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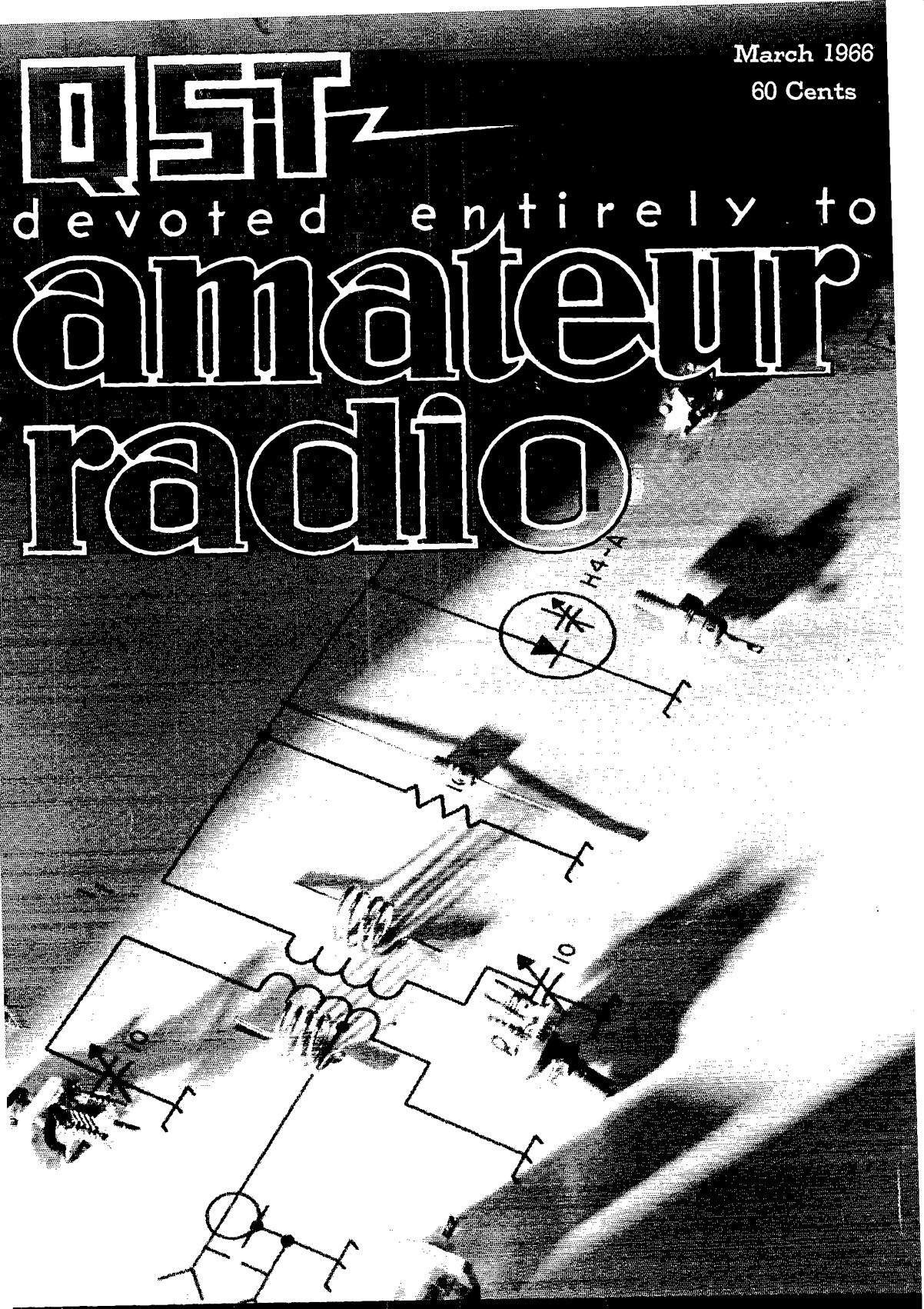

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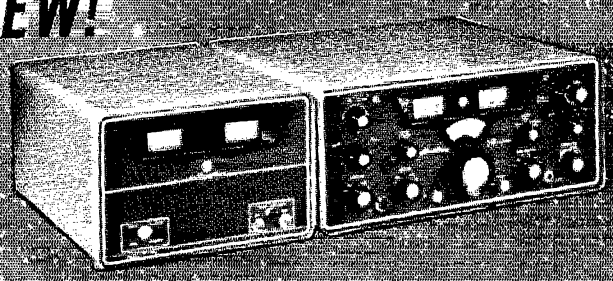
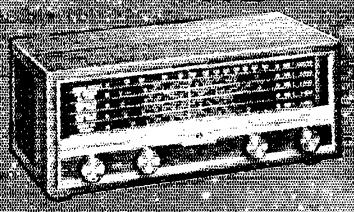


SR-2000 "Hurricane" Transceiver

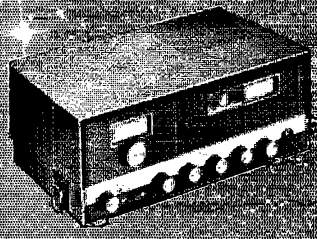
Hallicrafters' exclusive transceiver features plus 2000 Watts P.E.P.! $995.00 (less AC power supply).

NEW!



S-200 "Legionnaire" SW Receiver

Foreign Broadcast plus U.S. Standard Broadcast in 5 bands. New S-P-R-E-A-D tuning. $59.95



NEW!

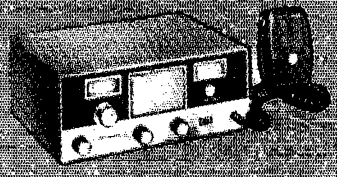
SR-46-A, SR-42-A VHF Transceivers

Full coverage, twice the usual bandspread. Maximum suppression of TV, FM "birdies". $199.95

WR-4000 Transistorized Portable

Exceptional FM, AM, SW, LW reception. Vernier fine tuning and BFO! Only $139.95.

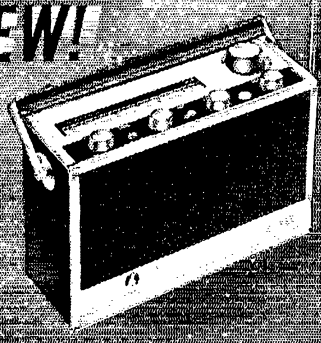
NEW!



CB-14 all-channel CB Transceiver

All solid state, all channels operate—the "ultimate" CB rig! $259.95 (less AC power supply).

NEW!



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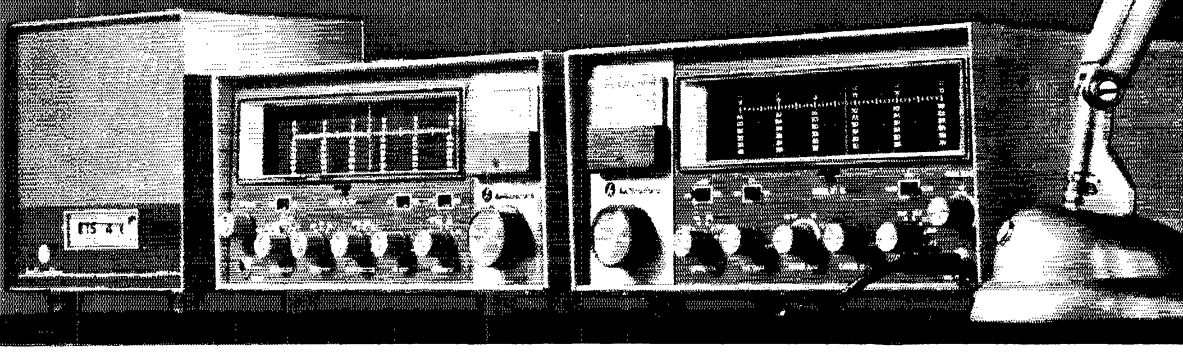

SX-146 Receiver

This is an amateur band receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain to assure high order frequency stability and freedom from adjacent channel cross-modulation products. The SX-146 employs a high frequency quartz crystal filter and has provision for installation of two more crystal filters. The receiver may also be used from 2 to 30 mc, with the exception of a narrow gap at 9.0 mc, with the connection of auxiliary oscillators. The highly stable conversion oscillator chain may be used for transceiver operation of the matching HT-46 transmitter.

FREQUENCY BANDS: 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0 mc (28.0 to 28.5, 29.0 to 30.0 requires extra crystals at users option).

SENSITIVITY: Better than 1 μv for 20 db S/N.

TUBES AND FUNCTIONS: 6JD6 RF amplifier; 12AT7 Signal mixer and cathode follower; (2) 6AU6A 9 mc IF amplifier; 12AT7 AM detector—AVC rectifier—product detector; 12AT7 USB—LSB crystal oscillators; 6GW8 Audio amplifier and audio output; 6BA6 Variable frequency oscillator; 6EA8 Crystal heterodyne oscillator and pre-mixer; Plus diode power supply rectifier, ANL diode and AVC gates diode; *6AU6A—100 kc crystal calibrator oscillator; *Harmonic generator diode.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 20 lbs.

FRONT PANEL CONTROLS: Frequency: Power off CW-upper-lower and AM; Audio gain; Band selector—3.5, 7.0, 14, 21.0, 28.0, 28.5, 29.0, 29.5; Selectivity—0.5, 2.1, 5.0 kc (0.5 and 5.0 kc filters optional extra); Pre-selector; RF gain; AVC on-off; CaL on-off; ANL on-off; Phone set jack; Smiter.

REAR CHASSIS: S-meter zero adjust; Internal-External oscillator switch; Slave oscillator output; External oscillator input; Antenna socket; Speaker, ground and mute terminals; Grounding stud; AC power cord.

POWER REQ.: 105/125 volt—50/60 cycle AC—55 watts.

I-F SELECTIVITY: Uses a 6-pole crystal filter to obtain a nose-to-skirt ratio better than 1 to 1.8.

Amateur net, $269.95

Model **HA-19** plug-in, 100-kc quartz calibrator available as accessory. **Amateur net, $19.95**

**Part of HA-19 calibrator.*

HT-46 5-band transmitter

All new from the ground up! Here's the "new breed" transmitter that matches your SX-146 . . . works independently or may be interconnected for transceiver operation.

FEATURES: 180 watts PEP input on SSB; 140 watts on CW; Frequency control independent or slaved to SX-146 receiver; Upper or lower sideband via 9 mc quartz filter; Built-in power supply; Press-to-talk or optional plug-in VOX; grid block for keying for CW.

FREQUENCY COVERAGE: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 mc and 28-30 mc in four 500-kc steps. Crystal supplied for 28.5-29.0 mc coverage. Other plug-in crystals at user's option.

TUBES: 6BA6 VFO; 6EA8 Heterodyne crystal oscillator and mixer; 12AT7 Carrier oscillator-third audio; 12AT7 Mic amplifier; 6EA8 9 mc I-F amplifier and AALC; 6AH6 Mixer; 12BY7 Driver; 6HF5 Power amplifier; 0A2 Reg.

FRONT PANEL CONTROLS: Frequency Tuning; Operation-Off, Standby, USB, LSB, CW-Tune, Standby LSB USB; Microphone gain; Driver tune; Carrier level; Band selector; Final tune; VFO selector—Transmitter-Receiver; Dial cal.; Calibrate Off-On; Meter MA-RFO.

REAR APRON FUNCTIONS: AC Cord; Ground lug; Fuse; Key jack; VOX accessory socket; Antenna jack; Receiver input (for transceiver); 11 pin control socket; bias adjust.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 26½ lbs.

HA-16 Vox Adapter, **$37.95** **Amateur net, $349.95**

R-51 Speaker,

4 x 6 inch oval speaker and attractive 24 hour clock.

amateur net $34.95

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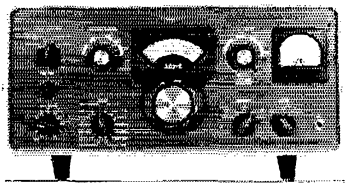
73, Old Man. You've worked another good one. With the clean voice signal of Collins 32S-3 transmitter. It gives you a lot to work with. Nominal output of 100 watts—175 watts PEP input on SSB and 160 input on CW. Gives you superior stability, transceive operation, mechanical filter sideband generation. And there's automatic load control, permeability-tuned VFO and crystal-controlled HF oscillator. With Collins 32S-3 there's no telling where you'll work your next QSO. See your authorized Collins distributor today.



Be sure to see the S/Line at the SSB show during New York IEEE.

COLLINS

QST

MARCH 1966

VOLUME L NUMBER 3

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—CONTENTS—

TECHNICAL —

Varactor Diodes in Theory and Practice
Doug DeMaw, W1CER 11

Practical Tripler Circuits
Douglas A. Blakeslee, W1KLK 14

A Varactor Converter for 50 to 432
Frederick R. Hess, W1IGJ 19

A Wide-Range Voltage-Regulated Power Supply
John Nydam, WA6JCZ 22

A Field-Day Gallon..... *George Daughters, WB6AIG* 47

Recent Equipment:

The Lafayette HA-650 50-Mc. Transceiver..... 66

Eico 753 S.S.B. Transceiver..... 68

Selectable-Sideband Selective-Filter Adapter
Thomas H. Fielder, W4EPL 71

An Automatic CQ Machine for Voice
James E. Taylor, W2OZH 75

Technical Correspondence..... 77

BEGINNER AND NOVICE —

Novices — Are You Ready for 15-Meter Openings?
Lewis G. McCoy, W1ICP 34

OPERATING —

Simulated Emergency Test — 1965
George Hart, W1JNM and Peter Chamalian, W1BGD 25

GENERAL —

Details, Details 51

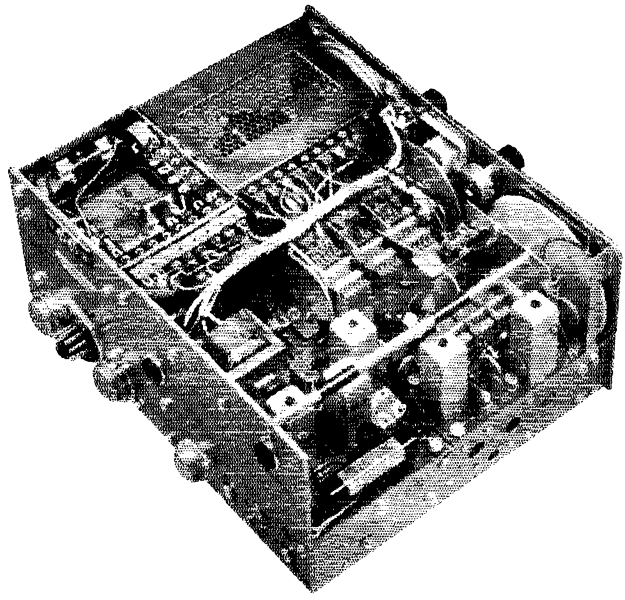
Help Your Library Help You
James P. Gillespie, W4LQC-W8BKK 21

ARRL National Convention... *Gene Hastings, W1VRK* 37

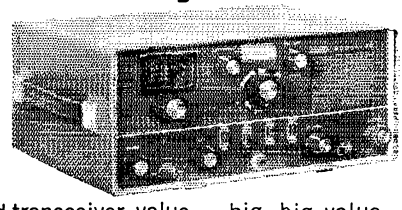
ARRL Awards Honor Roll for 1965..... 46

Modulation in Radio Telephony
(reprinted from *QST*, July and August 1921)... *R. A. Heising* 59

ARPSC	51	IARU News	74
Coming Conventions	56	Operating News	94
Correspondence From Members	57	Operator of the Month	99
Hamfest Calendar	55	Our Cover	56
Happenings of the Month	40	Silent Keys	148
Hints & Kinks	44	Station Activities	100
How's DX?	89	World Above 50 Mc.	81
Index to Advertisers	166	YL News and Views	86
"It Seems to Us . . ."	9	25 Years Ago in *QST*	33



Value is everywhere in SB-34



In the **SB-34**, four-band transceiver, value is wherever you happen to be looking. Front panel or rear—inside or out—you see tangible proof that **SB-34** is returning the biggest possible value for every dollar expended.

The top photograph is an example in point. See the steep-slope Collins mechanical filter in lower right hand corner—also some of the transistors used in the advanced bi-lateral circuits and in the highly sensitive **SB-34** receiver. This outstanding receiver is entirely solid-state—draws only 500 mills on standby. The left hand corner gives a peek at the big, big value—the transformer type, solid-state power supply that adds so much to **SB-34** enjoyment by providing **both** 12 volt DC **and** 117 volt AC operation. The heavy-duty transistors for this supply and the 11-pin receptacle that accepts both of the plug/cable sets provided for AC and DC operation are on the rear panel of the assembly shown. The prewired sockets for **VOX** and **Crystal Calibrator are on this same rear panel. Throughout** you see, without exception, the highest quality components available. Don't overlook the price tag. It will say **395.00 . . .** and, yes, the built-in two-way power supply **is** included.

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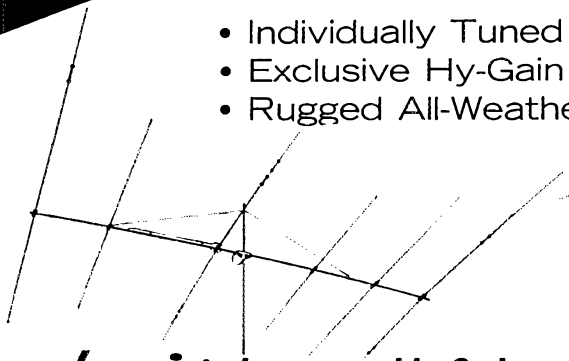
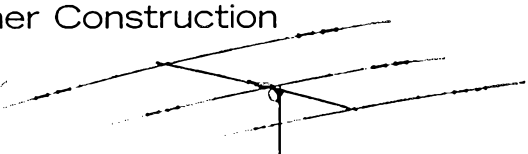


hy-gain's incomparable 6-element DX THUNDERBIRD Model TH6DX

- **Takes Maximum Legal Power**
- **Comes Through Like a Bomb on DX**

The Hy-Gain 6-element DX Thunderbird is a breed all its own...built to provide the ultimate in total performance on 10, 15 and 20 meters. Individually tuned Hy-Q traps for each band insure peak performance whether working phone or CW. Exclusive factory pre-tuned Beta Match assures optimum gain and maximum F/B ratio without compromise. SWR less than 1.5:1 on all bands. Feeds with 52 ohm coax. Ruggedly constructed to survive winds up to 100 MPH. Boom length, 24'; longest element, 24'; turning radius, 20'. Net wt., 47 lbs.

Model TH6DX..... **$139.50** Net

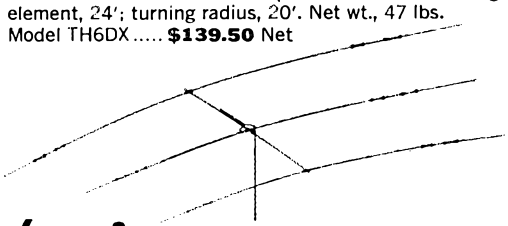


hy-gain's famous 3-element THUNDERBIRD Model TH3Mk2

- **Takes Maximum Legal Power**
- **Delivers Uncompromised Performance**

The Hy-Gain Model TH3Mk2 is more than just another 3-element tribander. Individually tuned, large diameter Hy-Q traps provide full-size performance on each band. Factory pre-tuned Beta Match insures optimum gain and maximum F/B ratio without compromise. SWR less than 2:1 on all bands. Heavy gauge seamless aluminum construction survives winds up to 100 MPH. Boom length, 14'; longest element, 28'; turning radius, 15.7'. Net Wt., 36 lbs.

Model TH3Mk2..... **$99.75** Net

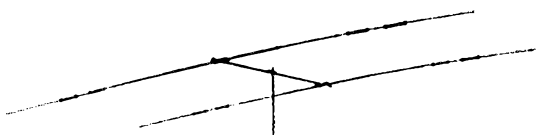


hy-gain's fantastic 3-element THUNDERBIRD JR. Model TH3Jr

- **Takes 300 Watts AM; 600 Watts P.E.P.**
- **Rotates with a Heavy Duty TV Rotator**

Mounted on a rooftop or a lightweight tower, the compact Model TH3Jr offers amazing total performance to the Ham hampered by severe space limitations. Has individually tuned Hy-Q traps for each band. Is Beta Matched for maximum gain and F/B ratio. SWR is less than 2:1 on all bands. Rugged heavy gauge aluminum construction survives 80 MPH winds. 12' boom. Longest element, 26'. Turning radius, 14.3'. Net Wt., 21 lbs.

Model TH3Jr..... **$69.95** Net



hy-gain's outstanding 2-element THUNDERBIRD Model TH2Mk2

- **Takes Maximum Legal Power**
- **Rotates with a Standard TV Rotator**

The Model TH2Mk2 is a high performance tribander that installs most anywhere. Has individually tuned Hy-Q traps for each band...exclusive Beta Match for maximum gain and F/B ratio without compromise. Feeds with 52 ohm coax. SWR less than 2:1 on all bands. Rugged heavy gauge seamless aluminum construction survives winds up to 100 MPH. Boom length, 6'; longest element, 28'; turning radius, 14.3'. Net Wt., 23 lbs.

Model TH2Mk2..... **$69.95** Net

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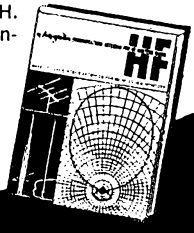

Section Communications Managers of the ARRL Communications Department

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, OES, OPS, OO and OBS. Technicians may be appointed OES, OBS or V.H.F. PAM. Novices may be appointed OES. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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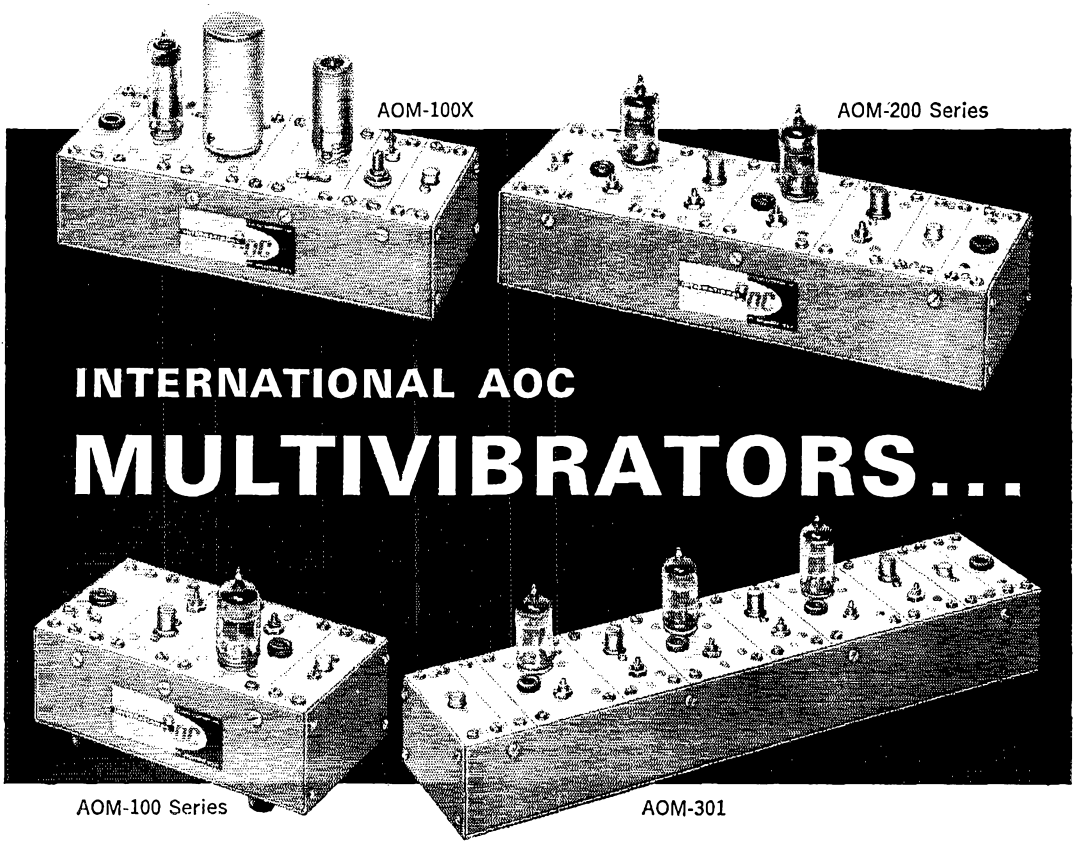

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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the 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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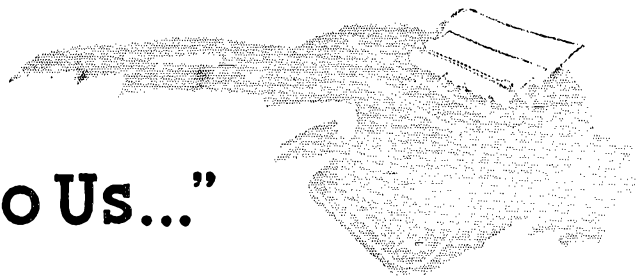


"It Seems to Us..."

20 METERS AND DOWN

Old Sol hasn't been very liberal with his ultra-violet output the past couple of years. All those little electrons and ions a hundred miles or so in space haven't been doing their desired job of bouncing back r.f. in the higher-frequency ranges. Or put more simply, conditions on 15 and 10 have been pretty punk.

All of which has resulted in a natural tendency for us to congregate on the bands which will provide regular DX communication, and thus crowd them even more. Such a situation is adverse to communications efficiency, and undoubtedly is part of the cause of short tempers and resultant discourtesy we too frequently encounter these days.

We've reached — and perhaps passed — the bottom of the sunspot cycle. Things should get better in a much shorter time than their slow deterioration required. But more of us must be alert to take advantage of this change. How many times have you tuned across 21 Mc., found it "dead," and so moved to (more likely, stayed on) another, more crowded, band? Our guess is that at any one moment, because of the size of the amateur body, a couple of hundred guys were doing the same thing, each not aware of the others! What would happen if one or more busted loose with a CQ or a "test"? More than likely, a QSO, with many more following. It happens often, but not often enough. We need to realize that while 21 Mc. has hardly reached the state of daily reliability, it offers a great deal more potential than we have been using.

The current DX contest, hopefully, will help show the way, with many eager enthusiasts not passing up any opportunity for another contact. Activity begets activity. Let's therefore take a lesson from the surge of occupancy — and QSOs — which the contest will produce, blow the dust off our bandswitches, and make activity on 15 a regular rather than a spasmodic affair.

And ten shouldn't be far behind.

LATE *QST*s

From time to time we have had occasional complaints about late delivery of *QST*. In a mail operation of 100,000 copies, this of course is bound to occur now and then. In such individual instances the fault may be ours, at the printer in labeling and sacking, or in the Post Office. But the complaints have been increasing this past year, and reached a peak with our January issue. Many irate members blame Hq., assuming we have somehow delayed mailing their copies.

The fact is that — with the one exception where a member is very tardy in sending his renewal — all copies for any one area go into the mail the same day. The job is completed over a 3-day period; west coast copies the first day, then the central portion of the country, then the east. After our delivery to the Post Office, we have no control over when the mag reaches you.

We are often asked a question such as why the fellow across town "always gets his *QST* a week earlier than I do?" We can't answer. Only the Post Office can. Hardly a model of efficiency, admittedly they have plenty of headaches with the growing mountains of mail. Magazines simply have to take a back seat to first-class mail. The load in one branch, in the same city, may be considerably different from that in others.

The P.O. Department puts its hopes for increased efficiency on the zipcode system, so far only partially in effect. ARRL membership records — and therefore *QST* mailing plates — will be 100% zipcoded by the middle of this year, even though the official deadline is not until January 1, 1967. We can only hope the zip system will meet P.O. expectations and improve delivery dates.

We are certain all League members will share the deep regret of the Board of Directors and staff in the receipt of the letter on the following page from President Herbert Hoover, Jr., W6 'H, published at his request for your information. Last-minute arrangements for publication do not permit us more space at the moment than to say that no one realizes more than Hq. the almost-unconscionable amount of time our President has taken from his business, personal, and family life — solely because of his devotion to amateur radio — to re-evaluate and to further, highly successfully, the aims and objectives of ARRL and IARU.

QST

A Letter From Our President

TO THE BOARD OF DIRECTORS, AMERICAN RADIO RELAY LEAGUE

Dear OMs:

As you are no doubt aware, my present term of office as President of the League expires at the time of the next Board meeting in May, 1966. By then I will have completed four years in this position. The purpose of this letter is to advise you, much to my regret in many ways, I shall not be a candidate for re-election.

First, let me say it has been a high honor to serve as President, and I shall always look back on these years with the greatest possible pleasure and satisfaction. The opportunity to work with so many good friends on behalf of the League — an institution in which I thoroughly believe — has indeed been a rare privilege.

There are several reasons which have entered into my decision. A change of voluntary officers must take place eventually, and I believe it might well be more beneficial to the League at this time than, possibly, a few years from now. The next ITU Allocations Conference will not occur for at least two or three years, and the groundwork for ARRL and IARU participation has already been laid. There will be ample time, therefore, for new officers to familiarize themselves with the program.

Domestically, while several important matters — including incentive licensing — are still pending before our governmental agencies, the League's work in connection with them has been completed. Hopefully, the decisions will be available by the next Board meeting. So although many challenging problems lie ahead, there do not appear to be any on hand which would make the present voluntary officers indispensable.

Furthermore, it is my opinion there is an optimum length of time that any one person should serve as President. The office is an honorary and volunteer one — as it should be — but it requires a large amount of energy, work and travel if all of its responsibilities are to be properly met. As you know, the President of the League must also serve as President of IARU, and this adds appreciably to the duties and travel required.

Whoever holds these offices must be prepared, of necessity, to make a substantial sacrifice to his business and family interests if he intends to do a conscientious job. Ultimately, however, there comes a time when personal obligations must take precedence; and I feel they can only do so, unfortunately, at some expense to one's duties toward the League.

In reaching this conclusion, let me say my interests in amateur radio will in no way be lessened, and I shall be most happy to work with the new President to make the transition a smooth one.

After much consideration, I would like to add a further conclusion. I sincerely believe that if a specific term in office were designated, those serving in voluntary positions would be able to intensify their efforts while in office, with the certain knowledge they would return to their other responsibilities at the end of the period. Additionally, the responsibilities and sacrifices — as well as the honors — would be spread more equitably. Moreover, an orderly rotation of officers would tend to bring new ideas, viewpoints and enthusiasms to the forefront. I therefore strongly recommend the Board give careful consideration to amending the bylaws to specify a definite length of tenure for the League's voluntary officers.

As I have said, it has been a very great honor to serve as President of the League during the last four years, and I have found the responsibility to be a most stimulating and rewarding one. In turn, I hope I have been able to make some contributions toward the problems before us.

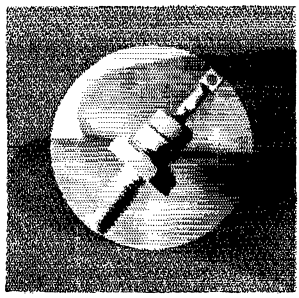
In closing I wish to express my appreciation to the members of the ARRL Board and Executive Committee, as well as my many other friends in the League, for the pleasure and privilege of working with them. Likewise, the friendships I have formed in numerous IARU societies abroad have been a great source of personal satisfaction.

I would particularly like to thank the many members of our governmental agencies with whom I have worked, for their courteous consideration of our amateur problems; and for the cooperative and constructive spirit in which they have approached their solutions.

One of the things that has impressed me most in my term of office has been the devotion and dedication of our staff at Headquarters and in Washington, for they have conscientiously put the best interests of amateur radio in the forefront of their efforts at all times. I am most grateful for the opportunity to have worked with them and for their having made my term as President such a rewarding one.

Sincerely, and 73.

HERBERT HOOVER, JR., W6ZH, *President*

Varactor  Multipliers

Appreciable power output at 432 Mc. from a device that needs no d.c. power supply and at the same time works at high efficiency would seem to be the answer to a u.h.f. man's prayer — or a pipe dream! It's no dream. The device that does it is the varactor diode.

Here is a group of three articles aimed at giving you background information on the varactor multiplier — what it is, how it works — along with practical construction data on equipment. The leadoff article, by W1CER, is on the varactor and its application. The second, by W1KLK, describes 432-Mc. triplers he and W1CER built, and their experiences in getting them into operation. The third, by W1IGJ, tells how to build a varactor tripler-converter for transferring a 50-Mc. s.s.b. signal to 432-Mc.

On a watts-per-dollar basis, varactor multiplication is a pretty attractive method for moving up in the spectrum!

Varactor Diodes in Theory and Practice

A Treatise for the Solid-State Neophyte

BY DOUG DEMAW,* W1CER

UNTIL recent years the u.h.f. enthusiast had little to look forward to as far as low cost was concerned when building a transmitter for use on 420 Mc. Expensive vacuum tubes and related component parts were required to generate power levels as low as 10 watts. With the advent of varactor diodes (variable reactance diodes) many of the problems were resolved. The varactor offers many advantages over vacuum tubes: no power supply is required, doublers and triplers are capable of efficiencies as great as 70 per cent, unit cost is below that of like-power circuits using tubes, the finished product does not generate high amounts of heat, and is capable of being miniaturized in a way that had been previously unheard of.

It became convenient to install a varactor doubler at the output terminal of the 220-Mc. transmitter (tuned down to 216 Mc.) to secure f.m. or c.w. on 432 Mc. A.m. signals could also be multiplied, but with the inherent distortion products brought about by the multiplication of a complex waveform. (Nevertheless, the resultant a.m. signal is still acceptable for voice communications.) In a similar fashion, the output from a 2-meter transmitter could be applied to the input terminals of a varactor tripler for the purpose of securing output at 432 Mc. Thus came the dawning of many new practices — applicable to industry and amateur radio as well.

Varactor diodes have been used successfully in parametric-amplifier circuitry, as mixers for the generation of u.h.f. s.s.b. energy, and as frequency multipliers in solid-state mobile equipment. Although there is a variety of applications useful to radio amateurs in which the varactor diode can be used, this article will deal with their use as frequency doublers and triplers. The varactor diode used in the tests which made much of this data possible was the Amperex H4A (1N4885).[1] The H4A is designed to handle up to 30 watts of r.f. input power when operating normally. Efficiencies of 60 per cent doubling to

* Assistant Technical Editor, *QST*.

[1] Amperex Electronic Corporation, 230 Duffy Ave., Hicksville, Long Island, N. Y.

144 Mc. and 50 per cent tripling to 432 Mc. are readily obtainable.

The Varactor Device

In ordinary terms, when we refer to a semiconductor diode, we think of a 2-terminal p-n junction operated in the forward-conduction region as is the case with a rectifier. Alternatively, we think of the device as operating in the reverse-avalanche region, exemplified by the zener diode. When considering these functions of the more common diodes we might rightly conclude that the term *diode* is not particularly applicable to varactors, since they operate neither as rectifiers nor as avalanche devices. In reality, varactor diodes operate in the region between forward conduction and reverse breakdown — the region in which a conventional diode is considered to be cut off. In this region the p-n junction can be compared to a capacitor in series with a resistor as illustrated in Fig. 1, at A. The capacitance varies as a nonlinear function of the applied voltage, and it is this nonlinearity that encourages the generation of harmonic energy.

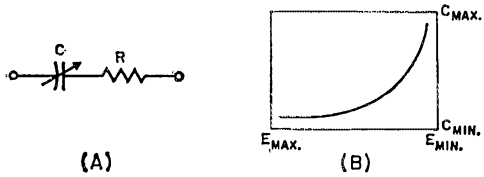


Fig. 1 (A) A varactor diode is equivalent to a variable capacitor in series with a resistor. (B) Typical voltage-capacitance curve for an abrupt-junction varactor. The capacitance at the varactor junction decreases as the reverse bias voltage is increased.

The component R, in Fig. 1, represents the resistance of the varactor's junction as well as of the bulk material from which the varactor is made. This resistance determines the quality of the varactor, making it necessary during the manufacturing process to hold this value to an absolute minimum. The typical varactor diode has a series resistance of the order of 1 ohm, or less. Although this may seem like a small quantity of resistance, the resultant losses caused by the total current through the device are quite significant.

The "cutoff frequency" (f_{co}) of a given varactor diode can be found by consulting the manufacturer's specification sheet and will enable the user to compare the merits of the various types when making a selection for a particular frequency of operation. It is best to select a varactor whose f_{co} is much higher than the intended operating frequency, rather to choose one with an f_{co} which is quite close to the operating frequency. This is true because as the operating frequency approaches the cutoff frequency, the varactor becomes more "lossy." Varactor manufacturers say that the cutoff frequency is related to the junction capacitance of the diode, and to its series resistance. The cutoff frequency is defined arbitrarily as that frequency at which the varactor's Q equals 1. Using the values of junction capacitance (C) and the series resistance (R_s), given on the varactor specification sheet, f_{co} can be determined from:

$$f_{co} = \frac{1}{2\pi R_s C} \text{ Mc.}$$

How a Varactor Works

The performance of the varactor's junction capacitance can be understood by reverting to basic semiconductor theory:[2]

When a junction is formed between n-type and p-type material, a cross-migration of charges takes place across the junction of the semiconductor materials (Fig. 2). This means that the electrons from the n-type material flow across the varactor's junction to neutralize the positive carriers near the junction in the p-type material. At the same time, the "holes" from the p-type material cross over the varactor's junction and neutralize the excess electrons near the junction in the n-type material of the diode. Because of this cross-migration process, all of the free charged particles are removed from the immediate vicinity of the junction, creating what is called a "depletion layer" in the junction.

The varactor diode performs very much like a lightly-charged capacitor with a relatively high Q factor. The depletion layer represents the dielectric and the semiconductor material on each side of the junction acts as the two plates of the capacitor. If an external voltage is applied across the p-n junction (reverse bias) the depletion layer will widen and the capacitance between the two materials will decrease. Conversely, if a forward voltage is connected across the p-n junction, the depletion layer will become thinner and the capacitance between the two materials will increase. (Bias can be developed across a resistor which is connected in parallel with the varactor. The system is not unlike the grid-leak principle used with vacuum tubes. It is possible to apply a fixed bias to the varactor rather than using the grid-leak method. The latter is not commonly practiced, however.) It is obvious therefore, that the junction capacitance will vary in relation to the externally-applied voltage as long as the junction is reverse-biased. The two conditions, for reverse bias, are low voltage for high capacitance and high voltage for low capacitance. A curve that illustrates this relationship is given in Fig. 1, at B. Generally, the capacitance of the depletion layer is inversely proportional to the square root, or cube root, of the applied voltage, depending on the type of varactor used.

The two most common types in use are the "abrupt-junction" varactor and the "graded-junction" varactor. The significant difference between the two types is that the graded-junction varactor has an impurity content in its semiconductor materials that permits a *gradual* and

[2] *The Radio Amateur's Handbook*, Chapter 4. For information on the varactor itself, see Cross, "Frequency Multiplication with Power Varactors at U.H.F.," *QST*, October 1962, and *The Radio Amateur's V.H.F. Manual*, page 241.

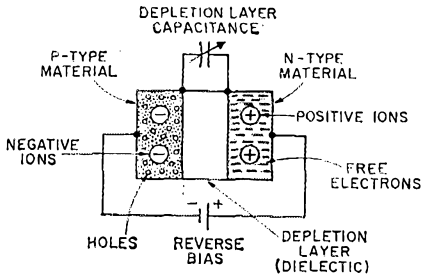


Fig. 2—Basic structure of a varactor diode, showing the relationship between the p.n. material and the depletion layer.

linear change from p-type to n-type material while the abrupt-junction varactor has an impurity characteristic, or profile, that results in a *rapid* change from p-type to n-type material. This article will deal with the more common abrupt-junction varactor which follows the square-root principle.

A Shunt-Type Frequency Doubler

It can be seen from the foregoing discussion that a condition of reactive nonlinearity exists within the varactor diode when an r.f. signal is applied to it. This reactive nonlinearity, without an appreciable series-resistance component, enables the varactor to generate harmonics very efficiently when used in circuits of the shunt frequency-multiplier variety shown in Fig. 3. With vacuum-tube harmonic generators the amplitude-distortion principle is used. In this case the tube is operated on the nonlinear portion of its curve, resulting in a plate-current change that is not directly proportional to a given change in grid voltage. Under these conditions, the amplitude of the output waveform will be distorted, giving rise to the production of harmonic energy (*The Radio Amateur's Handbook*, Chapter 3).

By comparison, the parametric-distortion principle is used when generating harmonics with varactor diodes. Harmonic generation is brought about by applying a current through the varactor. The resulting voltage which appears across the terminals of the diode is highly distorted and is, therefore, rich in harmonic energy. This action, plus the variation in capacitance at the varactor junction with r.f. energy applied, enables the varactor to generate harmonics.

The circuit in Fig. 3, a frequency doubler, is driven by a sinusoidal voltage source (V_s) having a fundamental frequency f and an internal impedance Z_s. Since the input tuned circuit, formed by L_1 and C_1, presents a reasonably high impedance to all frequencies other than the fundamental, essentially only the fundamental component of current (I_f) can flow in the input loop. A second-harmonic current, I_{2f}, is generated by the varactor diode (CR_1) and flows through the load Z_L. Another tuned circuit, L_2C_2, is inserted in the output loop to block the fundamental-frequency energy and is resonant at the desired output frequency.

The Shunt Frequency Tripler

The popular circuit configuration shown in Fig. 4 illustrates the basic arrangement for a shunt-type tripler. A sinusoidal voltage source (V_s), having an internal impedance Z_s, is applied to the input terminals of the circuit. The input network (L_1C_1) is tuned to the fundamental frequency and presents a reasonably high impedance to all frequencies other than the fundamental. The varactor, having a nonlinear characteristic, generates a second-harmonic current, I_2, that will flow through the diode and L_2C_2. The network L_2C_2 acts as a high-impedance device to all frequencies other than $2f$. The currents I_1 and I_2 flow through CR_1, along with frequencies f and $2f$, causing CR_1 to function as a mixer, producing a frequency $3f$. The remaining tuned circuit, L_3C_3, acts as a high impedance to all frequencies other than $3f$, enabling the third-harmonic energy to flow to Z_L. The tuned circuit L_2C_2 is commonly referred to as the "idler tank".

Some Design Considerations

Varactors can be used as frequency quadruplers, quintuplers, and as multipliers to frequencies that are even farther removed from the fundamental frequency. It is claimed by some engineers that efficiencies as great as 50 per cent have been realized from quintupler multipliers.[3] As the frequency of multiplication is extended farther from the fundamental, greater numbers of tuned circuits will be required, making the varactor-multiplier circuitry more complex. In general, for any order of multiplication, the second harmonic should always be used as an intermediate harmonic since it provides the closest coupling to the fundamental and enhances the over-all efficiency of the circuit.

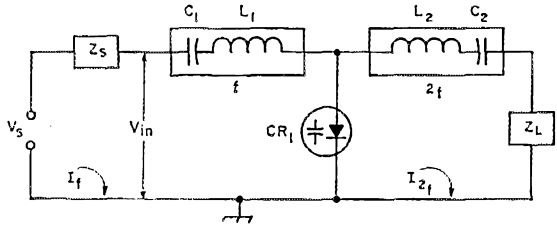


Fig. 3—Basic shunt-type frequency doubler.

In practical circuits, one of the important factors that lowers the efficiency is stray capacitance, including the varactor case capacitance. Any stray capacitance will decrease the over-all effective nonlinearity of the varactor because it is in parallel with its variable capacitance. Some difficulty has been experienced in the microwave region because of this stray capacitance effect and because of the loss factor of the diode (series resistance). Circuit losses, external to the varactor itself, can be minimized by using coaxial

[3] Utsupomia and Yuan, *Proceedings of the IRE*, January, 1962 p. 57.

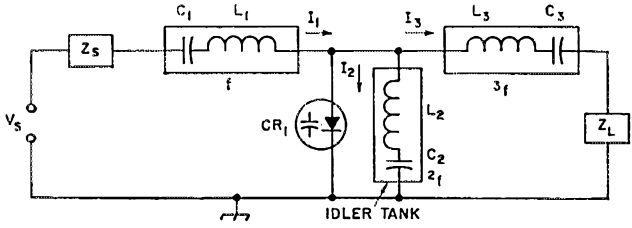


Fig. 4—Basic circuit of the shunt-type frequency tripler.

or cavity-type circuit elements at the input and output networks of the varactor multiplier assembly. Additionally, these circuits are more selective and will present an even higher impedance to unwanted frequencies than is possible with simple coil and capacitor tuned circuits. Another article,[1] contains a discussion on the merits of high-Q tanks along with some practical examples of such circuit elements. QST

[1] Blakeslee, "Practical Tripler Circuits," this issue.

Practical Tripler Circuits

BY DOUGLAS A. BLAKESLEE,* W1KLK

A SIMPLE model of a varactor frequency doubler, such as Fig. 1A, requires an input circuit to tune the varactor to the input frequency while rejecting all others, and a tuned output circuit which passes the wanted second harmonic while rejecting any others. To make this simple doubler into a tripler, the output circuit is tuned to the third harmonic, and an idler circuit (shown enclosed by dotted lines in Fig. 1A) tuned to the second harmonic is connected across the varactor to improve the efficiency. In early experiments with varactor frequency multipliers, no idler tank was used and the efficiencies obtained were none too good. The idlers had to await theoretical proof — idlers were first considered a sort of black magic — before they became an accepted way to reinforce the harmonic output of a varactor multiplier.

High orders of multiplication can be obtained with single varactors, but the circuits become rather complex because of the number of idler circuits required. Also, each idler tank restricts the bandwidth of the multiplier which is an undesirable feature. A varactor device requires moderate bandwidth to work properly, because of characteristics inherent in the operation of a nonlinear reactance and because of variations in the way a practical varactor's capacitance changes.

For a "starter" circuit to construct, we need only to add input and output tuned circuits to the circuit in Fig. 1A for matching to and from 50 ohms, as in Fig. 1B. This circuit was constructed for 432 Mc. as shown in Fig. 2, using a $4 \times 2 \times 1\frac{1}{2}$-inch Minibox with BNC-type connectors at either end for input and output. The phono type connectors so popular on h.f. transmitters should not be used. Two $\frac{5}{8}$-inch cone ceramic insulators are used to support the junctions of C_2–L_2 and L_4–C_5. All the glass trimmers are surplus items available from Barry Electronics: these trimmers were found to be superior mechanically to the TV-type ceramic trimmers. The varactor, an Amperex 1N4885 (H4A), is bolted directly to the Minibox, providing an easy heat sink.

This first model was working only after several hours of experimenting with the input circuit. Using double-tuned circuits for impedance matching is no easy job. With C_1, C_2 and C_3 all variable, getting a 50-ohm input impedance for the exciter to "look at" while at the same time delivering maximum power to the varactor was about impossible. A varactor's impedance changes with voltage across it, which makes things no easier. In the end, to make the unit easier to adjust, the input circuit was modified.

The input circuit suggested by Amperex in their application notes on the H4A[1] was installed. See Fig. 1C for the changes. The capacitive-divider input circuit made input matching easier. This circuit does not have the selectivity of the double-tuned circuit used before, but this should not be a problem since a "clean" 2-meter exciter should be used. If your 2-meter rig has harmonic or spurious output, it is the exciter you should work on and not the multiplier input circuit.

The final version of the multiplier, using the circuit of Fig. 1C, is shown in Fig. 3. This little box will deliver about 10–12 watts on 432 when driven with 20 watts on 144 Mc. — enough to drive the popular amplifiers using the 4X150 series tubes. If this multiplier were to be used

* 114 Shelley Road, Meriden, Conn.

[1] "Designing Frequency Multipliers with Varactor Diodes," Report S-121, available from Amperex Electronics Corporation, Hicksville, L. I., N. Y.

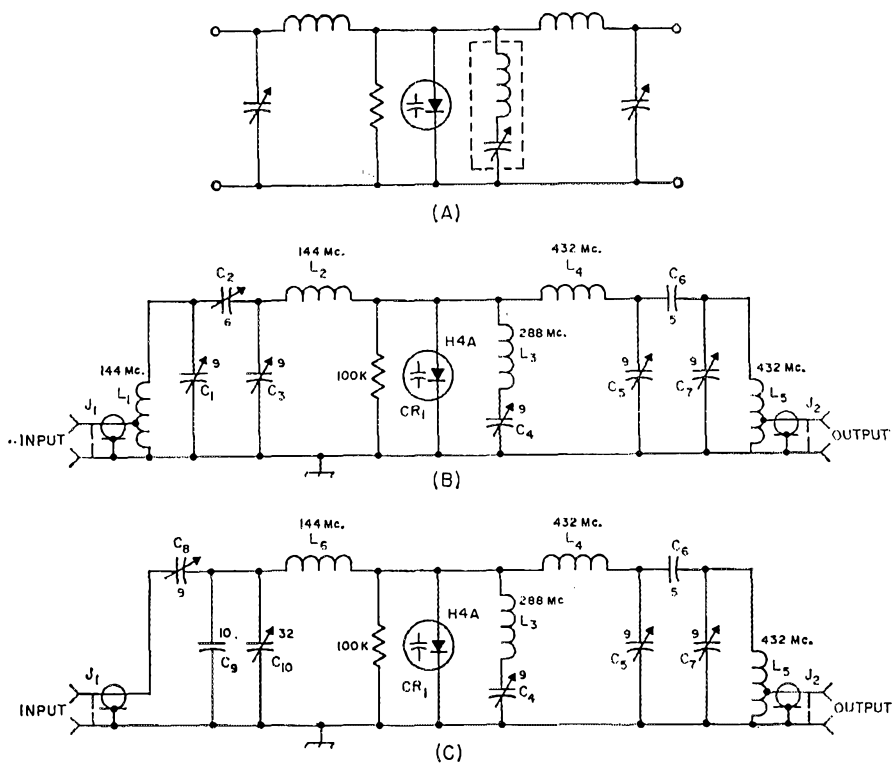


Fig. 1—(A) Model varactor multiplier circuit. (B) Practical tripler circuit using the Amperex H4A varactor and lumped-constant circuits. (C) Improved tripler circuit using a capacitive-divider input circuit.

C_1, C_3, C_4, C_5 C_7—9-pf. piston trimmer (see text).
C_2—6-pf. trimmer (Johnson 189-2).
C_6, C_9—Silver mica capacitors.
C_8—9-pf. variable (Johnson 160-104).
C_{10}—32-pf. variable (Johnson 160-130).
CR_1—Amperex H4A varactor diode (1N4885).
J_1, J_2—BNC coaxial receptacle, chassis-mounting.
L_1—9 turns No. 18, ⅜-inch diam., ½ inch long; tap at 2 turns from the ground end.
L_2—7 turns No. 18, ⅜-inch diam., ½ inch long.
L_3—4 turns No. 18, ¼-inch diam., ¼ inch long.
L_4—2 turns No. 18, ¼-inch diam., ⅛ inch long.
L_5—3 turns No. 18, ¼-inch diam.; tap 1t. from gnd. end
L_6—6 turns No. 16, ½-inch diam., ½ inch long.

directly into an antenna, a strip-line filter[2] or the transmatch described in this article should be used to reduce the unwanted harmonics to an acceptable level. When the multiplier is used to drive an amplifier, a tuned grid circuit should give sufficient harmonic attenuation to prevent trouble. The important thing to remember is that a varactor does produce harmonics other than the one you wish, although usually they are far enough away from the wanted harmonic so they don't cause too much trouble, if selective coupling circuits are used.

Line Circuits

In an attempt to make a higher-efficiency varactor multiplier, W1CER used a ¼-wavelength strip line in the output tank. The use of a strip line will also give additional attenuation of unwanted harmonics. This circuit is given in Fig. 4, again using capacitive-divider input, and the completed multiplier is shown in Fig. 5.

[2] Strip-line filters for 50–432 Mc. are described in *The Radio Amateur's V.H.F. Manual*, Chapter 12.

W1CER used a 5 × 7 × 2-inch chassis, although the unit can be made to fit in a 4 × 5 × 2-inch base if compactness is desired. A shield is formed to fit the length of the chassis 2 inches from one wall, forming a 2-inch-square trough inside the chassis. A National TPB polystyrene feedthrough connects the varactor to L_3.

Fig. 6 details the layout of the strip-line tank circuit, which uses a 5-inch brass strip ½ inch wide, having a ½-inch "foot" at the bottom for bolting the strip to the chassis. The input and output links are tuned with TV-type ceramic trimmers. The low-potential ends of L_3 and L_5 are soldered directly to the tops of these trimmers. C_5 is made by cutting two 1-inch disks from sheet brass. One disk is soldered to the end of L_4, and a mount for the other disk is fashioned from a Miller 4400 coil form. The ceramic form itself is broken off from the mount, and the slug removed from the end of the threaded rod. The disk is then soldered to the end of the rod. The coil-form base is mounted on the chassis so that the two disks are opposite each other (see Fig. 6).

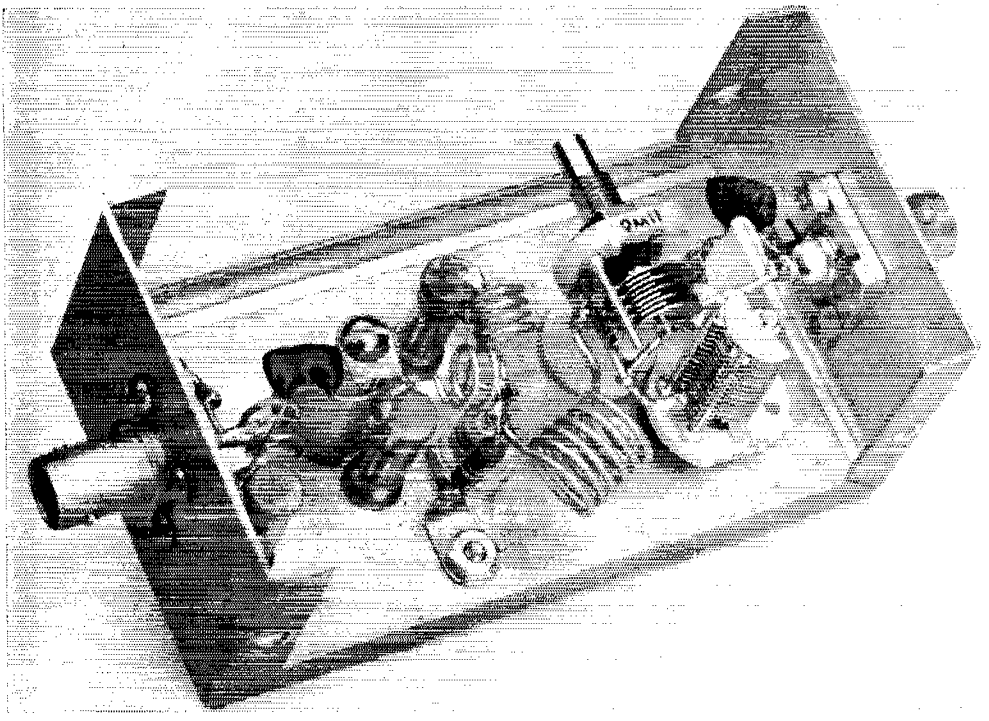


Fig. 2—Varactor tripler using the circuit shown in Fig. 1B.

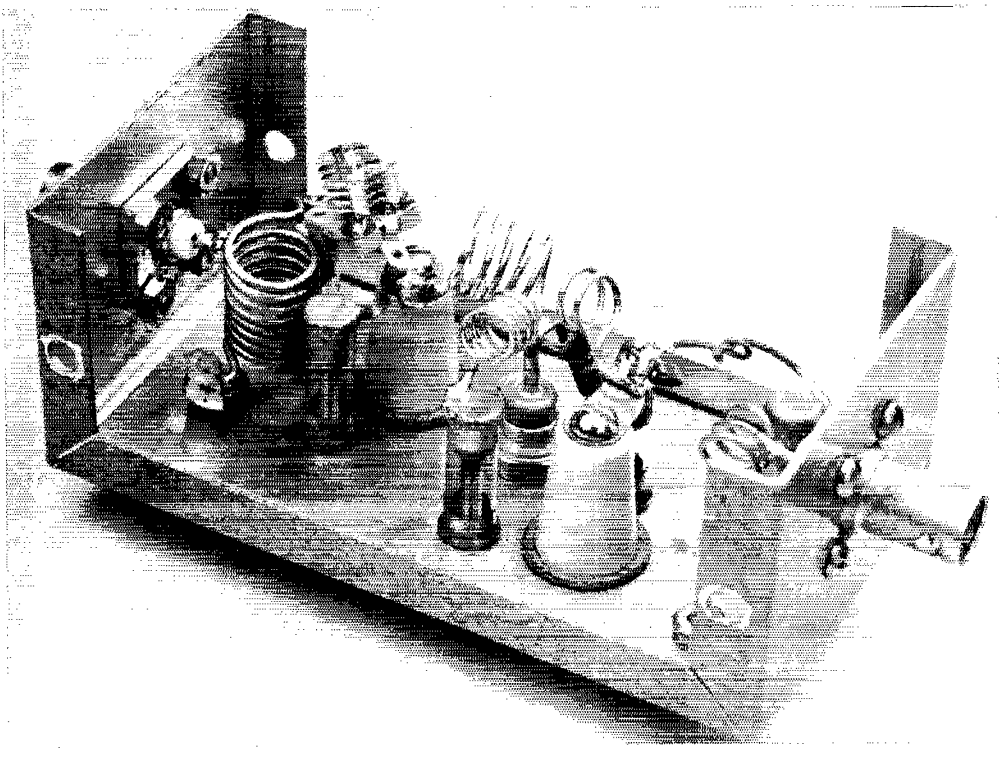


Fig. 3—The tripler with modified input circuit. The input tuning capacitor is mounted on top of the ceramic standoff insulator. A hole was drilled in the bottom half of the Minibox to allow adjustment of this capacitor.

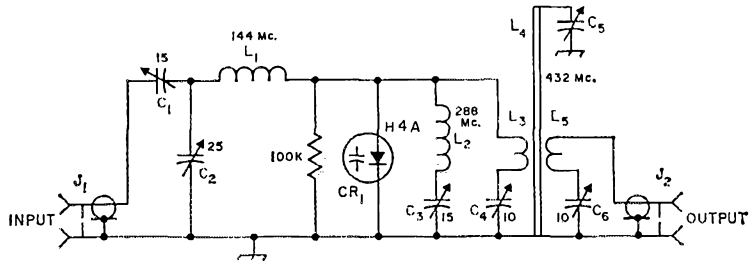


Fig. 4—W1CER's varactor tripler. A strip-line output circuit is used for better attenuation of unwanted harmonics than is possible with lumped-constant circuits.

C_1—15-pf. variable (Hammarlund MAPC-15).
C_2—25-pf. variable (Hammarlund MAPC-25).
C_3—15-pf. variable (Johnson 160-107).
C_4, C_6—10-pf. ceramic trimmer (Centralab 829-10).
C_5—See text.
J_1, J_2—BNC coaxial receptacle, chassis-mounting.
L_1—6 turns No. 16, 3/16-inch diam., 1/2 inch long.
L_2—3 turns No. 12, 3/16-inch diam., 3/4 inch long.
L_3, L_4, L_5—See Fig. 6.

For better mechanical stability of the tuning shaft, a 6-32 nut can be placed on the shaft so it may be locked in place.

Tuning Up

A varactor multiplier is simple to tune, provided you have the proper test equipment. But test equipment for 432 Mc. is not easy to come by. Most constructors will find they have to spend more time making test gear to check the varactor than in building the multiplier itself. Fig. 7 shows two possible test setups for checking a multiplier unit. The first requires a nonreactive 50-ohm dummy load, and the second uses a transmatch with a 300-ohm load. Most of the dummy loads available to amateurs are too reactive at 432 to be any good. The constructor may make his own 50-ohm load from 100 feet of RG-58/U coax. This length of coax, terminated with a 50-ohm, 2-watt composition resistor, will provide a nonreactive load that will handle the power from one of the varactor multipliers described above — and give the builder a good lesson in the losses of coax lines![3]

Another approach is to make a dummy load from carbon resistors[4] and use a transmatch to tune out any reactance in the load. This resonant load, when used with an s.w.r. indicator, will give a check on the harmonic content of the varactor's output. (More about this later.) When the varactor multiplier is working, the transmatch can be used in the station to match Twin-Lead feeders.

The 432-Mc. transmatch circuit is shown in Fig. 8. It is constructed from a $4\frac{1}{2} \times 7\frac{3}{4}$-inch piece of sheet copper, with a $1\frac{1}{2}$-inch lip bent on either end. Two hairpin loops are used for L_1 and L_2. L_2 is supported by a 3/4-inch standoff insulator. A crystal socket is used as an output connector as it has the proper pin size and spacing for the popular Twin-Lead connectors. The taps given in Fig. 8 for L_2 should be good for any low-reactance 300-ohm load. Other impedances will require changing the position of the taps.

In either test setup, a filter is used to insure that the output you are measuring is 432-Mc. energy and not some other harmonic. A simple strip-line filter like the unit described in *The Radio Amateur's V.H.F. Manual* (p. 304) will do the job. A power indicator is the hardest item of all to come up with. Bird wattmeters are very expensive; it may, however, be possible to borrow one from a local business-radio repairman. Several models of Micromatch-type bridges that work on 432 are available on the surplus market.[5] One of these units is a good investment for anyone seriously interested in 432 work. If you are not able to get a wattmeter, a simple relative indicator such as a wavemeter can be used at the load.

When the author was testing one of the multipliers described above, a Monimatch that worked well on 144 Mc. was tried as an output indicator for 432. It worked, but there was a 3-db. loss of power in the Monimatch, so it was quickly removed.

The s.w.r. bridge between the 144-Mc. exciter and the varactor multiplier indicates when the varactor input circuit is properly tuned. The input circuit of any of the varactor multipliers should be adjusted for a minimum s.w.r. reading. Then adjust the idler and output circuits for maximum output on 432 Mc. As the second-harmonic frequency is approached, the idler adjustment will make the output jump up.

The tuning adjustments will vary with changes in the drive level. First adjustments should be made with 10 or 15 watts from the exciter. After all the tuned circuits are adjusted correctly at this power level, the drive may be increased to about 30 watts for the H4A. With higher-power varactors, higher drive levels can be used. For any drive level, the varactor circuits should be tuned for best power output. W1CER's multiplier delivered a measured output of about 14 watts when driven with 20 watts on 144 Mc.

If you are using the 432-Mc. transmatch, you can get a check on the harmonic output by adjusting the transmatch for a 1:1 s.w.r. between

[3] See Chapter 11, page 290, of *The Radio Amateur's V.H.F. Manual*.
[4] Ibid., page 291.
[5] Try E. C. Hayden, Bay Saint Louis, Mississippi.

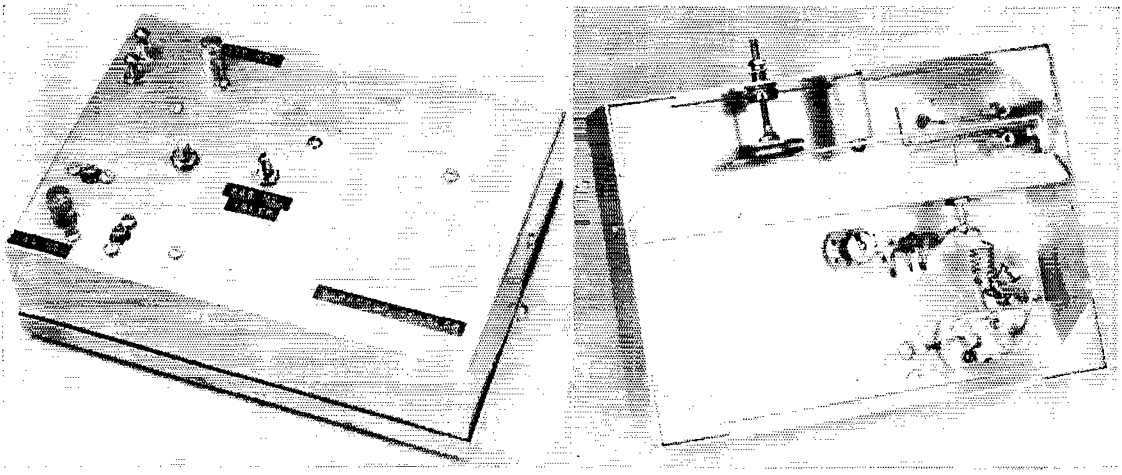


Fig. 5—W1CER's varactor tripler. In the panel view, the input tuning adjustments are located at the lower left, the idler adjustment is at the center, and the output link adjustments are at the upper left. In the bottom view the input circuit is at the lower right and the varactor with its biasing resistor is at the center. The strip-line tank circuit in the trough is tuned by a homemade capacitor described in the text.

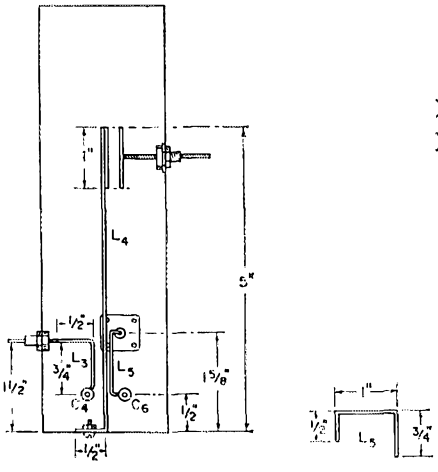


Fig. 6—432-Mc. tank-circuit details for W1CER's varactor tripler. L_3 and L_5 are coupling loops made from No. 14 wire, and L_4 is a ½-inch wide brass strip cut from sheet stock.

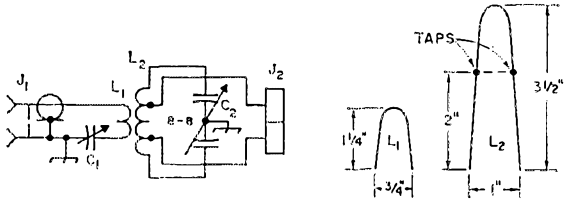
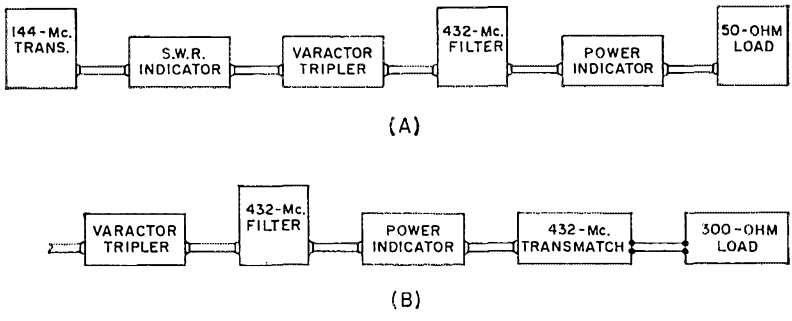


Fig. 8—432-Mc. transmatch constructed by W1CER.

C_1—15-pf. variable (Johnson 160-107).
C_2—8–8-pf. dual-section variable (Johnson 160-208).
J_1—BNC coaxial receptacle, chassis mounting.
J_2—Crystal socket.
L_1—Hairpin loop No. 14 wire; see above.
L_2—Hairpin loop No. 10, wire; see above; tap as shown.

Fig. 7—Test setups for checking varactor multipliers. A uses a 50-ohm load while B has a transmatch and 300-ohm load.



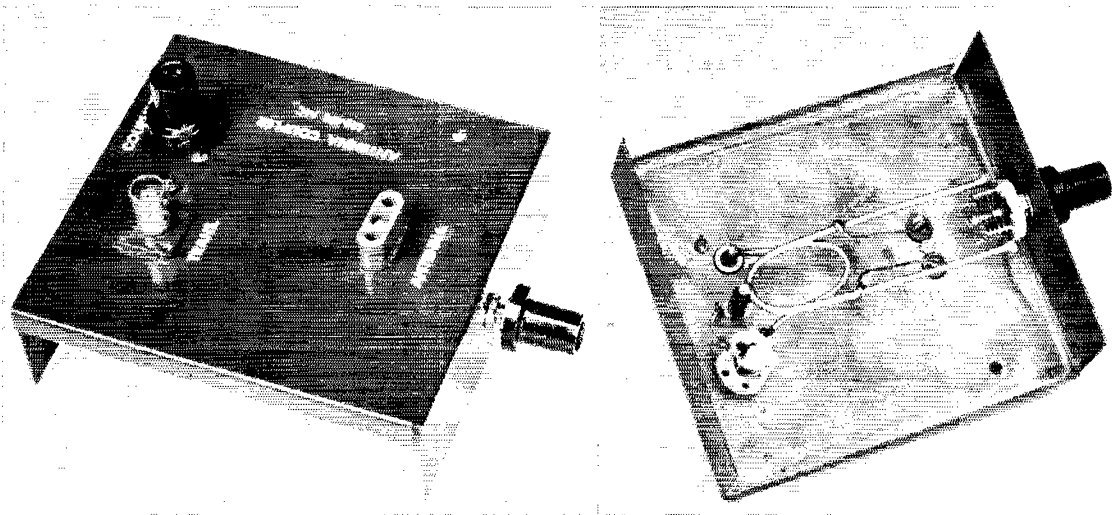


Fig. 9— Top and bottom views of the 432-Mc. transmatch. The chassis is homemade, although a Minibox could be used.

the multiplier and transmatch. Then remove the strip-line filter and recheck the s.w.r. If the s.w.r. has gone up, you can be sure some harmonic energy is getting out. Often these harmonics will not cause any trouble even when the multiplier is used directly into the antenna, but remember that if they are there you will never see a 1:1 match to your antenna. QST

A Varactor Converter for 50 to 432

BY FREDERICK R. HESS,* W1IGJ

THIS article is not intended to go into a great deal of theory on varactors but rather describes in a "how to" fashion the construction of a parametric up-converter from 50 Mc. to 432 Mc. The unit, the circuit of which is shown in Fig. 1, was designed for use with the Heath HX-30 50-Mc. sideband exciter.

The converter gives an actual power gain of 3 or 4 in converting the signal frequency to 432 Mc. Unfortunately the author was unable to get it to take more than 0.8 watts input at 50 Mc., but 3–4 watts of output were obtained at 432 Mc. This limit is a function of pump power, which was purposely kept low to insure against varactor burnout.

The pump frequency used was at 190.75 Mc. and covers the range 431.5 to 432.5 Mc. About 10–15 watts of crystal controlled pump are required. The 190.75-Mc. pump is doubled in the converter to 381.5 Mc. and added to the 50.5-Mc. signal from the HX-30 to produce 432.0 Mc. The range with 50 to 51 Mc. from the HX-30 is thus 431.5 to 432.5 Mc. The unwanted sideband (381.5 minus 50.5) is generated also and must be supported by an idler tank (L_5C_7). This frequency does not appear at the output.

* P.O. Box 147, Waquoit, Mass.

The Circuit

The input circuit consists of parallel-tuned circuits for both the pump frequency (L_3C_3) and the signal frequency (L_1C_1). These are lightly coupled to pi networks to couple to the varactor. Although this appears unsatisfactory at first glance, it will be noted that the reactance of the 50-Mc. pi-network inductor, L_2, at the pump frequency is so high as to constitute an open circuit. Conversely, the pump inductor, L_4, presents essentially no reactance at the signal frequency but the capacitor to ground, C_4, does. Therefore essentially no loading of the signal frequency occurs.

The output circuit consists of series-tuned idler circuits for 381.5 Mc. (pump frequency × 2) and 331 Mc. (pump × 2 minus signal), and two resonant circuits for 432 Mc. (pump × 2 plus signal). Output is taken from a tap on the output tuned circuit.

As may be seen in the photographs, the unit is built in an inverted 4 × 6 × 2 inch chassis. The mounting plate is a 4 × 6 inch piece of $\frac{1}{16}$-inch-thick double-sided printed-circuit board (0.040 copper may be used if desired.) All components are mounted on this plate. Wiring is done with at least No. 18 wire going point-to-point. Most leads

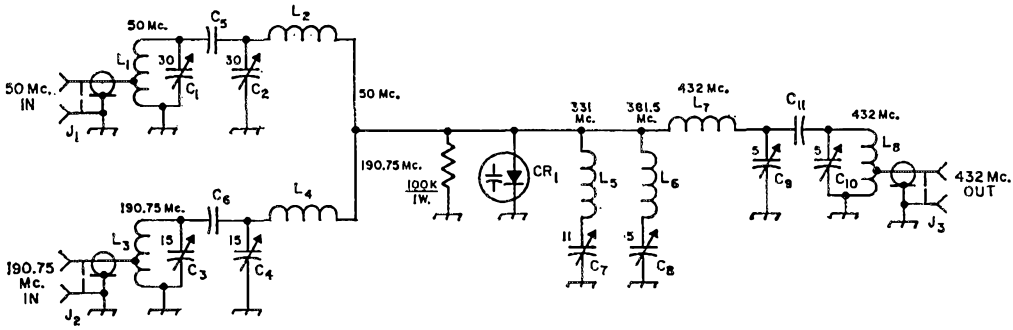


Fig. 1—Circuit of the parametric converter. Resistances are in ohms (K = 1000; capacitances are in pf. μf.)

C_1, C_2—30-pf. variable (Johnson 160-130).
C_3, C_4—15-pf. variable (Johnson 160-107).
C_7—11-pf. variable (Johnson 189-5).
C_8, C_9, C_{10}—5-pf. variable (Johnson 189-2).
C_5, C_6—Gimmick, 3 turns No. 18 solid plastic-covered hookup wire twisted together; ½-inch length for 190 Mc.; ¾-inch length for 50 Mc. (Johnson trimmers may be used as shown in photos).
C_{11}—Gimmick, 2 pieces ⅛ × 7/16-inch copper ribbon overlapped ⅜ inch, spaced 0.020 inch.
CR_1—Varactor diode (Amperex H4A).
J_1, J_2—BNC female.
J_3—Type N female.
L_1—10 turns No. 20, ½-inch diam.; tap at 3 turns (B & W 3003).
L_2—10 turns No. 20, ⅝-inch diam. (B & W 3007).
L_3—3½ t. No. 18, ½-in. diam.; tap at 1 t. (B & W 3003).
L_4—3 turns, same as L_1, without tap.
L_5—4 turns No. 18, ¼-inch diam., spaced wire diam.
L_6—3 turns No. 18, ¼-inch diam., spaced 2 times wire diam.
L_7—2 turns No. 18, ¼-inch diam., spaced 2 times wire diam.
L_8—2 turns No. 18, ¼-inch diam., spaced, tap at ½ turn.

are inherent in the components. The varactor heat sink shown is not necessary if a solid copper chassis is used.

Adjustment and Operation

Adjustment of the converter is a little tedious since there are eight interacting controls. It is not too bad, but considerable patience is necessary.

First apply about 10 to 15 watts of pump power through an s.w.r. indicator, and adjust C_3 and C_4 for minimum s.w.r. A field-strength meter tuned to 381 Mc. placed nearby will serve to detect the doubling operation. Tune C_8 for maximum 381-Mc. signal. Go back and forth a few times between C_3, C_4 and C_8, adjusting for maximum 381-Mc. signal and minimum s.w.r. (they should coincide).

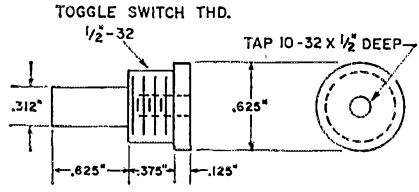
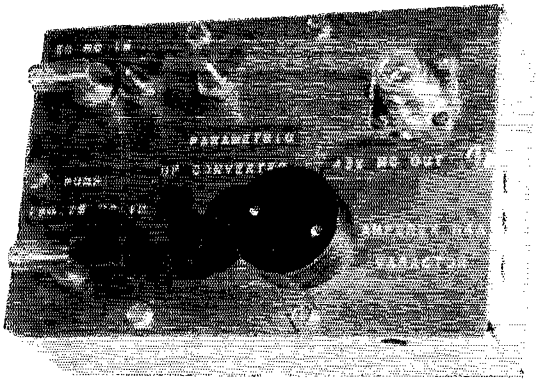
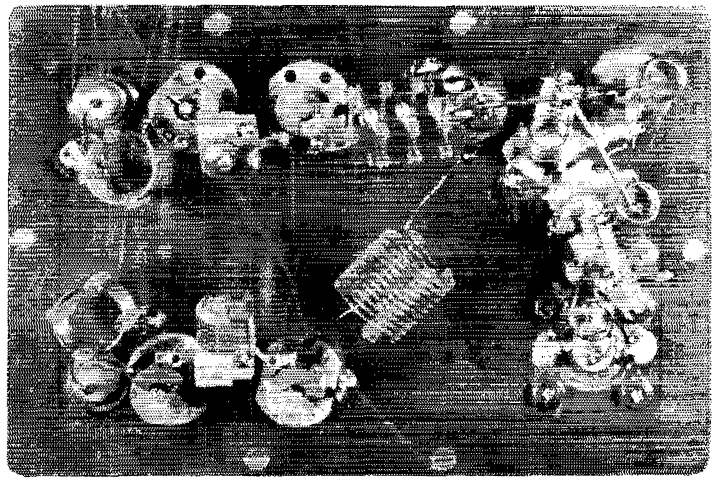


Fig. 2—Heat-dissipating cap for varactor diode. The material can be either copper or aluminum. Anode fins from a burned-out 3CX100A5 can be clamped on the stud.



W1IGJ's parametric up-converter for transferring a 50-Mc. s.s.b. signal to 432 Mc. The round black object at the lower right center is a heat-dissipating cap for the varactor. Its dimensions are given in Fig. 2.

Now connect a load, preferably a wattmeter, to the output and apply about 1 watt (30-per cent scale on the HX-30) to the 50-Mc. input. Tune the wave-meter to 331 Mc. and adjust C_1, C_2 and C_7 for maximum as above. Now tune the wavemeter to 432 Mc. and adjust C_9 for maximum signal. Adjust C_{10} for maximum output to a wattmeter or other output indicator. Note that a high wavemeter indication at 432 Mc. indicates only circulating current in L_7C_9 — *not output*. At this point it is well to go back and start again. Since all the adjustments interact to some extent you should go through at least three times. Do not be upset if your output indicator on the HX-30 goes up when connecting to the converter; this is normal. A 6-db. pad between the HX-30 and the converter gives better carrier suppression since you can use more audio (sideband power) while the carrier level output of the HX-30 remains essentially constant.



The converter is assembled on the back of the panel shown in the other photograph. The 50-Mc. circuits are at the lower left in this view, 190.75-Mc. circuits at the upper left, and 432-Mc. output circuits with idler tanks along the right side. The varactor diode is at the top just to right of center.

Conclusions

The unit exhibits good linearity when used to drive a 2C39 g.g. amplifier to about 12–15 watts output. There is some leakage of the 381.5-Mc. signal into the output; this is removed by a couple of tuned amplifiers or by a simple cavity filter. With no filter the 381-Mc. signal is at least 20 db. down from the 432 output.

This same scheme can be used to convert from a 28-Mc. s.s.b. exciter, with appropriate changes in pump frequency and idler resonances. It is possible to triple from the pump source instead of doubling, with little change in efficiency. The overall performance is nearly the same except for slightly higher pump power requirements to make up for additional loss. QST

Help Your Library Help You

JAMES P. GILLESPIE,* W4LQC-W8BKK

A rather frustrating and disheartening thing is to not be able to find a book you need in the library. Most hams are well aware of the almost universal fact that public libraries, high school libraries, and, to a lesser extent, college and university libraries are notoriously poor places to find up-to-date books on radio, especially ham radio. This sad state of affairs does not necessarily have to exist. Actually, you can do much to improve the level of material in your library.

Most libraries are granted so much money yearly for the purchase of new books. Books are generally selected by professional librarians who have limited scientific training. They are faced with the task of picking the books which in *their* opinion are the best additions for the library. The purchase of scientific books seems to parallel, more or less, the trends of the times. In the late 1920s and early 1930s radio was all the rage and most libraries are well stocked with books dating to that era. In the late 1940s and early 1950s television was riding high and most libraries are stocked with books in those years. Today aerospace technology is in style and many such books are being purchased.

Most librarians are reasonable people and more than welcome advice as to what type of books are needed, especially in the scientific fields. You can do your library, your fellow ham, or potential ham, and yourself a real service by thoughtfully compiling a list of useful books on ham radio and tactfully asking your head librarian to purchase them for the library.

Please remember that library funds are always more or less limited. If you have many such books in your list, you might advisedly divide the list into sections indicating "most needed," "second most needed," etc.

By all means stipulate that the books should go into the circulating library, *not* put on reserve. All too often a *Radio Amateur's Handbook* will be found in the reserve room where it is utterly worthless to anyone. (You cannot build your high power linear in the library!)

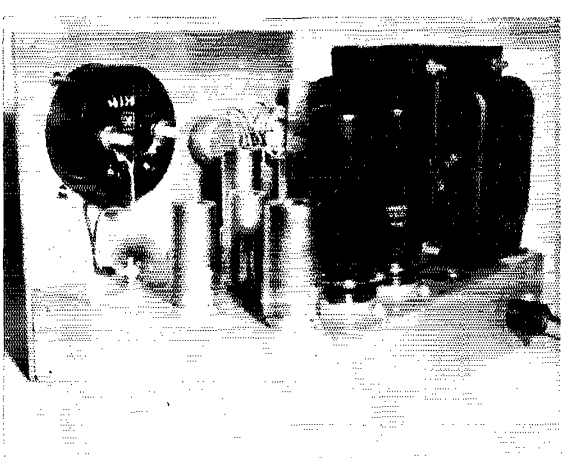
In summary, a real, a valuable, and very easily-accomplished public service can be made by simply turning in a list of radio books your library needs. QST

* Biology Department, Marshall University, Huntington, W. Va. and Science Education Department, George Peabody College for Teachers, Nashville, Tennessee.

A Wide-Range Voltage-Regulated Power Supply

Versatile Unit for Tube or Transistor Circuits

BY JOHN "DUTCH" NYDAM,* WA6JCZ



Interior view showing arrangement of components on the top side of the chassis. Along the rear edge of the chassis, from left to right, are the 12AX7A, and 6L6s (subsequently changed to 6L6GCs, because of their higher ratings), and the power transformer. Inboard are the 5651, 6AU6A and the 0A2s. The screwdriver shaft of R_7 is below the meter. The shaft of R_5 is hidden behind the 5651.

ANYONE who does much building and experimenting, as I do soon learns the value of a regulated power supply whose output voltage is capable of adjustment. Not only is it a time-consuming nuisance to try to obtain a desired voltage from a fixed-voltage source through the right combination of voltage-dropping or voltage-divider resistors, but any appreciable change in load current will usually change the voltage drastically. With a regulated supply, you simply set the voltage to the desired value without load, and have the satisfaction of knowing that connection of the load and variations in load current, as you adjust the equipment you are working on, will cause virtually no change in the preset voltage. After struggling along for some time without such a supply I decided to take time out and build the one whose circuit is shown in Fig. 1.

Circuit

Basically, the circuit consists of a pair of 6L6GCs acting as a variable-resistance element in series with the load, a 12AX7A which senses any change in output voltage with reference to the fixed voltage drop across the 5651 regulator tube, and a 6AU6A which amplifies the change and applies it as a change in bias to the 6L6GCs. The change in bias is applied in such phase as to alter the plate-cathode resistance of the 6L6GCs in the direction required to restore the output voltage to its original value.

This supply will maintain regulation with load currents up to the maximum current rating of the 6L6GCs (approximately 150 ma. for the pair) at output voltages up to 300. The output voltage may be set to the desired value by adjustment of R_6. Unlike some regulated supplies, the output voltage of this one can be brought down to zero. Thus, it is adaptable to transistor circuits as well as tube circuits. To provide for this reduction in voltage, the regulating control circuit is based on a potential negative with respect to output negative. R_5 is used to bring the output voltage down to zero with R_6 in its most-counterclockwise position, while R_7 is used to limit the output voltage to 300 with R_6 in its most-clockwise position. These two adjustments are not entirely independent, so some juggling of the adjustments of R_5 and R_7 will be necessary to arrive at the desired condition.

A maximum current of 150 ma. may be drawn from the supply, without exceeding the 6L6GC ratings, at voltages down to 150. To stay within the dissipation rating (60 watts per pair), the maximum current should be scaled down, as the output voltage is reduced, to approximately 135 ma. at 100 volts, 120 ma. at 50 volts, and 100 ma. at voltages of 10 or less. For most low-voltage applications, this limitation will be of little consequence.

The meter may be switched to read either load current, or output voltage. For conven-

* 24151 Friar St., Woodland Hills, California 91364.

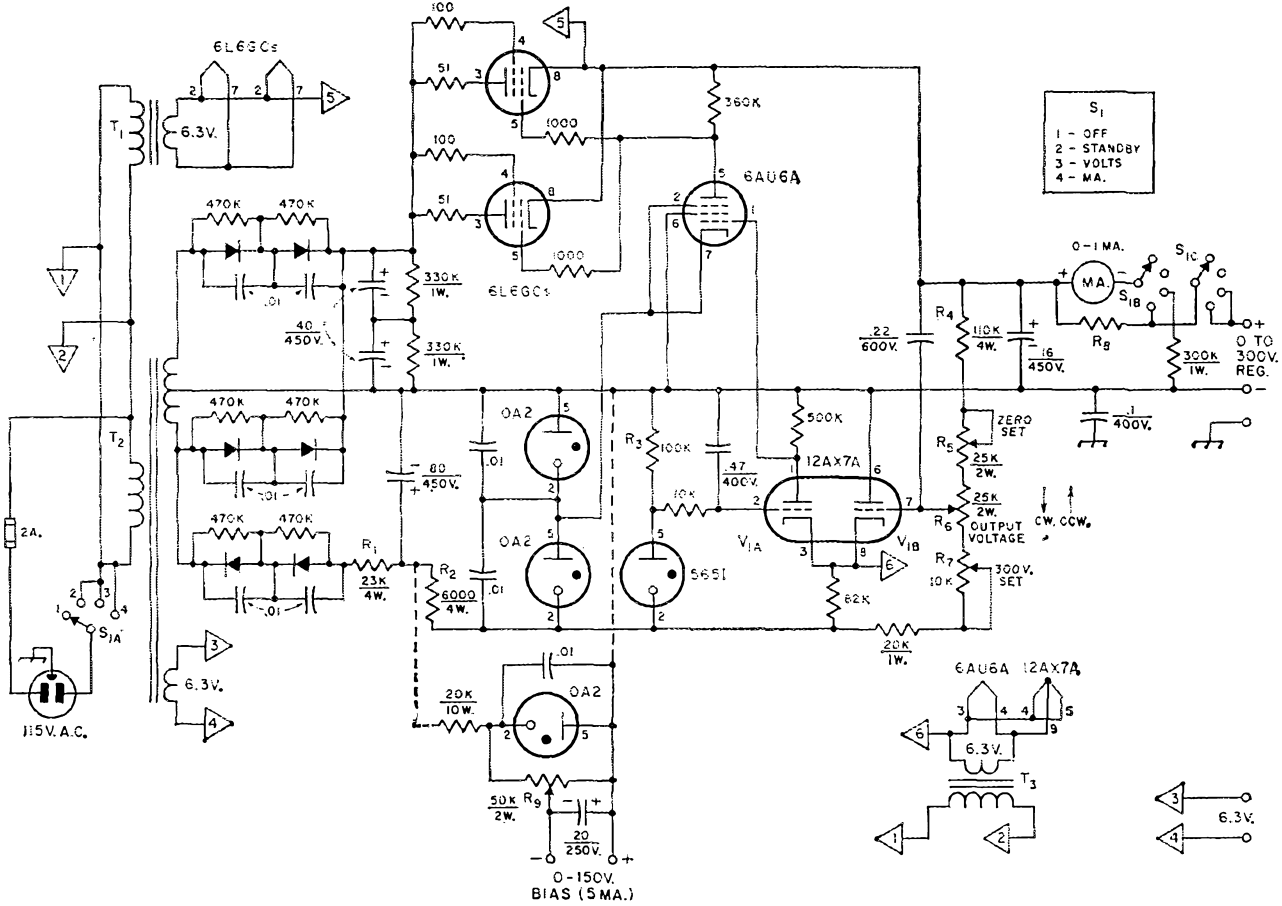
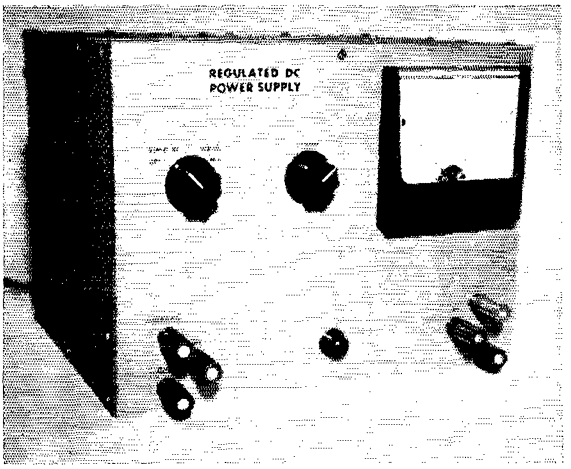


Fig. 1—Circuit of the variable-voltage regulated power supply. Capacitances are in μf.; resistances are in ohms (K = 1000). Polarity marks indicate electrolytic; other capacitors are paper or disk ceramic. Fixed resistors are ½-watt, unless indicated otherwise. All diodes are 800 p.i.v., 750 ma. (Sarkes Tarzian F8).

R1—Two 47,000-ohm 2-watt resistors in parallel.
R2—Two 12,000-ohm 2-watt resistors in parallel.
R3—See text.
R4—Two 220,000-ohm 2-watt resistors in parallel.
R5, R6, R7, R9—Linear control.
R8—300-times shunt for 1-ma. meter.
S1—3-pole single-section 5-position nonshorting ceramic rotary switch (Centralab PA-2007, 4 positions used).
T1—6.3-volt 2-amp. (min.) filament transformer.
T2—800 volts, c.t., 200 ma.; 6.3 volts, 5 amp. (Thordarson 24R07U, 5-volt winding not used).
T3—6.3-volt 1.2-amp. filament transformer.



The output voltage of this electronically-regulated power supply is adjustable from 0 to 300 volts at load currents up to 150 ma. To the left of the meter are the power/meter switch and the output-voltage control. Below are output terminals for filament and regulated-d.c. power.

ience, the meter switch and power switch are combined in S_1.

Either side of the output may be grounded, depending upon whether a negative or positive voltage with respect to ground is desired. If the supply is to be used as a negative bias source in applications involving grid-current flow, it should be preloaded with resistance that will draw several times the expected grid-current value. If desired, a small bias source can be added for use with the positive supply, connected as indicated by the dotted lines in Fig. 1.

Heater Connections

Since the heater-cathode voltage rating of the 6L6GCs is exceeded at output voltages above 200, a separate heater transformer should be used as shown, and the cathodes connected to one side of the heater. Neither side of the heater circuit should be grounded to the chassis. The same type of connection is shown for the cathode of the 12AX7A which also has a 200-volt rating. When the positive output terminal of the supply is grounded (for negative-voltage output) the cathode of the 12AX7A may be as much as 500 volts negative with respect to ground, depending on the setting of the output-voltage control. Under the same conditions, the cathode of the 6AU6A will be approximately 450 volts negative with respect to ground. However, with the heater and cathode of the 12AX7A tied together, the heater line is approximately 500 volts negative with respect to ground, so the cathode of the 6AU6A will be only about 50 volts positive with respect to its heater.

Some readers may wonder why the ungrounded heater winding does not provide sufficient isolation from ground to avoid the necessity for connecting cathode and heater together to assure that there will be no difference of potential between the two. The answer is that there is a capacitance from cathode to heater, and a capacitance from the transformer heater winding to the grounded core and primary of the transformer. These two capacitances are in series from cathode to ground. A d.c. voltage across capacitors in series divides in inverse proportion to the two capacitances. Since the cathode-heater capacitance is only a small fraction of the transformer capacitance, most of the voltage still appears across the cathode-heater capacitance.

The current range over which the 5651 will maintain a constant voltage drop is quite limited (1.5 to 3.5 ma.). Since the current is determined by the value of R_3, I felt that it was advisable to use a wire-wound resistor (for stability), with a tolerance rating of 5 percent or better.

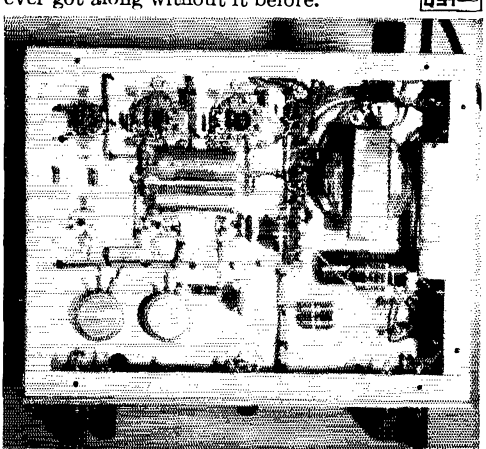
Construction

The supply is built on a 7 × 9 × 2-inch chassis. The panel is an old 7-inch rack unit cut down to a length of 9 inches. The cabinet is made from a 14 x 16-inch sheet of perforated aluminum approximately 0.045 inch thick. The cabinet is held together at the corners by ¼-inch square aluminum stock.

The layout of components is not critical. Essential details of the arrangement I used are visible in the photographs. By shopping around, and searching the junk box, the unit can be built at very moderate cost.

A check of the completed supply showed a variation in output voltage of not more than 100 mv. (0.1 volt) with changes in line voltage of plus or minus 10 volts from 120 volts, or with a load-current change of zero to 150 ma. with the output control set at 300 volts. This is a regulation of 0.033 per cent. The ripple measured less than 10 mv. (0.01 volt) peak-to-peak under all conditions.

After building this supply, I'm sure that you'll find it difficult to understand how you ever got along without it before. QST



Bottom view of the wide-range power supply. In the lower left-hand corner, R_7 is to the left, R_5 to the right. One of the filament transformers appears in the upper right-hand corner.

For Public Service

Simulated Emergency Test—1965

A Survey and Analysis of AREC and NTS Participation

BY GEORGE HART,* W1NJM
AND PETER CHAMALIAN,** W1BGD

PARTICIPATION in the 1965 SET remained at about the same level as last year, as far as the AREC was concerned, but seemed somewhat better among NTS circles, and the total result seems to have been progress. *Not enough*, but then progress is progress and we should not look askance at it. It would be correct to say that the performance in the 1965 SET was satisfactory, but not quite true to say it was "adequate." Nothing is adequate except the very best of which we are capable. We amateurs have never yet achieved this. We should redouble our efforts.

For those readers not familiar with the SET, let us point out that this is not a contest in any sense except that each group competes with its own previous performance, and each by its participation contributes a certain amount of points to the national total, which can be compared with the previous year's total to ascertain whether or not we are improving.

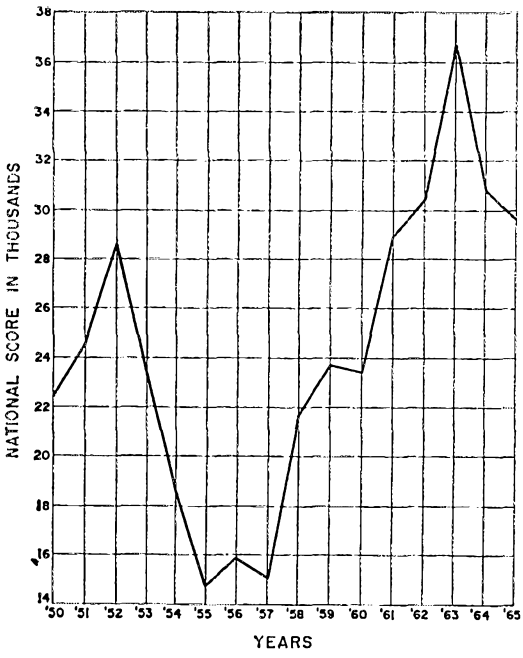
Here is EC K4WSS of Marshall Co., Ala., operating his mobile on Oct. 9 in Albertville, Ala.

