CQ

MAY, 1948

The Radio Amateurs' Journal

35¢



THIS MONTH

- Single Sideband: Its Pros and Cons
- Multi-Band Driven-Element Rotary
- A Transmitter for the New Amateur
- Clickless Keying Using VR Tubes

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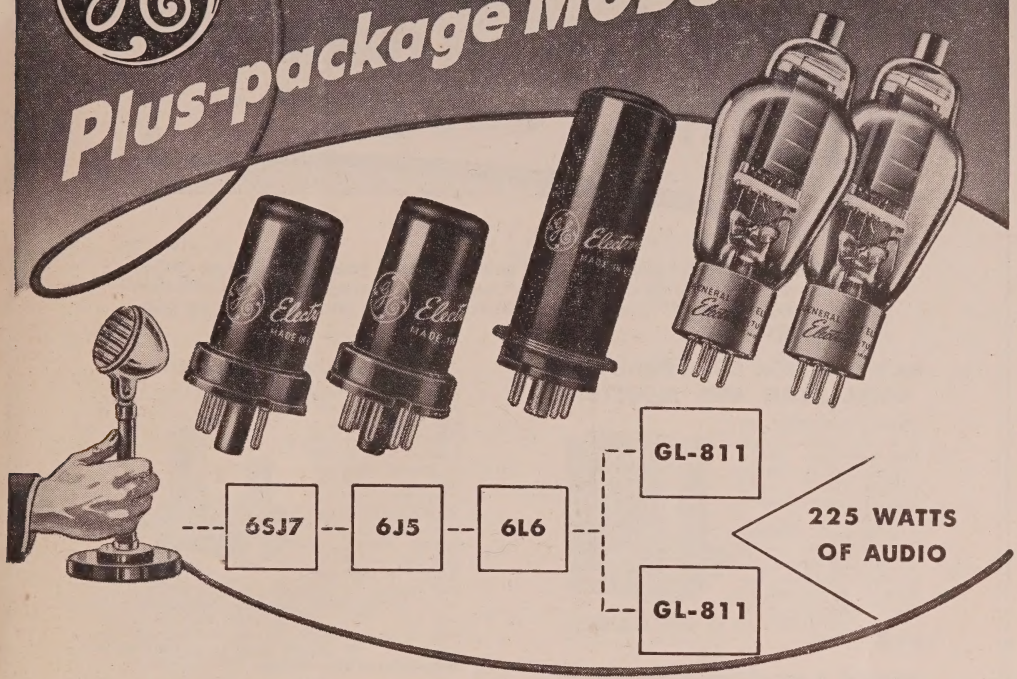
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• • •

For what's new, helpful, practical . . . read *Ham News!* Published bi-monthly in eight fact-crammed pages, with plenty of explanatory circuits and other illustrations. Ask your G-E tube distributor for your free copy of each issue as it comes off the press.

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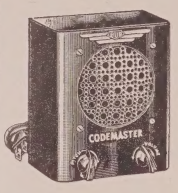
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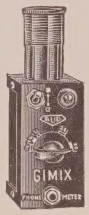
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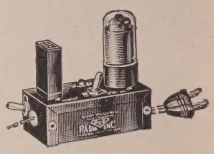
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Where else can you get not one, not two, but FIVE for the price of one.



The BUD GIMIX GX-79 can be used as a Wavemeter, a Monitor, a Field Strength Indicator, a Carrier Shift Indicator and a Sensitive Neutralizing Instrument. Savings like this are not found every day. **Ask your distributor to show you the BUD GIMIX. $8.30 net.**

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CQ The Radio Amateurs' Journal

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COVER—A complete low-cost amateur station which, during a 3-month period of on-the-air tests, was used to successfully contact 18 countries on 40 meters, and 46 states on 80, 40 and 20. The transmitter is described beginning on page 23. The receiver is the National NC-57. The antenna used is a 66-ft. doublet.

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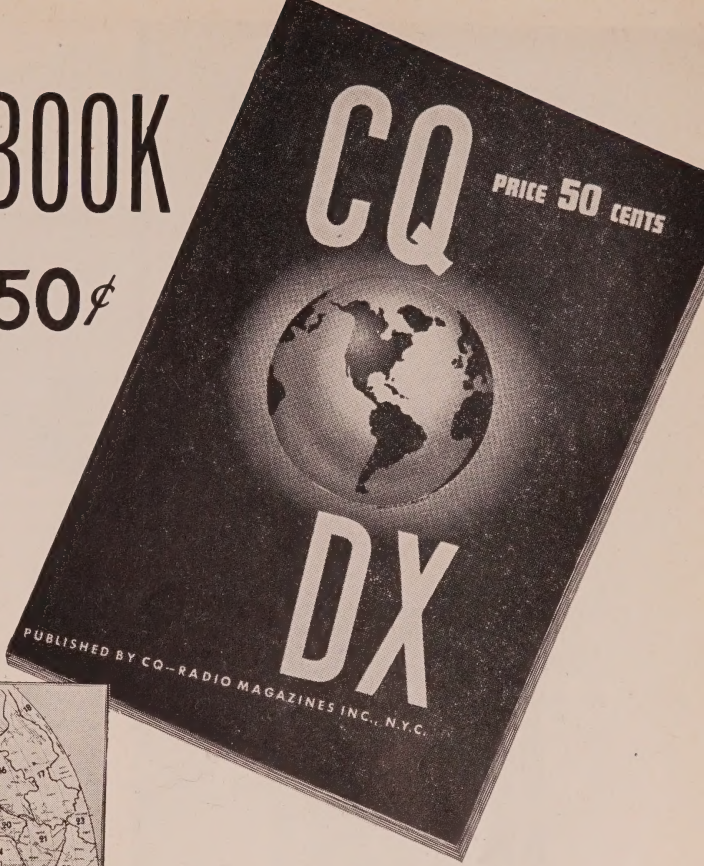
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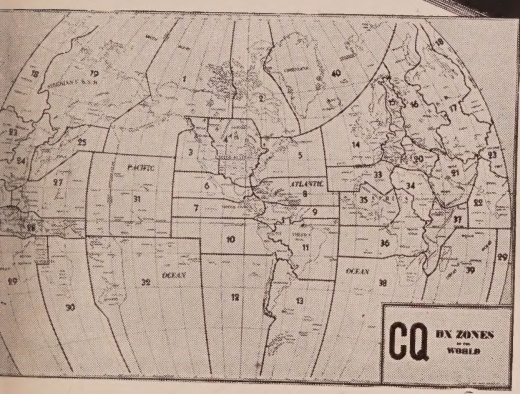
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- Use of DX Predictions
- QSL Bureaus of the World
- International Postage Rates
- World Zone Boundaries
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- 10 Maps and charts

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The No. 92101—Antenna Matching Preamplifier

The Millen 92101 is an electronic impedance matching device and a broad-band preamplifier combined into a single unit, designed primarily for operation on 6 and 10 meters. Coils for the 15 and 20 meter bands as well as television channel 2 thru 6 inclusive also available. This unit is the result of combined engineering efforts on the part of General Electric Company and the James Millen Manufacturing Company. The No. 92101 is extremely compact, the case measuring only 6½" x 5⅞" x 3". The band changing inductor unit plugs into the opening in the front of the panel. Plug is provided for securing power requirements for the 6AK5 tube from the receiver. Coaxial connectors and plugs are furnished for the antenna and receiver connections.

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★ ★ ★ Letters ★ ★ ★

Disaster at Palmyra

Palmyra Island, c/o Postmaster,
Honolulu, T. H.

Editor, *CQ:*

On the morning of February 16, 1948, at 5:15 a.m. Mrs. Barnes (KP6AA's XYL) awakened and thought she smelled smoke. She jumped out of bed and ran into the living room where she found a couch burning. She ran back and woke Steve (who had been up very late the two previous evenings in the phone DX contest). As Steve approached the couch with a fire extinguisher to put out the fire the whole room burst into flame. His XYL was taking their two children from the house and he ran out of the front door and over into the other section of the building, our quarters, to rouse my wife. As he opened the door the living room was already aflame but he did succeed in waking my wife who fled from the house with our 10-month old boy. Forty minutes after the start of the blaze the building was flat. Steve received second degree burns on the back, arms and hands, but he will be okay.

Naturally, all our furniture, personal effects, and ham gear was completely lost. Since our total loss was eight thousand dollars we won't be able to put out much for ham gear for a long time. Our things were not and cannot be insured here except for exhorbitant rates. I am not writing this to play on anyone's sympathies, but we wondered if it would be possible to have a line or so inserted in *CQ* to the effect that KP6AA and KP6AB would appreciate it if any of the gang who have spare or used parts, gear, tools and so forth, would send them along to us. Of course, we don't want any of the fellows to send or get new gear and send it, but I know, as we did, many fellows have stuff laying around that will never gather anything except dust and rust. If they figure that the gear would weigh too much to send us just on the off chance that we might use it they might be good enough to send us an air mail letter (reg. mail comes by boat and takes from six weeks to six months) saying what they have and we could reply. Also if any of the gang have back issues of *CQ* or *QST* that they could send we would appreciate it. One of Steve's friends is sending him a book of the '47 issues of *CQ*.

All of our logs, card files, and QSL files were destroyed. I fortunately had my log on Guam with me and can confirm all QSOs after Dec. 12, 1947, but none earlier. Steve worked some 1500 stations (quite a score) during the phone section of the contest and will not be able to confirm any of these QSOs except those he remembers. Any W or DX stations that we have exchanged cards with we would like to send us duplicate cards, if possible, to start our files anew.

I attended one of the club meetings of the boys on Guam and enjoyed meeting them. I did not get a chance to get on the air there because it would have taken me 6 weeks just to get the go ahead sign. You might inform those hams in the States with traffic and 3rd. party QSOs for KG6 that they had better have the phone numbers of the party on Guam in the future. For security reasons the KG6 boys will not be able to confirm deliveries or arrange schedules when specific Army/Navy groups are asked for. In other words if you ask for Sgt. Doe, of 67th. Company, 22nd. Engineers, etc., they are not allowed to admit that such an outfit is on Guam



EVERYTHING YOU WANT.....in a high quality low cost receiver

Model hallicrafters NEW S-53

- Coverage: 540 kc to 54.5 Mc
- Five bands
- Accurately calibrated slide rule dials
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Overall tuning range: 540 kc to 54.5 Mc. Band 1: 540-1630 Kc; Band 2: 2.5-6.3 Mc; Band 3: 6.3-1.6 Mc; Band 4: 14-31 Mc; Band 5: 48-54.5 Mc.

Controls: main tuning, bandspread, bandswitch, RF gain, audio volume, tone control, noise limiter, standby-receive, phone-code switch, speaker-headphone switch and phone jack on rear panel. Input jack for record player pickup connection.

New superhet circuit uses: 1—6C4 oscillator; 1—6BA6 mixer; 2—6BA6 IF's; 6H6 detector-AVC-noise limiter; 6SC7 BFO-1st audio; 6K6GT audio output and SY3 rectifier.

Size: 12⅞" x 6⅞" x 7⅞".

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LISTEN FOR THE GATTI HALLICRAFTERS EXPEDITION

Hallicrafters mobile, radio-equipped expedition now operating via short wave from the Mountains of the Moon, Africa. Listen for these call letters:

VQ5-GHE VQ3-HGE VQ4-EHG VQ5-HEG

Visit your distributor for maps, itinerary, schedules, other details.

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MALLORY HAM BULLETIN

Time to Dust Off Your Portable-Mobile Gear for Country-Side Operation

With Field Day activities just around the corner, get out those vibrator power supplies and check them over for defective and sub-standard components. Don't be caught short when the rest of the gang heads for open country. A few simple checks NOW will save vibrators and headaches later.

a. ***Check your buffers and filter capacitors for opens or shorts (don't forget, electrolytic capacitors usually draw higher than normal currents when first put into operation after a period of inactivity).***

b. ***If a rectifier is used in your pack, check that tube; it may be shorted, or its emission may be down.***

c. ***Check the circuits of your portable transmitter and receiver for high voltage shorts (watch those screen bypasses in particular).***

d. ***If your plans include mobile operation from your car or plane, be sure to check the voltage regulator on the charging circuit. (If this regulator puts out much more than 7 volts, you're heading for trouble.*** **It takes a very slight increase in primary voltage** ***to shoot that secondary voltage way up.)***

If your old vibrator is weak or defective, hop down to your distributor and get a new, fresh, Mallory unit and you will be all set—with the most dependable power supply on the market.

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or even exists. Traffic will be accepted for APOs and FPOs but for personal contacts it makes it very difficult to contact a party with just an APO/FPO Nr.

Ordinarily we would be due to leave Palmyra at this time but will probably stay now for another 18-month tour in order to recoup our losses. We have no real regrets, however, since everyone was very very lucky to have gotten out of the fire.

Bill Fells, KP6AB

Copies of CQ and other Radio Magazine Publications are on the way. Here is a chance to help out two DX men who were always willing to cooperate with the Stateside gang—Ed.

W.A.S. from VK

2 Stanford St., Kurri Kurri,
Newcastle, South Wales, Australia

Editor, *CQ:*

On behalf of the Newcastle amateurs who wish to gain the American W.A.S. certificate, we ask if you can find space to print our plea to your country in your *CQ*, which is much read here in Australia.

We are always calling or on the lookout for stations which will give us our W.A.S., and find Vermont, New Hampshire, Maine, Montana, and Nevada some of the ones we rarely hear on 10-meter phone. On Sunday, which is your Saturday, we call you all day on 10-meter phone. We often hear stations using quite low power and poor locations who never dream they are pushing a signal into Australia, so we in return can only give them their first VK in Australia for W.A.C., as we have many times done already. We often call stations on the 29–30 mc portion of the band but they in return when on 29–30 mc do not look over the 28 to 28.5 mc portion after they call CQ.

We start up here on 10 meters at 6 a.m., our time, which is mid-day on your Pacific Coast and your signals are still in at 9 p.m. on your Pacific Coast.

So if you hear these calls on 10-meter phone you will know that they are after W.A.S.: VK2YL, 2ADT, 2PZ, 2MK, 2KF, 2XT, 2YO, 2TY, 2ADX, 2AGD, 2AHA, 2ZC, 2BZ, 2AFS, 2KZ.

E. M. Austin, VK2KZ

Bouquets to W3JAY

Medford, Oregon

Editor, *CQ:*

In the November issue of your magazine, *CQ*, there was an article entitled "Life Insurance in the Shack" by George J. Nichols, M.D., W3JAY, on electric shock. This article was one of the best prepared summaries of the effects of low voltage on man that I have read and I would like to make this information available to the employees in our company.

C. C. Haggard
The Calif.-Ore Power Co.

An Offer of Equipment

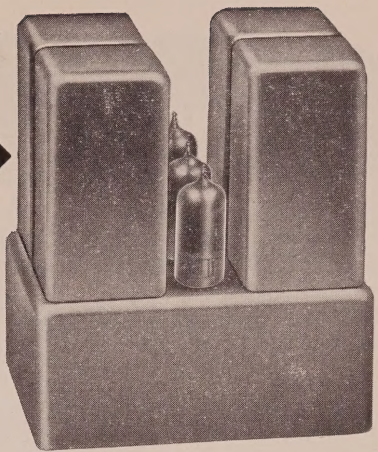
89–19 78th St., Woodhaven 21,
L. I., N. Y.

Editor, *CQ:*

This is just to ask you if you can by any chance, supply me with the name and address of some Veteran's organization, or any outfit that might be interested in making use of my old radio gear, which I would be glad to donate gratis, providing they just call for it and pick it up, as I am living in rather cramped quarters and wish to make more room for my present equipment.

(*Continued on page 89*)

McMurdo SILVER the "NEW LOOK" in SELECTIVITY

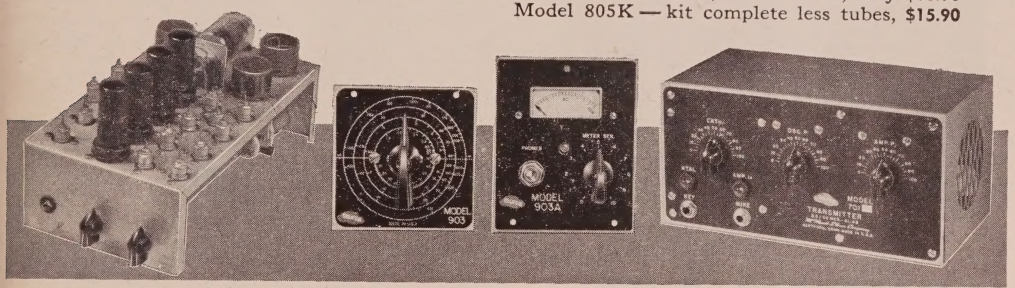


Philip Rand started a new trend to real, badly-needed receiver-selectivity with his Q-5er. Byron Goodman carried it forward with his "Lazy-Man's Q-5er". We applaud both steps, but felt that even more could be attained by *special design* to really give every ham super-het, new or old, the "New Look" selectivity QST advocates.

Our answer is Model 805, 100kc. I.F. Amplifier. Connect it between your last i.f. secondary and your audio volume control and you get a small boost in gain. But what you *really get is* single-side-band selectivity — a selectivity curve 2.4kc. wide across the flat top, skirts falling so steeply as to be only 4.7kc. broad 1000 times (60 db.) down, only 7.2kc. wide 10,000 times down! As Byron Goodman says of this *new look* selectivity, it will "cut thru the QRM and pull out the desired signal like nothing you ever saw or heard".

Take Model 805, only 3 7/8" wide, 4 15/16" long, 5 5/8" high, make 6 simple connections to your 455/465 kc. i.f. receiver, (which can usually supply 6.3 V. a.c. at .75 Amps. and 110 to 250 volts d.c. at 25 ma. to the 805) and you *have that* post-war receiver with the "new look"

Model 805 Price, less 1- 6BE6, 1- 6BA6, 1-6C4 tubes, only **$18.90**
Model 805K — kit complete less tubes, **$15.90**



703 FREQUENCY MULTIPLIER Model 703 Pre-Tuned Band Pass Frequency Multiplier is now in stock at all progressive amateur jobbers. All you need is an 80 meter v.f.o. or xtal oscillator putting out about 1 watt to drive 703 — which, at the flip of two knobs, gives you 40 watts output 80 thru 10 meters, 20 watts on 6 meters. Whether you use it to feed an antenna tuner directly, or to drive a kilowatt "final", Model 703 short-cuts all usual intervening doubler stages — replaces them with a compact, *quick* means of getting anywhere in any band 80 thru 6 meters in a jiffy. Net price, less 2 — 6AG7, 2 — 6L6, 1 — 807 tubes, and 300 volt, 250 ma., 400 to 600 volt, 100 ma. power supply is only **$49.90** net, ready to go.

903 WAVEMETER & 903A FIELD STRENGTH METER That Model 903 absorption wavemeter nicely meets a basic amateur need is proven by the thousands in use. "HANDBOOKS" have recommended such a wavemeter with crystal rectifier and meter for visual indication and field strength measurements. We are glad to offer Model 903A companion meter-rectifier unit — for direct attachment to top of 903 panel.

Model 903A matches, and becomes part of 903 wavemeter, to which it adds 1N34 rectifier, new Silver 0-1 ma. 0/100 division meter, meter sensitivity control and phone jack— to make the sweetest wavemeter and field-strength meter we've seen. 903 wavemeter is **$3.30** net; plug in coils, 1600 kc. to 500 mc., **$.65** each net. Model 903 A Rectifier-Meter Panel is **$14.50** net.

701 TRANSMITTER, 75 WATT CW, 30 WATT PHONE Following "HANDBOOK" teachings for maximum transmitter efficiency vs. cost and complexity. 701 Transmitter has proven itself in tens of thousands of QSO's. Compact to save space in home or mobile installation, it's the sure-fire answer to 75 watts of clean CW, 30 watts of AM phone signals. A 6AQ5 xtal Tritet drives an 807, 80 thru 6 meters. Two 6AQ5's turn out 14 watts audio to 100% speech modulate 807 plate/screen. Power supply requirements are satisfied by Model 301 Power Supply for 40 watts input or by a simple "HANDBOOK" assembly for 75 watts input.

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Deer Hon. Ed.

After fracas what are occurring at Itchi's ranch I are making good my get-away from posse and Scratchi is now hamming it incogneeto in a boarding house. My brother Itchi are visiting me the other day and bringing my low power ten meter phone rig, so I are having funs working out. Itchi are saying that the raleroad and telefone companies are still looking for me with bloods in there eye, and Itchi are suggesting that I stay away from his ranch another months or so.

He are thinking that Scratchi can staying out of troubles, but it are seeming that Scratchi's troubles occurring anyplace, like parasitics that are occurring wherever grid condenser are tuned. For examples, the landlady here recently investing in big new televisions set. Everybodys in boarding house very excited, and we are all watching man from deelers putting nice two-element beam on tops of house. He are hooking it to television set and are telling everyones that in evenings we can all enjoy programs.

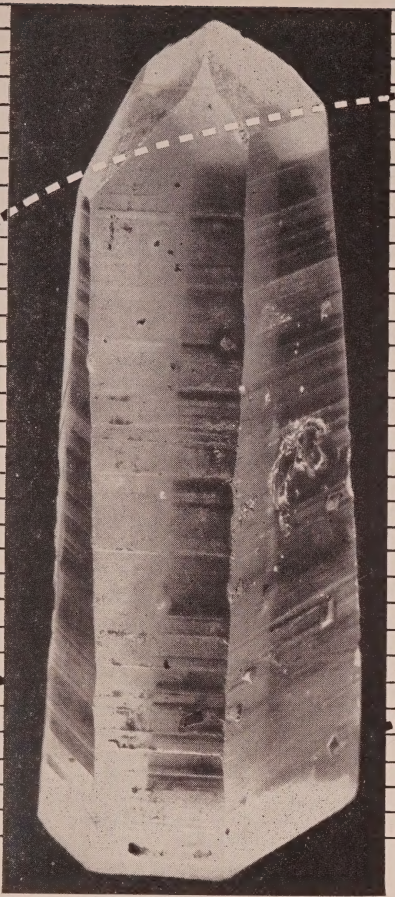
I are very worried, because unbeknowingly the installation man are putting beam for television set directly over Scratchi's folded dipole which are in attic. (Landlady not knowing Scratchi are amateur as we are not to be using anything electrical or is costing more monies.) However, that afternoons I tried out my ten meter rig and are finding that television antenna not bothering my sigs at all. By scientifick dedushion I are figuring that this is due to lack of harmonic relationships, so I are quite happy.

That evenings after dinner we are all retiring to sittings room and grouping around new televisions set. After many fumblings with knobs landlady are getting nice picture from local picture-sending station. This are Scratchi's first initiashun to television and by-gollies it are hot stuff. Pictures come out reel plain as we are watching news-reel. The next program are coming direct from studios, where several jugglers and akrobats are coming on and throwing things and themselves around. Scratchi are not caring for akrobats, so I are sneaking upstairs to see if I can working a VK or a ZL before program changes.

I are just getting into good voice as I are calling seek-you DX when I are heering much clappings from downstairs. Thinking that maybes I are missing big stuff programs, I are throwing rig off and dashing downstairs. Landlady are telling me that rite after I are going upstairs the akrobats are standing on ceiling and doing there tricks, but now they are back on floor again. This are sounding like very mistifying trick, even for televisions program. I are waiting for them to do it again, but programs are ending with akrobats still on floor and right-side up.

(*Continued on page 93*)

SOLID AS A ROCK





Tens of thousands of PR Precision CRYSTALS in commercial service the world over are eloquent evidence that PRs STAY PUT! In aircraft, in the marine, in broadcast and point-to-point, in police and military installations . . . in fact, wherever frequencies MUST be in channel . . . you will find PRs on the job. PRs for commercial service are *precision made* . . . low drift cut for the utmost in stability . . . with temperature coefficient less than 2 cycles per megacycle per degree Centigrade . . . calibrated within .005 per cent of specified frequency . . . contamination and moisture-proof . . . weight less than ¾ ounce. Power output is exceptional, both for fundamental and harmonic oscillators. Since 1934 PR has become a standard of excellence for crystal controls . . . in all fields — commercial, amateur and industrial. It's no wonder that amateurs prefer PRs in their rigs at all frequencies. Use PR and KNOW WHERE YOU ARE!—Petersen Radio Company, Inc., 2800 W. Broadway, Council Bluffs, Ia.

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ZERO BIAS

EDITORIAL

THE LEGISLATURE of the State of New York, in their 1948 session, finally amended a section of the penal law (Section 1916) dating back to 1933. The amendment in itself is more of a convenience than anything else, but its inception and ultimate passage carries a story of vital interest to all amateurs everywhere. It is also a tribute to the diligence of a small group of hams and the fair mindedness of a group of public servants.

In the June, 1946, issue of *CQ* in "Zero Bias" we discussed the case of a duly licensed amateur who had been detained on the grounds that he was carrying a receiver capable of receiving police calls. The case was dropped and the Commissioner of Police in New York City sent to all precinct stations a copy of the F.C.C. license form issued to amateurs with instructions not to molest bona fide amateurs. Nevertheless, the nuisance persisted, and, even when one is in the right, the experience of being taken to a police station can be painfully embarrassing.

Early in 1947 Ruben Gross, W2OXR, of the Staten Island Amateur Radio Association, contacted State Senator Robert E. Johnson, who introduced an amendment to Section 1916. However, the N.Y.C. Police Commissioner so violently objected to the amendment that it died in committee. Further efforts on the part of Louis Roth, W2DKH, to secure the introduction of a new amendment were rebuffed by his local legislator.

In November of last year Gay E. Milius, Jr., W2NJF, on behalf of the Westchester Amateur Radio Association, contacted State Senator William F. Condon of Yonkers. Senator Condon was most sympathetic and had the WARA contact Assemblyman Malcom Wilson of Yonkers. The WARA was requested to submit a draft of the proposed amendment. This was prepared by W2DKH and W2NJF and the final version of the law is essentially unchanged from the draft. On behalf of the amateurs of New York State, the amendment was introduced into the State Legislature.

Again the Police Commissioner of New York City filed a strong protest against the bill. The objection of Commissioner Wallander is noteworthy because of its complete disregard for the present state of the art—in other words, anyone who desires to receive police calls can do so without the slightest chance of detection unless a careful inspection is made of every radio-equipped vehicle in the city.

Stated Mr. Wallander: "The enactment of this legislation would mean that a large number of automobiles would be equipped with radio receiving sets of the type referred to [capable of receiving signals on frequencies allocated for police use] and law enforcement authorities would have no supervision or control over the use of such receiving sets. The Federal Communications Commission allocates wavelengths which may be used by holders of amateur radio operator's licenses, and these wavelengths are not in conflict with frequencies allocated for police use.

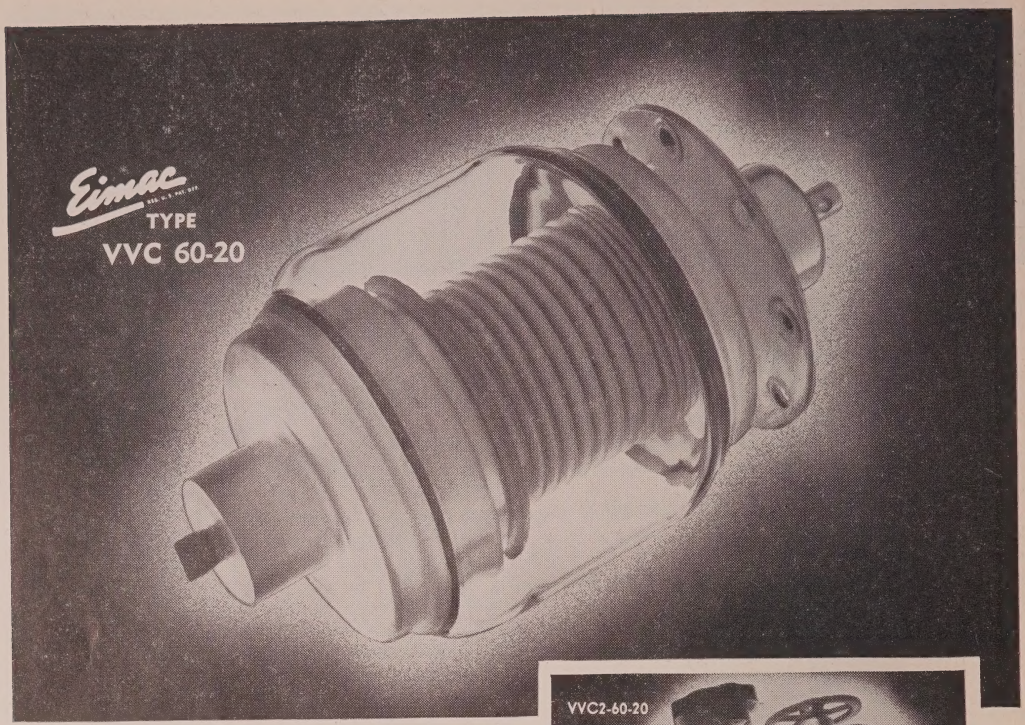
"The Police Commissioner of the City of New York, under the authority of Section 1916 of the Penal Law and Section 434a-37.0 of the Administrative Code, issues permits to persons to equip automobiles with radio receiving sets capable of receiving signals on police frequencies. These permits are issued only after a thorough investigation of applicant and the purpose for which application is made. The enactment of this law would deprive the Police Department of investigation, supervision and control of a large number of radio receivers operating on police frequencies."

Just about the time this objection was filed, *CQ* was deluged with telephone calls from amateurs in the metropolitan area who had learned that a bill was about to be enacted that would *prohibit* mobile operation in New York. This misinformation was widely disseminated by a number of poorly informed local amateurs. The results might have been disastrous had not the correct version of the law been quickly circulated. The irresponsibility of some amateurs in discussing heresay as fact is to be severely criticized since the correct information was so readily available from the officers of most of the interested New York radio clubs.

When the bill passed the Assembly and was introduced to the Senate it was felt that additional support from other parts of the state would be highly desirable. Letters to local legislators were dispatched by amateurs, although the exact number is not known. At any rate, the bill was comfortably passed by the Senate and was forwarded to the Governor for his approval or veto. Because Governor Dewey was formerly a District Attorney, apprehension was felt that he might be influenced by the objection of Commissioner Wallander. At this point Spencer McCarty, W2GTI, of the Albany Radio Club, was of great assistance in clarifying the amateurs' position to the Governor's Office, and, most important, was on the scene if needed. Also, a sufficient number of clubs and individuals were fully appraised of all the pertinent details to give the Governor an accurate and impressive picture of the amateurs' case. Governor Dewey signed the Assembly Bill 309 which became Chapter 183 of the Laws of 1948.

The lessons learned from the legislative procedure

(*Continued on page 87*)



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GENERAL CHARACTERISTICS

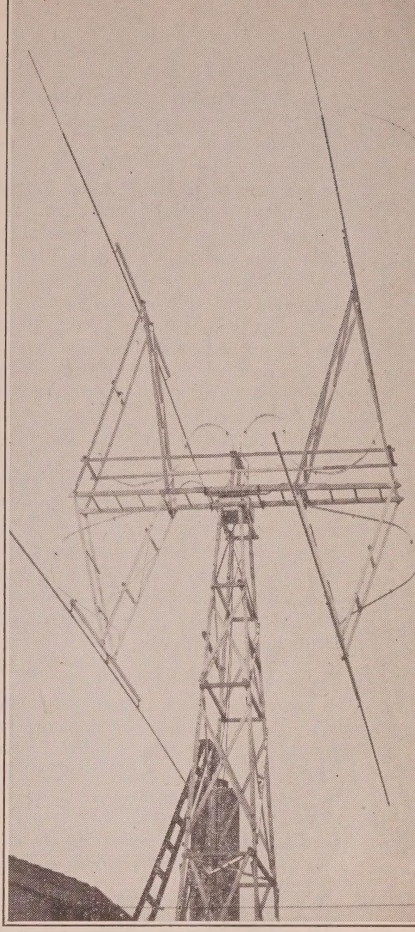
	Capacity	R-F Peak Voltage	Maximum RMS Current
VVC 60-20	10-60 mmf.	20-KV	40 amp.
VVC2-60-20			
Parallel	20-120 mmf.	20-KV	80 amp.
Split-stator	5-30 mmf.	40-KV	40 amp.
VVC4-60-20			
Parallel	40-240 mmf.	20-KV	160 amp.
Split-stator	10-60 mmf.	40-KV	80 amp.

Multi-Band Driven-Element

ROTARY BEAM

R. J. ROGERS, WØNNI*

A proponent of the driven-element school comes up with an effective beam for 10, 11, 15 and 20.



Two single-section 14-mc 8JKs stacked three-eighths wave on 20 and fed 180° out of phase with Q bars enables operation on 10, 11, 15 and 20.

WHEN SHORT SKIP sets in, the locals frequently get together for round tables on problems of mutual interest. Antennas, as always, are high on the list of topics gone over. The writer, as a staunch advocate of the driven-element type of rotary, has been the center of considerable controversy from the equally vigorous proponents of the parasitic type of array.

The beam described in this article was built as the "final" answer to the parasitic advocates. The driven-element beam, while impressive to look at, is even more impressive when one examines its performance statistics. Here is a single beam that will perform very efficiently without any retuning or switching on 10, 11, and 20, and also gives satisfactory performance on 15!

Basically, the driven-element beam consists of two Johnson Q-type, single-section, 20-meter 8JKs, stacked three-eighths wave on that band. The Q-bars are so arranged that the impedance at the feed point is identical whether the array be used on its fundamental on 20 or on its first harmonic on the 10-meter band. On 10 meters it becomes two *double-section* 8JKs, stacked approximately five-eighths wave. Looking at it from the front, it is two complete Lazy Hs, one 10 feet behind the other, fed 180° out of phase. If feeder length is properly adjusted, the array will also resonate on 15 meters as two extended-Zepp 8JKs stacked one-half wave.

Theory and Mathematics Involved

Most authorities on the subject agree that the impedance at the center of a single-section 8JK is approximately 21 ohms, where the elements are spaced somewhere between an eighth and a fifth of a wavelength. Optimum gain with two driven elements fed 180° out of phase is obtained with spacing between a seventh and a fifth wavelength, so we chose 10 feet spacing as giving optimum efficiency on 20 meters while still not too far out of line for 10-meter operation. These same experts seem to agree that the center impedance increases to approximately 1200 ohms when the array is operated on its second harmonic.

*2511 *Locust St., Denver 7, Colo.*

Two formulas are employed in computing the physical characteristics of the quarter-wave matching sections needed for 20-meter operation. The formula to ascertain the impedance necessary in a quarter-wave section to match the center of the antenna to a given feed line is as follows:

$$Z_m = \sqrt{Z_l \times Z_a}$$

where Z_m is the characteristic impedance of the quarter-wave section, Z_l is the impedance of the transmission line going to the transmitter, and Z_a is the center impedance of the antenna. The formula used to determine the physical spacing and size of the elements needed for such a quarter-wave matching section is

$$Z_m = 278 \log_{10} \frac{2D}{d}$$

where D is the spacing between the centers of the elements and d is the diameter of the conductors utilized in the matching section.[1]

These formulas are intended primarily for those who might want to use different diameter tubing than we did. If ½" aluminum tubing is used, a spacing of 1" center to center gives the 158-ohm

1 The presence of the second 8JK stacked 10 feet above the lower section changes the impedance of the array due to the mutual impedance between the elements. However, since WØNNI obtains a low SWR on the basis of impedances mentioned the practical change evidently is not too great.

impedance needed in the quarter-wave sections, and 3 1/16″ spacing gives the 300-ohm impedance for the feeder line.

On 20 meters the 158-ohm quarter-wave transformer increases the 21-ohm center impedance of each element to 1200 ohms at the center of the array. Connecting the feeders on each side in parallel and then transposing the connection between these brings four 1200-ohm impedances together, resulting in an impedance of 300 ohms where we attach the feed line. On 10 meters the Q sections become ½ wave and serve as a one-to-one transformer. The 1200-ohm center impedance for each element with second harmonic operation is transformed to 300 ohms at the beam feed point. Large diameter elements will tend to make the array broad enough to resonate also on 11 meters. A standing wave ratio may appear on 11, and will appear on 15-meter operation where we adjust feeder length to have a current maximum at the transmitter link connection. But 10 and 20-meter operation offers no such irregularities. The beam at WØNNI dips a grid meter at the link end at approximately 14,300, 28,500, and 21,350 kc, and will take the full output available on any frequency in the 20, 15, 11, or 10-meter bands.[2]

Material for the R-F Portion

The radiating portion of the beam requires light self-supporting 10-meter elements, with a good degree of stiffness. We employed Dural pipe, 24ST, 1 1/8″ in diameter, each 16′ 3″ in length. Some of the new tapered and corrugated light steel elements, such as are available from Premax would be excellent. Weight is quite a factor in an array of this size and every effort should be made to keep it down. In addition, four Q transformers, quarter-wave on 20 meters and 158 ohms characteristic impedance, are needed. 16′ 5″ half-inch diameter surplus duraluminum tubes, spaced 1″ center to center with Johnson variable spacing bars No. 136–33, were employed in our installation. From the center connection of the beam to the transmitter in the shack, 300-ohm line is needed. The most convenient, of course, is Amphenol Twin-Lead. The most efficient would probably be some more ½″ duraluminum tubing with the same Johnson variable spacers set to make the spacing 3 1/16″ center to center. The latter type feeder spacing could be varied with a Micro-Match hooked in for a more exact match. In our case, the Amphenol was employed for convenience. Since the element and Johnson Q dimensions will vary slightly with height above ground, the really particular fellow may want to make them slightly adjustable and resonate them for the favorite frequency with a grid dip meter.

Framework to Support

The headaches and the backaches in the building of super-duper dream beams generally occur in this phase of the operation, and our experience was no exception. The design employed appears to be sufficiently strong, lends itself well to either wood or metal construction, and is also conveniently arranged for raising and placing in position on the top of the tower. It can best be described in words as a rectangular center boom of sufficient diameter to carry the end weight involved, with 4 block triangles mounted on the ends projecting both skyward and groundward from the center boom. The elements are mounted along the line that constitutes the extremities of the triangular sections.

The framework was constructed of 2 x 2 and 1 x 2 lumber with aluminum strengtheners ¾″ wide

2 This is not just a function of beam design. Length of feeder and most important, the output coupling system employed must be considered. The output coupling system at WØNNI uses conventional link coupling.

DIMENSIONS

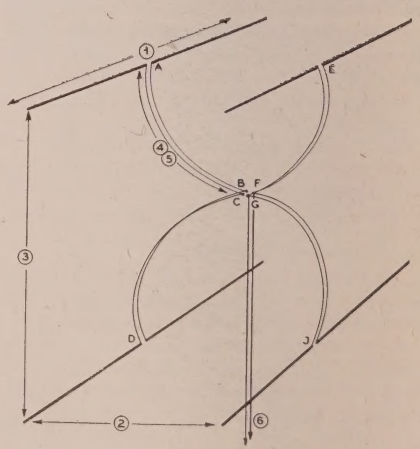
1. TOTAL LENGTH OF RADIATING ELEMENT = $^{464}/_{F_{MC}}$
   USE LARGEST POSSIBLE DIAMETER TUBING
2. HORIZONTAL SPACING BETWEEN ELEMENTS = 10 FEET
3. STACKING FOR BEST OPERATION = 22 FEET
   ANY DISTANCE 17 TO 24 FEET WILL WORK
4. ALL Q BARS (AB, EF, ETC.) ARE ONE-HALF INCH DIAMETER ALUMINUM TUBING SPACED ONE INCH CENTER-TO-CENTER
5. Q BAR SECTION LENGTHS ALL = $^{234}/_{F_{MC}}$
6. 300 OHM LINE TO TRANSMITTER CONNECTS AT THE JUNCTION OF EF AND GJ

DIRECTIVITY

FOR MULTIBAND BIDIRECTION PATTERN
JOIN BC AND FG WITH VERY SHORT CROSSOVER LINK TO OBTAIN 180° PHASING

FOR ONE-BAND UNIDIRECTIONAL PATTERN WITH A HIGH FRONT-TO-BACK RATIO
SUBSTITUTE FOR CROSSOVER LINK A QUARTER-WAVE LENGTH OF 600-OHM LINE

FOR ONE-BAND UNIDIRECTIONAL PATTERN WITH MAXIMUM FORWARD GAIN
SUBSTITUTE FOR CROSSOVER LINK A THREE EIGHTHS-WAVELENGTH OF 600-OHM LINE



The basic positioning of the elements and the Q bars comprising the multi-band rotary.

and 12" long, placed wherever a bolt through the 1 x 2 would be carrying a considerable amount of strain, especially in a high wind. Bolts were used throughout, with large washers, so as to secure all joints in a permanent fashion. The pieces making up the edges of the block Vs are 1 x 2s 12' in length. Two triangles with common 5' bases built of these 12' strips produced a stack of 22 feet, the necessary 3/8 wave on 20 meters.

