ICD

CQ

February 1964
50¢

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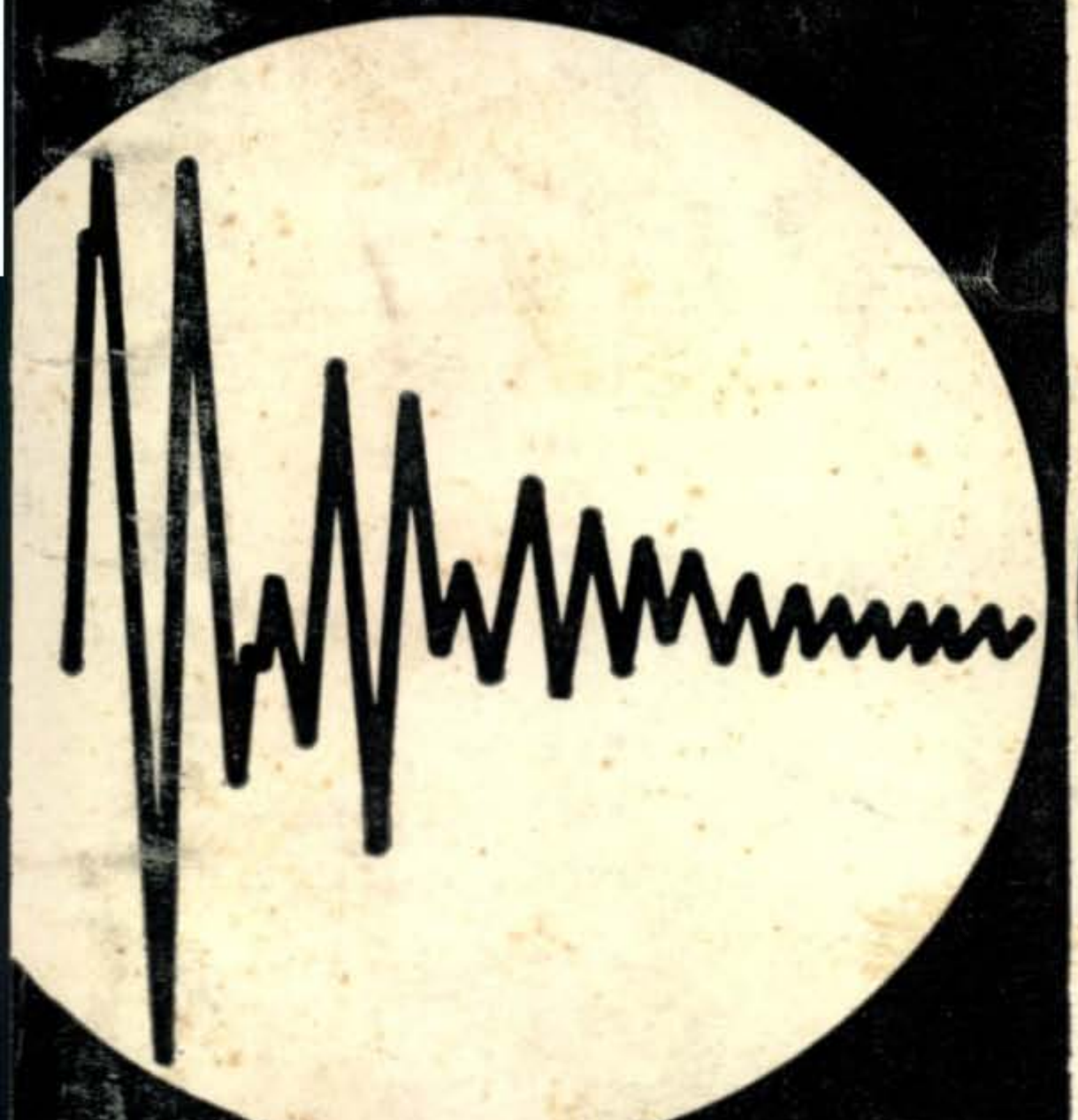
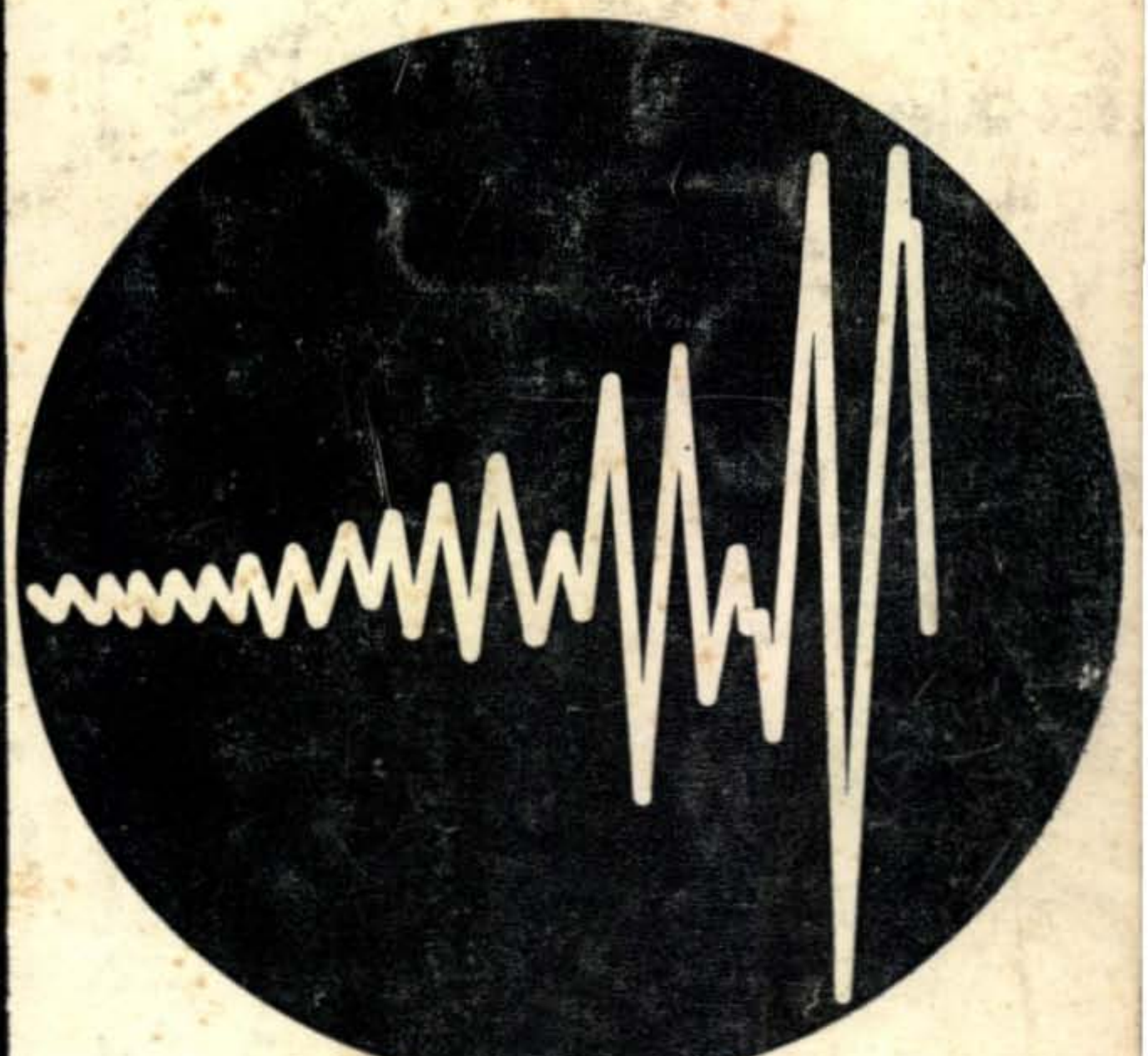
- Gus Browning on Aldabra
- The Can-Key
- 100 W. Transistor Modulator

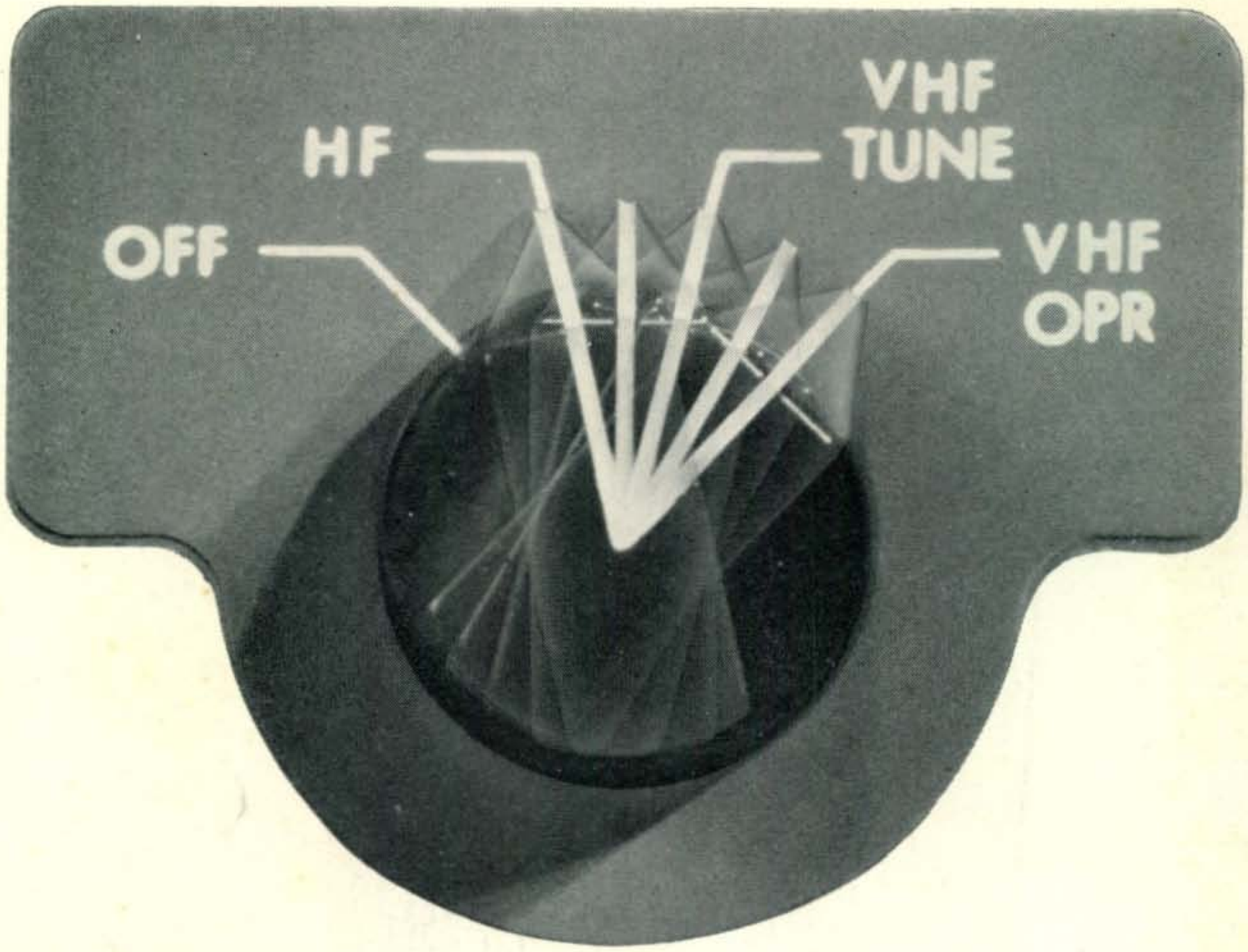




Something New . . .

Inverted Audio for D.S.B.

The Radio Amateur's Journal



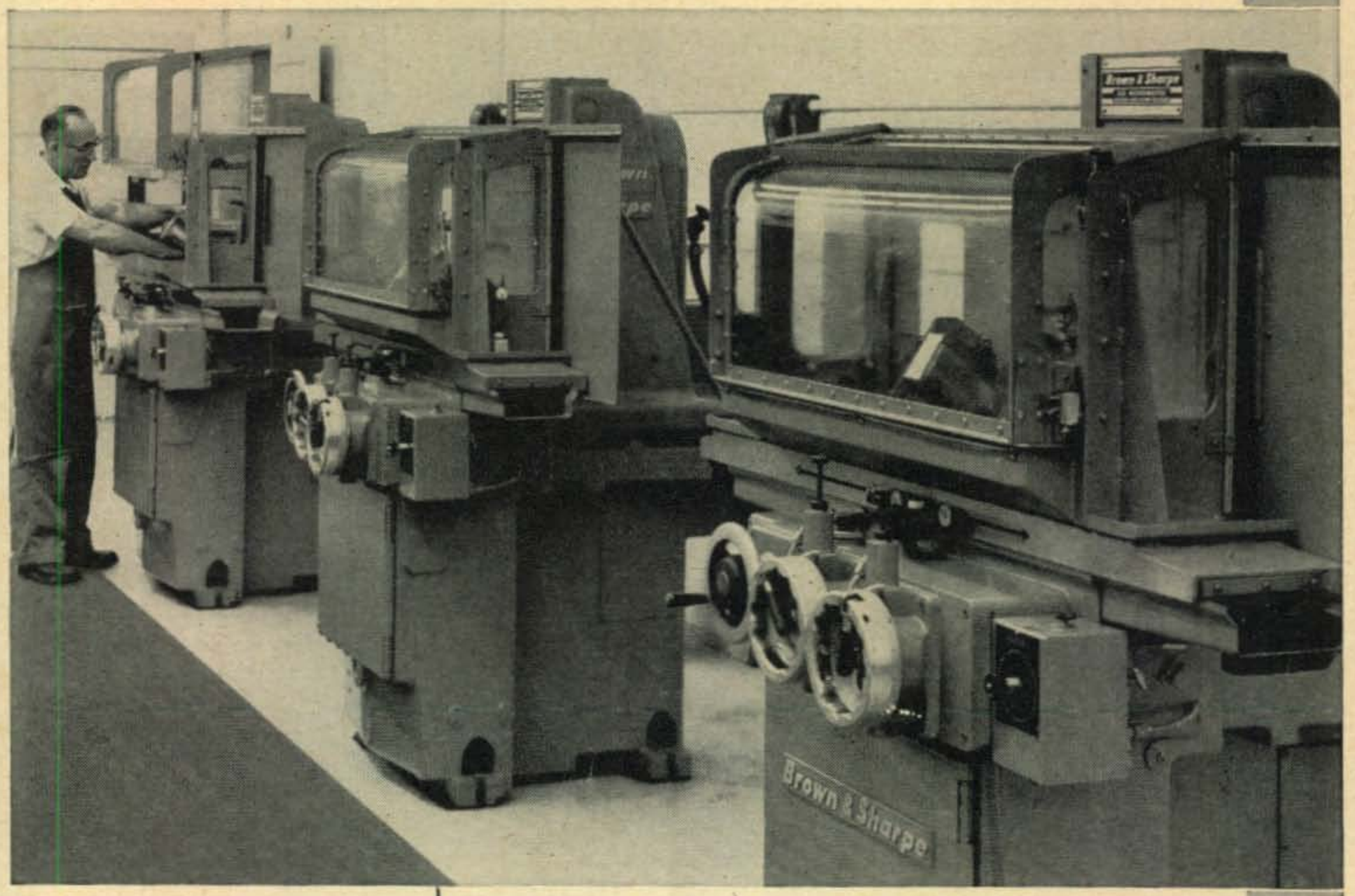
QUICK-CHANGE ARTIST

Flick the switch and you're on VHF. With Collins 62S-1 VHF Converter you can transmit and receive on 6 and 2 or HF without changing cables. Think how great it will be to escape the crowds on the lower bands. The 62S-1 gives you eight full megs of bandwidth. You'll be able to work people you've never been able to reach in the past. You'll be able to get more local QSO's. You'll have the cleanest VHF signal on the air. And you'll have both bands from one self-contained unit. When used with the KWM-2, you don't need an additional power supply. You can use the 62S-1 to cover 49.6 to 54.2 and 143.6 to 148.8 mc (crystals for amateur bands provided). Incidentally, Collins 62S-1 will convert most equipment operating in the 14.0 to 14.2 mc range. Visit your Collins distributor and ask him to demonstrate the 62S-1 VHF Converter. Then ask him about Collins S/Line trade-in value. You'll be pleasantly surprised to find out how little it costs to operate the finest.

COLLINS

For further information, check number 3, on page 110

These New Brown & Sharpe Automatic Slicing Machines Cut Raw Quartz to Make Blanks for PR CRYSTALS



AMATEUR TYPES

FUNDAMENTAL, PR TYPE Z-2—Frequency Ranges in Kcs.: 3,500 to 4,000 (80-M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M) ± 500 Cycles . . . $2.95 Net

(All Z-2 Crystals calibrated with a load capacity of 32 mmfd.)

Third Overtone, PR Type Z-9A, 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc. . .$3.95 Net

6 Meters, Fifth Overtone, PR Type Z-9A, 50 to 54 Mc., ± 15 Kc..... $4.95 Net

Citizens Band, PR Type Z-9R .005% .....$2.95 Net

ORDER FROM YOUR JOBBER

All PR CRYSTALS are made with the most modern precision equipment. Operators are highly skilled, and rigid inspection is the rule. Here is a view of the Cutting Room, where new Brown & Sharpe Micromaster Slicing Machines cut raw crystal into blanks of required thickness. Every PR Crystal is precision oriented by X-ray for minimum drift.

PR CRYSTALS have been the Standard of Quality since 1934, and every PR Crystal is Unconditionally Guaranteed. Get PRs from your jobber. They'll give you the finest precision frequency control that money can buy!

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

For further information, check number 1, on page 110

Compromise . . .
but not with quality!

The SX-122 is subjected to exactly the same exhaustive Quality Control Procedures applied to the most costly of Hallicrafters amateur-band equipment.

NEW SX-122 dual conversion general coverage receiver $295.00

If you operate **exclusively** on the amateur bands, we hardly need point out that an amateur-band-only receiver will give you more sophisticated features and performance for your money than **any** general coverage unit.

But if your personal interests require the versatility of a general coverage receiver, the wisest compromise you can make is the new SX-122 receiver.

For maximum flexibility consistent with the **high standards of basic performance you demand,** nothing even close to its price can touch the SX-122.

In addition to the solid value specifications listed alongside, the SX-122 brings you a major advance in stability through additional temperature compensation of the h.f. oscillator circuits and use of crystal-controlled 2nd conversion oscillators.

The SX-122 is in stock, at your distributor's today.

FEATURES: Deluxe general coverage receiver. Broadcast (538-1580 kc.) plus three S/W bands (1720 kc.—34 Mc.). Dual conversion, superheterodyne over the entire frequency range. SSB/CW/AM reception. Product detector for SSB/CW. Envelope detector for AM. Series noise limiter. Heavy-duty tuning capacitor with copper plates in oscillator section for maximum electro-mechanical stability. Audio output: 1.0 watts with less than 10% distortion. Three steps of selectivity: 0.5, 2.5, 5.0 kc. at 60 db. down. Antenna trimmer, amplified AVC. 2nd conversion oscillator crystal-controlled. Size: 18¾" wide, 8" high, 9¾" deep. Provision for 100 kc. crystal calibrator accessory (HA-7). UL approved.

The new ideas in communications are born at . . .

hallicrafters

5th & Kostner Aves., Chicago, Ill. 60624

Export: Hallicrafters International Div.
Canada: Gould Sales Co., Montreal, P.Q.

For further information, check number 2, on page 110

CQ

The Radio Amateur's Journal

Vol. 20, No. 2 February 1964

OFFICES
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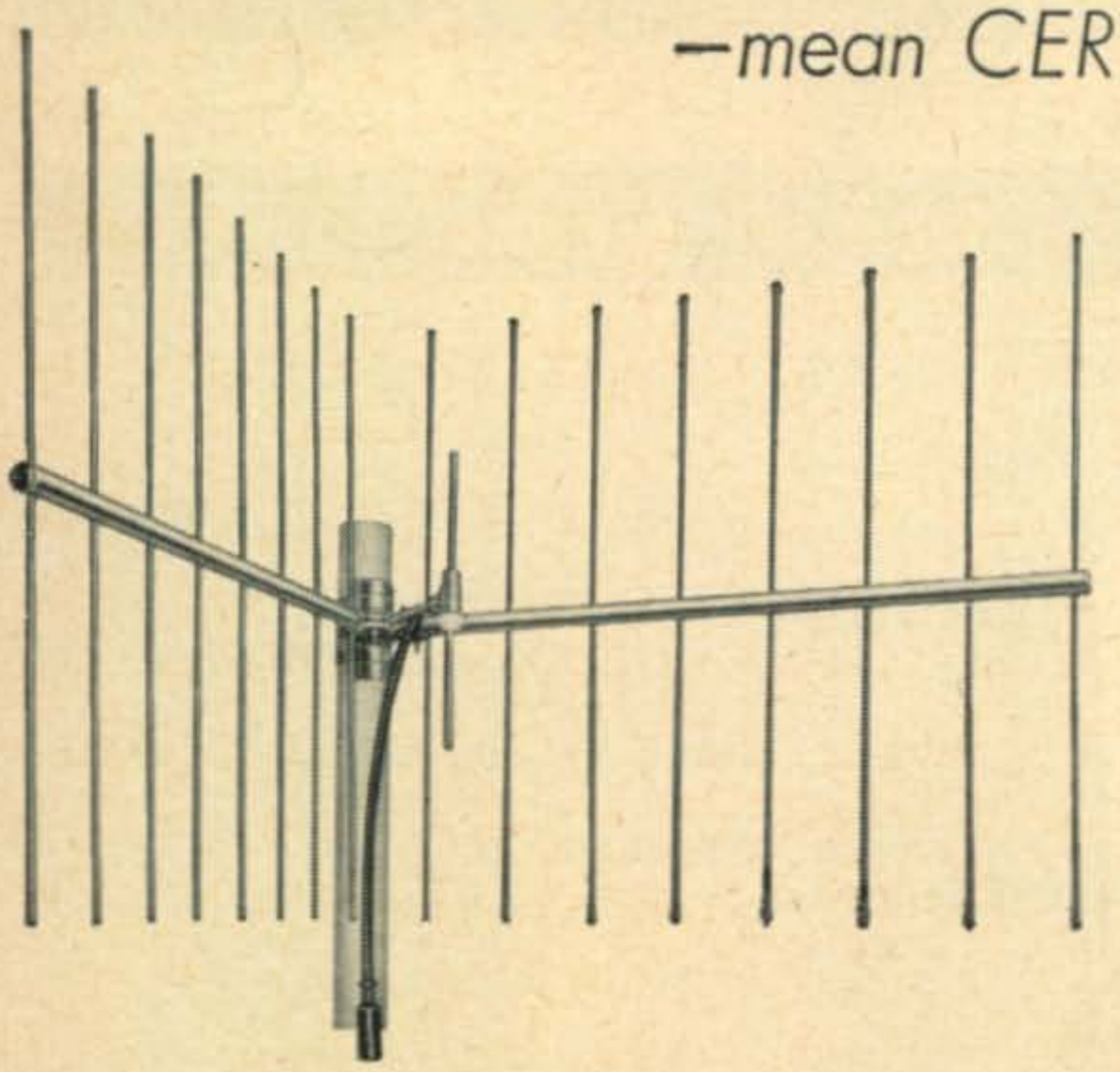
C-P COMMUNICATION ANTENNA SYSTEMS

—mean CERTIFIED PERFORMANCE!



Base Station Corner Reflector Advanced Design Antenna

(10X-Unidirectional Gain)

Cat. No. 161-509, Frequency Range 450-470 MC

Cat. No. 161-509 Corner Reflector Antenna is designed for use in the 450-470 Mc band. All reflector screen components are manufactured of high strength aluminum alloys, all mounting components are fabricated of hot-galvanized steel and all radiating components are fabricated of aluminum. The above combine maximum strength, optimum electrical performance and minimum weight for the first time in an antenna of this type.

This lightweight aluminum antenna is ideal for use in multiple corner arrays.

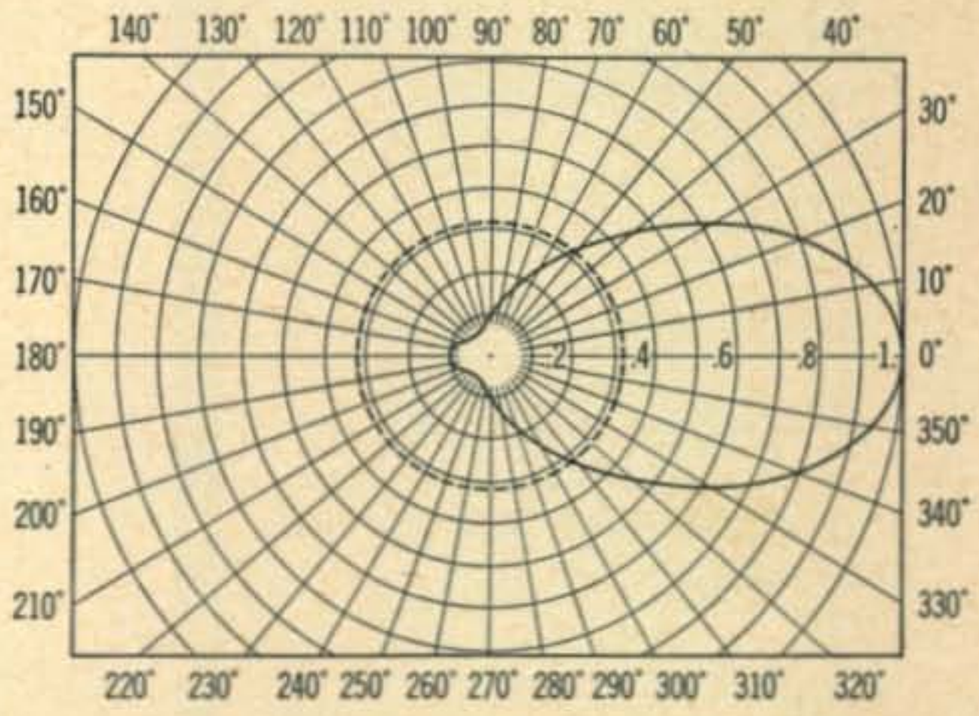
Electrical Specifications:

Nominal input impedance	50 ohms
Forward gain	10 db
Front-to-back ratio	20 db
Maximum power input	250 watts
Internal feedline	RG-8A/U
Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
VSWR	1.5:1
Bandwidth	±3%
Lightning protection	Direct ground

Mechanical Specifications:

Reflector (size per side)	2' x 2'
Reflector material	High strength aluminum alloy
Radiating element material	High strength aluminum alloy
Radiating element diameter	⅜"
Rated wind velocity	100 MPH
Lateral thrust at rated wind	16 lbs.
Torsional moment on mounting pipe	16 ft. lbs.
Weight	8 lbs.

Stainless steel hardware supplied to mount antenna on 2" IPS pipe.



Horizontal field strength pattern of Corner Reflector 10X-Gain Antenna Cat. No. 161-509. A dipole pattern is shown for reference.

SINCE 1933

COMMUNICATION ANTENNA SYSTEMS FOR AMERICAN BUSINESS

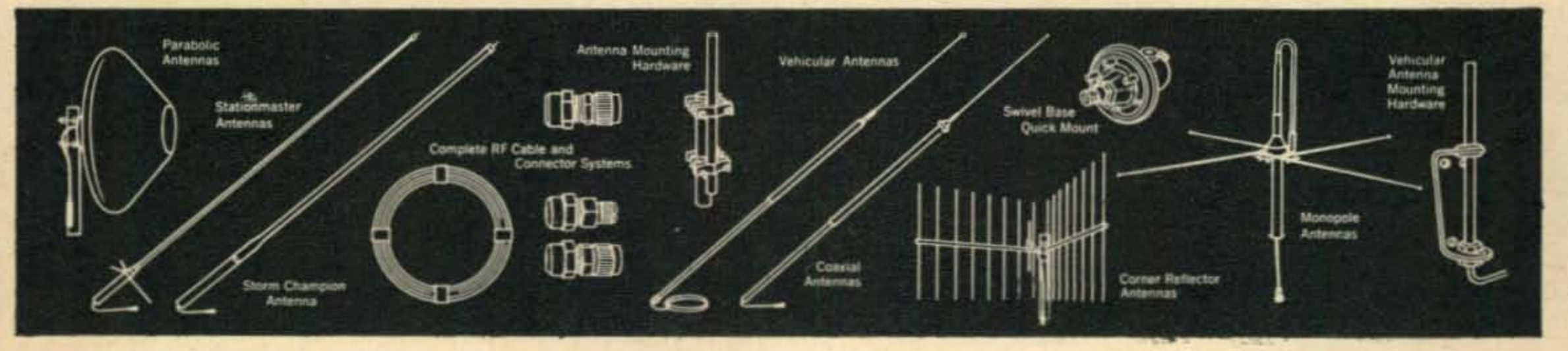
Communication Products Company

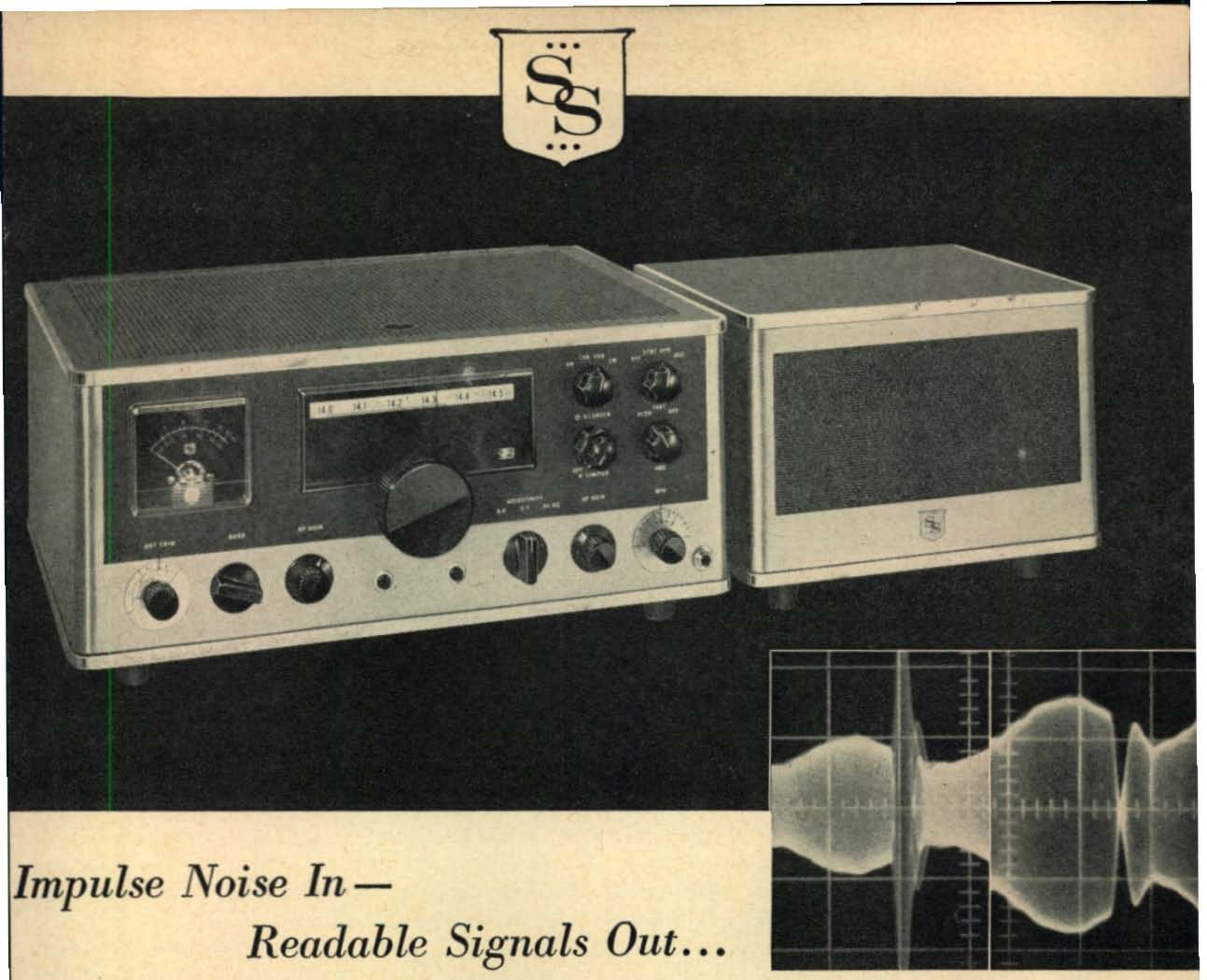
DIVISION OF

PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

MARLBORO, NEW JERSEY — Telephone HOpkins 2-1880 (Area Code 201)

LOS ANGELES 65, CALIF. — Telephone CHapman 5-1143 (Area Code 213)





Impulse Noise In— Readable Signals Out...

The SS-1S Pre-IF Noise Silencer[1] makes possible *solid copy* of barely detectable signals (S2 or less) in the presence of overwhelming (S9 or greater) impulse noise caused by ignition, neon signs, switches, power leaks and similar high peak, short duration disturbances. The truly spectacular performance of this accessory results in part from the exceptional overload and cross modulation characteristics of the unique SS-1R Receiver design[2] as well as from two most important design concepts: a) broad band noise detection (*full receiver front end bandwidth*), and b) gating the receiver (quietly and rapidly with low insertion loss) *before the noise pulse has been lengthened by receiver selectivity*. The oscillograms at right show the net effect of this silencing.

The SS-1R offers other extremely attractive performance characteristics: frequency precision and stability exceeding that of most frequency meters; digital frequency display requiring no mental arithmetic; autocalibration of all amateur bands with WWV; easy and exact sideband tuning (10 kc. per revolution with manual control) plus push button motor tuning fast traverse — to mention just a few. SS-1R is *The New Standard of Performance*. Now available at your favorite dealer.

[1]"A Pre-IF Noise Silencer", W. K. Squires, W2PUL, QST, Oct. 1963. [2]"A New Approach to Front End Design", ibid., Sept. 1963

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ μv, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a **10** μv signal with 2.5 kc. selectivity, an unwanted **0.1 volt** signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack — 1 ms., **Slow** release — 1.0 sec., **Fast** release — 0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

Interested in VHF? See Clegg Products at your nearest Distributor

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

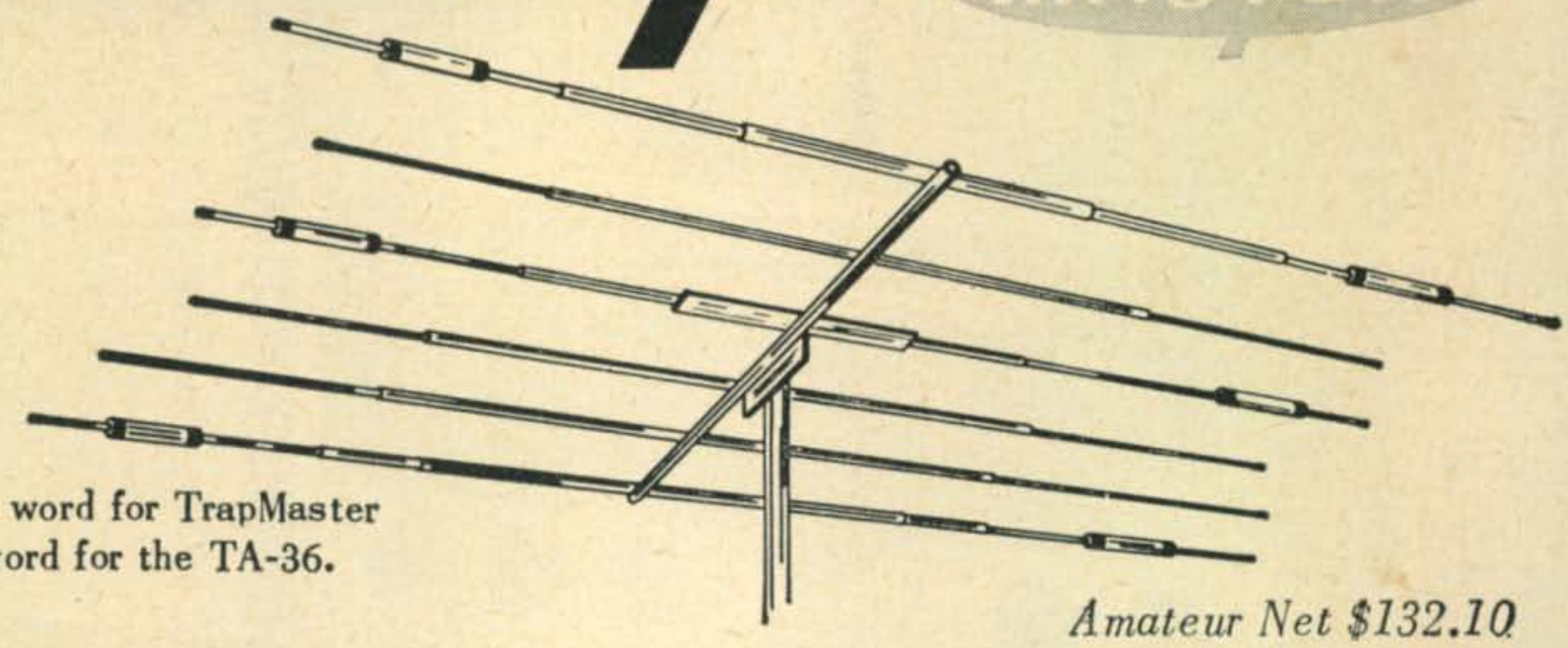
For further information, check number 5, on page 110

Mosley

TRAP MASTER

MODEL TA-36

for 10-15-20 meters



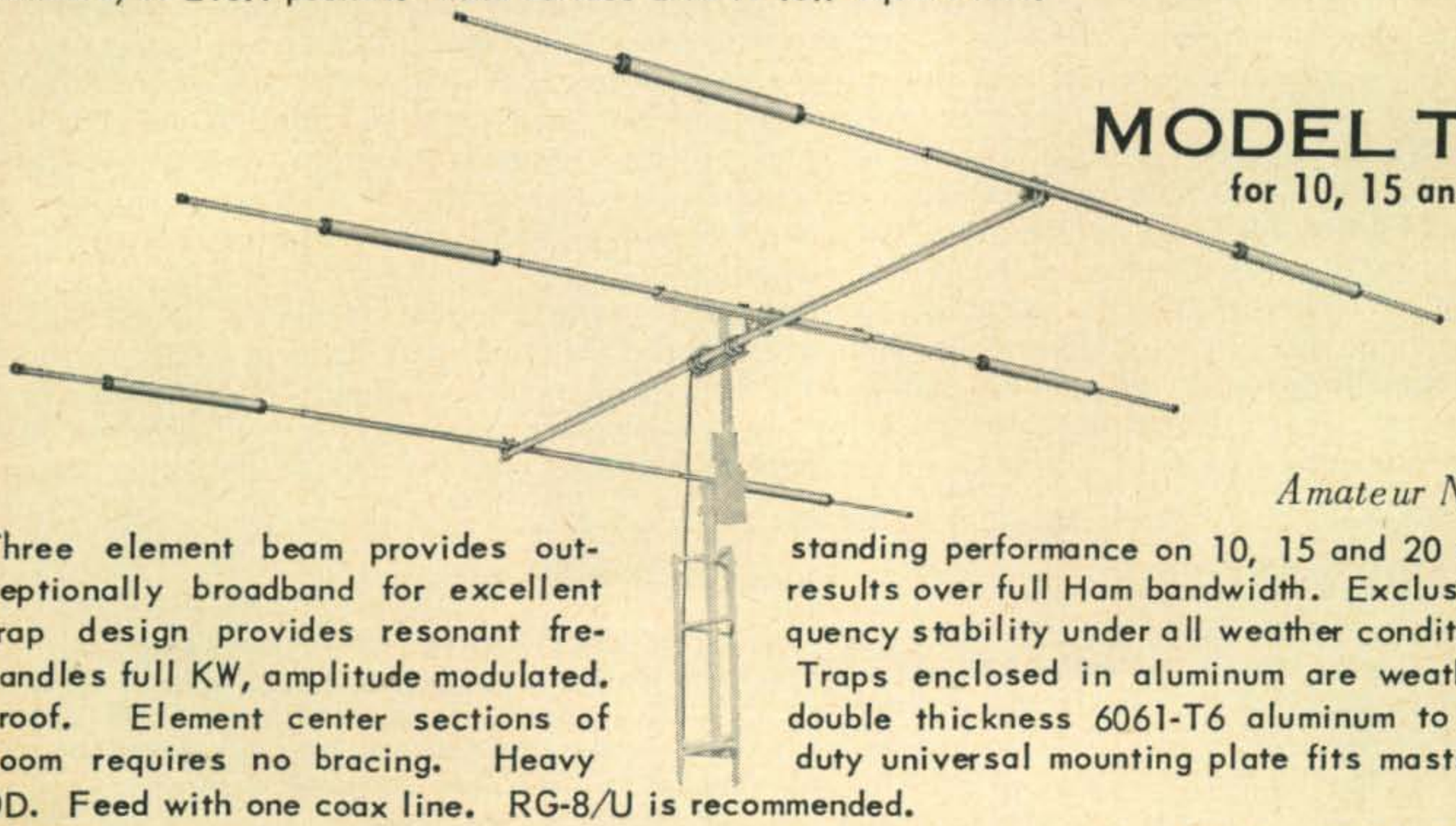
Incomparable is the word for TrapMaster and terrific is the word for the TA-36.

Amateur Net $132.10

The new clean-line TA-36 . . . the three band beam that will give your signal that DX punch!

This wide spaced, six element configuration employs 4 operating elements on 10 meters, 3 operating elements on 15 meters and 3 operating elements on 20 meters.
Automatic bandswitching is accomplished by means of exclusive design high impedance, parallel resonant "Trap Circuits". Built for operation at maximum legal amateur power.
Traps are weather and dirt proof offering frequency stability under all weather conditions. Just one coaxial feed line is needed. 52 ohm, RG-8/U is recommended.
Antenna comes complete with illustrated instruction booklet and color coded elements for ease of assembly.

SPECIFICATIONS and PERFORMANCE DATA: Forward gain on 10 meters is 9 db., on 15 meters is 8.5 db. and on 20 meters is 8 db. Front-to-back is 20 db. or better on all three bands. SWR is 1.5/1 or better at resonance. Transmission line - 52 ohm coaxial. Maximum element length is 29 feet. Boom length is 24 feet. Turning radius is 19' 3". Assembled weight is 69 pounds. Wind load (EIA Standard) is 210.1 pounds. Wind surface area is 10.7 square feet.



MODEL TA-33

for 10, 15 and 20 meters.

Amateur Net $104.75

Three element beam provides outstanding performance on 10, 15 and 20 meters. Exceptionally broadband for excellent results over full Ham bandwidth. Exclusive MOSLEY trap design provides resonant frequency stability under all weather conditions. Easily handles full KW, amplitude modulated. Traps enclosed in aluminum are weather and dirt proof. Element center sections of double thickness 6061-T6 aluminum to reduce sag. Boom requires no bracing. Heavy duty universal mounting plate fits masts up to 1½" OD. Feed with one coax line. RG-8/U is recommended.

SPECIFICATIONS and DATA: Fwd. gain up to 8 db. Front-to-back is 25 db. SWR is 1.1/1 or less, at resonant frequencies. Maximum element length is 28 feet. Boom length is 14 feet. Turning radius is 15.5 feet. Assembled weight is 40 pounds. Wind surface area is 5.7 square feet. Wind load is 114 pounds. Shipping weight is 53 pounds.

MOSLEY Electronics Inc., 4610 N. Lindbergh Blvd., Bridgeton, Mo., 63044.

For further information, check number 6, on page 110

ZERO BIAS

More than thirty-five years ago a man named Hiram Percy Maxim, President of The American Radio Relay League, played an important role in establishing the first international body of amateur radio operators.

Commercial broadcasting was, of course, in its infancy and amateurs went about describing their frequency in meters rather than the much more definite kilocycles we use now.

The FCC was still cutting its teeth and amateurs throughout the world thought little about commercial interests gobbling up 10 meters, (considered at that time a rather unpredictable very high frequency).

In general, few people, if any, were sticking their neck out to predict the future of "wireless" broadcasting and very few even cared at all.

We can't help but wonder, therefore, what Mr. Maxim's reasons were for establishing the International Amateur Radio Union, for whatever his ideas, we can only marvel at his foresight and ability to predict things to come.

Obviously, it was to the advantage of all amateurs that an international body exchange technical developments, coordinate amateur activities and bring closer the bonds of international amateur friendship. However, little, if any, "political" use was made of the organization, since little reason existed for such implementation.

Since many of the smaller member organizations of the IARU are not, and will never be as financially sound as our ARRL, it has been impossible for all IARU members to meet at one conference table. It has therefore, been expedient for member nations to meet at regional conferences to reduce expenses as well as precious travel time.

It now appears that the IARU has work cut out for itself in the form of amateur frequency preservation at the next International Telecommunications Union conference.

It is interesting to note that most U.S. amateurs erroneously feel frequency allocation problems are solely an internal American problem. May we remind our readers that with the exception of one or two v.h.f. bands, all amateur frequencies are allocated on a world-wide basis. True, some countries have more spectrum, and others less, but in general amateurs enjoy the opportunity of communicating with each other on *all* h.f. bands.

Since amateur frequency allocations have now become an international problem (in reality, it has always been) we feel the IARU should now collectively strengthen itself in order to present a united front at the next international conference. What better way to convince undecided countries of the importance of amateur radio than by having an IARU representative—speaking the same language, and knowing the country's internal problems — furnishing personal diplomacy on behalf of world-wide amateur radio.

It is rumored that the ARRL is seriously considering placing a working office at Geneva in an attempt to strengthen the IARU. We feel this is an excellent diplomatic move and we soon hope to hear of its establishment. It is our opinion that it will not be too long before the entire IARU headquarters will move, *en masse*, from the United States to Switzerland. This will certainly help enhance European liaison with other member nations as well as removing the stigma of American amateur radio "running the show."

At the moment, 4U1ITU is the official station of the International Amateur Radio Club located at ITU headquarters in Geneva; we hope to soon hear of a similar call for headquarters of the International Amateur Radio Union.

Sixty nations currently make up the roster of IARU members. They are: Angola, Argentina, Australia, Austria, Belgium, Bermuda, Bolivia, Brazil, Burma, Canada, Chile, Colombia, Congo, Costa Rica, Cuba, Denmark, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Ghana, Guatemala, Hong Kong, Iceland, India, Ireland, Israel, Italy, Japan, Korea, Lebanon, Luxembourg, Malaya, Mexico, Morocco, Mozambique, Netherlands, Netherlands Antilles, New Zealand, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, South Africa, Southern Rhodesia, Spain, Sweden, Switzerland, Syria, USSR, United Kingdom, United States, Uruguay, Venezuela and Yugoslavia.

LETTERS TO THE EDITOR

A Warm Feeling

Editor, *CQ*:

My observations of the ham band's deplorable conditions, the fact that amateur radio has developed into a commercial giant, and the race for greater power regardless of quality has led me to believe that the ham fraternity is on its way out.

To me, ham radio is not a toy, a means to out-do or out-brag your fellow ham. I have used it as a means of accomplishment. I have used it to help those less fortunate than myself. No DX, no certificate can produce that warm feeling you acquire when you hear a shut-in whose destiny is a wheel chair the rest of his life, say "I talked to a fellow in Seattle today. I never had so much fun."

W6WOJ with K7LYW

For an example, the enclosed snapshot (above) is that of myself and one such shut-in, K7LYW, Scott Sorensen, in his mobile wheel chair. Scott graduated from high school attended Brigham Young U., acquired an outstanding knowledge of higher mathematics via wheel chair. I feel as though it was ham radio that put him in a competitive status and worked as an incentive to advance himself.

I have a Class-A ticket, my homebrew gear is a product of my efforts, no DX, great expenditure but a great deal of pleasure has been mine since the early thirties. I am going to bide my time, and when the incentive licensing takes effect, I am going to get it, whatever that may be.

George E. Wilson, W6WOJ
771 Douglas Drive
San Leandro, California

Shape or Ship?

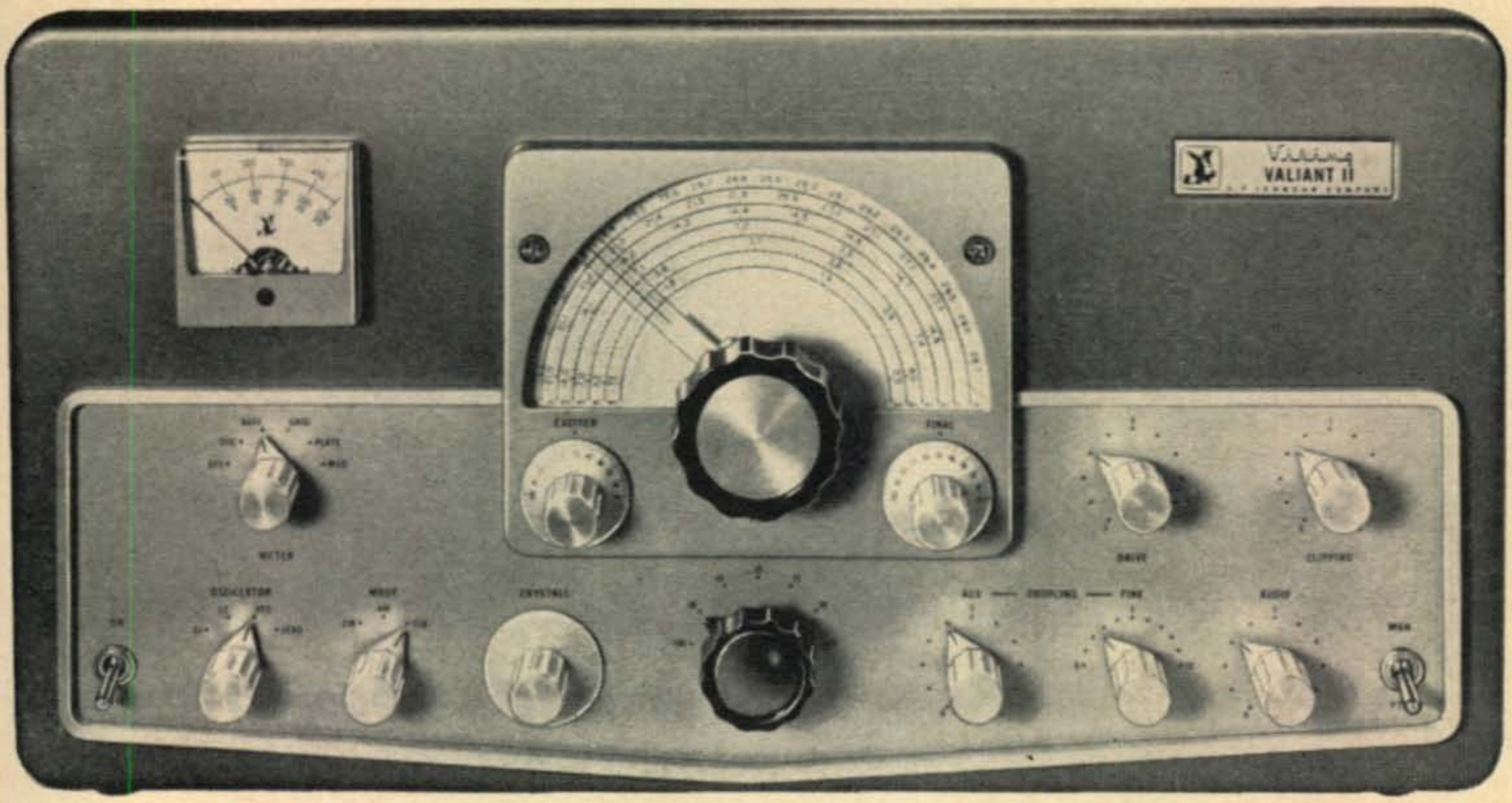
Editor, *CQ*:

The XYL and I have returned from a trip around the

For further information, check number 8, on page 110

VALIANT II—Outstanding flexibility and performance—band-switching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Provision for plug-in SSB operation with no internal modification.

Cat. No. 240-105-1 Kit . . . **Net** $375.00 **Cat. No. 240-105-2** Wired, tested . . . **Net** $495.00



VALIANT II SSB ADAPTER

SSB ADAPTER—Filter-type SSB generator—bandswitching 80 through 10 meters—more than 50 db sideband suppression—more than 45 db carrier suppression. Features built-in multiplier requiring VFO input only—design and front panel make operating practically foolproof! Wired, tested.
CAT NO. 240-305-2 . . NET 369.50

If you, like many of today's amateurs, find yourself with your interest fairly equally divided between working AM/CW and SSB, there's a real feeling of frustration with most available equipment. Why? Because most AM rigs require extensive modification to operate SSB—and no SSB rig offers high level AM and Class "C" CW—and the end result is compromise in one mode or the other!
Not so with either Viking SSB Adapter/Valiant or SSB Adapter/Valiant II combinations! Now, keep your contacts and work old friends no matter what portion of the band they operate in, and no matter what mode they use!

VALIANT OWNERS—You can make the conversion to SSB operation with a few simple modifications and the Viking "Valiant" SSB Conversion Kit.

Complete Catalog
Send for Amateur Catalog 962 giving detailed information on our complete line of amateur transmitters and accessories.

E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.

For further information, check number 9, on page 110

world, a trip that took us into some countries where amateur radio was greatly restricted and highly regulated as well as into other countries where it is non-existent. During that time we were aware of the opportunity that is ours here in the United States.

Imagine my surprise, to say nothing of disgust, to return to the States and hear over the air and read in the printed page all of the griping and downright bellyaching over a proposal to make amateur radio "shape up" and once again realize its responsibilities. . . .

It's written plainly in international radio law and repeated again in the Communications Act of 1934, our basic radio law. Each amateur radio station is licensed to serve public interest, convenience *and* necessity or his license should not be renewed. (Note: It should be PICAN, not PICON—there's a big difference.)

And let's not blame "they" at League headquarters for bringing this thing out into the open. It was forced upon them by numerous discussions with mature and responsible amateurs who have long felt that something would have to be done to prevent amateur radio from becoming another Citizens Band. This was a common topic of discussion at several s.s.b. dinners in New York over the years, or at the QCWA dinners for the past several years. (Neither are ARRL affairs, I might add.) Too many of us have long felt that amateur radio is "just a hobby" and not for the improvement of the art. We have been too content to rest on the laurels of our past accomplishments, rather than to plan for the future. We have boasted that our new equipment is still unmodified, and have been unwilling to modify it to improve its performance for fear it would hurt its resale value. We have been afraid to invent. We have refrained from joining any emergency nets for "fear of getting involved." No wonder those of us who have been in this business a few years saw this coming. In fact, it is long overdue. . . .

One of the big things that bothers me is the growth of selfishness as expressed by many amateurs. They are too concerned as to how it affects me rather than how it will affect amateurs as a whole. And if I don't get my way, I will pout, pick up my toys and go home.

After seeing what has happened in other countries I am thankful for all of the privileges we have in this one, and I will have to live up to my responsibilities. As for those others who may be affected by this proposal to tighten advance requirements I feel that they will have to "shape up or ship-out."

Lester C. Harlow, W4CVO
4201 S. 31st Street
Arlington, Virginia

A Little Bit of Home

Editor, *CQ*:

I have been following with considerable interest over the last six months or so letters from various people in regard to military phone patching. Most of which found considerable fault with this type of operation. WA5ERL, whose letter appeared in the June, 1963 issue of *CQ*, prompted me to write.

I think WA5ERL deserves a pat on the back and I would like to add a comment or two of my own. Last year I operated an amateur station and ran phone patches from my ship. . . .

If you spend some time listening to phone patches being run on the bands I believe you would find the following: The "Hello how are you and how's the family" and the business transaction type messages do not just come from military stations. I for one have heard very few business type messages originate from a military ham station, but have heard it many times from stateside stations. I believe stateside stations are just as bad offenders, if not worse.

Telephone communications in this country are very good and not expensive. Whereas over in the Pacific and Far East it is just the opposite, very expensive and many times the circuits are poor. Also the serviceman who makes a phone patch from a Navy ship or a military base overseas has been away from home for many months or even a year or two. Now I ask, what would anyone say if they were talking with their wife or folks for the first time in months?

I think amateurs should be proud of this service that amateur radio can offer. The fellows *in the* states who handle this phone patch traffic should take a lot of pride in doing so. My warm thanks to all the stations who ran

WHAT MAKES AN SSB TRANSMITTER GREAT? EVERYTHING THE HEATHKIT "MARAUDER" HAS!

Take any other transmitter on the market today . . . compare its price, performance, features, quality, and versatility . . . with the Heathkit "Marauder." You'll find none that offer so much at so great a savings! Here is a transmitter that has everything you need to enjoy SSB amateur operations to their fullest . . . a quality instrument that can be depended upon for years of faithful service. Check these features! . . . and see why so many "hams" consider the "Marauder" the best buy in SSB!

• First complete filter-type SSB transmitter in kit form • Operates SSB (upper or lower sideband), CW, AM and FSK • 180 watts PEP on SSB and CW . . . 80 through 10 meters • All crystals furnished—all power supplies built-in • Multi-section hermetically sealed crystal bandpass filter • Dual conversion, crystal-controlled heterodyne oscillator • Preheated, temperature compensated VFO • Automatic level control for higher talk power • Air-cooled, shielded final amplifier • VOX controlled break-in CW operation • Vernier 165 to 1 gear drive tuning assembly • Beautiful exterior styling—heavy chrome plated knobs

Kit HX-10 . . . . 96 lbs. $334.95

SPECIFICATIONS — Emission: SSB (upper or lower sideband), CW, AM and FSK. **Power input:** 180 watts PEP—SSB and CW, 75 watts AM. **Output impedance:** 50 to 75 ohms with not more than approximately 2:1 SWR. **Frequency range (MC):** 3.5 to 4.1; 6.9 to 7.5; 13.9 to 14.5; 20.9 to 21.5; 27.9 to 28.5; 28.5 to 29.1; 29.1 to 29.7. **Frequency stability:** within 100 cps, after warmup. **Carrier suppression:** 50 db below peak output. **Unwanted sideband suppression:** 55 db below peak output. **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone using grid-block keying. **Audio input:** High impedance microphone or phone patch. **Audio frequency response:** 400 to 3000 cps at ± 3 db. **Power requirements:** OFF—4 watts; STANDBY—200 watts; KEY DOWN—400 watts at 117 volts, 50/60 cycles AC. **Cabinet size:** 19"W x 11⅛" H x 16" D.

HEATHKIT MARAUDER
SSB Transmitter
Only $334.95

A PERFECT MATE FOR THE "MARAUDER"

Globe-circling SSB power at lowest cost! An ideal mate to the "Marauder" above for the ultimate in amateur power! Rugged, well-rated components used throughout. Easy to build and operate with complete instructions furnished.

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AM-144

For further information, check number 11, on page 110

patches for the fellows on my ship.

One must be realistic. Many operating practices in all aspects of amateur operation need improvement in our crowded bands. But, let's not just try to run down one group or operating interest. Some enjoy DX, others contests, ragchewing, c.w., s.s.b. and on the list could go. Common respect for the other, I think, is the way to make our bands an enjoyable experience for us all to carry on our own interests in the wonderful hobby that we have.

Herb Mesler, RM1, USNR-R, W6SAW
1032 Northwood Drive
San Carlos, California

Editor, *CQ*:

Re: the article about "The Swans of Abbotsbury" as far as operation in G-land goes I think that every encouragement should be given to all prospective hams for the simple reason that whenever I go on 80 or 160 I always have trouble in raising anybody. This is not due to a particularly weak signal because when I do make a QSO the reports I get are quite good.

Furthermore, I think that even if there were no examinations of any kind, the bands would, after an initial upsurge in operation, settle down again to the present figures. This is because interest and keenness regard no artificial barriers or stimulation and to many who would be attracted at first by the lack of examinations, the novelty would sooner wear off. This has been borne out by experience in G-land where, after the war, large numbers obtained licenses free of exams because of their service gratifications. After eighteen months or so many of these "war" hams ceased operation and have never been heard since.

I am a "war" ham whose interest did not appreciably flag—but I should say nine out of ten of my kind are nowadays completely inactive.

So I say—let em all come! It would be good for those of us who haven't gone QRO and would like a QSO occasionally and it may give some encouragement to those brave souls who produce gear for the ham market and that includes *CQ*!

John Worthington, G3COI
65 Hurst Street
Birmingham, 5 England

Antenna Impedance

Editor, *CQ*:

I want to compliment you on publishing the excellent two part article on antenna impedance matching by Paul C. Amis. They were the most simple, clear and comprehensive I have seen on the use of Smith Charts.

Electrical measurements are one of the amateur's greatest problems. In many cases we do not have the educational background and, with few exceptions, we lack the proper instruments to make these kinds of measurements. Although I have seen numerous articles on simple bridges which measure resistance at resonance, such as the Johnny Reinhartz "Tuna Fish Can RF Bridge," calibration and use of a full scale bridge. . . .

A. L. Eastman, W6AWI
735 Glen Ave.
Glendale, California

Q5 S5 A5?

Editor, *CQ*:

I am writing to you to tell you about my feelings on the s.s.b. signal reporting system (SIDEBAND, Feb. 1963, p. 56). I am quite intrigued with the system and feel that there are some definite advantages to it. It completely specifies the characteristics of an s.s.b. signal and it does this in a manner that is as simple as ABC. I have been using this system now and then; testing it out, as it were. However, someone pointed out a very true fact regarding the system and I asked if he would allow me to pass it on to you.

It was while in contact with G3DO, that I used it, specifing that I was reporting in the new s.s.b. system. Well, he made the comment that it was OK to do this with someone who was familiar with the system but it would cause a lot of confusion when talking to a DX station that did not speak English too well and was used to having a Q-S-report.

The problem, then, is to familiarize all amateurs with the new system and to explain it in some detail. This can not be done in a 10 or 15 minute QSO. Therefore, I

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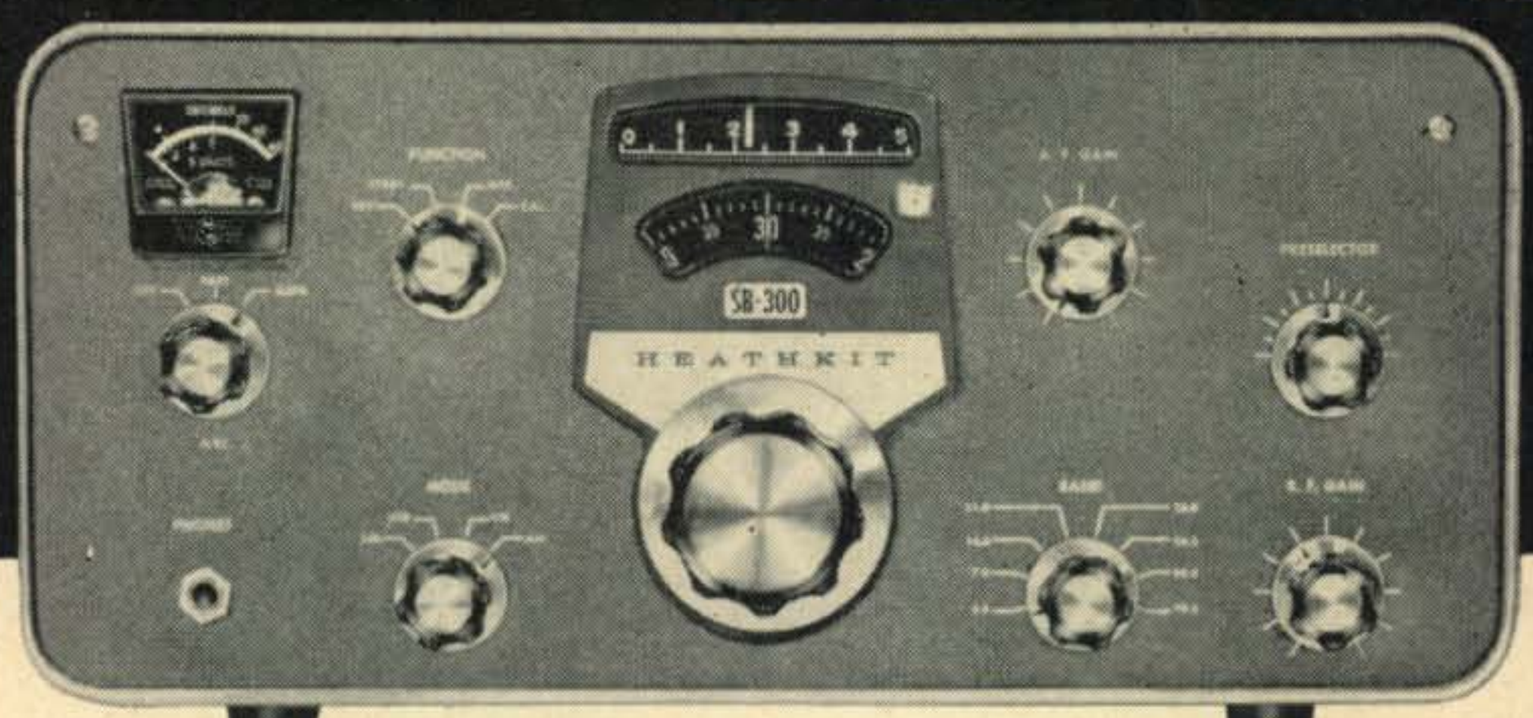

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Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected: LSB, USB, CW, AM. **Selectivity: SSB:** 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). **AM:** 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). **CW:** 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response: SSB:** 350 to 2450 cps nominal at 6 db. **AM:** 200 to 3500 cps nominal at 6 db. **CW:** 800 to 1200 cps nominal at 6 db. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal, ±.005%. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product detector, BFO, BFO, amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.

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AM-122R

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suggest that you inform other foreign magazines that have an amateur radio following of the system and ask them to print, in their own language, an explanation of it. I am sure that they will see the merits of such a system and pass it on to the amateurs all over the world.

In the meantime, I will use the system as often as possible, and gather comments from amateurs in this country and in other English speaking countries about it.