It was back in 1950 that we first started "keeping score" according to the present system. The scoring system, admittedly not perfect, has nevertheless been kept the same ever since, so that the year-to-year performance would be comparable. On that basis, as can be seen from the graph, it is easily apparent that the SET as an annual activity has had its ups and downs throughout the years. From the early years of RACES, which gave emergency preparedness a big boost, a marked decline ensued until we hit near rock bottom in '55–'57. Then we started up again, this time on our own, and finally hit a peak in '63.

Now, are we on our way down again? We think not. The present decline in scoring is purely a statistical one, resulting from a great amount of housecleaning being undertaken by SCMs and SECs during the past two or three years. There are fewer reports because there are fewer ECs. There is less AREC participation because there

* National Emergency Coordinator, ARRL.
** Communications Assistant, ARRL.

Many AREC groups made the test more realistic by using emergency power. Here K9SGB adjusts the generator being used by the Randolph County, Ind., group while WN9MPL looks on.



The SET has had its ups and downs through the years. The latest high of '63 has tapered slightly, but we are still above the high of the "RACES boom" years.

are fewer total AREC members — the inactives and the annuals have been weeded out, leaving the hard core of regulars from which to start rebuilding. Unlike the precipitous drop from the c.d.-inspired peak of 1952, the downward trend is already slowing and will soon be halted and reversed.

Another factor enters in. The National Traffic System, now the "long lines" division of ARPSC, is now a co-participant in the SET each year. This does not detract from the AREC participation, nor does it necessarily enhance it, but it is significant that our statistical analysis of the SET in the past has been based purely on AREC performance, and this is the basis on which we compare the 1965 performance with that of previous years. But now we also have NTS participation, which is separately reported and has, this year for the first time, a point-scoring system of its own. If we could add the NTS total to the AREC total (which we can't, because you can't add apples to oranges), the overall total would far surpass any we have previously amassed. Looking at it from that standpoint, the 1965 SET was certainly the biggest and best we have ever had.

NTS Participation

While Local (AREC) nets are a unit of the AREC, they also operate as a part of NTS in a nationwide exercise such as this, and would tie in as a part of the system in the event of a real emergency transcending the local area. Thus, at this level, such a net can participate in both the AREC and NTS and actually does so. At Section, Region, Area and TCC levels, however, NTS nets are "on their own," scorewise. It is quite gratifying, therefore, to be able to report that all except one of the NTS nets at Region and Area level, all three branches of the Transcontinental Corps, and thirty Section nets reported participation in the SET. It was an impressive performance, even though most of our indefatigable NTS managers expressed some degree of dissatisfaction. Much discussion among leadership levels has resulted, and the performance is almost bound to be better next (this) year.

Summarizing the NTS performance, we note that 44 NTS nets reported 8077 message handlings in just under 413 "net hours" during the SET. Most NTS nets operated on a "continuous basis" from 2300 GMT Oct. 9 to 0700 GMT Oct. 11, with a recess from 0800 to 1800 GMT. In a real emergency, of course, they would probably operate straight through, *without* sleep if necessary, but we don't like to make these tests *too* realistic. The point system, new this year, is based on total message handling, minutes of time in directed session, number of different net control stations in action and number of different participating stations.

Interested in a break-down, net by net? Here 'tis:

Net (NTS)	*Tfc*	*Time*	*NCS*	*Stns*	*Points*
Eastern Area (EAN)	1098	996	8	88	2,310
Central Area (CAN)	656	955	12	72	1,815
Pacific Area (PAN)	354	997	9	55	1,506
First Region (1RN)	330	480	7	30	905
Second Region (2RN)	254	431	4	29	763
Third Region (3RN)	352	960	8	51	1,454
Fourth Region (4RN)	320	818	7	50	1,273
Fifth Region (RN5)	181	983	12	67	1,658
Sixth Region (RN6)	258	1024	3	14	1,325
Seventh Region (RN7)	154	840	5	22	1,063
Eighth Region	291	686	10	26	1,079
Ninth Region	213	834	14	30	1,177
Eleventh Region (ECN)	59	242	5	16	359
Twelfth Region (TWN)	55	243	4	11	340
AENM (Ala.)	140	435	6	80	765
EPAPTN (Pa.)	72	240	5	28	393
PON (Ala.)	5	43	1	6	65
AENP (Ala.)	59	249	4	37	402

Some of the New York City AREC/RACES gang are shown at Columbus Circle, in the heart of the city. Standing, left to right are WA2TBT, W2HDV (RACES supervisor), WA2VKK (EC N.Y. County), K2DCY, W2KIA (Asst. RO). Kneeling are WA2AQQ (RO, N.Y. County) and W2ZCE.

AENT (Ala.)	39	135	3	15	219
TN (Tenn.)	10	135	2	14	183
SCN (Calif.)	140	960	8	33	1,206
AENB (Ala.)	305	665	7	25	1,055
GSN (Ga.)	127	757	8	24	972
KTN (Ky.)	53	540	3	70	758
Fla. SSB	35	180	3	31	292
MDD (Md.-Del.)	203	960	6	41	1,302
BUN (Utah)	16	116	2	22	186
NCN (N.C.)	103	557	9	31	767
NJN (N.J.)	79	270	6	23	425
AENH (Ala.)	28	90	2	11	150
NCN (Calif.)	180	780	5	32	1,049
MTN (Calif.)	44	125	6	10	219
OQN (Ont.-Que.)	220	1039	8	41	1,381
VSN (Va.)	168	617	10	65	965
QFN (Fla.)	98	320	5	22	487
RIN (R.I.)	55	140	4	5	225
CN (Conn.)	179	771	4	33	1,036
BN (Ohio)	115	304	4	26	491
SGN (Maine)	14	120	3	31	211
EMIKPN					
MKPN (Ky.)	20	1080	4	4	1,128
KPN					
Razorback (Ark.)	76	294	5	43	481
TPN (Tenn.)	71	243	3	42	413
Townsend AREC (Mass.)	66	180	2	7	270
PHD (Mo.)	3	60	1	3	74
Alexandria 2 Meter AREC (Va.)	104	600	5	31	791
Newport Emerg. (R.I.)	9	60	2	4	87
Indiana Co. AREC (Pa.)	3	20	1	1	30
ARPSC 3795 (Calif.)	12	120	3	6	159
Buena Vista Co. (Iowa)	10	360	3	3	391
No. Va. R.C.	223	480	6	18	769
ARPSC, Phila. Co.	91	240	6	7	375
TCC-Eastern	889				889
TCC-Central	470				470
TCC-Pacific	301				301
Totals	9710	24,775	273	1486	38,859
Non-NTS Nets					
Alberta Phone	195	1320	2	32	1,589
HPAK (Iowa)	10	33	2	12	77

The NTS reporting form used made no specific provision for TCC reporting, but we have at least added their traffic totals to the point total. The points shown are the target for next year. The two nets listed in the non-NTS category are so listed because they did not show a NTS liaison in their reports.

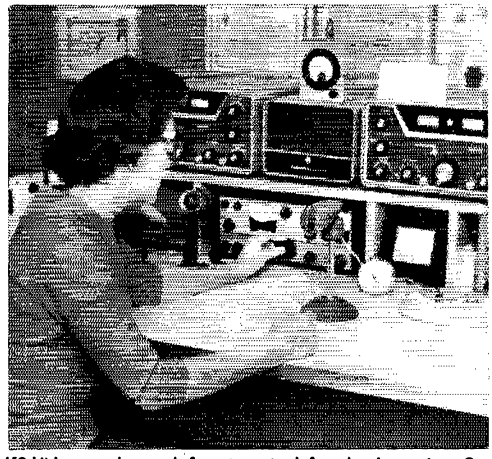
Headquarters Traffic

A total of 292 messages were received at the headquarters by members of the staff and local amateurs. About half of these were EC reports, the rest greetings and reports from individuals, some of them c.d. officials, some individual participating amateurs. Of all messages received, W1BGD handled 101, W1BDI 76, W1NJM 37, W1ECH 29, W1AW 22, W1YBH 10, W1EFW 7, WA1APY 3, WA1CJE 2 and one each for *W1s* ANA GUC VLK, K1QNF and W3KTW. Thanks to all concerned for the assist.

Red Cross

The SET has always been strictly an AREC (now an ARPSC) exercise, but Red Cross participation has traditionally been so widespread that many amateurs have been under the impression that it is a Red Cross exercise. This is typical of the close cooperation that has existed between the American National Red Cross and ARRL through the years. Red Cross was a primary participant in the first SET (1946) and has been right there in each one since.

In the '65 SET, National Disaster Services Radio Communications Chief K4IAG reports a total of 799 messages handled by Red Cross amateur stations at the four principal RC collection points. From originating station to destination point, of course, most of these were handled over NTS. The breakdown is as follows: National Headquarters (represented by W4PAY, Northern Virginia Amateur Radio Club), 30 originated, 39 received. Eastern Area (also represented by W4PAY), 25 originated, 99 received. Southeastern Area (represented by W4DOC, Atlanta Amateur Radio Club), 108 originated, 27 received. Midwestern Area (represented by KØLIR, St. Louis Amateur Radio Club), 132 originated, 110 received. Western Area (represented by W6CXO, San Francisco Naval Shipyard Amateur Radio Club), 127 originated, 102 received.



K3JJN served as v.h.f. net control for the Lycoming Co. (Pa.) AREC during the 1965 SET.

The stations indicated above were manned by club members and volunteer amateurs, assisted by many amateurs in the areas named, to whom National Headquarters ANRC wishes to express its deepest gratitude. Most of these amateurs have expressed themselves as feeling that operation of the club stations representing RC Areas was conducted more smoothly this year than previous years because of advance planning, improvement in traffic handling procedures, and training.

At the national headquarters level, K4IAG says that an analysis of received traffic shows the continued annual improvement in accuracy and delivery time. This he attributes to routing via organized nets, merger of NTS and AREC into ARPSC, revised understanding between ARRL and ANRC and increased emphasis on public service as the League's No. 1 objective.

AREC Performance

If our total AREC membership can be estimated at 30,000, then 11.8% of them participated in the 1965 SET. All of these worked under their 281 ECs, some in elaborate operations lasting hours, even days, some in token drills lasting only a few minutes. Analysis of data submitted

by these ECs on the report forms provided is a drawn out and exacting task, but gives us a pretty good overall picture of our AREC nationally and where it is strongest. We present the statistics as in previous years, by sections in order of the standing, which is arrived at through consideration of four factors involving number of reports and total points. The most populous sections do not *necessarily* achieve top ranking, but it is *possible* for them to achieve higher ranking than those of lower population; thus, it is seldom that we have a Section of low population on top of the heap.

Your Section's overall performance is best judged by its standing compared with last year and by comparison with other Sections of about the same amateur population. (The 1964 standing is in parentheses after the Section total point score.)

There is no competition among EC jurisdictional areas within a Section, and we list these alphabetically within each section.

Statistically, this SET bettered some of the 1964 totals. There was a noticeable increase in reported AREC members and radio reports to SECs. The number of mobiles and portables dropped off, indicating that their availability, or at least use, was lower than in previous years, and the number of fixed stations with emergency power remains lower than it should be.

No increase in statistical totals was required to maintain the same position in the section standings in 1965 as in 1964, evidenced by E. Fla., Tenn. and N.N.J. The appearance of new sections in the standings was gratifying, but some of the old regulars fell down in their activity and others failed to send in any reports.

Alabama and Ohio moved into a tie for the first spot, ending a long hard climb for both sections. Missouri made one of the best showings by jumping from 23rd to 4th while Virginia rose from 14th to 6th. Kentucky also took a giant step to the 11th position while Ontario, Southern Texas, Maryland-D.C., Montana, Los Angeles, West Virginia, Connecticut, Utah, South Carolina, New Mexico, East Bay, North Dakota, San Diego, Manitoba and Quebec showed significant improvement over last year's performance.

The 1966 SET is scheduled for **October 8** thru **9**, so why not start planning now?

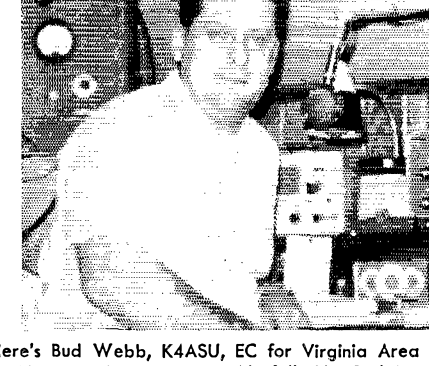
Figures in parentheses are 1964 scores for comparison:

Total Reports Received: 281 (282)
By Mail: 221 (217)
By Radio: 135 (160)
By Hearsay: 26 (17)
Total Reported AREC Membership: 7710 (7320)
Total Known Participation: 3546 (3697)
Mobiles and Portables: 1030 (1150)
Fixed Stations on Emergency Power: 233 (235)
AREC Messages Sent to SEC: 2339 (2225)
EC Radio Reports to ARRL: 165 (156)
Percent Received by Radio: 60.0 (75.0)
AREC Groups Also Heard From in 1964: 118 (143)
AREC Groups Bettering 1964 Score: 52 (62)
Total Score: 29,732 (30,522)

Area of Jurisdiction	*Reported by*	*Points*
1. ALABAMA (14 reports)		1431 (2)
Alabama Gulf Coast [1,3]	K4TIT	384
Blount Co.[1]	W4TSY	6
Butler Co.[1,3]	K4TNS	50
Chambers Co.[1,3]	K4AJF	76
Etowha Co.[1,3]	K5RSI/4	24
Jackson Co.[1,3]	WA4QNI	5
Jefferson Co.[3]	K4WOP	...
Limestone Co.[1,2,3]	WA4GNK	150
Macon Co.[1,3]	K4HSX	95
Madison Co.[1,3]	W4YFN	251
Marshall Co.[1,3]	K4WSS	49
Montgomery Co.[1,3]	WA4MTG	150
Morgan Co.[1,3]	K4WHW	138
St. Clair Co.[1,3]	K4NUW	53
1. OHIO (14 reports)		2100 (3)
Ashtabula Co.[1,2]	K8LXA	87
Belmont Co.[1,3]	W8DJD	65
Dayton [1]	W8ILC	207
Franklin Co.[1,2,3]	W8ETU	330

[1] Mail report received. [2] Bettered last year's score. [3] Radio report received. [4] Hearsay report. [5] Mail report received, no point summary. [6] Mail report received, no test held. [7] Oct. 30, 31. [8] Oct. 1. [9] Oct. 18. [10] Oct. 28–30. [11] Oct. 11. [12] Oct. 27. [13] Sept. 26, Oct. 8. [14] Oct. 2. [15] Oct. 20. [16] Oct. 30. [17] Sept. 26. [18] Oct. 31. [19] Oct. 7–10. [20] Oct. 26. [21] Oct. 3. [22] Oct. 23. [23] Oct. 9–11. [24] Oct. 21–28. [25] Oct. 16. [26] Oct. 17. [27] Oct. 3, 9–10. [28] Oct. 9–10, 13. [29] Oct. 24. [30] Sept. 10. [31] Oct. 2. [32] Report included in W2F1's report.

The Frederick Co., Va., c.d. headquarters is underground at Handely High School in Winchester, Va. Here at the RACES control position are (standing, l. to r.) C.D. Director Boyd MacDonald, C.D. Communications Officer W4UGX and (seated) C.D. Radio Officer W4KAV.



Here's Bud Webb, K4ASU, EC for Virginia Area One, at his operating position in Norfolk, Va. Bud is a 60-w.p.m. operator. *(Official Photograph, U. S. Navy)*

	Hamilton Co.[3]	W8HQK	...
	Harrison Co.[1,2,3]	K8LGB	50
	Lorain Co.[1]	K8DNS	212
	Lucas Co.[1,3]	W8UEL	126
	Oakland Co.[4]	.....	...
	Ross Co.[1,2,34]	K8SUB	191
	Seneca Co.[1,3,27]	WA8BUL	156
	Stark Co.[1,2,3]	K8DHJ	281
	Van Wert Co.[3]	K8PFD	...
	Wyandot Co.[1]	WA8IEI	95
3.	EASTERN FLORIDA (10 reports)		2647 (3)
	Broward Co.[1,3]	WA4HED	163
	Clay Co.[1,3]	W4WHK	15
	Duval Co.[1,2,3]	W4GUJ	310
	Hillsborough Co.[1,23]	W4KRC	199
	Indian River Co.[1,3]	WA4SCK	74
	Manatee Co.[1,3]	K4HLB	73
	North Dade Co.[1,3]	W4HYT	515
	Orange Co.[1,3]	K4KRG	524
	Pinellas Co.[1]	W4FPC	268
	Polk Co.[1,2,3]	W4FP	506
4.	IOWA (10 reports)	.....	881 (1)
	Buena Vista Co.[1,2]	KØEVC	59
	Cedar Co.[1,2]	KØHCL	39
	Clinton Co.[1,2,16]	KØSCW	172
	Hardin Co.[1,3,23]	WAØFEX	54
	Humbolt Co.[1,2,3]	WØFDM	55
	Kossuth Co.[3]	WAØDQD	...
	Linn Co.[1,3]	WØHDX	132
	Scott Co.[1,2,3]	WAØJWP	160
	Story Co.[1,2,3]	KØYLO	129
	Wapello-Davis Co.[1]	WØUHO	81
4.	MISSOURI (14 reports)		678 (23)
	Audrain Co.[1]	WØAKM	63
	Cass-Johnson Cos.[1,2,3,23]	KØFPC	62
	Greene Co.[1,3]	KØJPJ	146
	Jackson, Clay, Platte Cos.[1,2]	KØTCB	185
	Jasper Co.[3]	WØAIM	...

KØLHF, EC for Zone 2, Kansas, musters a smile from his operating position during the SET.

	Lafayette Co.[1,3]	WAØKNW	25
	Lexington Co.[4]	.....	...
	Madison Co.[1]	KØWKC	17
	Ramsey Co.[3]	WAØFUR	...
	Reynolds Co.[4]	.....	...
	Saline, Henry Cos.[1]	KØONK	91
	St. Charles Co.[4]	.....	...
	St. Louis Co.[1,3]	WØHTO	89
	Trenton[4]	.....	...
6.	VIRGINIA (13 reports)		1071 (14)
	Area 1[1,2,3]	K4ASU	228
	Area 2[4]	.....	...
	Area 3[4]	.....	...
	Area 4[3]	K4LMB	...
	Area 5[4]	.....	...
	Area 7[4]	.....	...
	Area 9[4]	.....	...
	Area 10[1,3]	K4GRZ	62
	Area 12[1]	W4VCJ	215
	Alexandria[1,3]	W4JXD	208
	Fairfax Co.[1]	W4OP	236
	Loudoun Co.[3]	WA4NKAI	...
	Washington Co.[1,3]	WA4KVR	125
7.	TENNESSEE (8 reports)		1026 (7)
	Bristol, Bluff City[1,2,3]	W4YAU	155
	Davidson Co.[1,3]	W4KAT	108
	Gibson Co.[1,2,3,21]	W4IGW	49
	Marshall Co.[1]	W4DWT	124
	Oak Ridge, Anderson Cos.[1,3]	K4VOP	102
	Rutherford Co.[1,3]	W4SZE	12
	Shelby Co.[1]	K4FZJ	322
	Sullivan Co. less Bristol[1]	W4TYV	124
8.	NORTHERN NEW JERSEY (12 reports)		1056 (8)
	Cranford[3]	K2VNL	...
	Englewood & vic.[1,2,7]	WA2CCF	144
	Maplewood[3]	W2COT	...
	Monmouth Co.[1,3]	WB2BCS	177
	Morris Co.[1,2,3]	K2ZFI	309
	Passaic & vic.[1,3]	K2KDQ	140
	Red Bank[3]	WA2VYN	...
	Rumson[3]	WB2KTO	...
	South Amboy[3]	WA2NJB	...
	S. Bergen Co.[1,3,15]	W2DMJ	286
	Sussex Co.[3]	WA2SED	...
	Union Co.[3]	W2HN	...
9.	NEW YORK CITY-LONG ISLAND (9 reports)		1715 (5)
	Area 6, Nassau Co.[1,3,32]	W2ELK	...
	Bronx, Yonkers[1]	WA2QAO	201
	Kings Co.[1]	WA2UCP	430
	Nassau Co. Area 7[1,11,32]	W2UAL	...
	Nassau Co.[1]	W2FI	900
	New York Co.[1]	WA2VKK	78
	Queens Co. 10 meter net[1]	W2IAG	103
	Wanagh[3]	W2FIJ	...
	West Central Nassau Co.[1,32]	W2ZAJ	...
10.	EASTERN PENNSYLVANIA (8 reports)		927 (9)
	Cumberland Co.[1]	W3UKP	101
	Lackawana Co.[1,2]	W3QDW	118
	Lehigh Co.[1]	WA3BYH	113
	Lewisburg[3]	WA3BBI	...
	Lycoming Co.[1]	K3LQM	135
	Philadelphia Co.[1,3]	K3EYS	299
	Schuykill Co.[1]	W3ZRQ	49
	Union, Snyder Cos.[1]	.....	82
11.	KENTUCKY (7 reports)		641 (39)
	Daviess Co.[1,3]	W4PFQ	181
	Dist. 1[1,20]	WA4GMA	37
	Dist. 2[1]	W4CSN	94
	Dist. 7[1,3]	K4MIQ	32
	Dist. 8[4]	.....	...
	Franklin Co.[1]	K4HOE	3
	Jefferson Co.[1,2,3,19]	W4NOA	294
12.	EASTERN MASSACHUSETTS (6 reports)		599 (11)
	Medford[3]	W1LVK	...
	Needham[1,3]	W1STX	96
	Newton[1,3]	W1RM	126
	Town of Winthrop[1,2,3]	W1BB	153
	Townsend[1,3,8]	K1PNB	140
	Waltham[1,2,9]	W1JSM	84
12.	KANSAS (7 reports)		746 (18)
	Beloit[3]	WAØCCW	...
	Clay Center[3]	WØFRC	...
	Zone 3[1,29]	KØLHF	293
	Zone 10[1]	KØEMB	119
	Zone 11[1,2,30]	KØJDD	204
	Zone 13[1,3]	KØLPE	59
	Zone 14[1,18]	WØHIJ	71
14.	INDIANA (7 reports)		569 (6)
	Jay Co.[1]	W9SNQ	100
	Johnson Co.[1,2]	K9QJT	109
	Henry Co.[1,2]	W9SVL	114
	Madison Co.[1,2,3]	W9FWH	142
	Morgan Co.[3]	W9ZSK	...
	Randolph Co.[1,2,3]	WA9GKF	104
	Tippecanoe Co.[3]	W9RGY	...
15.	ONTARIO (10 reports)		452 (23)
	Eastern Ont.[3]	VE3BZT	...
	Hamilton[4]	.....	...
	Hastings, Prince Edwards Cos.[1]	VE3DHH	9
	Huron, Perth Cos.[1]	VE3BWM	46
	Metro Toronto[1,2]	VE3DRF	170
	Niagara Peninsula[4]	.....	...
	North York[4]	.....	...
	Ontario Co.[1,3]	VE3ATI	73
	Waterloo Co.[3]	VE3FJB	...
	Wentworth Co.[1]	VE3EUM	154
16.	SOUTHERN TEXAS (7 reports)		1066 (26)
	Bexar Co.[1]	K5HZR	188
	Corpus Christi[4]	.....	...
	Harris Co.[1,3]	K5QQG	791
	Houston[4]	.....	...
	Nueces Co.[1]	W5AQK	253
	San Patricio Co.[1,2]	W5BRZ	46
	Tyler Co.[1]	W5ZTB	41
17.	MARYLAND-D.C. (6 reports)		597 (25)
	Calvert Co.[1,2,3]	W3ZNW	54
	Hartford Co.[1,3,17]	W3LDD	235
	Montgomery Co.[3,5]	.....	...
	Prince Georges Co.[1,3]	W3CVE	105
	Washington Co.[1,16]	W3OYX	82
	Washington, D. C.[1]	W3CJT	121

18. MICHIGAN (6 reports)			508 (10)
Calhoun Co.[1,2,26]		K8AEM	111
Hillsdale Co.[1,3]		K8GKX	44
Lapeer Co.[1]		W8EST	72
Lenawee Co.[1]		W8IUC	36
Livingston Co.[1,3]		W8SLV	37
Monroe Co.[1,2]		W8NDM	208
19. MONTANA (7 reports)			509 (34)
Deer Lodge Co.[1]		W7TYN	54
Gallatin Co.[1,2]		W7NPV	126
Gardiner[1]		K7YPC	56
Harlowton, Wheatland City[1]		W7CTM	38
Laurel[1,2,3,25]		W7LBK	90
Missoula[1,2]		W7COH	145
Saco[5]		K7OZU	...
19. SANTA CLARA VALLEY (5 reports)			973 (12)
Half Moon Bay[1,3]		W6PLS	85
North San Mateo Co.[1]		W6QIE	361
Redwood City[1,3]		W6DEF	394
San Jose[1]		WA6WFR	133
Southern Monterey Co.[5]		WB6IZF	...
21. WESTERN NEW YORK (5 reports)			637 (16)
Chemung Co.[1,3]		K2DDN	153
Delaware Co.[1,2]		W2TFL	121
Franklin Co.[3]		...	...
Glens Falls[1,3]		K2AYQ	178
Steuben Co.[1]		W2YIY	185
22. LOS ANGELES (5 reports)			453 (31)
Inglewood Area, El Segundo[1,3]		W6OI	194
San Fernando Valley[4]		...	...
West Covina[3]		W1KUX/6	...
Western San Gabriel[1,3]		W6MLZ	166
Whittier[1,3,25]		W6LVQ	93
23. WEST VIRGINIA (4 reports)			468 (48)
Fayette Co.[3]		K8CFT	...
Kanawha Co.[1,2,3]		W8IRN	251
Monogalia Co.[1,3]		W8GUL	122
Randolph Co.[1,3]		K8TPF	95
24. RHODE ISLAND (6 reports)			253 (21)
Charlestown[1]		W1FEQ	24
Cranston[3]		W1BTV	...
Newport[1,2]		W1JFF	75
Providence[3]		K1HZN	...
Town of Johnston[1,2,12]		W1POP	62
Univ. of R. I.[1,2]		W1QLT	92
24. EASTERN NEW YORK (3 reports)			858 (20)
Poughkeepsie, Dutchess Co.[1,2,13]		K2GCH/ W2HZZ	165
Schenectady Co.[1,3]		K2IOW	503
Westchester Co.[1,2,3,11]		K2SJN	190
26. NEBRASKA (7 reports)			428 (19)
Box Butte Co.[5]		KØWPF	...
Dawes Co.[1]		KØQAL	63
Hall Co.[1]		WØFHJ	57
Jefferson Co.[1]		WØWKP	77
Lancaster Co.[1]		WAØEUM	153
Loup Co.[1,11]		WAØJAV	27
Richardson Co.[1]		KØDIN	51
27. MINNESOTA (6 reports)			343 (32)
Cook, Lake Cos.[3]		...	...
Hennepin Co.[3]		KØZZR	...
Itasia Co.[4]		...	...
Ramsey Co.[1,2]		WAØFUR	141
St. Louis, Koochiching Cos.[1,3]		WAØEDN	149
Winona Co.[1]		WAØIAW	53
28. CONNECTICUT (4 reports)			285 (39)
Bloomfield[1,11]		W1PRT	83
Danbury[4]		W1ADW	...
Hamden[1,10]		W1NFG	152
Meriden[1,3]		W1FYG	50
29. NORTH CAROLINA (6 reports)			226 (15)
Buncombe Co.[4]		...	...
Durham Co.[3]		W4LEN	...
Forsyth Co.[1]		W4IRE	82
Guilford Co.[1]		W4AJT	97
Wake Co.[1]		K1FMW	47
Surry Co.[4]		...	...
30. UTAH (4 reports)			155 (53)
Davis Co.[1,3]		K7ERR	54
Salt Lake City[3]		K7HFV	...
Utah Co.[1,3]		K7SAI	101
Weber Co.[3]		W7GPN	...
31. MAINE (4 reports)			234 (27)
Hancock Co.[1]		K1DYG	26
Somerset Co.[1,2,3]		K1QIG	121
S. Aroostook Co.[1]		K1CLF	36
Waldo Co.[1,2]		K1TZH	51
32. SASKATCHEWAN (3 reports)			474 (36)
Moose Jaw, Dist.[1]		VE5IL	61
Northern Saskatchewan, Prince Albert[1,2]		VE5BO	301
South Saskatchewan[1,2,3,26]		VE5VD	112
33. WESTERN PENNSYLVANIA (6 reports)			117 (28)
Blair Co.[4]		...	...
Fayette Co.[1]		K3FNG	10
Indiana Co.[1,3]		K3ZYK	4
McKean Co.[1]		W3OCR	61
McKeesport[4]		...	...
Westmoreland Co.[1]		W3WBH	42
34. ARKANSAS (4 reports)			133 (22)
Craighead Co.[2]		WA5KUD	...
Monroe Co.[1,3]		WA5IIS	15
Sebastian Co.[1]		K5YMU	118
Washington Co.[3]		WA5GMV	...
35. WISCONSIN (4 reports)			163 (30)
Madison[3]		WAØIAW/9	...
Marathon Co.[1]		W9VHA	100
Monroe Co.[1,28]		W9QQQ	63
Winnebago Co.[3]		WA9CJU	...
36. SOUTH CAROLINA (2 reports)			206 (61)
Anderson Co.[1,2,24]		W4FVV	162
Beaufort Co.[1,3,22]		WA4GAW	44
37. WASHINGTON (3 reports)			158 (29)
Adams Co.[3]		W7CTS	...
Benton Co.[1,2]		W7YFO	78
Whatcom Co.[1]		W7DQM	80
38. OKLAHOMA (2 reports)			544 (13)
Comanche Co.[1,2]		K5BYF	337
Oklahoma Co.[1]		WA5KFT	207
38. NEW MEXICO (3 reports)			107 (46)
Eddy Co.[1,3]		W5ROH	37
Los Alamos Co.[1,2]		K5HTT	65
Luna Co.[1,3]		WA5AMG	5
40. ALBERTA (3 reports)			445 (38)
Calgary[1,2]		VE6SA	282
Central Alta.[1]		VE6SS	163
Edmonton[4]		...	...
41. GEORGIA (3 reports)			120 (44)
Cobb Co.[1,3]		K4YZE	120
Gwinett Co.[3]		WA4AJY	...
Muscogee Co.[4]		...	...
42. WESTERN FLORIDA (2 reports)			123 (35)
Leona Co.[1]		WA4EOQ	32
Okaloosa Co.[1,3]		W4MMW	91
42. SACRAMENTO VALLEY (2 reports)			358 (49)
Sacramento Co.[1]		W6SMU	239
Yolo Co.[1]		WA6TQJ	119
44. EAST BAY (1 report)			346 (54)
Napa-Solano[1,3]		K6TFT	346
45. SAN DIEGO (1 report)			555 (61)
San Diego Co.[1]		W6MHY	555
46. COLORADO (2 reports)			174 (32)
El Paso, Teller Cos.[1,23]		WØGCH	129
Weld Co.[1,2]		KØUYF	45
47. NORTH DAKOTA (1 report)			98 (61)
Grand Forks Co.[1,3]		WAØBIT	98
48. SAN JOAQUIN VALLEY (1 report)			76 (56)
Merced Co.[1,3]		WA6TZN	76
49. BRITISH COLUMBIA (1 report)			185 (41)
Vancouver[1,3]		VE7AMW	185
50. OREGON (2 reports)			121 (50)
Josephine Co.[1,2]		W7DEM	121
Multnomah Co.[4]		...	...
51. QUEBEC (1 report)			34 (61)
Champlain, St. Maurice, Laviolette Cos.[1,3]		VE2EC	34
52. MANITOBA (1 report)			155 (61)
Section[1]		VE4OL	155

At his operating position during the SET is Leon Co. Fla., EC WA4EOQ.

The Monroe County, Mich., communications center was built by AREC members and is located in the Red Cross building in Monroe. That's EC W8NDM (foreground) taking traffic, while WA8RRT operates the 160-meter link.

53.	ORANGE (1 report)		100
	Palm Springs, Cathedral City, Desert Area[1]	WA6TAG	100
54.	NEW HAMPSHIRE (1 report)		79
	Section[1,11]	W1ALE	79
55.	IDAHO		0 (58)
	Nez Perce Co.[3]	W7GMC	...
55.	SOUTHERN NEW JERSEY (1 report)		0 (37)
	Gloucester Co.[3]	W2LVW	...
55.	DELAWARE (1 report)		73 (42)
	Section[1]	K3NYG	73
58.	ILLINOIS (1 report)		0 (42)
	Monroe Co.[6]	W9ICF	...
59.	ALL OTHERS		zilch

Comments and Miscellany

Nearly everybody had something to say in his report, or by separate letter. Thissection of the write-up is intended to pick up some of the comments which are of general interest, but space does not permit exhaustive quoting or discussion. We hope to issue an ARPSC Field Bulletin in the near future to constitute a critique of the SET and cover a few other items as well.

Taken at random justin browsing through the large stack of miscellaneous (*i.e.*, not on standard form) reports: "QUA," the bulletin of the Winnipeg Amateur Radio Assn., devoted two pages to the SET, including a cartoon showing the entire control center on wheels with the caption "Who needs an emergency trailer?"

A useful caper during the local SET was to have a tape recorder running, to be played back later before the group for critique purposes. The Southern Monterey County (Calif.) group did this and benefited greatly in observing "areas of future improvement," according to EC WB6IZF.

The Hamden, Conn., AREC was publicly commended by the police department for its performance in "Operation Goblin," which it used as its SET.

Kanawha County (W. Va.) EC W8IRN goes in for complete records and charts of everything, including a detailed emergency plan, a chart showing the form 7 data on each AREC member, an alerting procedure, a map of the area covered (with coordinates), a chart showing how local RACES connects with other services and with state and regional levels, photos, diagrams of the mobile communications center, publicity releases, sample message form, and other useful tidbits. Wish we had room to reproduce some of it!

With the SET Bulletin each year we send along a sample news release, and this is often copied and used by many local papers, filling in the blanks with local names and places. The Chemung County (N. Y.) AREC also submitted a new release detailing the *results* of the test. This is a matter in which you fellows are pretty much on your own, but if anything this is even more important than the pre-test publicity.

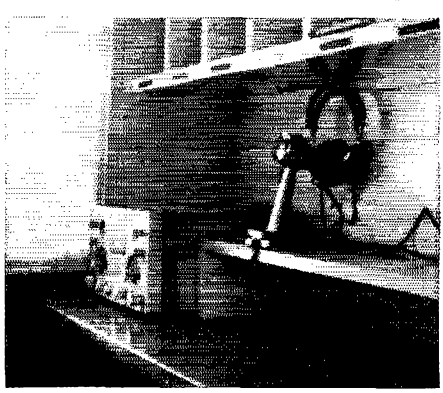
San Antonio EC K5HZR (foreground) and WA5FYX operate the club station of the San Antonio Radio Club, W5SC, during the SET.

Hennepin County (Minn.) EC KØZZR acknowledges the participation and assistance of Citizens-Band mobiles in his SET. He says local amateurs don't show much interest.

Ontario SEC VE3EUM threw a section-wide test during which at one period power was assumed to be off altogether. During this period, he was "agreeably" surprised to find so many stations still operating, on emergency power. Harry also says "I must . . . congratulate the c.w. boys and the OQN (Ont.-Quebec Net) for the fine way in which they soaked up extra-provincial traffic and held it until NTS started at 2300 GMT. I was rather disappointed in the Trans-Canada ARPSC Net."

A few words are in order about the operation of the NTS Transcontinental Corps during the SET. Normally, TCC directors (3 of 'em) designated 77 amateurs to fill as many functions in the TCC each week, eleven each day. In the SET, the NTS went through 8 cycles instead of the normal two for the period, which meant that the three TCC directors had to supervise the covering of 88 functions instead of the normal 22. This wasn't all. In addition to lining up the stations, they had to set the times and frequencies of the contacts, get reports of traffic handled (broken down by precedences) and make a detailed report to headquarters. Considering these demands on their weekend free time, we feel that all three TCC directors did an outstanding job and are to be loudly and enthusiastically complimented. Who are they? Why, W3EML, W4ZJY and W7DZX, we thought *everybody* knew this! (Applause!)

So little can really be said about an operation this size in a few printed pages! Virginia SEC W5VZO/4 gives us a four-page write-up of the SET in Virginia, with all the gory details — a document ordinarily suitable for an article by itself. However, he summarizes the sectionwide operation



This 6-meter booth is located in the Kanawha County (W.Va.) communications center in Charleston, and was used during the 1965 SET.

with these three lessons learned: (1) There was an obvious lack of organized activity, not because the EC didn't try, but because of general amateur apathy. (2) Operators who do not *practice* ARPSC work *cannot* perform at best efficiency. (3) Plans must be reviewed and, if necessary, revised to insure that they best serve the needs of the community, are flexible enough to meet any contingency and will work under the most adverse conditions.

Sound as though Virginia didn't do so good? The SEC calls the operation a "qualified" success. The Section places *sixth, far* better than they did last year.

North Carolina had planned another "Operation Election" in lieu of an SET, but this fell through at the last minute and an effort was made to engender interest and activity in the national exercise. SEC W4MFK says eight of the 100 N. C. counties were represented, but he is certain many others were active and did not report.

Missouri came up from 23rd to 4th place in the standing, and SEC WØBUL tells us why. A pre-announcement was sent to all ECs on Sept. 25, requesting participation. A post-announcement was sent to all ECs after the test requesting that they report their activities. The result: eleven EC radio reports received, 8 nets reported and 75 messages received from individual participants. A fine performance for the "Show Me!" gang. They sure showed *us*.

VE6FK tells us that the SET fell on the Canadian Thanksgiving weekend. Sorry about that. Seems *something* is going on *every weekend*.

Some of the advance duty rosters were amazing. RM W4DDY of the Georgia State Net (GSN) put out an impressive document in which were listed the SET duty rosters for both 4RN and GSN and complete instructions. Things like this made NTS participation in the 1965 SET notable.

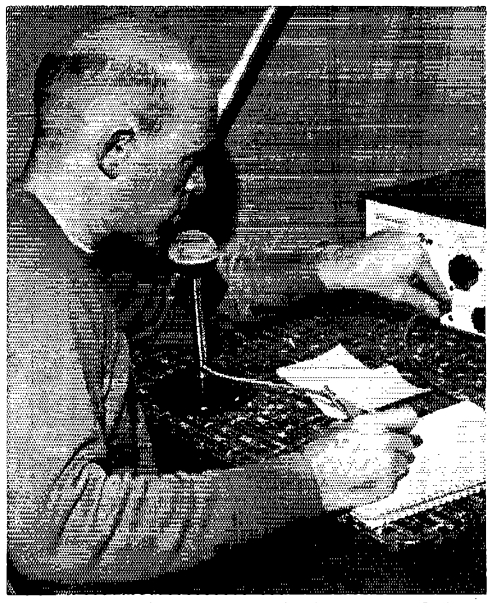
In Canada, the reeve of North York, Ont., handed VE3RX a message to be passed to Prime Minister Pearson during the SET. The message was in Ottawa seven minutes later.

SCM and acting SEC W7AJN of Oregon says they have no worries in Oregon, because the amateurs are always ready to go. Multnomah and Josephine Counties were active, the former operating the permanent Red Cross station in Portland for eight hours during the test. Ev complains of much unnecessary QRM on the 3875 kc. NCEF.

NTS Eighth Region Net Manager W8CHT submits an analysis of the situation as affecting 8RN and the NTS in general. In substance, what the analysis reveals is that NTS performance was good but a long way from perfect; he has many ideas for improvement of the system that we hope to be able to present in an ARPSC field bulletin.

The Houston SET was performed by the RACES group under RO W5VCE. As a part of the exercise, radiological instruments were passed out to the amateurs with no instructions on how to use them, except the instruction sheets

City of Houston C.D. Communications Officer W5OBC (right) issues radiological instrument, instructions and a city map to W5EKP prior to the test, Oct. 9



A six-meter field relay unit in the Minneapolis SET was operated by WØKGW.

with the instruments. State RO K5TRY says that all personnel operated the "RADEF" instruments perfectly and that no questions were asked — proving that amateurs *can* read instructions.

The following are random comments taken from remarks made on reports and letters by ECs, net managers and other SET participants: "I consider my AREC group an asset to this county, and we are already making plans for greater activity in . . . the next SET." — *W3WTW, EC Montgomery Co., Md.* "We have learned . . . that we've got a long road to travel to compare with some of the better AREC groups." — *WAGTZN, EC Merced Co., Calif.* "In order to separate routine messages from SET routine messages, we should have a 'test Routine' precedence for this exercise." — *VE6SA, EC Calgary, Alta.* "It required 40 minutes to set up and get into operation from scratch — rigging up emergency power, obtaining generator, installing antenna systems." — *K1QIG, EC Somerset Co., Me.* "Next step — meeting with ARC County services on Sept. 25 to play edited tape of SET and explain . . . how ARPSC/ARC work together and what amateur radio can and cannot do for them." — *K2SJN, EC Westchester Co., N. Y.* "Seems to me there should be more sessions of the Section nets to receive the outgoing traffic." — *K2KDQ, EC Passaic, N. J.* "I think that one SET per year is insufficient, two should be the minimum." — *K2AYQ, EC Glens Falls, N. Y.* "This year's SET was the most successful ever held in Delaware." — *K3NYG, SEC Delaware.* "All the agencies included with us during this drill were well pleased and complimented the AREC." — *W3CVE, SEC Md.- D. C.* "I was rather disappointed in the SET. It must be better next time or there will not be one in Tallahassee." — *WA4EOQ, EC Leon Co., Fla.* "Is there any kind of certificate available that can be given to Citizens Band operators, who were so cooperative in this drill?" — *W4HED, EC Broward Co., Fla.* "We had excellent cooperation from all agencies (12 of 'em) and received many favorable comments." — *K4KRG, EC Orange Co., Fla.* "This was my first SET. I was busy all the time and, sometimes, confused and frustrated, but I learned quite a lot." — *WA5IIS, EC Monroe Co., Ark.* "Our biggest problem was competition from . . . the World Series baseball game; of course this does not affect the dedicated few." — *K5HZR, EC Bexar Co., Texas.* "A number of messages are not listed in the score because there is no provision to do so, yet it all takes time and the messages were sent." — *W6QIE, EC North San Mateo Co., Calif.* "The SET was a near failure, due to non-interest shown by amateurs in this jurisdiction. I strongly recommend that each licensed amateur

be required to fulfill . . . one public service act . . . each year." — *W6PLS, EC Half Moon Bay, Calif.* "Not enough people took part." — *W6DEF, EC Redwood City, Calif.* "Our plan is simple and very flexible but has worked out nicely because of the splendid group in this area." — *W7DEM, EC Josephine Co., Ore.* "Our major concern during the coming year will be to strengthen the organization in every way, particularly in the development of a communications system completely independent of commercial power sources." — *K8LFI, Asst. EC Lucas Co., Ohio.* "I have organized 25 CB'ers into an effective group and they do very nicely the jobs hams should be doing but won't." — *W9ICF, EC Monroe Co., Ill.* "The biggest gripe was the state NTS nets shutting up shop because they had no traffic — ten minutes before I arrived *with* traffic." — *KØFPC, EC Cass-Johnson Co., Mo.* "This test came in a very busy harvest time which limited our activity." — *KØDIN, EC Richardson Co., Nebr.* "A great amount of effort was put into this alert by . . . amateur operators in Story County." — *KØVLO, EC Story Co., Iowa.* "I feel that much was learned from the SET and within the next few months there will be another one." — *VE3EUM, SEC Ontario.* "Very pleased with terrific response." — *VE5BO, EC Northern Sask. and Prince Albert.* "Twenty-four stations participated in TCC-Eastern SET functions." — *W3EML, TCC Director, Eastern Area.* "Main weakness was the link from local groups to NTS." — *VE3BZB, Mgr. ECN.* "Let's face it, with a large amount of traffic we just don't have enough horses to carry the increased load." — *W9DYG, Mgr. CAN.* "It seems to me we have to figure

These members of the Northwest St. Louis Amateur Radio club operated club station KØAXU from Red Cross Headquarters in St. Louis. Left to right are KØs: JPL ECG YIP and ECK.

out a way to at least double the traffic before we can begin to really check our facilities." — *WB6JUH, Mgr. PAN.* "I deplore the entire idea of 'points.'" — *WB6BBO, Mgr. RN6.* "There needs to be more training in use of NTS facilities." — *K7NHL, Mgr. TWN.* "Conn. Phone Net could have operated longer to facilitate Hq. traffic handling." — *WA3BYH, Mgr. EPA Emergency Phone & Traffic Net.* "A very fine SET exercise. SET information was clear and concise." — *K4NUW, Mgr. AENP.* "We handled over twice as many messages this year as in 1964." — *W6QAE, Mgr. SCN.* "Long Skip and QRM from the ragchewers killed us — but good." — *W4OVE, Mgr. Fla. Sideband Emergency Net.* "We need more SET traffic across the NTS. I have an idea for section-net-to-section-net originations that would boost the count." — *W3QCW, Mgr. MDD.* "Operationally, this was the best SET this Section has participated in." — *W7OCX, Mgr. BUN.* "Had very few non-member check-ins, presumably because of lack of knowledge on how to QNI." — *WB2AEJ, Mgr. NJN.* "ARRL coverage on CN was much better than last year." — *W1ZFM, Mgr. CN.* "Our boys put in long hours with NOT ENOUGH TRAFFIC." — *VE4QX, Mgr. MTN.* "SET showed up our faults. We could have used more traffic. Many times we lacked outlets." — *VE3CVR, Mgr. OQN.* "The SET showed us that the NTS can easily get saturated with traffic." — *K4SCL, Mgr. VSBN.*

QST

March 1941

. . . K. B. Warner, in his editorial, makes a strong plea to phone men to increase their proficiency in handling traffic by means of organized nets and to keep up their code speed at the same time. In view of the growing national emergency, this is considered to be sound advice.

. . . Narrow-band f.m. seems to be the trend in amateur practice at this time and George Grammer, W1DF, in a lucid article, describes an adapter to be used in connection with communications superhets. It appears that weak signals are better received with this combination than with either wide-band f.m. or conventional a.m.

. . . In order to overcome the disadvantages of an e.c.o where the cathode is "hot" and a part of the tuned circuit, a gang-tuned v.f.o. using three tubes and a regulator tube is presented by Byron Goodman, W1JPE (now W1DX). The oscillator is a 6J5 doubling into a 6V6 amplifier, followed by a 6L6 output stage. The rig uses a three-gang condenser, all on one shaft.

. . . Fifteen dollars will get you a 75-foot antenna tower according to J. D. Boatwright, W9JWC, who built one and describes its construction. Looks real pretty in the photograph supplied.

. . . According to the FCC, there is no objection to the use of American Morse code unless its use leads to confusion. Of course, call letters must be given in International Code. Nothing said about mixing the two codes. Who's for using the old Navy Code?

. . . For local rag chewing on 160, Vernon Chambers, W1JEQ, comes up with a powerful little 5-watter using the 110 volt a.c./d.c. 117L7GT tube. It's a pretty simple and inexpensive rig and works real well.

. . . For inauguration day, the Red Cross calls upon Roy Corderman, W3ZD, to set up a net of ten field stations operating on 2½ meters. The net was so successful that widespread official commendation was received.

. . . If you are seriously interested in f.m. operation you have to read Murray G. Crosby's article on bandwidth and readability. He presents a lot of data to guide those using this mode of operation or contemplating its use.

. . . Ed Handy, W1BDI, makes a plea to amateurs to go after higher code speed ratings and to learn to copy with a typewriter or "mill." Of course, at even 35 w.p.m., your fingers are hardly moving. It's easy but takes practice.

. . . Don Mix, W1TS, presents his latest rig, a low-frequency transmitter using push-pull 809s operating in 1.75- and 3.5-Mc. bands.

. . . Ed Handy, W1BDI, announces a nationwide test for emergency communications for the Red Cross. Tests will start April 4.

. . . John Huntoon, W1LVQ, shows how to conserve space in an apartment by using a typewriter table for the transmitter, with the receiver mounted on top. Neat looking layout.

. . . A number of cases of BCI are described by Chester Wesman, W9PFR, who coped with and solved these cases. Good informative reading.

— *W1ANA*

• Beginner and Novice

Novices—Are You Ready for 15-Meter Openings?

If you have been overwhelmed by 80- and 40-meter Novice QRM, maybe you've been overlooking a good bet — 15 meters offers plenty of clear space with the possibility of some choice DX contacts. It doesn't take much power, and simple antennas will do an excellent job.

Some Simple Antennas for 21 Mc.

BY LEWIS G. McCOY,* W1ICP

One thing a Novice in amateur radio will learn is that radio conditions are closely tied to the amount of sunspot activity. When the sunspot activity is at a low point, as it has been for the last few years, our higher-frequency bands — 21 and 28 Mc. — have much poorer DX conditions than when the sunspot activity is high. During a sunspot low, 21 and 28 Mc. (15 and 10 meters) are usually only good for local contacts, and any "openings" for DX work are few and far between. On the other hand, when the sunspot activity is high these bands are usually open every day.

Sunspot activity will increase during the next few years until it reaches a peak, currently predicted for around 1968. This means that we should have good DX conditions for the next four or five years on the 15- and 10-meter bands. Of particular interest to the Novice is the 15-meter band. When 15 is open, it is possible to make very "solid" contacts, and to do it with relatively low power such as a Novice is permitted to run.

One advantage of 15 meters over the two lower Novice bands is that antennas can be much smaller than those required to a good job on 80 and 40. In this article we will treat three simple antennas that can be used with good results on 15.

The Ground Plane

One of the simplest omnidirectional antennas is a ground plane. By omnidirectional, we mean an antenna that will radiate equally well in all directions around the horizon. The ground plane is an easy antenna to make and get working. As shown in Fig. 1A, it consists of a vertical member ¼ wavelength long and three or more "radials" that project out horizontally from the base of the vertical, each being ¼ wavelength long. Because the feed-point impedance of such an antenna is about 30 ohms, the antenna can be fed with 50-ohm coaxial cable without having a serious mismatch. The inner conductor of the coax is connected to the bottom of the vertical element and the coax outer shield is connected to the radials, which are all tied together just below the vertical mast.

One question that frequently pops up about ground planes is what happens to the impedance when the radials droop downward instead of being at right angles to the vertical mast or element. The impedance increases as the ends of the radials are lowered. In fact, when the radials are dropped to an angle of about 16 degrees below the horizontal, the impedance rises to about 50 ohms, which is a closer match for the coaxial line. However, the 30- to 50-ohm mismatch isn't important enough to worry about.

The formula for figuring a quarter wavelength is 234 divided by the frequency, if the radials and the vertical are made of wire. Using 21,150 kc. for the frequency, this figures out to a length of 11 feet, ½ inch.

If tubing is used for the vertical mast, such as 1-inch diameter electrician's thin-wall conduit or aluminum pipe, the length is slightly shorter because of the increase in the conductor diameter-to-length ratio. With 1-inch tubing the vertical element works out to be 10 feet, 11 inches long. However, the ground plane is not a "sharp" or "narrow-band" antenna, so these dimensions are not critical. For example, you could use either dimension and the antenna would cover the entire 15-meter band without a serious mismatch.

There are many ways in which a ground plane could be constructed. The vertical member could be a wire supported from the top or it could be made from tubing. Electrical thin-wall tubing, available from electrical supply houses, is quite inexpensive and makes excellent antenna material; it could be mounted on a rooftop and guyed with nylon or nonmetallic line. The base of the antenna must be mounted on an insulator. A soda-pop bottle makes a good insulator, as shown in Fig. 1B. A wooden base could be made to fit the roof contour in order to support

*Beginner and Novice Editor.

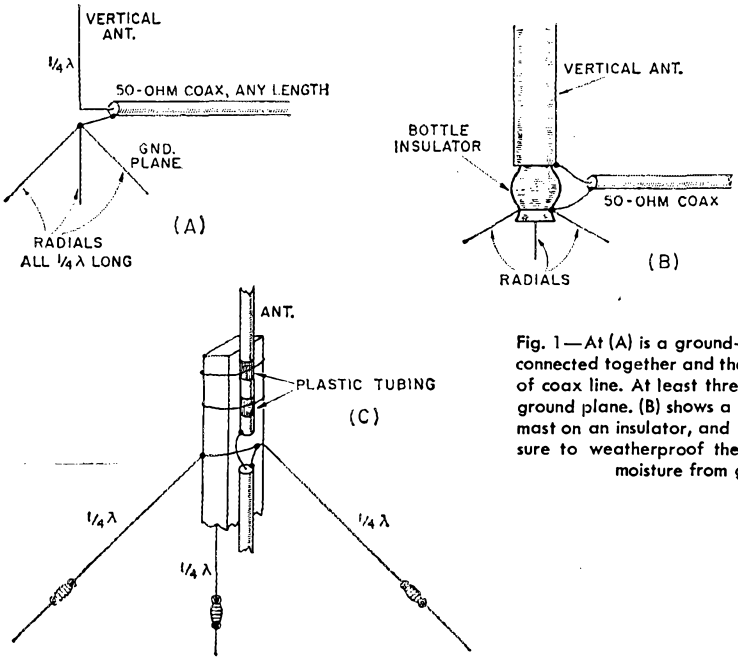


Fig. 1—At (A) is a ground-plane antenna. The radials are connected together and then connected to the outer shield of coax line. At least three radials should be used in a ground plane. (B) shows a method of mounting the vertical mast on an insulator, and at (C) from a wooden mast. Be sure to weatherproof the end of the coax to prevent moisture from getting into the line.

the base of the bottle. Radials can be made from wire and strung out from the base, at which point they must all be connected together and to the outer conductor of the coax. The inner conductor of the coax should be connected to the bottom of the antenna.

Another method of installation would be to mount the vertical element at the top of a wooden mast, such as a length of 2 × 2 lumber or an A frame. The antenna could be clamped to the top of the 2 × 2 as shown in Fig. 1C. One method of insulating it from the wood is by using plastic tubing fitted around it. A common source of plastic tubes of various diameters is women's hair curlers, available in most supermarkets. In such an installation, the radials can serve as guys to support the wooden mast. The radials are cut to the correct length and insulated as shown in Fig. 1. As to the height of the wooden mast, this will depend on what can put up in your location. Most lumber yards sell 2 × 2s 20 feet long. Three of these can be put together in an A frame to give you plenty of height. Details for constructing A frames can be found in the *ARRL Antenna Book*.

Folded Dipole

Another antenna that is simple to make is a folded dipole. Like the ordinary dipole, this antenna is essentially bidirectional, with the majority of the power being radiated broadside to the line of the antenna. This type of antenna is shown in Fig. 2A and its approximate radiation pattern given at B.

An easy way to build a folded dipole is with 300-ohm twin line. A length of 22 feet, 3 inches is used for the antenna. Remove 1 inch of insulation from both wires at each end, twist them together for about an inch, and solder. This will leave the overall length shown in Fig. 1A. The length

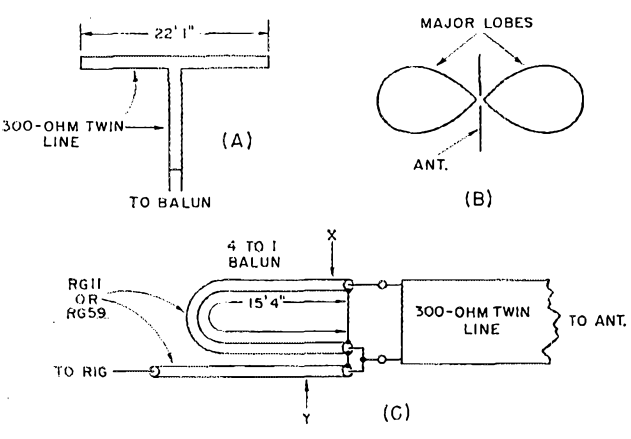
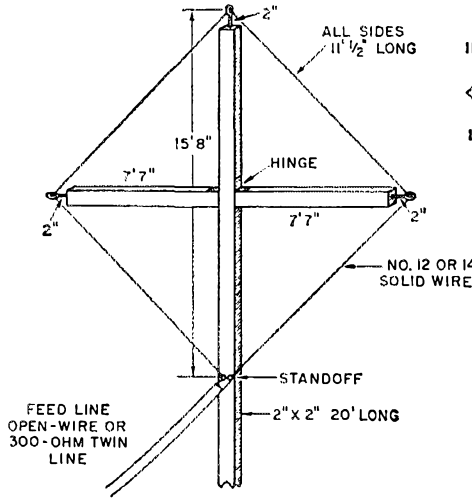


Fig. 2—The dimensions for a 21-Mc. folded dipole made from 300-ohm Twin-Lead are shown at (A). A typical pattern from a dipole antenna is shown at (B). Details from making a 4-to-1 balun are shown at (C). The line Y can be any length. All connections should be soldered—in fact, always be sure that you have good electrical connections all the way through your antenna system. Poor connections can cause erratic behavior in your final amplifier, noise in your receiver, and be a cause of TVI.



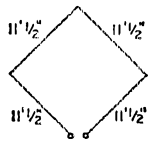


Fig. 3—This drawing shows the construction of a one-element quad antenna.

doesn't have to be *exactly* 22 feet 1 inch, so don't worry if the antenna is slightly longer or shorter. At the exact center of the antenna, cut *one* wire and solder on the 300-ohm twin-line feeder. Tape the connection to weatherproof it. Nylon line can be used to attach the ends of the antenna to insulators for supporting the antenna.

Nearly all transmitters these days have coaxial-output provision for working into 50- or 70-ohm loads. As coax lines are unbalanced while the 300-ohm twin line is balanced, we must get from the unbalanced condition to balanced. This is easily accomplished with a balun. This device, shown in Fig. 2C, is a transformer with a 4-to-1 ratio, and can be made from either RG-59/U or RG-11/U. The length of the section marked *X* should be about 3 inches longer than is shown in Fig. 2C, in order to make connection to section *Y* and the 300-ohm line. Section *Y* can be any convenient length.

The feed-point impedance of the folded dipole is approximately 300 ohms, a close match for the 300-ohm Twin-Lead. With the 4-to-1 step-down ratio of the balun, this comes out to about 70 ohms, which is a good match for the coaxial line.

This antenna can be mounted horizontally between two supports, but some amateurs have had good results by sloping the antenna. In orienting the antenna, pick the directions in which you want your signal to be strongest. As shown in Fig. 2B, the principal radiation is broadside to the antenna. By building two folded dipoles at right angles to each other, you can get fairly good all-around coverage.

The One-Element Quad

Another fairly simple antenna to build is a one-element quad. This antenna is also bidirectional, but has the advantage of having a slight gain over an ordinary dipole. Fig. 3 shows the quad antenna dimensions and the constructional details. The antenna is made from a length of wire 44 feet, 2 inches long. Although No. 12 or 14 solid wire is specified in Fig. 3, practically any wire that is strong enough can be used. The quad frame can be made from a 20-foot 2 × 2 with 1 × 2 side supports. A simple way of mounting the side supports is to hinge the 1 × 2s where they butt against the mast. A simple method of mounting the antenna wire to the supports is to use TV-standoff insulators. These can be taped or screwed into the supports.

Bamboo poles offer another possibility for side supports. These can usually be picked up for pennies from any rug dealer, as they are used for shipping rugs. The poles could be clamped to the mast with U bolts or a similar arrangement.

An A frame can be used to get the antenna high in the air or, if desired, the base of the 20-foot 2 × 2 could be fastened to the side of a house. Also, it shouldn't be very difficult to come up with an arrangement for rotating the antenna. You'll only need to turn it through 180 degrees to get complete coverage, because the antenna is bidirectional.

The quad should be fed either with open-wire line — the TV type is fine for this purpose — or a good grade of 300-ohm twin line. A transmatch should be used at the transmitter end for coupling the line to the transmitter. A simple transmatch that is excellent for this purpose is described in *Understanding Amateur Radio*[1] along with details for adjusting it.

Beams

As you spend time in amateur radio you'll become familiar with "beam" antennas, which allow the energy radiated by the antenna to be concentrated or aimed in a desired direction. One point about beam antennas that confuses the newcomer is "gain," so a short explanation is in order.

For example, a 3-element rotary beam, properly tuned and adjusted, has about 6 decibels gain over a simple half-wave dipole antenna. A gain of 6 db. is equal to a power increase of 4 times. Let's assume for a moment that we have 50 watts of power being radiated from a simple dipole antenna. This 50 watts will be spread over a wide range of directions. Now suppose we set up a receiver at some distant point and we orient our transmitting dipole antenna so that we receive the strongest possible signal from it. Also, let's assume that the S meter on the receiver is calibrated so that each S unit equals 6 decibels: that is, each S unit is equivalent to a 4-times increase in received power. In order to increase the receiver S-meter reading by one S unit, then, we must increase the power being radiated from the dipole antenna by 4 times: that is, the power must be raised from 50 watts to 200 watts. This can only be done by increasing the power of the

(*Continued on page 150*)

The convention site: the new Prudential Center in Boston.

Boston April 22-24

BY GENE HASTINGS,* W1VRK

NEW ENGLAND will play host to the 1966 ARRL National Convention April 22, 23 and 24, when thousands of fun-packed minutes will be enjoyed by hams from all over the world visiting ye olde Boston's new multi-million-dollar Prudential Center on the Massachusetts Turnpike at exit 22. Every major manufacturer of ham radio gear will display and answer questions about the latest equipment. Leading engineers from the country's top industries will give talks on various subjects concerning the ham and his fascinating avocation — its variations and its problems! There will be something for everyone: DX, traffic, building, antennas, communications, v.h.f., amateur satellite Oscar, RTTY, regulations and a terrific program for all YLs — ham and non-ham!

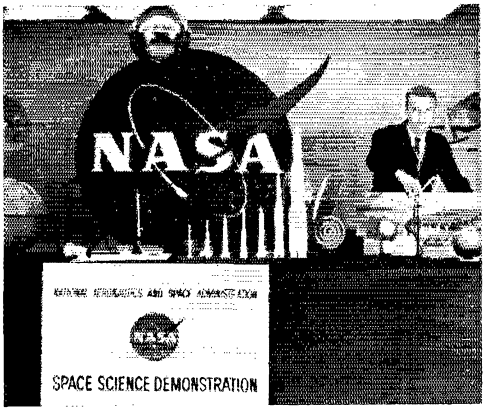
Friday's program will be rather leisurely and informal — a contrast to the fast pace of Saturday and Sunday. A very special evening program, prepared by the Antique Wireless Association, will be of interest to all hams and their "suffering" YLs and XYLs. "The First Amateurs," a production directed by Lincoln Cundall, W2QY, will be in beautiful color using special projection equipment and heightened by the use of stereophonic sound. The program will start at 7:30 and will allow hungry hams to have a delicious early dinner at the hotel or a nearby restaurant. Early arrivals will have already taken the elevator to the top of the Prudential Building for a breathtaking view of Boston and a snack or drink at the skyroof restaurant.

Massachusetts Governor John A. Volpe has set aside the week of April 17 as Amateur Radio Week in Massachusetts, in honor of the National Convention and in recognition of the public service performed by amateurs everywhere. A special multi-operator station in the gold-domed State House itself will talk in conventioneers. It would be pretty hard to get lost with the convention only 100 feet from the turnpike exit, but nevertheless W1LEL/1 will be operating Saturday and Sunday, s.s.b. on 75, 40, and 20 meters, and a.m. on 10 and 6. A special souvenir QSL will be issued for each contact with the station, so look for W1LEL/1!

Free parking will be provided for everyone staying overnight at the hotel. Those not staying there can park under the Prudential Center or at nearby lots at normal rates.

Featured speakers will include such well-known persons as Fr. Dan Linehan, W1HWK, who will have pictures of his African trip; George Jacobs, W3ASK, of the Voice of America; William Grenfell, W4GF, Chief, Technical and Legal Branch of FCC; Luis Salazar, microwave expert

* Co-chairman, Convention Committee.



To be presented this year is an entirely new NASA program, prepared especially for the convention.

from Western Electric; Major General David Gibbs, chief of communications, electronics, U. S. Army; Edward Liscombe, acting chief of Army MARS; Major General John Bestic, K4BMR; Major Richard Wareing; Major Harry Snell; Gus Browning, W4BPD, "Mr. DX"; Stuart Meyer, W2GHK; and, of course, a host of top speakers from the ARRL staff.

The National Aeronautics and Space Administration has prepared an entirely new three-hour program for Saturday. The W1 QSL bureau, now operated by the Providence Radio Association, will bring thousands of unclaimed DX cards; visiting conventioneers may find several addressed to them to take home as unexpected "prizes." The Antique Wireless Association will have a spark gap in operation. Words of welcome to the ARRL forum on Saturday will be made by President Herbert Hoover Jr., General Manager John Huntoon and other League officials.

Governor John A. Volpe proclaimed the week of April 17 Amateur Radio Week in Massachusetts. Standing behind the governor at the ceremonies, left to right: W1LEL, W1EYZ, W1VRK, W1HKG and K1OCD.

GENERAL PROGRAM (Speakers)

Saturday, April 23

ARRL Forum

NASA Space Program
Dr. Fred L. Niemann, WA1DRM
NASA Space Science Demonstration

Army MARS General Meeting
Major General David P. Gibbs
Chief, Communications — Electronic
Department of the Army

Army MARS Meeting
Edward S. Liscombe
Acting Chief, Military Affiliate Radio System

Navy MARS
Commander Robert E. Mickley

Air Force MARS
Major General John B. Bestic, K4BMR
"The Amateur in Military Communications"
Major Richard B. Wareing, Chief MARS
"Traffic and Youth Training"
Major Harry Snell, Eastern Comm. Region MARS Director
MARS Program for Eastern Communications
Bill Young, Eastern Comm. Technical Mgr.
"Technical Topics"

Antique Wireless Association
Bruce Kelley, W2ICE
"The Golden Twenties"

V.H.F. Meetings
Display and Description of V.h.f. Equipment
V.h.f. Forum (Questions and Answers)
Oscar Program

DX Meeting
NEDXA President, Dr. Clement Moritz, W1EVT
Speaker: Gus Browning, W4BPD, "Mr. DX"

League Official Meetings
SCMs, Ass't. SCMs, SECs, ECs, RMs, NTS Mgrs.

Tour of Television Station WHDH-TV

Sunday, April 24

Federal Communications Commission
Speaker: William Grenfell, W4GF, Chief, Technical and Legal Branch FCC

Rev. Daniel Linehan, S.J., W1HWK
Pictures and Talk On His African Trip

Luis Salazar, Western Electric Staff Engineer
"Microwaves"

Stuart Meyer, W2GHK
"Advances In Receiver Design"

Mosley Electronics, Inc.
Film: "Operation Success"

Hy-Gain Electronics Corporation
Robert L. Ruyle, WØFCH/NØTIJ, Field Engineer
"What Is The Proper Antenna Installation"

Microwave Associates
Fred Collins, W1FRR, Chief Electronic Engineer

Waters Mfg., Inc.
Robert A. Waters, W1PRI, President

Net Meetings

ARRL Technical Staff
Byron Goodman, W1DX, Assistant Technical Editor
"Semi-Conductors In Amateur Radio"
Lewis G. McCoy, W1ICP, Beginner and Novice
"How To Match Antennas And Transmission Lines"
Edward P. Tilton, W1HDQ, V.H.F. Editor
V.h.f. Topics

George Jacobs, W3ASK, Voice of America

Presentation of Contest Awards

Ticket committeeman W1THT (left) checks with ticket co-chairmen K1LDC and W1KCO, while program co-chairmen (l. to r.) W1EYZ, W1MXC and W1FXW review final convention plans.

An extensive YL program has been planned. Saturday highlights include the YLRL forum, a historical tour of Boston and Cambridge and Harvard University, which includes the famous Agassiz Museum, Ware Collection of glass flowers, Christian Science publishing house's giant glass mapparium and the home of Longfellow. There will also be a fashion show, the traditional Suffering Wives of Operators Protectorate (SWOOP) party, and, of course, the dance in the evening. Sunday there will be a talk on spices by the Baker Extract Co., a display of the latest styles in wigs and a special luncheon at the Tuileries French Restaurant for the first 130 gals who sign up by mail. Due to restaurant space limitations, YLs should send reservations with check (for $3.25) to Mrs. Ruth Barber, 19 Bidwell Parkway, Bloomfield, Conn.; price includes tax and tip. The meal includes: onion soup, coq au vin au vent (chicken removed from the bone and cooked in wine), haricots (almondine string beans), salade de la maison, mousse au chocolat, cafe and a glass of rosé wine.

There will be a Saturday tour of station WHDH-TV, but the number is limited and first signed, first go! This tour is technical and essentially for the OMs.

The Saturday night affair will really be something special. Starting at 6:30 P.M., the governor of Massachusetts will bring greetings from the Commonwealth, and ARRL President Hoover and other dignitaries will also be present. A delicious prime ribs of beef banquet will then be served. The Sheraton-Boston hotel is already famous for its fine meals and this should be no exception; the meat should be thick and juicy and all the extras are included. To fascinate you while you eat, Ronnie Gann, W1FGF, a professional magician, will demonstrate magic from table to table. At eight o'clock, a six-piece orchestra will start playing so those who wish can dance, while others continue to merely enjoy the music and good fellowship. At ten, stars from stage and TV will entertain. Featured will be Patti Delaney, a young songstress who won a talent search over hundreds of entrants and who has appeared on the Jackie Gleason TV program; her voice is terrific. In addition, there will be fast-moving comedy by the Jolly Jovers and the Wallace Brothers — possibly Ed Sullivan fans will recognize them! At midnight, the witching hour, the secret society of the Wouff Hong will invite those who have never been initiated, or those who wish to re-affirm their vows, to the Commonwealth Room. Come only if you dare; no one allowed to leave once the ceremonies have begun lest his skull feel the thunder of the Wouff Hong!

Saturday banquet tickets are available only in advance and only by mail due to hotel regulations: they will *not* be available at the door. The cost is $8.60 and includes dinner, tax and tip, entertainment and dancing. There is a handy order coupon on page 167) for both early bird registration (at $3) and the banquet. This coupon and its $1.40 discount expire March 31st.

(Continued on page 43)

Other convention planners; left to right: W1ADD and W1ADF, special events; WRONE President K1IIF and QST "YL News" Editor K1IJY, YL program co-chairmen; and convention co-chairmen W1VRK and W1HKG.

Happenings of the Month

FCC PERSONNEL CHANGES

Early retirements by a number of key FCC staff personnel, made possible by a change in Civil Service rules, created several vacancies at yearend.

Taking W3BA's place (February *QST*, page 34) as chief of the Field Engineering Bureau is Curtis B. Plummer, ex-W1IUA, ex-W3KRK. His federal service started in July 1940 as a radio inspector out of the Boston office of FCC. At the end of the war he was chief of the Television Division in the Office of the Chief Engineer where he directed work on color TV and also participated in the Commission's long-range planning for TV and for international broadcasting. The latter work brought him to international conferences in Mexico City, Geneva, and Washington. Later, Mr. Plummer served as Chief Engineer of FCC initiating the Conelrad system once used to deny enemy aircraft the use of domestic radio stations for homing purposes. From July 23, 1951 to August 1, 1955, he was chief of the Broadcast Bureau during the time that the compatible color standards were finally adopted and the long-time freeze on TV station construction was ended. He was instrumental in setting up harmonious TV allocations with Canada and Mexico.

On August 1, 1955 he became chief of the Safety and Special Radio Services Bureau, covering most of the private and local-government two-way radio services (and of course the Amateur and Citizens Radio Division which administers amateur radio affairs for FCC). When the position of Executive Director was created about five years ago, he was appointed to that post.

Curtis B. Plummer

Ralph J. Renton, W4CU

The new Executive Director, replacing Mr. Plummer, is Max D. Paglin, former General Counsel of FCC, who returns to the Commission from private law practice, adding to the 21 years he has already served as an FCC staff member.

Ralph J. Renton, W4CU, succeeds Edward W. Allen as Chief Engineer. Mr. Renton, like Mr. Plummer, started his federal service in Boston as a radio inspector with the FCC's predecessor, the Radio Division, Department of Commerce. His field service at Boston and Grand Island ran from 1929 to 1941 when he transferred to Washington as a radio engineer. He then served as chief of the Enforcement Section and of the Equipment and Projects Section. From 1946 to 1950 he was the U.S. member of the North American Regional Broadcasting Engineering Committee. In 1951 he became U.S. Supervisor of Conelrad. In 1956, Mr. Renton became assistant chief engineer for technical research. He was appointed as Associate Chief Engineer in 1958 and Deputy Chief in 1963. He has, along the way, been a member of several U.S. delegations to international telecommunications conferences, and has been chairman of the delegation upon occasion.

OM Renton started as a listener in 1919, and remembers copying NAD in the Boston Navy Yard on his crystal. His first license, as 1CU, came in 1924 under which he operated a spark-coil i.c.w. rig. His present rig is a Mohawk and 100-V. He is a Registered Professional Engineer, has a B.E.E. from Northeastern University, and is a member of IEEE and the National Society of Professional Engineers. He holds commercial licenses and the Amateur Extra. He has also held the calls W9VOG and W3JWD.

PERMANENT STATUS PROPOSED FOR RACES

Since the Radio Amateur Civil Emergency Services (RACES) was created by Docket 10102, in a Memorandum Opinion and Order on June 26, 1952, it has been technically and legally a

temporary setup within the amateur service. Some eighteen months ago, the U.S. Civil Defense Council petitioned the Commission (RM-670) to amend the rules, striking the word temporary and authorizing RACES on a permanent basis within its existing framework. Many local governments have been reluctant to allocate funds for RACES equipment purposes because of its apparent temporary status.

In Docket 16420, released on January 13 the FCC has now proposed to alter the rules as requested. The deadline for the comments of any interested party was set at February 21, and reply comments (in which a party discusses the comments filed by another party) at March 8. Obviously, information could not have reached the amateur body through magazines in the time allocated; accordingly, the ARRL has requested an extension of time for filing comments.

Members with any views on the subject may file individual comments direct with the Commission, and in addition may bring their views to the attention of their ARRL Division Director for his guidance in the formation of League policy toward the docket. Formal comments require an original and fourteen copies, as is set forth in the FCC administrative rules, but informal remarks in letter form are usually accepted for inclusion in the master docket file.

As ARRL Vice President Alex Reid, VE2BE prepared to go on a vacation trip to Florida, he was presented a complete mobile rig by the amateurs of Canada, in appreciation of his long service to amateur radio and the League. He served as Canadian Director from 1930 to 1960 and a vice president since—he has been on the Board three times as long as the man who is second in seniority! Canadian Director Noel Eaton, VE3CJ, makes the presentation with Mrs. Colin Dumbrille, (wife of Vice Director, VE2BK) looking on.

The four sections proposed to be altered are listed below. Words to be stricken are in italics, new language in bold face.

§ 97.161. Nature of this service. (a) The RadioAmateur Civil Emergency Service provides *a temporary phase* for amateur operation for civil defense communications purposes only, *and the rules are limited in their force and effect to the period of the present national emergency,* **during periods of local, regional or national civil emergencies** including any emergency which may necessitate invoking of the President's War Emergency Powers under the provisions of Section 606 of the Communications Act of 1934, as amended.

(b) Pursuant to the provisions of Section 4 (j) of the Communications Act of 1934, as amended, records relating to the Radio Amateur Civil Emergency Service shall not be open to general public inspection.

§ 97.163. Definitions. For the purposes of this Subpart, the following definitions are applicable:

(a) Radio Amateur Civil Emergency Service. A *temporary* radio-communications service carried on by licensed amateur radio stations while operating on specifically designated segments of the regularly allocated amateur frequency bands under the direction of authorized local, regional, or federal civil defense officials pursuant to an approved civil defense communications plan.

§ 97.189. Term of station authorization. . . .

(c) Nothing in this section shall be construed to alter *or amend the temporary nature of a station authorization in the Radio Amateur Civil Emergency Service and* the Commission's authority to cancel or amend **a station authorization in the Radio Amateur Civil Emergency Service** in accordance with the applicant's agreement as indicated on the initial application for station authorization.

§ 97.191. *Cancellation of station authorization.* (a) Each authorization for operation in the Radio Amateur Civil Emergency Service shall be issued with the express provision that such authorization is subject to revocation or cancellation without hearing whenever, in the opinion of the Commission, the security of the United States or the proper functioning of the Radio Amateur Civil Emergency Service would be served thereby. *Or termination of the national emergency makes it unnecessary to continue the operation of stations in this service.*

AMATEURS AND MEMBERS

FCC figures for December 31, 1965 show approximately 270,000 amateur station licenses and 262,000 operator licenses in force at year end, both figures up about six thousand from the end of 1964. (Some remaining anomalies in the computer system prevent exact comparison with earlier years.) The figures are high by the number of licensees holding both Novice and Technician Class licenses. There are about 14,000 Novice licenses in force, and there were about 17,500 new licensees in all during the year, almost the same as in 1964 but far lower than the range of 28,000 to 35,000 new licensees in the previous five years. (Also see, "It Seems to Us" in February *QST*.) An unrelated statistic of interest: there were almost 1000 successful candidates for the Extra Class license during 1965, a quarter of the present estimated total accumulated since the Extra became available in 1953.

Full League membership declined eight-tenths of a percent during 1965, with four of the five smallest divisions showing gains in Full Membership and the five largest divisions showing losses. The voting membership is 81,289 as of December 31, 1965, comparing with 81,969 at the end of 1964. Total League membership, worldwide, is 101,046 now as against 102,063 a year ago, a drop of less than one percent.

Minutes of Executive Commitee Meeting
No. 308
January 15, 1966

Pursuant to the requirements of the Articles of Association, the Executive Committee of The American Radio Relay League, Inc., met at the Shoreham Motor Hotel, Hartford, Connecticut, at 9:40 A.M. January 15, 1966. Present: President Herbert Hoover, jr., in the chair; First Vice President W. M. Groves; Directors P. L. Anderson, jr., Charles G. Compton, Robert W. Denniston, and Noel B. Eaton; General Manager John Huntoon; and Vice President F. E. Handy. General Counsel Robert M. Booth, jr., Assistant General Manager Richard L. Baldwin and Director Carl L. Smith were also present.

The General Manager reported to the Committee concerning year-end membership figures, the number of newly-licensed amateurs, the status of the Building Fund, the financial position of the League at year-end, and similar administrative matters.

The General Counsel reported to the Committee concerning the reorganization of the Safety & Special Radio Services Bureau of FCC, and the status of incentive licensing proposals in Docket 15928, which matters the Committee discussed at length.

Concerning ARRL National Conventions, the General Manager reported that a question had been raised about the possible applicability of anti-trust statutes on the exercise of League authority in controlling participation in such conventions under Paragraph 4 of the "Rules and Regulations Concerning ARRL Conventions." The Committee heard a report from the General Counsel on the matter; in his opinion, with which an attorney specializing in anti-trust law concurs, there is no cause of action against the Convention Committee, its members, or the League. Accordingly, the Committee found no remedial action necessary, and directed the General Manager to advise the Federation of Eastern Massachusetts Amateur Radio Associations, sponsors of the 1966 ARRL National Convention, that in the event of institution of suit, the League will bear all costs of the defense and will indemnify the sponsoring committee and its members should litigation terminate adversely.

In response to several invitations for League and IARU officers to participate in various international amateur meetings, it was agreed that the General Manager should represent the League at the January convention of the Radio Club Venezolano; it was further agreed that the President and Secretary, in their parallel capacities in IARU, should attend the Region II Executive Committee meeting in El Salvador in April and the Region 1 Conference at Opatija, Yugoslavia, in May.

The Committee next examined a report from the Technical Director concerning the problems of radio frequency interference. After discussion, it was agreed that the program as outlined should be continued, and that the Headquarters should report at the next meeting of the Committee concerning the feasibility of a manual on RFI.

The Committee was in recess for luncheon from 12:45 to 1:45 P.M.

On the question of devices for telephone interconnection commonly known as "phone patches," the General Manager and General Counsel were requested to review the practical and legal aspects of amateur use of such devices and report to the next meeting of the Committee.

At the Fifth Annual Dinner of The Communications Club of New Rochelle, N. Y., the K2BVC Memorial Award was presented to Arthur Brooke, City c.d. Director, in recognition of his continuing aid to New Rochelle amateurs (see November QST). Shown left to right are Hudson Division ARRL Director W2TUK, Mr. Brooke and WB2GMN, CCNR President for 1966. (Photo courtesy Westchester-Rockland Newspapers)

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

ARCON (Amateur Radio Club of Newfoundland)
Gander, Nfld., Canada

Chetimachi Amateur Radio Club
Thibodaux, La.

Logan County Amateur Radio Club
Stollings, W. Va.

On motion of Mr. Anderson, unanimously VOTED to approve the holding of a West Virginia State Convention in Jacksons Mill on July 2-3, 1966.

The Committee next engaged in extended discussion of the progress of international amateur matters, primarily IARU organization, forthcoming IARU meetings, and projects for stimulating amateur growth in "new and developing" countries.

After consideration of an FCC Notice of Proposed Rule Making, Docket 16420, on motion of Mr. Compton, unanimously VOTED that the General Counsel request an extension of time for filing comments, so that adequate consideration can be given the proposal to strike the word "temporary" from the rules governing the Radio Amateur Civil Emergency Service.

The Communications Manager announced the publication of a revised and expanded manual on amateur emergency communications procedures, and distributed initial copies to members of the Committee.

The General Counsel reported that the Supreme Court of Pennsylvania had reaffirmed the status of restrictive covenants on individual properties, and thus denied the appeal of an amateur that his tower should be excepted. It was agreed the General Counsel should prepare another article for *QST* on legal aspects, again warning amateurs to read carefully any such restrictions in documents signed at the time of lease or purchase of property.

On motion of Mr. Denniston, unanimously VOTED that the League casts its ballot in favor of IARU Proposals 113 and 114, relating to admission to membership of the Club de Radio Experimentadores de Nicaragua, and the Central Radio Club of

Czechoslovak Socialist Republic.

In the course of its meeting the Committee discussed, without formal action, amateur operating procedures and ethics, League representation at divisional conventions, revised DXCC rules, Novice examination procedures, and the question of Novice privileges on the 10-meter band.

There being no further business, the Committee adjourned at 6:30 P.M.

JOHN HUNTOON
Secretary

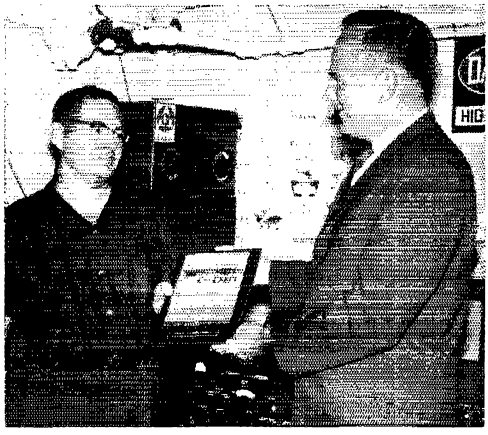
AMATEUR RADIO AS A CAREER

We have a permanent position vacant on the ARRL Hq. staff, as an assistant secretary. If you're a young amateur with a couple of years of hamming behind you, here is your chance to make amateur radio your career.

Duties include composing answers to regulatory, legal and general radio questions received in letters from members; conducting tours of headquarters for visitors, doing promotion and publicity work; handling international correspondence and other routine administrative chores. Later on, there would probably be some travel, to conventions and club meetings.

There is no formal education requirement, but a good working knowledge of English usage, grammar and spelling is important. Fluency in a foreign language is a definite asset. The candidate should have a neat appearance and friendly personality. Experience as an officer of a radio club, editor of a club paper, instructor of a training course, or similar activity is helpful.

Because there is little parallel outside the League to this position, we'll have to train our man on the job. Thus we are especially interested in a young man, perhaps in the mid-twenties. Candidates for the post should write to Box A, ARRL, Newington, Conn. 06111, outlining their education, prior employment, military service, marital status and amateur radio experience.



W4WQZ, at left, received the Cover Plaque Award for his *QST* article, "A Low-Noise Double-Conversion 144 Mc. Converter," adjudged the best of the July, 1965, issue by the ARRL directors. W4UVP, SCM for Tennessee, presents the award at the September joint meeting of the Bays Mountain and Kingsport ARCs.

ARRL National Convention

(*Continued from page 39*)

On Sunday from 10 A.M. until noon, FCC will give General and Extra Class examinations; results will be posted by 5 P.M.

A novel surprise for attending hams and their families will be a grand prize award of a trip for two to Puerto Rico, including air fare from Boston or New York, 8 days and 7 nights at a beautiful all-new San Juan hotel (plus several meals), cocktail parties, sightseeing tours and the like. All you need do to be eligible is fill out a card at the convention — there is no fee, and registration is not required. Better tune up the portable rig just in case.

The Federation of Eastern Massachusetts Amateur Radio Associations will again present a Ham of the Year award, the John Mansfield Memorial Plaque plus a cash award, to some deserving W1 who has met one or more of the following qualifications: performed a meritorious public service to his community through the medium of amateur radio; made a major contribution to the science of amateur radio; helped to greatly stimulate interest in amateur radio in others; or aided other radio amateurs to acquire greater knowledge and skill in operating or building amateur equipment. Presentation will be made at the convention and the award chairman would like to hear from everyone who knows some deserving ham to whom he feels the award should be presented. Please include as many details as possible in your letter and send before April 8 to Eli Nannis, 37 Lowell St., Malden.

To allow early departure for conventioneers, the program will continue through 5 P.M. Sunday, when contest awards and the grand prize will be awarded in the ballroom. A note for DX attendees: the hotel is on the Massachusetts Turnpike exit quite near and directly connecting to the Boston aerial highway system leading from Logan International Airport. Car rentals are available at the airport as well as taxi and limousine service. Travellers from the states north of greater Boston are urged to take the Massachusetts turnpike right to downtown exit 22.

Convention registration is $3 ($4 after March 31); Saturday banquet, $8.60 ($9 after March 31). Banquet tickets will not be available at the door at any price. Make checks or money orders payable to F.E.M.A.R.A.; send c/o John McCormick, RFD 1, Berkley Street, Taunton, Mass. 02780. A self-addressed, stamped return envelope will be appreciated. Don't forget the handy coupon on page 167!

Overnight reservations should be made directly with the Sheraton-Boston Hotel, Boston, Mass., at least 20 days in advance. Do *not* send lodging requests to the convention committee. Specify "ARRL Convention" to take advantage of these special rates: single — $12, $14 and $18; twin — $18, $20 and $22; suite (parlor and 1 bedroom) — $28, $40 and $45. Reservations are normally held until 6 P.M. QST

Hints and Kinks For the Experimenter

PAD CONSTRUCTION

RESISTIVE pads are handy devices, having more applications than the average amateur realizes. Besides the obvious one of offering a known amount of attenuation in a line, pads can be used for isolation, impedance matching, or all three in combination. However, to realize the theoretical possibilities, the pads must be as purely resistive as possible and must be so constructed that stray coupling between sections is negligible.

Small composition resistors, in the values commonly required for use in pads suitable for coaxial line, are nearly-enough purely resistive to work very well through at least the lower v.h.f. region, provided they are installed with negligible lead length. The matter of stray coupling can be handled by suitable layout and shielding.

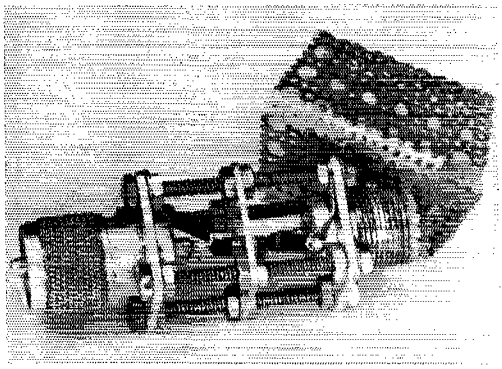


Fig. 1—Using coax connectors as the "chassis" for constructing a resistive attenuator pad. The cover, which slides on the connector assembly making a close fit, completes the shielding between sections. Thin perforated aluminum was used for the one shown because it happened to be on hand; the shielding would be a little better with solid metal.

An SO-239 socket can be substituted for the special male connector at the left end (this connector is no longer available) for ordinary "in-line" insertion, and a Dow-Key DKF-2 double male connector can be used for direct mounting to a receiver antenna-input terminal.

Fig. 1 shows a simple, but satisfactory, method of construction. The basic assembly is a pair of chassis-mounting-type coaxial connectors, rigidly supported 1½ inches apart by four lengths of brass rod with a 6-32 thread. This distance is just sufficient for mounting a ½-watt resistor between the two center terminals of the connectors, allowing enough lead length at the ends for soldering on the two leads from the shunt resistors of the pi-section circuit. At the center is a flat piece of aluminum cut to the same size as the connector mounting plates, with a ¼-inch hole in its center through which the pi series resistor projects. The shunt resistors are soldered to lugs at their other ends, with substantially no lead length; the lugs have considerably less inductance than the resistor leads. A cover formed from thin aluminum is folded around the assembly to make a close fit, completing the shielding between sections.

The pad shown in the photograph is a 6-db. 50-ohm matching pad used for isolation and for terminating lines in a load whose impedance is not known exactly, such as the input impedance of a receiver. The series arm is nominally 39 ohms and the shunt arms 55 ohms, selected by resistance measurement to be as close as possible to the theoretically-correct values of 37.5 and 150 ohms, respectively. Design data for pads in general can be found in *Reference Data for Radio Engineers*, published by the International Telephone and Telegraph Corp., New York. — *W1DF*.

IMPROVED C.W. OPERATION OF THE HEATH HX-20

TWO simple modifications to the Heathkit HX-20 exciter will improve its performance on c.w. without affecting its operation on s.s.b. The

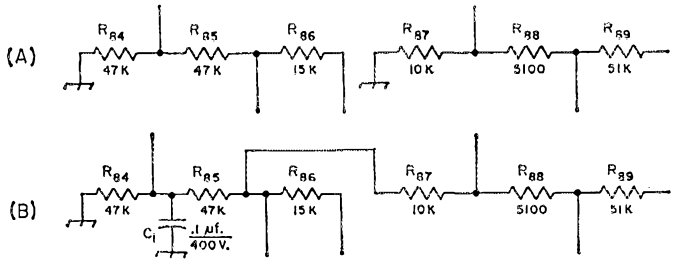


Fig. 2 (A) Circuit of the HX-20 before modification. (B) Modification of the bias network as described in the text. C_1 is a 0.1 or 0.25 μf, 400-volt, paper capacitor. R_{84} through R_{89} are original parts of the HX-20.

first is to disconnect the bottom of the 6146 grid-bias bleeder chain from ground (R_{87}, R_{88}, R_{89}) and to connect it to the junction of R_{85} and R_{86}. This will apply cutoff bias to the final when the function switch is in the OPERATE position and the key is up. Closing the key reduces the bias to normal Class AB_1 level. The final runs much cooler with no static key-up current, and any possible diode noise is eliminated in cases where a t.r. switch is used.

The second modification is to connect a capacitor to ground at the junction of R_{84} and R_{85} (see Fig. 2B). The keying of the HX-20 is a little "hard," and a suitable capacitor, C_1, at this point softens it sufficiently to eliminate local key clicks, both on make and break. A value of 0.1 μf. is sufficient if the HX-20 is used "barefoot" or to drive a linear, but if it is used to drive a Class C amplifier, the value should be 0.25 μf. — *D.W.R. McKinley, VE3AU*

HIGH-GAIN VOLTAGE-CONTROLLED TRANSISTOR AMPLIFIER

HIGH-GAIN transistor amplifier designs are often relatively unstable. In addition, most of these circuits require excessive power. It is possible to build an amplifier combining high gain with stability and low power consumption, using the circuit in Fig. 3. This amplifier's gain is controlled by an external reference voltage. Closed-loop gain is about 15,000.

The gain of the amplifier stage, Q_1, is stabilized by using a difference amplifier circuit, Q_2 and Q_3, to sense and correct changes in Q_1's operating point. The a.c. gain of Q_1 is controlled by its d.c. operating point. This d.c. operating point is controlled by the difference amplifier, Q_2 and Q_3, through the feedback loop from the collector of Q_3 to the base of Q_1. Varying the reference voltage to the base of Q_3, therefore, varies the a.c. gain of the amplifier.

The overall stability of this circuit depends on the use of quality components and transistors with betas greater than 100. — *NASA Tech Brief 65-10138*

OSCILLATOR INSTABILITY IN V.H.F TRANSMITTERS

INSTABILITY in crystal oscillators using tubes with high values of grid-cathode (input) capacitance, C_{gk}, is often caused by too much feedback. In many tubes, C_{gk} is on the order of 10 or 15 pf., a sufficient amount of capacitance to permit the crystal to oscillate. If additional capacitance is added to the circuit, often 10 or 15 pf., too much feedback will result and the oscillator will self-oscillate independently of the crystal. This effect is all too common in v.h.f. exciters using circuits similar to Fig. 4.

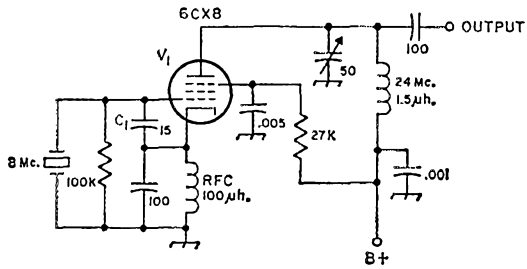


Fig. 4—Typical first stage in a v.h.f. transmitter. V_1 may be the pentode section of a 6CX8, a 5763, 6CL6, or other popular types.

The cure is simply to remove the external capacitor, C_1, from the circuit and employ only the internal capacitance (C_{gk}) of the tube.

Instability of the oscillator circuit can be detected by pulling out the crystal, applying operating voltage to the stage, and coupling an indicating-type wavemeter to the tank coil. If h.f. energy is present with the crystal removed, remove C_1 from the circuit. — *W1CER*

OPEN-WIRE LINE SPACERS

SMALL coil forms and open-wire line spacers can be made from the rigid poly tubes sold in sporting goods stores as golf club sheaths. The tubes, approximately 3 feet long and 1¼ inches in diameter, sell for only a few pennies.

— *Bob De Bragga, W1YNP/6*

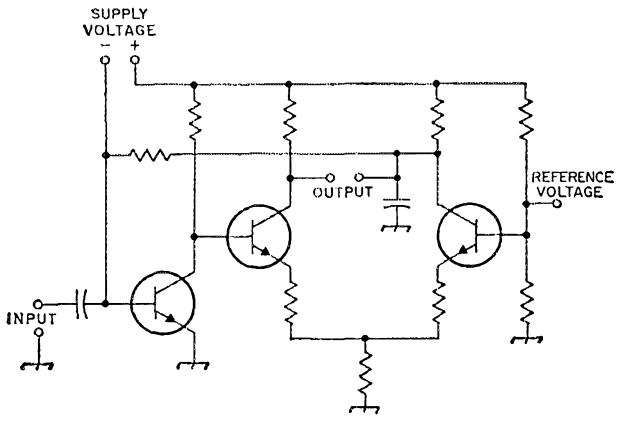


Fig. 3—Simplified circuit diagram of the high-gain amplifier. Resistors values will depend on the transistors used and available supply voltage. The transistors are, from left to right, Q_1, Q_2 and Q_3. All are silicon n.p.n. types with betas greater than 100.

