QST

May 1969
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amateur radio

OFFICIAL JOURNAL OF THE ARRL

PORTABLE COMMUNICATIONS
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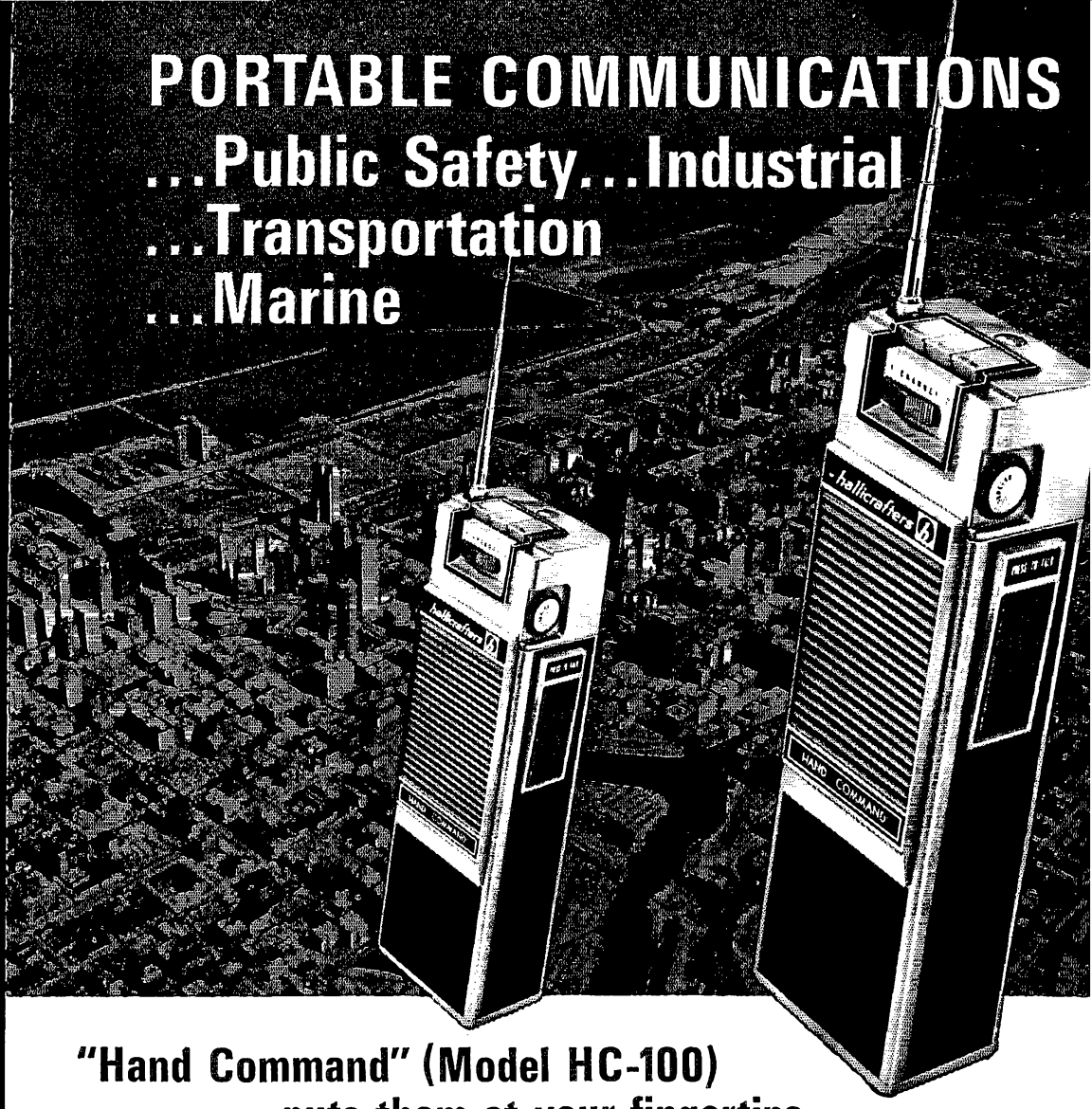
...Transportation
...Marine



"Hand Command" (Model HC-100) puts them at your fingertips.

- Made in U.S.A.
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- Covers 148-173 MHz frequency band.
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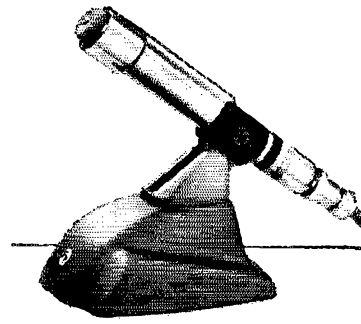
With a proud heritage of design, manufacture and field performance to demanding Government specifications, Hallicrafters' "Hand Command," Model HC-100, brings a new dimension to personalized two-way communications. Fully compatible with any existing radio system operating in the 148-173 MHz frequency band with or without continuous tone squelch. The "Hand Command" is now in use in a variety of applications, including Police and Fire, Plant Operation and Security, Railroads, Ships and Barges, and many others. Write today for complete details in free descriptive brochure.

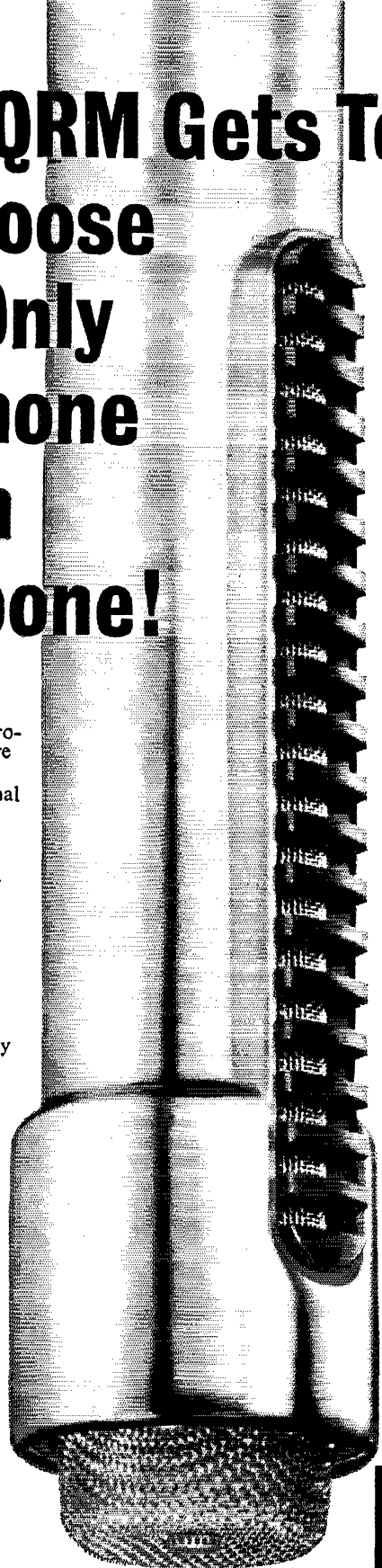
the hallicrafters co.
A Subsidiary of Northrop Corporation

600 HICKS ROAD
ROLLING MEADOWS, ILLINOIS 60008

When QRM Gets Tough Choose The Only Microphone With Backbone!



ELECTRO-VOICE
MODEL 676
DYNAMIC CARDIOID



The backbone of the Electro-Voice Model 676 is no mere decoration. It's visible proof of the most exciting idea in directional microphones—Continuously Variable-D (CV-D)™.

Here's how it works. We attach a very special tapered tube to the back of the microphone element. This tube automatically varies in effective length with frequency. It's a long tube for lows—a short tube for highs. All this with no moving parts! The tube is always optimum length to most effectively cancel sound arriving from the back of the microphone, regardless of frequency.

This ingenious solution* is years ahead of the common fixed-path design found in most cardioid microphones. It means you pick up less noise and room reverberation, ensuring a crisp signal and optimum vox performance. It also is less sensitive to wind and shock—ideal for field days! There is almost no "proximity effect"... no boosted bass when you must operate extra close.

Long life and peak-free response are guaranteed by the exclusive E-V Acoustalloy® diaphragm. And the 676 has unusually high output for a microphone so small. Of course you get both 150-ohm and Hi-Z outputs, plus high efficiency dust, pop, and magnetic filters—indeed, all of the hallmarks of Electro-Voice design that have made E-V a leader for years.

But that's not all. The 676 has an exclusive bass control switch built in. Choose flat response (from 40 to 15,000 cps) or tilt off bass 5 or 10 db at 100 cps to eliminate power-robbing lows that reduce efficiency and lower intelligibility. You'll be amazed at the reports of improved audio you'll get when you switch to the E-V676.

Visit your E-V distributor to see this remarkable new microphone today. And when difficult QRM must be faced squarely, stand up and fight back with the microphone with a backbone (and CV-D)—the new Electro-Voice Model 676 dynamic cardioid!

Model 676 Satin Chrome or TV grey, $53.40 net; in Gold, $56.70 net. Shown on Model 420 Desk Stand, $12.60 net. Model 674 identical except stud-mounted with On-Off switch, $56.70 net.

ELECTRO-VOICE, INC.
Dept. 592Q, 631 Cecil Street
Buchanan, Michigan 49107

Electro-Voice®
A SUBSIDIARY OF GULTON INDUSTRIES, INC.

*Pat. No. 3,115,207

there's a reason for the S/Line's reputation

The main reason is performance. Amateurs around the world praise the S/Line's clean, strong signal. But there are design reasons, too. The S/Line is an engineered system. Each unit augments the others to provide single sideband operation at its best.

You can operate the system as a transceiver, or transmit with the 32S-3 and receive with the 75S-3B on separate frequencies. The S/Line offers upper and lower single sideband and CW operation . . . plus AM reception.

Two linear amplifiers, 500 watts or 1000 watts PEP, round out the full-performance S/Line.

See your Collins distributor for details on the most respected system in the amateur field.

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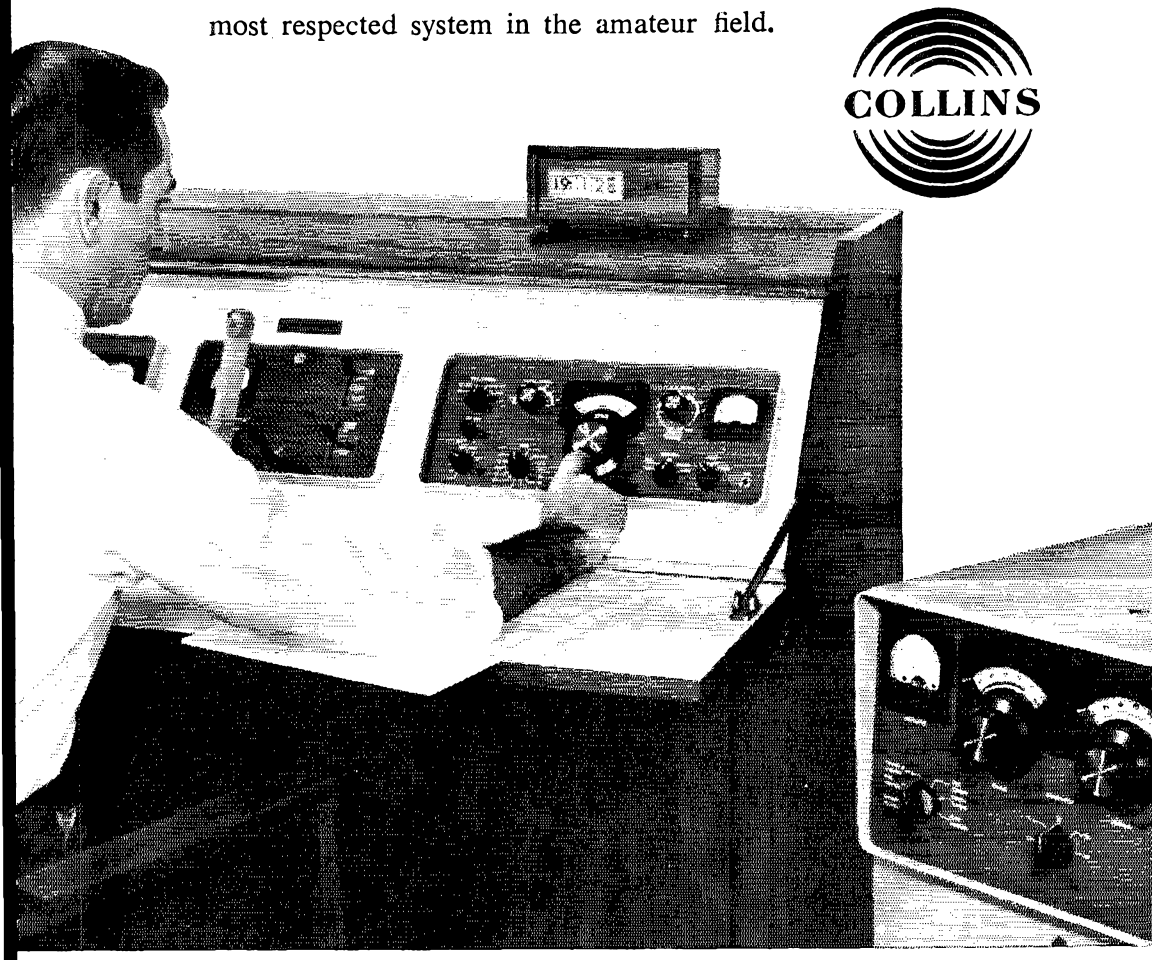

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OUR COVER

If you tend to think that v.h.f. gear is inherently inefficient, the performance figures for W1QWJ's 220-MHz. 500-watter may surprise you. See page 21

—CONTENTS—

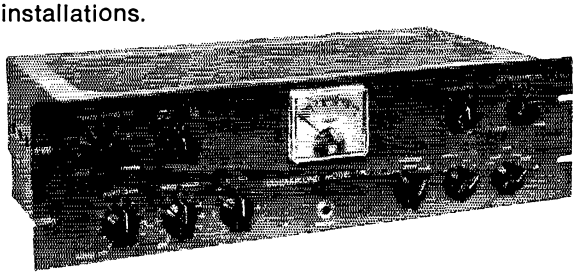
The Hammarlund Superpr

Nothing else even comes close.

For continuous communications under the most difficult conditions — when the message *must* get through — Hammarlund Superpros have been the mainstay of Armed Forces and Government Agencies around the world!

The world famous Hammarlund SP-600 series Communications Receiver is available in three frequency ranges (10 KHz-540 KHz, 100 KH-29.7 mHz, 0.54 mHz to 54 mHz); single or dual diversity. In cabinet or rack mounted units.

Tunable over 6 continuous bands, each band has 6,000 readable settings! Sensitivity of 1.0 microvolt on CW/SSB, 2.0 microvolts on AM. Image rejection is at least 74 db down and spurious responses at least 100 db down. Selectivity with three crystal and three non-crystal filter positions is from 200 Hz to 13 kHz. Radiation is negligible with no cross talk in multi-receiver installations.



The SPC-10 Single Sideband Converter can be operated with any receiver having an IF frequency of 450 to 500 kHz. When interconnected with the SP-600, it provides SSB reception at its best. The SPC-10 is a completely self-contained unit with a tunable 60 db slot filter. Selectivity is variable in seven distinct steps. Selectable AVC. Together the Hammarlund SP-600 and SPC-10 have set a standard of performance rarely, if ever, equaled.

Send for the SP-600 brochure—it has all the facts!

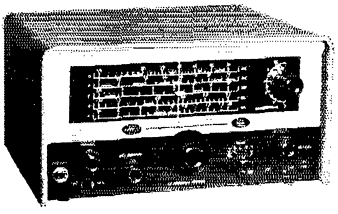
Established 1910

The **HAMMARLUND**
Manufacturing Company Incorporated
A subsidiary of Electronic Assistance Corporation
73-88 Hammarlund Drive, Mars Hill, North Carolina 28754

Just Getting Started In Ham Radio?

If your interest in ham radio has only recently developed you already know by now that there are hundreds of brands of equipment from which to choose, some costly . . . some not too costly. For years, Ameco equipment has appealed to the beginner because of its modest cost, yet with engineering and manufacturing quality you would expect to find in really expensive gear. Read about our All-Wave Receiver and Novice Transmitter below, then write for our new Ameco catalog to get complete specifications on these and other moderately priced items.

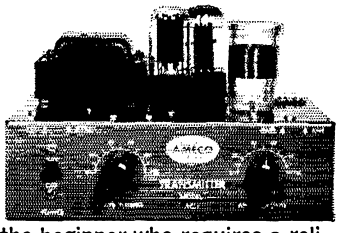
Model R-5A Allwave Receiver



An exceptionally fine receiver for the short wave listener and beginning amateur operator. Fully transistorized-solid state. Covers .54 Mc through 54.0 Mc in five continuous bands. Includes standard broadcast band, all foreign broadcast bands, all amateur bands from 160 through 6 meters, all 27 Mc CB channels, all 2 way radio frequencies from 30 to 50 Mc including many police and fire departments. Controls include Beat Frequency Oscillator, Noise Limiter, Bandspread. Provisions for external "Q" multiplier. Compare with tube-type units costing as much!

Wired and tested $99.95
Battery adapter kit. (permits operation from 12 VDC or eight "D" cells) .....$ 3.95

Model AC-1 Novice CW Transmitter Kit



The ideal kit for the beginner who requires a reliable TVI suppressed transmitter. Keying is clean and chirp-free. Crystal controlled, PI-network Output Circuit. Includes AC Power Supply. For 40 and 80 meters, CW. Fifteen watts input. Kit is simple to build and easy to operate.

Kit with coil for any 1 band, including tubes $23.95
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Radio Amateur Theory Course: Gives sufficient information to pass the FCC exams for the Novice, Technician, General and Conditional Classes of Amateur Licenses. The Ameco Theory Course is the shortest path to getting a ham ticket.
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Complete Jr. Code Course (100 series) $3.95

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Section Communications Managers of the ARRL Communications Department

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 SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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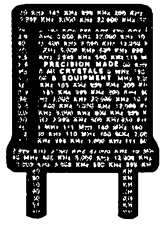

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International Crystal Mfg. Co., Inc.
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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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*Member Executive Committee

"It Seems to Us..."

PUBLIC RELATIONS

Every now and then a newspaper or magazine item will include mention of amateur radio activities in something less than complimentary fashion. The subject is usually amateur interference. Occasionally the item is directly antagonistic; more often the disparagement is implied, or conveyed by an inaccurate headline.

Usually, an alert local ham or club will take immediate action by contacting the paper or writing a letter to the editor in an attempt to obtain clarification and set the matter straight. While a desirable procedure, it still has the disadvantage of again mentioning interference and amateurs in the same breath, and thus tends to accentuate the association of ideas.

There's a much better basic approach.

What is needed is full, complete and accurate accounts of all *other* amateur doings, so that any localized problems such as interference will seem (as indeed they are) minor in comparison to the good that can be and is being accomplished by public-spirited hams. In other words, a good long-range public relations program. To paraphrase the song title, you eliminate or neutralize the negative by accentuating the positive.

Naturally, any emergency activities of amateurs should be promptly and fully reported to newspapers, radio and TV stations. If the report reaches the media while the emergency still exists there is a good possibility the editor will give pictorial coverage. But in any one community emergencies are few and far between. You can't create a disaster. Yet you can be alert to participation in civic projects, or to initiation of some of your own, to maintain and improve the local standing of your amateur group.

A number of clubs have cooperated in fund-raising drives — e.g., an all-night telethon on behalf of cerebral palsy, where a net control station at the Hq. channeled incoming pledge calls to mobile units spread around the city for prompt pickup. In another city, famous for its huge parades, hams offered their services to the grand marshal; the procession started on schedule for the first time in the city's history — and hams did themselves a world of good in public relations.

But you don't need to wait even for fund drives or parades. Except in the larger cities, a great many amateur occurrences are considered newsworthy. The local club receiving its charter of ARRL affiliation; a local amateur making DXCC; setting up an e.m.e. or Oscar ground station; appointment of an emergency coordinator or RACES radio officer; participation by clubs members in a contest, Field Day, or hamfest; delivery of a message from a serviceman in Vietnam to his mother — these and a host of other activities, however common they seem to us, can mean an inch or two in the Daily Bugle or 30 seconds on "The Voice of Podunk."

Next month ARRL Field Day June 28–29 will present a special opportunity for good public relations. Moreover, the week of June 22–28 is listed as "Amateur Radio Week" in Chases' *Calendar of Annual Events*, which many editors, columnists and on-the-air personalities use as an idea starter.

What else? Well, is your PTA putting on a hobby show? Be in it! Kiwanis looking for a speaker? Volunteer! Does your company have a "house organ"? Its editor would probably be delighted to have a feature story on hams in the company.

Publicity helps are on tap at League Hq. to make it easier for you, too. A sample speech, interview, and b.c. program, each available for the asking, can be the basis for a presentation spiced with local color from your own experiences. And we have reprints of outstanding stories, which have appeared in nationally-known magazines, as handouts to an audience after your talk, or for distribution at your club's hobby show exhibit.

Good public relations are important to nearly every society, corporation or charity, but especially important to us — our very licenses depend on our activities being "in the public interest, convenience or necessity." We must leave no doubt in the minds of the public that we fill this requirement to overflowing. QST

League Lines . . .

This page is prepared after the rest of the issue is put to bed, so here's some last-minute news of FCC-proposed changes in our rules. First, on petition by WA4FIJ, to allow maritime-mobile use of 7.0-7.1 MHz. when outside Region II, in addition to presently-authorized use of 20, 15 and 10 meters in those areas; Cmdr. Ackerman's request for 75-meter privileges was, however, denied. Second, on a somewhat dusty (1965) petition of ARRL, to establish an exclusive c.w. band 144.0-144.1 MHz. in place of the present one at the top edge of the band; and (another ARRL petition) to permit RTTY (F1) operation in the 10-meter c.w. band, i.e., 28.0-28.5 MHz. Comments from interested parties are solicited, with a deadline of June 11. Complete details in June QST.

If you work a lot of DX, or even a little, you should have a self-addressed, stamped envelope at your ARRL district QSL bureau. See page 70 for details on the system. If you expect a lot of cards, put on extra postage -- but not too much, or it will take longer than you think to fill the envelopes. A good compromise is 12 cents.

While a compliment or two, as usual, exists elsewhere in the annual report of FCC, one section of fiscal 1968 -- for the first time in Commission history so far as we can recall -- is sharply critical (underscoring added):

> The past year has shown a significant trend toward increased on-the-air feuding and use of questionable language in a radio service which historically has prided itself on cooperative self-regulation. Limited manpower has prevented attention to any but the most flagrant cases. Approximately 2,800 violation and advisory notices were issued to licensees during the year.

Is a word to the wise sufficient?

Clubs wishing to set up FD operations in advance may do so again this year, but in such event only 24 consecutive hours (of the 27-hour FD period) are permitted. Any other contest rules comments? Send 'em to the now-elected chairman of the Contest Advisory Committee, W6CUF (see page 62, March QST).

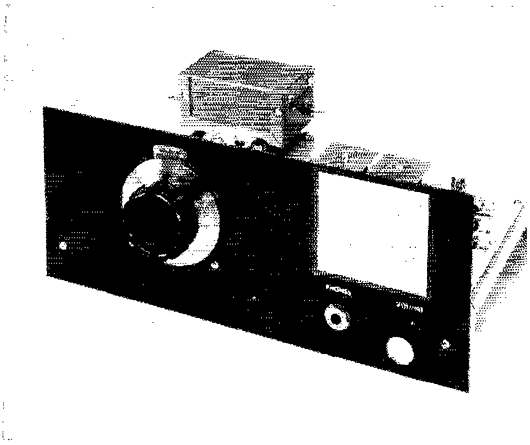
Some confusion has been caused by editorial changes in the way FCC tabulates amateur band/mode privileges. F-3 is now listed with A-3 for all the h.f. bands, instead of the former designation "n.b.f.m." But the matter is clarified by Section 97.65(c): "On frequencies below 29.0 Mc/s and between 50.1 and 52.5 Mc/s, the bandwidth of an F3 emission (frequency or phase modulation) shall not exceed that of an A3 emission having the same audio characteristics . . ."

If any Life Member has not yet received his special emblem pin, let us know; a few appear to have gone astray. As a separate matter, we have provided some 800 lapel pins for 25-year membership records. No charge, but they are issued on your request not automatically. Write us if you rate one.

Quote-of-the-month from "Bandspread," newsletter of the Wabash Valley A.R.A. -- "It appears we were much better off when the subject of patches was ignored and was non-authorized equipment. Everytime someone brings up a problem we get it real good!"

The D.C. 80-10 Receiver

BY DOUG DEMAW,* W1CER



Front view of the direct conversion receiver. The panel is finished in machine gray spray paint. The two controls are main tuning and audio gain.

THE D.C. 80-10 should appeal to those amateurs who are interested in building practical solid-state equipment. This receiver operates from 12 volts d.c. and draws only 40 ma. These modest power requirements suggest that it could be operated for long periods from a flashlight-cell battery pack, an important consideration during portable and emergency operations.

A 0.3-μv. c.w. signal can be detected easily on all of the ham bands covered by the receiver. Ample audio output is available to drive high-impedance phones to a comfortable listening level, on weak signals. Since there is no warm-up drift after approximately 10 seconds, good stability can be expected. A 2.5-kHz. toroidal audio filter provides suitable selectivity for copying a.m. and s.s.b. signals, even when the bands are crowded. Though the receiver operates nicely on c.w., additional audio selectivity could be added "outboard" by those who desire a narrower passband.

By using the direct-conversion approach in this design[1] complexity is greatly minimized. A product detector is used as the first stage of the receiver for 80-meter reception, and serves as the input stage of a tunable-i.f. receiver when the plug-in converters of Fig. 2 are used for receiving the four higher bands. The detector is used in combination with a b.f.o. which tunes the same range covered by the detector — 3.5 to 4 MHz. Audio output from the detector is passed through the 2.5-kHz. toroidal filter, then is amplified to headphone level by a single audio stage. Performance is comparable to that of a superhet except that single-signal reception (in which the audio image is eliminated) is not possible, nor is there any automatic gain control. Because of the simplicity of the circuit, and because there are only two operating controls, beginners should have no problems in building and using this receiver. The b.f.o. is always in operation, but a.m. signals (if they are stable) can be copied as easily as they are on a standard s.s.b. receiver.

A quick price analysis showed that the main section of the receiver costs approximately $26, minus the circuit board, if all components are purchased brand new. The converters cost approximately $12 each, less circuit board, when new parts are purchased. Naturally, the workshop "goodie" trove should provide many of the parts required, thus greatly reducing the total cost.

Circuit Information

Though the circuit of Fig. 1 may appear somewhat involved, it isn't. There are only three stages in the main receiver section — an integrated-circuit detector, U_1, a JFET b.f.o., and a bipolar-transistor audio amplifier. The input tuned circuit, consisting of L_2 with C_1, C_2 and C_{3A}, covers the range 3.5 to 4 MHz. Light coupling is used between the tuned circuit and the detector input to minimize spurious responses from strong out-of-band signals, especially those of commercial broadcast stations. (Heavier coupling caused cross modulation to occur when the receiver was used in the vicinity of some local broadcast transmitters.)

The b.f.o. operates over the same range as the detector, and the two stages are gang-tuned by means of C_3. The b.f.o. signal from Q_2 beats

* Assistant Technical Editor, *QST*.

[1] Hayward and Bingham, "Direct Conversion — A Neglected Technique," *QST*, November 1968.

Here is a direct-conversion receiver that is easy to build, uses semiconductors throughout, and provides ham-band-only reception from 3.5 to 29.5 MHz. with excellent stability and sensitivity. Circuit-board construction assures neatness and helps to minimize mechanical and electrical instability.

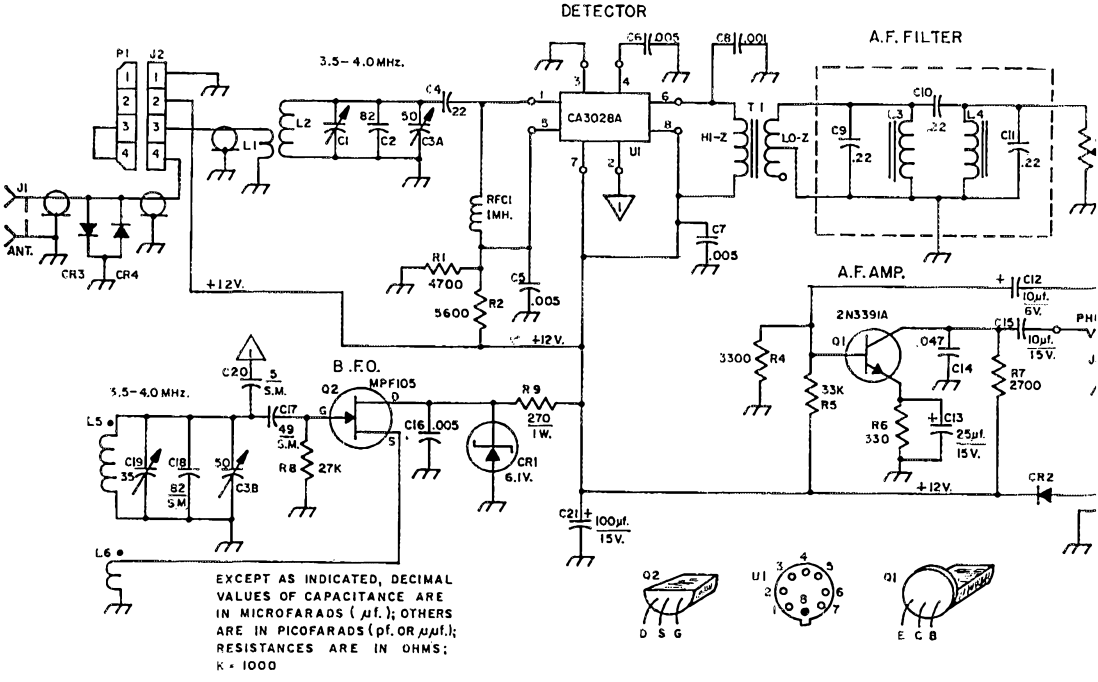


Fig. 1—Schematic diagram of the main portion of the D.C. 80-10. Capacitors with polarity marking are electrolytic. Other fixed capacitors are disk ceramic unless marked S.M. (silver mica). C_9, C_{10}, and C_{11} are dipped polyester types. Fixed resistors are ½-watt composition unless noted otherwise. Component numbers not listed below are for identification purposes on the circuit board.

C_1—3-30-pf. compression trimmer.
C_3—Split-stator variable, 50 pf. per section (see text).
C_9-C_{11}, inc.—Dipped polyester, 100 volts (Cornell-Dubilier type DMF suitable).
C_{19}—7-35-pf. ceramic trimmer (Centralab type 827-D or similar).
CR_1—Zener, 6.2 volts, 1-watt (Motorola HEP 103).
CR_2—Silicon top-hat rectifier, 50 p.r.v., 100 ma. or higher (Motorola HEP-161 suitable).
CR_3, CR_4—Small-signal silicon switching diode (1N465A or similar).
J_1—SO-239-type chassis connector; phono jack also suitable.
J_2—4-pin tube socket.
J_3—Single-circuit phone jack.
J_4—Male two-terminal chassis connector (Switchcraft 5501MP or similar).
L_1—6 turns No. 24 enam. wound over L_2 to occupy ⅓ of core.
L_2, L_5—36-inch length of No. 24 enam. on Amidon* T-68-2 toroid core; 45 turns total.
L_3, L_4—88-mh. toroid (see *QST* Ham Ads for suppliers).
L_6—14 turns No. 24 enam. wound over L_5 to occupy entire circumference of core. *Observe polarity.*
P_1—Base from discarded 4-pin tube, or jumper made from two banana plugs.
Q_1—Low-noise a.f. preamplifier transistor, n-p-n silicon, high beta rating.
Q_2—N-channel JFET, 30-MHz. rating or greater (Motorola MPF105 or HEP 801).
R_x—1000-ohm linear-taper carbon control.
RFC_1—1-mh. r.f. choke (Millen J300-1000 or similar).
T_1—10,000-ohm primary to 1000-ohm secondary driver (Lafayette Radio 99T6124; use ½ of secondary).
U_1—RCA CA3028A integrated circuit.

* Amidon Associates, 12033 Otsego St., North Hollywood, Calif. 91607

Converter Coil—Capacitor Table

Band (MHz.)	*Osc. (MHz.)*	L_7 *(Turns)*	L_8 *(μh.)*	*Miller No.*	C_{22} *(pf.)*	L_{10} *(μh.)*	*Miller No.*	C_{28} *(pf.)*	C_{29} *(pf.)*
7-7.5	11.0	7	9.4-18.7	42A155CBI	33	1.7-2.7	4503	220	150
14-14.5	10.5	3	3.6-8.5	42A686CBI	25	1.7-2.7	4503	220	150
21-21.5	17.5	3	2.12-4.10	42A336CBI	15	1.7-2.7	4503	100	100
28.5-29	25	3	1.3-2.7	42A226CBI	15	0.44-0.76	4501	100	100

Capacitors C_{28} and C_{29} should be silver mica for best stability. Miller parts can be ordered from J. W. Miller Co., 5917 South Main St., Los Angeles, California 90003, or from authorized J. W. Miller distributors. L_7 is close-wound over ground end of L_8 using No. 24 enam. wire.

against the incoming signal to furnish a beat note for c.w. reception and to provide a carrier for copying s.s.b. signals. Zener-diode voltage regulation is used in the drain supply to Q_2, to enhance the stability of the receiver.

Audio output from the detector is passed through a 2.5-kHz. bandpass filter which uses two telephone-type surplus 88-mh. toroids.[2] Output from the filter is routed to the gain control, R_3, which terminates the filter in its characteristic impedance. A bipolar transistor, Q_1, amplifies the audio signal to headphone level. The a.f. amplifier is designed for use with high-impedance phones, 1000 ohms or greater. A polarity-guarding diode, CR_2, prevents damage to the circuit components in the event the power supply is connected for the wrong polarity. It will conduct when positive voltage is applied to its anode, but is nonconducting with negative voltage.

For 80-meter operation a jumper plug, P_1, is inserted into J_2, the converter socket. P_1 completes the antenna circuit by shorting terminals 3 and 4 of J_2, and the receiver operates straight through. Plug-in converters are attached to the receiver at J_2 for 40-, 20-, 15-, and 10-meter operation. This results in a double-conversion arrangement, the main portion of the receiver being a tunable i.f. system. Diodes CR_3 and CR_4 conduct at approximately 0.6 volt to offer burnout protection to U_1 during 80-meter reception. When operating the four higher bands the diodes protect the mixer FET in the converter being used. This precaution is necessary when the receiver is to be used near or in combination with a transmitter.

The circuit for the converters is shown in Fig. 2. Each consists of an FET mixer, Q_3, and a fixed-tuned FET oscillator, Q_4. A crystal-controlled oscillator was considered, but in the interests of economy a self-excited oscillator was used. It is very stable and is easy to adjust. Though Zener-diode regulation is not used on the drain-supply line to the converter, it could be added if desired. This would entail the addition of a 100-ohm 1-watt resistor and a 9.1-volt Zener diode. The Zener diode and dropping resistor would be connected to the circuit in a like manner to that used at Q_2 in the main receiver. The two components could be connected to the converter socket, J_2, under the main chassis, at pin 2.

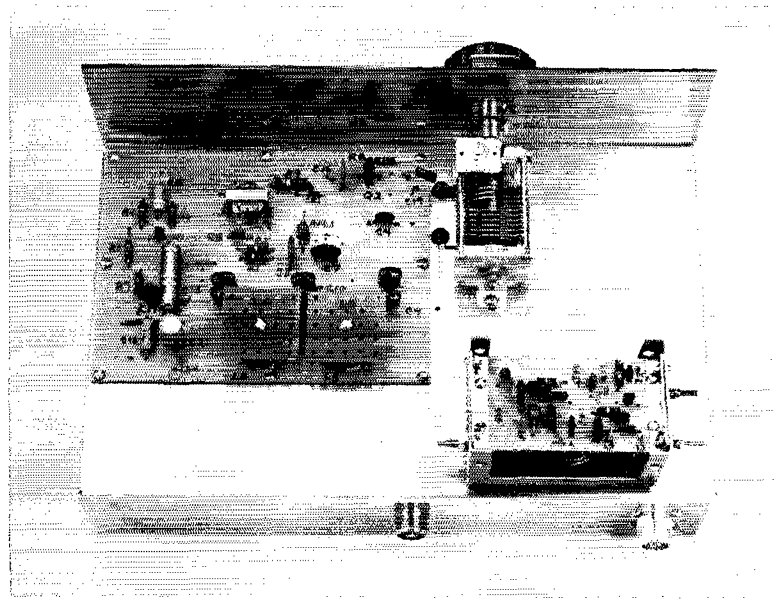
Construction Notes

A hand-made aluminum chassis and panel are used as a foundation for the receiver. Since the chassis is 2 inches high, 11 inches wide, and 7 inches deep, a Bud AC-407 can be substituted. The panel is 11 inches long and 4½ inches high. The chassis is larger than necessary, but the unused areas provide space for additional circuits that may eventually be added, such as an audio amplifier board for speaker operation. If the builder wishes to make the receiver smaller in size, it should be a simple matter to rearrange the components accordingly.

Though etched-circuit construction[3] is shown here, there is no reason why point-to-point wiring cannot be used. (Examples of both wiring methods are shown in Fig. 3. The circuits are the same, one converter being built for 40 meters and the other for operation in the 20-meter band.) The integrated circuit, U_1, is mounted on the foil side of the circuit board by means of a 10-pin integrated-circuit socket (Motorola HEP 451).

[2] Uncased 88-mh. telephone-type toroids are usually listed in *QST* Ham-Ads. Many surplus houses handle them too.

[3] Ready-made circuit boards for this receiver can be obtained from Stafford Electronics, 427 S. Benbow Rd., Greensboro, N. C. Also, Foto-Etch Co., 1760 Santa Maria Drive, Concord, Calif. 94520. Scale templates are available from ARRL for 25 cents.



Looking at the top of the chassis, the plug-in converter (its cover removed) is installed at one corner of the chassis. The main circuit board is located near the front panel and is mounted over a chassis cutout. Unused space remains for the addition of circuit refinements later on.

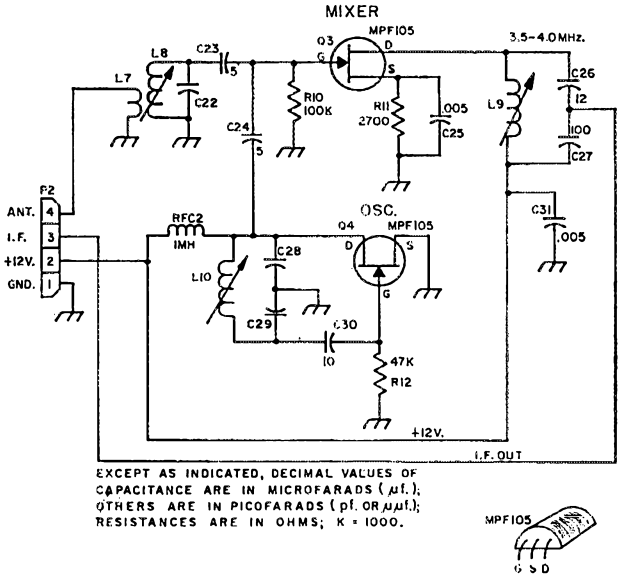
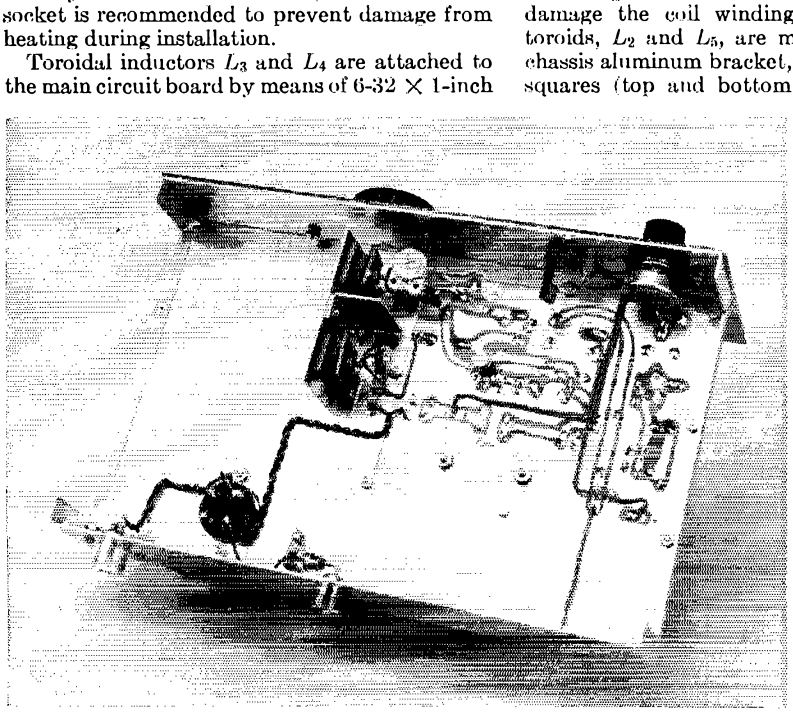


Fig. 2—Schematic diagram of the plug-in converters. These units can be used with any communications receiver that covers the 80-meter band. Capacitors are disk ceramic unless marked S.M. (silver mica). Numbered components not listed below are for circuit-board layout identification.

C_{22}, C_{28}, C_{29}—See coil table.
L_7, L_8, L_{10}—See coil table.
L_9—120 to 190-μh. variable inductor (J. W. Miller 4512).
P_2—4-prong plug mounted on converter box (Amphenol 86-CP4 or equiv.).
Q_3, Q_4—N-channel JFET, 30-MHz. rating or higher (Motorola MPF105 or HEP-801.)
RFC_2—1-mh. choke (Millen J-300-1000 or equiv.).

The pins of the socket are bent out at right angles from the base, then are soldered to the foil elements of the board. The IC can be soldered directly to the board if desired, but the use of a socket is recommended to prevent damage from heating during installation.

Toroidal inductors L_3 and L_4 are attached to the main circuit board by means of 6-32 × 1-inch machine screws and hex nuts. A small square o insulating board is used on each toroid as a retainer. Spaghetti tubing is slipped over each mounting screw so that the screw threads canno damage the coil windings. Similarly, the r.f toroids, L_2 and L_5, are mounted on an under chassis aluminum bracket, but each coil has two squares (top and bottom) of insulating board



Looking into the bottom half of the chassis, the integrated circuit, U_1, i at the center of the main circuit board. A aluminum bracket and divider holds toroidal coils L_2 and L_5. The co leads connect to termi nal strips which ar mounted in front of th bracket. Twisted-pai hookup wire connect the antenna lug on th converter socket to in put link L_1. Diode CR is mounted on a termi nal strip near the 12 volt input jack (J_4) nea the rear apron of th chassis (center). Diode CR_3 and CR_4 should b mounted directly at J (not shown here).

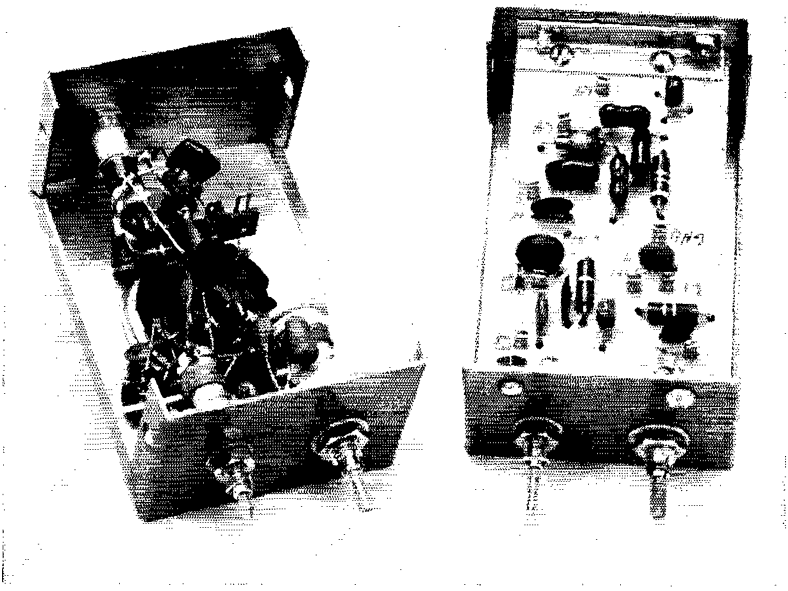


Fig. 3—Photo of two of the plug-in converters showing how point-to-point wiring compares to etched-circuit construction. The converters are built in 3¼ × 1⅝ × 2⅛-inch Miniboxes. The three slug-tuned coils mount on the ends of the boxes. In the circuit-board version, the coils are below the board.

to hold it in place. The bracket (see photo) is made of aluminum sheet, 3 inches wide and 1¾ inches high. A 1-inch wide aluminum divider helps isolate the oscillator coil, L_5, from the detector coil, L_2. Though the toroidal inductors are self-shielding, the divider was added to help reduce capacitive coupling.

A transistor socket is used for Q_2; it was installed to permit various types of FETs to be tried in the circuit. Q_1 is soldered directly to the circuit board, but a socket can be put there if the builder wishes to use one.

Trimmer C_1 is mounted on the frame of C_{3A} between the rotor lug and the stator rod. Though an E. F. Johnson 167-52 is used for C_3 in this model almost any miniature 50-pf. split-stator capacitor can be used. A less expensive and more compact tuning capacitor would be the Hammarlund HFD-50, or the James Millen 21050RM. The primary requirement, as in any good receiver, is that the shaft of the capacitor turn freely and smoothly, and that the rotor bearings make positive contact with their connecting lugs.

In this model an imported tuning dial provides the vernier action for the tuning capacitor. Though low in cost, the dial mechanism works well. Some backlash was noted initially, so the unit was taken apart and inspected, and it turned out that the simple remedy was to flow solder over both sides of each of the three brass pivots on which the dial-drive wheels are mounted. Each has a peened roller shaft for its bearing, and some slack was noted at each point. The addition of the solder secured the three bearings, thus correcting the backlash. A 100-watt iron will be needed. Some other dials of the same manufacture were tried and showed no backlash. If you get a good one, fine. If not, the cure is a simple one. A good substitute dial drive would be one of the precision verniers taken from a war-surplus TU-6B-series tuning unit — available from many surplus houses for a nominal price.[4]

There is room under the chassis to mount eight size-C flashlight cells by means of an aluminum bracket. Series connected, the batteries will provide the required 12 volts d.c. for the receiver. If this is done, an on-off switch can be added to the gain control, R_3.

Preliminary Testing

It is always wise to inspect any etched-circuit board used in a new project before applying operating voltages. Make certain that there are no cold-solder joints. Inspect the board for unwanted solder bridges between the various copper elements. The next check can be made by connecting an ohmmeter between the *circuit* side of CR_2 and chassis ground. With a v.t.v.m. the d.c. resistance in this model is 170 ohms. With the test prods reversed a reading of 80 ohms was noted. The ohmmeter tests should be made with one of the converters plugged in, and with all semiconductors in their sockets. Any significant departure from these readings will indicate a bad component or a wiring error.

Connect +12 volts to J_4 after inserting jumper plug P_1 into J_2. Tune in the signal from Q_2 on the 80-meter band of a ham receiver. (It may be necessary to connect a short wire to the antenna post of the monitor receiver, placing its free end near Q_2 in order to pick up the signal.) Adjust C_{19} so that the signal is heard at 3.5 MHz. when C_3 is fully meshed. With the plates of C_3 fully unmeshed the signal from Q_2 should be heard at 4 MHz. Actually, there should be some overlap at each end of the band, providing a tuning range of approximately 3495 kHz. to 4005 kHz. If

[4] Available from Fair Radio Sales, Lima, Ohio. Catalog gives complete listing of available tuning units.

Q_2 does not oscillate, check to make sure that L_5 and L_6 are phased correctly as shown by the two black dots in Fig. 1. Both windings must be put on the core the same way; that is, both can be wound either clockwise or counterclockwise, but not in opposite sense to one another.

After aligning the b.f.o., connect an antenna to J_1 and tune in a signal near the center of the 80-meter band. Adjust C_1 for peak signal strength. This will permit the detector and b.f.o. tuned circuits to track across the entire tuning range. Since there is no a.g.c. circuit in this receiver strong signals will overdrive the audio amplifier, Q_1, if the gain control, R_1, is set too high. Backing it off slightly will correct the problem, should it occur.

A plug-in converter can now be substituted for P_1 at J_2. Its oscillator signal can be monitored on a general-coverage receiver during alignment. When this is done L_{10}, Fig. 2, is adjusted until the required oscillator frequency is heard (see coil table). With an antenna connected at J_1, tune in a signal near the center of the band covered by the converter. Adjust the slugs in L_8 and L_9 for maximum signal response. The receiver should now be ready to use.

On 40 meters the band will tune "backwards," i.e., 7000 kHz. will tune in at 4 MHz. on the main dial, and 7500 kHz. will fall at 3.5 MHz. The other bands will tune conventionally, their low ends falling at 3.5 MHz. A calibration chart can be made up to show where the 10-kHz. points of each band fall on the tuning dial. A dial chart for the 80-meter band is pasted on the panel of this receiver, and calibration for the other four bands is carried out by means of mental gymnastics. *Note:* Other 500-kHz. segments of the 10-meter band can be turned by setting L_{10} for the proper frequency. Use the same 10-meter constants given in the coil table.

Performance

The operator of this direct-conversion receiver will be hard pressed to tell this equipment from a conventional superhet as he scans the bands. With only two controls to operate there is little to confuse a beginner. Sideband signals are tuned in the same way as with an s.s.b. receiver. The sideband being transmitted — upper or lower — will determine at which side of the signal the main dial must be set. A little practice will make this a simple procedure. A.m. signals must be tuned in at exact zero beat as is customary on an s.s.b. receiver. C.w. signals can be tuned in on either side of zero beat. The operator can select whichever side that has the least QRM on it.

Sensitivity is about the same on 80 meters as it is on the four higher bands. Stability is comparable to that of most top-quality communications receivers. Hand-capacitance effects are minimal, eliminating the need for a shield around the main tuning capacitor.

Radiation from the 3.5 MHz. oscillator is low because of the low power level at which Q_2 operates — 6.1 volts at 4 ma. U_1 offers additional isolation between the antenna and Q_2. The oscillator signal should be heard only in the immediate neighborhood of the operator's home. Enclosing the receiver in a metal cabinet should further reduce radiation.

The total current drawn by the receiver, converter installed, is only 40 ma. This means that many hours of operation can be expected from a flashlight battery pack connected to give 12 volts. Penlight cells are not recommended because of their low capacity. This receiver is suitable for any class of ham station, and should not be overlooked as part of a homemade portable or emergency station, especially if battery operation is a prime consideration. QST

Strays

QST Congratulates . . .

Finley Carter, K6GT, on receiving the Founder's Medal of the IEEE.

Frank A. Gunther, W2ALS president of Radio Engineering Laboratories, on receiving the 1969 De Forest Audion Award.

Albert K. Nielsen, WB4EAI, author of a meditation published by the Upper Room, a worldwide interdenominational devotional guide.

Dominic Giangrossi, WB6KOH, named Veteran of the Month by California's Dept. of Veterans Affairs.

Willi Kluehe, W6RJR, who received the Scott Helt Award for having the best paper published last year in the Transactions of the IEEE group on broadcasting.

—···—

George Folk, K8QYG, received his confirmed 100th QSL for DXCC from an EI on the Emerald Isle on . . . you guessed it, St. Patrick's Day!

During the Armed Forces Communication and Electronics Asso. Convention in June, K4NAA will be operating daily from the Sheraton Park Hotel in Washington, D. C. AFCEA convention delegates with AR licenses are invited to take advantage of the Navy's ham radio station during the convention on June 3, 4, and 5. Operation will be from 0900 to 2200 EST with two available positions for c.w. and s.s.b. on 10, 15, 20, 40, and 80-meter bands. A specially designed QSL card has been prepared to acknowledge contacts with the station. Thanks to LT J. F. Fagan, Jr., and LTJG K. H. Pearce, the Project Officers for the exhibit.

—···—

Podunk exists! Yes, the famous town is a real place and is, in fact, up for sale. A newspaper story that appeared across the country recently reported that the town, which is located a few miles southwest of Des Moines, could be purchased for $8000. What a rare chance for a ham . . . imagine, a QSL from Podunk! (Thanks to W6ZZN for the clipping).

Legalize Your Phone Patch

By J. B. BERRY, JR.* W4PME

Here is a follow-up article on W9NLT's phone patch arrangement described in the March issue. It contains more information on the Voice Coupler and simplified means of meeting the technical restrictions.

On January 1, 1969, the FCC allowed Bell System tariff changes to go into effect which provided for liberalized interconnections with customer-provided equipment and systems. In a previous issue W9NLT gave us information on how the new tariffs will work and described a hybrid-coil phone patch designed to meet the technical requirements contained in the tariff changes.[1] This article will give those of us that already own a phone patch additional ways of legalizing it for use with the telephone company's Voice Coupler. In particular, a simplified filter is presented for those who operate s.s.b. with selective receivers.

Interconnections of amateur radio *voice* signals to be transmitted over regular telephone lines must be made via a Voice Coupler provided by the telephone company. Most Bell System operating companies have, by now, filed tariff changes which provide such an arrangement for as little as 50 cents a month. A one-time installation charge may also be involved. The phone patch itself must be provided by the amateur. Either a commercial unit or a "home-brew" device can be used. However, in any case *the amateur is responsible* for complying with certain signal-level network-protection criteria included in the tariff. These were listed by W9NLT in his article. However, I will summarize them here in Table I as interpreted for the direct electrical Bell System Voice Coupler currently available for phone patch operation.

Table I is based on the Bell System 30 Type Voice Coupler[2]. It has a design level of —3 dbm.[3] at 900 ohms. If the telephone company installs some other type of coupler they will specify its maximum level and operating impedance. At any rate, a phone-patch arrangement which complies with Table I will be entirely "legal" for the 30 Type coupler. This coupler is connected to the dial telephone system via a Network Control Signalling Unit as shown in Fig. 1. Fig. 2 is a simplified schematic of the Voice Coupler.

Referring to Fig. 1, note that the simplest kind of Network Control Signalling Unit available is a telephone set with a modified "exclusion key". A typical phone patch is set up via the telephone set. When the land-line connection is established the amateur operates the exclusion key, which bridges the Voice Coupler across the line. Unless you specify a handset cut-off key option (which you may specify at the time of your order) the telephone handset becomes your mike. Operation of the transmitter-receiver and phone-patch equipment may then proceed either via push-to-talk (p.t.t.) or VOX operation. Since the voice level received over the land-line connection is highly variable, VOX operation may not be satisfactory. If you wish the handset disconnected during phone-patch operation a cutoff-key telephone set can be wired to provide this feature. However, it is not a good idea in most cases since you may wish to break in on the phone-patch connection via the handset to identify, to clarify a phrase, and so on. The volume output of your handset will generally be 10 db. or more higher than the other end of the telephone connection, so it helps to muffle *your* talking volume by partially covering the telephone transmitter with your fingers. This also prevents room noises from entering the handset during the patch. At the conclusion of the patch

TABLE I

Summary of Network Protection Levels

Frequency, Hz.	Max. Level (Note 1) *dbm., 900 ohms*	*Volts, p-p, 900 ohms*
1000 (reference)	—3	1.9
2450–2750 (2600–Hz. Signalling)	Note 2	Note 2
3995–4005	—21	0.24
4000–10,000	—16	0.43
10,000–25,000	—24	0.17
25,000–40,000	—36	0.043
40,000 and up	—50	8.5 mv.

Notes 1. Measured into a 900-ohm resistance termination and for the Bell System 30 Type Voice Coupler only.
2. Energy in this band must not exceed energy simultaneously present in the 800–2450 Hz. band.

* 750 Starlight Dr., N. E., Atlanta, Georgia 30305.

[1] Schleicher, "Phone Patching — Legitimately," *QST*, March, 1969.

[2] Formerly coded F57948.

[3] Averaged over any 3-second interval.

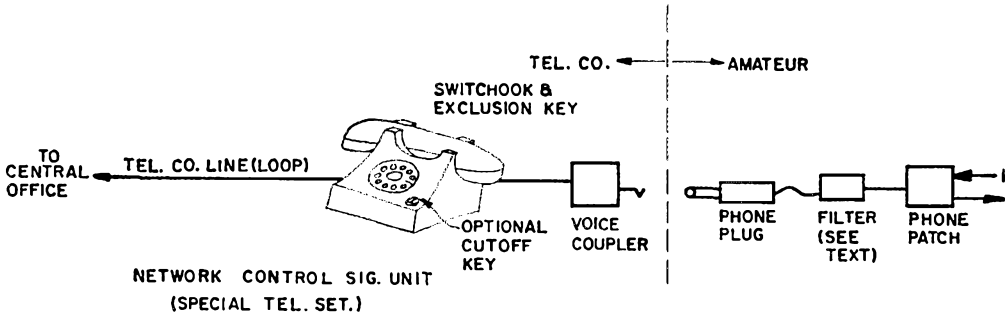


Fig. 1—Block diagram of Voice Coupler arrangement.

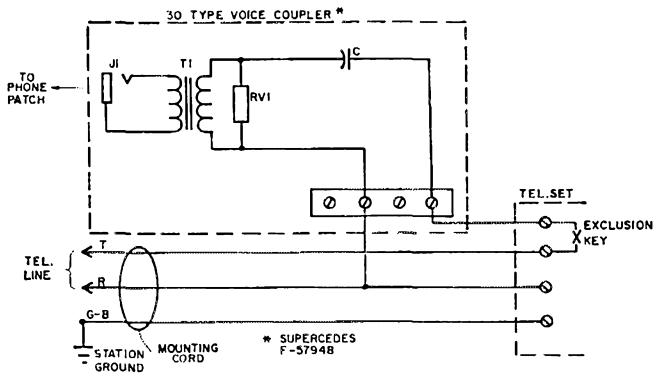


Fig. 2—Circuit diagram of 30 Type Voice Coupler.
C—D.c.-blocking capacitor.
J_1—Standard phone jack, for ¼-inch plugs.
RV_1—Peak-limiting silicon varistors.
T_1—Isolating transformer.

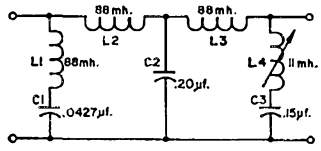


Fig. 3—Low-pass filter for network protection. See Fig. 4 for attenuation curve.
C_1—Paper; 0.04- and 0.0027-μf. capacitors in parallel.
C_2, C_3—Paper.
L_1, L_2, L_3—Surplus telephone toroids (see Ham-Ads).
L_4—Adjustable (Miller 6314 or equivalent).

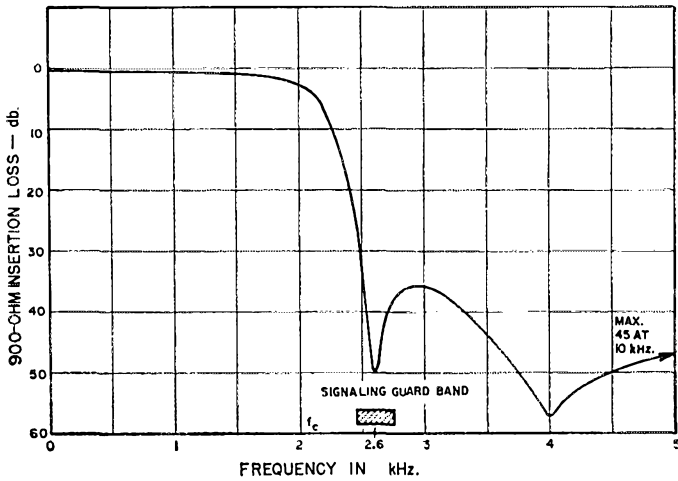


Fig. 4—Measured attenuation of the filter shown in Fig. 3

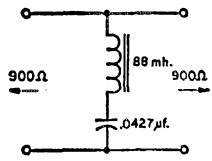


Fig. 5—Simple 2600-Hz. shunt filter. If the receiver selectivity is adequate to meet other requirements of Table I, this series-resonant circuit will provide the notch required at 2600 Hz.

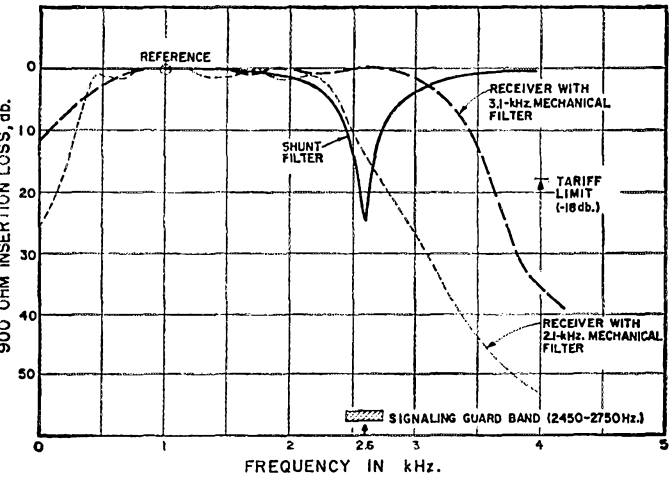


Fig. 6—Frequency response of shunt filter shown in Fig. 5 together with response curves of 2.1- and 3.1-kHz. mechanical filters of the type used in s.s.b. receivers.

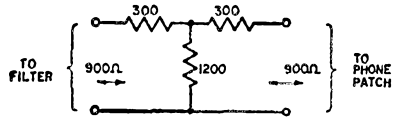


Fig. 7—6-db. pad for improving impedance characteristics. Resistors may be ½-watt composition.

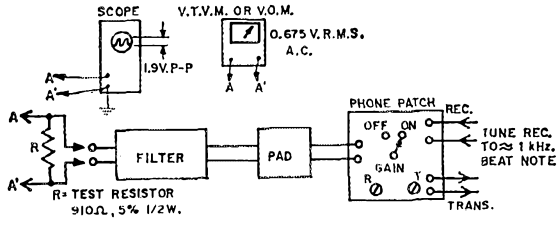


Fig. 8—Test setup for checking level and adjusting to —3 dbm.

tell the other party to hang up; then you can restore the exclusion key, hang up, and turn off your phone patch. Resume radio communications via the station mike.

In order to comply with the requirements listed in Table I you must make certain level measurements and adjustments, and you will probably need a special filter between your phone patch and the voice coupler. Fig. 3 is a schematic of a simplified low-pass filter designed and tested by the author to ensure compliance with these requirements. Its frequency response is shown in Fig. 4. The Appendix shows two computer designed filters of more sophistication. If your receiver has a 3.1- or a 2.1-kHz. mechanical or multi-element crystal filter with a good shape factor (3 or better) the 2.6-kHz. shunt filter shown in Fig. 5 may be adequate. It is designed to protect against heterodyne QRM "talkoff". Its response is plotted in Fig. 6 along with the response of a 2.1-kHz. and a 3.1-kHz. mechanical-filter receiver. If your phone patch is of the hybrid type and VOX operation is contemplated, an impedance-improving pad of about 6 db. is recommended, as shown in Fig. 7. Connect it between the phone patch and the filter (either type). Note that the input to the Voice Coupler is transformed coupled. Do not apply d.c. to this unit! The transformer is a miniature type and will saturate on direct current.

To adjust your phone patch use the test arrangement shown in Fig. 8. Turn on the phone patch, tune in an approximate 1-kHz. beat note from your crystal calibrator or v.f.o., and adjust the phone patch and receiver gain control for —3 dbm. into the 910-ohm, 5% resistor. As shown, this can be read with a v.t.v.m. (0.675 volt, r.m.s.) or with a 20,000-ohms/volt v.o.m. on the a.c. scale. However, the best way is to use an oscilloscope with an accurate voltage calibrator, to prevent waveform errors (adjust for 1.9 volts, peak-to-peak). Be sure the r.f. gain is turned up and all other receiver controls are just as they would be for phone-patch work. If your phone patch has a built-in VU meter the meter can be used as a reference but it *cannot* be used as a volt-meter. *Mark all gain settings* so that they can be referred to for phone-patch work. Remember, the peak limiter in the Voice Coupler is designed to prevent excessive voice energy from entering the telephone line, but it does not relieve you of the responsibility for setting your output to

—3 dbm. at 900 ohms (or such other level as specified by the telephone company).

The Bell System preliminary Interface Specifications on the 30 Type Voice Coupler give a method of measuring time-averaged *voice* energy using a damped noise-measuring test set. The method of setting your output level shown in Fig. 8 based on a heterodyne sine-wave tone is believed to represent a "worst case" condition for the telephone company. As evidence of this, the time-averaged *voice* levels actually measured by the author on his 75A3 receiver were about 7 db. *lower* than called for in the preliminary Interface Specifications. If the telephone company requests time-averaged voice level measurements, you should request a copy of their latest technical reference manual which will give complete details. As this is written, their suggested measurement technique is beyond the scope of most amateurs and fails to account for tone interference.

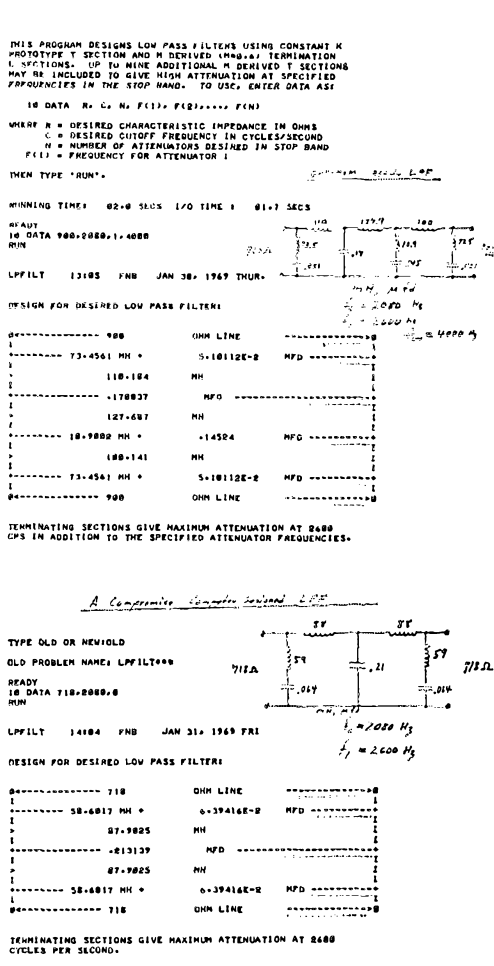
The transmitter gain can best be set by calling a friend on the land line and then using his voice signals to adjust your transmitter modulation in the phone-patch mode. Here again, an oscilloscope monitor is the best modulation indicator. To adjust the "balance" on hybrid phone patches have your friend mute his telephone by covering his telephone transmitter opening; then you adjust the hybrid balance control for minimum receiver noise feed-through. For commercial phone patches refer to the instruction manual. Needless to say, such testing should be done into a dummy load.

The purpose of this article is to give the amateur operator information on how to operate a "legal" phone patch properly. Other articles, in addition to W9NLT's, will undoubtedly be written on how to construct home-brew patches or how to modify certain popular kit patches or commercial units. The author uses a hybrid-coil unit containing components not readily available to most amateurs, so its description is not included here.

A final word of caution is in order in closing. Most telephone-company tariffs now include a "maintenance" charge for repair visits caused by complaints on the use of the Voice Coupler *if* the trouble is due to *your* equipment or operation! So, if you have trouble with r.f. feedback, hum, noise, low volume, etc., think twice before calling repair service. Better you should check your setup first! QST

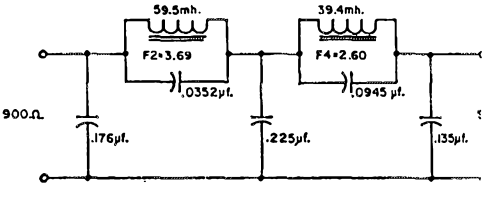
Appendix

Two computer-designed 900-ohm low-pass filters with 2600-Hz. attenuation notch:



In addition to these computer-aided *m*-derived constant-*k* type filters, a modern filter design using only two inductors is shown in the Fig. below.[4] Its frequency response is given in W3NQN's letter in November 1967 *QST*.

[4] Wetherhold, W3NQN, Technical Correspondence, *QST* November, 1967, page 51.



From all indications, there has been considerable confusion in the local application of the new phone-patch regs in some cases, although the policy of the overall Bell System is clear. Let ARRL Hq. know if you run into difficulties in negotiating a "legal" installation with your phone company.

A 500-Watt F.M. and C.W. Transmitter for 220 MHz.

Optimum Performance at the Top End of the V.H.F. Range

BY RICHARD B. STEVENS,* W1QWJ

THE 220-MHz. band is not unlike 144 in both transmitting and receiving requirements, except that getting top performance is just a little harder at the higher frequency. This may have deterred a fair number of potential 220-MHz. enthusiasts, and it is hoped that they will find this transmitter of interest. It is capable of more than 300 watts output, on c.w. and f.m. or the exciter portion may be used alone, to deliver up to about 8 watts.

Provision for f.m. and c.w. operation is included. The final amplifier could be plate modulated, but anyone starting out in the v.h.f. field today may well question the wisdom of building the expensive and bulky audio equipment necessary to modulate a 500-watt transmitter. Inclusion of f.m., on the other hand, adds almost nothing to either the cost or complexity of a v.h.f. transmitter, regardless of the power level. Deviation can be adjusted to fit the bandwidth of the usual converter and communications-receiver combination, or to work into the wide-band i.f. systems commonly used in fixed-frequency f.m. reception on 6 and 2 meters. If a v.f.o. is substituted for the crystal control shown, deviation can be expanded readily to true wide-band proportions, such as used in f.m. broadcasting. There is merit in any of these methods[1].

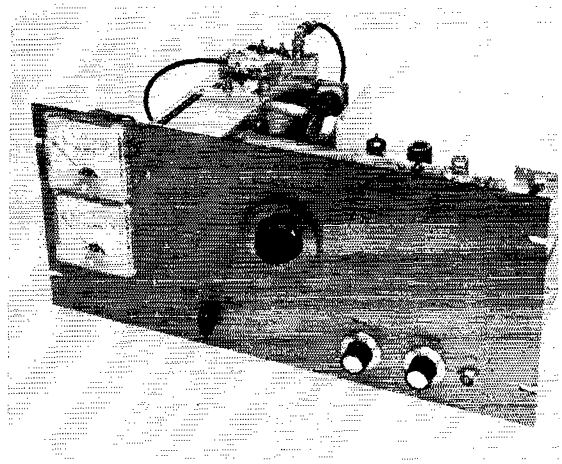
The R. F. Circuits

Looking at the schematic diagram, Fig. 1, it will be seen that the first three stages of the transmitter look very much like any v.h.f. transmitter using vacuum tubes. A conventional 6CL6 crystal oscillator, V_1, uses 6-, 8- or 12-MHz. crystals, multiplying in its plate circuit to 24 MHz. (12-MHz. crystals should be the fundamental type.) A 6BQ5, V_2, triples to 73 MHz., and drives a 2E26 amplifier, V_3, straight-through on this frequency. A variable capacitor, C_6, across the crystal permits a small adjustment of the frequency.

* 151 Canterbury Rd., Springfield, Mass. 01118

[1] *The Radio Amateur's V.H.F. Manual*, "Receiving F.M.," page 40-43. "Using Frequency Modulation," (in transmitters) p. 92-96.

We often hear the query, "Why don't you have more information on gear for 220 MHz.?" This transmitter, and the 220-MHz. FET converter in the current edition of* The Radio Amateur's V.H.F. Manual *and in the 1969 Edition of the* ARRL Handbook *should help to supply this demand.



The 220-MHz. transmitter is set up for rack mounting on on 8¾-inch panel. Meters at the left can be switched to read driver plate, amplifier screen and amplifier plate currents, and amplifier plate voltage.

The tubes used, and other similar types, work very well in the lower part of v.h.f. range, but very few types do really well at 220 MHz. Thus, we use a varactor tripler, driven by the 2E26, to get up to 220. Requiring no power supply of its own, it is capable of more than enough power output at 220 to drive our 500-watt amplifier. Varactor multipliers have been dealt with extensively elsewhere,[2] so about all that need be said about this one is that it follows a design in *QST* and the *V.H.F. Manual*, except that it goes from 73 to 220 MHz., rather than 144 to 132.

The output of a varactor multiplier contains harmonics other than the desired one, so a stripline filter is connected between the varactor output and the final amplifier grid circuit. The filter is a separate assembly mounted on the end of the chassis, visible in two of the photographs. Full details of the filter may be found in any edition of the *V.H.F. Manual*, and in the *Handbook* from 1967 on.

The final amplifier is a 4CX250 series external-anode tube, with a coaxial tank circuit. The B version is used here, but the R and F types have the same mechanical design. Earlier versions such as the 4X250A and 4X150A are also usable. The latter has somewhat lower ratings. Many

[2] Cross, "Frequency Multiplication with Power Varactors," *QST*, October, 1962, and *V.H.F. Manual*, Chapter 10. Also, Blakeslee and DeMaw, *QST*, March, 1966.

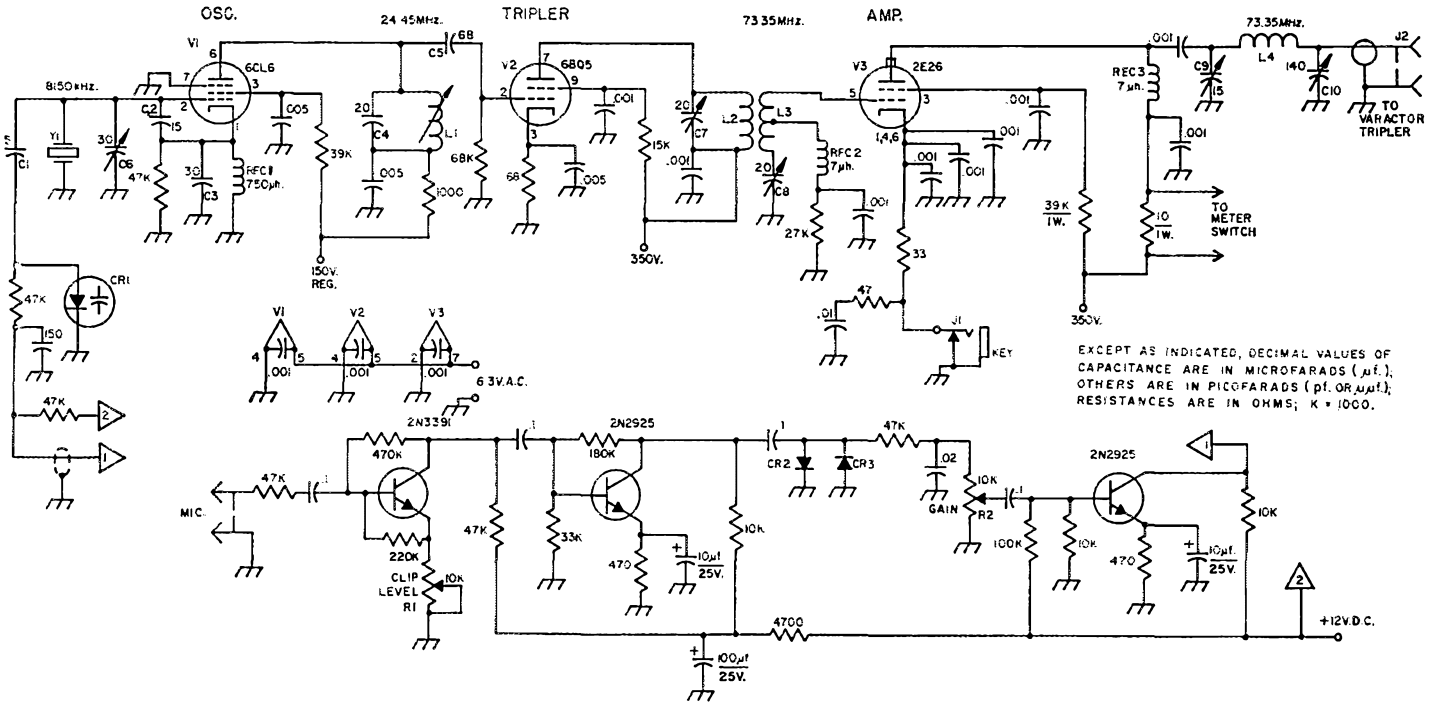
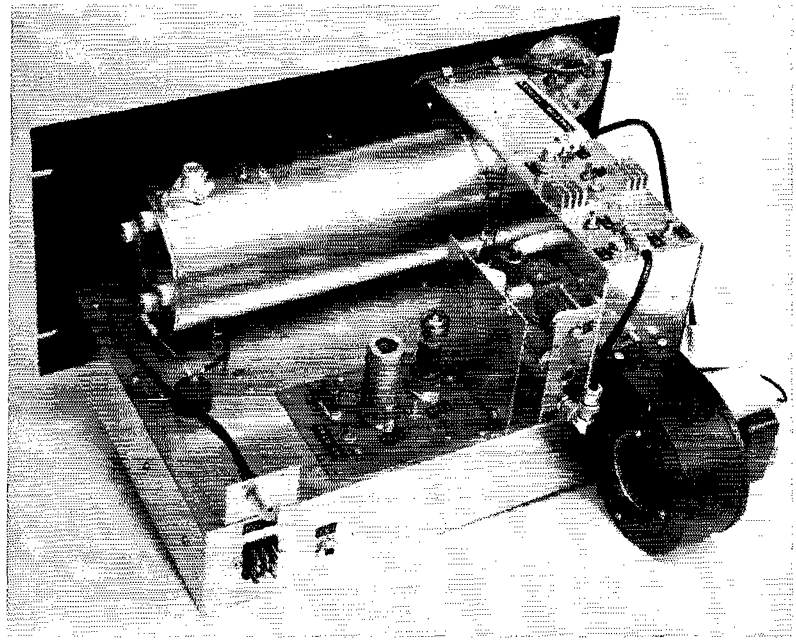


Fig. 1—Schematic diagram and parts information for the W1QWJ 220-MHz. exciter and frequency modulator. Capacitors with polarity marked are electrolytic. Components not specified below are marked for test reference purposes. C1 through C5 are dipped-mica or silver-mica.

C_6—30-pf. miniature trimmer (Johnson 160-130).
C_7, C_8—20-pf. miniature trimmer (Johnson 160-110).
C_9—15-pf. variable, double-spaced (Hammarlund HF-15-X).
C_{10}—140-pf. variable (Hammarlund HF-140).
CR_1—Varicap diode.
CR_2, CR_3—Any silicon diode.
J_1—Closed-circuit jack.
J_2—BNC chassis fitting.
L_1—10 turns No. 22 enamel, closewound on ¼-inch slug-tuned form.
L_2—4 turns No. 22, ½-inch diam., 7/16 inch long.
L_3—7 turns No. 22, ½-inch diam., ⅜ inch long. Tap 4 turns from grid end.
L_4—5 turns No. 16, ½-inch diam., 1 inch long.
Y_1—8150-kHz. crystal, HC-6/U holder preferred. 6112 kHz. or 12223-kHz. fundamental crystal also usable. Frequencies given are for low-frequency end of the band. Use C6 for slight frequency adjustment.



Rear view of the 220-MHz. transmitter. The exciter stages are on a circuit board in the foreground. Chassis at the right side houses the varactor tripler and the amplifier grid circuit. Air blows into this compartment and out through the center conductor of the coaxial plate-circuit assembly.

other tubes of this general family can be used, but may require alterations in the mechanical details.

The coaxial plate circuit follows a very old design,[3] but one that is hard to improve on. The author and his associate, W1RVW, built a similar amplifier for 432 MHz., described in the *V.H.F. Manual*. Such a tank has extremely high *Q*, and the heavy copper (or brass) construction offers considerable heat sinking. Probably its only disadvantage is the necessity for feeding the high voltage in through some kind of r.f. bypassing. This and the other mechanical features of a good coaxial tank are not readily made with the simpler tools. Details of the assembly are given in Fig. 5.

The final grid circuit, visible in the end view along with the varactor multiplier and the strip-line filter, is a half-wave strip-line. The fan blows cooling air into the grid compartment, up through the 4CX250 socket, and out through the end of the tank assembly, by way of the hollow inner conductor, L_{10}. The coaxial output fitting, J_6, the coupling loop, L_{11}, and its series capacitor, C_{21}, are mounted on a small detachable plate bent to fit the curvature of the coaxial assembly, and mounted near the outer end. The varactor tripler is built into the top of the amplifier grid assembly, and is visible in the end view along with the final grid circuit and the strip-line filter.

Generating the Frequency Modulation

Where only a small swing at the control frequency is needed, as in a v.h.f. or u.h.f. transmitter having a high order of frequency multiplication, the modulation can be applied very easily. A voltage-variable capacitor, the varactor CR_1, changes capacitance in relation to the audio voltage applied across it, and this changing capacitance is used to "pull" the frequency of the crystal oscillator slightly. A good 8-MHz. crystal can be pulled about 600 Hz. in this way. With 27 times frequency multiplication this gives a maximum deviation in excess of 16 kHz. at the operating frequency, close to the optimum for most of the f.m. receivers currently in use in fixed-frequency service on 6 and 2. Lesser deviation, for working into communications receivers, most of them having about a 3-kHz. bandwidth today, is merely a matter of applying less audio.

The communications effectiveness of f.m. is greatly enhanced if the deviation is held close to the maximum usable with the receiver in ques-

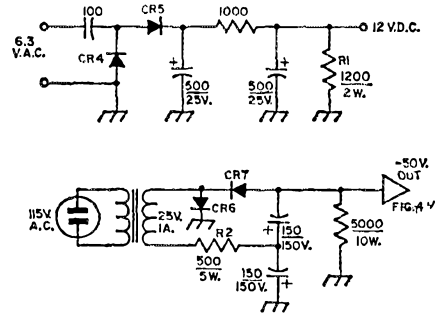


Fig. 2—Circuit details of the built-in power supplies for amplifier bias (lower) and speech amplifier-modulator (upper) for the 220-MHz. transmitter. Capacitors with polarity marked are electrolytic. All diodes are 200-volt p.i.v., 1 amp. R_1 and R_2 are approximate values. Select for 12 and minus 50 volts output, respectively. Capacitance is in microfarads.

[3] Brayley, "Coaxial-Tank Amplifier for 220 and 420 Mc.," *QST*, May, 1951. Also, *V.H.F. Manual*, Chapter 10.

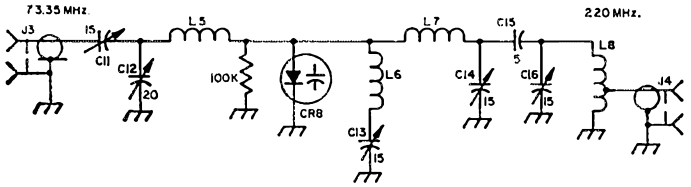


Fig. 3—Circuit of the varactor multiplier, 73 to 220 MHz.

C_{11}, C_{13}, C_{14}, C_{16}—15-pf. miniature variable (Johnson 160-107). Rotor of C_{11} must be insulated from chassis.
C_{12}—20-pf. miniature variable (Johnson 160-110).
C_{15}—5-pf. ceramic.
L_5—8 turns No. 16, ½-inch diam., ⅞ inch long.
L_6—4 turns No. 16, ½-inch diam., ½ inch long.
L_7—3 turns No. 16, ⅜-inch diam., ⅜ inch long.
L_8—3 turns No. 16, ⅜-inch diam., ⅜ inch long, tapp at 1 turn from grounded end.
CR_8—Varactor diode (Amperex H4A/1N4885).
J_3, J_4—BNC fitting.

tion, and if the audio response is kept down to near the minimum necessary to reproduce clean intelligible speech. Level control and limited frequency response are provided in this transmitter by the simple speech amplifier and clipper shown in Fig. 1. The circuit is a duplicate of that in a separate unit described in recent editions of the *Handbook*,[4] so it will not be detailed extensively here.

Layout and construction are not critical. The unit visible in the bottom view of the transmitter is built on a piece of copper-clad circuit board. The control R_1 sets the clipping level, and R_2 the audio gain. R_1 should be set so that the deviation is right for the receiver at the other end of the communications circuit.

The maximum deviation that is possible with good linearity depends on several factors: the crystal cut, the method of mounting the cryst the total capacitance across it, and the order frequency multiplication. The order of frequen multiplication has only a minor effect on t potential maximum deviation *in any one oper ing frequency band*, as a given type of cryst will "pull" nearly a fixed percentage of its fund mental frequency. A 6-MHz. crystal can pulled about 400 Hz., an 8-MHz. one about 6 Hz. and a 12-MHz. one about 800 Hz., so the e result in the 220-MHz. band is roughly the sam Various dodges can be used to increase t swing,[5] but all result in some sacrifice in stabilit

Crystals clamped in their holders, as in t FT-243 type, tend to pull less than the plat type in the hermetically-sealed holder (HC-6,

[4] *Handbook*, p. 232 in 1968, p. 234 in 1969 edition.