Anthony DiNardo, K2SYJ
51-27 72 Place
Woodside 77, N. Y.

"Amateur" TV

Editor, *CQ*:

I'm writing to tell you that I really enjoy your articles. They are very good. Keep up the good work.

I am speaking for a bunch of hams in town. We would like to see more articles on Amateur TV. We have been looking and looking for a magazine that has some on it. Mostly construction articles. We have seen some in *CQ* but we are looking forward for a lot more.

I didn't know *CQ* was so good, until another ham showed me some of the articles you have. That was early last summer. Since then I have been a steady reader.

Ronald Jasinski, K1ZPZ
80 Mt. Vernon Street
Springfield, Vermont

Watch for some real fine TV articles Ron, which we hope will run in serial form.—*Editor*.

A Lesson in Courtesy

Editor, *CQ*:

I have just finished reading K7PAG's letter published in the October, 1963 issue, and I find myself in full accord with his logic and reasoning.

I, too, do not believe it in good taste for any class of ham to consider another class license as a "lid." I have held a General ticket for fifteen months, and during this time I mainly worked the 6 meter band.

I am now on the lower bands, and I can make a comparison as to the operating procedure of both classes. During the period of time I worked 6 meters, I found the majority of hams to be considerate, friendly, and helpful.

On the other hand I have heard these so called "Elite" set of hams act as though courtesy and proper procedure were ruled illegal as soon as a DX station is on the frequency.

I fervently consider that if some of these amateurs would tune in on the Technician or Novice frequencies, they would not only have no reason to consider themselves superior, but might receive a lesson in common courtesy and good amateur radio practice.

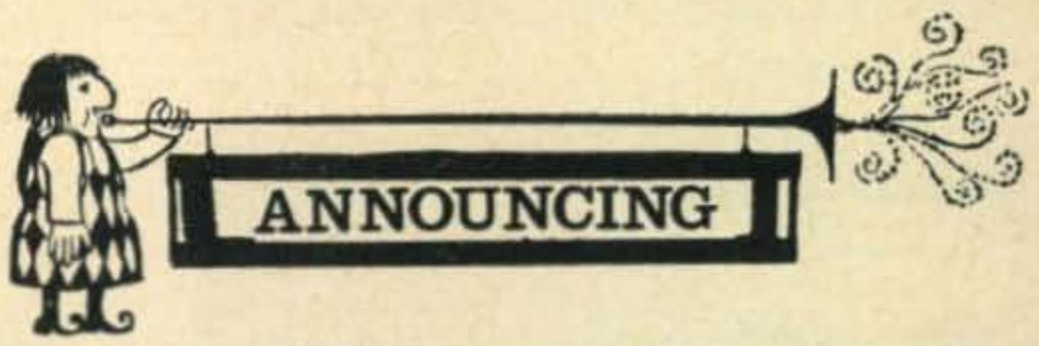
Mark Greenberg, WA2VOW
221 Linden Blvd.
Brooklyn 26, N. Y.

Fees and Pleas

Editor, *CQ*:

I am a new Novice not very well "filled in" on just what the big beef is about the ARRL's proposals on incentive licensing (I am not a member of the ARRL). I feel, however, that if these proposals cause *any* existing amateur

[*Continued on page 88*]



Attention W1 Amateurs

The Federation of Eastern Massachusetts Amateur Radio Associations will present an award to the outstanding New England amateur radio operator. Only amateurs in the first call district are eligible and should meet any one of the following qualifications:

1. Performed a meritorious public service to his

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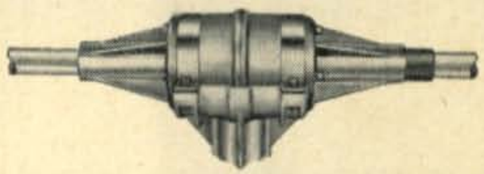

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community through the medium of amateur radio;

2. Made a major contribution to the science of amateur radio;

3. Helped greatly to stimulate interest in amateur radio to others;

4. Aided other amateurs to acquire a greater knowledge and skill in operating or building equipment;

This honor will be presented at the New England ARRL Convention to be held on May 9 & 10, 1964 at the New Ocean House, Swampscott, Mass. The award is known as the John R. Mansfield Memorial Award and is given each year at this convention. The recipient will receive a cash gift of $150 and a plaque commemorating the event.

Nominations are urgently requested from the amateur fraternity and they should be complete and accurate. Information on your choice of candidates should be sent to the Federation of Eastern Mass. Amateur Radio Asso., c/o Mr. Eli Nannis, W1HKG, 37 Lowell St., Malden, Mass. The closing date for nominations is April 10, 1964.

Logger Contest

Received too late for inclusion in the Contest Calendar section, we would like to announce that the Radio Club of Tacoma, Washington will hold its annual "Logger Contest" from 2200 GMT Feb. 15 to 2200 GMT Feb. 16. A certificate will go to those working 10 members of the club. This contest conflicts with the QCWA battle so keep you ears peeled for the "Loggers."

6 Meter Club of Chicago

The Six Meter Club of Chicago, Inc. would like it known that W9AVB has been elected President for 1964; K9ZWU, vice pres., W9AFA, secty., K9ZWV, treas., K9TMN, rec. secty., W9FVB and K9ARA, members at large, and W9CEJ, sgt. at arms.

QCWA Banquet (N. Calif. Style)

The Quarter-Century Wireless Association, Northern California Chapter will hold its annual banquet at the International Inn, 2 miles north of the San Francisco Airport, located on alternate U.S. 101. The date is Saturday, February 15th. A full course dinner will be served and you need not be a member to attend. Jack Slater, W6WF, Sec.-Treas. is handling the chores and will be glad to fill you in on the incidentals. His address is 2456 Johnson Place, Santa Clara, California.

Chicago Lecture

The "Mobileers" Mobile Emergency Service in Chicago will have as a guest speaker, Dave Walker, K7OIP, Service Director, Technical Services Dept. of the Champion Spark Plug Co. He will talk on Mobile Noise Suppression and a big crowd is anticipated. The date is February 7 at 8 P.M. and will be held in the Austin Town Hall, 5600 West Lake Street, Chicago, Ill. K9ZPS is President of the club and a phone call (RO 4-6011) will bring you directions.

Toledo Auction

The 9th Annual Ham Auction sponsored by the Toledo Mobile Radio Association will be held Sunday, February 16th, at the Toledo Sport Arena Exhibit Hall. Those who have equipment for sale should arrive early to have equipment tagged. Dozens of prizes will also be raffled. Tickets are available in advance for $1.00 or $1.50 at the door. Inquiries should be directed to K8LFI, P.O. Box 111, Sylvania Ohio.

Mills Trophy Race

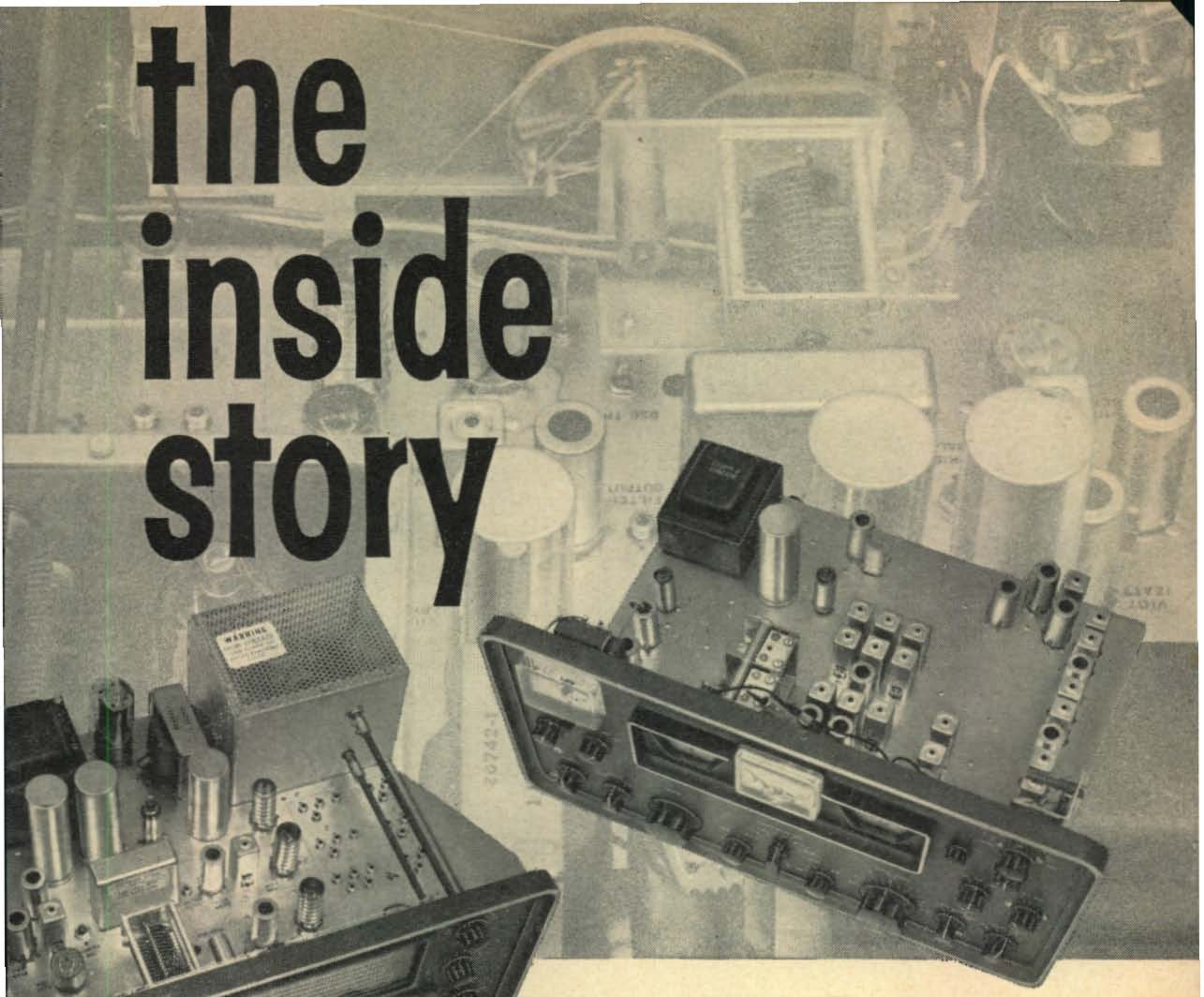
We are sorry that Joe Furfaro, W8NBD and Dick Manzey, K8ISE did not receive editorial mention in the story "160 Meters And The Mills Trophy Race, (December, 1963.) Without their help the story would not have come to pass. K8ISE was also responsible for the photographs.

Correction

The 5763 exciter shown on page 113 of the November, 1963 issue indicated a 1000 ohm, 2 watt screen dropping resistor. This should be 10,000 ohms 2 watts.

In the December issue, on page 72, one of the two 15 mmf capacitor dividers shown at V_1 is in error; the lower value should be 100 mmf. Sorry.

the inside story



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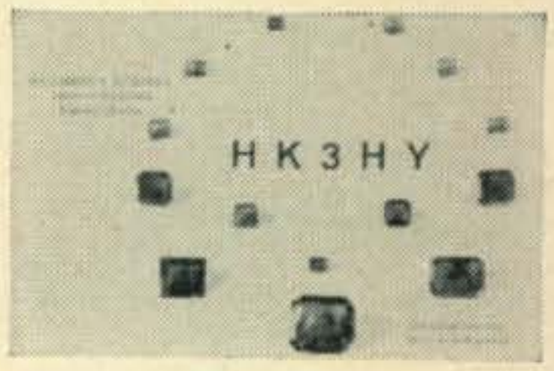
QSL contest

SOUTH America is the theme this month, backed up by cards from YV5ASG, HC1HL, HK3HY, YV5AST and YV5AJ. The winner, Jose, uses the phonetics "Five Aces Always Wins (cinco ases siempre ganan)." HC1HL's card features an early map of Quito dating back to 1734, and HK3HY's interesting card illustrates (in green) Colombia's famous emeralds.



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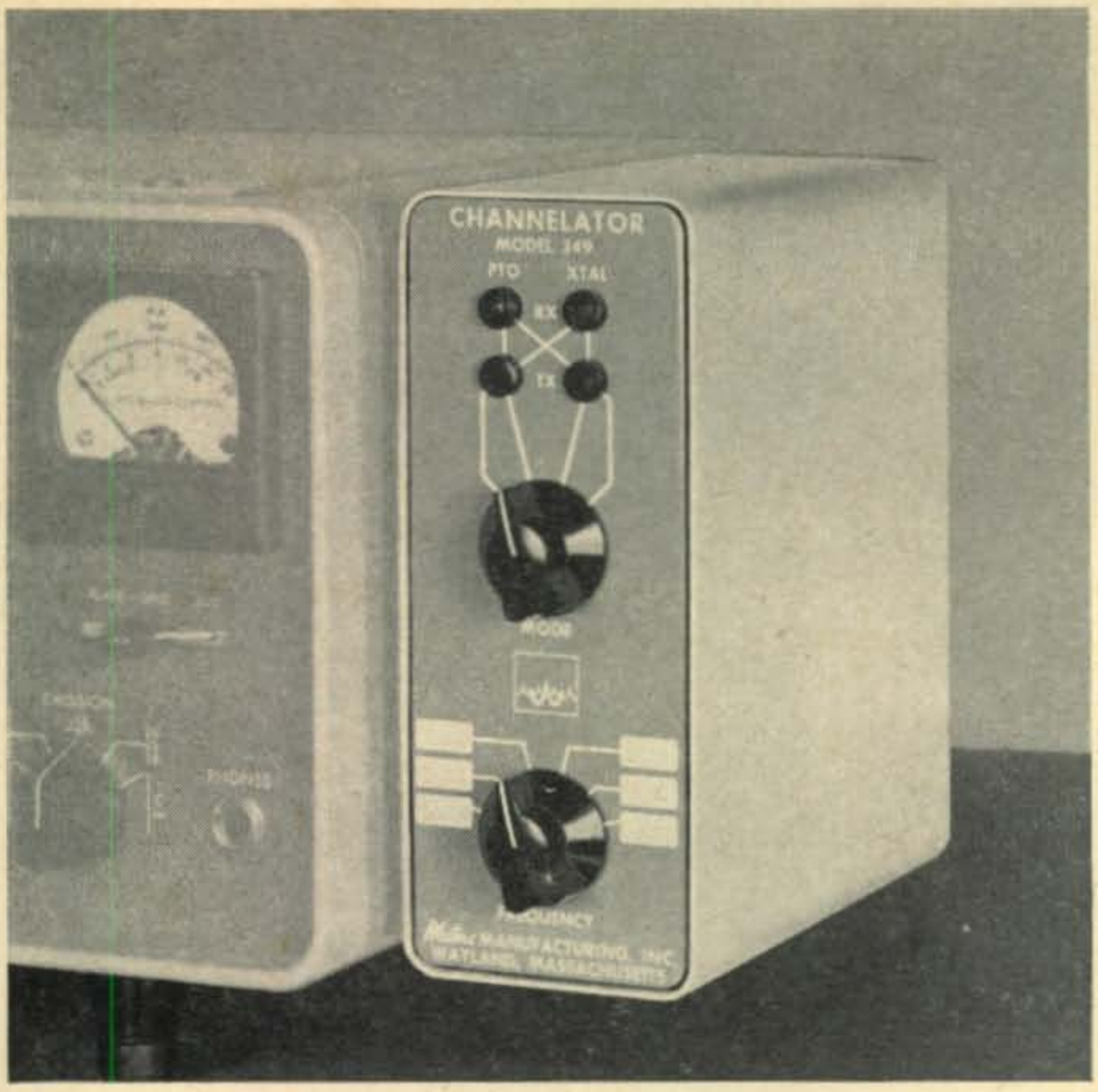

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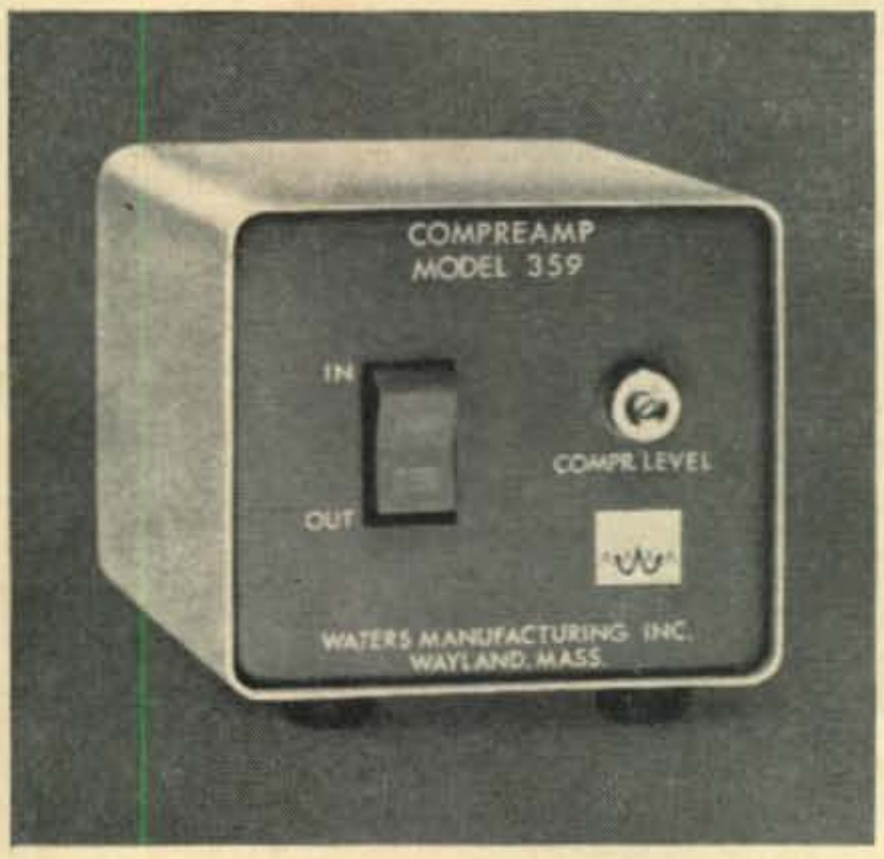

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For further information, check number 22, on page 110

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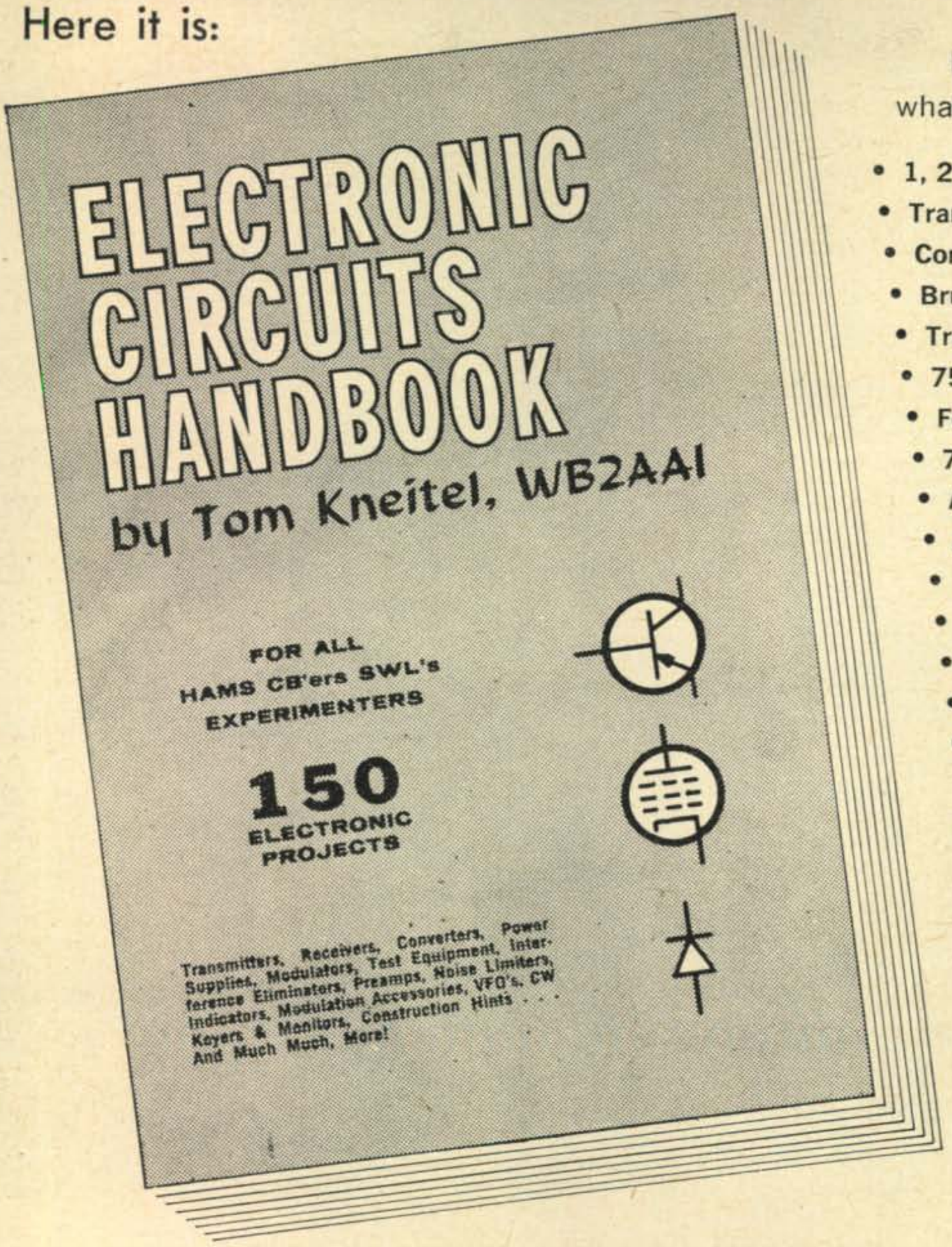
Here it is:



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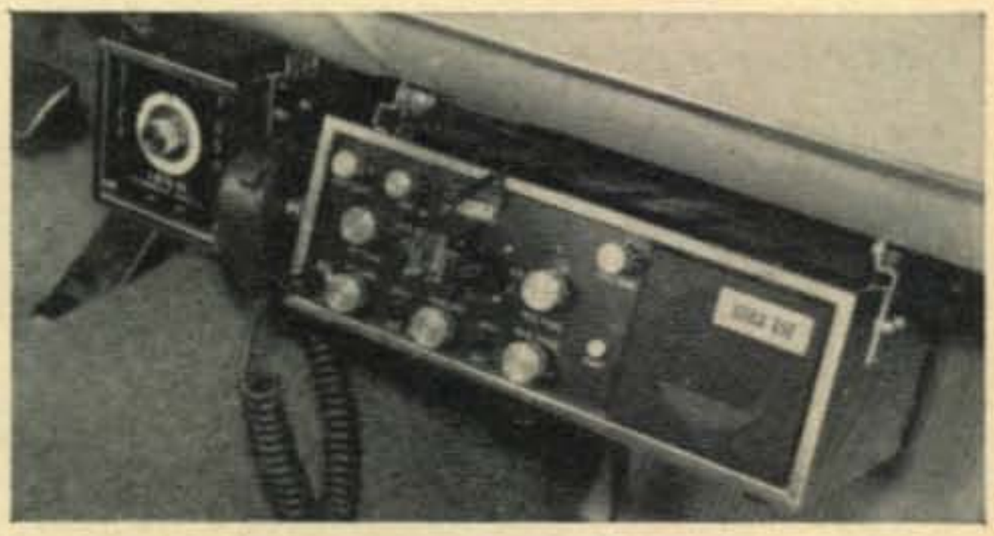

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BY E. L. WARDEN†, W4PGI

By inverting the audio signal in a 7360 balanced modulator tube, and, using this inverted audio to modulate a d.s.b. rig, many of the problems of receiving d.s.b. are eliminated. Receiving d.s.b. becomes as easy as s.s.b. In fact, the adventurous amateur will find that inverted audio for s.s.b. has its virtues in combating QRM.

THE use of double sideband suppressed carrier has appeal to many of us because of the extreme simplicity of this type of transmitter. The almost complete lack of critical circuitry will permit the amateur with a flat wallet to go on phone with a minimum of cash outlay. Unfortunately, after a short period of operation with this type of emission, it will be somewhat annoying to find that a large percentage of amateur receivers cannot copy double sideband suppressed carrier effectively.

The reason that a large percentage of receivers cannot copy d.s.b. is the fact that extreme skirt selectivity is required to reject the undesired sideband in the r.f. If not rejected, there will be phase cancellation between the sidebands in the second detector of the receiver and the signal will be unintelligible. A receiver with an almost rectangular selectivity characteristic is required to copy d.s.b. A receiver with this degree of skirt selectivity is normally found in the price range of 500 to 600 dollars. One type of receiver that can copy d.s.b. is the "Synchronous Receiver," which has a phase locked local oscillator. This type of receiver, however, appears to be somewhat of an advanced type, and you will probably not find one for sale at the corner radio store!

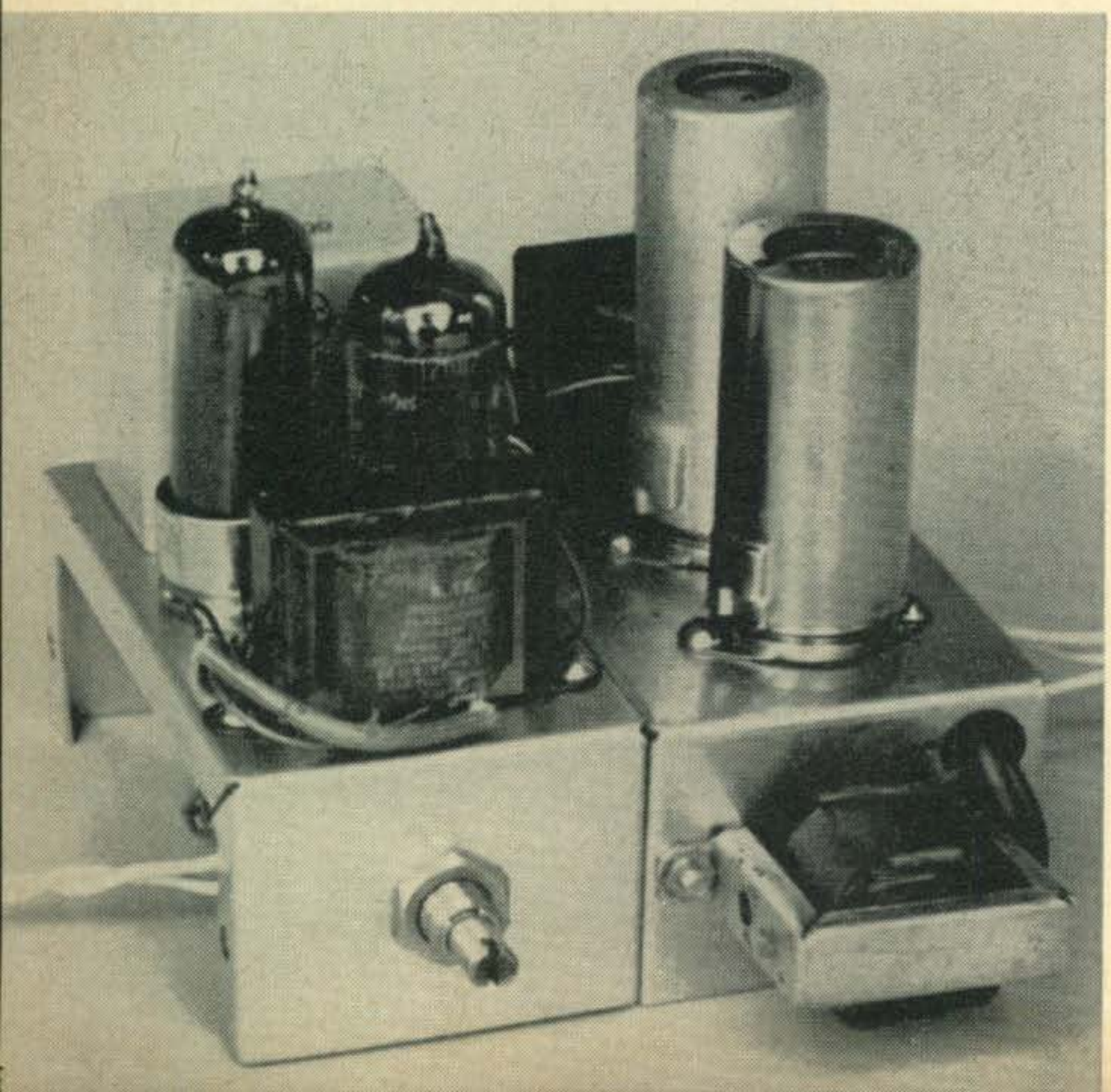
*Patent applied for.

†W-546 Arlington Towers, Arlington, Virginia.

A.F. Inversion

By using a technique known as audio frequency inversion, it is possible to generate a double sideband suppressed carrier signal that can be copied with conventional receivers, while still maintaining the extreme simplicity in the r.f. stages of the d.s.b. transmitter. Audio frequency inversion plus double sideband suppressed carrier will give you inverted double sideband suppressed carrier.

The description of the transmitter is as follows (see fig. 1): The audio input is heterodyned against the local oscillator in the audio balanced modulator. The output frequencies of the audio balanced modulator consist of the sum and difference frequencies between the audio input and the local oscillator. The sum frequencies are filtered out in the low pass filter and the output of the filter consists of only the difference frequencies. If for instance it is desired to transmit an audio frequency response of from 200 to



The completed audio inverter ready to modulate a d.s.b. or s.s.b. transmitter. Output is push-pull and for s.s.b. applications it must be converted to unbalanced output. The right hand chassis contains the oscillator, and speech amplifier (V_1) and the balanced modulator (V_2). The oscillator transformer is on the front lip and T_2 is behind V_2. The left hand chassis contains V_3, V_4, T_3 and Z_1 to the rear. The control on the front lip is the A.F. FEED THRU BALANCE.

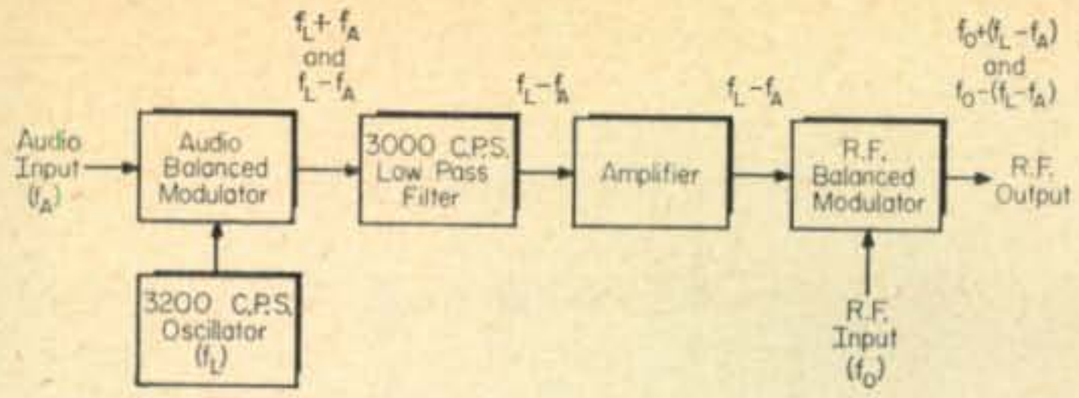


Fig. 1—Block diagram of the d.s.b. inverter unit shows how the balanced modulator inverts the audio spectrum. The filter eliminates the sum f_1+f_a, and only f_1-f_a is fed to the r.f. balanced modulator

3000 c.p.s., one may choose the local oscillator frequency of, say, 3200 c.p.s. Thus for an audio input frequency range of from 200 to 3000 c.p.s., the output of the filter consists of frequencies of 3000 to 200 c.p.s., respectively. In other words, the audio frequencies are inverted, or occur in the output in the reverse order of the frequencies which are applied to the input.

The output of the filter is amplified by a conventional audio amplifier, and is applied to a high level r.f. balanced modulator, which is excited by a suitable source of radio frequency. The r.f. carrier is removed by the r.f. balanced modulator, and the output r.f. frequencies consist of an upper and lower sideband. It is to be noted that the signal is still double sideband suppressed carrier, except that the audio frequency components of the sidebands have been reversed. The transmitted bandwidth is still the same as d.s.b. or conventional a.m.

Since the audio frequencies have been inverted, to demodulate this type of signal, it is only necessary to tune the radio receiver (with the b.f.o. on) to either the upper side of the upper sideband or the lower side of the lower sideband. The receiver will re-invert the desired sideband in order that the intelligence can be understood. The undesired received sideband will be translated to a higher audio frequency so that phase cancellation cannot take place. Additional effective attenuation of the undesired sideband will be accomplished by the i.f. selectivity and the limited high frequency response of the audio frequency amplifier in the receiver, and the limited high frequency response of the human ear. It has been determined that the undesired sideband will be inaudible, even when a receiver of poor skirt selectivity is used.

From inspection of the schematic that is given for a transmitter of this type (see fig. 2) it is apparent that the complexity is much less than many other phone transmitters (for instance, single sideband types). The r.f. circuitry is no more complex than most c.w. transmitters. This type of transmitter appears particularly attractive for use in ultra-high frequency applications, where the design of single sideband transmitters becomes somewhat unwieldly. It is not necessary to generate the signal at a low frequency and heterodyne several times to the operating frequency, like many single sideband transmitters do. The generation of the i.d.s.b. signal is accomplished at high level, and at the operating frequency of the transmitter. The electrical efficiency of the final r.f. balanced modulator is good, since it operates class C and also has a very low idling plate current between modulation peaks (in comparison to many linear class AB_1 amplifiers, which may be rather inefficient and have a higher idling current).

Advantages vs Disadvantages

There will, of course, be criticism about this type of emission, since it requires twice the bandwidth of single sideband. It was not the intention to replace single sideband with inverted d.s.b.; the intention was to make d.s.b. compatible for use with conventional types of receivers and to avoid much of the complexity and critical circuitry normally associated with s.s.b. The transmission of two sidebands does, however, come in handy when very high levels of QRM are encountered; if one sideband is jammed, the receiving operator can tune to the other one.

Since the characteristics of a modulation technique are normally compared to conventional amplitude modulation, it is important to remember that most of the interference caused by a.m.

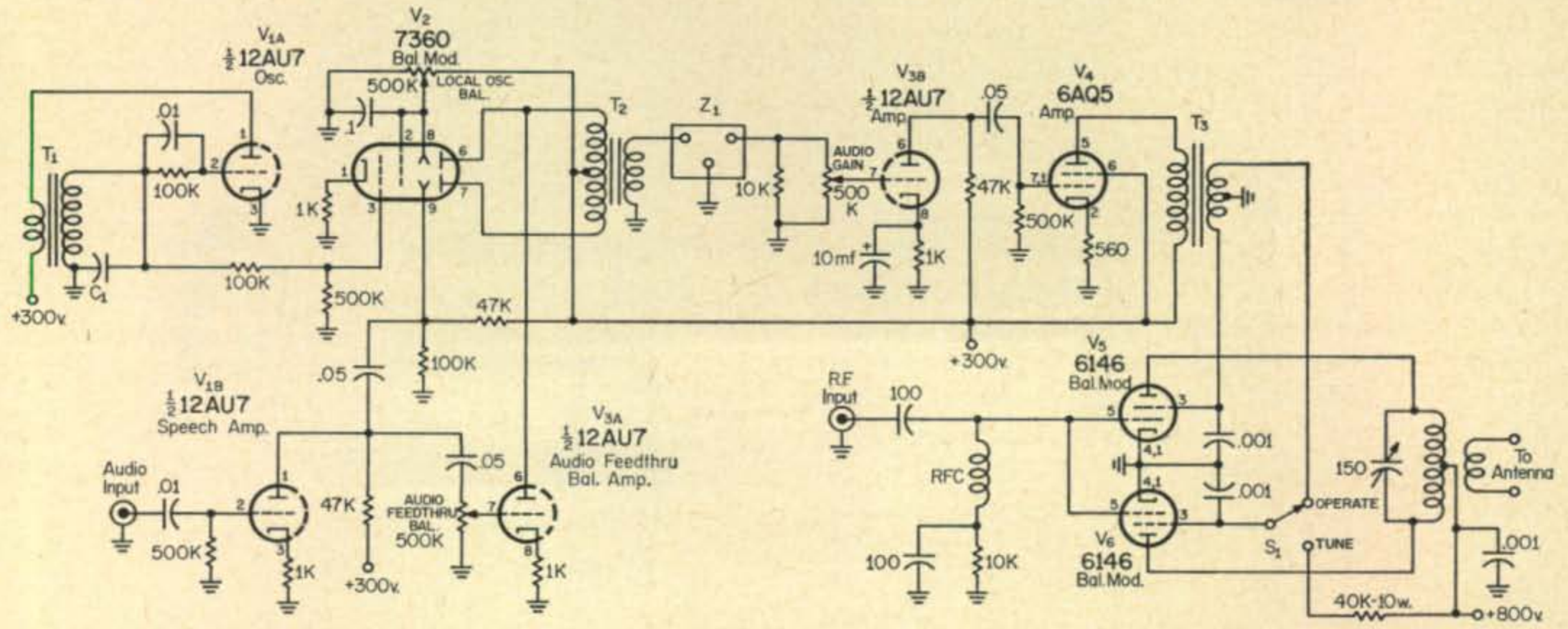


Fig. 2—Circuit of the inverted d.s.b. transmitter. Capacitor C_1 is approximately 0.002 mf and must be adjusted to place the oscillator at 3,200 c.p.s. Transformer T_1 is a standard 50L6 output transformer; T_2 and T_3 are both Triad M1-X units and Z_1 is a 3000 cycle low pass filter, UTC model LMI-3000. All capacitors greater than one are in mmf, less than one in mf, unless otherwise noted; all resistors are ½ watt unless otherwise indicated.

is by the carrier. It is sometimes assumed that two-thirds of the power of an a.m. signal is in the carrier; this is certainly true when the carrier is modulated 100% by an audio tone. However, when voice modulation waveforms are considered, the power of the carrier is a much larger percentage of the average radiated power. A reasonable estimate of this may be as much as 80%. Thus it is seen that even though two sidebands are transmitted by i.d.s.b., the level of the interference is reduced considerably. A much larger number of stations can operate without excessive interference, since the average radiated power is much less.

This article is directed primarily toward the hams which are still using a.m. who have probably not converted to s.s.b. because of the complexity and cost involved. The use of s.s.b. is unquestionably the ultimate, in regard to spectrum economy. If it is desired to utilize most of the advantages of suppressed carrier and eliminate heterodyne interference, and at the same time avoid the critical circuitry of s.s.b., the use of inverted double sideband suppressed carrier may prove to be a practical choice. Most final amplifiers which have push-pull or parallel tetrodes can easily be converted to a high level r.f. balanced modulator by connecting the control grids in parallel and the plates in push-pull to a balanced tank. By feeding the inverted audio into the screens in push-pull, you will then be in business.

Inverted Audio for S.S.B.

No doubt, the question will arise as to the possibility of using this inverted-speech technique with s.s.b., so the unit described herein was tried out on an s.s.b. rig with the following results.

Reception of s.s.b. with inverted speech requires that the receiver's b.f.o. be tuned to the other side of the passband or approximately ±3 kc each side of the suppressed carrier instead of directly to the i.f.; however, most s.s.b. receivers have a fix-tuned b.f.o. in which case the sideband selector must be set for the opposite sideband than that which is being transmitted, and the receiver tuned for normal s.s.b. intelligence. The *indicated* frequency will be off by about 3 kc, but the actual frequency of the transmitter will not have changed. If sidebands cannot be switched at the receiver, switching them at the transmitter instead, will accomplish the same result. In this regard, caution must be taken when operation is conducted near the band edges to make sure the switched sideband will not fall outside of the band limits.

[*Editor's Note:* Initial performance results indicated that received i.s.s.b. signals were sharper and produced less crud over a given bandwidth. Unwanted sideband suppression, after demodulation, was greater than that experienced using conventional speech with s.s.b. This is probably due to the inversion of the high-energy low-frequency speech components. At this writing, time was not available for a more comprehensive evaluation; however, it is expected that more data will be available shortly. In any event, individual experimentation with inverted speech for s.s.b. should show up some interesting possibilities.]

Construction and Adjustment

The transmitter is a converted c.w. rig which had parallel 6146's in the final. The final was converted into a high level r.f. balanced modulator by reconnecting the plates in push-pull to a balanced tank. Inverted audio is fed into the screens in push-pull. The TUNE-OPERATE switch will put screen voltage to one of the tubes to facilitate loading into an antenna. With the TUNE-OPERATE switch in the TUNE position, adjust the antenna loading until the plate current is about 150 ma.

The audio frequency inverter was built in a pair of mini-boxes. The inverter is located adjacent to the converted c.w. transmitter. By substitution of capacitors, vary C_1 until the local oscillator is operating at 3200 c.p.s. Put a scope across the output of the low pass filter. Adjust the local oscillator balance control for a null on the scope. Put the scope and a pair of earphones across the secondary of the output transformer of the 6AQ5. Advance the audio gain control and speak into the microphone. Adjust the audio feed-through balance control until there is a minimum of normal sounding voice in the earphones. The voice will sound inverted and unintelligible when this control is adjusted properly.

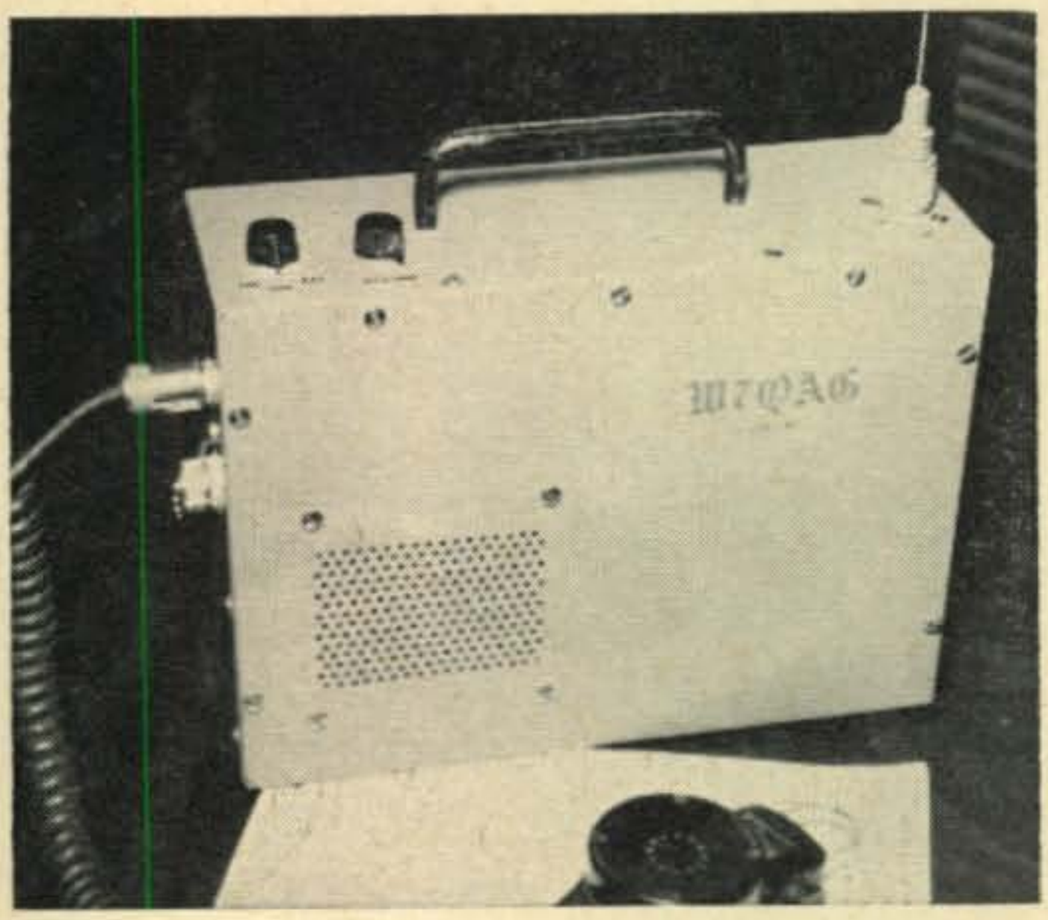
After the audio inverter is operating properly, connect it to the high level r.f. balanced modulator. After the antenna loading is adjusted for approximately 150 ma of plate current with the TUNE-OPERATE switch in the TUNE position, snap the switch to the "operate" position. Advance the audio gain control and speak into the microphone. The plate current will kick upward on modulation peaks. With the aid of a scope adjust the audio gain control until the modulation envelope just begins to flat-top on modulation peaks. Then back off the gain control slightly, in order that the modulation envelope does not flat-top. You are now ready for a QSO. ■

"Oh, I never know what amazing invention he's working on."

A Two Meter Portable Transceiver

BY ROBERT P. BRICKEY*, W7QAG

Here is a portable transceiver designed for in-the-field operation from self-contained Alkaline batteries. A d.c.-to-d.c. converter supplies 150 volts for the vacuum tube transmitter while the transistorized receiver and modulator are fed directly from the batteries.



This lightweight 2 meter portable runs over 2 watts input and is completely self contained in a 4½" x 5" x 7" aluminum case.

WHILE this transmitter-receiver is not the lightest or the smallest ever built, it is compact enough and light enough to be easily carried and at the same time it has a power output which gives a signal that is only about one and one third S units below that of a Gonset Communicator III. It is obvious that this output is sufficient to make the rig very practical for many communications purposes.

The Receiver Circuit

It was decided that the receiver should be fixed tuned as this would simplify the operation of the unit and eliminate the possibility of not being on the correct frequency to receive a call. Previous experience with this type of equipment has shown that most of the operation is usually limited to a single frequency anyway ar d so this was not thought to be a serious limitation.

The next decision to be made was whether the receiver should be a superheterodyne or superegenerative. Since fixed tuned reception was desired, had a superheterodyne been used it would have been necessary to use a crystal controlled local oscillator followed by multiplier stages in order to achieve the necessary stability at this frequency. This would result in increased complexity, expense, size, weight and power drain. While the superegenerative receiver is often thought of by many as being a pretty poor performer in these days of parametric amplifiers, etc., it does have much to commend it for this type of service.

For one thing, one of its most undesirable features, the radiation of interference over a wide area, can be almost completely eliminated by the use of transistors which operate at a very low power level and by the addition of an r.f. amplifier stage. The r.f. amplifier in addition to providing some gain also tends to reduce antenna loading effects on the detector. This type of detector has natural noise suppressing qualities and very effective a.v.c. action. The superegenerative receiver is quite broad, although the bandpass can be narrowed some with proper design. Since the receiver is fixed tuned, there is some advantage in having a broad response in order to be compatible with stations which are slightly off frequency.

The circuit shown in fig. 1 represents the best compromise found between the performance criteria of various configurations. This circuit

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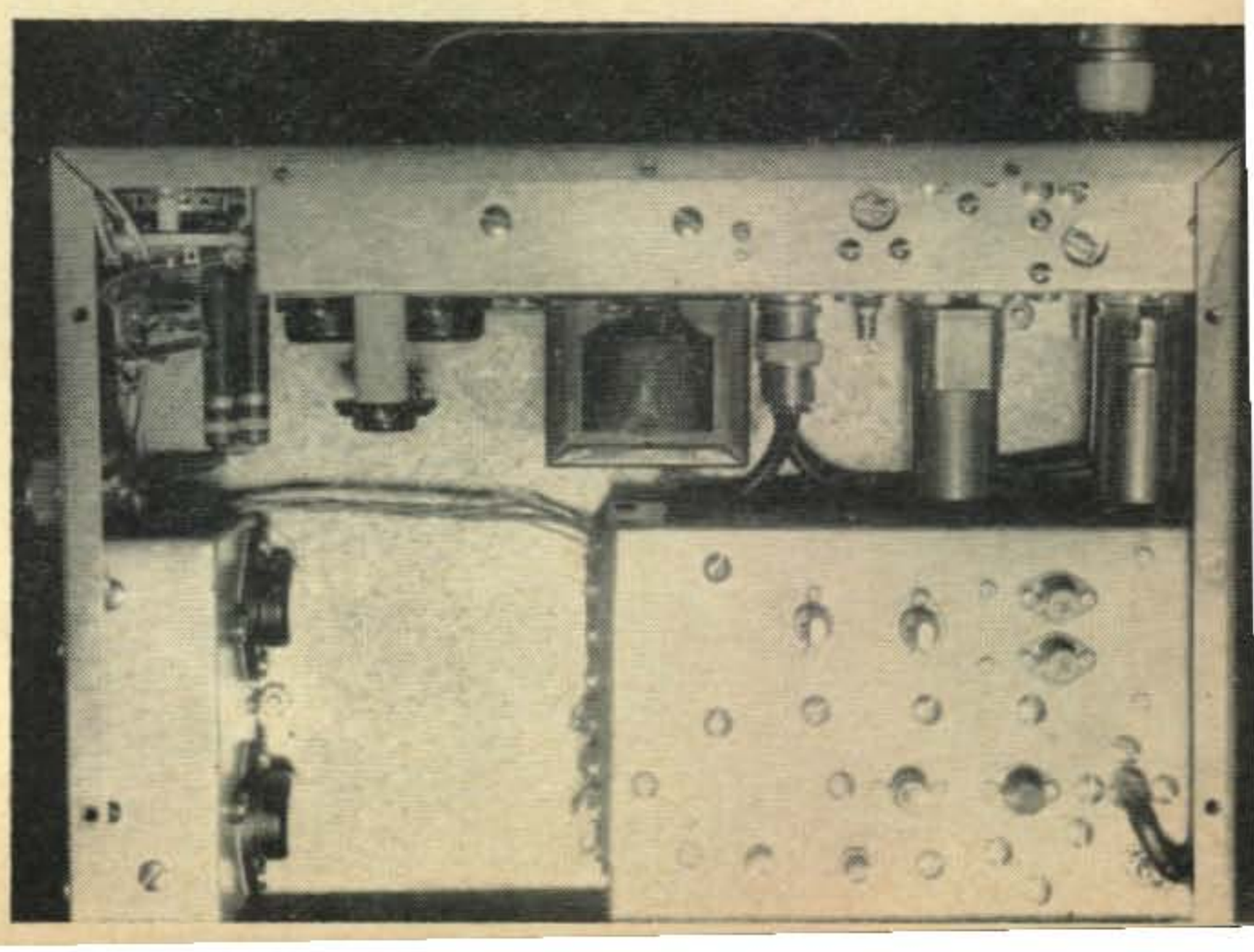


Front view with the cover removed. The modulator and transmitter chassis is across the top, the receiver chassis is on the right and the power converter is on the left. The speaker fits in the space between these two units.

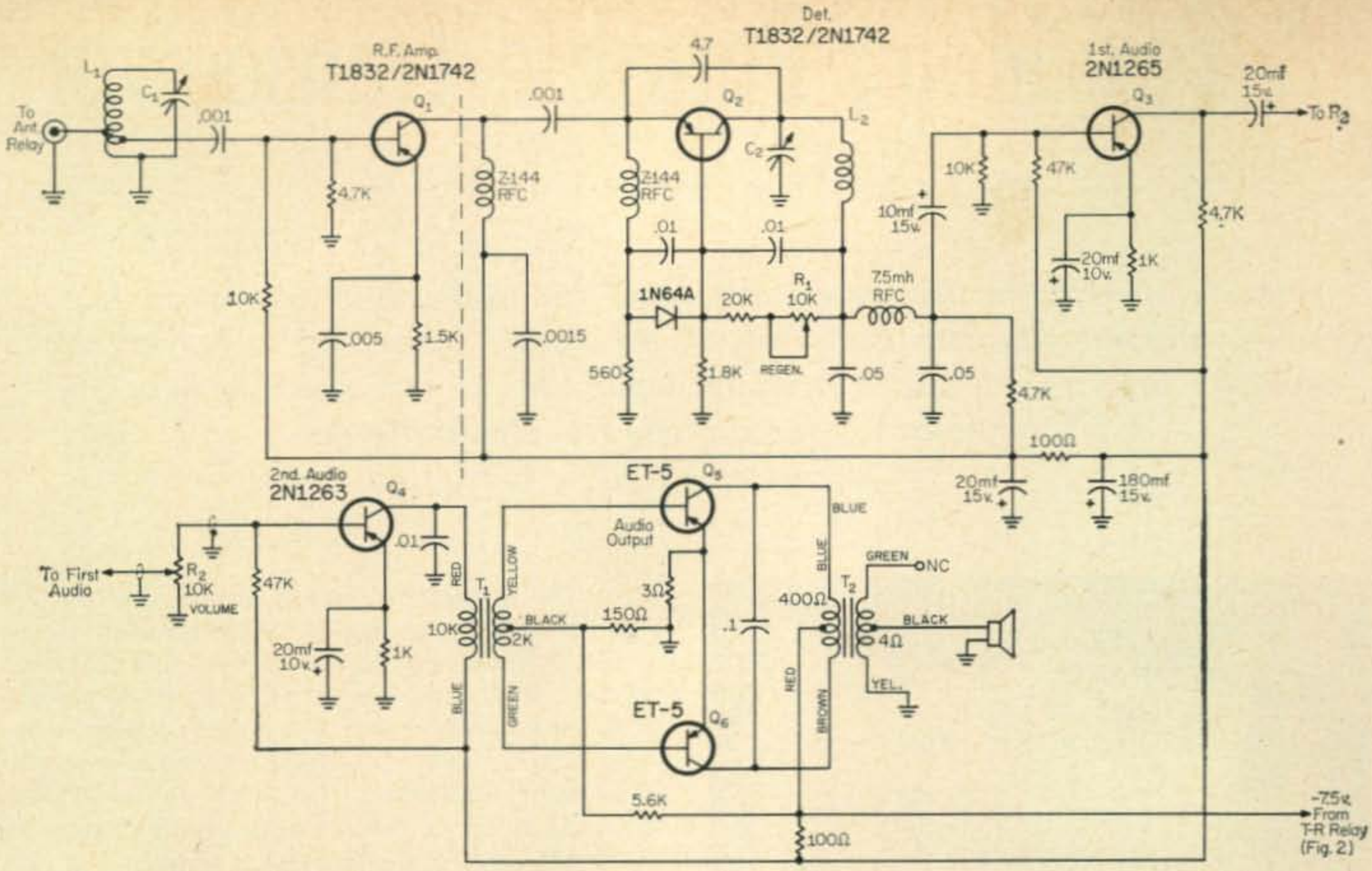


Fig. 1—Circuit of the 2 meter supergenerative receiver. All resistors are ½ watt unless otherwise noted; all capacitors greater than one are in mmf; less than one in mf unless otherwise noted.

C_1, C_2—11 mmf miniature variable with 4 stator and 5 rotor plates removed.

L_1—8 t. #21 e. wound on polyethylene center insulator from RG-8/U. Q_1 tap ¾ t. from cold end. Antenna tap 1 t. from cold end.

L_2—4½ t. #21 e. on same type form as L_1.

R_1—10K miniature pot. Centralab PNS7.

R_2—10K standard size Audio taper pot.

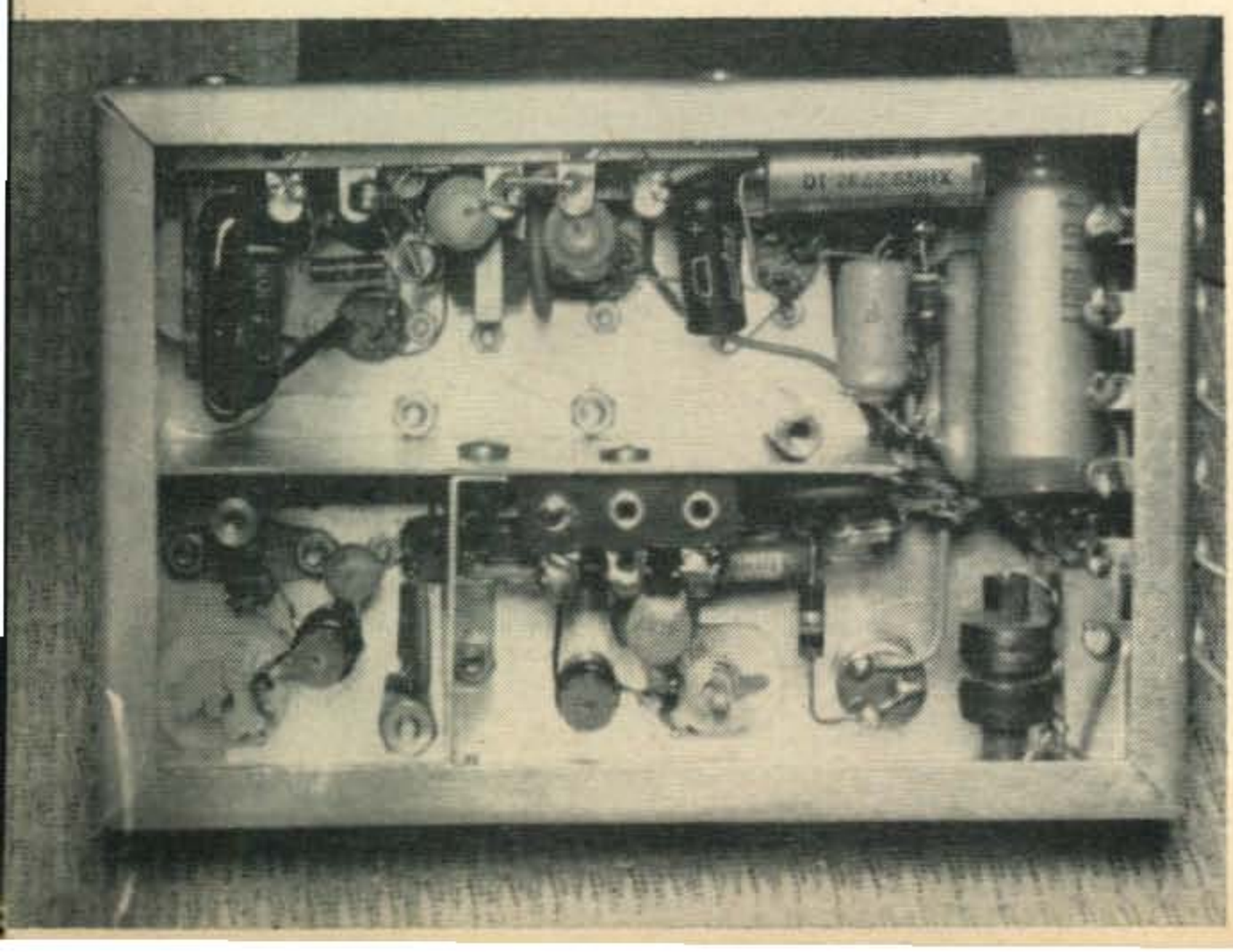
T_1—10K to 2K c.t. transistor driver transformer.

T_2—400 ohm to 4 ohm output trans. Thordarson TR-22.

is capable of sensitivity which is comparable to that of a much more complex superheterodyne. The interference radiation is so low that it cannot be detected at all on an NC-300 at a distance of 50 feet. The selectivity is great enough so that signals three hundred kc removed from the tuned frequency will not be heard unless they are much stronger than the desired signal.

The audio portion of the receiver is conventional. The audio power amplifier operates class B in order to reduce the battery drain.

The accompanying photographs show the physical layout of the receiver which is constructed on a 1½ × 3¾ × 5½ inch aluminum subchassis. Note the shield between the r.f. amplifier and detector stages. This improves the amplifier stability as well as reducing oscillator radiation.



Bottom view of the two meter superegen receiver subchassis. The r.f. amplifier is in the lower left corner shielded from the detector stage to the right. The audio circuit is contained in the section above.

The Transmitter Circuit

Due to the present high cost of transistors that would be capable of handling power inputs in the order of two to three watts at 145 mc it was decided to use vacuum tubes in the r.f. section of the transmitter. In order to keep the number of stages, and consequently the power drain, as low as possible an International Crystals seventh overtone crystal was used in the oscillator. This operates on 72.6 mc and the output of the doubler is 145.2 mc. While overtone crystals are a little more expensive than ordinary rocks the cost is not great enough to justify the use of more multipling stages when operation is to be on one frequency only. The final, ½ of the 3A5, operates straight through on 2 meters with a power input of about 2.2 watts as shown in fig. 2.

Since the batteries used have a voltage output of only 7.5 volts, it is necessary to use a power

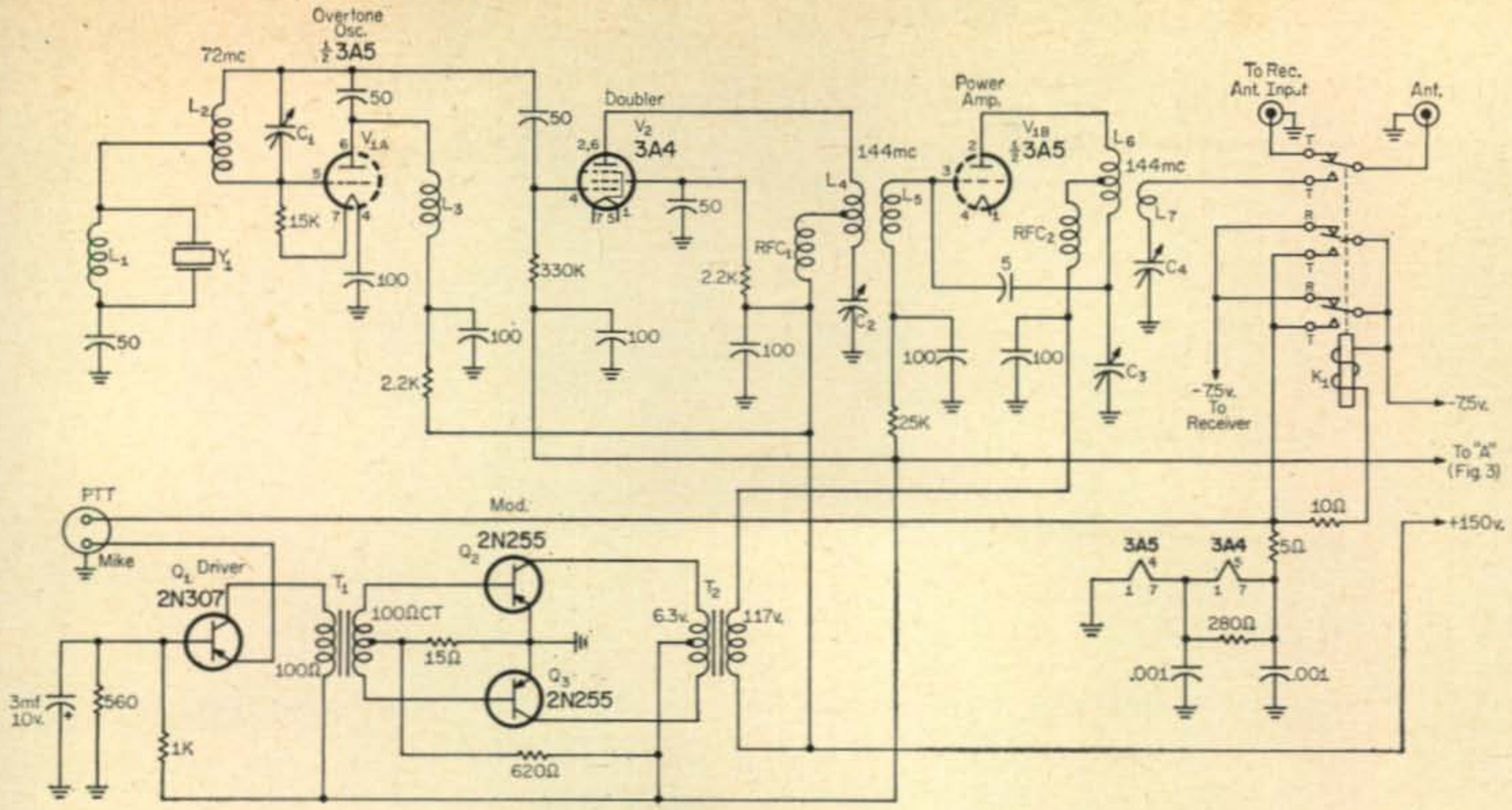


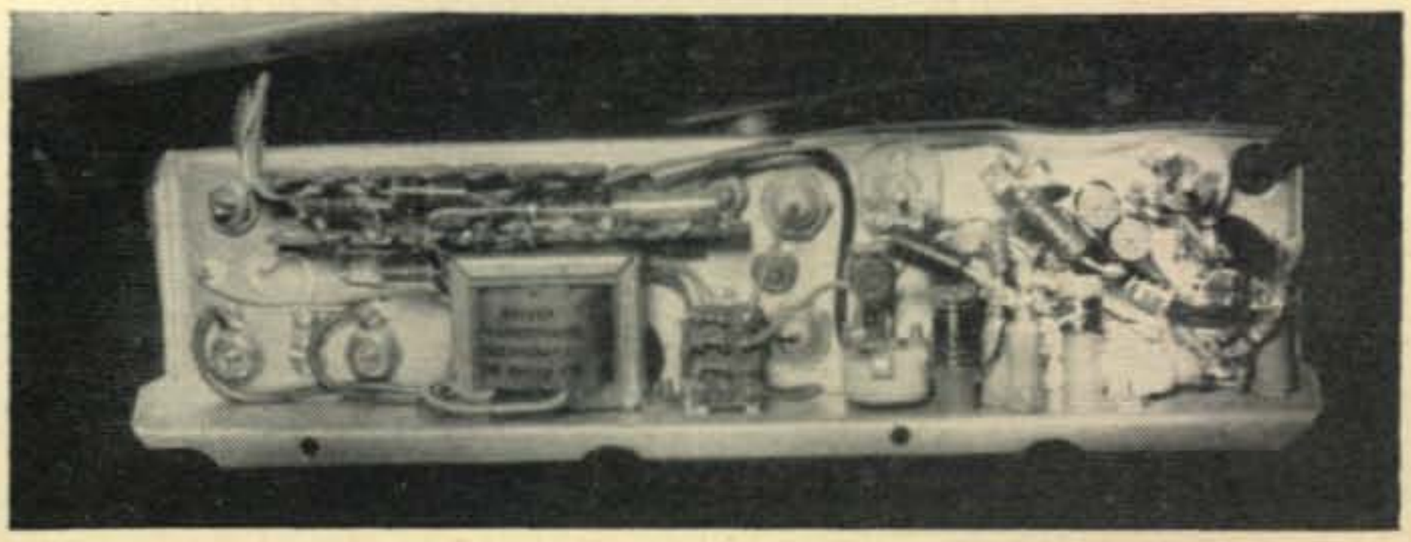
Fig. 2—Circuit of the 2 meter transmitter with a transistorized modulator. All resistors are ½ watt unless otherwise noted. All capacitors greater than one are in mmf, less than one are in mf unless otherwise noted.