ARRL AWARDS HONOR ROLL FOR 1965

In a membership association as large and as widespread as the League, much of the organization's work is accomplished by volunteers in the field. The League has some 35 unpaid directors, vice directors and officers; 71 elected SCMs and a like number of volunteer SECs; hundreds of *QST* contributors and authors; thousands of Official Station Appointment-holders; and some 35,000 members of the Amateur Radio Public Service Corps — all participating for the love of amateur radio and in support of League objectives. In addition to more general expressions of appreciation for such cooperative endeavors, the Board of Directors has occasionally singled out some individuals for special recognition on a particular contribution to the art. In the past year, the Board conferred the ARRL Technical Merit Award and twelve Cover Plaque Awards.

THE HIRAM PERCY MAXIM GOLD MEDAL

The Hiram Percy Maxim Gold Medal was created by the Board at its meeting in May, 1964, as an award for extraordinary contributions to the science of communications by a radio amateur. It is to be conferred only by the Board, and only in exceptional instances.

To date, the sole holder of the honor is the late John L. Reinartz, K6BJ, in recognition of his outstanding achievements of pioneering the early development of amateur radio communications equipments and techniques, which contributed so heavily to the opening of practical short-wave communications.

THE ARRL TECHNICAL MERIT AWARD

The Technical Merit Award was created by the Board at its 1953 meeting to be presented each year to an amateur chosen for his outstanding technical contributions to amateur radio.

These amateurs and groups hold the award: 1953, Philip S. Rand, W1DBM; 1954, Oswald G. Villard, Jr., W6QYT; 1955, Ralph E. Thomas, W2UK and Paul M. Wilson, W4HHK; 1957, Fred Schnell, W4CF; 1958, Paul F. Godley, ex-2ZE; 1959, James J. Lamb, ex-W1AL; 1960, John T. Chambers, W6NLZ and Ralph E. Thomas, KH6UK; 1961, F. S. Harris, W1FZJ and the Rhododendron Swamp VHF Society; O. H. Brown, W6HB and the Eimac Gang Radio Club; 1962, Project Oscar, Incorporated, W6EE; 1965, Project Oscar, Incorporated, W6EE.

This second award to Project Oscar was in recognition particularly of the launching of Oscar III, as well as a continuation of its vision, determination and leadership in amateur space communications. Project Oscar, Inc. also won the 1965 Christopher Columbus Gold Medal Award for technical achievement presented by the International Institute of Communications at Genoa, Italy, upon nomination for the honor by the League.

Nominations for the 1966 award may be submitted by any amateur to Vice President Wayland M. Groves, W5NW, Chairman of the Merit and Awards Committee, or to a division director (addresses on page 8). Deadline is April 15, 1966.

COVER PLAQUE AWARDS

As its 1961 meeting the Board established an award for *QST* authors adjudged by the directors in mail balloting to have written the best article of each month. A unique plaque goes with the award — the actual printing plate used for the cover that month, chromium-plated and mounted on a polished board.

Cover Plaque Awards for 1965 were earned by these articles:

January: "Silicon Replacement of Tube Rectifiers", by Gilbert L. Countryman, W4JA

February: "A.C. For Your Car," by John Lawson, W2MEX

March: "Single Band Combos," by Elmer T. Schorle, Jr., W3GSC

April: "100 Watts on 6 Meters," by Francis M. Yancey, W8DRU

May: "The KH6EGL Frequency Standard," by Gerald L. Hall, K1PLP

June: "Amateur Radio and the Public Interest," by Ivan H. Loucks, W3GD

July: "A Low-Noise Double-Conversion 144-Mc. Converter," by Gerald R. Lappin, W4WQZ

August: "Perfect Code at your Fingertips," by Paul Horowitz, W2QYW

September: "Frequency Measurement with the LM/BC-221," by Kenneth N. Sapp, W4AWY

October: "R9/S1," by Victor D. Poor, K3NIO

November: "Amateur Reception of Weather Satellite Picture Transmissions," by Wendall G. Anderson, K2RNF

December: "The 'Cantenna' as an RF Wattmeter," by Herman Lukoff, W3HTF

Our hearty congratulations and thanks on behalf of League members to these gentlemen, and to all the authors whose voluntary efforts make *QST* what it is. QST

This simple 40-meter transistor rig will handle 30 watts input (the power limit for maximum Field-Day multiplier) when operated from a pair of 12-volt batteries. An optional break-in keying system is included.

A Field-Day Gallon

Portable 30-Watt 7-Mc. Transistor Transmitter

BY GEORGE DAUGHTERS,* WB6AIG

HAVING been lucky enough to have accompanied Wes, WA6UVR, on Field Day 1963 and seen his little rig[1] in action, the author was sufficiently motivated to attempt construction of a Field-Day rig of somewhat different design. Being more portly than Wes, and hence less of a climber, a less portable design was chosen which would satisfy the following requirements:

1) Transistors for maximum over-all efficiency.
2) 40-meter c.w.-band coverage.
3) V.f.o. frequency control.
4) Maximum "legal" input; *i.e.*, 30 watts for best FD multiplier.
5) Reasonable cost.

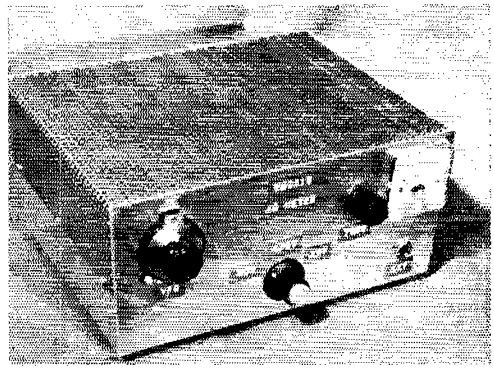
A rig which meets all of these requirements is described herein. Wes has been invited for the 1966 Field Day, and operations will be carried out at any altitude he desires. The author will carry the rig and WA6UVR will pack the two 12-volt auto batteries which easily power the rig for the full FD period.

Circuit

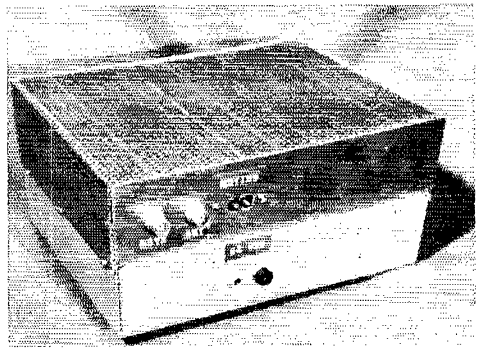
In the diagram of Fig. 1, a 2N3641, Q_1, is in a high-C Colpitts v.f.o. running at about 1 ma. collector current. The fundamental frequency of the oscillator is 3.5 to 3.6 Mc., which will give full coverage of the 40-meter c.w. band upon doubling. The oscillator is quite stable, although it will shift somewhat when the chassis is flexed. In normal operation, even on Field Day, the chassis is rarely flexed. The tuning capacitor, C_1, is driven by an inexpensive imported vernier drive of adequate performance.

The doubler, Q_2, is another 2N3641 whose output circuit is tuned to the second harmonic of the oscillator. This stage presents a small load to the oscillator under both key-up and key-down conditions. The collector voltage for both the oscillator and the doubler is stabilized at about 12 volts d.c., by the 2N3566, Q_4. The emitter-base junction of this transistor makes a topnotch Zener for only 90 cents.

The driver, Q_3, is a 2N696 running in Class C, and delivering about 1 watt of drive to the final. The collector tank has a "Q-killing" resistor, R_1, to make adjustment over the operating-frequency range unnecessary, and to add stability.



Panel view of the Field-Day Gallon portable transmitter. The v.f.o. dial is to the left, receive-transmit switch at the center. The output meter, final-amplifier tuning control and key jack are to the right.



All external connections are made at the rear of the unit.

* 1613 Notre Dame Drive, Mountain View, California 94040.

[1] Hayward, "A Transistor C.W. Station for 7 Mc.," *QST*, August, 1964.

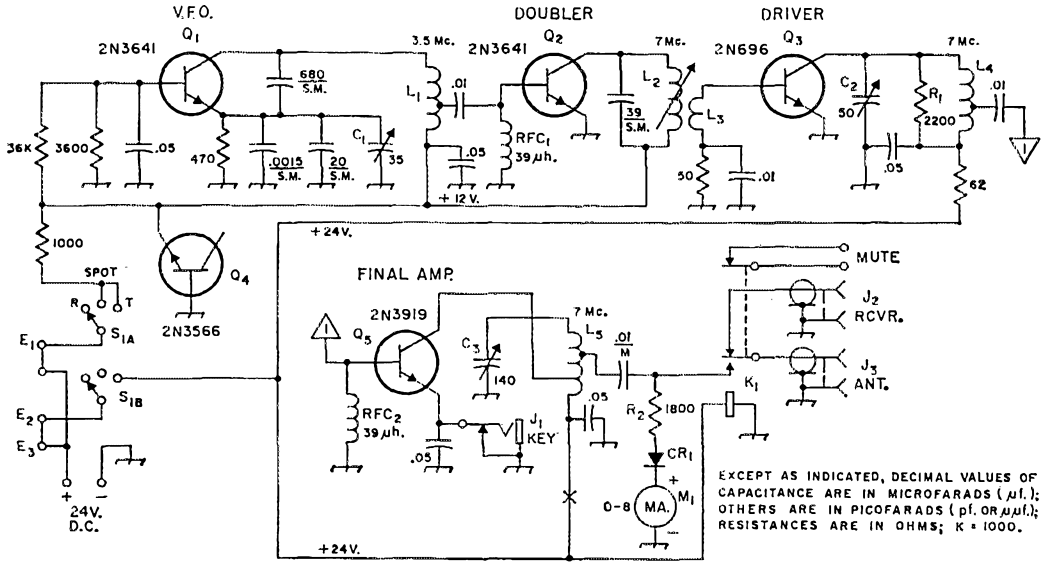


Fig. 1—Circuit of the Field-Day Gallon. Fixed capacitors; M = mica; SM = silver mica; others are disk ceramic. Resistors are ½-watt.

C_1—Miniature air variable (Hammarlund HF-35, or similar); see text.

C_2—Miniature air variable (Hammarlund HF-50, or similar).

C_3—Miniature air variable (Hammarlund HF-140, or similar).

CR_1—FDM 1000 (Fairchild), or similar.

J_1—Closed-circuit key jack.

J_2, J_3—Chassis-mounting coaxial receptacle.

K_1—24-28-volt d.p.d.t. relay.

L_1—20 turns No. 18, 1-inch diam., 10 turns per inch, tapped at 3 turns from low-potential end (Illumitronic Air Dux 810).

L_2—40 turns No. 32 enameled on 3/8-inch iron-slug form.

L_3—8 turns No. 28 enameled wound over low-potential end of L_2.

L_4—20 turns No. 20, 1-inch diam., 16 turns per inch, tapped at 3 turns from low-potential end (Illumitronic Air Dux 816, B & W Miniductor 3015).

L_5—25 turns No. 18, 1-inch diam., 8 turns per inch, tapped at 3 turns and 4–5 turns (see text) from low-potential end (Illumitronic Air Dux 808, B & W 3014).

M_1—0–8-ma. d.c. meter (see text).

R_1, R_2—See text.

RFC_1, RFC_2—39-μh. r.f. choke (Miller 4628).

S_1—Single-section two-pole three-position rotary switch.

Note: Q_1, Q_2, Q_4, and Q_5 are Fairchild types. No connection is made to collector of Q_4

The final, Q_5, is a 2N3919 — a new low-cost silicon planar power transistor, available from Fairchild.[2] It is operated in a common-emitter circuit which presents low input and output impedances. With a collector supply voltage of 24 volts d.c., and an I_{CE} of about 1 ampere, the measured power output into a 75-ohm load was over 14 watts. This device will do this well on 10 meters, and, in the author's experience, is a good output stage for 6 meters as well. The power output rises appreciably with increased supply voltage, as indicated in Fig. 2, but we don't want to exceed 30 watts input on Field Day. (Besides, WA6UVR has refused to carry *three* car batteries.)

R_2, CR_1 and M_1 comprise an r.f. output indicator for final-amplifier tuning purposes. The meter used by the author has an 8-ma. movement, which is a little unusual. The circuit may be adapted to any low-range milliammeter by simply changing R_2 to an appropriate value (approximately 15,000 divided by the full-scale meter reading in milliamperes).

[2] Obtainable from Fairchild distributors, list available from Fairchild Semiconductor, 313 Fairchild Drive, Mountain View, Calif.

A d.p.d.t. antenna relay (24-volt d.c. surplus type) is used, the extra pole being used for receiver muting.

The change-over switch, S_1, has a SPOT position which applies voltage to the v.f.o. and doubler alone to permit setting the v.f.o. to frequency without operating the driver and final-amplifier stages.

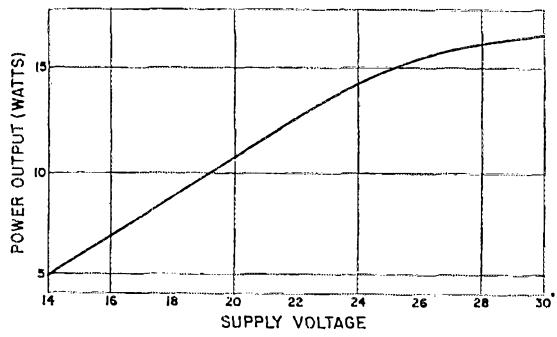
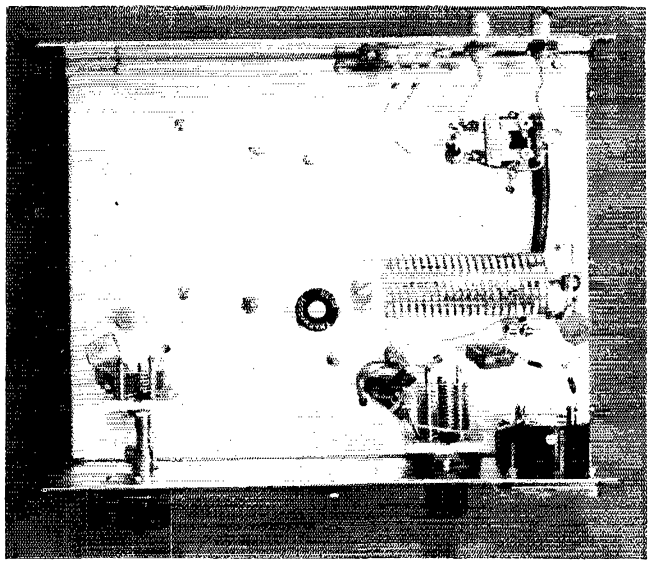


Fig. 2—Curve showing the maximum output obtainable at various input voltages.



Top view of the Field-Day Gallon. V.f.o. components are to the left, final-amplifier components to the right. The driver transistor to the left of the coil is fitted with a ring heat sink.

The little rig performed admirably on Field Day, 1965, bringing in 40 QSOs for a total of 540 points in only five hours. This is not bad, considering the author's c.w. ability. Nearly every station called answered, and reports of 599 were common from 500 miles away.

Construction

The transmitter is built in normal fashion on a 7 × 9 × 2-inch aluminum chassis. The front panel is a 4 × 9 × 1/16-inch aluminum sheet fastened against the front edge of the chassis. The rear panel is similar but is only 2 inches high, and has a flange bent along the lower edge so that it can be fastened to the top of the chassis with machine screws.

Most of the exciter-stage components are below deck. In the bottom-view photograph, the v.f.o. is at the left, with Q_1 mounted in a socket in the chassis, above the coil. Q_4 is mounted on a small tie-point strip below the coil. The buffer-doubler components are to the right of this strip. Q_2 is largely hidden by the resistor and fixed capacitor to the left of the slug-tuned coil, L_2. The driver stage is at top center, below the rotary switch. Q_3 is also partially obscured by small components below and to the right of the driver coil. This coil is mounted vertically to place it at right angles to L_1 and thereby minimize coupling between the two. It is a good idea to use a small heat sink with Q_3 (see top-view photo).

The final transistor, Q_5, is bolted directly to the chassis, at the lower right of the rotary switch in the bottom view. In the old-style transistor case in use by the author, the collector is isolated from the case. However, the current 2N3919 is in the familiar TO-3 diamond package, requiring the usual mica insulating washer. (Be sure to use mounting screws of nylon or similar insulating material.) The rest of the final-amplifier components, as well as the v.f.o. tuning capacitor and the antenna relay, are mounted on top of the chassis, as shown in the top-view photograph.

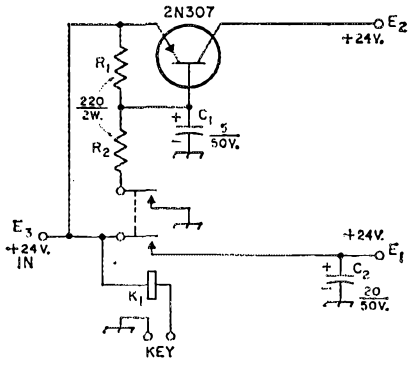


Fig. 3—Circuit of the differential keyer. Capacitances are in μf.; resistances are in ohms. Capacitors are electrolytic. Components not listed below are labeled for text-reference purposes.

K1—24-28-volt d.c. d.p.d.t. relay.

Testing

Before proceeding with the testing, it should be remembered that the voltage to a transistor circuit should always be turned off before approaching it with a soldering iron. This is a money-saving practice. Transistors depart rapidly under unfavorable conditions and, at $6.00 per copy, they are not often considered expendable.

A 10-ohm 10-watt resistor should be inserted temporarily at the point marked "X" in the B+ line to the final. A 24-volt d.c. power supply should be connected to the power-supply terminals, and the function switch turned to SPOT

(not TRANSMIT!). The v.f.o. signal immediately should be audible on a receiver at about 7 Mc. The range of the v.f.o. should be checked now. With the components listed, it should tune from below 7.0 to above 7.2 Mc. (If a 50-pf. variable capacitor is substituted, and L_1 trimmed slightly, the tuning range should cover the phone band as well.)

With an r.f. voltmeter, or an oscilloscope, the voltage on the base of the final should be checked with S_1 in the TRANSMIT position, and the key *open*. L_2 and C_2 should be tuned for maximum drive, as indicated by the voltmeter or scope, with the v.f.o. tuned to about 7.1 Mc. If there is any tendency for the driver to oscillate, it can be stabilized by making R_1 smaller. A value as low as 1000 ohms should be fine. The 2N696 has quite high power gain at this frequency, and some shielding between the driver and doubler output coils may be desirable.

The final amplifier should never be operated without load. For testing purposes, a dummy load of 50 or 70 ohms, depending on the antenna feed-line impedance to be used, should be connected across the output connector. (The author's dummy load consisted of six 390-ohm 2-watt composition resistors in parallel.) With the key closed, adjustment of C_3 should cause at least a flicker of the needle of the output meter. The output tap on L_5 should then be adjusted for maximum deflection, readjusting C_3 each time the tap is changed. Remember to turn off the voltage to the transmitter while adjusting the tap.

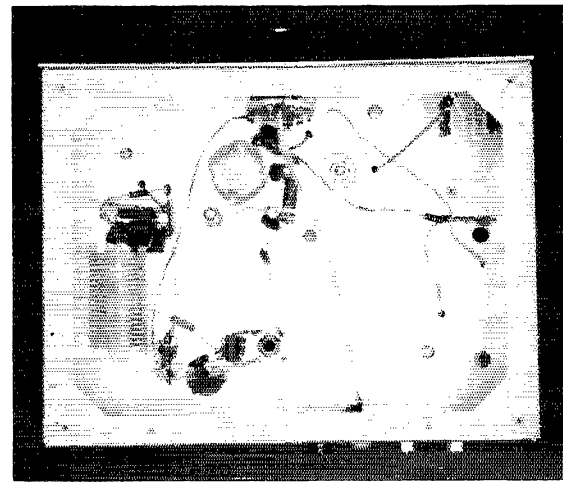
After the proper tap position has been found, the 10-ohm resistor can be removed and the circuit rejoined at "X." With key down, the power output should now be around 14 watts. If, after a minute or so with the key down, the resistors in the dummy load described above will "fry spit," the rig is operating nicely.

The Q of the output tank is not very high, so harmonics may be a problem. An antenna coupler is *always* a good thing. If the impedance of the antenna to be fed differs appreciably from the dummy-load value, an antenna coupler may be necessary for good loading in any event. Use the 10-ohm current-limiting resistor while tuning the coupler. A high s.w.r. can destroy the final.

Break-In Operation

Fig. 3 shows a differential keying circuit that may be added to, or incorporated in, the transmitter for break-in operation. The v.f.o. is keyed directly by the relay contacts in the E_1 lead. Since there is no resistance between the supply battery and the capacitor C_2, voltage is applied to the v.f.o. immediately when the keying-relay contacts close. However, when the key is opened, C_2, which has charged to the supply voltage, discharges through the resistance of the v.f.o. circuit (principally the 1000-ohm dropping resistor in the voltage regulator), causing the v.f.o. to "hang on" until after the final amplifier has been cut off.

The 2N307 is used as a controlled switch in the B+ line to the final amplifier. With the relay contacts open, C_1 charges to the full supply voltage. Since the base and emitter are at the same potential, the 2N307 does not conduct. When the relay contacts close, conduction through the 2N307 is delayed while C_1 discharges through R_2. The base then falls negative in respect to the emitter by the voltage drop across R_1, and the 2N307 conducts. When the key is opened, amplifier cutoff will be gradual while C_1 charges through R_1. This provides the desired shaping to avoid key clicks. The delay here, however, is shorter than the delay in the v.f.o. supply line, so the v.f.o. does not cut off until after the final is cut off. The v.f.o. "hang on" can be adjusted by changing the value of C_2.



Bottom view showing the v.f.o. coil to the left, slug-tuned doubler coil near bottom center, and driver coil near top center. The tubular trimmer to the left and below the driver coil was replaced by air capacitor C_2 after the photo was taken.

Either a separate receiving antenna or a t.r. switch of some sort is required, since it is necessary to have the antenna remain connected to the transmitter until the "break" keying characteristic has been completed. This is a requirement in all break-in systems, of course.

The keyer may be connected to the transmitter by removing the straps at E_1, E_2 and E_3 of the transmitter (Fig. 1), and connecting similarly-numbered keyer terminals at these points.

The rig is so stable and pleasant to use that the author is going to build one for each band for portable/driver use. The driver capability is especially attractive, since the little rig puts out enough power to drive a power amplifier — say, a pair of 4X150As — to a full kw. on the other 364 days of the year! QST

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Details, Details . . .

IT's the little things that drive you crazy. When one is primarily concerned with the overall aspects of a subject such as public service operating, one has a tendency to forget or overlook some of the details which make it efficient and impressive. In the past few months this column has been going in for some pretty heady philosophy. This month, let's talk about a few details that seem to need some talking about.

1) *What is the distinction between AREC, NTS and ARPSC?* Simple. The former two are divisions of the latter — that is, operating parts of it. We refer to ARPSC when we are talking about the overall operation, including both the local and regional or national picture. When we are talking about the local emergency group, this is the AREC. When talking about the nationwide system for handling daily traffic, this is the NTS. Our amateur public service force is ARPSC, the whole thing taken together. In normal times, NTS handles routine, day-to-day traffic, keeps in trim and does the public some good at the same time; the AREC conducts occasional drills, keeps itself ready in case of an emergency. When Old Man Disaster strikes, the emergency and traffic divisions work together and are the ARPSC — a single strong facility of amateurs working together *as* amateurs in the public interest.

Where does RACES come in? This is a part of the job of AREC, to a greater or lesser extent, depending on local circumstances.

2) On the subject of "service" messages, read the booklet *Operating an Amateur Radio Station* (free on request to members). Supplementing this, it should be pointed out that the purpose of the service message is to get instructions from the originating station — that is, to *ask* him, not to *tell* him. A message that is undeliverable for one reason or another goes on file *undelivered*, *not* cancelled unless or until instructed by the originating station to cancel it. When you cannot deliver a message, it is your duty to inform the originating station of this fact and the reason therefor, and request his instructions. Keep service messages short, but be sure they contain complete information. An example. "UR NR 67 JAN 20 TO JONES AT 717 GARBLE ST RENO UNDLD GBA OR ADVISE." Translated to phone procedure, this would read "Your number 67 January twenty to Jones at 717 Garble St Reno undelivered, give better address or advise."

You don't have to include the message precedence, this is *not* part of the number, but the date is important. Since the reason for non-delivery is the incorrect address, you do include this, but you can leave out parts of it, such as the addressee's first name or initials, and the state, provided these had no connection with the non-delivery.

Holiday greetings to servicemen via amateur radio were handled in the Schenectady, N.Y., area through a cooperative effort by the Schenectady County Red Cross and local AREC members. Shown discussing the program at Red Cross headquarters are (l. to r.) Executive Director Bateman, W2EFU (SCM ENY), and WA2CGD. (*Photo courtesy* G.E. Schenectady News)

If the reason for non-delivery is something else, state it as briefly as you can. For example, suppose you attempt to phone the message and are advised the addressee once lived there but has moved and left no forwarding address. Would your service message say "Your number sixteen, January 20, addressed to P. K. Merkle, 917 Blurb Street, Jibib, Missouri, phoned to this address but advice received that Mr. Merkle no longer at this address and no forwarding address available. Please advise disposition"? A lot of unnecessary words. How about saying "Your number 16, January 20, addressee no longer there, please advise." This tells the originator all he needs to know — that Merkle doesn't live there any more. The rest of the information is extraneous.

* National Emergency Coordinator.

The principal point we are trying to make is that you don't take arbitrary action on messages not of your origination. You ask the originator what he wants you to do. If he doesn't tell you, the message is filed undelivered, not cancelled.

3) About "book" messages. Again we refer you to the operating booklet, but we want at this time to mention two things: first, that *the precedence is not part of the number*, and if all messages in the book are the same precedence, you put this in the heading, not after each number. Second, that book messages are counted by threes or fractions thereof; that is, a book of two or three counts as one message handled, a book of four, five or six as two messages, etc. When reporting book messages into nets, the NCS is not interested in the fact that you have a "book of five." He is interested in the *count*, not in the form. If you are reporting messages into a net in book form, divide the number in the book by three, increase the quotient to the next full number and use *this* as the number of messages you are reporting in with.

One precaution about books in nets: don't forget that if the messages in the book are to go to different receiving stations, they are separated into complete messages and counted separately, regardless of the form in which they were received by you.

Oh yes, and one other admonishment: don't, for heaven's sake, use the word "same" to represent any part of a message. This is very poor procedure. If you *must* use it, be sure to indicate what it is the same *as*, or the receiving operator will not know how to fill in the "same" part.

4) Space (we hope) for one more item: sending traffic by voice. It is general practice, among phone stations, to read the traffic in clauses or phrases, in a "natural" or conversational tone of voice. But transmitting record traffic is not a conversational procedure. In casual conversation, one emphasizes certain words and syllables — which means that other words and syllables are *de*-emphasized, and in de-emphasis there is danger of losing a word or syllable completely. In record traffic handling, no word is more important than any other word.

Therefore, it would seem advisable to "send" the message by voice, rather than *read* it. This procedure has been tried on several occasions and has been eminently successful. True, it sounds odd, but it gets the message across with no errors and, unless there is outside interference of some kind, *no repeats*.

"Sending" the message by voice involves saying one word at a time, in measured tones, pronouncing every syllable evenly, almost in a monotone. You don't read a phrase, then wait until the receiving operator has had time to write it down. You say a word, slowly and distinctly and with emphasis, then the next word the same way, then the next, and so on until the message is complete. Each word is "sent" at *writing* speed — that is, enough pause in between to allow the receiving operator to get it down.

Of course you use phonetics when necessary (but not when *unnecessary*) and indicate procedural signs in a different (more casual) tone of voice, and do all the other things recommended in the operating book for voice traffic handling. The big difference is that you *send* the message to the other operator, you don't *read* it to him. Try it, some time. It works. — *W1NJM*.

New Public Service Manual

At long last we have put the Emergency Communications Manual and the circular describing the operation of the National Traffic System (CD-24) together under one cover in the form of the League's new booklet entitled *Public Service Communications*. This is a complete re-write of both the ECM and CD-24 and may be considered the replacement for both these publications. It is 26 pages long and printed between paper stock covers. Got your copy? It is available free of charge to anyone requesting it.

Diary of the AREC

In January, 1965, a large apartment house in Tulsa, Okla., burned down, killing four people and completely demolishing the house. The fire started around midnight. AREC members were alerted and were at the scene of the fire 10 minutes after the alarm was called in. Four mobiles were used at the fire, 2-walkie talkies were used by members who stayed close to the fire chiefs and a base station at Red Cross headquarters was activated. AREC coordinated the movement of people to temporary housing, helped with the issuing of blankets and other first aid items for those displaced or hurt. It should be noted that a dozen AREC members have first aid ratings and three are classified as instructors. These AREC members served for 9 hours, helping the people and moving supplies from Red Cross to the fire. The entire operation lasted 10 hours with W5DBM, *K5s* GMP YZQ ZCJ, *WA5s* BPS DBM and WN5OEM taking part. — *K5ZCJ, EC Tulsa, Okla.*

—•••—

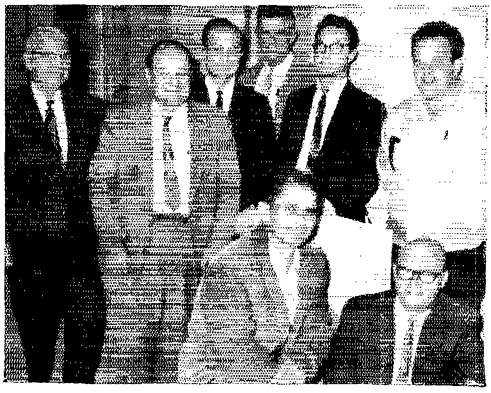
Within 3 hours after hurricane Betsy hit New Orleans, La., on Sept. 10, W5OK, a club station, was put on the air. They monitored for a long time prior to the hurricane hitting New Orleans, but weren't sure if their assistance was needed. Traffic was handled, damage reports and death information were relayed to the local news media. This helped, to a greater extent, to stop the origination of much health and welfare traffic aimed at the New Orleans area from Tulsa. By listening, the operators on duty in Tulsa could gain a lot of information about the number of

San Antonio, Texas, AREC members again provided communication for the Boy Scout Good Turn Day, held Nov. 13. Participating in this year's operation were (kneeling l. to r.) a scout, W5EJT, WA5FAM, WA5CBT. (Standing l. to r.) K5PKX, WA5FYX, W5LVE, W5VPQ, K5HZR (EC), and K5DNK.

people hurt, the locations hardest hit and the ares of New Orleans that were least affected. When skip conditions lengthened, W5OK acted as NCS for 3 hours, handling traffic from New Orleans c.d. and Red Cross to the mobiles in the disaster area. One of the AREC members from Tulsa happened to be mobile in New Orleans during and after the hurricane went through the city and he handled a great number of messages, made phone calls where lines were not down and generally helped wherever he could. When it became apparent that the flooding damage in New Orleans was bad and that an insufficient number of trained people were available, WN5OEM was sent from Tulsa, by the Red Cross, to the New Orleans area to do case work. Amateurs known to have participated were *W5s* GZS FWW CNF *K5s* GMP ZCJ and WN5OEM. — *K5ZCJ, EC Tulsa, Okla.*

At 1115 EST, Dec. 4, W2OP, Red Cross coordinator, contacted EC K2AYQ regarding a plane crash near Fort Ann, N. Y. The Red Cross Southeastern Adirondack Chapter was sending its disaster unit to the scene and communication from the crashed plane to chapter headquarters and Glens Falls, N. Y., was needed. The accident occurred in very mountainous terrain and other forms of communication were not available. WA2BCB/mobile was dispatched to the scene along with W2OP. W2KYS/mobile was also sent to the scene, but he stopped midway between Glens Falls and the crash site in case he was needed as a relay station. When direct contact was made between WA2BCB and Glens Falls, W2KYS went to the scene of the accident. WB2OMP in Glens Falls acted as NCS and other net members stood by in case their help was needed. Two of the three passengers in the plane were killed and the third was slightly injured. — *K2AYQ, EC Glens Falls, N. Y.*

A severe ice storm hit southeastern North Dakota on Dec. 16, leaving some 82 towns without telephone and electric service. The ice was so thick that over 5000 breaks in telephone lines alone were reported. Amateurs in many of these trouble spots provided the only means of communication with other parts of the state. Amateurs were used extensively by the power companies for putting out calls for more line men and emergency generators. When one television station was knocked off the air because they lost commercial power, one of the engineers, who was a ham, provided communication from the transmitter site to the studio. The state-wide emergency net was called into operation early Sunday morning by WØCGM who was located in the middle of the trouble area. This net remained in operation throughout Sunday and into Monday with *WAØs* AYL GRX MND and KØSPH alternating as net control. At one time on Sunday, there were as many as 47 stations in North and South Dakota, Minnesota, and Montana standing by for emergency traffic. It was estimated that nearly 150 pieces of traffic were handled from the disaster area to power companies, hospitals, railroads and law enforcement agencies. — *WAØAYL, SEC N. Dakota.*



On Dec. 27., an area meeting of ECs in Southern Texas was held in Dayton, Tex. After dinner, the group got down to business, discussing each EC's various problems. Attending the meeting were: (kneeling l. to r.) WA5BUV (EC), W5VCE (RO), (standing l. to r.) K5QQG (SEC), W5AIR (SCM), K5TOL (EC), WA5DCW, W5IIT (EC), K5HMF (EC). (Photo by K5HXR.)

When an emergency request from the civil defense coordinator in Vancouver, B. C., reached *VE7s* BTX, BIN and BOY, on Nov. 6, they responded immediately. They arrived at c.d. headquarters, but were unable to stay for any length of time because of other pressing matters. They were, however, able to make additional calls for aid. Mobile units arrived at headquarters shortly thereafter, and the group proceeded to the mouth of the Seymour River where a search team, skin divers and Royal Canadian Mounted Police were preparing a search for two missing women. The search plan was laid out by the police; amateur radio was to cover the skin divers' operation because they were working in dangerous waters. Civil defense set up their headquarters truck and an emergency generator. VE7AHX/mobile used the generator and acted as a base station for the operation. *VE7s* AHC and BQU covered the skin divers while VE7VJ went with a search team, headed by a constable, which covered the west shore of the river. VE7BJV and VE7FB went with the search team that covered the east side of the river. VE7BJV went on foot with a walkie-talkie so he could stay close to the search team and relay information to VE7FB who stayed in the car. Good communication was maintained with all units. After two hours, the skin divers had to stop searching because the water was getting dirty and the current stronger. At dusk, the rest of the search team quit. The next day, skin divers found the two women near where they had been searching the previous day. — *VE7FB, SCM B.C.*

For the last two years, AREC members in Tulsa, Okla., activated each time a tornado warning was sounded, providing at least 5 mobile units to act as storm spotters for the weather bureau. All members had received instructions from the bureau as to what a tornado looks like, what information they should report and when to report it. Each amateur knows what his job is and as yet, there have been no false alarms. If a tornado is sighted within 10 miles of the city limits, the weather bureau will sound the tornado siren. So far, there hasn't been a direct hit on Tulsa, but a number of near misses were carefully tracked until the tornado was safely past the city. — *K5ZCJ, EC Tulsa, Okla.*

From Sept. 30 to Oct. 30, the San Diego VHF Club provided communications for a hydroplane race. Two-meter f.m. was used by 15 participating amateurs in an operation that lasted from 0900 PST to 1700 PST each day. On one day, a boat blew up during a race, but amateurs played a secondary part in reporting and handling communications for the mishap. — *WA6TAD.*

Each July 4, the Peninsula Celebration Association in Redwood City, Calif., looks to the amateurs to provide routine communications while the annual Fourth of July Parade is assembling and while in motion. This is an annual test for that group and 1965 was the sixth straight year they participated. Mobile units were stationed along the parade route and in the forming area, so the parade marshall could be kept apprised of all details of the operation. As in past years, the operation proved to be quite successful and city officials were greatly appreciative of the amateurs assistance. — *W6DEF, EC Redwood City, Calif.*

On July 3, AREC members in Calgary, Alta., provided communication at the International Air Show. The operation came off without a hitch because the prerequisite to participating in this exercise was previous mobile experience and participation in other such exercises. Although the range required was extremely short, 75 meters was used and proved to be completely satisfactory. Two-meter equipment was not available for this operation. — *VE6SA, EC Calgary, Alta.*

Members of the Gallatin Amateur Radio Club and AREC members in Bozeman, Mont., provided communications for the annual Jaycee Roundup Model-T Race, held on Aug. 14. Since the 54-mile course was quite hilly, 75 meters proved to be the best band for complete coverage. Traffic

was handled for the race committee, a local radio station and various local organizations and individuals. Mobile units were stationed at various points along the course and when a car broke down, aid was quickly summoned. — *W7NPV, EC Bozeman, Mont.*

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A test of hospital facilities and amateur radio emergency communication was staged in a northwest suburban area of Cook County, Ill., on Aug. 29. The simulated disaster was an explosion and fire in the high school gym, with 40 injured people who required hospitalization or medical aid. K9RNQ acted as NCS from his home while mobile units were dispatched to the two participating hospitals and the disaster site. Traffic relating to the transportation of the injured to hospitals was handled. Hospital officials who had planned the test were most complimentary about the amateurs' operation during the test. — *W9CWH, EC Cook Co., Ill.*

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Forty-three SEC reports were received for November representing 20,626 AREC members. This is 9 more SEC reports and 3000 more AREC members than last year at this time. Sections heard from this month are: Hawaii, W. Pa., W. Fla. Kans., Wyo., Wis., Mich., Ala., E. Fla., Wash., Nev., Ohio, Utah, Mo., N. Mex., W. Va., S. Tex., Va., Colo., S. Dak., Okla., N.N.J., Tenn., N.C., Iowa, Nebr., N.Y.C.-L.I., Los A., Alta., Mont., Sask., E. Pa., B.C., Man., Del., Ga., S.F., S.V., Orange, Ky., Ore., E.N.Y., Mar.

National Traffic System

We would like to call attention to some NTS net procedures, definitely outlined in the new Public Service Communications Manual, which we think are not followed by some stations. If you are an NTS net participant, at any level, we suggest you check off these procedures to make sure you are following them.

First, *report in on time.* This is important. The business of the net is delayed when you are late. If you are more than 15-minutes late, you may not get your traffic cleared, because net controls at that time excuse all who are "clear."

Second, use the standard call-in procedure, whatever it may be. Be sure you indicate the destination(s) for which you can take traffic (unless you are a regular and the NCS already knows this) and the list of traffic you have on your own hook, broken down in accordance with net procedure.

Third, never mind pleasantries (except perhaps GE or "good evening" and use of the other operator's name). On c.w. particularly, pleasantries can consume a lot of time.

Fourth, don't question the directions of the NCS, if they are understood, just do what he tells you. This rule has limitations, of course, but in general it can be assumed that the NCS is more aware of what he is doing than you are. If his instructions *can* be complied with, just do so without question.

Fifth, avoid lengthy explanations of *any* kind. If NCS asks you if you can take a liaison job, just answer yes (not R or "Roger") or no, never mind giving reasons. Some net stations always have a story to tell which usually could have been summed up in one word, if indeed it was necessary to mention the matter at all.

Sixth, don't leave the net without being excused, and don't *ask* to be excused unless absolutely necessary. NCS will excuse you when he is through with you. If he forgets you, stick around; eventually he'll remember you and apologize, and then you can be a good guy and say "that's okay" and feel magnanimous.

Seventh, it's easy enough to criticize, but don't forget that NCSing a net is a lot easier if you have the net members with you instead of against you. — *W1NJM.*

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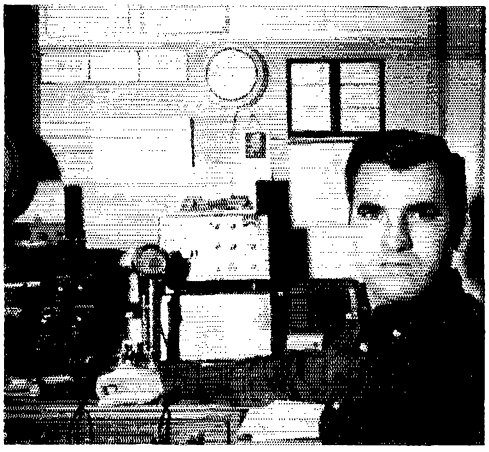
W9QLW, manager of 9RN, lists the following "Things I'm grateful for in 1965":

1) "That when I broke my glasses just before net time, I had some model airplane cement.

2) "That those two W2s QSOing on the net frequency used only a kilowatt, instead of high power.

3) "That when the wind blew my beam 32° off scale I can correct by adding 32° to the reading. Or do I subtract? Anyway, it's one or the other.

4) "That when we had 20 stations QNI and QTC of 162, we didn't have any QRN with the QSB and QRM.



Dan Babin, K5KQG, is the new SEC for Louisiana. From the look on Dan's face, we would suspect that he is pretty serious about the job and should have things in Louisiana jumping in jig time.

5) "That there are only four RTTY stations within 2 kc. of 9RN — at one time, that is.

6) "That all net members understand what QNV means."

Carty promises that in 1966 "I won't be grouchy, sarcastic, or hound you for net reports or beef about poor representation, lousy band conditions or poor traffic totals — for a week, at least."

December Reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	56	762	.427	13.6	89.5
2RN	57	828	.981	14.7	82.8
3RN	62	883	.458	14.2	97.3
4RN	56	1012	.647	18.6	96.9
RN5	62	2045	.641	32.9	94.9
RN6	62	1918	.710	30.9	97.1
RN7	31	1034	.810	33.3	80.6[1]
8RN	62	779	.433	12.6	93.5
9RN	31	895	.994	28.9	99.2[1]
TEN	62	1243	.681	20.1	64.5
ECN	31	300	.356	9.7	96.8[1]
TWN	31	709	.674	22.9	83.2[1]
EAN	31	2779	1.643	89.6	87.3
CAN	31	2680	1.408	86.4	100.
PAN	31	2807	1.607	90.6	98.9
Sections[2]	2201	17,417		7.9	
TCC Eastern[3]	132	1145			
TCC Central[3]	116	1545			
TCC Pacific[3]	132	1868			
Totals	2811	42,979	EAN	15.1	CAN
Records	2058	44,109	1.421	23.5	100

[1] Representation based on one or less sessions per day.

[2] Section and Local nets reporting (75): NCSSBN, NCN, NCNL, THEN (N.C.); MTN, MNPN, MEPN (Man.); NJN, NJ6&2 (N.J.); CHNN (Colo.); CN, CPN (Conn.); KTN (Ky.); MON, SMN, MOTTN (Mo.); LAN (La.); OBN (Ont.); WMN, EMNN (Mass.); OQN (Ont.-Que.); PTN (Maine); MSPN, MSN, MJN, PHD (Minn.); RIN, RISPN (R.I.); WVPN (W. Va.); CSN (Ariz.); NYCLIVHF, NYCLIPN, NLS (N.Y.C.-L.I.); Iowa 75; NTTN (Tex.); SCN, NCN (Calif.); MISS (Miss.); VN, VSN, VSSBN, VSSBNL (Va.); BN, OSN, OSSBN (Ohio); AENB, AENH, AENM, AENP, AENPL, AENR, AENT (Ala.); BUN (Utah); ILN (Ill.); MDD, MDDS (Md.-D.C.-Del.); EPA, WPA, PTTN (Pa.) QIN (Ind.); VTNH (Vt.-N.H.); IMO (Ind.-Mich.-Ohio); GSN (Ga.); QFN (Fla.); TPN, TN, TSSBN, ETPN (Tenn.); OLZ, SSZ (Okla.); WSBN, Badger (Wis.); WSN (Wash.); Wolverine, QMN (Mich.).

[3] TCC functions not counted as net sessions.

Ho hum, another almost complete set of new records again this month. We couldn't quite make it in the traffic

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

FULL TIME

3550	7100	50,550
3875	29,640	145,350

PART TIME

7250	14,225	21,400
14,050	21,050	28,100

Fulltime frequencies are for use 24 hours per day but only for emergency and traffic calling purposes. No transmissions for *any* purpose (except calling for emergency help) the first five minutes of each hour.

Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become *full time* frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require Ss all to work together. Any amateur wishing to assist is invited to use ARRL notification cards to be sent to stations not observing the rules.

category, but missing the average record is nothing new. On the average, representation was lower this month, but the long skip is probably washing out some of the weaker stations.

An excellent way to improve attendance on any net below the Area level is to have plenty of traffic for the fellows to handle. Where do we get the traffic? Try originating a few yourself, to friends, relatives, or just about anyone else you know. The more traffic we have, the more there is for everyone to handle.

WA2GQZ can't understand why the "rate" on 2RN goes way up when the representation drops, as it has been doing lately. K3MVO comments that traffic was plentiful this month and he feels that they might have hit the 100% representation mark if conditions weren't so bad. A regular Canal Zone outlet is now available on 4RN thanks to KZ5FX (ex-W4MXU). WA4NBT, WA4RAV and WA4SCK received 4RN certificates. K5IBZ is pleased with RN5s operation this month, especially since they broke their all-time high traffic total. WB6BBO has issued RN6 certificates to W6BGF and W6MLF. W8CHT issued an 8RN certificate to W8RYP; Hank might try to handle traffic via Oscar IV but the orbit is too difficult to track. 9RN certificates were issued to W9RGB and W9BLQ. W0LGG issued a TEN certificate to VE4LG. ECN was quite busy during December, but VE3BZB now comments that the "post Christmas slump" has set in — no traffic, etc. Wyoming has improved its representation on TWN; Utah and Colorado had perfect representation. K7NHL is hoping for even better things in 1966. K1WJD notes that this was a good month on EAN, with all NCSs having better than a 1.0 rate, a high rate of 3.83 and a new over-all rate record. W9DYG comments that CAN didn't do too badly this month either, breaking their all-time high traffic total and continuing the 100% representation. CAN certificates were issued to W1BGD, W3NEM, W4TUB, W5GHP, W5NND, W5CVB, W9HRB, K4BSS, KØAEM, WA4IBZ, WA5INZ, WA9AVT, WA9NFS WAØFKD and VE4JT. PAN walked off with the high traffic total for the month and WB6JUH sez he has a good feeling about this report.

Transcontinental Corps. W3EML reports that the RTTY schedule being kept by K6DYX and WA2BLV is proving to be quite successful. This December showed an increase in all categories for the Eastern Area. W4ZJY is planning on awarding a "TCC Operator of the Year — 1966" award to the top Central Area TCC operator. Details will be spelled out in a future newsletter. If this proves worthwhile, Dave may continue it in following years. W7DZX finds that comparing this December's report with last year's, the Pacific Area has shown considerable improvement. Additional skeds were set up with CAN and WA2WBA/Ø QNIed EAN to help with the overload.

December report:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	132	92.4	3607	1445
Central	116	87.2	3232	1545
Pacific	132	82.8	3736	1868
Summary	380	89.9	10,575	4858

TCC roster: Eastern Area (W3EML, Dir.) — *W1s* BGD EFW EMG NJM, W2SEI, *WA2s* BLV RUE UPC, WB2AEJ, *W3s* EML NEM, *K3s* FHR MVO, W4DVT, K4VDL, *W8s* CHT RYP, *K8s* KMQ NJW, QKY, WA8GYT. Central Area (W4ZJY, Dir.) — *W4s* OGG ZJY, WA4AVM, W5PPE, WA5CBL, *W9s* CXY DYG JOZ VAY ZYK, WA9BWY, *KØs* AEM GSY. Pacific Area (W7DZX, Dir.) — *W6s* EOT IDY VNQ TYM HC, *K6s* LRN DYX, *WA6s* ROF WNG, WB6JUH, *W7s* DZX GMC, WA2WBA/Ø.

Net reports:

Net	*Sessions*	*Check-ins*	*Traffic*
North American SSB	26	761	2010
HBN	31	606	1662
20 Meter SSB	23	412	1522
7290	46	1555	1182

QST

Hamfest Calendar

California — Sure and begorrah it's a St. Paddy's Day Dance . . . Knights of Columbus Hall, 12317 Birch, Hawthorne, California . . . Saturday 8 P.M. . . . March 19 . . . all orange and green invited . . . sponsoring group of fellows and colleens is the Southern California VHF Club. For information write W6FNE, 16205 South Broadway, Gardena, California 80247.

Georgia — The Columbus Amateur Radio Club, Inc., will sponsor the Annual Columbus Hamfest on Sunday, March 27 at the Fine Arts Building at the fairgrounds. For reservations or information contact W4FIZ, 3804 Conrad Dr., Columbus, Ga. 31904

Illinois — The 5th Annual Banquet of the Six Meter Club of Chicago will be held on Saturday, March 5 at 8:00 P.M. at the Park Manor VFW Hall, 1301 West 87th St., Chicago, Ill. Donation $4.00 per person. Tickets available until Feb. 26 from W9AVB, K9DKI and K9ZWV.

Illinois — The Sterling Rock Falls Amateur Radio Society will hold a hamfest on March 13. For details write WA9MOU, 301 Grace Ave., Rock Falls, Illinois 61071.

New York — The Southern Tier Radio Clubs will hold their 7th Annual Hamfest and Dinner on March 19. The dinner will be held at St. John's Memorial Center, Harry L. Drive and Virginia St., Johnson City, New York. The doors will open at 5:00 P.M. and dinner will be served at 7:00 P.M. Further information, tickets, and reservations may be obtained from W2SDA, 1165 Vestal Ave., Binghamton, New York 13903. Tickets are $3.75 for adults, $1.75 for children. Mobile talk-in on 50.4 Mc. (K2ERQ/2).

Ohio — April 16 is the date for the Dayton Hamvention this year. This 15th annual meeting of the Dayton Amateur Radio Association will be at Wampler's Ballarena, Dayton, Ohio, and is one of the largest amateur meetings in the U. S. A. This year's program includes technical sessions, exhibits, home-brew contests, hidden transmitter hunt, women's activities, flea market and FCC examinations. Information is available from the Dayton Hamvention, Department J, Box 44, Dayton, Ohio. QST

COMING A.R.R.L. CONVENTIONS

March 18–19 — Michigan State, Saginaw
April 22–24 — ARRL NATIONAL, Boston, Massachusetts
May 28–29 — Roanoke Division, Natural Bridge, Virginia
May 27–29 — Southwestern Division, Anaheim, California
June 3–5 — West Gulf Division, Arlington, Texas
June 18–19 — Rocky Mountain Division, Colorado Springs, Colorado
July 2–3 — West Virginia State, Jackson's Mill
September 16–17 — Ontario Province, Niagara Falls
October 15–16 — Hudson Division, Tarrytown, New York
October 21–22 — Great Lakes Division, Muskegon, Michigan

Prospective convention sponsors are urged to check with ARRL Hq. to avoid possible date conflicts.

Strays

Stolen Equipment

A reward of $500.00 will be paid for information leading to the arrest and conviction of the two men who broke into Harrison Radio at 225 Greenwich St., New York City at about 2:05 P.M. Sunday, January 23, and the recovery of the following Collins Amateur Radio equipment: KWM-2 serial No. 10520, KWM-2 serial No. 11316, 62S-1 serial No. 10429, 75S-3 serial No. 10165, and 399V-1 (PTO Speaker) serial No. 83. Contact Bil Harrison or Ben Snyder at 212-227-7922 or Detective Hayden at 212-226-8226.

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By the time this issue of *QST* reaches you a new weather satellite (ESSA II) carrying the Automatic Picture Transmission system described by Wendell Anderson, K2RNF, in last November's issue should be in orbit. The launch is planned for the latter part of February, and the "bird" will have a 5-watt transmitter on 137.5 Mc. Preliminary data indicate an altitude of 750 nautical miles, orbital period of 112 minutes, and an inclination of 98 degrees (sun synchronous). Northward crossing of the Equator is expected to be at 9 A.M. local sidereal time.

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All QCWA members residing in upstate New York are invited to join the new Central New York State Chapter. Purpose of the new chapter will be to promote fellowship among QCWA members and to renew acquaintances in the Radio Amateur fraternity, at least once annually. All QCWA members who might be interested in joining are requested to write Lt. Colonel (Ret.) Bert Martin, Jr., K2IBB/W3NT, 3646 Rath Street, Endwell, New York 13760 for information.

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The newly-formed Shaker Heights High School ARC, Shaker Heights, Ohio, would like to contact other high school radio clubs.

An effort is being made to locate veteran navy radio operators who served during the first World War at the Navy's station at Otter Cliffs, Maine. They will be eligible to receive a certificate of recognition signed by the Director of Naval Communications, Rear Admiral Robert H. Weeks, USN. Radio operators assigned to Otter Cliffs between the dates of August 28 1917, and July 26 1919 should communicate with Mr. Charles Ellsworth, W1TU, Hancock, Maine 04640. Approximately 80 watch-standing radio operators manned the Otter Cliffs facility in its heyday and by the end of World War I it was described by Secretary of the Navy Daniels as "the most important and most efficient station in the world." The station was decommissioned in 1935.

MICHIGAN STATE CONVENTION

Saginaw March 18–19

The annual Michigan State ARRL Convention will be held at the Bancroft Hotel, in Saginaw, Friday and Saturday, March 18 and 19. One of the Friday night features will be the selection of the "State Radio Amateur Queen." A full program is scheduled for Saturday, including meetings of QCWA; AREC; RACES; Army, Navy and Air Force MARS; and Postal, u.h.f.-v.h.f., CD, QMN, YLRL and other net organizations. FCC examinations will be given Saturday morning; FCC Form 610 and $4 fee must be sent **in advance** to FCC, 1029 Federal Bldg., Detroit 48226. A speaker of national reputation will be present at the convention, as will League officials and appointees. The ARRL forum is scheduled for Saturday evening.

Visitors may participate in many seminars, visit the swap shop, examine displays and talk with amateur equipment distributors. YLs and XYLs will have a special program of activities from a "Chatter Tea" to a bingo game.

Convention headquarters and home for out-of-town guests will be the Bancroft Hotel, at the corner of Washington and Genessee; all convention activities will take place in the hotel. Rates are as follows: single, $6.50; double, $8; studio, $16; suite, $22; dormitory, $3.50 per person. Convention registration is $1.75 in advance, $2 at the door. Hotel reservations, tickets and additional information are available from the Saginaw Valley Amateur Radio Association, 3505 Mackinaw, Saginaw, Michigan, 48602.

OUR COVER

A significant improvement in the overall efficiency of frequency multipliers has been made possible through the use of varactor diodes. For a thorough treatment of this useful vacuum-tube substitute, see page 11.

Correspondence From Members-

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

XLX

O.K.! Who's the clown who decided that the way to write Vol. 50 was "Vol. XLX"? Any schoolboy knows that after XLX comes L. — *James Grubs, W8GRT, Sylvania, Ohio.*

If ever a feller earned a thorough application of the Wouff Hong, it is the mixed up Roman back there at Hq. who put "Vol. XLX" on my perfectly good *QST* magazine. LXXIII — *Roy S. Williams, W6VON, La Mesa, California.*
(You can be sure we gave our printer L! — *Editor*)

V.H.F. MANUAL

I bought a copy of *The Radio Amateur's V.H.F. Manual*. I must confess it seemed at first to be a rehash of *QST* articles. However, I took the time to read it and have changed my mind diametrically. Providing historical information is a wise choice; perhaps too little is made of the serious scientific accomplishments derived from ham radio . . .

Your manual provides a means for the "average ham" (whatever that means) to begin v.h.f. or u.h.f. activity on a practical basis, and has more state-of-the-art material of practical help than I have ever seen in any other manual . . .

I compliment you on a job well done. — *Frank P. Merritt, Jr., K6YCX, Yorba Linda, California.*

This really is a good job! My first reaction was that it was like having ten years of *QST* right on the end of the workbench; then, after more, study, I realized it was even better. My congratulations . . . — *William L. Smith, W3GKP, Spencerville, Maryland.*

. . . I am sure it will bring forth the highest praise from all quarters — it is a marvelous job . . . — *John T. Chambers, W6NLZ, Palos Verdes Estates, California.*

. . . Something we have badly needed for a long time, this handy reference . . . done in the usual inimical Tilton manner . . . will be prized by me in the years ahead . . . — *Ralph E. Thomas, W2UK, Colts Neck, New Jersey.*

Since I am a tightwad, I haven't bought your new *V.H.F. Manual* as yet, but borrowed a copy. I have read it, looked at all the circuits, and must say it is a first-class job, obviously the work of a man who knows the common pitfalls . . .

Best two bucks worth to come along in a long time . . . gonna order me one, if I can find out where my wife hid the checkbook. — *John Cannavan, W5IICM, Houston, Texas.*

W/K QSL REPLIES

I made nearly 200 QSOs in the 1964 ARRL DX competition and sent cards to all by direct mail, except those whose addresses I could not find. Only a small part of all my W/K contacts have been confirmed. If I send a card it means I want to receive one. I wonder how these people feel if they QSL and don't get answers. It cost me a week's wages to pay the postage for cards from that contest.

I shall try to enter the 1966 competition if I can borrow a rig. Please, gals and guys, send me your cards first and I will answer you, but this time I won't send mine first. — *Henry Kotowski, SP5AHL, Warsaw, Poland.*

WANTED: T.O.M.

Managed a short glimpse of December *QST* today. Wish it could have been a longer one 'cuz I sure did 'preciate hearin' from T.O.M. again.

I guess it's understandable that we don't hear from D. A. Hoffman and Tewpieye, nor read the Young Squirt's epistles to The Old Man anymore; even the young squirt's key is probably silent by now. But honestly, editor dear, how come we don't have some one or ones writing (or drawing) in *QST* nowadays with at least an amount of lampooning ability equivalent to that of these old buzzards? Might do a whale of a lot of good.

Yeah, I've heard of W6ISQ, but it seems to my WA2 way of thinkin' that his writing is as contrived as my phony accent. I criticize his style only.

Funny thing, my nose has a greater tendency to get stuck in front of pages of print when I'm enjoying myself to some extent. — *Francis K. Williams, WA2UFI/WA1CRK, Cambridge, Massachusetts.*

USE ZIP CODES

I offer appreciative comment on the page-fillers you insert in *QST* wherein you point out that we are requested to use zip code numbers. There is little outside of the original contact that so delights the average ham as a card verifying said contact. Yet there are still those who ignore reminders to add that series of five digits that are a legal part of an address. . . . — *John L. Hartzler, K9DGW/WA9MAN, Elkhart, Indiana.*

TELETYPE STUNTS

Well, goody-goody; now we have a special feature in (December) *QST* on how to do stunts and have fun with RTTY — even to the point of playing "Jingle Bells" and possibly country folk music!

Shades of the days when broadcasting on ham fone and even playing tunes by slowing and speeding up the rotary spark were stunt features.

This kind of stuff almost ruined the ham public image; I for one do not think RTTY is a place for stunts. Your article is not in the interests of ham radio. — *Cecil W. Guyatt, W4IFO, Richmond, Virginia.*

DXPEDITIONS

There has been a lot of discussion lately about amateur radio's "image" and the necessity for raising general operating and technical standards. I should like to see some discussion about another "disease" afflicting ham radio: the current rash of so-called DXpeditions financed through donations by a group of DX-hungry addicts.

The commercial nature of these ventures makes a mockery of the term "amateur" radio. The pseudo DX contacts they produce are not in the best interest of amateur radio; many foreign amateurs have expressed disgust at their operating practices. Their operation in certain countries or localities is of dubious legality, they constantly shift all over the band creating tremendous QRM, reports given are usually erroneously high to discourage second callbacks, and QSLs go only to those on the approved list. Apparently these stations and many of those endeavoring to work them have never heard of "The Amateur's Code." To my way of thinking, DX is a marvellous way to further international understanding and to get to know your fellow ham on the other side of the world. The value of DX is in the quality rather than the quantity of QSOs. I fail to see how a 10-second QSO with one of these so-called DXpeditions adds anything worthwhile to amateur radio. Indeed, it stretches one's imagination to even think of these paid soldiers-of-fortune and their wholly commercial operations as even belonging to the amateur radio fraternity.

As a DX station myself, I have had many wonderful ragchews with stations all over the world, including my fellow American hams. I would never call the stations mentioned and I deplore the many good QSOs I have lost because of QRM caused by these dubious DXpedition activities. — *Edward L. Koller, VK2AU/W6UDY, St. Ives, N.S.W., Australia.*

HUMBUG

¶ Have I missed it?
Is it tucked away in some obscure corner?
Did you have it printed in Swahili?
RCA said it . . .
so did Collins . . .
Harvey Radio, too . . .
and Hammarlund, Drake and Swan.
I've been through my December *QST* front to back, and back to front, yet I fail to see it anywhere.

All right, you Scrooges, if you'll not wish me a Merry Christmas, I'll not have one. And who cares about 1966 anyway? But just wait until I'm next asked about this "international good-will", for which amateur radio is supposed to be renowned.

CHRISTMAS? HUMBUG! — *F. Allan Herridge, G3IDG, Basingstoke, Hampshire, England.*
(Aw shucks; happy new year, Al! — *Editor*)

CODE CLAIM DISCLAIMED

¶ Some time ago a Los Angeles newspaper reported a Communist Chinese claim to the world record for sending five-letter code by hand key . . . 150.8 characters per minute . . . This was mentioned on page 41, December *QST*.

One of our members, Mr. Harry Turner, W9YZE, set a record of 175 characters (35 words) per minute with a hand key, in November, 1942, at the U.S. Army signal corps school at Camp Crowder, Missouri. Plenty of spectators were present, one of them Commanding General Ben Lear.

Mr. Turner's army service record reads "35 words per minute or more" (machines used by the army at that time could only send back 35 words per minute). In the signal corps, an operator must copy back what he has sent to have his sending speed rated; Mr. Turner was able to do this. On the wall of his shack hangs a certificate of achievement, issued by the Department of Army, stating that he set this record.

It would appear that to equal or better Mr. Turner's record, they will need considerable more practice. — *Cletus Woodard, President, Egyptian Radio Club, Inc., Granite City, Illinois.*

COMPLIMENTS

¶ Thank you for an excellent magazine. Don't get discouraged by the nuts that withdraw their membership over the stand you have taken on incentive licensing (with which I don't happen to agree), or by publishers of other magazines that make irresponsible statements in their idiotorials . . . — *Bruce G. Thompson, W.17DNA, Port Angeles, Washington.*

¶ I compliment you on January *QST*, especially the 5-band, 3-transistor receiver article on pages 51–54; I have been looking for something like this for quite some time. I hope you follow up on this by supplying a transmitter which could be used with the receiver.

Keep up the good work.— *Terry Ryan, WA4VOM, Memphis, Tennessee.*

MORE NOVICE ADVICE

¶ I always read "Correspondence From Members." Most Novice advice is very good but some can be discouraging, especially if you are not making many QSOs. I have a couple suggestions: operate the way ARRL recommends; make CQs short but clear, and then scan the dial for an answer; and save an hour or so at night to transmit. If homework has to be done, take advantage of weekends and holidays. A little bit of encouragement: over the last ten-day holiday I worked 13 new states in over 25 QSOs. — *Steve Day, WN3EQY, Potomac, Maryland.*

OPERATOR OF THE MONTH

¶ I received your "Operator of the Month" award for December. It is the most highly-prized card I have received in nearly thirty years as W8PNW.

I wish to thank ARRL for this honor. I wish, too, continuing success of the League for this and all future years. — *Arthur C. Federle, W8PNW, Cincinnati, Ohio.*

PERSONAL CONVICTION

¶ I congratulate all ARRL officers who have stood up for what is best for the future of amateur radio in the face of those who oppose ARRL policies for purely commercial and selfish reasons. Your service is outstanding in that you have not allowed personal conviction to be swayed by political pressure and economic expediency. — *Eddie Bertram, W5PIL, Beeville, Texas.*

The article beginning on the opposite page, one of the series of classic QST *articles being reprinted in this anniversary year, was the first to put radiotelephony on a scientific basis for the radio amateur. As originally printed it was in two parts, but in reproducing it here we have deleted a section that dealt with practical tube combinations of the day. The technical description of the several modulation systems is as sound today as it was forty-five years ago, and the article can still be an eye-opener for those who don't know their modulation principles!*

QST

A Magazine Devoted Exclusively to the Radio Amateur

Modulation in Radio Telephony

*By R. A. Heising**

Presented at Radio Club of America, Columbia University, Feb. 25, 1921.

Here at last is really authoritative information for the amateur on radiophones. Mr. Heising has given the amateurs a splendid paper couched in terms they can understand and we consider it the best article on the subject it has yet been our pleasure to present. Incidentally it should settle once and for all the argument about grid leak vs. constant current modulation.—Editor.

The Modulated Antenna Current

The average radio amateur on entering the radio telephone field, must bear in mind the fact that he has much to learn to make a satisfactory telephone set that was not necessary for a telegraph set. Also, that because the nature of the signals to be transmitted is different, certain methods of operation and certain requirements which were proper for telegraphy are decidedly improper for telephony. Neglect of these facts and a blind effort to apply to telephony the rules for telegraphy will result in a considerably poorer set than should be the case.

Before discussing any of the systems of modulation, it appears desirable to point out some of the essential facts concerning radio telephony. By doing so, the reason for many modulation circuit connections will be better understood and the finer points which distinguish a poor arrangement from a good one will be appreciated. A study of the form of the antenna current as influenced by a signal will give us many pointers as to the best arrangements for a good circuit.

Human speech, which is the signal to be transmitted in radio telephony, consists of an aggregation of frequencies lying largely between 200 and 2000 cycles per second, having various amplitudes, periods of duration, and transients at the beginning and end, so arranged as to convey information to the listener. To convey the human voice by radio it is necessary to provide a system which will convey all of these frequencies; that is, it must reproduce each frequency at the receiving end and reproduce it with the proper amplitude in comparison with the others, and reproduce its "transient" or amplitude variation at the beginning and the end, and it must do this for each frequency while doing it for others. This is enormously more difficult than transmitting a telegraph signal. To transmit a telegraph signal it is only necessary to produce some kind of a noise at the receiving station and the signalling is done by varying the duration of this noise. The noise does not have to bear any relation to any noises at the transmitting station but needs only to be something the receiving operator can hear. In telephony, *any* noise will not do, because the noise to be reproduced must be identical with the noise produced at the transmitting station, it must contain the same frequencies, give them their relative amplitudes, and have them last the proper length of time. The complexity of the signal necessitates a control of the radiated wave not necessary in a telegraph system and it is the control which is such an important part of the radio telephone circuit.

An example of a radio telephone wave is indicated in Figure 1. The carrier wave amplitude is here varied according to the wave form of the signal. The precision of control required to cause the proper antenna current, regardless of the millions of forms the signal may take, is quite evident. This signal on being received and rectified

*Engineer Research Laboratories of American Telephone & Telegraph Co. and Western Electric Co., Inc.

will reproduce the modulating signal, since the rectified current will be substantially proportional to the high frequency amplitude.

In the discussion of a radio frequency current, it is usual to assume a simple signal as the modulating signal, as most of the necessary information can be secured with that assumption. It is assumed that the signal to be transmitted is a single sine wave of some audio frequency such as 800

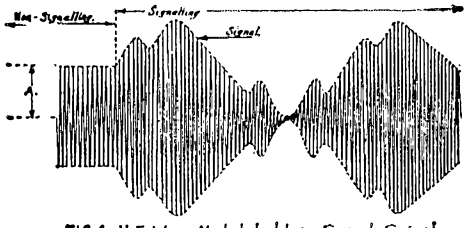


FIG 1 H.F Wave Modulated by a Speech Signal

cycles. A modulated antenna current carrying this signal is represented in Figure 2. This antenna current is expressed by the equation

$$i = A\ (1 + K\ sin\ p\ t)\ sin\ wt \quad (1)$$

In this equation $sin\ wt$ represents the radio frequency wave and $sin\ pt$ the signal frequency wave. K is known as the modulation constant and is usually expressed in percentage form. When no signal is being transmitted the high frequency amplitude is A and the constant K is zero. If a signal of such a loudness as to make K equal to unity is spoken, the term $1 + k\ sin\ p\ t$ varies between values of 0 and 2 depending upon $sin\ p\ t$ passing through the values -1 and $+1$ and the amplitude of the high frequency current varies between zero and $2A$. That is, the modulation of the current causes it to rise, as well as fall, and it should rise as much above as it falls below. If the system is so constructed that the amplitude does not rise, but is varied downward only, a speech signal will produce a wave of the form shown in Figure 3. In-

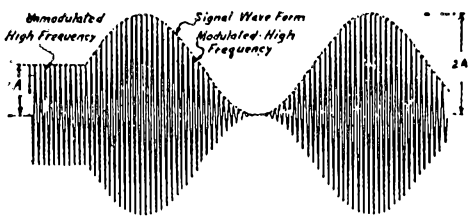


FIG 2 H.F Wave Modulated by a Single Sine Wave Signal

spection of this indicates that a great distortion is produced. The amplitude should vary so as to follow the dotted signal line, but the failure of the system to cause the current amplitude to rise chops off one-half of the speech signal and gives an imperfect reproduction at the receiving end. This one-sided or improper modulation is to be avoided if possible.

Those who are acquainted with elements of trigonometry will observe that we can change the form of the equation (1). Such a change does not affect its validity at all but does point out one or two new facts. The equation can be changed to:

$$i = A\ sin\ w\ t - \frac{AK}{2} cos\ (w + p)\ t + \frac{AK}{2} cos\ (w - p)\ t \quad (2)$$

This equation indicates that a sustained wave, such as shown in Figure 2 and represented by equations (1) and (2), can be said to consist of three frequencies—

The radio carrier frequency $\frac{w}{2\pi}$ *of amplitude* A

An upper side frequency $\frac{w + p}{2\pi}$ *of amplitude* $\frac{KA}{2}$

And a lower side frequency $\frac{w - p}{2\pi}$ *of amplitude* $\frac{KA}{2}$

When no signal is being transmitted, $K = 0$ and the only frequency is the radio carrier frequency with amplitude A. As soon as the signal begins to modulate the wave, the side frequencies $\frac{w + p}{2\pi}$ and $\frac{w - p}{2\pi}$ of amplitude $\frac{KA}{2}$ appear while the carrier remains unchanged. The modulation of the radio wave thus takes the form of the production of side frequencies. At the receiving station, the beats between the carrier frequency and the side frequencies, when rectified, produce the frequency of the transmitted signal.

If the signal to be transmitted consists of many frequencies such as 200, 500, 1200, and 2000 cycles, the frequencies in the antenna will be the carrier frequency f and the side frequencies $f+200$, $f-200$, $f+500$, $f-500$, $f+1200$, etc. In telephony, human speech contains frequencies largely between 200 and 2000 cycles so that to transmit speech by radio we must expect to have in the antenna the carrier f and the side frequencies $f+$ (200 to 2000) and $f-$ (200 to 2000). That is, if we use a carrier of 50,000 cycles there will occur in the antenna the frequencies—

The carrier 50,000 cycles
Lower side frequencies between 48,000 and 49,800
Upper side frequencies between 50,200 and 52,000
giving us *a band 4,000 cycles wide necessary for the transmission of speech.*

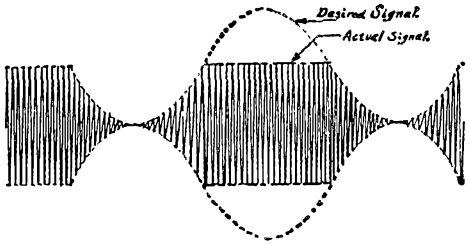


FIG. 3 An improperly Modulated Wave

Having described in detail the important features of a radio telephone wave, we are now in a position to point out a few facts of vital interest to an amateur. In radio telegraphy, it is customary to tune and adjust the set for the maximum antenna current that it is possible to obtain. Signalling is then done by making and breaking the circuit causing the antenna current to fall to zero in the spaces and rise to the maximum in the dots and dashes. The greater the antenna current, the greater is the VARIATION in the current when signalling. The VARIATION in the current is what is desired and the maximum antenna current is tuned for only because the change in current between that value and zero gives the greatest VARIATION. The VARIATION in the current while signalling is thus the factor which determines the loudness of the received signal. In telephony the VARIATION in the antenna current while signalling is also the determining factor as regards loudness of signal or distance to be reached, but the amateur must remember that the determination of the maximum VARIATION is not so easily done as in the case of telegraphy. The antenna current is not merely reduced to zero in spaces and then returned to the normal value, but it varies through all possible values from zero to TWICE THE NON-SIGNALLING VALUE. In telegraphy the current is either zero or maximum. In telephony it has a certain non-signalling value (*A* in equation 1 and Figure 2) and takes all possible values between 0 and twice the non-signalling value (*2A* in equation 1) and the apparatus must be capable of producing any possible value between these limits. Therefore the amateur is warned that when he tunes his set up for the non-signalling value *A*, he must see that the system that he uses has some variable in it which when operated upon by the speech will make the set give *2A* in the antenna. Failure to remember this will result in producing one-sided modulation as shown in Figure 3.

In telegraphy, it is possible to determine with the antenna ammeter alone the VARIATION in antenna current while signalling. When the key is open the current is zero, when it is closed the current is a maximum. In telephony, unfortunately for the amateur, there is no simple apparatus to tell what the variation is, or to tell him when he is getting complete modulation. There are, however, two indicators which will give an operator some idea of his degree of modulation. The first is the variation in the reading of the antenna ammeter. When a wave is completely modulated by a symmetrical signal in a properly adjusted set, the antenna ammeter reading increases by about 22½%. (To be exact, the reading is $\sqrt{}$ (1.5) times the non-signalling value). This must not be taken as an infallible guide as it is not easy to get a set adjusted so as to make this indicator worth much. A badly distorted wave will give a reading variation of even greater than this amount. Judgment should not be passed upon this evidence alone. The second indicator is the quality of the received signal. The signal from a set which tends to "over-modulate" has a peculiar sound often described as "tinny". It sounds like the voice of a person holding a sheet of paper against the lips. It is caused by the over-modulating action

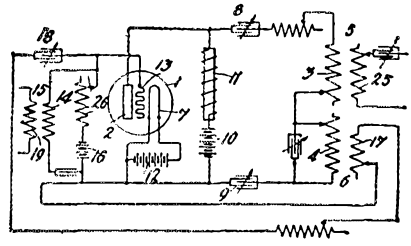


FIG 4 Colpitts System

cutting off the peaks of certain loud signal waves. The identification of this kind of distortion can be learned by observation. The amateur must not let his imagination get the better of him and confuse microphone distortion or other noises and distortions with this over-modulation distortion as many do. He should learn to identify the sound under conditions that will not give him the wrong impression of its character. This indicator is the only cheap indicator of complete modulation at present available to the amateur. It is much more reliable than the antenna ammeter method,

but indicates only over-modulation. It will be found, however, to be useful.

Having discussed the nature of a modulated antenna current, we are now in position to discuss some of the systems which produce it.

Colpitts System

Among the systems of modulation which may be of interest may be mentioned Colpitts' system shown in Figure 4 and a modification of it, the Logwood system shown in Figure 5. This system is

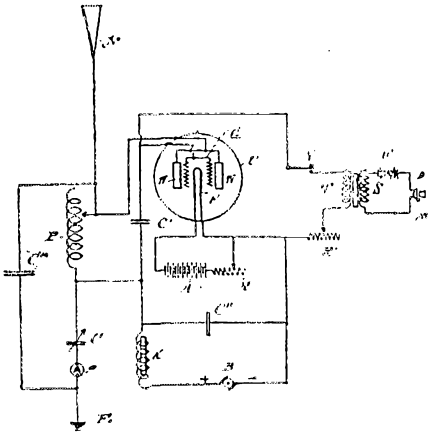


FIG 5 Logwood's Circuit

primarily an oscillator upon the grid of which the speech signal is impressed. In this circuit the grid acts as control member for the amplitude of the oscillation. However, as the grid is also used for controlling the current through the tube while oscillating, it is compelled to perform two different functions simultaneously and unless the circuit is very carefully adjusted, it fails in either one or the other. Usually the amateur will adjust the oscillator to get the most power into the antenna and then impress the signal upon the grid expecting perfect operation as easily as is secured in telegraphy by opening and closing the key. Such, however, is not what results. This system gives about 20% modulation, which is quite poor. To adjust this circuit to give complete modulation requires much more complicated apparatus that the amateur is likely to possess, and there is added the fact that the adjustment is not only difficult to obtain, but is difficult to maintain. The efficiency of such an arrangement is not very high. For an amateur who wishes to secure good range the system is not advised. If, however, one is merely interested in something which will talk a short distance, it is one of the easiest systems to construct.

Van der Bijl System

A system which we have used in many of our experiments is shown in Figure 6 and is known as the Van der Bijl system. It falls under a classification of systems known as "amplifier systems" in which a small amount of power is modulated and then the modulated current is amplified into the antenna. The modulation is done in this circuit by means of a tube in which we make use of its curved characteristic. In Figure 6 will be observed a small high frequency voltage with the time axis running downward, which is impressed upon the grid and whose position on the characteristic curve is varied by the signal to be transmitted. The varying slope of the characteristic curve causes the high frequency current in the plate circuit to change, depending upon what part of the characteristic curve this small voltage wave operates. If it operates around the point marked B, it produces the amplitude indicated directly to the right of the letter B. If it operates around the point marked C, it produces a much greater amplitude as is indicated to the right of that letter. If the signal should slide this wave down to the point A, practically no alternating space current occurs. We thus have the phenomenon of being able to get any alternating space current we desire by merely sliding the high frequency input up and down the curve. If we use the signal to slide this small input up and down, the amplitude produced in the plate circuit is such that a line drawn through the peaks (the envelope of the peaks, so to speak) is the wave form of the signal desired. Having once secured a small amount of modulated high frequency current, it is only necessary to amplify it up to the

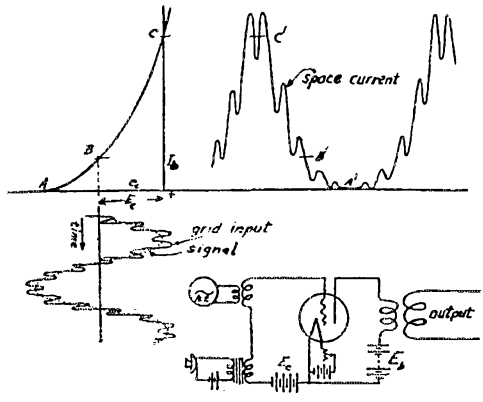


FIG 6. Van der Bijl's System

desired power and put it on the antenna.

This type of system, though fairly simple, is not as good as some to be described later. It is however, as good and as efficient as any other amplifier system. That is, it is as good as any system in which a small amount of power is modulated by some means and then amplified to the desired point. The efficiency in these systems is determined by the efficiency of the amplifier and has very little connection with modulating arrangement itself.

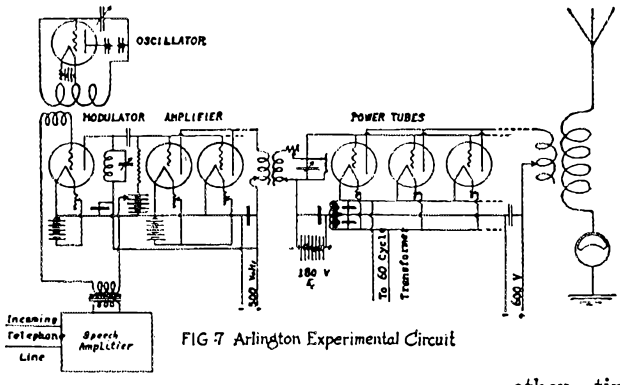


FIG 7 Arlington Experimental Circuit

The circuit which we used in our test at Arlington, 1915, is given in Figure 7. The average amateur should be able to pick out the oscillator, modulator and amplifiers in this circuit without much trouble.

Modulating Amplifier System

A modified form of the Van der Bijl system is that indicated in Figure 8. It is known as the "modulating amplifier" system. It differs in detail from the previous arrangement in that the high frequency wave impressed upon the grid is equal to or much larger than the signal wave, instead of being much smaller, and in that the modulator not only modulates, but amplifies and delivers the modulated high frequency current directly to the antenna. This system should be of some interest to an amateur because it is one he can quite easily construct. It requires, however, two or more tubes. One of the tubes must be used to generate the high frequency oscillations, while the other is used as the modulating amplifier. These tubes may be of different sizes; the one generating the high frequency oscillations does not have to be over 1/10 the power rating of the modulating amplifier tube. If the tubes are of very large size, it may be necessary to use a speech amplifier between the microphone and the modulating amplifier.

In a system of this kind, it is desirable to have a high frequency amplitude several times the signal frequency amplitude. The experimenter should vary the negative voltage, finding the values at which he gets maximum current and minimum current in the antenna. After having determined these values, he should set the negative voltage at about the value halfway between these limits, the value being that which will give ½ the maximum antenna current. The circuit it then properly adjusted for speech since the non-signalling value is ½ the maximum possible. He must not feel that he is cheating himself out of some power when he reduces the antenna current to half the maximum, because he is not. The speech signal coming in and being impressed will momentarily oppose the battery at times and cause the power to rise to the maximum, and at other times will momentarily aid the battery, causing the power to decrease to zero. He has a value about which the antenna current can both increase and decrease by the mere changing of the potential of the grid. This gives him a circuit adjustment which will produce an antenna current as indicated in Figure 1 or Figure 2. It can rise to a higher value as well as decrease to a lower value by a mere potential change which in this case is his grid potential, and he can get a properly modulated, if not a completely modulated, antenna current. The natural inclination of the amateur is to leave the value of E_c such as to give him the maximum antenna current. If he does this, he can only secure an improperly modulated current such as in Figure 3. His signal impressed from the transmitter and the transformer has alternating potentials which in some instances aid the battery

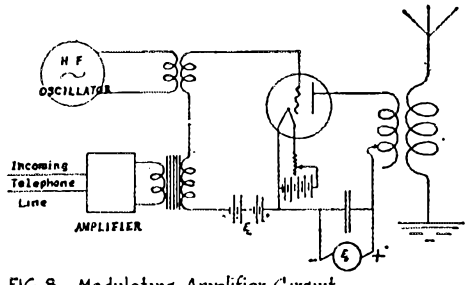


FIG 8 Modulating Amplifier Circuit

E_c, and other instances oppose it. At those instances where it aids the grid battery and makes the grid become more negative, the antenna current will be modulated in a downward direction. But in those instances when it opposes the grid battery and reduces the grid potential it should raise the antenna current. If he does not

make the non-signalling antenna current half the maximum by increasing the negative grid battery he will be operating about the point of maximum antenna current and nothing he can do on the grid can ever make the current any greater. Since his speech signal contains equal amounts of

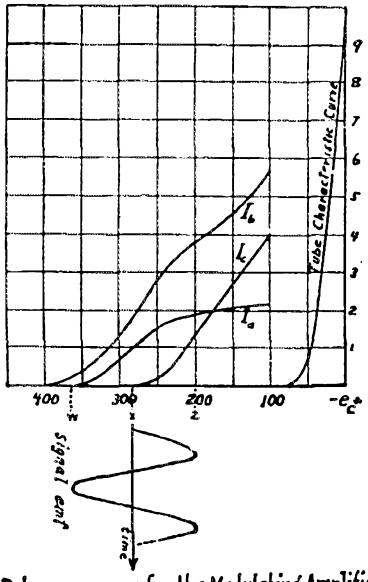


FIG. 9 Behavior curves for the Modulating Amplifier

positive and negative potentials which alternately aid and oppose the battery, he will get modulation only for that half of the signal which aids the battery, giving him the identical improperly modulated signal represented in Figure 3. To secure the complete radio signal, he must increase his negative grid voltage to such a value, as mentioned previously, as will allow the incoming speech signal to oppose the battery and increase the antenna current at times as well as to aid it and decrease it at other times.

A set of curves such as a person would get from a modulating amplifier is indicated in Figure 9. The curve for antenna current (I_a) was secured by slowly varying the negative grid potential and taking readings of the antenna current at the same time. As we approach the value of 100 volts on the grid, it is seen that the antenna current is rising so slowly that it is not desirable to go any farther in that direction. In fact, for most work, it is better not to go to a smaller value than 200 volts. This is marked by the letter Z. Half way between this value and that value W at which the antenna current is reduced to zero is marked the value X which is the amount of negative voltage we would apply to the grid when not signalling. If now, we produce by means of a microphone and transformer the simple signal indicated with the time axis running downward, we can cause the potential of the grid to vary. The potential of the grid is the sum of the constant negative potential 280 volts and the varying signal potential, and the grid's potential will range between the points W and Z, causing the high frequency antenna circuit to vary between the maximum and minimum values.

Constant Current System

The most desirable circuit for most amateurs to use is the constant current system. This has been described in numerous papers but is indicated again in Figure 10. It consists essentially of an oscillator and a modulator tube being supplied in parallel from a constant current source. The constant current source needs to be of constant current only as regards the signalling frequency, and then, does not have to be exactly so, but merely relative. The simplest arrangement is indicated as consisting of a constant potential generator with a large choke coil in series. Any variation of current through the generator and choke coil at the signal frequency is enormously opposed by the large choke coil, so that if a signal is impressed upon the grid of the modulator tube causing the current taken by it to vary, the variation must pass through the oscillator for the reason that the large choke coil imposes such a large impedance to any variation in current through the generator that the variable current is forced through the oscillator. This causes the oscillator to deliver an antenna current which varies according to the power supply.

The behavior of the constant current system is represented in Figure 11. The modulator has such a negative voltage that its space current is about the same as that of the oscillator. Theoretically they should be exactly the same but practically the modulator can be adjusted to take one half the space current of the oscillator when not signalling and on account of the curvature of the tube's characteristic, it will rise to an equal value while signalling. In curve I they are represented as equal. The top horizontal line represents the total space current which is kept constant. As the signal is impressed upon the modulator grid, the current taken by it varies according to the distance between the curved line and the top horizontal line, forcing the oscillator to take the remainder of the current—that represented by the ordinates of the curved line—from the bottom horizontal line. Now the voltage necessary to force this varying current through the oscillator must vary also, and it happens to vary in a corresponding manner, having the form shown in curve II. The antenna

current amplitude is proportional to the oscillator voltage or to the oscillator current and will also vary in a corresponding manner as shown in curve III. We thus get in the antenna a h.f. current whose amplitude varies according to the signal to be transmitted.

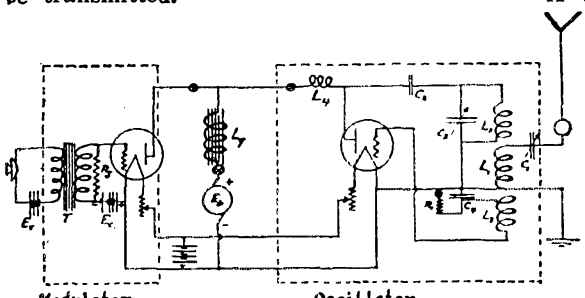


FIG. 10 200 Meter Constant Current Transmitter

The reason for the rise in voltage at point X to twice the generator voltage is explained by the fact that the constant current choke coil acts as a storehouse for energy at times and delivers this energy back at other times. Thus at point Y curve II the voltage across the oscillator and modulator is practically zero because the modulator resistance has dropped and the choke coil has such a large reactance against an increase in current that most of the generator voltage, if not all, is taken up by it. During this period, the choke coil stores up energy being delivered by the B battery. At other instants such as X, the modulator resistance has gone to infinity and the choke coil now delivers up this stored energy and causes the voltage across the oscillator to rise to twice the normal value.

The variation of power to the oscillator is represented in curve IV. This curve is arrived at by multiplying curve I by curve II. An interesting fact to be observed is that at point X the power being delivered to the oscillator is twice the average being delivered by the B battery. This is accounted for by the fact previously mentioned of the choke coil storing up energy during part of the signal cycle (around point Y) and delivering up this energy at another time. It causes the constant current system to be one of the most efficient circuits that has been devised.

Curve V represents the power delivered to the modulator. The power lost there is a maximum under the non-signalling condition. At point X when all the current goes to the oscillator and none to the modulator, the power dissipated in the modulator is zero. At point Y when all the current goes to the modulator and none to the oscillator, the voltage across the modulator is so small that again scarcely any power is lost there. Thus at the two extremes of maximum and minimum antenna current, the modulator dissipates no power, and the average while transmitting a completely modulated signal is one half the non-signalling amount wasted.

A desirable feature of this system is that no further changes or adjustments are necessary to the oscillator after tuning it up properly. The modulator is not part of the high frequency circuit and upon completing the high frequency adjustments, the system is ready to work.

It must be remembered, however, that the modulator has its own adjustment—that of the negative grid potential—but this adjustment is independent of the high frequency circuit.

This system can be used with any type of oscillator, or with certain master-oscillator-controlled amplifiers. The principal precautions to be observed are to see that the high frequency and audio frequency circuits have proper condensers or choke coils in them to pass the desired currents and stop the undesired ones.

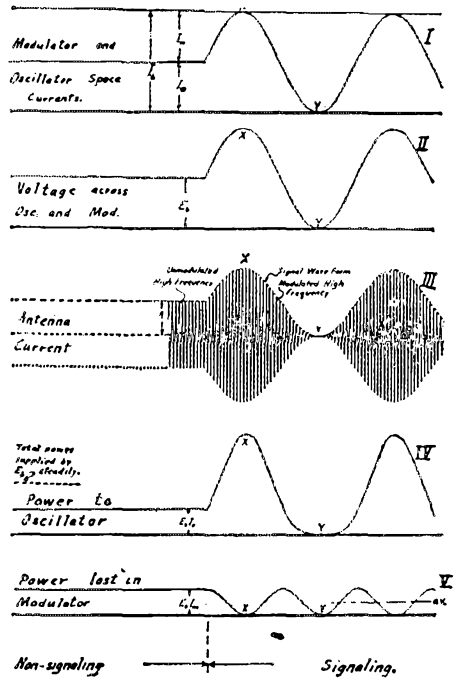
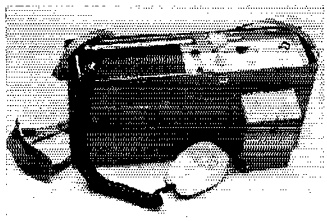


FIG. 11 Constant Current System Behavior Curves.

• Recent Equipment —



The Lafayette HA-650

50-Mc. Transceiver

HERE is a lightweight, compact all-transistor 50-Mc. station with enough output to be useful in ordinary communication, yet with power drain held down to the point where operation from self-contained flashlight cells becomes practical. As such, the HA-650 should be very popular with 6-meter men who like to "mountain-top" beyond the range of automotive transportation. It is ideal for short-range emergency communication, either on its own batteries or hooked up to the 12-volt system in a car. A cable for 12-volt connection is supplied, and a power supply giving 12-volt d.c. output from 115-volt a.c. input (HB-501) is available.

The transceiver is designed for pedestrian-mobile use. A leatherette case with shoulder sling is supplied, and the rig can be operated while in the case. A telescoping whip only 8 inches minimum length is mounted on a swivel joint at the left end of the panel. It opens up to a maximum of 55 inches and it may be used in any position, permitting horizontal, vertical or any polarization in between. A socket is provided for connecting an external antenna of the 50-ohm variety. A small slide switch selects either antenna.

The Receiver

Receiver sensitivity is well above the minimum necessary for adequate performance with its companion transmitter. An r.f. amplifier, mixer, tunable oscillator and three 1620-kc. i.f. stages precede a diode detector and three audio stages. The last audio stage is a push-pull Class-B amplifier that also serves as the modulator. It has thermistor bias stabilization. The i.f. stages are neutralized. A.g.c. voltage developed in the audio detector is applied to the bases of the r.f. and i.f. amplifier transistors. The a.g.c. characteristics are peculiar; the receiver makes almost no noise in the absence of any signal, but when you tune across the band signals pop out at you with tremendous audio volume. A comparison with a good converter, signal-for-signal on the same antenna for both receivers, will show that the transceiver does right well.

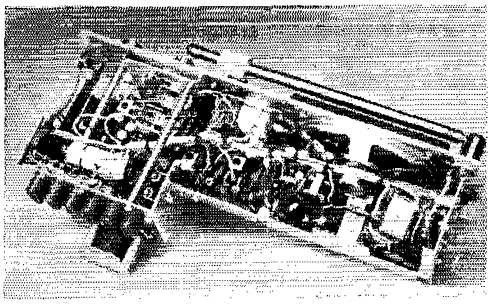
Selectivity is all you'll want to handle in portable work. Specifications say 3 kc. at 6 db. down and 8 kc. at 40 db. down. This is sharp slicing for a 1600-kc. i.f. system, and we found little trouble with interference between stations separated by more than heterodyning distance. The oscillator collector voltage and base bias are Zener regulated, and stability is quite good. There is a protective diode across the receiver input, to guard against r.f. burnout of the first transistor.

Receiver tuning range is 50 to 52 Mc., recognizing the basic fact of receiver design that it is extremely difficult to provide four megacycles of tuning and at the same time have ease of control. By covering only the first half of the band a reasonably good tuning rate is obtained with a low-cost planetary-drive dial. The small knob and dial assembly do not help in this, but they undoubtedly were a concession to the need for compactness and simplicity in a hand-carried portable.

If the receiver has a real weakness it is the small dynamic range of the a.g.c. system. Strong

The Lafayette HA-650 transceiver, with its metal case and leather carrying sling removed. The telescoping whip is swivelled out to show the panel and operating controls. Next to the speaker grill are the S-meter and spotting switch. Knobs are volume control and power switch, tuning dial, and 6-position crystal switch. Molded plastic housing for 10 D-size flashlight cells fits into niche at the left rear.

signals just about blow your ears off if you tune across the band with the gain up high enough to hear the weak ones. We know of no simple cure for this, having encountered the same problem in using a small pocket broadcast receiver as the i.f. for a 50-Mc. portable transceiver. You just have to be ready with a finger on the gain control. The a.g.c. cannot be turned off, and the receiver is definitely for a.m. phone only, there being no b.f.o. Sideband and c.w. are out.



Interior of the 50-Mc. transceiver. The two-gang receiver tuning capacitor and most other receiver components are at the left, with the crystal sockets and modulation transformer at the front of the picture. Most transmitter components are on the circuit board that occupies the righthand two-thirds of this view. The whip is shown in its carrying position.

Transmitter

Four transistors are used in the r.f. portion of the transmitter. The oscillator takes 8-Mc. crystals, and there are sockets and switch positions for 6 of them. Surplus FT-243 types work well. The circuit is a Pierce, with the tuned output on a harmonic. (The schematic doesn't say which harmonic, and we couldn't get to the coil to find out with a wavemeter.) The second transistor multiplies to 50 Mc., and it has three tuned circuits between it and the first amplifier, to filter out unwanted multiples of the crystal frequency. Two amplifier stages on 50 Mc. follow, and both are modulated.

Modulation is adequate, and of good quality. Some audio is applied to the driver through a 68-ohm resistor shunted across an audio choke. The output stage uses the grounded-base circuit and the output (collector) circuit is series-tuned. The microphone is a high-impedance dynamic, supplied with the transceiver. Its push-to-talk switch is the only operating control.

The transmitter frequency range is intended to match that of the receiver, but we found that retuning of the driver and output tuned circuits is necessary for maximum output, if the frequency is shifted more than 200 to 300 kc. This is no great handicap, as most 50-Mc. operation is in the first 500 kc. of the band, ordinarily.