At least as much cross-bracing as appears in the accompanying pictures should be used. In a location subject to high winds even more bracing might be advisable. The completed framework should be sufficiently rigid that it can be picked up by one corner without more than a few inches of give. Our center boom was made using a 14' ladder for its bottom foundation, with 1 x 2s and 2 x 2s making up the posts and the four other stringers plus cross bracing, sufficient to give it the rigidity needed. The ladder, while heavy,[3] made a good solid place to which the Vs going both skyward and earthward could be solidly bolted, and also a solid foundation to which the channel iron or plate on the rotator could be fastened. Anyone constructing this framework should also note that the 12' stringers making up the Vs begin at the same point of attachment on the center boom, namely on the lower stringer or ladder in our case. Thus, the large diameter of the boom helps to support that part of the structure above the rotator as well as furnishing vertical and horizontal rigidity for the whole array.

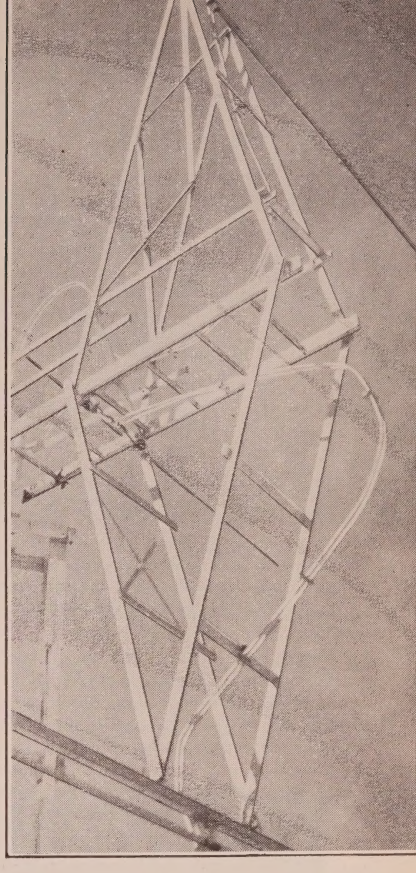
It is easy to understand why the 12' Vs going earthward do not require so much support, since they hang from the boom, so to speak, with gravity helping to keep them in position. Only strength enough to counteract wind resistance is needed.

The cross arms which carry the elements are 2 x 2s 10' long, bolted to the end of the 12' stringers where they come together with 2" angle irons. The joining of the 12' stringers at the end of the V is one of the places needing a strip of aluminum to distribute the strain back from the end of the wood employed.

Overcoming Excessive Rotor Strain

The rotator employed at WØNNI has a 1½" steel pipe, mounted in bearings 5" apart, which carries the plate and channel iron to which the beam is fastened. This has proven sufficiently strong to carry the beam without flexing in winds up to 25 mph. However, to assist the rotator in carrying the strain of such a large array, it was found necessary to build a block, fitted across the lower extremity, which would tie it to the tower at that point and thus remove the twisting motion and unusual strain to which the rotator would be subjected in case of high wind. With the bottom thus blocked in position the rotator has only to carry the side pressure and almost any type of side bearings will stand this strain.

This block was constructed from an 11-ft. 2 x 2 with holes drilled in each end large enough to fit down over extra long bolts fixed in the angle irons supporting the 2 x 2 element holder. Holes were then made in the 2 x 2 block bar to coincide with holes in cross pieces on the tower so that the beam could be blocked either in an east-west or north-south direction. We are thus able to employ the array in a fixed position regardless of the wind velocity. This blocking feature requires a convenient ladder up the side of the tower, together with a small platform step, 7" or 8" wide, installed at a point within reach of the point of attachment of this blocking bar.



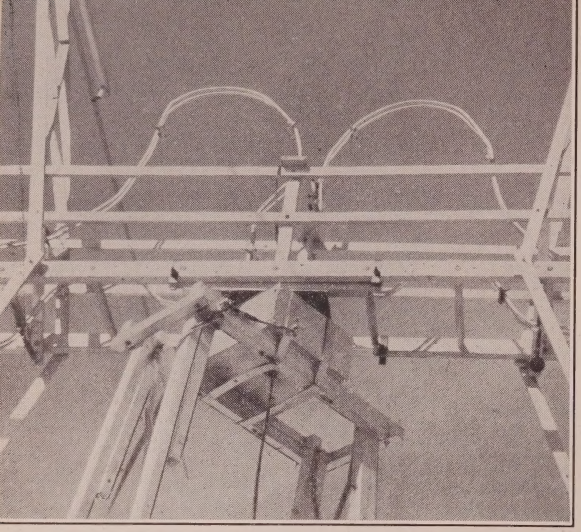
The method of supporting the Q bars and construction details of the supporting diamonds are identical for both of the 8JKs.

Variations in the Pattern Obtainable

The transposition connector between the front and back element Johnson Qs recommended produces bidirectional gain on both receiving and transmitting on all bands. If a unidirectional pattern is required, and that is sometimes especially desirable on receiving, it can be accomplished by employing a 600-ohm quarter wave for the band in question in place of the transposition connector. The front then will lead the back elements by 90° phasing and a cardioid pattern as described in the August, 1947, issue of *CQ*[4] is obtained with the same gain concentrated in one direction as was previously realized in two directions and an infinite front-to-back ratio if the beam is properly adjusted. But if this change is made the antenna becomes a *one-band* array, since a change in the length of the inserted quarter wave is necessary to change bands. Some lumped inductance devices

[3] Aluminum and other light metal ladders are available from many sources. Montgomery Ward lists them in their current catalog.

[4] Harris, "The Cardioid Beam Antenna," *CQ*, Aug., 1947.



The center mounting of the beam must be husky to support the weight of the superstructure. The Q bars and 300-ohm ribbon are brought to a juncture at the top of the platform.

with plug-in connectors might make this not too impossible an obstacle.

The author's original objective while the beam was still on paper was 20-meter results equal to a 3 or 4-element 20-meter parasitic array and a 10-meter gain at least two Rs beyond the parasitic competition. It has lived up to these expectations and even exceeded them on the longer hops on 10 meters, due probably to the low angle of radiation accomplished by the stacking of elements involved. 11-meter results have been the same as those on 10. And results on 15, when we get that band, should fall somewhere between, and still be better than a 4-element on that band—and all this with multiband operation with no change of connection in the array!

The evening we got the beam up we were the loudest signal on 20 at Milwaukee, and the same on 10 meters at KH6AM in Honolulu. Whereas previously, with a 4-element beam, the R meter in Denver and Honolulu had always read the same on both ends of our many QSOs with KH6AM and his Sterba, since "beam day" we have consistently been 3 to 4 Rs louder there than he is in Denver.[5] Eight-hour WACs, and better, on 20 meters are commonplace—not a bad feat in inland mountain-bound Colorado. We regularly worked DX on ten during the summer before the regular openings for consistent foreign contacts occurred in early fall.

During the fall and this winter we have kept consistent schedules with Germany, Japan, Korea, Manila, Liberia, and South Africa, on both 10 and 20 meters with never a failure unless conditions were out altogether. Reports continue consistently above average on the band in use and we have never been bothered by QRM from our own district.

For the man with a stout tower and rotator, limited space, and a yen for multiband operation on the DX frequencies, here is the beam that will solve your radiation problems.

5 The free-space gain of the multi-band driven-element beam is as follows: On 14 mc the gain of the out-of-phase 8JK is 1.6 in field strength which is 2.56 in power, or 4.1 db. The stacking provides a gain of 1.2 in field strength or 1.44 in power, or 1.6 db. The free-space gain of the array then is 5.7 db on 14 mc. On 28 mc the gain is 2 db for the colinear elements, 3.8 db for the out-of-phase 8JK, and 4.86 db for the stacking. Hence the over-all 28-mc gain in free space is 10.66 db.

The 4-element (half-wavelength elements) parasitic array has a gain of the order of 8–9 db in free space. When the parasitic elements are one wavelength long and excited in phase (second harmonic operation) the gain of the 4-element parasitic array is 10–11 db in free space.

Electronic Navigation

Long range navigation has now become an electronic art. However, some systems are better for certain purposes than others. This is a resume of the better characteristics of the most important types.

Loran—operates near 1.95 mc. and uses pulses emitted from pairs of masters and slave ground stations. An airplane receives one of the pair before its mate in such a fashion that they may be displayed on a cathode-ray tube screen and the time difference measured. The distance range at sea is about 800 miles during the day and 1600 miles during the night. The last range suffers from some inaccuracy while errors in a normal fix probably do not exceed 3 to 4 miles.

Low-frequency Loran—Essentially the same system operating from 140 to 200 kc. The claimed daytime range is 2400 miles at best and 1200 miles at worst. Usually the system is good to within 10 miles and is capable of being operated in the polar regions. The ranges beyond 4000 miles are not useful because of a geometrical error.

Decca—a British system using phase comparison somewhat similar to Loran in manner of display. Has a very high order of discrimination and is known to be exceptionally accurate at short ranges. Operates around 100 kc and can be used to distances of 300 miles, but has no judgment factor beyond.

Sonne (Consol)—Uses a rotating loop and sense antenna as in the common direction finding equipment. A special circuit corrects for phase shift errors. Has the potential accuracy of direction finding equipment and is considered useful from 800 to 900 miles during the day and 1200 to 1400 miles at night. Operates at 300 kc and uses sky-waves entirely.

High-frequency Direction Finding—A fairly common method which operates between 20 and 40 meters. It employs sky waves and is thus considered unpredictable. Slowly becoming obsolete since it is possible to introduce errors from 2 to 5 degrees.

Gee—A British system using four transmitting stations at about 50 mc. Uses a variation of the Loran system, but is limited to a range of about 350 to 400 miles at an altitude of about 30,000 feet. Special equipment needed and the system is not too common outside of Great Britain.

BABS—European variation of Lorenz landing beacons. Operating mostly in the range 30 to 40 mc. it gives the pilot a good idea of the center of the runway. Used with an airbourne interrogator. Sometimes enables long range (300 miles or more) location of airport.

Simplified Speech Clipping

WOODROW SMITH, W6BCX*

Utilizing the overload characteristic of a Class B modulator for speech clipping.

THE ADVANTAGES OF premodulation speech clipping and filtering have been expounded in several articles in the "amateur press" [1] and now are generally recognized.

At a slight sacrifice in fidelity or "naturalness," a high average percentage of modulation is possible without splatter. Or, if receiving conditions are good and the extra "punch" is not required, the gain can be backed off until there is negligible clipping and no loss in naturalness. In the latter case, the clipper simply acts as a policeman, ready to go to work and prevent overmodulation if an unexpected peak comes along as a result of a sneeze or door slam.

Despite the advantages to be realized, many amateurs have been slow to incorporate speech clipping in their transmitters. Perhaps some do not appreciate fully the advantages; perhaps some just don't care about the other fellow and prefer simply to crank up the gain and let the splatter fall where it may. But from talking to numerous amateurs on the subject, the writer has reached the conclusion that in a good many cases it is simply a matter of inertia; the reluctance to alter or add anything to the rig when it is "working."

With this in mind, it is the purpose of this article to describe a simplified method of incorporating speech clipping in an amateur transmitter, one which is applicable to any rig using triodes as a Class B modulator, *provided* the modulator is fairly husky as compared to the size of the Class C amplifier. The method also is applicable to certain beam tetrodes and pentodes under specific operating conditions, but with triodes it is sure-fire and foolproof.

The Class B Modulator as a Speech Clipper

Any Class B triode modulator stage having adequate output capability can be made to serve as a full-wave high-level peak clipper simply by raising the plate-to-plate load to such a value that it is impossible to exceed 100 per cent modulation regardless of the amplitude or waveform of the input signal, but still permitting approximately 95 per cent modulation. In such operation, there is a perceptible increase in odd harmonic distortion at levels below that at which a significant amount of clipping occurs, but the increase in distortion is hardly noticeable to the ear except at percentages approaching the "clipping level."

While the clipping is not quite as "clean" as that obtained with a well-designed low-level clipper of either the shunt or series type, it nevertheless is quite good, and listening tests will show little difference in performance as far as the *ear* is concerned.

When the Class B stage is made to do its own clipping, it is obvious that the low-pass filter required after any speech clipper for elimination of splatter components must be placed *after* the modulator (between the modulator and the Class C stage). However, this is desirable anyhow, as it eliminates any splatter which might occur as a result of high order distortion components generated in the modulator stage even when no clipping is taking place. These can be appreciable at modulation percentages approaching 100 per cent, even in a well designed modulator stage not adjusted for peak clipping operation. Also, a high-level clipper minimizes the problem of phase distortion of the clipped wave, as there is only the modulator output circuit with which to be concerned.

The disadvantage, of course, is that a post modulator filter requires much huskier components than does the filter for a low-level clipper inserted in the

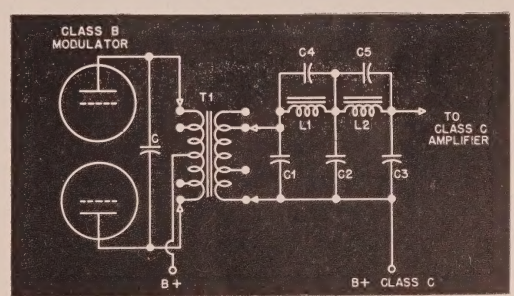


Fig. 1. Peak clipping Class B modulator with splatter filter. The impedance ratio of T1 is adjusted to a value which limits the peak modulation percentage to approximately 95 per cent regardless of the amplitude and waveform of the input signal. The filter design constants for any Class C load impedance may be obtained from Fig. 2. If T1 has excessive leakage reactance between the two halves of the primary, condenser C will improve the commutation and lower the distortion. The optimum value is best determined by experiment.

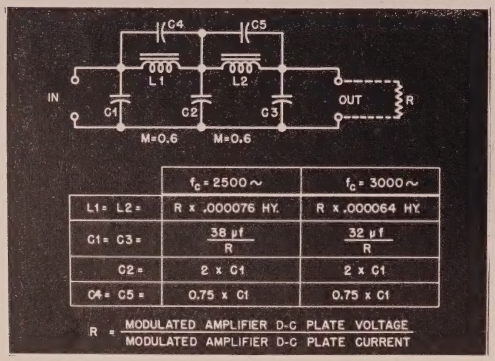
* *201 E. Morrison St., Santa Maria, Calif.*

[1] W. W. Smith, "Premodulation Speech Clipping and Filtering," *QST*, February, 1946.
J. W. Smith and N. H. Hale, "Let's Not Overmodulate—It Isn't Necessary!," *QST*, November, 1946.
W. W. Smith, "More on Speech Clipping," *QST*, March, 1947.
W. M. Scherer, "Converted ART/13 Speech Amplifier with Peak Clipper and Low-Pass Filter," *CQ*, December, 1947.

speech amplifier. However, the suppression of splatter components generated in the modulator itself (which as noted above often occur even when there is no clipping) is highly desirable, and justifies the additional expense of a high-level filter.

The reason that a conventional Class B triode modulator can be made to do its own peak clipping, and a creditable job at that, is explained as follows.

When the grids are driven hard enough that the peak grid voltage equals the instantaneous plate voltage, a further increase in driving voltage will produce no appreciable increase in the *peak* a-f output voltage. This tends to "flatten off" the a-f output voltage as the a-f input voltage is increased above a certain level. Under ordinary load conditions, and with typical Class B tubes and driver stage, the peak a-f voltage developed across one half the output transformer primary will not exceed roughly 95 per cent or so of the d-c plate voltage on the modulator, no matter how high the gain is run or what the input waveform.



	f_c = 2500 ~	f_c = 3000 ~
L1 = L2 =	R x .000076 HY.	R x .000064 HY.
C1 = C3 =	$\frac{38\ \mu f}{R}$	$\frac{32\ \mu f}{R}$
C2 =	2 x C1	2 x C1
C4 = C5 =	0.75 x C1	0.75 x C1

$$R = \frac{\text{MODULATED AMPLIFIER D-C PLATE VOLTAGE}}{\text{MODULATED AMPLIFIER D-C PLATE CURRENT}}$$

Fig. 2. Simplified design data for a two-section low-pass filter suitable for filtering out components not essential to satisfactory speech intelligibility. The computed values for C1 and C3 may have to be altered when the filter is used as in Fig. 1, for reasons explained in the accompanying text.

The clipping action is further enhanced by the fact that as the instantaneous grid voltage and instantaneous plate voltage approach each other in value, the grid impedance of the modulator stage very rapidly drops to a low value, which tends to clip the *driving* voltage even when low impedance driver tubes such as 2A3s are employed.

Exploiting the Driver Stage

A push-pull "pure" Class A driver has inherently good overload characteristics, especially when the series grid impedance is sufficiently high to prevent the grids from being driven more than very slightly into the positive region. The maximum peak output is but little greater than the maximum "undistorted" peak output. This will provide effective clipping of the signal fed to the grids of the modulator, and the characteristic can be exploited to improve the over-all clipping characteristic by adjusting the step-down ratio of the Class B driver transformer to a value which causes driver clipping and modulator clipping to occur at approximately the same level. In other words, the step-down ratio is increased to the highest ratio which will still provide the necessary voltage swing.

This not only helps the over-all clipping characteristic, but also minimizes distortion at amplitudes below the clipping level. However, if the driver transformer is not of the adjustable ratio type, it may be used with good results "as is," provided that the ratio is somewhere near the ratio recommended for conventional Class B operation of the modulator tubes employed when driven by the particular type of driver stage in operation.

To sum up, if your driver transformer is of the adjustable ratio type, take advantage of the fact. But if it isn't, don't worry too much about it, because a satisfactory clipping characteristic still can be obtained.

It is recommended that a 100,000-ohm resistor be placed in series with the control grid of each driver tube, right at the socket, and that the cathode bias resistor be of such value that the tubes are running under straight Class A conditions. This will minimize bias shift under conditions of maximum clipping. The avoidance of excessive bias shift in all stages under conditions of maximum clipping is an important consideration that is not always appreciated.

The Filter

A very effective low-pass filter for use between the modulator and Class C stage consists of a two-section M-derived filter with M equal to 0.6. This combination shown in *Fig. 1* gives a sharp cutoff, provides good attenuation characteristics at all frequencies appreciably exceeding the cutoff frequency of the filter, and presents a substantially constant impedance to the modulation transformer at all frequencies below the cutoff frequency. The correct constants for any Class C load resistance can be obtained readily by referring to *Fig. 2*, which gives the reader a choice of either 2500 or 3000 cycle cutoff.

The values are not extremely critical; 10% tolerance components are satisfactory for the inductors *L1* and *L2*, and for the capacitors *C4* and *C5;* 20% tolerance capacitors are satisfactory for *C1*, *C2*, and *C3*. Closer tolerance components are desirable, however, if readily obtainable.

Thordarson "splatter chokes" are suitable for *L1* and *L2*. The writer prefers air cored chokes for a filter following the modulator, but such chokes are not readily obtainable except for low-voltage low-current applications; and properly designed laminated iron core chokes (utilizing plenty of iron and plenty of air gap) will perform practically as well.

Mica condensers of the 5000-volt test variety are suitable for *C1, 2, 3, 4, 5* at d-c plate voltages up to 2000 volts.

A slight improvement in the filter characteristic sometimes will be obtained by making the value of *C1* somewhat greater than the value computed from *Fig. 2*. The excess capacity tends to compensate for the leakage inductance of the modulation transformer, which in some cases is considerable if the windings are not of the sectionalized type.

With such a transformer, the incorporation of condenser *C* in *Fig. 1* will tend to improve the com-

mutation at the higher frequencies and thereby reduce distortion. This condenser has nothing to do with speech clipping; such a condenser is desirable with any modulation transformer except possibly the most expensive types, as its use effectively improves the characteristics of the transformer.

The optimum value for C depends upon the particular transformer, modulator tubes, and plate-to-plate load, and is best determined by experiment. It also depends somewhat on the value of *C1*. Usually the optimum value for C will run between .0005 μf and .003 μf, with .001 μf being about average. The test voltage rating (assuming a mica condenser) should be at least four times the d-c plate voltage on the modulator.

From the computed value for *C3* must be subtracted the value of any r-f plate bypass condenser which is effectively in parallel at audio frequencies. If the desired value for the r-f bypass approaches the computed value for *C3*, the r-f bypass may as well be chosen to have the computed filter value and thus substitute entirely for (or serve as) condenser *C3*.[2]

Avoiding Excessive Phase Distortion

To avoid excessive phase distortion after clipping takes place in the modulator tubes, the modulation transformer should have fairly good bass response and the output filter capacitor on the power supplies feeding the modulator and the Class C amplifier should be fairly large. The burden on these components as regards bass response can be minimized by utilizing bass suppression in the speech amplifier, a good idea in any voice transmitter and an especially good idea when speech clipping is employed. Satisfactory bass suppression requires only that the interstage coupling condensers between low level speech stages be reduced in capacity sufficiently to give the desired characteristic. The slope of a single RC combination is not steep enough to do a really good job, and the sharper cutoff obtainable with two such RC high-pass filters of similar characteristics is to be preferred. If facilities for making a frequency run on the amplifier are not available, suitable RC values can be obtained by referring to the resistance coupled amplifier chart in the "RCA Receiving Tube Manual" (or in the HB series) and cutting the specified capacity values *in half*. If this is done for two stages the over-all attenuation will be from 4 to 6 db at 200 cycles, which is a good compromise, all factors considered.

Class C Amplifier Linearity

As with any transmitter using premodulation speech clipping and filtering, the Class C amplifier must be quite linear, or splatter components will be generated in the Class C stage itself. This means that the Class C stage should have adequate bias, plenty of excitation, and no regeneration.

Modulator Adjustment

Adjustment of the plate-to-plate load on the modulator for proper clipping need be made only once; the adjustment then will hold for moderate changes in Class C plate current. For instance, if the adjustment is made at 350 ma, it will be satisfactory for any plate current between 300 and 400 ma. Filter performance also will be satisfactory over this range if filter values are computed on the basis of the Class C load resistance existing at a plate current of 350 ma.

The adjustment also will hold for greatly reduced power if the power reduction is made by lowering the line voltage to both the Class C and modulator power supplies, so that all plate voltages (and Class C plate current) are lowered proportionally. Unless zero bias tubes are employed as modulators, the modulator bias also will have to be lowered proportionally if a substantial reduction in plate voltage is made.

Initial adjustment is best made with the help of a 'scope (borrowed or otherwise). The plate-to-plate load on the modulator is raised from the "normal" value a step at a time until it is impossible to clip negative peaks regardless of how loudly one yells, whistles, or gargles into the mike. If an adjustable driver transformer is employed, the step down ratio then should be increased a step at a time until a barely perceptible drop in the maximum obtainable peak modulation percentage occurs. But if the driver transformer is not adjustable there is no need to worry; the clipping performance still will be good.

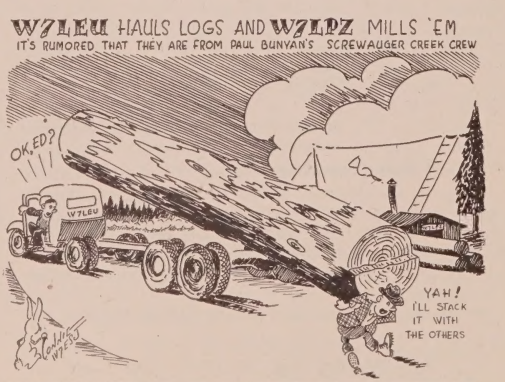
If an audio oscillator is available, the over-all characteristics of the system with sine wave input can be checked. If everything is working right, the output waveform at 400 cycles will flatten off and "square up" as the input voltage is increased above a certain level corresponding to a modulation percentage of roughly 90 per cent, but below this critical level the output waveform will closely resemble a sine wave.

As the oscillator frequency is increased above the cutoff frequency of the filter, the modulation percentage should fall off rapidly with increasing frequency. At the low end of the audio spectrum it will be found that below a certain frequency it will be impossible to obtain complete modulation regardless

(*Continued on page 88*)

[2] Four times the effective value of a split stator plate tank condenser must also be subtracted if the rotor of the condenser is grounded. For example, a 25-$\mu\mu$f split stator condenser (50 $\mu\mu$f per section) equals 25 x 4 = 100 $\mu\mu$f contributing to C3.

Dollars for Watts



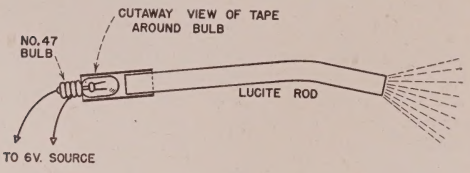
Inside the SHACK AND WORKSHOP

Conducted by A. DAVID MIDDELTON, W1CA*

Lucite Light-Pointer

Solder flexible insulated leads to a #47 pilot lamp bulb and secure it on one end of a 6 or 8-inch length of ¼-inch Lucite rod by means of rubber tubing or several layers of rubber tape.

The Lucite rod can be bent into any desired curve or can be left straight. The leads are connected to any six-volt source.



The rod will conduct the light to its far end where it will radiate.

This handy light can be poked into the tightest and most difficult spots without any danger from shock from energized equipment.

Jack Najork, W2HNH

Filing System for QSLs

For those hams who like to have their QSL cards filed according to states, the Oxford Number 4650 Guides are the ideal thing for this purpose. Available at any local stationery store (at about $1.25 per set) these cards make a very neat index for QSL cards.

Ed. Newman, W2RPZ

Increasing the Audio Output of the SCR-522

It's a well known fact that replacing the 12J5 output tube of the 522 receiver with a 12A6 increases its output considerably. Connecting an 0.01-μf condenser from the center terminal of the volume control to the cap (control grid) of the 12C8 second-detector first-audio tube makes a further improvement in the audio amplification of the receiver.

Adding this condenser bypasses the audio signal around the audio transformer. Removing the leads already connected to the center terminal of the volume control, and to the grid of the tube, and connecting a one-half megohm resistor from the grid to ground will remove the transformer (and audio squelch) from the circuit completely with a further slight increase in gain, but is hardly worth the effort.

Herbert S. Brier, W9EGQ

Warm-up Drift "Speeder-Upper"

A heavy cloth hood which fits snugly will reduce the warm-up time of a receiver or v.f.o. and will keep the dust out when the unit is not in use. (The latter point being of importance with some of the new units having top and sides punched full of holes for better ventilation.)

When the receiver or v.f.o. is first turned on the hood is left in place for a few minutes, but not more than about ten or the unit may become too hot. This speeds up the worst part of the warm-up drift. On my "store boughten" v.f.o. five minutes under a heavy flannel hood settles the oscillator down to the point where additional drift is insignificant, even on 10 meters, when the hood is removed.

W. W. Smith, W6BCX

Operating 28-volt Receivers From 115-volt Source

Some surplus transmitters, such as the BC-459A, etc., were designed to operate from a 28-volt source, and have indirectly heated filaments connected in a series-parallel arrangement drawing 0.7 ampere from a 28-volt supply.

A simple method of supplying this required filament voltage without re-wiring, or a special transformer, is to use an external dropping resistor in series with the filament terminal of the transmitter and by connecting directly across the 115-volt line. A 100-watt, 115-volt lamp bulb has just the right resistance for the BC-459A. The proper value for other transmitters may be found with the following formula, by substitution.

$$R = \frac{E}{I} = 40 \text{ ohms in transmitter}$$

$$R = \frac{E^2}{W} = 132 \text{ ohms in 100-watt bulb}$$

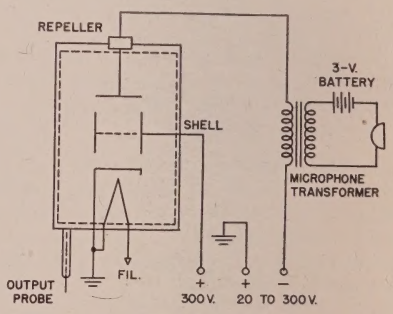
$$\text{Total} = 172 \text{ ohms}$$

$$I = \frac{E}{R} = \frac{115}{172} = .67 \text{ ampere}$$

R. R. Rosenberg, W3NCJ

Modulating Klystrons

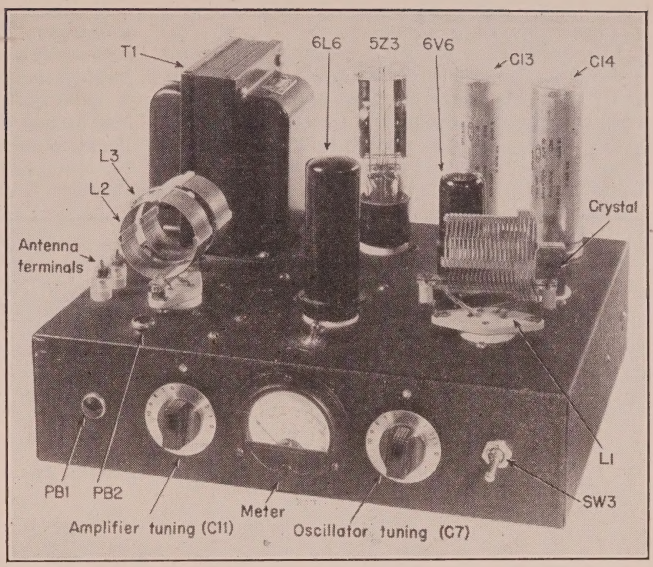
A simple and effective method of voice modulating reflex Klystrons is shown in the diagram. Tubes such as the 726A and 723A/B, currently available



from surplus dealers, lend themselves well to such a circuit. Since the frequency deviation of such Klystrons is approximately 2 mc per volt of modulation it is well to insure that the microphone battery voltage is not so high as to cause excessive distortion. The amount of such distortion encountered will, of course, also depend upon the passband of the receiver i-f system.

David Lee Thompson, W6VQB

**Address all contributions to S & W Department c/o CQ, 342 Madison Ave., N. Y. 17, New York.*



An over-all view of the c-w transmitter complete with crystal and manufactured coils for the 40-meter band. The antenna terminals are located at the left of the center-linked amplifier tank coil. Directly in front of that coil is the red warning light indicating the presence of r-f voltage on the coil. The meter switch is located directly in front of the 6L6 amplifier tube. The 6V6 crystal oscillator tube stands at the left and behind the oscillator coil. The crystal in use is placed in the pins at the *rear* of the socket. The operate switch is located at the right of the front apron. The 5Z3 rectifier is located directly behind the 6L6. The filter condensers are located at the rear of the chassis behind the oscillator components

A Transmitter for the New Amateur

A. DAVID MIDDELTON, W1CA/KP4*

18 countries on 7 mc have already been worked in on-the-air tests with this table-top rig designed for safety and simplicity.

A TRANSMITTER properly designed for the new amateur incorporates operating features desired by the experienced ham. This c-w rig, primarily meant as a project for newcomers, also makes an excellent stand-by transmitter for spot-frequency operation. Output is provided on the 3.5, 7, and 14-mc amateur bands. A 6V6 crystal oscillator drives a triode-connected neutralized 6L6 final amplifier. Break-in keying is provided as the cathode of both tubes is keyed. The required power supply, with a 5Z3 rectifier, is also contained on the 10 x 12 x 3-inch chassis.

A front-apron mounted 100-ma meter may be switched to read either the oscillator or amplifier plate current. A front-apron pilot lamp (with a green bull's-eye) indicates when the a-c input is turned on, and the transmitter is "standing by," ready to be powered by either operating the SEND-RECEIVER switch on the associated receiver or by operating the control switch on the transmitter's front apron. A pilot lamp (with a red bull's-eye), located immediately in front of the final amplifier plate tank coil, lights when the transmitter plate power is *on*, thus serving as a warning not to touch the *plate tank coil*.

Direct current has been purposely kept off of the coils by incorporating shunt feed, a feature that makes this beginners' rig virtually foolproof. As a final precaution, since there is some radio frequency energy on the output coil particularly, the red warning light has been located to be most prominent when approaching this coil.

The tuning controls for both the oscillator and the amplifier plate tuning condensers are available on the front apron. The neutralizing condenser, once adjusted, is not touched and is located beneath the chassis.

On the rear apron are located the a-c ON-OFF switch, the control-circuit socket, the key jack and an auxiliary socket from which connections may be made to any associated transmitter equipment.

The amplifier plate tank coil is equipped with a movable link coil, brought out to two antenna terminals for connection to either a two-wire antenna feeder or to a suitable antenna tuning unit.

Preparation of the Chassis

Lay out and drill the chassis as shown in the photos. The most difficult operation is making a hole for the meter. If a metal-working circle cutter is available, by all means use it. These devices are not easy for the newcomer to handle and extreme caution must be used to prevent accident. It is suggested that a 1-inch block of wood (2¾ inches wide by 4 or 5 inches long) be placed underneath the

* *Hotel Normandie, San Juan, Puerto Rico.*

chassis' front apron. The chassis should be fastened to a firm support by C-clamps.

If a drillpress is available, set it at its slowest speed and, after fastening the chassis, cut out the meter hole. The dangerous point in the operation is when the cutting device just starts *through* the metal. Should the cutter stick, shut off the power immediately. Oil should be frequently applied during drilling.

If only a hand brace is available, the job is more tedious but less dangerous. Again, it is wise to fasten the chassis to a firm support with the block of wood beneath the apron.

A third, and last alternative, is to make the meter hole by first drilling a series of smaller holes around the periphery of the desired hole. Then, take a small chisel and cut out between the holes and break out the center piece. This method will result in a hole

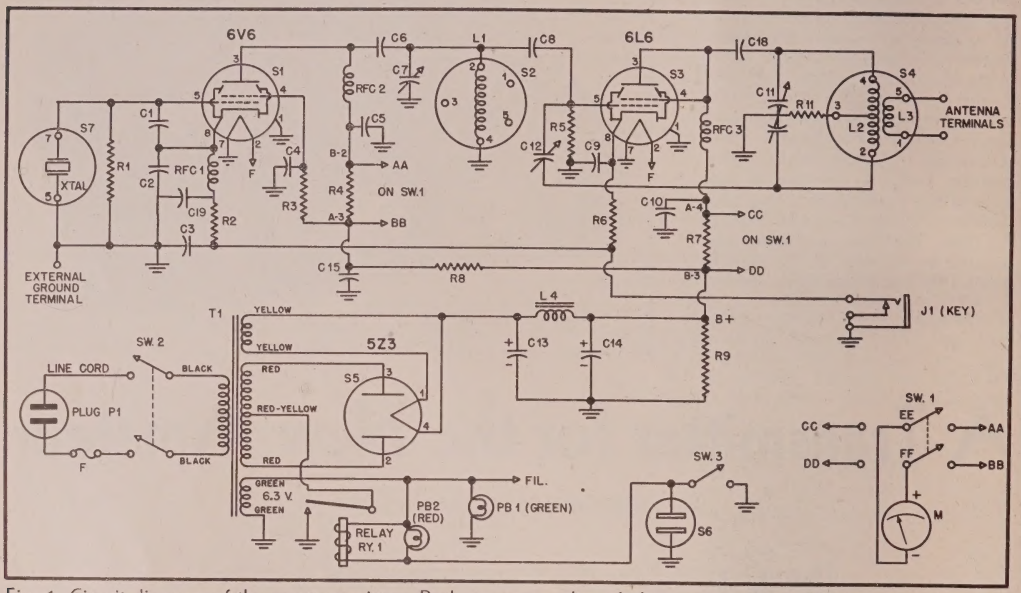


Fig. 1. Circuit diagram of the c-w transmitter. Both stages are shunt-fed to remove the d-c high voltage from the tank coils. Connections to meter switch SW1 are shown in the lower right-hand corner.

C1—25 μμf, mica.
C2—250 μμf, mica.
C3, C19—.01 μf, paper, 600 v. working voltage.
C4, C5—.005 μf, mica.
C6, C10, C15—.002 μf, mica.
C7—100 μμf, variable* (Hammarlund MC100M or equal).
C8—100 μμf, mica.
C11—100-100 μμf, variable* (Cardwell ER100AD or equal).
C12—0-5 μμf, variable, neutralizing (National NC-600 or equal).
C13—8 μf, 600 v., electrolytic in metal can.
C14—16 μf, 600 v., electrolytic in metal can.
C16—1.0 μf, 400 v., paper. (In key filter, see Fig. 2A.)
C17—0.5 μf, 400 v., paper. (In key filter, see Fig. 2A.)
C9, C18—.002 μf, 1200 v. working voltage.
R1—100,000 ohms, ½ w.
R2—220 ohms, 1 w.
R3—400,000 ohms, 1 w.
R4, R7—100 ohms, 1 w.
R5—47,000 ohms, 1 w.
R6—400 ohms, 1 w.
R8—4000 ohms, 10 w., wirewound.
R9—25,000 ohms, 25 w., wirewound.
R10—330 ohms, 1 w. (In key filter, see Fig. 2A.)
R11—2500 ohms, 1 w.
RFC1—1 mh, r-f choke. (Do not use 2.5 mh.)
RFC2, RFC3, RFC4, RFC5—2.5 mh, r-f choke. (No. 4 and 5 in key filter.)
P1—Male plug, two pin, on a-c line.
P2—Headphone plug.
L4—Filter choke, 10 hy, 130 ma (Stancor C-2303 or equal).
SW1—DPDT toggle switch.
SW2—DPST toggle switch.
SW3—SPST toggle switch.
RY1—Relay, SPDT 6-volt a-c coil (Advance K-1503S 6-volt a.c. or equal).
PB1—Pilot light, green bull's-eye, with 6-8 volt bulb.
PB2—Pilot light, red bull's-eye, with 6-8 volt bulb.
T1—Power transformer, 800 v. c.t., 160 ma., 6.3 v. @4.5 amp.; 5 v. @ 3 amp. (Stancor P4081 or equal).
F—5 amp. Littelfuse.
2—Dials, 15/8-inch diameter (Millen 10007 or equal).
1—Line cord, with plug (P1) or five feet two-wire cord and male plug.
1—Grommet, 3/8 inch.
S1, S3, S7—8-prong, ceramic sockets.
S2, S4—5-prong, ceramic sockets.
S5—4-prong ceramic sockets.
S6—Female socket, Bakelite, two pin.
1 coupling, ¼ inch.
2 inches shafting, ¼-inch diameter, Bakelite.
2 feed-through bushings, Polystyrene (Bud I-1910 or equal).
1 meter, 0-100 d.c. ma (Triplett or equal).
1—8-point tie lug strip.
1—6-point tie lug strip.
27—6/32 x ½-inch machine screws.
28—6/32 nuts.
4—4/32 x 1-inch machine screws.
1—Telegraph key.

*Commercial plug-in coils tune with a recommended value of capacity. The capacity of the circuit must be considered in choosing the proper value of C to tune the coil. This should be kept in mind if different variable condensers are substituted. Preferably, no substitutions in values should be made for components listed in bold type.

that will be of the proper size, but will not be as neat as those cut with a circle-cutter. Also, adequate care must be taken not to bend the chassis out of shape.

The power transformer is placed with the primary and the high-voltage leads coming through the chassis toward the center of the chassis. The orientation of the sockets is indicated on the under chassis view. The oscillator tuning condenser is mounted directly on the front apron of the chassis as the circuit is arranged so that the rotor (stationary plates) are grounded. The final amplifier tuning condenser is mounted on ¾-inch collars, (either available at a radio parts store, or made from 3/16-inch copper tubing.) It is wise to measure, accurately, the condenser mounting holes for the tuning condenser and to orient this condenser so that it lines up squarely and that the shaft (with its coupling and extension) protrudes through the apron at a neat right angle. Otherwise, the dial will not run true. The meter may be left unmounted until later. Place two tie lug strips as shown in Fig. 2E and the bottom-view photograph.