C_1—4-30 mmf ceramic trimmer.
C_2—11 mmf miniature variable with 4 stator and 4 rotor plates removed.
C_3—11 mmf miniature variable with 2 stator and 3 rotor plates removed.
C_4—5-50 mmf ceramic trimmer.
K_1—3 p.d.t. relay, 6 v. coil. Potter & Brumfield KM14D.
L_1—12 t. #21 e. on 1 meg 1 w. resistor.
L_2—9 t. #21 e. wound on polyethylene center insulator from RG-8/U. Tap 5 t. from grid end.
L_3—10 t. #21 e. on same type form as L_2. Space to resonate slightly above crystal frequency.
L_4—8½ t. #21 e. on same type form as L_2. Tap 4½ t. from plate end.
L_5—4 t. #21 e. on same type form as L_2. Space to resonate at operating frequency.
L_6—5 t. #21 e. on same type form as L_2. Center-tapped.
RFC_1, RFC_2—1 w. resistor wound full of #33 cotton covered wire.
T_1—100 ohm to 100 ohm c.t. audio transformer. Triad TR-64.
T_2—6.3 v. filament transformer. Triad F-14X.
Y_1—72 mc 7th overtone crystal.

inverter to produce B plus for the tubes while transmitting. As we were unable to locate a commercially manufactured transformer that would meet the requirements, one was wound using an 88 mhy toroidial coil for a secondary. This type of coil is commonly used in RTTY filters and is available from several sources at $1.00 each. Figure 3 shows the windings to be added. They should be wound uniformly around the secondary and covered with plastic tape. The original coil contains two windings which should be connected in series as shown to form the secondary. The value of resistor R_1 in the power converter should be adjusted for an output of approximately 150 volts from the inverter under full transmitter load.

Transistors are used in the transmitter audio in order to keep the battery drain as low as possible. The modulator runs class B with just enough bias to reduce the crossover distortion. A filament transformer is used as a modulation transformer as it has the proper turns ratio to match the class B transistors to the vacuum tube class C load. No modulation control is provided as the audio gain is just sufficient to produce 100% modulation when speaking in a normal voice using an F1 or T1 button carbon microphone.

The exterior of the box was painted with Dupont Dulux automotive paint and rubber feet attached on the bottom. The microphone and external power conections are located on the left hand side and the only two operating controls, the power switch and volume control, are located



Bottom view of the modulator and r.f. section of the two meter transmitter, built on 1¼" × 2" × 9⅜" aluminum sub chassis.

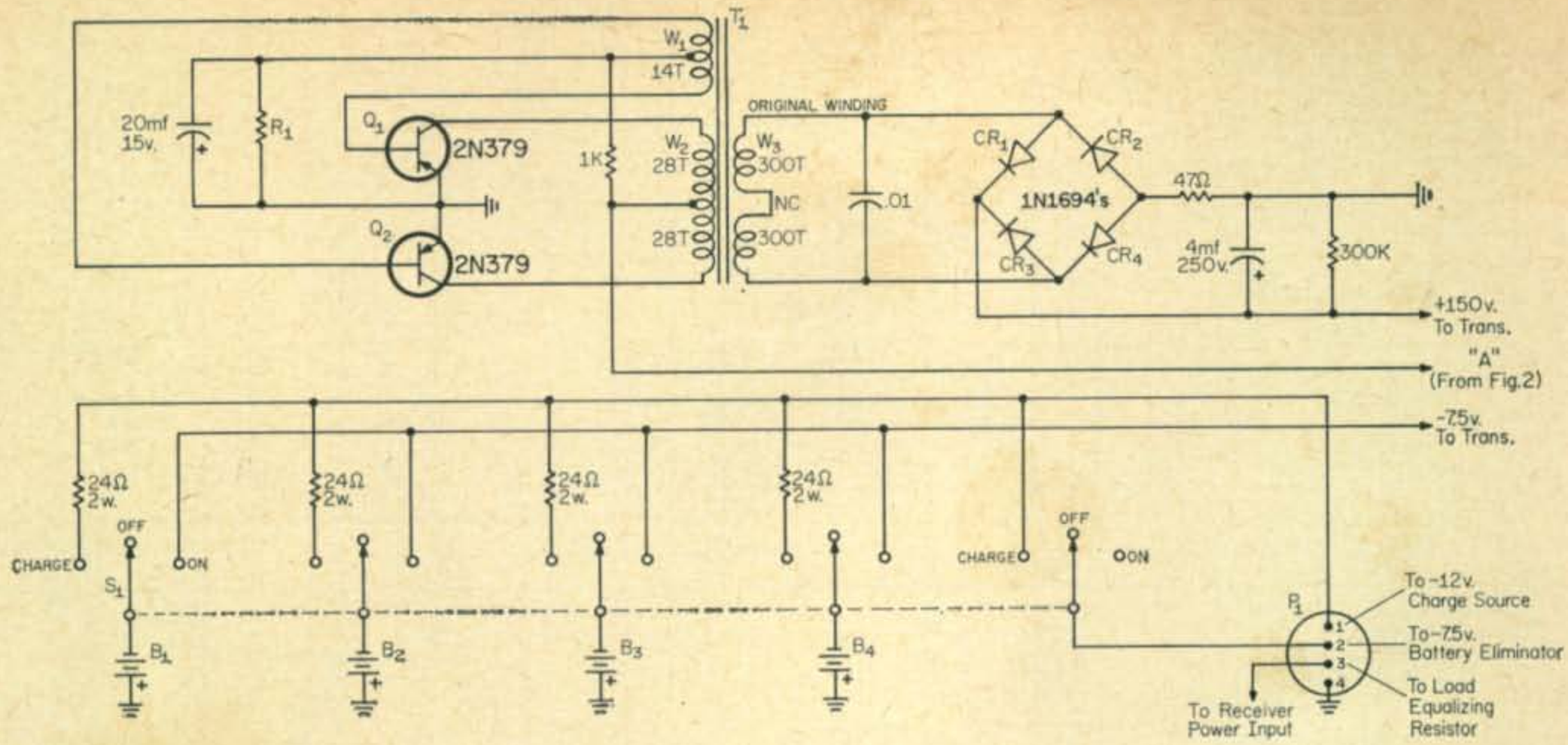


Fig. 3—Circuit of the battery section and d.c. to d.c. converter. All resistors are ½ watt unless otherwise noted and all capacitors are in mf.

B_1-B_4—Eveready #560 7.5 v. alkaline batteries.
R_1—Approx. 15 ohms, 1 w. Adjust for 150 v. output.
S_1—5 pole 3 position rotary switch. Centralab PA-2015
T_1—See text.

on the top. A standard SO-239 coax connector was used for the antenna so that antennas other than the whip may be easily attached.

Tuning and Operation

After the construction has been completed the receiver should be turned on and the regeneration control should be advanced just far enough to sustain oscillation as the receiver is tuned across the band. The detector is most sensitive with the regeneration set in this manner. Next the detector should be tuned to a weak signal on the desired frequency by means of the oscillator tuning capacitor C_2. The r.f. amplifier may then be peaked by adjusting C_1 for the strongest signal. This completes the receiver adjustments.

The transmitter should now be keyed on and the overtone oscillator adjusted by means of C_1. This can best be determined with a selective receiver tuned to the second harmonic of the overtone crystal frequency. This adjustment is quite critical and should be carefully made. Following this the doubler, final p.a., and the antenna loading should be adjusted for maximum output using a field strength meter or other output measuring devices.

With the transmitter and receiver both fixed tuned, the operation is about as simple as using an intercom. The power switch has three positions, off in the center, on to the right, and external power to the left. In the external power position the rig may be operated from the battery eliminator or the batteries may be charged. As the total charging current is only one ampere, a plug to fit the cigarette lighter in a 12 volt car provides a convenient charging method when in the field.

For operation while in motion a 19 inch plastic sprayed brass welding rod is used as an antenna. Of course when possible a more sophisticated antenna will provide improved performance. Due to the small size of the case, a coaxial antenna will provide considerable better performance than just the whip when the extra length is not objectionable. The coverage obtained will vary tremendously depending on the type of antenna used and the terrain between stations. Often the performance has far surpassed expectations. On one occasion several Provo, Utah stations were contacted over a non-line-of-sight path from Little Mountain, Utah (approximately 300 feet above average terrain) a direct distance of about 77 miles, using just the 19 inch whip antenna. At the home QTH using a ten element beam, all of the stations that are normally heard can be easily worked.

I would like to express my appreciation to Vernon Stiel, K7KHB, who is responsible for the pictures in this article and also to the many local stations which have co-operated in performing numerous operating tests on this equipment. ■

The R.I.D. Story

The Spark-Gap Times, official paper of The Old Old Timers Club is currently running a series of articles written by George Sterling, W1AE. The stories deal with espionage and spy activities carried on by radio during WW II. George directed the Radio Intelligence Division (R.I.D.) of the FCC during the war and we're sure all amateurs will find the stories and photographs exciting. W2EG, secty of the club, will take your order while copies last; however, should you miss out, watch for George's intriguing story in book form.

AHOY ALDABRA!

The Story of VQ9AA

BY SIR GUS BROWNING*, Ph. D(X), W4BPD

Ole Gus he's been doing just fine,
and this month he's called VQ9 . . .
Oh grateful are we, for '4BPD,
for Aldabra we sure stood on line.

IF YOU look at your world atlas, and if it's a good one, you'll observe a small dot a little to the northwest of the island of Madagascar. This is the island of Aldabra. This little spot remained vacant on everyone's country list for all these years; I always wondered why someone had not operated from there. Well—after getting there and experiencing the treacherous trip it is, I can see why it has not been done before and why it will be a long time before it's done again.

You'll notice that Aldabra is quite near the Malagasy Republic as well as being quite near the east coast of Africa. It always looked to me like an easy spot to get to—but brother—I have news; it ain't that easy.

On this "Round The World" DXpedition, Ack, (manager and "contribution accepter") and I discussed the many places from which I should try to operate. Aldabra was always tops on the list.

The first difficult problem to overcome was that of licensing. You may remember that Lee, WØAIW; Mike, WØMAF; Mac, WØUQV, and myself tried a previous unsuccessful try at Aldabra.[1] While we were in the Seychelle Islands during that ill-fated trip I made several friends who came to my aid during time of need and who interceded on my behalf with the Postal Dept. licensing authority. Consequently, through them, a license was promised when I arrived at Aldabra.

Travel Problems

Even getting to the Seychelles, from which I planned to reach Aldabra, presented a problem! Every reservation, from every ship leaving Africa was sold out for one full year in advance. It seemed as though all the Indian nationals in Africa were going home on a one-way trip. I was forced to book passage on the S.S. *Karanja* from Bombay, India. This is really getting to the Seychelles via the "long path."

Due to last minute delays, strikes, etc., all the radio equipment, which was shipped in January, we found, wouldn't arrive in the Seychelles until some time in June.

The Mosoons which sweep down across the Indian Ocean start in late May and blow for nine continuous months with winds frequently as high as 60 m.p.h. In simple words, this means you go to Aldabra before June 1st or you might become a Silent Key.

To complicate matters we had to purchase a brand new power plant, and along with other large items of radio gear, *air expressed* this whole mess from New York City to Bombay! This really flattened the bankroll but it had to be done.

On To The Seychelles

After a very smooth five-day voyage from Bombay, I arrived at Port Victoria. When you see the Seychelles from a distance you want to start taking pictures. Don't do it though, because after you land, everywhere you look you see the best picture material ever. Port Victoria is a small village of about 1,500 to 2,000 population; however, it's the biggest in the Seychelles. I was told that women outnumber the men approximately 9 to 1, so I say, young man, go to the Seychelles.

The islands are a group of mountain peaks emerging from the Indian Ocean. You're at the mountains and beaches at the same time and you can swim and mountain climb every day of the year. The natives are all colors, from black to white, mostly somewhere in between and they

*c/o The World Radio Propagation Study Association, Ack Radio Supply Co., Birmingham 5, Alabama.

[1]The unsuccessful VQ9AIW operation occurred during September, 1959—*Ed.*

are the most friendly people I have ever met. Cigarettes and gasoline are very high priced while labor is very inexpensive and plentiful.

When the steamer arrived from Bombay, I was expecting the usual customs trouble, especially since I had all the radio gear. Surprisingly enough they didn't open a single package; they didn't even ask what the boxes contained.

Harvey, VQ9HB met me at the dock as the ship arrived and asked me when I wanted to leave for the Aldabras. I, of course, replied, "yesterday."

Preparations For Aldabra

Even with a license and transportation, one very important point still remained, that of receiving permission from the owner of the island to land and operate.[2] Without that all important letter of introduction to the island manager, landing permission is not obtainable even after you arrive.

The owner of Aldabra, who is a business man in the Seychelles, was introduced to me. After many hours of talking, he gave me the all-important letter of introduction. This letter requested that I be their guest as long as I wanted to stay. After all these matters were attended to we were all set to go.

As soon as the news got out that someone was going to the Aldabras we were given mail to deliver to a few of the lesser islands enroute.

Anchors Away

Usual island slowness began to crop up, but on the fourth day after my arrival, the *Lua-Lua* put to sea. There were three of us aboard; Ben, the owner of the boat, Harvey, and myself.

The *Lua-Lua* is 35 feet long and has a beam of 10 feet. It was designed and built by the owner and I must say every inch of space is used. It sleeps three very comfortably and can sleep five in a pinch. It has an eating table, gasoline cooking stove, diesel engine and three sails.

The pantry was loaded with food, the diesel tanks were filled with oil, 80 gallons of water was aboard and I had 52 gallons of high-test gasoline for the generator spread all over the deck. The gasoline, by the way, cost me one buck per gallon. The 75S-3 and 32S-1 were strapped to the eating table and the all-band (7-28 mc) vertical was mounted two feet from the sail mast. The feed line was only 5 feet long and should have been 52-ohm coax instead of the 72-ohm cable I had. This was probably the cause of the high s.w.r. It wouldn't load on 40 at all but certainly worked fine on 15 and 20 meters.

I signed VQ9A/MM until the half-way point to Aldabra was reached and from there VQ9AA/MM. Many contacts were made during the voyage and the schedule with Ack clicked every day.

The arrival of a ship, any ship, is something the natives look forward to and is cause of much jubilation. One such stop was Des Roaches Island where we decided to spend the night in the lagoon aboard the *Lua-Lua*.

A Funny Thing Happened To Me . . .

After staying up for the long path opening to the U. S. which was 4:00 A.M. local time, I intended sleeping on a small bunk at the rear of the boat.

After lying down for a while and wondering about the 5-9 plus 20 db signal that signs W3CRA when all the others on the band are S7, I came to the conclusion that Frank must have the world's best QTH. When the band is dead he's always S7 and when the W-boys are S7 Frank is always over S9. This just isn't once in a while, it's an every day occurance.

Just then I heard a sloshing noise about eight feet from my bunk. I opened my eyes and the moon was up. As I looked in the direction of the noise I saw a long, black, wet, shining, sort of thing which looked like a l-o-n-g elephant trunk entering the boat from the sea. I jumped up hollering bloody murder and some unprintable stuff too. Harvey and Ben came tearing out from below decks and one of them had a flashlight in his hand. He pointed it at the thing which seemed to be coming on board and Harvey quickly spotted it as an octopus. He grabbed the lifeboat paddle and started pounding on the tenacle to pry it loose. Finally, it dropped back into the lagoon.

Ben and Harvey went back to their bunks. I suppose to sleep. As for me, this time I went to another bunk, *inside* the boat.

It was a long time before I fell asleep, for it seemed every time the boat rocked, I heard that same sloshing noise. I still wonder what would have happened if that octopus' tentacle had reached around me. It was an eerie feeling, believe me, and I was begining to wonder if Aldabra was really worth all the trouble.

Off Again To VQ9

The next morning bright and early we were again under sail for Aldabra. It was quite a sight to see Harvey's cat pounce on flying fish as they landed on deck. That cat of Harvey's was a real flying fish catcher.

At each of our additional island stops we were given two or three cooked chickens when we departed. This was about the darndest chicken-eating DXpedition I ever heard of.

After about three days of real smooth sailing

[2]Although Aldabra comes under the jurisdiction of the British Crown it is leased by the English Government to a private owner who has complete authority on the island.—*Ed.*

the ocean got rough. Harvey told me this was due to the Mozambique and Madagascar ocean currents as well as the gradual build-up of the monsoon winds.

We did some fishing and caught a few big ones, I guess 35 to 60 pounds. We would hook a pretty big one and then, wham-bang, the line was ripped apart by one of the many sharks which were our constant companions.

At one of the islands, I think it was Alphonse, I was shown exactly how a Copra plantation was run. This is a story within itself and I hope to describe it in a book I'm going to write when this DXpedition is completed.

The swells at this point were running about 10 to 15 feet. The boat and its passengers took a beating on those last few days and it was a good thing the Collins equipment was strapped down on the eating table. It was also good that I had a small, transistorized bug that Ed, W3KVQ, built especially for this trip. A regular mechanical bug would have been utterly useless with the boat pitching and tossing as it was. My c.w. would have been a mess and it is enough of a mess as it is now. I soon learned to go along with the pitching and tossing of the boat. I really became part of the boat and this is quite hard in itself. You fellows sitting back in the States in fancy office chairs in your air conditioned apartments could not possibly picture me on that boat operating under those trying conditions.

An enjoyable sight was Harvey and Ben with their sextants trying to shoot a star on that tossing and pitching boat. First they would assume our position by dead reckoning which was by a water-speed meter and estimates of currents and winds. Then they would prove to themselves, with their sextants, that they were right. Many times they proved that we were in the middle Atlantic or the South Pacific. All they could do was to take a new shot and do a lot of calculating until each of them came up with the same answer. All this time I was listening to WWV or WWVH and calling out the exact time. The exact time of each spot is just as important as the sextant shot. A second or two of time means miles and miles. All of this was quite interesting to me.

The islands around Aldabra can only be seen five to seven miles away even in the daytime. A mistake of a few miles means that you may completely miss an island and brother, it might mean it's another story. You can very easily get shipwrecked on the coral reefs around the islands. You always *plan* to arrive at the island in the daytime. I said you plan to do this but it is dark 50% of the time and we arrived at some of these islands at night. We saw quite a few remains of wrecked ships.

As I have said earlier, departing time came, and by now the Southeast Monsoon had started. We had a devil of a time getting the equipment from the island into the *Lua-Lua*. The boat was anchored about 600 feet from Aldabra, well beyond the reef. In deep water the swells were about 10 feet and each wave was breaking with a white cap. Can you imagine trying to transfer equipment from a twelve foot native boat and putting it aboard the *Lua-Lua* under these conditions while at the same time keeping it dry? I thought it was absolutely impossible but we managed to do it.

And Now, Back "Home"

At last we were on our way back to Mahe in the Seychelles. Aldabra and VQ9AA were now ancient ham history.

I thought coming down was a rough trip but that was a Sunday afternoon outing compared to the return trip. When we were a few miles from Aldabra the seas really began to get mean. The first wave completely washed over the boat and I mean completely. It hit from stem to stern and dumped about five gallons of sea water right smack on the radio equipment. For the next eight days everything in the boat, including us, got completely and thoroughly soaked. There was no chance of drying out the equipment. My Collins gear was completely soused. Those waves were 25 to 35 feet high and we were in a 35 foot boat. We were almost in a vertical position at times. Sometimes the wind velocity would be as high as 40 to 50 m.p.h. A terrible time was had by all. This was a most trying experience. I did not have time to worry; I was too busy trying to stay put. After eight days, we finally saw VQ9 in the distance. What a relief that was. The return trip had been very trying on everyone and we were extremely glad to know it was over.

It took me five days and nights and one gallon of carbon tet to get all the sea water and salt from the radio gear. Now you can see why I have predicted that it will be a long time before anyone operates an Aldabra station again.

In closing, I would like to personally thank everyone who has made this "round the World" DXpedition possible. The list is much too long to mention them all. No. 1—I would like to thank my wife, Peggy, for being so nice and letting me go. Boys, this proves that you must train them early, hi. No. 2—I would like to thank Ack for the 1000 or more things he has done and is still doing. I am sure he will be cussing me before the QSLs for those 7280 QSOs are sent out. No. 3—I would like to thank Collins for the fine equipment.

At future stops, please, no more than one QSO per band per mode and please remember that I have no place in my log for names, QTHs, power, etc. All I want is a signal report and please QRQ.

I could go on and on thanking all who made this trip possible. You all know what you did so I would like to thank each and every one of you from the bottom of my Coca-Cola drinking heart. ■

View of the completed Can-Key. Built from 2⅝" food tins, it is weighted by a cast lead base. It uses two paddles to form the characters. It is shown here slightly smaller than actual size.

This is a paddle key for an electronic keyer that can be homebrewed in the average workshop. It is built in a 2⅝" diameter food tin and incorporates separate dot and dash levers.

THE CAN-KEY

ALBERT H. JACKSON*, VE3QQ

HERE is an amateur designed and home-built miniaturized key-lever for your electronic key. Though small in size, 2⅝" wide and 3⅝" long, including the levers, by 1¾" high, it has the same "feel" and includes all features normally found in the larger units. It incorporates separate dot and dash levers, does not "walk" on the table, and performs exceptionally well. Although the writer was brought up on single lever keys, the change to the dual lever type was made without effort, and it is felt that the dual style has many advantages with regard to construction and use.

This particular key makes use of round, sandwich-spread canned-meat tins 2⅝" in diameter by 1⅛" deep. These tins are seamless, except for the cover joint, and you will need three of them, two of which should be without dents or scratches as they will form the outer case for the finished key. The covers should be removed with a rotary type can-opener, and the cans washed thoroughly and labels removed with soap and water. If it happens that this exact tin is not available in your area, a little ingenuity should turn up a reasonable substitute of the same diameter, which may then be cut to the dimensions given. Campbell's Soup, 10 oz. size, is one suggestion, and though these cans are seamed, the seams may be turned to the rear where they will be more or less out of sight on the completed key.

If a soup tin is used for the top cover, its top may be dressed up a little by inserting a ⅛" by 2½" diameter disc of lucite or aluminum inside the end flange. If lucite is chosen, it may be painted on the under side, or left clear and used to display the station call-sign, for instance. Again, some of the Aerosol pressure-spray cans have a seamless cover of the same diameter, and these also can be cut to the top cover dimensions shown. Note that if you use a soup tin for the base-weight cover, the lower edge of the top cover will fit inside its end flange rather than on the outside as shown in the photographs; the height of the top cover should be altered accordingly. Any of the tins mentioned can be polished with "Brasso" to a chrome-like finish, or they may be painted to suit the tastes of the builder.

A soup can is satisfactory for casting the base-weight as described later, but will handle more easily if it is cut to about 1¼" in height. Any leakage which develops at the soldered joint will be small, owing to the overlapping and interlocking construction of all seams.

Most of the remaining parts are junk-box items, or can be obtained for negligible cost. Access to a jig-saw and drill-press will help in construction, but an excellent job can be done with hand tools if you are careful.

Template

Since good position accuracy is required between holes of mating pieces, begin building by making a simple sheet-metal template as shown in fig. 1. Ordinary light gauge galvanized iron, available from the local tinsmith, is fine for the purpose. Scribe a 2½" circle with a pair of dividers, mark and drill all holes as shown, then carefully cut along the circumference with tin-snips. This will produce the finished template shown in fig. 1.

Base Plate

Make the base-plate next, using a piece of hard aluminum or dural, ⅛" thick. Clamp the template to this material and scribe around its edge to make a 2½" circle. Using the tip of a

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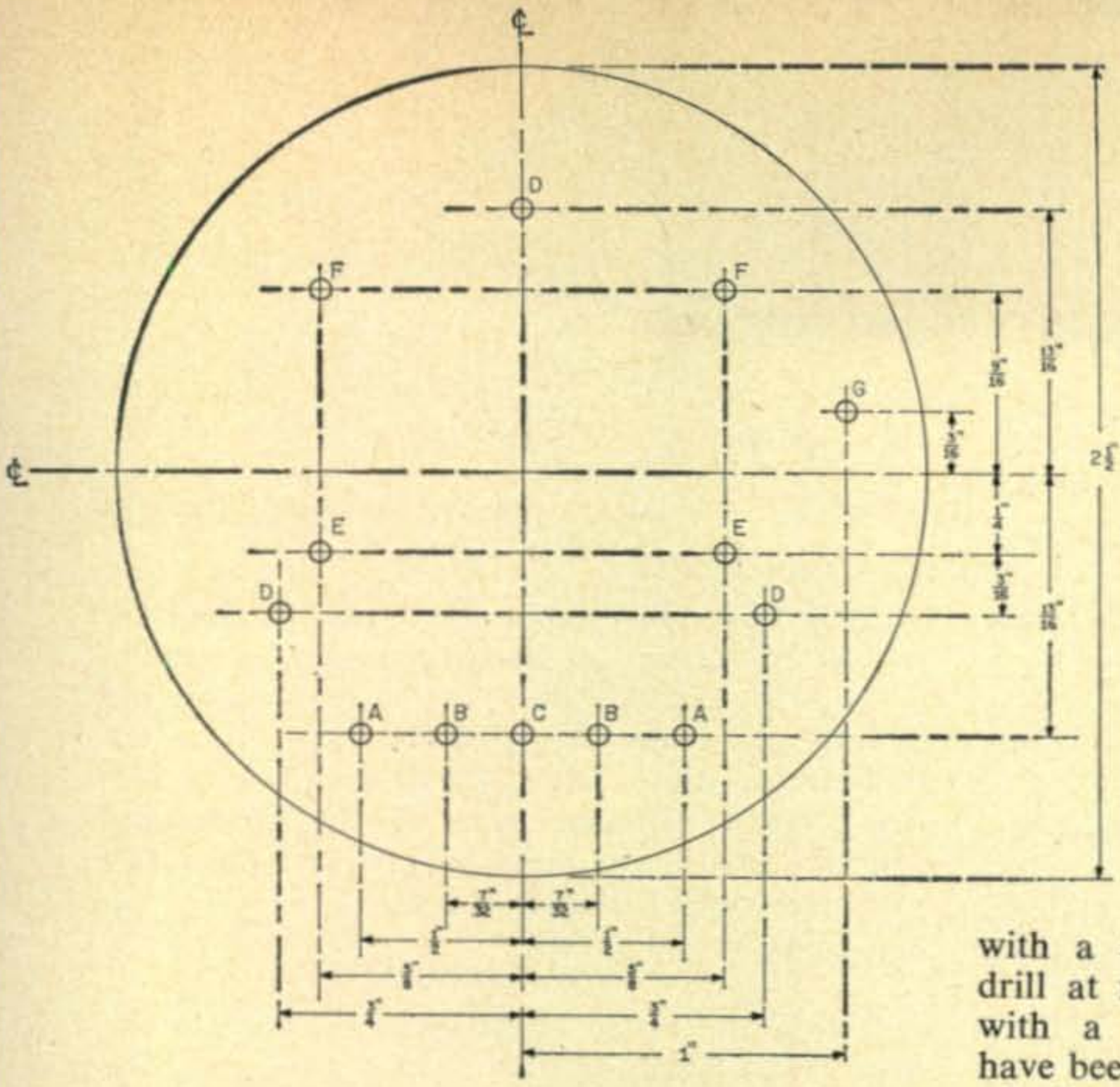


Fig. 1—Actual size base template made from light gauge galvanized iron. All holes are made with a #53 drill.

#53 drill, center mark holes A, B, D, E, F, G. Do not attempt to drill through. Remove the template and drill through points A, D, E, F, G, with a #36 drill. Then drill through points B, using a #29.

It is important to keep all holes perpendicular to the base-plate, and use of a drill press is recommended if available. Tap holes A, D, E, F, G, for 6-32 and holes B for 8-32 machine screws, being careful to keep the tap perpendicular at all times also.

Now saw out the base-plate by cutting to the edge of the 2½" circle. A jig-saw does a good job with plenty of lubrication applied to the blade, but with a little more patience, you can do the work by hand. Trim off all burrs and rub the base-plate lightly with a medium grade emery cloth, to remove any scratches. Clean out the tapped holes at this point, using the appropriate tap.

Levers

Next, using a piece of 1/16", or #12 gauge, *soft* aluminum, saw out the two key levers to the dimensions and shape shown in fig. 2. Do not try to use snips, as they will twist the material. Clamp the two levers together and trim the edges with a file until both are identical. Drill as shown, separate the levers and trim off all burrs. Using a set-square, carefully mark the pivot lines on both surfaces of both pieces.

Now comes the tricky part, though it is not really as difficult as it may at first appear. To accommodate the pivot pins, the levers are alternately expanded at their pivot points in such a way that they can be drilled and tapped edgewise to take 4-40 machine screws, from which the pivot pins are made. This is shown in fig. 2, and is accomplished as described below.

Grind a drift punch (or even a ¼" bolt from the junk-box) to the size and shape shown in fig. 2. Lay each key lever on the end of a block of hardwood clamped in a vise. Then take punch and hammer and make alternate dimples first from one side, then the other. Practice first on a piece of scrap aluminum if you like. Use care to center the dimples on the pivot lines, and begin each lever at the top *inside* edge. When dimpling has been completed, each piece should be a mirror image of the other. Now drill through edgewise, with a #43 drill, being careful to keep the drill at right angles to the key lever, and tap with a 4-40 tap. If dimpling and drilling have been correctly done, little or no weakening of the levers will result. Rub both pieces lengthwise with emery cloth to remove.

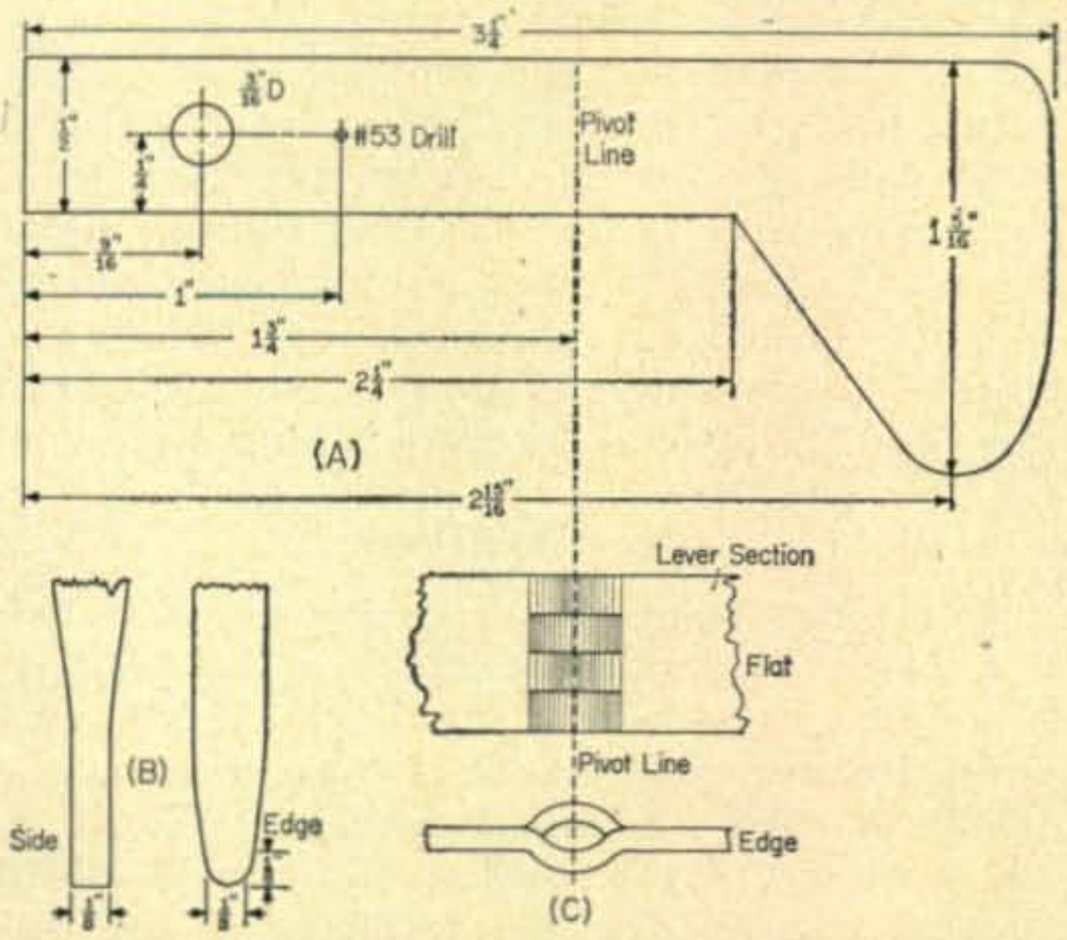
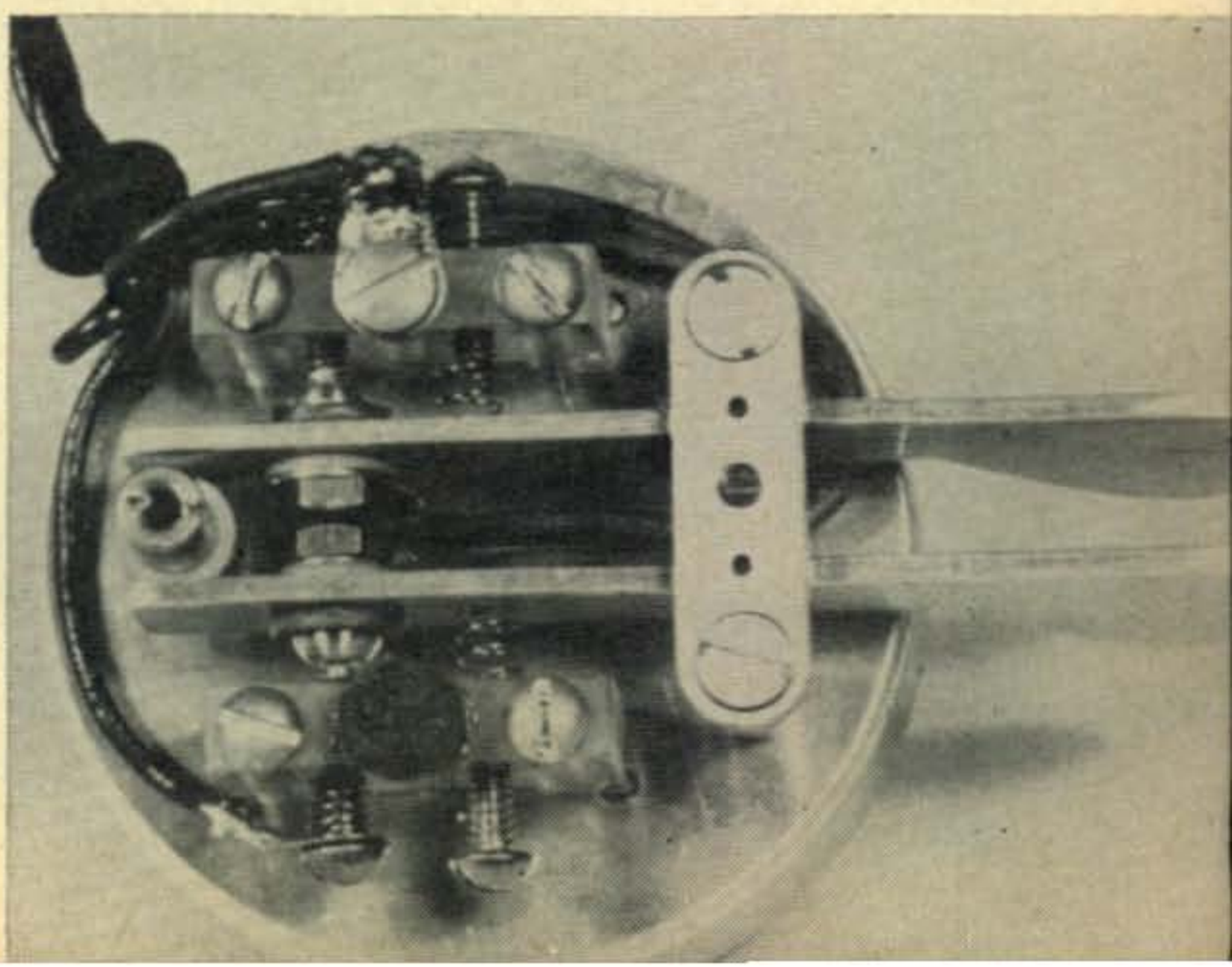


Fig. 2—Construction details of the key levers formed from 1/16" thick soft aluminum. A drift punch formed as shown at (B) is used to "dimple" the levers along the pivot line as shown at (C) prior to drilling as described in the text.



Exposed view of the Can-Key shows the lucite contact support blocks and contact assemblies. The cover screws thread into the rear assembly and the center hole in the paddle pivot arch.

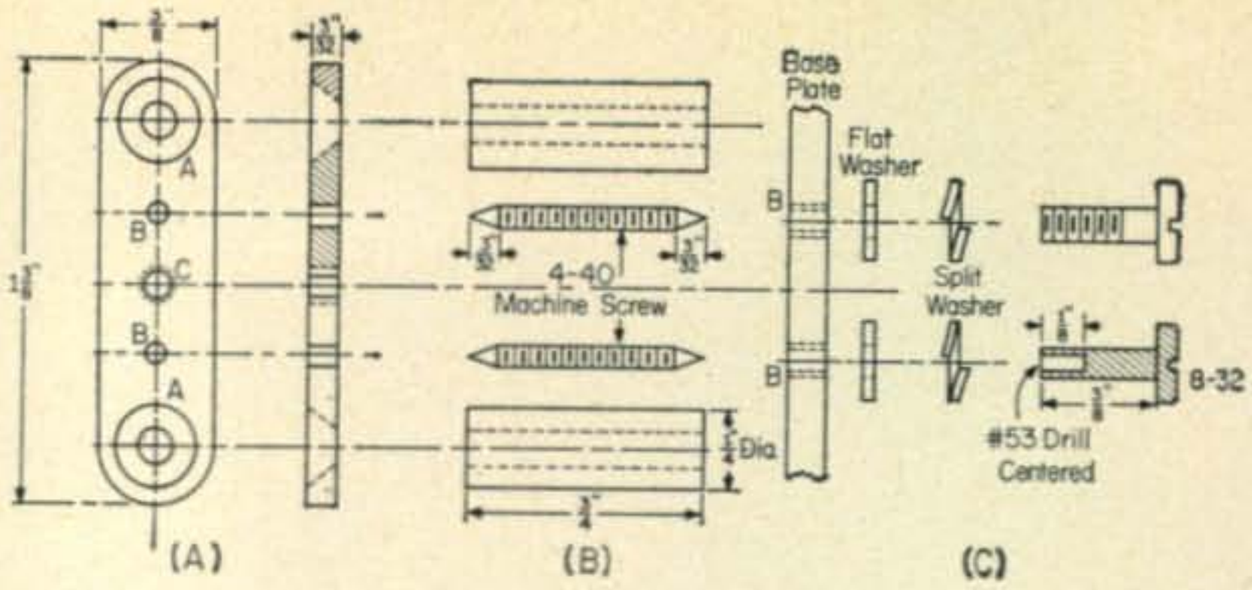


Fig. 3—Details of the pivot mounting arch. (A) Top plate is made of 3/32" steel. Holes *A* are drilled and countersunk for 6-32 flat-head screws. Bearing holes *B* are drilled with a #53 drill. Hole C fastens the top cover can to the key and is drilled and tapped 6-32. (B) Pivot pins are made of 4-40 plated steel screws. The ¾" spacers must pass 6-32 screws. (C) Lower pivot bearing screws are drilled with a #53 drill.

scratches, as previously done with the base-plate.

Pivot Pins

Next make the pivot pins, as shown in fig. 3. Cut the heads from two 4-40 plated steel machine screws of sufficient length, chuck in a power drill and point with a medium grade file. Use care as the final dimensions are approached, and finish with fine emery paper.

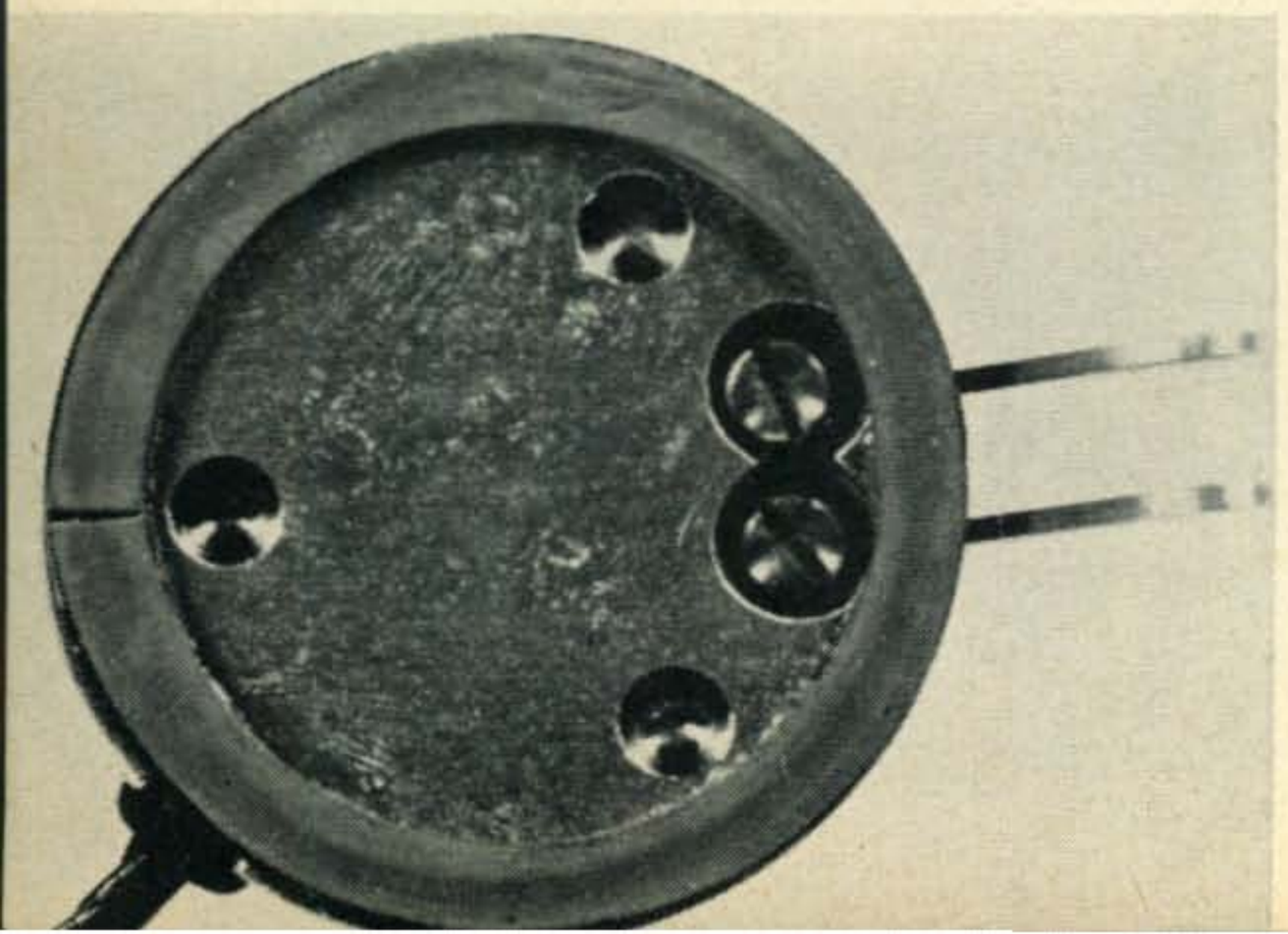
Pivot Mounting Arch

Now comes the pivot mounting arch, which consists of a steel top plate ⅜" wide, two ¾" spacers (#6), and two flat head 6-32 screws, as shown in fig. 3. Scribe a center line lengthwise on the top plate, use the template to accurately locate holes A, B, C, and center mark with the #53 drill as before. Drill holes A to clear 6-32, and countersink as shown. Drill through holes B with the #53 drill; these are the pivot bearing holes. Drill and tap hole C for 6-32; this is one of the two cover mounting holes. Remove burrs, cut and trim the ends to complete the top plate.

Pivot Bearings

The lower pivot pin bearings consist of two 8-32 plated steel machine screws, end drilled and assembled as shown in fig. 3. Make the two contact-and-spring mounting blocks as indicated in fig. 4, using ¼" lucite or bakelite sheet. If lucite is used, a little machine oil on the drill will prevent over-heating and softening of the material.

Bottom view of the Can-Key shows the cast base and the adjustment screws. The cable leads out through a notch in the can cover. Note the rubber ring glued down to prevent the key from sliding.



Now come the stationary contact and spring adjusting screws as detailed in fig. 4. Insert each brass contact screw into a 6-32 die in the *reverse* direction before soldering the contact material to its tip. After the contact is in place, the screw is removed from the die, continuing the thread over the contact material. Clean and trim the contacts with a fine file.

Lever Contacts

The lever contact material is soldered to the filed-down heads of two brass 6-32 machine screws bolted through the levers, using flat and shoulder type fibre washers and small soldering lugs. File the screws flush with the nuts after assembly. Flexible leads complete the circuit to the terminal lug shown at the center of the right hand contact-and-spring block. See the inside photograph for details.

Insert the pivot pins into the levers and lock in position with 4-40 nuts on the bottom edges. Assemble the pivot mounting arch, lower pivot bearing screws, base-plate, key levers and flexible leads as shown in the drawings and photographs. Make sure none of the mounting screws protrudes beyond the lower surface of the base-plate. Gently tighten the bearing screws against the pivot pins until snug, then back off slightly until a tiny amount of up-and-down play can be felt on each of the levers. At this point, the lockwashers should be about half compressed; if they are not, adjust the thickness of the flat washers until this condition is reached. This arrangement makes for easy future adjustment, and the usual locking nuts will not be required.

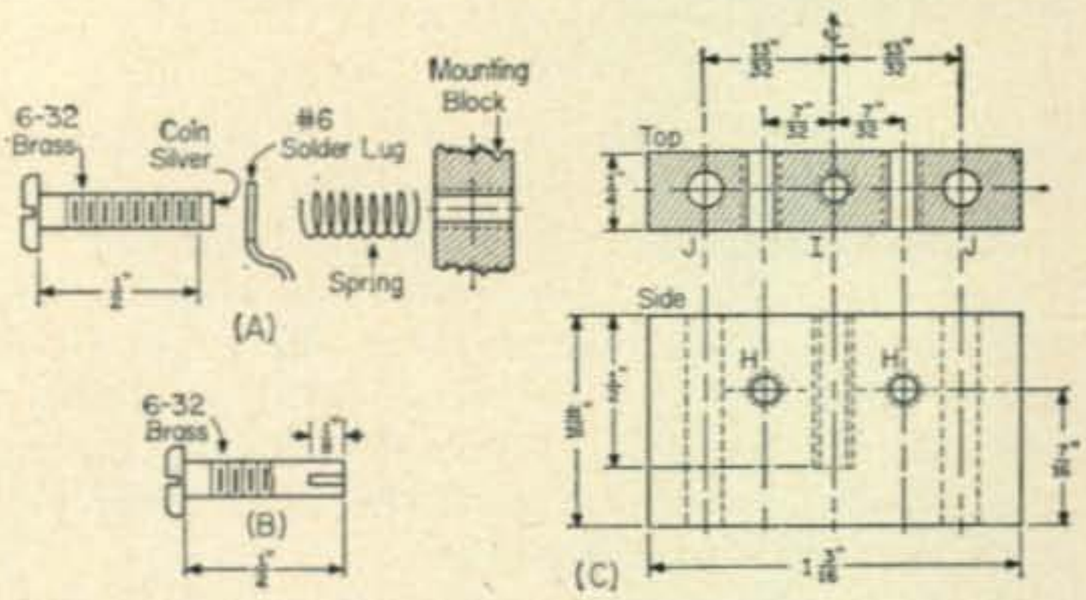


Fig. 4—Details of one of the stationary contact assemblies. (A) A compression spring on the brass contact screws maintains sufficient tension to hold contact adjustment. (B) The brass screw for key lever spring tension adjustment is drilled with a #53 drill. (C) Contact mounting blocks is made of lucite or bakelite. Holes *H* and *I* are drilled and tapped for 6-32. (Hole *I* is used on the right block only.) Holes *J* are 5/32".

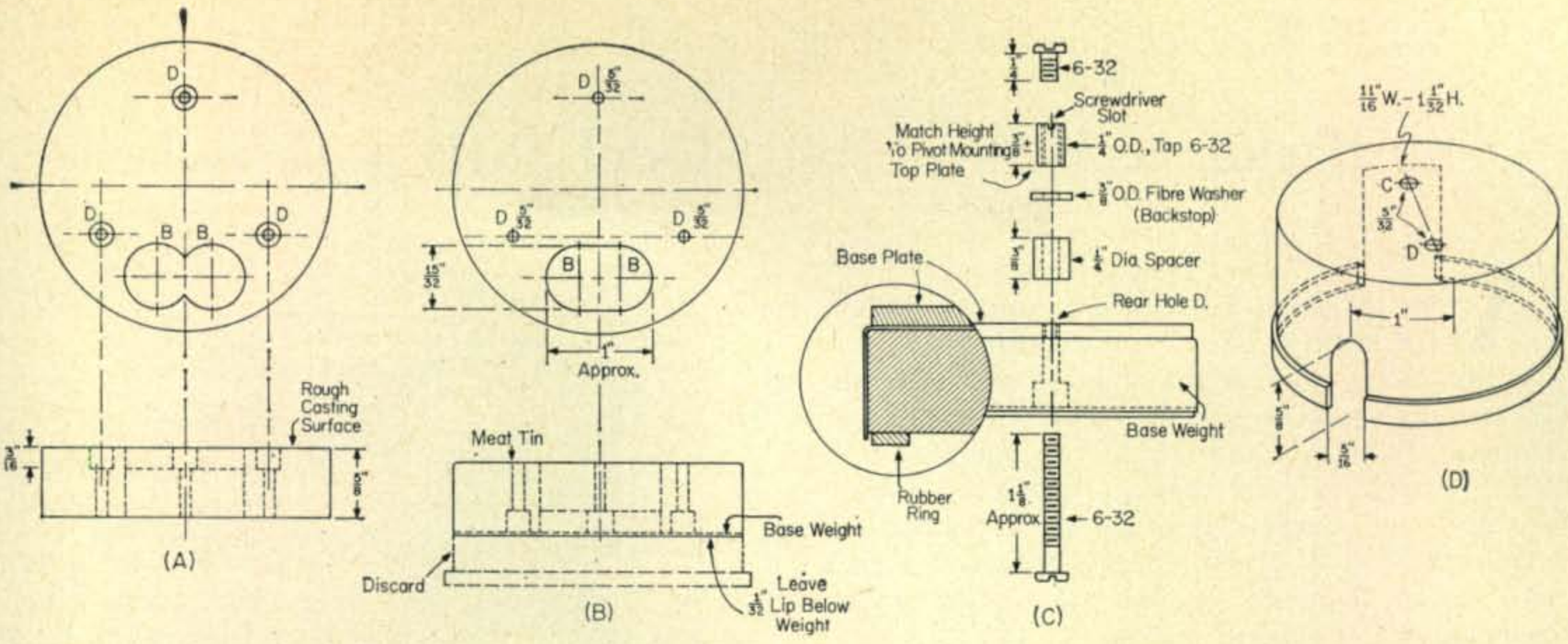


Fig. 5—(A) Drilling details of the cast lead base. Holes *D* are 5/32" and are counter-bored 5/16" dia to a depth of 3/16". Holes *B* are 15/32"; drill with caution because of a slight overlap. The top or rough side of the casting is used as the bottom of the weight. (B) Base weight cover is cut from another meat tin and drilled as shown. (C) Order of assembly for the backstop. (D) Top cover details.

Attach the assembled contact-and-spring blocks to the base-plate, using holes E and F (fig. 1) and as shown in the inside photograph. Check fixed and movable contact alignment, and adjust if necessary. True up the lever arms at the same time.

Base Weight

Next make the base-weight as shown in fig. 5A and the bottom view photograph. Using one of the meat-tins, melt enough scrap solder or lead into it to reach the required 5/8" depth. This can be done on top of the XYL's stove or other heat source. For safety's sake, be sure no moisture is present during this operation. A "spoon" made from a bent piece of sheet metal will serve to skim off the dross and any impurities which rise to the surface. With pliers, place the tin of molten metal on a level non-combustible support until cool. Use extreme care in handling. Once the metal has "set", it can be further cooled by dipping it slowly in water. Since the meat-tin will now be discolored from heating, peel it from the casting with pliers; beware of sharp edges! Check dimensions and smooth the surface with a file and sandpaper as required. Using the template to mark the correct positions, drill and countersink the base-weight as shown in fig. 5A and the photograph. Cut the second meat-tin to make a cover for the base-weight as diagrammed in fig. 5B, and use the template for hole marking as before. Assemble the base-weight and cover to the under side of the base-plate with 6-32 screws of suitable length in the front two holes, marked D. Tighten the back-stop screw into the rear hole D, and assemble as indicated in fig. 5C. Fasten a ground lug to the base at hole G.

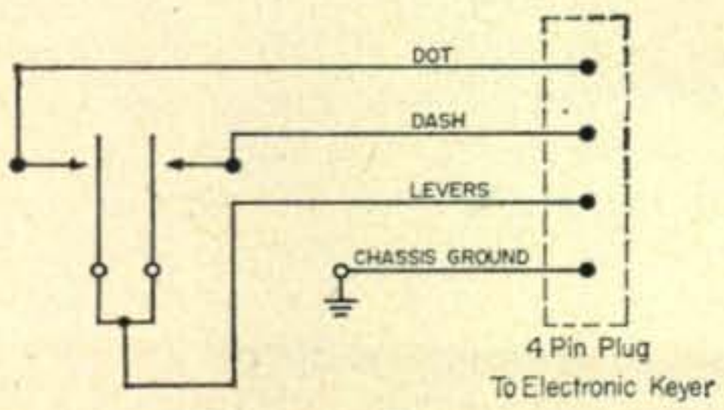


Fig. 6—Wiring diagram for the Can-Key.

Lever Springs

The two lever springs can be cut from light motor or generator brush springs, available from the junk-box or the local repair shop. Bend the ends out and insert in the holes provided in the levers and adjusting screws.

Cut a segment from a new 1/16" thick rubber "jar-ring" to fit it inside the 1/32" lip left at the bottom of the base-weight by its cover. Cement in place with "Household" or "Duco" cement. If slippage develops on the operating table, clean the rubber ring lightly with lacquer thinner.

Top Cover

Make the top cover from the third meat-tin, as shown in fig. 5D, using the template to locate the mounting holes. A piece of sponge rubber, 1/4" diameter by 1/8" high, is cemented inside the cover where it will press against the terminal screw on the right hand contact-and-spring block. Cement a similar piece of sponge, 1/4" high, to the top of the left hand block, as shown in the photo. This removes most of the "ring" from the cover can, and provides quieter operation. Place a tiny drop of oil on the four pivot pin bearing points.

Wiring

Attach a 4-conductor cable and plug as diagrammed in fig. 6, and adjust spring tension and contact spacing to your own liking. Fasten the cover in place with two 1/4" 6-32 machine screws, as indicated in the photograph, and the job is finished.

A further feature of any dual lever key is the ease with which it can be converted to left hand operation: simply reverse the connections to the dot and dash levers! ■

CQ Reviews:

The Barker & Williamson Model 381B T-R Switch

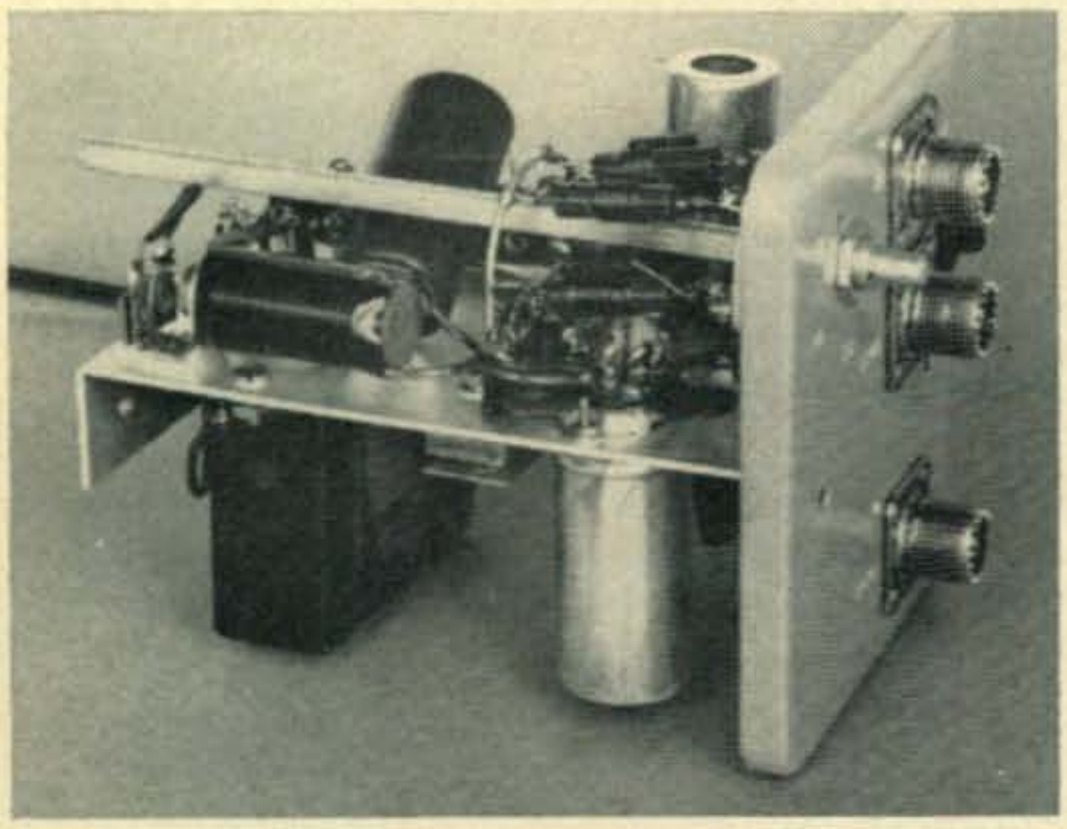
An all-electronic transmit-receive (T-R) switch permits use of a common antenna for both receiving and transmitting without the necessity of an antenna changeover relay. It ensures quiet operation and instantaneous transfer for fast break-in work together with trouble free and efficient performance. There are no relay contacts to arc or burn. Such a device is the B & W Model 381B T-R Switch which is a real neat job for use on the 10, 15, 20, 40 and 80 meter amateur bands.

The unit is designed for operation with either a 52 or 72 ohm coaxial transmission line. At a standing-wave ratio of 1:1 it will safely handle a peak power of at least 5 kw with a 52 ohm line and 3 kw using a 72 ohm line. For a higher s.w.r. the maximum allowable power is proportionately lower. With c.w., s.s.b. and d.s.b., operated at legal power limits, the s.w.r. may be as high as 4:1. With maximum a.m. power the s.w.r. may be almost 2:1.

B & W Model 381B T-R Switch. It is a neatly packaged unit with self contained a-c power supply. The knob at the lower left is for the band-selector switch.

Operation

The antenna feedline and the transmitter are connected together at the input terminals of the T-R switch at all times, so during transmissions the signal is fed directly to the antenna line without any switching (see fig. 1). The input terminals are also connected to the cathode of a 6S4 in a grounded-grid configuration. During reception the incoming signals are fed to this tube, the plate circuit of which is tuned to the operating band and is coupled to a 6AG5 amplifier. Bandswitched circuitry is used. The output of the 6AG5 embodies a special broadband r.f. transformer which is connected to the receiver.



Inside view of the B & W Model 381B T-R Switch. The bandswitched coils are mounted in a ring configuration around the switch. Power supply is underneath the deck. The panel shown is the rear panel, with the three coaxial connectors. The rear end of the bandswitch shaft extends through this panel and may be coupled to an external arrangement for other bandswitching needs such as operating relays to change antennas for different bands, *etc.*

No incoming-signal loss is incurred with the unit; in fact, a substantial gain is realized which can improve the sensitivity of the receiving system. The bandswitched circuits also provide a high degree of selectivity, excellent signal-to-noise ratio and a minimum of intermodulation effects.

When the transmitter is turned on, some of the r.f. potential is rectified in the grounded-grid stage and is applied as a d.c. cutoff bias to the 6AG5. The transmitted signal, which would otherwise pass on to the receiver, is thereby attenuated. Damage to the receiver cannot occur. The biasing arrangement functions regardless of the bandswitch setting, so protection of the receiver is afforded at all times.

Provisions are not furnished for receiver muting during transmissions, so other means of receiver disabling must be used, such as are available from many transmitter units.

The Model 381B is self powered from a 117 volt a.c. source. Type SO-239 coaxial fittings are provided on the rear of the unit for the antenna, transmitter and receiver connections. The only control is the receiving bandswitch which is located on the front panel.

Performance

The B & W T-R switch proved to be an excellent performer. When connected in the recommended manner for reception, its inherent sensitivity averaged 0.5 μv for a 10 db signal-to-noise ratio on a.m. and 0.5 μv for a 20 db s/n ratio on c.w., s.s.b. and d.s.b. Noise figure on 28 mc was 6 to 7 db. The measured gain was 8 db on 10 meters; 14 db on 15; 19 db on 20; 18 db on 40 and 14 db on 80.

In some cases this amount of gain could re-

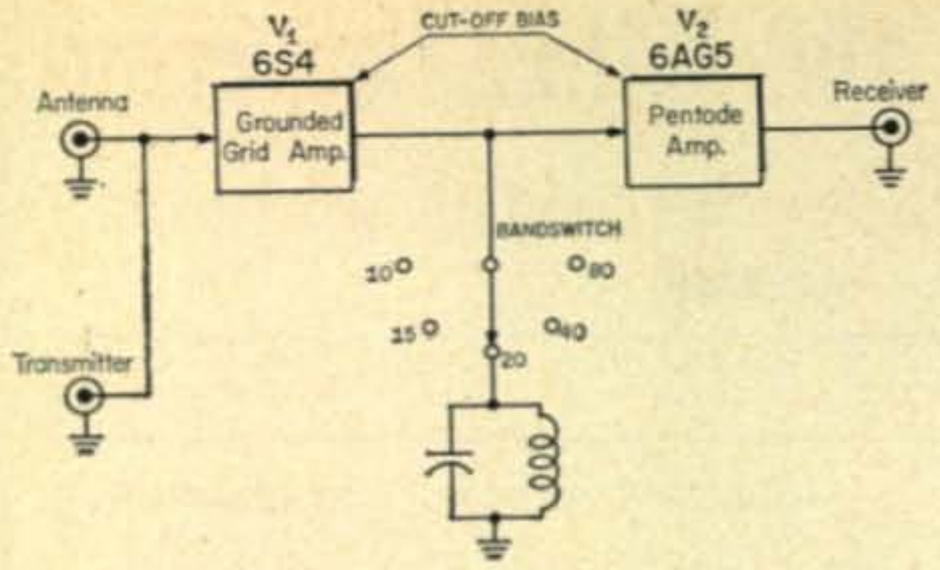


Fig. 1—Block diagram of the B & W Model 381B T-R switch.

sult in receiver overloading from strong signals, in which case several different measures can be taken. The receiver r.f. gain may be backed off, but at a possible sacrifice in a.v.c. and S-meter action. Another method is to rotate the T-R bandswitch to an adjacent band which will decrease the gain, but the signal-to-noise ratio will drop; however, good noise ratio is not essential with strong signals anyway, so this method could be a satisfactory expedient. The best arrangement would be the use of a 100-ohm potentiometer as a variable pad connected in the line between the T-R switch and the receiver; in fact, there is room to mount such a control on the rear of the unit next to the connector for the receiver.

Signal Suckout

When a T-R switch is connected across the output line of a transmitter, the tuned tank of the latter can act as an absorption trap which sucks out received signals. The extent to which this occurs will largely depend on the point at which the switch "sees" the tank circuit. Signal suckout usually will not be experienced on any band when the output of the transmitter is connected to the Model 318B with a three or four foot length of transmission line. At the same time, the transmitter tank must be properly tuned up for operation on the desired frequency range.

Should a *small* degree of suckout occur, there will be little deterioration of signal-to-noise ratio and due to the high gain of the T-R switch, the overall signal level will still be higher than it will be without the switch connected in the circuit. *Severe* loss of signal will require a little experimentation for the best line length needed to overcome it.

T.V.I.

The bane of many T-R switches is the generation of harmonics with resultant TVI. The manufacturer of the Model 381B recommends the use of a low-pass filter inserted between the T-R switch and the transmission line. Under these conditions, during field tests, no change in TVI was noted with the switch in or out of the line.

No a.c. line switch has been provided in the unit, so B & W recommends connection of the a.c. line cord to the primary terminals of the receiver's power transformer in order that the T-R switch be automatically disabled when the receiver is turned off. This will protect the unit against needless hours of operation, should the operator otherwise forget to remove the line plug from the a.c. outlet.