Assembly

With the exception of the crystals, sockets and selector switch, the entire r.f. assembly is a single circuit board, in a form that will be familiar to anyone who has examined the innards of small Japanese transistor radios. Innumerable beautiful little components are employed, and the whole arrangement is deceptively simple in appearance. Most part numbers are marked on the circuit board in black ink, adjacent to the components in question, but they are not easy to see. This combined with the Japanese symbols and general lack of information on the schematic diagram makes checking out the circuits no simple task.

The case and battery housing are marvels of simple metalwork, and the whole thing comes apart in a few seconds. Self-contained power is provided by 10 large-size "D" flashlight cells, in a molded-bakelite housing that keeps them together neatly and makes battery changing a breeze. External power from a 12-volt battery may be connected by removing the plug and cable that go to the D cells and substituting the cable supplied for this purpose. It has its own 1-amp. fuse. Small dial and meter lamps glow when the external power is used, and do not work on the flashlight cells. The transceiver should be used with negative-ground cars only, unless the circuit is rewired for positive ground. Current drain is 80 ma. maximum on receive, 400 ma. maximum on transmit.

The whip antenna is especially neat. It is fitted with a dual-purpose soft plastic clip that holds it in place against the front panel, for carrying, or slips down over the swivel joint to keep the antenna erect when the transceiver is used on the whip. One drawback with this arrangement: the folded-down whip lies directly over the S-meter, and comes close enough to other controls to be somewhat inconvenient when the rig is used with an external antenna. You can't have everything, as anyone who has tried to design really small radio gear quickly learns.

The instructions supplied with the HA-650 leave much to be desired. Almost nothing is said about the equipment's design features, and the made-in-Japan circuit diagram requires extensive study before the owner will know much about what he has bought. Most of the transistors have Japanese numbers, and American equivalents are not given.

Results

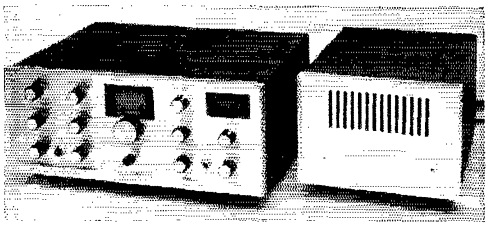
Coverage with the transceiver operating on its whip is essentially local, unless you take it to some high spot that has a distant horizon. But when you put the HA-650 on a good beam you may be surprised to discover that a watt or so is enough to provide plenty of contacts. This is not exactly earth-shaking, though in these days of kilowatts in every lunchbox the tendency is to think that high power is a must. Not so, in v.h.f. work, at least. Much of our 6-meter communication is over easy paths, where very strong signals ordinarily prevail. On such circuits one watt works exactly as well as 1000 — a fact of life that will bear emphasis when you hear wailing about 50-Mc. TVI. This little package would make it possible for many would-be 6-meter men to use the band without annoying their neighbors.

Chances are that they would work at least 75 per cent of the stations they could raise with 100 watts or more.

For mountain-topping a dry-battery transceiver is a pure joy. Take along a portable beam such as the one described in January, 1966, *QST*, page 32. Drive as far as you can up your favorite mountain. Then get out and walk to the top, if there's no road, and get up to where signals are strong, the air is clear, and ignition noise is nil. QSOs over 100 miles and more are routine in such circumstances. If you haven't tried it, you're missing one of ham radio's greatest thrills. — *W1HDQ*

Lafayette HA-650 Transceiver

Height: 5½ inches.
Width: 9½ inches.
Depth: 2¼ inches.
Power Requirements: 11.5 to 14.5 volts d.c., 400 ma. max. 117 volts a.c., with optional Model HB-501 power supply.
Price Class: $120, with 10 "D" cells and cable for 12-volt service.
Manufacturer: Lafayette Radio Electronics, P.O. Box 10, Syosset, N. Y. 11791



Eico 753 S.S.B. Transceiver

A NEW contender in the s.s.b. kit market, the Eico Model 753 S.S.B. Transceiver, transmits and receives a.m., c.w., and s.s.b. on three amateur bands. The transmitter p.e.p. input level is 200 watts on s.s.b. and c.w. On a.m., a p.e.p. input of up to 100 watts is available.

The transceiver operates on 80, 40 and 20 meters, transmitting and receiving upper sideband on 20 and lower sideband on 80 and 40. It is available either in kit form or as a factory-wired unit at the option of the consumer. Similarly, two power supplies — Model 752 for mobile operation, or the Model 751 for a.c. use — can be secured either in kit form or as prewired equipment.

About the Circuit

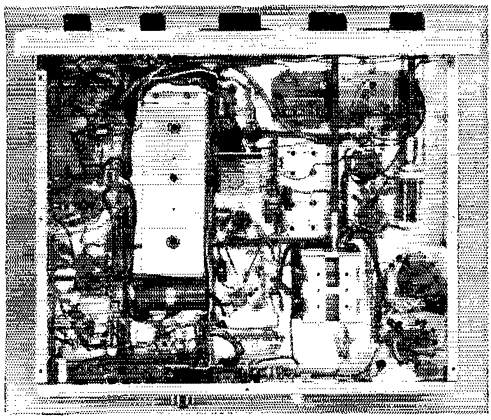
The original design of the 753 resulted in nearly 100 per cent use of vacuum tubes throughout. The only exception was the use of germanium diodes in the a.l.c. and a.g.c. circuits. Later, in an effort to improve the frequency stability, a solid-state v.f.o. was made available as a circuit-modification item to those who desired to update their transceivers. The new v.f.o. circuit board is prewired and can be installed in place of the vacuum-tube oscillator in less than an hour's time. The model discussed here is the one that has the revised v.f.o. circuitry.

In the transmit mode, during s.s.b. operation, the microphone output voltage is amplified by V_{1A} and V_{1B} (see Fig. 1) and passed along to the 7360 balanced modulator stage, V_2. Amplified audio is also supplied to the VOX amplifier, V_{3A}, where it is stepped up in level and fed to the relay amplifier tube, V_{3B}, for use in voice-controlled operation. Push-to-talk can be used instead of VOX, if desired, by using the microphone switch to control the changeover relay directly. There is a front-panel switch for selecting either method.

A 5.2-Mc. carrier generated by V_{4A} is combined with the amplified microphone voltage in V_2, the balanced modulator. The double-sideband suppressed-carrier signal from V_2 is then fed through a 2.7-kc.-bandwidth crystal filter to a common i.f. amplifier, V_8. The crystal filter removes the unwanted sideband and contributes further to the carrier suppression. After amplification by V_8, the s.s.b. signal goes to V_{12}, the transmitting mixer, where it is heterodyned by the v.f.o. signal to produce the desired transmitter output frequency. After further amplification by driver stage V_{13}, the signal is fed to the parallel-connected 6DQ6Bs, V_{14} and V_{15}, in the final stage. This stage operates as a Class AB_1 amplifier.

For a.l.c., a little r.f. from the final-amplifier stage is rectified by a diode, and the resultant negative d.c. voltage is applied to the grid of i.f. amplifier V_8. As the input signal to the grids of the p.a. stage increases, the a.l.c. voltage becomes greater, lowering the output level of i.f. amplifier V_8 and reducing the amount of drive to the p.a. grids. The a.l.c. action tends to prevent the p.a. stage from "flat-topping" during peak signal periods.

For c.w., the modulator is unbalanced and B-plus voltage is removed from the microphone amplifier stage, V_{1A}. These changes are made when the mode switch is placed in the c.w. position. When V_2 is unbalanced, carrier is supplied to the transmitting mixer, which in turn permits the buffer stage, V_{13}, to produce output to drive the p.a. stage. The drive is adjusted by means of the exciter control, which tunes the mixer and buffer plates. Grid-block keying is employed at V_{12}, the transmitting-mixer. A grid bias of −50 volts cuts off V_{12} during the key-up period, but when the key is closed the blocking voltage is



Bottom view of the Eico 753 transceiver. The metal enclosure at the left center of the photo contains the prewired crystal-filter assembly. At the upper right the underside of the v.f.o. printed-circuit board is visible.

removed, enabling V_{12} to drive the buffer stage.

The circuit conditions for a.m. operation are similar to those for c.w. with the exception that the microphone amplifier, V_{1A}, is switched back into the circuit in the a.m. position of the mode switch. Carrier output on a.m. is on the order of 30 watts.

Receiver Section

In receiving, the pi-section tank of the transmitter doubles in duty and serves as the antenna tuned circuit for V_{16}, the receiving r.f. amplifier. Similarly, the plate coils for V_{13}, the transmitter's buffer amplifier, are used in the tuned circuits for the plate of V_{16}, the receiving r.f. amplifier. When the transmitter is adjusted for operation at a given frequency, the receiver is automatically tuned for peak response at the same frequency because of the common tank circuits. Conversely, if the receiver is tuned for peak sensitivity by adjusting the transmitter's exciter and p.a. tank controls, the transmitter tuning will require only slight touching up when moving from one part of the band to another.

The solid-state v.f.o. controls both the receiver and transmitter frequency and stabilizes after a warm-up period of about 15 minutes. During an investigation of the transceiver's frequency stability, a Variac was placed in the primary circuit of the 753's a.c. power supply and the line voltage was varied from 100 to 120 volts. The receiver frequency shifted 5 c.p.s. during this excursion when checked against a crystal-controlled signal source. The v.f.o. exhibited comparable stability in the transmit mode.

Output is taken from the receiving mixer, V_{17}, and fed through the crystal filter, FL_1. The signal is amplified next by the common i.f. stage, V_5, and passed along to V_6 and V_7 for additional i.f. amplification. One half of V_8, a 12AX7, functions as a product detector, combining the i.f. signal from V_7 and the 5.2-Mc. carrier (b.f.o.) from V_{4A}. The resultant audio signal is amplified by the second half of V_8 and is applied to audio-output stage V_9. The changeover from transmit to receive is effected by switching the mode relay with the push-to-talk switch, or with the VOX circuit.

Careful checks were made while listening to all three bands and the image rejection seemed to be

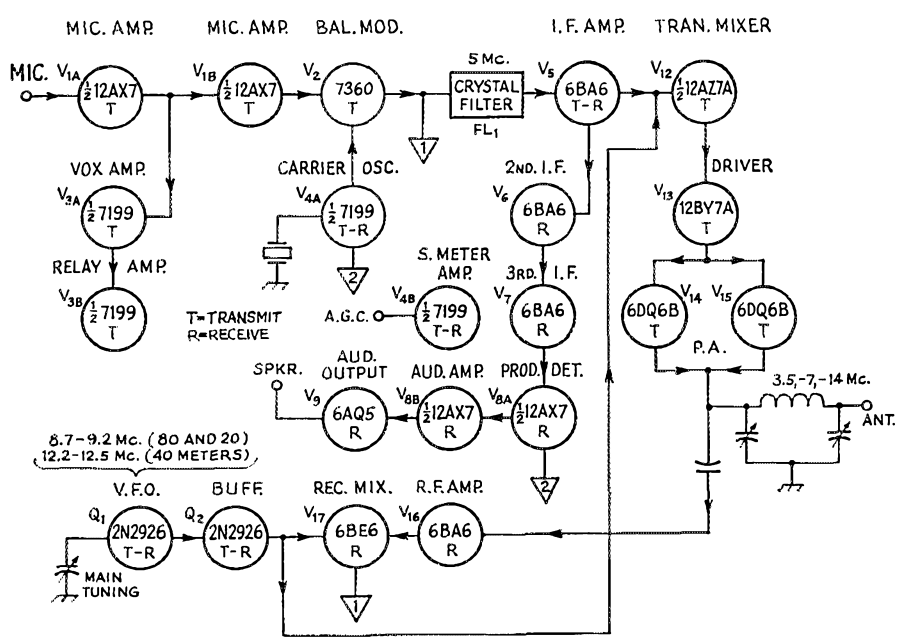
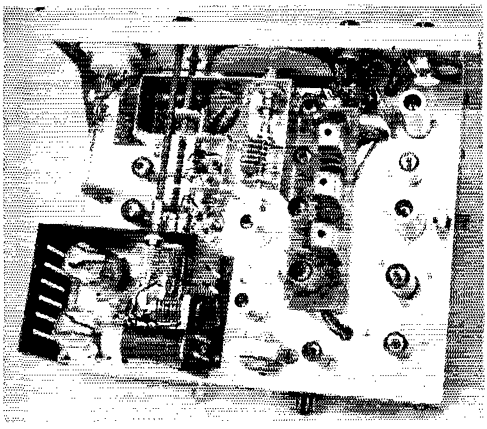


Fig. 1—Block diagram of the Eico 753 transceiver. Stages marked "T" are used in transmitting; those marked "R" are used in receiving.



Top-chassis layout of the Eico transceiver. The shield covers have been removed from the p.a. section (lower left) and from the v.f.o. compartment (upper center) to show the arrangement of the components. The i.f. printed circuit board is visible at the right-center of the chassis.

entirely satisfactory. The sensitivity of the receiver was good and the audio quality of the s.s.b. signals was sharp and natural sounding. The two-ratio dial drive took a little "gettin' used to" but proved to be very helpful when rapid excursions from one end of the band to the other were necessary. The bandspread action of the dial is desirable when one wishes to "fine-tune" a 50-kc. segment of the tuning range.

The main tuning dial is calibrated in 10-kc. increments and is supplemented, while receiving, by a panel-mounted "receiver-offset" tuning control. This control varies the v.f.o. frequency approximately 20 kc. by changing the voltage on a varicap diode which in turn varies the capacitance in the v.f.o. tank. When the offset control is in its center position the receiver is tuned to the transmitting frequency. The offset-tuning feature is especially useful to the c.w. operator who desires to shift the receiver frequency while maintaining an exact transmitter frequency. It also enables the operator to listen to portions of the foreign phone bands while keeping the transmitter frequency in the U.S. part of the band.

Additional Comments

The VOX circuit in the 753 is one of the easiest to adjust that this writer has encountered. In a matter of seconds, all controls were set according to the instruction manual and the "critter" did just what the book said it would. The anti-VOX circuit permitted high levels of audio from the speaker without any tripping of the relay — a most rewarding feature, indeed.

The circuit layout is orderly and in logical sequence. A printed-circuit board is used for the i.f. section of the transceiver. Circuit boards are employed, also, for the v.f.o. and the crystal-filter assemblies. The latter unit is prewired and factory aligned, reducing the complexity of final alignment of the equipment.

Approximately 35 hours were required to assemble and test the transceiver and its a.c. power supply. The less-experienced kit builder should expect to devote about 55 hours to the project. However, the assembly steps are straightforward and easy to understand, so even the less-seasoned radio amateur should have little difficulty in putting the kit together. The component parts are plainly marked and are packaged in individual envelopes for rapid identification.

The mobile power supply, a solid-state type, was supplied to us as a factory-wired unit. It performed well and permitted the transceiver to deliver performance that was comparable to a.c. operation. The early-production mobile supplies were reluctant to "start" in cold weather because the feedback ratio was a bit marginal in the transistor switching circuit. Eico has since offered a substitute resistor for that part of the circuit, which cured all traces of the trouble.

On-the-air signals during c.w. operation resulted in reports of 599X. The s.s.b. and a.m. signals were reported to be clean, effective, and natural sounding, even when the transceiver was used to excite a 1-kilowatt linear amplifier.

The equipment is housed in an attractive cabinet whose dark-blue wrinkle finish presents an appealing contrast to the chrome-satin finish of the panel. All controls are easily accessible and are situated in such a way as to provide ample finger room when adjusting the knobs. The a.c. power supply, which contains the speaker for the 753, is finished in a matching decor. — *W1CER*

Eico 753 Tri-Band Transceiver Kit

Height: 5 13/16 inches.
Width: 14¼ inches.
Depth: 11¼ inches.
Power Requirements: 700 volts d.c. at 300 ma.; 250 volts d.c. at 170 ma.; −100 volts d.c. at 5 ma; 12.6 volts a.c. at 3.8 amp.
Price Class: $190 (less power supply).
Manufacturer: Eico Electronic Instrument Co., 131-01 39th Avenue, Flushing, New York 11352

Strays

James Grubs, W8GRT, 7817 Maplewood Ave., Sylvania, Ohio, would like to hear from hams who are Boy Scout radio and electronics merit badge councillors. W8GRT is interested in exchanging ideas on techniques and in the possibility of starting a radio and electronics merit badge newsletter.

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The caption under the canoe-mobile photograph in *QST*, January 1966, page 56 should read K9EQY, WA9IWK and K9KLT. . . .

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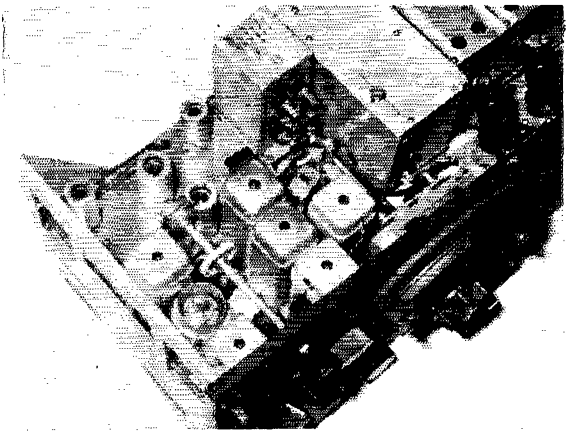
W4JLE/PJ on board the USS *Observation Island* (EAG-154) at Curacao, Netherlands Antilles, completed his WAS in three days! During the same three-day period, Jerry also worked about 1000 stations which represented 38 different countries.



In the author's case, the selective-filter unit is mounted in the dynamotor well of a BC-348. The control shaft of the crystal-selector switch (sideband selector) is extended to the front panel.

Selectable-Sideband Selective-Filter Adapter

Simple System for Updating Older Receivers

BY THOMAS H. FIELDER,* W4EPL

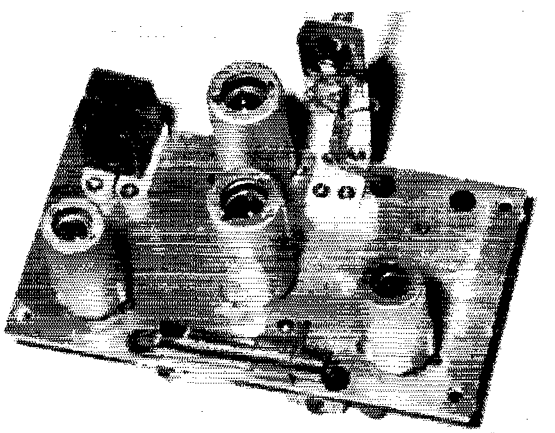
ANYONE who has examined some of the better older-vintage receivers is immediately impressed with the abundance of circuitry, and the rigid mechanical construction. Two tuned r.f. stages are not uncommon and, in many instances, three stages of i.f. provide a relatively sharp bandwidth of 6 kc. It doesn't take much imagination to visualize the performance obtainable with these old standbys when properly equipped with the necessary selectivity and other refinements, some of which have been discussed in earlier *QST* articles.

Increased selectivity may be obtained by inserting a suitable selective filter in the i.f. system. In the circuit of Fig. 1, this insertion is made through a pair of i.f. converters. An attractive feature of the system is that it provides instant selection of sidebands without retuning either the receiver or the b.f.o. The selective filter is sandwiched between the two converters. The first converter (V_1, V_{3A}, V_4) translates the receiver i.f. to the frequency of the filter to be used. The second converter (V_2, V_{3B}, V_4) translates the filter output frequency back to the receiver i.f. frequency. Since the frequencies involved in both conversions are the same, only a single local-oscillator frequency is needed. The conversion gain of the two mixers will usually be sufficient to more than offset the loss introduced by the filter.

The dual cathode follower, V_3, is used to decouple the local-signal grids of the two mixers to prevent the receiver i.f. signal from riding through without benefit of the filter.

Sideband selection is accomplished by shifting the frequency of the local oscillator to place the desired sideband in the passband of the filter. A receiver bandwidth of 6 kc. or more (the i.f. bandwidth of most older receivers which were designed for double-side-band a.m. reception) is sufficient to accommodate both sidebands simultaneously. Therefore, with proper conversion, neither the b.f.o. frequency nor the setting of the main receiver tuning dial need be changed when shifting sidebands, if the b.f.o. is set at the center of the i.f. passband. This is illustrated in Fig. 2. Fig. 2B represents the re-

* 1830 Landrum Drive, Columbia, South Carolina.



Top view of the selective-filter unit. The crystals and oscillator tube are at the top, to the left of the oscillator switch. The cathode follower is at the center; the two mixer tubes, with a mechanical filter in between, are along the bottom edge.

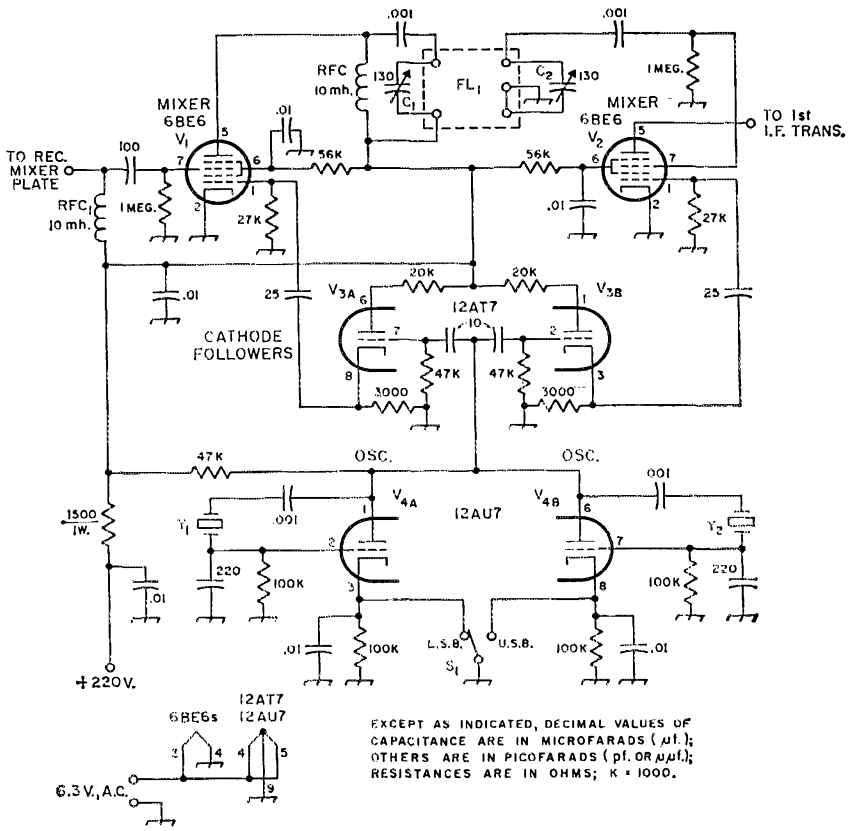


Fig. 1—Circuit of the selective-filter adapter. Fixed capacitors of decimal value are disk ceramic; others are silver mica or NPO ceramic. Resistors are ½-watt composition.

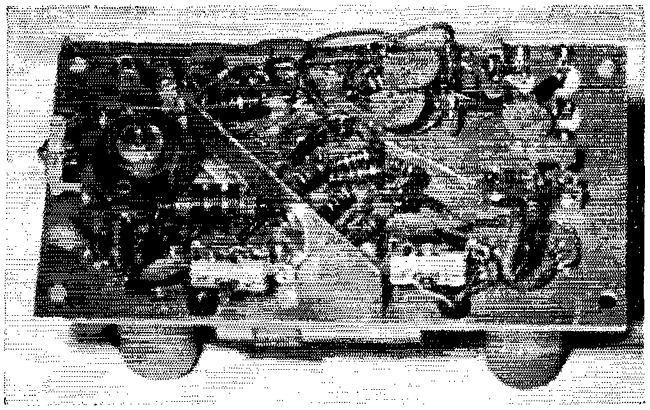
C_1, C_2—Trimmer capacitor (see text).
FL_1—Selective filter (Collins 455Y3.1 used by author).
RFC_1—10-mh. r.f. choke (see text for alternatives).
Y_1, Y_2—Oscillator crystal (see text for determining frequency).

sponse curve of a typical selective filter having a bandwidth of 3 kc. at 6 db. down, while Fig. 2C represents the curve for a typical receiver i.f. amplifier having a bandwidth of 6 kc. at 6 db. To accommodate both sidebands in the 6-kc. i.f. bandwidth without shifting the b.f.o., which replaces the suppressed carrier, it is obvious that the suppressed-carrier frequency should fall at the center of the i.f. passband. On the other hand, to accommodate a single sideband 3 kc. wide in the 3-kc. passband of the filter, the suppressed carrier frequency should fall at X for one sideband, and at Y if the other sideband is in use. Each of these points is 1.5 kc. removed from the center frequency by which most receiver filters are designated. Therefore the conversion-oscillator frequency must be such as to convert the frequency at X or Y to the center frequency of the i.f. amplifier, the choice depending upon which sideband is desired.

In the example of Fig. 2, the center frequency of the filter is at 455 kc., while the center frequency of the i.f. amplifier is at 915 kc. Point X is at 455 — 1.5 = 453.5 kc.; Point Y is at 455 + 1.5 = 456.5 kc. Therefore the two conversion-oscillator frequencies required for the output mixer are 915 + 453.5 = 1368.5 kc., and 915 + 456.5 = 1371.5 kc.

Fig. 2A represents the frequency segment that will be fed to the input converter from the receiver mixer when the receiver is tuned to place a suppressed-carrier frequency at the center (915 kc.) of the i.f. passband. Sideband A extends from 912 to 915 kc., with the suppressed carrier at 915 kc. Using the 1368.5-kc. oscillator frequency, this band will be translated by the input converter to the range of 456.5 (1368.5 — 912) to 453.5 (1368.5 — 915) kc., with the suppressed carrier at 453.5 kc. The output converter will then retranslate to the range of 912 (1368.5 — 456.5) to 915 (1368.5 — 453.5) kc., with the suppressed carrier at 915 kc. Similar conversion of Sideband B takes place when the oscillator is shifted to 1371.5 kc.

It will be noticed that the sidebands have been designated "A" and "B," rather than "lower" and "upper". Which sideband will be upper and which will be lower, as transmitted, will depend upon the conversion system in earlier stages of the receiver. If the undesired



Bottom view of the selective-filter unit. The shield separates the two mixer-tube sockets.

sideband results with one oscillator frequency, simply switch to the other, and label the switch accordingly.

The foregoing may appear to be rather basic, but it's fairly easy to make a mistake in calculating oscillator frequencies if the over-all picture isn't kept in mind. Check and double-check your figures before ordering crystals for the oscillator.

The specific combination shown in Fig. 2 was used to insert a 455-kc. mechanical filter in the 915-kc. i.f. system of a BC-348 receiver. The same scheme can be applied to other combinations of i.f. and filter frequencies, with the filter frequency either higher or lower than the receiver i.f. frequency. However, there should be a frequency difference of at least 2 to 1, and preferably 3 or 4 to 1, between the i.f. and the filter frequency. Also, care should be taken to select a filter frequency that will permit the use of conversion-oscillator frequencies whose fundamental frequencies and harmonics fall outside amateur bands. Contrary situations can sometimes be avoided by using sum conversion frequencies instead of difference frequencies.

Construction and Installation

The photographs show a unit that was designed to fit into the dynamotor well of a BC-348 receiver. The sideband-selector switch is controlled by a shaft brought out through the front panel. Layout of components should not be too critical. However, an effort should be made to hold stray capacitances across the filter to a minimum. The shield visible in the bottom-view photograph runs between the two mixer-tube (V_1 and V_2) sockets.

To minimize the effects of stray capacitance across the filter, the filter should be inserted at a low-level point in the i.f. system — preferably immediately following the receiver i.f. mixer. The signal connections to the input and output of the unit should be made with low-capacitance shielded conductor. If space is available, the unit can be mounted inside the receiver cabinet; otherwise, it can be mounted externally with the necessary connections to the receiver made through a system of phono plugs and jacks. Once the filter unit is installed, the stray r.f. leakage can be checked by unplugging the oscillator crystals, and adjusting the r.f. gain control of the receiver. If sufficient shielding has been used, no signals should be heard at the normal setting of the gain control. In the unit constructed by the author, the r.f. gain control had to be advanced practically all the way before leakage was noticed.

Fig. 1 shows capacitive coupling from the mixer, with a 10-mh. r.f. choke as the mixer load impedance. Some gain is sacrificed with this method of coupling, and there is loss of selectivity against unwanted mixer output components. From both of these considerations, a tuned circuit, or better yet, an i.f. transformer might be preferable as a coupling device. An alternative, in case an additional i.f. transformer

(Continued on page 156)

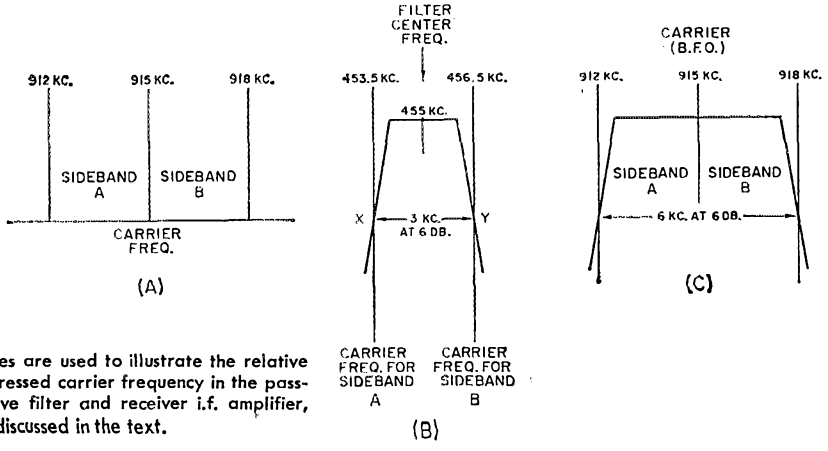


Fig. 2—These sketches are used to illustrate the relative positions of the suppressed carrier frequency in the passbands of the selective filter and receiver i.f. amplifier, as discussed in the text.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

U. K. RECIPROCAL OPERATING RULES

Three types of authorization are now available permitting operation by foreign amateurs holding valid licenses visiting the United Kingdom (British Isles only), provided that a reciprocal operating agreement is in effect between the visitor's home country and the U.K. The "Amateur (Sound) License C," renewable annually, and the "Amateur (Sound) License D," which is valid for only three months, are issued directly to the foreign amateur. Call signs issued will be in the G5 3-letter series, and station identification will consist of this call sign *plus* the home call of the operator; i.e., W4XYZ would sign "G5xxx/W4XYZ". Applications for the "C" or "D" license must be completed in English, typewritten or in block capitals, and should be sent not less than 30 days in advance to the Radio Services Department (Radio Branch), General Post Office, Headquarters Building, St. Martin's-le-Grand, London, E.C. 1. Required fees should not be sent with the application, but are payable upon issuance of the license, in British currency or by overseas money order payable to the Postmaster General, London.

Those requiring authorization for a period of more than three months will be unable to complete application for the "C" (renewable) license until they arrive in the United Kingdom, since paragraph 6 of the form for this license requires the Alien Registration Certificate number, place of issue in the U.K. and dates of issue and expiration. However, the slight delay in obtaining such authorization may be avoided by applying in advance for a temporary "D" license and then for the renewable license upon arrival in the U.K. (when the Alien's Registration Certificate has been obtained). Mobile licenses are also available. A separate fee is payable in each instance.

If a foreign licensee wishes to operate his station at some location in the British Isles other than that specified on his authorization, he must give written notice, at least seven days in advance, to the General Post Office Telephone Manager (E/Radio) for the area in which operation will take place. The *entire* call sign must be given, plus the suffix "P" to indicate temporary status of the station. Additionally, when operating from a different country or area within the British Isles, the licensee must vary his prefix accordingly; i.e., while operating in Scotland, G5xxx/W4XYZ would sign "GM5xxx/W4XYZ/P."

It is also possible for a British amateur to obtain temporary authorization for operation of his station, for not more than seven days, by a foreign amateur, such operation to take place in his presence and under his direct supervision. The foreign amateur must hold a valid amateur license, and there must be a reciprocal operating agreement in effect between his country and the U.K. Operation *must* be within the terms and limitations of the responsible British amateur's license, and the foreign amateur must sign the station log, giving his name and call sign. There is no fee for this authorization.

As is the case whenever an amateur operates within the territorial limits of a foreign country, amateurs operating in the United Kingdom must comply with British regulations: additional information on this subject appeared in "IARU News," August, 1965 *QST*. It is suggested that interested amateurs contact the Radio Society of Great Britain, 28 Little Russell Street, London, W.C. 1, for advice and the necessary forms.

WAC

1474 IARU WAC awards were issued during 1965, representing an increase of 300 over the 1964 total. Of this figure, 921 were for c.w. or mixed modes, 143 for phone only and 410 for s.s.b. 3.5 Mc. endorsements were issued for 22 c.w./mixed and 10 s.s.b. certificates; 1 special endorsement was issued for 1.8 Mc.

(Continued on page 168)

During a late-1965 European trip, Hallicrafters Co. Board Chairman Bill Halligan, W9AC/W4AK, was honored by the Italian (ARI) and French (REF) IARU societies, as well as the ITU amateur radio club (IARC), for his outstanding contributions to international radio communications. Bill is holding a scroll and pin, signifying his honorary ARI membership, from ARI President Dr. R. Sesia, I1FA, at a banquet in Rome.

An Automatic CQ Machine for Voice

BY JAMES E. TAYLOR,* W2OZH

AUTOMATIC sending for c.w. transmission has been commonplace for many years, with equipment varying in sophistication from the simple "CQ wheel" up to the most complex tape machines. However, little has been written about the use of automatic techniques for voice transmission, although the methods required for their inexpensive implementation are readily available. Such a method, capable of calling CQ automatically, is particularly desirable for mobile use, or for fixed-station use on the higher frequencies to discover sudden openings of an apparently "dead" band. The purpose of this brief article is to show how simply and cheaply an acceptable method can be arranged by making use of a small imported tape recorder.

General Arrangement

Since modern voice transmitters are normally equipped with automatic voice control, it is, in principle, necessary only to insert a repetitive tape-recorded message at the microphone input circuit, to achieve the desired result. The VOX circuitry automatically turns the receiver on between successive activations of the transmitter.

The tape recorder used is one of the small Japanese models selling for less than fifteen dollars. The one used by the author has no motor speed control and, therefore, the voice quality is quite poor when the recorder is used in the normal manner with two tape reels. Also, the required periodic interchanging of reels renders this method of operation unsatisfactory. Both of these defects are remedied by the use of a single loop of tape. The load torque is then much more constant, which greatly improves the output voice quality, and it is, of course, no longer necessary to change reels.

For use with a tape loop, the recorder is hung from brackets on the side of the operating desk, with the axes of rotation of the reels horizontally disposed, and with both of these axes in a single vertical plane. The control lever of the recorder projects upward for convenient access at desktop level. This places the driver reel, for the "play" mode, in the uppermost position where it is readily accessible for driving the loop of tape, as shown in Fig. 1.

Tension is provided on the tape loop by an empty reel suspended and rotated by the lower extreme of the loop. The drive reel is held securely against its rotating turntable by means of double-sided Scotch tape.

Some slippage was experienced at first between the driving reel and the tape, but it was found that a snugly-fitting wide rubber band around the hub of this reel provides sufficient friction to eliminate this problem.

The audio output is taken from the headphone jack of the recorder, and it is connected to the

* 1257 Wild Flower Drive, Webster, New York 14580.

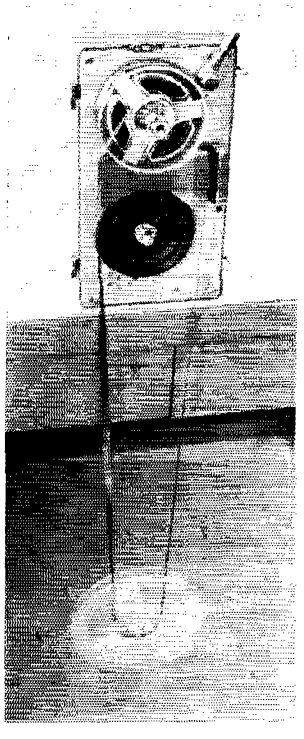


Fig. 1—An unmodified tape recorder drives a short loop (Moebius strip) of tape carrying the "CQ" recording. The operation is stabilized by the weight of the empty reel at the bottom of the loop.

microphone circuit of the transmitter through an adjustable mixer connector (Shure Mini-Mix) which provides adjustment and isolation so that the recorder can be left in the circuit continuously.

The Moebius Strip

A German mathematician and astronomer, Augustus Moebius (1790–1868), described, in a paper published posthumously, the peculiar topological properties of an endless belt formed with a half twist. If we consider an endless belt joined in the conventional manner, it will be observed to have two "sides" — an inside surface and an outside surface. If, however, we twist the belt through a half turn before joining the ends to form a loop, it will be observed that, as Moebius stated, there is no "other side." This can be seen by running a pencil point along the length of the closed belt — all of the surface may be covered without passing over an edge.

If we form the tape loop for the automatic "CQ-er" into a Moebius strip, we need use only half as much tape as would be required for a conventional loop, since the desired period of silence will come naturally in the uncoated portion which previously was the "outside" surface! The required loop length of tape is now only about 20 inches, which renders the arrangement much more acceptable, especially for mobile installation.[1] The loop length can be further reduced by overlapping at the splice. This also serves to make the "listen" period shorter than the transmit period.

Operation

The operation of this system is about as simple as possible. The recorder is permanently connected and, to utilize it, the operator just throws the control lever to the "play" position. The transmission time is about ten seconds, which means that the transmitter is on for this period, followed by a similar period of listening. As soon as a call is heard, it is only necessary to flip the control lever of the recorder to "off" and to grab the microphone.

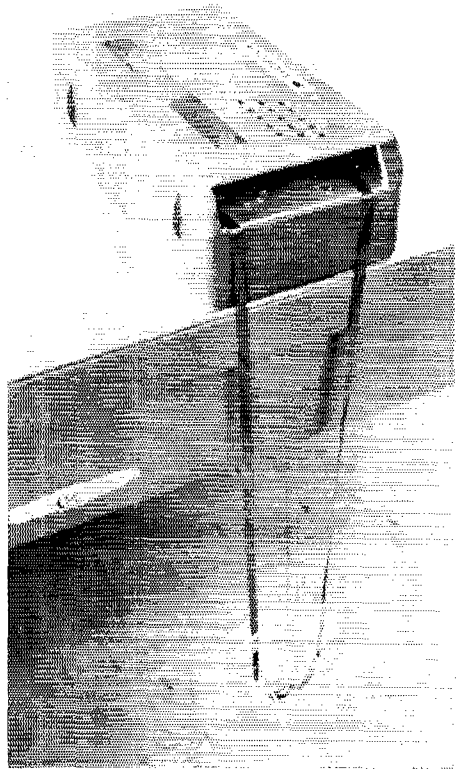


Fig. 2—To permit use of the recorder with cover attached, slits were cut in the cover with a hacksaw, and the end of the cover broken along a scribed mark.

It will be noted that the use of the Moebius strip provides a substantial improvement in signal/noise ratio from transmit to silent modes. This results from the fact that in the silent mode the recorder head is reading uncoated tape, rather than unrecorded coating — a situation which is just about perfect. QST

[1] Similar use of the Moebius strip was suggested by W3GKP in his article, "Magnetic-Tape Second Operator," *QST*, September, 1962.

Strays

The articles by Hall on the Smith Chart, *QST*, January and February 1966, mentioned that Smith Charts are sold by General Radio Co. and numerous college bookstores. Several illustrations in the article show the radial scales used in the Smith Chart. It should be noted here that the radial scales and the Smith Chart are copyrighted by Kay Electric Co., Pine Brook, New Jersey.

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Looking for North Dakota for WAS? The Turtle River ARC at Grand Forks AFB will operate on 14,283 kc. s.s.b. continuously between 1530 and 0100 GMT on April 2, 3, 9 and 10.

You figure the odds on this one. Fourteen years ago WØCMQ received his first amateur license. Last year, his son passed his Novice test and, yes, you guessed it. His call is WNØMQC!

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K2SJN, until recently, taught code and theory classes for c.d. in New Rochelle, New York. Three years ago, one of his students was assigned WV2SJN. Some time ago, he made up c.w. tapes for the Fathers at Holy Cross Monastery, West Park, N. Y., to use in their study toward ham licenses. According to the latest *Callbook*, John Walsted at the Monastery is now WN2SJN!

MONIFILTER

Technical Editor, *QST:*

After several months of using the Monifilter as described in November, 1965 *QST* by me and W7AZG, I have noticed one difficulty. When transmitting with powers in excess of 100 watts, there is a tendency for r.f. to couple back through the headphone lead, and block the transistors during the monitoring phase. I was able to eliminate this difficulty by placing a 270-pf. capacitor from the audio-output terminal to ground, thus bypassing the r.f. signal. — *Alex K. Tinker, Jr., K7UXG, 8330 East Sells Drive, Scottsdale, Arizona.*

THE W3QLV CRYSTAL V.F.O.

Technical Editor, *QST:*

During the building of the W3QLV Crystal V.F.O. (*QST*, December, 1964), I experienced some difficulties with the crystals.

After completion of wiring, adjustment, and some of the etching (bifluoride), it was noted that "rubbering" was not completely successful. In most crystal positions, a total shift of only about 800 cycles was noted. Attempts to correct the situation by changing circuitry ended in failure. Reasoning that the unetched crystals may have collected dirt during previous use, and that the etched crystals might be coated with a thin film of residue, the crystals and electrodes were washed in a hot-water/detergent solution, rubbing vigorously with the thumb and forefinger. The result was a 20- to 40-per-cent increase in the "rubbering" effect, and an increase in crystal activity.

The washing technique was quite successful in a few other cases. In one, a crystal was received that refused to oscillate initially, but it became sufficiently active after washing to be completely useful. In some instances it was necessary to lower frequency by rubbing the crystal with solder. If frequency was reduced by more than 100 cycles or so, activity dropped off, and oscillation actually stopped when "rubbering" was attempted. In all cases, activity was restored by washing, without affecting the solder coating by more than a few per cent.

The main point to remember in preparing for washing is that the fingers be made completely free from grease by washing thoroughly in the detergent solution. A minute or so of washing of the crystal was usually sufficient. Rubbing was continued during the first few seconds of a hot tap-water rinse. The crystal and electrodes were thoroughly dried with paper tissue before being installed in the crystal holder. — *Robert L. Appleby, K2VVE, 8 Frances Road, Metuchen, N. J. 08841*

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Technical Editor, *QST:*

I write in reference to my article, "Crystal V.F.O. with Full-Band Coverage," in *QST* for December, 1964.

There is a tendency for the oscillators to drop out if the crystal is dirty, or for some other reason below par in activity. Cleaning the crystal, as described above by K2VVE, is often effective, but the oscillators are still inclined to be a bit too marginal for comfort. Since publication of the article, we have made a simple change in the oscillator circuit which increases the feedback without materially affecting other properties. The modified circuit is shown in Fig. 1. Note that the original fixed-capacitor feedback voltage divider (5 pf. and 100 pf., or 5 pf. and 300 pf.) has been removed from each of the three oscillators, and that the cathode in each case is connected, instead, to the stator of the associated section of the tuning-capacitor gang.

One other modification was made to reduce the strongest spurious signal to a measured 70 db. below the desired output. This was accomplished by limiting the mixer inputs from the oscillators to about 1 volt, peak-to-peak. The spacing of the link from the main coil in each oscillator output circuit was increased to about 5/16 inch. In this chassis, the "cold" end of the main coil is near the chassis, so the link was merely pushed down the form as far as it would go and secured there with Duco cement. — *Frank W. Noble, W3QLV, 10004 Belhaven Road, Bethesda, Maryland 20034.*

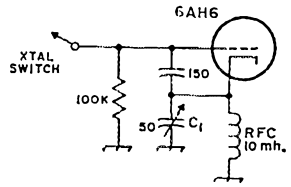


Fig. 1.

STANDARDS FOR MOONBOUNCERS

Technical Editor, *QST:*

I found W6GXN's article "Weak-Signal V.H.F. Reception" very thought-provoking, especially his suggestion that phase-shift keying might be a very efficient modulation scheme for radiotelegraph. I have begun a parametric study of a moonbounce system using phase-shift keying and synchronous coherent detection per current PCM telemetry technology.

The purpose of the letter is to suggest that ARRL propose some standards for moonbouncers. Some things which might be standardized are wave polarization with respect to the lunar axis, polarity of the phase shift for a "dot" (or key-down), keying rates, etc.

I also think that it would be worthwhile to solicit an article concerning the nature of the moon as a reflector. Items of interest are the spectral broadening caused by the moon's motion and its depth, polarization shifts encountered to and from the moon, etc.[1]

I think the time is not too far off when CQs in the 23-cm. band will be commonly heard echoing from the moon, and the earlier a standardized modulation and transmission mode is adopted, the sooner such signals will appear. — *Thomas F. Snyder, W4CAG, 2311 Lynn Road, Huntsville, Ala. 35810*

[1] The points mentioned have been discussed to some extent already in *QST*. See Dyce, "The Appearance of the Moon at Radio Frequencies," May, 1961; and Howard, "The Moonbounce Problem, 28 Mc. and Up," September, 1963. — *Editor*

MICRO-CIRCUIT SHIFT REGISTER

Technical Editor, *QST:*

Re "Perfect Code at Your Fingertips" in the August 1965 *QST:* Compliments to OM Horowitz. The techniques and nomenclature embodied in his article, i.e., the field of digital circuitry, should become as familiar to the amateur as other technical areas of his hobby.

Recently, digital micro-circuits by several manufacturers have been marketed at reasonably low cost for industrial users. More recently, Fairchild introduced a line of very low-cost epoxy encapsulated digital micro-circuits, also for industrial markets.[1] The first item in this line is a JK flip-flop containing 15 transistors and 17 resistor elements on a single tiny monolithic silicon chip. The unit, part No. UX8992328X, in a ceramic-epoxy package similar to the modified multilead TO-5 package, sells for $3.95 in 1-24 quantities. Guaranteed speed is 2MHz, though virtually all units operate through 20MHz. Eleven JKFFs will replace the magnetic shift register in the Horowitz automatic code typer at approximately one-third the cost of new magnetic shift-register elements. A typical interconnection

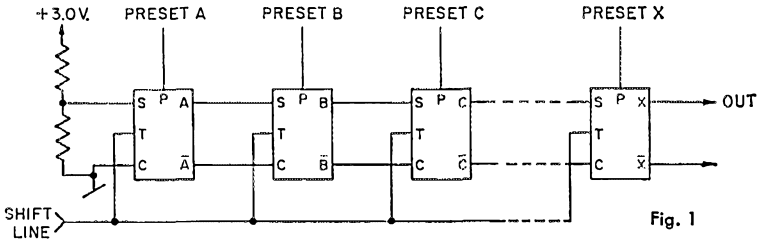


Fig. 1

of the UX899 — as a shift register is shown in Fig. 1.

Since the JK flip-flops switch very rapidly, the shift pulse to the register has only a minimum length, not a maximum. Also, the preset input pulses have only a minimum length. Therefore, the timing circuits in Horowitz's circuit need not be changed as the minimum is of the order of 35 ns. — much shorter than the 2- and 5-μs. pulses used in the present logic. Input and output levels will, of course, be quite different than magnetic-logic levels. Simple buffer stages and/or voltage dividers where required easily solve the level-difference problem.

The exact connections to the Fairchild micrologic elements will not be mentioned here since any description would take too much space for a simple letter of comment. Any interested readers may write me for further details if they so desire. Data sheets should be obtained when the micrologic elements are purchased since pin connections have not been fully explained here.

A definition of JK flip-flop operation is in order. The unit has several possible operational modes which render it rather versatile. In the clocked (gated) mode, logic levels applied to the set and clear inputs are followed by a logical "1" to the clock (transfer) input. If simultaneous "1s" appear at set and clear, the JKFF changes state — no matter what its initial state piror to application of the clock pulse. Simultaneous "0s" produce no change of state when the unit is clocked. A clocked set "1," clear "0" input produces a "1" output, while the opposite (inverted) input produces an inverted output. With both set and clear inputs grounded (logical "1" inputs), the JKFF changes state or toggles with the application of each clock pulse. No ambiguous states are possible with the JKFF. One can conceive of endless uses for such an inexpensive flip-flop in counters, control circuitry, keyers, RTTY terminal units, frequency synthesizers, etc.

Fine; flip-flops are very useful — but they *have* been around for a long, long time. The noteworthy point is they are now available as an off-the-shelf component whose cost (and that of companion gates, buffers, inverters, etc.) precludes the practicality of building equivalent units. Even with the advantage of economy transistors or a windfall in surplus material, try to duplicate their economy. Ideally, one should construct at least one bistable multivibrator, gate or any other circuit in order to get the feel of circuit parameters and operation. Using the individually-built circuit as a component in a larger system is a different matter, however.

Due to their higher speed and lower logic levels, these digital solid-state micro-circuits are more susceptible to circuit noise (transients) than their magnetic logic counterparts. Suitable precautions against noise should therefore be taken in their use. — *Julius M. J. Madey, K2KGJ/6, 1055 East Del Mar Blvd., Pasadena, California 91102.*

[1] The Fairchild epoxy micrologic elements may be purchased from any authorized Fairchild Distributor by an individual. A list of Fairchild distributors may be obtained by writing Fairchild Semiconductor, 313 Fairchild Drive, Mountain View, California 93041.

BC-221 MAINTENANCE

Technical Editor, *QST:*

The recent article by W4AWY (September 1965 *QST*) brings to mind a point or two which may be of benefit to LM/BC-221 users. Backlash, spring, or lack of smooth tuning under whatever names, can be quite frustrating. W4AWY's comments re backlash only cover the spring-loaded gears. In the case of units which are run 24 hours per day, or perhaps those which may have lain idle for months or years, it will be found frequently that the drive-worm bearings may be dry or gummed.

In certain later BC-221 models, the worm bearings and capacitor bearings both are of the sealed type. After a time the sealed lubricant becomes dry or stiff and a "bumpy" feeling is imparted to tuning. This can be cured by the judicious application of a contact-type cleaner such as "No-Noise." These cleaners have a penetrating-type vehicle which will act somewhat as a solvent in loosening the lubricant. It is necessary to apply the cleaner to the bearing drop by drop, and only at the point where the inner race and bearing seal meet. This separation is very small, and when the cleaner is applied with a small piece of wire capillary action will draw it into the bearing. It is not sufficient or practical to squirt the cleaner in the general area and hope for the best.

In the earlier models using the older Cardwell type of gear train and capacitor it is necessary to remove the whole unit for complete relubrication, although some points can be reached merely by removing two covers. It is quite practical to remove the front dial and knob without indexing, but it is

good insurance first to find one of the strong checkpoints near 30.00 and, with a small steel scale held flat on the edge of the rotor plates, mark an index on the housing before proceeding. Knowing what the index mark represents for a dial reading of this strong checkpoint will permit complete disassembly of the unit and reassembly with the assurance of returning to original calibration.

This disassembly and reassembly is not difficult, albeit time-consuming. The single ball bearing at the end of the worm shaft usually remains held in place by the oily lubricant, but can be lost — and if it is lost, all is lost! Great care is needed to keep track of it.

Withdrawal of the worm shaft will permit the spring-loaded gears to unload, but stops on the gears prevent unloading beyond one tooth, so reloading upon assembly will give the correct spring tension. The two gears each have an indexing hole to be aligned with the other — a design intent to provide proper loading.

Cleaning of parts can be done with acetone, naphtha or lighter fluid. Under no conditions should the dry bearings be spun. Contact cleaner seems to work well for bearing lubrication, but "sewing-machine" oil should be avoided, as it has a tendency to gum in time. Vaseline works well on the gear and worm working surfaces, although contact cleaner is suitable between gear faces. Frame-grounding contacts on the rotor should be lubricated with contact cleaner since these are usually silver.

In the process of removing the capacitor unit, it may be necessary also to remove the r.f. unit. As long as this is done as a unit (removal of switch knob and nut together with unsoldering the two or three wires) no harm will result if handled with reasonable caution.

While rough checks will suffice to see if the tuning unit is back in operating condition after reassembly, it will be necessary to allow it to settle down mechanically. This can be facilitated by alternately running the meter for 24 hours and leaving it turned off for 24 hours, over a several-day period. This will give various screws and fittings a chance to expand and contract into a permanent fit, and reduce stresses. Afterward, the high and low correctors can be reset if necessary. — *William H. Fishback, W1IKU, Old Comers Road, Chatham, Mass.*

THE "CANTENNA" AS AN R.F. WATTMETER

Technical Editor, *QST:*

The article by W3HTF (page 29, December 1965 *QST*) not only rang a bell, it short-circuited a note I was preparing to send to you on this subject. After more thought, I decided to send it to you anyway, since not every amateur may care to revise and extend the circuits of the Cantenna, although most amateurs will want to make quick and approximate wattage measurements with the original parts.

Using a new Bird r.f. wattmeter with 30-Mc. 500-watt and 1000-watt pickup elements, I took a series of comparative measurements to calibrate the Cantenna. The Bird meter was inserted between the transmitter and the Cantenna, using a short length of RG-8/U coaxial cable.

The response is frequency-selective, and not truly linear due to diode action as pointed out by W3HTF. I found that a multiplier, K, can be assigned for each amateur band in the formula

$$R.f.\ watts = K \times (d.c.\ volts)^2$$

where the d.c. volts are read with a v.t.v.m. at the Cantenna output.

On 3.9 Mc. K = 61 to 63 (the latter above 500 watts)
7 Mc. K = 33 to 36
14.2 Mc. K = 13.8 to 14.7
21.4 Mc. K = 7.5 to 8.6
28.6 Mc. K = 5.0 to 5.3.

Even though there will be some variation among a series of Cantennas as produced, the above information should be of interest to those who, like myself, were puzzled by the greatly different response with frequency, but who also wanted a fairly-accurate measurement device at a fraction of the cost of a precision wattmeter. Once calibrated as above, the repeatability was excellent. — *Donald F. Alexander, W8DMN, ex-W1BK, 66 W. Peach Orchard Road, Dayton, Ohio 45419.*

FIRE PROTECTION

Technical Editor, *QST:*

In visiting other hams' shacks, I have noticed that one important piece of equipment nearly always is lacking — a portable fire extinguisher.

In my capacity as a fire-protection engineer with the Ohio Inspection Bureau, I know the importance of this little piece of equipment. It can save apparatus, homes, and more important, lives.

The need for a portable fire extinguisher diminishes if the equipment is installed with due regard for proper electrical practices, but this is not the case in many ham shacks. The possibilities of an electrical fire from overloads, short circuits, and other factors are very numerous.

For the average amateur, a 5-pound (weight of the contents, not the weight of the extinguisher) carbon dioxide (CO_2) extinguisher in the shack would be sufficient. I recommend carbon dioxide for two reasons: First, it is designed for use on flammable liquids and electrical fires. Second, it will not leave a residue on the equipment, but will dissipate after extinguishing the fire. A 2½- or 5-pound dry chemical extinguisher is also recommended, although it will leave a powdery residue on the equipment once the fire is extinguished. However, dry chemical and carbon-dioxide units will not be effective against combustible fires — paper, cloth, or wood. An exception is the dry-chemical type specifically rated for this use, in which case it will carry the label "For use on Class A, B, C fires."

Water or soda-acid extinguishers should *never* be used on electrical or flammable-liquid fires. They may cause even greater damage by spreading the fire or causing electrical shock to the user. They are intended for use on combustibles *only*.

A 5-pound carbon-dioxide extinguisher will usually cost about five to ten dollars, depending upon the manufacturer. It is recommended that the purchaser check the extinguisher for the Underwriters Laboratory label, a sign with the symbol "U/L" on it. This means the unit has been tested by U.L.

Once the purchase has been made, the amateur and home owner should instruct *every* member of the household in the proper use of the unit. The local fire department will be more than willing to demonstrate the proper use to the amateur or home owner. — *Jon Q. Groth, K8AFN, Apt. D-11, 381 Front St., Berea, Ohio.*

ONE PLUS ONE = SOLID COPY

Technical Editor, *QST:*

Normally, the amateur has little direct control over component reliability except by selecting reputable suppliers. There exist, however, straightforward techniques of circuit design which can do

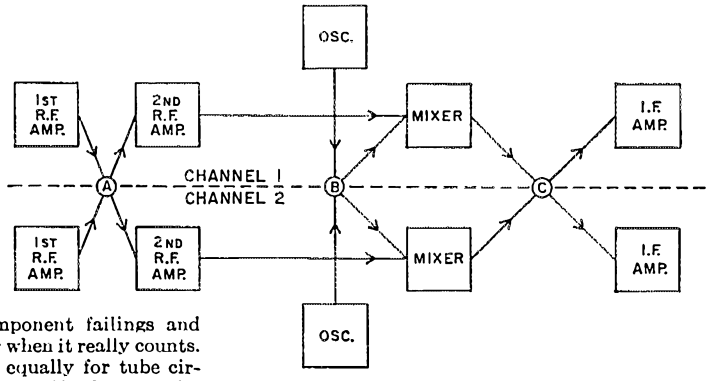


Fig. 1

much to compensate for component failings and thereby insure being on the air when it really counts. Although these methods hold equally for tube circuits, transistor circuitry will be used in the examples because *properly-designed* semiconductor circuits are inherently more reliable, since transistors lack the basic failure mode which goes along with heated-cathode devices.

So even if it means shoving that crumbling box of war-surplus farther back in the closet we should take a hard look at the advantages offered by redundant circuitry — a limited "more-the-merrier" concept which transistors and the like have made feasible.

Redundant circuitry usually takes the form of parallel signal channels feeding a common output, say, a loudspeaker. Even a catastrophic failure in one channel will not appreciably hinder operation of the total circuit. In addition, frequent cross-channel connections are made so that a failure in an early circuit of one channel does not disable the remaining portion of that channel. The end effect is to make very unlikely the possibility of both channels being blocked at the same place.

Fig. 1 illustrates in block form the redundant design of a communications receiver front end. Points A, B, and C symbolize the interconnecting points of identical circuits, either of which can drive *both* following circuits (one in each channel).

A typical method of reducing the redundancy idea to practical circuitry is shown in Fig. 2. In this push-pull arrangement the failure of either transistor will not disable the circuit because of the comparatively-high-resistance coupling from transformer to transistor. If T_1 shorts, for instance, no amplification will occur in the channel following T_1. However, because R_1 is large compared to other resistors in base circuit, even a dead short in T_1 causes only a minor change in the load seen by the driving transformer. T_2 will therefore receive adequate base current to drive its output transformer.

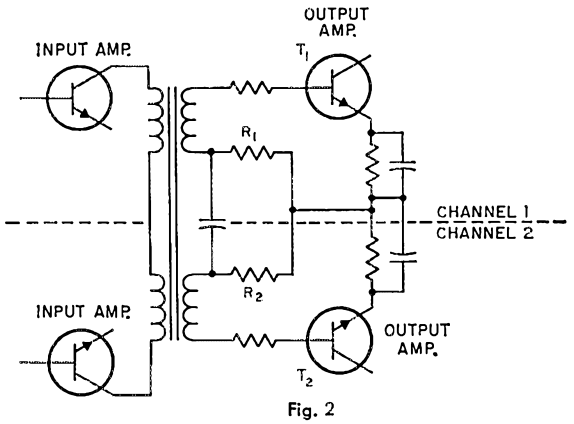


Fig. 2

If you know your component, gratifying improvements in reliability can be had using less Herculean methods. For instance, diodes usually fail in the shorted mode. Knowing this, we find that merely connecting diodes in series significantly adds to circuit reliability since the shorting of one diode in a series string does not stop the diode action of the group. A word of caution, however: The improved reliability in this case is based on the assumption that the remaining diode will still be operating within its specs, so don't drop to a reduced voltage rating on the diodes now that you've seriesed them. The reverse voltage rating of *each* diode in such a reliability "package" should exceed the expected peak voltage with an adequate safety factor (say, 50 per cent).

Two penalties, unfortunately, accompany the redundant approach to reliability: (1) Higher power levels are required to supply the losses in isolation resistors such as R_1 and R_2. (2) Incorporating redundant components into a circuit complicates reliability predictions by increasing the possible modes of failure.

The second penalty listed may seem a contradiction; actually it is merely a fact of life we face each time we build a circuit. Assuming all component failures are either shorts or opens (this assumption is the basis of establishing reliability through iteration) then logically a shorted component is the failure mode in any parallel group of components and an open component in any one of a series destroys the function of that group. Knowing this, we seek to increase the reliability of the group by paralleling the critical items in a series circuit (assuming open component failure most probable) or by series-connecting the elements in a parallel circuit (assuming shorted component failures most probable). However, the less probable mode of failure *can* happen, and the use of redundant components makes this type of failure more likely than before going redundant. As the complexity of the circuit grows, so does our uncertainty of being able to predict the most likely mode of failure and the less certain we can be of the effects of "redundantizing."

So like most panaceas, this one ain't; nevertheless, as the lads in the blockhouses well know, real improvements in countdown reliability can be had using these principles. In the interests of maintaining our reputation for getting the job done under any conditions we can do ourselves and our community a favor by adopting some of this circuit development all we taxpayers helped pay for. — *Phil Higgins, W5JTP, Star Route, Box 182 AB, Alameda, New Mexico.*

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

ONCE upon a time it was enough to know that your receiving set up had a sensitivity of 1 microvolt for some specified signal to noise level at the speaker. This method of receiver rating was (and still is) fine for the low frequencies where the antenna temperature is always high compared to the receiver. As a result of the post-war stampede to the v.h.f. however, the need for a better method of comparing receiving equipment became apparent.

After some fumbling around the communications people settled on "noise figure" for comparing the relative weak-signal merits of receiving systems. This method is fairly easy to use and yields a number which is not dependent on receiver bandwidth, gain, etc. It was (and still is) an excellent method, but it bases its measurement on a comparison with a perfect receiver.

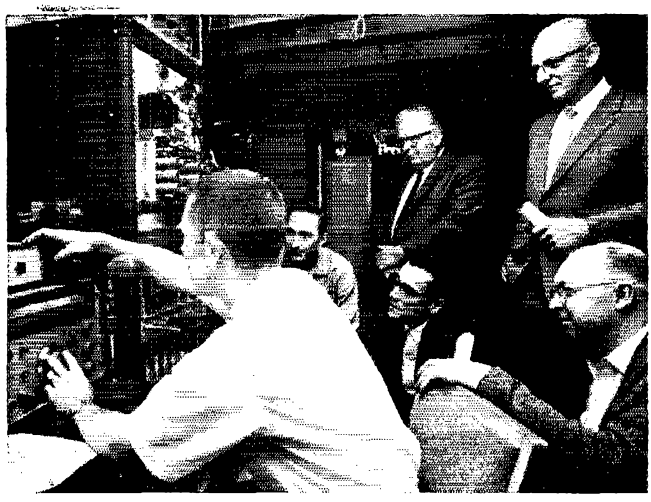
As long as your receiver is poor the comparison yields nice numbers which, when properly used, allow you to calculate how strong a signal must be to be detected by your receiver. The more perfect your receiver, the less meaningful the rating system becomes. If, for instance, your 420-Mc. converter has a 6-db. noise figure, you might be inclined to think that the most improvement you could realize with perfect receiver would be 6 db. This, however, is not the case. The amount of improvement you can obtain cannot be determined by measuring your receiver as a separate entity. It is also necessary to know what your antenna is doing. Not in terms of gain; in terms of temperature.

Now, pay attention, especially if, in the past when antenna temperature was mentioned, you turned to the advertising section so you wouldn't have to think a little. It just so happens that receiver temperature and receiver noise figure are the same thing. As a matter of fact you don't measure the noise figure at all; you measure the equivalent temperature of your receiver and calculate the noise figure from that.

Back in the days when noise figure was the "in" way to do it, you terminated the input of your super-special converter with a resistance which properly matched (you hoped) its input impedance. This resistor, usually 50 ohms, was at room temperature. The noise output of your receiving system was then read on a meter. If the converter was perfect, all the noise at the output would be coming from the resistor. How does the resistor make "noise?" The same way a vacuum tube does. Random-electron motion generates noise. The amount of random-electron noise varies with temperature. Vacuum tubes have hot cathodes and make lots of noise. Resistors at room temperature are relatively cool and make small amounts of noise. But they do make noise and they make it at all frequencies.

Now the feedline from your antenna looks like 50 ohms too, assuming a 50-ohm feedline matched to your antenna in some reasonable manner. So if you switch from the 50-ohm resistor at room temperature to your feedline, what will you see at the output of your perfect receiver? No! No! The noise doesn't go up! That was back on 20 meters. This is 420 Mc., remember?

* P.O. Box 1738, Arecibo, Puerto Rico 00613.



As part of the program to spread the work on future Oscar satellites around to as many people as possible, two groups of amateurs in Minnesota have taken on design and construction projects. A meeting of the Twin Cities group at the home of John C. Fox, WØLER, Minneapolis, is pictured herewith. WØLER is seated at his operating position, demonstrating the rotation and elevation controls of his satellite tracking array. Grouped around him are George Nelson, WØZBM, Chuck Kunze, WØWVM, and Philip De Jarlais, WØJHS. Standing are Robert Hall, WØCRO, and Heinrich Theobalt, KØIJN.

Remember all those charts; about antenna temperature vs. frequency and sky temperature behind the moon, that you skipped over the last year or so? Well, if you dig them up you will note that even with your antenna aimed at the horizon its temperature will only be 150 degrees or so. Degrees Kelvin, that is. Temperature is temperature, regardless of the name you give it. It just so happens (thanks to Lord Kelvin's erudition and foresight) that the Kelvin scale is handier to use in this case than Fahrenheit or Centigrade.

The accepted value for room temperature is 293 degrees Kelvin, so the resistor you have on your converter at room temperature is roughly twice as hot as your antenna. How can your antenna be "colder" than your resistor when they are both at the same air temperature? (I live in Puerto Rico where this situation always obtains.) If you think about it you will recall that your antenna is not a resistor and in particular it surely isn't a 50-ohm resistor. In fact, it had better be something less than an ohm if it is going to be an antenna. It looks like a 50-ohm impedance because of the various and sundry currents induced in it by sources at or near its resonant frequency. The temperatures of these sources are what determines its temperature. If you aim the antenna at the horizon, half of its beam will illuminate the earth which is around 300 degrees, and the other half of the beam will be looking at the sky, which might be anything from 3 or 4 degrees to 50 or so.

Now if half of the antenna pattern "sees" the earth, you will have 150 degrees plus whatever the sky contribution is. If you tilt the array up a few degrees, so that the first null is just below the horizon, you can lower its temperature to just a bit more than that of the sky. In this case the noise output of your perfect receiver would drop like a stone when you switched to your antenna. Of course this is all academic if you have a receiving system with a 6-db. noise figure. If your receiver thinks it has a 1000 degree or so resistor across its input terminals, it will be pretty complacent about things you do in the way of antennas. Remember, the important thing about temperatures is that they always add. If your receiver looks like 1000 degrees and you switch from your 290-degree resistor to your 100-degree antenna the system temperature will change from 1290 degrees to 1100 degrees. That's a big change to a radio astronomer but you are going to have a hard time telling the difference on your communications system.

144 Mc. and Up

An encouraging report was received from K1YON concerning 220 Mc. activity. Ted sez that the January Sweepstakes caused an increase of activity on that band to such an extent that at times there was even QRM. Stations worked from his QTH at East Hartland, Connecticut, were W1WHL, K1VDZ, K1POP and W1NOC in Connecticut plus K2GHU, WB2GYX, WB2AQM and W2ITE. In addition a phone call from W3MFY advised that the Pack Rats operate on 221.45 Mc. and this information led to contacts between K1YON and W3MFY and W2AXU. Ted's hopes are high that the increased activity will not dwindle too much between contests. At Huntington, New York, WN2TOM sez that reception on 220 has been very poor with only a few weak signals being heard. John has come to the conclusion that the poor signals are probably due to the relatively low power of most transmitters on 220 Mc.

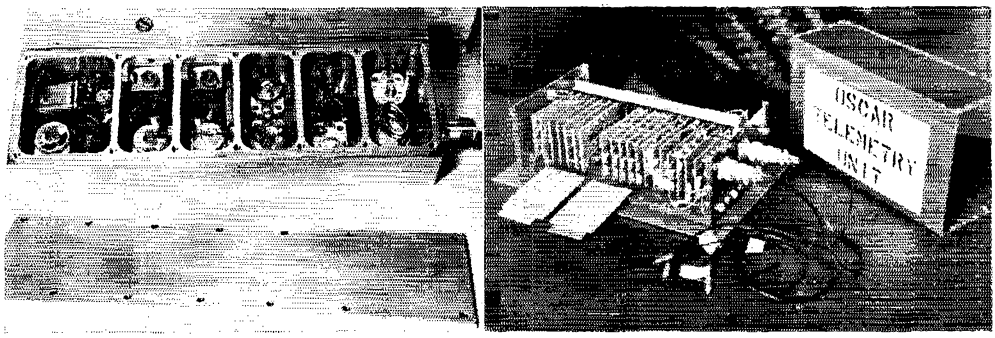
Several of the gang on 432 Mc. write of good openings on January 1, 2 and 4. W3RUE worked W9BRN, WA9HUV, K8TJP, W8FWF, W9ZIH, W8EDS, W8YIO, W8RQI, K8REG, W9OKB, W8EMO. Besides these stations worked Ted heard W8TYY, K8ZES, W8FAK and W9KVK.

Jesse, W4MVB, writes that he has completed refinements on his 432-Mc. s.s.b. mixer. The unit uses a 5894 mixer with 404-Mc. local oscillator injection and 28-Mc. s.s.b. injection and gives 2- to 3-watts D.C. output. With this and a 32-element collinear he has been able to work 150 to 200 miles when the band is in good shape. Jesse sez that WA4JKY,

2-METER STANDINGS

W1REZ	32	8	1300	K5WXZ	29	8	1225
W1AZK	29	8	1384	K5TQP	28	7	1250
W1JSM	27	8	1330	W5UGO	25	7	1384
W1AJR	25	7	1130	W5UKQ	25	8	1150
W1KCS	24	7	1150	W5SWV	20	5	960
W1MEH	24	6	1000	W5ML	17	6	700
W1MMN	22	8	1200	W5KFU	15	5	1360
W1HDQ	22	6	1020	W5WAX	11	5	735
W1AFO	19	6	920	W5BEP	9	3	1000
K1CRQ	19	6	800	W5EDZ	8	5	1375
K1AFR	17	6	675	W5YYO	7	4	1330
W2CXY	37	8	1360	W6WSQ	15	5	1390
W2ORL	37	8	1320	W6NLZ	12	5	2540
W2BLV	36	8	1020	K6HMS	10	5	1240
K2GQI	35	8	1365	W6DNG	9	5	5250
K2LMG	32	9	1710	W6GDO	8	3	864
W2AZL	29	8	1050	W6AJF	6	3	800
W7PUA/2	26	8	1150	WB6KAP	5	3	1300
K2CEH	25	8	1200	W6MMU	3	2	950
W2AMJ	25	5	960				
W2ALR	24	8	1100	W7JRG	24	6	—
WA2PZE	23	7	1200	K7NII	19	5	1275
W2LWI	23	7	1050	K7ICW	12	4	1246
WA2FGK	22	7	1340	W7LHL	10	4	1170
W2ESX	21	6	750				
W2UTH	20	7	880	W8PT	41	9	1260
WA2EMA	19	6	1010	W8KAY	39	9	1210
K2HLA	19	6	1005	W8IFX	39	8	1225
WA2PZE	18	6	750	W8SDJ	37	8	1220
WA2LTM	17	7	730	W8YIO	36	9	1250
WA2YXS	17	6	720	K8AXU	34	9	1275
K2OEI	16	6	1010	W8LOF	34	8	1060
WB2CGO	16	6	780	W8MVF	33	9	1155
WA2RAT	16	5	700	W8NOH	31	8	1090
K2JWT	16	6	550	W8EHW	31	8	860
WA2JAM	16	5	670	K1CRQ/8	30	9	850
				W8WNM	25	8	900
W3RUE	34	8	1100	W9WOK	42	9	1170
W3GKP	31	8	1180	K9UIF	41	9	1150
W3TDF	30	8	1125	K9AAJ	36	9	1200
W3BYF	30	8	1125	W9WDD	35	9	1300
W3LST	22	6	800	W9AAG	35	9	1050
W3LNA	21	7	720	W9GAB	34	9	1075
K3OHU	20	7	930	K9SGD	33	9	1100
W3MFT	19	6	600	W9OH	22	8	1090
K3CFA	17	6	600	W9PBP	23	8	820
W3HHC	16	6	550	W9OJT	27	9	910
				W91FA	27	6	1000
W4HJQ	39	9	1150	W9CUX	24	7	1000
W4HHK	38	9	1280				
W4WNH	35	9	1350	WØBFB	43	9	1350
W4ZXI	34	8	954	WØLFE	33	9	1010
W4MKJ	34	8	1149	WØENC	28	7	1250
W4MNT	31	8	1225	WØDQY	27	8	1100
K4QIF	31	8	1000	WØMOX	23	6	1150
K4IXC	29	8	1255	WØIDY	22	8	1050
W4FJ	28	8	1050	WØIC	22	7	1360
W4RFR	24	9	820	KØITF	21	6	940
W4TLV	23	7	1000	WØJAS	19	7	1130
W4AWS	22	7	1225	KØJXI	19	7	750
W4RMU	21	7	1080	KØCER	17	6	1225
W4OLK	20	6	720				
K4YYJ	20	6	720	VE1CL	8	5	800
K4MHS	20	5	800	VE3DIR	37	9	1300
W4LNG	19	7	1080	VE3AIB	29	8	1340
K4VWH	18	6	590	VE3BPR	24	7	950
				VE3BQN	23	7	1180
W5RCI	39	9	1280	VE3AQG	18	8	1300
W5AJG	33	9	1360	VE3HW	17	7	1350
W5FYZ	33	9	1275	VE6HO	1	1	915
W5JWL	23	7	1150	KH6UK	2	2	2540
W5DFU	29	9	1300	OH1NL	1	1	5250

The figures after call refer to states, call areas and mileage of best DX.



A solid-state 144-Mc. satellite transmitter designed and built by WØZBM and WØLER is shown at the left. The case was milled from a solid block of aluminum, and has a precision-fit cover for adequate shielding against radiation effects. Output of one watt is obtained from a varactor tripler, driven by a 48-Mc. crystal oscillator and amplifier. Filters to eliminate 48- and 96-Mc. components are included. At the right is a solid-state telemetry unit for Oscar service, built by Bob Vogel, WØUBD, and Jim Fromke, KØMHC, of the Rochester, Minn. group. About 150 transistors and 320 diodes are included in the 8-channel telemetry assembly. Other members of the Rochester group are John Champlin, WØZUN, Donald Brouillard, and Jeary Vogt.

K4PZW and W4MVB are active 432-Mc. stations in the Jacksonville area. WA4JKY has his s.s.b. mixer and a 4CX250B. Pappy, W4BCL, in St. Simons Island, Georgia, and Dave, W4UWH, Auburndale, Florida have skeds every night at 0100 and 0200Z. Pappy is on 432.005 and Dave on 432.1. Pappy runs a.m. while Dave runs s.s.b. Both stations are heard by Jesse every night.

Activity in Texas on 432 is definitely picking up with K5QPV, K5FOB, W5MJW, W5YI, WA5GDZ and W5UJF all working on gear for this band. Most of the fellows are now ready to go. At Alamogordo, New Mexico, W5UJF is also ready to go and provides an incentive for the Texas crew.

The following received from Ken, W7JRG, at Billings, Montana, another enthusiastic 432-Mc. worker. "TD2 used as 4-kmc. pump for 432 paramp continues to work very reliably with approximately 5 volts on 2C43s and 416Bs. Other minor modifications included means for reducing plate voltage on output stage beyond original value. Entire TD2 operates on small constant voltage type transformer which, with VR tubes on 250-volt supply, keeps output very constant over long periods of time. Paramp works nicely with only 5 or 6 ma. of current in output tube V_2. The varactor is a MAHU and the paramp is patterned after a *QST* article. Waveguide is W.E. type used near 4 kmc. and signal tank uses sections of TD2 cavities one half-wave in length with rotating input and output loops. Started polar mount for 432-Mc. antenna but progress has been slow due to lack of material. Suggest others interested in using auto rear end check junk yards for American Austin which is torque tube drive and much lighter than standard size types usually mentioned in articles. All threads and bearings are standard." Ken goes on to say that he has worked K7MMT locally on 145.8 and also copied his 432-Mc. s.s.b. signal. Fine business Ken. Nice to learn some of the inner workings of the Montana area on 432 Mc.

In the Detroit area, w.b.f.m. activity on 432.9 Mc. is growing by leaps and bounds. At last count twenty stations were checking in on that frequency. W8FWF tells us that K8TJP and himself have cavity amplifiers on the air with output powers of 100 watts. Signal reports have been very good and it looks like the amplifiers are really worth the work. K8TJP and K8WXO have constructed transistorized preamps for their f.m. receivers and K8GTC has constructed a tube type preamp. 1296 Mc. has a few regular occupants in the Detroit area with K8AIY, W8UCT, W8RLT and W8JLQ all active and K8TJP almost there.

"The big opening I was hoping for occurred the night of January 4 and into January 5. Everyone on 432 Mc. within a radius of 300 miles from Dayton to the east, north and west was anything from S9 to 50 db. over." So spake Vince, K8REG. Lowest powered station worked was W9BRN (0.4 watt) who read S9 and the strongest station (50 db. over S9) was W9ZIH in Chicago, 275 miles. A total of 18 stations were worked that night covering a five state area. Vince worked two s.s.b. stations in Chicago, WA9HUV and W9OKB and comments that their frequency stability is perfect with absolutely no noticeable drift. "I transmit with a converted Motorola TU-110 taken from a T-44A. It has a 3CX100A5 straight through final, approximately 50 watts in and 30 watts out. Antenna is a 32-element collinear at 65 feet. My receiver set up consists of a home-brew converter with a 1N21C crystal mixer front end."

From Illinois, WA9HUV wrote us also about the openings of January 1 and 4 on 432 Mc. Looks like Norm and W3RUE are involved in the first s.s.b. contact on 432 Mc. between Pennsylvania and Illinois. Stations in Indiana, Michigan and Ohio were also worked during that same opening on January 1. On the 4th stations were worked in the same areas as on the 1st but Norm sez: "This opening was a Lulu! The band was open from 7:30 P.M. until 12:30 P.M. and most stations had signals well over S9. All (11 stations) were worked on phone both ways. K9DBR at Janesville, Wisconsin is working on a new converter for 432 Mc. and hopes to be operational on that band by June.

From WB6IOM we hear that he has finally gotten his 1296-Mc. amplifier working. He reports that the 7650 puts out between 300 and 400 watts on s.s.b. and c.w. "The RG8 output cable gets uncomfortably warm, but it holds out on c.w. I have drawings for simple sheet metal cavity designs for the 7650 and the dual 2C39 driver and they are available to anybody seriously interested in high power tropo or moonbounce."

220- and 420 Mc. STANDINGS

220 Mc

W1BU	14	5	600
W1HDQ	12	5	450
W1AJR	12	4	480
K1JIX	11	4	615
K2CBA	16	7	660
W2AOC	15	5	530
W2SEU	12	5	450
W2LWI	12	4	400
K2DZM	12	5	400
K2KIB	12	4	300
K2ISA	11	4	300
K2UTP	10	5	265
K2ITQ	11	5	265
K2AXQ	9	3	240
K2JWT	6	3	244
K2UUR	6	3	210
WA2BAH	6	3	200
W3FEY	11	5	350
W3RUE	10	5	480
W3LCC	10	3	300
K3IUV	10	3	310
W3JYL	8	4	295
W3JZI	4	3	250
W4TLC	5	1	315
K4QIF	4	2	500
W5AJG	3	2	1050
K7ICW	4	2	250
W7AGO	2	1	160
K8AXU	11	5	1050
W8PT	11	5	660
W9JCS	6	2	340
VE3BPR	3	3	300

420 Mc.

W1BU	13	3	390
W1AJR	12	4	410
W1UHE	10	4	430
W1HDQ	10	3	250
W1OOP	11	3	390
W1QWJ	10	3	230
K1JIX	9	3	230
WA2DTZ	6	3	200
K2DZM	10	4	390
K2CBA	9	7	220
WB2EGZ	9	4	260
W7PUA/2	7	4	500
WA2EUS	7	3	130
K2GGA	4	4	383
WA2HQE	8	4	280
K2HQL	8	4	250
W2QTA	10	4	300
K2UUR	9	3	280
W2VCG	9	4	280
K2ACQ	8	5	525
W2YPM	6	3	300
WA2TOV	5	3	140
W3RUE	10	5	470
W3MMV	10	5	410
K3CLK	9	4	
W3FEY	8	4	296
K3IUV	8	3	310
W3SZD	5	4	300
W3UJG	4	2	350
W4HHK	9	4	550
W4TLV	6	2	500
WA4BYR	6	2	420
W4GOO	6	2	415
W4RFR	5	2	665
W4TLV	4	2	500
K4QIF	1	1	285
W5RCI	16	5	725
W5SWV	7	3	525
W5AJG	7	3	1010
W5HTZ	5	3	440
W5ML	5	1	350
W5UKQ	3	2	500
W6GDO	2	2	385
W6FZA	1	1	280
K6GTG	1	1	180
W8PT	11	7	600
W8YIO	11	6	560
W8TYY	9	5	580
W8IFX	8	5	470
K8REG	6	4	275
W8JLQ	6	3	275
W8RQI	6	3	270
K8AXU	5	3	660
W7FWF	5	3	450
K9AAJ	9	5	425
K9UIF	9	5	390
W9GAB	9	4	608
WA9HUV	8	5	450
W9AAG	8	4	525
WA9NKT	7	3	310
W9OJI	6	3	330
W0LDY	9	5	560
K0ITF	3	2	158
VE3AIR	5	4	450
VE3BQN	5	4	147
VE3BPR	4	4	600

The figures after each call refer to states, call area and mileage of best DX.

K1BTF writes from Massachusetts that 1965 was quite good to him on 144 Mc. He worked K3KEO for Delaware and K1IED/4 for Virginia, plus VE2-ZX and VE2SH, during the old year. Barry is using a 32-element collinear up 60 feet, a Johnson 6N2 transmitter and Eico modulator. Operating frequencies are 144.20 for phone and 144.015 for c.w. He's looking for Ohio on two meters next.

Skeds held by K1ABR during the Geminids resulted in no contacts. During the Quadrantids he did work W9WDD and although it was a new state for W9WDD it was not for Dick. Can't discourage him though! He's ready, willing and able to keep skeds with anyone whether he's worked the state or not. He is particularly looking for skeds with Arkansas, Alabama, Tennessee and West Virginia.

From New Jersey WB2JKU reports that during the summer of 1965 he raised his power from 20 watts to 120 watts on 144 Mc. and promptly worked two new states, Maine and Vermont. Presently he's working on a new rig for two meters with a pair of 4CX250s which should run between one half kilowatt to a kilowatt. Also in the works are rigs for 220 and 420 Mc.

The Quadrantids paid off with a new state for K2HLA when he worked W9WDD in Illinois on January 3. No other stations were heard at Dick's QTH during the shower although he did hear a few pings. K2HLA is available for anyone needing the state of New York on 144 Mc. during the meteor showers so if you need that one get in touch with Dick.

WA2ZPD at Elmsford, New York reports contact on December 24 with K3WLP in Delaware but other than that he has noted no particularly good conditions on 144 Mc. Ray will be raising his power from 6 to 40 watts in the coming months and has already raised his beam and installed new coax in preparation for the Spring season. Good luck! Conversion of his Big Wheel is keeping WA2IPC busy these days. Mal is converting it from horizontal to circular polarization (left handed) to see how it compares to a horizontally polarized antenna, particularly when working mobiles. He has already completed his 12-element collinear but has had no chance to test it yet for DX. Works fine with local contacts though.

K3OBU had skeds during the January shower with W9WDD and W5UGO. Results, nil. Complete calls were heard from W9WDD but no contact, and only a few pings were heard from W5UGO. Joe sez the shower was the worst it's ever been at his QTH. A new s.s.b., c.w. rig has been completed and is working perfectly sez Joe. He has made careful notes on construction for possible use by others interested in two meter s.s.b. Just let him know and he'll be glad to send you the information. From Lemont, Pennsylvania, K3CFA reports that although he heard only W3MBN and W8KAY on 144 Mc. on the night of January 1 propagation was excellent. T.V. channels 7, 8 and 9 were in solid at his QTH from Ohio.

K4QIF reports that the Geminids shower was very poor. He had skeds with 9 stations and never heard so much as a *ping* from 6 of them. Only station worked was W9BFB in Iowa. An interesting comment from Rusty: "Ran skeds with W3CKB in Florida. In five days of one hour skeds I heard one five second burst and two pings. Previous to the shower we had been running a short sked nightly and we always heard a lot of pings and short bursts. There seemed to be a reduction in meteor scatter activity during the shower." During the Quadrantids in January Rusty did pick up another new state for number 32 on 144 Mc. Contact was with WA0FDY in Minnesota. K4GL in South Carolina goes along with Rusty's opinion of conditions during the Geminids. "Very poor!" Jack sez that while he lived in Michigan he heard K2IEJ nightly during his sked with W8KAY. He is still hearing him nightly. "He must have a minor lobe on his antenna that puts very strong pings and bursts into South Carolina."

Out in California the meteor showers have been working for W6GDO (or is it the other way around). During the Leonids Jay worked W0EYE and W0-MOX in Colorado. During the Geminids he worked W7JRG for Montana and during the Quadrantids he worked K7NII for Arizona. This brings his states worked from California on 144 Mc. up to six. Several very long bursts of 15 seconds which brought the S-meter reading up to 6 were heard at his QTH during the Quadrantids. WN6QWE reports that an opening occurred during the week of December 20 on 144 Mc. when contacts were made into San Diego and Santa Barbara from his QTH at Inglewood.

Al Olcott, K7ICW, reports results of the Geminids very poor, the worst ever heard at Las Vegas. Al also reports that tropo to southern California was excellent during December with a pick up in s.s.b. QSOs due to heavy rains washing off the insulators in the L.A. area.

W7JRG in Montana has been having himself a time during the meteor showers for the past several

months. During October he picked up Oklahoma; during November it was Texas, Nevada and Oregon plus two other successful skeds with K6GCD (California) and W9WDD (Illinois). The Leonids was the best shower ever seen at Ken's QTH in Billings. During the Geminids skeds were kept with W9AAG and W6GDO. Very poor signals heard from W9AAG and no QSO. A contact was made with W6GDO but took almost an hour to complete because of poor signals. WØDQY was worked during the Quadrantids and to date Ken's total on 144 Mc. is 24 states worked. In Arizona K7NII worked W6GDO and W7MFP (Utah) during the Quadrantids.

On New Year's Day Lew, W8YIO, wanted to start out right so he proceeded to work K1OYB in Maine for state number 36 on 144 Mc. W8CVQ reports conditions on two meters generally normal to good during December with a tremendous opening occurring on January 4 of the new year. W3, 4, 8, 9, and Ø lands plus VE3s were coming into Kalamazoo and most signals were above S9 with much QRM. W8IBB reports most signals were below normal during December at his QTH in East Lansing. John would like to receive any heard reports of his signal on 144.288 or 145.237 Mc. Since December 10 he has made seventy calls (mostly c.w.) netting twelve contacts with three stations. At Marshall, Michigan, WA8DXW has built a 5 over 5 J-slot beam for two meters with rotators for elevation and azimuth control. He is having trouble with the rotator though as it doesn't seem to have enough torque to tilt the antenna.

W1MEH (Connecticut) and K1ABR (Rhode Island) were the two new ones picked up by W9WDD during the Quadrantids. Chuck contacted 3 out of 4 stations he had skeds with and called the shower "not too bad." He is using a kw. for m.s. work and finds it works out well. In Illinois also, WA9LYV reports extended ground wave on January 4 when stations were coming in from Ohio, Michigan, Iowa, Wisconsin and Indiana with Q5 signals. KØJXI sez that most of his 144 Mc. work is done during the summer because of school but at the present time he has worked 19 states on two meters.

RECORDS

Two-Way Work

50 Mc.: LU3EX — JA6FR
12,000 Miles — March 24, 1956
144 Mc.: OH1NL — W6DNG
5250 Mi — April 11, 1964
220 Mc.: W6NLZ — KH6UK
2540 Miles — June 22, 1959
420 Mc.: KH6UK — W1BU
5092 Mi — July 31, 1964
1215 Mc.: W1BU — KH6UK
5092 Miles — August 9, 1962
2300 Mc.: W1EHF/1 — W2BVU/1
170 Miles — July 1963
3300 Mc.: W6IFE/6 — W6VIX/6
190 Miles — June 9, 1956
5650 Mc.: WA6KKK/6 — WB6JZY/6
117 Miles — Sept. 25, 1965
10,000 Mc.: W7JIP/7 — W7LHL/7
265 Miles — July 31, 1960
21,000 Mc.: W2UKL/2 — WA2VWI/2
27 Miles — Oct. 24, 1964
Above 30,000 Mc.: W6NSV/6 — K6YYF/6
500 Feet — July 17, 1957

50 Mc. WAS

1	WØZJB	22	W5SFW*	43	W6ABN*	64	W7ACD
2	WØBJV	23	W0ORE	44	VE3AET	65	K6PYH*
3	WØCJS	24	W3ALU	45	W9JFP	66	W4JOB
4	W5AJG	25	W8CMN*	46	WØQIN	67	KØJJA
5	W9ZHL	26	WØMVG	47	WØWWN	68	K6RNQ**
6	W9OCA	27	W0CNM	48	K9ETD	69	W9QWT*
7	W6OR	28	W1VNH	49	WØFKY	70	W6EDC**
8	W6INI	29	WØOLY	50	W8LPD	71	K8VLM**
9	W1HDQ	30	W7HEA	51	WØZTW	72	K6GOX**
10	W5NJD	31	KØGQG	52	W6GCG	73	WØEDM
11	W2IDZ	32	W7FFE	53	W2RGV	74	W9JC(**
12	W1LLL	33	WØPEP	54	W1DEI	75	WØLLU*
13	WØDZM	34	W6BJI**	55	W1HOY	76	W7RT**
14	WØHVW	35	W2MEU	56	W6ANN	77	W7RDY**
15	WØWKB	36	W1CLS	57	W1SUZ	78	W6KIN**
16	WØSMJ	37	W6PUZ	58	W1AEP*	79	W6OKR**
17	WØOGW	38	W7ILL	59	W5LFH	80	K6GMX**
18	W7ERA	39	WØDDX	60	W6NLZ**	81	W7DYD**
19	W3OJU	40	WØDO	61	W7MAH	82	K6ZEE**
20	W6TMI**	41	K9DXT	62	W8ESZ	83	K6HCP**
21	K6EDX	42	W6BAZ	63	W2BYM	84	K6YIL**

* 49 states ** 50 states

VE7CN	45	EI2W	37	LU3DCA	27	SM5CHH	20
KL7AUV	44	CO2SZ	36	LU3EX	27	LA7Y	20
VE1EF	42	ZS3G	32	ZE2JV	26	VQ2PL	18
VE4HS	41	SM6ANR	30	LU9MA	26	JA8AO	18
XE1GE	39	CO2ZX	30	CO2DL	25	JA8BU	17
VE2AOM	38	SM7ZN	29	CT1CO	24	JA1AAT	17
KH6UK	37	PZ1AE	28	CO6WW	21	JA1AUH	16
		SM6BTT	28	LA9T	21	VP5FP	7

The rig consists of a Seneca with 50 watts to an 8-element beam. Plans for the future include a pair of 4CX250s and an s.s.b., a.m., c.w. exciter, a tower and a large array for two. Good luck, Dale. Hope the plans come through.

50 Mc.

The six-meter band is proving an attraction for a number of VE4s. VE4RE writes us that he has been working VE4FG and VE4JC and has been heard in Winnipeg by VE4JC, VE4NY, VE4FG. Ron has been conducting tests on 50 Mc. with VE4TL over a 130-mile path and on December 20 worked WA5DJZ, WA5LQQ, W5KMJ and K5GHR, all on s.s.b. VE4TL is acquiring a s.s.b. exciter and will be building a linear for it. VE4YW has partially completed a s.s.b. exciter and VE4CT is building and testing a small exciter. Through W2IYR we learn that OA4C advises he is ready on six meters with 200 watts s.s.b.

The skip openings on 50 Mc. are the usual varied ones that come with the winter season. Some of the gang hear a few openings and some hear many. WB2KLD and WB2QXH both caught openings on December 15. Dick worked K4AMI in Madison, Tennessee while Tom sez that only Alaska, Hawaii, 6 and 7 lands were lacking. Although WB2TPS heard openings on December 3, 14 and 19, the best of the three was that of the 19th when 4, 5, 8, 9 and Ø were coming through. At Setauket, New York, WB2TBX sez that the band opened up many times during December with a direct pipeline to 4 land. Pete is building a six-meter class-C amplifier which will run 100 watts normally but which will be capable of running 500 watts. A G50 with Saturn halo has provided WA3BNO with 21 states worked on six meters. Most recent new one was WA4MQE in Georgia who was worked during an opening on December 15. December 16 proved to be the best date during December for K3FNG who worked stations in Nebraska, Ohio, Kansas and Colorado and heard K6TYX in California. Floridians seem to have had more than their share during December. At Sarasota WA4FJO caught 12 days of openings with 15 states heard or worked plus KP4. In Miami WA4FZV caught 7 days and heard 11 states while WA4WLG sez that "six meters was open

(*Continued on page 152*)

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

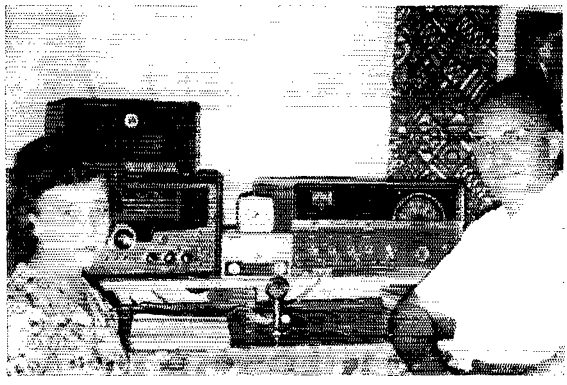
9Q5YL

SOME unusual stories have evolved from history's darkest periods, and such is the story of 9Q5YL, Lily Dagnaux, who was born in Elisabethville, Republic of the Congo. Licensed not even a month before the uprisings the world well remembers, Lily joined forces with the other radio amateurs in the area who were responsible for saving thousands of lives.

Prior to 1960, Fernand and Lily Dagnaux were not aware of the world of amateur radio, but did have a commercial station with an OQ4 call sign. While operating their station on 40 meters one day, they discovered two OQ5 stations in QSO which provided their first introduction to amateur radio. Their inquiries were gladly answered by one of the OQ5 stations who explained amateur radio's meaning, the allowed bands, code requirement, and the willingness of the great family to welcome all newcomers. Shortly thereafter, Fernand applied for his call and license at Leopoldville. Lily's interest came later.

Fernand received his license, OQ5FD, and ordered a Geloso 212 transmitter and a BCL receiver. His first contacts were with local stations, but as he added FQ8, ON4, France and then the Argentine, Lily became as excited as he over the prospects of speaking with the entire world. Since they both speak fluent French, but knew little English and judged that 80 per cent of the QSOs seemed to be in English, they envisioned a few obstacles, but accepted the challenge.