[5] Tilton, "A Stable but Variable Frequency-Cont System for the V.H.F. Bands," *QST*, July, 1963. *V.H Manual*, Chapter 6.

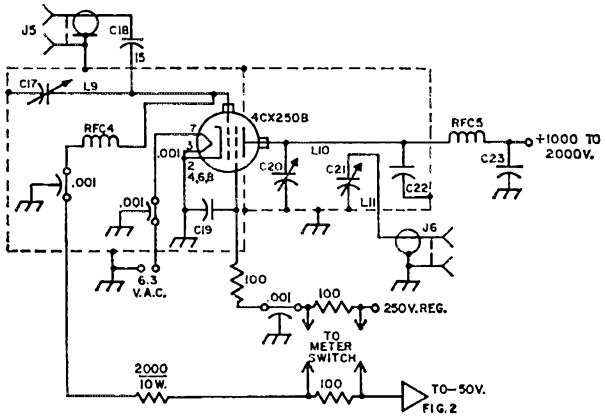
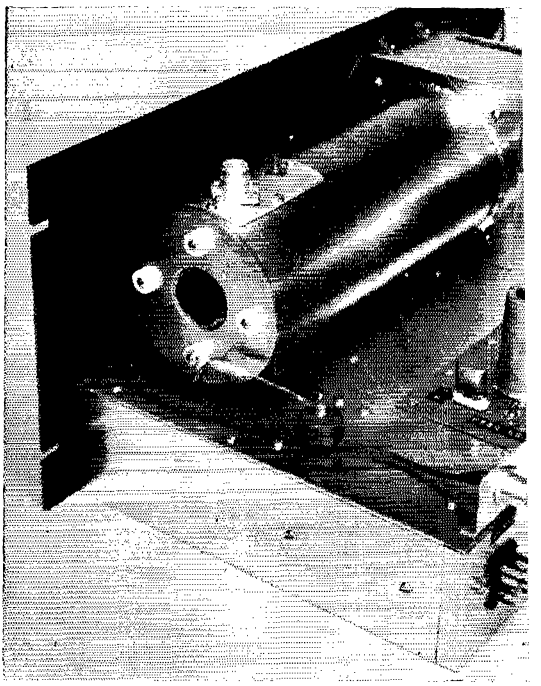
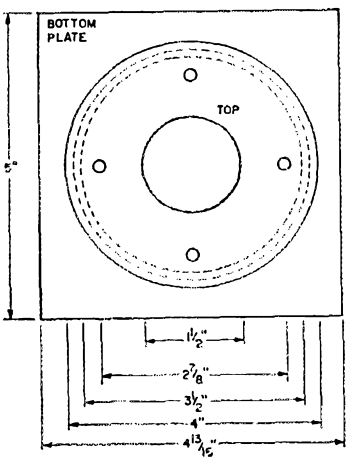


Fig. 4—Schematic diagram and parts information for the 220-MHz. final amplifier. Decimal values of capacitance are in microfarads (μf.); others in pf.

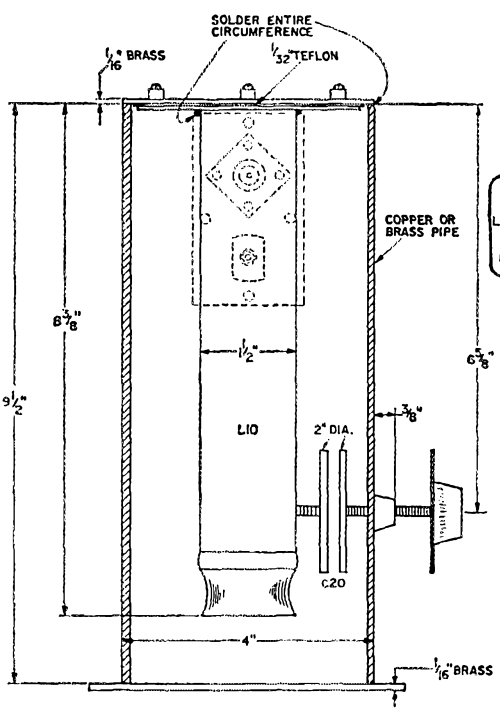
C_{17}—20-pf. miniature variable (Johnson 160-110). Stator supports end of L_9.
C_{18}—15-pf. silver-mica.
C_{19}—Capacitor built into socket assembly (Johnson 124-109-1 socket, with 124-113-1 bypass ring and 124-111-1 chimney).
C_{20}—Disk-type tuning capacitor; see Fig. 5.
C_{21}—15-pf. miniature variable (Johnson 160-160-110).
C_{22}—Built-in bypass capacitor; see Fig. 5.
C_{23}—500-pf. 5-kv. or more.
J_6—N-type fitting.
L_9—Brass strip, 1/16 by ⅜ by 6½ inches. Bolts to g terminal on socket. Tap C_{18} ⅞ inch from gr
L_{10}—Coaxial line inner conductor; see Fig. 5.
L_{11}—Output coupling loop made from 3¼ inches No. Cover with insulating sleeving and bend to inch high and 1¾ inch long. See Fig. 5.
RFC_4, RFC_5—0.84-μh. r.f. choke (Ohmite Z-235).
J_5—BNC fitting.

Close-up view of the amplifier coaxial tank circuit. The output coupling assembly is removable for adjustment purposes. Plate voltage is fed into the line on a ceramic bushing in the end plate.





and similar holders). The older types of holders also have higher capacitance, inhibiting the crystal frequency swing that can be obtained, as the holder capacitance is part of the total across the crystal. There is a limit to the amount of change you can make in the center frequency by adjustment of the trimmer C_6. The lower the capacitance setting of this trimmer, the greater the swing that will be possible. The value of C_1, in series with the varactor, also has some bearing on this, as do the input capacitance of the oscillator tube and stray circuit capacitance.



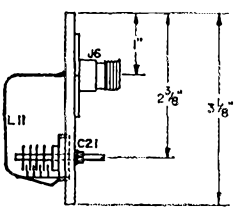
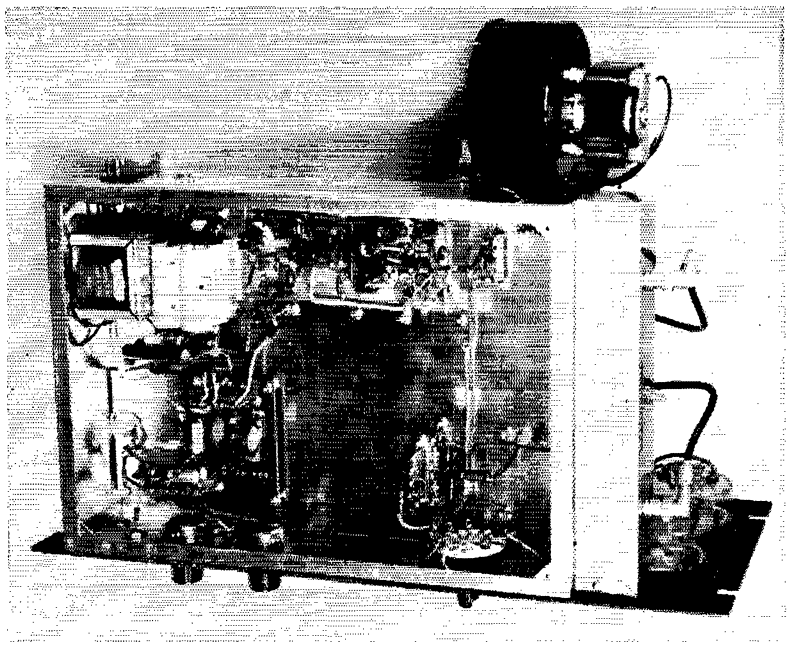


Fig. 5—Details of the coaxial-line plate circuit of the 220-MHz. transmitter.

Power Supplies

Voltages for the speech amplifier and the final amplifier grid bias are developed from built-in supplies, so these are shown schematically. The transmitter r.f. section also requires 150 volts, regulated, for the oscillator plate and screen, 350 volts for the tripler and 73-MHz. amplifier plates and screens, and 250 volts, regulated, for the final amplifier screen. These are all taken from a single power supply of conventional design, not shown herein. The final amplifier plate supply, capable of 2000 volts, maximum, at 300 ma., is also not shown.

For the fellow interested in experimenting with operating conditions in a transmitter of this kind, there is merit in making provision for varying the final bias voltage, the amplifier screen voltage, and the amplifier plate voltage.



Looking underneath the chassis of the 220-MHz. transmitter, we see the speech amplifier-clipper at the lower left, the exciter circuits across the top, power supply components at the upper left, and meter switching, lower right.

Most operation on 220 will not require maximum power. If the final plate voltage can be reduced and the other operating conditions adjusted accordingly, it will be possible to maintain high plate efficiency over a very wide range of operating conditions. It is nice to be able to drop the final plate voltage to 1000 or less, for example, and the 150 watts or so available at this level will be more than enough for most work. With f.m. or c.w. there is nothing critical about making such power changes, and provision for this is highly recommended.

Probably the most convenient way to vary final plate voltage is installation of a Variac or other means of varying the a.c. primary voltage in the final-stage power supply. Some power transformers also have tapped primaries, which provide degree of flexibility. If you don't have a 2000-volt supply, start with anything that will deliver 500 volts or more. The 4CX250-series tubes work very well over a wide range of plate voltage.

Adjustment and Operation

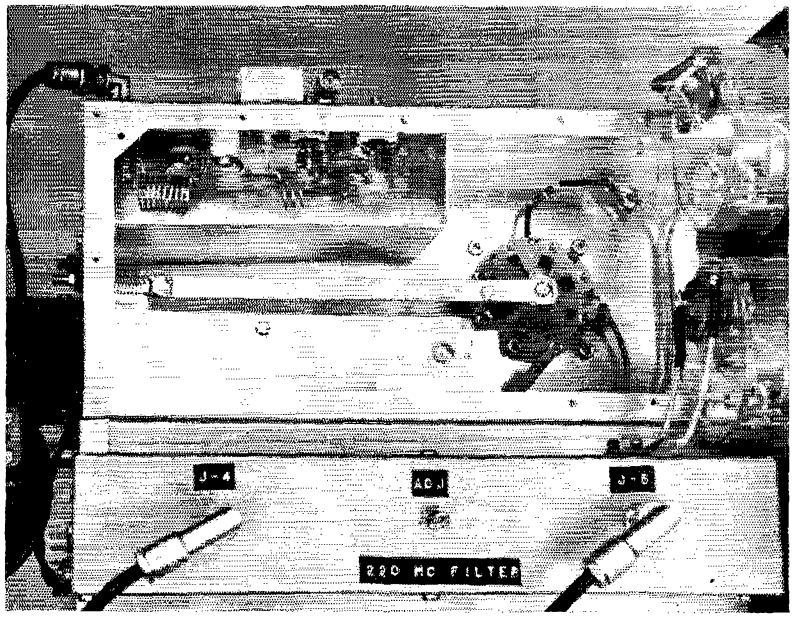
This is not intended to be a beginner's project, so detailed discussion of the mechanical layout will be omitted. The mechanical arrangement of the components could be altered to suit one's own requirements, since the complete transmitter is made up of many subassemblies. Adjustment for best results may be somewhat strange to anyone who has not had experience with varactor multipliers, so two adjustment procedures will be described. One involves instruments that not every v.h.f. man may have at his disposal. The other, worked out after the rig was checked out by the first method, seems to give essentially the same results, and it requires less in the way of expensive gear.

The first step is to get a good 52-ohm load. The Heath Cantenna will do, or a bank of resistors such as described in the *V.H.F. Manual* is suitable. For the present, it will have to handle a maximum of about 10 watts — but lamps are out — the load must have close to 52 ohms impedance at 73 and 220 MHz. A good s.w.r. bridge is also needed for the first method.

First, we must adjust the exciter. Procedure here is like that for any similar lineup of tubes, but the 2E26 must be adjusted for optimum results when working into a 52-ohm load. Once an output of 10 to 12 watts is obtained in this way, leave the tuning of the 2E26 and preceding stages alone thereafter.

Now connect the s.w.r. bridge output to J_3 of the varactor multiplier, and tune C_{11} and C_{12} for lowest s.w.r. indication. Leave the 2E26 adjustments alone.

Now connect a coaxial cable from J_2 to J_3, and connect the s.w.r. bridge or wattmeter in a line from J_4 to the dummy load. Adjust C_{13}, C_{14} and C_{16} for maximum output at 220 MHz. Adjustments in the multiplier interlock, and several passes through all adjustments may be needed for best output. But remember that the 2E26 is set for a 52-ohm load. Leave it alone, and make the multiplier adjustments do the job. An indication of some 8 watts or so of output should be obtained. Part of this will be harmonic energy, however, so the s.w.r. bridge should now be connected between the strip-line filter and the amplifier grid circuit, and the filter adjusted for maximum forward power and the amplifier in-



Looking into the amplifier grid compartment. The varactor tripler is in the upper left portion. Below the compartment is the 220-MHz. strip-line filter.

put circuit for minimum reflected. This should result in maximum grid current in the final amplifier.

It is likely that getting enough grid current for the 4CX250B will not be difficult, as the line-up described gives more than ample drive. Up to 20 ma. grid current has been obtained, but not this much is needed. In fact, with f.m. or c.w. operation, only a slight increase in efficiency is noted after the drive is raised beyond the point grid current begins to flow. For plate modulation with good linearity, more drive is necessary. Follow the typical operating conditions for the tube and mode of operation you prefer.

Adjustment of the coupling loop, L_{11}, and the loading capacitor, C_{21}, will be fairly critical, if one is striving for the absolute maximum output. Following the manufacturer's recommendations as to maximum plate voltage and current, 2000 volts at 250 ma., resulted in about 320 watts output. Raising the plate current to 300 ma., by increasing the screen voltage, netted 400 watts output. Even at this input the tube seemed to be operating well and the tank circuit did not indicate excessive heating. There is little to be gained by pushing the limit, however, and tests with various plate voltages from about 1000 up showed optimum performance in the 1500 to 1800-volt range, where in excess of 65 percent efficiency was measured.

The simple-equipment tuneup involves some kind of r.f. indicator that can be placed near a bank of resistors used for the dummy load. A tunable field-strength indicator and wavemeter such as that shown in Fig. 11-7 of the *V.H.F. Manual* (any edition) will do nicely for the 2E26 tuneup. If the indicator's tuned circuit is made smaller, so that it will tune 70 to 220 MHz., it will serve for all adjustments. Of course a grid-dip meter is fine. Either will give a usable indication when its coil is placed close to a resistor bank used for a dummy load. If it will tune to 220 MHz. this kind of indicator can be used for checking the output of the varactor multiplier as well, in the same way. QST

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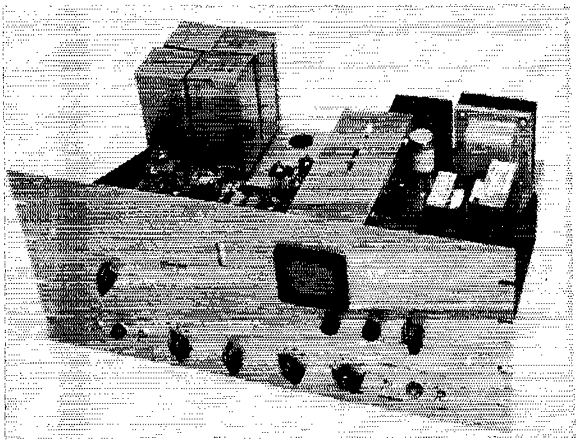
The Mainline TT/L-2 F.S.K. Demodulator



A completed TT/L-2 demodulator built for rack mounting. This unit, constructed by John Roache, W1SOG, includes a phase shift oscillograph indicator in addition to the eye-tube indicator described in the text. The main and loop power supply components are mounted on the right rear of the chassis. Plugged into sockets at the left rear are the two Butterworth input-bandpass filters and the two discriminator filters, each built into a Minibox fitted with an octal plug. One of four vacant sockets may be seen at the rear of the unit. These sockets are used in conjunction with the spare positions of the discriminator filter selector switch.

In Two Parts—PART I

Construction and Adjustment

BY KEITH B. PETERSEN,* W8SDZ

THE Mainline TT/L-2 Demodulator is an advanced-design unit offering high-performance f.m. (limiter) and a.m. (limiterless) reception of radioteleprinter signals.

The TT/L Demodulator as published in 1965[1] was the result of almost two years' work. Because of the desire to make each part of the basic design as nearly perfect as possible, the circuitry has gone through continuous improvements since publication of that information. Advance information[2] has enabled many RTTY enthusiasts to build an earlier version of the demodulator described here. The TT/L-2, with the improved auto-receive stage and added anti-space circuit, is rapidly becoming the most popular demodulator for use in the h.f. bands because of its excellent performance. Its many advantages have also encouraged a number of v.h.f. operators to build the unit.

General Description of Changes

Some confusion has resulted with respect to the name chosen earlier for the "squelch" circuitry for the demodulator. In the original *QST* article, this section was called the AUTO-START stage. This name has become confused with the classic "auto-start" circuitry used at v.h.f. for simple control of the printer motor. It has therefore been decided that it would be wise to change the name to AUTO-RECEIVE, a name which had been considered earlier.

The original TT/L unit included an input-bandpass filter only for 850-Hz. shift. The new version includes an additional bandpass filter for use with 170-Hz. shift, which is becoming increasingly popular at h.f. these days due to the advantage of noise and QRM reduction. The TT/L-2 also includes discriminators for both 850-Hz. and 170-Hz. shift.

Further included in the new design is a three-speed switch for the low-pass filter stage following the discriminator detectors. This feature selects the optimum cut-off frequency for each transmission speed, 60, 75, or 100 w.p.m. With

The TT/L F.S.K. demodulator described in an earlier issue of QST was an advanced design by the author and Irvin Hoff, W6FFC (formerly K8DKC), with the assistance of Victor Poor, K3NIO. With its designers continually striving for the utmost in operation from each part of the circuit, evolution has led to the unit presented here.

*1418 Genesee Ave., Royal Oak, Mich. 48073.

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

[2]Petersen, "The Mainline TT/L-2 FSK Demodulator," *RTTY Journal*, September, 1967.

the increasing availability of equipment which will operate at higher speeds, this feature is especially timely.

The auto-receive stage in the TT/L-2 is significantly better than earlier designs because the time-constant portion of the circuit has been isolated entirely from the triggering neon. The charge voltage for the time-constant capacitor is determined entirely by the signal itself, because there are no "parallel-discharge" paths. This results in vastly improved performance. This circuit prevents the receiving teleprinter from printing garble when there is no RTTY signal present, and completely ignores c.w. and other non-RTTY signals which may be within the received passband. The auto-receive circuit also controls a motor-control stage which turns off the teleprinter motor approximately 30 seconds after the signal leaves. (This delay is sufficient to keep the motorrunning during station identification and subsequent "turn-over" to another station.) The combination of the auto-receive and motor-control stages provides an efficient and reliable system for obtaining unattended reception of RTTY signals. The motor-control stage design has been simplified and stabilized.

The TT/L did not include any protection against a steady space tone, which causes the teleprinter to "run open." The new anti-space circuit provides full protection against steady space signals. This circuit also prevents the auto-receive circuit from responding to steady space signals.

The TT/L-2 incorporates a new simplified mode-switching system, using a single six-position rotary switch. This feature eliminates much of the confusion resulting from the separate switches used in earlier designs. The switch controls four different functions, interlocking them so there is no possibility of a wrong combination which might cause improper operation.

The new design offers heavy-duty main and loop power supplies for cool operation and good regulation. This is especially important when the unit is used for continuous auto-start operation. It is surprising to note that the cost of the heavy-duty supplies is very nearly the same as for the earlier design.

The loop supply provides a balanced-voltage output for driving a saturated diode for f.s.k. or a.f.s.k. operation. The circuit also permits automatic retransmission of received signals — such as for relaying from another band or playing back from a tape-recorded signal.

The EM84/6FG6 tuning eye has been retained because it is a more accurate indicator than either an oscilloscope or a meter. It shows at a glance when the signal has drifted, and is especially effective when "straddle-tuning" is necessary due to inaccurate shift by the sending station.

You will notice that no power-on indicator has been included in this design. It was purposely omitted because the tuning eye provides this indication.

The Circuit

The circuitry of the TT/L-2 Demodulator is shown in Fig. 1. Fig. 2 shows the schematic of the power supplies and the f.s.k. driver. A detailed description of the operation of each stage of this demodulator, including the function of each switch and control, is given later. However, the following brief description should enable the builder to satisfactorily construct and adjust the demodulator.

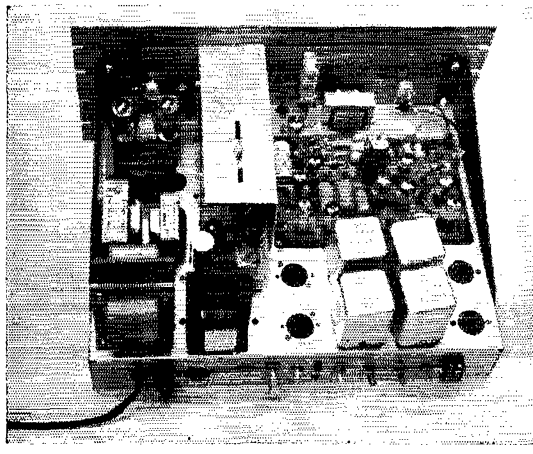
Two input-bandpass filters are provided, one for 850-Hz. and the other for 170-Hz. shift. Selection of the desired filter is made with S_1. V_2 and V_3, the limiter stages, are used for f.m. reception. These stages may be bypassed for limiterless reception with S_2.

A four-position switch, S_3, is shown in the discriminator filter section for selection of filters with different responses. Only two filters are included in this design, as it was felt that the builder might wish to add other filters at a later date, after becoming better acquainted with the operation of the TT/L-2. The narrow-band 3-pole Butterworth filters described earlier in *QST*[3] could be installed in the extra switch positions.[4]

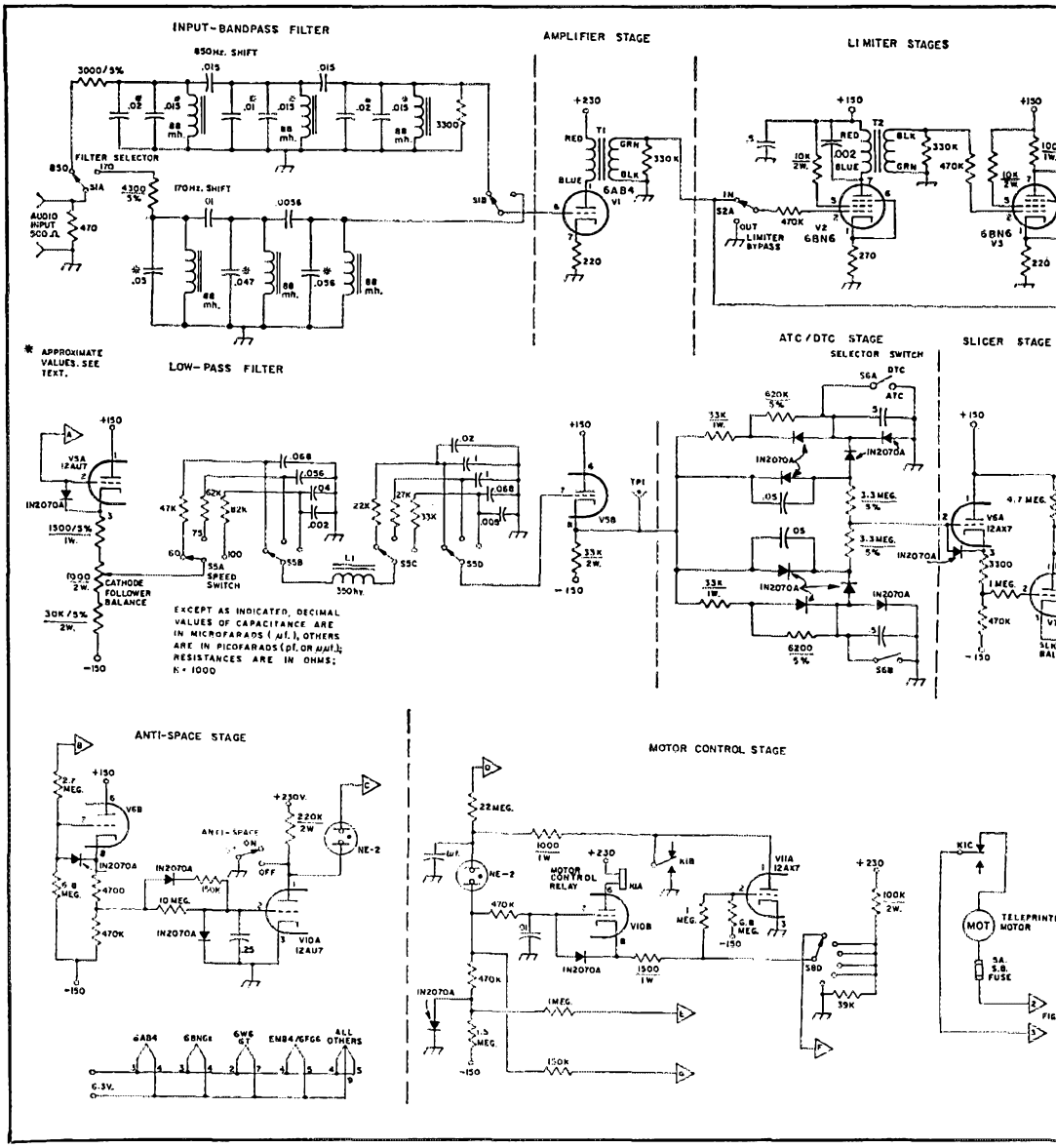
The speed switch, S_5, is used to select the components for 60-, 75-, or 100-w.p.m. signals.

[3]Hoff, "High-Performance RTTY Filters," Part II, *QST*, September, 1966.

[4]Or the builder might wish to install filters for special shifts, or select a heterodyning mixer and filter system in these switch positions. — *Editor*.



A look at the TT/L-2 from the rear. Suggested chassis size is 13 x 17 x 3 inches, such as a Bud AC-420. The K5BQA printed circuit board was used in the construction of this unit. The two tubes appearing on the upper left corner of the chassis are the voltage regulator tubes of the power supply. The eye-tube indicator is mounted at the opening in the front panel. For this photograph, input-bandpass and discriminator filters built into Vector cans have been inserted in the filter sockets.



This switch is shown in the 60-w.p.m. position, and may be omitted if you have no interest in 75- or 100-w.p.m. operation. In this case, only the parts associated with the left position of the switch are required.

Special Notes

All components required for the construction of the TT/L-2, with the exception of the 88-mh. toroids, are available from a single source.[5] A fiber-glass-epoxy printed circuit board has bee designed for the builder wishing to use this time saving construction technique.[6] Should th builder lack the necessary equipment for tunin the filters or otherwise desire to obtain complete filters, these are also available.[7]

[5]A complete package of parts is available from Newark Industrial Electronics Corp., 2114 South Division Ave., Grand Rapids, Mich. 49507, attention Truman Boerkoel, K8JUG. If the builder prefers to buy only certain specific parts, they are available from this same source.

[6]A well constructed undrilled board, designed to mat the physical sizes of the parts included in the package liste above, is available at reasonable cost from James R. Salte K5BQA, 11040 Creekmere, Dallas, Texas 75218.

[7]Completed and tuned input-bandpass and discriminat filters are available from J. & J. Electronics Communic tions Specialists, Windham Rd., Canterbury, Conn. 0633 as are the narrowband 3-pole Butterworth mark and spa channel filters described in September 1966 *QST*. Custo made TT/L-2 demodulator units are also available fro this source.

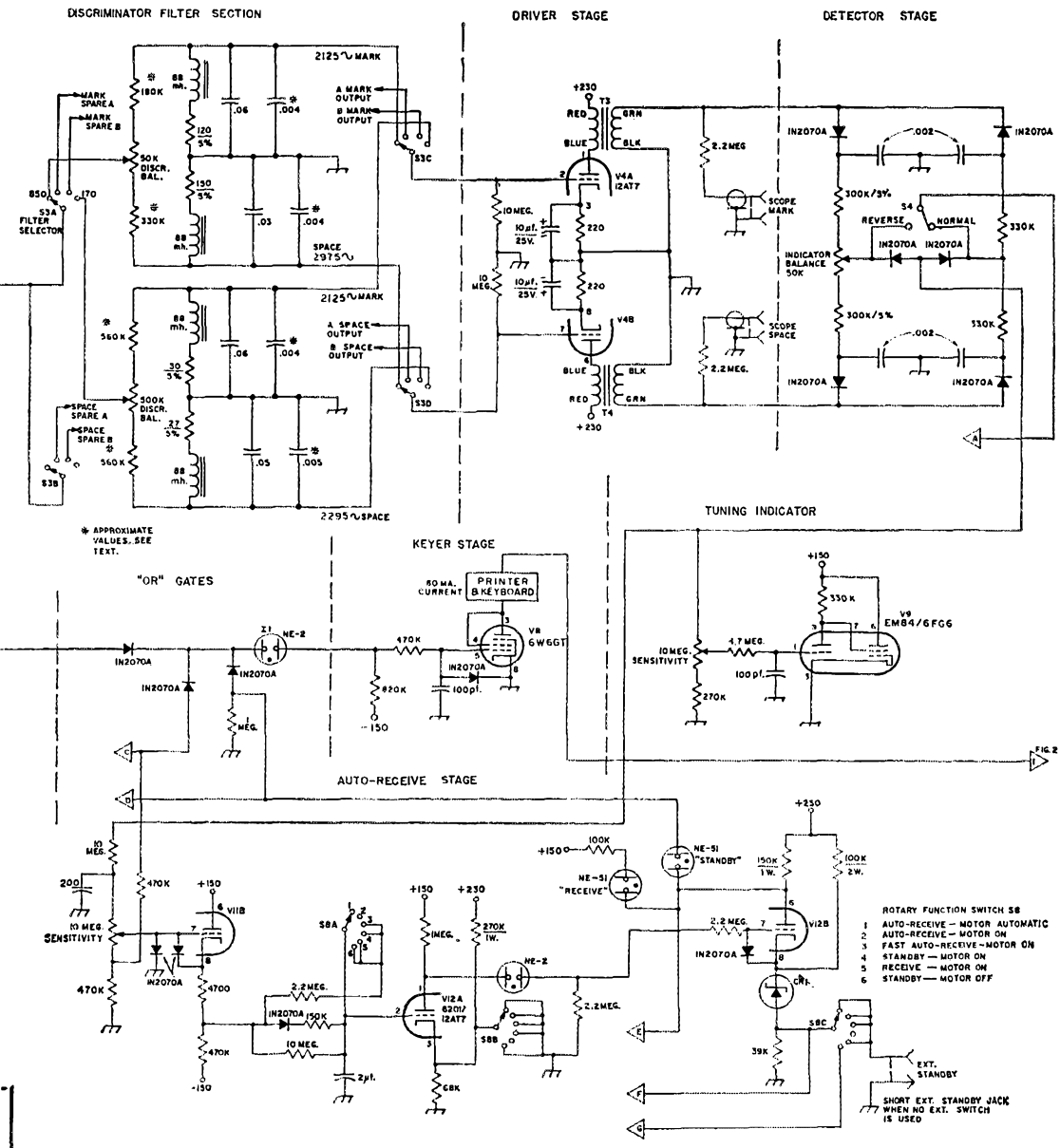


Fig. 1—Circuit of the Mainline TT/L-2 F.S.K. Demodulator unit. All resistors are ½-watt, 10% tolerance, unless otherwise indicated. All capacitors are mylar, 10% tolerance, except those indicated in pf. which are mica, and those with polarity indicated which are electrolytic. See *QST* "Ham-Ads" for obtaining 88-mh. toroids.

CR—Zener, 10 volts, 1 watt (International 1ZC10T10).

I_1—For text reference.

K_1—110-volt d.c. relay (Potter and Brumfield KAP-11DG or KRP-11DG).

L_1—350 henrys, 5 ma. (Stancor C-2345).

S_1 S_2—D.p.d.t. rotary, non-shorting (Centralab 1464).

S_3—Miniature phenolic rotary, 2 sections, 4 poles, 5 positions (1 position unused), non-shorting (Centralab PA1013).

S_4—S.p.d.t. toggle.

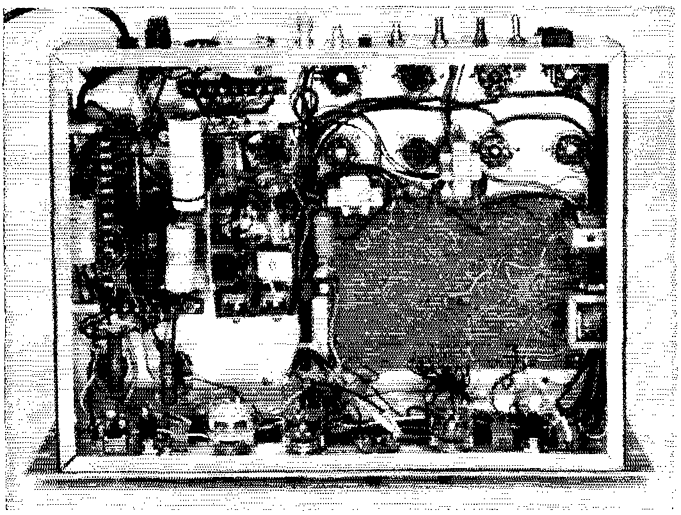
S_5—Same as S_3 except 2 positions unused.

S_6—D.p.d.t. toggle.

S_7—S.p.s.t. toggle.

S_8—Miniature ceramic rotary, 2 sections, 4 poles, 6 positions, shorting (Centralab PA2010).

T_1, T_2, T_3, T_4—Interstage audio, 1:3 primary:secondary turns ratio; 10 ma. (Stancor A-53).



The inside of the TT/L-2. Components at the left are those of the power supplies. The concentration of parts inside the partially-shielded compartment is associated with the phase-shift indicator circuitry. Most small components are mounted on the opposite side of the printed circuit board.

All diodes except those in the power supplies and the Zener in the auto-receive stage are type 1N2070A. It is important, especially in the ATC/DTC stage, that the diodes have at least 200 megohms back resistance.

All controls are linear taper. Those marked 2 watts are Ohmite type AB or equivalent.

Capacitor values shown with asterisks in the input-bandpass filters are approximate. Using the tune-up instructions appearing in the September 1966 issue of *QST*,[3] tune individual sections of the 170-Hz. filter to 2200 Hz. The 850-Hz. filter requires no tuning if 5% tolerance capacitors are used. Otherwise, tune filter sections A and C to 2400 Hz., and section B to 2300 Hz. Figs. 12 and 13 in the September 1966 article show these filter sections.

Capacitor values in the discriminator filters are approximate. Choose values for resonance with the appropriate toroid at the desired frequency.

Construction Notes

The layout used for construction of the TT/L-2 should be similar to that used in a high-quality audio pre-amplifier. This type of layout is desirable because of the very high-gain circuitry used. Be sure to shield all audio and high-impedance d.c. leads which might otherwise pick up extraneous signals or noise because of physical length or placement.

The wiring associated with the grids of V_1, V_{5A}, V_{6A} and V_{11B} should either be very short or else be shielded.

It is most important that T_1 and T_2 be mounted in such a way that they will not pick up inductively from each other, from T_3 and T_4, or from the power supply transformers and chokes. The best method is to mount each of the four transformers on different axes. Do not mount one above and one below the chassis in an effort to avoid inductive coupling, because the usual aluminum chassis used will not provide inductive shielding. Also be sure that the 350-hy. cho in the low-pass filter section is not mount near any of the power supply transformers chokes.

The 5-volt a.c. winding of the main pow transformer, T_6, is not used, and the lea should be insulated and secured to prevent th shorting out. This winding is a spare, for possib future use. Particular attention should be pa to the indicated connection of the secondary transformer T_2 for proper phasing to avoid fee back.

Shield all leads associated with the limit bypass switch, S_2. The 0.47-megohm series gr resistors for V_2 and V_3 should be located rig at the grid pin for each tube socket. All switch except S_7 should be mounted on the *front* pan S_7, the anti-space ON-OFF switch, is used for te purposes only, and may therefore be mounted the rear panel since it is not used in norm operation.

The test point located at the cathode follow output of the low-pass filter should be mount in a convenient spot on or near the rear panel

The auto-receive sensitivity control and t indicator sensitivity control should be mount on the *front* panel. All other potentiomet should be mounted on the rear panel.

The RECEIVE and STANDBY neon indicat may be mounted on the front panel, if desir to show when the unit is ready to receive signal. Be sure the sockets do not contain a resistors. If the builder does not wish to inclu these indicators for front panel use, the RECEI neon and its resistor may be omitted. T STANDBY neon must be retained, however, as is used as a coupling device. It has been t author's experience that many neons (abo 20%) are not good performers due to mar facturing tolerances, so an extra few should purchased. If any trouble is experienced w either the auto-receive or the motor-cont stages, the builder should try another neon.

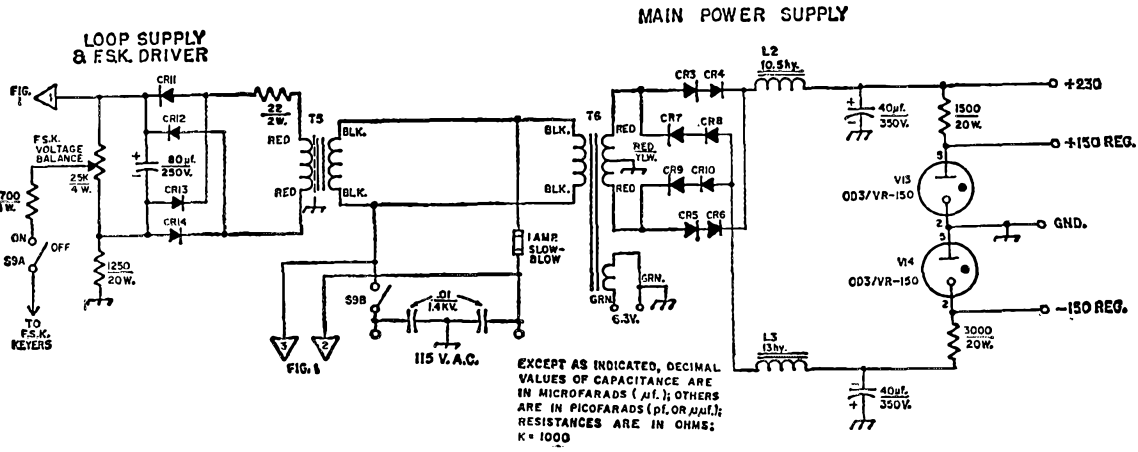


Fig. 2—Power Supplies and F.S.K. Driver for the TT/L-2 Demodulator.

CR_3-CR_{14} incl.—Silicon, 800 p.i.v., 500 ma. (Sarkes-Tarzian F-8).

L_2—10.5 henrys, 110 ma. (Stancor C-1001).

L_3—13 henrys, 65 ma. (Stancor C-1708).

S_9—D.p.s.t. toggle, 15 amp., 125 volts.

T_5—115 volts, 35 volt-amps. (Triad N-51X).

T_6—550 volts c.t., 110 ma.; 6.3 volts, 5 amp.; 5 volts, 2 amp. (Triad R-12A).

Adjustment Instructions

Allow the unit to warm up for at least fifteen minutes before *any* adjustments are made. The tubes will age during the first few days of operation, so it is wise to repeat the entire adjustment procedure approximately a week after initial set-up has been performed. These adjustments should always be done in the order shown below, or improper operation will result.

CATHODE FOLLOWER BALANCE

The first adjustment to be made is the cathode follower balance control in the low-pass filter stage. Connect a sensitive v.o.m. or a v.t.v.m. to the test point, TP_1. Remove the audio input from the TT/L-2 by unplugging the input cable. Set the limiter bypass switch to the OUT position. Adjust the cathode follower balance control for zero volts d.c. at the test point. If it is not possible to reach zero, and a new tube has already been tried, change the value of the 1500-ohm resistor in the cathode circuit of V_{5A} as necessary so the adjustment can be made properly.

SLICER BALANCE

The slicer balance adjustment is also made with no audio input and with the limiter bypassed. The anti-space switch, S_7, should be set to the OFF position and the rotary function switch, S_8, should be set to position No. 5 (RECEIVE — MOTOR ON) for this adjustment. Turn the slicer balance control until the teleprinter "runs open." Then turn the control in the opposite direction until the printer returns to the marking condition. Note these two points, and set the control midway between. No further adjustment is necessary.

Return the anti-space switch to the ON position.

DISCRIMINATOR FILTER SECTION

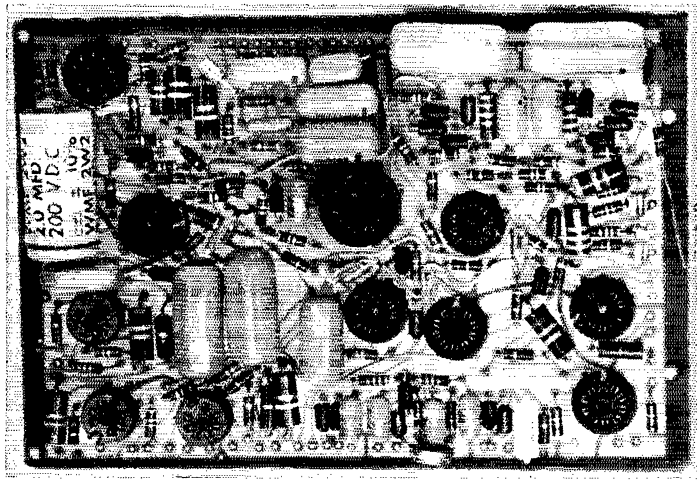
The discriminator filters should be tuned to resonance for the desired tone frequencies by varying the capacitors marked with asterisks. When adjusting the filters for resonance, the resistors in series with the ground connection of the toroids should be temporarily shorted out. Be sure to remove these shorts after the tuning is completed, or severe distortion of the received teleprinter signals will result. For additional tuning hints, refer to the article in September 1966 *QST*.[3]

The resistors marked with asterisks on either side of the balance controls should be chosen for each filter so that the d.c. voltages developed from mark and space tones, when balanced, do not exceed ±60 volts at the Test Point 1. If adjustment is required, change both resistors by an equal amount, so as to maintain a balance within the range of the control.

Adjustment of each discriminator balance control is made with the limiter bypass switch set to the IN position, and the normal-reverse switch, S_4, set in the NORMAL position. Alternately apply a mark and space tone to the input of the TT/L-2. Adjust the discriminator balance control so that the mark and space d.c. voltages are equal, but of opposite polarity, at the test point.

INDICATOR BALANCE

After the discriminators have been balanced, set the normal-reverse switch in the REVERSE position. Now adjust the indicator balance control for equal mark and space d.c. voltages at the test point. Observe the tuning eye. Carefully adjust the indicator balance control to eliminate any eye movement when alternating between mark and space tones. No further adjustment is necessary.



A close-up of the printed circuit board with all components mounted. Measuring approximately 6 × 9 inches, the board contains tubes and components of the amplifier, limiter, driver, detector, low-pass filter, ATC/DTC, OR gate, keyer, anti-space, motor-control, and auto-receive stages.

F.S.K. VOLTAGE BALANCE

Set the rotary function switch, S_8, to position 4 (STANDBY — MOTOR ON). Connect a test voltmeter from the F.S.K. DRIVER output to ground. Disconnect the external f.s.k. keyer lead during this adjustment. Alternately open and close the printer loop by pushing the "break" key or opening the keyboard contacts at the teleprinter. Adjust the f.s.k. voltage balance control for equal but opposite mark and space d.c. voltages. The mark voltage should be approximately — 45 volts and the space voltage should be approximately + 45 volts. No further adjustment is necessary.

CORRECT VOLTAGE CHECKS

With a 1.5-volt peak-to-peak 2125-Hz. tone at the grid of V_1 and the limiter switched in, there should be approximately 40 volts peak-to-peak at the plate of V_1, 10 volts peak-to-peak at the grid of V_2, 45 volts peak-to-peak at the grid of V_3, 40 volts peak-to-peak at the center of the discriminator balance control, and 40 volts peak-to-peak at the plate of V_{4A}. There should be about 120 volts at the secondary of T_3.

D.c. voltages are present from this point on. The grid of V_{6A} should be approximately -50 volts with the ATC/DTC switch at DTC, and about -28 volts at ATC. All of the following voltages should appear with the switch at DTC. The cathode of V_{6A} should be about -50 volts, the grid of V_{7A} -45 volts, and the grid of V_8 between 0 and -0.2 volt. With a space tone at the input and with the anti-space switch turned off, the grid of V_8 should be about -50 volts. The junction of neon I_1 and the two resistors in the keyer stage should be at +10 to +20 volts with a mark-tone input.

Operation

The proper audio input level for the TT/L-2 is that which produces the same amount of tuning-eye closure in either the f.m. (limiter) or a.m. (limiterless) mode of operation. You will find that this is slightly above normal room volume, and it will be necessary to install a pad in the speaker circuit to bring its volume down to a suitable listening level. The pad also offers the advantage of decoupling the variable impedance of the speaker from the receiver output circuit.

It is best to use your receiver's 100-kHz. crystal calibrator or an actual signal to make the auto-receive sensitivity adjustment. Set the rotary function switch to position 2 (AUTO-RECEIVE — MOTOR ON). With no signal (just noise) input to the TT/L-2, adjust the auto-receive sensitivity control to a point just below that where the teleprinter prints garble. The printer should now remain quiet. Now adjust the sensitivity control so that when a signal is applied there is a 3- to 4-second delay before the RECEIVE neon indicator lights. If your adjustment is correct, the teleprinter should print five or six letters after the signal leaves, and then remain quiet.

The auto-receive circuit was designed to be used only when receiving in the f.m. (limiter) mode. When the a.m. (limiterless) mode is used, the rotary function switch, S_8, should always be placed in the No. 5 position (RECEIVE — MOTOR ON). The motor-control stage works only when the auto-receive circuit is in operation.

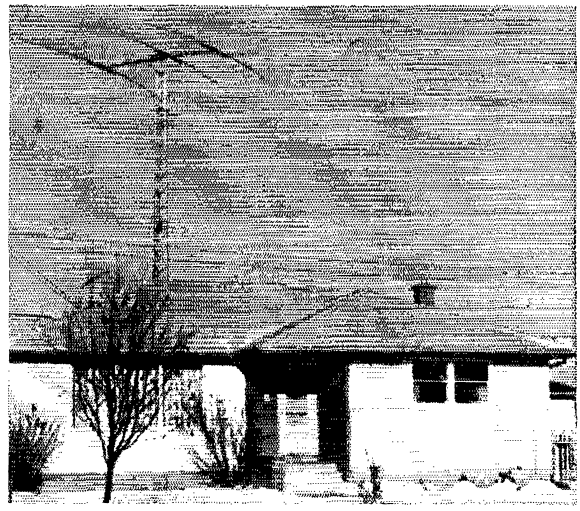
The tuning-indicator sensitivity control is provided so that the user may control the amount of eye closure during operation. The best setting is one where the eye just closes with the signal properly tuned. If the signal drifts, the eye immediately starts to open, signaling the operator to retune.

S_6 is used to select the Automatic Threshold Corrector or the Decision Threshold Computer. The DTC is used at all times except for reception of mark-only or space-only signals.

During transmission, the EXT. STANDBY switch must be opened, so that the signal will not feed back into the loop. When retransmitting or transmitting from tape-recorded signals, the switch must remain closed. QST

(Part II will appear in a subsequent issue of *QST*.)

All-Driven Three-Element Mini-Beam



The mini-beam for 20 meters is approximately the same overall size as a regular 10-meter beam.

A Modification of the Compact 20-Meter Parasitic Array

BY ALLAN A. SIMPSON,* VE4AS

SEVERAL years ago, after a somewhat frustrating attempt at phasing a couple of ½-wave vertical elements on 20 meters, I decided the time had come to graduate to a rotatable beam. Disregarding the advice of local DX enthusiasts, who advocated the largest Yagi possible or at the very least a two-element quad, I decided to build a somewhat smaller antenna, consistent with available resources and the home-brew s.s.b. exciter, converted surplus receiver and junk-box 813 linear in use as a station.

After weighing the pros and cons of a full-size 2-element or compact 3-element affair, I decided in favor of 3 elements mainly because the beam would look more symmetrical when in the air. The miniature 20-meter beam described in the *ARRL Handbook*[1] using center-loaded elements and a 12-foot boom was chosen as a guide. I say "guide" because I have the habit of improvising when involved in a construction project. When completed my beam was similar to the one in the article with the exception that the boom was one foot longer, the coil material was No. 6 copper, the coils differed in diameter, length and number of turns, the element lengths were very slightly longer, and the element diameters went from ¾-inch aluminum tubing at the center down to ¼-inch solid aluminum hydroline tie wire at the ends.

The beam was mounted 30 feet above the ground on the roof of the house, using a TV pop-up mast with an AR-22 rotator at roof level turning the mast and beam through two ball-bearing guy rings, and was used for a year or so with good results until the competition for DX forced an acknowledgment of the limitations in gain, beamwidth and side attenuation characteristics of the small loaded beam. Always on the lookout for a "something-for-nothing" scheme, I began searching for methods to make the mini-beam act like a maxi-beam. The text book, of course, said that this was impossible.

Accepting the fact that to do the impossible sometimes takes a little time, the investigation continued based on a reasoning that improved pattern characteristics might be achieved by

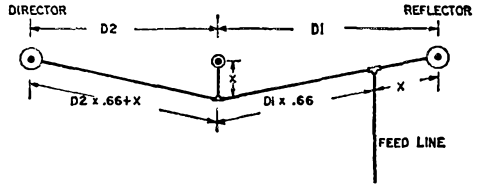


Fig. 1—Side view of the driven mini-beam, showing arrangement of phasing harness. The X dimension can have any convenient value. In the beam at VE4AS, D_2 is 5.5 feet. Element dimensions and loading-coil construction are described in the text.

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[1] "A Compact 14-Mc. 3-Element Beam," Antenna Chapter; p. 376 in 1968 edition.

more efficient interelement coupling. This led to a review of the literature on phased arrays, and in particular the unidirectional end-fire array. Available data suggested that a 3-element end-fire array would require an overall length of ½ wavelength and involve very tedious adjustment to obtain the required element-current ratios. A reference in the *ARRL Antenna Book* did, however, hold promise of being adaptable to the mini-beam,[2] and the principle was stated as follows:

"The requirement for unidirectivity is that there must be a progressive phase shift in the element currents equal to the spacing, in electrical degrees, between the elements, and the amplitudes of the currents in the various elements also must be properly related."

I felt that it was technically feasible to phase elements with spacings of less than ¼ wavelength, and from a gain point of view that the mini-beam spacing of a little less than one-eighth wavelength would, in fact, be an advantage. From a practical point of view, the center loading coils of the mini-beam would facilitate the link coupling of phasing lines and the degrees of coupling could be used to adjust for correct element-current ratios. Impedance changes and matching problems were expected, but disregarded for the moment.

Fig. 1 describes the phasing network and formula based on the use of RG-8/U coaxial cable. Calculating the phasing-line lengths was straightforward; however, in applying the velocity factor the resultant line lengths turned out to be shorter than the element spacings. In the circumstances, a convenient length of line, designated *X*, was added to sections of the phasing network in such a way that it lengthened the lines sufficiently to span the distance between elements but did not change the relative phase.

Element tuning and driven-element coupling were left adjusted for optimum operation as a Yagi, and the phasing network was added to the beam. Initially, coupling to the outside elements was made the same as that for the driven element (5-turn links). The pattern was checked and it was found that there was little or no front-to-back ratio and the side nulls were much too sharp and somewhat unsymmetrical. Element-current ratio adjustments were then carried out by decoupling the two outside elements. This was accomplished by unwinding the link coupling coils one turn at a time and using the length of wire unwound to increase the diameter of the remaining turns of the link. After several adjustments, followed by pattern checks, it was found that 2-turn links on the outside elements together with the original 5-turn link on the center element produced substantially improved pattern characteristics. The beamwidth narrowed down considerably, with the half-power points in the order of 70 degrees, and the front-to-back ratio went to approximately 16 db. The *E*-plane plot shown in Fig. 2 was arrived at by rotating the antenna while measuring the strength of a horizontally-polarized signal from a station located approximately one mile from the antenna.

With the beam mounted at 30 feet the s.w.r. was not good, but last summer the height was increased from 30 feet to 40 feet when a tower was procured, and at this height the s.w.r. is in the neighborhood of 1.7 to 1 over a major portion of the band when the beam is properly tuned and without further attempts at matching.

Construction Details

Four-foot sections of ¾-inch, ⅝-inch and ½-inch o.d. aluminum tubing were used for the elements in this case because the ⅞-inch tubing called for in the *Handbook* article was not available locally. While these sizes have been found satisfactory, slight element sag is evident and the tubing called for in the original article would be more desirable. The element lengths change appreciably with loading coil changes and the reason for the solid aluminum sections on the ends of the elements was that when fully extended the elements would not resonate in the 20 meter band. To lengthen the elements, short solid aluminum sections were slid into the ½-inch diameter end sections and wedged there using wedges made from the same material. The lengthened elements were required regardless of the increased number of turns in each coil over that called for in the original construction data. Anyone constructing this beam should make provision for increasing the length of the elements. Short pieces of ½-inch o.d. tubing slipped inside the ⅝-inch end section would do nicely.

The instructions call for an increasing number of turns in each coil going from the reflector to the director; however, I reversed this so that the elements would be almost equal in length.

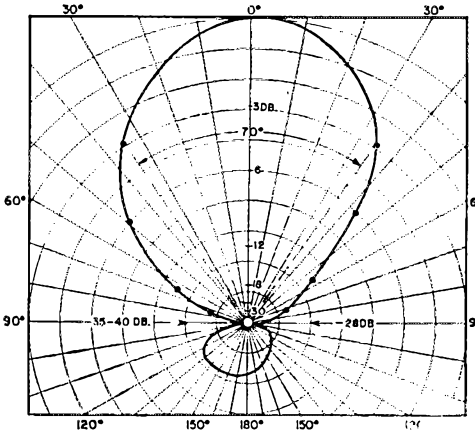
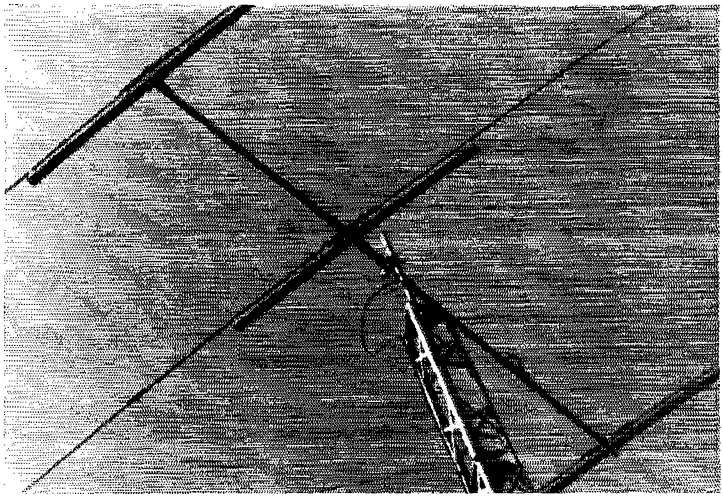


Fig. 2—Measured pattern of the VE4AS beam, made by rotating the beam and recording field strengths measured by a Stoddart Model NM-20B field-strength meter from a horizontally-polarized signal one mile distant. Frequency approximately 14.2 MHz.

[2] Chapter 4, section on Unidirectional End-Fire Arrays; p. 147 in 11th edition.



View of the element supports and loading coils. In general, the construction follows that described in the *Handbook* compact-beam design, but the reflector and director are driven through phasing lines instead of being parasitically excited.

The coils were made by tightly winding No. 6 solid copper wire on a ⅝-inch form. The slight spring to the material resulted in the coils ending up with a ¾-inch inside diameter. The tightly wound coils were then spread just enough so that the turns did not short. They were then slipped over the ⅝-inch polystyrene-bar coil form which provided support. The coils are approximately 10 inches long and adequate space for mounting must be allowed when fixing the elements to the redwood supports. The ends of the coils were bent so that they could be clamped to the elements using hose clamps. The copper-to-aluminum connections must be very clean, securely clamped and perfectly sealed from the air. The number of turns in each coil is as follows: reflector 48 turns, driven element 46 turns, and director 44 turns. While the element lengths will vary considerably depending upon the coil characteristics, the tip-to-tip lengths (including the coil length) required in my case is close to the following: reflector 24 feet 4 inches, driven element 24 feet, and director 23 feet 8 inches.

After mounting, the coils were wrapped with a couple of layers of plastic tape (all clamped joints on the beam were similarily taped) and the 5-turn coupling link was tightly wound around the center of the driven-element coil using No. 12 copper wire with a heavy plastic coating. This type of wire was also used for the other coupling coils and is stiff enough to be self-supporting when loosely wound. Connection to the link coils was by means of coaxial cable connectors, and the female connectors were mounted on aluminum brackets fixed to the redwood supports near the centers of the coils.

The element mounting insulators were made from 2-inch lengths of ⅞-inch diameter polystyrene rod suitably drilled and tapped on each end to facilitate mounting and element fastening. One feature not shown in the original article but very definitely required is the use of aluminum plates on each side of the redwood element mounts to distribute the pressure when the boom U-bolts are tightened. In my case the element separations are: reflector to driven element 7.5 feet; driven element to director 5.5 feet.

Coaxial T connectors were used for each of the three-way connections in the phasing network. Length X in my case was 2 feet 9 inches and was chosen simply because a couple of pieces of RG-8/U cable with connectors on the ends were on hand at the time. The two outer link-coupling coils were wound in the same direction as the original driven-element link coil. The phasing line network was secured to the beam by taping with plastic tape.

In conclusion, while the call sign VE4AS may never show up on the DXCC Honor Roll without resorting to the use of a monster beam, the mini-beam has worked an average of seventy-five new countries a year over the past three years from a somewhat-less-than-ideal city location — not bad for a 20-meter beam no larger than the usual 10-meter Yagi.

The principles described when applied to 40- and 80-meter beam construction might just produce directional antennas small enough to be rotated within the capability of the average amateur station. Anyone interested in a five-band DXCC Certificate? QST

Strays

To commemorate the town's Centennial, the Fort Sill, Okla., ARC, K5VOZ, MARS station K5USA, and all members of Lawton — Fort Sill ARC, will be on-the-air from 1500 GMT July 4 to 0200 GMT July 7 to conduct QSOs with stations interested in competing for the Fort Sill Centennial Award. Space does not permit listing the award rules but a SASE to the club will bring complete information on the award. Special QSLs will be used to confirm all QSOs.

Long-Delayed Echoes . . . Radio's "Flying Saucer" Effect

BY O. G. VILLARD, JR.,* W6QYT, C. R. GRAF,** W5LFM, AND J. M. LOMASNEY,*** WA6NIL

HAVE you ever had the experience of hearing your own voice repeat the last couple of words of your transmission, after you have switched over to receive? Or have you been aware, after another station stands by, that a weaker signal on the same frequency is repeating the last few words of the transmission, with exactly the same "fist"?

Well, believe it or not, some amateurs have. If you, dear reader, think us out of our minds to even bring this matter up, rest assured that there are many others who share your view and would cheerfully consign us to the booby hatch. If you haven't tuned out by now, you are undoubtedly asking: just who *are* the folk who have had this experience? Are they emotionally unstable types, prone to LSD-style hallucination? But hear this: one is a professor of mathematics at a well-known West Coast university; another is a physicist at a midwest research foundation; still another has managerial responsibility for important communication satellite programs at a prominent West Coast aerospace corporation, and most of the rest have a professional connection with electronics in some way . . .

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Amateur help is needed in unraveling the mystery of signal "echoes" which persist for times much longer than round-the-world propagation delays. This baffling and unexplained effect, wherein whole words —and not just syllables—are repeated, was first reported in 1928, and occurs so rarely that many doubt its reality. Interest in the subject has been reawakened by recent discoveries in plasma physics which—if applied to the ionosphere—suggest new possible explanations. The authors review the reports known to them, suggest that the effect is real, and solicit further observations.

Hard to discount their reports, it appears. Were these men hoaxed, you ask? That's always a possibility, and it apparently has happened in the past. But what about the instances where the echo was heard *both* on the ham's own signal, *and* on the signal of the station being worked? It would take a pretty clever spoof to simulate both the sound of long-distance transmission and the transmit-receive timing. Still, it could be done, just as a photograph of a flying saucer can be handily simulated with the aid of ordinary crockery.

That's what makes the study of long-delay echoes (LDEs) exciting. At the moment, there is no really indisputable proof that they exist. Scientists remain unconvinced about UFOs, and LDEs are in the same category. However, an increasing body of experimental evidence argues for the reality of LDEs, and it is interesting that a number of new ideas for possible theoretical explanations have come to light only within the last couple of years.

Scientific research is placed under great handicaps when the effect being studied is highly infrequent in occurrence. The handicap is even worse when there is no satisfactory theory to guide experimentation. In these circumstances it hardly pays to set up a special test if a useful result is achieved only once a year on the average. This problem is well known to astronomers, who depend almost entirely on amateur reports to locate comets which pop into view in unannounced places and at unannounced times. Busy professionals simply cannot devote that many hours per year to scanning the skies. LDEs provide an analogous opportunity for hams to be of service to the professional community. Reports on LDEs, with time logged accurately, should be invaluable in helping to solve this particular puzzle.

Background

Echoes of very long delay were first reported in 1928 (References 1 and 2), not long after international short-wave broadcasting got under way. Transmitter powers were around ten kilowatts; antennas were tilted wires (see Fig. 1); the radio frequency used was around ten megacycles, and receivers were for the most part regenerative. Oscilloscopes and tape recorders were unheard-of.

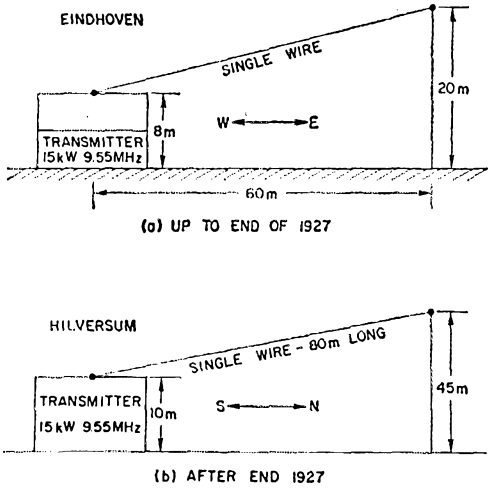

Fig. 1—Details of the transmitting setups used for the first observations of long-delayed echoes.

On the other hand, interference levels were far below those of today. The experiment consisted of transmitting one or more dots or dashes, and timing the received signals with the aid of a stop watch. Delays ranged from 2 to 30 seconds. Echoes were heard at locations both close to and distant from the transmitter, sometimes apparently at the same time. Fig. 2 shows an example.

A number of theories in explanation of the observations were tried and discarded. The basic difficulty is that radio waves in most circumstances travel at the velocity of light (186,000 miles per second), so that a complete transit of the earth takes only one-seventh of a second. A trip to the moon and back takes roughly two seconds. One theory held that the waves might be slowed down sufficiently if they happened to be close to the ionospheric "critical frequency;" however, it soon became obvious that the accompanying losses would inevitably swallow them up. Loss also makes the possibility of multiple passes around the earth unlikely (210 are required for a 30-second delay) — for the ionospheric gas is by its very nature a lossy dielectric. The hypothesis that echoes might be returned from uncharted clouds of electrons far distant from the earth was seriously considered at the time; today, of course, we know that deep space holds no surprises of that particular sort.

By the middle 1930s few echoes were being received, and the matter remained dormant until the Cavendish Laboratory of Cambridge University undertook a study in 1948 (Reference 3). In a careful year-long test involving transmission of about 27,000 test signals at 13.4 and 20.6 MHz., not one LDE was recorded. No further published scientific activity seems to have taken place since that time. In the intervening years there appears to have been at least one amateur report which was discovered to be a hoax, and in another instance a mechanical fault in a recording was responsible for reports of "delayed echoes" audible on a standard-frequency-station time announcement.

In scientific work when none of the postulated explanations satisfactorily explains a reported effect, and when a reputable scientific organization attempts to find it experimentally and doesn't succeed, there is an understandable and almost overpowering impulse on the part of other members of the scientific fraternity *not* to become further involved. This is how LDEs came to have roughly the same dubious status as UFOs.

More Recent Experiments

In 1958, W5LFM drew W6QYT's attention to field-strength recordings in which there was an apparent decay of received-signal energy during the 30-second interval of carrier interruption for identification purposes. This behavior, which *could* have been ascribed to weak (perhaps incoherent) long-delayed echo energy, turned out in the end to be due to the effect of mechanical "stiction" on operation of the pens of the then-standard Esterline-Angus paper-chart recorders. The observation did, however, suggest an inexpensive means for collecting data on possible LDEs: use a more suitable recorder and see what is left behind on the frequency when WWV's carriers leave the air once an hour. Studies of this sort were made by W6QYT with the help of various part-time graduate-student assistants at Stanford University in the period 1958–1960 (Reference 4). The following suspicious circumstances were — very occasionally — noted:

1) extra noise, decaying exponentially for tens of seconds,

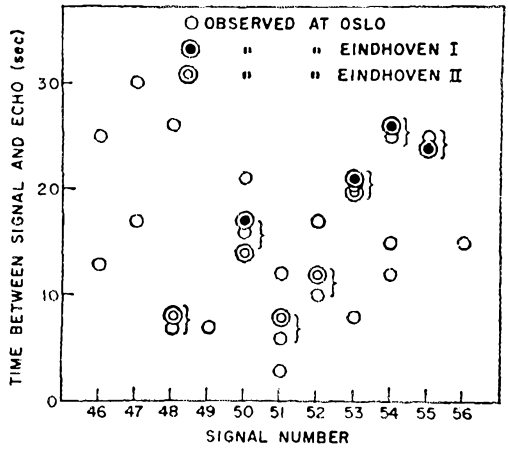

Fig. 2—Some early observations of long-delayed echoes, some of which were apparently audible at three locations at the same time. Signals were sent every 30 seconds; note the briefness of the total period of reception. (From Reference 2).

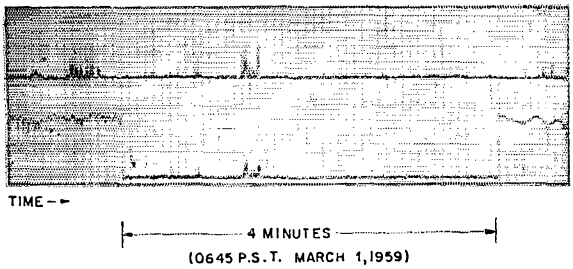

Fig. 3—Signal-intensity-versus-time recording for normal conditions. Upper channel is background noise 30 kHz. away. Lower channel is standby of WWV-20 carrier. Note rapid drop into background noise level. Receiver bandwidth: 100 Hz.

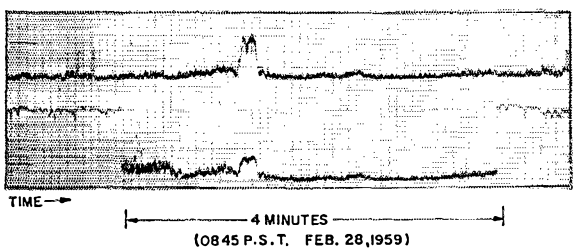

Fig. 4—Note the weak signal persisting on the WWV-20 frequency for roughly 30 seconds after standby. There is no proof, but it *might* be long-delayed echo energy.

2) extra noise of roughly constant intensity, enduring for about the same period of time (see Figs. 3 and 4), and

3) instances where the same noise actually contained a weak signal similar to the WWV carrier. (An example is shown in Fig. 5.) Some 18 of the type 3 events were observed in a period of about a year. These findings were reported to the Office of Naval Research under whose contract the work was performed, but they were never published because it could not be proved beyond reasonable doubt that the observed signals were in reality caused by the WWV transmissions. They could, for example, have been the result of an obscure fault in the transmitter, although this is considered highly unlikely. WWV frequencies are shared by other standard-frequency stations throughout the world; this introduces troublesome uncertainty. (So does harmonic radiation from 100-kHz. crystal oscillators on the Hewlett-Packard Palo Alto production line, as WB6FDV found out in a classic bit of detective work.) A more sophisticated experiment was clearly needed to decide the matter one way or another, and the effort was sidetracked owing to the pressure of other activities.

Possible Theoretical Explanations

If h.f. signals are to endure for tens of seconds, a way must be found for ionospheric loss to be overcome. In the 1930s the possibility of signal amplification in the ionosphere had not occurred to anyone, but today we can visualize a number of means by which this might take place. Parametric amplification has been suggested (Reference 5): the ionosphere is not a perfectly linear dielectric, and if we could exploit this property, one signal — in principle — could "pump" another. Another new development is maser amplification; the ionospheric plasma is acted upon by a whole spectrum of radiation from the sun; is it possible that amplification-producing population inversion somehow takes place? Still another explanation has to do with signal storage in the ordered motion of electrons spinning around magnetic field lines; for example, there might be an ionospheric analogue of the phenomenon of spin echoes in nuclear magnetic resonance.

Professor F. W. Crawford of Stanford University has been studying — on paper and in the laboratory — plasmas that "talk back," almost like Edison's original phonograph (Reference 6). A complex signal is fed in, which then disappears insofar as the external circuit is concerned. To call it out, the plasma is pulsed; a replica *reversed in time* then appears (see Fig. 6). These "plasmas with memory" — and the above is only one scheme of many — are most readily studied when comparatively high pressures and gigahertz radio frequencies are used. The tantalizing feature of these experiments is that if they *could* be extended to ionospheric pressures and h.f. frequencies, the indicated time delays fall right in the 3-30 second ball park.

Another remarkable and comparatively recent finding is the so-called "stimulated natural emission" observable at v.l.f. At very low frequencies (on the order of 15 kHz.), radio signals both travel underneath the ionosphere and penetrate it. Those which penetrate are guided by the magnetic field lines and travel from northern to southern hemispheres at phenomenally high altitudes over the equator (one or two earth radii). During their travel, these waves actually rearrange the ambient electrons and store energy in them. This energy is available to amplify any signals of the same frequency after the causative wave is shut off. As a result, an unstable but recognizable replica of the signal is heard after the original transmission stops. Examples are shown in Fig. 7, which is taken from Reference 7. This mechanism most emphatically will *not* work at h.f., since the circumstances are then wholly different. But the fact that radio signal amplification in the ionosphere can happen at all, makes the possibility that something analogous might happen at h.f. seem more likely.

These new developments in the understanding of plasmas stimulated W6QYT to ask for reports of LDEs at a recent get-together of the Northern and Southern California DX Clubs; to his surprise five excellent ones were received; they are included in the summary on the next page.

W5LFM, who has also been interested in this subject since 1958, has collected reports from

Summary of LDE Reports

Date	*Call*	*Band, MHz.*	*Approx. duration, seconds*	*Time, GMT*	*Phone/ c.w.*	*Audible on Own/Other*
Oct. 16, 1932	W6ADP	28	18	≈1800	c.w.	Own
Winter, 1950–51	W5LUU	7	5	≈0300	c.w.	Own
Winter, 1965	K6EV	14	3–4	0600–0700	s.s.b.	Own
Dec. 2, 1967	W5VY	28	3	1328	s.s.b.	Own
Jan. 27, 1968	W5LFM	10	½	1400–1430	Time Ticks	Station RID
Dec. 18, 1968	W6KPC	28	1	≈2000	s.s.b.	Other
Jan. 21, 1969	W6OL	14	6–10	1536	c.w.	Other
Feb. 17, 1969	K6CAZ	2	≈2	1430–1500	s.s.b.	Own and Other

W5VY and W5LUU, and has himself observed a difficult-to-explain half-second time delay on the time ticks of a Russian standard-frequency station.

Summary of Characteristics

The Stanford recordings suggested — but did not prove — that incoherent noise "echoes" may exist, as well as coherent ones containing a replica of the signal. The amateur and the early reports, of course, deal only with the coherent variety, which seem to be appreciably less frequent in occurrence. Following is a summary of the conclusions which can be derived from the ham reports taken as a group:

1) multiple-second "coherent" signal echoes, either phone or c.w., appear to be real, and are observable for short periods of time at highly infrequent intervals.
2) they are audible both on a station's own signals, and on signals of other stations,
3) they have been observed at 7, 14, 21, and 28 MHz., but apparently not at higher frequencies,
4) They either occur most frequently (or perhaps are most easily heard) when a given band is just "opening up" — i.e., when skywave propagation to some point on earth is just becoming possible.
5) They seem to be audible when long-distance propagation is good, and when geomagnetic activity is low. (The presence of long-path as well as short-path propagation, or signals from stations at antipodal locations, is apparently a good omen.)
6) Stations reporting LDEs typically have been ones having antennas well up in the air, at locations reasonably good for DX, but other than that no exceptional facilities seem to be required.
7) An active ham who DXes one or two hours a day, may expect to hear an LDE once a year, on the average.
8) The LDEs appear to be one single echo, rather than several successive ones.
9) No Doppler shift is perceptible.
10) The sound of the echo resembles that of a DX signal (i.e., it apparently involves long-distance multipath propagation.)
11) The strength is usually weak, although some reports have put it at S3 or more.
12) Echo strength always decays with time, rather than the other way around.
13) The total time interval during which the echo effect can be heard is remarkably short — usually no more than a few minutes.
14) There is some indication that LDEs may be heard more frequently on signals which have travelled through the northern and southern auroral zones.

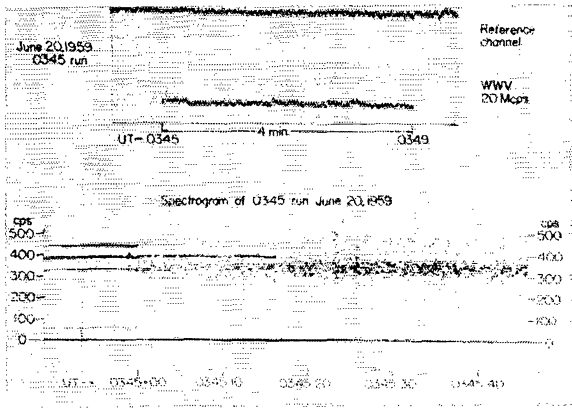

Fig. 5—Lower record (a frequency-amplitude-time plot) shows possible 15-second "echo" of WWV-20 transmission. (Note the 60-Hz. hum side frequencies on the WWV carrier prior to standby.) There is no *proof* that this signal was really related to the WWV transmission; only a presumption based on observation of a large number of records of this type.

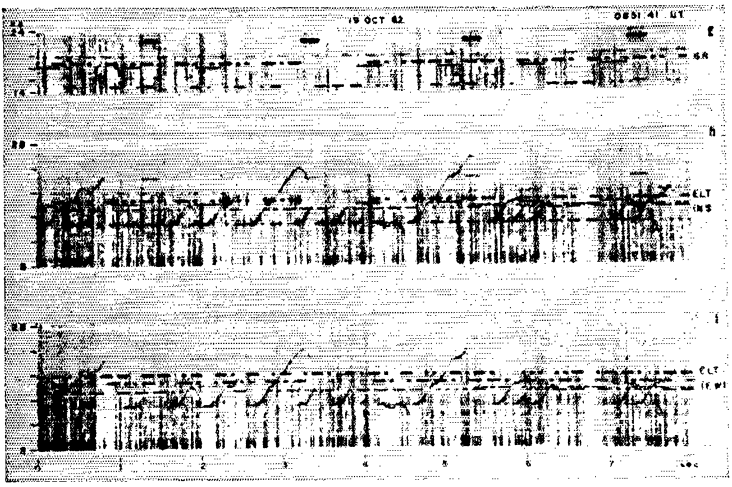

Fig. 7—Artificially-stimulated natural emissions (similar to "echoes") at v.l.f., shown here as a matter of interest only. Uppermost spectrogram shows v.l.f. spectrum as received near the transmitters; NAA is the lowest frequency signal, at 14.7 kHz. Lower two records, taken aboard the USNS *Eltanin* in the Antarctic, show diagonal emissions growing out of NAA dashes. Energy stored in the magnetosphere while NAA is transmitting, is released in the form of unstable, partly coherent radio signals. Note: this particular mechanism does *not* work at h.f.; however, it is conceivable that something analogous might. (From Reference 7).

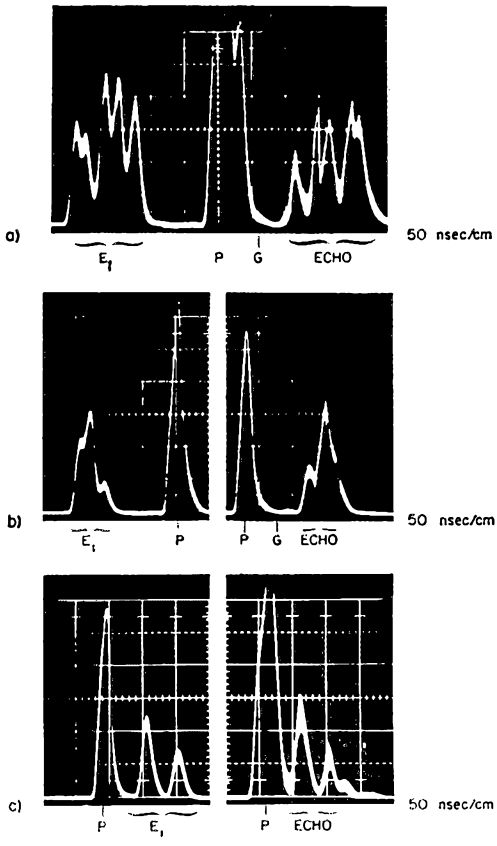

Fig. 6—Examples of signal storage in plasma at microwave frequencies. Above are plots of amplitude versus time (from left to right). The signals marked E_1 are the inputs, which are stored; the readouts are the replicas designated "echo," which require for their release application of the pulses "P." (Photo courtesy of Professor F. W. Crawford.)

A Comparison

It isn't clear that the currently-observed effect is the same thing as was reported in the 1930s, since the early accounts all stressed a multiplicity of signals returned for a single outgoing pulse. But a connection is certainly possible.

It is interesting to compare the circumstances of the experiments of those times with those of today. The early work involved high transmitter power (10 kw. or so), relatively non-directional antennas (tilted wires) radiating upward as well as outward, frequencies of the order of 10 MHz., and comparatively short-distance propagation. Today's observations were performed with lower power, higher beam gain, higher frequencies, antennas directing their energy closer to the horizon, and long-distance propagation.

As the Cambridge group (Reference 3) pointed out, perhaps the most significant difference between "then" and "now" is the greater crowding of the h.f. spectrum. In their view their lack of results might in part be explained by the difficulty of finding a clear channel. It is certainly true that they operated in commercial telegraphy bands, which are comparatively crowded; it is also true that their antennas were directive upward, since they were primarily looking for reflections from electron clouds in space. It is also possible to speculate that, if maser amplification were involved, interference would have the effect of siphoning off amplifying power which might otherwise go into keeping the echo going. (This would be in addition to the obscuring effect of the interference.) The QRM would tend to be amplified, instead of the echo, since stimulated electrons in giving up their energy will tend to lock themselves to the strongest signals of the appropriate frequency present at any given time.

What Amateurs Can Do To Help

Additional amateur reports of LDEs are urgently needed to guide on-going research. If an

LDE *is* experienced, the most important single piece of information to write down is the exact time of occurrence. Because LDEs are so transitory, it may be possible to establish a relationship to other, equally transistory geophysical events simply by making a time-of-occurrence comparison. Try to log, *at the time*, all the circumstances of the experimental setup — frequency, antenna heading, etc., plus a careful description of the observed effect.

It is suggested that the making of special transmissions in the hope of catching an LDE is a sure road to total frustration. Best bet is to act as if they didn't exist. However, if you have a tape recorder which can be spared from other duty, use it to record the output of the station receiver at all times. A single tape can be used over and over again. Then, should an echo put in an appearance, you'll have it trapped — if the tape hasn't worn out in the meantime! Frequency-amplitude-time plots (similar to "voice prints"), made from such recordings, should be very instructive. However, tapes (like photos of UFOs) can be easily faked, so don't expect to convince skeptical scientists and garner instant glory by producing a single example: nobody will bite. Nevertheless, many tapes collected over a period of time at many locations, and containing internally consistent information, may well permit the piecing together of a sensible explanation.

It's fun to think that in this era of "big" science, there is still an area where amateur radio operators can make contributions which will be as uniquely valuable as those provided to astronomers by the amateur comet-watchers.

Some Reactions Upon Hearing LDEs

Those who are privileged to hear LDEs are clearly members of a highly exclusive club, since many hams active for 20 years or more have never observed anything like it. Yet some who do, such as W5VY and W6CAZ, report that they hear LDEs on the average about once a year when they are operating regularly (perhaps 1–2 hours per day on the average). Hence, the effect must happen at least this often.

W6QYT has queried ship-to-shore radiotelegraph operators of the Mackay Radio receiving site at Half Moon Bay, California with negative results. It appears that these men, who contact ships at varying distances throughout the world, every day, around the clock, and in several wavebands, simply do not hear LDEs. However, a typical ship transmitter has a power in the order of 150 watts, and a non-directional antenna; hence it is not as potent as most ham stations.

Psychologists say that the human mental computer is astonishingly efficient at recognizing something which is known. This is probably an important aspect in the identification of one's own voice or "fist." One wonders how many weak LDEs associated with other transmissions may have gone unnoticed, because the ear tends to shut out —automatically —anything it classes as QRM, and therefore spurious.

Please send reports to W6QYT, Radioscience Laboratory; Stanford University, Stanford, California 94305. All communications will be acknowledged and credit given.

The almost universal reaction to hearing a good LDE is total astonishment. For this reason the memory tends to be fresh even after the passage of years. Some of the reports convey this feeling quite dramatically. According to W6OL, "I was just tuning the band, listening, and heard this Russian working someone. There was some slight QRM on his transmission but the copy was reasonably good. However, I heard him sign and then I realized that the QRM was his echo, and that I could again copy the last part of the transmission." Says W6KPC, who heard "whole words, if they were not too long, . . . the echo was so loud, long, and startling that my reaction was to 'talk' about it with someone! . . . I've never heard such long echoes before or since." In W6ADP's words, "I was calling ON4AU on 28 Mc. and switched over to listen and heard on my own frequency ON4AU de W6ADP K. Was very weird and never will forget it. Signal sounded like it was coming a long way but was S6 or so."

Acknowledgement

The assistance of Professor B. Dueno, KP4HF, is gratefully acknowledged. Members of the staff of WWV and WWVH have provided useful information. Measurements at Stanford University were supported in part by the Office of Naval Research under contracts Nonr-225(24) and Nonr-225(64). QST

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2. Van der Pol, B., *Nature*, 122, December, 1928, pp. 878–9.
3. K. G. Budden and G. G. Yates, "A Search for Radio Echoes of Long Delay," *Jour. of Atmos. and Terr. Physics, 2*, 1952, pp. 272–281.
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● *Beginner and Novice*

Some Common Problems and Their Answers

BY LEWIS G. McCOY,* W1ICP

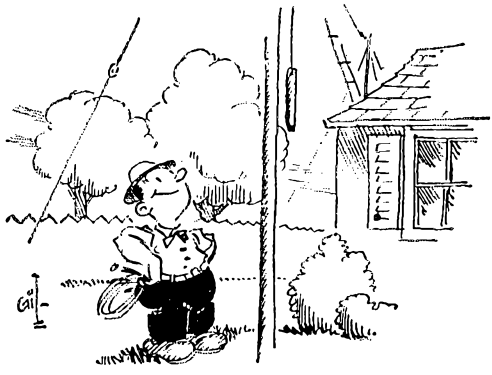
In handling questions from amateurs, both at ham meetings and through the mail, certain queries are much more common than others. Possibly one of the questions treated in this article is one that bothered you.

"I read your recent article on a transmatch but nowhere in the article do you say, or imply, that you should turn off the power when making adjustments on the transmatch. Should I turn off the power?"

Let's make one thing clear: always turn off the power when you handle any circuit or unit capable of having power in it. It is common practice to make adjustments on a transmatch coil with the transmitter a.c. voltages turned on, but not with r.f. flowing or being generated, such as when the key is left open. While it may be common practice, it is not a good one; the reason is that it is possible for a blocking capacitor in the amplifier tank circuit to fail, and under such conditions, the amplifier plate voltage could appear on the coil of the transmatch and such voltages can be very dangerous.