Appearance

The unit is nicely packaged with a light gray panel and perforated cabinet measuring 4¾" h. × 4" w. × 5¼" d. The panel lettering is white and the control knob is dull aluminum. The B & W Model 381B T-R Switch is priced at $60.00. The manufacturer is Barker & Williamson, Inc., Bristol, Pa.—*W2AEF*

CQ Reviews:

The Ameco All-Band Pre-Amplifier Model PCL

An r.f. pre-amplifier (often called a pre-selector) is used ahead of a receiver to improve its sensitivity, gain, signal-to-noise ratio, noise figure or its front-end selectivity together with better image and spurious signal rejection.

The Ameco Model PCL Pre-Amplifier has been designed to include the above features. It is a tunable device, not broadbanded, which covers the entire frequency spectrum from 1.8 to 54 mc in four bandswitched ranges of 1.8 to 4, 4 to 10, 10 to 23 and 23 to 54 mc. Operation is not limited to just the amateur bands, making it desirable for use with continuous-coverage communications receivers as well as the amateur-band type. Coverage through 54 mc also makes

[*Continued on page 104*]

The Ameco Model PCL all-band nuvistor cascode preamplifier is a small attractive unit. The tuning control is at the left, the range selector is toward the right. On-off switch is at the right.

Which Receiver To Follow The V.H.F. Converter?

BY JULIAN N. JABLIN*, W2QPQ

THE use of an amateur receiver as a tunable i.f. strip to follow a v.h.f. converter is standard practice for serious work on the frequencies above 50 mc, yet little has been written about the receivers used. In all likelihood, most hams who make the move to v.h.f. already have a receiver for the lower bands, and this becomes the i.f. strip. If v.h.f. proves challenging enough, the amateur improves his converter or converters, and along the way may change to a receiver which has certain features especially suited to its role as a tunable i.f. strip.

Questionnaire

What do experienced amateurs look for in a receiver to follow a converter? We had wondered about this for a long time. We wanted to know more about receivers which are actually on the operating desks in v.h.f. shacks across the country. To get some specific answers, we sent a simple questionnaire to about 120 amateurs, all being active v.h.f.ers.

We received responses from 58 hams, an extremely good percentage as mail surveys go. In reading the completed questionnaires, we discovered that our responses came in large measure from long-path, weak-signal operators. C.w. work, v.h.f. s.s.b., moonbounce and ham TV were also mentioned. Many took the trouble to write long notes giving their views based on personal experience.

Of the 58 replies, 22 indicated operations exclusively on the frequencies above 50 mc, while 33 use their i.f. strip/receivers for lower-band work as well. Two meters was most popular, followed closely by six, as shown on Table I. In all

50 mc	*144 mc*	*220 mc*	*432 mc*	*1296 mc*	*2300 mc*
43	57	18	20	7	2

Table I—V.h.f. bands used.

of the tabulations, some figures total more than 58 because some amateurs use more than one receiving system. On the other hand, not all questions were answered, leaving some totals less than 100%. Fifty-five respondents use commercial or surplus receivers while three use home-brew i.f. systems

As might be expected, the 14-18 mc range is favored for tuning the i.f. strip, following the rule of thumb that the conversion frequency should be about 10% of the received-signal frequency. Also, some amateurs like the easy dial-reading which results. The 7-11 mc range was also popular. Two other ranges, 26-30 and 30-35 mc, which appear on some hambands-only receivers are somewhat less popular. The "other" category in Table II refers to home-brew and

7-11 mc	*14-18 mc*	*26-30 mc*	*30-35 mc*	*other*
15	24	14	2	11

Table II—Converter i.f. frequencies.

surplus arrangements and to one chap who works into Channel 2 for amateur TV!

The listing above gives the information we were really after—specific receivers now in use. Here we had a surprise after tabulating the data. We had expected to get a listing of a dozen or so different models. Instead, we wound up with what amounts to a catalog of the more popular commercial and surplus items, with a total of 36 *different* receivers mentioned. The number in parentheses indicate that a particular receiver showed up that many times in the survey as being *currently* in use. Many amateurs added notes telling about receivers which they had previously owned and used as i.f. strips, but we did not include former receivers in the listing.

S-40A
SX-16
SX-25
SX-28A
SX-43
SX-71 (2)
SX-96 (3)
SX-100
SX-101A
NC-101
NC-109
NC-156
NC-183
NC-303 (2)
HQ-120
HQ-140 (2)
HQ-150
HQ-170 (4)
HQ-180C
75A-1
75A-2 (4)
75A-3 (5)
75A-4
75S-1 (3)
51J-2
51J-3
Interceptor
Drake 2A
Super-Pro (3)
Eddystone 750
BC-312
BC-348 (6)
BC-683
RAO
RAX
RCH
TCS

Listing of the commercial and surplus receivers in use as tunable i.f. systems.

The listing of features is closely related to the receivers used and was arrived at in the following manner. We included specific questions as to which features about their present receivers satisfy the users, and also what improvements hams would like to have. After going over the whole survey several times, we decided to lump those desirable features which v.h.f. amateurs *now* have in their equipment with those they *would like* to have. This is, therefore, a list of desirable features in the order of the number of times in which they were mentioned. Obviously, not all of these are available in any one of the receivers listed.

Good i.f. selectivity (including various filters).
Calibration accuracy and resettability.
Tunable oscillator stability.
Wide bandspread—Slow tuning rate.
Improved noise limiter or blanker.
Variable i.f. selectivity.
Accurate S-meter.
Product detector—FM discriminator.
Increased i.f. gain.
Smaller package.
Reduced signal feed-through at i.f.
Reduced mixer overloading and cross modulation.

Tunable i.f. strip features.

*147-17 Charter Road, Jamaica 35, New York.

Terminology

A complication arose in the terminology used by the respondents, since we provided them with "open end" questions—admittedly not a perfect survey technique. For example, many hams want what they call "better i.f. selectivity" while others say "narrower passband" and still other describe the use of mechanical filters. We assumed that they are all aiming at the same thing. And when an amateur writes "more bandspread" the question arises, "more than what?" Related to this was an expressed desire for slow tuning rate; did those who specified "slow tuning rate" mean "more bandspread" or do they want a 25:1 dial hooked on to a local oscillator tuning across 500 kc?

However, it becomes very clear just what v.h.f. amateurs do want in a tunable i.f. strip and why they want it. Oscillator stability and accurate calibration are needed to find a DX station again once it has been logged. Narrow bandwith in the i.f. is a requirement for improved signal-to-noise ratio. Variable i.f. selectivity is demanded by the amateur who works a varity of modes—a.m., c.w. and s.s.b. The suggestions include i.f. systems which are variable from 6 kc wide down to 100 cycles, or over various segments of that range. One ham wants a 15 kc bandwith for handling Doppler-shift signals from satellites, while another wants an audio filter for moon-bounce reception. The S-meter should be accurate, not in terms of a mythical "db over S-9" but in relative terms to aid adjustment of equipment on both ends of a v.h.f. path.

Some problems are always with the v.h.f. amateur. A variable-gain r.f. stage in the i.f. receiver (or in the converter) is suggested as an answer to mixer overloading and cross-modulation. Better receiver design and shielding is called for to overcome feed-through at the i.f. frequency. The elimination of birdies is not only desirable but necessary. Here a compromise is needed between the obvious value of several frequency conversions for better image rejection and selectivity and the spurious responses which are almost inevitable. Design and construction must be very, very careful indeed.

The amateurs who use ham-bands-only receivers are blessed with very wide bandspread, and some of them would gladly give up a few feet of this for the ability to cover a little more of any given v.h.f. band. On the other hand, those who use general coverage receivers are faced with the problem of practically no bandspread on the main tuning dial and inaccurate calibration (for v.h.f. purposes) on the bandspread dial. Tuning dials (and associated oscillators) covering just four megacycles (or even one megacycle) were suggested. And all of this, plus detectors for s.s.b. and f.m., good noise limiters and a take-off for a panadaptor should be put up in a smaller package than is presently available!

Thus the wide variety of receivers in use as shown in the listing. Each one provides some of the most-desired features; none provides all. The receiver actually at work in any typical ham shack was probably selected on the basis of a number of conflicting factors. As we indicated in the beginning of this article, if the amateur is also involved in operation below 50 mc, the receiver was either selected for that purpose and later became an i.f. strip, or it was chosen because it represented a practical compromise between low frequency and v.h.f. interests. Only 23 of the hams answering the questionnaires devote all of their radio time to v.h.f., so this compromise becomes important. Of course, in view of the conditions which exist on the lower bands, many of the features which make for a good receiver on those frequencies are also valuable in v.h.f. work, although perhaps for different reasons.

Cost

And, when all other elements have been evaluated, there is the final factor of cost — good engineering, quality components and careful manufacture do not come cheaply, no matter what the name on the panel. This, too is a matter of compromise, but many amateurs are apparently willing to pay for the kind of receiver they feel they need; more than half of those listed are in the $400-plus class, or were when they were new. The point has been made (not in connection with this survey) that "this much money"—whatever the sum under discussion—is a lot to spend for a receiver which is used only to follow a converter. In view of the answers to our questions, we must come to the conclusion that the only "expensive" feature of the "expensive" receivers which is not useful to the v.h.f man is a solid band-switching arrangement. Even here, it must be realized that one cannot isolate the elements of a piece of equipment, and if a receiver *must* be band-switched, precision and dependability in this component will aid in the achievement of precise tuning.

If you match the features listed against what you know or can learn about the receivers listed, you can begin to see what receiver is suitable for you. You will not find any one which has everything that you require so you must compromise, balancing features which seem important to you against those receivers which are available and which you can afford. If you have been in amateur radio for any period of time, you are acutely aware that "compromise" is a vital part of the vocabulary.

Although there were very few home brew receivers mentioned in the answers, there were indications that many hams would like to take the home brew route. Unfortunately, several people misunderstood the purpose of the survey and assumed that we were asking questions preparatory to designing a tunable i.f. strip. Would that we had the engineering ability! It is abundantly clear that there is need for published material on the subject, despite the appearance of a recent article which describes interesting approaches to the problem.[1]

[1]Margot, "A High-Performance Tuner for VHF Converters." *QST*, Jan., 1962

Announcing

THE *CQ* WORLD WIDE SSB CONTEST

April 11-12, 1964

I Contest Period: 1200 GMT Saturday, April 11th to 2400 GMT Sunday, April 12th, 1964. Only 24 hours of the 36 hours permitted for Single Operator stations. The 12 hours of non-operation can be taken in two periods, at the beginning, end or during the middle of the contest; however, the two rest periods must total a minimum of 12 hours and be clearly indicated on the log.

Multi-operator stations are not required to show a rest period and may operate the full 36 hour contest period.

II Bands & Participation: All bands 3.5, 7.0, 14.0, 21.0 and 28.0 can be used but operation is confined to two-way sideband emission only.

III Type of Competition: 1. Single operator. (a) All band. (b) Single band. 2. Multi-operator. (a) All band only.

IV Equipment: Only one transmitter may be operated at any one time, and competitors may use the maximum power permitted under the terms of their license. (Multi-transmitter operation is *not* permitted in this contest).

V Serial Numbers: The contest exchange will be the usual five figure serial number, RS report plus a progressive three digit contact number starting with 001 for the first contact.

VI Points: 1. Contacts between stations on different continents will count three (3) points.

2. Contacts between stations on the same continent but not in the same country will count one (1) point.

3. Contact between stations in the same country will be permitted for the purpose of obtaining a Prefix multiplier, but will have no QSO point value.

VII Multiplier: The multiplier in this contest will be determined by the number of different prefixes worked. A "prefix" is considered to be the two or three letter/numeral combination which forms the first part of an amateur station call. (W1, WA2, DJ2, DL4, GB2, 4X4, 5A1, etc.) Each different prefix may be counted only *once* during the contest.

VIII Scoring: 1. The score for a single band entry will be the total contact points on that band multiplied by the number of different prefixes worked on that band.

2. The score for an *all* band entry will be the total contact points from all bands multiplied by the total number of different prefixes worked on *all* bands.

3. A station can be worked once on each band for QSO point credit; however, prefix credit can be taken only *once* regardless of the band.

4. Those sending in a log for a single band will be eligible for a single band award only. If a log shows more than one band, it will be judged as an all band entry unless indicated otherwise.

5. A station will not be eligible for more than one award.

IX Awards: Certificates will be awarded to the highest scoring Single Operator station in each country and each call area of the United States, Canada and Australia.

1. For the highest score on each Single band.
2. And for the highest score on All bands.

Certificates will also be awarded to the highest scoring Multi-Operator station in the same areas but for All band scores only. (Alaska and Hawaii will be considered as separate countries for both scoring and award purposes.)

X Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, or the rules of this contest, or unsportsmanship conduct, will be deemed sufficient cause for disqualification.

XI Log Instructions: 1. Indicate a prefix only the *first* time it is contacted.

2. Use a separate sheet for each band and also a tally sheet or report form.

3. All times indicated must be in GMT. And the 12 hour rest period must be clearly indicated.

4. All contestants are expected to compute their own scores. Logs should be checked for contact and prefix duplication and proper credit before they are submitted. Unscored logs will be used as check logs only.

5. A prefix check list is not only desireable but a *must* for proper contest operation.

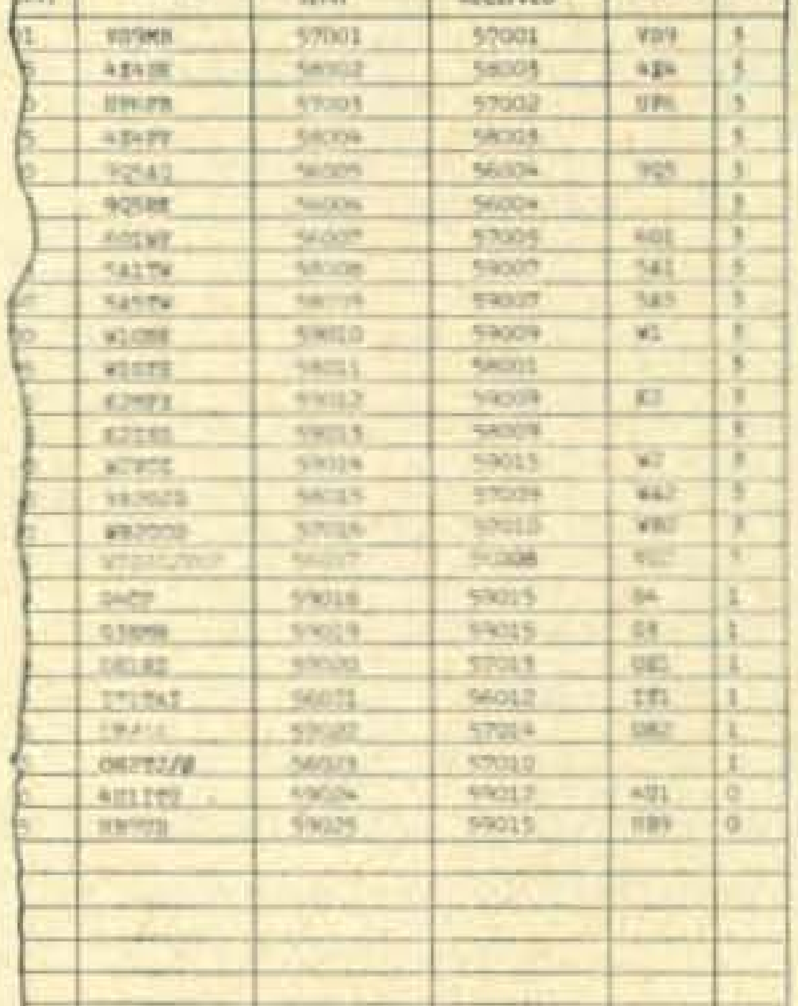
6. Make sure name and address is clearly shown on each summary sheet. PRINT or TYPE.

7. Each contestant must sign a pledge that all rules and regulations have been observed and that the report is a true one.

8. Official log forms are available from *CQ*. Send a large-size self-addressed envelope with sufficient postage to cover your request. If official forms are not available use a duplicate form. The size is 8½" x 11" with 40 contacts to the page. (The same forms used in our World-Wide DX Contest can be used.)

9. It is suggested that you send your prefix check-off list along with your log.

XII Deadline: All logs must be postmarked *no later* than April 30, 1964. Send logs to: *CQ*, 300 West 43rd Street, New York 36, N.Y. Att: WW SSB Contest.



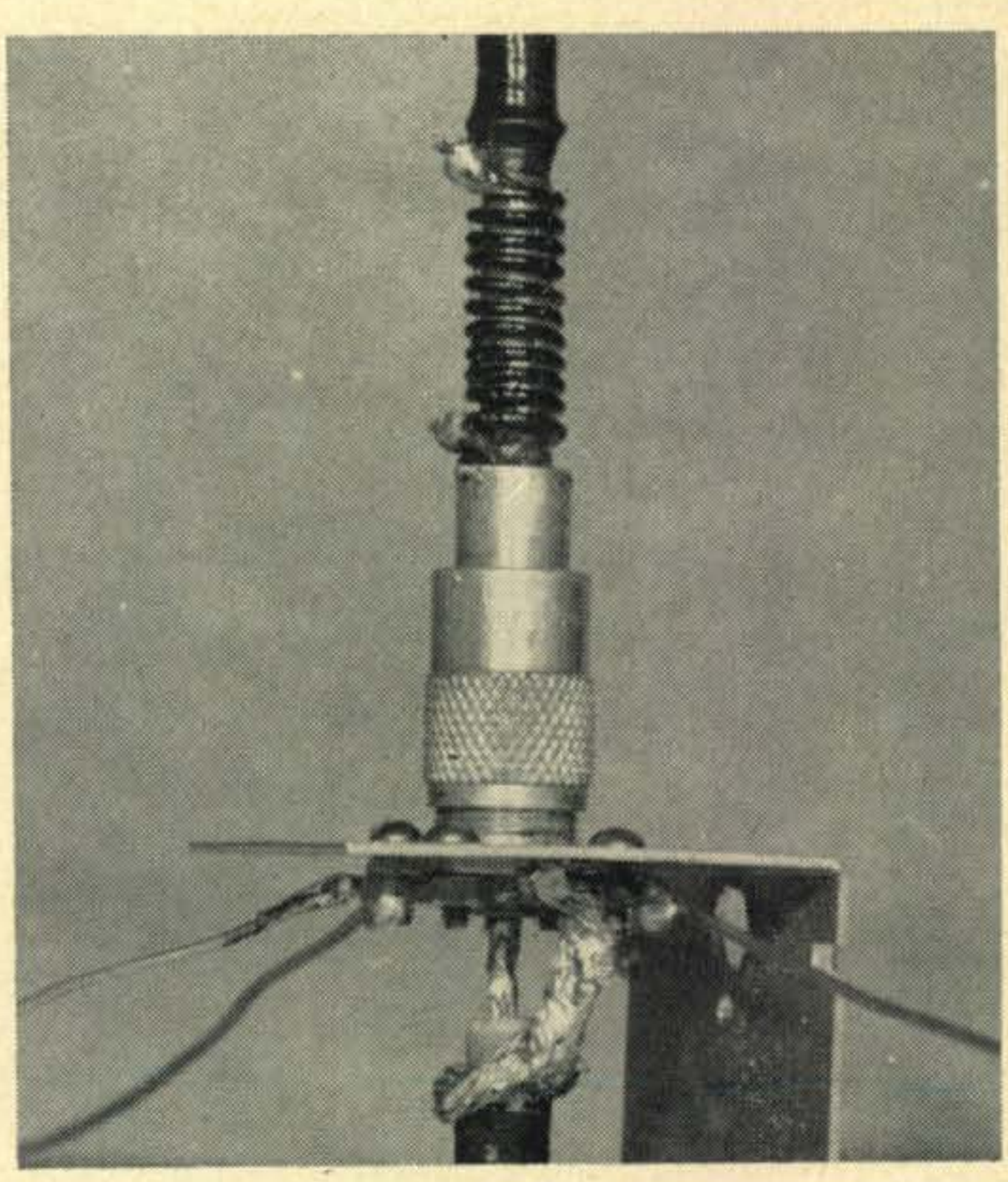
A 5/8 Wave Vertical for 2

BY HERBERT S. BRIER,* W9EGQ

This 5/8 wavelength vertical antenna is ideal for mobile or fixed operation and particularly for nets and local ragchewing.

WITH all the descriptions and pictures of multi-element v.h.f. beam antennas seen in the various amateur journals, some amateurs forget that the simple vertical v.h.f. antenna still has definite advantages for certain types of operation. A vertical antenna, for example, is much simpler to install and far less conspicuous on an automobile than a horizontal antenna. Also the omni-directional radiation pattern of the vertical antenna is highly desirable in local v.h.f., CD, emergency and ragchewing nets where none of the stations are very far apart, but who are scattered in every direction of the compass. Under these conditions, a beam is often a disadvantage, because, in no matter which direction it is turned, you can't hear all the stations in the net.

What we really need is to retain the advantages of a vertical for local work, and, at the same time, achieve a little antenna gain—without too many complications. Actually, there is an antenna that meets these specifications. It is the 5/8 wavelength vertical. Although it is 2½ times as long as a ¼ wavelength antenna, the 5/8 wavelength antenna has a power gain of almost 3 db, and the resulting length (four feet on 2 meters) is easily accommodated on the v.h.f. bands. Equally important, the antenna is simple to build, as indicated in fig. 1.



Close-up view of the base section of the 2 meter antenna showing the loading coil and ground plane assembly for fixed station operation. Connections to the coax line were left untaped to show the details. Tape these connections and the connector for weather protection.

Theory of Operation

Touching briefly on the operation of the 5/8 wave antenna, as a short vertical antenna is increased in length, its radiated power is concentrated more and more at angles approaching the horizon. But, as the length exceeds ½ wavelength, a secondary lobe of high-angle radiation develops in the radiation pattern. In spite of this, the low-angle radiation from the antenna continues to increase until a length of 5/8 wavelengths is reached. Beyond this length, however, the low-angle radiation decreases, and the high-angle radiation increases. Thus a 5/8 wavelength vertical antenna gives the maximum low-angle radiation possible in a simple vertical antenna.

Because 5/8 wavelengths is a non-resonant length, a small inductance is connected in series with the antenna to increase its effective electrical length to ¾ wavelengths (without changing its radiation pattern). With the addition of the loading coil, the 5/8 wavelength antenna sketched in fig. 1 has a feedpoint resistance of approximately 50 ohms, a close match for 50 ohm coaxial cable.

Construction

To construct the antenna, obtain an inexpensive fiberglass fishing rod at least four feet long and approximately ¼" in diameter at the large end. Such rods are often available for less than $2.00 during special sales at sporting-good and department stores. Detatch the rod from its handle, and remove the ferrules from the rod. On some rods, the ferrules are fastened to the rod with wrappings of cord and are easily removed completely; on others, they are crimped in place. If yours is of the latter type, it may be better to clip off as much as possible of the ferrules, and smooth off the remaining rough edges with a file. Then, measuring from the large end, cut the rod to a length of 48".

Drill a 3/32" hole through one side of the rod an inch from the large end, and thread a length

*385 Johnson Street, Gary, Indiana. 46402.

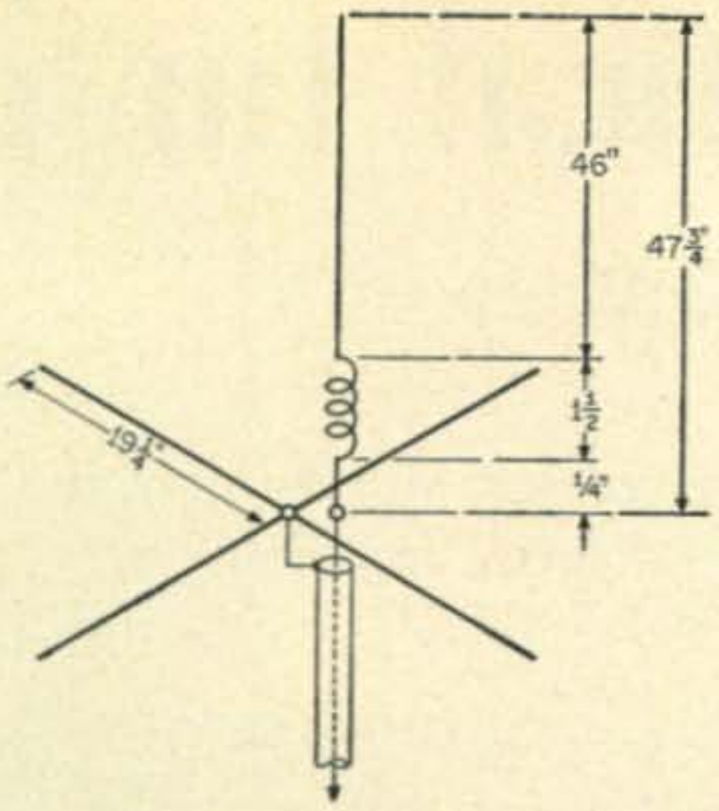


Fig. 1—Construction details for the 2 meter 5/8 wavelength antenna. The antenna base is a PL-259 coaxial connector on an SO-239 with four #10 copper wire radials, 19¼" long, attached. The loading coil has 11 turns of #14 wire wrapped around the 48" x ¼" fiberglass rod.

of #14 bare copper wire through the hole and out the bottom of the rod (which is usually hollow at this point). Allow about an inch of the wire to protrude at each end. Next, place a PL-259 type coaxial connector over the end of the rod, threading the #14 wire through its center contact. Cement the connector in place with epoxy-resin or similar adhesive. After the cement has set, solder the wire to the connector.

Remove the outer vinyl coating from a four-foot length of RG-58/U or similar coaxial cable, and slide the shield braid off the cable on to the fiberglass rod. Push the braid down to within about two inches of the bottom of the rod. Next wrap a turn and a half of #14 wire around the shield braid 1½" above the previously-installed wire. Allow about an inch of the wire to protrude at right angles to the rod and parallel to the first wire. Solder the wire to the braid and trim off the excess braid below the wire. Next, tightly wrap the shield braid with plastic electrical tape. Finally, space wind an 11 turn coil of #14 wire in the 1½" space between the two protruding wires on the rod, terminating the ends of the coil at these wires.

Installing the Antenna

For a mobile installation, mount a standard, chassis-type coaxial connector on the automobile fender, roof, or trunk, *etc.*, and screw the antenna to it. The photograph gives hints for constructing a ground-plane base for using the antenna in a fixed-station installation.

The four ¼ wavelength radials (19¼" long) shown in the picture are constructed of #12 wire; but, for increased rigidity and improved appearance, #10 or larger wire is recommended. Suitable wire in various gauges can be obtained in the form of plastic-covered house wire from electric-supply and mail-order houses. Remove the plastic coating before using the wire, of course. You can also obtain heavy duty solder lugs for mounting the radials from the same sources. Of course, 50-ohm coaxial cable is used to feed the antenna.

Adjustment

Connect an s.w.r. bridge in the feedline between the transmitter and the antenna, and vary the spacing between turns in the antenna loading coil for minimum feedline s.w.r., which was just over 1¼:1 in this installation. Depending on the actual diameter of the fiberglass rod used and other variables, it may be necessary to add a turn to or subtract a turn from the loading coil to obtain minimum s.w.r. After the coil is adjusted, solder its ends to the protruding leads, trim off the excess wire, and coat the coil with low-loss dope to weather-proof it and to hold the turns in place.

In a ground-plane installation, the position of the radials will affect the s.w.r. obtained. As a suggestion, start with them slanting downward from the base of the antenna about 30 degrees. Then, after the antenna coil is adjusted for minimum s.w.r., try bending the radials up and down for a possible further slight reduction in s.w.r.

Additional Construction Notes

If you can find a shop where fishing rods are repaired, you may be able to obtain a fishing-rod "blank" for much less than the cost of a complete rod. Also look around for a broken rod from which the 48" length can be salvaged. Incidentally, adjustment of the coil will compensate for slight differences in rod length, but don't exceed the specified length.

Results

Experience shows that replacing a ¼ wave vertical with the 5/8 wave type definitely increases transmitting range somewhat, but the greatest improvement is apparent on reception, especially when the antenna is low. ■

"After you pick the target for tonight—supper's ready."

A 100 Watt Modulator Using Transistors

BY JERRY L. NORRIS*, K5OZV

This 100 watt transistorized modulator costs no more to construct than its vacuum tube counterpart. It is more economical to operate and reduces the problems of heat and space. The transformers used are homebrewed with complete construction data given. A speech clipper is included in the preamp stages to provide more talk power.

Most currently available circuits and equipment used for modulation of transmitters operating with plate input power levels up to 200 watts use vacuum tubes. Until recently any attempt to generate the large amounts of audio power required to plate modulate such transmitters would require such typical arrangements as push-pull 6146's, 807's, 6550's, etc. It is now possible to produce the same power level using transistors to replace these tubes. This article discusses the construction and circuitry of a completely transistorized modulator capable of plate modulation of any amateur transmitter having a d.c. input power up to 200 watts. This modulator is not intended to be used in high fidelity applications as the design limits set for distortion and frequency response were intentionally limited to produce audio quality necessary for communications purposes only. The amplifier to be described is capable of producing 100 watts of audio power in the frequency range from 200 to 2500 c.p.s.

The fact that the transistor can produce power is not usually denied by anyone. However, to produce power in a quantity at a price equal to vacuum tubes is something else. The modulator circuit decided upon would contain a high impedance input microphone preamp, a speech clipper, and a push-pull output stage. The speech clipper was included at the risk of increasing the overall cost, but the expense has proven worth while. The cost factor of transistors versus tubes was worked out through use of the catalogs and it was quickly apparent that there was *no* price differential. Thus the project was started.

Some of the most readily apparent differences in tubes and transistors are size, weight, and amount of power associated with each. The use of transistors allows a considerable reduction in heat generation. In the standby condition complete elimination of heat is possible without sacrificing any warm-up time when operation is desired.

It is sometimes difficult to remove the heat being generated by power transistors by using tube techniques for cooling. However, the addition of a heat sink in contact with the transistor will usually provide sufficient cooling and is the means used in this modulator.

*13315 Belfield Drive, Dallas 34, Texas.

Modulation Considerations

One of the major design considerations for communications type equipment using amplitude modulation is the percentage of modulation at the transmitter. Since the carrier conveys no useful intelligence in a.m., the percentage of modulation is extremely important. The only way to increase the amount of intelligence on the carrier is to increase the modulation. This process is limited, however, to 100% or less as overmodulation is undesirable in that it produces audio distortion at the receiver and increases the bandwidth occupied by the signal. An increase in carrier power would permit more "talk-power" or sideband energy to be generated. However, the carrier power may be limited by other considerations such as the ratings of the transmitter's r.f. output stage, power supply, or FCC regulations.

Clippers

If a voice wave shape is observed on an oscilliscope, it will be found to contain a few large peaks that are several times as large as the average of the speech patterns. If speech is to be transmitted by a.m., the peaks must not produce more than 100% modulation. However, since the peaks occur relatively seldom and are short in duration, a transmitter adjusted to produce 100% modulation on peaks will have a relatively low average modulation level.

It is possible to process a speech waveform so that the ratio of peak-to-average is reduced. If this processed signal is then used for modulation, the average modulation percentage may be increased without increasing the carrier power. One method to achieve the necessary reduction in peak-to-average ratio of the modulating signal is to clip off the speech pattern at some level. Such a speech clipper is incorporated in this modulator. Since clipping will distort the modulation, an adjustment was incorporated to set any level of clipping desired.

The use of clipping will also generate high frequency components in the audio stages that should not be transmitted. These frequencies are

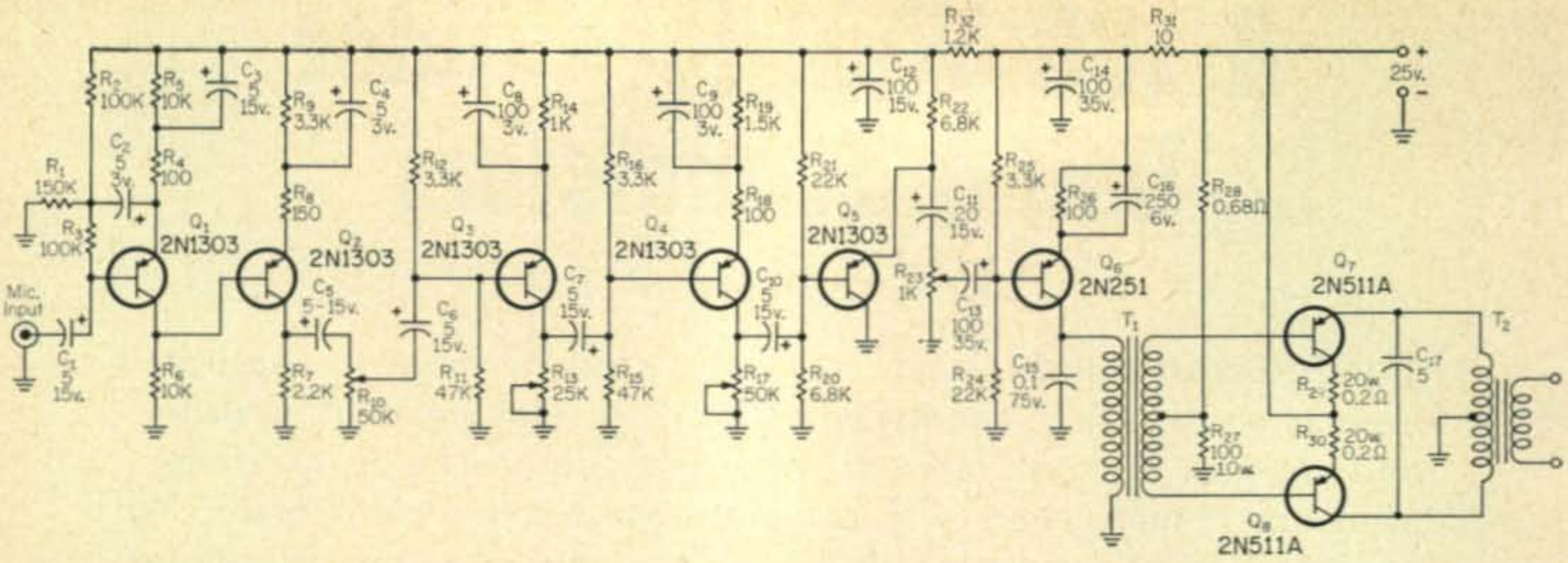


Fig. 1—Circuit of a modulator capable of a 100 watt output. The current drain at full output is 6.8 amperes resulting in an efficiency of approximately 60%. Construction data for T_1 and T_2 is given in the text. All capacitors are in mf and all resistors are ½ watt.

removed before the signal reaches the modulator by controlling the high frequency characteristics of the driver and output transformers of the amplifier.

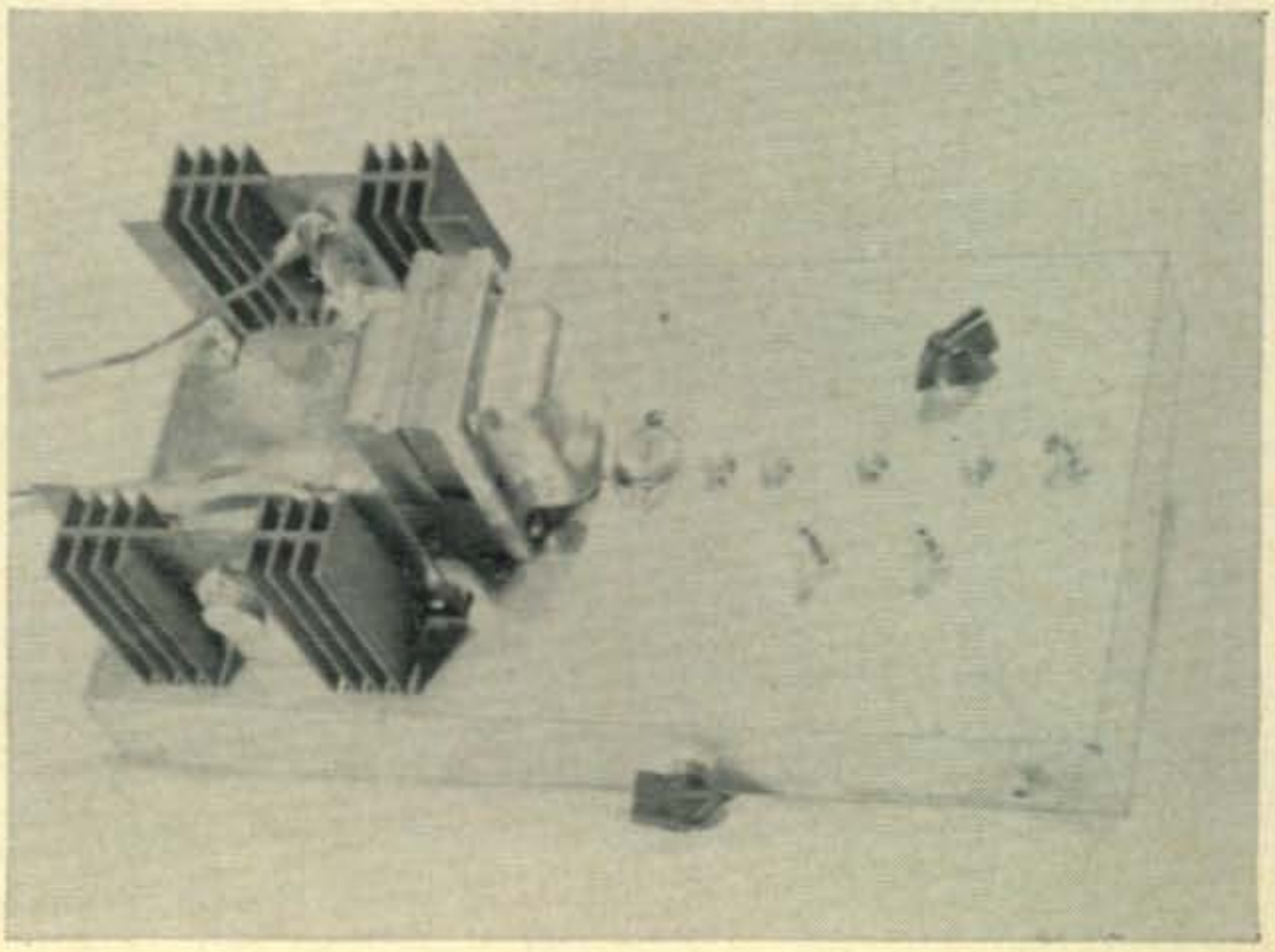
Circuit Description

The input signal for this amplifier is injected on the base of Q_1, a common emitter amplifier. A high input impedance is developed by bootstrapping through C_2. A signal is developed across R_4 for feedback to junction of R_1 and R_2. The output of this stage is direct coupled to the base of Q_2. Transistor Q_2 is a common emitter amplifier with some negative feedback caused by the unbypassed emitter resistor R_8. This unbypassed emitter resistor is used to raise the input impedance so as to reduce loading on Q_1. Output from this stage is taken across R_7 to a variable resistor, R_{10}. For minimum noise, R_{10}, is isolated from d.c. by C_5 and C_6.

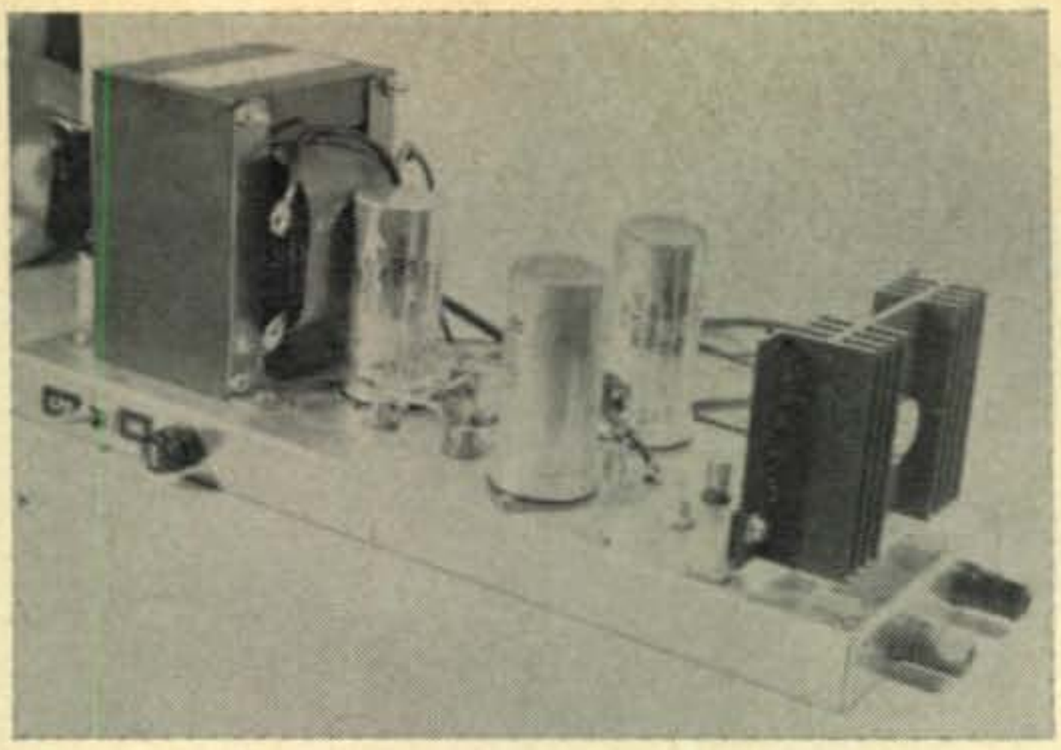
From R_{10} the signal goes through two stages of amplification consisting of Q_3 and Q_4. These stages may be adjusted to cause collector limiting by adjustment of R_{13} and R_{17}. These stages will thus be able to accomplish speech clipping action. The symmetry is adjustable as is the degree of clipping through control of R_{10}, R_{13}, and R_{17}. *R-C* coupling was used to prevent changes in clipping level or symmetry from occurring due to thermal changes. The output of Q_4 is coupled through C_{10} to a common collector stage, Q_5. This stage keeps variations in the setting of R_{23} from altering the clipping action of Q_4, while also providing a low impedance source to drive Q_6. The gain control, R_{23}, is used to set the desired audio output power by adjusting the amount of signal on the base of Q_6.

Transister Q_6 is a Class A power amplifier transformer coupled, through T_1, to the bases of Q_7 and Q_8. The collector load impedance of Q_6 is bypassed at high audio frequencies by C_{15}. This bypassing is the method used to eliminate the high frequency components generated by the clipping action of Q_3 and Q_4 before modulation takes place. Transistors Q_7 and Q_8 are used as push-pull outputs and are transformer coupled on both input and output.

A small amount of bias current is developed by action of R_{27}, R_{28}, R_{29}, and R_{30}. This bias current reduces crossover distortion generated when Q_7 and Q_8 start and stop conduction. Resistors R_{29} and R_{30} are included to provide better thermal stability. Capacitor C_{17} is of the non-polarized type used to further reduce the amount of high frequencies being applied to the modulation transformer T_2. Resistors R_{31} and



View of completed 100 watt transistorized modulator. In place are (r. to l.) transistors Q_1, Q_2, Q_3, Q_4, Q_5 and Q_6, transformer T_1 and, at heat sinks, Q_7 and Q_8. Controls, rear to front, are CLIPPING LEVEL, two CLIPPING SYMMETRY, and VOLUME. Jack at front apron right is MIKE INPUT. Wires leading off left go to modulation transformer.



View of transistorized power supply. At left is transformer T_1, 1N1612 rectifiers, electrolytic capacitors, and transistors Q_1 and Q_2 at heat sink. At far right on apron are the 25 v.d.c. output terminals.

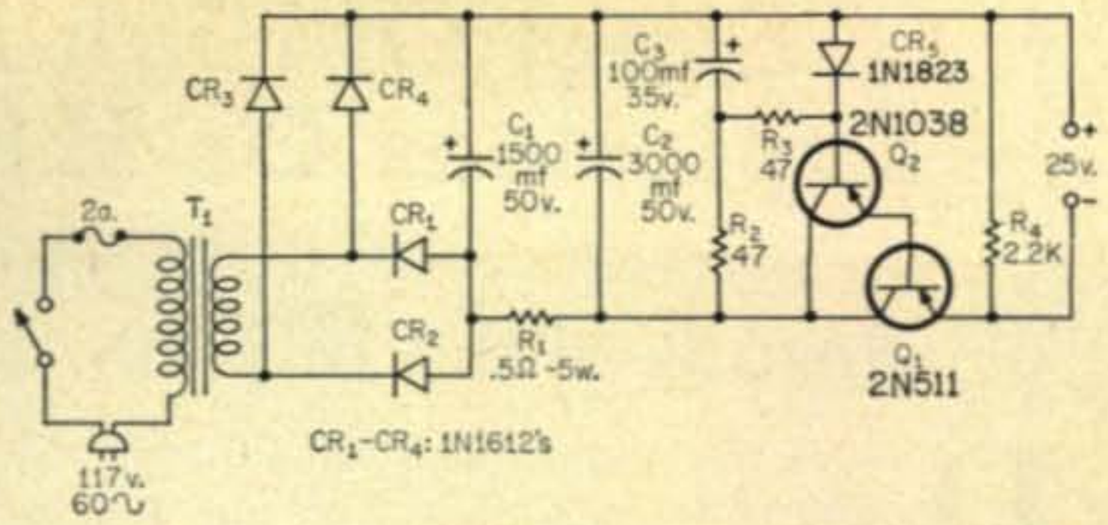


Fig. 2—Circuit of a regulated power supply suitable for operating the 100 watt modulator. All capacitors are in mf and all resistors are ½ watt unless otherwise noted.

R_{32} along with C_{12} and C_{14} provide filtering of the power supply and reduce the supply voltage for Q_1, Q_2, Q_3, Q_4, and Q_5. The input and speech processing sections of this amplifier were designed to use a 12 volt supply to allow these stages to be used with any other equipment if desired.

Transformer Construction

The audio transformers for this amplifier were designed with the frequency response and power requirements in mind. A search of transformer catalogs produced no source for commercially available transformers. Thus, it became necessary to wind these by hand. This task is not difficult and will prove interesting for those ambitious enough to try. To simplify the problem of duplication as much as possible, a transformer that is commercially available was chosen to be the source of laminations and bobbin. The driver transformer was constructed by taking a 500 volt center tapped power transformer similar to a Stancor PC-8403 and removing all wire from the bobbin. The bobbin was then fitted with end pieces made of stiff paper to keep the windings from spilling over the edge during the rewinding. The primary winding of this transformer was wound first directly on the bobbin in a random fashion while trying to keep the wires laying side by side. The primary consists of 325 turns of #21 enameled copper wire. The secondary winding was placed directly on the primary and consists of 100 turns of a double strand of #18 enameled copper wire.

A double strand was used here to allow a balance of the d.c. resistance in the center tapped secondary. To complete the center tap it was necessary to connect the start end of one strand to the finish end of the opposite strand. The coil was covered with insulating tape to hold the windings in place and provide some insulation between the coil and the laminations. Insulated wires were then attached to the exposed ends of the enameled wires and were long enough to permit easy connection into the circuit when the transformer was mounted. As each lead was attached and soldered, a short piece of tape was used to cover the exposed end connection. After all connections were made, a layer of tape was wrapped with enough tension to hold the leads securely against the coil. The laminations for this transformer were then butt stacked to a thickness of 1½ inches.

In order to wind T_2, some secondary impedance must be specified. In this instance the unit was used to modulate a pair of 6146's. To comply with the ratings on these tubes, it is necessary to limit input power to approximately 150 watts for two tubes. This tube is typically operated with a 600 volt plate supply. Under the conditions present here, the modulation impedance is 2.4K.

A word of caution against using a filament transformer for T_2 is necessary. If the turns ratio of the modulation transformer is computed, it will be found to be almost equal to 18 to 1. A 5 v.c.t. filament transformer for 110 volts will also have nearly this same turns ratio. However, if the primary is rated for 110 volts, the number of turns may be too small. This results in a low inductive reactance developed by the 5 volt winding which in turn results in excessive transformer loss. Such a transformer was tried during the development of this modulator, but had to be discarded when the output power was found to be only 60 watts instead of the desired 100 watts.

A modulation transformer was then built from a surplus TV power transformer. If such a transformer is not available, a power transformer such as a Stancor PC-8414 may be used as the source of bobbin and laminations. First remove all the old windings to obtain the bobbin. The one used by the author was rectangular 2½" × 1⅝" without any side supports. To keep the windings from spilling over the edges during rewinding, a side support was constructed from stiff cardboard and glued to each end of the bobbin. The primary winding was to be center tapped so a double strand of #12 enameled copper wire was used. A total of 50 turns of the double strand was used as the primary. The center tap was formed by joining the start of one wire to the finish of the other. A word of warning: the lead or start of this winding will come in contact with the secondary unless a covering of tape is used along all the lead in portion of this wire. Since the plate potential, 600 volts, is present in the secondary a covering

[*Continued on page 96*]

Effect Of High-Altitude Nuclear Explosions On H.F. Communications

BY PERRY I. KLEIN*, K3JTE

Results of the July 9th, 1962 Johnston Island Tests

DURING the summer and fall of 1962 the United States exploded several nuclear devices in the ionosphere above Johnston Island, which is located in the Pacific Ocean, about 750 miles southwest of the Hawaiian Islands. With the support of the International Business Machines Corporation, the Naval Research Laboratory, the Moore School of Electrical Engineering, and Haverford College, short-wave receiving stations were set up in Bethesda, Maryland and in Yeadon, Haverford, and Philadelphia, Pennsylvania. These stations were equipped with high-frequency receivers and with strip-chart recorders, to monitor the signal strength of several broadcast stations transmitting from locations in the Pacific. The transmitting stations monitored included Radio Australia on 7190, 9570, 11710, 11740, and 11810 kc; Radio New Zealand on 15280 kc, Radio Japan on 11725 kc, a station in the Philippines on 12736.5 kc, and WWVH in Hawaii on 5000 kc. The object of this monitoring experiment was to investigate the nature and extent of high-frequency radio propagation phenomena associated with the Johnston Island high-altitude nuclear detonations.

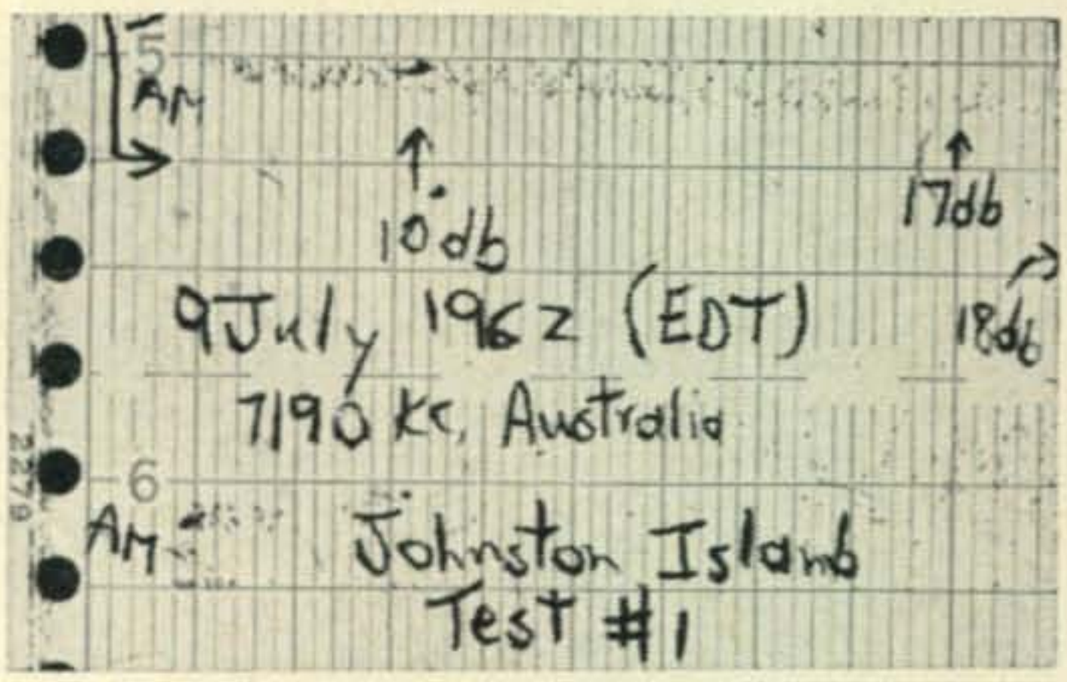


Fig. 2—Strip chart showing the reception of Radio Australia on 7190 kc.

Selection of Monitored Stations and Instrumentation

Radio Australia (Melbourne) was selected as the station of primary interest for several reasons. First, a great circle propagation path between Melbourne, Australia, and Bethesda, Maryland, is only a few degrees from the point at which the nuclear explosions take place. Second, Radio Australia transmits during the time at which the explosions were to occur. Third, Radio Australia transmits on several frequencies, thus enabling frequency-selective phenomena to be observed. The other stations selected (*viz.*, Radio New Zealand, Japan, Philippines, and Hawaii) were chosen to indicate the general propagation conditions in the Pacific area, to investigate the effects of a nuclear explosion on propagation over great circle paths

*Moore School of Electrical Engineering, The University of Pennsylvania, Philadelphia, Pa.

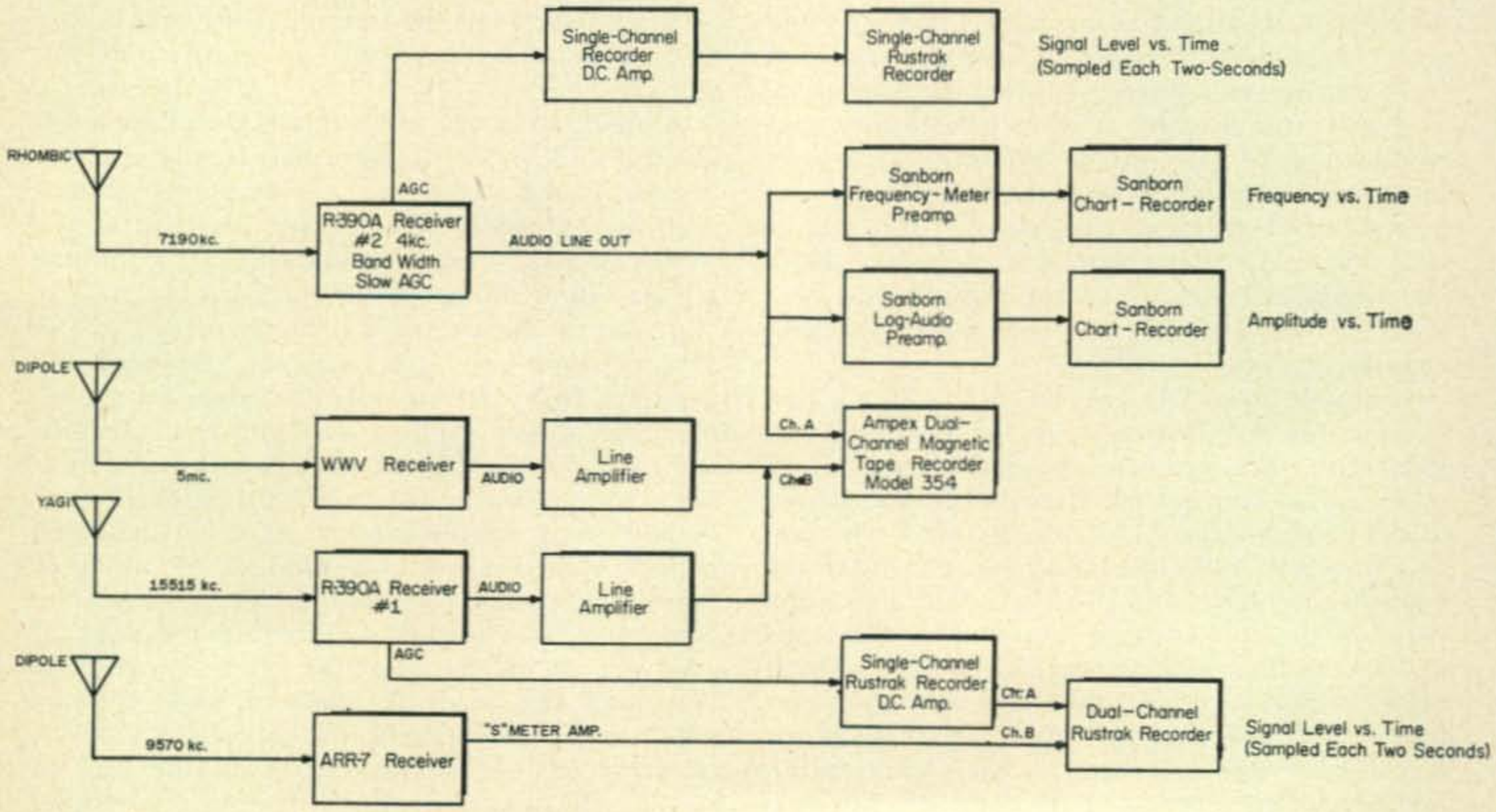


Fig. 1—Simplified diagram of the equipment used at the IBM Communications System Center in Bethesda, Maryland, to monitor Radio Australia.

which are far from the test area, and to investigate the possibility of ionospheric disturbances which might occur at magnetic conjugate points.

The instrumentation consisted of h.f. receiving equipment, with a.g.c. voltage monitored on strip-chart recorders which sampled the a.g.c. voltage every two-seconds. At one installation (fig. 1) one channel of a two-channel magnetic tape recorder was used to record the audio signal of Radio Australia beat against a beat-frequency oscillator. The second channel recorded audio time signals from a WWV/WWVH receiver and also the transmitted countdown for the nuclear tests. One channel of a two-channel Sanborn Strip-Chart Recorder monitored the amplitude of the Radio Australia beat-note. The second channel measured the frequency of the beat-note. Dipoles, end-fed long wires, a rhombic, and a yagi were used as receiving antennas.

The July 9 Johnston Island Nuclear Experiment

The first successful high-altitude nuclear detonation of the 1962 test series occurred at 5:00 AM EDT on July 9, 1962. The explosion was equal to about 1.5 megatons of TNT and occurred in the *F*-layer of the ionosphere, at an altitude of about 400 kilometers. The equipment used during this test is shown in fig. 1. This equipment was located at the IBM Communications Systems Center in Bethesda, Maryland. In addition to this station, a second station, located in Yeadon, Pennsylvania, was equipped with a Collins 51J-4 receiver and a General Electric Strip-Chart Recorder.

Before detonation, Radio Australia transmissions on 7190, 9570, and 11710 kc appeared normal in signal strength and fading rate. Within 0.1 seconds after detonation, the signal level on 7190 kc dropped 45-50 db (fig. 2). A residual signal from Radio Australia was heard slightly above the noise level. An oblique sounder[1] and an amateur station in California were heard on the frequency immediately after detonation. They could not be heard before the instant of detonation. Several possible reasons can be offered to explain the appearance of these two stations. First, Radio Australia may have been strong enough before the detonation to prevent the sounder and amateur station from being heard, particularly since the automatic gain control was used in the receiver. A second possibility is that both the sounder and the amateur station began transmitting at the instant of detonation. Still a third possibility is the proposition

[1]An oblique or backscatter sounder is a high-frequency radar-type device which is used as an ionosphere sounder at various radiation angles to determine propagation conditions of the ionosphere.

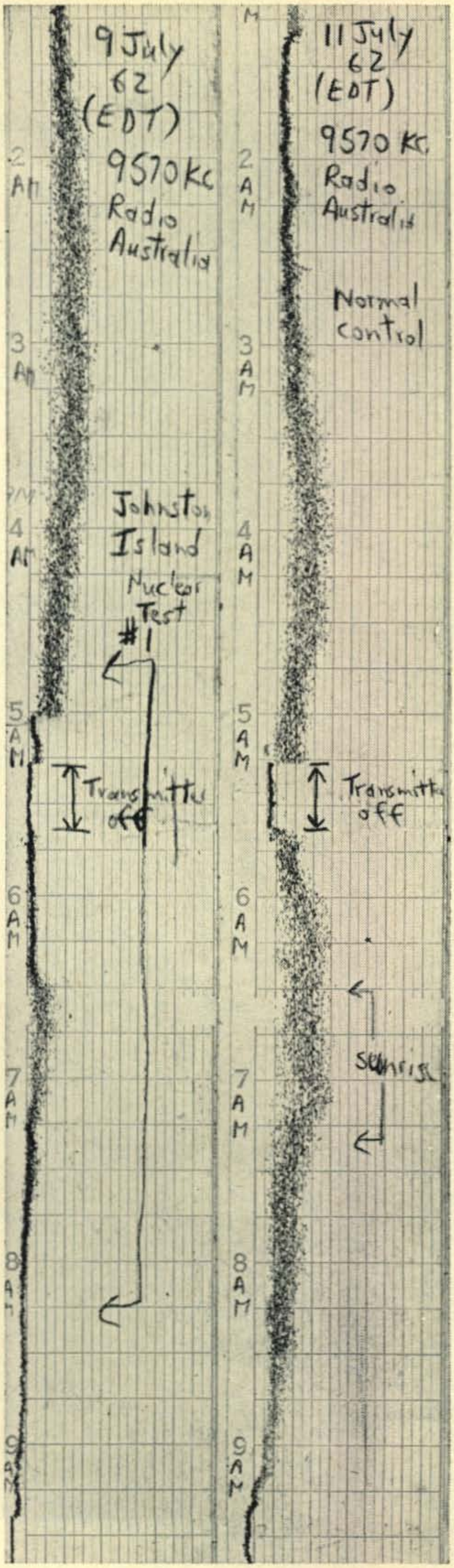


Fig. 3—(Left) Strip chart showing reception, the morning of test, for Radio Australia on 9570 kc.

Fig. 4—(Right) Strip chart showing same station on 9570 kc two days after the test detonation.

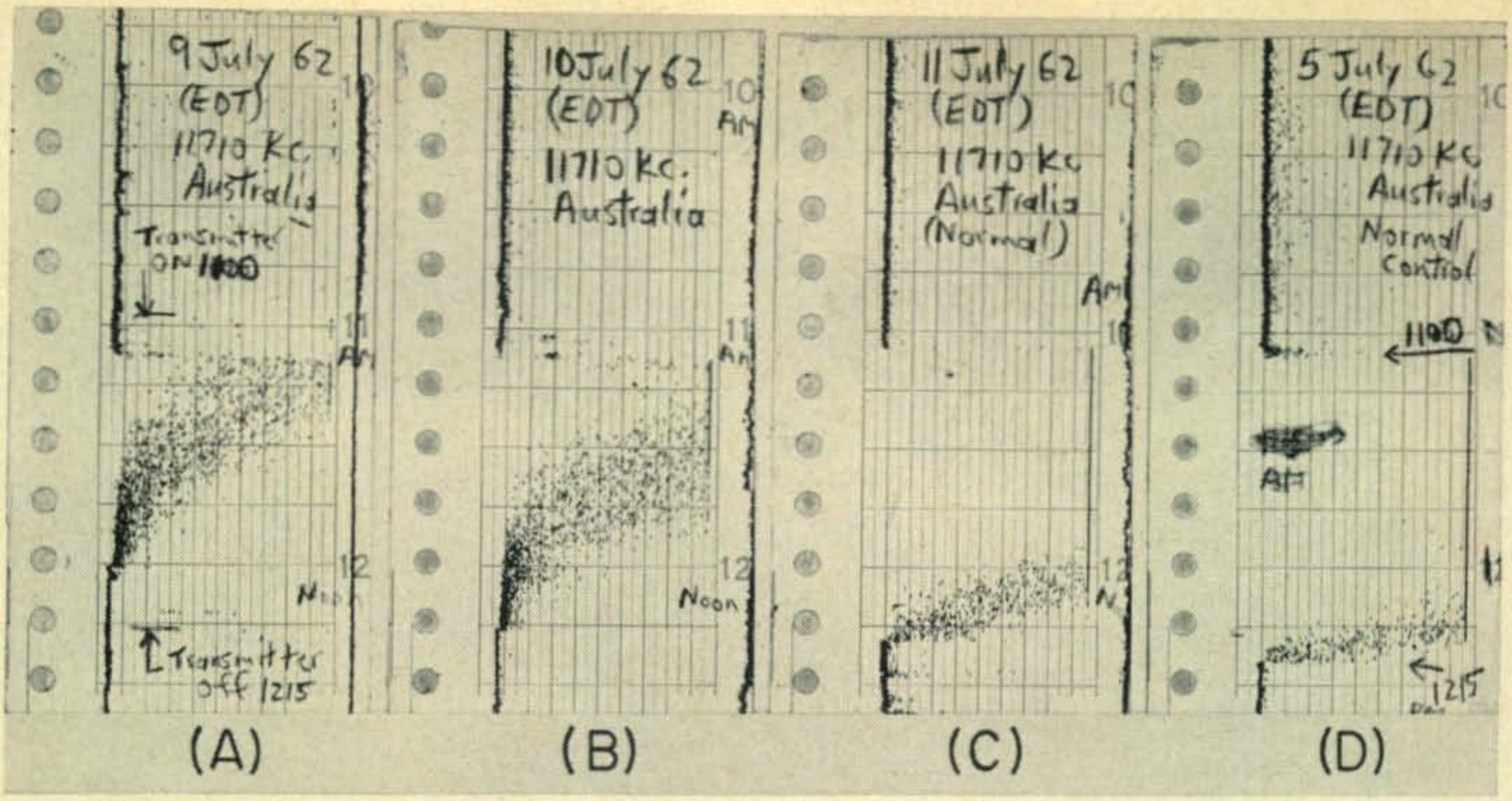


Fig. 5—(A) Strip chart showing reception of Radio Australia on 11710 kc six to seven hours after detonation. (B) Thirty to thirty-one hours; (C) Fifty-four to fifty-five hours and (D) normal control on 11710 kc.

that ionospheric propagation was altered by the nuclear blast, enabling the sounder and the amateur station to be received after the explosion. Insufficient data were obtained to further substantiate this theory.

Immediately after detonation, the Australian signal increased at a rate of 2.5 db per minute for approximately 14 minutes and remained steady after 14 minutes at 30 db above the noise level. The signal appeared weaker than normal for the following three hours until the station ceased transmission. Fading rates appeared normal.