Wiring the Transmitter

A) Connect one primary (black wire) lead of *T1* to one side of *SW2*, and connect the other primary lead to the other side of *SW2*.

B) Connect one rectifier filament (5-volt, yellow wire) lead of *T1* to *pin 1* on *S5*. Connect other yellow wire to *pin 4, S5*.

C) Connect one lead of filter choke *L4* to *pin 4, S5*, and connect positive (red wire) lead of *C13* to same point. Ground negative (black wire) leads of *C13* and *C14*.

D) Connect one high-voltage secondary (red wire) lead of *T1* to *pin 2, S5*, and other high-voltage lead to *pin 3, S5*.

E) Connect the other lead of filter choke *L4* to *tie-lug B8* (*Fig. 2E*). Connect positive (red wire) lead of *C14* to *lug B8*. Connect one end of resistor *R9* to same lug. Ground other end *R9* to convenient point.

F) Connect one filament (6.3-volt, heavy green wire) lead of *T1* to *pin 2, S3*. Ground other filament (green wire) lead to lug under screw on *S3*. Cover bare end of the center-tap wire and tuck away in corner, unused. Connect insulated wire from *pin 2, S3*, to *pin 2, S1*. Connect insulated wire from *pin 2, S3*, to one terminal on pilot light *PB1* (green) on the front apron of chassis. Ground other terminal *PB1*.

G) Ground *pins 1* and *7* of *S1*. Repeat on *S3*.

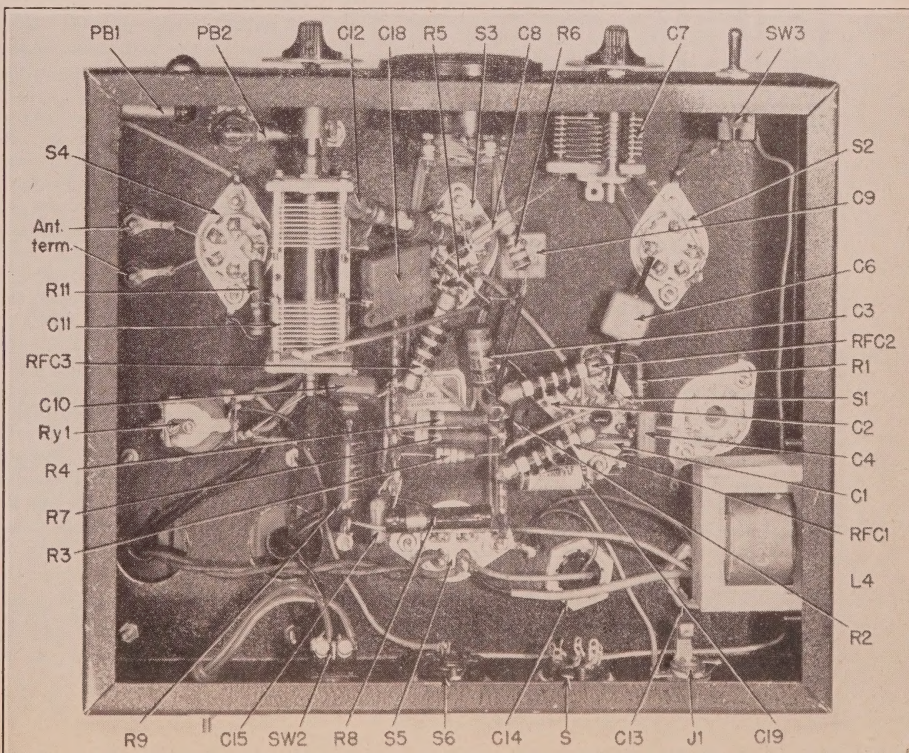
H) Connect one end *R1* to *pin 5, S1*. Ground other end *R1*. Connect *pin 7, S7*, to *pin 5, S1*. Ground *pin 5, S7*, to lug under screw on *S1*. Connect *C1*, between *pins 5* and *8, S1*. Connect *C2* between *pin 8, S1*, and nearest ground lug. Connect *RFC 1* between *pin 8, S1*, and *lug B5* (*Fig. 2E*). Connect *R2* between *lug B5* and *lug B1*. Connect *C3* between *lug B1* and ground.

I) Connect *RFC2* between *pin 3, S1*, and *lug B2*. Connect *C5* between *lug B2* and ground. Connect *C6* between *pin 3, S1*, and *pin 2, S2*. Ground *pin 4, S2*. Connect rotor terminal (end plate) *C7* to *pin 4, S2*. Connect one stator terminal (fixed plates) *C7* to *pin 2, S2*. Connect *C19* between ground and *lug B5*.

J) Connect *C4* between *pin 4, S1*, and nearest ground lug. Connect short length insulated wire between *pin 4, S1*, and *lug B4*. Connect *R3* between *lug B4* and *lug A5*. Connect *lug A5* to lug *A6*.

K) Connect one end *R6* to *pin 8, S3*, and other end *R6* to *lug B1*. Connect *C9* between *pin 8, S3*, and nearest ground lug.

L) Connect *R5* between *pin 5, S3*, and nearest ground lug. Connect *pins 3* and *4, S3*, together. Connect *pin 4* to one end *RFC3* and *C18*. Solder a soldering lug onto end of *C12* (the end away from screw end) to increase its capacity slightly. Connect *C12* between *pin 5, S3*, and *terminal B, C11*, with adjustment screw toward condenser *C11*. Connect



Underneath chassis view of the transmitter. Crystal socket, S7, is located just above choke L4. On capacitor C11, terminals A and B are the forward section stator terminals and C and D the rear section stator terminals. Terminal E is the rotor connection on the back end of C11.

terminal A, C11, to *pin 2, S4.* Connect *terminal C, C11,* to *pin 4, S4.* Connect *pin 1* and *pin 5, S4,* to antenna terminal binding posts. Connect other end *RFC3* to *C10* and also connect to *A4.* One end *R7* on *SW1.* Connect remaining free end *C10* to nearest ground lug. Also connect *terminal E, C11,* to ground lug. Connect *R11* between *pin 3, S4,* and ground point of *C11.*

M) Connect *lug A1* to *lug A2* with 1-inch jumper. Do not solder wire to *A2.* Connect *lug A2* to *lug A4.* Connect *R7* between *lug A1* and *lug B3.* Connect *lug B3* to *terminal DD* on *SW1* (*Fig. 2C*). Connect *lug A4* to *terminal CC* on *SW1.* Connect *lug B3* to *lug B8.*

N) Connect resistor *R4* between *lug A3* and *B2.* Connect *lug A3* to *A6.* Connect *R8* between *lug A6*

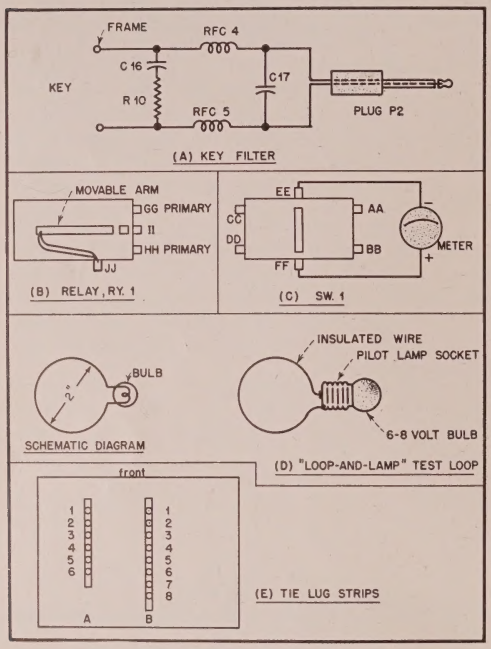


Fig. 2. (A) Recommended key thump filter. Component values are given in the parts list of Fig. 1. No wiring sequence is given due to the simplicity of the circuit. (B) Details of the relay controlling the high-voltage circuit to the rectifier. (C) Wiring diagram of meter switch, SW1. This shows the terminals as viewed from the bottom of the chassis. (D) "Loop-and-lamp" test unit. A 2-inch diameter insulated loop is connected across the terminals of a pilot light socket. Either a 2 or 6-volt bulb may be used.

and *B8.* Connect *C15* between *lug A6* and ground. Connect *lug A3* and *terminal BB* on *SW1.* Connect *lug B2* and *terminal AA* on *SW1.*

O) Connect *C8* between *pin 5, S3,* and other stator terminal (fixed plate) on *C7.*

P) Connect insulated wire between *lug B1* and tip of *J1.* Connect sleeve and inner-leaf of *J1* together.

Q) Connect *terminal GG* on *relay RY1* to *pin 2, S1.* Connect terminal *HH, RY1,* to one *pin S6.* Connect this pin to one terminal *SW3.* Ground other *pin S6.* Ground other terminal *SW3.* Connect *terminal GG of RY1* to one terminal of red pilot light *PB2* (mounted on top of chassis.) (See *Fig. 2B.*) Connect *terminal HH* to other terminal of *PB2.* Connect high-voltage center (red-yellow wire) lead of *T1* to fixed contact *terminal II,* on *RY1.* Ground movable arm, *terminal JJ, RY1.*

R) Install meter on front apron. Connect positive screw to *terminal FF* on *SW1,* and connect negative screw to *terminal EE* on *SW1.* See *Fig. 2C.*

S) Place line cord in grommet-protected hole in rear apron. Tie knot in cord and connect one lead to each side of *SW2.* Connect other side of line cord to fuse *F.* Connect remaining side of *SW2* to remaining side of *F.*

T) Socket *S8* on the rear apron is not connected and was installed for future use by the author.

Testing the Transmitter

Before attempting to operate the transmitter, make the following tests. From now on you will be working with high voltage. There is ample voltage to cause bodily harm. Be *careful!* One good safety rule is to keep one hand behind you while working on a "hot" transmitter. Another is to double-check your connections *before* turning on the power.[1]

Turn *SW2* to "on" and measure to ground (with a 10-volt a-c voltmeter) on *pin 2, S1,* and repeat on *S3.* The meter should read approximately 6.3 volts. Turn off *SW2.* Insert pilot light bulb *PB1* (green bull's-eye). Turn on *SW2.* The green pilot light should light. These tests will indicate the correctness of the filament wiring.

Place the 6V6 and the 6L6 in their respective sockets, *S1* and *S3,* and with *SW2* in the "off" position, plug the line cord plug, *P1,* in a "live" 117-volt socket. Throw *SW2* to "on" and the 6V6 and 6L6 should become warm.

Turn off *SW2.* Remove the 6V6 and 6L6. Place the 5Z3 rectifier in socket *S5.* Insert pilot light bulb *PB2* (red bull's eye).

Connect a 0-500 volt d-c voltmeter with the positive lead of the voltmeter connected to *lug B8,* and the *negative* lead connected to the chassis.

Close *SW3. Red* pilot light should glow. The meter should read about 400 volts. *Open SW3.* Plug in *L2-L3,* final tank coil. Remove the positive voltmeter lead from *B8* and place it on *pin 3* of *S3* (6L6). It should read approximately the same voltage. Check on *pin 3* and *pin 4* of *S1* for the same voltage. If approximately the same voltages are not obtained on all these points, re-check the wiring and test the components. Possible locations of faulty components could be an open circuit in *R4, R3, R8* or an "open" in *L4,* or in *RFC2* or *RFC3.*

Turn off *SW2.* With a continuity meter (or substitute) make the following tests: Connect one side of the meter to *pin 8, S3,* and the other side to ground. Plug a key (connected to a 'phone plug) into *J1.* When the key is closed, the continuity meter should indicate a low value resistance. When the key is open, the meter should indicate an open circuit.

With the filament and high-voltage circuits correctly wired and with any possible faulty components replaced, the transmitter r-f circuits are ready to test.

[1] Nichols, "Life Insurance in the Shack!" *CQ,* Nov. 1947, p. 32

The 80-meter c-w band (3500–3850 kc) is a good place to start testing. Select an 80-meter crystal and the proper coils as shown in *Table 1*. Plug the crystal into *pins 5* and 7 on *S7*. Plug in the 6V6 and the proper coil for *L1*. (Or, select another band and its components from *Table 1*.)

With a lamp (*Fig. 2D*) coupled to *L1* and with the meter switch, *SW1*, operated to the right-hand position, turn on *SW2*, and after a 30-second wait, close *SW3*. Pilot light *PB2* (red) should light whenever *SW3* is closed. The plate milliammeter should indicate 20-25 ma when the key is closed. Turn *C7* (the right-hand control on the front apron) and operate the key. A point should be found on *C7* where the crystal plate circuit will be tuned to resonance and the bulb (in the loop circuit) will light. It will be noted that as *C7* is rotated the light will get brighter and then suddenly go out sharply. Back off the control until the bulb burns at nearly full brilliance. If a receiver is available, listen to the signal being made by the crystal oscillator. Adjust *C7* until the note is clean and without chirps.

Open *SW3* and turn off *SW2*. Remove the jumper from *A2*. (See itemized step M.) Place 6L6 in *S3* and the proper coil *L2* in *S4*. Turn on *SW2*, close *SW3*, and rotate *C7* until the lamp lights as it did before with the key down. *C7* may have to be rotated slightly from its original position. Remove the "loop-and-lamp" from *L1* and couple it to *L2*. Close the key and rotate *C11* until a point is found where the bulb will glow. This adjustment is quite sharp. Open *SW3*. Turn the screw on *C12 inward* almost as far as it will go. Repeat the test with the "loop-and-lamp," readjusting *C11*. If the lamp still glows, readjust *C12*. Repeat this adjustment until the 6L6 amplifier is *neutralized* (i.e., until the lamp does not glow) indicating that the 6L6 is not oscillating when excited by the crystal oscillator. The adjustment of *C12* is quite critical, a half-turn on the screw being sufficient to throw the tube out of neutralization. A point will be reached where *no glow* of the test loop lamp will be obtained regardless of the setting of *C11*. When the glow in the 6–8 volt bulb is reduced to a minimum, a 2-volt bulb may be substituted.

Another method that can be used is to solder short wires to a 6–8 volt bulb and connect them across the antenna terminals, thus using the *L3* link, as the "test loop."

When the amplifier is neutralized, no glow will be obtained in any size bulb coupled to *L2*. Remove the test bulb. Turn off the power by opening *SW3*. Replace the jumper on lug *A2*.

Operate the meter switch *SW1* to the left. Close *SW3* and rotate *C11*. Close the key briefly and observe the plate meter. The off-resonance plate current may now reach 75–90 ma. Rotate *C11* rapidly and note a sharp dip in the plate current—down to 10–15 ma. This indicates no-load resonance. Connect a 25-watt 117-volt light bulb to the antenna terminals. Adjust *C11* until this bulb lights and maximum brilliance is indicated on the bulb. The meter will dip and will read approximately 40-50 ma at this point, the resonant-load point of the amplifier.

Listen to the signal in a receiver and adjust *C7* until the crystal keys properly as indicated by a clear signal, free from chirps. Some crystals will key better than others, so if it is impossible to obtain a clear signal try another crystal of approximately the same frequency.

If it is impossible to obtain the resonant no-load dip as described above, check to make sure that the crystal is oscillating. This will be indicated by the glow in the test lamp coupled to *L1*, and by a slight dip in the plate current of the oscillator as read when the meter switch *SW1* is thrown to the right. The crystal must be oscillating before the final amplifier will work properly.

When the transmitter is operating properly and loaded by an antenna or "dummy" the voltages and currents shown in *Table 2* will be obtained.

TABLE 1

Output Frequency	Crystal	L1	L2-L3
3500-4000 kc	3500-4000 kc	Coil A	Coil AA
7000-7300 kc	3500-3650 kc or 7000-7300 kc	Coil B	Coil BB
14,000-14,000 kc	7000-7200 kc	Coil C	Coil CC

Coil A—B & W JEL 80. (End link coil.)
Coil B—B & W JEL 40 with four turns removed. (End link coil.)
Coil C—B & W JEL 20 with three turns removed. (End link coil.)
Coil AA—B & W JVL 80 (Center-link coil.)
Coil BB—B & W JVL 40 (Center link coil.)
Coil CC—B & W JVL 20 (Center link coil.)
If handmade, coils A, B, and C are wound with 30, 15 and 8 turns of No. 20 E. wire respectively, on 1½-inch diameter five-prong coil forms. The turns are spaced until the coil is 1½ inch long. No links are wound on coils A, B, or C. The ends of the windings are connected to pins 2 and 4 of the coil form.
Manufactured five-prong, variable center-linked coils are recommended for coils AA, BB and CC.

TABLE 2

Voltages and currents, under load, of oscillator and amplifier stages. Dummy load, 25-watt lamp bulb, across antenna link, L3.

	OSCILLATOR *		AMPLIFIER **	
Band MC	Plate voltage	Plate current, ma	Plate voltage	Plate current, ma
14	300	25	400	50
7	200	20	420	40
3.5	320	20	420	40

* Screen voltage—approximately 200 volts.
**Amplifier plate, no load, 420 volts, 10-12 ma.

Key Click Filter

A suggested key click filter is shown in *Fig. 2A*. This filter is assembled on a small piece of metal bakelite or wood, and fastened either on top or underneath the operating table right at the key, and the leads from the key to the filter should be kept as short as possible. *C16* and *R10* are in series across the key, then an r-f choke is placed in each leg, and *C17* is across the output. The leads from the output end of the filter to plug *P2* may be any desired length. The "frame" of the key should run to the grounded or sleeve side of the plug, *P2*.

(*Continued on page 92*)

How to Work All Continents

K. S. WILLIAMS, W6DTY*

WORKING 40 ZONES is child's play, as everyone well knows. But working six continents is a long, wearisome job and definitely not a suitable activity for those with ulcers or weak hearts. Working all zones or 100 countries is relatively simple for those who can do it; working all continents, for the remaining 98% of us, usually occupies most of our ham careers.

The first five continents fall into our logs with practically no effort at all . . . it's always the sixth that turns out to be an impossibility. And (it must be a Law of Nature) it makes no difference which of the six remains to the last. No matter what you do you can't work it. It would not be surprising to hear of some amateur working all continents but North America during his first hour on the air and then spending seventeen years trying to QSO a W9!!

But, if you're determined to snag that W.A.C. certificate then the process will probably run somewhat as follows:

You've worked them all but, say, Africa. Very well; it should be relatively simple, what? Your eardrums become concrete blocks to any sound but that of a ZS or a VQ or an SU calling CQ DX. VS2, SM7, UA3 and TF3 go in one ear and out the other without exciting any brain cells whatever. But the moment the receiver is tuned across a ZS your hair stands on end, your ears jangle like fire alarm bells and your mouth goes dry.

You work on that signal like a watchmaker assembling a fine watch. You tune carefully for peak sigs in the phones; you adjust the b-f-o pitch; you twiddle carefully with the gain controls; you comb out a pair of heterodynes with the phasing knob;



you check to see that the earphone plug is firmly in its jack. You look at the transmitter filaments. You curse the gent just a few kilocycles away who is splattering your ZS with key clicks. You mutter a short prayer, the ZS signs over . . . and YOU'RE OFF!

You become more and more confident as you squeeze out the call. After all, didn't you get RST 338 only yesterday from G5LI? And you know your rock is just 4 kilocycles above the African's spot, by great good luck (it's the only crystal you have and the v.f.o. is still just a dream). You toy with the vain hope that by some quirk of fate you are the only ham in the world who happened to hear that guy calling CQ. A bead of sweat oozes down your left cheek. At last you sign and, being an optomist, end with a "K." But . . . does he come back to you? Of course not! Don't be a gullible fool! He comes back to a geezer in the neighboring town . . . a geezer, you happen to know, who has an 807 final and a piece of baling wire on his roof for an antenna.

For weeks you keep at it, until your log book is bulging with African calls, none of them answered. You hear every African who has ever been issued a ticket. But it is definitely no soap. (There is a variation of this horrible situation; every African in Africa hears your rock crusher RST 589 but your receiver carefully filters out all African calls and you hear nothing but the other five continents. In this case your procedure is to call CQ Africa day after day for months, with no result).

About this time you get very cunning. You look up all the nearby hams who have no trouble working Africa and you put the old eye on their layouts or



their systems. Joe Twirkpopper, down the street, has a sloppy fist but works Africans. So you try it sloppy. Nothing doing. Bill Goofknob, over in Podunk, has a twin-nine, double-twisted, high-speed rotary beam with which he gets S9 from ZS with no effort at all. So you beat the XYL out of some grocery money and buy enough wire and insulators to put up a twin-nine just like Bill has. But for all the good it does you might just as well have used kite string. George Bugeye, down on the beach, works Africans without strain and he has a new XR-98 receiver, complete with built-in electronic hot dog cooker and one-gallon coffee boiler (for that midnight snack, OM). So . . . you sell the refrigerator and buy a XR-98 receiver. You hear the same Africans you heard on your old SNAFU-3 receiver but you still can't work 'em.

By this time months have passed. You have worked lots of juicy stuff all over the world, but not a single African. You are obsessed; a mad man, straining and stretching for that one contact that will give you W.A.C. No longer do people remark on how young you look for your age; your shoulders

(*Continued on page 90*)

* *244 Magnolia Ave., Oxhard, Calif.*

[1] *W6QD please note.*

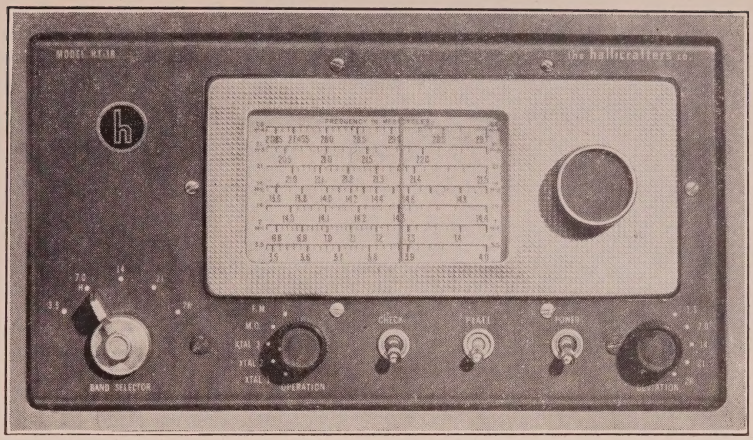


Fig. 1. Along the bottom of the panel left to right may be seen the band selector switch; the operation switch; three toggles for test or check, plate supply voltage and power; and the deviation control. The plate toggle switch doubles as a remote control. The single tuning knob is at the upper right.

Very Narrow Band FM

LEONARD MAYBERRY, W5BMW*

A commercial unit doing much to prove that narrow-band FM can work successfully with AM.

ONE OF THE NEWER variable frequency oscillator exciter units now commercially available to the amateur fraternity is the Hallicrafters' Model HT-18. Extreme versatility is the order of the day with the HT-18, illustrated by a look at some of the major features, including:

1) 2.5 watts r-f output across 72 ohms on the 3.5, 7, 14, 21 and 28-mc amateur bands.

2) Choice of three crystal frequencies, single dial v.f.o., or v-f-o narrow-band FM phone.

3) Full scale coverage of the above bands by means of a direct reading dial, with added convenience scales for finding output frequency when using harmonic operation.

The unit is illustrated in *Figs. 1*, and *3*. *Figure 3* shows the exciter removed from the decorative metal case in which it is normally mounted. Three 6BA6 miniature tubes function as the electron-coupled oscillator, the reactance tube, and the audio amplifier respectively, while the 6L6 in the rear of the chassis serves as an r-f amplifier, being separated from the smaller tubes by a highly polished metal barrier functioning as a heat reflecting shield. The underchassis layout is a typical commercial product which most amateurs will not be able to duplicate with the limited machine tools usually found around the house. By careful engineering, the v.f.o. is practically drift-free over normal changes in room and chassis temperatures.

The circuits used in the HT-18 are for the most part conventional; however, in the packaging and construction the exciter unit departs radically from amateur home-built v-f-o exciters of the common variety. For example, the principle tuning element is a condenser gang, one of the largest and most ruggedly constructed of the available standard types. It is double spaced and consists of six sections, four of which are used in various parallel combinations for oscillator grid tuning, the remaining two for oscillator and amplifier plate tuning. To minimize frequency drift, the oscillator coil is wound on a threaded ceramic form and is designed for maximum Q with minimum inductance drift.

Band switching is accomplished by a ganged ceramic switch, one section of which selects the appropriate combination of fixed, variable, and

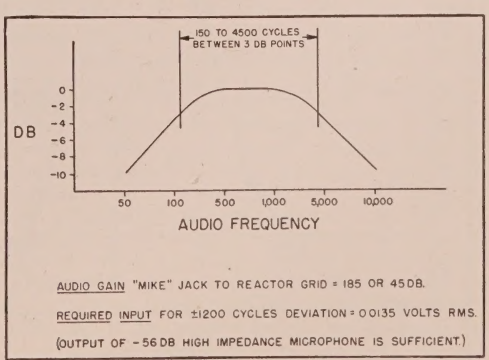


Fig. 2. Audio frequency response curve.

*Engineer, The Hallicrafters Co., Chicago, Ill.

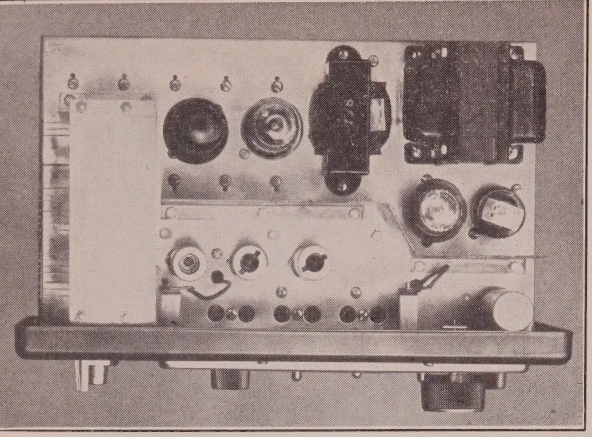


Fig. 3. shows the top view of the HT-18. Top left to right, the tubes are the 6L6 amplifier, two VR tube regulators and the 5Y3GT/G rectifier. Bottom left to right are the three 6BA6 miniatures, oscillator, reactance modulator and audio amplifier respectively. Three crystal sockets can be seen at front center.

padder condensers required for complete coverage of any of the bands. Another switch determines whether operation will be with any one of three crystals, v-f-o or NBFM phone.

Stability being of prime consideration in variable frequency oscillators, selected components having suitable temperature compensation characteristics are used where necessary, while further improvement is secured by operating the oscillator in the 3.5-mc band only; output at the higher frequencies is obtained by frequency multiplication in the 6L6 amplifier stage. Keying is accomplished in the cathode circuit of the electron-coupled oscillator. Plate and screen voltages are regulated.

Following the oscillator is the shunt-fed 6L6 frequency multiplier-amplifier which is capable of 2.5 watts output, on any band, across the 72-ohm link-coupled output circuit.

Narrow-Band FM Feature

Turning to the narrow-band FM feature of the HT-18, it is well to mention a few advantages of the system used by Hallicrafters to frequency modulate their self-excited oscillator as compared to the method known as phase modulation. Some of these are:

1) Complete freedom in the choice of operating frequencies as compared to crystal controlled phase modulation.

2) Large frequency swings for small audio inputs to the reactance tube.

3) Greatly reduced unwanted amplitude modulation, which causes distortion unless removed by subsequent limiting circuits.

4) A more desirable audio frequency characteristic than obtained with phase modulation. Even though the characteristic phase modulation rise in equivalent deviation with rising audio frequencies can be compensated for in the audio system of either the receiver or transmitter, a rather high order of frequency multiplication becomes necessary to achieve good low frequency response.

In a direct FM signal, the deviation is independent of the audio frequency, and therefore the design of the equipment need not be influenced by the particular audio frequency characteristic desired. Actually, the principle design problem in the HT-18 was to devise a means whereby a reactance tube could be connected across the oscillator without affecting either the center frequency or frequency stability. By connecting the output of the reactance tube to the oscillator cathode coil rather than by the more conventional means of a grid connection, a smaller center frequency shift resulted which was further minimized by arranging the phase splitting network in such a fashion that an inductive reactance is injected, of a magnitude equal to the capacitive reactance of the additional components and wiring associated with the reactance tube circuit.

Maximum deviation, at the oscillator frequency, is ± 1200 cycles. For all other frequency bands, the same frequency deviation is maintained by suitably adjusting the audio voltage reaching the grid of the reactance tube. This operation is performed by the operator when switching bands by means of a front

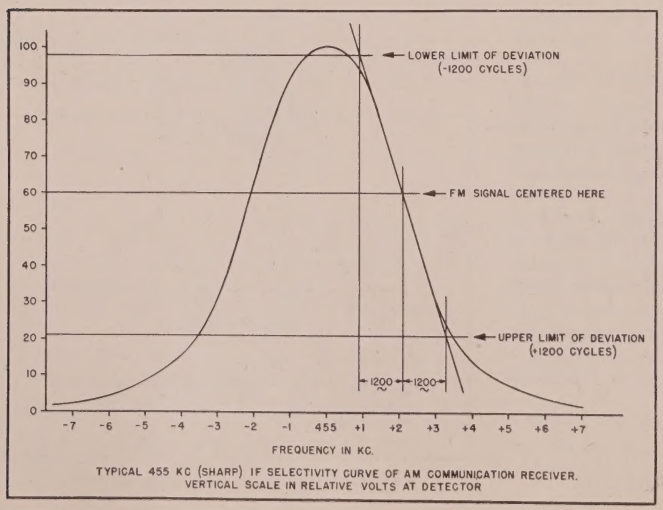


Fig. 4. Receiver selectivity curve.

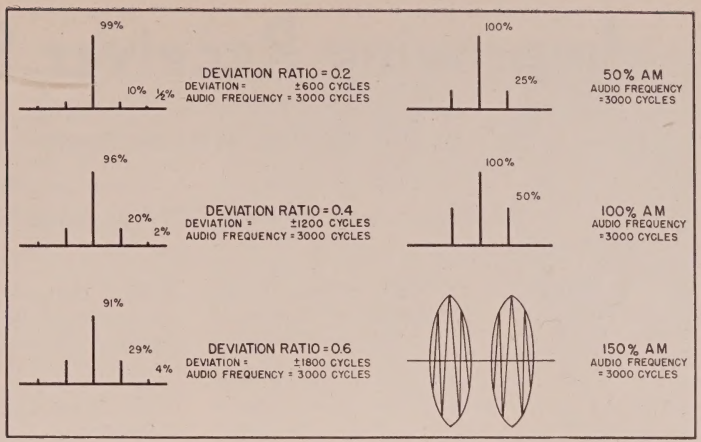


Fig. 5. Spectra.

panel switch resembling the BAND SELECTOR but labeled DEVIATION. The audio amplifier employs a 6BA6 in a resistance-coupled circuit which provides a voltage gain of 185, sufficient to permit the use of most high impedance crystal and dynamic microphones. For the full ± 1200 cycle deviation, the microphone should develop 0.0135 volts RMS at the input, corresponding to the output of a −56 db high impedance microphone when the operator is speaking normally about six inches away. *Figure 2* is the curve of frequency response of the HT-18 audio system measured from the microphone jack to the grid of the reactance tube.

Supplying the power needed by the unit is a 5Y3GT/G full-wave rectifier working into a fine filter consisting of two 20-μf capacitors and a 10-henry filter choke.

Reception of NBFM

To complete the picture of the exciter unit, it is well to consider the available means for the reception of the NBFM signal. *Figure 4* shows an over-all selectivity curve typical of communications receivers designed for AM phone reception. A NBFM signal can be received with little distortion by detuning the AM receiver so that the signal falls in the center of the most linear portion of either sloping side of the selectivity curve. The FM signal then varies along the path indicated, producing a signal of varying amplitude which is demodulated by the receiver in a normal manner. Further increase of the deviation to a value greater than ± 1200 cycles would increase the audio output slightly, while distortion would increase tremendously. In the case illustrated, the loss in signal strength introduced by the detuning necessary to make the NBFM intelligible is almost −4.5 db in terms of voltage. This is not serious when the dollars and dbs are weighed; considering the cost of the NBFM exciter against the additional cost of AM modulation equipment necessary to get on the air with an AM signal equal to the FM signal in signal strength. Furthermore, much better results will be obtained when the AM receiver is fitted with an adapter for NBFM.

When discussing the means for reception of NBFM, the human element should also be mentioned. It seems as if some amateurs have misgivings about this newer type of modulation. A brief review of the NBFM modus operandi follows which should help clarify some of the points most frequently discussed.

Advantages of NBFM

Narrow-band FM as applied to amateur radio communication implies a total transmitted bandwidth equal to that occupied by an AM signal of the same modulation frequency. Since the top frequency required for intelligible speech is approximately 3000 cycles, a deviation of ± 1200 cycles at 3 kc audio results in a spectral distribution of energy very similar to that resulting from 100% AM requiring essentially no greater bandwidth. *Figure 5* shows the spectral distribution of various FM and AM signals, all at the same modulation frequency of 3 kc but differing in the degree of modulation, expressed for AM as "percentage modulation" and for FM as the "deviation ratio," the latter equalling total deviation in cycles divided by audio frequency in cycles. The middle two sets of plots show the similarity between the spectra generated by ± 1200 cycle deviation and 100% AM. The two top row plots compare ± 600 cycle deviation to 50% AM, while the lower row shows another great advantage on the side of NBFM. Of course, no amateur would knowingly overmodulate by normal means on AM, but if he should accidentally do so, the results are shown. The 150% AM plot is not a spectral distribution; in fact, such a plot would require more room than the page allows if all components having greater than 1% amplitudes were shown to the same frequency scale. The corresponding FM plot shows that for the same relative increase in degree of modulation that only a small amount of energy is added outside the bandwidth limits, which adds only small interference to adjacent channels by comparison. With a bandwidth no wider than AM and with a signal almost as strong in amplitude, no one can rightfully accuse an operator on FM of unduly adding to the interference problems in the phone bands; and, in reality, a good NBFM rig gets the speech intelligence across with not only less cost but in accordance with good engineering practice.

Improving Receiver Stability

JAMES N. WHITAKER, W2BFB*

Modifications made on the BC-779A to correct for severe drift.

MUCH OF THE pleasure to be derived from the use of a high quality communications receiver will be lost if the receiver "drifts," or is unstable in frequency. For communications work a receiver is usually in operation continuously except for short periods of overhaul, and servicing. In this type of service, the frequency stability with temperature changes is of little importance, as normal operating temperatures are maintained at all times. For amateur or casual listener service the receiver is seldom in use for more than a few hours at a time, and a tendency to drift becomes a matter of great annoyance.

The purpose of this article is to indicate the major causes of frequency instability due to temperature changes in receivers, and to suggest means for eliminating or compensating for this fault.

Most superheterodyne receivers incorporate oscillators which are relatively stable with voltage changes, or some means is provided for maintaining a relatively stable voltage to the oscillator. We will assume that we need not concern ourselves with voltage variations. The source of instability about which we are concerned results primarily from mechanical changes produced by variations in the temperature of the receiver as it warms up. In a sturdily built receiver, these changes may continue for a period of several hours. The rapid change noted in the first half hour of operation is due largely to the physical expansion of the elements in the oscillator tube. The variations are more pronounced if the tube happens to have a relatively high input or output capacitance. By the time the tube has reached its maximum operating temperature, other elements associated with the oscillator circuit have absorbed sufficient heat to start expanding, and the drift is continued until complete equilibrium of temperature is reached by the receiver as a whole.

* *93 Shepard Ave., West Englewood, N. J.*

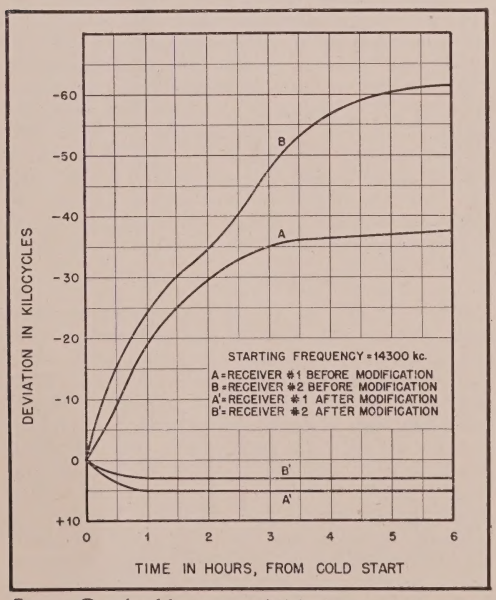


Fig. 1. Graph of frequency drift before and after modification of two BC-779A receivers.

The work to be described in the following paragraphs was done on one specific type of receiver, the war surplus BC-779A, but is applicable to all of the Super Pro series and, in general, to all types of receivers. Two of these receivers have been modified and the results have indicated that a vast improvement can be obtained with a minimum of effort and expense.

The curves shown in *Fig. 1* indicate the frequency drift over a period of six hours, before and after the modifications. Set A drifted 37.5 kc and set B drifted slightly more than 61 kc in a period of six hours before modification. After the modifications were completed, set A drifted 5 kc during the first hour, and set B drifted 3 kc during the same period of time, and no further drift occurred subsequently in either set.

The major cause of the fast drift at the start of the test was found to be due to the use of a type 6J7 tube, triode connected, in the high-frequency oscillator circuit. In the oscillator circuit, both the input and output capacitances affect the frequency, and therefore frequency change will result from the changes in tube capacitance alone as the tube warms up. Step number one was therefore to replace this tube with a suitable triode having similar electrical characteristics, together with the lowest possible input and output capacitance. The type 6C4 miniature tube fulfilled these requirements and was therefore installed as will be described later.

The installation of the 6C4 oscillator tube improved the short-time drift appreciably, but the drift over a period of several hours was so great as to almost completely cancel the advantages realized by the new tube. The next step was to determine the cause of the very great frequency deviation over long periods of time.

The BC-779A, like most receivers incorporating multiple tuned stages, contains a special ganged tuning capacitor with a semi-rigid bearing at one

end of the shaft, and an adjusting screw at the other end. The purpose of the adjusting screw is primarily to adjust the torque of the shaft. The shaft is quite long, and since the adjusting screw is rigid, any variations due to the expansion of this shaft must be taken up by the semi-rigid bearing at the front end. The oscillator section of the tuning capacitor is mounted on the front end of the assembly near the semi-rigid bearing. Any variations in the length of the shaft will therefore cause a change in the oscillator tuning, and cause a drift in frequency with changes of temperature.

The oscillator section of the main tuning capacitor must be electrically centered in order to minimize the change in capacitance due to the shaft expansion with temperature changes. To center this capacitor, apply a steady r-f signal to the input of the receiver, using the beat oscillator to provide an audible signal in the speaker. Next loosen the locking nut on the rear bearing adjusting screw, and turn the screw in or out until a point is found where the pitch of the signal stops varying and then changes in the *opposite* direction as the screw is adjusted in the *same* direction. This will indicate that the electrical center has been reached and passed. Adjust the screw until the exact point is reached where the audible beat note reverses itself. You have now eliminated the cause of the greatest magnitude of frequency drift with temperature changes.

Refer to *Fig. 1* and note the vast difference in the original drift of receiver B as compared to receiver A. The oscillator tuning capacitor in receiver B was found to be the most poorly adjusted capacitor of the two, and when the oscillator tuning capacitors were properly adjusted, both receivers performed substantially the same.

The capacity of a multiple plate variable capacitor does not change linearly with a lateral movement of the rotor. The change in capacity will be less for a given lateral movement of the rotor if the rotor and stator plates are electrically centered.