In addition to the danger of such failures and d.c. voltages being on the transmatch coil, if the transmitter were turned on, r.f. voltages would appear on the transmatch coils. While r.f. voltages are not usually lethal, they can cause very nasty r.f. burns which are slow to heal. And, even running very low power, some very high r.f. voltages can develop on coils in a transmatch. So as like we said, turn off the rig before making any adjustments.

* Novice Editor



The antenna wire can be stranded or solid . . .

"In putting up a wire antenna, is it all right to use a "coated" (insulated) wire or should I use bare copper wire? Also, I plan on going high power when I get my General and I want to use a so called "invisible" antenna; can I use wire as small as No. 30 for high power?"

It doesn't make any difference whether the wire is coated or not; the antenna performance will be the same in either case. Also, the antenna wire can be stranded or solid. One type of wire commonly used for antennas is copper-coated steel electric fence wire, available at any farm supply dealer.

You can use No. 30 wire for high power, even the full amateur limit. If you should happen to look up the current-carrying ratings of wire in any wire table you are liable to be misled by the figures. For example, No. 18 wire may be rated at slightly less than 2.5 amperes but this figure is for transformer windings, where the wire would be enclosed. No. 18 has a continuous duty rating for a single wire *in air* of 16 amperes. Bear in mind that amateur radio operation would not be continuous, but intermittent. In this case the rating would be much higher than 16 amperes.

We tested an antenna made from No. 30 wire, running a full kilowatt input under conditions that put some rather high current points on the antenna. The antenna "took" the power with no trouble at all.

"I have my antenna in the same room as my rig; are there any radiation hazards from my home station such as I read about from TV picture tubes?"

Some readers may chuckle at this question but after all, if you don't know, one *could* worry about radiation hazards in this day and age!

The answer is no, there is no danger from radiation — at least not from any commonly-used amateur radio frequencies. By commonly-used we are referring to everything below the ultra-high frequencies — below 300 Mc., that is. There can be radiation hazards when working with equipment operating above 300 Mc. WB6IOM in a recent article in *Ham Radio*[1] points out some of the dangers in working with a high-power amplifier on the 1296-Mc. band. However, for the bulk of ham work, radiation is not a problem as far as health is concerned.

"I notice articles describing the construction of transmatches never discuss the need for shielding

[1] Laakman, "High Power Linear For 1296 Mc.," *Ham Radio*, Aug. 1968, page 17.

transmatches to prevent TVI. Do you or don't you have to shield a transmatch?"

Shielding a transmatch will have little, if any, effect on reducing harmonic radiation from your equipment. For effective harmonic TVI suppression, the transmitter must be thoroughly shielded so that any harmonics generated within the transmitter cannot escape. Output from the transmitter must come out via a shielded coaxial feed line and into a low-pass filter, which attenuates any harmonics that are present. It follows that any r.f. reaching the transmatch should be clean of TVI-creating harmonics, and therefore there should be no need for shielding the transmatch.

Along the same line is a frequently-asked question about using a low-pass filter with an inadequately-shielded transmitter — will the filter help, or is it useless without shielding? Probably the best answer is that *everything* in the way of harmonic suppression helps to some degree. Many commercial rigs these days don't have really *adequate* shielding when it comes to dealing with truly fringe-area TVI. However, the important point is that the low-pass filter will help to some degree, but how much it helps is impossible to answer without trying it. If it is determined that the TVI is the fault of harmonics, and the low-pass filter doesn't help much, then it is highly probable a case of inadequate shielding of the transmitter.

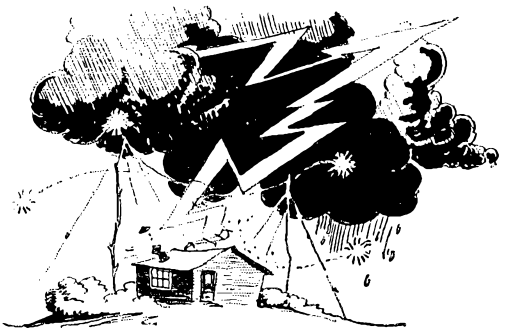
"When I am on the air, my neighbor complains that I interfere with his telephone. What must I do to my transmitter to stop this type of interference?"

There is nothing you can do to your transmitter to stop the interference, (except to turn it off!). However, the interference is *not* the fault of your transmitter but rather that of the telephone system itself. In such a case, tell the complainant, as diplomatically as possible, that his telephone is at fault and that the phone company will install appropriate filters. Not that we expect you would, but you shouldn't offer to fix the phone, assuming you know how. It is the telephone company's property and their obligation so let them fix it.

"I have heard that strong signals can burn out my receiver. Is this true, and if so, how can I protect my receiver from accidental burn out?"

It all depends on what one means by "strong" signals. It would be almost impossible to damage the normal receiver from signals picked up on a receiving antenna. However, nearby lightning strokes could generate enough "static" electricity to cause damage to a receiver's front end. Also, many newcomers make mistakes in hooking up antennas to their transmitters and receivers and sometimes accidentally feed the transmitter output into the receiver, which would of course damage the receiver's front end.

One simple precaution that can be taken to protect the front end of a receiver is to install a pair of 1N60 diodes between the antenna terminal and chassis ground. The diodes will limit any incoming signal to about ½ volt. Fig. 1



Nearby lightning strokes can generate harmful static that can cause damage . . .

shows the circuit connections for connecting the diodes. The diodes should be connected from the inner conductor pin of the antenna input connector to chassis ground.

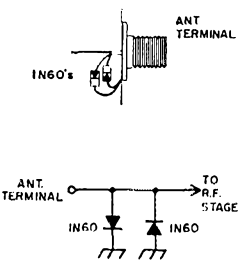


Fig. 1—The 1N60, or similar types, can be used to protect the input of a receiver from harmful overload. The diodes should be connected from the antenna terminal to chassis ground.

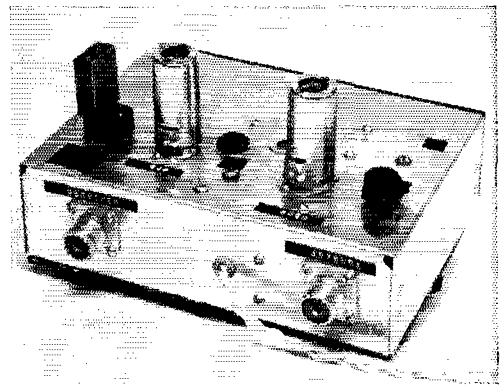
"I have a two-stage c.w. transmitter that has a bad chirp when I use some crystals, but not with all of them . . . what gives?"

In a crystal-controlled transmitter the frequency controlling device is the crystal. When voltages are applied to the oscillator tube and the key is opened and closed the oscillator goes on and off. At the same time, the crystal goes from a point of not oscillating to full oscillation. As far as the crystal itself is concerned, once it is in full oscillation, its frequency is fully "established." However, some crystals are "sluggish" and take their time, so to speak, in coming to full oscillation. During the time from full off to full on, the crystal frequency changes and this in turn causes a "chirp" on the transmitted signal. One simple answer to eliminating this problem is to leave the oscillator run, and key the amplifier stage only. This will help a great deal in eliminating chirp. Such keying may not get rid of the chirp completely because another cause of chirp is changing the load across the crystal. And keying the stage following the crystal oscillator stage does change the load the oscillator stage "sees."

(Continued on page 51)

A 160-Meter Converter For Ham-Band-Only Receivers

BY JAMES P. GILLESPIE,* W4LQC/W8BKK



Top view of the 160-meter converter. The 6J6 converter stage is on the left, and the amplifier, which can be either a 6CB6 or a 6AK5 (see the text), is on the right. C_1 is controlled by the knob at the right, and C_2 is adjusted by inserting a screwdriver through the rubber grommet located between the two tubes. Electrical tape is used to cover up unused holes.

With the expansion last year of 160-meter amateur privileges, there has been an increase in activity on the top band. Owners of general coverage receivers can tune in right away, but those possessing ham-band only receivers are usually left in the cold, as most of their sets don't cover 160. For the latter bunch of fellows, here is a converter that provides high performance and good stability on the top band. It can be constructed with a minimum of effort and expense.

The circuit, which is shown in Fig. 1, is essentially that used by Deane in a series of simple mobile converters.[1] The incoming signal is mixed with a 5500-kHz. oscillator signal to produce an output on either 80 or 40 meters. One can receive 1.8- to 2.0-MHz. signals by tuning his ham receiver from 3.7 to 3.5 MHz. or from 7.3 to 7.5 MHz.

The converter was built on a 5 × 7 × 2-inch chassis. A smaller chassis could have been used, but the addition of a self-contained power supply is planned for a later date. As in all converters,

* 1228C 18th Ave. South, Nashville, Tennessee 37212.

[1] Deane, "Simple Crystal-Controlled Converters," *QST*, Dec., 1954.

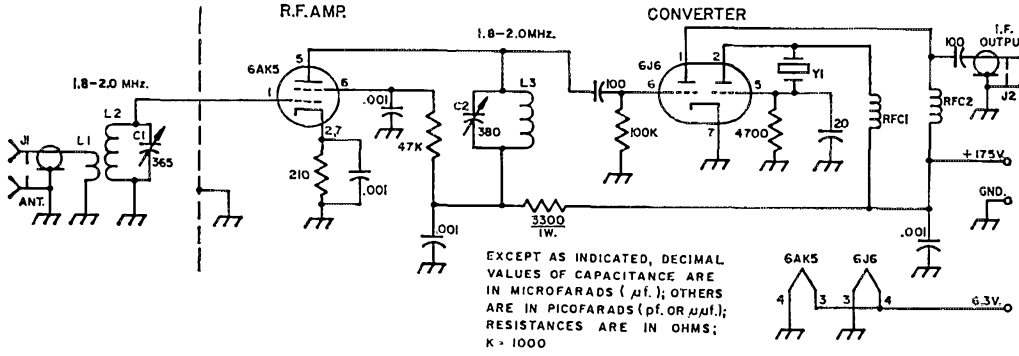


Fig. 1—Circuit diagram of the 160-meter converter. Fixed capacitors are either disk ceramic or mica. Resistors are ½-watt composition, unless noted otherwise.

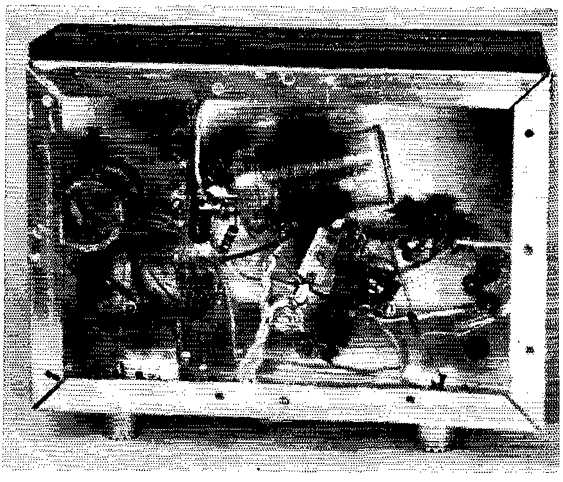
C_1—365-pf. miniature broadcast variable.
C_2—50-380-pf. trimmer.
J_1, J_2—Coax chassis connector, SO-239.
L_1—16 turns No. 30 enam. close-wound ⅜ inch from ground end of L_2.
L_2, L_3—50 turns No. 30 enam. close-wound on 1-inch dia polystyrene form.
RFC_1, RFC_2—2.5-mh. r.f. choke.
Y_1—5500-kHz. crystal.

the input and output circuits should be well shielded from each other, and the r.f. leads should be as short as physically feasible. The r.f. amplifier shield shown in the underside-view photograph may be made from flashing copper or a strip of metal cut from a galvanized tin can. It should extend across the chassis from the front to the rear, cross between pins 1 and 7 and 4 and 5 of the 6AK5, and make contact with the top, bottom, front and rear of the enclosure. L_2 and L_3 should be close to their respective tuning capacitors and should be mounted at right angles to each other.

L_1, L_2 and L_3 were wound on small polystyrene medicine vials available for pennies at most drug stores. Slug-tuned coils are not recommended, as they probably won't have sufficient Q to prevent bleed-through by strong local broadcast stations.

The converter requires from 150 to 175 volts at 20 ma., and 6.3 volts at 0.625 ampere. If a 6CB6 is on hand, it can be used in place of the 6AK5. In this case, the 6CB6 suppressor grid, pin 7, should be connected directly to ground. In addition, the converter will draw slightly more filament current (0.75 ampere).

Alignment is very simple. If you have a v.f.o. with a 1.75- to 2.0-MHz. basic tuning range, merely set the v.f.o. at 1.8 MHz., tune the ham receiver to 3.7 MHz., and peak the signal with C_1 and C_2. If you do not have a 1.8-MHz. signal source, tune your ham receiver to the 3.9- to 4.0-MHz. range and peak C_1 and C_2 while listening for broadcast stations (1.6 to 1.5 MHz.). Then tune the receiver to the 3.7- to 3.5-MHz. range and slightly reduce the capacitance of C_1 and C_2 while listening for 160-meter signals. At night you should be able to receive loran or ham signals loud and clear.



Bottom view of the converter. A shield made from a galvanized tin can divides the chassis about one-third of the way from the left. J_1, C_1, L_1, L_2, and half of the r.f. amplifier tube socket are located on the left side of this divider. L_3 is the large coil on the right side. Trimmer C_2 is supported by a ½-inch high ceramic pillar and one terminal of a five-terminal tie point. RFC_1 and RFC_2 are connected to other contacts of the same terminal strip.

The worth of any piece of gear lies in its performance. The other night I tuned to 1.8 MHz. and heard a KV4 riding in like a local. Who could ask for more? QST

Strays

Licensed radio amateurs who intend to make a career in electronics or related sciences may apply for the seventh John W. Gore Memorial Scholarship for either graduate or under-graduate study. The scholarship for 1969 consists of a $500 award. It may be applied for more than once. To be eligible, applicants must have completed one year of a course in an accredited college or university leading to a bachelors or higher degree. They must hold a valid FCC license of at least General Class rating. Preference will be given to applicants from District of Columbia, Maryland and Virginia, although those living elsewhere are not excluded. This year's scholarship award will be announced on September 1, 1969. The award is sponsored by The Foundation for Amateur Radio, Inc., a nonprofit organization devoted to the advancement of AR. It is composed of trustees representing over 20 radio clubs in the D.C., Maryland, and Virginia Area. Mr. John Gore, W3PRL, was, until his death, the president of the Foundation. Scholarship application should be completed and mailed not later than August 15, 1969, and should be addressed to Chairman, Scholarship Committee, Foundation for AR, Inc., 4449 Greenwich Parkway, N.W., Washington, D.C. 20007.

I would like to get in touch with . . .

. . . anyone with information about amateur radio activities at Rutgers University before 1950. WB2ERM.

. . . Francis X. Knott, operator at K5AT in 1941. WN8BPH.

. . . college students interested in pure physics. Aron Faegre, WA9FJG/7, Box 318, Reed College, Portland, Oregon 97202.

. . . anyone interested in a teenage net. WB2EXS, WA9VLK, WA1GWS.

. . . amateurs who are pilots or who work in the field of aircraft communications. WN4IGY.

. . . members of a police force or a police auxiliary interested in starting a net. K8NKB.

. . . Novices who want to form a 40-meter ragchew net. WN5TFU.

. . . hams interested in racing pigeons. WAØVMP.

. . . those interested in playing chess over the air. WAØNVM, WB4ACQ.

. . . state governors and mayors of major cities. W4BKO.

. . . former members of the 86th Signal Co. of the 86th Infantry Division. WN8ATX.

. . . hams who work on the design and marketing of battery powered equipment. W1YZP.

Technical Correspondence

USING A GROUNDED TOWER ON 160 METERS

Technical Editor, *QST*:

I have been wanting to get back on 160 meters for quite some time, but getting up an antenna of reasonable efficiency was somewhat of a problem for my 150-foot lot, particularly so on account of other antennas already in place. I have a triangular steel tower of welded construction in the front of the lot, near the curb. It is 42 feet high, and well grounded with iron stakes down into the earth some 6 feet. This tower holds up the front end of the 80-meter flat-top antenna.

It appeared to me that a Marconi-type antenna might be feasible. I attached to the upper end of the tower a hundred-foot length of wire, brought it over toward the shack about 42 feet, and then dropped it straight down to a "black box." Inside the box is a parallel tuned tank made of a length of standard coil stock. I pruned 4 or 5 turns off the total length so that a 100-pf. tuning capacitor — shunted by 200 pf. — nicely tuned from about 1.7 to 2.1 MHz. I used a grid-dip meter for this determination. See Fig. 1.

Determining the resonant period of the antenna before attaching it to the tuned circuit was another matter. Wrapping the end of the antenna around the dipper coil was fruitless. The *ARRL Antenna Book* gave a clue, indicating that the end of the wire should go to the dipper through a "very small *C*." I took a couple of inches of No. 22 enameled wire, scraped a half inch or so bare, and wrapped the bare end around one of the pins of the dipper coil and then inserted the coil into the dipper socket. The insulated end of the wire was wrapped 4 or 5 times around the antenna end, hopefully forming the "small *C*." It worked! A very nice dip resulted.

I had used the formula, $l = 234/1.8$, to obtain an indicated length of the overall system of approximately 130 feet. The actual length was arrived at by pruning, using the s.w.r. meter connected to the tuning box by a short piece of coax. Another piece of coax of the length necessary was connected between the s.w.r. meter and the Ranger transmitter at the operating position. The Ranger was first loaded at approximately 1900 kHz. into a dummy 50-ohm load for an input of 50 watts. The antenna tank was then adjusted to frequency, the antenna was pruned a little at a time, and the coax tap was varied. Eventually a combination was reached where the s.w.r. was very close to 1:1, the Ranger settings were the same as with the dummy load, and the end of the antenna was hot! Tapping the antenna down on the hot end of the tank coil seemed to produce little noticeable change.

There is very little 160-meter activity heard here, but a great deal of man-made noise. I formed the habit of listening around 8:00 CST and, hearing a weather net operating in Nebraska, "zeroed" in and gave the net a call on approximately 1.980 MHz. Three stations (about 500 miles away) gave me "nice signal here, old man" reports. A CQ brought a similar report from Houston, Texas, some 400 miles to the south, and another report from Buffalo, Oklahoma, which is about 225 miles to the north. All in all, the antenna seems to be worth the time and trouble. — *Edgar G. Chatterton, W5AVA, 107 Professional Bldg., Tenth at Denver Sts., Wichita Falls, Texas 76301.*

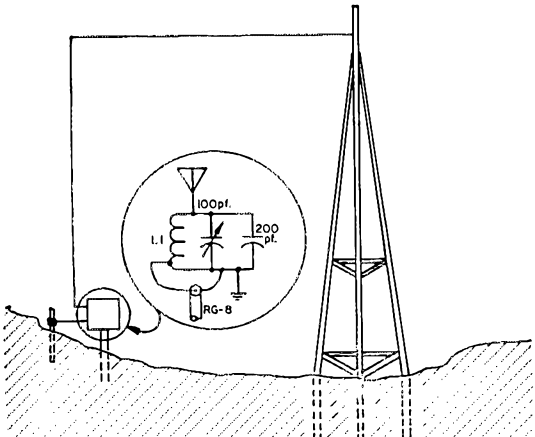


Fig. 1. The grounded tower system for 160 meters.
L_1—Approx. 29 μh., to resonate with the capacitors over the 1.7 to 2.1 MHz. range, such as a coil 9 inches long, 3 inches diameter, 4 turns per inch (Illumitronix Air Dux No. 2404). Tap determined experimentally, see text.

BUILD YOUR OWN EQUIPMENT?

Technical Editor, *QST*:

From what I hear over the air, "I have a complete S-line here," or, "I have a complete Drake line," there are not too many that have a complete "home-brew line" today. From my recent experiences, I think I know why, and thought I'd write and let you know, too. For the first time since 1936, conditions have become just right for me to add to the W6TTS-line. I have retired.

Around 1936, *QST* published an article on how to build a 500-watt plate-modulated r.f. amplifier. It worked fine, but that was the last of the home-brew projects until the May 1967 issue of *QST* arrived. There, on page 19, was the punch line, "Want to soup up that old receiver?" I sure did, as my receiver was of 1935 vintage — an all-wave home receiver.

So the "Bonus FET Converter" was on its way. In fact, it was on its way out. I had never heard so many "birdies" — they were all over the dial. But the sensitivity was good, so I hooked it up through the home-brew electronic t.r. switch and called the gang. But after ten minutes or so the signals disappeared (and so did the birdies). After reading literature on transistors and their care and feeding, I learned I should have done this and that (not mentioned in the original article). It was finally figured out that r.f. had gotten to the FETs somewhere, and that they had gone bye-bye. After finding that the cure would probably cost more than the original, I junked the whole FET converter and built the one for 20-15-10 meters per the 1967 issue of the ARRL. *Handbook*. That worked

perfectly, and even got rid of the final birdie which hung around the middle of the 15-meter band. And the original *tubes* are still in it!

Then along came the January 1968 issue of *QST*, and the article on the W5OMX receiver. A look at the circuit indicated no *transistors* — only a couple of diodes in the rectifier, which are not tricky. After checking over the air with all my old buddies, who had been connected with receiver design in the past, it was agreed that this *was* a good receiver, and was really something new. So it was decided to go ahead and build it.

An order for the layout, etc., was sent to W5OMX, Col. Dave Curtis. Next an attempt was made to obtain the parts, or some of them, locally, as well as through the mail order houses. But most of the familiar supply houses had folded up. Letters sent to those listed by the good colonel for parts also came back unopened — these places, too, had closed up. Even ARRL Headquarters was consulted for parts location, and the place they suggested had folded up, too!

Every effort was made to use those parts exactly as specified, so that if it didn't work, it would simplify going back to the colonel! It took from June to late September of 1968 to round them all up. During that period, many notes were exchanged between the colonel and myself, and in one of them, Dave said, "They'll crowd us home-brewers out of existence yet."

By August, the parts ordered in June started to come in, and the W5OMX receiver began to take shape. In anticipation, a v.t.v.m. was ordered. It arrived, but turned out to be one that had been shipped back for repairs. A new one was received, and that was found to read 78,000 ohms on a 50,000-ohm 1% resistor, so that was sent back for recalibration. I expected to get it back at the end of November, but meanwhile, I used a friend's v.t.v.m. to line up the 9-Mc. i.f. (This was easy.) Also a set of crystals was ordered for all the bands. None of the higher frequency crystals received would operate on the 3rd overtone, but it took some time to find this out. So new ones were ordered from *another* firm, and these were so close in frequency that the bands can be calibrated without changing the capacitor in the v.f.o. for each band. There was a misprint in the crystal table in *QST* which threw me off for a while, but soon became obvious what it should have been.[1]

A little trouble was experienced with the zeroing of the S-meter. One of the 470-ohm resistors in the bridge circuit was replaced with 500 ohms, and now all is well. All claims by the author in *QST* are true. So thanks to W5OMX and *QST*, I now have a ham receiver which is among the best, and of which I am proud. Why don't you make one? But you had better hurry, before they completely shut off the supply of parts to us home-brewers! — *Gene Darlington, W6TTS (ex-W2ALP, 3AIJ), 1016 Masonic Ave., Albany, Calif. 94706.*

MORE ON THE TRIBAND ONE-LOOP QUAD ELEMENT

Technical Editor, *QST:*

I am sure that many readers would be interested in the following information supplementing my article on page 50 of March 1969 *QST*, describing the triband one-loop cubical quad element. This information describes the principle and some possible applications, besides those shown in the article.

[1] See the feedback note, page 58 of this issue. — *Editor.*

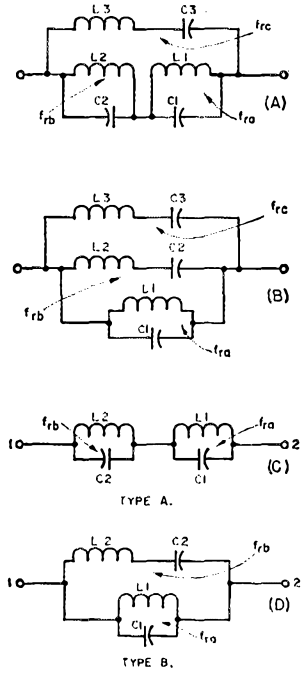


Fig. 2—Three-frequency tuned circuit

There are two forms of three-frequency tuned circuits, as shown in Figs. 2A and 2B. Three simultaneous resonances, f_{ra}, f_{rb}, and f_{rc}, occur for any L_1 C_1, L_2 C_2, and L_3 C_3 value combination. The two versions give similar results. The three resonances are not necessarily harmonically related, nor do they have to be evenly spaced in the spectrum. All resonances may fall within a frequency ratio of less than 1:2, or greater than 1:3.

The series-tuned circuit, L_3 C_3, of the Type-A or Type-B version can be replaced by any dipole form, like a simple dipole, the element halves of a Yagi beam, a single loop of a cubical quad, and the radiator and radials of a ground plane antenna. The dipoles are connected to points 1 and 2 of the tuning section, as shown in Figs. 2C or 2D.

Typical conditions are given below.

f_{rb}: Resonant frequency between high-frequency band and medium-frequency band (without dipole).

f_{ra}: Resonant frequency between medium-frequency band and low-frequency band (without dipole).

f_{rc} or dipole: Resonance (without triband tuning section) between medium-frequency band and about 80% of low-frequency band.

Perhaps this information will encourage the experimenter to go on from here. — *H. F. Ruckert, VK2AOU, 25 Berrille Rd., Beverly Hills, N.S.W. 2209, Australia.*

Mobile Whips And Corona

BY B. J. BITTNER,* KØWQN

The increased power levels on 160 meters and the availability of kilowatt-level mobile equipment for other bands brings up the old problem of corona around the mobile whip. Some practical examples and solutions are discussed.

As mobile rigs increase power a point is reached where any additional power is simply pumped into corona because of the limits of antenna size and the voltage breakdown potential of air.

With the increased use of 160 meters for mobile operation, this problem suddenly becomes one of practical importance. For example, on 160 meters, the corona limit for a ⅛-inch diameter whip 10-feet long is about 25 watts. On 75 meters the problem is somewhat relaxed, as a ⅛-inch diameter whip 10-feet long can handle about 200 watts. Amateurs should experience no difficulty on 20 meters as an output power of 7 kw. is required to produce corona.

With higher output powers than those specified, it is possible to watch the corona glow on a dark night. Except for the impressive display for the YL or a startled motorist, the producing of corona won't help your signal. The production of corona is actually a waste of power. Not only does the onset of corona detune the antenna, but it also creates significant harmonic radiation. If you do suspect any corona, it is wise not to transmit in an explosive atmosphere.

Other factors also contribute to corona. At typical Colorado 10,000-foot elevations the corona power level decreases to 56% on a hot day and to 58% on a cold day.[1] A cold, snowy day tends to reduce the maximum usable power even more.

W8ULD/Ø has observed corona on his 160-meter center-loaded whip at power levels of less than 50 watts just south of Denver. I have heard (corona isn't visible during the day) my whip's corona in Loveland Pass on 75 meters with about 80 watts output. This latter observation I feel certain was aided by the static gradient which is determined primarily by the existing weather conditions.

* Route 4, Black Forest, Colorado 80908.

[1] Watt, A. D., *V.L.F. Radio Engineering*, Pergamon Press, 1967.

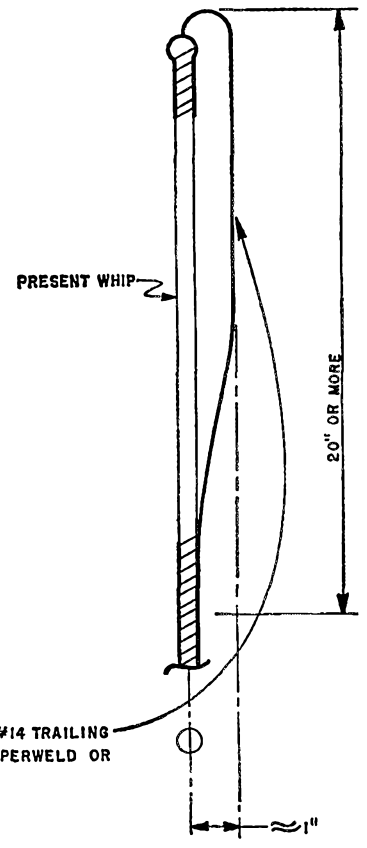


Fig. 1—A method of effectively increasing power-level capability of a whip antenna. The added trailing wire is wrapped around the whip at both ends. Make smooth joints and cover joints with good electrical tape. Be sure there are no sharp edges or projecting points. Note this modification will change antenna tuning and unfortunately increase air drag.

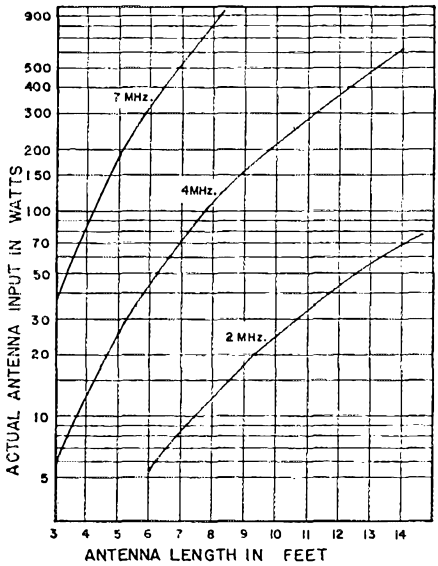


Fig. 2—Acceptable antenna power versus antenna length for a given frequency with a ⅛-inch diameter whip. For a ¼-inch diameter whip multiply the power scale by 2.8.

You're probably wondering how you can find out if you're having corona difficulties. The easiest technique is to initially tune up your transmitter at a low power level. Then apply full power to the rig. If the transmitter's tank circuit is no longer tuned to resonance, chances are you're probably having corona problems.

Just what can be done about this problem? The easiest way out is simply to learn to live with the problem. A more positive approach is to increase the effective diameter of the whip antenna near its top as is shown in Fig. 1. Another method of increasing the top diameter of the whip is to place a larger conducting ball on the top of the whip than was originally present. In a recent test, when a ½-inch diameter ball was placed atop a whip, all corona effects that occurred with a ¼-inch diameter ball were eliminated. Feeding two or three antennas in parallel would also eliminate the problem but brings up the additional problem of mounting the antenna system as well as matching it to the transmitter. Still an additional alternative is to tape or encase the whip in a good tight dielectric cover which can be replaced every couple of months as a safety measure since even slight corona will create a highly corrosive environment that will attack both the whip and the dielectric.

Fig. 2 represents a simple approximation of power versus antenna length and frequency. Factors such as altitude, rough surfaces and sharp edges on the antenna, or snow all tend to make the graph rather optimistic. On the other hand, such factors as the I^2R losses in the antenna and antenna tuner may reduce the actual power level considerably more on 160 meters than does corona. QST

Problems and Answers

(*Continued from page 45*)

Many times a sluggish crystal can be improved by the simple expedient of washing it. A crystal is held in place by two electrodes and as the crystal oscillates, it vibrates in these electrodes. Remove the crystal and electrodes from the holder and carefully wash them clean in soapy water and carefully dry them. Many crystals that don't oscillate at all have been returned to useful life by a careful washing.

Here is an example of the *most* frequently asked question: "*I have decided to buy a transceiver and my choice has come down to either the Star Stream 200, the Arapahoe, or the Clunker 250. Which of the three would your staff recommend?*"

It is easily understood that it can be quite difficult to make a choice from the many varieties of equipment that are offered in the amateur market, particularly for the newcomer. In fairness to all *QST* advertisers, and for other reasons, we have had to adopt a policy of not recommending one manufacturer over another.

The other reasons are even more valid than the one mentioned above. *What may be my preference may not be yours.* I may like a cabinet that is painted green, while you wouldn't give it house room. I may be a c.w. man, and would desire selectivity in reception that you could care less about, or vice versa. We could go on and on along these lines, but the point should be pretty clear. It may be a cliche but it certainly fits here — what's one man's meat is another man's poison.

The thing to do before choosing a piece of gear is to decide what your preferences and needs will be and then try to fit them in your choice. Generally speaking, the quality of an article is closely reflected in its price. Also, certain features in a product may appeal to one person and not another.

One piece of advice we can offer: Once you have made a decision, don't worry about it. Nearly all hams go through a buying and swapping and changing period before they settle on a more or less semipermanent station. As one ham once said, "After all, you aren't buying a coffin!" QST

Strays

Want up-to-the-minute, on-the-scene dope on Apollo space launches? Listen one hour prior to all Apollo launches, 80 through 10 meters (including the Novice band) for WB4ICJ, the Space Center Amateur Radio Society. The station is located inside the Kennedy Space Center Area. A special certificate is sent to all stations who QSL after contacting the club station during a lunch period. The station usually stays on the air for several hours after a launch.

Hints and Kinks For the Experimenter

INDUCTIVE ATTENUATOR

A CAPACITIVE attenuator for use between v.h.f. transmitting converters and high power h.f. s.s.b. transmitters is shown on page 89 of *QST* for December 1967. I have seen this circuit and resistive ones many times. However, I use one which costs no money and is adjustable to boot. In fact, it is built inside the transmitting converter itself, needing no enclosure of its own. As shown in Fig. 1, it's essentially an inductive tap. The links are bent together or spread apart until the converter receives the proper amount of drive. — *Roy C. Koeppe, K6KOL*

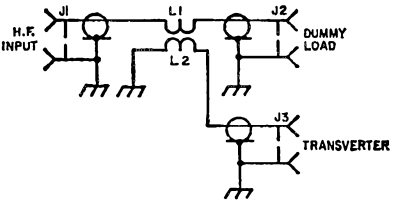


Fig. 1—An adjustable attenuator for use between h.f. exciters and v.h.f. transmitting converters.
J_1, J_2, J_3—Coaxial receptacle (SO-239).
L_1, L_2—One- or two-turn links of hookup wire, the size of the loops and the spacing of the coils depending on the amount of drive required. See text.

VIKING INVADER-2000

ABOUT six months ago my Viking Invader-2000 blew the fuse in the low-voltage bias supply. After the fuse was replaced, the p.a. meter hit the pin when the p.a. filaments were turned on, and after a few seconds the replacement fuse blew.

The trouble was traced to a grid-to-filament short in one of the PL-175A p.a. tubes. The short did not show up when the tube was tested with an ohmmeter.

To solve the problem, the control grid lead was removed from the socket containing the shorted tube, and filament voltage was applied. Two tests leads were then connected to the a.c. line. After the lead going to the ground side of the line was connected to the Invader chassis, the test lead connected to the hot side of the a.c. line was momentarily touched to the grid pin of the tube socket. A large flash occurred; however, when the lead was touched a second time, no flash was noted.

The grid lead was reconnected to the tube socket, and filament voltage applied. This time no short was evident. The tube has now been operating for over six months and appears to be running normally so far.

Incidentally, with no noticeable difference in performance, 4-400A tubes may be substituted for the more expensive PL-175A tubes in the Viking Invader-2000. However, a 4-400A should not be paired with a PL-175A or an unbalance will occur. — *R. F. Herbig, W6ME*

CAPACITANCE MEASUREMENTS

THE measurement of high capacitance, as described in the article "Simple Measurements of High Capacitance" in *QST*, January 1969, may be made even simpler if the multiplying factors given in Table I of the article are multiplied by a factor of $\log_e 0.37/\log_e 0.50 = 1/0.692 = 1.44$. A revised table is shown below. It gives multiplying factors which may be used with a voltage that is 50 percent of the initial voltage, rather than 37 percent, thereby reducing the required mental arithmetic.

Adopting the author's example, with the switch closed, the meter reads 40 volts. The switch is then opened. It is found that the voltage drops to 20 volts (50 percent of 40) in 17 seconds. From the revised Table I, the multiplying factor is found to be 1.2. Therefore, the capacitance is $17 \times 1.2 = 20$ (approx.) microfarads.

May I also mention that the value given in the original table for a 1.5-volt scale and a 50K-ohm/volt meter resistance is incorrect. The value given is 6.65; it should be 13.3. — *Nathan M. Reiss W2PVQ*

TABLE I

Volt. Scale	*Meter Resistance (Ohms/Volt)*			
	1K	*10K*	*20K*	*50K*
1.2	1200	120	60	24.05
1.5	960	96	48	19.2
2.5	576	57.6	28.8	11.52
3	480	48	24	9.58
5	288	28.8	14.4	5.76
6	240	24	12	4.8
10	144	14.4	7.2	2.88
12	120	12	6	2.4
15	96	9.6	4.8	1.92
50	28.8	2.88	1.44	0.576
60	24	2.4	1.2	0.48
100	14.4	1.44	0.72	0.288
150	9.6	0.96	0.48	0.192
250	5.76	0.576	0.288	0.115
300	4.8	0.48	0.24	0.096
500	2.88	0.288	0.144	0.058
	μf. per second			

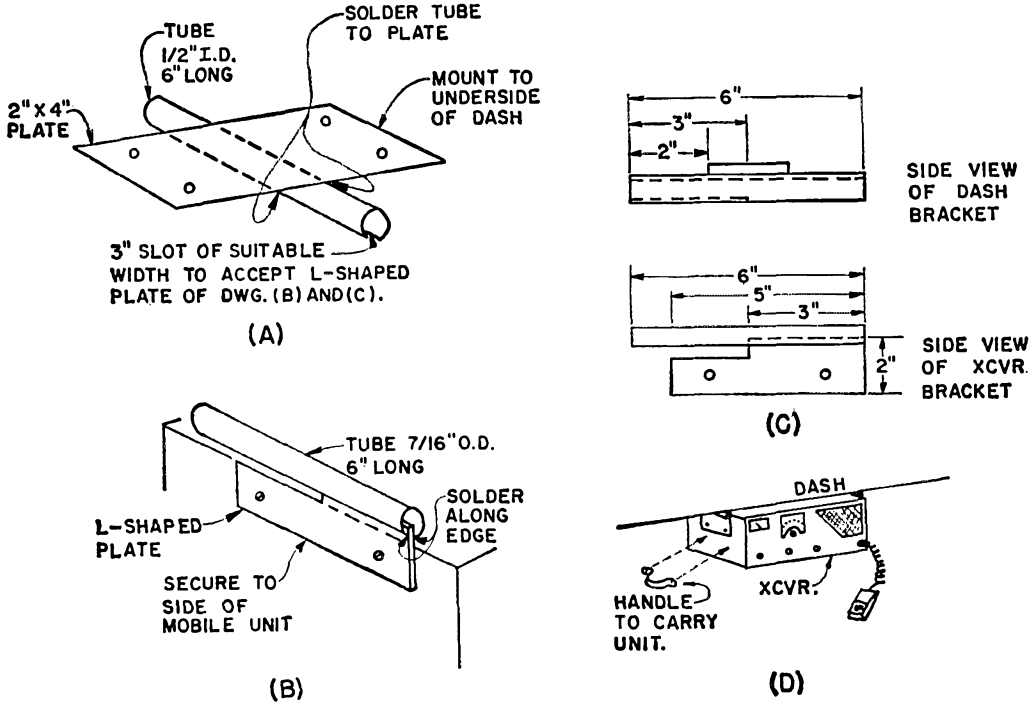


Fig. 2—Details of the mobile mount. Four brackets are needed: two copies of the one shown in drawing A and two copies of the one shown in drawing B. Drawing C shows a side view of the bracket, and drawing D shows how a typical installation looks after a transceiver has been slid in place under the dash. For ease in soldering, copper or brass tubes and plates should be used to construct the mount.

MOBILE MOUNT

I LIKE to use the same transceiver in my car and at home. In order to quickly and easily install the rig in the car or remove it from the vehicle, I devised the mobile mount shown in Fig. 2. With this arrangement, for mobile operation it is only necessary to slide the rig into place once the feed line and power cable have been connected. — *E. McIvor*

NEW GAIN CONTROL FOR THE HW-12

USING a Heath HW-12 transceiver in my car, I found it impossible to communicate with other mobiles that were less than a few blocks away. Even with the r.f. gain control set at minimum, nearby stations overloaded the receiver. Analysis of the circuit showed that extremely strong signals should be handled successfully if the r.f. gain control was moved from the mixer and installed before the grid of the first r.f. stage. The following changes, which were suggested by W6TEE, have proven to be effective, and the modified circuit is not critical to operate.

First remove the existing r.f. gain control from the HW-12. Then tie together the three leads

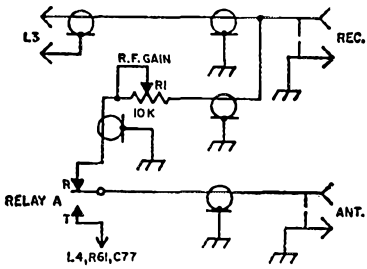


Fig. 3—Modified portion of the HW-12 for greater control of the receiver gain. R_1 is a 10,000-ohm control with a linear taper.

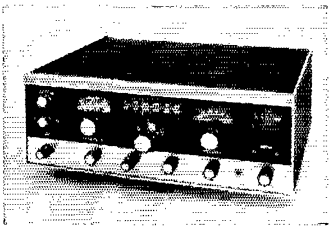
that were removed from the old control. This is the same as turning the old control fully on. Next install a 1000-ohm potentiometer in the location of the former r.f. gain control. Disconnect the coaxial cable from the receive terminal of the antenna relay and, as shown in Fig. 3, connect the new control between this cable and the relay. The difference in overload capabilities will amaze you. — *Jay O'Brien, W6GDO*

(The current HW-12A uses a different r.f. gain control circuit and consequently has better overload capabilities. — *Editor*)

Recent Equipment

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

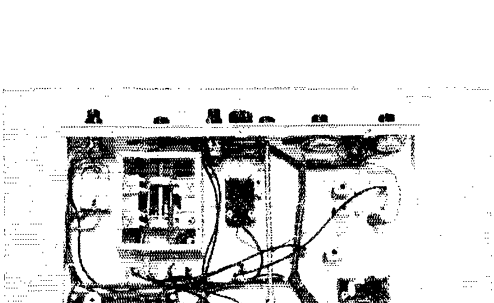
Galaxy R-530 Receiver



A PRODUCT that seems to have resulted from an extremely "ambitious" engineering effort, the Galaxy Electronics R-530 receiver is designed to give continuous coverage from 0.5 to 30 MHz. in 500-kHz. steps. Each 500-kHz. range is broken down into 1-kHz. increments which are read out on the skirt of the main-tuning dial. Though there are no integrated circuits used in this equipment it does use 52 transistors — bipolar and JFETs — and 35 diodes in its all-solid-state lineup. It is designed to receive upper- and lower-s.s.b., c.w., RTTY, and a.m. signals. Provisions exist for using four crystal filters, switchable from the front panel of the receiver. These filters are available in bandwidths of 0.5, 1.5, 2.1, and 5 kHz.

Though the R-530 could be classed a laboratory-type instrument it is likely to be a strong contender in the communications receiver market, both for commercial and ham radio applications. It is ruggedly built, and its cabinet is adaptable to rack-and-panel mounting should this be a requirement. It is supplied for table-top installation unless the rack-and-panel conversion kit, RPA-530, is specified by the purchaser.

Modular construction is used throughout the R-530, making servicing of the ten individual circuit boards a reasonably simple task. A voltage chart for the transistors is included in the operator's manual. If need be, any defective circuit board can be sent to the factory for repair or replacement, thus avoiding the necessity to ship the entire receiver. This feature saves wear and tear on the equipment while greatly reducing the shipping costs. Each module is shielded by its own metal box except for the audio/regulator and calibrate/a.v.c. boards. The signal-carrying leads between the modules are of coaxial cable and the interconnecting power leads are filtered at each subassembly by means of r.f. chokes or decoupling resistors, and feedthrough capacitors. The foregoing measures are important in the reduction of spurious responses.

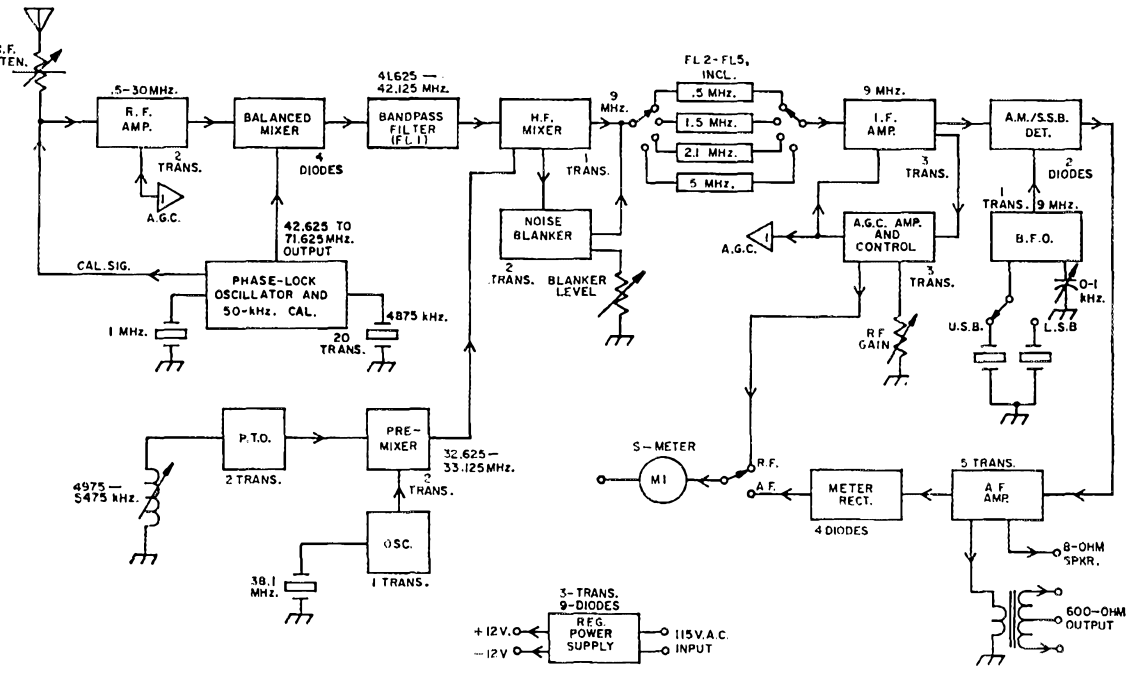


Some of the module covers have been removed to expose the circuit boards in this bottom view of the receiver. The p.t.o. board is at the top center. The small board at the right-center area of the chassis is part of the phase-lock oscillator. Directly below it is the large audio amplifier and power-supply regulator board. It, and the calibrate-a.v.c. board at the left-center of the chassis, do not have shield covers. Coax cable connects the various modules and reduces radiation and spurious responses.

Specifications

The manufacturer states that no more than 100 Hz. of drift occurs from the time the equipment is turned on, including any change in line voltage under 20 percent. Backlash is rated at less than 100 Hz., and the sensitivity is said to be 0.1 μv. for signal-plus-noise-to-noise ratio for s.s.b. reception. A 0.05-μv. signal is required on c.w. for the same conditions, and a 0.5-μv. signal is required for comparable performance during a.m. reception.

The R-530 comes equipped with a 2.1-kHz crystal-lattice filter for s.s.b. reception. Its shape factor is 1.8:1. The three additional filters shown on the block diagram are available as accessories. Front-end overload is rated at 0.1 volt for 10 percent distortion on the signal. Third-order intermodulation distortion is suppressed in excess of 50 db. according to the specification chart. In excess of one watt of audio output is available with less than 10 percent distortion



Block diagram of the Galaxy R-530 receiver. This drawing has been simplified for reasons of clarity. Filters FL_2 through FL_5 are wired differently than shown (see text and footnote 1). The S meter is used in a balanced circuit for both audio and r.f. measurements. The number of transistors in each section is listed near each box.

The frequency response of the audio channel is rated at 250 to 3000 Hz., plus or minus 3 db.

A Look at the Circuit

Referring to the block diagram and Fig. 1A, the input stage uses two transistors in a reverse-gain-controlled r.f. amplifier. Arranged as a differential amplifier, the two bipolar transistors are emitter-coupled. The first transistor operates as a common-collector stage and provides a high input impedance to the tuned circuit. The second transistor operates in a common-base hookup to establish a high output impedance for the collector tuned circuit. Since this type of circuit is inherently stable, there is no need for it to be neutralized. A.g.c. voltage of negative polarity is applied to the emitters of the transistors. As the received signal increases in level, the a.g.c. voltage becomes less negative by virtue of the voltage drop across the collector load resistor in the a.g.c. control transistor, Fig. 1A, thus reducing the forward bias on the two r.f. amplifier transistors. As the forward bias is decreased, so is the gain of the stage. The a.g.c. voltage was measured between no-signal and maximum-signal (10,000 μv.) levels and varied from zero volts to -5.25 volts. One stage of the 9-MHz. i.f. amplifier is wired identically to the r.f. amplifier. A.g.c. voltage is applied to it also.

The r.f. stage is followed by a 4-diode balanced mixer. The main feature of this circuit is its ability to produce the desired i.f. output signal, 41.625 to 42.125 MHz., with a minimum amount of the input and oscillator signal appearing in the output. This circuit greatly aids in the reduction of "birdies" and other unwanted responses in the receiver's tuning range. Oscillator injection to the first mixer is supplied by a phase-locked frequency synthesizer consisting of 20 transistors. Fifty-nine individual oscillator signals are generated from the harmonics of a single-stage crystal-controlled 1-MHz. oscillator. The 59 output frequencies occur at 500-kHz. intervals from 42.625 MHz. to 71.625 MHz. This complex circuit contains gating and sensing circuits in addition to a high-frequency oscillator which is phase-locked to the harmonics from the 1-MHz. crystal oscillator. It is adjusted from the front panel of the receiver by means of a tuning control, and has a dial-type readout. The phase-lock oscillator is set for the desired 500-kHz. interval which permits tuning the desired portion of the 0.5- to 30-MHz. input-signal range. If the phase-lock control is not set exactly on frequency, a red warning light is illuminated, and a beat-note audio tone is heard in the receiver's output, thus indicating an error in tuning.

The balanced first mixer is followed by a bandpass filter, then a second mixer (h.f. mixer) which receives its oscillator injection from a premixer and amplifier. The premixer gets its input signals from a p.t.o. which operates from 4.975 to 5.475 MHz. (Fig. 2), and from a 38.1-MHz. crystal oscillator. The h.f. mixer operates with an oscillator injection frequency of 32.625 to 33.125 MHz. A noise detector, amplifier, and gating circuit comprise the noise-blanker which follows the h.f. mixer. The blanker has a threshold

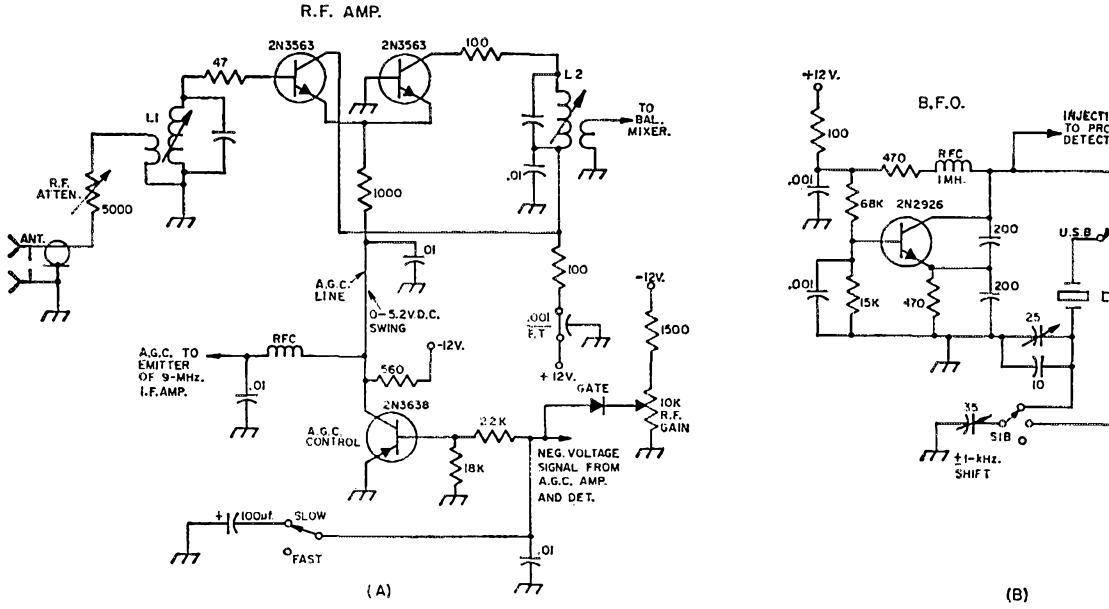


Fig. 1—At A, the r.f. amplifier, its input and output circuits, and the a.g.c. control stage. L_1 and L_2 are selected by a band switch. They are ganged and are permeability-tuned. A 47-ohm base resistor and a 100-ohm collector resistor act as parasitic suppressors to stabilize the amplifier. Slow a.g.c. is made possible by switching a 100-μf. capacitor in parallel with the bias line to the a.g.c. control transistor. The r.f. gain control varies the bias on the a.g.c. control stage, thus changing the gain of the r.f. amplifier. At B, circuit details for the 9-MHz. b.f.o. A 35-pf. variable capacitor is adjustable from the front panel to permit a ± 1-kHz. "rubbering" of the b.f.o. crystal in use. This provides passband tuning.

control which is adjustable from the front panel. Under normal conditions the blanker is disabled.

I.f. selectivity is provided by any one of four crystal-lattice filters which follow the h.f. mixer. These filters are selectable from the front panel of the R-530. Each filter is used independently except for the 0.5-kHz. unit. When it is switched into the circuit it is placed in series with the 2.1-kHz. filter, and a filter-amplifier stage is connected in the line also.[1] The amplifier is used to compensate for the insertion loss caused by the addition of the extra filter. By placing the two filters in series the spurious responses adjacent to the skirt of the response curve of the 0.5-kHz. filter are knocked down to an acceptable level. A three-stage 9-MHz. i.f. amplifier follows the filters, and one stage is a.g.c.-controlled, as mentioned earlier.

A two-diode product detector is used for c.w., RTTY, and s.s.b. reception. It receives its b.f.o. signal from a crystal-controlled 9-MHz. oscillator. The b.f.o., Fig. 1B, has crystals for upper- and lower-sideband reception, plus a variable capacitor which "pulls" either crystal over a

[1] Not shown as series-connected on the block diagram for reasons of simplification in the drawing.

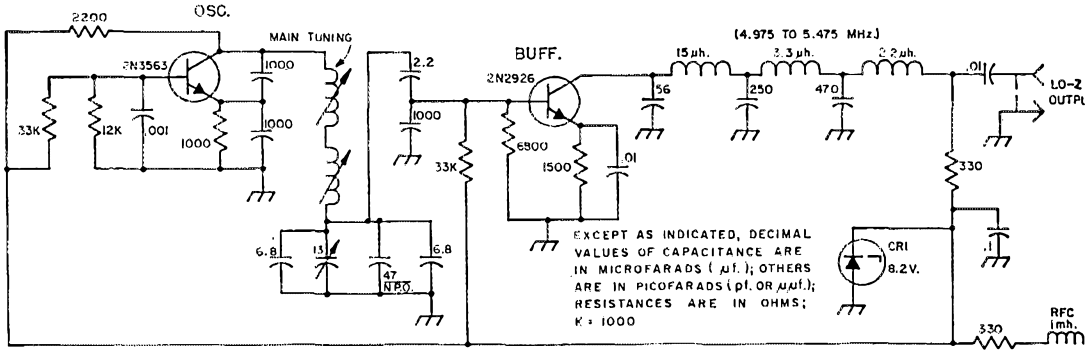


Fig. 2—The circuit shows how Galaxy reduces the spurious output from its p.t.o. The collector tank of the buffer stage consists of a double pi-section tuned circuit which is followed by an *L*-network. This low-pass filter attenuates harmonic currents by 35 db. or more, providing pure output at the desired frequency. R.m.s. output from this p.t.o. was measured at approximately 0.1 volt using a Heath v.t.v.m. and r.f. probe.

± 1-kHz. range to provide passband tuning. This capacitor is adjustable from the front panel of the receiver. During a.m. reception the b.f.o is disabled, as is one of the detector diodes, to permit normal reception of that type of signal. Output from the detector is amplified by a four-stage *RC* coupled audio circuit which uses a complementary-symmetry pair in its output. The audio circuit has outputs for 8 ohms, unbalanced, and 600 ohms, balanced.

A db. meter is included in the circuit of the R-530 and is operated by a d.c. amplifier which is controlled by the a.g.c. voltage. The meter is calibrated from 0 to 80 db. in steps of 10 decibels for r.f. purposes. It can be switched to read audio and is calibrated for −6 to +4 dbm.

An a.c.-operated power supply is included in the receiver and delivers a regulated plus and minus 12 volts. For d.c. operation it is necessary to provide a positive and a negative 18-volt supply which can be attached to the receiver at the rear apron of the chassis. The R-530 can be operated from the 230-volt mains by changing the wiring in the power plug.

Physical Characteristics

In this writer's opinion, this receiver reflects a new and significantly improved appearance for the Galaxy line. Housed in all-metal cabinet, this ruggedly-built piece of equipment should be durable enough to withstand many years of normal use. Its removable side panels are made from ⅛-inch thick aluminum plate. The top and bottom covers are fashioned from heavy-gauge aluminum sheeting. The main cabinet parts are painted with black wrinkle finish, while the front panel is set off in gloss black with satin-aluminum and gold trim. The knobs are black and have aluminum inserts. All things considered, the equipment has a very professional appearance.

Some Other Features

Fast and slow a.g.c. response can be selected from the front of the receiver. Also adjustable from the front of the equipment is an r.f. attenuator control which is in series with the antenna at the input of the R-530. This provision gives the operator some 0 to 20 db. of control over the input signal *before* it reaches the front end, a most useful feature when dealing with extremely strong local signals.

Accessible from the rear of the receiver are some spare jacks, v.f.o. input and output jacks, a detector output jack, and terminals for receiver muting, a.g.c., and 12 volts d.c., both plus and minus.

Peaking of the front end is accomplished by the PRESELECTOR TUNING control. This is a high-*Q*, ganged, permeability-tuned system which has a dial presentation calibrated in MHz. A band switch selects the desired tuning range. A very pronounced increase in sensitivity is noted when the tuning control is properly adjusted.

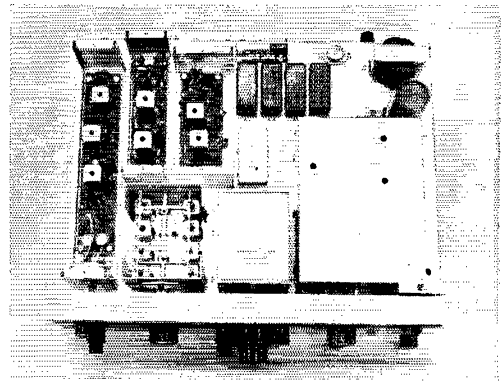
The main tuning dial has a fast and a slow tuning rate. The smaller knob is the vernier control. Both knobs are somewhat smaller in size than one would expect if complete ease of tuning were a major consideration. Both knobs turn quite stiffly, which may be somewhat of a deterrent when it is necessary to tune rapidly from one end of a 500-kHz. segment to the other. Also, the fiduciary, which is located above the fast-tuning knob, can easily be bumped out of calibration by the operator's fingers during rapid tuning excursions if the fast-tuning knob is not carefully engaged.

Galaxy R-530 Receiver

Height: 6 inches.
Width: 17 inches.
Depth: 14 inches.
Weight: 25 pounds.
Power Requirements: 115 or 230 volts a.c., 50-60 Hz., 25 watts, or 18 volts d.c., 600 ma.
Price Class: $700.00.
Manufacturer: Galaxy Electronics, Council Bluffs, Iowa.

Observations

As might be expected of any communications receiver which employs the multiple-conversion technique, some spurious responses showed up in the tuning range. There are two "birdies" in each 500-kHz. tuning range, both occurring at the same dial settings in each range. Fortunately, they are low enough in amplitude so as



The covers have been removed from some of the modules to expose the circuit boards in this top-chassis view of the R-530. The 9-MHz. i.f. strip can be seen along the left side of the chassis. Immediately to its right, near the front panel, are eight permeability-tuned transformers which are gang-tuned from the front panel for preselector peaking. To the right of the i.f. strip, at the rear of the chassis, is the premixer assembly. The h.f. mixer circuit board is to the immediate right of the premixer. Four crystal-lattice i.f. filters are visible at the rear-center of the chassis. The three modules with their covers still in place are the balanced mixer (center), p.t.o. (front center), and the phase-locked oscillator (lower right of photo).

to pass almost unnoticed in the presence of normal atmospheric noise when the antenna is connected.

On-the-air tests indicated that the manufacturer's performance claims were well justified. Good sensitivity, image rejection, and outstanding frequency stability were noted. Laboratory tests further substantiated the manufacturer's performance specifications.

This receiver should appeal to v.h.f. and u.h.f. operators because of its excellent frequency stability, low-noise characteristics, 500-kHz. tuning ranges, and good sensitivity. The availability of the 5-kHz. i.f. filter should appeal to those operators who are using a.m. Few modern-day receivers have provisions for good a.m. reception, while at the same time providing for c.w. and s.s.b. selectivity. During tests with a 2-meter converter (28-MHz. i.f.), all indications were that this was one of the best receivers for the application to be tried by this writer. The noise blanker, of course, is another major consideration if good v.h.f. reception is to be had.

The instruction book carries a complete set of specifications for the receiver, a trouble-shooting/alignment section, and a complete parts list. The explanation of the circuit and how it operates is quite vague, the major discussion being centered around the phase-lock frequency synthesizer. Some difficulty was encountered in trying to identify the various transistors, as to their function, while tracing the circuit on the diagram furnished with the unit. This large blueprint could be made less difficult to decipher if more labels were added to it.

Whether used as a piece of laboratory test equipment, or as a full-fledged communications receiver, this unit should satisfy most requirements set by either type of user. — *WICER*

Strays

Feedback

Unfortunately, a letter disappeared somewhere along the line from the call of a "Silent Key" that ran in the March 1969 issue of *QST*. Edward B. Yorty's call should read K8JQP, not K8QP.

— • • • —

In the article, "The W5OMX Communications Receiver," January 1968 *QST*, the second crystal frequency listed in the table for Y_1 in the 10-meter range, should be 32.5 MHz., instead of 33.5.

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The labels on S_1 in Fig. 1 of the article "A 2-Meter Transmatch With S.W.R. Indicator," March 1969 *QST*, were inadvertently reversed. Change FWD. to REF. and vice versa.

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If you're having trouble getting enough control range in the gated amplifier of the frequency counter described in October 1968 *QST*, Fig. 7 on page 15, lift the V_{2B} 50K cathode resistor from ground and connect the lower end to pin 3 of V_{2A}. Also, a 6200-ohm 1-watt resistor between the negative terminal of C_2 and the lower end of the 4000-ohm control will "bandspread" the control action. These changes are from the author, VE3CUS.

Silent Keys

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

ex-1CSM, Winthrop R. Martin, Littleton, Mass.
W1GCF, John F. Howard, Peabody, Mass.
K1MVA, Julian Rickert, Manchester, N. H.
W1SEO, Dr. John F. Daly, Richmond, Vermont.
K2CEM, Kurt Treptau, Palm Harbor, Florida.
W2CSC, Thomas B. Millspaugh, Nyack, N. Y.
W2DH, Haines Lippincott, Morristown, N. J.
W2EEB, Donald M. Stephens, Rochester, N. Y.
W2JHF, Stanley P. Bird, Scotch Plains, N. J.
W2LHN, Harold Dann, Lakewood, N. J.
W2NWM, Dr. Z. John Vaclavik, Binghamton, N. Y.
ex-W2UC, 3IF, Earle Godfrey, Margate City, N. J.
W2UYY, Wilbur B. Sommer, Beachwood, N. J.
W3EEY, D. C. Schattschneider, Bethlehem, Pa.
W3GBE, J. Curtis Crawford, Rochester, Pa.
W3HAT, Griffith Sechler, Allentown, Pa.
W3LNV, Francis N. Kacsmar, Munhall, Pa.
W4BAM, Jack E. Inman, Sr., Middlesboro, Ky.
WB4DFA, John R. Hanson, Holly Hill, Florida.
W4DG, Hubert J. Merwin, Knoxville, Tennessee.
W4ETD, Terrence Biggs, Orlando, Florida.
K4FH, Tom G. Seese, Sr., Savannah, Georgia.
K4HKN, Rev. Wallace Lesley, Seneca, S. C.
W4KWB, Oscar L. Miller, Seneca, S. C.
K4LC, Glenn W. Curtiss, Holiday, Florida.
W4LYN, Thomas Lookabill, Thomasville, N. C.
W5AOX, Clarence W. Standridge, Lexington, Okla.
WA5ISH, C. R. Sandlin, Harlingen, Texas.
WA5NDW, Emick J. Lantier, Lafayette, La.
K5QEE, James Smith, Enid, Oklahoma.
W5WE, Henry W. Hall, Sr., Beeville, Texas.
W6NAL, Roy E. Butler, San Diego, California.
W6AZQ, Edward E. Hall, Oildale, California.
W6DSN, William P. Corbett, Fullerton, Calif.
W6IFE, Donovan L. Thompson, Corona, California.
W6JSY, Elwin L. Johnson, Eureka, California.
K6RAJ, Charles H. Zaverl, Arlington, California.
WA6YPF, Carlos Swenson, Fresno, California.
W7ANL, William Cooper, Shelton, Washington.
W7FCJ, Francis E. Hall, Spokane, Washington.
W7GBJ, William R. Hirt, Orinda, California.
W7LUN, Wilbur O. Boswell, Tucson, Arizona.
K7RYZ, John Givens, Seattle, Washington.
K7YMB, Howard Pate, Bellingham, Washington.
WA8BVB, Ray Arnold, Sutton, West Virgina.
W8CSN, Dr. Walter C. Breth, Chillicothe, Ohio.
W8GXK, Paul Guenther, Canton, Ohio.
K8JID, Oralace Lavender, Coldwater, Michigan.
W8SIW, Herbert E. Strong, Brecksville, Ohio.
W8TIN, Darrell W. Hugan, Clio, Michigan.
K8UJX, Raymon Hamer, Ovid, Michigan.
W8VDF, Valentine Breynak, Tiffin, Ohio.
K8YQB, Grant K. Eaton, Coldwater, Michigan.
K8YVZ, William Green, Canton, Ohio
W9AFG, John Sabol, Jr., Calumet City, Ill.
W9CZN, Harry W. Stingley, Chicago, Ill.
W9HOV, William Roberts, Dolton, Ill.
W9REA, John Handel, Plainfield, Ill.
W9SIE, John J. Mazurkiewicz, Kenosha, Wisc.
K9ZLQ, Charles E. Mattern, Plymouth, Indiana.
KØBEC, William Crawford, Cedar Rapids, Iowa.
WØLYV, Mike T. Harney, Louisville, Colorado.
G6CL, John Clarricoats, London, England.
VE3FKH, Rev. C. C. Gilbert, Beamsville, Ontario, Canada.
KP4BZ, Victor D. Cifuentes, Rio Piedras, San Juan, Puerto Rico.
VE5CQ, Gerald H. Paul, Melfort, Saskatchewan, Canada.
VE5FG, Donald L. Shelton, Moose Jaw, Saskatchewan, Canada.
VE5HW, Raymond Lasco, Yorktown, Saskatchewan, Canada.
VE5NJ, Joseph Foster, Kerrobert, Saskatchewan, Canada.
6Y5GG, Gregory LaGrenade, Kingston, Jamaica.
VE7ADO, J. G. Riley, West Vancouver, B. C., Canada.

V.H.F. QSO Party Announcement *June 14–16*

STARTING TIME	ENDING TIME
1900 GMT, June 14	0600 GMT, June 16

Operate any consecutive 28-hour period

WHAT is so rare as a day in the June V.H.F. QSO Party? *Two* days, that's what; and you won't want to miss either day if you're looking for fun and excitement in the World Above 50. There's lots of mountaintopping, usually some sporadic-*E* or other such v.h.f. phenomena, and always a chance to come up with a new state or two. You may operate any consecutive 28-hour period and you may work the same station on different bands for additional QSO and section credit. Just exchange sections with your man, and you're off and running. Your final score equals the total QSO points times the total number of band-sections worked.

Read the rules carefully, then send *now* for your free contest logs. A sample log elsewhere in this announcement will show you how to fill the form out correctly (dates shown were for the September Party, but don't let that bother you). **Be sure your entry is postmarked no later than July 5.** Happy hunting, OMs!

ARRL V.H.F. QSO Party

STATION...K1ZND/1..... ARRL SECTION..CONN..........

Mhz.	(GMT) Date/Time	Station Worked	Section	Nr. mults. per band 50	144	220	432	1215	Pts.
	Sept. 7								
144	1903	K1ABR	RI		1				1
	1918	K2HLA	NLI		2				1
50	1933	K1MUJ/1	CONN	1					1
	1937	WB4HIP/4	EFLA	2					1
220	1958	K1YON	CONN			1			2
420	2232	W1QWJ	WMASS				1		2
1215	2347	WA1IOX	CONN					1	3
	Sept. 8								
144	0031	WA1IOX	CONN		3·				1
	0042	K1HTV	CONN		—				1
	0217	W8SH	MICH		4				1

ENTER BELOW ON LAST SHEET USED.

⊗ Single Operator ◯ Multiple Operator

Band	Contacts		Points	Mult.
50 Mhz.	2	X 1=	2	2
144 Mhz.	5	X 1=	5	4
220 Mhz.	1	X 2=	2	1
432 Mhz.	1	X 2=	2	1
1215 Mhz.	1	X 3=	3	1
TOTALS	10	QSOs	14	9

Calls of all operators/loggers....—..........

D.C. power input..75/5/1.....W.

Transmitter..TX-62/mod. Hyl-30/triplet/APX-6

Receiver..2-B/CN-50/CN-144/CN-220/432-2/APX-6

Antenna..5el/11el/16el/16el/6' dish....

CLAIMED SCORE: ...14... x ..9.... = ...126........
(points) (mult.) (final score)

Mail promptly with comments and photos to ARRL, 225 Main St., Newington, Connecticut 06111.

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Dave Sumner ..... K1ZND ..... 2 Grove Rd, Cromwell, Conn. 06416
Signature ..... Call ..... Mailing address

Rules

1) The June 1969 V.H.F. QSO Party begins at 1900 GMT, Saturday, June 14, and ends at 0600 GMT, Monday, June 16. Entrants may operate any continuous 28-hour period beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the chosen 28-hour period and must be made on amateur frequencies above 50 MHz., using authorized modes of operation.

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

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

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

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

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

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

5) A contact *per band* may be counted for each station worked. Ex.: W2EIF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 MHz. for complete exchanges. This gives W2EIF 4 points (1 — 1 — 2) and also 3 section-multiplier credits. (If W2EIF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

6) Each section multiplier requires a complete exchange with *at least* one station. The same section each provide another multiplier point only when contacted on a new v.h.f. band.

7) Awards: Entries must be postmarked no later than July 5, 1969. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licensees submit logs and to Novices in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final.

QST

RULES For The 1969 ARRL Field Day

Annual Test for Emergency-Powered Stations, June 28-29

TIME to dust off the generator (or find one), stock up on insect repellent, and get your club cracking — it's almost June, and that means Field Day. There is only one significant change in the rules for this year's FD: **the limited setup-time proviso is now optional rather than mandatory.** If you choose to honor it, then you may operate all 27 hours; if you set up beforehand, however, you may operate no more than 24 consecutive hours of the allotted 27.

Field Day is what you make it. It can be an exercise in emergency preparedness, or a training session for neophyte operators, or a contest pure and simple, or just an excuse to have a lot of fun! But keep the following in mind:

To keep on good terms with ARRL and FCC, logs must be kept in GMT for cross-checking purposes, portables must be logged as such in your entry, do *not* send your original FCC/DOT log as your entry and last (though not least), odds are in favor of Murphy striking, so plan ahead!

ARRL Field Day forms are now available from the Communications Department, ARRL, 225 Main Street, Newington, Connecticut 06111.

All entries must be postmarked no later than July 27 for *QST* listing. Try to submit your FD photos along with your entry. *GL!*

do not write above this line

ARRL Field Day

FIELD DAY CALL USED (indicate portable): W1CW/1 ... F.D. LOCATION: ESSEX'S ELEVATION, CONNECTICUT

ENTRY CLASS (check only one)

(✓) A. Club or non-club group portable — Club or group name: HURDIN'S MARAUDERS

( ) B. Non-club portable (1-2 oprs.) — NUMBER OF TRANSMITTERS IN SIMULTANEOUS OPERATION: 4

( ) C. Mobile — If Class B, calls of operator(s): .....

( ) D. Home station

The number of people participating at this station: 17

CHECK POWER SOURCE: (✓) Generator (✓) Commercial Mains (✓) Battery ( ) Other

Description of power source (generator type, etc.): MOTE-X-LITE, MARK III

Band	Nr. QSOs	Independence or Mains multiplier	D.C. input multiplier	Score	Transmitter	D.C. Input
80 c.w.	108	x 3	x 2	= 648	32V3	150
80 ph.	267	x 3	x 2	= 1602	SB-101	90
40 c.w.	415	x 3	x 1	= 1245	6146-813	400
40 ph.	93	x 3	x 3	= 837	SB-34	50
50 c.w.	205	x 3	x 2	= 1230	RANGER	75
20 ph.	87	x 1	x 1	= 87	SWAN 500	250
10 ph.	70	x 3	x 3	420	SB-34	50
2 mtrs	32	x 3 x 1.5	x 4	576	HW-30	5
TOTALS	1277	TOTAL QSOs		6645	CLAIMED SCORE	

Check and attach proof(s) of claimed bonus points, to be added to score at ARRL Hq.

( ) 100% Emergency Power (200 points per transmitter class) (✓) Publicity (200 pts.) (✓) Message Orig. (200 points) (✓) Messages (10 pts/bdls., maximum 200)

I/we certifies that the station whose call appears above was operated in accordance with the current Field Day rules (see May QST) and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

6/29/68 ..date E. Murphy ..signature/call club president

Be sure to attach logs, proof(s) necessary for bonus points, soapbox, photos and send promptly to ARRL Headquarters, 225 Main Street, Newington, Connecticut, U.S.A. 06111.

Check (R-68) Printed in U.S.A.

Entries must be accompanied by this summary sheet. You may obtain the summary shown here plus log forms free on request from ARRL, or prepare a facsimile. Attach logs of all Field Day contacts and copies of all messages received and relayed. Furnish publicity proof if applying for Spirit of Field Day bonus as well as a copy of your message origination.

Rules

1. Eligibility: The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

2. Object: For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

3. Conditions of Entry: Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority and the decisions of the ARRL Contest and Awards Committee.

4. Entry Classifications: Entries will be classified according to the number of transmitted signals simultaneously on the air at any one time, followed by designation of the nature of the individual or group participation, as follows:

a. *Class A.* Club or non-club group (3 or more licensed amateurs) portable stations set up specifically for operation in the Field Day. Such stations must be located in places which are *not* regular permanent or licensed amateur station locations, operated under one call and under the control of a single licensee or trustee for each entry. All control locations for equipment operated under a single call must lie within a circle whose diameter does not exceed 1000 feet.

b. *Class B.* Non-club portable stations operated by not more than two licensed amateurs. Other provisions same as for Class A.

c. *Class C.* Stations located in vehicles capable of operation while in motion and normally operated in this manner, *including* antenna. Class C stations may operate stationary, but *no* stationary equipment or facilities may be used. A Class C station may *not* be used as a Class A station.

d. *Class D.* Stations operating from permanent or licensed station locations, not portable or mobile.

5. Field Day Period: Field Day operation starts at 1900 GMT the fourth Saturday of June and lasts until 2200 GMT the following Sunday, a period of 27 hours. **Entries that do not begin any setting-up operations until 1900 GMT on Saturday may operate the entire duration of the contest; others may operate no more than 24 consecutive hours.**

6. Bands: Each phone segment and each c.w. segment is considered as a separate "band." All forms of voice contact will be considered *phone* band contacts, in the voice segments in which they are allowed. C.w. and RTTY will be considered "c.w. band" contacts. The same station may be worked on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited.

7. Exchanges: Stations making contact, in order to count their contact as valid, must exchange ARRL Section (see p. 6, *QST*) or specific location.

8. Valid Contacts: A valid contact is defined as a two way *exchange* (see Rule 7, above) between stations. Class A, B and C stations may contact *any* other amateur station. Class D stations may contact any Class A, B or C station. Stations may be worked only once in each "band" (see definition, Rule 6).

9. Miscellaneous Rules:

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

b. A station used to contact one or more FD stations may not subsequently be used under *any other call* during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station using different calls.

10. Scoring: Scoring is based on the number of valid contacts times the power multiplier times the independence-of-mains multiplier, times the battery multiplier, *plus* bonus points. The following are multipliers and bonuses:

a. *Power.* For each contact made using output stage plate (collector) d.c. input power of 10 watts or less, multiply by 4. Over 10 watts up to 50 watts, multiply by 3. Over 50 watts up to 200 watts, multiply by 2. Over 200 watts up to 1000 watts, multiply by 1. Over 1000 watts, multiply by *zero!* Power on s.s.b. phone is considered to be half the peak envelope power: that is, 100 watts p.e.p. would take the 50-watt multiplier. Where various powers are used, each contact must take only the multiplier for that particular contact.

b. *Independence from Mains.*

(1) Contacts made with both transmitter and receiver operating from power source independent of commercial mains take an additional multiplier of 3.

(2) Contacts in Classes B, C, and in 10-watt Class A (see Rule 4), made with battery power, take an additional multiplier of 1.5.

(3) Charging batteries from commercial mains while using them to operate equipment is *not* considered "independence from mains" or battery operation. However, batteries may be charged from an independent source while being used, or they may be charged from commercial mains while *not* being used.

c. *Bonuses.* The following points may be added to the score *after* all multipliers have been applied:

(1) *100% emergency power.* If *all* equipment and facilities at the Field Day site were operated during the entire FD period by emergency power independent of commercial mains, add 200 points per transmitter classification (See Rule 4). (Example: Class 1A would get 200 points, Class 2A would get 400, Class 3A would get 600, etc.). This includes *everything;* keyers, refrigerators, lights, monitoring receivers, cooking, battery charging, etc.

(Continued on page 97)

SCORING EXAMPLES

A home station (Class D) uses a generator to power his transceiver. The station runs 120 watts d.c. input and 150 QSOs are made.

150 × 2 (50-200 watts) × 3 (Independent power) = 900

—•••—

A one-man portable (Class B) makes 50 QSOs using a battery-powered 5-watt rig. He originates a FD message to his SCM.

50 × 4 (under 10 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 900
Bonus for 100% independence from commercial power (200 × 1)	200
Bonus for message origination	200
	1300

—•••—

A small club mans one transmitter in the field, runs 40 watts d.c. input and uses commercial power exclusively. 400 stations are worked.

400 × 3 (10–50 watts) = 1200

—•••—

A club mans two transmitters simultaneously. One runs 8 watts d.c. input, powered by batteries and makes 70 QSOs. The other station runs at 180 watts input, generator powered, makes 300 QSOs. No commercial power on site. No FD traffic, no publicity.

70 × 4 (under 10 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 1260
300 × 2 (50-200 watts) × 3 (independent power)	1800
Bonus for 100% emergency power (200 × 2)	400
	3460

A home station (D) using commercial power and running 30 watts d.c. input works 200 FD portables.

200 × 3 (10–50 watts) = 600

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A mobile (Class C) makes 60 contacts running 30 watts input. He originates a FD message, receives two and relays two.

60 × 3 (10–50 watts) × 1.5 (battery multiplier) × 3 (independent power)	= 810
Bonus for 100% independence from commercial power (200 × 1)	200
Origination bonus	200
Receive/relay bonus	40
	1250

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A large group in the field mans 6 transmitters simultaneously (Class 6A). Three setups run 30 watts input and make 350 QSOs, three run 150 watts input and make 600 QSOs. No commercial power on site, publicity supplied, a message originated, 4 received and 2 relayed by ham radio.

350 × 3 (10–50 watts) × 3 (Independent power)	= 3150
600 × 2 (50-200 watts) × 3 (Independent power)	3600
Bonus for 100% independence from commercial power (200 × 6)	1200
Publicity bonus	200
Origination bonus	200
6 rcd./rel. @ 10/points	60
	8410

1969 Armed Forces Day Communication Tests

EACH year on the third Saturday in May, the Department of Defense sponsors the observance of Armed Forces Day. As a part of this observance the Departments of the Army, Navy and Air Force annually conduct communication tests designed to demonstrate to the world the close partnership and mutual respect enjoyed between U.S. amateur radio operators and the U.S. military. This year's program will be conducted on Saturday, May 17, 1969, and all licensed radio amateurs are encouraged to participate.

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

Once again this year, several military radio stations will participate in communication tests which include military-to-amateur crossband operations and receiving contests for both c.w. and RTTY modes of operation.

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

Military to Amateur Crossband Test

Military radio stations WAR, NSS, NPG an AIR will be on the air from 171400Z GMT t 180245Z GMT. During this test of crossban operations, the military stations will transmit o specified military frequencies while amateu stations will transmit in the indicated portion of the amateur bands. Contacts will consist o a brief exchange of locations and signal reports No traffic handling will be permitted.

Station	*Military Frequency kHz. unless otherwise noted*	*Emission*	*Appropriate Amateur Band (MHz*
WAR (Army Radio Wash., D.C.)	4001.5	c.w.	3.5–3.65
	4020	c.w.	3.65–3.8
	6992.5	c.w.	7.0–7.1
	7325	c.w.	7.1–7.2
	14405	c.w.	14.0–14.2
NSS (Navy Radio Wash., D.C.)	3385	c.w.	3.5–3.65
	4012.5	RTTY	3.65–3.8
	4040	l.s.b.	3.8–4.0
	7301	c.w.	7.1–7.2
	7336	l.s.b.	7.2–7.3
	7380	RTTY	7.0–7.2
	13940	RTTY	14–14.1
	14385	u.s.b.	14.2–14.35
	14400	c.w.	14.0–14.2
	21500	c.w.	21–21.25
	*143.820 MHz.	a.f.s.k. RTTY/a.m.	144.0–145.5

*Provided it is consistent with operational and trainir commitments, this frequency will be keyed from a U.S Navy aircraft flying between Washington, D.C. and Bosto Massachusetts during the major portion of the time allotte for military to amateur crossband contacts. The flight pat will be over Baltimore, Philadelphia, New York City an Hartford, Connecticut. The call sign NSSAM will b utilized from the aircraft.

NPG (Navy Radio — San Francisco, Calif.	4001.5	l.s.b.	3.8–4
	4005	c.w.	3.5–3.65
	4016.5	RTTY	3.65–3.8
	7301.5	l.s.b.	7.2–7.3
	7347.5	RTTY	7.0–7.2
	7495	c.w.	7.1–7.2
	13922.5	RTTY	14.–14.1
	13975.5	c.w.	14.0–14.2
	14356	u.s.b.	14.2–14.35
	20954.5	c.w.	21–21.25
	21600	u.s.b.	21.25–21.4

**143.700 MHz.	a.m.	144–148
#148.410 MHz.	a.m./f.m./ a.f.s.k.	144–148

To be operated from Mt. Diablo.

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

Station	*Military Frequency KHz, unless otherwise noted*	*Emission*	*Appropriate Amateur Band* (MHz.)
AIR (Air Force	3347	RTTY	3.5–3.8
Radio	3397.5	c.w.	3.5–3.8
Wash., D.C.	4025	l.s.b.	3.8–4.0
	6997.5	c.w.	7.0–7.2
	7305	l.s.b.	7.2–7.3
	7315	RTTY	7.0–7.2
	13995	c.w.	14.0–14.2
	14397	u.s.b.	14.2–14.35
	20994	c.w.	21.0–21.1

C.W. Receiving Contest

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

Time	*Transmitting Station*	*Frequencies (kHz.)*
17 May 1969		
180300 GMT	WAR—Army	3347, 6992.5, 14405
172300 EDST	NSS—Navy	3385, 7301, 14400, 21500
171900 PST	NPG—Navy	4005, 7495, 13975.5, 20954.5
	AIR—Air Force	3397.5, 7315, 13995
	A6USA—Army Radio San Francisco	6997.5

RTTY Receiving Contest

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

Time	*Transmitting Station*	*Frequencies (kHz.)*
17 May 1969		
180335 GMT	WAR—Army	3347, 6992.5, 14405
172335 EDST	NSS—Navy	4012.5, 7380, 13940
172135 CST	NPG—Navy	4016.5, 7347.5, 13922.5
171935 PST	AIR—Air Force	3397.5, 7315, 13995
	A6USA—Army Radio San Francisco	6997.5
	A5USA—Army Radio Fort Houston, Texas	4025

Submission of Competition Entries

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

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

Completed entries should be submitted to the Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D. C. 20315, and postmarked no later than 31 May 1969. QST

May 1944

. . . K. B. reminds that thirty years ago this month (now 55 years ago) Hiram Percy Maxim came up with the idea from which stemmed the ARRL. More important, this month marks the centennial of the invention of the Morse Telegraph. It took Morse twelve years to accomplish the first New York-Washington transmission after he first conceived the idea. Up to that point he was an artist and today many of his paintings can be seen and enjoyed in the Museum at Cooperstown, N. Y.