Radio Australia on 9570 kc dropped to noise level at the time of detonation, recovering slowly but not completely during the following 15 minutes (fig. 3). From 1.5 to 2.25 hours after detonation, the signal gradually increased and then decreased, apparently affected by local sunrise. The signal remained weak for four hours until the normal fade-out time. Twenty four hours after detonation, signals were slightly weaker than normal. Forty eight hours after detonation, the signal level appeared normal (fig. 4).

Radio Australia on 11710 kc dropped to noise level at the time of detonation and the signal increased during the following 15 minutes, but did not return to the original level. Three to four hours after detonation, the signal appeared strong. Six to seven hours after detonation, the signal appeared weaker than normal and faded 45-minutes earlier than normal (fig. 5A). Thirty to thirty-one hours after detonation, the signal appeared weaker than normal and faded 30-minutes earlier than normal (fig. 5B). Two days after detonation, the signal appeared normal (fig. 5C). Figure 5D is the normal control for the signal on this frequency.

The 11810 kc signal of Radio Australia remained very weak after detonation, with increases in the signal level occurring 25 to 45-minutes and 1.5 to 2-hours after detonation, the latter increase probably the effect of local sunrise. Figures 6 and 7 show the test and normal control chart recordings for this frequency.

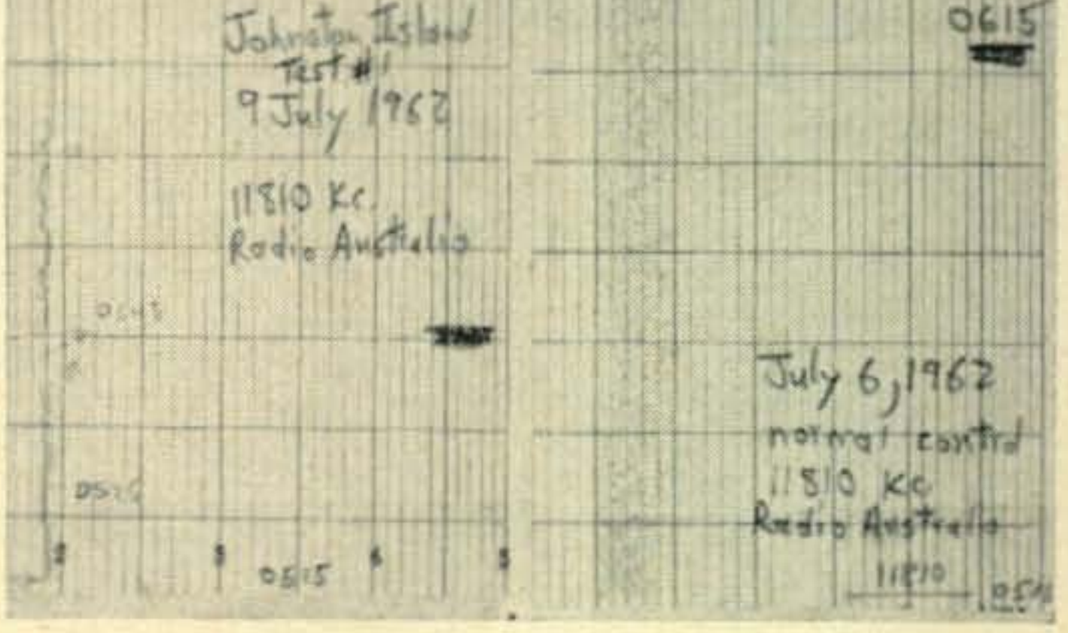


Fig. 6—(Left) Strip chart showing reception of Radio Australia on 11810 kc on morning of the test.

Fig. 7—(Right) Strip chart showing normal control on 11810 kc on July 6, 1962.

Radio Japan on 11725 kc was observed well above the noise level when checked 14 minutes after detonation. The Philippines station on 12736.5 kc was heard when checked 10 minutes after detonation, but was not identified. WWVH in Hawaii on 5000 kc was very strong 45 to 50 and 105 to 110-minutes after detonation. This station could not be heard at other times because of the presence of local station WWV on the same frequency.

The operation countdown was monitored on 15515 kc. The location of the station broadcasting the countdown is not known, although it was observed that the countdown station could not be heard at the instant of detonation or after the detonation.

According to sunspot count and geomagnetic data released by the National Bureau of Standards Propagation Warning Service, solar conditions appeared normal during the days of the July 9 Johnston Island nuclear experiment. This indicates that the effects observed during the nuclear experiment were not produced by abnormal solar activity.

Lower Altitude, Lower Yield Nuclear Detonations

Further tests in the high-altitude nuclear test series consisted of low-yield detonations in the mornings (EDT) of Oct. 20, 26 and Nov. 1 and 4. These explosions occurred at *D* and *E*-layer altitudes. Instrumentation for these tests consisted of a single Collins 51J-4 receiver and G. E. Strip-Chart Recorder which recorded the a.g.c. voltage of Radio Australia on 9570 kc. Details on the tests are as follows:

TEST No. 2, October 20, 1962, 0330 EST, under 20,000 tons yield, 20-30 miles altitude. RESULTS: no effects observed.

TEST No. 3, October 26, 1962, 0600 EDT, under one megaton yield tens of kilometers altitude. RESULTS: drop in signal level (Fig. 8), recovering gradually during the following two hours. Sunrise effects appeared more pronounced.

TEST No. 4, November 1, 1962, 0710 EST, under one megaton yield, 20-30 miles altitude. RESULTS: no effects observed.

TEST No. 5, November 4, 1962, under 20,000 tons yield, 20-30 miles altitude. RESULTS: no effects observed.

Summary of Observations

The observations made during the 1962 Johnston Island nuclear test series can be summarized as follows:

1. Signal drop-out effects were immediate in some detonations but were negligible in others.
2. Signal drop-outs were not total; *i.e.*, residual signals could be heard above the noise level after each detonation.
3. Long-term effects were most pronounced at 11710 kc, less pronounced at 9570 kc, and negligible at 7190 kc; lasting as long as two days.

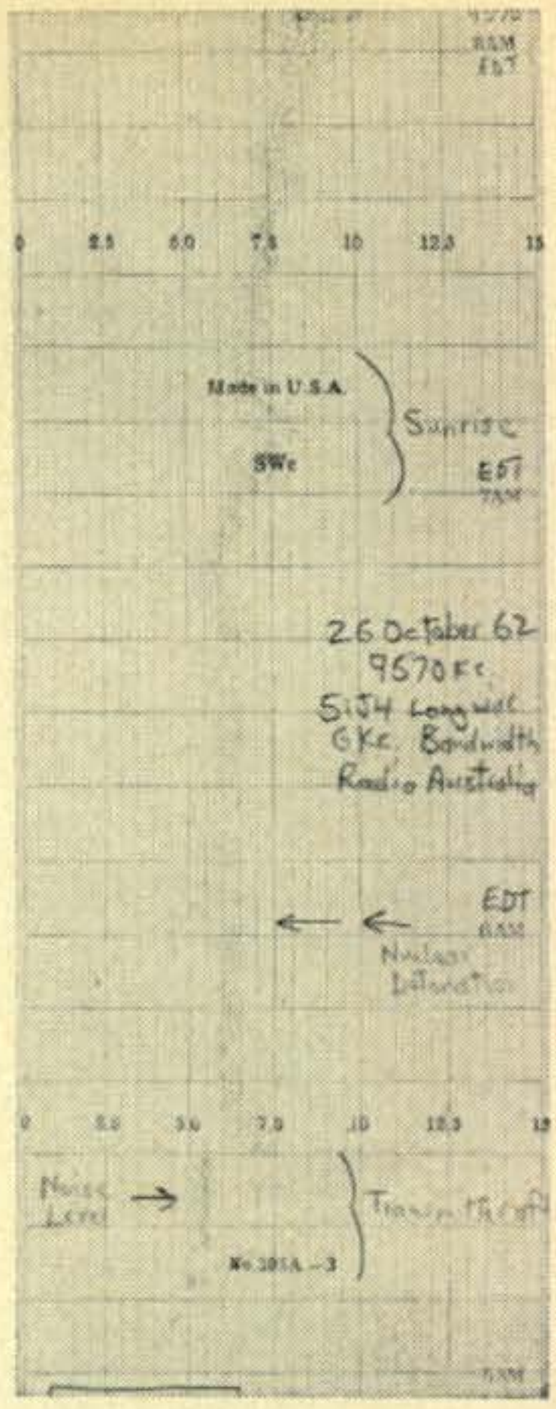


Fig. 8—Strip chart showing the results from the low altitude (D and E-layer) low yield explosions. Signal recorded is Radio Australia on 9570 kc on Oct. 26, 1962.

4. Sunrise effects appeared more pronounced than normal.
5. The extent of effects appeared greatest for a large detonation at high altitude (*F*-layer) than for small detonation at lower altitudes (*D* and *E*-layers).
6. Signals of stations not heard before detonation could be received immediately after detonation.

Conclusions

The extent of propagation effects, including long-term effects, appears to be a function of the altitude and yield of the nuclear detonation, and the frequency of the station affected. Signal drop-outs were not as prolonged as anticipated, lasting only a few hundred seconds, although less serious after-effects were observed for as long as two days. It is possible that the propagation path was altered, causing enhancement of other signals from different geographic locations. The effects from lower altitude (*D* and *E*-layer), low yield explosions were not detectable, with the exception of the sub-megaton detonation of October 26. Further data is needed, however, before any positive conclusions can be reached.

Acknowledgements

The author is indebted to Dr. Hunt Curtis, W1OKL/3 and George Selz of IBM for support and encouragement of this work; to Professor Schwartz of the Moore School, project advisor, and to Jan Carman, W3JXS of the Moore School for obtaining data from the receiving station in Yeadon, Pennsylvania. ■

A Ham Service That is Not a Novelty

BY JOHN W. OHLSEN*, K2TSE

OVER my receiver came the words, "Break, break, priority traffic." Operation on the New York City-Long Island Phone Net immediately came to a dead calm. The Net Control Station was heard querying the breaking station as to the nature of his priority traffic.

According to the story I remember hearing, it appeared that a New England ham's wife had just become seriously ill. At the time, their son was touring somewhere on Long Island. The ham, wanting his son to return home, but not being able to locate him, decided to use the traffic net's services to see if he could get a message through to him.

He made up messages to be sent to the towns listed on a tentative schedule his son had composed previous to the trip. As soon as he listed the traffic on the net, the net members took the traffic and called the various places. Within a half hour, the son was located and was preparing to leave for home.

Although this is one example of traffic passed during the course of the day, priority traffic is the exception rather than the rule. During the day, hundreds of the common "having a wonderful time, wish you were here" type of messages are passed via traffic nets.

Sending and relaying these radiograms is a valuable service provided by hams. This service is for everyone: you, your friends, your group. Take advantage of it.

Now, suppose that you decide to send a message for yourself or your friends. Do you know what to do?

A few simple rules should be followed when originating a message. First, keep the number of words in the text to a maximum of 25. The reason for this is twofold. It makes the message easier to handle. Therefore, it will be delivered with a minimum of mistakes.

The next step is to put the message in message form. (See fig. 1.) If this is your first message, place the number one in the box located in the upper left corner. Then comes the station of origination where you would put your call letters. For the check, count the number of words plus punctuation in the text, and place this number under the word "check." Your QTH will be the place of origination. The time and date you originate the message are placed in the next two boxes. Record to whom the message is going and the destination. If you arrange the text in five-word groups, handling the message will be facilitated. (Remember, punctuation *is* counted for the check.) Finally, sign the sender's name (this name is *not* counted in the check).

*P.O. Box 782, Mastic, N.Y.

Number	Station of Origin	Check	Place of Origin	Time	Date
1	K2TSE	14	ITHACA, New York	1300	11 June 1962

To: John Smith
Main St.
Atlanta, Georgia

Received from _____
Sent to K4XXX-1400-11 June
Delivered _____

Telephone: AT.1-1111

JUST	COMPLETED	TOUR	OF	COUNTRY
X	WILL	SEE	YOU	AT
YOUR	PLACE	IN	SEPT.	
		-John	Ohlsen-	

Fig. 1—A sample message form that should be used and kept on file.

Now that the message is completed, your job is to get it to its destination. Since the traffic nets are organized to provide an efficient service for passing messages, they are the best place to go to pass your traffic. If you have trouble locating a net, there is a list of traffic nets in past issues of *QST*.[1] The nets' time, days and frequencies are listed.

Both c.w. and phone nets will be listed. Which should you use? If you decide on a c.w. net, I'd advise you to obtain a list of "Q" signals from ARRL Headquarters since these signals are used for efficient net operation. Then listen for the Net Control Station, NCS, who will be directing the net's operation. When he calls for stations with traffic, give him your call letters. When the NCS acknowledges you, pass on the message's destination to him. If another station on the net can take your message, the NCS will say, "Up 5," or to whatever frequency is clear. On the assigned frequency, call the station, and pass the traffic.

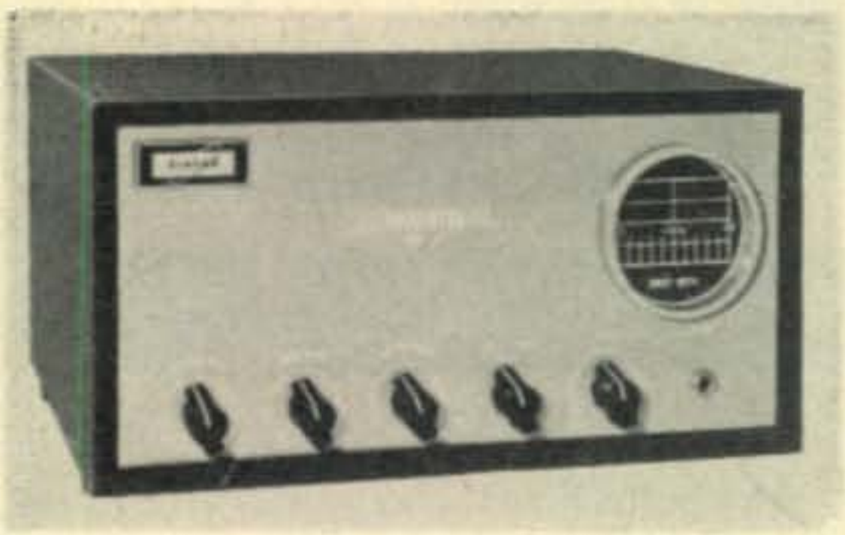
Don't worry about your code speed! Although the other station would probably appreciate a high code speed, he will slow down if you are rusty at c.w.

However, if you are rusty at c.w., and you are inexperienced with handling traffic, it would be advisable to use the phone net to pass your traffic. First, listen to how the net operates. After you hear the NCS call for stations, zero beat on him. Wait a few seconds before you give your call as there may be others checking into the net creating dual transmissions, thus making it difficult for the NCS to copy. Then give your call with the word "traffic." Don't worry if you were not acknowledged the first

[*Continued on page 88*]

[1] Operating News, *QST*, July 1961, p. 18.
Operating News, *QST*, Nov. 1961, p. 95.

New Amateur Products

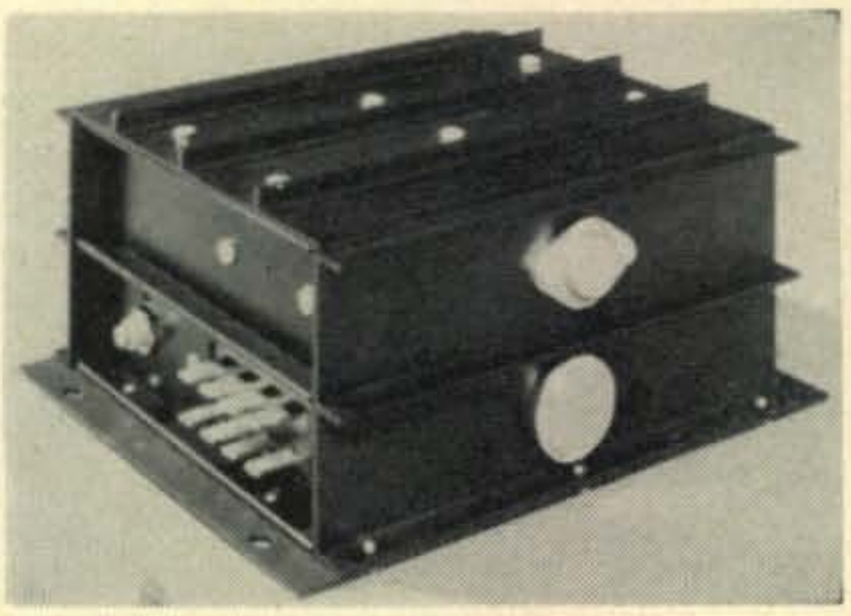


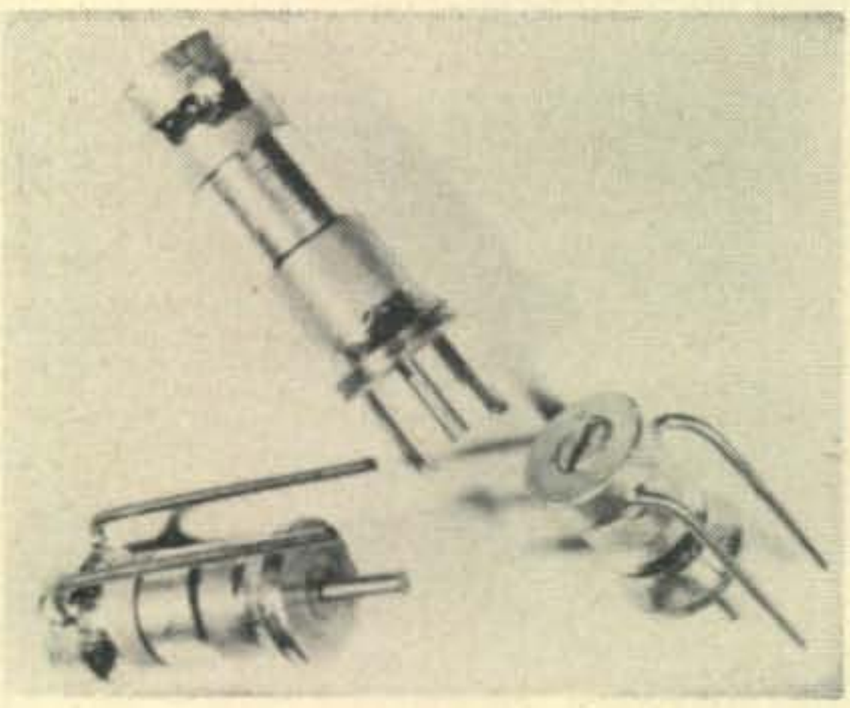
455 Kc Panadapter

THE Singer Company, Metrics Div., 915 Pembroke St., Bridgeport, Conn., has announced a new low-cost spectrum analyzer developed especially for non-professional use. The PR-1 displays signals up to 100 kc on either side of center frequency on a 3" c.r.t. Operating off the i.f. of the receiver, connection is made to converter tube for pickup. Unit has 10 tubes, operates off standard 115 v.a.c., 50-60 c.p.s. line at 55 watts. The PR-1 is in production and available F.O.B. for $199.75. Circle A on page 110 for more information.

DC to DC Converter for Mobile Use

RATINGS such as to cover the requirements of all modern mobile transceivers accompany the new Linear Systems Century model d.c. to d.c. converter. These include: h.v. output from 650 to 850 v.d.c. with 500 to 400 ma, l.v. output from 250 to 325 v.d.c. at 200 ma, and a bias output from 0-120 negative at 20 ma. It operates at 91% efficiency at 275 watts output, dropping 8 per cent from no load to full load. Unit weighs 7 lbs. and has compact dimensions of 3½ × 6 × 7". Price $145.00 direct from Linear Systems, Inc., 605 University Ave., Los Gatos 2, Calif. Circle B on page 110 for further details.



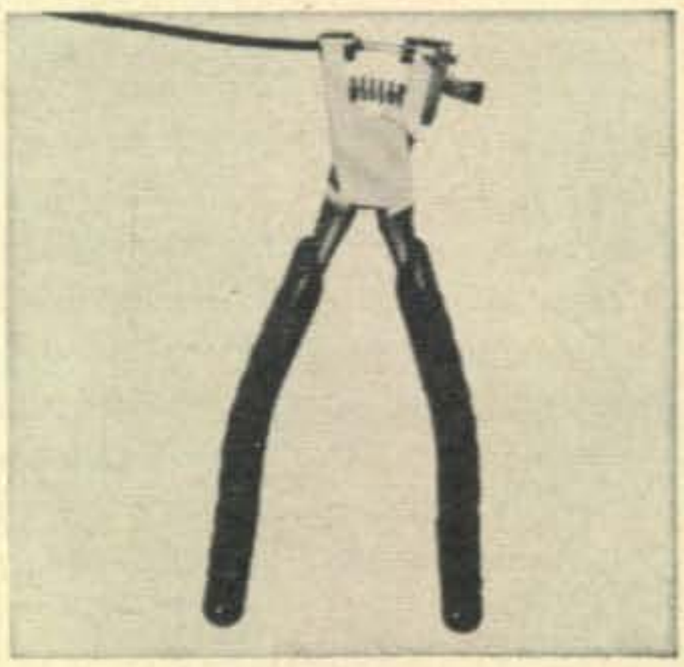


Miniature Trimmer Capacitors

A NEW miniature trimmer capacitor for printed circuits has been designed by Corning Electronic Components to take up minimum board area and allow vertical trimming. All models of the pin terminal mini-trimmer are only 5/16" in diameter. Capacitors available are 1-5, 1-10, and 1-14 mmf. It has a d.c.w.v. of 750 volts and dielectric strength of 1500 volts. A custom design that has now become standard in itself, the new trimmer originally was a modification of a standard model. Circle C on page 110 for further information.

Metal-Braid Stripping Tool

GAGNE Associates, Inc., of Binghamton, New York, has come up with a novel hand stripping device which will easily and quickly shear off metal braid from shielded wire, producing neat and uniform ends that are slightly flared to accept connecting sleeves. The use of this tool is faster and cleaner than scissor or diagonal cutter methods and it may be used over any type of insulation on single conductor wires. Price is in the $25 range. For further information, circle D on page 110.



DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

Here and There

AP West Pakistan: AP5HQ has been very active on 20 meter c.w. 1300 GMT preferred. In spite of the AP5 prefix, the station is located in West Pakistan.

CEØ Juan Fernandez Island: The following is by "Edmundo" Cushing, W4QVJ/CEØZI:

"The first attempt to reach the island was made Tuesday, Oct. 22, and a second attempt followed on the 23rd but both failed because of bad weather at the island. Strong winds, estimated 20-25 knots caused 3-4 foot waves and the captain considered a landing of the PBY to be unnecessarily risky. On Thursday the plane did not even leave the airport due to continued bad weather. However, landing was finally effected on Friday at 1515 GMT and the beam and gear were made ready with dispatch. Unfortunately, phase regulation trouble with the generator required repair prior to start.

"Operation commenced in earnest on Saturday, Oct. 26, but propagation conditions were poor which resulted in only S. American QSOs, but with many of these. Mostly YVs, ZPs, PYs and LUs were worked until a W6 who evidently was doing a little careful listening broke through and advised that I had a good signal, S8, but that the boys were busy working the easier stuff, à la contest.

"A total of 1,210 QSOs were made in the 5½ days of operating. Much trouble was experienced with water and dirt in the gasoline continually fouling up the feed system. On the next-to-the-last day it became necessary to dismantle the feed lines and give them a thorough cleaning. Unfortunately, 3½ hours were lost in the process. Band conditions to W/K were good for about 2-3 hours in the morning and 3 hours in the evening. By 1400 GMT 20 meters was almost completely dead . . . and there was very little action from the USA on 15. The few stations worked on 15 phone all gave me fine reports, but there simply was not enough attention paid to that band. Twenty opened again about 2230 GMT.

"From 07-09 GMT festivities were devoted to Europe, the South Pacific, and the Far East by the long path. In all, a total of 50 countries were worked with time about evenly divided s.s.b. to c.w., QSO totals being 651 c.w. and 549 s.s.b.

"A continual shortage of gasoline hampered

*Box 35, Hazlet, New Jersey 07730

The following certificates were issued between the period from November 6th to and including December 5th, 1963:

CW-PHONE WAZ

1866	W6ISQ	John G. Troster
1867	YO3RD	Liviu Macoveanu
1868	G3HCT	John Bazley
1869	GB2SM	The Science Museum Demonstration Station
1870	WØMAF	Dr. F. A. Carmichael
1871	K4HYL	Jacob Shartsis
1872	HB9EO	Ralph Graeub
1873	W3KDF	John H. Possehl
1874	W1MQV	Robert A. Wallace
1875	G8PL	L. A. Kippin
1876	G3JUL	G. C. Voller
1877	W1BPW	Peter Butler
1878	OE8KI	Hans Hrejci
1879	W4AVY	Gary Crane
1880	W6OUN	William A. Creany
1881	VE4TJ	Al Jebb
1882	KØRHO	R. F. Hassing
1883	K5STL	Tony Arnold

ALL-PHONE WAZ

210	DL9OH	Karl Müller
211	WØMAF	Dr. F. A. Carmichael
212	SP9KJ	Jerzy Szczesniak
213	K4HYL	Jacob Shartsis
214	DL9CT	Peter Zieschang

TWO-WAY SSB

196	K4HYL	Jacob H. Shartsis
197	DL3RK	Walter Geyrhalter
198	LU1DAB	Juan Carlos Naon
199	G3NMR	Maurice Margolis
200	KP4CK	Felix V. Rodriguez
201	DL9OH	Karl Müller
202	W8BKO	R. R. Adams
203	W8YBZ	George A. Cunningham

CW WPX

501	K7ADL	Bill Bevan
502	W9WJH	Allan F. Houston
503	VP9BO	Kenneth E. Simmons
504	F8GB	Jean-Claude Fouret
505	K8YCM	Donald S. Chamberlain, M.D.
506	WA4CXR	Lawrence L. Williams

PHONE WPX

99	WA2EOQ	C. C. Unruh
100	W6CHY	Gan A. Baker
101	VE3BKL	Homer T. Houser
102	I1AIJ	Courir Armando
103	YO2BN	Nechita Pantelimon

SSB WPX

148	W6RKP	James N. Chavarria
149	W6OHU	Murray H. Link
150	K1RTB	C. LaMar Ray

MIXED WPX

79	W5RU	Roy L. Alciatore
80	OE1FF	Frank Friedl
81	ST2AR	Eric Dowdeswell

operations. This was caused by a misunderstanding as there had been a 55 gallon drum saved for my exclusive use. Unfortunately, someone had 'cut' it with oil and started using it for the outboard motors used by the fishermen. As a result I had to use dregs from the bottoms of several drums resulting in the water and dirt problem which plagued the fuel lines. The operation was concluded at 1330 GMT on Thursday, Oct. 31 when the generator sputtered and was finally and totally out of gas.

"After reaching the island I could understand why we could not get over earlier. The weather was very rough during my entire stay, with heavy, low-hanging clouds, strong winds, and heavy swells in the small harbor, all of which did not make the landing and take-off of a PBY very easy.

"On the flight back to the mainland, I shared the plane with 24,000 lbs. of lobster plus Sergio Rozas, CEØZF, who has lived on the island 7 or 8 months a year for the past several years. He strongly asserts that he is a rag-chewer addicted to 40 meter a.m. operation, but even at that he does not have a rig on the island at this time. He has an all-band trap dipole up about 60 feet with the ends pointing at the USA, Hi.

"During the operation DX hoggery was in full swing, with some stations calling for a second QSO within ten minutes of their first. Eighty meters was completely devoid of signals and the skeds arranged with W4BRB could not come off. There was absolutely no copy except for two very weak OA4 fone stations. Forty meters, however, was excellent and many Ws, VKs, ZLs, etc. were worked here. Only one QSO was made on 10, and that, when Chuck, W4RHE, was heard calling CQ. We had a fair signal into Florida at that time and could hear many 6s calling CQ and tried valiantly to raise them. At one time on 15, prior to making the first QSO on that band, we heard and called K4TWF and K4IIF, but they were very busy calling YVs, Hi.

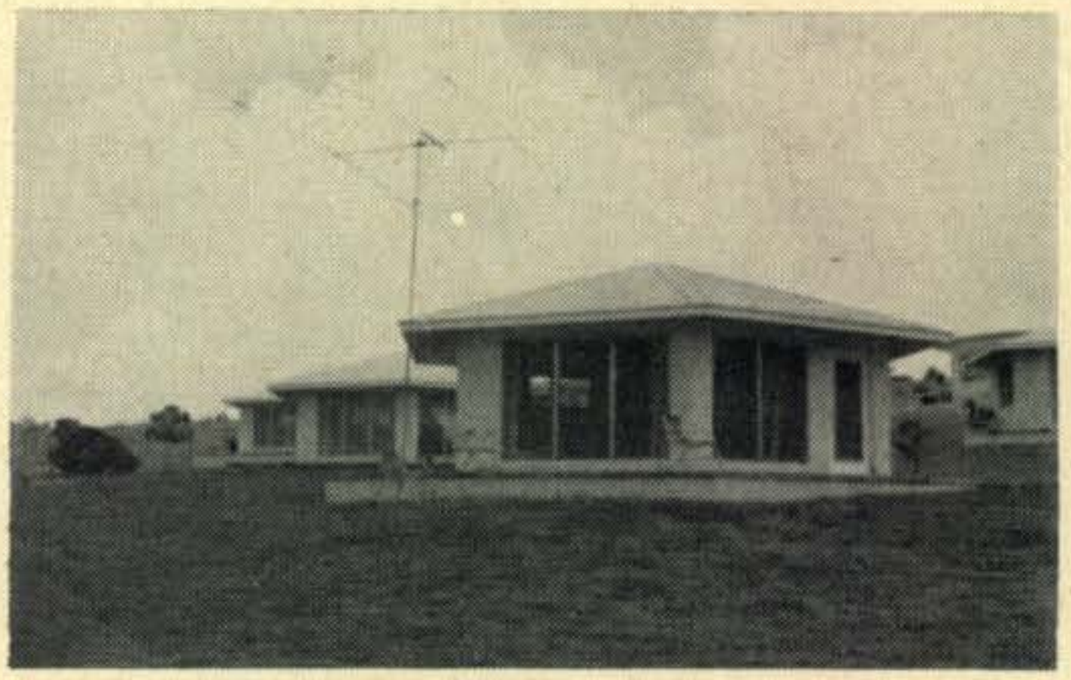
"I had a wonderful time both in Chile and on the island, and genuinely hated to depart both places. The people were exceptionally nice to me. I was the first North American on the island for some 4 or 5 years past. The island itself is a rough, rugged volcanic mass of high peaks with sheep, goats, cows and horses roaming at will. The famous Juan Fernandez lobsters attain tremendous size and weight and are delicious.

"My host, CE3AG, provided the additional necessities for the success of the trip. The PBY owner, Col. Roberto Parrague, graciously donated the 55 gallon drum of gas which was unfortunately denied me due to the misunderstanding. He also proved to be one of the most accommodating and fine gentlemen I have had the honor of meeting.

"Many thanks to those who listened and labored long for a QSO, and special thanks to those thoughtful souls who stuffed their QSL envelopes with stamps and assorted 'green' QSLs." *(Tnx to Ed for the recap)*

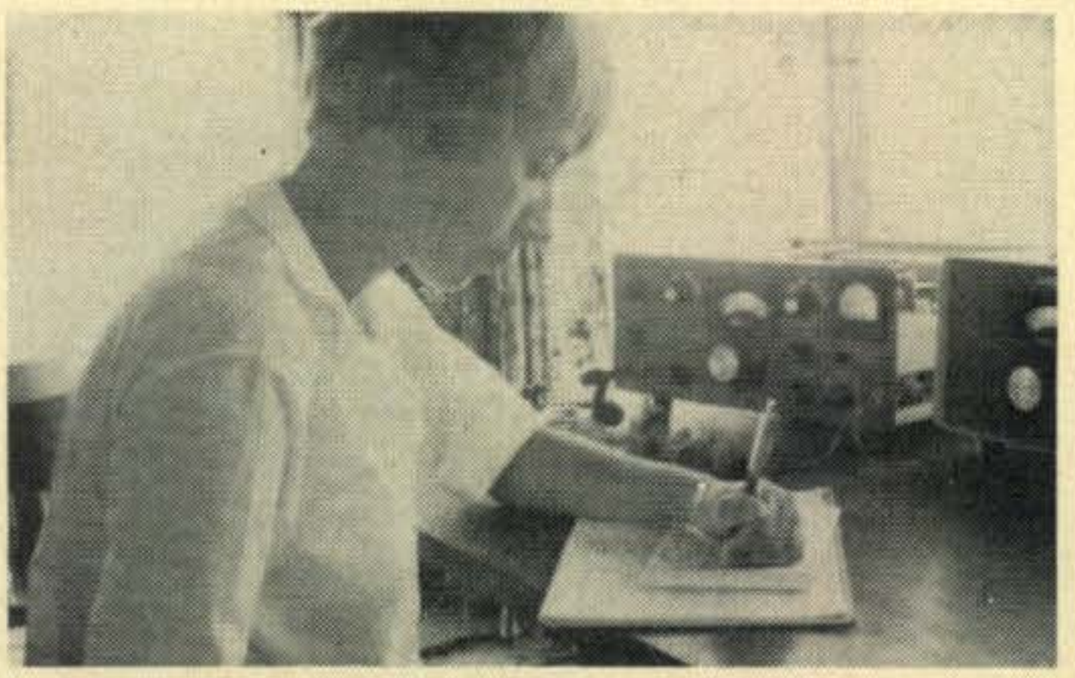
FR7 Reunion Island: A new station, FR7ZI, is

The wonderful Ryden family on location during the "Ryden DXpedition" to Montserrat, where they operated as VP2MM. From left to right; Alicia K8RBB, Sally K8ONW, Mary K8ONV, and Ken K8OHG. Some of Mary's observations on the trip are in the text.



The location of VP2MM. As you can see there are many terrible difficulties to overcome when operating a DXpedition.

Alicia, K8RBB, operating VP2MM. It might be interesting to note that Alicia made DXCC when she was only 16 years old.



Sally, K8ONW, at the operating position of VP2MM. When not DXpeditioning Sally is a straight A student at the Univ. of Michigan.

WPX HONOR ROLL

CW WPX

W2HMJ	685	W8RQ	505	W7HDL	457	W5AWT	412								
W8KPL	648	W9UZS	505	OE1FF	457	W5DA	412								
W5KC	642	G3EYN	503	OK3EA	456	WA2DIG	411								
W2AIW	617	YU1AG	503	UC2AR	456	W2PTD	411								
W2EQS	605	W5LGG	502	K4TEA	451	K5LZO	411								
W4OPM	600	W6YY	502	PAØLOU	451	W4DKP	410								
W6KG	596	DL7CS	502	W3PGB	450	W1CKU	408								
W2NUT	571	K2CPR	501	DL1YA	450	K4IEX	408								
W9UXO	566	W9SFR	501	DL9KP	450	K4JVE	407								
K6CQM	565	W2EMW	500	W8JIN	449	W5AFX	407								
W5OLG	564	W2FXA	500	W3AYD	443	W4CKD	407								
ON4QX	556	K2ZKU	500	W6UNP	442	SM5AJR	406								
DL1QT	552	W2MUM	495	VK3XB	439	W4YWX	404								
W1EQ	549	W3GJY	495	W3BQA	437	GI3OQR	404								
W1IJB	546	W1WLW	494	LA5HE	437	KP4AOO	404								
K2UKQ	546	LA3DB	491	ON4FU	433	VK5RX	404								
W9YSX	544	OK3DG	488	VE3ES	433	ZS4MG	404								
W9GFF	538	SM5CCE	488	W8UMR	429	K2ZRO	403								
SM7MS	534	W4BYU	487	WØAUB	429	W9DYG	403								
W2HO	526	W8PQQ	481	W2RA	428	W9IHN	403								
G2GM	526	W4HYW	478	K5LIA	428	VE6VK	403								
K9AGB	515	W8IBX	476	OK1MB	428	W2FLD	402								
IT1AGA	515	W5BUK	475	W3CGS	426	G8PL	402								
KP4CC	515	WØMCX	472	W1EIO	425	WA2CBB	401								
W6WO	511	W3OCU	466	OE3WB	425	K9BVR	401								
DJ2KS	511	SP6FZ	465	KL7MF	424	WØVBQ	401								
W2GT	510	K6SXA	464	SM5WI	424	IT1TAI	401								
K9EAB	510	W2KIR	463	WØPGI	420	VE3JZ	401								
DL3RK	509	PY4OD	462	W7ABO	419	K4HPR	400								
W8LY	506	JA2JW	461	HB9TT	419	SP4JF	400								
W9DWQ	506	W9WIO	460	G3HIW	418	VE1AE	400								
		W9WCE	458	KH6BLX	418	VE4OX	400								
		W3BCY	457	K2PFC	415	VK3KB	400								
				VK3XB	415	ZL2GS	400								

Phone WPX

W9WHM	605	SM3AZI	362	W2VCZ	320	W9YSX	622								
CT1PK	603	DL2UZ	361	W1UOP	318	W8WT	621								
W8WT	589	SM3EP	361	W2YBO	318	K9EAB	606								
G3DO	583	W1DGJ	358	W8PQQ	315	W8JIN	605								
CT1HF	527	W5ERY	358	WA2EOQ	315	W3OCU	588								
MP4BBW	506	W8JIN	356	W1ORV	307	W9DWQ	571								
W9YSQ	471	G3GHE	356	K4PUS	305	W6YY	570								
W9UZC	462	CX2CN	354	DJ3CP	304	W4BYU	557								
PAØHBO	453	PY2CK	354	WA2SFP	300	W3AYD	552								
K9EAB	450	5A5TO	353	K2TDI	300	YU1AG	552								
W6YY	448	W1ORV	351	W3VSU	300	HB9EU	551								
G8KS	430	LA5HE	351	W4NJF	300	WØMCX	529								
G3NUG	429	ZS6IW	350	KØRDP	300	W2GT	528								
VK6RU	421			VE3BKL	300	DJ2KS	524								
W3AYD	420			WØCVU	291	G8KS	520								
F8PI	418			GI6TK	278	K9AGB	510								
PZ1AX	413			VE3ES	274	W5LGG	509								
K2CJN	409			K2JFV	266	K2ZKU	508								
DL3TJ	404			K2MGE	263	W4BQY	505								
OE1FF	404			W3AYD	262	W3KPD	501								
W1UOP	402			W4EEU	262	W8UMR	500								
W6USG	400			DL1PM	257	LA5HE	500								
VE3BQP	386			XE1CV	256	DL3RK	493								
SP7HX	381			G3FKM	255	JA2JW	480								
TG3AD	381			UR2AR	255	W3CGS	475								
DL6VM	376			K5OGP	254	W9FVU	474								
DJ3CP	375			K1SHN	253	G3HDA	469								
W3DJZ	374			W1EQ	253	G3FKM	463								
PAØSNG	369			W6USG	252	DL1YA	456								
G3FKM	366					WØZBQ	452								
W8UMR	363					PAØLOU	452								
						GI6TK	450								
						HK3LX	450								

Mixed WPX

W4OPM	658														
G3DO	624														

active daily on 14075 kc between 1500 and 1600 GMT. *(Tnx WGDXC)*

HC8 Galapagos Island: Virgil, WA2WUV sent a TR-3, v.f.o. and 110 volt a.c. pack to Forest Nelson, HC8FN. This equipment will be permanently installed at the QTH of HC8FN. The antenna, a beam, is just waiting there. The antenna was left there by HC8CA/WA2WUV. Galapagos, without a doubt, will have one of the loudest signals to be heard in the states.

The financial situation of Forest, HC8FN, is quite plain. When sending for a QSL he asks that a stamped, self-addressed envelope be included definitely or proper IRC enclosed with addressed envelope. The temporary QSL manager will be Virgil Bowers, Box 296, Massepequa, Long Island. *(Tnx LIDXA)*

HE Lichtenstein: Jack, HB9TL, will DXpedition to this spot between Feb. 14 and 16. S.s.b. will be used on 20, 40, and 80 meters. *(Tnx WA2QNW)*

JY Jordan: The U.S. State Department says the recent JY1US operation was illegal and no amateur radio is permitted in Jordan. *(Tnx LIDXA)*

MP4D Das Island: MP4DAH has been very active around 14060 to 14065 kc, 1230 to 1330 GMT preferred. This counts as Trucial Oman for DXCC purposes. *(Tnx WGDXC)*

MP4M Muscat: MP4MAH daily 14032 kc 1500 to 1700 GMT. *(Tnx WGDXC)*

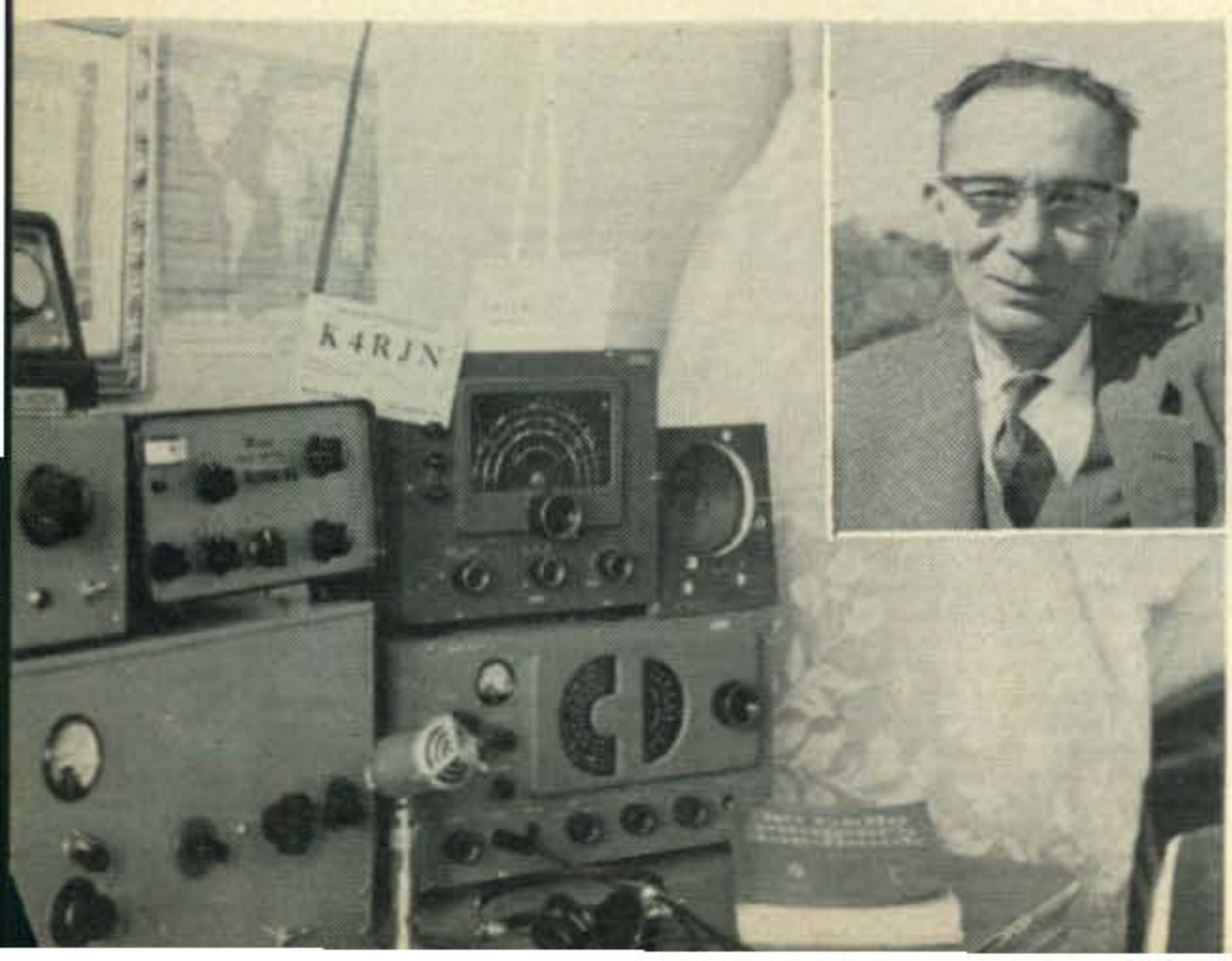
MP4T Trucial States: MP4TAS daily on low end of 20. 1500 to 1700 GMT.

SVØ Rhodes: The following stations are currently active from Rhodes. Frank, SVØWQ and Jack SVØWF on s.s.b. and Dave SVØWG and Gus SVØWDD on c.w. *(Tnx VERON)*

TL8 Central African Republic: Sid, TL8SW (ex-XW8AH/3V8CA) has been very active; c.w. is used almost exclusively. 14045 kc preferred between 2200 to 2300 GMT. *(Tnx VERON)*

TR8 Gabon: Harry, 9Q5AB, is trying to get to

Rasheed Jalal, YK1AA, and his neat station in Damascusm Syria. Rasheed is presently on a.m. and d.s.b. on 14172 and 14320 kcs from 0330-0430 GMT and 1330 to 1630 GMT. A rotatable dipole is used. When not making DXers happy with a new country, Rasheed keeps busy at a local TV station, recording sound tracks for Syrian movie producers; tending the Syrian Army ground communications systems and taking professional still and moving pictures. Thanks to Morris, K4RJN, for these pictures. Morris will be serving as YK1AA's QSL manager.



SSB DX HONOR ROLL

W2ZX	288	PZ1AX	261	WA2IZS	240										
W8PQQ	288	G8KS	261	W1AOL	238										
TI2HP	283	G3FKM	261	PJ2AA	232										
PY4TK	279	W5IYU	260	W7DLR	232										
K9EAB	279	DL1IN	258	K8NZD	232										
K4TJL	279	K2MGE	257	WØCVU	229										
W8EAP	278	MP4BBW	256	OZ7FG	228										
WØQYZ	278	G3NUG	253	K4AJ	226										
K8RTW	276	W6BAF	252	G2PL	225										
VQ4ERR	275	WØUUV	251	W4UWC	225										
W2FXN	272	K1IXG	250	WA6EYP	222										
W6UOU	270	G2BVN	249	WØPGI	221										
HB9TL	269	W6WNE	248	WA6HOH	219										
WØQVZ	268	W6PXH	247	W3VSU	217										
W2TP	267	W8YBZ	246	W4RLS	210										
W4OPM	265	W6LGF	244	DJ3CP	207										
W6RKP	265	K6ZXW	243	W1ICV	205										
W2VCZ	262			OH2NB	204										
W3LMA	261			W9SFR	203										

One of the most popular stations on the air at the present time is the gentleman shown here. Vlad, JT1CA put Mongolia on the Zone 23 s.s.b. map for the first time with this home brew rig. The transmitter runs 200 watts of s.s.b. or c.w. on 7 and 14 mc and c.w. on 3.5 mc (3510) the antenna is a ground plane. *(Tnx W4CKB)*

TR8-land. He has cut a lot of red tape but his trip depends upon his getting a pilot to fly him there. *(Tnx NEDXA)*

TT8 Tchad: TT8AJ active daily on 14102 s.s.b. around 2200 GMT. *(Tnx WGDXC)*

TY2 Dahomey: During the first week in February 5N2RSB will operate portable in TY2. This follows up his operation in TJ8 and 5U7.

VK9 Christmas Is.: VK9MV, Mathew, using 40 watts c.w. on most evenings between 13 and 15 GMT and at odd times on weekends. Operates on 14062 and 14103. Will be on a.m. shortly. VK9XI new radio club station operates Mondays 13 to 15 GMT around 14100 both c.w. and phone. Also active 0230 to 0600 GMT Saturdays and Sundays.

VK9DR, Don, currently on c.w. around 14060 and odd times as available running 12 watts and will soon have 100 watts on c.w. During weekdays the entire island population is at work for the phosphate commissioners for the government and no ham transmissions are permissible. *(Tnx W2GHK)*

VP2G Grenada: Frank, VP2GAC, now has his transmitter repaired and may usually be found around 14115 kc between 1200 and 1300 GMT.

VP2MM Montserrat: Mary, K8ONV relates her family story of the "Ryden DXpedition" last year. "Our trip was nothing but fun! It was the first time the children and I had been in an airplane or out of the U.S., and to be on the other end of DX pileups was almost too much enjoyment to have all at the same time. We did not try to operate as a hard-working DXpedition, as it was primarily a vacation, but did work about 1,900 QSOs including 62 countries, about ⅔ c.w. I even had the pleasure of two nice early morning QSOs on s.s.b. with Barry, K3UIG. We swam, and snorkeled, and walked the beach, and even climbed up to the crater of a volcanic mountain called a soufriere to watch the sulphur boil.

"Dean Goddard, VP2MV, not only let us use his beam and was wonderfully hospitable and helpful to us in every way, but even brought his boat over and took us sailing. The Vue Pointe Hotel, where we stayed, was modern, the service perfect, and the meals wonderful. If I sound enthusiastic, it is because I am! We had never eaten mangoes, pawpaws, breadfruit, and fresh bananas and pineapples before. Frank Daly, the communications officer who issued my license was also a delightful person even though he isn't a ham—Hi. The worst part of the entire trip was having to come home. The license was in my name because I wrote the letter inquiring about it, and Dean picked out the second M in the call to stand for "Mary."

VP8 South Sandwich Islands: G3RFH should start his operation from this group of islands at any time now. He has been operating as VP8HF/MM while on the way there and will also use that call ashore. This is the first operation from the South Sandwich since 1955 when LU2ZY and LU3ZY operated from that spot. It's been a long time between QSOs. The VP8HF operation should last about 3 weeks.

VQ1 Zanzibar: VQ1IZ makes fairly regular appearances on 21 mc about 21028 to 21035. 1700 to 1800 GMT. *(Tnx LIDXA)*

VQ8 Chagos and St. Brandon: Harvey, VQ9HB, is leaving for Chagos Island on February 14th and is expected to arrive there about the 21st of February for a stay of about two weeks (or 5,000 QSOs). He will use a 200 watt p.e.p. transceiver which was built by Jack Laib, HB9TL. The transceiver was sent to Lenny, VQ4GT, in late December so that Lenny could familiarize himself with the rig and will be in a position to advise Harvey, should anything go wrong. In

W2 DX Banquet

The North Jersey DX Association will hold its first W2-DX Banquet Saturday evening, March 21 at Schraffts' County Restaurant in Scarsdale, New York. The dinner/program will take place on the weekend prior to the IEEE show. Tickets are $7.50 per person and include festivities and dinner with all the trimmings. Write Bob Stankus, W2VCZ, Dinner Chairman, 30 Pitcairn Ave., Ho-Ho-Kus, New Jersey. Make your reservation early as space is limited.

addition, Harvey will have another receiver, a Tri-Band beam and two dipoles.

Following the Chagos operation, Harvey will go to Rodriguez Island for another two weeks (probable arrival date 2nd or 3rd week of March). Then it is hoped that he will continue on to either Agalega or St. Brandon for a similar two-week operation.

His transmitting frequency will be 14120. He will listen for USA sidebanders on 14250-260 kc and for c.w. on 14010-030 kc working s.s.b. to c.w.

Les Hill, G8KS, will handle all QSLs. Contributions will be welcomed to help defray operating expenses incurred on this expensive operation. This is a joint British-USA endeavor and our English cousins are very pleased that they are able to participate in arranging such a wonderful DXpedition. *(Tnx LIDXA)*

VS1 West Malaysia: VS1LV and VS1FZ both active daily between 1300 and 1500 GMT. 14040 to 050 usually preferred. *(Tnx LIDXA)*

VS4 East Malaysia: VS4FS is a new one on 14 mc c.w. only. *(Tnx LIDXA)*

VS5 Brunei: Gus may join Ron, VS4RS, in dishing out VS5 QSO in February. If Gus doesn't make it, Ron promises to go himself.

XW8 Laos: There are presently four XW8 stations on s.s.b. They are XW8s AV, AF, AU, and old reliable Phanh, XW8AL. *(Tnx WGDXC)*

XZ2 Burma: Tara, XZ2KN, frequently active on 14036 kc around 1300 GMT. *(Tnx WGDXC)*

YK Syria: "In Syria there are many unauthorized transmitting stations operating from unknown places on 14 mc (c.w.) as YK2SK, YK1BC, etc. Perhaps these stations are working from outside Syria using our call signs. The call sign for authorized Syrian amateurs begins with YK1AA. At present there are only 12 stations working in Syria. Our QSL Bureau receives thousands of QSL cards sent to unknown YK stations. According to the new government's amateur regulation our club station YK1DF is temporarily QRT, other transmitting stations are working as before.

"If you like to work YK1s, try to see them on the air every Friday at 0500 to 1600 GMT. Many stations are there working on this day. *(Tnx to YK1AA via LIDXA for the above information)*

YI Iraq: Kjell, SM5CCE, has not received any logs from YI2WS although that station remains spasmodically active. *(Tnx VERON)*

YVØ Aves Island: The recent YVØAA DXpedition made 2,500 QSOs, of which 1,900 were s.s.b. They were unable to land on the island the week end of the phone contest because of hurricane *Helen. (Tnx WGDXC)*

ZB2 Gibraltar: ZB2A has been reactivated and now active on 21054 kc 1500 GMT. *(Tnx LIDXA)*

ZD3 Gambia: ZD3AL is definitely a phony according to ZD3A who is the only licensed station there. *(Tnx NCDXC)*

ZD6 Nyasaland: G3PBD is now in Nyasaland and will be active shortly. Peter, who will be remembered as VQ4PBD/VQ3PBD/VQ1PBD/VQ5PBD, will spend 2½ years in ZD6-land. *(Tnx LIDXA)*

This very neat station belongs to F8FU who is located in Bordeaux. Camile is shown with his cute Junior Op. *(Tnx K2UKQ)*

ZD8 Ascension Island: ZD8WF continues active almost daily around 1900 GMT between 14025 and 14040 kc. *(Tnx WGDXC)*

6O1 Somali Republic: The following from Woody, 6O1WF, should help clear up the misunderstanding with his QSLs. "I am scheduled to leave for home leave in the USA in the first three months of 1964. My policy in relation to QSL cards is to send cards to all stations on first contact. The cards are first held for one month in case someone has special requests for mailing or if they are in a hurry to receive them. If no request is received during the month the cards are hand carried to the Radio Society of East Africa in Nairobi, Kenya for distribution through the Bureau. My QSL addresses are: 1—P. O. Box 6, Mogadiscio, Somali Republic; 2—American Embassy, Mogadiscio, Somali Republic; 3—The *Callbook* address—ICA Mogadiscio, Somali Republic and 4—The safe sure but slower USAID, Somali Republic, State Dept. Mail Room, Washington 25, D.C. Zip Code 20521. If anyone has not received a card from me by Jan. 1, 1964 he should check his bureau then airmail the information to me immediately. I still have several hundred EL8D cards. If anyone that worked me in the period 1957-1961 is still missing a card, just send details and I will look it up in the old logs."

6W8 Senegal: 6W8AC, Jean, has been very active on 20 meter s.s.b. between 2200 and 2300 GMT. *(Tnx WGDXC)*

9L1 Sierra Leone: 9L1TL may be around 14025 kc about 2030 GMT daily. QSL via ISWL. *(Tnx WGDXC)*

160 Meters

GENERAL: The band has been pretty good after a slump of approximately three weeks. Much DX is being worked. Generally speaking, DX this season is quite a bit ahead of last year—for example, to date last year W1BB had worked a total of 8 DX stations, this year same period 20. These are *different* stations and do not count as repeat QSOs.

ACTIVE DX: 5B4RF, 5B4FB, VQ4IV, ZB1BY, HB9QA, GM3KLA, OH3NY, VK9GL, 5N2-

[*Continued on page 100*]

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during February, 1964. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (February 7, 10, 20), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED DAY-TO-DAY PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* Feb. 7, 10, 20	*Normal Days (WWV rating 5-6)* Feb. 4-6, 8-9, 11-13, 17-19, 21-22, 24-26	*Below Normal Days (WWV rating 4)* Feb. 2-3, 14, 16, 23, 27, 29	*Disturbed Days (WWV rating less than 4)* Feb. 1, 15, 28
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	D	D

Where:

A—is an excellent opening with strong steady signals.

B—is a good opening, moderately strong signals, with little fading and noise.

C—is a fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.

D—is a poor opening, signals generally weak, with considerable fading and high noise level.

E—is a very poor opening or none at all.

THE 20 meter band is expected to be the optimum band for DX openings during the daylight hours of February. The band is forecast to remain open from shortly after dawn through the late afternoon and early evening hours. Some fairly good DX openings are also forecast for 15 meters during the daylight hours, but the band is expected to open considerably less frequently and to fewer areas of the world than 20 meters. Except for the possibility of an occasional opening to southern or tropical areas during the daylight hours, propagation conditions are not expected to be suitable for DX openings on 10 meters during February.

Forty meters is forecast to be the best band for DX openings during the hours of darkness. The band is expected to open for DX during the late afternoon hours, and remain open to one area of the world or another until shortly after sunrise. Frequently, DX openings on 40 meters should be marked by exceptionally strong signal levels. Fairly good 80 meter openings are also predicted during the hours of darkness. The band is expected to open frequently for DX to many areas of the world between sunset and sunrise. DX openings to several areas of the world are forecast for 160 meters during the hours of darkness. While signal levels will be weaker, and the band will open less frequently than 80 meters, conditions this February are expected to be better than they have been during the February's of the past ten years. (The annual 160 meter DX Tests will be conducted on February 2 and 16 from midnight to 2:30 A.M. EST. See last month's PROPAGATION column for more details.)

VHF Openings

Auroral activity usually occurs more often during February than the earlier winter months, and this is expected to result in several short-skip auroral type openings on 10, 6 and 2 meters during the month. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be either "disturbed" or "below normal" since there is a tendency for auroral activity to take place during these periods.

No significant meteor showers are expected during February, and very few short-skip sporadic-*E* openings are forecast for the month.

Sunspot Cycle

The Zurich Solar Observatory reports a monthly sunspot number of 21 for November 1963. This results in a 12-month running smoothed sunspot number of 29 centered on May 1963. Smoothed sunspot activity has remained relatively constant at this level for the past eight months. A smoothed sunspot number of 17 is forecast for February 1964.

Due to lack of space, the detailed analysis of the present sunspot cycle scheduled for this month's column will appear next month. This analysis will contain a long-range prediction for the remainder of the present cycle and the beginning of the new cycle.

*11307 Clara Street, Silver Spring, Md. 20902

CQ DX Contest Post Mortem

The *CQ* Propagation forecasts for the 1963 *CQ* World-Wide DX Contest appear to have been "right on the nose."

The forecast for "normal" conditions during the Phone section weekend of October 26-27, with WWV ratings between 5-6, turned out to be almost exactly what was observed. Based on extensive observations and ionospheric measurements, the National Bureau of Standards rated each six-hour period of the Contest weekend as follows:

October 26:
0000-0600 GMT Fair, rating 5.
0600-1200 GMT Fair, rating 5.
1200-1800 GMT Fair-to-good, rating 6.
1800-0000 GMT Fair, rating 5.

October 27:
0000-0600 GMT Fair-to-good, rating 6.
0600-1200 GMT Poor-to-fair, rating 4.
1200-1800 GMT Fair-to-good, rating 6.
1800-0000 GMT Fair-to-good, rating 6.

Generally fair-to-good propagation conditions prevailed on both days of the Contest period in most parts of the world on *low* and *high* frequency bands. From the United States, 10 meters opened to the Mediterranean area, to Africa and South America, but for short periods of time and with marginal signals. Fifteen meters was open with very strong signals to most areas of the world for at least 12 hours of each day, with particularly strong signals on the North Atlantic path. Twenty meters remained open to some area of the world or another for 46 of the 48 hours of the Contest period. Forty meters was open for DX from the late afternoon through the hours of darkness, with exceptionally strong signals on the North Atlantic path. Conditions on 80 meters, while not as good as 40, still permitted fairly good openings during the hours of darkness to Europe, Australasia, Africa and South America.

The *CQ* prediction of "normal" conditions for the c.w. weekend of November 23-24 also seems to have hit the nail pretty much on the head. The National Bureau of Standards rated these days as follows:

November 23:
0000-0600 GMT Fair, rating 5.
0600-1200 GMT Fair, rating 5.
1200-1800 GMT Good, rating 7.
1800-0000 GMT Fair-to-good, rating 6.

November 24:
0000-0600 GMT Fair, rating 5.
0600-1200 GMT Fair, rating 5.
1200-1800 GMT Fair-to-good, rating 6.
1800-0000 GMT Fair, rating 5.

Although the National Bureau of Standards rated conditions slightly better during the c.w. section than the Phone section, m.u.f.s were not as high and conditions appeared to be somewhat more variable.

Few 10 meter DX openings took place during the c.w. weekend. Conditions on 15 meters, especially to Europe, were not as good as during the Phone period, although the band did open to many areas of the world during the daylight hours. Twenty meters was the best band for DX during the c.w. weekend, and the band held up for DX during nearly the entire Contest period. Fairly good DX conditions were observed on 40 meters from the late afternoon hours until shortly after sunrise. Eighty meters also opened to several areas of the world during the hours

[*Text continued on page 104*]

FEBRUARY AND MARCH, 1964

Time Zone: EST (24-hour Time)

EASTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	08-10 (1) 10-13 (2) 13-15 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-18 (1) 18-19 (2) 19-23 (3) 23-02 (2) 02-05 (1)	18-20 (1) 20-23 (3) 23-01 (1) 20-21 (1)† 21-00 (2)† 00-01 (1)†
Eastern Europe & European USSR	09-13 (1)	07-12 (1) 12-14 (2) 14-16 (1)	18-02 (1)	20-00 (1) 21-23 (1)†
Eastern Mediterranean	09-13 (1)	07-12 (1) 12-15 (2) 15-17 (1)	18-20 (1) 20-21 (1) 21-23 (1)	19-23 (1) 20-22 (1)†
Southern Europe & North Africa	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-16 (1)	06-07 (1) 07-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	16-18 (1) 18-19 (2) 19-20 (3) 20-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	19-21 (1) 21-23 (2) 23-01 (1) 20-00 (1)†
Central & South Africa	10-13 (1)* 07-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-18 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-21 (1)	18-20 (1) 20-22 (2) 22-00 (1)	19-22 (1) 19-21 (1)†
Central Asia	07-09 (1) 16-19 (1)	07-09 (1) 12-15 (1) 17-19 (1)	05-07 (1) 18-21 (1)	*NIL*
Southeast Asia	07-09 (1) 17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-21 (1)	06-08 (1) 17-20 (1)	*NIL*
Far East	16-19 (1)	07-09 (1) 16-17 (1) 17-19 (2) 19-21 (1)	05-08 (1)	06-07 (1)
Pacific Islands & New Zealand	15-17 (1)* 12-16 (1) 16-18 (2) 18-20 (1)	18-20 (1) 20-23 (2) 23-07 (1) 07-09 (2) 09-11 (1)	00-02 (1) 02-06 (3) 06-07 (2) 07-08 (1)	02-03 (1) 03-05 (2) 05-07 (1) 02-06 (1)†
Australasia	09-11 (1) 15-17 (1) 17-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-15 (1) 20-23 (1)	04-05 (1) 05-07 (2) 07-09 (1)	05-07 (1) 05-07 (1)†
North & Central South America	09-13 (1)* 13-15 (2)* 15-17 (1)* 07-08 (1) 08-10 (2) 13-16 (4) 16-17 (2) 17-19 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-00 (2) 00-06 (1)	17-19 (1) 19-02 (3) 02-04(2) 04-07 (1)	19-21 (1) 21-02 (2) 02-06 (1) 20-03 (1)†
Argentina, Chile & Uruguay	12-15 (1)* 07-09 (1) 09-13 (2) 13-16 (3) 16-18 (2) 18-20 (1)	06-09 (1) 14-16 (1) 16-18 (2) 18-20 (3) 20-00 (2) 00-03 (1)	19-21 (1) 21-03 (2) 03-05 (1)	21-04 (1) 22-02 (1)†

*Predicted 10 meter openings, all others in column are 15 meter openings.
†Predicted 160 meter openings, all others in column are 80 meter openings.

