

QST

June 1974
\$1.00

...ely to Amateur Radio



OFFICIAL JOURNAL OF THE ARRL



Thank you QST
for saying . . . the TS-900 . . .
"has to be the pace setter
for the '70s"

See product review in the July 1973 issue of QST or send to Henry Radio for a complete reprint.



KENWOOD'S TS-900

NOW THE PROMISE OF THE TRANSISTOR HAS BEEN FULFILLED. HERE IS THE TRANSCEIVER YOU WILL WANT TO OWN AND CAN AFFORD. FOR YEARS AMATEURS HAVE WAITED FOR THE NEW GENERATION GENERAL PURPOSE SSB TRANSCEIVER. NOW THE WAIT IS OVER. WHATEVER TRANSCEIVER YOU OWN GET READY TO TRADE.

FEATURES: Break-in CW with sidetone provided ★ Built-in 100 KHz and 25 KHz crystal oscillator ★ The receiver incremental tuning control can vary the receive frequency ± 2 KHz or more ★ RTTY — Built-in frequency shift circuit for FSK operation. The frequency shift is factory set at 850 Hz ★ Built-in noise blanker designed to reduce impulse type (ignition) noise ★ Built-in VOX circuit with adjustable VOX gain and delay ★ All major electronic circuits are built on modular (plug-in) circuit boards

SPECIFICATIONS: Frequency range: 80 meter band — 3.5 to 4.0 MHz; 40 meter band — 7.0 to 7.5 MHz; 20 meter band — 14.0 to 14.5 MHz; 15 meter band — 21.0 to 21.5 MHz; 10 meter band — 28.0 to 28.5 MHz, 28.5 to 29.0 MHz, 29.0 to 29.5 MHz, 29.5 to 30.0 MHz; WWV — 15.0 MHz (receive only) ★ MODE: SSB, CW, or FSK ★ **POWER OUTPUT:** 150 watts nominal into 50 ohms for FSK, 125 watts nominal into 50 ohms for CW, 50 watts nominal into 50 ohms for SSB, 125 watts nominal into 50 ohms for CW, 50 watts nominal into 50 ohms for FSK ★ **RF INPUT IMPEDANCE:** 50 ohms ★ **FREQUENCY STABILITY:** Within 10 Hz during any 15 minute period after warmup ★ **CARRIER SUPPRESSION:** Carrier better than 45 db down from output signal ★ **SIDEBAND SUPPRESSION:** Unwanted sideband better than 40 db down from output signal ★ **HARMONIC RADIATION:** Better than 40 db signal + noise/noise signal ★ **RECEIVER SENSITIVITY:** 0.5 microvolts for a 10 db signal (6 db down), 4.4 KHz bandwidth (60 db down), CW — 0.5 KHz bandwidth (6 db down), 4.4 KHz bandwidth (60 db down) (with optional CW filter installed) ★ **RECEIVER SELECTIVITY:** SSB and FSK — 2.2 KHz bandwidth (6 db down), 1.5 KHz bandwidth (60 db down) ★ **TUBE & SEMICONDUCTOR COMPLEMENT:** 3 tubes (6LQ6 x 2 and 6GK6), 3 IC's, 16 FET's, 57 transistors, 70 diodes ★ **SIZE:** 12.6" W x 5.5" H x 12.8" D

The TS-900, unquestionably the best transceiver of its kind ever offered.
PRICES: TS-900 . . . \$795.00, PS-900 (AC supply) . . . \$120.00, DS-900 (DC supply) . . . \$140.00, VFO (External VFO) . . . \$195.00
Also, Kenwood's TS-520 five band SSB & CW transceiver . . . a superb state receiver at \$629.00. If you prefer separate units, Kenwood's R-599A solid state receiver at \$439.00 and the T-599A transmitter at \$459.00 are the best available.

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BASSETT

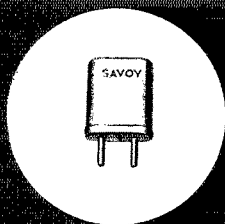
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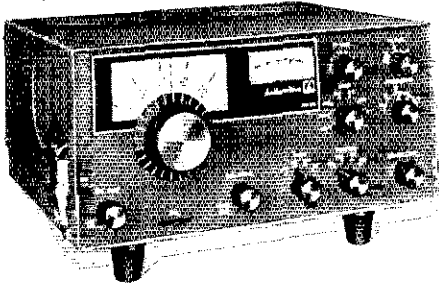
Savoy Electronics, Inc.

P.O. Box 5727 - Fort Lauderdale, Florida - 33310

Tel. 305-563-1333 or 305-947-9925



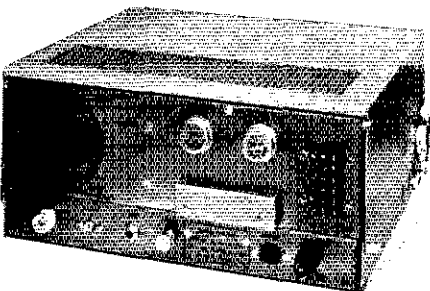
Hallicrafters' all-american made FPM-300, Mark II "Safari" SSB/CW transceiver is Q5... from the Mauritania solar eclipse expeditions to a famous raft adventure in the Atlantic.



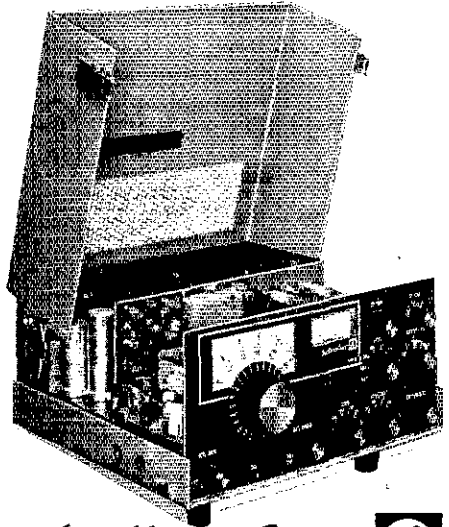
Proven design in the tradition of the HT-37 and solid-state dependability are combined in this compact transceiver featuring state-of-the-art FET's, hot carrier diodes and bi-polar transistors for peak, reliable performance for only \$625.

Some of the high performance specifications are:

- Designed for fixed, portable and mobile use
- Equipped with a self-contained Universal AC and DC power supply system
- Compact dimensions (HWD) 5½ x 12 x 11 inches
- Weight: 25 pounds
- Tuning ranges: 8-600 kHz Bands, 80-10 meters
- Built-in speaker
- Power requirements: 117 V or 234 V 50/60 AC; 13.4 VDC negative ground
- Modes: Selectable Upper or Lower Sideband-CW or RTTY
- Type of service: continuous operation with 2-tone SSB-CW-RTTY (50% duty cycle)
- Power Output: 125 Watts P.E.P. (Nominal) into 50 ohms
- Receiver Sensitivity: Less than 1 uV for 15 db SN Ratio
- Selectivity: 2.0 kHz
- Receiver IM: 60 db below 2 equal 10MV signals
- Receiver Image and IF Rejection: Greater than 60 db.



- Internal Receiver Spurious: Less than equivalent 1 Microvolt Signal
- Transmitter IM: 30 db below P.E.P. (26db below one of two equal tones)
- Adjacent Channel Desensitizing: 3 db with greater than 10,000 MV
- Sideband Suppression: -50 db minimum @ 1 kHz
- AF Power Output: 2 watts
- Stability: 100 Hz after warmup. Max. 100 with 10% line voltage change
- Frequency Readout: Within 1 kHz ± 100 kHz of Cal. Point not more than 3 kHz across entire 500 KC Band
- Break-In CW: Semi-Automatic
- CW Sidetone
- Audio Frequency Response: 500-2500 Hz Nominal
- AALC: 12 db Compression
- AGC Figure of Merit: 60 db minimum
- Crystal Calibrator: Provides 25 kHz Calibration Signals
- Optional Accessories: MR-300 Mobile Installation Kit; HA-60 Blower Fan Kit, works on AC or 12VDC



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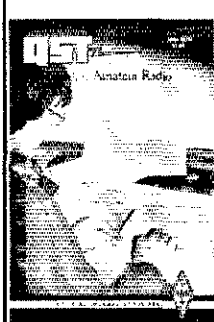
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OUR COVER

W1CER'S article on receiver design gets its graphic design on the QST layout table by Barbara Dirrigr. The story unfolds on page 23.

ADVANCED
AMATEUR
TECHNOLOGY from

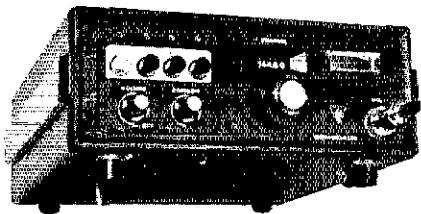


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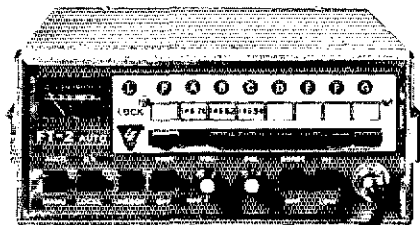
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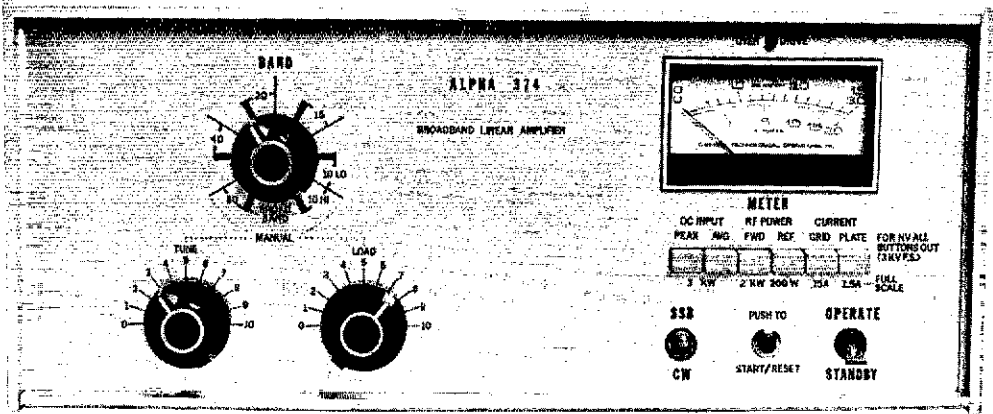
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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the S.C.M., the administrative ARRL official elected by members in each Section. Radio club reports are also desired by S.C.M.s for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licenses or higher may be appointed GRS, GVS, OPS, OO and OBS Technicians may be appointed GVS, OBS, or YHF PAM. S.C.M.s desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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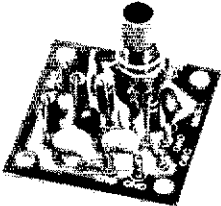
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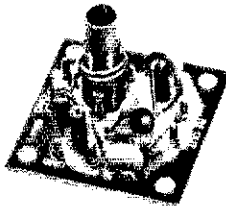
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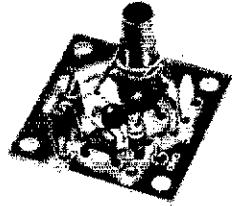
**1. MXX-1 TRANSISTOR
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A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**\$3.50**



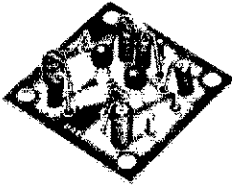
**2. SAX-1 TRANSISTOR
RF AMP**

A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output. Lo Kit 3 to 20 MHz, Hi Kit 20 to 170 MHz (Specify when ordering).....**\$3.50**



**3. PAX-1 TRANSISTOR
RF POWER AMP**

A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw, depending on the frequency and voltage. Amplifier can be amplitude modulated. Frequency 3,000 to 30,000 KHz.....**\$3.75**



**4. BAX-1 BROADBAND
AMP**

General purpose unit which may be used as a tuned or untuned amplifier in RF and audio applications 20 Hz to 150 MHz. Provides 6 to 30 db gain. Ideal for SWL. Experimenter or Amateur.....**\$3.75**



5. OX OSCILLATOR

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

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

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

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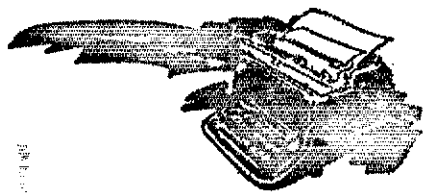
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"It Seems to Us..."



MORE RULES?

THE FEDERAL COMMUNICATIONS Commission has denied the request of ARRL — as well as a separate, independent petition from Amsat — for an additional extension of time in which to formulate comments on rules for an Amateur-satellite Service. FCC says it is "in receipt of a number of well prepared comments and other material which provide, by themselves, sufficient information to proceed to a Notice of Proposed Rule Making." And so it looks as though we may get another addition of paragraph after paragraph of new rules in an already overburdened Part 97.

Because a satellite is inherently an international activity (it is rather difficult to achieve any U.S.-only orbits!), the League promptly informed each of the member societies of the International Amateur Radio Union about the initial FCC inquiry, and solicited their comments. While only a few have responded so far, the consistent theme urges minimal regulation. For examples, Australia says, "special regulations . . . should not be promulgated." Sweden pleads for "as few detailed limits as possible," and bluntly adds, "anything else is unnecessary bureaucracy." Germany suggests avoidance of "every not absolutely necessary regimentation." (See "Haps" this month for details.)

The Commission originally said in its Notice of Inquiry, "The experience of amateurs with six satellites over a twelve year period should provide adequate insight for developing rules." In our view, the existence of only six satellites in twelve years points, instead, to the desirability of keeping things on a flexible (waiver, if and when necessary) basis as before. To us it points up the illogic in preparing rules, at least other than nominal, to apply to an event which occurs once every two years.

Oh, someone says, but the newer satellites are in orbit a year or two, and need some rules for operational guidance during their lifetimes. For telecommand control, maybe? But control can't be exercised solely

by FCC licensees; amateur stations not under U.S. jurisdiction must also be involved. In fact, 90% of Oscar 6 control has been by VE, D, VK and ZL stations. So established cooperation, not more rules, is the necessary ingredient here.

Yes indeed, this matter is substantially one of international effect. Well over half of Oscar 6 users are located outside U.S./FCC legal jurisdiction. If amateur satellite progress is not to be stifled, their views are most desirable. That is the principal reason the League asked for more time in which to gather additional information.

There is encouragement, however, for those who support minimal regulatory texts: Germany (DARC) condemns the ITU's 1971 establishment of a *separate* Amateur-satellite Service and says its administration at the next conference wants to put us all back together, whether terrestrial or space, under the same common rules. So eventually there may be no As-S to regulate separately.

Regulations promulgated by the Commission for amateur repeaters two years ago were excessive in coverage and overly restrictive in substance. It has required well over a year to recognize and correct those misjudgements, and some necessary additional remedies are still in process. Our concern is that the lesson is lost, that history may repeat itself in the satellite matter and cause another regulatory setback — this time to space enthusiasts in the Amateur Radio Service.

Put another way, in its inquiry the Commission asked many questions about possible requirements for classes of license permitted to use satellites, technical standards, new material for amateur exams, and other such details. It failed to ask a more basic question: do we really need any additional regulations at all? QST

League Lines . . .

With the receipt of the 44th "Aye" ballot in late April, ARRL Vice President Noel B. Eaton, VE3CI, was formally elected president of the International Amateur Radio Union -- the seventh since the Union was organized at Paris 49 years ago.

"The FCC giveth and the FCC taketh away:" In early April the Commission issued an Order assigning a number of bands above 40 GHz for amateur use effective April 16. They are 48-50, 71-84, 152-170, 200-220, 240-250 and all above 275 GHz. Don't plan too far ahead, however, because (as May League Lines reported) FCC was already (in March) proposing changes which would make the bands 48-50, 71-76, 165-170, 240-250 and all above 300.

The Goldwater Bill, SJ Res. 197, to provide for National Amateur Radio Week June 17-23, 1974, has cleared the Senate and at press time was awaiting action by the House Judiciary Committee. See "Happenings" for more detail.

The ARRL Foundation is now accepting contributions of all sizes in support of its programs. WA7LRU/W6UF and W6APW have offered to match, dollar-for-dollar up to \$25,000, donations to the Foundation earmarked for use in the amateur satellite program. These funds are urgently needed to support the construction of the next satellite in the Oscar series. Contributions to the ARRL Foundation are tax deductible under Section 170 of the Internal Revenue Code. Anyone wishing to make a contribution in support of any Foundation program should send it to the ARRL Foundation, Inc., 225 Main St., Newington, CT 06111. Be sure to indicate that the contribution is for the amateur satellite matching fund program, if this is your desire.

Planning for the Sweepstakes in November? Rules changes initiated by the Contest Advisory Committee include choosing the first and third weekends of the month (one free in between); only completed contacts count (no more "one-way"); and separate awards for low-power entrants when there is enough competition.

A lot of dust was raised in some ham circles about a "Chopper One" TV episode involving an amateur, with strong recommendations from one news sheet to write ABC in protest (even before anyone saw it!). We caught the show on a re-run, thought it presented ham radio in a most sympathetic and positive light! More important, a number of our non-amateur friends had the same favorable reaction.

Canada and Honduras have completed an agreement for reciprocal operating privileges. At press time Fred Laun, W9SZR/LU5HFI was reported making good progress in recovering from wounds inflicted by his kidnappers in Argentina (see "IARU News," page 76). Our thanks to WB4KNW of the State Department Medical Division for keeping us informed of developments in the tense days immediately following the incident.

The Republic of Viet Nam has announced that it has no objection to communications between stations XV5AA and XV5AB and amateur stations in other countries. These stations join XV5AC on the "okay to work" list for amateurs. This news was transmitted first on the regularly-scheduled W1AW Official Bulletins, which continues to be your best and most authoritative source of late-breaking news.

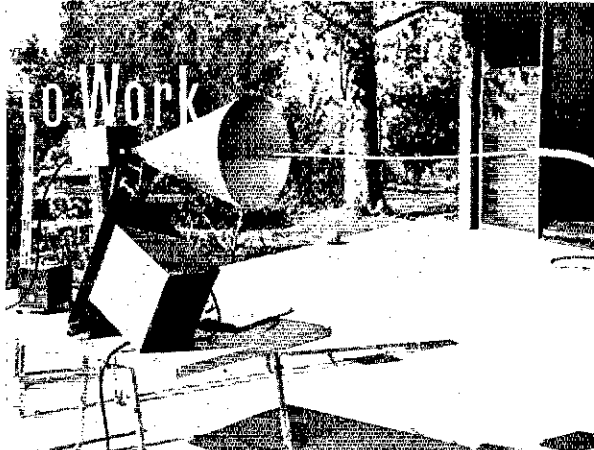
The ARRL W4/K4 QSL Bureau has moved from Huntsville, Alabama, to greater Washington. New address: National Capitol DX Association, P. O. Box DX, Boyce, VA 22620. (The WA4-WB4-WN4 bureau remains with J. R. Baker, W4LR, P. O. Box 1989, Melbourne, FL 32901.) Hearty thanks for past service to the Northern Alabama DX Club; welcome aboard to NCDXA!

We ought to mention more often that QST is available on microfilm, to members/subscribers only, at (momentarily) \$9.10 per volume of 12 issues (but likely to be \$10 shortly). Address University Microfilms, 300 N. Zeeb Road, Ann Arbor, MI 48106.

It seems there's no place amateur radio is immune to confusion with CB, no matter how visible we are. An article in the Dayton "News" reporting on K7UGA's speech at the Dayton Hamvention in which he lambasted illegal CB activity was headlined: "Amateur Radio Abuses Cited by Goldwater Here"!

Putting the **G** Line to Work

For a number of years, some amateurs interested in vhf and uhf have been curious about the use of G line. This single-wire transmission line (named after Goubau) has some interesting and unique properties, not the least of which is very low loss at uhf and lower parts of the microwave spectrum. Most experimenters were scared off by a lack of understanding of some of the drawbacks to the line. Here is a report by one (K6LK) who was not afraid to take the collectors by the horns and check out the operation.



A section of G line set up for measuring the loss incurred from bending and dielectric loading on the inside of the curve.

BY GEORGE A. HATHERELL,* K6LK

THE G LINE was developed in 1950 by Goubau¹ and a practical line was constructed by this writer to test the theoretical concept. Fig. 1 shows the line and the match between theory and practice.

The system consists of a coaxial feed to a launcher, an unshielded single-wire transmission line, and a collector which feeds again into a coaxial line or to a load. When the mathematics is boiled from the concept, it appears somewhat as follows: A coaxial line supports an rf wave traveling in the dielectric between the inner conductor and the shield. This wave has both H (magnetic) and E (electrostatic) components just as does the wave radiated from an antenna. Goubau determined mathematically that a proper launcher would strip most of the E field from the wave and convert it to a form which contained the H component and a remaining trace of the E field as it traveled along a single conductor. There would be practically no radiation as the E component would be substantially absent. Calculation also showed Goubau several other things. There must be a dielectric surrounding the conductor as otherwise the field becomes unmanageable. A small conductor needs a heavy dielectric sleeve. As wire diameter increases, the dielectric thickness may be decreased. Also, the efficiency of the field which it intercepts.

It has been difficult to find anyone who has worked with the line, and yet many amateurs have heard of it. W6HFR remembers seeing installations in the mid 1950s with runs from a launcher to a collector at the base of a tower, then a short coax

line from the first collector to a second launcher which fed the power vertically to the top of a tower. There, a second collector fed an antenna. W6DRV did some work on the line at Northrop Aircraft some years ago but does not remember any of the details. W6QV used a 1500-foot G line for communications during the construction of the Colorado River aqueduct. The system used a 4-foot by 4-foot cone launcher and collector. This line fed signals to and from the top of a steep hill to maintain radio contact with a distant station. No audio line could be cleared of noise for the run, but the G line worked well on a frequency near 150 MHz. Use of the line is mentioned in the ARRL *VHF Manual* (First Edition), and was tried on 432 MHz with the television-kit G line then available. The loss was 2.7 dB for 100 feet of line.

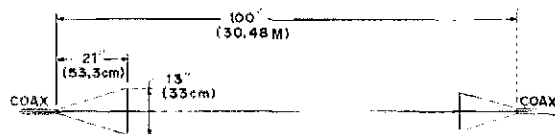


Fig. 1 - A sketch of one of the tests setup to evaluate the performance of G line at 1296 MHz. Later tests by K6LK employed a shorter length of line.

If the line is so good, why isn't it being used? There are several reasons. The line has to be fairly straight or the losses mount. It must be kept clear of metallic objects. In recent years coaxial cable has been developed with very low loss. Such cable,

* 10160 Maude Ave., Sunland, CA 91040.

¹ Goubau, *Proceedings of the IRE*, 39, 619-624 (1951); *Journal of Applied Physics*, 21, 1119-1128 (1950).

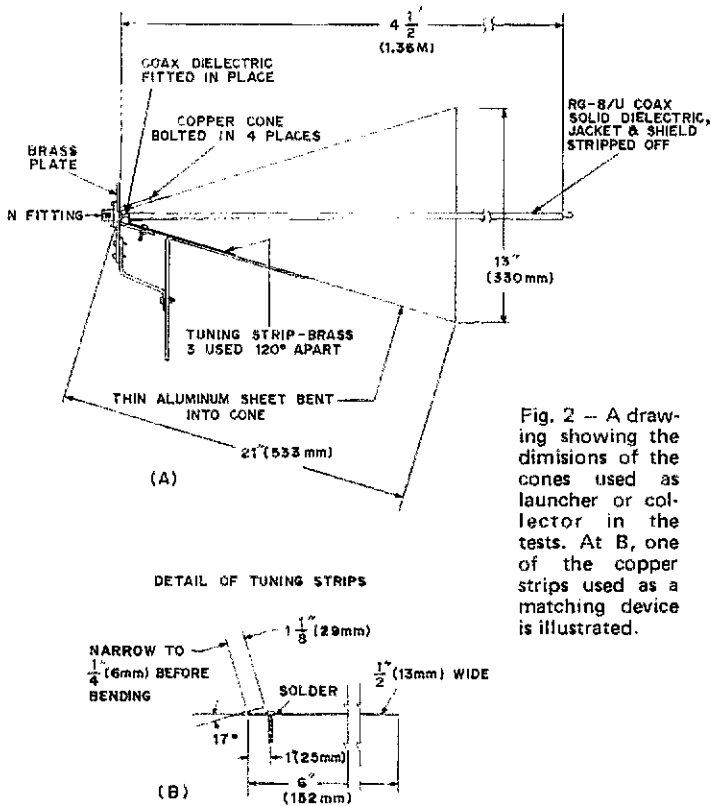


Fig. 2 — A drawing showing the dimensions of the cones used as launcher or collector in the tests. At B, one of the copper strips used as a matching device is illustrated.

A Bird No. 43 Thru-line wattmeter was coupled directly into the launcher. The 100 feet of line under test was supported by monofilament nylon fishing-line slings which were attached to four wooden frames and spaced evenly along the line. Two stretched ropes ran the 100 feet at the corners of the top horizontal frame members. This allowed additional slings to support the line from the ropes between the wood frames. The collector was clamped to the last frame and fed directly into a second wattmeter. The second wattmeter is home-made from a microwave directional coupler and is calibrated against the Bird 3.² Output from the second wattmeter is fed through 5 feet of coax line into a Philco 160B-300 terminating load.

The first launch and collector horns were built approximately to the dimensions of the Goubau original experiment (Fig. 2). The horns are made of 30-gauge aluminum sheet. Since this does not accept solder readily, copper

however, is very expensive and is usually pressurized with dry nitrogen. Very definitely it does not fit into the average ham budget.

The G line has been under test at this location for the past two months. My dish for 1296 MHz is forty feet from the shack and I am not eager to invest in jewelry-priced coax and rent tanks of pressurized dry nitrogen. In addition, I want to run field-pattern tests which will take 87 feet of line from the shack to the radiators. Eventually, the final amplifier will be mounted at the focus of the parabola, but if all goes well with the G line the driver stage will be in the shack..

Initial Tests

The original test setup here used a 100-foot line starting with a launcher at the edge of the roof outside the shack. The launcher was fed by a 12-foot length of high quality RG-8/U foam coax.

cones were formed around the small ends and bolted to the aluminum cones. Brass plates were soldered to the apex of the cones at right angles to the axis. The type-N flanged chassis fittings were bolted to the plates for easy assembly after the line conductor was soldered into the fitting.

During the first series of tests there was a little trouble with reflections back into the coax at the launcher. This problem was solved later. Forward power was set at, or close to, 10 watts on all tests. Tests at higher and lower power indicated slightly higher efficiency at the higher power, for some unexplained reason.

Test results at 1296 MHz:

100 feet No. 12 enamel coated wire	loss 3.87 dB
100 feet No. 12 enamel coated wire sleeved with Teflon	loss 2.53 dB
100 feet No. 12 plastic-insulated house wire (white)	loss 3.62 dB
100 feet No. 12 plastic-insulated house wire (black)	loss 3.87 dB

²Care must be taken in calibrating a bidirectional coupler for use as a wattmeter. There is always insertion loss. Calibrate power in and power out separately. To measure power out at the collector, use the POWER IN calibration. The difference can be quite surprising in close work.

A launcher. . . .

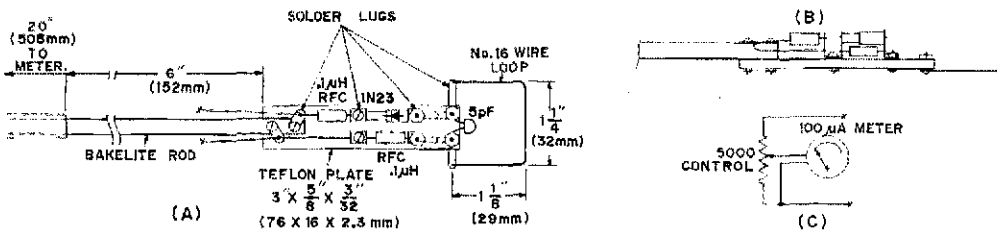
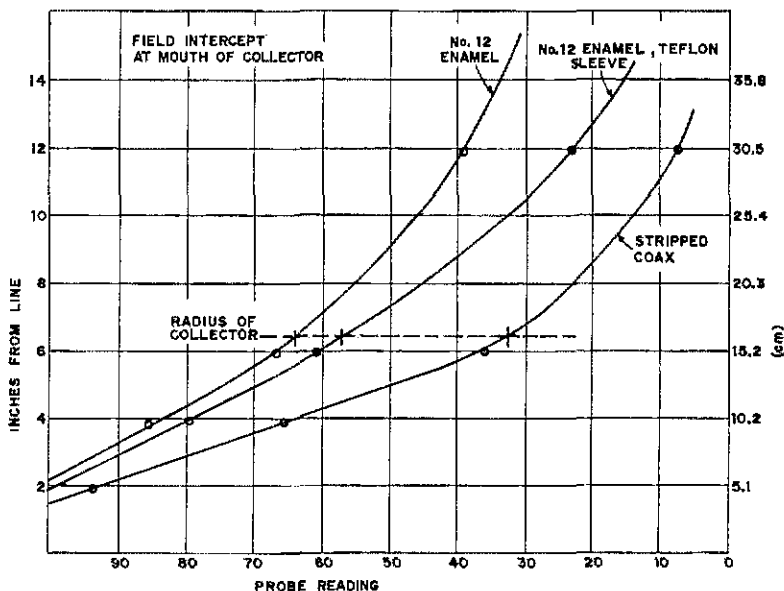


Fig. 3 - The author assembled a sensitive rf probe to investigate the rf field surrounding the transmission line. -

Fig. 4 - Some representative readings taken near the line, showing the effect that dielectric material has on field intensity.



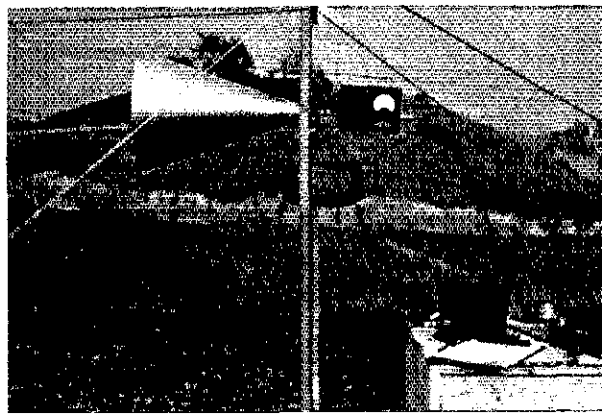
Theoretical development of the G line indicated that efficiency of power transfer is dependent on the proportion of the H field that can be intercepted by the face opening of the collector. Field strength near the conductor is dependent on the thickness and type of dielectric surrounding the wire. A special probe was constructed to take field strength readings along the lines (Fig. 3). The same probe was used to make standing wave tests along the lines. The jacket and shield were stripped from 8 feet of RG-8/U. This section was substituted for the last 8 feet of line into the collector. Field-strength readings were taken on sections of lines consisting of the stripped RG-8/U, Teflon sleeved No. 12 enamel-coated wire and the original No. 12 enamel-coated wire. The results are shown in Fig. 4. Here the probe read 63 at the collector radius of 6-1/2 inches for the enamel coated wire and read only 27 at the same radius from the stripped RG-8/U coax. The power interception by the collector should be very greatly increased with a

shift from the light-dielectric wire covering to the stripped coax, and so it is.

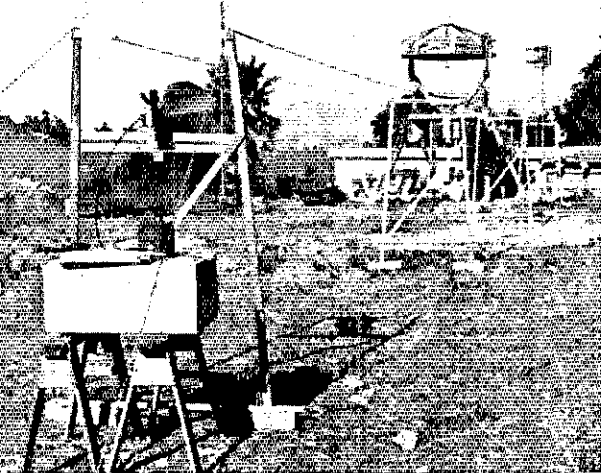
100 feet of line (92 feet Teflon sleeved No. 12 enameled wire plus 8 feet of stripped RG-8/U into collector) loss = 1.67 dB

Standing waves on the G line are a serious problem. Fortunately they are easily removed - at 1296 MHz anyway. Using the slotted-line formula for standing waves: SWR = max/min (which is probably not too accurate in a technical sense for this line), a typical group of SWR readings is:

- 1 inch from line = 1.05:1
- 2 inches from line = 1.08:1
- 6 inches from line = 1.08:1



... and a collector



The transmission line was suspended from ropes, supported by wooden frames along the 100-foot span.

On a coax feed to an antenna this would be akin to perfection, but tests showed that it is a serious problem on the G line. It is also to be noted that these readings always showed an increase in magnitude as distance from the line was increased. The cause is probably twofold: the field is distorted by the probe being close to the line, and the magnetic field forms a pattern with the nodes on the line acting as radiating points. A collector mismatch is easily made, compared to which the above figures look good.

Separating the Losses

If all lines were 100 feet long, we wouldn't care how much of the loss takes place along the line and how much appears at the launcher and collector. The launcher and collector loss is substantially constant. If this is known, we can predict the loss in a line of any length. To separate the losses into line and terminal values, the testing was moved to a patio where 75 feet of clear area was available. A 75-foot guy wire was stretched tightly 7 feet above ground. The lines under test were suspended by monofilament fishing line, half way between the guy wire and ground. The combined launcher and collector loss was determined as follows: A piece of RG-8/U, 18.3 feet long, was stripped of jacket and shield, then mounted from N fitting to N

fitting between launcher and collector. The results: 10 watts input, 8.75 watts to load, loss 0.58 dB

The line was opened near the middle and 50 feet of stripped RG-8/U coax inserted:
 10-1/2 watts input, 7.5 watts to load = loss 1.46 dB
 loss in 50 feet of stripped coax, $1.46 - 0.58 = .88$ dB
 loss in 100 feet of stripped coax = 1.76 dB
 loss in 18.3 feet of stripped coax,

$$18.3/100 \times 1.76 = 0.32 \text{ dB}$$

loss in launcher plus collector $0.58 - 0.32 = 0.26$ dB

All indications are that this loss is not divided evenly between the launcher and collector. There is freedom in the design of the launcher as long as it will load without having reflections back into the feed coax. There is no such freedom in the collector, or at least I did not find it.

The calculated loss for a 100-foot system using the stripped coax line works out to 2.02 dB. The stripped coax thus shows its value as a feed from the launcher and into the collector, but power losses in the dielectric overcome any advantages derivable from a restricted field.

A standard launch and collector system was next constructed with a 4-1/2-foot length of stripped RG-8/U which was mounted into the N fitting at the apex of each cone and brought out for connection to the lines under test. The 9 feet of stripped RG-8/U plus the launcher/collector gave a total of 0.4 dB constant loss.

A check was made with the standard launcher/collector system using the 4-1/2-foot RG-8/U stubs compared to the original 100-foot-system test using the 8 feet of stripped RG-8/U into the collector.

Fifty feet of Teflon-sleeved No. 12 enameled wire was inserted between the launcher and collector. The measured loss was 1.03 dB. For a 100-foot system this calculated to a loss of 1.56 dB. The original line with the stripped RG-8/U into the collector, but not in the launcher, showed a measured loss of 1.67 dB.

Before considering bends in the line and the losses incurred, two features of a G-line system deserve comment:

Putting sections in and taking them out between launcher and collector could have been a major nuisance if making the joints had turned out

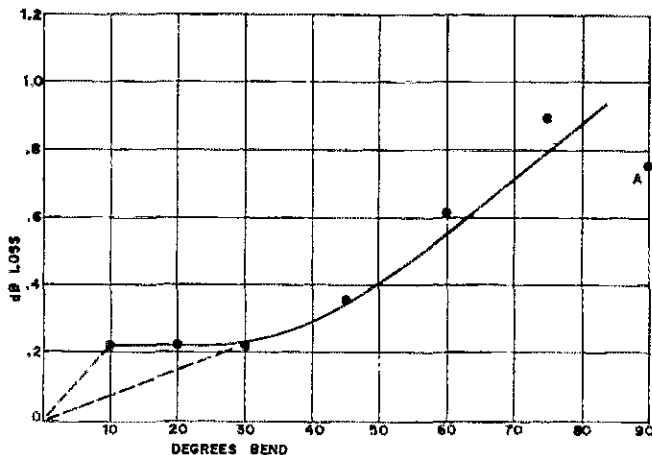


Fig. 5 — Line loss versus angle of bend. The radius was maintained at 5 feet for this test.

to be critical. When using coax at 1296 MHz there is the constant worry about reflections and losses in the connectors. There is no such problem working with the G line as it seems to be insensitive to discontinuities in the dielectric or to the type of joints used. At first the strands of the center conductor were fanned out and laid along the solid No. 12 wire and soldered. Dielectric was fitted carefully around the joints. For tests, small open-hook loops were bent into the ends of the stripped coax and used for connection (without solder). The joints were covered with dielectric in some cases and left bare in others. It made no difference in the performance of the line. A 4-inch section of Teflon-sleeved No. 12 enamel wire was put into the same spot. Again the output remained constant. Whether the joints were covered with dielectric or remained bare, did not disturb the function of the line. With 10 watts in the line it is not even necessary to solder for tests of short duration.

The second feature has to do with tuning the launcher and collector. It may be possible to construct horns that will match to 50-ohm lines in and out - this didn't happen here. Possibly irregularities in the fit between the main horn and the copper shell figured in the mismatch. It is possible that the N fittings used at the apex of the horns are not the most desirable hardware for feeding and collecting power at these points. A tight metal fit right to the coax shield might be better. This would allow for a better strain relief when the line is pulled tight. However, tuning was found to be very uncomplicated. A sharp V is bent on the end of a 1/2-inch wide brass strip which is placed inside the cones. It will effect a match if adjusted properly near the apex, (Fig. 2). At the launcher, it is only necessary to watch the wattmeter and adjust for zero reflected power. At the collector, the strip is adjusted for maximum output. (There is never any reflection back into the collector if the load matches the collector coax.) At maximum output a probe will show very low standing waves on the line, or none at all.



K6BV gave the author a hand in making field-strength checks.

Bending the Line

How can we put bends in the G line? It would be ideal if we could put a simple launcher at the transmitter and use G line all the way to the antenna. Only 5 or 6 inches of clearance is needed with RG-8/U stripped line.

Two series of tests were made with the stripped RG-8/U coax. During the first series the radius was held at approximately five feet and I slowly changed the bend from 0° to 90°, (Fig. 5). In the second series I held the angle between input and output at 90° and changed the radius of the bend from 2 to 60 inches, Fig. 6. Unfortunately the results are indicative only. The stripped coax has to be suspended clear of other objects and the process of approximating the curvature is akin to orienting a length of wet spaghetti. Two hours were spent on point "A" which shows in both Fig. 5 and 6. This is a 5-foot radius with 90° between input and output. It may be considered quite accurate. The other points determined in Fig. 6 are reasonably accurate. Not until after the points were plotted did it become apparent that a real effort should

(Continued on page 152)

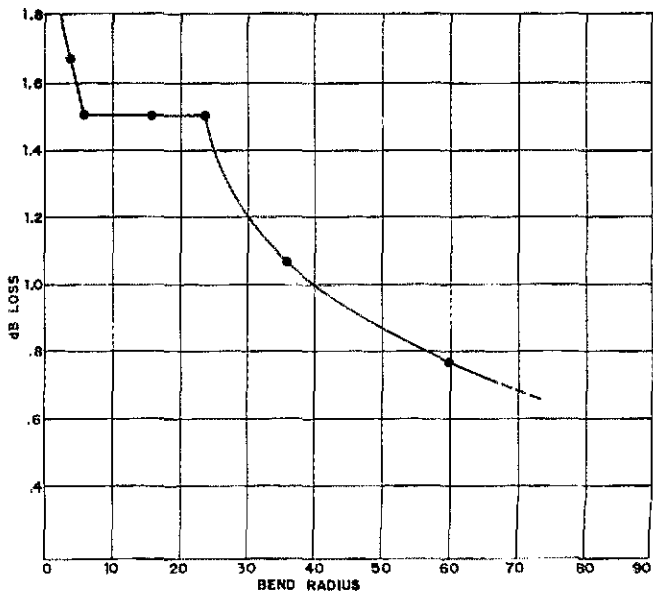
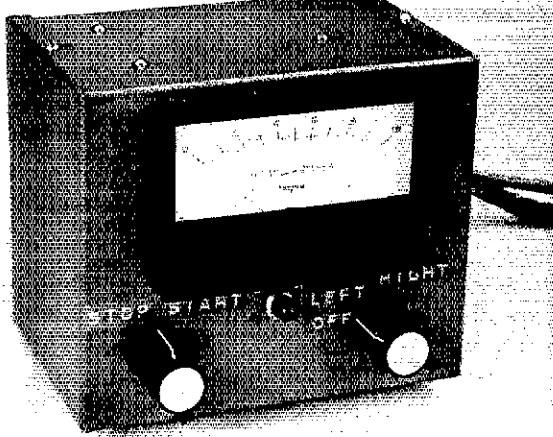


Fig. 6 - Loss incurred when the angle of the bend is held at 90° and the radius is varied.



A Directional Indicator for the Hy-Gain Model 400 Rotor

BY ROBERT M. MYERS,* W1FBY

THE HY-GAIN rotator system is a heavy-duty rotational device which can be used to turn large arrays. The control box is designed to have a direction dialed on the front-panel compass face and when power is applied to the unit, the rotator will turn the antenna to the designated heading and then shut off automatically. While the automatic feature is handy for casual operating, the dedicated DXer or contester might like to have an indication of the antenna (or rotator) position during the turning period. The control system described below was designed to be used in place of the Hy-Gain control unit, and with the exception of the motor capacitor, no parts from the original control box are used. The rectifying components which power the rotator brake are located in the rotator as provided by the manufacturer. If a component fails the rotator must be removed from the tower for repairs. For this reason, two extra conductors were added to the existing control cable and the brake power components were placed in the control box.

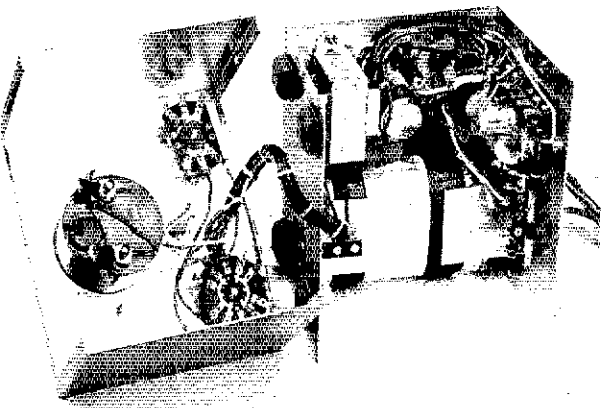
The modification of the rotator is best done in the workshop. These modifications can be performed while standing on the tower with the mechanism mounted in position, but it is much more difficult.

* Asst. Technical Editor, *QST*.

The first step is to remove the two diodes, the electrolytic capacitor, and the 10-ohm resistor from the motor housing. The terminal strip is set up for five screw positions. Originally the two diodes were connected to a sixth terminal which will be used for the brake control. A seventh wire will be required for the indicator system. Connect this wire to the *unused* terminal of the potentiometer and route it out through the rubber bushing. It then may be spliced into the rotator control cable which has been modified for seven conductors. The two new wires do not handle much current and therefore need not be greater than No. 18 for runs up to 250 or 300 feet. This completes the modification of the rotator motor assembly.

The construction of a control box is the most difficult portion of the project. For the model shown in the photographs, a Minibox, sized to house the meter and control knobs, was used. The overall dimensions of the housing will be determined by the size of the meter frame. For calibration purposes, a large meter-face area is desirable.

The Hy-Gain 400 rotator is designed to have about 30 degrees of rotational overlap. Unfortunately there are no end-of-rotation limit switches provided, and it is possible to turn the motor around several times in the same direction. Needless to say, the coaxial feed line will not withstand this kind of treatment. In order to keep



Inside view of the rotator control box. The meter and two switches are located on one half of the housing. A long cable is used to connect the switches and meter to the other half of the container.

the control circuitry simple, it was decided to use two switches, one for turning on the power to the system, and one for determining the direction of rotation. The ROTATE switch needs to be spring-loaded for the OFF position. The purpose is to assure that the operator keeps his mind on what he is doing while the antenna is rotating. The spring loading acts as a "dead-man" switch - one cannot go away and leave it turned on.

The circuit for the control box is given in Fig. 1. A conventional low-current (less than one ampere at 6.3 V) transformer is used to provide a regulated 8.2 volts dc to drive the indicator circuit. The value of the voltage is not critical, and any voltage from about six to as high as ten will suffice. Regulation is desirable to assure the calibration won't change under different line-voltage conditions. R1 is a linear-taper, two-watt composition control. The meter is a Simpson Electric model 523. The internal resistance is 43 ohms.

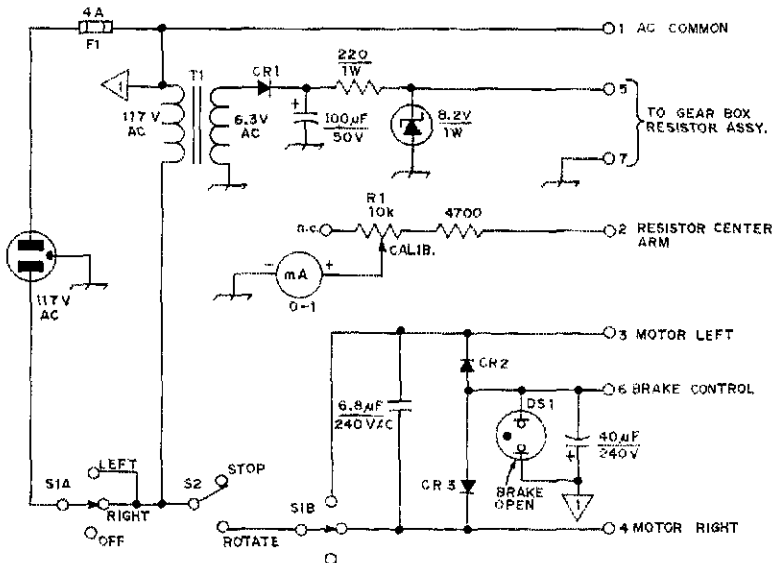
Control of the brake at the rotator is provided by the 120 volts of dc developed by CR2 or CR3 in the control box. The voltage appears at terminal six each time voltage is applied to the rotator motor. A small pilot lamp is included to assure the operator that the brake-release mechanism is receiving power.

The potentiometer in the rotator housing is gear driven to allow the antenna to turn approximately 380 degrees while the resistor turns through only about 270 degrees. The easiest way

to calibrate the overall system is to turn the rotator motor until the potentiometer is at midposition of its travel. This can be determined with an ohmmeter by observing the resistance between control wires two and seven. Since the value of the potentiometer is approximately 5000 ohms, an ohmmeter reading of 2500 will indicate correct positioning. Next, the rotator should be installed and the antenna pointed so that its heading is correct for the center heading given by the indicator. Then the antenna should be rotated 180 degrees as noted by visual inspection of it. Do not use the control box for the indication. After the antenna has been rotated 180 degrees, the indicator may be labeled for the correct position. Rotate the antenna 360 degrees in the opposite direction, again observing the antenna (not the control box). When the array is at the correct heading, the control-box indicator may be marked accordingly. With the system shown in the photographs, the center was set for north. South appears on the meter at 15 and 85 percent of full-scale deflection.

Operation of the new control box is simple. The operator should first select the direction he wants to turn the antenna, then select the ROTATE position of S2. Since the indicator provides continuous indication of the antenna heading, one can observe the bearing even when the antenna is not rotating. Selecting the OFF position of S1 completely disables the rotator control box.

Fig. 1 - Circuit diagram for the rotator control box. The 6.8- μ F, 240-V ac capacitor is taken from the original Hy Gain control box. CR1, CR2, and CR3 are conventional power diodes, 1000 PRV at 1 A. T1 is rated for one ampere. R1 is a linear-taper composition two-watt control. S2 is a spring-return type of rotary switch.



Learning to Work

Part III

with Semiconductors

BY DOUG DE MAW,* WICER AND
LEW MCCOY,** W1ICP

THERE ARE many kinds of oscillator circuits, and all of them can be used with tubes, FETs, or bipolar transistors. One of the most popular varieties of oscillator used in solid-state work is the Colpitts. The reason for the popularity of the circuit is because it is very stable if designed properly. It uses relatively large amounts of capacitance in the feedback network, and the frequency stability is enhanced because of this high value of C . The junctions of bipolar transistors are capacitors of sorts. With various values of collector, emitter and base voltages specific amounts of internal capacitance exist across the *base-emitter* and *collector-base* junctions. The amount of capacitance is dependent upon the applied voltages and the transistor type. Some transistors exhibit more or less capacitance than others, depending upon how they are built. When a transistor is operating as an oscillator or amplifier, the amount of capacitance across the junctions changes as the sine wave goes through its excursion (positive through negative periods). The effect is similar to that of varying the *dc* operating voltages on the transistor. Another factor which affects the junction capacitance is the *temperature* of the device. The foregoing characteristics suggest, therefore, that large amounts of shunt capacitance (external) be employed in variable-frequency oscillators (VFOs). The larger the amount of capacitance used, the greater the shunting effect, which tends to mask any changes in junction capacitance. The benefit is seen as improved frequency stability (reduced drift).

Fig. 8 shows a basic Colpitts *L-C* oscillator. We will talk about some basic rules for making it work to serve our needs in a proper manner. Although the "recipe" given is by no means a precise one with respect to the customary design techniques, it does offer the layman a practical set of guidelines for amateur radio circuit development.

Some Practical Considerations

It is possible to use either an npn or pnp transistor for oscillator work, just as it is for most other circuit applications. The rules given for biasing and power-supply polarity (Part II) should be observed in designing an oscillator. The small-signal beta (h_{FE}) should be fairly high — 100 or more. This will help to assure oscillation even though we will be using large values of tuned-

* QST Technical Editor.

** Beginner and Novice Editor.

In Part II of this series we learned some rules of thumb for designing and adjusting Class-A audio amplifiers which use bipolar transistors. This installment treats some basic ground rules for designing and using tunable oscillators of the L-C variety. We shall be working with more rules of thumb as we develop a local oscillator for the 80-meter receiver which is to be the workshop product of this course. The grass-roots approaches given in this part are applicable also to VFO designs for use with transmitters. Part IV will deal with a mixer design which utilizes a junction FET.

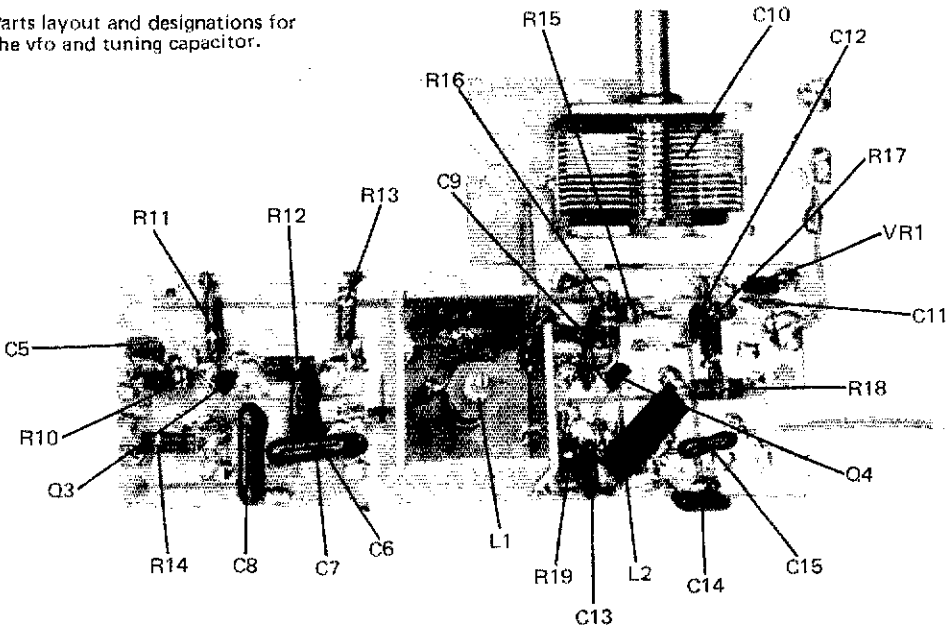
circuit capacitance and low operating voltages. Similarly, the upper-frequency rating (f_T) of the transistor should be high — five times or more the operating frequency of the oscillator. Most transistors can be made to oscillate at or slightly above their rated f_T , but to assure good oscillator efficiency and starting capability the f_T should be well above the *highest* operating frequency.

As was true in our selection of audio transistors, we must observe the maximum voltage and current ratings in accordance with our operating levels. Remember to use a transistor with a V_{CE} rating of at least two times the supply voltage, and an I_C maximum of at least twice the anticipated current taken by the transistor. It is unlikely that the amateur will observe any difference in circuit performance when using plastic or metal type transistors.

Oscillator Stability

There are a number of factors which relate to the electrical stability of a solid-state oscillator, so it is best that we treat them one by one. Of greatest significance is the relative quality of the components committed to the *frequency-determining* part of the circuit (coil and capacitors). Ordinary disk or paper capacitors are unsuitable in VFOs. Dipped silver-mica capacitors (C6 through C9, inclusive, Fig. 9) are usually stable enough for amateur work, although they have an

Parts layout and designations for the vfo and tuning capacitor.



unpredictable drift characteristic, and no two silver-mica capacitors from a production run seem to exhibit the same drift traits. Some change in a positive manner, and others move in a negative direction. Under normal environmental conditions, however, the amount of change is seldom great enough to cause a problem once the VFO has stabilized. Some "purists" prefer to use NPO (zero temperature coefficient) capacitors in place of silver-mica units (Erie type COGO or equivalent), though the cost per unit is considerably higher.

Solid-state VFOs are prone to frequency changes with shifts in supply voltage. Therefore, it is highly recommended that some means of voltage regulation be applied to the VFO power source. The least expensive method for assuring stability of this kind is to use a *Zener-diode regulator* in the dc supply line to the VFO. Zener diodes operate in a fashion similar to gaseous regulator tubes of the VR-105 and VR-150 species. The diodes are designed to conduct at some specific voltage level, and draw a reasonably high amount of current at that voltage plateau . . . approximately 20 mA for a 9.1-volt, 1-watt Zener diode. The current taken by the diode shifts up and down slightly with small variations in supply voltage to it across a series dropping resistor. This action tends to hold the regulator output voltage constant. In a similar manner, small changes in current on the regulator-output side of the diode are masked by the larger current being taken by the diode.

One should never attempt to extract power from a VFO if stability is a design goal. The oscillator should run at *as low a level as possible*, and power should be obtained through the use of amplifiers which *follow* the VFO. Designers of VFOs should strive to keep the base and collector

voltages as low as is consistent with good oscillator activity and output level. The higher the operating voltages, the greater the junction temperature of the transistor, and therefore the poorer the stability. High rf-voltage levels in the oscillator tank cause high rf currents to flow in the coil and capacitors. The higher the rf current, the greater the heating, and the more degraded the stability will be. The writers never call upon the VFO to run at more than *50 mW of dc input power* (emitter current $\times V_{CE}$). A well-designed Class A VFO will deliver approximately 30 mW of output at that input level (60-percent efficiency).

Selecting a VFO Coil

A transistorized receiver is less subject to oscillator-drift problems than is a tube-circuit equivalent. This is because the tube receiver generates considerable heat as the tubes reach a stabilized operating temperature, and the chassis undergoes a gradual change in temperature at the same time. The ambient temperature changes markedly from a cold start to full warmup, and the VFO components expand as the heat increases. With expansion, the component values change, causing a shift in oscillator frequency.

Although such a drastic start-to-warm-up temperature excursion is seldom seen in a solid-state receiver, the ambient temperature can shift sufficiently to cause changes in parts values. The camper or mobile operator is aware of the probability of frequent environmental temperature changes. It is because of the foregoing that temperature-stable capacitors are mandatory when designing a stable VFO. The *coil* chosen for the circuit must be as temperature-stable as possible too!

Air-wound coils are affected the least by changes in temperature. Unfortunately, most air-wound coils (Miniductors) are too bulky to be practical in solid-state circuits, unless the builder is willing to trade compactness for enormity of equipment size. Our second choice, is, then, to wind the coil on a temperature-stable coil form of practical size. In the interest of maximum stability one should avoid using coil forms which include ferrite or powdered-iron cores. Such core material will expand or contract with changes in temperature, bringing about a change in oscillator frequency. Similarly, iron- or ferrite-core toroidal-wound inductors should be avoided in VFO circuits. The possible exception to these rules is when the receiver is to be used in a controlled environment, such as the ham shack with its reasonably constant year-round temperature.

The writers prefer to use ceramic coil forms when winding VFO inductors. It is convenient to use a ceramic slug-tuned form as the coil foundation, after removing and discarding the core slug. The coil turns should be wound as tightly as possible on the form, then cemented in place by means of a good grade of coil dope. It is recommended that the completed coil be housed in a metal shield when it is mounted in the VFO assembly. The clearance between the coil and the shield should be one coil diameter or more to assure minimum degradation of the quality factor (Q) of the inductor. Coil shielding serves a host of purposes. It reduces detuning effects from nearby objects, helps prevent the coil from inducing unwanted currents into nearby components, and serves to prevent unwanted energy (originating in other tuned circuits) from affecting the VFO performance. It should be noted that *iron* shields *increase* the coil inductance, while *aluminum* shields *decrease* the inductance. Because of this effect it may be necessary to add or subtract a turn or two from the coil when final adjustment of a VFO is undertaken.

If coils with slugs are used, the builder should make certain that the core material is designed for the frequency of operation. *Beware of surplus coil*

forms! Some have core material designed for frequencies *below* the ham bands. Cores of that kind can destroy the Q of a coil, and will in turn prevent the oscillator from operating correctly.

A Design Method

The notations in Fig. 8 will provide a practical basis for designing VFOs which can be used between 1.5 and 30 MHz. It will be seen that the business of building a stable oscillator can be simplified by starting with specific values of capacitance and resistance, and through the observation of certain ratios between the values used.

The VFO is a *common-base* (grounded base) Colpitts type. Therefore, the base element is grounded at r_f by means of $C1$. To assure good rf bypassing it is necessary that $C1$ have minimal reactance at the lowest operating frequency of the VFO. A disk ceramic capacitor is recommended for that part of the circuit. $C3$ and $C4$ form a capacitive divider which regulates the amount of rf feedback used in the oscillator. The two capacitors (series value) provide the required capacitance to form a resonant circuit with $L1$.

$$C_{\text{total}} = \frac{1}{\frac{1}{C3} + \frac{1}{C4}}$$

Some additional capacitance gets into the act — that which is added by the following stage (through $C5$) and the $Q1$ output capacitance (through $C2$). Normally, those two capacitance amounts comprise a small part of the tank-circuit capacitance because $C3$ and $C4$ will be much higher in value. Therefore, the design can be carried out by assuming that there will be approximately 25 pF of additional C across $L1$ after we compute the effective value of the $C3$ - $C4$ combination. Thus, if $C3$ and $C4$ provide 500 pF of capacitance (combined series value of two 1000-pF units), we will add 25 pF, and this will give us a total of 525 pF across $L1$. Of course, a more precise method of determination would be to know the value of our transistor output C (many data sheets don't give

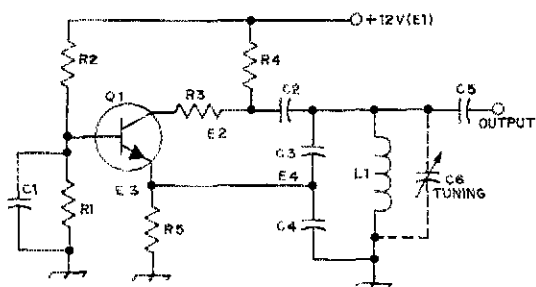
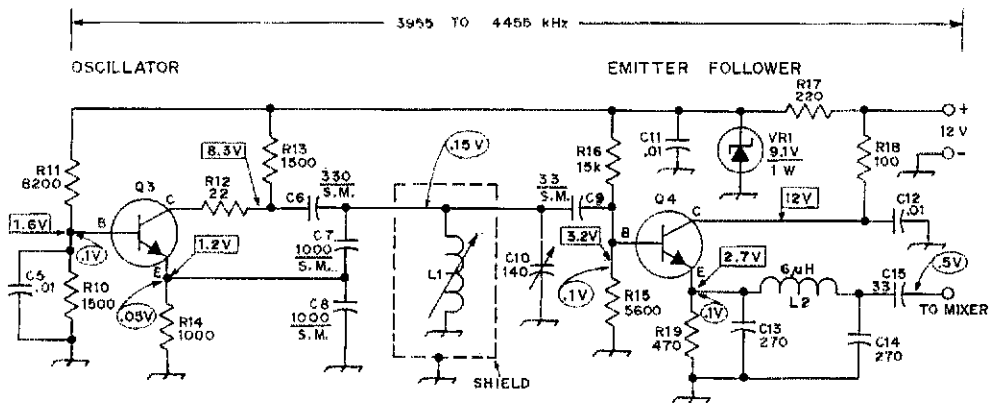


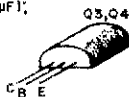
Fig. 8 — Design data in rule-of-thumb form for building a solid-state Colpitts oscillator. Additional data are given in the text.

- $R5 = 560$ to 1500 ohms
- $R4 \approx 2 \times R5$
- $R1 \approx R4$
- $R3 = 10$ to 33 ohms
- $R2 =$ set for 3 to 5 mA static I_C .
- $E2$ (DC) $\approx \frac{1}{2} E1$
- $E3$ (RMS) $\approx \frac{1}{4} E4$ (RMS)
- $Q1$ ac beta (h_{fe}) = 100 or greater
- $Q1$ upper freq. (f_T) = 5 times operating freq., or greater

- $C1 =$ reactance (X_C) of 5 ohms or less at lowest operating freq. ($.01 \mu F$ at 3.5 MHz)
- $C2 \approx 0.33 \times C3$ value.
- $C3/C4$ ratio $\approx 1:1$ to $1:3$.
- $C5 =$ smallest value which will provide desired output to next stage.
- $C3, C4$ reactance (X_C) ≈ 50 ohms
- $L1$ reactance (X_L) = $X_{C3} + X_{C4}$ (100 ohms, approx.)



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μpF); RESISTANCES ARE IN OHMS, $\times 1000, \text{M} = 1000 \text{ ODD}$.



Q3, Q4 = 2N4124
npn silicon

\square = dc voltage
 \bigcirc = RMS voltage
as measured with
voltmeter and probe
from Part I.

$f_T = 300 \text{ MHz}$
 $h_{FE} \approx 120$
 $V_{CE} = 25 \text{ V (max.)}$
 $I_C = 200 \text{ mA (max.)}$
 $P_D = 310 \text{ mW (max.)}$

Fig. 9 — Circuit diagram of the VFO and emitter follower. Part designations not listed below are for text and placement references. All resistors are 1/2- or 1/4-watt carbon or composition. Capacitors marked with polarity are electrolytic. C10 — 365-pf variable capacitor modified to 140-pf, see text (Radio Shack 272-1344). L1 — Variable inductor, 1.7-2.7 μH (Miller 4503). L2 — 6 μH , 48 turns No. 30 enam., close-wound on 1/4-inch (6 mm) form. Wooden dowel or polystyrene 1/4-inch dia rod is suitable for a form. Q3, Q4 — Motorola 2N4124 or equivalent (HEP53 suitable). VR1 — 9.1 V, 1-w Zener diode, 1N4740 or equiv.

it), then apply the foregoing formula, substituting output C of Q1 (C_o) for C_3 , and inserting C_2 in place of C_4 . The same technique could be applied if one knew the input C (C_{in}) of the stage after the oscillator. C_5 and C_{in} would then be used in for formula. In our application we won't worry about C_{in} and C_o . Rather, we'll assume the ball-park value of 25 pF for most VFO work.

In a practical VFO we will need some means by which to vary the operating frequency. C_6 is shown in dashed lines and will serve our purpose. Its maximum capacitance (plates fully meshed) must be included as part of the total C across L1. So, if we use a 50-pF tuning variable it will be necessary to add 50-pF to the previously computed 525 pF. This will give us 575 pF to establish resonance with L1 at the lowest operating frequency.

A suitable value for R_5 in most Colpitts VFOs is 1000 ohms, though more or less resistance can be used. A reasonable starting point with respect to R_1 and R_4 is to use a 1500-ohm resistor for each. Then adjust the value of R_2 until the collector voltage (E_2) is one half the supply voltage . . . 6 volts in this example. Normally, the value of R_2 will be between five and ten times that of R_1 (7500 to 15,000 ohms). The precise value will

depend upon the gain characteristics of the transistor used at Q1.

The values chosen for C_2 and C_5 should be as small as possible, consistent with good oscillator activity and ample output to drive the following stage. The lighter the coupling between Q1 and the collector tank, and between the VFO output and the following stage (load), the better will be the stability of the oscillator. Typically, C_5 will be of some value between 10 and 50 pF. C_2 should be one third the value of C_3 , or less. Silver-mica capacitors should be used for C_2 and C_5 to help assure stability.

R_3 is a low-value resistor which is used to prevent parasitic oscillations. It should be mounted as close to the collector of Q1 as possible. As a further preventive measure against random oscillations it is important to keep all transistor and component leads as short as possible.

Local-Oscillator Module

The receiver we are building has an i-f (intermediate frequency) of 455 kHz. In order to receive in the 80-meter band we must use an oscillator that will provide an operating frequency range of 3955 to 4455 kHz. Then, if we mix 3955 with an incoming 3500-kHz cw signal the i-f will be 455 kHz (3955 kHz, minus 3500 kHz, equals 455 kHz).

The circuit shown in Fig. 9 is suitable for our requirement. For the most part we have adhered to the rules of thumb outlined earlier. The main departures from our previous design example include the use of second transistor (emitter-follower buffer stage) and the employment of a slug-tuned coil at L1. Emitter follower Q4 does not amplify the VFO energy, but does afford isolation between the VFO and the mixer stage. This is

helpful in the interest of preventing changes in operating conditions at the mixer from affecting the stability of the VFO (pulling, and the like). An emitter follower, just like a cathode follower, is incapable of amplifying voltage. In fact, a slight loss in rf output voltage will result from the use of Q4 (approximately 0.9 times the amount fed into Q4 will arrive at the output).

It was stated that the best kind of inductor for VFO use is an air-wound type. However, we need not be wholly idealistic in our design. Slug-tuned inductors of good quality *can* be used if one is willing to accept a slight trade-off in ultimate stability. A slug-tuned coil saves one from spending money for a temperature-stable trimmer which would otherwise be necessary for calibrating the VFO. L1 in this example is a slug-tuned coil. It is housed in a shielded enclosure.

VR1 is used to regulate the operating voltage of Q3. It also holds the forward bias on Q4 at a fixed amount. Lower regulated operating voltages could be used, and no doubt the oscillator would be sufficiently active at levels as low as 6 volts. However, the higher the voltage, the greater the rf output.

Network C13-L2-C14, a *low-pass filter* (pi network), was included to attenuate harmonic currents developed in Q3 and Q4. It uses constants which were designed for a low Q_L (loaded Q). A reasonably low Q is necessary (3 in this design) to assure uniform rf output (broadbanding) across the tuning range of the VFO. Higher values of Q_L would offer better harmonic rejection, but would be too sharp in frequency response, requiring retuning as the operating frequency was changed. For best mixer performance the oscillator-injection

voltage should be as clean as possible (pure sine wave). We can consider C13, L2 and C14 as a *harmonic filter*.

The collector of Q4 is grounded at rf by means of C12. R17 and R18 help to decouple (isolate) Q3 and Q4 from one another, aiding circuit stability. R17 serves also as a dropping resistor for Zener diode VR1.

Construction

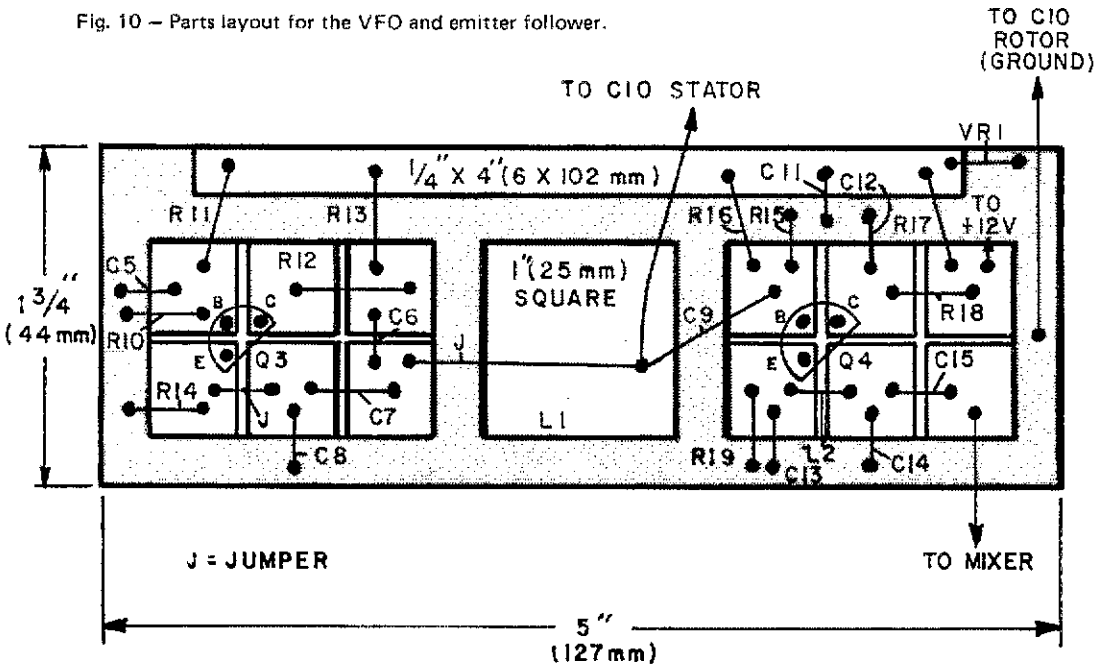
The same construction techniques described in the previous sections of the series are used for the oscillator (VFO) and emitter follower. However, as you will note from Fig. 10 and the photographs, we have a slight variation. The oscillator section with Q5 is mounted on one side of the board. L1, the VFO coil, must be shielded. Therefore, it is mounted at the center of the board, on its own section. The emitter-follower section is at the other side of the board.

The pad for L1 is one inch (25 mm) square, as are the shield sections, which are also made from the copper-covered board. A small notch is filed on one of the shield sides to permit an access wire to run from the L1 terminal to the junction of C6 and C7. Be sure to use insulated wire for this connection. Likewise, a small gap is left at one corner of the shield box for connection of C9 and the lead to the stator of C10.

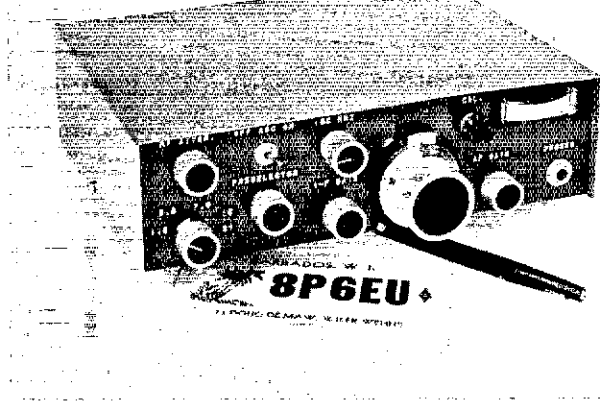
L2 is a homemade coil. It is wound on a 1/4-inch (6 mm) diameter form and either wooden dowel or polystyrene rod is suitable. Use a piece that is 3/4 inch (19 mm) long. Drill two small holes 1/2 inch (13 mm) apart in the rod. Feed one end

(Continued on page 72)

Fig. 10 - Parts layout for the VFO and emitter follower.



Exterior view of the solid-state cw receiver. The QSL card and pen illustrate the relative size of the unit. The imported main-tuning vernier dial is calibrated in 0 to 100 divisions. Each division is a 1-kHz marker.



More Receiver Design Notes

Part I

BY DOUG DE MAW,* WICER

THERE HAVE BEEN a number of superb receiver-design papers carried in *QST* over the years, and three relatively sophisticated approaches were treated in the journal.¹ Good performance can come only from careful, well-planned circuit design of the kind highlighted in the referenced articles. The basic "do's and don'ts" specified in those treatises should be the rule in any design . . . simple or complicated. However, one need not go to extremes in circuit complexity when building a high-performance receiver. The design can contain fewer stages than one might be tempted to include, and the kinds of semiconductor devices employed need not be the latest varieties available. This article describes some of the techniques used by the author to obtain good performance at minimum cost and modest complexity. A need existed for a unit of relatively small size and low weight, consistent with the limitations imposed by portable operation. The end product is described here, and served as the

test circuit for a subsequent design to be carried in the *Handbook*.

A Design Outlook

A criterion was drawn: (1) The receiver should be capable of operation in the lower 100 kHz of 160 through 15 meters, inclusive. (2) An i-f bandwidth of 400 Hz would be employed. (3) Immunity to overloading, cross modulation, and IMD must be good. (4) Age and manual gain control would be available to the operator. (5) A small package must evolve to assure portability. A block diagram of the final circuit is given in Fig. 1.

It should be stated that the receiver could just as easily be tailored for ssb reception. All that would be required for the modification could be realized by substitution of an ssb-bandwidth filter at FL2, a suitable BFO crystal at Y2, and a shift in coverage range of the tunable local oscillator. The age time constant could be lengthened, if desired, for ssb operation. It would be necessary also to employ different operating frequencies for the crystal oscillators in the switchable hf-band converters. So, despite the fact that we're dealing here with a cw man's receiver, the phone enthusiast can use the same circuit with minor changes in the numbers involved.

* *QST* Technical Editor.

¹ Hayward, "A Competition-Grade CW Receiver," Parts I and II, *QST* for March and April, 1974. Sabin, "The Solid-State Receiver," *QST* for July 1970. Fischer, "An Engineer's Ham-Band Receiver," *QST* for March, 1970.

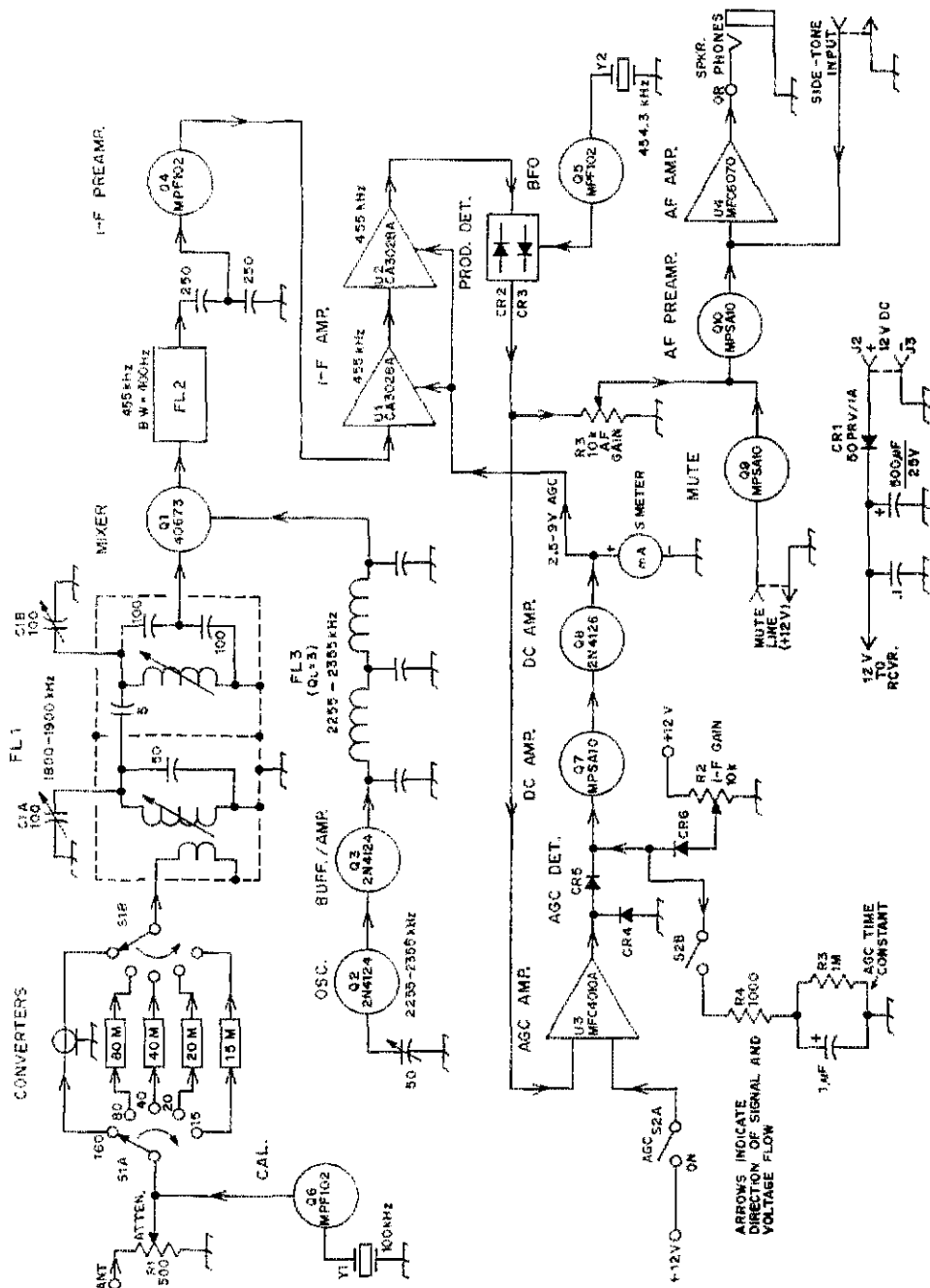
High-density lightweight amateur equipment is of prime importance to the camper, vacationer, or operator of emergency gear. Part I of this two-part article describes the tunable i-f portion of the compact solid-state receiver which was designed by the author for operation afield. Frequency coverage of the lower 100 kHz of 160, 80, 40, 20, and 15 meters is provided, and single-signal reception is enhanced through the use of a Collins 400-Hz-bandwidth mechanical filter. Dc current drain does not exceed 100 mA when the equipment is operated from a 12-volt supply.

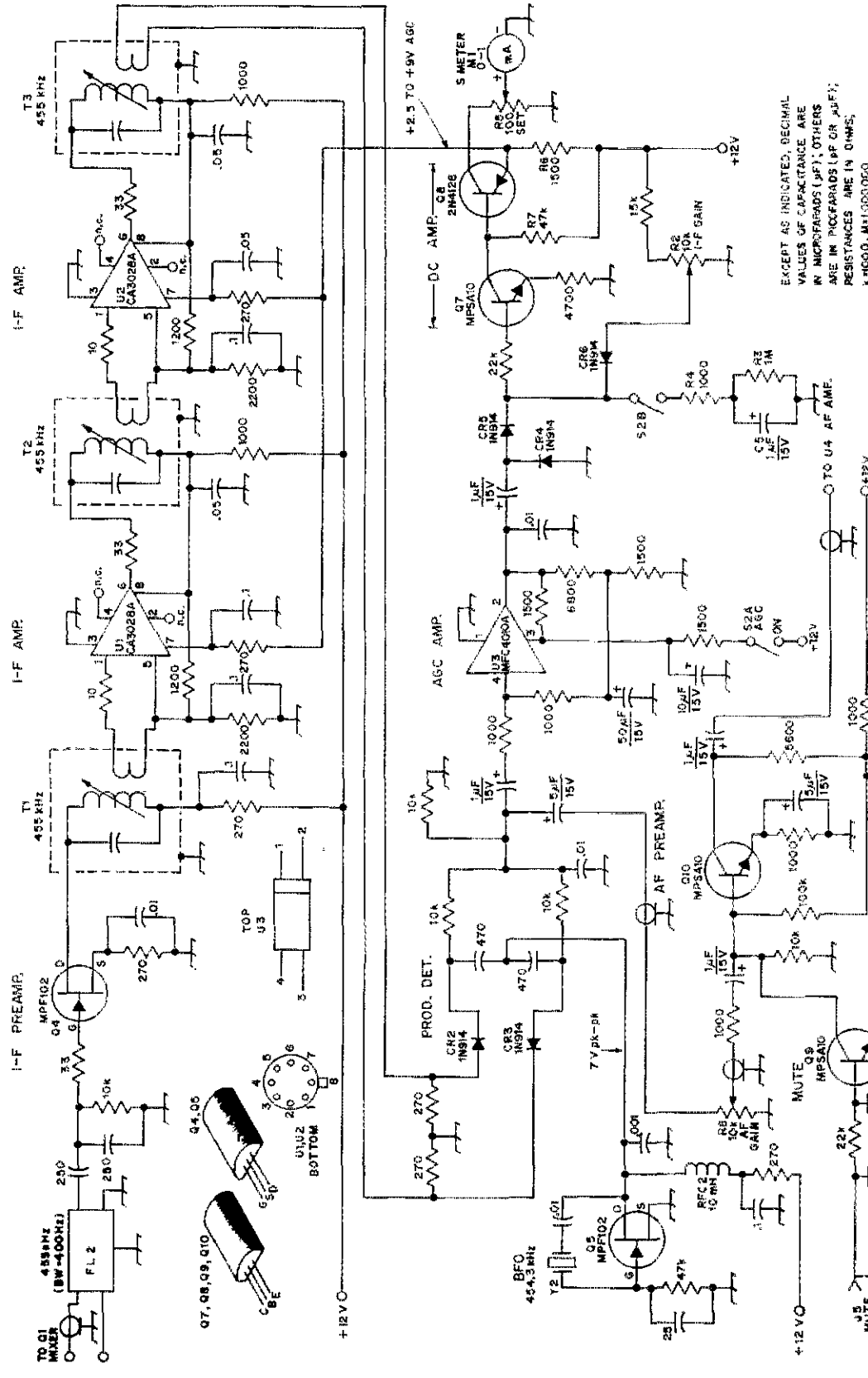
Tunable I-F Section

A tuning range of 1800 to 1900 kHz was chosen for the tunable I-F portion of the receiver. This range is applicable to CW operation on 160 meters (East Coast), where FCC band segmentation provides for use of the 1800- to 1850-kHz part of

the band, exclusively. Coverage to 1900 kHz was included to permit tuning the lower 100 kHz of the bands above 160 meters. Some may desire coverage of the entire 160-meter band - 1.8 to 2.0 MHz, thereby permitting reception in the high segment for DXing and contest work. This can be

Fig. 1 -- Block diagram of the solid-state portable receiver. A polarity-guarding diode, CR1, is shown at the lower right. This diode and the two bypass capacitors associated with it are mounted just inside the receiver cabinet near J2 and J3. These components do not appear in the schematic diagrams of this article.





EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (UF); OTHERS ARE IN PICOFARADS (PF OR .001); RESISTANCES ARE IN OHMS, UNLESS OTHERWISE SPECIFIED.

TO U1 AF AME.

TO U4 AF AME.

TO U3

TO U4 AF AME.

TO U4 AF AME.

TO U4 AF AME.

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TO U4 AF AME.

TO U4 AF AME.

from 1800 to 1900 kHz with the split-stator variable used in the filter. The unloaded Q of each, after modification, is 125 at 1.9 MHz. Those interested in duplicating this filter may experience the depths of frustration when trying to obtain a dual 100-pF variable, for they are almost as scarce as DX pileups on 1296 MHz. Cardwell Corp. of N.Y. has taken over the Hammarlund capacitor line, and does manufacture the HFD-100 unit, but an extremely stiff minimum-order fee exists. Check the surplus market for dual capacitors, or modify a dual-section bc capacitor by pulling plates from it.