. . . In another Editorial, the Editor lists the arguments so far set forth in the matter of low *vs.* high power. There are many specious arguments for both and nothing is settled — nothing was intended to be. The edge appears to be with the high-power boys in terms of numbers of letters received. The low-power proponents have yet to come up with a hard-headed conclusive argument.

. . . We note the passing of Dr. Eugene C. Woodruff, W8CMP. He was once the League's president as well as a teacher and inventor.

. . . Fundamentals of Wire and Tape Recording are given by D. W. Pugsley, of General Electric Company. He tells what goes on and how it works, illustrating his article with some diagrams and photos.

. . . The need for more WERS transceivers focuses attention on how one group put a school shop to good use. This story is well told by C. Irvin Metzger, W8FER, a resourceful instructor in Altoona, Penna. He set up this deal as a laboratory project for his students. The high status thus attained soon attracted additional funds and donations of equipment. He has a standardized two-tube rig and gives detailed instructions and drawings, as well as a photograph.

. . . Ha — another little bit of simple math, directed toward Bias Calculations. Edward M. Noll, Ex-W3FQJ uses nothing but arithmetic.

. . . For Portable Power Supplies for WERS, Frederick A. Long, ex-W8NE, makes use of a small motorcycle-storage battery and vibrator pack. This all fits into a carrying case 12 × 8 × 6 inches. Gives 300 volts.

. . . Some very pleasant reading in a yarn by "Sourdough" who tells what really happened "When Spring Came to Pine Notch."

. . . Thomas A. Garretson, W2ASB, is already thinking about the post-war antennas and describes some New Antenna Mast Designs. — *W1ANA.*

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

HRH

CONDUCTED BY GEORGE HART,* WINJM

Getting Together

PUBLIC service through amateur radio is a universal aim. The League has always subscribed to it and indeed has been instrumental in effecting it to the extent it has been put into effect. In 1964, the Board of Directors at its annual meeting made it the League's No. 1 objective. Past issues of *QST* have carried hundreds of articles on the subject. Field organization has been set up and given funds to promote public service among the amateur operating fraternity, and considerable progress has been made, generally speaking, throughout the years.

Yet, in all the effort there has always been an undercurrent of division among our own ranks which has been troublesome. This division, boiled down to its essence, has revolved about the question: Is amateur radio a service in its own right (like the so-called common carriers, but restricted to volunteer emergency and backup) or is it merely a pool of raw communicators from which trainees can be recruited to fit into groups of communications specialists serving specific agencies for their communications? A corollary question has been: Should we build our own facility, or should we simply support efforts on the part of to-be-served agencies to recruit amateurs for their various agency purposes, whatever they may be?

Actually, down through the years, we have done both — or tried to. In addition to building our own AREC and NTS eventually into the Amateur Radio Public Service Corps, we have supported or assisted, in their amateur recruiting efforts, the military, civil defense, the Red Cross, the Post Office Department and various other agencies who have paid us the compliment of being interested in what the amateur "pool" had to offer in the way of raw material. In some cases, quite worthwhile functioning special facilities have resulted, each with little or no relation to the other, each reaping the benefits of the association and deriving from it good public relations for amateur radio as well as for the served agency. Perhaps, being the path of least resistance, this is after all the best path to follow. And those amateurs left over, not affiliated with any of these benefactors, could serve in an "experience" pool in one or another of the ARPSC divisions as an interim measure, until or unless they can make such affiliations through competitive wooing with special advantages as incentives.

* Communications Manager, ARRL.

Does the idea shock you? It well might because the other side of the coin shows quite a few amateurs who believe that we ought to put more effort into solidifying our own public service organization to the end that one amateur service facility is recognized as the *primary* amateur public service communications medium serving the needs (requirements, if you will) of all the above agencies and any others who want the services and are willing to cooperate with the established amateur centralizing agency to get them.

Which way the amateur service goes depends, as always, on what you want and how hard you're willing to work for it. We are still living in a democracy, and if we get together we can provide the type of organization required.

This leads to a lot of interesting conjecture on what such a service would look like. Suppose we stop and consider some hypotheses, such as the following:

(a) It should be an amateur service to be implemented by licensed amateurs in the amateur bands.

(b) In its overall concept it should operate as a unit, although parts of it may tend in the direction of meeting specific requirements or performing specific functions.

The Vienna (Va.) Wireless Society put on an exhibit of amateur radio and handled a total of 430 pieces of traffic during the holiday season. The demonstration was housed in a new shopping center in Fairfax. Left to right are WA4HQW, W4JQT and WB4DVR passing some of the traffic to an intermediate relay point. *(Photo by Bo Baird)*

(c) It should be sponsored, centralized, administered and implemented at the behest of a *civilian* agency of the federal government, under federal government regulations.

(d) Operation of the service at all levels should be conducted under the direction of licensed amateurs with the function of determining how best or to what extent the requirements of served agencies can be met by the *established amateur service.*

(e) The service should be organizationally tight, but operationally flexible.

(f) It should be acceptable to all, or an overwhelming majority, of those concerned.

(g) It should utilize modern, up-to-date equipment, facilities and procedures, embracing all modes of emission and all parts of the amateur spectrum.

(h) It should be all-encompassing as to scope and phases. That is, it should include operation in both natural and man-made emergencies in all phases of gravity: peacetime, grave national crisis, war and post-war rehabilitation so that one amateur service will take care of all requirements, without disruption except as to certain operational details necessitated by transition from one phase to another.

Well, what think? Are we up to it? Can we get together? Are we as a service mature enough, cohesive enough, dedicated enough, serious enough, and can we compromise our divided loyalties enough, to operate as a unit under an *amateur radio* emergency plan to serve our nation both in peace and in war? If not, we had best find it out now so we can stop kidding ourselves and accept the alternative.

What alternative? Why, dividing ourselves up into special-interest groups each with its own aims and objectives and loyalties and scattering ourselves into service to each of the many agencies which have requirements for our services — all too often in the name of that agency as our benefactor instead of in the name of our own service: The Amateur Radio Service — *W1NJM.*

Net Registration

Once annually, in late summer, a new, revised edition of the Net Directory is published. There are very few requirements for inclusion in the directory: (1) frequencies must be inside the amateur bands; (2) primary function must be a public service activity; and (3) for continuous inclusion, each net must be re-registered once each year. To determine if your net needs reregistration, look at the 1968 edition of the directory. If the date under column 9 is Jul8 or Aug8, there is no need to submit a CD-85 unless there has been some change in vital information from what is listed in the directory. If your net has been registered since August, 1968, please *do not* submit another CD-85 unless there has been a change in information.

NET REGISTRATION

Name of Net.....

.....

Net Designation (if any).....Freq.....Mgr.....
(Call)

Days.....Starts.....Ends.....GMT

Direct coverage.....

Purpose of Net.....NTS?.....

Liaisons.....

Previously registered?.....Submitted by.....
(Your call)

CD-85 (R664)

The CD-85 net registration forms (see cut) are available from headquarters, or you may use a facsimile. Fill out the cards according to the following directions:

1. *Name of Net.* Type or print the name of the net exactly as you wish it to appear in the directory. The full name should appear, but common abbreviations such as AREC, RACES, SSB, CD, etc. are acceptable.

2. *Net designation.* Many nets have short letter and number combinations by which they are known. If your net has such a designation please list it. Examples are PAN for Pacific Area Net, M6MTN for Michigan Six Meter Traffic Net, etc.

3. *Frequency.* List the net frequency in kilocycles (or kilohertz). If there is more than one frequency, be sure to correlate days and times.

4. *Net Manager.* Call letters are sufficient. If your net has no manager, list the call of someone who can supply additional information about the net.

5. *Days.* List the days your net meets *according to GMT.* Errors arising from failure to list days by GMT are your own responsibility.

6. *Net starting and ending times.* Enter the time your net begins and ends *in GMT.* If the time is not shown in GMT the net may not be listed. For ending time, use the length of an average session. If the net meeting time shifts an hour by GMT during daylight saving time, denote this by an asterisk (*).

7. *Direct Coverage.* If your net is part of a system, list the assigned coverage area; otherwise, the area covered by regular participants. Don't include coverage provided by liaison with other nets. NTS nets have definite coverage boundaries; don't put your standing as an NTS net in jeopardy by showing coverage contrary to NTS principles.

8. *Purpose of Net.* A word or two showing the service performed is sufficient. If there is a special purpose, describe the public service performed. Nets leaving this space blank or those not showing a public service activity will not be registered.

9. *NTS?* If your net is part of the National Traffic System, so indicate by entering yes. Otherwise, leave blank. NTS nets must indicate the proper liaisons. Failure to do so may result in the net being registered as non-NTS.

10. *Liaisons.* NTS nets must show their proper liaisons. Other nets should show nets with which regular liaison is maintained. Do not show liaisons with MARS, CB, etc.

11. *Previously registered?* Give the year in which your net last appeared in the Net Directory. If it is a new net, enter no. If your net was registered previously, but under a different name, list the old name.

12. *Submitted by.* Enter your call letters. If you have more than one call, enter the one by which you are best known. Unauthenticated and unsigned registrations will be disregarded.

Mail the completed CD-85 to headquarters before July 1, 1969. Tardy registrations will be entered in the card file but not printed until the 1970 edition.— *WA9HHH.*

Traffic Talk

Are telephone numbers necessary on traffic? No, but they are very helpful, *if* they are correct. If they are not correct, they can be an awful pain in the neck and could run up your telephone bill if you are one of those good samaritans who place toll calls once in a while in the interest of prompt delivery.

So, first of all, make sure you have the telephone number correct. Of course we realize you can only make it as correct as the sending operator gives it to you, which is only as correct as he copied it from the station he got it from; but if everybody *makes sure*, it will arrive at the delivering station correctly.

Next, make sure it is written legibly. A large percentage of errors are not copying errors at all, except in the sense of legibility. Some of the hen-scratching we have seen which is supposed to pass for the written word defies belief. In that connection, we wonder why so few amateurs copy their traffic on a typewriter? It increases legibility greatly. (Of course, there are those whose typing is illegible too!)

And third, if you decide to make a toll call because the message comes from Vietnam or Korea or some place like that, check out the number *first* before you put in the call. You can do this, most places, by dialing 1 followed by the area code (if it's out of your area), then 555-1212. If that doesn't work, dial the operator and she'll connect you with the proper information operator (at no charge).

One more point, which has been mentioned before but bears repeating: Don't argue with the guy who sends you the message because something about it doesn't sound right or you know is wrong. Just make sure you copied it the way he sent it, then QSL. If the message can't be delivered, tell the *originator* (by SVC), not the relaying station.

Oh, and that brings up one more point, about service messages. Most of them are unnecessarily long! There is absolutely no excuse for a service message to be over CK 25, and in most cases it can be kept below 10. You don't have to tell the originator the long, sad story of your noble but abortive attempts to deliver the message. Refer to the message by number (*forget* the precedence, it's *not* part of the number) and date, give the reason for non-delivery. If the reason is the address, give the address; if it's the town, give the town. If the person has moved, just say "removed," never mind adding that he left no address, wasn't in phone book, mail returned or any of that stuff. If you need a better address, just GBA (on c.w.) does it. Let's cut down on the length of those service messages.

Oh yeah, and another thing — but whoa! We're getting off the subject. More about service messages another *time*. — *W1NJM*

National Traffic System. W2FR has issued a 2RN certificate to WB2FEH. Third Region certificates have been issued to *W3s* ATQ CID MPX, *K3s* OIO SOH, *WA3s* AKH CTP EXW INC IUV, and W9UCE/3, by net manager K3MVO. W6EIY and W8ELW/6 have received RN6 wallpaper from WA6ROF, who reports conditions better but traffic way down. K7NHL reports issuing a TWN certificate to WA7ISP. K2KIR congratulates the Eastern Area Region Nets, all of which had perfect attendance records on EAN during February. CAN Manager WA9RAK reports nearly a record month for traffic and setting a new record for rate.

February reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
1RN	56	618	.408	11.0	92.9
2RN[1]	70	1088	.792	15.5	96.8
3RN[1]	70	1029	.511	14.7	99.1
4RN	49	605	.484	12.4	82.1
RN5	56	807	.455	14.4	92.9
RN6	56	897	.614	16.4	97.7
RN7	56	366	.329	6.5	44.0
8RN	56	638	.376	11.4	97.0
9RN[1]	69	938	.510	13.6	90.2
TEN	56	560	.664	10.0	80.4
ECN	56	197	.230	3.5	82.1
TWN	44	203	.260	4.6	46.1
EAN	28	1886	1.379	66.6	100.0
CAN[1]	38	2457	1.200	64.7	100.0
PAN	28	1145	1.057	40.9	100.0
Sections[2]	1791	11678		6.5	
TCC Eastern	112[3]	807			
TCC Central	112				
TCC Pacific	112[3]	917			
Summary	2579	26,816	EAN	17.0	—
Record	3059	34,238	1.481	16.4	—

[1] Including 1969 SET information.

[2] Section and local nets reporting (65): BUN (Utah); Franklin County, OSN, OSSB, BN (Ohio); WSSB, M6MTN (Mich.); HNN, CCN (Colo.); PVTEN, NJEPTN (N.J.); CN, CPN (Conn.); QIN (Ind.); WSBN, WIN, WSSN (Wis.); NMRTN (N.M.); WSN (Wash.); VSBN, VN, VSN (Va.); KTN (Ky.); NCN, CNN (Cal.); FMTN, VEN, TPTN, FPTN, NHN, WFPN (Fla.); MDDCTN (Md.-D.C.); NYS, NLI Phone, NLI VHF, NLI (N.Y.); ILN (Ill.); OZK (Ark.); PTN (Me.); TEX (Tex.); OLZ, SSZ (Okla.); RISPN (R.I.); NCN(E), NCN(L), THEN (N.C.); GSN (Ga.); LAN (La.); MJN (Minn.); MNN, SMN (Mo.); AENB AEND, AENH, AENM, AENR, AENT (Ala.); RTQ, West Quebec VHF (Que.); EPAEPTN, PTTN, EPA (Pa.); WMN (Mass.); WVN (W. Va.); GBN (Ont.)

[3] TCC functions, not counted as net sessions.

Transcontinental Corps.
January reports

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	112	94.6	2142	807
Pacific	112	93.8	1834	917
Summary	224	94.2	3976	1724

The TCC roster: Eastern Area (W3EML, Dir.) — *W1s* BJG EFW EMG EOB NJM, K1ESG, *W2s* FR GKZ PU, K2RYH, *WA2s* BHN BLV OYE UWA, W3EML, K3MVO, *W4s* NLC UQ ZM K4KNP, WB4DXX, *W8s* AHZ IXJ UM, K8KMQ, *WA8s* POS ZGC, VE3GT. Pacific Area (W7DZX, Dir.) — *W6s* BGF BNX IPC IPW VNQ VZT, K6DYX, WA6HVA, *W7s* KZ ZIW, K7HLR, WA7CLF.

Public Service Diary

On Jan. 13 while mobiling twenty miles west of Montreal on the TransCanada Highway, VE2ALE came upon an overturned car near the high speed lane of the road. A large number of spectators had gathered, thus creating a hazard to oncoming motorists. VE2ALE called for assistance on the VE2RM repeater. VE2AKM answered and relayed all information to the Quebec Provincial Police. — *VE2ALE, SEC Quebec.*

Participation in the Simulated Emergency Test last January had to be cancelled for the East San Gabriel Valley AREC. They had been in the field

since January 22 providing communications for the American Red Cross in the flood stricken area surrounding Azusa and Glendora, California. All communications utilized wide band f.m. in the two meter band. A total of thirty one amateurs participated in the four day operation, under the direction of EC WA6JXG. — *WA6JXG, EC East San Gabriel Valley, Calif.*

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On the early morning of January 23, a tornado struck the towns of Mendenhall and Hazelhurst, Miss., leaving about twenty dead and hundreds injured. Also damaged as the twister skipped through the area were Sardis and White Oak. W5FYH, WA5UDQ and K5PJY were active from the stricken cities handling traffic. The operation, a combined AREC and RACES effort, lasted for two days, during which *K5s* FMV ZFM and *WA5s* JWD QDC FII acted as net control stations. WA5PZI at the University of Southern Mississippi was instrumental in making arrangements for vocational students being sent to the damaged area to aid in clean-up operations. — *WA5KEY, SCM Mississippi.*

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The SET plans of the Lompoc (Calif.) Civil Defense organization were also washed out because of the severe flooding in the area. The control center was activated at 1300 PST on Jan. 25, and liaisons were maintained with the West Coast Amateur Radio Service Net, the Western Public Service System, and NTS. Fortunately, the rains ceased and the flood crested about 1600 before more damage was done. Soon afterward, the control center was moved to the home of W6UJ where traffic was still being handled at 2000. — *W6UJ, RO Lompoc, Calif.*

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California wasn't the only place where "simulated emergencies" turned out to be the real thing. On the evening of Jan. 25 a record snowfall of three feet was registered in the Willamette Valley, Oregon, with more than a foot accumulating at some points along the coast. Most roads and highways were left impassable, power was knocked out in many places, and normal means of communication were completely disrupted. Coos County amateurs went into action handling health and welfare traffic, as well as arranging for aerial food drops to many stranded families. The state RACES net was activated at noon on the 26th, and remained on the air until February 1. More than sixty amateurs were active until the state dug its way out and normal facilities were restored. — *K7WWR, SCM Oregon.*

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The state of Mississippi was again struck by tragedy when, on the heels of the tornado described earlier, Laurel was rocked by a series of explosions from tank cars loaded with butane. Fortunately, the first car to explode did little damage, but it signaled the warning of what was to come. The residential area near the railroad yards was quickly evacuated. As the fire spread and the cars exploded, more and more damage was done until a two square mile area was completely leveled. K5MOH, in Laurel, was soon assisted with the handling of health and welfare traffic, when K5HYE and WA5BWE arrived from Hattiesburg. — *WA5KEY, SCM Mississippi.*

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The small college town of Crete, Nebr., was also the victim of a railroad mishap, when, on Feb. 18, a train derailment caused the explosion of a freight car loaded with ammonia gas, resulting in eight deaths and a number of injuries. As news of the disaster was released, telephone lines to the city were immediately jammed with calls. KØLDP at the Red Cross headquarters was activated by WØOWR to aid in the passing of health and welfare messages. WØYOY drove to Crete and set up a second station at a local factory to help with the traffic. WAØPGP, KØSFA, and WØKFE were also active from the site of the disaster. At the peak of activity, one hundred inquiries per hour were being received, which resulted in more than 600 message handlings. Active from the Lincoln Red Cross chapter were WAØOMY, KØQVN, WAØNKZ and several other amateurs. — *KØODF, SEC Nebraska.*

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Forty-two reports from Section Emergency Co-ordinators were received for the month of January, 1969. These reports represent 15,318 members of AREC. This is two more reports and 1,414 more AREC members than January, 1968. SECs reporting were those from Alta, Ariz, Ark, BC, Colo, Conn, Del, EFla, EPa, Ga, Ind, Iowa, Kans, Ky, La, Mar, Mich, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, Ohio, Okla, Que, SDgo, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY and WPa. Alabama was inadvertently omitted from the list of 100% sections last month.

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Independent Net Reports:

Net	*Sessions*	*Checkins*	*Traffic*
Northeast	28	386	912
QTC	20	181	91
North American SSB	24	524	402
Clearing House	24	475	730
20 Meter ISSB	20	435	9168
Hit & Bounce	28	365	908
7290	40	1895	1587
EUS	26	63	58
All Service	4	93	89
Mike Farad E & T	21	407	587

QST

K7OHX. Bob, a member of the Northern California Net, helps to clear some of that often difficult to unload Nevada traffic. *(Photo by K6KOL)*

Happenings of the Month

MORE AMATEURS CHARGED FOR OBSCENITY

The Federal Communications Commission took action to revoke the operator licenses of three amateur radio service operators on charges of obscene, indecent or profane radio communications. The Commission ordered Steven P. Bowman, WAØHQO, of Sikeston, Missouri; Kenneth C. Henry, WAØKYU/9, of Anderson, Indiana; and Gary Overman, WA9KEA, of New Castle, Indiana to show cause why their licenses should not be revoked. The three operator licenses were also ordered to be suspended.

In addition to the obscenity charges, other violations included transmission of false or deceptive signals or communications, failure to identify stations properly, transmission of unidentified communications or signals and willful or malicious interference to radio communications of other amateur stations.

The Commission said that the three amateur licensees had repeatedly and willfully violated the Rules. The enforcement actions followed investigations carried out by the FCC Field Engineering Bureau and the Federal Bureau of Investigation after complaints were received from other amateur radio operators.

The actions were taken March 14, 1969 by the Chief, Safety and Special Radio Services Bureau. — *From FCC News Release, March 14, 1969.*

MARS PROGRAM FORMALIZED

After some twenty years of service, the Military Affiliate Radio System has been formally adopted as an official program by a Department of Defense Directive, Number 4650.2, November 30, 1968:

I. PURPOSE: This Directive formalizes the composition, mission and functions, and the organization of the Military Affiliate Radio System (MARS), and sets forth policies concerning Department of Defense support of both MARS and civil Amateur Radio activities.

II. APPLICABILITY: The provisions of this Directive apply to all DoD Components.

III. COMPOSITION: MARS shall be composed of military unit radio stations and individual United States volunteer and military radio operators, licensed by the Federal Communications Commission or otherwise authorized by United States competent authority, who have reached their sixteenth birthday and either possess a radio station capable of operating on radio frequencies assigned to MARS, or are affiliated with a civilian or military radio club with an operational radio station capable of operating on specified radio frequencies assigned to MARS.

IV. ORGANIZATION: There shall be an organized MARS entity within each of the Military Departments. (The Marine Corps will function under the jurisdiction of the Department of the Navy.)

A. Each Military Department entity will function under the direction of a "Chief, MARS," who will be appointed by the sponsoring Military Departments.

B. The Office of the Secretary of Defense, the Defense Agencies, and appropriate Executive Agencies of the Federal Government may affiliate in a program of a Military Department.

V. MISSION AND FUNCTIONS: A. The mission of MARS is to provide DoD sponsored emergency communications on a local, national, and international basis as an adjunct to normal communications.

B. MARS will:

1. provide auxiliary communications for military, civil and/or disaster officials during periods of emergency;
2. assist in effecting normal communications under emergency conditions;
3. handle morale and quasi-official record and voice communications traffic for armed forces and authorized U. S. Government civilian personnel stationed throughout the world;
4. create interest, and furnish a means of training members in military communications procedures;
5. provide a potential reserve of trained radio communications personnel for military duty when needed;
6. maintain and operate an Army — Navy — Marine Corps — Air Force MARS facility on the main concourse of the Pentagon Building; and
7. conduct an appropriate Amateur Radio program as a part of the annual celebration of Armed Forces Day (see referenced Directive 5400.5).

Indiana governor Edgar D. Whitcomb and Centre Division Convention chairman Joe Poston, K9GCE with th Indiana Amateur Radio Week proclamation.

Behind the Diamond *Number 15 in a Series*

A dozen columns ago we mentioned Gil Crossley as a young college instructor having to take the keys to W8YA away from one of his top student brass pounders. Now it's time to shine the spotlight on that young squirt of 35 years ago — **George Hart, W1NJM/W3AMR,** ARRL Communications Manager.

George got his license in 1930, and his fame at Penn State in 1933-1936, handling traffic from the college station — and, almost incidentally, acquiring a B.A. and later adding an M.A. in English. George came to Newington in September 1938 to operate the shiny new Hiram Percy Maxim Memorial Station, W1AW, just dedicated. In 1942, as chief operator, he put the station in mothballs for "the duration" and moved over to the West Hartford offices where, by the end of the year he was acting communications manager. In 1944 he joined the Army, survived Officer Candidate School and spent the next two years as a lieutenant in the Army Airways Communications System. Back at ARRL, he set up the Training Aids program and then organized the National Traffic System of local, state, regional and area nets, the latter tied together by the crack ops of the Transcontinental Corps — in which, incidentally, George is still active. He spent 1949 to 1967 as National Emergency Coordinator, overseeing the efforts of 74 section emergency coordinators, 1300 local ECs and 35,000 Amateur Radio Emergency Corps members. When Ed Handy retired as communications manager, George became head of the department.

Rare is the SCM who has not received a five-page letter from George, carefully spelling out the reasons why something is done as it is. And George has a deserved reputation for going straight to the point, especially with those of his correspondents whom he counts as friends. In a headquarters letter-writing seminar a couple of years ago, Public Relations Consultant Don Waters made frequent reference to "sandpaper phrases," those frequently-used words capable of irritating the guy at the other end. In W1NJM's office hangs a nicely framed "Sandpaper Award with Don Waters' Clusters," a memento from his staff of his occasional bluntness.

In addition to his own two calls (W3AMR is located on the family farm in Raubsville, Pa.), George is trustee for W1AW; W1INF — *It's Never Finished* — the station in the ARRL lab; and W1EIA, club station of the Connecticut Wireless Association, known for its 15 to 65 w.p.m. code practice sessions each Sunday night at 0130 GMT (Monday morning, Greenwich) on 3637 and 7120 kHz. A hangover from George's too-eager youth is a "glass arm" which won't tolerate a bug or automatic keying lever — W1NJM operates with two straight keys side by side, hitting them alternately with his index fingers!

Our comms manager and his quiet, patient wife Louise have two sons, Fred and Dennis, and one granddaughter, Kimberley — who is well on her way to being spoiled rotten by grandpa!

VI. Policy: It shall be the policy of the Department of Defense to:

A. Support and encourage MARS and Amateur Radio activities and avoid, within the limitations imposed by military exigencies, any action which would tend to jeopardize the independent prerogatives of the individual Amateur Radio operator.

B. Encourage and cooperate in the development of amateur and private communications activities to enhance their military and civil value.

C. Recognize demonstrated technical and operating qualifications of personnel, as evidenced by possession of a valid Amateur Radio License issued by the Federal Communications Commission.

D. Maintain liaison with all recognized U. S. Amateur Radio organizations and the Federal Communications Commission.

AMATEUR RADIO WEEKS AGAIN

In Indiana and Indianapolis, amateur radio week is May 24 to May 31, 1969, the dates coinciding with the ARRL Central Division Convention in the capital city on the 24th. Both proclamations mention, ". . . the inventive genius of hams, . . . the instant mobilization of communications by the hams . . . in a disaster area; . . . the intuitiveness of hams in conquering malfunctions . . . the friendliness and helpfulness of the hams throughout the world . . ."

In Massachusetts, the state chapter of the National Awards Hunters Club secured a declaration of amateur radio week June 15 to June 21, 1969. Governor Francis W. Sargent's proclama-

WHO THE DEVIL IS WHO?

Thirteenth in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	*Was*	*Now*	*Was*	*Now*	*Was*	*Now*	*Was*
W1KU	W1DYY	W3SG	W3MRZ	W5MW	W5CYE	**W8GI**	WØDUD
W1LG	K1OXU	W3WC	K3VOZ	**K6DC**	W6ULS	W8IU	W8TJM
W1LL	W1POY	W3WF	W3LVU	K6MU	W6FJJ	W8JC	W8GSE
W1MM	W1AEW	W3WS	W3CLP	K6OD	W6JAI	**W9DY**	W9GFF
K2AC	K2GDP	**K4KM**	WB4HVQ	K6OE	K6TYQ	W9FC	W9DGA
K2AI	W2POC	K4KP	W4DIJ	K6OH	WB6IAQ	W9FT	W9VFZ
W2PL	WA2WNR	K4KQ	W4LVV	K6OI	WA6TMK	W9FU	W9OVF
W2ZO	W2GKW	**W5LK**	W5MMT	K6OL	K6YIW	W9GA	W9HMO
W2ZS	W2SWC	W5MB	W5GXP	W6NP	W7HNS	WØJK	WØOSX
W2ZU	W2QZG	W5MQ	W5ERR	**W7OK**	W9AMP	WØKC	WØSHW
W3ML	W3CKN					WØKE	WØDOP

tion cited contributions of the amateur to development of electronics in war and peace, disaster communications, and civil defense work. The club will give a special recognition certificate to amateurs working Massachusetts stations during the week; details from Steven Rich, 31 Arlington Avenue, Revere, Mass. 02151; s.a.s.e. please.

Walter Peterson, Governor of New Hampshire, set aside June 22–28 as amateur radio week, in recognition of amateurs' service in emergencies, international goodwill, and training through such activities as the ARRL Field Day.

The same week was picked by the mayor of Englewood, New Jersey for his city's observance. Mayor Robert I. Miller mentioned specifically "The Englewood Amateur Radio Association, Inc. during their Field Day exercises each year since 1963 have brought honor and recognition to themselves and to the city by placing first in their transmitter category . . ." and linked Field Day to FCC's basis and purpose of the amateur service.

CANADIAN FEES STAY AT $10

In spite of strong pleas to the contrary by the League, the Canadian Amateur Radio Federation, provincial societies, local clubs and individual amateurs, the Canadian government has decided to keep the amateur license fees at $10 per year. The measure is part of an overall government drive to make all special services self-supporting, and it applies to fields other than radio as well.

Happily, the "amendment fee" of $6 will not apply to amateurs after April 1, 1969. QST

ARRL QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters *in the upper left-hand corner.*

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

W1, K1, WA1, WN1[1] — Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4 — H. L. Parish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4[1] — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

WØ, KØ, WAØ, WNØ — Alva Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.

KP4 — Alicia Rodriquez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.

KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5[1] — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

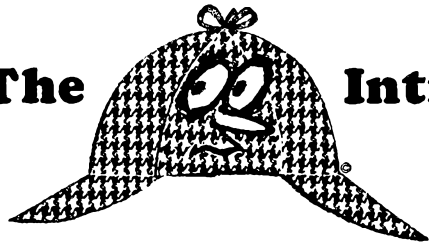
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232 Goose Bay, Labrador.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

[1] **These bureaus prefer 5 × 8 inch or #50 manila envelopes.**

ARRL The Intruder Watch



How You Can Help to Preserve the Amateur Frequency Allocations

BY RICHARD L. BALDWIN,* W1IKE

OFTENTIMES changes take place so slowly that the casual observer doesn't notice what is happening. Were the change to take place overnight, it would be dramatic. Spread over two or three years, it makes little impact except among the people who spend so many hours bringing the change to pass.

That's how it's been with the amateur bands since the ARRL Intruder Watch went into operation about three years ago. A group of dedicated amateurs have spent uncounted hours of their personal time in reporting the presence of interference to the amateur service. These interference complaints have been coordinated by Hq. and filed with the FCC, where they have been diligently and aggressively processed. Signs of success have been slow in coming, but there has resulted a gradual cleansing of the amateur bands, and in some segments the change has been very noticeable.

What we should have done three years ago was to record, for example, the conditions existing in the band 7000-7100 kHz. Then, comparing the 1965 recording with a 1969 recording, we would have had that dramatic impact that we mentioned. But, not having the comparative recording tapes, and in any event having no way of playing the tapes for you here in the pages of *QST*, we'll have to rely on statistics.

What Are Intruders?

To understand why we need an Intruder Watch, it is necessary to back up a bit and get some background on international radio regulation. First of all, our amateur band assignments are based on international agreements which are worked out at conferences held by the International Telecommunication Union. Because radio waves know no political boundaries, it is essential to have universal agreements on how the radio spectrum is to be used — otherwise there would be chaos. And so the spectrum is chopped up into segments, with different bands of frequencies allocated to the broadcasting service, to the aeronautical service, to the maritime service — indeed, to more than two dozen different services, including the amateur service.

This would all be very neat, except for a couple of problems. In the first place, there are not enough frequencies available so that each service can always have its own private allocation, and so we have shared bands. Thus, the 3.5-MHz. band is shared, even in North and South America, between the amateur service, the fixed service, and the mobile service. In other areas of the world there's also some broadcasting permitted in that band. That's why, on the 80-meter band, you hear so much other stuff on a cold winter night.

The second problem is that there's a loophole in the international regulations. So that there will be as little misunderstanding as possible, let's quote from the Radio Regulations, Geneva 1959, which is the currently effective international document:

"Article 3, Section 3. Administrations of the Members and Associate Members of the Union shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall

The ARRL Intruder Watch is a part of the League's continuing work to protect and preserve the amateur frequency bands. About a hundred League members are participating in this activity by reporting non-amateur stations in the amateur bands causing harmful interference to the amateur service.

*Assistant General Manager, ARRL.

not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations."

This loophole makes it possible for Country X to assign, let's say, 7050 kHz. to one of its broadcasting stations, and to continue using that frequency, contrary to the allocations table, as long as no interference is caused to the amateur service. But since we know that such interference is inescapable, the real crux of the matter is to get amateurs to *report* the interference, rather than simply to accept it as more QRM.

Besides those cases of deliberate use of the amateur bands by other administrations and by other services, we also have many instances of inadvertent interference. Spurious transmissions caused by faulty equipment or by faulty tune-up procedures, together with harmonics, can also wreak havoc to amateur communications.

How Much Interference Is Reported?

Since now we all know that cases of interference *do* exist on the amateur bands, our problem is in getting amateurs to report the interference, with suitable specifics so that we can furnish sufficient factual data to FCC. In the days prior to the formal organization of the ARRL Intruder Watch, which took place in 1965, at the urging of WØDX, Hq. was getting only a very small number of interference/intruder complaints each month — never more than half a dozen. Since that time, complaints have come in at a rate as high as a thousand per month.

Here's another comparative statistic. In the three-year period prior to August of 1965, amateurs filed complaints on 124 different non-amateur stations operating in the amateur bands. In the three-year period after the establishment of the ARRL Intruder Watch, amateurs filed complaints of interference on 1258 such stations. This doesn't mean that beginning in 1965 the amateur bands were suddenly full of intruders. It means that beginning in 1965 we began to do a much better job of reporting the interference.

Who's Doing the Work?

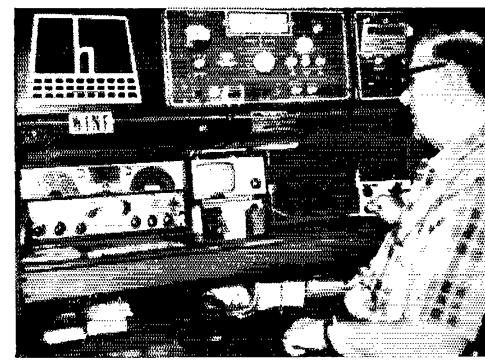
Hidden behind the impersonal title of "Intruder Watch" are a multitude of League members who have devoted many, many hours to this work, in order that you and I and those who follow will continue to be able to enjoy the amateur bands. Any success that the Intruder Watch has had is due almost entirely to the devotion of these individuals.

It is usually difficult, in an effort such as this, to single out one or two people who have been outstanding contributors. But in this case we must mention the contributions of W1NF and K6KA. Art Ericson, W1NF, has been an ARRL Official Observer for years, and when the Intruder Watch opportunity came along he jumped in. He has the distinction of having submitted a report every week for over three years, and if his reports were lined up end to end, they would surely form a line of paper extending from Connecticut to Washington, D. C. Art has done an outstanding job for the Intruder Watch, in both quantity and quality of reports. Not far behind is Bill Conklin, K6KA, who has done yeoman service from the other coast, and who has been a prolific source of ideas on how the operation of the Intruder Watch could be improved.

We've mentioned two outstanding contributors by name — there are another dozen who stand extra high on our list of appreciation. For instance, each of the following has submitted *at least* 50 weekly reports: K1CLM, W2MZB, W2VAQ, W4OPM, WA5SKI, WA7BSG, W8BU, W8DHJ, W8MSG, W9AZP, W9DY, and KH6AHZ.

Here's a complete list of those who are currently active in the Intruder Watch: K1CLM, WA1EIG, W1ETU, WA1FFB, K1HIS, W1NF, W1WEE, W2CNQ, WA2CRW, W2CUC, WA2CUR, WB2DYB, W2EHD, WB2FEH, WN2GZE, WA2HIU, WB2MBU, W2MZB, W2NSZ, W2ODC, WB2TFN, W2VAQ, W2WHB, W3BUO, W3FU, W3LIE, K3ZKD, WB4CAP, K4CG, W4FY, WB4GTS, W4MLE, W4OPM, W4OYI, K4UDP, K4YBE, WA5SKI, WN5TVO, W6APF, WA6COE, W6JF, K6KA, WB6LNS, WB6SXY, K6ZFI, K6ZTK, WA7BSG, WA7KQS, W8BU, K8DHJ, W8LQB, W8LZE, W8MSG, K8QKT, W8QXQ, W8SSL, W8ZCQ, WN9AHM, W9AZP, W9DY, W9IHN, K9LJQ, WA9TSG, WN9ZJI, WØCVZ, WØDX WAØFLL, KØORB, WAØPRI, WØSIN, KØSPH, KH6AHZ, KH6AX, KH6BZF, KH6GPP, KH6GRO and VE3FCH/W1.

In addition, we have had the help in the past of a number of other amateurs whose contributions have been greatly appreciated but who could not continue with us for the whole three-year period. These include: K1ACL, W1AGB, W1ASW, W1BGD, W1CFW, WA1DBM, W1DFS, W1DRA, K1DYG, W1ECH, WA1FAV, W1FEC, WA1FGN, K1FNU, WA1GGY, WA1HOD, W1KC, W1MO, W1NEB, W1NZV, K1RSK, W1TS, K1UNQ, W1YNE, WB2ALF, K2AYQ, W2COT, WB2DLW, W2ETS, WB2EZG, WB2FJE, W2GTZ, WB2HWB, WB2IJF, W2NEP, WB2OFC, WA2OJD, WB2OYE, WA2PJL, WB2PYZ,



This is W1NF. From this operating position he has turned in thousands of individual interference complaints.

Merle Glunt (l.) W3OKN and Saul Meyers, ex-WØHPL, Chief Engineer, put their heads together over a tabulation Assistant FCC of interference reports.

W2PZI, WB2RSC, WB2SBR, WB2TBV, WB2TDK, WB2TOM, WB2UHZ, WB2UYD, W2VIR, W2VP, WB2VUC, WN2YKB, WN2YOJ, W2ZCZ, WN2ZXQ, W3AEQ, W3BI, WA3CTJ, WN3DWQ, W3DYX, WA3FHM, K3FNS, W3KDF, W3KO, W3NET, K3OJX, W3OY, W3UXW, K3WKJ, W3ZLP, W4AFM, WB4APN, K4AT, W4BJD, W4BMM, W4BNU, K4BQP, W4BUW, WB4CLY, K4HJM, W4LQE, W4LRN, W4LVV, W4MSH, W4MXF, K4NJS, W4ROC, WA4TBM, WA4TJS, WA4VNV, WA4WHX, WA4WOV, W5ACL, WA5FGC, W5FGO, W5FJZ, W5LXG, W5MSG, W5MXC, K5OLU, W5PKK, W5PQY, W5SAW, W6EGN, W6GMC, W6GQA, K6HPR, W6ID, WB6KPR, WB6LPN, WB6MLB, WB6MOC, WA6MWG, WB6NXK, K6OZL, WB6PGK, WB6QCJ, W6RDB, W6RW, K6ROR, W6SAW, WN6SLU, WA6SRT, WN6TAO, WB6UDH, K7BON, WA7DRC, K7DVK, W7EXM, WN7FEP, W7FNS, W7NXJ, K7ONF, K7TCL, W7UVR, W7UXZ, W7VCB, K8ACC, K8BFH, W8CHT, W8EDL, W8ELE, W8IV, W8JM, WA8NDY, K8OAG, WA8PVR, W8SAY, WN8TGO, WA8UDG, K8VEX, W8VUV, W8WS, K8YSO, W9ALZ, K9AQJ, WA9BIH, K9CHZ, K9FXW, W9MCJ, WA9MNC, K9OFA, WA9TCR, W9TV, KØAZJ, KØBPW, WAØEFN, WAØHLQ, WAØJNF, WAØNLN, WNØOFS, WØPAN, WAØPFC, WNØPVR, KH6IJ, KH6KS, KL7FEF, KL7DR, and KL7PI.

Who's Processing the Interference Complaints?

Getting all these complaints of non-amateur operation in the amateur bands does us no good if they are simply collected but not acted on. The U.S. amateur service has been particularly fortunate to have the unstinting cooperation of the Federal Communications Commission. The FCC Monitoring stations, under the direction of Field Engineering Bureau Chief Curtis Plummer (ex-W1IUA and ex-W3KRK) have helped in providing identifications that could not be handled by our Intruder Watchers. The cooperation between the monitoring stations and the individual Intruder Watchers has been invaluable in conducting the program.

Where the work of the Intruder Watch finally begins to pay off is when the complaints of interference arrive in the office of the Chief Engineer of the Commission, William Watkins, and get routed to the Treaty Branch of the Frequency Allocation and Treaty Division of the Commission. There, Branch Chief Merle Glunt, W3OKN, an expert in diplomatically getting another country to move its interfering stations, has processed the flood of complaints turned in by the Intruder Watchers. Sometimes he deals directly with the station involved, sometimes with the administration of the country where the station is located, and sometimes he has to work through the headquarters of the International Telecommunication Union in Geneva. Which course he takes depends entirely upon the individual circumstances. Presumably he got to be Branch Chief because he is smart enough to pick the right course most of the time!

What Can You Do?

This Intruder Watching, even though it is contributing a great deal to the protection of the amateur frequency bands, and even though it represents a great deal of total effort, doesn't need to occupy the time of an individual for more than a couple of hours a week. If you can spare that sort of time, we can surely use your help.

We provide detailed instructions on what to look for on which bands, we provide a special manifold reporting form which makes your job and that of the Commission easier, and we provide monthly bulletins on current information and priorities.

A postcard to Hq. will get you started, and you will become a participant in the League's program to preserve our amateur frequency bands. QST

Strays

Last February, Dale Norton, W1JI/MM, operating near the top of Northern Luzon, P. I., contacted another maritime mobile, W4DWD/MM, who was off the coast of East Africa. W4DWD mentioned that he had sailed the seas in 1928. "This beats me by one year," said W1JI. "My first job was the *Yorba Linda*, a tanker, which I joined on February 11, 1929, in Providence, R. I." "How did the 2 kw. arc and the ½-kw. spark work," asked W4DWD? This question was a surprise to W1JI since that was the gear used on the *Yorba Linda!* It turned out that W4DWD had quit the job and W1JI had replaced him. Forty years later, over a distance of 7000 miles, they finally met via ham radio.

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

John Clarricoats, O.B.E., G6CL

It is with deepest regret that we record the passing on March 14 of John Clarricoats, O.B.E., G6CL, a long-time leader in international amateur affairs principally through 33 years as secretary of the *Radio Society of Great Britain*. But even in retirement, "old Jack" provided both his meticulous skills and his wise counsel as volunteer secretary of the Region I Division of IARU and editor/producer of its bulletin. He also served the London Borough of Enfield as its Mayor.

G6CL

G6CL became active in *RSGB* circles in the 1920s. In 1927 he was appointed Social Manager of the society's T&R Committee (the strictly amateur communications branch) and in 1930 became *RSGB* secretary, a post held until his retirement in 1963. During his tenure, the society membership grew from 2000 to 12,000.

In 1967 *RSGB* published "World At Their Fingertips" a detailed history of U.K. amateur radio compiled by Clarricoats — probably the only person who could write it so authoritatively. It is a fitting and lasting tribute to his memory.

Leon Deloy, 8AB

Through the *Reseau des Emetteurs Francais* we have sad news of the passing on January 21, 1969, of radio pioneer Leon Deloy, 8AB. Deloy was the European end of the first transatlantic two-way amateur communication, which took place in November 1923, on about 100 meters, with Fred Schnell, 1MO (now W4CF) and the late John Reinartz, 1XAM. The contacts were the culmination of months of intensive advance planning.

During 1925, Deloy served as co-president of the *REF*, and attended the First International Amateur Congress in Paris — an organizational meeting of IARU.

LX1JW RETIRES

Jean Bernard Wolff, LX1JW, recently retired as Deputy Director-General of the Posts and Telecommunication Administration of the Grand Duchy of Luxembourg. Jean joined the PTT as an electrical engineer in 1933; he became Chief Engineer of the Technical Division in 1959 and, in 1963 was promoted to the Deputy post. Being also Director-General of Telecommunications, he represented his country regularly at international conferences. Jean has long been active in affairs of the *Reseau Luxembourgeois des Amateurs d'Ondes Courtes*.

U.S. — INDONESIAN RECIPROCITY

The United States and Indonesia signed a reciprocal operating agreement on December 10, 1968 to permit amateurs of one country to operate in the other. The United States now has 40 such agreements with countries around the world; a list appears in last month's column.

BAN LIFTED FOR W/HS

The Royal Thai Government some time ago notified the International Telecommunications Union that communications between Thai amateurs (HS) and stations in other countries are prohibited. This ban is still in effect, and it remains illegal for U.S. amateurs to contact HS stations. However, the government of Thailand has permitted the operation of a number of amateur stations by FCC-licensed operators signing U.S. call signs /HS. With Thai concurrence, FCC has now lifted the restrictions on contacts with such stations.

CONTESTS

The *Radio Sport Federation of the USSR* invites amateurs to participate in their "CQ-M DX Contest, 1969." The contest period is from 0900 GMT, May 3, to 2100 GMT, May 4, using c.w. in the 80, 40, 20, 15, and 10 meter bands. Participants should call "CQ-M;" an exchange consists of signal report and contact number (USSR stations will substitute a district number for contact number). Submit logs within 15 days after the contest ends to: *RSF*, Box 88, Moscow, USSR.

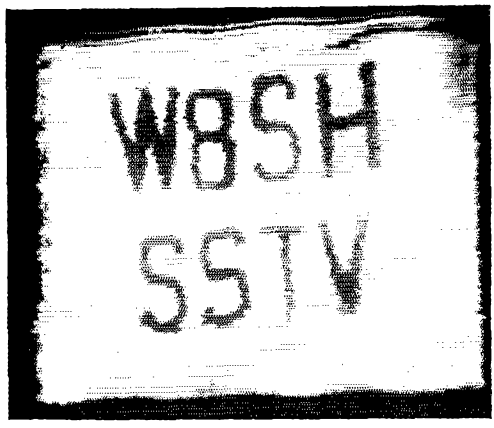
Experimenterende Danske Radioamatorer announces that the 18th "OZ-CCA" contest will be held from 1200 GMT, May 3, to 2400 GMT, May 4. Contest rules appeared on page 101 May 1968 *QST*. Logs should be mailed not later than June 15 to *EDR* Contest Committee, P. O. Box 335, Aalborg, Denmark.

QST

U.S.–Europe Two-Way Slow-Scan TV QSO

THE first two-way amateur television between the U.S. and Europe became a reality on February 22, 1969, when W8SH, the Michigan State ARC station, worked SMØBUO in Stockholm, Sweden. Contact was made on ten meters by Art Backman in Sweden and Dave Sumner (K1ZND) and Ralph Taggart (WA2EMC) in the U.S. Pictures of call signs, operators, and station gear at both ends were exchanged for over an hour. The slow-scan equipment at the U.S. end was constructed by WA2EMC and included a monitor (MacDonald, *QST*, March 1964) and a live Vidicon camera (Taggart, "Technical Correspondence," *QST*, December 1968). Both a Vidicon camera and flying spot scanner were used as picture sources at SMØBUO. Despite the fact that the contact was between areas of 60 Hz. and 50 Hz. power-line frequencies, reliable synchronization was possible at all times.

Slow-scan activity in Europe is presently increasing at a rapid rate and Art may be found on 28.7 MHz. every Saturday at 1500 GMT looking for s.s.t.v. contacts. — *Ralph E. Taggart, WA2EMC*



SMØBUO sent a tape of W8SH's signals as received in Sweden. This picture was obtained by playing the tape back through a monitor and photographing it.

Fig. 1—A QSL card (Plumbicon camera used) and Art, SMØBUO (flying spot scanner used) as received from Sweden via slow-scan TV on 10 meters.

Correspondence From Members-

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

STIMULANT

I went down and passed my Extra Class on the 27th of December 1968. I studied for six hours total the day before, reviewing basic theory and the License Manual. I found it not difficult at all — I don't feel any smarter now than I did before!

Also a very good friend of mine from Liberal, Kansas, went wild with the idea of getting licenses. He previously had a Conditional Class ticket, but on 7 January 1969 he went into Dallas and took the General, Advanced, Extra Class, 3rd Class, 2nd Class, and 1st Phone — all in one day. He said he was mighty tired after the day was over.

And he and I don't give a . . . [hoot] about the incentive licensing program unless you can really make it an incentive — for instance, have the FCC open up 3700–3800 for A3 transmission, 7150 to 7200 for A3 transmission. Now that would be an incentive!

By the way, his hotel bill in Dallas was $55, you should get it shortly — thanks for nothing! — *Dennis J. Alexander, W4RNG, Niantic, Connecticut.*

Some time ago I registered a strong protest both with ARRL and the FCC concerning incentive licensing. However, it became a reality this fall.

What to do? Give up ham radio and sulk or get to work. Well, after two months of hard study and a lot of code practice, yesterday I passed the Advanced and Extra Class exams and my objections seem to have evaporated.

Frankly, I feel I know a great deal more about ham radio and will be a better operator. My code speed is up to 25 w.p.m., and being retired the concentrated studying was an excellent stimulant for me.

Thanks to the ARRL for the always good *License Manual* and the Monday, Wednesday and Friday code practice. — *Grant Fitch, W9DZE, Milwaukee, Wisconsin.*

EXTRA "EXPERIENCE" REQUIREMENT

Why doesn't the ARRL draft a recommendation to eliminate the so-called two-year "experience period" presently required for the Extra? This waiting period is simply a seniority clause in an otherwise incentive-based licensing system. It makes no difference to me if this clause is a "hangover" from before the Class A days or the crystal-set era — it still deprives hundreds of amateurs of important frequency subbands, while "tying their hands" for a 730-day waiting period. Removal of this clause is in the best interest of amateur radio. Let's do something about it! — *Philip J. Schmitt, WA8JXE, Benton Harbor, Michigan.*

I have had my Advanced Class license for about three months now, and after some extensive studying for my 1st Class Radiotelephone license exam, I feel I am eligible for my Extra Class exam. I strongly feel that the two-year waiting period for the Extra Class is not only unnecessary, but an injustice to the amateur who has the knowledge, code speed, and the desire, but not the "experience" to qualify for the Extra Class. I wish to urge all amateurs who agree with me to write to the ARRL and ask them to petition the FCC until this unjustified requirement is eliminated. — *Ron Dagavarian, WA2FLO, Syosset, New York.*

Now that the lowest 25 kHz. of most bands have been taken from the General and Advanced licensees, we are faced, more than ever, with that old ruling that one cannot take his Extra Class exam until two years after the General has been achieved. I have had my General one year. I now have my Advanced: but the Extra Class privileges and frequencies — which used to be our own — remain off limits for another year. — *Jeff Kramer, WB4IPC, Mt. Dora, Florida.*

Now that incentive licensing has started going into effect, the ideal thing for all hams to do would be to go for their higher class licenses. For the time being, I have gone as far as I can by getting the Advanced Class license. I would like to go for my Extra but, under the present ruling, the earliest I can go up for it is in August, 1970. If the purpose of incentive licensing is to encourage amateurs to advance themselves, why is this roadblock left in our way? During the time when the Extra license conveyed no privileges that a General didn't have, the two-year wait was unimportant; but now that we lose very substantial parts of the best c.w. bands if we don't get the Extra, this two-year wait becomes a major stumbling block for the new ham who wants to advance to the higher privileges as fast as possible.

I, and a number of others who feel the same way, think that anyone who is competent enough and cares enough about ham radio to get his Extra before the two years are up, should be able to go after the "big" ticket. The enthusiasm of new comers is generally high, so why discourage them by making them wait for full privileges if they are competent enough to get them soon after entering ham radio? — *John Ashburne, WA1JMR, Wellesley, Mass.*

STRANGE HOBBY

Amateur Radio. Just what is this strange hobby of ours? It's two raw Novices, fumbling with words, learning to speak with their fingers, finding the old Morse code is a lot of fun after all. It's a couple of two-letter men on the low end of the band talking of their grandchildren and roses, keeping off old age. Or perhaps one of each, bridging the age old generation gap.

It's two people speaking, not knowing they are of different races and not really caring. It's a boy fighting in a foreign hand phone-patching to his weeping wife back home. It's hundreds of people helping others in a time of need and disaster. It's

the thrill of working a new state or country, not for personal gain but for pure pleasure.

It's the agony of waiting for the band to open and then the ecstasy of hearing your own signal come back to you by way of the moon.

It's the smell of melting solder and the feeling of accomplishment from getting that home brew rig on the air for the first time and finding it really works.

Amateur radio is an American and a Russian, speaking together, acting as the first real line of international trust and respect and mutual admiration.

Amateur Radio . . . it's what you make of it. — *John C. Almberg, WN2IEM, Smithtown, New York*

NEW LAW

While ruminating this morning following two DX contacts before my first cup of coffee, I hit on a new basic law which your readers may not be familiar with, at least in the following quantitative sense.

Actual code speed = $(S\text{-}3)\ (1\text{-}\frac{RQ}{100})$, where:

S = That speed which you think you can copy, w.p.m.
Q = Amount of QRM — 1 if it's a clear channel,
5 if moderate QRM
10 if heavy QRM
R = Rarity of DX — 1 if it's a local buddy
2 if a new station
5 if a new country
10 if it's a really rare one.

As you can see, and as we all have experienced, the speed is never what you think it ought to be, and drops to zero under trying conditions. I hope this will give added confidence to new operators like myself. — *Charles H. Gould, WA3LVV, Washington, D.C.*

NEW HANDBOOK COVER

I was happy to find that the new *Handbook* upholds the tradition of annual improvement. It was particularly pleasing to find the addition of a comic section right on the cover, where there is shown an OM in his shack, hard at work on his latest project, having tea brought in by the smiling, devoted XYL. (.... .. !) — *F. M. Simowitz, WA8YUS, Ann Arbor, Michigan*

CHART FOR 97.119

Because of various problems, I've been unable to exercise my hobby in amateur radio of late. A yard and a tree were acquired recently along with time to erect a simple dipole. After several hours of listening on 40 meters, I was shocked by the four-letter words flowing through the air. What's going on? It's rather clearly written in the rules that "No licensed radio operator or other person shall transmit communications containing obscene, indecent, or profane words, language, or meaning." But perhaps it isn't clearly written or if you will, *defined*. Maybe the FCC needs a little chart.

Word	*Penalty*
"Damn"	$ 25.00 fine
"Hell"	$ 100.00 fine
"****"	$1000.00 fine

Sure it's weird, but one of these days it might come to pass if old rule nr. 97.119 is progressively violated. I mean, how come a good Christian on 75 meters tells a brother amateur that believes prayers shouldn't be transmitted from the moon, to "Go to Hell". I may disagree also, but it's not necessary to express a desire that he travel to such a location. Leastwise, not on 75 meters.

After pulling the plug on the receiver I almost decided to give it all up and spend what spare time was available in the lucrative profession of mass producing Super Megawatt Linears for 11 meters. But instead, I think I'll study twice as hard for the Extra, continue good amateur practices, and pay strict attention to the rules. Who knows, it might rub off on somebody. — *Charles A. Haynes, K5VQF, Brenham, Texas.*

EXCLAMATION

Although I think ham radio to be the best hobby in a long time and I reap much enjoyment from it, I do encounter my share of mild frustrations. One of the most irritating, which I think could be most easily alleviated, is the frustration which arises when, after making some clever, funny or even turgid c.w. statement, I find myself helpless to add the proper punctuation mark, probably because in this, the language of the ham, it doesn't exist! I am speaking, of course, of the exclamation point. Do other hams share my feeling of need for this very useful piece of punctuation? If so, why can't the ARRL, the voice of the amateur in need, recommend the addition of this symbol to the list of Continental Code characters (perhaps the Morse Code's dahdahdahdit would be suitable)?

I'm sure we all agree that "Hi Hi" is being used a little too frequently and, might I add, presumptuously where there should be an exclamation point! — *Paul Traverse, WN3KZY, State College, Pa.*

6 METERS

I have a Technician license and have read with interest the results of your latest effort to keep six meters fully opened to holders of renewable amateur licenses in the February 1969 *QST* issue on pages 64–65.

The Technicians have large sums of money as well as great interest in this matter. A big investment in six-meter equipment and plans to reinvest in more modern equipment or improve present gear for us only to lose some of our frequencies seems most unfair.

Subsequently, you cannot win them all, but I have faith that you have not struck out and believe if we bring out additional facts we may still bring back these frequencies as you feel they should be used. — *William H. Boyer, W3AMQ, York, Pa.*

7 HOURS — 1 QSO

I am sure you have heard or read about some fantastic feat accomplished by a Novice: 20 states with 125 QSOs on 40 with 10 watts on a 6AG7. Humbug! After having had a ticket for four months, I finally finished and ironed out the bugs in my rig. I was anxious for all that beautiful DX waiting for me. I found out something quite different. After logging 502 transmissions I had 21 QSOs, 11 of which were destroyed by QRM. I did everything under the sun to find out why. One Sunday, I was on the air for seven, count 'em, seven hours and had 1, count 'em, 1 QSO, *1 QSO*! I even got up at 5 A.M. to beat the QRM on 40 and for some dawn DX but to no avail. But then it happened — 2 days after my last QSO, I boringly sent out a CQ and a guy answered. It was like a first QSO all over again. To a 15-year old Novice, ham radio is frustrating, but it still is tops. I wouldn't give it up for all the kilowatts in the world, contacts or not, I am hooked! — *Jack Robertson, WN2HOP, Copiague, N. Y.* QST

COMING ARRL CONVENTIONS

May 9-10 — Michigan State, Grand Rapids.
May 24-25 — New England Division, Swampscott, Massachusetts.
May 24 — Central Division, Indianapolis, Indiana.
June 13-15 — Pacific Division, Sacramento, California.
June 20-22 — NATIONAL, Des Moines, Iowa.
July 4-6 — Rocky Mountain Division, Salt Lake City, Utah.
July 5-6 — West Virginia State, Jackson's Mill.
August 16-17 — West Gulf Division, Amarillo, Texas.
August 29-30 — Great Lakes Division, Louisville, Kentucky.
October 11-12 — Roanoke Division, Huntington, West Virginia.
October 17-19 — 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 for up to two years in advance.

NEW ENGLAND DIVISION CONVENTION

Swampscott, Massachusetts

May 24-25, 1969

The 1969 New England Division ARRL convention will be held May 24 & 25 at Swampscott Massachusetts, and is again sponsored by the, Federation of Eastern Massachusetts Amateur Radio Associations. The speakers program will include talks on DX, RTTY, repeaters, construction, public service, contests, MARS, etc., plus special feature talks on subjects such as radio astronomy, setting up a commercial broadcast station, seismology, film and talk about Apollo 8, the FCC and an "on the air" demonstration of matching Yagi antennas. Members of the League Staff will be in attendance and will talk on their special fields. The ARRL forum will be held Sunday at 11 A.M. YL programs are scheduled for both days. A night-club style show and banquet will start at 6 P.M. Saturday. A new feature this year will be a "flea-market" where buyer and seller can get together on good used ham gear. The first district QSL bureau will have cards available and there will be a "new" antique wireless exhibit by the New England Wireless Museum. A grand prize of a transceiver will be awarded Sunday — everyone is eligible and there is nothing to buy. W1EED/1 will be on the air giving mobile stations directions both mornings on 75, 40, 20 & 10 meters. Early-bird tickets for both banquet and registration are $10.50 per person ($3.50 registration only — $4.50 at the door) and are available from John McCormick, W1KCO, Berkley Street, Taunton, Mass. 02780. Hotel reservations should be sent directly to the New Ocean House Hotel, Swampscott, Mass. 01907 or to the Lynn Charter House Motor Hotel Lynn, Mass. 01903. QST

ARRL MICHIGAN STATE CONVENTION

Grand Rapids

May 9-10, 1969

The 20th ARRL Michigan State Convention will be held in Grand Rapids on May 9-10 at the Grand Rapids Civic Auditorium and in the Pantlind Hotel. Saturday's activities will begin at 9 A.M. with a swap and shop and distributors displays. The featured speaker this year will be Dr. Paul Fuller, Chief Staff Scientist for Lear Siegler, Inc. In addition NASA will provide color films on the flight of Apollo 8. Also, meetings of various traffic nets, MARS operations, and technical discussions will highlight the day. Friday evening, May 9 will be the beginning of the early bird entertainment at 8 P.M. followed by an initiation into the Royal Order of the Wouff Hong at midnight. The pre-registration fee is still only $2; $2.50 at the door. For further information contact Glenn Ricketson, K8LOY 23 Morning Glory SW, Grand Rapids, Michigan 49508.

CENTRAL DIVISION CONVENTION

Indianapolis, Indiana

May 24, 1969

The 1969 ARRL Central Division convention will begin with a gathering of DXers Friday evening May 23, at the Stouffers Indianapolis Inn. A "hospitality" hour begins at 9 P.M. highlighted by a diving demonstration, soft combo music, DX slides, and eyeball QSOs.

Lafayette Square Mall will be the focal point for Saturday's activities starting at 9 A.M. Several technical discussions will be held concerning such "hot" subjects as "The Legal and Technical Aspects of Phone Patching" by George P. Schleicher, W9NLT, "The State of the Art Doesn't Mean Solid State" by Dick Ehrhorn W4ETO, of Signal/One, and "Problems of DXing from Navassa" by the U.S. Coast Guard. Additionally, topics on f.m., traffic, DX, and amateur TV will be covered by experts in the field. Among those attending will be J. F. Wathen, III, W4BAZ, ARRL, Central Division Director Phil Haller, W9HPG, and Bill Dunkerly, WA2INB/KL7ELA, from ARRL Hq.

Saturday evening festivities include a banquet featuring U.S. Senator Barry Goldwater K7UGA, as guest speaker with Stu Meyer W2GHK, of Aerotron acting as MC. Indianapolis Motor Speedway owner, Tony Hulman, is planning to be there and will be inviting all banquet guests to visit the speedway for the final "500" time qualifications on Sunday the 25th.

While the fee at the door will be $2.00, family preregistration for the OM, XYL, and Jr. Ops. can be made prior to May 12. $1.00 should be sent to Joe Poston, 309 Benton Drive, Indianapolis, Indiana 46227. Registration includes XYL entrance to the Shopping Mall for fashion shows and demonstrations, and of course rides and snacks for the kids. Banquet reservations and tickets can be obtained at a cost of $10.00 each or $18.00 per couple. For tickets or information, you can contact the Chairman at the above address any time. If you wish, Joe's telephone number is 317-881-9771.

Hamfest Calendar

Alabama — The Birmingham Hamfest will be held at the National Guard Armory on Opporto Street in Birmingham on May 3 and 4. For further information contact the Birmingham ARC, W4CUE, P.O. Box 603, Birmingham, Alabama 35206.

Alabama — The Annual Hamfest sponsored by the Mobile ARC will be held on May 24 and 25 at Mobile, Alabama. For entertainment, swap table, eye-ball QSOs, and fun for the whole family, plan to attend. For further information and reservations call or write Ham Wentworth, W4IZX, P.O. Box 7232, Mobile, Alabama 36601. Tel.: (205) 473-8561.

California — The Lockheed ARC, W6LS, is holding its Burbank Hamfest on May 17 and 18. There will be displays, good program, free parking, and food at reasonable cost. $2.00 donation per ticket. Pre-registration tickets or further information from LERC, 2814 Empire, Burbank, Cal. 91504.

Florida — The St. Petersburg ARC, Inc. will hold its annual Hamfest at Lake Maggiore Park, entrance gate at 9th St. and 38th Ave. South, St. Petersburg, Fla., Sunday May 18. All hams and guests cordially invited. This is an old fashioned hamfest with picnic lunch, swap table and fun for all.

Illinois — The Kishwaukee ARC will hold its annual Swapfest on Sunday May 4 at the Hopkins Park Shelter House in DeKalb, Ill. No charge for buying, selling or swapping but a $1.00 donation will be expected. Come one, come all and meet your ham friends.

Illinois — The Rock River Radio Club Ham Vention will be held on May 18 at the Lee County 4H Center, 6 miles South of Dixon, Ill. Technical lectures, plenty of parking, new equipment display and XYL program. Contact W9SON for further details.

Indiana — The Wabash County ARC is sponsoring their First Annual Hamfest on May 25 at the 4H Fairground at Wabash, Indiana. For more information contact Dick Webster, K9ULW, 1165 N. Cass St., Wabash, Ind. 46992.

Indiana — The Indianapolis Ham Association is having their first Convention at Indianapolis, May 24.

Kansas — The Hi-Plains ARC will hold its Annual Hamfest, May 18 at Plains, Kansas. No pre-registration. Featuring basket dinner, swap table and eye-ball QSOs. Parking space will be available at the City Park shelter house for campers and trailers. Hook-ups are not available. Saturday night rag chew open to all.

Michigan — The Hazel Park ARC Swap/Shop will be held at Hazel Park High School on May 18.

Nebraska — The Pine Ridge ARC will hold their Annual Hamfest on June 1 at Chadron State Park, ten miles South of Chadron, Neb. Each family bring a covered dish and own utensils. The club will furnish coffee and soda pop. There will be contests and awards including mobile judging, transmitter hunts, and code speed. Don't forget the swap table.

New York — Rochester is the location for the 36th Annual Western N. Y. Hamfest and V.H.F. Conference, the weekend of May 10. Same location as last year at 50 Acres, Rte. 15 just South of Thruway Exit 46. Advance registration and banquet only $5.75. Advance sale closes May 2nd. Send check or request for information to Western N. Y. Hamfest, P.O. Box 1388, Rochester, N. Y. 14603. Activities start Friday night followed by full day of technical programming with outstanding speakers. Specia activities include Navy MARS, AREC and QCWA meetings, YL program, code contests and huge flea market. See you there.

New York — The Rome Radio Club presents the 16th consecutive Ham Family Day on Sunday, June 1 at Beck's Grove, ten miles West of Rome, N. Y. Features include technical talks, a mobile DX contests, and a technical quiz. Also, participants in the flea market are invited. An afternoon of entertainment for the ladies and children is planned. Registration starts at noon with that famous chicken and steak dinner at 5:00 P.M. Advance adult reservations $5.00, at the gate, $5.50. Children under 12 $2.00, under 6 free. Send reservations to Rome Radio Club, Box 721, Rome, N. Y. 13440.

Ohio — The Ashtabula ARC will hold an auction on May 3 at the K of P Hall, Fargo Drive, Ashtabula, Ohio. Doors will open at 7:00 P.M. with the auction starting at 8:00 P.M. Free refreshments will be served to everyone attending.

Ontario — On May 16, 17, and 18, the Ontario Trilliums will be hosting the Mid-Western Convention for women amateur radio operators at the Canadiana Motor Hotel, Kennedy Rd. and 401 Scarboro, Ont. For more information write Doreen Aston, VE3FUR.

Pennsylvania — The Foothills RC Inc. of Greensburg, is having a Hamfest Sunday June 8. This event will be held at Wendel Park, Route 30, Irwin, Penn.

Pennsylvania — The 15th Annual Breeze Shooters Hamfest is to be held at White Swan Park near Pittsburgh, Penna. on May 18.

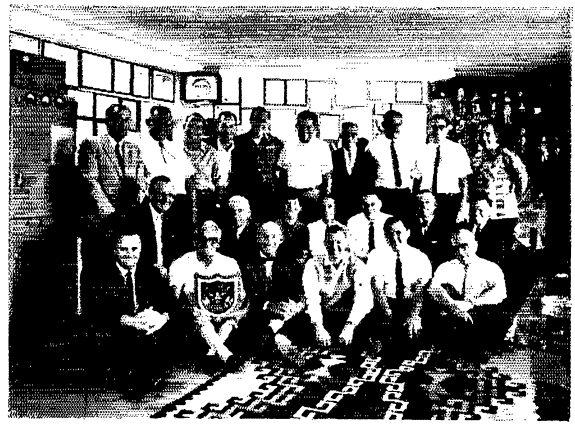
South Carolina — The Palmetto ARC announces its Second Annual Hamfest to be held indoors at the State Fair Grounds, Columbia, S. C. on June 1. A Dutch supper is in the planning for the night before. The Hamfest will feature swapping, a transmitter building contest, home brew contest, antique radio display, f.m. and MARS Forums, and bingo for the XYLs. More information from C. W. Moorer, K4FNT, 227 Castle Dr., West Columbia, S. C. 29169.

South Carolina — The Blue Ridge Radio Society will hold their seventh Annual Hamfest Sunday May 4 at Cleveland Park, Greenville, South Carolina.

Wisconsin — The Ozaukee Radio Club will have its Annual Hamfest at the Belgium Community Center at Belgium, Wisc. on May 25. For further information write Ozaukee RC, Box 13, Port Washington, Wisc. 53074

QST

Strays



K7UGA's volunteer crew, with Barry Goldwater holding a plaque, responsible for many thousands of MARS phone patches last year. Young lady in the center is Doris Counts, who handles the station paperwork, QSLs, scheduling, etc., especially while the Senator is busy again in the nation's capital.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Whoa!

Long Hall sounded like Gus's 14-MHz. VQ8 slots under fire during short-skip conditions. QRM almost drove our ears to cut-off as we elbowed through to the relative safety of gallery seats for the umpteenth May meeting of the DX Hoggery & Poetry Depreciation Society. Lots of ex-Gs in attendance this year.

O. U. Sakitumi, chairman very *pro tem*, grabbed his gavel to introduce our guest of honor, a sickening specimen indeed. After a few more kegs of Old Haywire we jarred the place with the Wouff Hong Song, DXHPDS anthem, and settled back to do our annual thing. From the stage that freakish visitor greeted us in a mushy voice that sounded like tortured audio emitted by the undersized 'speakers of those bargain-basement midget TV sets now glutting the market. The clown wore dark thick-lensed glasses, a pin-striped herringbone-twill suit and appeared undernourished enough to be subsisting on TV dinners. YLs first, so Wanda Grabbim started off the program:

Hot-sender Bugsy McGlee
Brought home an electronic key.
He tried and tried
But finally cried,
"This doggone fool thing's sending *me*."

A lead-based rabbit-ears TV antenna bounced off our guest as Sue Perpower yelled her offering above the din:

There was a DX hound named Shmuv
Who scoffed at the hot lines above.
He went boppin' past
With a high metal mast—
Yes, there *was* a DX hound named Shmuv.

Several Channel Two Yagis with needle-sharp elements ripped off our myopic visitor's vest, wrist watch and charm beads while Vera Uptight took her turn from the floor:

A great engineer is O'Skree,
An audio expert,you see.
Just stand by some more
While he tries three or four
Microphones alternate-ly.

The flinching fink next presented an abortive tech speech on linear amplification of ITV birdies and the proper matching of TV-set horizontal oscillators to the a.c. line. Val E. Indristing pierced the ensuing uproar:

One rover with high sense of mission
Embarked on his DXpedition
With plans far too vague.
He returned with the ague
And a case of severe malnutrition.

Our seedy guest then discussed "progress" in the development of ultrasensitive nonlinear devices for installation in rooftop TV receiving antennas. The resulting barrage of old CRTs almost finished him off as Kenny Spreadmore delivered

Von Jurk with a microsized brain
Slowly drives all the locals insane,
Making hideous noise
As he roars at the boys
With his gain past the threshold of pain.

The rowdy audience grew dangerously belligerent as our creepy visitor bragged about having transmitted the original brainwave causing establishment of lower-v.h.f. TV channels. Obie Quayet hollered:

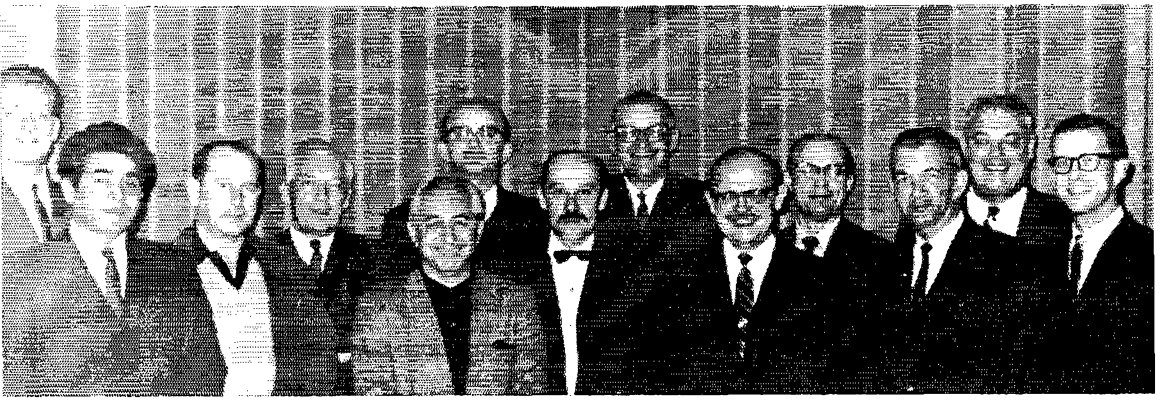
A C.B. with mind full of static
Thinks Uncle is undemocratic.
He daily demands
A dozen more bands
For his secret black box in the attic.

It was clearly time for the award presentation, so our messy guest was abruptly seized by a flying committee of DXHPDS operatives garbed in white. Before you could say "in a moment, but first this message," a microsized multichannel TV set with no off-switch was surgically implanted in the emptiness of the goof's cranium.

When he regained consciousness in a few moments there must have been two or three cheap off-color kook-studded panel shows and an early-early-oldie movie running simultaneously, for he raced madly screaming out the backstage exit. When last we saw our unanimously elected DX Dog of the Year he had already turned negative and was beginning to fear horizontally.

—Reprinted from August 1955 *QST*

*7862-B West Lawrence Ave., Chicago, Ill. 60656



Radio Society of Iran's January meeting at Tehran included (left to right) DL2WB, EP2JP, W4GUS, WA5AUA, EP2BF, EP2BI, EP2HL, RSI QSL manager T. Libershall, WA9EHZ, WB4DSF, EP2DA, HC5HC and EP2CB. Members gather on the last Thursday of each month, and EP2CB at the United States Embassy welcomes attendance inquiries from amateurs passing through the region.

What:

Twenty's the band where 5B-DXCC skeds are made for other bands, so 14-MHz. DX biz is still brisk. There's a noticeable thinning out in the evenings, though, when the boys make their move on 40 and 80. Anyway, time to sample stuff lately worked, heard, called, heard worked or heard called on

20 c.w., and we'll leave out all the ZAs and Biafrans and ZK2AU. **W**s 1VAH 2ICO 2KSK 2LJF 3HNK 4YOK 6YKS 7BE 8BQV 8IBX/2 8YGR, **K**s 3CUI 3UXY 4TWJ 5YUR 8DHT 9SRR/2 ØGVA, **WA**s 1FHU 1GGN 1IDP 1JKZ 1JMR 2APG 2BHJ 3GVP 3HMR 3HRV 3IID 3IRY 3KOS 5PPZ 5SOX 8MCQ 8VBY 8YXE 9MQI 9SQY 9TFM, **WB**s 2RNL 2UOO 4GSS 4GTI and 1IER account for radiotelegraphers **A2**s CAQ 1700 GMT, CAU (14,018 kHz.) 18-20, **AP**s 2AR (30) 12-13, 2SG 16, 5CP (65) 12, 5HQ (5) 22, **BV**2A (28) 12-13, **BY**1C (20) 2, **CE**s 2CN (50) 23, 2DI 2ID (24), 2PN (11), 2QD (33), 2R1 (21) 0, 3CF (27), 3EX 3RY (46) 23, 3ZK (31), 6EF 9AT (50) 4, **CM**2s QN (10) 21, ZU, **CN**8BK (10) 22, **CO**s 1AR (12) 23, 2AP (21), 2CG (50) 22-2, 2CN (2) 23, 2DR (10) 15, 2FC (64), 2KG (50) 3, 2PY (15) 22, 6PP (12), 8VT (30), **CP**8AM (55) 0, **CR**s 3KD (4) 23, 6AI (27) 18, 6BN 6BX (40) 6-20, 6CA (86) 10, 6EI (9) 18, 6IV (80) 18, 7BN 7HU (50) 18, 7IZ 15, **CT**s 1BQ (22), 1GD (25), 1IT (56) 21, 1MK 1MO 1TT (10) 2, 1VB (40) 22, 2AK (20) 0, 2BO (24) 22, 3AS (28) 22, **CX**s 1AAD (50) 23, 20J (46) 22, 4CO (27) 22, **DM**s 2ATD 2BDD (83), 2BRI (36) 20, 2BLJ 2BOB 2BOG 2, 2BTO 2BZN (25) 19, 2CZM (19) 20, 2DDN (11), 4YEL 6MAO 8ROS, **DU**s 1OR (35) 13, 1UP 2EN (21) 23, **DX**1AAV (30) 16, **EA**s 6BH (64) 19, 8FF 21, 8FJ (43) 8, 8FO (24) 1-2, 8FS (23) 1, 9AQ (35) 17, 9EO (8) 1, **EI**s 4Z (72) 23, 5HH (50) 13, 5F 9AR (4) 21, 9J (25), **EL**s 2D (36) 23-1, 2BE (26) 22, 2Y (41), 2Z (71) 23-0, 8L (16) 23, 8R (42) 22, **EP**s 2BQ (57) 14, 2EE 3AM (30) 17, **ET**3s RN 23, USA 22-23, Fs 8TT/**FC** 13-14, 9UC/**FC** 13-14, 9VN/**FC** (20) 16, **FB**8s WW 17, XX (70) 23, YY 16-18, ZZ (5) 11, **FG**7s TG (48) 22, TQ (33) 23, XC (50) 20, XT (57) 21, XX (40) 21, **FL**8s AU HM (31) 19, MB (37) 20, **FM**7s WH (75) 21, WO (13) 19-21, **FO**8s AA (45) 5, AU (81), BO (33) 16, BV (50) 16, **FP**8s AP (20) 12, CW (26) 11, **FR**7s ZD 18, ZF ZS (15) 12, **FY**7s YK (76) 18, YM (75), YN (15) 0, **GC**s 2LU 3AAU 3EML (5) 21, 3IEW 30BM (53) 20, 3UJE 19, 3ULZ (19) 22, **GD**3s AIM (33) 21, FBS (26) 14, FXN (21), **HA**s 1KSA 1KSS 1KZB 1SQ 1VI 3GA 3MB 3MJ 4KYB 4KYF 4KYH 5AF 5AK 5KFZ 7KPH 7KPN 7LO 7LU 7PS 7RB 8CC 8KCC 8KCP 8KUC 8UD 9PF ØLG, **HC**s 1RR 2HM (69) 23, **HH**9DL (20) 18-19, **HI**s 3PC 7JMP (58) 0, 8PN, **HK**s 3AMJ 3AV 3RQ 4ALE (39) 0, 5YC (64) 2, 6IC (20), 7AHM ØAT, **HL**9s KH (25) 12, TW US (9) 12, **HM**s 1DH 5CL (6) 23, **HP**1s AD (10) 3, BR (32) 3, EE (11) 2, XHG (53) 18, XYZ (53) 23, **HS**1EL, **IS**1BDO (62) 20, **IT**1s AGA (32) 15-16, AF (25), AI (47) 18, AQ (81) 5, AUA (73) 21, PST SBT ZGY (28) 3, **JA**s 1AH 1BGR 1BNW 1BZR 1CJF 1CWZ 1FGB 1JAN 1OHD 1OJE 1YL 2EG 2EKR 2HLX 2HSE 2LC 2WB 3DYU 4CX 5BJC (55) 12, 6AD 6AOC 6YCW 7AYW 7BVW 7CDV 7FS 8AE 8AQX Ø/AZE Ø/BBB, **JH**1s EPS SEX, **JT**1s AG (15) 2-4, KAA (30) 3, **JX**s 2BH (6) 23, 5CI (29) 23, **KA2**NY (35), **KC**4s USB (50) 21, USF USM (25) 1-5, **KG**6s AAY (12) 12-13, AGY (28) 8, ALV, **KJ**6BZ (49) 9, **KL**7s AZN EWA FPA FSV 2, FSY (50) 6, GGN (57), GLS (100) 3, MF (21), IR 1, **KR**s 6AW (38) 14, 6KQ (72) 8-11, 8BL 8DE (50) 12, **KS**s 4CZ (36) 20, 6CX (30) 3, **KV**4s AA (79) 23, CI (2) 21, EU (66) 23, FZ (8) 21, **KX**6s BQ (11) 10, GD 11-12, **KZ**5s EM (80) 22, NC (18) 1, NG (3) 1, RP (70) 22, SF 21, **LA**ØAD, **LG**5LG, **LJ**2T (43) 11, **LU**s 1DI ISE 2DAW 2EN 3EP 4ECO 6ABX 6AX 6FBR 7AU 7BH 7BN 8DSJ 9DAV 9DTQ, **LX**1s AU (25) 14, RG (22) 19, RM (40) 16, **LZ**s IFP 1KBG 1KKZ 1KPG 1KSF 1KSM 1KSZ 1LW 1SS 2EA 2KAF 2KPG 2KRO 2KRS 2ZZ **M1**s B (96) 16,, 1, **MP**4s BBA (32) 15, BEU 2, BGX MBJ (30) 7, TAF (18) 23, TCE (87) 7, **OA**s 4ACF (13), 4KF (16) 22, 4QN 4VE 4XK (6) 23, ØLS, **OD5**LX (26) 6, **OE**s 2PZL (36), 3SGA (23), 4SZW 5XPL (28) 23, 6GC 6HZG (20), 9, 9SKI (18), **OHØ**s AA (30) 0, NF (7) 7, RJ (23) 22, **OK7**UTB (23) 8-9, **OX**s 3FD (16) 18, 3MB (51) 23, 3UD (4) 23, 3ZO (77) 1, 5AA 5AC 5AO, **OY**s 1F 1IR 1R (8) 20, 2H (26) 15, 2X 2Z 23, 3H (37) 1, 3HP (60) 16, 4OV (3) 9, 5S 6FRA 7JD 7TM 7Z (12) 22, 9IM, **PJ**s 1CV 2CB 2CK (110), 2VB (50) 22, 2VD (56) 13, 7VL (19) 23, **PY**s 1BQO 1CKZ 1DB 1FK 1MB 1PK 2CLX 2DBU 2DLK 2DSE 2GLJ 2NE 2NX 2RZ 2SO 3AXN 4HCX 4UG 4ZG 5ARK 5ASN 5YC 6ABD 6JD 7AH 7AN 7AW 7AHO 7SR 7VNO 8FI 8FK 8FM 9HL ØEP (53) 23, **PZ**1s AV (47) 20, BD (48), BI (22) 23, BL 22, DD (23) DE (73), RAEM/mm (50) 4-5, **SK**s 2AU 2ZA 3BG 5AA 6AB, **SL**s 4SA (26), 6CY (25) 23, 7AC 20, **SM**2s COL (30) 23, EZE ME, SPs a-plenty, **SU**1IM (25) 8, **SV**s ICA ODD (25) 1, ØSV (36) 21, ØWH ØWB (27) 13, ØWN ØWOO (31), ØWP (22) 19, **TA**s 1AV (70) 12, 11B 1KT (11) 21, 1NC (45), 1SK 2DX (29) 11, 2E (26) 3, 2EI 2EK 2EM (27) 18, 2SC (28) 10, **TF**s 2WLI (20) 13, 30J (45) 19, **TG**9EP, **TI**2LA, **TJ**1QQ (5), **UA**s 1KAE/8 (20) 0 of antarctic wastes, 1KED (40) 2 of F.J.L., 2AC 2DO 2DM 2KAP 2KAQ 2KAS (46) 15, 2KBD 2KCC (11) 3, 9AB (30) 9CV 9FV (43), 9IB (13) 0, 9JL (14), 9KHB (28), 9KOA (5), 9KOG (10), 9KSA (47) 4, 9KUK 9NN (18), 9OS (37), 9PF 9PG (41) 4, 9YK (68), 9YW (68), 9XN 9YG (28), ØAF ØBL (43) 1, ØEH 6, ØEQ (40), ØEX ØFS (12), ØIW (10), ØKAE (23) 12, ØKAH ØKBS (20), ØKCQ (40) 6, ØKFG (21), ØKKB 11, ØKOD (15) 7, ØKQU (27) 6, ØKZB 11, ØKZD (55) 2, ØLE (2), ØLH (6) 23, ØLL (55) 9 ØSL (15), ØTW (25) 2, ØYD (10) 2-4, cØYE 3, ØYT (15) 1-2, **UC2**s BA (36), KMZ (26) 19, KNU (33) 0, KSB (30), OC (13) 4, TA (32) 22 **UB5**s EC EH EO (27), ES (28) 2, JR (4), JX (28) 15, KAA (20), KCD KDS 23, KKA KKD KKO KQO QA (24), RN (27), TL (25), TR (25), **UD6**s AR (73), BW (40) 13, **UF6**s AM CR (3) 2, CX (12) 3, DZ (65) 2, HS (47), **UG6**s AB (15) 2, AD (30) 15-16, EA (15), KAA (40) 13, **UH8**s AB (15) 13, AE CI CS (4) 16, DH (19), DI DT 13-15, KBC (55) 16, **UI8**s CY (38) 3, EK IZ (7), KAA (44) 7, KBA (55) 11, KNA (28) 15, OJ, **UJ8**s AC (51) 15, AH (36), AJ (65) 2, ES (7) 8, KAA (25) 12-13, SX (48) 16, **UL7**s BG CG CA DD FD (32), FO (18) 2, GW (40) 13, JA (45) 15, KAA KBA (35), KAR (53) 13, KBK (35), KDW (62), KFD (50) 7, KFB (40) 11, KKB (32) 11, KKQ (18) 8-9, OE PH (45) 11, QO RL (45), RQ XE (9) 11, **UM8**s AP (30) 3, IE (42), FM (84) 13, KAA (49) 13, KAI (72) 4, **UN1**s AB BR (45) 15-16, CQ (80) 3, KAL (11) 12, **UO5**s AP 16, AS AW (19) 19, BM (5) 20, KAA 17, PK (26), SM (75) 22, **UP2**s KBA (80) 11, KBC (17) 18, KBI (62) 5, KDB (42) 14, KMU (8), KMV (41), KNP (27), NA YS 23, **UQ2**s AB (20) 21, AN (2) 21, CC (18) 20, KAE (30) 18, KEO (47) 13, KAX PP (6), PY (13), PZ (8), **UR2**s FU 17, HX (9), JW (75), KAD (15), LO (19) 6, **UT5**s BP 21, HP (53), KCU (41), KDP (25) KKM (47) 18, LF (34), MD (27) 2, QE (81) 21, SY (40), UV (16) 19, XB (21) 15, XJ (18),

UVs 9CU (17) 14, 9CU 9DI (28), 9DR (13), 9KAG (21) 13, 9UA (45), ØAB 12, ØJZ, **UWs** 9AI (11), 9ER (48) 4, 9JF (29), 9JH (29), 9KDH (26), 9PJ (41) 2, 9SA (6), 9VC (20), ØAJ ØAZ (21), ØBA ØBX ØBQ (24) 23, ØFL (30) 11, ØIF (2) 3, ØIG (20) 6, ØOU ØTB (16), ØTH (50), **UY5s** EI (30), IU QE (45), TE (8), UU UW (5), XH (46), ZH (26), **VEs** 8RX 8YO (36) 15, 8YX 8ZZ ØMD (25) 1, **VKs** 6HJ (80) 13, 6IZ (30) 23-0, 6OV (10) 11, 6RU 16, 6SA (72) 0, 6US (28) 18, 7OM (32), 7SM (47), 8HA (49) 21, 9KS 9TG (14) 11, 9XI, **VO1s** AF DU (22) 16, JF 1, **VPs** 2AZ (60), 2DAJ (45) 2, 2DAP (26) 2, 2GBR (15) 21, 2GLE (43), 2MK (80) 23, 2MO (30) 4, 2VW (2) 19, 7EB (69) 23, 7NF (15) 21, 7NP (20) 22, 8BJ (29) 0, 8DJ (10) 13, 8HO (67) 22, 9B 9BK (5) 1, 9EC 9FC 9GD 9GG (45) 3, 9GI 23, 9WB (14) 23, **VQs** 8CC 8CJ (70) 2, 8CF (41) 14, 9B 9MK (50) 18, **VR4**CR, **VSs** 5PH (10) 10, 6AA (25) 14, 6AE 6AF 6FX (36) 15, 6WR (50) 15, **VU2s** CP (58) 18, GGB (22) 15, GW (35) 13, JA (65) 0-1, JN (40) 1, KQZ LE (51) 2, LN (40) 13, LO MD (49) 13-14, NO (31), OLK (54) 15, QQ (55) 18, QV (65) 1, RQ (27), SL 18, SN 1, VZ (41) 1, WP (26) 16, **XEs** 1AAG (3) 23, 1AX 1BN (80) 3, 1CE (4) 7, 1DDM (78) 4, 1RM (12) 21, 1TQ (30) 23, 1YX (10) 14, 2AAG (14) 18, 2CCI 2SSL ØDUS ØGEN 17, **XP1**AA (14), **XW8s** BP (26) 12, CD (10) 17, CR (50) 0-1, CS (40) 1, **YAs** ICW (44) 20-0, 2HWI (31) 3, **YN1s** AA (13) 12, CM (17) 23, CW (20) 21, RMP (27) 3, **YOs** 2ABW 2AFB (20), 2BC (17) 17, 2KAO 3RF (27), 4CT (47) 0, 8KAE 9EM 6, **YSs** 1AG (14), 2RC (33), YUs galore, **YVs** 1ACH (72), 1KA 1ZE (38) 12, 2LL 4AQ (58), 4OY 4SA (20), 5ANT 5BFQ 5BNR 5CL, **ZB2s** A (25) 22, AZ BG (15), **ZC4**JH (6) 8, **ZDs** 5-M (37) 16-19, **5X** (17) 13, 7DI (37) 1, 7GS **8J** (41) 22-23, 8JW (15) 21, 8Z (30) 23-1, 9BK (18) 19, **ZEs** 1AE 1BF 18-19, 1BH 1BT (44) 19, 1CY (58), 1DG 2JS (44) 19, 2KV 3JO (21), 3JX 8JJ (63) 21, 8JN (35) 20, **ZP5s** CE (30) 22, KA (75) 23, OQ (30) 0, **ZS3s** AW (10) 20, E LU (10) 21, XO 21, XQ (78), **3A2**MJC, **3V8**VA (15), **4S7s** AB (40) 13, EC (39) 18, NE (34) 2, **4U1**ITU (40) 16, **4W1**ADO (15) 16, **4X4s** BG (35) 1, FU (62) 5, HD WN (40) 0, **4Z4**BG (30) 2, **5As** 1TA (20) 18, 1TY (75) 7, 2TQ (14) 18, 2TV (5) 13-14, 3TW 9, **5H3s** KJ (41) 20, LV (59) 18-19, **5N2**AAK (7) 18, **5R8s** AM (74) 3, BB **5U7**AK, **5W1**AR, **5Z4s** LS (8) 1, LW (46) 1, **6W8s** AW (30) 21, BL (38) 20, DQ (39) 22, DY XX (40) 23, **6Y5s** SR (25) 22, UC (43) 0, **7P8s** AB (40) 19, AR (48) 19, **7Q7s** AM (24) 17, GB, **7Xs** 2AI (21) 21, 2FO (48) 18, ØWW, **7Z3**AB (35) 14, **8P6s** AE (30) 22, AG (30) 23, AO (25) 0, AU (31) 0, AY (50), BU (13) 21, BX (44) 22, CF (42) 21, **8QA**LK, **8R1s** J (10) 21, H, **9E3**USA (10) 15, **9F3**USA (10) 15, **9G1s** FN (10) 8, GM (85) 20, **9H1**BL (15) 23, **9J2s** AB IE (75) 4, MX 21, RA (36) 18, WR (8) 19, **9K2s** BJ BV (26) 19-20, **9M2s** LN (61) 10, ON (19) 13, US (44) 23, **9Q5s** FH (44) 0, SS, **9Z5s** AB CR, **9V1s** LK OC (21) 10, OJ (54) 13, OK 23, ON OS (39) 1, OT (22) 13, PA (35) 15, PF (35) 16, PI and **9Y4**DS (30) 3. Fishin's fine!