Mc-Murdo Sound Antarctica	14-15 (1) 15-17 (2) 17-20 (1)	06-09 (1) 16-18 (1) 18-21 (2) 21-00 (1)	23-05 (1)	*NIL*

Time Zones: CST & MST (24-hour Time)

CENTRAL USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	08-10 (1) 10-13 (2) 13-14 (1)	07-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	16-19 (1) 19-22 (2) 22-02 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)†
Eastern Europe & European USSR	08-13 (1)	07-08 (1) 08-11 (2) 11-15 (1)	19-01 (1)	20-23 (1)
Eastern Mediterranean	09-12 (1)	07-12 (1) 12-14 (2) 14-16 (1)	19-23 (1)	20-22 (1)
Southern Europe & North Africa	08-10 (1) 10-12 (2) 12-15 (1)	06-11 (1) 11-13 (2) 13-14 (3) 14-16 (2) 16-18 (1)	16-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)†
Central & South Africa	11-13 (1)* 08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-18 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-21 (1)	18-20 (1) 20-22 (2) 20-00 (1)	19-22 (1) 19-21 (1)†
Central Asia	07-10 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	06-08 (1) 19-21 (1)	*NIL*
Southeast Asia	10-14 (1) 17-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-21 (1)	06-08 (1) 17-19 (1)	*NIL*
Far East	15-16 (1) 16-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	02-09 (1)	05-07 (1)
Pacific Islands & New Zealand	14-17 (1)* 09-11 (1) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1)	17-19 (1) 19-01 (2) 01-07 (1) 07-09 (2) 09-14 (1)	22-01 (1) 01-06 (3) 06-07 (2) 07-09 (1)	00-03 (1) 03-06 (2) 06-07 (1) 03-07 (1)†
Australasia	08-10 (1) 14-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-15 (1) 21-23 (1)	02-04 (1) 04-07 (2) 07-09 (1)	05-08 (1) 05-07 (1)†
North & Central South America	09-11 (1)* 11-13 (2)* 13-15 (1)* 07-08 (1) 08-13 (2) 13-16 (3) 16-17 (2) 17-19 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-00 (2) 00-06 (1)	18-20 (1) 02-04 (2) 04-07 (1) 20-02 (3)	20-21 (1) 21-02 (2) 02-06 (1) 21-03 (1)†
Argentina, Chile & Uruguay	12-14 (1)* 07-09 (1) 09-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	06-09 (1) 14-16 (1) 16-18 (2) 18-20 (3) 20-00 (2) 00-03 (1)	19-21 (1) 21-03 (2) 03-05 (1)	21-04 (1) 22-02 (1)†
Mc-Murdo Sound Antarctica	13-15 (1) 15-18 (2) 18-20 (1)	06-09 (1) 17-19 (1) 19-21 (2) 21-00 (1)	00-07 (1)	*NIL*

Time Zone: PST (24-hour Time)

WESTERN USA To:

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	08-12 (1)	06-08 (1) 08-11 (2) 11-15 (1)	17-00 (1)	19-22 (1) 19-21 (1)†
Eastern Europe & European USSR	07-10 (1)	06-07 (1) 07-09 (2) 09-12 (1)	17-23 (1)	20-23 (1)
Eastern Mediterranean	08-11 (1)	07-12 (1) 19-21 (1)	18-21 (1)	*NIL*
Southern Europe & North Africa	07-08 (1) 08-10 (2) 10-13 (1)	07-10 (1) 10-12 (2) 12-15 (1)	18-19 (1) 19-21 (2) 21-22 (1)	19-22 (1) 19-21 (1)†
Central & South Africa	09-11 (1)* 07-10 (1) 10-13 (2) 13-16 (1)	05-07 (1) 11-14 (1) 14-17 (2) 17-21 (1)	19-22 (1)	20-21 (1)
Central Asia	07-09 (1) 17-19 (1)	07-09 (1) 16-18 (1) 18-20 (2) 20-21 (1)	05-08 (1)	*NIL*
Southeast Asia	16-18 (1)* 08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-19 (1)	07-09 (1) 09-11 (2) 11-13 (1) 19-22 (1)	02-05 (1) 05-07 (2) 07-09 (1)	05-07 (1) 04-06 (1)†
Far East	12-13 (1) 13-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	07-12 (1) 12-14 (2) 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	23-02 (1) 02-06 (3) 06-08 (2) 08-09 (1)	01-03 (1) 03-05 (2) 05-07 (1) 03-06 (1)†
Pacific Islands & New Zealand	12-16 (1)* 09-10 (1) 10-12 (3) 12-15 (2) 15-17 (3) 17-18 (2) 18-21 (1)	07-08 (1) 08-10 (2) 10-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	21-22 (1) 22-05 (3) 05-07 (2) 07-09 (1)	22-00 (1) 00-05 (2) 05-07 (1) 02-06 (1)†
Australasia	07-08 (1) 08-12 (2) 12-15 (1) 15-18 (2) 18-21 (1)	07-08 (1) 08-10 (2) 10-20 (1) 20-22 (2) 22-02 (1)	01-03 (1) 03-05 (3) 05-07 (2) 07-08 (1)	02-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)†
North & Central South America	08-10 (1)* 10-12 (2)* 12-14 (1)* 06-08 (1) 08-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-06 (1)	18-20 (1) 20-00 (3) 00-03 (2) 03-05 (1)	19-20 (1) 20-00 (2) 00-04 (1) 20-03 (1)†
Argentina, Chile & Uruguay	10-14 (1)* 06-08 (1) 08-14 (2) 14-16 (3) 16-18 (2) 18-19 (1)	06-08 (1) 13-15 (1) 15-18 (2) 18-20 (3) 20-22 (2) 22-02 (1)	18-20 (1) 20-02 (2) 02-03 (1)	19-20 (1) 20-01 (2) 01-03 (1) 20-01 (1)†
Mc-Murdo Sound Antarctica	12-15 (1) 15-18 (2) 18-20 (1)	06-08 (1) 16-18 (1) 18-21 (2) 21-23 (1)	00-06 (1)	*NIL*

Explanation Of Forecast Symbols

The numerical rating appearing in parenthesis following each predicted time of band opening indicates the *total* number of days during each month of the forecast period that the opening is expected to occur, as follows:

(1) Less than 7 days
(2) Between 8 and 13 days
(3) Between 14 and 22 days
(4) More than 22 days

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

The *CQ* DX Propagation Charts are based upon a double-sideband a.m. effective radiated power of 600 watts, a single-sideband e.r.p. of 300 watts, and a c.w. e.r.p. of 150 watts, at antenna radiation angles less than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 and KP4 amateur call areas; the Central USA Chart in the 5, 9 and Ø areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through March 31, 1964. Propagation information contained in these Charts is derived from basic ionospheric data published by the Central Radio Propagation Laboratory

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

January	25-26	*CQ* W W 160.
January	25-26	R E F C.W.
January	25-27	New Mexico Party.
February	8-9	ARRL DX Phone.
February	14-16	QCWA Party.
February	15-16	B E R U.
February	15-17	Vermont Party.
February	22-23	ARRL DX C.W.
Feb. 29-Mar. 2		YL/OM Phone.
Feb. 29-Mar. 1		R E F Phone.
March	14-15	ARRL Phone.
March	14-16	YL/OM C.W.
March	23	Pakistan DX.
March	28-29	ARRL DX C.W.
April	11-12	*CQ* WW DX SSB.
April	25-26	PACC C.W. & Phone.
May	2-3	*CQ* Spring VHF.
May	9-10	OZ CCA C.W.
May	16-17	OZ CCA Phone.

CQ W. W. 160

Starts: 0200 GMT Saturday, January 25.
9 P.M. EST Friday, January 24.
Ends: 1400 GMT Sunday, January 26.
9 A.M. EST Sunday, January 26.

Rules same as last year and they have appeared in the last two issues of the CALENDAR.

Deadline for mailing your logs is February 17th and they go to: *CQ*, Att: 160 Contest, 300 West 43rd Street, New York 36, N.Y.

R E F

C.W.

Starts: 1400 GMT Saturday, January 25.
Ends: 2100 GMT Sunday, January 26.

Phone

Starts: 1400 GMT Saturday, February 29.
Ends: 2100 GMT Sunday, March 1.

Rules same as previous years with one exception. The multiplier is now determined by the number of French departments worked on each band. Departments are identified by the number after the call of the station. (*i.e.*: F8TM/78) See January CALENDAR.

Extracts from your log can be used for any of the French awards. Award applications go to F9IL (DUF)—F3ZU (DPF)—F3JI (DDFM) and F3FA (DTA) Log credits are only valid for 2 years.

* 14 Sherwood Road, Stamford, Conn. 06905.

CLAIMED SCORES

1963 CQ WW CW DX Contest

Single Operator

All Band

W3GRF	712,640
VK6RU	509,615
KH6EPW	417,783
W8JIN	378,456
DL7AA	347,595
W9EWC	300,045
W6IBD	281,082
W9IOP	267,810
CN8FW	265,980
W1BIH	257,796
VE2NV	250,408
HZ1AB	243,504
HI8MMN	196,342

28 Mc

W6ID	1,375

21 Mc

VQ2W	173,727
W1WY	56,776
W7UXP/KH6	32,244
W8UMR	31,951
W4RLS	30,889
W6BSY	28,944

14 Mc

HL9KH	355,364
CE3AG	271,250
W4KFC	261,513
YV1DP	146,940

7 Mc

W5WZQ	54,832
DL1EE	47,402
W6JZH/6	47,360
G3HCL	29,323
DJ5JH	28,274
K4VWH	27,951
KØMIC	19,028

3.5 Mc

W4WHK	3,399
WA2RUB	2,916
W8AJW	2,142

1.8 Mc

VE2UQ	1,521
W2EQS	180

Multi-Operator

Single Xmtr

W2PCJ	388,620
SM5BAU	316,160
WA6SBO	300,312

Multi-Xmtr

CX2CO	1,450,000
W4BVV	748,160

Complete rules appeared in last month's CALENDAR. Your logs go to: Reseau des Emetteurs Francais, BP. 42 01, Paris R.P., France.

New Mexico Party

Starts: 1500 GMT Saturday, January 25.
Ends: 0300 GMT Monday, January 27.

Rules appeared in the December CALENDAR. Logs go to: CHC Chapter #1, New Mexico, c/o Willie Petty, W5LEF, 3107 Morningside Drive N.E., Albuqerque, New Mexico 87110.

QCWA Party

Starts: 2200 GMT Friday, February 14.
5 P. M. EST Friday, February 14.
[*Continued on page 92*]

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

In response to last month's special report, "Amateur Radio and the 1963 ITU Space Communications Conference," (see p. 43 *CQ*, January, 1964), a large number of requests have been received for copies of the two documents submitted to the conference by the International Amateur Radio Union. Since copies of these documents, bearing conference numbers 84 and 107 (Revision 2), are no longer generally available, *CQ* has decided to reprint them in their entirety in this column so that radio amateurs can become more familiar with the very important role being played by the IARU in the field of amateur radio space communications.

Following is the text of Document 107 (Revision 2), entitled "Memorandum On Amateur Experimental Space Satellite Activity," as submitted to the conference by the IARU. The text of Document 84 will appear in next month's column.

The International Amateur Radio Union, with 60 affiliated national societies, represents more than 500,000 radio amateurs throughout the world.

Radio amateurs have an interest in the furtherance of world peace and form a world-wide brotherhood of friendship which is unique. Its activities are open to all who are qualified and desire to participate. It is a body of people concerned in the pursuit of scientific knowledge for their own and radio's sake.

The orbiting of Sputnik in October, 1957, and its radio reception and tracking by thousands of radio amateurs, created initial enthusiasm and interest in learning about the combined scientific fields of electronics and space.

On their own time and at their own expense, a group of amateurs in the USA designed, constructed, and obtained launch permission for the Oscar I and II satellites. Using 145 mc in the exclusive amateur band 144-146 mc, the Oscar beacon transmitters were heard and tracked by thousands of radio amateurs throughout the world, alerted through IARU coordination. In most cases reception was accomplished with the very simplest equipment. Those with more advanced apparatus cooperated in Doppler measurements and charting of the Oscar orbit. Results of the experiments were published in many amateur magazines, and are being studied by many radio engineers throughout the world.

Discussions are now taking place between member societies of IARU with the obective of building additional satellites as a cooperative effort. It would be their hope that all countries with launching facilities would directly assist the amateur satellite program. The following points may be helpful:

1. Amateur satellites have been built without direct government or commercial assistance except for launch. They are conceived, designed and constructed entirely by amateurs, according to environmental specifications, on a voluntary basis. In the two Oscar experiments, launch was obtained through installation as balance weight on a primary space vehicle. Once in orbit, the Oscar satellite unit was ejected by an explosive mechanism which sent Oscar on a completely separate orbit of its own, entirely independent of the primary vehicle. The tracking and issuing of orbital predictions was, therefore, also exclusively a responsibility of amateurs.

2. No frequencies outside the amateur allocations have been used in the Oscar experiments nor are they contemplated for future amateur satellite activity. All transmissions to and from the satellite are planned within exclusive world-wide amateur bands, and within presently authorized power limits.

3. Mutual interference within the amateur bands is commonplace, and results simply from the large number of stations crowded into comparatively small bands. Amateurs have never sought regulatory help to solve this general problem. Amateurs have always had interference, but such contributes to the technical developments of radio equipment and to the better use of the crowded state of the amateur bands through more selectivity in receivers and directivity of antennas.

4. Because amateur satellite experiments, like all amateur endeavors are accomplished solely through voluntary personal time and effort, and are particularly limited by the amount of personal money which can be expended, as a practical matter amateur satellites are not contemplated with a power of more than a very few watts. Thus it is the satellite itself, rather than routine terrestrial amateur operation, which will need interference protection. This necessary coordination is accomplished through IARU societies working under regulations of each national administration.

5. No increase in transmitter power is contemplated by or necessary for amateur ground stations which will transmit to the satellite. Normally permitted power inputs will be used, as authorized by the amateur regulations of each administration. The use of highly-directive antennas tracking the satellite position will accomplish the necessary additional transmitting and receiving gain.

6. Amateur satellite activity will continue as a series of experiments rather than become established as a satellite "service" in the normal sense of that term. Practical limitations on power sources, particularly from the economic standpoint, indicate that the most amateurs can hope to construct is a transmitter or repeater with a life of four to five weeks.

Document No. 84 described amateur satellite activity in the 144-146 mc band. Working Group 5C has come to substantial agreement on the use of this band for further amateur space experimentation.

There are other exclusive amateur bands in which similar arrangements would seem appropriate to provide flexibility for amateur experimental satellite communication. In this connection, it is an extremely difficult technical problem to accomplish both reception and retransmission by an active repeater satellite within the 2 mc available to amateurs at 144 mc.

A particular band which would give rewarding results

*11307 Clara Street, Silver Spring, Md. 20902

Table I – Transmitting Satellites

Freq. (mc)	*Name*	*Date Launched*	*Inclination* (Degrees)	*Period* (Minutes)	*Modulation*
19.945	POLYOT 1†	Nov 1, '63	59	102	One-second dashes.
108.012	VANGUARD 1	Mar 17, '58	34	134	C.w. beacon on when in sunlight.
136.050	TELSTAR 2	May 7, '63	43	225	C.w. beacon & command telemetry.
136.077	ALOUETTE	Sep 29, '62	80	106	Command telemetry.
136.110	EXPLORER 18	Nov 27, '63	33	5666	C.w. beacon & command telemetry.
136.140	RELAY 1	Dec 13, '62	48	185	C.w. beacon & command telemetry.
136.233	TIROS 7	Jun 19, '63	58	97	C.w. beacon & command telemetry.
136.405	ARIEL	Apr 26, '62	54	101	C.w. beacon & command telemetry.
136.440	EXPLORER 14	Oct 2, '62	40	2185	C.w. beacon & command telemetry.
136.468	SYNCOM 2	Jul 26, '63	33	1436	Command telemetry.
136.592	ALOUETTE	Sep 29, '62	80	106	Command telemetry.
136.620	RELAY 1	Dec 13, '62	48	185	Command telemetry.
136.650	1963-38C	Sep 28, '63	90	107	C.w. beacon & command telemetry.
136.890	1963-30B	Jul 19, '63	88	168	C.w. beacon & command telemetry.
136.915	EXPLORER 18	Nov 27, '63	33	5666	Command telemetry.
136.979	ALOUETTE	Sep 29, '62	80	106	C.w. beacon.
136.980	SYNCOM 2	Jul 26, '63	33	1436	Command telemetry.
136.992	TIROS 7	Jun 19, '63	58	97	C.w. beacon & command telemetry.
150.00	TRANSIT 4A	Jun 29, '61	67	104	C.w. tone.
150.00	1963-22A	Jun 16, '63	90	100	C.w. beacon & command telemetry.
162	ANNA 1B	Oct 31, '62	50	108	C.w. tone.
324	ANNA 1B	Oct 31, '62	50	108	C.w. tone.
400	TRANSIT 4A	Jun 29, '61	67	100	C.w. beacon & command telemetry.
400	1963-22A	Jun 16, '63	90	104	C.w. tone.

at the present period of the sunspot cycle is that between 28 and 29.7 mc, where currently ionospheric propagation is almost non-existent. A satellite built and operated by amateurs would form the basis of a number of valuable experiments using this band in conjunction with the 144 mc band.

Thousands of individual citizens, licensed by their administrations as amateurs, are eager to learn more about and to participate in the combined scientific fields of electronics and space. They look forward to achievement of their aims!

Although the conference failed to allocate a band of frequencies for amateur radio space communications between 28 and 29.7 mc, Document 107 (Revision 2) played a very important role in the conference's final vote in favor of the 144-146 mc allocation. It also called attention to the importance of amateur radio at this high-level international conference which was attended by officials from 70 countries.

†Launched by USSR. All others launched by USA.

Transmitting Satellites

Table I (above) contains those frequencies on which space orbiting satellites could be heard as of December 31, 1963. Many of the satellites shown on the list are expected to continue to be heard when this column appears in print.

Table II (below) contains frequencies that are expected to be used on satellites that the United States plans to launch during 1964. The list is by no means complete, and some changes in frequency may be made before actual launch time. The list, however, can be used as a guide as new launches are announced.

Late OSCAR News

There's been a hold on the OSCAR-III 90-day countdown. Progress is continuing on the design of the flight package, and the one-watt linear amplifier final is completely de-bugged and ready to go. Some problems stil exist in the receiver design and in the power supply, but these appear to be well on the way to solution. At the present time it *does not* seem likely that OSCAR-III will fly *before* April 1, 1964. Next month's column will contain a more detailed report on OSCAR-III progress as well as the progress being made on OSCAR satellites being built by Project OSCAR East and the IARU European region.

73, George, W3ASK

Table II – Expected Launchings

Freq. (mc)	*Satellite Name*	*Modulation*
20.005	S-66 Ionospheric Research	Ground controlled c.w. beacon.
40.010	S-66 Ionospheric Research	Ground controlled c.w. beacon.
41.010	S-66 Ionospheric Research	Ground controlled c.w. beacon.
136.170	S-66 Ionospheric Research	C.w. beacon & command telemetry.
162.000	S-66 Ionospheric Research	Ground controlled Doppler trans.
324.000	S-66 Ionospheric Research	Ground controlled Doppler trans.
360.090	S-66 Ionospheric Research	Ground controlled Doppler trans.
136.020	ECHO 2 Communication	C.w. beacon & continuous telemetry.
136.170	ECHO 2 Communication	C.w. beacon & continuous telemetry.
136.560	S-52A-International Research	C.w. beacon & command telemetry.
136.140	RELAY 2 Communication	C.w. beacon & command telemetry.
136.620	RELAY 2 Communication	C.w. beacon & command telemetry.
136.500	NIMBUS Weather	C.w. beacon & command telemetry.
136.950	NIMBUS Weather	Continuous telemetry channel.
136.740	OSO-A Solar Observatory	C.w. beacon & command telemetry.
136.710	OSO-B Solar Observatory	Continuous telemetry channel.
136.290	OSO-C Solar Observatory	Continuous telemetry channel.
136.350	S-48 Ionos. Topside Sounder	Command telemetry.
136.680	S-48 Ionos. Topside Sounder	C.w. beacon & command telemetry.
136.860	S-55 Research	C.w. beacon & command telemetry.
136.125	S-74-C Interplanetary Probe	C.w. beacon & continuous telemetry.
136.200	OGO Geophysical Observ.	C.w. beacon, high power on command.
145.900	OSCAR 3, Amateur Radio	Repeater communication channel.
145.850	OSCAR 3, Amateur Radio	C.w. beacon & continuous telemetry.

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

WHEN we described the Taylor system of modulation in this column in Dec. 1960, we were swamped with letters. The article in this column on the modification of a surplus transmitter to Taylor modulation in Nov., 1961, brought more mail.

It seems that the a.m.'er (either not interested in s.s.b. or desiring to get as much punch out of his a.m. rig as possible) felt he should at least give the system a try—as many did with great success.

In June, 1961, we heard of the RCA Ampliphase Modulation System (a.m.s.) and appealed for information from hams "in the know" on this system. We received many replies, but after sifting the information, figured that the system is a little more complicated than it looks. For all-band ham operation the average ham would certainly run into adjustment difficulties. We therefore decided not to present the system to HAM CLINIC readers.

Recently, however, we received over a dozen letters requesting information on a.m.s. While we bow here and supply it, we still don't feel the amateur will buy much using this system.

The information that follows was compiled from a number of sources. However, we are mainly indebted to Mr. D. R. Musson of R.C.A. (the author of an original paper on a.m.s.) for the greater part of the data presented.

When one first looks at a.m.s. he is inclined to think that it is essentially a modified Taylor system, but this is not so, as you will see. A.m.s. is a variation of the "outphasing" system of modulation pioneered by Cherioux of France, a technique whereby the amplitude modulation is formed across a single capacitive element which is directly coupled to the output (antenna) system.

Examination of fig. 1 will show that a.m.s. is basically two parallel c.w. transmitters with conventional Class C amplifiers used in the final. Plate voltages remain constant and the r.f. energy is amplified by conventional means. Modulation is imposed on the low-level end of the transmitter and produces a phase shift rather than an amplitude change. The phase modulated signal (with no amplitude changes) is then processed by the Class C stages with their attendant high efficiency.

*c/o *CQ*, 300 West 43rd St., New York, N.Y. 10036.

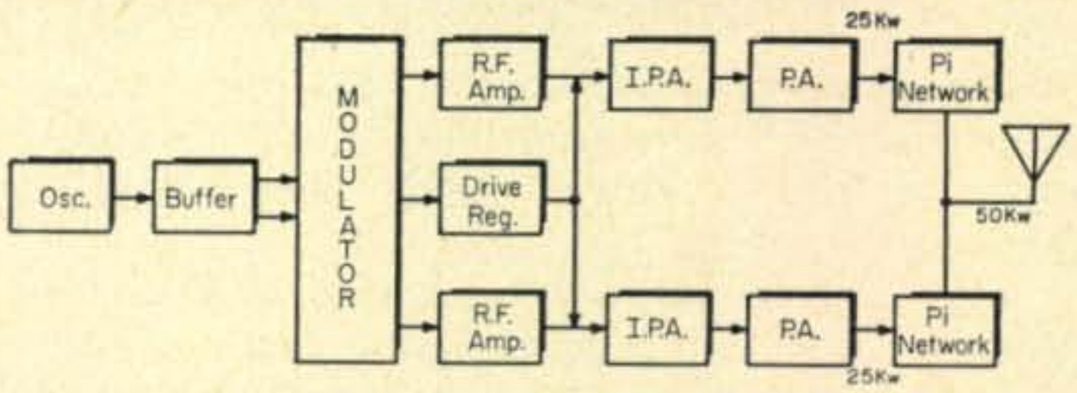


Fig. 1—Block diagram of the Ampliphase Modulation System (a.m.s.) explained in the text. Modulation is accomplished in the low level stages and little modulating power is required.

The network across which the output signal is developed is the secret of the system's success. This network is made up basically of two pi-networks, each coupling one power amplifier to the common load.

Now, if the r.f. energy from the two power amplifiers were fed in phase to the load, the network would act as a simple paralleling device used to couple two tubes to a single load. But feeding the two inputs to the network out-of-phase produces somewhat less voltage at the output than did the in-phase condition. The vector analysis of the combining signals is shown in fig. 2(A), (B) and (C). Fig. 2(A) shows the conditions with no modulation. Here, the two out of phase signals (I_1 and I_2 combine to produce I_L). The plate loads for the two output tubes for the idling condition are producing a capacitive reactance in one and inductive reactance in the other. The pi-input capacitor on the amplifier experiencing inductive reactance is increased to draw more capacitive current from the tube, thereby compensating and providing

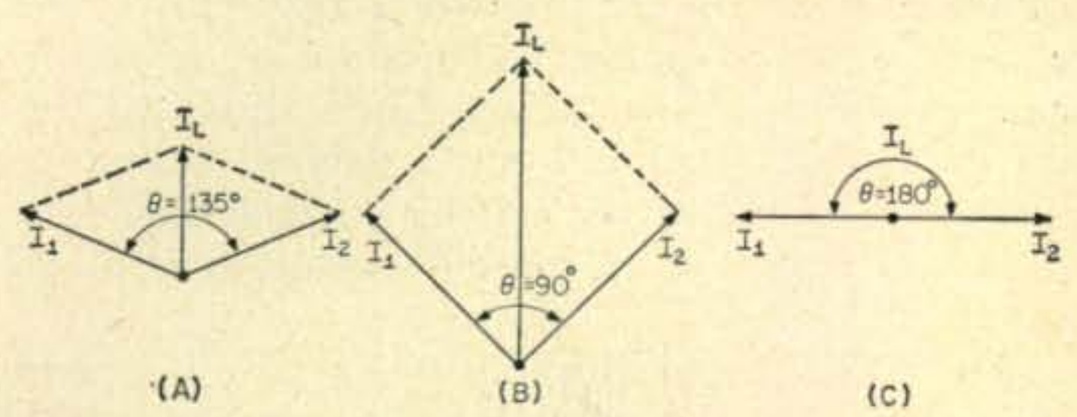


Fig. 2—Vector analysis of the phase shifts producing modulation. In (A) the unmodulated carrier produces two signals, I_1 and I_2 where Θ is 135° producing the resultant I_L. In (B), on positive modulation peaks, the phases shift to produce a Θ of 90° thus resulting in an increased I_L. Vector (C) shows the results of the negative half cycle of the modulation. Here the angle Θ is 180° and I_L is zero.

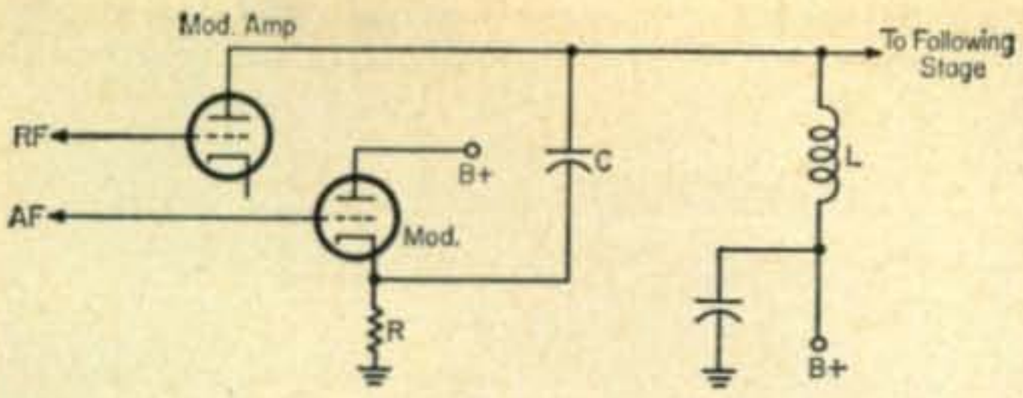


Fig. 3—Circuit of the basic phase modulator. By correctly proportioning the values of C, L and R, variation of the cathode impedance of the a.f. cathode follower causes the phase angle of the impedance to vary but not the magnitude.

the real load required for efficient operation. Likewise, on the power amplifier experiencing capacitive reactance, the input element is adjusted an equal amount in the opposite direction to provide the other contributing tube its purely resistive load at carrier level. This should be apparent from fig. 2(A).

Figure 2(B) shows the vector analysis for positive modulation peaks. Note that the angle θ (between I_1 and I_2) has been reduced and the resultant I_L is now greater thus delivering greater power to the antenna. In fig. 2(C), representing the negative modulation cycle, angle θ increases and the resulting decrease in I_L is shown.

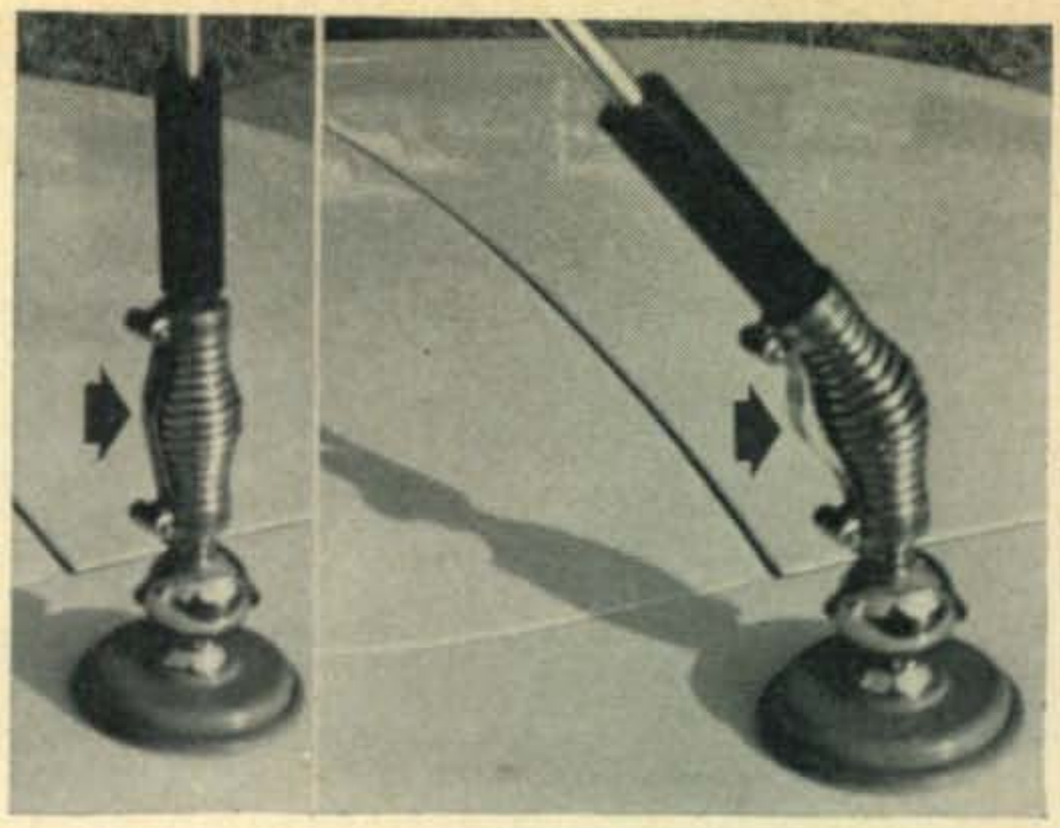
The a.m.s. system makes use of drive regulation. This provides the high value of drive necessary to the i.p.a. when the p.a. tubes are required to develop the high power levels for the positive modulating peaks and apportions drive to i.p.a. stages as the depth of the negative modulation peaks dictate. This means that the drive is very small when the load to the power amplifiers is the least real.

Phase Modulator

Figure 3 shows the basic circuit of the a.m.s. modulator. This stage is a simple tuned r.f. amplifier with the tuned load formed by a parallel resonant circuit in which a variable resistance is placed in series with the capacitive element. The inductive element is tuned so that its reactance is equal to twice the reactance of the capacitive element. At this point varying the resistance will change only the phase angle and not the magnitude of the impedance as seen by its driving tube. The resistance variation in the audio phase modulator is the cathode impedance of the audio cathode follower stage. This is the circuit in which phase modulation at an audio rate is attained. The phase modulation characteristic complemented by a given transconductance characteristic of the cathode follower produces linear phase modulation over a given range.

The Ampliphase Modulation System, it should be noted, uses a modulator that can be as effective on a 100 watt as well as a kw transmitter. Its size (within limits) has nothing to do with the size of the final.

It must be remembered that since the modulator imparts the modulation intelligence at the input of the system, and the linearity is not affected by r.f. amplification, there is no limit



Here's W2WK's ingenious idea for keeping his mobile antenna from swaying backward.

to the extent to which this information can be amplified. This is the reason that modulator "size" is not too important.

The modulator in fig. 3 was designed by RCA for m.f. operation. For operation in the high frequency band of 3 to 30 mc, however, a second type modulator called a Belaskis Phase Modulator circuit is used. In this circuit the plate resistance of the modulator is changed at an audio rate to control the amount of r.f. through the tube to be added vectorially with a fixed amount of energy fed in quadrature directly to the plate circuit. This stage produces some incidental amplitude modulation which must be removed by a limiter stage but has the advantage of requiring no tuning.

If an amateur decides to try the system, he can broadband intermediate power amplifier stages. By its nature, the system is not sensitive to unusual load impedance changes, the modulating components do not represent large investments as on high level systems and the changes of high power tube characteristics do not radically affect system linearity.

Questions

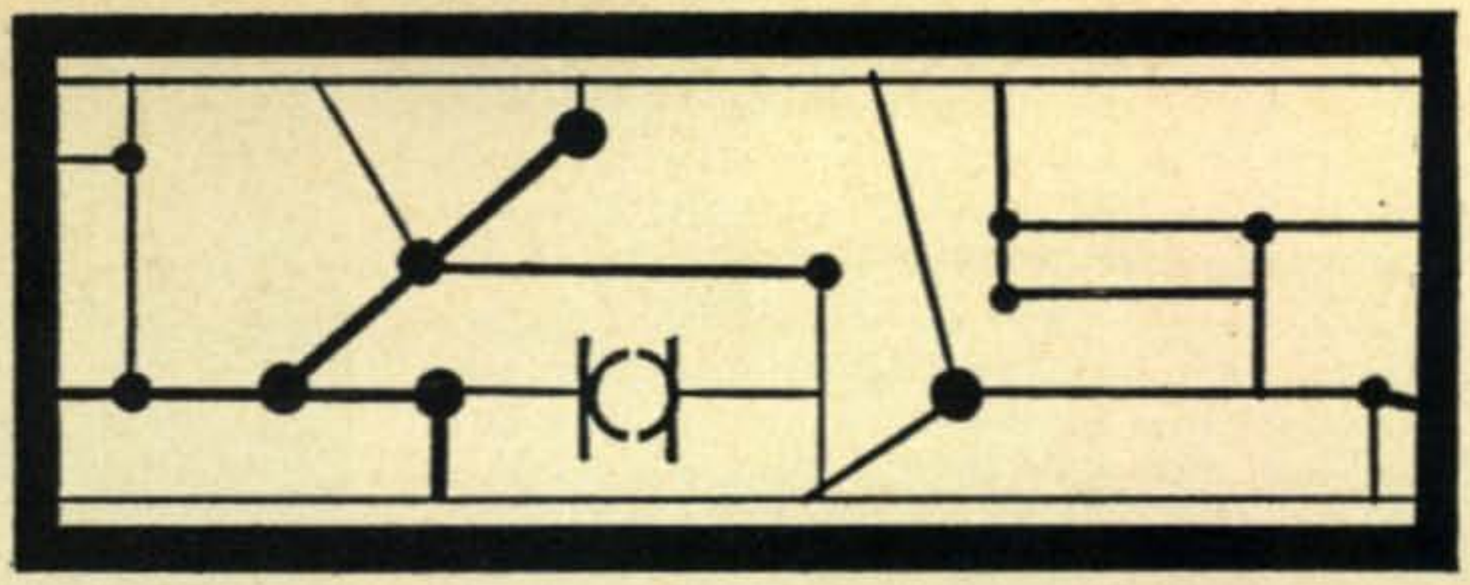
Mobile Antenna Kink—Jonathan N. Pomeranz, W2WK, of Freeport, New York, sent in a very worthwhile idea for holding his mobile vertical antenna vertical while in motion, but at the same time permitting it to be tied down when the car is garaged.

W2WK uses three stainless steel adjustable hose clamps. One is used above and one below the antenna spring, the other clamp is used between the two to give it the rigidity required. The photos show the installation. The clamps permit only forward motion of the antenna.

One drawback of the system is that when striking an underpass or tree, the antenna itself could be damaged when it does not "give." Some hams on the West Coast have solved the in-motion problem by merely slipping a stiff rubber hose *over* the spring (mount). However, I like Jonathan's idea better. Thanks for sharing your idea, W2WK!

[*Continued on page 90*]

NOVICE



WALTER G. BURDINE*, W8ZCV

ANY time that I receive ten letters on a subject I will attempt to answer them in the column for all concerned. If you have a subject that needs to be covered in this column, just sit down and write a letter. I surely won't be able to answer your question if you fail to write; I'm no mind reader. I could use some new ideas and lots of pictures and maybe we can get the Editor to give us a little more space for our column. This is not *my* column; it is *our* column, for both the Novice and Technician licensee. Are you doing your part?

A long time ago someone told me something that I've never forgotten. This came from one of the smartest people that I know and I have reason to remember it often when tuning the amateur bands today. I was told, "Never be caught in public arguing with a fool because the average passerby can't tell which is which." Think this over before you enter into some of the present controversial subjects being discussed on the air today. Unless I'm sure of my subject, I never bring up the topic. If you had to judge the worth of our hobby by some of the conversations being heard on the air, would you choose to be a ham? Our conversations can be heard by anyone with a good short-wave receiver and used against amateur radio. Are *you* a contributor to this cause? If you are going to openly discuss controversial subjects, be sure you have *all* of the facts before arguing with another fool. I am sure we can find enough to talk about without coming to name calling and some of the foul language you hear on the bands; this is not good for our public relations. Take a good listen on *all* of the presently used bands and judge for yourself.

About Amateur Licenses

I have received eleven letters within the last two months from readers who want to know how to become a radio amateur. This month we will attempt to touch on the subject briefly. In this country all radio licensing comes under the auspices of the Federal Communications Commission, 334 York Street, Gettysburg, Pennsylvania, 17325, although the tests for many amateur tickets are given through the mail by volunteer examiners. Except for General and Extra Class exams, no tests are conducted at FCC offices when they can be handled by mail.

Basically, there are four classes of FCC license available: Novice, Technician, General, and Amateur Extra. (A Conditional license, identical in structure to the General, is provided for those unable to appear in person for the test. The exam is then administered similarly to the Novice.) The Novice license is a starting place, enabling you to be a "licensed ham" while at the same time providing on-the-spot training for further amateur advancement. It will permit you to use code transmitters (75 watts maximum power input) in certain parts of three popular ham bands as well as some radiotelephone operation in the 2 meter band. Only crystal controlled transmitters are permitted (bear this in mind if you're thinking about buying equipment). There is no charge for the Novice license, but it is only available for one year and cannot be renewed.

The Technician Class license permits full amateur privileges on all amateur frequencies above 50 mc, except on two meters where the restricted Novice segment is shared. The Technician Class license necessitates a $4.00 fee for filing, but its term is five years and is renewable. The code test is similar to Novice (more on this later), but the written examination is more involved. The General license permits full privileges on all amateur bands. Written test is similar to Technician, but the code rate is 13 words per minute. There is a $4.00 filing charge, a term of five years, and it is renewable. The Amateur Extra Class ticket mentioned earlier is probably the most cherished in all hamdom. There are no special privileges attached to it, but the examination is the most demanding in the hobby, with a 20 w.p.m. code exam and a written test requiring a solid technical knowledge of radio theory and practice. It also carries the $4.00 fee, five year term and renewal option.

In countries other than the U.S. it is best to check with the postal authorities to find the name of the issuing body. The methods for obtaining the license differ from one land to another, but all require some knowledge of the International Morse Code.

Novice Class Prerequisites

Amateur radio is one of the very few areas where a federal license may be issued without regard to age, but the applicant must be a U.S.

*R.F.D. 3, Waynesville, Ohio. 45068.

citizen who has never held a previous ham ticket. Like all amateurs, the prospective Novice must pass both a code test and a written exam. He must prove an ability to send letters, numerals, (and punctuation marks) at the rate of five w.p.m. This is defined as meaning 25 characters a minute, numbers and punctuation counting two characters. You must also be able to receive at 5 w.p.m., although just five-letter word groups are sent. In both cases, send and receive, you must show at least one minute out of five of perfect work. The written examination consists of 20 multiple-choice-answer problems dealing with FCC rules and regulations and some basic electronic theory. You will not be required to draw schematic diagrams.

Learning the necessary theory and acquiring the ability to copy code at the required speed isn't simple, but it certainly is not difficult. It will require work and some of your time, but as in all things study and practice pay. I think you'll find it interesting and very rewarding. Remember: the Novice license is not given—it is *earned*.

Many pages have been written to help the person interested in becoming a ham to gain the necessary know-how. A sample test can be found in the *CQ Amateur Radio License Manual* ($2.50) while the ARRL *Handbook* can further aid you technically. *CQ* itself will prove most valuable, with its many articles on theory, construction and application of electronic circuits. Many magazines are published expressly for the radio trade and one even prints booklets for the training of the neophyte in the fundamentals of radio.

Seek out your local radio club. There you will make friends and often be able to participate in instruction classes aimed at licensing the newcomer. Practice with a friend while working on the code; the "buddy system" seldom fails.

Novice Exam Procedure

Once you feel you are ready to be tested, write to the FCC (address given earlier) and request Form 610. Unless otherwise prescribed by the Commission, exams for Novices are conducted by a volunteer who holds a General Class license or better and has reached the age of 21 years. It is now your job to find an examiner. If you don't know a ham who meets these conditions, contact your local broadcast or TV station; they invariably know of someone able to give you the test. The larger radio stores might also know of someone properly qualified. Arrange with him to take your code exam at a mutually acceptable time and place. Before you begin the test he will check Form 610 to insure that you have filled it in properly. If you successfully complete the code test, he will sign the form, attach a request for your written exam papers, and mail it off to the Commission. Within a week or so, the written exam should have arrived and again you'll have to arrange a meeting. Once the test begins, there should be no interruptions. There is no time limit on any amateur exam, although the written test will probably only take you about 20 minutes. After you have completed the written work, your volunteer examiner will return all papers to the FCC. Now there is nothing to do but wait.

"I don't believe I could have picked a more satisfying way to occupy my time. Ham radio re-establishes your sense of contact with the outside world and renews your sense of being a part of it all, particularly for anyone whose disablement confines them to the home," are the words of Technician Louis J. Sortman, WA8KPF, Dayton, Ohio, uses to describe our hobby. Louie is near blind, vision 2-400, was licensed in September and has made 296 contacts on the six meter band. He uses a Lafayette HE-45-B with a 5 element beam 22 feet high.

If you should fail, you will be informed by the FCC shortly afterwards. You can try again in 30 days, during which time you should study up on your weaker points. If you have passed, you'll receive your Novice Class license within four to five weeks. Congratulations!

When you decide to become a radio amateur, you are opening the door to the best hobby on earth. If I can be of further assistance to you, don't hesitate to write.

Letters

The following letter is typical of many received here and one that I feel should be answered. It was written by Tim Weber, WNØHNJ, 14, of 1620 Lakeside Drive, Topeka, Kansas.

"This is my first letter to a columnist. I sure do enjoy the Novice column very much. You are doing a fine job; keep it up.

"I have a few questions to ask you, so get comfortable.

"First on the agenda: why don't you have all the letters from everyone published like you did in the late fifties? The reason that I know about this is that a friend, WØTRG, gave back copies to WNØHMN and me. I really liked reading those letters from the other guys even if I know that I will probably never know or contact them. I have gotten answers to questions that have come up while putting my shack together from those letters.

"Next, why in the world can't I ever hear anything on 15 meters? Oh, every now and then I'll hear a W6, but never any DX. Maybe I'm over-anxious. Even writing about DX gets my blood a-boiling. I have a Mohawk receiver, so I'm sure my receiver is good enough. Besides, my friend, WAØBAI, fixed it for me and he

[*Continued on page 88*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

CLIFF Corne, K9EAB, the boy in an iron lung, has broken a few more records by bagging USA-CA-2000 for working stations in over 2000 U.S. counties! Cliff entered the hunt in 6th place for USA-CA-1000, then forged ahead to get USA-CA-1500 No. 1 and then USA-CA-2000 No. 1. Cliff also leads in USA-CA endorsements held which include USA-CA-500; All 7 mc; All 14 mc; All c.w.; All 2 × s.s.b. and mixed operations; USA-CA-1000 all 2 × s.s.b. and mixed.

Latest winner of USA-CA-1500 was Norman McGuire, W5NXF for No. 4. Nine hunters as shown below also bagged USA-CA-500 during November 1963.

USA-CA HONOR ROLL

2000

K9EAB 1

1500

W5NXF 4

500

K8DCR 296	VK3AXK 299	WA6MIE 302
WAØAQN 297	KØWEN 300	KØORB 303
W4WLN 298	K9PZD 301	W2KIR 304

Of the above, all were for mixed band/mode operations except W2KIR which was for all c.w., and VK3AXK which was for all 14 mc c.w. VK3AXK, Russ, also operated as VK3XK, VK3XK/7 and VK9XK.

Corrections to complete USA-CA Honor Roll, page 84, November, 1963 *CQ:* W7NNF was incorrectly listed as W7NNH, and KØOJG was listed in error.

Worked All Everything

The above title was used by K4RIN in a recent QRP Amateur Radio Club *News Letter*. Inasmuch as it refers to USA-CA in constructive presentation, it bears repeating.

"The title might well apply to the USA-CA Program which has mushroomed to an activity comparable to DXCC in nature and scope in less than three years. To someone who has never been involved with the award it seems to be a rather easy way to kill time while we are passing through the Doldrums but once you become a small part of the USA-CA Program, to many people it becomes much more interesting than DXCC ever was. USA-CA as it stands now is in infant stage as was the DXCC program about 1948; and for this reason, *now* is the time to begin hunting counties. Even if you started now with less than 500 counties it would be almost impossible to catch up with or even pass the leaders.

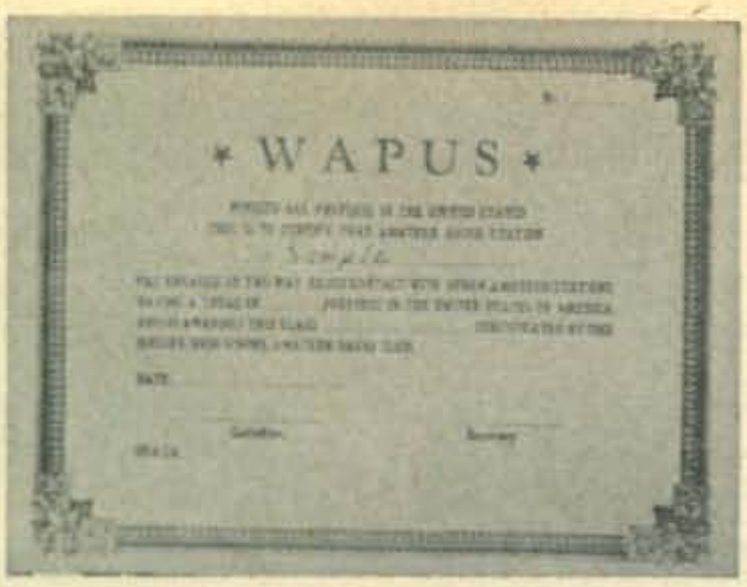
"The best way to begin the program is to take stock of what you have accomplished thus far. If you have between five and ten thousand contacts since getting on the air, you will have probably worked at least 600 counties. Systematically check all of your old logs up to the present date. If you work hard you will be able to go through around 2,000 QSOs in a week. Send a QSL to all old contacts whose county you need stating the reason you want their QSL and you will stand a good chance of return. Once you have searched through your old logs, you will be ready to start hunting new counties. Here again, follow basic DXCC rules and procedures —listen, listen, listen. There are also a few other basic rules to follow which will dawn on you sooner or later:

"1—Never call a CQing station until you have checked his QTH in the *Call Book* first. Working another Los Angeles County isn't going to help for USA-CA.

"2—Try to work as many bands as possible so as to come in contact with as many different

Here is the "Cotton Pickin Certificate" sponsored by the Mid-South V.H.F. Club for working members; Memphis, Tennessee, stations work 15; others work 5. No charge. 76 members. Send list to Club Secretary, Sam Hicks, WA4ISC, 3159 Wilcox Avenue, Memphis 11, Tenn.

*United States of America Counties Award Custodian, Box 385, Bonita, California 92002



WAPUS certificate pictured above means "Work All Prefixes in the U.S." It is sponsored by the Bossier High School, Bossier City, Louisiana, Amateur Radio Club, for contacts after October 20, 1963, in three classes; Class "C" for 16 prefixes; Class "B" for 32 and Class "A" for total prefixes which today is 46. Apply with GCR list and 25 cents in coin or stamps to the Club, c/o Edwin T. Shell, W5ZBC, Coleman Drive, Bossier City, La. 71010. Note the USA-CA in lower left-hand corner . . . we asked the significance and Edwin said the club was so solidly behind USA-CA that they wanted to indicate same on their award.

hams as possible.

"3—Watch the pattern as you work new counties. You will notice that you will work more new counties on some bands than on others. In my (K4RIN) section of the U.S. it seems that I work more new ones on 80 meter Novice, 15 meter fone, and 40 & 20 meter c.w., but I'm sure there's no real reason except for propagation and communication effectiveness over other bands and sub-bands.

"4—If you're trying to up your county total as quickly as possible and you have already worked most of the really populous counties, concentrate on the W4, 5 & Ø call areas. Why? A little arithmetic will show that these call areas have the most states and counties per call area than the other. Also the amateur population is less concentrated thus giving you a better chance to work a new county.

"5—Enter as many contests as possible—especially state QSO parties.

Old Man's comment: Good sound logic for effective USA-CA hunting approach. We might add a few additional pointers: (a) Cultivate known Mobileers who many times will go out of their way to help others make contacts with needed counties; (b) QSL card returns will be much higher if you state you need specific cards for named counties. During contacts consult your *Call Book* and P.O.D. No. 26 or other reference material in order conversation can be directed by your knowledge of the other fellow's county . . . with that approach the other fellow most often considers it a pleasure to be of help; (c) Always name own county during contacts and name own county on your QSL; (d) Show an interest in the other fellow's area of QTH over and above need for his QSL, and not only promise him a QSL but promptly send one.

Remember always that USA-CA is a good-will public relations program to help you learn more about your own country and meet new friends throughout all the fifty states . . . plus some painless Geography.

ARRL Delta Convention Boycott

Amazing but true . . . only 239 persons registered at the ARRL Delta Division Convention held at Lafayette, Louisiana, November 30-December 1, 1963. Of these 239, only 60 showed up at the ARRL RM-499 Forum and toward the end when League officials began pitch for building funds, only 12 persons remained in the hall.

What happened? We were there to report on this convention. The answers were obvious without specially seeking them. The Division had held a six-way election for Director. Only *one* candidate took a stand opposing the League's RM-499 petition to the FCC. He won!

Originally (before ARRL Bulletin 917 and RM-499) the Delta Convention expected upwards to 1,500 attendance. As resentment generated toward the League, estimates were lowered to 750; however, as it turned out, folks just stayed home in a mass boycott.

Had a nice talk with the newly elected Director of the Delta Division, Phil Spencer, W5LDH, an attorney from New Orleans. Our estimate of Mr. Spencer is that if he disagrees with other Directors, and he already has on the incentive license deal, there will be a "minority" report in *QST* rather than the past several year's reported 16 to 0 Director's votes on all controversial matters.

Had a lot of fun both in New Orleans and Lafayette . . . met many friends . . . attended SSB'ers Board of Director's meeting, and swung via Arkansas to visit kin folks . . . we were born in Louisiana and, as we say, "raised" in Arkansas and the Navy. Yes Mam, thank ya Mam, was a trip we will long remember.

Go West Young Man

Each year the population center of the U.S. shifts West but it takes ten years before the center of population of the U.S. is officially moved.

As of today, the population center of the U.S. as determined by computers is fixed by a Government stone marker on a farm owned by a Mr. Klienbocker, located 6½ miles northwest of the town of Centralia, Illinois. The stone was placed there in 1960 on basis of our ten-year

This is the "Population Center of the United States, 1960-1970" award for working stations in Centralia, Illinois. See text for story about this award which has only a ten-year life.

U.S. census and we won't know where the next stone will be placed to the West until 1970.

Because of Centralia's close proximity to the center of U.S. population, the town has claimed the title "Population Center of the U.S." and this is even part of the local Post Office's cancellation stamp. Also, most maps designate this QTH by appropriate title.

What's all this to do with ham radio? A natural; the Centralia ARC sponsors an award for working the population center of the U.S. with contacts after January 1, 1960 and effective until 1970 when another census changes the situation. To get the award, stations in Illinois, Indiana, Missouri, Kentucky and Tennessee work five; rest of U.S. except KL and KH work 4; DX, KH and KL work 2. Award is free to non W/K stations. Send log data only and 50¢ to Club, c/o Ken Bauer, W9WGO, Rte 1, Centralia, Illinois. (See picture of award which has gold borders and background.)

Pictured above is Nevada 1864-1964 Centennial Certificate by the State of Nevada for contacting five Nevada stations during 1964. Nevada hams will use a special silver QSL in honor of the celebration. Send GCR (list certified by two other hams) to Nevada State Centennial Amateur Radio Committee, P.O. Box 2534, Reno, Nevada. No charge.

North of the Arctic Circle

The Norwegian Radio Relay League issues the Worked All LA (WALA) award for contacting 20 different LA stations at least 6 of which are north of the Arctic Circle. Contacts after January 1, 1950. Stations in OZ, OH, SM and LA must contact the 20 on at least 2 bands and such must represent 20 different counties. Send list, QSLs and 10 IRC to NRRL, P.O. Box 898, Oslo, Norway.

Our story switches to the NRRL Club in Harstad, Norway, with 30 members eager to give those "6 contacts north of the Arctic Circle." Club station call is LA1H which has logged over 6,000 QSOs in 1963 alone 20% of which are with W/Ks and seeking new counties for the USA-CA.

It has come to our attention that the fellows of the Harstad Radio Club need a bit of help in starting a ham library. We have mailed them a gift *Directory* and a few other items. We will see that they get a late *Call Book* and a P.O.D. No. 26. Here is another worthy good-will action folks . . . those radio books and magazines you have collecting dust, why not send them up to the Arctic boys . . . please do. Send gifts to Harstad Radio Club, P.O. Box 263, Harstad, Norway.

Above "cheese cake" award by Puget Sound YL Coffee Net (club) for working seven members on 6 meters only and with requirement QSO must last at least 15 minutes. Stations 100 miles or more distant work only 3. Send list and 25 cents to Custodian, Milly Mowry, K7QNG, 4514 So. Juneau St., Seattle, Wash. 98118.

Emergency Flying Medical Corps

The Certificate Hunters' Club, announces formation of the Emergency Flying Medical Corps, EFMC, organized to provide free medical supplies and transport and delivery of same to any stricken area or person anywhere in the world where such services are otherwise unobtainable.

CHC now has close to 1,200 members representing all 50 U.S. States and 150 countries. CHC now has 26 chapters with additional forming. The Doctors CHC Chapter 24 will take a leading part in EFMC operations.

The Flying Hams' Club, now with 750 members worldwide, will join with CHC in EFMC operations and services. The FHC/CHC Chapter 16 (worldwide) whose members are both CHCers and FHCers will take leading part in EFMC activities.

As reported in last month's column, the YL International SSB'ers, Inc., operates a worldwide Emergency Communication System seven days a week. See January column for greater details. By mutual agreement between the three independent organizations, SSB'ers, CHC and FHC, all EFMC communications will be conducted under the master control of the SSB'ERS Communication System with primary operational frequency on 14331 kc.

For further information on the EFMC, CHC or FHC, send s.a.s.e. to K6BX. For further information on the SSB'ers, send s.a.s.e. to K4ICA, 428 S.W. 28th Road, Miami 36, Florida.

What's Cooking Department

Pantry is full of goodies being cooked up and on which we will report as they get done "brown." Just remember there are upwards of 1,000 amateur radio and several hundred s.w.l. awards listed in the *Directory*. We couldn't possibly report on all of them in this column, so for further awards information, send along an s.a.s.e. to the

Old Man, K6BX

RTTY

BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

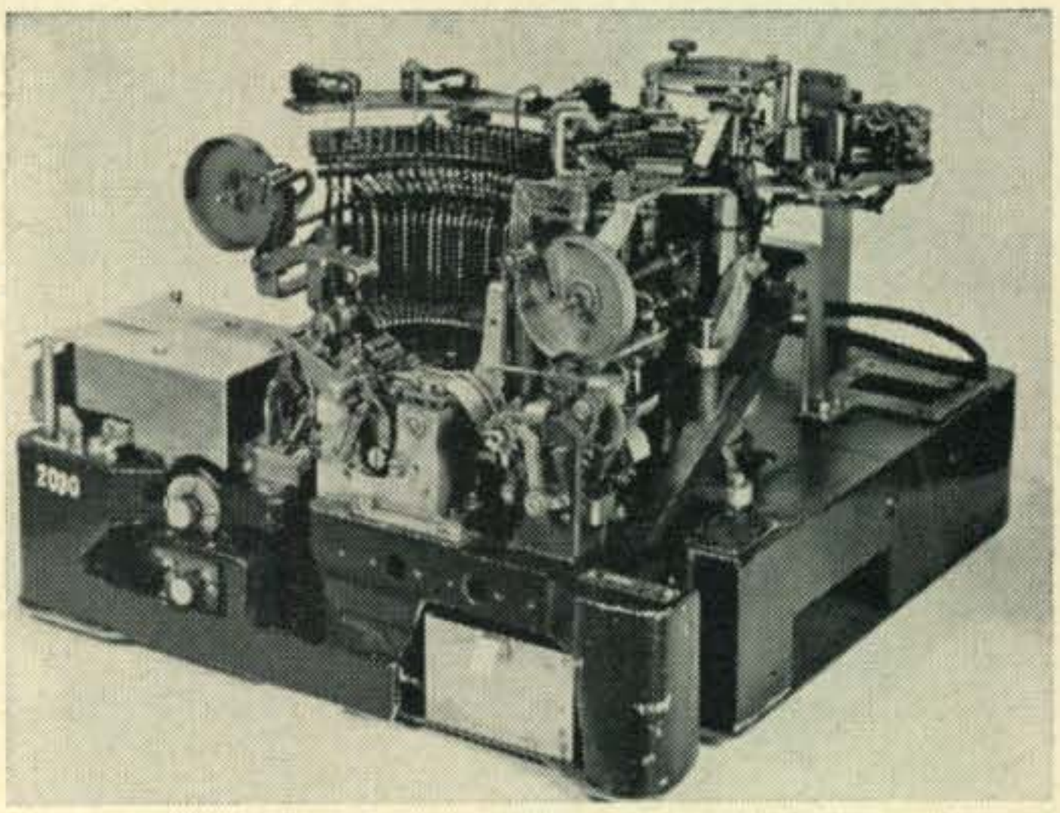
Nets centered on frequencies given; operation usually ± 10 kc on h.f.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.60 mc
2 meters	146.70 mc

TELETYPE tape equipment in use at amateur radioteletype stations equipped for this high speed (60 w.p.m.) operation most likely is of the Model 14 variety. The popular combination is the Model 14 Typing Reperforator and the separate Model 14 Transmitter-Distributor (TD). If the Typing Reperforator is equipped with the optional keyboard, an "answer" tape can be punched and stored in a loop while the fellow you are working is being copied on the regular station page printer. The tape, then, is inserted into the TD, ready for high speed transmission at the flick of a switch.

The above combination has only one operational drawback. That is the unavoidable physical necessity for about one foot of tape between the last character punched and the sensing pins of the TD. As the result, it is therefore necessary to perforate a long string of "blanks" after the last character of the message, otherwise the "taut-tape" switch on the TD stops transmission some place in the middle of the message.

*431 Woodbury Road, Huntington, N.Y. 11743



Inside the FRXD9. The tape reel has been removed.

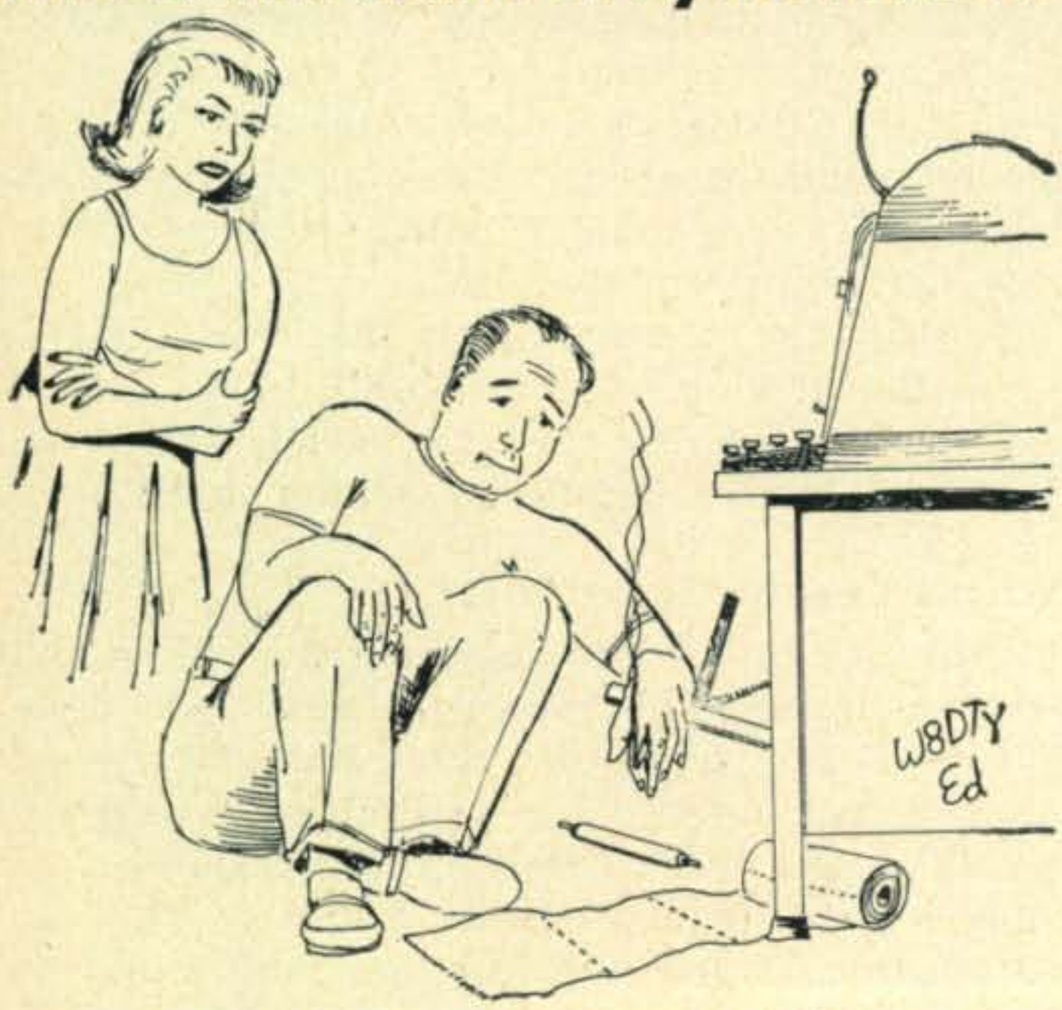
For ordinary RTTY operation the limitation described above is not too important. For high volume message handling, however, the string of blanks required is a bother. Much more efficient message handling can be accomplished by using another type of machine, the "FRXD," which combines the features of the reperforator and the TD into a one-motor device with the very special ability to transmit right up to, and including, the last character punched.

The FRXD Reperforator Transmitter Distributor

The FRXD machine has recently become available because of the phasing-out of 60 w.p.m.-only equipment in various teleprinter communication systems, such as those used by airlines, railroads, *etc.* The FRXD was used with semi-automatic message routing gear, which explains the electrical separation of the transmitter and distributor circuits, and the auxiliary contacts on certain characters in one version. No provision for a keyboard is included, by the way.

This unit is unique. Like the separate typing reperforator and TD combination, perforated tape is stored in the form of a loop to accommodate any necessary delay in transmission; how-

RTTY The Hard Way...No. 29



"I don't care about your 'emergency', and I want my paper toweling back!"

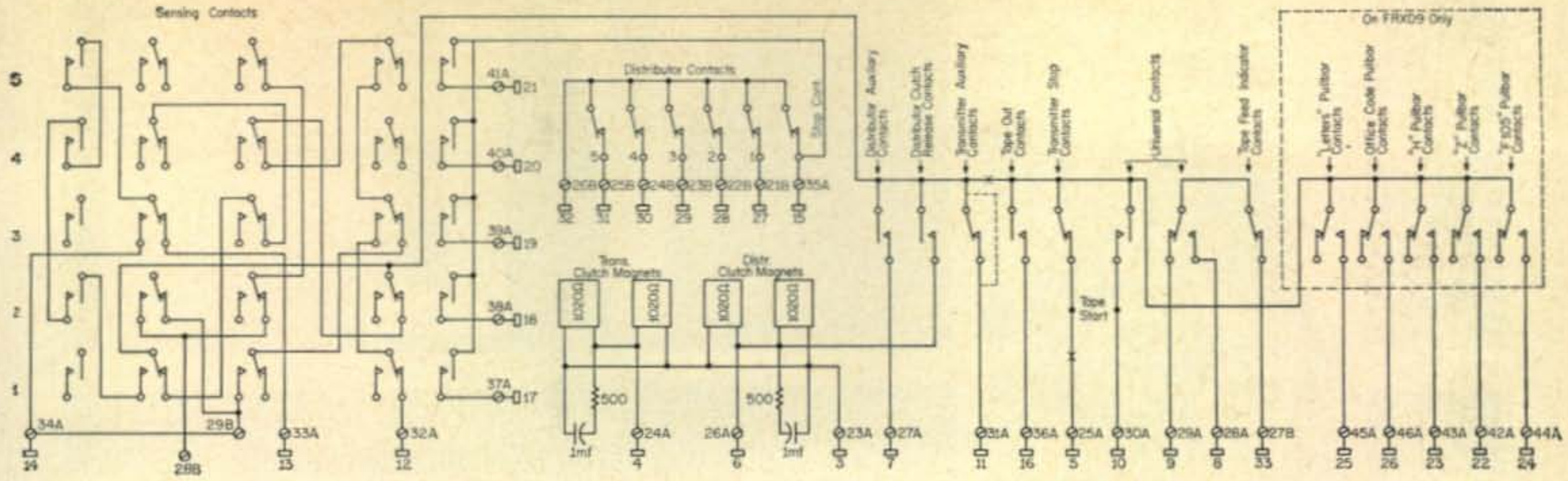


Fig. 1—Schematic diagram of FRXD reperforator transmitter distributor.

ever, unlike the above combination, the last character punched may be immediately transmitted. (There is no necessity to punch a series of blanks.) This is accomplished by means of a pivoted tape transmitter which moves along the tape, as it becomes taut, until it reaches a position one character away from the one in the punch block at that instant. Sometimes the pivoted tape transmitter is called the "climbing monkey" by Teletype repairmen.

Actually the FRXD machines are also part of the Model 14 series. Various versions include the FRXD3, FRXD4, FRXD9, FRXD10, and FRXD5 (Bell 14E). The FRXD-3 has a *non-typing* reperforator while the others have *typing* reperforators. The FRXD10 seems to be mechanically similar to the FRXD4 except that the MOTOR ON and TAPE START switches on the front of the base casting are missing. (The holes are there.) The FRXD9 is similar to the FRXD10 except that pull-bar operated auxiliary contacts are provided. Little information is available on the FRXD5 except Adjustments, which are described in Teletype Bulletin No. 193. Issue 1 is dated April, 1945.