A fairly high noise figure (approximately 10 dB) exists in the front end of the tunable i-f section. This represents an acceptable design trade-off for 160-meter operation. This was a deliberate move on the writer's behalf, and assures minimum trouble with the mixer during 160-meter operation. Atmospheric and man-made noise levels far exceed the receiver noise on 160, so noise figure is not a prime consideration on that band. The lossy front end assures minimum opportunity for overloading and cross modulation on 160. The noise-figure deficiency is compensated for on the bands above 160 by means of the converters.

An active mixer was chosen for the first stage of the tunable i-f section to limit the number of receiver stages required for suitable overall gain. A passive mixer of the diode-quad type (doubly balanced) would probably have been acceptable, and would be superior to the dual-gate MOSFET type with respect to IMD and overloading. However, such a mixer has a typical conversion loss of 8 dB, and this was not desired. Q1, the dual-gate

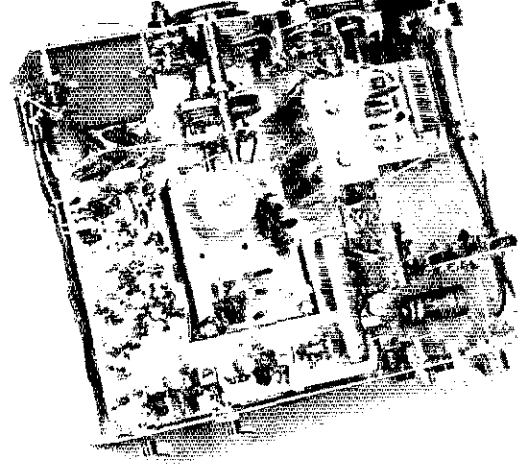
MOSFET, operates with the signal gate tapped down on FL1 to reduce the possibility of overloading and cross modulation. The conversion gain is roughly 10 dB, and that more than compensates for the insertion loss of the tunable filter, FL1. It is wise to keep the signal voltage at gate 1 as low as practicable to assure good mixer performance. A small amount of forward bias is applied to both gates of the 40673 mixer to increase the linearity and conversion gain of that stage. A 33-ohm resistor is used in the drain to prevent vhf parasitic oscillations.

Local Oscillator

Stability is especially vital in a local oscillator when a narrow i-f bandwidth is used - 400 Hz in this example. Although the photograph shows silver-mica capacitors in the frequency-determining part of the VFO, they were changed later to the more stable polystyrene kind. The drift specifications given at the end of this article were obtained after the change was made. The idea for using polystyrene capacitors came from a VFO design by Ten Tec, which was later incorporated by Heath Co. in their HW-7 QRP transceiver. Both brands of gear were used by this writer, and despite the relative simplicity of the VFOs used, they exhibited good frequency stability over a wide range of environmental conditions. Polystyrene capacitors are rated to hold their values within 1.3 percent over a temperature excursion of -10 to +70°C. Furthermore, they are sealed against moisture, and have a tolerance of 5 percent with respect to the marked value. They are no more expensive than dipped silver micas, and have proved to be far more stable than the latter when used in the writer's circuits. Silver-mica capacitors have unpredictable drift characteristics. Identical values taken from the same drawer have an unknown character when it comes to drift. Some are fairly stable, some drift in a positive direction, and others change value in the opposite manner. Some never seem to stabilize in an active circuit, owing perhaps to circulating rf currents which have a never-ending effect upon them. The polystyrene capacitors stabilize quickly and maintain their values.

It can be seen from Fig. 2B that a conventional Colpitts oscillator is used. The L and C values were selected to provide *exactly* 100 kHz of tuning range - 2255 to 2355 kHz, thereby providing receiver coverage of 1800 to 1900 kHz. This feature enables the builder to use a dial mechanism of low cost (0 to 100 dial-face markers) and small size. Linearity is quite good, providing 1-kHz accuracy per division up to 50 on the dial plate. At the high end of the tuning range (100 on the dial) there is an error of 2 kHz. A 5-pF variable is used in parallel with the 50-pF main-tuning capacitor to correct for the error when tuning from 1850 to 1900 kHz. It is mounted on the front panel as shown in the photograph. The dial mechanism used in this receiver is a Calctro No. E2-745. It has good torque, does not slip, and turns smoothly. It uses a ball drive similar to those found in the

- M1 - 0 to 1-mA meter (Simpson No. 1521 edge-mount type used in this receiver). Builder may use any 0 to 1-mA meter of his choice.
- R2, R8 - 10,000-ohm linear-taper control.
- R5 - 100-ohm pc-board-mount control (Mallory MTC-12L1 or equiv.).
- RFC2 - 10-mH subminiature rf choke (Millen J302-10,000 or equiv.).
- S2 - Two-pole, single-throw toggle. Subminiature type used in this example.
- T1-T3, incl. - Single-tuned miniature 455-kHz i-f transformer, 30,000-ohm primary to 500-ohm secondary (Miller 8811 or equiv.).
- U1, U2 - RCA integrated circuit.
- U3 - Motorola integrated circuit.
- Y2 - 454.3-kHz crystal in HC-6/J style holder (International Crystal Co., type EX. 10 N. Lee St., Oklahoma City, OK 73102).
- Fig. 3 - Schematic diagram of the i-f, agc, and audio preamplifier circuits. Capacitors are disk ceramic except those with polarity marked, which are electrolytic. Fixed-value resistors can be 1/4- or 1/2-watt composition unless otherwise noted. Numbered components not appearing in the parts list are so numbered for text discussion.
- CR2-CR6, incl. - High-speed silicon switching diode, 1N914 or equiv.
- FL2 - 455-kHz Collins mechanical filter, 400-Hz bandwidth. No. F455FD-04, Collins Radio Co., 4311 Jamboree Blvd., Newport Beach, CA 92663. Those wishing to use a 300-Hz-bandwidth Collins filter (slightly larger physical size) can obtain one from New England Engineering, P.O. Box 145, Wethersfield, CT 06109.
- J5 - Phono jack, single-hole mount.



Interior view of the receiver. The U-shaped pc board (lower left) contains the i-f, agc, BFO, and audio preamplifier circuits. Mounted edgewise behind the S meter is an MFJ Enterprises 1-watt audio-amplifier module. The subassembly in the center is the VFO. The shield can is a cut-down 35-mm film container. To the right of the VFO, mounted on end, is the front-end tunable filter and 160-meter mixer. An MFJ crystal calibrator is visible at the upper right. One of the hf-band converters is shown in place at the lower right. The others mount ahead of it. Because the pc boards used in this model were experimental types, some of the components shown are different from those specified in the diagrams and parts lists. Some circuit changes were made after this photo was taken. The mechanical filter used here (lower center) is a military surplus model which was obtained at a flea market. Its part number is unknown.

Jackson Bros. drive units. A nearly identical dial mechanism is sold by Radio Shack, but it contains a rim drive and will slip and cause backlash if the tuning capacitor is "stiff." The units with hall drives have a shiny dial face. Those with rim drives have a satin (dull) aluminum-color dial plate.

A buffer/amplifier follows the oscillator to increase the rf output and prevent "pulling" of the frequency when the front end is peaked. Output from the buffer is filtered by means of a half-wave network to assure pure sine-wave injection to the mixer. VFO noise was measured as being better than 80 dB down from the peak value of the rf output. The 500- μ H rf choke in the collector of Q2 is broadly resonant with the stray circuit capacitance at the VFO operating frequency. FL3 is designed for a Q_L of 3 and a bilateral impedance of 1000 ohms.

A Simple I-F Strip

An esoteric i-f system is no more a requirement in receiver design than is an automatic transmission in an automobile. A "stick shift" will do the job as well as an automatic one, and is preferred by many. Gain and specific agc characteristics can range from the simple to the sublime. The operator must decide what he needs and wants, then design accordingly. This writer does not care to use agc for cw work, so a minimal effort is often the rule when he decides on a suitable i-f strip for the job. The primary requirement is a *clean* i-f system . . . one which is free of instability and nonlinear characteristics. It should be capable of handling a reasonable amount of signal without overloading (age activated), and should have an acceptable noise figure, consistent with the circuitry ahead of it. U1 and U2 of Fig. 3 are preceded by an FET i-f preamplifier, the gain of which has been compromised purposely by tapping the gate down on the output of FL2. This stage, Q4, compensates for the insertion loss of FL2 and establishes the noise figure of the i-f strip. An MPF102 was selected because of its low-noise characteristics. It is uncon-

ditionally stable without being neutralized, because the gate is tapped down at low impedance. A single-tuned 455-kHz i-f transformer is used to couple the output from Q4 to the input of U1.

RCA CA3028A integrated circuits were chosen for use in the i-f chain because they are inexpensive and easy to work with. In this circuit they are connected as differential amplifiers. Audio-derived age is applied to terminal 7 of each IC (+2.5 to +9 volts), the constant-current-source bases. The dynamic range of the i-f system is approximately 60 dB. Other devices, such as the MC1590G, are capable of providing a dynamic range as great as 90 dB, and are preferred by W7ZOL.³ This writer finds the CA3028A to be more than satisfactory for simple receiver designs. These IC's are less prone to instability because of their moderate gain characteristics.

A passive product detector was chosen over an active one because of its simplicity and good signal-handling capability. A pair of high-speed switching diodes (1N914) were chosen because of their low cost and widespread availability. BFO injection to the product detector is 7 volts pk-pk.

Audio-Derived AGC

Audio output from the product detector is split into two channels, one line feeding the age strip and the other running to the audio amplifier circuit. An MFC4010A low-cost IC provides 60 dB of gain and serves as the age amplifier (U3 of Fig. 3). Output from U3 is rectified by means of a voltage doubler consisting of two 1N914 diodes. Because of the high gain capability of U3 it tends to be unstable at frequencies above the audio range. Addition of the .01- μ F bypass from terminal 2 to ground cured all signs of unstable operation in this circuit. Stubborn cases may require some additional bypassing at terminal 4 of U3. If so, use only that amount necessary to ensure stability.

³ See footnote 1.

(Continued on page 72)

A Tuning Control for Digital Frequency Synthesizers

BY DENNIS D. RASMUSSEN,* W6MCG

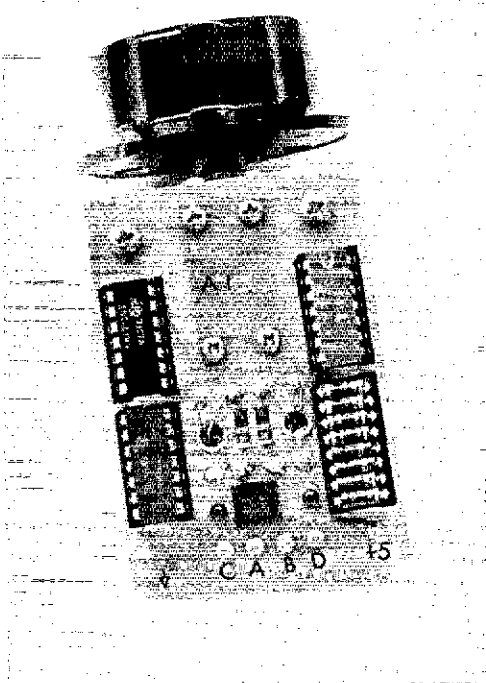
THE HEART of a programmable digital PLL is the divide-by- N counter. The divide ratio, N is varied by changing the BCD or binary data applied to the counter's parallel inputs. This may be accomplished with coded rotary or thumb-wheel switches -- a rather awkward method when the number of channels to be covered is large, or when frequent changes are made. An alternative and more desirable method -- single knob tuning, may be employed in these situations by using the tuning sequencer shown in Fig. 1 and the control counter in Fig. 2.

The tuning sequencer converts shaft rotation and direction into serially generated pulses which are accumulated in the control counter. The control counter's parallel outputs program the divide-by- N counter. The parallel outputs may also be used to operate a digital readout.

Tuning Sequencer Operation

An optical encoder generates two quadrature square waves as a function of shaft rotation. The wave forms are generated using a slotted disk to interrupt the light path between LEDs CR1 and CR2, and phototransistors Q1 and Q2 respectively. Direction of rotation and counting information is obtained from the rising edges of the wave forms.

Digital-frequency-synthesized phase-lock-loop (PLL) systems are becoming popular for receiver and transmitter control of all types. While information is readily available on the use of ICs in such circuits, the means of control have, in general, been seriously neglected. This article describes a method of single-knob tuning for use with digital PLL systems. It is usable for synthesizers employing any channel spacing. Only one moving part is used.



Top view of tuning sequencer.

Transistors Q3 and Q4 amplify the changes in phototransistor current. U1, a dual TTL Schmitt Trigger, provides clean transitions at the C and D outputs. U2 and U3 generate pulses at the A and B outputs from the rising edges of the quadrature square waves at the C and D outputs. The pulsed outputs are necessary to satisfy the triggering requirements of the 74192 BCD up/down counters used in the circuit of Fig. 2. These counters are triggered by a low-to-high transition of either count input while the other input is high. The direction of counting is determined by which count is pulsed while the other count is high. Both outputs must now be low at the same time.

For clockwise rotation (quadrature output wave forms as shown in Fig. 3) the rising edge of wave-form C will cause Q of U2A to drop to a logic 0 since wave-form D is a logic 1. (Basic operation of an edge-triggered type D flip-flop.) Q of U2B will remain a logic 1 since wave-form D is a logic 1 when the low-to-high transition of wave-form C occurs.

\bar{Q} of U2A is reset to a logic 1 by using the flip flop's output to apply a logic 0 to the CLEAR input (logic 0 to CLEAR forces \bar{Q} to a logic 1). This cannot be done directly because of setup times and minimum pulse widths required by the flip flop. To obtain this required time delay, three inverters are used in the signal path from Q of U2A to the CLEAR input. This is equivalent to connecting the \bar{Q} of U2A output to the CLEAR input through a time delay. For cw rotation output A generates negative-going pulses and output B does not change.

* 1251 N. Ontare Rd., Santa Barbara, CA 93105.

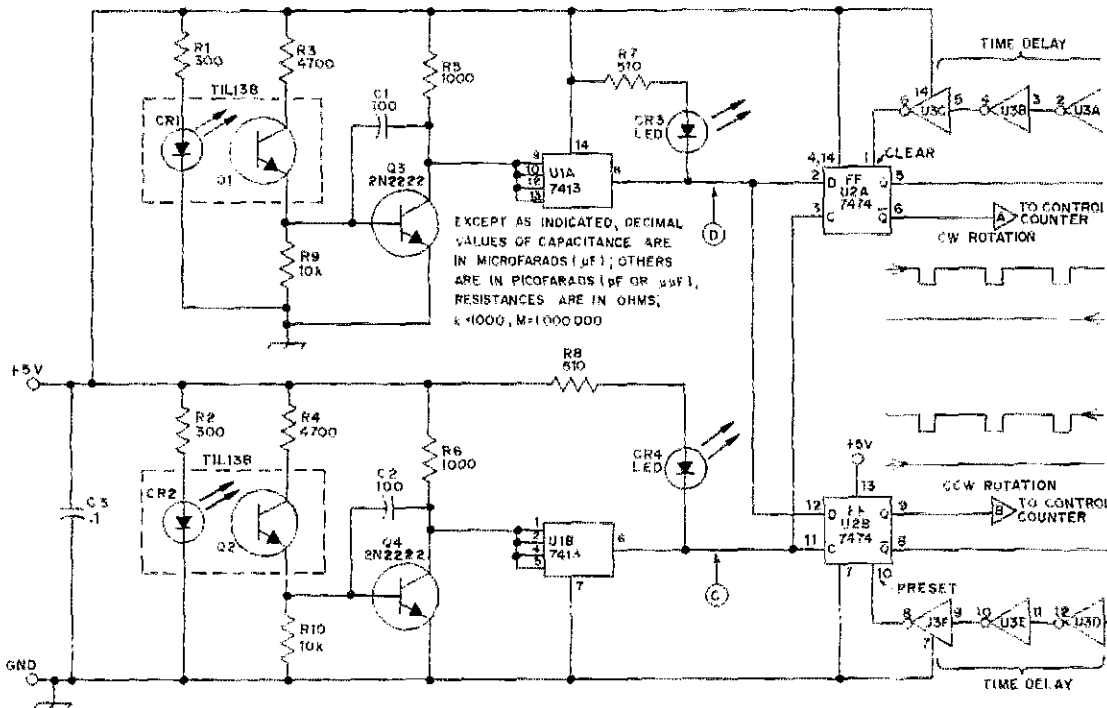


Fig. 1 — Tuning sequencer. All resistors are 5%.
 C1, C2 — 100 pF, 20% ceramic or mica.
 CR1, CR2, Q1, Q2 — Part of TIL 138 (2 required).
 CR3, CR4 — LED, TIL 209 or equiv.
 U1 — 7413 dual NAND Schmitt trigger.
 U2 — 7474 dual D edge-triggered flip-flop.
 U3 — 74LO4 or equiv.

For ccw rotation the rising edge of wave-form C causes Q₂ to drop to a logic 0 since wave-form D is low. Q of U2A will remain a logic 1 since wave-form D is low. Q of U2B is reset to a logic 1 by using the flip flop's output to apply a logic 0 to the PRESET input (logic 0 to PRESET sets Q to a logic 1). As with the other flip-flop this cannot be done directly, but must have a small time delay. The delay is obtained in the same manner using three inverters. For ccw rotation output B generates negative-going pulses and output A does not change. A mechanical hysteresis occurs when changing directions. This hysteresis varies slightly depending on the point of reversal.

A 74LO4 hex inverter is used with the 7474 or 74LS74 D flip flop rather than a 7404. The 74LO4 provides sufficient delay under worst case conditions for correct circuit operation, and a longer clock pulse for the up/down counters. The 7404 may not provide sufficient delay for the worst case, but no problem has been observed on a trial basis.

The pulses from this circuit are on the order of 100 nanoseconds wide and will be very difficult to see with most oscilloscopes because of their non-uniform repetitions. To determine if the circuit is working, the pulses can be fed to the external trigger input which will indicate a pulse has

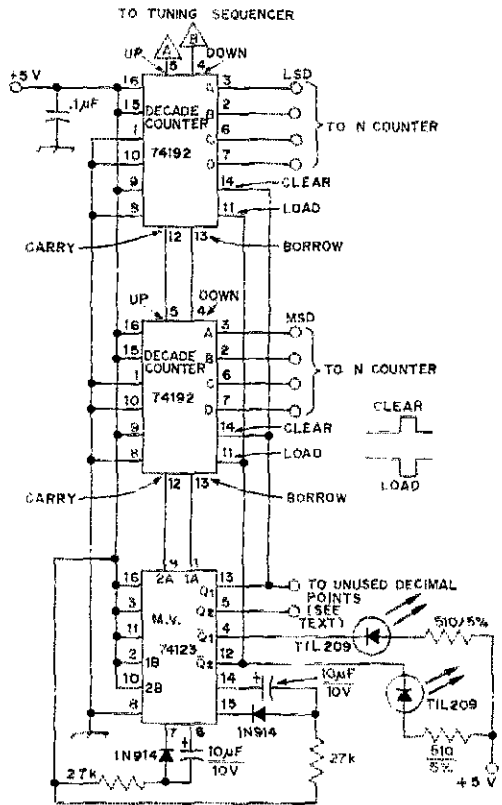


Fig. 2 — Control counter.

occurred by triggering the scope sweep. A pulse stretcher or pulse detector may also be used.

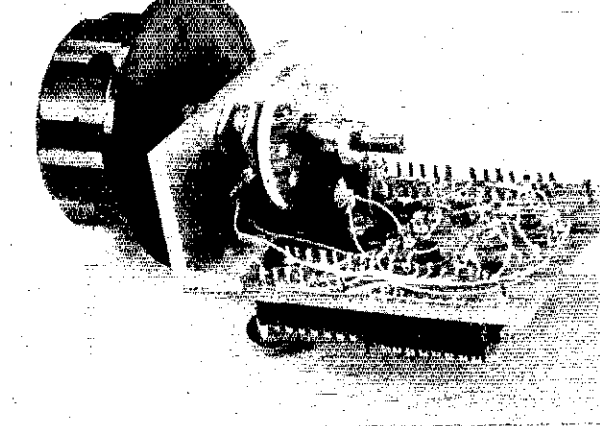
Light-emitting diodes CR3 and CR4 provide information that the quadrature wave-form generator is functioning. The wave forms need not be truly quadrature since edge triggering is used. The four possible combinations of outputs - HH, HL, LH, and LL are the only requirements. The mechanical hysteresis may become unbalanced if the waveforms differ greatly from 90 degrees. Unbalance and the variations in mechanical hysteresis are difficult to detect with the circuit in operation unless n , the number of pulses per revolution, is relatively low (6 or less).

Control Counter Operation

The 74192 up/down counter was selected because it is easily band limited: the counter can be made to stop at 99 when up counting, or at 00 when down counting. (Additional decades of counting may be added if desired.) If cycling from 99 to 00 on the next up count, or cycling from 00 to 99 on the next down count is desired the counters may be connected as shown in Fig. 4.

When the 74192 counter of Fig. 2 is at 99, the next up pulse cycles the counter to 00, but the carry pulse generated by this operation is used to enable the LOAD input and 99 (which is hardwired to the parallel data inputs) is reloaded into the counter. When at 00, the next down count cycles the counter to 99, but the borrow pulse generated by this operation is used to enable the CLEAR input and the counter is reset to 00.

The borrow or carry pulses generated by the 74192 counter each trigger a monostable multivibrator. The multivibrator lights an LED for approximately 80 milliseconds each time an



Bottom view of tuning sequencer developed for use with a 100-channel vhf synthesizer.

attempt is made to exceed the minimum or maximum count. In addition to providing band edge limit indicators, the LEDs are visible test points which aid in determining system faults. If the lower and upper band limit indicators can be made to light, it indicates the entire tuning sequencer and control counter are functioning correctly. If one desires to eliminate the multivibrator and its associated circuitry, connect the CARRY output of the MSD (most significant digit) to all of the counter LOAD inputs. Invert the BORROW pulse of the MSD and apply it to all of the counter CLEAR inputs.

The monostable \bar{Q} outputs can drive LEDs directly as shown, and/or the Q outputs can be used to trigger unused decimal points in LED displays such as the Texas Instruments TTL 308 and 309 or Hewlett-Packard 5082-7300 series. The up/down counter's parallel outputs can drive these displays directly.

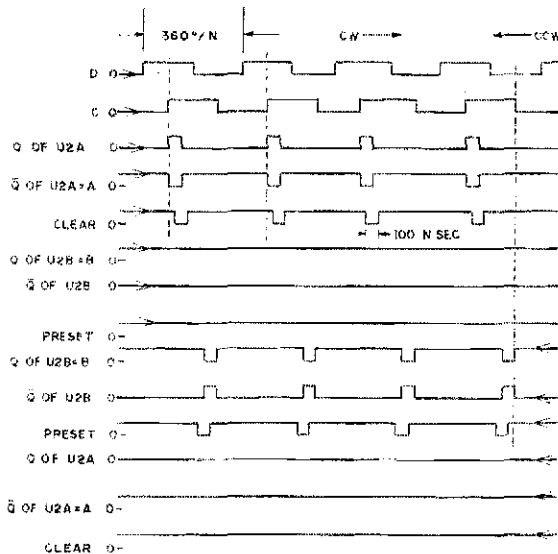


Fig. 3 - Tuning control sequencer timing diagram.

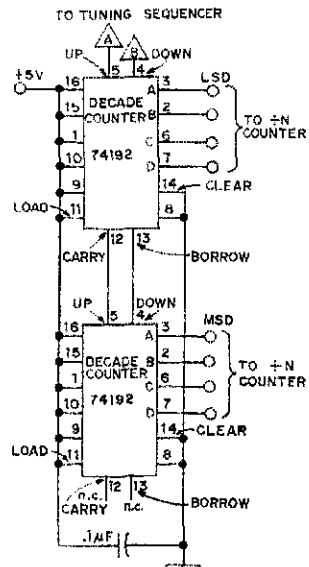


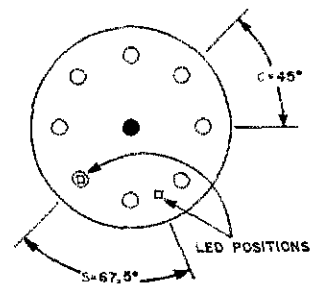
Fig. 4 - Control counter with no band limits.

Construction Information

Electrical: General layout rules for TTL circuitry apply to the tuning sequencer and counter. The only supply voltage required is +5. Current requirements for the circuits shown in Fig. 1 and 2 are typically 270 mA. Add 65 mA for each additional counter decade. All semiconductors are available from Texas Instruments distributors. Costs may be reduced by buying the ICs from parts suppliers advertising in *QST*.

Mechanical: The optical encoder was assembled using the shaft and bearing from a small variable air capacitor. All plates were removed and a single .090-inch (2.3 mm) aluminum disk placed on the shaft. Holes drilled in the disk break the light path between the TTL 138 source and sensor assemblies. The entire sequencer can be assembled in the capacitor frame if desired. Material available in the junk box can greatly govern the form of the finished product. A design summary for making the disk is shown in Fig. 5. The holes occupy one fourth to one third of the total swept area. The hole diameter should be about 3/32-inch (2.4 mm) minimum, and can be enlarged to increase the ON duty cycle. The height and spacing of the TTL 138 assemblies is varied to obtain the quadrature output.

While a metal disk with holes was used in the author's unit, construction is not limited to this technique. Any material may be used for the disk as circuit operation depends only on breaking the light path between the source and sensor. A reflective type sensor (TTL 139) could be sub-



n = number of steps per shaft revolution
 c = channel or hole spacing: $c = 360^\circ/n$
 s = LED spacing to obtain quadrature output:

$$s = 360^\circ/n = 360^\circ/2n = c \pm c/2 = 3/2c$$

For $n = 8$, $c = 45^\circ$, $s = 45^\circ + 22.5^\circ = 67.5^\circ$

Fig. 5 — Tuning sequencer disk for $n = 8$.

stituted and would require only alternate reflecting and non-reflecting surfaces for operation.

It is hoped this information helps eliminate some of the problems in interfacing and using the new types of ICs that will make digital PLL systems commonplace in the next few years.

QST

ARRL Technical Information Service

Any member of the League is welcome to appropriate help from the Hq. technical staff in connection with equipment problems he may encounter. We ask that you observe the following guidelines so that we may provide the best possible service to the greatest number.

1. Before writing for technical assistance, search your files of *QST* and other ARRL publications. The answer you need is probably there. Consult the annual index of articles in each December issue.

2. All inquiries must relate to amateur radio. (We cannot respond to questions about CB, marine radio, hi-fi, etc., unless they concern TVI or RFI caused by amateur gear.) Please be reasonable in the number and kind of questions you ask. Limit the number of questions to three per letter.

3. Use a typewriter if possible; otherwise, write or print clearly, on one side of each sheet. Circuit diagrams should be on separate sheets. Put your name and address (including zip code) on each sheet, not just the call. Staple or clip the pages together. Include a self-addressed, stamped *business-size* envelope. (No stamp required for foreign inquiries.)

4. For practical reasons there are certain things we cannot do. Please do not ask for comparisons between commercial products, or ask for advice on

repairing in-warranty commercial equipment (write the manufacturer for assistance). Do not ask for advice or information on articles published in other magazines; write to the magazine editor or author of that article. Do not request custom designs for amateur gear.

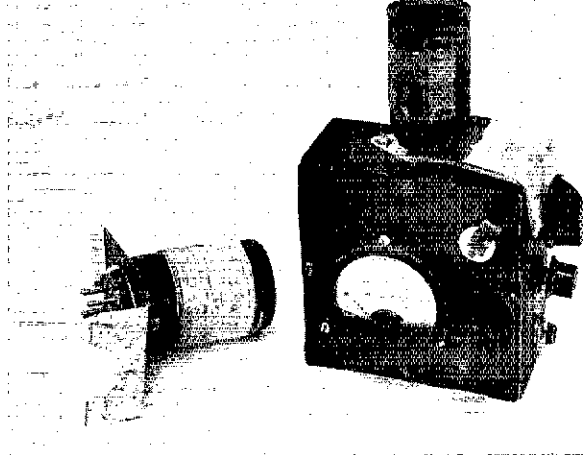
5. We may refer you to a back issue of *QST*. If so, and if that issue is still available, you may purchase it. If not, photocopies of a particular article are available at 25 cents per page. Include payment with your order.

6. Address all technical questions to: Technical Information Service, American Radio Relay League, 225 Main Street, Newington, CT 06111.

Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of *QST* is available from the ARRL for two dollars postpaid. Titled *Fifty Years of ARRL*, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic *200 Meters and Down*, a reprint of which is also available from the ARRL for two dollars.

A Hybrid Gate-Dip Oscillator



BY BENJAMIN CLARK,* WB4OBZ

ONE OF THE MORE useful test instruments in the ham shack is the dip oscillator.¹ It can be used to determine the resonant frequency of a tuned circuit, to provide a signal for alignment for a receiver or for antenna measurements. With a standard capacitor and inductor, it can also be used to measure unknown inductances and capacitances. Moreover, with a little additional circuitry, it can be made to serve as an absorption frequency meter, a field-strength meter, or even as a simple receiver.

Circuits generally used in dippers include the Armstrong, Hartley, and Colpitts oscillators. Each has disadvantages: the Armstrong requires two coils inductively coupled; the Hartley, a tapped coil; and the Colpitts, a capacitive voltage divider. If the voltage divider of a Colpitts circuit is in parallel with the tuned circuit, the additional capacitance reduces the tuning range. The use of a split-stator capacitor avoids this, but makes both ends of the coil hot, and suitable split-stator

capacitors are sometimes hard to come by. In addition, many published circuits require that resistors or capacitors or both be changed for each frequency range. Builders solve this by putting the components inside the coil forms, so that they are changed when the coils are changed. The previous complications are eliminated in the writer's circuit.

Parts Procurement

Today, one of the problems facing anyone who wishes to construct his own gear is that of finding suitable parts. This is especially true if one wishes to build an exact duplicate of something described in an article such as this. In the present case there is no need for exact duplication. The parts came from the author's junk box or from grab-bag assortments. Component values are not critical, nor is the placement of parts important except for the usual need to keep rf leads short. The values indicated in Fig. 1 are nominal, and any parts will work satisfactorily. R1 could be anything from 2000 to 25,000 ohms, for example, and M1 could be a 50- or 100-microampere meter instead of the

* Mepkin Abbey, Route 3, Box 357, Moncks Corner, SC 29461.

¹ Clark, "The Art of Dipping," *QST*, January, 1974.

Table 1

Frequency range (MHz)	Coil diameter and turns			l (inches)	Wire size and coil const.
	1-1/2	1-3/8	1-1/4		
	38	35	32	25 (mm)	
.08 - 0.2	700	750*	800	1000	No. 30 enam., 5 pies.
0.205 - 0.6	220	240*	256	310	No. 30 enam., 5 pies.
0.5 - 1.4	90	100*	110	140	No. 30 enam., close wound.
0.95 - 3	40*	45	49	64	No. 22 enam., close wound.
2.6 - 6	18	20	22*	29	No. 22 S. C. enam., 1-3/4" long (44 mm)
5.5 - 15	7	8	9*	12	No. 22 S. C. enam., 1-1/2" long (38 mm)
14 - 35	2	2	2*	2-1/2	No. 22 S. C. enam., length indicated at bottom of column.
	(11/16")	(3/4")	(1")	(1")	
	(17 mm)	(19 mm)	(25 mm)	(25 mm)	

Coils indicated by (*) were used in the prototype. The other values were computed.

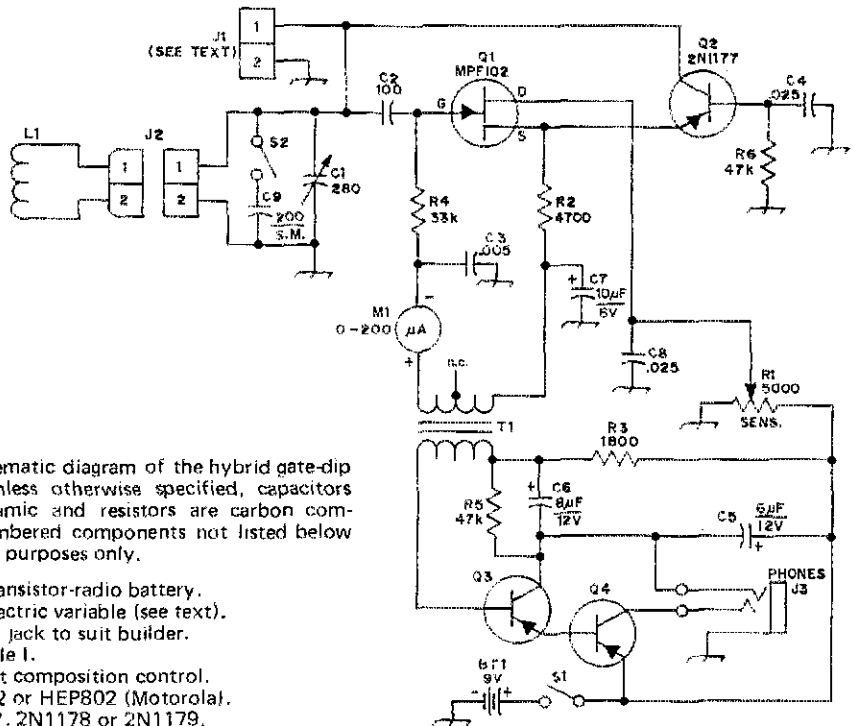


Fig. 1 — Schematic diagram of the hybrid gate-dip oscillator. Unless otherwise specified, capacitors are disk ceramic and resistors are carbon composition. Numbered components not listed below are for layout purposes only.

- BT1 — 9-V transistor-radio battery.
- C1 — Air-dielectric variable (see text).
- J1 — Antenna jack to suit builder.
- L1 — See Table I.
- R1 — 1/2-watt composition control.
- Q1 — MPF 102 or HEP802 (Motorola).
- Q2 — 2N1177, 2N1178 or 2N1179.
- Q3 — Pnp audio transistor 2N4125, HEP52 (Motorola).
- S1 — Spst on R1.
- S2 — Single-pole, two-position rotary switch.
- T2 — Transistor interstage audio transformer,

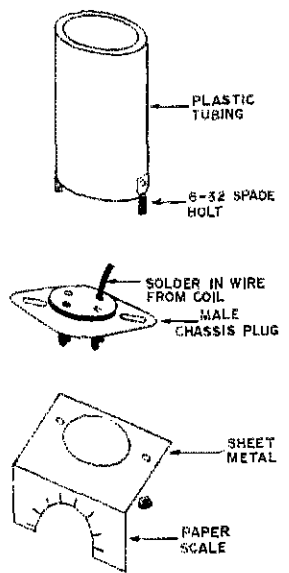
10,000 to 2000 ohms, with 2000-ohm winding connected to meter circuit (Radio Shack 273-1378 or Calrad TR-70).

200-μA one used in the prototype. Knowing how to make such substitutions can often save a good amount of money. If one tries to get all new parts to duplicate a project exactly, it can end up costing more than a factory-built piece of gear. Looking for the bargains can often reduce the price to a small fraction of the cost of new parts. Don't overlook the grab-bag assortments. What you usually get are parts that may be quite valuable but odd-sized, mismarked, or otherwise special; parts that would be unprofitable for the merchant to classify, inventory, advertise, and sell in the ordinary way. If one does much building and has a little ingenuity, grab-bags are a good investment. You'll have to test components before using them, but that's a good idea anyway, even with new parts.

Two items in this circuit may be difficult to find these days, namely, the coil and capacitor. Plug-in coil forms used to be in every electronics catalog, but are almost a collector's item today. For this reason, coil-winding data is given for several different form diameters with the ones used in the prototype marked with an asterisk; the others are merely computed values.

Fig. 2 shows a homemade plug-in coil form that can be used if you can't find any commercially made forms. To cover the range with a reasonable

Fig. 2 — Plug-in coil construction details.



number of coils, a 400-pF capacitor would be called for. None was found of size suitable for the space available, so instead a 225-pF unit was used. It was actually a two-gang type (85 and 140 pF) with the two sections connected in parallel, and an additional 200-pF mica capacitor switched in and out of the circuit to give full coverage. The switch knob can be seen below the tuning knob in the photograph.

The Circuit

A JFET is used in the common-drain circuit configuration, followed by a pnp bipolar transistor in a common-base circuit. As neither transistor inverts the signal phase when so connected, and as both present a high impedance to the tuned circuit, this configuration will oscillate efficiently with no need for coil taps or any other complications. The gate junction of the JFET acts as a rectifier and meter M1, the dip meter, measures the gate current. When the tuned circuit of the dipper is loaded by coupling it to an external circuit, power is absorbed from it by the latter and the meter current reading dips. As power transfer is greater when two circuits are tuned to resonance (up to the point of critical coupling), the meter will dip as one tunes through resonance.

R1 acts as a regeneration control by varying the voltage applied to the oscillator. When this voltage is zero, the gate junction acts as a diode detector, and the dipper may be used as an indicating absorption frequency meter. When the voltage is raised to just below the point of oscillation, the sensitivity is increased by regenerative action. The resonance then becomes sharper because of the *Q*-multiplying effect of a regenerative circuit. Above the point of oscillation, R1 is used to adjust the meter to a convenient value or to set the output level when the unit is used as a signal generator.

Q3 and Q4 form an audio amplifier. This amplifier is not needed for the gate-dip or signal-generator functions of the unit, but it is sometimes helpful to be able to listen to signals picked up the tuned circuit of display them on a scope. Also, the dipper could even function as a receiver in the lower frequency ranges. The amplifier is turned on when a phone plug is inserted into J3.

Terminal J1 serves three functions.

- 1) One can attach an antenna to it to enable the unit to act as a field-strength meter.
- 2) The oscillator can be connected without a coil to a resonant circuit (provided it has dc continuity) to excite it at its resonant frequency.
- 3) A small capacitor of approximately 5 pF can be used to couple capacitively to circuits that are hard to couple to inductively such as toroids and shielded coils.

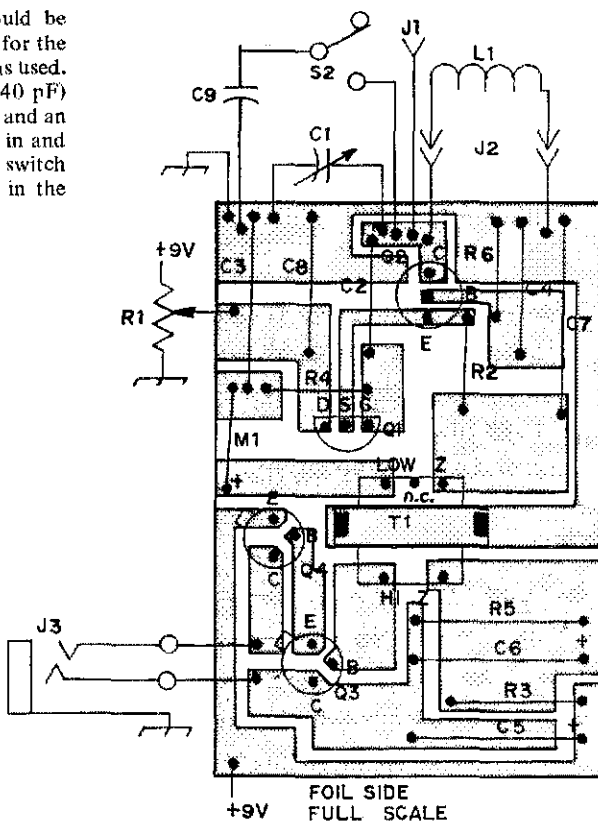
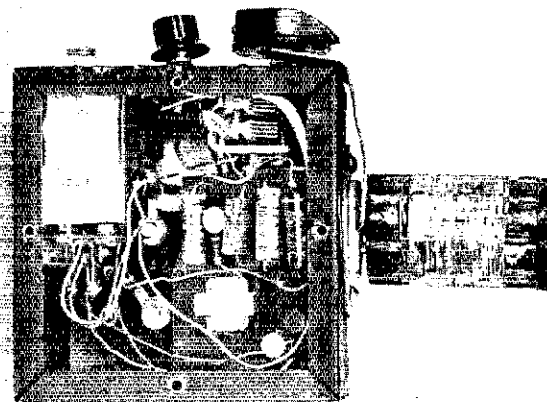


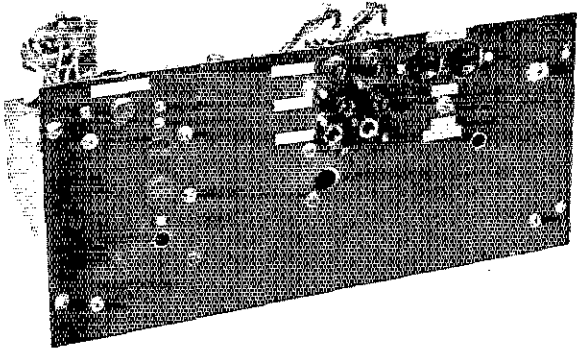
Fig. 3 — Parts layout and overlay for the oscillator.

A piece of sheet metal is attached to each coil form. It is then bent and cut to fit under the knob on the tuning capacitor, with a paper scale glued on as can be seen in the photograph. This avoids the need to cram several scales into a small space. You have only one scale to read which is the correct one for the coil actually in use.

(Continued on page 37)

Interior view of the dip oscillator.





•Gimmicks and Gadgets

A High-Power SCR Inverter

BY RUSSELL DUNAJA,* W3BBF

*Wind-charger enthusiasts take note!
Here is a high-power inverter.*

DESIRING TO OPERATE portable from my trailer, I decided to build a high-power inverter. The unit described here will work off either a 24- or 32-volt storage battery. It can also be used with an alternator capable of delivering from 55 to 130 A. With a 55-A alternator, the maximum output is 1500 VA (volt-amperes). The 130-A alternator will give 3600 VA. A blower should be used if the output exceeds 1800 VA.

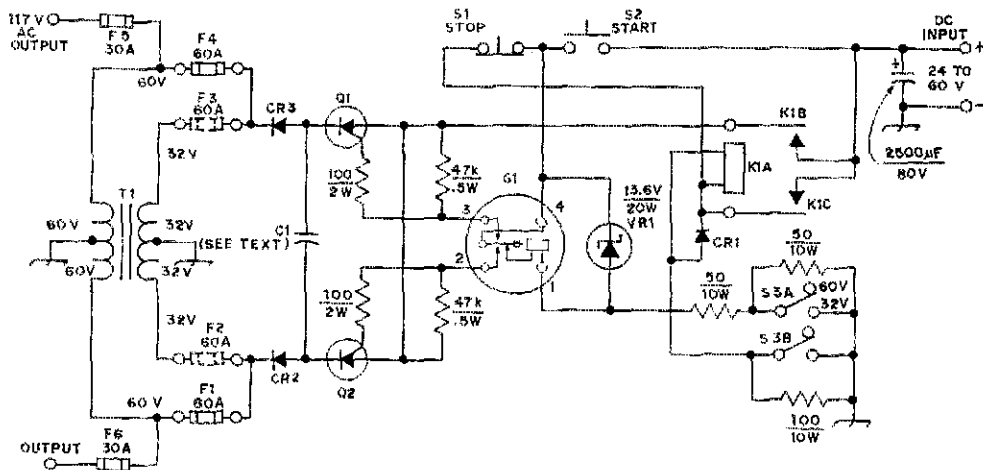
The schematic diagram is shown in Fig. 1. T1 is a modified Variac which allows operation from either 24/32- or 60-volt (dc) sources. If only 60-V operation is desired (some alternators are capable of producing 60 V) the 24/32-volt winding can be omitted. The movable arm on the Variac is removed and the center tap connected. The writer used a surplus Variac which was capable of handling 20 A. It had 205 turns of No. 12 wire for the original winding.

If 24- or 32-V operation is desired, the original 117-V winding of the Variac is used as a secondary and a bifilar primary winding is added (observe the polarity shown on the drawing). For 24-V operation, the primary should consist of 38 turns (76 total) of No. 8 double-coated (glass) wire. It should also be possible to operate the inverter on 12 V (at approximately 720-W output), but the windings would be halved and heavier wire would be needed. For 32-V operation, the winding would consist of 48 turns (96 total). Since No. 8 wire is difficult to work with, 4 strands of No. 10 formvar could be used. Two strands of No. 10 would be paralleled to give the equivalent of one strand of No. 8.

* 7524 Battle Grove Circle, Baltimore, MD 21222.

Fig. 1 — Schematic diagram of the inverter. The inverter is shown set up for 60-volt operation. For 24/32-volt operation, F1 and F4 are removed from their sockets and F2 and F3 are inserted at the dotted positions. S3 is switched to the 32-volt position.

- C1 — 120 μ F (see text for discussion).
- CR1 — 2-A silicon diode, 400 PRV.
- CR2, CR3 — 250-A silicon diode, 800 PRV (Poly Paks No. 87CU685).
- G1 — 60-Hz vibrator, 12 volt (Cornell-Dubilier, type 98600 or equivalent).
- Q1, Q2 — 100-A SCR, 800 PRV (Poly Paks No. 92CU1167).
- S1, S2 — Motor start/stop switch.
- T1 — 20-A Variac, 117 V.



Operation

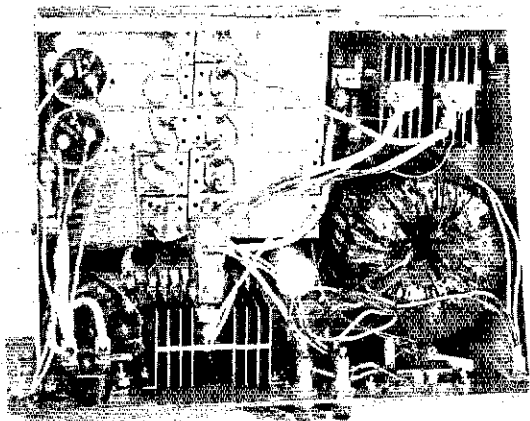
Operation of the inverter is as follows. Assume one SCR has just been turned on and the other one is in the nonconducting state. Current will flow in one half of the primary and the commutating capacitor (C1) will be charged through the other half. When the other SCR is turned on, it shuts off the one that was previously conducting. This is because the supply voltage plus the voltage in the charged commutating capacitor appear as a reverse bias at the cathode of the previously conducting SCR.

The commutating capacitor (C1) consists of 10 120- μ F oil-filled capacitors with 400-V (dc) rating each. *Do not use electrolytic capacitors for C1.* The SCRs are switched by means of vibrator G1. VR1 limits the voltage across the vibrator coil and consists of two 6.8-V, 10-W Zener diodes.

Using the Inverter

To use the inverter, the fuses F1 and F4 or F2 and F3 are inserted in either the 60- or 24/32-V sockets (but not both) and S3 is switched to the proper position. Always make sure the vibrator is in its socket - otherwise the fuses may blow if the unit is turned on. With 60-V battery operation, it is also advisable to use a 1-ohm, 200-W resistor in series with the inverter while starting. It should be shorted out while the inverter is running, however.

The START switch is depressed to energize the coil of K1. The contacts are closed and the inverter is connected to the line. When the STOP switch is depressed, the relay contacts open and the inverter is disconnected from the line. When the STOP switch is released, the line is still disconnected and remains so until the START switch is depressed again.



Top view of the inverter.

The output voltage of the inverter varied from 150 V under no-load conditions to 110 V with a 1650-W resistive load. In cases where this might be objectionable, the circuit shown in Fig. 2 would be useful, if the inverter is used with an alternator or generator only.

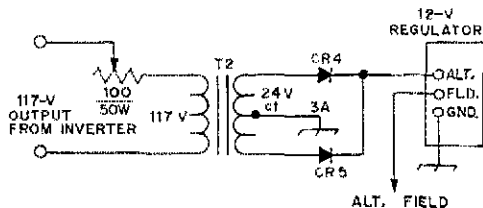


Fig. 2 - Schematic diagram of a voltage regulator suitable for use with the inverter and an alternator. CR4, CR5 - 5-A silicon diode, 50 PRV. T2 - 3-A filament transformer, 24-V ct.

Oscillator

(Continued from page 35)

Calibration and Use

This writer found the audio amplifier useful in calibrating the various frequency ranges. Frequency checkpoints and harmonics of a marker crystal were tuned in and plotted on the dial. There is no need to zero-beat as the scale is only approximate anyway. For calibrating in the low-frequency ranges, if markers close enough are not available, one can measure the spacing between successive harmonics of the oscillator in a receiver. Thus, if a signal is heard at 3500 kHz and another at 3850 kHz, the oscillator is tuned to 350 kHz (3850 - 3500). The tenth and eleventh harmonics of 350 kHz are the ones being heard. These low ranges can be helpful in aligning and troubleshooting i-f circuits, or f circuits also if one is interested in the unofficial experimental band between 160 and 190 kHz. Several dozen amateurs now operate there, under Section 15.203 of the FCC rules, which permits unlicensed operation

with up to one-watt input and with a total antenna and feed-line length of not over 50 feet (15.3 m).

The many uses of dippers are covered in the chapter on measurements in any recent edition of the *Handbook*. There seems little doubt that the most useful instrument in the shack is the volt-ohm-milliammeter. But for second place, it is hard to say whether the dip meter or the oscilloscope is more useful for the amateur who builds gear. This writer has found he uses the dipper more.

Strays

W6GK, the very active club station of the Cabrillo High School Zero Beaters in Lompoc, California, proposes more students make use of the frequencies between 21,360 and 21,363 kHz on 15 meters and 7,260 and 7,263 kHz on 40 meters. Discussion between California high school radio clubs picks these frequencies so students can more easily locate others with similar interests.



Hints and Kinks

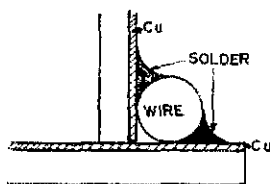
For the Experimenter



RF-TIGHT ENCLOSURES FROM PC BOARD

When constructing high-performance receiving equipment for the vhf and uhf bands, proper shielding from the outside world and between various sections of a system is mandatory. A popular and very inexpensive means to achieve this end is to build small boxes from scraps of double-sided pc board. While the results are nearly as good as the most exotic professional techniques, the method has one deficiency — once the box is soldered together, it's nearly impossible to get it apart again! This is a bit frustrating when expensive components are used and circuit modifications are contemplated.

A less committable approach to the problem is to build an rf-tight box without the usual lid, again using double-sided pc board. Then, after initial circuit adjustments are made, the shielding is completed with a lid which is soldered to the box. However, prior to final soldering, a file is used on the edges of the box to remove the copper adjacent to the lid. A piece of bare copper wire is then used to bridge the electrical gap that would otherwise exist. A cross-sectional view is shown in the drawing. Later, when (not if) it's necessary to change the circuit, the wire is easily peeled away with a pair of long-nose pliers and a medium-sized soldering iron. — *Wes Hayward, W7ZOI*



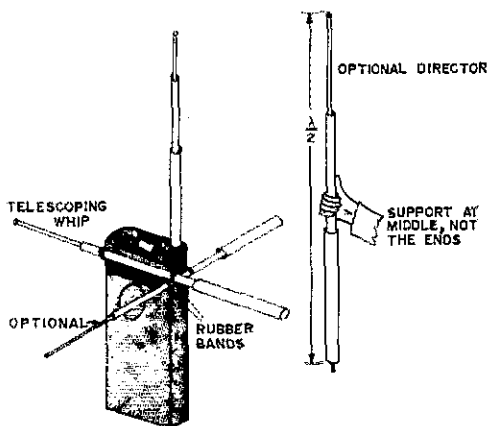
INSTANT GROUND PLANE FOR WALKIE-TALKIES

The performance of hand-held equipment can often be improved by the addition of a simple ground plane. Attach a whip antenna (such as that used with a transistor radio) with rubber bands to the base of the walkie-talkie as shown. You will note a difference in radiation efficiency.¹

The radials should be adjusted in length to a quarter wavelength or better yet, they should be

¹ [EDITOR'S NOTE: The roof of a car also makes an effective ground plane for small hand-held vhf receivers such as those used for ESSA weather broadcasts. While not very convenient for transmitting applications, it can often mean the difference between solid copy and not hearing the station at all.]

tuned by watching a field strength meter. A simple field-strength meter can be jury rigged by placing a 1N34A diode (or equivalent) across the test-lead terminals of a VOM set in the microampere range. The test leads themselves act as the pickup antenna.



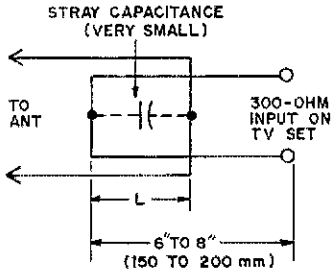
By holding a telescoping whip in front of the radiator with the radial(s), you should note an increase in signal strength. Stand with your back against a metal post which will act as a reflector. Even a quarter-wavelength wire is better than no counterpoise. — *Katashi Nose, KH6IJ*

A SIMPLE CURE FOR TVI

The seemingly ever-present problem of TVI may occur even though the rig may be properly shielded and adjusted to prevent harmonic radiation. The TVI is then likely to be caused by pickup on the television Twin-Lead and being coupled into the front end of the TV receiver, overloading it. This signal energy is coupled to the TV set in "common-mode" fashion — that is, the Twin Lead acting as a single conductor.

Most TV sets have very little rejection to this type of signal, as may be demonstrated by disconnecting one side of the Twin-Lead. A simple method of increasing this common-mode rejection, and thereby reducing TVI, is to add an inductive coupling loop in the Twin-Lead. The procedure is to cut the Twin-Lead about 6 to 8 inches (150 to 200 mm) from where it enters the set. Short each of the cut ends and overlap the ends approximately 1 to 4 inches (25 to 102 mm). The amount of overlap used should be the smallest amount

possible that will still give a satisfactory picture on all channels. It would be wise to start with the lower frequency channels first. Once the proper amount of overlap is found, secure the two leads with electrical tape. This trick will often cure TVI problems without resorting to buying high-pass filters or making modifications to the TV set. Doubtless, the TV owner would appreciate not having to incur service charges for this type of problem.



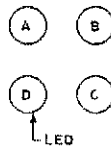
The circuit functions as a one-to-one transformer. The overlap distance, L , controls the coupling and inductance. The balanced currents from the antenna are coupled with little attenuation. Common-mode signals, on the other hand, must be capacitively coupled by the conductor-to-conductor capacitance which is very small due to the short overlap distance. — *Wilmer Radke, K7MCL*

A SIMPLE BCD CONVERTER AND READOUT

The arrangement shown will take a binary input and convert it directly to a decimal readout using four lamps (or LEDs). This eliminates the need for decoder/drivers, Nixie tubes or neon lamps and provides the ultimate in a low-cost readout.

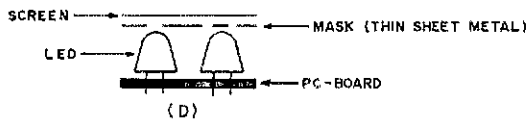
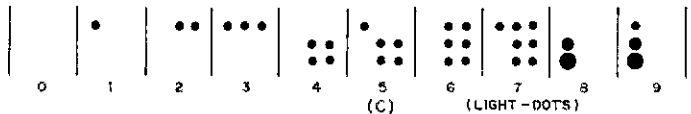
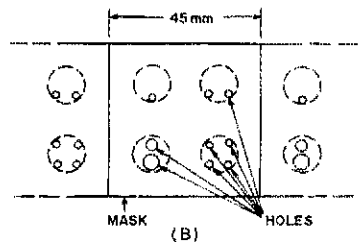
Each decade digit consists of four lamps in back of a mask as shown in the drawing. The lamps correspond to the binary positions for 1, 2, 4, and 8. One hole is drilled in the mask for the "1" position, two holes for the "2" position, and four holes for the "4" position. A small hole over a larger one is drilled to represent the "8".

In reading the display, one could merely count up the lighted dots (except for 8 and 9). But with a little practice, the digits can be read on sight. The figures for 1, 2, 3, 4, and 6 resemble the numbers themselves (with a little imagination). Only 5 and 9 are new but can be learned with little difficulty. — *Peter Hansen, DK4YD*



(A)

0	OFF				
1	ON				
2		A	B	C	D
3		0	0	0	0
4		1	1	0	0
5		2	0	1	0
6		3	1	1	0
7		4	0	1	0
8		5	1	0	1
9		6	0	1	1
		7	1	1	0
		8	0	0	1
		9	1	0	1

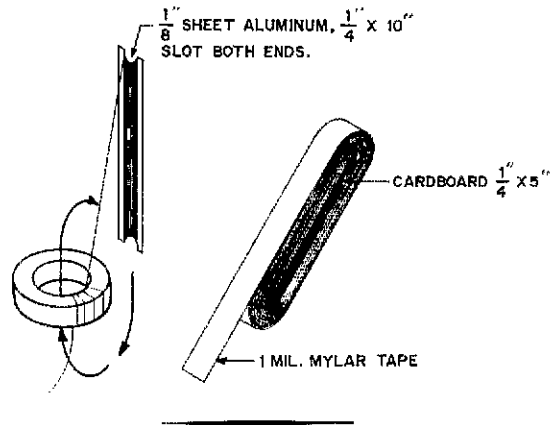


EASY WAY OF WINDING TOROIDS

Here is a way of winding toroid inductors, especially ones with many turns. A bobbin is made from thin aluminum stock (No. 18 to No. 14) $1/4 \times 10$ inches (0.6×25 cm) on each side. Thinner or wider bobbins can be made for particular toroid diameters. A slot is made in each end (make two cuts with a hacksaw and break the tab with a pair of long-nosed pliers) and the wire is then wound on the bobbin as shown.

The bobbin and the wire can then be passed through the core all at once, alleviating the need to pull ten or twenty feet of fragile wire through for each turn. Remember that the diameter of the hole will decrease as the number of turns increases.

Also, for the professional touch, and some extra protection for the windings, a layer of tape can be added in much the same way. Wind 1-mil Mylar tape on a suitable piece of cardboard and then rewind it back over the inductor. The above method results in a toroid that is easier to build and is better to look at. — *Ken Voelker, WB6KBI*





Recent Equipment



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



Wilson Electronics DB-54 20- and 15-Meter Duo-Band Beam

HOW DOES one evaluate an antenna? The answer is simple if an antenna range and elaborate test gear are on hand. The solution is not quite so simple, however, if these are not available. The latter has been the case with each of the antennas reviewed over the past many months. Perhaps the more important considerations for most amateurs are the mechanical construction, the size, and the general effectiveness of the system. Therefore, this review, as have the ones before it, will be directed primarily at the mechanical characteristics, while dealing briefly with the electrical properties. For those amateurs who would like to calculate the theoretical gain or the front-to-back ratio of this array, the ARRL *Antenna Book* should be consulted.

The Wilson Electronics Model DB-54 is an interlaced 15- and 20-meter Yagi antenna. Five elements are used for 20-meter operation and four, spaced evenly between the 20-meter elements, are used for 15-meter operation. Overall dimensions

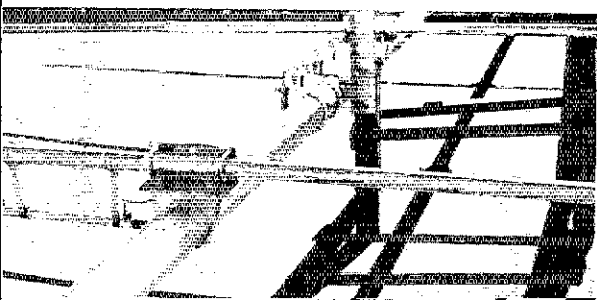
for the system are given in Fig. 1. The principal characteristic which should be of interest to most amateurs is the physical size. There is no doubt that this is a large array. And it needs to be treated as such for its installation. The boom is 40 feet long and is three inches in diameter.

Each driven element (there are two) is equipped with a gamma matching system which, according to the directions supplied with the antenna, will provide a suitable match across each of the two bands. The test model was mounted on top of a 120-foot tower; the SWR as measured at the transmitter end of the coaxial cable was as specified in the instruction book. The 20-meter curve is given in Fig. 2. An attempt to retune the 15-meter matching network for optimum performance in the cw portion of the band was successful; the SWR curve for this is also given in Fig. 2. Adjustment of the 15-meter system is not difficult since it can be reached while standing on the tower. The 20-meter gamma rod is too far out the boom to be reached and the antenna would have to be uncoupled from the mast and positioned differently in order to make retuning adjustments. This was not necessary, however.

Assembly of the antenna is easy. The instructions are simple and can be followed by anyone. Building the antenna consumed the better part of a day (in the rain) but much of the time was spent double checking dimensions and security of hardware. One doesn't want to have a piece of an element vibrate loose and fall to the ground — or through a neighbor's window! When an antenna is constructed which consists of nine elements, it is not uncommon to make a simple mistake. Considering the difficulty for installing an antenna of this size, it is well worth the effort and time to recheck everything before hoisting the completed system to the top of the tower.

The DB-54 performed as one would expect a five-element 20-meter or four-element 15-meter array to "play!" The front-to-back ratio on each band, as measured with an ordinary communications receiver, appeared to be better than 20 dB. No difficulty was encountered working *any* station. There appeared to be no interaction between the 15- and the 20-meter elements. This was determined by turning two of the 15-meter elements to a vertical position and checking the tuning of the 20-meter gamma match. The tuning did not change and therefore one can *assume* that there is little, if any, interaction.

Each element is held in place by means of aluminum angle stock and plated steel hardware. The aluminum section attached at the boom-to-mast clamp is used to support the truss cable.



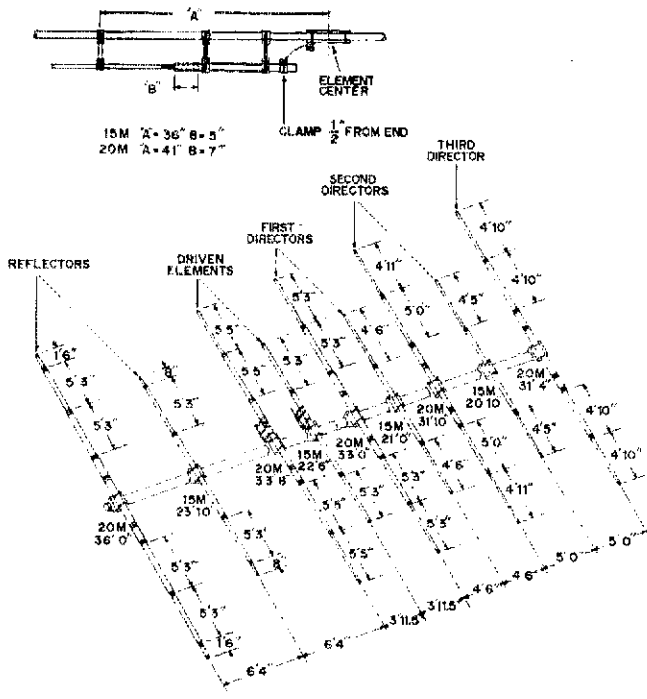


Fig. 1 — Dimensions for the Wilson DB-54.

It should be pointed out here that this antenna is not designed for "typical" installations. The rotator needs to have a brake capable of holding the array in place. A Hy-Clain Model 400 was used for the testing period. The tower has to be able to withstand the torsional forces developed during high-wind conditions. A torsion bar is recommended. This consists of a four- to six-foot section of heavy steel angle stock clamped to the tower near the rotator (the point where the antenna torsion is transmitted to the tower section), extending outward and connected via steel guy wire to an anchor (concrete or screw-in) on the ground away from the base of the tower. A suitable distance is 60 to 80 percent of the torsion-bar height above ground. The purpose of the four-foot steel angle stock is to transform any

small amount of tower-twisting action to a much larger moment (out six feet from the tower) where the guy wire can then act to hold it in place. This system not only keeps the tower from twisting, it also reduces the strain on the normal guy wires and allows them to better perform their intended function — that of holding the tower upright.

While the antenna and hardware described here are for those amateurs fortunate enough to be located somewhere other than in a residential area, there are several smaller versions manufactured by Wilson Electronics which are suitable for the "average city lot." One interesting note about the Wilson antenna line; the smaller systems contain the same components and hardware as do the larger arrays. While it is sometimes impossible to keep a large array up during a winter season (no matter how well it is built), a smaller antenna, constructed of materials used typically in larger ones, can be installed with some assurance that next spring it will still be there. *WIFBY*

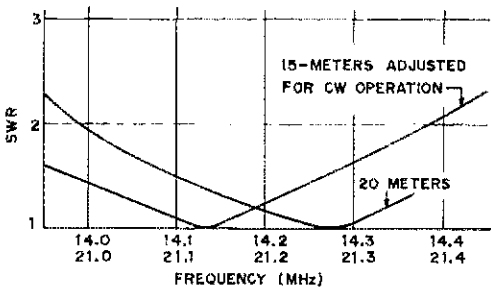
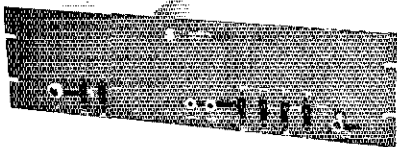


Fig. 2 — SWR curves of the antenna for the 15- and 20-meter bands.

**The Wilson Electronics
DB-54 Duo-Band Beam**

Frequency range: 20 and 15 meters.*
 Boom dimensions: 40-feet long and three-inches OD.*
 Longest element: See Fig. 1.*
 Mast size: Two inches dia recommended.
 Price class: \$260.00 (includes truss kit).
 * Checked in the ARRL lab.



Standard Communications RPT-1 Repeater

THE STANDARD Communications Corporation Model RPT-1 is a 2-meter fm repeater, providing automatic repeating or duplex operation on a single pair of channels in the 144- to 148-MHz range. The RPT-1 is completely solid state and provides a transmitter power output of 10 watts when operated from a 13.8-volt dc power source. Both transmit and receive crystals are furnished.

Additional features of the RPT-1 include a carrier-operated relay (COR), carrier delay and time-out timer. Provisions are included for control of the squelch threshold, repeat level, and instantaneous deviation control (IDC). The instantaneous deviation control adjustment limits the peak deviation of the transmitter. This adjustment is factory preset at ± 5 kHz. The complete repeater is mounted on a 19-inch wide rack panel, 5-1/4 inches high with a 9-inch depth.

The Receiver

The receiver is a crystal-controlled, double-conversion superheterodyne. One quality feature is that a triple-tuned helical resonator is used at the input circuit of the rf amplifier. This provides very good selectivity where it is needed, at the input of the receiver. The first intermediate frequency is at 11.7 MHz and the second is 455 kHz. A dual-crystal filter is used at 11.7 MHz to provide additional selectivity.

The receiver, along with the carrier-operated-relay (COR) and timer unit is completely shielded. All incoming and outgoing leads are filtered.

COR and Timer Section

The COR/Timer provides four basic functions:

1) It keys the transmitter push-to-talk relay when a signal appears in the discriminator (receiver) output.

2) It provides a delay to hold the transmitter on for a predetermined period of time after the received signal drops out.

3) It can be used to remove the inhibit from the squelch circuit to permit monitoring at the repeater.

4) It turns the transmitter off after a predetermined period of time to limit the length of any user's transmission (time-out timer).

It should be pointed out that the timer "accumulates" time only as long as the repeater transmitter is on the air. The running timer recycles *only* when the repeater transmitter carrier is allowed to drop. In our initial tests of the repeater, we set the squelch tail too long and because we were "quick" on the mic button, we timed out the machine, even though the transmissions were relatively short. An adjustment on the squelch tail length quickly cured this problem.

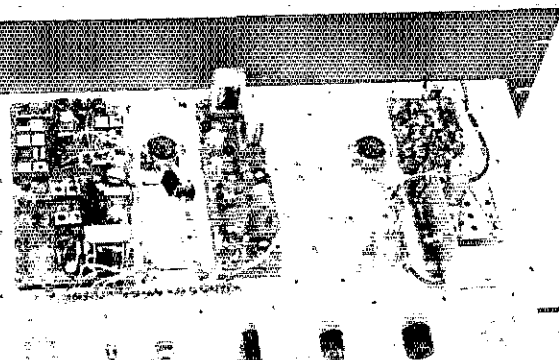
The Transmitter

The transmitter oscillator frequency is at 8 MHz. The signal is multiplied to 144 MHz via two triplers and a doubler. There are two driver stages and a single amplifier stage. The amplifier is designed to work into a 50-ohm load. Amplifier output is sampled by a directional coupler. If the VSWR increases, a reverse voltage is detected and amplified and then used to cut off the final amplifier and driver stages. This provides protection for these stages in the event of a mismatch at the load.

The speech amplifier has two inputs which are selected by a panel-mounted switch, RPT/DPLX. In the repeat position the demodulated audio is taken from the COR circuit and amplified. The audio is then processed and fed to a phase modulator.

When the RPT/DPLX switch is thrown to duplex operation, the repeater is taken out of the repeat mode and put in the duplex mode. The microphone input is connected to the speech amplifier. Assuming the amateur on the other end can run his transmitter and receiver at the same time, full duplex operation is possible.

At the left is the receiver board and in the center is the COR/timer circuitry. At the right is the transmitter. The large cylindrical object on the rear of the board is the final amplifier heat sink.



In addition to the microphone input and RPT/DPLX control, the front panel has the following controls or jacks: TX/OFF switch, used to turn transmitter power off; meter jack for discriminator meter, meter not furnished; speaker jack, this and a rear terminal jack provide speaker outputs, speaker not furnished; PC/OFF switch, used to disable private channel circuitry, an accessory; MON/OFF, this is the monitor audio amplifier enable/disable switch which reduces power consumption when the monitor is not used; RX/OFF, receiver power switch; SQ/OFF is the squelch setting override switch which places unit in fully unsquelched condition in OFF position; MONITOR VOLUME, controls receiver monitor volume at both front and rear panel speaker outputs.

Our Observations

The RPT-1 unit that we have has been in our hands for about a year and has been extensively tested during that period. First, after lab tests, we used the repeater as a portable machine at the New England Division Convention last fall. There were at least two other repeaters being operated at the same time and in the same building so it made a good test for the RPT-1. A circulator and duplexer were used with the repeater. In no case did we experience any problems while receiving — that is, from the other transmitters in the same building. Admittedly, we got complaints from the other repeater operators but to our knowledge, they were not using circulators and duplexers.

After further tests in the lab, the repeater was installed at WR1AAD and has been in operation for about six months on 147.96/36 powered by an automobile battery that is occasionally recharged. There have been no problems of any kind with the repeater in this period.

We had one complaint that resulted in very red faces on our part. The transmitter coil tuning slugs are painted to lock them in place. We broke the slugs trying to tune the transmitter to a new frequency and then complained to the company about it. The reason our faces were red was because we were politely informed there was a cautionary note in the manual to use paint thinner on the paint to loosen the slugs before making tuning adjustments. (When all else fails, read the instruction manual!)

However, we did have a couple of other legitimate gripes. Both the transmitter and receiver are very tightly shielded with about "umpteenth jillion" screws to hold the covers in place. You have to remove the transmitter cover in order to adjust the deviation control and the receiver cover for timer adjustments. *And then* put them all back in before testing — *and then* hope you made the correct adjustments. In any event, we talked to the Standard people and they said they would provide holes in the cover to permit making the adjustments without removing the screws. (Yes, we could have drilled a few holes ourselves but it wasn't our equipment.)

The other complaint — and Standard informs us it is being taken care of — is the quality and content of the instruction manual. Parts designations in the text do not agree with the circuits and it makes it difficult to follow the circuits (much less to describe them). However, this does not detract from the repeater. In this reviewer's opinion, it is an excellent piece of equipment. — *W1ICP/WR1ABH*

Standard Communications Corp. SC-ARPT-1 VHF 2-Meter FM Repeater

Power requirements: 13.8 V dc, nominal, negative ground only, transmit 2.5 A, standby 50 mA, receive maximum 300 mA.

Dimensions (HWD) and Weight:
5-1/4 × 19 × 9 inches, 7 pounds.

Transmitter: Power output into 50 ohms, 10 watts;* Spurious and harmonic response better than 55 dB;* Modulation, fm ±5 kHz deviation; COR adjustable from noise level to 20 dB quieting plus 10 dB.

Receiver: Sensitivity (20 dB quieting). .04 μV; squelch sensitivity (threshold), .03 μV; modulation acceptance bandwidth, ±8 kHz; spurious and image attenuation, 70 dB minimum, audio power output, 4 watts.

Frequency range: 144 to 148 MHz.

Price class: \$695, accessories available, ac supply, tone squelch board, speaker.

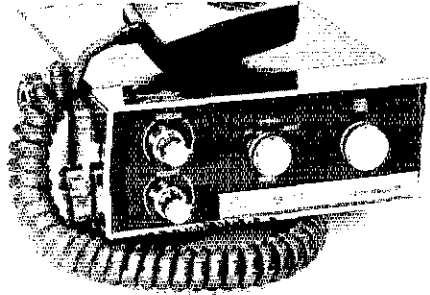
Manufacturer: Standard Communications Corp., 639 N. Marine Ave., Wilmington, CA 90744.

* Measured in ARRL lab.

Stays

The First National Rover Crew, Boy Scouts of Canada, who operate VE3SHQ at the National Council headquarters, are sponsoring a Scout net which will meet on Saturdays during June 1974 on 14.175 kHz ±10 kHz, using ssb, at 1600 GMT. They welcome checkins from anywhere. (U.S. stations may check in on cw, and if conditions warrant, the net may slide upward to permit ssb operation by the W/Ks.)

Two joggers from Frederick, Maryland are planning to spend the months of June, July, and August jogging from Seattle, Washington, to Rehoboth Beach, Delaware to call attention to the American Heart Association's educational programs on the heart and heart-related diseases. W3FOA, WA3CGU, and WA3ROA are interested in forming a network to make progress reports on the jog. The planned route is through Minneapolis, Chicago, Fort Wayne, Pittsburgh, and Washington, D.C.; if you're interested in helping out, contact Stephen R. Bauman, W3FOA, 813 Clearfield Road, Frederick, MD 21701.



The Clegg

FM-21 220 MHz

Transceiver

THERE ARE not many vhf fm transceivers on the amateur market today that are American made. Of the select few, an even smaller number will operate on the 220-MHz band. Not long after introducing their popular equipment for the 144-MHz crew, Clegg announced the FM-21 for use on 220 MHz, thus helping to fill the void.

In an effort to make the exploration of new bands as painless as possible, the FM-21 employs a "Crystal-Saver" circuit, wherein only one crystal need be purchased for each channel that is desired. A crystal is obtained for the selected transmit frequency, and an offset crystal within the transceiver will place the receiver input frequency on that of the transmitter for simplex operation. A separate offset crystal, selectable by means of a front-panel switch, will place the receiver input 1.6 MHz higher for use through repeaters. Other input-output frequency spacings may be obtained on special order.

Operation

In spite of all the drum beating by this writer, ARRL, frequency coordinators, and many others, the 223- to 225-MHz fm and repeater band is by no means overpopulated. This is somewhat hard to understand in view of the crowding of other bands and also in light of a generous repeater offer made to clubs by the Clegg Division of International Signal and Control.¹ In order to evaluate the

¹ QST, April, 1974, p. 111.

capabilities of 220-MHz fm, the writer has maintained a dual facility at home (with the aid and patience of the XYI, WIRNT) employing both 146- and 223-MHz equipment. In all of central New England, no location has been discovered where the 220 system was found wanting in comparison to the lower band.

The 10-watt output from the FM-21 has proved adequate both for local coverage into WRIAAD, and in the simplex mode. The latter use has come into play on occasions when some local amateurs needed to be convinced that equipment really did work on this band! Receiver sensitivity was found to be adequate for mobile work throughout the area, and squelch action was always crisp, as would be expected from modern solid-state design.

Circuit Details

Because of the interweaving of functions between transmit and receive for some sections of the circuitry, it is hard to separate the discussion into two categories. However, a good start can be made with a look at the transmitter. A front-panel-mounted switch selects the channel, or transmitter crystal frequency. The crystals are in the 45- to 46-MHz range. Multipliers bring this up to the vicinity of 90 MHz, where the path is divided. A portion of the 90-MHz energy is applied to the transmitter mixer, where it beats with a 20.5-MHz signal. This latter signal is obtained from a VCXO (voltage-controlled crystal oscillator). Modulation is applied to the VCXO, thus providing the fm

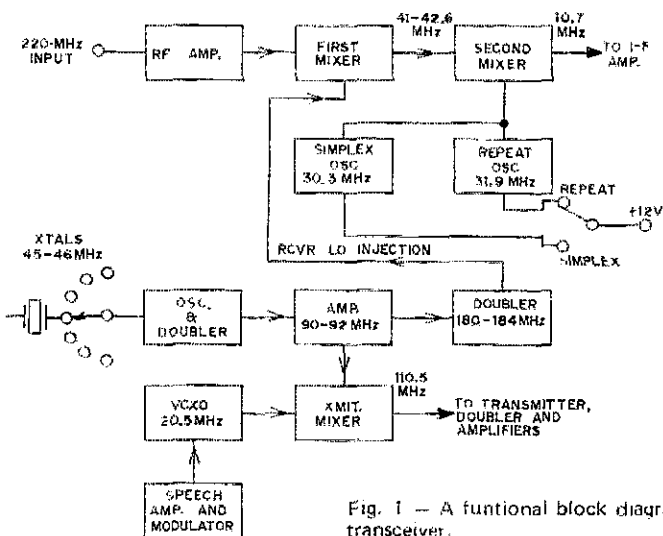


Fig. 1 — A functional block diagram of the FM-21 transceiver.

needed for communications. The output from the transmitting mixer, near 110 MHz, is amplified and doubled in successive stages to provide 220-MHz drive for the PA.

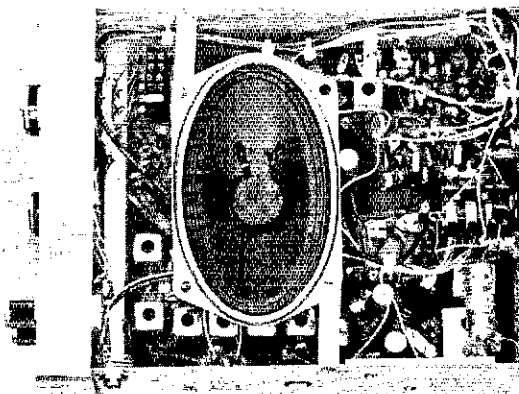
A second path for the 90-MHz energy leads to a doubler, producing 180-MHz output which is applied to the first mixer in the receiver. The i-f from the first mixer is near 41 MHz. A second mixer combines this high i-f with the output of an oscillator, providing a second i-f at 10.7 MHz, which is filtered, amplified, and detected in the normal manner. The oscillator just mentioned operates at 30.3 MHz for simplex receiving, and a different oscillator is switched in, at 31.9 MHz for the repeat mode. Both oscillators are crystal controlled, and selectable by means of a front-panel switch. As can be seen from the foregoing, and by examining Fig. 1, a single crystal serves as frequency control for both transmitting and receiving, thus reducing the cost to the amateur.

Glitches

When the unit was first turned on in the home workshop, the response from downstairs was an immediate thumping on the ceiling and some comments to the effect that whatever was going on was disrupting a favorite TV program. The upstairs reaction was an immediate frowning of the brow and some muttering. The instruction manual was then perused! After all, this was vhf, low power, and besides, the mic button had not been pushed. Further investigation showed that only one channel was being "herringboned," but that channel was *below* the 223-MHz frequency of the transceiver. Additionally, the upstairs TV set was not being bothered. To shorten a tale of persistent sleuthing, the crystal oscillator in the 45- to 46-MHz range was found to be annoying the i-f in the more modern TV set, while the older model, with its 21-MHz i-f, played on. It should be noted that the TV channel being affected was almost "fringe-area" quality in this vicinity; any channel providing a solid, clear picture was strong enough that the FM-21 did not bother it. Of course, when the transceiver is used in the car, as intended, there is usually no sustaining TVI problem. However, if the unit is operated from the shack, some additional shielding or filtering may be necessary in TV fringe areas.

Conclusions

The FM-21 has proven to be reliable and satisfactory for operation in the simplex mode or through repeaters. The controls are convenient to



This bottom view of the interior of the transceiver indicates the generous size of the speaker, a definite aid to communications effectiveness. Additional crystal sockets are located behind the speaker bracket in the lower right.

adjust during mobile operation, and the internal speaker is of a size to provide adequate volume for noisy environments.

The unit comes complete with a mounting bracket for mobile installation, a power cord with built-in fuse holder, and a microphone. Connection to the transmission line is via a vhf connector on the rear apron of the transceiver. — *WISL*

Clegg FM-21 220-MHz FM Transceiver

- Dimensions (HWD) and Weight:
2-3/4 x 7 x 9 inches, 5 pounds.*
- Power requirements: 12 to 14.8 V dc.
standby current, squelched, 120 mA;
receive, unsquelched, 450 mA;
transmit, 1.3 A.*
- Power output: 10.3 W at 13.5 V dc.*
- Sensitivity: 0.22 μ V for 20 dB of quieting;
0.1 μ V to open the squelch.*
- Channel capability: 12.
- Transmitter deviation: Adjustable up to ± 7
kHz.
- Receiver bandwidth: Will accept deviation
up to ± 6 kHz.
- Price class: \$320.
- Manufacturer: International Signal and Control
Corp., Clegg Division, 3050
Hempland Rd., Lancaster, PA 17601.
- * Measured in the ARRL lab.

Strays

Stolen Equipment

Stolen on March 6, from automobile, Genave GTX-200 No. 12-38, extensively modified, Philip D. Greenway, W4LRR, 234 Elden Drive NE, Atlanta, GA 30342.

I would like to get in touch with . . .

Those interested in forming a tenth call area teenage ssb net on 80, 40, 20, and 15 meters. WB0HBH

Amateurs who are volunteer firemen. WN9JUD

Anyone interested in helping restart the New England Slow Net. WN1QPS

Technical Correspondence

SOURCE FOR COIL FORMS

Technical Editor, *QST*:

I may have found a source for some of the harder-to-get small parts. You specify J. W. Miller coil forms for the converter described in the June, 1971, issue of *QST*. Now, 1/4-inch forms are no big deal, except that these have to fit the pc board for which a template is provided, so it looks like the Miller items are required.

A local electronics parts jobber, who supplies parts for TV repairmen in the area, carries Miller parts for TV sets. He does not have these specific forms on hand, but is perfectly willing to order the items for me in small quantities. Of course, there's a wait of a couple of weeks, since he orders just once a month, and I haven't even asked about price! There must be similar jobbers in other cities. — Julian N. Jablin, W9IWI, 9124 N. Crawford Ave., Skokie, IL 60076.

MORE ON BATTERY ELIMINATORS

Technical Editor, *QST*:

Concerning the Technical Correspondence on battery eliminators in *QST*¹ the author suggests connecting a bridge rectifier and capacitor to the output of a battery eliminator as in Fig. 1.

The original diode, if left in the circuit, prevents half of the bridge from operating, and the only improvement is from the added filter capacitor. If, however, the original diode is shorted out or the input to the new bridge is taken from point A, then Mr. Spitz's suggestion is valid. — Tom Schultz, Box 353B, Route 1, Kernersville, NC 27284.

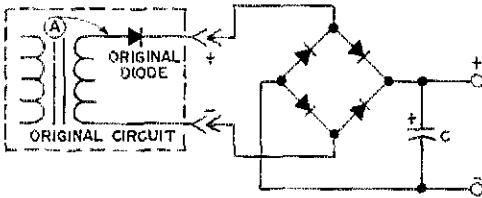


Fig. 1 — Addition of bridge rectifier and filter capacitor to obtain well-filtered dc from a battery charger. See text concerning original diode.

SOLID-STATE KEYING OF GRID-BLOCK TRANSMITTERS

Technical Editor, *QST*:

Many electronic keyers which do not use a relay place a positive voltage on the grid-block circuits they key. The keyer in August, 1973,

¹Spitz, "Battery Eliminators," Technical Correspondence, *QST*, September, 1973, p. 44.

*QST*² is an example, and places approximately +4 volts on the transmitter's bias and keying circuits. This is easily reduced to +0.6 volt by the addition of a diode to the circuit. It could be reduced to zero with the diode and a resistor, as shown in Fig. 2.