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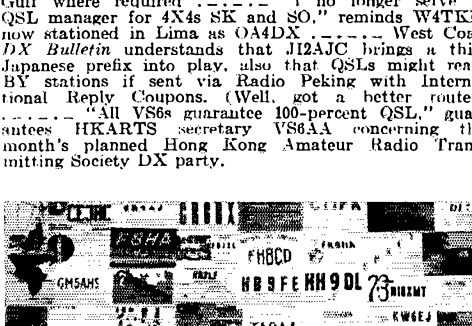
Next month we'll check another band or more thanks to dispatches from (15 phone) **Ws** 2DY 2LJF 2VOZ 3HNK 4UF 4YOK 5BZK 8BQV 8YGR, **Ks** 5YUR 6TWT, **WAs** 1IDP 2BHJ 9MQI 9SQY 9TFM 9URY, **WB2**DZZ, P. Kilroy, B. Tindall: (15 c.w.) **Ws** 1BGD/2 1EGM 2LJF 3BBO 3HMR 3HNK 4YOK 7BE 8BQV 8YGR, **Ks** 5MHG/6 5YUR 9EUZ, **WAs** 1FHU 1JKZ 1KEX 2APG 2DQE 2FOR 3GVP 3JRY 5SOX 7BOA 8VBY 8YXE, **WBs** 2DZZ 2RNL 2UOO 4IGL, **WNs** 2DRS 2FEL 2GMC 9WLF 9ZRV ØWEP, I1ER, **VE7-**BST. B. Tindall; (10 phone) **Ws** 1EGM 2VOZ 3HNK 4UF 4YOK 5OJZ 8BQV 8YGR, **Ks** 1HDO 5YUR, **WAs** 8MCQ 8YXE 9TFM, **WB2**DZZ; (10 c.w.) **W** 3HNK 4YOK 7BE 8BQV 8YGR, **Ks** 1HDO 3CU 3UXY 5YUR ØGVA, **WAs** 1FHU 1JKZ 3ATX 5PPZ **WB2s** RNL UOO, I1ER; (40 c.w.) **Ws** 1ARR 3HN 4YOK 7BE 8YGR, Ks 8DHT 9SRR/2 9YRA ØGVA **WAs** 1FHU 2FOR 5SOX 7BOA 8MCQ, **WB4**GT **VE3**GHO; (40 phone) **W8**YGR, **WA8**MCQ, P. Kilroy (80 c.w.) **Ws** 1BGD/2 1SWX 7BE, **K8**DHT, **WAs** 1FH 2DQE 2FOR 8MCQ: (75 phone) **WAs** 8MCQ 9SQY, P. Kilroy; (160) **Ws** 1BB 2RAA, **K8**DHT, **WA1**FHU (20 phone) **Ws** 2VOZ 3HNK 8YGR, **WAs** 1JMR 5PP 8YXE, I1CTL and Mr. Kilroy. Indications are tha W1BB has passed the 1.8-MHz. 100-mark by a com fortable margin now. If Stew can do it all over agai in a hurry he'll have a dandy start on 5B-DXCC!

Where:

OCEANIA—Cocos-Keeling newcomer VK9KY's QS chores are undertaken by VK2SG. The latter re marks, "As mail service to Cocos island is once ever three weeks there might be some delay in delivery c cards, but it is hoped that this will be kept to minimum. The usual arrangements will apply—self addressed envelopes and five International Reply Cou pons will receive answer by air, less than five IRC will be answered by surface mail, and no IRCs v bureaus if credit permits." . . . . . Everybody's bee looking for VK7KJ's address re VKØKJ QSLs. T VK7ZKJ . . . . . According to West Coast *DX Bulle tin* it complicates things for QSL manager VE6A when you ship him more than one QSL per envelop also that adding "via Darwin, Australia" can spe your direct mail to CR8 amateurs . . . . . FO8A hunts a French-speaking VE2 for on-the-air emc and QSL managerial duties, says *DX News-Sheet*.

EUROPE—International Short Wave League's *Mon tor* somewhat clarifies HV3SJ QSL confusio Cards from stations in (1) Europe, Africa and Asia direct or via the Italian bureau; (2) in "the Americ continent" go via WB2ETI; and (3) U.S. and Can dian west coast go via W6KNH when the latter acts HV3SJ's net control during QSOs . . . . . Ex-DL4Z advises, "QSLs for contacts made with DL4ZS fro May, 1968, to March of '69 can be obtained by sendi cards to Capt. P. R. McKeeby, WB4IGX, Tucke Trailer Ct., Lot 19, Radcliff, Ky." . . . . . SV0S (WB2AWQ) writes, "I previously held the call KG4D Anyone still needing my Guantanamo QSL please patient. I'm still working on them between W/K/V pile-ups."

ASIA—"QSLs for *all* EP stations may be sent dire to *Callbook* addresses or via the Amateur Rad Society of Iran QSL bureau," assures EP2CB (WA GZZ) . . . . . "Effective January 25, 1969, DL7FT b came my QSL manager," notifies KR6JT. "Franz r ceives my logs monthly." . . . . . K6CAG/1 points o that the term Arabian Gulf is in disfavor in certa mid-east areas. For higher QSL returns use Persi Gulf where required . . . . . "I no longer serve QSL manager for 4X4s SK and SO," reminds W4TK now stationed in Lima as OA4DX . . . . . West Co *DX Bulletin* understands that JI2AJC brings a thi Japanese prefix into play, also that QSLs might rea BY stations if sent via Radio Peking with Intern tional Reply Coupons. (Well, got a better route . . . . . "All VS6s guarantee 100-percent QSL," gua antees HKARTS secretary VS6AA concerning t month's planned Hong Kong Amateur Radio Tran mitting Society DX party.



HB9AAA files a photo of QSLs confirming QSOs with ARRL DX Century Club members in 100 or more countries, most of them visible here. It's "DXCC-squared" No. 59 and the second from Switzerland after HB9J. No, this isn't an "award", just a little game some of the lads have enjoyed playing for more than a decade. How many of these pretties are on your wall?

AFRICA—3V8AC tells W1WQC he had to leave 9Q5CZ hurriedly sans logs, hence Bob can't confirm his Congo QSOs . . . . . Ws 2FAR 3BOQ 3EVW 3TV 5LLB 6CBP 6GP, Ks 2KUR 4THA 5HTM 6VW 9COS, WA8s DXA and QIY may have 7Q7AM QSLs awaiting arrival of self-addressed stamped envelopes at WB2JBJ . . . . . ZS2OB tells WA3ATX she has only 68 pasteboards to show for 600 QSLs sent Stateside. Fellas! . . . . . West Coast *DX Bulletin* has it that the Liberian field day label, 5L, is being used to commemorate the 25th anniversary of President Tubman's office. Suffixes remain unchanged in most cases; 5L8J equals EL8J, for example . . . . . Geoff Watts's *DX News-Sheet* gives Michael Dort, F2MO, Maison Heldu, 64 St. Pierre d'Irube, Basses-Pyrenees, France, as FB8XX's QSL address for QSOs after January 6, 1969. FR7ZD holds earlier logs of former FB8XX operator Maurice. FB8ZZ now has his confirmations handled by F3LO and/or F8US . . . . . The same organ hears that ZS6N shoots ZS1ANT's antarctic QSLs out via bureaus after receiving log transcripts on the air . . . . . For impressive QSL of the Month K4RON nominates the three-dimensional artpiece of ZS6AYI . . . . . CR6GO, not a member of his local radio society, tells W5BZK he wants his QSLs via England's RSGB. All DXers should keep in mind that some overseas societies relay QSLs on a members-only basis. QSL via the ZZ bureau only if ZZ1A tells you to.

HEREABOUTS—"I'm QSL manager for HR2HHP as of February 27, 1969," declares WA9RAT . . . . . "I signed VP2MJ for ten days in February of '65," recalls K3HGX in lines to W1SWX. "Now I'm receiving QSLs for some operator named Monty using that call." Somebody digging obsolete QTH data from old DX notes? . . . . . Failure to include s.a.s.e., or s.a.e. plus IRCs if appropriate, will slow your VP2VY reply to a crawl, says W3HNK in behalf of the former . . . . . "I find Russians and Africans the hardest to get QSLs out of," reports K3AC, making a DX comeback. "I'm beginning to catch on again with a 90/50 worked/confirmed total. To me QSLing is the final courtesy of a QSO, and when a guy puts a price on his card I don't want it, even if he should be on the moon's backside." Amen, brother Mac . . . . . West Coast *DX Bulletin* comments, "Some countries do not honor International Reply Coupons but amateurs in those countries will accept them for trading purposes. In other countries where IRCs are supposed to be good there sometimes is difficulty due to unfamiliarity at local post office levels." . . . . . W3DJZ observes that VP8s HZ IA JB and JC have G3NMH handling QSLs for British QSOs only. Others should go direct . . . . . VK3APN, in Long Island DX Association's *DX Bulletin*, claims that KV4CI does so QSL in response to s.a.s.e. . . . . Ws 1SWX 3BBO 3KJ 5IB, K1HDO, WAs 1JKZ 2BHJ 8YXE 9SQY and listener P. Kilroy nominate our "QSLers of the Month" this time, namely CRs 6ML 7IX, CT2AC, EL2AS, F8DP, FY7YK, G3s SM VJI/8R1, HG5GG, HKØTU, HV3SJ, KH6-GPM, KJ6CD, KS6CX, KV4EY, LX1DT, PZ1AV, SMØCBC, SVØWM, TA2E, TG9CD, TI2NA, UV3-ADG, VE7BYG, VP2VY, W7HST/8R1, XE1WS, YN1-GLB, YV5CCX, 8P6AE, 9J2XZ, 9K2CF, 9L1AC, 9Y4s DS PHO and RS, plus QSL aides W5HM, Ks 4ADU 9CSM 9KLR, WB2ETI, VE3s ABG EUU IG and DJ1-QP, all specifically commended for QSL promptitude bevond the call of duty. Any fast fellers in *your* file lately? . . . . . 'Elp! These italicized brethren hunt hints toward prying QSLs from reluctants mentioned: *W8YMB*, VQ9VX; *WA4CZM*, PJØCC; *WA4ZLP*, 8QAYL; *WA5PPZ*, CN8NF, FP8s CY DZ, JX2BH, KP4DDB, VEØMB; *WB2IBJ*, 3V8RG; *WB4IGL*, EL2BJ and 9Y4KK. Ideers? . . . . . QSL managerial service for DX ops in need is offered by WAs 1JMR 8YXE 9SQY, WBs 2RLK 6YNK and WN6QQE . . . . . Good supply of individual suggestions this month but remember that each datum is necessarily neither "official," complete nor accurate. . . .

AP5CP, Tiger ARC, Dacca Signals, Dacca 6, E. Pakistan
EA8GM, Box 860, Las Palmas, Canary Islands
EIØ1s SI SR (via IRTS)
EL2AS, Box 1529, Monrovia, Liberia
FC6ABT, B P. 44, Ile Rousse, Corsica
FM7WR, Box 287, Fort de France, Martinique
HA8KUX, Radio Club, Vorosmarty utca 1, Jaszszentlaszlo, Hungary
HC1TH, Box 583, Quito, Ecuador
HR2RRD, Aptdo. 112, San Pedro Sula, Honduras
IS1BDO, T. Barraccin, P.O. Box 2, Oristano, Sardinia
JX4XM, c/o Norwegian Embassy, Reykjavik, Iceland
ex-KA2TP, T. Paul, W2BTQ/4, 10108 Glenmere Rd., Fairfax, Va., 22030
ex-KA7RF, R. Follett, WA7FCU, 1101 N. 12th., Apt. 7, Tacoma, Wash., 98403
KC6CS, M. Bennett, c/o Peace Corps, Truk, Carolines, 96942
OA4DX, C. Bethel, jr., (W4TKN), Aptdo 6, Manuel Bonilla 125, Miraflores, Lima, Peru
OK1AOW, V. Zdenek, Stod, J. Fucika 596/23, Czechoslovakia
PI1LS/mm (via PAØWSS)
PX1s JB PY (to F5JB)
PYØBLR, D. de Barros, PY4BLR, P.O. Box 2590, Belo Horizonte, Brazil
SM5WL/OY, H. Akesson, Vitmaragatan 2, Vaesteras, Sweden
TA2E, c/o Box 35, Station S, Toronto 20, Ontario, Canada
TI2EVA, Box 2817, San Jose, C.R.
TJ1AT, Box 173, Garoua, Cameroon
TT8AF, J. Fremont (F2HF), P.O. Box 444, Ft. Lamy, Chad
VKØWR, KC4USF Opns. Ofcr., USCG Cutter *South Wind*, FPO, New York, N.Y., 09501
VP2GRN, c/o P.O. Box 1909, Hendersonville, N.C.
VP8s KI KM, Port Stanley, Falkland Islands
W7HST/8R1, O. Moellmer, M.D., Peace Corps, P.O. Box 337, Georgetown, B.G.
WA1DYR/mm (to WA1DYR)
WA4DMC/mm, USS *America* (CVA-66), FPO, New York, N.Y., 09501
WA4DOU/mm, USS *Charles R. Ware* (DD-865), FPO, New York, N.Y., 09501
WB2TFH/VO1, RM2 G. Hall, USCG Radio Station, Box 49, FPO, New York, N.Y., 09597
WB4JSV/KS6 (to WB4JSV)
YA1EXZ, C. Green, USAID-SIU, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1GNT, E. Popko, Pan-American P.O. Box 76, Kabul, Afghanistan
YA1YB, W. Baldwin, USET/USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1ZA, G. Craig, R. Nathan Associates, USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YA1ZC, J. Wallace, U.S. Eng. Team, USAID, U.S. Embassy Mail Rm., Kabul, Afghanistan
YBØAAC, c/o U.S. Embassy, APO, San Francisco, Calif., 96356
YO7NA, C. Cristea, P.O. Box 108, Craiova 1, Roumania
ZS1s AMB ANT (via SARL)
ZS3HF, Box 5011, Windhoek, Southwest Africa
3V8AC, Box 323, Tunis, Tunisia
4X4s SK SO (see text)
5A4TY, Sgt. W. Maxwell (WA2ETP), Box 2634, APO, New York, N.Y., 09231 (or via W2DU)
6W/W4BPD (via W4ECI)
9G1YG, P.O. Box 1639, Accra, Ghana
9J2BR, Box 1186, Lusaka, Zambia
9Y4CR, Box 1083, Trinidad
9Y4DX, P.O. Box 4187, Patrick AFB, Fla.
9Y4RP, P.O. Box 862, Port of Spain, Trinidad
CO2KG (via FRC)
CR6BX (via CT1REP)
CR6GO (via RSGB)
ex-DL4ZS (see text)
DU1DBT (via I1CTL)
EA8AU (via DJ2VJ)
EL8J (via LA6OJ)
F3KW (via WB2QXX)
FØJP (via DL8FR)
FB8XX (see text)
GB2NI (via G3UGF)
GB3NEW (via GW3VKL)
GC3UJE (via RSGB)
HI8RXM (via WA2RSX)
HL9UX (to KØLCB)
HR2HHP (via WA9RAT)
HS3RB (via DL7FT)
JX5CI (via W2CTN)
KC6BW (via WA3HUP)
ex-KG4DF (see text)
KG6ARQ (via WA8DBI)
KR6JT (via DL7FT)
MP4TAF (via DL6AA)
MP4TJK (to DL7JK)
OX3MB (via OZ6MI)
SVØDD (via WN1JMH)
SVØSV (via VE3GCO)
TI2CAP (via YV4QG)
VK9KY (via VK2SG)
VKØKJ (to VK7ZKJ)
VP2DAR (to W7PHO)
VP2MJ (see text)
VP8KF (via G3LDA)
YA1YL (to DJ9DK)
ZF1WP (to W4YKH)
ZS2MI (via ZS6OB)
ZS3BS (via WB2RLK)
5R8AO (via GI3PLL)
5R8CJ (to WAØRZB)
5W1AS (via WB6KBK)
6YØA (to 6Y5CB)
7X2AI (via ARA)
9H1BL (via G3VPS)
9Q5JV (via DL8MZ)

Samaritans **Ws** 1ARR 1SWX 1WQC 2DY 2VOZ 3BBO 3DJZ 3KJ 5BZK 5IB 8YGR, **Ks** 3CUI 3UXY 4KI 8DHT 8RXD 9EUZ, **WAs** 1FHU 2BHJ 5PPZ 8YXE 9SQY, **WBs** 2AWQ 4IGL, **VE3**ABG, **VK2**SG, P. Kilroy, R. Ettysnitch, Canadian DX Association *Long Skip* (VE3HJ), Columbus Amateur Radio Association *CARA-scope* (W8ZCQ), DARC's DX-MB (DL3RK), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (K4GRD), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1-DM), Long Island DX Association *DX Bulletin* (W2-GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N.Y., 12020), Northern California DX Club *DXer* (Box 608, Menlo Park,

Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB), VERON's *DXpress* (PAØs FX LOU TO VDV WWP) and last, but by no means least, West Coast *DX Bulletin* (WA6AUD) supplied most of the foregoing information as well as much of the material to follow.

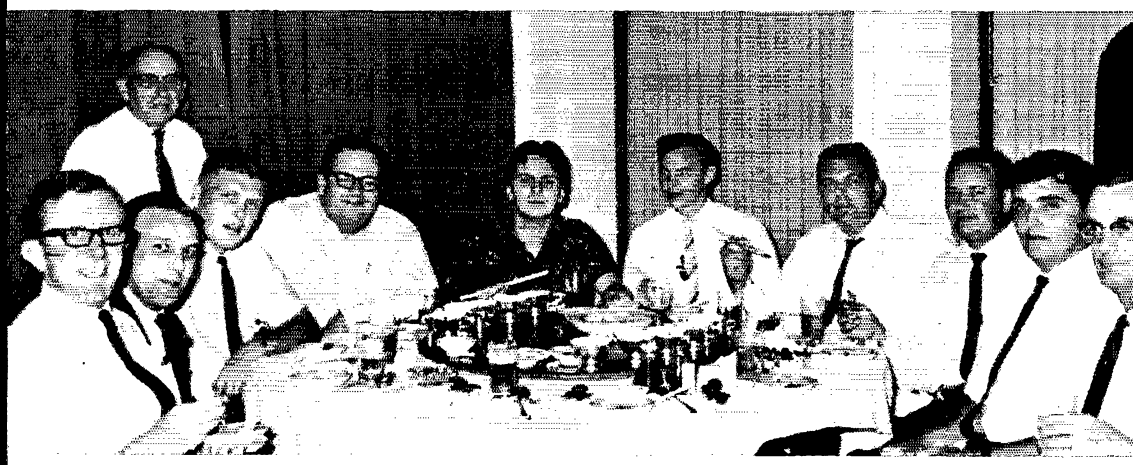
Whence:

ASIA—Got your Firecracker award? Hong Kong Amateur Radio Transmitting Society, VS6AA secretary, announces a special opportunity to attain same from 1000 GMT on the 17th of this month to 1000 the 18th when the HKARTS gang will take to the airwaves in force. S.s.b. enthusiasts VS6s AL BS CO DR EF and EK will concentrate 170, 270 and 370 kHz. above lower 20-, 15- and 10-meter band edges; c.w. fans VS6s AA AF BA DL FV and FX may be found about 25, 50 and 75 kHz. inside each h.f. band. Suggestions for schedules at other times will be welcomed by HKARTS at P.O. Box 541, Hong Kong . . . . "It's a great feeling to be on the far end of the pile-ups!" exclaims KØLCB, now signing HL9UX. "My first session of operation netted almost 100 DX stations." . . . . Hmm-mm—according to a New York *Times* dispatch forwarded by W8IBX/2, "An agreement between Sheik Rashid bin Said of Dibai and Sheik Zaid bin Sultan of Abu Dhabi, signed February 18, 1969, was brought about by the mediation of Sheik Ahmed bin Thani of Qatar. It established a neutral zone a kilometer wide and 18 kilometers long between the two states." . . . . "TA2E is active on c.w. using 3527, 7001, 14.030, 21,027 and 28,005 kHz.," specifies VE3ABG. "Haci is polite but has been annoyed by *fellows who practically demand an immediate* QSO on another band even though conditions may be very good on the frequency being used." Easy on those 5B-DXCC pressures, men . . . . "UI8IZ, on 14,028 kHz., switched to a one-watt 14,083-kHz. rig and was still RST 549," testifies K3UXY. "Juri is very happy with his QRP results." . . . . EP2CB writes, "Iran stations are active on all bands with 20 meters the ruling favorite. Several EPs can be found nightly around 14,225 and 14,235 kHz. at 1230-1830 GMT. During the past few months 20 has been best around 1330 on long path to North America." . . . . Far East addenda courtesy literature of aforementioned clubs and groups: TA1RF, with three paralleled 807s, a dipole and 51S-3, likes 14,205, 14,213, 14,245 or 21,355 kHz. at 1300-1645 GMT. Nar plans a bigger linear. . . . Somebody beat XW8AX to 80 c.w. with his own call but the real one should be on there soon. . . . KH6IJ will be KA2IJ *again this summer.* . . . JA3AA *skeds KS6CN on 160,* of all bands. . . . Far East Auxiliary Radio League president KA2FL and secretary K3FUR took office in January. New or renewed FEARL memberships are claimed by KAs 2JB (WB6JCX), 2JP (W4FRU), 2PX (WA4PXX), 2RC (WA3ION), 7GD (W2KEQ), 7IY (K9SIY), 7RF (WA7FCU), 8YI (WAØUYD), 9AK (K6KGX-WØUMH), 9CG (WB2JPD), 9EE (WA7-KPN), W6WPB, Ks 1FUW 7GH and WA4FLR of club station KA9MF.

AFRICA—W2DU-W8KHK remarks, "My son W2-ETP is in the USAF at Wheelus Air Base, Tripoli, operating as 5A4TY. Bill is quite active on c.w. and phone in the lower portions of 15 meters after 1500 GMT week days and Saturdays, also beginning 1000 GMT on Sundays. 5A4TY appreciates the fact that he is one of a small number of active Libyan stations and is anxious to help as many as possible make contacts with that country." . . . . W4NQM dates VQ9GA's shutdown as March 21st, a fresh DX assignment pending . . . . "ZS6AYI runs an FL-100B and homebuilt 813 amplifier," finds K4RON. "Gerald works 20 sideband at 0300-0500 regularly." . . . . "February 14th was 3V8AC's first day on the air," comments W1WQC. "Bob expects to be active in Tunisia for about a year. He runs 100 watts s.s.b. to a ground-plane on 14 MHz. at present but has permission to use 10 and 40 meters." W1WQC noted 3V8AC on 14,213 kHz. at 1800-1900 GMT . . . . More Africa items via the clubs press: 7P8AB hunts Ariz., Miss., Nev., R.I., S. Dak., Utah, Vt., Wyo. and Alaska on 14,250 or 21,300 kHz., Tuesdays and Fridays at 1800-2000 GMT, while neighbors 7P8s AR and YL spread 5B-DXCC cheer on five bands. . . . Ramblin' W4BPD started things off from Dakar and ZD3A using c.w. spots 20 kHz. inside the low band edges, s.s.b. on 3795, 7073, 14,195, 21,395 and 28,495 kHz. . . . ZS1ANT's Queen Maud Land showing should improve with a new HW-100 and TA-33 around 14,150-14,170 kHz. at 1500-1600 GMT or so. ZS1AMB is also thereabouts. . . . Marion islander ZS2MI may have a new op with single-sideband by now if early description of Ron's replacement bears out. . . . W2LGU reportedly mediates for 9U5s CR DS and HT on 21,310 kHz. at 1730 GMT. . . . VQ8CF credits VQ8s AD AP CC CJ and VQ9HB for prime encouragement and assistance toward obtaining his own ham ticket in 1966 after the ham bug first bit him in '63. Jacky affirms that scarcity of electronics gear and components stifles Mauritius hamming.

OCEANIA—"VK9KY will be operating from Cocos (Keeling) for about twelve months," enlightens VK2SG. "Keneth, who works with the ionospheric prediction station on Cocos, is a new operator so it is requested that the boys treat him gently for a start. VK9KY's operating times are not certain but it is *anticipated he will be on at 1000-1400 and 2300-2400* GMT, which times will vary according to conditions, etc. Ken will use 7050, 14,050, 14,150, 14,195, 21,050 and 21,350 kHz., plus or minus QRM. VK9KY's ionospheric

Hong Kong Amateur Radio Transmitting Society's recent dinner meeting produced appearances by (seated, l. to r.) VS6AA, s.w.l. associate Roy, KR6NR, VS6DR, s.w.l. Digger, VS6DX, VS6AL, VS6AB, VS6DO and VS6BE, with VS6EK standing. DX activity by the HKARTS gang always is in outstanding proportion to their limited number. By the way, you're invited to join a special VS6 QSO party this month—see "Whence".



work should enable him to pick the best frequencies and times for distances concerned." . . . . . ZL1AH, formerly G3AH, is understandably drawn to his suffix. John has QSLs from his "AH cousins" bearing prefixes CO7 CR9 DL7 FK8 FO8 FP8 F7 F8 G8 HA5 HK3 JA1 JA3 JA4 JA8 KM6 KR6 KX6 LU5 OH3 PZ1 UA3 UAØ UD6 UH8 UQ2 UW3 VS9 W1 W2 W4 W7 YV2 XW8 ZB1 4X4 and 7XØ. AH, so! . . . . . "Outstanding hospitality was received from ZL1KG, VKs 3TE 4DV 4OF 4ZW and other amateurs during our vacation down under," acknowledges K6PHT who made the trip with son WB6WFP, wife and daughter . . . . . "Our FW8DY DXpedition with VE6AJT went off as planned," recounts KH6GLU. "We began operation February 2nd just in time to pass out a hundred contest QSOs on 10 meters. Two thousand QSOs later, February 8th, we packed up and departed Wallis. FW8DY used Yaesu and Swan rigs with external v.f.o., a Zeus generator, a TA-33 jr. and dipoles for 40 and 80." . . . . . IICTL finds his QSL client DU1DBT available week ends around 14,106 kHz. from 1500 to 1700 GMT . . . . . Pacific potpourri from publications of DX clubs and groups: Heard island's rarity may go the way of Easter if rumors of a tracking-station installation pan out. Meanwhile hit-and-run activities like W7ZFY's March VKØWR effort will keep things interesting. . . . VE6AJT hopes to get on with his Manihiki maneuver a.s.a.p. after visiting the home front. Some U.S. sevens may join Don's ZM7 fun. . . . VKØMI is supposed to carry on from Macquarie in the wake of VKØs IA and KJ. . . . ZLs 3ABJ (3803 kHz. at 0800 GMT) and 4AF, in the Chathams and Campbells respectively, are expected to move upward from present 75-meter limitations. . . . . FO8CG (F5PE) signed FB8XX in '65. . . . KW6EJ's QRT and QSY Stateward sacrifices Wake. . . . KX6BQ enjoys a c.w. resurgence near 14,010 kHz. at 1000 GMT while other KX6s continue to concentrate on phone traffic. . . . Christmas VK9s AD DR MV and XI, under VK6RU's guidance, may congregate Mondays on 14,240 kHz. at 1300-1500 GMT. . . . G3NRA brings a KW-2000A, rhombic and long-wire to Tarawa and could be signing his new VR1 tag on 10 through 160 as you scan this copy.

EUROPE—Notes from sunny Italy: "We of the Feltre Radio Club offer a special certification for QSOs since September 15, 1967, with certain numbers of IIs in the Dolomiti zone," announces IICTL. Check with Gianni for Dolomiten Award details. . . . "IIMOL wants me to relay word of Italian DX limitations on 75 and 80 meters," writes WB2OZW. "IIs can use only 3613-3627 kHz. on c.w. and 3647-3667 kHz. on phone." . . . IIAWX says, "After I finish high school here I'll be in Oakland, California, this September hoping to meet many on-the-air friends. I work 15 meters almost daily." . . . IIJZ managed 175 countries though heavily beset by TVI problems. "I suggest 3B-DXCC endorsements along with 5B-DXCC because 100 countries on five bands seems too formidable a goal for too many DXers." . . . . . "Our Region Four (Limerick Radio Club) of the Irish Radio Transmitters Society for many years past has highlighted its activities with annual DXpeditions to some of the many islands on the south coast of Ireland," states EI9AD. "The tradition is being maintained this year by a similar trip to Sherkin, an isle some six miles southeast of Baltimore, Co. Cork. The venture is planned for the week end of May 31st, June 1st and 2nd. We will use the call EIØSI on sideband, a.m. and c.w. from 10 through 160 meters. At the same time we will sign EIØSR from the vessel *Shure Return* on 10 and 40 meters." . . . . . W. Geddes of London's Science Museum says the new GB2SM RTTY exhibit is still popular with visitors. "Our normal demonstration times are Mondays through Fridays at 1030-1100 and 1500-1530 GMT. We welcome reasonably short QSOs during these periods on 3.5 through 28 MHz., and it may also be possible to operate week ends and evenings." . . . . . Math professor YO7NA, also chief op at YO7KAJ, likes the c.w. DX chase on 80, 40 and 10 meters. Cristea tells W1VG he'd like to try s.s.b. but gear is unavailable. Anyone with sideband suggestions for YO7NA can reach him via the address listed in "Where" . . . . . WA1FHU identifies OZ5CK as another fellow ex-HA . . . . . K3CUI observes, "It's sometimes interesting to learn what's behind the other fellow's signal. DL1JT, for example, has a 15-watt c.w./10-watt phone transmitter once used in a Panzer tank." . . . . . A social note from ex-YO2BO discloses that HB9TE's daughter vacationed pleasantly in the Bahamas with VP7NQ's family, the happy result of a chance DX contact . . . . . DL4ZS (WB4IGX) departs Germany for Stateside leave and then a year in Vietnam. "I'll sadly miss my ham radio." . . . . . "We use 700 watts and a TH-6 on 20- or 10-meter s.s.b. and c.w.," describes SVØSV (WB2AWQ), operating from Makri with SVØs DD and WH. "The evening pile-ups from the States are terrific but W/Ks are very cooperative and we manage to work a lot of them with minimal interference. Earlier in the day we do well into Asia and Africa." . . . . . WA9SQY ran into F5GV's ham family. "Chief op Gerard likes 15 c.w. 'where the Russians aren't so strong', 2nd op son Serge works both phone and c.w., and 3rd op son Alain is a bug for v.h.f." . . . . . DL7FT, YU3TXT and others diligently strive for Albanian DXpeditionary credentials . . . . . SVØWE still offers Rhodes on week ends, 28,650 kHz. at 1300 GMT.

SOUTH AMERICA—"W7HST/8R1 is with the Peace Corps," notes W3BBO, "using a TR-4 and 4BDQ on 21,070-kHz. c.w. around 0100 GMT." . . . . . From W3HNK: "PZ1CF is back on the air after clearing up rig problems. He goes back to the States shortly." . . . . . "I'm working as a telecommunications consultant to the Peruvian government," explains W4TKN, now greeting DX friends as OA4DX . . . . . More from the south through club newshawks: Volcanic outbursts in the Deception area may curtail South Shetlands VP8 possibilities. . . . YV1YC can put you in line for a 21,200-kHz. HC8RS contact at 1300 GMT or so. . . . PYØEP kept doing his spring Trindade thing, 20 c.w. preferred. . . . The HKØTU combine was worked by some 5B-DXCC fans on five or six bands apiece during the hectic February 23rd-26th invasion of Malpelo isle. Nigh impossible docking, voracious ants, birds, crabs, treacherous topography, high winds and a few injuries plagued the operation, plus the rock's well known westward radiation shortcomings. QSOs from the moon should be easier.

HEREABOUTS—"I'll be signing ZF1WP sometime between mid-April and May 10," confirms W4-YKH who signed ZF1CP down that way last year. "My operation will be primarily on 15- and 40-meter s.s.b. with an SBE-34 and TA-32." . . . . . "Four days before the ARRL Test a snowstorm destroyed my vertical and heavily damaged my beam," bemoans WA1FHU. W1BB lost his big 160-meter weapon around the same time. 'Twas a rugged winter for our coastal DX men . . . . . "I don't have a ham ticket yet but hope to take the exam soon," writes s.w.l. Bruce Tindall, enjoyable practicing his code on 21-Mhz. DX with a Zenith Transoceanic . . . . . "I work ten phone exclusively with a 150-watt HT-46," comments W5OJZ. "The way DX has been calling *me* lately makes me wonder where all the competition went." K1HDO seconds the motion for 10-meter straight-a.m. with a fast 99/72 record on 80 watts and a 4-element spinner . . . . . WA2RSX says HI8RXM is a Baptist missionary at Santo Domingo, and K9SRR/2, just returning to the "How's" team after college absence, is an assistant Methodist minister in New Jersey . . . . . "I'm with the Coast Guard in Newfoundland," reveals WB2TFH/VO1, busy with an SR-500 and dipole on 20 c.w. . . . . W2DY claims a 158/146 worked/confirmed total since the sideband bug first nipped him three years ago . . . . . "Adak island is well represented DXwise by KL7s AIZ GOM, W6IBU/KL7, WA5WNM/KL7, WB2OIF/KL7 and myself," writes WA2ZOF/KL7. "Club station KL7AIZ can be worked almost daily on 21,310 kHz. at 2300-0100 GMT. We like to hook Europeans and Africans over the pole around 1900 GMT." . . . . . "An Advanced ticket sure helps the DX total," avers WA8VXE . . . . . "Back in the DX game after several rag-chewing years," reports WB4IGL, formerly W9FLH, having a gay old time on 15 c.w. . . . . K3UXY gloats, "Moved to Pennsylvania's hills from Maryland and now have a location with fine ground conductivity, high water table and a clear shot in all directions." . . . . . WB2OZW figures, "5B-DXCC will only load the overloaded bureaus still more. Why not start all over with DXCC, count only real countries and real 15-minute-or-longer QSOs?" . . . . . W3KJ suggests that contest exchanges from DX stations include name of country rather than power input as an added helpful identification factor in pile-ups. Guys in Peru would have too much advantage over those in Afghanistan, perhaps—how about just the *prefix* in lieu of power? . . . . . "Too many good c.w. men have gone from clean bug sending to bad keyer sending," opines K3AC. "It's pitiful to hear 'em trying to get their own calls right." . . . . . W3-HNK warns, "KV4EY-VP2VY plans trips to other spots including possible VP2K work." . . . . . Florida DX Club stalwarts hang out on 7230 kHz. at 10 A.M local time of a Sunday . . . . . A few fat Five-Band-DXCC scores we've heard of at this writing include (80 through 10 meters) W8GZ 47/77/100/100/100. W6-ANN 38/71/100/97/100. W6NJU 38/66/100/99/81 and K6-KA 25/71/96/100/62. QSL managers and printers, battle stations!

QST

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* K4AYO

World's 144-MHz. DX Record

New Zealand to Sweden

THERE is a new DX record on 144 MHz. — and for the first time a U.S. station is not involved. John Morgan, ZL1AZR, of near Auckland, New Zealand, and Kjell Rasmusson, SM7BAE of Nordana, in southern Sweden, turned the trick using moonbounce (e.m.e.) and c.w. on March 4, 1969. The distance appears to be 11,055 miles, subject to a slight adjustment when the coordinates are available. The previous record, 10,417 miles, was set by VK3ATN and K2MWA/2 in November, 1966.

For ZL1AZR the contact was his first on e.m.e. John had previously run schedules with K9MQS and K6MYC, and while close to a successful contact on several occasions, had lacked completing a contact to the satisfaction of the parties involved. ZL1AZR developed his e.m.e. station working essentially alone, except for the stateside assistance of K6MYC. John's grounded-grid final delivers a measured 520 watts to an array of six 8-over-8 J-slot Yagis.

SM7BAE has worked on his e.m.e. station for about one year and had four previous e.m.e. contacts with K6MYC. Kjell's station includes the Swedish maximum input power of 1500 watts and an array of sixteen 10-element Yagis stacked four wide and four high. K6MYC has also assisted Kjell.

ZL1AZR and SM7BAE began their schedules on March 3. Signals were heard both ways. However, because of the distance between the stations, there was limited available moon-time; that is the amount of time while both stations can see the moon. In e.m.e. the actual earth distance between stations means nothing, as long as the moon can be seen from both locations. On March 4, the contact was made quickly with good signals each way. I have heard the audio tape of SM7BAE's signal, as received in New Zealand—no doubt about it, the signals were very good!

Not only is the ZL1AZR — SM7BAE contact a new world DX record for 144 MHz. and the first e.m.e. record not involving a U.S. station, the contact is also the first e.m.e. two-way with a U.S. station not on at least one end. That record is going to be difficult to return to the U.S., if for no other reason than geographical. Where do you look for an e.m.e. prospect mor than 11,000 miles from this country?

I'm sure there will be satisfaction that th record is now held by two operators using entirel amateur-constructed stations. The previou record, between VK3ATN and K2MWA/2, ha involved a commercial-type antenna on the U.S end. One of the operators of K2MWA, Dic Turrin, W2IMU, wrote three months ago sug gesting that I consider the VK3ATN—KØIJJ 9405-mile contact in February, 1968, as th record. Dick reasoned this would remove th commercial stigma from the record, but still leav one end of the record with VK3ATN. I had no made a decision on Dick's suggestion, not bein sure that a record should be adjusted to fit th situation. Now ZL1AZR and SM7BAE hav made the decision for us, and I'm certain a parties concerned are pleased that it was strictl amateur.

Congratulations to both John and Kjell!

Swan 250 Notes

The Swan 250 is perhaps the most popula piece of commercial equipment available for 5 MHz. However, tuning the transmitter gives man operators trouble, as attested to by listening t comments heard on the band. For that reason here are s.s.b. mode tuning suggestions permittin maximum output with minimum carrier.

The shack of W9NAU with Al seated in front of camer while in duplex TV-to-TV contact with W9VRV. See Operat ing News section for further details.

* Send reports and correspondence to Bill Smith K4AYO, ARRL, 225 Main St., Newington, Conn. 06111.

Turn the set on and allow the tubes to heat for about 2 minutes. While waiting for the tubes to heat, *READ* the transmitter tuning instructions in the 250 manual. Under *Transmitter Tuning*, step 5, note that the manual says *move the meter switch to the* OUTPUT *position*. Be sure to do this after the manual's steps 1 through 4 have been properly completed. In step 8 the manual says *move the meter switch to* CATH *position in order to observe PA cathode current*. The manual says the proper loading is achieved when the current reads 200 to 250 ma. But don't worry if it reads as high as 300 ma. You will not damage the tubes, if your antenna system s.w.r. is proper. Note the manual *DOES NOT* say to retune the transmitter while reading cathode current. DO NOT tune the transmitter while reading cathode current. This is where many Swan 250 owners get into trouble blowing fuses and 6146Bs. Tune the transmitter *only* with the meter switch in the OUTPUT position and adjust the p.a. plate, load and grid controls for *maximum* output indication on the 250 meter.

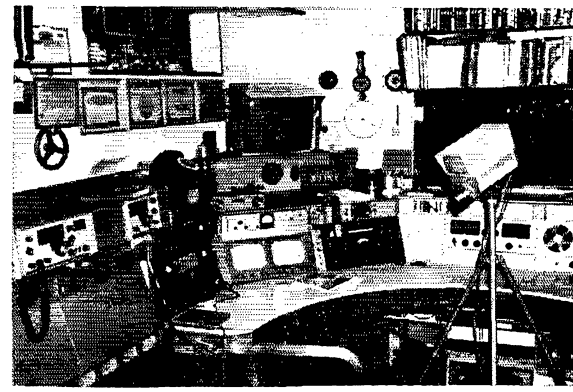
The Swan 250 series transmitter, or any other transmitter, may be tuned by observing forward power on a wattmeter or s.w.r. meter. The initial cost of a good wattmeter may seem high but one is a worthwhile investment. Commercial meters are available for $80 and up. It is reassuring to know your transmitter power output, and the meter also shows how much power is being reflected due to improper antenna matching. Wattmeters provide also a means of observing transmitter operation. Voltage and output problems may quickly be detected.

The Swan 250 transmitter may be peaked for maximum output by placing the REC TUNE CW switch in the TUNE CW position and reading forward power on the wattmeter. Except for proper adjustment of the bias voltage, the Swan's meter may be disregarded. Adjust the PA PLATE, PA LOAD and PA GRID controls for maximum output on the wattmeter. The controls interact, so adjustment of one will affect the others. Each should be peaked for maximum output. Properly tuned, the Swan will give 110 to 140 watts output.

An s.w.r. meter reading *relative* forward power may also be used. Set the pot control so the s.w.r. meter reads about one-third scale with the Swan's REC TUNE CW switch in the TUNE CW position. The tuning procedure is same as with the wattmeter.

Many Swan 250 operators have difficulty nulling the carrier from the s.s.b. signal. This may be done three ways. The REC TUNE CW switch is placed in the normal REC position for each example. If you have a wattmeter, set it to read forward power on its lowest wattage range. Depress the microphone button and adjust the CAR BAL (carrier balance) control for minimum reading. If you are using an s.w.r. meter, set it to read forward power and advance the pot control fully clockwise. Depress the microphone button and adjust the CAR BAL for minimum reading. You may also use the meter in the Swan. Set it to read OUTPUT, depress the microphone button and adjust the CAR BAL control for minimum reading. In each example the carrier null will be very sharp. This is where the carrier is best suppressed. A word of caution: *Do not* allow sound pickup in the microphone while making carrier-null adjustments. If you do, you may damage the meter and you will surely get incorrect meter readings.

One final suggestion that may help six-meter operators living in metropolitan areas to clear up cross modulation and other "garbage" from television transmitters. This may be caused by the television transmitter, poor receiver front-end selectivity, or a combination of both. The use of a commercial low pass filter, such as the Drake TV-1000-LP or a homebrewed coaxial or strip-line filter will add to your receiver's selectivity and clean-up most reception problems of this type. Designs for suitable filters may be found in either edition of the ARRL *V.H.F. Manual*.



This is the shack of W9VRV. (Photos by W9NAU's XYL)

Install the filter at the converter input, or transceiver output, connector. Placing the filter at these locations will eliminate unwanted signal pickup from a connecting cable. The filter should also be bonded to the converter or transceiver by physically bolting it on, or with a *short* length of copper strap. A flattened and solder-tinned shield from a piece of RG-8 coax will work fine.

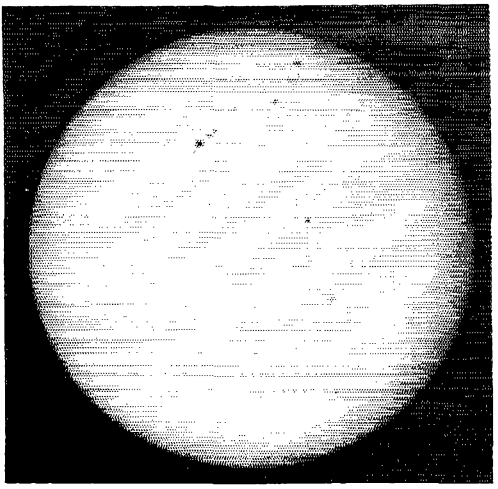
The use of a filter will not only aid in cleaning up reception, but when used in the transmitting line also, may lessen TVI problems arising from harmonic radiation. It will *not* cure fundamental overloading, the most common cause of 50-MHz. TVI.

Preliminary Report — March 23rd Aurora

A sky-filling aurora of a beauty and intensity not seen in years enlivened the v.h.f. scene March 23. Its effects were observed on the v.h.f. bands from early afternoon on, and after darkness fell the display gave the bands strong competition for the attention of v.h.f. operators. From soon after dark until about 2145 EST there was no point in the heavens where either the greenish-white streamers or the strong red glow were not visible. Streamers shot up to the zenith from all parts of the horizon, in the Northeast, and sightings were reported as far south as Lake Charles, La.

As might be expected, this was a great night for southerners, and it may have been the best ever for the 432 gang. K4QIF, Chesapeake, Va., worked K8DEO and K8REG, near Dayton, Ohio, on 432, with signals almost identical to the best on 144 at the time. WA2EMB, W4FJ and K2UYH also worked these fellows on 432, and were heard by K4QIF, along with several radars coming in via the aurora.

At W1HDQ (following an alerting call from W1SUZ) the 4's almost seemed to dominate the 2- and 6-meter bands. W4HJZ, Raleigh, N. C., was as strong as any 2-meter aurora signal ever heard, and was one of the last to go out, just before



Aurora coming up! W1CNY aimed his Questar at the sun, showing a bad case of spotted fever, at 1630 GMT, March 23. A few hours later one of the wildest auroras on record was going strong.

2200 EST. K1HTV worked K4GL, Pickens, S. C., around 2000 EST, and his tape of the QSO show's Jack's 2-meter signal at a fantastic level. Signals seemed to come from all directions at times, and auroral distortion could be heard almost regardless of beam heading.

At times the reflecting qualities of the aurora were exceptional. WA2INB/1 heard readable 2-meter a.m. from W4JFU. The sidebanders made out better than usual, and particularly on 50-MHz. s.s.b. results were very good. The Dakotas and Minnesota were heard in East Coast states at times, along with the usual nearer areas, on 6.

The Northwest, often left out of auroras, got into this one well. K7BBO, Tacoma, Wash., worked VE6, VE7, Oregon, North Dakota, Idaho, Utah and Iowa on 50 MHz., between 1430 and midnight, PST. It doesn't pay to quit early; Dave worked KL7GLL, Sitka, Alaska, just after midnight. W7FN also worked KL7GLL. Signals were in from as far south as the Bay Area. W6DOR, Sacramento, who learned about aurora as W8NAF, reports working W7FN on 6.

The periods just before and after the aurora were good for 50-MHz. DX. HI8XDS heard the ZK1AA 50.1-MHz. beacon March 17, 18, 20, 21 and 22, mostly between 1900 and 2100 GMT. Californians worked into South America the afternoon of March 22. K4AYO worked LU3DCA around 2300 GMT, March 23. A somewhat garbled radiogram from KH6BZF indicates that KH6NS worked Texas, Louisiana, Utah, Idaho and the West Coast States on the 24th. K7BBO reports 50 MHz. open to Hawaii between 1115 and 1341 PST. Dave worked KH6NS KH6GHC and KH6EQF, and the ZK1AA beacon was heard by W6ABN and K6GJD.

The aurora was a shot in the arm for the 220-MHz. fraternity. Known to have been active are W2JKI K2CBA W2CRS K2RTH K2DNR K1JIX K1AGB W3UJG and K8AXU. As with the 432-MHz. reports, the 220 operators say that this was the best aurora ever on this frequency. K4AYO should have more details on the big event next month. — *W1HDQ*.

OVS and Operating News

50-MHz. DX this solar cycle hasn't been what it was during the last one, but there have been some interesting days. Some of the following reports are supplementary to last month's column.

On February 1, 4, 5, 6, 10 and 11, KV4FU, now back in the United States, observed *TE* from the Virgin Islands to South America. VP2MJ, on Montserrat, also noted *TE* to South America every night in February but two. HI8XDS reports *TE* from the Dominican Republic to South America almost every night during February. Swany had contacts with 14 different Argentina stations, 7 in Uruguay and CE3BQ and QG!

Additions to the previously-reported February 2 *F*-layer come from WAØJYK, K6RNQ and K7ICW. WAØJYK, Kansas, worked K6TYW at 2204 GMT on backscatter while aurora was being heard in Kansas from the east. Both stations pointed their beams south for maximum signal strength. Between 2226 and 2257 GMT, K6RNQ worked 7 W6s and W7s beaming 180 degrees. Bob says, however, that the beam headings were exceptionally broad, indicating a large, highly ionized layer. In Las Vegas, K7ICW heard Puerto Rico between 2200 and 2245 GMT, along with backscatter from northern California and W5s.

Aside from the normal Caribbean-to-South American *TE*, nothing special was reported until Feb. 20 when CE3QG heard Hawaii, but no contact was made. The next day, VP2MJ copied the ZK1AA, Cook Island in the Pacific, beacon on 50.1 from 2100 to 2120 GMT.

On Feb. 24, KX6HK (ex WA5IOD), on Kwajelein in the Marshall Islands, heard Japanese stations. KX6HK tells friend K9AQP/1 that most of the JAs run 25-watt a.m. transmitters and 4- to 7-element Yagis.

VP2MJ says South American *TE* was exceptionally good the night of Feb. 26. Monty worked four countries, Chile, Uruguay, Argentina and Brazil. On the same evening, LU3DCA heard Mexican XE1P, and LU3EX heard a Hawaiian beacon.

What appears to have been a *TE*-to-*Es* hook-up on Feb. 28 allowed the ZK1AA beacon to be heard in at least two widely-separated states. W5RCT and K5WVX, Dallas, heard the beacon from 0135 to 0232 GMT, and again from 0250 to 0315 GMT. There was *Es* after 0015 as W5RCT worked XE1AAN and heard California and Arizona. The ZK1AA signal was likewise copied in Knoxville, Tennessee from 0130 to 0215 GMT by W4s ASD, LTJ, K4KYL, WA4YKN and WB4DZF. At the same time, the Tennessee stations were hearing *Es* from the San Antonio area. HI8XDS heard the beacon from 1945 to 2030 GMT.

As predicted, March proved very good for DX. VP2MJ heard the ZK1AA beacon on March 1, 7 and 8, each day between 2100 and 2125 GMT. On March 8, LU3EX was hearing ZK1AA at the same time.

March 2, WB6UYG found CE3QG on *TE* at 0200 GMT. The Chilean was working Arizona, New Mexico and Texas.

K7HIX/KG6, Guam, says 50 MHz. was open March 1–7 from Guam to Japan, but that the 3rd was the best. Ken worked 16 JAs that evening on *TE*, 13 on 50.11 s.s.b. Ken says JA2AC has a new Swan and has been working Australians above 52 MHz. Ken also worked VK6ZGH and VK6ZGI above 52 MHz. on March 3.

Also on that date, KX6HK worked JA2OAW JA2MGE and JH1DAM between 0721 and 074

GMT. CE3QG's beacon was copied by K4AYO, Miami, beginning at 0145 GMT. CE3QG listened for replies at 0220 and was worked by WB4BND and K4AYO. The South American signals faded in Florida at 0235 but were being heard and worked in California and Arizona until 0440. K6RNQ and WB6UYG were successful in working CE3QG.

March 8 was another big day. K6RNQ reports *F*-layer backscatter from 1940 to 2300 GMT. Bob worked many W5s, 6s and 7s with a beam heading of 150 degrees. He also heard, but could not raise, HI8XDS. HI8XDS says he was able to work only WB6UYG because of terrific interference.

Here is where transceiver operation falls down. A separate receiver, or receive v.f.o., is a must for serious DXing so that separate transmitting and receiving frequencies may be utilized. It is impossible for a DX station to separate several dozen 100-watt signals all piled onto one frequency! The separate tuning is also a must if the DX is below 50.1, on voice.

The backscatter was heard only briefly in Florida, from 2120 to 2140 GMT. W4UWH and K4QKR worked W6ABN and K6RNQ was heard calling CQ. Beam headings for the Florida stations were 225 degrees!

The band also opened for F_2 to Hawaii from California north to Tacoma, Washington. K7BBO and K7OFT heard the KH6EQF beacon at 2220 GMT, and worked KH6NS at 2240.

Apparently conditions returned to normal until March 13 when a series of F_2 openings from Florida to South America began at 2100 GMT. W4VCI worked CX9AJ and LU3EX until 2200 GMT.

On March 16, K4RBR, Miami, heard LU6EAM working W6s between 2100 and 2145 GMT, but couldn't work the Argentina station or another heard in Chile. The next day, LU3EX worked W4VCI and other W4s between 2130 and 2200 GMT. These three openings came on the heels of high solar activity and auroral openings, but there was no stateside-to-South America *TE* reported during the evening hours of those days.

Just before this reporting period ended, KH6EEM heard the beacon of CE3QG and worked CXs 1AAV, 3AA, 9AJ and LUs 3DQO, 3EX and 6EA from 0033 to 0100 GMT, March 16.

Now these 50 MHz. notes. WB6UYG says CE3QG has activated a 24-hour 50-watt beacon. It runs 50 watts c.w. on 50.05 with a 3-element Yagi pointed towards the central U.S.A.

On Guam, Ken, K7HIX/KG6 has a SB-110 and 4-element Yagi. KØPYV/KG6 has 50 watts of a.m. on 50.35 and a 4-element Yagi. Ken says he frequently hears military f.m. stations in Vietnam on 50.0 and 50.3. He and the other chap will be on Guam until January, 1970.

Gene, KL7GLL, is disappointed in DXing from Alaska this winter. He says KL7GGZ (W7CNK) reports having a kw. and 6-element Yagi on s.s.b., but Gene's requests for schedules have gone unanswered. KL7GGZ reportedly has kw. rigs available for 144, 220 and 432. His address is Lucky Whitaker, Box 921, Wrangell, Alaska 99929.

Watch for ZF1DT (K4AYO operating) on Grand Cayman Island, 500 miles south of Miami, May 17–24. QSL to WB4BND, 11120 W. Biscayne Canal Rd., Miami, Fl. 33161. Please include a stamped self-addressed envelope.

144 MHz. was slow the first quarter of the new year. Except for the ZL1AZR—SM7BAE c.m.e. contact and a handful of auroral openings, DXers have contented themselves with plans for the fast-approaching condition improvements in tropo and meteor scatter.

K4RCV, Fort Lauderdale, says the annual spring inversion season began March 18 with strong tropo signals throughout Florida. Bill says a combination of hot days, rapid evening cooling and high humidity set the stage for those terrific Gulf Coast inversions. Contacts over distances of up to 1000 miles are made each spring from Florida to Texas and north to North Carolina, but go unreported because they are relatively common in the southeast. K4RCV recommends 145.08 for s.s.b. in southern Florida. Bill says several stations, including W4VTJ, who is also an a.t.v. buff, are active nightly with good power and decent antennas.

The now available Swan 2-meter transverter is causing a boom in 144 s.s.b. activity. Heath will soon be marketing a 6146 transverter for 2 meters. But it seems a shame that we wait for the manufacturers to give band usage a boost.

K4IXC had his antennas battered by a tornado. The 144 and 220 Yagis were destroyed but John's 432 array came through with only slight damage. His 100-foot tower was slightly bent. John says he will replace the 144-MHz. long Yagi with a vertical stack of several short boom Yagis. He says a vertical stack of four or more 4- to 5-element Yagis is *the* answer to long-haul meteor scatter work. K4IXC suggests reading—and heeding—the advice of K2GAL in *QST* for November, 1960, page 23.

Like most topics in ham radio, you can get a good argument when one begins discussing the proper stacking distance. "Proper" depends on what one wishes to achieve in stacking. If it is maximum forward gain, then $\frac{5}{8}$ wave is too close, unless you're using small bays, such as 4 elements or less. A $\frac{5}{8}$ wave spacing with longer bays gives a nice clean pattern, but less gain over a single beam. Most often the best approach may be to use a longer single Yagi, unless you're willing to solve the mechanical problems of wide spacing for maximum gain. An optimum spaced 8-element Yagi will produce more gain than a pair of 4-element Yagis spaced $\frac{5}{8}$ wave. More on this subject in a future column.

RECORDS

Two-Way Work

50 MHz.: LU3EX — JA6FR
12,000 Miles — March 24, 1956
144 MHz.: W6NLZ-KH6UK
2540 Miles — July 8, 1957
220 MHz.: W6NLZ — KH6UK
2540 Miles — June 22, 1959
420 MHz.: W5LUU — WA4KFW
1150 Miles — April 13, 1965
1215 MHz.: W6DQJ/6 — K6AXN/6
400 Miles — June 14, 1959
2300 MHz.: W2BVU/1 — K1DRB/1
225 Miles — Aug. 30, 1968
3300MHz.: W6IFE/6 — W6VIX/6
190 Miles — June 9, 1956
5650 MHz.: WA6KKK/6 — WB6JZY/6
179 Miles — October 15, 1966
10,000 MHz.: W7JIP/7 — W7LIIL/7
265 Miles — July 31, 1960
21,000 MHz.: W2UKL/2 — WA2VWI/2
27 Miles — Oct. 24, 1964
Above 30,000 MHz.: W6FUV/6 — W6ICJ/6
2.3 Miles — Feb. 9, 1969

Monty Werry, VE3EVW, wintered on the island of Montserrat in the Caribbean. Using a transceiver and 4X150 transverter, Monty signed VP2MJ. He worked numerous South American stations and heard ZK1AA on 50 MHz.

In Kansas, WØDRL is constructing a large rhombic array similar to that at KØMQS. Al's pattern will be centered on 80 and 260°. I would guess we'll be hearing more about e.m.e. work at WØDRL come summer.

KØMQS will be using his rhombic for e.m.e. tests on 144.005, on the following dates and times: May 10, 1900 to 1935; May 11, 1945 to 2000; May 27, 0715 to 0805; June 7, 1740 to 1835, and June 23, 0525 to 0555, all times are GMT. Dick's rhombic is fixed. Those times are when the moon passes through the antenna's beamwidth. If you have the receiving capability for e.m.e., or think you have, give a listen. Further transmission data is available from Dick.

Before leaving the e.m.e. subject, K6MYC has moved into his new home and is assembling his e.m.e. antenna for planned September resumption of schedules. Mike's new address is 5418 Stancrest Drive, San Jose, California, telephone 408-227-1727.

Also in the west, WB6KAP will be scheduling KH6EEM in search of another elusive 2-meter opening between the mainland and Hawaii. Their success would better the existing terrestrial two-way record of 2,540 miles set in 1957 by W6NLZ and KH6UK. W7FQE, Vancouver, Washington, offers 144 schedules, c.w. preferred. Stand back, here comes de requests, John!

Bunky, K4EJQ, has a word of warning. He says, "the next fellow who calls me on 2 meters while 432 is hot and reports hearing me on 432 in some hard-to-get state had better be able to transmit something besides w.b.f.m. or a.t.v. — or he'll get a present from me: a sack of Tennessee mountain rattlesnakes!" I think ole Bunky is trying to tell us something. He has entertained himself this winter building several 144-MHz. finals while waiting for conditions and operating activity to improve. He also wonders what the possibilities are for an eastern v.h.f. conference this summer.

Incidentally, K3CFY has taken exception to my March column report that the Sunday night eastern v.h.f. net is somewhat inactive. He says, "not so — we meet every Sunday night at 2130 EST on or about 3.980." K3CFY has been the eastern NCS for the past year. The midwest group meets one hour later on the same frequency, but may mo slightly if the interference is especially tough.

K1ABR says K2HLA has moved to Massach setts. K2HLA will fill the 144 DX void left Massachusetts when W1JSM moved to Ne Hampshire. K2HLA's address is 4 Carter Roa Westminster, Massachusetts 01473. His location on an 1100-foot hilltop.

Jack, K4GL, believes an effort should be made end the division of the two-meter band. His fi choice would be to allow Technicians to operate c down to 144.1. A possible alternative would be f the low-frequency-end group to move to 144.9 a tune above 145 MHz. Jack admits his proposal w take much selling, but he says many fine DX oppo tunities are missed due to band division.

Finally, monitor 144.1 this summer for sporadic At least one station, W5LO, has a beacon on th frequency. It is aimed northeast from New Mexic We have a fine opportunity to help determine t upper frequency limits of *Es* and the frequency appearance at 2 meters.

220 MHz. and Up activity has especially felt t winter lull. K6IBY says the Southern Californ 220-MHz. Rag and Technical Net continues acti with nearly 20 stations participating. Joe says ma members are building low-noise converters and th further information on that net be had from him.

The East Coast Vhf Society will operate WA2WE portable from Mt. Equinox, Vermont on June 21 a 22. Schedules may be made by writing the Ea Coast Vhf Society, P.O. Box 1263, Paterson Ne Jersey 07509. Their equipment will include a kw. c.w. and f.m., a 3 db. receiver and 18 db. antenn Here is your chance to work Vermont on 432.

K1ABR, Cranston, Rhode Island recently pass his amateur Extra, and Dick says he will be on 4 this summer.

At Cedarville, Ohio, K8DEO has observed dece tropo conditions through most of the winter, b laments the activity—and awareness of so operators. W1HDQ says the favorable wint conditions were due to a series of stalled storm are Stable tropo conditions developed along th edges. Ed says he has noticed for years that slo moving winter storms usually have good v.h conditions associated with them. The DX may n be as great as warm-weather openings, but t signals are beautifully stable.

Elsewhere in this column appears two pictures a.t.v. installations. Leo Gary, W9VRV, a W9NAU have been holding t.v.-to-t.v. contac three times weekly this winter with snow-free (pun) reception both ways. The path distance 30 miles.

W9NAU's station consists of a standard 19-in t.v. set with a u.h.f. tuner, trimmed down to t 420-MHz. band. The receiver operates from separate 20-element Yagi. His video transmitter a modified ART-28 running 500 watts input. T

E.M.E Two-Way Records

144 MHz.: SM7BAE — ZL1AZR
11,055 Miles — March 4, 1969
420 MHz.: WA6LET — G3LTF
5,730 Miles — Sept. 25, 1965
1215 MHz.: W1BU — KH6UK
5,092 Miles — August 9, 1962

camera is an imported transistorized type. The audio transmitter is a modified 450-470 MHz. RCA f.m. Carfone running 50 watts input. Both transmitters are crystal-controlled.

The antenna is a 128-element slot and couples to the audio and video transmitters through a home-brewed slotted diplexer. The transmitting antenna is 60 feet high and the receiving antenna is 30 feet above ground. The receiving antenna couples to the t.v. set through a bandpass filter.

At W9VRV, the equipment consists of a standard t.v. set and a modified u.h.f. tuner. The receiving antenna is a 20-element 10-over-10 Yagi with bow-tie driven elements.

The video transmitter is also a modified ART-28. The transmitter has its own video modulator which grid modulates a pair of 4X150A tubes running 500 watts input on 444.5 MHz., crystal-controlled. The ART-28 is driven with 20 watts of r.f. from a RCA 450 MHz. Carfone r.f. strip. W9VRV also uses a transistorized imported camera. His transmitting antenna is an 80-element slot-type 75 feet high. The audio transmitter is likewise a modified RCA Carfone running 50 watts input on 449.0 MHz. Both video and audio transmitters feed into the antenna through a notch-type diplexer.

Both stations use interdigital filters, as described in the March, 1968, *QST*. The filter is in the antenna lead to the receiver, and is tuned to pass just the receiver signal. It skirts off very nicely at the transmitting frequency. A test was run using this filter with the video transmitter running 500 watts input, and the receiver coupled through the filter into *one* antenna fed by a notch diplexer. The received signal, from 30 miles away, was the same with or without the video transmitter being on. Future plans call for 2 diplexers into one antenna which will transmit both video and audio, and receive signals simultaneously.

The photograph taken at W9NAU was made during a duplex contact. It shows W9NAU in front of his camera. His t.v. set shows W9VRV's signal which was retelevising W9NAU's signal to W9NAU. W9VRV is on the monitor. The cameras at both stations incorporate an original idea, a combination viewfinder and monitor. The top half of the camera assembly swivels 180 degrees for either function. In the W9NAU photo it is in the monitor position. These units are homebrewed and use a 5-inch tube. The other photograph shows the W9VRV operating position.

W9VRV reports the following stations are also active on a.t.v. in the Chicago area: W9YTM, Cicero; W9JEC, South Holland; W9DUT, Norridge; WA9JVB, Chicago, and K9HJA in Des Plaines.

Thanks Leo for the fine a.t.v. information.

WA4HGN has been troubled with a chirp in his c.w. signal on 2300 MHz. Bill solved the problem by converting the 2C51 oscillator stage to an amplifier, and building a separate transistor oscillator.

This is a 64-MHz. 2N708 oscillator on a small piece of copper-clad epoxy board, using good quality parts such as silver mica capacitors and glass variables, for stability. The output is amplified by an outboard mounted 5763 buffer, giving just enough drive for the cathode of the converted 2C51 stage. To isolate the transistor oscillator from the heat, humidity and vibration, WA4HGN used a large-mouth vacuum bottle with the plastic cap and cup drilled for r.f. and d.c. leads to the oscillator. The vacuum bottle was partially filled with styrofoam chips and the oscillator nested in these. The bottle was then filled with more chips and sealed. The assembly was mounted on a 4-inch panel in a styrofoam cradle and held on by large rubber bands.

This resulted in a signal on 2303.951 MHz. that W4HHK can tune on his 75A3 receiver in the 40-Hz. selectivity position and hold with no chirp and no drift. W4HHK has heard Bill's signal from a 4-foot dish on several occasions. The distance is about 105 miles. Bill also noticed a reduction in 60 Hz. modulation on the transmitted signal since using the transistorized oscillator. During schedules, Bill experimented with varying the height of the 4-foot dish from 21 to 38 feet. During one test the signal disappeared at both extremes but was very readable at 28 feet. W4HHK reports success in receiving WA4HGN on all tests in February and March, except during and immediately following precipitation. Normal receiving bandwidth is 3KHz. The signal peaks 10 db. above the receiver noise, and shows considerable fading. QST

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

RULES FOR LIFE MEMBERSHIP

1. The Board of Directors has established a provision for Life Membership in The American Radio Relay League, Inc., effective August 1, 1967.
2. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
3. The Life Membership fee is twenty times the annual dues rate, or currently $130.
4. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, $16.25 each. In such instance he will provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
5. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
6. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of $1, but without receipt of *QST*. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
7. Application forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

That "Little Talk"

MOST of us, at one time or another, are suddenly faced with the program chairman of the local civic club, PTA, VFW, American Legion Auxiliary, or any one of a dozen organizations who asks us "Would you give a little talk about amateur radio at our next meeting?" She follows it with a pitch that includes enough flattery to weaken anyone, and the next thing we know we've said "I'd love to." Right then we are in a spot that calls for serious thinking of what *is* the best way to present amateur radio to a group that knows nothing about it.

None of us are speechless when we are discussing our on-the-air experiences with each other. We are even quite glib when enlightening our curious friends who ask us about radio, but this "little talk" is a far cry from any chatting. We are, frankly, much in the same situation as in the White Knight's poem in *Through the Looking Glass*, for we must answer:

"Come tell me how you live," he cried,
And what it is you do."

Our answers cannot be like those of the "aged aged man," for we have the opportunity to tell the real meaning of the amateur radio service.

There is a great temptation to impress our audience with a colorful array of certificates that we have earned, and some of the really beautiful QSL cards that we have amassed. Or we are equally eager to polish our halos, and stress the public service aspect until all of us sound like a bunch of dedicated deadheads, complete with harps and trailing clouds of cherubs. Again, it's quite possible that we dig deep into the SRI report, *Two Hundred Meters and Down*, *Fifty Years of ARRL*, and boast of the many "firsts," and special achievements that are a part of the amateur story. While others might talk of contacts, and the excitement of contest operating.

To tell the story is to tell a little of all this. It is to spice the tale of our successes, both personal and as a group. It is telling our audience that we owe our existence as a wonderful hobby to the fact that we have qualified as a service to the public. It is telling of the truly vital link that amateur radio plays in the communications story, particularly today when rapid communications are the life blood of a community.

But while we are telling it we have to watch our language, for we speak a foreign tongue. We "get loaded," we "read the mail," we talk in Q-symbols, and discuss our "wall paper," and Mrs. Jane Public would be as bewildered as our OM would be if he were attending a class in knitting (assuming any of us could get our OM to a knitting class!).


S W O O P

This Certifies That

Suffering Wives Of Operators Protectorate

SWOOP certificate.

The people in the audience really want to know the answer to "what it is you do," and this is our opportunity to "tell it like it is," to let them know about our special interest, yes, but more, the contributions of the amateur to the communications art, not in the aspect of being plaster saints, but rather the improvements we have added to make our operating more pleasant and which have been accepted by the entire communications industry. All this is a part of our service along with the story of the amateur in public service. They want to know about our DX and the international fellowship that has come about through our getting to know each other on the air, for this is the real story of amateur radio told by us about our experiences.

Last Call for Toronto!

Travel advertisements on TV tell us that "this is the year for Canada," so if anyone has waited until now to "cross the line" into Toronto for the Mid West YL Convention, it isn't too late. A full program is planned so that we can sight-see, chat

*YL Editor *QST*, Please send all news notes to WB6BBO's home address; 1036 East Boston St, Altadena, Calif 91001.

renew friendships, make new friends, and put faces and figures on voices or fists.

The club call, VE3TOT, will be used at the special station. For the gals who want to maintain skeds, or check up to see if the OM is managing to survive without them, just contact Cathy Hrischenko, VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, and book a sked with her.

Above all, *don't* forget those "swaps": they are as much a part of the flavor of a YL gathering as the meeting itself.

The dates again: May 16, 17, 18, 1969 at the Canadiana Motor Hotel, Agincourt, Toronto, Ontario. See everybody there.

Meet the Club — Los Angeles YLRC (YLRC/LA)

The official name Los Angeles YLRL is deceptive because the membership of this group includes women from many parts of California as well as Arizona and Texas, among the 52 members.

"All feminine amateur operators are eligible for membership." It is a policy of YLRC/LA to maintain 51% membership in ARRL and 50% membership in YLRL.

Organized in 1946, the Los Angeles club is the second oldest YL amateur radio group, formed just four years after the NYC-YLRL club. Five of the members have served as president of YLRL with one, Martha Edwards, W6QYL, serving as YLRC/LA, and YLRL president simultaneously. It was members of this club who accepted a "dare" that resulted in the first International YLRL Convention held in Santa Monica, California in 1955.

The "Lads 'N Lassies" certificate is awarded by YLRC/LA to any amateur who submits proof of working ten members. Special recognition is noted in the certificate if all the contacts are made in c.w. Custodian is Irma Weber, K6KCI.

SWOOP

"An organization dedicated to creating happy times for the suffering wives of amateur radio operators," reads the program that is distributed at SWOOP initiations.

SWOOP, the Suffering Wives of Operators Protectorate, was originated by W6BDE, Esther Given, and was created to entertain the poor suffering XYL guests attending the National ARRL Convention in San Francisco, in 1956. The program was such a success that SWOOP has literally become a nationwide organization, and is on the "must" list for many hamfests as well as conventions.

Any group that wishes to include SWOOP as a part of an Amateur Radio gathering should send an inquiry to Esther Given, W6BDE, Box 84, Montara, California, Zip 94037, for the SWOOP Kit, containing programs, certificates, and the initiation ceremony.

No award has ever been developed to soothe the suffering OMs who don't indulge in radio. SWOOP is exclusively feminine.

YLRL Membership

There have been a number of inquiries about YLRL. Membership is open to any licensed woman amateur-radio operator. Dues are $3.00 per year. Any YL who is interested in becoming affiliated with this oldest of world-wide amateur radio organizations for women operators may write to the membership chairman: Marge Campbell, K4RNS, 1700 Nova Road, Ormond Beach, Florida, 32074, for an application. QST

"Lads 'N Lassies" certificate.

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

Nada Jones, WA6YEJ. Nada, one of our sightless amateurs was licensed in 1962, and in February of this year received her Extra Class License. Operating almost exclusively c.w., Nada participates in many nets.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE
Contests: ROBERT HILL, W1ARR
DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD

Get Off My Frequency. We have just conducted a search of the FCC Rules and Regs to try to find out where therein it states that no amateur shall cause QRM to any other amateur. Judging by some of the complaints we have been receiving lately, it must be in there somewhere. The closest we can come to it is 97.125 which states: "No licensed radio operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal."

Of course many of the complaints do not claim violation of the regulations, just of operating ethics, but there does seem to be a growing tendency for many operators to consider the frequency on which they are operating as "their" frequency on which no one else should operate until after they have vacated it. Perhaps it is time to take a close look at this aspect of amateur operating.

The terms "willful" and "malicious" both have to do with intent. That is, intent to do harm (malice) or deliberately or without reason (i.e., willfully) cause QRM. Intent is something mighty hard to prove, since it usually rests only in the mind of the person committing the act, but it is safe to say that *usually* someone who lands on "your" frequency does not do so with the intention of causing you QRM. Even if he knows he is doing so, this doesn't necessarily mean that he is making his transmission for that purpose, and therefore there is some question as to whether or not it is "willful."

In other words, no amateur or group of amateurs has prior or exclusive right to the frequency on which he or they are operating (except in an FCC-declared emergency, per 97.107). It is not "his" frequency just because he was using it first. It is not his because he is on record, somewhere, as using it regularly or at specific time. *All amateur operation* (except 97.107) *is subject to QRM from other amateur operation.* We might as well face it.

Does this profound and sweeping comment end the matter? Not quite, although perhaps it should. There is still the matter of ethics to contend with. What, for example, are the ethics in the following situations?

(1) A net which "fires up" on a frequency on

OPERATING EVENTS (Dates in GMT)

ARRL-IARU-Affiliated Club-Operating Events

May	June	July
1 **Qualifying Run, W6OWP**	4 **Qualifying Run, W6OWP**	3 **Qualifying Run, W6OWP**
3-4 Ohio Interstate QSO Party (p. 111, April *QST*). Nebraska QSO Party (p. 113, April *QST*). OZ-CCA (p. 75, this issue). Russian Contest, c.w. (p. 75, this issue).	14 **Qualifying Run, W1AW**	12-14 **CD Party (c.w.)***
5-10 Educational Institutions Radio Club QSO Party (p. 110, this issue).	14-15 VHF QSO Party (p. 57, this issue)	15 **Qualifying Run, W1AW**
10 **Frequency Measuring Test** ARRL Official Observers *only*.	28-29 **Field Day** (p. 58, this issue).	19-20 Ontario QSO Party
10-12 Georgia QSO Party (p. 130, April *QST*).		19-21 **CD Party** (phone)*
16 **Qualifying Run, W1AW**		20 Minnesota QSO Party
17 Armed Forces Day (p. 60, this issue).		26-27 New Hampshire QSO Party
17-18 Michigan QSO Party (p. 106, this issue).		* League Officials and Communications Dept. appointees, only.
		Sept. 13-14 VHF QSO Party
		Nov. 8-9 SS, phone
		Nov. 15-16 SS, c.w.

NOTE: Possible W6OWP Qualifying Run "alternate" (same times and frequencies) is W6ZRJ.

which a ragchew is going on? The net adherents will say that the net's frequency and time are a matter of record, and the net couldn't do otherwise. The ragchewers will say that this is most impolite and inconsiderate, to say the least, that the net should wait until the ragchew is over or use another frequency. The situation is compounded if a DX station or stations are involved.

(2) A station which calls a CQ on a frequency occupied by a net. The net will say that only an idiot (lid) or a cad would do such a thing; he should listen first, stay off if the frequency is occupied. The perpetrator may defend himself by saying that he didn't hear anything (which could be true, especially if he didn't listen!) or that he has as much right to the frequency as the net (which is also true).

(3) An Official Bulletin Station that transmits its bulletin promptly at the time and exactly on the frequency which its pre-announced schedule calls for, only to be called afterward and vigorously "chewed out" by a couple of stations who happened to be near enough to be inconvenienced. The complaining stations call him names, threaten to report him to the SCM or headquarters and have his appointment cancelled for not "listening first." The OBS defends himself, saying that he will be near someone no matter where he transmits and if he goes off frequency his regular listeners might not be able to find him.

(4) Two nets which find themselves both trying to operate on the same frequency at the same time. Which one has precedence, ethically speaking? The oldest net? The one performing the greatest service? The one with the most members?

But there we go, putting forward hypothetical questions and not giving any answers. What is the solution?

Well, there is none, really — except simply to stop wrangling about QRM, and stop impugning the motives of every other station that causes you QRM — except to grin and bear it. What you are doing may or may not be more important than what the other guy is doing. Probably you

DX CENTURY CLUB AWARDS

From February 1, through February 28, 1969, DXCC certificates based on contacts with 100-or-more countries have been issued by the American Radio Relay League to the amateurs listed below.