The centering of the capacitor should be done at a frequency which falls near the center of the highest frequency band in which you wish to operate. In this instance, the centering and all other tests, and

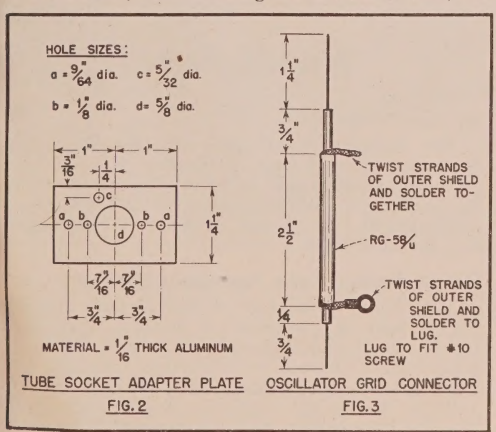


Fig. 2. 6C4 socket adapter plate. Fig. 3. Grid connector lead.

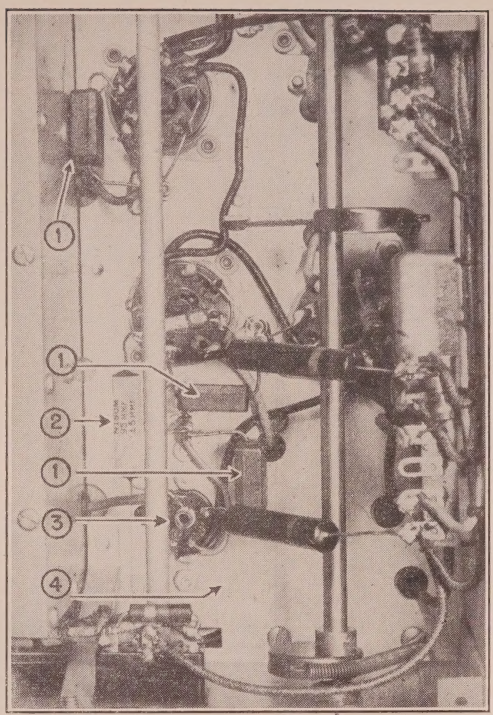


Fig. 4. Bottom view, oscillator and mixer area showing modifications completed. (1) .01-μf molded mica bypass capacitors. (2) 95-μμf "Ceramicon" No. N150M (3) Miniature tube socket. (4) Socket adapter plate.

the heat runs were made at a frequency of 14,300 kc.

The remaining drift apparently resulted from heat being absorbed by the tuner unit. The ideal location for the compensating capacitors is therefore adjacent to the oscillator tuning capacitor near the top of the tuning unit. Two Centralab No. 13303A negative coefficient capacitors connected in series across the oscillator tuning capacitor provided the exact value of compensation required for complete stabilization of the receiver. As is indicated by curves A′ and B′ in *Fig. 1*, the total drift does not exceed one division of the band spread dial. This small error is not at all noticeable in actual operation.

Mechanical Modifications

The first step in stabilizing the receiver is to make the mechanical modifications. But in the event that it is not desired to carry the stabilization that far, electrically centering the oscillator tuning capacitor as previously described will be the only work required. The mechanical modifications can best be understood by referring to *Figs. 2, 3, 4,* and *5*. Carefully unsolder and remove all wires from the socket terminals, being particularly cautious not to break off the wire from the cathode terminal to the tuner unit, or the wire on the plate filter resistor. The oscillator tube socket is then removed by drilling out the rivets which mount the socket to the chassis. Cut and drill a piece of aluminum 1/16-inch thick for a socket adapter plate as shown in *Fig. 2*. Pre-

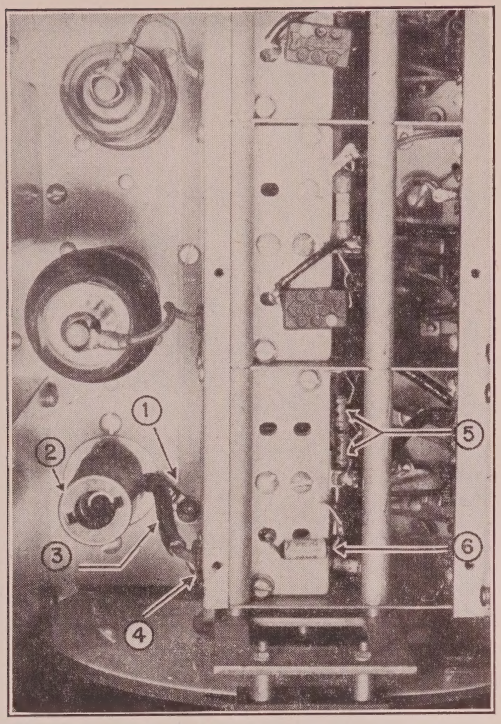


Fig. 5. Top view, oscillator and mixer area, with tuner left top shield removed, showing modifications completed. (1) Coaxial cable shield lug, under tuner mounting screw. (2) 6C4 miniature tube, in shielded socket. (3) Coaxial grid connector. (See Fig. 3.) (4) Upper end of coaxial shield soldered to tuner side shield. (5) Two Centralab No. 13303A negative coefficient capacitors. (6) Centralab CC32Z zero temperature coefficient oscillatar grid coupling capacitor.

pare the grid connection from a short length of of RG-58/U coaxial cable as shown in *Fig. 3.*

Mount a shielded miniature socket on the socket mounting plate by means of two number 4 screws, and mount the entire assembly to the chassis with two number 6 screws, using the holes provided in the chassis for mounting the original socket. The socket should be oriented with the cathode terminal toward the rear of the receiver. The 3/16-inch cable opening in the mounting plate should be toward the tuner unit. Connect the elements of the tube into the circuit exactly as they were previously connected. The circuit is the same electrically as with the triode connected 6J7 tube. Consult the schematic diagram supplied with the receiver and a tube base chart for details. Replace the silver-mica injector capacitor with a Ceramicon N150M 95-$\mu\mu$f capacitor. (In some model Pros this change has been made at the factory.)

Install the oscillator grid connector as shown in *Fig. 3.* Remove the number 10 screw holding the front end of the tuner unit to the chassis, and fasten the lug on the bottom end of the grid connector shield under this screw, thus securely grounding the bottom end of the shield. Remove the top left cover plate of the tuner unit. Carefully remove the old grid connector and solder the center conductor of the coaxial cable in its place.

The grid connector, the grid coupling capacitor, and the grid resistor of the oscillator system all connect together through an opening in the ceramic support of the oscillator tuning capacitor. With care the old connector may be removed and the new one inserted in its place. Replace the silver-mica coupling capacitor with a 50-$\mu\mu$f zero temperature coefficient capacitor (Centralab CC32Z). Solder the upper end of the grid connector shield to the left side shield of the tuner assembly. Solder two 10-$\mu\mu$f negative coefficient capacitors (Centralab 13303A) in series. This combination forms the negative compensation unit, which is to be connected in parallel with the oscillator main tuning capacitor. One end of the compensator is soldered to the stator of the tuning capacitor, and the other end is soldered to the internal shield of the tuner unit as shown in *Fig. 5.* Replace the tuning unit shield. Solder the center lead of the coaxial cable to the grid contact of the oscillator tube socket, and the modifications are complete.

If the receiver is equipped with the black bakelite covered paper r-f bypass capacitors, it is well to replace them with .01-μf mica capacitors as shown in *Fig. 4.* There are two additional capacitors of this type not shown in *Fig. 4,* which should also be replaced with .01-μf mica capacitors. They occupy a position similar to the most rearward capacitor indicated in *Fig. 4.*

After the modifications have been completed, the entire r-f amplifier section, or at least the oscillator portion of all bands must be re-aligned. The modification and re-alignment will be a good day's work, but will be well worth while from the standpoint of satisfactory operation. The stability of the receiver will be entirely satisfactory, and there will be another advantage incidental to the frequency stability. There will be less tendency for accoustical feedback (microphonics) since the new oscillator tube has much smaller elements and is more rigid mechanically.

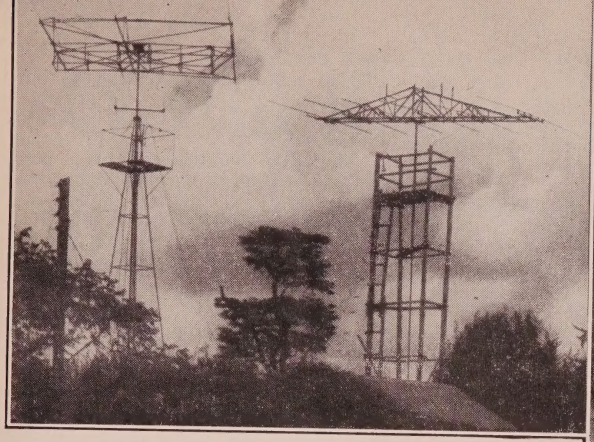
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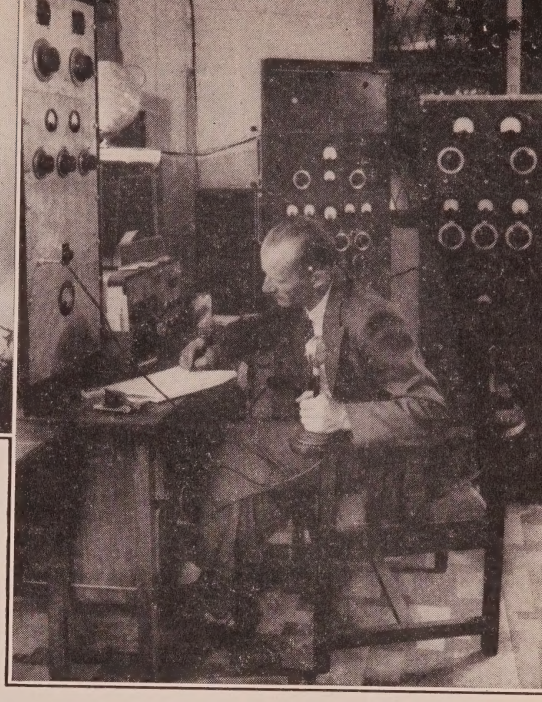
Mid-South Hamfest

The Jackson (Mississippi) Amateur Radio Club is sponsoring a Mid-South Hamfest on May 15–16 at the Edwards Hotel, Jackson, Miss. Reservations for hotel rooms and advance registration should be addressed to J. P. Brown, W5ITL, at 1108 Central St., Jackson, Miss.

Detroit Amateur Radio Association Hamfest

The Annual Hamfest of the Detroit Amateur Radio Assn. is scheduled for Sunday, May 23, at the National Guard Armory, Ypsilanti, Mich., 30 miles west of Detroit on the route to Chicago. Contests, prizes, short talks, traffic meetings and YF and YL doings are planned. Registration: $1.00. Further information may be obtained from G. H. Goldstone, W8MGQ, 1745 W. Boston Blvd., Detroit 6, Mich.





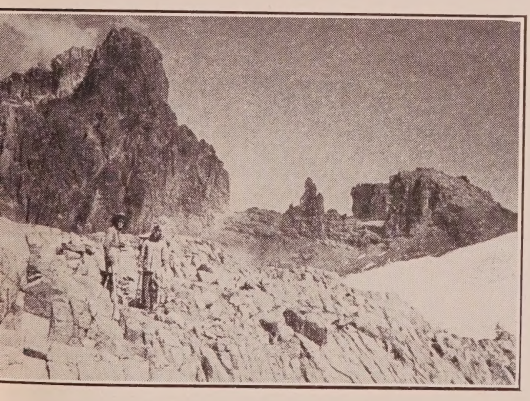
The Other Fellow's Station-VQ4ERR

Mountain Radio

E. R. ROBSON, VQ4ERR

ONE OF THE MOST CONSISTENT Kenya Colony signals to start off a DX man's free-for-all is VQ4ERR. When not carrying on his professional duties as a chemist, acting as vice-president of the Radio Society of East Africa, or hamming, Robbie can be found mountain climbing. How these two hobbies fit together is a fascinating story best told by VQ4ERR.

Home station conditions are far from what one would normally expect in Africa. Nairobi, the home QTH, is 6,000 feet above sea level and has summer weather throughout the year. Robbie received the third postwar VQ4 call and operated QRP c.w. until September, 1946. The new station operates almost exclusively on phone. The impressive antennas, consisting of a 6-element 10-meter rotary and a 3-element 20-meter rotary, account for a good bit of the power-house signal. Antennas are also up for 6, 5, and 15. The three transmitters, all complete rigs, consist of a 70-watt job on the operating table ending up with a TZ-40, and two 150-watt transmitters ending up with 35Ts. Operation is on 5, 6, 10, and 20, with all provisions for 15 built in. The receiver is an SX-42. QSLs are preserved in filing cabinets and special albums.



Mt. Kenya, the main peak rising 17,400 feet.

To the ham who loves his radio and is also a keen mountaineer, it is a wrench to leave the shack when he goes on holiday. On top of a high mountain one could not be further from civilization and radio —or could one?

The idea of a portable rig had occurred to me, but the difficulties were many. Have you ever tried carrying a battery at sea level? Not too bad for a hundred yards. Well, try it at 15,000 feet in a snow storm. At these heights lack of oxygen causes trouble, and the motto is "travel light."

The more I pondered, the more the jig-saw fitted together. Mules up to 13,000 feet on Mt. Kenya were arranged for, and a small rig with a 6V6 into a 6V6 and final 6L6, modulated by a 6C5 and 6N7 was put together. It weighed very little—less than the heavy-duty vibrator unit next made. I found on local QSOs that an antenna tuning unit was worth the small extra weight. Two batteries and an S-38 completed the 10-meter station. 5 to 10 watts is naturally more effective on 10 meters than on 20, and, as every ounce counted, I decided on 10 meters only. A few spare tubes and a midget repair kit, my Avometer, and dinghy aluminum masts for the antenna were included.

The first part of the journey to the base of Mt. Kenya went smoothly, but through the bamboo forest at 10,000 feet the equipment was badly knocked about. One day on the march a rhinoceros disputed the right of way and, being in a truculent mood, scattered the party completely—scaring the mules who panicked off back to camp five miles away.

All was straightened out again with only a food box smashed, though I did not dare examine the radio equipment. During that night elephants passed through the camp and, before I realized what had happened, the mules had stampeded again, and once more a trip was made back to camp No. 2. Traveling light this time the double trip back was quicker.

A rough check on the equipment showed that the locking washers and careful construction were well worth while and the transmitter and receiver appeared perfect. Canvas was wrapped around everything as the rain began to pour down on the lower slopes.

At 13,000 feet, in the Teleki Valley, I put up the 6′ x 4′ radio tent and tried out the equipment. To my horror the power unit fuse blew, and clouds of smoke arose from the set. Discouraged and shivering with cold I gave up as it turned dark.

The next morning the sun came out and, feeling better, I went over the set with the Avometer and found a paxolin-type tube holder had packed up. No spare holders so I had to extemporize a soldering iron, and with the aid of the primus stove soldered the wires directly to the tube pins and lashed the tube to its neighbor with first aid plaster. Everything else seemed okay and to my relief all went well. However, I had had a chill and had practically lost my CQ voice so had difficulty in contacting ZS6CM for my first QSO.

The next day, December 3rd, we manhandled the whole outfit to 15,000 feet, and contacted ZS1AX and ZS6GN. G6JS gave me a QRZ and gradually faded out, much to my chagrin. The next day my voice had gone completely, but it was not until I cracked up completely after the trip that I realized I had malaria—the first go of it for twenty years.

On the 6th I got the spare battery up and some more food and blankets and my croaking voice would occasionally yield to hot cocoa and allow my dulcet CQ to float out. I contacted G4HW who kindly gave me 5 and 7, and VQ4JWB at 90 miles gave me 2 and 2! Heard W1FH and W1BEQ, but the W signals were poor.

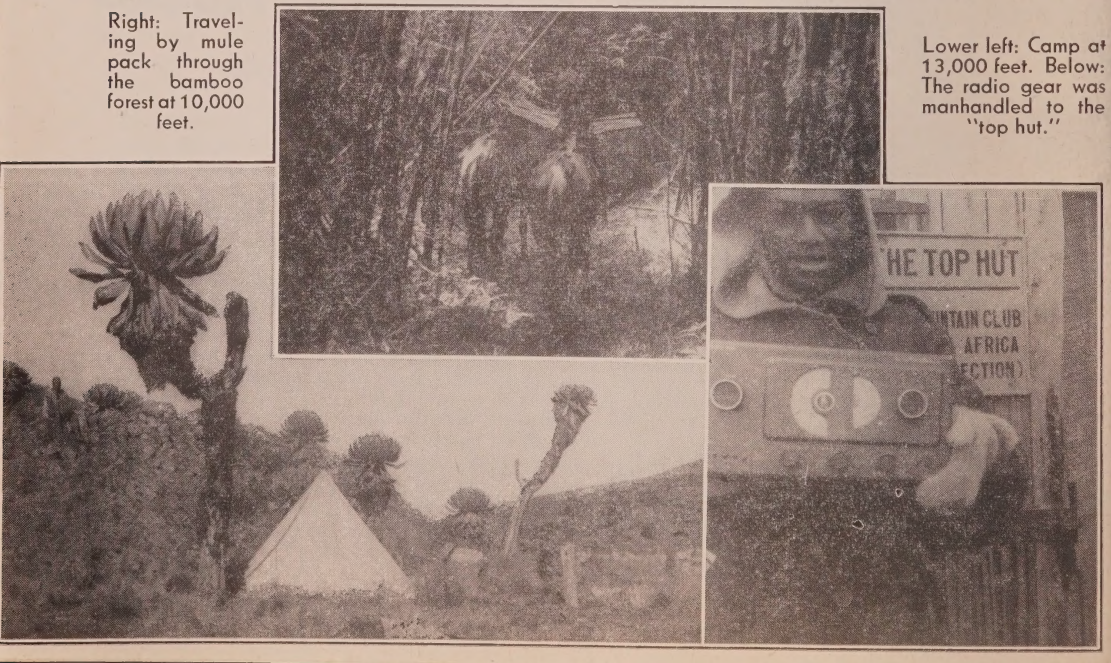
The most interesting thing I found was the ease of contacting "shortskip" on ground wave at 90 miles on 10 meters. Obviously the altitude made it possible as it was the first time in Kenya Colony that we had 100-mile skip on ten. The only trouble was the distortion echo and weakness of the signals. Experimenting with a weak voice I overmodulated about 200 per cent—the gain control full up and the reports were Q5!

I had several contacts with Nairobi, and could even occasionally hear the harmonic of VQ4NSH who was actually working on 20 meters! Reception from the top hut at nearly 16,000 feet was poor. The best results for receiving on the trip were between 10,000 and 12,000 feet.

A severe tribulation one discovers is moisture condensation. The receiver with its closer-spaced condensers is far more vulnerable than the transmitter with its wide spacing. The best plan was to keep the kit warm and wrap the receiver and mike in a blanket and warm all the kit up when the sun came out. The temperature at 13,000 feet was below freezing each night, in spite of being on the Equator, and rose to as high as 50° or 60° during the day. These extremes of temperature naturally caused condensation, and how the tiny S-38 survived I do not know.

The food began to get low and we could see the foot of the mountain blacked out daily with rain. While on top the weather had been quite good, barring a few storms and damp mists. So we packed up and began the descent. The last day's march was about 20 miles knee-deep in mud on the level and a treacherous tobaggon on the slopes. We got into our base camp covered with mud, scratched, sodden and tired, yet happy, and singing the native chant which scares away elephants and rhinoceros which literally infest these slopes.

Amply satisfied with two-way mountain-top communication, I decided I would take my portable alpine equipment on various future trips, but I'll use an 815 in the final, modulated by an 815, for I'd rather be on the air for a shorter time with higher power. Last, but not least, on the next trip there will be no mules—it will be a helicopter or nothing!



Right: Traveling by mule pack through the bamboo forest at 10,000 feet.

Lower left: Camp at 13,000 feet. Below: The radio gear was manhandled to the "top hut."

Clickless Keying Using VR Tubes

MACK SEYBOLD, W2RYI*

When tuning the c-w bands the inescapable conclusion is that too many transmitters could use a good key click filter. Here is an entirely new approach employing VR-type tubes that is guaranteed to lick the most stubborn kind of click.

When the 20-meter amateur band was reopened in '46, I rigged up a transmitter using a grid-leak biased 829-B in the output stage. In order to prevent excessive dissipation in this push-pull beam power amplifier when the doublers in the exciter unit were being tuned up, a low-current relay was placed in the control-grid circuit of the 829-B. The contacts of this relay opened the screen-grid supply line when excitation dropped below 7 ma. For phone work, this system behaved very nicely, but for c.w., it presented several problems.

First of all, cathode keying in the final stage was not satisfactory because of the time-delay characteristics of the grid-current actuated relay. Naturally, an open cathode circuit prevented grid current from flowing even when excitation was available, so the grid-current relay would not start to function until after the key in the cathode line was closed. This was not taking advantage of the main feature of cathode keying; namely, the simultaneous switching of plate, screen, and control grid circuits. Actually, it was the screen grid that was being keyed, because each time the cathode key was closed, the No. 1 grid and plate connections would be completed before the relay contacts could throw on the screen voltage. The obvious thing to do was to ground the cathode, and then key the screen directly.

The second problem was one of key clicks. Half-a-dozen different filters were tried in the screen-keying circuit, but none of them gave satisfactory control of the transients that produce key clicks. There may be in existence a filter that will handle this job, but I couldn't find a combination of capacitors, resistors, iron-core chokes, and r-f chokes that would give satisfactory performance.

It looked as though vacuum-tube keying would help the situation. A triode in series with the screen lead could swing the current from a few microamperes to full flow by keying a biasing potential at the triode grid. However, a control tube in this position operates with its bias-supply pack, heater supply, and key line several hundred volts positive with respect to ground. In addition, all of these components operate in the screen-grid lead of the output stage, and, therefore, have excessive capacitance to ground when the rig operates on phone. The prospects for a series control circuit were none too bright.

Shunting the screen to ground through a vacuum tube is an alternative which avoids the main objections to the series circuit because all of the controls and supplies are operated from the ground reference level. That part is fine, but there is still one objection: a vacuum tube in a shunt system can never drop the screen voltage to zero. The higher the perveance [1] of the control tube, the nearer to zero one can get, but sufficient voltage drop still remains across the tube to let some signal through the keyed stage.

The closest approach to zero drop in shunt systems is obtained by the use of thyratrons. 2D21s and 2050s will give a voltage minimum of 8 to 10 volts, which appeared to be sufficiently low to do the job. With this in mind, I looked through the literature for applicable thyratron circuits. The trick in gas-discharge-tube circuits using a d-c plate supply is to kick the plate negative when you want the tube to stop conducting. As soon as the gas stops ionizing, a negative potential on the control grid will prevent further current flow. Every time the tube is fired, however, plate current will continue to flow no matter how negative you make the grid, until the d-c plate voltage is reduced to less than eight volts.

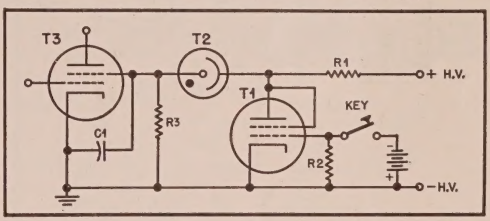


Fig. 1. Fundamental keying circuit. See text for function of each component.

The circuits available to do this job either use two thyratrons or one thyratron with a time-delay network that loses about eight more volts. No matter which of the two types you choose, you end up with a rather complicated circuit and the screen-grid voltage still can't hit zero.

At that point in the investigation I decided that there must be a simple and effective way of doing the job. I figured that the shunt system was the best approach, that it would be well to have a gas tube in the circuit because of the transient-damping time lag in ionizing and deionizing, and that the timing element in the system should be entirely the function of the key so that any speeds within reason

* *c/o Tube Department, Radio Corporation of America, Harrison, New Jersey.*

1 Perveance is a measure of a tube's ability to conduct high current at low plate voltage.

could be used without having to adjust time-constant networks.

With these specifications in mind, the circuit practically developed itself. The vacuum tube in the shunt position would swing the screen voltage from 200 down to some minimum potential under the complete control of a key in the No. 1 grid circuit. All that was needed to bring the screen voltage down to zero was a gas tube in the circuit that would extinguish itself completely when the voltage drop across the shunt tube was at its minimum. It is a well-known fact that the OA3/VR75 voltage regulator tube will deionize completely when the potential across it drops a few volts below 75. Similarly, the glow in the OC3/VR105 and OD3/VR150 will be extinguished when the potentials fall a few volts below 105 and 150, respectively. Here are three tubes that need no heater supplies, that will conduct up to 40 ma of current, that will maintain a constant drop across themselves throughout a current range of from 5 to 40 ma, and, fortunately for our purpose, will stop conducting at a certain minimum potential.

Fundamental Circuit

The circuit for keying, as developed, is shown in *Fig. 1.* When the key is down, the bias thereby applied to the control tube T_1 prevents it from conducting, leaving only the series dropping resistor,

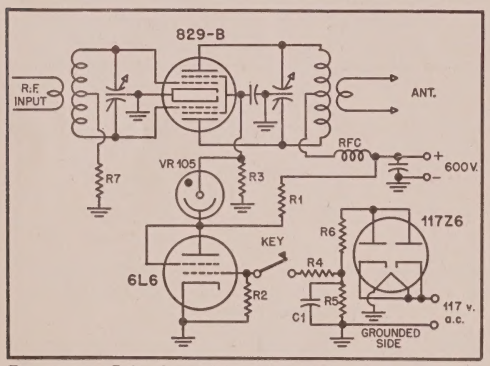


Fig. 2. 829-B final amplifier using Class-A keying control tube.

R1—10,000 ohms, 50 w.
R2, R3—0.25 meg., ½ w.
R4—50,000 ohms, ¼ w.
R5—0.1 meg., ½ w.
R6—100 ohms, ½ w.
R7—5800 ohms, 2 w.
C1—30 μf, 150 working volts.
R-F components are conventional.

R_1; the gas tube, T_2; and the controlled tube, T_3, in the circuit. The supply voltage, minus the drops across R_1 and T_2, is the effective screen-grid potential applied to T_3, which permits T_3 to operate normally. When the key is up, bias to T_1 drops to zero, making T_1 conduct, and as a result, the voltage drop across T_1 becomes less than the ionizing potential for the VR tube, T_2, which makes the VR tube stop conducting. When the VR tube stops conducting, the supply voltage is completely removed from the screen grid of the r-f amplifier, T_3, and the transmitter then goes off the air.

This procedure can be repeated as often as desired, as in c-w work; the rapidity of keying is limited only by the ionizing and deionizing characteristics of th VR tube. The limiting speed is much faster than one can read code. It probably would meet requirements for high-speed tape transmission.

In the circuit of *Fig. 1*, resistors R_2 and R_3 are of high value, and are present merely to maintain each grid at a potential near zero when keying potentials are removed. C_1 is a conventional r-f bypass capacitor.

Application in the 829-B Transmitter

Before discussing further developments of this circuit, it would be perhaps worthwhile to examine the actual layout (*Fig. 2*) used in the 829-B transmitter of W2RYI. The protective relay mentioned at the beginning of the article is omitted because it is not a necessary component of this keying device.

The 117Z6, operated directly from the 117-volt a-c line, furnishes the keying bias. Since practically no current flows through the key contacts, high values of resistance are used in the bias supply filter, making it possible to eliminate the ripple with a single 30-μf capacitor. About 150 volts of bias are available to bias the 6L6 control tube. To protect the operator against shock from the bias supply filter capacitor, a 50,000-ohm resistor is placed in series with the key lead. If a keying relay is used, this resistor will not be necessary from the standpoint of operator protection, but should be included in order to reduce the 6L6 bias to 125 volts, which is the maximum rating of this tube for amateur service.

The selection of the proper tube for keying control is a matter of picking one with high perveance and a reasonably sharp plate-current cutoff. The 6L6, operated as a triode, has satisfactory characteristics with respect to both perveance and cutoff.

The value of resistor, R_1, is determined as follows: Subtract from the value of the high-voltage supply (600 v.) the VR tube drop (105 v.) and the screen potential needed for operation of the 829-B (200 v.). The result is 295 volts for which the dropping resistor R_1 will be responsible. The screen current is 30 ma, so R_1 will be about 10,000 ohms.

To find out what happens at the control tube and R_1 when the key is up, draw a 10,000-ohm load line from the supply voltage (600 v.) point on the plate family of the triode-connected 6L6, *Fig. 3.* At the intersection of the zero-bias line with the load line, the value of the space current in the 6L6 will be found. The point should also indicate a tube voltage drop of 100 volts or less if the OC3/VR105 is to behave properly. The drop across R_1 will be at least 500 volts, which means that its dissipation in the key-up position will be

$$\frac{E^2}{R} = \frac{500^2}{10{,}000} = 25 \text{ watts.}$$

Therefore, a good conservative rating for R_1 would be 50 watts. The plate and screen of the 6L6 in the key-up position will be dissipating about 5 watts. The solid line on the plate family indicates the conditions through which the 6L6 passes throughout the keying cycle. Although the plate load-line terminates at the potential of the high-voltage power supply, the operating voltage at the plate of the control tube does not exceed the screen potential

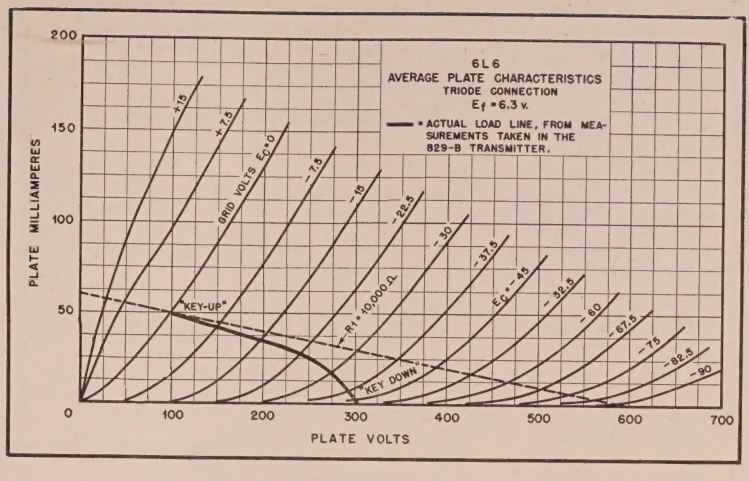


Fig. 3. 6L6 plate characteristics.

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of the 829-B by more than the drop across the VR tube.

If a c-w transmitter utilizing a power supply potential other than the 600 volts designated above is to be used, then the value of R_1 and the VR tube to be used can be determined in the same manner as for the 600-volt condition. Use the same 6L6 triode plate family and plot the new R_1 load line from the point representing the supply voltage to be substituted.

As for the behavior of the circuit on the air, key clicks, thumps, etc., just aren't available, yet it doesn't sound too soft, as would primary keying. The characters are extremely clean.

Phone Operation

When the rig is swung over to phone, the easiest way to "close" the key is to have the a-c switch that throws on the speech-amplifier heaters connected so that it opens the 6L6 control-tube heater at the same time. The same switch, if a DPDT affair, could also open the hot leg of the 117Z6 heater, inasmuch as the bias supply and control tube are not necessary when the final stage is to be operated in the "key-down" position all the time you are on phone. The OC3/VR105 and the screen resistor will carry on normally without the rest of the control circuit. *Figure 4* shows the c.w.-to-phone switching arrangement.

By the way, modulation of the common plate and screen circuit proceeds normally with the VR tube remaining in the circuit. Variation with modulation of the amount of ionization glow can be seen, but the VR tube has no detrimental effect upon phone operation of the rig.

Modifications of the Circuit

Various applications of this new keying method are possible. Devices other than Class C amplifiers can, of course, be keyed. Wherever minimized switching transients are desired, this circuit has its advantages. Limitations as to the amount of current that can be handled are determined by the ratings of the gas tubes and control tubes available. In any event, the VR tubes discussed here will handle most of the screen-current requirements for amateur transmitters. Paralleling VR tubes is a possibility, also, if suitable resistors are placed in series with each of them to allow concurrent ionization.

Other modifications of the circuit for screen keying of Class C r-f stages are possible. Several have been used at W2RYI. For instance, the 829-B application just described utilizes extremely low current in the keying line, but the control tube does not necessarily have to operate as a negative-bias affair. Many amateurs construct transmitters with a minimum number of power and bias supplies. If a power pack with 150 volts below ground is not available in the present rig, and if it is inconvenient to throw together the 117Z6 circuit described above, a positive potential obtained from existing equipment will serve well in the following modification of the system.

Instead of using a control tube that allows heavy current to flow at zero bias, a triode of the Class B type that is practically cut off with zero potential on the grid will do equally well. The current-conducting portion of the keying cycle is actuated by applying a positive potential to the control grid. Of course this system requires more current in the keying line than the negative-potential method, but the magnitude of current is in the order of 10 ma, which is even less than required by ordinary cathode keying in low-power transmitters. In addition, the

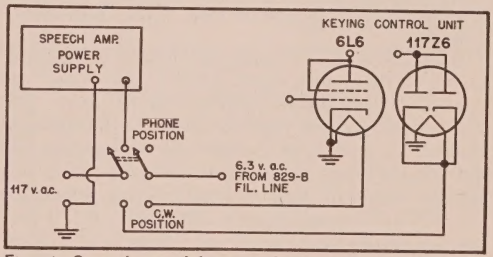


Fig. 4. Speech amplifier switch wired to select either phone or c.w.

keying line has very little inductance and capacitance to cause arcing difficulties, and the line is isolated from the r-f equipment, minimizing the possibility of the appearance of switching transients in the r-f signal.

Several different Class B tube types will work well in this application. The old 46 could do the job, but when a 2.5-volt filament supply is not available, it is more convenient to use a 6.3-volt type, particularly a heater-cathode type in order to prevent 60-cycle pick-up. The 807, connected as a

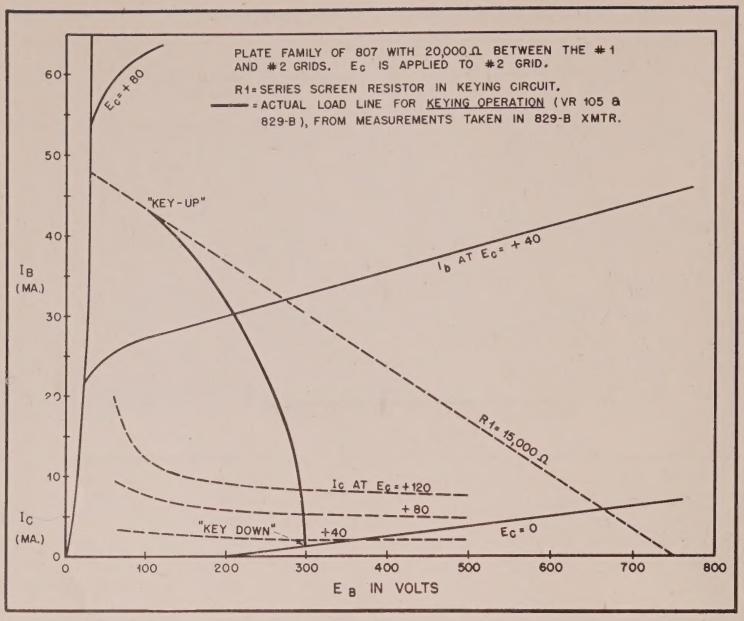


Fig. 5. Plate family for 807.

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Class B triode, behaves very well in this capacity. A plate family for the 807 with Class B connections is shown in *Fig. 5*, giving a load line for keying operations. Further data on the 807 in Class B service are available in the May-June 1947 issue of RCA's "Ham-Tips."

Application of the 807 Control Tube

Figure 6 is the schematic diagram for positive-potential keying of the control tube. Again the 829-B is shown in the r-f amplifier stage. Calculations for the value of R_1 are similar to those used for the negative-potential keying circuit, except that there may be one or two milliamperes of current flowing through the control tube in the "key-down" position.

Selection of R_4 for power and resistance requirements is dependent upon conditions in both the open and closed-circuit positions of the key. The 750-volt connection requires about an 85,000-ohm resistor to produce a grid-driving voltage for the 807 control tube. The greatest dissipation from this resistor occurs in the key-down position, where the full 750-volt drop appears across it. A 10-watt resistor should take care of the 6.6 watts dissipated. The "key-up" position determines the resistance value of R_4; the grid-current curves of *Fig. 5* give the necessary data. From 70 to 80 volts of grid drive produce about 8 ma of grid current, so the 670-volt drop through R_4 determines its 85,000-ohm value.

A positive potential from a lower-voltage power supply could be used to control the 807 if the value of R_4 is changed accordingly. For instance, if a +200-volt connection is available for operation of the keying line, R_4 should be about 16,000 ohms. A 5-watt resistor would be large enough.

As a further practical requirement, it is recommended that a relay be used rather than a key because of the high potentials at the contacts. A "normally-open" relay as a direct substitute for the key in *Fig. 6* is a good safe arrangement.

If a "normally-closed" relay is hanging around the shack waiting for a job, the circuit of *Fig. 7* may be employed. This circuit permits series operation of the positive line. The dissipation rating of R_4 is dependent only upon the control-tube grid voltage and current requirements. Any supply source giving + 100 volts or more may be used. Just be sure that R_4 is selected to produce enough voltage at the grid of the control tube to drive the plate current up the load line to the knee of the curve, or at least to a point where the potential drop across the control tube is low enough to extinguish the gas tube in the "key-up" position.

If deviation from the above values of R_1 and the high-voltage supply are used, plot a new load line on the plate family of the 807 control tube. Then select a driving voltage for the control tube grid that will swing the tube sufficiently but still keep the grid current at a low level.

For low-power transmitters, a 6L6 instead of the 807 may be used in the Class B control tube arrangement. In this case, the 807 curve of *Fig. 5* is valid for the 6L6 because the two tubes have very similar characteristics when the 20,000-ohm resistor is connected between the No. 1 and No. 2 grids.

A great many amateurs are using a single 807 or

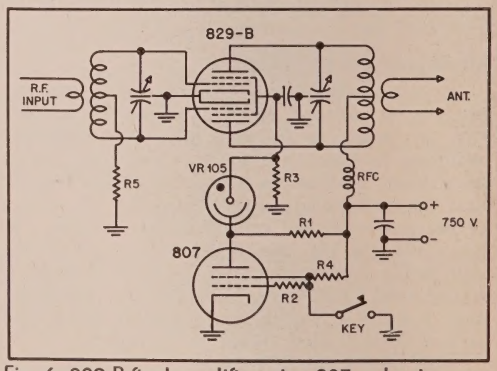


Fig. 6. 829-B final amplifier using 807 as keying control tube.

R1—15,000 ohms, 50 w. R3—0.25 meg., ½ w.
R2—20,000 ohms, 2 w. R4—85,000 ohms, 10 w.
R5—4,600 ohms, 2 w.

a pair of 807s in the output stage. The only modification necessary to swing over to the VR-tube keying system is to change the value of the screen resistor according to the following formula:

$$\frac{E_{HV} - E_{VR} - E_{c2}}{I_{c2}} = R_1$$

where

E_{HV} = plate and screen supply voltage
E_{VR} = drop across the VR tube in volts
E_{c2} = operating screen potential
I_{c2} = operating screen current in amperes
R_1 = screen dropping resistor

Either the positive or negative-potential keying system can be used. The selection of control circuit components is made as described in the discussion of *Figs. 2, 6,* and *7,* depending upon which system is chosen. When modifications of these systems are designed, it is recommended that the maximum rat-

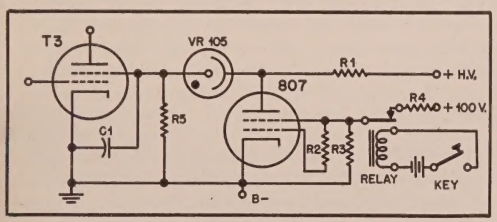


Fig. 7. Alternative connection of the 807 control tube.

Relay—"Normally-Closed"
R1—See text.
R2—20,000 ohms, 2 w.
R3—0.25 meg., ¼ w.
R4—2500 ohms, ½ w.
R5—0.25 meg., ½ w.
C1—Screen bypass.
T3—Tube or tubes being keyed.

ings of each tube be studied so that operation of the tubes will be within ratings and will provide a normal service life. The control tube and VR tube can be mounted at any convenient place in the transmitter or power supply. If desired, the VR tube can be mounted horizontally behind a panel, with the top of the tube visible to the operator through a hole or jewel. When the VR tube is mounted this way, the ionization glow can be used as a visual keying indicator.