When the transmitter is keyed, the diode clamps the output voltage to +0.6 volt. The current through the diode is limited by the emitter resistor of the keying transistor to approximately 10 mA. When the transmitter is not keyed, the diode has to withstand up to -100 volts without excessive leakage. It should have a rating of 200 PRV or greater.

R14 can be used to drop the remaining 0.6 volt when the keying current from the transmitter flows through it. Its value is picked with the aid of Ohm's Law and the value of the keying current. It is not too critical, and 470 ohms should be close enough in many cases. — Joseph T. Olesik, WA1JQA/2, 3 Francis St., Pottsdam, NY 13676.

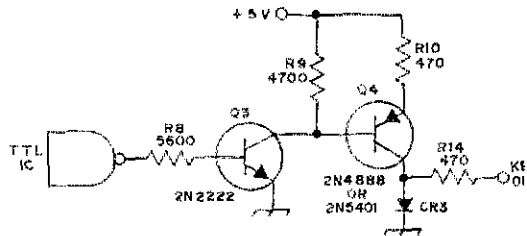


Fig. 2 — Keying portion of the WB4VVF Accu-Keyer. R14 and CR3 are added components to prevent positive voltages from being presented at the transmitter keying terminals under key-down conditions. Other component designations are those of the original *QST* article (see footnote 2). CR3 must have a rating of 200 PRV or greater; a silicon rectifier diode may be used.

CATV TVI

Technical Editor, *QST*:

I have run into a new TVI situation that may be of interest, and perhaps one that more hams will need help from in the future. I have had almost no TVI problems in my area. Then recently, cable TV was installed and I was deluged by TVI complaints from a circle larger than a city block, and all from cable customers.

Tests showed the problem to be TV front-end overload — all channels, all bands from 15 through 75 meters. High-pass filters cured it, and since it seemed that my signal was entering the cable system I called the cable company. They were extremely helpful and sent men, trucks, and test equipment immediately.

A series of high-pass filters, plus some improved grounds and terminations, cured the problem eventually. But the most interesting discovery is that the cable systems are two-way systems to permit eventual initiation of data transmissions from the home. This would be used to order merchandise, pay bills, and so on. The reverse

²Garrett, "The WB4VVF Accu-Keyer," *QST* for August, 1973, p. 19.

(Continued on page 59)

FILAMENT STARTING CURRENT IN HIGH-POWER TUBES

With the growing popularity of the grounded-grid amplifier, amateurs desiring to run the maximum legal power are turning increasingly to large transmitting tubes requiring high filament current. It is possible that they may be shortening the return from their considerable investment in such tubes by ignoring the matter of *maximum starting current* for the filaments.

In looking through tube manufacturers' data sheets, one finds this factor mentioned only in connection with certain highly specialized tubes (magnetrons and traveling-wave tubes, for example) until much higher power levels than are permitted for the amateur are involved. (The smallest conventional tubes we've seen where a minimum filament starting current is mentioned have plate-dissipation levels of around 20 kW!).

But proper operation of the heater or filament is a critical factor in the life expectancy of any transmitting tube. Variations of more than about plus-or-minus 5 percent are warned against in the tube manuals; and low filament voltage can be even more detrimental than high, as the writer of this piece quickly discovered when he lived briefly in an older-type home, with inadequate house wiring for modern loads.

But what we're concerned with here is what happens when full or near-normal filament voltages are applied to cold tubes, as happens very frequently in the average ham station. What follows is mainly from advice passed along by L. Edwin Ryback, W3QAG.¹

It probably does not matter too much with tubes going for five or ten dollars, but when amateurs begin paying \$50 to \$200 or more for tubes it behooves us to be sure we take every tube-life factor into account. Considering that a high percentage of filament or heater failures occur at the moment of turn-on, rather than during sustained operation, there must be a reason, and we'd do well to examine this "maximum starting current."

Check the filament or heater resistance of a cold tube, and the chances are it will be so low that you can't measure it on your typical ohmmeter. So — that low cold-tube resistance represents essentially a short across the filament transformer. But a 3-400Z (used in a fair number of ham rigs these days) has a *hot* resistance of 0.35 ohm, an appreciable value.

If you run the heater from a transformer that matches the tube's rating, 5 volts at 14.5 amperes, the actual heater voltage at turn-on will drop to a low value, simply because the transformer is incapable of handling the near-short that the cold tube represents. Under these circumstances you'll probably never have a maximum-starting-current problem, though you may have a hot transformer.

But suppose you look in the catalogs and find that a suitable transformer costs anything from \$18 on up. You decide to wait for the next radio club auction, in the hope that you'll get something suitable for 50 cents or less. You find a real bargain. It's a bit large, but it has a 30-ampere secondary, which should be on the safe side, as far

as over-heating is concerned. But this transformer is not going to have the turn-on voltage drop that a 15-ampere one would show. You may be letting yourself in for some maximum-starting-current trouble. There are several simple solutions.

You can insert a small value of resistance in series with the primary, determining by experiment the value needed to drop the initial applied heater voltage to something around half the rated value. You can equip this kind of thing to automatically short out the resistor with some sort of time-delay device, if you like. A rheostat (10 to 50 ohms) in series with the primary works well, and provides a means of setting the filament voltage to precisely the desired value, if you have a meter permanently connected across the tube socket terminals. A variable-voltage transformer (Powerstat, Variac, to name two familiar types) is fine, as it will allow precise adjustment of operating voltage. The smallest available types are capable of handling the current easily. They can be set by hand for each turn-on, or switched in and out with a suitable time-delay device, as with the rheostat. The rheostat and variable-voltage transformer methods are particularly desirable in these days of energy-crisis lowerings of line voltage. For a visual demonstration, turn on the filaments at normal voltage, and note how quickly they reach normal brilliance, then connect in the limiting arrangement and note the longer warm-up time.

The cost of any of these devices is small compared with that for tube replacement, and may well pay for themselves in increased tube life. The assurance that you are operating your expensive tubes correctly as to filament temperature is worth whatever it may cost, within reason, and you'll be rewarded with efficient, reliable results from the amplifier, as well. — *W1HDQ*

Strays

There has been a change from \$5.50 to \$6.75 in the amount of donation for the Two-Tone Encoder Enclosures from that given on page 40 of *QST* for May, 1974. This new info became available after the last issue went to press.

When the use of wire Morse code was being phased out by the New York Central Railroad about 1950, W8VWX, Art, was given permission to call CQ on the Morse wire by the telegrapher he was visiting, W8WEO. To W8VWX's amazement he received a prompt reply from W8VWV, also named Art! Since that wire Morse QSO, W8VWX has contacted W8VWV several times on the air.

Late News for VHFers

Results of the April 27th and 28th EME test by WA6LET show 37 contacts with 25 stations. Their two-meter work encompassed 13 states plus VE2 and VE3. Three ssb contacts were made, with VE2DFO, W6PO, and K8III.

The least power and antenna that was successful was 150 watts and a 40-element collinear by WA6GUY. Photographs and more information will be in a subsequent issue of *QST*. Another test is scheduled for May 25 and 26. Some details about the use of the 150-foot dish were given on page 85 of *QST* for April, 1974.

¹ 73 West Garrison St., Bethlehem, PA 19018.

Definition of Terms

One of the problems in licensing repeaters, and for that matter even discussing them, is that there have been no standards as far as terms are concerned. Many months ago in this column we mentioned that it was difficult to know what some repeater people were talking about because the terms they used didn't make sense. In any case, the following list has been compiled through cooperation with and informal approval by FCC from terms in common usage by amateurs. When licensing a repeater, please use these terms in your applications to FCC.

Automatic control: Control of a RPT or AUX station by means other than a control operator. (Rules have not been adopted for automatic control.)

Command decoder: A device for transforming electrical control signals into discrete command signals in a remotely controlled station. A typical example is the transforming of a tone sequence into a command signal for activating a relay.

Command encoder: A device for transforming control operator instructions into electrical control signals. A typical example is a switch matrix which initiates a set of audible tones.

Continuity current: A steady electrical current flow in a line established for the purpose of determining the integrity of the line.

Control: Responsibility for the proper immediate operation of an amateur radio station in compliance with the rules.

Control link: Apparatus for effecting remote control between a control point and a remotely controlled station.

Controller: A device for transforming command signals into the activation/deactivation of various control lines in a remotely controlled station.

Control lines: Lines in a remotely controlled station activated by a controller. A typical example is the B+ line in the station transmitter.

Control operator: An amateur radio operator designated by the station licensee to also be responsible for the emissions from that station (97.3 p). The control operator must enter his signature and primary station call sign into the station log for the periods he is on duty.

Control point: The operating position of an amateur radio station where the control operator function is performed (97.3 q). Every station when in operation must have a control operator at an authorized control point (97.79 b). If the control point is not at the station location, the station must be licensed for remote control. When the control link is radio, the control point must be at an authorized control station.

Control station: A station licensed to conduct remote control of another amateur radio station (97.3 i).

Control transmitter: The transmitter at a control station which transmits the control signals to a remotely controlled station.

Dedicated line: Wired interconnections in a control link, between the control point and the remotely controlled station, without any inter-

mediary point. Also called "hardwire" and "solid copper pairs."

Direct control: Control by a control operator from a control point located adjacent to the station transmitter(s), such that the associated operating displays and adjustments are accessible to the control operator. (Direct mechanical control, or direct wire control of a transmitter from a control point located on board any aircraft, vessel, or on the same premises on which the transmitter is located is also considered direct control.)

Guard receiver: An independent receiver, at a remotely controlled RPT or AUX station, capable of receiving the radio signals of any other station already transmitting on the same frequency, and disabling the transmitter to prevent interference to the other station.

Malfunction detector: A device for detecting the absence of a normal continuity current or system voltage on a dedicated line or public telephone system line.

Monitor receiver: A receiver at the control point for a remotely controlled station, for the purpose of monitoring the emissions from the station. In some systems, it is also used for determining the presence of other radio signals of other stations already transmitting on the frequency(s).

Public telephone system: A direct dial common carrier. (Systems using a local or control telephone operator cannot be used for a control link.)

Radio remote control: Remote control of an amateur radio station by means of a control link using a control station which transmits control signals to the remotely controlled station on amateur frequencies above 220 MHz (excepting 435-438 MHz).

Remotely controlled station: An amateur radio station licensed to be operated by remote control from an authorized control point. (Although many RPT and AUX stations are licensed as remotely controlled stations, not all are. Nor are all remotely controlled station RPT or AUX stations.)

Remote receiver: RPT receiver(s) in a split-site repeater system.

RPT (repeater station): Station licensed to automatically retransmit the radio signals of other amateur radio stations for the purpose of extending their intracommunity radio communications range (97.3 i). (Only other amateur stations desiring to be retransmitted may be retransmitted.)

Ring counter: A device used at a remotely controlled station as a command decoder in a wire control link using a public telephone system. It transforms a specific number of rings into a discrete command signal for the controller.

Semi-automatic control: Control by control operators, or a RPT station limited to use by only those control operators, from control points not at the station, by means of control signals transmitted simultaneously with their amateur radio communications. (Rules have not yet been adopted for semi-automatic control.)

Split-site RPT: RPT stations having the receiver(s) located on different premises from the transmitter, and interconnected by an intermediary link. If the link is radio, an AUX station is required.

Standby shutdown transmitter: An independent transmitter at the control point for a
(Continued on page 59)



REPEATERS ARE PUBLIC SERVICE MACHINES

BY A. STEWART JOHNSON,* WIUVE

THE AVAILABILITY of fm equipment has opened up the area of public service to a great number of amateurs not previously involved. Additionally, the opportunities for public service have also expanded greatly. This article hopes to show how one repeater group went about meeting its responsibility to serve "in the public interest, convenience, and necessity," which, after all, is a main justification for allowing amateurs valuable portions of the radio spectrum.

The Minuteman Repeater Association (MMRA) is an organization of 250 members serving an area including some 75 communities within I-495, a highway nearly circling Boston, Massachusetts, with an average radius of thirty-five miles. Its goal is to provide solid radio coverage within this area through its three repeaters. Located in Boston, Weston and Marlboro, each of the repeaters is under a different trustee and is serviced by its own group of technicians under the overall guidance of the Technical Coordinator. All equipment is owned by the MMRA, an incorporated, non-profit organization.

Responsibility for public service is vested in the MMRA Public Service Committee (PSC). Currently composed of ten members, it has responsibility for coordinating public-service activity. To simplify its work the service area is divided into eight geographical sub-divisions, each the responsibility of a member of the PSC.

In the case of a pre-planned event, the area coordinator will investigate it and advise the Board of Directors of the MMRA as to what action he recommends. Should it be an official MMRA activity, or should it be handled unofficially by a small group of members? Principal considerations are: (1) Does the event require the services of the MMRA? (2) Is the event properly sponsored and organized? The Board's decision is then implemented.

Radio amateurs fiddled with their repeaters as Chelsea burned, and the tune which resulted was music to everyone's ears: a dramatic example of the usefulness of amateur repeaters in public service communication.

In the event of an emergency, the area coordinator concerned has the responsibility for taking whatever action is required. Generally he will consult with the PSC chairman and/or other PSC members, time permitting. Together they will decide the course of action. Time not permitting, the coordinator makes the decision, which can range from taking no action to requesting a full mobilization of MMRA resources.

In accordance with a policy of flexibility, any one coordinator can act for another if that coordinator is unavailable to direct the activity. In allowing the PSC to operate in this manner, the Board of Directors is simply letting those best qualified to direct PS activities do so, just as the technical committee is responsible for the functioning of the radio equipment.

It's a Conflagration

The following account of the Great Chelsea (Massachusetts) Fire of 1973 is taken from the MMRA records and is presented to show how one amateur radio organization reacted to the challenge of "doing its thing."

Shortly after 3 P.M. on Sunday afternoon, October 14, the first alarm was sounded for a blaze in the heart of Chelsea, just north of the City of Boston. Aided by strong winds, the blaze soon spread to adjoining properties, and had become a general alarm fire within a short time thereafter.

* 20 Woodside Rd., Newtonville, MA 02160



The Minuteman Repeater Association's Public Service Committee provides the planning and leadership behind the organization's emergency and other public-service activities. The committee is composed of (left to right) WA1QXK, K1UVD, WA1GRH, W1REP, WA1QXH, K1CCK (standing) and K1UAQ.

By 4 P.M. it was apparent that this was no ordinary fire — it was a conflagration in the true sense of the word, and so declared by the Chelsea Fire Chief.

As the flames spread to housing areas, evacuation of the homeless and those threatened by the fire began. Evacuation centers were established at the Chelsea National Guard Armory and nearby churches. Telephone circuits were flooded, and each city, town or public service was on its own radio frequency, often unable to communicate with a vehicle only a few hundred yards away! Shortly after 4 P.M., K1UAQ of the Minuteman Repeater Association's Public Service Committee contacted the Chelsea Police Department with an offer of assistance. The offer was accepted!!

An emergency base station was established at the police station on the prime MMRA frequency (146.22/146.82) and a second base station established at the home of W1WSN (located in Stoughton, a town Southwest of Boston). This second facility was simultaneously operated on .22/.82, and the Boston MMRA Repeater frequencies .13/.73. A call went out on both channels for mobiles, particularly with walkie-talkie capability, to assemble at a shopping center in Medford, a short distance from Chelsea.

To coordinate mobiles, .13/.73 was used with assignments being made by W1WSN. Requests for assignments were made via .22/.82 from the Chelsea Police Station, and shortly thereafter also by K1DJG and WA1RSE who set up operations first at Framingham Central Fire Headquarters, and then at the Registry of Motor Vehicles radio room. In summary, the prime repeater was used for base-to-base communications and the secondary repeater for dispatching of mobiles.

Deployment of mobiles began almost immediately, one of the first being dispatched to a major intersection to provide communications between the police officer on duty and the Chelsea Police Department. Another was sent to the Armory for evacuation traffic. Others were sent to hospitals and other locations as required. Mobiles were dispatched to a major staging area from which ambulances and other emergency vehicles were

assigned, and furnished communications there. The National Guard ranking officer also asked for 25 mobiles with walkie-talkies to assist in communications; these were dispatched within minutes of the request. One amateur made a "diaper-and-bottle" run to assist evacuees at the Armory. Another made his portable unit available to a Marine helicopter at the request of officials. Other hams furnished personal communications for police chiefs and other officials.

By 11 P.M. the fire had been contained, though still not under control. The amateurs continued to assemble for assignment and move out on request, until 1 A.M. Monday (Oct. 15) when the mobile communications net on .13/.73 was given permission to secure and return all unassigned mobiles to their homes. About 3 A.M. all amateur radio operations were able to secure.

Analysis

The role of amateur communications in a major disaster is one that depends upon circumstances. With the development of amateur fm, the number of amateurs equipped for public service has expanded tremendously. The comments that follow are based on a critique by the Public Service Committee of the MMRA and observations by the author. Although they refer specifically to the preceding account, it is hoped that they might suggest guidelines for others who may find themselves in the same position.

Fundamental to the planning policy of the MMRA is the concept that the function of amateur radio in an emergency, or any other event it might be involved in, is communications. Accordingly, in a lost-child search, it will provide communications for the search groups, but will not get involved with the directing of search operations. There are two important benefits of such a policy: (1) The communicators can direct all their attention to the problem of providing the required communications. (2) It will serve notice on public agencies that may be served by amateur radio that the amateurs are interested only in "doing their thing" and not interfering in matters not directly related to the communications assignment. This becomes important especially in those instances where the agency to be served has had an unfortunate experience with another volunteer public-service group.

The key to this operation was the Public Service Committee of the MMRA. It meets monthly to discuss and formulate public-service policy and operational procedures. Having met regularly for over a year, and having had some practical experience, it was prepared to meet the challenge. From the moment that one of its members, K1UAQ, was enroute to the Chelsea PD, with a complete base station, other members were preparing for a communications mobilization. By the time the mobilization was implemented, not only was a base station on the air at the Chelsea PD, but the base station of W1WSN was also. Other MMRA members called in to say they would be operational at home and available to assist, for example, in relaying messages by landline.

If organization was the key, the hand that turned the key and opened the door to a near-flawless operation was the tremendous teamwork displayed by the personnel involved. Persons becoming aware of the situation either offered their services or stood clear of the operation. Once they became aware of the situation and recognized the superb direction being given by the control sta-

tions, two repeater operators, K1MON in Waltham and WA1NPN in Maynard, offered the MMRA full and unrestricted use of their repeaters.

Comments

Unlike many public service activities involving ham radio, the amateurs' role in the Chelsea disaster was relatively unglamorous. Assignments for the most part involved providing communications between hospitals, evacuation centers and the emergency command center; it is doubtful that more than a half dozen of the 96 involved amateurs had a first-hand view of the fire as a direct result of a specific assignment. Incoming units were directed to the staging area and then assigned in a progressive, orderly manner. In this way everyone knew that he was an active element in the overall picture.

In a couple of instances, after the operations were secured, individuals who had been given assignments complained that they felt their time had been wasted. Instead of shrugging them off, it was carefully explained that their assignment was made in anticipation of a possible major evacuation in which they would have had an important communications role to play. Fortunately the fire was contained and the evacuation did not become a reality.

The ability to command two repeaters made possible the dual channel radio system, as previously described. The advantage of the capability was soon apparent when amateurs began checking in, for even as they were calling, assignments were being made. To have done everything on one channel would have been nearly impossible with 96 portable and mobile units involved. With the availability of a repeater, simplex operation was at a minimum. MMRA's chief technical coordinator, K1RAK, was assisting at W1WSN and available to initiate repeater maintenance if required. In the case of a power failure at the prime repeater, emergency power was immediately available. Most units had simplex capability of 146.52 or 146.94 direct. In its review of this matter, the PSC found no serious objection to reliance on its own repeaters and its principal recommendation was that plug-in back-up equipment should be available at all three MMRA machines. Additionally, it was recommended that technicians be automatically assigned to the active repeaters in the event of an emergency operation. With spare equipment, and a technician to install and service it in the event of a malfunction, reliance on repeaters in an emergency could be justified.

One of the problems that did arise was that of passing through police lines. Fortunately, because of the fine coordination between the various police agencies involved, it remained a minor problem. This subject was reviewed and it was decided that through a continuing program of public relations, sufficient recognition of amateur radio as a valuable emergency communications service could be effected, and a simple identification system

developed. The MMRA has its own decal; its use on both the front and back of members' cars is being encouraged, and its recognition by public agencies promoted. Additionally, an arm band for members involved in portable operation with walkie-talkies, is being designed.

The mobilization of the participating radio units at the staging area went reasonably well. However, there was some confusion as to who had what equipment. Consequently, it was felt that some sort of a form should be made up that would be given each unit arriving at a staging area. This form would list the equipment available, the length of time the unit would be available, frequencies available and other pertinent information. This check-in card would be retained by the on-scene coordinator and used to guide him in making assignments.

By the time operations had ceased, almost 100 radio amateurs had volunteered or contributed their services, numerous pieces of emergency traffic had been cleared and an unknown number of civilians, as well as authorities, had benefited from amateur radio. It is interesting to note that at no time did amateurs misuse the frequencies, no horseplay was heard, nor were any jammers or "button pushers" heard. It was also gratifying that several repeater owners, contacted the MMRA stations, by phone or radio, offering the unrestricted use of their repeaters for the duration of the emergency.

In retrospect, it is apparent that fm offers an ideal interface between authorities and amateurs. The walkie-talkie or mobile radio is a familiar object; ignition noise and interference is virtually non-existent and the repeater makes wide-area coordination a reality instead of a dream. Bear in mind the problem of coordinating ten or twenty public service organizations without having a command center and radios for each service available. Amateur radio, by its flexibility, makes such communications possible.

It is also evident that an association must be prepared for such emergencies. The Public Service Committee of the Minuteman Repeater Association, chaired by WA1OQK, is an active group of amateurs who spent many hours formulating emergency action plans that can work. Channels have been established to the state police and other agencies so that MMRA members are available on an emergency basis. The bright yellow decal of the MMRA is a welcome sight to many authorities now that the flames have aided in the search for lost children, controlled March-of-Dimes Walkathons, and reported scores of accidents via the auto patch.

(Continued on page 58)



Emergency situations such as this fire which ravaged Chelsea, Massachusetts, last fall, call for communications assistance. Officials were aided by nearly 100 amateurs using repeater facilities in the Boston area. *(This and title photo courtesy of the Boston Globe)*

July 'Open' CD Parties

APPOINTEES—OFFICIALS—LEAGUE MEMBERS

JOIN THE FUN!

JOIN THE FUN!

JOIN THE FUN!

IN MAY OF 1969, the ARRL Board of Directors voted to expand one of the quarterly ARRL CD Parties to include all league members.

What, you may ask, is this CQ CD all about, anyway? CD in this case designates the ARRL Communications Department. CQ CD is, in effect, a call for all ARRL appointees (and elected officials, too) to get together, work each other and enjoy a brisk test of operator and equipment. The object is to work as many of the eligibles as possible in as many different ARRL sections (p.6) as possible. The same station may be worked on each of the bands, but a section may be worked just once for credit. Thus, the maximum multiplier will be 75. Now, how come that, when there are only 74 sections? Well, for many years Yukon and the Northwest Territories were grouped together to form the VE8 section. Because of the small number of hams therein, this section (as such) was dropped quite a few years back. However, the VE8 multiplier was retained in ARRL contests — just for fun!

The exchange is brief and to the point. Appointees/officials transmit a short designation of their "status" plus ARRL section. Non-appointees-officials may transmit: member (MBR), life member (LM) or charter life member (CLM) — whichever is applicable; plus ARRL section.

The appointees and officials you'll run into, with some "probable" cw abbreviations of their designations, are shown below:

President	PRES
Vice President	VP
Past President	PASTPRES
Director	DIR
Vice Director	VDIR
Assistant Director	ADIR
General Counsel	GC
Associate Counsel	ASSTGC
QSL Manager	QSLMGR
Public Relations Asst.	PSA
Section Communications Manager	SCM
Asst. Section Communications Manager	ASCM
NFS Official	NTSMGR
Contest Advisory Committee	CAC
DX Advisory Committee	DXAC
Emergency Comm. Advisory Comm.	ECAC
Repeater Advisory Committee	REPAC
Intruder Watch	IW

CW

Starts 2300 GMT July 13
Ends 0500 GMT July 15

PHONE

Starts 2300 GMT July 27
Ends 0500 GMT July 29

You may operate any 20 hours out of the 30-hour periods. Times out must be 15 minutes or more to count as off-time.

Section Emergency Coordinator	SEC
Emergency Coordinator	EC
Route Manager	RM
Phone Activities Manager	PAM
Headquarters Staffer	HQ
Official Relay Station	ORS
Official VHF Station	OVS
Official Observer	OO
Official Bulletin Station	OBS
Official Phone Station	OPS

Scoring is simple. Count 5 points per QSO (remember now, you can work the same station, for example, on 160, 80, 40, 20, 15 and 10 meters — vhf too!). To this figure add your ARRL code proficiency credit (you must have the certificate at that time). Multiply this new sum by the section multiplier.

Suggested frequencies are: CW, 35 kHz up from the bottom edge. Phone, 3870-3900, 7200-7235, 14265-14285, 21340-21360, 28600-28630. Try 10 on the half-hour and 15 on the hour from 1500-2100 GMT. Try 160 at 0530 GMT and again during the last 5 minutes of the party. Don't forget 6 and 2.

Reporting should be done on ARRL CD Party report forms. An addressed stamped envelope sent now should get the logs to you in time for use in mid-July! The cut-off date for receipt of entries at Hq. is August 10. All participants reporting activity will receive a copy of the appropriate CD Bulletin containing final results. High-claimed CD scores will, as usual, appear in QST.

Remember now, CQ CD CQ CD CQ CD de
—WAIPID K

MULTIPLIER CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE
Conn	ENY	Del	Ala	Ark	Flay	Ariz	Mich	Ill	Colo	Mar
EMass	NLI	FPa	Ca	La	LA	Ida	Ohio	Ind	Iowa	Que
Me	NNJ	MDC	Kv	Miss	Org	Mont	WVa	Wisc	Kans	Ont
NH	SNJ	WPa	NC	NMex	SRar	Nev			Minn	Man
RI	WNY		NFla	NTex	SCV	Oreg			Mo	Sask
Vt			SC	Okla	SDgo	Utah			Nebr	Alta
WMass			SFla	STex	ST	Wash			NDak	BC
			Tenn	CZ	SV	Wyo			SDak	VE8
			Va	SV	KL7					
			WI	KH6						

Results, 1974 VHF Sweepstakes

CONDITIONS FOR THE 27th running of the January VHF SS, held January 5-6, were mediocre - to put it mildly. Although scores didn't climb greatly, participation was up in many parts of the country. Bad weather in Southern California (snow) and along much of the Eastern seaboard (ice) kept people indoors during the contest - which kept scores up, to some extent, despite the dismal conditions.

Only one divisional scoring record was set this time around - that by K8III with the top multiop score to boot. The chart on the next page gives all-time division highs for the January VHF SS. Many of those marks, especially those set back in the sunspot choked days of 1958, will be hard to topple.

This year some were confused by the time. Although time is no longer a part of the exchange and its inclusion is not specifically required in the contest rules, it *is* required by the FCC. Next year there will be an addition to the contest rules covering this point.

The WB4CXC multiop is a little unusual - it was composed of two husband and wife teams. CXC is married to WB4LSK and WA4DFV is the wife of WB4KMK. You know the old saying, "A family that contests together. . ."

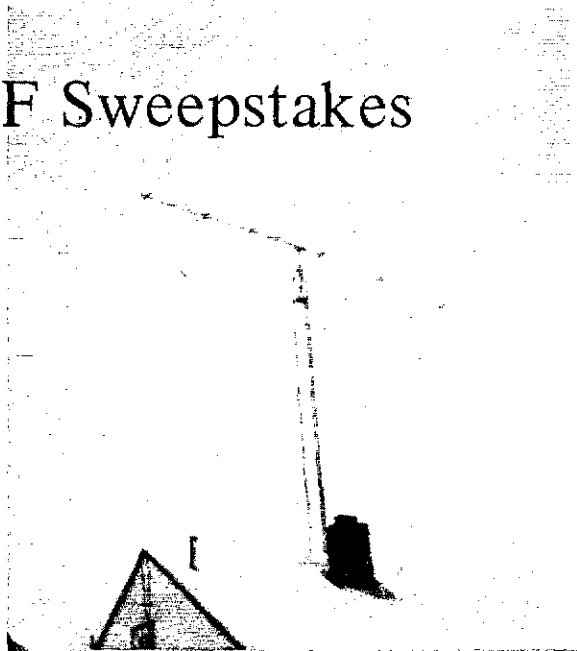
Entries were down this year to 580. Awards are scheduled for a June 17 mailing.

Clubs

Well, Mt. Airy did it again - keeping alive their string of consecutive gavels started in 1961. That's 14 now!

The club competition in the VHF SS has been around as long as the contest itself. A few hours of research produced some interesting information.

Of all the clubs competing this year, only two were listed in the results of the first contest back in 1948. They are York Radio Club and South Jersey

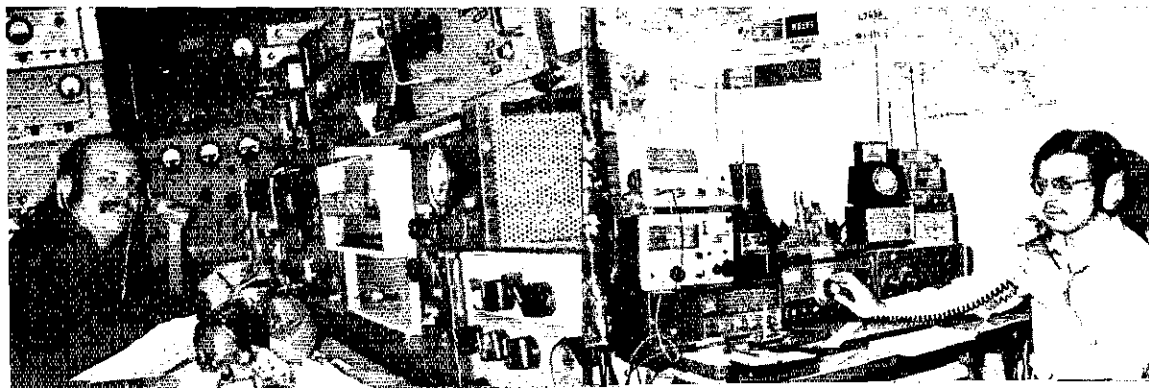


WA20TK

DIVISION LEADERS

Single Op.	Division	Multiop.
K3IPM	Atlantic	WB2LZD/3
K9OXY	Central	K9YHB
W0OYL	Dakota	
WB4JGG/4	Delta	WB4CXC
WB8IGY	Great Lakes	K8III
WB2ZVS	Hudson	W2SZ/2
K0MST	Midwest	
WA1IQJ/1	New England	W1KGZ/1
K7GWE	Northwestern	WA9DGM/7
WA6JUD	Pacific	
W4YEB	Roanoke	W4BFB/4
W5TDZ		
W9MHL/0	Rocky Mt.
WA4GCH	Southeastern
K6YNB/6	Southwestern	WA6UMI
W5QDB	West Gulf
VE2DFO	Canadian

Left: K2OWR who holds both the single op and multi op records in the Hudson Division. This year Bill ran another NNJ multiop effort and grabbed 4th place nationwide. Right: WA6MHZ. Pat used 6 and 2 meters to earn the top San Diego total. Next year he hopes to have 2 meter capabilities.



RA. In fact, SJRA holds the record for most club entries, having been in every VHF SS since the beginning — an unbroken string of 27 club entries. FB, indeed.

The following is a listing of all the clubs that entered this year's contest in order of decreasing club submissions. The number to the left of the club name is the number of years a VHF SS entry has been received, and those at the right represent the years in which an entry was received.

27	SJRA	48-74
24	Hampden Co.	49-63, 65-72, 74
24	Rochester	50-59, 61-74
23	Dayton ARA	52-74
21	York RC	48-61, 68-74
21	Lake Success	51-65, 67-71, 74
18	Mobile Sixers	57-74
18	Mt. Airy	57-74
17	6-M Club Chicago	58-74
15	S. Cal. VHF	59, 61-74
14	Dutchess Co.	60-72, 74
12	Albany ARA	57, 60, 65-74
9	Gloucester Co.	62-67, 71, 73-74
6	Suburban ARC	69-74
6	Whitman ARC	63-64, 71-74
5	Scioto Valley	63, 71-74
3	Parma RC	71-72, 74
3	Potomac Area VHF	72-74
2	Warren ARA	72, 74
1	Spartanburg ARC	74

Soapbox

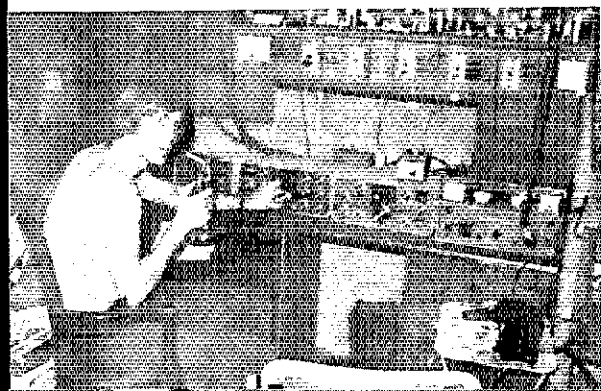
I enjoyed the contest information exchange this time, made it more of a challenge. Would have been on 2 but my P & H final died first QSO. — (WA8TTS). Perhaps next year beams and a spinner will provide more excitement. A good band opening would also help. — (WB4NBK). My license, being first issued as 1NX on July 10, 1916 (giving me a check of 16 - 57 years ago), gave me many chuckles. I guess many figured that no one would still be alive with ck 16. So right here I will claim to have been the oldest ham to come up with a score of 1800 points in the East Coast. Am I? — (W3HB). [As far as I can tell you had the lowest check of anyone in the contest. FB. — Ed.] Really enjoyed this VHF SS. Having just moved down to Illinois from Minn. in September, it is quite an experience to tune the 2-meter band and actually hear signals. Propagation the first day in the Midwest was fair to average (which is poor) and the second day was average to YUK! It really added a lot to include the year licensed to the exchange. I'm all for continuing that particular feature. — (WB9NLF/W0MJS). This was my first contest from this location (ex-W2EWC) and I must say things were very much different than they were when I was located in NNI. I ended up on the receiving end of a 6-meter pile-up I'll never forget. My apologies to all those stations I didn't get to work. — (W0OYL). Conditions were sporadic, but the fog was solid from Ground Hog Mountain, Va. — (W4BFB/4). Fantastic! Beautiful opening from here to East Coast and points in between during Sunday afternoon and night. — (WA0CSL/0). Best January SS in a long time. FB conditions. — (WA1IQJ/1). The hand-writing on this will be even worse than usual. Reason — the QTH is the 11th

floor of Hartford Hospital. Having participated in every VHF contest, of all kinds, I couldn't let a hospitalization keep me out of this one. With help from WAINBR I was able to work 3 stations on .52 simplex FM and keep my string unbroken. — (W1HDQ). [Ed had a spinal disc operation but is now very much up and around. — Ed.] Much better participation on 2 meters than I expected. — (WB2HDS). I like the new format. — (WA1MD). Mixed feelings about the new message form. The simplification — ending of time consuming discourse on the time (some neophytes felt agreement was required, others felt it was necessary to justify differences), getting the November and January exchanges to look alike, and learning when the other guy was licensed are all to the good.

AFFILIATED CLUB SCORES

Club-Score-Entries-Winner

Mt. Airy V.H.F. RC (Pa.)	581,117	65	K3IPM
Rochester V.H.F. Group (N.Y.)	300,768	116	WA2TEY
South Jersey RA	236,242	43	W3MFY
Potomac Area V.H.F. Soc. (Va.)	67,836	10	K3DUA
Mobile Sixers RC (Pa.)	53,215	24	W3IZU
Suburban ARC (Pa.)	22,418	7	WA3OTI
Dayton ARA (Ohio)	21,746	11	WA8ZUQ
Scioto Valley ARC (Ohio)	18,826	9	K8SUB
Hampden Co. RA (Mass.)	16,838	8	W1MTV
York Radio Club (Ill.)	16,338	12	WA9NRI
Dutchess Co. V.H.F. Soc. (N.Y.)	13,993	3	K2DNR
Whitman ARC (Mass.)	13,366	10	W1DKD
Six Meter Club of Chicago	13,074	18	WA9FIH
So. Calif. V.H.F. RC	12,434	4	K6YNB/6
Albany ARA (N.Y.)	10,606	4	WA2JWO
Gloucester Co. ARC (N.J.)	10,084	5	WB2BZY
Warren ARA (Ohio)	8640	4	W8KUR
Parma Radio Club (Ohio)	6686	3	K8YYK
Spartanburg ARC (S.C.)	1336	3	WA4LBO
Lake Success RC (N.Y.)	936	3	W2TNI



Using only 6 meters Tom, WA8TTS, garnered 83 QSOs in Ohio. As the first soapbox comment puts it, he had a bit of trouble on 2.

All-Time Division Leaders

Single Operator			Division	Multioperator		
Call	Score	Year		Call	Score	Year
W3MFY	52,910	68	Atlantic	K21TQ	36,468	58
K9HMB	20,746	73	Central	K9DZK	26,520	68
KØDTA	4100	68	Dakota	WØTKO	10	56
K5HUW	9680	60	Delta	WB4HEL/4	8880	73
K8UQA	34,232	69	Great Lakes	K8III	53,568	74
K2OWR	32,830	72	Hudson	K2OWR	50,427	73
K9ECV/Ø	12,690	68	Midwest	WAØJYK	9520	68
W1HDQ	24,402	58	New England	W1GB/1	36,250	63
K7AAD	7650	58	Northwestern	K7BBO/7	5642	63
W6BAZ	11,556	58	Pacific	K6TJL/6	13,248	61
W4LTU	13,206	60	Roanoke	WA4LTS	12,792	68
K7JFQ	5320	68	Rocky Mtn.	WAØPHZ/Ø	8062	68
W4GDS	26,400	73	Southeastern	W4TOE	6042	61
K6YNB/6	12,300	70	Southwestern	W6FNE/6	20,352	63
K5TKR	13,640	60	West Gulf	K5STI	12,804	59
VE3ZZZ	12,896	72	Canadian	VE3ASO	7800	71

However, we are getting further away from the original concept of exchanging an amateur type message preamble (for practice), and leaving out the signal report has the distinct disadvantage of eliminating essential QSL information from the log. Even though of often questionable accuracy it was better than none at all. - (K1CHY). Wish I had ssb on 6. - (K2OVS). Hoorah for the new rules. - (K9KQR). Minnesota on 6 with a triband beam? Wow! - (WA3NAF). Sure could have used a good opening to any area for an extended period. - (WB8BGY). The boys in the Northeast didn't seem to be listening for the weaker signals. At least 100 different 1, 2 and 3 land stations were heard by myself and other NC stations (many for the entire two days) with only a handful being worked. - (K4LWZ). I was very disappointed with the lack of 2-meter cw and ssb stations. All of the 2-meter activity seemed to be on FM. - (K9DZS). This is the 5th year for us to be at this fire tower on the Tenn-NC line. Down below we had been covered with rain and fog for days. We suddenly broke into beautiful weather above 3000 feet (tower is at 4860 feet) and erected antennas in shirt sleeves. Some contrast to the usual below-zero weather we've had in the past. - (W4ZZ/4). Not much action. Scatter was at its poorest. - (WA6JUD). Activity was best I've seen for a winter contest. - (WB2ZTD). Hoping more amateurs from Vermont would send in logs. - (K1GYT). Four feet of snow in the Southern California mountains Friday night closed every last mountain road. I ended up operating from a residential neighborhood in the Palos Verdes hills overlooking L.A. instead of a planned site 8500 feet up in the mountains. - (K6YNB/6). As far as I have been able to ascertain through WPa contacts, I believe that I was the only XYL in this area working the contest. - (WA3VQV). Tried to operate from Mt. Diablo but got snowed out so went home and got on just for the fun of it. - (K6GSS). Being 200 plus miles

south of Philadelphia, few stations hear, or listen, for us down here. Next year we would like to remind the gang up there to stop QRMing each other, turn your beams south and work us. We can hear you! - (WB2LA1/4). I think everybody else would be more interested in their RST than when I got my license. - (WB4JGG/4). The old 6-meter a-m rig, rock bound on 50.113, did a good job. It's like fishing with a cork and worm - you have to wait until someone gets close enough. - (W8EVY).

TOP TEN

Single		Multi	
K3IPM	45,825	K8III	53,568
W3MFY	37,264	W8CCI	49,404
W2EIF	27,234	W2SZ/2	41,580
K1SFF/3	27,160	K2OWR	40,794
W3ZD	25,568	K8LEE	39,400
W3KKN	24,360	WA2SNA/2	30,710
WA1IQJ/1	24,161	WB2LZD/3	27,027
WB2ZVS	23,206	W1KGZ/1	21,720
K1JDY/3	22,374	WA2KHL/2	20,288
K3ZSG	21,886	K1MNS	13,608

WA2RPW used a FT-101 and transverters on 6, 2 and 432 for 21 QSOs in the competitive SNJ section.



VE	WA1CYK/1	312- 13- 2-B	WB2EFL	1300- 50- 3-AB	LU7BD/W2	1254- 57- 1-B
Quebec	WA1GVV	168- 7- 2-B	W1GRR/2	988- 38- 3-AB	WA2DRC	1212- 51- 2-A
VE2DFO	W1UWX	44- 2- 1-B	WB2BNS/2	924- 33- 4-B	K2JQJ	1120- 2812-B
VE2ADE	WA1HHN (+WA1s LFR LPJ)	8944-172-16-AB	WA2AXJ/2	800- 29- 5-A	K2LCS	1100- 50- 1-AB
			W2VX	864- 36- 2-B	WA2SDK/2	1100- 50- 1-A
			WA2WCT	840- 35- 2-AB	W26LU	1034- 47- 1-B
			W2GGB	720- 30- 2-B	WA2PCX	1034- 47- 1-AB
			WA2HJG	720- 30- 2-A	WA2TPR	1008- 28- 8-A
			WA2KOI	600- 20- 5-ABC	WB2HTC	990- 45- 1-B
			WA2OSN	552- 23- 2-B	W2ICE	902- 41- 1-AB
			WA2RPW	546- 21- 3-ABD	W2UZL	902- 41- 1-B
			WA2YHD	490- 15- 3-AB	K2CBD	880- 40- 1-B
			W2SDB	288- 12- 2-B	WB2QVA	880- 40- 1-AB
			W2OSD/2	240- 10- 2-B	WA2BOH	858- 39- 1-AB
			WB2NPF/2	88- 4- 1-B	WB2NSD	858- 39- 1-AB
			W2HBE	22- 1- 1-B	K2YAH	836- 38- 1-B
					W2CQJ	836- 38- 1-AB
					W2EBF	748- 34- 1-B
					W2PDS	726- 33- 1-A
					WB2QXB	726- 33- 1-AB
					DL7KX/W2	720- 30- 2-B
					W2JAD	660- 30- 1-A
					WA2UEB	660- 30- 1-B
					WB2EUB	648- 27- 2-AB
					W2SFA	616- 28- 1-AB
					WB2JNA	594- 27- 1-A
					WA2JHC	550- 25- 1-B
					WB2NJE	550- 25- 1-B
					W2GVJ	418- 19- 1-B
					WB2FLX	374- 17- 1-B
					WB2FKY	330- 15- 1-B
					K2LZG	168- 6- 4-D
					WA2JFM	88- 4- 1-B
					W2UTH (+K2s BWK JOJ KLP ZFV	
					W2EHA (W2ERHW)	
						12,864-201-22-AB
					WB2MMD (+WA2MML)	
						4598-(21- 9-AB
					WA2EJY (+WA2EKR WN2FFY G.	
					Holdsworth)	
						324-147- 1-AB
					K2IBG (+WB2DHR)	
						2528- 79- 6-AB
					K2JD/2 (WA2EJY WN2FFY)	
						1782- 81- 1-AB
					W2EQM (+K2IBX)	
						538- 24- 1-B
						5
						Delaware
					WA3OPX	10,912-176-21-ABD
					W3GVP	3634- 87-(1-AB)CDE
					K3URP	156- 6- 3-A
						Eastern Pennsylvania
					K3JPM	45,825-588-29-ABCD
					W3MZY (+WA3JC, opr.)	
						37,264-548-24-ABCD
					K3SEF/3	27,160-388-25-ABCD
					W3ZD	25,568-376-74-ABCD
					W3KKN	24,350-406-20-ABCD
					K3JY/3	22,374-339-21-ABCD
					K3ZSG	21,888-353-21-ABCD
					W3HFX	19,548-363-17-ABCD
					W3CFL	18,000-360-15-AB
					WA3DNC/3	17,416-311-18-ABCD
					K3JUD	16,281-302-17-ABCD
					K3ACR	16,275-326-15-ABC
					K3BPP	15,848-283-18-ABCD
					K3KMN	15,834-275-19-ABC
					K3JUZ	13,222-301-12-ABCD
					K3EOD	13,075-262-15-ABC
					WA3AXV	12,500-250-15-ABCD
					WA3PUL	11,730-255-13-AB
					WA3NGK	11,270-245-13-ABCD
					W3JZO	10,950-219-15-AB
					K3GAS	10,668-254-11-ABCD
					W3AJF	10,400-208-15-ABC
					W3CJU	10,000-250-10-ABCD
					W3HOD	9944-226-12-ABC
					K3AJT	9154-199-13-AB
					W3HK	8568-204-11-ABC
					W3GEW	8480-212-10-ABC
					K3KTY	7524-171-12-ABC
					K3MDA	7500-250- 5-ABC
					WA3AQA	7072-221- 6-AB
					WA3ANF	7000-175-10-AB
					W3EFT	6944-217- 6-ABC
					K3IGX	6592-206- 6-ABC
					WA3JDF/3	6560-164-10-ABCD
					K3MXX	6272-196- 6-ABC
					W3CCX (W3SAC, opr.)	
						6048-216- 4-ABC
					WA3OVH	5920-185- 6-AB
					K3EPB	4230-141- 5-ABC
					W3BRU	4104-108- 9-AB

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1AKH, Floyd W. Russell, Oakville, CT
 K1AXV, Alfred T. Banas, Avon, CT
 K1CJH, Arthur R. Garvey, Waltham, MA
 W1CV, Elzear J. Martineau, Lewiston, ME
 W1HI, Charles F. Silver, Lynn, MA
 W1JFS, G. Leslie MacCracken, Danvers, MA
 K1RCR, Richard M. Hobbs, Spencer, MA
 K1MNP, Stanley A. Augustine, Central Falls, RI
 W1MPW, George W. White, Waterbury, CT
 W1NEC, Wilbur C. Strecker, Boston, MA
 W1NYQ, E. Goodwin Johnson, Braintree, MA
 W1QXL, Pierpont E. Dutcher, Essex, CT
 Ex-W1RL, Charles C. Kolster, Somerville, MA
 K1SGK, Myra E. Smith, Leominster, MA
 K1UJY, Lloyd W. Chase, Buzzards Bay, MA
 K1WIO, Howard R. Gokey, New Britain, CT
 W2AE, Chester E. Watzel, Midland Park, NJ
 W2IAF, Jean J. Espinal, Woodside, NY
 W2IXP, Frank I. Wescott, Lodi, NJ
 WB2JOJ, Frank L. Peckham, Lakehurst, NJ
 WB2IRS, Theodore A. Coelho, Poughkeepsie, NY
 W2QYZ, Seth J. Kelly, Arverne, NY
 WB2YPN, George H. Greenberg, Brooklyn, NY
 W3CJB, Harry H. Donaldson, Farrell, PA
 W3CQ, Defoe C. Ginnings, Bethesda, MD
 W3OZ, Ernest C. "Nick" North, Baltimore, MD
 W3RNO, Albert P. Schlaechter, Pittsburgh, PA
 K3JUD, Mario W. Fontana, Ivyland, PA
 W3WYC, Warren E. McDowell, Bethesda, MD
 W3ZN, Harold O. Hoggan, Brexel Hill, PA
 K3ZVE, Stephen W. Wuchina, Pittsburgh, PA
 W4EAL, Richard D. Stansfield, Knoxville, TN
 WA4GEM, John C. Schwesinger, Parkersley, VA
 W4KMK, Mack B. Godsey, Greenville, SC
 W4OKP, Virgil H. St. Clair, Roanoke, VA
 WB5BIN, Elmer C. Barnett, Latayette, LA
 W5FHE, Alfred J. Mims, Houston, TX
 W5FNQ, Lucian C. Ochsner, Snyder, TX
 W5HHV, James H. Leveque, Sr., Glenmora, LA
 W5KZQ, Fred F. Kaigler, Jr., Ferriday, LA

W5SHP, Louis K. Stark, Albuquerque, NM
 W5SJM, Carlton L. Hall, Rio Rancho, NM
 W6FIL, Jerome B. Abernathy, Hemet, CA
 W6FR, Edwin R. Anderson, Joshua Tree, CA
 K6GOM, Albert N. Bartley, Long Beach, CA
 W6HHU, Albert F. Hanson, Apple Valley, CA
 WA6MKN, Raymond B. Eldred, Jr., Carpinteria, CA
 W6UDR, Douglas E. Gayner, Orangevale, CA
 WA6YFJ, Steven E. Anifenson, Encinitas, CA
 WA6ZDD, Cecil H. Coe, Santa Cruz, CA
 Ex-W7BKL, Edward G. Utzinger, Astoria, OR
 W7CDG, LeRoy F. Peck, Great Falls, MT
 W7NRB, Franklin J. King, Kirkland, WA
 W7ZAS, Larry F. Sweeney, Tacoma, WA
 W8BOD, Harry L. Kennedy, Youngstown, OH
 W8REKV, William J. Riefler, Owensville, OH
 W8EWN, Fred Kelly, Bellaire, MI
 WB8HFD, Earl E. Kuhn, Miamisburg, OH
 WB8H, Sam Cirin, Cincinnati, OH
 WB1S, Ralph E. Farnham, Marietta, OH
 W8SLF, Louis Pastor, Jr., Norton, OH
 Ex-W8TOL, Ernest Pastor, Copley, OH
 WA8YKU, Ernest A. Bengtson, Lexington, OH
 K8ZBL, Roswell Lowry, Shaker Hgts., OH
 W9CAV, Herbert S. Hambright, Chicago, IL
 W9CJA, Charles F. Schlegel, Indianapolis, IN
 W9DNO, Robert K. Caskey, Indianapolis, IN
 W9FEJ, LeRoy O. Fix, Indianapolis, IN
 W9FLB, Edward A. Hartl, Sr., Hales Corners, WI
 WA9QXG, Alan J. Martin, Ft. Wayne, IN
 WA9WIO, Clarence G. Welker, Clarendon Hills, IL
 W68UC, Joseph R. O'Toole, Brainerd, MN
 K6KWL, Helen M. Armstrong, St. Louis, MO
 W6MYS/WB2QHR, William V. Walker, Lodi, NJ
 W6NPN, John S. Gregg, Rapid City, SD
 W6OEN, Everett D. Blackman, Eagle Grove, IA
 K6OOJ, Sherman E. Carlson, Tekamah, NE
 WA6TJN, Karl F. Mahan, Carthage, MO
 VE3TI, Fred G. Green, Niagara Falls, ON
 VE6OF, Edward A. Emery, Lethbridge, AB
 VE7FL, H. S. Waites, Marysville, BC
 G8RI, Robert A. Hosie, Liverpool, England

Repeaters Are . . .

(Continued from page 51)

One point to ponder is that amateurs got hardly any publicity for their Chelsea efforts in spite of the fact that the main base station on-the-scene was operating right under the mayor's and police chief's noses. Perhaps it was the confusion, the fright and the closeness of the blaze. But perhaps it was also the fact that the hams went about their business with such efficiency and determination that they were regarded as "just another emergency team" brought in when the going was rough. If the latter is the case, this is one of the greatest compliments that could be paid amateur radio.

After all is said and done, the fact remains that how an emergency is handled depends upon circumstances at hand. In the same manner, the organization of an amateur radio public service group must take into consideration the needs and resources of the specific area concerned. One has only to read the reports in *QST* to realize that, in general, ham radio can do a good job when put to the test. However, these same reports usually only tell what was done and who did it. It is hoped that this article has introduced the subject of how one organizes to do the job. New concepts and techniques must be researched and tested, and the know-how derived from experience passed on to those amateurs who are just getting introduced to

the field of public service, far too often "Lady Luck" has had a role in successful ham radio operations. Furthermore, one can legitimately ask how much wasted effort and energy has been spent in the conduct of a public-service activity because there had been no real advance planning. In short, the time has come when more "How It Is Done" type of information must be made available for sharing with each other.

In the November *QST* (1973) ARPS column in a brief article entitled "Is The Repeater King?" the statement is made "Unless your repeater group is dedicated exclusively to AREC or RACES, it is going to contain a lot of untrained operators, many of whom can be more in the way than of help in an emergency situation." It is my belief that nothing can be more self-defeating to the development of amateur public service capability than to see this attitude expressed. If a repeater group finds itself in this situation, I respectfully suggest that the group find a remedy to the situation. Any doubt in my mind of this was erased during the course of events at the Chelsea fire. Ninety-six amateurs, most of whom probably had never been involved in a major disaster, or for that matter, any type of emergency situation, participated. Because experienced amateurs provided excellent leadership, the less experienced followed their example. Consequently, anyone monitoring the communications would have been hard put to identify an "untrained operator." I find it hard to believe that this 96 does not represent amateurs everywhere. RE

ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 5 by 8 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in bold face.

W1, K1, WA1, WN1 - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
W2, K2, WA2, WB2, WN2¹ - North Jersey DX Assn. P.O. Box 8160, Haledon, NJ 07508.
W3, K3, WA3, WN3¹ - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
W4, K4 - National Capitol DX Assn. Box DX, Boyce, VA 22620
W4A, WB4, WN4 - J.K. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.
W5, K5, WA5, WB5, WN5¹ - ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.
W6, K6, WA6, WB6, WN6 - No. California DX Club, Box 11, Los Altos, CA 94022.
W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.
W8, K8, WA8, WB8, WN8 - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
W9, K9, WA9, WB9, WN9 - Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
W0 - Reggie Hoare, W0OYP, P.O. Box 115, Mitchellville, IA 50169.
K0, WA0, WB0, WN0 - Dr. Phillip D. Rowley, K0ZFL, 5209 Road 5.3 South, Alamosa, CO 81101.
KP4, WP4¹ - Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.
KV4 - Graeciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, VI 00820.
KZ5 - Lee DuPre, KZ5OD, Box 407, Balboa, CZ.
KH6, WH6¹ - John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.

KL7, WL7 - Alaska QSL Bureau, Star Route, Box 65, Wasilla, AK 99687.
VE1 - L. J. Fader, VE1FQ, P.O. Box 663, Halifax, NS.
VE2 - A. G. Daemen, VE2JJ, 2960 Douglas Avenue, Montreal, Quebec, H3R 2F3.
VF3 - R. H. Buckley, VE3UW, 20 Almont Road, Downsview, ON.
VE4 - D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg MB R3N 0E8.
VES - A. Lloyd Jones, VE5II, 2378 Grant Road, Regina, SK, S4S 5L3.
VE6 - D. C. Davidson, VE6TK, 1108 Trafaldr Dr. N.W., Calgary 47, AB.
VE7 - H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC, V8P 2L8.
VE8 - Frank Van Der Zande, VE8OO, P.O. Box 72, Fort Smith, NWT X0E 0P0.
VO1 - William Cuffen, VO1KM, P.O. Box 6, St. John's NF.
VO2¹ - Stan L. Parsons, VO2AS, P.O. Box 232, Goose Bay, LB.
Leroy Waite, 19 Hannum St., Ballston Spa, NY 12020.

¹ These bureaus prefer 4 1/4 by 9 1/2 inch or No. 10 business envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the "LARI NEWS" section of the June and December issues of QST.

IS YOURS ON FILE WITH YOUR QSL MGR?

YOUR CALL

W1USA

YOUR OWN NAME,
IS YOUR STREET,
TOWN,
STATE & ZIP
U.S.A.



FM News

(Continued from page 48)

remotely controlled RPT or AUX station, which can be used for a backup method of shutting down the station in case the control link malfunctions.

Status analyzer: A device used in a RPT or AUX station to monitor the on-off status of the station transmitter and receiver. If the transmitter is "on" (transmitting for a period of more than about 15 seconds or so), while the receiver is "off" (no signal being received), the device issues a command signal to the controller to take the station from service.

Terminal: The place in a control point or in a remotely controlled station where a wire control link (dedicated lines or public telephone system lines) terminate.

System voltage: A steady electrical voltage on a line, which can be used for the purpose of determining the integrity of the line.

Timer: A device used in a remotely controlled RPT or AUX station for the purpose of establishing a time interval for "timing out" the transmitter.

Timing out: A contingency operation used for shutting down a remotely controlled RPT or AUX station in the event the control link malfunctions. The control operator activates a standby shutdown transmitter for a period not exceeding three minutes. A timer in the station recognizes this as a control signal to take the station from service, and issues the command signal to the controller.

Wire remote control: Remote control of an amateur radio station by means of a control link using dedicated lines or a public telephone system. - WIICP|WR1ABH

QST

Technical Correspondence

(Continued from page 46)

amplifiers in the system operate between 5 and 30 MHz, so it seems that a strong hf signal entering the cable at a break, or at the ham's TV set, is promptly transmitted to the reverse amplifiers and piped all over the neighborhood.

If these findings of mine are in fact correct, this is a new TVI problem that many of us will face in the near future as two-way cable TV systems become common. - Arnold P. Stein, WB4FSV|WA3NOS, 1951 Thunderbird Trail, Maitland, FL 32751.

FEEDBACK

Some amateurs who built the voltmeter described in Part I of the semiconductor series experienced difficulties getting the meter to zero, or the meter pinned on the negative side. It was determined that because of different gain characteristics in transistors, such a problem could occur. One cure is to change R7, Fig. 3, the "zero" control from a 2500-ohm control to a miniature 10,000-ohm unit. This is particularly true if using an HEP802 rather than an MPF102. This change provides greater zeroing range. It is also suggested that this new control be mounted on the panel to permit ease of adjustment and to compensate for battery voltage changes with age.

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

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY BILL MANN,* WA1FCM

Net Operation — Fun or Business?

THERE SEEMS TO BE TWO somewhat-opposing views regarding net operation. One goes something like this: Since amateurs volunteer their time, net activity should be tailored to the membership, i.e. the "character" of a net should reflect the operating preferences of the member stations. An important purpose of nets is to promote good fellowship among amateurs. Traffic can be handled and still leave plenty of time to fraternize on the net.

Another view is that nets should operate in a concise manner, handling traffic efficiently, holding "pleasantries" until after the net and closing the net promptly when all traffic that can be cleared has been passed.

Which philosophy is correct? That depends upon the purpose for which the net is intended. In this column, our primary interest is with the public-service attributes of amateur radio communications. The remarks which follow relate to nets whose *primary purpose is public service*. We hope this includes all levels of National Traffic System nets (local, section, region, area, national), Amateur Radio Emergency Corps nets and other emergency and traffic nets.

For public-service operations, let's keep a couple of equally-important objectives in the spotlight: (1) rapid movement of traffic from origin to destination, and (2) training of amateur operators in handling of written traffic and participating in directed nets. If we claim to operate "in the public interest, convenience and necessity," the movement of traffic and training aspects must take precedence.

A typical net session might go something like this: The net control "calls" the net (on time!), stations report in indicating what traffic they hold,

* Assistant Communications Manager, ARRL.

the NCS directs the passing of traffic, each station passes traffic using standard message format and the net is closed. Verboseness is minimized. The length of the net session is determined by the amount of traffic which can be passed.

Two assumptions are made here. The NCS is capable of keeping the net operating swiftly and smoothly and net stations employ proper message-handling procedures. Here's where the second objective listed above steps in — training.

Have you re-read the Handling Messages and Network Organization sections in *Operating an Amateur Radio Station* and studied the *Public Service Communications* manual recently? Do you read Traffic Talk each month in this column? If your net puts out a bulletin or newsletter, do you periodically review the sections concerning net operating? Is there a copy of *The Radio Amateur's Operating Manual* in your shack? Are you applying the principles set forth in reference material so that anyone who "emulates your style" will be reflecting good net practices?

What happens if there is very little traffic to pass? On some nets — AREC, emergency nets in particular — there may be a "training session" covering traffic handling or emergency procedures or there may be announcements of upcoming activities such as a walkathon, parade, etc., for which the net stations will be providing communications. On some nets when traffic is light, net stations are asked to make "comments" for the net. But if comments are not brief, or if there are not frequent calls for other stations to report in or if comments are solicited when there is traffic which can be passed, one questions if the net's primary purpose is public service.

Can we, as net managers, net control stations, regular or casual net check-ins, be content with our net operations and not strive for improved efficiency? Make no mistake, we have many excellent nets in existence! But are there any nets which can't be improved to *some* extent? During emergency situations we cannot afford inefficiency and the same should apply to regular net activity. The overall performance of a net can best be



This month's Public Service Diary accounts VE3HCX's assistance in arranging by amateur radio for a flight into his remote Northern Ontario village to transport a child with serious head injuries to a hospital. Here's Gord in his shack.

improved when the participants take it upon themselves to become familiar with and utilize message format and proper, concise net procedure. The collective result is a succinct, effective, businesslike operation which exemplifies its purpose — public service. — *WA1FCM*

We Get Some Help

Just at deadline (in fact, a little *after!* — M.E.), authorization was obtained for addition of a new Communications Assistant to the Public Service Branch of the CD. In accordance with the policy of promotion from within where a qualified person is available, this position goes to Rosalie Cain, WA1STO, who for the past several months has served a clerical assistantship in the DXCC Branch. Rosalie came from out Indiana way with OM Jim, now WA1STN, who is holding down the fort in the Affiliated Club (Training Aids) Branch.

Our Public Service Branch is thus on the move. Its functions are manifold and expanding as time goes on. Rosalie's addition to the branch will give it the greater capacity for detailed considerations that have been needed since 1967, when the "National Emergency Coordinator" title was changed to "Assistant Communications Manager" for Public Service and we went through a six-year period of trying to find the right man for the job.

One never knows when a vacancy on the staff is apt to occur, in this or any other CD Branch, or even elsewhere in the headquarters. Such opportunities invariably go to any qualified person already on the staff, and so openings are usually at the bottom rung of the ladder. If you are a young person willing to start there, let us hear from you. — *WINJM*

Traffic Talk

We've all heard complaints that some messages originated by amateur radio are never received by the addressee. All too frequently, the failure occurs at the delivery end. Admittedly, it's simpler to relay a message to another amateur who knows what amateur radio and traffic are all about rather than to someone who may have no knowledge of amateur radio whatsoever. But that's one of the reasons delivery is so important. You have the opportunity to present amateur radio to the public (albeit a small part of the public) as a service.

Usually, the preferred method of delivery is by telephone immediately upon receipt of the message within toll-free calling distance (unless receipt is at an early or late hour; we don't want to rile 'em!). Don't refuse a message just because it doesn't have a phone number listed; numbers are readily available from Directory Assistance. A brief introduction of yourself as a radio amateur, indication that the message was handled without charge by hams and a reading of the message (at copying speed if desired by the recipient) should make a good impression. Offer to send a return message and a confirmation copy of the message you are delivering by mail if they desire. Sometimes it is feasible to deliver a message in person.

If there is no amateur available within toll-free calling distance, a nearby amateur should accept the message for possible mail delivery. If the message cannot be relayed within a day or so to



Recently, WA4VZZ (left) was presented with the Operator of the Year Award for the Morning Kentucky Phone Net. Net Manager WB4AUN (right) made the presentation.

someone who can make a free call, or if there are no prospects for possible relay into the area, the messages should be mailed. Don't hold the message for days! The message should be neat and, preferably, typed on an ARRL radiogram blank. Some amateurs use the address of the originating station, if it corresponds to the place of origin, as the return address on the envelope. Then, if the message "bounces," the originator is the first to know. Your address will be on the message blank, if the recipient wants to send a reply back through you.

If your section net has good coverage of the section, the number of mailings for each traffic handler is relatively small in the run of a year. Regardless, if telephone delivery cannot be made, the appreciation on the part of the recipient and the responsible attitude of amateurs that is conveyed by the delivery of the message is usually well worth springing for the dime postage.

If any irregularity occurs in delivery attempts — phone number not available, mail is returned, delay involved, address incorrect, etc. — the originator is to be sent a service message indicating the difficulties and if necessary asking advice. If the originator does not receive a service message, he has every right to believe that his message was promptly relayed and delivered. Don't let him down!

■ *National Traffic System.* PAN Mgr. K7NHL reports both traffic and QRN up from the previous month. A PAN certificate went to W6BVB. WA1PGY has been assigned Asst. Mgr. for DIRN. WA1SQB has issued DIRN certificates to W1DGL, WA1s FCM JCN. W2FR submitted his last report as 2RN Mgr. and has awarded certificates to W2CU (3rd annual) and WB2JWM. Our thanks to Howie for a job well done through the past 6 years. W4HFU's impression of the month on RN5 was one long static crash causing the rate to suffer some. RN6's liaison to Hawaii not available on weekends causing the net's long string of 100% representation to be broken. DRN7 certificates have been issued to W7s HHU NP PI, VE6FK by VE6FS. The early session of TWN has returned to its former system and schedule. WSPNY has awarded DTWN certificates to WA7RDC, K0SPR, WA0YNP



Amateur Radio Emergency Corps leaders and members in the San Diego section have established an Amateur Radio Control Center to coordinate activities during emergency operations. Some amateurs involved are: (front row, left to right) WA6QVH, WB6UAW, W6GBF (SCM), WB6NYL, W6INI (Asst. SCM, EC); (back row) W56BAC, WA6UBO, K6ESN, K6OWU, WA6DMB and W6TET.

Transcontinental Corps

March was an extremely good month for TCC-E traffic and performance-wise under very poor condx at times. W3EML expresses admiration for the TCC gang saying they hang in there somehow and often clear traffic for their functions under almost impossible condx.

Area	Functions	%Successful	Out-of-Net	
			Traffic	Traffic
Eastern	129	97.7	2240	842
Central	97	90.7	1264	605
Pacific	124	93.5	1969	962
Summary	350	94.3	5473	2409

March Reports

Net	Sessions	Traffic	Avg.	Rate	%Rep.
EAN	31	1867	60.2	1.302	98.9
PAN	31	1233	39.8	1.024	98.4
CTN	30	395	13.2	.234	76.3
1RN	62	573	9.2	.372	88.0
DIRN	31	133	4.3	.282	75.6
2RN	62	623	10.1	.807	99.0
3RN	62	558	9.0	.478	97.9
D3RN	30	200	6.7	.487	94.4
4RN	61	658	10.8	.488	94.5
D4RN	11	28	2.5	.164	35.5
RN5	62	663	10.7	.383	94.9
DRN5	29	71	2.5	.112	60.3
RN6	62	910	14.7	.533	93.5
DRN6	31	232	7.5	.190	70.0
RN7	61	328	5.4	.371	69.6
DRN7	30	83	2.7	.160	47.0
D8RN	31	115	3.7	.275	75.2
9RN	60	507	8.5	.436	94.8
FEN	62	652	10.5	.561	88.3
DTRN	31	112	3.6	.140	60.6
FCN	62	264	4.2	.339	91.4
1WV	45	210	4.7	.188	68.1
DTWV	18	56	3.1	.127	41.9
TCC Eastern	126 ¹	842			
TCC Central	88 ¹	605			
TCC Pacific	116 ¹	962			
Sessions*	4351	17461	4.0		
Summary	3346	30341	5.7		
Record	4242	33737	18.1		

¹TCC functions not counted as net sessions.

²Section and local nets reporting (135): AFSN (AB), MTN (MB), CMN GBN ODN OPN OUN RACN WOEN (ON), WQ-VUHF (OJ), SAFN (SK), AENR AFND AENM (AL), ASN (AK), ATEN HARC (AZ), OZK (AR), IEN NCN NEN (CA), CCN CHNN (CO), BEN CN OPN NVHFTN (CT), DEPN DTN (DE), BEN FAST FMTN GN QPN QFTN PFTN VEN (FT), GSBN GSN GTN (GA), IMN (ID, MI), ILN (IL), ITN (IN), I78MN TLCN (IA), KPN KSN QKS (KS), KNTN KTN KYN MKPN (KY), LAN LSN LTN (LA), SGN (ME), MDCTN MDD MEPN (MD, DC), EMRI EM2MN NENN WMN WMPN (MA), MNN QMN WSN (MI), MSPN PAW (MN), MNN MSBN MTN (MS), ALE ACWN JC2AN MoAREC MON MoSSB MSN WEN (MO), MIN (MT), WNN (NE), NHVTN (NH, VT), NIN NJPN NISN PVTEN WEPN (NJ), NMN (NM), NLI NLIEN NYS (NY), CN NCSSBN THE-N VHEFN (NC), BN BNR O6M6N OSN OSSBN (OH), OIZ Z OPEN OION OIWN SSZ STN (OK), BSN OSN (OR), EPA EPAEPJN PEN PTTN WPA (PA), LEN LEN NIQ SON (SD), TN FNN (TN), TEX TEXSS TTN (TX), BUJN UCN (UT), VEN VSN (VA), NSN WSN (WA), WEN WVN WYPN (WV), BEN WIN WSN (WI).

Independent Net Reports (March)

Net	Sessions	Traffic	Check-ins
Mike Farad	26	31	233
Northeast Traffic	31	184	242
North American Traffic	22	358	340
Clearing House	26	251	435
IMRA	27	509	1160
Hit & Bounce	31	762	357
7290 Traffic	42	449	2044
Early Eighty Free	23	92	99
20 Meter ISSB	21	1109	333
75 Meter ISSB	31	410	1416
Central Gulf Coast Hur.	31	239	1631
Hit & Bounce Slow	19	76	135
Ohio Valley Teenage	30	159	355
Eastern Area Slow	31	170	293

With the AREC

Reports of amateur radio emergency communications during the disastrous tornadoes which struck many communities in the Midwest early in April, are coming in. As is usually the case with major disasters, the reports will be compiled into an account in the Public Service column or an "upfront" article, depending upon the amount of material we receive.

In one person's report, sent to his SCM with copy to ARRL Hq., the following view was expressed when referring to communications by amateurs: "I think that this should point out more than ever the need for an EC in each communications area, i.e., each community, who can coordinate emergency communications, and can draw up a plan to be followed *before* the tornado or storm hits. I'm afraid that too many people did

not take this idea seriously enough, and although we were able to get organized in a short time, I'm wondering what we could have done if we had some formal plan drawn up prior to the time that this storm hit."

In many sections, we need responsible people to assume leadership positions that are presently not filled. Our total number of ECs is down around the 1000 mark, the lowest it's been in years. But emergencies occur as frequently as ever! Then there is the need in some sections for Assistant ECs, whose functions may be developing effective emergency plans, in charge of the AREC net, public relations, etc. And there is always the need for more AREC members. Can you take on additional responsibilities to help better prepare your AREC group? Let your EC, SEC or SCM know!

■ Speaking of reports, we're always receptive to reports of public-service activities of amateurs. Each month the Public Service Diary documents amateur involvement. Emergency operations are listed first (by date), then alerts (amateurs deployed for emergency activity but no actual communications emergency developed) and when space permits special activities (parades, races, walkathons, etc.) and non-routine tests or drills.

What information are we looking for? Date and type of activity, places involved, nets or bands used, number of amateurs taking part, name of agencies for whom communications were conducted, calls of all amateurs known to have participated and a factual rundown on just what the *amateurs* did, are important. Include any pictures showing amateurs in action and newspaper clippings which might be available. Public Service Activity Reporting Forms (CD-157) are available from Hq. for an s.a.s.e.

■ Thirty-seven SEC reports were filed by the deadline (15th of the following month) for March. The reports represented 10,984 AREC members. For March 1973, 34 SEC reports were received listing 10,726 members. Sections reported: Alta, BC, Colo, Conn, Del, EPa, Ill, Kans, Ky, Mich, Miss, Mo, Mont, Nebr, Nev, NC, NFla, NNJ, NTex, Okla, Ont, Org, SV, SDgo, SJV, SBar, SCV, Sask, SFla, STex, Utah, Va, Wash, WVa, WMass, WNY, WPa.

Public Service Diary

■ During Feb. members of the Long Island (NY) Mobile ARC, using WR2ADM, reported to authorities 18 accidents, 23 stalled and disabled cars, a fire, a riot, an inoperative traffic signal and one medical emergency. -- (K2QPF, EC Oyster Bay Village)

■ A fire broke out early Feb. 6 in a chemical warehouse in Omaha, NE, necessitating evacuation of many people into temporary shelters. Members of the Ak-Sar-Ben Radio Club supplied communications for Red Cross with WA0DHU as NCS on WR0ABQ, W0NMN as relief NCS, W0s YZY NMN set up at shelters, WA0GEH at the police dept., WB0GAJ at the fire, K0GHK at the Red Cross Chapter House and W0OCZ on standby. -- (WA0DHU, EC Douglas Co., from *Ham Hum*)

■ Two boys drowned in the ice-covered Little Hoosick River in Hoosick Falls, NY, on Feb. 13. Although one boy was recovered shortly after his death, the search for the other boy continued through Feb. 16 at 1623 GMT when his body was recovered. The Rensselaer Co. RACES group

Public Service Honor Roll March 1974

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.

WR5AMN	72	W4AAY	49	K4MC	44
WA3SCR	65	WB4DXN	49	WR4OXT	44
WA8FTX	65	WB4TVU	49	WB5DLW	44
WB2RKK	64	WB4ZMK	49	WR5KAN	44
WB0BHM	64	WB5GWB	49	WB6AKR	44
WA5ZZA	62	WA5JQU/5	49	WA6IDN	44
K6GMI	62	K5MAJ	49	W7BO	44
K0BIX	62	WA7OCV	49	W7DAN	44
W4IMSK	61	K7OUF	49	WB8NH	44
WA2OVE	61	W7UTM	49	W9DND	44
WA4DUM	61	WB8JHW	49	WA9QVT/9	44
WB2FLF	60	K0MRI	49	VE3DVE	44
W4OGG	60	K1JDO	49	VF3RG	44
WA1RZC*	39	VE3DPO	49	VE3JIG	44
WB5FFY	38	VE3FOZ	49	VE3SB	44
WB0CZR	37	VE3GFN	49	VE5TT	44
WA1FCM	36	WB5GVO	48	VE5XC	44
WB2CHY	36	WB5JZP	48	WA1PHJ	43
WB2OYV	36	WA6BEM	48	WA4BAA	43
WB2PYM	36	K3OIO	47	WB5DBK	43
K3KAJ	36	WA3URV	47	K6UYK	43
WA3RC	36	WB5HFW	47	W9NXG	43
W5GHP	36	W6RFJ	47	W2RUF	42
W7OCX	36	WB8FTT	47	WA3ATQ	42
VE1AMR	36	WB0HSZ	47	WN3VGV	42
WA2ZNC	35	WA0ROK	47	WA5VBM	42
K2QJ*	53	WB8HW	46	W6INH	42
WA3UKZ	53	W6AUC	45	WA6LBO	42
WA2EPL	52	K6NCG*	45	VE1ARB	42
WB2JRX	52	WA6TVA	45	K4EZH	41
WB8NCD	52	W1BVR	44	WB0BMG	41
WB0GVR	52	WA1RFR	44	WA0MLE	41
W0OYH	52	WA2BSU	44	W2MTA	40
WA0TMM	52	WA3PHO	44	WR4WS	40
WA1KVI	50	WA3SWF	44	W4WXZ	40
K1ONW/5	50	WB4EKJ	44	W5RBB	40
WA1ROG	49			WA0FMD	40

*Denotes multioperator station.

provided communications between river lookouts, search parties and traffic control. - (WA2YQY, Director of Communications, Rensselaer Co. C.D.)

■ Mt. Tom (MA) Amateur Repeater Assn.'s newsletter INTERMOD lists the following emergency reports for Feb.:

On Feb. 15, WA1HPX/1 spotted an auto accident in East Springfield, MA, called through

K1BCS is very active on traffic nets and is a former EC and RM. As a side hobby, Press collects expired amateur call-letter plates. Here are but a few.



WRIABX and was answered by WIGUG who called authorities.

A garage fire in Westfield, MA, was reported by WA1OWS/1 on Feb. 23. WA1JHK called Westfield Fire Dept.

A two-car accident off Route 91 in Chicopee, MA, was reported to WA6GVC/1 by WA1OCK. WA6GVC got help.

On Feb. 26, W1LJF stopped to assist a girl with a flat tire near Enfield, CT, but had no car jack. WIGUG was about to call for aid, but K1KBQ was nearby and had a jack which would fit.

The Alamance Sheriff's Dept. alerted Alamance Co. EC WA4FFW on Feb. 26 at 2303 GMT that a plane was believed crashed somewhere between Greensboro and Burlington, NC. WA4FFW alerted the AREC group and a net was started on 146.94 simplex. WB4ZIN/mobile was dispatched to Sheriff's Office and WB4s VHB VHE sent to local airport to assist Civil Air Patrol. At 2335 GMT, CAP notified WA4FFW that an emergency-locator beacon had been picked up and CAP asked for a link to police. A policeman, WB4HBQ, and WB4JPP went to the airport. The Durham FM Repeater Assn. turned over their repeater to WA4FFW and a net was established. At 0030 GMT, CAP search craft placed the beacon 10

miles north of Greensboro. W4ANM was asked to contact Guilford Co. EC W4AJT. Within minutes W4AJT responded and the Guilford Co. AREC was activated on the Greensboro repeater and was assisted by Alamance Co. AREC. At 0400 GMT, CAP located the emergency beacon which had been accidentally left on by a private pilot. - (WA4FFW, EC Alamance Co.)

During March, Harris Co. (TX) amateurs operating through WR5AAA made initial reports and summoned aid for 7 auto accidents. Amateurs using WR5ABX reported 3 automobile accidents. - (WASABA, EC Harris Co.)

In the Jackson, MS, area, amateurs utilized WR5ABT to report 8 traffic accidents to local authorities during March. - (WASFTI, SEC MS)

On Mar. 10, K0HNE called into the Daytime Tenth Region Net with priority message for New Mexico. Unsuccessful attempts had been made through state police to locate a son and advise him of a death in the family. It was thought the son might have rented a recreational vehicle and broadcast media might be asked to notify him to call home. The request was provided to Missouri police by W0UXH and W0H0X alerted the Coast Guard Net, then passed the message to WA7WOD. As a result, the son was located. - (K0BIX, SEC MO)

A young girl fell on the ice sustaining a severe head injury in remote Kashechewan, ON, on Mar. 16. At 0210 GMT VE3HCX made a call on 3775 kHz and was answered by VE3ECV who phoned-patched VE3HCX to the Moose Factory Hospital. The hospital advised an airlift and attempted to plan for a flight. On learning that a flight would not be possible for hours, VE3s CZA DQL contacted the Canadian Forces Station in North Bay for an aircraft. Since the remote village had no lighted airstrip, the request was denied. VE3ECV advised that no crew was available for the airlift proposed by the Moose Factory Hospital. The Canadian Forces Station in Trenton agreed to send an aircraft to Kashechewan. At 1145 GMT the craft landed and within 15 minutes the child was on her way to the Hospital for Sick Children in Toronto. During the 5 hours of organizing the airlift, VE3FTO, a doctor, provided first aid information and alerted the hospital in Toronto. - (VE3HCY, VE3DQL)

On the afternoon of Mar. 19, a railroad tank car of ethylene derailed and caught fire in Columbus, OH. The Emergency Operations Center was manned from early evening until 0130 the following morning furnishing communications (using WR8ABV) and coordination between a command post at the scene set up by K8IIF and 8 mobile units with c.d. rescue. Ten amateurs participated. - (K8UHH, RO Columbus, Franklin Co.)

While providing communications for a March of Dimes walk in Houston, TX, on Mar. 23, amateurs summoned ambulances for 3 serious injuries, many heat-exhaustion cases and cut and bruised feet. They also assisted in locating quite a few lost walkers. Operations continued for over 8 hours, using WR5AAA. - (WASABA, EC Harris Co.)

While mobiling near Lexington, KY, on Mar. 27, WB8KFU saw a motorcycle skid out of control, hurling its rider into an oncoming car. WB8KFU called through WR4ACR and WA4ERE

(Continued on page 150)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for March Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	212	1093	997	57	2339
W0WVX	47	650	104	546	1347
K0ZSQ	0	634	0	634	1268
K0ONK	121	535	566	19	1241
K9CPM	31	533	82	446	892
WA0TNM	25	392	342	3	762
W3JVR	204	261	221	10	696
W8SUS	5	327	299	28	659
W1PLX	68	293	309	28	698
W8MCR	5	288	251	32	581
WA0ROK	41	273	265	0	579
W2KAT/3	11	264	234	25	544
K4SCL	66	273	184	16	539
WB4ATW	14	254	231	23	522
W3EML	20	297	203	1	521
WA0RWM	39	462	2	6	509
WB2RKK	12	286	185	20	503
W0ZWL	9	262	0	241	503
WA0VAS (Feb.)	112	898	194	704	1908
WA1POI (Feb.)	61	345	183	31	520

More-Than-One-Operator Station

K8LME	487	15	25	0	527
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BPL for 100 or more originations-plus-deliveries

K1BCS	264	WB8FFZ	123	WA2EPI	105
WA0AUX	210	WB8IFT	119	WN3CVG	105
K9MVA	185	K6UYK	118	WB0HRM	104
WA3SCR	174	WB9IHF	118	WB2NKN	102
W8QCU	143	W2RUF	111	WA3VWI	102
WB6MKV	136	WB2EDW	108	WA1RYL	101
W6RFF	133	K9EYF	107	WB0HOX (Feb 1158)	
W0OYH	130			WA0YYT (Feb 1136)	

More Than-One-Operator Station

WA1RZC 104

BPL Medallions (see December, 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings. WN4FZO W8NRC K9EYF WN0IQ WN0KI WA0ROK VE3FQZ.

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

OSCAR NEWS

Using Oscar 6 on Field Day

For the second year, Oscar 6 is expected to be available for use during the ARRL Field Day activity. Taking advantage of this opportunity isn't hard to do. The Field Day rules on page 68 of last month's QST make the following special provisions for the satellite:

1) Any Class A or B (portable) station making one or more cw contacts through Oscar receives a 50 point bonus.

2) Use of Oscar does not count as an additional transmitter in determining your number of transmitters in simultaneous operation.

3) The usual repeater prohibition is waived to the extent that cw (no phone) contacts via Oscar 6 may be counted toward your score.

4) Otherwise, Oscar operation is treated as a separate "band." That is, you may work the same station at different times over the weekend on ten meters, two meters, and Oscar and count three contacts.

Here are some tips for successful Oscar operation during Field Day based on the experiences of last year:

* Position your receiving antenna as far as possible from the generator and other sources of rf noise. The satellite's signals on ten meters are relatively weak and it doesn't take much noise to mask them.

* Bring along a good compass. You'll need to know your directions pretty well in order to track the satellite accurately with your antennas.

* Unless yours is a one-man operation you'll probably be able to use an "armstrong" rotator pretty effectively. Remember that antennas mounted close to the ground (six to eight feet up) are perfectly adequate for satellite work, since for much of the time the satellite is well above the horizon. So don't put a lot of energy into assembling an exotic antenna system.

* Put your station together and try it out well in advance of Field Day so you'll be familiar with it when the time comes. Field Day is no time to discover that your transmitter frequency is 10 kHz from where you thought it was, or that your favorite receiver has poor sensitivity in the 29.45-29.55 MHz section of ten meters.

* While you're reading the FD rules in last month's QST, review the "How Do I Work Through Oscar?" discussion in "Oscar News" on page 62.

* Check W1AW bulletins to determine when during FD, the satellite will be available for use.

For the regular satellite users, Field Day is an excellent opportunity to acquaint your fellow club members with Oscar and perhaps convince a few to give it a try. For all groups, Oscar can be an excellent vehicle for gaining publicity in the local media for amateur radio in general, and for your Field Day operation in particular. Why not see that your group is in the "Oscar 6 Users" box in this year's FD results?