New Members

WA5REU....242
KØRTH....157
WB6UDC....147
JA4BEX....145
K4DXS....139
W3JXH....138
W9BF....121
VK1QL....119
DL8YR....116
W3ML....111
UA6YD....109
W2PZF....109
G2CKN....107
K1UKC....107
W9KCY....107
W5DAU....106
W9JVF....106
K4LRL....105
VE6ARG....105
JA1HRQ....104
W8FRJ....104
VE2UN....103
UA6LY....103
WB4EHX..103
LA4HL....102
WA5JDR/-
VE3....102
W2FHY....102
WA2WVV..102
W7ETZ....102
W8PUB....102
DJ6KK....101
W4DMS....101
W8WCW....101
HA6VK....100
UA1KAS....100
UM8FM....100
WA1IJC....100
W2MYK....100
WB2NYK...100
W7GVA....100
WA8KHL...100
WØKON....100

Radiotelephone

K1OZR....222
WA4GVE...195
SM5FC....186
ZS9L....160
G3PMX....129
WB6UDC...124
SVØWI....121
K4MOJ....120
WAØGZA...110
G5AHW....109
KØKPQ....108
VP7DL....108
WAØCEL...107
5N2HJA....106
W1RPF....105
WA4TWQ..105
WA8PWF...105
MP4TAO...104
W8FRJ....104
LA8PF....103
W3FQJ....103
WA9TBZ...103
YV5AAZ....103
9X5PB....103
G3VVU....102
K4ADK....102
JA1HRQ....101
W6EF....101
ZL1AMN...101
K8ZFR....100
WB4EPI....100

Endorsements

Endorsements issued for confirmations credited from February 1, 1969 through February 28, 1969 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given 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.

340
W6HX

330
W5UKK

325
W6HYG

315
W6KG

310
K6EV

305
DJ7ZG
G3KZI
W5FT
W5HJA

300
DJØKQ

W2WD

280
K9PPX
WA6YVW
WØYTQ

260
K1OZR
OH2BW

UA3CT
W1SXQ
W5HTY

240
SM5AHK
W5LLB

220
DL1MD

W3AG
WA3HUP
W8PCS

200
OH2SF
VE3DLC
VE4SA
WA1ABW
W6PBO

WA9TFM

180
OZ6RL
PY2BBO
WB4CGY

160
FP8CY
K4ADK
K4OCE

WA1FJU
WA4GQM
WB4MZP
WA8TFJ
WA9QAM
WØDAK

140
DJ9ON
K5BYV

K8CMO
K8EDQ
PY4ALC
VE2DCW
VK9KS
VQ8CC
WICT
W3UC
W6DR
WØIU

120
K2IEF
K6TVL
K9BNF
WB2NDI
WA3HGY
W7SLU
WA9AUM
WA9TBA
K4PHY/-
YV5

Radiotelephone

320
W6HYG

305
DJ7ZG
K6EV

280
I1SGZ
WA2HOK
W8GMF

260
VE3RE
W5HTY

220
WA5REU
YV4QG

200
PAØDEC
WB2VZW

180
DL1MD
W5LLB
W9CCK
WA9IYG
WAØOAH
YV4UA

160
WB2FMK
W4OKO
WA4GQM
WB4CGY
WA5REB
WØOGW

140
I1AKI
K2PIU
K5MFA
K8CMO
VK9KS
VS6DR

W4EAL
WØYTQ

120
CP5AD
GM5AHS

K4NKI
KØRTH
UA3CT
VE1RU
W2EV
W2HXF

W3KVS
WA3HGY
WB6DXU
WB6DXU
W8KVF
WAØIRP

will think so; most likely he will not. Unless a regulation is broken and the matter comes to hearing (very unlikely) there can be no decision on such a matter, and it makes no difference anyway. Within the authority and scope of his license, each amateur has exactly the same spectrum rights as every other amateur. The only interference that is illegal is "willful or malicious" interference, and there is precious little of this going on — much less than you might suspect. How about giving your brother amateur the benefit of the doubt? — *W1NJM*.

ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 w.p.m.) you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will transmit a qualifying run on all listed c.w. frequencies at 0130 GMT May 16. (In converting, 0130 GMT May 16 becomes 2130 EDST May 15.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. 0400 GMT May 1. (In converting, 0400 GMT May 1 becomes 2100 PDST Apr. 30.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5–13 w.p.m. transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EDST daily 4:30 P.M. PDST	2330 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EDST { SnTTh 6:30 P.M. PDST { Sat	0130 MWFSn
35, 30, 25, 20, 15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThSat

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0130 GMT practice on the following dates:

Date	Subject of practice text from March *QST*
May 19:	*It Seems to Us*, p. 9
May 22:	*Phone Patching — Legitimately*, p. 11
May 28:	*A Band-Spotter and W1AW Marker*, p. 28
June 3:	*Amateur Radio Public Service*, p. 58

Date	Subject of practice text from *Understanding Amateur Radio*, First Edition
June 6:	*The Terminated Line*, p. 105
June 9:	*Standing Waves on Lines*, p. 105

W1AW SCHEDULE, MAY 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EDST, Saturday 7 P.M.–2:30 A.M. EDST and Sunday 3 P.M.–10:30 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed Memorial Day, May 30.

	Sunday	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	←		C.W.-OBS[1]			→
0020–0030[4]	.....	.....	3.700[6]	14.020	14.020	7.150[6]	14.020
0030	.....	.....	3.700[6]	14.100	14.100	7.150[6]	14.100
0100	.....	←		Phone-OBS[2]			→
0105–0130[4]	.....	.....	3.820	50.120	145.600	1.820	21.720
0130	←	CODE PRACTICE DAILY[1] (35-15 w.p.m. TTHSat), (5-25 w.p.m. MWFSn)					→
0230–0300[4]	.....	.....	3.555	.....	1.805	.....	3.555
0300	RTTY-OBS[3]	.....	←		RTTY-OBS[3]		→
0310–0330[4]	.....	.....	3.625	14.095	7.095	14.095	3.625
0330	Phone-OBS[2]	.....	←		Phone-OBS[2]		→
0335–0400[4]	.....	.....	7.220	3.820	7.220	3.820	7.220
0400	CW-OBS[1]	.....	←		C.W.-OBS[1]		→
0420–0430	.....	.....	3.700[6]	7.020	3.945	7.150[6]	3.520
0430–0500	.....	.....	3.700[6]	7.080	3.945	7.150[6]	3.555
1700–1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900–2000	.....	14.280	7.255	14.280	7.255	14.280	.....
2000–2100	.....	14.100	14.280	14.095	21/28[5]	7.080	.....
2200–2300	.....	21/28[5]	21.100[6]	21/28[5]	7.255	14.280	.....
2300–2330	.....	.....	.....	RTTY OBS[3,7]	.....	.....	.....
2330	←	CODE PRACTICE DAILY[1] 10-13-15 w.p.m.					→

[1] C.W. OBS (bulletins, 18 w.p.m.) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.
[2] Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.
[3] RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
[6] W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
[7] Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
Maintenance Staff: W1s QIS WPR. K6OSO. *Times-days in GMT. Operating frequencies are approximate.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for February Traffic:

Call	*Orig.*	*Rcvd.*	*Rel.*	*Del.*	*Total*
W3CUL	750	3964	3781	143	8638
K5TEY	4	2316	2309	1	4630
W3VR	196	1743	1602	121	3662
W7BA	9	1501	1363	134	3007
W8UPH	14	1498	1322	170	3004
K5BNH	9	1159	1050	63	2281
WA2UWA	120	1080	960	40	2200
W1PEX	21	893	874	12	1800
W9JYO	592	515	485	30	1622
WA7HKR	5	725	682	20	1432
WØLCX	6	733	670	10	1419
WA4IJH	11	653	641	11	1316
WB2RKK	31	561	491	55	1138
WB4AIW	15	553	540	13	1121
WA9CNV	2	548	542	2	1094
WA4SCK	21	540	516	2	1079
K4EHY	51	199	752	23	1025
K3SLG	2	522	475	22	1021
WA2BHN	26	471	453	18	968
WA9MHU	56	446	367	73	942
WA7BZY	4	416	411	6	837
W9ENU	2	414	409	5	830
W5OBD	10	391	391	0	792
W3EML	21	417	317	3	758
WA8WZF	5	347	368	8	728
WA4DYL	6	380	323	5	714
W6RSY	30	348	262	70	710
W6GYH	69	320	316	2	707
K9NBH	686	2	0	0	688
W9CXY	5	337	323	16	681
W9EQO	121	271	271	0	663
K7RQZ	16	316	274	29	635
WØPZO	2	304	265	39	610
W4EVN	17	290	291	5	603
K3ZNP	38	234	155	119	546
WB6BBO	29	266	249	2	546
WA3AOJ	8	270	215	45	538
W6IPW	6	266	245	21	538
K8LNE	10	276	246	3	535
K9FZX	4	259	259	2	524
W1OJM	5	258	252	6	521
W4SQQ	21	245	221	32	519
K3PSO	19	215	248	3	515
W3CLD	71	230	175	34	510
W8RYP	15	242	179	73	509
WA9THQ	10	249	218	27	504
W2OE	46	244	208	3	501
Late Reports:					
K9NBH (Jan.)	523	2	0	0	525

More-Than-One-Operator-Stations

KØLDP	350	0	350	0	700

BPL for 100 or more *originations-plus deliveries*

W6ALF 262	K8ZJU 122	WA6BYZ 109
WA9TUM 187	WA9QOO 120	WA3HV 107
W3TN 149	W8OUU 113	VE3ERU 106
WA3JWF 143	WA8DWL 112	K2KDQ 104
WB2YVP 140	WA1GGN 111	WA8WGM 104
K2UBG 137	WB2UVB 111	W9ESJ 102
WTTXL 123	KØJG1 111	WA3IUV 101

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA2ABY, W4NLO, W4VYS, WB6UTC/4, WA7HKR, W8IXJ, WAØPNB.

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 400 or a sum original ou 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.

ARRL FIELD DAY

June 28–29, 1969

But *first*, have you requested your FD log forms? Remember that each ARRL FD log sheet contains enough room to report 100 QSOs. Please try to estimate the number of contacts you'll make on each band (be generous!) — add 'em up, divide by 100 and ask for that number of logs. If you're brand new at this, estimate 100 contacts per band. Let us know the number of bands you plan to operate and we'll be able to send you sufficient check sheets to avoid duplicating contacts! A bid for Operating Aid 9A will certainly aid you with a correct message origination.

The mails aren't what they used to be so allow at least 4 weeks for third-class shipment of the forms. In a hurry? Then please forward sufficient postage for first-class return of the material. Furnish your zip code along with your name, call, street address, city, state and/or province. *C U FD!*

1969 Field Day Rules

(Continued from page 61)

If commercial mains are at hand, *pull the main switch* from 1900 Saturday until 2200 Sunday. Even if your generator goes *pfffft* you lose the bonus if you turn on the commercial power.

(2) *Publicity.* Evidence of publicity must be attached to the FD log and report to get additional 200-point bonus. This can be in the form of a newspaper or magazine clipping, or a letter or memo from a BC or TV station stating that publicity was given.

(3) *Message origination.* An additional 200 points may be added if a message is originated by your club president or activities manager or other FD leader addressed to the SCM or SEC, stating the club name (or non-club group), number of operators, field location and number of AREC members participating. The message must be transmitted during the FD period and a fully-serviced copy of it in standard ARRL form must be included with the FD log and report.

(4) *Message handlings.* Add 10 points for each message received and each message relayed during the FD period, up to a maximum of 200 points. Copies of each message, properly serviced, must be included with the log.

SAMPLE SCORE: Assume a station in Class 3A with independent power running three 50-watt rigs. If 127 valid contacts are made, all power at FD site independent of commercial mains, publicity obtained and a message originated, the score would be computed as follows:

127 × 3 (Power 50 watts or less) × 3 (Independent power)	= 1143
Bonus for 100% independence from commercial power (200 × 3)	600
Bonus for publicity	200
Bonus for message origination	200
Message handling points (7 handled at 10 points each)	70
	2213

d. *Club Aggregate Mobile Scores.* Entries under Class C may be combined to form an aggregate score for the club, having no connection with the club's portable entry, if any. Individual reports must include the club name, and the club secretary or other designated club official must submit a claimed aggregate score. Only bona fide members of the club residing in the club territory may contribute to this aggregate mobile score.

11. Reporting: Mail reports or entries on or before July 27. Reports must show starting and ending time of FD operating period, bands used, dates and contact times in GMT, calls of stations worked, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, class of entry, and score computations. QST

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

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX. RM: W3EEB. W3TRC wishes to remind stations to use "Q" signals only while passing c.w. traffic. W3CZS reports excellent results with his home-brew linear. K3VWQ joined the other operators over at WA3GAY. W3FEG is helping the KC4 boys with phone patch traffic. W3EEB reports on his new campground. Sounds like a nice place for the Delaware ARC to hold its Field Day. WA3CDV is enjoying his new HW-100. K3WLP is now the proud owner of an Advanced Class license. WA3BAO is 2-meter s.s.b. WA3DYG issued W3SL/RACES calls to sixteen stations. Net reports: DEPN, QNI 53, QTC 12; CEPN, QNI 52, QTC 1; DSMN, QNI 31, QTC 2; DTMN, QNI 42, QTC 14. Total net SET traffic: 154. Traffic: (Feb.) W3EEB 27, W3DKX 26, W3TRC 17, WA3HWC 14, W3HKS 9, W3NX 7, K3NYG 5, WA3DUM 2, WA3DYG 1, WA3GSM 1. (Jan.) W3TRC 27.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX, K3SLG. PAMs: K3WAJ, K3MYS. V.H.F. PAM: W3FGQ. OBS reports were received from WA3EEC, W3CBH, WA3AFI, W3ID, K3WEU, WA3HDI, WA3INC; OVS reports from W3FGQ, WA3BJQ, WA3EEC, WA3IAZ, WA3FCZ, WA3HDI; OO reports from W3BFF, W3FGQ, WA3IUV, K3WEU, K3RDT, K3HNP, W3NNC, W3KEK.

Net	*Freq. Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610 Daily 6:45 P.M.	386	467	W3MPX
PTTN	3610 Daily 6:00 P.M.	301	268	W3MPX
EPAEP&TN	3917 Daily 6:00 P.M.	548	276	K3WAJ
PFN	3960 Daily 5:30 P.M.	729	1037	K3SLG
VHF (6)	50.25 Mon.-Fri. 7:00 P.M.	118	70	W3FGQ
VHF (2)	145.35 Mon.-Fri. 8:00 P.M.	79	16	W3FGQ
ENTN	3740 Mon.-Wed.-Fri. 7:15 P.M.	56	53	WA3IUV

New officers: Lafayette College ARC—K3MNT, pres.; WA3EEC, vice-pres.; K3KBO, secy.-treas. Suburban ARC—WA3HGX, pres.; WA3DNV, vice-pres.; WA3GFZ, secy.; WA3IAO, act.; WA3IMG, treas.; WA3EGD, dir. R.F. Hill ARC—WA3FOQ, pres.; W3PNL, vice-pres.; WA3HMU, secy.; K3ALV, treas. Penn State ARC—WA3CFU, pres.; WA3KAC, vice-pres.; WA3LTW, secy.-treas.; K3PBL, dir. Awards were given by the SARC as follows: Public Service to WA3GEL, Man of the Year to W3BUR, W3CUL is off for Florida. W3VR is going along to get warmed up after a cold winter. W3EML, now the owner of an SB-200, reports TCC running smoothly. WA3AOJ is off for Florida, too. W3MPX is working hard at two nets, EPA and PTTN. WA3INC finally found the cause of his chrip. K3MVO has his old home-brew rig back on while he trouble shoots newer gear. W3FGQ has been busy getting the v.h.f. nets perked up again. W3NNL and K3OIO hit pay dirt on a home-brew article for an FD transceiver. WA3ATQ still is hitting the mark on phone patches from the boys in Gitmo. WA3CNM is the new Montgomery County EC. The latest Novice from his class is WN3LZZ. W3JSX is getting back in harness. WA3HDI got his "A" ticket. WA3AFI and W3CBH are keeping c.w. bulletins going. W3RV is all set with a new antenna. WA3EEC will be operating from Lafayette College ARC. WA3HMU is sporting a new HW-100. K3KTH's c.w. is beginning to sound like a computer. WA3EXB is going for his commercial tickets. To avoid much unnecessary correspondence I will in the future disregard late reports and not try to carry them over. Also, unless an error is gross or makes the difference between award or no award let's drop the matter. Okay? Traffic: W3CUL 8638, W3VR 3662, K3SLG 1021, W3EML 758, WA3AOJ 538, K3PSO 515, W3CID 510, W3MPX 364, WA3IUV 308, WA3JWF 256, WA3INC 254, K3MVO 236, WA3EXW 218, WA3IHV 195, W3FGQ 122, W3IIK 103, W3NNL 73, K3OIO 73, WA3ATQ 71, WA3FMI 70, WA3CNM 68, WA3CND 53, WA3GLI 49, WA3FPM 47, K3WEU 47, WA3JKB 46, WA3CFU 45, W3JSX 45, WA3HDI 40, K3RUA 40, WA3AFI 39, WA3GWL 38, W3VAP 38, K3WAJ 34, W3CBH 31, W3BNR 28, W3FPC 28, WA3IOB 26, K3PIE 26, W3RV 23, WN3JZI 20, K3RTX 17, W3ADE 16, K3HNP 16, WA3EEC 15, K3YVG 15, WA3EXB 13, W3BUR 12, W3HNK 12, W3OY 12, WA3IYC 11, W3VA 11, WA3HMU 7, W3OMI 6, WA3BSV 5, K3KTH 4, W3NNT 4, WA3BJQ 3, W3EU 2, WA3IAZ 2, WA3CMD 1, WA3EWV 1, WA3FCZ 1, K3FOB 1, W3ID 1, W3KEK 1, W3YPF 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munholland, K3LFD—SEC: W3LDD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	0000Z	Daily	28	318	15.0	WA3HTQ/RM
MDDS	3643	0130Z	Daily	28	81	5.8	W3CBG/RM
MDCTN	3920	2300Z	STTS	16	64	23.5	K3GZK/PAM
MEPN	3920	2300Z	MWF	(No report)			K3IAG
		1800Z	SS				
MTMTN	145.206	0200Z	T-S	22	28	10.9	W3IFW

New appointments: W3CSZ as OO; WA3GUI as ORS. WA3EOP holds "revival" meetings on MISTN every Sun. at 8 P.M. on 50.4 Mc. WN3KNJ is now WA3KNJ and is enjoying the new-found phone bands. The 19[illegible] SET turned on W3LQY and now she is riding all traffic tracks with the OM jockeys. K3JOM and K3TBI are running the Maryland 2-Meter Technical Net on 145.206 Mc. every Sun. at 1 P.M. Listen for the Central Maryland Emergency Net coming soon on 2 meter. WA3GUI, aged 16, is a budding traffic man. WN3LEQ plus 5N equals WA3LEQ/Extra Class for an XYL known as Lou, where N equals 1 month. Top that yo[illegible] OMs. W3TN strikes again—BPL, that is. W3MSN logging more hours on 6N2, S.S.B. and C.W. since he retired. Watch *QST* for the MDC QSO Party announcement coming soon. K3JYZ, WA3HTQ and WO[illegible] UCE/3 ganged up on the ARRL DX Test for 718 contacts and 225 countries. WN3KGC, Pasadena, is now portable 3 Baltimore until his license modification arrives. W3EOK is back from a Florida vacation and says a W4 call looks good for retirement. W3JPT received the Marconi Memorial Gold Medal of Service from the Veteran Wireless Operators Association while in London recently. K3RGB EC Baltimore City, operates his AREC Net on 28.680 Mc. every Sun. at 19[illegible] EST. WA3GYW is attempting moonbounce. W3GE[illegible] tried QSK for the first time in 33 years of operating and loves it. K3GZK is doing a fine job promoting local net/section net liaison in Central Maryland. From the SCM desk, the addition of a low-powered 2-meter rig to every low-band traffic station looks like a economical way to expand NTS-local coverage as well as an easy way to obtain an emergency operating capability with the aid of fixed or mobile battery power. Traffic: W3TN 356, W3CBG 155, WOUCE/3 13[illegible] K3LFD 88, K3GZK 85, W3DYA 79, W3ADO 77, W[illegible] ATQ 62, WA3JRQ 58, WN3KAA 51, W3LQY 50, K[illegible] ORW 44, W3FU 35, WA3ERL 29, K3JYZ 28, WA3EC[illegible] 27, WA3HSU 25, W3FA 24, WA3IAQ 24, W3PRC [illegible] WA3GXN 17, K3OAE 17, W3ZNW 17, K3LFN [illegible] WA3GUI 13, WA3HKR 13, K3FQF 12, K3QDC [illegible] WA3IJR 11, WA3CEK 9, W3GEB 9, WA3KNJ 8, WA[illegible] JHE/3 7, W3CRE 6, WA3GGO 6, K3JOM 4, WA3DW[illegible] 2, K3RGB 2.

SOUTHERN NEW JERSEY—SCM, Edward [illegible] Raser, W2ZI—Asst. SCM: Charles E. Travers, W2YP[illegible] SEC: W2LVW. NJN Net Mgr.: WA2BLV. RMs: WA[illegible] KIP, WA2BLV. PAMs: WB2UVB, W2ZI, W2ZVW [illegible] doing a fine job as NCS of EAN. WB2DRG has be[illegible] in the hospital for several months. W2BLM is trust[illegible] for club station WA2FEZ. K2CPR has been appoint[illegible] to the new ARRL Advisory Committee. W2ORS sa[illegible] he received his new call-letter license plates and th[illegible] look swell. W2YPZ made a trip to Spain during t[illegible] Easter vacation. W2ZQ has a new 1-kw. linear a[illegible]

worked Alaska and Hawaii on 75 phone! W2WI is in Hollywood, Fla., for the winter, and signs K4GO. New OPSs: WA9PRE/2, W2JI, W2BLM, W2DNF. W2TAZ, from Freehold, is attending Rider College in Trenton. He has his new Extra Class ticket, and 30-w.p.m. ARRL endorsement. Two new calls in Trenton are WB2IPF and WN2HPB. W2ZI is off to sea again, this time to New Zealand, Australia and the South Seas aboard the *S.S. Monterey*. K2ARY is faithfully transmitting his OBS skeds. A first report was received from WB2WHB. WB2BGH is now W3EZT in Silver Spring, Md. W2DNF joined the QCWA. W2BWF has new s.s.b. gear and is working all kinds of DX. The N.J. Emergency Phone and Traffic Net participated in the SET and made a total of 1563 points. W2PEV submitted an excellent report. W2ORS was high traffic man this month. NJPEN reports a QNI of 632 and total traffic of 355 messages. Traffic: (Feb.) W2ORS 224, WB2UVB 162, WB2VEJ 161, W2YPZ 145, W2PU 89, W2ZVW 72, WA2ABY 71, W2ZI 49, W2BLM 34, K2SOL 32, W2IU 29, W2DNF 24, WB2WHB 21, K2SHE 17, W2CDZ 14, WA2KIP 14, W9PRE/2 14, WA2KAP 13, K2JJC 12, WB2FJE 11, K2MBW 5, W2JI 2. (Jan.) W2PU 75, W2ZVW 35.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2KTK—Asst. SCM, Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. PAM: WB2VSL. RMs: W2FR, W2MTA, W2RUF, K2KIR. Section nets are listed in *Station Activities* in Feb. *QST*. A late session has been added to NYS at 2200 local time on 3795 kc. WB2WGF is a new OPS; WB2VSL is a new OBS. Renewals: W2RQF as OPS and OO, WA2BEX as ORS, W2IDM as EC and OVS. Your SCM had the pleasure of speaking to the Oswego County ARC. WA2DWE is QRX for a TH6DX to go with his SB-300/SB-400. W2QNA now signs K4AYR from Florida. WB2QAP, though busy at work and on the air, still finds time to play the organ. W2ZA, one of the first 70 radio amateurs has joined Silent Keys. NYS reports for Feb. show 670 messages cleared with 699 check-ins. BPLer W2OE made it the hard way with only 14 days of operation in Feb. WA2DCC is QRX for good weather to put the skyhook up. K2LCT finds it necessary to cut back on his OBS schedule because of extra work. WB2WGF is planning a pair of 813s to add to the Eico 753. WB2YEE received a shiny new NYSPTEN certificate. W2CFP, WB2RHJ and WB2VSL are all active in the newly-formed East Coast Amateur Radio Society. W2CFP has a weekly ten-minute radio program on WHCU in Ithaca dealing with amateur radio. Dave, K2SZJ and W2CXX are working on a 2-meter repeater for Ithaca. OVS WA2BSG passed the General Class test. The NCARC, K2PCQ, one of the only clubs operating out of a lighthouse, was robbed twice in Feb. WB2ZDP was forced to QRS on his 432 gear because of the high cost of varactors. Don't forget the WNY Hamfest in Rochester May 10. W2IDM and WB2ZDP observed some good aurora openings on 50 Mc. K2DUR and WA2SOO are running Novice classes for the Fulton ARC. W2RUF reports AREC activity in the section picking up sharply and also activity in NYSCN continues at a fever pace. WB2VSL suggests a WNY appointees net. Traffic: (Feb.) W2OE 501, WB2YVP 441, W2FR 321, WA2CAL 309, K2KQC 251, WB2SMD 236, W2MTA 190, W2RUF 180, WA2BEX 160, W2HYM 136, WB2VND 114, WB2GAL 108, WB2HLI 78, WB2VSL 74, K2RYH 59, WB2YEE 58, WA2HSB 54, W2PRY 47, W2PVI 44, WB2WGF 43, W2IDM 42, W2RQF 39, K2UIR 35, K2DNN 34, K2QDT 34, K2VCZ 25, WA2GLA 23, WB2FHF 20, W2CFP 17, K2OFV 17, WB2RWR 15, WA2HSU 14, WB2YEM 14, K2IMI 13, K2KTK 12, WB2AVY 5. (Jan.) WB2RHJ 92, WB2YEM 29.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3CJY—SEC: W3KPJ. PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFB, W3NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT, 3585 kc.; WPA, sessions 28, QNI 335, messages 346, stations 54; KSSN, sessions 20, QNI 145, messages 51, stations 27. Congratulations to K3ZNP on making the BPL. W3IYI and W3CFC sponsor code classes for the Indiana County ARC. K3RBH is the new pres. of the Nittany ARC. New board members are K3AKR, K3CXZ, W3TYL, WA3LJW and K3UMT. WA3IFC, WA3JBQ and WA3DTQ are new members of the Etna Radio club; at the Steel City ARC it's K3UQD and at the Indiana ARC it's a new YL member, WN3JXA. K3VCI and W3FVU are avid county seekers. The Washington County AREC net meets each Thurs. at 0100 GMT on 21,350 kc. The WMAL AREC Net meets every Wed. at 2000 EST on 29 Mc. WA3DTG wired up an HW-100 while son WA3DOI put together the Heathkit SB-101. The Carroll Township Junior High Radio Club at Monogahela, WA3KNW, is on the air with an Eico 720 and a Lafayette HA-350 is ably represented by WN3KFY, KMK, KGA, KQO, KJZ, KFZ, LAX and LZX. W3ZUH obtained a 120-countries confirmed DXCC endorsement. K3WWP expects competition in future CD Parties from WA3GPK. Anyone interested in broadcast-band DXing, contact K3WWP. K3HZL has upgraded to Advanced Class. K3OTY leans towards RTTY operations. The Trinity Area High school at Washington, Pa., WA3HWU, with a Johnson Challenger and Hallicrafters SX-146 and a TA-33 Jr. beam, is augmented by WA3DOH, FJM, ITK, JDD and Novices WN3JDB, JDC, JIJ, JIK, JIL, KBL, KDX, KFD and WN3LSX. 2- and 6-meter activities show, WA3JDT with an HE-45A transceiver and a three-element beam, WA3DPI and K3QAY run Lafayette 460s on 6, WA3GIV a Squalo. In Erie County, RTTY enthusiasts are WA3HLN, WA3HDK, WA3GIV, WA3FFD, K3CKO, K3FVO, K3HFL, K3KJN. WA3ISN runs an HQ-110 and an HC-10. K3UIK, specialist in rotors, ordered gears and only needs a clip. WA3HRJ runs an HW-17 on 2. WA0OIU, at Denver, keeps a sked with his dad, W3WDK. K3KJQ is a new voice on 6. K3AXS is back on the air. WA3GSB, with a new T-4XB, is indebted to W3AOH and W3MOK for their help in securing his Advanced Class license. Appointments: K3FSF as Blair County EC. Endorsements: WA3BLE as ORS/OPS, K3WWP as OBS. Traffic: K3ZNF 546, WA3IPU 326, W3MFB 224, WA3AKH 130, W3LOS 112, W3KPJ 60, K3EXE 53, K3HCT 50, K3SJN 43, K3HKK 42, W3GJY 34, K3SMB 25, WA3GPK 22, W3RUL 16, W3YA 8, W3BLZ 7, W3IDO 6, W3SN 6, WA3LDZ 4, WA3GTE 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	37
ILN	3760 kc.	0100Z	Daily	254
NCPN	3915 kc.	1300Z	Mon.-Sat.	664
NCPN	3915 kc.	1800Z	Mon.-Sat.	
Ill. PON	3915 kc.	2245Z	Mon.-Fri.	732
Ill. PON	3915 kc.	1430Z	Mon.-Fri.	
Ill. PON	145.5 Mc.	0200Z	M.W.F.	212
TNT Net	145.35 Mc.	0300Z	Sun.-Fri.	326

WA9QBM, WN9ZTJ and WA9VLP are the new officers of the Deerfield Amateur Radio Club. W9OKI is now an Advanced Class licensee. WA9TCW has a new Swan 250. WA9QZE is running a home-brew gallon with four 811s. W9VHD is back after a short illness. WA9RTI and his XYL, WA9RSK, of Clinton, have moved to Peoria. The Illinois Post Office Net is inaugurating a Sat. net on 3915 kc. with the time set at 2200Z. WA9ZHR is working new DX with his HW-100. The newly-founded Palestine ARC has received the call WB9AOJ. Mr. Fritz Franke, of Hallicrafters, gave a chalk talk on "The Decision Threshold Computer" at the Mar. 5 meeting of the Chicago Area Teleprinters Society. K9LLU's new QTH is Newberry Park, Calif., with the call W6KCI. According to reports received, many clubs which have been conducting code and theory classes for advancement and also new amateurs have graduated many new licensees. Neil Whitney gave a talk and demonstration on "Programmed Slide Rule" at the Hamfesters meeting on Feb. 28. The Hamfesters is holding its annual nomination for Illinois Amateur of the Year Award. If you know of an amateur who has performed a service to the public during the year please contact Hamfesters at 6000 South Tripp St., Chicago, Ill. 60629. The Rock River Radio Club will hold its third Hamvention at Amboy, Ill. Sun., May 18. Contact W9SON for further details. This column's sympathy is extended to K9DCG and his family on the loss of his father. New Advanced Class licensees are K9KGV, W9UFH and K9LUX. W9BRY is now W9FL. The Chicago Suburban Radio Assn. held its Mini-Fest Mar. 16 in Brookfield. The 1969 ARRL Central Division Convention will be held in Indianapolis, Ind., Sat., May 24, 1969. Write to 309 Benton Drive, Indianapolis, Ind. 46227, for details. WA9CNV, WA9MHU, K9NBH and WA9TUM are BPL certificate recipients this month. Traffic: (Feb.) WA9CNV 1094, WA9MHU 942, K9NBH 688, WA9TUM 487, WA9AKR 481, WA9QBM 193, WA9ZUE 181, W9NXG 139, WA9TOC 129, W9HOT 103, WA9NZF 62, W9DOQ 58, W9JXV 51, WA9LDC 46, WA9WNH/9 41, WA9BRQ 38, WA9UXF 34, K9RAS 29, W9YH 25, W9LDU 22, K9TXJ 7, K9FRZ 6, W9LNQ 6, WA9YQT 6, K9DQU/WB9AIE 5, K9HSK 5, W9PRN 5, WA9LHU 4, W9IDY 2. (Jan.) K9NBH 525.

INDIANA—SCM, William C. Johnson, W9BUQ—

Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	*Freq.*	*Time*	*Feb. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300Z M-F	225	K9IVG
ISN	3910	0030Z Daily 2300Z S-S	496	K9CRS
QIN	3656	0100Z Daily	130	W9HRY
Ind. PON	3910	1245Z Daily	29	K9EFY
Ind. PON V.H.F.	50.7	0200Z Mon.-Thurs.	180	WA9NLE

W9PMT, Mgr. Hoosier V.H.F. Nets, reports Feb. traffic as 110. The W9YB TV crew reports that contact was made with K9FUE. WA9JNC has an HW-12 mobile for any emergency. WA9ITB has been handling traffic from K9NBH at Great Lake NTS. W9DOK is back from Florida after six weeks. W9EJW has been checking into the QIN Net. WA9TQH passed the Advanced Class exam and is using a T4X-R4A. WA9-QEQ passed the Extra Class exam. W9HWR is the EC for Gibson County. WA9NYU is running a Galaxy 5 Mark 2 Johnson Matchbox feeding a 180-ft. wire. The Wabash County Amateur Radio Club is sponsoring its First Annual Hamfest May 25, 1969, at the 4-H Fairground at Wabash, Indiana. Contact K9ULW, 1165 N. Cass St., Wabash, Ind. 46992. To all Indiana amateurs: The Indiana nets need additional net control during vacation time. The nets are listed at the head of this column. May 24-31, has been proclaimed as Indiana Amateur Radio Week by Gov. Edgar D. Whitcomb. The Indiana Ham Assn. Hamvention will start Indiana Amateur Week. QIN Honor Roll: W9BDP 27, K9VHY 25, W9JBQ 24, K9DHC 17, WA9BWY/9 16, W9EPZ 16, WA9FDQ 15, WA9KAG 15. *Amateur radio exists because of the service it renders.* BPL certificates went to W9JYO, W9ENU, W9EQO, K9FZX, WA9QOQ. Traffic: (Feb.) W9JYO 1622, W9ENU 830, W9EQO 663, K9FZX 524, K9IVG 421, WA9QOQ 309, W9HRY 285, W9JBQ 277, WA9VZM 195, WA9BWY 180, WA9VBG 168, W9BUQ 110, W9CMT 75, W9ICU 64, K9CRS 50, K9HYV 47, W9FWH 46, K9EFY 42, WA9-VRV 40, WA9RNT 36, K9CBY 33, K9VHY 30, WA9-OHX 29, W9YYX 27, W9DOK 26, WA9WME 26, W9LG 23, WA9ITB 22, WA9GNA 21, WA9SBR 20, WA9TJF 17, WA9GJZ 16, W9PMT 16, WA9BHG 15, W9ALM 13, WA9BVL 13, WA9IPS 13, W9EJW 10, K9FUJ 10, K9-WGN 10, K9KFM 9, WA9LHG 9, WA9OAD 9, K9QVT 9, WA9AXF 8, W9DZC 8, K9RWQ 7, W9BDP 5, WA9-QEQ 5. (Jan.) W9QLW 96.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. PAMs: K9DBR, WA9IZK, W9LVC, W9NRP, WA9QNI, W9AYK. RMs: K9KSA, W9DND.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1145Z	Mon.-Sat.	387	249	W9AYK
BEN	3985 kc.	1700Z	Daily	610	185	W9LVC
WSBN	3985 kc.	2200Z	Daily	1388	289	WA9QNI
WIN	3662 kc.	0015Z	Daily	311	133	W9DND
WSSN	3780 kc.	2330Z	Daily	136	36	K9KSA
WRN	3620 kc.	0030Z	Sun.	16	2	K9GSC
SW2RN	145.35 Mc.	0130Z	Daily	268	26	WA9IZK
SWRN	50.4 Mc.	0200Z	Daily			K9DBR

Net certificates went to WA9WKI and K1LQI/9 for WSBN; new appointment to WA9TPV as ORS; renewed appointments to W9CBE as OBS, W9CBE and W9ODD as ORSs, W9ESJ and W9ODD as OPS; K9-DBR as OVS. WN9YCY was active in the Novice Roundup with 153 QSOs. The 1969 WNA Picnic will be held in Madison, Wis., July 13. BPL for Feb. traffic was earned by W9CXY and W9ESJ. The AAA "Bring em Back Alive" program for highway safety will be in effect again this year during the holiday periods. WA9VIV will be the Madison outlet to AAA. Additional information can be obtained from him or WA9QNI. Traffic: W9CXY 681, W9DND 295, K9CPM 279, W9ESJ 218, WA9RAK 115, K9KSA 83, WA9QNI 80, K9TBY 76, K9FHI 68, W9AYK 54, W9DXV 41, W9KRO 41, WA9QQM 39, WA9WOC 39, WA9UMT 33, WA9TXN 33, WA9PKM 32, K9JPS 32, W9DM 27, W9-NRP 26, K9PKQ 24, W9IHW 23, W9BCH 19, K9GSC 16, W9RTP 14, W9IRZ 11, WA9HFB 10, WA9UNW 8, K9GDF 4, WA9SAB 1.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØMZW. RMs: KØORK, WAØ-RRA. PAMs: WAØOEJ, WAØHRM. MSN meets daily on 3685 kc. at 2330Z and 0300Z. MJN meets Tue.-Sun. on 3685 kc. at 0000Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1705Z., Sun. and holidays at 1400Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Minn. RTTY Net meets Sun. on 3620 kc. at 0100Z. AREC Net meets Sun. on 3910 kc. at 2330Z (DST schedule). Congrats to new Ramsey Co. EC, KØLAV. In the recent SCM election 606 votes were cast, wi Larry Shima, WØPAN, being elected. My heartic congratulations to Larry and best wishes for co tinued growth in Minnesota activities. This is my la report after four years of interesting work as yo SCM. I want to thank each of you who took part the public service work of the League in any of t many phases of activity. A special thanks to you a pointees who gave much assistance in leadership pos tions. I am sure WØPAN, WAØMMV and WA(IAW each want to thank you for your support in t election. 73 for now. Traffic: (Feb.) KØZRD 2 WAØIAW 237, WAØTHI 216, KØIJL 116, KØMVF 1 WAØRRA 96, WAØMMV 90, WAØONS 80, WAØQ 73, WAØRKV 66, WAØPUH 65, WØBUC 60, WA(TQT 59, WØTCK 51, WØFHH 50, WAØPOC WAØODB 47, KØZBI 45, KØFLT 34, KØCNC KØSRK 19, WØHEN 18, WAØGMX 17, WAØRKF WØAAU 16, WAØJPR 16, WØFHO 14, WØKNR WØATO 13, WØKLG 13, WØEQO 11, WAØLAC KØICG 10, WAØDFT 9, WAØNQH 9, WAØUNS, 9, WØMBD 8, WAØOEJ 8, KØZWG 8, WØBUO WAØEPX 7, WØPAN 6, WAØHRM 5, WAØJRA WØSZJ 2, WAØJKT 1, KØWXH 1. (Jan.) WØAZR

NORTH DAKOTA—SCM, Harold L. Sheets, WØD —SEC: WAØAYL. OBS: KØSPH. PAM: WØCA RM: WAØRSR. KØPYZ is recovering from a hea attack in a Chicago Hospital. WØBF and WØE were given retirement dinners the same week end. W has been operating WØZRT, the Bismarck Club st tion, in the basement of the Capitol Bldg. WAØJ and father were guests at WAØGRX-WØBF on th way back to Breckinridge. WAØKRI took a wint trip to the central states. WØTOM finally got t two-element beam up. WAØOVW got his repaired a made the DX Contest. W8ARB/Ø, of the Grand For AFB, went all out for the PON CCPX Party. WA(DLB, WØDXC, KØPVG, WAØRWM, KØSPH, K(ITP, WAØRSR, KØPZK, WAØHUD, WØEFJ, WA(MND and KØBWZ also took part in it. WØRT got the new HW-100 on the air. WØBF took part the Frequency Measurement Test and did real w with the FS-1 Secondary Standard he built. WØH(has a new addition to the family—a son. WAØMSJ mobiling in Arizona and California. WAØHUD led the check-ins for the Tenth Regional Net again, wi WAØOVW and WØBF helping out. WØHUD's traf report shows his activity in that direction so rou your out-of-state traffic through him. WØNMV leading the group with s.s.b. traffic via MARS. WA(RSR reports for the C.W. Net for Jan. 33 session 108 QNI, traffic 19. The NDRACES Net held a pra tice run for the SET Sat. and on Sun. 59 statio checked in, stood by and handled the messages of t program. My congrats to all who participated and KØSPH and WAØAYL who made it such a succes

Net	*Sess.*	*Check-ins*	*Tfc.*	
Goose River 160M	4	56		0900 CST Sun. WØCDO
YL WX Net	20	376	28	0730 CST M-F WAØGR, WAØMN
NDRACES	37	820	177	1730 CST M-F KØSPH 1830 " "
NDPON	12	243	31	1730 " Sat. WAØHU 0900–1730 Sun.

Traffic: (Feb.) WAØHUD 209, WØNMV 152, WA(RWM 65, WAØGRX 44, WAØIKS 33, KØSPH WAØTBR 26, WØWWL 23, WØDM 20, WØEFJ WAØJPT 10, WØDXC 4, WØCDO 2. (Jan.) WA(RWM 54.

SOUTH DAKOTA—SCM, Seward Holt, KØTX —SEC: WAØCPX. RM: WØIPF. PAM: WAØCWV Congratulations to WAØPNB and WAØLLG on th reelection as net managers. Contact WØNEO or WA(PNB if you have any information of former Sou Dakota hams and any information about the histo of hams, nets, etc., to be included in their new dire tory and historical summary of the South Dakota se tion. Remember the South Dakota Picnic to be he in Mitchell in Aug. We will see you all there. We wi WØDIY and KØALP a speedy recovery. Net report NJQ Net—455 QNI, 105 QTC, 73 informals. Late Se sion Phone—1305 QNI, 78 QTC, 144 informals. SDN 23 sessions, 18 QTC, 507 minutes. The following WI 10 or more times: WAØAOY, WØAYD, WAØFG WØIPF, WØNEO, KØTXW. Traffic: WØZWL 4 WAØPNB 293, WAØLLG 50, WØIG 48, WAØBZD WAØFUZ 14, WØDVB 12.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA5I —SEC: W5PBZ. RM: W5NND. PAM: WA5PP WN5WLI passed the General Class exam. Welcome

Beneath this calm exterior lurks... Supertetrode!

imac's sensational new water cooled 50 and 00 kW tetrodes are the world's finest for high ower applications. They're ideal for transmitters ı HF, FM and broadcast bands, for over-the-orizon radar, distributed amplifiers, high energy hysics and high power voltage regulation.

Both tetrodes feature transconductance double ıything even we've been able to offer. They ave greatly reduced cathode lead inductance ıd a unique re-entrant anode, permitting a ıorter stem and lower input capacitance. eedback capacitance also is much lower, mplifying tube neutralization and eliminating any need for a neutralization circuit. In both tubes the screen base is designed to serve as an electrostatic shield.

These tubes have 4 to 5 dB higher gain than comparable tetrodes, yet are very compact. The 4CW50,000E (50 kW model) weighs only 35 pounds. It has 310 pF input capacitance, 52 pF C_{out} and 0.6 pF feedback capacitance. The 4CW100,000E weighs 50 pounds, has 349 pF C_{in}, 60 pF C_{out} and 0.8 pF C_f. For data and application assistance contact your nearest Varian/Eimac distributor or ask Information Operator for Varian Electron Tube and Device Group.

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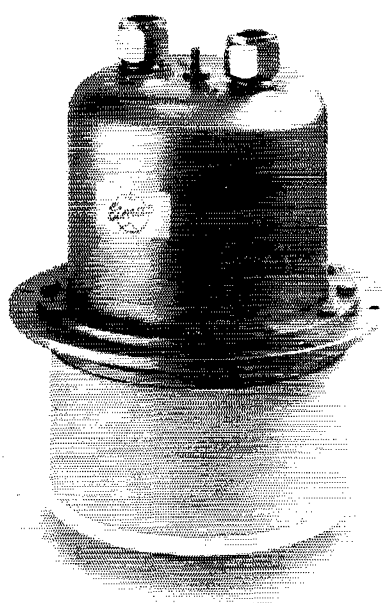
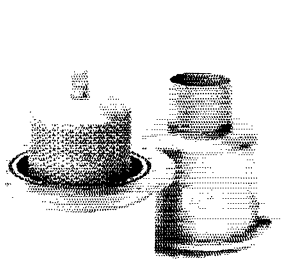


Supertetrode Keeps its Super cool.

Eimac's revolutionary 4CV50,000E 50-kW Wick-Cooled Tetrode combines the electrical features of the industry's first "Supertetrode" with a unique new vapor-cooling concept. This system replaces bulky anode cooling fins with a compact metal-mesh wick which dips into an integral boiler, and is permeated with water by capillary action.

The result is a dramatically smaller package. Tube plus boiler measure only 6½ inches in cross section, weigh 35 pounds. Water level is not critical. The unit will operate efficiently in a position up to 45° from vertical, ideal for mobile and marine installations.



And performance is truly supe
It betters comparable tetrodes in
by 4 to 5 dB. It has greatly reduce
cathode lead inductance and a u
re-entrant anode, permitting a
shorter stem and only 310 pF inp
capacitance. Feedback capacita
is only 0.6 pF, making tube
neutralization very much simpler
For data and application assistar
on this or any Eimac tube,
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Varian/Eimac distributor
or ask Information
Operator for Varian Electron
Tube and Device Group.

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new hams WA5VSE and WN5WKG in Monticello and WN5WIX in Warren. Father-and-son team WA5TVF and WA5ULA have new General Class tickets and a new SB-101. The Camden Amateur Radio Club has been reorganized. The EC Net needs your support. WA5AVO is back on the air with a new Galaxy 5. Congratulations to WA5VDH, Arkansas winner in the Arkansas QSO Party. WN5VSV now has 47 states and 10 countries. Net reports for Feb.:

Net	*Time*	*Freq.*	*Tfc.*	*Mins.*	*QNS*	*Mgr.*
OZK	0100Z	3790	24	533	188	W5NND
RN	0030Z	3995	35	456	608	WA5PPD
APN	1200Z	3930	12	1451	435	W5VFW
PON	2130Z	3925	369		421	W5ELF
Teenage	2330Z	3995	23	352	275	WA5QMQ

Traffic: W5OBD 792, W5NND 159, W5MYZ 58, WA5-QMQ 57, WA5KEF 44, WA5RCK 26, WA5TLS 21, W5-SMS 13, WA5TJB 8, W5PBZ 4.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: K5ANS/5. V.H.F. PAMs: WA5-DXA, W5UQR. Don't forget that the Fifth Annual Hamfest sponsored by the BRARC will be held May 3 and 4 at the Belmont Motor Hotel. W5SKW has been awarded a Certificate of Merit for his activities as EC in Southwestern Louisiana. This award will be presented by W5BUK, our SEC, at the Lake Charles Fish Fry and Hamfest sponsored by the Southwest La. ARC to be held at Prien Lake Park June 28 and 29. And don't forget the CLARC Hamfest at Alexandria July 12 and 13. W5KC, our FB DXer, is planning to put up a quad. W5BMM, up Plain Dealing way, is ready to take the Extra. Two new-comers to the 3900 Round Table are W5GMO and WA5SIK. K5UAR has been awarded an LAN Net certificate while WA5VGD is with Uncle Sam's CG in the Caribbean. WA5VMO is most active with LAN. WA5LGO is showing his new Extra Class license. K5ANS/5, our FB RM, also is LAN Mgr. Up Monroe way the Twin City hams have started a Novice Class with 30 enrolled! W5JYA is active with Navy MARS and the Delta S.S.B. Net and has returned from a trip to Jamaica. W5MXQ reports the Jefferson ARC has 6-meter code practice Mon., Thurs. and Sat. W5EA is active on 40-meter c.w. WA5QVN is signing up many of the gang in the AREC. W5LQ, an OOTC from Shreveport, is active again mostly on 80-, 40- and 20-meter c.w. W5NMS is sporting a new receiver. W5BBV is all hep over flying. Many of the GNOARC gang assisted in communications to help the Police during the MardiGras Parades. WA5PDJ has a new electronic keyer, while W5NOH has completed a solid state converter. W5FMO is polishing up his fishing gear indicating spring is here. K5JBC still is chasing that elusive DX. W5BV is again most active on s.s.b. Traffic: W5MI 434, W5MXQ 89, W5CEZ 87, K5ANS/5 71, WA5WBZ 24, W5EA 12, W5PM 9, WA5QVN 9, W5JYA 2, WA5IJG 2.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—W5PPB is recovering nicely from a heart attack. K5ZFM has his new quad up but reports it worked better on the clothesline post than on the tower. WA5TUD drove 190 miles looking for two 82K 2-watt resistors with no luck. That fellow who forgot that his electric drill could trip his VOX sure has a good signal. He found out what was happening just in time to keep from being reported to the FCC monitoring station. We welcome K5FZX back on the air on S.S.B. WA5TUD may be portable again by the time you read this. The expected new QTH will have enough room for an antenna farm. W5BW's 39-year-old Phosphor Bronze antenna is arousing much interest. The MSBN Winter Picnic was held for the first time in the southern part of the state. Thanks to K5HYE for the leg work. The updating of our field organization is in progress now. Those who were left out or feel that their toes were stepped on are asked to please write the SCM.

Gulf Coast Side Band Net	3925 kc.	Daily	2330Z
Miss. Side Band Net	3990 kc.	Daily	0015Z
RACES	3987.5 kc.	Sun.	1345Z

Traffic: WA5FII 181, W5BW 105, K4RIN/5 90, WA5-SIM 11, WA5JWD 5, WA5SEG 5.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. PAMs: W4PFP, WA4YBT, WA4EWW, WA4CRU. RM: WB4GSS.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980Z	Tue.-Sun.	0030	27	1233	151	WA4YBT
TPN	3980	M-Sat.	1245	28	1100	83	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	20	547	9	WA4EWW
TCN	3980	Thurs.	0200	4	53	0	W4TYV
TPON	3980	Mon.	0030	4	140	23	K4RTA
TTN	7290	Daily	2200	28	346	115	WA4CRU
TN	3635	Daily	0100	28	149	43	WB4GSS
ETVHF	50.4	TuThSat.	0000	12	234	0	WA4TJJ
ETVHF	145.2	W & F	0000	8	61	0	WA4TJJ

WB4GSS has been appointed RM. Our thanks to WA4YEM for a fine job. Anybody interested in a slow-speed c.w. training net? If so, drop me a line or a message to K4RCT, Memphis. The RATS of Nashville and the Greenville ARC are working with Explorer Scouts. MARA (Memphis) joined the Tenn. Council of Clubs. An all-out CD party battle is in the making between K4AMC and K4PUZ, who is planning an antenna farm at his new QTH. W4SKH, Oak Ridge Radio Operators Club, operated at the Tenn. State Women's Bowling Tournament and provided on-the-spot message service for the ladies and chalked up another score for amateur radio. Make your plans to attend the Humboldt Hamfest, June 8, and the Crossville Hamfest July 19-20. Traffic: W4OGG 236, K4AT 183, W4SQE 143, WA4UAZ 140, W4WBK 78, W4SKH 61, WB4GSS 49, WA4YSX 44, W4KQL 42, WB4JFT 40, WB4JZE 34, W4PFP 28, WA4CRU 22, WB4GTI 21, WA4NEC 17, WB4HYY 14, WA4CGK 12, K4MQI 12, WB4HSS 11, WB4EHK 10, WA4GLS 10, WB4ANX 9, W4TYV 9, K4UMW 9, W4YKN 9, WA4ZXZ 8, WA4-BXH 6, WA4EWW 5, WA4YON 5, K4AMC 4, WB4-DGI 3, WA4YFG 2, W4VJ 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, George Wilson, W4OYI—SEC: W4VYS. Endorsed: K4FPW as OVS and OBS; K4-CSH, K4YZU, WA4GMA, WB4BTM as OPSs; K4-NYO, WA4WWT, WA4DYL as ORSs.

Net	*Freq.*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	1130	376	51	K4KIS
MKPN	3960	1330	449	104	K4TRT
KTN	3960	0000	922	249	WA4AGH
KYN	3600	00+0300	473	647	W4BAZ
FCATN	50.7	0200	156	74	W4OTP

Louisville's Kenvention will be held Aug. 29-30 at Stouffers Downtown Motor Inn. K4YZU is chairman. Henderson has a Novice class going. The Armed Forces netted one with WB4FOT and WA4YXC going in and K4DMU coming out. New Kentuckiana RC wheels: K4FJK, pres.; K4FLP, vice-pres.; WA4UDK, secy.; K4KZH, treas. WA4UIH is now Advanced Class. The Owensboro Club/RACES station has changed its call to K4HY in memory of Jeff, our late SCM. The Unlimited Hydroplane Race in Owensboro June 15 will call for about 20 stations, about 16 of them afloat. Kentucky hamming is on the move. We have all-time highs on such important barometers as number of EC's (18), number of AREC registrants (252) and enthusiastic, active appointees (73 individuals with 95 appointments). Keep those cards and letters comin', folks! Traffic: (Feb.) WA4DYL 714, W4NLO 293, W4-BAZ 291, WA4VUE 236, WA4UIH 214, K4YZU 161, K4MAN 111, K4TRT 109, WA4AGH 104, K4HOE 86, WB4HQW 81, W4NBZ 77, W4OYI 67, WB4EDK 61, WB4DQM 58, WA4VZZ 58, W4UK 55, WA4GHQ 41, WB4EOR 35, WB4EQY 31, W4KJP 30, K4VDO 28, W4ADO 23, W4OTP 23, K4AVX 21, WA4MXD 18, K4-UMN 18, K4SWL 16, W4BTA 15, WA4UHR 12, K4-YCB 12, WB4IZX 11, W4SZB 11, WA4MEX 7, WB4-HTN 6, W4MWX 4, WA4WWT 3, WB4GCV 1. (Jan.) WA4WWT 153, K4AVX 70, K4TRT 47, K4SWL 38, W4ADO 9, WB4GCV 3.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ, W8IXJ. PAMs: K8GOU, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8BEZ, W8HKT, W8IZ, K3KRX/8, W8NOH, W8YAN as ORSs; W8TIC, W8YAN as OPSs; W8NOH, W8FWF as OVSs; K8AYJ, WA8YTL as OBSs. K8DX's XYL Edna, recently passed away.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Dy	926	542	83	W8FWQ
WSSB	3965	0000	Dy	802	146	28	K8WRJ
PON-DAY	3935	1600	M-Sat	2510	523	24	K8LNE
BR/MEN	3930	2230	M-F	844	168	24	K8LJS
GLETN	3932	0230	Dy	857	124	28	WA8ONZ
M6MTN	50.7	0000	M-Sat.	455	40	23	WA8LRC
PON-CW	3645	0000	M-Sat.	67	11	24	VE3DPO

Your new SCM is Joseph L. Pontek, K8HKM, P.O. Box 288, Holt, Mich. 48842. Thanks for 10 years of good cooperation. Send K8HKM all your Form 1 traffic reports, net reports and club bulletins. New of-

(*Continued on page 106*)

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CN-220 Conv(14-18) 29
CN-220 Conv(50-54) 29
PCLP Preamp 19
PS-1 AC Supply 8
TX-86 Transmitter 39
TX-62 VHF Xmtr 109

AZTEC
876 DC Supply $ 25

B&W
5100 Transmitter $ 89
6100 SSB Xmtr 275

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100V Transmitter 325

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416 AC Supply 75
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75A-4 (ser. #3159) 425
75A-4 (ser. #4244) 449
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75S-1 Receiver 325
75S-3 Receiver 425
75S-3B Receiver 495
R-390A Receiver 995
32S-1 Xmtr 395
32S-3 Xmtr 575
30L-1 Linear 375
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KWM-2 Xcvr 750
351D-2 Mount 75
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516E-2 28v Supply 95
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2CS Speaker 12
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R-4A Receiver 299
R-4B Receiver 325
TR-3 Xcvr 375
AC-3 AC Supply 65
DC-3 DC Supply 95
MN-4 Matcher 69
2NT Xmtr 99

EICO
720 Xmtr $ 49
723 Xmtr 34
753 Xcvr 139
751 AC Supply 49
752 DC Supply 49

GLOBE/GALAXY/WRL
SB-175 SSB Xmtr $ 59
755A VFO 34
PSA-300C AC Sup 40
Galaxy V Xcvr 249
Galaxy V Mk II 269
Galaxy V Mk III 299
AC-400 AC Supply 75
AC-3S AC Supply 65
DC-3S DC Supply 69
SC-3S Speaker 12
DAC-3S Console 75
F-3 300 cy. filter 24
UM-1 Modulator 29
SC-530 Speaker 29

GONSET
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Comm IV 2m 199
6m Linear II 69
6m Linear III 85
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910A 6m Xcvr 199
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G-77A Xmtr 59
GSB-100 Xmtr 169
GSB-101 Linear 169
6m 12v Converter 29

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SX-100 Receiver 139
SX-101 Mk I Rec. 125
SX-101 Mk III Rec. 149
SX-101A Rec. 189
SX-110 Receiver 99
SX-111 Receiver 129
SX-115 Receiver 299
SX-117 Receiver 225
SX-122 Receiver 225
SX-130 Receiver 149
SX-140 Receiver 69
SX-146 Receiver 199
R-47 Speaker 9
R-50 Speaker 12
HT-32 Xmtr 225
HT-32A Xmtr 249
HT-32B Xmtr 299
HT-37 Xmtr 225
HT-44 Xmtr 225
SR-150 Xcvr 289
SR-160 Xcvr 175
SR-42A 2m Xcvr 139
SR-46 6m Xcvr 79
HA-26 2-6m VFO 39
HA-10 LF tuner 19

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HQ-170A/VHF Rec 289
HQ-170AC/VHF 299
HQ-170AC/VHF w/immunizer 325
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HX-50 Xmtr 199
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SBA-300-3 6m Conv 15
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DX-60 Xmtr 59
DX-100 Xmtr 99
TX-1 Xmtr 125
SB-10 SSB Adaptor 75
HX-10 Xmtr 225
HA-10 Linear 175
HX-20 Xmtr 139
HA-20 6m Linear 95
HW-12 75m Xcvr 99
HW-32A 20m Xcvr 89
HW-100 Xcvr 225
SB-100 Xcvr 325
SB-101 Xcvr 349
SB-110A 6m Xcvr 295
SB-400 Xmtr 275
SB-200 Linear 219
HP-14 DC Supply 75
SB-630 Control 59
VF-1 VFO 19
HG-10 VFO 29
HW-10 6m Xcvr 139
VHF-1 Seneco 149
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HP-13 DC Supply 49
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Mob.Xmtr (as-is) 25

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NCX-5 Xcvr 34
NCX-5 Mk II Xcvr 49
NCXA AC Supply 7
NCXD DC Supply 7
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400 Xcvr 22
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410C VFO 8
350 Xcvr (early) 24
350 Xcvr (late) 23
SW-117C AC Supply 7
512 DC Supply 7
500 Xcvr 35
500C Xcvr 39
117XC AC Supply 8
14-117 DC Supply 10
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250C 6m Xcvr 29
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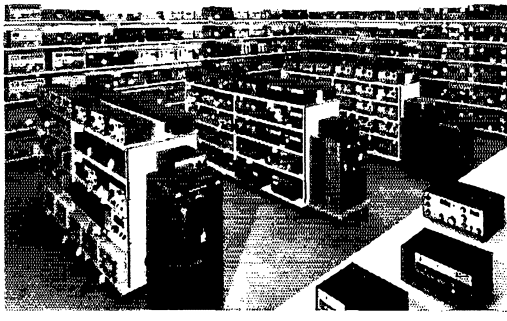

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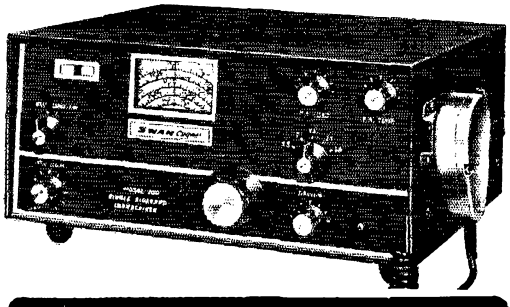

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610.01 to	640.	21
640.01 to	670.	22
670.01 to	700.	23
700.01 to	730.	24
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ficers: Genesee County RC—W8YMA, pres.; WA8WGK, WA8NSD, W8IFK, WA8POB, vice-pres.; K8BPQ, secy.; K8KMQ, treas. Van Buren County ARC—WA8QHI, pres.; WA8YYI, vice-pres.; WA8PRJ, secy.; WA8QGV, treas.; W8NRX, W8RWK, W8GVC, board. Stu Rockafellow ARS—WA8TLW, pres.; WA8BVP, vice-pres.; WA8UJZ, secy.; WA8WJX, treas.; WA8WME, WA8SNK, K8YNV, K8VQP, W8MWG, board. W8AXN heard wedding bells. W8RWK/WA8ZXN have a new jr. operator. New Extra Class licensees: K8VQP, WA8RJZ. W8TIC is back on the air with a 20A exciter and a linear. WN8CMQ has HW-16 transceiver, 80/40 dipole and 15 vertical. The CMARC had some trouble getting its repeater license. W8HID moved to Utica. K8EQC has a new Valiant and an HW-12. W8OHS has a new Clegg 22er. WA8NYK and WA8SIQ worked WB4JMP (ex-WA8VGA) at Sun City, Fla., on 15. BPLers: WA8WZF, K8LNE, K8ZJU, WA8WGM. W8IXJ has been hospitalized with a stroke, but is improving. K8CKD is instructor in Mason County RC classes. K8CJQ moved to High Hill near Allegan, with WA8VGQ helping operations. W8AAM is getting set for retirement. K8HLR is using invisible antenna from the apartment. Silent Keys: WA8DBN, W8MID. Traffic: (Feb.) WA8WZF 723, K8LNE 535, K8ZJU 259, K8KMQ 213, W8JTQ 201, W8GAI 147, W8NOH 130, WA8SQC 129, WA8QGI 125, WA8WGM 125, K8MXC 123, W8EU 120, W8IZ 118, K8GOU 90, K8JED 78, W8MO 72, W8FX 54, W8DSE 53, WA8OGR 47, W8RTN 38, W8BEZ 30, WA8INZ 27, W8YAN 25, WA8ZPH 25, W8SCW 20, W8IUC 19, W8SS 12, K8QLL 10, WA8LRC 8, W8MPD 8, W8TBP 8, W8FWQ 7, WA8VBL 5, K8VDA 4, K8CJQ 3, WA8VGQ 3, W8AAM 2. (Jan.) K8HLR 99.

MICHIGAN QSO PARTY

May 17-18, 1969

The Central Michigan Amateur Radio club is pleased to announce the second annual Michigan QSO Party to run for 24 hours, from 2100 GMT May 17 to 2100 GMT May 18, 1969.

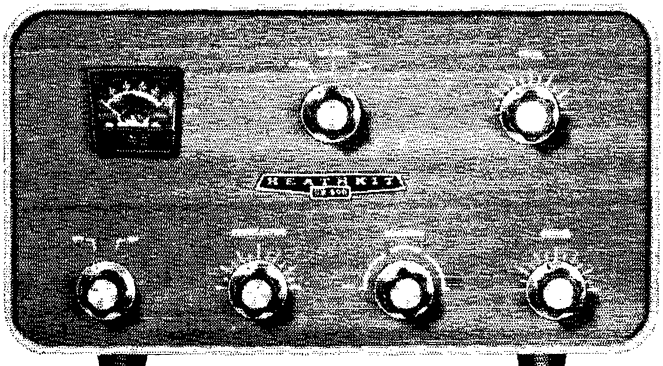
Rules: The same station may be worked on c.w. and on phone on each band. Call CQ Mich with Michigan amateurs signing de Mich or this is Michigan. Michigan stations send RS(T) and a three digit serial number starting at 001 and county. All others send RS(T), the three digit serial number starting at 001 and state, province or country. Score one point per contact (Michigan stations may work other Michigan stations). Michigan multiply by states, provinces and non W/VE countries (includes Mich.). Others multiply points by the number of different Michigan counties (83 maximum). Certificates will be awarded to the highest scoring stations in each state, province and non-W/VE. Michigan stations will compete for first-place trophy and 2nd thru 5th place certificates. A trophy will also be awarded to the highest out-of-state score. Suggested frequencies are (c.w.) 3560 7060 14060 21060 28060, (phone) 3930 7235 14240 21310 28650 50400 52525 145000 and 146940. Logs showing dates, times, stations worked, exchanges, bands, modes, location and final score must be mailed no later than June 30, 1969. Send logs to the Central Michigan Amateur Radio Club, P. O. Box 73, Lansing, Michigan 48901.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst SCM: Roger Barnett, K8DGG. SEC: W8OUU. RM W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU. Feb net reports.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time*	*Mgr.*
OSSBN	1742	1310	55	3972.5	1430 & 2245Z	K8UBK
BN	564	529	55	3580	2300 & 0200Z	W8IMI
O6MtrN	283	76	28	50.61	2300Z	WA8ADU
OSN	176	69	27	3580	2225Z	WA8VNU
APRICOT	280	289	28	51.0	0000Z	K8ONA

This month's column was written by K8DGG. W8ETU has returned from HS-land and is resuming his duties as SCM. Please note that net times are listed one hour earlier in GMT (same time local) because of Daylight Saving Time. New Novices: WN8CQC, WN8CZZ, WN8CQE, WN8CQF, WN8CUL. New Techs.: WB8CQC, WB8CQE, WB8CQF. New Advanced Class: WA8YXE and W8DDY. New Extra: W8IBX. Congratulations to those dedicated clubs and

NEW Heathkit® SB-500 2-Meter Transverter



Only $179.95*

• Provides complete 2-meter capability for SB-101, SB-110A, HW-100 and the SB-301/401 combination • USB, LSB & CW operation • 144 to 148 MHz coverage • 130 watts PEP input . . . 50 watts PEP output • Highly sensitive receiver • Fast, easy tuning • No cable switching • Handsome SB-Series styling

Now, in answer to many requests, Heath has a fast, low cost way to put you on two meters . . . without having to buy a whole new rig. If you own an SB-101, SB-110A, HW-100 or the SB-301/401 combo, you're almost there. Here are the details on how to get on "2" — the SB-500 way.

Here's How It Works. In the receive mode, the SB-500 takes an incoming 2-meter signal and heterodynes it to either 6 or 10 meters, where the low band gear handles it in the usual way. On transmit, a 28 or 50 MHz driver output is heterodyned to 2-meters, amplified and coupled to the output.

Here's What It Delivers. When used with any of the gear above, the SB-500 2-Meter Transverter gives you complete 2-meter SSB or CW transceive operation from 144 to 148 MHz. A pair of inexpensive 6146's in a push-pull AB1 circuit deliver a husky 50 watts output into a 50 ohm nonreactive load. Final plate voltages are derived from the driving unit, but all other operating voltages come from a built-in power supply — no extra supply to buy. Receiver sensitivity is 0.2 uV for a 10 dB S+N/N ratio... that means solid copy QSO's. A front panel on-off switch places the SB-500 into operation or allows the low band gear to operate straight through to an antenna or drive a linear . . . a combination of complete rear apron jacks and internal relay switching eliminates troublesome cable changing. Reliable relay-controlled T/R switching too. Tuning is fast and easy, and a built-in meter monitors either final plate current or relative power. ALC voltage is supplied to the driver to aid in preventing over-driving and distorted signals. A built-in 1 MHz crystal calibrator is also included.

Solid, Stable Construction. The sensitive receiver and oscillator go together on well planned circuit boards. To insure stability and make adjustment more exact, the transmitter and power supply components are ruggedly chassis mounted. The SB-500 comes complete with all interconnecting cables too. Start enjoying the QRM-free world of 2-meters today . . . with the new Heathkit SB-500 . . . another hot one from the hams at Heath.

Kit SB-500, 19 lbs.....**$179.95***

SB-500 SPECIFICATIONS — RECEIVER: Sensitivity: 0.2 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Spurious Response:** All are below 0.1 microvolt equivalent signal input, except at 145.310 MHz (50 MHz IF only). **Antenna Input Impedance:** 50 ohm unbalanced. **TRANSMITTER: DC Power Input:** 130 watts PEP. **Power Output:** 50 watts (50% duty cycle). **Output Impedance:** 50 ohm with less than 2:1 SWR. **GENERAL: Frequency Range:** Any 2 MHz segment between 144 & 148 MHz into 50 MHz or 28 MHz tuned IF. **Mode of Operation:** SSB or CW only. **Power Requirements:** (1) 120/240 VAC, 50/60 Hz at 82 watts (internal). (2) 700 to 800 VDC at 200 mA (from driving unit). **Fuse:** ¾ ampere slow-blow for 120 VAC (formerly 3AG); ½ ampere slow-blow for 240 VAC. **Front Panel Controls:** Meter-calibrate switch, final tuning, off-on (function) switch, preselector, final loading, driver tuning. **Chassis Controls:** Relative power adjust & bias adjust. **Rear Apron Connectors:** RF output, ALC, linear relay, relay, drive, power plug, low f receiver, low f antenna, fuseholder. **Tube Complement:** 6CB6 transmitter mixer, 6CB6 crystal calibrator, 6DS4 receiver RF amplifier, 6DS4 receiver mixer, 12GN7 transmitter RF amplifier, (2) 6146 final amplifiers, (types 6146A or 6146B may be directly substituted), 7059 heterodyne oscillator-amplifier, 8156 RF driver, 0A2 voltage regulator. **Diode Complement:** 5 silicon diodes, 750 mA, 500 PIV; 3 in power supply, 2 in ALC. 1 Germanium diode, IN191: REL PWR. **Cabinet Dimensions:** 12¼" W x 6⅝" H x 13" D. **Overall Dimensions:** 12¼" W x 7-15/16" H x 14" D including knobs and feet. **Net Weight:** 14½ lbs.

FREE '69 CATALOG

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instructors offering classes including: Greater Cincinnatti ARA with W8UQI, K8CKI and K8CKJ; Lancaster and Fairfield County ARA; DeVilbiss H.S. with WA8ZFL; Urbana ARC with W8SXQ; Dayton ARA with K8SPC; Inter-City RC with W8EMK and W8VTP; and Columbus ARA with W8ELE. No doubt there are many others. Any omissions are unintentional. The Canton QCWA held a dinner meeting and honored W8HR and his XYL on their 52nd anniversary. New officers of the Lake Geauga ARC are W8GQU, pres.; WA8TNG, vice-pres.; W8EFB, secy.-treas.; W8LAG, act. mgr. WB8AHY is new secy. of the OSU ARC. The Inter-City RC had its annual auction with 150 attending. Local nets include: Sunday Noon Naggers on 50.4 at noon in the Atwater area; Stark County Mutual Aid Net on 28.8 at 11:45 A.M. WA8OCG is working on a 3-400Z kw. final. W8AN was heard in G-Land on 160 phone. W8UX helped K8UBK on MidCARS when UBK's car broke down on a lonely highway. WA8RUO says WA8TZJ made WAS. Incidentally, WA8RUO says he had a great time in his first SET. He has been named "Ham of The Month" by the Treaty City ARA's *Beam*. The Buckeye Net is sponsoring an Ohio QSO Party. Details Apr. *QST*. WA8RQQ says OSU and work leave little time for traffic. W8GDQ worked 6YQA, and HKOTV on 160. K8PBE says AREC membership is slowly growing. WA8YHN and WA8TYF report aurora openings on 2 and TYF now has 32 states on 2. Lancaster ARA will hold a hamfest June 8. W8EPA is a welcome addition to OSSBN from Gallipolis. We have received several inquiries about appointment as ORS, OPS, OBS, OVS and OO. These appointments provide a means of recognition for service to other hams and to the public. Anyone interested should send a card or message to W8ETU for application. New net certificates: BN to WA8ETX and WB8AKW; OSN to WA8WAK. Traffic: (Feb.) W8UPH 3004, W8RYP 509, W8SZU 402, WA8DWL 263, WA8ETX 232, WA8LAM 232, WA8BZX 221, W8IMI 208, W8QCU 208, W8GVX 177, K8ONA 161, W8OUU 154, W8ERD 147, WA8PPK 134, WA8DUL 132, WA8FSX 126, W8UDG 120, WA8UTX 107, W8CHT 92, W8QZK 92, WA8ULF 89, K8UBK 85, W8LT 70, W8GNL 69, W8PMJ 67, WA8GRR 66, W8OE 66, W8GOE 65, W8LRE 65, WB8AKW 56, W8NAL 54, WA8VNU 51, WA8MHO 49, WA8ADU 48, WA8FZS 48, K8DDG 43, W8FRV 43, WA8UPI 43, WA8QFK 36, WA8SHP 35, W8DAE 31, WA8ETW 26, W8FGD 26, W8UX 26, K8PBE 25, WA8YHN 23, W8WEG 21, WA8CXV 20, K8OHJ 20, W8GRG 20, K8CKY 19, W8WDU 19, WA8RQQ 18, WA8JSW 15, W8LZE 14, W8LAG 13, WA8QHG 13, W8CXM 11, W8TV 11, W8HII 10, W8IO 9, W8QXQ 9, WA8KPN 8, WA8WJR 8, WA8AJZ 6, WA8CFJ 6, K8LFI 5, WA8BZR 4, WB8CHW 4, WA8JEH 4, W8DYF 2, WA8MCR 2, WA8PZJ 2, WA8RUO 2. (Jan.) W8SZU 238, WA8PZJ 28, WA8RQQ 16.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN-Asst. SCM and RM: Ruth E. Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB. *Section nets:* NYS, 3675 kc. nightly at 0001 and 0300Z; ESS, 3590 kc. nightly at 2300Z; NYSPT&EN, 3925 kc. nightly at 2300Z; NYPON time correction to 0300Z. *Club notes:* RPI (W2SZ) lists W2DVQ as pres.; WB2DRW, vice-pres.; WB2ECU, secy.; K1BVM, treas.; WB2EXP, equipment supervisor. The s.s.b. room at W2SZ now boasts tiled ceiling and wall-to-wall (almost) carpeting, with plans for new windows, sliding door and panelled walls being worked on. The Hudson Council (HARC) reorganization under new Pres. K2SPO is aimed at more inter-club service for council members. In New Rochelle, the CCNR had W2CYK/W2LH speak on antenna theory and operations of its Feb. meeting and is now conducting its 10th year of license training covering Novice through Extra theory. The Westchester Club's (WARA) Feb. speaker was W2KFB on "What Makes a Good S.S.B. Signal." Poughkeepsie ARC's Officers are WB2YQU, pres.; WA2STH, vice-pres.; WB2DCH, secy.; WB2PED, treas. WB2RBG reports the Albany Club had a demonstration on slow-scan and normal-scan amateur TV in Feb. *Station activities:* WA2JGL is installing new equipment for the Order of Holy Cross Radio Club (WB2AAL) at the monastery in West Park. Look for their world-wide net on 12.255 kc., 1900 GMT Sat., linking the Episcopal monks with their mission in Liberia, school in Tennessee and chapter hourses on both coasts. W2PV has a new tri-bander up. WB2YQU is having trouble with the 2 meter FET converter from the *Handbook*. A call for help was received via the W2CUT repeater but handled from Albany. The Feb. 2 aurora added two new ones, W9 and VE1, to WB2YQU's 17-state 2-meter total. W2SZ made the first 220-Mc. contact. K2RRZ is back from ski trip. WB2DXM is active in traffic nets from Albany. WA2VEQ

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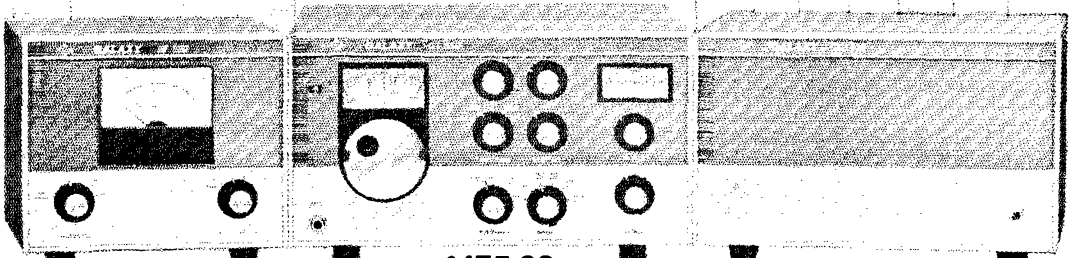

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You asked for it...now it's here! The new GALAXY GT-550 and a complete line of handsome matching accessories!

Your suggestions made it possible. We took your ideas—added some of our own and went to work. We built in new power, new conveniences—*such as a 25 kHz calibrator option, and no frequency jump when you switch sidebands.* Then we hired the best designers in the business to give GALAXY a distinctive "New Look"!

Our new GT-550 has all those great qualities of the famous Galaxy V's ...and then some! **It has new POWER...550 watts SSB,** making it the hottest transceiver made! **A new single scale VFO Dial** makes frequency interpolation child's play...the **new skirted knobs** make tuning and band-changing a split-second job...and, **that slick, king-sized finger-tip tuning knob** works like a dream! *Compact—only 11¼x12⅜x6"!* $475 Amateur Net.

P.S. Sounds unbelievable but it's an even HOTTER receiver than our previous Galaxy V's!

Space prevents telling you all about the handsome, matched accessory line. Write for a free brochure that's loaded with exciting news!

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is quad-less after the big snow. Traffic: (Feb.) WA2BHN 968, W2EAF 153, WA2CRW 141, WA2VYT 123, WA2JWL 55, W2JKI 47, WB2VJB 44, WB2IYO 42, K2SJN 28, WA2BUF 21, WB2RBG 19, WB2DXM/2 14, WB2FOA 11, W2TPV/2 2. (Jan.) K2HNW 6.

EDUCATIONAL INSTITUTIONS RADIO CLUB QSO PARTY (School and College)

May 5-10, 1969

All amateurs are invited to participate in the First Annual Educational Institutions Radio Club QSO Party, sponsored by the Mount Vernon High School Radio Club, K2VSU. The party has been planned to encourage active operation by all school (elementary through college) radio clubs, and to promote recognition of the tremendous stimulus to the fraternity by these organizations. It will also give many of the clubs' recently licensed Novices some concentrated operating experience both at school and home stations.

Rules: Time will be from 1500 to 2300 GMT each day, May 5 through 10. The general call will be CQ RC. Participating clubs will sign 'de (call) RC K.' Exchange QSO number (clubs prefix with "C" for positive identification), RST and ARRL section. At least one side of each QSO must be with a participating club station. For scoring purposes, a complete exchange with a club station is worth 5 points, an individual station is worth 2 points. Multiply by the number of ARRL sections and countries worked. (A station may be worked only once per band). A 100-point bonus will be awarded by the contest committee to each club that works from its school with assigned call. Frequencies suggested because of the predominance of Novices) are at or near 3725 7175 and 21175 kHz, c.w. only. Higher-grade licensees may use 3575 7075 14075 and 21075. Certificates will be awarded to the highest scoring station in each state, province or country. Second and third place awards will be issued if, in the opinion of the contest committee, the number of entries warrants it. Logs must show dates, times, stations worked, band, sections, RST and QSO numbers, with computed final scores, must be signed and postmarked no later than June 2, 1969. (Club logs must include signatures of the Trustee and club president.) S.a.s.e. required for results and appropriate certificates. Send all information to Mr. C. Andrew Randall W2EY, Trustee, Mt. Vernon H. S. Radio Club, 100 California Road, Mt. Vernon, New York 10552.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3630 kc.	1915/2200 Nightly	K2UAT	RM
NLIVHF*	145.8 Mc.	1930 MTWTF	WB2RQF	PAM
NLIPhone*	3932 kc.	1600 Daily	WA2UWA	PAM
Clear Hse	3925 kc.	1100 Daily	WA2GPT	Mgr.
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG	Mgr.
East US	3683 kc.	0001 Nightly	K2UBG	Mgr.
All Svc	3925 kc.	1300 Sun.	K2AAS	Mgr.
NYSPTEN	3925 kc.	1800 Daily	K2SPO	Mgr.

**Section Nets All times shown above are local.*

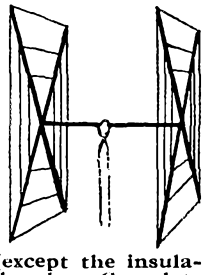
The "Thought of the Month" sallied forth from the writings of WA2RZZ, editor of the *Huntington RACES Bulletin*. It goes like this, "Message handling is probably one of the most underestimated tasks that exist—it is really an art!" Isn't that a bodacious truth? Our beloved old Director once said, "Traffic-handlers as a rule; are not born but come from school." Although he frequently talks in rhyme, the simple truth is practice makes the artisan. Won't you join one of the above nets and get in on the practice? K2UBG allows that holidays, state fairs and antennas creaking under a heavy snow load turned the month into frantic Feb. WB2RQF should be safely ensconced in the new QTH by now. WB2YKU was appointed Asst. PAM for the NLI Phone Net by WA2UWA, the new PAM. WA2RUI is back from his visit to California. WA2JZX still is setting up in the new QTH. K2JFE reports on Staten Island ARA's operation "Ferryboat." W2KWN is busy mobiling through W3- and W4-Land. K2RIW and W2TVN are teaching license upgrading classes for the Suffolk County RC. K2JDH, WA2KEC and WB2WLV

GOTHAM ANTENNAS ARE MUCH BETTER OF COURSE, YOU PAY MUCH LESS

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 16 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—



CUBICAL QUAD ANTENNAS—these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

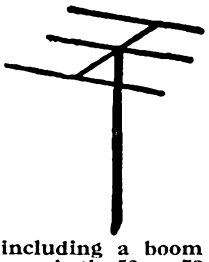
Now check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD.	25.00
FIFTEEN METER CUBICAL QUAD.	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS!WN4DYN



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$19	4 El 10	$18
3 El 20	25*	7 El 10	32*
4 El 20	32*	4 El 6	18
2 El 15	15	8 El 6	28*
3 El 15	19	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

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are to be congratulated on making the Advanc Class. The same goes to WA2YOU. And, there also WN2IEM, who passed the General. Sun., May 18 "Worked TuBoro Radio Club" Day. There will be f certificate for working five members on 2, 6 or meters. WB2DRW was elected vice-pres. of the R Radio Club (W2SZ) up in Troy, N.Y. WB2WFJ back on the air with an SB-100. The Huntington C. alerted all three of its nets during the Feb. sn blast. WA2FNQ and WB2TDK have picked up th Generals and zinged on down to all those good General-type bands. WB2ZIT moved into a new QT over East Northport way. K2JWT blew the tran mission out of the old 1932 Buick mobile. WB2GS is in the Navy operating radio aboard the U *Cambria*. W2HAE says there were more hams over Harrison's on Washington's Birthday than show up most manifests. It's encouraging to see the Radio Cl of Brooklyn continuing to make gains in its drive rebuild. WB2DJQ also made General. Congratulatio K2UBG presently is installing a portable 110V ge erator at the QTH and can't wait to start chantin "Who's afraid of the big bad blackout!" Traff (Feb.) WA2UWA 2200, K2URG 463, WB2RQF 182, K UAT 163, W2EW 118, WB2YKU 91, K2AAS 74, WI AEK 74, WA2RUI 38, WB2WFJ 25, W2EC 14, WA GRJ 11, WA2EMP 9, WA2JZX 7, W2DBQ 5, K2JFE WA2BRF 3, WB2NLM 3, WA2QJU 2, W2JTZ 1.

NORTHERN NEW JERSEY—SCM, Louis J. Am roso, W2ZZ—SEC: WA2ASM. RM: WB2RKK. PAM W2PEV, K2KDQ, WA2KZF and WA2TBS.

ARPSC Section Net Schedules

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJN	3695 kc.	7:00 P.M.	Dy	—	—	—	—
"	"	10:00 P.M.	Dy	56	231	311	WA2BI
NJSN	3740 kc.	8:00 P.M.	Dy	21	44	14	WB2RI
NJEPTN	3929 kc.	6:00 P.M.	M-Sat.	28	632	355	W2PE
NJAN	50,300 kc.	8:00 P.M.	M-F	22	259	47	WA2K
PVTEN	145,710 kc.	7:30 P.M.	Dy	28	363	310	K2KD
ECTN	146,700 kc.	9:00 P.M.	Dy	28	230	185	WA2TI

Endorsements: WB2RKK as RM for NNJ and OI K2KDQ as PAM for PVTEN. W2DMJ as EC Wood-Ridge. K2KDQ as EC for Passaic and W2T as EC for Blairstown. W2TPJ, W2BVE and K2BMI OOs. All appointees are requested to check the da on certificates and forward to me if overdue. WB2B reports that the group at K2USA is now conduct code and theory classes Wed. at 1930 and Sat. at 1 local time. We wish to welcome to our ranks WN2I in Chester and WN2ITX in Dumont. We also hope hear you on for a QSO. Congratulations to WA2D and WB2QJI on passing the Extra Class; K2IBF WA2BCN on passing the Advanced Class and to WN GTV on passing the General Cass exam. This ye NJAN winter meeting was held at WB2JCI's QT WB2QJI reports working lots of DX on 15-meter c W2CVW operated in the 160-Meter Contest. W2P is working over his Model 25 for the RTTY N W2ZZ and WB2DRJ are now on t.s.k. and will be 2-meter a.f.s.k. shortly. W2JDH is building an 811 kw. WN2IHV is using the DX-20 and HQ-170 at station. The East Orange High School ARC is on with the S/Line. The club officers include WN2D. pres.; and W2SUE, advisor. The Bergenfield H School ARC's officers are WB2EZI, pres.; WA2E vice-pres.; WN2FIV, secy.; WA2UZS, advisor. school station includes the KWM-2 and TA-33 be OO reporting for Feb. shows W2TPJ with 51 obser tions, W2BVE with 25 and K2BMI with 15. If you interested in this work, please contact your SC Traffic: (Feb.) WB2RKK 1138, WA2TBS 315, WB2F 306, WA2TAF 231, WA2WID 216, K2KDQ 188, W NSV 164, K2DEL 154, WB2AMV 125, K2HHT WA2BAN 108, WB2DDQ 102, WA2ACJ 90, W2PEV WA2CAI 69, WB2BXK 63, WB2WNZ 54, WA2EUX WA2CCF 47, W2ZZ 43, WA2DRH 42, WA2BAU WB2YXY 38, WA2GLI 35, WA2ACP 32, W2CVW WA2NJB 28, WB2ZSH 23, WA2CLO 22, WA2KZF K2PBP 19, WB2YPQ 16, W2TFM 10, K2MFX 9, EWZ 8, K2JSJ 5, K2ZFI 5, WA2ZIE 5, WB2JRT WA2EUO 2, WB2DRJ 1. (Jan.) WB2AMV 143, W YXY 141, WB2YPQ 55, W2CVW 48, WB2HEO WA2GIE 28, W2JDH 22, WA2ZDA 22, WB2TUL WB2CLI 13.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson. KØMHX—SI KØLVB. PAM: WØPZO. RM: WØLGG. OBSs: W LCX, WØJAQ, WØCXN, WØSEF, WAØMIT. UVU was hospitalized recently and is now doing Congratulations to WØLUA, who is now WØ WAØJZX also has his Extra Class license. WØGQ

First class or tourist... Swan gets you there loud and clear.