Connections

Figure 1 is the schematic diagram of the FRXD9 or FRXD10. Rather than recabling the unit it is suggested that a *Cinch-Jones* S-333-CCT female plug or S-333-AB socket be obtained; and, jumpers and connections made thusly:

Step 1—Install the following jumpers: 21 to 31, 20 to 30, 19 to 29, 18 to 28, 17 to 27, 8 to 9.

Step 2—Install 1000-ohm, 10-watt, resistors:

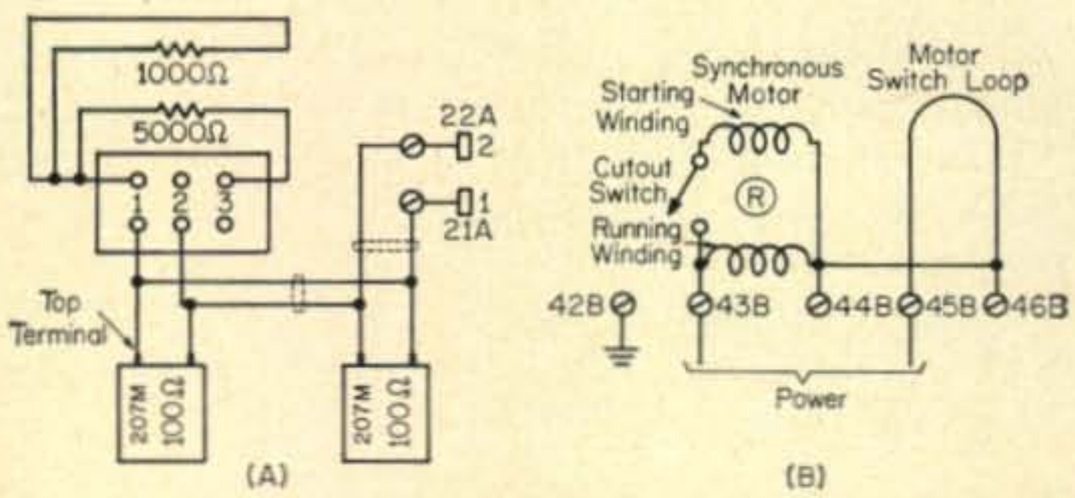


Fig. 2—(A) FRXD selector magnet circuit shown wired for parallel operation. For series operation move the black wire to terminal 2 and the red wire to terminal 3. (B) FRXD motor circuit.

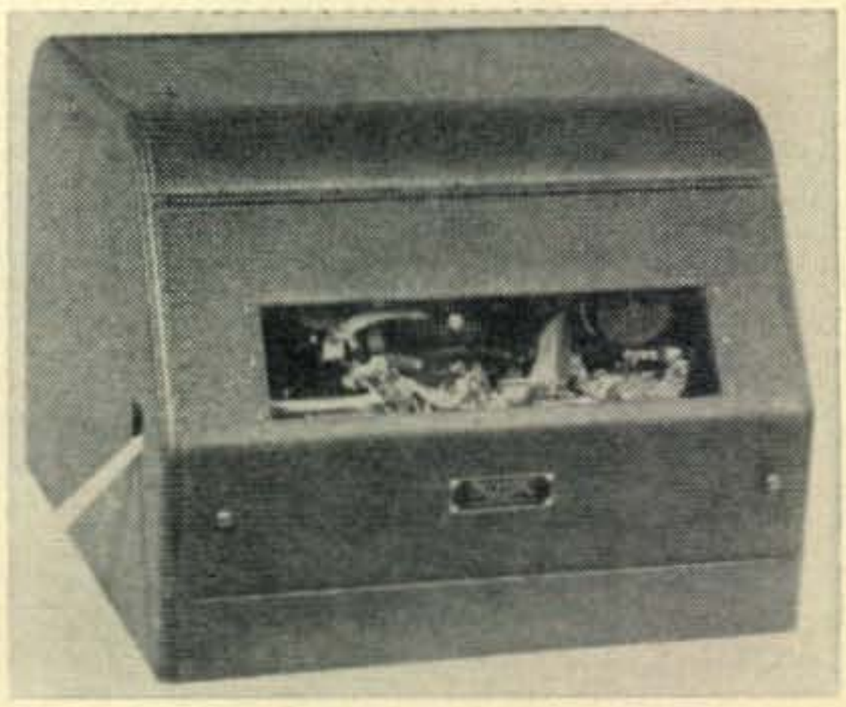
Step 3—Break connection between TRANSMITTER AUXILIARY CONTACTS and TAPE OUT CONTACTS, as marked "X" on diagram. Connect a jumper across the TRANSMITTER AUXILIARY CONTACTS. This contact is underneath the transmitter unit located closest to the front casting.

Step 4—The TD output connections are made to 15 and 32. The receiving selector magnet connections are made to pins 1 and and 2. (Note that the selector magnets may be connected either in series for 20 ma or in parallel for 60 ma.) 120-volt d.c. power goes to 3 (plus) and 5 (negative).

If you have an FRXD9 or FRXD10, a motor switch and a tape start switch may be installed in the two holes on the front of the base. Wiring loops should be located next to the holes. Cut the loops and install a switch in series with each loop. This wiring makes active the TAPE FEED INDICATOR CONTACTS (which open on tight tape) and the TRANSMITTER STOP CONTACTS (which open when the climbing head reads the last row of holes). Opening of either of these contacts will interrupt the circuit to the transmitter clutches. The TAPE OUT CONTACTS close when tape runs out so a relay would have to be used to stop the machine.

Thanks go to J. Thomsen W9YVP for the supply of the schematic, the jumper information, and the fine photo of the innards of his machine. Should Teletype bulletins be available, No. 191 is the Description for the FRXD3 and FRXD4, No. 178 is the Adjustments for the FRXD3 and 11 to 9, 4 to 9.

[*Continued on page 104*]



Reperforator transmitter distributor with cover (typing FRXD4).

YL

LOUISA B. SANDO*, W5RZJ

Rules 15th Annual YL-OM Contest

TIME: Phone—Sat. Feb. 29, 1964—1300 EST to Sun. March 1, 1964—2400 EST. C.W.—Sat. March 14, 1964—1300 EST to Sun. March 15, 1964—2400 EST.
ELIGIBILITY: All licensed OM, YL, and XYL operators throughout the world are invited to participate.
OPERATION: All bands may be used. Cross band operation is not permitted.
PROCEDURE: OMs call "CQ YL"—YLs call "CQ OM"
EXCHANGE: QSO number, RS or RST report, ARRL section or country. Entries in log should also show band worked at time of contact, time, date, transmitter and power. (ARRL section list available for s.a.s.e. to V.P.)
SCORING: A. Phone and c.w. contacts will be scored as separate contests. Submit separate logs.

B. One point is earned for each station worked, YL to OM or OM to YL. A station may be contacted no more than once in each contest for credit.

C. Multiply the number of QSOs by the number of different ARRL sections and countries worked.

D. Contestants running 150 watts input or less at all times may multiply the result of (c) by 1.25 (low-power multiplier).

E. S.s.b. contestants running 300 watts p.e.p. or less at all times may multiply the results of (c) by 1.25 (low-power multiplier).
LOGS: Copies of all phone and c.w. logs, *showing claimed scores* and *signed* by operator must be postmarked not later than March 31, 1963, and received no later than April 11, 1964, or they will be disqualified. Please file separate logs for each section of contest. Send copies of logs to: Martha Edwards, W6QYL, 44303 North Date Ave., Lancaster, Calif.
AWARDS: 1st place phone: YL Cup, OM Cup; 1st place c.w.: YL Cup, OM Cup. The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to high place c.w. and phone winners in each *district* and country.

No logs will be returned. Be sure it is a *copy* of your log sent for confirmation.

WE often wonder how some gals can accomplish so much, while others of us, well. . . . Interests and accomplishments galore surround Joyce Wright, WA6YSD. She came up with her Novice ticket in April '62, at age 11, and General that Sept. with help from WA6TGC on theory, and her dad on code. Her whole family took up the hobby, with her dad becoming a Novice in Feb. '62 and General, WA6VUT, in June, while mom, Anne, became WN6COP that Dec. and is working on her General. They use a Valiant, Drake 2B and a dipole, and operate 10 through 80.

This is only the beginning—most of Joyce's time is spent with music. She plays piano and organ and also is studying cello. She is organist for a West Pomona church and plays for each Sunday service. She also is piano accompanist for her 7th grade orchestra. Next among her hobbies comes swimming and other outdoor sports. Joyce also is fond of animals and has two Chihuahua dogs, a cat, parrakeet and a box turtle.

Congrats, Joyce—you surely provide inspiration for all of us!

*4417 Eleventh St., N.W. Albuquerque, New Mexico. 87107.

Joyce Wright, WA6YSD, active on the air since 1962 at age 11, also plays the organ and piano and has a number of other hobbies.

California YL Funfest

All YLs are invited to the 1964 Calif. Funfest to be held March 6-7 at Sacramento. This coincides with Sacramento's annual Camellia Festival. Hostess club—Camellia Capital Chirps. Convention Hq.—Mansion Inn, where both the YL luncheon and YL/OM banquet will be held. "Goodies" include a certificate for a hand-knitted call-letter sweater, card file of recipes from YLs all over the world, etc. For details write K6DLL, Marcia Rast, 10466 Nieretto Ct., Rancho Cordova, Calif.

YL-OM Contest

The 1964 YL-OM Contest, sponsored by YLRL, will be held Feb. 29-Mar. 1 for phone,

[*Continued on page 105*]

VHF AMATEUR

Vol. 6, No. 2—Feb., 1964

BOB BROWN, K2ZSQ

LAST night I stopped in the Post Office," writes Armand F. Jones, K2UJX, "and found the December *CQ* awaiting me. As soon as I got home, I immediately opened the magazine to the VHF editorial.

"I am still so stunned by what I read that I am unable to think coherently on the subject, but the magnitude of the implications contained therein impells me to write you forthwith.

"In spite of all the 'talk' at ARRL, it has taken someone like you to call this situation to our attention. I saw nothing in *QST* on this in its December issue, although in all fairness I may have overlooked it. It is too bad that in *CQ* it was relegated to the VHF editorial. It deserves the most circulation possible.

"I have mentioned nothing of the actual events described therein. I believe that my failure to do so eloquently expresses my feelings. One phrase in your editorial sticks in my mind, *Public Service*. I think if ARRL and others who are advocating 'incentive' licensing would concentrate on public service by the amateur and adherence to existing regulations, there would be no necessity for incentive licensing . . . No non-amateur group is going to care a darn about how much a fellow knows, but they may well listen to what he does when they come in to grab for frequencies. This part has been almost completely overlooked.

"Perhaps after I have had time to calm down I shall write you further concerning my views on the 'meat' contained in your editorial. I can conceive of some motor vehicle commissioner revoking a driver's license because he does not approve of the driver's color, race, religion or occupation. This is simply carrying the implications in your editorial to a logical (?) conclusion."

More Reader Reaction

WØCVU—I never thought such a thing was possible in these United States . . . but it finally *did* happen to K3IOP. This is a case which concerns *every* American amateur.

W5CA—I deplore that such an event could happen in this country. I am afraid that it only deepens my belief that we are headed into something less than the American Way we all love and have enjoyed for so long. I, for one, intend to take action . . .

WA4DXP—All I can say is "Bravo." If your editorial were in story form, it wouldn't be believed. Seems to be no doubt that Butch was in the right, but then there's the problem that "might often makes right." Still . . . it's a basic premise to the democratic way of life that even if a thousand people say a thing is right and only one person says it is not right—that one person should be *respected* for what he believes is right, not have stones thrown at the house.

W2COT (in a letter to K3IOP)—250,000 federally licensed amateurs are behind you in your justified defense . . .

K3RLR/1—After reading your fine editorial in Dec. *CQ*, I am really disgusted with the FCC, two-bit Pa. politicians, sorry newspapers, etc. . . .

W6LXL—How can the FCC hold up its head after the persecution that this young man and his family have gone through? There is much talk today of discrimination. I'm sure Butch could explain that much-used word in detail if you asked him. And how nice it was of Rep. Holland to file for local government restriction legislation. I wonder how many of Butch's "good neighbors" are voting for this . . . gentleman?

W2OQI—We'll always be in the minority of the general citizenry, so let's not trod on too many toes, or who knows? No hams . . . Seems to me that amateur radio and everyone concerned would have been better served by his QSYing to another band.

Joe Franek, Los Angeles—If there is going to be a court session, the people of Elizabeth, Pa., should go on the stand, too. Where are his rights as a U.S. citizen?

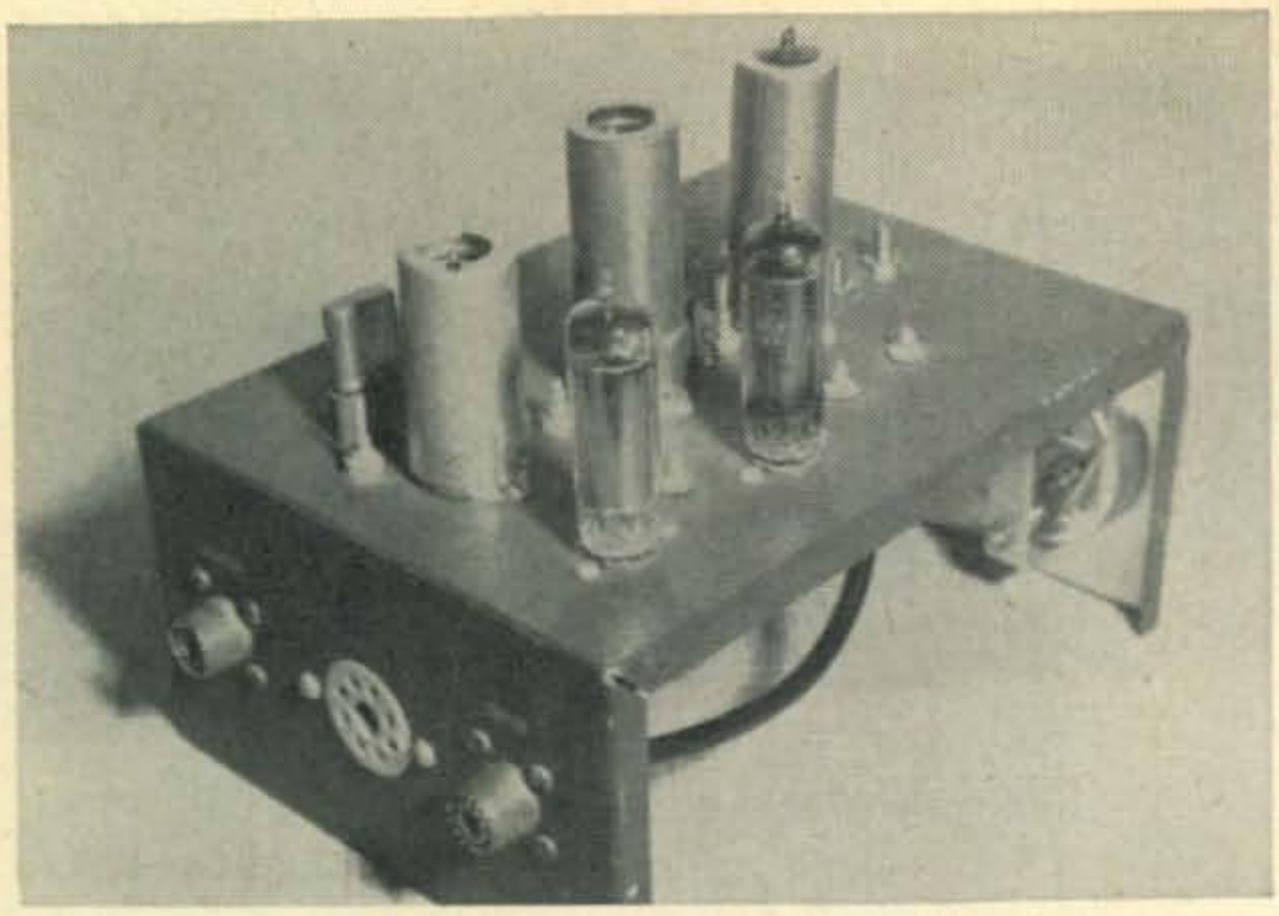
[*Continued on page 106*]

WORD has just reached us that a fund has been established by W3BWU and W3WFR to finance the legal battle for Butch Seaman, K3IOP. If you are able to help, send your contribution to:

Edward C. Lips, W3BWU
3302 Hazelhurst Avenue
Pittsburgh, Pennsylvania 15200

A donation in any amount will go a long way towards insuring the success of this effort.

Other late developments: K3IOP has changed his position from that of the previous refusal of the General Class license without six meter privileges to one of acceptance of that ticket, but with the right of appeal for six meter operation. Reason: This will at least permit him to hold a ticket until a hearing date is set by the FCC.



Rear view of the two-meter transmitting converter. Shielded tubes left to right are: 6U8, 6CL6 and 6360. The input connector is at the right. The author uses Centralab ceramic feedthrough capacitors as voltage check-points.

A Low Power S.S.B. Transmitting Converter for 144 MC.

BY VICTOR H. ZIMINSKI*, W4LIP

Tempted to try your hand at 2 meter sideband? It's easier than you may think, as evidenced by W4LIP's 3 tube transmitting converter described below.

NEW concepts and new trends are always of great interest to the ham fraternity. Something of special interest today is 50 and 144 mc single sideband. Analyzing the results obtained it is small wonder that there is an ever-increasing interest in this mode. Now we find s.s.b. playing a new role, not merely more "punch" per watt, but greater intelligibility due to inherent narrow bandwidth; apparently the narrower, the better, provided the voice range is not clipped too severly.

Circuit Description

The s.s.b. converter described here does not employ any special or hard to adjust circuits. It is truly an easy method of getting on 2 meter s.s.b. The oscillator operating on 32.5 mc is very stable. Cathode output is coupled to the pentode grid of a class A operated 6U8 for improved stability and adequately drives a 6CL6 to operate as a quadrupler to 130 mc. A 6360 push-pull mixer operates on a resultant frequency of 144-148 mc. Drive requirement is 0.45 watt. This can be easily obtained by inductively coupling the plate coil of the 6CL6 to the grid coil of the 6360 mixer. The bases of the Miller coil forms should just touch each other for proper coupling. Both coils are tuned to 130 mc, or the fourth harmonic of the crystal oscillator. Feed-thru bypass capacitors are employed which also serve as voltage check points. The octal power plug wiring and power supply requirements are identical to the P&H 600A six meter mixer, making the power supply interchangeable.

*328 N.E. 89th St., Miami, Fla.

Construction

The unit is built on a 8 × 6 × 3" Mini-box with the tubes mounted on two inch centers and the power plug mounted on the back. Bypassing should be done at the power plug and at the tube sockets, keeping the leads as short as possible. No. 14 bus wire is used for ground connectors between power plug terminals 1, 3, 5 and 7. A ground lug is placed under one hold-down nut at each tube socket to provide short ground connections. Small pieces of insulated tubing are used over the feed-thru capacitors that extend through the top of the chassis as these are also voltage check points. Use caution when voltage is applied.

Tuning Up

Tune up is accomplished by first grid dipping all coils to frequency. After applying voltage, the grid dip meter should be set for r.f. indication and loosely coupled to the oscillator plate coil. Both oscillator and pentode plate coils should be tuned for maximum 3.25 mc output. With the grid dip meter set for 130 mc, tune the 6CL6 plate coil for maximum output. With exciters of 100 watts, the 14 mc signal should be applied through a 12 db resistive pad. (The output of the Central Electronics 10A or 20A does not have to be attenuated.) The cathode

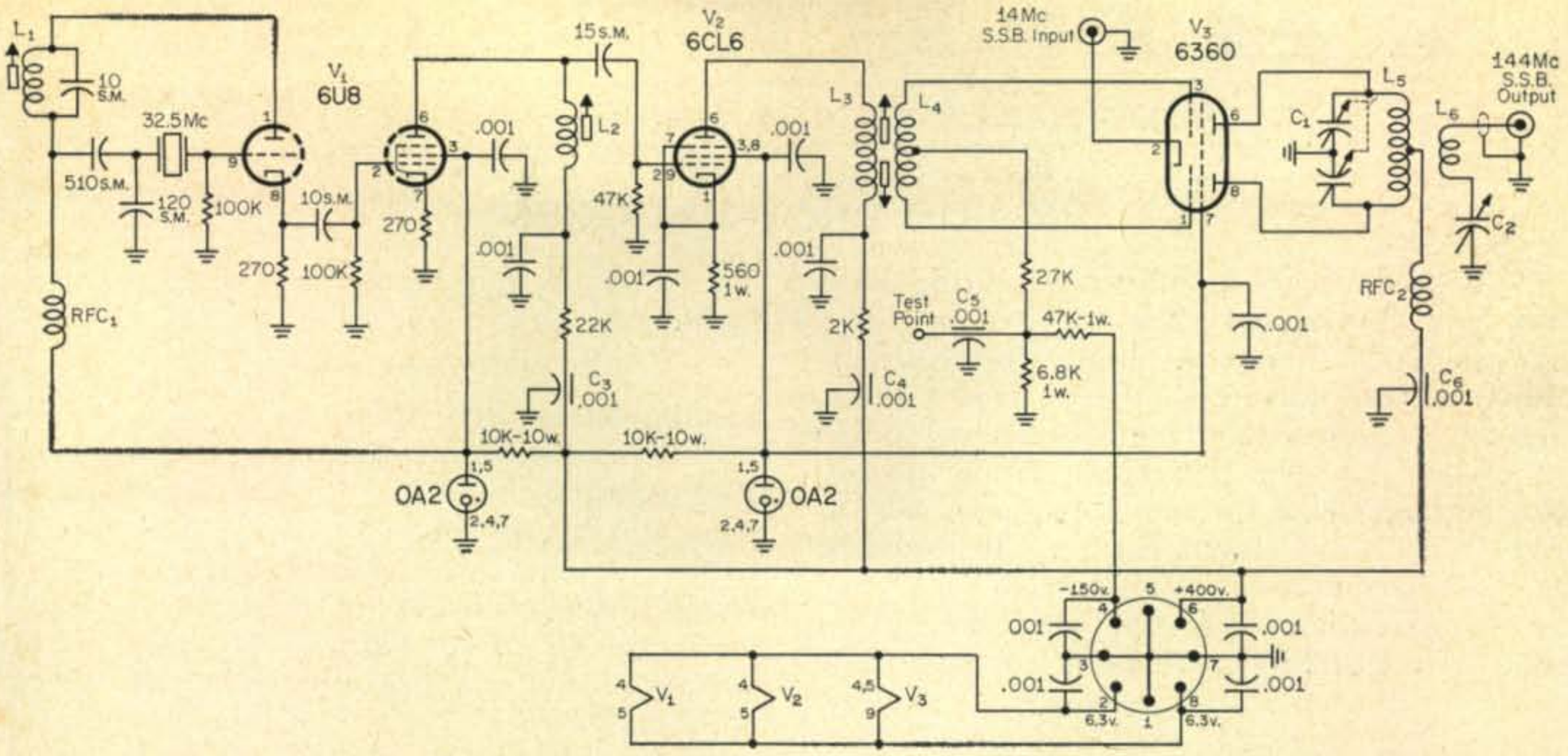


Fig. 1—Circuit of the simple, low power s.s.b. transmitting converter for two meters. All capacitors are in mmf and all resistors are ½ w. unless otherwise indicated. S.M. indicates silver mica capacitor.

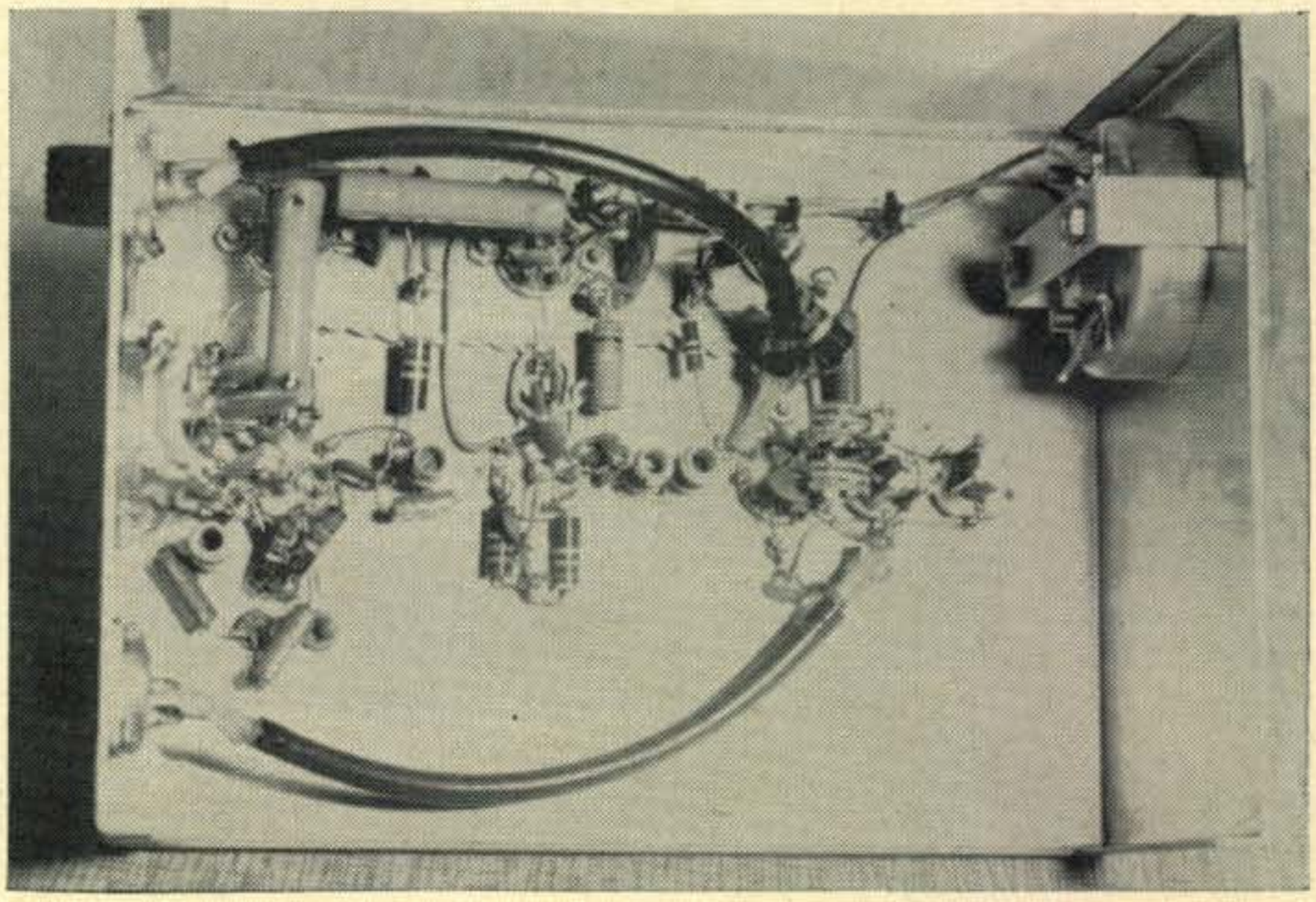
C_1—11 mmf per section miniature butterfly capacitor. E. F. Johnson 160-211.
C_2—20 mmf miniature variable. E. F. Johnson 160-110.
C_3, C_4, C_5, C_6—.001 mf 500 v. feedthrough capacitors. Centralab FT-1000.
L_1—17 t. #26 enamel on ¼" dia. slug tuned form. J. W. Miller 4500.
L_2—13 t. #26 enamel on ¼" dia. slug tuned form. J. W. Miller 4500.
L_3—4 t. #20 enamel on ¼" dia. slug tuned form. J. W. Miller 4500.
L_4—6 t. #26 enamel on ¼" dia. slug tuned form. J. W. Miller 4500.
L_5—6 t. #18 bare wire ⅜" dia. Space wire dia. with ¼" space at center. Center tapped.
L_6—3 t. #20 bare wire ⅜" dia. at center of L_5.
RFC_1—10 μh r.f. choke. J. W. Miller 4612.
RFC_2—1.8 μh r.f. choke. Ohmite Z-144.

return is through the tapped output coil of the tank circuit. Some care should be taken in keeping this lead short or the 6360 may oscillate. A good indication of correct 14 mc injection is when any further drive increase will tend to decrease the 144 mc output. The plate coil of the 6360 now can be tuned for maximum output and loaded into the antenna. The mixer has a measured output of 3 watts which is more than enough to drive a 4X250B to 500 watts.

Performance

A Johnson 6N2 Thunderbolt was driven to 600 watts using this rig as the exciter. Using a second 6360 with its cathode grounded and a 12K swamping resistor across the grids, wired the same as the mixer shown, the Thunderbolt was driven to a full kilowatt. Using a Hammarlund HX-500 and the mixer described here, the author and W4GJO (using the same type exciter and mixer) experimented using a.m., f.m., c.w. and s.s.b. under very marginal conditions. It was found that when c.w. could be copied, s.s.b. could also be copied. With the HX-500 only a small resistive pad need be used since a variable level control is provided.

The serious minded v.h.f. operator with this arrangement can work all modes at the flip of a switch. There is a new thrill in store for any who have yet to try v.h.f. s.s.b. ■



Bottom view showing parts placement and layout. The chassis is a Mini-box measuring 8" × 6" × 3".

VHF REPORT

an exclusive feature of The VHF Amateur

BY BOB BROWN*, K2ZSQ

SEEMS like every month we're hearing more and more about f.m. on six and two meters. Till recently most "funny modulation" activity was concentrated in the more rural outposts throughout the midwest and south, but of late it's been making surprising inroads into the larger east and west coast a.m. strongholds. F.m. is not always easy, but it's possibly the most inexpensive way to get on v.h.f. fast. It's characteristics are so unlike ancient modulation (a.m.) and its operational techniques fall so far from what we are accustomed that we all too often overlook this fascinating aspect of v.h.f.'ing. From all indications it appears that f.m. is undergoing a rediscovery period in many areas of the country, and for good reason. F.m.ers of New York City, Long Island and northern New Jersey recently gathered in Huntington, Long Island. The main purpose of this pizza meeting was to get acquainted with each other; to get to know personally those worked, mostly on 146.94 mc, the nationally recommended f.m. channel in the two meter band. W2JTP acted as chairman. Discussed also was the complimentary use of other channels, 52.525 and 52.64 on six meters and 146.58 as a second two meter channel. It was generally agreed that as the ultimate aim, 52.525 and 146.94 were to be utilized mainly as continuously monitored channels, with the bulk of communications carried on 52.64 and 146.58, the secondary channels. The operation of repeater stations was also discussed, and the recommendation was made that the secondary channels be kept free from control tones and high power repeater stations. It was especially urged that personal type repeater stations in favorable locations use discretion in light of the extremely large station-populated area covered.

A recent note from W8HYD/7 in Caldwell, Idaho, calls our attention to the Boise Valley F.M. Net, which meets on Sundays at 1930 MST on 145.44 mc. NC is W7CRE in Boise. "There are 40-50 hams in the area who check in regularly," Dick advises. KØVSA in Crystal, Minnesota, tells us that there are at least 70 stations in his locale with f.m. gear in operation. "A complete 60 watt output station for six or two meters can be had for about $50," Don relates.

By the way, we'd like to suggest your obtaining an *F.M. Net Directory*. This will tell you what's going on in your area, who to get in contact with, what times to listen, and on what frequencies they may be heard. For the paltry sum of 25¢ you can obtain a copy from The Tri-State College Amateur Radio Club, Angola, Indiana, 46703, while another good listing is available for the same amount from K4ZAD. If you are at all thinking about going f.m., these booklets are a must.

**The VHF Amateur*, 300 W. 43rd St., N.Y., N.Y. 10036.

Miscellaneous Tech

Low Power for 220: Shown in fig. 1 is a nifty 1¼ meter transmitter-exciter which uses 55 mc third overtone crystals (available from International Crystal for $4.40) in the 6J6 oscillator-doubler, doubles again in a 6J6 driver, and runs straight-through on 220 mc in the final. Modulation can be added with a 6AQ5-6AQ5 type configuration. The entire unit can be constructed easily enough in a 2 × 10" chassis. Remember to keep all wires as short as possible, using feedthru capacitors where indicated. Links L_7 and L_8 should not be fixed, since coupling here is quite critical and coils may need adjustment. Limit oscillator voltage to 150 v.d.c. Grid current corresponds as follows with plate voltage: 150 v., 1.1 ma. on 6360, 20 ma. on 6J6; 175 v., 1.5 ma. on 6360, 25 ma. on 6J6; 200 v., 2.0 ma. on 6360, 30 ma. on 6J6. A suitable dummy load for tune-up can be made from two 47 bulbs in series. Our thanks to W3NSI and the Mt. Airy V.H.F. Club's *Cheese Bits* for this circuit.

HE-35 Modification: Harry Graziano, K9YGR, offers an economical solution to those who use the Lafayette HE-35 and Allied Lincoln six meter transceivers with 25 mc crystals. Harry installed a Heathkit HWM-20-1 ($4.95) modification kit, designed to be used by owners of original Heath Sixers, in his Lincoln oscillator circuit. The inexpensive kit allows 8 mc operation using garden variety surplus rocks and comes complete with 6AK5 and outboard crystal socket (FT-243).

Club Notes

The Grizzly Peak VHF A.R.C. (Calif.) reports 64 members to date. Monthly meetings include technical discussions on v.h.f. techniques and well-known speakers. The famed Grizzly Peak repeater is heart of this group, providing f.m. contacts on two meters over astounding distances. Input: 146.2 mc, output: 146.8. In addition the club sports a fine monthly newsletter, *via WB6AAE*. Contact Al Christian, WA6YOB, 541 Chetwood St., Apt. 308, Oakland, for full information.

Newest member of the NYC-LI V.H.F. CHC Chapter 19 is none other than Senator Barry Goldwater, K3IUG/K7UGA. See certificate. Contact WA2SAZ for membership details.

Another thriving club is the Waukegan VHF Society of Waukegan, Illinois. Club projects include Amateur TV, RTTY and moon bounce, to name but a few. All members display an intense desire to build and operate conventional and unconventional equipment on both v.h.f. and u.h.f. bands. And *Skip*, the official organ

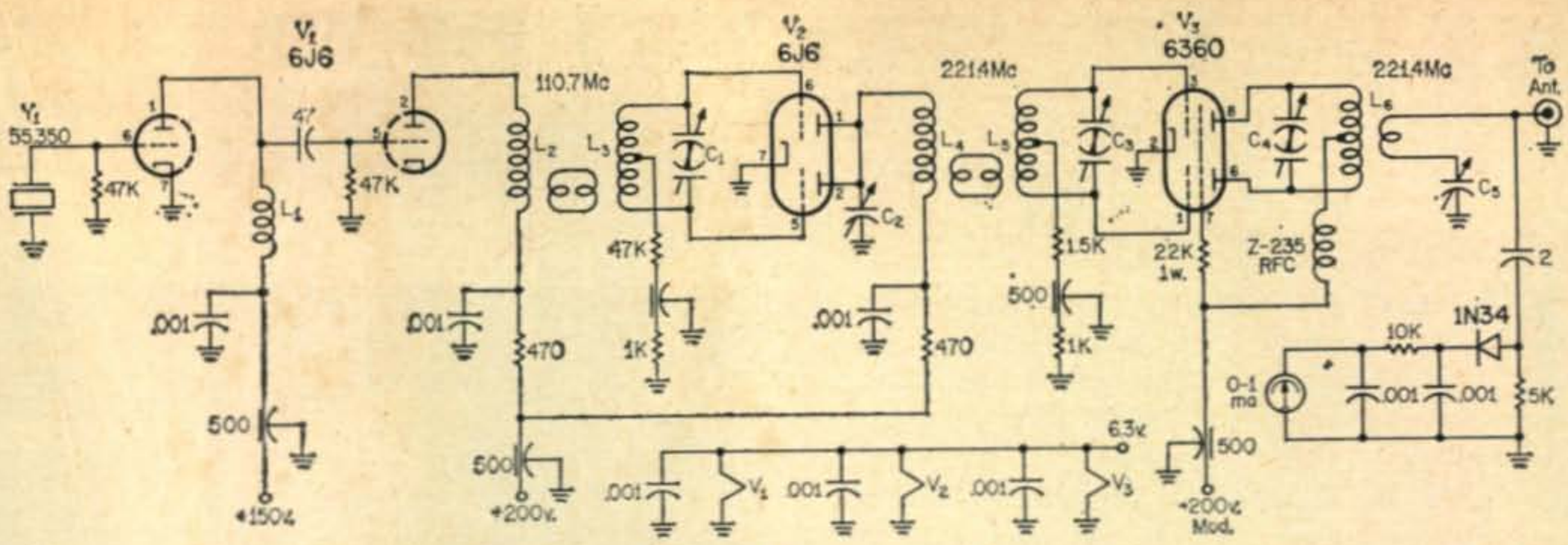


Fig. 1—Simple 220 mc transmitter-exciter employing inexpensive tubes. Doubling action in the oscillator and driver permits straight-through operation of the final. Links L_7 and L_8 are quite critical and should be constructed so that adjustment in coupling can be made. All capacitors are in mmf and all resistors are ½ watt unless otherwise stated.

$C_{1, 3, 4}$—14 mmf butterfly. Hammarlund type BFC-12.
$C_{2, 5}$—16 or 22 mmf. Hammarlund type MAC-15 or MAC-20. C_2 may have to be cut down.
L_1—10t. #24e. close wound on ⅜" iron core slug-tuned form.
L_2—6 t. #20 e. close wound on ⅜" iron core slug-tuned form. Link: 2 t. hookup wire at cold end.
L_3—8 t. #18 e. air wound ⅜" dia. Link: 1 t. hookup wire at cold end.
L_4—1 t. #18 e. air wound ⅜" dia. Link: 1 t. #18 ⅜" dia.
L_5—2 t. #18 e. air wound ⅜" dia. Link: 1 t. #18 e. ⅜" dia.
L_6—2 t. #16 e. air wound ½" dia. Link: 2 t. #18 e. ⅜" dia.
Y_1—55.350 mc third overtone crystal.

of the club, is among the finest publications of its kind. Contact W9ZGS or K9HPB for full details.

Scanning Six

The Anguilla expedition didn't work out, writes VP7CX, who had written to the fellows who were going on this DX trek. No answer received. Harold mentions that he is soliciting v.h.f. gear now to help equip the islanders for the oncoming '64 season. He advises that FM7WQ would well appreciate donations of six meter equipment, inasmuch as he lost his entire station in Hurricane *Edith*. VP7CX will soon be on six sideband with big sigs, so keep a lookout. And by the way, Harold now has 329 U.S. counties confirmed in 38 states and has joined Ohio V.H.F. CHC Chapter 14. NOTE: All QSLs for VP7CX should now go direct, *not* through W9ZDI. For future reference: HI8XAG in Santo Domingo is on 50.022 and .034, HI8RO is on 50.150 and VP2SY is on 50.060 and .063. VP5BB, VP6AQ and VP7NS are all in the process of getting 50 mc gear on now. Popular trick employed by VP7CX: Use 27 mc CB to detect strong *Es* openings, then switch to six.

KP4BPH writes of his interest in the bands above 50 mc, adding that he's doing all he can to arouse more activity in v.h.f.-u.h.f. in Puerto Rico. Ralph would appreciate skeds. LU3DCA has been spending a good deal of his time visiting v.h.f.ers in the northern hemisphere and wishes to thank everyone for their gracious hospitality. Among those visited: KP4's AAN, CK; K6HMS; W6's ABN, DNG and TNS; K7AAD and XE1's DDD and GE.

One of the biggest achievements in v.h.f. work is to try for those elusive counties. Well, with this month's mail came a one sentence line from WA2SAZ in Long Island, New York, that he now has 560 counties confirmed on 50 mc. Whew! Our hearty congratulations, Smitty! By the way, last month he received his USA-CA award for 500 counties. Wonder how long it'll take for the next 500?

In spite of the season at hand, the tropo boys are going stronger than ever. K3NXH in Baltimore worked K1MRI (Conn.) and quite a few N.Y. state stations during October. Charlie sez he contacts WB2CUD (So. Plainfield, N.J.) almost constantly now. Oh yes . . . K1ONJ (Conn.), K1OZM (R.I.), K1RYF (Mass.), K1TJS (Me.), were all snagged during a recent aurora.

Down Miami way big things are happening at K4OCK, where John recently erected four five-element 18 ft. Yagis in a quad fashion. Each antenna is separated by 18 ft. from the others. John looks like he's just the ticket for the W2

[*Continued on page 85*]

This is the NYC-LI VHF CHC Chapter 19 certificate awarded those within a 50 mile radius of NYC who work 10 members, and those over 50 miles who work 5 members. Available thru WA2SAZ, GCR and $1.00. No date limitation on contacts with members, who include WA1AKE, K2EWG, RPW, WA2EIY, MGV, PMW, PWI, SAZ, SNT, UXI, WB2BEV, CCF, FTQ, K3MPZ, UIG, WA5ECF.

UHF ROUNDUP

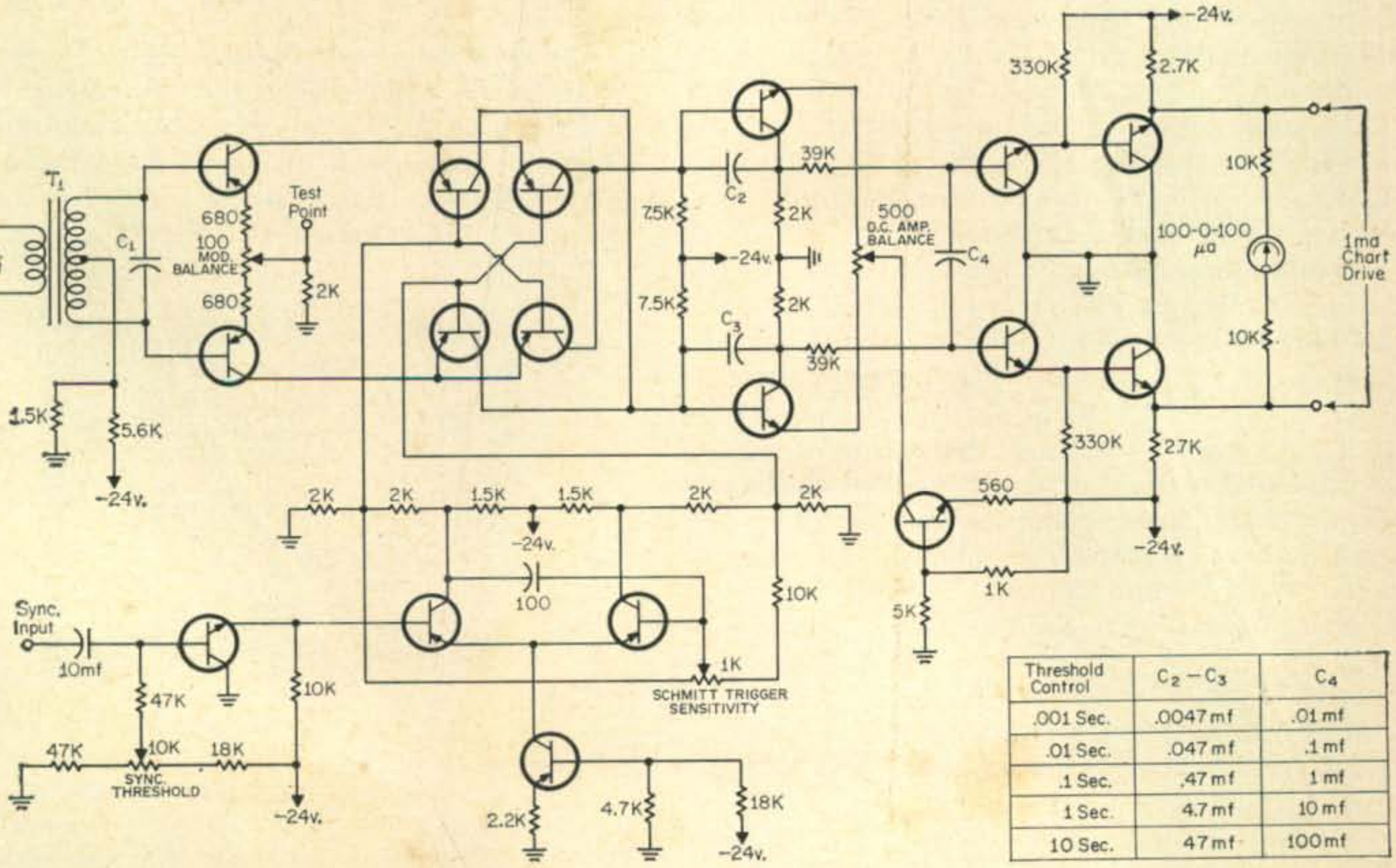
an exclusive feature of The VHF Amateur

BY ALLEN KATZ*, K2UYH

FARADAY rotation, the effect by which the polarization of a radio signal is rotated as it passes through the ionosphere, has been the demon behind the failure of many an enterprising moon bounce project. This particular little devil's power diminishes with frequency; however, on 144 or even 220 mc a signal's polarization can be rotated more than 16 times. Signals reflected from satellites are not immune to this type of loss, which could well play havoc with Oscar III. One way to get around this polarization shift is to use a cross yagi antenna. The cross yagi produces a circular polarization by mounting both the horizontal and vertical elements on the same boom. Dave Bray, K2LNG, has been doing research on this antenna. About a year ago Dave produced a bulletin of practical construction hints for 144 mc cross yagi arrays. In this bulletin Dave suggests: 1) The vertical elements should be spaced six to eight inches from the horizontal elements, with the vertical elements behind the horizontal ones. 2) When stacking, the supporting members should be non-metallic for at least three-quarters of a wave length from the boom to avoid detuning the elements. For this purpose oak closet dowel works quite well. 3) The horizontal and vertical yagis should be treated as separate antennas, with two feedlines leading to the shack. At the shack a choice can be made between horizontal, vertical, and right or left circular polarization. To obtain circular polarization the two antennas must be connected together 90 degrees out of phase. This effect occurs when one feedline is ¼ wavelength longer than the other. Experience has shown that just measuring the length of the feedline is not enough; the ¼ wavelength difference should be determined by the use of a s.w.r. bridge. Right or left handed circular polarization will be produced depending on which antenna has the longest line. Provisions should be made, by use of a phasing section, to choose between the different polarizations at will. Dave suggests right hand circular polarization be used by stations in

K7VQI's live amateur TV signals as received by K7JQJ four miles away.

*48 Cumberland Avenue, Verona, New Jersey. 07462.



Threshold Control	$C_2 - C_3$	C_4
.001 Sec.	.0047 mf	.01 mf
.01 Sec.	.047 mf	.1 mf
.1 Sec.	.47 mf	1 mf
1 Sec.	4.7 mf	10 mf
10 Sec.	47 mf	100 mf

Synchronous detector used by K2TKN for very weak signal detection. T_1 and C_1 are tuned to receiver audio output. Any signal measured at TP indicates overload at input. Medium beta transistors provide excellent operation.

the east and that left hand circular be used in the west.

More on Weak Signal Detection

We have been doing our utmost to keep you abreast of an *amateur* technical development which threatens to change the course of v.h.f.-u.h.f. history. For years we have been attempting to 0.5, 1, or possibly 3 db, yet here is a technical advancement which promises an ultimate of over 30 db. In the past we have presented the theory of "very weak signal detection" from a point of view of integration. Here is an explanation from a slightly different point of view, that of Bill Ashby, K2TKN, which arrived along with a circuit diagram of his latest system of synchronous detection shown in fig. 1:

"All systems of 'weak signal detection' are actually precise indicators of total noise power. By definition, noise is noncoherent and therefore can not be directly cancelled. But the total amount of noise in a given number of kc (measure over a long enough period of time to establish an average value) can be used to precisely balance out the total noise of an identical channel closely related in frequency. This is a fact and is the basis of all radio astronomy. Yet notice that no particular bandwidth of each channel is relative to the quality of the system (as long as they are the same). We are narrowing up the channel so that a given signal gets a reasonable chance in relation to the noise in one channel. Under conditions of good balance of average noise power, it does not take very much signal to show an unbalance, which is exactly what we want. With the crudest of equipment it is easily shown that with one VU of noise power from two adjacent channels (0.7 volts across 600 ohms), a signal 30 VU below zero VU will unbalance the bridge circuit when keyed. At 15 w.p.m. with 5% error, a loss of 3 db due to a 50% duty cycle is a small price to pay for the ability to make all noise common mode and signal the fundamental quantity to be measured. At this instant I haven't the faintest notion of which system of synchronous detection is best for amateur use, but any one of them will reliably read signals 30 db or more weaker at given location than the best standard receiver with all the narrow band gadgets in common use."

Over three years of hard work has proven the above points many times for Bill, and we must admit that we agree with them (but it took a lot of convincing). From our point of view of gain from integration, we picture the synchronous detector as an extremely effective means of gain stabilization. Variations in gain stability (known as flicker noise) do not average out as quickly as noise, and yet they do not occur as gradually as we once believed. In fact (much to our surprise) a great deal of gain variations occur around a rate of 10 c.p.s. In eliminating these gain variations synchronous detection does provide great gain. This gain is not something for

nothing; synchronous detection is increasing our efficiency to trade time for gain, and thereby give us more of the gain we deserve for a given length of time sacrificed. *Many thanks, Bill, your schematic diagram was something the fellows were waiting for.*

Activities

We received a letter from K6HEP, about his activities on 1215 mc with an APX-6 and a 12 turn right-hand circularly polarized helix. I think the letter speaks for itself. "After finishing up the conversion and calibration of an APX-6, I wanted to see how well it worked (if at all). I got in touch with K6JMK, who also has an APX-6, and we arranged a sked for November 24. Signals were 5 × 9 both ways from Millbrae to Berkeley (about 10 miles). Since the first contact was so easy we tried a longer one December 1 with K6JMK in South San Francisco and myself in Santa Clara. I received him about S5 with no problem, but he could not hear me. We plan to try again soon, after working on the equipment." *See, it can be done! There are hundreds of APX-6's all over the country in all states of conversion. Why are they not on the air? They do work! Get the 1215 ball rolling in your area. Like Randy says, "it's easy!" And you can be sure that you will hear more on this subject in the future.* Also mentioned in the letter is his desire for skeds with anyone in the area. K6HEP can operate from his home in Santa Clara, or college at Berkeley.

John, K7VQI sends a picture of his TV signals as received by John, K7JQJ, who lives about four miles away. The picture was received with a Bogen u.h.f. converter which Al says works very well, a standard TV receiver and a homebrew collinear array. At the transmitting end K7VQI was using an ART-26 transmitter and an ATJ camera. Incidentally, the picture was shot from the shack window. For receiving Al uses a homebrew converter, 7-inch Teletone TV set, and an APR-1 receiver with an REJ panadapter. K7JQJ also emits with the video on 440 mc, although not as sophistically as Al (yet). He uses a FSS (flying spot scanner) for a camera and a dual 6J6 transmitter to produce the r.f. K7VUB has also got the video bug, and is now equipped to receive ATV. *Nice to hear amateur TV is faring so well in the west. Sure hope it will be an incentive to the fellows around here.*

Vic, W5HPT, reports: "I guess the biggest news that I have to report is W5AJG getting on 432 mc sideband. His signals are very stable and easy to copy here. He has worked Houston very fine business with s.s.b. I guess this will be his mode of 432 mc operation from now on. We made a check with W5AJG where he used his mixer with a single 6J4 in the final to his antenna giving a grand total of 300 milliwatts output on a Bird watt meter. I was able to copy him 28 miles away on 432 s.s.b. Q5. This is certainly a real test of s.s.b.'s power." *S.s.b. sure does seem to be the coming thing on u.h.f., although I doubt if it will ever replace the left foot completely.* 73, Al, K2UYH

gang who are looking for a scatter comrade down south. Antenna gain is 19-20 db, 20 db down on the side lobes.

Two California kilowatts on sideband at WA6LHR in Oakland are providing reliable scatter contacts during the weekend sessions. Skeds are invited between 6-9 A.M. PST. Why not drop Mike a line?

More aurora news from W8MBH, Detroit, Michigan, who reports many solid northeast contacts on the September 20th session. Sideband is the new rage at K8REG, Dayton, Ohio. Vince sez he worked K1PBE (Mass.), K8ATM (Mich.), K9EWV (Ill.), KØABY (Iowa) and VE3CVX on two-way s.s.b. during the big Sept. auroras. On Oct. 24 and 29 K8REG made solid contacts with K9HBT (Wisc.), K9QXK (Ill.) and WA9DGZ (Wisc.). On the eleventh and thirteenth of November S9 contacts were made with VP7CX via *Es*, in addition to the statesiders. Am convinced Vince has a pipeline to the Bahamas. Regardless of conditions elsewhere K8REG works VP7CX at least once a month. A fb two-way sideband QSO was made between W3AUG in Silver Spring, Md., and W8NJP, Detroit, on November 15.

WA9AZO caught the October 15 *E* opening to the east, lucky boy. This was a real shorty that was in and out for a few minutes at 11 P.M. DST. Attention Chicago sidebanders! K9KGI sends word of the new Metropolitan S.S.B. Net which meets on Wednesdays at 7 P.M. CST on 50.11 mc. From what we've been hearing, this is one of the fastest growing sideband groups in the country. John, who incidentally is net control, runs 330 watts p.e.p. to eight elements up 104 feet.

WØCCD in Omaha tells of Jamaican signals breaking through on Nov. 6, but no contacts. On the next afternoon, however, KP4AAN put a big hole in the low end and provided many QSOs for the WØ-land gang.

Tuning Two

PAØVDZ writes to let us know that there is quite a bit of two meter activity in Holland—hundreds of stations, in fact. He promises to keep us informed of European doings on v.h.f.

After being off the band for thirty days, WA2HNI upped the power at his New Milford, N.J. station. Dave is eager to work Delaware and is willing to sked on 144.580 or 145.110 mc. W3 and W4 call area stations are requested to write WB2CLN in Flushing, New York, for 145 mc skeds. Tom has been busy working into Conn., Mass., Md., Pa., R.I. and Va. quite regularly. W2SLC/MM is in the western Mediteranean and busy snooping on two aboard ship with a Communicator. Scattered sigs heard.

Salisbury, North Carolina, is being put on the two meter map by K4QIF with his kilowatt on 144.017 mc. Rusty wants tropo and m/s skeds on c.w. On Friday, Saturday and Sunday nights K4QIF broadcasts 5 minute CQs in this sequence: SW at 2115 EST, NNW at 2125 and NNE at 2135. Rusty has already worked 22 states on two. K4SHE (Va.) reports contacting K2KFE (N.J.) on October 26 using just her f.m. rig (146.94 mc) and ground plane antenna. Ginny adds that the local f.m. net meets daily on that frequency at 6:30 P.M. EST.

More aurora reports coming in all the time. Gary, K9WZB, (New Carlisle, Ind.) includes K2BXS (Wilson, N.Y.), W3PGU (Wilkinsburg, Pa.), K3RLL (Pittsburgh, Pa.), WØDQY (St. Louis, Mo.) and WØLFE (Bowling Green, Mo.) on his list. (No dates here). A twenty element Yagi precariously swaying 70 feet in the air apparently is the key to K9WZB's success. Never had a 'noreaster,' Gary?

That's about it for this month; looks as though we've run out of space again. Keep the news and photos coming.

73, Bob, K2ZSQ

For further information, check number 34, on page 110

Which Receiver? [*from page 43*]

Tunable I.F. Features

On the basis of a large number of comments in the answers, a good tunable i.f. strip could take the following form: It would begin with an r.f. stage, broadbanded over a four-megacycle range. The major function here would be to control the gain to the following stages and reduce overloading and cross-modulation. However, this r.f. stage would necessarily be a compromise. To be really effective for its purpose, it should be tuned, but this would introduce complications of design and construction.

A converter stage, with a crystal-controlled oscillator, would then convert the usual 14-18 mc output from the v.h.f. converter to the frequency of the tunable stage which follows. Since the tunable stage would cover one megacycle, crystal switching would probably be required here.

The tunable oscillator is a critical part of the system. It should cover one megacycle, possibly in the 2-4 mc range. It must be extremely stable, and a Franklin or Clapp circuit might be useful. The mechanical aspects are as important as the electrical, and the best transmitter v.f.o. techniques must be employed. Dial drive must be precise, and an Eddystone or National PW, or some arrangement like the ARC-5 worm-drive is indicated. Most operators would like calibrations at one- or two-kilocycle points, and a digital counter on the capacitor shaft might be tried.

Some arithmetic will be involved in the selection of frequencies in the stages described above to put the birdies where they will do the least harm.

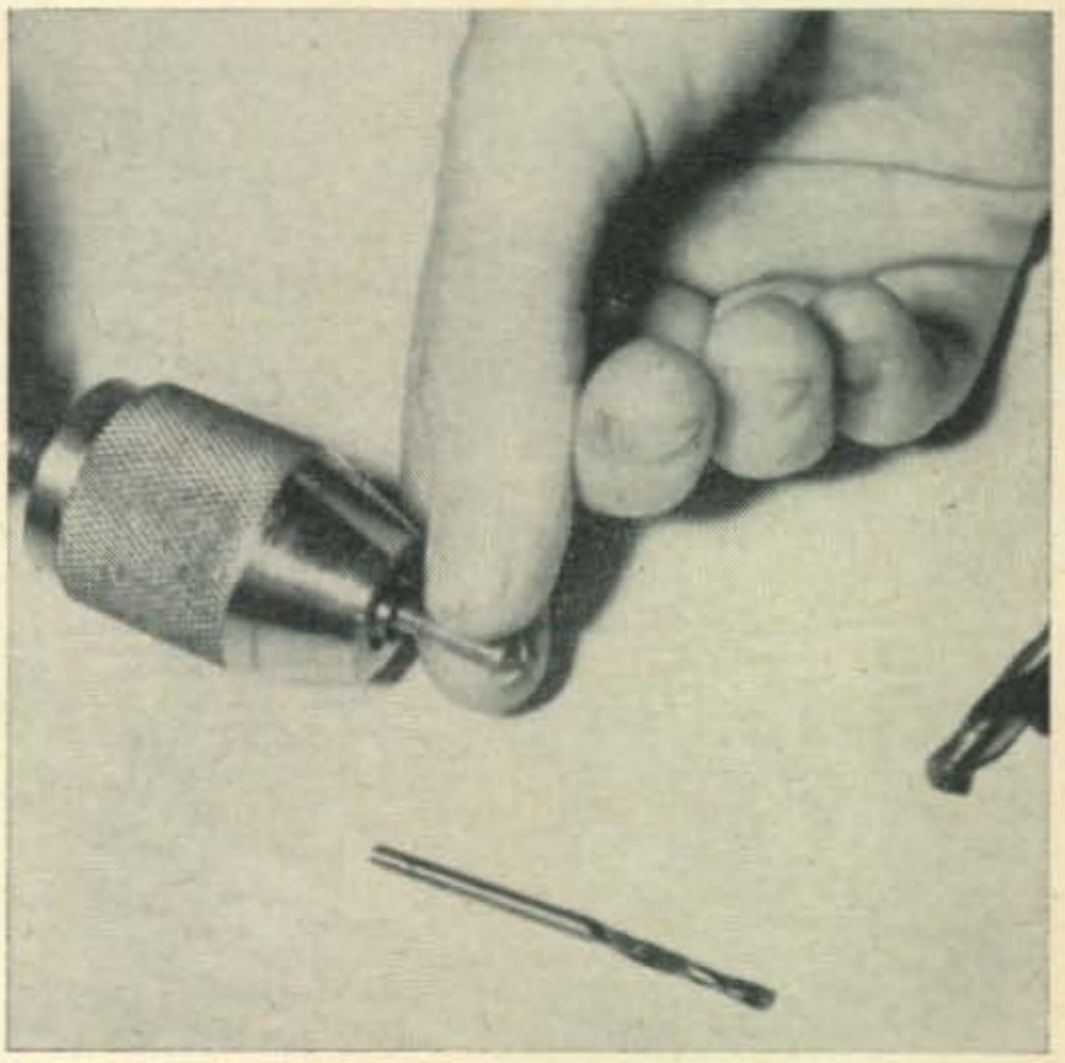
Following the tunable stage, the i.f. amplifier, detector(s) and audio stages complete the unit. The need for narrow bandwith has been mentioned. Some workers would want to go to 455 kc and then convert again to 50 kc or so, but it is our feeling that this creates complexities. Using crystal or mechanical filters, it is possible to achieve the desired selectivity at 455 kc, and *Q*-multipliers, signal-slicers and T-notch filters offer further opportunities for experiment.

Some additional design notes: it was suggested in numerous comments that the "noise blanker" is a superior form of noise limiter, and the point was made that the noise limiter should be as close to the antenna as possible. A product detector seems desirable for c.w. and s.s.b., and (depending on local mode preferences) an f.m. discriminator might be added. A.v.c. switching should be independent of b.f.o. switching. The S-meter would require some sort of calibrated adjustment to compensate for the output levels of different converters. The b.f.o. might be crystal-controlled for stability. The tunable oscillator might incorporate a slow motor drive to enable the rig to be used as a search receiver.

Hams being the individuals they are, it must not be assumed that the above points are made on the basis of unanimity of opinion. One refreshing note was the absolute diversity of ideas in some areas of the "comment" column. One amateur stated flatly that there is no need for sophisticated S-meter circuitry, while another has gone to great lengths to add a complex S-meter to a BC-348. One amateur editor warned solemnly against using the ..... receiver for v.h.f. work because it is "not sensitive enough" while another expert asserted that the ..... receiver (the same make, of course) is the only *possible* choice for the serious worker. You will note some high-priced gear in use, but one happy fellow said that he would not trade his 1947-vintage SX-25 for *any* of the new $400-$800 receivers. A couple of experimenters are trying solid-state converters and i.f. strips but others have rejected transistors at this time for a variety of reasons. There were many descriptions of home-brew construction and modification, but one fellow refuses to touch his gear or build his own, asserting that this cuts into his operating time. While there were many suggestions for articles on building tunable i.f. strips, one competent amateur asked for an article on how to *use* a receiver.

The survey provided an interesting look into ham shacks in all parts of the country. We wish it were possible to continue correspondence with all of the interested and interesting amateurs who included informative and friendly letters with their answers. Since this is manifestly impossible, we would like to take this means of expressing our thanks for their cooperation. Thanks are also due to Dick Ross, K2MGA, and Al Dobrof, WA2PNY, for their help in getting this survey underway. ■

Ham Hints



Time Saver For Finding Drill Size

When you have to drill a particular size hole for a screw, the best drill gauge available is the screw itself. Just chuck it in the drill's jaws lightly, pull it out (don't upset the chuck setting), and then try different size drills in the chuck until you find one that fits. Use this size drill to make the hole. You'll find that the screw will fit through it perfectly.

Letters [*from page 14*]

to lose *any* of his existing privileges (as I am informed it would) it is unfair and (in plain words) just not very democratic!

I feel, personally, that if an amateur applied for certain privileges he is entitled to those privileges and should not be subject to any FCC laws passed *after* his license was issued. That, to me, is the same thing as making someone pay back license fees for every renewal of his license he has applied for up to date on top of charging current renewal fees (which the FCC is not doing).

While I am on the subject of license fees I want to say that I have no objections to charging a small renewal fee and new license fees. You will find that the first thing an interested friend will ask you is, "How much did a license cost?" and they act surprised when you told them "nothing."

David Swaim, WN4NAG
Box 85
Liberty, North Carolina

"Best For The People"

Editor, *CQ*:

I have enjoyed the writings you have given us on the subject of incentive licensing, restricted privileges, or whatever it is called. Your qualified support of ARRL measures to improve the general level of technical and operating excellent, makes good sense. We cannot accept without question, everything that ARRL does, but must not make the mistake of automatically rejecting everything they propose. . . .

Democracy is marvelously useful for preventing extremes, but is wholly impractical as a precise instrument when wise detailed decisions must be made by leaders of large groups. Notice that I say "precise instrument"; leaders must always know the will of the majority, and attempt to carry it out to the best of their ability. But wisdom may direct that specific methods may have to be adopted which will be best for the people even though resented by them. This does *not* call for dictatorship (which loses contact with the people), but for a *republican* form of government in which the leaders lead, with suitable checks and balances provided by the "democratic" system. If true in our government (what do you have to say about income tax or foreign policy??), why not in radio amateur government?

R. L. Gunther, W6THN/VK7
University of Tasmania
P. O. Box 252C
Hobart, Tasmania, Australia

Ham Service [*from page 54*]

time; you may have been part of a dual transmission. The Net Control Station will give everyone a chance to check into the net. Like the c.w. net, you will be queried concerning the traffic's destination, which you will then give him to list on the net. When a station asks for the traffic, you will be allowed to call him on the net frequency to pass the message.

Give that station the information on the message form. (In the text, a period is pronounced "x-ray.") After the traffic is passed, write on the message form the call letters of the station that received your traffic, plus the time and date it was sent. That is all there is to it.

Let us go a step past the sending of a message. Suppose that while you were on the net, a piece of traffic was listed that you could handle. Call the NCS and tell him. The station will then pass the traffic to you. It would be advisable to call the person to whom the message is going as soon as possible. If a telephone number is not on the message form, look up the number.

When you reach the person over the phone, explain who you are, and that you have a radiogram for him. Then tell him what a radiogram is, and how you received it. Give him the message. Don't hang up! Ask whether he would like to send a reply, and, if so, take the message. You know how to handle traffic.

By doing the above, you will not catch the person you call off-guard, and he will not become confused.

There is still another situation that you will encounter. Traffic may be listed for a town in which a friend of yours lives. If you have a schedule with him, or know when he would be on the air, take the message. Record from whom you received the traffic. Later, when you pass the traffic to your friend, record his call on the message form. If he does not know how to handle the message, explain the procedure.

Above all, when you have a radiogram, try to get it on the air as soon as possible. If a person can send a message by mail faster then it would take for a radiogram to reach its destination, the prestige of this valuable amateur service will drop.