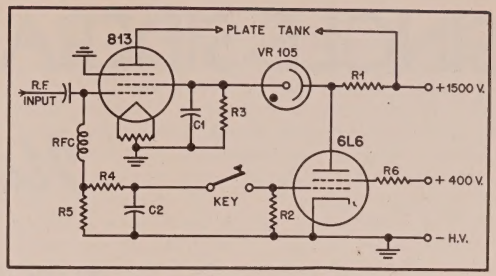


Fig. 8. Control-tube keying bias obtained from final amplifier grid current.

R1—35,000 ohms, 100 w.
R2—0.5 meg., ¼ w.
R3—0.5 meg., ½ w.
R4—50,000 ohms, ½ w.
R5—7,500 ohms, 5 w.
R6—50,000 ohms, 5 w.
C1—Regular r-f bypass
C2—0.25 μf, 300 v.

Control of High-Power Transmitters

The discussion thus far has been concerned with the keying of r-f amplifiers of the 150-watt size. Higher-powered rigs are also capable of being handled with the same circuits. At W2RYI, an 813 has been keyed in exactly the same way as the 829-B. Over 400 watts input has been keyed successfully in the 813 transmitter with one VR tube in the screen-grid circuit. The VR tubes have a maximum current rating of 40 ma, so the 813 screen current can flow through the trigger circuit without exceeding the rating of the VR tube.

Among the first of the new keying circuits used for the 813 final was an arrangement containing an OC3/VR105, a 6L6 control tube connected as a pentode, and a 117Z6 bias supply. Later, a filter in the control-grid circuit of the 813 was used to provide a negative potential of 100 or more volts for keying the 6L6 pentode in the control-tube position. This eliminated the 117Z6 bias supply, and gave complete protection to the 813 from excitation

(*Continued on page 91*)

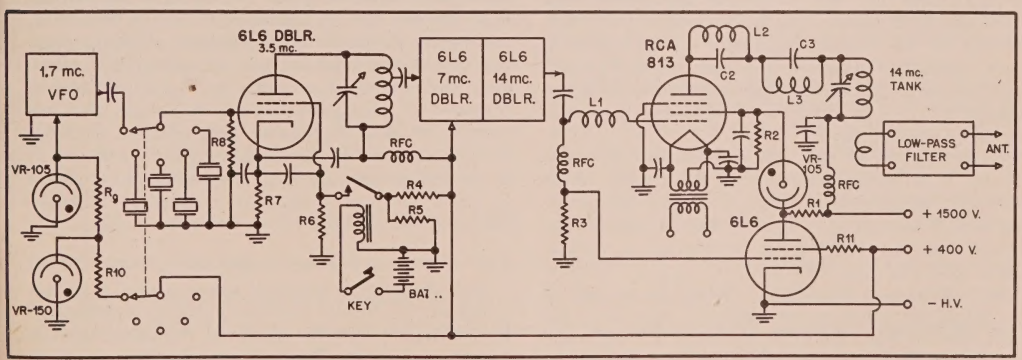


Fig. 9. 14-mc transmitter with keyed first doubler and OC3/VR105 control of final amplifier.

R1—35,000 ohms, 100 w.
R2—0.5 meg., ½ w.
R3—7500 ohms, 5 w.
R4—20,000 ohms 5w.
R5, R6—0.25 meg., ½ w.
R7—1,000 ohms, 10 w.
R8—0.1 meg., ½ w.
R9—1250 ohms, 5 w.
R10—4400 ohms, 20 w.
R11—50,000 ohms, 5 w.
L1—0.5 h grid choke.
L2/C9, L3/C3—57, 71-mc traps.
R-F components and bypass condensers are conventional.

SINGLE-SIDEBAND:

Its Pros and Cons

BY THE CQ STAFF

FROM TIME TO TIME, articles have appeared extolling the virtues of a transmission system differing from the conventional systems, but after a brief flurry of excitement, interest wanes and eventually even the most ardent proponents have placed it in the discard.

Looking back over the past eighteen years we can recall more or less vividly the controlled carrier systems, single-sideband systems, high-efficiency linear amplifier systems, and others too numerous to mention.

Recently, interest has been reawakened in single-sideband suppressed-carrier transmission. It will be che purpose of this article to present the pros and tons of the conventional single-sideband suppressed-carrier system, and to introduce to the reader a new system which provides certain simplifications and advantages over the more conventional systems.

Conventional AM Double-Sideband Plus Carrier System

When a radio-frequency wave, F, is amplitude modulated, by a signal, f, the resulting wave contains energy at three frequencies: F, $(F+f)$, and $(F-f)$. Increasing or decreasing the intensity of the modulating signal, f, causes a corresponding increase or decrease in the intensities of frequencies $(F+f)$, and $(F-f)$. It will be appreciated that all of the intelligence—that is, the intensity and frequency of the modulating signal—is contained in each sideband; the carrier, F, is constant in intensity and frequency and contains no intelligence. The two sidebands, $(F+f)$ and $F-f)$, each contain exactly the same intelligence.

Demodulation of the AM double-sideband plus carrier is relatively simple. If the carrier, F, is combined with a sideband, say $(F+f)$, in a detector, the beat frequency, f, will be present at the output of the detector. Further, if the carrier, F, is combined with the other sideband, $(F-f)$, in the same detector, the beat frequency, f, will be present at the output of the detector and will be in phase with the beat derived from the other sideband, $(F+f)$, and the carrier, F. The two beats add and provide an output, f, having twice the intensity that would be obtained if only one sideband were present.

AM Double-Sideband Plus Carrier Converted to Single-Sideband Plus Carrier at the Receiver

In a receiving system wherein the *i-f* selectivity is very great and assymetrical,[1] and one sideband is attenuated greatly compared to the carrier and other sideband, the demodulated audio is reduced 6 db (below double-sideband condition) in the limiting case of one sideband completely suppressed due to receiver selectivity. However, the signal-to-QRM ratio[2] of such a system may be superior to the S/Q of the conventional system in the presence of frequency-selective interference.

Single-Sideband Plus Carrier (One Sideband Completely or Partially Suppressed at Transmitter)

A single-sideband plus carrier signal can be demodulated in substantially the same manner as an AM double-sideband plus carrier signal.

With this system the bandwidth can be one half as great as in the case of the conventional double-sideband system. If the undesired sideband is completely suppressed at a low level in the transmitter, then the transmitter output peak power in the utilized sideband may be increased, and the 6 db loss in the receiver mentioned in a preceding paragraph may be compensated at the expense of high distortion.

When the undesired sideband is only partially suppressed, as in the vestigial sideband system used for television picture transmission, the peak sideband power radiated is less for the same transmitter than for the case of double-sideband transmission, and loss in demodulated intelligence at the receiver over the double-sideband case is experienced. However, the bandwidth required by the transmitter to transmit a given intelligence is less than that required for double-sideband transmission. In the limiting case of one sideband completely attenuated at the transmitter, the frequency spectrum occupied by the transmitter is half that occupied by a double-sideband transmitter.

Partially and Completely Suppressed Carrier Systems

The previously described systems had a carrier frequency, F, present and demodulation was effected by beating F with the sideband frequency, or frequencies, $(F \pm f)$. Since the carrier frequency, F,

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[1] McLaughlin, "The Selectable Single-Sideband Receiving System, *QST*, June, 1941.

[2] By "signal-to-QRM ratio" is meant "desired signal ratio to all other responses present in receiver output." It will hereafter be abbreviated as S/Q.

contains none of the intelligence, it is logical to consider the elimination of the transmission of this "unuseful frequency" since so doing would represent a saving in transmission power.

If a double-sideband signal ($F \pm f$) with the carrier, F, missing is impressed upon a linear detector, the resultant low frequency output obviously is $2f$. In other words, the modulating frequency at the transmitter is doubled by such a demodulating system at the receiver. Incidentally, such a condition may be experienced (and too frequently is!) on the AM broadcast band at night under conditions of interference between sky and ground wave. So-called "selective fading" or "multipath" is nothing but the condition of carrier suppression double-sideband transmission, but the condition of carrier vanishing rarely exists except momentarily in this example. Similar multipath reception is encountered, of course, on the higher frequency bands. Under such conditions the loudspeaker output is so garbled as to make speech almost completely unintelligible.

Now that we have seen that demodulation of intelligence cannot be obtained without beating the sidebands against the carrier, and since the carrier is to be suppressed at the transmitter, it is apparent that the carrier must be generated locally in the receiver. However, this carrier must not only be of exactly the correct frequency, but it must also have the correct phase with respect to the sidebands if serious distortion is to be avoided. Obviously, if the locally generated carrier is not of correct frequency, F, but is of frequency ($F \pm \triangle F$), then the demodulated signal will be ($f \pm \triangle F$) rather than f, the originally transmitted signal. Overtones transmitted as Nf will be demodulated as ($Nf \pm \triangle F$).

In the case of single sideband with suppressed carrier, the accuracy requirement on frequency of the reinserted locally generated carrier is less in the case of speech transmission since a frequency deviation $\triangle f$ of the local carrier oscillator produces $f + \triangle F$ and in the case of harmonics, $Nf + \triangle F$, rather than ($f \pm \triangle F$) and ($Nf \pm \triangle f$) produced in in the double-sideband case. Experience indicates that with a $\triangle F$ of the order of not more than 25 cycles, speech transmissions are still intelligible.

By eliminating the carrier and transmitting both sidebands, the "duty cycle" of an amateur voice transmitter may be greatly decreased. By the use of Class B amplification, power gains of the order of 10 per stage may be obtained and the over-all efficiency of the voice transmitter may be greatly increased.

But eliminating the carrier and one sideband and transmitting the other sideband appears to hold greater advantage. The peak power output of the single-sideband transmitter can be twice that of a double-sideband transmitter on each sideband, and hence will furnish greater output energy when demodulated by a single-sideband receiver. Further, the amount of space occupied by the transmitter in the spectrum is halved. And, the demodulation problem is simplified at the receiver since the locally generated carrier does not have to be as closely in synchronism as in the double-sideband case.

Generally speaking, it makes things easier at the receiver if the carrier is not completely suppressed. By transmitting, for example, a 20-db attenuated carrier, the increase in voice transmitter duty cycle over that with zero carrier is negligible. The attenuated carrier may be amplified at the receiver, and used to control the frequency and phase of the locally generated carrier frequency.

Systems for Generating Single-Sideband Suppressed Carrier

There are two well-known systems for generating single-sideband suppressed carrier waves.

In the first system, modulation of a very low-frequency carrier is effected in a balanced modulator, and the double-sideband suppressed-carrier output of the balanced modulator is impressed upon a suitable band-pass filter which passes but one sideband. Generally associated with this system is a further tube which is used to feed a controlled amount of carrier energy to the output of the filter in order to provide a ready means for furnishing a controlled amount of carrier energy when desired.

The single-sideband output with the controlled amount of carrier is then heterodyned to the desired frequency, amplified by Class A or Class B amplifiers to the desired output level, and radiated by the antenna.

Shortcomings of this first described system include the requirement of a low-frequency (and expensive) band-pass filter, and the requirements of additional band-pass high-frequency filters in order to avoid spurious outputs when the low-frequency single-sideband signal is heterodyned to the desired output frequency.

The second system generates a second modulating signal in quadrature with the normal modulating signal. Each of these modulating signals is fed into balanced modulators, the one balanced modulator being excited by a carrier voltage which is in quadrature with the other. The output of each balanced modulator contains two sidebands. These outputs

Single-sideband transmission is allegedly the great white hope of the amateur who works phone. With it, anywhere from five to ten times the number of stations can be accommodated in our existing amateur phone bands. Admittedly a complicated system to get operating properly, no really practical circuits for the amateur have yet been introduced. Much hope is held that the new General Electric circuits will provide the solution. Donald E. Norgaard, W2KUJ, discussed some of the details in his talk presented at the National I.R.E. Convention. As further information becomes available it will be covered in subsequent issues of CQ. High on the list is a constructional article about the SSB rig in operation at W2KUJ's home station.

will be in phase for the lower sideband and out of phase for the higher sideband, or vice versa, depending on the phasing of the modulating and carrier potentials. By suitably combining the outputs of the balanced modulators, either the upper or lower sideband may be utilized. This is then heterodyned to the desired output frequency (or it may be generated on the desired output frequency), amplified, etc. An additional tube may be provided to furnish controlled amount of carrier to output.

The most serious shortcoming of this second system is that a quadrature phase shifter at audio frequencies that provides exactly 90° shift over even one octave, has never been satisfactorily developed. If it were not for this fact, the system would have substantial advantage over the first discussed method since in the second system low-frequency generation of the single-sideband energy is not necessary, thus the expensive band-pass filters are not required.

However, by development work on the part of General Electric engineers[3, 4] a modification of the second system, known as the "phase-balancing system" has been perfected. Briefly, the new system takes advantage of the fact that a pair of phase shifting networks may have a very constant differential phase shift over many octaves.[3]

Thus two networks are employed having a differential phase shift of 90°. The output of each network feeds one of the balanced modulators of the second system, and a single-sideband signal is generated. The carrier, 20 db attenuated, is transmitted simultaneously with the sideband and serves as a pilot for locking the locally generated carrier frequency into synchronism.

Isolation is sufficiently high in the G. E. system so that different intelligence may be transmitted on each sideband simultaneously, and by the use of two quadrature differential phase shift networks of the same design at the receiver, crosstalk between the upper and lower sideband is better than 40 db.

Now, what are the advantages and disadvantages of the single-sideband suppressed carrier system when compared with the presently employed double-sideband plus carrier system?

Transmitter

The single-sideband suppressed carrier generator system described above requires 8 or 9 tubes and is rather complicated. It certainly is as involved as a superheterodyne receiver, and since most amateurs gravitate toward commercially manufactured receivers, it is felt that amateur adoption of the system will only take place if manufacturers make a packaged unit available at a reasonably low price.

The receiver unit is also involved (7 tubes) and since the phase shifting networks should be similar in characteristics to the networks in the generator, it is felt that unless this unit is made commercially available, widespread amateur acceptance is questionable. The ability to transmit either the higher or lower sideband in the G. E. system by a flip of a switch which shifts the audio phase 180°, and the ability of the receiver to demodulate either the higher sideband or the lower sideband, or both, at the flip of a switch, holds great appeal as a QRM reducing feature.

For a given peak power output the remainder of the transmitter is more economical than with our present systems. However, the economy is obtained by the use of Class B amplifiers and, as is well known, this means that bias supplies in the transmitter must be low impedance, and must have excellent regulation. Likewise, plate and screen supplies must also have excellent regulation. Current drawn by the Class B stages will vary as a function of the intensity of modulation, being a minimum, of course, when modulation is zero. In a practical amateur transmitter of the single-sideband type built by Norgaard of G. E., electronically regulated plate and screen supplies are used.

Receiver

As we now know it, a.v.c. in the receiver is out. To minimize distortion, the reception should be as "exalted carrier" [5] as possible. Therefore, for the case where a special adapter is not used in conjunction with the receiver the output of the b.f.o. injected into the second detector will probably have to be increased, and the sensitivity control backed down as much as possible. The receiver (without adapter) will be rather hard to tune at first, but with practice this will be no great drawback as long as there are not too many SSC signals on a band at the same time. S/Q ratio will be good since the masking effect of the receiver second detector with the exalted-carrier (b.f.o.) will be excellent.

However, more important than the above considerations is the QRM reducing quality of the system. We amateurs need more space on the lower frequency bands, and the situation will become progressively worse as time goes on. Single-sideband is a step in the right direction toward more economical utilization of our frequencies.

As we see the single-sideband situation now, it is up to the manufacturers. The first described generating system requires expensive filters that possibly can be made more cheaply. While the second system with G. E. modifications is not complicated, it requires matched (but inexpensive) components. If practical equipment is made available to us before interest wanes, then single-sideband should become popular, and eventually even supplant the conventional double-sideband plus carrier system now used.

We at *CQ* have several interesting single-sideband developments including a complete transmitter incorporating G. E.'s simplified single-sideband system. Much remains to be done, however, before single sideband is practical for other than the most experienced amateur. Developments as they become practical for the majority of our readers will be promptly covered.

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[3] Dome, "Wide-Band Phase-Shift Networks," *Electronics*, December, 1946.

[4] Norgaard, "Selective Sideband Transmission and Reception," I.R.E. National Convention, March 22, 1948.

[5] "Exalted carrier" refers to a condition in which the carrier intensity is very large in relation to the intensity of the sidebands.

A Family Man's MOBILE ANTENNA

G. VAN W. STIVERS, W2LUD*

IN THE AVERAGE amateur household it is not too uncommon to find that the XYL has nearly the last word in the appearance of the family automobile. Probably this is as it should be—for were it not so many of us would tie all types and styles of mobile antennas to the family chariot. Therefore, it became necessary to devise an antenna capable of serving a dual purpose; i.e., appearing pretty much like a regular car antenna and yet usable as an efficient mobile transmitting antenna.

Van R. Field, W2OQI, has proposed a mechanical design for either a 2-meter or 6-meter vertical "J" type antenna which has proven to be acceptable to all concerned. One of these dual purpose "J" antennas is shown in the accompanying illustration. Actually it comprises two vertical whip antennas which are spaced at the bottom by a metal shorting bar and at the top by a plastic feedline spacer.

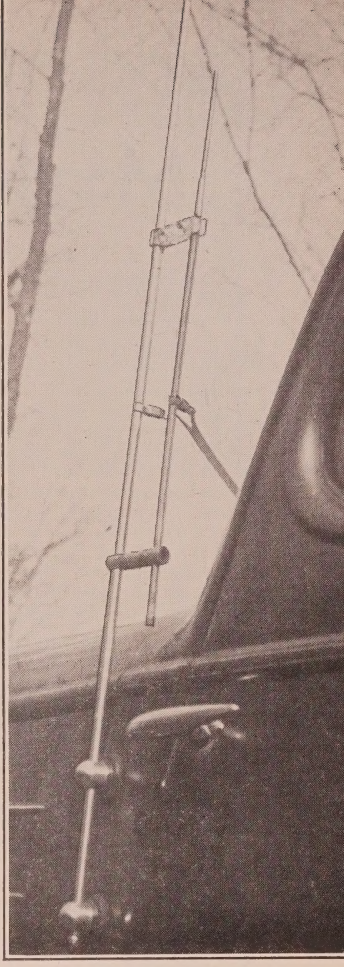
First step in the construction of this type of mobile antenna is to replace the usual shorter whip antenna that came with the car with one of the extra long variety. A two-inch plastic space is then drilled out so that one of the enlarged holes will fit snugly over the new whip antenna and the other hole will fit snug over the old whip that was just removed from the car. Tighten down the screws that normally hold the feeder line so the spacer is sure to stay in its proper place. Next take a piece of thin wall brass tubing about 1 inch in diameter and drill out another set of holes spaced two inches apart. These holes should be large enough to allow the brass tubing, which is to be used as a shorting bar, to slip up and down the two whip antennas. Make a hacksaw cut through each of the holes as shown in the illustration and then drill two more holes at right angles for the nut and bolt which will be used to clamp the shorting bar into place.

We may now assemble the antenna by locating the shorting bar so that a minimum stub length of about 18 inches can be realized. Then clamp the shorting bar tight since the remainder of the tuning adjustments are made by varying the length of the whip antennas and the location of the feeder points.

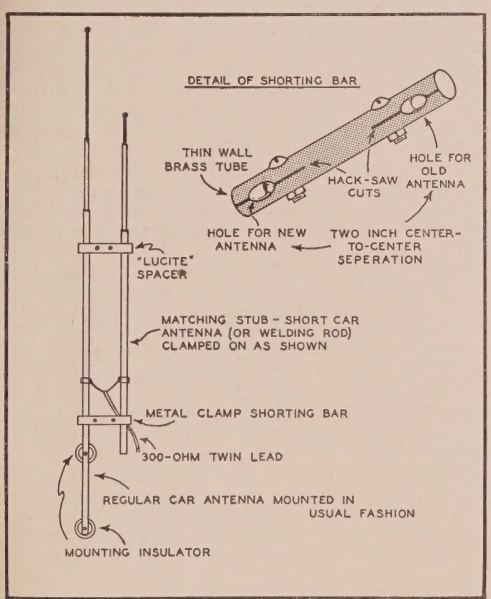
Solder two midget battery clips on the end of a length of 300-ohm twin lead. Clip one wire of the lead-in to the antenna and the other to the matching stub. Run the free end under the car hood and through the dashboard or fire wall until you have a direct feedline to the mobile v-h-f rig. The length

(*Continued on page 93*)

*Box 382, Riverhead, L. I., N. Y.



A dual purpose J-type antenna mounted and ready to go places. The short whip antenna that was removed from the car is now used as the matching stub. The 300-ohm feed goes to the mobile rig while connections to the BC set are made in the usual fashion. Either fender or side cowl mounting may be used.



Construction detail of the dual purpose mobile antenna. An extra long whip antenna is used to replace the common shorter variety. The BC connections remain the same, while the mobile rig works into a J-type antenna through 300-ohm feedline.

Monthly DX Predictions-May

OLIVER PERRY FERRELL*

MANY AMATEURS who have never had the oportunity to see or own a copy of the "IRPL Radio Propagation Handbook" will be glad to learn that we have been advised by W. B. Chadwick of the CRPL that an up-to-date book on radio wave transmission and reception will probably be released during the month of May.

This book is written by the staff of the CRPL and is titled "Ionospheric Radio Propagation" (also to be known as NBS Circular 462). It will be available to all through the Government Printing Office at a price which has not been disclosed at this writing. It will contain approximately 215 pages and at least 207 illustrations. The titles of the chapters are:

Chapter 1. Introduction
2. Theory of radio wave propagation
3. Measurement technics
4. Structure of the ionosphere
5. Variations of the ionosphere
6. Maximum usable frequencies
7. Ionospheric absorption and sky-wave intensity
8. Radio noise and required field intensity
9. Lowest required radiated power and lowest useful high frequency

In addition to presenting those parts of the old Handbook whose accuracy has stood the test of time, modified where necessary for clearer presentation and inclusion of later theory, the new book contains, particularly in the last three chapters, information of great practical and operational value heretofore not generally available to the public, concerning methods of calculation of incident field intensity, required field intensity, lowest required radiated power and lowest useful high frequency. These are all factors of particular importance in amateur DX operation. Watch this column next month for further information about this important book.

DX Conditions for May

As most DX men know it is sometimes possible to catch some of the more evasive DX by working them "the long way around." While this is not by any means as consistent a method as the short route, it does, however, increase the number and duration of the DX openings. This month we have attempted to forecast a "long-path or route" opening in *Graph 1* from W6 and lower W7 to ZS.

Opening *Graph 1* at midnight we find the LUHF very high due to the large amount of absorption at the eastern end of the path. Absorption increases over this path throughout the early morning hours and reaches a peak with an LUHF of about 26.5 mc at 0700 hours PST. During this same period the MUF is low and no amateur band is actually open over this short-path until about 1430 hours when scattered 20-meter band signals will be heard. But, if the W6 stations will reverse their beams and aim them due west they will find the 20-meter band opening around 0500 hours PST and staying open until 0900 hours over the long route. The cutout window in *Graph 1* shows the variation of the MUF and LUHF during this period. Otherwise over the usual path we should expect to find 20 meters open from 1430 until 1845 hours PST and possibly from 2045 until 2320 hours PST. A short 40-meter band opening around 1800 to 2130 hours PST might be expected if it were not for high static levels on this band at this season. Further information of static levels will be included in these graphs within the near future.

Graph 2 represents the predicted conditions from W5, W9 and WØ to Japan. As usual for this season we cannot expect to find any 10-meter band openings. 20 meters will probably be open from about 2300 until 0130 hours CST the following day. Signals during this period will probably be weak and fairly scattered. A somewhat better 20-meter opening is expected from 0630 to 0845 hours CST. Once again a short 40-meter opening is predicted from 0215 until 0615 hours CST which may not be usable due to the high static level along the Asiatic coastline.

In *Graph 3* we have shown the path from the central United States to Argentina which was also shown in this same spot last month. The peak MUF is now only 30 mc and it will not be uncommon to find the 10-meter band closed over this path for several days in succession. On some days the signals will be very strong and on others there will probably be considerable deviative absorption. The 20-meter band may open around 1730 hours CST with best signals from 2000 until about 0230 hours CST the following day. The location of the static areas at this time of the year will prohibit the use of 40 meters over this path.

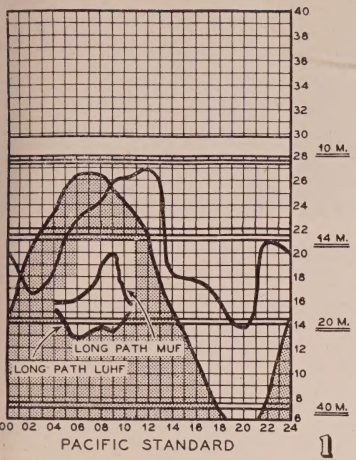
Graph 4 shows the expected conditions from the W1, W2 and W3 areas to Italy and the Mediterranean area. No 10-meter band openings are expected and the morning opening is now covered by increased signal absorption. Some scattered signals may break through around 0400 hours, but this will not be sufficient for good DX work. The higher power stations may break through about 1315 hours EST with fair signals after 1515 hours EST until closing around 2200 hours.

Ionosphere storminess has been moderate so far this year because of the few large sunspot groups at the low latitudes. At the present time only two cycles appear to be running and the most probable periods of disturbance will be May 8–10 and May 22–24.

The data for the preparation of the MUF curves is derived from the booklets issued by the CRPL of the National Bureau of Standards entitled "Basic Radio Predictions Three Months in Advance." These are available on a subscription basis from the Superintendent of Documents, Washington 25, D. C.

* *Assistant Editor*, CQ.

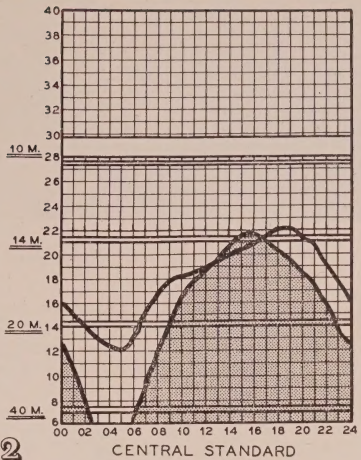
Monthly DX Predictions



PACIFIC STANDARD

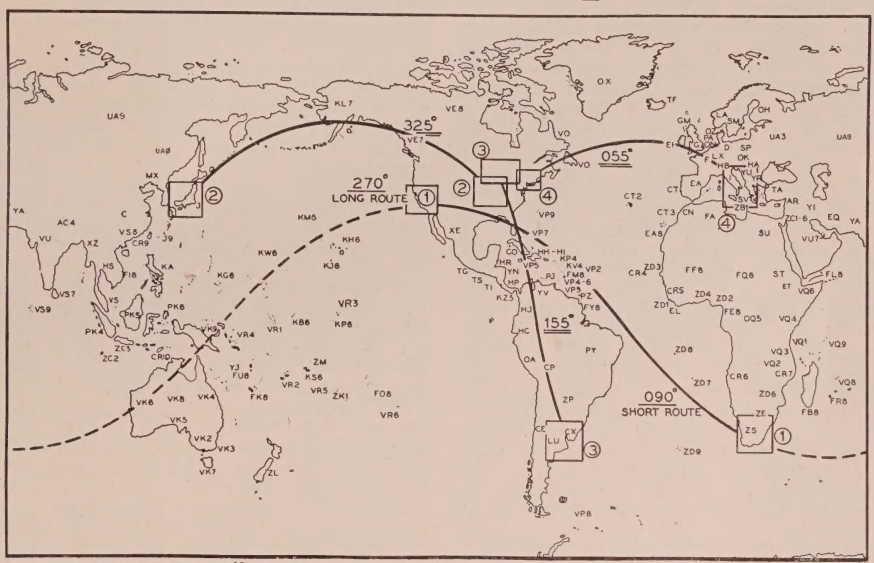
1

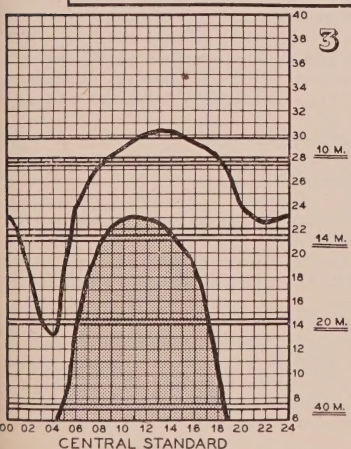
Maximum Usable Radio Frequencies—Charts show the maximum usable frequencies propagated by the F2-layer over the paths indicated in the world map. The abscissa shows the local standard time at the point of origin of the path. The ordinate shows the frequency in megacycles. Amateur frequencies fall within the two heavy parallel lines that indicate the upper and lower limits of the principal bands.



2

CENTRAL STANDARD





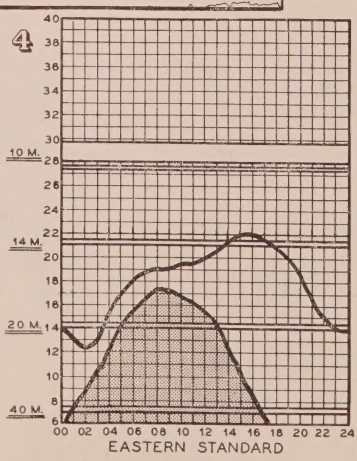
3

CENTRAL STANDARD

Lowest Usable Radio Frequencies—The shaded area in each chart indicates unusable radio frequencies for the illustrated path. The LUF is calculated for an above average amateur location using a good communications receiver. The effective radiated power is assumed to be 1000 watts. The LUF is based upon average monthly signal absorption and does not include the effects of abnormal or auroral zone absorption.

Azimuth—Radio transmission is known to vary considerably with geographic latitude and longitude. Each path MUF and LUF as illustrated is calculated for the "short-path" This is the path shown in the map.

Variations in Forecast—All graphs are monthly predicted average conditions. On ionospheri cally "quiet" days some variation amounting to less than 15% may be expected. However, a value representing 0.85 of the MUF will be exceeded over 90% of the total time. The graphs do not indicate radio propagation conditions during ionosphere storms or sudden ionosphere disturbances. They are not adjusted for the effects of sporadic-E layer formation or long and short scatter. Radio disturbances of the ionosphere storm type are the most severe for paths which pass through the auroral or polar regions, the effects gradually tapering off towards the equator.



4

EASTERN STANDARD



Conducted by VINCE DAWSON, JR., WØZJB*

THE SOUTH AMERICAN path again holds predominance, for 50-mc openings, during February and March. In fact, the LUs are really making a DX band out of 6 meters by pushing their signals all over South America and into XE, KZ5, W4-5, and the latest, to KH6.

While all this DX has been taking place in South America, the Ws are planning for a big session of Es, which should begin in April and continue on into September. With increased activity on 6 meters during the past year, it is expected that 1948 will bring someone WAS, on 50 mc, for there is someone on in each state. Who the lucky operator will be is anyone's guess, for with the F2 openings during November and December, stations on both coasts, as well as in the middle west, are just a few shy of the goal.

Gene Piety, KH6PP, ex-W7ACS, again provides the big DX news, for on March 12–13–14 he was fortunate in having a three-day vacation, and to make it better he was able to work into LU and CX with nice strong signals, the distances averaging 7600 miles!

Gene already had 3 continents tucked under his belt, and for the past months his beam had been pointing on the fourth continent, South America. March 12, at 1452 HST, KH6PP heard a station breaking in, speaking Spanish. A CQ, at 1504, brought a reply from LU9EV, with signals S7 both ways, for 10 minutes. Then LU6DO was worked at 1518, but the contact was poor, for LU6DO spoke only Spanish. LU9EV was again worked at 1545 and 1602, with signals still S7, the latter QSO on c-w for a check. Calls were exchanged with LU4BO at 1610, and at 1627, with LU1DO. This ended the opening on March 12.

The following day, Gene felt that the contacts on the 12th were late, so an early start was made. Nothing happened until 1100, when a tremendous burst of signal was heard, again speaking Spanish. Gene called CQ at 1105, and was answered by CX3AA, in Uruguay, with signals 20 db over S9, until 1120. The band then sounded dead, but a CQ at 1124 resulted in a surprise for KH6PP, as W6CDQ called. W6CDQ was an S8 off the side of Gene's beam, running 8 watts to an MBF! Turning his beam stateside, KH6PP then worked: W6ZBZ, W6BOS, W6UOV and W6QFT until 1206. Again it sounded as if the band had gone dead, but at 1211 a truly remarkable signal was heard testing, which turned out to be LU5BJ; however, no contact was made. A CQ at 1217, brought forth a QSO with LU5CK, who was S9 for 5 minutes. LU9EV was worked again at 1222; then LU1AN at 1233; LU9AS at 1245; at 1258, LU6BO was the last contact for the day.

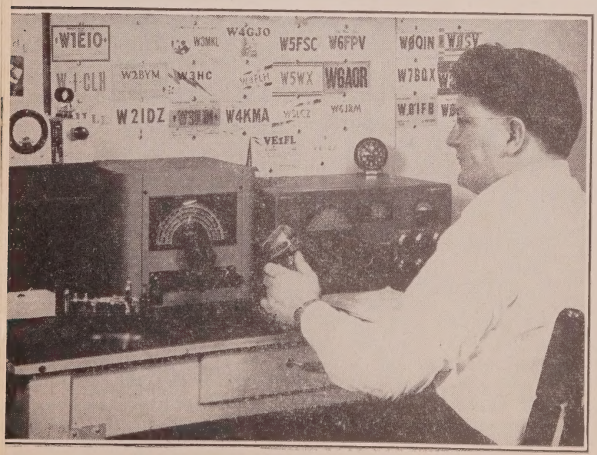
March 14, Gene, KH6PP, was at it again and at 1042 signals started breaking through. LU6DO was worked at 1050; LU1DO at 1054; LU6DO on c-w at 1110; LU3BD at 1114; CX1AA was heard calling at 1130 but QSBd out. At 1145 a station on 51.3 mc was heard speaking Spanish; for the finale, LU9EV was worked at 1154. This ended the three-day session for KH6PP, which, he says, was "more exciting than romance!!" Now, with only Europe and Africa to go for W.A.C., Gene says he will be working harder than ever.

During the openings from LU to KH6, it was most discouraging for OA4BG and OA4AE to hear the LUs call KH6PP without any trace of the latter. This seems odd, for it is some 2000 miles closer to OA4 than to LU, indicating a very long skip was taking place by either a combination of F2 and Es, or by multiple hop Es. Perhaps when the recordings from the ionosphere stations are received this can be clarified.

The same condition was found on Sunday, March 14, around 1330 EST, when LU7WA was worked by W4EID, W4GJO, W4FLH, W4IUJ and W4JEP until 1450 EST. LU7WA is the most southernly LU, being 1000 miles south of Buenos Aires. Although the Buenos Aires stations were on, working KH6PP, none were heard or worked by the Florida gang. Again odd, but added a new country for the W4s listed above.

Openings from W4-5, to South America have been revived since they stopped last October. March 6, W4EID, heard OA4BG and OA4AE in local QSO, fading out at 1505 EST. The same day, OA4AE, heard W5JTI, in Miss., at 1512 EST. The first two-way contacts came on March 7, when OA4AE

Send all contributions to Vince Dawson, Box 837, Gashland, Mo.



Walt Manning, W7ERA, one of the West's stalwart 6-meter men.

50-MC DX HONOR ROLL

Calls	States	Others
W6UXN	46	VE1, 2, 3, 6, 7-KH6
W4GJO	45	VE1, 2, 3-OA4
WØZJB	45	VE2, 3, 4, 7-G5
WØUSI	45	VE2, 3, 7
W6WNN	45	VE1, 7
W9DWU	45	
W9ZHL	45	VE1, 2, 3, 4, 7-XE1-KL- G5-HB-8G6, 5-KL7
W1CLS	44	VE1, 3, 7G5, 6-F8-PAØ
W7BQX	44	VE1,3,4,7
W7ERA	44	VE1, 7
W7FFE	44	VE1, 7
WØDZM	43	VE1,2,3,7
WØQIN	43	VE1,2,3,7
W9PK	43	VE1, 2, 3, 4-XE1
W9ZHB	42	VE3, 4, 7-G5-HB8-KL7
WØBJV	42	VE2, 3, 7
W3CIR/1	41	VE1
WØINI	41	VE2, 3, 4
W5VY	40	VE3, 4, 7-KH6-LU9- XE1-OA4-PAØ-G2, 5, 6,-F8-HB8, 9
W8ZVY	40	VE1, 2, 3-OA4-LU9- KL7 - PAØ, G2, 5, 6
W4QN	40	VE2, 3-OA4
W1LLL	40	VE1 - G5 - G6 - PAØ
W6NSS	40	VE1,4-VP7
WØSV	40	10 VE7
W4GIY	40	VE1
W4EQM	39	VE1, 2, 3, 7-XE1-KL7
WØYSJ	39	VE2, 3, 7
W6ANN	39	VE1,7-KH6
W7HEA	39	VE1-7
W8QYD	39	VE1,2,3,4OA4-G5
WØDKS	39	VE3, 4-XE1
W5JLY	38	VE3, 7-XE7-O-A4-G5, 6-PAØ HB8
W4EID	38	VE1,2,3,7-OA4, LU7
W2AMJ	38	VE1, 3, 7-G2, 4, 5,6F8-PAØ-HB8
W5AJG	38	VE2, 3-KL7-G5, 6-HB8-PAØ
W5FRD	38	VE3,7-XE1-PAØ
W5ML	38	VE3-XE1
W8ZVY	38	KL7-G5
W6OVK	37	VE1, 2, 3, 7-KH6
W2RLV	37	VE1, 3, 7KL7-G2, 5, 6-PAØ
W2IDZ	37	VE1, 7-G5-G6-PAØ-F8
W6OYK	37	VE1,2,3,7-KH6
W5JTI	37	VE3 - KL7 - XE1 - OA4
W7DYD	37	VE1, 7
W9UNS	37	
W5VV	36	VE7-XE1
W7FDJ	36	VE1, 7
W5FSC	35	VE1, 3, 7-XE1-OA-KL7
W1GJZ	35	G5, 6-HB8-PAØ
W3OR	35	VE1, 7-G-PAØ-KL7
W5HF	35	VE1,3,4,7
W1JLK	35	VE7-G5
W9ALU	34	VE1, 2, 3, 4-KL7-G5
W2BYM	34	VE1-VP7
WØDKS	34	VE3
WØJHS	34	VE1-2
W7JPA	34	
W4WMI/4	33	VE1, 2, 3-VP7
W1HDQ	33	VE1 - G5 - G6 - PAØ
W6BPT	33	VE1, 2, 3,7-KH6
W4DRZ	33	VE1, 2, 3,
W6PUZ	33	VE3-7
W7KAD	33	VE7
W3MKL	33	VE1, 7-G5
W9ALU	33	VE1, 2, 3, 4-G5-KL7
W1CLH	32	VE7-G5-G6
W3RUE	32	VE1-G2, 5, 6
W6FPV	31	VE1, 2, 3-KH6
W4FBH	31	VE1, 2, 3-XE1
W5LCZ	31	VE3-XE1
W3OMY	31	VE1-VP7
W5WX	31	VE4-XE1
W4HVV	30	VE1, 2, 3
W9UIA	30	VE1, 2, 3
W5ELL	29	VE7-XE1
VE1QY	28	G5, 6-VE1, 3, 7
W4EQR	28	
W1CGY	28	VE1 - G 5 - G6 - PAØ
W4FQL	28	VE1
W1ATP	28	VE1, 7-G5
W9FKI	28	VE1, 2, 3-KL7
W1AF	27	G-F8-PAØ-VE7
W7ACD	27	
W5LBG	26	VE7-XE1
WØDNW	26	
WØYKX	26	VE2, 3
W7BOC	26	VE1
W6NAW	25	VE7
W5ESZ	25	VE7
W4FNR	25	VE3-OA4-LU7
VE1QZ	24	VE1, 2, 3, 7-G2, 3, 5, 6-F8-HB8-PAØ
W7JPA	24	VE7
W5LIU	24	VE3-XE7
G5BY	23	W1, 2, 3, 4, 5, 8, 9, ØVE1, 2, 3-MD5 - SU1-ZS1
W8MVG	23	G5, 6-PAØ-F8
W9AB	23	VE1,2,3,4
W7CTY	22	VE7
W8YLS	22	VE2
W4JML	20	VE2-3-G5
XE1KE	13	XE-W4, 5, 6, 7, 8, 9, Ø-LU-CX-OA
W7ACS/KH6	3	W5, 6, 7-J9 VK5-KH6
KH6PP		KH6-W5, 6, 7-KW6-VK5 - LU1, 3, 4, 5, 6, 9-CX3
W4GJO		XE1 - KL7 - VE7 - LU7
W7BQX		VE1, 2, 3, 4, 7

worked: W4EID, W4IUJ and W4FNR, from 1330–1432 EST. Other dates the band was open from W4 to OA were: March 9–10–11 and are given in detail under, 50-mc openings.