THE SWAN 500C

5 BAND — 520 WATT TRANSCEIVER SSB-AM-CW HOME STATION — MOBILE — PORTABLE

You're really operating 'First Class' with our 500C. It combines all the features you require to have a complete SSB-AM-CW transceiver with performance, quality, and reliability second to none.

The P.E.P. input rating is conservatively rated at 520 watts, but actually, with the pair of 6LQ6 blast rated tetrodes in the final amplifier stage, peak input exceeds 570 watts before flat-topping. With this kind of power, S-9 signal reports from the far corners of the world are commonplace. Audio quality of the 500C is definitely superior to most other transceivers on the market today. This is due to the high frequency crystal lattice filter used in the 500C that is made especially for us by C-F Networks. This filter provides excellent channel separation, combined with the smooth, natural voice quality for which the Swan 500C is so well known. Velvet smooth dual ratio tuning is achieved with our custom machined planetary drive, machine tooled to extremely close tolerances. Refinements of the Swan VFO have resulted in superior mechanical and thermal stability and more precise dial calibration. For the CW operator, the 500C includes a built-in sidetone monitor, and by installing the SWAN VOX accessory, you will also have break in CW operation.

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elected pres. of the Cedar Valley Club. WØEIT built a 5- and 10-Mc. WWV receiver from a recent *QST* article. WØPFP advises that the Story County Club has a new club call, WØYL, in memory of W. L. Cassell, former holder of the call. The AREC meets Sun. at 1900Z on 3977 with KØLVB. Each of four areas alternate as host. Some areas are contemplating 2-meter f.m. for AREC work. It's time to get your reservations and registration in for the National Convention in Des Moines June 20-22 if you have not already done so.

Net	*Freq.*	*Day*	*GMT*	*QNI*	*QTC*	*Mgr.*
Iowa 75	3970	M-Sat.	1730	1366	264	WØPZO
Iowa SSB	3970	M-Sat.	2300			WØYLS
Iowa 160	1815	Daily	0000	845	8	KØTDO
PON	3915	Tu.-Th.	2330	116	7	WAØDYV
PON-CW	3697	M-F	2330	32	3	WAØDYV
TLCN	3560	Daily	2330	211	352	KØAZJ

Traffic: (Feb.) WØLCK 1419, WØPZO 610, WØKB 458, KØAZJ 278, KØJGI 234, WØUPX 96, WØLGG 54, WØJPJ 29, WAØDYV 20, WAØGMZ 15, KØTDO 14, KØKAQ 11, WØCZ 9, WAØMIT 9, WAØVDP 9, WAØBSF 8, KØEVC 8, WØIAE 8, WAØAIW 7, KØIDN 6, KØJMA 5, WAØPPW 2. (Jan.) WAØMIT 9, WØGQ 5.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RMs: KØMRI, WAØJFV. V.H.F. PAMs: WAØCCW, WAØLSH. Silent Key: WAØAQD. Our sympathy to WØKKS, who lost his YXL. New appointments: WØPB and WAØLBB as OPSs; KØFPC and WAØOZP as ORSs. Renewed: KØPSD and KØGIG as OPSs and WAØLSH as V.H.F. PAM and OVS. KØPSD reported handling 43 phone patches in Feb. on the amateur bands. Zone 9, 2-Meter Net, and Zone 15, 6-Meter Net, combined with the NCK and ACARA 2-meter nets and gave us 19 sessions, 88 QNI and 17 QTC. Radio KEYN, Wichita, boasts a staff of 30% amateur radio operators including KØWTM, W5MGC/Ø, WAØKQW/Ø, WØCSH and WAØQPM. KØJID, EC Zone 10, reports that the Zone 10 AREC Net now is back in operation Sun. at 9:30 A.M. on 3920. On Feb. 22 the Flint Hills ARC honored WØHVL as its Amateur of the Year at the Annual Dinner Meeting. Sun. morning following the meeting I had the pleasure of visiting with the Topeka Amateur Radio Club then at noon the KØNL famed workshop was open so I stopped by for a visit with our Vice-Dir. Sun. evening found me with the Hiawatha Amateur Radio Club for a real enjoyable and, I hope, informative week end. The Hambutcher Picnic will be held at Fort Leonard Wood, Mo., June 15 with a fun frolic the evening of the 14th. For more information contact WAØBHG. The group will be monitoring 7280. After 30 years of c.w. operation we should be hearing and working WØCHJ on s.s.b. with a new Swan 500C. Feb. net results:

KSBN	QNI 792	QTC 225	Sess. 25	Mgr. KØJMF
KPN	229	6	16	KØJMF
QKS	321	206	56	KØMRI
Ks. PI	58	2	7	WAØCCW
HBN	567	93	21	KØICB
KPON	939	1039	28	WØLXA

Traffic: WAØTHQ 504, WØHI 266, WØLXA 207, WØINH 182, WAØNFP 157, WØPSN 133, KØMRI 128, WAØLLC 124, WØQQQ 100, WAØLBB 91, KØBXF 83, KØJMF 73, WAØOZP 65, WAØOWH 55, WAØSHG 52, KØPSD 45, WØCGZ 31, WAØSEV 31, KØUVH 26, WAØKED 25, KØLPE 25, WAØNDZ 25, WAØCCW 23, WØBGX 18, KØFIG 15, WAØJOG 15, WAØKPE 11, WØGCJ 8, KØGZP 6, WØFDJ 4, KØFPC 3, KØJID 3, WAØUTT 3, WØLYC 2, WØSOE 2, WAØLSH 1.

MISSOURI—SCM, Alfred E. Schwaneke, WØGS—SEC: WØBUL. This will be my last report as SCM. To thank all who helped over the past six years would be impossible, but I do want to recall some of those who rendered outstanding service while I was SCM: WØBUL, as SEC and manager of MEN; KØWKC and WAØBWW as NCSs on MEN; WØOUD for her consistent and faithful work promoting c.w. nets such as MON, SMN, MNN, and QMO; WAØFKD for QMO; WØOMM for promoting and KØIHA, KØTCB, KØTGU, WØRTO for ably carrying on MoSSB; WAØFLL for promoting the PHD Net and Club and WAØKUH for carrying it on; WØWYJ, KØJPL, KØAEM, WØTDR, KØYBD as managers of MON; WAØEMX and WAØELM for MTTN; KØONK for recruiting new station appointees; WØHVJ as manager of MoPON; and all those who have served as NCSs on the nets, as OOs, as ECs, as OVSs. At one time we had over 10 nets active in section-wide service. In

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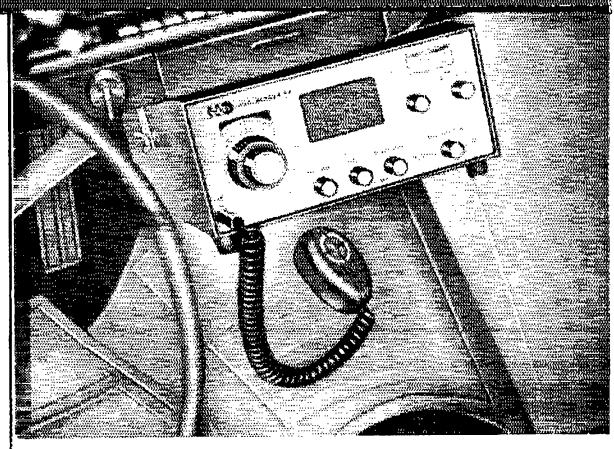
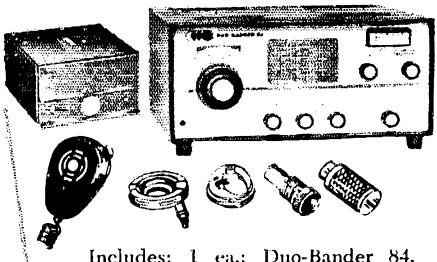


A Complete 80-40 Meter MOBILE PACKAGE!



Includes: 1 ea.: Duo-Bander 84, DC384 Power Supply, one Bandspanner Antenna, BDYF Mount, 350C mic, Mic Plug, PL 259 Plug, UG176/U Reducer and 25' RG58/U coax Cable. All supply cables are included.

ORDER: ZZMA103 package. $288.33 ($14 monthly)

OR...

A Complete 80-40 Meter FIXED STATION PACKAGE!

Includes 1 ea.: Duo-Bander 84, AC48 250 watt supply, 80/40 Duo-Doublet Antenna kit, 350 mic., Mic. Plug, PL259 Plug, UG-176/U Reducer and 100 ft. RG58/U coax cable.

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addition, my thanks to all of you who endured through my family tragedy and the subsequent and continuing reshuffle of my personal life. I also appreciate receiving all the various club newspapers. WØGCL renewed ORS; WØGS renewed as ORS and OPS. WØBUL reports extra sessions of nets for SET showed a total of 156 QNI and 212 QTC. WAØWQA is the new call of the Mules ARC at CMSC, Warrensburg. KØBIX is trustee and faculty sponsor. WNØWPU is a new Novice and WAØUTB a new Tech. Class in K.C. Net reports for Feb.:

Net	Freq.	Time	Days	Sess.	QNS	Tfc.	Mgr.
MoSSB	3963	2400Z	M-Sat.	23	861	343	WØRTO
MON	3585	0100Z	Daily	21	118	68	KØAEM
MNN	7063	1900Z	M-Sat.	24	81	35	WØOUD
SMN	3585	2200Z	Sun.	4	14	15	WØOUD
MoPON	3930	2100Z	M-F	25	53	179	WØHVJ
PHD	50.45	0130Z	Tue. (GMT)	4	120	6	WAØKUH

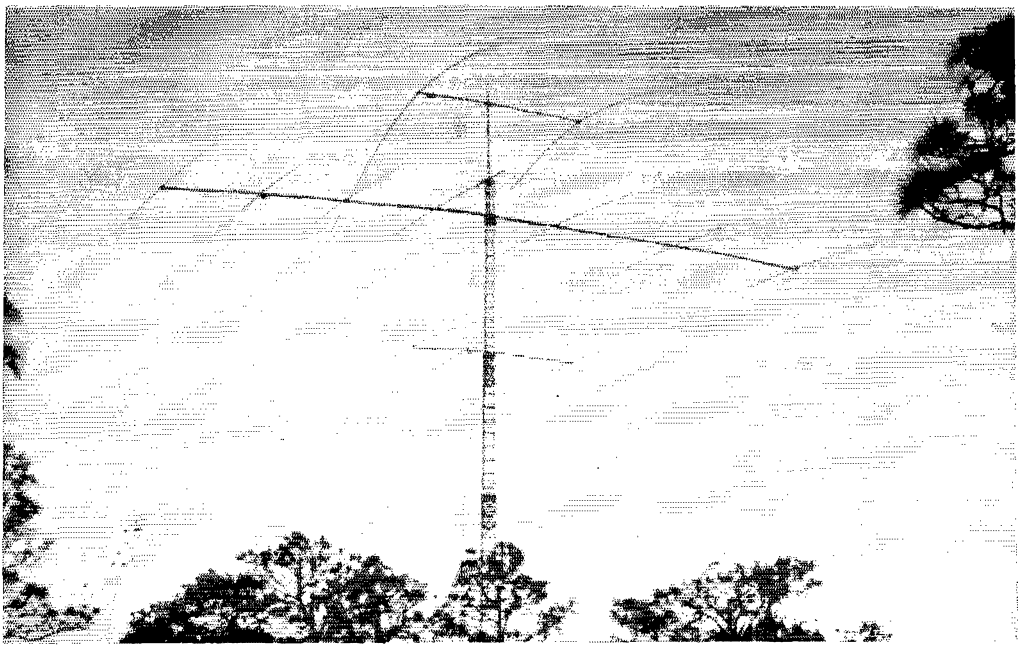
Traffic: (Feb.) KØAEM 285, WAØHTN 178, WAØFKD 143, WØOUD 138, WAØKBE 90, WØRTO 21, WAØKUH 19, WØJKF 14, WØBVL 9, KØONK 3, WAØQXG 3. (Jan.) WAØQXG 82.

NEBRASKA—SCM, V. A. Cashon, KØOAL—SEC: KØODF. Monthly net reports for Feb.: Nebr. Storm Net, WAØLOY, 0030Z session, QNI 1044, QTC 47; 0130Z session, QNI 933, QTC 26. Nebr. Emergency Phone Net, WAØGHZ, QNI 1520, QTC 280. Nebr. Morning Phone Net, WAØJUF, QNI 988, QTC 35. West Nebr. Phone Net, WØNIK, QNI 620, QTC 20. AREC Phone Net, WØIRZ, QNI 160. Nebr. C.W. Net (NEB 1), WAØFGV, 0100Z session, QNI 102, QTC 14. Nebr. C.W. Net (NEB II), WAØHWR, 0400Z session, QNI 76, QTC 35. 160-Meter Phone Net, WAØCBJ, QNI 806, KTC 26. WAØFGV has been appointed RM for the first session of the Nebraska C.W. Net. The Smoke Signal Senders Annual Pow-Wow is scheduled for May 31-June 1. The Pine Ridge Amateur Radio Club Picnic will be held June 1 at Chadron State Park. BPL for Feb.: KØLDP. ECs are requested to become familiar with Form 35 for completion whenever emergency and public service is performed by amateurs. C.W. nets need more QNI to survive. Help keep Nebraska nets active. Traffic: (Feb.) KØLDP 700, WAØDOU 343, WØLOD 335, WAØIBB 317, KØJFN 147, WØBFV 128, WAØGHZ 96, WAØJIH 71, WAØLVM 58, KØSFA 51, WØHTA 48, WAØCBJ 47, KØKJP 44, KØJTW 37, WAØFGV 34, KØOAL 33, WAØQLE 32, WØVEA 27, WAØHWR 26, WØAGK 20, WAØJUF 17, WØBFN 16, WØGEQ 15, WAØMHW 14, KØHNT 13, WAØIXD 12, WØEWZ 10, WAØGVJ 10, KØODF 10, WAØOMY 10, WAØTMG 10, WAØJTU/Ø 9, WAØEEI 8, WAØTBL 8, KØØWK 8, WAØOQX 7, WØRJA 7, WØHOP 6, WAØTET 6, WØVFR 6, KØDGW 5, WØNIK 4, WAØPIF 4, WAØRPB 4, KØYRL 4, KØEJT 3, KØMUF 2, WØPHA 2, WAØPSN 2, WØSWG 2, WØWZR 2, WØKFY 1, WAØNYM 1. (Jan.) WAØDOU 368.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNassor, W1GVT—SEC: W1PRT. RM: WA1HSN. PAM: W1YBH. V.H.F. PAM: K1SXF. Net activity report for Feb.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	28	367	433
CPN	3880	M-S 1800 Sun.	1000	28	520	310
VHF 2	145.98	M-S	2200	20	123	44
VHF 6	50.6	M-S	2100	20	190	69



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High QNI: CN—WA1HEW, WA1HLP, WA1HOL, WA1IGF and WA1JGA. CPN—K1SXF and W1GVT 27, WA1HEW and WA1IGF 23, WA2HMX and W1YBH 21, W8CWE/1 19, WA1FXS 18, W1NBP 16, WA1HOL and W1LUH 15. SEC W1PRT thanks all ECs who sent reports—send yours now if you forgot. N.E. Director W1QV requests correspondence covering topics you feel should be discussed at the Board Meeting in May. Traffic operators know the NCS works hard, remains on frequency for the full net session and sends a complete report promptly to the net manager. Connecticut is fortunate in having devoted, dedicated and very capable managers. Without them, organized Connecticut section nets would fail. My sincere thanks to RM WA1HSN, PAM W1YBH and V.H.F. PAM K1SXF. They do the work of keeping our section nets organized. The new Sunday Morning V.H.F. Net is on 145.35 Mc. at 9:30 A.M. The Talcott Mountain U.H.F. Society meets each Wed. P.M. on 145.35 Mc. Congratulations to: WA1GGN on Feb. BPL; WA1JKR on Advanced Class; Murphy's Marauders on High Scores in the SS Contest; and WA1HSN, Nutmeg Net News editor on an outstanding monthly bulletin. The New England Division Convention will be held May 24 and 25 in Swampscott, Mass. See you there! Traffic: (Feb.) WA1HEW 452, W1EFW 412, WA1GGN 293, WA1IGF 265, WA1HSN 243, W1WCG 153, K1SXF 143, WA1FNJ 126, WA1HOL 117, W1AW 77, W1GVT 73, WA1JGA 51, W1ARR 46, WA1KMR 42, W1YBH 38, W1RFJ 34, WA1GIX 32, W8CWE/1 25, W1NBP 24, W1BDI 23, WA1HLP 22, WA1IEG 20, WA1JQC 20, K1YGS 17, W1GEA 16, W1CTI 15, WA1FXS 15, WA1KQN 14, W1QV 11, W1CUH 9, WA1GWS 9, W1BNB 8, WA1IQJ 6. (Jan.) W1WCG 281, WA1GEK 6.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—We all want to wish W1JMA the best on his retirement as Engineer in Charge of the First District of the FCC. Silent Keys: Ex-W1BCM, W1NAX, W1LYH, K1KWC, the wife of W1AAR. W1FH has retired. W1UIR broke his leg. If your town does not have an EC and you feel you are qualified, write to me or W1AOG, our SEC. Technicians are eligible. W1AOG's wife broke her wrist while in Florida on vacation. New YLs: WN1KPL Newton, WN1KRQ Pepperell. WA1KUG, ex-K1KTK, is in Framingham. W1IAU and WA1EFR are conducting classes for hams at the Whitman RC. W1WMH received a special award in the Calif. QSO Party. W1RXZ is back on the air. WA1BFD worked some new countries on 15. K7JRE/1 has a new antenna for 15, 20 and 40. WN1JKJ made WAS and has a CP/25 certificate. WN1JNJ and WN1KBZ are father and son-in-law. Ernie Behrens is Advanced Class. W1DTY, editor of *Ham Radio Magazine*, spoke at the South Shore Club. Guests were TI2JCC, KH6IJ and K1SCQ, who was on the USS *Pueblo*. W1AXL is NC of the Farmers Net on 1840 kc. each Sat. from 7 to 9 P.M., writes W1MGP. The 6-Meter Crossband Net had 20 sessions and 95 QNIs. Appointments endorsed: W1HGT as OVS, W1s EMG and AQE as ORSs, W1FJI as OPS, W1AQE as RM, W1ALP as OBS. W1MX and W1OOP are on 432 Mc. W1VAH built an integrated circuit keyer. WN1FKM is 13 years young. WA1FNM is working DX on 10. WA3ITR/1 has 32 in WAS from MIT, Mass. PON had 28 sessions, 161 QNIs, 92 traffic. WA1DPX says there are 35 stations on 6 RTTY. New are WA1JZG and W1YZC. The T9 RC Net met at W1MVQ's. W1TJP is in Florida. The OOTC Chapter met at Lord Wakefields. The Chelmsford ARA voted to grant an annual award of a certificate to some qualified individual in its area, to be known as the Robert Cameron Memorial Award. Massasoit ARC has two nets every Tue. night on 145.32 and 28.7 Mc. New officers of the Massasoit ARC are K1UIW, pres.; WA1BFD, vice-pres.; WA1EBG, treas.; W1CUY, secy. We now have an East Coast Amateur Radio Service on 7255 kc. Write to WA1KRN at WBZ, Boston. W1SMO is NØLAW in Navy MARS. WN1KTA is active in the Lexington HS Club. K1JMQ, WA1JSN spoke on d.b. unit at the Middlesex ARC. W1TED spoke at the Whitman RC and K1UCT was made "Ham of the Year" at its banquet. The Capeway RC met at K1NFZ's QTH. WN1KSF is K1IPB's son. EM2MN had 21 sessions, 138 QNIs, 214 traffic. The Yankee RC had another of W1AAT's "Old Timers Nite." Quannapowitt RA had a talk on "Amateur Radio Astronomy" by a speaker from MIT. K1MVT says that the Maritime Mobile Service Net on 20 does a swell job on phone patching for the Navy boys. K1ESG is busy on TCC skeds. WA1IFE has a R108 for 2 and a G50 for 6. WA1KOR/WA2KZV is a new OVS. EMN had 31 sessions, 139 QNIs, 174 traffic in Jan.; 28 sessions, QNIs 201, 164 traffic in Feb. Traffic: (Feb.) W1PEX 1800, W1OJM 521, WA1EYY 419, K1ESG 330, WA1IBL 296, W1EMG 147, WA1DPX 88, W1HKJ 80, K1PRB 64, W1CTR 61, W1EAE 56, WA1IFE 43, WA1FHU 34, K1YUB 34, W1DOM 29,

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WA1IJL 29, W1ATX 27, W1NUP 27, W1BUF 13, WA1HHK 10, W1MX 10, WA1JMR 9, K1LCQ 7, K2GLQ/1 6, WA1ION 3, K1CLM 2, W1LE 2, WA1DFL 1. (Jan.) W1MX 103, W1EAE 78, WA1IFE 58, W1SMO 2.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net meets Mon. through Sat. at 1700 on 3940 kc. Pine Tree Net meets daily at 1900 on 3596 kc. c.w. It is with deep regret that we pass on that W1UDD, of Portland, is a Silent Key. He was the manager of the Barnyard Net and active in nets and most phases of radio. He will be sadly missed by all who knew him along the way. The Old Farmers Net has been reactivated on 1840 kc. Sat. evening 7 to 9 and would like representatives from all areas. WA1FQW is busy on 80 and 20 c.w. and is using a vertical on 20. Traffic: W1BJG 270, K6CAG/1 172, WA1FLG 59.

NEW HAMPSHIRE—SCM, Donald W. Morgan, K1QES—SEC: K1RSC. RM: K1BCS. PAM: K1APQ. We welcome the following new members to our ranks: WN4LRN, who became interested by listening to the GSPN; WN1KRB, Plaistow; WN1KRO, Amherst; WN1KRZ, Kingston. W1MGP reports the Old Farmers Net has been reactivated on 1840 kc. Sat. night from 7 to 9 with 25 watts maximum power. W1JB is on daily, 10 through 75 phone, and K1OQ is on 160 meters. W1YWC has a new Drake R4-B. The GSPN reports 868 check-ins and 141 traffic for Feb. The month of the big snow, a state of emergency existed in some cities and towns for three or four days when 45 inches or more of snow fell with high winds. Antennas suffered, buildings collapsed, roads were impassible. Traffic: (Feb.) WA1IIH 227, K1BCS 85, K1PQV 61, W1MHX 29, K1QES 6, W1SWX 2. (Jan.) K1TXC 14, W1SWX 8. (Dec.) K1TXC 3.

RHODE ISLAND—SCM, John E. Johnson, K1AAV —SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 28 sessions, 454 QNI, 134 traffic. The W1AQ Club of Rumford reports that work has started on a new operating room for the club rigs. Club Pres. K1AGA reports that Field Day preparations have started and K1LII has reserved the field. Antennas will be completed in the near future and the club generator will be overhauled. W1DK has the club ARRL registration completed and several members recently joined the League. The recent snowstorm cancelled the program of the Newport County Radio Club of Newport and the New England Division Director will visit them at a later date. W1TXL, of the club, has received another BPL award and is the state's leader in BPLs. W1JFF has been very active in the RACES program and is active on 2 meters. K1QFD will be on 20-meter s.s.b. as soon as she finishes building her HW-32A. Traffic: W1TXL 428, W1BTV 103, K1YEV 64, K1VYC 47, K1QFD 38, K1TPK 26, WB2HPW/1 24, WA1BLC 8.

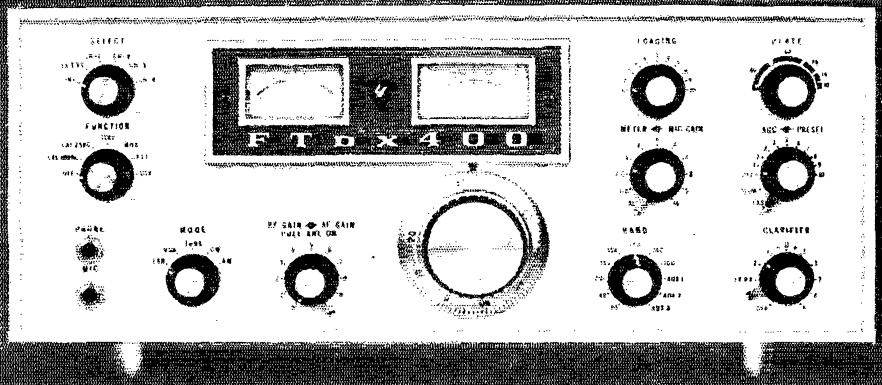
VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*N.Mgr.*
Gr. Mt.	3855	2230Z	M-S	526	21	W1VMC
Vt. Fone	3855	1430Z	Sun.	114		WA1EDI
VTNH	3685	2330Z	M-F			K1UZG
VTCD	3990½	1500Z	Sun.	39	18	W1AD
Carrier	3865	1400Z	M-F	292	20	W1KKD
VTSB	3909	2230Z	M-S	589	133	KL7DVP/1
		1330Z	Sun.			

Welcome to new Novice WN1KRX (Ludlow). Also welcome to W1FCI (ex-K2PSL), who moved to Cornwall and is doing some TV work on the ham bands. Two-meter f.m. still is growing. K1MPN and W1ZYZ now are on and more are in the process. The East Coast Amateur Radio Service (ECARS) now is operational on 7255 daily at 7:30 A.M. all day. Please advise if you are interested in ARRL appointments and would like to see more traffic reports: Traffic: K1BQB 344, W1FRT 44, K1MPN 43, WA1GKS 31, W1MRW 6.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DVW reports WMN attendance during Feb. comparable to Jan. with traffic about the same. Only the Gardner/Fitchburg area remains as a challenge to improve our coverage. Stations calling in order of attendance were W1BVR 27, W1DVW 27, W1ZPB 23, K1WZY 20, K1IJV 17, W1IHI 12, W1STR 11, W1HRC 7, W1EOB 6, W1KK 5. K1ANF is converting an R432A surplus receiver to use FET. Bill and W1QWJ had an excellent demonstration on printed circuit construction at the Mar. HCRAI meeting. The May meeting will be home-brew night at HCRAI. The Pre-WW II Farmers Net has been reactivated on

TOP OF THE YAESU LINE



THE FT DX 400 TRANSCEIVER

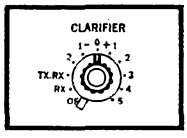
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

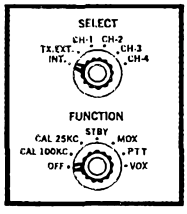
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

SPECIFICATIONS: **Maximum input:** 500 W PEP SSB, 440 W CW, 125 W AM. **Sensitivity:** 0.5 uv, S/N 20 db. **Selectivity:** 2.3 KHz (6 db down), 3.7 KHz (55 db down). **Carrier suppression:** more than 40 db down. **Sideband suppression:** more than 50 db down at 1 KHz. **Frequency range:** 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). **Frequency stability:** Less than 100 Hz drift in any 30 minute period after warm up.

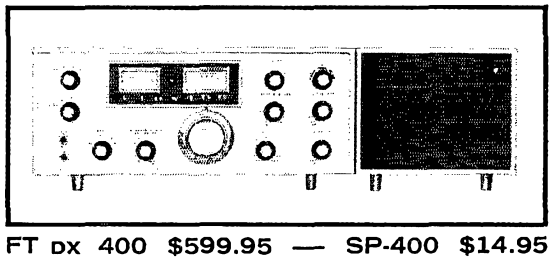


CLARIFIER CONTROL — Does the work of an external VFO — allows operator to vary receive frequency 10KHZ from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL — Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL—Selects crystal calibration marker frequency and desired transmit mode of operation.



FT DX 400 $599.95 — SP-400 $14.95

SPECTRONICS BOX 356, LOS ALAMITOS, CALIFORNIA 90720

— PROFESSIONAL EQUIPMENT FOR THE AMATEUR —

1840 kc. from 7 to 9 P.M. Sat. W1MOP indicated an invitation to all WM operators on 160 meters. K1ZOH should be out of the hospital by this printing. We hope Sr. Loretta Thomas is OK. WA1IZS reports news in from Cathedral HS in Springfield. WA1DNB is settled in Belchertown and is helping civil defense communications. Also, he is EC there. Appointments: WA1DNB and K1ANF as ECs. Endorsed: K1SSH as EC, K1SSH as ORS. K1BVV has a TA-33 and a rotor. W1GUI has a new shack complete with carpet and plush chair, maps and charts, a new receiver and beam outside. Ellis is looking for a 6-meter s.s.b. rig. K1DPP still needs Delaware and Maryland on 6 for the Worked All States East of the Mississippi on Six award. Traffic: W1EOB 176, W1ZPB 146, W1BVR 109, W1IHI 107, W1DVW 95, W1STR 63, K1WZY 46, W1KK 40, W1IC 20, K1IJV 12, WA1IZS 8, W1HRC 4, W1UPH 4, WA1DNB 1.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—KL7FJW reports that 10 members of the Arctic Club upgraded licenses this year. We do not seem to have the number of people from the CB club who did the same, but it's been at least 15, so things are looking up. KL7FKO reports that transistorized 2-meter gear is looking like go, so he will be airmobile soon. With the ice road north out of Livengood, the Arctic Club is planning a winter Field Day sometime, north of the Arctic Circle. Sure wish it would be usable in the summer, but then there wouldn't be much accomplishment I suppose. In fact, it's been several years since we have had winter Field Day, even around Fairbanks. How does an all-Alaska winter Field Day sound to people? Would like to hear any comments, and we can sure have one next year. Traffic: KL7CAH 136, KL7FKO 14.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7THX. The FARM Net convenes week days on 3935 kc. at 0200 GMT. The Idaho C.D. Net convenes week days on 3991 kc. at 1515 GMT. WA7HOX is moving to Alaska. W7AXL is helping boys and girls to become hams and reports one new Novice since the first of the year. W7JMH has been appointed EC for Ada County and W7DQU has been appointed EC for Bonneville County. WA7BDD operated 12 hours during the SET. W7FIS has been appointed ORS and OO. K7KRO is recovering from a serious illness and has been discharged from the hospital. A ham station has been set up in the Lewiston Highway Department fallout shelter. FARM Net report: 20 sessions, 699 check-ins, 328 traffic handled. Traffic: K7KBX 480, WA7BDD 113, W7AXL 33, W7ZNN 30, W7GHT 23, K7OAB 20, WA7GJE 16, K7CSL 13.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. RM: WA7DMA.

Section Nets	*Freq.*	*Time*	*Day*	*QNI*	*QTC*
Montana Traffic Net	3910 kc.	0100	M-F	680	83
Montana PON	3950 kc.	0245	D	435	142
Montana Section Net	3950 kc.	1700	Sun.	42	4

Appointments: W7IMZ as Missoula EC; WA7JWF as OPS. Most of the active radio clubs in the state are getting set for the upcoming Field Day to be held in June. Get your group out and join in the fun. WA7IZR is now on with an SB-101 and has a fine signal. WA7HDD is very active on 75. Lee is an NCS for the PON in the state. K7PWY spent some time in the Seattle area putting an FB mobile signal back into the state. K7OZY is back in the state and will be on the air soon. K7CCZ is active on 160 meters. W7CBY has finished the kit TV receiver. There still is lots of activity on 2-meter f.m. in several cities in the state, using 146.760 simplex. We still are in need of OOs and RN7 check-ins. Traffic: K7CGJ 16, WA7IZR 10, W7TYN 8.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV—RM: W7ZFH. PAM: K7RQZ. Section nets:

Net	*Time*	*Days*	*Freq.*	*Mgr.*
BSN	0030/1900Z	Daily	3875 kc.	K7IFG
AREC	0200Z	Daily	3875 kc.	K7YQM
AREC	0230Z	Tue-Sat.	145.35 Mc.	K7YIA, WA7DLE
OEN	0100/0200Z	Daily	3980 kc.	W7VIF
OSN	0130Z	Tue-Sat.	3585 kc.	K7GGQ
PON	0130Z	Thurs.	3920 kc.	W7MLJ

W7ZFH reports for the OSN for Feb., sessions 20, check-ins 117, high 9, traffic 64, high 9. K7YQM reports for the AREC, sessions 23, check-ins 737, traffic 45, contacts 73, QSTs 4, maximum number of counties 17. K7IFG reports for the BSN, sessions 52, traffic 176,

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contacts 223, check-ins 1087. K7YQM is the new mgr. of the AREC Net. K7GGQ is the new mgr. of OSN. A new ham in Cave Junction is WN7LSY. The Post Office Net is looking for members. WA7JMD is putting up an 80-meter dipole. WA7KIU passed the Advanced Class exam. WA7ASP became W7NX. WA7FTN handled 585 phone patches to S.E. Asia during the month. W7ZUL is now in Eugene. WA7GFP reports a fine turnout for the first Valley V.H.F.er Picnic held in Oak Grove. Traffic: K7RQZ 635, W7WHY 146, K7IFG 108, WA7IFS 76, WA7KIU 60, K7CBA 59, W7ZFH 46, WA7HKV 43, K7OUF 29, W7ZUL 28, W7AZD 24, WA7HJV 19, W7MLJ 18, K7YQM 18, WA7BOO 14, WA7GMP 14, WA7ICD 14, K7KPT 14, W7AVW 12, K7WWR 11, WA7IXX 10, K7STG 9, W7DEM 8, W7BNS 6, K7WNX 6, W7AFQ 4, WA7EQE 4, WA7GJZ 4, W7PJO 4, WA7JMD 2.

WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. Asst. SEC: K7WTG. RM: K7CTP.

AREC	3930	Sun.	1800Z	QNI	52	QTC	8	Sess.	4
WSN	3590	Daily	0245Z	QNI	326	QTC	187	Sess.	28
NTN	3970	Daily	1930Z	QNI	943	QTC	748	Sess.	28
NSN	3700	Daily	0300Z	QNI	201	QTC	67	Sess.	28
WARTS	3970	Daily	0200Z	QNI	1086	QTC	129	Sess.	27

Governor Evans will be asked to set aside Sept. 1-7 as Amateur Radio Week for 1969. Response was good to our legislation for reducing the fees of license plates to $5.00 from $30.00. Contacts made to the legislators through the clubs were extremely helpful in briefing them on amateur radio's public service activities for justification of our cause. The U. of W. ARC reports new officers for 1969 are WA7JGO, pres.; WA7BAY, vice-pres.; WA7FVD, secy. A campus-wide drive for members is under way with code practice on 160 meters. The Apple City Club is planning a Ham Jamboree in June open to the public. The Washington State Hamfest plans are moving along for July. Details should be out soon. The Walla Walla Club auction will be an April event along with the Skagit Hamfest. The Spokane area should have higher licenses after the April visit of the FCC Examiner. New appointment: W7PI as OPS. W7BQ attended the Clark County Banquet as guest speaker. The N.W. Tech Net has started another series of General and Advanced Class material Sun. at 3 P.M. on 3970 kc. The BEARS started a full program of license training at all levels. WA7BDB and WA7ACQ are class instructors. WN7KWY reports the new Novice Traffic Net on 7187 kc. daily at 0030Z and invites more members. WA7JZO also is assisting in the organization. ORS W7AXT was nailed by an SM while trying to QNB Alaska. W7FQE is looking for c.w. on 144 and will meet schedules on 144.040. W7ZIW is back on the traffic nets after the addition of a new jr. operator. Traffic: W7BA 3007, WA7HKR 1432, WA7BZY 837, K7UDG 482, W7DZX 480, W7KZ 274, W7PI 250, W7AXT 128, W7JWJ 121, K7CTP 118, W7BQ 117, K7JXO 82, WA7EYN 79, W7MCW 75, W7JEY 67, WA7JEB 66, W7GVC 52, W7ZIW 47, W7GYF 41, W7IEU 29, WA7ACQ 26, W7BUN 26, W7RXH 26, WA7BDB 19, WA7JZO 15, K7OXL 15, K7MGA 14, K7TCY 14, K7SUX 11, W7APS 10, W7UU 10, W7UWT 8, K7YFJ 7, W7ZHZ 7, K7SNG 5, WN7KWY 4.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Official and acting official SCM is Paul Parker, WB6DHH, 2236 Whyte Park Ave., Walnut Creek. I am now in charge of such things as the monthly report and all position-filling and if you want an appointment will be glad to give you one if you qualify. Please write and see. To those in this section who sent in reports this month you will be able to see that the post of SCM has not been vacated and that there really is such a person. WB6YCA reports that the Novice Round-up can even be fun for non-Novices and his FB total of 6836 is a testimony to that. Chuck is awaiting his Navy MARS call and looking into some RTTY gear. Can anyone in the section give this man a hand? Chuck also was in on a happy experience when his hobby helped save the life of a young child when an important blood transfusion had to be administered. W6IPW says that 20 meters has really been open during the day and working the world around is not an uncommon thing. WA6DIL reports that he is getting his feet wet in traffic nets and that some of his teachers might not appreciate them as much as he does. If you didn't see your call here where it should have been it is because you didn't send any reports to me. If you need station activity report cards, please contact me. I will be glad to send you some. Traffic: W6IPW 538, WA6DIL 165, WB6YCA 23, WB6DHH 5.

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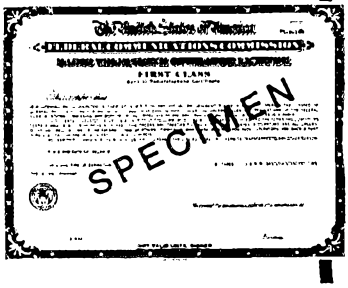

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HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: W4UAF/KH6. RM: KH6AD. V.H.F. PAM: KH6EEM. QSL Mgr.: KH6DQ. RACES Nets: (40, 10, 6, and 2 meters) Coordinate with KH6AIN.

Nets	*Freq.(Mc.)*	*Time(GMT)*	*Days*
Friendly Net	7.290	0700Z	Wed.
PACIFIC Interisland Net	14.320	0830Z	M-W-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4 Tue.
Gecko Net (Marianas Is.)	14.240	0930Z	Tue. & Thurs.
Pacific DX Net	14.240	0700Z	Fri.
Marine Corps Net	21.380	1900Z	All
Confusion Net (Phone Patches)	21.400	0200Z	All

Plan your Mainland vacation to include the 1969 Pacific Division Convention June 13, 14 and 15 at the El Dorado Hotel, Sacramento, Calif. League Hq. speakers, ARRL/DX/MARS/QCWA/TFC/VHF/WCARS, mobile judging, contests, FCC exams, YL programs, displays and tours of Sacramento, to name a few events. Interested persons should write to Convention Committee, 4100 Worthing Drive, North Highlands, Calif. 95660, for details and reservations. W4ZZ was in town recently and looked up W6WGB, who arrived on the Liner *President Wilson*. Ex-KS6BR is now signing W4RUU. Some of the Honolulu Sideband Club gang went to KH6AFG's place after the formal Pizza-in at Shakey's/Keeaumoku. KH6GND now Advanced Class, is on with a Collins S/Line to a vertical. KH6OO is on with a new Swan 500C. K1PND/KH6IJ/1, will be back in Japan this summer signing KA2IJ. KH6FQE, ex-KH6NEZ has had the DX bug of late. KH6FRI is also signing VE7CBB. Seen at the DX convention in Fresno in Jan. were KH6AA, KH6FRI, KH6GHC and ex-KH6EPW, now W6QY. KH6BJ/6 sails a nice signal into the islands on 20 and 40 meters too.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. W7TVF worked WAS on c.w. with two-letter calls, and will continue to schedule anyone stateside or DX needing a Nevada contact. WA7BEU was elected Boulder City Rotary pres. WA7KQJ reports activity from Lander County. The K7UGT repeater lost its antenna in a recent ice storm. Novices were reported in the majority in participation of the Reno SET. The SARS has 30 students enrolled in the amateur radio code and theory class at the U. of Nevada, Reno. WA7HXO, repeater of the Las Vegas Repeater Assn., is operational from Mt. Diablo (Potosi) 5 miles northwest of Goodsprings. A.B. 86 was signed into law by Governor Laxalt after being amended so as to not affect Nevada amateurs in securing their call-letter license plates. A vote of thanks to the many who took such quick action and provided assistance. W7DDB repeater 146.34/146.94 now has another feature, 52.525/52.525 and 52.525/147.84 Mc. WA7LWT, ex-K4LHP is active on 2-meter f.m. and WA7BYQ has his Extra Class license. W7CTK's new QTH is Parhump. W7PRM has rebuilt his RTTY TU and reports FB print on a model 15. The a.f.s.k. unit in *QST* has created lots of interest and should provide for more 2- and 6-meter a.f.s.k. K7ICW reports back on the air and is active after a month's diagnostic trouble with his h.f. exciter for v.h.f.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—Feb. was a rough month for Sacramento Valley with all the rain in the valley and snow in the mountains. WN6FHN, active on 80 meters from Lake Almanor, says he had to switch over to an inverted Vee since his vertical antenna is getting covered up by all the snow. K6RPN, in Grass Valley, rebuilt his c.w. rig with break-in. WB6VSC has been busy looking for California counties. WB6EAG will be operating from Central France during Aug. with the call FOMR. W6DOR, our Pacific Division Convention chairman, has been so busy that it has left him little time for operating; and to top it off, Ev lost his 6-meter quad in a 70-m.p.h. wind! WA6CXB has been busy constructing a small 420-Mc. transceiver. New officers of the Nevada County ARC are W6NDT, pres.; K6RPN, vice-pres.; K6FJ, secy.; WN6CSM, treas. New officers of the Oroville ARS include WB6FMI, pres.; WN6GKY, vice-pres.; W6SLS, secy.; W6DHI, treas. W6SIG now has a new first-class QTH. Don't forget to make your reservations for the convention to be held this June in Sacramento. Traffic: (Feb.) W8VDA/6 257, WB6MAE 44, WA6RBD 22, K6YZU 21, WB6VSC 18, WB6WJO 18, W6LNZ 10, K6RPN 6, WB6EAG 2. (Jan.) K6YZU 35, W6LNZ 4. (Dec.) W6LNZ 70.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV. WA6JUV is installing a new beam to help in his v.h.f. work. He has 40 states confirmed on

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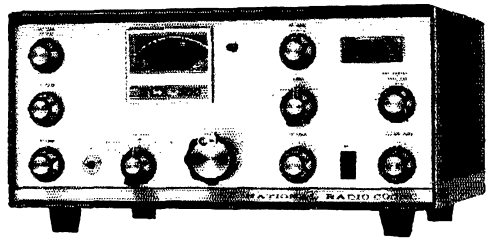

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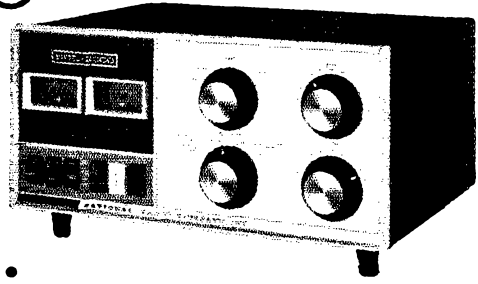
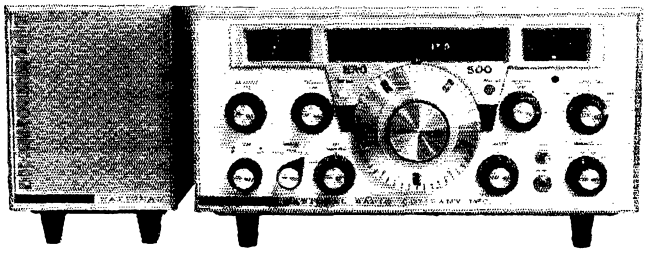


the Classic Receiver HRO-500



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6 meters. WA6ALK is mostly on 2 meters these days. W6EAJ, from the wilds of Humboldt County, finds the Grand Pappy Net on 160 meters his biggest activity. K6TWJ still is the mainstay on the Golden Bear Net. W6WLV and W6BWV are on the NCN along with WA6BYZ, with Humboldt, Sonoma and San Francisco Counties covered, someone is needed in Marin for an NCN outlet—3635 kc. at 0300Z daily. WB6JQP got in some traffic work while at home. K6SRM is turning out a newsletter for the Valley of the Moon Radio Club. Officers of the Valley of the Moon Club are WB6KMI, exec. vice-pres.; K6SRM, vice-pres.; WN6NQZ, treas.; WN6PQV, secy. The Tamalpais Radio Club now meets at the Bethel Baptist Church on West Novato Blvd. the 3rd Fri. W6RQ came up with a score of 0.4 parts per million in the Feb. FMT. W6HSA, editor of the *San Francisco Club Bulletin*, has been in the hospital. W6RQ seems to be our most active OO. The Marin Club's theory classes, conducted by WA4CKF, have been well attended. W6AEY, in Loleta, handled some traffic. WB6NHF is interested in a weekly net for the Redwood Empire Region. New AREC members in the Willits area are W6AEV and WA6UHR. W61VS at Ft. Bragg, is an Asst. EC. WB6CIE has her beam up again. W6BUY has located in Marin and is looking for some DX. After a long absence, the San Francisco *Courie* surfaced in Mar. again. Traffic: WA6BYZ 377, W6WLV 227, W6AEY 29, WA6AUD 21, WB6JQP 18, W6BWV 16, K6TWJ 12, WB6NHF 5.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Turlock Amateur Radio Club held its 40th anniversary meeting Feb. 14 with 74 in attendance. W6JUK and W6JPU were among those attending. The Delta Amateur Radio Club's new officers are WB6SUP, pres.; WB6SPT, vice-pres.; WB6OPQ, secy.; K6AXV, treas. The club meets the 3rd Wed. of each month, usually at the Dan Webster School. W6ILR received the Boner Award from the Tulare County Amateur Radio Club. WA6NRV is working on 2 & 6 s.s.b. equipment. W6UHN is on 2-meter l.m. mobile. W6CD is heard on 75-meter s.s.b. W6DPD has a Com IV 6 & 2 rigs. W6OHT is operating without a final—it burned up. W6BQG has a Galaxy GT-550. W6JUK has a Clegg Zeus. WA6GQP has an HRO-50T. W6DCP is on all bands with a BTI amplifier. K6QOG is on the air with an HT41 amplifier. W6JPS bought a *new* call book. W6ZTY is on the air with a GT-550. WB6MWY is using a GT-550. WB6ZBX is on with an HT-32 and an SX-101. W6UTU is NCS of the TARS Net. WN6PRO is on 80 c.w. W6GOJ and WB6RZI are active on 2-meter MARS. WN6FDM blew up his rig while trying to load it up. K6KOL was nearly flooded out of his shack. Traffic: WB6WGR 326, WB6HVA 263, WA6SCE 138, WB6ZBX 35, K6KOL 33.

SANTA CLARA VALLEY—Acting SCM, Albert F. Gaetano, W6VZT—SEC: W6VZE. RM: WA6LFA. Many thanks to all the sleuths who found out that I was acting as SCM until an election can be held. I really appreciate those reports. K6BGM has recovered from the flu. At least her OM, Director Gmelin, hopes so. W6AUC is continuing his heavy phone patch traffic with the Pacific Islands in addition with his reappointment as secretary of the Norcal chapter of QCWA. Congrats, Russ. WB6ZSE is building an SB-101 kit. W6DEF and his XYL are making plans for a flying trip to Japan and plan to stop off at Hawaii on the way. W6RSY again had the largest traffic total for the month. As reported by many, the QCWA Dinner in Feb. was a great success. W6BPT has been working DX on 40 meters. W6FFC gave a fine talk on his a.f.s.k. at the Feb. SCARA meeting. WA6HVN has been real busy with the Red Cross because of the rain. Hal, WB6DWX and W6MIKE spent two days and nights handling traffic for an evacuation because of the flood. W6VZT gave a talk at the SARO Dinner Meeting on how to select a receiver. W6YHM gave a talk at the West Valley Club on earthquakes and the communication problems associated with them. WB6TKT had his antenna blow down in one of the recent storms. Traffic: W6RSY 710, W6YBV 316, WA6LFA 155, W6DEF 128, WB6ZSE 28, W6AUC 20, W6VK 18, W6ZRJ 10.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE. RM: W4IRE. PAM: W4AJT. V.H.F. PAM: W4HJZ. The Raleigh Amateur Radio Society was organized recently with seventeen members to date. At the kick-off meeting the following officers were elected: WA4PEN, pres.; WA4ZZN, secy.; K4CIA, treas.; WA4OTA, legal advisor. The Robeson/Bladen County ARPSC Net has been reactivated on 145.290

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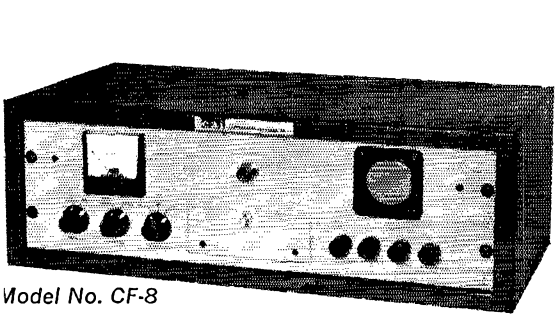

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Mc. according to EC W4EVN, who made BPL in t
traffic department of ARPSC. K4EO says he just g
his 50th state confirmed for WAS. WA4KWC has be
busy running p.p.s. on 15 and 10 meters. K4TT
reports he has finally picked up WAC. K4CIA h
been appointed Official Observer.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3923 kc.	0030Z	Daily	185	W4ZZC
NCN(E)	3573 kc.	0000Z	Daily	121	W4IRE
NCN(L) (Late, Jan.)	3573 kc.	0300Z	Daily	53	WA4CI
NCN(L)	3573 kc.	0300Z	Daily	20	WA4CI

Traffic: (Feb.) W4EVN 603, W4IRE 183, K4VBG 1
W4FDV 60, K4EO 45, WA4UQC 34, WA4VNV
WA4GMC 25, WA4KWC 25, W4AJT 22, K4PKE
WA4AKX 18, W4VTR 17, WA4VTV 17, WB4COO
WB4GHK 5, WB4BZE 4, WB4DPI 4, K4TTN
WA4RVI 3. (Jan.) W4RWL 69.

SOUTH CAROLINA—SCM, Charles N. Wrig
W4PED—SEC: WA4ECJ. RM: K6QPH/4. PA
WB4BZA.

SCPN	3930 kc.	0830 and 1530 EST	Sun.	12 Noon D
SCN	3795 kc.	2345Z and 0300Z	Daily	Feb. Tfc.
SCSSBN	3915 kc.	0001Z	Daily	Feb. Tfc.

W4BJE, an old-timer on SCN, is handling tra
again. WA4IKU, in Spartanburg, is now K4II. WN
MCI is QSOing on 3710, 3725 and 7170 kc. fr
Spartanburg. W4NTO reports that a typing error b
the Feb. FMT for him. K6QPH and family will
departing for California and home shortly. WA4ZI
WA4ICF, WB4DOT, WA4HFA and W4FVV are tak
the Amateur Extra course at Greenville Tech. WI
AMR is mobile from Anderson. Dates to rememb
SSB Net Dinner in Greenville May 3 and Hami
May 4, Section Meeting in Columbia May 31
Columbia Hamfest June 1. Traffic: K6QPH/4
K4BSS/4 67, W4PED 38, W4NTO 29, K4QMK
W4FVV 10.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SE
K4LMB, PAM: W4OKN. RMs: WA4EUL, K4MI
WB4DRB is being heard on VN and VSN with
1-watt QRP rig. W4OKN issued VSBN certifica
to W4SQQ and K4VCY. Congrats to W4YZC and
on the new baby in Feb., OM type. W4JUJ may h
a record for the number of different contests
QSO parties he participates in. The Roanoke Hami
will be held the last full week end in May. See
there? W4UQ finds DXing good on the low end of
meters. W4SQQ has relieved K4KNP of an NCS s
on 4RN and made the BPL in Feb. K6ZQB/4 is act
from Annandale and has received his Advanced C
license. K4KNP sends ARRL Bulletins on c.w., W4
and WB4DOY on phone. Listen for them on or n
net frequencies. Virginia nets will continue to m
at same local times during Daylight Saving Ti
This is one hour earlier on GMT, however. Frequenc
3680 3935 and 3860. Traffic: (Feb.) W4SQQ 519, W
211, W4NLC 200, K4KNP 194, WB4CVY 140, W4
140, WA4EUL 119, WB4FDT 113, K4KDJ 109, W4R
82, WA4OHZ 77, W4ZM 68, WA4SJT 67, K4FSS
WB4GTG 66, WB4DOY 61, W4OKN 58, WB4DRB
W4SHJ 53, K4JM 49, WA4JJF 36, WB4GDO 34, WB4J
32, K4MLC 32, W4THV 28, WB4JFI 22, K4TSJ
W4KX 19, W4IA 18, K4GR 16, W4YZC 16, W4JUJ
K4VCY 11, WB4FJJ 10, WB4FLT 10, WA4YBV
W4MK 5, WA4WQG 5, W4OP 4, W4WG 4, K4LME
WA4YRH 2. (Jan.) W4UQ 390, K4TSJ 92, W4MXU
78, WB4FLT 14.

WEST VIRGINIA—SCM, Donald B. Morris, W8JI
SEC: W8EV. RMs: K8MYU, K8TPF. PAMs: K8CE
W8IYD. Net Mgrs.: K8MYU, WA8YOF. WVN-C
meets on 3570 at 0001Z: Phone on 3890 at 23(
W8AKM, with a new four-element quad, worked
new countries on 15. W8HZA is going mobile with
SB-101. WA3EQG, WA8POS, WA8UUY, WA8Y
WB8BEO, WA8PDJ and WN8ZOJ keep W. Va. 'T
Club station W8AHZ active. K8QEW operates RT
on 80. The WVN C.W. Net, with 28 sessions and
stations, handled 88 messages. The Phone Net in
sessions with 833 stations, passed 131 messages.
Opequon Radio Society and Mountain State Tra
mitters of Martinsburg and Elkins are starting
code and theory classes. WB8BBG has a new 70
high antenna. W8EV has an HA-14 mobile lin
effective from Florida into the WVN phone n
San Diego celebrates West Va. Week July 7 to
The Greenbrier ARC of Lewisburg celebrated
Novice graduation with a dinner meeting. K8H

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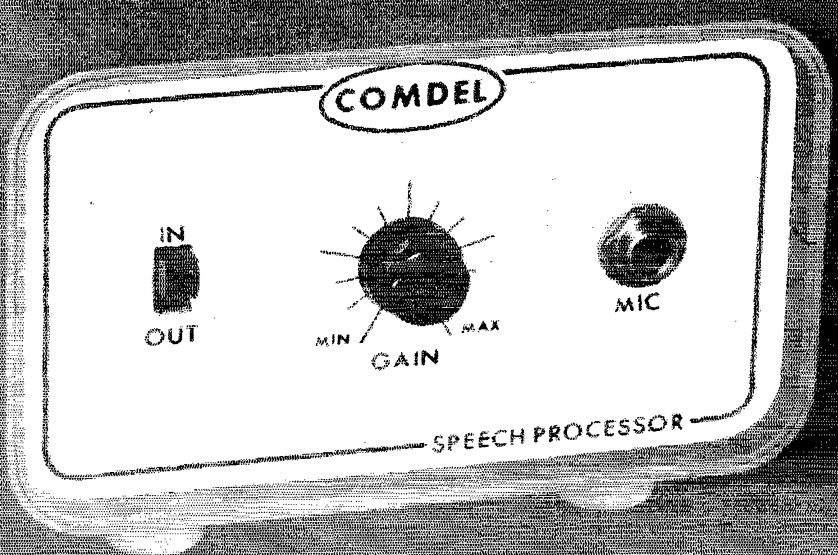

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moved to Fairmont. W8DUV publicized the Roanoke Division Convention at Huntington Oct. 11 and 12 at the LO meeting in Greensboro. The Northern Panhandle ARC of Wheeling will hold its Annual YL-OM Dinner in mid-May. Remember the State Convention at Jackson's Mill July 5 and 6. Traffic: W8AHZ 121 WB8BBG 73, WA8WIX 67, WA8YHH 56, W8HZA 54 K8MYU 51, WA8YOF 40, W8CKX 32, W8JM 20 W8DUV 15, K8QEW 11, W8CWY 10, WA8RQB 7 W8EV 6, WA8LFW 6, W8QOB 6, WA8NDY 5, WA8YMP 3, WA8YSB 3, WB4GCK/8 2, W8AEN 2, WA8WCK 2 W8WEJ 2, WA8WMA 2, WA8WPR 2, K8ZDY 2 WA8ZNH 2, WA8LAL 1, WA8LFZ 1, W8QEC 1 K8QYG 1, WA8THX 1, WA8TWR 1, WA8UFX 1 WA8UNP 1, W8VOI 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Cotterell, WØSIN—Appointments are being renewed and new requests being received and they will be announced as soon as possible. Please let me have your traffic count and news as soon after the first of the month as you can. SET reports were received from ECs KØSPR (with newspaper article), WØGVT and KØLPI, with WØFA WØGCH, WØYCD, KØTIV, KØWGC also sending in some dope on this test. KØTIV sports a new TR-4. WØLRN is working on a linear. WØWYX reports that the Forest Service intends to rebuild the lookout tower at his QTH. Colorado Code Net (CCN) invites all who wish to QNI at 0130 GMT, 3780 kc. every night. Hi-Noon Net meets every day at 1900 GMT on 7240. Colorado Emergency Phone Net meets Sun. at 1500 GMT, 3945 kc. and the Colorado Weather Net at about 1630 GMT on the same frequency. The Columbine Net meets at 0200 GMT daily except Sun. local time on 3989 kc. Reports, news and comments are solicited and we hope to fill the column next time. Traffic: KØJSP 134, WAØMNL 94, WØKAU 86 WØLRN 74, KØMNQ 61, WØWYX 52, WØUAT 40 WØSIN 26, KØTIV 26, KØECR 19, WØLCE 13 WØLRW 5, WAØSIZ 1.

NEW MEXICO—Acting SCM, James R. Prine W5NUI—SEC: W5PNY. PAMs: W5DMG, WA5FFL OO: W5QNQ. RM: WA5FJK. ORS: K5MAT. OPSs W5BWV, WA5MIY, W5PNY. Thanks to W5WZK for his service to the state and we are sorry other obligations required his resignation as SCM. Several southern New Mexico amateurs upgraded licenses during the Feb. FCC exams in El Paso. Your Acting SCM retired from the Air Force and moved to Los Alamos Mar. 1. Thanks to the excellent support of state nets and the mobile rig, information was collected for this report. The New Mexico Net (NMN 3760 kc. 0200Z, Tue.-Sat.) has made substantial gains in activity—19 net sessions, QNI 109, QTC 86. W5OTO WA5UJY and K5MAT are commended for sustained net activity. Traffic: WA5UJY 155, K5MAT 96, W5DMG 36, WA5JNC 20, W5NON 8, WA7FBV/5 8, WA5MCX 4.

UTAH—SCM, Thomas Miller, W7QWH—SEC: W7WKF. RM: W7OCX. Remember the Rocky Mountain Division ARRL Convention will be held in Salt Lake City July 4, 5 and 6. Keep that date in mind and plan to attend. An outstanding program is being arranged with plenty of activity for YLs. Make it part of your vacation this summer. OO K7ZJS participated in the Frequency Measuring Test on Feb. 8. Stan is aiming at the Class I OO appointment. WA7KUW now has a tri-band quad up 75 feet. W7LQC has been awarded the Beehive Utah Net certificate No. 66. W7LQC is the Army MARS station at Defense Depot in Ogden. The section now has no ECs. All appointments are maintained on the basis of activity determined by monthly reports to the SCM. Traffic: K7HLR 303, W7JSS 105, W7OCX 73, K9BLQ 2 WA7KUW 2.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM OBSs: K7SLM, K7NQX, W7SDA, K7TAQ, WA7FHA Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, Mon. through Sat. at 0030 on 3920. W7EVN, one of the oldest hams in the state passed away in Feb. Jay will be missed by many of the old-timers. K7MGM is on the air with a new transceiver. WA7AUV is back on with a new rig. K7NQX was in Casper in Feb. and gave a very good talk to the club on AREC, etc. K7AHO is back home and on the air again after a vacation in Florida. K7TKF has moved to Missoula, Mont. W7KWR is on the air from his home in Worland. K7TAL was married in Feb. to the daughter of W7MZW. W7TZJ has a new transceiver on the air and recently was appointed as the County Civil Defense Communications Chief by the Civil Defense Coordinator. Traffic

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W7TZK 57, K7VWA 51, WA7FKF 19, WA7BDI 1
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SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG-
SEC: K4KJD. RM: K4BSK. PAM: WA4EEC. K4WH
is the new EC for Morgan County. WA4OCM is th
new EC for Lauderdale and Barbour Counties. WB4
LAO, WA4JSM and WN4JRR/WB4LYE all have the
General Class tickets now. Don't forget the Birming
ham Hamfest, which will be held at the Nationa
Guard Armory on Opporto St. in Birmingham May
and 4. Let's have an eyeball. The Huntsville ARC
doing an FB job with its monthly bulletin. It was nic
to have W4LHW/PAØLHW back with us for a sho
visit. He is in the Netherlands. Please make you
Field Day plans now because time is growing sho
and this year should be a big one. The Decatur AR
is really out to beat the HARC this year. Things a
going to be tough. Correction: As reported in th
Mar. column, the 0400Z session of AENB on 3575 k
has been cancelled—not 0100Z. Sorry 'bout that! WA4
AZC is on with a new SB-101. WB4LAO has a ne
TR-3 and an RV-3. W4USM is OPS/ORS no
WB4EKJ moved to the top on traffic this month
Traffic: WB4EKJ 82, WA4VEK 77, K4BSK 69, K4AO
62, W4MKU 44, K4WHW 41, WB4KDN 28, WA4RO
23, WA4JSM 21, K4KJD 21, WA4OCM 15, WA4AZC 1
WN4KSL 13, W4DGH 9, WN4JMH 9, K4UMD
K4KMG 7, WN4LHH 7, WB4DYY 6, K4ADK
WN4MIN 2, WB4LAO 1, WA4TMY 1.

EASTERN FLORIDA—SCM, W. G. Blasingam
WA4NEV—SEC: W4IYT. Asst. SEC: W4FP. RMs
W4ILE, K4EHY, W4RWM. PAM 75M: W4OGX. PA
40M: W4SDR. V.H.F. PAM: WA4BMC. Official Bulle
tin reports were received from K4DAX, K4LPS, W4
OGX and WA4EYU. W4DUG operated portable at th
Tampa Fair again this year. This must have set a ne
record in the number of pieces of traffic handle
Congratulations to all who participated. Also from th
Tampa Bay area comes the news that K4GT is th
pres. of the Tampa Amateur Radio Club. K4IE
reports he has just acquired a Twoer and should
active on v.h.f. soon. W4IYT and family report the
were on vacation and toured the Kennedy Spa
Center. Those of you who did not make the Browar
Amateur Radio Club Annual Auctiontest really misse
some good bargains. W4YNM is the new EC
Columbia County. He has appointed W4CYG as h
assistant. They now have a 2-meter emergency n
going and are getting the communications head
quarters set up in the c.d. office. The North Flori
Amateur Radio Society gang is busy getting the cl
station on the air and the RACES program in opera
tion. The club now has 2-meter f.m. and teletype
operation and plans to have the other bands on soo
The 2-meter repeater is soon to be a reality her
Hope to see you all in Orlando. Traffic: (Feb
WA4JJH 1316, WB4AIW 1121, WA4SCK 1079, K4EH
1025, WA4NEV 499, WA4FGH 396, WB4JHW 13
W4SDR 130, W4KRC 120, WB4IER 90, WA4HED 7
WA4TWD 78, WB4EPD 68, W4ZAK 64, K4DAX 5
W4FP 48, WA4CIQ 44, W4ILE 44, WA4EJA 4
WB4FLW 40, W4EHW 39, W4SMK 39, W4YPX 3
WB4ADL 34, K4LEC 33, W4DVO 29, W4NGR 2
W4AKB 28, WA4NBE 27 ,K4LPS 26, K4QCG 2
K4IEX 18, WA4BGW 17, W4IAD 17, W4BKC 1
WA4EYU 14, W4TJM 13, W4BPK 12, W4IYT 1
W4VPQ 10, W4LEP 8, WB4DSP 7, WA4OHO
W4SOM 5, W4LK 4, K4EBE 3, WB4JNI/4 3, WN4HV
WN4JJH 1. (Jan.) W4LEP 25.

GEORGIA—SCM, Howard L. Schonher, W4RZL
SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W
YDN. Apologies are due the Georgia Single Sideba
Net. Its report was filed Feb. 5 but not delivered un
the 10th. The net had a fine SET with 931 check-
and 91 messages. K4HQI submitted his usual f
report on v.h.f. activity indicating weak openings
50 Mc. based on many hours of patient listenin
W4LRR has a new linear on 2. WB4EYY is operati
2-meter s.s.b. Most activity was a bit on the lig
side after the SET. W4LRR is holding 2-meter sche
ules with WA4BVW in N.C. running a 450-watt fin
W4HYW is as active as possible when work will perm
WB6UTC only totaled 201 because of rig trouble.
W4TYE has been relatively inactive because of the
and church work. WA4UQQ lost his mother. WA4BV
participated in the Arizona and Vermont QSO Partie
WB4GOJ is building an SB-301. Our section nets we
active during the month with GSN handling 3
messages with 392 check-ins for 62 sessions, while t
S.S.B. Net had 931 check-ins handling 91 messages
31 sessions. Traffic: (Feb.) WB6UTC/4 201, WA3RA
125, W4FDN 112, W4CZN 102, W4PIM 85, W4NSO

W4TYE 61, W4DDY 35, K4FLR 27, W4RZL 23, WA4UQQ 9, K4PIK 6, WA4BVD 4. (Jan.) K4JFY 128, K4TXK 112, WA4UQQ 21, WB4GOJ 1.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM-V.H.F. K4NMZ. RM: K4UBR. RM-RTTY: W4WEB. Nets:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	28	626	62
QFN	3651 kc.	2330/0300Z	"	56	—	—

Pensacola: W7BNR/4 received appointment to the U. S. Naval Academy. The FFARA set up a TVI committee at the request of the Mobile FCC office. K4OSE, K4CFS and WB4JCV were active in the ARRL DX Contest. Fort Walton: Members of the FM Assn. are designing tone oscillators to use with the tone decoder installed on the f.m. repeater. WB4KAN, WB4HEM, W4FRF, WB4GMH and W4APR are looking for more local 6-meter stations, but TVI still is a problem! Two-meter a.m. activity is up, with 10 or more stations on the 7 P.M. Wed. Net on 145.2 Mc. F.m. activity was boosted by a large quantity of 1-watt handie-talkies recently received. W4RKH and W4APR have theirs going. W4BVE was appointed historian of QFN, the All-Fla. C.W. Net. Panama City: WA4VIY built a nuvistor pre-amplifier and a nuvistor converter for 2 meters. Chipley: W4IKB moved to a new QTH with a 2½ acre antenna farm. WA4GTA is active on all bands from New Hope. Tallahassee: W4MQQ is the new Leon County EC. Traffic: (Feb.) K4VFY 256, K4LAN 140, WB4DVM 45, WB4HKM 29, W4WEB 21, WA4EOQ 19, W4KCA 16, W4IKB 11, W4RKH 8. (Jan.) WB4EQU 27.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF—SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. A recent appointment is K7GPZ as SEC. He is State Radio Officer for Civil Defense and has been active in organizing the state RACES program. K7GPZ appointed W7CAF, SCM, as an Alternate State RO and both will attempt to organize Arizona amateurs in the best way for emergency communications utilizing RACES and AREC members. The Old Pueblo ARC held an auction Apr. 27 at Randolph Park in Tucson. The 75-meter transmitter hunt of the Arizona ARC was won by W7UXZ. Field Day is coming June 27 and 28 so get your plans laid to participate either with a club or individually. W7CFJ operated the c.w. part of the ARRL DX Contest from Mexico as XEØGEN and scored real well on all bands. WA7CYB has 100 countries confirmed. W7OIF has a new camper on his pick-up. Sierra Vista amateurs are setting up a 2-meter f.m. repeater that will cover most of Cochise County. K7NOS ran about 200 phone patches in Feb. with Peru and Alaska. K7UGA and K7HQF continue to run over 1000 overseas phone patches per month. The Copper State Net handled 234 messages and the Arizona Post Office Net handled 22 messages. Traffic: W7GEP 396, K7NHL 236, WA7IIF 84, WA7CYB 37, W7UXZ 33, K7NOS 30, W7OUE 30, W7YXA 24, W7LLO 20, WA7FEG 18, K7DHL 16, W7CAF 15, W7WGW 15, W7SBZ 8, WA7IFD 6, W7KYM 6, K7UOY 6, K7JFY 2.

LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—Asst. SCM: Harvey D. D. Hetland, WA6-KZI. RM: W6BHG. The West Valley ARC (WA6LXN) has been chosen to be in the ARRL film being made about amateur radio. *Didi-dumdum-didi*, the new L.A. section news bulletin, is going strong after a warm welcome initially by section appointees and clubs. Lockheed's Burbank Hamfest is scheduled for May 17 and 18. Write LERC Radio Club, 2814 Empire, Burbank, Ca., for more information. New Southern Calif. Net Mgr. is W6MN, and new Asst. Mgr. is WB6TQS. Crescenta Valley RC reports K6INY, prexy; WB6DRH, vice-pres.; W6INH, secy.; WN6TJF, treas. W6TXJ reports he has a new QTH. 205 countries worked was the first year total with the new call from W6QB! The ARRL SET in Jan. went over extremely

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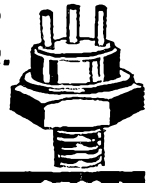

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well considering that present disaster conditions wer in effect in reality in many locations because water/rains. L.A. City RACES was involved for th first time ever in the ARRL SET and L.A. Count RACES also participated. To all participants, we done! BPLers for Feb. include W6GYH, WB6BBO an W6MLF. W6BHG spent a short spell in the hospit but is now out and recuperating. New Extra Class ma is WB6UHF. Congrats. Welcome back to W6ORS, wh had been /1 for some time. An Advanced Cla licensee now is WA6TYR! W6FTQ is a new OO in th section and is with the WB6WPO group in Redond Beach. Rain damage was reported by W6TN at h /6 location and OO W6RW reported many antenna down and various poles damaged. New members of th W6LS crew include WN6s PJC and TJF. W6SD repor that WN6TNP is a new recruit. The Rocketdyne AR reports new officers in the form of WA6IGU, prexy WA6OTV, vice-pres.; W6ZZN, secy. WB6SSZ repor she blew her final tubes recently. K9ZMS/6 has ne antennas up and an Extra Class license. WB6OUD h a Drake R4 and T4X combo going. OBS W6RCV looking for a Matchbox. WB6USX reports the Cali Novice Net, CNN, on 3737 kc. at 0200 GMT dail Silent Key: WA6TII. The TRW RC has installed OR WB6WDS as prexy; W6QKI, vice-pres.; W6PM secy.; K6AWO, treas. The WB6WPO gang recor W6BUH and WB6GBC as new members. Jan. BPLe included W6MN/6, WA6LWE, W6GYH and W6ML The PARC has WB6USB as its new activities chm The ITT San Fernando RC's new call is WB6LK The Southwestern Division ARRL Convention will held in Oct. this year in San Diego. Write P.O. B 1469, San Diego, Cal. 92112 for more information. T Ten-Ten Net has W6FFN as pres.; W6TXJ, vic pres.; W6OI, secy.; WB6FFY, corr. secy. Traffi (Feb.) W6GYH 707, WB6BBO 546, W6MLF 348, W6QA 253, WB6USX 93, WB6TQS 68, K6CDW 47, W6M 37, W6DQX 33, WB6OUD 33, K6ASK 26, W6BRG W6USY 20, WA6KZI 19, WB6WDS 16, WB6UHF K6UMV 11, K6CL 10, W6DGH 9, W6HUJ 9, WB6GC 6, K6EA 5, WB6KGK 5, W6TN 5, W6FD 2, W6FTQ

ORANGE—SCM, Roy R. Maxson, W6DEY—T San Bernardino Microwave Society, Inc., meets 1930 the first Thurs. of each month on the seco floor of the Security Pacific National Bank, 204 E Sixth St., Corona, Calif. Entrance is to be made at t rear stairway. K6MBL is corr. secy. New OR W8ELW/6. W6EIY notes we need much improvem on our sectional net activity. He currently has to m messages within a 100-mile radius. K6OT reports he back on the air after a falling tree took out t transmission line and control cable to the quad. T Annual Banquet of the Newport Amateur Ra Society was held Feb. 28 at Sams Sea Food. Pres. W6CI was MC, WA6OET was the featured speaker. A go time was had by all. Please note that the Anahe Amateur Radio Assn. holds breakfasts at 9 A.M. t 2nd Sat. of each month at Denny's on Euclid, 811 The AREC again furnished communications and servi for the Orange County Heart Fund. Traffic: WA6R 229, W8ELW/6 90, W6BNX 56, W6EIY 46, W6WRJ WA6TAG 14, K6OT 1.

SANTA BARBARA—SCM, Cecil D. Hinson, WA OKN—SEC: K6GV. RM: W6UJ. The regulars on 3 were delighted to hear W6BJM back on the air after long absence. Seems his KWM-2 went sour and it to several attempts to get it back in shape. WA6D is building a beam for 20 and a "V" quad. W6UJ up emergency communications for Lompoc and pr vided communications for the Mayor during the rec flooding of the Santa Ynez River. Actually, most of t rivers which lead to the ocean within the section ha flooded twice in as many months and all emergen communication groups have had an exercise. W6K sold his 2-meter f.m. gear and is putting up a tri-ba beam to use with the Drake R4, T4 and 3-100 linear. WN6ZWM has a small QRP rig and plans long motorcycle trip into Baja, Calif. K6AAK let cook go on vacation and now has to eat at t Country Club. Traffic: WA6DEI 181.

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WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR Asst. SCM, E. C. Pool, W5NFO. Asst. SEC: W5JSM. PAM: W5BOO. RM: W5QGZ. We are in the middle of paper work problems, i.e. cancellation of inactive appointments. Your SCM is searching for new OOs. RM W5QGZ is writing letters to all former ORSs searching for recruits. Your OOs continue to make a good showing despite the limited number available. We are processing three new OOs now. Anyone desiring to participate in quarterly ARRL Frequency Measuring Tests are urged to try your luck. Requirements include a frequency meter and a receiver. Remember these guys in Newington run those "decimals" way on out there. Don't *feel* hurt if you did not get in the *ball* park. This is one of the most rewarding experiences in ham radio. W5KYD acquired a new Henry 2KD-3. K5RBL resigned as OO but will be back. W5KUC spoke on DX before the DARC. Any of you ever hear of the Intruder Watch? W5MSG continues to travel. W5RHF, former TCC man, is active in Tex. C.W. W5HVF is on 7290. W5QKM is active Sun. at 0800 on 3970. W5RID applied for OO appointment Class II and III. He has a 500 kc. standard in an oven plus 100 kc. output to direct reading bridge. The Denton group was very active in the SET. WA5OJW, of Richardson is interested in an OVS appointment and uses equipment above 1000 kc. W5QJA says Tex. C.W. traffic continues to improve. For those of you who may or may not be interested both 80 and 160 meters has DX running up and down the band late at night and early in the morning. Our West Gulf Division Director and his XYL visited the Dallas Chapter of the QCWA in early March. Some 50 guests attended. I want to take this opportunity to thank the many affiliated clubs who are sending me their club news. May I suggest to each of you that you please take time to mail in your annual forms to Headquarters. This is an absolute "must" as this keeps all address changes of officers up to date. Your club secy. usually has this assignment. Traffic: K5BNH 2281, W5RHF 274, W5QGZ 90, W5HVF 84, W5FCX 71, W5PBN 39, W5JSM 26, WA5CTJ/5 22, W5LR 12, W5MSG 2.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5FSN. RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU, K5ZCJ. W5QMJ reports the Enid Air Force MARS 2-meter repeater is installed and working fine. W5EFM has a new SBE-34 on the air. WA5MJA recently underwent surgery on a leg but is doing fine now. K5WPP finally got moved into the new house. WA5SEC still is struggling with his 2-meter f.m. rig. WA5AOB resigned as SEC because of the over load of work at the University Hospital, and has been replaced as SEC by WA5FSN. Appointment of WA5FSN was made at the Mar. meeting of the ACARC at Oklahoma City. The Lawton-Fort Sill ARC was honored at its 22nd hamfest by the presence of the Vice-Pres. W5NW and West Gulf Division Director W5EYB. The Lawton-Fort Sill Club station, K5VOZ, has just bloomed out with a new and complete Drake rig. New officers of the Oklahoma Central V.H.F. Amateur Radio Club are K5VRL, pres.; WA5OUU, vice-pres. WA5HUN, secy.; WA5JGU, treas. Congratulations to W5BDV, Extra Class, WA5TRS, Advanced Class WA5VIH, WA5WDS, WA5WYD, General Class. Net reports:

Phone Nets	Sess.	QNI	QTC	C.W. Nets	Sess.	QNI	QT
OPEN	4	158	6	OLZ	17	56	38
OPON	20	304	64	SSZ	15	42	40
STN	24	670	199				

Traffic: K5TEY 4630, W5QMJ 90, WA5IMO 33, WA5 LKS 32, K5OOV 32, WA5AOB 29, WA5FSN 2 WA5KFT 26, W5FKL 23, W5PML 19, W5QBF 1 W5MFX 17, K5SWL 14, WA5SEC 13, WA5DZP 1 K5CBA 6, W5IQ 4, K5WPP 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Sear W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZ W5QJA is doing a bang-up job with the Tex Traff Net. Congrats to those who QNI to the Tex Ne Keep up the good work. WA5QQR advises a new an different net, the Handicappers Net, now in operatio on 7270 kc. Mon., Wed. and Fri. from 2000 to 21 GMT. WA5QQR, net Mgr.; WA5TIK, asst. net mg W5PCN, equipment coordinator, or W5QZY can furnis further information. EC W5TFW says high win shook up some antennas and towers in the Nederlan area. EC W5ICL advises the Orange County Six Met Net was activated Feb. 24 when an explosion occurr at one of the chemical plants in the Orange are Stations logged in as participating were W5NO (clo

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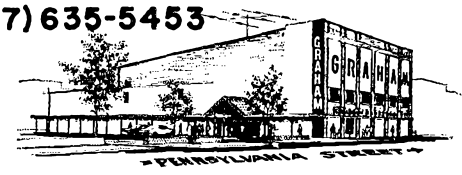

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station), K5UAH/mobile, K5AVN, WA5DIK/M, W
QVB, WA5ONZ/M, K5VXP, WA5LFT, W5NMV,
W5MOO, WA5GYQ, W5SON, K5ROZ, W5ICL, K5
along with outlying stations W5HYV, WA5NVH,
WA5SSP operating, K5ZCU, WA5QBX and WA5D
Luckily only few injuries were reported even tho
windows were broken out five miles away. EC W
KHE reports the Twin Cities Public Service Net
changed its name to the East Texas Traffic Net
will continue skeds at 1700-1730 local time M
through Fri. on 3951 kc. The change was made
further participation and the net will function a
traffic and emergency net when needed. WA5TXI,
Navasota, has been appointed civil defense coordina
for Crimes County. From EC W5KR's bulletin
Southmost ARC visited the Port Mansfield Sate
tracking station Mar. 16. Come on, fellows, let's h
your traffic reports. Traffic: W5QJA 133, K2EIU/5
WA5QKE 80, W5TFW 64, W5BGE 49, W5ABQ
WA5WFR 38, W5AC 23, W5EZY 22, W5KLV 2.

CANADIAN DIVISION

ALBERTA—SCM, Don Sutherland, VE6FK—S
VE6FK. APSN meets daily on 3770 kc. at 01
CPSN meets weekly at 0220 Wed. on 3740 kc.
CREN, on 3690 kc. at 0300Z Mon., Tue., Fri., Sat.
designed for training purposes. The CARA held a
fine Annual Banquet Feb. 22 and honored VE6AO,
has helped many amateurs over the years. It's nice
see a club recognize such service. The Annual Gen
Meeting of the ARLA will be held in Edmonton du
the Hamfest Aug. 2 and 3. VE6UJ and VE6A
have volunteered for the Intruder Watch. Thanks
your help on this project, fellows. The Aurora
on 7188 kc. at 0200 and 0300, is becoming
established. A good number of VE6s are helping
the furthering of this net as a daily Trans-Can
Net, or as a Canadian Service Net. This should b
great net during the holiday season for mobiles ac
the country. Control stations are VE7IL, VE
VE6NW, VE6TG. Traffic: VE6FK 31, VE6SS
VE6ATG 7, VE6XC 6, VE6VF 5, VE6WN 5, VE
1, VE6NT 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE
—After a winter for the records we can now repair
damage to our antennas and plan for summer activ
At the June 7 and 8 QCWA Party a special eve
Sat. is being planned for all of us. FD will be
June 28/29. On June 15 the Vancouver Island Pi
will be held and the Okanagan International Ham
will be held July 26 and 27. The Kamloops A
reports its own club house and HW-100 all in worl
order. VE7BZ, formerly WØIDJ, is active on 20,
and 10 with a TH-3. The Fort George RAC reports
2-meter repeater is working, in 146.58 Mc., out 14
Mc. VE7EC celebrated his fiftieth wedding annivers
The British Columbia Amateur Radio Public Ser
Corp Net, 3755 kc., elected VE7BVB net mgr.
VE7BVG as his asst. BCEN summer time is 0300 G
on 3650 kc. VE7KZ will handle traffic from 3755 to 3
VE7BGV, in town for a week end, visited the
office and obtained his Class A license. VE7BLO rec
mends that you DXers join the Canada DX A
VE7LL is looking for more to join the Green Keys
B.C. Traffic: VE7ZK 62, VE7AC 14, VE7SE 11, VE7
7, VE7GG 5.

MANITOBA—SCM, John Thomas Stacey, VE4J
Slow-scan TV is occupying the time for VE4EG
VE4EF at Margaret and for VE4CN and VE4FO
Dauphin. The Brandon boys are taking to 2-m
work with VE4RE, VE4RW, VE4CT and VE4OD
the forefront. VE4DQ is off to YA-Land for a mo
as part of a medical teaching team. VE4NE
added the Polar Net on 14.130 Mc. to his tr
activities. This is a reminder that reports should re
me by the fifth of the month for inclusion in
column. Both traffic nets report very successful mon
The Phone Net had sessions 28, QNI 784 and QTC
MTN had sessions 26, QNI 129 and QTC 59. Tra
VE4FQ 41, VE4YC 32, VE4EI 29, VE4JA 15, VE4
15, VE4EF 13, VE4QJ 10, VE4CR 7, VE4RL 7, VE4
7, VE4RB 3, VE4EG 2, VE4JC 2, VE4QK 2, VE4O
VE4OL 1, VE4OL 1, VE4ZP 1.