* YL Editor, *QST*. Please send all news notes to K1IJV's home address: 139 Cooley St., Springfield, Mass.



Lily, 9Q5YL, and Fernand, 9Q5FD.

Brigitte, Carol and Eddy, the harmonics of the Dagnaux household.

Lily became the second op of OQ5FD and well remembers the first day she gathered up all the English she knew and made her first DX QSO.

In June 1960, when Lily first started operating, they lived in Kolwezi. A converter was added to the BCL which improved their receiving conditions. At the end of that same June, they experienced the series of sad events that all the world knows. Lily heard the calls for help and responded to the other amateurs whose first actions were to organize a net of help. Because of this emergency net, thousands of lives were saved. Then, there were the messages to families. At this time, there was no incoming or outgoing mail and Lily and Fernand relayed message after message to Belgian families. Announcing good news brought them great pleasure. Unfortunately, the news was not always good. In appreciation, the people of Kolwezi later presented them with a new SX-101 receiver.

In 1962, all women and children were evacuated from the Elisabethville area. Upon arrival in Belgium, Lily requested a provisional license, ON4VB, which enabled her to talk to her husband every day. Alone in Belgium for the first time with a two-month-old child and a little girl of four, she found tremendous moral support through her daily skeds with Fernand.

When she was able to return to the country of her birth, Lily asked for and obtained the license 9Q5YL. They have since purchased an HT-37 and have once again taken up DXing. It is now their pleasure to be able to speak with the entire world once more. In addition to their on-the-air contacts, the Voice of America broadcasts are part of their every day lives and have greatly increased their knowledge of the United States.

That amateur radio has greatly eased many an emergency situation is a fact all of us well know. Such was its unique role during the Congo crisis.

26th YL Anniversary Party Results

Last year's top phone and c.w. scorers have done it again. Irma Weber, K6KCI, is once again the first place winner of the phone portion and Jan Burgess, VE3BII, remains in first place for the c.w. portion. Increased YL interest and activity for the two contest weekends resulted in Irma's score being 28 per cent higher than last year. Jan's score on c.w. increased by 23 per cent.

Barbie Houston, K5YIB, a well-known YL contest winner, had the highest combined score and JA1YL and VE3BII appear to have won the two DX YL cups from the information received.

HIGH PHONE SCORES

Irma Weber, K6KCI.....10,057.5*
Marge Campbell, K4RNS.....9,660 *
Barbara Houston, K5YIB.....9,142.5*

HIGH C.W. SCORES

Jan Burgess, VE3BII.....1,959 *
Peggy Putnam, W9MLE.....1,417.5*
Barbara Houston, K5YIB.....1,290 *

CORCORAN AWARD

Barbara Houston, K5YIB.....10,432.5*

PHONE SCORES

K1IIF.....4300
K1GSF.....977. 5*
K2KQC.....2550 *
WA3ATQ...3468.75*
K3HZY.....2932. 5*
K3NUF.....2170
K3TNL.....1575 *
K4RNS.....9660 *
WA4VKG...5643.75*
W4ZDK.....4214
K5YIB.....9142. 5*
K5OPT.....7452
W5NQQ....6468.75*
K5LUZ.....3510 *
K5MIZ.....1375 *
K6KCI....10057. 5*
K6DLL.....7522. 5*
WB6CGA...5664
WA6PQI....4382. 5*
WA6LWE...3375 *
WA6AOE...2975 *
WA6EVU...2088
K6UHI.....1484
K6POC.....735
K7WVT....5966.25*
K7RAM....5712
K7KSF.....4687
WA7EEX...4680
W7NJS.....3626
K7ADI.....3105 *
W7GGV....2772
K7CHA.....990 *
K8RZI.....7236
WA8ARJ...5995 *
K8ITF.....4240
K8MZT....4224
K8VCB.....3825
K8PXX....3511.25*
W8HWX....3052. 5*
W8WUT....2886
WA8AIQ...2520
WA8ENW..2475 *
W8ETT....2175 *
WA8CXF...1500
WA8FSX....465 *
K9LUI.....5460
K9AXS.....3850
KØEPE.....3870
WAØEXX...3478
WØJUV.....3293
KØZPX.....3006.25*
VE7NW....4692
VE3BII.....4202. 5*
VE6ABP....3000
DJ2YL.....972
JA1YL.....4262.5*
JA1FPB.....1.25*
KL7FMI....1925
KP4CL.....4465
KZ5TT.....1080
PY2SO.....3774
VK3KS.....157.5*
XE1HHH...3219
ZL2JO.....925 *

The Auto State Young Ladies (TASYLs) have recently formed a new YL club in Michigan. Following their first board meeting, the officers, (l. to r.) Treas., Bobby Lemon, WA8ARJ; Pres., Thelma Schrontz, WA8ENW; V. Pres., Betty House, K8VCB Secy., Mary Clements, WA8CTE, were guests at a luncheon at the Ford Museum's Clinton Inn in Greenfield Village.

C.W. SCORES

K1UOR.....1110 *
K1IJV.....318.75*
K2UKQ....1235 *
W2EBW.....640
WB2PYI.....464
WA3AZU....130 *
W3UTR.....30
K3HZY.....1.25*
K5YIB.....1290 *
WA6AOE....800 *
WB6CGA....720
K6POC.....285
K7ADI.....150
W8WUT.....651
WA8KMT...625 *
WA8ENW...570
K8ITF.....325
K8PXX.....206.25*
WA8FSX....187
K8VFR.....70.75*
WA8CXF.....40
W9MLE....1417. 5*
WA9CCP....688.75*
WA9EZP....162.5*
WAØEXX....352
KØGIC.....260
VE3BII.....1959. 5*
VE6ABV.....858
VE5DZ.....517.75*
JA1YL.....392
JA1FPB.....1.25*
PY2SO.....940
VK3KS.....15 *
ZL2JO.....30 *

Confirmation logs: W3CDQ, K5OPS, W6NAZ, W6QYL.
* Low-power multiplier.

DU1GSP

If it is your good fortune to QSO DU1GSP, it will be your pleasure to contact the only active YL station in the Philippines. What's more, this is believed to be the only Girl Scout headquarters that has established their own amateur radio station.

Frances Lacebal, who hopes to soon be operating her own hamshack under the call of DU1FL, was appointed trustee of the GSP station in May, 1965. DU1AJ, Aleli Jose, was the first trustee at the station's inauguration in 1962. Its purpose is to introduce Girl Scouts to amateur radio and to teach them of its importance.

Frances is a faculty member of the Manuel A. Roxas High School in Manila and is a volunteer member of the Girl Scout movement in various capacities. Her first brush with radio communications occurred when she attended a class on the theory of flight on board a C-47 plane. During the class, ground control relayed flight and weather information. Then, in 1962, the Boy Scouts of the Philippines, with the cooperation of the Philippine Amateur Radio Association, opened a seminar to which the Girl Scouts were invited. With no idea what she was getting into, Frances attended as their

representative. The Seminar's demonstration of an actual QSO was all it took for her to realize that here was a challenge she would gladly accept.

DU1RTI and DU1TK assisted the GSP amateur station in setting up radio gear and you'll find them operating a souped-up BC669 transceiver aligned for 40 meters on 7025, 7045 and 7075 kc. They are very active during the national and annual Jamboree on the Air sponsored by the Boy Scouts. Their station also handles emergency messages for the civil defense when needed. During the International Friendship Days of the GSP, they borrowed extra equipment from other hams which enables them to enjoy far more DXing.

1965 was Silver Jubilee year for the Girl Scout movement is the Philippines. Their International Heritage Camp, which culminated Jubilee celebrations, was held from January 19 to February 2. During this time, DU1GSP hoped to make many new contacts and demonstrate amateur radio to all attending.

YL interest in amateur radio is quite new to the Philippines. There are at least five YLs who are now licensed, but at the moment Frances is the only one able to be active. She's most anxious to meet other YLs on the air. Look for DU1GSP!

Priscilla Paris

The youngest of the famous Paris sisters, Priscilla, has just received her Novice license, WN6RNR.

About a year ago, Priscilla visited the amateur radio station of Louis Litwin, WA6ZFF, and became completely fascinated with amateur radio. Then and there, she decided to become a ham. Not having a background in the sciences, and having been an entertainer since she was four years old, it was rough sledding.

Loaded down with texts on basic radio and physics, Priscilla studied between shows while touring across the U.S.A., South America, islands in the Pacific, and the Orient. With an old Boy Scout hand key and oscillator, she learned code.

Last September she was ready to take her Novice examination. Now, thrilled with having her license, she plans to build her own rig from scratch along with studying for the General exam.

Priscilla and her two sisters, Sherrell and Albeth, are native Californians and are presently living in West Hollywood. They have toured most of the world during the past fifteen years and have entertained audiences with their singing and dancing in most of the major night clubs as well as our servicemen at bases around the world. Their recording of "Soldier Boy" is but one of their successful hits. Many records and albums are presently being recorded by them for Reprise and Warner Brothers Records. They are also co-starring in a soon-to-be released television series.

As in the song, "like a melody" describes a pretty girl. Priscilla will find that all radio amateurs will sing to that.

YL Club News

Waylarc's 1966 officers are: Pres., W3RXJ; V. Pres., W3CDQ; Treas., W3UTR; Secy., WA3EER; Cert. Cust., WA4FEY.

Baylarc's 1966 officers are: Pres., WA6OGK; V. Pres., Editor, K6USC; Secy., WA6GQC; Treas., W6BDE; Cert. Cust., K6SZT. Board members, K6SZT, WA6LIZ, WA6PTU.

Coming Events

The 17th annual YL/OM Contest — c.w. portion March 5 and 6. See complete rules in January column.

Priscilla Paris, the youngest of the famous singing Paris Sisters, is now WN6RNR.

YLRL Forum — April 23-24 at the ARRL National Convention in Boston, Mass. See convention highlights for details. [QST]

Strays

Visitors to the IEEE convention who are accustomed to including the Single Sideband Show in their activities will be glad to know that it is being continued this year under W2AVA's sponsorship and will be held Tuesday, March 22 from 11:00 A.M. to 9:00 P.M. in the Penn Top Room, Statler-Hilton Hotel, Seventh Ave. at 33rd Street in N.Y.C.

B.A.R.T.G. SPRING RTTY DX CONTEST

The British Amateur Radio Teletype Group is sponsoring a spring RTTY contest that will run from 0200 GMT on the 12th of March to 0200 GMT on the 14th of March. Stations may not be contacted more than once on any one band (80 through 10 meters), although additional contacts may be made with the same station if a different band is used. Use the ARRL Country list for country status. However, KL7, KH6, and VO will be considered as separate countries. The message exchange will consist of message number, report (RST), time in GMT, and country. All two-way RTTY contacts with stations in one's own country will earn two points, with stations outside one's own country earning ten points. All stations will receive a bonus of 200 points per country, including their own. Scoring will be done as follows: (A) Two-way exchange points times total countries worked. (B) Total country points, times number of Continents worked. Add A and B for total score. Logs and score sheets should be sent to B.A.R.T.G. Contest Manager, Alan Walmsley, G2HIO, The Woodlands, Bath Lane, Moira, Nr. Burton-on-Treat, Staffordshire, ENGLAND, not later than May 1, 1966.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

If you dig into your *QST* file to check the outcome of ARRL's annual DX contest 25 years ago you'll find there wasn't any. Almost all the world was up in arms. There was practically no ham DX left to work, and no authorization to contact what little remained. Dark days.

Gee, to think that a short 24 months earlier our bands had been jammed with the Big One, the 11th ARRL DX classic, greatest DX contest ever. The 12th, 1940's, was comparatively a hollow shell, and we had to wait until 1947 for resumption of the series with No. 13. Imagine, you young OMs, if you can — six DX-empty years, six consecutive February–Marches without an ARRL DX Competition!

But they were busy, harrowing years, and they gave amateur radio the opportunity to prove itself once more. They helped cement general acceptance of the fact that the radio amateur, individually and collectively, is *responsible.*

Times have been good and we're enjoying an era of unprecedented DX prosperity. We're authorized to communicate with fellow amateurs almost anywhere in the world. Some few exceptions are detailed on page 67 of last month's *QST.* That ITU/FCC Ban business is further complicated by the fact that there are occasional exceptions to the exceptions. But let's make every attempt to hew close to the wiggly line. It's mighty important at this time to demonstrate that we can and will do so.

What about sudden changes in these or other FCC regulations? Are you unconcerned until you read it in *QST*? No, so long as W1AW is on the air ignorance is no excuse. Each active amateur owes it to himself and to his colleagues to keep currently informed by regularly copying W1AW's scheduled bulletin transmissions. Twice a week is not too often.

What:

It's time we took a close look at 14-Mc. DX doings through the ears of our "How's" Bandwagoneers. Here's some of the stuff you might be passing up if you fail to charge into this month's final week ends of the 31st ARRL International DX Competition. . . .

20 c.w. is the subject of mail from **Ws** 1AYK 1BGD 1CNU 1ECH 3HNK 6KHS 7VRO 8TRN 8YGR 8ZCQ 9CAQ, **Ks** 1ZJA 2UPD 3FKU 3SLP 5DZE 6CAA 7TNW 8BCK 8HLR 9JPL, **WAs** 1CYT 2LDX 4YDR 5IIS 6IDN 6JDT 6TGH 7ASM 7BOA 7BOB 8LVT 8MAT 9BGK 9DJO 9IBT, **WBs** 2AMO 2CON 2FMK 2LSV 2NLH 6KIL 6MEQ 6NXK 6PCV and Mr. R. Johnson concerning the radio telegraphic action of **BV1USA** (14,052 kc.) 0800 GMT, **CEs** 3PQ 3QP 3ZW 4AD 2, 8CF 1, ØAC (60) 6, **CN8s** CN (25) 23, FS 18–19, FV (20) 19, FZ 20, **COs** 2BO (29) 14, 2JB (20) 23, 2KG (40) 18, 5EG 6AH 7JB 8BH 8HB (49) 23, **CPs** 1EA 1AQ 1, 5EZ, **CRs** 3AD (65) 19, 3KD (35) 0–1, 4AE (60) 16–20, 6DX (60), 6EI 6FW 20, 6GO 6JA 7IZ 17, 7SV 19, 8AE 8AF (90) 20, **CT2AC** (35) 23, **CXs** 1FB 1RY (85) 9, 2CO 9PP, **DMs** 2AGH 2ATD 2ANO 2BLD 3NZN 4EL 6XAA, **DUs** 1OR (50) 23, 1RGB 8, 7SV (90) 12, **EAs** 6AM (50) 12, 6BD (45) 15, 8AT 8EY (17) 17, 8FB (80) 17–18, 9AQ (60) 17, **EI9N** (20) 18, **ELs** 2AE (45) 21, 2AO 2AQ 2D ØE (55) 19, **EP2EZ** (38) 14, **ET3USA** (44) 17–1, F9UC/**FC** (4) 19, **FB8s** WW (15) 16–17, XX (15), YY ZZ (41) 6, **FG7s** XF (19) 1, XK 20, XX (15) 12, **FK8s** AC AZ BG BH, **FL8s** CD (22–50) 15, MC (46) 18, RA (61) 19, **FM7WH** (29) 21, **FO8AA, FU8AG** (10–90) 7—9, **GCs** 2FMV 8HT, **GD3TNS** 18, **HAs** 1KVM 3MJ 5FD 15, 5KBB 5KFR (30) 21, 8UD (36) 6, ØHC ØLH, **HC2SB, HIs** 3AGS 8JM 8XAL (57) 2–6, **HKs** 1QQ/AM 14, ØAI, **HL9KF** (28) 12, **HMs** 1BB ØHQ 2–3, **HPIs** AC 20, IE, taboo I S1CW, **HV1CN** (63) 16, **ISIs** CXF (42) 21, I1C (40) 17, IT1AGA, **JAs** 1AA 1AKH 1AVA 1BWA 1BX 1CIB 1EVM 1JKG 1KSO 1NEC 1OA 1OIO 1YAI 1YL 2ANX 2NI 3EOP 3GI 3HF 4BS 4BZH 4XW 6AA 6AK 7FS 7KW 7YAG 8AA 8ADQ 8BFI 8BMK 8FY 9VS 9ZE ØBBB ØCCE, **JT1FM, Ks** 3SWW/**KG6** 0, ØKPU/VO2, **KAs** 2JH 0, 5RC 0, **KB6CY** (20) 5, **KC4USX** (4) 0, **KGs** 4AA 6ALT, **KJ6DA** (22) 4, **KM6s** CE 23, DJ (20) 3, **KRs** 6FQ 6IQ 6JZ (44) 22, 6KJ (25) 0, 6MM 2, 6UL (80) 10–11, 6USA 8CA (89) 0, **KV4s** AA CI (60) 11, **KW6EK** 2, **KX6BQ** 2, **KZ5s** QH 20, TX (40) 22, **LAs** 4FG/p (48) 16, 5CT/p (49) 21, **LUs** 1ZC 3ZA (75), **LX1TP** 16, **LZIs** KAB (22) 18, KPZ 0, **MP4BFL** (9) 5, **OA4AO** 22, **OD5s** ED EE, **OHØVF, OXs** 3AB 3BB 3GR 3LP 17, 3UD 5AX (36) 18, 5CF (14), **OYs** 1L (15) 15, 1R (22) 12, 1X 2H 2J 18, 6FRA (97) 14, 7Z 0, **PIIPT** 14, **PJs** 2ME 3AT 4AA, **PX1YR** (20) 10, **PZIs** BD (28) 23, BH (60) 21, CL (35) 21, **SM2s** BJI CXU, **SU1IM** (63) 16, SVØWLL, TA2BK 8, **TF3AB** 22, **TI2PZ, TL8SW** (77) 22–23, **TN8AF** (35) 19, **TT8s** AE (80) 20, AW, **TU2AN** (55) 21, **TY3ATB** (65) 0, **UAs** 1KED of F.J.L., 2AR 2CA 2KAK 2KAP 2KAW **9FM 9UC** 2, **9VJ, 9WS** 13–14, ØCA 1, ØEE (81) 0, ØER ØEY 2, ØKAD ØKAE 16, ØKAN ØKFG 0–1, ØKIG ØKKC ØKKH (19) 4, ØKYA (50) 0, ØKZD ØMD ØYE ØYP, **UB5s** GB (51) 19, KDS KEU KHQ KJE 16, KKA (39) 19, KKI (25), KVO PG UA WF WK, **UC2s** BI KAC KMZ KNK LO WJ (42) 12, **UD6s** AM KAB KAW (17) 12–13, **UF6KPA** 15, **UG6KAA** 15, **UI8s** AI 19, AZ 15, **UJ8KAA** (50) 23, **UL7s** BG (30) 12–13, CH KAA KBF (60) 12, **UM8s** IE KAA (28) 13, KAI (60) 13, **UN1s** AZ BC BZ, **UO5s** BM 14, GW (40) 16–17, KBR (40) 15, **UP2s** BZ (36) 17, CT (40) 19, KAB KBC OG (35) 15, **UQ2s** AN KDD (40) 8, SM, **UR2s** KAN (50) 15, KAW 15, **UT5s** KDG KH (40) 19, KSG (46) 18, PB RS (80) 18, **UWs** 1AQ 12–13, 1BG ØFK 1, ØIK (39) 5, ØIQ 2, **VKs** 9GC (50) 5, ØTO, **VPs** 1LP 0, 2AO 2AR (55) 18, 2AX (56) 23, 2AZ 2GLE (50) 0, 2KJ (65) 22, 2MN 2SJ (50) 13–14, 2SY (10) 17, 3YG (18) 23, 5AR (54) 17–22, 6AK 21, 6PJ (19) 22, 7DJ 7NQ 7NW 8HD 1, 8HJ (15) 19–2, 8HX (23) 1, 8IB (10) 0, 8IN 8IP (55) 28, 9BP 9EU 9FB 9FF 9FX, VQ8s AI (52) 17, BJ (28), **VR2s** CC DK 5, **VSs** 6FE (20)

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4X4s HW (left) and SK are two of Israel's proliferating new DX breed. David, 4X4HW, likes s.s.b.ing with a quad near 14,250 kc., while Dan's 75-watt 6146 transmitter and dipoles frequent 20 and 15 c.w. mostly on Fridays and Saturdays at 2000–2300 GMT. (Photos via K4WMB and W2IWP)

6-11, 6FF 23, 9ARV (9-23) 17-19, 9CC (37), 9MP (65) 15, 9OC 10-11, 9OSC (20-55) 15, VU2GW (35), WØYKD/KS4 (48) 0, WA9KUP/KL7 23, XEs 1FN 1JJD 1NNN 1NL (75), 2EEL, XP1AA, YN4KM, YOs 2BB (45) 15, 6AW 16, 8GZ, YS1s RFE (5), RJ, YV9AA (30-60) 12, ZB2AK, ZC4AC, ZDs, 5M 5R 20, 7IP (60) 18, 7RH (15) 17-23, 8AR 8BC (21) 2, 9BC (25) 17, 9HE (45) 17-18, ZL4CH (47) 6 of the Campbells, ZP5s CF EC (40) 22-23, OG 2, ZS2MI (62) 19 of Marion isle, 3A2BS (36) 17, 4S7NE (27) 1, 4X4s HJ 16, QA 17, VG 16, 4U1ITU (15) 15, 5R8s AL (15) 18-19, AM (67) 19, AS, 5VZ8CM (65) 23, 5Z4s ERR (60) 20-22, IR 20-21, JD (60) 22, 6O6BW, 6W8s BD BF (24), BL (45) 18, DQ (30) 18-19, 6Y5s BB MJ, 7G1A (36) 20, 7X2s AH (25) 7, ED 11, PY (60) 22, 7Z3AB (50) 18, 9F3USA (50) 9, 9G1s FN FQ 19-22, SC (50) 21-22, 9H1s AB (35) 21, AG R (20), 9K2AN (17) 14, 9L1SW (28) 23, 9Ms 2LO 4JY (25) 1, 4ME (54) 13, 6LX (51) 5, 8KS 16, 9Q5s FU HD TJ 1, 9X5PS (75) 17-19 and 9Y4VT 0.

20 phone keeps Ws 1ECH 1RST 3HNK 8YGR 8ZCQ, Ks 1BPJ 1QGC 3FOP 3SLP 3SWW/KG6 6CAA 8HLR ØJPL, WAs 4SRS 4YDR 5IIS 6IDN 6TGH 7ASM 8IBX 8MAT 9BGK, WB2s CON LSV MJD and W. P. Kilroy mighty busy with BV1USF (237), CE3RC 7, CN8s AW (232) 19, AX BW FV, CPs 5AY (300) 23, 8AB 8AD, CRs 3GF (115) 23, 4AJ (270) 2-3, 6BX (138) 18, 6DA 6EC 18-20, 7GF 19, 7IG 19, 9AK (115) 12, CTs 1EE 1GE* 1OZ* 23, 2GF 20, CX2AY, DM2BRN (106), DU1AP (243) 10-12, EAs 8BQ 20-23, 9AZ (243), EIs 4Q (120) 16, 6AG 12, ELs 2AF 2O (338) 23, 6VP 7A 23, EPs 2AX (340) 13-14, 3AM (123) 13, ET3s MEN (254) 21, USA (110) 0, F9RY/FC (110) 13, FB8WW*, FG7XL (115) 11, FK8s AC (123) 12, AZ BH, FO8AB (120) 9, FM7WQ (244) 22, FR7ZD (135) 18, FY7s YJ (110) 21, YL, GC8HT, GD3s ENK (332) 18, RFE (130) 12, HA5s DU (131) 14-18, KBB, HCs 2AG 2MV 5BZ (345) 22, 6GM* 14-15, 8JG (130) 23, HIs 7RXB 8COU 21, 8JGM* 22, 8J8M (110) 17, 8RSD (110) 11, HKØs AI (225), QA, HL9s KF KW 8, TD TH (120) 11-12, TM TT US, HMs 1AB 2BD (120) 14, BV (230) 0, HP3MC (120) 12, HRs 1SO (125) 13, IRP 2ABC 17, 5NLC, off-limits HSIs AK CB DH 14, EJ US (110) 13, S, HV1CN (103) 16-22, IS1VAZ (310) 18, IT1SAI, JAs 1MP 2AEY 2CJB 3IW 4BJO 6NP 7BY 8AA 8HK all 0-1 or so, Ks 1YPE/XV5 3SWW/KG6 4JFA/KS4*, KAs 2RJ 5ZS 7AB, KCs 4USB 3, 4USH 4USN 2, 4USK 4USX 6BY (220) 21, KGs 4AA 4AM 4CM 6APJ 11, 6APR 6IF, KL7s BJV WAH 1, KM6BI, KR6s CS CU DB EC EO JM LJ MB OJ TW UA UL, KS6s BD 6, BK 7, BO BV (236) 5, KV4CF (280) 11, KW6EJ, KX6s BQ BW DC (270) 7, DR (260) 7, JI, KZ5s DR (345) 22, LC 23, MM, LAs 5AJ/p (250) 13, 5CI/p (230) 16, 5ZJ/p (125) 13, LUs 1ZC* 3ZA* (75), LX1s CO 21, DB, LZ1BZ (225) 13-15, M1B 14, MP4s TBM (235) 14, TBO (115) 12-17, OAs 4HF* 8B (130) 11, OD5s AD AI BZ 19-20, CN EE (253) 17, EG, OH0NI (118) 12, OXs 3BH 19, 3JV 3LP 19, 5AX 5BO, OY7ML (230) 12, PJ2s CH (115) 12, CZ*, PZ1BW (383) 22, SVØs WF WR (238) 15, WS, TFs 2WJK 3AP 16, 3EA (264) 12, TGs 8LS 9CB 9OP, TIs 2CJH 2KR 2VJ 4DL, TJ1AC (115) 17, TU2AA 17, TY3ATB (105) 23, UAs 1KED (110), 2AO 14, 2KAW 0EH (276) 0, 0SH (117) 1, ØYE ØYP ØYU, UB5s ES KAA 13, KJA KKA 15, OK, UD6s BR DA KAR (133) 13, UF6FB, UH8BO, UJ8KAA (128) 22, UL7BF, UN1BK, UP2s KAB (117) 12, OK (240) 12, UR2s AO AR (243) 16, KAA (270) 12, KAW, UT5s RQ ST, UV3TP, UW9CC 5-6, VEs 1AED/SU (135) 17, 8AM 8CO 8PS* 0, ØMF ØMY ØNE, VKs IJG 8, 8KK (115) 12, 9DR (120) 14, 9XI 14, ØGW ØTO*, VO1s AE CM, VPs 1AM 14, 1HB (110) 22, 1LB 1NDC* 1PV 1WS* 14, 2AA (148) 22, 2KD (115) 12, 2KG 2MJ 2ML 13, 2VD 4-5, 3AA (110) 11, 3HAG 5AR (120) 17, 5GC 5RB (120) 12, 6WR 6JC 6KL 15, 7BI 7CC (275), 7NC (120) 11-12, 7NS 9AX* 18, 9BP* 21, 9FB 9FT* 22, 9H (332) 19, VQs 8AX (249) 17-18, 9HB (100) 18, 9TJ, VR2EJ 5, VSs 6AJ 6EK 6FM 6FO 6UA 9AAG (250) 19, 9AFR (125) 8, 9AWR (245) 18, 9MB 9MP 9OSC (203) 16, VU2AK, Ws 7MNT/KJ6 (275) 1, ØYKD/KS4* (333), WB6PZK/KJ6 (260) 4, XEs 1HHH 1JJA 1YO 2BC 2NNN, XV5AA, XP1AA, XW8s AF (103) 22, AL AX AY AZ (112) 14, BF (100) 15, YAs 1AW 3TNC 14, YK1AA (240), YNs 1LH (130) 18, 1NA 1RD (120) 12, 3KM (332) 21, 9JUL, YO3LM (138) 17, YS1s HUKE (352) 19, MS O (334) 22, SRD, YU3BC 21, YV9AA, ZB2s AJ (290) 9, AK (125) 17, AL 22, AM (110) 14, AL 22, ZC4MO (290) 19, ZD8s AR (130) O, HL (240) 21, JPL LV RD (115) 7-20, ZSs 2MI (138, 235) 14-15, 3HT 18-21, 8G (202) 18, 3A2BF (110) 12, 4S7IW (210-235), 4U1ITU 13, 4X4s AS (245) 17, BO (122) 22, FV (114) 5, 5A2TR 22, 5H3s JJ JR 19, 5J3LR (240) 21, 5N2s JRM (120) 8, KOB (332) 22, 5VZ8CM (122) 18, 5X5s FS (310) 7, IU 20, 5Z4s AA ERR IR (242) 18, 6Y5s RA RD, 7Q7PBD, 8J1RL, 9F3USA (250) 16-17, 9G1s DI DY (255) 0, FR* (119) 21, GD 23, TV 1, 9J2s AB (228) 21, FF (290) 19, FK (100) 17, 9L1HX (248) 23, 9Ms 2DQ 2JR 2LO 2SR 4ME 6AC 6AP 18, 6BM 6DG 8DR 8DS, 9N1MM, 9Q5s AA EG 19, QR, 9U5s DB 20, IB 19-20, 9X5CE, 9Y4s VP and VT*, the asterisks for non-s.s.b. customers.

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Next month we intend to inspect other DX bands with the aid of (15 c.w.) Ws 4DXF 8YGR 0CVZ, Ks 1ZJA 6CAA 8HLR 8YSO, WAs 1CYT 2LDX 4YDR 5EID 6JDT 7BOA 7BOB 8MGD 8BGK 9IBT, WBs 2FMK 6MEQ 6NXK, WNs 2RTX 2UHK 3DYT 4YZC 8QJK 9OZC, VE2ANK; (15 phone) Ws 3HNK 8YGR, Ks 1ZJA 6CAA 8YSO, WAs 1BDR 1CYT 4YDR 6JDT 8MAT 8MGD 9BGK 9IBT 9OIT ØLWC, WB2OLN, VE2ANK; (40 c.w.) Ws 1BGD 1 CRX 1VAH 2APH 3HNK 4OMW 4UJT 6YKS 8YGR 9ACS 9NN, Ks 1ZJA 3FKU 3SLP 6CAA 8HLR 8YSO ØJPL, WAs 1BDR 1CYT 2LDX 4UMX 4YDR 5EID 9IBT ØFRM, WBs 2LSV 2NLH 6CGL 6MEQ 6NXK 6PCV, WNs 4BGL 4YZC 9OZC; (40 phone) W1BVP, KØJPL, WA4YDR, W. Kilroy; (80 c.w.) Ws 1BGD 1SWX 6YKS, Ks 1ZJA ØJPL, WAs 1BDR 4UMX ØIIJ, WN4YZC; (75 phone) W3HNK, KØJPL, VE3FUX, Mr. Kilroy; (10 phone) WAs 2VFA 7BOA 7BOB 9QJW; (10 c.w.) WA7BOB; and (160 c.w.) W1BB, plus others reporting in the interim.

Where:

WHEREABOUTS — "QSLers of the Month" this month include CN8FV, CR8AF, DL6VP, DU7SV, EAs 8CP 8EN 9AY, EL2AE, F3YR, FG7XX, FP8s CK CQ, FR7ZD, GC8HT, HC2MV, HV1CN, IS1TAI, JAØAZE, K3SWW/KG6, KB6CY, KH6EOQ, LA5CI/p, M1N, MP4TBO, PAØZAV, PJ2s CE MF, PYs 2BZD/Ø 7ACQ/Ø, PZ1CM, RAEM, TL8SW, TU2AN, VKs 2DI 5TC, VPs 2SK 5AR 8HJ 9BY, VQs 8BEA 9HB, VR6TC, VS9s ARV AWR, VU2s AK YL, WA9KUP/KL7, WP4COZ, XE1NNN, YK1AA, YOs 3RF 8GZ, ZB2AM, ZDs 7IP 8BB, ZP5EC, ZS6JK, 4X4QA, 5R8CB and 9H1AG, all nominated for surprisingly snappy service by "How's" correspondents Ws 1BGD 1SWX 7AYY 7QPK, Ks 3SLP 4AUL 8YSO, WAs 4WIP 6MWG 6OET 7BOA 7BOB 8MAT 9IBT, WBs 2LSV 2NLH 6ITM 6MEQ, WN2UHK and KH6FLC. QSL aides Ws 2CTN 2GHK 3HNK 4ECI 4TAJ 9IOP, WAs 2WUV and 8GUA also are mentioned in dispatches. Anybody we missed? . . . . . WB6MEQ thinks FP8AP ought to get some sort of award as fastest non-QSLer of the month. Nothing derogatory; somebody arrogated FP8AP's call and Gus let John know about it within a week. Similiarly, W2HLL points out that he hasn't

used his FP8CC license since August, 1962, current spurious indications notwithstanding . _ . _ . _ A Hammarlund inter-*office letter gives* this new address for the company's QSL activities: Stuart Meyer, W2GHK, P.O. Box 7388, Newark, N. J., 07107. W2GHK states, "Outgoing cards will be sent direct to the appropriate bureaus, except those accompanied by s.a.s.e. (*self-addressed stamped envelopes*) or s.a.e. These will be mailed direct. Hams outside the U. S. may use the appropriate number of IRCs (International Reply Coupons) for surface or air reply." Never fear; QSLs received at the former New York address will be forwarded . _ . _ . _ "I still have a thousand QSL blanks for my KL7CDF and W9KLD/KL7 operations," remarks W7AYY. "Though I've been back in the 'old 48' since '61 and endeavored to QSL 100 per cent there still may be some I missed. W/Ks replied to my Alaska cards about 60 per cent, Europeans almost 90 per cent. By the way, as a KL7 I received almost ten thousand s.w.l. cards. I'm afraid I never will get around to answering all of these but I continue to plug away at it." . _ . _ . _ After much pondering K3FKU comes up with Drool's Law: One's chances of obtaining a QSL are inversely proportional to the country's rarity times one's need or desire for it . _ . _ . _ W1WQC did a guest stint at VP5AB from 2015 GMT, December 30, 1965, to 2345, January 1, 1966, for some 500 s.s.b. QSOs, on 20 and 75. Ham offers to confirm these contacts from his Connecticut QTH on receipt of s.a.s.e. and valid QSO data . _ . _ . _ WA4AYX emphasizes he's the one and only QSL agent for VP2SM . _ . _ . _ K1MIP will confirm only his own QSOs from VPs 2AC 2SY and 6WR on November 23–29, 1965 . _ . _ . _ W1BGD of ARRL, WA7s BOA and *BOB affirm* that W4SSU has terminated his QSL arrangement with VP2KJ, so consult Ken direct . _ . _ . _ Think you have QSL troubles with rare DX? KP4BJM has spent two years trying to coax a WAS-clinching QSL from his one and only Wyoming contact . _ . _ . _ 'ALP! The following italicized OMs need assistance towards glomming QSLs from holdouts specified: *W2CES*, MP4DAN, TU2AA, UP2OK, UQ2BT, VP2DAA; *W3IBX*, TT8AC; *W3YGR*, CR4s BB BC; *KA1UL*, BV1USB '63; VP1WH; *K4DRO*, KG6IG '62, TN8AG '62, VS1HX '58, ZD1GM '59; *WA2YJN*, CM2WS, CP5EQ, LZ2AW, M1B, UD6DU, VP5SG, ZB1CR, 5N2JWB, all '63; *WA6MWG*, AP5HQ, UI8AU, 4U1SU; *WA7BOB*, GI3PGD; *WB2AMO*, FB8XX; *CX2CN*, HZ1AT '64; *KP4BJM*, 9G1FE '64; *PY2BGL*, FL8AA, MP4s, QBT/MP4T TBJ TBL; *VE1AKZ*, DJ6SI/LX, HP9FC/mm '63, VPs 1NDC and 6AK. K8YSO wants to thank everybody who came to his aid with VK9BH QSL suggestions in response to a "How's" holler for help, and PY2AGL's recent QSL plea brought K9YRA to his rescue with helpful data . _ . _ . _ K1YPN, WAs 2MHY 4YDR 8MQE and VE1AKZ add their calls to those available as QSL tenders for needful overseas DX stations, the rarer the better.

SOUTH AMERICA — "My apologies to the gang who waited so long for CE1GJ QSLs," writes K7MFD. "I now have all logs for my Chile operation from *October*, 1961, to April 28, '65, and a fair supply of cards for those whose earlier CE1GJ confirmations went astray in the upheaval of my sudden departure from CE-land. One comment for the benefit of QSL *managers* and operators of stations with heavy QSL loads: *Please*, fellows, have all address info and QSO data on only one side of your cards." Howard also cites confusion caused by ambiguous PSE QSL TNX remarks. *Cross out* either the PSE or the TNX . _ . _ . _ VERON's *DXpress* has it that K2HLB's generous shipment of QSL stock to the PY2BZD/PY0 gang never arrived in Brazil, thus delaying Trinidad confirmations until a local print shop could deliver.

OCEANIA — VK4TE's Willis isle logs for May 8 to June 7, 1965, are held by W8ZCQ. Dan will answer petitioners on an s.a.s.e. basis. "I have no logs for operator Graham's activity *prior* to the dates mentioned." . _ . _ . _ VR2CC's call apparently was pirated by a chap named Warren between August, 1964, and April, '65, a period when Fred, the real VR2CC, was off the air changing QTH. The illegal operation didn't cease even with Fred's return to the air, judging from recent QSLs arriving at VR2CC. Authorities are investigating the matter but many a DXer will have to scratch what he thought was his first Fiji QSO . _ . _ . _ K6QPG's OM, W6PEU, helps man KX6JI on Japtan atoll, so Mary may be able to assist in confirming contacts made by operator Britton Garlow.

EUROPE — GC8HT is getting a real workout QSLing all his Guernsey QSOs. "I sent out some 4000 cards from June to November, 1965, eighty per cent via bureaus, some 800 cards direct." Response to Dick's 14-Mc. s.s.b. signals are such that he had to increase a 5000-QSL print order to 10,000, which stock he doubts will last through this year. GC8HT heartily endorses the editorial comments on page 107, October '65 *QST*. If you're new to the *DX* facet you would do well to dig same . _ . _ . _ HBØs ABS and YS, who recently radiated from Liechtenstein on 20 phone, are HB9s ABS and YS. You can hardly go wrong by QS*Ling* an *HB*Ø to the *HB*9 of the same *suffix* . _ . _ . _ IT1AGA, certificate accumulator par excellence, is frustrated by W/Ks in rarer U. S. regions who do not return their QSLs even in response to registered airmail. Are *your* books balanced, OM?

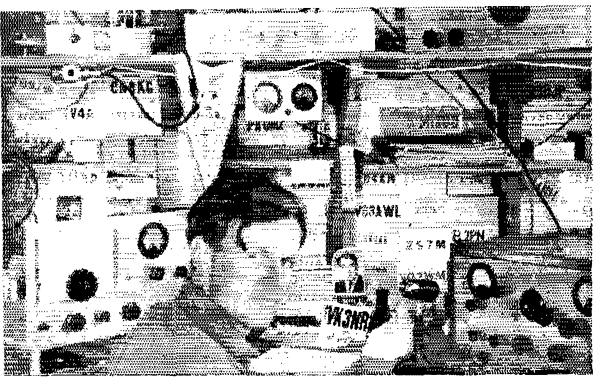
The Cambridge University Wireless Society is once again organizing an expedition to the Isle of Man to operate GD6UW. From March 16 through 21, c.w., a.m., and s.s.b. will be used on all bands, 160 through 10 meters.

AFRICA — "For the past six months W4TVQ has been my QSL manager and his efforts have really been appreciated," writes ZD8WZ. "Due to moving and professional responsibilities he is no longer able to take care of QSL chores for ZD8WZ contacts, so I will handle things from Ascension from now on. All cards received will be answered 100 per cent by first class or airmail. Anyone not receiving an answer in a reasonable time might check with me again. However, as mail service here is comparatively slow, I suggest a wait of about two months before follow-up." . _ . _ . _ K2MIGE tells us she can help confirm FB8WW contacts made by operator Henry. The usual s.a.s.e., or s.a.e.-plus-*IRCs*, please . _ . _ . _ QSLs for CN8FS QSOs dating prior to October 15, 1965, should be sent to Box 10, c/o FPO, New York, N. Y., 09544. Subsequent contacts can be confirmed through the new W2GHK address aforementioned. Operator K3RRF vows *100-per-cent* QSL and adds, "The Morocco bureau, handled by CN8AW, also does a reliable job for those who prefer that route." . _ . _ . _ From WB6ROA: "I'm anxious that everyone who QSOd me as 7Q7GN receives a QSL." Gordon's address appears in the roster to follow . _ . _ . _ "I finally received logs from FL8RA for contacts on November 11–29, 1965," reports W2LJX. "A stack of incoming cards were awaiting replies. I've requested Andre to airmail logs monthly. Fellows who require confirmations for FL8RA QSOs before the dates mentioned are also invited to apply to me with s.a.s.e. Those who are kind enough to send along thank-you notes and extra postage surely help make a QSL manager's chores gratifying." Jim asks for the customary s.a.e. with IRCs from non-W/Ks.

ASIA — "We've had about 60,000 QSOs from, twelve stops over a three-month period," states W9WNV, pointing out that QSL manager W4ECI is bound to need time to tidy up the task . _ . _ . _ WA6MWG's tour of HM2BD QSL duty begins with this year's QSOs . _ . _ . _ "I have all back logs for YA1AW," declares K5GOT, promising quick response to applicants who supply self-addressed stamped envelopes (s.a.e. plus IRCs from non-W/Ks) . _ . _ . _ Now let's see what individual recommendations plop out of the "How's" mailsack, keeping mindful of the fact that each item is necessarily neither "official," complete nor accurate:

ex-CE1GJ (to K7MFD)
CN8FS (see preceding text)
CO2KG (via ANRAC)
CR6DX (via W2CTN)
ex-EP2DS (to W9AUM)
F8ITU (via REF, attn. F9OE)
FB8WW (see preceding text)
FL8RA (via W2LJX)
FM7WH (via REF)
FW8s XX ZZ (via W4ECI)
HI8XGB-ON5AK-VP2VU-4X4UX (to W2GBX)
HI8XMT, c/o U. S. Embassy, Santo Domingo, P. R.
HM2BD (via WA6MWG)
HP9FC/mm (via VE1AKZ)
HR1JMF, P.O. Box 146, Tegucigalpa, Honduras
HZ3TYQ/8Z4 (via W1RAN)
K4SOD/mm, R Sansom, USNS *Rose Knot* (T-AGM-14), c/o PAA, CMR, Patrick AFB, Fla.
KL7CDF-W9KLD/KL7 (to W7AYY)
KS6s BO BV (via K4TWF)
KX6JI (via KX6BQ; see preceding text)
LU2ECS, Box 5396, Buenos Aires, Argentina
LX1TP (via LX1DC)
MP4TBO (via VE1AKZ)
OD5EJ (via *SM5BOK*)
OD5EK, Box 2309, Beirut, Lebanon

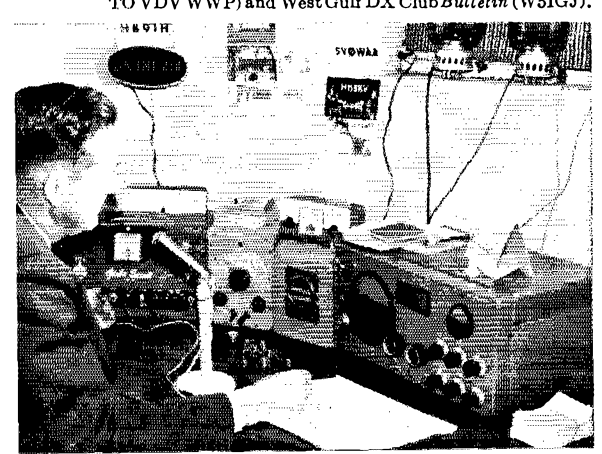
VR2CC's location at Deuba, one of the Fijis, is where we northern folk should have spent this past winter. The QSL scene doesn't show Fred's HT-32, SX-28, SX-115, home-made 150-watter, triband quad and lower frequency dipoles at the island's Beachcomber Hotel.



VK3NR is our homebuilt station of the month, a hamworthy job indeed. That stuff really works, too, as Stateside 20-meter c.w. hounds can verify. (Photo via W1YYM)

OK3UL, J. Siraka, P.O. Box 44, Malacky, Czechoslovakia
OX3LP (via OZ4KY)
PJ5ME, Rog. Corey, W1JYH, 60 Warwick Drive, Westwood, Mass.
ST2BSS, J. Collins (5N2JWC), USAID, U. S. Embassy, Khartoum, Sudan
VK3AFF (via W4ECI)
VK4TE (see preceding text)
VPs 2AC 2SY 6WR (see preceding text)
VP2SM (via WA4AYX)
VP2VD, R. Gynn (G3SBP), Box 27, St. Thomas, V. I.
VP5AB (see preceding text)
VP5HM (via VP5AB)
VQ9TC, T. Crawford (W4IBD), Box 191, Mahe, Seychelles
VS9AFR (via VE1AKZ)
WØYKD/KS4 (via WA4PXP)
WA5BGW/KP4, J. Chapman, USNS Box 36, R-41, FPO, New York, N. Y., 09550
WS6BW (via W4APE)
XV5AA (via W4UWC)
YS1MAM, P.O. Box 570, San Salvador, El Salvador
YS0EM (to YS1EM)
YV4MK, P.O. Box 182, Merida, Venezuela
ZD5M (via W2CTN)
ZD8WZ (see preceding text)
ZF1RV (to VE7RV)
ZK2AF (via W4ECI)
ZL4CH (via ZL2GX)
ZS8K, C. Stenton, P.O. Box 363, Maseru, Basutoland, S. Afr.
4S7IW, I. Wollen, Dickoya, Ceylon
6W8CW (to DL9KRA)
ex-7Q7GN, G. Nelson, WB6ROA, 5628 N. Lafayette Ave., Fresno, Calif., 93705
7X2AH (via WA4STL)
9F3USA (via W7TDK)
9J2IE (via W2CTN)
9Q5FH, c/o IME, Kimpese via Leopoldville, R. C.
9U5DP (via W2SNM)
9X5PS, Box 636, Kigali, Rwanda
9Y4RS, Claxton Bay, Trinidad

These suggestions were culled from the contributed correspondence of **Ws** 1AYK 1BGD 1ECH 1SWX 1WPO 2APH 2JBL 3HNK 4WXZ 8GQU 8YGR 9HPG, **Ks** 1ZJA 2MGE 2UPD 8HLR 8YSO, **WAs** 1CYT 4WIP 7BOA 7BOB 8MAT 91BT, **WB2s** FMK LSV, **WN4YZC**, **WS6BW**, **VE1AKZ**, **G3ATH**, **9Q5RD**, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4LVV), International Short Wave League *Monitor* (12 Gladwell Rd., London, N.8, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WB2HXD), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif.), Ontario DX Association *Long Skip* (VE3FXR), Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV), VERON's *DXpress* (PAØs FX LOU TO VDV WWP) and West Gulf DX Club *Bulletin* (W5IGJ).



Whence:

ASIA — HL9s KF TD TM TT, HS1s AK CB HS S, KR6s CS CU EC EO OJ TW UD UL, KX6BW, VKs 2AOK 3DH 3OZ 9DR, VSs 6AJ 6EK 6FM 6FO 6UA 9AFR 9AWR 9MB 9MP, XW8s AL AX AY AZ, 4S7IW, 9Ms 2DQ 2JR 2LO 2SR 4ME 4MF 4MT 4MU 6AC 6AP 6DG 8DR 8DS and 9N1MM are members of the South East Asia Net that meets daily on 14,320 kc. Contacts with any twelve SEAN members may make you eligible for a certification offered through 9M4MT (G3ATH); check with Harry for details. W/Ks should keep in mind that those Thailanders are still on the ITU/FCC banned-countries list. We hear that WØEBI and military colleagues are using a KWM-2 as HS2US but this also apparently comes under ban at our end . . . . . "Special thanks to EP2s AR BF and CN for their help in obtaining Iran amateur licenses for foreigners," acknowledges ex-EP2DS, now W9AUM once more. "Had many hours of enjoyment as rare DX." EP2AS paid WB2FMK a visit before joining EP2DM at North Georgia Tech . . . . . WA6MWG expects plenty of QSLs when HM2BD completes his homespun s.s.b. exciter and high-power linear . . . . . VS9AFR and associates will sign a VS9K call from Kamaran isle this month according to K1YZW, "all bands, c.w., s.s.b. and possibly ordinary a.m." . . . . . "Kite flying is a Maldivian's favorite sport," goes a newsclip forwarded by W2JBL. "Men and boys alike sail the big tailless toys in the monsoon winds, attaching noisemakers to the frames to create roars and whines." Maybe VS9s MB and MP should attach copper to those frames to make some noises on 160? . . . . . BYs 3NA 6HN and 9SX are heard working each other on 40 c.w. with the latter as net control . . . . . XV5AA and K1YPE/XV5 keep busy with skeds on 14-Mc. phone.

AFRICA — W7WLL gives us a French Somaliland fill-in: "FL8AA (4W2AA) turned his borrowed s.s.b. rig over to FL8RA when he left Djibouti but Roger had difficulty with English. So FL8RA, now operating 14- and 21-Mc. c.w. with some a.m., sent the Heath sideband rig back to ET3USA. FL8AO is on a.m., mostly 21 Mc., but he's located so close to the official French Somaliland radio station that he must be selective in his activity. FL8MC replaced his BC-1004D receiver with an SP-600JX, and still transmits with a Globe Chief on 14- and 21-Mc. c.w." Don intends to help secure beam and s.s.b. facilities for Claude . . . . . According to 9Q5RD operator W4WXZ, 5N2JWC will try for more rare Africa Boy Scout demonstration stations like his successful December ST2BSS set-up. W4WXZ spent two hungry no-hamming years in Iraq before trying the Congo. You also may have worked Chuck as KA2FEC. He expects to have his own personal 9Q5 call around 14,035 kc. soon . . . . . CN8FS (K3RRF) likes 20-meter sideband and c.w. on 20 and 40. "Forty is heavy with broadcasting QRM but 7050 kc. is good for occasional DX." Ed may leave Morocco in May . . . . . K2MGE says Fs 3DJ and 9LC talked FB8WW operator Henry into accepting the Crozet assignment along with an SR-150/SX-117 combo . . . . . ZD8WZ observes, "Worked 140 countries here since June, mostly near 21,415 kc. on phone, 21,040 kc. on c.w., with a 32S-1, 75S-1 and R4." . . . . . WB2FMK finds the distinctive c.w. signal of ZD9BE likely to appear anywhere in the 14-Mc. band, though usually around 14,050 kc. at 1700–1745 GMT.

EUROPE — VERON (Holland) lists Ws 4SNU 4HOS 7BTH and WB2KIV as U. S. A.'s 1-2-3-4 in the 1965 PACC DX Contest, a free-style event. VEs 4ZX and 1AE did a Canadian one-two. On the local scene PAØs LV LOU, PI1STC, PAØs BRM VB LO RXR FAK DC and MAR finished in that order. Other country winners: CT1NW, DL1AM, DM2AYK, F8OP, G2LU, GW3LAD, HB9QA, LA4WJ, LZ1KKZ, OH2BQ, OK2KOJ, OZ6HS, PY2CQ, SM5CZK, SP8HR, UAs 2KAP 3UJ 9WS, UB5KBA, UC2KAA, UD6BD, UL7KBB, UM8KAA, UP2KCF, UR2KBT, YO8FZ, YU1DVW and 4X4NY. PY2CQ, UA9WS, UP2KCF and W4SNU registered continental highs. This year's PACC affair comes off on the 23rd–24th of next month, details coming in April's "How's" . . . . . The British Empire Radio Union Contest, 29th in the series, takes place the 19th–20th of this month. It's for hams of the Commonwealth only, so let's not pester those rare ones calling "BERU" as tempting as they may be . . . . . TF3KB advises, "I'm testing a transistor 30-watt c.w. transmitter near 3505 kc. and find conditions quite good

HC1JQ (WA9FNR) is English program director for famous SWBC station HCJB, "Voice of the Andes." When duties permit you'll find Jim's c.w. near 21,050 kc., his phone around 21,333 kc., with 50 or 60 watts to a cubical quad. By the way, the HCJB boys cooked up the quad a few years ago and it's really getting around.
(Photo via WA9BGK)

QST for

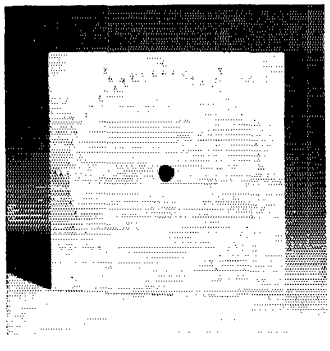
to the U. S. around 0900 GMT." . . . . . RAEM of Moscow always mystifies new DX generations, so WB2LSV reminds us to restate that Ernst Krenkel's unique call was inherited from the icebreaker *Chelyuskin* aboard which he performed heroic Polar Sea radio duties in the 1930s . . . . . S.w.l. Jean-Yves Berthe, B.P. 92, Proermel 56, France, desires to correspond with some young U. S. amateur . . . . . F9OE, at the key of International Telecommunications Union Centenary station F8ITU, worked some 300 W/Ks on 14-Mc. c.w. in early December . . . . . IT1AGA, with 38,700 QSOs since 1952, looks for c.w. Yanks on 7 through 28 Mc. daily at 1300-1600 and 2200-0200 GMT with a Geloso 60-watter, 2B and Windom wire . . . . . GC8HT makes all those Guernsey sounds with an NCX-5, rhombic and 3-element quad, 3.5 through 28 Mc. . . . . Jan Mayen's LA8FG/p, on 14,255 kc. at 1500 GMT or so, has until June to zero in on WAS . . . . . Albania is said to be welcoming British tourists these days. S.w.l.s only?

OCEANIA — VR6TC, according to K2MIGE, should soon have his HT-37/HT-41/SX-117 ensemble perking from Pitcairn on 15 and 20 s.s.b. almost daily. A new TH-3 spinner will help Tom chop channel chatter. Ws 4TAJ and 5OLG expedited these procurements . . . . . K6QPG skeds Japtan island's KX6JI on c.w. around 14,080 when the rig isn't tied up with 20-meter voice traffic. Operator W6PEU says KX6JI's 4CX-250Bs really slice a slot . . . . . Oceaniagrams via club literature: WS6BW is a rare Novice catch on 7158 or 7180 kc., 0600-1100 GMT. WM6DK and WV4AP are also scarce specimens. . . . ZLs 3UY and 4CH are reported raisable in the Campbells near 14,060 kc. at 0600 GMT, also 14,110-kc. sideband. . . . Keep an ear on 3502, 7002, 14,045, 14,105, 14,235, 21,200, 21,400 and 28,600 kc. for further DXcitement on the W9WNV-K7LMU-ZL2AWJ and W6KG-XYL Pacific DXpeditionary front. Don, Chuck and Ted, as well as independent YS1s AG and EM, have been contemplating Clipperton.

HEREABOUTS — Now that ten-meter DX is making a comeback W8IBX hopes the band doesn't turn into the power-packed bedlam 20 has become. Checking the 28-Mc. QSL collection of his OM, the late K8ANX, Kurt comes up with an average U.S. power figure of 166.77 watts for activity during the last sunspot maximum. This he thinks is plenty. Well, the harmonic proximity of TV Channels Two and Six will hold things down in many areas. WA9QJW, for example, hunts his DX on ten with 5 watts of a.m. and a ground-plane on 29,100 kc. . . . . Ex-CE1GJ, now back at K7MFD, left his tower, rotator and 4-element quad with CE1DN, and his HX-20 with CE1FG, so the town of Iquique remains on the DX map . . . . . W9NN caught up with a guy signing "VU4CQ" on 40 c.w. A joker's anonymity may be less secure than he thinks . . . . . W8YGR fears he may become a solid-state operator if he sits around much longer waiting for new countries to show up . . . . . W8GQU says you shouldn't have missed the phenomenal 14-Mc. DX conditions of last December 19th . . . . . W2GBX-W4UXB visited 87 countries in four years but didn't have as much operating fun as Gus . . . . . Another Long Island DX Association year-long DX marathon got under way January 1, 1966. The club invites inquiries addressed to LIDXA Contest, P.O. Box 599, Lynbrook, N. Y. W2FGD and K2MIGE are hard at work evaluating entries for the 1965 affair, results soon due for release . . . . . K6ARE writes, "Several years ago when I was K1GCX in Burlington, Vt., I met the Mr. Tyndall mentioned in your August, 1965, item on s.w.l.ing. He's an OT in the business and has a fabulous memory. Stories of his experiences in the infancy of radio hold the attention of young and old." . . . . . Connecticut Wireless Association Ws *BGD BIH* TX and W2ADE plan possible FS7 or PJ5M output during this month's concluding ARRL DX Test c.w. week end . . . . . WA9DJO notes YS1RFE regularly workable near 20's slow edge, usually around 1500 GMT, although a new YL harmonic gives Dick lively local QRM . . . . . W2APH finds increasing Caribbean action beefing up DX logs on 40 c.w.'s bottom end . . . . . K8YSO says CO2BO is visitor OK3MM working c.w. on 14, 20 and 40 meters. He's an electronics engineer and his brother, OK3HM, handles his QSLs back home . . . . . W3JAK/mm, shooting solid signals at K1ZJA near 21,050 kc., is on the U. S. A.-Scotland run. VE1AKZ finds VE1AHK running a KWM-1 as HP9FC/mm on a New York-South Africa orbit . . . . . "Caicos VP5s AB and HM are without equipment," states W1WQC, who sometimes puts VP5AB on DX bands while down there with his own apparatus. "DX conditions are fantastic on South Caicos. With an NCX-3 and TD-1 doublet we repeatedly worked VKs long path. I'm amazed at the number of W/Ks with high countries totals who said they had not worked Turks & Caicos." Ham says that VP5GC, Grand Cayman, has a.c. mains power only in the evenings, also late mornings Mondays and Wednesdays, so the availability of Frank's 813s linear is intermittently restricted.

ET3USA (9F3USA) of Asmara has been a standout DX club institution for many years. K1QHP-FL8AK, at the key in this photo, now is based at Ft. Devens, Mass.
(Photo via K4YFE)

Strays



Jack Davis, who had an article, "Auditory Meter Dial," in *QST*, June 1964, page 60, is now set up to make additional meter dial plates for blind persons who may need them. Jack has templates for 180, 270, 300, and 360 degree dot arcs. Arcs for 3-, 3½-, 4-, 5-, and 6-inch square plates are available. The number of dots in the main dot arc is either 25, 50, or 100, except for a special template with a 5-inch diameter dot circle of 260 degrees with 60 dots in the main dot circle. This template was made for HB9ADN, who plans to use it in conjunction with a pair of selsyns and his beam antenna. If a blind ham or technician has need for a dial with an odd number of dots, etc., Jack will try to fill such a request. Dial plates are available free for the postage. Six cents should be adequate postage for U. S. A. or Canada. Request should be sent to Jack Davis, 836 Bellefontaine Ave., Marion, Ohio 43302.

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
LILLIAN M. SALTER, W1ZJE, Administrative Aide — GEORGE HART, W1NJM, National Emergency Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards — ELLEN WHITE, W1YYM, Ass't. Communications Mgr.
GERALD PINARD, Club Training Aids — PETER CHAMALIAN, W1BGD, Communications Asst.

MARS Opens Viet Nam Circuits. We congratulate the chiefs of the Military Affiliate Radio System on the success of their efforts to operate overseas collecting-distributing stations for personal and morale-helping traffic for our service personnel in Viet Nam. Such MARS stations have long operated in Germany and at other posts. But even as two-way work between plain amateur stations with Viet Nam has been prohibited, so has been any MARS operation up to now. Discussions between our military and the Vietnamese government have been going on with the end in view of instituting MARS operation for a very long time. We congratulate all concerned on a successful culmination of the representations with adoption of policy and plans that permitted the start of such radio service just ten days before Christmas.

The first message (15 December) was from AI8AIR (K3AKK/AFA3AKK) at Saigon to McClelland Air Force Base in California. The credit for a grand service, which should continue and increase in volume through 1966, is shared between Army MARS, Navy MARS and Air Force MARS, all three branches and their scores of operators and personnel assisting! The Deputy Secretary of Defense in a holiday greeting stated, ". . . . this contributes in a unique way to the morale of our personnel overseas, and to their families at home. Many thousands will be made happier because of your volunteer work . . ."

We write as of mid-January. At this time nine originating stations in Viet Nam were in daily operation handling the traffic, using RTTY, c.w., and voice. Messages are coming direct and by relays to give a fast and accurate personal message service. W9KJ sent us three days of clippings from the *Chicago Tribune* which printed a blank-message box to assist in getting traffic from service men's homes started along. There were lots of good newspaper items about amateurs and MARS-amateur work, and 240 MBS stations broadcast an interview on the subject as a result of this operation. Additional stations are being set up in Viet Nam and will be working by the time you read this.

Delivery Precautions. The messages come to the U.S.A. on military, not amateur frequencies. This of course is true of all traffic that comes from overseas countries having no special-agreed provisions that "third party" communications and interchanges are permitted. When re-filed into domestic amateur circuits, a message in the case of Viet Nam must bear VIET NAM VIA MARS in the preamble, so the origin and handling is unmistakable. In making a *delivery*, each operator must use tact and common sense not to cause any concern or alarm. "I have greetings from Viet Nam" must be substituted for any expression that you "have a message!" Be sure you do not make the addressee of any message jump to the conclusion you have bad news.

Re-file MARS to Amateur Procedure. On any messages that are relayed first on military frequencies and then transferred into amateur nets and sent on amateur frequencies, note the following requirements — to put the traffic in its proper amateur-service form. The heading put on at the transfer point has (1) the amateur station's (new) message number, (2) the appropriate amateur precedence, usually routine, (3) the *amateur* call sign of the station refiling, (4) the check of the number of groups, text-only, (5) the place overseas this message came from, as Viet Nam via MARS, (6) time — date. The text remains unchanged, except that a break sign (only) separates the signature from the text. It is most important for handling stations with any *overseas traffic* that the preamble show point of origin VIA MARS. Otherwise FCC monitors may well pick it up as a problem of finding the station that would have to take responsibility for handling such a message overseas on amateur frequencies in the face of the ITU prohibition for this message from such a country!

Requirements for Originating. Wherever there are MARS unit-stations at Army, Air Force and Navy installations, there's an open invitation to the families of service men to start messages in the limits of what can be handled to those overseas. Amateur radiograms to service men in Viet Nam that can be relayed in a single day to such transfer points as Ft. Devens, Mass.; the Presidio, San Francisco, California: Scott Field AFB, Ill.; Westover AFB, Mass.; McLelland AFB, Calif.; Great Lakes Naval Training Station, Great Lakes, Ill.; Ft. Sam Houston, San Antonio, Texas; Camp Pendleton, U. S. Marine Corps Base, Calif.; Ft. McPherson, Ga.; and many others can be started on their way, provided all traffic meets the following requirements. Delivery can not be guaranteed but every possible effort is made to contact personnel wherever stationed. The services are suggesting the full use of our ARL-texts to keep messages concise. The absolutely necessary points to be met on starting these messages are: (1) We suggest 15-word messages with a limit of 25 words or less. (2) Complete mailing address must be provided. The address on the message should be complete with Zip Code as on a letter. (3) No commercial or business messages may be handled via this program, designed specifically for the morale of personnel and families of those service people overseas.

Top-Level Code Proficiency Certificate Issuances. Very special credit should be given those amateurs who achieve our full 30- and 35-w.p.m. certifications! About 48,000 different amateur operators hold our prized certificate, at some speed between 10- and 35-w.p.m. All amateurs are urged to work toward these top ratings. The practice, tape sent twice nightly on each frequency band by W1AW, covers the whole 5- to 35-w.p.m. range. All are invited to use this.

DX CENTURY CLUB AWARDS

From December 1, through December 31, 1965, DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

WB2EPG...201
W9BZB.....184
W5BPF.....176
IIC8A.....163
OK1VK.....141
JA1OIO.....128
TU2AE.....122
DJ9SB.....120
DL1VG.....120
WB2FON...119
HK3AH....115
WA0FQZ...115

DL6ZT.....115
W3UHN....112
W3FIU.....111
K6SVQ.....110
K9WDY....110
OK1KUL...109
W8LXU.....109
WA2MTI...109
WB6KPR...109
G8NKQ....109
HM5BF....108

DL1TV.....107
SM3DSE....107
WA4JLY....107
WB6CGA...107
ZS6AXU....107
UN1BK....106
WB6HGH...106
JA1FAF....105
ON4CE.....105
PA0WDG...105
WB6CMN..105
JA7MJ.....104

OK1HA.....104
OK2YJ.....104
K7TCL.....104
WA4LUG...104
UA4KHN...103
VE6BR.....103
K4BE.....102
OK3JV.....102
W6MTJ....102
W9YXX....102
WA9LZA...102

F5CH.....101
K8VYY.....101
LA3HI.....101
OE1KRW...101
VE3ETB....101
WA4FJM...101
WB6GFJ....101
W7MVC ...101
F2ZE.....100
F7DQ.....100
K1SWG....100
K3GUR....100

K3JGJ.....100
K5KYD....100
UW3CS.....100
WA2WLN...100
WB2COM...100
WB2FOV...100
WB2PBI....100
WA4UOE...100
W9BMD....100
W9CRW....100
W0CRY....100

Radiotelephone

VK2ADE...191
W4GXB....159
IIC8A.....148
OK1VK.....120

PA0TGW...115
WB2GYD...110
HA5AM....108
WA4JLY....107

W8LXU.....107
DL6ZT.....106
HP1JC.....105

WB6CGA...105
DJ8BQ.....104
WB6HGH...103

W9GFF.....103
W0JWD....103
K7TCL.....101
PA0DEC....101

W2UFT.....101
WA0EMS...101
W1MRQ....100
W4JVU.....100

Endorsements

Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but show only that the participant has reached the endorsement group indicated.

330
IIAMU
K2BZT
PA0FX
W1HZ
W2LAX
W3ECR
W5ABY
W6CYV

320
IT1TAI
W5QK
W6OSU
W9UXO

310
K8LSG
W4AVY
W4MS

300
K1SHN
W2DXX
W2MJ
W4HUE
W4NJF
W5OGS

280
W7BA
W9FKH
W9RQM

W0AUB
W0OAQ

260
K3HQJ
K6EXO
SM5BCE
W2OIB
W2ZTV
W4VMS
W9IVG
W0YCR

200
HB9DX
W1DGJ
W1UUK
W2FXE
W8LUZ

220
K4CEB
SP4JF
VE3DDR
W0CKC

240
CR7BC
DL3ZA
SM7ANB
K0IFL
W1CJK
W4FRO
W4HOS
WA4PXP
W8RCM

180
DJ2BG
DL1ME
I1IR
I1PP
K1PNL
K4YYL
K9VRU
SM5RK
SP8SZ

160
DL1XZ
K2AFY

W2OCL
WA2EFN
W3WJD
W4ZXI
W7FUL
W7MH
W8HDB
W9MCJ

140
DJ4OQ
K1ZS1

K2QIL
K4ZJF
K8ZIP
UT5CC
VE3UR
W4GTS
W0PAH

120
SM4CMG
PA0LV
UA9BZ
VE3CLK
WA2VFU

K5BZU
K7PBM
K8LNL
K9CZV
OH7PJ
OK1BP
F3TK
K3FGO
K3SLP
K4CK

W5EIL
W5HTM
W7RVM
W9ADV
WA0KDI

K7PJF
K7VYU
SM7BHH
UA4KKC
WA1ABW
WA6CAL
W0JWD
ZS6BIJ

Radiotelephone

320
G8KS
W9YSX

310
W8JIN

300
WA2IZS

280
G6TA
K2BZT
W6ZJY

260
CT1PK
W1CGX
W2ZTV
W7CMO
W8EVZ
W9NLJ

240
OA4KY
W2CZF
W4EEU
VK2JZ

220
K1IDW
K4TWF
K6HZP
SM5RY
W2FXE
W2UTH

WB2HXD
W4NI
W4VMS
W6LDA
W8WC
W9IVG

200
W1CJK
K4CAH
K4FTZ
K8VDV
W2FXA
WB2EPG

WA6TGY

180
FG7XL
K2POA

W2MOF
W7MKI
W8HDB

160
SM5RK
VE2ANK

K4ZJF
OK3CDR
OZ7BG
VE3CBY
VE3UR
W1BFA
W1BPY

140
DL1ME
K0IFL
W4ELB
WA4WIP
W9BZB

120
K1ZSI
TU2AE
W3OJW
WA5LJU
XE1AZ

Those already started on the road can up their speed in submitted copy (on the once-a-month W1AW and W6OWP qualifying runs) so as to rate endorsement stickers on the initially earned rating. The Code Proficiency Award permits each amateur to prove himself as a proficient operator, and sets up a system of awards for step-by-step gains in copying proficiency. We're proud this month to present the list of those certified at the top speeds in the last six months of 1965.

ARRL Certified at 35-w.p.m.—July-December 1965

WA1FAV*	W3LBC*	K6BTA*	WA8FAE*
W1YJI	K3SLP*	WB6CUA	K8IKB*
W2AUS/4*	K3UFV*	W6EUH	W8JEX*
W2FHY	W4HOJ	W6GC	WA8KUW*
W2KBK	WA4ICU*	W6SAW*	K8MNG*
WB2LZF*	K4OXM	WA7AXG	K9KLR
W2NXB	K4SAV*	WA7BDF*	WØMB
WB2PAJ	W4UHO*	WA8BQK*	VE4DL
WA2RWU*	WA4VYG	K8EHD*	VE7BOQ
WA3DAO	W6BGX	WA8ENO/1*	VE7BQB*
	VE7BPM*	PY2BGL	

ARRL Certified at 30-w.p.m.—July-December 1965

WA1ABW*	W2IXB*	WA4SOL	W6JOV*
K1DQC*	WB2JWB*	K4TEA*	WB6KIF
WA1FAV	WB2LHF*	WA4UBQ*	WA6NON*
K1FTW*	WB2NYK*	W4UWS*	W6SAW*
W2AUS/4*	K2OFV*	WA5EID*	W8DJD
K2BMI*	WB2PTS*	WA5GVB*	WA8LBR*
K2BYX	WA2PZD/2*	WA5JDR*	W8RYZ*
WB2DXM	W2UJR	K5STL	WA9HHH
WB2ECZ	K3GJB*	K5VBA*	WA9MQI*
WB2EGR*	K3TEM*	WB6AKZ*	KØIJU*
WB2EHB*	K3ZNT*	WB6FPQ*	VE2WM
WB2EWH*	K4BBK/ W1AOW*	W6GQA*	VE3BII*
WA2HSP*	W4QCW	W6IDY*	VE7BQB

* Endorsement Sticker

Listening Before Calling CQ. We'll give you a meaningful little poem (contributed). But first to agree with W4FJG (Tenn.), who suggests we "bear down hard on this business of listening-before-calling CQ, and stress courteous and correct operating procedure." FJG writes: "Most

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Dec. Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	365	4896	4101	726	10088
K6BPI	112	3311	3027	284	6734
W1PEX	519	1835	1665	100	4119
K2KQC	20	1629	1481	3	3133
WA4RQR	39	1193	1132	49	2413
KØONK	132	1022	987	28	2169
WB6JUH	28	948	886	61	1923
W3EML	46	855	762	11	1674
K6YVN	25	781	761	19	1586
K6EPT	101	716	542	174	1533
WA2RUE	204	669	480	124	1477
WAØJKT	218	626	459	104	1407
W6GYH	103	626	604	11	1344
K1CLM	657	330	281	5	1273
W8UPH	17	628	550	73	1268
KØGSY	45	618	579	1	1243
WB6BBO	171	557	478	32	1238
W9OHJ	22	597	585	12	1216
WA4BNC	1036	62	62	8	1168
K5TEY	65	793	299	5	1162
W2OE	189	526	414	11	1140
K4VFY	117	477	466	11	1071
WA4SCK	10	509	496	9	1024
W7BA	15	506	466	37	1024
WA5CBL	107	431	418	13	969
W6ZJB	102	433	396	37	968
WB6PRP	37	464	462	2	965
W7DZX	9	497	398	44	948
W6VNQ	22	454	453	1	930
W1DQM	30	449	430	2	911
W7JHA	0	443	427	14	884
VE3BII	405	260	208	7	880
W8RYP	43	408	379	38	868
W4FX	1	410	403	5	819
W6RSY	114	396	122	173	805
WA5AUZ	22	358	296	108	784
W7HMA	22	355	380	4	761
WB6JFO	56	365	310	23	754
K3MY8	28	365	329	25	747
W4BOW	354	190	166	24	734
W6BVK	21	343	364	0	728
K8TIG	135	294	277	17	723
WA9CCP	14	379	316	14	723
WØZWL	1	492	3	226	722
K1ESG	24	351	328	18	721
W5OBD	12	353	348	2	715
WA6ROF	95	299	284	7	685
WA9NFS	31	329	300	24	684
WAØIAW	24	327	317	5	673
K7TCY	17	328	290	36	671
W6QAE	13	347	256	34	650
WA9CNV	14	326	175	134	649
K3ZYP	214	188	61	182	645
WA6GHZ	10	0	635	0	645
WA2FTS	25	294	295	24	638
WB6GQJ	117	267	230	17	631
WA4DEL	23	310	248	40	621
W9DYG	87	284	228	6	605
K5MBK	425	93	73	12	603
VE7BJV	27	280	255	25	587
WA4NEV	28	277	197	80	582
W4OGG	18	286	240	35	579
WB2DXM	49	277	191	57	574
W6EOT	1	285	287	0	573
W6MLF	23	263	257	27	570
WA8CFJ	9	261	235	53	558
K8NJW	11	272	273	2	558
WA4IJH	26	259	249	8	542
WB6QXY	25	254	25	231	535
K6IWV	3	265	257	8	533
K2TXP	16	46	438	22	522
K2UGB	50	244	49	176	519
K8JJC	103	207	196	11	517
WA4EUL	57	246	130	71	504
WA6WNG	25	241	213	24	503
WB2GAL	5	264	226	7	502
Late Reports:					
W7BA (Nov.)	11	1198	1059	137	3405
K7TCY (Nov.)	24	560	476	77	1137
W7DZX (Nov.)	7	416	348	5	776
W7HMA (Nov.)	12	369	349	0	730
WA4BMC (Nov.)	325	129	169	22	645
WB6JFO (Nov.)	45	250	230	25	550
K7MTZ (Nov.)	528	6	6	4	544
WB6HRH (Nov.)	6	257	128	126	517
More-Than-One-Operator Stations					
K6MCA	284	2831	2763	69	5947
W6IAB	546	2367	1987	380	5280
K6WAH	147	1982	2056	73	4258
W4LEV	173	1808	1685	123	3789
W6YDK	2360	642	420	200	3622
KR6GF	1425	64	30	44	1553
KR6D1	576	123	103	20	822
Late Report:					
W4LEV (Nov.)	16	1723	1700	23	3492

BPL for 100 or more *originations-plus-deliveries*

K1QIM/2 466	WAØMKF 151	WB2HZY 113
WAØHWJ 301	W3TN 144	W2URP 108
K4EVY 257	WA8HVR 143	W7OCX 107
W4PQP 248	WA4OWG 140	VE4JT 107
K4BNE 235	K1IIK 139	W4RHA 105
W5JDF 217	K8QKY 139	W8DAE 104
K4Y8N 204	K4YZE 136	W2EW 103
W6BHG 190	W4FP 131	W4BAZ 103
WA6AGQ 183	K1VOK 123	WA4GAY 103
W8BEZ 182	KØBAD 122	K4KJD 103
WB6CMM 179	W7YDZ 119	W1AOG 102
WA9GJU 173	K6YBV 118	W4PIM 102
W6TXJ 166	W3KUN 117	WAØFLL 102
K9IMR 154	K4PNG 116	WAØMKB 102
WAØDEM 154	WA4TID 114	WA4VCN 100
	K5CBG 114	VE4LG 100

More-Than-One-Operator Stations

KR6MB 202	WA1DIU 142	Late Reports:
		WA7CFY (Nov.) 335
		WA1DIU (Nov.) 175
		K7CTP (Nov.) 106

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: W1CRX, WA4AGH, WA4QLZ, WB6QMM, W7HMA, K7TCY, K8QKV, WAØJKT, VE3DRF.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination 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.

hams *want* to be courteous in their operating procedure. It is the 10% that louse up the bands. The newcomer we can forgive, but the OT *must* watch his image. *Power* is not the answer . . . it is of little use unless it gets into the antenna. An antenna properly matched to the line is what does the job, and this is true whether it is a beam, a dipole or a vertical. But operating consideration such as listening before one calls CQ is an essential ingredient." Let us share the wish expressed in verse.

ONE WISH

I chanced to find a magic lamp —
I rubbed it eagerly.
And Lo! — A genie did appear,
And bowed in front of me.
He said "Oh Master, what is your wish?
Just ask and it is done;
But consider well the wish you make,
For I can grant but one."
Like a shot came forth my answer;
Not a second did I stall:
"PLEASE STOP THAT BOOB WITH THE ENDLESS CQ
AND MAKE HIM SIGN HIS CALL".

— *W2MXJ*

RTTY Assumes TCC Role. *Seventeen years* ago *QST* recorded the first successful direct transcontinental message work by amateur two-way teleprinter! Pictures of stations and the equipment and operators at W1AW and W6PSW appeared on page 10, March 1949 *QST*. That first RTTY formal message exchange was on Feb. 1, 1949 after briefer contacts on the printers (old model 12s) the January date previous. Amateur ownership and use of RTTY equipment today is much more widespread. W6CG reports brand new DX success from keyboard work each month in W6AEE's *RTTY*. Radio bulletins to amateurs are transmitted nightly on teletype from W1AW (these transmissions made simultaneously on 3624, 7045 and 14095 kc.). Scheduled 60-w.p.m. amateur-RTTY circuits have repeatedly demonstrated the h.f. handling of volumes of traffic (in Illinois, Vermont, Connecticut, etc.) in connection with recurrent amateur tests for civil defense and disaster readiness. From this point RTTY also may come into use, we think, in a big way, for v.h.f. amateur coverage of many cities. (All amateurs having a.f.s.k. on

C. D. ARTICLE CONTEST

A Communications Department article contest, a continuation of the very successful *QST* Article Contest during the 1964 anniversary year, needs your best ideas (in 800–1200 words) relating to League organization, clubs, training exercises, and operating techniques. Periodically, the best articles submitted for the "CD Contest" will be chosen to appear, with the winner electing to receive (a) a bound 1965 *Handbook* or (b) a *QST* binder, League emblem and the ARRL DX map. Our winner this month is John B. Johnston, K3BNS, and his article appears below.

A NEW YEAR'S RESOLUTION

So you have an amateur license. You have learned to send and receive Morse code, absorbed a smattering of knowledge of electricity, radio, law and procedures, and made an investment in equipment. How do you use this capability? The answers to this question will be as varied as the reasons for obtaining the ticket in the first place — perhaps to satisfy a desire to contact far-away places; perhaps to gain a better insight into the electronic world; maybe — "I just enjoy it."

Whatever your answer, it is good enough to separate you from those who want to become amateur operators, but don't. You possess that intangible something that makes the difference. How many times have you heard someone remark, "Ham radio is the most wonderful thing I ever heard of! I'm going to become an amateur, too!" But they don't. They may borrow or buy books and equipment, but they don't carry through. Why?

Whatever the answer is, it is also the thing that makes hams unique. It explains the basis for the mutual respect that amateurs enjoy. It identifies someone who can carry through to his chosen goal.

This "thing" that we have and take pride in has been polished bright by the deeds of thousands of operators during our fifty-year heritage. Does the award of a ticket entitle us to bask in the brilliant reflection as the tarnish of time dulls the image? Or does it identify us as one worthy of adding to the radiance?

Look back over your ham career. Are you a contributor, or just going along for the ride? Are you a taker or a giver? Have you staked out your own personal frequency to the exclusion of everything else? Well, again the replies will be as varied as the repliers. Not everyone has the opportunity to be a hero or has the creativity to make a technical contribution. We can try, and we can be ready to respond when called upon, however.

There is one important area where every ham can make a significant contribution: *goodwill*. The benefits to be gained by emphasizing the positive aspects of our hobby are limitless. Let us all resolve to capitalize upon every opportunity — no matter how small — to be an ambassador for ham radio. Let us strive to seize every privilege granted us to spread goodwill for our hobby.

Every time we speak of amateur radio to others, every time we are called upon to assist, every time we speak into the microphone or tap the key — we can make a contribution, or, conversely, damage the contributions of others. Let us be deserving of the image of a highly competent group of ladies and gentlemen who are a benefit to our society.

A prominent engineer recently remarked, "I've listened on the ham bands, and I can't see where anyone over the age of 18 would participate in that drivel." Well, I doubt that he listened for very long — but was it *your* station he did hear? Someone among us missed a chance at spreading goodwill — and no amount of recitation of the past deeds of dedicated amateurs will change his mind.

In this new year let us all re-read the Amateurs' Code in the *Handbook* and resolve to operate our stations to the betterment of ham radio.

A.R.R.L. ACTIVITIES CALENDAR

(Dates are shown in GMT)

Mar. 3: CP Qualifying Run — W6OWP
Mar. 12–13: DX Competition (phone)
Mar. 17: CP Qualifying Run — W1AW
Mar. 26–27: DX Competition (c.w.)
April 8: CP Qualifying Run — W6OWP
April 15: CP Qualifying Run — W1AW
April 16–18: CD Party (c.w.)
April 23–25: CD Party (phone)
June 11–12: V.H.F. QSO Party
June 25–26: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor and page reference of *QST* issue in which more details appear.

Mar. 5–6: YL-OM Contest c.w., YLRL (p. 86, January).

Mar. 12–14: BARTG Spring RTTY (p. 88, this issue).

Mar. 14: W1EIA High Speed Code Test, Conn. Wireless Assn. (p. 98, this issue).

Mar. 19–20: Rhode Island QSO Party, Providence Radio Assn. (p. 120, this issue).

Mar. 19–21: B.E.R.U., RSGB (p. 92, this issue).

Mar. 19–21: Missouri QSO Party, Northwest St. Louis ARC (p. 114, this issue).

Apr. 2–3: Florida QSO Party, *Florida Skip* (p. 136 this issue).

Apr. 9–10: Iowa QSO Party, Sioux City Amateur Radio Assn. (next month).

two- and six-meter bands who would go for point-to-point linkages and nets, please tell your nearest Emergency Coordinator or v.h.f. net manager, to build such capability!)

NTS, our National Traffic System, can utilize any mode but has mostly stuck with voice and c.w. netting at Section level. This may be changing. We're anxious here to report that Florida is the first state to boast a full net with interconnection of a dozen of its major points, on a daily basis, by radioprinter. (*Florida Skip* shows the following participation: W4ZAG (NCS-FATT), W4IET, W4IYP, W5WVI/5, W4PGP, W4IMZ, W4VAF, WA4IZZ, K4ANJ, WA4NWM, W4DFU.) We know this net is in operation since we've put traffic into it. Likewise, NNJ had planned to put a similar teleprinter net in operation starting in January. All such takes careful organization. To carry an appreciable load the new RTTY-h.f. nets must have necessary liaison to the other nets to give-and-take traffic. Only so can there be the meaningful national interconnections and regional outlets this provides. A radio printer's 60-w.p.m. capability is ideal for use moving traffic, wherever the choice of time and frequency is right to provide reliable printing. But use in the top circuits, where there's volume of traffic is a natural for those teleprinter equipped. We're especially happy to report that this January marks the establishment of the first RTTY Transcontinental Corps (TCC) link of the NTS (K6DYX, California to WA2BLV, New Jersey) for transmitting western traffic expeditiously into eastern areas on a regular basis . . . as part of our NTS.

An Invitation to be in the Field Organization and Play a Larger Part in ARRL. Our League is the greatest organization of amateurs in the world. As large as we are, we need the strength of numbers that only membership by *every single* licensed amateur in the United States and Canada can give. Your membership and participation in activities are needed; your cooperation in public service and other programs invited. Without activity, even membership is not enough.

We can do our staff work better if we have your support and know-how. May we invite your full participation. The League has its Amateur Radio Service Corps (ARPSC) including a strong National Traffic System as a result of the participation and interest and complete dedication of present members of these groups. But many nets and sections are under manned. Timely information on amateur matters is bulletined from W1AW. The rules for spot activities are presented in *QST*. Your Section Manager will provide information and application blanks in connection with *any* of the Official Appointments. You need (and most amateurs use) the organized facilities the League provides. All the elements and patterns contribute to our interest and the capabilities of the amateur. Net operating and appointments contribute to the public interest and our own results in amateur radio. Won't *you* become part of a section net or hold down an appointment?

— *F. E. H.*

HIGH SPEED CODE TEST, MARCH 14

The Fourteenth Semi-Annual High Speed Code Test of the Connecticut Wireless Assn. is scheduled for March 14, 1966. The test is transmitted by club station W1EIA simultaneously on 3637 and 7120 kc., and synchronously by a number of other volunteer stations in the midwest and far west to give nationwide coverage. The exact identity of the latter have not as yet been fully settled, but look for transmissions on 3640, 3653, 3660, 3690 and 7005 kc.

Call-up for the test will commence at 0115 GMT, consisting of announcement, identification, and a plea for a clear channel. At 0130 GMT very important instructions will begin, which all operators intending to participate in the test should copy. The first speed run, 40 w.p.m., will begin at 0150 GMT and will last for exactly five minutes. Subsequent speeds will be 45 w.p.m. at 0200, 50 w.p.m. at 0210, 55 w.p.m. at 0220 and 60 w.p.m. at 0230, all GMT. Text will be plain English with common punctuation and numerals in stride, with no intent either to deceive or make it easy. One minute of consecutively-solid copy out of any five-minute transmission is required to qualify for a certificate.

There are other rules for which we do not have space here. Copy the instructions at 0130 GMT, March 14. (Note that this is the evening of March 13 if you are still using local time.)

This is *not* a part of the ARRL code proficiency program. All correspondence should go to W1NJM at his home address.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Mar. 17 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Mar. 3 at 0500 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION:* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Mar. 17 becomes 2130 EST Mar. 16.

Any person can apply. Neither ARRL 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 through 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.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sunday, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230–0320 GMT runs are omitted four times each 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 on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230–0320 GMT practice on those dates:

Date	Subject of Practice Text from Jan. *QST*
Mar. 2:	*It Seems to Us*, p. 9
Mar. 8:	*G/60 Special*, p. 11
Mar. 10:	*Smith-Chart Calculations for the Radio Amateur* p. 22
Mar. 14:	*Portable Beams for 50 and 144 Mc.*, p. 32
Mar. 25:	*A New Method for the Reception of Weak Signals at Short Wave Lengths*, p. 41
Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Mar. 28:	*Interelectrode Capacitances*, p. 41
Mar. 30:	*Grid-Plate Capacitance*, p. 42

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Considerations to bear in mind include a clean signal, good keying, careful enunciation, correct procedure, judgment and courtesy. The League's Operating Aid No. 11 lists further examples. Send your vote for "Operator of the Month" to the ARRL Communications Department.

During January the following additional amateurs were nominated in recognition of their extra skills and courtesies:

W1CPI	W4DQH
W1EFW	WA4PXP
K1TZH	K4SXD
W1ZFM	WA5NOM
W2DFT	W5SEY
WB2DXM	WA6MWG
WB2ICY	WN6ODP
K2KQC	K8SLU
WB2OQK	WØPJI
WB2TZD	KP4CL
W3KQD	VE3BOF

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.

WIDE-BAND F.M. 52.525, 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST −3, AST −4, EDST −4, EST −5, CDST −5, CST −6, MDST −6, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

W1AW SCHEDULE, MARCH 1966

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.–3A.M. EST, Saturday 7 P.M.–2:30 A.M. EST and Sunday 3 P.M.–10:30 P.M. EST. 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.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0030		**Code Practice Daily[1] 10-13 and 15 w.p.m.**					
0100	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0120-0200[4]	.....	.....	7.080	3.555	7.080[6]	3.555[6]	7.080
0200	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0205-0230[4]	.....	.....	3.945	50.7	145.6	1.82	3.945
0230		**Code Practice Daily[1] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**					
0330-0400[4]	.....	.....	3.555	7.080	1.805	7.080	3.555
0400	RTTY OBS[3]	.....	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]
0410-0430[4]	.....	.....	3.625	14.095	3.625	14.095	3.625
0430	Phone OBS[2]	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0435-0500[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS[1]	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0530-0600[4]	.....	.....	3.555[6]	7.080[6]	3.555	7.255	3.555
0600-0700	.....	.....	7.080	3.945	3.555	7.255	7.080
0700-0800	.....	.....	3.945	7.255	3.945	3.555	3.945
2000-2100	.....	14.280	21/28[5]	14.100	21/28[5]	14.280	.....
2100-2200	.....	14.100	14.280	14.100	14.280	14.100	.....
2300-2345	.....	7.255	21/28[5]	21.1[6]	21/28[5]	7.255	.....

[1] C.W. OBS (bulletins) and code practice on 1.805 3.555 7.08 14.1 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82 3.945 7.255 14.280 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.624 and 14.095 Mc.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075 21.1 21.41 28.08 or 28.7.
[6] W1AW will listen for Novices on band indicated before looking for other contacts.

Station Staff: W1QIS W1WPR W1NPG. * All times/days in GMT, general operating frequencies are approximate.

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, Roy A. Belair, W3IYE—SEC: K3NYG. RM: W3EEB. V.H.F. PAM: K3OBU.

Net	*Freq.*	*Local Time*	*Day*
DEPN	3905 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6&2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

Renewals: W3BDP as OES, W3HKS as ORS, K3MPZ as OBS. Kent County ARC voted K3NVV as Outstanding Amateur of the Year and awarded a plaque at its annual dinner. All 5 members of the club's Novice class passed the code exam. New officers of the Dover 6 & 2 ARC are K3OCI, pres.; W3JFR, vice-pres.; W3UDR, secy.-treas. New officers for First State ARC are K3JXR, pres.; K3UXQ, secy.-treas.; K3UHU, act. dir.; W3KET, pub. dir. K3GKF reports his 45,000th QSO in 30 years of amateur radio. Traffic: W3EEB 388, WA3DYG 127, K3UXQ 45, K3MPZ 39, K3NYG 24, WA3CDV 17, K3YZF 4, W3IYE 2.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3YVG, K3MVO. PAMs: WA3BYH, W3SAO. EPA C.W. Net, 3610 kc., had QNI of 311 with QTC of 415. PTTN, 3610 kc., had QNI of 318 with QTC of 297. EPA Emergency Phone & Traffic Net, 3915 kc., had QNI of 324 with a QTC of 102. New appointments: WA3DBC for Lancaster County, K3YRM for Cumberland County and W3PVY for Carbon County as new ECs. K3QCQ is a new OES. WN3DWD is active on the 40- and 15-meter bands. WA3CUO moved to a new QTH. (where?). W3BUC moved into the Souderton area and is operating with a Valiant II. WA3BBI is active on 6- and 80-meter RTTY. The Big "K" ARA held a successful pancake supper in its new club house near Ulster, Pa. K3JHF reports as a student from Swarthmore College. New Gear Dept.: To W3ONJ, a new Swan 400; WA3CUI, a new Vibroplex bug and 40-meter dipole; WA3BSV added a new s.w.r. bridge; W3OHX added an SB-200; K3FCB built an 80- to 10-meter 600-watt final; K3MYS has a new SB-400 on the air. K3ZSK received WAS. W3KEK acquired WAC, WAS and Old Timers Club awards at age 38. New club officers of the Drexel Electronics Society are WA2JAM, pres.; WA2ZZO, vice-pres. Hazleton ARC's officers are W3OHX, pres.; K3MZR, vice-pres.; K3PII, secy.; K3YVP, treas. Net certificates were issued to the following members of the Eastern Penna. Emergency Phone & Traffic Net: K3LPT, K3IHJ, K3LQM, K3MDG, K3TNL, K3TYD, K3UIU, K3UVZ, K3YVG, W3FGQ, W3GSX, W3HCW, W3KJJ, W3OML, W3PVY, W3VAP, W3ZRQ, WA3BJI, WA3BBI, WA3CCC, WA3BYH. 1965 is now history and our section is honored to have added its part in amateur history. ECs have made the trend toward better v.h.f. nets and section ARPSC liaison. The PTTN Training Net had a very successful crop of trainees, some of which have been an assist to our EPA C.W. Net. The formation of the EPA. Emergency Phone and Traffic Net has closed the gap for our phone traffickers. All in all, these additions could not have come about without the assistance of an active group of section officials and operators. Traffic: W3CUL 10088, W3EML 1674, K3MYS 747, K3MVO 393, W3AIZ 351, K3PIE 258, K3YVG 212, K3ZSK 143, W3ZRQ 113, W3RV 110, W3CBH 99, W3JKX 89, K3WEU 63, WA3BYH 62, K3FSV 61, K3TNL 60, W3AXA 49, K3KTH 48, K3KXJ 38, W3VAP 38, WA3AFI 37, W3FGQ 36, K3LPT 35, W3OY 34, K3FCB 25, K3HKW 25, K3RZE 25, K3HNP 18, K3MDG 15, W3BUR 14, W3ELI 13, W3BKF 10, K3KKO 9, W3ADE 4, WA3BBI 4, WA3BSV 4, W3ID 4, W3KJJ 4, K3RUA 4, WA3BJQ 3, K3MNT 2, K3NZD 2, W3PVY 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*Ave.*
MDD	3643	0000Z	Daily	31	489	15.8
MEPN	3820	2300Z	M-W-F	22	29	1.3
MEPN	3820	1800Z	S-S			
MDDS	3643	0130Z	Daily	18	5	0.24
MSTN	50150	0100Z	Daily	29	83	2.9

SCM W3QA is QRT on TDY in Arizona. In Colt parlance, K3LFD will "roll out" the reports Matte fashion until Bruce returns to resume Unitas-style quarterbacking. Note that MDDS now uses 3643 kc. K3ZYP, K3JYZ, W3TN, K3IPX, W3LBC, K3ZIX and K3GZK set a hot pace for traffic men this month with 100-plus scores. Sorry, no cigar for K3UXY with a score of 99. He'll have to be content with his Superex headset, boom mike and Heath sine-square generator Santa brought him. K3QDD says he and K3LLV hope to be operating from W1MX at M.I.T. come September. W3EOV is QRL improving rigs in his car and boat. W3AJR is engrossed in RATT operations and W3AJS is going all out on 2 meters. K3NDM is overhauling the transmitter at K3IVO. K3GTW went back on c.w. when his speech amplifier blew a tube. K3ZSX made his activity report early and went to New Jersey to use his K2SHB call for the holidays. W3RKK suggests that ECs use 50.4 Mc. (ARC freq.) or another 6-meter channel for local emergencies and drills. K3LLR has run out of receivers. We are saddened by reports on the Silent Keys of W3DK and W3AKB. W3BTA says the Georgetown University Radio Club is being organized. W3MCG was too busy on an eye-ball QSO with Brazil to handle much local traffic—Bikinies had beautiful signals. Santa brought K3URZ a new keyer paddle. Our 73s accompanied W3ECP to the hospital for lung surgery. K3VCG lost his QSK and built a transistorized keyer. K3GUR got 10 new countries and is building a new 20-meter final to get more. Listen for W3JZY on 220 Mc.; he may be calling for help from his snow-bound QTH. K3PVW invites all v.h.f. amateurs to join him on the B&O nets every Sun., 50.3 Mc. at 7 P.M. EST and 145.350 Mc. at 8:30 P.M. EST. WA3CBC, K3URE, K3IPX and K3MWQ are having a ball on the v.h.f. bands. Come on up, fellows, the QSOs are fun on v.h.f. Bring your traffic too—to MSTN. And don't forget ARPSC. Handle some traffic, help with that emergency and make your activity reports regularly. Traffic: (Dec.) K3ZYP 645, K3JYZ/3 264, W3TN 245, K3IPX/3 215, W3LBC 196, K3ZIX 140, K3GZX 117, K3UXY 99, K3TJE 77, K3FKY 75, WA3BTA 69, W3UE 66, K3QDD 57, W3EOV 35, W3PRC 25, K3ZSX 25, K3VHS 22, W3RKK 15, K3LLR 11, W3MCG 9, WA3CEK 7, W3ECP 7, W3ZNW 7 K3GUR 4, K3URZ 4. (Nov.) K3VCG 5.