Oscar 7 License Granted

The Federal Communications Commission has granted a license to the Radio Amateur Satellite Corporation (Amsat) to operate a space radio



A lot of thought and planning went into the antenna used for Oscar work by the WA3JZR/3 group last year. It was effective, too, earning them the 50-point bonus with just a three-watt transmitter.

station in the Amateur-satellite Service. The satellite package is now designated Amsat-Oscar B and will be redesignated Oscar 7 upon launch. The FCC has assigned the call W3OHI to the satellite but has waived its identification rules to permit emissions from the satellite to be identified only by the last two letters of the call. Other waivers of Part 97 allow Technicians to be repeated on ten meters by the satellite translator, permit any emission authorized on the uplink frequencies to be retransmitted on the downlink, and authorize the use of 432.125-432.175 MHz as uplink frequencies provided the earth telecommand stations have the absolute capability to disable the receiver should this become necessary. A request for a low-power beacon on 2304.1 MHz was denied on the basis of the international implications of such a waiver.

K4TI Works Five Continents

K4TI isn't resting on his laurels as the second station to qualify for the special Amsat-Worked All (Continued on page 75)

Recent Satellite DX Achievement Award Winners

G3GKI DL3SX WA7ECY LA9DL WA3EPT
W4DWN K4CYF G2WS DC4EZ LZ1BW
DC1HV W2BXA W2LV W7MCU

Certificates have been issued to 231 stations in 32 countries and 5 continents.



Correspondence From Members-

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

SUPER STATIONS

● A quick look at the high-claimed scores of the 1973 ARRL Sweepstakes shows that 9 out of the top 10 scores were from stations operated by persons other than the station owner! This appears to be an outgrowth of the building of large contest stations for the DX multi-multi competitions. These stations, of course, also serve quite nicely for single operator contests, with a definite advantage over most other stations. I cannot help but wonder if the individual amateur operating from the "super" station could do any near as well from his own home station. If so, why operate someone else's station?

Considering this trend towards the multi-multi contest super station, one cannot help but consider the formation of a special classification to allow the vast majority of operators operating from their own stations a fair chance in ARRL competitions. If an operator is financially and/or technically able to build a station with a superior signal he should be able to reap the fruits of his efforts. But, should someone else come along and utilize those efforts? Something to think about.

A possible solution, fair to all concerned, is to formulate an additional classification for any operations by someone other than the station owner. This would allow the high level competition that has become standard between the giant stations to continue while giving other stations a chance in single operator competition. Since determination of what comprises a "super" station is too complicated and impossible to accurately determine, the rule would have to be applied to everyone. Thus the operator with only a dipole or trap vertical who goes down the block to the station with a good beam installation falls into the same category as the operator who heads for the giant station. The idea in both cases is the same, for each operator is trying to improve his chances of winning through the efforts of someone else! Something else to think about. — *Glen E. Zook, K9STH/WA5STI, Richardson, TX*

EXAM COSTS

● Most amateurs do not live on top of an examination point. For me it's 90 miles plus, so I look at the price this way:

Examination fee	\$9.00
Gasoline — 15 gal @ 55¢	8.25
Parking	2.00
Lost Wages	29.00
Total	48.25

This list does not include the aggravation of having to fight Philadelphia's rush hour traffic in order to be there by 8 A.M.

I hope to be able to drop the N in my call as soon as I can afford the \$50.00 fee. — *Roland Raudenbush, WN3VPM, Tremont, PA*

CALCULATED ANSWERS

● The "Strays" item on page 43 of your April issue caught my eye as an interesting bit of statistical trivia, which mesmerizes me much like a snake does the bird.

The problem is very straightforward if you have a fair value for the density of pure ice. In this case I lifted a value from page 186 of *General Chemistry* (Macmillan Co., N.Y.) by Ralph Petrucci. He gives the density of pure ice as 0.917 grams per cubic centimeter. Assuming the ice to be a simple cylinder 3 inches in diameter and 135 feet long, the weight (exclusive of wire) comes to around 172 kilograms or about 380 lbs. — *Bill Hellberg, Columbia, MO*

● If we assume that the ice was uniformly 3" in diameter (7.62 cm) and that the ice was at a temperature of 32° F (0° C) or less, the weight of ice on a 135 foot (4.115 × 10³ cm) dipole cranks out close to 5200 pounds!! (5197.839 lbs or 2.358 × 10³ kg was the closer approximation). — *Lt. W. A. Hickey, USN, WAFSXE/6, Monterey, CA*

● By the formula: Volume = 3.14 (pi) × 2.25 (radius squared) × 1620 (135 feet converted to inches) = 11,445.36 cubic inches of ice. Dividing this figure by 1728 (12 × 12 × 12), we get approximately 6.62 cubic feet of ice. Since water weighs 62-1/2 pounds per cubic foot, the weight of the ice on the antenna was approximately 414 pounds (actually 413.750 pounds). — *Tom Buckley, WN2TR Y, Long Island City, NY*

● I never could turn down a dare. If anyone really cares, the weight of the ice on W1FBY's antenna was about 405 pounds (which is about 184 kilograms). — *Steve Gold, WB8OJF, Beachwood, OH*

● The antenna coated with 3" of ice weighed 374.42226 lbs when it came down. — *Richard H. Cassada, K1LAX, Granby, CT*

CHURCH BUSINESS?

● Recently I was listening to a QSO on 20 meters between a K6 station and one in a Latin American country. I wanted to work the Latin American, so at an appropriate time I called "break." I was very impolitely told, "Clear this frequency. You are interfering with church business."

I listened for the next 30 minutes (during which no ID was given) and it really was routine church business which could be handled via mail; Sunday school attendance, church attendance, number of converts, etc. The only thing discussed that could be considered legitimate ham traffic were the air arrival and departure times of some missionaries.

For five years I worked at a ham radio supply store on the West Coast and, on a number of

occasions, sold ham gear to missionaries getting ready to depart to Latin American countries. Our store had a policy of selling transmitting equipment to licensed hams only. In most cases, only one of the mission group would have a license, and in further conversation it developed that the legitimately licensed ham planned to "see that all the party get their Conditional Class license as soon as they get to their Latin American destination" (and out of FCC testing jurisdiction!)

We know that some licenses are obtained thru the grace of family members or "friends" giving the test, but I was shocked to find church groups using the same illegal path to obtain a ham license. — James T. Pierce, W7GLC, Seattle, WN

SPACING

● Editor *qst* would like to recommend that someone develop an electronic keyer that would make spaces as well as dots and dashes listen on the air and you will see what I mean best regarded *preston w2rzt*.

ZERO BANDWIDTH A-M

● Though VO1DER's contribution in April *QST* on ssa-m was a good theory article, it gave no practical information on how to convert existing ssb rigs to this more efficient mode.

I have found that an ssa-m signal may be generated by completely unbalancing the carrier in my ssb exciter. This produces one sideband plus a carrier. To suppress this spectrum-hogging sideband, I use a parallel LC circuit of .01 μ F and .28 H at the transmitter output. The resonant frequency of this high-Z combination is about 3 kHz, the bandwidth of an ssb signal, hence no sideband gets to the antenna.

I hope that this information is useful to those who wish to modernize without casting aside their ssb rigs. — Glenn W. Banks, WA2BIQ, Wyckoff, NJ

● As an avid cw man, I heartily endorse Mr. Attaway's proposal for this method of communication on the ham bands. I fervently hope it will be adopted internationally — and soon. I can think of nothing that would reduce our phone QRM more. Let's have more technical articles on this phase of our hobby! — E. E. Pearson, W4RU, Charleston, SC

● I read the article by N. G. Attaway and have just a few reflections (no SWR jokes intended) about it. Ssa-m really appears to be the transmission mode of the future; however, I feel that it will find its true utility, not in the ham bands, but in the new Citizens Band being proposed for 224-225 MHz. The FCC projections of use on this band indicate that even with nbfm and 80 crystal controlled channels there will be much QRM. This QRM could be completely eliminated by using ssa-m with its zero bandwidth signals. Maybe now instead of fighting the new 220 MHz CB proposal, ARRL will support it under the condition that ssa-m is used. Don't forget in your arguments before the FCC that it is possible to have infinitely many signals with zero bandwidth in any band of frequencies. — Paul W. Pellegrini, WAILZA, Bedford, MA

SEMICONDUCTOR SERIES

● My great appreciation is extended to you for the excellent article "Learning to Work with

Semiconductors," in April *QST*. This should be a "classic" series. I can hardly wait for the next article. Please extend the series on beyond the receiver that you now have as your goal. — T. D. Roberts, WB5HNE, Fayetteville, AR

TROUBLE AHEAD?

● At the risk of jumping the gun, I would like to oppose any lessening of the licensing requirements for vhf as mentioned in March "League Lines," especially the elimination of the code requirement. I feel the more we reduce the licensing requirement the closer amateur radio comes to being like CB. The main trouble with CB is since there is no technical or code exam required for the license there is no respect for it. Unfortunately, it is just human nature not to respect what is easily come by. . . .

I feel we can best keep our privileges by showing that we are willing to work and sacrifice for them by passing harder exams and getting higher licenses. — Jim Milburn, WB5BYK, Batesville, AR

OPPORTUNITY FOR ERROR

● I enjoyed your article on the trials of the computer changeover. If you think you have problems you should work for a hard-sell direct mail outfit. The opportunity for error in addressing individually typed letters is two percent times the number of letters in the client's folder, squared.

One client is in Faro, Yukon Territory, Canada. One typist left off "Territory" and "Canada." The next typist sent her letter to Faro, Yukon, Alaska. Another is at 970 Broadway, San Diego. One typist abbreviated it to 970 B'way. The next one typed 970 "B" Way. These are just the horror stories.

We have one standard follow-up approach that goes "Why haven't we heard from you lately?" Because we done it, that's why. Very often, when we spot the source, he is us.

At present I'm working for the direct mail department of my church. We have four major churches in the Los Angeles area, each with precisely defined teaching functions. Each one also has its own bookstore. Out-of-town orders for books go through that church's direct mail department. So do all out-of-town complaints. Last November we published a new major book just in time for the Christmas mail rush. On Monday, March 18, I personally saw three letters written to ask the buyer if he had received his replacement for the book that was lost in the mail in November. I myself average 5-10 letters a week of this kind and there are eight other people doing the same kind of work. And our mailing list is only seven percent of the nationwide church membership!

The man who is in the catbird seat in this department is running a personal campaign in which his second followup letter asks the recipient whether his registration forms were lost in the mail going or coming?

If you really want to blow the charge on the computer changeover (same idea as electrical charge) go to the Scientology center in Middletown (none closer) and tell the registrar you want to sign up for your Life Repair. — Mike Fern, WA6OWJ, Los Angeles, CA

Change of Address

Please advise us direct of any change of address. Be sure to give old as well as new address.

Happenings of the Month

SATELLITE SERVICE COMMENTS

The American Radio Relay League has filed comments in Docket 19852, FCC's Inquiry into the matter of rules for the Amateur-satellite Service. Key points of the League filing:

... 4) The necessity of a body of formal rules for the Amateur-satellite Service at this time is not apparent to the League. . . With but an occasional exception, the rules of Part 97 are adequate. . . 5) The only type of station for which special provisions need be made is 'space station' . . . 6) Each licensee in the Amateur Service should be permitted freely to operate in the Amateur-satellite Service without any additional examination or authorization required. . . "

The complete text can be found toward the end of this department.

NATIONAL AMATEUR RADIO WEEK

As announced briefly in "League Lines" of May QST, Senator Barry Goldwater, K7UGA, has introduced Senate Joint Resolution 197 which would authorize and request the President to proclaim National Amateur Radio Week June 17-23, 1974. The resolution was adopted by the Senate, May 2, and sent to the House of Representatives, where it has been assigned to the Judiciary Committee. The Chairman is the Hon. Peter Rodino, Jr; ranking minority member is the Hon. Edward Hutchinson.

Arguments to Representatives in support of the measure could include the following: 1) Amateurs once again provided valuable public service by furnishing emergency communications following the epidemic of tornadoes on April 3, 1974. 2) The most recent national recognition of amateurs was the commemorative stamp in 1964, issued (in part) to honor amateur work following the Alaskan earthquakes that year. 3) More than half of the states have already recognized amateur radio operators by proclaiming "Amateur Radio Week" on

at least one occasion. 4) The week in question is already established as "Amateur Radio Week" in custom, as through publication in *Chases' Calendar of Annual Events*, a widely used directory of such things. And of course the bill mentions ARRL Field Day - an annual exercise which has helped amateurs remain prepared for emergency communications. Senator Goldwater's bill reads:

Joint Resolution

To authorize the designation of the seven-day period beginning June 17, 1974, and ending June 23, 1974, as "National Amateur Radio Week".

Whereas over two hundred and fifty thousand Americans are licensed by the Federal Communications Commission as amateur radio operators, and

Whereas these amateur radio operators have served their fellow Americans on countless occasions in times of crisis, such as floods, tornadoes, hurricanes, earthquakes, and power failures, by relaying information and summoning medical and other assistance, and

Whereas our amateur radio operators are a vital element in our civil defense network, rendering valuable assistance to civil defense personnel in times of emergency or natural disaster, and

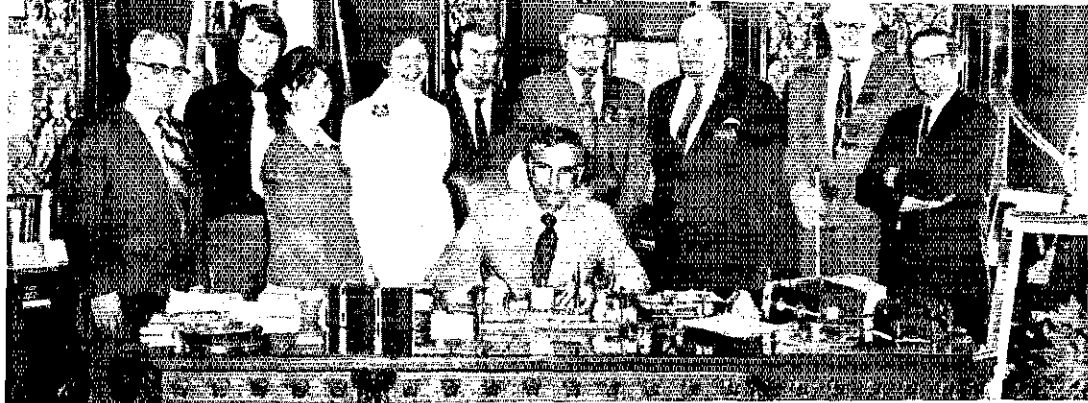
Whereas our amateur radio operators are an important force for international understanding and good will among all people, opening up channels of communication and information across the oceans and the continents, and

Whereas the National Amateur Radio Field Day of the American Radio Relay League has been held during the fourth weekend in June for many years, and will be held during the weekend of June 22 and 23, 1974:

Now, therefore, be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled, that the President is hereby authorized and requested to issue a proclamation designating the seven-day period beginning June 17, 1974, and ending June 23, 1974, as National Amateur Radio Week in recognition of the many contributions of amateur radio operators, and calling upon the people of the United States and interested organizations to observe such week with appropriate ceremonies and activities.



Amateurs were once again "on display" at the Sportsmen's Show in Cleveland March 1-10, 1974. Jacqueline Urbanek, "Miss Ohio" holds the mike while Apricot Net President Ken Simon, WA8QFK and event chairman William Zahuranec, WA8LIP, look on. (Photo via K8ONA)



Using the Spokane World's Fair, Expo 74, as one of his themes, Governor Daniel J. Evans (seated, in photo) has designated June 16-23 as Washington State Amateur Radio Week (adding one day to what will be National Amateur Radio Week if the Goldwater bill, mentioned in a separate story, is successful). Left to right: K7OZA, WA7TNK, WA7WMD, SCM W7QGP, WA7WMC, W7JWJ, Northwestern Director W7PGY, K7AJT, W7PWP.

NO COMMUNICATIONS WITH CHINA

On April 10, FCC issued a public notice stating "The Commission at this time cannot allow communications between its licensees and any station or stations situated in or over the territory of the People's Republic of China. . . ." Article 41 of the international regulations is cited as the basis. Although the situation is complex, there has been concern in Washington that independent unauthorized operation might jeopardize future chances for the support of the amateur service by the People's Republic of China.

STALLED CAR OK AS "EMERGENCY"

An individual amateur asked FCC whether it was permissible to engage in third-party communication of a business nature to bring aid to a disabled car along the highway. FCC's answer is of interest to all of us:

The Amateur Radio Service rules, see Section 97.3(x), define emergency communications as any communication relating to the immediate safety of an individual's life or the immediate protection of property. It is our view that this definition includes any communication relating to providing assistance for an automobile collision or breakdown. Communication in such instances to call for gasoline, repair parts, or towing service would be proper. . . . - Charles A. Higginbotham, Chief, Safety and Special Radio Services Bureau

CALL CONFUSION - OOPS!

In November we ran a photo of W0DM being presented a plaque by WA0SJB. We mistakenly

Each year when the IEEE convenes in New York City, the Metropolitan Chapter QCWA, the Radio Club of America and the New York Chapter AFCEA hold an amateur luncheon. The tenth in the series was March 26, and the speaker was Richard Everett, assistant chief, Amateur and Citizens Radio Division, FCC.

called the presenter WA0SJB. The W0SFWA picture, page 76 of April QST - about a station commemorating the opening of the Dallas-Fort Worth Airport, should have listed the logging operator as Mike Badolato, W5MYA/VP2MYA instead of Stu Bonney, W5PAQ. We also got Stu's call down as W5PAW. Our new QSL manager for Newfoundland is William Coffen, VO1KM rather than VO1KN as we have been saying in the QSL bureau listings and on page 70, March QST. In the story about advisory committees, page 99, May QST we moved C. LaMar Ray, W9LT, in with Albert Vitt, WA0CVS. The right address for W9LT is RFD 1, Ranch Road, Grabill, Indiana 46741. And Leslie Sawkins was listed under his old call, VE7BDJ, instead of his new one, VE7CC. Ouch! Apologies all around.

W0LCT NOMINATED DIRECTOR CCIR

Richard C. Kirby, W0LCT, associate director of the Office of Telecommunications, U.S. Department of Commerce, Boulder, Colorado, has been nominated by the United States as a candidate for director, International Radio Consultative Committee (CCIR), a subdivision of the International Telecommunication Union. Election of the director will take place during the XIIIth Plenary Assembly of CCIR July 15-26, 1974, in Geneva. (The present director is Jack Herbstreit, W0DW/HB9AJJ.)

Mr. Kirby has been active in the work of CCIR for several years, serving as chairman of various



U.S. CCIR study groups; as a member of Commission 3, International Scientific Radio Union (URSI); chairman, Group of Specialists, International Scientific Committee on Antarctic Research (SCAR); and various similar positions. He



originally joined the Department of Commerce at its Central Radio Propagation Laboratory in Boulder. He has two gold medals from the department, in ionospheric scatter and for outstanding leadership, is a Fellow of the IEEE, and has been an amateur since 1938.

RULEMAKING PROPOSALS FILED, NUMBERED, DISMISSED

Standard width fm would be permitted either in the entire 6 meter band or on frequencies between 51.0 and 54.0 MHz (at least) under a proposal, RM-2330, submitted by Gordon Schlesinger, WA6LBY.

The League request for rules changes to permit linking of repeaters (page 85, May *QST*) has been assigned the number RM-2349.

RM-2148, the petition of Robert R. Rule, WA7EGK, for amendment of Section 97.47 (f)(1) relating to topographic maps with a scale of 1:250,000 and contour intervals of 50 feet has been denied by FCC but only because the request has already been granted. The section in question has been deleted from the application requirements for a repeater license. The logging requirement for such stations which replaced this rule, Section 97.111, does not call out specific contour intervals.

Robert D. May, K2GCL, had asked in RM-2151 for mandatory repeater input and output subbands and mandatory frequency separation between input and output. The Commission finds that the arguments and supporting data submitted by the petitioner are "... totally insufficient to justify a rule making proceeding. The essence of this petition is an assertion by one amateur licensee that all licensees require stringent regulation by the Commission on the amateur frequency bands. ..." Accordingly, the petition was denied by order released April 9.

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

In the Matter of

Inquiry Into Provisions)	Docket
for the Amateur Satellite)	No.
Service in Part 97 of the)	19852
Rules)	

To: The Commission

REPLY TO NOTICE OF INQUIRY

The American Radio Relay League, Incorporated, respectfully submits the following reply to the Notice of Inquiry released October 30, 1973 (FCC 73-1097, 38 FR 39566).

1) The American Radio Relay League has participated and supported most actively in many ways the development of the Amateur Satellite Service long before that service was established by the 1971 World Administrative Radio Conference on the International Telecommunication Union. Representatives of the League attended and participated in the 1963 WARC on space communications as well as in the 1971 conference along with representatives of other societies of the International Amateur Radio Union. The principal amateur satellite activities in the United States, Project Oscar, and the Radio Amateur Satellite Corporation (AMSAT) and, to a lesser and more specialized extent, the educational work of the Talcott Mountain Science Center, have been and continue to be furnished financial as well as other tangible support. The ARRL Foundation has been established to assist in financing amateur satellite and other worthy programs and projects. The pages of the League's monthly journal, *QST*, and the facilities of the League's Headquarters station, W1AW, have devoted much space and time to the many amateur satellite programs and operations. No other organization in the world has been and is involved in so many different aspects of amateur satellite and space operation.

2) Immediately following release of the Notice of Inquiry, copies were sent to each of the 86 member societies of the IARU with a request for their comments at the earliest possible date. The views of amateurs in other countries are most important because an amateur satellite, even though licensed by only one administration (country), is truly international in many respects. Many of the components and units of amateur satellites have been and are being designed and built by amateurs outside the United States, most notably in Australia, the Federal Republic of Germany, and Canada, with new systems under development in Japan and the Netherlands. More than 50% of the more than 2,200 amateurs who have communicated many thousands of times through Oscar 6 in the last 18 months reside outside the United States and are licensed by their own administrations. The orbit characteristics have required use of telecommand stations outside the United States.

3) Most unfortunately, the Commission has not provided sufficient time to obtain views from many foreign amateurs and societies and then to coordinate their views into comprehensive and constructive comments in response to the Notice of Inquiry. The League's request that the time for submitting comments be extended from January 7, 1974 to July 8, 1974, was only partially granted, to April 8, 1974. (Mimeo 16097, 39 FR 1643). A second request for extension of time to July 8, 1974, filed by the League on March 29, 1974, was denied by an Order released April 10, 1974

(Mimeo 20471) in which the Commission stated:

The Commission is in receipt of a number of well prepared comments and other material which provide, by themselves, sufficient information to proceed to a Notice of Proposed Rule Making.

Even though, as noted in that Order, the League will have opportunity to submit comments in response to the Notice of Proposed Rule Making, the following may be of assistance to the Commission.

4) The necessity of a body of formal rules for the Amateur Satellite Service at this time is not apparent to the League. The Radio Regulations state that the Amateur Satellite Service has the same purposes as those of the Amateur Radio Service. With but an occasional exception, the rules of Part 97 are adequate. To be most beneficial to both services, therefore, action by the Commission should be limited to establishing minimal regulations and allow the maximum amount of overlap with the rules of the parent Amateur Service.

5) The only type of station for which special provisions need be made is "space station." Here, the requirements of Footnote 320A and Section 1567A of Article 41 of the Radio Regulations must be observed.

6) Each licensee in the Amateur Service should be permitted freely to operate in the Amateur Satellite Service without any additional examination or authorization required. Operation would remain, of course, subject to present limitations on class of license.

7) The Amateur Satellite Service is by its very nature international in scope. Users of any satellite-borne amateur equipment will not only be FCC licensees; in fact, as noted earlier, more than 50% of the users of Oscar 6 have been stations outside the United States' licensing authority. Any restrictions which the Commission might place on use of a satellite by its amateur radio licensees would not apply to the majority of the satellite's users. Therefore, any such restrictions could be ineffective.

8) This principle applies also in reverse. While all satellites in the amateur field so far have been launched by the United States, the U.S. administration does not inherently hold a monopoly on such activities. It is not at all impossible that one or more other administrations may authorize and license a space station in the Amateur Satellite Service. It would be extremely unfortunate, therefore, if this Commission's licensees were saddled with regulations of a nature which might prevent, however unforeseen, their use of "foreign" space stations.

9) Because an orbiting amateur satellite is essentially an international activity, its success or failure can to a large extent depend on participation by amateurs of other countries. Their views on the Amateur Satellite Service are therefore highly pertinent. The League undertook to solicit comment from member societies of the International Amateur Radio Union. Quoted below are applicable portions of comment so far received from national societies in other countries:

JAPAN:

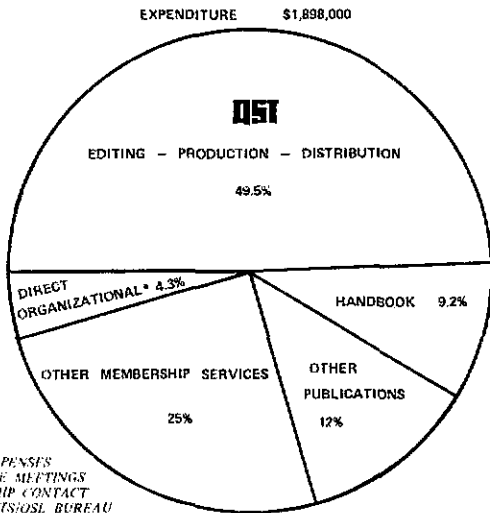
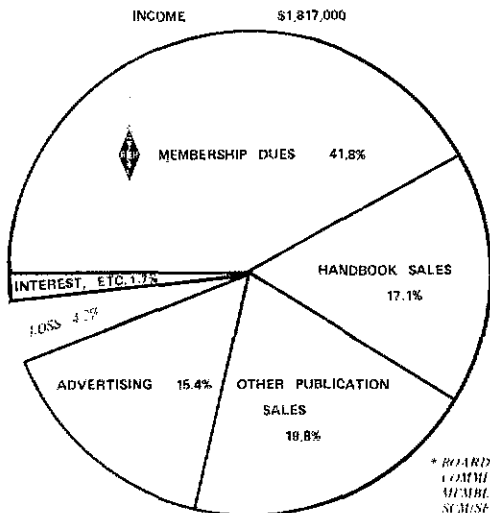
A precedent should be provided in the regulation for terms and conditions of the equipments of such amateur stations conducting amateur radio service in the cosmos, though it will be out of our control if such precedent be different from those of earth stations. Regulations for the equipments shall be the same as those for club stations, whereby said equipments are of such amateur stations, conducting QSO with amateur stations in the cosmos, while said stations are earth stations.

AUSTRALIA:

The view here by and large is that special legislation or regulations catering for the amateur Satellite Service should not be promulgated. An exception might be the codification of all the ad hoc concessions and variations found to have been

(Continued on page 163)

These "pie charts" summarize the League's financial picture for the 1973 calendar year. A detailed operating statement is available to League members who send in a business-sized s.a.s.e.



* BOARD EXPENSES
COMMITTEE MEETINGS
MEMBERSHIP CONTACT
SEMIFUNCTIONS/ QSL BUREAU

Semiconductors

(Continued from page 22)

of the wire through one of the holes, allowing enough lead length for connections to the circuit. Then wind on the 48 turns of No. 30 enamel wire, keeping the wire tight. Use close-spaced turns. The other end of the wire is fed through the remaining hole to secure the winding. C10, which is the receiver main-tuning capacitor, has too much capacitance as it comes from the store. The total capacitance, plates fully meshed, is approximately 365 pF. In order to cover the desired frequency range we need to reduce the maximum capacitance to approximately 140 pF. Incidentally, you *don't* have to use the capacitor specified. There are 140-pF variable capacitors available but they are hard to find, and the cost is considerably more. To modify the specified variable you need a pair of long-nose pliers. Grasp carefully the rear rotor plate of the capacitor with the tips of the pliers, bending the plate back and forth to free it from its mounting. A little upward pressure will quickly free the plate. You need to remove six rotor plates to obtain the desired capacitance. Take your time when doing this job because you don't want to slip and ruin the unit. After the plates are removed, rotate the variable through its range to make sure the plates are not shorting together. Next month we'll show you how the capacitor is mounted. In fact, at that time you'll have a receiver with which to hear signals. QST

Receiver Design (Continued from page 28)

Rectified audio voltage from CR4 and CR5 is supplied to a two-transistor dc amplifier, Q7 and Q8. Agc voltage is taken from the emitter of Q8. Its amount varies with the incoming signal level, and changes as the current-caused voltage drop across the 1500-ohm emitter resistor, R6, shifts in value. S meter M1 follows the same excursions in current at Q8. It should be said, however, that this S-meter circuit is quite generous. It reads nearly half scale when receiving signals that are only S2 or S3. This required establishment of the S9 point well above midscale on the meter face. Since the writer uses S meters only for relative indications of signal strength this characteristic does not pose a psychological handicap. S9 doesn't *have* to fall at midscale on a meter!

Manual i-f gain control is possible by means of potentiometer R2. It supplies dc voltage to the base of Q7, thereby causing a voltage drop across R7, which causes Q8 to conduct more heavily. As a result, the voltage drop across R6 increases and reduces the agc voltage to lower the gain of the i-f system. The same action takes place during normal agc action. Diode CR6 acts as a gate to prevent the dc voltage provided by CR4 and CR5 from being disturbed by the presence of R2. Maximum i-f gain occurs when the arm of R2 is closest to ground.

R3 and C5 establish the agc time constant. The value of R4 can be tailored to provide the attack-time characteristics one prefers. Slower or

faster agc time constants can be obtained by changing the values of R3 and C5. The final value will be a matter of operator preference; no two people seem to agree on which time constant is best. Part II of this article will appear in a subsequent issue of QST. QST

Strays

The Hotel Dixie in mid-Manhattan, New York City, has a huge nine-story tall red neon sign on its 43rd Street facade. The sign had some trouble recently, and for three weeks it read "Hotel DX." After staring at this sign for two days from his salt mine across the street, WB2DIW couldn't stand it. So, he rented a room near the top floor, dragged up a heavy transceiver, threw a wire out the window, and — guess what?? That *%* sign made so much QRM, he couldn't hear a thing! Talk about frustration!!!!

RULES FOR LIFE MEMBERSHIP

1. A paid-up Life Membership in the League shall be available to any Full or Associate Member, other than a Family Member, upon payment of a fee twenty times the annual dues rate, and upon approval of the application by the League's Executive Committee.
2. The Life Membership fee for U.S. applicants is currently \$150, for Canadian applicants \$170, and for other applicants \$180, all in U.S. funds.
3. An applicant may choose an alternative time-payment plan of eight quarterly installments (\$18.75 for U.S. applicants, \$21.25 for Canadians, and \$22.50 for others), to be completed within a two-year span. In such instance, he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
4. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the installment plan within the two-year span, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
5. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$2, but without receipt of QST. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
6. Life Membership is also available to blind amateurs upon payment of a fee of \$40, without the receipt of QST.

50 Years Ago

this month

June, 1924

... This issue launches a series on the construction of superhets, edited by Kruse after picking the brains of the best receiver engineers in the business. J. L. A. McLaughlin's masterpiece looks at least six feet long, and has four stages of neutralized i.f. amplification, with a desirable bandpass of about 20 kc. (10 would be "too sharp, cuts off part of side band.")

... On the transmitting side there is extensive discussion of power amplifiers — not so much for power as to isolate the oscillator (Hartley and Colpitts are recommended) and gain stability. With direct final tank coupling, however, the antenna is at the same potential as the plate supply!

... Successful conventions in Halifax, Philadelphia and Seattle illustrate the health and growth of 1924 ham radio, while club-sponsored radio shows in Denver and Washington, D.C., show a consciousness of the need for good p.r.

... Canadian amateurs are duplicating transatlantic DX records, and going one better by obtaining news copy when undersea cables of commercial services break down.

... Yes, we had "feedback" even then. The tuner circuit published in May won't work as shown, says the correction — the headphones are shorted.

... A Senate bill to levy a 10% excise tax on all radio gear was publicized through League channels and the resulting flood of protests to Congress laid the matter to rest.

... Are evening "quiet hours" to be observed on Standard or Daylight Savings Time? The editor says for good public relations we may have to do both.

25 years ago

June, 1949

... Our cover shows the gang from the Podunk Hollow Radio Club enroute to Field Day in an old jalopy, replete with gear, storage batteries, picnic baskets — and smiling faces.

... The editor predicts the new FCC proposals for amateur rules changes will be the most controversial in years. The Commission wants to cancel the Class A (phone) license and re-examine everyone at 20 w.p.m. plus a tough technical exam (a new "Extra Class") before permitting return to 75- and 20-meter voice operation. Those who don't make it will be reduced to General Class. Proposals for new classes of Novice and Technician seem to be momentarily overlooked in the furor.

... Recognizing the physical limitations of urban life, *QST* does a series on indoor antennas — eight success stories include loops, dipoles with ends folded back, loading coils, etc., with most of the wire in attics. At the opposite end of the scale there is design and construction info on inverted rhombics and biconical beams. W3HH describes the nondirectional properties of a tilted folded dipole, and W4HYR completes the package with a wooden lattice tower 40-feet high — at the "good old days" lumber prices of \$17 total.

... Those toroid gadgets are found ideal for the filter system of a W0MNN sideband rig. The advantages over phasing are becoming more obvious.

... W8GZ shows us how to modernize the prewar HRO, adding stability to the high-frequency oscillator through voltage control and temperature compensation, plus a noise limiter. — *WIRW*

Strays

A Cure for a Tough TVI Problem

In the South of England we are still plagued with interference to a major TV channel on 42 MHz (third harmonic of 14 MHz). All attempts to cure some persistent TVI problems proved unsuccessful. This meant operating the DX bands outside of the TV hours, and these hours were few and far between.

However, a solution to the problem seemed possible: we live on a small housing estate which adjoins the grounds of St. Michael Benedictine Abbey and Monastery. Fortunately, the end of my garden is next to the estate. My thought was to move the antenna far enough away from the TV sets so that the TVI could be controlled or eliminated.

The next step was to obtain permission to put up an antenna on the abbey land and the prior was kind enough to grant it. The first antenna was a 1/4-wave vertical and later, a 3-band TA31 dipole was used (see photograph). In both cases, the TVI was gone and the dipole has performed beyond expectations — the country total is now at 197. While not everyone can expect to have such understanding neighbors, it is hoped that the writer's experience will encourage others in similar predicaments. — *Mike Faulkner, G3JZJ*

June 1974



Hamfest Calendar

California - The Mission Trail Net's annual roundup on June 15-16 is at Pea Soup Anderson's in Buellton, 45 miles north of Santa Barbara in the Santa Ynez Valley. For reservation info write: K6EVO, Bill Long, Box 151, Buellton CA 93427.

Illinois - The Egyptian Radio Club, Inc. annual hamfest is Sunday, June 9, at the picnic grounds, 700 Chouteau Slough Road, Granite City IL.

Illinois - The Six Meter Club of Chicago, Inc. 17th annual hamfest is Sunday, June 9, at Santa Fe Park, 91st St. and Wolf Road in Willow Springs, Ill. Food, drinks, swap 'n shop. Advance registration \$1.50, at gate \$2. For further info and tickets write: Val Hellwig, K9ZVW, 3420 S. 60th Ct., Cicero IL 60650.

Indiana - The Greater Indianapolis Hamfest is Sunday, July 14, at the Marion County Fair grounds (the south east side of Indianapolis at the jct. of I 465 and 74). All events including a giant flea market under one roof. Thirteen area amateur radio clubs combine to bring central Indiana an outstanding convention of technical forums, commercial displays and fellowship. Complete food facilities. Free coffee and donuts in the morning. Good restaurant. Full schedule of women's activities.

Iowa - The second annual Hawkeye hamfest is Sunday, June 16, at the state fairgrounds in Des Moines. Saturday night camping and auto racing available. A free show "Ponties of America" Sat. and Sun.

Maryland - The Maryland Mobileers ARC hamfest is June 16, Father's Day, at Anne Arundel Community College, Arnold, at 10 AM, rain or shine. Talk-in on 146.10/.70 and 146.94. Games, refreshments, contests, auction. Free parking, but car pools save petrol. Contact: Ted Redick, K3UPU, 2 Acton Place, Annapolis MD 21401. (301) 269-5577.

Michigan - The Jewish Community Center Radio Club's 2nd annual swap 'n shop is Sunday, June 16 at the Center, 18100 Meyers Rd. (at Curtis, 6-1/2-mile rd., 1/2 mi. north of Lodge Xway, US 10) in Detroit. Hours 10 AM-3 PM. Plenty of food, free parking. 2 meter talk-in, 146.94 simplex, K8PBQ club call. Write: JCCRC swap 'n shop, 12702 Talbot, Huntington Woods MI 48070 for tickets; s.a.s.e.; \$75 before June 1; \$1 at door or call Phil, WB8MLD, (313) 548-7295.

Nebraska - The Pine Ridge Amateur Radio Club's 20th annual hamfest is June 2 at Chadron State Park-Camp (Norwesca 10 miles south of Chadron). Registration at 10 AM free. Bring covered dish and utensils; coffee and pop furnished.

New Jersey - The Bergenfield Amateur Radio Club's annual swap 'n sell is Sunday, June 16, at 11 AM. Located at Pony League Field, end of Deerfield Street, Bergenfield. For info contact: Robert A. Winter, Secretary, BARK, 104 John Place Bergenfield NJ 07621.

New Jersey - The Raritan Valley Radio Club's annual hamfest and electronic flea market is Saturday, June 29, rain date June 30. An all-day affair at Columbia Park, Dunellen, the program includes a ham clinic, frequency and deviation checks, transmitter hunt, food stand, specialties for the YLs, play space for children and much more. Admission: each licensed amateur \$1, family free. Arrange to sell from car. Contact: Victor Anthenelli, WA2LWS, 733 Center St., Piscataway NJ 08854.

New York - The Rome Radio Club's 22nd annual ham family day is June 2 at Beck's Grove. Flea market, ARRL Atlantic Division Director, W3SW, Air Force Mars meeting, technical program, ladies and kids program, and all you can eat

COMING ARRL CONVENTIONS

June 7-9 - Rocky Mountain Division, Pueblo, Colorado.

June 8-9 - Georgia State, Atlanta.

June 15-16 - Florida State, Orlando.

July 6-7 - West Virginia State, Jackson's Mill.

July 19-21 - NATIONAL, New York, N.Y.

November 1-3 - Southwestern Division, San Diego, California.

NOTE: Sponsors of large ham gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

chicken and steak dinner. Advance tickets \$6; \$6.75 at the door. More info from K2IXN.

New York - The Suffolk County Radio Club's annual flea market is Saturday, July 13, at the Bohemia Recreation Center, Smithtown Ave., Bohemia from 10 AM to 5 PM. For info and directions write: George Veraldo, WB2BAU, 1397 Manatuck Blvd., Bayshore NY 11706. Donation \$1.

North Dakota, Manitoba - The eleventh annual International Hamfest is July 13-14 at the Canadian Pavilion in the International Peace Garden between Dunseith ND and Boissevain MB. Camping excellent. Party, contests, meetings. For info write Ken Larson, K0PVG, 807 Kelly Ave., Devils Lake ND 58301 or Ron Samchuk, VE4SR, 834-9th St., Brandon MB.

Ohio - The Goodyear Amateur Radio Club's 7th annual hamfest picnic is June 16, Father's Day, at Goodyear Wingfoot Lake Park east of Akron (1 mile west of Suffield on County Rd., 87 near O43). Come for fellowship, swap 'n shop, refreshments, displays, and a huge flea market, 10 AM to 6 PM. Family admission \$2.50 at gate; \$2 prepaid. For details, tickets and map write: Floyd T. Gilbert, WB8ALK, s.a.s.e. 1976 Newdale Ave., Akron OH 44320.

Oklahoma - The YL International Sideband Communication System 1975 convention is June 14-15 in Oklahoma City at the Holiday Inn N.W.

Pennsylvania - The Williamsport and Milton Club's eleventh annual Penn-Central Hamfest is Sunday, June 2 at the Union Township Volunteer Firegrounds on Rt. 15 Winfield. Indoors and outdoors facilities for contests, auction and flea market. Starts at noon. Gate registration \$3, YL and children free. Free parking. Talk-in on 3940, 146.52 and 146.94. Info from Clair Yeagle, WA3QXI, 714 N. Main, Watsontown PA. (717) 538-9292.

Pennsylvania - The Harrisburg Radio Amateur Club hamfest is Sunday, July 7, at the Indian Echo Caverns between Harrisburg and Hershey (off Rt. 422-322). Entire pavilion reserved 10 AM to 4 PM. Registration \$2 at door. Tables and tailgaters \$2.

Saskatchewan - The annual 1974 hamfest is at Melfort SK June 28-30 in the Melfort Civic Centre.

Wisconsin - The South Milwaukee Amateur Radio Club's 4th annual southeastern Wisconsin swap-fest is Saturday, July 14, at Shepard Park (American Legion Post 434) 9327 South Shepard Ave., Oak Creek. Activities begin at 7 AM-5 PM on. Parking, picnic area, hot and cold sandwiches and liquid refreshments available. Admission is \$1 and includes a "Happy Hour" with free beverages. Talk-in on 146.94 MHz. fm. For info write: South Milwaukee Amateur Radio Club, S.F. Schreiter, W9AKF, Sec., 104 Brookdale Dr., S. Milwaukee WI 53172.

GEORGIA STATE CONVENTION

Atlanta June 8-9, 1974

The Atlanta Radio Club invites everyone to attend the 50th annual Atlanta Hamfest and 1974 ARRL Georgia State Convention to be held at the Atlanta Townhouse Motor Inn on June 8-9, 1974. This year's event will be highlighted by two days of activities starting Saturday at noon with the opening of the flea-market and manufacturers' exhibits and concluding Sunday afternoon with the presentation of awards. The program will include an ARRL Forum, a Saturday evening banquet, a number of technical meetings on various amateur radio subjects, special interest group meetings, ladies and childrens activities and much more. Keynote speaker at the banquet and ARRL Forum mentor will be John Huntoon, W1RW, General Manager of ARRL.

Preregistration is \$2 per person or \$4 per family (\$3 or \$5 at door). Registration includes \$1 per day flea-market space. Special hamfest motel rates are \$19 single and \$23 double. For complete information write: Hamfest, P.O. Box 11555, Atlanta, Georgia 30305.

FLORIDA STATE CONVENTION

Orlando June 15-16, 1974

The 1974 ARRL Florida State Convention, Orlando Hamfest and 2-Meter FM Convention will be held June 15-16 at the Orlando Exposition Hall with facilities for over 5,000 persons. Convention headquarters will be the Howard Johnson Hi-Rise Hotel located at Route 50 and Interstate 4. Activities will cover all aspects of amateur radio and will feature displays on RTTY, SSTV and repeater operation. Staff members of ARRL and FCC will be on the program. A banquet is planned for Saturday. This will include a buffet dinner and dancing. The ladies will enjoy an art show and other entertainment planned especially for them. The Exposition Hall is only a short distance from Disney World, Seaworld, and many other central Florida attractions.

Talk-in will be on 16/76, 22/82 and 28/88. Swap/shop charge is \$2 per day for a 6-foot table, or, in advance, \$3 for two days. Pre-registration is \$2, at the door \$3. Banquet tickets are \$7 per person, and are available from Chalmers Stromberg, W4WLX, c/o WDBO Radio Station, Orlando, Florida. Room reservations at the hotel may be made by calling toll-free 1-800-654-2000. Pre-registration and requests for information go to Ralph Halberton, W4ZVX, 1617 Flamingo Drive, Orlando, Florida 32803.

ROCKY MOUNTAIN DIVISION CONVENTION

Pueblo, Colorado June 7-9, 1974

Be sure to attend the 1974 ARRL Rocky Mountain Division Convention June 7-9 at the Ramada Inn, Pueblo, Colorado. Sponsored by the Pueblo Ham Club, Inc., this year's affair begins on a social note Friday evening. Saturday and Sunday there will be a full program including a fast scan TV display, real-time SSTV demonstration by

W0LMD, MARS meetings, traffic session, fm forum, and LO meeting. The ARRL forum will feature President Harry J. Dannals, W2TUK.; Vice-President Carl L. Smith, W0BWI; Dakota Division Director Chic Cotterell, W0SIN; QST beginner and novice editor and headquarters repeater liaison representative Lew McCoy, W1ICP/WR1ABH, plus other League officials in attendance. There will be a special luncheon for the ladies in addition to a program that will include tours to local tourist attractions. Arrangements have been made with several local service stations to insure adequate gas for those coming by car. Talk-in will be on 7.240 kHz, 19/79, 34/94, and 449.350 MHz.

Pre-registration to June 1 -- \$6, \$7 at the door, Saturday breakfast \$2.85, Saturday buffet-style dinner \$3.50, Sunday banquet \$6. Reservations at the Ramada Inn (\$12 single, \$16 double) may be made by calling toll free 800-648-5970. For pre-registration and information write Robert Shriner, WA0UZO, Box 92, Pueblo, Colorado 81002.

WEST VIRGINIA STATE CONVENTION

Jackson's Mill July 6-7, 1974

West Virginia, almost heaven, and even closer is Jackson's Mill 4-H camp where the 16th annual West Virginia State ARRL Convention will be held on July 6-7. The convention will get underway with the noon meal on Saturday July 6, followed by activities for the whole family. Be sure to attend the ARRL forum with General Manager John Huntoon, W1RW, and other League officials, and the technical forum with QST Assistant Technical Editor Tom McMullen, W1SL, on hand to answer all questions. There will be new equipment displays, a flea market, net meetings, MARS meetings, etc. The ladies program will include home economy demonstrations and games. A childrens program is planned with games, stunts and swimming.

Pre-registration (full) \$10, which includes 2 meals on Saturday, one night's lodging (dormitory style), and 2 meals on Sunday, plus entrance to all activities of the convention. Full registration at the mill \$12 for adults and \$7 for children under 12 years of age. Regular registration will be \$3 or 2/\$5. Talk-in on 3995 kHz, 146.52 MHz and 146.94 MHz. Convention station will be W8WVA.

For further information contact West Virginia State Radio Council, 182 Monterey Drive, St. Albans, West Virginia 25177. QST

Oscar News

(Continued from page 65)

States trophy. Now he has filed his claim as the first to work and confirm five continents by satellite. CN8BO, KH5HLLK, and HK3CMI provided the toughest three. Bill is now looking frantically for Asia; anyone interested in organizing a Wrangel Island DXpedition? - K1ZND

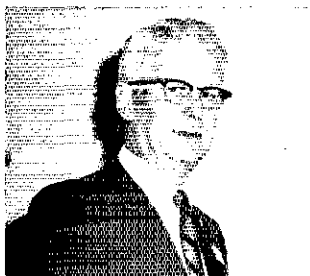
The Post Office Department promises faster mail service with Zip codes. Use yours when you write ARRL. Use ours, too. It's 06111.

I A R U News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

IARU OFFICERS

The IARU Constitution provides for the offices of president, vice-president, and secretary. Normally these posts are filled automatically by corresponding officers of the Headquarters society; however, such an officer may decline to serve in a similar capacity for the Union. On his election in 1972, Hq. society (ARRL) President Harry J. Dannels, W2TUK, expressed his desire not to serve also as IARU President, since the two offices "... are each so important and demanding of time and energy that they should be held by separate individuals." When this occurs, the Constitution provides for the Headquarters society to nominate one of its other officers to be president of IARU, subject to vote by the other member-societies of the Union.



President Noel Eaton, VE3CJ, is setting a brisk pace during his first months in office. Late April found him in Venezuela to meet with officers of the *Radio Club Venezolano*; in Mexico City for an Executive Committee meeting of the *Union Interamericana de Radioaficionados-IARU Region II*; and on both coasts of the U.S. Visits to IARU societies in Great Britain, Switzerland, Austria, Italy, Spain, Portugal, and Ireland were planned for May and early June, in addition to brief attendance at the ITU WARC-Maritime conference in Geneva.

From 1972 until early this year, ARRL Vice President Robert W. Denniston, W0DX, served as IARU President following his six years of service in the dual capacity of ARRL/IARU President. When the office became vacant in January, 1974, the ARRL Board of Directors nominated newly-elected Vice President Noel B. Eaton, VE3CJ, to fill the post. This nomination has been ratified by the affirmative vote of a majority of the IARU societies. Background sketches of OM Eaton and the new IARU Vice-President, Victor C. Clark, W4KFC, appeared on page 67 of *QST* for March, 1974. Since 1961, the office of IARU Secretary has been held by ARRL Secretary/General Manager and *QST* editor John Huntoon, W1RW.


Article IV of the IARU Constitution defines the duties of the officers as follows:

The President shall have general supervision of the affairs of the Union. He shall preside at any meetings which are held in the name of the Union. He shall be responsible for and shall direct the work of the Secretary in the handling of correspondence, records, funds, and the Calendar.

The Vice-President shall be responsible for such matters of general supervision as may be delegated to him by the President, and in the absence or disability of the President shall act in his stead.

The Secretary shall be the manager of the routine affairs of the Union, under the direction of the President. He shall conduct the general correspondence of the Union and shall maintain files and keep full records of all actions taken. He shall record the proceedings of any meetings held in the name of the Union. Whenever the Union has funds of its own, as distinct from the funds of the member-society serving as the Headquarters, the Secretary shall be responsible for their safe-keeping and shall account for them to the President. The Secretary, under the direction of the President, shall arrange and issue the Calendar, and shall handle the correspondence and records in connection therewith.

IARU officers serve as unpaid volunteers, as do the officers and directors of the ARRL.



MARCONI'S MAUSOLEUM
and VILLA GRIFONE
BOSCO MARCONI (BOLOGNA) ITALY
HERE IS LOCATED THE REMAINS OF
"GIUGLIEMMO MARCONI"
AND THE RADIOAMATEUR MEMORIAL
STATION 114-FGM

To OSO of 194 at 2
on MHz R S T
2X-SSB-AM-CW
TXN 78 de

ITAB ILCK
Cassava Station, 100L, 1000W

QSL N° 85443
WWDX CONTEST
PHONE - CW
ARRL CONTEST
VHF CONTEST

OPERATIONS
MUCH
IWN
RSGC

114 FGM

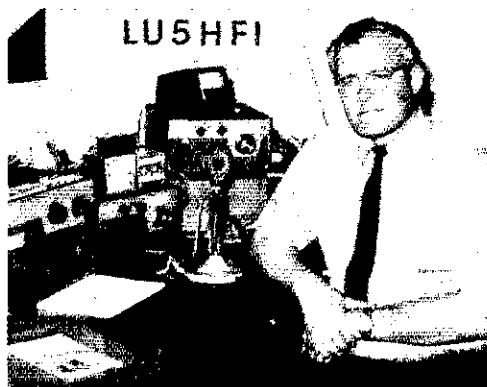
EX

iO-FGM

P.O. BOX 2128 BOLOGNA

The Marconi Memorial Station 114FGM was operated extensively in the latter part of April to commemorate the 100th anniversary of the inventor's birth on April 25, 1874. The station is operated regularly at other times, as well. The *Associazione Radio-tecnica Italiana*, IARU society in Italy, sponsors a "Diploma Guglielmo Marconi" to celebrate the experiments carried out by Marconi in various parts of the world.

Amateurs the world over were shocked to learn of the kidnapping and shooting, on April 12, of well-known amateur Alfred A. Laun, III, W9SZR/LU5HF1. Fred was serving as U.S. Information Service director in Cordoba, Argentina at the time of the incident, and is now recuperating in a hospital in the Canal Zone. He has operated previously as H18XAL, HS3AL, HS5ABD, and XV5AC.



WARC - MARITIME OPENS IN GENEVA

On April 22 the 1974 World Administrative Radio Conference for Maritime Mobile Telecommunications opened at the Geneva headquarters of the International Telecommunication Union. While the deliberations of this Conference are not expected to have a direct bearing on the allocations to the amateur radio service, the degree of utilization of shared bands by maritime stations may be affected. A team of IARU observers, led by Roy F. Stevens, G2BVN, has been accredited to the Conference. The team will note specific developments as well as general trends in the thinking of the delegates, thereby gaining background which should be useful in preparing for the 1979 general WARC.

COMMUNICATION WITH CAMBODIA

Information has been received by the Federal Communications Commission that the Khmer Republic's Ministry of Foreign Affairs has informed the United States Embassy at Phnom-Penh that amateur radio station XU1DX may conduct amateur radio communications with U.S. licensed amateur radio stations. Accordingly, the Commission has no objection to amateur radio stations licensed by the Commission conducting amateur radio communications with station XU1DX.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: e.g., cards for VP8s go to *RSGB* in Great Britain. W, K, VE and VO stations only may send foreign cards for which no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations.

Algeria: ARA QSL Service, P. O. Box 2, Algier R.P.

Angola: LARA, P. O. Box 484, Luanda

Antarctica: Dave Porter, K2BPP, Mountainside Rd., Mendham, NJ 07945

Argentina: RCA, Carlos Calvo 1424, Buenos Aires, BA

Austral/French Antarctic Lands: via Malagasy Republic

Australia: VK1 QSL Officer, VK1ACA Canberra Radio Society, P. O. Box 1173, Canberra City, A.C.T. 2601; VK2 QSL Officer WIA Hunter Branch, P. O. Box 134, Charlestown, N.S.W. 2290; VK3 QSL Bureau, Mr. E. Trebilcock, 340 Gillies St., Thornbury, Vic. 3071; VK4 QSL Officer, P. O. Box 638, G.P.O. Brisbane, Qld.

4001; VK5 QSL Bureau, Mr. Geo. Luxon, VK5RX, 27 Belair Rd., Torrens Park, S. Aust. 5062; VK6 QSL Bureau, Mr. J. Rumble, VK6RU, Box F319, GPO Perth, W.A. 6001; VK7 QSL Bureau, P. O. Box 371D, G.P.O., Hobart, Tas. 7001; VK8, 9, Ø, Federal QSL Bureau, 23 Landale St., Box Hill, Victoria 3128.

Austria: OeVSV, Box 999, A-1014 Vienna

Azores: via Portugal

Bahama Islands: BARS, Box 6004, Nassau

Bahrain: Ian Cable, MP4BBW, P.O. Box 425, Awali

Barbados: ARSB, Box 814E, Bridgetown

Belgium: UBA, Postbox 634, 1000 Brussels

Bermuda: RSB, Box 275, Hamilton

Bolivia: RCB P. O. Box 2484, Cochabamba

Brazil: LABRE QSL Bureau, P. O. Box 070004, 70000 Brasilia DF

Bulgaria: CRCB, Box 830, Sofia

Burundi: via Zaire QSL Bureau

Canada: See *ARRL QSL Bureau in this issue*

Canal Zone: Lee DuPre, KZSOD, Box 407, Balboa

Cape Verde Islands: RCCV, CR4AA, Praia, Sao Tiago

Chagos: via Seychelles

Chile: RCC, P. O. Box 13630, Santiago

Colombia: LCRA, P. O. Box 584, Bogota

Cook Island: ZK1 QSL Bureau, c/o Radio Station Rarotonga, Rarotonga

Costa Rica: RCCR, Box 2412, San Jose

Cuba: FRC, Apartado 1, Habana

Cyprus: CARS QSL Bureau, P. O. Box 216, Famagusta

Czechoslovakia: CRC, P.O. Box 69, 113 27 Praha 1

Denmark: EDR QSL-Central, Harry Sorensen, OZ6HS, Ingstrup Hovdegaden 51, DK 9480-Lokken

Dominican Republic: RCD, P. O. Box 1157, Santo Domingo

Ecuador: GRC, P. O. Box 5757, Guayaquil

El Salvador: CRAES, P. O. Box 517, San Salvador

Ethiopia: Telcoms ARC, Box 1047, Addis Ababa

Faeroe Islands: OY-QSL Bureau, P. O. Box 184, DK 3800 Thorshavn

Fiji Islands: QSL Bureau, P. O. Box 184, Suva

Finland: SRAL, Box 306, 00101 Helsinki 10

France: REF, 2 Square Trudaine, 75009 Paris 12

French Oceania: RCO, P. O. Box 374, Papeete, Tahiti

Germany (East): DM QSL Bureau, P.O. Box 30, 1055 Berlin

Germany (West): DARC Amateurfunk-Zentrum, P. O. Box 1155, D3501 Baunatal 1

(Continued on page 158)



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* W3WRE

YL June Activities

JUNE CONNOTES summer, roses, the end of school, and, of course, weddings. It is a time when we relax our rigid schedules and let go in the anticipation of the vacation season. For many of us June marks the last of the major ARRL activities, Field Day, the one contest that we all enjoy because anything can happen, and usually does. But when the gear is packed and returned to our fixed stations, and the logs are mailed, our amateur radio schedule seems to fall into the same mold as our other programs for nothing lies ahead on the calendar until September's YL "Howdy Days."

June through September is a busy time. It is the start of summer training classes in theory and code to prepare new groups for Novice, or upgrading present licenses. And for those of us whose school hours have curtailed operating, it is the opening of the door to leisurely contacts, and making friends on the air instead of a few quick ones between homework and bedtime.

Until the energy crisis interfered with the plans, this was the month for the final preparations to assure that communications would be available for the annual Powder Puff Derby, and June will be again when that activity can be resumed. To YLRL it is hallots, and election of officers for the coming year, and the setting up of the dates for Howdy Days, YLAP, DX-YL to Statewide YL, and the YL-OM contests - while for the many clubs it's planning of programs and special events when the fall's activities are resumed.

June is the beginning of the YL get togethers at hamfests, or at state, division, and national ARRL conventions, where it is possible for many of the YL club members to meet, and the on-the-air clubs to hold a formal meeting of their wide-spread memberships.

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

A lot of us think of summer as an excellent time to indulge in that favorite occupation of most women, rearranging the shack. As one YL put it "Just like our neighborhood campaign, this is when I clean up, fix up and rearrange. I've been waiting all year for this!"

June isn't the beginning of the amateur radio "doldrums" as it is sometimes described, for the YL nets continue daily with the memberships dwindling, then building as vacations, or special family events make demands on our time. The ladies in the three MARS programs, and in the amateur public service nets are maintaining their schedules, and the women in YLISSB, and YLRL, continue to keep their national, and world-wide systems of service and friendships.

YL Plans for National ARRL Convention

The NYC-YLRL will again host the YL program at the National ARRL Convention, July 19-21, 1974, at the Waldorf Astoria Hotel in New York City. An interesting program of events including sightseeing tours has been planned for the wives of operators who will be attending.

While the full program is geared for all the YLs who attend, whether licensed or not, there is the YL Forum and specially arranged events for the women amateur radio operators that has been set up so that they may attend the many technical sessions if they desire. YLRL will be represented by the 1974 President, Eila D. Russell, W4EBS, and Dorothy Baumgardner, W4BJW, Eastern Librarian of the club's program of Tape Topics for blind operators.

It is expected that there will be representatives of YLISSB, the officers of many of the YL clubs, as well as YL nets. See you there!

1974 YL Club Officers

Several YL clubs have elected the following women to serve as officers for the year 1974.

The Buckeye Belles: President, Carol Jans, W8WRJ; Vice President, Eva Karnatz, W8AHU; Secretary, Jean Blakeslee, W88FH; Treasurer, Jackie De Pizo, W8WRH; Certificate Custodian, Marge Farinet, K8TF; W8MBI Memorial Station

Chris Haycock, WB2YBA/VK3AJZ, 1974 YLRL Vice President was entertained by Australian YLs during a recent visit to that country. L-r back row: Chris, WB2YBA/VK3AJZ, Maris, VK3KS; front row: Vi, VK3BAK, Norma, VK3AYL, Austine, VK3YL.



Custodian, Edie Best, WA8DMT; *Buckeye Burr* Editor, Lillian Abbott, K8CKI.

WAYLARC: President, Meg Cauffield, W3UTR; Vice President, Irene Akers, W3RXJ; Secretary, Sandy Rutiser, K3SQX; Treasurer, Maxine Harris, WA4UWK.

TASYL: Marion Van Til, WA8OCD; Vice President, Rosemary Davidson, WA8VXE; Secretary Bev Stoner, K8ZJU; Treasurer, Nona Schneider, WA8CXF.

MINOW: President, Frieda Raymond, K7PVG; Vice President, Joan Gallagher, WA7BDD; Secretary-Treasurer, Patricia Smith, WA7GMX.

Georgia Peaches: President, Jeannie Hunting, K4THU; Vice President, Hilda Andrew, W4HWR; Secretary, Nancy Hickman, WB4NTW; Treasurer, Meg Hennon, K4HSC.

YLRL 35th Anniversary Project

1974 YLRL President, Eila D. Russell, WA8EBS, has planned an update of the club's history to commemorate the 35th anniversary of this world-wide YL organization.

The outline history of YLRL from 1939 through 1958 was compiled by Vada Letcher, W6CEE. Under the present plans each of the women who held office as President since then will contribute a report of the officers, events, and achievements during her term of office.

The only available YL history at present is *CQ-YL*, the illustrated publication of Louisa Sando, WSRZJ, covering the activities of women amateur radio operators. Upon completion of this YLRL project there will be an official record of this oldest of the world wide clubs for YLs only.

Swedish YLs

In answer to a request for corrections or omissions in the YL Story-Europe, in *QST*, February 1974, Jan Thoren, SM5CPC, sends an up to date list of the YLs who are licensed amateur radio operators in Sweden.

The YLs with an SM prefix are: SM2FRU, SM3TT, AOW, DYL, FEF, SM4MD, YL, CFX, SM5ES, BAG, BLX, BOY, CXC, EHG, EPG, EUU, FFP, SM6AYL, AOV, BFO, DAX, DYG, EGY, ELX, EVA, EWH, FCA, FEQ, FMK, FUC, FXG, FXW, GOA, SM7BAC, BLQ, CIT, CRI, CYL, CBI, COL, CMB, DYX, EAI, EDJ, EOW, EPA, FGJ, FMD, FOJ, FTV, GIF, FJE, IT, OA. SM0ALS, CBU, DAM, DZ, EVB, EYL, ECT, EYU, EBY, EXY, FI, FIB, FER, FLQ, FVQ, FYL, ZZ.

At present there are no YLs with SM1, SM8, or SM9 calls.

"YL News and Views" is very grateful to SM6CPC, for his assistance in helping to give an accurate record of the YL story world wide.

New French YLs

The women in France continue to add YL calls to help build the ever growing YL story in Europe. Latest calls are F6CYL, Ann, who lives in Louveciennes, near Paris. If Ann were at home she would hold a GM call. Thanks to 9Y4PH, Phil Habib in Port of Spain for this information.

Carol Anderson, K9HQN/Ø will soon be acquiring a permanent call in the 10th call area. An active YL, she enjoys training as a TV engineer.



YL members of the Southern Chester County Amateur Radio Club with ARRL Officials were in front row: Sharon, WA3QZF, Ann Murdock, wife of K4AJN, Lil Wist, K3NFT. Back row: Kathy, WN3VEO; Paul Mercado, W3FBF, SEC, E. Pa.; May, WA3JHF; Millie, WA3IVO; Charlie Curry, K3FYX, club president; Jesse Bieberman, W3KT, Vice Director, Atlantic Division, Phebe, K3HAI.

Another newcomer, F1CDN, Mme. Jaqueline Leleux, in Thornery, is listed in the "New Calls" of *Ondes Courtes Informations*, February 1974.

New YL Net

The Western Pennies Net, an outgrowth of the W. Pa. CD (Races) Net meets each Sunday at 9:30 P.M. Eastern Time, on 3990.5 kHz.

This newest YL net is open to all YLs who wish to check in and get acquainted with other gals on the air.

Carol Anderson, K9HQN

Carol surprised even herself when the radio bug bit for not only did she absorb all the electronic theory, but is now studying with an eye towards becoming a TV, or broadcast engineer, or both.

Licensed in 1962, she is very active on 40-meter cw, and tries to have four or five contacts a day. Carol prefers the friendly informal chats to be able to get to know her contacts. This method of operation holds true even in her hunt for the many certificates that are offered, for, she comments, "all were earned through good long friendly QSOs."

A member of ARRL, YLRL, and AIC, she is active in ARPSC as EC of Nuckolls County, Nebraska, and hopes that there will be a local radio club there before long.

Carol's operating interests are as varied as radio itself with contests, rag chewing, net operation, and AREC all vying for first place, as does building equipment and antennas.

The move to Nebraska will soon bring her a new call, and also a new class of license for Extra Class is now on the top of her list as a goal to be achieved.



Strays

WASCON holds First Class Radiotelephone with radar endorsement, First Class Radiotelegraph with radar endorsement, six months maritime endorsement, aircraft radiotelegraph endorsement, and Amateur Extra Class. How many can equal that achievement?

Summer time is here, the bands are noisy and in poor shape, QSOs are difficult. What to do? Clean house! Here are a few suggestions that will aid you in maintenance of your gear:

Cabinets and chassis: remove dirt, grease and gum with soft brush, vacuum, damp cloth and proper cleaning solution.

General condx: rust and corrosion on parts and wiring, loose connections, frayed or burned insulation, loose hardware, charred resistors, discolored parts, signs of arcing.

Controls: ease of operation, binding, scraping, looseness, misalignment. Tighten any loose knobs or controls, check for worn drive string, spray noisy pots with control cleaner.

Plug-in items: proper seating of tubes, lamps, crystals, fuses, etc.

Cables: cuts, breaks, fraying, kinks, strain-clamps.

Connectors: loose connections and bent or broken contacts. Check solder joints, wire fraying, clean metal contact parts.

Pilot-light assemblies: looseness, broken or loose lenses, burned out or discolored bulbs.

Meters: damaged glass, broken cases, bent or non-zeroed needles.

Antenna: check droop, mountings, connections and connectors, relays, ropes and guys, coax, twisting of open line, ground connections, etc. Prune if necessary. Clean and scrape aluminum joints (exposed) and seal with Penetrox (available electrical supply houses). Do not scrape with steel-wool. Tighten all screws, nuts and bolts carefully. Fittings tightened beyond the pressure for which designed will be damaged.

Power supply: measure and determine if correct, also various test points. Measure ac line

voltage for regulation under full load.

Tubes: loose envelopes, cracked sockets, insufficient spring tension, dirty sockets, grid and plate caps, low emission of tubes.

Terminal boards: loose connections, cracks or breaks.

Transformers, chokes, etc: check for overheating and signs of same. You should be able to place bare hand on for 5 seconds without discomfort.

Capacitors: leaks, bulges, discoloration. Inspect variable capacitors for dirt, moisture, misalignment of plates, loose mounting, loose coupling, signs of arc-over.

Resistors: cracks, chipping, blistering, discoloration or moisture.

Switches: poor operation, arcing, or corroded contacts, binding. Do not lube or spray actual contacts of any switch with over 1 watt of power thru contacts. Variable inductor tension, signs of overheating, clean with alcohol, clean rag, crocus cloth (not emery or steel-wool).

Relays: wipe off contacts with soft lint-free rag or narrow strip of bond paper dipped in alcohol. Brown discoloration found on silver and silver-plate contacts is silver oxide and is a good conductor. Burnish contacts only when necessary, and never file or sandpaper.

Bugs and keys: (see above), tighten all loose parts, a drop of light oil if required, check weight, ratio, clicks, and the like.

General alignment and calibration: follow instruction book, and only to extent of test gear available.

Scope: use oscilloscope to observe modulation and keying.

Measure output into calibrated dummy load if available.

Check for spurious and harmonic radiation of separate and isolated receiver. Check transmitter neutralization.

Make sure all equipment is chassis grounded to a proper earth ground (independent of ac mains) via a ground cable of sufficient gauge.

Tag leads . . . Do not use steel-wool or emery cloth/board . . . Use crocus cloth, 0000 sandpaper, damp lint free cloth. . . . Unmedicated petroleum jelly, 3 in 1 oil, Isopropyl alcohol. . . Put things away. -- W4LDF, The Richmond Ham.

The Missouri Valley Amateur Radio Club, W0NH, put on a three-day display at the East Hills Mall, Saint Joseph, Missouri, late last year. The 35-foot exhibit covered earlier days; repeaters; emergency work in connection with the Red Cross in particular; amateur radio's contribution to technology and information on the club and the League. Equipment on display included converted

surplus; commercial kits; home-built gear; cw identification module that spectators could key; a five-step explanation of pc boards from copper-clad to finished project; and a four-position amateur station in operation. Roy Waldo's antique tubes and old magazines were attractively displayed. An RTTY machine played a continuous-loop description of amateur radio. QSL cards were on view from the 50 states, 6 continents and 35 countries. MARS was well-represented, too, through the cooperation of WB9IMQ and Chief David W. Whalen of the Navy and Lt. Col. R. H. Queen of the Missouri Army National Guard. The display was designed and built by Bob Martin, W0GGD with photography by W0OGC. Others helping were K0AFF, K0CWQ, K0ERD, WN0JEP, WA0KDF, W0LBW, W0NUT, WA0RTT, W0YZZ, W0HEF, WA0HBX, WA0FLF and the Savannah Repeater Association, WR0ABI.

Most communities have similar malls nearby, and most of the malls encourage displays of various types in the common areas between stores. How about your club tackling a project like this? Hq. will help with ideas and literature for the public.



How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How :

"Many persons believe that the radio bug bites but once," wrote H. F. Mason in this same journal fifty years ago. "Indications are, however, that the bug bites twice." The second more lethal nip, he explained, comes with the thrilling realization that full ham status lies within one's very own reach. But, though the path be clearly marked, proceeding from desire to reality requires a guiding hand for most of us. From recent "How's" mail, then, more on the Saga of Elmer, picking up where we left off last September.

"Just a short note on KØKLY, my personal Elmer, who introduced me to the spirit of hamdom with infinite patience and tolerance of the other guy or gal," writes WNØI.ØR. "His eager enthusiasm is a lesson to any amateur who professes to be 'too busy with other things' to aid a budding ham."

Carlton Davis, awaiting his Novice license in Cambria Heights, New York, was lucky enough to find his Elmer in W2JIA. "But for Jack I'd most certainly be sidetracked on CB," he admits. "He's already encouraging me toward my General. Great combination, patient W2JIA and persistent W1AW." W2JIA wasn't too busy to ease the path.

No matter how long ago you joined ham ranks you don't forget your Elmer. Who ever forgot Santa Claus? "Old 9RME got me started back in the '20s," fondly recalls W9HNV. "Set me up with a bloopster UV201 receiver. I'm still going strong on 160 cw after 46 years of wireless fun." And you never know where Elmer might pop up. WB9JSN found him signing WN9YHR in 2-meter QRM on the old Novice phone band. Jay adds, "Thanks also to ARRL for indispensable services rendered."

If one is lucky enough to make early club connections the chances of meeting Elmer increase manyfold. WN3VAW traces the breed back to SWL days and WN2FEO, then to amateur radio instruction by W2EO, finally to encouragement by radio clubbers in New Jersey's Livingston vicinity. WB4KZG discovered advantageous group therapy, too, in multi-Elmers W4VGZ, WA4FVW, WB4s CTC and GXW. "Through their great generosity

and spirit those four fine hams showed me what amateur radio is all about."

Okay, but what about the guy in the sticks, the isolated QSO-hungry bird with no Elmers in sight? Many lone wolves make the grade by self-study without help. Zero help? Not exactly. Remote VE3CUI writes, "The first time I saw a ham station was well after I had obtained my own callsign. Elmer to me, neither a 'he' nor 'she,' was my beloved old third- or fourth-hand S77A receiver. With it I progressed gradually through simple BCLing, digging out voice ham-band signals, copying W1AW's code practice, finally to cw QSOs of my own. I doubt that I'll ever part with this old set, a wonderful source of information and inspiration toward the avocation of a lifetime."

Ed gives a neat twist to our basic Elmer definition and we welcome the added inanimate category. That S77A did the job! This whole inquiry on Elmer phenomena goes back to "How's" for March, 1971, also June '71, July '72 and February '73. Elmer really gets around. May we hear about yours?

† † †

What :

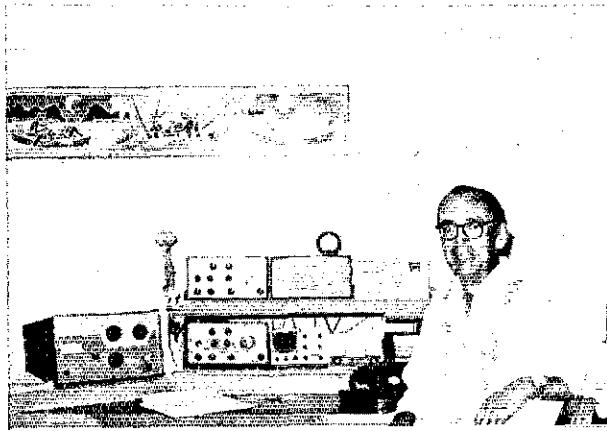
An ailing ionosphere was subjected to its usual annual punishment in this year's ARRL International DX Competition. The rf assault was even more merciless than ever, if possible, with participants topping off their gallons for every last legal watt to crack reluctant DX routes. Contest commentary by club scribes culled from the DX press:

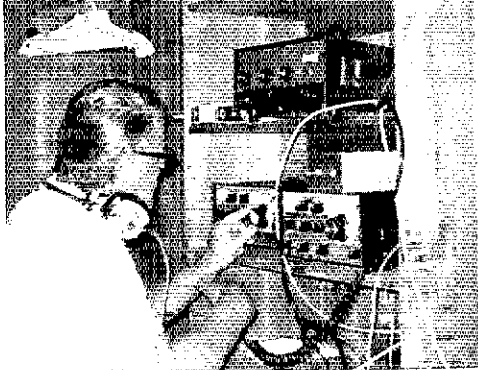
Joust (from *Compton's*): "knightly combat in which armored contestants engage each other singly; combat between troops of knights usually called a *mele*." A thousand years have passed since that description was written but the action is still with us. It applies to the yearly ARRL DX Contest. Things are a bit different now. The armor is metal boxes containing electronic devices, and the lances are spears of aluminum called elements from Japanese-derived Yagis. The yelling and blood-letting appear to be still with us, and the overall description still holds, especially the *mele*. Between halves the contestants retire to lick their wounds and repair their weapons, then beware the

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

WA7IXE/KP6 threw 20 into an uproar by putting Palmyra island on the air for a few days in mid-February. John Paul Jones quickly gladdened a thousand amateurs in 52 countries from this FD-style QTH of the Month. WA7IXE gads about the Pacific aboard motor yacht *Wandering Star* after previous DX activity in Kuwait, Bahrain and Singapore. (Photo via KS6DY)

June 1974





Idea of March! February conditions were pretty so-so, the phone weekend particularly sad. CW's first Saturday was fair, the Sunday found wanting. Ten meters didn't open Saturday in our area but a good Sunday 28-MHz opening went almost unnoticed. Too much CQ-DXing was observed, and there was a great reduction in the number of low-power boys logged. With bands as they were the 40-watt/dipole gang just couldn't cut the mustard. A mass of little DX signals floated unreadable in the noise level. Sorry, chaps, just couldn't copy you, especially under some State-sider's marathon CQ-DXing. DX stations say that trying to work a contest in General Class portions of our phone bands is a completely lost cause. The number of contacts does not justify the effort because so many Generals want to pull up a chair and chat a while. Arrival of spring still produced good but short DX openings with skip becoming very selective geographically. There are times when you can hear Europeans working up and down the east coast barely above the noise level while Florida fours give them S9 reports. Then in the mornings on 20 W4s can be doing great with the Pacific while we Eights can only imagine hearing possible VKs. The band has the cute habit of popping open to Vietnam or somewhere around 1400 GMT but never two days in a row. (Columbus Amateur Radio Association *CARAScope*, W8ZCQ) . . . Band conditions improved a little for the last two weekends of the test. There were, however, few openings on 10 meters and almost no Europeans for Sevenland on 15. Don't yet despair; things will get worse before they get better! Most "little guns" made out better on 40 and 80 with increased DX activity on lower bands. Poor 28- and 21-MHz conditions sure made things hectic on 20. The onset of March found occasional 10-meter openings to South America, Hawaii and New Zealand; 15 meters with evening paths improved; 20 waking up a little earlier and staying in longer; 40 with fine openings to Europe and Africa before summer static builds; and 80-meter propagation starting to shorten with increasing QRN levels. (Western Washington DX Club *Totem Tabloid*, W7BRU) . . . Mediocre conditions may drive fair weather contesters to other pursuits but our hardy band of diehard SCDXC contest maniacs continue to fight with mike and key through pile-up and line noise in a valiant attempt to uphold club honor against ogres of the north. Low suspot activity made Europeans almost nonexistent during both phone weekends. Fifteen-meter JAs were very poor the first weekend and fair the second when 21 MHz closed around suppertime but reopened later for

VP5GS was one of several DXpeditionary sorties recently uncorked by lower-frequency specialist W4BBB. Gene managed some 800 QSOs from this Turks & Caicos clothes closet in January, 250 contacts on 160-meter cw.

three more hours! Serious entrants were forced to run JAs on 40 to build up respectable totals. Inability to transmit and receive on the same 7-MHz voice frequency due to allocations makes this a totally unenjoyable procedure. Each station effectively takes up two frequencies and sooner or later someone is bound to ruin your receiving spot with his pile-up. Eighty was extremely productive multiplierwise with nearly every South and Central American country represented. On cw a European was even worked backscatter over Africa by some Sixes. Fifteen was fair to Europe the second weekend but there was a near-blackout to Japan on Saturday. A little farther north, we hear, it was a blackout. Our thanks go to DX stations who put in large efforts working U.S.A. and Canadian stations hour after hour. This might be likened to Californians working JAs all night long, something only about five percent of our club would appreciate. (Southern California DX Club *Bulletin*, W6DGH).

That about sums it up from east, west, north and south until ARRL's Communications Department gives No. 40 the full QST treatment a few months from now. Remember not so long ago when all continents barreled through simultaneously all day long on three bands? Today it's hard to run a simple string of garden-variety Europeans or JAs on any band, especially north of Mason-Dixon. Ah, well, here comes another summer. Turn up that rf gain, keep twirling that beam and you'll catch occasional unexpected breakthroughs, all the while dreaming of better DX days to come.