Activity has picked up in Mexico City, providing company for XE1KE. All the stations run around 100 watts, have 3-element beams, and VHF-152s. Each night they meet at 2000 CST for a round table (Ed. note—and they usually find the band open to South America). Those now active include: XE1A, XE1QE, XE1ME, XE1FE, XE1KE. A sure-fire way to depend on the band opening for them, according to XE1KE, is when Jeff, XE1GE, has to make trips out of town. Of course, XE1GE appreciates being the band opener and stopper!

Since Feb. 18 the XEs have had almost continuous openings to South America, the longest stretch was for 16 days straight, two dead days, then going on again until the present writing. CX3AA was finally worked by XE1KE, on March 18. PY2QK was heard on March 10, but the real holdout is LU8DJI the only LU *not* worked by XE1KE as yet. PZ1A is on in Paramaribo, Surinam, which is on the N.E. coast of South America and within range of the U.S. for contact. So far he has worked the LUs and OAs but XE1KE is gunning for him.

On March 17, around 1930 CST, LU9MA worked W5VY, in San Antonio, and XE2C, in Monterrey, just west of Brownsville, and heard W6UXN in contact with a local W6!

The mobile marine boys always seem to pop up where there are band openings. W5BSY/MM, has been working the LUs and OAs, from his location off Costa Rica and while passing through the Panama Canal. Its been a long time since we have heard from you fellows so how about some info on your 50-mc happenings?

KZ5AY, located at Howard Field, Canal Zone, has been bitten by the 50-mc bug, and has heard

(*Continued on page 80*)



Conducted by HERB BECKER, W6QD*

HAVE YOU SENT in your 1948 DX Marathon score yet? . . . Better hurry! Just cast your optics on the Marathon standings (p. 68) . . . you fellows are really hopping on this thing. Last month, we showed a total of 38 entries, and this month, it is over 100. You don't have to be psychic to figure out that we have changed the method of listing the scores of you fellows who are in the Marathon. As explained in rule No. 2, found in a box on page 74, competition will be based on a zone-to-zone basis. The high station in each of the 40 zones will be given an award. So far, of course, we do not have representation in too many zones, but by tabulating them in this form, beginning with this month, we figure it will stimulate DX men in some of the missing zones.

CAUTION!!! Read rule No. 4. Don't make a mistake by not sending in your Marathon lists or additions within 60 days of the date of the QSO. Don't make the mistake of letting your Marathon contacts lie around in your log book until the spirit moves you to list them and send them in. They might be beyond the 60-day limit, and if so, you will not receive credit for them. We want to keep the Marathon standings current, and the surest way for you to keep your Marathon totals up to date with us is to make a regular habit of sending them to me once every month. Once again, . . . claims sent to us for zones and/or countries must be postmarked within 60 days from date of QSO to receive credit.

Since the DX department's deadline is the 15th of each month, why not make it a habit to put your stuff into the mail no later than the 10th.

Zone and Country Log Forms

If you haven't as yet received any forms for compiling your list of zones and countries, they can be had by dropping a line to me or OM LeKashman in New York. I like to refer requests such as this to him, because then he gets stuck for the postage!! Anyway, when you get these lists, you can use one set for the Marathon and one set for the Honor Roll. Even though you have previously sent in a list, we would appreciate it if, when you get the time, you would make up another one on our forms. In this way, our Master lists would be standardized, thus helping our poor, downtrodden DX committee no end.

This may be as good a spot as any to explain the 15th of the month deadline in relationship to the publication date of the magazine. What brought this to my attention was my trustworthy operative No. 1492 bumping into a guy last month who said, "I want to get this stuff in the mail so Becker will have it by March 15 in order to make the April issue." This would certainly be a neat trick if we could do it. I know it would save brother 2IOP many headaches if he could get any issue of *CQ* "put to bed" and into the mails within ten days to two weeks from receipt of all copy. Since we can't work quite that fast, we'll give you the dope as it generally works out.

Let's take this month's DX column for example. We're working on the May issue . . . the deadline for incoming copy to me is March 15. Usually, on the night of the 15th or 16th, the DX committee finishes checking all new Zone and Country Lists, as well as revisions, for the Honor Roll and Marathon, which have accumulated during the previous thirty days. Then they lose more sleep when they must tabulate these totals and put them in their proper sequence. This operation usually takes us up until the 19th or 20th of each month. After this hard work by the committee, I go into the act of cooking up the DX column proper. By the time the whole batch of stuff is typed by my able, and usually willing (?) secretary, it is time to dump it in Larry's lap, which is generally around the 23rd or 24th of the month.

What I have tried to say is that when you fellows send in your DX news and Country Lists, etc., before the 15th of any one month, don't look for it in the very next issue. From the time of my deadline, it takes usually five weeks to get the stuff to you so you can read it. You can see that if you miss the deadline by two or three days, your contribution will not be used for almost another month.

So far, this certainly doesn't sound like a DX column. It always seems as though I have to get something off my chest before we can go into the stuff which the column is supposed to contain. So, just relax . . . take off your shoes . . . tip back in that squeaky chair, and I'll see if I can put you to sleep. . . .

Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.



Bill Wayne, ex - KS4AE, during his recent visit to San Francisco. In the foreground is CQ's expert photographer, Gene Pera, W6-DOT.

W.A.Z. for W7BD and W6NRQ

Our congratulations to E. L. "Mac" McClintock W7BD, and Carl Louis, W6NRQ, on achieving

(Number eight of a series)



THE PATH to perfection is a thorny one. This truism was forcibly impressed on us by a recent and rather unnerving experience.

It all started when Carl Horton, of Athol, Mass., asked our opinion on the relative DX ability of the HRO-7 and the NC-2-40D. We replied that both were fine DX receivers but that the HRO probably had the edge.

We were gratified not long after that to learn that Carl had taken our advice. He sent us, in fact, an enthusiastic letter. Detailing his listening activities on the broadcast band, he wrote:

"I have been able to stay up about five nights since purchasing the HR and here are the results:

601	kc	RABAT Morocco	Logged	1:00–2:00 A.M.	Q4/R7
638	kc	PRAGUE Czech.	"	1:35–2:00 A.M.	Q4/R6
704	kc	ANDORRA Andorra	"	5:05–6:00 P.M.	Q5/R8
941	kc	ALGIERS Algiers	"	1:00–2:30 A.M.	Q3/R6
1167	kc	SWITZERLAND	"	1:00–2:05 A.M.	Q4/R6

Also BBC on 668—767—804—877—1013—1122

Also France on 648—776—832—856—958—1040—1185—1393—1456

550	kc	KMVI Wailuku, T.H.	Logged	3:42– 4:06 A.M.	S/O
630	kc	KPOA Honolulu, T.H.	"	3:05– 4:30 A.M.	S/O
985	kc	YSR San Salvador, Sal.	"	10:50–11:20 P.M.	
1380	kc	CB-138 Santiago, Chile	"	3:10– 3:50 A.M.	

"All but the BBC verify and I have reports out to them. The following may be of interest also:

	Sensitivity	*Signal-to-Noise Ratio*	*Calibration*	*Drift (after ½ hr. warm-up)*
HRO-7	1	1	100%	NIL
NC-2-40D	2	2	100%	"
(RECEIVER "A")	4	3	90%	5kc
(RECEIVER "B")	5	4	75%	40–70kc
(RECEIVER "C")	3	5	60%	20–35kc
(RECEIVER "D")	6	6	60%	10–15kc

"For what it's worth, the above was a side by side test. Without a question, the HRO-7 is the best receiver I've used in the past twenty-seven years . . ."

Frankly amazed, we swelled our chest with pride. Such performance was better than anything we had expected! We kept right on thinking that until one morning about a month later. We were reading our newspaper at the breakfast table when this small advertisement caught our professional eye:

RADIO MARKET

FOR SALE—HRO-7, with coils from 500,—30,000 kc., used about two months, reason for selling, losing too much sleep. f.o.b. Athol, Mass., $250. CARL L. HORTON.

Shaken but sobered, we reflected that the ultimate is probably unattainable, human frailty being what it is.

W. A. Ready

THE NATIONAL COMPANY
Malden, Mass.

National
EST. 1914
ADVERTISEMENT

W. A. Z. HONOR ROLL

C. W.-PHONE		
W6VFR	**40**	**193**
W8HGW	**40**	**187**
G2PL	**40**	**185**
W2BXA	**40**	**185**
W6PFD	**40**	**183**
W6ITA	**40**	**182**
W6MJB	**40**	**178**
W6SAI	**40**	**176**
W6ADP	**40**	**172**
W6SA	**40**	**170**
W6AMA	**40**	**165**
W7FZA	**40**	**161**
ZS2X	**40**	**159**
VE7ZM	**40**	**159**
W7BD	**40**	**156**
W6WKU	**40**	**154**
W6FHE	**40**	**152**
W6LEE	**40**	**150**
W6LER	**40**	**142**
W6YZU	**40**	**129**
W6TI	**40**	**128**
W8RDZ	39	188
W2GWE	39	182
W3BES	39	181
G6ZO	39	180
W6ENV	39	179
W2HHF	39	178
W5ASG	39	174
W4CYU	39	172
W8BKP	39	170
W9ANT	39	170
W3JNN	39	169
W6EBG	39	168
W6DI	39	165
W6PCS	39	165
W2PEO	39	163
W6SN	39	162
G5DQ	39	160
WØYXO	39	160
W8NBK	39	159
WØNUC	39	158
WØGKS	39	156
G8KP	39	156
W3DRD	39	156
W6TT	39	154
W6ZCY	39	153
VK2DI	39	153
F8BS	39	153
G6QB	39	152
WØNTA	39	152
G5YV	39	151
G2AJ	39	151
W6KRI	39	151
W2COK	39	150
G2WW	39	147
D2KW	39	147
W8LEC	39	146
W2MEL	39	145
W1NMP	39	143
W9IU	39	143
G3DO	39	141
W9DUY	39	141
G6BQ	39	140
W6GDJ	39	140
W6OMC	39	140
VE7HC	39	139
G3FJ	39	139
W2MEL	39	139
W6AM	39	138
CE3AG	39	138
W3JTC	39	138
W6BAM	39	137
ON4JW	39	136
W6RW	39	135
W6RDR	39	134
W6BPD	39	134

C. W.-PHONE		
VK2ACX	39	133
W6KUT	39	133
W6NNV	39	133
G5RV	39	132
G2VD	39	132
G2CDI	39	132
G2FSR	39	130
W9NRB	39	126
G5BJ	39	126
G3AAM	39	126
W7BE	39	125
G5VU	39	124
W6EAK	39	123
G3AAK	39	122
W6ANN	39	121
G5WM	39	120
G8RL	39	120
W6QD	39	118
G6BS	39	117
G3QD	39	116
G3TK	39	114
MD1D	39	110
OK1AW	39	110
W6UZX	39	109
W7GXA	39	106
W7ETK	39	105
KG6AL	39	103
W6EPZ	39	101
W6AX	39	93
G6PJ	39	76
W3IYE	38	158
W3EPV	38	152
W9RBI	38	147
W3EVW	38	144
W2CYS	38	144
W8FJN	38	144
W3GHD	38	142
W2HZY	38	140
PY1DH	38	138
W1JYH	38	138
W1ENE	38	137
W2IOP	38	137
W4BRB	38	133
W8CVU	38	133
W1ZL	38	131
W9VW	38	131
G8IL	38	131
W4INL	38	131
G5CI	38	130
W1AB	38	128
W3ZN	38	128
G6LX	38	126
W2PQJ	38	125
W9VND	38	125
W2RDK	38	124
GW3AX	38	123
WØSQO	38	123
WØOUH	38	117
W9YNB	38	117
W6RM	38	114
W5CPI	38	113
OK1CX	38	110
VR5PL	38	109
G3ZI	38	107
G8IP	38	105
W6LN	38	88
W6LEV	38	79
G3BI	38	75
W1BIH	37	138
W3DKT	37	136
KP4KD	37	129
W4OM	37	126
W2TJF	37	122
W1KFV	37	121
G4CP	37	117

C. W.-PHONE		
W3KDP	37	115
W9MZP	37	113
W4ML	37	113
W6PQT	37	112
W4FPK	37	110
VE1EA	37	109
G4AR	37	108
W4MZ	37	102
W8VLK	37	102
W8WWU	37	101
G5MR	37	100
W2BLS	37	100
G3AAE	37	99
W2SGK	37	95
W6LN	37	82
W2CWE	36	134
W2PUD	36	128
W9LNM	36	124
W2RGV	36	119
SV1RX	36	119
W3ZN	36	119
MD5AK	36	118
G2CNN	36	114
G2AKQ	36	112
W9TB	36	101
W5BK	36	101
W9FKH	36	100
W2CNT	36	100
WØAZT	36	100
G2AO	36	100
G6WX	36	95
W2GUR	36	94
W6LRU	36	94
GW4CX	36	92
W7EYS	36	87
W8HSW	36	85
GM2AAT	36	75
W6BIL	36	69
W2DYR	35	123
W8REU	35	104
W9CKP	35	101
G8VR	35	100
VE3AAZ	35	99
W6YYW	35	92
W7BTH	35	91
W6ID	35	90
G2AVP	35	89
W6DLY	35	89
W9FNR	35	85
D4ANM	35	80
G8RC	35	78
G3BDQ	35	74
CM2SW	34	132
W8AVB	34	105
W9WCE	34	103
G8QX	34	99
G8KU	34	96
VK4RC	34	91
W3JKO	34	91
G6XX	34	89
W3WU	34	88
W4DIA	34	86
TF3EA	34	84
W2JA	34	84
W6MI	34	84
W3EMW	34	82
D4AVE	34	81
W6MUF	34	79
D4ANM	34	77
W2EMW	34	77
J4AAK	34	66
W7FNK	34	65
W2ZW	33	115
W4HA	33	99

C. W.-PHONE		
W6ZZ	33	97
W4QN	33	94
W2GVZ	33	92
W3LVJ	33	90
W3AYS	33	89
G2LC	33	85
W8JM	33	82
W5BK	33	79
GM2UU	33	79
G8VG	33	78
G3BFC	33	77
W2WC	33	75
W6WUD	33	61
W2NXZ	33	61
W6CTL	32	83
WØFWW	32	78
HA1KK	32	78
W8PCS	32	69
PHONE		
W6DI	38	143
W4CYU	37	147
W1HKK	37	131
W6VFR	37	126
G6LX	37	124
G2AJ	37	121
G3DO	37	116
W8BKP	37	113
G2PL	36	128
W1JCX	36	126
W2BXA	36	123
G6BW	36	119
W1FJN	36	119
W8REU	36	116
W7HTB	36	108
G5YV	36	106
G6WX	36	105
W3DHM	36	96
F8DC	36	85
W6SA	36	80
W2DYR	35	122
W1NWO	35	120
W8BF	35	120
W1MCW	35	119
W3JNN	35	115
G3FU	35	115
W9RBI	35	113
W6PXH	35	112
GM2UU	35	107
G8QX	35	100
W9HB	35	89
W8BIQ	34	100
W9CKP	34	91
W6PCK	34	91
W2ZQ	33	113
W5ASG	33	106
W2PQJ	33	92
W8QBF	33	83
W2DRH	33	60
XE1AC	32	114
W4HA	32	90
W4INL	32	88
W5LWV	32	87
W2HV	32	86
W6CHV	32	84
WØHX	32	82
W9GZK	32	72
W9WCE	30	85
W6AM	29	70
W8SXU	27	54

AMATEURS! GET YOUR SUPPLY OF 826'S WHILE THEY LAST!



WELLS' TUBE SPECIAL OF THE YEAR!

The 826—60 Watt UHF Transmitting Tube..... 49c

(LESS THAN THE PRICE OF A RECEIVING TUBE)

Accustomed as we are to excellent valuesin Government radio equipment, we were amazed at the remarkably low price at which we were able to get these 826's. The regular Amateur net price is $9.25 and worth it! So you can see why we're calling this the TUBE SPECIAL OF THE YEAR. Build your new rig around the 826. Order Plenty of spares as we doubt if you will be able to duplicate this price when our stock is gone.

UHF Operation up to 250 MC.

The 826 will perform beautifully in your 2 meter rig as well as on the lower frequency bands. Use it as a final amplifier, modulator, doubler, buffer, or oscillator. In fact, the 826 is good for practically any R. F. or audio application.

826 Specifications

Max. Plate dissipation	60 watts
Filament volts	7.5
Filament amps.	4
Max. plate voltage	1000
Max. plate current	125 m.a.
Approx. grid drive	6 watts
Max. freq. full rating	250 mc.

Power Output	Watts
Class C amp.	86
Class C plate mod.	53
Class B telephony	22
Grid modulated	25

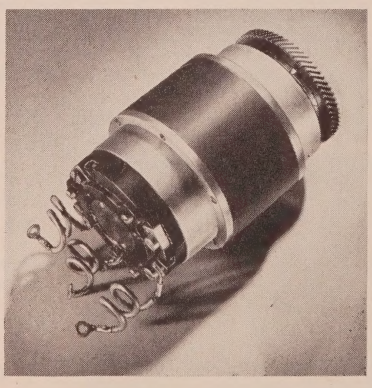
These tubes are standard make, brand new, JAN inspected, and packed in their original cartons.

At our low price, 826's can be shipped only in boxes of 4 for $1.96. Add 25c for each box of 4 tubes for prepaid shipment to any part of the continental U. S.

SELSYNS

110 VOLTS-60 CYCLES

These top grade Selsyns are ideal for beam direction indicators or for any remote rotation indication. 110 Volt Selsyns are rapidly becoming scarce. Order now for prompt delivery.
Price—only $7.00 ea. $11.00 per pair.



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W.A.Z. They will be issued certificates 21 and 22 respectively. The Honor Roll listing now shows W7BD at 40Z, 156C and W6NRQ at 40Z, 123C.

The DX contest which has just been concluded will, no doubt, furnish a lot of you fellows with a brand new collection of zones and countries. Business in this department should be rushing next month.

One of our more consistent and enthusiastic DX men, *CE3AG*, has just boosted his countries to 138, while his zones show in the Honor Roll at 39. Luis has worked them all, and should be getting his 40 confirmations in shortly. *KP4KD* says he is relaxing a little bit from the DX getting business, but does tell us that *W8LZK/KP4*, who until recently was NY4CM, is down there and on the air with an 807. W1QCY says he doesn't see very much in the column about 40-meter DX. He is absolutely right, and I wish we had more to say about 40. To date, he has worked 22 zones on 40 and heard quite a few more which he plans to polish off as soon as possible. Obviously, in working 22 zones on 40, his list includes some mighty good stuff.

W9YB, which is the station of the Purdue Radio Club, has been pretty active. They have a 150-watt transmitter and a six-element beam. The beam is strung between two towers on top of the electrical engineering building and is 150 feet off the ground. According to W6TE, the Australian Antarctic expedition left Melbourne the latter part of February and is carrying some ham equipment. They intend to operate on the following crystal frequencies: 7,019, 7,027, and 7,186. . . . On the 14-mc band, the same crystals will be used, and I presume you can figure out the frequency. They will use a special call . . . *VK1AA*. We don't know whether they will operate aboard ship or from the ice, but, in any event, it should prove to be an interesting station to contact.

If you have worked *YA3B*, it doesn't look good, because W9MXP says his card addressed to YA3B, undercover, to Box 5, Kabul, Afghanistan, has been returned from the Afghanistanian postoffice marked in English, "Returned . . . unknown." Better scratch that one, at least until we know more.

For those of you who want a little more information on Korea, . . . they were given their new prefix "HL" on February 15. This change-over from J8 to HL also effects the Korean Broadcasting Corporation station in Seoul, formerly JODK, and is now known as HLKA. Hams in Korea, consisting of officers, enlisted men, and civilians attached to the U.S. army forces, will be identified throughout the world by call letters from HL1AA through HL1ZZ, these being allocated by general headquarters of the Far East Command in Tokio. At present, there are 29 amateur stations in operation in Korea.

Last month, just as we were cranking out this column, word came to us that fire destroyed everything owned by *KP6AA* and *KP6AB*. I am grateful to VE7ZM for passing along a letter from Bill Fells, KP6AB. I want you to read every word of it.

"We haven't been in QSO in quite a while now. I believe our last contact was on 20 fone. It looks like it may be quite a while before we QSO again. On the morning of February 16, 1948, a fire broke out in Steve Barnes' (KP6AA) section of our duplex home. Fortunately, Mrs. Barnes awakened. The time was 5:30 a.m., and Steve attempted to put out the fire, but the living room burst into flames, and he received 2nd degree burns on arms, hands, and back. He succeeded in arousing my xyl who grabbed our 10 month old baby boy and fled. In 45 minutes, the building was level with the ground. I was on Guam at the time. Our families lost all our furniture, personal belongings, radio gear, etc. Since our total loss is about $10,000.00, and could not be insured down here, we will not be in a position to purchase gear. I remember during several of our contacts you mentioned the fact that you had quite a bit of spare gear that you did not think you would be needing. We are certainly in a position now to use anything you might send us. All of our test equipment, tools, and electric drills, etc. are lost, so construction is almost impossible at the present time, even if we did have the parts, which we do not. This is not a military base, so scrounging is out. We do however have ARC5 surplus transmitters which are the beginning of a fairly decent VFO. I was lucky enough to be able to pick them up in KH6 when I flew back from Guam after the fire. Incidentally, when you QSO any of the European, African, etc. gang such as: G6ZO, G2PL, OK1LM, F8BS, I6AB, MD1D, UAØAF/UA1AF, UAØKQA, UAØKFA, VE7ZM, etc., tell them that Steve and I would appreciate duplicate cards to start our QSL files over again. So if you have any gear that Steve and I might be able to start over with again, we would be very much indebted to you. If you think the shipping cost would be excessive, write us, and we will send you checks for the amount."

Our shipping QTH: National Bureau of Standards
Radio Propagation Field Station
c/o C.A.A., Box 4009
Honolulu, T. H.

Our letter QTH: Bill Fells or Steve Barnes
Palmyra Island
c/o Postmaster, Honolulu, T. H.

There it is gang . . . let's get KP6AA and KP6AB back on the air. What do you say?

AP" Prefix for Pakistan

Operative No. 1492 squeezed this bit of information out of W6ENV and W6MI. ENV worked *AP4A* who said his call was assigned to him on March 9, while W6MI worked *AP5B* located in Lahore. This one says to QSL via G3HS.

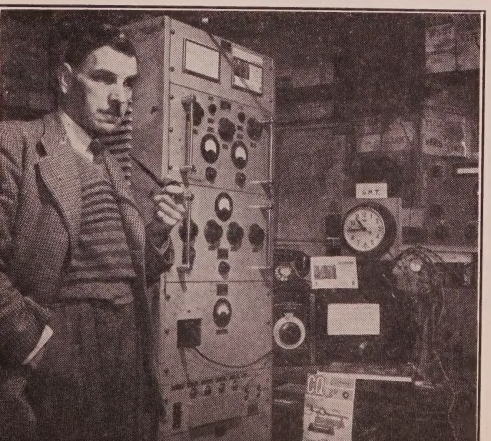
I want to wish VE3QD a lot of luck on his new DX column in the magazine "XTAL," which is the official journal of the Canadian Amateur Radio Operators Association. Roy has been on the air a long time, and should be given all the support of you VEs. I notice another old time DX man listed among the executive committee of "XTAL" . . . good old H. A. M. Whyte, ex-G6WY, and now VE3BWY. "Ham" wrote the DX column in the *R.S.G.B. Bulletin* before the war.

In a letter from *TF3EA* to W2IOP, we learn that the TF's were authorized to use 21 mc. Here is a chance to get a preview of what this band might be like. How do you do it? . . . well, simply work cross-band . . . arrange a schedule, and TF3EA will operate from 21 mc while you're on 14 mc. He says Saturday and Sunday afternoons G.M.T. would be the best time for schedules of this type. It might also be of interest to you to know that TF3EA has just submitted his list and is in the Honor Roll with 34Z and 84C.

EA7AV, in a letter, wants to stress this point. *DO NOT* send cards to him direct . . . send via A.R.R.L. EA7AV is an old-timer having been on the air since 1923. Some of you may remember his old call . . . EAR151. He runs 375 watts into an 813 and is on 14 and 28 mc.

HR1AT gives with what I think is a very good idea. He would like all the DX stations around the

Continued on page 64)



Ben Wallich, G6BW. 150 watts on 7, 14, and 28 mc.

MORE FOR YOUR MONEY EVERYTHING FOR THE HAM

Distributors of amateur radio equipment and parts.

BARGAINS GALORE

COMPLETE **$9.95** **35-FT. MAST**



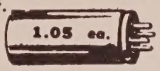
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7 pieces 1½" rustproofed steel tubing 5' long which fit together to form mast, easily erected, complete with instruction booklet.

EASY TO INSTALL Sound powered phones $4.95 per set

VIBRATOR

Similar to Mallory 294 or Radiant 5300



4-Prong 6-Volt

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MODULATOR OSCILLATOR AMPLIFIER

SUPER SPECIAL BRAND NEW! Eimac 304 TH JAN inspected $3.95 ea.

ORDER NOW

BRAND NEW mast KITS SEPARATELY OR COMPLETE UNITS

7 SECTIONS – 5 FEET LONG

Handy for Camping Trips, also Useful for Transmitting, FM and Television sets.

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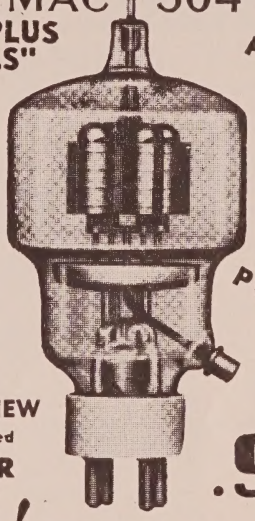
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Army-navy surplus! Brand new 807's at this smash price!



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BRAND NEW JAN inspected **SUPER VALUE!**

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BETTER! ORDER 4 or more TODAY!

MISCELLANEOUS ACCESSORIES Express Collect

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ATTENTION ! ! !

ALL SCR-522 OWNERS:

Remote Control Boxes for SCR 522's, Brand New in Original Packing. Consists of 5 push button switches, 5 Western Electric Pilot Assemblies, with Pilot Bulbs and Dimmer, and lever Switch, all finished in Black Crackle. Order yours To-Day for only . each **79c**



SCOOP! 110 M.C. REC. BARGAIN

BC-733 D Localizer Receiver



Freq. 108-110 Mc; Tube complement: 10 tubes—1—F8Q7, 2—12SR7, 1—12A6, 1—AH7GT, 2—12SG7 3—717A.

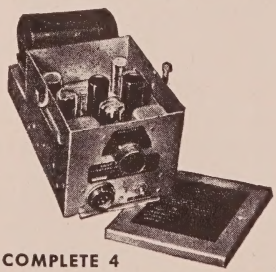
NEAR NEW CONDITION. A RED HOT VALUE

Companion to the glide path receiver. Also contains 90 and 150 cycle band-pass filters. Has the best AVC system yet developed; can use parts or use as a model for construction. 10 tubes, crystals, relays, etc. Schematic included. Don't pass this up! At only..... **$3.95**

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Let us quote on components and equipment that you require. We have too many items to be listed on this page. Place your name on our mailing list now for new catalog.

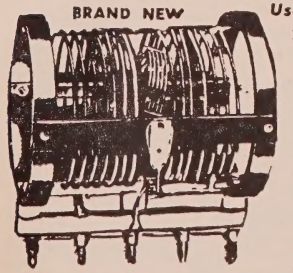


COMPLETE 4 TUBE INTERPHONE AMPLIFIER

Comes in an aluminum cabinet 9¾ x 4¾ x 5½ inches with two 12J5GT tubes and two 12A6; also General Electric Dynamotor 28DC Volt input and 250 VDC output at 60 MA. Complete instructions and diagram for high fidelity phonograph or speech for 110 Volt operation. Greatest offering ever made in War Surplus Electronics.

NEAR NEW CONDITION. **$1.50**

BRAND NEW *Use The Best!*



SURPLUS TRANSMITTING COILS

B & W 3400 SERIES INDUCTORS

Frequency Range (mc)	Coil 500 watts		No. of turns on Link Coil	
2.0 - 3.5	C-387-D	14 coils. Per Set $5.00	6.5	matching up to (60) ohms.
3.5 - 4.5	C-388-C		4.5	
4.5 - 5.7	C-389-C		4.5	
5.7 - 8.0	C-390-C		4.5	
8.0 -11.0	C-447-B		4.5	
11.0 -14.0	C-448-B		2.5	
14.0 -18.0	C-449-B		1.5	

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SY. 3-1196

FROM L. A., RY. 1-6683 DOW RADIO

1759 E. COLORADO ST., PASADENA 4, CALIF.

The YL's Frequency

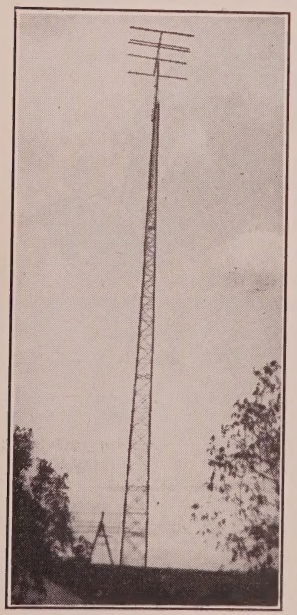
Conducted by LOUISA DRESSER, W2OOH*

With Spring here again it is once more the season of DX on the v.h.f. Already enthusiasts are tuning 6 meters for elusive sporadic E openings, and those who now work locally on 2 will soon be taking advantage of temperature inversions for DX QSOs.

YLs will be in there working their share of it. As a matter of fact, there is many a frustrated OM who has to leave the shack to go to work in the morning just when 6 opens up. That is the time the YL can really have her fling, though we must admit that we are surprised to find how few take advantage of all the fun to be had on the higher frequencies. The unpredictability of 6 has always seemed to us to make it the most fascinating of all ham bands.

Another YL who feels that way is Sandy Sarver, W6YRL, Van Nuys, Calif., who exclaims: "The OM, W6AOR, and I are strong 6-meter addicts because of the constant element of suspense. You never know when you turn on the rig whether you're going to work a local, or whether the band will be wide open and DX pouring in. The DX contacts are terrific—their signals drown out the locals often times, and with a good receiver and converter there is very little QRM." And she adds; "I think the thing I enjoy most about 6 is the attitude of the hams—they're always overjoyed to talk to you; never an exchange of reports and '73, cul.'

**Assistant Editor, CQ. Send all contributions c/o CQ, 342 Madison Ave., New York 17, N.Y.*



The handiwork of W6AOR — 4-element beam of 2-inch copper tubing, 93 feet high and fed with 600-ohm open wire line, which he and W6YRL use on 6 meters. Says Sandy: "Personally, I'll stack our antenna against any in the country!"

"We have tried almost everything on 6. Two years ago we had an MBF and a folded dipole, and gradually increased power and improved our antenna until we wound up with our present setup. We now have a three-stage kw rig consisting of a 6V6, 829B, and a pair of 4E27s in the final. The modulator is a pair of 810s. Normally we run low power, 300 watts or less, unless the band opens.



Jean Doss, W5HYF.

"As to my own small achievements on 6 - they're not much, because if the OM is home when the band is open *he* usually operates the rig. But I have managed to work 11 states, a few VE7s, and I've had several fine contacts with Ed, W1HDQ, solid R9 plus both ways. My biggest thrill was working W7ACS/KH6 on Nov. 29, 1947, with a 50 db above S9 report!"

One YL with whom Sandy has had QSOs on 6 is Jean Doss, W5HYF, at Amarillo, Tex. Jean and her OM, W5HF, are on both 6 and 2. On 2 it's an SCR-522 and a 3-element vertical, best DX being 35 miles. On 6 they use NBFM to an 807 and a 3-element beam.

Jean says: "The score for W5HF (which in the 50-mc Honor Roll in *CQ* stands at 35 states, all districts, and VE1, 3, 4 and 7 worked) is due partly to me as I use the OM's call on all bands, and use my call for mobile work only. My biggest DX thrill on 6 was working VE1QY."

Jean explains that they haven't had many openings on 6 and she missed out on all the real DX, but adds: "I'm spending most of my time these days listening and waiting for the band to open up for I plan to be in on every opening from now on. Please pass along to the girls that if they really want to enjoy operating they should get on 6—I am sold!"

It was through QSOs on 5 meters, when her OM, W1DJ, was active on that band, that Martha Ridley, W1OIR, at Winthrop, Mass., first became interested in ham radio. She came up with her own license just after Pearl Harbor, and during the war was active on 2 with the WERS, as well as teaching code classes for the Mass. Women's Corps. Incidentally, Martha tells us that she already had a background in code operating as she was a Morse operator for Western Union from 1916 to 1918. (We've gleaned from our "undercover operator" that this was not only her introduction to code, but the way Martha met her husband, also an old-time Morse operator, as well.)

Martha says that most of her operating has been on 6-meter openings to the Middle West and West

(Continued on page 76)

Make your RADIO a WIRE RECORDER COMBINATION

WEBSTER-CHICAGO *Model 78* WIRE RECORDER



SEE YOUR NEAREST HAM SUPPLY HOUSE



NEW SIMPLIFIED WIRE RECORDER MAKES IT EASY TO CONVERT ANY RADIO INTO A WIRE RECORDER COMBINATION

The Model 78 Wire Recorder is especially adaptable for home use in connection with a radio receiver or with a high fidelity public address type amplifier and speaker. Compact in design with simple push button controls, the Model 78 adequately meets the needs of both the professional and amateur recording enthusiast.

Model 78 comes complete with necessary cords, plugs, microphone, 15-min. spool of wire, and full instructions for easy connection. Head phones may also be used for quiet, private play back of a recording.

WEBSTER-CHICAGO

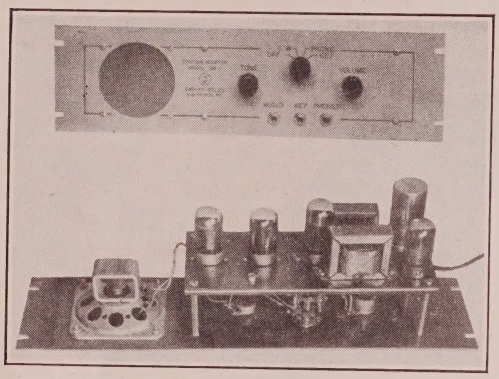
MAKERS OF WEBSTER-CHICAGO RECORD PLAYERS AND NYLON PHONOGRAPH NEEDLES

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PARTS AND PRODUCTS REVIEW

Phone-C. W. Monitor

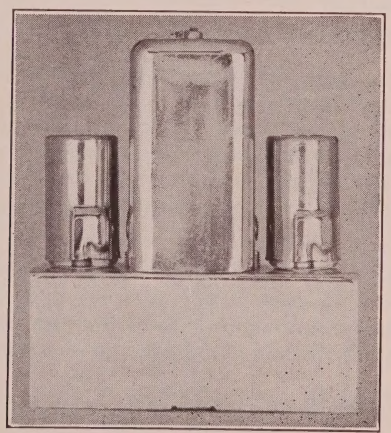
Harvey-Wells Electronics, Inc., is now manufacturing a complete station monitor. Constructed on a standard 19" x 5¼" x 5½" rack panel it provides an audio note for monitoring any c-w transmitter.



For phone monitoring a two stage speech amplifier is built in. No tuning or bandswitching is required. Included in the monitor is a 4" PM speaker, built-in power supply and headphone jack.

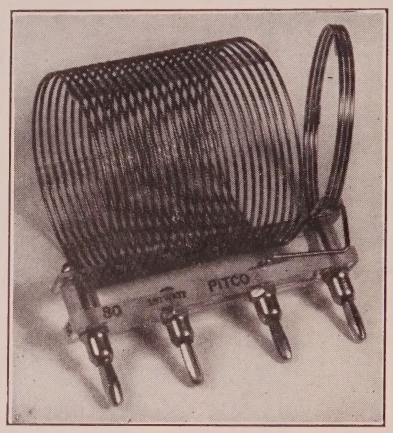
Narrow-Band FM Adapter

Schuh's Radio Parts, is now producing a narrow-band FM adapter available in two models, 455–556 kc and also 915 kc for use with BC-348 receivers. The adapter is small and compact for simple mounting in almost any position. A 6AK5 limiter and 6AL5 discriminator comprise the tubes. Details may be obtained by writing the manufacturer at 1253 Loyola Ave., Chicago 26, Ill.



Adjustable End Link Coils

The Pitco Adjustable End Link Coil is a new design that will operate with high efficiency on a variety of circuits and with beam power tubes. A product of Pittsburgh Coil Co., Carnegie, Pa., this new coil can be substituted for the standard end link model wherever desired. It is readily adjustable by moving the end link with your hand and is available in 75, 150, 250 and 500 watt sizes.

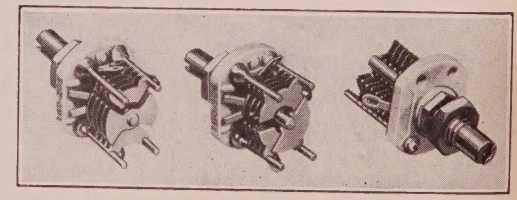


Compact Air Variables

E. F. Johnson Company of Waseca, Minn., has developed a new line of air variable condensers. They are available in three models: single, differential and butterfly types. Each of the three types is available in four different capacities.

The single type takes the place of adjustable padders for trimming r-f and i-f oscillator circuits; is available in 1.55 to 5.14 μμf, 1.73 to 8.69 μμf, 2.15 to 14.58 μμf and 2.6 to 19.7 μμf.

The differential type, for switching capacity from rotor to either of two stators, and for shifting tap on capacity divider, is available in 1.84 to 5.58 μμf, 1.98 to 9.30 μμf, 2.32 to 14.82 μμf, 2.67 to 19.30 μμf.



The butterfly type is applicable wherever a small split stator tuning condenser is required. Four models include 1.72 to 3.30 μμf, 2.10 to 5.27 μμf, 2.72 to 8.50 μμf, and 3.20 to 11.02 μμf.

(*Continued on page 87*)

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PLACE: Milwaukee, Wisc. TIME: Sept. 4-5-6, 1948. WE'LL BE THERE. Plan to attend this year.

Keep This Buying Guide Handy . . . **FREE**



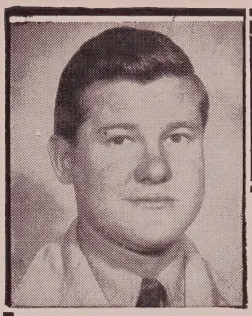
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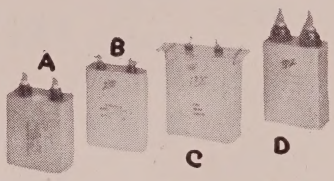
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ESSE Specials!