SOUTHERN NEW JERSEY—Acting SCM, Edward G. Raser, W2ZI—At a meeting held in the home of former NJN Net Mgr. WA2BLV, WB2AEJ was elected the new manager. WA2BLV did a swell job during his past two-year term. NJN traffic report for Dec.: Sessions 31, QNI 416, traffic 446. NJPN report for Dec.: Sessions 31, QNI 591, traffic 251. WB2RBU was appointed ORS. WB2GUK's ORS appointment was renewed. W2YPZ, W2EWR and K2MBW are new OPSs. K4RAD/2, in Princeton, submits his monthly OO report. New officers of the Southern Counties Amateur Radio Assn. are WB2MRA, pres.; WB2JBJ, vice-pres.; WB2FIS, treas.; K2CIR, secy. DVRA's new officers are W2HX, pres.; W2JBF, vice-pres.; K2AAR, secy.; W2WOA, treas. WA2UPC, Yardville, is now EAN and CAN rep. Thurs., Fri. and Sat. He also holds down the 2RN rep. position Tue. and Fri., along with TCC Sat. WB2SBD is busy with DX and NJWRCN at 2 P.M. Sun. on 3715 kc. WA2BLV reports the first successful RTTY circuit on TCC, with K6DYX at the Western terminal. K2CPR finally made his DXCC on 5 bands, 101 stations on 80 meters. W2BAY reports in on many club nets and is working 160 daily. K2ERG wants ORS appointment. W2IU, another 160 convert, still is "beating the drums" for a low frequency traffic net. W2BZJ sold out all his gear and may go s.s.b. soon. W2EWR recently was elected mayor of his town. He has a new mobile rig, 10 through 80 meters. Old-Timer W2BEI still enjoys ham radio after nearly half a century. He is a former SCM of this section. W2HAZ, getting back on the air after an absence of some 8 years, recently had his ORS ap-

THERE isn't much doubt that the major reason our NCL-2000 2KW linear amplifier is chosen by so many amateurs is because of its outstanding power performance — The whopping increase in signal strength with a rock-crusher that can deliver up to 1400 watts into a dummy load under "key down" conditions — on any band — and *factory rated* for 1000 watt average, 2000 watt peak, I.C.A.S. operation. And unlike other amplifiers being actively promoted for the amateur market, the NCL-2000 is capable of delivering the same relative oomph when used in one-KW CW or RTTY operation because circuit parameters are automatically adjusted for such operation.

BUT we feel the '2000 is just as superior in areas other than the delivery of large quantities of signal. Which is the reason we chose passive grid, tetrode operation in controlled AB_2 rather than the admittedly cheaper grounded-grid circuit using zero bias triodes which is so popular for "home-brew" amplifiers and used in some manufactured rigs.

THE most immediate, obvious advantage of the NCL-2000 is the enormous flexibility available in terms of driving power. The adjustable passive grid circuit used in the '2000 may be pre-set by the owner to provide full amplifier output with as little as 20 watts or as much as 200 watts of drive — and is a "set and forget" adjustment. Regrettably, many SSB transmitters and transceivers are short on power output and can deliver nowhere near the high power levels required to drive a grounded-grid kilowatt properly — much less the 160 watts of drive specified by at least one such manufacturer as being necessary to achieve rated input. The owner of an NCL-2000 can be certain, regardless of the make of his exciter, of having enough output available to comfortably drive the '2000 without pushing the driver beyond its capacity and limits of linearity. The so-called "feedthrough" driver power in a grounded-grid amplifier is of no real benefit in a kilowatt job, by the way. The amplifier itself must be loaded to correspondingly *less* than a kilowatt average input to comply with F.C.C. requirements.

THE additional advantages of the NCL-2000 over grounded-grid amplifiers are important, and many. For example, tune-up is immensely easier. To prevent destruction of the tubes, a grounded-grid amplifier can be excited only while plate voltage is applied. It is necessary therefore, to simultaneously adjust amplifier tuning and loading as well as exciter tuning and loading — and in addition, adjustment of the amplifier has a substantial effect on exciter tuning. The NCL-2000, on the other hand, uses the swamping resistor aross the grids of the output tubes as an exciter load during tune-up to permit perfect match and adjustment of the exciter into the amplifier before amplifier B+ is applied! The NCL-2000 circuit also permits monitoring of that parameter which best indicates correct amplifier loading and tuning — screen current. When screen current is maximum, amplifier resonance is perfect, and when screen current is adjusted to the specified value at maximum by means of loading adjustment, maximum power output is assured. There is no such equivalent indicator in a triode amplifier.

ALC control voltage from the amplifier to an exciter such as the NCX-5 with ALC provisions is highly desirable to minimize flat-topping and splatter while maintaining high average speech levels. The NCL-2000, of course, incorporates ALC output.

We've previously discussed in detail on this page (July, '64) another important advantage of the controlled AB_2 operation used in the NCL-2000 as compared to Class B amplifiers — the ability to provide extremely stiff bias for high linearity and efficiency, yet also safeguard the amplifier against destructive peak currents caused by accidental overdrive.

So if your main reason for choosing the NCL-2000 is because of its remarkable efficiency and power output . . . fine. But also keep in mind the ease of drive . . . the efficient operation on CW or RTTY . . . the ease of exciter tune-up and proper amplifier tuning indication . . . the provision of ALC control . . . and the protection against damage resulting from accidental overdrive. You also get the whole works, including power supply, in a desk-top package the size of the HRO-500 solid state receiver — and in the same price range as ordinary equipment.

MIKE FERBER, W1GKX

National Radio Company, Inc.

pointment renewed. WB2FJF also had his ORS and OPS appointments renewed. W2ZVW was high scorer again in the Oct. CD Party. W2YPZ is having trouble reaching MARS freq. Fellas, we need more local traffic nets. Anyone who would like to help organize should get in touch with me. Traffic: (Dec.) WA2UPC 356, WA2BLV 253, W2RG 119, W2ZI 35, K2CPR 21, W2EWR 18, W2GIW 15, K2SHE 14, W2BEI 8, W2BZJ 5. (Nov.) WA2UPC 127.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ZRC. PAM: W2PVI. RMs: W2RUF, W2EZB and W2FEB. NYS C.W. meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT. NYS C.D. on 3510.5 kc. and 3993 (s.s.b.) at 0900 Sun. and 3510.5 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT. NYS County Net on 3510 kc. Sun. at 1000 and 3670 kc. at 1700 Sat. K2KQC, Mgr. of NYS Post Office Net, reports sessions are held daily on a.m./s.s.b. at 2145Z on 3912 kc. Congratulations to BPLers K2KQC, W2OE and WB2GAL. Endorsements: K2DNN as Chemung Co. EC, WA2PZD/WB2NNA as ORS and WA2IYB/WA2-TFV as OPS. The following have qualified for section net CPS for NYSPTEN: WB2IMF, WA2DXB, K2ZWI (U. of R.), WB2HFA and WA2NKI. The NYSPTEN has elected WB2HLV, net mgr.; WB2GAL, 1st asst.; K2SPO, 2nd asst.; K2LMS, secy.-treas.; and WA2JWL, chmn. of policy committee. W2RUF, mgr. of the NYS C.W. Net, was burned out of her lovely home and is looking for a new QTH. I know her many friends are looking forward to her return to the air as soon as possible and we all wish her good luck. The NFDXA elected K2KNV, pres.; W2PZI, treas.; and W2SSC, secy. NFDXA and RDXA held another one of their famous joint meetings. New officers of the UARC (Utica) are WB2AIZ, pres.; W2QDO, vice-pres.; WB2AWF, secy.; K2TOF, treas.; WK2DE, WA2EJJ, W2SFT, W2QXA and K2YFP, board of directors, WB2SIA, vice-pres. of Brighton HS RC, reports that the club is getting a new Drake R-4A and that WN2RAZ, WN2PMM and WN2-SNJ passed the General Class exam. More than 100 members of the RARA and Monroe County Civil Defense participated in a drive to collect 66,300 pennies to be used for a hospitalized children's toy fund throughout 1966. Mobiles on 75, 6 and 2 meters covered approximately 2000 miles. WA2KMI headed up the operation assisted by WA2KND, WB2MAC, K2SQI, WA2STJ, WA2-HWC, W2UTH and others. W2ZOJ took over the helm of RAGS for the remainder of the club year. The last two issues of the *RAWNY QSO* listed 16 new members. W2KLF edits a fine paper, *Cromedome*. WB2MKD will sponsor the CVARA code class (Chenango Valley). Traffic: K2KQC 3133, W2OE 1140, WB2GAL 502, W2MTA 322, W2SEI 231, W2FEB 182, WA2FOJ 136, W2FCG 74, WA2IHP 58, K2QDT 56, WA2UFI 49, W2RQF 43, WA2-RLV 39, K2OFV 35, W2QHQ/1 27, K2MQN 21, K2HOH 20, K2DNN 13, K2MQN 13, W2PNW 12, WA2ANE 11, WA2NKI 11, WB2ERK 8, K2BWK 7, WA2GLA 7, WA2-IYB 7, WB2NZA 6, WA2PZD 3, WB2SIA 1.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—Asst. SCM: Robert E. Gawryla, W3-NEM. SEC: K3ZMH. PAMs: W3TOC, K3VPI (v.h.f.). RMs: W3KUN, W3MFB, K3OOU, W3UHN. Traffic nets: WPA, 3585 kc. 0000 GMT Mon. through Sun. KSSN, 3585 kc. 2330 GMT Mon. through Fri. This office is sorry to record the death of K3ENF, Armstrong County EC. W3SMV has 160-meter band aspirations. WA3BGE built an electronic keyer from the ARRL *Handbook*. W3UHN has applied for DXCC certification. W3NEM misses BPL credits because of work at the salt mine. Congrats to W3KUN who *did* make BPL this month. WA3AKH made a solid 31-day QNI into the WPA Net this month. W3LOS had his best traffic-handling month ever. WA3DUS is getting good results with a home-brew beam on 21 Mc. K3FFJ put up a base-loaded vertical for 80. K3KMO has added a new beam and tower. W3HSW is aboard a tracking ship for space explorations. WN3EVP joined the Etna Radio Club. WA3AKQ is a new General in New Castle. W3AGO partakes of 6-meter activity around Corry. Amateurs in the Corry area interested in u.h.f. work should contact K3KAP. WA3BNO is building a 6-meter cavity resunator and picked up a Model 15 printer. K3CFA does yeoman work in u.h.f. endeavors. K3FNG is enthusiastic about excellent ground-wave conditions on 6 meters during December. The Brownsville AREC Net was activated with K3AUC, K3AUD, K3FNG, K3LTY, K3-PCC, WN3DXP, WN3DGD and WN3DUT. K3SBT rests after suffering a stroke. W8FZP was formerly W3LIJ. K3KMO has been appointed EC for Centre County and is reorganizing the AREC in that area. If interested, contact him for details. New Gear Dept.: W3SII, HT-37; WA3BHV, TR-4 and HXL-1; W3NCE TR-4; W3RUK, three-element beam. WA3EXP, who received his General Class license for Christmas, SX-117 and HT-40; WA3CDL, HA-14. Have you or your club started plans for the 1966 Field Day? FD week end will be upon us before you know it. And, how about the expiration date on your license? Check it now. Don't get caught with your ticket down. New appointment: WA3-BNO as OES. Traffic: (Dec.) W3NEM 426, W3KUN 361, W3MFB 179, W3LOS 129, W3SMV 121, K3PYS 114, W3BLZ 84, W3GJY 50, K3SOH 42, K3KMO 30, WA3AKH 19, W3OEO 16, W3LOD 13, WA3BGE 11, K3EDO 10, K3SMB 10, W3UHN 9, W3CGJ/3 3, W3YA 3. (Nov.) W3NEM 204, K3SMB 11, K3ZMH 11. (Oct.) W3NEM 342.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: George Nesbed, W9LQF. SEC: W9RYU. RM: W9EVJ. PAMs: W9VWJ, WA9CCP and W9KLB (v.h.f.). Cook County EC: W9HPG.

Net	*Freq.*	*Time*	*Oct. Traffic*
IEN	3940	1400Z Sun.	No report
ILN	3760	0000Z Daily	281
NCPN	3915	1300Z Mon.-Sat.	937
NCPN	3915	1800Z Mon.-Sat.	
ILPON	3925	2300Z Mon.-Sat.	134

The new officers of the Joliet Amateur Radio Society are W9UCW, K9SKX, WA9MVD and W9KPC. W9MAK is operating WA6GFY every Tue. on 7035 kc. W9LNQ has a new granddaughter. W9IRH lost his 40-20-15-meter beams in a recent ice storm. The new officers of the Six Meter Club of Chicago are W9AVB, K9DKI, K9ZWV, W9FVB, WA9IRZ, K9SZT, WA9BWB and WA9GVF. The club will hold its annual banquet Mar. at 8 P.M. at the Park Manor VFW Hall at 1301 West 87th St. Director W9HPG and Vice-Director W9PRN attended the Milwaukee Amateur Radio Club's Annual Old Timers Nite Jan. 6. WN9OTM is working 2-meter mobile and WA9KLB is doing the same on 6 meters. W9EVJ extends an invitation to check into the ILN Mon.-Sat. on 3760 kc. at 0000Z. K9KHZ, of Tonica, recently lost his large barn in a fire. WA9CCP reports her OM's (WA9CCQ) home-brew kw. is working great for all bands. K9YRA reports that Old Man Winter made an inverted "V" out of his vertical antenna but he is using a long wire temporarily. WA9FIH reports some good openings on 6 meters during December. This column is sorry to hear of the death of WA9FKR and extends its sympathy to his family and many friends. The Ill. PON v.h.f. section moved to 50.280 effective Jan. 10. It meets Mon. and Thurs. at 8 P.M. Net manager is WA9FJW. W9CWH received a new Cantenna for Christmas. W9QVE is net control for the York Radio Club's new 2-meter net meeting Mon. at 8:30 P.M. in 145.5 Mc. WA9NFS has been playing chess over 80-meter c.w. New officers of the Chicago Area Radio Club Council are W9MSG, chairman; K9PGN, vice-chairman; WA9AQJ, secy.; W9YMF, treas. W9ATH, W9AVP, W9CKU, W9-RV, W9NN, W9LI, and W9WEA celebrated thirty years or more with WGN, the Chicago Tribune Station in Chicago. All were presented gold Omega watches properly inscribed by the station officers in a presentation ceremony. Our sympathy to the family and friends of W9FEV, of Matoon, who passed away recently. W9PNE worked G3PU and NS1A on 160 meters. W9UB is operating from the U. of M. Amateur Radio Club, K8TIG. WA9EYM changed his QTH to Houston with the call WA5NVQ. A new call in the Lyons area is WA9YPE. K9DWG is adding DX with a new SB-400 and a 14AVQ. W9AUM is operating as EP2DS. New appointees include K9WMP as OPS, K9WMP as OO and K9WMP and WA9MLX as OESs. Recipients of the BPL award are WA9CCP, WA9NFS and WA9CNV. Traffic: (Dec.) WA9-CCP 723, WA9NFS 684, WA9CNV 649, W9EVJ 429, K9-WMP 163, W9DOQ 143, WA9GUM 124, K9AVQ 117, W9ELL 110, W9HPG 103, W9EET 91, K9BTE 80, W9-NXG 49, K9HSK 36, W9HOT 29, W9IDY 29, WA9AJF 28, W9WGQ 20, W9HJM 9, W9LNQ 8, W9PRN 8, K9RAS 8, W9SMD 7, W9OKI 4, K9QPJ 2, WA9FFY 1, WA9FIH 1, K9IDQ 1, WA9KLB 1. (Nov.) W9NXG 75.

INDIANA—SCM, M. Robert Kroulik, K9IVG—Asst. SCM: Ernest L. Nichols, W9YYX. SEC: K9WET.

Net	*Freq.*	*Time*	*Dec. Tfc.*	*Mgr.*
IFN	3910	1330 Daily, 2300 M-F	330	K9IVG
ISN	3910	0000Z Daily, 2130 M-Sat.	417	K9CRS
QIN	3656	0000Z Daily	297	WA9BWY
RFN	3656	1400Z Sun.	131	WA9IZR
		1800Z Sun.		

K9GLL, PAM of Hoosier v.h.f. nets, reports Dec. traffic of 145. W9QLW, RM of 9RN, reports that Indiana was represented 100% in Dec. V.H.F. PON traffic total 37 by WA9HCE. QIN Honor Roll: K9HYV, W9HRY, WA9BWY, K9DHC, WA9IQV, K9WWJ, W9RGB, W9-ZYK, K9VHY, K9RGR, K9KTZ, W9WQQ. New ap-

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pointments: WA9FHF, WA9ISM, K9RAA, WA9GJZ as ECs; WA9CJR as OES. K9EBY works on Gemini Capsules in St. Louis, Mo., and built his Mom, K9ILK, a 6-meter converter. W9UC has a new Gonset s.s.b. rig. WA9PDO received her General Class license. WA9AMZ has a new SBE-34. WA9BWY is enjoying the new TX-4. W9EGQ is building the SB-100. K9SNQ, W9HWA and K9FNP are putting up beam antennas—they lost their quads in a bad storm. K9OVC's home-brew trapped antenna is working well. WA9AVT is traffic mgr. of W9YB, Purdue Amateur Radio Club. K9DIIN and K4HSB are teaching a code class at Purdue University and W9FWH is teaching a code class at the Anderson Red Cross. New officers of the Indianapolis Radio Club are W9APJ, pres.; W9JJC, vice-pres.; WA9CCX, secy.; K9VIE, treas. *Amateur Radio exists because of the service it renders.* Traffic: (Dec.) W9MM 365, W9ZYK 334, WA9IZR 293, W9QLW 250, K9HYV 229, W9RGB 179, W9HRY 90, WA9BGI 89, WA9MYF 84, WA9CJR 80, K9RWQ 69, K9VHY 64, K9GLL 61, W9HRB 60, W9BUQ 51, W9SNQ 43, K9EFY 38, WA9FGT 37, WA9CHY 36, WA9CJR 33, W9YYX 32, K9DHN 31, K9KTL 30, K9VIE 26, W9DGA 24, K9ILK 22, WA9DBK 19, W9HWR 19, W9CC 17, W9FWH 16, K9WET 16, K9ZLB 16, K9BSL 15, WA9LUG 14, K9IIV 13, K9UHQ 13, WA9BVS/9 12, W9URQ 12, K9APH 10, W9BZI 10, W9FJI 10, K9FPE 10, K9QVT 9, W9RTH 9, WA9CYG 8, K9DHJ 8, W9BDP 7, K9FUJ 7, WA9GJZ 6, W9TKK 6, K9UEO 5, W9ZZR 5, WA9CFW 4, W9CLY 4, WA9LRB 4, W9AQW 2, K9PNP 1. (Nov.) W9EGB 102, W9ZYK 82, K9DHN 43, W9HRY 15.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. RM: none. PAMs: K9IMR, K9HJS and W9NRP.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
BEN	3985 kc.	1300Z	Mon.-Sat.	27	156	42	W9NRP
BEN	3985 kc.	1800Z	Daily	31	740	158	K9HJS
WSBN	3985 kc.	2315Z	Daily	31	1027	413	K9IMR
WIN	3535 kc.	0045Z	Daily	31	277	172	W9KQB
SWRN	50.4 Mc.	0300Z	Mon.-Sat.				W9CTU

New appointee: W9MNG as EC for La Crosse County. Renewed appointments: K9ZPP as SEC, K9RIZ and W9NRP as ECs, W9CBE and W9DYG as ORSs, W9GOC and K9GDF as OPSs, K9DBR as OES; W9CBE and K9KJT as OBSs. WA9BKR is pres. of the Greater Beloit Area Club. W9SUF is back on the h.f. bands with a 200V. 1964 Wisconsin QSO Party winners were W9RQM, phone and W9RKP, c.w. BPL on Dec. traffic was made by W9DYG, K9IMR and WA9GJU. K9GDF led the OOs with 55 notices in Dec. WA9MRG is on s.s.b. with an SBE-34. WA9NVJ is on 80- and 2-meter RTTY. W9KQB made 30 of the 355 WIN sessions in 1965. Door County Amateur Radio Club's new officers are WA9PFQ, pres.; W9UNE, vice-pres.; WA9ARB, secy.-treas. Waupaca Amateur Radio Club's new officers are W9KXK, pres.; K9EWG, vice-pres.; WN9PUN, secy.-treas. The Wisconsin Area Teleprinter Society recently was organized to promote RTTY in Wisconsin. Officers are K9GSC, pres.; W9CUW, vice-pres.; K9ZPP, secy.-treas.; WA9EUA, K9ERD, W9ATK, K9CUT and K9PKQ, directors. Traffic: (Dec.) W9DYG 605, K9IMR 423, WA9GJU 299, K9HJS 275, WA9LWJ 202, W9SUF 167, WA9MIO 160, K9UTQ 99, WA9NFG 96, WA9NBU 93, W9BLQ 83, WA9GJH 74, W9GOC 74, W9KQB 65, W9NRP 62, WA9EOF 60, K9GSC 24, WA9IVH 23, W9APB 22, K9RCK 22, W9AYK 18, K9DBR 17, K9VWQ 16, W9HWQ 12, W9IRZ 10, WA9NPB 10, K9FHI 5, W9EWC 2. (Nov.) W9SUF 62, W9HWQ 29. (Oct.) W9SUF 30.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke Jr., WØTCK—SEC: WAØBZG.

Net	*Freq.*	*Time*	*Days*	*RM-PAM*	*QNI*	*QTC*
MSN	3595 kc.	0030Z	Daily	WØISJ	148	98
MJN	3595 kc.	0100Z	Daily	WAØIDZ	110	25
MSPN	3820 kc.	1805Z	M-Sat.	KØQBI	949	437
(Sun. at	1500Z)	2300Z	M-Sat.	KØFLT	729	218
MSSB	3805 kc.	1730Z	M-F	WØHEN	644	169
	3812 kc.	0045Z	M-F			
MSTN	50.4 Mc.	0430Z	M-F	WAØDWM	655	35

WAØLVG is the new EC for Dakota Co. ECs WAØEDN and KØVMW and ORS KØUXQ renewed their appointments. New officers of the Rochester ARC are Bob Rossi, pres.; WØZUN, vice-pres.; KØEVW, secy.; WAØEWJ, treas. WØZUN traded his Galaxy III for a Galaxy IV. KØJFJ will be attending John Brown University at Siloam Springs, Ark. WAØCQG, WØWVM and KØIJN have been tracking the improperly orbited Oscar IV. Luckily the Minn.-built gear for Oscar wasn't used in this shot. WØUWG has a new three-element quad. WAØIAW has his 750-watt linear working. WAØACI is using three 813s in his new linear, and has a new 15-meter beam up. Mankato ARC members have seventeen 6-meter f.m. units in operation. Five stations made the BPL in December. They are WAØJKT, WAØIAW, WAØMKF, KØBAD and WAØMKB. Traffic: (Dec.) WAØJKT 1407, WAØIAW 673, WAØMKF 227, KØBAD 187, WAØBWH 128, WAØEPX 119, WAØMKB 112, KØQBI 88, WØHEN 58, WAØKFJ 49, WAØILX 48, WAØIEF 47, WAØDVH 44, WAØIUJ 40, WØTCK 36, KØFLT 32, KØZKK 30, WAØBZG 28, WØATO 23, WAØEDN 22, KØZRD 21, WAØFUR 17, WØBUO 16, KØICG 16, KØSRK 15, KØIGZ 12, WØEQO 11, WAØLCF 11, WAØLOH 11, WØFHO 8, WAØHOE 8, WØMXC 8, WAØHRM 7, WØKJZ 7, WAØLVK 6, KØSXQ 6, KØURA 6, KØLWK 5, WAØDWM 4, WØFKC 3, WAØGNO 2, WAØDFT 1, WØSZJ 1. (Nov.) WØKJZ 8.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. The Weather Net and the RACES Net have been moved to a later hour in order to be heard. Hats off to WAØGRX and WAØMBD, who have been NCSs of the net since WAØAYL has been QRL with work at the U.N.D. WAØNBY is a new General in Grand Forks with a DX-100B while WNØLDZ passed the code test and has applied for Conditional. The Valley Junior High School Radio Club has been holding theory and code classes for five of its members and soon will be operating club station KØPZW on the Novice bands. WØDM is the faculty advisor of the group. KØSPH finally got the man to come and get the beam back into operation. WAØBIT has an HT-32 and a modern Collins receiver. WAØJTP came up with a new SB-34 to take the place of the Ranger. WØFVX got the new beam all built up and tuned. He and brother WØJXN keep a sked with their dad, WØBIH, daily. WØGFE has been busy oscillating between N. Dak. and Washington, D.C., conferring on the new power plant out on the Missouri River. Our leading traffic-pusher, WAØITP, will have had a few weeks of vacation in California by the time this gets in print. The Navy MARS group has been busy getting crystals for 160-meter work and also getting the 2-meter gear in operation. WAØCAQ's rig could not stand the compliments of the gang and promptly blew up on him. WØGNS has been on sick leave. The RACES report for 22 sessions for Oct. and Nov. was 813 check-ins, 172 messages handled and the North Dakota Weather Net reported 338 check-ins for Dec. Traffic: KØITP 199, WØWWL 48, WØDM 15, KØSPH 5.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WAØAOY. Officers of the Watertown Amateur Radio Assn. for 1966 are WØNIW, pres.; WØTLD, vice-pres.; WAØAZC, secy.-treas. Meetings will be held the 1st and 3rd Tue. of each month. Officers of the Prairie Dog ARC for 1966 are KØYJF, pres.; WAØCVZ, vice-pres.; WØKHU, secy.-treas.; WØZAL, chief operator of club station. KØGSY has been appointed CAN Net Control Station. KØHQD is back on the air following needed surgery. The Sissiton ARC meets Mon. evenings each week, holding c.w. and theory classes in the shack of WØCGB. New calls include WNØNNV at Trent. Traffic: KØGSY 1243, WØZWL 722, WAØAOY 201, WA6VPN/Ø 175, WØSCT 133, KØVYY 113, KØBMQ 54, WA4LYO 43, WØHOJ 29, KØYGZ 26, KØKOY 14, WAØBZD 13, WØDJO 12, WØRWM 8, WAØCKH 6, WAØBMG 2, WAØBWJ 1, KØHQD 1.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—WA5CBL/5 is on the move again. Buzz has just completed a move to Glen Rose, Ark., from Benton but his moving around has not hampered his activity in amateur radio. He has made BPL for the third straight month since I became SCM. Just get a load of his traffic report for the month of December. All this in addition to chasing DX. We still need volunteers for the following positions: SEC, EC, AEC. Congratulations to WA5AER on his appointment as OO.

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*QNI*	*Time*
RN	3815 kc.	0001Z	Daily				
AFN	3885 kc.	1200Z	Mon.-Sat.	27	42	841	1861 minutes
OZK	3790 kc.	0100Z	Daily	27			
PON	3825 kc.	2130Z	Daily	23	103	271	?

Traffic: WA5CBL 969, W5OBD 715, W5NND 329, W5MJO 244, WA5KJT 106, WA5IIS 63, K5TCK 59, K5VBF 36, WA5KUD 26, K5ABE 8, K5EDH 5.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: K5KQG. RM: W5CEZ. PAM: W5TAV. V.H.F. PAMs: WA5KHE and W5UQR. WN5NEM meets with a new 2-meter net with outlets in Ruston, Jonesboro, Honesville and Covington on 148.00 Mc. A nice letter was received from W5CUO, aboard a destroyer in the Western Pacific. WA5NOS pushes traffic with 150 watts from Camp Polk. WA5BIM expects a Drake R-4 any

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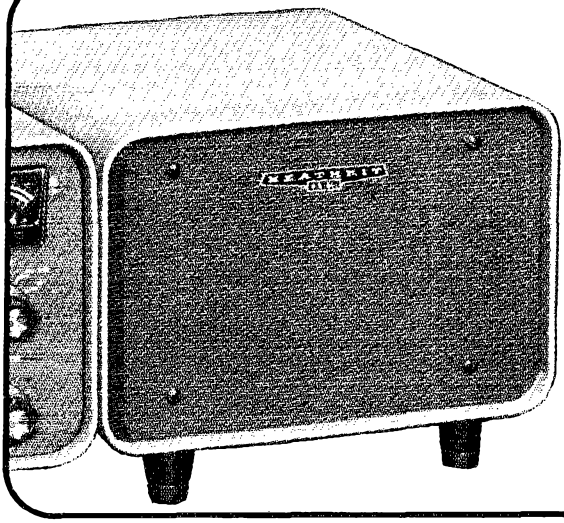

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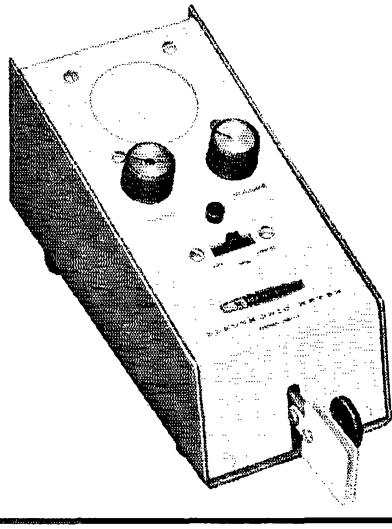

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minute. WA5CPD is running 15 watts on 2 meters. WA5-LVB has moved. WA5JVL says that during Dec. he worked five Eastern Seaboard states on 6 meters. The GNOARC reelected WA5CST as pres. A nice talk was given at the installation ceremonies by W5LDH, our Director. W5MBC has been appointed an Alt. CAN rep. from RN5. W5EA has not been very active recently because of his job. W5CEZ has completely recovered from his eye surgery and is back to his old traffic haunts. The Holidays interfered with WA5KIV getting his new rig on the air. WA5KHE reports 2-meter reception excellent lately in his area. W5FMO's XYL passed her General. W5MXQ has a nice traffic total. K5OKR and K5FYI both say traffic is the thing! WA5EID is looking for a crank-up tower for his three-element quad. WA5-LGO is busy nightly with LAN. W5CEW is back MCing 3900 daily. W5BMM put new tubes in his rig and is now back giving 75 lots of fun. WA5KAS gave a Ham Party New Year's Eve. Both WA5KKB and WA5KAJ have Eico 753s. WA5HGX still likes Sunday MARS. WA5FNB now has LAN swinging along in fine style. WA5DES says he is very proud of making "Operator of the Month" in Dec. W5JFB is preparing for the spring v.h.f. season. WA5JOL would like to correspond with those interested in remote control experiments. I receive very few phone reports for this column. Why not get your club secretaries to drop me a line each month. W5BUK with a new vertical and new quad is back chasing DX. Traffic: W5CEZ 128, WA5EID 121, K5OKR 119, WA5-NOS 114, W5MXQ 103, WA5JOL 94, W5MBC 81, WA5-FNB 56, W5PM 55, WA5DES 48, W5FMO 48, WA5LGO 20, WA5HGX 17, W5EA 8, K5FYI 6, WA5JVL 1.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. WA5JTB worked lots of 15 meters during the holidays. W5BW built the keyer from Dec. '65 *QST* with good results. New officers of the Lumberton ARC are K5WUX, pres.; WN5MCE, vice-pres.; WA5LJX, secy.; W5CHP, public relations. W5IHP and sons are doing a fine job. K5TJG and WA5GHF are doing good work as new OOs. WA5FAD has really been hot on 20-meter mobile the past months. WA5NPP certainly did a wonderful job in keeping K5BWW and his family informed daily about the condition of a 2nd and 3rd-degree burned child for 35 straight days. He had able support from W5NNZ. Mississippi calling frequencies for sideband generally are 3925 and 3888 kc. All stations are invited to call into our nets: Gulf Coast Sideband, daily 1730 CST on 3925 kc.; Miss C. W., daily 1845 CST on 3547 kc.; Miss. Sideband, daily 1815 CST on 3888 kc. There are several appointments open. Traffic: W5JDF 326, W5ODV 63, W5WZ 48, WA5JTB 28, K5VBA/5 22, K5TJG 18, W5BW 17, W5WUX 7.

TENNESSEE—SCM, William A. Scott, W4UVP—

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
TSSB	3880 kc.	Tu.-Sun.	0030Z	27	1081	249
ETPN	3980 kc.	M-F	1140Z	23	378	10
TN	3635 kc.	Daily	0100Z 0230Z	31	382	168
TPN	3980 kc.	M-Sat. Sun.	1245Z 1400Z	31	944	374

Christmas traffic resulted in good totals for all, including W4FX, W4OGG and W4PQP, who made the BPL again. The Knox ARC reports new code and theory classes. K4SHY and W4WQZ are working on 432-Mc. converters and K4EJQ on a transmitter. W4VSN will get the 432-Mc. gear out of the boxes for another try. W4CHB is transferring to Atlanta. Vice-Director W4-WHN reports the increasing Tennessee ham circulations causes increased work, but welcomes it. AREC members are needed in every section of the State. Apply to your local EC or SCM. The State C.D. will welcome all volunteers. Apply to Col. Wallick, C.D. Hq., Sidco Rd., Nashville. Traffic: W4FX 819, W4OGG 579, W4PQP 337, WA4HRG 309, W4RUW 285, WA4GQM 206, W4MXF 127, W4SQE 88, W4TZJ 78, K4SXD 71, K4UWH 63, WA4YNF 50, K4RCT 38, W4PFP 37, WA4KHD 30, W4UVP 30, W4WBK 30, W4TYV 27, W4TZR 21, WA4WNK 20, WA4-OSD 19, K4CPM 14, WA4VWQ 13, WA4KOG 12, W4-VTS 12, WA4CGK 9, K4UMW 9, WA4EWW 6, K4OUK 4, WA4YHO 4, K4BTY 3, W4SGI 2, W4VJ 1, K8UFD/4 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Laurence F. Jeffrey, WA4KFO—SEC: K4URX. PAMs: W4BEJ, K4YZU. V.H.F. PAM: K4KZH. RM: W4BAZ.

Net	*Freq.*	*Days*	*EST*	*Sess.*	*QNI*	*QTC*
EMKPN	3960	M-Sat.	0630	23	358	73
MKPN	3960	Daily	0830	29	444	136
KTN	3960	Daily	1900	22	435	173
KYN/K8N	3600	Daily	1900/1700	64	371	442
KPON	3945	Sat.	1300	4	101	109

The Louisville Area 6-Meter Net reports 26 sessions, 231 QNI and 52 QTC. The Lexington 6-Meter Emergency Net reports 111 QNI with 30 stations active in 9 cities with WA4GHQ as NCS. W4CDA has nearly finished decorating the shack. WA4OMH is doing well with 6-meter skip contacts. K4DZM reports DX on 160- and 80-meter c.w. W4JUI, ex-W9FZV is back on c.w. Our sympathy goes to the family of K4ZJS who became a Silent Key Dec. 17. WA4AYI helps OM WA4-AVV with NCS on KPON. New officers of the Louisville ARTS are WA4IBG, pres.; W4MPV, vice-pres.; W4-BTA, secy.-treas.; K4RRF, asst. secy.-treas. W4WNH is trying hard to work through Oscar IV. W4DGC is back on the air after a long layoff. We welcome KPON to our regular listing of Kentucky nets. W4RHZ publishes the monthly bulletin for KYN. K4ZRA is editor of *Kentucky Hunter* for the Ky. Chapter of CHC. W4EWL has a new linear amplifier. W4ISF has a new 50-ft. tower with tribander and 6- and 2-meter beams. Traffic: W4-BAZ 449, WA4HJM 318, WA4DYL 269, WA4TPB 251, K4PNG 215, WA4KFO 185, WA4VCN 164, W4RHZ 163, K4DZM 140, K4YZU 116, W4CDA 104, WA4GHQ 88, K4MAN 73, WA4UAZ 67, WA4IBG 60, W4KJP 48, W4ISF 42, WA4DXA 31, WA4QLK 19, WA4ZIF 16, W4BTA 13, WA4BZS 13, WA4OMH 12, W4OYI 9, K4HOE 4.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8ELW, K8QKY, W8EU, K8-KMQ. PAMs: W8CQU, K8LQA, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: WA8DNZ, W8ELW, W8FX, K8KMQ, K8NJW, W8SCW, W8SJF as ORSs: W8EMD, W8FZ, K8PBA as OESs; W8DCT as EC. W8EMD as OO. New officers of the Genesee County RC are W8VGG, pres.; K8JEH, vice-pres.; W8RUV, vice-pres.; WA8IEX, vice-pres.; K8KRF, vice-pres.; WA8BQQ, secy.; K8KMQ, treas. Officers of the Hills ARS are W8EZX, pres.; W8CZK, vice-pres.; W8YPB, secy.; W8ERI, treas. Pictured Rocks RC's officers are WA8LHC, pres.; K8NBF, vice-pres.; WA8FSV, secy.-treas. The Bible Bank Net, with WA8MWP as NCS, meets daily at 1200Z on 3855 and Sun. at 1330Z on 3895. The TASYLS meets Thurs. at 1330Z on 3900. Transmission ideas for the 144-Mc. band by K8TCA and W8CVQ: (1) Give QTH and frequency of DX station worked with each sign-over. (2) Modulate carrier closer to 100%. (3) Keep net frequency clear of QRM during the net. (4) With large frequency space on the 144-Mc. band, try not to operate on the same frequency as other stations. K8HSW has a new Drake TR-4 transceiver. The Pictured Rocks RC bulletin says "You don't learn anything while you are talking" and "Profanity never made a man out of a boy." Old W8HK is now K4HK, in Florida. The K8PNAs are going there for the winter. W8FSZ had surgery and is home. My best wishes for you, Skutt. Same to WA8CVH. K8IRB has a B&W SB generator and 32V-3 going. The HVARA bulletin *Grid Leaks* says "Some of us 'older girls' wanted to sit on Santa's lap, but chickened out." W8FWC has a new Ranger. K8UNI a new R4-T4X combo and K8EQC a new Eico s.s.b. transceiver. K8BVJ now is on 40-meter s.s.b. with a Swan. W8IQS finally retired and is now DXing. The Michigan Six-Meter Traffic Net is now registered with ARRL and is not connected with the Michigan Post Office Net. W8NRX has a new SB-200 and W8BVR a new crank-up tower. W8MTI bought a new home. WA8-MWP has an SR-160 and a Loudenboomer Mark II, with a 62-ft. tower and an inverted "V." WA8LRC gets a new Swan 350. Sorry to hear that W8AHV has a stomach ulcer. WA8MEE has a new HO-10. W8SWF, mobile, called the Oak Park Police for an ambulance after a bad three-way car accident. BPLers: K8TIG, K8NJW, K8JJC. Silent Key: John P. Krutsch, WA8FPA, Roseville, Mich. Traffic: (Dec.) K8TIG 723, K8NJW 558, K8JJC 517, K8QKY 363, K8KMQ 329, K8LNE 325, W8BEZ 314, K2SIL/8 247, W8ELW 187, WA8ENW 109, WA8MWP 80, K8ZJU 64, W8FX 57, K8HLR 54, WA8-LRB 54, WA8LRC 51, WA8MOT 50, W8YAN 49, K8MFO 45, W8TBP 44, W8IBB 43, W8EJR 38, W8DSE 34, K8JED 31, W8EU 29, WA8MGM 26, W8AUD 24, W8FAW 22, WA8HGE 15, K8LOS 14, K8KBN 12, W8AHV 11, WA8-MEE 11, W8SWF 11, K8QLL 9, K9RHU/8 9, WA8LNE 8, W8IWF 6, K8VDA 3, W8WNX 3, K8AQA 2. (Nov.) K8NJW 205, K8TIG 117, K8MFO 24, K8KBN 23, W8SH 23, W8IWF 18, WA8MEE 11, W8IBB 9.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8-UBK. K8EUC was married. K8SOW moved to Florida.

Net	*Freq.*	*Time*	*Sess.*	*QTC*	*Avr.*
BN	3580	2400Z	31	328	10.6
OSSB	3972.5		59	1329	22.9

In 1965 OSSB handled 11,397 QTCs. WA8MQE has a new three-element beam on a 40-ft. crank-up tower. K8HDO reports the Ohio Council of ARC's 1966 QSO Party will be held Apr. 23 and 24. Canton Chapter of QCWA

SS-1R

The New 701 Series SS-1R is Greater than Ever

The SS-1R, with its unique approach to receiver front-end design, has been called a major advance in HF receiver art. Continuing engineering improvements now incorporated in the 701 series make the SS-1R greater than ever. For example:

Sensitivity has been improved by 3 to 6 db. Typical production units measure 0.25 μv for 10 db S+N/N.

Sideband Stability is even better; USB and LSB BFO frequencies are now *crystal-controlled* while retaining variable BFO for CW.

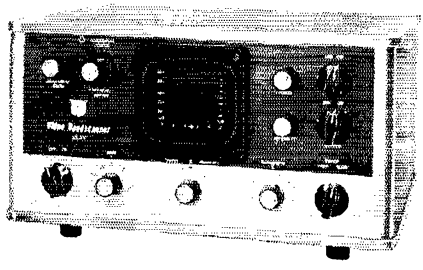
Sideband Quality is clean and distortion-free over a tremendous range of signal strengths (from a microvolt to as much as a volt!). An improved product detector (employing a 6BY6) combined with an i.f. cathode-follower (now a 6AV6) to drive the a.g.c. circuits has increased the already large dynamic range of the SS-1R.

Reliability and Performance Stability have been improved through 1) redesign of a simpler, rugged dial-drum and display mechanism, 2) use of precision glass and ceramic piston trimmers in all critical circuits, and 3) an effective quality – assurance program throughout production and test.

Plus: Crystals for full 10 meter coverage provided.
Improved super-durable sand-blasted finish for the rugged extruded cabinet.
Superior SS-1R Speaker quality.

SPECIAL FEATURES: Freedom from Cross Modulation and Overload • Extreme frequency precision with digital readout in kilocycles. Slow (10 KC per turn) manual tuning rate provides precise tuning of sideband signals • Motor Drive of tuning mechanism for fast traverse of band • 5.0, 2.5 and .35 KC Selectivity with 2:1 60/6 db skirt characteristic • Crystal Lattice Filters • Special Hi Q IF Circuits • Autocalibration of amateur bands to WWV • Choice of AM, USB, LSB or CW modes • Provision for use with the unique SS-1S Noise Silencer and with dramatic new SS-1V Video Bandscanner.

SS-1V, Video Bandscanner. This unique oscilloscope display unit, when used with the SS-1R shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. Provision is made for transmitter monitoring or analysis.



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held a dinner in Massillon with 54 attending, including W8ACH, W8ADQ, W8AL, W8AXR, W8DNC, W8DVM, W8EUK, W8HR, W8KMF, W8LVW, W8MEI, W8MND, W8NAL, W8NBK, W8NWR, W8OYV, W8PZW, W8QAZ, W8RLR, W8RZ, W8SJC, W8SQW, W8TPS, W8YAB, W8ZA, K8JOI and K8UBK. K8HKB is using an SB-200 to better his signal. Dayton ARA's *R-F Carrier* tells us the club's new meeting place is the Museum of Natural History and K8ERE is in Stillwater Sanatorium. WA8HFI reports that WN8SKS is a new Novice in Nevada, K8BZZ is the new president of the Marion V.H.F. High Banders Club and WA8HFI has a new baby girl. Mt. Vernon ARC's *K8EEN* Newsletter reports the clubs' 1966 officers are WA8KNP, pres.; W8PEN, vice-pres.; WA8FYU, secy.; WA8QQY, treas.; and W8DGC joined the Silent Keys. Those who made BPL in December are W8DAE, W8RYP, W8UPH, WA8CFJ and WA8HVR. Canton ARC's *Feedline* informs us that W8DIM joined the Silent Keys. Toledo's *Ham Shack Gossip* tells us that WA8GEW joined the Silent Keys, WA8SCR received his his General Class license, WN8SDE is a new Novice, WA8SGX is a new Technician, K8KOM is in the hospital, K8ARY is in Texas with the Air Force, K8QZH is in Africa with the Air Force. W8FSQ has a new SB-400 S.S.B. Heathkit, Oregon City RC's 1966 officers are K8LCW, pres.; K8RSR, vice-pres.; K8UPQ, secy.; K8LBI treas. Appointments made in December were K8OYQ as EC and WA8POU as OBS. Parma RC's *P.R.C. Bulletin* relates that at the club's Annual Christmas Party W8EPP showed a Laurel and Hardy movie. 1966 officers are W8CZM, pres.; W8EPP, vice-pres.; K8MVA, secy.; WA8PLC, asst. secy.; K8BQY, asst. secy.; K8JZI, treas.; WA8CGH, asst. treas., visitors were K6TXW, LU1AX, WB2QZL, K8CVZ and WA6OVI/K8UTE. A new bulletin was received from the Kettering ARC's *A-Q* which names its 1966 officers as WA8LXS, pres.; WA8QBF, vice-pres.; WN8QNR, secy.; Bob Krause, treas.; WA8OFZ, equipment mgr. K8BXT sends this news: W8TAE is using a 2A and a TR3, W8JBW moved to New York, K8AZY moved to Illinois and K8BXT has a new R4A receiver. Miamisburg AWA's *The Spectrum* says 1966 officers are W8GGE, pres.; K8WZQ, vice-pres.; WA8PRA, secy.-treas.; WA8DFA is in the Navy, WA8PQI has a new Clegg 22er and K8WZQ has a new SB-200 linear. Columbus ARA's Carascope tells us the club had a Christmas Party 1966 officers are W8INO, pres.; W8KJM, vice-pres.; WA8FSX, secy.; W8TSE, treas.; K8DJM, W8GKQ and W8ZCQ, trustees, and the V.H.F.'s 1966 officers are K8HRR, chairman; WA8BGF, vice-chairman; K8ZHO, secy.-treas. Lancaster & Fairfield County ARC's *The Rag Chewer* informs us that WA8HIO is with the Air Force in Germany. Massillon ARC held its fourth annual December auction. Many thanks for my receiving Southeast ARC's *Ham Fax*, Warren ARA's *Q-Match*, Newark ARA's *NARA News*, V.H.F. High Banders bulletin, Ohio Navy MARS' The *Scuttlebutt* and Ohio AF MARS' *O-Beat*. Traffic: (Dec.) W8UPH 1268, W8RYP 868, WA8CFJ 558, WA8HVR 382, K8LGA 336, W8DAE 283, WA8CXY 259, K8UBK 221, W8FSM 207, W8WEM 198, WA8FSX 197, K8YDR 184, WA8BUW 176, W8TV 143, W8CHT 141, WA8HTR 132, WA8GYT 116, K8BYR 94, WA8FKD 88, WA8AUZ 85, W8QZK 83, W8QCU 82, W8LAG 81, W8BZX 72, K8YSO 65, W8MGA 51, W8MOK 51, WA8PMN 50, W8CXM 40, W8DQD 32, W8LZE 29, K8LGB 28, WA8MQE 28, WA8OVC 28, WA8AJZ 22, K8DHJ 22, K8HKB 22, K8DDG 21, WA8HFI 19, WA8KPN 15, K8LFI 12, W8WEG 12, K8BNL 10, WA8QES 9, WA8MJD 8, W8PMJ 6, K8RXD 6, W8FGD 5, W8MXO 5, W8EEQ 3. (Nov.) W8CHT 156, WA8JXM 119, WA8HVR 67, WA8GYT 54, WA8BUW 47, K8HKB 11.

HUDSON DIVISION

EASTERN NETWORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointment: WB2TNB as OES. Endorsements: WA2ZPD as OES; W2HZZ and K2RDS as OBSs; W2HO and W2HZZ as ECs. December was a banner month with BPL certificates issued to K2TXP, WB2HZY, W2URP and K1QIM/2. New officers of the New Rochelle Club are WB2GMN, pres.; WB2NVJ, vice-pres.; WA2FCR, secy.; W2YLE, treas.; WA2TEQ, K2MPK and K2SJN, directors. The club's Annual December Dinner attracted over 100 members and guests. After 8 years and nearly 300 students, K2SJN is retiring as New Rochelle's chief instructor in code and theory. We all thank you, Graham. The new officers of the Dutchess County V.H.F. Society include K2GCH, pres.; K2UKE, vice-pres.; W2HZZ, secy.-treas. They will award a trophy to the highest scoring section multiple-operator station each year in the June V.H.F. Party. Three-time winners have permanent possession of the trophy. During December Family Night was held in Schenectady with Dr. T. H. Mason describing his experiences on the medical staff of the USS

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Now you can have reliable power in a new 1500 watt pentode. Eimac's 5CX1500A power amplifier tube is designed for use at the popular 1000-2000 watt peak envelope power range. And it's compact: height, 4⅞", diameter 3½". Physical configuration is similar to Eimac's well-known 4CX1000A tetrode. The tube carries control and screen grid dissipation ratings of 25 and 75 watts, respectively. The 5CX1500A is ideally suited for Class C operation. In linear service the tube can provide a two-tone signal with third-order products of −39 db at 1000 watts PEP or −35 db at 1700 watts PEP. Write Power Grid Product Manager for information or contact your local EIMAC distributor.

5CX1500A

CLASS C MAXIMUM RATINGS	
DC PLATE VOLTAGE	5000 V
DC PLATE CURRENT	1.0 Amp.
DC SCREEN VOLTAGE	750 V
PLATE DISSIPATION	1500 W
SCREEN DISSIPATION	75 W
GRID DISSIPATION	25 W
SUPPRESSOR DISSIPATION	25 W

TYPICAL CLASS AB_1 LINEAR AMPLIFIER MEASURED VALUES IN TWO TONE TEST	
DC PLATE VOLTAGE	4000 V
DC PLATE CURRENT (No Signal)	250 mA
DC PLATE CURRENT (Two Tone)	485 mA
DC SCREEN VOLTAGE	500 V
PEAK ENVELOPE POWER OUT	1785 W
THIRD ORDER IM MAXIMUM	−35 db

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Hope in East Africa. K1QIM/2 and K2TXP handled over 500 messages to servicemen during Albany's Project Goodwill over the holidays. The Schenectady Red Cross Chapter also conducted a similar program. WA2ZPD was high single operator during the Sept. V.H.F. Party. New NYSPTEN Net officers are WB2HLV, mgr.; WB2GAL, 1st asst.; K2SPO, 2nd asst.; K2LMI, secy.-treas. Traffic: (Dec.) K2TXP 522, K1QIM/2 466, WB2HZY 320, WA2VYS 249, W2URP 209, WA2JWL 115, K2AJA 86, WB2TNB 81, K2SJN 62, W2ANV 56, W2UC 54, WA2LJM 52, W2BXP 29, WB2DXL 27, WA2HGB 24, WA2WGS 19, WA2JYV 17, W2ODC 12, WA2ZPD 10, WB2FBF 7, WA2DXB 6. (Nov.) K2SJN 32, WA2LJM 18.

NEW YORK CITY AND LONG ISLAND—SCM, Blair S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. Section nets:

NLI	3630 kc.	1915 Nightly	WA2EXP — RM
VHF Net	145.8 Mc.	2000 TWTh	W2EW — PAM
VHF Net	146.25 Mc.	1900 FSSuM	W2EW — PAM
NYCLIPN	3932 kc.	1600 Daily	WB2DXM — PAM
NLS (Slo)	3630 kc.	1845 Nightly	WA2RUE — RM

NYC-LI nets: *See Dec. 1965 column for schedules.*

The Rockaway ARC installed its new officers in January and they are K2OVN, pres.; WB2CYL, 1st vice-pres.; WB2EJD, 2nd vice-pres.; W2VZQ, treas.; W2BJM, secy.; and WA2SYB, sgt.-at-arms. Hey, WN2UGP was listening to his favorite frequency the other day when he heard both WA4EYH and WN3EYH calling CQ, but they failed to hook up. WB2DXM was presented the NLI/NLS Spirit Award at the Net Dinner in December. With dogged determination, K2UBG and W3IVS waded through the red-tape mill to get permission to handle traffic to and from servicemen in Viet Nam via MARS. "Such a tall, majestic beauty," thought WB2NGZ as he stood back to admire the newly-erected 40-ft. telephone pole-type mast. "Dumb stick!" said the kindly old neighbor. New officers of the Farmingdale HSRC are WB2RBA, pres.; and WN2TUP, vice-pres. W2DBQ reached the top of a CD Party for the first time *since 1938!* WB2UDD is net control of the American Red Cross 6-Meter Net which meets Wed. at 1930. WB2IPO, recently appointed Asst. EC for the Queens 2-Meter AREC Net, has whetted the interest of that group by presenting new and realistic exercises. K2PSQ is running an HT-44, HT-45, SX-117 and TA-33 combo. W2LGK and W2LZX worked each other for the first time recently since they were both licensed in 1938. WB2SKN, club station of the Bayside HS, is now fully operative. WB2ASR has a new SX-115 and a 2-meter Polycomm. The lights have gone out in WB2BKS's AF-68 and for no reason at all it would seem. Now there's WB2AWX who dug the hum out of his rig, but most of the audio went with it. Oh, well, back to the lab. K2LOT is now sporting a new two-element, three-band quad, an HT-37 and a 75A-4. The Nassau 10-Meter AREC Net now has an s.s.b. affiliate on 28,650 every Mon. at 2000. K2UFT is back after a two-year hitch with the Army as K2UFT/4 and K4VDL. WB2ART is now on 2-meter c.w. and f.m. *Now hear this*: The New York RC has arranged to offer theory courses at the Sunnyside Vocational HS for the purpose of upgrading your current license. Since the courses begin in early March for any NYC-LI amateur, it behooves thee to contact WA2SCG as quickly as possible. *Listen*, HARC wishes to select a "Miss Amateur Radio"—a licensed YL or XYL—to preside over several functions at the 1966 Hudson Division Convention. You are all requested to submit your candidates to K2SJO, 1st POFP (Purveyor Of Feminine Pulchritude). WA2YIH won the HQ-180AC raffle by the Flatbush RC. The Crossbanders now meet Mon. on 50.31 Mc. at 1915. New appointments: W2BCB as ORS; WB2FAJ as OPS; WB2RBA and WN2TCS as OES. Traffic: WA2RUE 1477, WA2FTS 638, WB2DXM 574, K2UBG 519, W2EW 399, WA2LJS 199, WB2RQF 119, W2GKZ 114, K2AAS 107, WB2FAJ 85, WB2NGZ 74, WB2RBA 73, W2DBQ 66, WN2TCS 66, WB2AEK 62, WA2UCP 59, WB2UDD 49, K2UAT 33, WB2EUH 28, WB2MLN 22, WB2DZZ 20, W2EC 19, W2PF 16, WA2QJU 14, WB2IPO 12, W2SEU 10, W2GP 9, WB2MCT 8, K2PSQ 8, WA2DTY 6, W2LGK 6, WB2BKS 5, WB2STW 5, WB2DBW 4, K2JFE 2, WB2AWX 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—SEC: K2ZFI. NNJ traffic nets:

NJN	3695 kc.	7:00 P.M. local Daily	WB2AEJ Mgr.
NJ Phone	3900 kc.	6:00 P.M. local Ex. Sun.	W2PEV Mgr.
NJ Phone	3900 kc.	9:00 A.M. local Sun.	W2ZI Mgr.
NJ 6&2	51,150 kc.	11:00 P.M. local M W Sat.	K2VNL Mgr.
NJ 6&2	146,700 kc.	10:00 P.M. local Tu. Sat.	K2VNL Mgr.

Information on AREC nets is available from K2ZFI. Your SCM would like to issue a special plea in this column. *PLEASE master the technique of using an electronic keyer BEFORE you put it on the air! A truly*

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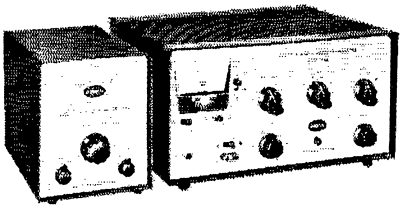
NEW VFO FOR TX-62 or any other VHF TRANSMITTER



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The new Ameco VFO-621 is a companion unit designed to operate with the Ameco TX-62. It can also be used with any other commercial 6, 2, or 1½ meter transmitter.

Because it uses a transistorized oscillator circuit, it is extremely stable. An amplifier stage provides high output at 24-26 MC. The VFO includes a built-in solid state Zener diode regulated AC power supply.

This new VFO is truly an exceptional performer at a very low price **Model VFO-621 $59.95 net.**

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SPECIFICATIONS AND FEATURES

Power input to final: 75W. CW, 75W. peak on phone.
Tube lineup: 6GK6—osc., tripler, 6GK6 doubler, 7868 tripler (on 2 meters) 7984-Final. 12AX7 and 6GK6 modulator.
Crystal-controlled or external VFO. Crystals used are inexpensive 8 Mc type.
Meter reads final cathode current, final grid current and RF output.
Solid state power supply.
Mike/key jack and crystal socket on front panel. Push-to-talk mike jack.
Potentiometer type drive control. Audio gain control.
Additional connections in rear for key and relay.

Model TX-62 Wired and Tested only $149.95

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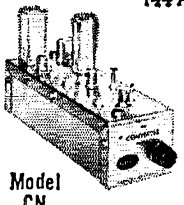
NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



Model CN

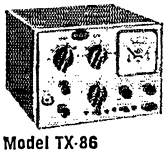
Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired. (specify IF.) $49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) $34.95

ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS

MODEL PCL, Wired, $24.95
MODEL PCLP, with built-in power-supply, wired, $32.95

2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. — can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3".

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

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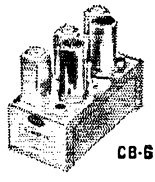

CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested ... $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc. $23.95
CB-2W — wired and tested. ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. **PS-1K — Kit ... $10 50**
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EL 3 ..... **1.75** EL 4 ..... **1.25**
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good operator will follow this rule and not be ashamed or embarrassed when he goes on the air, because he will have CONTROL and self-confidence. The excess of spurious dits and dahs has been driving away the good, experienced operators, because c.w. is not a pleasure when you have to listen to garbage. But a good fist is a joy to hear. So please take heed and make a New Year's resolution to do better if you haven't already done so. It might be a good idea for Official Observers to send notices for bad fists. WA2SRQ put up a new 40-feter dipole. WB2HLH is looking into Moonbounce. WB2QLF has filled in as NCS for NJ2. WB2KTO reports 23 members in the Navesink Net at 9 P.M. daily 145.8 Mc. WA2DEW is back at KV4CQ. WB2OYK is on 2-meter c.w. K2KFP, WB2ATK and K2ZSS have new Swan 350s. K2UKQ has a new NCX-5. New officers of the Central N.J. V.H.F. Society are K2UYV, pres.; WB2KLD, vice-pres.; WA2OOD, secy.; K2MPD, treas.; WA2UDT, sgt. at arms. K2LSX and K2BEV are setting up their OO gear in new QTHs. K2BEV participated in the FMT with the receiver on the basement floor. WA2-UDT reports good ground wave on 2 meters during December. WB2KLD is on RTTY. K1UCE (ex-W2CHI) visited W2NIY. K2DOX and W2ABL have new QTHs. K2GBP is at the South Pole. K2JSB, W2KOG, W2CZM, WB2OQM, W2MTP, WB2LAM and W2NKD hold weekly pizza parties in Scotch Plains. W2NVA is trying to make DXCC with indoor antennas. It can be done! W2CVW did it in 1958. W2DND has a new tower and tri-bander. K2ZJW and WB2OQM are home-brew artists, c.w. rigs being their latest projects. WB2JWB has a new keyer. WB2QGB has a new NCX-5. NCN-2000 and TA-33. K2OEI has replaced his 2-meter beam. WB2TTG received his General Class license. OO reports for Dec.: W2TPJ-27, W2BVE-13, W2JAE-11, W2NIY-1. The Fourth Annual *PRE*liminary Simulated *E*mergency *T*est has been set for Sat., May 14. Plan now for this exercise of the Amateur Radio Public Service Corps. Any novel suggestions to make this event more interesting are welcome. Your inquiries about AREC, NTS, ARPSC and other questions are also welcome. Traffic: (Dec.) K2VNL 299, WB2JWB 293, WB2FIT 286, WB2KSG 160, WB2AEJ 148, W2CVW 127, K2ZFI 52, WB2IYO 40, WB2OHK 40, WA2TAF 38, WB2GFY 25, WA2SRQ 25, K2EQP 23, W2NAK 20, WB2HLH 18, W2PEV 18, K2MFX 17, WA2-CCF 13, W2DRV 13, K2JTU 13, WB2QLF 11, WB2KTO 9, K2SLG 9, W2TFM 8, WA2DEW 3, W2EWZ 3, WA2-SRK 3, W2NIY 2, WB2OYK 2, WB2QGB 2, WB2ICH 1. (Nov.) W2CVW 113.

MIDWEST DIVISION

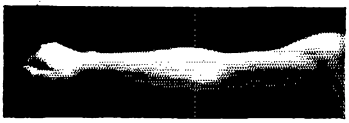
IOWA—SCM, Dennis Burke, WØNTB—SEC: KØ-BRE. We still are looking for ECs. This section is well supplied with other appointments, but we are looking for more of those hardy souls who have the courage to call the local c.d. officer out of bed at 1 A.M. and tell him that those tireless watchdogs of the nation's safety and welfare, the radio amateurs, are having a practice run while the rest of the people sleep in peace. This has happened: write for names and places. In reference to the SET again, Iowa did not do too badly. WØNWX and his buddies, with WØAJA, have been successful in logging Oscar IV four times but no contacts so far. Because of the distances involved and the u.h.f. frequencies this has been a more challenging project than previous flights. KØEXN is moving back to Spencer. WAØDEM, formerly Asst. SCM for So. Dak., has moved to Iowa and is teaching school at Logan and living at Pisgah, we assume from the postmark on his report. The Tall-corn Net needs more support. This net should be a training ground for NTS activities and our section is woefully weak in this department. WØGPL's Weather Net has been a decided asset to our section. Net reports for Dec.: 160-Meter Fone, QNI 875, QTC 28, sessions 31. 75-Meter Fone, QNI 1459, QTC 232, sessions 26. Hamilton Co., QNI 221, QTC 3, sessions 31. Traffic: WAØDEM 329, WØNTB 135, WØYO 105, WAØDYV 100, WØUSL 50, KØTFT 42, WØLTW 22, WØATA 17, WAØFEX 12, WØMMZ 12, WØBKR 10, WØPTL 10, KØTDO 10, WØQVZ 8, WØNGS 6, WAØJYT 3.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB, PAM: KØJMF, RM: WAØJII, V.H.F. PAMs: WØHAJ, KØVHP.

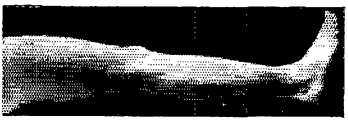
Nets	*Freq.*	*Time*	*QNI*	*QTC*	*Mgr.*
KPN	3920	1245Z M-W-F	215	81	KØJMF PAM
	3920	1400Z Sun.			
QKS	3610	0100Z Dy	126	65	WAØJII RM
KWN	3920	0001Z M-S	—	—	KØEMB SEC
EC	3920	1900Z Sun.	51	11	WAØCCW EC
KSN	3920	0130Z T-Th-Sat.	—	—	KØLHF
HBN	3880	1805Z M-Sat.	1666	559	WAØHWJ

KØJMF has accepted the PAM appointment. KØYLV was a welcome voice from Phillipsburg on KPN. WØ-FRC has moved to Abilene. WØILB has taken over as

Who says it costs



an arm



and a leg to get 22 watts at 450 mc... or 10 watts at 960

We've developed a new UHF power source for you designers of mobile communications gear, low-cost point-to-point microwave links and citizens band. It's simple, efficient and economical, (extremely economical). It uses a single Amperex power tube, the 8458, as a driver at 150 Mc., and a single varactor, the Amperex 1N4885 as a tripler. For 960 Mc., one more 1N4885 used as a doubler will provide 10 watts of output power.

The basic specifications of the 1N4885 are: Efficiency 70%, Breakdown Voltage 150 volts, Series Resistance 0.7 ohms and a Capacitance Range of 29 to 39 picofarads. The basic specifications of the 8458 are: Plate Voltage 600 volts. Plate Current 120 mA Screen Voltage 180 volts and a drive power of approximately 3 watts.

If you can beat the watts per dollar you'll get from this combination of solid state and vacuum tube technology, you've got yourself a swell new job as head of our research and development lab!

For complete information, including an applications report on 8458 driver circuits and 1N4885 frequency-multiplier circuits and filter networks, write: Amperex Electronic Corporation, Semiconductor and Receiving Tube Division, Department 371, Slatersville, Rhode Island 02876.

Amperex®

owner-publisher of *Ham Monitor*. Bob's address is 914 East Republic, Salina, Kans. 67401. Endorsements: WØZGK, WAØCCW and KØGOZ as ECs; KØGII as OPS. New OPS: KØJMF. The net time of QKS, Kansas c.w. net is now 0100Z daily. WAØHWJ, of Springfield, Mo., has been elected net mgr. of the Ham Butchers Net. His right hand will be WAØEMQ, Kans. Asst. Net Mgr. The Ham Butchers Picnic will be held June 18-19 at Warsaw. WAØDZI and KØGIC report several band openings on 6 in December. Miss KØJWW, formerly of Atchinson, is now in Versailles, Mo. Central Kansas Radio Club's officers are WAØIXY, pres.; KØKED, vice-pres.; WAØJFC, secy.-treas.; KØECB, act. mgr.; WØAMJ, handiest eh. Newton Amateur Radio Club's officers: WAØDDK, pres.; KØEMB, vice-pres.; WØCIZ, secy.-treas. Officers of the Jayhawk Amateur Radio Society, Inc. KCK are KØCZT, pres.; WØWNX, vice-pres.; WAØHSK, secy.; KØEVM, treas.; KØBXF, WØFEY, WAØEMQ, WAØHZS, board directors. The Jayhawk Amateur Radio Society, Inc., announces the Kansas QSO Party to be held May 21 and 22, 1966. If you would like more information before this, contact your SCM or any member of the JARS. Traffic: WØOHJ 1216, WAØJII 198, KØGZP 192, KØHGI 178, WAØFCO 86, WAØEMQ 59, WAØCCW 57, KØBXF 56, KØGII 49, KØJMF 49, WAØMLF 47, WØFRC 27, KØEMB 26, WØFDJ 18, KØLPE 13, KØGIG 11, WØBMW 4, KØJID 2.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. WAØELM was appointed EC for Macon and Adair Counties. WAØEMX received PAM certificate as mgr. of the Mo. Teenage Tfc. Net. WAØHWJ was elected mgr. of the Hambuchers Net. WAØEMQ was elected asst. net mgr. Net certificates for MOSSB went to KØENS, KØJEQ, WØSOZ, WAØDKT, WAØLYE, KØHNE, WØEEE and KØVNB. KØJPJ is mgr. and NCS on the 75-Meter County Hunters Net. New officers of the HARC (Kansas City) are KØUEJ, pres.; KØORB, exec. vice-pres.; WØCTQ, WØLVW, WAØJIH, vice-pres.; WAØABO, secy.; WØMCL, treas.; WAØMOF, membership; KØAEU, sgt.-at-arms; WØTFQ, editor. KØYIP has 120 DXCC endorsement. WAØEMS is at Lackland AFB. KØJPS gave an amateur radio demonstration to the City-Wide Hobby Club. KØLGZ has a new SB-200. KØONK has a Galaxy V. KØYIP assembled a monitorscope. WAØHHV reports QSLs of Official Bulletins from Texas and Colo. The Annual HBN Picnic will be held June 19 at Warsaw. Pre-registration is $1—$1.25 at the picnic. Send pre-registration to WAØHWJ. The Annual Mo. QSO Party will be held Mar. 19-21.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*ONI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	13	191	21	WØBUL
MON	3580	0100Z	Daily	31	210	182	WØWYJ
SMN	3580	0400Z	Daily	22	74	57	KØAEM
MNN	3580	1900Z	M-Sat.	27	53	13	WØOUD
QMO	3580	2200Z	Sun.	4	16	12	WAØFKD
MSN	3715	0300Z	Daily	12	22	4	KØONK
MoSSB	3963	2400Z	M-Sat.	32	578	171	KØTCB

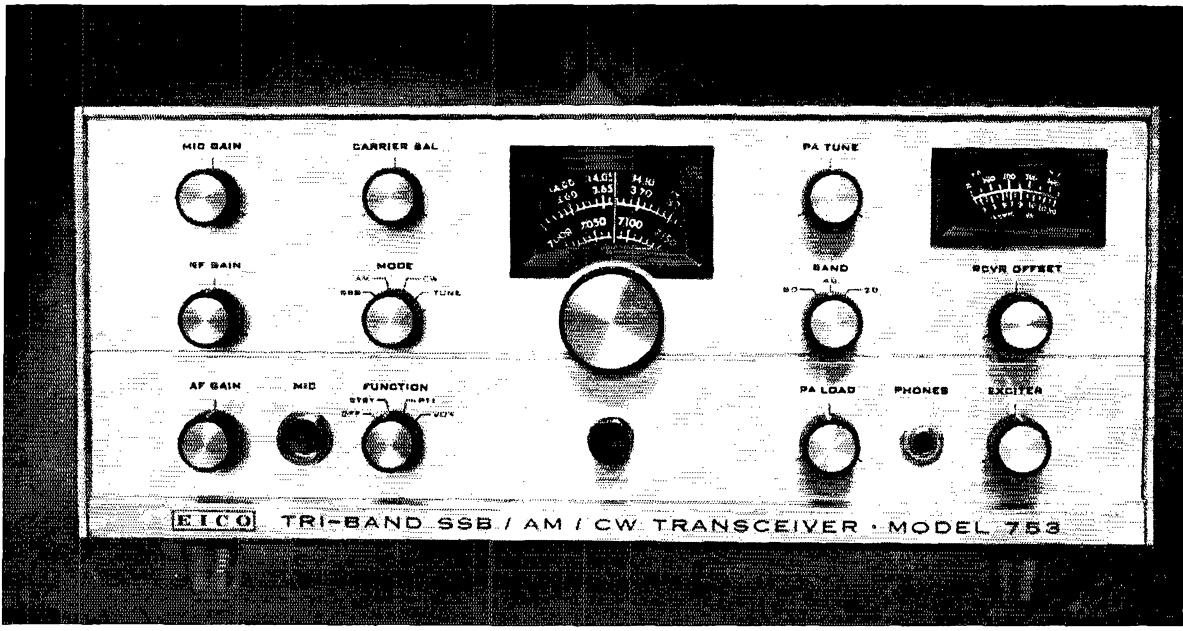
MISSOURI QSO PARTY

March 19-21, 1966

The Northwest St. Louis Amateur Radio Club, KØAXU, invites all amateurs to participate in its Third Missouri QSO Party.

Rules: (1) The contest period starts at 1800 GMT Saturday Mar. 19 and ends at 0500 GMT Monday, Mar. 21. (2) No time limit or power restrictions. (3) Missouri stations count 1 point per contract and multiply total by the number of states, provinces and countries worked. All others count 2 points per Missouri contact and multiply by the number of different Missouri counties. (4) The same station may be worked on more than one band (phone or c.w.) for additional credit. (5) Suggest frequencies 3520 3950 7025 7225 14050 14330 21050 21350. V.h.f.ers are welcomed. (5) The general call will be CQ Mo c.w. and calling Missouri on phone. (6) Information required to exchange: QSO number, signal report, Missouri county (or state province or country outside Missouri). (7) Certificates will be awarded to the 5 high Missouri stations and, additionally, to the highest scoring individual in each state province and country (5 QSO minimum). Awards will also go to the 3 highest clubs in the world. (8) Logs and scores must be postmarked no later than April 30 and sent with SAE or SASE to Paul Haefner, KØJPL, 1939 East Warne Avenue, St. Louis, Missouri 63107.

NOW! A 3-BAND SSB TRANSCEIVER KIT FOR 189.95



NEW EICO 753 SSB/AM/CW 3-BAND TRANSCEIVER
WITH SILICON SOLID STATE VFO

Build the finest of SSB/AM/CW 3-band transceivers with 200 watts of SSB punch and every wanted operating facility, plus the extra reliability and maintenance ease inherent in kit design. Assembly is made faster and easier by VFO and IF circuit boards, plus preassembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The new EICO 753 is at your dealer now, in kit form and factory-wired. Compare, and you will find that **only the 753 has all these important features:**

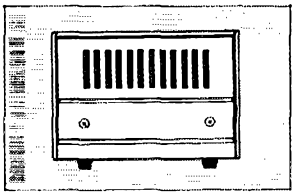
■ Full band coverage on 80, 40 and 20 meters. ■ Receiver offset tuning (up to ±10kc) without altering transmitter frequency. ■ SILICON SOLID-STATE VFO for drift-free and voltage stable operation in both fixed and mobile installations. ■ Built-in VOX. ■ Panel selected VOX, PTT & STANDBY. ■ High level dynamic ALC to prevent flat-topping or splatter and permit the use of a linear amplifier. ■ Automatic carrier level adjustment on CW and AM. ■ Dual ratio ball drive permits single knob 6:1 rapid tuning and 30:1 vernier bandspread (over 10 degrees of scale). ■ Position of hairline adjustable on panel. ■ Illuminated S-meter/PA Cathode Current Meter and tuning dial. ■ Fast attack, slow decay AGC. ■ Grid-block break-in CW keying. ■ Product detector for SSB and CW, triode detector for AM. ■ TR relay with auxiliary contacts for use with high power linear amplifier. ■ Includes mobile mounting bracket.

ADDITIONAL SPECIFICATIONS

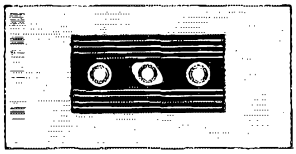
FREQUENCY COVERAGE: 3490-4010kc, 6990-7310kc, 13890-14410kc. SSB EMISSIONS: LSB 80 and 40 meters, USB 20 meters. RF POWER INPUT: 200 watts SSB PEP and CW, 100 watts AM. RF POWER OUTPUT: 120 watts SSB PEP and CW, 30 watts AM. OUTPUT PI NETWORK MATCHING RANGE: 40-80 ohms. SSB GENERATION: 5.2 Mc crystal lattice filter; bandwidth 2.7kc at 6db. STABILITY: 400 cps after warm-up. SUPPRESSION: Carrier-50db; unwanted sideband-40db. RECEIVER: Sensitivity 1uv for 10db S/N ratio: selectivity 2.7kc at 6db; audio output over 2 watts (3.2 ohms). PANEL CONTROLS & CONNECTORS: Tuning, Band Selector, AF Gain, RF Gain, MIC Gain with calibrator switch at extreme CCW rotation, Hairline Set (capped), Mode (SSB, AM, CW, Tune), Function (Off, Standby, PTT, VOX), Carrier Balance, Exciter Tune, PA Tune, PA Load, Receiver Offset Tune, MIC input, phone jack. REAR CONTROLS & CONNECTORS: VOX Threshold, VOX delay, VOX sensitivity, Anti-VOX sensitivity, PA Bias adjust, S-Meter zero adjust, power socket, external relay, antenna connector, key jack, accessory calibrator socket. METERING: PA cathode on transmit, S-Meter on receive. SIZE (HWD): 5 13/16" x 14 1/4" x 11 1/4". POWER REQUIREMENTS: 750 VDC at 300 ma, 250 VDC at 170 ma, -100 VDC at 5 ma, 12.6 VAC at 3.8 amps.

The Model 753 is an outstanding value factory-wired at $299.95.

Power Supplies Tailored for Optimum Performance of the 753.



Model 751 Solid State AC Supply/Speaker Console.
Matching table-top companion unit. Built-in PM speaker.
Kit $79.95 Wired $109.95



Model 752 Solid State Mobile Supply.
For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload.
Kit $79.95 Wired $109.95

EICO For FREE Catalog and 753 Spec. Sheet write to EICO Dept. QST-3, 131-01 39th Ave., Flushing, N. Y. 11352

MoPON	3810	2100Z	M-F	23	310	267	WØHVJ
MTTN	3940	2300Z	M-F	23	302	174	WA0EMX
PHD	50.15	0130Z	Mon.	4	58	12	WA0FLL

Traffic: KØONK 2169, WAØFKD 352, KØAEM 314, WAØHWJ 313, KØFPC 221, WAØFLL 149, WØHVJ 132, WAØFMD 117, WØYO 105, WØØUD 99, WØEEE 81, WAØCHH 76, KØTCB 69, WØTDR 64, KØØJD 63, WØWYJ 63, WAØEMX 59, WAØDGG 55, KØJPL 54, WØZLN 52, WØRTO 49, WAØLYE 40, WAØBGU 28, KØWOP 27, WAØHOQ 26, WØTPK 25, KØDEQ 24, WØGQR 23, WØBVL 22, KØØYV 22, WAØDKT 17, KØYIP 12, WØBUL 10, WAØKNW 9, WAØCMO 6, WØJBK 3, KØBWE 2, WA9JDR Ø 1, WAØHJ 1, KØJPJ 1, KØLGZ 1.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Net activity reports for Dec.: Nebr. Storm Net, KØJXN, 2330Z, QNI 903, QTC 53; 0030Z, QNI 490, QTC 24. Nebr. Emergency Phone Net, WAØBID, QNI 1558, QTC 256. Nebr. Morning Phone Net, KØUWK, QNI 630, QTC 63. Nebr. AREC C.W. Net, WAØEEI, QNI 7. Nebr. C.W. Net, WAØGHZ, 1st session, QNI 156, QTC 98; 2nd session QNI 120, 160-Meter Net, WAØCBJ, QNI 549, QTC 10. Western Nebr. Phone Net, WØNIK, QNI 429, QTC 77. Emergency Noon Net has elected WAØGHZ as net manager for 1966. WAØJKN is the new pres. of the Pine Ridge ARC at Chadron. WØPHA is the new pres. of the Tri City ARC in Scottsbluff. WAØEUM will head the Lincoln ARC. KØYRK,Ø now is on 2 in North Platte. Traffic: WAØGHZ 645, WAØDOU 272, WØNIK 142, WAØBID 133, WAØGVJ 120, KØJFN 88, WAØAES 83, WAØKFP 80, WØGGP 57, WØLOD 48, WØFQB 45, WØBFV 43, KØBRG 39, WAØEEI 35, KØKJP 35, WØGEQ 33, WAØIBL 30, WØVEA 27, WAØBOK 26, WAØKRK 25, WØDDT 24, WØUKD 22, WAØBIE 20, KØHNT 18, WAØHWR 17, WAØKGN 17, KØFRU 16, KØJXN 16, WØVRE 15, WØAGK 12, KØRRL 12, WØZAG 12, WØFBY 11, WØYFR 11, WAØIXD 10, WAØIXF 9, KØVTD 9, WAØEUM 8, WAØIKG 8, WØERN 7, WAØFNY 7, WAØHOP 7, WAØHSX 7, WØLJO 7, KØUWK 7, WØWHY 5, WØWKP 5, WØCXH 4, WAØIBB 3, WAØJUF 3, WØVPR 3, WØEGQ 2, WAØFJN 2, KØFJT 2, WAØJZL 2, WØNOW 2, KØØAL 2, WAØJTU 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Fred Tamm, K1GGG—SEC: W1PRT, RM: W1ZFM, PAM: W1YBH, V.H.F. PAM: K1RTS. Dec. net reports:

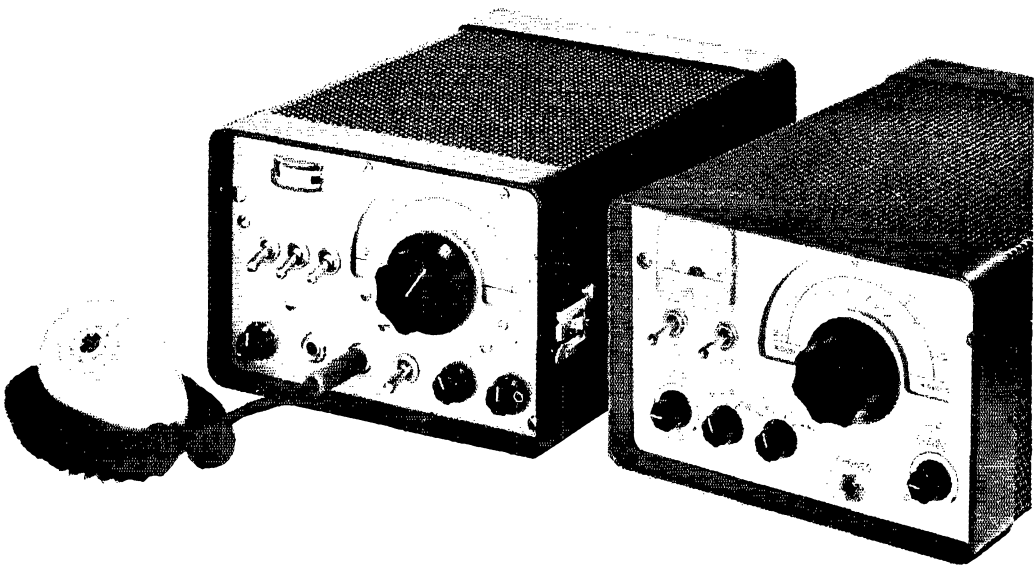
Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	313	480
CPN	3880	M-S	1800	30	408	133
		Sun.	1000			

High attendance: CN—W1ZFM, K1LMS, WA1APY, W1RFJ. CPN—W1YBH 27, WA1CYB 26, W1FVU 24, K1LMS 24, W1LUH 23, W1MPW 23, K1DGK 21, WA1CBW 20, K1RSK 17, K1SRF 17, K1EIC 16. New actives on CPN: K1RSK, K1VYU, W1WHQ, K1VXK. Because of transferring out of this section I would like to thank all appointees, members and friends for the support given me during my term as your SCM. I will be looking for you on the air and hope to keep in touch on your FB nets. New officers of the Southington ARA are K1EUW, pres.; W1GVZ, vice-pres.; W1EFW; secy. W1IOB, treas. Traffic-handlers at WA1DIU: W1IOW, K3SXA, K4WRM, WA5GVF. The Conn. Council of Clubs reports a list of speakers available for your group. Contact W1WHQ for details. WA5GVF/1 and K1VDZ are experimenting with Oscar IV nets on 145.494. WA1CYU has a new HQ-170C and Valiant. K1AFC is busy on Navy MARS. K1JHX mailed 7 new ones for his DXCC. W1BGD's DXCC now is 173/131. W1ECH made WAC on 3.5 Mc. Appointments: W1BEA and K1JHX as OOS. Endorsements: K1QAH, K1BEN, W1WX, K1RPQ, W1WAZ, W1NFG, W1FYG and W1HGE as ECs. Our AREC/APRSC program has really picked up. W1PRT is doing a fine job reorganizing our section. New AREC members: W1CNI, K1ILJ, WN1EFT. Reports received: W1BGD and W1ECH as OOs. BPL: WA1DIU (Nov., Dec.) WA5GVF/1 (Dec.) Traffic: (Dec.) K1RQO 453, W1EFW 429, WA1DIU 381, K1ZND 371, WN1JM 326, W1BGD 287, W1ZFM 268, WA1APY 265, K1LMS 154, WA5GVF/1 121, W1LOW,1 120, K1EIR 105, K1EYY 98, W1YBH 88, K1EIC 85, K1SRF 69, W1CTT 65, K1GGG 62, W1BDI 47, W1QV 24, WA1CYB 21, K1TKS 18, K1NTR 16, W1GKF 14, W1MPW 9, WN1DUV 8, W1CUH 7, W1BNB 1 6, W1BHV 5, W1EVU 4, K1YXK 3, WN1EFT 2, K1YGS 2. (Nov.) WA1DIU 175, K1RQO 166, W1CTT 59, W1RFJ 57.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from WIs JVZ, STX, LVK, BB and K1PNB. New ECs: W1QFN Fall River, K1WVW Hopkinton. K1BTF is a

DESIGNED FOR THE AMATEUR WHO IS

ACTIVE ON SIX



COMPLETE, SELF-CONTAINED STATION FOR FIXED, PORTABLE, OR MOBILE OPERATION.

LI'L LULU TRANSMITTER FOR 6

Special gang-tuned circuits in Li'l Lulu let you QSY instantly — there's no buffer tuning and final dipping needed when the frequency is changed. And the rig is really TVI proof! By keeping the VFO grid circuit in the 25mc range, TVI is eliminated.

• 117 vac, 12 vdc integral power supply. Class A high level modulation. Carbon dynamic or crystal mic input. Push-to-talk, or use panel switch • Built-in cw keying filter • VFO spotting switch • VFO control • 12 DQ7 final.

LI'L LULU RECEIVER FOR 6

Specially developed to complement the famous Li'l Lulu one-knob-controlled transmitter for 6 meters, the new Li'l Lulu receiver is unmatched for performance.

• AM, CW, SSB • Product detector for SSB • BFO crystal controlled • Delayed AGC operates on AM, CW, SSB • Integral front-end filter • Tunes 50-54 mc, and 10 mc for WWV and converter input • Critical components are temperature compensated • 10 mc crystal filter ahead of 3 IF amplifiers • Built-in CW monitor • ANL operates in all modes • S meter controlled by non-delayed AVC • Front panel control for companion transmitter — 80 to 1 drive reduction for precise tuning • Matches the Li'l Lulu transmitter.

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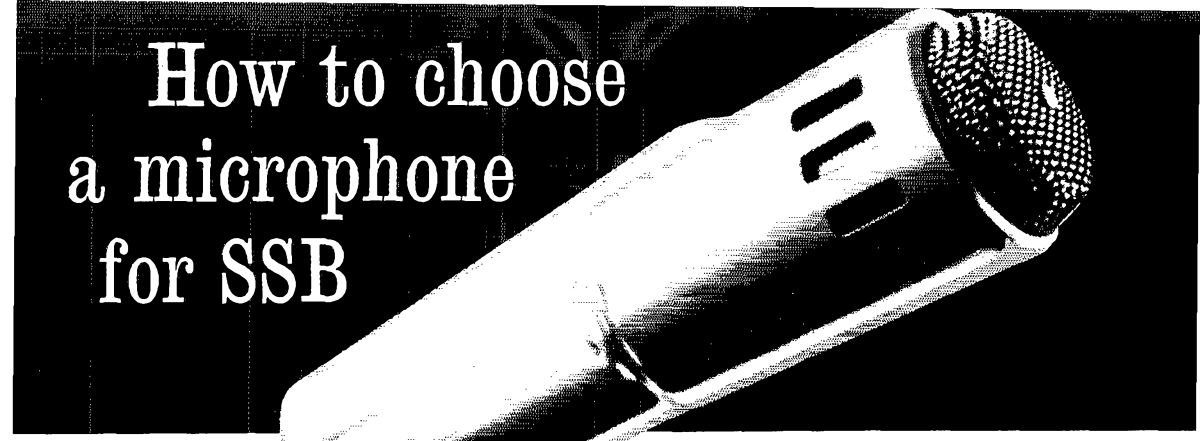
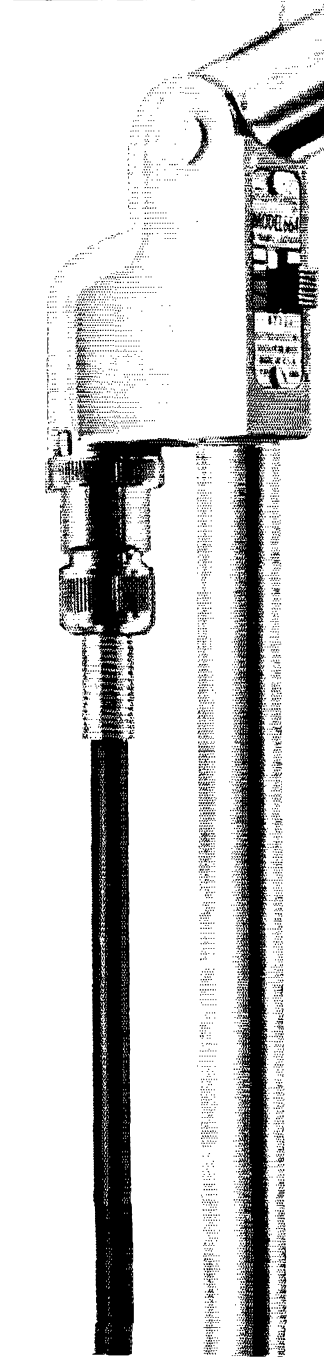
new OES; K1ETT a new ORS. Any more volunteers as EC? Does your town have one? K1BTF has 11 states on 2 plus VE1 and VE2. W1HWK is on 2. Novices are welcome to our net on 3733 kc. Mon., Wed. and Fri. at 6:30 P.M. and code practice at 8:30, same place and day. WA1BSY is a Silent Key. W1s OSQ and FPF now live in Mattapoisett. K1OIC is in Alabama for a stay. WA1-DIIQ has a bamboo quad. W1IPZ is mobile on 6. The Yankee Club C.W. Net will give a certificate for 4 consecutive call-ins on the net Wed. at 7 and 8 P.M. on 28.3 or 28.8 Mc. WA1FEO has an NCX-5 and a TA33 Jr. beam on 15. The Marlboro Club has a 28-ft. dish antenna to go up, says W1BNE. New officers of the So. Eastern Mass. ARA (W1AEC) are K1VOK, pres.; WA1BZJ, vice-pres.; WA1CTP, secy.-treas.; K1IBR and WA1CCM, directors. Send W1AOG a card if you can help out on a Selective Service Net on 3870 kc. W1DFS is Comm. Officer for this. EM1OMN had 11 sessions, 54 QNIs, 52 traffic. This is on 29.2 Mc. at 2200 GMT Mon. through Fri. Give W1ZLX a hand. W1YQM has a TR3 in the car. W1PGN is working on an SB-100. W1EUJ is temporary chairman of the Merrimac Valley ARC. W1-NBN. He is building a rig for 160. EM2MN had 25 sessions, 253 QNIs, 487 traffic. The 6-Meter Net had 22 sessions, 363 QNIs, 85 traffic. W1HKG sold his mobile gear. The South Shore ARC now meets at the Viking Club in Braintree the 3rd Thurs. of each month. W1WK is group leader; W1YTB, secy.; W1MME, treas. WA1DJC is on several nets. EM1NN had 19 sessions, 70 QNIs, 40 traffic. K1CLM's new "Tornado" is working fine. K1ESG has a Valiant. K1VPJ says Needham EN will handle any traffic and meets Sun. on 51.75 Mc. at 1930R. K1KBO says he telephone relayed traffic in and out of Ft. Devens. WA1EAT is now Tech. Class. W1HBB provided communication for USN personnel all over the world. WA1DLT has a TA-33. PAØLOU visited W1JYH. W1-IIP has a QRP 100 award and has 473 counties. Appointments endorsed: W1BHD as OBS, EC, OES; K1-VGM as OBS; K1ESG and K1BUF as ORSs; W1EUJ as OES; W1WAJ and K1RPA as OOs, K1PNB as EC. K1CLM is a new OPS. Our BPL list: W1s PEX, AOG, DOM, K1s CLM, ESG, VOK. W1GA is mobile on 75. The T-9 Club met at W1TJP's. W1CRX is on 2 and 6. K1ETT has a Ranger and an NC-303. The Wellesley Club held a meeting. WA1FMC is ex-W1DSD. W1GOF is on 20-meter c.w. and DXing. W1GAG likes it up in Maine. The Middlesex Club had a talk by W1FLD. The Capeway Club met at K1MAK's. WA1AWJ is on many bands. WA1CHP is helping K1YUB at the Somerville Y teaching code, etc. W1HBY and K1SWU are in the Navy. K1KNM is at the U. of Arizona. K1DYU was St. Nick on Christmas Eve for the kids on 10 for the Capeway Club. W1FON says the Mass. Army MARS handled 870 messages in 2231 hours participation in Nov. Traffic: (Dec.) W1PEX 4119, K1CLM 1273, W1DOM 911, K1ESG 721, W1CRX 453, W1EMG 324, W1OFK 223, W1AOG 193, K1PNB 172, K1VOK 168, K1LCQ 135, WA1CRR 115, W1ZLX 115, K1VPJ 104, K1KBO 100, WA1EAT 96, K1GKA 83, W1JDP 71, W1CTR 69, W1-HBB 65, K1BGK 44, K1EYM 34, W1SIV 31, W1LES 25, WA1DEC 22, WA1DED 20, K1ETT 18, WA1DLT 17, W4YAC 14, W1BGW 8, K1CMS 8, WA1DJC 8, K1YUB 8, W1IIP 7, W1JYH 7, WN1FHJ 6. (Nov.) W1LES 33, K1BGK 6.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1QIG. RM: K1TMK. PAMs: K1WQI, K1ZVN. V.H.F. PAM: K1OYB. Traffic Nets: Sea Gull Net, 1700 to 1800 and 2000 to 2100 on 3940 kc. Mon. through Sat. Pine Tree Net, daily at 1900 on 3596-kc. c.w.; some traffic being passed on 2 meters. Tribute to a Silent Key: K1GUQ passed away quite suddenly. He was active on many of the bands and nets, also active in Army MARS. He will be sadly missed by all who knew him along the way. There is not much for news in the v.h.f. frequencies. K1MTJ had hard luck on the Vermont trip, but new things will be forthcoming soon. W1GRG is on 2 meters with a Twoer and a beam from Toddy Pond and doing quite nicely. The reports coming in from the Maine QSO Party shows a trend to c.w. and a very good time was had. We hope for a bigger and better party next year. Also many thanks for all the ideas. Traffic: (Dec.) K1TMK 406, K1WQI 143, K1VUU 137, K1WNC 16. (Nov.) K1ZVN 19.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: W1ALE/W1TNO. PAM: K1APQ. RM: W1DYE. The GSPN meets on 3842 kc. Mon. through Fri. at 2330Z and Sun. at 1430Z. The VTNH Net meets on 3685 kc. Mon. through Fri. at 2330Z. Endorsements: W1EVN as ORS and K1APQ as PAM. Appointment: K1YSD as EC for Rockingham County. W1RCC has a new Eico 753 and is having no trouble working DX on 75. K1IIK made the BPL on originations. W1-PYM was home from W6-Land during the holidays. K1APQ reports 559 check-ins and 59 traffic for GSPN.

How to choose a microphone for SSB





Model 664
$51.00 Amateur Net

Hand us a blank check. Tell us you want the best microphone you can buy for SSB — with price no object. We'll hand you the Model 664 dynamic cardioid microphone. We'd like to tell you why the 664 is so uniquely suited to SSB operation.

Let's start with the transmitter. Almost every quality SSB transmitter, commercial or home-brew, incorporates an automatic level control circuit. And the general practice in transmitter design is to assume that the microphone response will be flat. On this assumption, the audio input circuits are designed to shape your speech characteristics, in conjunction with the ALC control, so that proper transmitter setup gives you maximum PEP.