† † †

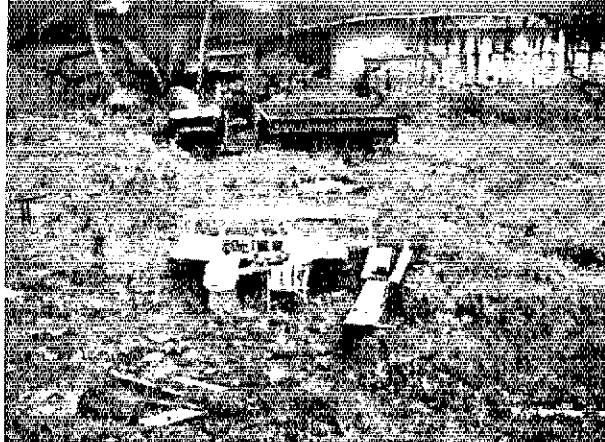
Where:

NORTH AMERICA - Three cheers, two tigers and a handstand for June's "QSLers of the Month," all applauded in "how's" mail from Ws 1RML 3CTE 4WFL 6OKX 8ROV, Ks 2LEF 2VJS 6ANE 7DSZ, Ws 2DLV 2EAH 6CPP, Wbs 2EOD 2NOM 4ZYF, KH6IAC and VE7HQ for profoundly punctual pasteboard production: CR7GJ, CJ2AK, CXs 1EK 2XA, EL2Y, FB8XA, FG7s AH XT, FK8BB, FM7s WG WH, FY7AM, I0ZO, I19JWA, I8FBH, JY9GR, KA6WS, KH6s GKD/KB6 HC, KJ6DI, KX6BB, LXs IBW 9SI, MP4Bin, OD5EJ, OX3XE, PJs 8DX/7 9JT, SM7EL, SV0WGG, TF3AW, 112WX, VPs 1FOC 1SYL 21AW 28Q 2VAN 5GS 7DF, YU2FC, YX1KE, W6LUV/KB6, WB0JOS (somebody's North Dakota), XW8BP, YU3DMP, YV5KR, ZF1FOC, ZK2BD, ZL3GO, ZS6BKS, 5U7AZ, 6W8DY, 8P6s BU EII, 9H1s BM CH, 9LIJT, 9K2AU and 9M8SDA, plus QSL aides Ws 2MIG 3HNK, Ks 2FJ 4EKJ SAWR, WA1QBH, Wbs 2UKP 4VUP, VE4SK, F2MO, DJ9ZB and DL7FT. Any overlooked deservables out your way? . . . 'Alp! Parenthesized colleagues would appreciate hints toward chasing down tardy wallpaper from holdouts mentioned: (W6FET) FR7ZL/I;



SV0WXX nears Century Club membership from Levkas isle after ten DX-filled months on 15 and 20 meters. Simple dipoles do the job for Doug. (Photo via W4KZI)

KG6SW offers Saipan regularly near 14,225 kHz at 0100 GMT or so. Len signs W7DXH with the Western Washington DX Club gang when home from the Marianas. (Photo via W7YRX)



(W8BQV) AP5CP; (K2LFG) KH6HNR; (WA2EAH) FO0TG '71, GM5AIW '70, HC8AA '70, HL9TS '70, HP9APU/mm '71, KA9MF '69, OK7CSD '70, PY0AD '71, VQ9s XX YL '71, SVZDB '70, TZ1AB '71; (WN2NOM) VP2MSS-WA9VLI; (WN9LXK) WH6ONT, XE2PRS. Any 'alp? . . . If a W/K keeps his local ARRL QSL Bureau branch supplied with self-addressed stamped envelopes and applies correctly to individual QSL managers he should make out okay in the "Halp!" department. HI3PC is forthright enough to say "No QSL" during QSOs although I do have his card for an earlier contact. (W8BQV) . . . Right. HI3PC states he has no QSLs. It's annoying to see other excellent QSLers listed in your help-wanted paragraphs. Leads me to wonder if help-hunters realize that bureau routes take months and that s.a.s.e., or s.a.e. plus International Reply Coupons, are required by QSL tenders. After a reasonable lapse of time a second request to a QSL manager often brings response. Considering the volume of mail they handle it's not surprising that some go astray. No trouble here getting confirmations from CR6AI, FM7AD/FS7, OY5NS, TY0ABD, VR1AA, ZF1FB1, ZK1TA and 8P6BU via their respective managers W7VFO, WA5ZNY, Ws 3HNK 2GHK, K3RLY, WA0BFI, W6KNH and WB2UKP. (WA2EAH) . . . Still awaiting logs for 3E1E (HP1E) operation. (W2GHK) . . . From some of those impatient 'alp-seekers: KH6BZE, OH2NB, HK4RCA, ZL2AFZ, W4SPX and W3HNK respectively provided me with QSLs from KH6EDY, ZD3Z, 5K4RCA, A35FX, TT8AC and IG9DX. (WB4UKA) . . . Still keeping busy as QSL manager for CR7GJ, CTs IUE 2AK, KH6JCZ, LX1BW, OD5CS, OYs 3H 5NS, SU1MI, SV0WC, VS6s AI DD, XW8EO and 9L1JF. (W3HNK) . . . Finally found a workable system for receiving and answering my QSLs. Being an active KV4 can be a first-class headache as far as confirmations are concerned, especially with the League's Five-Band DXCC stepping up demand. Since the St. Croix ARRL QSL Bureau branch is too costly for me to use from St. Thomas I find it preferable to work through Radio Society of Great Britain's bureau. Please QSL only via RSGB. (KV4CI) . . . If anyone out there in Dixland needs a Stateside QSL manager I'm available for the job. (WB2EOO) . . . The 1973 edition of *QSL Managers Directory* is due off the press. This is a new venture since W6GSV passed away and publication ceased. I'm hopeful the book will fill a void in the DX world and that its quality will improve with experience. (W6NJU) . . . Note that while I was a member of several Caymans DXcursions I hold logs only for the operation of ZF1s GW and GW/VP7. (WB4TAF) . . . My stint as TI2CF's QSL manager dates from January 1, 1974. (WA4LDM) . . . VPIFOC-ZF1FOC intends to QSL all contacts from his current Mississippi QTH. (W6OKX) . . . Photo-stamps, such as those available through WASGNT, are bound to personalize your QSLs to the point of increasing returns. (W5QPX) . . . U.S.A. Twos are reminded that their ARRL QSL Bureau outpost now has a fresh New Jersey address. (LIDXA) . . . Hats off to DXdom's QSL managers without whom so many rare QSOs would go unconfirmed. I shudder to think of the amount of postage we'd all be using without their help. They deserve our full support. (K2VJS)

ASIA - Ex-7Z3AB has retired in California, as most of the gang probably knows. As soon as he gets settled and retrieves his logs, etc., from

storage he will take care of all QSL obligations. Henry regrets the delay as he has always been a 100-percent QSLer. (W6FET) . . . 9V1RF cards should go via W9GHK. Those missent to my address are being forwarded to him. (W2GHK) . . . Better late than never, HM1AQ's arrived in nineteen months. (W7YF) . . . My QSL from UJ8AC took fourteen months via bureau. Box 88 isn't easy to figure. (WA2EAH) . . . KA6WS writes, "Stations working me as MC on prearranged schedules with XU1AA have advised that the logs of XU1AA for June through September, 1973, have been lost. When, and only when, KA6WS acted as MC he maintained a copy. To obtain a QSL send complete QSO information and s.a.s.e. to KA6WS." It should be stressed that Bill is not acting as general QSL manager for XU1AA but merely offers to confirm QSOs for those who checked in through him for contacts with XU1AA. (W3GID) . . . W1YRC holds XU1AA logs for the periods September 30 to October 31, 1971; January 1 to July 16, 1972; December 17, 1972, to June 25, 1973; September 21 to October 20, 1973; and after December 1, 1973. (LIDXA) . . . Cw QSOs with 9K2AH after September, 1970, can be confirmed through my address. (JA8HI) . . . HZ1AB contacts with W/Ks may be QSL'd through W3KT, others via DJ9ZB. (DXNS) . . . Cards for TAIHY should go only to Box 23, Bakirkoy, Istanbul, or via my address. Due to low response TAIHY and YN41AB henceforth will confirm QSOs only on receipt of QSLs. (W5QPX)

EUROPE - In four years or more as DL5LC, etc., I've sent out about five thousand QSLs, 1500 since the December two-Germanys ruling. These went out via bureau routes which take some time. I'll also supply special QSLs to certify QSLs with two or more of the following callsigns used by the NYL (WNBCTW) or myself in that period: DA1GU, DL5LC, F0ATS, G5ACK, H1FCP, ON8VV, PA9QD, W8s WNK WNK/HB and WNK/OE. (W8WNK/6) . . . UA1KAE/1's antarctic QSL came through from Molodezhnaya station in eighteen months via Box 88. (W7YF) . . . My dad, WA5BDJ, does my Azores QSLing from the Louisiana address listed in *Callbooks* for and after the summer of '73. (CT2BM-WB5BBC) . . . We'll make good on QSLing for any QSOs we make during our spring sojourn in Balkan countries. Apply to our home address. (WB2AQC, WA2BAV) . . . 4U1TU radiotelepy QSOs of April 3-10, 1974, can be confirmed by DJ8HT. (DXNS) . . . Club station SP5PWK's world-wide QSL returns are reported down around 25 or 30 percent. (W5QPX) . . . DL7FT now handles QSLing only for EA6s AS BG BH BJ, XW8s BP CN, ZA2RPS, 3As 2CN and 0CU, also for his own sideband contacts from SV1DB of Mt. Athos over April 21-25, 1973. (W4WFL)

AFRICA - We're receiving quite a number of QSLs for ZD8s not licensed or located on Ascension Island. For examples, ZD8s AC and AF

are unknown here. When s.a.s.e. is included senders are notified with explanation. As of March 8, 1974, ZDRs AB AR AW CS DH ES LN MF MH NC OE RW TM TT and US are officially licensed, many of these not overly active. (ZDRAB) . . . EL2s DK and C are former EL4s B and F. I do QSL chores for all four calls. Client EL2CI moved Stateside and I'll acknowledge straggling QSL requests. (K81UH) . . . Use only the latest *Callbook* for my QTH concerning FM7AQ, JA3IG and IU2DQ confirmations. Because no logs are coming through from FL8DS, TU2BB and TY8ABB I have discontinued attempting to handle their QSLing. (WB4SPG) . . . A8 is a new prefix block assigned to Liberia by the International Telecommunication Union. (LIDXA) . . . 3B8DA emphasizes once again that he employs no Stateside QSL manager. Alex wants all QSLs direct. s.a.e. plus IRCs included. (K6TL)

SOUTH AMERICA — I'm back in the U.S.A. after thirty months of cw, ssb and RTTY sport in Chile. Anyone still needing QSLs should ship s.a.s.e. and QSO details to my Virginia address. (ex-CE3YO) . . . KZ5PW requests patience while he attacks the DXtensive QSL backlog of HC8GI. (WCDXB) . . . CV PS and YY prefixes are sometimes respectively displayed by CX PY and YV amateurs, suffixes usually unchanged. When in doubt try their national QSL bureaus. (DXNS) . . . In my book Uruguayan DXers are among the world's worst QSLers. CX returns are running 30 percent with VKs and ZES not much better. On the other hand, my local W/K comebacks are averaging 60 to 70 percent. (WA2EAH)

OCEANIA — Please understand that I manage WA7IXE's QSLing only for Palmyra QSOs. John's *Callbook* address is okay for his other DX stops. (KS6DY) . . . Our DXpedition of the Month staff handles P29JK QSLs as of December 20, 1973. (W2GHK) . . . Wow, KH6HC's card arrived just two days after QSO! (K7DSZ) . . . Let's scamper happily through this month's QTH collection now but keep in mind that each suggestion is necessarily neither accurate, complete nor "official".

ex-CE3YO, S. Roth, 2810 Evelyn Ct., Vienna, VA, 22180
 CE51Q, P.O. Box 1685, Concepcion, Chile
 ex-DL5LC, Capt. L. Cook, WA8WNK/6, P.O. Box 4201, Norton AFB, CA 92409
 ELs 2C 2CI 2DK 2NAP 4B 4E (via K8LUH)
 EG0GE, R. Little, P.O. Box 63, Marigot, St. Martin, F.W.I.
 EM7AD/HS7 (to WA5ZNY)
 HB9XBA/HB0 (via OE7XIH)
 HC1KH, Box 691, Quito, Ecuador
 HP4CK, Box 333, Grandinola, Panama
 HR6SWA, Box 120, Changuin Cayman, Cayman Islands, W.I.
 ISZPA, P.O. Box 511, Firenze, Italy
 IS6LBU, Box 35, Sassari, Sardinia, Italy
 JY6HHB, P.O. Box 32, Zarka, Jordan
 JY7s FB YL (to FP2s FR YL)
 KA6WS, W. Spence, P.O. Box 128, MCAS (H), FPO, Seattle, WA 98772
 OE9TNI/HB0 (via OE7XIH)

ex-OK1SR, R. Strnad, 201 29th St., Copaugue, NY 11726
 PA0IWH/S2, W. Bolkensteyn, P.O. Box 681, Dacca, Bangladesh
 PSs ICCK 2FIZ 2JB 4AKL 4BTK 4KL 6AM 7AKW 7A0J 7APS 7ARM 7AZQ 7BDX 7DX 7NS 7ZAV 8JO (see text)
 VP1FOC, M. Carter, Box 706, 11 Old Spanish Tr., Bay St. Louis, MI 39520
 VP2DM, P. Mallallieu, Box 70, Dominica, B. W.I.
 VP5MI, P.O. Box 00316, Miami International Airport, Miami, FL
 VP7BC, E. Link, Box 8086, West Palm Beach, FL 33407
 VS6s AI DD (via W3HNK)
 WITZJ/HR6, H. Hoots, 4 Bandera Dr., Bedford, MA 01730
 W2GON/KS4 (via W2GHK)
 W6GSK/KW6, E. Aliber, P.O. Box 335, Wake Island
 WA6TLJ/HK6, J. Palmer, Airbox 1028, Pereira, Colombia
 WA7IXE/KP6/KH6 (see text)
 WB2JGD/KP4, G. Gibson, USNSGA, Box 677, FPO, New York, NY 09555
 XT2AP, B.P. 112, Boho Dionoulasso, Upper Volta
 YA1ZWA/TJ1 (via I1BAW)
 YB5BI, Sawky, P.O. Box 2761, Djakarta, Indonesia
 YB0ABK, P.O. Box 26, KBT Kebayoran Timor, Djakarta Selatan, Indonesia
 ZF1s CW VD (via K4SHB)
 ZF1TZ, A. Smarr, W4BTZ, P.O. Box 52701, Atlanta GA 30305
 ZD1ANT, P. Els, P.O. Box 92, Winklespruit, Natal, S. Africa
 STSKJ, Box 6, Nouadhibou, Mauritania
 5V7JT, J. Thurtell (K8PSV), R.P. 46, Dapango, Togo

A35KI (via JA1SWL) T12RT (via SM6CVX)
 A4XFK (via ROARS) TU2BB (see text)
 CN8MT (via F5GE) TU2DQ (via WB4SPG)
 CV2T (via CX1AA) TU4AH (via F2QQ)
 DA1GC (see DL5LC) TY8AB (see text)
 FL8DS (see text) VE8RC (via VE8CX)
 GB3RUT (via G3CAF) VP1MPW (to WB8LJY)
 HS1AJB (via G3LKY) VP2EEA (via W4GSM)
 HS3AJJ (to WA8GCW) VP2EEC (to K2FJ)
 HSSAJH (to K5LMA) VP2GGG (to W5MYA)
 HZ1AB (see text) VP2GJI (to WA2BJI)
 IM0GE (via I5ZPA) VP2MAW (to W0AAW)
 JY6AS (via WA3HUP) VP2MOP (to VE4OP)
 JY6UMM (via DK6ZR) VP5CW (to W4OT)
 JY8AP (to DJ0AP) VPsWW (to WB4EYX)
 JY8FK (via G3LQP) VP8HZ (to G3NMH)
 JY9AC (via EP2JH) VP8NO (via G4AFJ)
 JY9EH (via SM5EAC) VQ9JPH (to K7UKP)
 KC6CW (via JA1OBY) XU1AA (see text)
 KC6VE (via W7PHO) XU1DX (via W1YRC)
 KG6JCZ (via W3HNK) XX6CC (to K6LA)
 KH6DI (via W6JYT) YY5MM (via G4BVL)
 KV4CI (via RSGB) ZB2WPX (to ZB2BU)
 KW6HF (via WA6AHF) ZC4FI (via DK1OP)
 KZ5PW (via WA6AHF) ZD9GD (via ZS6AO)
 OE1ZBZ (to WA1IKJ) ZF1AH (via WA1QBH)
 OY7BD (via W3HNK) ZF1AO (to W2JNO)
 TA1HY (see text) ZF1ES (to W2BBK)
 T12CF (via WA4LDM) ZF1FOC (see VP1FOX)

PY4LW is among the bigger Brazilian DX guns piercing pile-ups these days. Falc just hit the 300-confirmed mark from Belo Horizonte hanks to a QSL from 1S1A.





YB0ABO's shack-warming party in Djakarta turned out an impressive array of active Indonesian amateurs. Front, left to right, are YB0s ABO JC and IZ; rear, YB0s ABN BY, DL3EA, YC0FM, YB0s AT PY BK and YD0HF. YB0ABO is former OA4AGM, and this photo comes courtesy YB0ABN who signs LU8BF back home.

ZF1VW (to K4VW) 5Z4OS (via PA0PMP)
 ZSSDW (via WA9UES) 5Z4OW (via G3DGW)
 3B8DA (see text) 6Y5VH (via VE2AKZ)
 5N2ESH (via WA5ZWC) 9K2AH (see text)
 9V1RF (to W9GHK)

Your gratitude for the preceding is due Ws 1CW 1OP1 1RML 3GID 3HNK 4WFL 6FET 6OKX 7YF 9PCQ, Ks 1ZND 6TL 8LUH, WAs 1STN 1STO 2DLV 2EAH 2EXP 6CPP, WBs 2FOO 2NOM 4TAF, VE3CUI, DJ0AK, JA8BI, Columbus Amateur Radio Association *CARAScope* (W8ZCQ), *DX News-Sheer* (G. Watts, 62 Bellmore Rd., Norwich N. 72T, England), International Short Wave League *Monitor* (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club *Bulletin* (JA3GZM), Long Island DX Association *DX Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (M. Witkowski, Rt. 5, Box 167, Stevens Point, WI 54481), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJI), *VERON's DXpress* (PA0s INA TO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (WA7JCB). Got a few for your buddies?

† † †

W h e n c e :

It's aggravating and downright embarrassing to have one of DXdom's rarest countries lying dormant in our own back yard. But several signs point to the imminent reactivation of Clipperton Island. Gee, twenty years have passed since a daring FO8AJ gang rang up 1108 contacts from those remote rocks. If that was before your time, young fellers, better dig back in some old-timer's radio library for the epic tale in *QST* for July, 1954. With summertime short skip hopping up QRM on our higher bands once more we'll stick with the local DX scene this trip. . . . "The Report," a short one-act drama played on a 3800-kHz back-drop at 0645 GMT: DX op, "Please give my signal report again, old man." Local, "Roger, my QTH is . . ." Chorus, "He wants his report again!" Local, "Roger, you are five by five." Chorus sighs mightily. Curtain. (WB4URW) . . . At 15 I'm just finishing my second year in ham radio with a TS510 and multiband ground-plane on 10 through 40. Hope to add an SB200 soon for better DX on 15 and 40, cw and ssb. (VE7AFX) . . . Still hunting Asia for my 75-watts/dipole 7-MHz WAC. I can hear the west coast working all sorts of JAs with ease on 40 but they're hard to pull through in Ontario. (VE3CUI) . . . Reached the 99-country mark on 75 phone with a barefoot KWM2A and my own favorite minimum-space antenna design. Details on request. (VE2WW-VP7DX) . . . Fishing

20 through 160 with my old Ranger and dipoles but I may break down and try sideband one of these days. (W2GP) . . . Is this a record? Last week I had my first QSO in 41 years! My last contact was with J1DO in 1933 under the same call. Things have changed; my 1933 rig was a homemade 852 job with WD212s modulating, and the receiver a souped-up Crosley superhet. At that time I also owned one of the few four-letter-suffix amateur calls ever issued in the U.S.A., W67ZBK. (W6FKF) . . . Prominent astronomer Dr. Robert Chapman agrees that lack of solar stimulus was one of the likely factors dimming Kohoutek's comet. (K3CL) . . . The Ides of March pepped up the 21-MHz Zve noise notch for a nice bag of Europeans here plus ZS6AFC and 9K5PT. A QSL from EL2NS confirms WAC for me at 51/29 countries worked/confirmed. Now for those General hands! (WN6UFW) . . . With hopes of eventually confirming WN-style DXCC I closed my Novice career at 115/44. (WN2FUN) . . . We're keeping University of Missouri club station W0HEE active in many operating activities. Most of my own operating there is on 7- and 14-MHz cw but RTTY and SSTV facilities are planned. My thanks to all OMs and YLs who helped clinch our WAS and DXCC! (WB0GQP/0) . . . Hey, what happened to cw DXing? After being relatively inactive for the past ten years I returned to find the majority at the top of the bands with mikes in their hands. Not only that, we northwesterners now seem to be left out of most of the openings enjoyed by midwest and western DXers. (K7DSZ) . . . Cw is a lost art in the Near East for sure where I still need 9K2, YK, etc. My 5BDXCC totals, 10 through 80, go 120-150-200-82-35. Sure a long way to go on 3.5 MHz! And why does it seem more difficult to get QSLs from DX on lower bands? Many QSOs have entered the log since I collected the first Canal Zone DXCC as KZ5IP many years ago. (W8BQV) . . . Mid-March was a DX delight in Seattle, 15 and 20 breaking wide open for morning Europeans and afternoon Asians. (W7FEJ) . . . Hospital-enforced rest made me realize I hadn't contributed DX data to *QST* since I was first licensed in 1932. Now enjoying 160-meter DX thanks to such transpacific regulars as JA8FBH and ZL3GQ. (VE7HQ) . . . My new 50-foot tower and on-the-spot 14-MHz rotary sure pay off during the sunspot decline. (W3CTE) . . . Lost my beam to winter ice but I'll try RTTY DXing soon with a vertical. On 40 a Novi-Loop works out well in all directions. (WB2EOO) . . . FB DX on 40's Novice range lately including CE6DT. We'll soon have Oak Creek Radio Club station WA9QQM out after DX on 7 and 21 MHz. (WN9LXK) . . . Ended my Florida activity in December with nearly 200 worked. Now await my Michigan Eight call.

QST

Operating Events

de W1YL

JUNE

1-30 160-Meter Activity Period, all month (transequatorial tests), info. de E19J and PY1RO. EUs transmit on 1825-1830, S.A. stations on 1800-1808 kHz. Other DX will use one or the other segment depending on who they call (exception, 2S stations will transmit on 1930-1935 kHz). Keep QSOs short. Further info. from PY1RO through June at the following address: Rolf Rasp, Parker St., Bldg. PK-2, Educational Services, Maynard, MA 01754. After about July 10, he'll be heading home.

1-8 Six Meter QSO Party, p. 114 May.

2 Minnesota QSO Party, p. 114 May.

6 W6ZRJ Qualifying Run (K6DYX, alternate) 10-35 wpm at 0400 GMT on 3590/7090 kHz. This is 2100 PDST the night of June 5. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading.

8-9 VHF QSO Party, p. 68 May.

9-15 Massachusetts Amateur Radio Week, sponsored by Mass. amateurs. A certificate of recognition will be issued to all amateurs who take part in the operations award program for the week; 0001Z June 9 to 2400Z June 15. Mass. amateurs must work 16 other Mass. amateurs; the rest of the New England states' amateurs must work 8 Mass. amateurs. All other amateurs in the U.S. work 5 Mass. amateurs; DX, including KH6 and KL7, must work 2 Mass. amateurs. Any band/mode. All those submitting logs meeting requirements will be issued a certificate signed by the Mass. Governor. Exchange RS(T), county/state. Logs must show date, time, frequency. Applications must be received no later than July 31 and accompanied by a No. 10 business size s.a.s.e. (DX enclose 1 IRC). Send to: Bill Holliday, WA1EZA, 22 Trudy Terrace, Canton, MA 02021. (Note there will not be a Work Mass. Cities and Towns Contest as part of the week this year.)

13 WIAW Qualifying Run (10-35 wpm at 0130 GMT) on 1.405 3.580 7.080 14.080 21.080 28.080 50.080 and 145.588 MHz. This is 2130 FDST (9:30 PM FDST) the night of June 12. 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) and complete mailing address.

15-16 All-Asian DX Contest, phone, p. 114 May.

16-23 Florida Amateur Radio Week. The Hollywood ARC plans to activate KH4/LA or a similar call during the week. Traffic will be handled on 146.94 and general contacts on cw will be made at 70 kHz from band edges; on ssb, frequencies will be 3930 7230 14330 21430 and 28530. QSL via WA0ZFF.

22-23 FIELD DAY, p. 68 May.

26 WIAW Morning Qualifying Run 1300 GMT (this is 9 AM EDT). Same frequencies and details as under the June 13 listing.

JULY

3 W6ZRJ Qualifying Run

3-4 Straight-Key Nite, first mid-summer running of this now popular classic, from 8 PM your local time on July 3 to 3 AM local time on July 4. Aim at 7030/3530, but spread out as necessary. Rules require use of a straight key. Following SKN, please send a list of the calls of the stations you worked plus your "vote" for the best straight-key fist you heard (or worked) that night. Suggestions for improvement, please! The last event (New Year's Eve) brought in so few suggestions for improvement that the same format is being retained. Reports should be mailed by July 8, please, to make the September report. CU SKN!

6-7 CW QRP Contest, sponsored by the DL Activity Group, single op., from 1800Z-1500Z, on 80 through 10 meters. Open to all, input must be below 10 watts. Fifteen hours of operation permitted, take 6 hours pause in two parts at most. Call CQ QRP and exchange RST and QSO no./input (1-9). Add x if the TX is crystal or VXC. QSOs with all stations valid. In the case of non-contest stations worked, it is not necessary to receive a serial or input. QSO points: own country 1, own continent 2, DX country 3. Three additional points for a QSO with another QRP station (4-6 points). If one or both stations in the QSO used less than 3 watts input or crystal, both double their points (8-12). Each country in your continent counts 1 multiplier, each DX country 2 multiplier

points (PER BAND). Use the ARRL DXCC list except that the call areas in JA PY VF VK W and ZS are additional. QRO stations follow same rules but input is not limited and only QSOs with QRP stations will count. Logs by July 31 to Hartmut Weber, DJ7ST, D-3201 Holle, Kleine Ohe 5, Germany.

12 WIAW Qualifying Run

13-14 Open CD Party, cw, this issue, 150 Years of German Colonization in Brazil Contest, sponsored by the Cachoeira do Sul Lions Club, full 48-hour period GMT, phone only, 80-10 meters. A station may be worked just once regardless of band. Each QSO counts 1 point. Contacts with another DXCC country count 2 points. Intercontinental contacts count 3 points. Multipliers are the DXCC countries and all the Brazilian states and territories. Log time, date, stations, numbers sent/received, points and note if new multiplier. Send entries before Aug. 30, 1974, to Lions Clube Cachoeira do Sul, PY3CKL, Box 377, 96.500 - Cachoeira do Sul (RS), Brazil. Awards.

20-21 VHF Space Net Contest, 5th anniversary of the VHF Space Net, honoring Apollo 11. Usual rules and further info. from Tony Slapkowski, WB2MTU, Box 909, Sicklerville, NJ 08081. Note, however, the special bonus: all QSOs made from 10:36 PM local time July 20 until 1:15 AM July 21 will count as 10 points each. This is the actual time period Apollo 11 astronauts first walked on the moon. **HK Contest**, celebrating the Independence of Colombia, from 0001Z July 20 to 2359Z July 21, 80-10 meters, all modes (but no cross mode). Scoring for non-HK stations: stations outside America count 5 points per HK, stations in America score 3 points per HK, 1 point for contacts with other than HK stations. Multiplier is the total of HK zones plus total no. of countries worked on each band. Exchange report plus consecutive serial no. HK stations will send the HK zone they're located within. Logs must be sent by Sept. 30 to Independence of Colombia Contest, c/o I.C.R.A., Ap. 584, Bogota, Colombia, S.A. (Note, categories are one op. one rig, multiop. one rig, multi-multi.)

27-38 Open CD Party, phone, full rules this issue. CW County Hunters Contest from 0000Z July 27 to 0600Z July 29. Call CQ CH and exchange QSO no., category (portable or mobile; P or M), RST, State (province or country) and county (for U.S. stations). Stations may be worked once on each band and again if the station has changed counties. Portable or mobile stations changing counties during the contest may repeat contacts for QSO points. Stations on county lines give and receive only one no. per QSO but each county is a valid multiplier. Score 1 point for QSOs with a fixed station, 3 points for portables or mobiles. Multiply QSO points times no. of U.S. counties worked. Mobiles and portables calculate their score on the basis of total contacts within a state. Suggested freqs.: 3575 7055 14170 21070 28070 kHz. Awards, trophies, logs must show category, date/time GMT, stations, exchanges, band, points, location and claimed score. All entries with 100 or more QSOs must include a check sheet of counties worked or be disqualified from awards consideration. Enclose large s.a.s.e. if results desired. Logs must be postmarked by Sept. 1 and sent to: CW County Hunters Net, c/o Jeffrey P. Bechner, W9MSF, 64 North Pioneer Parkway, Fond du Lac, Wisconsin 54395.

AUGUST

1 W6ZRJ Qualifying Run

3-4 Kentucky QSO Party, YO Contest

10-11 WAEDC, cw, LU Contest, phone, CQ-WF, wbf

13 WIAW Qualifying Run

17-18 Scandinavian Amateur Radio Teleprinter Group Contest

24-25 All Asian Contest, cw, Ohio QSO Party

Sep. 7-8, VHF QSO Party

Sep. 8, FMT

Oct. 12-13, CD Party phone

Oct. 19-20, CD Party cw

Nov. 2-3, SS cw

Nov. 16-17, SS phone

SWEEPSTAKES NOTE: On advice of the Contest Advisory Committee, the SS will take place this year per above November dates, order reversed with a one-week break in between. Other SS changes include low-power awards and the permitting of only two-point QSOs.

The World Above 50 Mc.

135-1360 2500-2450 3300-2300 5650-5925 10,000-10,500 21,000-22,000 50,000-?

CONDUCTED BY BILL SMITH,* W5TVB

January Tropo -- Revisited

THE REMARKS of Bob Cooper, W5KHT, in the March column regarding the tropo conditions January 14-17 have brought much reaction and some discussion on the phenomenon of long-haul tropo.

Bunky Botts, K4EJQ, Blountville, TN, was alerted to the conditions noted in Oklahoma City on vhf and uhf television channels. Following is his report.

I was unsuccessful with any of my long-haul schedules with W5 and W0 stations during this opening, but I wasn't really surprised. During this period we had the same weather conditions as described in the column, especially the heavy fog which lasted day and night for several days, an unusual condition for my part of the country.

I was operating from my home location at Blountville, 1800 feet above sea level, or 250 feet above average terrain. My equipment, which runs 600 watts output to a 10-dB antenna on 144 and 300 watts output to a 15-dB antenna on 432, was checked and found in good operating condition. The Kingsport station, Channel 19, is 10 miles from me, line-of-sight, and the Norton, VA, station, Channel 47, is only 20 miles away. Both were reported seen in Oklahoma City by W5KHT. My station location is in line between the two television stations, both of which are on mountaintops, with antenna heights of better than 4000 feet above sea level, or 2000 feet above average terrain, and both run power in the megawatt ERP range.

When I was tipped by K5PJR to the existing conditions noted in Oklahoma City, I first checked my own television set for distant signals. Nothing unusual was noted then, or later.

During the years I operated K4EJQ from Holston Mountain, at the location of Channel 19, I caught many uhf openings of this type. During this same time, W4WQZ was active on 50, 144, and 432 MHz in Kingsport, with moderate to high power and large antennas atop a high ridge. When I would catch an opening I would notify W4WQZ so he too could try for some DX. Some of these openings were ones where the signal played hide-and-seek in the noise, but others provided meter-pinning signals. During these I could easily work DX with a 10-watt exciter to other stations running similar

equipment, but W4WQZ would hear nothing from a location only 2000 feet lower than mine. The reverse of this would sometimes happen on 50 MHz.

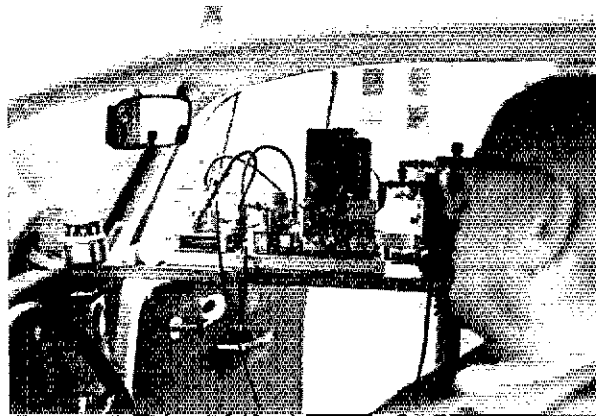
During other openings, W4WQZ and others would work DX, apparently hearing stations as well as I, although my additional height did provide some additional signal strength. At the same time, distant TV stations could be seen at both locations. Overall this type of opening provided signal levels well below those of openings when only I could work from the mountaintop. While height gain must play a role in this phenomenon, I don't believe it can explain signals being up to 40 dB over S9 on the mountaintop, but not even detectable 2000 feet below.

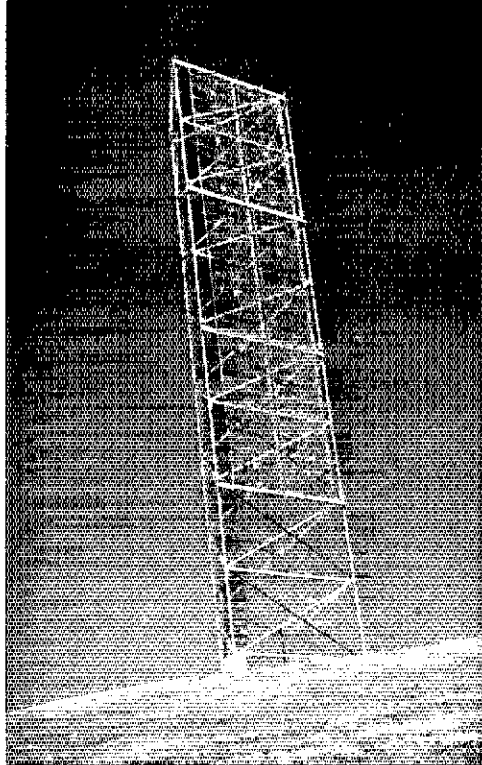
This led me to formulate my probe-in-a-waveguide theory concerning duct-type tropo openings. Simply stated, unless the antenna is *within* the actual duct, chances are exceedingly slim that you will be able to use the duct for DX work, regardless of power or antenna size. Signals from stations not within the duct will not penetrate the lower or upper boundaries, and are reflected. This effect has been noted during several openings into areas with high levels of amateur vhf and uhf activity. Only stations in a very small area could be heard or worked, although I knew others outside these areas were trying to use the duct, some running high power and large antennas.

Therefore I'm sure that DX signals were present in our area during the January 14-17 opening, especially since local uhf television stations were within the duct itself and were being seen in Oklahoma City. I was not able to work anyone in W5 and W0 because the DX signals were passing overhead and were not detectable, except possibly by a station located on a mountain 1500 to 2000 feet above average terrain. My signal could not penetrate the duct, nor could incoming signals "leak out." A true pipeline. Where the duct returned to earth as it traveled east from the Oklahoma area would be anyone's guess, although we know it extended past Roanoke, as that Virginia city's Channel 27, with its antenna 2040 feet above average terrain, was being seen at W5KHT.

*Send reports and correspondence to Bill Smith, W5TVB, ARRL, 225 Main St., Newington, CT 06111.

1296-MHz mobile, anyone? This is the set-up used by Jim Wood, W1AYG, as he mobiles New England in his VW. An approximately 21/2-foot dish is fastened to the side of the car. (Photo via K1OJQ)





The April, 1974 issue of this column made mention of the 131.95 MHz aeronautical circuit between San Francisco and Honolulu. Al Hairston, K6OI, sent this photograph of the transmitting antenna at the San Francisco end of the circuit. The array consists of 24 Yagis with screen reflectors mounted on an 80 foot tower overlooking the Pacific Ocean near Half Moon Bay, CA. An identical antenna, located two miles south, is used for receiving. The transmitter runs one kilowatt output. K6OI says that while direct communications with Honolulu are not an everyday happening, it does happen often enough that the radio operators seldom get excited. A similar installation is in use near Honolulu. (K6OI photo)

In conclusion, I feel that had I been able to see TV signals from Oklahoma on my home set, our schedules would have been successful. But as it turned out, the duct must have been over my home by at least 1500 feet. I tend to think that this supports the belief that TV and fm broadcast stations are *not necessarily* good indicators of band conditions for amateur vhf operators, especially in mountainous terrain where the commercial transmitters are located several thousand feet above average terrain. Whether my theory will hold up only time and more activity will tell. The field is certainly wide open for experimentation and speculation.

Thanks, Bunky, for your views. If readers will refer to the November, 1973, edition of this column and the report on the July tropo between California and Hawaii it will be seen that similar conditions existed at that time.

Polarization Diversity

From time to time we have mentioned diversity reception techniques in this column, but reference

has been mainly to space diversity; mounting similar antennas several wavelengths apart. Polarization of diversity reception is also useful, and as pointed out by Dale Parfitt, WA2YPY/4, it perhaps has been overlooked by most vhf amateurs.

Simply it consists of two Yagis constructed on the same boom with one set of elements mounted at right angles to the second set so that one set is horizontal, the other vertical. Separate feedlines are used and switched through a relay or manual coaxial switch.

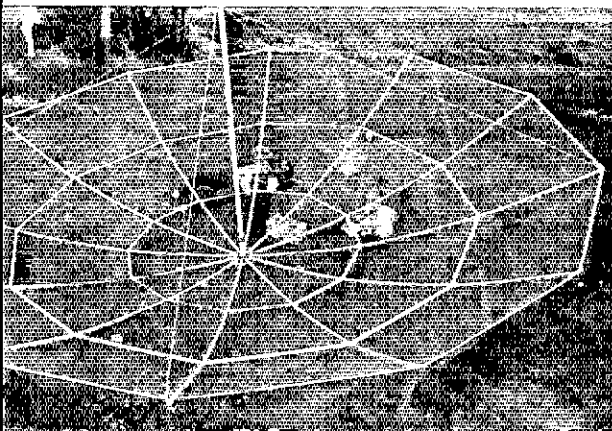
Communication installations have used polarization-diversity arrays for many years, over paths that are beyond line-of-sight. Signals that travel beyond the radio horizon are often skewed as to their polarization, and the ability to switch polarization may help to reduce fading due to polarization shift. Polarization diversity may be helpful on signals propagated through the troposphere, E-layer, as WA2YPY/4 has confirmed with the use of a pair of 4-element 50-MHz Yagis, one horizontal and one vertical, built on the same boom. Dale reports being able to obtain up to 20-dB additional strength on the signal of a distant station, when switching from horizontal to vertical polarization, or the reverse.

Your column editor has been recently involved in reception techniques for television signals over 100- to 200-mile paths, where a high degree of reliability is desired. Experimentation over these tropo paths reveals effects similar to what WA2YPY/4 suggests and in fact, helical antennas perform quite well under these conditions.

Some readers may consider this "reinventing the wheel" but application to long-haul paths in amateur vhf communication might prove well worth the effort.

2-Meter Antenna Notes

There are many Hy-Gain 15-element Yagis in use on 2 meters, mostly in arrays designed for



Tony, K5PJR, and non-ham Tim Thorpe, secure the wire mesh screen on a 24-foot dish antenna for use at K5PJR, Oklahoma City, on 144 and 432 moonbounce. Initial tests on 2 meters produced echo returns and received signals from W6PO and SM7BAE. No formal scheduled two-way tests had been completed when this photo was taken in early April. The dipole feed system is mounted on PVC tubing.

moonbounce, meteor scatter and long-haul tropo. The Hy-Gain 15-element model is essentially similar to that designed a number of years ago by Telrex, except that in the Telrex model, the elements ran through the boom. On the Hy-Gain model, the elements are mounted in plastic insulators and on top of the boom, causing the elements to be electrically longer, so the antenna resonates below 144 MHz.

To cause the Hy-Gain model to resonate within the 2 meter band, simply cut one-half inch off each end of each element. This will place the resonant frequency of the antenna at approximately 145 MHz, and the antenna will function with an SWR not exceeding about 1.7 to 1 between 144 and 147 MHz. Fm users of the Hy-Gain 15-element Yagi would do well to cut off three-quarters of an inch from each end of each element.

Discarding the RG-58/U balun supplied with the Yagi and replacing it with a good quality balun, such as the KLM 50 to 200-ohm sleeve balun, can save up to 1.5 dB in balun losses. In lieu of the KLM balun, a simple 4:1 half-wave balun made of RG-8/U is better than the supplied balun. Low-loss baluns are also described in all editions of the ARRL VHF Manual.

Trimming the elements and affixing a good balun result in a Yagi that repeatedly shows a 15.2-dB gain over a reference dipole, in measurements made by an independent group of amateurs on the Stanford University antenna range.

Now a word about the Cushcraft 2-meter Yagi series 144-7 and 144-11. Cushcraft says they resonate at approximately 144.5 MHz. If you happen to be using the 144 series for fm operation, above 146 MHz, one-half inch should be trimmed from each end of each element to bring the resonant frequency to approximately 146.5 MHz. The sliding strap on Cushcraft's gamma match will then have to be readjusted for minimum reflected power, as described in Cushcraft's instruction sheet. The Cushcraft 147 Yagi series are designed for frequencies above 146 MHz, and the element lengths should not be altered in using them for fm communication in the upper part of the band.

Tips on FM Simplex DXing

To continue last month's discussion of fm simplex, and DX utilization of the fixed-frequency fm channels in the 2-meter band, early indications are that we are in for a good sporadic-E season. While E_s is just that — sporadic — long-duration and stable E openings during April saw the maximum usable frequency (muf) rise above 100 MHz on several occasions. This leads E prognosticators to believe that early summer, 1974, may provide E-skip opportunities for alert fm simplex DXers.

Distances of 500 to 1300 miles are commonly covered on 50 MHz by this mode, and occasional openings over paths up to 2500 miles or more occur each year, most often in June and July. The incidence of E skip falls off rapidly with frequency above about 60 or 70 MHz, though it is fairly common in the fm broadcast band. W5LO, Albuquerque, N. Mex., observes skip propagation in the VOR range, around 114 MHz. There is a lack of signals for monitoring purposes between the aircraft services and the 144-MHz band, but from recent amateur experience it is reasonable to assume that the E muf does reach the 2 meter band more often than we once believed.

2-METER STANDING

K1HTV	36	8	1310	W5AJG	33	9	1360
K1ABR	35	8	1478	W5UKQ	33	9	1290
W1AZK	34	8	1412	K5PIK	29	9	1330
W1AFFO	32	9	2624	W5LO	29	7	1325
K1WHI	31	8	1300	W5SX	25	6	1265
K1UGQ	30	8	1370	W6PO	20	9	8000
K1WHS	29	8	1300	W6GDO	18	5	1326
W1VTU	29	8	1296	W6WSQ	16	4	1390
K1BKK	29	8	1275	K6QE	13	4	2580
W1JSM	29	8	1100	K6HAA	13	4	2580
K1PXE	28	7	1250	K6JYO	13	4	1240
K1MTJ	26	7	1250	K6HMS	11	4	1258
W1FZA	25	9	2750	WA6JRA	6	3	2591
W1HDQ	24	7	1040				
K1RJH	22	7	1450	W7JRG	28	6	1320
W1MX	18	6	850	K7NH	25	5	1290
K1JIX	18	6	800	K7ICW	18	4	1278
W2AZL	38	9	2500	WA7BBM	14	4	1250
W2NLY	37	8	1300	K7VIM	10	6	950
W2CXY	37	8	1360	W8KPY	42	10	2050
W2QRI	37	8	1320	K8AXU	38	8	1275
W2BLV	36	8	1150	W8IDJ	36	8	1150
K2RTH	34	8	1215	W8YIO	36	8	1100
WA2FGK	33	8	1340	W8IDT	36	8	1150
W2CUX	33	8	1334	K8DEO	35	8	1200
WB2WIK	32	8	1080	K8HWW	32	8	1125
WA2CJX	31	8	1160	WA8PIE	32	8	1000
W2CRS	30	8	1270	W8NOH	31	8	1165
K2CEH	27	8	1200	WA8LLY	28	8	820
W2CNS	27	8	1150	W8TII	24	8	1000
K2DNR	27	7	1200	W8KBC	24	7	900
WB2SIH	25	6	1000	K8ZES	22	8	675
WA2UDT	24	7	1020				
WA2EMB	23	6	1335	K9SGD	42	9	1300
K2BWR	23	7	1350	W9AAJ	41	9	1200
WA2PMW	23	6	1000	K9AAG	41	9	1200
W2DWJ	23	6	860	K9UIF	41	9	1150
K2EVW	22	8	1140	W9YYF	41	9	4500
WB2YQU	22	6	850	W9BRN	36	9	1260
WB2BXB	21	6	915	W9PBP	34	8	820
K2YCO	21	7	750	K9HMB	33	10	1820
W3RUE	36	8	1250	K9UNM	33	8	930
K3CFY	36	8	1237	W9JDT	29	8	1000
W3BHG	35	8	1260	WA9QZE	28	8	960
W3GKP	32	8	1108	K0MQS	46	10	10605
W3BDP	29	8	1225	W0LER	44	9	1440
W3LNA	27	8	970	W0DDY	41	9	1300
W3OMY	26	8	800	WA0CHK	40	9	1120
K3CFA	25	8	1200	W0LFE	40	9	1100
W3TMZ	24	8	1000	W0RLI	36	9	1293
W3HB	23	8	1310	W0EYE	35	9	1380
W3ZD	22	8	950	W0ENC	35	9	1360
W3TFA	21	8	1342	W0EMS	24	10	1320
K3OBU	21	7	930	W0LCN	33	9	1100
K3QCQ/3	20	7	900	W0DRL	27	9	1295
				W0MJS	26	8	1118
K4GL	40	10	2340	VE1ZN	7	2	500
W4HJQ	39	9	1150	VE2DFO	37	9	10605
W4WNH	38	9	1350	VE2YU	32	8	1200
W4HHK	38	9	1280	VE2BZD	23	7	1309
K4IXC	37	9	2480	VE2HW	18	6	800
K4EJQ	37	8	1125	VE3ASO	37	8	1290
W4VHH	36	8	1000	VE3BQN	37	8	1250
W4CKB	35	8	1440	VE3EZC	33	8	1283
K4QIF	35	8	1225	VE3AIB	29	8	1340
W4FJ	34	8	1150	VE3EVW	29	8	1100
W4AWS	29	8	1350	VE3DSS	27	8	1200
W4ISS	29	8	1000	VE3CWT	27	7	1072
W5UGO	43	10	1398	VE3EMS	27	8	1100
W5UNL	42	10	1700	VE7BQH	12	3	7920
W5ORH	42	10	1507				
W5RCI	42	9	1289	KH6NS	3	2	6000
K6BXG	41	10	1394	SM7BAE	1	1	11055
W5WAX	39	10	1370	VK3ATN	4	4	10417
K5WXZ	38	10	1450	VK5MC	3	3	10000
W5HFV	38	10	1285	ZL1AZR	2	2	11055

The figures after each call refer to states, call areas mileage of best DX. Revised June, 1974.

220- and 420-MHz STANDING

WA1MUG	15	5	450	W2OMS	16	5	537
K1PXE	13	6	700	W2DWJ	16	4	570
W1HDQ	13	5	450	K2OVS	15	5	734
K1JIX	12	4	600	K2LJG	14	7	650
W1AZK	10	3	375	K2YCO	14	6	675
K1BFA	10	3	225	W2CNS	14	6	525
K2CBA	19	7	2650	WA2EUS	10	4	280
W2DWJ	15	5	740	W3RUE	19	7	850
W2CRS	14	5	600	K3IUV	18	5	720
K2RTH	13	5	960	W3HMU	16	5	700
K2DNR	13	5	600	W3OMY	11	7	850
W2SFU	13	5	325	W3CJG	10	5	450
W3JUG	14	5	460	W3UJG	9	4	400
W3RUE	11	6	480	K4GIF	22	7	1065
K3IUV	11	4	340	W4FJ	22	7	995
W4UCH	9	5	543	K4EJQ	19	7	800
K4IXC	5	3	1115	W4HJZ	15	5	560
K4GL	4	2	485	K4SUM	15	5	462
W5RCI	10	5	910	W4VHH	15	4	750
W5ORH	6	4	1178	K4GL	11	5	720
W5AJG	4	2	1050	K4NTD	9	2	963
WA5MFZ	3	3	1100	K4IXC	5	2	800
WB6NMT	10	6	2650	W4AWS	4	2	750
W6WSQ	6	4	1178	W5RCI	19	6	880
W7CNK	6	3	923	W5ORH	15	5	1200
W7JRG	5	3	959	W5AJG	9	3	1010
K7BBO	5	3	940	W5GVE	7	3	963
K7ICW	4	2	250	W5UKQ	6	2	590
K7HSJ	3	2	400	W5UGM	5	2	956
W8PT	11	6	660	W5SDX	5	2	850
K8HWW	10	5	550	W6FZJ	9	4	7450
K9HMB	20	9	1285	WA6HXW	6	4	7500
W9EYE	14	6	1600	W6DQJ	4	2	360
WA9QLP	4	2	923	K7ICW	4	2	225
VE2YU	8	3	300	W7JRG	3	2	420
VE2HW	5	2	325	K8DEO	24	8	775
VE3AIB	7	4	450	K8UQA	23	7	880
				W8YIQ	22	7	650
				W8HVX	19	7	660
				W8CVQ	13	7	625
				W8MNT	13	7	600
				W8RQI	10	6	425
				WA8VHG	10	6	625
				W8QOB	8	5	500
				W8FWF	8	5	450
				W9WCD	22	9	1725
				K9HMB	21	8	836
				WA9HUV	19	7	780
				W9JUY	15	6	550
				W9AAG	15	5	800
				K9AAJ	12	5	425
				W0DLR	24	9	1425
				W0LER	18	6	1000
				W0EYE	15	5	1700
				W0LCN	13	4	700
				K0TLM	10	5	700
				W0YZS	9	4	650
				VE2HW	6	3	750
				VE3DKW	19	7	340
				VE3AIB	9	5	600
				VE3EVW	9	5	520
				VE3EYC	7	5	510
				VE7BBG	1	1	1125

The figures after each call refer to states, call areas, and mileage of best DX. Revised June, 1974.

The key to successful *E* DXing on 2 meters is to be alert. Most openings may be short-lived, though continuous 2-meter *E* skip of up to two hours or more has been recorded, and who knows what the true extent of such openings may have been?

How to be alert? First I would suggest keeping close watch on the 50-MHz band, TV channels 2 through 6, and the fm broadcast band. One of the popular 8- or 10-channel fm scanner receivers

crystallized to popular simplex and repeater-output frequencies is recommended. A good frequency selection would be 146.49, .52, .55, .58, .76, .82, .88 and .94. Most of the commercially available scanner receivers are broadband aligned so that they will receive 148 to 170 MHz. To be more effective the receiver should be realigned for 146 to 148 MHz. Other weaknesses of many scanners are their sensitivity and selectivity. The former may be easily corrected with a good tuned pre-amplifier; the latter will be helped to some extent by realignment, but will likely require a good bandpass filter such as described in various League publications such as the *VHF Manual* and *Handbook*. The bandpass filter will prevent signals from services other than amateur from getting into the scanner receiver.

Two-meter sporadic-*E* signals are often reasonably strong, although at times they may sound more like weak tropo. A good omnidirectional antenna will work well most of the time, and allow you to likely hear an *E* signal that could be missed off the line of a directional array. I would equip myself with an omnidirectional antenna on the scanner receiver and a collinear or Yagi array for the transceiver. High power, while nice to have to get the edge on your competition, usually is not necessary for successful sporadic-*E* work. The popular 10 to 30-watt transceivers are adequate, but if you want a few more dB there are old but serviceable tube amplifiers gathering dust. Also available are rather inexpensive solid-state 100-watt amplifiers designed for mobile service. If you don't want the expense of a high-current dc power supply, a trickle-charged automobile battery will provide the power. But again, *alertness* is the key, and it is worth many dB when the competition is "sleeping."

Ssb and cw operators are reminded of the national 144.1-MHz sporadic *E* watch frequency. Let me know what is worked this summer on 2-meter *E*.

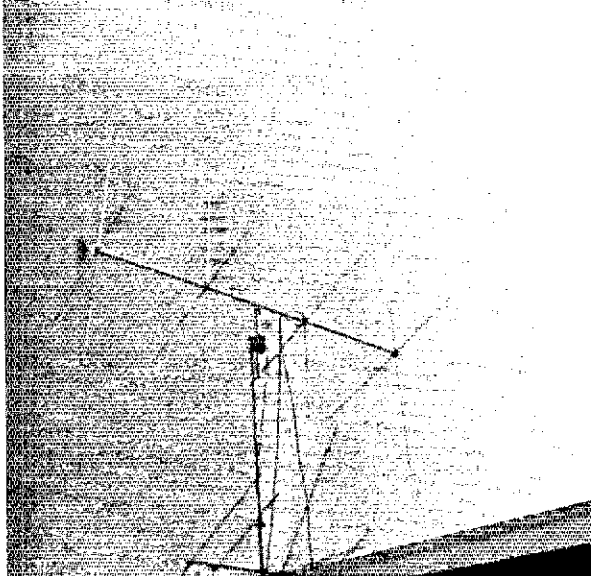
OVS and Operating News

50-MHz DXers may be in for a good summer *E* season if early indications were not just a tease. There were good openings beginning around the middle of April, too late for detailed reports to filter through to this column. In Oklahoma City W5KHT, W5TVB, K5CFM, W5DSDH and others noted extremely intense and long-duration *E* on the 14th. This produced an opening to Mexico that lasted at least 6-1/2 hours. XE1GE provided many contacts. Strong *E* backscatter was worked all the way between New Orleans, Oklahoma, and Phoenix, with W5SFV at Amarillo having his usually potent signal. The *F* muf exceeded 100 MHz for at least 90 minutes and it is likely that 2 meters may have been open into Mexico.

The grapevine has it that TI2LA was active in Costa Rica, good news for those who miss the once-active TI2NA. April 15 appeared much the same on 50 MHz, but the opening lasted some 3 hours, and the muf never exceeded about 70 MHz. XE1GE was worked this night also. April 16 found *E* beginning early in the afternoon in San Antonio, where W5IYX reported 4s. Before the opening ended some 12 hours later, Oklahoma City stations had worked 1s, 2s, 3s, 4s and 5s, with Connecticut's WA1BAR providing W1 entertainment for the 5s. The muf stayed around 60 MHz most of the evening, more than sufficient for six-meter DXers.

1215-MHz STANDING

W1ALP	9	4	500
K1PXE	7	4	500
K9AGP/1	7	3	300
WA2LTM	16	6	770
K2UYH	10	5	520
K2JNG	10	4	305
W2OMS	8	5	537
WA2VTR	6	4	330
K2YCO	5	3	525
K2OVS	3	2	135
W3HMU	10	5	260
K3IUV	7	4	320
W4VHH	2	1	350
W4LDV	1	1	290
K4QIF	12	5	551
K4NTD	2	1	350
K5PUF	1	1	290
W5AJG	1	1	235
K5LLL	1	1	235
W5HPT	1	1	235
K8UQA	6	3	448
W8YIO	5	4	551
WA9HUV	5	3	525
W9JIY	5	3	300
W9WCD	3	3	770
W9JTP	3	2	165
VE3HW	1	1	260



This is the 8-element polarization diversity Yagi at WA2YPY/4 used for 50-MHz sporadic E. See column content for remarks on polarization diversity reception.

From San Antonio, K5ZMS reports the *E* activity, and adds that KS6DH, Pago Pago, reportedly worked Japanese stations on the 14th. Also from the Pacific, KH6GRU reports trans-equatorial propagation March 19, when he and KH6EQI worked FO8DR and were heard by ZK1AA. Bert, KH6GRU, has 800 watts on 2 meters, and says that ZK1AA should soon be active with a kilowatt. They are looking for 144-MHz *TE*. This has never been reported, but studies between Australia and Japan, another excellent *TE* path, indicate that a 2-meter contact may be possible. Two-meter *TE* having never been reported, may be due to a lack of trying rather than lack of propagation. Bert advises also that the new schedule for the KH6EQI 50-MHz beacon is 1400 to 2330 towards North America, 2330 to 0100 towards South America, 0100 to 0230 towards North America again, 0230 to 0400 towards Japan, 0400 to 0530 towards Australia, and 0530 to 1400 towards ZK1AA. All times are GMT.

Near Portland, K7ZCB says March was quiet, with the only apparent opening coming on the 28th, to California and Arizona. WA7ECY, also near Portland, reports much the same and is tuning up for the annual June contest competition with friend K7ZCB.

Mary, WA0CSL/0, Grand Forks, North Dakota says she and her OM, WA0CSK, are active on 6 and 2 with kilowatts, and on 432 with 150 watts. They will also be working the Oscar 7 satellite.

One last note from the Pacific: WA6ICM is now KH6JDX operating from Guam. On March 28 Joe worked six Japanese stations on 50 MHz. He says HL9WI will soon be active as will a VS6.

144 MHz finds K1WHS, Maine, having replaced his tower and antennas lost in a January 31 storm. Dave is active on moonbounce and advises he is

(Continued on page 96)

50-MHz WAS

1	W0ZJB	41	K9DXT	81	W7DYD
2	W0BJV	42	W6BAZ	82	K6ZEE
3	W0CJS	43	W6ABN	83	K6HCP
4	W5AJG	44	VE3AET	84	K6YIL
5	W9ZHL	45	W9JFP	85	K6GMV
6	W9OCA	46	W0QIN	86	K7BAG
7	W6OB	47	W0WWN	87	W7ZOW
8	W0INI	48	K9ETD	88	K7ZPS
9	W1HDQ	49	W0FKY	89	K6EPT
10	W5MJD	50	W8LPD	90	K7HKW
11	W2IDZ	51	W0ZTW	91	W5WAX
12	W1LLL	52	W6GCG	92	WA7FPO
13	W0DZM	53	W2RGV	93	WA6HXW
14	W0HVW	54	W1DEI	94	W6NIT
15	W0WKB	55	W1HOY	95	K7ICW
16	W0SMJ	56	W6ANN	96	K6EJO
17	W0OGW	57	W1SUZ	97	W6NLO
18	W7ERA	58	W1AEP	98	K7BBO
19	W3OJU	59	W5LFH	99	K6ZXS
20	W6TMI	60	W6NLZ	100	K7MUR
21	K6EDX	61	W7MAH	101	K5EFW
22	W5SFW	62	W8ESZ	102	WA6JRA
23	W0ORE	63	W2BYM	103	WB6WAX
24	W9ALU	64	W7ACD	104	W7FN
25	W8CMS	65	K6PYH	105	WB6IMV
26	W0MVG	66	W4HOB	106	WB6OKK
27	W0CNM	67	K0JJA	107	K7ZOK
28	W1VNH	68	K6RNQ	108	WA6OLE
29	W0OLY	69	W9QWT	109	W6PO
30	W7HEA	70	W6EDC	110	K6JUU
31	K0GQG	71	K6VLM	111	K9BDJ
32	W7FFE	72	K6GOX	112	WA5FPS
33	W0PFP	73	W0EDM	113	K6IBY
34	W6BJI	74	W9JCI	114	K6QAX
25	W2MEU	75	W0LLU	115	WA6OZC
36	W1CLS	76	W7RT	116	WA6HXM
37	W6PUZ	77	W7RDY	117	K7CIN
38	W7ILL	78	W6KIN	118	WB6NKO
39	W0DDX	79	W6OKR	119	WA7GCZ
40	W0DO	80	K6GMX	120	WA7ZBS

No. 20, 22, 34, 60, 68, 70, 71, 72, 74, and all after 75 are for 50 states. No. 120 issued March, 1974.

Operating News

GEORGE HART, WINJM
Communications Manager
 ELLEN WHITE, WIYL
Deputy Communications Mgr.

ASST. COMMS. MGRS.: DXCC, R. L. WHITE, WICW; *Hq. Station*, C. R. BENDER, WIWPR;
Contests, F. D. NISWANDER, WAIPID; *Public Service*, W. C. MANN, WAIFCM.

850 or 170? WIAW RTTY Bulletins have come under criticism from many listeners who prefer to copy bulletins by this mode. Why do we continue, they ask, not only to send bulletins in the obsolete 850-Hertz shift, but to give it preference, when a choice must be made, over the more popular 170-Hertz? Also, why is no apparent effort being made to adopt some of the faster speeds for RTTY transmission, rapidly gaining popularity and use in amateur circuits?

The procedure currently being used, at this writing, is as follows: When there is time to repeat the bulletin (i.e., when it is short), it is sent first at 850 and repeated at 170. When we have a long bulletin and there is no time to repeat, it is sent at 850 on 3625 kHz and at 170 on other bands.

This seems to give 850 priority when, in fact, 170 is by far the more popular shift used by amateurs. Many will even go further than that by saying that 850-shift is not used at all any more. While this is questionable, it is certainly true that 850 shift is scarce and gradually getting scarcer, especially on the higher bands. Perhaps one day it will disappear entirely.

Effectively June 1, therefore, WIAW will recognize this trend and send 170-shift first, followed by 850 when there is time to repeat, and 170-shift *only* when long bulletins do not permit repeating. This is an *interim* arrangement, subject to change again should sentiment from the field indicate that it is unpopular. Meanwhile, how about some response on this matter?

As for the use of higher speeds — well, this will receive further consideration when such speeds become common amateur practice. We are not in the "dark ages," as some seem to think, but WIAW has a limited function in the pioneering of newer techniques. Its primary function is to serve the greatest number of amateurs.

Code Practice Stations Needed. Headquarters maintains a sheet of code practice stations

(CD-139) which is sent out gratis to anyone requiring that kind of information — stations, amateurs and others, transmitting practice at speeds from 5 through 60 wpm. Naturally, it requires updating from time to time.

If you transmit on-the-air code practice and are

ARRL CERTIFIED AT 35 WPM

January 1972 to December 1973

W1EJI WA2UOO*WB4WCM*W9KO
 W1ERW* W3AG* WA5BJK* W9MUC
 WA1ICU K3AMI* WN5ENX W9YPO
 W1IHN* W3BWG* WN5IKU W0AGK*
 K1MZB* K3DCB* W5JOS* WN0DYV*
 WA1REM*W3FA W5QEI* W0GK
 WA1RHA W3GVR K5VTE* WB0IMU*
 K2ANW WA3JIH W6EHK* W0JX
 WA2AYC K3NEZ* W6FWK* W0LJT*
 WN2CJN* WA3NXW*WA6INK* W0NTW*
 WA2CNE*WA3OIA* W6MV WA0OHL/0*
 W2DML* W3QOR* WN6OYV*WA0ZOL
 WB2DXM*W3RBF WB6VKV*VE1AHG*
 WB2EWH*WA3TQA W6ZMJ* VE2ALH
 WN2FIG* WN3TVF*W7UD VE3HM*
 K2HYM* W3YAF* K8UNL* VE3JR*
 WA2ICU* WA4DHD*WB8AKW*VE3OT
 WB2IEC* W4DOP W8DB* VE7ACZ
 WA2LLF*WB4HJW*W8MD* VE7BBW
 WB2NRK*W4MV WN8MKL*DL5BR*
 W2SUE WB4RUA*W9DCE HM5AP
 WB2UFG*WB4SMA WN9JKO* Boone, D.
 Danziger, L.

*Endorsement Stickers

not now shown on CD-139 (if you don't know, you're not), please send us your schedule, including frequency, days, times and speeds. If you know of someone who sends practice, even if you do not, ask him to send us his schedule. WIAW's code practice is very widely used, but even though it occurs three times daily (not counting cw

WA6DEI, SCM Santa Barbara (left), shown greeting ARRL President W2TUK at a Santa Barbara Amateur Radio Club meeting.

QST for



W1AW SCHEDULE

The ARRI Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M. - 1 A.M., Saturday 7 P.M. - 1 A.M. and Sunday 3 P.M. - 11 P.M. (all times local Eastern). The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed Jan. 1, Feb. 18, April 12, May 27, July 4, Sept. 2, Nov. 28, Dec. 25, 1974.

Times/Days

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000				← CW Bulletin ¹ →			
0020-0100 ⁴			3,7 Nov. 5*	14,080 ⁺	14,080*	7,15 Nov. 5*	14,080*
0100	Oscar ¹⁰			← Phone Bulletin ² →			
0105-0130 ⁴			3,990*	50,190*	145,588 ⁺	1,820*	21,390 ⁺
0130		CODE PRACTICE ¹ (35-15 wpm TThSat, 5-25 wpm MWFs) Details Below					
0230-0300 ⁴			3,580*		1,805*		3,580*
0300	RTTY Bull. ³			← RTTY Bulletin ³ →			
0330	Phone Bull. ²			← Phone Bulletin ² →			
0335-0400 ⁴			7,290*	3,990*	7,290*	3,990*	7,290*
0400	CW Bull. ¹			← CW Bulletin ¹ →			
0420-0500 ⁴			3,7 Nov. 5*	7,080*	3,990*	7,15 Nov. 5*	3,580*
1240				← Oscar ⁸ →			
1300		CODE PRACTICE ¹ (5-25 wpm MWF, 35-15 wpm TTh) Details Below					
1700-1730		21/28 cw7*	21/28 ssb8*	21/28 cw7*	21/28 ssb8*	21/28 cw7*	
1730		CTN ⁶					
1800				← Oscar ⁸ →			
1900-2000		7,080*	7,290*	14,095 RTTY*	7,290*	7,080*	
2000-2030	Oscar ¹¹	DIRN ⁶	21/28 cw7*	21/28 ssb8*	21/28 cw7*	21/28 ssb8*	
2030			CW Bull. ¹		CW Bull. ¹		
2100-2130		7,15 Nov. 5*	21,1 Nov. 5*	7,15 Nov. 5*	21,1 Nov. 5*	7,15 Nov. 5*	
2130			RTTY Bull. ³		RTTY Bull. ³		
2200		CPN ⁶	1,095 RTTY*	3,625 RTTY*	14,095 RTTY4*	CPN ⁶	
2300			CN ⁶	RTTY Bull. ³	CN ⁶		
2330				← CODE PRACTICE ¹ (10-13-15 wpm) Details Below →			

¹CW Bulletins (18 wpm) and code practice on 1,805, 3,580, 7,080, 14,080, 21,080, 28,080, 50,080 and 145,588 MHz.**

²Phone Bulletins on 1,820, 3,990, 7,290, 14,290, 21,390, 28,590, 50,190 and 145,588 MHz.**

³RTTY Bulletins, on 3,625, 7,095, 14,095, 21,095, and 28,090 MHz.** Bulletins repeated when time permits.

⁴Starting time approximate, following conclusion of bulletin or code practice.

⁵W1AW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.

⁶Participation in traffic nets.

⁷Operation will be on one of the following frequencies: 21.02, 21.08, 21.1, 28.02, 28.08, 28.1 MHz.

⁸Operation will be on one of the following frequencies: 21.260, 21.390, 28.590 MHz.

⁹When an Oscar satellite is in orbit, daily updated orbital data is sent at 18 WPM on cw frequencies.

¹⁰Oscar orbital data for the coming week, on RTTY frequencies.

¹¹Oscar orbital data for the coming week, on cw frequencies.

*General contact period.

**No 10- or 15-meter activity from 0130-0500.

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 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.

Speeds	Local Times/Days	UTC/Days
10-13-15	7:30 PM EDST Dy	2330 Dy
	4:30 PM PDST	
5-7½-10	9:30 PM EDST SnTThS	0130 MWFs
13-20-25	6:30 PM PDST	
5-7½-10	9:00 AM EDST MWF	1300 MWF
13-20-25	6:00 AM PDST	
35-30-25-20-15	9:30 PM EDST MWF	0130 TThS
	6:30 PM PDST	

35-30-25 9:00 AM EDST TTh 1300 TTh
20-15 6:00 AM PDST

The 0130 UTC practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and QST practice text (from the issue 2 months previous) to be sent in the 0130 UTC practice on the following dates.

June 10:	It Seems to Us
June 18:	Correspondence
June 21:	League Lines
June 27:	ARPS
July 5:	World Above
July 10:	YL News

bulletins, which can also be used as 18 wpm code practice, there is no need for additional practice. CD-139 will be updated early this summer, so send in your info *immediately*, if not sooner!

Spring Comes. Oh, yes it does - once each year. You people down south may hardly notice it in all the monotony of year-around mildness, but to us in the frozen northern climes it's a big event.

Of course it's customary, in ham circles, to wait until winter, usually in a blinding blizzard, to make antenna repairs (because that's when they are most needed, right?), but to the sensible minority, now is the time to climb those trees, poles or towers to check connections, replace cracked insulators or spacers, corroded wire, rusted bolts, and conduct a general inspection. No telling what Old Man Winter

DX CENTURY CLUB AWARDS

New Members

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings - March 1-31, 1974

W9OHH	318	D13OE	144	WB4QGN	113	W2FPG	106	WA4SCJ	107	5P7PBC	100
OZ8KR	270	UA4NM	135	OZ8CN	111	EA4KB	104	GW3ZVU	101	W1VH	100
JAIRWU	267	JA7GY	132	JA2AHH	110	K0ZTV	104	W4THU	101	W2YWK	100
W6APW	250	IA5IU	130	OK3ZMT	108	D16LK	103	WA4BTC	101	WB2FRM	100
K5FVA	229	W9PBS	128	VE4OM	108	G4BKI	103	WA4RDO	101	W4IIVP	100
K8HLR	209	LA9BM	125	WA3IUW	108	VE7UBC	103	1HSU	100	WB4THN	100
UK5MAF	202	NM5DD	120	WB9GUG	108	JA1GOV	102	K5ETA	100	W5BS	100
JA3VLD	200	W8GE	119	F71D	106	JA2AJA	102	K17HMO	100	WA7OMX	100
SK5AA	162	K2HAJ	117	KH6HML	105	K5VNJ0	102	OH7RM	100	WB8ARC	100
D13OE										WA0PKF	100

OZ8KR	270	ZL1BKS	198	JA5IU	130	9M2CJ	112	SM5DD	109	LA9BM	103
JA1RWU	267	IR8RC	190	IA7GY	129	W4CYJ	111	JA1LR	105	11PIN	100
K5VA	232	WASWOT	147	WA7GKL	126	D19AV	110	KH6HML	105	K2QLY	100
KZ5JM	210	JA3VLD	139	JA0FMB	125	K2HAJ	110	11NDP	104	W5DS	100
K1ZCD	202	W6APW	136	LA7DR	121	YV4YG	110	1Y6UNM	103	W7OK	100

Endorsements

In the endorsement listings 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.

ZL1HY	350	PY5UG	280	W80BG	250	14SZE	200	W81H	180	WA4EWX	140
OZ3Y	335	K4AEB	270	WA0TLT	250	WB4UKA	200	W9KDX	180	W6OPF	140
W2CKY	335	WA2AEH	270	EA3NC	240	W8GIO	200	WA9VW	180	WA7SLC	140
JA8ADO	320	W9CL	270	K4FIC	240	YU2BQR	200	F9CZ	160	W8VOM	140
PY4AP	320	D13BJ	260	W1DAL	240	YU3TXT	200	JA6MBU	160	WB9CEP	140
OF7UD	310	F2VK	260	D16GB	220	G3DLH	180	K1VSK	160	LA9JM	120
W6CLS	305	K3CHP	260	K6GT	220	H89ZF	180	WB2EXK	160	WB2OHU	120
F8TU	300	K6NM	260	LA3UE	220	13CZO	180	WA3NAV	160	WA3SWI	120
G3RO	300	K8DYM	260	PY7VON	220	JA3ADU	180	WA4EPM	160	WA5STI	120
K2KTK	300	PY1JN	260	W5GZR	220	PY7BFN	180	G4AMJ	140	VF7AJA/W6L2D	120
W7BCH	300	SM5AOB	260	WA8NDL	220	SM2CXU	180	JA1KTM	140	WB6ERG	120
K6UFT	290	W3HTW	260	WA0OU	220	SM6EON	180	K5EJC	140	WB81VA	120
W3DHT	290	W3YX	250	DK5WL	200	WB2FSC	180	WA2KAZ	140	W9RJM	120
K5IZY	280	WSUNF/6	250	H89ADP	200	WA30MH	180	W4CZU	140	W6KMN	120

ZL1HY	345	WASREB	300	CP1FW	260	VF3BIF	220	W6YVK	200	WB9CEP	140
LU9DAH	335	W6CLS	300	CT1ZW	260	W3YX	220	W8GIO	200	DA2OW	120
W2CKY	335	F8RU	290	F2VY	250	F8AGK	200	W8KRS	200	G4AMJ	120
W91JF	335	JA8ZO	290	F3TR	250	JA1HBC	200	WUQUQ	200	JA1KTM	120
K8CFU	320	W9OHH	290	K4OPR	250	K4MEZ	200	YU3TXT	200	KZ5LZ	120
OZ3Y	315	K3PDC	280	SM5AOB	250	VK9BS	200	EA3NC	180	PY1DOK	120
VE4OM	315	K4VKW	280	WA2LAN	240	W5LDH	200	JA6MBU	160	W2FGY	120
W3FVW	315	K4AEB	270	W80BG	240	W5SSV	200	13FDC	140	W4BAA	120
OF7UD	305	K6SVL	270	K2GBC	220	W6PSO	200	WB2GYD	140	WB4KCL	120
K6AOV	300										

has done to your antenna system or other outdoor works that is sapping your efficiency, leaking off good rf to ground, or creating rectification that causes you more TVI or BCT than you normally get. Do it now. Don't wait until the end of summer, wasting all that time when your signal efficiency would be improved. Get up that tower, OM!

CU on FD. The other day we brought up FD at one of several clubs we belong to, and were astounded to note that no one seemed to be much interested. That's like finding a species of bee not interested in honey. Imagine not going out on FD! This OM hasn't missed one since 1936, and although the old adrenalin doesn't flow as freely as

it used to, still feels many years away from missing his first one.

Of course we all go out on FD for our own reasons. What's yours? An outing with the gang? A burning desire to win? Get away from the family, or the routine? Rough it? Or maybe you just don't know why you do it, you just do it. Whatever your reason, or lack of one, or even if you don't intend going out at all, Field Day is just about whatever you want to make it, and there's a place in it for every amateur. That's why it's attractive to so many different kinds of amateurs, from novices right up through grizzly old veterans. Even if you don't "go out," you can participate from the indolent comfort of your home, and give field day

stations each one more contact.

See you on Field Day? We hope so. But we'll be out there ourselves, so don't look for — WINJM.

New Films Available Two new films have recently been added to the Training Aids Library, now available under the customary rules, affiliated clubs first.

F-90, "Charles Proteus Steinmetz." The story of the German-born mathematician who pioneered the modern system of electric power generation.

F-60, "Antenna Matching Devices." Describes delta-match, "T" match and quarter-wave stub matching systems. 20 minutes.

The above two films are black-and-white. Negotiations are under way for the acquisition of a number of additional films for both training and general education purposes, both color and black-and-white. Further details soon, we hope. Meanwhile, it should be possible to acquire additional copies of the above if they are popular with users.

Our previous request for leads to additional film sources still stands.

ARRL Instructor Corps Progress Report. At this writing (mid-April) the AIC has 47 signed-up members; about fifteen new ones in the past month. Seems that every time we mention the subject a new crop of volunteers shows up. At present, the influx of volunteers has almost equalled the number of requests for assistance, but now begins the "slow" time of year. In the fall, prospective hams will emerge from the woodwork and we'll be hurting if we don't have better representation from some areas in the AIC. Thus far we have only matched three instructors with students, but that's three students who might have fallen by the wayside otherwise. Sign up! — WA1STN

Feedback

The FMT Honor Roll listing on page 98 of the April issue should show WA8MSC as a qualifier, not WA8NSC.

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 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are sent 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.

DXCC Notes

Announcement is hereby made of the deletion of Tibet (AC4) and Zanzibar (5H1) from the ARRL Countries List. In view of political realities, in the continuing review of the entities on the list, a consensus was reached that the two listings no longer warrant separate consideration. Any contacts made June 1, 1974 and after with stations located in Tibet will be creditable toward the China (BY) listing, while contacts with stations located in Zanzibar will be creditable toward the Tanzania (5H3) listing. These deletions will be effective as of June 1, 1974, and will be reflected in the Honor Roll totals which will appear in the September 1974 listing. As of June 1, 1974, this will make a maximum possible total of 355 with a possible total of 35 deletions. Therefore, submissions which may be made in June for DXCC Honor Roll consideration can be made on the basis of a minimum undelisted total of 311.

Effective July 1, 1974, DXCC endorsement stickers will be issued in increments of 5 above the 300 level. This is being done in view of the DXCC pins which become available as of that date (see page 96, April 1974 DXCC Notes).

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the ARRL Section of the Division, hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, WINJM, Communications Manager

Section	Closing Date	Current SCM	Present Term Ends
Canal Zone	7/10/74	J.L. McMullen, KZ5ZZ	9/10/73
Vt.	7/10/74	J.H. Vele, W1BRG	3/1/74
Ky.	7/10/74	T.H. Huddle, W4CID	10/30/74
Utah	7/10/74	J.H. Sampson, Jr., W7OCX	11/10/74
S.F.	7/10/74	L.A. Gallager, W6NUI	11/1/74
Mich.	7/10/74	L.J. Olinhouse, W8ZB1	12/10/74

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections completing their election in accordance with applicable rules, each term of office starting on date given.

W.I.	J.S. Sepulveda, KP4QM	7/12/74
W.N.Y.	G.H. Hippisley, Jr., K2KTR	8/18/74
S.J.V.	R. Saroyan, W6LPU	8/20/74

In the Oklahoma Section, Mr. Cecil C. Cash, W5PML and Mr. Leonard R. Hollar, WA5BSN were nominated. Mr. Cash received 270 votes and Mr. Hollar received 198 votes. Mr. Cash's new term of office began March 19, 1974.

5-BAND AWARDS

(Updating the May 1974 listing.)

5BDXCC: (starting with number 323),
W9LKJ WASRXT W4WRY DL8NU.

New A-1 Operators

F6AFA SMSBBC PAQLCE PAQEE
G3YSK VK3APU F2YT I3ANE
DM2CJJ W9AES W9KR W7MBO

In the Ohio Section, Mr. Henry R. Greeb, W8CHT and Mr. Kenneth L. Simpson, WA8FX were nominated. Mr. Greeb received 1040 votes and Mr. Simpson received 712 votes. Mr. Greeb's term of office began April 29, 1974.

In the Connecticut Section, Mr. Charles J. Harris, WR2CHO/WAISOB and Mr. John J. McNassor, W1GVT were nominated. Mr. McNassor received 438 votes and Mr. Harris received 236 votes. Mr. McNassor's new term of office began April 12, 1974.

In the Idaho Section, Mr. Dale Brock, WA7FWV and Mr. Wynn Hibbert, WA7MEJ were nominated. Mr. Brock received 118 votes and Mr. Hibbert received 31 votes. Mr. Brock's term of office began April 23, 1974.

CLUB COUNCILS & FEDERATIONS

Federation of Eastern Mass. Amateur Radio Assoc., Eugene H. Hastings, W1VRK, Secy-Treas., 28 Forest Ave., Swampscott, Mass. 01907

Foundation For Amateur Radio, Hugh Turnbull, W3ABC, Pres., 6903 Rhode Island Ave., College Park, Md. 20740

Indiana Radio Club Council, Willis F. Sample, K9RPZ, Secy., 207 F. Oak, Anderson, Ind. 46012

Ohio Council Of Amateur Radio Clubs, James W. Benson, WR0UO, Secy., 2463 Kingspath Drive, Cincinnati, Ohio 45231

San Diego County Amateur Radio Council, Inc., Sam C. Dear, K6BWT, Chmn., 13031 Papago Drive, Poway, Calif. 92064

Tri-County Council Of Amateur Radio Clubs, Dave Brainerd, WB6DHW, Secy-Treas., 2117 Piru St., Oxnard, Calif. 93030

West Virginia State Radio Council, Inc., Vivian L. Kibler, WA8OKG, Secy. 182 Monterey Drive, St. Albans, West Virginia 25177

ARRL AFFILIATED CLUB HONOR ROLL

In these days of raising requirements in one place and lowering them in another, the affiliated club that can maintain its ARRL membership at 100% deserves some special recognition. Headquarters bestows such recognition twice a year in the form of an honorary listing in *QST* and a special certificate.

Each year, as annual affiliated club questionnaires are received, those showing that all their members are also ARRL members are noted and put aside for this special honor. The list below are those clubs who are 100% ARRL according to

questionnaires so far received. If your club is 100% ARRL and is not listed below, it means we do not have your questionnaire form yet; fill it out and send it in, so you will make the addendum of 100% ARRL Clubs in December *QST*. Ladies and gentlemen, our Affiliated Club Honor Roll!

Adams County Amateur Radio Society, Gettysburg, Pa.
Aeronautical Center Amateur Radio Club, Oklahoma City, Okla.
Anderson Radio Club, Inc., Anderson, South Carolina
Associated Mountain Toppers, Montebello, Calif.
Atomic International Rocketdyne ARC, Tarzana, Calif.
Bandhopper's Radio Club, St. Louis, Missouri
Beacon Radio Amateurs, Philadelphia, Pa.
Buckeye Shortwave Radio Association, Akron, Ohio
Buffalo Area DX Club, Buffalo, N.Y.
Central Virginia Contest Club, Richmond Virginia
Colorado Contest Conspiracy, Denver, Colo.
Connecticut Wireless Association, Bristol, Conn.
Covington Radio Club, Andalusia, Ala.
Esterio Radio Club, Morro Bay, Calif.
Fulton Amateur Radio Club, Fulton, N.Y.
Granite State Amateur Radio, Goffstown, New Hampshire
Hiawatha Amateur Radio Club, Hiawatha, Kans.
ISKRA, Inc., Madison, Indiana
Jessamine Amateur Wireless Society, Nicholasville, Ky.
Kings County Band Scanners, Brooklyn, N.Y.
Lake Cook DX Association, Waukegan, Ill.
Lockheed Amateur Radio Club (LERC), Burbank, Calif.
Loudon County ARC, Lenoir City, Tenn.
Mason-Dixon Pate Radio Society, Wilmington, Delaware
Massillon Amateur Radio Club, No. Canton, Ohio
Miami Amateur Radio Club, Miami, Okla.
Mid South DX Association, Germantown, Tenn.
Mike and Key Radio Amateur Club (MAKRA), Camarillo, Calif.
Newport County Radio Club, Newport, Rhode Island
Niskayuna H.S. Amateur RC, Schenectady, N.Y.
Norfolk Radio Club, Norfolk, Nehr.
North Alabama DX Club, Huntsville, Ala.
Northeast Nebraska Radio Club, Norfolk, Nehr.
Northern Illinois DX Association, Wheaton, Ill.
OBP No. 1 RC of St. Louis, St. Ann, Missouri
Order of Boiled Owls, Columbus, Ohio
Potomac Area VHF Society, Rockville, Md.
Providence Radio Association, Inc., Greenville, R.I.
Radio Amateur Transmitting Society, Nashville, Tenn.
Red River Valley ARC, Paris, Texas
Rock Hill Amateur RC, Rock Hill, S.C.
Rockaway Amateur RC, Ridgewood, N.Y.
St. Louis Amateur RC, Inc., Webster Groves, Mo.
Southern Nevada Amateur RC, Boulder City, Nev.
Virginia Century Club, Norfolk, Va.
Wabasha Area Amateur RC, Kellogg, Minn.
Wheatbelt Radio Club, Inc., Colby, Kans.

World Above

(Continued from page 97)

"raring to go on meteors" if anyone needs Maine. He is also nearing completion of a 1296 station. K2EVW, N.J., offers meteor-scatter schedules, if everyone hasn't already worked W2UK(!).

Moonbounce interest continues high, and in Florida, K4IXC reports working SM7BAE, upon answering an EME CQ from the Swedish station. John is also hearing the VKs on EME, so should soon have a contact with Australia. K5BXG, Tulsa, is working towards his first EME contact, and has been heard by at least four stations. Charlie uses an 88-element array of 11-element Yagis stacked four high and two wide. K7ICW, Las Vegas, says he is making progress with his EME project. He is in no big hurry, just trying to do it right as he moves forward. At the other end of the spectrum, Al was recently issued a 160-meter WAS award.

March 30 and 31 found the Gulf tropo path open as WA9QZE/5, about ten miles north of Dallas, worked into Florida on both days. WA5LYX told your writer that he had seen the Miami-area Channel 51 in San Antonio on the same days, but no other reports of this opening were received.

220 MHz is now populated by WB0COR, St. Paul, with a kilowatt and 88 elements. Dale would appreciate some schedules. He also has an 80-element collinear and pair of 4CX250Bs on 432. VE3EMS continues his interest in 220 EME, and seeks long-haul tropo schedules.

Moving to 432 and higher, K2UYH coordinates EME schedules on 432 with VK2AMW, W9WCD, W4NUS, W0YZS, W8YIO, W0DRL, W1SL, F8DO, G3LTF and KH6BZF participating. Hope I didn't leave anyone out. K2UYH and W6YFK await lower winds, so they can hold dishes on the moon, preparatory to their certain contact on 2300 MHz. K2UYH is running 432 RTTY EME with VK2AMW. Al has heard his own echo returns, probably an amateur first for RTTY. Al says also that Harley, WA6HXW, is expected on 432 EME again soon, with an 18-foot dish, and G3VZI is apparently EME ready.

W3KE/1, Vermont, reports that OZ9CR, using the club call OZ3FYN, had a successful contact on 1296 EME with W9WCD, Feb. 18. On the Danish end was 500 watts input to a homebuilt 28-foot dish.

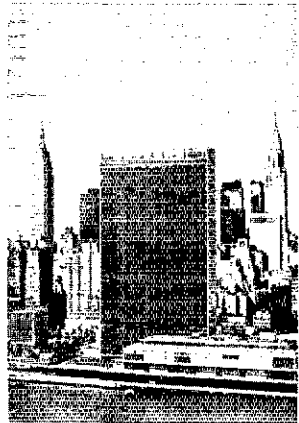
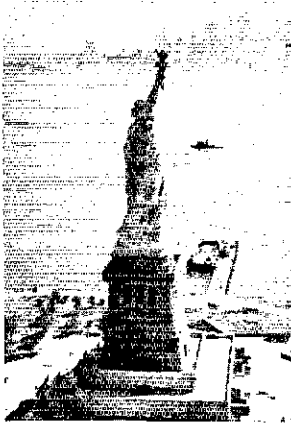
Enjoy a Weekend at the Waldorf!

1974 AMERICAN RADIO RELAY LEAGUE NATIONAL CONVENTION

July 19, 20, 21

WALDORF ASTORIA HOTEL

New York City



The Hudson Amateur Radio Council invites you to an outstanding convention in a truly outstanding setting! A jam-packed program: FM-DX-SSTV-RTTY-VHF-MARS-OSCAR-IC-more! Special YL programs. Latest equipment. Royal Order of Wouff Hong. Saturday banquet in the luxurious Waldorf Grand Ballroom. Special room rates: \$22 single, \$28 double direct from Waldorf—mention radio convention. Reserve now for reduced rate: Registration \$3.50 in advance, \$4.00 at door. Banquet \$17.50 in advance, \$20.00 at door (if available).

ARRL CONVENTION, 303 Tenafly Road, Englewood, New Jersey 07631

I will attend the Convention. Please send me tickets checked below.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PLEASE ENCLOSE STAMPED, SELF-ADDRESSED ENVELOPE!

Quantity

_____ Registration tickets at \$3.50 each

_____ Banquet tickets at \$17.50 each

_____ Combination *banquet and registration* at \$20 for both.

Total amount \$ _____ Make check/money order payable to "HARC"

Enclosed is check _____ Money order _____

PLEASE MAKE HOTEL RESERVATIONS DIRECT TO WALDORF ASTORIA

Be sure to state reservation is for RADIO CONVENTION

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE - SCM, Roger E. Cole, W3DKX - SEC: K3KAJ, PAM: WA3DUM, RM: W3EHB, PSHR: WA3DUM, K3KAJ. New appointments: WA3DUM as PAM; K3BBR as OBS; W3ASKUD/3 as ORS. WA3GAY finally has the new Drake 4-C equipment operational. New officers of the U. of Del. ARC are WA3LMY, pres.; WA3KFR, vice-pres. & sta. mgr.; WA3QFN, treas. WA3KFR is also a new Extra. K3KAJ lost his Quad in a Mar. wind storm. The Del. Repeater Assn. again furnished communications for the "Walk for Mankind." W3CFA is finding time in his retirement to get back into the Del. phone nets. W3ADQ and WA3FER from Md. Eastern Shore are newcomers to the DTN. Del. ARC is meeting on 145.26 MHz Mon. at 1930 local time. DTN: QNI 174, QTC 37. DEPN: QNI 72, QTC 5. Traffic: WA3DUM 65, W3DKX 53, W3EEB 53, K3KAJ 41, WA3SKP 22, WA3GAY 1.