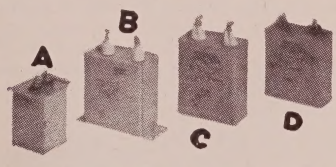


(A) Filter condenser, G E Pyranol, oil filled 8 MFD @ 1000 volts DC working voltage about 1½" x 4" x 5" high, shipping weight about 3 lbs. Brown porcelain stand off insulator terminals.....New **$2.00**

(B) Filter condenser, Sprague, oil filled, 8 MFD @ 1000 volts DC working voltage size about 1" x 4" x 5" high, shipping weight about 2 lbs.....new **$2.00**

(C) Filter condenser, 8 MFD @ 700 volts DC working voltage. Oil filled, well insulated terminals. Size about 2" x 4¼" x 5" high, with mounting flanges, gray metal case shipping weight about 4 lbs. .....new **$1.25**

(D) Filter condenser Cornell DuBilier, 1 MFD @ 4000 volts DC working voltage, oil filled. Size about 2¼" x 4" x 7" high over all. Shipping weight about 4 lbs. Heavy stand-off insulator type terminals. .....New **$3.75**



(A) Filter condenser, oil filled, 4 MFD @ 300 volts DC working voltage, size about 2" x 2" x 3½" high, shipping weight about 2 lbs.....new **35c**

(B) Filter condenser, GE Pyranol, oil filled, 4 MFD @ 2000 volts DC working voltage, size 2¼" x 4" x 5" high, shipping weight about 4 lbs.....new **$3.00**

(C) Filter condenser, Industrial Condenser Corp., oil filled, 1 MFD @ 3000 volts DC working voltage size about 2¼" x 3½" x 5" high, well insulated terminals. Shipping weight about 3 lbs.....new **$2.00**

(D) Filter condenser, Industrial Condenser Corp., oil filled, 4 MFD 2000 volts DC working voltage, porcelain insulated terminals, size about 2¼" x 3½" x 5" high, shipping weight about 3 lbs.....new **$2.50**

METERS-*Brand New*

ALL CHECKED FOR ACCURACY!

0-500 MA DC 3½", round, NX35 Westinghouse...**$ 3.00**

0-5 Amps RF 3½", round, NT35 Westinghouse, Internal TC..... **4.50**

0-3 Amps RF 2½", round, NT33 Westinghouse, less TC **3.50**

0-10 & 0-250 MA DC combination, round, NX33 Westinghouse..... **2.50**

0-10 & 0-250 MA DC combination, round, DW41 G.E **2.50**

0-2 volts full scale 2000 ohms/volt Volume Level meter, Westinghouse, round 2½"..... **3.00**

0-100 MA DC 2½", round, MD20001 McClintock.. **2.50**

0-3 MA DC 3½", square, 327A Triplett..... **4.50**

0-500 Volts AC 3½" square 337A Triplett..... **6.00**

0-2 Volts AC rectifier type 10,000 ohms/volt 327A Triplett, 3½" square..... **15.00**

0-50 MA AC 337A Triplett 3½" square..... **7.50**

0-30 amps AC 3½" round case, 331JP Triplett..... **6.00**

RELAYS-*All Brand New*

RBM DPDT 110 v 60 cycle, make before break.....**75c**

Relay, 6 MA 5000 Ohm DC resistance, SPDT.....**85c**

Leach type 1127-FR 110 V 60 cycle DPST.....**$1.50**

Automatic Electric Co. DPDT 24 v DC 6 amp silver tungsten contacts.....**40c**

Automatic Electric Co. delay relay, 20 ohm, silver tungsten contacts.....**40c**

Starter relay, 28 volt operated, heavy duty construction **50c**

Switch, pushbutton type DPST on/off type, to fit standard switchbox, 10 amps at 250 volts.....**25c**

Switch, toggle type, bat handle, DPDT heavy duty contacts.....**35c**

Leaf type switch, 4 poles, single throw, single hole mounting.....**25c**

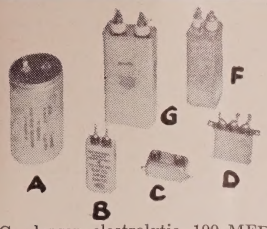
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Microphone transformer, Ouncer type, for carbon mike to tube grid, circuit printed on case.....NEW **50c**

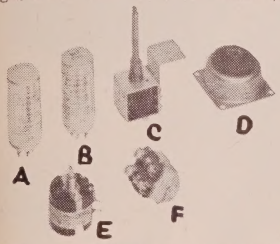
Transformer, two sets of windings each 1 to 1 ratio, good for frequencies of 1000 CPS and higher.....NEW **25c**

Filter Choke, 19 henry 105 MA DC, resistance 170 ohms, metal cased, size about 3" x 3" x 4" high.....NEW **$1.50**

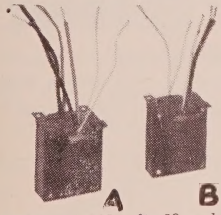
Neon tube clear glass about ½" O.D. overall length about 11". Excellent for transmitter RF tuning indicator .....NEW **40c**



(A) Condenser, electrolytic, 100 MFD. @ 300 volts, 2½" diameter, 4½" high, metal can, shipping weight 2 lbs., brand new **$2.00**
(B) Filter condenser, Tobe, oil filled, 1 MFD @ 600 volts DC working voltage, size about 1" x 1" x 2½" high....new **20c**
(C) Condenser, bath tub type .1 MFD @ 1000 volts DC .....new **20c**
(D) Condenser, Tobe, oil filled, 3 x .1MFD @ 600 volts DC at..... **25c**
(F) Filter condenser, Aerovox, oil filled, 2 MFD @ 600 DC working volts size about 1½" x 1½" x 5" high, shipping weight about 1 lb.....new **35c**
(G) Condenser, Cornell-DuBilier, oil filled, 4 MFD @ 1000 volts DC working voltage, size about 1" x 2½" x 5" high, shipping weight 2 lbs.....new **$1.75**



(A) Vibrator, Radiart VB-3, for 6 volt battery operation, used in vibrator supply PE104—which is used with BC654A transmitter-receiver. Type J-4.....new **$1.95**
(B) Vibrator, Radiart VS-3 for 6 volt battery operation, used in vibrator supply PE104—which is used with BC654A transmitter-receiver. Type J6 (probably exactly the same as (A) .....new **$1.95**
(C) Relay, 110 volt 60 cycle AC plunger type for door interlock.....new **85c**
(D) Lord Shock Mount, heavy duty type, base size 3" square x 1½" high—⅜" diameter bolt may be used. New..... **35c**
(E) Dual volume control wire wound, each section 2500 ohms.....new **35c**
(F) Toggle switch, bat handle, DPDT .....new **30c**



(A) Transformer, 110 volts 60 cycle in put; output being two secondaries—each giving 14 volts @ 11 amperes, which can be used alone, in parallel, or in series for various voltage and current combinations. Size about 3½" x 3½" x 4" high. Ideal for operation of propeller pitch motors used for beam antenna rotation. Shipping weight 7 lbs. Manufactured for "Esse Radio Company" brand new..... **$5.95**
(B) Transformer, for use on 110 volt 60 cycle primary line; secondary giving 28 volts, center tapped, @ 11 amperes, auto-transformer type of winding, size 3½" x 3½" x 4" high, shipping weight 7 lbs. made for "Esse".....new **$4.95**

Microswitch, completely weather-proofed, metal-clad or cased, rated 15 amps at 115 volts, normally open type, plunger has override feature .....NEW **35c**

Battery type BA-38, 103.5 volts, used in Handie-Talkie, Mine detectors, or for any purpose where low current drain is required. Size 1" x 1" x 11½" long. Out-dated, but tests O.K.. .....NEW **$3.00**

Tube socket, RCA, for 866 or similar type tube bases.....NEW **35c**
Tube socket, wafer octal type, excellent mica insulation.....NEW **10c**
Tube socket for 813 type tube, Johnson type 237.....NEW **60c**
Tube socket, for Acorn type tubes, made by Millen Co.....NEW **20c**
Tube socket, porcelain octal type, less mounting ring.....NEW **10c**

First IF transformer for BC348 type receiver, 915 kilocycles NEW **$1.00**

Ohmite tap switch, model 111, 9 taps, non-shorting, will handle 10 amps at 115 volts.....NEW **35**

Kit of potentiometers, twenty-five assorted sizes carbon and wire-wound.....NEW **$2.25**

Resistor, voltmeter multiplier type, rated at 2 megohms, 2 kilovolts insulation, 1 MA maximum current, about 1" diameter x 5½" long, mounts in clips.....NEW **75c**

Resistor, 100 watt type, 5 sections having 7500, 3000, 23, 23 and 75 ohms (total of 11,269 ohms) resistance. 1¼" diameter by 8½" long .....NEW **35c**

Cord CD-132, has PL-55 type plug and 9" cord, with spade type lug tips.....**35c**

Sylvania type 1N26 crystal.....NEW **35c**

Resistor 20 watt, one-half ohm.....NEW **10c**

Fuse holder for type 3AG fuses.....NEW **10c**

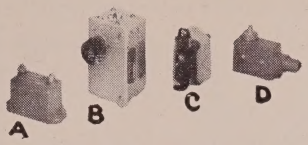
Amphenol co-axial chassis connector, new, type 83-1R.....**40c**
Amphenol co-axial junction connector, new type 83-1J.....**40c**
Amphenol co-axial angle plug adapter, used, type 83-1AP.....**40c**

Connector, bakelite insulation, male and female section, 6 pin polarized. **50c**

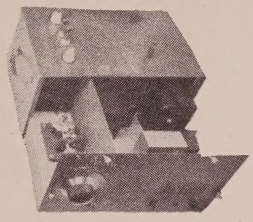
Canvas bag, moisture & fungus proofed, with carrying strap, leather re-enforced corners, weight 3 lbs., size 9" x 14" x 12" high. Ideal for tool case, for sportsmen, etc.....NEW **$1.00**

HAND SET T-S-10-G—Sound-powered telephone. No batteries required for operation: connect to any two wires or fence, in ground, etc., by convenient clips included..Price.....NEW **$9.50** each

ARGON BULBS—2 watt ideal for transmitter tuning, night light and etc. Price, **.35c** each. **$3.00 per carton of ten.**



(A) Condenser, mica, .25MFD @ 250 volts .....new **15c**
(B) Jack Box BC-631-B, size about 2" x 2" x 4", aluminum case, contains 10,000 ohm volume control, knob, Jones Barrier strip brand new.....**40c**
(C) Switch, push-button type DPST on/off type, to fit staudard switch box, 10 amperes @ 250 volts new **25c**
(D) Micro-switch completely standard, metal grate well cast rated 15 amperes @ 115 volts normally open type, plunger has override feature. New.....**35c**



RADIO MODULATOR

BC-424, made by Westinghouse, 110 volt 60 cycle AC operated. Size 9" x 14" x 9" high, weight about 30 lbs. packed. Has National Velvet Vernier Dial, Thordarson power transformer & chokes, tubes used and included are: 6F6, 6J7, 6J7, 5W4 and 955. Frequency about 190 megacycles. Comes with heavy steel case.....**$22.50**

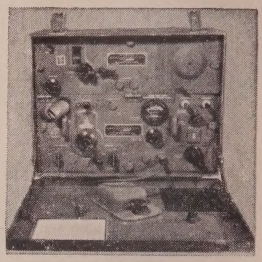
SCR-625 MINE DETECTOR

Used by the Army to detect buried metallic mines. Its private use suggests the location of underground or underwater pipes, cables and ore bearing rock, the location of metallic fragments in scrap materials, logs, etc. and the screening of personnel in plants for carrying of metallic objects.

The unit consists of a balanced inductance bridge, a two-tube amp. and a 1,000 cycle oscillator. The presence of metal disturbs the bridge balance, resulting in a volume change in the 1,000 cycle tone. The tubes used are low-battery drain types such as 1G6 and 1N5. The circuit may be modified for control of warning signals, stopping of machinery, etc. when metal is detected. Operates from two flashlight batteries and 103 V. "B." However a power supply operating from 110 V. may be used. Comes complete with spare tubes, spare resonator and instruction manual—in wooden chest 8¼" x 28¼" x 16". Weight in operation is 15 lbs. New, complete in original overseas packing container. Originally sold by War Assets for.....**$166.00**

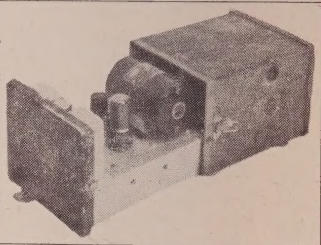
Price..... **$79.50** **ea.**
Batteries.....**$4.00** extra

BC-654-A—Receiver and Transmitter for frequencies, 3800-5800 K.C. Used but in good operating and mechanical condition. Worth many times the price for parts. Complete with all necessary tubes. Shipping weight 40 lbs. Each.....**$29.75**



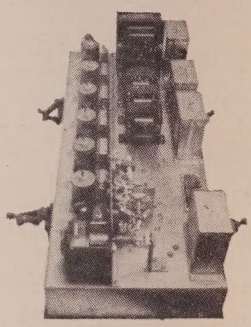
Jack Box BC-1366—Contains 2-pole, 5-position switch, rheostat, two phone jacks, etc. In aluminum case 3¼" x 4⅜" x 2¼". Complete with headphone set adaptor to match high to low impedance. PRICE.....**$1.25**

Interphone Amplifier, size 7" x 9" x 6" high, weight about 12 lbs. packed. Contains 6SJ7 and 6V6 tubes, 24 volt dynamotor. Use for phono or intercom amplifier.....**$3.75**



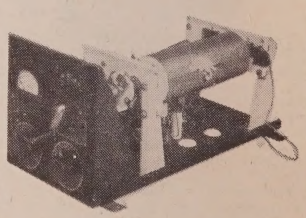
Turbo Amplifiers—Used for parts. Shipped complete with the following tubes: two 7C5's, one 7Y4, and one 7F7 in metal case. PRICE.....**$1.75**

BC-406-A Receiver—Brand new. Manufactured by Western Electric. 165 to 205 mc operation. IF frequency 19.5 mc. IF band width .7 mc. Easily converted for operation on other ultra-high frequencies. Operates from 110 V., 60 cycle, A.C. Worth many times this amount for tubes and parts. Tubes—one 5T4, two 6SJ7, four 6SK7, one 6N7, five 954's, one 955, one 6F7, one 6N7. Also contains small 110-V. operated motor. **$34.50**

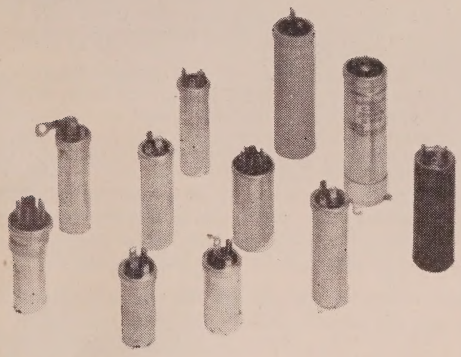


BC-733D Localizer Receiver—Part of aircraft blind landing equipment. Contains 10 tubes—3 of which are W.E. 717-A's—and crystals. Ideal receiver for conversion to 144 Mc. ham band or mobile telephone bands. For 24 V. DC operation. Size, 14½" x 7" x 4⅝". Price, with dynamotor....**$5.95**
Price, without dynamotor.....**$4.95**

Antenna Tuning Unit BC-729-C, size about 9" x 9" x 19" overall, weight 24 lbs. packed. Contains 0-15 ampere RF ammeter 3½" square case, Tuning Inductance, having 60 turns heavy wire on 3½" dia coil form, completely variable, also split stator coil with swinging link, vernier dial and revolution counter, will easily handle 500 watts of RF power. Will match up any length antenna to any common frequency for amateur transmitters....**$9.50**







CONDENSERS

Cornell Dubilier—2 MFD. 1000 V DC. 1" Diameter 5" tall.....new **$1.35**

Cornell Dubilier—4 MFD 600 V DC 1" diameter 5" tall.....new **$1.00**

Electrolytic 30 MFD, 450 V DC Mallory F P aluminum can.....new **50c**

Electrolytic 40 MFD, 450 V DC Mallory F P aluminum can.....new **75c**

Electrolytic, triple 20 MFD, 25 V DC Mallory F P aluminum can.....new **35c**

Electrolytic, 30 MFD, 150 V DC, Mallory F P aluminum can.....new **35c**

Paper, .05 MFD, 400 V DC Solar.....new **10c**

Paper, .5 MFD 400 V DC Aerovox.....new **10c**

Bath tub type .3 MFD, 50 V DC.....new **10c**

Bath Tub type .1 MFD, 1000 V DC.....new **20c**

Oil filled 3 x .1 MFD, 600 V DC Tobe.....**$1.95**

1.75 MFD, 50 V DC.....new **15c**

.5 MFD, 600 V DC.....new **15c**

30 MFD, 300 V AC G.E. Pyranol...**$3.00**

Three gang trimmer condenser assembly, each adjustable 5 to 45 mmfds...new **25c**

Neutralizing, for 6L6 or 807 tube applications.....**10c**

Variable tuning condenser, 7-17 mmfds 1½" shaft, ceramic insulation, single hole mounting.....**20c**

Padder type variable, 100 mmfds maximum, screwdriver slot in shaft for adjustment.....new **20c**

Padder type variable, 140 mmfds, maximum, screwdriver slot in shaft for adjustment.....new **20c**

Mica condenser kit, kit of many values and assorted capacities and voltages, about 100 condensers per kit.....new **$1.98**

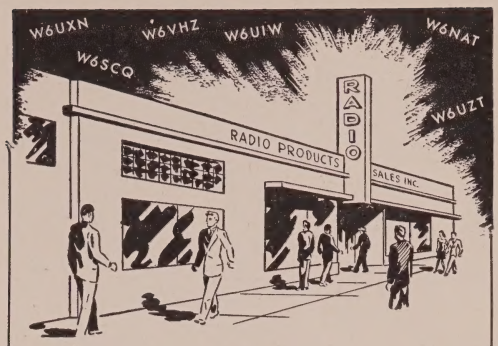
Electrolytic 1000 MFD, 15 V DC 1¼" diameter x 4½" high metal can...new **45c**

Electrolytic, mounts in octal tube socket 10, 5 and 15 MFD, 100 working volts DC. Aluminum can.....new **50c**

Electrolytic, 50 MFD, 350 V DC Mallory F P aluminum can.....new **50c**

ESSE Radio Co
130 W. New York St.
Indianapolis 4, Ind.

Unless Otherwise Stated, All of This Equipment Is Sold As Used
CASH REQUIRED WITH ALL ORDERS
Orders Shipped F.O.B. Collect



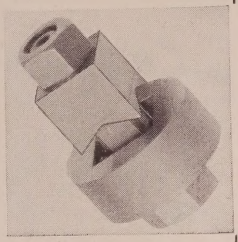
SQUARE HOLE PUNCH

The answer to your square hole problem

- **Cuts clean**
- **No filing**
- **Simple operation**

5/8″ size—special

2.95 Net



Shurite PANEL METERS

2″ Square case

Stock No:

9305	0–25	D.C.M.A.	Ea. **$1.45**
9306	0–50	"	**1.45**
9307	0–100	"	**1.45**
9308	0–150	"	**1.45**
9309	0–200	"	**1.45**
9310	0–300	"	**1.45**
9311	0–400	"	**1.40**
9312	0–500	"	**1.40**
9402	0–6	A.C. Volts	**2.50**
9403	0–10	"	**2.50**
9404	0–15	"	**2.50**

(Please order by stock number)

TUBE SPECIALS

(All new and boxed)

6J5GT	**.44**	5T4	**.79**
6K6GT	**.49**	6H6	**.30**
6K7G	**.49**	77	**.39**
6K7GT	**.49**	6AC7/1852	**.69**
12SK7GT	**.49**	VT127	**3.50**
83	**.89**	872A	**2.25**
VR-90	**.89**	5D21	**4.50**

All prices F.O.B. Los Angeles (California Purchasers add 2½% sales tax). Include 25% with order—balance on delivery. Foreign orders cash. Minimum order..... **$1.00**

Get YOUR NAME on our mailing list. We'll keep you posted on merchandise available, new equipment and special bargains. Address correspondence to Dept. C5.

When in Los Angeles, drop in for a rag chew.

RADIO PRODUCTS SALES INC.
1501 South Hill Street • Los Angeles 15, Calif
Phone: PR. 7471 • Cable Address: RAPRODCO

DX

(*from page 54*)

world to include the zone number on their QSL cards in which they are located. He points out that in some places, the cities or towns might be very close to zone boundary lines, and it might be a bit difficult in such cases to determine exactly in which zone the station is located. The next time you have cards printed, why not include your zone number? It is, of course, not too difficult insofar as the zones in North America are concerned, except, possibly, I might add . . . Zone 2.

The Rochester DX Association has a quiz show all of its own. They have printed up 48 questions in their "DX Quiz." After each question is a space where it can be checked "true" or "false." Many of the questions are stickers, and a guy would have to be awfully sharp to get them all right.

W6UXF, a YL, recently had her most interesting QSO, to date, with *UAØKKB*, who turned out to be another YL named Tanja. Since our DX YLs are somewhat limited, I had better give with her name . . . Enid Aldwell.

KL7KV says he is just getting started in the Marathon, and his list is not very impressive. Let's not worry about impressive lists, as we have all year to run up a Marathon score. Get in the thing for the fun you can get out of it. Who knows? . . . maybe he'll win for Zone 1.

Those of you who worked or knew *XAAE* in Verona, Italy, might be glad to know his present QTH. The name is Tommy Coleman, and he is located at 1208 Fourth Avenue, Watervliet, New York.

KA1AI is now being run by W7JKJ, and is the Special Service Morale station at Clark Field in the Philippines. Their job is to run as many personal QSOs as possible for the folks in the Philippines with friends and relatives back home. Stan wants to thank all of the hams, Stateside, who have helped them in the past. He is having new QSL cards made . . . frequencies used are 28,460 and 14,155 kc.

VP7NG??? VP7NG!!! How many of you fellows wondered where this station popped up from during the DX contest? W3JTC, DX coordinator of the Potomac Valley Radio Club, gives with the low-down. It seems that one of the members, W9NWX/4 thought it would be a good idea to go to a country where there were no hams on the air and really make hay during the DX contest.

Thus, W9NWX/4, W3GRP, and W4NND went to the Bahamas and became VP7NG. W3JTC was going along, too, but just before the DX contest, his XYL broke her ankle, so Larry had his hands full taking care of her, as well as the three offsprings. I don't have to tell you that VP7NG was one of the most active, if not THE most active, in the contest, and in one weekend, they worked over 1700 stations . . . That's right . . . 1700! Everybody they worked will get a card, and you can send your card c/o Potomac Valley Radio Club, Box 2003, Arlington, Virginia; or, of course, via A.R.R.L. We'll get more info on this later, I expect.

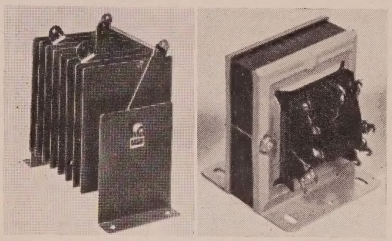
W3JTC tells me that *ex-KH6DD* is now W4RQR and has worked 30 countries on 80 c.w., while W4KFC has 40 countries on 80 . . . incidentally, he is ex-W6KFC. No one in the club has made W.A.Z. yet, but W3JTC is up to 39Z and 156C.

W9RBI says that *VQ3EDD* has left for England. Ross didn't intend to submit any totals for the Marathon, but, as he puts it, "Unfortunately, I

RADIO PRODUCTS SALES Inc. is *FIRST* TO *Announce* the *NEW — R. P. S. POWER CONVERSION UNIT*

"CONVERTS ALL WAR SURPLUS d-c RECEIVERS AND TRANSMITTERS, etc., INTO a-c USE." NO REWIRING NECESSARY—INSTALLED IN A FEW MINUTES—UNITS AVAILABLE FOR ANY RATING—A FEW POPULAR MODEL SETS EASILY ADAPTED TO THE R.P.S. POWER CONVERSION UNIT: BC-453, BC-454, BC-455, BC-312, BC-348, BC-433, BC-624, BC-733, BC-946, BC-1206, R-89/ARN-5A, ARB, BC-457, BC-458, BC-459, BC-375, BC-625, BC-654, SCR-522, SCR-274-N, ARC-4.

★
INSTANT WARM UP
SELENIUM RECTIFIERS



★
NO MAINTENANCE
NO TUBES
LOW COST
COOL OPERATION

FREE INSTALLATION DIAGRAM SENT WITH EACH PURCHASE—R. P. S. POWER CONVERSION UNITS ARE AVAILABLE FOR ANY VOLTAGE AND AMPERAGE RATING. The R. P. S. POWER CONVERSION UNITS were designed especially for the radio amateur by VICKERS ELECTRIC DIVISION, Vickers Inc., a unit of THE SPERRY CORPORATION, manufacturers of selenium rectifiers. The transformers were designed by The Thermador Electrical Manufacturing Company and operate efficiently in conjunction with the rectifier prescribed.

IMPORTANT—HOW TO ORDER—The input rating of your dynamotor must not exceed d-c output rating of the rectifier. For example, dynamotor series DMDX—12 v. 2 amps.—requires Rectifier No. S-295A and Transformer RPS-8883.

Shipping weights are listed—please contact your local freight agent for cheapest means of shipment—and include shipping charge with remittance.

ALL NEW—FULL WAVE VICKERS SELENIUM RECTIFIERS

Code Number Rectifier	d-c Output Volts	Amps.	Ship. Wt. in Lbs.	Amateurs Net Price
S-295A	14	2	1.25	$ 6.95
S-458A	14	4.5	1.75	7.25
S-167A	14	10	3.75	10.95
S-292A	14	40	12	29.95
S-296A	28	1.8	1.25	5.75
S-344A	28	5	5.75	11.50
S-172A	28	10	6	16.50
S-291A	28	20	12	29.95
S-297A	28	40	23	45.00

ALL NEW—THERMADOR TRANSFORMERS
50/60 Cycle—117 Volt Primary Rating

Code Number Transformer	Secondary Volts	Amps.	Taps See Note A	Ship. Wt. in Lbs.	Amateurs Net Price
RPS-8883	18	3		3.5	$ 3.65
RPS-8884	18	5.2		5.5	4.15
RPS-8885	18	12		12	5.95
RPS-8886	18	46		35	19.35
RPS-8888	36	2		5	3.95
RPS-8889	36	6		12	6.55
RPS-8892	36	12		25	11.35
RPS-8890	36	23		32	18.65
RPS-8891	36	46		78	50.25

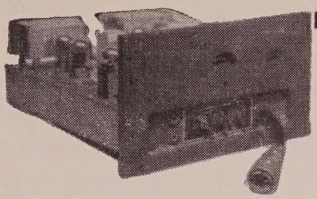
NOTE A: All transformers have 3 extra tappings—for example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts.

All prices F.O.B. Los Angeles (California purchasers add 2½% sales tax). Include 25% with order—balance on delivery. Foreign orders cash.

RADIO PRODUCTS SALES, INC.

DEPT. C-35 1501 SOUTH HILL STREET, LOS ANGELES 15, CALIF.

EXCLUSIVE PACIFIC COAST DISTRIBUTORS OF THE POWER CONVERSION UNIT



RADIO RECEIVER AND TRANSMITTER BC 620A

ONLY **$9.95**

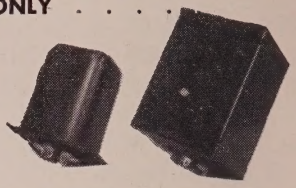
F-200

Radio set BC 620-A is a portable low power frequency modulation set, capable of dependable communication. Frequency range 21.-27.9 MC. Either of 2 Xtal controlled pre-set frequencies may be chosen by throwing the channel switch. The change from receiving to transmitting is made by pressing a button on the hand-set microphone. The fact that this equipment incorporates the latest FM. circuit makes it adaptable to uses in locations where noise levels are extremely high.

Power requirements for receiver are as follows: "A" supply—1.5V. at .7 amps. "B" supply—90V. at 25 milliamperes. Transmitter 7.5V. "A" at .3 amps and 150V. "B" at 45 milliamperes.

This equipment is used depot stock, is in good condition and comes complete with the following tubes: (1)VT 177 or 1LH4, (1)VT 178 or 1LC6, (4)VT 179 or 1LN5, (2)VT 182 or 3B7/1291, (1)VT 183 or 1R4/1294, (4)VT 185 or 3D6/1299.

MODULATION TRANSFORMER AND DRIVER TRANSFORMER, BOTH FOR ONLY . . . .



$4.95

F-302

RC 1206 Mod. Trans. 815 to 815 Class "C" load 56W audio. RC 1205 Driver trans. 6SN7 to 815 Class "B". Companion to RC 1206.

POWER TRANSFORMER

Ideal filiment trans. 110V 60 Cy. 220V at 50 ma. 6.3V at 1 amp., 6.3V at 2 amps. 5V at 6.5 amps. 6"x4½"x 5" Shipping wt. 11 lbs.

$1.29

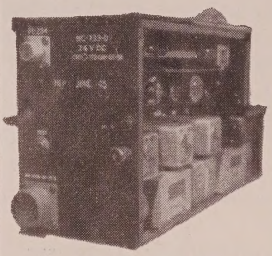
F271



BC 733 D RADIO RECEIVER

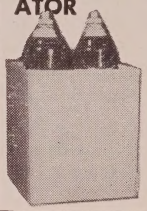
$5.95

F-225



A part of aircraft blind landing equipment manufactured by W.E. Operates on any one of its pre-determined Xtal controlled frequencies in the range of 108-120MC. Contains 10 tubes, 3 of which are W.E. 717A's, and Xtals. Ideal receiver for conversion to 144MC. ham band or mobile telephone bands. For 24 VDC operation. 14½" x 7" x 4⅝". Complete with tubes.

GENERAL ELECTRIC PYRANOL CAPACITATOR



$2.95

F229

1 MFD. 5000 VDC 4" x 4½" x 3¾".

POWER TRANSFORMER

Test 4000V. Pri. 115V. 60 cy. 1400V. ct. or 1200V. ct. at .260 amps DC.

$6.95

F310



DUAL VARIABLE CONDENSER

95c

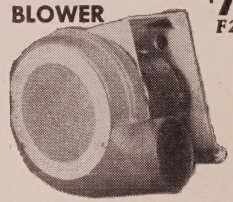
F303

120 MMFD per sec.

SQUIRREL CAGE BLOWER

$7.95

F258

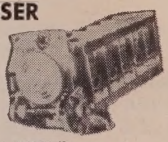


2" outlet, 110 AC. Silent ball bearing motor with mounting bracket.

5 GANG VARIABLE CONDENSER

$1.95

F-243



Approx. 50 MMFD. per section with individual air tunnel padders . . . 18 to 1 vernier drive.

PATTER AND BRUMFIELD OVERLOAD RELAYS

$1.95

F236



1, 5000 ohms, coil current 10 Ma., Relay 2, 110V. 60 cy. AC. coil S.P.D.T.

TOGGLE SWITCH

39c

F223



D.P.S.T. 30 amps., in black bakelite case.

RELAY *F305* $1.95

S.P.D.T. and S.P.S.T. 6500 ohms.



SPRAGUE CONDENSER

1 MFD 7000V **$1.95**

F219



MICA CAPACITATOR

69c

F241

.002 MDF. 3000 VDC.



Cash Required with all Orders - - - Orders Shipped F.O.B. Collect

HERSHEL RADIO COMPANY

5249 GRAND RIVER DETROIT 8, MICHIGAN

AIRCRAFT POWER RHEOSTATS

25W 25 ohms 1 amp. max. **69c** *F282*



50W 30 ohms 1.7 amps max.

95c *F283*



HIGH SPEED PHOTO FLASH TUBE

$8.95 *F222*

12,000,000 lumens light output—stops all action. Ignition coil included on back of bulb. 10,000 flashes. Diagrams furnished.

Complete line of GE photo flash tubes in stock.



T-17 CARBON MICROPHONE **89c**

Like new.

FM Radio and Transmitter BC-620-A, 20 MC - 27.9 MC

$9.95

This Xtal controlled FM set has 13 tubes and has dual Xtal controlled channels. It also contains built-in Fil. and Plate Meter. Tubes used: (4) 1LN5, (1) 1LC6, (1) 1LH4, (2) 1291, (4) 1299, (1) 1294.

Ideal for communication between Trucks. Boats. etc. Used, in good condition. Less power supply. Wt. 38 lbs. Complete with carrying case and diagrams.

Butterfly Condensers

Oscillator assembly 76 to 300 MC with acorn tube socket mounted on condenser.	$1.95
Type B, frequency range 300 to 1000 megacycles.	95c
antenna condenser 105-330 MC.	$1.95
Oscillator 105-330 MC.	$1.95

BK22K RELAY



$2.95 Used in conjunction with SCR269F. changeover contains 29V, step relay, 5 deck, 6 position switch 2V D.P.S.

SMOOTHING CHOKE



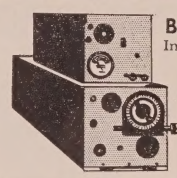
$3.95 *F304*

10 Hy. 350 mil.

95c MALLORY *F308*



(W.P.) 2000 MMFD at 15V.



BC-AR230 Transmitter

Including 4 tubes and Rf Amps. meter.

BC-AL229 Receiver

Including 6 tubes. Used in aircraft.

BOTH UNITS ONLY **$9.95**

#18 COPPER-WELD WIRE

3000 feet

$2.95 *F240*



GEN. ELECTRIC METER **$3.95** *F232*



Type DO41, 0-1 Ma. meter scale graduation 0-5 DC Kilo V. and 0-10 Ma.

AMPHENOL COAXIAL CONNECTORS

3 for **.75**

IRC TYPE HE BLEEDER

49c *F246*



100W. consisting of five sections, 750 ohms, 23 ohms, 23 ohms, 3000 ohms, 7500 ohms. Total — 11,269 ohms.

RADIO TUBE SPECIALS

815	$1.95			872A	1.95
3AP1	1.95			RK60	.95
3BP1	1.95			IT4	.44
5BP1	1.95			3Q4	.44
5FP7	1.95			3S4	.44
7BP7	1.95			1N5	.69
9LP7	3.95			1H5	.69
VR 150	.69	9004	.44	3Q5	.69
955	.65	9006	.44	VT 127A	$2.95
9001	.44	50B5	.89		
9002	.44	35WA	.69	6L6G	.95

Extra Special 304TL $1.95

BC 39-A RECEIVER AND TRANSMITTER

This equipment brand new and in original sealed carton. IF strip can be used on television. APG 5 contains; (1)829, (1)2C43, (1)2C40, (2)2X2A, (1)1N21B Xtal. (1)5Y3, (2)9-3, (1)VR105, (8)6AK5, (1)6AL5, (1) Blower, (1) Adjustable Vacuum spark gap

24.95 *M501*

Cash Required with all Orders - - - Orders Shipped F.O.B. Collect

HERSHEL RADIO CO.

5249 GRAND RIVER DETROIT 8, MICHIGAN

C.W.—PHONE

Zone 1

KL7KV	8	15

Zone 2

VO6EP	31	73

Zone 3

W6ITA	39	128
W6SN	39	121
W6PFD	39	116
W6ENV	39	104
VE7ZM	38	75
W6WKU	36	80
W6GAL	35	98
W6SRU	32	56
W6AM	30	67
W6QD	30	53
W6PQT	29	55
W6NNV	29	54
W6LER	29	48
W6ANN	27	60
W6OMC	27	56
W6ZZ	27	55
W6LRU	27	47
W6AGT	24	44
W6MUF	24	43
W6CTL	23	34
W6UCX	22	34
W6QWL	21	28
W6UZX	21	28
W6LN	19	28
W6BIL	13	20
W6UXF	12	12
W7PK	10	10

Zone 4

WØGKS	39	100
WØYXO	39	97
W5ASG	38	128
W9NDA	37	98
WØCMH	30	48
W9CIA	29	69
WØSBE	28	51
WØEYR	27	61
WØCFB	27	60
WØUOX	27	57
W5CPI	27	53
WØDU	27	53
W5EWZ	27	45
W9MZP	27	42
W8BF	25	68
W9VW	24	84
W8LFE	23	38
WØAZT	23	36
W8MQR	23	35
W8NKU	18	35
W9KMN	15	13
W9EHS	14	12
W9LM	5	8

Zone 5

W1AB	38	82
W3OCU	33	86
W3IYE	33	81
W1NMP	33	77
VE2WW	31	72
W8GLK	31	65
W8SDR	31	59
W2PQJ	30	74
W2RGV	30	73
W3DRD	30	73
W1JYH	30	61
W2TJF	29	68
W1AWX	29	63
W3EPV	28	58
W2MEL	27	63
W1ENE	25	66
W2EMW	24	54
W1BFT	24	49
W3WU	24	43
W2PUD	23	40
W4TO	22	55
W1QCJ	21	38
W2OM	21	38
W3NOH	20	40
W4LK	18	37
W1HJ	18	34
W2IOP	18	31
W4HA	17	55
W8JM	17	33
W2AW	17	33
W4JUJ	17	24
W4HKJ	10	15
W4BRB	9	10
W4CY	7	11

Zone 7

TG9JK	17	24

Zone 8

KP4KD	21	48
KV4AD	15	23

Zone 12

CE3AG	37	77

Zone 14

G3DO	31	66
ON4MS	30	54

Zone 30

VK2DI	35	62

Zone 38

ZS2X	37	95

PHONE

Zone 3

W6DI	34	104
W6PCK	28	51
W6ITA	26	60
W7HTB	23	46

Zone 4

W9NDA	34	79
W5ASG	32	81
W8NK	31	66
W9RBI	30	62
VE3BBZ	24	52
W9WCE	19	43
W5ERY	19	30

Zone 5

W1ATE	34	82
W1JCX	32	74
W1NWO	30	90
W8HUD	28	63
W2RGV	28	59
W1FJN	25	58
W2DYR	24	53
W1EQ	22	43
W4ESP	21	51
W2PQJ	21	29
W4HA	16	49
W2IUV	16	24

Zone 6

XE1AC	28	88

Zone 8

KV4AD	13	19

Zone 14

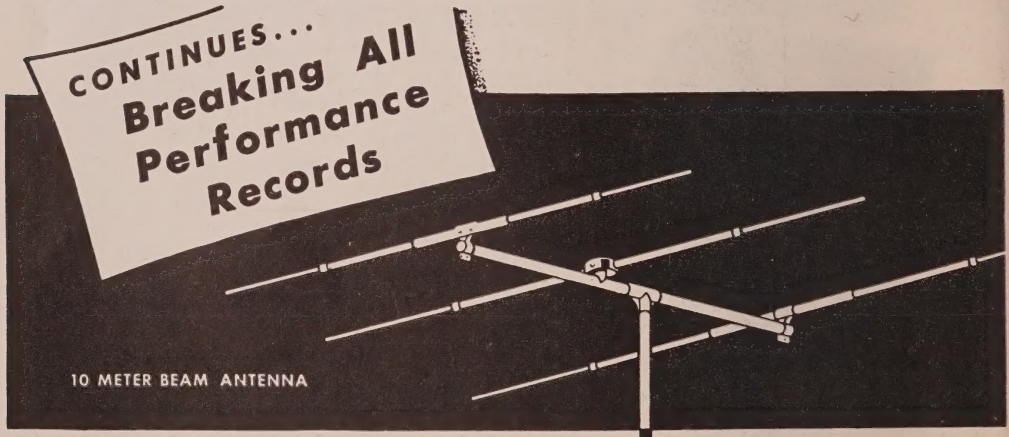
G3DO	28	55
F8DC	24	35

worked *UA1AB* which gave me a new phone zone, as well as a shot in the arm." He says he nearly lost his tonsils calling the guy one night on 20, with no success, but raised him easily on 10. . . . W9LNM, who also lives in Madison, tells me that W9RBI was pulling out too far in front of him, so he stayed home a few days to see if he could close the gap. LNM stands at 36Z and 124C, while RBI has 38Z and 147 C.

What Does "Honor Roll" Mean?

Let's get serious for a moment.

We have actually had to ban a few so-called DX men from participation in the Honor Roll. The reason for this was either a very vivid imagination or over-zealousness on their part in claiming contacts that we know did not occur. We have a pretty good system for running down this sort of thing and



. . . . Worked 25 countries in 12 days! — Mass.
. . . . Stood up beautifully during recent wind storm! — Penn.
. . . . Working occupation forces in Japan consistently! — Canal Zone.