Anything less than flat microphone response limits your ability to obtain maximum PEP, and your effective radiated power will be reduced. To satisfy this basic requirement, the 664 is unusually free from peaks or dips in response. It allows maximum PEP while retaining your natural voice characteristics.

Another important SSB feature, found in almost every modern transmitter, is voice operation. The 664 flat response, plus the effective Variable-D® cardioid pattern, reduces the possibility of accidentally opening the VOX circuit when speaker level is high. That's because the 664 rejects sound from the back and sides of the microphone. You can operate with higher receiver volume with complete safety. And noise, reverberation and echoes in the ham shack are reduced by the cardioid pattern to give you better intelligibility on the air.

Despite the performance advantages of the 664, this is not a fragile microphone, far from it. It's rugged, almost indestructible. The dynamic design meets the most rigorous tests for quality and service. And at the heart of 664 dependability is the diaphragm, made of Acoustalloy®; a unique plastic material available only from Electro-Voice. Acoustalloy is virtually impervious to shock, temperature extremes, humidity and the countless other environmental conditions that gradually destroy less rugged instruments.

But there's more to the list of 664 advantages: High output level, handsome appearance, and the guaranteed backing of a manufacturer of unquestioned integrity and wide experience in electro-acoustics.

While we manufacture microphones ranging from the communications units in the Gemini space program to professional models that have won an Academy Award for their contribution to motion picture sound, no field is closer to our hearts than amateur communications. And the engineers and hams in our organization are particularly responsive to the needs of the amateur fraternity. They insist on good value for every product, in every price range.

But when price is no object, their choice is the 664 for SSB. Outstanding in performance and value for even the most critical amateur radio operator. We urge you to try the 664 in your own shack soon. We guarantee your satisfaction, or your money back.

ELECTRO-VOICE, INC.
Dept. 632Q, 631 Cecil Street
Buchanan, Michigan 49107

Electro-Voice®
SETTING NEW STANDARDS IN SOUND

K1IIK is going into the Army. K1UZG reports 93 check-ins and 114 traffic. The Concord Brasspounders is planning a hamfest in October. We hope to have the exact date next month. K1AEG has a new SB-400. W1PZA is on 80-meter c.w. New Nashua Mike & Key Club officers are W1DUB, pres.; WA1CEH, vice-pres.; WA1FJE, secy. W1SWX, treas.; K1TEL, act. mgr. K1AEG won the c.w. and W1DYE the phone section in a recent CD Party. The only other active station was K1AC. Traffic: K1IIK 168, W1ALE 70, W1PFU 29, W1EVN 19, W1MHX 15, K1YSD 12, W1SWX 6, K1YWT 6. (Nov.) W1DYE 84, K1IIK 3.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. RISPN reports 31 sessions, 636 QNI, 172 traffic. RIN reports 29 sessions, 99 QNI, 30 traffic. WA1BJS received a Section Net certificate. The NCRC Club of Newport elected WA1CSO, pres.; W1JFF, vice-pres.; W1WLG, corr. secy.; WA1BLC, rec. secy.; Roy Smith, treas. The W1AQ Club of Rumford issued WRI Certificate No. 70 to K1HMO. The club elected K1LII, pres.; WA1EQF, vice-pres.; K1QLM, secy.; K1CZD, treas. K1QLM has a new 6-meter rig. W1YKQ has a new Ameco preamplifier and a Heath Monitor Scope for his shack. W1BTV recently installed a new 4000-watt generator in the basement of his house for emergency power. Any ham interested in joining the AREC should contact the SEC. W1YNE. Traffic: W1-BTV 258, K1TPK 220, W1YKQ 192, K1NJT 162, W1TXL 147, K1VYC 130, W1YNE 71, K1YEV 36, WA1CSO 21, K1SXY 21, K1QZW 20, K1CPL 19, K1VPK 15, WABJS 12, W1YVN 11, K1YOA 5.

RHODE ISLAND QSO PARTY

March 19-20

The Providence Radio Assn., W1OP, announces the Third Rhode Island QSO Party and invites world-wide participation. Only single-operator entries will be considered for awards.

Rules: (1) *Time:* 7 p.m. EST to 11 p.m. EST Sat. night, 7 a.m. to 11 a.m. Sun. morning and 7 p.m. to 11 p.m. EST Sun. night. (2) Phone and c.w. are considered the same contest. A station may be worked twice per band, once on phone and once on c.w. (3) *General call:* "CQ RI." R. I. stations will identify themselves by signing "DE RI" on c.w. and "Rhode Island calling" on phone. Only phone-to-phone and c.w.-to-c.w. contacts count. (4) *Suggested frequencies:* 1812, 3530, 3850, 7020, 7250, 14040, 14275, 21060, 21225, 29000 kc., and 50.2 and 144 Mc. (5) *Exchange:* QSO number, RS(T), and county name and state. (6) *Scoring:* Outside stations multiply the number of stations worked times the number of counties (maximum of 5). R. I. stations multiply the number of stations worked times the total number of states, provinces and countries. (7) Awards will be sent to the highest scoring station in each state, province or country, and 1st and 2nd place awards in each R. I. county. Novice and Technician awards will also be issued. (8) Logs must, in addition to the above information, show date, time, band, and emission and be received no later than May 10, 1966. Send logs to: John Good, K1ZHN, Box 2903, Providence, R. I. 02908.

Stations outside of R. I. working 2 stations in each of the five R. I. counties are eligible for the "Worked R. I. Award" given by the Associated R. A. of Southern New England, W1AQ, 54 Kelly St., East Providence, R. I.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: W1WFZ. Dec. net reports:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2230Z	Dy x S	578	38	W1VMC
Vt. Fone	3855	1400Z	Sun.	108	—	W1UCL
VTNH	3685	2330Z	M-F	93	114	K1UZG
VTCD	3990.5	1500Z	Sun.	130	47	W1AD
VTSB	3909	2300Z	Dy x S	326	17	W1CBW
		1330Z	Sun.			
CVARC	145.8	0100Z	Mon.(Z)	41	0	W1JLF

We are sorry to report W1OJO as a Silent Key. We hope you had a good time in the Vt. QSO Party. Please QSL as most of your QSOs need yours. The CVARC set up stations in theater lobbies in Montpelier and Barre for "The Bedford Incident" showings. A new Central Vt. 2-meter net has been established on 145.8 Mc. at 8 p.m.

ANTENNA BREAKTHROUGH

IN PERFORMANCE, VALUE, QUALITY, PRICE, AVAILABILITY

ALL-BAND VERTICALS

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

NO GUY WIRES

Our design eliminates unsightly guy wires. You save time, trouble, space and money by avoiding guy wires.

"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!

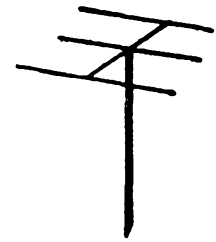
V40 vertical for 40, 20, 15, 10, 6 meters.....$14.95

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

ALSO AVAILABLE AT
AIREX RADIO CORP., NEW YORK CITY
CANADA — ON REQUEST

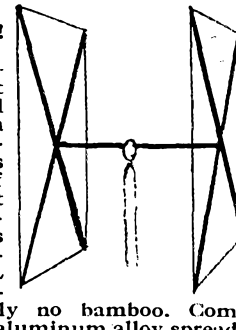
BEAMS



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.

3 EL-20 METER.....$22.00
2 EL-20 METER..... 16.00
3 EL-15 METER..... 16.00
2 EL-15 METER..... 12.00
4 EL-10 METER..... 18.00
4 EL-6 METER..... 15.00

QUADS



NEW! NEW! NEW! 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 fool-proof 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! Now check these startling prices — note that they are *much lower* than even the bamboo-type:

TWENTY METER CUBICAL QUAD.$25.00
FIFTEEN METER CUBICAL QUAD. 24.00

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATEY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

Sun. Traffic: K1BQB 474, K1UZG 85, W1FRT 16, K1-EQI 10, K1MPN 9.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1IJU. C.W. RM: K1IJV. No reports were received this month from any West. Mass. amateurs except those operating in the West. Mass. C.W. Traffic Net, important as that work is we still would like reports from other hams, also. Maybe you think what you are doing will be of no interest to others, but I'm sure that many would be interested in reading about what you are doing. Three excellent club bulletins were received here as usual, *Random Scatter* from the Berkshire County Amateur Radio Association, *The Oscillator* from the Valley Amateur Radio Club and *Zero Beat* from the Hampden County Radio Association. The following information is gleaned from these. The theory class sponsored by the Valley Club is now being held at at Chet's shop at 23 Hamburg Street, Springfield. Check with K1IYT. Howard A. Roberson, an engineer at G.E., was the guest speaker at the Berkshire County club. K1GFT is moving to Florida (address later). K1OOV is now at Franklin Rd., RD #2, Skaneatles, N.Y. Many of the Berkshire gang are batting out the DX. The temporary emergency 10-meter frequency for the Springfield area is 28.9 Mc. W1GIV is on the ARRL Log, Jan. *QST* cover. K1RPB has an article in Jan. *QST*, page 35. W1UPF is taking Vietnam traffic through Mass. to APO area. RM K1IJV submits the following (in part) of the activities of the West. Mass. C.W. Traffic Net: 121 messages handled with K1WZY, K1IJV, K1LBB, K1-SSH, W1BVR, W1ZPB, W1DWA and W1MNG active (listed in order of activity). Traffic: W1BVR 138, K1IJV 135, K1SSH 99, K1WZY 79, K1LBB 57, W1ZPB 14, W1-DVW 5.

NORTHWESTERN DIVISION

IDAHO—Acting SCM, Raymond V. Evans, K7HLR—PAM: W7GGV. There is no news to report this month. I would like to remind you fellows and gals that Idaho is in desperate need of an SCM. The FARM Net reported: Sessions 17, QNI 432, traffic 36. PJ3CD is looking for Idaho for WAS. Traffic: K7HLR 143, W7GMC 78, W7-GGV 12.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. V.H.F. PAM: K7IOA. OOs: W7FIS, K7SVR.

Montana S.S.B. Net	3910 kc.	1800 MST M-F
Montana RACES	3996.5 kc.	0900 MST 1st-3rd Sun.
Montana PON	3885 kc.	0815 MST Sun.
Missoula AREC Emergency Net	3890 kc.	0900 MST Sun.
Butte-Anaconda AREC Net	144.450 Mc.	1900 MST Wed.

The state hams are saddened by the sudden death of K7QLP. W7KJX has a new 6N2 on the air. W7HDP and W7AYH have been hearing Helena on 2 meters from Great Falls. K8KGI/7 has his new Heathkit color TV working. W7MBV, W7RZY and K7CHA worked W5HDE and K5HMN on 2 meters. The 5s were aeronatical over Yellowstone. Hi. The Old Faithful Radio Club held its Annual Christmas Party. WA7AQH has a new Galaxy 5. K7ZHO is now in Williston. W7IKA is mobile with an SB-34. W7FL is on with his new SB-100, SB-200 combo. W7FLB also has a new SB-100 on the air. A group in Anaconda has been formed to put on the Annual Glacier Park Hamfest. The dates will be July 23 and 24. W7CJN is the new pres. of the Butte Club; W7QCY is the new vice-pres. K7UPH has a new harmonic in the family. K7OQX spent Christmas in Virginia. K7MYC has moved to Chinnock. It's not too soon for your club or group to be thinking about Field Day. Traffic: K7DCH 10, K7UPH 6, K7EGJ 5, K7SVR 5. K7PWY 4.

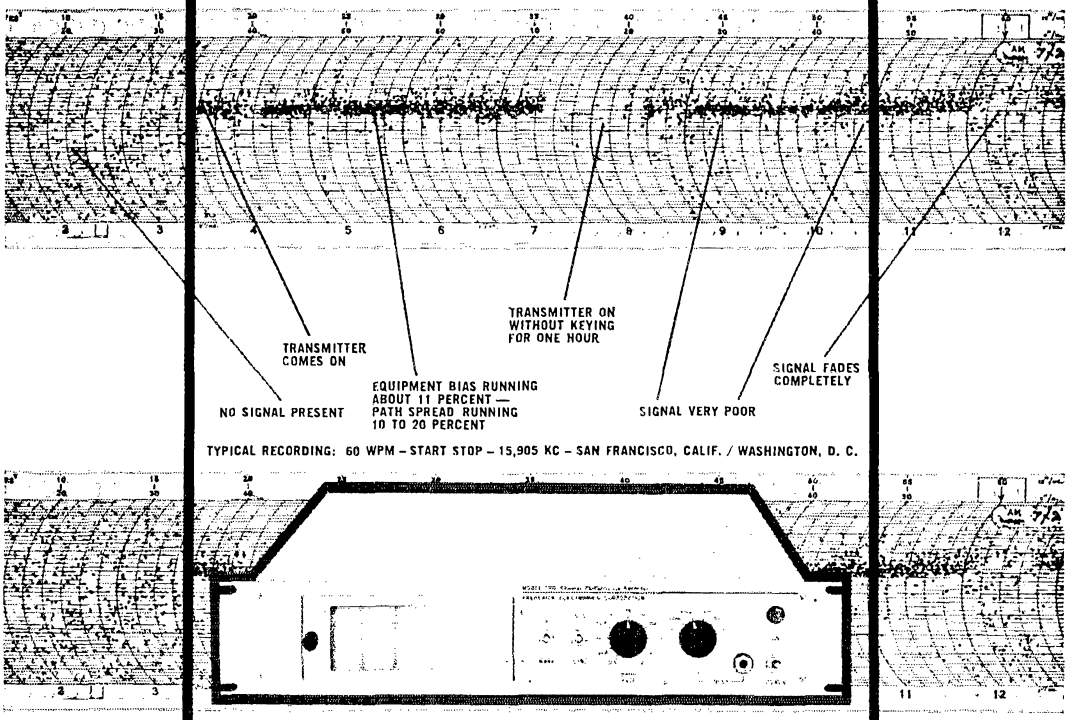
OREGON—SCM, Everett H. France, W7AJN—Acting SEC: W7AJN. RM: W7ZFH. New appointments: W7-VTW as EC for Lincoln County.

Net	*Freq.*	*GMT*	*Days*
OSN	3585 kc.	0130	Mon. through Fri.
OEN	3840 kc.	0200-0300	Daily
AREC	3875 kc.	0230	Daily
AREC	145.350 Mc.	0400	Mon. through Fri.

K7IFG, OSN mgr, reports for Dec.: Sessions 23, attendance 87, traffic 40. The Multnomah County-Portland area AREC now has full RTTY in the Red Cross building. W7DEM reports for the Grants Pass area. W7ADF has a 50-ft. tower and Hy-Gain beam. K7YQM has his RTTY printer working, the high school club, K7GWU, is converting a 522. K7UAQ has a new Twoer mobile, K7CMV has NCX-5 now. W7TLK has invented and sold a transistor and diode demonstrator which he developed to aid in his physics instructing in a Grants Pass high school. W7ZB says he is having fun on s.s.b. but is not forgetting a.m. and c.w. WN7DWK has put up two 50-ft. poles for dipole and is putting together a Knight

A NEW APPROACH
TO CHANNEL PERFORMANCE ANALYSIS

Frederick Electronics' NEW Channel Performance Recorder, Model 1310, provides an accurately timed and printed analysis of telegraph signal distortion.



Accepts start-stop or synchronous signals at standard rates, 37.5 to 300 baud from conventional neutral or polar telegraph systems.
Provides long-term permanent record of overall system performance.
A trouble-shooting aid – indicates amount and type of distortion present.
Provides information on channel traffic loads.
Provides information on propagation conditions.
All solid state circuitry.
Designed for use in standard rack mounting.

FOR FURTHER INFORMATION WRITE--

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Kit transceiver. Records for 1965 on activity reports for traffic: BPL awards went to W7JHA, K7IWD and K7TWD. The traffic handled by Oregon stations, according to reports, was originations 812, received 5975, relayed 4919, delivered 742, total 12,248. Stations reporting were W7LT, W7AJN, W7DEM, W7GWT, W7KTG, W7ZB, W7ZFH, K7BHJ, K7DVK, K7IFG, K7WPC, K7ZMR, WA7DEI and WN7COB. Traffic: (Dec.) W7JHA 884, K7IFG 452, K7IWD 265, W7ZB 186, W7ZFH 43, W7DEM 12, WN7COB 1, WA7DEI 1. (Nov.) K7IWD 225, W7ZB 52.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7HMQ. RM: W7OEB. PAM: W7LEC. V.H.F. PAM: W7PGY. NTS nets:

WSN	3535 Daily	0100Z QNI	294—QTC	542—Sess.31
NTN	3970 X-Sun.	0100Z QNI	1303—QTC	1079—Sess.27
NSN	3700 Daily	1730Z QNI	199—QTC	48—Sess.30

The Radio Club of Tacoma, W7DK, will conduct its Annual Loggers Contest from 1600 PST Mar. 12 through 1600 Mar. 13. A fancy certificate for contacts on all frequencies will be given. W7LEC starts the 3rd year of the Code Practice Net on 3728 Mon.-Fri., 0900 PST. K7CHH renewed his OBS appointment. K7MGA heads for a 6-Land vacation. ORS W7GYF originates much traffic for the elderly in Moses Lake. K7YDZ hooked VP2VE while in V.I. W7BTB, W7EYC and W7GEV report increasing activity on 160. ORS K7JHA conducts a technical net on 3970 at 1500 PST. K7VVA joins hubby K7VUZ at Camp Pendleton. ARAB has a new vice-pres. ORS W7AMC QSPs through 6-Land with bad skip. Chet recently celebrated his 74th birthday. W6QJW has a new homestead in Kitsap County. W7AXT ordered a new T4X after losing his power supply in a smoke-fest one sad day. K7WTG, Puget Sound Emergency EC, reports the start of traffic drills. K7PZX, K7NZV, K7CAL, K7NPS, K7ZDF, WA7BUT, K7LED, K7SQA, K7SRU and K7ZEF participated. PAM W7LEC has processed Section Net certificates to all qualified members of the Washington Amateur Radio Traffic System, and also is working toward Noon-Time Net certifications. Both nets, along with WSN, are affiliates of the National Traffic System. K7PIY is a new OO-OPS in Ilwaco. W7BUN is back from an East Coast trip and has resigned as secy.-treas. of WARTS. Mt. Baker ARC is sponsoring a home-brew contest. W7KCZ has moved to Seattle from the Baker area. W7FCH snagged HL9TO on 14. W7GGV plans a visit to eastern parts with Richland the main target. K7QOM is going RTTY and K7HSA joins RTTY at U. of W. Big noise on f.m. from K7VNV-K7PVF-K7VNW on 6 meters. RM W7OEB reports a new policy of slower net speed for WSN on frequency. New officers of the Radio Club of Tacoma are W7OS, prexy, W7AZI, vice-pres.; Rene Smith, secy.; WA7AKW, treas. New officers of the Richland ARC are W7YFO, pres.; K7PWM, vice-pres.; W7OEB, secy.; K7VNV, treas. R.C. of Tacoma sets up a Blood Bank account. W7AZI is B.B. chairman. All hams willing to donate blood should contact the local Blood Bank. One good ham now needing blood is W7REZ. Why not donate now for his account c/o Veterans Hospital, Seattle. W7NIL is heard on 10 after 11 years. Mt. Baker ARC officers are K7VNI, pres.; K7ZJP, vice-pres.; WA7BZP, secy.-treas. K7JZS reports Mt. Erie ARC of Anacortes is going FB with meetings in City Hall. Country Cousins 3970, 0500Z daily has a new project called "Project Carol" to help a badly burned 20-year-old gal with letters. Won't you join? If interested write Mrs. Carol Bodarek, Franklin Hospital, 14th & Noe, San Francisco, Calif. Traffic: (Dec.) W7BA 1024, W7DZX 948, W7HMA 761, K7TCY 671, K7JHA 346, W7OEB 322, K7CTP 221, W7PI 180, W7BTB 152, K7YDZ 141, W7GYF 119, W7JEY 116, W7HMQ 94, K7ZVA 60, K7MGA 58, W7AMC 39, W7APS 25, W7AIB 12, W7EVW 8, W7AJV 5, K7CHH 4. (Nov.) W7BA 2405, K7TCY 1137, W7DZX 776, W7HMA 730, WA7CFY 344, K7CTP 294, K7JHA 267, W7OEB 173, W7PI 160, W7BTB 98, W7GYF 78, W7APS 73, W7JEY 52, K7NZO 47, W7HMQ 45, W7AIB 25, W7AMC 24.

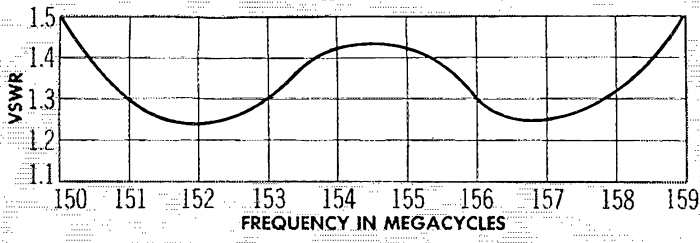
PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Appointments as of Jan. 1, 1966: WA6OLF—SEC, WA6WNG—RM, WA6RRH—V.H.F. PAM, K6SPP, WA6RRH, WB6ADM—OESs, WA6WNG/WB6CRC, K6TFT—OPSs, WA6WNG/WB6CRC, WB6ETY, WB6RKQ, W6IDV, W6TYM—ORSs, WA6KLL, W6OJW, W6CBF, W6BEZ, W6TYM, K6TFT—OO Class I, K6LRN—OO Class II, K6TFT, WB6IBU, WA6VAT, W6DUB, W6LGW, W6UB, WA6RRH, WB6NUI—OBSs, K6TFT, W6TYM, WA6ANE—ECs, W6ZF traded his HX-50 for a 75A-4. WN6NUI is now WB6NUI and is on s.s.b. WA6WNG made the BPL for the second time in 1965. WA6RRH, mgr. of BAN, needs help—QNIs, liaisons and traffic. The Ban-Bay Area Net meets at 0245Z on 146.7 Mc. Officers of the Oakland Radio Club for 1966 are WB6IZE, pres.; WA6CUY, vice-pres.; WA6BMT, treas.; WB6GQN, sgt. at arms; WA6OLF, EC; K6LWA, public rela-

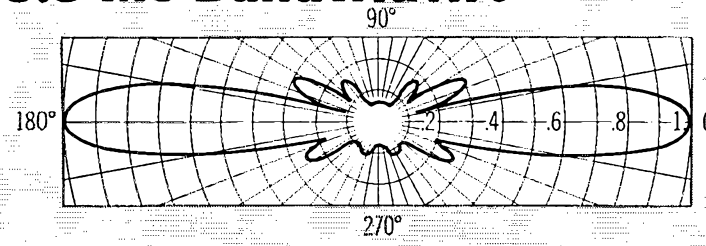
It's Here! The New CPC BROADBAND...

SUPER STATIONMASTER®

Base Station Antenna



9.0 Mc Bandwidth!



This new CPC antenna has all the qualities of its predecessor, plus new features not now available in any antenna made for the land mobile services

ONE WAY
—to GREATER efficiency!

RIGHT TURN
—to HIGHER performance!

SMOOTH ROAD AHEAD
—SMOOTH OUT communication problems!

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—to BETTER communication!

CAT. No. 220-509
SUPER STATIONMASTER

is a second generation antenna growing out of 30,000 STATION-MASTERS and ten years of experience with this type array.

Because of its exceptional bandwidth, the SUPER STATION-MASTER is produced in three ranges which cover the VHF band, 150 to 159 Mc, 157 to 166 Mc, 165 to 174 Mc.

A 10 db—10 Mc wide version, CAT. No. 455-509, is available to cover 450 to 470 Mc in two ranges.

Electrical Specifications

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	9.0 MC
Maximum power input	500 Watts
Flexible terminal extension	18" of RG 8A/U
Terminations	Type UHF female and Type N male
Vertical beam width (½ power points)	18°
Lightning protection	Direct ground

Mechanical Specifications

Radiating elements	Copper
Element housing material	Fiberglass
Element housing length	20'
Support pipe	2¾" dia. 6061-T6 aluminum pipe
Rated wind velocity	100 MPH
Lateral thrust at rated wind	79 lbs.
Bending moment 1" below ground plane at rated wind	521 ft. lbs.
Weight	30 lbs.

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tions; W6ELW, ch. op. W6OT; K6OXK and K6KQD, directors-at-large. WB6KBW replaced WA6WHY as president of LARK. Hayward RC officers are K6CFY, pres.; WB6FVW, vice-pres.; WA6VPG, secy.; WB6CVZ, treas.; K6HGO, sgt. at arms. WN6RPK is a new ham in San Lorenzo and is a new member of the HRC. Congratulations to the editor and staff of the HRC's *Chewed Rag* for a consistently interesting and newsy paper. W6TYM spent the Christmas holidays in Oregon. WA6WIJ passed his General and is currently enjoying Uncle Sam's hospitality at Ft. Benning, Ga. WA6KOS has been having his share of trouble lately. Around the New Year he apprehended a burglar at his house and then had a fire that did considerable damage. W6EY has a Swan 350. He operates fixed and mobile, phone and c.w. If this report seems a little short it is because the news was a little short. If you need Form 1 cards, a card or radiogram will get you all you need. Traffic: WA6WNG 503, W6IDY 415, K6LRN 395, W6TYM 268, WB6ETY 87, WA6RRH 49, W6ZF 11, WA6PTU 8, WA6QZA 5.

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. PAM: KH6ATS. RM: Vacant—taking offers. V.H.F. PAM: Vacant, too! Join a net today.

Net	*Freq.*	*Time*	*Days*
Friendly	7,290	2030Z	M-F
50th State	3,895	0500Z	Tu-Sat.
No KaOi	14,250	0700Z	Nightly (when no DX coming in)

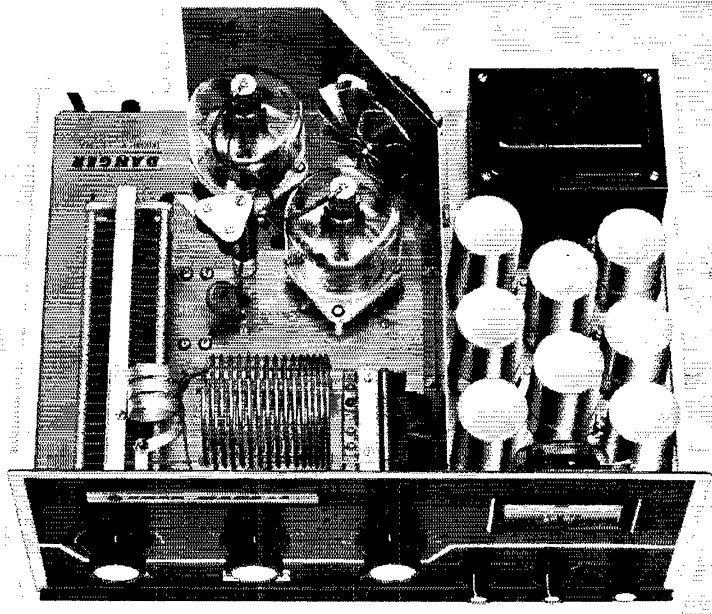
Ex-KP4BEV, now KH6CJY, is on with a TR-3 and 14AVQ and has a beautiful signal. KH6BZF is Lee, KH6BFZ is Joe. Unfortunately they both live on the Windward side of the island of Oahu. WA4SIH/KH6 runs KH6EOQ—the voice of Tripler Army Hospital. KH6IJ reports that the local power company has surrounded his QTH with 12-kv. lines on 60-ft. poles on three sides of him. KG6IG reports that K3TSC/KG6 was a recent visitor from Guam to Bonins and went to see John and Lee at Chi Chi Jima. KG6AIG reports much traffic during the recent holidays. WA6MLW/KH6 is the Director of Navy MARS Hawaii. He'd be interested to have you get in touch with him. Duty phones 430-43248 or 430-42141. Your SCM is elected by you to serve you. Let him know your needs today. See page 6 for his address. Are you contributing? Traffic: KH6BZF 21, KG6IG 1, KH6IJ 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU/K7JU. Several areas are open for ARRL appointments. W7AAF is doing a fine job on the Nevada 3660-kc. C.W. Net but needs help from Nevada amateurs. WA7BAV reports good DX in between studying for college at N.S.U. K7NYU reports a heavy schedule at the P.O. but light amateur activities. WN7COL will be dropping the "N" so watch for him in the v.h.f. contests. K7OIR, who is a CPU mgr., has Elko for his new QTH. Let's hope Elko doesn't have a black-out. W7HJ is in the Boulder City Hospital. No visitors are allowed but I am sure cards will be appreciated. W7PRM is working on an HB-432 converter. 2-meter f.m. is going well in Southern Nevada, along with 6 meters. W7VR, aided by W7KOI, W7QYK, K7NCO, K7DTJ, K7OIR, W7VIU, W7KOA and W7YQL with their XYLs, played host to ZL1DK at a house party. Traffic: W7VIU 15, W7PBV 4.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: W6SMU, WA6TQJ. RM: W6CMA. PAM: K6RHW.

Net	*Freq.*	*Time*	*Days*	*Net Mgr.*
SVN	3690 kc.	0230Z	Daily	W6CMA
SCEN	146.28 Mc.	0500Z	Wed.	WB6BWB
NCN	3635 kc.	0300Z	Daily	W6QMO
NCTN	3905 kc.	0130Z	Daily	K6YBV

New officers of the Oroville ARS are W6AF, pres.; WB6GOO, vice-pres.; WB6HND, secy.; WB6FMI, treas. W6GDO recently worked Colorado, Montana and Arizona on 144 Mc. to bring his 2-meter standings to 6 states and 3 call areas. Jay was heard by VK7PF through Oscar IV. New officers of the McClellan ARS are K6QVB, pres.; WA6QVV, vice-pres.; WB6BVK, secy.; WA6YYS, treas. WB6LNQ, of Chico, is now on 1920 kc. for QNI Golden Empire ARS Civil Emergency Net that meets Mon. at 2000. Dec. BRAT certificates for NCTN participation go to K6YBV and WB6MAE. K6AJA has a new linear amplifier for s.s.b. New officers of the RAMS are W6TEE, pres.; K6GUS, vice-pres.; WB6ONB, secy.; WA6IVI, treas. W6QHP, WA6QGT,



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WOUMG/6 and K6OPT of the RAMS were able to track down an unidentified carrier that had been accidentally turned on by some children. K6IKV is going mobile with a new Swan 350. WB6MAE is now on 2 meters. K6YBV received a BPL for more than 100 originations plus deliveries. The Western S.S.B. Assn. had a breakfast in West Sac' to hear a guest speaker give a brief history of the Collins Radio Co. K6LZQ has just about completed his new linear amplifier. NCN and SVN still are looking for QNI from Northern California. AREC and NTS needs *you!* Traffic: K6YBV 271, WB6MAE 131, W6CMA 39, WA6JDT 39, WA6VVR 36, K6IKV 8, W6LNZ 7, WB6EAG 4.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6KZF is looking for more ECs in Sonoma County. The NCN still needs check-ins from Marin and San Francisco Counties. 3635 kc. is the NCN frequency at 0300Z. W6DTV reports that the Sonoma County amateurs were prepared for high water on the Russian River just after New Year's but no serious flooding occurred. WA6ROJ reports hearing the beacon on Oscar IV but nothing else. W6GQA made every FMT in 1965 and capped it all with an Extra Class license. WB6GVI is trying to get his sideband rig working for the Section Net. Still meeting Mon. and Fri. on 3900 kc. at 1830 local time. WB6AIS was in the hospital in San Francisco for possible surgery. Several of the Marin Radio Club amateurs received Public Service awards for activity during a fire last fall. Those getting the certificates were W6CYO, K6OVV, WA6FJY, WB6AIS, WB6PVV and WA6AUD. The San Francisco Section *Courier* has finished its first full year of publication, getting a good response from the members in the section. WA6JUV has a Polycom on 2 meters and got nailed to handle some traffic. W6YKS still is the big traffic station in the section and the only one to make BPL in 1965. W6BWV got a QCWA 50-w.p.m. certificate. W6YKS needs Delaware for WAS. The Sonoma County Radio Amateurs publishes a club paper. WA6IVM finally got his new beam up. Ray reports his 80-meter country total is up to 38 with DU7SV the latest one. Preparations are going forward for a v.h.f. emergency net in the Humboldt County area. The San Francisco Radio Club will hold its annual Auction Night Mar. 18. WA6ROJ got a 52-element, 4-bay Yagi up for Oscar IV but winter storms plus jury duty put a crimp in his operating. WA6IVM and WA6RXM continue to be the active OOs in the section. New sign-ups in the AREC are WA6BHX in Santa Rosa, WB6PDP in Scotia and WB6OGF in Tiburon. The HAMS in San Francisco have a 6-meter test on 50.6 Mc. the 1st and 3rd Tue. at 2000. The section ended up 1965 with more stations reporting traffic but the total down, mostly because of the big flood last year which brought everyone into action. All Form 1 reports will be welcomed in 1966. Traffic: W6YKS 312, WB6GLD 222, W6KVQ 44, W6UDL 34, W6WLV 22, WB6GVI 15, WA6AUD 14, K6TZN 11, W6BIP 6, WA6IVM 5, W6CYO 4, WA6JUV 2.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—At the Annual Installation Dinner of the Fresno Amateur Radio Club, WB6KUG received the Boner Trophy. WB6ETR still is recuperating from a nasty automobile accident, and is on the air with a 20A on 75-meter s.s.b. K6ACO is building up a phasing type s.s.b. exciter. WN6PEL, WN6PCQ and WN6PCR have passed the General Class test. K7KAP/6 is on 2 meters. W6SVM, after spending 6 months in Europe, is back in Fresno with a Galaxy transceiver. W6QFR has a Heath 200 amplifier. W6QON is heard on 160-meter a.m. W6HYZ is vacationing in Japan and is supposed to be operating portable JA. W6KOK is getting on 15 meters with his Swan. W6JMP is working on his Model 15 RTTY K6SEV is active with Navy MARS. WB6FRM has a new HE-80. WB6KQJ is on 40-meter s.s.b. working Europe. WB6MEY is working DX on 20. W6NCG is working on a repeater system for 2-meter f.m. which is tying with the Bay Area gang. K6PPI is now located in Menlo Park. W6JUK is heard on 75-meter s.s.b. using a KWM-2. WB6ETQ has a Heath Twoer. W6JXY is putting the finishing touches on his new ham shack. W6PBM is active with MARS. W6PSQ is mobiling with his Swan 240. A new slow-speed c.w. traffic net is operating on 3590 kc. at 0630Z. If you are interested in handling traffic at slow speeds, here is your chance to join in on the fun. Traffic: (Dec.) WB6HVA 156, WA6TZN 94, WB6MWY 45, W6ADB 33, WB6NCJ 6. (Nov.) WB6MZU 10, WB6NCJ 6.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Ed Turner, W6NVO. SEC: WA6HVN. RM: W6QMO. NCN operation continues on a high level, with a second session during the Christmas rush. This is the first time the section net has had a second session for some years and indicates the growth of section activity in Northern California over recent

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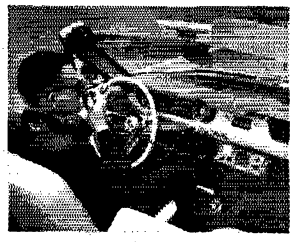
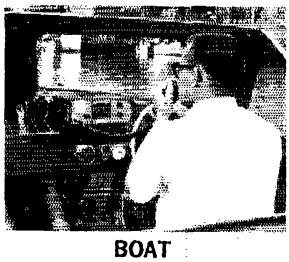
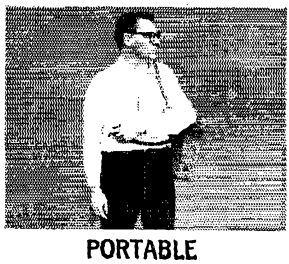


MOBILE

BASE STATION



BOAT



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months. New officers of the Santa Cruz Radio Club are WA6UDE, pres.; W6EUR, vice-pres.; W6ONX, secy.; WB6FCX, treas.; K6ZNM, W6KHS, W6PGU, WA6LCK and WN6PZE, board members. K6DYX now handles TCC sked on RTTY with WA2BLV. Smitty reports that WB6KCX, of Seaside, became a Silent Key. W6YBV got his ART-13 on the air on NCN. W6AIT works NCN and RN6. The SCCARA held a Christmas Dinner early in December with a fine talk on earthquakes and amateur communications by the Red Cross Director. Among those attending were W6MVL, chairman of the 1965-National Convention; W6BPT, former S.C.V. SCM; WA6HVN, SEC and new president of SCCARA, and W6ZRJ, SCM. W6DEF resigned as EC of Redwood City after eight fine years of emergency planning and organization. Our thanks to Hal on a job well done. W6JXK works NCN and MARS RTTY. Ralph reports that conditions have been making traffic-handling very difficult. W6HC is handling TCC from W6YL to WIAW. W6ASH, ORS and Communications Director of Oscar, is very busy with W6EE schedules on all bands and modes. W6OII works MTN. W6RFF is very QRL with teaching and classes he is taking himself, but manages to handle traffic on two schedules. K6GK, new OO/OBS, has moved in from East Bay. Major works NCN and other traffic schedules. W6AUC was busy making plans for the QCWA dinner to be held at the Edgewater Inn in Oakland Feb. 12. WA6-WIH reports that the Bay Area Traffic Net is now in operation on 146.7 Mc. at 0245Z. Bob earned the first BAN Net certificate for this section as well as the last SJVSN certificate. WA6JSA now has his new tower and beam up and operating. W6SAW is handling RTTY skeds on 80, 40 20 and 2 meters as OBS. WB6IZF reports that the King City Explorer Post visited the Oscar Headquarters in December. Ed works mobile into the 2-meter repeaters. W6IBW reports that W6ASH is handling NCS on the SPECS Net. The Dec. PAARA meeting featured a talk by W6RH on the Perham Foundation and the Foothills Electronics Museum. Traffic: W6RSY 805, K6DYX 477, W6YBV 178, W6AIT 166, W6DEF 154, W6QMO 131, W6HC 50, W6JXK 50, W6OII 43, W6ASH 40, W6RFF 33, K6GK 22, W6AUC 20, WA6JSA 13, WA6WIH 11, W6ZRJ 10, K6YKG 9, W6SAW 2.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4-MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. W4LEV says they are reworking their rhombic to make it a three-curtain array. WA4VTV is back in operation at the new QTH. WA4ICU says he played in the orchestra for "Annie Get Your Gun" given by his school. K4EOF has completed his automatic tape keyer and says it does an FB job at 35 w.p.m. W4HJZ, K4QIF and WA4-SHA are all participating in the Oscar IV program. K4WLV has been handling phone traffic from servicemen returning from Viet Nam. K4QIF reports good results in the November Leonids meteor shower.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN(E)	3573 kc.	2330Z	Daily	314	K4CWZ
NCN(L)	3573 kc.	0300Z	Daily	231	WA4ANH
NCSSBN	3938 kc.	2330Z	Daily	193	WA4LWE
THEN	3865 kc.	2330Z	Daily	34	K4WLV

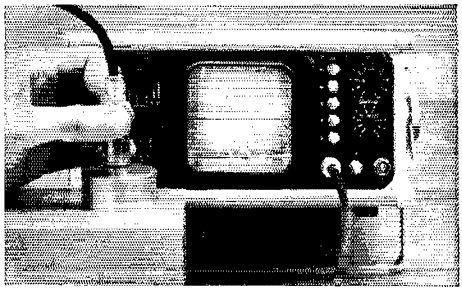
Traffic: (Dec.) W4LEV 3789, W4LWZ 436, W4EVN 386, K4HZP 240, K4EOF 236, W4UWS 202, K4OXM 160, K4-TTN 159, W4IRE 117, K4IEX 86, WA4UFQ 74, WO-GXQ/4 73, K4CWZ 71, W4OTE 56, WA4ANH 48, K4EO 32, WA4FJM 21, W4BNU 17, WA4VTV 16, K4SHU 14, K4ZKQ 13, K4DJZ 11, WA4CSN 10, WA4KWC 10, WA4-VVT 7, WA4ICU 6, K4CVJ 5, WA4NUO 4. (Nov.) W4-LEV 3492, K4EOF 264, W4OTE 55, K4GNX 40, WA4-CFN 10, WA4VTV 10.

SOUTH CAROLINA—SCM, Charles N. Wright, W4-PED—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4-LND. PAM: K4WQA.

SCN	3795 kc.	Daily	0000Z/0300Z	Dec. Tfc: 76
SCSSBN	3915 kc.	Daily	0000Z	Dec. Tfc: 146
SCSN	3795 kc.	Daily	2330Z	
SCEFN	3930 kc.	Sun.	1330Z/2030Z	

K4JIF and WA4HFA are keeping SCSN running regularly. More check-ins are needed. It's a good way to get your feet wet in traffic-handling. WA4NIG reports that K4NHN demonstrated his home-brew TV camera for W4NZA, WA4ZRM and WA4NIG and has construction under way on the 432-Mc. transmitter. OO W4NTO reports 502 notices mailed during '65. K4GL still reports regular activity on 2 meters. With the amount of local v.h.f. activity we have in the state we should be looking toward more statewide activity. With skip condi-

New battery-powered CRT will travel



Hams with two-letter calls will remember the early dry-cell-operated radio receivers with mixed emotions. The sets used tubes with thoriated tungsten filaments with little to their credit other than the absence of warm-up time and low filament current drain.

Still, history has a way of repeating itself, as evidenced by a new battery-operated cathode ray tube developed by Sylvania. It employs a high-efficiency heater that draws only 140 mils at 1.5 volts, and thereby makes possible the design of portable oscilloscopes of small size and weight, capable of being powered from a rechargeable nickel-cadmium battery and a transistorized high-voltage supply operating from the same power source.

The advantages are obvious. Engineers can now design virtually any type of oscilloscopic devices for military or industrial use in the field and completely divorced from the power line. And, aside from the fact that an N/CD battery can be recharged several thousand times before going west, it has been demonstrated that such batteries can readily serve as highly efficient power-supply filters when it is desired to operate the oscilloscope from an a-c line.

You'll find the Sylvania SC-3511 CRT of particular interest. The tube has a square screen with a useful viewing area of 2½" x 2½". The heater is the "instant on" type, so there's no waiting for readings on the face of the tube. The SC-3511 also features helical-resistor post-deflection acceleration to achieve a high writing rate, high deflection sensitivity, and a distortion-free pattern. And the tube itself weighs only 1½ pounds. Weight of equipment is further reduced because the tube uses electrostatic focusing and deflection.

The SC-3511 CRT is already filling the bill in the Sonoray model 301 ultrasonic flaw/thickness tester, developed by Branson Instruments Inc. This battery-operated unit weighs only 16 pounds, and uses dual transducer crystals for obtaining direct readings of pipe wall thicknesses, the detection of corrosion in ships' hulls, and the location of fatigue cracks in jetliners. The tester is small enough to be carried into such difficult areas as manholes, catwalks and scaffolds. The instrument is shown in use in the accompanying illustration.

Sylvania has also developed the SC-3802 with a round faceplate, and two other square-faced CRTs - the SC-3551 and SC-3377 - the latter having a 6.3-volt heater requiring 600 mils. These square-faced units have useful viewing areas of 2½" x 2½", while the round CRT's useful screen diameter is 2⅝". If you'd like data sheets on these new CRTs, just drop a line to the Sylvania Electronic Components Group, Sylvania Electric Products Inc., 1100 Main Street, Buffalo, New York 14209.

73, Bob Lynch

K2RMN

SYLVANIA

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tions as they are on 75 meters, such a statewide hook-up could be a life-saver for emergency operations. If you are on v.h.f., look around for stations not in your own local area! Traffic: (Dec.) K4LND 165, K4LNJ 79, K4OCU 65, W4WQM 56, W4NTO 25, WA4QKQ 18, W4PED 15, WA4HFA 9, W4VIW 8, WA4LPV 5. (Nov.) WA4HFA 7.

VIRGINIA—SCM, H. J. Hopkins, W8SHJ—SEC: W5XZO/4. RMs: W4QDY, W4SHJ, WA4EUL. PAM: K4VSCL. All loyal members in the section are reminded of the forthcoming Roanoke Division Convention May 28-29 at Natural Bridge. Contact K4RDT for details. The VAH 500 Award still is available and application should go direct to W4QDY. WA4EUL made BPL via the long route for the first time in three years of effort. W4ZM has resigned as RM for the VN. K4LMB now has a Clegg Zeus and Interceptor with 180 watts on 6 and 2, all this a result of a visit from Santa. Watch for the *Virginia Directory and Operating Manual* to be released by W5VZO/4. W4MXU now is KZ5FX and is the official who issues KZ5 licenses. K4ORQ is in Pakistan and WA4EDG in California. W4JXD is helping new hams and organizing RACES in addition to his usual EC work. W4PFC received a public service award from the International Eye Bank. Six-meter enthusiasts are urged to organize net activities with aim toward public service coverage of one or more counties in the section. All u.h.f. nets desiring information or assistance should contact our SEC, Bob Phillips, 2414 Little Fox Lane, Vienna, Va. Traffic: (Dec.) WA4EUL 504, W4DVT 331, W4RHA 223, WA4UMX 218, W4OWE 142, W4BZE 124, W4NLC 124, W4OKN 89, W5VZO/4 89, WA4DAI 73, K4MXF 67, K4FSS 50, WA4TNS 46, K4YCH 44, K4LMB 41, K4SCL 41, WA4URN 40, W4TE 35, WA4KVR 30, WA4NJG 30, K9KBI/4 30, WA4PUI 28, W4WRG 28, WA4STC 27, WA4FCS 25, K4VCY 25, W4KFC 17, W4MK 17, W4SHJ 15, W4ZAU 13, K4BAV 12, K4ITV 12, W4KX 12, W4JUJ 11, K4SDS 10, W4JXD 9, W4ZMT 9, W4PTR 2, W4WBC 2, K4YEE 2, WA4VEE 1. (Nov.) W4PFC 485, W4NLC 114, K4LMB 39, WA4TNS 21, K4WUM 15, W4LK 8, WA4KVR 7.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RMs: W8LMF, K8TPF. PAMs: K8CHW, W8IYD. S.S.B. Mgr.: K8SHP. C.W. Mgr.: WA8GRE. Nets meet on 3570, 3890, 3903 and 3905 kc. It is with deep regret, I report the passing of K8HTS, Mt. Hope. Quite active on 75 and the MARS program, he was proud of his license and proved it by his operation. WN8SNS is a new Novice. WA8MRK is teaching code and theory to his mother and father. Another family team in Charleston is OM WA8ELP, XYL WA8KSR and YL WA8NVJ. RTTY operation on v.h.f. includes K8CSG and W8TVO. K8MYU has a new hilltop location and renewed ORS. WA8AKU and K8VQG visited W8JM, putting a 29.6-Mc. f.m. antenna 40 feet in the air. K8LTT, K8QYG, K8KRU, K8KZF, K8ZWM, K8RTB, WA8BVB, WA8DOY, WA8KXN, W8AKQ W8DUV, W8DUW and W8JM are members of the B. and O. Railroad Amateur Club. WA8BUM and K8SDI are active on 75 and 2. New officers of the W. Va. State Radio Convention are K8BIT, pres.; K8TPF, vice-pres.; W8MLX, secy.; W8SSA, treas. The convention will be held at Jackson's Mill, July 2 and 3. Also remember the Roanoke Division Convention, Natural Bridge, Va., May 28-29. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
WVN C.W.	3570	2330	Mon.-Fri.	30	144	136	WA8GRE
WVN Phone	3890	2300	Mon.-Fri.	23	510	112	K8CHW
WVN PON	3903	2230	Mon.-Fri.	4	60	26	K8TPF
WVN S.S.B.	3905	2330	Mon.-Fri.	20	146	9	K8SHP

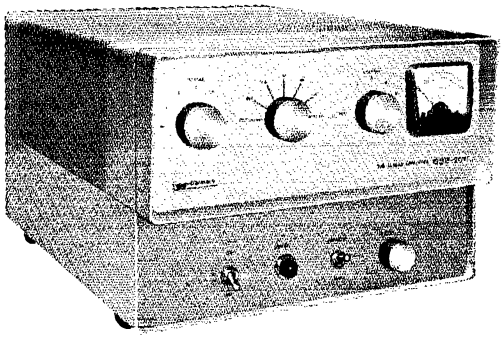
Traffic: K8TPF 201, WA8IMY 120, W8CKX 89, WA8MRK 84, WA8GRE 76, K8WWW 57, K8BIT 43, WA8PXF 43, W8HZA 31, WA8KQX 23, WA8QND 9, K8MYU 8, K8SDI 8, WA8GGI 7, WA8KMZ 6, K8WMQ 6, WA8BUM 4, WA8KGU 4, WA8KXN 4, WA8FIE 3, W8JM 3, K8MQB 3, K8CHW 2, W8CZT 2, WA8KCN 2, WA8QND 2, K8FVP 1, WA8HPQ 1, WA8KVV 1, WA8MAT 1, WA8OXI 1, W8VOI 1, K8ZDY 1.

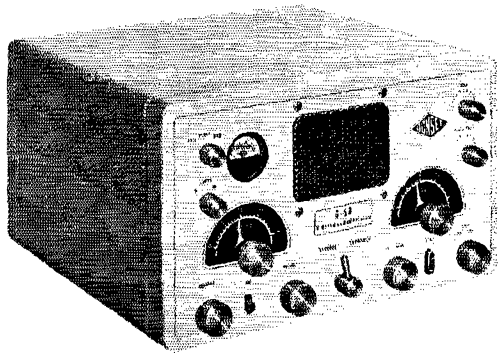
ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Bill Farley, WA5FLG—WA5KZP is to be highly commended for his outstanding work during a recent auto accident on the highway. Although there were fatalities he stayed with the injured at the scene and made sure they were assisted. His prompt action and reporting via 75 meters on the Breakfast Club Net saved two lives. Thanks should go to SEC K5HTT, 75-Meter PAM K5FPO and OPS K5ONE for helping SCM WA5FLG keep the frequency open while the Police were being notified. Excellent work, gang! K5FPO and WA5AMG were instrumental in obtaining valuable information and assistance in the re-

THE HOT LINES

FROM GONSET®





For HFers

GSB-201 RF LINEAR AMPLIFIER

- **Covers 80, 40, 20, 15, and 10 Meter Bands**
- **Input 2000 Watts PEP, 1000 Watts CW, 400 Watts AM**
- **Controlled Avalanche Silicon Rectifiers**
- **Built-in Antenna Changeover Relay**

The GSB-201 Linear Amplifier makes an ideal fit into any high frequency system. It provides high performance in a compact handsome package at a comfortable price.

Gain — 10 db worth on the 80, 40, 20, 15 and 10 meter bands.

Input — Maximum power ratings are 2000 watts PEP, SSB, 1000 watts on CW, 400 on AM.

Exciter — Any SSB unit capable of delivering 65 to 100 watts output.

Circuits — Grounded-grid for max stability — low cost 811A tubes — silicon rectifiers for dependability.

Plus — A built-in antenna changeover relay, switchable panel meter to indicate plate current or power output, and a switch facility for preliminary tuning at low power.

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G-50 COMMUNICATOR

- **6-Meter Fixed Station Transceiver**
- **48 Watt Transmitter**
- **Built-in Power Supply**
- **VFO or Optional Crystal**
- **Dual Conversion Receiver**

Here's a complete 6-meter amateur station in a compact, smoothly operating package. Look at these features:

Full Band Frequency Coverage — 50 to 54 Mc with a built-in low pass filter to attenuate harmonics and spurious signals over 65 Mc. 48 watts at your fingertips, with VFO or crystal, pi network, and ganged multiplier stages.

Reception, Plus — RF receiver stage provides high S/N ratio and top sensitivity. Dual conversion means excellent image rejection, 7 Kc selectivity.

With Full Control — Adjustable squelch; "S" meter; calibrated, planetary vernier dial tuning; VFO spotting switch; meter conversion switch for amplifier grid or plate currents, or modulator plate current.

The Gonset G-50 has all the dependability and performance that goes with the name Gonset, for over 25 years the leader in VHF amateur radio gear.

Complete specifications on the G-50 Communicator and GSB-201 Linear Amplifier are included in Gonset's Amateur Equipment Catalog AG-1303 — yours on request from your local Gonset distributor, or write — GSI-3.

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cent flood at Cliff, New Mex. The Red Cross had nothing but high praises for these two gentlemen. W5UNK is sporting a new VW. Wonder why he keeps muttering something about mobiles and a new SBE? RACES anyone? Snow and cold weather haven't interfered with WA5LQP and his mobile fishing trips. He is the official mobile road conditions tester for both New Mexico nets. His recent trip to Colorado proves that no matter where you are you can check into our nets. K5ONE is back in the mobile race with his new Swan 240. Some sort of pat on the back should go to W5GD for his superb traffic-handling during the Christmas rush. Welcome to new ECs, W5WSH, Farmington, and W5-UBW Alamogordo. New 75-Meter PAM is K5FPO. Traffic: W5UBW 56, K5ONE 27, K5FPO 26, K5VXJ 15, K5HTT 14, WA5AMG 11, W5BWV 10, W5DER 8, WA5-FLG 8, K5MWV 8, W5WZK 3, WA5JXU 2.

UTAH—SCM, Marvin C. Zitting, W7MWR/W7OAD—Asst. SCM: Richard E. Carman, W7APY. SEC: W7WKF. Section nets: BUN meets daily on 7272 kc. at 1930Z. UARN meets each Sat. and Sun. on 3525.5 kc. at 1400Z and on 3987.5 kc. at 1500Z. Traffic on the nets was heavy this month. Congratulations to W7OCX on making the BPL. W7SAI has been working DX on 10 meters. The Utah Relay Club now has its mountain-top 2-meter repeater, WA7BTS, operating and is providing excellent 2-meter coverage over a large portion of the state. K7RAJ spent his Christmas vacation working on his rig and chasing DX. Traffic: W7OCX 284, K7CLS 109, WA7BME 16, W7MWR 8.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: W7BHH. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM and K7ZHT. Nets: Pony Express, Sun. at 0830 on 3920; YO, Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1230 on 3920. New appointments: K7ZHT, of Cody, as OBS; W7-OGT, of Douglas, as EC. The hams of Wyoming suffered quite a loss when W7DW passed away in December. Carter had been a continuously active ham since he was first licensed in 1923. He is missed by the many friends he made over the years via ham radio. Code and theory classes are being conducted in Cody by WA7AMM, WA7BPO and K7ZHT. 1966 officers of the Casper Amateur Radio Club are WA7BFV, pres.; K7-SLM, vice-pres.; WA7CLF, secy.; W7NNX, treas. Start making plans now to attend the Annual Wyoming Hamfest in July. Traffic: K7SLM 36, W7NKR 28, WA7-CLF 17, K7MGM 12, K7POX 10, K7AHO 8, W7GOJ 8, K7ITH 8, W7YWE 8, W7BHH 7, WA7CGK 4, W7CQP 4, W7TZK 2, K7VWA 2.

SOUTHEASTERN DIVISION

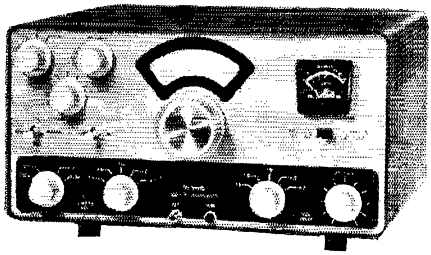
ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: WA4EXA. PAMs: K4NSU and K4WHW. This report for Dec. finishes an FB year for the Alabama section. The other officials join me in extending thanks to all for your support and ask for it again in 1966. Dec. net reports (times GMT):

Net	*Freq.*	*Time*	*Days*	*Sess.*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575	0100	Daily	30	5.6	6.0
AENH	50.7	0200	Sun./Tue.	8	1.125	14.25
AENM	3965	2400	Daily	31	3.6	40.5
AENP	3955	1230	Mon.-Sat.	27	2.4	10.2
AENR	50.55	0115	Wed./Fri.	9	.66	20.5
AENT	3970	2230	Daily	38	2.5	7.0

AENB is on the upswing again. Check in and help them along. K4KJD and WA4TID made the BPL. New equipment: WA4SBD-Ranger, WA4SPG-TA3640, K4IKR-60-ft. tower, WA4VTM-SB200, W4RLS-NCL2000. WA4-YDR reports the homebrew quad is working FB. Macon Co. is planning a v.h.f. net. WA4MTG is the new Montgomery Co. EC. Sorry to lose K4THT to Texas. He has been one of our outstanding ECs. Traffic: (Dec.) W4ZJY 393, WA4TID 310, WØHXB/4 275, WA4-RES 197, K4KJD 156, K4HJX 128, WA4UXC 115, K4-NUW 91, W4NML 89, K4BSK 77, WA4EXA 43, K4-WHW 31, WA4FYO 26, W4HON 20, K4NSU 15, K4FZM 12, K4ANB 11, WA4HUO 8, WA4YTK 8, K4CZZ 6, K4-AJF 5, WA4EBS 4, W4DGH 3, K4FZQ 3, K4WOP 3, W4ZVI 3, W4YRM 2. (Nov.) WØHXB/4 125, K4HJX 32.

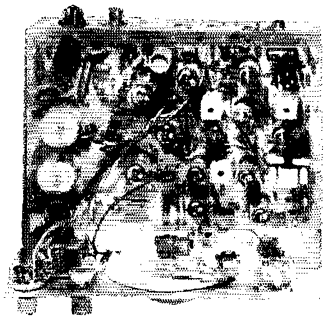
CANAL ZONE—Acting SCM, Marvin G. Flynn, KZ5MV—The following were elected at the January CZARA meeting: KZ5AG, pres.; KZ5MM, vice-pres.; KZ5EF, secy.; KZ5WI, treas.; KZ5FX, act. chairman. Several new members were brought in. Many thanks to the various MARS stations and Canal Zone amateurs for their fine work in providing communication to the states during the holidays. SCM KZ5TD has transferred to Gibbsboro, N.J., as W2ZHN. Filling his slot will be a tough job. SCM nominations are open until Mar. 10, 1966. New hams: KZ5s SO, OWN, FK, ES,

NEW! INTRODUCING . . .



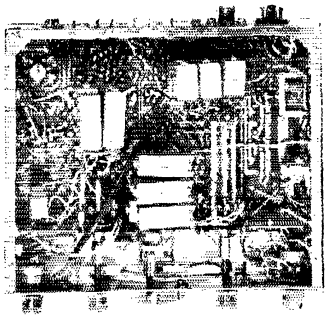
A TRIBAND SSB & CW TRANSCEIVER MODIFICATION KIT FOR USE WITH AN HW12, HW22, OR HW32 SINGLE BAND TRANSCEIVER.

PHOTOS SHOW THE TWO GANGED BANDSWITCHES FOR SEPARATION OF TUNED CIRCUITS AND REDUCTION IN COUPLING BETWEEN INPUT AND OUTPUT CIRCUITRY



Front panel view shows a new etched blue modern style panel with 5 extra "balanced" control mounting holes. No drilling or labeling required.

Front panel controls include: function, RF Gain, AF Gain, three 5 position bandwitches, SSB select switch, AVC slow/fast select switch, Vox sensitivity, Vox delay, S meter adjust, final tune, key jack.



Rear chassis controls include: MIC Gain, tune level, bias set, MIC jack.

FINISHED TRIBAND TRANSCEIVER SPECIFICATIONS: RECEIVER SECTION: SENSITIVITY: 1 microvolt for 15 db. signal plus noise-to-noise ratio for SSB operation. SELECTIVITY: 2.7 kc minimum at 6 db down, 6 kc maximum at 50 db down. INPUT IMPEDANCE: Low impedance for unbalanced coaxial input. OUTPUT IMPEDANCE: Unbalanced 8 ohm speaker. POWER OUTPUT: 1 Watt with less than 8% distortion. SPURIOUS RESPONSE: IMAGE AND IF REJECTION BETTER THAN 60 db. Internal spurious responses below equivalent antenna input of 1 uv.

TRANSMITTER SECTION: DC POWER INPUT: SSB 200 watts P.E.P. continuous voice. CW: 120 Watts — 50% duty cycle. RF POWER OUTPUT: 100 watts SSB, 65 watts CW OUTPUT IMPEDANCE: 50 ohms to 75 ohms with less than 2:1 SWR. HARMONIC RADIATION: At least 40 db. below rated output. TRANSMIT/RECEIVE OPERATION: SSB: PTT or VOX, CW Provided by cathode keying of the driver. (AB1) INPUT IMPEDANCE: High impedance. CARRIER SUPPRESSION: 45 db. minimum below peak output. UNWANTED SSB SUPPRESSION: 45 db. down from single tone output. THIRD ORDER DISTORTION: 30 db. down from 2 tone output. RF COMPRESSION: ALC

GENERAL: FREQUENCY COVERAGE: 3.8-4.0 mc, 7.0-7.2 mc, 7.2-7.4 mc, 14.0-14.2 mc, 14.2-14.4 mc. FREQUENCY STABILITY: 200 cps per hour after 20 min. warmup under normal ambient conditions. Less than 200 cps for 10% line voltage variations. MODES OF OPERATION: Selectable upper or lower SSB (Suppressed carrier) and CW. DIAL ACCURACY: within 2 kc, resettability within 1 kc. AUDIO FREQUENCY RESPONSE: 400 to 3100 cps.

TUBE COMPLEMENT: Fourteen tube heterodyne circuit; (3) 6EA8's mic. amp, VOX relay amp, IF amp. Rcvr. mixer (5) 6AU6's VFO, VOX amp. IF amps, Xmtr. mixer, (1) 6BE6 VFO Isolator, Heterodyne-oscillator-mixer (1) 12BY7 Driver; (1) 12AT7 Xtal osc., product detector, (1) 6EB8 Audio Amp. and output; (2) 6GE5 RF output. POWER REQUIREMENTS: 800 VDC @ 250 ma peak, 250 VDC @ 100 ma, −130 VDC @ 5 ma, 12 VAC or VDC @ 3.75 amperes. CABINET DIMENSIONS: 6¼"H × 12¼"W × 10"D.

The assembly manual may be purchased for $3.00 deductable from the Triband modification kit price if the kit is purchased later.

HW12 MODIFICATION KIT MODEL TB1.....	**$59.95**	Shipping wt. 3½ Lbs.
HW22 MODIFICATION KIT MODEL TB2.....	**$59.95**	
HW32 MODIFICATION KIT MODEL TB3.....	**$59.95**	

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RXN, JY, RJN, NAN, RF, CJN, FUN and SW. KZ5-FX has been appointed ORS. KZ5CT and KZ5RW report good results on 40 meters. KZ5GE has a new Swan 350. KZ5TW is on 160 meters and having some success. KZ5MV and KZ5GE are in school in Oklahoma City. The new coordinator of Amateur Radio Activities (J-6) is Major Coggins, KZ5FX/W4MXU. The USAFSO MARS Club wound up code classes and added several new novices. Traffic: KZ5FX 9.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJH—SEC: W4IYT. RM C.W.: W4LUV. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAMs: W4SDR, W4-TUB. PAM V.H.F.: WA4BMC. Traffickers WA4JYB and WA4QLZ slipped back for the holidays and managed to get their feet wet with a little traffic. Congrats to WA4RQR for a resounding 2413 count for December. W4BOW, Lakeland ARS station, did right well in 8 days operating from the Southgate Shopping Center. K4BY has been behaving himself per doctor's orders and will keep his activities curtailed until all is well again. K4YOQ may have his 1st-class phone ticket by the time you read this. He also is taking the next scheduled Extra Class exam. Hal says that W4NGR broke his right wrist on the job. If poor old K4DAX ain't traveling he is down with something or other. W4SMK reports that WA4UWJ passed away Dec. 29. Sure sorry to hear that. All in all 1965 proved out to be a pretty good year for the section. Let's look to 1966 to top them all and give forth with a real hefty effort. Traffic: (Dec.) WA4RQR 2413, WA4BMC 1168, WA4SCK 1024, W4BOW 734, WA4DEL 621, WA4NEV 582, WA4IJH 542, W4FPC 426, K4YSN 366, WA4BAW 330, K4EVY 326, WB4AIW 316, K4BNE 316, WA4NBT 251, WA4LHK/4 244, K4QAY 242, WA4OWG 222, W4FP 197, K4COO 188, W4LUV 187, WA4FGH 158, W4SDR 141, K4SJH 139, W4TJM 138, W4AKB 132, K4KDN 121, WA4HDH 117, K4BY 98, WA4JYB 97, K4JZI 82, W4-SMK 78, W4OGX 77, K4TQL/4 77, W4VDC 77, W4EHW 67, WB4AJV 63, WA4CIQ 59, W4DFU 56, W4KRC 55, W4IE 54, W4LDM 53, K4DAX 49, W4VPQ 49, WA4-MOL 48, WA4PDM 48, WA4OHO 47, WA4PWF 47, W4-CWI 45, K4LTX 42, K4ILB 36, WA4FZV 32, W4IYT 32, W4MVB 31, WA4VZD 31, W4TRS 30, WA4DEV 29, K4-YOQ 28, WA4BGW 26, K4EBE 24, K4MTP 24, WA4-WTG 24, WA4WZD 19, W4SCY 17, W4VWL 17, WA4-QLZ 15, W4BNE 14, WA4SHJ 14, WA4YRU 12, WA4-IYG 10, W4BKC 9, WA4HXY 9, W4AYD 7, W4EDZ 7. (Nov.) WA4BMC 647, WA4IYG 17, W4LDM 10, K4DAX 8, WA4WAJ 1.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. RM: W4-DDY. PAMs: K4PKK, K4YZE, WA4JSU. K4QNA is

FLORIDA QSO PARTY

April 2-3, 1966

Florida Skip, the all-Florida amateur radio publication announces the Florida QSO Party, April 2 and 3, 1966. Participation is open to all. Florida amateurs are urged to work as many out of state stations as possible, as well as those within the state.

Times: 1400-2000, 0000-0500, 1400-2400, GMT.

Frequencies: 1815 3530 7030 14,030 21,030 28,030 145.2; 3930 7230 14,230 21,330 28,830 and 50,230. Phone and c.w. count as separate contests.

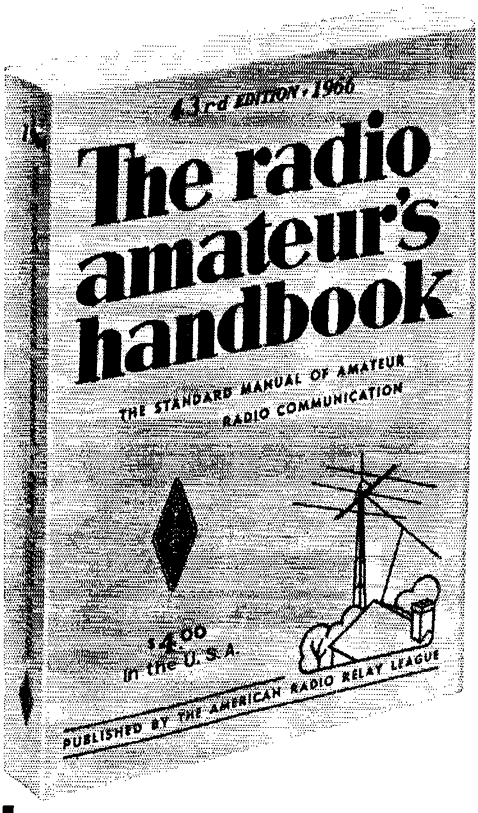
Exchange: Serial number, RST, county for Florida stations, all others state, province or country.

Scoring: Florida stations count 1 point per QSO times the number of states, provinces and countries. Other stations in Florida may be worked, but only for contact points. Outside stations count one point per QSO times the number of Florida counties worked. Bonus points will be given for working Florida counties as follows: first 20, 50 points; second 20 counties, 200 points; third 20 counties, 500 points; all 67 counties 1500 points.

Power: No restrictions.

Awards: Certificates will be awarded to the highest scoring station in each state, province and foreign country (with 5 or more contacts) and each entry from Florida county.

Logs: All logs must be postmarked no later than April 30, 1966 and mailed to *Florida Skip*, Contest Chairman, P. O. Box 501, Miami Springs, Florida 33166.



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The AMERICAN RADIO RELAY LEAGUE, Inc.
NEWINGTON, CONN. 06111

battling 40 with a new inverted "V." The Griffin Vocational Amateur Radio Club has been activated with an impressive club station. WA4GYD's sideline hobby is rebuilding antique BC sets. WA4ARV has a 75-meter beam. W4AFB is recovering from a heart condition. K4UDR has a new linear, 6HF5s this time. WA4JSU hosted W4YPL and family and W4PSZ. K4TXK enjoyed mountain-topping with a URC-4. K4FH sent a nice picture of the shack. Tom was signing "GO" in 1910, later 9SU and 9LZ, picked up K4FH in 1964 and operates strictly c.w. from the Hostess City. W4LRR is settling down on 20-meter s.s.b. for a time. WA4KRU has a new Eico 753 and SB-200.

Net	*Freq.*	*Time (GMT)*	*Sess.*	*QNI*	*QTC*	*Mgr.*
GSN	3595	0000&0300	60	483	358	W4DDY
Ga. SSB Net	3975	2300	30	1063	97	WA4JSU
Ga. Training Net	3718	2200	29	112	73	K4NFP
Ga. Teenage Net	3855	1600 (Sat.)	4	30	35	WA4GAY

Traffic: W4UYT 282, W4PIM 211, WA4GAY 171, W4DDY 152, K4YZF 146, W4FOE 124, K4NFP 105, WB4BDG 46, WA4LLI 35, WA4JSU 27, WA4BVD 26, K4QPL 18, WA4WQU 13, K4BAI 10, W4RZL 10, WA4JES 9, K4TXK 1.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: K4NMZ. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3950 kc.	2300Z	Daily	31	578	200
QFN	3651 kc.	2330/0300Z	"	62	—	1000

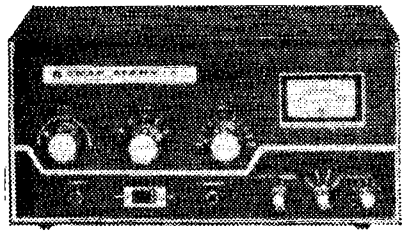
Note the new frequency for WFPN. Perry: WA4WUV has moved here from Marianna and plans to put Taylor County back on the air. Tallahassee: W4MLE has 19 states and 2 countries with his home-brew 160-meter rig. WA4GFU's stronger signal comes from a Swan 350. Chattahoochee: WA4IPJ has a new SB-300. Marianna: W4KCA fills another gap in the 2-meter link this month with his Twoer. Chipley: W4IKB replaced AF-68 mobile with HW-12. County C.D. has purchased equipment for a five-station 2-meter net; W4LXK and WA4SRR are assisting RO W4IKB with the installation. Panama City: K4FVY was snowed under with Christmas traffic. Defuniak: WB4BYO just received his Tech. Class license. Crestview: WA1BBB/4 hopes to start a new club, meeting here or at Eglin's Duke Field. Fort Walton: QFN Mgr. W4BVE reports an outlet to Canal Zone now via KZ5FX. W4MMX finished assembling his SB-300. Pensacola: W4AXP asks for more participation in LO Parties. Traffic: K4VFY 1071, W4BVE 345, WA4IMC 276, K4BSS/4 258, W4MLE 153, K4NMZ 104, WA4EOQ 98, W4IKB 18, WA4JIM 15, WA4FIJ 10, WA4NRP 10.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7CAF. RMs: K7NHL, K7TNW. K7UTF has been appointed ORS. K7RUR had his OO and OPS certificates endorsed. OES reports were received from W7AYY, K7NII and K7OFL. K7RUR and K7OIX are keeping busy with their OO work. W7AR still is busy plugging DX and lends the state with a staggering count of 300 countries confirmed. K7RFG has moved to California. The new officers of the Arizona Amateur Radio Club are K7CEH, pres.; W7OIF, vice-pres.; W7UXZ, treas.; K7UXG, secy.; W7CAF, act. mgr. K7RUR, W7NRI, W5FWA and W7CS were visited by W2JE, executive secy. of the QCWA. WA7EBR has moved to New Mexico. Radio amateurs in the Phoenix area turned out en masse Dec. 31 and Jan. 1 to give valuable assistance during a crippling flood in the Phoenix Metropolitan area. Thanks to all who took part in a job well done. If you hold a League appointment check to make sure that it has been updated. If you are interested in holding an appointment please write to me. Traffic: (Dec.) K7NHL 334, K7MTZ 226, K7UTF 157, W7FKK 20, K7RUR 17, K7PLO 14. (Nov.) K7MTZ 544.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: J. A. Vaidean, W6BNX. RMs: W6BHG, WB6BBO, W6QAE. PAMs: K6MDD, W6MLZ, W6ORS. ECs: W1KUX/6, W6LVQ, W6MLZ, W6OI, WA6WJT. OOs: W6BNX, WB6HWZ, W6FSJ, W6IDB, K6KA, K6KII, K6KUQ, W6LDA, W6PCP, W6PUZ, WA6WOY, WA6YKP, WA6YMY. OBSs: W6BHG, WA6DTG, WB6KGK, W6MEP, WB6MEQ, WB6NCF, W6NKR, WA6NLG, WA6RJJ, W6SD, WA6WKF, WA6WOY. ORSs: K2PHF/6, K6CDW, K6EA, K6EPT, W6AM, W6BHG, W6BNX, W6FD, W6GYH, W6HUJ, W6JNX, W6QAE, W6USY, W6WPF, WA6USU, WA6WTX, WB6AEL, WB6AKZ, WB6BBO, WB6KVA, K9ELT/6. OPSs: K6EPT, K6MDD, W6AM, W6BHG, W6MLZ,

HARVEY presents "The perfect couple" from SWAN



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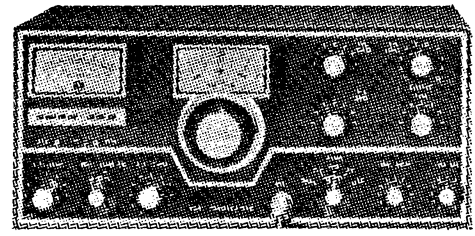

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W6ORS, W6SRE, W6VUZ, WA6NUA, WA6OKZ, WA6WKF, WB6BBH, WB6GXI. OESs: K6LDM, K6UMV, W6MEP, W6ORS, W6QJW, W6TXJ, W6YRA, WA6NUA, W6WKF, WB6BBH, WB6BOW, WB6GHB, WA6IOM, WB6KGK, WN6QWE. Los Angeles had a total traffic count of 16,228 for Dec. The following made the BPL: K6WAH, K6YVN, K6EPT, W6GYH, WB6BBO, W6BVK, W6QAE, WB6GQJ, W6MLF, WB6QXY, K6IWV, WA6AGQ, W6TXJ, W6BHG, K6IOV and one late BPL for WB6HRH. WB6BBO now has a Swan 350. WB6GQJ made his third BPL, one each year since 1964. K6IOV is liaison from V.H.F. to SCN. W1KUX/6 reports f.m. activity on AREC. W6MLZ's radio program is going FB on a local f.m. station. WB6AEL wound up 1965 with two states lacking for WAS. WB6BOW took down the Tri-bander to make room for the 2-meter and 70-cm antenna. W6NKR reports that W1AW signals are weaker than other East Coast stations. W6VUZ lost his Tribander during a Dec. storm. WB6KVA is looking for chess players on the air. WA6USU worked on improvements on the station. W6AM is now running 500 watts mobile. WB6GHB is interested in 432-Mc. skeds. W6HUJ still is having antenna troubles. K6IYF/WA6MOX is returning to the air after a big-game hunting season, mobiling with a Swan 350. W6MEP/K6MYK still keeps the repeater active. WB6MEQ says he got a better score on his General Class exam than he did on his driver's exam. W6ORS finally let go of his AF67 and PMR6A and now has Eico 753. W6PUZ has logged 12 of the 29 orbits of Oscar IV. WA6WJT has a new GSB 100 and is working s.s.b. WA6WJT is looking for new ways to increase interest in AREC drills. Congrats to WB6HRH on getting her 3rd BPL. WB6IBZ and WB6ITG are setting up their RTTY station. WA6TYR is running a new TX62 on 6 and 2 with HQ-180 and converters and also passed the General Class exam. WB6NMO says that his SR-150 didn't take kindly to storage. Officers of the Inglewood Radio Club are WA6OKZ, pres.; W6CJB, vice-pres.; WB6IPR, rec. secy.; W6OI, corr. secy.; W6SEZ, treas.; K6YUI, sgt.-at arms. Southeast Radio Club's new club officers are K6ICS, pres.; K6ELS, vice-pres.; K6LXL, treas.; George Probert, secy. Atomics International-Rocketdyne Amateur Radio Club's officers are Harlan H. Benoy, pres.; W6ZZN, vice-pres.; T. F. VonKampen, secy.; WA6VRT, treas.; WA6OTV, sgt-at-arms. OES reports have been received from WB6GHB, WB6IOM, W6YRA, WA6WKF, WN6QWE, WB6KGK, K6LDM and W6QJW. Let's not forget the Southwestern Division ARRL Convention at Disneyland May 28 and 29. The Eight Ball Net (EBN) meets Mon. through Fri. at 1515Z and Tue. through Sat. at 0130Z on 50.5 Mc. Southern Calif. Net (SCN) meets daily at 0300Z on 3600 kc. Traffic: (Dec.) K6WAH 4258, K6YVN 1586, K6EPT 1533, W6GYH 1344, WB6BBO 1238, W6BVK 728, W6QAE 650, WB6GQJ 631, W6MLF 570, WB6QXY 535, K6IWV 533, W6WPF 375, K6MDD 304, WA6AGQ 284, W6TXJ 276, W6BHG 234, K6IOV 225, W6FD 197, WB6GGL 188, WB6KGK 106, WA6WKF 60, K6LDM 57, W6BNX 56, W6USY 50, WB6BBH 39, WA6ZID 30, WB6GXI 23, W6YRA 21, W1KUX/6 20, W6MLZ 16, K6HV 13, WB6AEL 12, W6PCP 8, WB6BOW 6, WB6NCF 5, W6NKR 5, WA6NLG 3, WB6MQF 2, W6SRE 2, W6VUZ 2, K2PHF/6 1, WB6KVA 1, WA6USU 1. (Nov.) WB6HRH 517, WB6IBZ 43, K6LDM 25.

ORANGE—SCM, Roy R. Maxson, W6DEY—WA6CXB reports the 2-4-6 Net, on 145.08 Mc at 0230Z daily, in Dec. '65 had QNI 605 total, 19.5 average, and QTC 286 total, 9.2 average. K6RCK, EC/V.H.F., reminds all interested amateurs of the AREC 6-Meter Net Thurs. at 0400 GMT on 50.304 Mc. and that Breakfasts are held at Smitty's Pancake House in Tustin. WB6NGE and WA6IDN were at Fallings Springs Lodge in the San Gabriel Mountains attending the VOA Seminar with 62 other youths and 4 adults when a storm hit Dec. 28-31 (13 inches of rain in 6 hours) washing out all power and roads (110 feet deep). Using an NCX-3 they contacted VOA Hq. in Glendale and handled communications to worried parents with the assistance of W6ZHH and K6MJU until CHP led them out on emergency bridges, etc. Quite an experience and the efficiency of W6ZHH and K6MJU put amateur radio in the highest esteem in the eyes of many grateful people. WB6OPA has been transferred from K6MICA. W6FB worked CN8FV for No. 184, also skeds WA6DNI in Mexico on holiday. Traffic: (Dec.) K6MCA 5947, W6ZJB 968, WB6PRP 965, WB6JFO 754, WA6ROF 685, K6IME 154, WA6IDN 77, W6WRJ 44, WA6CXB 39, WB6LCO 29, WB6NGE 24, WB6ASQ 23, WA6TAG 15, W6PQA 8, W6DGM 5, WØOPX/6 5, K6RCK 4, WA6YWS 4, W6FB 2. (Nov.) WB6JFO 550.

SAN DIEGO—SCM, Don Stansifer, W6LRU—New officers of the Palomar Radio Club are WB6IHF, pres.; W6NDH, vice-pres.; W6YZV, secy.; WA6BYC, treas. New San Diego DX Club officers include WB6LZI as pres. and K6CF as secy.-treas. Sorry to report the passing of K6UBF, of San Marcos. The following change in

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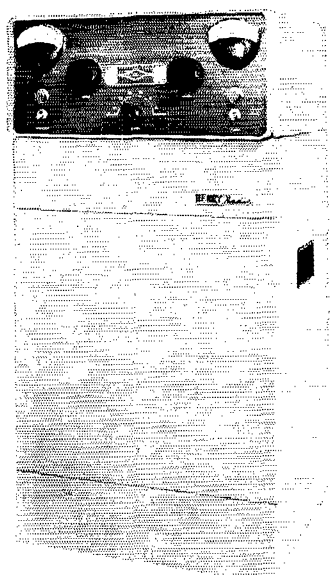

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the AREC/ARPSC/C.D./RACES set-up for San Diego is now in effect: W6VNM is EC for San Diego City and County for AREC/ARPSC and W6MHY is EC for C.D./RACES. This was worked out by SEC W6SK with the persons concerned to make sure of coverage in case of an emergency with our present EC out of the area at times. WB6OHZ and WB6OIA, a father-and-son team, are now on s.s.b. with their Apache and an SB-10. A December visitor to the San Diego area was PAØLZ. W6RGF has earned an RN6 certificate for his traffic work. WA6AJB has returned home after an extensive trip in Europe, which included operating from Monaco. W6NLO won the V.H.F. Club Home Brew Contest, with WA6OSB as second and W6IJO third. Traffic: K6BPI 6734, W6IAB 5280, W6YDK 3622, WB6JUH 1923, W6VNQ 930, W6EOT 573, WB6GMM 388, W6BGF 322, WB6JLC 6.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: WB6NDP. RM: W7WST/6. After an extended stay in the hospital, K6QBF is now home and back on the air. KI5KH has moved into the section and is on the air from Camarillo. W6YK, our active v.h.f.er in Camarillo, was the first confirmed contact via Oscar 4. K6QOE has moved to Santa Paula and is back on the 75- and 10-meter bands. The last monthly breakfast was held in Santa Suzana, which is the northeast corner of the section. After breakfast we had a tour to K6GV's hilltop ham shack. The Satellite ARC has the following line-up for 1966: K6YHK, pres.; WA6UEF, 1st vice-pres.; WB6NPJ, 2nd vice-pres.; WB61PI, secy.; W6QMV, treas. The station manager-trustee of W6AB remains W6PRN. WB6BII had a tower-raising project but it was rained out on the first attempt. 3895 will be hot for the SAROC and hope to see everyone there.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. Now that all of us have had time to sit down and read the instructions for operating our new equipment, I hope you will take the time to get back in the habit of sending news of your activities. I hope that all of you had a very happy Christmas and a good start on the New Year. Here are a few good resolutions: I will not transmit a signal without listening on that frequency, I will try to improve my operating procedure, I will join a traffic net or emergency group so that I may better fulfill my obligation of rendering a public service and I will treat my fellow ham as I would like him to treat me. The Arlington ARC held its Annual Christmas Dinner Party Dec. 11 with 76 attending. W5QKF, West Gulf Division Director, gave an interesting talk. "The Ham of the Year Award" went to WA5DCH. The club is going all out working on the Convention to be held in June. Many prominent amateurs as well as representatives of the MARS RACES and League will be there. The Wichita RACES and area amateurs took part in an emergency test Dec. 12. The test was the result of the planning of the Sheppard AFB MARS and was a very successful exercise, with 17 amateurs taking part. All mobiles were in place 40 minutes after the simulated emergency was called. Traffic: K5DBJ 257, K5FLD 134, K2EIU/5 44, W5LR 7.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—W5NML is the newly-appointed EC for Washington County. The new officers of the Bartlesville Club (W5NS) are: W5NKY, *pres.*; K5JZT, *vice-pres.* The Tulsa Club also has new officers: W5IPT, pres.; W5EYK and W5WI, vice-pres.; WA5KBJ, secy.; W5ZBI, treas. No plug-in appliance operator is K5IZH. Jack works all modes from 50 to 432 Mc., and he built all his equipment himself, even using his own recipes. Ex-W5EUL is now WAØNQL, at Littleton, Colo. W5AGM and W5UYQ have both retired from the FAA. Congratulations to WN5MDN, a Novice in Ponca City, who worked all states in must 8 months, and got them all confirmed. He uses an HT-40 and SX-99. W5AAH now has a 115-volt a.c. generator. So does W5WI, to say nothing of his whole new rig, consisting of a Drake R4A, a T4X and a Loudenboomer final. Enid regrets the loss of two very active hams, WA5KNR and KØBWN/5, who are in the Air Force and have drawn overseas assignments. W5QMJ wants more stations checking into e.w. nets, OLZ and SSZ, which convene nightly, Mon. through Fri., at 0100Z and 0345Z respectively, on 3682.5 kc. SSZ is a slow-speed net, specializing in training new operators for traffic-handling. Don't be afraid to get your feet wet. Traffic: K5TEY 1162, K5MBK 603, W5NML 217, K5CBG 116, W5QMJ 93, WA5BTQ 35, W5MFX 33, WA5FVJ 6, K5OCX 5, W5FKL 2.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5ZPD. RM: K5ANS. New appointees in Southern Texas are K5HMF as EC for Brazoria County, and W5HWY, of Victoria, as

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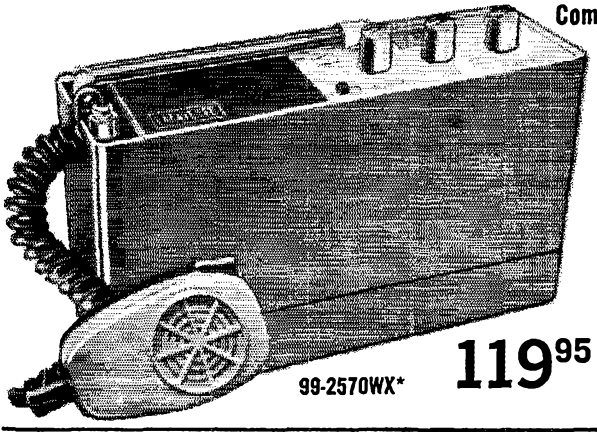

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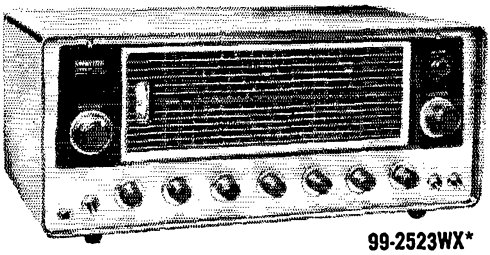

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PAM for 40-meter activities. Recently married were K5MWC and K5FOG. Good luck, fellows, and hope to see you on the air soon. W5ABY is recovering from major surgery. W5ZPD is busy recruiting Asst. PAMs to cover activities on all bands. K5HZR, Bexar County EC, reports that W5SC, the San Antonio ARC station, is moving to a newly-remodeled building with a new 65-ft. pole and will be equipped for 2- and 6-meter operations as well as other bands. W5VCE, Leon Vice with his Vice Squad Net of approximately 100 2-meter f.m. units, has become the 2-meter section of the West Gulf Emergency Net. Leon is Radio Officer for the City of Houston Civil Defense and advises they have reliable communications within a 60-mile radius of Houston at all times. W5ABQ reports that W5BD has gone to sea again; K5MKB is experimenting with d.s.b. and W5IRJ is active again on the 7290-kc. Net. Congratulations to WA5AUZ; he made the BPL for the 2nd straight month and also received a new Section Net certificate. RM K5ANS says too much deer-hunting and W5AC is getting a new rotator and a couple of 10-ft. sections for a new 50-ft. tower. WA5BUI asks the Southern Texas gang to watch for hif on 20 and 40 through Jan., Feb. and Mar. as he will be working W4TZN/MM aboard the USS *Cadmus* in the Mediterranean and Atlantic around 7210 and 14,300 kc. and handling traffic for the crew. Reports were received from 17 stations. Come on, gang, let's hear from *you*. Traffic: WA5AUZ 784, K5HZR 339, K5GDH 178, W5ABQ 67, K5ANS 66, WA5CZR 40, W5ZPD 30, K5HXR 17, W5AIR 2.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM APN: VE6ADS, PAM S.S.B.: VE6FK. Asst.: VE6ALQ, ECs: VE6SA, VE6SS, VE6AFJ, VE6HB, VE6ALL, VE6XO, ORS: VE6BR, OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, VE6ADS, OOs: VE6HM, VE6NX, VE6TY, OBSs: VE6AKV, VE6HM, OESs: VE6DB, VE6AKV. PAM (APN) reports conditions are good some nights and other nights are poor. PAM S.S.B. reports check-ins are getting better and he would like to hear from more VE7s and VE5s. Since we have had a power increase I think that the boys should get together once in a while and talk things over, which will help for better relations all around. We do have some 2- and 6-meter activity around the province, but I never hear from any of the fellows so don't know if they are getting over the back fence. How about a report from some of you? Also would like a report from some of the DX hounds. It was with regret that we heard of the passing of VE7HJ, formerly VE6HQ of Smalley's Radio Ltd. and before that R.I. of this province. Do we have any active clubs in the province outside of Calgary, Vulcan and Medicine Hat? Traffic: VE6FK 120, VE6HM 118, VE6XC 25, VE6ALQ 16, VE6SS 15, VE6PZ 10, VE6SA 9, VE6ADS 8, VE6WN 4.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—VE7DH says "Only report from here is sixty inches of snow." Eric Hamber High School ARC VE7BLZ, is looking for other schools for contacts. VE7BHW is holding up the B.C. end of the Trans-Canada Net Sun., also handled a good load of VE8 traffic over Christmas. The net meets at 1800Z on 14.140 kc. VE7GR is building a receiver to end all receivers. VE7BQB received membership in the Pacific Area Net and spent Christmas in Tucson, Ariz. VE7BLS has been appointed net treasurer and editor in charge of mailing for members of the British Columbia Emergency Net, which reports that the slow-speed net on 3650 kc. is progressing very nicely. VE7YQ has been keeping check on Oscar. VE7BLO's 80-meter antenna is down caused by snow but he keeps traffic rolling. VE7XW's Fairlane 500 has the works even to the racing type fifth wheel. VE7BK has push-to-talk via B.C. Hydro. In other words the power is on and off more than he can sign over. VE7AMW is now a two-base 2-meter operator. VE6UB/7 is attending U.B.C. VE7XF has moved from Gibson to Port Coquitlam. VE7BRE and VE7BLS have been awarded SNC for the BCEN. The BCARPSC Net at 2000Z on 3755 KC. is doing fine with traffic, whilst the 0200Z session still is suffering from poor band conditions. VE7UJ has rebuilt his hamshack and recreation room and is working 2 meters. Traffic: VE7BJV 587,

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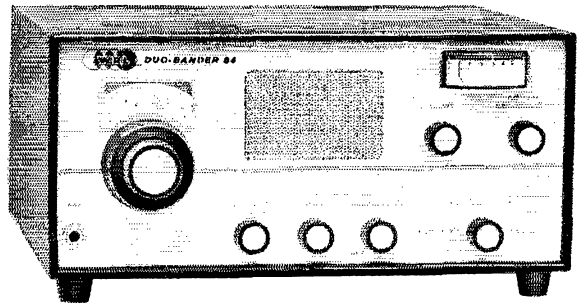

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VE7BQB 147, VE7BIIH 88, VE7BLO 72, VE7BJA 31, VE7QQ 21, VE7DH 11, VE7AMW 7, VE7BHW 7.

MANITOBA—SCM, John Thomas Stacey, VE4JT—VE4RE, VE4TL, VE4CT and VE4YW are building 50-Mc. s.s.b. gear. VE4JC, VE4NY and VE4FG also are active on 6. The building bug has hit VE4LG, who has added a modulator to the rig, and VE4EP, who is completing a home-brew transistorized transceiver. We welcome a new EC, VE4IG, up at Churchill. Others willing to serve as EC should drop a line to VE4OL, in Winnipeg. VE4DL has a 400-watt linear behind the s.s.b. rig and is doing an FB job. The Noon Phone Net is back in operation, meeting at 1845Z on 3760 kc. with fine representation. Both evening nets are suffering from propagation. The Phone Net meets at 0000Z and the C.W. Net at 0025Z to beat Old Man Skip. Net reports for the month: Phone, QNI 427, QTC 28 and sessions 35. The C.W. Net had QNI 148, QTC 123 and 31 sessions. BPL certificates were earned by VE4LG and VE4JT. How about your monthly reports, fellows? Traffic: VE4JT 261, VE4LG 254, VE4QX 85, VE4EI 75, VE4SC 69, VE4XN 38, VE4NE 36, VE4QD 24, VE4JA 18, VE4EF 11, VE4QJ 10, VE4OL 9, VE4JY 8, VE4EG 7, VE4AN 6, VE4LQ 4, VE4DL 3, VE4EP 3, VE4FX 2, VE4EX 1, VE4GN 1.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and R. P. Thorne, VO1EI, SEC: VE1HJ. New appointments include VE1-AI as EC. Congratulations to VE1MX and his XYL on their recent wedding. Active from Port Aux Basques are VO1s BQ, CV, CX and HX. Welcome to W5ZXO, K9-YCN, WA5FCX, WAØNEI and WAØMSU, now signing /VO2. VO1GE is the only YL VO1 active on phone. VE1RT reports the Old Timers' Net still is active, 3750 kc. Sun. at 1200 GMT. VE1A1 is using a G4ZU "X" beam on 14 Mc. with good results. All are reminded of the Goose Bay QSO Party, April 1-15, incl. Details from any VO2. This is a good opportunity to get your WAG certificate. Congratulations to VO1DT, VO1FM and their XYLs on the recent new arrivals. VO2AW is the new QSL Manager for Labrador. Newly-elected club officers of the Sydney ARC are VE1CI, pres.; VE1NV and VE1AKE, vice-pres.; VE1QD, secy.; VE1ABM, treas. St. Croix Valley ARC's officers are VE1ACJ, pres.; VE1DP, secy.; W1FJP, treas. VO1DP has moved his QTH to Salmon Cove. Another s.s.b. addict is VO1-GV. The new call of the NSARA is VE1ASD. Active on 80 meters and signing /VO1 are WA4TUH, WA1EPO and WA1EVL. Traffic: (Dec.) VE1RT 360, VE1DB 100, VE1HE 76, VE1ABS 31, VE1OM 24, VE1AAX 12, VE1-MX 4. (Nov.) VO1FX 22, VO1AX 2.