MARITIME—SCM, William J. Gillis, VE1NR—S
VE1HJ. Our sincere sympathy to the family
VE1XK, Truro. Gordon Purdy was one of the
timers and will be greatly missed by all. VE1A
now is signing VE3GIM, VE1AHK/HB9FC MM no
ashore at Saint John. VOIs JH and DF are on the
with HW-100s. VOIs GI, BS and EX are warming
for 2 in Central Newfoundland. Additional 2-m
repeaters are now on at Halifax and Saint John. T
active on 2 are reminded of the "Ross Clements M
orial 2-Meter DX Trophy," donated by his wi

and administered by the Moncton Club. Compe is open to all in the section and reports of DX ac should be addressed to MAARC, Box 115, Mon The Greenwood, N.S., Club extends an invitatio all visitors. APN: QTC 97, QNI 369, session Traffic: VE1RO 89, VE1AMR 83, VE1AUD 78.

ONTARIO—SCM, Roy A. White, VE3BUX—BPR (of moonbounce fame) tells me he is VE3NA. VE3AUU has a new HW-100 percolatin has VE3BEB, and VE3CQD blew himself to an 101. Trans-Caanda ARPSC Net certificates have to VE3s APM, AML, ANZ, AWU, AYW, BUC, COL, CUC, CRW, CXU, CYL, DOB, DQG, FBZ, FGH, FHQ, FWC, CO and CU. VE3DE again active. He is one of the old-timers who hel call 3HB back in 1917 and, incidentally, was a first Canadian ARRL Convention held in Toron 1922. I'm told Bell Telephone is initiating an radio classes right across Canada. I also hear tha DOT is requesting that amateurs not send in li renewals until notified "as the matter is under rev The Ontario Trilliums is working hard on its co tion to be held in Toronto May 16-17-18. Peel provides living proof that hams *can* work in har with EMO if they really want to. The scuttlebu that Ontario nams may have call-letter license in 1970. I'm struck by the frequent complaint of bulletin editors that they can't get members to s material. Dryden ARC has a good idea. They s *name* the individual who is required to send i autobiography for the next issue—or else! How some people assume that they have squatters righ *their* particular net frequency? It just ain't Another point is that the language just below sometimes sails a little close to the wind so let's it, fellows! VE3CTJ tells me that the RSO is soring its first QSO Party July 19-20. Congra VE3ACH and GUM, who are now ECs. Some o OPN Controllers have been absent from their r stint for many weeks and haven't even bothered the PAM know. This makes it rough on the fa so how about it, boys? Traffic: VE3ERU 211, V 168, VE3DPO 101.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: ALE, RM: VE2DR. We expect renewed activit some frequencies during the summer. VE2EC r good activity from Trois Rivieres and VE2BVY tinues good work for the nets. It's like old tim listen on 3700 Sat. and Sun. One hears VE2H control old-timers like VE2II, VE2DR, VE2JS, QE, VE2GK, VE2BG and many more. What a w of amateur radio in those old heads! We have newcomers. VE2DKJ, VE2DIH, VE2BHH, VE2 are making great strides. VE2BKA is operating VE3-Land. VE2CRT sponsored a successful an radio exhibit at Technical School. VE2AT has inactive recently. VE2AOX maintains many American skeds. VE2BGJ has a very impressiv meter report. He can be proud of his hom kilowatt on 144 Mc. VE2WM has laid all the pla the forthcoming VE2 Contest. VE2DEK agai ranged amateur communication for the dog sled VE2APT did likewise for the Annual Rally des N Traffic: VE2BVY 106, VE2AJD 86, VE2OJ 84, V 74, VE2BRD 56, VE2ALE 46, VE2CP 38, V 27, VE2DKJ 2.

SASKATCHEWAN—SCM, Gordon C. Pearce, HP—Field Day will be held the week end of 28-29. All Saskatchewan participants will like taking up the challenge of VE5NN, the winn the coveted "QC" Trophy in 1968. Then the wee of July 5-6 the Saskatchewan Hamfest will be h Moose Jaw, Sask., at Wild Animal Park. If it ra snows we will retire to the spacious and he Saskatchewan Technical Institute. The ARRL Contests were enjoyed by all. The 40-Meter N 7.188 kc. (two sessions, 0200 GMT and 0300 GM working out better than anticipated by its origi There are over 180 registrants so far. Several VE5s are now involved in RTTY and surplus ment and the same applies to slow-scan TV. katchewan did very well in the SET Exercise. I our count was 328; this year it totalled 616. Any travelling through Saskatchewan this year should watching for stations on 2 and 75 as well meters. (Frequencies 3785 etc., transmit 146.460, 1 147.330; receive 146.940, 147.330.) A repeater atop our SPC Building enhances coverage province. Traffic: VE5GL 69, VE5LQ 36, VE5P VE5XL 17, VE5SC 11, VE5KZ 7, VE5CF 6, VE5 VE5KI 5, VE5QS 5, VE5FA 2, VE5PZ 2, VE5 VE5UB 2, VE5UT 2, VE5YR 2, VE5CA 1, VE

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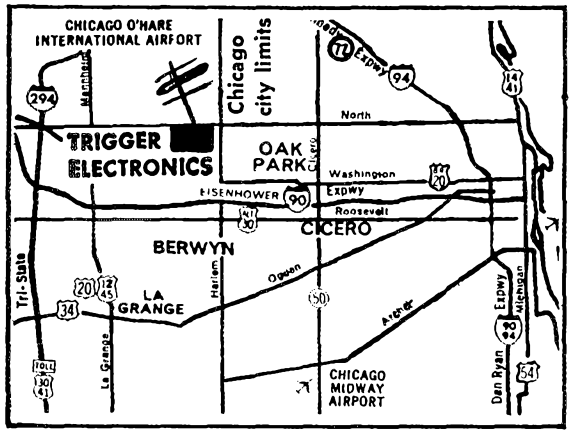

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(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

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(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.

HAMFEST—Roanoke, Virginia, Roanoke Valley ARC May 24-25. Saturday, May 24—7:00 PM Rag Chew at Embassy Motor Lodge. Sunday, May 25—8:00 AM to 4:00 PM contests etc. Vinton War Memorial, Vinton, Virginia.

AUCTION: June 8th Manchester Radio Club at Tower Hill, Candia, N.H.—Map and information S.A.S.E. W1HPM, Post Office Box 661, Manchester, N.H. 03105.

ROCHESTER, N.Y. is again Headquarters on Saturday, May 10 for one of the largest hamfests in the East. Full day of dual programming covering all phases of amateur radio, plus huge surplus equipment sale. See Hamfest calendar for more information.

SOMERSET County Hamfest—June 8th. Casebeer Church Grove, Route 219, 7 miles north of Somerset, Pa. (9 AM-5 PM) Write Theodore J. Leonberger, K3RCI, Rd 2, Rockwood, Pa. 15557.

A.W.A. National Amateur Radio Historical Conference, Oct. 3, 4, and 5th, East Greenwich, Rhode Island. A weekend of nostalgic memories: Spark transmitters, Crystal sets, Hartley oscillators, and Regenerative Receivers. Everyone welcome! Write W2QY.

ROCHESTER, N.Y. is again Hamfest, VHF meet and Flea market headquarters for one of the largest events in the East, May 9, 10 and 11th. Write WNY Hamfest, P.O. Box 1388, Rochester, N.Y. 14603, for program and information.

"SEE your picture and a thumbnail sketch of your life in wirelss along with many of your old buddies in Spark Gap Times magazine published by the Old Old Timers Club. Charter membership is offered to all pre-World War I operators, regular membership to any operator licensed 40 years or more ago. Be a recognized pioneer, join the Old Old Timers by writing the Secretary W5ZC, Bert E. Gamble, 402 Beck Building, Shreveport, Louisiana 71101."

INVITATION: New York Radio Club invites New York Area hams and SWLS to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 PM. W2ATT, New York Radio Club. Our April, May and June meetings will be held on the 2nd Monday of the month. Our Annual Auction will be held on March 14, 1969 at the George Washington. (All our meetings are held there.)

HAMFEST: June 8th. Save this date for Annual Starved Rock Radio Club Hamfest at Ottawa, Illinois. Write: George E. Keith, W9OLZ, RFD #1, Box 171, Oglesby, Illinois 61348, or see Hamfest Calendar in May QST.

FANTASTIC—1969 New England ARRL Convention. May 24 & 25, Swampscott, Massachusetts. Save money! Early bird registration $10.50 including Saturday dinner, dance and night club entertainment. Be a winner! Every major manufacturer will exhibit, plus top speakers from science & industry. Tickets: W1KCO, John McCormick, Berkeley Street, Taunton, Massachusetts.

BROOKLYN New York Ham Auction (no junk!) May 16, 1969, 8 PM, at Cummings Brothers American Legion Post Benefit, Ave. D and East 46th St., Brooklyn, N.Y. Coffee, cake, etc. For further info, call a.c. (212)-763-4233, M. Libowitz, K2BDQ.

WELCOME To Maritime Mobile service net, 14313 Khz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry, RDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

QSL'S?? SWL'S?? America's finest!! Personalized made order!! Samples 35 cents. DeLuxe 50 cents. Religious 25 c (refunded). Sakkers, W8DED, Box 218, Holland, Mich 49423.

C. FRITZ—QSLs that you're proud to send, bring greater turns! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz 85252.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Pe 18103. Samples 10¢. Catalog 25¢.

QSLS stamp and call brings samples. Eddie Scott, W3C Fairplay, Md. 21733.

QSLS—SMS. Samples 25¢. Malgo Press, Box 375, M. Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Tren N.J. 08638. Samples, 10¢.

10¢ Brings free samples, Harry R. Sims, 3227 Missouri A St. Louis, Mo. 63118.

QSLs, SWLS: Rubber stamps, address labels, and envelo Quality with service. Samples 25¢ (refundable), R. A. La Press, Box 45, Fairport, N.Y. 14450.

QSLS. Free samples, attractive designs. Fast return, W Press, Box 2378, Eugene, Oregon 97402.

QSL, SWL, cards that are different. Quality Card stock, S ples, 10¢. Home Print, 2416 Elmo Ave., Hamilton, 45015.

CREATIVE QSL Cards. Personal attention. Imaginative designs. Send 25¢. Receive catalog, samples, and 50¢ re coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 9

QSLS SWLs Hundred $2.00, samples dime. Garra, Mahoning St., Lehighton, Penna. 18235.

QSLS 300 for $4.35, samples 10¢ W9SKR, George Ve Rte #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS-100 3-color glossy $3.50; silver globe on front; re form on back. Free samples. Rusprint, Box 7575, Kansas Mo. 64116.

QSLS. Gorgeous rainbows, cartoons, etc. Top quality! prices! Samples 10¢ refundable, Joe Harms, WA4FJE/W3C 905 Fernald, Edgewater, Fla. 32032.

QSLS, SWLS, WPE. Samples 15¢ in adv. Nicholas & Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLS, samples, 10¢. Fred Leyden, W1NZJ, 454 Proctor Revere, Massachusetts 02151.

RUBBER Stamps. Return mail delivery, postpaid. Basic r $1.00 first line, 60¢ each additional line. Request type chart. Fulton Rubber Stamps, Route 216-A, Fulton, Mary 20759.

QSLS. Neat, quick, 10¢. Filmcrafters, Box 304, Martin's F Ohio 43935.

QSLS Kromkote glossy 2 & 3 colors, attractive, distinc Choice of colors, one hundred—$3.00 up. Samples Agent for Call-D-Cals. K2VOB Press, 457 Chancellor Newark, N.J. 07112.

QSLS, Radio Press, 15008 Orchid Ave., Poway, Calif. 9

QSLS, finest YLRL's, OMs samples 10¢. W2DJH Press, rensburg, N.Y. 12885.

RUBBER Stamps $1.15 includes tax and postage. Clint's dio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSL cards. Finest quality. Economical prices. Fast se Free samples. Little Print Shop, Drawer 9848, Austin, 78757.

LOW PRICED QSLs!! Free samples!! K. L. L. Press, Box Martinsville, N. J. 08836

QSLS, WSLS, XYL-OMS (Sample assortment approxim 9¢) covering designing, planning, printing, arranging, ma eyecatching, sedate, fabulous, comic, DX-attractive, proto snazzy, unparagoned cards (Wow!). John Patterson carrie in the spirit of the late Warren Rogers, KQAAB, addin own, Patterson Printing, 961 Arcade St., St. Paul, 55108.

3-D QSDS—The modern concept that makes all others fashioned. Samples 25¢ (refundable). 3-D QSL, Co., Mc 2, Mass. 01057.

RUBBER Stamps, 3-line address $1.50. J. P. Maguire pany, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Se Free samples. Thomas St., Riegel Ridge, Milford, N.J. 0

QSLS by K1FF; $2.00 for 100. Others at reasonable p Samples 25¢ (deductible). K1FF QSLS, Box 33, Me Mass. 02177.

PICTURE QSL cards of your shack, etc. from your p graph. 500, $12.00, 1000 $15.25. Also unusual non-pictur signs. Generous sample pack, 20¢. Half pound of samples Raum's, 4154 Fifth St., Philadelphia 19140.

ORIGINAL EZ-IN double holders display, 20 cards ea plastic, 3 for $1.00 or 10 for $3.00 prepaid and guarar Free samples to Dealers or Clubs. Tepabco, John. K4 Box 198T, Gallatin, Tenn. 37066.

3 Line engraved badges, any color, $1.25. Special rat clubs. Fallert's Engraving, 121 N.C. St., Hamilton, 45013.

PICTURE of yourself, rig, etc. on QSLs made from photograph. 250—$7.50; 1000—$14.00 postpaid. Samples Picture Cards, 129 Copeland, LaCrosse, Wis. 54601.

QSLS: 100, $1.25 and up, postpaid. Samples, dime. Hc R3, Box 649, Duluth, Minn. 55803.

MINI QSLS. Eye-Ball cards. Free information. A. A. Irving Ave., South, Minneapolis, Minn. 55403.

EMBOSSED QSL's. Free Samples, with cut catalog 25 cents. Ace Printing Service, 6901 Clark Ave., Cleveland, Ohio 44102.

CANADIANS! The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. It will pay you to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel: 416-789-1239).

CANADIANS: DX-60 90 watt phone and cw xmtr (power supply built-in) plus HG10 V.F.O. 10 to 80 meters. Total Price $100. You pay shipping. I. Lightbody, VE3FEQ, 12 Golding Ave., Brampton, Ontario, Canada. PH 459-4171.

CANADIANS! SX-101-A Receiver, used, to sell, Sacrifice!! $150. ARC McGill University, 3480 McTavish, Montreal, Quebec.

CAPACITORS For your Linear. 140 ufd at 450 w vdc. Brand new at only the giveaway price of 10 for $9.50. K4IHP, Mehaffey, 6835 Sunnybrook Lane, NE. Atlanta, Ga. 30328.

CHRISTIAN Ham Fellowship being organized for Christian fellowship and witness for license amateurs. Free gospel witness tract samples and details on organization on request. Christian Hamm Callbook for $1 donation. Write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

HAMFEST sponsored by Lancaster and Fairfield County ARC at Derby Downs one mile south of Lancaster, Ohio, on BIS Road, Rte 793, June 8th. Gigantic Swap Shop! $1.00 Registration. Good food at reasonable prices. W. C. Beach, 268 Peters Ave., Lancaster, Ohio 43130.

WANT Early issues RDO News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electrics, Popular Radio, Radio Broadcast, Wireless Age, 1923-1925 Callbooks. For historical library. Wayne Nelson, W4AA, Box 127, Concord, N.C. 28025.

INVITATION To form a Town Hall group for open discussion, debate and dissent on amateur radio matters. Write WA5TSN, 4023 Mackland Ave., Albuquerque, N.M. 87110. INVITATION. Voudrais 'vous un group les francais aider dans l'etudies pour reseau des emetteurs francis' Ecrit WA5TSN, 4023 Mackland Ave., Albuquerque, N.M. 87110.

QCWA—Quarter Century Wirless Association in a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information. A. J. Gironda, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10543.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase. W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. NOrmandy 8-8262.

PROP Pitch rotor, WW2, small, excellent, $45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

WANTED: 2 to 12 304TL Tubes, Callanan, W9AU, 118 S. Clinton, Chicago 6, Illinois.

SELL: New Yaesu FT-DX-400 Transceiver. W8AO, 2912 Riverview Blvd., Silver Lake, Ohio 44224.

NORTHERN California hams: best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1305 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

HAM Transformers rewound, Jess, W4CLJ, 411 Gunby Ave., Orlando, Florida 32801.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits. P.O. Box 175, Cranford, N.J. 07016.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-Q567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes. Callanan. W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

MANUALS for surplus electronics. List 15¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HAM'S Spanish-English manual $3.00 Ppd., Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateurs License Manual, Editions, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 QST'S needed for personal collection. Price secondary, Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted, wits to wire. Heath preferred, 2% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

FOR Sale: Asahi transistorized TV camera, $197.50, Fred Mertin, W5YHT. Rte 2, Fayetteville, Ark. 72701.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI. Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

TOROIDS, 88 mh uncased. 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

HEATHKIT SB-300 w/SSB, CW crystals. Mint condx. $219.00. WB2EYZ, 2154 57 St., Brooklyn, N.Y. 11204.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $2.00 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Model #28 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass, caps and bridging resistors, 10 for $3.75. Postpaid USA. With diode purchase. 125 Mf. at 350 volt electrolytic capacitors. 50¢ each. Postpaid USA, no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? AARL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

SELL, trade or buy Call Books, handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood City, California 94062.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Raod, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

3000 V @ 3mf brand new GE Pyrano oil capacitors, $3.00 each. Can mail, 3-lbs. each shipping weight. FOB P. Wandelt, RD #1, Unadilla, New York 113849.

TELETYPE Wanted—M28 typing units, any condx, keyboard perforators—reperforatros, cast aluminum TD bases, all unused parts. Sell, too. Typetronics, Box 8873, Ft. Lauderale, Fla. 33310.

VIKING INVADER 2000 Drake Receiver TA-33 beam, tower as a bonus if I can sell my modern home, air-conditioned, on half-acre. And my radio and TV, business which is located downtown, with very low rent. Both for $22,500. Full details if you are interested. 40 years in same business, same town is enough for me. Want to become a full-time W4. K. Deal, W8THJ, 4755 No. Washington Road, Piqua, Ohio 45356.

VHF-UHF Digest . . . Sample 30 cents. M. Goldman, Box 5001, Milwaukee, Wisconsin 53024.

TEST Equipment wanted: Any equipment made by Jewlett-Packard, Tektronix, General Radio, Stoddart, Measurements, Boonton. Also Military types with WRM-( ), USM-( ), TS-( ), SG-( ) and similar nomenclatures. Waveguide and coaxial components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040.

WANTED: Early wireless receivers and transmitters prior to 1926 for private collection. Jack Swanson, W5PM, RFD 1, Box 399, Covington, Louisiana 70433.

FOR Sale: T150 $85.00. Superpro commercial version. $60; antique Bretting 1, $70; antique jewel meters, $10 each, 4.250, $20. QST's 25¢ each. Estate W7DDE. Union, Washington. K. Olson, Star Rte 1, Box 398, Belfair, Washington 98528.

POLICE-Fire radio dispatcher directories! Exclusive official directories; callsigns, frequencies of local, county, state agencies. National. For all VHF fans. CD, AREC, RACES, MARS, VFD's. Catalog for stamp. Communications, Box 56-T, Commack, N.Y. 11725.

DAH-DITTER Keyer. Integrated circuit electronic keyer. Fully self-completing on both Dit and Dah with automatic spacing. Built-in SC pwr. supply, reed relay output, with sidetone monitor and speaker. Completely assembled and tested. Only $34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30238.

WANTED: Electronics Instructor. General indispensable. Theory and workshops. Science Camp, Lake Placid, N.Y. Write Eppstein, Apt. 4B, 440 Westend Ave., N.Y. 10024.

COLLINS KWM-1 with 516E-1 12VPS, 351D-1 Mobile mount, 312B-1 Speaker and Home AC PS. All extremely good. $4.35. Bill Pfeffer, 120 Post, Iowa City, Howa 52240.

HT37/SSX-111 package only $300 HW12A $100. BC221-AK Frequency meter $65. New Johnson 250-39 TR Switch $15. K4EOF.

COLLINS Station in new condition, for sale. 75S3C with 800 cycle, 2.1 K.C., 6.OK.C. filters. 32S3 transmitter, 516F2 power supply, 312B4 station control, 30L1 linear amplifier. 664 mike and TH6DX beam. 30% off list price. Pick up only. K8LDC, 738 Truesdale Rd., Youngstown, Ohio 44511.

SALE: Apache X'mtr, w/D104 mike; HQ170C receiver-both mint condition. SASE for many other items. Mrs. Ruth Hornbeck, 3406 Rock Bluff, Dallas, Texas 75221.

SALE: War Surplus items; Command Sets. Send SASE for complete list. C. W. Roberson, W5MBP-Box 218, Terrell, Texas 75160.

TWO Galaxy V Mark 2, One new, one slightly used. A.C. Power Supply, D.C. Power Supply, Speaker, console, and Novice Adaptor, will accept reasonable offer. Arlie E. Paige, 418 Antelope Trail, Parker, Colorado 80134.

SELL: Hallicrafters 18AVQ in superb shape. Looks like new, $170.00. Will pay postage. WAØDXL, 514 North Washington, St. Peter, Minn. 56082.

WANT: Early issues Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord, N.C. 28025.

REPAIR and calibration service. Write before shipping. Pantronics, Inc., 6608 Edsall Road, Alexandria, Virginia, 22312.

HALLICRAFTER SR-150 Mount, D.C. supply $375.00. S.X. 117-Speaker $225.00; SB 200 Linear $195.00. TH6DX Tribander $85.00; Tristao CZ-454-FS Tower expecting fixture $280.00; Both like new. Ham "M" Rotator $75.00. Tri-ex 60' crank-up tower $125.00. W4MVC, 10 Carjen Ave., Asheville, N.C. 28804.

LINEAR, new, pair of 4-1000A, in Class B, grounded grid, vacuum capacitor, adjustable filament and plate voltage. 10 thlu 80 meters. Bill Brown, WØSYK, 28 Marine Lane, Hazelwood, Mo. 63042.

SELL: Hammarlund SP-600 Receiver, new condition, rack mount with manual $350. Stancor 300 watt modulation transformer, type A-3898 $20. WØOHX, Wilford Lane, Kiowa, Kans. 67070.

COLLECTORS! QST's. Complete run 1922 to date in binders. First $300.00 certified check. Pick up or pay shipping costs. Globe King 500C with HD outboard transformer. 600 Watts Easy. A-1 shape $225.00 including spare 4-400A and D-104 Mike. Must pick up. E. B. Charlton, W5WQX, 6824 Lacey Drive, Baton Rouge, Louisiana 70811.

SELL NC. 300, NC. 300/6 converter Ameco TX62, Elmac AF68A, WA9LHG, Ted Suddarth, 54868 Quince Road, South Bend, Ind. 46628.

FOR Sale: Hallicrafters SX-100, $125.00. Hallicrafters S-36A, 27-143 MC. with squelch $35.00; Hickok Scope RFO-5 $20.00: K2SJB, 109 W. Haven Rd., Ithaca, N.Y. 14850.

HT32, Full 10 meter coverage $225. Collins 75A3 vernier knob, 3.1 and 2.1 mechanical filters, product detector and calibrator, $250. Art Rauch, WD2DID, P.O. Box 58, Central Islip, New York 11722. Tel: (516) 234-8544.

FOR Sale: Heath DX-60; S-40B receiver; Knight VFO; SWR Bridge; Key; Mike; xtals; Antenna relay; Headphones; beam filter $100.00. Great for novice or General. Write: WA9ZPE, 757 Bonniebrook, Mundelein, Ill. 60060.

SELL: Hy-Gain 18-HT Hy-Tower 50 ft. vertical for 10-80 meters. 6 months old. Less base insulators but six ground rods included $100. Bob DeLuca, WB8BMG, 14120 Ashton, Detroit, Mich. 48223.

COLLINS 75A-4 Receiver, mint. No. 3540. First $325.00 gets it. W5MK, 4701 Linden St., Bellaire, Texas 77401.

FOR Sale: TS-452 C/U 5-100 mc RF Signal generator with scope, and 1 mc sweep marker $250 or trade. Central Electronics 200V $400. Drake 2BQ with calibrator $200. HW-32A Transceiver, 20 Meters, and A/C supply in SB-600 speaker cabinet $150, all on the air and in excellent condition. Want for Cash late KWM-2. WA4EWA, 10905 Satellite Blvd., Orlando, Florida 32809.

WANTED: Damaged HW 12 or HW 32. State condition and price. H. C. Reich, KØUBK, 1205 Hall Ave., West St. Paul, Minn. 55118.

RADIO Control: Quadruplex Feedback Proportional, 4 servos, complete. 2.0 MHz. Looking for 6/2 transmitter for $100. WB2UHO, Box 104, RD 2, Flemington, N.J. 08822, 201-782-8026.

SELL: 1 KW Ham station with circular console. 100A Eldico Exciter, Linear Amplifier pair of 4-400A. Power supply. 3500 Volt 1 Amp., Collins 75A 1 with SBA 1 Eldico sideband detector, rejection Notch filter, Panadaptor 500 KC IF now in operation at K2PKH Great Neck, N.Y. Many component parts, motors, syncros, etc., Price $395.00. Telrex 3E1 Beam free. Moving to Florida. For quick sale. 8 Willow Place, Great Neck, N.Y. Phone (516) Hunter 7-3440 or write.

COLLINS 75A-2 rcvr w/spkr & xtal calib., $180.00. Globe Chief 90 w/screen modulator Drake filter, Heath VF-1 VFO, $40.00. Electro-Voice 664 mike & desk stand $40.00. All excellent, all w/manuals. George F. Maier, K1GXT, 516 Prospect St., Methuen, Mass. 01844. Tel. (617) 685-0051.

CE-100V. No. 957, one of the last and best, excellent $395.00. Drake 2B/2AQ full 10 meter coverage $200.00. HQ-129X plus calibrator, speaker, Q-multiplier $75.00. Knight T-150 highly ruggerdized, stabilized $70.00. New EIMAC 4-1000A's $50.00 each. Want mechanical filters F500B-31, F500B-08 for 51J4. Also need vernier turning knob for 75A series. Carl Huether, RFD No. 1, Box 129, Chester, N.H. 03036.

FOR Sale: KWM-2 No. 15220 (new Oct. 68), 516-F-2, $895. 312B-5, $250. F455C-60 (75A-1), $25. HO-13, $50. 75A-3, $225. Eldico SSB-1000-F, spare tubes, relay, $185. Wanted: 30S-1, 30L-1. James Craig, 29 Sherburne Ave., Portsmouth, N.H. 03801, 603-436-9062.

COLLINS 32S3 $425. 30S1 $700, KWM2 with CC-2 & PM2 $900, fully motorized EZ-Way 60 ft. Tower $500. 32S1 $375, 75S3B $400. Jack Anderson, W1FDH, 64 Hitchcock Lane, Avon, Connecticut 06001.

NCX-500 with AC power supply. Never used. Will ship prepaid to first money order or $410.00. W. P. Steinhauer, W3LHZ, R.D. No. 1, Dallas, Pa. 18612.

WANTED: Transformer 800 v 400 ma or close. W7ED, 10304 Hipkins Rd., SW, Tacoma, Washington 98498.

HALLICRAFTERS HT-32. $225. Mark Timpany, 209 West Racine St., Janesville, Wisconsin 53545.

WANTED: Plug-In (100 mc plus) Converter for 5246L H-P, CG3 General Radiotelephone, or Northeastern frequency counter. W8UCG-630 Glenwood, Muskegon, Mich. 49445.

BOSTON-Providence-Eico 753 SSB CW transceiver, AC power supply $175. Harvey Wells R9, T90 rec. and trans. power supplies $100.00. Local sale only K1KFE, 617-348-3869.

COLLINS MP-1 12-volt power supply Serial 10259, cables, complete $125; K4EC, 33561.

DX100 $75.00. NC300 with speaker $150.00. KØJOI, Glenn Davidson, P.O. Box 401, Buffalo, Mo. 65622.

HEATH HW-16, $58.00; Heath HW-32A and H $145.00; All rigs in A1 condition. Chuck Schmidt, 306 na Street, Anna, Illinois 62906.

SWAN 350 with VOX and AC power supply/speaker ca all in excellent condition, little use since factory cho and Shure 444 mike $350. WA8HCS, 403 Lincoln, Ches Michigan 48616.

FOR Sale: CQ Mag's 52, 53, 55, 56, 58, 61, 62, 63, 6 $2.00 per year. Eldico EE-3 Keyer $20. TME GSB-1 adapter LN $25. W2HPJ, 20 Ash Dr., Neptune, N.J.

TWO 4-400A's and two 810's $120; Eico 720 xmitter power supplies, and Heath VF-1, make offer: Heath mi mint condition $55. Bill Blum, Broadus Route, Miles Montana 59301.

WRL's used gear has trial-terms-guarantee! KWM1, $2 SR34AC, $149.95; HE45B, $79.95; Swan 240, $179.95; V. $229.95; H&W 5100B, $109.95; HX20, $149.95; $249.95; Ameco RS, $59.95; SX146, $189.95; HR20, $ NC303, $199.95; SB301, $269.95. Hundreds more. Free hook" list. WRL, Box 919, Council Bluffs, Iowa 515

EXCEPTIONAL NCX-5 and NCX-A supply/speaker for Was factory-converted to Mark II six months ago, a in prime electrical and mechanical condition, all m service bulletins, Mark II tech sheets and original ca Has never been mobile, and absolutely no modific $429.00 f.o.b., Williamsburg, Virginia 23185. Larry Guc W4UJT, 3 Foxcroft Road.

SB620 Spectrum analyzer scope, factory aligned $1 Loren Hole, Box 2347, Everett, Wash. 89201.

SELL: NCX-5, Mk II: Calibrator; NCX-A Supply; Heath K Keyer; HO-10 Scope; HM-11 Bridge; EV-229SR Mike, Condition. Package deal only. Best offer over $550.00. K A. Duntley, K1EVU, 88 Perham Street, Farmington, 04938.

15 METER Bandspread coil "AC" for HRO-60, $25.00. FHK, M. W. Minear 703 N. Garfield, Lombard, Ill. 60

DELUXE RTTY Station. Model 28-KSR with power s full tape equipment, including printed reperforator. E com converter, model 250 keyers, model 100 for 850 au shifts. Complete working unit cost over $2500. Sell co $1500. WA2WUV, Phone 516-799-8544.

HEATHKIT: SB-200 Linear $150.00: SB-400 xmtr $2 Easy-Way 40 Ft. Tower $100.00. All excellent condition little use. No time to operate, and need money. Joe M WB2QYO, 1034 Estates Blvd., Trenton, N.J. 08690. Te or Sun. 609-586-6671.

KWM-2 PM-2 $750, 75A4 Matching speaker $375, $275, Jones Micromatch $25, Eico 147AK tracer $25, K RFD 1, Millville, N.J. 08332.

COUNSELORS—electronics, ham radio, male-coed General license. A. R. Saphir, 62 Howard Avenue, Tuc N.Y. 10707. 914-WO1-3786.

WANTED: New or used FRR-18, FRR-21, SRR-11, 11A, or URR-45 very low frequency Navy receiver, condition and price. James Williams, 1641 Link Road, burg, Virginia 24503.

FOR Sale: Eight 4-250A tubes with sockets, approxi 100 hours usage $5.00 each. Two Stancore P-6468 30 filament transformers $5.00 each. Elmac AF-67 Tran with voltage regulated power supply, in excellent con $45.00. You pay shipping charges. W6WY.

SWAP: Davco DR-30 w AC/DC PS Spkr, factory overl and updated, for SBE-33 w DCPS or SBE-34 or trans Rankin, W4ZUS, Naveodfac Indian Head, Md. 20640.

FOR Sale: KWM2 with noise blanker and power suppl 30L1. Best offer-f.o.b. Bill Schwarz, WA4EHB, 11 Lane, Danville, Virginia 24541.

B & W 6100, good, $250; National HRO-60, good speaker and 15 meter coils $180; DuMont 208-B lab needs new small tubes $25; Heath Ham-Scan, good $50; get, or pay shipping. ARRL-W1AW, 225 Main St., New Conn. 06111.

COLLINS 75A4 serial 2319, 3 filters, Vernier dial, s $425.00. Central Electronics 20A exciter 458 VFO Both mint condition. W2RQD, 9492 Hayes Rd., Marcy York 13403

SELL: HT37 with mike and Manual A1 condition $ W2TPB, 111 So. Crescent Dr., Rome, New York 134

SALE: Hi power linear pair 4-1000A in parallel G.G. has vacuum var. cond. and variable inductance. Powe ply: 0-5000V, at 1.2a. Choke input. Solid State Rec. 47" cabinet. Not Homebrew. Will ship FOB Littleton, nal Cost $2000. in 1966. Send for pictures. P.O. Box Littleton, Colorado 80120. 303-794-7789.

SELL: Drake 2-NT xmtr. 2-C rcvr (100 Kc calibra noise blankers) 2-CQ spkr (Q-Multiplier & notch filter) Like new, 18 hrs. tot. use. $350.00. Tel: TA-4 3281. Z mann, 250 Hollywood Ave., Bronx, N.Y. 10465.

EXCELLENT new HW-32A with calibrator, manuals Hy-Gain 18V; all for $125. Jim Sandberg, K6HE, 1138 Road, Escondido, Calif. 92025.

FOR Sale: Heath Twoer HW30, A-1 condx, w/mike tenna, 4 ft. coax connector, $30. WAØOHC, E. W. An 4206 Lombard St., Duluth, Minn. 55804.

FOR Sale: HR-10 rcvr, excellent $50, DX60A needs work $45. Knight V.F.O. F.B. Condx $25. and DK relay $7.50. Tom M. Coburn, WB4LLL, Box 38, Te Ridge, Tennessee 37178.

FOR Sale: Collins 75A2 with speaker. Central si slicer, model B., HT32 and HT33A, all in excellent HT33A used less than 15 hours. $675.00 for the lot. Matthews, W3DPA, 921 Stuart Rd., Wilmington, D 19807. Phone 302-658-3200 evenings.

SELL Heath Twoer with mike and manual $40. Leda 483 Eastbrook Rd., Ridgewood, N.J. 07450.

FOR Sale: Hammarlund HQ-170A-VHF, xlnt. cond. (213) 375-1731. 5519 Calle De Ricardo, Torrance, 90505.

SELL: Heath SB-301 receiver, purchased and assembled in December 1968. Absolutely mint condition, asking $250. Pair AMPEREX 4-400A, good condition, not pullouts, $35. Jennings vacuum variable 50 to 250 picofarads at 15,000 volts $20. Capacitors, 7 microfarads at 4000 volts, $5 each. Pentron President Mark IV solid state tape recorder, built-in QRP amplifiers and speakers phone jacks for external amplifiers, and high impedance line input. Original cost approximately $220, asking $90 complete with 2 microphones. Tom Healy, 305 East John St., Champaign, Illinois 61820.

FOR Sale: SX-140, T-60, Mike relay misc. $105. Trade? Wanted HE45A, SR46, etc., WA9BHR, 1253 Carriage Lane, Northbrook, Ill. 60062.

NOVICE Station: Eico 720 Transmitter; Lafayette HA-500 receiver: w/speaker, Key and crystals. $129.95. WA3LEJ, 6917 Chester Ave., Phila., Penna. 19142

WANTED: Very low frequency receiver (MSL-5). Write WA7KDZ, Box 355, Kent, Washington. 98031.

COLLINS: 75S1 rcvr with Waters rejection tuning, $250.00. DX-60 and HG-10, $75.00. WØRTK, Belfield, North Dakota. 58622. Tel: 575-4404. C. C. Thompson.

RADIO Counselor for upstate N.Y. brother-sister camp. Fully equipped cabin, top camp facilities. Send personal details in a letter requesting further information and application. Camp Scatico, 25 Fenimore Road, New Rochelle, N.Y. 10804.

WANTED: HA-14 Heath Linear. State price and condition. George Cherney, 4986 Leavitt Road, Lorain, Ohio 44053.

WANTED: Heath Q-Meter. G. E. Hall, W1TPK, 40th Floor, 299 Park Ave., New York, New York 10017.

HALLICRAFTERS HT44 w/P500 $295. 2 Meter SR42A Mint, $125. Galaxy 300 with AC supply $175. Swan 120 $95. HP13 $48. HP23 $40. HP20 $28. List Available. W2FNT, 18 Hillcrest Terr., Linden, N.J. 07036 (201) 486-6917.

200V—seldom used—original carton $450.00. HQ 160 like new $125.00—cash and carry—WA2RMR, M. DelBaglivo, M.D., 20 Centre Ave., Secaucus, N.J. 07094 (201)-867-8754.

CLEANING SHACK: Sell HW-22 with manual excellent $80.00. BC221-AK excellent with original calibration book $60.00. TS375A/U VTVM 110V $30.00. TS-488A/UP Echo Box 9000-9600 MC $30.00. General Radio Variable capacitor with standards $50.00. George Heabler, W8QXO, 121 Parana Drive, Newark, Ohio 43055.

SELL: HW-32A and HP-23A. HRA-10-1 excellent $145. AN/SRR-13A Rcvr very FB $250. Tecraft model 50 converter excellent $45. Twin City TU all OK $30. Knight TR-106 good $70. Tecraft 2mtr. xmitter 20 wts with p.s. $50. National type NRAO rcvr good $30. TCS xmitter needs work $20. write for details. Wanted: SB-101,620. Tel: 669-8744, WA1EDJ, Gary Confrey, Rt. 80, Killingworth, Conn. 06417.

DRAKE: R-4A, like new condx. $250 firm. Ameco CMA allband converter, 1.7-54 mc and 108-174 mc new condx. $30. Ameco PCL-P, preamp, 1.8-54 mc $15. Sid Levinson, 3406 Church Ave., Bklyn., N.Y. 11203. Phone: 856-9862

DRAKE TR3, completely mobile with accessories. WAØ-HTZ, 4411 Glacier, San Diego, Calif. 92120.

MUST Sell: Like new, Collins 75S3, First $350 or best offer. Also Ham-M Rotator. KØIDV, 1732 Ross Avenue, St. Paul, Minnesota 55106.

CUSHCRAFT 2 and 6 antenna. $15.00 Heathkit HR-0B receiver with crystal calibrator with instruction book used 1 hour $74. Cheg 22'er with Ameco VFO both mint condition $225. Knight P-2 swr meter and Knight compressor amplifier $15. Jerrold Channel three antenna and amplifier $69. Herb Holzberg, W2FCI, 115 Sandra Drive, Totowa, New Jersey 07512. Tel: 201-256-0826.

WRITE, phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry linear, BTI linear, towers, rotators, or other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

FOR Sale: Mint condition, SBE 34-Shure 404C mike $275.00. Fred Bickell, W4ZSB, 2160 N.E. 56 Place, Ft. Lauderdale, Fla. 33308.

VIBROPLEX Champion bug one-year old $14. Adolph Gudzune, WA3GFP, 218 Dumont Rd., Wilmington, Del. 19804.

WANTED: Someone to professionally install tower and beam at my QTH. Work can be done at your convenience. W2-OGA, Harold Hayflick, 20 Meadow Drive, Woodmere, N.Y. 11598. Bus: 212-LO3-2054. Home 516-295-2116.

HP-13 mobile power supply $50.00. SBA 100-1 $10.00. Hustler, Bumper mount 20-75 $15.00. K3UKZ, 305 Elm, Hazleton, Pa. 18201.

SELL: Complete ham station: SB-300, $180; SB-400, $220; Telex Tribander, $40; TR-44 Rotor, $35; 55 ft. crank-up tower, $50; EV-66 mike, $20; SWR Meter, $10; Eico Grid Dip, $15; Simpson 260 VOM, $20; Simpson 311 VTUM, $25; Digital Clock, $10; Cabels, tubes and many misc. tubes thrown in all for $525. WA1CTL/3, 1414 Independence Dr., Whitefield, Reading, Pa. 19609 (215)-678-5444.

DRAKE: R-4A receiver, excellent condition $285.00. Drake AC-3 Power supply, perfect $50.00. Will ship. REA Collect. M. R. Nettleton, W1KDD, 272 Edgewood Dr., Torrington, Conn. 06790. Tel: 489-8095.

STEREO, Harman Kardon Citation I preamp; Heath AA-121 80w amplifier, AJ-13 tuner AA-32 amplifier. Package only, $10 shipped. R. Wanat, 443 Atlas Dr., Madison, Alabama 35758.

HT32 and SX101A both for $300. Come and get them. Alex Ekblad, 161 Evans St., New Hyde Park, N.Y. 11040. 516-FL4-3122.

DRAKE 2C and 2NT. Both are in top shape. Plus 2CS and cables. Asking $300 for the entire lot. Will trade. Write or call: Edward Benson, 216-16 85 Ave., Jamaica, L.I., N.Y. 11427. Tel: (a.c. 212)-776-5669.

DRAKE 2C, excint condx, $160.00. Gary Kunz, 391 Pascock Rd., Westwood, N.J. 07625.

HEATH DX-60B transmitter $50, Matching HG-10B $25. Both in excellent condition. Don Wile, WB2CGK, 7 Orchard Farm Rd., Port Washington, N.Y. 11050.

SALE: Heath Monawk receiver, matching speaker, in excint condx; manuals, original owner! Studor, WA9CCX, 3907 North New Jersey, Indianapolis, Indiana 46205.

BRONICA S-2, with 50, 75 and 135 mm lenses, prism, two 120/220 backs and L grip. All less than 1 year old and in like-new condex: $720 or trade or Johnson 6N2 Thunderbolt, Concord viewtinder CCTV camera, or certain Hewlett-Packard and Tektronix items. Want Boonton 230A amplifier, H-P 340B, 343A, 349A, 430C, 431, other late RF gear. H. Greenlee, K4GYO, 430 Island Beach Boulevard, Merritt Island, Florida 32952.

FOR Sale: To settle the estate of Otto Smith, W3BOJ. Make offer: HT-37, SX42, B&W model 370, SSB rcvg. adaptor, BC-221D freq meter, ARC5 xmtr 2.1 to 3.1 Mc. and .5 to .8 Mc. Heath sig generator, IG102, Heath sig tracer IG12; set of wave-meters covering 3 to 180 Mc., 100TH tubes, 4-125 tubes, SCR BC 625 rcvr and pwr supply, Micro Match SWR bridge, OST mags 1953 thru 1968. Many items not listed here. Send SASE for complete listing. Albert Godshall, W3SDE, 509 Lansdale Avenue, Lansdale, Penna. 19446.

COLLINS KWM2, PM-2 a.c. supply; 516E1 d.c. supply, mobile mount. Make cash offer. W9ATH, 6533 No. 52nd St., Milwaukee, Wisc. 53223.

SELL: Ranger 2 with PTT, $170; HQ170C, $175; Heath Twoer & Beam $40. CN144 Converter with 6 Mtr IF, $25; D-104 $15. Drake 1000 Low Pass, $8; Dow-Key Relay $10. All mint no modifications. $395, takes all. K1VMT, Galloway, 46 Oak Hill Dr., Arlington, Mass. 02174. Tel: 617-648-5474.

BARGAINS: Hammarlund Superpro SP-400X, free 100 kc. crystal calibrator, $50.00; new UTC CVM3 125-watt modulation transformer, $16.00. W8HET, D. R. Gardner, 3800 N. River Road, Port Huron, Michigan 48060.

HALLICRAFTERS HT-44, SX-117, WWV Crystal, Transceive Cables, PS-150-AC $425 NCX-3, NCX-A, NCX-D, $250. All like new. W8FRJ, 5124 Mapleridge, Kalamazoo, Michigan 49001.

SELL: Clegg 99er $75.00. Globe Scout $25.00. "Lamp" K8-ABP, 116 Euclid, Creston, Ohio 44217.

WANTED: An old horn-type speaker, and (5) OIA tubes. State price and condition. Andy Brewer, 4917 Monte Vista Dr., Knoxville, Tenn. 37914.

HAVE Collection antique radios, also 7" Hallicrafters, 3" Pilot TV and National SW3. Swap for SSB transceiver. WØ-RGD, 1328 E. Bannett, Springfield, Mo. 65804.

GOING to College: Sell Swan 350, 117XC Power supply, TA33 jr., TR-44 rotator, D-104 mike, HM-15 swr, IC keyer, paddle, all cables, coax, . . . $400 firm. WA9RPF, 9328 Parkside Drive, Des Plaines, Illinois 60016.

OPENINGS for Ham Radio Counselor for coed camp Poconos, July and Aug. Kittatinny Camp, 119 S. Easton Rd., Glenside, Pa. 19038.

SELL: Swan-400, full-coverage VFO, AC power supply, all in "like-new" condition, not a scratch. $400. Ronald Schultz, WA2ONV, 114 Blossom Rd., Syracuse, New York 13224.

R389, R390, R390A, S1J4, 75A4, 75S3A, NC101X, HR050-T1, HR060T1, SP600, KWM-1, KWM-2, 62S1, 312B5, HA-2, and others. List for SASE. W2ADD.

COLLINS 62S-1, KWM-2; TS-323/UR freq. meter; Rtty: Kleinschmidt TT-4A/TG, CV-89A/URA converter; Model 19. Make offer. K5RTI, 1301 Cleartield Drive, Austin, Texas 78758.

SWAP—Almost new Telrex 20M546 beam for SSB transceiver, exciter, or linear. Will pay cash difference. K4JC, Route 1, Springfield, Tennessee 37172.

FOR Sale: Swan 500. For college expenses. Late model. Mint condition. $420. Firm. I'll ship. WA7IPT, Rt. 1, Box 629, Ridgefield, Wash. 98642.

SB-34 with microphone, never used mobile, like new. $250. Drake 2B, Gnd Condx. $145. Will ship. Cart. Fred A. Dorsey, WA4TDC, Box 711, Moody AFB, Georgia 31601.

NEW Mexico: Sell Heath SB-300 receiver Excellent condition $170.00. 2.1 KhZ, and 400 Hz filters. Cecil Lennox, 13113 Lomas Verde NE, Albuquerque, New Mexico 87112.

USED Triplett TV-FM Signal Generator marker model 3434 $35.00, plus postage. I-122 Combination Signal Generator & Hetrodyne Frequency Meter 8 to 15 & 135 to 230 MC $40.00 plus postage. Roache, Canterbury, Ct. 06331.

BTI 2KW linear, 2 yrs old, but used vv little, and like new, $495. Drake KW L.P. ftr $6; Vibroplex Blue Racer $10; 2 EL 15 mtr beam $10; D104 w/G stand $12. K8IKB, 221 Edinborough, Findlay, Ohio. Ph: 419-423-5890.

"HOSS Trader Ed Moory" says if you don't buy your ham gear from him, you might pay too much. Shop around for your best price and then call the Hoss before you buy. New equipment: factory warranty. Galaxy V Mk III, $279; new early Swan Model 500-C, $379; SB-34, $339; NCX-500, $309; FTDX-400 Transcvr, $459; New Rohn foldover twr, 50 ft., prepd, $188; new Mosley TA-33 and demo Ham-M rotor, $189. Used equipment: Heath Marauder, $175; HQ-170, $149; A-4, $139; 75A-4, $289; TR-4, $409; T4-XB, $339; R-4B, $319; Ham-M rotor, $88; Hallic, SX-117, HT-44 & supp., $399; Collins S/Line, complete, $899; GT-550, $298; Swan Cygnet, $309. Ed Moory Wholesale Radio, Box 506, Tel: (501)-946-2820, DeWitt, Arkansas 72042.

OST's for sale from W2AYU estate. Forty years—1925 to date, complete except for 1938 through 1941. Unbound, but in good to excellent condition. Will consider sale of all or by the year. Best offer plus shipping costs. Henry J. Metzner, 206 Glen Street, Glens Falls, New York 12801.

WANTED: HW100 with HP-23A and SB600; might accept SB100 or SB101. Must be guaranteed perfect. M. Kramer, WN9AHQ, Box 6, Fennimore, Wis. 53809.

DRAKE 2C, 2CQ, Calibrator, like new $225. DX-60 $35. Cashier check or money order. Will ship in Southeast. Alex Turner, WB4GVP, Univac, Box 10242, Charleston, S.C. 29411.

SBE-34 Guaranteed perfect with mobile mike and mounting plate, $260. KWPEP, SB2LA also perfect, but needs 6JE6 tubes, $150. Gary Davis, K1LEM, R.F.D. No. 1, Williston, Vermont 05495.

COLLINS 75S3B Latest model for sale, includes 500 cycle CW filter. Like new. Asking $575.00. K6SVT. 18672 Spaulding Avenue, Santa Ana, Cal. 92705.

HQ-170AC, HT-37, 250 w. matchbox, SWR meter, Shure 444 mike, Dow Key Ant. relay, spkr., headphones, pre-amp and more. All gear except matchbox in excellent condx. SASE for list. Make offer. Carl Stecker, 1531 Deer Path, Mountainside, N.J. 07092. 201-233-6984, weeknites after 9:30.

SELL: Viking II, 122 VFO, new 8298A finals, $85.00. Hallicrafters SX-96 clean $95.00. Tapetone XC-144 2-meter converter $40.00. Donald Conley, 90 Donahue Drive, Manchester, N.H. 03103.

FOR Sale: Going microwave: Collins 51S1 used 50 hrs $1400. Bronica camera with prism $400. Marantz model 18 receiver $500. Marantz 7 preamp $150. Citation B 100W amp $150. Revox G36 MkII tapercorder $350. Professional condenser Mic $150, with built in power supply. Altec Lansing A-7-500 $300 with super tweeter to 40 KHZ. scott FM multiplex tuner 340E $150. Millen Dipmeter 90651 $40. Videcon 7735A New $30. Robert Yoshida, 144-59 28th Avenue, Flushing, NY. NY 11354. Tel: 212 INI-9476.

T.V. Cameras—Heavy duty industrial. Trade-ins. These are beefed-up babies that really give "positively the brightest, clearest picture you ever saw!" Complete with schmatic lens and vidicon $250.00. C.C.T.V. Center, Inc., Route 46, Little Falls, N.Y. (201) 256-7379.

DX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available. $3.95 postage paid ($4.95 foreign). The McMahon Co., (W6IZE), 1055 So. Oak Knoll, Pasadena, Calif. 91106.

SELL: Hammarlund HQ170AC with noise immunizer, and EICO 720 transmitter. Will sell separate. WA2GQW, 63 Park Drive, Warwick, New York 10990.

STAR SR700E sacrifice $150. First M.O. it goes. Frank M. Rodio, 243 Senator St., Bklyn, N.Y. 11220.

WANTED: Mosley MP-33 beam or equivalent with rotator and 35-50 ft crankup tower. W6EBY, 789 Garland Drive, Palo Alto, Calif. 94303.

DRAKE: TR4 $395.00. AC4 $60.00. RV4 $60.00. DC3 $60.00. All $550.00. Hustler mobile whip, ALL bands $39.00 Heath sixer $25.00. Keyer HD10 $25.00. NCL 2000 $299.00. Trade considered. Vic Barry, WA4LIG, 306 E. Gilpin Ave., Norfolk, Va. 23503.

SELL: Portable, gas driven D.C. Generator, 16 volt/150 amp. Boonton mod 202-D FM sig. gen. H-P mod ZOZ-B audio osc. all excellent with manuals. $125 each. shipping paid. WB2PLY, Box 207, Princeton Jct., N.J. 08550.

SPRING Specials: KWM-2 $795.00; 32S-1 $395.00; 75A-4, Ser. No. 5591 $375.00. 75A-1 $149.00; 30L-1 $395.00; HT-33A $275.00; HT32A $275.00; HA6 with A/C $179.00; B&W LPA with LPS1 $275.00; B&W 51SB $75.00; B&W 5100 $95.00. HW12 $89.00 and NC270 (New) $179.00. Free List. Howard Radio, 4235 N. 1st St., Abilene, Texas 79603. Tel: A/C 915-677-1335.

DRAKE 2-B, 2BQ, cal, LF con $195. DX60A-HG-10 VFO, TR $85, 4-125A $10. 1300v 450 ma. Trans P. Supply $25. E. Hiskes, WA9VIN, 233 W. 106 St., Chicago 60628.

WANTED: Heath DX60A VFO. K1PNL. Tel: ac (203)—583-5433.

NOMINATIONS: Nominations are due for 1969 Illinois Amateur of the Year award, to be presented at the 35th Anniversary Hamfest. Hamfesters, 6000 South Tripp, Chicago, Illinois 60629.

LAMBDA Solid State Regulated Power Supply Moden LA-2005BM continuously adjustable 20-105 VDC at 2A. Voltage and current metered 3½"H 19"W 15"D 55 lbs like new. Make offers. Jarvis. 5 Stratford Pla., N. Babylon, N.Y. 11703.

COLLINS: 75S-3B-32S-3-516-2. Present production models, High Ser. numbers, orig. cartons, cables, & manuals, $1190.00. Collins 51J3 Recv. with manual, orig cndtn. consider swap on KWM-2. H.V. Transformers 5000 V. C.T. and ½ A. Lower V. Taps. Pri. 115-220 in oil. 9x10½x9". $35.00. One 4700 V. C.T. 350 ma. Pri 117 V. in oil 7½x7½x8", $29.00. plus shipping. W9CLN, 1101 N. Elm, Centrals, Ill. 62801. Ph. 1-618-532-9281. Personal checks not accepted.

SELL: HT44-PS150 and SX117 $485. All A-1. Dr. C. R. Crosby, Chatham, Mass. W1QP. 02633. (423-1157).

FOR Sale: SR400 transceiver and PS-500-AC supply. $580.00. HA-20 remote VFO. $125.00. Davco DR-30 receiver. $230.00. All units like new. Jack Yeoman, W8VHY, Rt. 4, Washington Court House, Ohio 43160.

LINEAR Amplifier FLDX-2000 Built-in P/S 1300 PEP. New condition $165.00, VOX for swan 500 new $20.00. Will ship within 300 mi radius WB4JDT, G. Heisler, Route 5, Abingdon, Va. 24210. Tel: 703-628-5429.

FOR Sale: OST-s from Jan. 1947 to present day—no reasonable offer refused. All good condition. Earl O. Fuller, W6-CSS, 1765 N. Puente Ave., Sp 34, Baldwin Park, Calif. 91706.

FOR Sale: Hawkins Electrical Guide vol 1 to 10 2nd edition by Audel. Marconic Victor course in Wireless telegraphy records. Best Offer. Mrs. Glenn Imler, 3016 West 40th Ave., Gary, Ind. 46408.

BEAM, Hy-Gain TH-4, 2 kw, 4 element tri-bander, like-new, has two coats of zinc chromate and aluminum paint. $65. WA2AEI/1, 48 Offutt Road, Bedford, Mass. 01730.

SWAP & Shop: Biggest in Southeastern Michigan. Spo by Hazel Park Amateur Radio Club. May 18, 1969 10:00 to 4:30 P.M., Hazel Park High School, Hazel Park, Mic

MOVING: Forced to sell QST 1941-1968 complete, Following home-brew gear cannot be packed, for p only: 500 watt CW buffer and final, 6146 driving PP with LV and HV supplies incl. uncased pole xformer, 25 watt modulator, $8. Pair 816 rectifiers with 2 sect. input filter (needs plate xformer), $5. J. E. Cann, WA 175 Marsha Dr., Middletown, N.J. 07748.

NOVICES: Heath DX-60A. Mint condition. Professi wired—includes five crystals $55.00. Matching HG10VFC separate power supply, $20.00. Jack Cramer, 240 Mt. V Place, Newark, New Jersey 07106. Tel: 201-399-2944.

ART13 125 watt transmitter with manuals, calibration generator, cable, new tubes $75.00 or best offer. Sherm W3PI., St. Michaels, Maryland 21663.

HEATH: Apache, excellent, $75. Drake 2-B, $165. Also Recorder, wires. Make trade for all or part. WA6ZH1, Holmes. 770 Pacific, Alameda, Calif. 94501 (415) 523-8987.

HT-32B. Like new $295.00. HT33A latest factory Mod 33B specs A-1 $275.00 Viking II & 122 VFO. Like new $ Art Fugate, W8GFH, 2309 Revere Avenue, Dayton, 45420.

SELL: SX101A receiver with R 48 speaker $200. Converter CN114W $30. Cush-Craft CL116 Antenna $1 like new, in original cartons, in use three months. Jacklin, W6IXJ, 15010 Larga Vista Dr., Los Gatos, 95030.

E. H. Scott: All-wave Imperial 23-tube receiver, cabinet, manual turntable, preamp. Tunes to 22.6 MH cellent condition. Complete set spare tubes, full replac receiver. $75. Homer S. Davis, 4455 West 60th St. Angeles, Calif. 90043. Tel: (213) 291-6552, evenings.

COUNSELOR: Over 19 General Class Operator—Boys su camp in Maine, (July and August). Bring own rig if po Excellent salary and benefits. Write: Director—P.O. Bo Carle Place, N.Y. 11514.

TELETYPE wanted—28s etc, all parts. Sell, too! Typet Box 8873, Ft. Lauderdale, Fla. 33310. W4NYF.

COILS: Want old plug in type coils. 150W, 500w, 1000w, center link: all bands: Cash: K6OB, 2007 17th, Baker California 93301.

SWAP, sell, buy: I will swap or sell HW-32A, HP-23, money-back guaranteed perfect; for Drake 2B in ex condition. WAIGTV, 617-653-0076, 47 Aqueduct, Wa Mass. 01778.

SELL: Drake 2-NT, 2-C, speaker, xtal calibrator, cables fect condition, 6 months old. All for $325. WA3KZS, Marbury Road, Bethesda, Md. 20034.

SELL: SX-117, HT-44 and PS/150 A/C supply. Excellen dition $450.00. Bill Gregory, K4VCA, 112 Gallivan Greenville, S.C. 29609. Phone: 803-235-3272.

ONLY $325.00 gets my like-new Galaxy V Mk. III and ing speaker console. Purchased in December. Less hours transmitting. Factory cartons. W2DAP, 21 Drive, Lake Grove, New York 11755 Ph. (516) 588-7598.

HEATH HA-14 Mobile Linear, 1 kw with Heath HP-14 mobile supply, both in excellent condition, $140, P. Sher Jones St., N.Y.C. 10014, 691-3065.

DRAKE 2B, excellent $150. W2BCG, 24 Pearwood Huntington Station, N.Y. 11746. (516-271-1468)

OSTS 1941-1955, Binders, excellent cond. swap for DX other, or best offer. Steve, 74 Florence Dr., Syosset, 11791.

PREPARE for FCC exams! You need Posi-Check, now addenda to cover latest FCC questions. Multiple choice tions, diagrams, explained answers. IBM sheets for self-t Same form as FCC exams. New price—General Class Advanced Class. $3.75. Extra Class, $4.00. Each complete specific exam. Basic questions duplicated if they apply. class postage prepaid. Add 2 cents per copy for first mail, 64 cents for air mail. Send check, or money or Posi-Check P.O. Box 3564, Urbandale Station, Des M Iowa 50322. Addenda available separately for each cl previous purchasers covering new questions. Send 50 per copy in coins or stamps.

KWM-2 with Noise Blanker and Waters Rejection 516F-2 supply, FV-605 Mike, all excellent conditio $745.00 FOB WØUDZ, 1030-20th Street, West Des M Iowa 50265.

CAMERA gear wanted. Will swap Hallicrafters SR-2000 cane transceiver (2kw), plus P-2000-AC power supply HA-20 remote VFO. All under 10 months old, and us only 3 months. Will swap even for items alone or for plus cash such as: 500EL body; SWC; Tele-Tessar f. 8/5 Distagon f. 4/40mm; Beseler CR-7, with power focus, sta timer, VM, Agfa color head, Rinaldi Photo service, P.O 11112, Newington, Conn. 06111.

MOVING: Must sell, Ranger II with D-104 and bug; SX-96 dual conv. rcvr with dynamic speaker $49. Wil W. R. Robinson, WA2DZB, 31 Franklin Ave., Pompton N.J. 07444.

DRAKE: 2B, calibrator, xtals, excellent condition, Wanted: 20-meter beam. WB6UDW, 1672 Lear Lane, California 92680.

HEATH DX-60 transmitter, HG-10 VFO $59; Johnson 6N2 Transmitter $79; Amplidyne 6N2 transmitter $125; $95; 75A4, KWS-1, Cleanup list, stamp, W4API, Box Arlington, Virg'n'a 22204.

WANTED: Schematic, operating instructions, Handbo other information concerning National-built Type S fixed frequency receiver manufactured about 1951. Has converted former 3023.5kc. to WWV on 5 or 10 MC? Monahan. 817 Pacific Ave., Manhattan Beach, Calif. 9026

HT-37 $175. W2AU quad cut down to 15 meters $1 finished 432 MC xtmr $25. John Michel, 9 Hennessy Huntington, N.Y. 11743.

WANTED: Johnson 6N2 VFO Factory wired preferred. Tom Brown WB6DHZ, 2451 East Glenoaks, Glendale, California 91206.

COUNSELOR: Penna. Brother-Sister camp seeks Ham Radio College man with General License. David Blumstein, 1410 E. 24th St., Brooklyn, N.Y. 11210.

FOR Sale: CE-100V $300, 75A4 (no. 4566, 2.1, .5 KHz filters) $430, GSB-101 $140, 4 El Quad $100, 88 ft. crank-up tower $195. J. Walker, 328 Corpio Dr., Diamond Bar, California 91766.

SELL: Clegg Venus 6 mtr. transceiver, AC supply, like new, original cartons, $300.00. WA8ZUA, 7230 Wilmington Pike., Dayton, Oh.o 45459.

VHF! Sell HA-2 two meter trnsvtr, P-26, pwr supply, Ameco preamp, $200. WA3GPL, 2400 Lititz Pike, Lancaster, Pa. 17601. Tel: 717-569-0985.

COLLINS 75S-3B, 5 mos. old No. 85376 Orig. carton & Manual—$500.00. WN2HFS, Box 3, 4 Weeks Ave., Manorville, L.I., New York 11949.

SWAN 350C-550 watt transceiver, 117X powr supply, 454xss mike, manuals, extra tubes—perfect condx. $430 complete. Ship REA. WB2BVL, 7 Bowen Pl., Stony Brook, N.Y. 11790.

FOR Sale: 75A4, Vernier Knob, Noise Blanker .8 & 3.1 KHZ filters, external compression amplifier 200HZ filter. $350.00, GPR 90 rcvr xtal calibrator, outboard product detector, vernier knobs, Tapeton converter 50-54 MHZ. $250.00. Tristao galv. tower 54', 10-15-20 Hygain Beam, rotator. You dismantle. $150.00. Shipping and packing receivers not included. Carl Thorsell, 1195 E. 77th St., Kansas City, Mo. 64131.

WANTED: An opportunity to quote your ham needs. 30 years a ham gear dealer. Collins, Drake, Swan and all others. Also $25,000.00 inventory used gear! Request list. Chuck, W8UCG, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

HIGHLY Corrosion resistant stainless, brass, bronzes, threaded, washer, hardware. Over 1200 items. Antenna accessories—Boom tilting mount, guying hardware, many insulators. Quote your needs. Lists 20 cents, 15 cents credited first order; or Basic list only six cents, stamp. W8BLR, Walt, 29716 Briarbank, Southfield, Mich. 48075.

CRYSTALS Airmailed: MARS, Marine, SSB, Nets, CD, etc. Novice .05% crystals $1.50. Custom finished etch stabilized FT-243 .01%—any kilocycle or fraction 3500 to 8600 $1.90, (five or more this range $1.75 each), (nets ten or more same frequency $1.45). 1700 to 3499 and 8601 to 20,000 $2.95, overtones supplied above 10,000. 10,001 to 13,500 fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Crystals, singles and groups for ARRL-QST, handbook, SSB Manual. Be specific. Write for order-bulletin. Crystals since 1933. Airmailing 10¢/crystal. surface 6¢. C-W Crystals, Marshfield, Missouri 65706.

DON and Bob new guaranteed surplus telex HMY2000 stethoscope headset 3.95; ANB-1 Military headset with new band, cord plug 8.95; 1-82 indicator 2.95; 100KHZ HC6/U crystal 3.95; 1200W dummy load DA-64B/UP 49.95; 800V/1a. Top-hat 25 cents: Mallory 3000MFD/30V. Cap 35 cents; 6V/10A., 12V/6A. Filament transformer 3.95; RG-11U 12 cents/Ft; RG22B coax 15/ft; new specials—Motorola HEP170 2.5A/1000PIV 39 cents epoxy; Sony 250A station recorder 109.95; GE 811A 6.95; GE 6146B 4.95; GE 829B 14.95; Used 75A-4 KWS-1 1000.00 Cash, no trade. Write for new equipment quotes, surplus flyer. We have export facilities. GECC finance. Prices FOB Houston. Madison Electronics. 1508 McKinney. Houston, Texas 77002. (713) CA4-2668.

FOR Sale: Heath HW10 6 meter transceiver, $100.00. HX20 and HR20 with AC supply, $225.00. Frank McJannet, 11557 Evanston N., Seattle, Wash. 98133.

GROUNDED Grid filament chokes 30 Amps $4.00. Plate chokes 800MA $2.00. PPUSA 48. William Deane, 8851 Sovereign Rd., San Diego, Cal. 92123.

FOR Sale: HW-35A $85.00. Heath Twoer—$30.00. K1ZZJ, Dick Wall, 74 Eddy Street, North Attleboro, Mass. 02760.

SB200 immaculate $190. K2QIL. 1518 Longfellow Drive, Cherryhill, New Jersey 08034.

HEATHKIT HW100 with HP23 power supply, excellent condition factory aligned, used only about 20 hours $300, going to college. Also AR22R rotator, never used $25. Gotham Tri-Band quad never used $25. Whole deal together $325. Yellin, WB2VIN, 315 Rogers Ave., Bklyn, N.Y. 11225. P.O. Box 11112, Newington, Conn. 06111.

SACRIFICE: Eico 753 Transceiver (Solid State), factory wired, never been used. $160.00. 751 AC Supply $30.00. David Wyatt, 96 Bowen St., Providence, R.I. 02912.

SELL: HA-350 used, but good condition, including matching sork and 100KC calibrator $95. Mosley MCO-33 Tri-band Quad-damaged parts factory replaced—like new $85. Cash Pse. You must arrange shipping—WN4MGA. 4307 Wyncliff Dr., Richmond, Va. 23235.

SELL: Drake TR-4, RV-4, AC-3 and Shure 444, all excellent, $490; HT-32, $175. Steve Paulson, 716-28th St., Bismarck, N.D. 58501.

HALLICRAFTERS SX71 double conversion receiver, bandspread, speaker, Johnson Challenger, Xmtr, 80-6 meters, 120W C.W., A.M. w/relay. In excint condx. Both $130.00. NYC area only. WA2GEW, tel: (212) 763-3537.

FOR Sale: Collins KWM-2, PM-2, and MP-1 Power supplies, Electro-Voice 636 and Shure 505C microphones. All in excellent condition—$45.00. K4INT, 566 Woodland Hills Dr., Athens, Ga. 30601.

FOR Sale: Collins Station: KWM-1 Transceiver, 516F-1 AC supply; 516E-1 DC supply, 312B-2 station control, 351D-1 Mobile mount, microphones, and Hustler antenna. Prefer to sell as package $540. Also TH6DX $90: 60' Tower (Rohn No. 25) and accessories $130; TR44 Rotator $25. Call 606-441-4253 or write Byron Fehler, K4JHR, 247 Blue Grass, Southgate, Kentucky 41071.

SEND QSL for list of goodies by return mail. Ham, audio, test gear, parts. WB2FWS, 31 Penny Drive, Huntington Station, New York 11746. 516-HA1-3824.

MUST sell immediately: Swan 500 P/S, VOX, D104, all perfect condition, year old. Best offer over $400. Charles Lambert, 314 Jamestown, Williamsburg, Virginia 23185.

FIVE Single Band amplifiers. (SSB, CW, AM), Plate modulator, power and RF control system, 6KV, 5KW supply runs amplifiers simultaneously, Variac, 32MF 10KV Pyranol, 5 KW keyed, vacuum antenna relay. Trade all for 30L-1, similar commercial amplifier, or cash. K1LPL, 108 Whitehall St., Providence, R.I. 02909.

HT-37 Excellent Cond. U-pay shipping $210.00. W8JCO, 316 Hanson St., Whitehall, Mich. 49461.

SELL: Excellent HT32A and SX101A $200 each, $350 the pair. W2AU vinyl clad bamboo tri-band quad. Never used. $30. Jack Koplin, WA3EXJ, RD 1, Zionsville, Penna. 18092. (215) 679-9745.

SWAN 350 with 100KC calibrator. Exc. operating condition $285. Local sale preferred. W2HNB. tel: 516-LO1-6841.

DRAKE 2A receiver with calibrator, built-in speaker, Drake 2-LF 100KC 1800KC converter, Heath Q-mult. All for $150. W2AC. Harry Greenberg, RR1, Box 121, Kerhonkson, N.Y. 12446 Tel: (914) 626-7124.

SELL: SX-101A, perfect, $175. Cush-Craft 3L 20 mtr Beam—$40; Mosley 10-40 mtr vertical $16. 75A-4 speaker plus 6 KHZ filter—best offer. Want 75A-4 0.5, 0.8 or 2.1 KHZ filters. WA2FNY (516)-938-7096.

TOROIDS: 88 & 44 mhy., center-tapped, not potted. 5/$2.00 postpaid. Model 32KSR complete page printer excellent condition $250. Model 15 page printer $85. Drake 2B & 2BQ $185. Hammarlund HQ180C $200. RME 4350 receiver $85. Johnson signal sentry $10. Eico 555FW brand new VOM $25. 11/16" reperferator tape $3/box/10. Page printer paper $6/case/12. Wanted: Ham-M RTTY and FM gear. 5 band SSB transceiver. Stamp for list. Van, W2DLT, 302Z Passaic Ave., Stirling, N.J. 07980.

SWAN 500, p.s., like new. No use since September. $425 or best. Dave Siddall, WA1FED/Ø, Lindenwood College, St. Charles, Mo. 63301.

SELL: HRO-7 w/xtal calibrator. $50 local only. It made DXCC for me. Virgil Talbott, W6GTE (213) AN-88868.

HW-16, Eico VFO, best offer over $100. Also want 811A's, have 813. WA6KYU, Bob Marsolais, 3631 Calmgrove, Covina, Calif. 91722.

FOR Sale: Going back to school—T4X-$280, AC4-$70, R4-$225, W4-$39. Tektronics 310 scope (new CRT-$175.00) all equipment absolutely perfect. Eimac SK410 sockets, linear components (B&W) etc. SASE brings list. All equip. FOB WA3EPB, 212 N. Gov Printe Blvd. Lester, Pa. 19113.

FOR Sale: HT 37 100 watts and HT 41 1000 watts both $375.00. Heath SB300 rcvr. $175.00. Tel: 516-295-5411.

SWAN 240-AC supply late model, high serial number, excellent condition—complete with spare brand new final tube and p.t.t. mike. Three bands—s.s.b.-c.w. $225.00 complete. Will ship anywhere collect upon receipt or certified check or m.o. R. Myers, W1FBY, 226 Main St., Newington, Conn. 06111.

WANTED: 2LF low frequency converter for Drake receiver. Claude Sweger, Box 1003 McAllen, Texas 78501.

HP-13 Mobile power supply. Excellent condition. $50. KØFUZ, 1916 Sandusky Kansas City, Kansas 66102.

HEATHKIT HW-16 transceiver for sale. Used one year. Excellent condition. With six crystals. $70. Write WNØUJO, Walt Maistryk, 1260 So. Fenton, Denver, Colo. 80226.

ANTIQUE Radios: Best offer RCA Radiola circa 1922. Grebe MU-1, 1925 and RCA/GE amateur receiver year unknown. Grebe and Radiola need tubes otherwise all in vry good condition. Arnold Smith, 1433 Marlborough Ave., Plainfield, N. J. 07060.

HT-37 perfect condition, $220 & shipping. Lachterman, 3 Archer Ln. Scarsdale N.Y. 10583.

CHICAGO area Hams, complete 6N2 meter station, Seneca-Mohawk extras. WA9DHD, 849-4450 Riverdale, Ill. 60627.

WANTED: HRO coils—all bands—any year for 5-7 or 50. Also want an HRO 5 for spare parts. Name your price. Wells Chapin W8GI, 2775 Seminole Rd. Ann Arbor, Mich. 48104.

WANTED: HT-20 or HT-32A, and HT-33A in excit. or mint cond. Doug Flagg, 287 Main St., Apt. 1, Northport, N.Y. 11768.

FOR Sale: Viking II. $75. RME 6900, $150. National NC-2-40D rcvr. $100. VFO $10. Dumont 208B scope $40. WEBCOR Tape Recorder, $25. SBE33 transcvr, $150. Knight CB transcvr C560, $50. K2AJV, 201-228-4434.

HRO 60 coils, A,B,C,D,F,AD wanted. W. Ewanchyna, 10524 Belair Dr. Pierrefonds, Quebec.

TORIOD Coils 88 mh uncased postpaid 5/$2.00. LaVon Zachry, PO Box 845, Apple Valley, Calif. 92307.

WANTED: SSB transceiver-Hall SR-400 or Swan 500C. State condition and price—75 mile radius from Norwalk Conn. Kikon, 3 Beechwood Rd. Norwalk, Conn. 06854.

SWAN 240 with Heath AC supply, Microphone, all cables, excellent condition. Call Ron, WB6YVU, 5649 Lenore, Arcadia, Calif. 91006 213-448-9498. $200.

COLLINS 30L-1 linear, $350; KWM-2 (sn. 10377) with Waters Rejection Tuning & 516F-2, $795; hardwood cabinet/desk custom-made for above, $50. Jim Catlin, 813 W. Fern, Fullerton, Calif. 92632.

R. L. DRAKE Co. Notice: come say hello to the fellows from the R. L. Drake Company at the following conventions: Dayton, Ohio, Dayton Hamvention, April 25-26; Orlando, Florida, Orlando Hamfest, Apr.1 25-26; Rochester, N.Y. Western New York Hamfest and VHF Conference, May 9-11; Swampscott, Mass., New England Div. ARRL, May 24-25; Indianapolis, Indiana, Indianapolis Ham Convention, May 24; Sacramento, California, Pacific Div. ARRL, June 13-15; Des Moines, Iowa, National ARRL, June 20-22; Jackson's Mill, W.Va., West Virginia State, July 5-6; Amarillo, Texas, West Gulf Div. ARRL, August 16-17; San Diego, California, Southwestern Div. ARRL, October 17-19. The R. L. Drake Company will be closed for summer vacation on Thursday, July 3, and will re-open on Monday, July 21.

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Frequency Coverage with TR-6 and SC-2: 143.9-144.5 MHz and 144.9-145.5 MHz.
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Average Distortion Products: The odd order are better than 25 dB below PEP.
Input Power: 180 watts on CW or RTTY. 180 watts PEP on SSB and AM.
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4 Tubes, 4 Transistors, 5 Diodes.
Size: 5½" high, 11⅝" deep, 7⅝" wide. **Weight** — 9 lbs.

TC-6 SPECIFICATIONS

Frequency Coverage: 49.5-54 MHz.
Modes of Operation: SSB, CW, AM, and RTTY; determined by exciter.
Average Distortion Products: The odd order are at least 35 dB below PEP.
Input Power: 300 watts on CW or RTTY. 300 watts PEP on SSB and AM.
Output Impedance: Nominal 52 ohms with adjustable Pi-L network (SWR less than 2:1).
Injection Required: 0.25 V. at 36.0 and 36.5 MHz (from SC-6).
Excitation Required: 0.25 V. at 13.5-17.5 MHz.
6 Tubes, 1 Transistor, 4 Diodes.
Size: 5½" high, 11⅝" deep, 7⅝" wide, **Weight:** 9 lbs.

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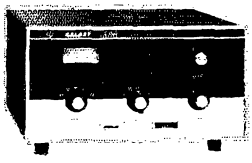
GALAXY GT550 TRANSCEIVER. Highest power in a compact design, 550 watts SSB, 360 watts CW, with tune power provisions for longer life — Solid-State circuits where they provide maximum performance and reliability — Selectable Sideband without frequency jump — Audio derived AGC — Sharpest filter for minimum QRM — King size finger-tip VFO tuning knob — Size: 6" X 11¼" X 12½" (HWD) — Weight: 17 pounds ... $449.00

CAL-25. Plug-in 25KH₂ solide state calibrator $25.00
VOX35C. Plug-in VOX control unit $29.95
F3. Plug-in 300 Hz CW filter $29.95
RF550 R.F. CONSOLE. A precision wattmeter in the range of 3.5/30.0 mHz — Contains switch to select 5 antennas or a dummy load (not supplied) $69.00
SC550 SPEAKER CONSOLE. A matching speaker with headphone jack — AC400 power supply will mount inside $19.95
AC400. Full power, heavy duty state supply for 115/230 volts $89.95



GALAXY LA550 LINEAR AMPLIFIER. 200 watts PEP input on SSB, 1000 watts DC input on CW/RTTY. Band switching 80 thru 10 meters, with some adjacent MARS and special frequencies.
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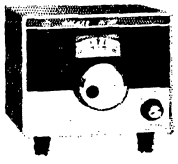
GALAXY RV550 REMOTE VFO. A solid state VFO complete with simple plug-in cables. Gives flexibility of a separate transmitter and receiver.
... $75.00



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To Get A $500 Rig For $240...

Build The Heathkit® HW-100

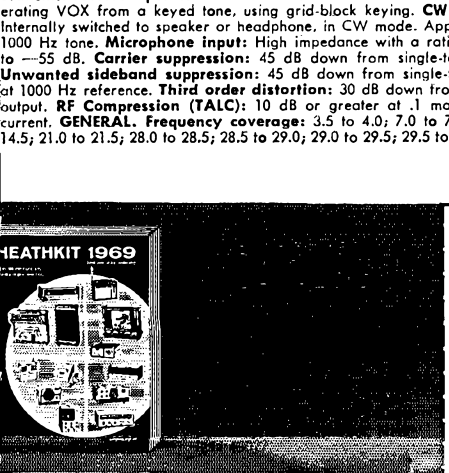
When the time comes for a new rig, most hams approach the task with enthusiasm ... until financial reality invades their dreams. An ordinary 5-band transceiver, wired and ready to go, costs around $500. Much of the reason for this price, of course, is that you are paying to have someone else wire your rig.

Heath also sells $500 worth of transceiver — the HW-100 — but our price is a bit more realistic — $240 — and the performance is better! We reason that if you can handle the FCC exam, you can also handle a soldering iron. And because we don't use any of your money to wire your rig, we can use more of it to provide advanced engineering. Check out a realistic $500 rig ... the Heathkit HW-100 ... another hot one from the hams at Heath.

• 80 through 10 meter coverage • Solid-state (FET) VFO • 180 watts input PEP SSB — 170 watts input CW • Switch selected USB, LSB or CW • Crystal filter for sharp 2.1 kHz selectivity • Full coverage on all bands with 500 kHz per band segment • Better than ½ uV sensitivity • Smooth vernier control of frequency with patented Harmonic Drive™ dial mechanism • Outstanding frequency stability • Excellent image and IF rejection • Built-in 100 kHz calibrator • Separate offset CW carrier crystal • Triple Action Level Control™ for reduced possibility of overdriving & distortion • Built-in S-meter • Quiet, enclosed relays • Run fixed or mobile with HP-23A or HP-13A power supplies • Built-in VOX • Easy circuit board — wiring harness construction

Kit HW-100, 18 lbs., no money dn., $22 mo. **$240.00***
Kit HP-13A, DC power supply, 7 lbs., $7 mo. **$64.95***
Kit HP-23A, AC power supply, 19 lbs., $5 mo. **$49.95***
Kit SB-600, 8 ohm speaker, 6 lbs. **$18.95***

HW-100 SPECIFICATIONS — RECEIVER. Sensitivity: Less than .5 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **Selectivity:** 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down (3.395 MHz filter). **Input:** Low impedance for unbalanced coaxial input. **Output impedance:** 8 Ω speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB.
TRANSMITTER. DC Power input: SSB: 180 watt P.E.P. (normal voice: continuous duty cycle). CW: (A1 emission) 170 watts (50% duty cycle). **RF Power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 Ω nonreactive load). **Output impedance:** 50 Ω to 75 Ω with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. **CW Sidetone:** Internally switched to speaker or headphone, in CW mode. Approximately 1000 Hz tone. **Microphone input:** High impedance with a rating of —45 to —55 dB. **Carrier suppression:** 45 dB down from single-tone output. **Unwanted sideband suppression:** 45 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **RF Compression (TALC):** 10 dB or greater at .1 ma final grid current. **GENERAL. Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial calibration:** 5 kHz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz. **Front panel controls:** Main tuning dial. Driver tuning and Preselector. Final tuning. Final loading. Mic and CW Level control. Mode switch. Band switch. Function switch. Meter switch. RF Gain control. Audio Gain control. **Side controls:** Meter Zero control; Bias; VOX Sensitivity; VOX Delay; Anti-trip. **Internal controls:** Carrier null; neutralizing. **Tube complement:** OA2 Regulator (150 V); 6AU6 RF amplifier; 6AU6 1st receiver mixer; 6AU6 Isolation amplifier; 6AU6 1st IF amplifier; 6AU6 2nd IF amplifier; 6BN8 Product detector and AVC; 6AU6 VFO Amp.; 6CB6 2nd transmitter mixer; 6CL6 Driver; 6EA8 Speech Amplifier and cathode follower; 6EA8 1st transmitter mixer; 6EA8 2nd receiver mixer and relay amplifier; 6EA8 CW sidetone oscillator and amplifier; 6GW8 Audio amplifier and audio output; 12AT7 Heterodyne oscillator and cathode follower; 12AT7 VOX amplifier and calibrator oscillator; 12AU7 Sideband oscillator; 6146 Final amplifiers (2). **Diode complement:** 6 Germanium Diodes: Balanced modulator, RF sampling, and crystal calibrator harmonic generator; 9 Silicon Diodes: ALC rectifiers, anti-trip rectifiers, and DC blocking; 1 Zener Diode: cathode bias. **Transistors:** MPF-105 FET-VFO; 2N3393 — Voltage regulator. **Rear apron connections:** CW Key jack; 8 Ω output; ALC input; Power and accessory plug; RF output; Antenna; Spare. **Power requirements:** 700 to 850 volts at 250 ma with 1% maximum ripple; 300 volts at 150 ma with .05% maximum ripple; —115 volts at 10 ma with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. **Cabinet dimensions:** 14-13/16" W. x 6-5/16" H. x 13-3/8" D.



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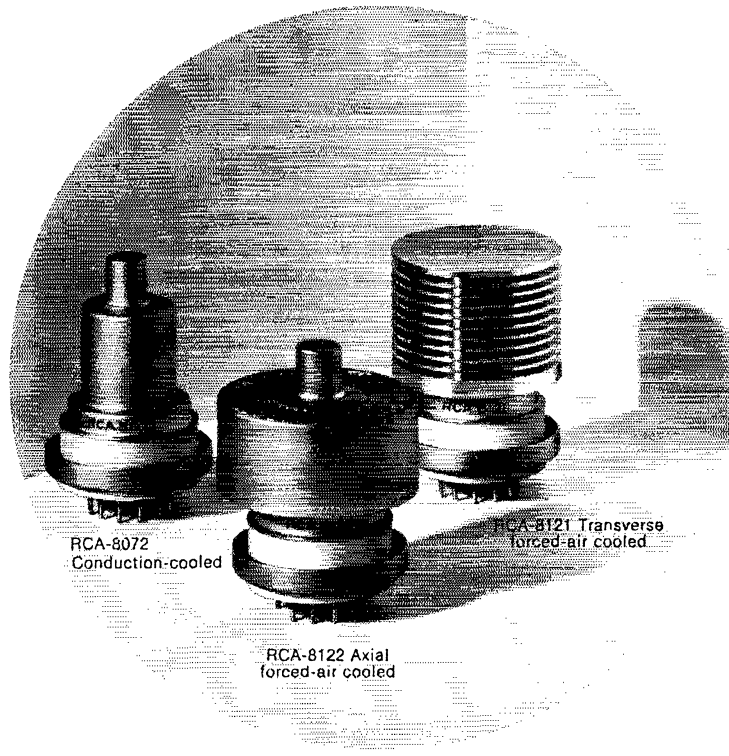

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Ceramic-and-metal construction, exclusive electrode configuration, and precision-aligned grids eliminate mechanically-caused noise even at the high temperatures and severe vibration levels encountered in mobile service.

So whether you plan to buy or build, get the full story on the RCA-8122 as your first step. Write for a copy of the RCA-8122 Data Bulletin to RCA Electronic Components, Commercial Engineering, Section **E37M**, Harrison, N.J. 07029. Or see your local Authorized RCA Industrial Distributor for a copy of the new Power Tube Product Guide, PWR-506C.

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