EASTERN PENNSYLVANIA - SCM, Allen R. Breiner, W3ZRO - SEC: W3EBF, PAMs: WA3PZO, K3BHU, RMs: K3PIE, W3EML, WA3QLG, K3MVO. Appointments: WA3QYY as OPS; WA3OVH and WA3RCA as OVS. WN3VDO is our section's first ORS-II and also achieved CP-25. WA3LUX and WA3NSD are now General Class and biding time to take the Advanced. Spring arrived at WA3ATQ with 5 inches of snow. W3CUL and W3VR finally got enough gas to return to Pa., welcome back. W3EML doing fine and just counted number 142 BPL card. An "Ole" friend, W3WRP rubbed elbows with us and spoke at the Del. Chapter OCWA and the South Chester County ARC. Her key collection now over 200. WA3LMO taking up the slack in the Lehigh valley area once more after a long absence. Northeast High School Transmitting Society is now an ARRL affiliate. W3HK's trip to 6Y5-Land was curtailed due to ill health of WA3BJO, XYL. He spent his vacation time repairing sky-wires. WA3CKA has been experimenting with heterodyning in the 5 MHz region. W3ID got 2-meter fm operative and now is a welcome addition to our cw traffic system. Traffic handlers in the Media area are getting a boost from WA3SVK. Along with traffic work, WA3RKH worked PAQVYP as his first European QSO. Mother nature is hard at it again and took one of W3EU's antennas. Pine Grove Area Repeater Assn. now operating on 146.04-64 MHz. Officers elected for the Bicentennial Amateur Radio Convention committee are W3ZD, chmn.; W3CL, vice-chmn.; K3GAS, treas.; WA3UNJ, secy. Their first organizational meeting was held at Glenside. New gear dept.: A new operating shack for W3GMK; a phone patch added to WA3TMP; a 2-meter beam installed at WA3QLG; new rig at WA3KWD is FT-101 and SR-220; WA3UKZ new QTH is Lewisburg. Nets: EPA dy 3610 kHz 0000Z QNI 504, QTC 463, K3PIE mgr. FTN(training)dy 3610 kHz 2330Z QNI 199, QTC 91, mgr. WA3QLG, PFA&P&TN dy 3917 kHz 2301Z QNI 455, QTC 123, mgr. WA3PZO, PFN M-F 3960 kHz 2230Z QNI 654, QTC 498, mgr. K3BHU. Don't forget to originate that message for your extra Field Day points. Traffic: W3CUL 2339, W3VR 696, W3EML 521, WA3QYY 243, K3DZB 177, W3WRE 171, K3PIE 167, WA3ATO 164, WA3PZO 152, K3BHU 132, W3ABT 115, K3OIO 115, K3MVO 97, WA3LMO 89, W3ZRO 80, WA3KWD 76, WN3UDV 71, W3VA 70, W3LXP 68, WN3VDO 67, WA3TBG 59, WA3UKZ 59, W3BFB 47, W3PHQ 40, W3HK 31, WA3QLG 30, WA3SVJ 28, WA3CKA 20, WA3DE 24, W3ID 24, WA3UXP 24, K3KNL 12, W3HNR 10, W3CBH 10, K3KTH 10, W3OY 9, WA3AB 8, W3CL 8, WA3XSU 7, W3BUR 6, W3OML 5, WA3SVK 5, W3KCM 4, WA3RCA 4, WA3IMP 4, WA3IYT 4, K3VVG 4, WA3BJO 2, W3LC 2, WA3RKH 2, WA1DIC/3 1, W3EU 1, W3GMK 1, WA3RJJ 1.

MARYLAND-DISTRICT OF COLUMBIA - SCM, Karl R. Medrow, W3FA - SEC: K3LFD, RM: W3OU, PAM: K3TNM, NCM:

W3LDD, WA3SCR and WN3VGV made BPL for Mar. PSHR has WA3SCR, WA3RCL, WA3URV and WN3VGV listed with WA3EOP 34 and W3FCN 30. MEPN toppers were WA3IIV, W3IQN, W3LDD and K3ORW. Runners up W3DKK and W3HWZ. WA3RCL becomes Me-PN Net Communications Mgr. replacing W3LDD who completed an outstanding term. W3MSN radiates 3.5 through 450 MHz all modes in his "Use 'em or lose 'em" campaign. WB2TJR/3 eyes replacement gear while working hard on the school newspaper. W3ZY reports the last ice storm for the season. K3DI and WA3SEE are an enthusiasts on 10 and 2 respectively. WA3SCR touts EMTN on 3715 kHz at 1000Z. W3OKN goes to ITU for the upcoming Maritime Conference. W3EOV is getting his practice copying the WY reports. W3CDO made it to the Washington OCWA dinner. W3IPT earned the "Satellite DX Achievement Award," with 167 contacts in 9 weeks all on homebrew. WA3SEE received his Commercial ticket. WA3TNK upgraded to Advanced. Congrats, WA3EOP is up to his ears with Worldwide VHF logs. WN3VGV is battling ORN on EEFN. K3NCM gets the traffic overload. W5TWT/3 opines that /7 gets better DX than /6. Look for the MDC QSO party in Sept. with W5TWT, ex-K3JYZ doing the honors. WA3TDK and WA3TIP team up on ATV in the Baltimore area. WA3UHW is the new prey at the U of Md. Radio Club W3EAX. Their Novice classes were oversubscribed. WN3URO reports the Columbia Amateur Radio Assn. has K3TFU, pres.; W3DKS, vice-pres. and communications; K3EVC, treas.; W3FUS, pub.; WN3URO, secy. They are the Official Station for the Statewide Scout-O-Sphere. WA3IHW reports 18 to 20 hams provided communications for the Cherry Blossom Festival in Washington. Well done gang. WA3RVU is busy with the MDD bulletin. W3FZV made the VA QSO party for old times sake and did some YIOM work. W3HMT has 3K states QRP at 3 watts. Ft. Meade stations are WA3JBJ, WA3TDZ and K3IVO. W3ABC is revising the W3UE/W3OCW MDC delivery directory. WA3INK allows it's hubby WA3CZT who does all the work on the PARI's Newsletter. The nets report high activity, high static levels and high tun with sessions/OTC/QNI average for MDD-W3OU 6h/249/7.3; EEFN-WN3VGV 23/92/4; MEPN-W3LDD 20/82/26.6 and MDCIN-K3TNM at 18/65/17.0. MDD top brass W3FA, WA3RVU and WA3SCR. Traffic: WA3SCR 399, WN3VGV 217, W3OU 184, W3OKN 181, WA3RCL 140, W3FA 121, K3DI 84, WA3URV 82, WA3EOP 76, W3HMT 66, WB2TJR/3 66, WA3AFO 41, WA3RVU 28, W3FZV 27, K3TNM 26, W3LDD 25, W3EOV 18, WA3IIV/3 14, K3NCM 14, W3FCN 13, WA3ITM 12, WA3OEJ 9, W3FCI 2.

SOUTHERN NEW JERSEY - SCM, Charles E. Travers, W2YPZ

Acting SEC: W2YPZ, PAMs: WB2FJE, WB2RKK, RM: W2JL

Net	Freq	Time(PM)	Seas.	QNI	Ttc.	Mgr.
NJPN	3950	6:00 S	31	544	159	WA21VH
NJSN	3730	8:15 Dy	31	213	94	WB2RKK
NJN	3695	7:00 Dy	31	546	214	WB2RKK
NJN	3695	10:00 Dy	31	253	104	WB2RKK
NJPN	3930	6:00 Su	5	112	34	WB2FJE

The GCARC Crosstalk informs us that WA2FGS was elected a member of the Board of Dir. at the Feb. 20th board meeting to fill the office held by Bill Bills. It is also nice to hear Rose Ellen on the NJP Net on Sun. News of clubs always welcomed. There are still many positions open in the AREC program. If interested contact the SEC as soon as possible. Anyone interested in an ORS appointment should contact the RM on NJN. Requests for other appointments should be addressed to the SCM. With the growing interest in 2-meter fm you are again reminded of the NJPO Net on 146.52 nightly at 10:30 P.M. W2EPI and WB2FJE are Net Controls. This makes an excellent outlet for local traffic. WB2FNK has 2-meter fm capability having purchased a Drake FR22C. W2ORS is in there checking the airways and doing a fine job in helping operators with good standards of operation. Thanks Chuck. Traffic: WB2VEJ 299, WA2FCD 62, W2YPS 44, WB2FNK 22, WA2GMH 20, WA2HIF 18, WB2FJE 17, W2YPZ 17, WB2SFX 10, W2IU 7.

WESTERN NEW YORK - SCM, Richard M. Pitzeruse, K2KTK - Asst. SCM: Rudy Ehrhardt, W2PVI, Sec: W2CFP, PLEASE NOTE: I have decided not to run for re-election as your SCM. Therefore, starting with your reports for the month of Aug., please send all traffic and activity reports to the new SCM, K2KTK. Reports through the end of July (i.e. those mailed before the 8th of Aug.) should be routed as before to either W2PVI or to me. After

Put together the top-value Heathkit 2-meter package!

Start with the Heathkit HW-202 2-Meter FM Transceiver.

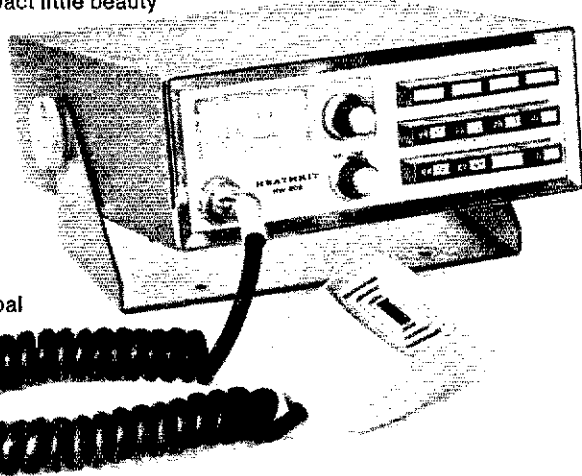
It's an all solid-state design that you can build and completely align without special instruments. And this compact little beauty gives you independent pushbutton selection of 6 transmit and 6 receive crystals. 10 watts minimum output into an infinite VSWR without failure. And for the ultimate in convenience there's the optional tone burst encoder for front panel selection of four presettable tones. The HW-202 kit includes two crystals for set-up and alignment and simplex operation on 146.94; push-to-talk mike; 12-volt hook-up cable; heavy duty clips for use with temporary battery; antenna coax jack; gimbal bracket, and mobile mounting plate.

See specifications below.
Crystal certificates available at 5.95 each.

Kit HW-202, 11 lbs., mailable . . . 179.95*

Kit HWA-202-2, Tone Burst Encoder, 1 lb. . . 24.95*

Kit HWA-202-1, AC Power Supply, 7 lbs. . . 29.95*



Kit HWA-202-3, Mobile 2-Meter Antenna, 2 lbs. 17.95*

Kit HWA-202-4, Fixed Station 2-Meter Antenna, 4 lbs. . . 15.95*

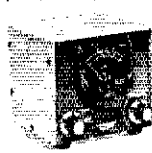
Add 40 watts of output

with the Heathkit HA-202 2-Meter Amplifier. It's designed for the HW-202, 4 lbs. 69.95*



Tune-up your 2-meter rig

with maximum precision. The Heathkit HM-2102 VHF/SWR Bridge makes it happen, 4lbs., 29.95*



New Heathkit 10-Watt Amplifier,

HA-201, is perfect for hand helds or any 1 to 1½ watt 2-meter rig, 3 lbs. 25.95*



HW-202 SPECIFICATIONS — RECEIVER — Sensitivity: 12 dB SINAD* (or 15 dB of quieting) at .5 μ V or less. Squelch threshold: 3 μ V or less. Audio output: 2 W at less than 10% total harmonic distortion (THD). Operating frequency stability: Better than \pm .0015%. Image rejection: Greater than 55 dB. Spurious rejection: Greater than 60 dB. IF rejection: Greater than 75 dB. First IF frequency: 10.7 MHz \pm 2 kHz. Second IF frequency: 455 kHz (adjustable). Receiver bandwidth: 22 kHz nominal. De-emphasis: —6 dB per octave from 300 to 3000 Hz nominal. Modulation acceptance: 7.5 kHz minimum. TRANSMITTER — Power output: 10 watts minimum. Spurious output: Below —45 dB from carrier. Stability: Better than \pm .0015%. Oscillator frequency: 6 MHz, approximately. Multiplier factor: X 24. Modulation: Phase, adjustable 0-7.5 kHz, with instantaneous limiting. Duty cycle: 100% with ∞ VSWR. High VSWR shutdown: None. GENERAL — Speaker impedance: 4 ohms. Operating frequency range: 143.9 to 148.3 MHz. Current consumption: Receiver (squelched): Less than 200 mA. Transmitter: Less than 2.2 amperes. Operating temperature range: —10° to 122°F (—30° to +50°C). Operating voltage range: 12.6 to 16.0 VDC (13.8 VDC nominal). Dimensions: 2¾" H x 8¼" W x 9¾" D.

*SINAD = $\frac{\text{Signal} + \text{noise} + \text{distortion}}{\text{Noise} + \text{distortion}}$

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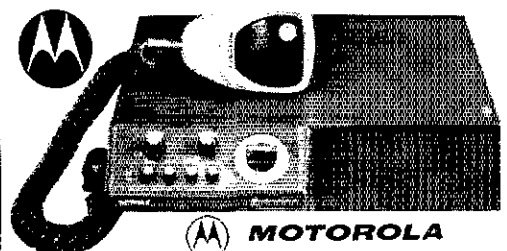
ALLIED AX-190 Receiver \$159 SP-190 Speaker 9	EICO 720 Transmitter 5 49 722 VFO 34 730 Modulator 39 717 Keyer 49	SB-300 Receiver 209 SB-310 Receiver 279 SB-310 Receiver 279 XC-2 2m Converter 25 XC-6 6m Converter 25 SB-600 Speaker 15 HS-24 Speaker 9 LX-35 Transmitter 34 HX-40 Transmitter 34 MT-1 Transmitter 39 TX-1 Transmitter 99 SB-10 SSB adaptor 75 SB-10 Transmitter 179 HX-10 Linear 175 HX-30 6m Xcvt 149 HX-20 6m Linear 75 HW-22A 40m Xcvt 85 HW-32 20m Xcvt 75 HW-52A 20m Xcvt 85 HW-16 Transceiver 89 HW-100 Xcvt 279 SB-100 Xcvt 249 SB-101 Xcvt 309 SB-102 Xcvt 359 SB-110A 6m Xcvt 295 SB-400 Transmitter 225 SB-401 Transmitter 249 SB-610 Sig. monitor 79 HW-29 (Six'er) 74 GP-11 DC supply 49 VH-1 (Seven'er) 59 HP-13 DC supply 49 HP-20 AC supply 34 HP-23 AC supply 34 HP-23A AC supply 49 HP-13A DC supply 64 HRA-101 calibrator 9 HM-15 SWR bridge 15 HW-17A 2m Xcvt 95 HWA-17A DC supply 9 HW-17-2 FM adaptor 25 HW-7 ORP Xcvt 89 HW-202 2m FM Xcvt 159	PNH LA-400C Linear 3 69	PIERCE-SIMPSON Gladding 25 2m FM Transceiver \$159	POLYTRONICS PC-2 2m Xcvt \$119 PC-6 6m Xcvt 99 PC-9 2B 6-2m Xcvt 169	RME 6900 Receiver \$159	REALISTIC DX-150A Receiver \$ 89	REGENCY HR-712 2m FM \$199 HR-25 2m FM Xcvt 239 HR-2 2m FM Xcvt 149	ROBOT 70 Slow Scan Monitor \$239 80 Slow Scan Camera w/ Macro-Cosmic 25mm 1:1.4 lens 249	ROBYN Digital 500 Xcvt w/ supply \$399	STANDARD SR-C851T 2m FM \$269	SBE SB-33 Transceiver \$189 SB-34 Transceiver 259 SBZ-LA Linear 175	SWAN 600R Custom Rec. w/ SB-16 filter \$425 VX-II VOX 19 508 VFO 129 117B AC supply 65 600T Transmitter 199 350 Xcvt (late) 259 350C Transceiver 299 512 DC supply 75 TVA-2 2m Xcvt 189 500 Transceiver 399 500C Transceiver 329 500CX Transceiver 379 117XC AC supply 95 14-117 DC supply 99 14X DC module 39 14A DC module 79 117X Basic AC sup. 65 Clynet Xcvt 389 1200X Linear 139 250 6m Xcvt 125 250C 6m Xcvt 149 Ic. Audio filter 19	TPL 502 2m Amp 5 89	TEMPO FMV 2m FM Xcvt \$149 CL-146 2m Xcvt 175	TEN-TEC 200 VFO 5 49 315 Receiver 169 TX-100 Transmitter 59 RX-10 Receiver 49 PK-3 Transceiver 49 FM-3A Transceiver 54 AC-4 SWR bridge 12	TOPAZ C10XPG AC supply \$39	VARITRONICS FM-20BM 2m Amp \$ 39 PA-50A 2m Amp 49 PS-1500 AC supply 29 HT-2 Mk II 2m FM walkie-talkie 119	YAESU FR-100B Receiver \$179 FRDX-400SD 275
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5/3/74

All items subject to prior sale. Amateur Electronic Supply reserves the right to sell such items as power supplies with their matching equipment only, and not separately - depending upon our stock situation. To insure quality, our used gear is sent through our repair shops after we receive your order - as please allow for a possible slight delay (approximately 5 to 10 working days).

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2 motor FM radio

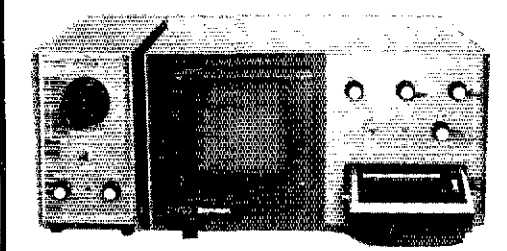


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MD-4 2m Antenna	21.95
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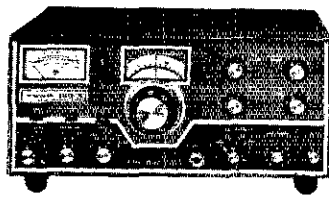
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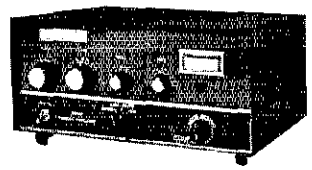
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SAVE \$70



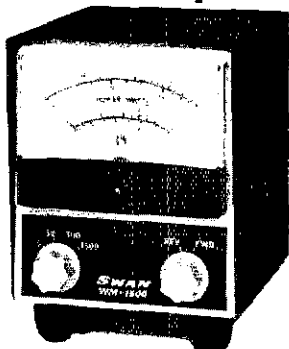
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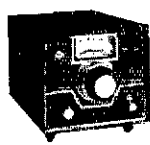
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NOTE: We are able to offer the special price on the WM-1500 due to a large purchase made at the old price.



SAVE \$30
External VFO
for 160X
Reg. \$119.95
NOW \$89.95

Now you can use your
SWAN CREDIT CARD
at
AMATEUR ELECTRONIC SUPPLY
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Address: 599 OSO Lane, Anywhere, USA
Call: W9XYZ
Joe Ham
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am interested in the following new equipment:

I have the following to trade: (what's your deal?)

Ship me:

I Enclose \$ _____ I will pay balance (if any):
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Account Number: _____

Expiration DATE _____ *Master Charge Interbank number _____ (4 digits)

Name: _____

Address: _____

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UNIVERSAL Aluminum Towers are GREAT!

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that, to the new SCM, K2ILH had his homegrown 2-meter synthesizer swiped from his car. RAWNY has elected W2JJN, pres.; W2RTC, vice-pres.; WA2SON, secy.; and W2EWT. Elected as RAWNY directors are WA2SON, W2CUL, W2JJN and W2RTC. They replace WB2YIM, W2JPE, K2HWF and W2PLG who all did an FB job. Fla. bound W2NW makes good use of the Recreational Vehicle net on 7268 kHz at 1130Z. W2SD, W2KX, W2TAX and K2CZV can be found daily on 3900 kHz at 1330Z. GRAM meets every third Fri. at 2400Z at the CD hall in Batavia, K2BMC presiding. K2HYO and WA2RTI conduct the WNY Emergency Net over WR2ABU Sun. at 1545Z. WA2LUF has a new Swan 350. W2GLB has HER car license plates to match the HIS plates of W2GTK. Neat, eh? PSHR this month to WB2JRX, W2RUF and W2MTA. BPL to W2RUF. K2LUR reports ESS handled 179 QTC with 5190 QNI for Mar. Congratulations to W2MTA, the new mgr. of the Second Regional Net. Bill replaces W2FR who has so capably handled the reins for the past 7 years. W2FR and K2KTK are both hooked on Astronomy - radio astronomy next! The new mgr. of NYS replacing W2MTA is WA2PIL of ENY - an FB choice. NYS handled 332 QTC with 647 QNI for Mar. WA2PZD is growing a new HW-202. K2OUA of Ballston Lake is back on the air after ten years with an FT-101B and 1K-22C. W2CFP reports the Southern Tier Hamfest was graced with the worst weather he has ever seen at a Hamfest. What does he expect in WNY? WN2ISJ is busy on 15 with states at 48/47 and countries at 42/23. He holds a CP-20 wpm certificate. On Mar. 8, WA2SHV and WN2QDN set up an amateur radio station for the Newark Valley High School mini-course day. They used the call WA2SHV/2. WB2CFE reports that the locals around Saratoga, Albany and Schenectady counties (latter two in ENY) are gathering on 10 meters on Sun. Contact WB2CFF for details. WA2BCK operated from K2LWR during the ARRL DX test. WA2RSP does an FB job as mgr. of the NYSPTEN. WA2BCK has a new Drake C Line. WN2MHI getting ready for mobile (?) with a new cycle. WA2AOG working on a pair of 813s. Traffic: W2RUF 330, W2FR 281, K2KOC 156, WA2JWM 126, WB2VND 110, W2MTA 103, W2MSM 79, WB2JRX 75, K2LUR 61, W2RUF 50, WA2DRC 49, W2FZK 41, WA2CTB 35, WA2HSB 35, W2HYM 35, WA2TPC 35, WA2PUJ 34, WA2TSR 30, W2PVI 28, K2OFV 25, W2EAF 24, K2KTK 24, W2PNW 24, W2GLB 21, K2IMI 18, WA2HEC 15, WN2TGL 12, WA2RSP 11, WA2ABL 10, WA2LUF 9, WA2KYM 7, K2RTO 7, WA2AOG 5, WA2AIV 2, WA2GLA 2, W2CFP 1, WA2CJY 1.

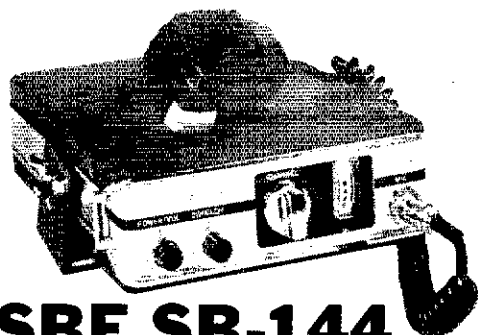
WESTERN PENNSYLVANIA - SCM, Robert E. Gawryla, W3NEM - SEC, W3KPI. PAM: K3ZNP. RMs: W3KUN, W3LOS. WPA CW Net meets daily on 3585 kHz at 7:00 PM local time. It is with deep regret that we record the Silent Key of W3NEZ. The Western Pennsylvania Repeater Council was formed on Mar. 16 with members WR3AAA, WR3AUI, WR3ACM, WR3ACS, K3PSP, WA3IOK with W3MIF as a member of the board of directors. Good luck men. The Crawford Amateur Radio Society has new officers with K3TLP, pres.; WA3ICO, vice-pres.; WA3PRI, secy.-treas.; K3YAK and WB4ZDY/3, dir. Mercer County ARC announces the following new officers for the coming year: K3ULJ, pres.; K3SAN, vice-pres.; WA3SWR, secy.; WA3IAL, treas. The Foothills ARC, W3LWV, celebrated their 15th anniversary. A tip of the hat. K3CA spent two weeks visiting 112s, HP1s, YV1s, YV5s and YV6s. The Nittany ARC gave Ham-of-the-Month awards to WA2CVD/3 and K3RBH. WN3IBK, WN3VWJ and WA3UEN all upgraded to Advanced Class while WA3SWA, WA3SWP and WN3SZX advanced to General Class. WN3VVN and WN3WEZ are new Novices in the Pittsburgh area. The WPA CW Net had 31 sessions, 391 QNI and 377 messages handled in Mar. PSHR: WA3SWF 44, W2KAT/3 and WN3VWJ made BPL for the month. Congrats men. WA3HSI and WA3RUO were the operators at W3YI. Traffic: W2KAT/3 544, WA3SWF 451, WA3TTS 204, W3NEM 170, K3CR 159, WN3VWJ 148, W3LOS 74, W3KUN 67, W3YI 62, WN3SZQ 51, WA3IYA 41, WN3VRM 34, WA3FMR 22, K3VOV 21, WN3KUP 16, K3HCT 13, K3SIN 11, W3ATO 10, W3IDO 4, WN3VVN 3.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - Asst. SCM: Harry J. Studer, W9RYU. SEC, W9AES. PAM: WA9LDC. RM: W9NKG. Cook County EC, W9HPG.

Net	Freq.	(GMT) Days	1/c.
ILNN	3720	2215 Dyno	Report
ILN	3690	0300 Dy	281
ILN	3690	0400 Dy	
III PON	3915	2145 Dy	402
II PON	145.5	0200 MWF	10
NCPN	3915	1800 MS	32
NCPN	3915	1300 MS	85
IEN	3940	1400 Su	5

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Top performing 2-meter FM transceiver, outfeatures everything in its class—stands apart as the exceptional dollar value in VHF/FM gear for the radio amateur. Beautifully constructed—compact and conveniently installed, SB-144 has what it takes for rock solid, "through the repeater" contacts. 12 separate crystal positions for both transmitter and receiver allow all-repeater pair off or combo repeater/inter-mobile operation. Three sets of crystals are supplied with frequencies most widely used nationally for repeaters. Extra power too—10 watts output at only 2.5A from 12V car battery. "Hot" double conversion receiver features FET front end for high sensitivity, low cross modulation. Panel meter shows relative power output or receive signal strength. Set is all solid state including an FET and three I-C's. Supplied with quality dynamic mic w/coil cord/plug.

Freq. range: 144-148MHz.

Channels: 12

Power output: 10 watts

Emission: F3

Max. deviation: ±15kHz.

Mod. system: Phase

Osc. freq. range: 6MHz band

Operating voltage/power:

Transmit: 13.8V @ 1.9A approx.

Receive: 13.8V @ 0.35A approx.

Size: 6-11/16"W, 2-3/8"H, 9-1/16"D.

Antenna impedance: 50 ohms

Rec. sensitivity:

0.5 µV for 20 db quieting.

AF output: 1 watt.

Selectivity:

± 12.5 kHz @ 6db.

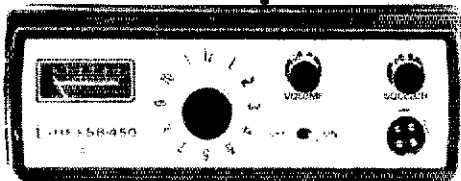
Filter: Ceramic type

Crystals supplied:

34-94, 94-94, 16-76.

Add \$5 for shipping. Extra xtals \$5 each.

SAVE \$100.



SBE SB-450, UHF FM Xcvr, 5 watt, 12vdc, 12 channels w/xtals for 449.5T/444.5R & 446 MHz simplex. Reg. \$399 — Now \$299

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- * Cushcraft, Gam, Hy-Gain, Larsen Antennas
- * Bird Ham-Mate 4352 wattmeter \$79.00
- * If you can't think of anything—Phone us or write for our "Condensed listing of Amateur Radio Equipment".

Standard SAVE \$50



Purchase a Standard CI46A Hand-Held for the regular price with No-Trade, and you may take a \$50.00 Credit toward the purchase of any other new merchandise.

SR-CI46A 2w hand-held, 5 ch. w/xtals for 146.34T/.94R & 146.94 \$289.00

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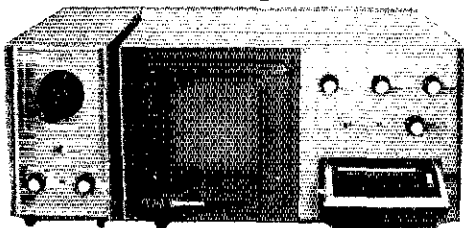
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W9MTT was KD9ITU for World Telecommunications Day. New Extra Class licensees are WB9DFD and WB9NDP. The I.L.N. requests those Chicago area stations who are interested in traffic to please check in. The Lee County repeater was scheduled to go into operation about May 20th. WB9JPS now on RTTY. W9JLF, K9AWG, E9DAG, WB9AMX, WB9FRU, W9JXV, WA9DCZ, WA9NUL, K9PZR, WA9SYU, W9VHU, WA9KHG, WB9EYV, E9VMZ, K9SWR, K9MZZ, WA9TEC, K9CNP, K9RZD, K9UZZ, WB9LJJ, WB9TBX, WB9KFP, W9WES, W9WPG, WA9HIU, W9GIL9, WA9ULO, WB9HGG, WA9OGI, K9FTI, W3FNA/9 and W9AES participated with the Macon County Chapter American National Red Cross on the scene of the tornado which struck Decatur on Apr. 3, 1974. The Moultrie County Hamfest held in Sullivan, Ill. was well attended and many of the traffic gang met with their usual eyeball QSOs. The Jacksonville Annual Hamfest will be held June 30 at the Fairgrounds. The Six Meter Club of Chicago has moved the date and location of their Hamfest. This year it will be at Santa Fe Park, 91st and Wolf Road Rd. in Willow Springs, the date Sun. June 9. WB9GRH now a newly licensed amateur Extra Class. The Bel-Rock Hamfest will be held Sun. Aug. 25 at the Boone County Fairgrounds sponsored by the Rockford Amateur Radio Assn. K9IVB of the Dynascan Corp. gave a program on "Digital Counters and Voltmeters" at the Apr. meeting of the Northwest Amateur Radio Club in Arlington Heights. WB9MOY now an Advanced licensee. This column's sympathy to the family and friends of Herbert S. Hambricht and K9GLF who recently passed away. The Jefferson Junior High School Amateur Radio Club has just purchased a 20-meter Mono-bander Heathkit HW-32A. The Elgin Amateur Radio Society, W9IKN held its Annual Spring Banquet on Mar. 23rd. Traffic: W9NXG 444, K9MWA 366, WB9JPS 136, W9JXV 136, W9OYL 90, K9ZTV 88, W9LNO 66, W9AES 49, WA9LDC 48, W9MTT 48, WB9DED 42, W9MUC 37, WB9KDY 26, WB9JTO 24, WB9LPL 22, WA9ULP 12, WA9LHU 10, WB9FWO 8, W9IFA 8, W9PRN 8, WA9MZS 5, W9RYU 4, W9LDU 1.

INDIANA - SCM, Michael P. Hunter, WA9EFD - SFC; WA9YXA. PAMS: W9HWR, W9PMT. RMs: WB9LHL, W9HKY, WB9KVN, WA9EED.

Area	Freq.	GMT/Days	QNI	QTC	Mgr.
ITN	3910	1330-2300 Dy	2992	432	W9FWH
		2130 M-S			
QIN	3656	0000-0300 Dy			WB9LHL
IPON	3910	1300-2130 Su	209	94	WB9AHD
		2000 S			
IPONCW	3714	2330 Dy			WB9KVN
IPONVHF	50.2	0200 Dy	195	16	WB9AHI
CIPON	50.7	0100 Dy	160	6	WB9LIV
SIPON	50.7	0200 MTh	52	23	WA9ULH
Hubs, VHF			487	23	W9PMT

Congrats to the following: BPLs: WB9IHH, K9EFY. Endorsements: EC: WA9OEQ; ORS: W9VNE; QVS: W9BUQ; OO: W9UC; OPS: W9BUQ; ORS: W9E1, W9EGQ, W9NZZ. Many thanks to the many persons who assisted during the recent outbreak of tornadoes. The cooperation was great but the preparation was not the best. It simply took us too much time to get activated. Once activated, we still did not have a prior, designated plan. It seems a shame that an emergency can pull numerous operators together but we can't get the needed volunteers for leadership positions. We need to have active, prepared ECs in each county. Too many people take the opinion that they don't have the time and/or the capability to be an EC. NONSENSE! Get involved. If your county doesn't have an EC, volunteer! If you want to help, ask! Let's get off our backside and observe the Boy Scout motto, "BE PREPARED." Traffic: WA9EED 311, WB9IHH 288, W9FWH 224, W9QLW 156, WB9EOT 121, E9EY 118, WA9OHX 56, K9UHY 45, WA9BWW 40, WA9OAD 40, K9IU 31, K9RWQ 31, WA9TJS 31, K9PSL 29, W9DKP 28, W9PMT 27, W9UEM 27, K9RPZ 24, WA9ZTY 18, W9BUO 17, W9RTH 15, WB9DIX 14, WB9CAC 12, K9YBM 11, W9ENU 9, W9KWB 8, WA9OKK 8, K9DIY 7, K9JOY 6, W9BDP 5, W9FC 4, W9JGE 4, W9CMT 3.

WISCONSIN - SCM, Roy A. Pedersen, K9FHH - With deep regret I report the following Silent Keys: W9GPV, W9F1B. Our condolences to their families. ORS appointment to WA9OVT/9. W9MFG RM for WIN-E, give him your support fellows. OPS-RM-ORS-BWN-BEN-WSBN- WSSN-WIN endorsed for K9KSA. WNA meeting held at Wausau Mar. 9 Sorry to hear that W9SLF lost his wife, our condolences George. WSBN cert. to WA9AJW, K9ANV. WIN-E cert. endorsed W9MFG. WSBN renewed for W9DXV, WA9GJU, WA9WCZ. BEN endorsed W9DXV, WA9GJU. ORS II to WN9LSS. Don't forget WNA picnic July 14; WIPON July 21. Is everyone getting ready for FD? How about the phone fellows checking into the CW nets, too, 3662 at 7 and 10 PM. Ever hear of the AREC? Do you belong? Inquire about it, we could use more

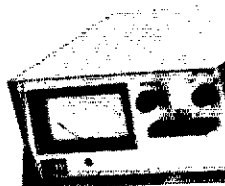
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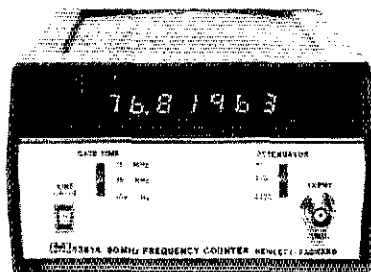
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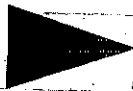
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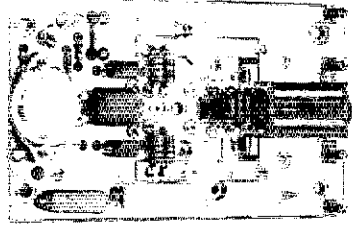


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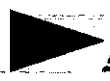
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members. WSNB cert. to WA9ZPC; BEN to W9PD. WSNB cert. renewed K9JPS; BEN to W9AOW. WN9LXK had a ball on the Novice Roundup, had fun on 40 meters working DX, stations as CE6DT, XF2PRS and VE5DW. WSNB cert. renewed for WB9GBG, WB9UKL. WSNB cert. to K9CJM. W9KKK new EC for Winnebago Co. Monitor 3985 kHz in case of severe weather. WSNB cert. to W9BKD. WA9QV1/9 expecting first harmonic in Aug. K9MOI back on 2 meters, though this time it's P.M. Just got word of the passing of K9ODK of Baraboo, our condolences to the family. WN9LSP passed General first try in Chicago. WN9LSP phone patched WB9MFC to VE7ACU who was MFC's first contact on 15 meters. WB9MFC hopes to pass code test in Apr.

Net	Freq.	Time (Z) Days	QNI	Tyc.	Mgr.
BWN	3985	1145 M-S	384	285	WA9QAY
BEN	3985	1700 Dy	785	110	WB9CVB
WIPON	3925	1701 M-F	592	49	WA9NIX
WSNB	3985	2230 Dy	1404	212	E9UTQ
WNN	3725	2230	—	—	WN9KMR
WIN(F)	3662	0000 Dy	309	189	W9UCR
WIN(L)	3662	0300 Dy	152	71	K9LGU
WRN	3660	0130 Su	—	—	K9JSC

Traffic: (Mar.) K9CPM 892, WA9QV1/9 212, W9IND 169, K9FH 145, K9LGU 84, WA9ZLU 83, W9MFG 71, W9AYK 70, K9UTQ 62, WB9ABF 51, WA9PKM 46, W9HWH 43, WB9KPX 43, K9JPS 42, W9UCR 39, W9KRO 37, K9KSA 35, W9CTI 30, WB9CVB 30, WA9QAY 28, W9DXV 26, WN9LSS 25, WB9JGV 16, W9AOW 13, WB9DXK 12, WB9IGA 10, W9ZRD 8, WB9JFH 6, WB9HZA 5. (Feb.) WB9KMO 28. (Jan.) W9GF 14.

DAKOTA DIVISION

MINNESOTA — SCM, Casper H. Schroeder, WA0VAS — Feb. late report. Minn. section phone net (noon sess.), 3945 kHz at 1705Z daily except Sun. & Holidays, meets at 1400Z; Minn. section phone net (evening), 3925 kHz at 2245Z daily; Minn. cw net (MNS high speed), 3685 at 2330Z & 3685 at 0300Z; Minn. Jr. CW net, 3685 at 0000Z; Piconet All Day Watch, 3925 1400 to 2200Z; DTRN 7263 at 1900. Check in whenever possible. Traffic: (Feb.) WA0VAS 1908, WB0HOX 390, WB0FMN 253, WA0RRA 187, WA0VVT 185, K0CSE 182, K0ZRD 121, K0PZJ 96, WA0ONE 74, WB0TFL 69, WA0URW 65, K0RKM 60, WB0CNM 58, WA0VYB 58, K0ZXE 55, WA0GRX 42, K0FLT 41, W0PET 40, WA0VUP 37, WB0FMI 29, K0ZBI 29, W0F0CX 28, WA0MMV 21, WA0CCA 18, WA0YAH 18, WA0IB 16, WB0DBD 15, K0WXH 12, WB0EUB 11, WB0JPR 10, WA0CYM 10, WB0FNK 9, WB0CPC 8, W0IPN 6, W0OPX 6, K0SKO 6, W0PAN 2, WA0IAW 1.

NORTH DAKOTA — SCM, Harold L. Sheets, W0DM — SEC: WA0AYL, OBS: K0PVG/Q, RM: WA0MLE, OO: W0BF, K0PYZ starting another class in amateur radio. WB0HHC has been working in the grade school at Fargo with interested pupils along with his busy net activities. W0DM has hopes of five new Novices at Valley Jr. and a couple of Conditionals. WA0ZCC had a stay at St. Luke's in Fargo. WA0WLP going back to some slow-scan experimenting. Incidentally he is the proud papa of a baby girl. Congrats. WN0FML and XYE WB0FFM are calls reported from Abercrombie way. Welcome. WA0MLE and WA0BMG made the PSHR for the month. We want to commend WA0RWM on her good job of completing the season with the YL WX Net under the most trying propagation conditions in years. Just to remind you of the International Hamfest to be held in early July at the Peace Garden. The Midwestern CANAM Repeater Council held a meeting at Devils Lake in Mar. chaired by VE4QI with WA0CSL acting as temporary secy. with about 20 members of repeater groups attending. W0JWL, K0PVG/Q and VE4QI will serve as the Constitutional Committee.

Net	kHz	CDT/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990	0900 S	5	93	2	W0CDO
PON	3996.5	0900 S	15	316	15	WB0BMG
		1830 S-S				WB0BPS
YL WX	3995	0730 M-F	21	456	470	WA0RWM
PAUCES	3996.5	1730 M-F	42	718	41	WB0ATI
		1830				WA0SUF

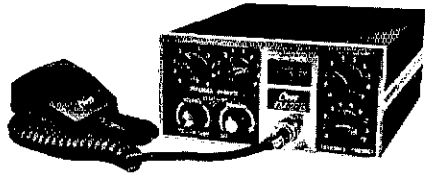
Traffic: WA0RWM 509, WA0MLE 160, W0CDO 96, WA0SUF 39, W0DM 31, W0WWL 25, W0HBR 23, WB0BHI 18, WB0BMG 16, WA0WLP 8, WB0BMH 2.

SOUTH DAKOTA — SCM, Ed Gray, WA0CPX — SEC: WA0RIO, PAM: WA0YAK, RM: WA0TNM, Net Mgrs.: WA0VRE, WA0ZWZ and W0NEO. Congratulations to WA0TNM and W0ZWL on making BPL this month. A special congratulations to WA0ROK who has made BPL three months in a row which entitles Ken to the BPL Medallion. Because of the work of these two fellows and several others SDN CW net has done an outstanding job handling

THIRD CHANCE TO BE TOP HAM

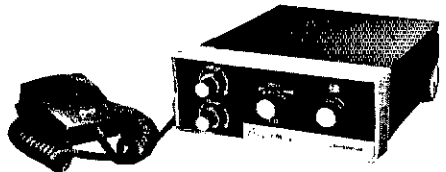
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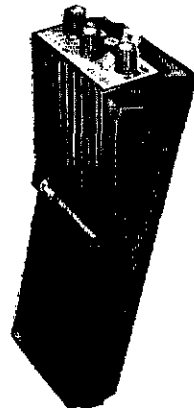
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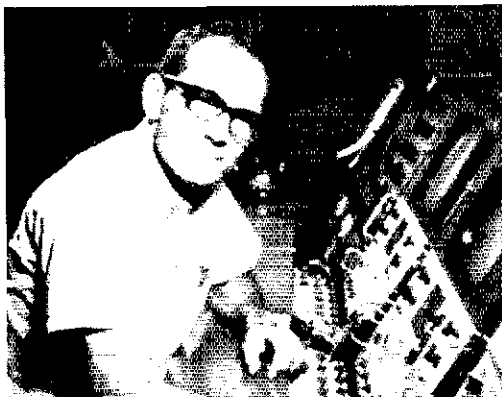
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QT-08

traffic the past few months. Emergency planning is moving ahead in the state with planning taking place between amateur radio and State Civil Defense officials. Net reports: NJQ - 765 check-ins, 57 forums; Early Evening - QNI 940, QTC 36; Late Net - 1517 QNI, 52 QTC; SDN CW - QNI 322, QTC 333. Traffic: WA0TNM 762, WA0ROK 579, W0ZWL 503, W0HOJ 115, W0KJZ 61, W0BDGA 52, WA0VRE 45, WA0FUZ 36, K0GSY 26, WA0KKR 14, W00JV 4, W0WCN 4.

DELTA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, W5SVWH - Feb. late report. RM: W5EUI, PAM: W5FDP. Congratulations to new OPS W5DET, W5TXA has a new Zepp antenna and plans should be under way for a new beam and tower. He will also soon be on 2-meter fm. W5SABF is the first repeater to be licensed under the new FCC 18803 rules in Ark. Located in Texarkana, Ark. the machine is run by W5FDU, who has done a great job with the 22-82 repeater.

Net	Freq.	Time(Z)/Days	Manager
OZK	3765	0000 Dy	W5MYZ
Razorback	3995	2330 Dy	W5FDP
Teague	3995	2230 Dy	
Post Office	3925	2130 M-F	W5OEO
Phone	3937	1100 M-F	W5IOH

Traffic: (Feb.) W5EJ 51, W5MYZ 44, K5OKO 35, W5UAW 33, W5BED 7.

LOUISIANA - SCM, Robert P. Schmidt, W5GHP - Asst. SCM: John R. Suvestre, W5NYY. SEC: K5SVD. RM: W5ZZA. PAM: W5SEKU. VHF PAM: W5KND. It is with deep regret that we report the passing of W5BIN, past member of the Board of the Lafayette ARC. He will be missed. New officers of the Springfield ARC: K5ONK, pres.; K5EJ, vice-pres.; K5WOD, secy-treas.; W5FRG, act. mgr. W5SIHM has moved to Ark. W5JZP active on TEX SS net as well as LSN. W5IZO active on DRN-5 and has new 38-200 on the air. W5IKT appointed pro. chmn. Twin-Cities ARC. W5HGT, club station, has worked through Oscar 6. Twin Cities ARC have 15 in new Novice class. Lafayette ARC starting new General class conducted by W5EXT. The Louisiana Council of Amateur Radio Clubs will present a trophy to the member club with the best field Day score. New Orleans VHF Club has ordered a new Solid State Repeater with Auto Patch. The Jefferson Club has received a new transmitter to replace the one stolen. The club will again hold their Summer Novice class. GNOARC have their new beams installed.

Net	Ritz	Time(CDT)	QTC	QNI	Mgr.
LAN	3615	6:30K 10:00	114	242	W5ZTA
LIN	3910	6:45	58	170	W5SEKU
LSN	3703	8:00 MT	22	43	W5IQUS
LRN	3587.5	8:00 Su			W5GHP

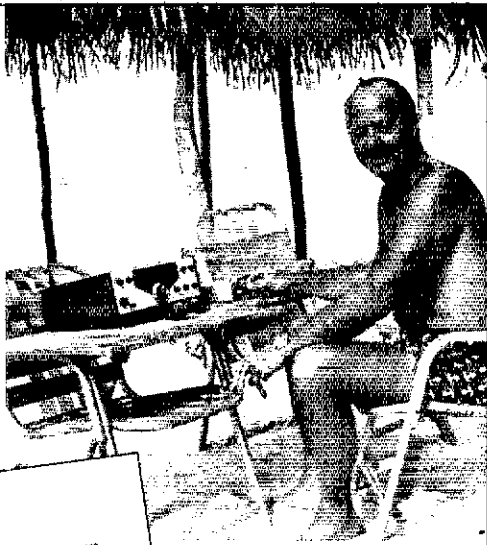
Traffic: W5GHP 246, W5ZZA 186, W5IQUS 88, W5TOA 54, W5SJJZ 43, W5SEKU 32, W5SJO 19, W5ASPI 19, K5BLV 17, K5DZE 7, W5NICK 7, W5HIC 6, W5WBZ 4.

MISSISSIPPI - SCM, Walker J. Catter, W5NCB - SEC: W5EHL. Our SEC worked air module on 2 enroute to Lafayette Hanfest. He says good DX in jet stream. Hattiesburg ARC has equipment installed for repeater on 22.82 awaiting license. K50BL is asst. SEC. W5DPO EC for repeaters. W5GWD lost his 70-ft. tower. Shrimp Net on 52/52 covers Ala., La., and Fla. as well as Miss. along the coast. K5MVP put on slow-scan demo. for MCARA at last club meeting. Repeater frequency for MCARA will be 13773. W5SBIL being used to memorialize the 275th birthday of the Biloxi Colony. Send SASE for QSL. W5BW recuperating from surgery. K5VOK demo VHF-FM for Coast Guard Aux. Squadron. K5AT recently operated MM on coast. W5ARMS finished his Heath super TV set. W5ERS/5 in Air Force MARS. Congrats to W5SJBW onw General Class. Net cert to W5SDF, W5SKAN, W5SIUS, W5NSHYR; ORS II cert to W5SIUS and W5NSHYR. W5SKAN appointed RM for Novice Net. W5DLW had to resign because of work loads. Our sympathy to the family of W5ESC now a Silent Key.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
MTN	3665	2345 Dy	110	98	W5YZW
MNN	3733	2300 MWF	40	25	W5SKAN
GCSBN	3925	2330 Dy	--	--	W5IHS
UGCHN	3935	0100 Dy	1631	239	W5SDVS
MSPON	3970	2345 MS	--	--	W5GVO/S
M5BN	3987.5	2315 Dy	1047	157	W5SHKM
GUSN	146.52	0100 Th	--	--	W5DICY

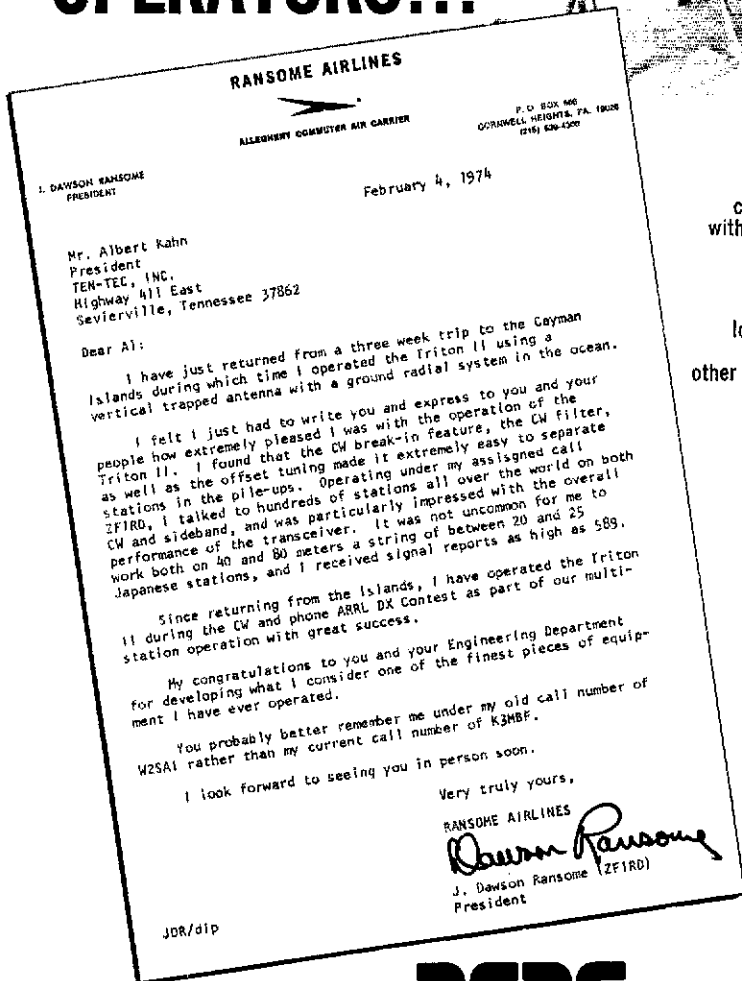
Traffic: W5SDLW 321, W5SBM 128, W5EDT 102, W5YZW 94,

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TENNESSEE - SCM, O.D. Keaton, WA4GLS - SEC: WB4DYJ. PAMS: W4RUW, WA4NEC. RM: WB4NIR.

Net	Freq.	Time/Days	Sess.	QNT	QTC	Mgr.
IPN	3980	1140 M-F	71	3410	157	WA4EWW
		1245 M-F				W4PFP
		0030 M-S				WB4PRF
		1400 SSh				
IPON	3980	0030 Su	4	128	5	WB4BHZ
JN	3635	0000 Dy	31	213	166	WB4DJU
TNN	3707.5	2300 Dy	01	158	00	WA4GAM
E1VHFN	50.4	01000 MWF	12	194	0	W4SG1
E2VHFN	145.2	0000 TTh	8	32	0	WB4DZG
F1TMN	28.7	0200 WF	8	59	0	WB4NEI
M1TMN	28.8	0200 TTh	8	40	0	W4EAY
ACAREC	146.28	0100 T	4	73	1	WB4ZS2
	146.88					

WB4DJU was endorsed as ORS for another term. WA4BMV now net control station for IPN. Because of inactivity OJ K4TWW and OBS WB4YCV appointments have been cancelled. W4ZJY has resigned as RM of TN, WB4NIR appointed in his place. Many thanks Dave for the good job as RM. New officers for Oak Ridge Club are K4TYB/4, pres.; WB4TPX, vice-pres.; WA4CDP/4, secy.-treas.; WB4CRT, tech. chmn.; WB4PJS, pub. chmn. Get out and have a hang-up FD on June 22-23. Tenn. amateurs are doing great job for disaster victims of recent tornados. final report is incomplete. RMRC grants Life Membership to the following: W4LNF, W4EUM, W4KJY, W4BVA, W4SWW, W4FCU, W5UIR. Traffic: W4OGG 240, K4CNY 212, W44ZBC 91, WB4DJU 75, WB4NIR 66, W4ZJY 65, W4PFP 48, W61YY/4 47, W4RUW 44, WB4ANX 43, K4SXD 42, W4CYL 17, WA4BMV 12, WB4PRF 11, W4SG1 9, WB4MPI 6, WB4YPO 5, WA4GLS 4, W4CGK 1.

GREAT LAKES DIVISION

KENTUCKY - SCM, Ted Huddle, W4CID - SEC: WA4GHO. Endorsements: K4FPW as OVS and OBS, W4KJP as OPS, WA4JQS as EC.

Net	QNT	QTC	Net	QNT	QTC
KRN	246	23	KTN	1346	194
MKPN	721	44	EYN	126	124

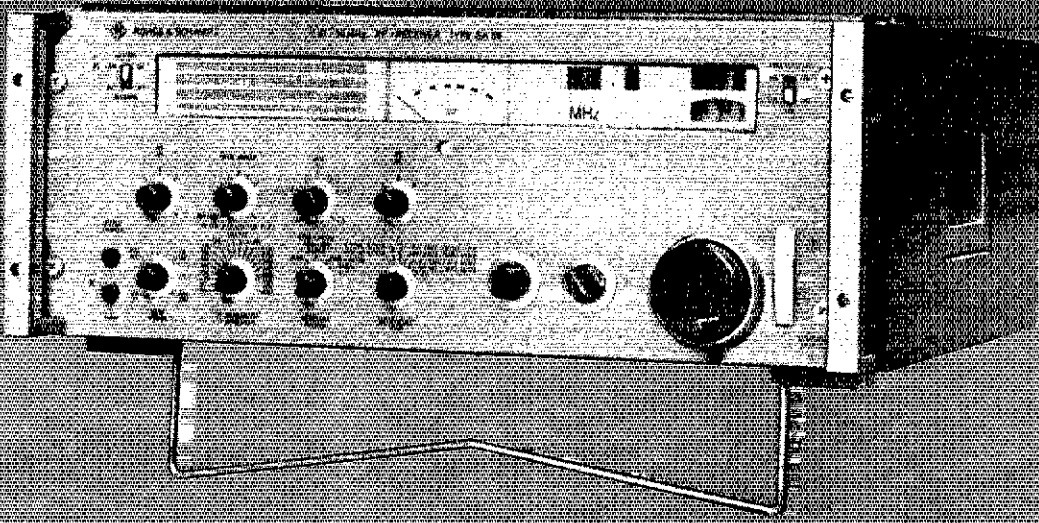
WB4TPU, WB4MAV and WB4YDX are all now on RTTY out of Lexington and looking for schedules. WN4EXO will soon be dropping the N. The No. Ky ARFC recently helped in coordinating a Boy Scout clothing drive. The BG ARC in Lexington now has very sharp blazers and patches for their members. A great idea for hamfests! WA4CTC now erecting a complete new antenna farm. W4CID will also need to do the same. He lost everything in antennas in a recent storm. As this was being written, central Ky. was being struck by severe tornadoes. Amateurs were active in providing emergency communications out of many of the stricken areas. More details next month. Traffic: WA4CKW 156, WB4AUN 99, WB4EOR 81, WB4YOS/4 62, WN4ECB 56, WB4VBG 53, WA4GHO 47, WB4ZMK 46, WB4RLN 42, WA4VZZ 40, W4CID 39, WA4FAU 38, K4UNW 34, W4BAZ 35, WN4EXO 25, WB4WCM 23, W4IQZ 21, K4LOL 14, WA4CPK 12, K4HOE 3, WB4SLI 1.

MICHIGAN - SCM, Ivory J. Olinghouse, W8ZBT - Asst. SCM: A.L. Baker, WRTZZ. SEC: WMPPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC, W8RMI. PAMS: K8GBC, W8NDL. VHF PAMS: K8AEM, W8WVV.

Net	Freq.	Time/Days	QNT	QTC	Sess.	Mgr.
QMN	5663	1200 Dy	1421	632	93	W8JYA
WSBN	3935	2300 Dy	831	132	31	K8GRC
BR/MEN	1930	2130 Dy	1152	164	31	W8NDI
OPEN	3922	2130 Dy	692	40	36	W8BEH
GLEYN	3922	0130 Dy	500	46	27	W8RMI
EGN	3955	1500 Dy	1168	425	31	K8LNE
PCN/CW	3645	2300 M/S	177	21	27	VF3JRO
6M, 6M	50.7	2300 M/S	241	25	24	W8VXC
6M	3720	2130 Dy	348	121	31	W8JAD

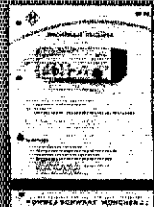
SW Mich. 6M WX Net held 4 drills with 38 QNT, K8ZWR Mgr. SW Mich. 2M Nets 142 QNT, 2 QTC, 9 sessions, W8CVO-W8WVV. 6M SSB Net in 4 sessions had 49 QNT. Wayne Co. AREC 2M Net 28 QNT, 4 QTC, 4 drills, W8BEZ Mgr. Silent Keys: W8MKM, W8SPOY and W8EKL. W8MYU now a General. W8RIU now W8SLIU. W8RRLD new at Sturgis. W8RUC a new Novice in Saginaw area. W8MGB now W8MGB. W8RNDP has new General ticket. W8VHA waiting for Extra ticket. W8DOL now W8RC. CARS is

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planning a Michigan Week again this year May 24-27. W8OW is receiving reports of his call being used on 15 meters, he does not work 15 meters! Officers for Big Rapids Amateur Radio Club are K8YHJ, pres.; W8NRUV, vice-pres.; W8QNE, secy.; John Yax, treas. The Milford Repeater W8AAA is all home brew and on the air with very few bugs. W8ILO has a new Rohn 68-ft. foldover tower. The Great Lakes Div. Convention at Muskegon was very well attended and everyone seemed to be having a good time. New repeater W8ACY at Whitmore Lake is operating. W8YUZ works Oscar. New officers for the Wolverine Side B and Net are K8GBC, mgr.; W8FKA, asst. mgr.; W8QBE, secy.-treas. Jewish Community Center Radio Club will hold its 2nd Annual Swap & Shop June 16 at 18100 Meyers at Curtis. Detroit. The Blossomland ARA Swap & Shop was very well attended, elbow room only. Traffic: (Mar.) W8JTT 353, K8KMO 347, W8WZF 319, W8RJAD 277, W8SPM 210, W8NCD 194, W8NHI 172, W8TZZ 129, K8DYI 123, K8LNF 114, W8ZBT 106, W88PY 104, W8BDKO 103, W8GLC 75, W8MO 66, W8NOH 65, W8UFS 58, W8NDI 57, K8LJS 52, W8LXY 49, K8JED 47, K8CKD 46, W8FKA 46, W8FBG 41, W8DJS 40, W8WVL 40, W8CNW 39, W8GKB 38, W8MJJ 37, W8NYO 37, W8GVS 33, W8BIM 31, W8MWG 30, W8ZUL 30, W8ENW 28, W8YPY 27, K8WRJ 26, W8VIZ 25, W8OW 24, W8HYR 23, W8DCN 22, W8OJI 22, W8IUC 21, W8BEZ 20, W8CUP 19, W8EOI 19, W8LQN 19, W8EU 16, K8AMU 14, K8ACO 13, W8FXR 11, K8HGA 11, W8QZL 11, W8CUP 10, W8DRT 10, K8JDX 10, K8YPN 10, W8TBP 10, W8ACW 9, W8AXI 9, W8FZL 9, K8MJK 9, K8SWW 9, W8BEYM 8, K8GXV 8, W8WVV 8, K8MXC 7, W8JIX 6, K8JLJ/8 4, W8QBE 4, K8SDA 4, W8YIO 4, K8YRD 4, W8BANR 3, W8APN 3, W8HKL 3, W8QOX 3, W8BEEN 2, W8HIB 2, K8ZJU 2. (Feb.) W8NHI 44, K8AEM 6, W8DUI 6, K8ZJU 4.

OHIO - SCM, William E. Clausen, W8IMI - Asst. SCM: Kenneth L. Simpson, W8ETX. SEC: W8COA. RMs: W8WAK, W8KKI. PAMs: K8UBK, W8YLW. VHF PAM: W8ADU.

Net	QNI	QTC	Sexs.	Freq.	Time(Z)	Mgr.
OSBN	2920	1007	83	3972.5	1430/2000/ 2245	K8UBK
BN	572	310	62	3577	2245/0200	W8WAK
O6MtrN	394	77	31	50.16	0100	W8ADU
OSN	287	132	31	3577	2210	W8KKI
BN-RTTY	199	37	31	3605	2200	K8NCV

Hundreds of Ohio hams responded to the critical communications emergency following the worst tornadoes ever to hit the state. OSSBN, BN, O6MtrN and BNR all handled disaster traffic and OSSBN was in session almost continuously for several days. In the Cincinnati area, EC W8DFD reports participation by W8s: PCK, CUU, JIO, JGP, YML, VND, BZN, HOK, CHT, VVL, WJV, MXR, JAS, GEC, QID, SSI, BWI, CRK, HQQ; W4s: SMU, PII, IFX; W8s: RSP, STX, GQQ, ZPS, ZIP, DFD, CFJ, ZPO, JXM, UIO, STV, KZV, PBW, JEN, KHR, COA, FOA, K8s: PMW, DGE, CJY, RXM, JBO, OGO; K4s: DEZ, MEF; W8s: NCS, LTN, MEX, ESB, FXL, HRV, HRU, LNF, AMI, IIZ, AXK, BUT, ALU, PHB, RGZ, JHT, LKC, LTD, KMD, FVL, BKT, HRW, IPQ, IPV, PBV, DLJ, GYW, PBN, IAD, E-K, PAT, HJJ, W8MIV, W84s: QIT, FAT. Cincinnati area repeaters used were W8ABP, W8ACB, W8ACC and the OH-KY-IN repeater, Montgomery/Greene Co. EC W8ILC reports that communications at Xenia were provided by members of the Miami Valley FM Assn., Dayton ARA, Miamisburg Wireless Assn., and WPAFB MARS Repeater W8ACV, W8COK and W8PLZ were used and participants included W8s: KKF, JUK, CUJ, IPT, HIC, JRN, OK, SLY, DPW, BI, WYH, FPZ, DHJ, BWT, RKL, DGG, KAG, NFL, KRV, KRJ; K8s: ZYU, GCS, SNI, URB, YOH, GAK, BLQ, BNC, EMN, GKX, GKI, WGJ; W8s: MCR, DZG, ZWJ, BNV, GZE, DZU, MSC, SED, LUX, VBC, YNV; W8s: KUH, JGX, PKL, GWO, IPK, NPY; W0AVS, W5ZAI, W5ED and W5ZWA. The Western Ohio Repeater Association's W8ABG at Springfield provided a Xenia-Columbus link and many Springfield hams served in Xenia, including W8AJC, W8HYK and W8BMF. Central Ohio I-C W8ERD reports the operation of a field station at Xenia with participation by W8s: BKO, BTW, CRX, ERD, LMI, JMD, KJM, OMY, DII, VMS, ETU; K8s: IKD, MLO, RLS, OVP, KTA; W8s: LUL, LUR, OHI, RUT, YHN, ZTV; W8s: CYS, DEA, GOW, GVI, IBZ, IHW, INY, JGO, JND, JXS, LRL, NEC, NNK, LBC, OSC, CKI, RDY, MWI; W89EBU. The above lists are incomplete because reports were still coming in at the time this was written. Look for a feature article QST soon for the full story. Ham radio served well because years of training and practice paid off. Support your emergency organizations, AREC, RACES, or independents, and the traffic nets so we can do an even better job next time. Traffic: W8SUS 659, W8MCR 581, K8LMF 527, W8AOZA 331, W8PMJ 276, W8KKI 221, W8OCU 220, W8NEZ 211, W8JID 148, W8GVX 125, W8MGA 125, W8YLW 100, W8CUT 96, W8FGD

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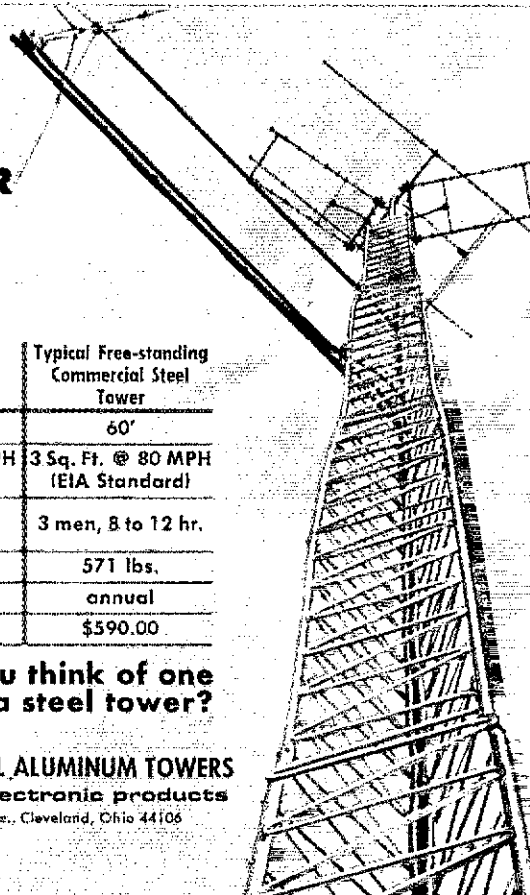
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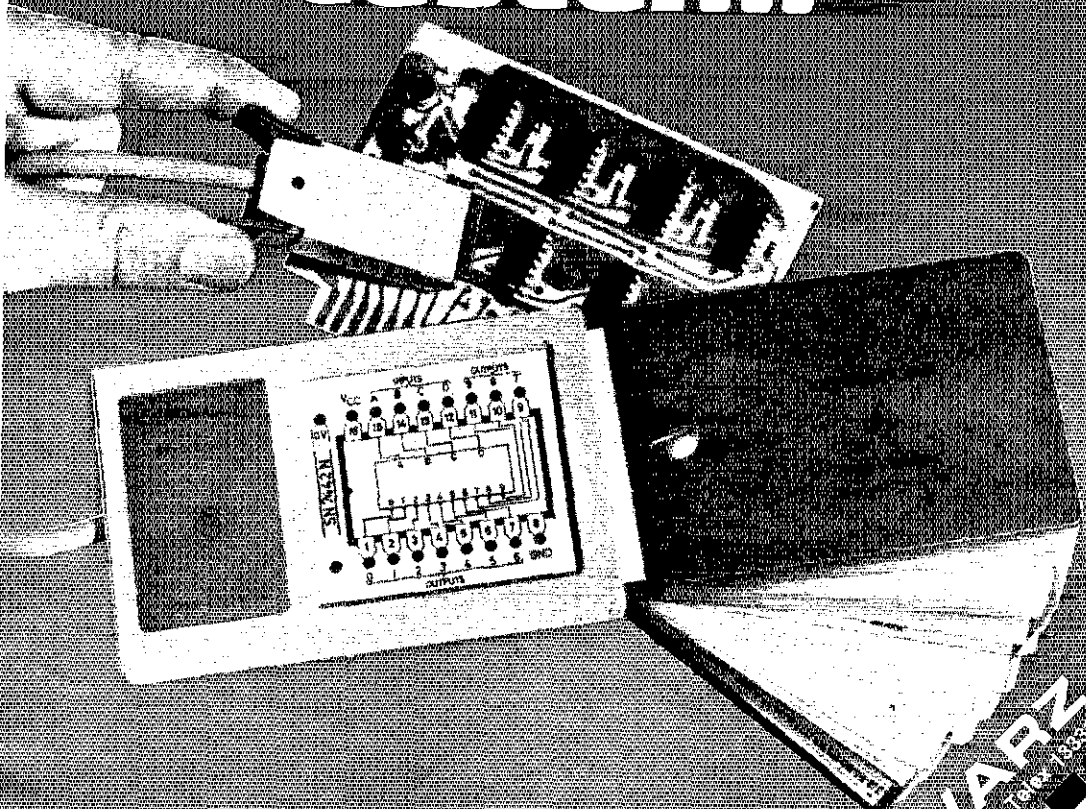


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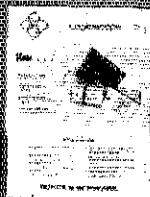
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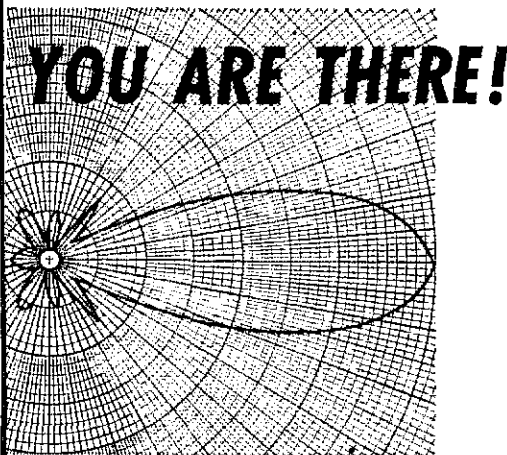
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HUDSON DIVISION

EASTERN NEW YORK — SCM, Graham G. Berry, K28JN — Asst. SCM/IRM: Kenneth Kroth, WB2VJB. RMs: WA2FBI and WB2IXW. RM RTTY: K2DN. Please note new SEC — W2KGC, Bill Stahl, 92 Shirley Ave., Fishkill 12524. He held job for over 15 years in past, makes ideal replacement for W2URP who has had to resign for business and personal reasons. Sorry to lose him, and thanks for job well done in past few years. Section has its first ORS CI II appointee W2RKF, already waiting for new General ticket after Mar. exam. If you worked K82RPI during 150th birthday celebration for RPI in Troy, please QSL with S.A.S.E. to WA2EAL. WB2CUH now holds OBS (RTTY) appointment. Congrats to W2MTA on long service as Net Mgr. NYS and new job as 2RN Mgr., also to WA2PJL on taking over NYS slot. (See last column for net times, frequencies). WA2CNE picked up 1URPM looking for health report on relative, had to return report of death at U/Pa Hospital. New call in Binghamton is WN2RAC — not in ENY, but welcomed as Scoutmaster of Troop 33 BSA who joined his membership on the bands. Another soon-to-be general is WN2RUZ who just joined bands with "N" call. WA2NKN handled 22 pieces of formal traffic via Slow Scan as part of his Mar. BPL qualification. K2RRZ to Extra Class. At Communications Club of New Rochelle, film and tape report from SE Asia and Spratley Is. DXpedition operations. At Schenectady ARA, WB2YLB chairing committee to make annual Broughton Award. SARA heard member W2ODC in Mar. on his Washington trips to FCC re Repeater Rules. Harmonic Hills RL heard WA2BLX in Feb. on Japan activities, held antenna roundtable discussion in Mar. in Albany. AARA members W2GTJ, WB2JLR and W2OOJ/M presented "Amateur Radio in the Community" to members of Albany Monarch Club. Westchester ARA heard W2LH and W2EFG in famed Greenberg demo on antenna design basics. Coming soon — ARRL National in New York City at the Waldorf next month. Reservation information from WA2CCF in NNJ. Capitol area hams and XYs contact WB2VJB re bus transportation down and back. Hope to see many of you at the Convention — 50th Anniversary of Hudson Division founding. Traffic: WA2PJL 303, WB2NKN 202, W2GPH 91, W2URP 85, WB2IXW 75, WB2OBJ 70, WA2RFP 67, WB2IQQ 53, WA2CNE 50, WB2KDC 46, K28JN 45, WB2EAO 42, WB2VVS 42, K2DN 35, WA2BRV 10, WB2LA 9, WB2BWE 8, WN2RKF 5.

NEW YORK CITY-LONG ISLAND — SCM, John H. Snale, WB2CHY — SEC: K2HTX. RM: WB2LZN. PAM: WA2UWA. VHF PAM: WB2ROF.

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NLS*	3730 kHz	1830 Dy	WB2FLF Mgr.
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AJ SVC	3928 kHz	1300 Su	W2OE Mgr.
MIC FARAD	3925 kHz	1300 MTWThFS	W2OE Mgr.
NYSTPEN	3925 kHz	1800 Dy	WA2RSP Mgr.
ESS	3590 kHz	1800 Dy	K2UR Mgr.

*Denotes Section Net; all times local. Have you got your tickets for the National Convention? They are going fast. For those who have forgotten, the dates are July 19, 20 and 21. The place the Waldorf Astoria in NYC. This is your chance to meet the people behind the calls you read about and hear on the air. For more details, please contact either K28JO or WB2CHY. Welcome to WN2TUC, who joins Dad W2TUK and brother WB2UZU. Congratulations to WN2STR and XYL on their new son. Officers for 1974 for Tu-Boro Club are: W2YSM, pres.; K2GHR, vice-pres.; WA2WAK, treas.; WB2FZF, secy. WA2JZX reports members are needed for Babylon Town AREC Net, which meets on 28.610 MHz at 2000 local Mon., for any further info contact him. As I reported in an earlier column, the week of Field Day has been declared in Suffolk Co. At present, plans are also being made for Nassau Co. WB2LZN reports much success on forming a 2-meter FM Traffic Net; look for it in the next few months. WB2EDW putting out an FB signal using a fire escape as an antenna, and also on making BPL. WB2FIG now getting active on 10 meters. Welcome to WN2TLM who also sends thanks to W2JIA for helping him get his license. W2PF reports the 10th annual Amateur Radio Luncheon sponsored by NY chapter of

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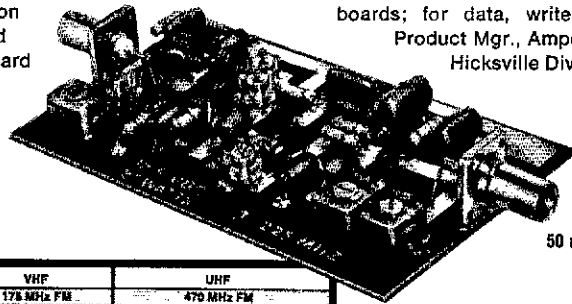
The line is a broad one with an RF power semiconductor to fill virtually any RF amplification need in fixed and mobile transmitting equipment—from 30 MHz single sideband through 960 MHz UHF FM.

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The engineering assistance doesn't end with the applications manual—it only starts there. You won't even have to build the prototypes to get these circuits into production! We will supply sample boards, built for you, here in the Amperex applications laboratory.

Use them to test, to evaluate, to demonstrate your system. Typical of the sample boards now being made available to Amperex customers, is a 25 watt, 225 MHz Amplifier (illustrated at left) with 50 mV input power and 12.5 V operation.

For more information... on the line, the book, the boards; for data, write to Marty Burden, Group Product Mgr., Amperex Electronic Corporation, Hicksville Division, Hicksville, N.Y. 11802. Telephone: (516) 931-6200.



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25 W output, 225 MHz,
50 mV input power, 12.5 V operation

P out (watts)	SSB		VHF		UHF	
	30 MHz	178 MHz FM	178 MHz FM	26 V	470 MHz FM	26 V
	28 V	12.5 V	12.5 V	12.5 V	12.5 V	26 V
2.0					Ampl. Modules	
3.0			2N3653		BLX65	
3.5		2N3624			BLX66	
4.0		6FS22A	6FS22A		BLX67	BLX62
4.0			2N3375			BGY22
7.0		2N3926			BLX68	BGY23
7.0	BLX12	BLY87A	BLY91A			BLX83
12.0		2N3927				
13.0			2N3632			
13.0		BLY88A	BLY92A			BGY24
20.0					BLX69	
25.0		BLY89A	BLY93A			BLX94
40.0						BLX95
60.0	BLX14	GLY80	GLY94			
150.0	BLX15					

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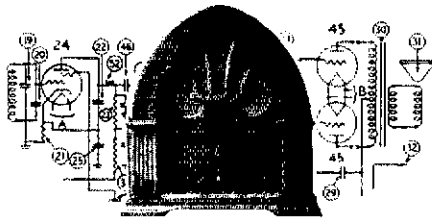


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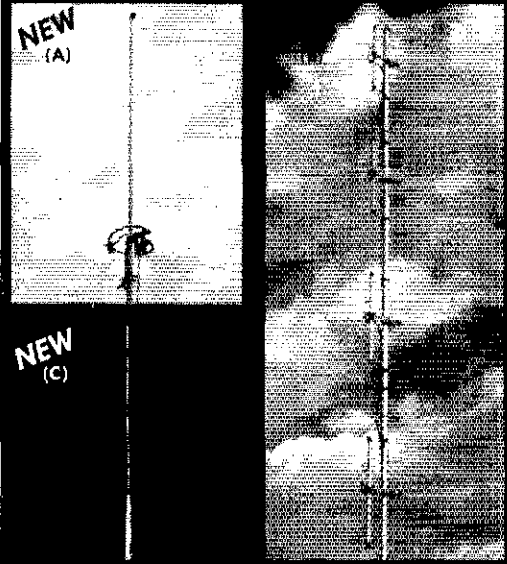
QCWA was a success. Hope everyone is making final preparations for Field Day. This annual function really has a purpose, so try to participate in some way. WB2WFH reports ex-CO6OK is trying to get a Nassau Co. Radio Club going, if you are interested, contact WB2WFH. WA2BRF reports getting active again after fixing problems with his rig. WB2MHT is on 2 meters and reports he is putting up a full size ground plane for 80 meters. Congratulations to new ORS WB2EDW. All members are reminded of the annual NLI section picnic on Sun. Aug. 25; this year the picnic will be for everyone in the section, also NLI will accept challengers from either NJN or ENY for a softball game for the championship of the division and the right for that SCM to keep the Director's trophy. For further details contact WA2CXV. All stations please note new QTH for WB2CHY (remember this is being written in Apr.). If you submitted anything and it's not in here, it's a good possibility that it's still somewhere in the mails and I will try to get it in next month. Traffic: WA2UWA 468, WB2FLF 237, WB2LZN 235, W2EC 202, WB2PVM 184, WB2OYV 168, WB2EDW 162, WB2CHY 70, W2MLC 61, WB2LGA 38, WA2BRF 35, WA2PLI 17, W2EW 16, K2JEE 14, W2DRQ 10, WB2MHT 9, W2PF 8, K2FV 5, WB2FKP 3, K2HK 2, WA2KXE 2, WB2FKI 1, WA2LJS 1.

NORTHERN NEW JERSEY - Acting SCM, William S. Keller, HL WB2RKK. SFC: K2KDO. RMs: W2ZFP, WB2RKK. PAMs: K2KDO, WA2FVH.

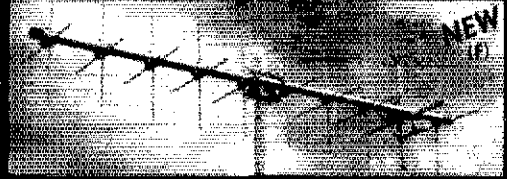
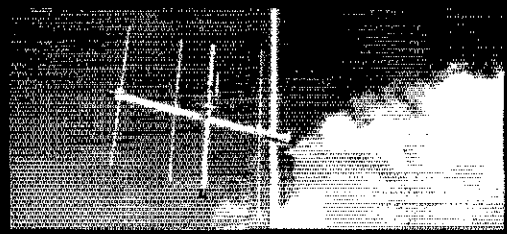
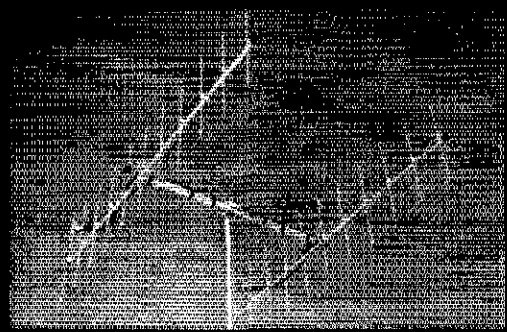
Net	kHz	Time (PM)	Days	Sess.	QNI	Tfc.	Mgr.
NJN	3695	7:00	Dy	31	546	214	WB2RKK
NJN	3695	10:00	Dy	31	253	104	WB2RKK
NJNS	3730	8:15	Dy	31	213	94	WB2RKK
NJPN	3950	6:00	M-S	31	544	159	WA2FVH
NJPON	3930	6:00	Su	5	112	34	WB2FJE

New appointments: WA2BSU as EC for Clifton and vicinity; WB2CFT EC North Plainfield and vicinity; WA2DVE EC Union City; WA2EPI EC South Orange and vicinity; WA2OVE EC North Haledon; WB2PBO EC Cranford and vicinity; WB2RJJ EC Luckerton and vicinity. WA2DOB and WA2EPI as OBSs. WA2DSA and WA2GAX OPSs. WB2AXY, WA2BSU, WA2CWS, WA2DSA, WA2FLW, WA2GAX ORSs. WN2HSG ORS-IL Endorsements: WB2CST, WA2DNU and WA2EXX as ECs; W2CU, WB2JAE, WA2NPP, W2ZEP ORSs; W2CVW, WA2EUO, WA2UOO OPSs; K2YFF OVS. K2KDO looking for someone to do EC duties in Warren, Sussex and Hunterdon counties. WA2DIW became NJSN mgr. on Apr. 1. The best of luck to him and I hope he receives the same good support I did while I was mgr. OO reports received from K2BMI, WB2IEC and W2DYS. WB2EIC has a new "C" line, WA2EXX a three-element quad for two; W2DYS an FT101-B and WA2NPP new teletype equipment. WA2DSA a new 80-meter dipole. WA2MAP now using an HR-2A. W2DED and K2MNO are piling up the DX with new 20-meter beams, while W2LKY works 2-meter mobile FM. NNJ welcomes new Novices WN2UAK, WN2UGI, WN2ULP, WN2ULE, WN2UDJ and WN2UDI, plus General Class WA2SCE, who has been active on the traffic nets. W2DYS participated in the Feb. FMT. WB2RKK, WA2UOO, WB2RJJ, WA2SRQ, WB2VFT, WB2AXY participated in the ARRL DX test. WA2SHT received the CP-35 code proficiency award. Mar. winds visited the antennas of WA2GAX and WB2RKK. K2BHL now doing liaison duties for D2RN and is active in MARS. K2ZFI, WN2TES, WB2KMS, K2EOP, W2IMM, K2AKB, W2NR and W2NKD also busy with MARS. WA2EXX busy with schoolwork and jobs. W2NR has been appointed Radio Officer for Union County RACES. WB2CFT working with local CD on an emergency communications plan for Plainfield. WB2AEH, WA2OVE, WB2HSD and WB2PBO working hard at EC duties. W2CVW reports 5BXCC closer, but still far away. K2EZ participating in RTTY activities. WA2EPI reports the 2-meter NJPN net had 7 sessions, 78 check-ins and 11 messages during Mar. All are invited to join this net which meets on Sun. and Thur. at 10 P.M. on 146.52. WB2HSD of Edison invites anyone who can to check into EPN at 0000Z Thur. on 21.425; EESN at 1500Z Sat. on 21.135; 40 EESN which meets on 7.135 Sat. and Sun. at 0000Z. The Metuchen Radio Club, K2YNT, has a 100-watt rig and an eleven-element beam up 60-ft. for 2 meters and is looking for other stations on 1296 in the area. Traffic: (Mar.) WB2RKK 503, WA2FPI 253, WA2DSA 148, WB2AEH 99, K2OOJ 98, WA2BSU 96, WA2SHT 95, W2ZEP 95, WA2OVE 71, WA2DVE 55, W2SWE 49, WA2ELW 41, WA2UOO 39, K2BHL 37, WA2NPP 32, K2ZFI 31, W2BLM 28, WN2HSG 27, WA2OPY 24, WA2CAK 22, WA2DIW 20, WB2GAV 18, WB2CFT 13, W2CVW 10, WA2CCF 9, WB2RJJ 8, WA2SCE 8, WA2DWB 6, WA2EXX 6, WA2OJU 6, WA2RGV 6, W2NKD 4, WB2ELF 3, WA2SRQ 3, WB2HSD 2, (Feb.) WA2GAX 189, WA2EXX 32, W2CVW 27, K2ZFI 26, W2SWE 23, WA2FVH 17, K2EZ 15, W2ABL 9, WB2KNS 8, K2EOP 6, W2WOJ 2.

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(A)



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(C)



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AR-6	100 watts	50-54 MHz	19.50

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AFM-24D	1000 watts	220-225 MHz	44.50
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AM-147T	146-175 MHz mobile	\$26.95
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(D) **POWER PACK:** A 22 element, high performance, vertically polarized FM array, complete with all hardware, mounting boom, harness and 2 antennas.