ONTARIO—SCM, Richard W. Roberts, VE3NG—Once again my XYL, VE3DZA, and I wish to thank all of you for your kind wishes for 1966. I regret very much to have to announce the passing at Christmas time of one of my best friends, VE3DRF. Tom recently was appointed EC for the Metro Toronto area. To his wife and daughter our sincere condolences. VE3DTO was in the body shop and is recovering. VE3MF has a gallon on s.s.b. The Skywide ARC will be operating in the Ont. Div. AREC booth during the Sportsman Show in Toronto in March. VE3FWA has been appointed EC for 75 in the Metro Toronto area. VE3CJ, Noel Eaton; VE2-BK, Colin Dumbrille, and VE3RX, Art Meen, will be in the Cayman Islands by the time you read this. The call there is ZF1BP on 14-Mc. s.s.b. daily. The Ottawa Valley MRC elected VE3YC, pres.; VE3BRE, vice-pres.; VE3SH, secy.; VE3CSF, treas. The new club emblem is a beaut. I would like to thank VE2DR, Quebec SMC, and VE4JT Manitoba SCM, for their greetings during the holidays. The North Shore ARC will hold its Annual Banquet May 14. Information may be obtained from VE3ATI, RR2, Whitby. VE3CJ spoke to the Windsor Club in Jan. The RCAF at Clinton has formed a group known as the Clinton ARC with VE3BWM, pres.; VE3FCX, vice-pres.; VE3FXH, secy.; VE3BSZ, treas. They will exchange bulletins. The QTH is P.O. Box 79, RCAF Stn., Clinton. Your SCM is revamping the present club list and will forward a copy to all listed clubs sometime in Feb. VE3ESH has received his Old Timers Club certificate after 32 years of ham radio. Congratu-

(Continued on page 154)

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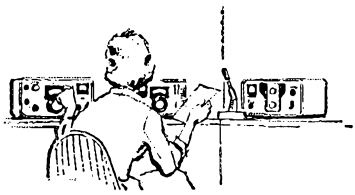

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75S1	279	DRAKE R4	319	GONSET G50	229	HR10	69
75S3	439	CENTRAL 100V	379	GONSET G76	169	HR20	119
32S1	399	THOR 6&AC	259	G76 DC SUPPLY	59	DX100B	129
KWM2	699	CLEGG VENUS &AC	389	IV 6METER	189	TX1	139
PM2 SUPPLY	99	POLYCOMM PC6	169	SUPER 12CONV	47	HW12	99
SM2 MIKE	29	AMECO CMA CONV	47	NCX3	229	HW22	99
SWAN 350	339	EICO 720FW	77	NCX5	449	HW32	99
AC SUPPLY	72	EICO 730FW	59	XCU27 XTAL CAL	20	6ER	47
DC SUPPLY	109	VIKING VFO	29	NCX AC SUPPLY	79	2ER	49
SWAN 120	119	JOHNSON TR SW	19	NC105	97	SR10	87
SWAN 240	259	MATCHBOX W/SWR	74	NC155	119	VF1 VFO	19
SBE33	199	CHALLENGER	69	NC188	77	UTI SUPPLY	27
SBE34	339	NAVIGATOR	77	NC300	179	HP10 SUPPLY	32
SB2LA LINEAR	209	RANGER	99	HRO60	229	HP20 SUPPLY	34
DRAKE 2A	159	VALIANT	159	HRO60 AD COIL	37	S40B	49
DRAKE 2B	189	VALIANT II	259	LAFAYETTE HE10	49	S85	69
DRAKE 2BQ SPKR	14	HQ110AC	159	LAFAYETTE HE45B	77	S86	67
DRAKE 2BQ MULT	37	HQ140X	107	LAFAYETTE HA350	119	SX96	127
DRAKE 2B CALL	14	HQ170C	209	HEATH DX20	37	SX111	149

SX117	$259	CRX2A 152-174MC	69
SR46	149	HT33	179
HT37	239	HT40	77
HT41	199	HT45	249
P45 AC	139	HOW1 SCOPE	77
P&H DD1 SCOPE/W TONE OSC	69
HICKOK 539A	77
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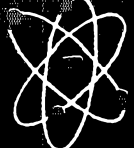

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IT is with deep regret that we record the passing of these amateurs:

W1KPA, Everett C. Foster, Windham, N. H.
W1NBI, Merton E. Porter, Arlington, Mass.
W1OJO, John B. Mansfield, Winooski, Vt.
W1QHQ, Edward A. Dickey, Wellfleet, Mass.
K1TUX, Sylvio A. Gannino, W. Lynn, Mass.
K2CT, Harry E. Hiller, North Troy, N. Y.
K2EIC, T. Howard Leighton, Slingerlands, N. Y.
W2JZD, Benjamin B. Reczko, Union, N. J.
WA2LHP, William A. Geohegan, New York, N. Y
W2SIV, Kenneth G. Sanders, Rockaway, N. J.
W3AKB, Frances R. Darne, Takoma Park, Md.
W3BNU, Oscar A. Hiskey, Warminster, Pa.
W3DK, Barron P. Freeburger, Silver Spring, Md.
K3NWG, David W. Huber, Burgettstown, Pa.
W4FYI, James B. Eledge, Tampa, Fla.
W4JCS, Frank E. Bien, Gainesville, Fla.
WA4KPG/ex-W2FTQ, Karl L. Weinhoeppel, Ft. Lauderdale, Fla.
W4RBY, Haakon Follien, Falls Church, Va.
W4RJ, Berry L. Hinnant, Whiteville, N. C.
W4SAZ, Thomas J. Donan, Acworth, Ga.
W4VSZ, John D. Dickson, Ellenwood, Ga.
W4WWS/ex-W2AIL, Gordon C. Shannon, Ft. Lauderdale, Fla.
K4ZJS, Ollie J. Rowe, Pikeville, Ky.
W5ARX, James D. Fields, Jr., Fort Smith, Ark.
WA5END, George G. Harris, Houston, Texas
K5LXM, Fred Loe, Albuquerque, N. M.
W5OIE, Claude N. Harrison, Canyon, Texas
K5RDL, T. Fitzhugh Murray, New Iberia, La.
W6DKB, Arthur W. Starr, El Monte, Calif.
W6DWW, Andre L. Minjoulet, Salinas, Calif.
W6END, Dean W. Ketchum, Novato, Calif.
W6JW, Otto B. Tyler, Saugus, Calif.
K6KNI, Charles C. Baggett, Oroville, Calif.
W6LZW, Isaac Levin, Riverside, Calif.
W6MRO, Richard O. Brazelton, Newport Beach, Calif.
W6NOJ, Charles L. Combs, Alhambra, Calif.
K6TXQ, John L. Kovacs, Whittier, Calif.
WA6VFQ, Paul Akridge, Anaheim, Calif.
K7QLP, Walter W. Fry, Billings, Mont.
K7RJK, Samuel J. Grauman, Tucson, Ariz.
W7SGD, Jack R. Hipperson, McMinnville, Ore.
WA8ALP, Edward A. Thompson, South Point, Ohio
W8BAB, Paul A. Kelly, Dayton, Ohio
W8BMX, Carl F. Mueller, Willowick, Ohio
W8DIM, Charles O. Benz, Massillon, Ohio
WA8GEW, William L. Hicks, Toledo, Ohio
K8HM, Howard H. Manning, Fremont, Ohio
K8HTS, Richard E. Martin, Mt. Hope, W. Va.
W8QNQ, James C. Burleigh, Wayne, Mich.
K8RIC, Frederick A. Bouck, Elkton, Mich.
W9DDC, Walter W. Bliss, Brodhead, Wisc.
W9FVI, Hartzell A. Boren, Indianapolis, Ind.
WA9EQD, Daris C. Madsen, Colorado Springs, Colo.
8SP, Thomas A. Reid, Springfield, Ohio
G5XG, John Butcher, South Devon, England
VE1ALN, C. F. McCaull, Halifax, N. S.
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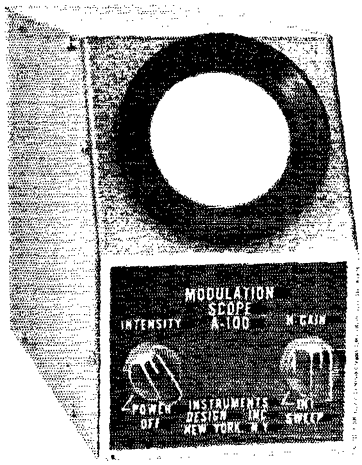

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Novices Are You Ready?

(*Continued from page 36*)

transmitter, since the antenna has already been aimed to give the best possible signal at the receiver.

However, if the antenna system could be designed to concentrate most of the radiated power in the desired direction, we could obtain the same increase in signal strength at the receiver without increasing the transmitter power. An antenna system can do this by taking power that otherwise would be radiated in unwanted directions and adding it to the power going in the desired direction. Thus by using an antenna such as a 3-element beam that has 6-db. gain, we can obtain the same result without increasing the transmitter power.

The usual 3-element beam has a driven element, a director, and a reflector. With a beam, the majority of our 50 watts would be concentrated in one direction only. The important point that many Novices miss is that the antenna is *not* an amplifier when it has gain, it merely concentrates the energy in one direction. If we rotate the antenna we can, of course, concentrate our signal in any direction we wish.

On 15 meters, it is possible to build a 3-element beam that doesn't take up a great deal of space. Occasionally, we receive letters from newcomers asking for dimensions for beams on 80 meters. A 2-element beam for 80 would have elements 130 feet long on a boom that would have to be about 50 feet long, and the antenna would have to be well over 100 feet high before it would be really worthwhile! On the other hand, a 15-meter beam would have elements about 20 feet long on a boom 15 to 20 feet long, and it only needs to be about 30 feet above ground to do a really effective job.

There is a multitude of different designs of beams that either can be built or purchased ready-made. As you gather experience you'll be in a better position to make a decision between them. A beam will give you a better signal, but don't expect to have the best signal on the air when changing to a beam from one of the antennas described here. The three antennas described in this article will do an excellent job. Additionally, there are many other simple antennas that can be made. Details on several other types can be found in *The A.R.R.L. Antenna Book*.

The important point is that 15 meters offers excellent contact possibilities for the Novice, and we know you'll find it a lot less congested than the lower-frequency bands. QST

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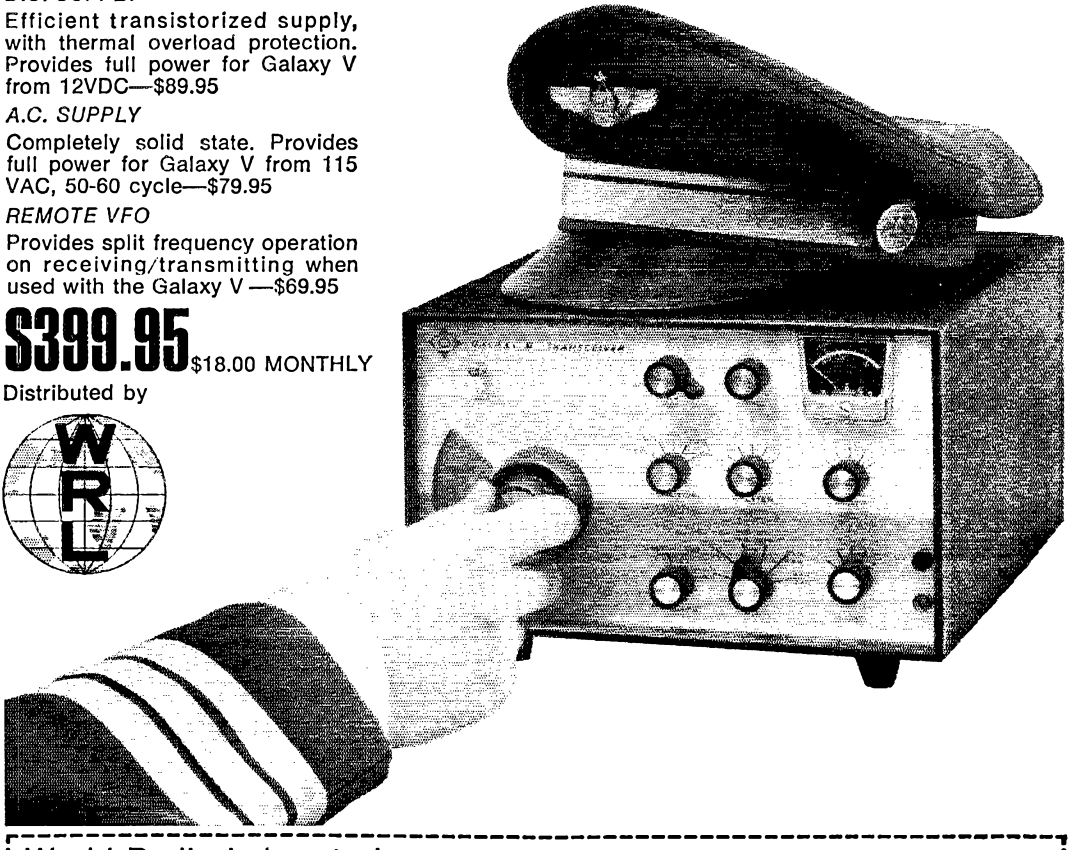

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World Above 50 Mc.

(*Continued from page 85*)

almost every day from December 5 to 28" Best opening was on the 5th into 2, 3, 8 and 9. It started at 7:00 P.M. on the 5th and lasted until 5:00 A.M. on the 6th. WA4ST worked five days of openings with 8 states worked plus KP4 and VP7. At New Orleans, Louisiana, WA5JVL was able to work stations in Maryland, Delaware, Pennsylvania, North Carolina and Connecticut on December 18, while the 5s in Texas had frequent openings during the month hearing 4, 6, 7, 8, 9 and Ø lands. W6YKS informs us that during the previously mentioned opening of the 18th, signals from southern California and Arizona were coming through at his QTH for a period of three hours and a number of stations were worked on low power.

From W7GWT: "After operating n.b.f.m. on six meters for over three years I have come to the conclusion that n.b.f.m. is just as effective as a.m. if the deviation is kept to 2.5 kc. at 50 Mc. and the receiving station has a receiver with a band pass of not over 5 kc. Transmitter and v.f.o. here is entirely homebrew." K7ICW reports: "Es on 50 Mc. on December 1, 2, 4, 18, 19 and 25. Backscatter noted on the 19th while working Great Falls, Montana when K6IBY in southern California was heard on on s.s.b. Iono-meteor scatter excellent with regular paths c.w. and s.s.b. to Colorado, Washington and northern California. Tropo picked up a bit to southern California with some s.s.b. noted. Unidentified meteor scatter signals noted via Geminids meteor shower on December 11 with the beam East." Reports from Michigan concerning skip are encouraging. WA8FTA observed openings on 21 days, heard all U. S. call areas plus VP7. Bruce is running an Ameco TX-62 with a National 62 v.f.o. and an SX99 receiver, a HE-56 converter with an Ameco preamp an 8-element beam up 60 feet. K8AQA reports openings throughout the entire month of December into VP7, 4 and 5 lands, and extended ground wave most prominent on December 26, 28 and 29. The 15th of December was the best of three openings observed by K8TUT in Ohio. Bill sez that on that date stations were heard in 1, 2, 3, 4, 5 and Ø lands.

K8REG sez: "Six meter DX has been the same as always, except for the fact that more and more fellows are realizing the potentials of meteor scatter using s.s.b. With 2000 watts p.e.p. input to a pair of 4-400As in g.g. and stacked 5-element beams, I and a number of others around Ohio can work the east coast almost at will. (He does have the almost capitalzed.) In a good meteor shower, it is not uncommon to work five or more states in one evening using this mode of propagation. So far I have not noted any valid instances of the reoccurance of F_2 or TE forms of propagation on 50 Mc." Neither have we, Vince. Best opening of the month was December 15 for WA9FIH. The opening started about 4:30 P.M. and lasted until 9:00 P.M. and Jim worked stations in eight states during that particular one. He also caught skip stations on December 14, 16, 17, 18, 19 and 26 and worked 10 states in all during December. 13 States were worked by WØPEP during 8 days of openings in December. Jim sez: "During a scatter contact with WA5CMZ/5 on December 18, we both observed a large increase in signal at 1420Z. Wonder if this was caused by trail created by re-entry of Gemini 7. If anyone has track of re-entry orbit I would be interested to know if this could be the cause. Signals were up many db. above normal scatter. We went to VOX

operation and it lasted about two and a half minutes. Seems to me that six is much better than for several years. VP7 in winter as well as opening to W6 is very unusual for this area. Any comments?" Out in Kansas Dot Hall, KØGIC also caught the good conditions on the 15th when stations from Ohio, New Jersey, Washington, D. C., Michigan and North Carolina were getting into Wichita with very good signals. "The first good band opening in months!" sez Dot. WØBMN didn't catch the 15th but does report the band open to 4 land on the 16th. QST

Station Activities

(Continued from page 146)

lations to VE3BII on her FB traffic total. Traffic: VE3-BII 880, VE3NG 243, VE3BZB 189, VE3CYR 178, VE3-GI 145, VE3DPO 140, VE3EAM 122, VE3DMU 117, VE3EBC 117, VE3TT 107, VE3FGV 105, VE3DVE 81, VE3BUR 61, VE3BTV 47, VE3AUU 43, VE3DU 38, VE3NO 36, VE3CFR 29, VE3CWW 29, VE3BLZ 22, VE3DWN 13, VE3ETM 11, VE3VD 7, VE3OU 3.

QUEBEC—SCM, C. W. Skarstedt. VE2DR—Asst. SCM: Claude Duberger, VE2ALH. The Expo 67/ARRL Convention QSL cards are now available. Contact VE2-BEC. The MARC Christmas Party was a success. An NCX-3 was presented to VE2BE to show the esteem of his many friends. WIICP kept the audience in stitches with his slides and commentary. VE3SR, who lived in N.J. for some years, now signs VE2KH. VE2SO has an excellent mobile sig. Sorry to report that VE2AIM lost his equipment in a fire; fortunately the rest of the house escaped excessive damage. VE2s BYN, BSC and BUK are active at Three Rivers in connection with AREC and operate from VE2MO frequently. Congrats to Sally, editor of *Marcogram*, who passed the Advanced and switched calls from ARQ to KO. VE2s enjoying the Florida sunshine will keep the 14,160/14,220 channels busy. Two half-hour TV programs depicting AREC activities and the hobby side of ham radio appeared on Jan. 1 and 8. AREC members in 50 areas of the Province will serve as CP communications officers, thus bringing us and the Civil Protection and Emergency Measures Organization closer together. The AREC Sun. Morning Net on 3755 kc. at 11 A.M. is becoming popular with as many as 60 stations reporting. The OQN handled close to 400 messages in December. QRM on the repeater station (VE2MIT) frequency of 146.5 Mc. may necessitate a change to 146.94 Mc. The contemplated repeater on Mt. Orford may use the 146.5 channel instead. New ECs: VE2ALE, VE2AP and VE2DK. VE2ATU, Arvida, explores DX: now has 152/122. Traffic: VE2DR 194, VE2OJ 159, VE2WM 68, VE2BRD 48, VE2BVY 43, VE2AGQ 41, VE2EC 32, VE2AUU 29, VE2CP 26, VE2-BRT 19, VE2CK 18, VE2BG 15, VE2ALE 7. QST

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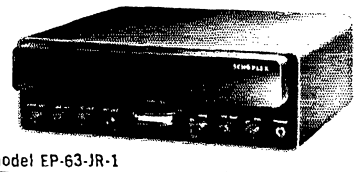

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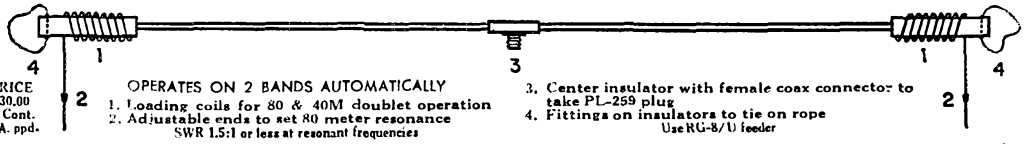
LRL-70 ANTENNA **70' LONG, 80 & 40 M** • Power rating 2 Kw. P.E.P. or over

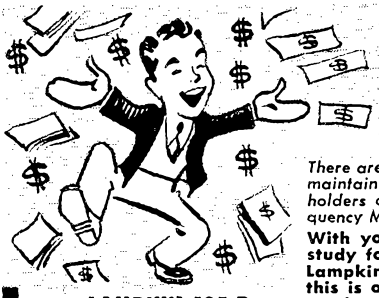


PRICE $30.00 in Cont. USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance
SWR 1.5:1 or less at resonant frequencies

3. Center insulator with female coax connector to take PL-259 plug
4. Fittings on insulators to tie on rope
Use RG-8/U feeder

LATTIN RADIO LABORATORIES • **Box 44** • **Owensboro, Kentucky**

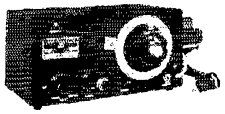


HAMS! TURN CB RADIO INTO YOUR OWN BIG-MONEY MAKING BUSINESS!

There are over 1,500,000 CB rigs—and 30,000 more go on the air every month. Each must maintain a frequency tolerance of 0.005%; frequency adjustments can be made only by holders of commercial tickets—and with proper equipment . . . like the Lampkin Frequency Meter.

With your ham background, it should take but a few weeks to study for your 2nd class ticket. When you have it . . . and your Lampkin 105-B . . . you're ready to check CB rigs for cash. And this is only the *beginning*—for there are 2,800,000 other mobile-service radios requiring regular frequency measurements. In your area you can find hundreds of them—Business Radio . . . Aviation Radio . . . Marine Radio . . . Mobile Telephone . . . Police Radio—and you can contract to maintain them for a fat fee!

LAMPKIN 105-B FREQUENCY METER



0.1 to 175 MC and up. Inexpensive accessory PPM Meter available for 0.0001% accuracy on split-channels.

TO LEARN HOW MAIL COUPON TODAY!

LAMPKIN LABORATORIES, INC.
MFG Division, Bradenton, Fla.
At no obligation to me, please send me free booklet "HOW to MAKE MONEY in MOBILE-RADIO MAINTENANCE"—and data on Lampkin meters.

NAME_____
ADDRESS_____
CITY_____ STATE_____

LAMPKIN LABORATORIES, INC. BRADENTON FLORIDA

Selective Filter Adapter

(*Continued from page 72*)

is not available, would be to use the first i.f. transformer in the output of the receiver mixer, and use choke-capacitor coupling between the output of the unit and the grid of the first i.f. tube, where the filtering contributed by the transformer is of less importance because of the tuned circuits in following i.f. stages. In this case, the plate voltage to the output mixer, V_2, would be fed through the choke, the coupling capacitor would be connected from the plate of V_2 to the grid of the first i.f. tube, and a 1-megohm resistor connected from the grid of the first i.f. tube to ground, or to the a.g.c. line. However, while several spurious beats were found across the general coverage of the BC-348, none of objectionable level appeared in any of the amateur bands, so these measures were not considered to be warranted.

The b.f.o. should be well shielded, since spurious beats within the amateur bands can be produced in some instances by the combination of the b.f.o. fundamental and harmonics of the conversion oscillator.

Adjustment

The filter adjustment depends upon the type of filter used, and is usually covered by an instruction sheet furnished with the filter. The Collins mechanical filter used in the author's unit called for 130-pf. resonating capacitances across the input and output. Since this capacitance includes stray capacitance, variable capacitors were connected across input and output and adjusted for maximum gain. However, the value of capacitance arrived at by this method was so close to 130 pf. that no allowance had to be made for strays, so fixed capacitors of this value were used.

The b.f.o. can be adjusted to the center of the i.f. passband by listening to the upper- and lower-sideband transmissions from one's exciter. It can also be adjusted by switching the sideband selector and listening to the background noise at a clear spot in the band. When the noise appears equal in both intensity and pitch for both sidebands, the b.f.o. frequency is close to being correct, and can be trimmed up, if necessary, by listening to signals on the air.

Some thought was given to crystal-controlling the b.f.o. However, the idea was dismissed since at times of heavy interference, it is sometimes possible to move an interfering signal out of the passband of the filter by slight readjustment of the b.f.o. and the main tuning dial. Also, it is desirable to have some adjustment of the b.f.o. possible in c.w. reception, especially if your receiver is already equipped, as the BC-348 is, with a crystal filter of the older type which, of course, will provide additional c.w. selectivity. The original setting of the b.f.o. should be plainly marked, so that it can be returned to for normal s.s.b. reception. QST

(*Continued from page 74*)

DX OPERATING NOTES

(**Bold face** indicates changes since the most recent *QST* listing.)

United States Reciprocal Operating Agreements currently exist *only* with: Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, Luxembourg, Peru, Portugal, Sierra Leone and United Kingdom. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details concerning a particular place.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U. S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela. Permissible prefixes are: CE CM CO CP EL HC HH HI HK HP HR OA PY TI VE VO XE XP YN YS YV ZP and 4X. CANADIAN radio amateurs may handle these relatively unimportant third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Mexico, Peru, U. S. and Venezuela. Permissible prefixes are: CE CP HR HK OA TI W XE YS and YV.

DX Restrictions

United States amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the International Telecommunications Union under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Viet Nam[1] forbid radio communication between their amateur stations and amateur stations in other countries. U. S. amateurs should not work HS XU 3W8 or 8F. CANADIAN amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan. Prefixes to be avoided are HS JY XU XW8 3W8 and 8F.

[1] K1YPE/XV5 has permission for international communications from U.S. and Vietnamese administrations and is authorized to handle third-party messages with U.S. amateurs.

HAM-ADS

(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 box 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.
(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.
(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

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.

AUCTIONFEST: Ft. Lauderdale, Fla. Saturday Mar. 19, Armory, SW 24th St.—Fourth Ave. Doors open 8 A.M. Broward Amateur Radio Club, sponsor. Fred Schmidt, W4NYF, Chairman.

ROANOKE Division Convention, Natural Bridge, Va. May 28 and 29, 1966. Varied program includes Home-brew Contest. Enjoy the Convention and see Natural Bridge, too! Special Advance Registration package, $6.50. Reservations handled. Inquiries to Box 2002, Roanoke, Va. J. M. Evans, K4RDT, Program Chairman.

ROCHESTER, N.Y. is again headquarters for one of the largest Hamfests in the east on May 14. Write for free program. Rochester Amateur Radio Assn., P.O. Box 1388, Rochester, N.Y. 14603.

DAYTON Hamvention April 16, 1966. Everyone welcome at the Dayton Amateur Radio Association's 15th Annual Hamvention, Wampler's Ballarena, Dayton, Ohio. Come and participate in the technical sessions, forums and banquet. See the latest in equipment. Take part in the "Home Brew" contest and hidden transmitter hunt. New this year: Giant "Flea Market". Bring the XYL for the best in women's activities. FCC General Class examination at 09:00 Saturday. Exhibits open Friday evening. For information write Dayton Hamvention, Department D, Box 44, Dayton, Ohio 45401.

MOTOROLA used FM communication equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WANT Callbooks, catalogs, magazine, pre-1920 for historical library. W4AA Wayne Nelson, Concord, N.C.

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. Tel. NOrmandy 8-8262.

WANTED: all types of aircraft on ground radios. 17L 618F or 388, 390, GRC, PRC, 51 JRVX. Collins linear amplifier. Type 294; Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames W2KUW, 308 Hickory, Arlington, N.Y.

SELL swap or buy ancient radio set and parts magazines. Laverty, 118 N. Wycomboie, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Cointon, Chicago 6, Ill.

304TL tubes wanted. Also other xmtg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARG, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

WANTED: Collins Parts. BC-610, GRC-27, Autodyne, Bethpage, L.I., N.Y.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-Walker-5-7000.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 120 West 18th St., N.Y. 11, N.Y.

QSLS?? Personalized made-to-order! One-day service! Largest variety samples, 25¢, Deluxe, 35¢; religious, 25¢ (refunded). Sakkers, W8DED, Box 218, Holland, Mich.

QSLS, samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ For better QSLS! Bringing hams greater returns for over a quarter-century. Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Ill.).

QSLS: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 43601.

DELUXE QSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 07638. Samples, 10¢.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1994 N. M.-18, Gladwin, Mich.

QSLS. Twenty exclusive designs in 3 colors. Rush $3.00 for 100 or $5.00 for 200 and get surprise of your life. 48-hour service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

10¢ Brings free samples. Sims Advertising Service, 3227 Missouri Ave., St. Louis, Mo. 63118.

DON'T Buy QSL cards until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

CREATIVE QSL cards, 25¢ for catalog samples, 50¢ coupon. Personal attention given. Wilkens Printing, Box 787-1, Atascadero, Calif. 93422.

QSL Specialists. Distinctive Samples, 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago, Illinois, 60639.

QSLS, Moyer's Printing, 846 Rising Sun, Relford, Penna.

QUALITY QSLs. New designs monthly. Samples 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

SUPERIOR QSLS, samples 10¢. Ham Specialties Co., 108 East Palace, Hobbs, New Mexico.

QSLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal, snazy, unparagoned cards (Wow!). Rogers KOAAB, 961 Arcade St., St. Paul 6, Minn.

QUALITY QSLs, Samples dime (ex-W3QCC). Ted Beseparis, WA4WVK, Box 1275, Lake Worth, Fla.

QSLS, finest, YLRL's, OM's, samples 10¢ W2DJH Press, Warrensburg, N.Y. 12885.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLS Kromekote 2 & 3 colors attractive, distinctive, different. Free ball point pen with order. Samples 15¢. Agent for Call-D-Cal decals K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

QSLs. Free samples, fast service, customized cards. W7IJZ Press, Box 183, Springfield, Ore.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

3-D QSL Cards have that prestige look, with glittering colors and metallic in raised space-age designs fused to brilliant plastic finishes. Cost so little more than mere mediocrity! Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass.

QSLS-100 3-color glossy $3.00: silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

AT Last! Something new in Qsl cards! All original designs. Send 25¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

QSLS Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSL, 3-color glossy. Samples, 10¢. Gates Print Shop, 317-11th Ave., Juniata, Altoona, Penna. 16601.

1966 QSL Designs. Samples 10¢. Brigham, Colson St., No. Billerica, Mass.

DX-QSL. The original plastic display for ur cards. Holds 20 cards, 3 for $1; ten for $3. Satisfaction guaranteed. Dealers' Inquiries invited. DX-QSL, Box 19033, Houston, Texas 77024.

FINE Embossed QSL cards. Ace Printing Service, 3298 Fulton Road, Cleveland, Ohio 44109.

QSLS-SWLs. 3&4 colors. 100 $2.00. Samples dime. Bob Garra, Lehighton, Penna.

QSLS, 18 samples, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

HUNDRED QSLS: $1.00 Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803 (formerly Meininger, Jesup, Iowa).

QSLS. Free offer with samples, 10¢. "Jack", W3PRU, Rice's Lane, Baltimore, Maryland 21207.

RUBBER STAMPS $1.00. Call and address. Clint's Radio W2UDO, 32 Cumberland Ave., Verona, N.J.

DENVER Metropolitan Area only; QSLS by KØRRS (John Cox). Phone 934-4739 or come to 3624 West Kentucky, Denver evenings or Saturdays.

QSLS, Cartoons, colors, something different, samples 10¢. Chris, W9PPA, Route 1, Box 31, Crystal Lake, Ill.

HUNDRED QSLS, $2.00. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000. $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

ORIGINAL EZ-IN double holders display 20 cards each in plastic. 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

SMART Ham operators buy their QSL cards from the Ham Wholesale Card Club. See ½ p. ad (p. 153) in this magazine.

QSLS. Free samples. Radio Press (WA6QAY), Box 17112, San Diego, California.

QSLS. 18 samples, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

PERSONALIZED Photo QSL Cards. Samples, prices 15¢. Mike Boyar, G.P.O. Box 2066, New York, N.Y. 10001.

HUNDRED QSLS, $1.00. Samples, dime. Holland, R 3, Box 649, Duluth 3, Minn.

QSLS. Large selection, including photos, rainbows, glossy stocks, cuts, etc. Fast service. Samples 25¢. Ray, K7HLR, Box 1176 Twin Falls, Idaho 83301.

LOW Cost QSLS: 100 4-color glossy, $3.99. Free samples. Ed's Press, 3232 Le Moyne, Chicago, Ill. 60651.

PICTURE QSLS 4 x 6, $16.95 per thousand. Black on white QSLS, 4 x 6, $7.95 per thousand. Amateurs rubber stamp with pad, 79¢. John Donlin, WA8CYJ, Box 24133, Cincinnati, Ohio 45224.

COMPLETE QSL Rubber Stamp, free sample print. WIFP, Blanchard, Wes's Rubber Stamp Shop, RFD 1, Amesbury, Mass. 01913.

QSL Cards. Quality printing. Samples 15¢. Sargent Press, 19 Glen Ave., Lynn, Mass.

QUALITY QSLS, new designs monthly. Samples 10¢, 25¢ 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

SAMCO QSLS presents "Pronto-Call" for '66: samples 10¢. Rubber stamp owners: Stamp-Ett Multi-purpose cards, only $1. Hundreds, ppd. Samco, Box 203, Wynantskill, N.Y. 12198.

DENVER, Colorado Metropolitan Area only: QSLS by KØRKS, John Cox. Only open evenings or Saturday. Phone 934-4739 first. Then come to 3624 West Kentucky.

AMATEURS! Your QSL photographically reduced and imprinted on imported cigarette lighter. Send card and $6.95. Details free. Warren Mailorder, Dept. Q, Box 2081, Detroit, Michigan 48231

RUBBER Stamps, call, address, zip: $1.00. Accurate Rubber Stamps, 1106 Arnold Court, Des Plains, Ill. 60016.

CANADIANS: For sale—Heath Comanche mobile receiver, mobile p/s, MP-1, mount AK6. E. Crump, 64 Barrie, Galt, Ont. Canada.

CANADIANS: Selling Twin Gonset G66B-G77A complete. VE2OU, Box 355, Riviere du Loup, Quebec, Canada.

CANADIANS: Drake 2A receiver, complete with Drake 2AQ, crystal calibrator, crystals for all amateur bands plus 4 short wave bands: $250.00. Gonset GSB-100 transmitter, SSB, AM, FM, CW. $300.00. These units are in a like-new condition. Gil Ford, VE3AEZ, 29 Larwood Blvd., Scarborough, Ont., Canada.

WANTED: For personal collection: QST, May 1916, WICUT, 18 Mohawk Dr., Unionville, Conn.

NOVICE Crystals 80-40M, $1.05 each. Also other freqs. Free list. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

TELETYPE Model 15 in mint condx with table, power supply, manual, auto-unshift-on-space, copy light, worked 20 countries, $129.00; with converter built into table, ready to go on air, plugs into phone jack, and mic jack or ssb xmtr: $395; usable with any rig. K2DCY, Tom Perera, 410 Riverside Drive, New York City, N.Y. 10025.

OLD Old Timers Club now over 600 members with verified 2-way contacts before 1925. Life membership, $15. Bi-monthly "Spark-Gap Times", $2.50 annually; also available to non-members, $3.00. Write Secretary W1MPP, Lovell, Maine 04051.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each. $10.00 pair prepaid in U.S.A. Send check or m.o. Everett Stidham, Jr., W5JLQ. 722 So. 30th Muskogee, Okla.

MANUALS for surplus electronics. List, 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

FOR Sale: Plate transformers. 3600-0-3600 VAC @ 1000 ma. CCS, with 120/240 VAC primary. Commercial-quality units carry one year unconditional guarantee. Price $35.00. Peter W. Dahl Co., 401 4th St., S.E., Minneapolis, Minn. 55414. Tel: 338-9077.

POSI-CHECK Extra Class Amateur Extra and General Class FCC type exams, complete in detail and style even to the IBM type answer sheets! A must for checking before taking an exam. General Posi-Check consists of 297 questions and explained answers for only $2.98—Extra Class, 115 questions and diagrams with explained answers, $2.00. A very good aid to learning and a Must in preparation for FCC exams. 138 questions of the 297 in the General Posi-Check apply directly to Extra Class also. Get both for only $4.50 postpaid, Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa. 50322.

TOOOOBES: 6146B, $4.00; 6360, $3.45; 6CW4, $1.40; 8058, $8.55; 6146, $2.55; 717A, $3.95; Brand new, boxed, guaranteed. No pulls, seconds or JAN. Free catalog of others. Vanbar Distr., Box 44Z, Stirling, N. J. 07980.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J., Tel. GArfield Area code 201-471-2020.

WANTED: FR-2409 bandpass filter. State price. Pete Chamalian, W1BGD, 111 Buena Vista Road, West Hartford, Conn. 06107.

BELOW Distributor cost: SR-150 with P-150 AC, P-150-DC, MR-150, $550; SR-160 with P-150-AC, $335.00; CDR TR-44, $47.50 F.o.b. Stamford, Conn. Send certified check or m.o. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

TELETYPE Machines, converters, R-388, 51J3 and 51J4, R-390; R-390A receivers, mechanical filters for R-390A (455 IF) Want: TS-382 audio sig. CV89/URA8A converter. Alltronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: 617-742-0048.

RTTY Gear for sale. List issued monthly. 88 or 44 mhy toroids, five for $1.75 postpaid. Eliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

APACHE: Perfect, only $135. K2EGI.

HAVE VHF Power tubes. 4CX250B, 4X500s, etc. Will swap for old toy trains. W3SYT.

FM Equipment Schematic Digest: A comprehensive collection of Motorola schematic diagrams covering low-band, high band and 450 Mc equipment, manufactured between 1949 and 1954. Crystal formulas, alignment instructions and a wealth of technical data included in 92 pages. Price $3.95 ppd. Two-Way Engineers, Inc., 1100 Tremont St., Roxbury 20, Mass.

HIGHLY Effective home-study review for FCC commercial phone exam preparation. Free literature. Cook's School of Electronics, Box 747, Riveread, N.Y. 11902.

SELL: QST, CQ, Radio, Modern Electrics and Handbooks, any quantity. Buy: old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

COLLINS 32V3, $250.00; National NC-300, $150.00. In excint condx. Each used approx 50 hours. Original cartons. Charles McNulty, W5LDK, 2928 Florida NE, Albuquerque, New Mexico.

SELL Collins 32V3, $225.00; SX-117, $285.00; Lysco 600, $25.00. W8VPC.

BRAND New SB-300 with SSB filter, professionally wired, $245.00. Used but in excellent condx. Challenger 80, 6 mtr. transmitter, $70.00, matching 80-6 mtr. rock stable VFO, $25.00; Johnson 275 Matchbox with SWR, $65.00. Write WA2-SJZ, R. J. Christie, Box 18, Queens Village Station, Jamaica, L.I., N.Y.

GOING S/Line, new HT-37 in factory-sealed carton $275.00. Also factory sealed HT-41 linear, $250.00. Both for $500.00. Received as Christmas gifts. Also NCX-3 w/D.C. p/s, calibrator & antenna, $325; Health XC-6 and XC-2 converter, $35 ea. Clegg 22'er with Johnson VFO, new, $200.00. WA2LIM. Tel: 212-461-1779.

WANTED: Counselor for summer camp. College student general license and equipment necessary. Contact W2GON, Shelly Weil, 114 Phylis Court, Elmont, N.Y. 516-HU-8-3555.

WANTED: Electronics Instructors. General indispensable. Theory and workshops. Science Camp, Lake Placid, N.Y. Write Eppstein, 440 West End Ave., N.Y. 24, N.Y.

NCL 2000 plus one unused 8122. $450.00. Condition perfect. W. Sabin, 1400 Harold Dr., S.E. Cedar Rapids, Iowa.

KILOWATTS, Hallicrafters HT-33, $194.00; HT-41, $245.00 (new final tubes); both electrically perfect and without scratch. Drake 2-B calibrator, $10.00. Elvin Miller, 3845 Kipling Ave. So., Minneapolis, Minn.

WANTED: National "HRO" dials with gear boxes. WA6KGP, Box 9081, San Diego, Calif. 92109.

APACHE and HQ-110A. Seek new operator. Compatible servants, prefer working together and don't plan early retirement. Offers accepted by WA1AAY, Box 213, Brown University, Providence, R.I.

COLLINS S/Line AM adapter, $5.00! Install five minutes! Switching! Kit Kraft, B-763, Harlan, Kentucky.

MARAUDER HX-100, professionally tuned, $250.00; Drake 2-B, 2-BQ, 2-AC, $210.00; Dow-Key TRP T/R switch ($27.00 new), $15.00; Heath HM-11 power meter, $10.00. Will sell separate, prefer New England area; SASE for info and photo. K1SCO, Ralph McClintock, 44 Parkway Crescent, Milton, Mass. Call 617-2575.

WANTED: RC-610 transmitter. W5PIN, 5844 Argonne, New Orleans, Louisiana.

KWM-1. Power supplies 516E1, 516F1, matching speaker. Mobile mount, cables. Exceptional condition. $425.00. WØZHJ, 2444 D, Lincoln, Nebr.

WANTED: Collins 32S-1 and 516F-2. George Conn, 412 Old Boonton Rd., Boonton, N.J.

HW-12-22-32 Owners, inexpensive Triband conversion. Complete plans, $4.00 postpaid. Plans, Box 17, West Bend, Wis.

4X250B, $10.00 pair; 4X150A, $5.00 pair; 4CX250B, $12.00 pair, used; new, $20.00 pp. guaranteed. C. M. Pruett, Star Rte. C, Flamingo Bay, N. Ft. Meyers, Fla. 33901.

HOUSE, Custom-built estate home, ideal ham location. 400 ft. high point in Stamford ridges 35 miles from NYC. 3 bedrooms, den, 2 full baths, solarium, terrace, 2-car garage, sundeck, large kitchen, privacy. On landscaped acre: $46,000. Two adioining acres available. Financing arranged. 60' telescoping attached tower included. W1TZX Erich Quast, Skymeadow Drive, Stamford, Conn. 06903.

TV Camera, PH-548/AXT-2A, complete, image orthicon, TM, tested. $200.00 or SSB transceiver. K3NZR/Ø. L. Macknik, 1712 Mizzou Place, Columbia, Mo.

TELETYPES, parts. Fast service. Schmidt, W4NYF.

COMPLETE Station, in xcint condx. Eico 720, HQ-110C, HQ-10 speaker, all meter dipole, plus all accessories: $260.00. Write Bruce MacDonald, 1689 Central Avenue, Needham, Mass. 02192.

SELLING Station to pay college expenses. All gear in A-1 condition. Apache, $145.00; Drake 2-B with speaker, $195.00; HW-12, $110.00. John Carmody, KØOAM, 2915 East Locust, Davenport, Iowa.

FOR Sale: All with operating manuals. Johnson Viking Valiant xmtr, $185.00; Heathkit mobile: Cheyenne xmtr, Comanche rcvr, transistor power supply, HP-10 speaker, mic, mtg. rack, total assembly $175.00. Homebrew 6 meter 75-watt xmtr, as described in QST April 1960, $75. Mrs. B. L. Greco, Box 79, Brant Lake, New York 12815.

GSB-201 2 Kw. linear; SX-101A1; SX62A, all in excellent condition. Your choice, $195.00. F. D. Smith, W8GDY, 720 Elizabeth St., Kalamazoo, Mich. 49007.

HEATHKIT DX-20 transmitter, $20.00; Lafayette HE-10 receiver, $35.00. Jim Demarest, 433 Prospect Ave., Oradell, N.J.

FOR Sale: Heathkit HX-11 transmitter, like-new condx, $36.50. Bill Vaughn, 202 Ward St., St. Joe, Mich.

BARGAINS: Cleaning shack, all exclnt working condition following Heathkit items: Mohawk receiver front-end tuning assembly, $20; OL-1 3" oscilloscope (ideal for RF monitoring or RTTY), $20; AK-5 spkr, $4; AM-2 SWR meter, $5; HD-11 "Q" multiplier, $5; IP-10 var. voltage line isolation xfrmr, $15; GD-20 27 Mc. garage door opener electronics, one receiver, two xmttrs, all three $10; also, Turner 250 Dynamic mike, $9; fancy Turner dynamic mike and stand, model unknown, $5; B&W FC-30 bifilar fila. choke, never used, $4; Two RCA 7094 tubes, new, used, $15 ea; enclose SASE and postage with inquiries. K8BLL, Box 256, Rte. 2, Stevensville, Mich. 49127

COLLEGE Expenses force extra equipment sale: SX-99, $75.00; Heath GR-91, $25.00; both recently reconditioned by expert. Heath HD-14, Q-Multiplier, $10.00. WA5KXC, 517 Westminster, Kerrville, Texas.

FOR Sale: Heath Tunnel Dipper, $25.00; Q-Multiplier, $7.00; Alexander Redchuk, W5CND, 5607 Jackson, Houston, Texas #3012 and #3011 (152-162 Mc) and (40-50 Mc), respectively.

FOR Sale: Heath HX-20, HR-20, RME DB-23 Preselector, HX-20 converted to 200 watts: $225.00. Prepaid anywhere in the U.S.A. WA2ALA, 1044 Roxbury Drive, Westbury, N.Y. Tel: 516-303-0472.

SELL: Johnson Invader 200 transmitter, excellent condx with manual, $230.00. George Kraus, WØEUQ, 1822 S. 17th St., Grand Forks, N.Dak. 58201.

TWO Meter TDQ transmitter, good, $70.00. Local deal. DeSalvo, tel: TA-9-3070, N.Y.C., N.Y.

CE-20A w/QT-1, 458 VFO (160-10M), Vantron 300 linear, $150.00; Drake 1A, $100; good condx. Both for $225.00. Bernard Ricciardi, WB2EJT, 237 Ivanhoe Path, Manasquan, N.J. 08736. Tel: 201-223-0837.

HUNDREDS Of electronic parts, Nixie tubes, transmitters, VHF, RTTY, etc. Need space! 13-year collection. Card brings list. W9BQC, 2107 Charles, Rockford, Ill.

SPECIAL Filament xmfr. 120 v pri., 2 secondaries 7.6 v @ 21 amp. and 5.1 v @ 13 amp. New, sealed. $4.50 plus postage. Wt 14 lb. A.R.C. Sales, P.O. Box 12, Worthington, Ohio.

EXCELLENT Ranger, NC-300, both $300.00, plus shipping. Morse, Rte 3, Moscow, Idaho, Tel: 883-5241.

DRAKE 2-B, new condition; factory carton, $200.00; Heathkit HX-20 mint condition. $125.00. Both for $300.00. Robert Bertics, 1340 Sunnymede, South Bend, Indiana. Tel: Area code (219)-232-5390.

FOR Sale: Model 19 teletype, good condition. $150.00. Buyer must pick up. S. Foster, 2050 Elmwood Ave., Rochester, N.Y. 14620.

COLLINS: 75S-3, in excellent condx, $435.00 or your best offer. Write or call W9FYU, 518 W. Park Ave., Libertyville, Ill. 60048. Phone: 312-362-7346.

BOUND Volumes QST for sale, 1928 to 1935 inclusive. Good condition. Best offer. Mancorad Radio Club, Inc., 1313 Marshall St., Manitowoc, Wisconsin 54220.

FOR Sale: HT-37 SSB exciter, $255.00; HQ-100-AC, general coverage receiver, $105.00. Both are in mint condition. Mike Brubaker, WA8NOP, 3159 Shroyer Road, Kettering, Ohio 45429.

NC-183D rcvr w/Sideband adaptor, QST October 1957 and Oct. 1963, $130.00; Viking II and 122 VFO, $95.00, both for $215.00. All manuals, in xcint condx. McCune, K2HWE, 21 Lillian Dr., Scotia, N.Y. Tel: 518-399-1494.

SELL: All equipment in excellent condition: DX-40, crystals, $40.00; VFO, HG-10, $30.00; multiplier, QF-1, $6.00; S-85, $60.00; NC-125, $65.00; new Hy-Gain 66B beam, $30.00; AF-68, new p/s, $125.00; 6M Lafayette converter, $15.00; Heath Allband receiver, $23.00; pr. Vocaline 400's, mikes, $40.00; 1525 Washington, Conway, Arkansas, WA5ECP.

SELL: SB-34, like-new, $295.00. Want: Heath Single-Bander straight or converted for Tri-band; also KW Kompact. Sell: Conn flute, $50 (trade?). WAØHDX, 3305 W. 4th, Coffeyville, Kansas 67337.

BEST Offer: Precision E-400 sweep generator, new; Precision E-310 Sine/Square generator new; Simpson 388 Thermo-Meter new; Teletest capacitor bridge; Jackson 49er Tubetester, RCA geiger counter, Telectro MR511 tape-recorder; Mohawk Midge-tape 300 tape-recorder new; Emerson Wondergram phonograph new; Zenith Royal 850 Radio. Mail order only. Witmer, 217 S. East, Oak Park, Ill.

EXCELLENT Equipment and parts for sale: Collins 75S-1, $260.00; Heath HW-12 (never used, new), $100.00; Phasemaster II-B, $125.00; 50 ft. aluminum tower, $30.00; two new 4-400A tubes, including new fil. transformer, $45.00; tube-checker, VTVM, battery eliminator, microvolt signal generator and more. K5OGK, Rte. 2, Box 300, Neshanic Sta., New Jersey 08853. Tel: 201-369-4337.

2-METER Station: Tecraft TR-20/144 Criterion converter; power, relay, BC-348, AR-22, 8-el. Hy-Gain, coax, Whole/part. W8FAX, Falls, Box 182, Allen Park, Michigan 48101.

HAMMARLUND HQ-145 receiver, like new, $150.00; Knight T-50 xmtr, $28; HA-1 keyer, $60; new tubes 5894, $9; 4CX250, $7; Hallicrafters SX-101 receiver, $150. Wanted: Matchbox, rotator, CB equipment. Send SASE for list. W2FNT, 18 Hillcrest Terrace, Linden, New Jersey 07036. Phone: 201-486-6917.

DRAKE 2-B. In excellent condition. $175.00. K7URR, Room 924, University of Washington, 1101 N. E. Campus Parkway, Seattle, Wash.

SX-101 Mark 1 Receiver. Original owner, not a scratch! No tampering or changes. Perfect operating, all bands. $99.00. Locals only, cash & carry. W2JBL, 123 Davis Ave., Hackensack, N.J.

ESTATE Sale: SX-100 Hallicratters w/spkr; Eldico SSB-1000 transmitter; SSB-100 exciter; Cornell-Dubilier rotor TR-2; Heath HH1 voltmeter, Heath T-4 signal tracer; EICO VTVM; 221P-RCA 'scope WO88A; Eico 369 sweep generator; Eico 666 tube-tester-4 FM IF strips; 1 BSR tape-head. $695 for everything. W. L. James: 201-228-2771, Bloomfield, N.J.

PENTA 4-400A's, slightly used, $16.00 each postpaid. K6SGQ, 189 Petaluma, Long Beach, Calif.

SELL: SB-110 with AC-DC supplies. Has not been checked on the air. $400. HW-10, $150. Will ship p.p. or deluxe within 100 miles of Jacksonville, Fla. Ens. John Butrovich III, W6GTJ, U.S.S. F. D. Roosevelt, CVA-42, c/o F.P.O., New York, N.Y.

4-1000As wanted. Will pay cash for these in good condition. Surplus, new or used. Also want Clegg Zeus xmttr. Must be vv clean and reasonable. WA4YFI, Bill Smitherman, Rte. 2, East Bend, N.C.

DX-60 and VFO, new, $105.00; HQ-170, gud condx, $240.00. Will ship. K8YWS, David G. Steffens, 656 Cascade Rd., Cincinnati, Ohio 45240. Phone 513-825-8333.

WANTED: Cabinet for Johnson Viking II transmitter. Old unit acceptable if priced right. B. G. Brandt, 241 Retama Pl., San Antonio, Texas 78209.

GOING SSB. Must sell T-150, $70.00 First check gets it. Lon, WB2ETV, 77 Gless Ave., Belleville, N.J.

NEED Coils for C.E. 10-A. W5HKW, 121 Williams Rd., Vicksburg, Miss.

FOR Sale: 1—944 Eico Klyback tester, $14.00; 1—KG 670 R/C tester (Knight) $15.00; 1—230 B&K substitution box, $15.00; 1—tube tester (Sencore), $35.00. All used but A-1. Robert Penko, c/o Kirtland Hardware, 9183 Rte. 306, Kirtland, Ohio 44094.

SELL: SX-101, Mk III: SX-111, Eico 723, Matchbox, SWR, Atomic instr. 15000V DC reg supply; plate trans. 7 KV, 5 KV at 1 A., 110/220V AC input; broadcast quality speech compressor, U.S. Govt. AM 864/U; McLean dual blower. Make an offer. K2LAI, 427 East 69th St., NYC. Tel: TR 9-8087.

COLLINS 32-V-3, exclnt, $160; D-104 mike w/stand, $15; Vibroplex bug, $10; conv. prop pitch w/xformer, $15. Cash and carry only. Lee Osborne, WB6GJJ, 619 No. Willow, Compton, Calif. Tel: 631-5590.

WRL Blue Book prices save money. Take 10% off these low prices without trades. TR3—$399.00; SB-34, $319.00; Galaxy III, $219.00; Galaxy 300—$199.00; SB33, $209.00; NCX3, $219.00; SR-150, $389.00; HW-22 and HW-32, $129.00; Communicators: III/6m, $159.00; IV/6m, $219.00; SR34AC, $199.00; Sidewinder 2m, $299.00; Polycom 6, $199.00. Hundreds more. Free list. Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

2 EL. Pre-tuned Triband quad, only $29.95. Brand new. Sturdy bamboo spreaders. Quality construction guaranteed. WA8MQE, 3645 Tolland, Cleveland, Ohio.

WANTED: Many types Military, Commercial, Surplus. Airborne, Ground, also test sets. Try the big boys, then write or call Collect: Area code (703) 560-5480 and give us your price. We pay cash and freight. Dun & Bradstreet rated. Ritco, P.O. Box 156, Annandale, Va.

COLLINS KWM-1, perfect, no mobile use. $290.00. KØGVX, 1900 Muscatine, Iowa City, Iowa.

FOR Sale: SB-100, SB-200, SB-300. Wanted: any kit to wire and repair, prefer Heathkit. Most Heathkits in stock. Business references on request. Lan Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

GOING Cliff-dwelling. Selling all electronic gear owned. Valiant; NC-300; Tribander; rotor; coax; D-104; bug; antenna relay; headphones; Cheyenne; AC and two DC power supplies for Cheyenne; 80-meter mobile receiver; ceramic mike; Bandspanner, mount and spring; Hickok tube-tester; LM-13 w/hook; scope; grid dipper; voltohmeters; continuous coverage National receiver; capacity relay; spare tubes for all plus many more; resistors, capacitors, relays, wire, callbooks, engineering books; handbooks; instruction books; back QSTs; junk boxes, etc. Fixed station factory wired—mint condition—original cartons. Approximately $950.00 value. $700.00 cash. Terms if good credit. You haul. W6YQS, San Francisco 731-4000 or 564-0235.

FLAWLESS HW-12 with xtal, calibr. and SB-200, used 6 and 2 months respectively. Must sell as package for $325.00 or get SB-100. WA4YTK, Rte. 2, Vina, Alabama.

SELL HQ-180C, $250.00; NC-303, $250.00; Viking Valiant F7W, $200.00; 6N2 with matching VFO, $95.00; Gonset G-50, $200. All equipment with manuals and in good condition. William E. Daupert, Route One, Lebanon, Ind. 46052.

75A4 with RCA speaker, $400. Excellent condition in all respects. W2AOW, tel: 607-749-2308.

"HOSS-Trader" Ed Moory, says if "You can pay cash and no trade involved you can purchase the following "Demonstrator Equipment with Factory Warranty: SR-500, $329.00; SB-2 Linear, $199.95; SB-34, $339.00; SWAN-350, $348.00; Drake, TR-4, $479.00; HAM-M Rotor, $89.95; NCX-5, $575.00; R-4A, $329.00; New Galaxie 2000 Watt Linear, $349.00; New TA-33 Mosley Beam and Demo HAM-M Rotor, $169.00; Galaxy V, $329.00; Reconditioned & Guaranteed: SB-33, $198.00; Swan 240, $199.00; HT-37, $239.00; 2-B, $195.00; 20-A, $99.00; SX-111, $129.00; HQ-145, $119.00; 32S-1, $399.00; 75S-1, $298.00; KWM-2, $695.00; New Eico 753 TRI-Bander Transceiver, $159.95; T4-X, $289.00; TR-3, $395.00. No Reasonable Cash offers Refused. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WHitney 6-2820.

SELL: CIE complete first fone course with slide rule. Also LM with cal. book and HB supply, all exclnt condx. E. E. Marriott, W9IRF, 58 Torrey St., Clintonville, Wis.

FOR Sale: Mosley TA-33 Jr. beam. Will deliver within any reasonable distance. Best offer over $35.00 takes it. Russel Appleyard, WA2MHY, 16 Coolidge Street, Larchmont, New York. Telephone: 914-TE-4-3470.

QSTS: Over 275 old issues. Almost a complete run from 1936 to 1963. Also CQ Magazines from 1945-1963. Make offer. W5LTY/6, 2458 Lullaby Lane, Anaheim, Calif.

RTTY Channel Filters, octal mounted, 2125/2975 cps, $5.95 pair. 88 mh toroids, uncased, 5 for $2.50. WA6JGI, 3232 Selby Avenue, Los Angeles, Calif. 90034.

ESTATE OF W4GZI. 30L-1, $350.00; KWM-2 with Waters "Q" multiplier and AC supply, $750.00; SR-150, mobile mount and DC supply, $400; NCX-3, AC and DC supplies, $400. All in vv good condx. Contact W5OJB, 3626 Lisa Drive, San Antonia, Texas.

INVADER 200, clean, make offer. K1VTM, 2438 Stanley, New Britain, Conn.

HALLICRAFTERS SX-101, $150.00; Communicator II 2M, $125.00; Globe Hibander 6/2M, $75.00; BC-221 HA-1 keyer, 500W isolation transformer. WA2VHW, 18 Hillcrest Terr., Linden, N.J.

OLD, Old radio magazines, 1922-25, over 100, many kinds, also directories, catalogs, call-books, detailed list 20c. Clark, Box 266, Albia, Iowa 52531.

DRAFTED Into army. Must sell out: SR-160 w/matching AC supply containing SWR bridge, $300; 4CX1000A (new), $100; 4-400A (new), $25.00; 4-250A, $15.00; vacuum variable, USL 300 w/head, $45.00; Heath HP-13, $40.00; Collins F455F15, $25.00; Collins F455J31, $25.00; Collins F455N20, $25.00; Collins 70E2 VFO, $10.00; Ameco CN5OW (new), $30; B&W 550A (coax switch), $5.00; 4-125A, $10.00; Daven 4" sq. DB meters, $10.00; 100 kc. xtal, $2.50; 136 bug, $5.00; Hammarlund "Four-11" mod., $15.00; pr 4X250B w/air sockets, $25.00; rotary inductor (500W w/counter dial), $7.00; Rotron Muffin fan 14W, $7.00; Lafayette HE-90, $35.00; 226 Mc. FM/AM xmtr (commercial), 150 W less final tubes, $20; UTC VM-5, $50.00; UTC CVM-2, $7.00; Triad TY-80 (new), $4.00. Send check or money-order to Larry Pace, K2IXP FUSAMV, Fort Meade, Maryland.

COLLINS S/Line, 75S-1 with 500 cycle filter and Waters Q-multiplier, $325.00; 312B4, $125.00; 32S-1 all factory modifications, with 516F2, $410.00; 30L-1, $350.00. All equipment used very little and in sootless condition. Package price, $1100 and will include free, custom birch operating bench. WA2OBZ, 3 Pryor Place, New Rochelle, N.Y. Tel: NE-2-7450.

FOR Sale: New Hammarlund HQ-110A rcvr. Used 4 months. Perfect condx. Matching spkr, incl.: Heathkit DX-60. Used Novice year. FB condx. Xtals and key incl. Make offer. Bruce Porter, 6060 E. Atherton Rd., Flint, Mich. 48507.

HALLICRAFTERS SX-101 Mark III for sale. In excellent condition. Take first $175.00 on a pick-up basis only. Ken Hookanson, 1328 Bonnie Glen, Glenview, Illinois.

SENECA, new condx, 120W, on 2M, 200 on 6M. No TVI 6 or 2! Also 2M Ameco Nuvistor 28-30, 6M LAF conv. 7-11, Finco A62 beam. Cash, $250. WB2OQK, Schwartz, 1129 Astor Ave., Bronx, N.Y.

KITS Assembled by professional wiremen/technicians for approx. 1/3rd kit price, inc. testing. Write for details. Nat Wadsworth, 1 Edgerton Court, Darien, Conn.

LOUDENBOOMER Mark 2-A linear amplifier, brand new, in perfect condition, with power supply, $295.00. C. Brooner, P.O. Box 272, Morton, Ill.

DRAKE 2-B, 2-BQ, 2-AC, all 10 meters xtals. New condition and performance, $200.00. WB2FGR, Meleske, 786 Grand Terrace Ave., Baldwin, L.I., N.Y. Tel: BA-3-0101.

CLERGYMEN Of all faiths! Sixth Edition of Clergy and Religious Radio Operators Callbook to be published soon. Please inform us of additions and changes. Over 1000 calls now included. No cost or obligation. Write: Callbook, Capuchin Seminarians, K1QFT, Box 218, Hudson, New Hampshire 03051.

SELL: Complete station, Elmac AF-67 transmitter, AC power supply, Drake 1-A receiver, Mosley TA-33 beam. Best offer takes it. M. Fox, K2OWO, 97-07 Horace Harding Expressway, Corona, L.I., N.Y. 11368.

WANTED For cash: Collins 30L-1, 351-D2 mount, MP-1 supply, WØDVZ, Box 475, Ottumwa, Iowa.

HT-37, $250; Drake 1-A, $125.00. Both plus all accessories including antenna wire for $350.00. NYC evenings: TR-3-5531.

FOR Sale: Heath Tunnel Dipper, $25.00; Q-Multiplier, $7.00; Crystal calibrator, $5.00. Rick, Box 359, Lehigh University, Bethlehem, Penna.

G-E 600L, mint condition: $175.00. W4IEN.

CERTIFICATE Will be issued by Henry Ford Museum to any station that works the Motor City Radio Club station, W8MRM, during the 24 hours prior to the Old Timers Night banquet. Work W8MRM on May 7 (GMT) on or near 1.815, 3.663 (even hours), 3.900, 7.070 (odd hours), 7.215, 14.300, 50.178 or 146.94 Mc. Novice contacts by schedule. QSL for certificate. Beverley M. Stoner, K8ZJU, Sec'y. Motor City Radio Club, Greenfield Village, Dearborn, Mich.

NATIONAL NCX-3, NCX-A original owner, like new condx. Perfect physical and elect. condx. Never mobile. All factory recommended changes installed: $300.00. A. R. Malone, W1FKE, 3 Chestnut Ct., Seymour, Conn. Tel: 203-888-4607.

SELL: Central Electronics 100V, mint condition, with instruction manual. Approved factory modifications, improved audio circuit. Spare set of matched 6550's for final amp. Original shipping case. Foto sent on request. Will ship for $395.00. Alexander Redchuk, W5CND, 5607 Jackson, Houston, Texas 77004.

NEW 4000 watt AC power plants. Kato generators, Kohler 8 HP engines. Factory direct, only $350.00. Department ZKO, Box 149, Mankato, Minnesota 56002.

WANTED: Collins 62S-1, R. Arrowsmith, 1204 North Evergreen St., Arlington, Va. 22205.

SELL: Lafayette HA-90 VFO—excint condx, $26.50. Dave Rabenhorst, K3WPN, 12507 Davan Drive, Silver Spring, Md. 20904.

6 FM Motorola coffin-box transmitter and receiver, 12 VDC. Tuned up 52.525 cables, crystals, speaker, etc. Beautiful condition. $80.00. Federal Electronic, Siren, P.A., 12VDC, 4 lbs., all transistorized—latest model. 100 watts w/1 spkr, 150 w/2 output. Cost over $200. Will sell for $120. Gonset Tuners, #3012 and #3011 (152-162 Mc) and (40-50 Mc), respectively. Receiver police, fire, mobile telephone, ambulance services, highway patrols. F.B.I., etc. Illuminated dial. Squelch $65.00 each. All F.o.b. Richard M. Jacobs, WAØAIY, 1015 Glenside Place, University City, Missouri 63130. Tel. (314) WYdown 1-1941.

SELL: SX-71 general coverage receiver .5 to 34 Mc. with band spread on all ham bands, $100.00; Wanted: capacitors, oil: 40 mfd. minimum at 4000 wvdc. Chokes: 10 henry minimum, .5 amp continuous, 1.0 amp peak, 7500 volt insulation. Write W9BZW, George Hanus, 4833 N. Knight Ave., Norridge, Illinois 60656.

SIDEWINDER Two meter Gonset, less power supply, $250.00. KØGRP, Estelline, S.D.

SELL: 5 in. 'scope, Eico 427; used less than 5 hours, $50.00; Hallicrafters S-118 (covers 19-30 mc.); used less than 10 hrs, $75.00; Central Electronics 20-A; never used, $135.00. All like-new with manuals. John Libby, W2SWA, 16 Dorchester Ave., Hastings-on-Hudson, New York 914-GR8-3180.

SELL: Hammarlund HQ-170AC receiver with matching S-200 speaker, $239.00; Hallicrafters HT-44 SSB transmitter with matching PS-150-120AC power supply/speaker combination, $269.00; HT-41 Linear amplifier, 3 months old, $219.00; Millen 2 KW Transmatch, Model 92200, $79.00; Millen Monitor oscilloscope, model 90932, $59.00; Hallicrafters HA-1, "T.O. keyer" and Autronic Key, $59; Johnson TR switch 250-39, $17.00; RCA signal generator, $9.00; Superex Amateur Headphones AP-S, $9.00; Tetrex 8-el. 2-meter beam, $5.00; Carborundum HL-CC-1 100-watt dummy load, $4.00. All equipment originally bought new and in perf.condx. All less than 1 year old. Contact: Harvey Silberstein, 49-17 Cloverdale Blvd., Bayside, L. I., N. Y. 11364. Tel: (212)BA-5-7014. WB2LBW.

COLLEGEBOUND: New rig must go. NC-155, $150.00; T-60, $25.00 or your best offer. Jim Hamley, 604 East Rockwell, Arlington Heights, Ill. 60005

SALE: B and KT.V. analyst model 1076, $150.00; Seneca, $120.00; Ameco CN-50 converter, IF 14-18 Mc. with power supply, $31.00; 8 in. f8 telescope mirror by Criterion $60.00. Ronald Silver, 32 North College, Athens, Ohio.

THOR 6 w/A.C., $225.00; T-150A, $70.00; SX-110, $80.00; Mobiline 6 (6M), A.M. 20 W. transceiver w/VFO, $117. 6,12 v. supplies, $100; all in excint condx, and p.p. Want: (6 & 2 M) Interceptor rec. WA9KAN, 1436 Bonniebrae, River Forest, Ill. 60305.

SSB Sacrifice: Heath HR-20, HX-20, AC power supply, VOX mike, professional wired, never used. Needs bench check or new tube. Cost $435.00. Asking $250.00, plus freight. WA2AZF.

SR-150 AC supply, $500: never mobile and hardly used on SSB, C.W. only! EE student needs cash. Frederick S. Macary, K1-NVY/3, 105 Llanfair Rd., Bala-Cynwyd, Penna. 19004. Tel: (215)-MO-4-5087. (nr. Philly).

JOHNSON Pacemaker, $135.00; Johnson Ranger I, $100.00; Babcock mobile transmitter, less power supply, $25.00. Will ship F.o.b. KØJGI, Box 73, Ottumwa, Iowa.

16 MM Professional movie outfit, trade for SSB equipment. Prefer high quality transceiver adaptable to mobile operation; consider S/Line type gear. Cine-Kodak K-100 turret camera with Ektra II 25 MM F-1.9, Raptar 3 inch F-4 cine telephoto with size 4.5 filter hood, Raptar 17 MM F-2.7 with size 4 filter hood, complete with leather Cine-Kodak K-100 field case. Bell & Howell model 273-A projector; will include model KE-16 Craig projector-editor and Craig master splicer if deal requires. All in new condition. Will consider part cash if necessary. W. Hooper, 366 S. El Monte Ave., Los Altos, California 94022.

FOR Sale or trade: Complete amateur radio teletype station: 60" cabinet, freq. exciter, freq. converter, 3" scope, S.P. 600 JX rcvr, twin DC power supplies with meters. Model 28 TT with keyboard, models 14, T.D. and reperforator, spare parts, etc. Will trade for Collins trans. and recvr. or best offer. Sorry, no shipping. Pick-up deal only. N. A. Masterton, WAØIQQ, 300 West 6th St., Litchfield, Minn.

GLOBE Scout AM/CW transmitter, $35.00; Eico 722 VFO, $25.00; Heathkit SWR/Power meter, $10.00. Complete package, $60.00. WA1DJD, 63 Freeman St., Hartford, Conn. Tel: 249-0313.

FOR Sale: Collins 30K-1, in gud operating condx, and in appearance (sorry, no shipping!): $300.00. W1DBS, John Savonis, 410 Blake Rd., New Britain, Conn.

WANTED: Set of tapes for TG-34 code machine. Elvin Smith, 2522 Stratford Road, Columbia, S.C.

NEW Tubes late production sealed poly bags. 7580—4CX250B, $19.00 each; 4X150A sealed bags, $9.00 each; Collins PTO 70E-23, new, $39; 70K-1, $19.00; KWM-1 DX adaptor, new, $19.00. Novice Adaptor, new, $9.00. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

SELL Johnson Viking 500, in excint condition, factory-wired 4-400 in final. No first reasonable offer refused. Pick-up deal only. W8DSW. Rowland Hudson, 6635 Crane Ave., Detroit, Mich. 48213.

TR-4, $480.00; AC-3, $68.00; DC-3, $108.00; all factory sealed, never opened. Warranty, naturally; sell separately. G. M. Palmer, K4LGR, Box 10021, Greensboro, N.C.

DRAKE 2B, calibrator, 2AQ, HT 37, HT-41. Very good condition. $575.00 takes all. Will sell individually. W8MEC, Box 490, Bellefontaine, Ohio.

COLLINS S/Line: 75S-3 and 32S-3 with extra 10-meter crystals, cables, L.P. filter, Johnson VSWR meter, dummy load, monitor scope and 24 hour clock. Complete Deluxe station for sale: $1100. Owner transferred and has no chance of set-up in new location. Also large collection of v.h.f., u.h.f., and microwave goodies. List on request. WA5KGO, Parks, 9 Kitchell Place Morristown, N.J. 07961. Tel: (201)267-9545.

TOO Much gear. Must sell: Hammarlund SP-600JX, mint, $395.00; Hammarlund HQ-140X, excint, $135.00; National NC-183D, excellent, and spkr, $145.00; Hallicrafters SX-100, mint, and spkr, $145.00; Heahtkit Mohican, good, $70.00; also 1 each of several transistor portables, Sony 9" TV, etc. All guaranteed, all f.o.b. Northridge. Dick Nelson, 18440 Halsted St., Northridge, Calif., 91324.

HALLICRAFTERS HT-37, $230.00; Drake R-4, $290.00, both guaranteed like-new. Albert Brehm, W8MFW, 5081 Sumter, Cincinnati, Ohio. 45238. Phone 921-1037.

EICO 753 transceiver with regulated oscillator filament voltage for greatly increased stability. Excellent fixed or mobile, $190.00. Central Electronics 10-B with QT-1 and CE-458 VFO. Excellent, $80. HW12, $105.00. HQ-129X, $100. Jack Buchanan, K4FRS, Box 391, Winchester, Kentucky.

SELL: Bandhopper, VFO, Phasemaster II, SSB xmtr, needs adjusting, $85.00; HA-5 heterodyne VFO, Eico 720 xmtr, $90.00; two 700-V 300-mil power supplies, $20 each. W3CD, 211 Sumner, New Castle, Penna.

FOR Sale: Complete station, Mohawk rcvr, DX-35 xmtr, Viking VFO, Signal Sentry, antennas, much miscellaneous. $200 or your best offer. Alan Berens, K9IEJ, 5335 S. Dorchester, Chicago, Ill.

CHRISTIAN Ham Fellowship being organized among Christian hams for the purpose of fellowship, missionary efforts among hams, tract evangelism and gospel efforts. Christian Ham Callbook for $1 donation. Details free on request from Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Mich. 49424.

SELL National NC-98 receiver. Excellent condition, only used occasionally: $75.00. Victor Vaughan, WA6ACV, 216 N. 10th St., Montebello, California 90640.

AC Power supply, WRL 63A 600V and bias, $20.00; Hiverter 6-meter transmitting converter, $25.00. Write WA0AYP, Egan, S. D.

HQ-110 excellent, $100; VHF-62 with relay, $75.00; 3-400 Mc signal generator, $95.00. Richard Barnes, 368 East 2nd South, Provo, Utah.

WANTED: Central Electronics SSB Slicer, Model B, in excellent condition. Write me. Harold Collins, W8LEZ, 225 N. Jackson, Lowell, Mich.

COLLINS 75A-4 and Ranger II, both like new, $600. K4AOZ, 572 Park Avenue, Birmingham, Ala. 35226.

NORTHERN Wisconsin wild land: Trade 200 ft. Namakagan River lot or forty (near Hayward) for good RTTY outfit ham gear, or? Albert Pratt, 114 W. Lakeview Ave., Milwaukee 17, Wis.

HT-37 Transmitter in excellent condition: $240.00. K1UDP, 120 School St., Braintree, Mass. Tel: VI-3-1282.

SWAN-350 with 117 XC power supply. Used but few hours. Guranteed. $435.00 cash. "Rus" Sakkers, W8DED, P.O. Box 218, Holland, Mich. Phone ED-5-8545.

COLLINS 75A3, 32V-3 unmodified, excellent throughout. 3.5 and 6 kc. filters, etc. Complete $450.00 or $250 each. K6CUK, 1502 East Sycamore, El Segundo, Calif.

SALE: KWM-2, 516F mint, $750.00; SX-101 MK-3, mint, $150.00; 516E1 DC supply, $75.00. W6SCI, 2280 Hanover, Palo Alto, Calif.

TIG-Array Tri-band beam, $65.00: CDE TR-44 rotator, $45.00; Viking 122 VFO, $40.00. S. H. Reck, Box 241, South Wellfleet, Mass.

QSTS Over 300 copies, 1922 to 1964. Write for list and prices. Make offer for all. W1TF, Elmer Turner, 2 Virginia Circle, Reading, Mass.

CENTRAL Electronics 100V SSB transmitter. Late model, absolutely mint condition: $400. No trades! Sry! J. P. Scott, 3533 Wyandotte, Kansas City, Missouri.

A Good buy! Swan 400 transceiver and Swan 420 full-coverage VFO. All original packing and cartons; absolutely like-new condition; never mobile. Prefer W6 area deal, but will answer all inquiries. $419.00. J. M. Lobmaster, K6BBY, 4436-C West 117, Hawthorne, Calif. 90250.

ANTIQUE Collectors: Still have some W.E. VT-1s, McCullough 401's, 99's, 102F, 205D ur choice, $2.00 each plus postage. Jennings UZ50 vacuum variable condenser, $25.00, some 6146's, 6883's, tested OK, $1.25 each plus postage. Samkofsky, 201 Eastern Parkway, Brooklyn 38, N.Y.

FOR Sale: HT-40, $65.00; SX-140, $85.00. Excint condition, separate or together. Chuck Dyess, Box 103, West Georgia College, Carrollton, Georgia. Tel: 832-9161.

9M2GA requests assistance from old contacts, location of 32S-1 or 32S-3 with AC supply. Also good used 9 Mc. McCoy filter. Please write Dr. Lee, Jalan Majidi, Muar, Malaysia.

SB-10, excellent condition, $60.00. W2QDY, 2319 Wayne Ave., Camden, N.J.

SELL: Drake TR-3 with AC supply, 1 year old. Mint condition, $375. F.o.b. Arthur Vogel W2RKO, 212 First Ave., Massapequa Park, L.I., N.Y.

LISTENERS: SWL News is devoted entirely to SWLing. Sample copy 60 cents. SWL News, P.O. Box 9768, Kansas City, Mo. 64134.

Sell Heath VTVMs. Models V6 and V7a. $15 each FOB Hartford. R. L. Baldwin, W1IKE, 26 Ridge Road, Simsbury, Conn.

FIRST Check takes HQ-170 with matching speaker, manual, recently factory-converted to HQ-170A, $200. Also HT-37 with TR switch, manual, $215.00 and Courier linear w/manual, cables; 500 watts on SB, 500 C.W., 200 AM, $115.00. A package deal for $500.00. Everything guaranteed in perfect operating condition. W5JUZ, Lauderdale, 6601 Nasco Dr., Austin, Texas.

VIRGIN Eico 720 F/W, $60.00. Late model SX-101-A with R-48 spkr. Used 300 hours, $180.00. All perfect, factory cartons. J. Czar, Poultney, Vt.

NOVICES Complete station—NC-77X w/S meter, 40-watt xmtr w/7 xtals, complete, $75.00. WB2TFK, 320 Grant Ave., Cresskill, N.J. Tel: 568-2715.

SWAN 240, $180.00; Gonset 101 Linear, $140; HX-30 six meter sideband transmitter, $150. Hallicrafters SX-111, $120. Hallicrafters SX-71, $60. Philip Schwebler, Jr., W9GCG, 4536 N 50 St., Milwaukee, Wis. 53218.

HQ-180C, matching speaker, $180; Globe Champion 350, PTT mike, $170.00; Telrex beam 10/15; w/tower, $50. B&W lowpass, $6.00. WA2OFK, 596 Rutland, Teaneck, N.J. Tel: 201-836-2836.

FOR Sale: Physically clean, electrically excellent: GSB-100, $180.00; HQ-170C, $185.00: both for $350.00 F.o.b. J. Taylor, K5PAC, Box 288, Osceola, Arkansas.

SACRIFICE: HT-44 and matching PWR/Spkr, SSB/CW/200W, AM/50W. Same as new (4 mo.) Amnet, $494.50. Urs for $275. Want sked to hear? New HA-6 and matching pwr transverts xmtr and rcvr 10M to 6M 100W. Amnet $449. Urs, $105. Perhaps wacky but want SB-400 to match SB200/300. W5ACL, 4010 River Dr. Houston 17, Texas.

VIKING Challenger with Heath VFO and PTT perfect, $60.00. W1LOF, Stanley Ciaburri, 72 Hillside Ave., West Haven, Conn.

MUST Sell: HT-37, $290.00; Drake 2-B, 2-BQ, Knight xtal calibrator, $240.00; Heath HQ-10 monitor 'scope, $60.00; Heath SWR bridge, $10.00. AR-22 rotor, w/100 ft. cable, $20.00. All in excint condx. All f.o.b. Prices not firm. K5SPM, 11415 Chatten Way, Houston, Texas 77024.

SELL! No reasonable offer refused: Halicrafters HT-30 exciter; Heathkit HW12, two linear amplifiers, one B&W 1000L, one Central Electronics 600L. Heathkit HW12 high voltage oil-filled condensers, low DC resistance chokes and plate transformer. New HD-32, 3B28 tubes. W2CUZ, D. B. Whittemore, 36 Masterton Rd., Bronxville, N.Y. 10708.

FOR Sale: HT-44; perfect, under 10 hours use. Built-in antenna relay. $300.00. WA0GST.

DRAKE 2AC crystal calibrator, $11.50 postpaid. Serratronics calibrated dial for 2A-B receivers, $1.50. WA6QIC, 1849 Middleton, Los Altos, Calif.

COLLINS KWM-2 PM2, mint condition, MARS use only, in factory cartons. $825. F.o.b. McLaughlin, Dufied Road, Lennon, Mich.

APACHE Heath TX-1 transmitter for sale, excellent condition, $100.00. Jim Flynn, W4ISM, 1704 Drewlaine Dr., Vienna, Va. 22180.

SELL: NC-183D receiver clean as they come: $145.00. Want: National NC-400. W2DYU, 360 Marlboro Road, Englewood, N.J.

RTTY For sale.: Very clean Model 19 for sale. Best offer takes it. Sorry, I won't deliver or pay freight. Contact Larry, K9BJM, Hoopeston, Illinois 60942.

SELLING: Central Electronics 20A, QTI, matching VFO, nearly new NC-190; SX-100. Both with calibrators. Heathkit Tri-Band converted HW22. All excellent, with manuals. First best reasonable offer. Lewis Ralston, 105 West Ann, Knoxville, Illinois.

SELL: DX-60 with HG-10, with manuals. Both excellent operating condx and clean, $80.00. First certified check takes it f.o.b. WA4UMU, Chuck Warren, Star Route, Lyles, Tenn.

HAMMARLUND HQ-110 (original carton); HT-37, manuals included, $385.00. Will separate. K2OSA, 249 East Shore Drive, Massapequa, L.I., N.Y. 11758. Tel: 516-541-1322.

SELLING Entire station: B-W 5199B and 51SB-B, $425.00: Collins 75A-1 w/s, $215.00: B-W LPA-1 amplifier and matching LPS-1 power supply, $325.00: entire package plus B-W 381-B T-R switch, plus B-W Matchmaster for $895.00. Also: SX-42. Needs alignment, best offer over $150.00. Spec Bowers, WB2-RDJ, The Hill School, Pottstown, Penna. 19464.

CRYSTALS Airmailed: Nets, SSB, Novice, MARS, etc. Custom finished to ordered frequency. Etch stabilized FT-243, .01% any frequency 3500 to 8600 $1.90. (Five or more same or mixed frequencies $1.70) (Ten or more same frequency $1.35) 1700 to 3499 and 8601 to 20,000 $2.50. Above 10,000 kilocycles are overtones. Add 50¢ each for .005%. Add 75¢ each for HC-6/u miniatures above 2000. ARRL SSB Manual, Handbook and QST builders crystal kits: "DCS-500", "IMP" $9.95 Write for literature. State exact needs. Postage: 5¢/crystal or 10¢/crystal airmail. Crystals since 1933. C-W Crystals, Route #2, Box 22-B, Marshfield, Missouri 65706.

COLLINS 75A-4 serial No. 4256, mint condx, with reduction knob. $375.00; also 3 extra filters 6 Kc, 2.1 and 800 cycle, $25.00 each with receiver only. Central Electronics 200V in very good condition. $395.00. Shipped in original wooden crate. Stanley Partyka, K1AGL, 141 Waite Ave., Chicopee Falls, Mass. Tel: 1-413-592-2952.

COMPLETE SSB Station. Hammarlund HX-50, $260.00; HQ-145XC with clock, calibrator, S-200 speaker, product detector, SSB and CW AGC, $165.00. No holes in panel. HD-11 O-multipl., $15.00. Package deal: $400. Will ship. Macdonald, K2GKK/5, 1033 Usher, Fort Worth, Texas, 76126.

TOROIDS, 88 mh, uncased, 5/$2.50 postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

SELL: Like new, Swan 350 transceiver with AC and DC power supplies and VOX unit. Still in factory warranty, $500.00. Also new 4-1000, $50.00 subject your approval. Westbrook, c/o FAA, Galena, Alaska, 99741.

FOR Sale: Telrex 20-meter 3-el. O.S. Super-Deluxe beam, 26 ft. boom. $100.00. Gary Stilwell, W6NJU, 8114 Irondale, Canoga Park, California Tel: 341-9899.

CE-20A SSB exciter, VFO, instructions, $100. Pair 811s, GG linear and PS, $40.00. Want RF and AF signal generators, good oscilloscope, test equipment. Bill Wanbaugh, 2604 Weller, Wheaton, Md.

CE-20A SSB Exciter, VFO, instructions, $100.00. Pair 811's, GG linear and PS, $40. Want RF and AF signal generators, good oscilloscope, test equipment. Bill Wanbaugh, 2604 Weller, Wheaton, Md.

FOR Sale: FB condition: DX-60A, $60.00; HG-10 VFO, $25.00; Knight R-100A, $65.00. Package deal: $125.00. Will ship. Robert Whitaker, WA5LJB, 2314 11th St., Lake Charles, Louisiana.

ASB-7A and watch repair tools traded for amateur equipment. Bernie Savko, 411 Princeton Drive, Pittsburgh, Penna. 15235.

KWM-2 with Waters "Q" multiplier, Collins power supply, low serial number, clean, in excint condition. First $650.00 gets all. W5KAE, John Adell, 7615 Mason Dell, Dallas, Texas 75230. Phone: Area (214) FM-81071.

SELL QSTs 1915-1920. Best offer. Landa, Clayton, R2, Georgia 30525.

WANTED: Collins parts for R-390A receiver. Need VFO, ant. relay subchassis, mechanical filters, crystals, etc. W3CQ, 7116 Longwood Drive, Bethesda, Maryland 20034.

HT-37, $275.00; Gonset GSB-201, $190.00; Drake 2B, $180.00. All in very good condition. W9HHA, 8019 Catherine, Chicago, Ill. Tel: 312-457-0812.

G-E 5 inch oscilloscope, ST-2, identical direct coupled XY amplifiers, internal voltage calibrator, excellent working order, with probe. W3AEQ, Box 62, Lehigh University, Bethlehem, Penna.

GONSET G-76, 12Vdc pwr. supply, $115.00. WA0JUK, 421 N. 17th Ave. E., Duluth, Minn. Tel: 218-724-1249.

SELL: Swan 350 w/a.c. power supply, 9 months old. Used but little, excl. condx. Asking $300.00. P. O'Brien, 63 Second St., New Rochelle, N.Y. 10801.

TRIAD Transistor power transformers, TY-81 (12v) & TY-101 (6v): output FWB 187.5/375 volts @ 200 mils. Limited quantity, $10.00 each, postpaid (U.S. only). Components, P.O. Box 10793, Raleigh, N.C. 27605.

JOHNSON Viking KW Model No. 240100, brand new, tubes still in boxes, best acceptable cash offer. Sorry, no trade. W4IKM, P.O. Box 9187, Mobile, Ala.

SALE: Matchbox Johnson 275W with directional coupler and SWR indicator. Excellent condition, $55.00. W9PWD, John Yaeger, 815 S. Vine St., Hinsdale, Ill. Tel: 325-1427.

HQ-100 receiver with matching speaker, $110.00. In excellent condition. WA2VUY, 106 Commander Black Drive, Oradell, N.J., or Box 162, Lehigh University, Bethlehem, Penna.

FOR Sale: Best offer—HRO-50T, several accessories. For details write Gerald Brookman, KL7CMN, Box 128, APO, Seattle 98701.

HQ-145XC General Coverage receiver, $175.00; HT40K xmtr, $75.00; both 1 year old and like-new. Jay Lipe, WA9NM E, 639 Lincoln, Winnetka, Ill.

HQ-170C Showroom perfect, $170.00; HC-10, $50; DSB-100, $40.00; want HK-1B or HA-1 TO keyer. Harold Vester, WB6CEV, 1224 Windsor Dr., Thousand Oaks La., California. Tel: 805-495-7883.

SELL: DX-60, $65.00; VF-1, $10.00; SX-99, $65.00; R-100A, S-Meter, $65.00, all sud to excint; Eico 723, $15.00, poor. Dick Schellens, WA1BDA, Hotchkiss School, Lakeville, Conn.

SALE: GSB-100 (used 6 months), $240.00; HQ-110C revr, spkr, $185.00; Hy-Gain vertical, relay, T-R switch, mikes. Make offer! Parts or station. WA2LXX, Box 1771, Georgtown University, Washington, D.C. or New York Area: Call (516) MA-7-3920.

WANTED: New England Radio Counselor to teach and operate W1MYM, Maine Senior Boys' Camp. Minimum 19, General Class, plus one year college. Write: Camp Androscoggin, Wayne, Maine.

SELL: CE-100V serial 914 mint, $399.00; SX-100 Mark 1A, serial 118363, good, $124.00; Gonset Linear 500, $89.00; Ranger I, factory wired and tested, serial 68744, perfect, $124.00; Patterson PR-10 offer, Los Angeles area, K6MQT, Phone: 254-2344. Sorry, no ship.

DRAKE R4A receiver. Latest '66 Model. New. Will sacrifice. $330 or best offer. Call or write W9AW. (Tel: RO-3-2265), 7329 North Oconto, Chicago, Ill. 60648.

QUITTING. Selling out. Drake TR-4, Swan 175, 3-1000Z linear, beam. Among other goodies. Send stamped, addressed envelope for list. M. Luce, W2PTQ, RFD, Cutchogue, N.Y.

RME-6900, $260; Ranger I, $120. Mike Bellinger, 2110 Lincoln Way, Ames, Iowa.

FOR Sale: SX-110 receiver and matching R-48 speaker, $75.00. K0C1B. Jeff Broberg, Dassel, Minn. 55325.

FOR Sale: NCX-3 with NCXA and NCXD power supplies, $335.00; BC-779 Super Pro with power supply and Central Electronics Model B Signal Slicer, $85.00. George Diehl, W2-IHA, 20 Wilson Ave., Chatham, N.J.

2 MTR. Port. transistor revr, $50; new SS1S blanker/spkr, $50; HO-13, $60.00; AFC/2 CW, $35.00; TGR-765 filter, $25.00; Simpson 260/651, $40.00; DKC-71, $28.00. Wanted: HA-650, W1DGG, 40 Rossie, Mystic, Conn.

HEATH SB-300, $250.00; SB-400, $285.00; pair for $495.00. Both in perfect condition. Built by Heath engineer. Larry Houghton, 1911 State St., St. Joseph, Michigan.

COLLINS 75S-1 revr, 32S-1 xmtr, 516F-2 pwr. supply. Used for a total of 35 hours. Immaculate condition. $795.00. Ed Madonna, RD #3, Kingston, N.Y. 12401.

NOVICE Xtals. $2.00, some unused. WN0MSL, 126 E. Alta Vista, Ottumwa, Ia.

COLLINS KWM-2, PM-2, CC-2. $725.00; 312-B4, $115.00; new 75S-1, used 3 months, $300.00. Lt. R. P. Huffman, 205 Johnson Ave., Mather AFB, Sacramento, Calif. 95655. Tel: 916-363-7763.

FIRST $285 takes like-new Drake R-4; Hallicrafters SX-111, late model, excellent condition: $155.00. Won NCL 2000. Still in sealed carton: $500.00. W8BQH, phone: 513-522-6310. 3587 Sussan Dr., Cincinnati, Ohio.

HY-GAIN 18-HT vertical, $75.00. K9MNV, 3107 So. Harlem, Berwyn, Ill. 60403.

FOR Sale or trade in the St. Louis area: 4-1000A GG linear amplifier with 4000 V. heavy duty power supply in floor cabinet. Operable now but needs some work. You pick up. Make offer. W0EKT, phone: (314) YO-6-4067.

RANGER, nice, $80; receiver RME 6900 AM, CW, SSB, clean, $150.00; Hallicrafters SR-150, AC and DC supplies mobile mount, Hustler 20-40-80, 600E mike package; $450.00. Hallicrafters linear HT-41, like new, $225.00. T-O key Vibrakey, perfect, $55.00. Cesco SWR bridge, $20. WA4SBD, 2804 Broadview, Huntsville, Ala. 35810.

SELL: Hallicrafters SX-140 receiver. Factory assembled, excint condx, $50.00. Littman, Teaneck, N.J. Tel: 201-836-3493.

WANTED: B&W L-1000A, L-1001 A or LPA-1, any condition, also parts for KW linear amplifier, also 4-1000A tube. K3BHB, 901 Western Ave., Jeannette, Penna.

NEED Cash; Sell SR-160 with complete mobile antenna, microphone, mobile mount and DC supply—all brand new, never used! $375.00. K2BRT.

WANTED: AN/TRC-24 B-band tuners for receiver (type AM-913/TRC) and transmitter (type AM-912/TRC). Weldon Drennan, 510 Iowa. Beaumont, Texas 77705.

BARGAIN: Swap Millen Transmatch JR Model 92201, brand new, for used Johnson Matchbox 275 watts. Also sell P&H linear, Model LA-400C, 800 watts P.E.P., only $125.00. Sked me 40 meters week-ends and hear FB linear and consummate sale. K4EOF, Thomasville, N.C.

SELL: NCX-3, NCX-A, NCX-D. Hustler antenna (80, 40, 20), mike, and cables: $390.00. Alan Grinberg, WA3DJC, 8532 West Howell Rd., Bethesda, Md. 20034.

WANT: Drake R-4 Receiver and T-4X transmitter. Harold Laver, W2TWK/3, 750 Azalea Dr., Rockville, Maryland.

Index of Advertisers

Adirondack Radio Supply 156
Alltronics-Howard Co. 159
Ameco Equipment Corp. 111
American Radio Relay League
QST 165
Course Book 136
Decals 140
Handbook 137
National Convention 167
Amperex Electronic Corp. 113
Arlington Stainless 157
Arrow Electronics, Inc. 149

Barry Electronics 130
British Radio Electronics, Ltd. (Eddystone) 144
Budwig Manufacturing Co. 150
Burstein-Applebee Co. 134

Clemens Manufacturing Co. 148
Collins Radio Co. 2
Communication Products Co. 125

Dames Co., Theodore E. 148
Dayton Hamvention 126
Dow-Key Co., Inc., The 116
DuBord, G. 152
Dynalab Radio Co. 135

Editors & Engineers, Ltd. 120
EICO Electronic Instrument Co. 115
Eitel-McCullough, Inc. 109
Electro-Voice, Inc. 119
Electronic House 142
Electronicraft, Inc. 148
Evans Radio 152

Fair Radio Sales 158
Farmerie Corp., The 152
Fichter Electronics 159
Fort Orange Radio Distributing Co., Inc. 154
Frederick Electronics Corp. 123
Fugle Labs. 146

Gentec, Inc. 142
Gift Shop 158
Gonset, Inc. 133
Gotham 121
Grand Central Radio, Inc. 158

Hallicrafters Co., The ..... Cov. II, 1
Ham Wholesale Card Club 153
Harrison Radio 168
Harvey Radio Co., Inc. 139
Heath Co., The 103, 105
Henry Radio Stores 141
Hy-Gain Electronics Corp. 5

I.E.E.E. 138
Instructograph Co., Inc. 146
International Crystal Manufacturing Co., Inc. 7

Jan Crystals 146

Kahn Research Labs., Inc. 155

Lafayette Radio Electronics Corp. 113
Lampkin Labs., Inc. 155
Lattin Radio Labs. 155

Marquette Corporation 146
Millen Manufacturing Co., Inc., James 166
Mini-Products, Inc. 112
Mor-Gain 159
Mosley Electronics, Inc. 156
Mulry Sales 144

National Radio Co., Inc. ..... 101, Cov. III
National Radio Institute 132

Parks Electronics Lab. 153
Partridge Electronics, Ltd. 122
P & H Electronics, Inc. 150
Pennwood Numechron Co. 156
Poly Paks 140
Productive Tool & Manufacturing Co., Inc., The 150

Radio Amateur Callbook, Inc. 128
Radio, Inc. 157
RCA Electronic Components & Devices ..... Cov. IV
RCA Institutes, Inc. 159
RF Communications Associates, Inc. 129
Rohn Manufacturing Co. 108

Saich & Co., Herbert 154
Sideband Engineers, Inc. 4
Skylane Products 134
Slep Electronics Co. 150
Sound History Recording 148
Space Electronics 154
Squires-Sanders, Inc. 107
SSBCO 158
Swan Electronics Corp. 127
Sylvania Electric Products, Inc. 131

Teleplex Co. 150
Telrex Labs. 157
Tepabco 154
Tri-Ex Tower Corp. 114
Trigger Electronics 147
Turner Co., The 124

Unadilla Radiation Products 154
United States Fiberglass Co. 118

Van Sickle Radio Supply Co. 150
Vanguard Electronic Labs. 142, 148
Vesto Co., Inc. 144
Vibroplex Co., Inc., The 157

W3KT QSL Service 157
Walden Electronics Corp. 144
Webster Manufacturing 110
Whippany Labs., Inc. 117
Wiggins, W6CHZ, Wally 138
Wilson, Inc., Willard S. 154
World Radio Labs. 145, 151

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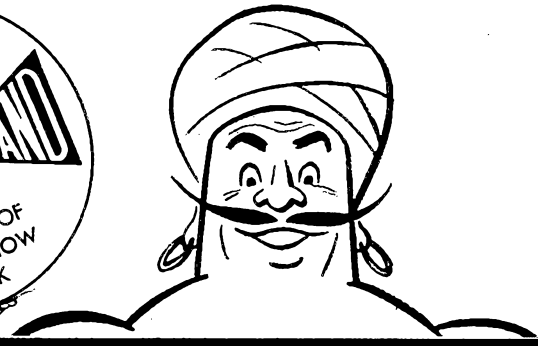

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