This ham service is not a novelty. We are lucky to have it—so, *use it*. You know the standard operating procedure. The message form should be kept in your files.

Daniel Defoe, the famous English writer, once said the following. "All the good things of this world are no further good than as they are of use; and whatever we may heap up to give to others, we enjoy only as much as we can make useful to ourselves and others, and no more."

Let's apply the above thought to our amateur radio service—the traffic net. ■

Novice [*from page 70*]

knows what he is doing. I sure hope some one could help me with this problem.

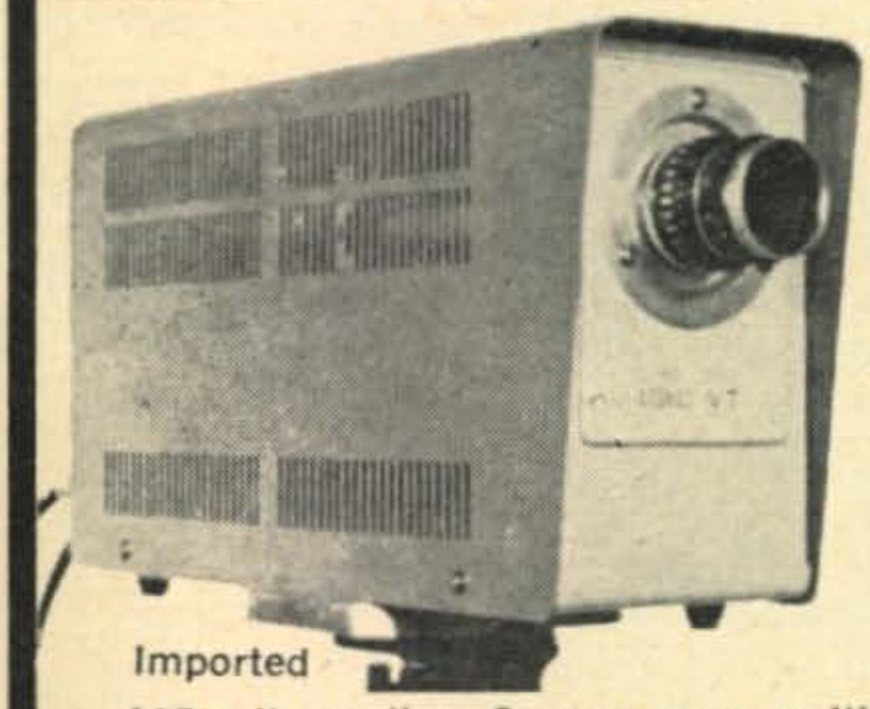
"Finally, would you start a *simple* course so that we prospective Generals might be able to pass our exams? I am not stupid and I make real good grades in school. But for some reason I don't seem to be able to understand Mr. Electron and what he and his counterparts do in a radio circuit.

"My transmitter is a homebrew 30 watter. I've contacted 9 states and have 8 confirmed. 73, Tim."

Well, Tim, I'm sorry that we do not have space for more material in the column as many have written to say they missed the letters and to be frank with you the letters to me have fallen off considerably since the column was reduced in size. It is harder to write a small column than a large one. I am writing this column for the newcomer and not for the General and therefore it requires more detailed explanations. As I always try to put more than enough information than is needed in my column, it would of necessity be longer than the same material written for a group that was well versed in the art of radio

by hams... for hams... Harvey is reliability

Harvey
VALUES OF THE MONTH



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The HV-13A closed-circuit TV camera has many uses in the home, in industry and in the laboratory. It can be used for keeping an eye on the baby in another room or on the lawn, for remotely observing hazardous operations or experiments, and for providing service to sports fans at race tracks or arenas. It can be combined with a microscope to present highly magnified views to numbers of people in educational TV or other applications.

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For further information, check number 38, on page 110

communications. I feel that this is one of the reasons that this column has been so well received by the neophyte in amateur radio and that many have been able to get answers to their questions here. The fact that I have received letters from all over the world (32 countries and 47 states) attests to the fact that it is well read. We would, of course, appreciate more space, but until we do, bear with us.

As for your other problems, that would be hard to analyze from this distance. Look well at your antenna and antenna feedline. Check to see that the primary of the antenna coil has not been opened by lightning or voltage surges in the system. And be sure that the receiver is correctly aligned and in good working condition. If you are able to get plenty of signals on the other bands, then you can devote most of your testing to the coils in the 15 meter section. But if the signals are weak on all bands, then the whole receiver needs a checkup. If you have a good receiver and a good antenna, you should be able to hear DX out there if for no other reason than others around you hear them. Check on that.

As a last resort you might send the receiver to Heath for alignment. I sure wish you the best of luck and I'll be on the band in a couple of weeks with a new 40 watt rig that we will start showing in our column soon. C U on 15 meters, tim.

Help Wanted

Tim Looker, 3144 Troy Road, Schenectady, New York, would like some help in getting the Technician license and would also like to communicate with some one who has put a reactance modulator in the 6 meter transmitter shown in the 1963 ARRL *Handbook*.

William M. Redmond, 3708 Jackson Street, Monroe, Louisiana, would like to contact a local amateur—object, to join the ranks of the amateur radio brotherhood. He just needs some help on what to do. I hope the column this month helps you, Bill, along with others that have requested this information.

If you need help, let me know the particulars and I will see that your name is listed here. Just drop a letter to Walter G. Burdine, W8ZCV, R.R. 3, Waynesville, Ohio. 45068.

That about winds up the column this month. I surely would like to hear from you and when you write you might enclose a picture of yourself for the column. A good picture is worth a thousand words. I hope to run into a few of you now, since I will be on the low bands in a couple of weeks. Until then,

73, Walt

Ham Clinic [*from page 68*]

Viking Ranger II—"I am looking for a transmitter for a.m. and c.w. in the 60 to 75 watt range. It must cover 6 to 160 meters, have a built-in v.f.o., a good modulator and be available in kit form. This transmitter should be readily convertible when I am ready for s.s.b. using a Heath SB-10 adapter. What is your recommendation?"

I would suggest the Johnson Viking Ranger II. It has all you want and a lot more. This is definitely the best transmitter for a ham just starting out or the oldtimer as a standby rig. Its price is somewhat higher than other transmitters offered by some manufacturers, but you are getting quality and a set with *punch*. Even though I am s.s.b. inclined, I intend to buy another. I had an early model of the Ranger and I worked the world with it. The new model is much better.

CB Questions—"I am sure you must receive a lot of questions from ham-CB'ers. How come you don't put them in the column? Are you CB too?"

This column is devoted to amateur radio. If you want information on CB gear send your questions to *S-9*, the CB Journal (same address as *CQ*) maybe they can help you. Yes, we do get a lot of questions on CB equipment and if the person writing in *is* a ham we answer them, otherwise no. Yes, we are CB too. Our call: KCF0305.

HX-50 Final—"I hear there is another final tube available for the HX-50 which is better than the one used. Is this true?"

I talked to Stu Meyer the president of Hammarlund about this. He said they were testing out another tube but would not release information on this until it was shown that the change would be worthwhile. He did not elaborate. He did say however, that when the change is recommended, information would be made available on it. The reports being received on the HX-50 are excellent.

GSB-201 R.F. Linear—"I own a Hallicrafter SR-150 (I know I'm lucky—hi!); now I want to tie a linear on the end of it for increased power. Money, however, is my problem. I only have $250.00. What I want is a linear complete with power supply. What is your recommendation?"

I imagine you want as much p.e.p. as possible for the money—well, in the price range you are shooting for, I would recommend the Gonset GSB-201. This set gives you 1500 watts p.e.p., has a built-in supply and covers 10 to 80 meters. It is small and well metered. The current price of the GSB-201 is $297.00 so you'll have to save up $47.00, but the wait will be worth it. Your SR-150 will drive it beautifully.

Challenger—"My Challenger has developed a little trouble. Without excitation the final plate current soars. Should it do this?"

No. No doubt you have a bad clamp tube. This should be checked as well as associated circuitry.

Thirty

We are truly grateful for the many letters received from American hams offering to assist those less fortunate than themselves. Over 150 letters offering assistance have been received at

[*Continued on page 96*]

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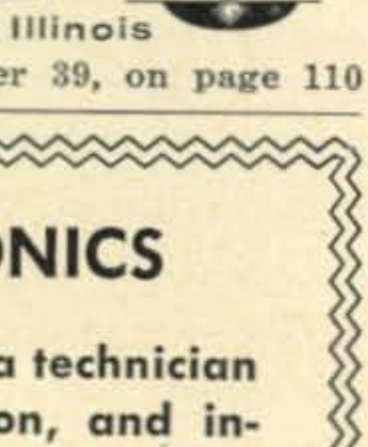

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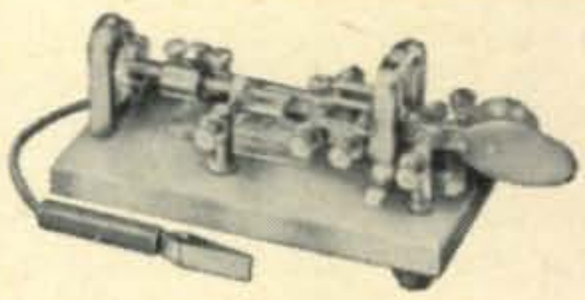

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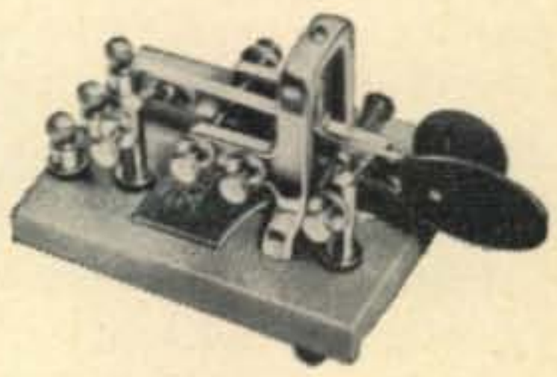

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Contest Calendar [*from page 64*]

Starts: 2200 GMT Friday, February 14.
5 P.M. EST Friday, February 14.
Ends: 2200 GMT Sunday, February 16.
5 P.M. EST Sunday, February 16.

This year's party is sponsored by the Southern California Chapter of the QCWA. Only members are eligible for the QCWA Plaque but other stations are invited to work QCWAers for credits toward other awards.

There is no point-scoring or multiplier involved, just see how many of your fellow members you can work. Ed Zimmerman, W4FNQ has already won two legs on the trophy. One more time and he keeps it permanently.

A list of frequencies where you will find the activity and other details appeared in last month's CALENDAR.

Your log should be in the mail before the end of the month and they go to: Walter A. Knight, K6GMA. 13841 McMains Street, Garden Grove, Calif.

Vermont Party

Starts: 2300 GMT Saturday, February 15.
Ends: 0300 GMT Monday, February 17.

A good opportunity to work the comparitively rare state of Vermont during this party. Details were in last month's CALENDAR.

Logs postmarked no later than March 31st should be sent to: CVARC c/o Ann L. Chandler, W1AOK, RFD #2, Barre, Vermont.

B E R U

Starts: 0001 GMT Saturday, February 15.
Ends: 2359 GMT Sunday, February 16.

This one is for stations that are in countries that are part of the British Empire. So, as we have warned you in the past, no matter how juicy the prefix, don't go calling the boys during the contest week-end unless you are a member of the Crown or located in one of the Colonies. Any communication of course should be referred to the RSGB.

ARRL DX

Phone—February 8-9 and March 14-15.
C.W.—February 22-23 and March 28-29.
Starts: 0001 GMT Saturday.
Ends: 2400 GMT Sunday in each instance.

It's the world working the W/K, VE/VO, KH6 and KL7 in this the 30th ARRL International DX Contest.

DX stations will send RS/RST plus a three digit number representing their power input. Our guys will also send RS/RST reports but follow it with the abbreviated name of their state or province.

Each completed QSO counts three (3) points, and the same station can be worked once on each band.

DX stations derive their multiplier from the total call areas (not states) worked on each band. (A maximum of 21 per band.) Our side will use countries for their multiplier.

Your final score is figured by multiplying your total QSO points from all bands by the multiplier totaled from each band.

Marty Cash, EL1C, always happy to provide you with a Liberia contact. He will usually be found on s.s.b. on the high end of 21 mc. Marty will also switch to c.w. on request. Maybe we can induce him to give the Top Band a try this winter.

Additional information and log forms are available from ARRL. Your request as well as the finished product go to: 225 Main Street, Newington, Conn. 06111.

YL/OM

Starts: 1800 GMT Saturday, February 29.
Ends: 0500 GMT Monday, March 2.

The c.w. section begins on Saturday, March 14, 1964 and the corresponding times are the same as above. Louisa Sando, W5RZJ gives you all the information in her YL column on page 75 of this issue.

CQ W.W. SSB

Starts: 1200 GMT Saturday, April 11.
Ends: 2400 GMT Sunday, April 12.

Because of the Easter Holiday the date for this year's contest has been moved to a more convenient spot.

See page 44 for a complete run down of modified rules.

Basically the rules are the same as in our W.W. DX contest, except that prefixes are used as a multiplier instead of Zones and Countries. Credit for a given prefix however may only be taken once during the contest, and *not* once on each band.

The contest period has been extended to 36 hours in order to take advantage of additional band openings, especially on 20, but the popular "rest period" has been retained and modified.

Multi-operator operation has been given a broader scope, but it was deemed advisable not to include multi-transmitter operation in this contest.

Contact point credit has been changed to the simpler and well established 1 and 3 points used in the W.W. DX contest. We could see no advantage in giving extra credit for contacts on the lower bands. It gives a decided edge to European stations and has done little towards promoting more activity on 40 and 80.

Because of the large number of available pre-

IMPORTANT!

Dealers, see page 19

For further information, check number 43, on page 110

fixes, it is highly recommended that a separate check list of prefixes (as they are worked) be kept in addition to your log. This list should be submitted along with your log to assist the committee in checking your score and giving you proper credit.

Mailing deadline is April 30th and your logs go to: *CQ*, Att: W.W. SSB Committee, 300 West 43rd Street, New York 36, N.Y.

"El Rimac"

To promote mutual understanding, goodwill and peace between men, the Rotary Club "El Rimac" with the cooperation of the Radio Club Peruano, has organized a QSO Party to take place during "World Understanding Week," from March 15th thru the 19th.

Stations all over the world where Rotary Clubs exist, will try to contact the two Club stations, OA4A and OA4O. In your contact exchange give them the name of your Rotary Club and the Rotary District number.

You in return will receive a contact reference number.

Use this contact number and the name of the Rotary Club in your district on your QSL card.

In return you will receive a special QSL card and the represented club will receive a decorative banner together with an informative pamphlet on Peru.

OA4A will operate on s.s.b., transmit on 14.110 & 21.410 mc and listen on 14.345 & 21.440 mc.

OA4O will use a.m. on 7.050, 14.180 & 21.150 and listen on 7.100, 14.210 & 21.350 mc.

Interested stations should contact their local Rotary Club and QSO OA4A and OA4O with the necessary information.

Your contact information (QSL) goes to: Radio Club Peruano, P.O. Box 538, Lima, Peru.

Editors Note

You will note a change in the March week-ends of the ARRL DX marathon. This does not follow the usual pattern of previous years and now presents a serious conflict with the already established YL/OM C.W. weekend.

It is still my feeling that two-week-ends for one activity is too much, and that the picking of dates should be given more thought and consideration. There is no excuse for date duplication because even with a crowded calendar there are still some open week-ends evident.

The PACC made a wise move this year. Noting that the phone activity was very low, they have combined both c.w. and phone in one week-end. This pattern could be followed by other organizations who find that the returns from their contests does not justify occupying two week-ends.

The list of claimed scores for the c.w. week-end of our W.W. contest are only a few of the more interesting early scores we received. Once again, they are *only* claimed scores and have no bearing on what the final results will show.

73 for now, Frank, W1WY

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TERRY STERMAN W9DIA

Watch for Terry mobile from his plane!

From our other advertising in C.Q., you know that our A.E.S. company airplane has a Collins KWM-2 installed for the lower frequencies. However, a lot of our employees enjoy operating the VHF bands. So here's what's resulted: Ted Willett, W9NHE, who is in charge of our of our printing shop, borrowed Elin's Clegg Thor and put it in the back seat of our Cessna 310. An adcom investor was used to convert the 28 volt airplane system to 110 volts a.c. Incidentally, this Adcom invertor sure is a honey—a lot different from the old vibrator-type invertors, which gave you a lot of dead batteries, hash, vibrator noise and varying voltages. It's almost too good to be true. (Complete Adcom line in stock—any model $5.00 Down, Take up to 3 years to pay!)

Our electric reel-out antenna was used. To find a suitable matchable length, a Cesco SWR bridge was used. No shack should be without one. (Only $29.95). Incidentally, we found that ten feet of trailing wire worked the best on 6 meters.

Koss model **PRO-4 professional headsets were used.** Here is a **real** headset for only $45.00—(send a check in Full and we'll pay shipping charges—and give you a 10 day money back guarantee, if you are not happy).

Of course, a person doesn't have to describe the Clegg Thor VI, which is a little 6 meter rig that just can't be beaten (we have the complete Clegg line in STOCK and any model can be yours for just $5.00 down + up to 3 years to pay). Hope to see you on six meters from 10,000 feet.

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☐ Check for latest reconditioned bulletin.

For further information, check number 46, on page 110

Ham Clinic [*from page 90*]

my present QTH (4 Lutzelmatt St., Luzern, Switzerland) and a number via *CQ* Hqrs.

When you read this, our present list of people (hams and hams-to-be) who need material assistance in the form of parts, books, etc., will be exhausted. If you are a needy ham (and we *spot check* to determine this), or a ham-to-be, send us your name with your requirements, and *please* let us know if you will pay postage or shipping costs.

For this month then, 73 and 75 to our ham readers everywhere.

73, Chuck

100W. Modulator [*from page 49*]

of tape over the start wire along the bobbin edge is highly recommended After winding the primary, a covering of tape was applied to completely insulate it from the secondary. Care must be used to keep the edges of the windings from touching. The secondary was then wound consisting of 980 urns of #22 enameled copper wire, random wound. After completion of the secondary winding, a generous supply of insulating tape was wound over the coil to insulate it from the transformer laminations since the plate supply voltage will be developed from this winding to ground. Leads were attached as in T_1 and the laminations were replaced. This core was stacked 2 by 2 to a total thickness of 2½" and then the transformer case was replaced. The case should be tightened securely as vibrations of the laminations may cause audio feedback if coupled though the microphone during operation of the completed amplifier.

Power Supply

The power supply for this modulator may be constructed using commercially available transformers and diodes. Supply consists of a full wave bridge rectifier fed into a series current regulator. The power transformer is a Stancor RT-206 rated for 6 amps at 33 volts.

Heat Sinks

To maintain a case temperature of 75° *C*, each power transistor was mounted on a Delta heat sink Model NC403. Silicon grease was applied between the transistor and the heat sink to reduce the thermal resistance. This grease is very important since its omission will prevent the heat sinks listed from providing enough reduction in the case temperature of the transistors at the full 100 watts output.

A test using an audio oscillator was run to check the continuous operating temperature of the amplifier. Measurements revealed that the output transistor's case temperature was stabilized, after 2 hours of continuous operation, at 75° *C*. It is felt that in an ambient temperature of 25° *C* the heat sinks would provide adequate

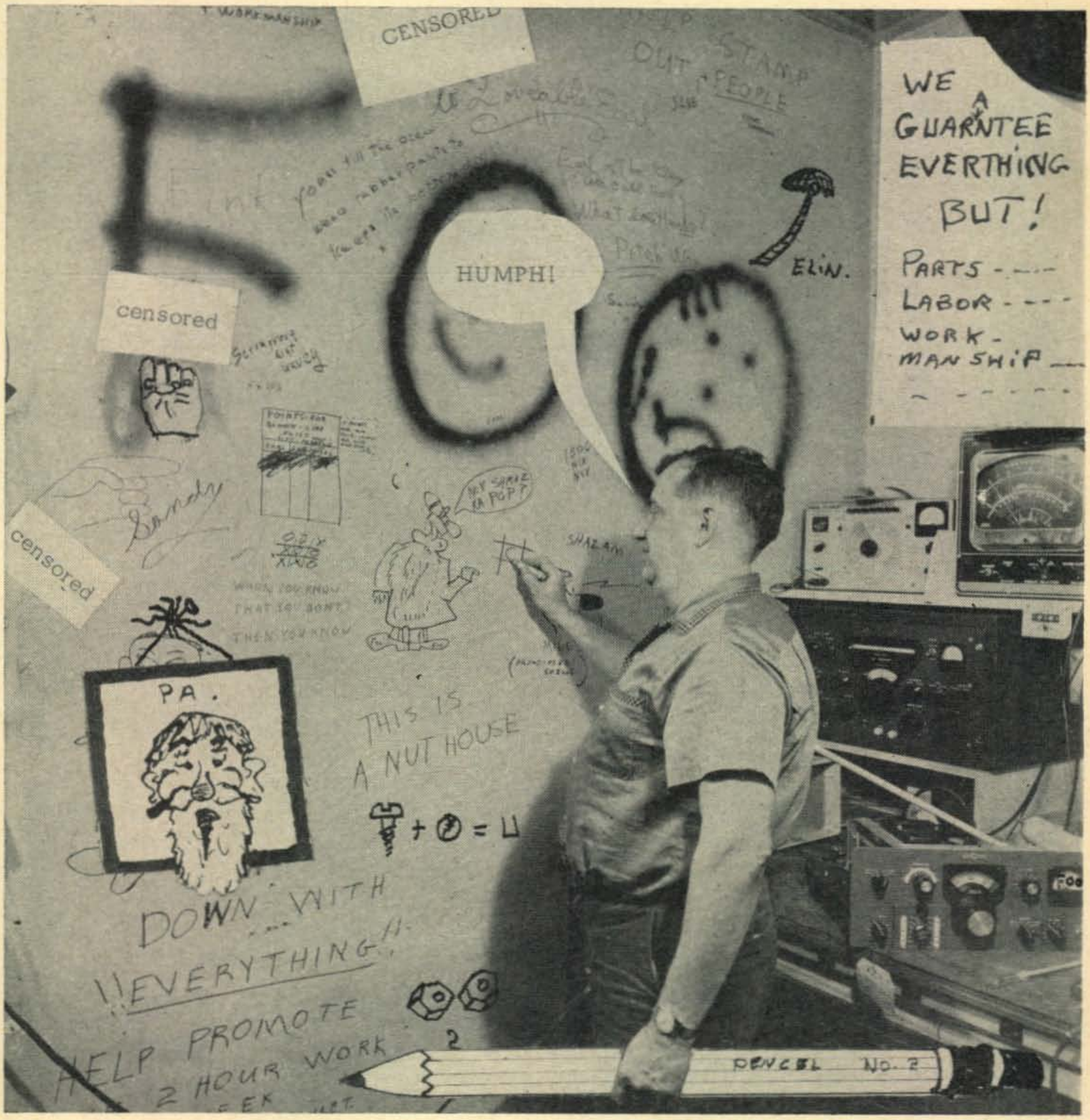
[*Continued on page 100*]

TERRY STERMAN
W9DIA

We Need Your Used Gear NOW

WE'RE TRADING WILD!!

Our high salaried reconditioning experts are going nuts trying to keep busy . . . now they're marking up the walls. Help us put these idle hams to work fixing your old gear for our reconditioned shelves. Tell us what NEW gear you want . . . what you have to TRADE . . . and get our fantastic deal!!



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100 W. Modulator [*from page 96*]

cooling. The power level used in this measurement was 50 watts. At 100 watts no increase in case temperature was noted. Using voice power instead of sine wave power, the heat sinks used are more than adequate. The driver stage transistor must also dissipate some power, but the amount is only a few watts and heat sinking was not thought to be necessary. This transistor was mounted on an insulating mica sheet directly to the chassis. No heat problems were encountered in the low level stages of the amplifier.

P.T.T.

For push-to-talk operation the 117 v.a.c. line to the power supply was keyed. Due to the charge time of the electrolytics a delay of about 500 milliseconds was experienced. This was not thought to be excessive and the system was used. Other more conventional systems may be used. of course.

Conclusion

The operation of the modulator discussed here has proven satisfactory in the author's transmitter and quality reports have been most favorable. A cost of just over $50.00 for the modulator was realized, with both modulator and power supply adding up to about $75.00. The price of the modulator may be reduced by approximately $14.00 if new transformers are not used for T_1 and T_2. ■

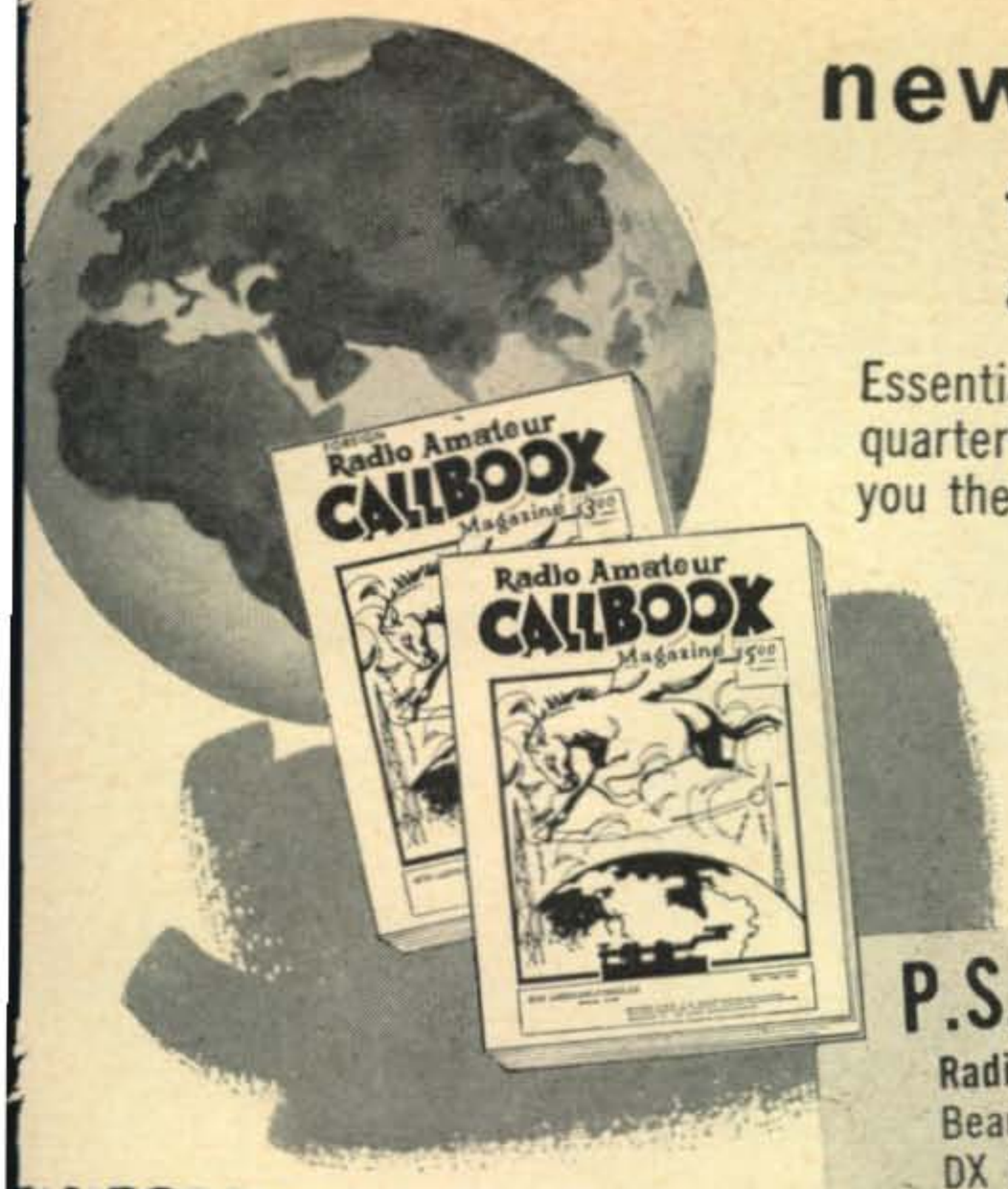
DX [*from page 60*]

JKO, ZE3JO, ZS2FM, GC3EML, EI9J, 6YAXG, VE4RO, VP7NY, VP8GQ, HR3HH, PAØPN, DL1FF, GC3EMI, GI6TK, UB5WF, possibly OY7ML, 5A3CJ, LU3EX, Many Gs, OK, DL, etc. JA may be on 160 soon.

CQ WW DX TEST: Conditions generally only fair. EUs worked by W/VE; G3RAU, GRI., OQT, PQA, RBP, RFS, RBP, G6BQ and DL1FF, believed no others. Small list. Conditions were very good for the first transatlantic DX test. Big success. Many EU and W/VE participants and QSOs too numerous to mention. DL1FF worked VP8GQ.

General 160 DXing

Sunday mornings, two mornings a complete washout; however, others from fair to excellent. Many new DX stations coming on and also Ws all over the USA. New states were heard. Several most complete. (W8GDQ received first WAS on 160) although W2IU worked 50 states first but from two QTHs. Interest and activity increasing. **South Pacific:** K1KSH/VK9GL Gary Lunney received his VK9GL license and ran schedules. Worked ZL3RB, heard W1BB/1 (may have QSOd W6ML not sure of it at this time). Unfortunately due to change of orders must leave and come home to W-land as of Dec. 8th. Gary



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For further information, check number 52, on page 110

worked W6ML from Marcus and W1BB from Marianas in S. Pacific. Congrats to Gary.

Congratulations to Mal, ZE3JO on a resounding first. ZE/W on 160 QSOing W1BB/1 Nov. 6, 0315-0338, 1801. 5 kc both 339/359. Static was terrible. Mal said signals went in and out within 20 min. peaking period. Mal used 10 watts, HRO, 260' long wire.

Congratulations to Piet, PAØPN for the first PAØ-W QSO on 160, 5 Oct. 0415 working W1BB. Had previously QSOd VE1ZZ and VO1BD. Used 10 watts.

Bruce Kelley, W2ICE, advises he will be on the air soon, probably 1804 kc with Antique Wireless Association station using UV202 in Hartley circuit, all parts genuine antique, 1932 or earlier. Ino Zinc-plate 48-Jar CRAC power supply.

Expectations are that this is really going to be the very best year we have ever experienced on 160. The band is fickle as usual but gives good dividends to the faithful and wise. Suggested check German marker station DHJ/59/2 1830 kc to find when EU band open. Also conditions on 80 meters East-West-South good criteria.

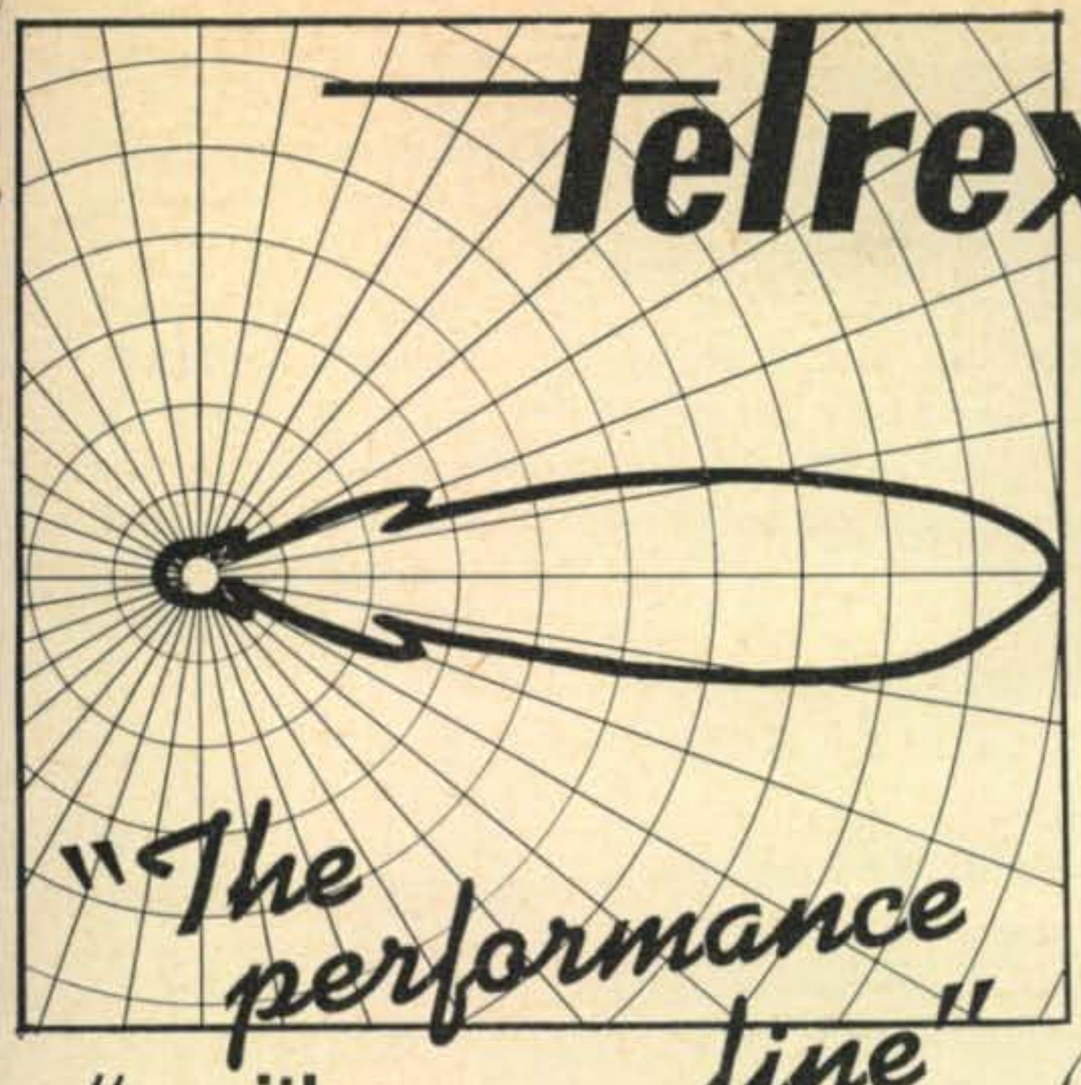
VS1LP, Bob Snyder, ex-EP2BK is back in Singapore with 160 rig and expected to be a real rare one on 160 this season. Has Valiant. *(Tnx to W1BB for the above)*

W2CTN is now QSL Manager for over 140 DX stations. He soon expects a new one for a total of 80 DXCC countries as QSL Manager! Jack is recovering from an operation and a few cards of the non-QSL type would, I'm sure, be appreciated.

QTHs and QSL Managers

CEØZI via W4QVJ.
DU1MR Marcial Recio, 2660 T. Ayala, Singalong, Manila, Philippines.
ET3FF Box 2014, Addis Ababa, Ethiopia.
ET3USA APO 843, N. Y., N. Y.
FS7MB via W3ZQ.
KP4BJM A. Llona, M. D., Box 5306, Puerta de Tierra, Puerto Rico.
M1M via DJØHZ.
M1VU via DL1VU.
MP4DAH via G5GH, or via RSGB.
MP4MAH C. A. Thomas, Box 47, Doha, Qatar.
MP4QBF Box 75, Doha, Qatar, Arabian Gulf.
MP4TAS via G3KDE.
PJ5MC via W3ZQ.
PX1MO via K2JFV.
SM6CPI via WA9AEA.
SM7CPI via WA9AEA.
TA2BK via DJ2PJ.
TC3ZA W/VE via W2JXH, others via G8KS.
TT8AJ via WØLYQ.
TT8HA via WØLYQ.
UAØRV via UA2AW.
VP2SX via G8KS.
VP4TR via W2CTN.
VP8HO via R. Biggs, Box 142, Port Stanley, Falklands.
VS1MB via K7GCM.
VS4IH Barry, c/o GPO, Kuching, Sarawak, Malaysia, Rep.
W4VGL/KG6 Wilford Mintz, Loran Station, APO 925, Box D, San Francisco, Cal.
VP2VS via VE6TP.
VE3BSB/5V4 via VE3AXC.
XW8AU via W4QCW.
VP5NK via VP5BB.
ZD3A Box 285, Bathurst, Gambia.
TL8SW via W1BPM.
FG7XJ via W2CTN.
FG7XK via W2CTN.
XZ2VK Union of Burma Allied Research Inst., Kanhe Road, Yankin Post Office, Rangoon, Burma.
YN1LH Box 52, Managua, Nicaragua.
ZD8WF via W3PN.
ZS2MI via ZS1OU.
ZS6ARU F. P. de Vrics. Box 193, Germiston, Tvl, South Africa.
ZS8O Box 3, Maseru, Basutoland.
3A2AE via RSGB.
5N2JEB Box 914, Lagos.
5N2RSB/TJ8/5U7/TY2 Box 2022, Kaduna, Nigeria.
7G1IX via Box 477, Conakry.
9L1TL Tom Lloyd, c/o Fourah Bay College, Freetown, Sierra Leone.
9Q5TJ via DJ4OP.

73, Urb, W2DEC



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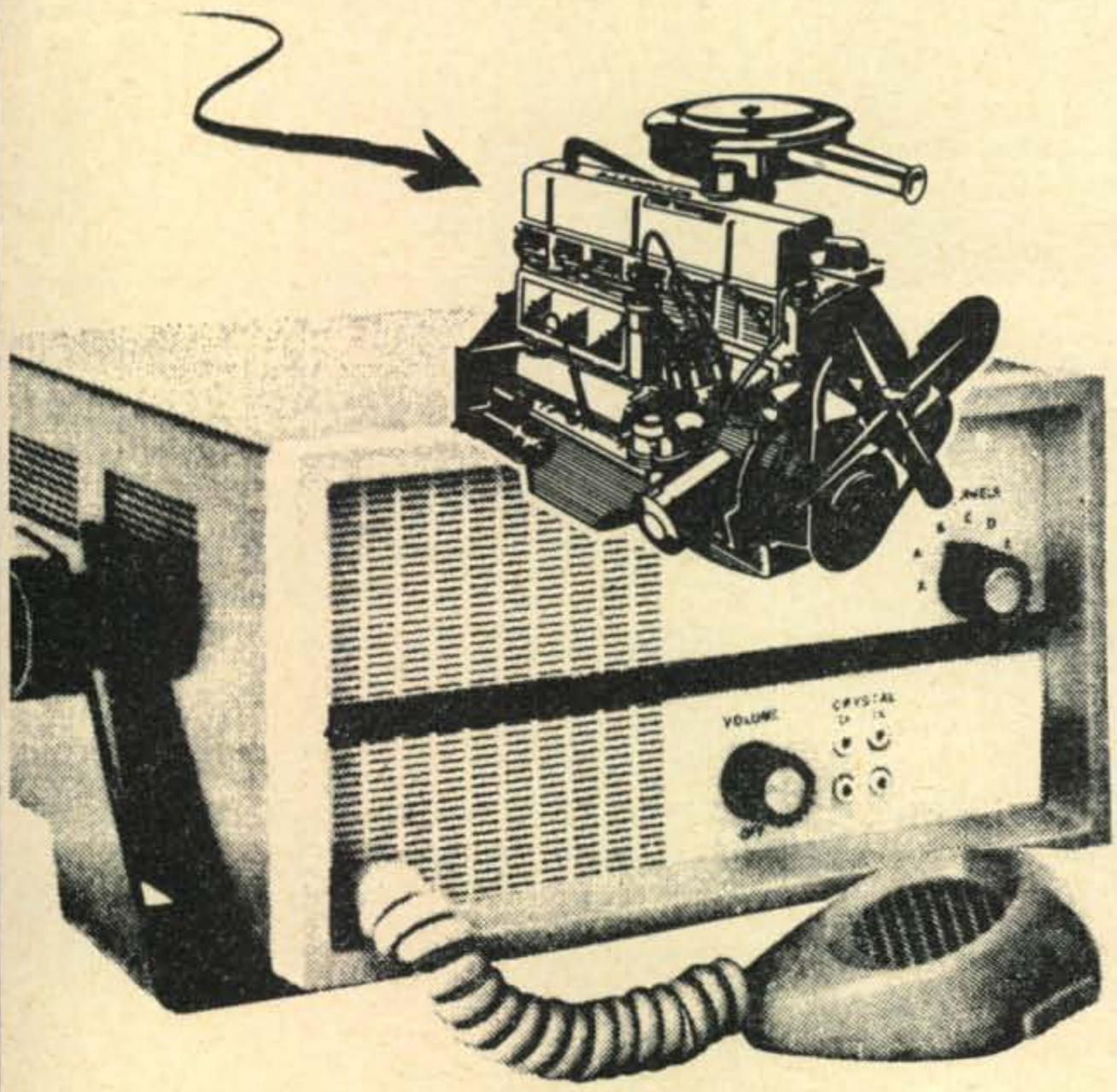

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Propagation [*from page 62*]

of darkness. W1BB reports that conditions on 160 meters were fair, with the band opening for DX to Europe.

The fortunate periods of good propagation conditions which took place during the Phone and c.w. weekends of the 1963 *CQ* World-Wide DX Contest should result in near record, if not record-breaking scores, despite declining sunspot activity.

73, George, W3ASK

RTTY [*from page 75*]

FRXD4, No. 202 is the Description for the FRXD9 and FRXD10; and, No. 203 is the Adjustments for the FRXD9 and FRXD10. For comparison purposes, details on the Model 14 Typing Reperforator and on the Model 14 Transmitter-Distributor may be found in Chapter 2.3 of the *New RTTY Handbook*.

Comments

In order to give you as much information as possible on the FRXD, we had to omit the usual activities section, "On the Bauds." Be sure to watch for it next month. In the meantime, if you are in the east, tune in on the narrow shift activity Sunday mornings around 7140 kc.

73, Byron, W2JTP

Ameco Preamp [*from page 41*]

it attractive for improving the performance of six-meter receivers, particularly the inexpensive transceivers.

High gain and sensitivity with excellent signal-to-noise ratio and noise figure of merit is assured by using Nuvistors in a cascode amplifier circuit. The gain is specified as in excess of 20 db and noise figure as 1.5 to 3.4 db, depending on frequency.

The Model PCL is equipped with a front-panel tuning control together with a switch for selecting the desired frequency range. An ON-OFF switch connects the amplifier in or out of the circuit, with the antenna connected straight through to the receiver when the switch is in the STANDBY or OFF position.

Auto-radio type coax connectors for the antenna and the output to the receiver are located on the rear of the unit. Power must be obtained from an external source such as a receiver or the Ameco PS-1 power supply. Power requirements are 6.3 volts a.c. or d.c. @ .27 a. and 100-150 v.d.c. @ 8 ma. Instructions are included for modifying the unit for 12.6 volt heater operation or to accommodate higher B+ potentials. A slightly larger size pre-amplifier, the Model PCL-P, is also available with a self-contained power supply.

The Model PCL is a small and compact package measuring only 5" × 3" × 2½". It is neatly designed with a copper-finished panel having black lettering and using black knobs. The case is a charcoal gray.

Performance

The performance of an Ameco Model PCL was found to be as follows: Measured sensitivity averaged .5 μv for a 15 db signal-to-noise ratio on a.m. and for a 20-25 db s/n ratio on c.w. and s.s.b. Gain on the amateur bands measured 24 db on 160 and 80, 23 db on 40, 21 db on 20, 16 db on 15, 15 db on 10 and 10 db on 6 meters. Noise figure on all bands averaged near 3 db and is much better than that of most receivers. No significant improvement in image rejection was experienced when the unit was used with a single-conversion receiver having a 455 kc i.f.

The instructions, which by the way are very concise and cover operation and installation under many varied conditions, specify a modification for handling extremely strong signals which may overload the receiver or the preamplifier; however, it was found that simply detuning the unit usually was sufficient to cope with such situations.

The Ameco Model PCL R.F. Pre-Amplifier sells for $24.95, wired and tested. The Model PS-1 power supply is $11.50 (wired). The self-powered Model PSL-P is priced at $32.95. These units are produced by Ameco Equipment Corp., 178 Herricks Road, Mineola, L.I., New York.

—W2AEF

YL *[from page 70]*

and Mar. 14-15 for c.w. Complete rules in accompanying box.

Here and There

New officers for the Rhode Island YLs: Pres., K1DCW, Elinor; V.P., K1VXZ, Theresa; secy., K1QJE, Betty; treas., K1DWH, Florence. The RIYLs have a nice certificate for anyone having proof of contact with 10 members. Apply to secretary, K1QJE, at 6 Spring St., West Warwick, R. I.

The Buckeye Belles are sponsoring two QSO Parties to promote the Buckeye Belle certificate —one in Feb. for OMS and one in March for YLs. The OM Party will be Feb. 4-6, all bands, all modes. OMs call "CQ Buckeye Belles"; Belles will call "CQ from Buckeye Belles." OM logs to show station worked and handle, Belle number, QSO number, date and time (GMT). Scoring: 1 point per contact. Awards will be made to OM with greatest number of Belle contacts and to the Belle with greatest number of OM contacts. Send signed *copy* of log to K8-VMV, Jean Posey, 2864 Sherwood Dr., Aurora, Ohio, postmarked no later than Feb. 29, '64.

Mark the dates for the YL Party—March 9-13; full rules in next issue.

4th International YLRL Convention

You'll be hearing a lot about this coming event from now until June 19-20-21 when YLs from all over the country, and DX ones also, will gather at the Nationwide Inn, Columbus, Ohio, to celebrate the 25th anniversary of the founding

of YLRL. Get your reservations in early. Some gift items for all attending are being personalized and the committee needs time to complete these. Make reservations with K8UKM, Elizabeth "Zip" Isham, 474 Darbyhurst Rd., Columbus 14, Ohio. Complete ticket $10 (registration $2.50, luncheon $2.50, banquet $5); for the OM, $5; absentee ticket $1 (to support the convention and receive a memento).

U.K. News

OM G3IDG brings his list of U.K. YLs (Jan. '63 CQ) up to date with the following additions: G3's EYO, PQT, RHV, RIW, RUA, SFU. G3OMN should be G3OMM. No longer listed in the RSGB *Callbook:* G3's HYL, YL.

Allan also sends word of the Radio Amateur Invalid & Bedfast Club (RAIBC), founded in 1954 to provide help to any incapacitated amateur, SWL, or anyone wishing to take up the hobby. In its first nine years 170 members were enrolled (including YLs W1GWF & G3OHB), and a further 100 representatives and supporters. Membership is free and the magazine *RADIAL* is sent monthly for the small charge of 56¢ yearly. Secretary is Frances Woolley, G3LWY, and more information may be secured by writing her at 10 Sturton Rd., Saxilby, Lincoln, England.

Silent Key

We are sorry to have to record that Opal Jones, W6PCA, joined the Silent Keys on Nov. 25, 1963. The YF of W6PJB, Opal received her license in 1952. She operated on 20, 40 & 80 and had earned an impressive list of awards, all on c.w. She also enjoyed contests, and was custodian of YLRL's WAC/YL award during the mid-'50s. Before taking up ham radio Opal worked in b.c. radio and had a number of other hobbies, including playing the steel guitar, carpentry, crocheting, quilting & collecting old coins. Our sympathies to her OM.

33, W5RZJ

VHF Editorial [*from page 77*]

W4GJG—I would be very happy to make a financial contribution to aid this cause if it can be used. It might not be much, but I'd like to have a part in this fight and I'm sure thousands of others would too.

The Elizabeth Herald (Mary Sloan, editor)—Your unwarranted attack has already been brought to my attention by one of your co-workers. You are far more guilty than I of the charges you have directed at me . . .

Anonymous "ham admirer"—Would like to congratulate you and other hams like you for taking the momentous stand concerning the decision of the FCC . . . I think this is a growing problem in the amateur world today and your fine editorial points this out.

WA4NED — The only thing wrong with your editorial is that it wasn't printed in BOLD face type on the front cover of *every* ham magazine! ■

Ham Shop

Rates for the Ham Shop are 5¢ per word for advertising which in our opinion, is non-commercial in nature. A charge of 25¢ per word is made to all commercial advertisers or organizations. Since we do not bill for Ham Shop advertising, full remittance **must** accompany all orders.

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1964 QSL-size calendars, 100—$7.00. Samples 25¢ Morgan, W8NLW, 443 Euclid, Akron, Ohio.

PICTURE of yourself, home, equipment, etc., on QSL cards, made from your photograph. 250—$7.50 or 500—$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland, LaCrosse, Wis.

QSLs SWLs XYL-OMs (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fantabulous. DX-attracting. Protopay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLs free samples. Fast service. Bolles, 7701 Tisdale, Austin, Texas.

CREATE a QSL with a sampler instruction kit, 25¢. Cards $1.50 up per 100. Samco, Box 203, Wynantskill, N.Y. 12198.

QSL's—100—$2.50. Samples. Dime. AMEE's Printery—W9FXQ—Box 138, Oak Lawn, Illinois.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507, Kansas City, Mo. 64416.

QSL's 3-color glossy. 100 $4.50. Rutgers Vari-typing Service. Free Samples, Thomas Street, Riegel Ridge, Milford, N. J.

CALL CARDS Badges, decals, goodies, illustrated literature with samples 25¢. Errol Engraving Att: K1VRO, Westfield, Mass.

QSLs Samples, dime. Print Shop, Corwith, Iowa.

NEW QSL PRINTER with new designs. "2-color" $2.25 per 100. 10¢ for samples. Corneilson, 321 Warren, N. Babylon, N. Y.

QSLS Large selection styles, including photos. Fast service. Samples Dime. Ray K7HLR, Route 3, Twin Falls, Idaho.

1964 QSL catalogue. New Designs. 10¢. Longbrook, Box 393-Q, Quakertown, N.J.

QSL CARDS $2.50 per 100 in three colors. Samples and catalog free. Garth, Box 51C, Jutland, New Jersey.

QSL CARDS. As low as $2.50 per 100. Samples free. Radio Press, Box 24C, Pittstown, New Jersey.

FREE Write for copy of latest issue. Hundreds of buy, sell and trading ads. Hams Hobbymart, P.O. Box 38, Rowayton, Conn.

RUSTIC, Call letter plaque, $1.50. KV4DI, St. John, Virgin Islands.

For further information, check number 63, on page 110

QSL's . . . New Designs . . . Dime. Filmcrafters . . . Martins Ferry, Ohio.

FOR SALE Complete instructions including 28 page booklet and 22" × 36" schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50. Sam Appleton, 501 No. Maxwell St., Tulia, Texas.

FOR SALE New and used CB and 2-way F.M. radio equipment. Send for list. Dealer inquiry invited. Becom Co., Seminary Heights, Weatherford, Texas. 76086. 817 LY 4-5172.

TECHNICAL MANUALS for surplus electronics. Free list. W3IHD, 4905 Roanne Drive, Washington, D.C. 20021.

FREE For latest copy of Hams Hobbymart with hundreds of classified buy, sell and swap ads. Write Kruse, P.O. Box 38, Rowayton, Conn. K1WPZ.

BC-611 Pair of BC-611 handy-talkies, 3885 kc. In perfect cond. With manual. Will take $50. Karl Schneider, 5023 Florida Ave., Temple City, California. 91780.

75 MTR TRANSCEIVERS Two BC-611 walkie-talkies in perfect cond. For 3885 kc. With manual. Will take $50. Karl Schneider, 5023 Florida Ave., Temple City, Cal.

SALE Ranger II factory wired, Hallicrafter SX-100A with crystal calibrator, matching speaker, $350. If bought separately, $185 each. M. Kendrick, 61-15 43 Ave., Woodside 77, N.Y.

COLLINS 516E1 mobile power supply plus KWM-1 rack, $69. 353E-1 less filter for 51J3, $10; Electro Engineering E-6543 ½ amp swing choke, $10; Centimeg 220 mc converter, $25; UTC LS-27 input trans, $17. Chas. White, P.O. Box 32, Fullerton, Calif.

FOR SALE: Pair of 813s GG final amplifier including heavy duty power supply, $120. Pick up only. Kenneth L. Blamey, 24 Conestoga Dr., Bethel Park (Allegheny Co.), Pennsylvania.

75A3, crystal calibrator, speaker, product detector, two filters, $300. TG10 keyer with 5 Army tape code lessons, $20. Apt #1, 424 W. Prairie, Decatur, Ill.

SELLING OUT TS-175 Fr. Mtr.: RME 8P. Comp: tubes, Xmfrs, other items. S.a.s.e. for list. W8MTI, 4761 Baldwin, Onondaga, Mich. 49264.

FOR SALE Northern radio model 152 RTTY converters. Two units on 19 in. panel with manual. Simpson 479 and Tripplet 3434 sweep generators. Collins 308 kc mechanical filter. P.c. board for W2JAV RTTY converter. Two H.B. nuvistor 6m converters. K5DZM, 1112 Bellaire, Grapevine, Texas.

200V $625; HQ-170C, $200. Both excellent condition, W8BPX, 7300 E. Aracoma Dr. Cincinnati 37, Ohio. Telephone: 351-2612.

FOR SALE HAM—HQ 180—$275; HAM—Super Pro 310—$275.00; Globe King 500—$350; Gonset G-76—$350; Gonset Communicator 2 meters—$125. Prices f.o.b. John Capazzi—W2KFY, 2 W. Main St., Mellville, N.J.

LAFAYETTE RK126 transistor technicorder, $50; Seco 520 3 to 160 mc s.w.r. bridge, $35; RCA WV98B v.t.v.m., $50; Checkwriter, $15; Utica police duo-band receiver, $100; Sony TR812 3 band portable, $35. All above like new. Locascio, 8420 51 Ave., Elmhurst, N.Y.

FOR SALE QSTs. Almost complete from 1932. Few before to 1929. Complete set of CQ from Jan. 1945. Complete set of 73 from Oct. 1960. About 650 magazines. Excellent condition. $150 postpaid U.S. W6JAT, 14666 Berryway, San Jose, Calif.

WANTED Panadapter for 455 kc I.F. in working condx. Mil surplus unit okay if p.s. included. State lowest price first letter. Box TK2, CQ, 300 W. 43 St., New York, N.Y. 10036.

WANTED S-36A, S-37 receivers; Panadaptors BC-1031C, SA8T-200, or equivalent. Equipment should be in near new condition. MacGregor, 5820 Oregon Ave., Washington 15, D.C.

WANTED one diagram for Howard Comm Receiver 450-A. Please quote your price in first letter. KØFUD. Edwin J. Rowe, Comanche, Iowa.

MUST SELL for friend in Navy; JT-30 mic, $5; Rider code course records 33 r.p.m. 9 to 20 w.p.m., $3.50; Heathkit tube checker model TC-2, $15; 1 pair of earphones, $1; 6 meter lo-pass filter, $2; you pay postage. F. F. Taylor 2025 Willia, 7BX, Cheralis, Wash.

NO TIME TO OPERATE Complete 1 KW s.s.b., a.m., c.w. station. Less than 40 hrs. use. Cost, $1900. Sell for $1100. Will ship. Singly HT32A, $400; includes D-104 w/PTT stand; HT-33A—$500; NC-303 with xtal calibrator & WWV adapter, $300. W7PMC, Philipsburg, Montana.

SELL Hallicrafters HT-30 S.S.B. transmitter, $120; Johnson Ranger, $160; Early Heathkit SB-10 excellent condx, $50; Revere C-153 16 mm 100' Rollfilm Turret Movie Camera, $100. Want KWM-2 with portable a.c. supply and carrying case; also want Collins mechanical filters, advise model and price. Contact W4ADU or K1YYM.

SELLING ENTIRE SSB STATION. All equipment immaculate and with manuals. Consists of 75A-4 Receiver, Eldico SSB-100F transmitter, matching speaker console with light, drake phone patch, timer, audio test oscillator, control switches, etc., all built in, Harvey Wells Z Match, Homebrew KW Linear using pair 4-400A's, B and W TR switch, and coaxial relays. Must see to appreciate. Prefer you pick up the works for $850.00 KØBXJ, 114 Louise, Topeka, Kansas.

SELL: 32S-1 with a.c. supply, less than 2 hrs. use, will throw in old Dumont scope . . $530; Eldico SSB 1000F linear . . $300; Eldico SSB 100F exciter . . $400; Transtenna T-R switch, new . . $45; Eldico low pass filter . . $5; Sony CS-300 stereo tape recorder . . $225; Concertone professional recorder, 7½ and 15," five heads, 10" reels . . $500; all f.o.b. . . . Lamb, 1219, Yardley Road, Morrisville, Penna.

PRINTED CIRCUIT BOARDS. Hams, experimenters, many different projects. Free catalog. P/M Electronics, Box 6288 Seattle, Washington. 98188.

ATTENTION! Have you seen "Equipment Exchange"? Buy, sell, swap offers galore! Rush card for interesting sample copy. Brand, Sycamore, Illinois.

YOUR HAM SHOP advertisement in this space would cost you only $2.80. CQ's non-commercial rates are the best bargain available today at only 5¢ per word. The deadline for our April issue is February 10th. Type your classified ad, attach payment and mail to CQ Ham Shop, 300 West 43rd Street, New York, New York 10036.

JOHNSON DESK KILOWATT—new side band modification kit—Ranger PTT sequence keying—factory wired—Kilowatt Match Box swr bridge—new tubes—extra spares 4—400A's—810's—872 A's—not surplus—complete cables ready to operate—condition like new—$900.00 cash. Ted Brix—5573 No. Van Ness Blvd, Fresno 5, California.

TOROID RTTY KIT Mark-Space discriminator and bandpass filters. Includes 4-88 mh and 1-44 mh uncased, like new toroids; information sheet, mounting hardware and six mylar capacitors. $5.00 Postpaid. Toroids: Specify 88 or 44, less capacitors, $1.00 ea. 5/$4.00 Postpaid. KCM Products, Box 88, Milwaukee 13, Wis.

!!SWAP, SELL, TRADE with other hams!! Special subscription to "Ham Trader" 12 issues $1.00—Box 153C, Franklin Square, N.Y.

WANTED: Commercial, military, all types ARC, ARN, ARM, GRC, PRC, URR, URM, TS, 618S, 17L, 51R, 51X, APN, others . . . Ritco, P.O. Box 156, Annandale, Va.

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. . . that it costs only 5¢ a word to insert an ad in *CQ*'s Ham Shop? That's right; only 5¢ a word will buy you an ad that will be seen by more active amateurs than *anywhere* else! So, why wait to sell that extra piece of gear or those spare parts? Simply send your typewritten copy along with your remittance (based on 5¢ per word) to: Ham Shop, c/o *CQ*. The Radio Amateurs Journal, 300 W. 43rd St., New York, N. Y. 10036. You will find that your ad has more than paid for itself.

QSL's Large selection, including photos, rainbows, cuts, etc. Fast service. Samples, 25¢. Includes beautiful four inch call letters for your shack. Ray, K7HLR, Box 1176, Twin Falls, Idaho.

NOW! 1000 gummed name & address labels with call, $1.00; self-inking pocket name & address rubber stamp with call, $1.00. Boss's, Box 7-A, Grandville, Michigan.

DISCOUNTS! All reconditioned and guaranteed. Home trial. E-Z terms available. Act now. G-76, $224; HX-50, $296.10; Invader, $395.10; G-66B, $79.20; Scout Deluxe, $89.96; DX-100, $135.10; Meteor, $67.05; 20A, $107.10; NC-109, $98.10; HQ-140X, $125.10; Viking II, $112.05; HG-303, $53.10; PMR-6A, 12 v., $53.96; HR-20, $116.10; HX-20, $179.10; DX-40, $44.96. Leo, WØGFQ, Box 919, Council Bluffs, Iowa.

SELL Heathkits, GR-91 rcvr, $23; GP-11, 12 v. pwr., $13. Ameco CB-2 conv., $14. WA8HKN, 375 So. Market, E. Palestine, Ohio.

ART-13, complete with power supply, $80., or will trade for DX-60 or equivalent. Write: Michael Windolph, 3644 Rocky River Drive, Cleveland, Ohio.

SACRIFICE! Heath Apache xmitter with SB-10, $225 (w/o SB-10, $175); Collins 75A-1, $175; 500 watt linear, $75. Whole station, with cables and relays, $450. Bill Darby, Box 226, Perry Point, Maryland.

MORROW TWINS MB560-A xmtr and MBR-5 rcvr, mobile power supply, mike, Master Matcher, whip antenna. Cables, mount. A-1 shape. $150 complete. KØAEK, 6551 East Dakota Avenue, Denver, Colorado.

FOR SALE Knight R-100A with speaker & S meter, $100. Heath MT-1 with HP-20 pwr supply, $80; Knight P-2 SWR meter, $10; all less than 1 year old. Also, Hammarlund Super Pro with pwr supply, $50. WA8IPJ, 208 Marble St., Cadillac, Michigan.

WANTED: Early CQs. Jan., Feb., May, 1945. Last issues needed to complete collection. Write: A. M. Dorhoffer, 75-15 177 St., Flushing, N.Y.

advertisers index

WRL Makes Quantity Purchase Of New National Receivers

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Council Bluffs, Ia. (HAM)—Leo I. Meyerson, WØGFQ, President of WRL quotes:"I have just purchased a stock of New National Receivers, at a hot price. This savings will be passed on to our customers." Leo also stressed, "We shall give top trade-in allowances despite the bargain prices on these receivers. For the past 28 years WRL

SAVE $100.00 *NC-270*

A SAVINGS OF OVER 35% on the regular price of $279.95 on the famous NC-270,...a double conversion receiver, 6 to 80 meter ham band coverage and other features, including: selectable sideband; five selectivity positions—600 cy. /5Kc.; both product and diode detectors; high order stability for SSB/AM/CW reception; 1 uv. sensitivity for 10DB SN ratio; built-in 100 Kc. calibrator, ANL; "S" meter; etc. Size 8⅝" x 15⅝" x 9". Approx. 28 LB. less speaker.

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Quote trade-in allowance on my _____ ( ) Send info on Charg-A-Plan.

Name _____ call _____
Address _____
City _____ State _____

For further information, check number 69, on page 110

from ALLIED

Get the Most Out of Your Rig and Antenna with this knight-kit® SWR/Power Meter!

Flexible 2-Unit Design

LOOK AT THIS BIG ARRAY OF "MOST WANTED" FEATURES...

- Provides accurate readings of relative power from 0 to 10, and SWR from 1:1 to 20:1
- For use on ALL TEN Ham Bands from 160 Meters to 420 Mc—and other transmitters in the 1.8 to 432-mc range
- For 50-72 ohm unbalanced lines
- Withstands full kilowatt input
- "In-Line" type—can be left in line as constant monitor
- Accuracy better than 10%
- No batteries or power needed
- SO-239 RF coaxial connectors
- Sensitive 100 microamp meter
- Built-in sensitivity control
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Model P-2 SWR/Power Meter Kit

ONLY **$15.95**

Want to experience that wonderful feeling that comes from knowing you're getting maximum power into your antenna? The easy-to-build Knight-Kit Model P-2 "in-line" type SWR/power meter makes it a breeze to eliminate the power waste occurring in transmission lines with high SWR. It measures relative power being fed to your antenna, and SWR reflected from it. Negligible insertion loss permits unit to be left in the line permanently—providing a constant check on your rig's efficiency. The P-2 SWR/power meter is actually two separate units—a coupler and an indicator connected by a 4-foot shielded cable. Units are designed for unbalanced 50-72 ohm lines. They handle a full kilowatt from 1.8 to 432 mc (require 35 watts for full-scale deflection on 80 meters). Meter reads SWR from 1:1 to 20:1 and relative power from 0 to 10, with better than 10% accuracy. Sizes: coupler, 2 x 5 x 2½"; indicator, 2⅞ x 6¼ x 3". Complete with all parts and easy-to-follow instructions. Shpg. wt., 2 lbs. Get maximum signal punch from your rig—order today!

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City_____ Zone_____ State_____

For further information, check number 70, on page 110

Our Founder

It looks funny today in its slab-sided black crackle cabinet, but in its day the National SW-5 "Thrillbox" was a real bearcat of a ham receiver. Imagine . . . plug-in coils all the way down to 10 meters, a tuned R.F. stage, and even a "screen grid detector for increased sensitivity"! The Thrillbox and its equally famous little brother, the SW-3, were the first receivers designed by National for amateur use, and probably nine out of ten old-timers remember these units as their first store-boughten equipment. The Thrillbox was the first of a proud line of National amateur equipment through the years that represents the finest quality and performance it is possible to buy — Grand old names like the FB-7 and FBX-A, the AGS, the mighty HRO series, the NC-100 and '101X, the NC-200 and '240D, right up through the NC-300, '303, and the new NCX-3 SSB transceiver. 1964 marks our Golden Anniversary . . . and we take a certain pride in maintaining National's acknowledged reputation for leadership in workmanship and performance over half a century. The advanced products we build today for both the military and amateur markets are pretty fancy compared to the SW-5, but are still old fashioned in one important respect–our built-in determination to make the very best.

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A special message to every Amateur using a 6146, 6146A, or 8298

33⅓% HIGHER POWER INPUT

—with this new beam power tube

If you are now using a 6146, 6146A, or 8298—you can replace it with a new RCA-6146B/8298A and increase your power input one-third. A single tube takes up to 120 watts plate input, ICAS; *two take nearly a quarter kilowatt!*

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And there is more about this tube than just high power. "Dark-Heater" design lengthens heater life—makes it possible for the tube to deliver full power output over wide swings in heater-supply voltage. Plate dissipation rating exceeds any design in the 6146 family. And when this new tube operates at 6146 plate input, life expectancy goes up substantially.

Install RCA-6146B/8298A's. Increasing your power was never easier.

Available from your Authorized RCA Industrial Tube Distributor.

Typical Operating Conditions (ICAS) (Heater voltage range, 6 to 7.5 volts)				
Class of Service	DC Plate Volts	Plate Dissipation Watts	DC Plate ma.	Plate Input Watts*
SSB	750	35	220	120
Class C AM	600	23	180	85
Class C CW	750	35	220	120

*Full input to 60 Mc; reduced input to 175 Mc.

For technical bulletin on new RCA-6146B/8298 write: Commercial Engineering, SectionB-15-M RC Electronic Components and Devices, Harrison, N.J.

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