A147-22	1000 watts	146-148 MHz	\$56.50
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(E) **4-6-11 ELEMENT YAGI(S):** The standard of comparison in VHF/UHF communications, now cut for 2 meter FM and vertical polarization. 4 & 6 Element models can be tower side mounted.

A147-4	1000 watts	146-148 MHz	\$11.95
A147-11	1000 watts	146-148 MHz	19.95
A220-11	1000 watts	220-225 MHz	17.95
A449-6	1000 watts	440-450 MHz	11.95
A449-11	1000 watts	440-450 MHz	15.95

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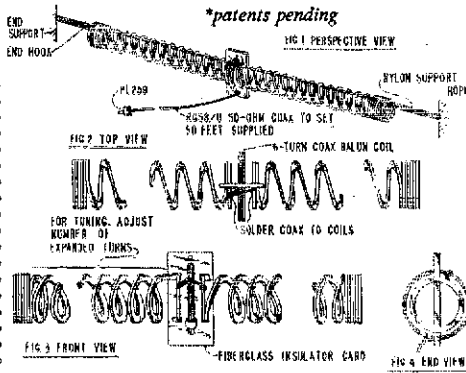


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MIDWEST DIVISION

IOWA — SCM, Al Culbert, KØYVU — SEC, KØOOD. It is with sadness that we have to note the passing of "Uncle Bill", WØCGL for many years the Iowa 160-meter net stalwart. The 3900 Club had a nice meeting at Spencer with 140 in attendance with the SCMs of S. Dak. and Minn. as well as Vice Pres. Compton. The 3900 Club has applied for sponsorship of a Midwest Convention to be held this fall at Sioux City. The Southeast Polk High School Radio Club has received the call WØMCMW. KØJGI is recovering from injuries received in a fall this winter. WØQYWD has a new ST-6 and has been using it at WØKHF. New officers of the Cyclone ARC (I.S.U. at Ames) are WØDGF, pres.; WØKHO, vice-pres.; WØEON, trustee. They planned a special station for VEISHEA in May and applied for a commemorative call. Congratulations to KØSVW and KØHLB on obtaining their Advanced Class license.

Net	QNT	QTC
Iowa 75 meter (noon)	1543	99
Iowa 75 meter (eve)	971	38
Fallicorn (civ)	158	74

Traffic: WØAUX 276, KØDDA 258, KØAZI 208, WØVZG 62, WØLCX 55, WØZVF 48, WØATAQ 32, WØMOO 31, WØJPI 29, WØWSV 19, WØKHF 11, KØYVU 9, KØJGI 2.

KANSAS — SCM, Robert M. Summers, KØBKF — SEC, KØJMF. RM: KØMRI. PAMS: WØGCI, WØBCL. VHF PAM: WØTRO. Our sincere sympathy to the family of our silent Key WØNXJ. Al will be missed by all. WØPB informs us that Lt. Colonel Charles Plumb of Overland Park, recently released Prisoner of War, once held a Novice license and is expected to renew his interest in amateur radio soon. SEC KØJMF working hard on emergency communications. Efforts for Kans. now reporting 15 ECs, 574 AREC members. Congratulations to WØTRO on passing his General, also WØJFI upgraded his license. We had 7 stations reporting totals for the PSHR. Two of those were below the necessary 40 count. Nets: Kans. Emergency, sessions 5, QNT 33, QTC 5. Kans. Weather, session 31, QNT 535, QTC 206. Hambutchers, session 21, QNT 228, QTC 7. Kans. Side Band, session 26, QNT 843, QTC 90. Kans. Phone, session 5, QNT 163, QTC 21. QKS CW, session 62, QNT 497, QTC 353. Traffic: WØOYH 235, WØHBM 211, WØGVR 142, KØMTI 142, WØHI 133, WØFIR 97, WØBGL 82, WØFGV 73, WØCZR 70, WØOF 60, WØNFI 51, WØPB 48, KØYTA 36, KØJMF 31, WØMA 23, WØGCI 20, WØHS 20, KØBCK 15, WØQNC 14, WØCHI 12, WØMCH 12, WØBLI 8, WØFDJ 5, WØOWH 5, WØGSG 3.

MISSOURI — Acting SCM, Ben Moschenross, WØFMD — Asst. SCM: Clifford E. Chamney, KØBIX. New appointments: WØJGD as EC and WØNLI as PAM. Endorsements: WØBV as RM/OVS. WØCGL as ORS and KØONK as OPS/ORS.

Net	QNT	QTC	Net	QNT	QTC
MOSSB	1241	117	MOAREL	62	1
MON	262	176	ISCN	47	18
MON 2	165	65	WEN	31	1
LOPAN	72	0	MPN	27	5
MSN	62	41	ACE	18	6

Congrats to the following new club officers — Center Place ARC: WØHMT, pres.; WØJXH, vice-pres.; WØGGMX, secy.; WØJGX, treas.; WØHHW, comm. mgr. Tri-Lakes ARC: WØLCL, pres.; KØPUE, vice-pres.; WØAUX, secy.-treas. KØAEU and WØJU were elected to the executive council of the HARC. Mid-Mo AREC meeting will be held in Jefferson City on June 9 after the MOSSB picnic. With deep regret I report WØJUR and WØHLY as Silent Keys. St. Louis ARC has new SB-303 and SB-401. WØKMF and KØYTI have new 2-meter fm gear. A new repeater and antenna have been installed at WRØABE. Congrats to WØTDR on reaching 300 in DXCC and KØRWL for 15 wpm code proficiency. WØJOG reports he has a class of 4 Novices anxiously awaiting exam papers. WØVZK is establishing a weather watch for KMMO. The AREC had a good month with 48 drills and 14 nets active. We now have 28 ECs and 230 members. Good luck to all on Field Day. Traffic: (Mar.) KØONK 1231, WØBV 154, KØBIX 151, WØBMD 88, WØUD 65, KØRWL 63, WØLEP 59, WØOTF 58, WØBYNC 55, WØJLMW 34, WØRTW 32, KØPCK 29, WØVYG 24, WØFKY 23, WØCKI 21, WØMFO 19, WØBVI 17, WØFKD 15, WØQAU 12, KØAHL 4, WØQOW 3, WØJOG 2, WØCBL 1. (Feb.) WØCKI 21, WØFKY 9.

NEBRASKA — SCM, V.A. Cashon, KØOAL — Asst. SCM: Velma Sayer, WØGHZ. SEC, KØDFF. Endorsements: WØBPN, WØDMY, WØHOP as OPS; WØDMY as ORS; WØHFF as EC.

Net	Freq.	GMT/Day	QNT	QTC	Mgr.
NEB I-II	3700	0000/0245 Dy	61	3	WØGHZ

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WNN	3950	1300 M-S	353	3	W0NKR
ARCC	3982	1330 Su	212	1	W0RZR
CHN	3980	1730 Dy	1420	52	WA0GH7
SHN	3950	1830 M-S	215	0	W0DJO
NAN	3980	2000 M-F	461	17	WA0AUX
NSN II	3982	2330 Dy	985	36	WA0LOY

Congratulations to WB0JGN and WB0IUU on their General tickets. DXers are reminded to send additional postage to QSL bureau to accommodate postal increase. Keith Co. ARC 2-meter repeater now operational 146.16/146.76 MHz. Lincoln ARC participated in March of Dimes Marathon Apr. 27. Hastings RC officers: WB0IP, pres.; K0MRH, vice-pres.; WN0KYD, secy.-treas. New call for Hastings RC is W0WVY. WA0CBI advised 160-meter net suspended operations for time being. Congrats to W0EGO on recent marriage. ECs should become familiar with activity reporting forms (CD-157). They may be requisitioned from ARRL. Traffic: (Mar.) WA0CBI 63, W0HTA 58, W0EOB 33, W0HOP 29, W0VYX 28, WB0FVS 21, W0VEA 20, W0DMY 19, W0NKR 19, W0GCK 17, W0CSW 13, K0SFA 13, W0GEO 10, WB0HRG 9, WA0YGZ 9, W0MWS 8, K0PTK 8, WA0GHZ 7, WB0GMO 6, WA0OQX 6, WA0HOO 5, W0FOW 4, W0LWS 4, W0NHS 4, K0ODI 4, W0YFR 4, W0LCE 3, WA0PC 3, WA0FFI 2, K0OAI 2, W0RJA 2, W0AFG 1, WB0FYB 1, W0RZR 1, WB0TQ 1. (Feb.) WA0HOO 6, K0SDG 2, W0LCE 1.

NEW ENGLAND DIVISION

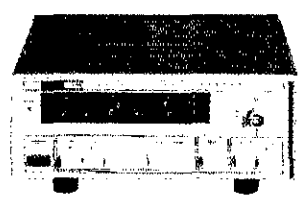
CONNECTICUT - SCM. John McNassar, W1GVT SEC. WIHHR. RM: K1EIR. PAM: K1YGS. VHF PAM: W1SX6.

Net	Freq.	Time/Days	Secs.	QNT	QTC
CN	3640	1900 Dy	62	537	425
		2200			
CPN	3965	1800 M-S	51	684	291
		1000 Su			
VHF 2	28/88	2130 Dy	26	213	62

High QNT: CN - W1CTI, W1AFCM and W1KW. CPN - W1NQO, W1OPB, K1PAD and K1SRF. SEC WIHHR very pleased with progress of the Training Nets. They are very helpful in developing correct F-C practice. Please check with Sully for more information on this. Our Director, W1QV, would appreciate a copy of all Club

Newsletters and Bulletins - an ideal way for clubs to keep members up to date during summer months. The 21st Annual CN/CPN Dinner Meeting arranged by K1EIR and K1YGS was well attended and much enjoyed as usual. Many topics of interest covered and Awards and Certificates were presented. A suggestion by W1GFH resulted in the intention to present the WIMPW Award each year in honor of George White, more on this later. The Nutmeg VHF 2-Meter Traffic Net is going very well on 29/88 FM. Net Mgr., W1OYE extends a warm welcome to all who wish to check in. Field Day time again and most all are looking to another great year! Be sure to check all the rules and check your plans and preparations. Because of the Energy crisis and high cost of gasoline, this may be the year for QRP, low power stations, fewer transmitters and battery powered rigs; take your choice but be sure to join the fun! Congratulations to: W1RYL and W1RZC for Mar. BPI, W1QZH for Advanced Class; W1RXA and W1SHO for General and Advanced Class! Traffic: (Mar.) W1FCM 333, W1RZC 255, W1GFH 245, W1RYL 222, W1PHI 173, W1CTI 140, W1RFR 139, W1KVI 133, W1EWF 117, W1NYU 88, K1YGS 58, W1KW 56, W1RUA 51, W1PHF 50, K1SRF 47, W1GVT 45, W1RXA 44, W1AW 43, W1SHO 41, W1JCN 37, W1SQB 36, W1PPD 29, W1NLD 21, W1OPB 21, W1QMI 21, W1DGL 20, W1RBO 18, W1CUI 16, W1IKN 14, W1QV 14, W1QZH 13, W1JGA 12, W1KAM 9, W1LXV 9, W1RZR 9, W1BDI 4. (Feb.) W1RFR 244, W1EWF 168, W1MBK 2.

EASTERN MASSACHUSETTS - SCM. Frank L. Baker, W1ALP - SEC W1AOG home from Fla. We are on a campaign for new ECs, what say fellows any volunteers. Silent Keys are W1HI and W1NYO his son is K1KWA. W1PEX made BPL and is on 2-meter fm. K1ZZY getting married. K1LLE and K1ZIN are getting married. W1MRJ has Advance ticket. K1JJJ new tower. W1PNG designing logic for Massasoit ARA repeater. W1PLK will soon have R1TY. T9 Club met at W1SX's QTH; new officers: W1IB, pres.; W1WNK, vice-pres.; W1SX, treas.; W1MNK, secy. W1BJZ has Advance ticket. W1TRY operating at school as W1RMA. W1OOF spoke at the South Shore Club on "Printed Circuits." W1BWH on 75. W1AAC has new call in Fla., K4YA. K6PM ex-W1DIX works the gang back here on 20. W1OOV still the secy. of QRA. Greater Lawrence Regional ARC has call W1SYJ in Andover. W1SYC is a YL in Danvers. WB2BLT son of ex-W1HHU is on 75 in the morning.



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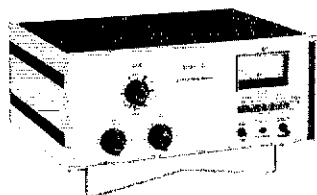
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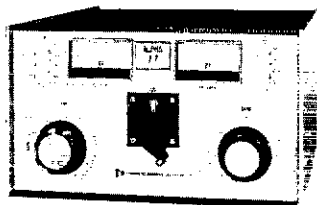
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Framingham RC had a good auction. K1PNB sending code practice on 3720 M,W,F at 6 PM to 6:30 at 7-10-13 wpm; the New England Novice Net is on at 6:30 PM. WA1PGY is Asst. Mgr. for DLRN. W1PL has 2-meter fm in car. WN1RNE has DX-60B, Drake R-4, new HR-10B. K1OOU on way home from Fla. K1EPL has TA33 beam. Our sympathy to K1GNW on the death of his father K6TO, ex-W1BSD. WA1EAC moved to Japan. Welcome to W6FZJ1 in Chelmsford, a well known VHFer. WA1KI teaching ham radio to handicap children at local hospital, would like donations of books, code oscillator etc., nice work Bill. New appointments: W1EC EC for Duxbury; WA1JK EC for Medford; WN1SQW is asst. EC; WA1IGL OBS; WA1RCP ORS; W6FZJ1 OVS. Endorsements: WIDBY EC; W1ANB OBS; WA1RY/RMA, WIEMG ORSs. WA1KDL is pres. of the Holy Cross College ARC. W1AEC has application in for a repeater. W1EC on 80 and 40 cw. WA1CTR has a linear. W1FDP new EC for Cambridge, also RO. K4VH, ex-W1GM says he is putting up a vertical trapped antenna, 10 through 80 and wants to hear the gang. Capeway RC met at K1NDA's. WRIACO on at K1VTE's QTH. WN1RXA is NCS on Fri. for the New England Novice Net. Massasoit ARA had "Miniature Auction" at its meeting. K1HHN spoke about VFO's 2-meter fm, at the Norwood ARC. Chelmsford ARA had a talk by Mr. Connell on insurance on ham equipment.

Net	Freq.	Time/Days	QNT	QTC	Mgr.
NEEPN	1945	0830 Su	137	15	K1EPL
LM2MN	145.8	2000 M-F	121	72	W1AEC
EMRI	3660	1900/2200 Dy	395	283	WA1MSK
NENN	3720	1830 M-W-F	44	29	K1PNB
M PON	50.63	2000 Dy	195	61	WA1HL
HRUN	146.04	2230 Dy	210	136	WA1MYA

WA1QAA, WA1SDZ have General ticket. WN1MRR showed slides at the Framingham RC on trip to ARRI and Field Day events. WIDMS and W1AIP visited Barnstable RC meeting. Traffic: (Mar.) WIPEX 598, WA1MSK 350, W1QYY 214, WA1IGL 100, W1EIH 95, W1CE 92, WA1ROG 87, WA1OWG 70, K1PNB 66, W1EMG 59, W1ABC 43, WA1PGY 33, WA1OAO 31, WA1IFE 30, W1AEO 21, WA1PAZ 20, WN1RFD 16, W1PL 11, WN1RNE 9, K1EPL 8, K1LCO 5, W1ATX 4, WA1HGG 2. (Feb.) WA1MXV 94.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX - SEC: K1RSC. RM: W1UBG. PAM: K1YSD. Your new EC for Merrimack Co. is W1JB. Endorsements: WA1QGA as OPS and EC. Welcome to new hams WN1SXN, WN1SZE, WA1SZO, WN1TAP, WN1TAW, WN1SZZ, WN1SZZ and WA1TCY. The NHTVN report by W1UBG shows 92 traffic, 91 check-ins in 24 sessions. WA1JSD now active in the Intruder Watch plus OO duties. K1ACL is checking into the NHTVN regularly. K1WKS is selling his extra equipment to buy 2-meter fm gear. WA1QOW and XYL are honeymooning in Bermuda after being married by W1LLM. K1RCS and W1DSJ attended the ceremony. W1SWX met ARRL pres. W2TUK briefly at New York's Laguardia Airport. Both of us were rushing to catch planes. W1UBG lost his trap vertical in the last ice storm and now has a new 14AVQ. PAM K1YSD reports 100 check-ins and 9 traffic for the NHEPN. News items are scarce this month. Traffic: K1BCS 343, W1UBG 95, K1POV 75, K1ACL 24, K1YSD 14, K1WKS 5.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLF. PAM: K1GUP. RM: W1BJG. K1PWG, Clayton Lake, visited Mass. for a few days. W1CTR participation in the Feb. QCWA contest enabled him to receive the wooden nickle awarded some of the contestants. WIEM has had great difficulty acclimating to the cold spring after his Caribbean cruise. Sorry to report the passing of WA1CFH. W1FMI is still looking at plenty of snow and ice in Moosehead. Northeast Area Barnyard Net reports 26 sessions, 800 check-ins, 2 traffic for Mar. K1GUP has his antenna up at 40-ft. and doing better than ever. Our PAM is looking for volunteers for NCS and also alternate. New hams in Maine are WN1SXT, WN1TAX, WN1TAV, WA1SXX, WN1SZN, WA1SYF, WN1TDA, WN1TCO. Congratulations, fellows. K1TEV now has the Kenwood Twins, and working out well. The Sanford repeater 13/73 is looking for support so we can keep the machine going, any donations will be welcome. Please send donations to W1WAS, or K1MTJ. W1HHO. Your support will surely be appreciated, let your conscience be your guide. WA3MTV now W1SUJ now in the Portland area. The State of Maine Seagull Net reports 989 check-ins, 57 traffic, 26 sessions, check-in per session 38, traffic per session 2, average net time 64 minutes. K1EUV now on with a new FT-101B. WA1GAA is finally on 2-meter fm after a long absence. Traffic: K1GUP 50, WA1JHT 35, W1CTR 8, K1TEV 4, W1OTO 1.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - Feb. late report. The Newport County RC recently elected W1POL, pres. W1GHH, vice-pres.; WA1OSL, treat.; W1NEC, corr. secy.; Eric

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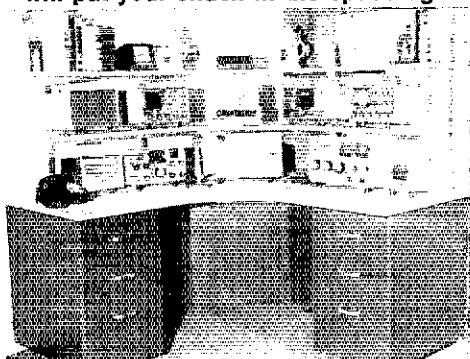
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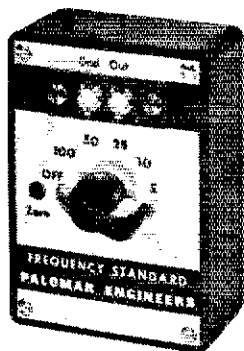
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Spiro, rec. secy. In the future WIGO will demonstrate a black box that will convert audio morse code to a video alpha-numeric display to the members. The Providence Radio Assn. elected WA1PJD, pres.; WN1RLN, vice-pres.; W1KKE, treas.; WA1OOG, secy.; K1HZN, W1EYH and Tony Muto, dir. The Univ. of RIRC recently held an organizational meeting and plan to meet each Thur. at 7:00 PM in the radio room at Lippitt Hall. Members joining are WB2ZPS, WA1OZD, HC2EPL, W1LUJ, K1KVV, WA1RFT, WA1SPT, WA1PJC, K2VXO, WA1FOG and Tom Hone. The club recently renewed its affiliation with ARRL. New Novices in RI W1N1S 5TW, STC and SUB. New Techs: WA1STA and WA1STJ. RISN report for Jan. QNI 89, QTC 34, sessions 15. (Feb.) QNI 102, QTC 44, sessions 18. Traffic: (Feb.) WA1POJ 520, WA1RFT 16. (Jan.) WA1POJ 246, WA1OOG 15, WA1RFT 14.

VFRMONT — SCM, James H. Viele, W1BRG — Sec: W1VSA.

Net	Freq.	Time/24 Days	QNI	QTC	Mgr.
VTSB	3909	2200 M-S	724	133	WA1HGL
		1130 Su			
VTPD	3909	2200 Su	127	29	K1BQB
Carrier	3935	1300 M-S	398	8	W2DSK
Green Mt.	3932	2130 M-S	384	32	W1LLZ
Vt. Phone	3932	1230 Su	95	6	W1KKM

Welcome new amateurs WN1SZL, WN1TBO, WN1TBV, WN1TBX, WN1TCB, WN1TCI and WN1TCZ. K1CUJ has new HW202 and active on 2 meters. Vt. Nets Get Together meets at Eureka Barn in Springfield on June 23. BARC International Field Day at Charlotte Aug. 11. Montreal ARC Field Day Aug. 4. More details on these later. Congrats and best wishes to W1GZH and Ellie, W1ZYZ's widow, married Apr. 20. Traffic: K1BQB 133.

WESTERN MASSACHUSETTS — SCM, Percy C. Noble, W1BVR — SEC: WA1DNB. CW RM: W1DWV. 75-Meter PAM: WA1ITL. UHF/VHF PAM: W1KZS. WA1DNB reports WMEN (Sun. 8:30 AM on 3935) held 5 sessions with good attendance on all. W1AUW and WA1OUZ are new asst. EC's in Worcester Co. W1DWV reports WMN (daily 7:00 PM 3562) held 31 sessions and handled 133 messages. WA1ITL reports WMPN (Mon-Fri 3935 4:30 PM) had QNI of 327 and handled 67 messages with a total of 14 WM stations checking in. WA1ITL has designed, and had printed, very fine WMPN membership certificates. Congrats. WM AREC2-meter net held 21 sessions and handled 22 messages with a total of 22 stations reporting in. CMARA reports with sadness the passing of K1KCR. The club is conducting code and theory classes at Forest-Grove Junior High School. HCRA reports code and theory classes are being conducted Tue. evenings in Room 202, Bldg. 15, at STCC. Mt. Tom ARA says new members are K1IOA, WA1HJ, WA1DOI, WA1GOE, WB4JFS/1, K1MRF, WA1NXG, K1OPN, W1QWS, K1ZKH, WA1GXY. Fifteen members assisted in Holyoke during the St. Patrick's Day Parade. The club now has auto-patch repeater WR1ACP. NOBARC reports K1RQF has 12 people taking his code and theory class. (That makes 3 clubs doing that, FB). The Voice of Lincoln says that during the year the club assisted the Easthampton Rivants, U. of M. Security, Belchertown State School, and chapters of the Audubon Society. Traffic: W1DWV 117, W1TM 113, W1BVR 110, WA1LNF 82, WA1MJE 32, K1RQG 23, W1H1 21, WA1DNB 13, WA1FBE 11, W1ZPB 10.

NORTHWESTERN DIVISION

ALASKA — SCM, Roy Davie, K17CUC — Thanks to all who participated in the 1000 mile sled dog race between Anchorage and Nome. This was great public service, more will appear later when all data is in. The Snipers Net reports 28 days of operation with 364 check-ins with an average of 13 check-ins per night, 36 phone patches and traffic total of 21. EC K17JDO, Kodiak planned exercise in Apr. Alaska may sponsor a 75-meter contest. Bad band conditions are giving the two cw nets trouble. K17DG reports a new Novice W17HOJ. K17FSE still working on a 2-meter transverter for Oscar work. K17GCH reports ice finally going out of the bay and it is time for more antenna work. EC K17HAB working on emergency plans for the ARPC. K17EWQ anxiously awaiting a license for his repeater which will give good coverage north toward Fairbanks. He advises there are hopes that between Fairbanks and Anchorage a continuous 2-meter link can be established. The Anchorage Club held a Flea Market. Traffic: (Mar.) K17CUC 97, K8VWM/K17 89, K17GCH 18, K17HDX 16, K17JDO 15, K17HER 1, (Feb.) K17HER 3.

IDAHO — SCM, Dale A. Brock, WA7EWV —

Net	Freq.	Time/Days	Sess.	QNI	QTC	Mgr.
FARM	3.935	0200 Dy	28	1118	19	WA7ROT
IM	3.582	0130 M-F	20	97	43	W7GHT

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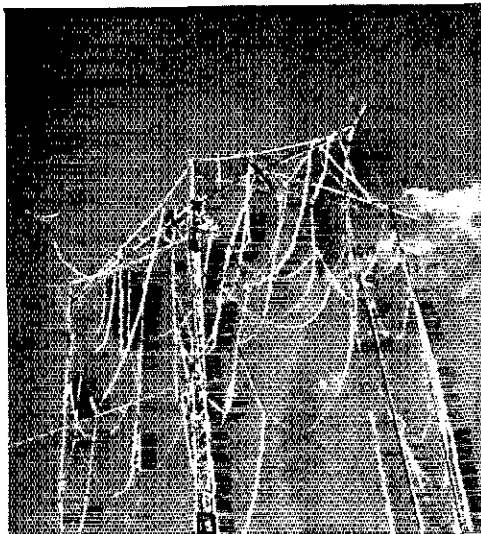
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WA7CTS has passed the General Class exam. WA7SI, OYS/PAM reports hearing W6s on 2 and 6 meters. WA7EWV attended the monthly meeting of the Boise Chapter of Idaho Society of Radio Amateurs. The Boise group is setting up a 34/94 monitor system to cover from the Ore. border to Twin Falls. Boise station KAID is planning a 1 1/2 hour report on Amateur Radio. W7FHQ and WA7JFC are new ORSs in New Meadows. Traffic: W7AXL 142, W7GHT 136, W7FIS 31, K7NHV 26.

MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM; Bertha A. Roylance, K7CHA. SEC: WA7IZR. PAM: WA7IZR. WA7OBH has his beam up in Hardin and K7MNZ is getting his station set up in Big Timber. K7IQC is active with the PON. Helgate Radio Club will meet at W7MIZ OTH in Hamilton in June. W7NEG turned in a good traffic count and states that this is his first time in handling traffic. WA7PZO is the Butte Radio Club chmn. of the WIMU Hamfest. Anyone else interested? WA7MKY was reappointed EC; WA7MUU as OBS; WA7OBH as OPS; WA7NWP as OPS and EC; and WNTYSB was appointed as ORS. MTN had 951 check-ins, 65 formal traffic and 21 sessions. IMN had 20 sessions, 43 traffic and 97 check-ins. Traffic: WA7IZR 71, W7NEG 47, WA7PZO 14, WA7KMP 12, WA7KHM 5, WA7OBH 2.

OREGON - SCM, L. Ray Perkins, WA7KIU - SEC: W7HLF. PAM: K7RQZ. RM: K7GGQ.

Net	Freq.	Time(Z)	QNT	QTC	Sess.	Mgr.
OSN	3.585	0145	147	83	31	K7OUF
BSN	3.908	1900/0930	1085	143	62	WA7NWW
ARLC	3.9935	0200	288	6	31	WA7RWM
PDXAREC	146.		189	4	20	WA7EUO
SOAREC	146.76	0230				

Several of you have commented on the above format used by W7OGP, SCM Wash. section. Hope you like it. Several activities coming up this summer, BSN picnic, OEN picnic, etc. As you read this I hope you are about ready for Field Day, if not, better get busy. Mar. was a busy month, visits to OSU/ARC in Corvallis, Rogue Valley ARC in Medford, So. Ore. RC in Grants Pass while W7PGY and K7WWR were visiting PARC in Portland. Reports from around the section indicate propagation back to normal so lets QNI more of the section nets. Try OSN (cw) at 13 wpm and help get a message delivered a day earlier. Congratulations to WA7TDZ for outstanding score in Novice Roundup. With the proliferation of repeaters and low power gear on the market 2-meter fm seems to be the most certain way to get mobile or emergency contact this summer. Ingredients are transceiver, crystals, and brand new Repeater Directory fresh off the press and available from Hq. F.D, June 22 and 23, see y'all. Traffic: K7OFG 166, K7NTS 153, W7ZB 132, K7OUF 130, W7HKE 101, W7DAN 65, WA7NWW 62, W7IWN 36, WA7KIU 36, K7WWR 22, W7LT 11, WA7TXV 9, WA7EUO 5, W7MLJ 3, WA7GCE 1.

WASHINGTON - SCM, Mary E. Lewis, W7OGP - SEC: W7IEU. RM: W7JWJ. PAMs: W7PWP, K7OUV. VHF PAMs: K7BBO, K7LRD.

Net	Freq.	Time	QNT	QTC	Sess.	Mgr.
NWSSB	3945	1900	716	103	31	K7OVC
WSN	3590	1845	302	116	31	K7OZA
NTN	3970	1130	1489	83	31	W7PWP
NSN	3700	0200	383	141	31	WA7OCV
WARTS	3970	1800	2194	209	31	W7QGP

W7IEU reports 160 meters proving to be of great value for overnight communications for AREC activities. AREC net Sun. 10:00 AM 3930 open meeting. WNTVMS upgraded to WA7VMS. W7PI reports RN7 back on 0230Z and 0430 sked also 20 meters very unstable. W7JFR operating FT-101B. Spokane Dial Twisters QSO party issued 50 awards for one week end. Do you have a spare call letter license plate from Wa.? A disabled Vietnam Vet is collecting same and will pay shipping. Contact me for name. Reports of intrusion on amateur bands is at an all time high mostly phone in cw bands. OOS do you have need of report forms and coop report forms. K7GGD almost completed planting 100 fruit and nut trees, next is dahalias. WA7FVT will be issuing Wash. Satellite awards for contacts after 3/1/74 via Oscar 6. Contact Tim for details. Attendance at annual dinners and hamfest almost up to last year. K3MNT/7 new in Puyallup from Easter Pa via oil co. to do research for fuel from coal. Traffic: W7PI 178, WA7OCV 127, W7BO 99, W7FQE 93, K7CTF 84, K7OZA 81, WA7BDD 74, K7OXL 71, W7APS 54, W7HHU 53, W7PWP 39, W7JFR 32, K7AJT 27, WA7RCR 24, WA7KNW 23, WA7YCK 21, W7BUN 20, WA7UCQ 19, W7IEU 18, W7AXT 16, W7LG 12, WA7GVB 4, K7VNI 1.

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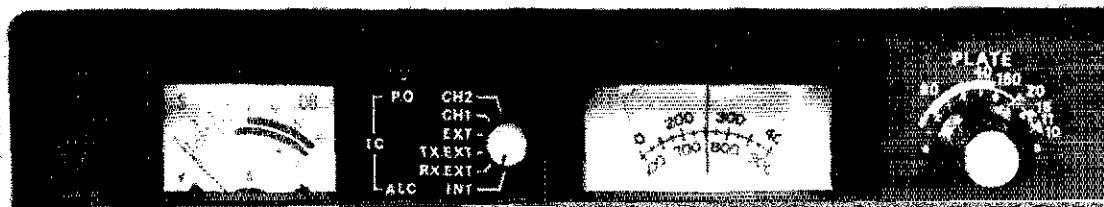
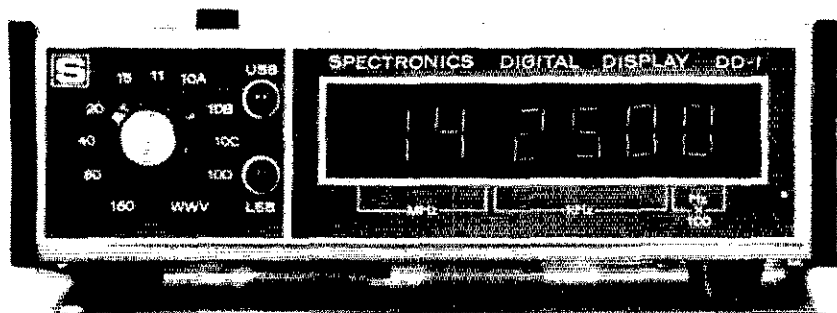
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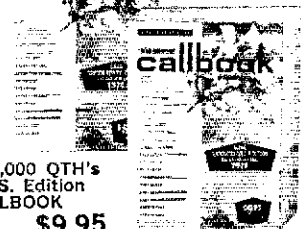


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PACIFIC DIVISION

EAST BAY - SCM, Charles R. Breeding, K61WR - Asst. SCM, Ronald G. Martin, W6ZF. SEC: WB6RPK, Asst. SEC: WB6DSL. NE OPS is WA61PL. New EC for Southern Solano Co. K6OKK. Congratulations to both and good luck. The Grizzly Peak VHF Radio Club did a fine job in providing communications at the Marin of Dimes, Walk-a-Thon in Alameda. The Alameda Co. ARRL RACES holds their meetings on the 1st Mon. of the month at the County Civil Defense Training Center in San Leandro. Those who would like further information should contact WB6NMZ - 865-5042. W6ZF transmitting West Coast Bulletin on 3540, the 1st and 3rd Mon. of the month, 9 PM PDT at 22 wpm. W6CBF returned from a trip to the Caribbean. His monthly report was sent from Trinidad. WA61PI has been doing a real FB job on traffic from DR6, Mission Trail and Western Public Service Nets. K6BYO now finds much more time for VHF and UHF activity since his retirement. W61ZU has a new in. up. Congratulations. W6G working on a new tone-burst oscillator and 450 control gear. The San Leandro Radio Club holds meetings on the 1st and 3rd Tue. in the basement of the San Leandro City Hall. All are welcome. The Sat. morning breakfast meeting of the Silverado AR Society was a great success. WA6YCT is hard at work on a new 40-meter vertically phased antenna system. A. Prose Walker of FCC will be the main speaker at the Pacific Division Convention to be held in San Mateo on Oct. 26 and 27. Traffic: W61PW 477, W6JKX 79, WA61PI 6, W66VEW 45, W6ZF 5, K61WR 4.

HAWAII - SCM, J.P. Corrigan, KH6GOW - Several KH6s were active in the WPX Contest with KH6RS again surging to the lead. A little head-to-head competition between KH6GMP and KH6GCU produced very close results. KH6IAC hosted D10FX in Mar. Woody says it was great to help contact DL9PI for him to have hour-long QSO home. Woody also says someone got to his coas recent KH6BZF reports V64SK, V64RP, K6IHU and W9YFW with Y were recent visitors. Also, W6FB/W70X, ex-KA2DX, TA3GVU and many others. KH6GRU reports transatlantic propagation is back this spring with F8DR worked on 50 MHz by KH6EOI and KH6GRU. For more, see Bert's report in VHF Column. K4FR ex-K6HRM now avidly pursuing SSTV. Gary still maintaining weekly skeys with KH6. KH6RZF says K2UYH was heard via FM for two days in Mar. Official Bulletins will soon be heard on meters, hopefully, through good offices of OBS KH6AGS. Under the guidance of KG6JCP (FC4LIAM), KG6 is building up a venture ARRL group to respond to situations in W. Pacific. Better looking forward to expanding and increasing activity. This is volume column, so don't forget to send your news by the first of the month. Traffic: KH6BZF 33.

NEVADA - SCM, Harold P. Leary, K7ZOK - SEC: WA7BE - A welcome back to Nev. W7AAF and WA7UBQ, husband and wife team recently appointed as ORSs. W7VII is retired from railroad. Co-workers gave him a Ham clock as retirement gift. VHFer K7IO has received WAS certificate for 160 meters. FB. W7OK has worked all State Capitols and states (harder than worked all countries). K7YUJ has new Japanese rig working FB. WA7MVY has new frequency counter. WA7MRS has WAS on 20 meters. Code class are conducted at Eldorado High after school on Tue. & Thur. WA7IPZ. Another retirement! W7CV after 35 years with City of Boulder City. His new QTH has GOOD receiving conditions with UG service. He is active on 40 cw. The Las Vegas Amateur Radio Club held a picnic and swap meet on Sun. Mar. 31 with good attendance. The local 2-meter FM repeater is back on the air with solid state receiver. Traffic: W7ILX 8.

SACRAMENTO VALLEY - SCM, Norman A. Wilson, WA6J - SEC: W6SMU. New officers for the North Hills Radio Club are WB6RDA, pres.; WB6FDR, vice-pres.; W6BWZ, treas.; WA6P secretary. W6KYA hosted a well attended organizational meeting of new Sacramento area DX group. It may never have a constitution dues, but enthusiasm indicates that the DXers will flock together once a month. Anyone interested contact W6KYA or WANJL. Up Keddling, on Mar. 31. WA6QJA organized a ham breakfast with attendance. How about a club up there? The Glenn County RACES with K6BIO as RO held a reorganization meeting. Willows. WA6GWH's RYL received the call WN6DCO. Congrats. K6KWN returns to local activity after wintering in the South. A set of discs and tractor reduced WA6JVD's radial system to 6 in chunks. W6NIU presented a talk on ARRL organization to North Hills RC and W6HDO gave a presentation on "Microw Communications" to the GFARS. K6YZU renewed as an ORS a month and is trying to stimulate traffic activity up North. We need active Northern Calif. Net participation in the Sacramento area. Traffic: K6KWN 77, WB6MDD 6, K6YZU 6, WA6GWH 3.

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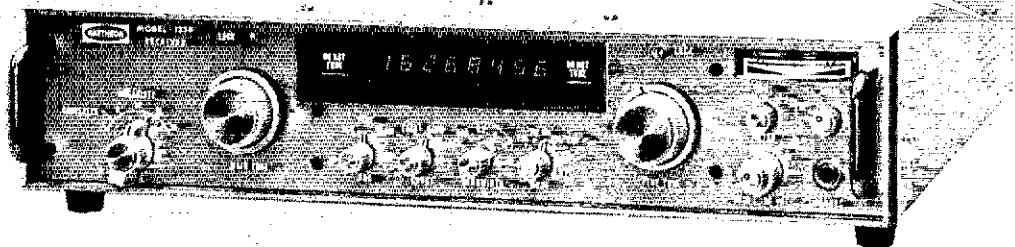


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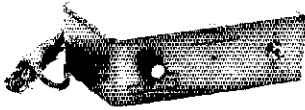
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SAN FRANCISCO - SCM, Tom Gallagher, W6NUT - WA6SIG/6, our traffic mainstay at K6NCG now in Japan. Good luck and thanks for an FB job. WA6BTF, Eureka, assumes the post of RM. WA6PYN is renewed as VHF PAM and also appointed OPS. Mike reports WB6AZB and K6VFN/6 new in the city. Mitch operates from a fire house and must suddenly QRT when the bell rings! K6JFY keeping 10 meters active. Another flood threat in late Mar. kept the Eureka Farwest Repeater gang on alert. JA3USA now in the city for a few years. JA7IBG is an engineering student in the Bay area. Refugee from Murphy-Land WIARR pores over his R-390 in search of rare SWL DX from his noisy S.F. apartment. Meanwhile, W6NUT pores over his old QST collection to find that OO W6WB was one of the section's original SCMs and W6RTP was (is) quite a lady's man between traffic and contests. Please give some thought to candidates for SCM as my term is up in Nov. and professional demands will not permit me to be a candidate for another term. Keep your activity reports coming. Traffic: W6RNL 302, WA6ICQ 128, K6NCG 79, WA6BTF 11.

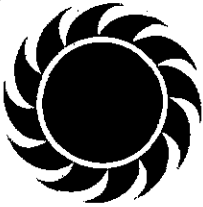
SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - It is with deep regret that I announce WA6SCF has joined the Silent Keys. His death was untimely, and he will be missed by many. John was very active in the NCN net and was always the high traffic handler for the SJV, and was always very prompt in his reporting of traffic handled and any bits of news he sent to me. I know I will miss him. W6FOZ is heard on 2 meters fm. WA6UMU is on 2 meters fm. WA6KZY has 10 stations on his net which meets 0230, on Tue. on a frequency of 145.35. Their club project is building 2-meter am transmitters. WA6RXI has a new ham shack, and is active in NCN, SCN, NEN and DRN6 nets. WA6CPP, W6YKS and K6OZI represented the Stockton ARC in the DX contest. W6OWL worked two new countries on 20 cw. W6LUKB is active on WR6ACU. W6ASV has an FT101. WA6ONZ is a city Councilman in Woodlake. WA6SHO moving to Denver, Colo. W6WXZ operating 40-meter mobile. W6VFC is on 2 meters fm and is doing a lot of flying. W6QDN also doing some flying and mobiling. Traffic: WA6SCF 324, WA6RXI 40.

SANTA CLARA VALLEY - SCM, Jim Maxwell, W6CUF/K6AQ - W6REF made BPL. New appointees are W6YAM EC for Monterey, Carmel, Pacific Grove, Seaside and Fort Ord; WA6IDF OO/OPS; WA1ABW/6 ORN; VE3DXV/W6 OO. WA6UAM completing new 1296 solid state ssb transceiver. W6JINN ORV on 220. Oscar prexy K6LFH has been a regular speaker on Oscar and Oscar/Sister Cities activities at local clubs such as WVARC, NCDXC and SCCARA. The NCN dinner attracted 22 members and guests. The prize for the most dedicated member went to WA6BTF. The Palo Alto ARA (PAARA) meets monthly on the first Fri. 7:30 PM at the Menlo Park Recreation Center. A PAARA homebrew contest is in the mill for this summer. Congrats to General WA6LNY, recently upgraded from Novice ranks. W6NW speculates that the recent upsurge in NCN activity may be due to the new NCN Bulletin, edited by W6QNB. K6QOQ now sports WR6ADY for the San Mateo County RACES repeater. WN6DIR a new Novice, active in Salinas. WN6JUX traded in her call for WA6CUX as a General, still active on cw. W6ZRJ reports good results with new KW rig for code practice transmissions. WA6TFK has been fitting in trc. on NCN between school assignments. WA6NDN operated part of the DX contest from W6PAA. OO K6COF noted numerous violations of ID regs during the DX contest. Daytime RN6 (DRN6) meets daily at 2100Z on 7265 ssb. The Santa Clara Valley VHF Relay Society (WR6ADE) provided communications for the annual March of Dimes Walk-A-Thon in San Jose during Mar. NCN mgr. W6BVB reports Q1 692, QTC 567 in 36 sessions for Feb. Traffic: W6RSY 442, W6YBV 271, W6RIF 217, W6NW 121, W6BVB 93, W6DEF 69, W6AUC 58, WN6TYA 43, W6KZI 38, W6ONB 21, W6ZRJ 18, WA6HAD 14, W6DJ 7, WA6IDF 7, K6AQ 5, WA6TFK 2, WA6NDN 1.

ROANOKE DIVISION

NORTH CAROLINA - SCM, Chuck Brydges, W4WXZ - SEC: K4FBG, RM: WB4ETE, PAM: WB4JMG. VHF PAM: K4GHR. D4RN (Daytime 4th Regional Net) meets on 7233 kHz at 2000Z on MWF and K4FTB plus W4WCG need other NC stations to check in. The NCSSRN (13938) annual "Ham-n" was held at Raleigh and a great time was had by all. W4OFO, Farheel Emergency Net secy., reports 1210 QNI for Mar. with traffic count of 100. WB4LDO entered a fine propagation report on 2-meter skip conditions. WR4AEU (ex-W4FBF repeater) now carries the Mecklenburg Co. AREC network on 34/94, Mon. 8 PM, with WB5CZR/4 as mgr. and NCS. Greensboro ARC (W4GG) had YL/YXL classes taught by W4BUZ and K4CJZ with 9 going up for exams. K4CJZ also receives

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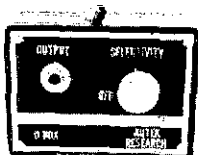
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his Extra; Congrats. Ex-WN4TMD now WA4HWT and happy to be General. Remember Field Day is June 22-23, are you ready? Alamaance ARC (K4EG) will have Novices classes by WB4VHB and K4NV. W4JGA and WA4OYY assisted Greensboro Police with auto accidents with relay through WB4ZGS. June 8-9 is VHF QSO Party and WA4WZO and friends will be atop 5500-ft. White Top Mtn. in Va. WN4HRR a new Novice in Hickory and also helps CAP. K4BE our leading OO, had good readings in Feb. FMT even through apparently intentional ORM. Cape Fear ARS (Jayetteville) now has 6 Life Members! The 2nd Annual Charlotte Hamfest drew approx. 1500 with W4ACY and W4WXZ on program. K4GHR, NC Repeater Assn. prexy. had nice meeting at Charlotte Hamfest on current 2-meter topics. To make the PSHR you now have to get 40 or more points. WB4OXT now has made PSHR about 8 in a row; Congrats Traffic: (Mar.) W4OFO 125, K4EZH 76, WB4KHZ 64, K4FTB 60, WB4OXT 34, W4WXZ 34, W4ACY 24, WB4ZIN 22, WB4JMG 9, K4VBG 9, WB4MKJ 8, K4MC 6, W4EHF 4, K4TTN 4, WB4CLS 3, WA4KWC 2. (Feb.) WB4OXT 12.

SOUTH CAROLINA - Acting SCM, Beth Miller, WA4EFP - SFC: WA4ECL. RM: K4LND. PAM: WB4KNB. OO: W4NTO. New officers of Columbia Repeater Society are W4WOL, pres.; K4FRX, secy.; WA4RYN, treas. Repeater on 146.34/94 with 1800 cps tone burst. It meets at 2000 EDT Thur. The Swap Net has proven so popular it now meets every Sun. at 3 PM EDT on 3915. SC Phone Net meets daily on 3930 at 12 noon daily except 8:30 and 3:30 EDT Sun. No manager. Mostly rag chew but will handle traffic if called for. SSBN observes its sixteenth year of daily operation on 3915 at 7 PM EDT. Mgr.: WB4KNB. CN serves both Carolinas on 3573 at 0000Z and 0300Z daily. Union County 2-Meter Net meets 1st Mon. each month at 1930 EDT on 146.97 MHz. We have a new Novice Net on 3720 at 8 PM EDT on Sat. with WB4UOS as NCS. Newly licensed Florence repeater on 146.37/97 WR4AGM. Trident ARC is Charleston's new club, just getting under way with WA4DAX, temporary pres.; WA4GZV, temporary secy-treas. Regular meeting sked to be announced later. Beautiful Novice WN4BKG made General. She will remain on 40 cw for awhile. Traffic: W4NTO 82, WA4ELJ 20, K4GOG 20, K4FRX 14, WB4OBZ 10.

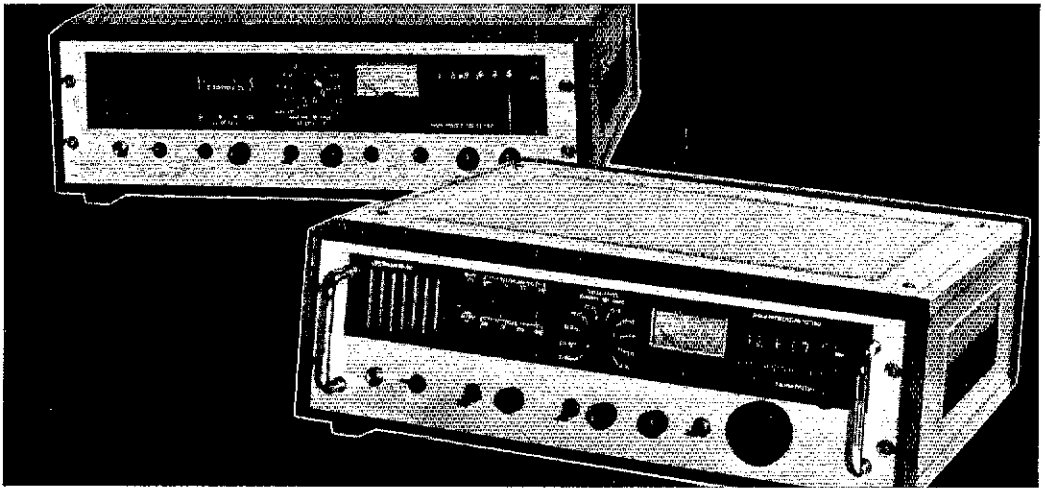
VIRGINIA - SCM, Robert J. Stagle, K4GR - Asst. SCM: A.L. Martin, Jr., W4THV. SEC: WA4PBG. PAM: W4HRR. RMs: W4SQO, WA4SMR, W4SHJ, K4EBY, WN4GHY. LO meeting in Richmond biggest and best yet - thanks to RARC. Wendy Susan, first harmonic of WA4FOW and WB4PNY born Mar. 16 and attended her first LO conference. VEN QNI 1077, QTC 51; VSN QNI 294, QTC 151; Central Va. Service Net QNI 180, QTC 9. VSN Sun. afternoon session on 3947 kHz at 1330 going strong with QNI of 104. Counties, W4JUL 2930, WA4UNS 1650, WA4EPH 1100. WB4FDT editing the 1ex. CW Traffic Net Bulletin - just can't quit Va. Hamming. WA4JF has deserted Va. at 500 N. 62nd St., Waco, Tex. 76710. WB4RZ/W4 on air in Charlottesville. K4JM reports nothing new. HW-12A at WB4WIS worked the first time he turned it on. K4MLC was hospitalized in Ft. Smith, Ark., while on travel - OK now. WB4DZL reports it is streaking season at 11Va. W4ZM reports wonderful trip to Orient. PVRC reunion contest is June 1 and 2. ARRL first VP, W4KFC attended everything as usual. WA4EPH has a directory of county hunters in Va. - anyone wanting one send him a long SASE. W4TZC has raised his dipole: little and getting results. K4MLD reports things are looking up on 40 and 80. Other things have forced W8VDA/4 off Sun. night skeds. W4DM left DX long enough to handle some traffic. WA4UN working on 75-meter antenna. K4EZL going to Seoul from Hong Kong. WB4DRB 2 FMing at Med School.

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VSMN	3947	0715/1631
VSNB	3947	1800/2201
VSN	3680	183
VNTN	3712	183
VN	3680	190
VUN	50.25	190
VFN	3947	193
VRN	3625	200
VSN	01/61	210
	WR4ABO	
VRON	3905	2215 GMT

Traffic: (Mar.) K4KNP 293, WB4KSG 284, WA4AVN 19, WB4SGV 194, W4UQ 183, K4GR 122, WA9MWF/4 112, W4OD 110, WA4SMR 109, WB4WIS 95, W8VDA/4 93, K4JM 91, K4KI 71, WA4PBG 68, W4LDF 60, WA9NEW/4 57, WB4KIT 48, W4T 36, K4VIG 36, WB2VYK/4 20, WA4OFL/4 17, WB4BZX/4 1, W4DM 16, W4KFC 16, WB4FDT 14, W4YZC 14, WB4PNY 1, W4TZC 13, K4KA 10, K4MLD 10, W1KAM 9, W2TPV/4 5, W4M 5, W4THV 5, WA4YIU 5, WR4DRB 4. (Feb.) WB4WIS 14

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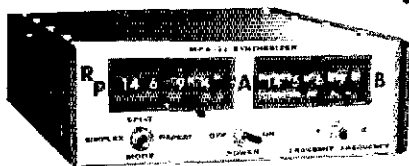
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WA9MWF/4 121, WA4SMR 115, K4MTC 56, K4KA 48, W4LD 30, WB4DZL 10, W41HV 4, K4MSG 2.

WEST VIRGINIA — SCM, Donald R. Morris, W8JM — SFC; WA8NDY. PAMS: W8DUW, W8IYD, RMs: W8HZA, W8JWX, CW Net Mgr.: W8HZO. Phone Net Mgr.: W8BQX. (The following attended LO meeting at Richmond: W8BMMV, W8DUIV, W8DUW, W8HZA, W8JM, W8LAL, WA8NDY, W8WCK, W8BYCD. New officers of the MARA ARC of Fairmont are: W8LAL, pres.; W8AAA1, vice-pres.; Terry Orsini, secy-treas; W8EOL, treas. W8WNI and W8PAV Novice YLs in Grantville. W8NRFC has new HW 16 and interested in the WVa. Novice Net. W8LGT finds Intruder Watch very interesting. WVN CW Net in 30 sessions with 157 stations passed 79 messages. WVN Phone Net in 31 sessions with 708 stations handled 227 messages. W8MCR, mgr. D8RN needs assistance on the Daytime 8RN net at 2030Z on 3940 kHz. 16th Annual West Va. State ARRL Convention, July 6 and 7 at Jackson's Mill with General Mgr. John Huntton, W1RW and Tom McMullen, W1SI, attending from Hq. Dr. John Knight, G3TPR spoke at the MARA meeting. W8IZA and W8JWX efforts paying off to build up the CW Net on 3570 at 7 PM daily. Traffic: W8BML 88, W8HZA 85, W8BDOX 42, W8JWX 37, W8LGT 27, W8JM 21, W8FUE 20, W8ZNN 17, W8AEC 14, K8OE 14, W8DUW 13, W8CZT 12, W8LFW 7, W8BMMV 6, W8BML 6, W8BNN 4, W8IET 4, W8GWR 4, K8RCC 3, WA8NDY 3, W8RNX 3, K8ZDY 3, W8ZNCB 3, W8CUL 2, K8HHV 2, K8XO 2, K8LSN 2, K8NNK 2, W8NYC 2, K8HCH 1, K8CFT 1, W8CKX 1, W8RCC 1, W8RHA 1, W8BOK 1, W8RRO 1, W8WHR 1.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Clyde O. Penney, WA0HLO — SFC; K0FLO. RM: K0OTH PAMS: K0CNV, WA0YGO, K0DCW. An excellent performance was turned in by all area repeater groups in the recent March of Dimes Walk-a-thon in the 5-county area surrounding, and including, Denver. A total of 98 amateurs participated in this public service event. All amateurs in the section are requested to send an additional 2 cents postage to cover envelopes now on file with their QSL Bureaus. W0JTW and K0PVT presented a program on amateur radio to a Cub Scout Pack here in Denver during Mar., and report the program was very well received, and generated considerable interest among those present. Welcome back to K0SPR who missed 2 weeks of service handling phone-patches in South America account of the flu. Net traffic for Mar.: Columbine QNI 1631, QTC 120, informals 341, 32 sessions; Hi-Noon QNI 1429, QTC 49, informals 170; CCN (Jan.) QNI 150, QTC 78, 28 sessions; UCN (Feb.) QNI 129, QTC 73, 24 sessions; SSN (Feb.) QNI 263, QTC 163, informals 17, 27 sessions, 646 minutes. Traffic: (Mar.) W0WYX 1347, K0ZSO 1268, W0H8Z 189, W0JTW 136, K0OTH 107, W0LO 103, WA0YGO 69, W0JW 65, K0SPR 63, WA0TMA 54, W0JRW 41, W0LLA 40, W0BY 24, K0PVT 25, W0GAO 15, W0H8ZL 14, WA0YNO 13, W0WY 9, W0LAF 8, K0DCW 7, W0NZL 5. (Feb.) K0OTH 136, W0LO 87, W0H8Z 49, W0JRW 29.

NEW MEXICO — SCM, Edward Hart, Jr., WSRE — SFC; W5A1R. RMs: W5UH, K5KPS PAMS: W5SPNY, W5DMG. MNM meets daily at 7:30 P.M. 3585 kHz. QNT 252, QTC 170, in 773 minutes; K5KPS Mgr. NMRN meets 6 P.M. M-F 3940 kHz QNI 574, QTC 51 W5DMG Mgr. W5SAZP, W5FDY and the NM Emergency Services Council were very busy with two successful search and rescue missions. Last search was for four young people in the Sandia Mts. A Mon. evening Ten Meter Net on 28.6 MHz has been organized and meets at 0200Z. The Albuquerque Radio Club is sponsoring a new Va. hospital radio station with W5EAW as trustee. W5TLK has been on TDY to Vandenberg AFB. W5POA, K5DAB and W5DAD have been on the sick list. W5YO and W5NLI lost antennas to the wind. Traffic: K5MAT 371, K5KPS 127, W5UH 78, W5TLK 24, W5YO 73, W5SHI 17, W5WXX/5 16, W5BKD 16, W5PDY 15, W5RSNE 14, W5SOHI 10, W5GTU 9, W5SMY 7.

UTAH — SCM, John H. Sampson, Jr., W7OCX — SEC: W7GPN. RM: W7HTM. HUN meets daily at 1830 GMT on 7272 kHz, 936 check-ins, 36 messages. UCN meets daily at 0130 GMT on 3575 kHz, 293 check-ins, 56 messages. Band conditions all month were bad. W7WKQ passed the Advanced Class exam. Congrats! It is sad to report W7IOU as a Silent Key. The Ogden RC is conducting classes to upgrade current licenses and the Salt Lake Club is conducting on-the-air code classes. K7DJS has been awarded the MARS operator of the month certificate. WA7GTU and NYI. WA7VIN announce the arrival of their second jr. op. W7RF now

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mobile on the air until new tower is up. WA7TSB is a Sterling Scholar finalist in the vocational field. K1TMK/7 and WA7MEL report good DX on certain band openings. WA7GWU remodeling the shack and putting together a 2-meter transceiver. K11MK/7 on a big job hunt, graduates from KYI in 3 weeks. W1DKB attended a Western Public Service System conference in Camb. in mid-Apr. Traffic: (Mar.) K7HLR 141, W7UIM 92, W7DKB 50, W7COX 27, WA7MFL 23, WA7WIB 22, W7YR 18, WA7OAU 18, K1TMK/7 15, WA7TSB 11, K7CLO 4, WA7HCQ 4, W7BE 2, W7LJH 2. (Jan.) K7PFB 42.

WYOMING - SCM, Wayne M. Moore, W7CQL - SEC: K7NOX. PAMs: W7SDA, WA7NHP, K7YUG. OBSs: K7NOX, W7SDA, WA7FHA, K7YUG. Nets: Pony Express Sun. at 0800 on 3920; YO daily at 1830 on 3597; Jackalope Mon. through Sat. at 1215 on 7260 (alt. 3,920); Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. Last call for nominations for the PICON award for 1973 - please send them to me now! Repeater license of WR7ACZ has been issued to K7NOX. Just got word that the Casper mountain repeater license has been approved - just awaiting the paperwork now. W7OUX now on 2 meters. Don't forget the hamfest in Laramie in July and the convention in Pueblo June 7-8-9. Traffic: W7SDA 276, K7VWA 78, W7HNI 68, W7TZK 63, W7BHH 48, K7IITH 43, W7IOI 34, K7BMT 28, W7YVW 10, K7SLM 5, K7AHO 3, K7TAL 3, W7ILL 2.

SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4EKJ - SEC: W4DGH. RM: W4HFU. PAM: W4RQS. WB4KDI and K4MRH are helping with liaison functions between DRNs and Ala. If you are available and can "fire" up on 7290 at 2000Z (daily), why not check in and lend a hand. 7070 is monitored daily 1330 to 2130Z for emergencies and traffic. Speaking of emergencies, our section neighboring sections too have had their share lately. Sorry to hear of W4GET moving to Fla. K4JK has relocated his QTH, but still in the Ala. section. Note his FMT measurement near the top. K4HJM activity mostly nets and 2 meters. K4UMD still having rig problems. K4VF has a new 30-watt amplifier for 2 meters. K4HJC attended the swapfest at Ft. Walton Beach Mar. 31. WB4DSK in the hospital. WB4SVH checking into the nets.

Net	Time CDT	Freq.	Days of Week
AENB	1730	3.725	Daily
AENM	1830	3.965	Daily
AENB	1900	3.575	Daily
AENR	2000	50.52	T&Th

Appointed K4VF and K4MRH as OPSs. Traffic: (Mar.) WB4EKJ 158, K4AOZ 69, WN4FZS 45, WB4RCF 27, WB4KSL 21, WB4SVH 16, WA4AJA 15, K4VE 9, WB4PDQ/4 8, WB4ZRR 7, K4HJC 6, K4UMD 3, WB4JJP 2, K4HJM 1. (Feb.) W4USM 116, WA4AJA 16.

GEORGIA - SCM, Ray, LaRue, W4BYG - Asst. SCM: John Boston, WB4RUA. SEC: K4WC. PAM: K4JNL. RM: WA4BAA.

Net	Freq.	Time(EST)	QNT	QTC	Manager
GSN	3595	2300/0200	690	320	WA4BAA
GSBN	3975	0000	897	34	K4JNL
GTN	3718	2200	210	51	WB4TVU
CVEN2	146.94	0130	308		WB4AJA

K4BAI and WB4KVE are endorsed as ORSs, OBSs: WB4RUA ORS, and is now attending electronics school in Atlanta. W4JM now an ARRL member for over forty years. WB4NMA reports the Gainesville repeater now on Walker Mtn. WB4DBO received military orders to move to Ala. Our loss is their gain. The NW ARC and Repeater Assn. have a new Rx antenna on the Rome repeater; looking for more ONI to their CVEN2 above. K4CBO doing a good job as OO. WA4NJP says he has a new 5-element 4 Bay eleven-element yagi array on 436 MHz. The Dixie Six Meter SSB Net meets Sun. nights, 50110 at 9 PM EDT. Welcome to the Albany RCs Novice Class grads: WN4GBP, WN4GB1, WN4GK1, WN4HGK, WN4HGO, WN4HGO, WN4HGR, WN4HGS, WN4HHE, WN4HNV, WN4HSU, WN4HVW. Thier Novice Net meets 3710 kHz Sun. at 0030Z. Also men, please ONI GTN (above) regularly. The recent storms and tornadoes in our state have kept the bands busy. If you want to help organize our emergency efforts, contact SKC K4WC, 2220 Lyle Rd., College Park, Ga. 30337. (404) 767-4837. Many thanks to WB4WMT, for his trip up to Chatsworth to report on the storm damage there. Members of the Atlanta RC have been running a "Salute to Hank Aaron" station from within the Atl Stadium, Apr. 8-18. Much good publicity for ham radio has been received. Equipment donated for this special one time event was donated free by Collins, Heath, Hallicrafters, Clegg, Drake, Swan, Robot, Hal Devices, Hy-Gain and Galaxy. This gear will be

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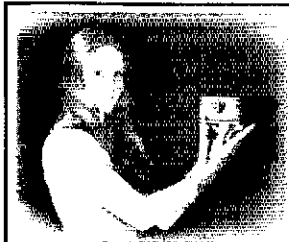
autographed and placarded by Hank Aaron, and will be given away at the Atlanta Hamfest. Y'all come! Traffic: (*notes PSHR) WA4BAA* 271, K4JJQ 157, K4OSL 123, WA4FSL 88, WB4CTL 85, WA4AY* 55, K4JNL 30, W4BYG 27, WB4DBO 24, WB4YVU* 23, W4CZN 8, W4JM 6, WA4LLI 5.

NORTHERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB, RM: WA4BGW, RTTY: WA4WV, PAMs: WA4IZM/75, W4SDR/40, WA4CAD/VHF, Effective May 1 the NFPN has moved to 3950 kHz; same time - 2230 GMT. Jacksonville's first annual hamfest drew a big crowd. WB4VYU earned TPTN Net Certificate. WA4HLP got his ticket after a long struggle! W4FXQ received Advanced Class ticket. W4WWI recently worked K4WWI and K5WWI in a roundtable! W4FWZ and WB4VYU conducting course to upgrade Novice & Techs. to General. W4GXL appointed WA4IHY, W4MTM and WA4LZV asst. FCs in Nassau Co. They have plans for a radio club and 2-meter net. WB4NJI moved indoors to new shack. WB4ESH has new beam and tower. K4CDF joined Silent Keys. WN4GHU doing fine job promoting QFTN, Novice Training Net. WB4OMG one of judges for QLF contest at Jax hamfest. The 4th Annual Swapfest drew a crowd of about 400; main prize won by K4IUH. K4GH1 got a 2-meter fm HT to coordinate his DX chasing. W2GVH/4 active on QFN. New officers of PARC are W4MMW, pres.; WB4MHG, WB4SFU, K4UBR and W4RKH. W6OMH/4 was rescued from the Gulf after 48 hours adrift in a small boat. The .01/61 repeater call now WR4AFW. New officers of the FFARA are W4ETE, WB4WEQ, W4GSY and WB4PKR. K4CFS and WB4JHQ are new liaison stations between phone & cw nets. WB4DXN earned Gator Net certificate. Traffic: (Mar.) WB4UPI 182, K4VND 181, WB4DXN 164, WN4GHU 134, WB4SKI 119, W2GVH/4 85, W7EM/4 84, K4CVO 65, W4RKH 52, WB4OMG 51, WA4FJA 40, W4LSR 36, WA4EYU 34, WB4NJI 34, WB4HKP 33, WA4BGW 26, W4LDM 23, WB4VDM 21, WA4BOV 20, K4IZT 20, WA4CAD/4 17, WA4HCS 16, W4AFT 15, WB4ADL 11, WB4ZQC 10, WN4DAD 9, WB4JHO 9, K4OER 8, K4FLV 5, WA4VZF 5, W4IA 4, WB4VMP 4, K4ECG/4 3. (Feb.) W4LDM 67, W4IA 5, WB4NHH 2. (Jan.) WN4BVK 5.

SOUTHERN FLORIDA - SCM, Woodrow Huddleston, K4SCL - SEC: W4IYT, Asst. SEC: W4SMK, RMs: WB4NCH 80, W4EH 40, K4EBE 44, PAM: W4OGX. New appointees this month: W4EH

RM 40; W4AWS 00 III and IV; K4VW OVS. Endorsed: K4KQ, K4SC 00s III; K4WXS, WB4TAF OBSs; WB4HJW OPS, ORS; W4LK, W4ILE ORSs; W4DO OVS. Issued TPTN certificate to W4IRA. We sent out letters to all OOs and all OVSs in the section with special reporting forms, Form 13 and Form 18(CD)-97, to help with monthly reports. Results show improvement in quality and quantity of data received. The "Bold City Hamfest" was the biggest event of the month. Although in Northern Fla. section, it was well attended by Southern Fla. hams. Hope everybody was ready for the Fla. QSO Party, held Apr. 27-28. We have been informed that W4IYT will be leaving the section soon, being transferred by his company to Washington, D.C. He will be a hard man to replace as SEC and nobody - but nobody - can publish FLORIDA SKIP like he and his family does. W8BZY/4 reports he is being transferred to Andrews AFB, Md. We will miss Jim, but MDC will gain an outstanding traffic man. OVS WB4TUP in an early report stated no band openings in Mar. He should have waited until the last of Mar. to report, for there were many nice openings on 146 MHz the last few days of Mar. and first week of Apr. with Fla. and most of Ga. appearing to be in the same VHF community with good signals all over. Wayne also reports two new repeaters coming on the air soon in Tampa area: 443.1/448.1 and 146.28/146.88. WA4BMC reports hearing 2-meter stations in Tex. and that Canada and Cuba were heard in Lake Worth area. W3CUL settled in Pa. for summer. Traffic: (Mar.) K4SCL 539, WB4AIW 522, WA4SCK 274, WA4GBC 222, W3AIZ/4 193, WB4UPI 182, WA4NBT 159, W8BZY/4 137, WB4HJW 135, WA4ATF 131, W4ILE 126, WB4AIK 122, W4EH 80, W4WYR 67, W4RCZ 62, WA4BPE 60, K4BLM 58, WB4TRI 48, W4BM 45, W4DVO 40, W4DOS 30, WA4HDK 25, W4IYT 25, W4TJM 14, WB4QD 11, W4OGX 7, WA5MU 7, WA4UOO 5, K4EBE 4, WB4TUP 4, WB4PIW 2, K4SGR 2. (Feb.) WB4AID 43, K4NE 31, W4LK 5, K4GFW 4, W4NTE 3.

WEST INDIES - SCM, Pedro J. Piza, Jr., KP4AST - Congratulations to the Radio Club de Puerto Rico for a very nice Hamfest. KV4BA is working KP4s from the Virgin Islands on 2 meters. New stations on 2 meters KP4s DDO, DLU, AOO, DRE, DCY, RK. KP4CK will install a repeater on 25-85. KP4AOC is the new pres. of the Radio Club de Puerto Rico. Congratulations, Roberto. Traffic: KP4WT 67.



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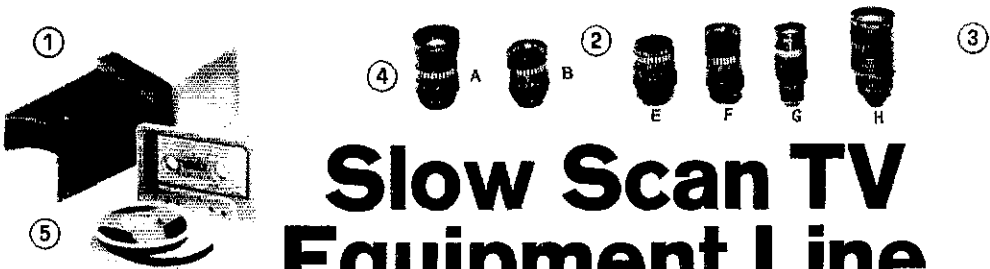
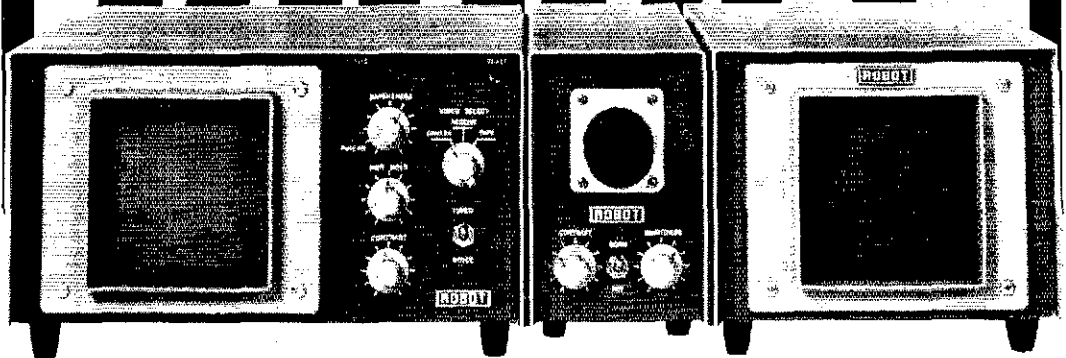
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SOUTHWESTERN DIVISION

LOS ANGELES - SCM, Eugene H. Violino, W6INH - SEC: WA6DUC. RM: K6UYK. Congrats to WA6DUC on his appointment to SEC for the LA section. WA6ZNA of the St. Clarita RC had eye surgery which was a success. W6CK has been promoted to Lt. Colonel in CAP/USAF. Don't forget the LERC award TAD. The Antelope Valley RC had a field trip to FAA in Palmdale. K6AEH is trustee for PARC repeater. The club also will handle communications for the Culver City Flag Day Parade. WA2HVK/6 doing a great job with their club bulletin. New ECs are W6QYF, who will be liaison with WCARS and WA6IDN in the Claremont area. WB6MKV is sending a tree kit for would-be traffic handlers, those interested in cw traffic nets contact him. Those interested in VHF operation should attend the So. Calif. VHF club meetings in Nurwalk. The TELCO RC should have their repeater on the air by the time you read this. Frequency unknown at the present time. The United Radio RC group is recruiting Field Day operators. K6OSC and a group of the Associated Radio Amateurs of LA are assisting the Veterans Hospital in Long Beach to put an amateur station on the air. This same club is considering having a Sat. morning breakfast once a month. K6QYB sporting a new Clegg 27B mobile around town. WA6KLA has been making the rounds of the various clubs participating in transmitter hunts. You seagoing ops don't forget the SOWP bash at Brothertons in Pasadena June 29. Contact W6PZY for reservations. W6DOX now member of popular FCC group, congrats. WB6MKV now has Petter Diesel emergency generator with 4KW generator available for Field Day operation and also for emergency operation. Emergency minded members keep him in mind when you have need for same. WA6IDN has been taking over the NCS duties on SCN and at the same time organizing ARFC. WA6TLV has been active in CD parties. WB6BCO active in the Torrance RACES group and active on WPSS RACES and WCARS. W6USY taking Link time at LERC. K6EA has gone to sea as radio operator on Mariposa. W6HUJ now among the retired, and active again on SCN. OVS WA6FOA very active building UHF solid state experimental projects. TRW RC now have their No. 2 radio shack in operation, thanks to K6KQI and W6YCZ. The JPL RC had W6MVM, a special events call active from Mar. 25 to Apr. 5. K6LSO has new harmonic in family. K6ASK, reports no had effects on dad's pacemaker on two meters at 5 watts, going to increase

power soon. Traffic: W6INH 370, W6OYN 291, WA6OTU 191, WA6IDN 185, WB6MKV 176, K6UYK 164, W6QAE 101, WA6TLV 98, WA6TCH 36, WA6ZKI 24, WA6BCO 22, WB6OYD 16, W6USY 10, K6CL 9, WA6EWEY 5, K6FA 4, W6NKE 4, W6HUJ 3, WB6KKG 3, W6VIC 2, W6DGH 1.

ORANGE SCM, William L. Weise, W6CPB - Asst. SCM: Richard Birbeck, K6CID. SEC: WA6IVA. PAM: K6YCI. RM: WB6AKR. DRN Mgr.: K6GMI. New OBS skeds from W6BAM after June 1 will be Fri. 3580 kHz 2000 local and Mon., Wed. and Fri. 7080 kHz at 2030 local. W6QBD received very nice write up as "Biggest Ham" in Lucerne Valley. Congrats Woody. The Orange County Council of Amateur Radio Organizations is planning to participate in a Hobby Show at the Orange County fair July 12-21. Look for special call. So. Calif. 222 MHz net meets Sun. 2000 local time. Ex SCM, Jerry, visited in area middle of Mar. He passes on his best 73s to those who did not see him. Look for his call W5ELK. WB6RAL says WA6UMI is planning activity in June VHF contest with better site than last year. Hopes to see some of you on. Propagation has curtailed some operation on the various traffic nets. Conditions will not improve for some time. Long and short skips are in. Keep plugging, conditions will eventually improve. Clubs wishing to have publicity in this column regarding their activities such as hamfests etc., should remember it takes two months before material is published so a lead time of at least 2 months is required. Traffic: K6GMI 420, W6ISC 263, WB6AKR 242, W6CPB 26, K6LJA 20, WA6IVA 17, WA6YWS 16, K6GGS 12, W6WRJ 12, W6BUIK 3, W6QBD 2.

SAN DIEGO SCM/SEC, Cy Hugar, W6GBF - Asst. SCM: Art Smith, W6INI. OBSS: WA6DMB, K6PM. Each Official Bulletin Station receives info on timely subjects from HQ to put on the air at scheduled times. Local geographical needs determine the number of stations required. Considerable power, copy of the WIAW schedules and maintaining the section schedules are requisites. Congratulations to new Novices, WN6CIQ and WN6DFB. The Sdgo DX Club has a new pres. W6LAG and secy. W6AXX. They meet on 4th Wed. at Convair Gun Club. Escondido AR Society meets on 1st Mon. at Youth activity bldg., between Broadway and Gamble on Mission. Upgrading to Advanced is WB6OZT. The AREC FM group provided communications for the Amigos de las Americas walk and did an outstanding job. Thanks gang. My appreciation to all section

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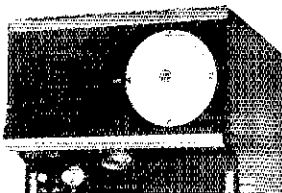
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WEST GULF DIVISION

amateurs who gave to their time and talent for the Torrey Pines Glider meet. Due to the very heavy fog on the coast it had to be cancelled for the first time in 28 years. K6QXN, WB6EVI, WB6ODR set up an operating amateur station at the Sdgo Scout Lamboree where some 2000 scouts were gathered. Some time public service. Sdgo Council of the Amateur Radio Council very busy with convention planning. K6BWT, chmn. with K6QM, W6OSD vice-chmn. Mark your calendar for SW Div Convention for Nov. 1, 2, 3. Good luck and have fun all, participants in Field Day 1974. PSHR: WA6BEM. Traffic: W6VNO 217, W6RCF 128, WA6BEM 113, WB6DPV 59, W6DEY 28, W6PZU 23, WA6DMB 21, WB6ERF 16, W6GRF 5, K6PM 2.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DE1 - SEC: WB6HJW. RM: K6OPH. PAM: K6EVO. New AREC net frequency for Morro Bay area is 146.40 fm. Estero ARC will reimburse members for crystals. Santa Maria received RACES authorization and will operate on 147.12. Asst. EC WB6PGK held a successful AREC drill in Morro Bay with 12 participants. New MAKRAC of Camarillo officers are WA6GKR, pres.; K6OPH, vice-pres.; WA6TPL, secy. Fred Rollyson spoke at Canejo club on phone system and K6TS spoke at Poinsettia Club on antennas. Satellite ARC is building 2-meter and 20 repeaters, Ventura Co. ARC planning the county fair operation. WB6O1D operated the CW DX contest from W6OUN. K6OPH working DX and worked HT2 and IT0 to complete WAZ. K6THA and XYI vacationed in ZL-1 and maintained contact with W6SUN and K6KCI in T.O. W6HHC joined the American Telegraph Society. W6OAL running afsk RTTY experiments via Oscar. He has worked his 50th state (Ida) via Oscar. W6PRP active as OO in DX contest. WA6LBO new Net Control on MTN. K6EVO is now 2-meter fm and has joined the 10-10 Club. K6CFJ received the Navy League citation for the local ham who has done the greatest service to VXE-6 South Pole Support Group with over 200 phone patches. The MTN annual Roundup will be hosted in Buellton by K6EVO and XYI on June 15/16. The TRICAR sponsored section picnic planned for July 27 near Santa Maria. WB6KXA rebuilding old gear. WB6MXM hosted the MTN board meeting in Oxnard. WA6TMO recovering after visit to hospital. PSHR: WA6LBO 42, WA6DE1 39, WB6PGK 32. Traffic: (Mar.) WA6MBZ 174, WA6DE1 87, WB6PGK 83, W6ITA 56, WA6LBO 55, WA6WYD 25, K6EVO 14, WA6PEF 6, W6UJ 4, W6IDU 2. (Feb.) WA6WYD 21.

NORTHERN TEXAS - SCM, L.E. Harrison, W5LR - Asst. SCM: Frank Sewell, WS1ZU. SEC: K5KOM. RM: W5OU. Section Net Certificates are on hand for WASRUP, K5MVW, WBSGRZ. please advise your OTH as mail returned. OO appointments renewed for K5ABV and WSKYD. Congrats! Kiloevele Club F-1W new officers WASVPG, chmn.; W5JAX, secy.-treas.; WA5MWS, pub. Also reports FD generator overhauled 100%. Plano ARC meets 4th Sat. each month. We understand 150 plus attended Lawton-Ft. Sill Hamfest. Those holding OPS appointments requiring renewal contact W5GSN, our new PAM. He will prepare new Form 4 card. W5NFO reports full activity his area. NEFFEN roster arrived shows 1 OPS, 5 ECs, 5 ARECs, 1 SEC, 1 SCM plus several holding no appointment of all. Arlington ARC meeting 1200 N Collins member name badges ready. 44 students attending classes. FD planning underway. W5NT OCWA/DARC member Silent Key. Bulletin will probably be compiled by WB4FDT/5 commensurate with his input, so please help him. FCC has announced exam hour changes for Houston, Dallas, El Paso, Lubbock and Tulsa. Check OM before you go there. CD F-1W Skywarn training classes now in operation. National WX service active. Remember SET reports are transmitted to Hq. via SEC K5QKM. Tex. operators and mgrs. should note. Thanks K5CSM for your report. Red River Valley ARC '74 officers include WBSJIV, pres.; WBSGLC, vice-pres.; WNSJFL, secy.-treas. Meetings monthly REA Bldg. 7 PM and school twice per year. WBSBFW attending Skywarn school. K5ENL former (W5AFB Dallas DX man) reports NTEEN annual meeting at KC Club Oakgrove Airport Apr. 3rd week end. Dallas ARC members participating in RACES school were K5LZA, (instructor) W5Y1Q, WBSGBR and WBSFDF. Participants needed from Oak Cliff area. Skyline HS. Dallas working on Oscar 6 per WA5YKT. March-o-Dimes walkathon against birth defects participants were WBSGRR, K5BDC. Panhandle Amateur RC meeting of Mar. 2K voted on applying for repeater license in name of Amarillo Repeater Society. Chmn. of repeater committee is W5KKWC assisted by W5CBT. SEC K5QKM report shows nice gain. Traffic: W5T1 180, WBSBFW 124, W5LR 21, WS1ZU 20, WBSBFZ 10, W5YK 6.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM/SEC: W5FSN. RM: WBSGWB. Asst. RM: WBSLEY, PAMs: WBSA7S

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and WASOUV. Mark your calendar for the summer activities in Okla. City. In addition to the Army MARS fest there is the all Okla. nets picnic at Lake Overholster on June 8 & 9. The following week end is the YL International Sideband Communications System, Inc., at Holiday Inn NW June 14 & 15. The Okla. City Hamfest Aug. 3 & 4 at Holiday Inn East. WNSKKN reports ending his term 610 in too late to get his General or Advanced so now will have to wait until July. We have a slow speed net at 3705 kHz each day at 2350Z, come on down there and help out. WNSKKN is running almost all homebrewed equipment including an electronic keyer. His son is WN7WZ in Ore. Congrats to new Advanced Class WB5GZO. Thanks to WA5CBF for keeping me informed on activities in Altus. WA5TWM spent a couple week ends in Fla. Traffic: WB5GWB 10Z, W5RB 8S, WB5LEY 5S, WASZQO 3S, WB5AZS 3S, WNSKKN 2S, WB5AXH 2Z, W5FKL 21, W5SUG 20, W5PML 19, W5F5N 1S, K5TFY 1Z, WA5TWM 1Z, WASOUV 7, WB5EAY 6, WB5ELG 6.

SOUTHERN TEXAS - SCM, Arthur R. Ross, WSKR - SEC: WASYXS. PAM: W5HWY. RM: K1ONW/5 effective Apr. 1. OO's reporting this month: W5RBB, W5NGW. New net mgr. for TEX is WB5BFW of Northern Tex. section. IW/ORS WB4FDI/5 will work as law clerk for FCC in Wash., DC this summer; worked KJ7 for WAS from Tex. OO W5RBB reports WB5GQI passed Advanced Class exam. Austin ARC had a 2-meter AM and R1Y relay bnk set up for Austin Natural Science Fair Apr. 20-21; ORS WASZBJ and K5EJL worked on the project. SM5CR attended Mar. 24 breakfast meeting of Tideland's ARC in Orange. WB5IOG passed Extra Class exam; says W5YG will need new transmitter next semester. O8S WAS5DB has been transferred from Corpus Christi to Tehran, Iran. W5HQK and WB5EUT rebuilt emergency antenna systems for Corpus club station, W5MS. EC W5TOP has new linear amplifier. W5EIU going QRP with HW-7. W5MIF engineering new communications system for San Antonio Police Dept. The ladies had a busy month in Mar.: WB5CLR is in first place with 365 messages handled; Sister May, WASVBM is in number two spot with 218. WB5GVO reports a broken collar hone intereferes with cw traffic handling. WB5GNP has transferred to Jaredo, he has applied for the EC job there. Traffic: WB5CUR 36S, WASVBM 218, K1ONW/5 214, W5KLV 13Z. W5TOP 131, WASYEA 99, W5SAMN 90, W5HWY 60, WB5BWW 5Z, K5HZR 5Z, W5DURK 51, WB4FDI/5 49, W5S1WF 46, W5TSTF 46, W5UQO 3Z, W55FOE 29, W5BGE 2Z, W5RBB 21, WSKR 18, WB51MA 1Z, WASZBJ 1Z, W51EW 1S.

WSIRJ 14, WBSAPT 10, WNSIBT/5 10, WB5GVO 9, W5YG 8, WB5GFO 5, WASCRT 4, WASYXS 4.

CANADIAN DIVISION

BRITISH COLUMBIA - SCM, H.F. Savage, VE7FB - R/EN 3650 KHZ. VE7AMP's trophy is open to the station which checks and originates the highest score by July 31. We receive more mail from the VE's lately. VE7BR at Cape Young, VE7DJ should now be VE3DFM. Large number also signing form 7s. Van Island Picnic, June at Nanatsoo, hosted by Nanatsoo ARC; Hamfest Haney, sponsored by Maple Ridge ARC; Okanagan International Hamfest July 27, 28 at Concoully State Park. VE7BPB now VE7FY. Our winter birds are returning from the South. VE7PW, VE7RDA and XYL VE7AYK, VE7BIM. Traffic: (Mar.) VE7CDF 60, VE7ZK 47, VE7QO 30, VE7AKI 25, VE7BLO 16, VE7MW 10. (Feb.) VE7AKJ 24.

MANITOBA - SCM, Steve Fink, VE4FO - We welcome VE4JP as our new PAM and mgr. of the Manitoba Evening Phone Net. Thanks to VE4FO for an FB job in that capacity the past two seasons. Assisting Doug will be new OPS VE4LU, and VE4CR remains the official recorder. WARC held a series of three shopping center amateur displays in Apr. and May. The project was well received by the public. ARIM held a successful auction Apr. 7 in Winnipeg. VE4MG a new ARRL Life Member. VE4DQ has left us for VE7-Land after several years in Brandon. Several VE4s spent part of the past winter in KH6-Land, the latest list including VE4SK, VE4MP, VE4JA and VE4TY. Circle Oct. 18-19 for the Manitoba QSO Party; details to follow. Don't forget Field Day also the Peace Garden Hamfest July 13-14. Traffic: (Mar.) VE4PG 74, VE4RO 45, VE4XA 28, VE4UN 14, VE4TR 13, VE4LU 9, VE4IP 7, VE4OY 7, VE4CR 6, VE4NF 5, VE4YO 5, VE4XN 4, VE4EF 3, VE4HR 3, VE4HS 3, VE4NC 3, VE4BM 2, VE4FK 2, VE4HF 2, VE4IE 2, VE4NW 1, VE4VY 1. (Feb.) VE4TY 32, VE4TR 19.

MARITIME - SCM, W.D. Jones, VE1AMR - SEC: VE1SH. RM: VE1ARB. New appointments: VE1YZ, VE1AKI and VE1AIC, E.C. A hidden transmitter hunt was held by the VE1KPT boys in Moncton on Mar. 31 - VE1NU was the dog with the best

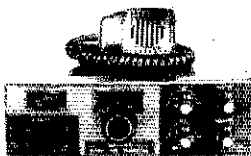


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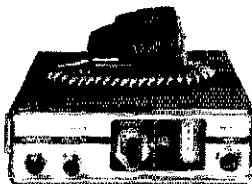
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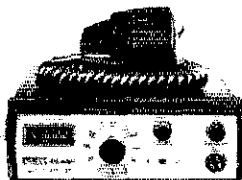
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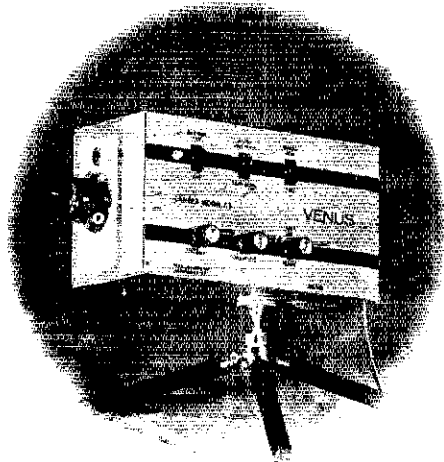
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nose. More activity of this type is planned for the near future. VE1AHM followed VE1TC to the Magdalen Islands and enjoyed the trip. Welcome to VE1YW new ham in the Moncton area. Winners in the 1974 VF1 contest were VE1AAW and VE1AMR tied for first place in the cw section with VE1ADV winning the phone section. The Oromocto High School ARC has 5 newly licensed members; club pres. is VE1APS and the club advisor is VE1BCJ. The club also received a lot of help from VE1ARM. Traffic: VF1AMR 129, VF1ZU 105, VE1ARB 68, VE1AKB 10, VE1AWP 4, VE1AYJ 3, VO1GW 2, VE1AMB 1.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - I would like to thank all those who sent cards and get well wishes during my Mar. sojourn in bed. They really helped. VE3GJH, VE3DGX, VE3GNI and VE3AST have been nominated as Amateur of the Year by the Scarborough ARC. Congratulations to VE3BMV who once again was top Canadian in the 4th ARRL Top Band contest. Ottawa amateurs turned out en masse for the official opening of the Jim Cotter, VE3JW Memorial ARS located at Canada's Museum of Science and Technology. A big vote of thanks to the station curator, VE3GX and the volunteers from the OARC and OVMRC who through long hours of effort have brought the citizens of Canada a fine tribute to one of its true amateur pioneers Jim Cotter, VE3JW, Canada's first blind radio amateur. A pleasant welcome to VE3EJF who recently received his license. VE3GQU was given a fine send off by the Freeman Amateur Radio Transmitting Society as he leaves Burlington for Peterborough. ED '74 is on everyone's mind if one can believe the stories of pre-FD activity in the club bulletins. Good luck to each and every one of you and don't forget you can get extra points by sending a formal message to the SFC or SGM. VE3DQJ of Timmins reports repeater VE3TIS now in operation on .34/.94 and has a 40 mile coverage. VE3DQJ also sent me a full report on a successful mercy mission that saw a 6 1/2 year old Cree girl air lifted from Saskatchewan 100 miles NNW of Mooseonee to Toronto. Thanks to VE3s HCX, CZA, DQJ, FTO, FCV, DGW, BWL, DJY, CDP/W9 and to all those countless others who helped by keeping quiet. Traffic: VE3SB 214, VF3HFH 160, VE3DPO 135, VE3TQZ 110, VE3GIG 110, VE3FRG 104, VE3AWE 94, VE3GFN 83, VE3DBG 67, VE3DVF 49, VF3ASZ 39, VE3EWD 31, VE3ATR 20, VE3FZG 15, VE3HHQ 10, VE3FGV 6, VE3GNW 4.

QUEBEC - SCM, Joe Unsworth, VE2ALE - SEC: VE2DEA.

VF2DKK appointed EC. VE2OJ reports that conditions still very poor and that more VE2 stations on cw are needed to help with traffic on the OO net and FC net as does the QR net which needs more VE2 stations to pass traffic in and out. West Island ARC held a successful auction on Mar. 30. Regret to report that VE2AKH passed away on Mar. 30 very suddenly. On Apr. 2, 28 members of the PL net visited the RCAF mess in Ottawa for fish and chips and good time by all. VE2BRW back on two meters. VE2RM net now has more than 40 stations for each session. VE2H back on 75 meters after working on HF rig with help from VE2ATZ. VE3BAZ former VE2KG has now moved to the Toronto area. VE2JO building homebrew gear to work through Oscar 7. VE2YU has moved to Pointe Claire, Que. and has to reestablish his station, making plans for VHF contests and Field Day operations, he also has been nominated for the office of SCM. The VHF and UHF frequency plans as published recently have caused much discussion and soon VF2BMO, VE2BEN, VE2AS and few others will meet to iron out some of the problems as to how they affect the Montreal and Quebec area. Traffic: VE2DR 64, VE2ALH 60, VE2ALE 23, VE2OJ 22, VE2APT 17.

SASKATCHEWAN - SCM, P.A. Crosthwaite, VE5RP - Sask. annual 1974 Hamfest to be held in the beautiful heart of the Carrot River Valley at Melfort June 28 to the 30th. Registration to be June 15. For further information contact VESFX. I expect our cw nets may not be too functional this summer so if you wish to pass traffic and can't get through on the NTS or SATN please use the Phone Net. I wish to thank VESTT, VE5XC and VESQS for their fine work performed on the NTS and SATN through the winter months. If there is anyone who has the time during the summer months to take day time traffic for the Sask. section please give me a call. Traffic: VE5XC 121, VE5KZ 82, VESQS 51, VESTT 32, VE5HP 29, VESBO 14, VESDN 8, VESSM 8, VF5RP 5, VESBD 3, VESBW 2, VESLC 2.

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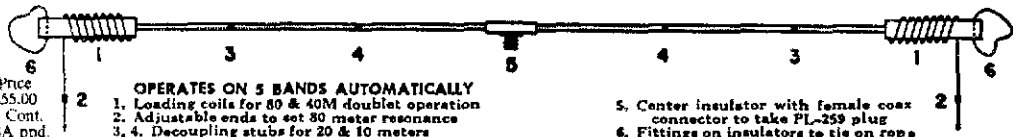
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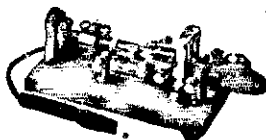
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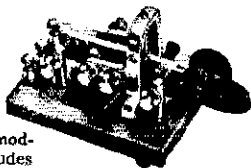


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responded and dialed police through the repeater. Ambulance and sheriff arrived within 15 minutes. — (WB8KFU/4; WA4GHQ, SEC KY)

■ On Mar. 29, about 2200 GMT, WA4CKI broke into the Florida Amateur Sideband Traffic Net to report a truck burning on the Sunshine State Turnpike. NCS K4BLM called WA4ATF who called and relayed details to the Florida Highway Patrol. A police car was immediately dispatched. — (WA4BPE, EAST Mgr., EC Martin Co.; K4SCL SCM SFla; WA4CKD)

■ Just after the Columbine Net (CO) closed on Mar. 30, WAØRYL/mobile called WAØYAR to report that he was having car trouble. With assistance from WBØELD, WAØRYL's relatives in Durango, CO, were notified and a wrecker was sent from Cortez, the closest town to WAØRYL. (WBØELD)

■ At 1030 on Apr. 9, WA2GPO and WN2TV were traveling in Western New York state when they came across a disabled vehicle. After attempts were made to start the vehicle, WA2GPO called tow truck using WR2ABU. — (WN2TVS)

■ On the night of Apr. 9, W4WLF mobile near Jasper, AL, noticed a car moving slowly and weaving, traveling in the opposite direction on the wrong side of the road. He called on WR4ADD and contacted WB4OVH who alerted troopers and stopped the man before he could cause an accident. (K4AOZ)

■ While in contact with W6YKS and K6OZI on WR6ACV on Apr. 10, WA6CPP ran across a trailer truck jackknifed across the road. K6OZI relayed this information to his office, the trucking company was called and help dispatched. — (WA6CPP)

■ By request of the Winsted, CT, police, Winchester C.D. Communications Engineering Officer W1JUV originated a priority message on the Nutmeg VHF Traffic Net on Mar. 22 regarding information of a missing woman in the Winsted area. The message was relayed to Connecticut phone and cw nets. Amateurs were asked to advise police if woman or car was spotted. The following evening W1JUV sent a message indicating the woman's body had been found. — (WA1MBK)

■ At about 2200 GMT Mar. 23, a boy was reported to have fallen into a tar pit in Canton Township, PA. Washington Co. RACES and ARE were asked to stand by. WA3OKK was sent to the area, but after no sign of the boy was found, the search was called off and amateurs released at 2300 GMT. The K3PSP repeater was used. — (WA3OKK EC Washington Co.)

■ The Office of Disaster Control and Civil Defense of Baltimore City (MD) alerted EC WA3UTC at 1330, Apr. 5, that a tornado watch was in effect for all of Maryland and the help was needed to man amateur radio and RACES circuit. A total of 80 amateurs reported into the Baltimore ARC repeater. The watch ended at 1800. (WA3UTC, EC Baltimore City)

■ *Special Activities, February.* Feb. 22-24 saw 36 Ottawa (ON) amateurs linking checkpoints and administrative headquarters during the 197 Canadian Ski Marathon. Six and two meters and the VE2RM repeater were used. — (VE3BNO)

March During the Amigos de los Americas Walk held Mar. 9, 14 amateurs manned checkpoints using 146.52 MHz fm simplex. Control was set up at the starting point and two



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base stations were used for outside contacts for alerting police and other agencies. — (W6GBF, SCM) Santa Clara Valley (CA) VHF Relay Society (WR6ADE) members assisted in the San Jose, CA, March of Dimes Walk-a-thon on Mar. 17. Mobile units were stationed at 7 checkpoints. — (K6JKE) On Mar. 23, the Puget Sound AREC and the Mike and Key Radio Club provided communications for the Washington Assn. for Retarded Children walk-and bike-a-thon. — (WA7EBH, EC) Several members of the Dallas ARC and Dallas Emergency Corps helped in the annual March of Dimes March in Dallas, TX, on Mar. 23. (*The Mike*) The Cancer Society Crusade Bike-a-thon was held on Mar. 30, in Stuart, FL, with members of the Sailfish Emergency Net supplying welfare communications, repair and first aid. — (WA4BPE/4, EC) With 14 mobile units and an NCS, members of the Beaver Valley Amateur FM Assn. helped dispatch ambulances, provide traffic control and watch over the safety of the marchers in the Beaver Co. (PA) March of Dimes Walk-a-thon. WR3AAA was used. — (K3KGX) On Mar. 30, the Metro Denver (CO) AREC provided communications for the March of Dimes Walk-a-thon using WR0s ABB ABG ABM ACM ADA ADG, 3 auto patches and 98 amateurs. Operation lasted 10 hours. — (K0FLQ, SEC)

April. Again this year, Apr. 6, the Glen Falls Area (NY) AREC supplied communications during the Clean Water Derby canoe and kayak races. Sixteen members used 6 and 2 meters. — (K2AYO, EC) During the week of Apr. 7, members of the Eastern Ohio Contesters 4-H ARC went to nursing homes in Colerain, OH, to collect Easter traffic. Over 30 messages were handled on Ohio section nets using WB8RLT/8. — (W8ZNC) QST

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G Line

(Continued from page 15)

have been put into making an accurate determination at a bend radius well beyond 5 feet. There is not enough information in the determined points to extrapolate much beyond the 5-foot point. The discontinuity shown at sharp bends in Fig. 6 is real and not an experimental error. It is very possible that at a bend radius of ten feet the loss may be acceptable.

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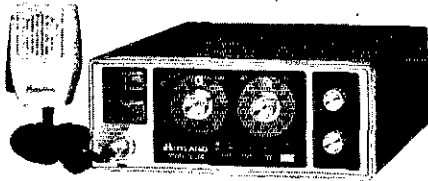


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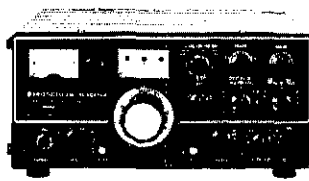


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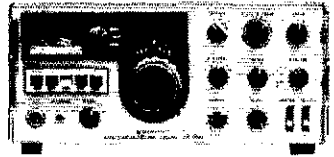
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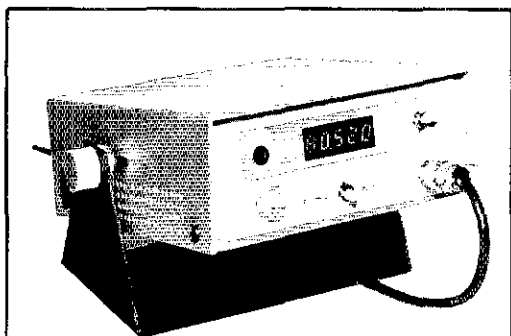
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demonstrated by setting up standing waves on the line and measuring the distance between nodes. For accuracy, twenty nodes were measured along the lines with the probe. The distance divided by ten gives the wavelength which is proportional to the propagation velocity. At 1296 MHz:

Enamel-coated line,
(free space velocity). $\lambda = 9.1$ inches

Enamel-coated line
with Teflon sleeving, $\lambda = 9.05$ inches.

Stripped coax line, $\lambda = 8.3$ inches.

Dielectric Loading

It seemed possible that loading the field with dielectric on the inside radius of a bend might reduce the loss. Bend radius was set at 12 inches and the total angle at 90°. The line was loaded with a flat strip of Teflon, 5/8 inch wide by 3/32 inch thick, on the inside of the bend. The loss increased. Loading the outside of the bend gave the same increase in loss.

A number of other tests were made around this bend. 7/8-inch coax was stripped of its jacket and shield; it was inferior to the stripped RG-8/U in all respects. RG-58/U was stripped and was found worthless in single strand, but was equal to the stripped RG-8/U if two strands were connected in parallel. The two strands were formed around the bend in the plane of the bend and perpendicular to the plane; no change was found. The strands were arranged with a varying number of twists around the bend, from test to test. There did appear to be a very slight improvement with 5 twists in the complete bend. Television 300-ohm Twin Lead was tried, placed in the bend both flat and twisted. The sleeved No. 12 enamel-coated wire was tried alone and in parallel strands and in a twisted configuration. Outside of the twisted pair of stripped RG-58/U there either was no change or there was a deterioration in efficiency around the bend. Just the same, I have a hunch that there is some way to take advantage of the velocity dependence on dielectric material to put the G line around a bend with far less loss than is presently experienced. In opposition to this, a lot of effort must have been expended in the past by a lot of people to solve this very problem, because it is the major fault of the G line. Run it straight, bend it gently and accept the loss, or forget it.

The final line arrangement here for field-pattern tests consists of 1 foot of RG-8/U foam coax plus 10 feet of copper-tubing, air-dielectric coax (loss 2.2 dB per 100 feet), plus 1-1/2 feet RG-8/U foam coax to launcher, and 75 feet of G line. Total loss in the system is 1.71 dB for the 87-1/2 feet. The G line itself can be lengthened or shortened with a Teflon sleeved No. 12 enamel wire, using a figure of 1.26 dB per 100 feet of line.

Conclusions

There is no question about the extremely low loss of the G line. It is simple to construct. There should be some commercially made wire product to take the place of the Teflon sleeved No. 12



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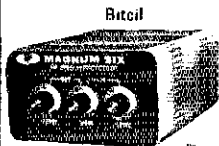
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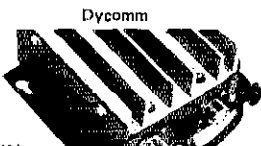
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enamel wire. It is a mistake to build the launcher and collector horns in a manner that forces them to pick up the line tension. The coax should be stripped of its jacket and shield for whatever extension is used from the apex of the cones to the line connection. The jacket should then be stripped from the braided shield for a distance allowing a metal-to-metal clamp right at the apex. Then the tension can be applied to the jacketed coax behind the horns. This floats the horns on the line and does away with heavy mounting brackets. The dielectric in RG-8/U is not a good weather-resistant material. In the final version here, a tight sleeve of Teflon was placed over the exposed dielectric for its entire 4-1/2 feet. This increased the diameter and interfered with tuning. Wrapping with light-gauge Teflon tape is a better approach.

Holding the line concentric with the horns is difficult though exact concentricity is not necessary. Small holes drilled at three or four places around the rim of the horn mouth allows tying the line to exact alignment with monofilament nylon line. This is a help. Studying the G line without input and output in-line wattmeters is bound to be difficult. I think the line can be adjusted, however, with a power-reading meter at the load end. It is likely to be right when further adjustment does not improve the output.

It is surprising to consider the number of approaches that suggest themselves when working on the line. Goubau felt the line would function best between 1500 and 3500 MHz. This would put 2400 MHz in a very favorable spot. Unfortunately I did not have this frequency available for the test. Those working at this frequency should give the line a try and let us know how it works. What will happen with different line sizes? Goubau took this into consideration theoretically and decided on No. 12 enamel line. Other sizes deserve a test. How much of the collector loss can be removed with a larger mouth on the horn? A horn with a wide mouth and greater included angle did not tune well here. A small horn right at the transmitter loaded as well as the bigger one, but it would not load at the end of 10 feet of 50-ohm coax. (The final amplifier here is probe coupled to the line and will match almost anything.) It was surprising how close objects could be brought to the line without reducing the output. Walk within a foot of the line, and the output dips. Place a piece of 2 x 4 dry lumber parallel to the line and it has to be closer than 6 inches to have any effect at all. The nylon slings used here were nice to use. They lessen my worry about absorption of power, but are far more elaborate than necessary. With support for the line every ten feet, dropping tension on the line put a ripple at every support point, and this showed immediately in the output reading. A tight line with a support at each end should be as good as, or better than, this multiple support system. When there are no standing waves on the line, dielectric washers and disks on the line have no readable effect on the output.

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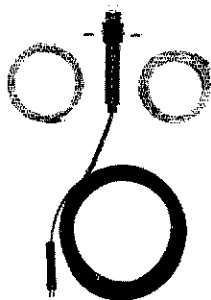
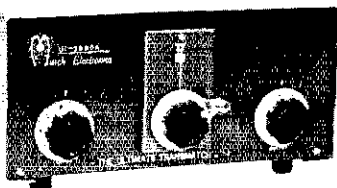


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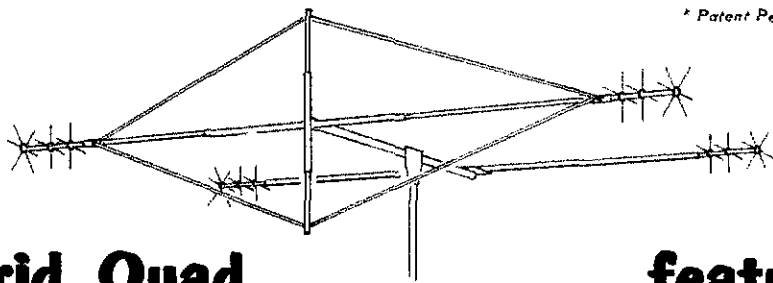
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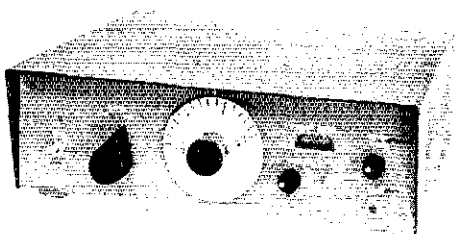
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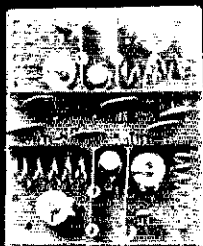
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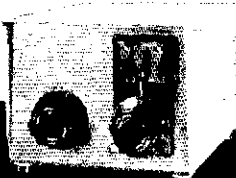


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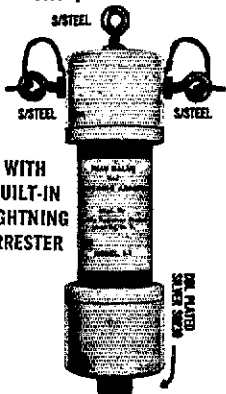
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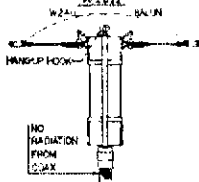
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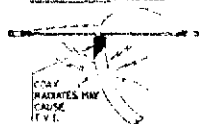
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essential up to the present time. In all other respects, it is believed that the rules governing the amateur service should apply equally to the Amateur Satellite Service.

The W.I.A. would view with concern any attempts to impose upon operations through any amateur satellite restrictions not compatible with ordinary terrestrial amateur operations. In these early days of satellite usage, it is considered that the maximum freedom of operations should be the aim and this cannot be achieved by new grades of license, new scales of fees, and a multitude of petty impositions which the ordinary amateur service would be expected not only to observe but also to police on behalf of authorities unable or unwilling to impose enforcement.

Finally, the W.I.A. believes that the regulatory and licensing authorities of many countries might refer to FCC Regulations on the subject as a guide for use in their own countries. It follows therefore that such originating legislation ought to be prepared with enlightenment and minimum restriction.

SWEDEN:

Our opinion is, as it has always been, that as few detailed limits as possible should be written in such rules. The Amateur Satellite Service is part of the Amateur Service and thus it should find room within the existing rules, perhaps with a few additions for, e.g., security reasons. Anything else is to use unnecessary bureaucracy. Amateur Radio's self-policing ability should be trusted as has been the case earlier in our history.

To be more specific, our answer is:

(a) License requirements and privileges should be those existing, i.e., an operator who within the limits of his license can operate in the satellite service, should be allowed to do so, provided he follows the rules set by the launching party for such operation.

(b) The technical standards for telecommand, telemetry, and the like must be decided on by the launching party, if necessary in cooperation with the authorities in that country, and hopefully after consulted the other IARU member countries, as this is an international question.

GERMANY:

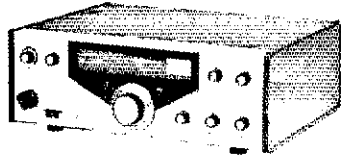
After discussion with our telecommunication authority, DARC wants to suggest that every not absolutely necessary regimentation concerning amateur satellite traffic should be avoided.

Firstly, there is no great possibility of influence on all participants in amateur satellite traffic throughout the world.

Secondly, the installation of telecommand stations for amateur satellites and their equipment should remain in the responsibility of the Radio Amateur Satellite Corporation (AMSAT) in cooperation with certain national amateur radio societies. It seems highly undesirable to make the telecommand system and methods known world-wide as would occur if special rules for licenses would be published.

Thirdly, every specialized regulation for the amateur satellite traffic would furthermore consolidate the most regrettable splitting, which at the WARC/ST Geneva 1971 has divided the amateur radio service with satellites from the conventional Amateur Radio Service. With this trend continued, further separate or additional licenses may become necessary. To prevent such dangerous develop-

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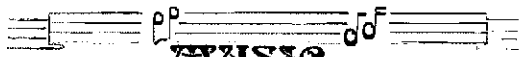


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ment, every regulation should be avoided as far as possible.

It should be taken under consideration that the German telecommunication administration wants to make the proposal at the WARC in 1979 to rejoin all the formerly split terrestrial and satellite services.

10) It is most significant that each foreign amateur society which has so far offered comment has taken the common view of pleading for minimal regulation of the Amateur Satellite Service. Those societies represent countries providing a large portion of the "foreign" amateur activity in the Oscar 6 satellite.

11) In the amateur field, six satellites have been constructed and provided a launch over a period of nearly 13 years. In the commercial and government field, certainly several hundreds of satellites equipped one way or another for communications, have been constructed and launched. The League is not aware of any current or proposed FCC rules which deal specifically with space research, inter-satellite, fixed-satellite, maritime-mobile satellite, maritime radionavigation-satellite, aeronautical mobile-satellite, broadcasting satellite, or any of the other services established by international regulations, some as long as eleven years ago at the 1963 Space conference. The League does not perceive the reasoning for giving initial attention to the Amateur Service as concerns satellite rules, while other areas of space communications, of considerably greater volume, have no rules applied.

12) The Commission already has adequate regulations to permit exercising necessary control over the emissions of earth-bound stations which use space radiocommunication techniques. Based on the experience of 13 years of amateur satellite activity with six different satellite packages, it can be said with confidence that whatever interference problems develop between amateur stations using space techniques and those using more conventional modes in the same frequency band can be settled internally, without the need or desirability for Commission rule making.

13) The design and construction of amateur space stations is a constantly changing technology, growing with improved knowledge and improved components. There should be no attempt to "force" a series of technical standards. Those who design and plan amateur satellites are among the more responsible of the amateurs. Their enthusiasm for ever improving design standards will automatically provide for the sort of design protection which will prevent harmful interference to other amateur stations. This capability has already been adequately demonstrated in the six satellites so far launched. Technical standards for the Amateur Satellite Service would at this juncture be artificial and inhibiting.

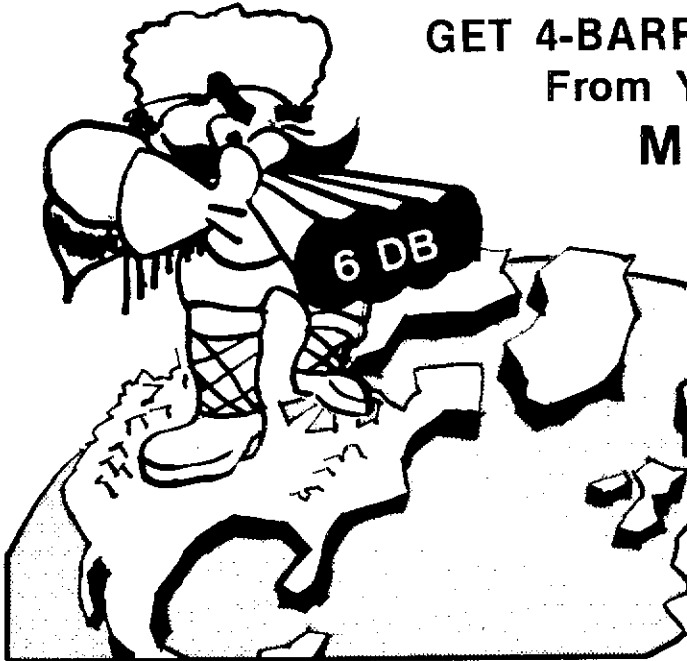
14) In summary, the League believes that the success of the Commission in attaining its objective "that the Amateur Satellite Service develop in an orderly fashion and in a spirit of cooperation with other amateur radio activities" will be measured by the simplicity of any new rules, with primary reliance on existing rules for the Amateur Service itself.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE
By Robert M. Booth, Jr.
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April 12, 1974

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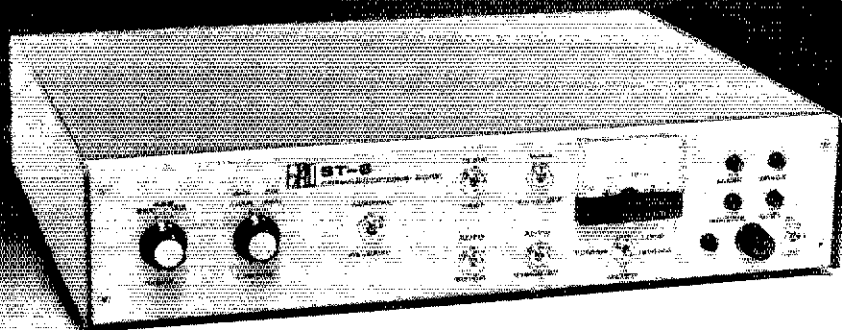
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The HAL ST-6 terminal unit has been hailed by experienced RTTY amateurs. Its immunity to interference and noise is the talk of the RTTY world as the best in the business. In fact, we built it to highest standards — but kept the price in a range that you can afford.

The features of this unit tell the story of why it's so popular: Auto-start operation, separate input filters for each shift, an antispacer feature, and switch selection of 850 and 170 Hz shifts are standard. An extra discriminator for a 425 Hz shift is available as an option. A space-saving special power transformer is part of the package; it includes windings for low voltage and loop supplies, and a 115/230 VAC primary. Dual-in-line IC's are mounted in sockets for ease of testing and replacement. Seven G10 epoxy glass boards with reliable wiping contacts hold all circuitry. Tuning is read from a 1 ma. panel meter which, at the flick of a switch, serves as a loop current readout. Other visual indicators display AC power on, Mark, and Space conditions. Two other lamps indicate whether the ST-6 is in the receive or standby mode. For maximum safety, a three-wire grounding

cord and grounding outlet for the printer are included. The power supply card contains easy-to-replace clip-in fuses. The ST-6 is available factory assembled and aligned, or in kit form. The PC boards and cabinet only are also available.

A popular option designed to plug right in to the ST-6 is HAL's AK-1 AFSK oscillator. Available assembled or in kit form, the AK-1 is an AFSK oscillator that demonstrates stability and reliability. It provides switch selection of 170 Hz and 850 Hz shift using standard AFSK tones. The AK-1 may also be mounted in its own cabinet for use as an independent unit. Frequencies are set by 15-turn trimmers for ease of accurate tone adjustment. The AK-1 operates on 12 VDC, or directly from the ST-6 power supply.

If you're ready for the very best RTTY at an attractive price, look into the HAL ST-6 TU, the 425 Hz discriminator, and the AK-1 AFSK oscillator. They'll give you all the help you need. Order yours today!

Prices:
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\$310 — ST-6 Terminal Unit
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All prices postpaid, USA. For air shipment add \$4 for the ST-6 kit or cabinet, \$1 each for the 425 Hz kit or the AK-1 kit, \$10 for the assembled ST-6 with any options.



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The DKB-2010 also has a three-character memory buffer which operates in either the RTTY or CW mode, allowing you to burst type ahead without losing characters. A 64-character memory buffer is also available as an option. Key function logic in either mode is governed by LSI/MOS circuitry. All key switches are computer grade.

The DKB-2010 is available assembled or in kit form. Should you choose the kit, you'll find construction easy — the unit consists of three assemblies: power supply board, logic PC board, keyswitch PC board, and pre-assembled wiring harness.

Any way you look at it — as an easy-to-build kit, a complete assembly, as a CW keyboard, or an RTTY keyboard, the HAL

DKB-2010 is a real breakthrough for every amateur. It adds a whole new dimension to the exciting world of amateur radio. Once you've used the DKB-2010, you'll wonder how you ever got along without it!

Prices: \$425 Assembled;
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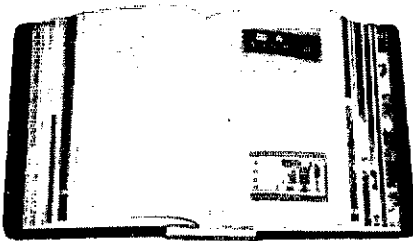
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(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

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(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information, Q.C.W.A. Inc., Box 394, Mamaroneck NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers - W7GAQ/6 Box 530, Santa Rosa CA 95402.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Rosemary Willis, 9276 Borden Ave., Sun Valley CA 91352.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O. Box 73, West Cotuit NY 11727.

THE NEW YORK Radio Club invites hams to club meetings, 2nd Monday of each month, 8:00 P.M. at the Williams Club, 24 E. 29th St., NYC.

MONTREAL hamfest 74, MacDonald College Farm, Ste. Anne de Bellevue, giant flea market, technical sessions, family fun, \$2.50/adult. Info contact, VE2RM, Box 201, Pointe Claire-Dorval, Quebec H9R 4N9.

BLUEFIELD, W. Va. Hamfest, August 24-25th, bigger this year. Big flea market, free space for information contact K4CGF, Ralph, Rocky Gap VA 24366.

2ND annual Des Moines Hawkeye Hamfest will be held on Sunday, June 15th, at the Iowa State Fairgrounds. Plenty of free parking. Flea Market, open area, no-charge, covered booth w/power, small charge. Dealer displays and expanded XYL activities. Saturday night auto racing and camping, extra. Registration \$1.50 advance \$2 gate. Write DMRAA, Box 88, Des Moines IA 50301.

MIX pleasure with pleasure at the Hamburg International Hamfest near Niagara Falls on September 2. For information contact Lin Brownell, WR2HCL, 210 Buffalo, Hamburg NY 14075.

WARREN Hamfest, largest family style hamfest in east. Sunday, August 18th, on famous Yankee Lake Park. Giant flea market, swimming, picnicking, all free. QST, WBVT-D, Box 809, Warren OH 44482.

HAMFEST: July 7th. Harrisburg Radio Amateurs Club, Indian Echo Caverns between Harrisburg and Hershey, Pa. off Route 422-322. Registration 10 A.M. \$2 at the door. Tables and tailgates \$2.

QSLs??? Largest variety samples 40c. Deluxe 75c. Religious 40c. (Deductable). Sakers, W8DED, Box 218, Holland MI 49423.

3-D QSLs - Increased returns assure users' satisfaction. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

PICTURE QSL cards of your shack, etc. from your photograph or art work. 500 - \$13.50, 1000 - \$18.25. Also unusual non-picture designs. Generous sample pack 35c. Half pound of samples 65c. Raun's, 4154 Fifth Street, Philadelphia PA 19140.

TRAVEL-PAK QSL. Kit - Send call and 25c; receive your call sample kit in return. Sameco, Box 203, Wyantskill NY 12198.

FREE QSL samples, Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

QSLs, samples 10c. Fred Leyden, WINZJ, 454 Proctor Av., Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send & receive catalog, samples and refund coupon. Wilkins Printing, Box 787-1, Atascadero CA 93422.

SAMPLES 20c. Harry Sims, 3227 Missouri Ave., St. Louis MO 63118.

QSLs 300 for \$4.65, samples dime, W8SKR, Ingleside II, 60041.

QSLs "Browie" W3CJ1, 3035A Lehigh, Allentown PA 18103. Samples with catalog 35c.

DELUXE QSLs. Samples 20c. Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78757.

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FRAME Display, and protect your QSLs with 20 pocket plastic holders. 2 for \$1, 7 for \$3, prepaid and guaranteed. Tepabco Box 198T, Gallatin TN 37066.

QSLs. Second to none. Same day service. Samples airmailed 25c. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSLs - Variety, quality, custom. Samples 20c or your QSL. Alkauprint, Box 3494, Scottsdale AZ 85257.

RUBBER stamps \$2 inclues postage. NJ residents add tax. Clints Radio, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

QSLs 3 color glossy \$4.50, samples 10c. Rutgers Vari-Typing Service, Thomas St., Millford NJ 08848.

QSLs, samples 20c. John Hull Printing, Rte 6, Box 41, Duluth MN 55804.

CANADIAN Surplus Catalog and flyers \$1. Elcox Electronics, Box 741, Montreal Canada H3C 2V2.

CANADIANS! Wanted: Johnson Viking "Thunderbolt" (or similar) linear amplifier, VES30U.

CANADIANS. Hallierasters SR400 MK11 transceiver with ac P/S - \$850. Mel Martin, 179 Dupont St., Chateaugay, Quebec, J6J 1H3.

VP2M land DXpedition! Modern house overlooking ocean, constant sea breeze. Hy-Gain quad at 70' SR200, 1R AVT, vertical \$90 weekly. Joe Beysterin, 60 Amsterdam, Toronto M4B 2C2. Tel. (416) 755-2117.

PRESTIGE call plates engrave on 2 X 8 blue black, red or simulated walnut plastic \$2 each. Winsor, 2049 Yosemite, Milpitas CA 95035.

PEORIA hamfest September 15, Peoria, Illinois, same place as last year. For further details see August issue of QST, Hamfest Calendar, Banquet Saturday, Sept. 14, at V. Junction - \$8 per person. Cocktails 5:30, dinner 6:30. Two motels within walking distance. Reservation deadline Aug. 31, cancellation Sept. 9, 150 maximum so get reservations in early. For hamfest tickets, \$1.50 advance (\$2 at gate), write Earl R. Kimzey, WA8SCA, RR1, Hanna City, Illinois 61536. For banquet reservations write Larry Pearsall, W9PFDY, 2224 W. Herold Ave., Peoria IL 61604.

THE 27th annual Turkey Run Hamfest and VHF Picnic sponsored by the Wabash Valley ARA, Inc., will be held Sunday, July 28, at Turkey Run State Park near Rockville, Indiana. Don't miss the midwest's finest flea market. Fun for the whole family. XYL bingo and flea market, food and refreshments, camping facilities and park recreation for the kids. Activities begin at 9 A.M. with free coffee and doughnuts. Talk-in 146.94 by W9UUU/9. For details send s.a.s.e. to WVARA Hamfest, Box 81, Terre Haute IN 47808.

THE Original fm hamfest, Sunday August 4, 1974, near Angola, Indiana. Free flea market, entertainment for ladies and kids. Picnic grounds, campsites, boating, food, soft drinks, available rain or shine. For information contact Fort Wayne Repeater Assn. Box 6022, Fort Wayne IN 46806.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL Toll-free: (800) 327-7799. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Vacum, Eimac, Amperex. Address: 412, 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9551.

SPIDERS for homeless quads. Helicar welded aluminum. A1's Antennas, 1339 So. Washington St., Kennewick WA 99336.

VERY in-ter-est-ing! Next 5 big issues \$1. "The Ham Trader," Sycamore II, 60178

GREATEST of them all! That's the ARRL 1974 National Convention! Remember the dates - July 19, 20, 21 at the Waldorf-Astoria, New York City. Three days of exciting events!! Wide array of demonstrations, exhibits and forums featuring latest in fm, SSVT, av, RTTY, fax, satellites, antenna design, transistors, integrated circuits, DX MARS, ARPSG and much more. Something to do every exciting minute for V.I.s & N.Y.s - tours, New York sightseeing, visits to popular TV shows, parties, fashion shows. Meet the ARRL President, vice-presidents, and all 16 directors! Famous-name speakers at Saturday Night Banquet! For info contact: ARRL Convention, 303 Tenafly Road, Englewood NJ 07631.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information, Amateur License, PO Box 6015, Norfolk VA 23508.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York NY 10013

MANUALS for most ham gear made last 25 years. Send SASE for quote. W0JJK, Hobby Industry, Box 864, Council Bluffs IA 51501.

WE BUY electron tubes, diodes, transistors, integrated circuits, microcomputers. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

MOBILE Ignition Switching gives more range, no noise. Kits and custom systems. Literature, Estes Engineering, 543-A West 184th, Gardena CA 90248.

WANTED: QST's 1920 and before. Also ARRL Handbook before 1940. W6ISQ, 82 Belbrook Way, Atherton CA 94025.

QST's of 1916, March through July, wanted for any unreasonable price. Also any tubes purchased at 5% over prevailing market price. Ted Dames, 308 Hickory St., Arlington NJ 07032.

JEHOVAH's witness who are amateurs write Bob Ellis WA4UQU, 160 Lagoon Rd SE Winter Haven FL 33880 or call (813) 293-3595.

P.C.'s Send large s.a.s.e. for list, Semtronics, Rt. 3, Box 1, Fellaire OH 43906.

TELETYPEWRITER parts, manuals, supplies, equipment, Toroids. S.a.s.e. for list, Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Buy parts, late machines.

WANTED: An opportunity to quote your ham needs. 35 years a ham gear dealer, Collins, Drake, Ten-Tec, Swan, Kenwood, Tempo, Clegg, Regency, Icom, Hy-Gain, and all others. Also \$25,000 inventory used gear. Request list, Chuck, W8UCG, Electronic Distributors, Inc., 1960 Peck St., Muskegon MI 49441. (616) 726-1398. Telex 22-8411.

STUDYING for FCC ham exams? Try Post-Check. Original, expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams; IBM sheets for self-testing; keyed answers with explanations. Each classification complete for its own class only. New General, including section on new Rules and Regulations 95.10, new Novice \$7.95; Advanced Class \$4.95; Extra Class \$4.95. Best class mailing included. Air mail 25c extra per copy. Send check or money order to Post-Check, P.O. Box 3564, Urbandale, Des Moines IA 50322.

NON-Commercial swap-sell ads run FREE in Radio. Send ads to Wichita Amateur Radio Society, Box 4391, Wichita Falls TX 76308.

UNIQUE wire tuner, like new \$45, Sheehan, Box 8352 Savannah GA 31402.

BRAND New Clegg 66'er, 6-meter transceiver, 22 watts input, built-in 117 V dc transistorized power supply, Urag, \$269, selling \$125. J. A. LaTorre, P.O. Box 521, Lawnview MA 01842.

COLLEGE ham club seeks donation of gear. Campus Amateur Radio Club, 4304 University Drive, Wichita Falls TX 76308.

LEAVING VHF, selling almost new Swan 250C, Mark 6B, TY2-C, Telrex on 1-element beam. Everything under 1-year old. All original cartons and manuals. Arnold L. Chase, WA1RYZ, 95 High Ridge Road, West Hartford CT 06117.

HW17-A, 2 m a-m transceiver; HW17-S fm adaptor, dc supply for above - \$110. Russ Burcham, Kennett MO 63857. (314) 888-3521.

CLEANING out: excess parts, antennas, equipment. Write, Marc Feib, W2GYQ, 669 Summit, Englewood Cliffs NJ 07632.

WANTED: Squires, Sanders Bandscanner, KWM2A, Heath or any other transceiver. Albert, 304 E. Courtland, San Antonio TX 78212.

NOW paying \$1750 & up for 618T/ARC-102 - \$1200 & up for ARC-51 - \$1,000 & up for 490T-1A antenna coupler. Also parts for these units. \$1500 for GRU-106. D&R Electronics, RD 1, Box 56, Milton PA 17847. (717) 742-4604, after 6:00 P.M.

AMATEUR Vacation. Livingstone Lodge, Massena Lake, New Hampshire, 03748. Cowsy cabin for two weekly - \$55. Swimming, fishing, boats, sports, ham radio, showers, fireplace, housekeeping, children half, tent, tents, literature. Q. Livingstone, W2LA. (603) 632-7784.

WANTED: Heath SR-840 external LMO any condx, also Antenna. Rick, 4618 Crestline, North Little Rock ARK 72116.

TELETYPE Model 26 LESU-8. Complete wiring for 28KSR, cables, loop supply, less polar relay \$15 each plus shipping. S.a.s.e. for complete list RTTY equipment. Larry Pfeiffer, 10615 W. Ridge Rd., Apt. 54, Hales Corners WI 53130.

URGENTLY needed for school science project: Hammarlund HR-10 or SP600VLF; any ARC-5 receiver, especially RCB or 6-9; Kustrak tape and recorder. Call person-to-person collect. Bob Ammous, (406) 543-6389 or write 411 Keith, Missoula MT 59801. Any reasonable price.

FOR SALE: Collins 7553-B, 32S-3, 312B4, 516F2, all mint condition - \$1295 firm. W9HCG, Alan Kogerup, 9508 S. Knoll Top, Union IL 60180. Phone (815) 923-4455.

CLEVELAND Institute of Electronics, home-study course titled, Electronics Technology, complete, 25 lessons, originally \$455, asking \$75 plus shipping. WB4PUE, 5200 Mawood Ave., Fayetteville NC 28304.

TRYING to make WAS with auto license plates. Will pay postage and send an engraved plaque with your call and name for desk door, or rig. T&C 73, John B. Thomas, K4NMT, Box 198, Gallatin TN 37066.

FM gear for sale: 4 Mot T44AAV, 1 Mot T53GKT, 2 Hammarlund FM-50A, 1 new Mot uhf "A" rec strip with PL-1 Mot "G" low-band rec strip on 52.525 with PL-1 GE Progress Line MTS, 5-channel phone less acc, 1 Mot P23 HT 1, Mot P-21 HT 1, Mot high-band 80D base station, 1 Aerotron bn35 SLS mtg. base, Andrew Mueller, WB9GAC, R 1, Box 203, Germantown WI 53022.

ANTIQUE - 1925 radio picture machine, rare collectors item, refer QST, May 1925, pages 18, 67, and cover "Linkins Motor-Driven Duplex Machine" make offer. W6KC, C. J. Camp, 950 Tasman Dr., 20, Sunnyvale CA 94086.

HEATHKIT HW-72A, HP-13A, HP-23A, new professionally wired, also Hustler antenna, resonator, mike, calibrator; good offer takes. W4PZD, 40-3 Robert Gardens, Glens Falls NY 12301.

MUST Sell: Swan 500 xcvr - \$259; 14-117 ac-dc power supply - \$89; 2-kw amplifier with 4-1000 A (partially assembled) - \$99. John Conners, K9PGF, 107 N. Peters Ave., Fond Du Lac WI 54935. (414) 922-7430.

DISCOUNTS: Antenna 7 refers: Hy-Gain two-meter 1/4-wave no-hole trunk mount - \$9.95; top position noise Hatter, 2000 8-way cars - \$19.95; Clegg 27B show demo - \$369, prepaid with ud. L. A. Electronics, 23044 Crenshaw Blvd., Torrance CA 90505. (203) 534-4466 (closed Sundays and Mondays).

COMPLETE Collins station, KWM2A with db and speech processor, 312B5, PM2, 516F2, 301A, 351D2, CP1, 399B5, new unused, round emblem, 516E1 used - \$48; list - \$24, as package only. Also 754A, 5N402, three filters, speaker, very good - \$300. W6KVEY, W. A. Shurer, 9350 Carmichael Drive, La Mesa CA 92041. (714) 466-3878.

SWAN Model 14A dc converter, 12 volt, new - \$35. F. Thiede, W2EC, 8 Nathan Hale Dr., Setauket NY 11733.

BUY, sell, trade. Write for monthly mailer. Give name, address, call letters. Complete stock of major brands, new and reconditioned equipment. Call us for best deal. We buy Collins, Drake, Swan, etc. S. & M. Associated Radio, 9012 Conser, Overland Park KS, 381-5901.

MAGNUM Six, brand new in original carton for 32S 1. Best offer around - \$100. Cash or money order, P. B. White, W4OM, 106 66th St., Va. Beach VA 23451.

SELL: Drake R-4A, T-4X, AC-4 - \$600; Heath HD-10 - \$25; TA-33 Jr - \$25. A. S. Berman, 622 Pleasant Ave., Highland Park IL 60035. (312) 432-6522.

SELL: Complete Heath station, HW-16 transceiver, HG-10B 80-Z VFO, HD-10 keyer, HM-102 wattmeter/SWR bridge, antenna - \$189. Individual pieces on request. Also Tenax \$20. WAIMSB, Greg Stone, 1346 Drift Rd., Westport MA 02780.

WANTED: 837 tubes, unused. Give price for four. WR2AZL, Don Baldwin, 28 Crescent Drive, Plattsburgh NY 12901.

FOR SALE: HW-16 - \$75, DX-60 - \$50; HG-10B VFO - \$25; A-1 Heathkit unit - \$30; cab (717) 488-3326, WA3PKU Nelson Sollenberger, R-7, Chambersburg PA 17201.

DRAKE 2B, all crystals, manual, calibrator - \$150, plus shipping. John Skubick, 1040 Meadowbrook, Warren OH 44484.

WANTED: Johnson Thunderbolt, no junk. W5SYX, R 8, Box 220, Springdale AR 72764.

DRAKE 2NT - \$90; Ten-Tec 200 VFO - \$55. Bob Mauro, 257 Center Ln., Levittown NY 11766.

SELL: Drake ML-2, 2 m fm, absolute mint condx! xtals for 8 channels, complete - \$219. WA3CUQ, 269 Greenwich St., Kutztown PA 19530.

CLEANING shack: pwr, fil, xformers, fixed, variable condx; chokes, meters, etc. back to 1924. S.a.s.e. for list, W2BGO, Box 288, Brookway, Valley Cottage NY 10989.

FOR SALE: My entire station. Drake Z-C xcvr, 2-NT xmitter; Eico T23 VFO - \$300, or best. Lionel Goulet, 28 The Fenway, Boston MA 02215.

EXCELLENT DX40 VFT - \$45; Viking Adventurer - \$20. Fair H&K 15 receiver - \$25; Hamray HW30 - \$15. K7KER 1924 Sourdough, Bozeman MT 59715.

NATIONAL NC303 with converters, speaker, manuals - \$200; trade for transmitter or 2 meter gear, or best offer. Must pick-up. J. Hampton, (201) 264-7870, after 6 P.M.

FOR SALE: HW101 cw filter, HP238, just back from factory, not over 20 hrs, on set - \$275. (A-1 keyer with key - \$50. Val, 29 Prospect St., Amityville NY 11701. (516) 691-3642.

COMPLETE station (former K9CYD) Mosley beam, Drake 2B, Q-multi, HT-37, 4-1000 A ant. tuner, mic., coax & other goodies. \$600 or offer. Phelps. (312) 381-6458.

SELL: HRO-5 with 4 coils, xtal-phasing, and power supply - \$30. Maskell, 144 Birchwood Ave., Brockton MA 02401. Tel. (617) 586-3174.

FOR SALE: Heathkit HW-12 transceiver. Good condition includes new tubes and manual. Price - \$75. T. A. Keely, 116 Meadowbrook, Fond Du Lac WI 54935.

COLLINS 7553B, 32S3, 30L1, 516F2, 312B4, with manuals, mint, mint condition - \$1,495. Swan 600CX, Super Special, 117 CV - \$495. WA2RGR, 4540 Harris Hill Rd., Williamsville NY 14221.

18 14VT/WB, good shape - \$150. George Black, Box 175# Moffat CO 81143. (303) 266-4862.

WANTED: Older cw receiver \$65 to \$125 with speaker, manual, nfo modified. 12 and you pay shipping. Consider NC138D, HC-300, RME-6900, Drake 1A, HQ-13A, HQ-129X, HQ-138X, HQ-170A, HRO-60, SX-88, SX-111, SX-117, SX-146, 75-A1 send details. Bill Downs, KOMNA, 4805 Sullivan Wichita KS 67204.

KENWOOD Twins, T599 and R599, both \$550. Drake MN-4, mint \$70. Knight FR-10, 8-meter very accurate, \$85, each. All mint w/manuals. WA4GIB, 7716 Enfield 202, Norfolk VA 23505.

SELL: HQ110 ac with spkr - \$120, DX20 - \$20; HM15 SWR - \$10; Hy-Gain HD140 vert. - \$25. Vibroplex bug, brown brook paddle - \$15 ea. All with manuals. David Treiff, Hardwood Acres, 7B, Stiles Ct 06268. (203) 456-1857.

SELL: SB-200 - \$195; DX-60 - \$45; and Knight VFO - \$15. K1MVT, 78 Mechanic St., Foxboro MA 02035.

SB650, digital frequency display, tested, never used, mint \$179. FOB D. Sachnoff, 9429 Ohio, Omaha NE 68134.

NEED schematic for Supreme Instruments Multiester Model 542. Max Kunzman, 412 Huntington Ave., Plainfield NJ 07060.

FOR SALE: NRI FCC first class license course, 49 texts - \$59, or best offer. Heathkit HG102 VFO - \$29. Don Snortland, 231 9th St., Breckenridge MN 56520.

WANTED: 12 V, 10-80 cw transceiver. Joe Smith, 2424 Marcia Dr., Pleasant Hill CA 94523.

SELLING Heath Apache - \$80; SB-10 - \$60; Globe DSB-100 - \$25; Globe 755A VFO - \$25. All good condition. David Roberts, K4FOY, Box 247, Paktonn NC 28371.

HEATH DX60B & relay - \$70; HR10B + crystal calibrator - \$80; HG10B VFO - \$40. All for \$150 + shipping. KP4DGT, 751 Calle 15 SE, Caparra Terr, PR 00921.

BEST OFFER, all or part HW101, HP23A, HW32A, SB200, Shelly, W6NFT, 10617 Debra, Granada Hills CA. (213) 360-3643.

YAESU FTDX570, 500hz filter; SP-401, matching ruke, Less than \$100. Hardly used, not a scratch - \$570. Charlie Jolicœur, Taftville CT 06380. (203) 889-1816.

WANTED: QSTs 1915 (December) 1916 (all except October and August), 1917 (January, February, September), 1919 (June thru December), 1920 (January, February, March, June, July), 1921 (December), 1922 (January). C. J. Mozzochi, W1YQ, Box 1315, Hartford CT 06101.

MAGAZINES for sale: CQ/73/QST 15 cents each including postage - 12 for one dollar from W2JGF, 5 Oakbrook Rd., Ossining NY 10562. Send list and check available issues and refund will be sent promptly. Toiva A. Rae, 5 Oakbrook Rd., Ossining NY 10562.

HQ-180 ac serial 30916833 perfect condition with speaker S-200. - \$300. form. No ship, pick up only. WA4HNX, A. Hochstetler, 2026 Funston St., Apt. 2, Hollywood FL 33020. (305) 920-6467.

SALE: Swan 500CX & 117 xc mint, 32' aluminum tower, TR44 rotator, TA33 Jr. antenna, SWR bridge, low-pass filter, electronic TR switch, coax switch, coax relay, HD15 phone patch, Vibroplex keyer, microphone. Many extras, package FOB - \$700. WB2DWX, 1153 Outer Dr., Shenectady NY 12303. Tel. (518) 355-2618.

WANTED: Hallcrafters HT45, linear amplifier with ac power supply and Hallcrafters HA-10 if/mf tuner. Tom Hambleton, 5737 Cahalan Ave., San Jose CA 95123.

GENERAL coverage receiver; Heath SB-310, flawless and filtered, extra, sb, cw - \$170. Gary, W6GWAP, 2221 Guthrie Circle, Los Angeles CA 90034.

SELL: Galaxy GT-550 transceiver, SC-550, AC-400, CAI-25 and P-3 cw filter. Vry gud condx - \$400 and t ship. WA3QFD, 120 Thomas Penn, Hatfield PA 19440.

MINT HW-16, excellent Eico 722 VFO, 11 crystals, extra tubes, coax, speaker, relay. First \$100 takes. You ship. WN0JNH, 1106 Seventh, Fairbury NE 68352.

BUILD digital multimeter using standard parts: four digits display, 1000, amps, ohm, 27 ranges very accurately. Plans \$2.98, Green Bank Scientific, Box 100N, Green Bank WV 24944.

WANTED: 2 LF for Drake 2B. Also borrow, buy Heath QT-1 manual, W2POV, 81 Eberling Drive, New City NY 10956.

SELL: R4B w/outboard filters; TX4X, ac; Magnum-6 late (TX4); 516F-2; Hy-Tower electrical. Wanted: Comdel; Curtis Keyer. K1VFM. (203) 224-4581.

SELL: Hallcrafters HT40, 75-watt Novice xmtx. Good working condition with manual - \$40. Vibroplex "original" model, mint - \$15. You ship. Jon Croke, WB9HMO, 395 Berkeley, Winnetka IL 60093.

WANTED: Six-meter converter for KWM-2. WA3QMK, Box 442, Shamokin PA 17872.

SELL: Heathkit SB-301; SB-401; SB-200; model 26 teletype, model 14-TD; TG-16, perforator. Like new. All for \$550. W1GLR, 133 Oxbow Lane, Guilford CT 06437.

MANUALS: Motorola vhf T power U43GGT, Business dispatch/Mocom 50 D33CMT - \$3 each. K6AVF, Box 568, La Mesa CA 92041.

WANTED: Matching spkr. and 2.1 kc filter p/n F455J21 for Collins 75A4 revr, must be excellent. K2LZJ, Romagnino, 2 Plowboy Path, Comack NY 11725.

SELL: Heath SB401, SB301, SB600, Electro Voice 638 mike, all manuals and cables - \$425. WA3HRP, RD 2, Hegins PA 17938. (717) 682-9592.

SWAN 508 VFO - \$90; VX2 VOX - \$17. Both perfect. Will ship. WB8DAR, 7300 Reitz Rd., Lot 2, Perysburg OH 43051. (419) 833-5386.

PROCEEDINGS IEEE, Jan 67-Dec 73, Electronics Feb 70-Dec 73 & CQ Jan 65-Dec 73. Best offer for whole lot or for all issues, same publication. W4TG, Wayside GA 31032.

WANTED: Heath SB500, two-meter transverter in good condition. Tom Fuller, 2100 Utica, Tonawanda NY 14150.

WANTED: 100 kc crystal calibrator model, HA-10 for Hallcrafters general coverage receiver, model SX-122A. Robert J. Colarusso, P.O. Box 581, Alpena MI 49707.

GALAXY R-530 spk 3 opt. filters - \$450; AK-breakboard 4700, Federal 59, other old radios; also send s.a.s.e. Make offer R. Becker, 1021 Chestnut Waukegan IL 60085.

WILL buy cabinet for Hammarlund SP600 receiver. Check or master card. Royal Enders, 7625 Meredith Ave., Omaha NE 68134.

TOROIDS 44 and 88 mby 5/8 2.75 pp. M. L. Buchanan, P.O. Box 74, Sequel CA 95073.

EICO sb/a/cw transceiver. Model 753, Call (802) 425-2614. 1110. Thomas R. Luhr, Hill Point Drive, Charlotte VT 05445.

FOR SALE: Collins 70K-2 PTO for S line & KWM-2 part 922-1093-000 value - \$217. Like new - \$90. Heathkit SB-610 signal monitor w/manual. Like new - \$75. M. Maruya, JA7DBG/W6, 20821 Amie Ave., Torrance CA 90503.

ATTENTION Heathkit owners! Service and modification manual for the 59 and hw series transceivers and transmitters. Over 125 troubles and their possible causes, Rf voltage charts, resistance charts, and trouble shooting procedures that are easy to follow. Transmitter and receiver modifications that will improve your system in minutes. Act now and become your own expert. Send \$7 for prepaid manual in U.S.A., \$8 elsewhere to: Data Service, 911 Melissa St., Torrance CA 90502.

ANTIQUE Atwater kint TRF be console circa 1928 with tubes and speaker mwt condx. You ship. Best offer. K2GS, R. Beck, 13 Georgetown Rd., Parlin NJ 08859.

WANTED: Drake TC-2 converter for TR-6. For sale: Swan 250-C, 117-cv, with TV-2C transverter, late model, mint - \$585. Russell, 19680 Mountview Dr., Maple Hts OH 44137. (216) 662-2175.

FOR SALE: 800 watts plate transformer, 16 mm movie projector, 16 mm movie camera, gsap gun type. Peter Donneau, W1YX, 11 Blanche Ave., Cumberland RI 02864.

FOR SALE: Lampkin 105B frequency 6Meter and uhf harmonic generator - \$175; Allied A-2515 all-band receiver - \$50; Regency TME-8A aircraft monitor with 3 crystals - \$100; 2-Motorola T51GV mobiles and C51AAB base, \$400/lot, Ground 30W 5-band base, used - \$150. Rob of New Scan monitor, mint - \$200; Hammarlund SP-600 - \$200; Regency DR-200 Hi & Lo tunable monitor - \$75; Hickock 288X a-m/fm signal generator - \$75; Allied KG686 signal generator - \$50; Argus President 35 mm slide projector w/access - \$75. Beckman 6121, 60 MHz counter with 180 MHz prescaler mint - \$650. Pat Darby, 608 Nursery Ave., Maitland IA 70005. (504) 833-7929.

WANTED: dc p/s for Galaxy V MK III, mobile ant. 80, 40, 20 m, kW matchbox, 14 AVQ, write "Brad" WB9LFD, 1029 E. Behrends, Peoria IL 61603.

FOR SALE: Communicator IV, 2 meters - \$110; Communicator IV VFO for 6.2 & 220 - \$45; Genet Model 3251 12 volt, 80-10 meter mobil converter, new-never used - \$35. QSTs 1950-1967, complete except 7 issues, best offer. WA6BYA, 1101 Martin Road, Santa Cruz CA 95060.

SELL: NCX500, AC500 like new - \$250. Drake R4B - \$325. 14 Teubin, W2GCV, Box 55C, Mtn. View Drive, Elizaville NY 12523.

HEATH HW-101 with cw filter, HP23B power supply. Expertly wired and aligned - \$275; W0DKX/4, 2941 Kedron, Winston-Salem NC 27106.

HEATHKIT HW-16 with HG-10B VFO. Expertly wired. Mint - \$130. WN5KMN. (512) 585-3432.

NEED amateur call books 1922-24-26-27. Will pay cash or trade my extras 1923-30-35. K6NA, 780 S. Grand Ave., Pasadena CA 91105. (213) 682-2915.

ESTATE sale for Silent Key, W2FGV, Galaxy GT550 with ac supply and speaker - \$375; Galaxy remote VFO - \$50; Galaxy phone patch - \$30; Collins 75A2 with GE sideband selector & spkr needs work - \$100; Heath SB-303 never used - \$295 or - \$395 with SB-200; Hy-Gain 30A presently top of town - \$80; 75-foot Tri-ex motor driven tower - \$200 and you must take it away. Heath HM-15 - \$9. Waters 359 comprem - \$12; D104s (2) - \$10 each. Anthony Pantuso, W2BBE, 76 Anderson Pkwy., Cedar Grove NJ 07009. (201) 256-7196.

MOVING: Swan 250 - \$215; Swan 350 - \$259; Ameco TX-62 with VFO - \$95; Eico Keyer - \$39; Vibroplex paddle - \$13; all mint condx. T1B000 beam - \$50; EZ Way 61 foot tower, crank, foldover with ground post - \$225; freight extra. W5SYB, 5000 Hall, Amarillo TX 79109.

FOR SALE: Drake TR-4C with noise blander - \$475; DC-4 power supply - \$75; both in perfect like new shape, you pay shipping. Alan Moss, W7GYR, Route 1, Box 8, Samuels ID 83862. (208) 263-3726.

DISCOUNT prices plus full warranty. Call or write for fast quote and delivery. All items new, guaranteed. Midland 13520 WT - \$209.95; new CDE Ham-2 - \$109; CD44 - \$79.95; Belden wire rotor - \$10/ft; 20% off list. Belden TH61XX, 2048A, 402BA, Mosley Classic 33, MCQ3B quad; Belden consolidated RG6 foam coax \$214 1/8/ft; Belden 7214 RGR foam 100 ft/PL259 ends - \$17.95; Amphenol PL259 59c; Discount Trix tower W51, MW50, MW65, FOB Calif.; Quote Swan, Drake, Kenwood. Prices low Houston; Free flyer. Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668. Nite/weekend (713) 497-5683.

SWANTENNA 55 (less control unit - \$25; Heath inverter - \$30; Heath HP-13 supply - \$40; will trade for Dycemmm amplifier for TR-22 or equivalent, Mike Craig, Rte 8, Box 340, Tucson 85710.

SALE: 1 Motorola 6 & 12 V dc two-way radio with remote control, microphone, remote speaker, all cabling; 130 MHz to 174 MHz. Excellent for 2-meter mobile fm - \$50; 1 National NC57 receiver with Gonsel Cascade amplifier and Gonsel 2-meter converter - \$30; 2 GE mobile 25-54 MHz fm units only - \$20 each. Ronald Leddy, K1LAW, R-2 Pine Tree Hill Road, Newtown CT 06470.

EDDYSTONE Dial, sliderule type, 110/1 ratio, new - \$22 postpaid. K6FV.

WANTED: Oscillator Collins 70K2, plug-in elements for the "Bird 43 Thru-line wattmeter"; Heath kit HW-18 CAP, sss transceiver. Also any kind transistors by-the-pound, for experiments, please specify its characteristics, autometric keyer paddle. Leo, P.O. Box 3316, AMF, Miami FL 33159.

PROP-pitch motors for sale. Excellent condition, FOB. 1965 La Cuesta, Santa Ana CA 92705. Days (714) 833-2133, nite (213) 835-1926.

MOTOROLA HT-200, excellent, includes charger, stubby and whip antennas, external hand mike and speaker mike, spare battery, manual, xtals 94/94, 224/22 - \$235 cash price includes shipping. W6PGK, P.O. Box 99463, S.F. CA 94109.

FOR SALE: Drake TR-6, N.B. AC-4 & MS-4. Excellent condition - \$500. Jim, K4HOC, 2011 5th St. W. Apt. E. Bradenton FL 33505. (813) 747-8535.

HEATH TX-1 - \$78; Hammarlund HQ 140X - \$95, both with manual. D. Voit, 1 Ruskin Circle Dr., Apt. 201, Dimmitt TX 79027.

NOVICES: Heath HR-10 rec, HRA-10-1 calib, DX-60A trans, HG-10B - \$125. Clair Hoffman, RD 2, North East PA 16428.

WANTED: RCA, Motorola, or similar unit capable of 46.10 & 46.12 MHz with dual monitoring. Must have control head and cables for trunk mounting. Must be in excellent condition. WA2GMC, 11 Francesca Drive, Oyster Bay NY 11771.

SELL: Drake TR-4, AC-4 with speaker - \$400. DC-4 - \$80. Bill Adkins, 509 Gordon Lane, Erie PA 16509.

PHILADELPHIA area: Hammarlund HQ-170AC-whf with i-f noise immunizer, HX-50A matching transmitter; Heath HO-13 panoramic adaptor. Everything \$500. WA3OBW. (215) HO 2-4293.

UHF Parks 430-3 fet conv., like new; pair Eimac 4-400A's; Collins 4-400 MHz wattmeter; Hy-Gain "HIL"; Ten-Tec PM-2A like new; Gonsel II 2 meters; Hewlett-Packard reg. P.S. model 629A, excellent; Lambda reg. H.V. P.S. C1260; Allied tube tester, K6600C, new; Eimac PMR-6 revr, gud sby or Novice rc; T-23 50 watt 2 mtr. xmit; hf tunable LP filter; Johnson electr. TR switch, excellent, more. Steve Katz, WB2WIK. (201) 366-9326.

TEMPO fmp - \$180, includes rechargeable batteries and 6 crystals. Hustler 5/8 2 m. antenna - \$20, both excellent. Gary Carmack, WA7GFT, 4902 E. 18th St., Tucson AZ 85711.

COLLINS 51J-4 or 51J-3 wanted. Bill Moyer, W2KKJ, Box 121, RDS, Troy NY 12180.

HEATH HW-100 transceiver and PS - \$195 FOB. Mort Caldwell, WB1FN, 1068 Windsor Ave., Morgantown WV 26505.

MOBILE station, HW-22A, HP13, mike, cable, master mobile antenna with coil - \$125. WB6SQW, 320 Mooney Drive, Monterey Park CA 91754. (213) 280-1517.

LOW MILEAGE, mint condition: 758-3B at \$500; HX-50 exciter at \$150; and HXL-1 linear at \$150. Also, deluxe mahogany remote control console including built-in Bird model 43 wattmeter, TR-4 rotor, mike, speaker, meters, etc. at \$100 (\$350 to build). Purposely priced below market in order to sell! Peter H. Bliss, WB2TD, 3024 Cardinal Place, Lynchburg VA 24503. (804) 384-7601.

FOR SALE: Pearce Simpson Gladding 25 e/w 6 channel's, arrange for R. pad & pi for \$169. G. Smith, 340 Granville, Bellwood IL 60104.

WANTED: Johnson navigator in good condition. WB6TMY, Warren Reese, General Delivery, Ukiah CA.

CONVERT your Regency HR to a scanner with the RK-4 four channel scan module featuring memorized return from instant priority channel searchback - \$24.95, completely built. Write R & K Products, 4295 Kenridge, Grand Rapids MI 49508.

QUAD kits from \$145.00 to \$25. Send s.a.g.e. for information. WAC, 404 Sanders Rd. S.W., Huntsville AL 35802.

WANTED: Mint condition unmodified GPR-90 or SP-600 JX receiver, reasonably priced. W5AME, Box 96, Temple TX 76701.

FOR SALE: Hammarlund HQ 170, excellent - \$110, you ship. J. Fraits, 1611 Electric Avenue, Venice CA 90291.

FOR SALE: QST's 1940 through 1969, make offer. Richard Bush, WA4KQK, 4007 Alton Road, Louisville KY 40207.

WANTED: Knight V-44 VFO. Chris Brugman, WN2SYS, 100 Louis Road, Schenectady NY 12303.

DRAKE R-4 - \$225, KR-20 Ten-Tec keyer - \$25; 2 element quad - \$50; by Cubex 3-band almost new Hustler vertical - \$30; 5 band Dow antenna - \$10; relay new. All very mint, you pay shipping, except antennas. David Kiley, 915 S. Court St., Medina OH 44256. 723-5441.

WANTED: Solid-state Swan, monobander, Atlas or similar, T-22, HRT-2 or similar GTX-10, AC3, WA5AAU, Box 335, L Grange TX 78945.

COLLINS 75S-3B, mint 2100 Hz. filter - \$600, firm, Inguma (317) 476-7965.

WANTED: tower and antenna. Nori Akiike, 1200 Kenton Drive, Monterey Park CA 91754. (213) 288-2428.

SELL: Tektronix 514D scope - \$175, Boonton 202B, vhf generator - \$70 (needs bandswitch). Prefer local pickup. W9LJU, 354 N. Stewart Ave., Lombard IL 60148. Tel. (312) 627-7271.

SELL: McCoy golden guardian 48Ba 9 MHz ssb filter with upper and lower sideband crystals - \$25. Pat Bradley, WA4RGH, Box 156, Temperanceville VA 23442.

WANTED: National NC-190 receiver with book. Will pay \$15 for mint condition. Bart Burchaell, W6BCA, 2039 17th Avenue, San Francisco CA 94116. (415) 731-4563.

WANTED: Collins 312B-5, Ferguson, K5AD/2, Box 507, Medford NJ 08055. (609) 654-5377.

SELL: Swan 117XC supply - \$75; Swan NS-1 noise silencer - \$22. You pay shipping. H. Richardson, 1109 Dakota S.E., Albuquerque NM 87108.

WANTED: HQ180 ac Swan 600T 600R CE200 V. Bird 43 T test equipment fm generator. Waskowitz, W2KPF, 35-30 73 St., Jackson Heights NY 11372.

DRAKE 2C, 2CQ, xtal calibrator, for sale, absolutely mint condition - \$200. FOB or best offer. Al Vazquez, 31 Harpertown Road, Elkins WV 26241.

WANTED: Beacom liner 2 or liner 2DX Japanese two-meter solid-state sss transceiver. David Sumner, K1ZND, RR5, Box 2, East Hampton CT 06424.

COLLINS 75S-1, mint - \$295. Electrovoice H64 mike - \$35. Paul Capetz, 701 Bubbling Well Dr., Glendora CA 91740.

FOR SALE: Swan 350C with 117XC power supply, Heath warrior linear - \$175 postal MO only you pay shipping or pickup. Willie N. Love, K6MFA, Box 411, Atlanta TX 75651.

GERTSCH FM-6 frequency meter, 0.001% perfect with manual - \$275 or best offer; Swan 250 with microphone - \$185. Collins 516E1 supply - \$40, you pay shipping. Wanted: 3 to ke mechanical filter for 75A3. Oleg, K1WHS, Poplar Hill Road, West Lebanon ME 04027. (203) 658-9076.

SELL: reasonable HP416A ratio meter, Pseudo HP562 digit recorder, W6ISG, Emil Kasprzyk, 1531 Sixth St., Santa Monica CA 90401.

WANTED: 01 A tubes, manual for RCA AR77 receiver, Vol. "Surplus Radio Conversion Manual." Will purchase or copy return manuals. Lloyd Salkamp, 4723 L-Way, Ames IA 50010.

NOVICE DX-60A, HG-10B - \$80; HQ-170C with speaker - \$130. All good condx with manuals. Take all - \$200. You ship. W9MGR, 2119 Grant, Lake Mills WI 53551.

SELL: Heath HM-102 wattmeter/SWR - \$23; R & W Prolox 35 - \$12; B & W 592 - \$9; all new Greene 1170 E 22nd Marysville CA 95901. (916) 743-3871.

HAMMARLUND HQ180 w/spk - \$210; model 15 TTY w/14 pwr supply, table, Stoner TR-1 converter - \$150. K8LJO, 141 Andrea Dr., Brunswick OH 44212.

SALE: Hallcraft SR-400 with matching power supply, a manuals, less than 2 yrs old - \$495; Swan TV-2B beam antenna up 4 months - \$55, going to college - Help Larry Remm (WB9GII), 1321 Ruger, Janesville WI 53545. (608) 752-9651.

KENWOOD TS-611S sss transceiver with PS-5115 power supply VFO 5SS remote vof, and cw filter - \$510. One and a half year old, with original cartons. Ed Kaitn, WA1JZC, 75 Tumblebrook Lane, West Hartford CT 06117. (203) 233-9915.

HEATH: GR-7B short-wave receiver. Absolutely mint. Used less than 100 hours, not aligned with carton, manual - \$100. WB3CLU, Larry D. Tucker, 802 W. Joliet, Ottawa IL 61350.

FOR SALE: Complete ham station, B & W 5100-B transmitter, B & W 515B single-sideband generator; Hallcraft SR-7 receiver & speaker, Heathkit reflected power meter, Dowiec relay microphone, antenna wire and other items. All in excellent condition. Price \$250. G. Ross, WB2UOD, 190 Demarest Ave. Closter NJ 07624. (201) 768-7864.

HEATH DX100B transmitter converted to SB, Heath SB1 converter. All manuals. Excellent condition. Best offer. Maurice Barrett, 49 Abbott St., Nashua NH 03060.

SELL: mint DX-60B w/VFO - \$68; SX-111 - \$125. WA2LOR (212) 528-1184.

FOR SALE: Drake T4-X, R4A, AC-4, combination. Darn good! \$550. Homebrew, 1200-watt PEP linear - \$80. GE voice commander - \$35. WA7PCA, 95 W. N. Logan UT 84321.

WANTED: 30S1, L4B or Henry Linear, and Collins 516FZ. Stat. best price and condition in first letter. Sell: Galaxy V ME II - \$195; AC35 - \$60; CAL35 - \$9; SC35 speaker - \$10; National 200 - \$175; NCCA supply - \$65; 75A4 sn 4904 - \$375; Ranger - \$74. W9HF, 505 Roxbury Ct., Ft. Wayne IN 46807.

WANTED: F455J05 filters, sell/trade: F455J31 filters. W3PQK, 615 Market St., South Williamsport PA 17707.

COLLINS 32V3 excellent for RTTY or vhf exciter — \$150; Johnson Viking 2 VFO 22 completely rebuilt mint condition — \$75; excellent for 160 or Novice rig. Call (201) 891-3064. WA2MVQ, 404 O'Brien Court, Wyckoff NJ 07481.

DRAKE linear L-4B, less than 8 hours total operation time. Power supply, cables, everything like brand new — \$650 or best offer. Mark Weiss, W3GAV, 18 Vita Road, Totowa NJ 07075. Phone A.C. (201) 256-4577.

HP-13A power supply, 2 hrs on it, mint — \$48; HW-17, mint + \$75. U pay shipping. O. F. Crags-Baird Ave., Meadville PA, 724-2497.

WANT to buy Collins 312B-5 console for KWM-2 also Drake MN2000, and a Magnum Six for KWM-2. Also trade clean all original 1936 Pontiac 2DR Sedan, drive anywhere, for Collins late model complete 5-line, with 30L-1 or sell car — \$1800, or open to other offers. Richard Schark, 417 North Ferry, Ottumwa IA 52501. Phone 682-5741.

FOR SALE: Galaxy V transceiver with matching speaker cabinet containing ac power supply, dc power supply, remote VFO, RX-2 special VFO — \$35; calibrator — 35B vox & rector, you pay shipping — \$175. Also Globe model V-10 VFO — \$15. WB4QPH, 1549 Findlay St., Deltona FL 32763.

KENWOOD TS 900 transceiver, remote VFO 900, ac power supply, PS 900 cw filter, 6 months old, excellent condition in original boxes — \$725. Tel. (203) 585-5433. KIPNL, 226 E. Main St., Bristol CT 06010.

NCX-3, NCX-1, 1200 w linear — \$275. Pete Linder, W3CUP, 207 Beechtree, Broomall PA 19008.

SELL: Brand new Drake SC-2 two-meter converter, SC-6 six-meter converter, CC-1 console, CFS-1 power supply, SCC-1 calibrator — \$175. W3WIP.

2 M Hartman commercial 12 V linear 2-1/2 w input, 110 w output, automatic TR switching, 12 X 4 X 4", \$100. SX101 MK II, needs alignment — \$80. Both excellent, with manuals, FOB. K9JSC, 2101 Neva, Chicago IL 60635.

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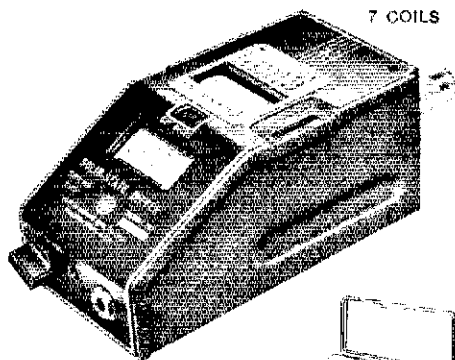
WANTED: tower crank-up 50-60 ft. converter cement base studs — \$75. S.F. Bay area CA (W6RGZ), 1330 Curtis, Berkeley CA 94702. (415) 526-7345.

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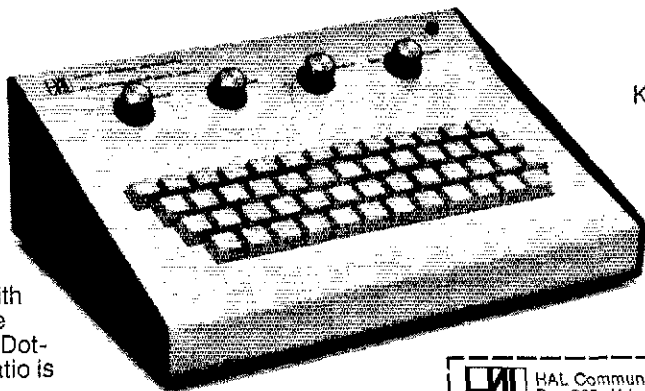


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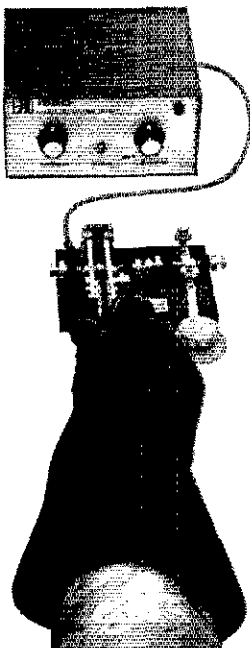
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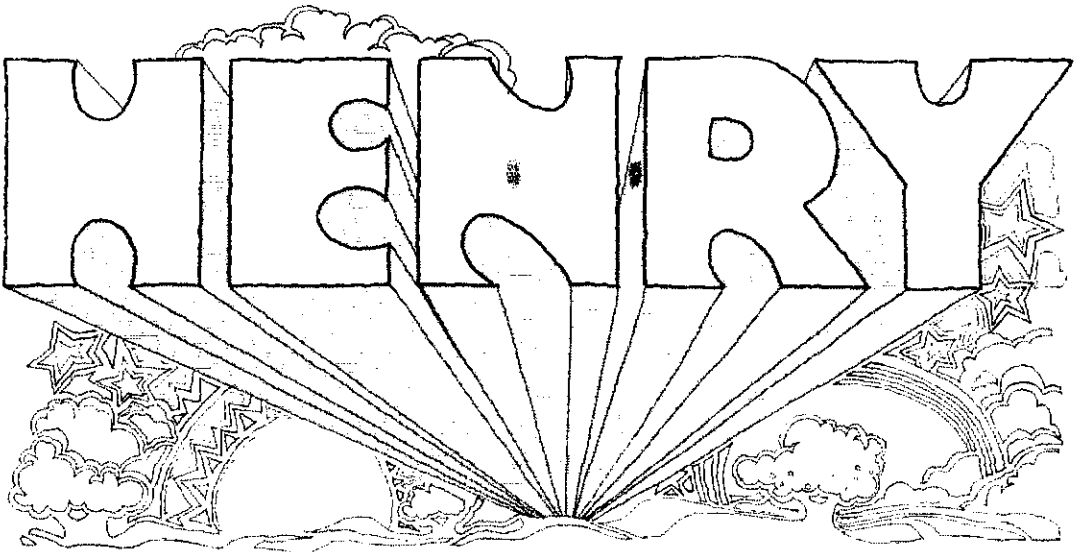
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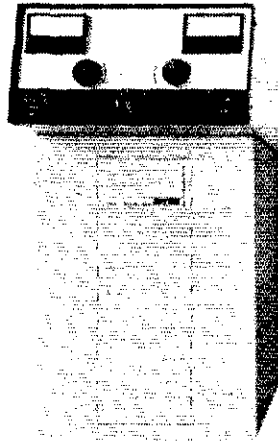
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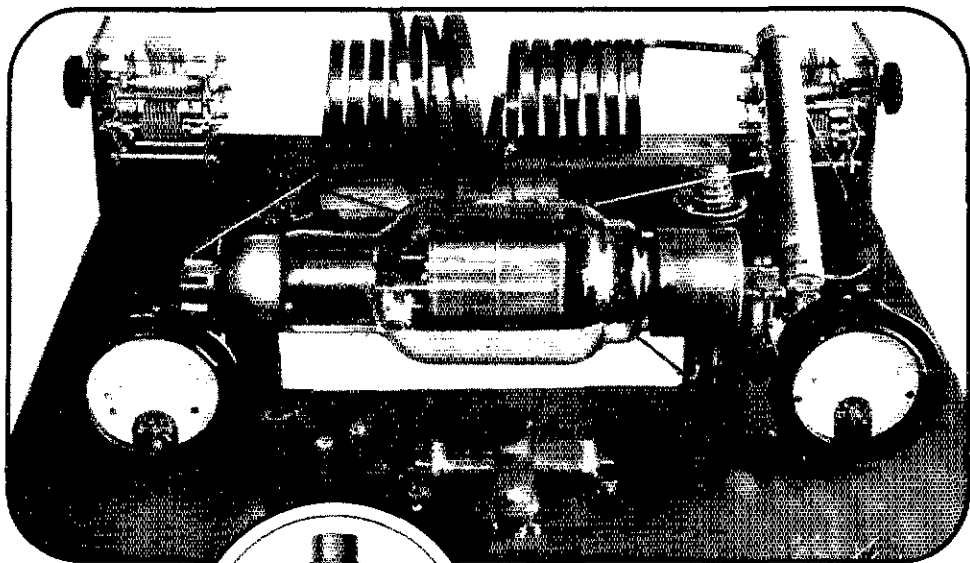
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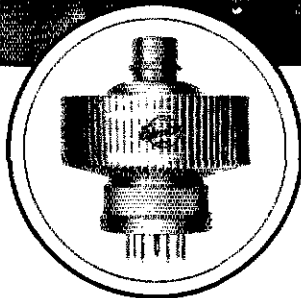
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