These enthusiastic comments from owners of Workshop 10-meter beams are the result of many months of painstaking research and testing to obtain *constant* gain, impedance match, and "front-to-back" ratio over the entire band. For structural strength, clean-cut design, and maximum performance, you cannot equal the Workshop 10-meter beam antenna. Model #29, price $39.50

The WORKSHOP ASSOCIATES, INC.

Specialists in High-Frequency Antennas

52 NEEDHAM STREET, NEWTON HIGHLANDS 61, MASSACHUSETTS

Workshop Antennas and Equipment

2-Meter Beam Antenna #146AB	$21.50
6-Meter Beam Antenna #52AB	$9.00
10-Meter Dipole Antenna #29AD	$8.00
10-Meter 3-Element Beam Conversion Kit #29B	$31.50
20-Meter 3-Element Beam Antenna #14	$120.00
Antenna Mast Kit #AM	$8.25
Model #AM1	$1.30
Rotating Accessory Kit #AM2	$5.00
Workshop Rotator	$157.50

Available at better dealers

HARRISON HAS IT! HARRISON HAS IT!

THE VERY BEST TRADE-IN DEAL FOR YOU!

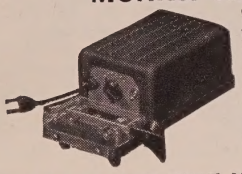
NOBODY, but **NOBODY** can give you a better one than Harrison!

WHY? — Because I guarantee to top by 5% any bona-fide offer.

I have all Receivers and Transmitters in stock — Let's do business.

73, *Bil Harrison*, W2AVA

MONitor-KEYer



The CW man's delight!

In New York — Only HARRISON has it! Come in and try it out! Complete with tubes $29.95

TIME TO FIX UP THAT ANTENNA!

WIRE — Best grade enamelled copper. Full coils.

14 ga:	100′ —	**82c**	250′ —	**$2.10**
12 ga:	100′ —	**$1.24**	250′ —	**3.25**

B&W CC-50. Weatherproof insulator and housing to suspend coaxial cable from center of wire flat-top. A necessity for a permanent splice that will keep moisture out of the cable.....$5.00

300 OHM RIBBON LEAD. Newest brown type. 100′ coil - **$2.69,** 500′ spool - **$10.95,** 1M′ - **$19.50**

ANTENNA INSULATORS. Strong, glazed white ceramic 1″ dia., 12″ long. List price **$1.25. THREE for $1.00.**

ELEMENTS: Per pair to make one half-wave —

	10 Meter	20 Meter
Hy-Lite	$ 4.40	$ 8.95
Premax "Corulite"	5.40	11.40
Gordon	10.50	16.00

HI-LITE BEAMS — Well designed, with sturdy aluminum castings, heavy steatite insulators, strong adjustable elements with secure locking clamps. Easily assembled and tuned.

BAND	THREE ELEMENT Junior	THREE ELEMENT Standard	FOUR ELEMENT Junior	FOUR ELEMENT Standard
6	$18.50	$24.00	$24.00	$29.00
10	19.95	29.50	25.95	37.00

(Standard has much more rugged construction) Folded Dipole radiator, or T match - **$4** extra each.

MIMS Amphenol Dual 10/20 beam, complete with rotator and indicator.....$358.00

GORDON all metal dual 4 element 10 and 3 element 20. **254.60** Rotator with indicator . . **300.00**

TRIG TOWERS. Sturdy, yet lightweight. Good design, all dural. Self supporting, climbable. Complete with hardwear.

10′ - **$90.00** 20′ - **$147.00** 30′ - **$216.00**

FM - AM

Tuners - Receivers - Hi Fi Amplifiers - Record Changers - Wide Range Pick-ups - Co-Axial Speakers - Adapters - ETC.

HARRISON has them ALL! Come in for comparative test!

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UNTIL 9:00

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ALUMINUM CHASSIS

New, clean—a joy to behold! Die cut and welded, heavier guage, hard stock gives strength and rigidity —yet easy to work.

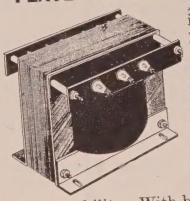
7x5x2	$ .72	12x10x3	$1.54	17x10x5	$2.92
7x7x2	.79	13x7x2	1.10	17x11x3	2.33
9x7x2	.93	14x10x3	1.61	17x12x3	2.37
9½x5½x2	.82	15x7x3	1.46	17x13x2	2.49
10x5x3	1.05	17x4x3	1.32	17x13x3	2.74
11x7x2	1.10	17x10x2	1.61	17x13x4	3.22
12x7x3	1.30	17x10x3	1.82		

Aluminum Bottom Plates

17″x10 - **90c,** x11 - **94c,** x12 - **$1.00,** x13 - **$1.07**

* The space inside these chassis is mighty handy for packing in some condensers, tubes, transformers, etc.! How about including them in your order, too? Remember, Harrison has all standard lines in stock at lowest prices. THANKS.

PLATE TRANSFORMER SENSATION



A Harrison Super-Value in a rugged Xformer to power your entire rig. 1170 volt center-tapped secondary will deliver up to 750 mils at 500 Volts DC with choke input filter or 600 mils at 600 Volts with condenser input (delivers 750 volts at 300 ma load). Use branch or duplex rectifiers and filters for added flexibility and stability. With half-wave or bridge rectifier will give 1200 volts, 300 ma. TWO, with secondary windings in series will economically make available 1200 volts at 600 ma!

Primary is 115 or 230 volt, 60 cycle, with taps to reduce output 10% and 20%. With 115 volt line on 230 tap output at 500 ma is 300 volts DC; 300 ma, 350 volts.

FB regulation —plenty of good grade iron and copper!

Compact —6¾″ x 6½″ high (overall)

Husky —22¾ lbs, unpacked.

Dependable —made to Gov't specs. by reputable manufacturer.

Sensationally priced —Item TP6.....$5.94

(add packing charge of 80c each)

Don't forget to include in your order the rest of the items you need for that new power supply—filament xformers, rectifiers, sockets, bleeders cond .switches, chassis, etc!—

Harrison has it

Safety inter-lock push switch. Double pole, each 15 amp at 125 volt. List **$2.25.** Item SW4 SPEC. **59c**

Mica Xmitting Condensers. .002, 2500 volt test. Lug type. List **$1.90.** Item CM24. **7 for 98c**

Kindly remit in full, or send deposit. Please make order above **$2.50** Thank You!

HAM HEADQUARTERS Since... 1925!

HARRISON RADIO CORPORATION

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PHONE—BArclay 7-9854 • EXPORT DEPT.—CABLE—"HARRISORAD"

[JAMAICA BRANCH—172-31 Hillside Ave.—REpublic 9-4102]

have actual proof in the cases referred to above. At times, I have felt compelled to list the calls of such stations, however, I have not done so.

The true meaning of Honor Roll is just what its name implies. There may be a few who feel that when they submit a list of zones and countries without confirmations, it is a wonderful chance to put something over on someone else; either fellow DX men, or maybe my DX committee. Then, there might be some that feel that this is just a page on which we are honoring you by listing your call. It should have another meaning to you.

When you send in your claims to us, don't forget this . . . YOU are on YOUR HONOR. We can't see much point in anyone going to extremes just to make an impressive total of zones and countries in the Honor Roll. When a DX man cheats, through one means or another, he's only kidding himself. It could be that some are exceptionally clever and get away with it for a while, but eventually, the error of their ways catches up with them.

Fellows, I am glad to say that I believe the DX gang, as a whole, have the right spirit. A lot of you fellows have written directly to me when you have found that stations previously submitted by you proved to be phonies. This, of course, helps the DX committee, as we can then make the revisions immediately. Otherwise, it takes some time before we get a chance to pull out the few phoney calls remaining on the list.

Let's not kid ourselves. Let's have fun in this DX business and not do any leg pulling. We don't like to uncover stuff such as we have mentioned above, but it should indicate to you that my DX committee is on the job, and that we do check the lists.

W6GAL has knocked off a few new ones about which you might be interested. The first soun awfully good, being *VR6AB* on 14,180 c.w. When George worked him, Andrew Young was at the key, and he indicated that 6AB would be on consistently, while he had hopes of getting back on again himself with VR6AY. Another one for George was *FO8AA* on 14,030. As usual, the QTHs will be at the end of the column.

W6GAL, who is one of the DX committee, finally got off the dime and gave us his Marathon entry at 35Z and 98C. When one of the DX committee members makes out his monthly additions to the Honor Roll or Marathon, the rest of the members really hop on him unmercifully in checking over his claims. They seem to get a big drive out of trying to convince one of their fellow members that maybe he didn't work so-and-so, after all. In spite of cooking up gags on each other, they are doing a swell job. I can assure you that without them, I wouldn't be trying to run this DX department. Once again, so you will know who comprises the DX committee, here they are:

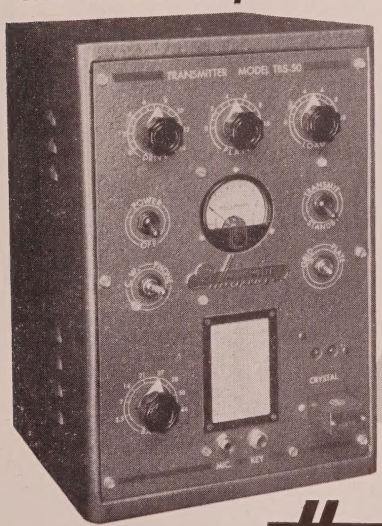
W6ENV, Andy Elsner; W6SA, Ed Hayes; W6DI, Guy Dennis; W6JBL, Dick Merrick; W6GAL, George Sinclair.

W6VFR has been concentrating on his phone score, of late. I would say pretty high class concentrating, too, because he has 37Z and 126C. While I am mike conscious, let's not overlook W1MCW. She has grabbed off two more making 35Z and 119C. Lou also tells me that MD2C is now *ST2FU*.

I want to welcome a couple of new DX stations to the Honor Roll . . . *F8DC* and *HA1KK*. F8DC is phone only and goes in with 36Z and 85C. He also shows up in the Marathon with 24Z and 35C. F8DC is located in Paris, and says within a mile or so of him are F8NT, F8KI, F8DX, and F8LX. He

"the most simple and fool-proof Xmtr I have ever handled"

Says: J. G. CLEMENS W6BOV



"it has done all that I had hoped for — and then some!"

"have not had a signal report of less than R9 plus . . . ."

"I like the ability to vary the frequency considerably without having to retune . . . ."

"during fifteen years . . . . . no transmitter has afforded me more pleasure and satisfaction than this little Harvey-Wells TBS-50."

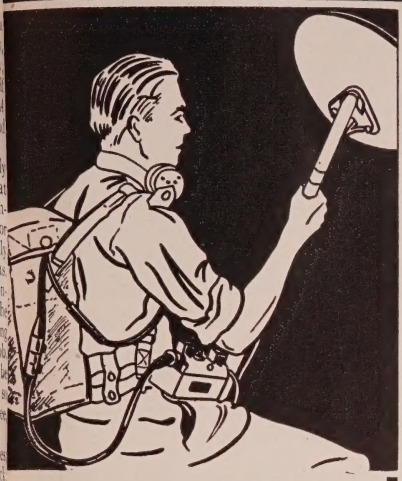
Tnx, Jim Clemens, for those kind words. What you have said, has been echoed by hundreds of satisfied hams throughout the country.

it's the Harvey-WELLS TBS-50

See it — Try it — at your local supply house, TODAY!

Manufactured by HARVEY-WELLS ELECTRONICS, INC., SOUTHBRIDGE, MASS.

HIGHEST QUALITY • LOWEST PRICES • THE LATEST BARGAINS

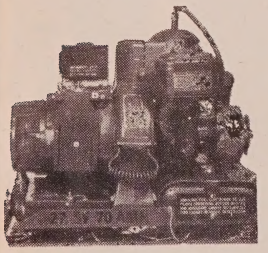


BRAND NEW SCR-625 MINE DETECTORS

Attention, Prospectors, Miners, Oil Companies, Plumbers, etc.

Used by the Army to detect buried metallic mines. Its private use suggests the location of underground or underwater pipes, cables and ore-bearing rock, the location of metallic fragments in scrap materials, logs, etc., and the screening of personnel in plants for carrying of metallic objects. New, complete in original overseas packing container. Originally sold by War Assets for $166.00. The U. S. Forestry Service has recommended procedure for using the SCR-625 Mine Detector to find concealed metal in tree logs and other timber products.

$79.50



24-28 V. at 70 amp. 2000 watts gasoline engine generator with electric starter. Power supply which can be used to operate 24-28 V. equipment, start airplane engines, charge batteries, as a welding machine, lighting system, or for amateur radio station. 21½", 17½" x 24⅝". Wgt., 115 lbs.

$72.50

Includes 20 ft. plug-in cable.

SCR-274N COMMAND SET

SCR-274N Transmitter and Receiver Assembly consists of 13 pieces which are: 4 dynamotors, 1 modulator, 1 remote control box, 2 transmitters, 3 receivers and one antenna relay unit and it has its own individual dynamotor. Each receiver employs 12 V. tubes. Each transmitter contains four 12 V. tubes and has a variable frequency and crystal calibrated master oscillator, driving two 1625 final amplifier tubes, 55-watt output, with built-in silver plated variable inductance antenna matching device. Oscillator and final stage have simultaneous tuning and the dial is directly calibrated in MC. Transmitters have slugged and capacity tuning, built-in high voltage and antenna switches. Modulator furnishes plate supply for transmitters and is equipped with a dynamotor for high voltage. Also supplied is one antenna relay with built-in antenna meter. Transmitters make ideal V F O driver unit. Easily converted to 110 V. 60 cycle operation. Wt. approximately 100 lbs.
PRICE .....

$24.75

R-5/ARN-7 RECEIVER

Three bands 200 to 1750 KC. Complete with 17 tubes required. This set is ideal for conversion to home broadcast Receiver addition to ham shack, etc. Reported sold for many times the price when brand new. A Receiver that would be hard to pick up at this price.
ONLY .....

$19.95

Control Head available **$2.50 ea.**

BRAND NEW NAVY HOSPITAL TENTS

Fire resistant, heavy canvas, 16′ wide, 50′ long, 12′ apex, 4′ side walls — complete except poles.

$150.00



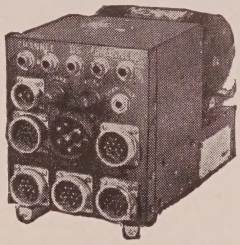
OXYGEN TANKS

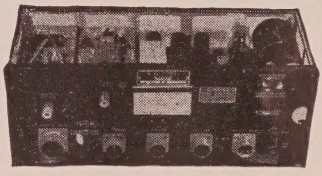
These oxygen tanks, removed from surplus aircraft, have a capacity of 500 lbs. pressure. Type D2, with complete regulator assembly. Size of tank 22″ x 5″. Wt. 7 lbs.

$5.95

Convert to high fidelity phone Amp. or speech Amp. Complete with tubes and dynamotor, for 24 V. DC operation. Used but in good condition.

$1.95





RADIO ALTIMETER APN/1

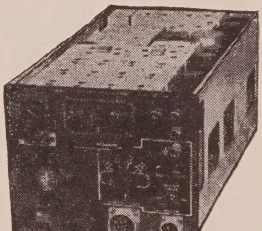
A complete 460 mc. radio receiver and transmitter which can be converted for ham or commercial use. Tubes used and included: 4-12SH7, 3-12SJ7, 2-6H6, 1-VR150, 2-955, 2-9004. Other components such as relays, 24 V dynamotor, transformers, pots, condensers, etc., make this a buy on which you can not go wrong. Complete as shown in aluminum case 18′ x 7′ x 7¼.

$8.95

Navy CRV-46151 Aircraft Radio Receiver

Including case

$19.50



Four bands, including broad cast (195-9,050 KC). Circuit is six-tube superheterodyne with mechanical band change or remote operated electrical band change. Remote band change and tuning controls included, making this set readily adaptable to mobile ham use. Powered from self-contained 24 V. DC dynamotor.

The sets are complete with tubes, mounting rack and remote controls. No cables or plugs.

TERMS: CASH WITH ORDER

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INDIANAPOLIS, IND.

ALL PRICES F. O. B. INDIANAPOLIS
ORDER T ODAY

TERMS: CASH WITH ORDER

AMERICAN SURPLUS PRODUCTS CO.
537 N. CAPITOL AVE.
INDIANAPOLIS, IND.

is using a pair of 100-THs in the final, while the antenna is a single half-wave doublet. He uses two receivers, an RCA AR-88 and a Super Pro. F8DX is greatly disappointed on his percentage of returns on QSL cards. He QSLs 100%, but in return receives only 20%. He says this becomes very expensive when you figure the postage, as well as the printed card. HA1KK, as you will see, has 32 zones and 78 countries. He, of course, has meant a new country for many of you fellows.

Sometime ago, W6ODD gave us the QTH of *ZD1WB*. With a tear in each eye, he now says his card has been returned from the postal authorities marked, "Unknown." W2EMW is having a heck of a time trying to work Zone 36. He has heard four or five stations in this zone, but for some reason or another, he can't connect. Think nothing of it Bob. If we raised everything on the first call, we would probably have over 200 countries and nothing to look forward to but to retire . . . except me, and I could catch up for lost time on W9s.

W6PFD said for a while he was mad at the DX contest, but after working *CT3AB*, he is not mad at anybody. Mark is now up to 183 countries, and he says he has just concluded Memorial services for his poor old final bottles, as they flattened out after 179 countries. We hope the next 179 will not have the same effect.

W6VFR is still doing his share of the key punching and is up to 193C. The last four are *AR8AB, UL7BS, VQ8AB* on Chagos, and *AR1RJ*. Marv says *VQ8AD* has promised some real activity on Chagos. *YR5AH* sends a bank note type of QSL. . . . W6ZZ says the past month has produced less quantity but more quality. This quality consists of *VQ3HGE, VP3TY, W6YAW/KS6*, and *VQ4EHG*.

W3EPV is sailing right along adding 12 countries for a total of 152C. Some of the best look like *MD7DA, SP5AB, EA7AV*, and *YN1SG*. . . . W3BES picked up three giving him 181C . . . zones stand at 39Z. His latest were *VU2BK*, Pakistan; *ST2FU;* and *FQ3AT/FE*. W4MZ is now over the hump with 102 countries, all worked with a simple dipole, but, as Doc says, "It was tough going." Zones 37 . . . W1ZL says they expect a Jr. Op. any day now, so he will probably take advantage of the 2:00 a.m. bottle time, and 7-mc DX.

W6SC, during one night of the DX contest, looked outside his shack to see a bunch of the Power Company linemen, with their trucks, milling around with red lights flashing, and a spot light trained on the pole transformer supplying W6SC. While W6SC was trying to get them thoroughly confused, he discovered the reason for their visit . . . wasn't much, just an unsoldered lead on the inside of the transformer case. After they stuck this back together, W6SC was again on the air for another try.

XE1AC has received 100 cards out 115 countries, which is a very good percentage.

W.A.A.P.

One or two of the boys have asked what we intend to do about W.A.A.P., as mentioned in our CQ DX Handbook. As you know, W.A.A.P. was originated in 1939, and certificates were to be issued for Working All American Possessions. This, of course, was sponsored by the magazine *Radio*. We didn't get a very good start, as the war came along and butched up the whole deal. Although we have it listed in CQ DX Handbook, we feel forced to hold any postwar W.A.A.P. activities in abayence until such a time that our American possessions are clarified. We all know there is a chance of adding a few American possessions at the conclusion of the Pacific Peace Treaty. If we had adequate assurance that



At B&W they know how to build parts the way Amateurs like them . . . and they have been doing just that for a long, long time. Back in 1933, B&W pioneered the now famous "Air-Wound" Inductor which created new standards of performance. Through the years a continuing program to refine and improve production finds the B&W Inductor preferred by experienced Amateurs who know the value of top performance and dependable service.

B&W TYPE B INDUCTORS

for powers up to 150 watts input

The B&W "B" Series Inductors are supplied in four types: Type B, without link; type BEL, end link; type BCL, center link; type BVL, variable link. The variable link is particularly useful where variable loading is desirable. A steatite base and plug-in jack mounting provide maximum efficiency and flexibility.

WRITE FOR B & W CATALOG

Inductors, Turrets, Rotary Coils, Accessories for all Amateurs

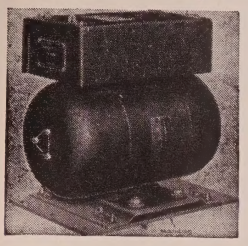
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MORE DOLLAR-STRETCHING VALUES

"Communications"

RADAR-AIRCRAFT AMATEUR-INDUSTRIAL



DYNAMOTORS

PE 73 CM (G.E.) Power supply for BC 375 Input: 28 VDC Output: 1000 VDC @ 350 Ma. New **$4.95**

BD 77KM Power supply for BC 191 with spare fuse links, etc. Input 14 v.d.c. Output 1000 v. @ 350 ma. NEW **$9.95**, Army re-issue, ex. cond. **$5.95**

PE 101-C input 13/26 VDC @ 12.6/6.3 A. Output: 400 VDC @ 135 Ma. 800 VDC @ 20 Ma. 9 VAC 1.12 A. New **$3.49**

PE 86 N. Input: 28 VDC, Output: 250 VDC @ 60 ma. .. **$1.95**

PC 77, Input 12 VDC. Output 275 VDC @ 110 Ma. 500 VDC @ 50 Ma. **$3.25**

DAG 33A Input: 18 VDC @ 3.2 A. Output: 450 VDC @ 60 Ma. **$2.45**

DM 33: Input 28 VDC @ 7 a. Output: 540 VDC @ 250 Ma. Power supply for SCR 274 modulator **$3.95**

DM 21: Input: 14 VDC Output 235 VDC @ 90 Ma. Power supply for BC 312 ..... **$2.49**

PE 55. Input: 12 vdc @ 25 amp. Output 500 vdc @ 400 ma. (slightly used) ex. cond. **$4.95**

ZA/USA 0516. Input: 12/24 vdc @ 8/4 amp. Output: 275 vdc @ 110 ma., 12 vdc @ 3 amp. Compact square, size: 7½" x 4½" x 3" **$4.25**

B-19 power pack (dynamotor). Input: 12 vdc @ 9.4 amp. Output: 275 vdc @ 110 ma. 500 vdc @ 50 ma. New, complete in metal case with 2 plugs, filters, etc. **$4.75**

DM 28-R, Input: 28 v.d.c. @ 1.25 amp. Output: 270 v.d.c. @ 70 ma. New, with enclosed terminal box **$3.25**

ZA/USA .0515, Input 12/24 vdc @ 4/2 amp. Output: 500 vdc @ 50 ma. Compact square shape, size 7½" x 4¼" x 3" **$3.95**

INVERTERS

PE 206-A. Input: 28 vdc @ 28 Amp. Output: 80 volts @ 500 volt-amp. 800 cy. Leland Electric. New, complete with instruction book,relays, filters,etc. **$12.50**

PE 218—Input: 25-28 vdc @ 92 amp. Output: 115 volts. 1500 volt-amps. 380/500 cy. Leland Electric. New **$35.00**

Cross Pointer Indicator—Two 0-200 microampere movements, 3" case, many applications. **$2.50**

MICROWAVE TUBES
(Magnetrons)

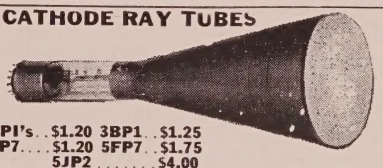
TUBE	FREQ. RANGE PK.	PWR. OUT	PRICE
2J31	2820-2860 mc.	285 Kw.	$15.00
2J21-A	9345-9405 mc.	50 Kw.	$25.00
2J22	3267-3333 mc.	265 Kw.	$15.00
2J26	2992-3019 mc.	275 Kw.	$15.00
2J27	2965-2992 mc.	275 Kw.	$15.00
2J32	2780-2820 mc.	285 Kw.	$15.00
2J38 PKG.	3249-3263 mc.	5 Kw.	$25.00
2J55 PKG.	9345-9405 mc.	50 Kw.	$25.00
3J31	24,000 mc.	35 Kw.	$17.50
W.E. 700-A	680-710 mc.	100 Kw.	$35.00
W.E. 720BY	2800 mc.	1000 Kw.	$25.00

MAGNETS for 2J21-A, 2J22, 2J36, 2J26, 2J27, 2J31, 2J32 and 3J31, each ..... **$ 8.00**

Field Strength Gauss	Distance Bet. pole faces	Pole Face Diameter	Price
4850	⅝"	¾"	$ 8.00
1500	1½"	1⅝"	$ 8.00
1000	Adjustable		
(Electromagnet)	2⅜" to 3"	2½"	$12.00
2100	1⅛"	¾"	$ 4.00

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M.O. Coils $1.00 ea.	P.A. Coils $1.00 ea.	Antenna Loading Coils $.85 ea.	Freq. Range
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#6030	#9293	#6034	4–5.3 mc.
#6032	#9295	#6035	7–9.1 mc.

CONVERSION KIT, consisting of 1-M-O coil, 1-P.A. coil, 1-ANTENNA COIL, in any one particular frequency range **$2.00**

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ARC No. 4990 variable xmtg. capacitor, 22.4—145 mmf. .05" spacing, 11 rotors. Each **$1.00**

ARC 5032 Var. Xmtg. capacitor, 29.2—117 mmf. .06" spacing, 16 rotors, worm drive: 96:1 ..... **$1.00**

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No. 5058; 6.3 VCT @ 2A, 6.3 VCT @ 2A, 6.3 VCT @ 2A **$2.25**

No. 5100, 6.3 VCT @ 1.2 A, 5000 V test **$1.35**

No. 5056: 6.3 VCT @ 9 A, 6.3 VCT @ 2.2 A, 6.3 VCT @ 2.2 A **$2.50**

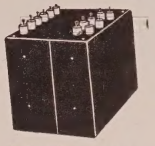
No. 5057: 6.3 VCT @ 1 A, 5 VCT @ 3 A, 5 VCT @ 3 A **$2.50**

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Freq. Range 4-5.3 Mc.
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1948 DX Marathon

CQ is sponsoring a DX Marathon for the year 1948. The purpose of the DX Marathon is to revive some of the interest that has been lost during the terrific last two years of DX. A simple set of rules governs the DX Marathon:

1. The 1948 DX Marathon began January 1, 1948, and closes December 31, 1948.

2. Competition is on a worldwide and on a zone-to-zone basis. In other words, the high station in each of the 40 zones will be given an award as winner of his zone.

3. Classifications will be the same as in the Honor Roll, i.e., "C.W.—Phone" and "Phone only", thus actually making two winners in each zone.

4. In order to receive credit, claims sent to us for zones and/or countries must be postmarked within sixty days from the date of the QSO. This will assure listing the current monthly scores in CQ and eliminate last minute entries.

5. Due to the tremendous amount of detail work, please list all DX Marathon scores on standard reporting forms available from the CQ Editorial Office, 342 Madison Ave., New York 17, N.Y. Enclose a stamped self-addressed No. 10 envelope.

6. Zone and country lists must be submitted in the same manner as though they were for the Honor Roll: the zones listed in numerical order showing the call letters, date, and time; the countries in alphabetical order by country, followed by call, date, and time.

7. The CQ DX zones of the world, and the official DX country list, will be used for the yardstick. All decisions by the DX Committee of CQ shall be final.

The cooperation of all DX men in the states to help the word overseas is requested. We think that as the years progress, it will be interesting to see who the winners are from one year to another.

our possessions would remain as is, we would like nothing better than to get the postwar W.A.A.P. awards started. In other words, we are going to have to take a rain check on it for a while.

During the last couple of months, the Honor Roll has appeared in all shapes and forms. The February issue included everyone with 30 zones or more. Then, we changed printers, and the March issue used a whole page for the Honor Roll, but, due to the type size available at the printers, we couldn't show anyone having less than 31 zones. The April issue was still worse, as due to the increase in the Honor Roll, we couldn't show anyone having less than 33 zones. This is just a case of growing pains, and if you fellows will bear with us, I think you will find this current Honor Roll back where we originally wanted it . . . including everyone. Eventually, of course, there will have to be a limiting factor. We plan to continue using the present type size until the Honor Roll fills one complete page. From then on, it will be up to you fellows to "make the page." This page will hold just so many calls then, and whatever the space limitation is will determine who is the bottom man. *(QSY to page 76)*

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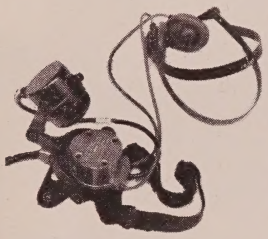
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Address.....

City & Zone.....State.....

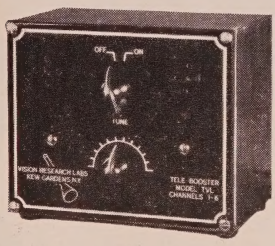
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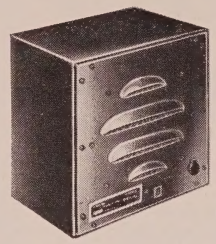
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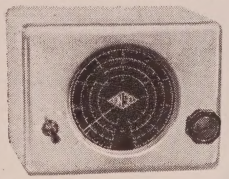


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This winds up our little clam-bake for this time. If any of you fellows happen to be around the Congress or Stevens Hotel in Chicago from May 11 to the 14th, during the annual Radio Parts Show, maybe we can get together and hold hands for a minute. We could even get around to talking about DX. Chicago generally gives me a chance to catch up on some personal QSOs with W9s, too. Well, take it easy . . . see you next month. 73.

QTHs

CT1NT, Santarem, Portugal
DA7AC, Via DARC, Box 585, Stuttgart, Germany
EK1AD, P. O. Box 2, Tangier, Int. Zone
ET3AE, P. O. Box 145, Addis Ababa, Ethiopia, East Africa
FO8AA, Radio Club, Papeete, Tahiti
KL7KV, Major William A. Pope, 11th Weather Squadron, APO 942, Seattle, Washington
OX3UF, Via Experimenterende Danske Radio Amatorer P. O. Box 79, Copenhagen, Denmark
PX4AA, Via R.E.F.
ST2FU, c/o B.O.A.C., Wadi Halfa, Anglo-Egyptian Sudan
VR6AB, Gilbert Long, Pitcairn Island, Via New Zealand
VQ4FCA, F. Crossley (ex-VQ5FCA), Aeradio Stn.-Posts & Telegraphs, Mombasa, Kenya
W3LYK/KC4, Via A.R.R.L.
YA2AB, Via A.R.R.L.
YR5AH, Via HB9CE
ZC1AF, c/o R.A.F., Amman, Transjordan
ZC6SM, Via Box 360, Cairo
ZK1AJ, Angus T. Marshall, Aitutaki, Cook Islands

THE YL'S FREQUENCY

(from page 56)

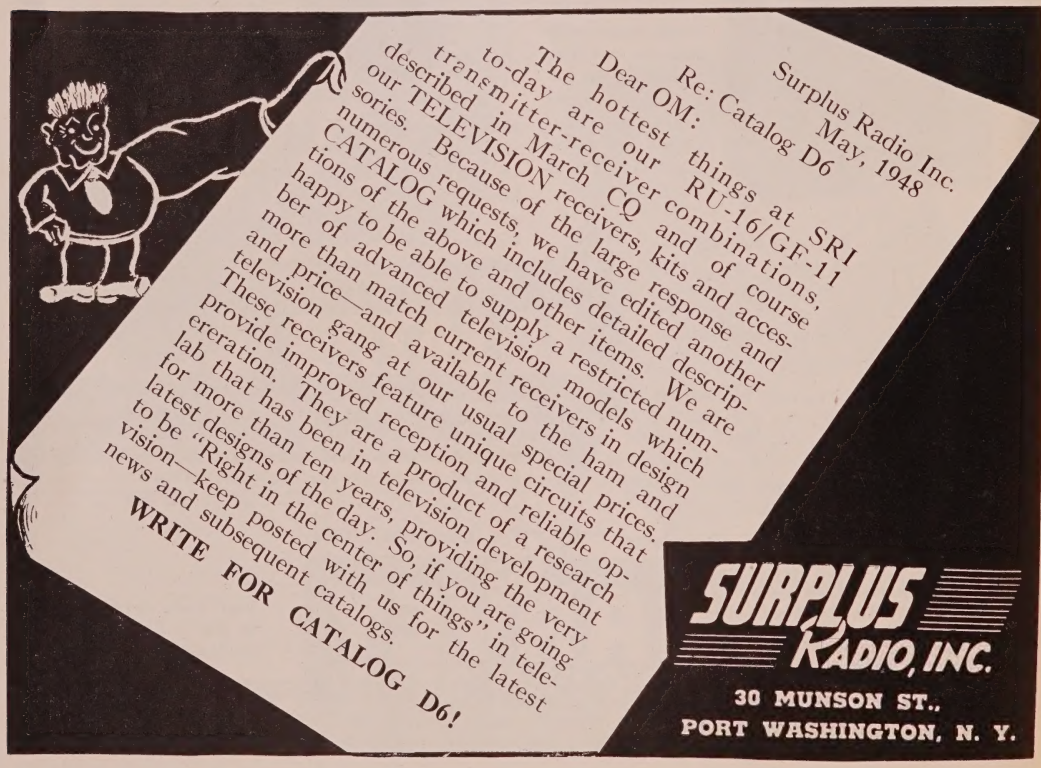
Coast, but adds: "When the English stations came on the 50-mc band last Fall during sporadic E openings, G5BY reported I was the first YL he worked over here. Contacts were made Nov. 7, 29, and 30—it was some *thrill!*"

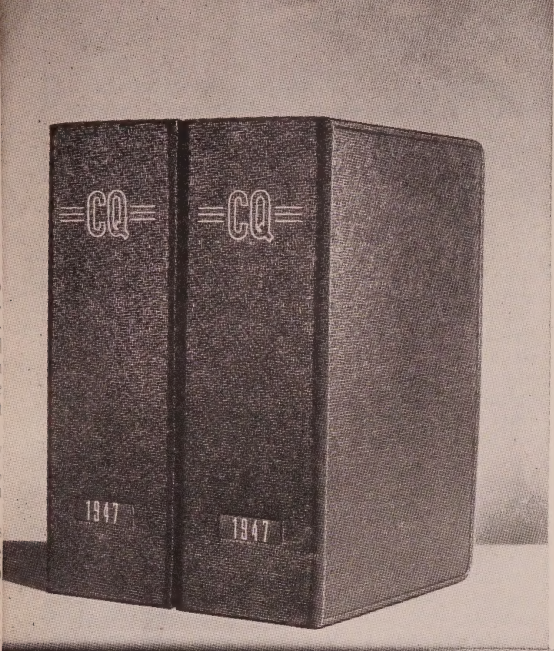
Then she asks: "How about grandmothers who operate on v.h.f.? Have two sons and two grandsons, and would like to hear how many other grandmothers there are on 6 or 2. On the latter band we'll have a 522 shortly. Have a TR4 now and with it on vacation last Summer at North Eastham, Cape Cod, worked W2RH at Port Chester, N. Y., about 200 miles.

"On 6 meters I also report for W1DJ Tuesday nights on the Horse Traders' Net when he is working, and on the Tuesday night round table which is a more or less local net."

Another YL member of the Horse Traders Net is Eunice Randall, W1MPP, at Waltham, Mass. She started out on 5 meters back in 1940 using an HT6 and a vertical dipole and worked over a 50-mile radius. After VJ Day she emerged on 2 meters with a 4-element beam, which a line squall disposed of last October. Eunice says: "I've gone 'old fashioned' on this band and now use a high horizontal wire fifteen half waves long, and hear stations formerly inaudible with the beam. Cross polarization seems to be no handicap. I am also on 6 meters with the same horizontal wire."

Interest in v.h.f. on the part of YLs in other countries is keen as well. When the band opened up last





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Fall, Nell Corry, G2YL, was one of those who was granted a 50-mc permit. Unfortunately she didn't get in on any of the W-G contacts as hams within 50 miles of London (as she is) were not allowed on the band between the hours of 1000–12000 and 1400–2230 GMT, and she was unable to be on between 1200–1400 GMT. But this hasn't dampened her enthusiasm any, for she exclaims: "It's the one band [5 meters in England] where you can have nice long rag-chews—phone, c.w., or phone/c.w. (there are plenty of the latter sort) with no QRM!"

One of the best stories of 56-mc operation we've heard comes from Jira Jandova, OK1MI, in Czechoslovakia. A year ago Jira took her 5-meter rig to the hospital with her when she was expecting her second baby. Not only did she keep daily skeds with her OM, OK1EJ, but he first heard his little daughter's voice via 56-mc phone!

144 MC

Two meters is quite a popular band with some of the YLs. One "regular" is Mary Davis, W7ENU, who is on 2 every evening with the Snake Eye Net of Portland, Ore., and vicinity. Another is Ginny Segnious, W4KKM, who is on with the 2-meter gang in Miami, Fla. Ginny is also on 6 and says: "As soon as 6 opens here in Miami I'll be putting my two cents worth in!" Miriam Brown, W7JFB, at Everett, Wash., is also on both 2 and 6. Her 2-meter beam blew down and now she is planning to remount it on top of her 6-meter beam. Operating with the 2-meter Long Island emergency net each week is Dot Miller, W2SPI.

A strong supporter of 2 meters is Barbara Lakey, W2TWJ. Barbara's introduction to radio, by the way, was by being trained as a high-speed code operator by the Army, and spending 2½ years at this work with G2 (military intelligence) during the war. Barbara used 2 for mobile work last summer with a TR4, but her biggest thrill came when she worked from her home station at Forest Hills, Long Island, to Arlington, Mass., a distance of about 230 miles. But she also thinks 2 is wonderful for local rag-chews, and emphasizes that it is easy to work locals on 2 using low power, and that we can avoid considerable BCI and TVI by sticking to this band for local work instead of operating on 10, where most stations use higher power.

For her home station Barbara uses the transmitter portion of a 522 and for a receiver has a broad-band converter in front of a Super Pro. For antennas she has used ground plane, a 5-element beam, and a J, the last at the time of her Arlington contact.

The matter of antennas is a story in itself. Barbara and her OM, W2WHT (ex-2JDS), live in an apartment house, the owner of which does not permit antenna installations. But they have found a way around this by working their rigs from "dark till dawn." When it turns dark in the evening these two hams gather up the feedline and the particular antenna they wish to use that night, ring for the elevator and, if it is empty, proceed to ride to the roof four floors above them. There they set up their antenna, drop the feed over the side, and return to their second-floor apartment. Come the dawn, or whenever they decide to QRT, the procedure is repeated. It takes real enthusiasm to go through that every night! But W2TWJ ("Toast With Jam") finds an advantage in it, too—since they have to put up an antenna anyway each time they want to go on the air, it is a relatively easy matter to operate on any band they choose simply by selecting the proper antenna each evening before proceeding to the roof!

YL of the Month

After the foregoing, it is only fitting to have a v-h-f enthusiast for our YL of the Month. One who fills the bill perfectly is Bernice May, W5JKM, of Dallas, Texas. It was all because of 5 meters (and a persuasive OM) that Bernice got into ham radio. Here's how she tells it.

"I lived with ham radio for ten years on peaceful and respectful terms, believing that a man and his hobby should not be rent asunder. Like all radio widows, I became reconciled to the idea of having the OM, W5AJG, call home after one of the severe windstorms we sometimes have in Texas, with the request, 'Will you go out and see if my antenna blew down?' Also learned to stay quietly at home while the OM and assorted hams got lost in the hinterland of Dallas County establishing 5-meter DX records.

"Time passed, as it always does, and I was looking forward to becoming a normal grandmother in my old age, with my crocheting and my gardening, when one day the OM put me to work monitoring the 5-meter band. That was 1939, in the Good Old Days, when W1s were extreme DX on 5. It all sneaked up on my blind side. In the persuasive manner he has, the OM said: 'Look, dear, since you are here all day with the baby anyway, why don't you just look in every few minutes and check the band for me?' And that I dutifully did, believing in the 'for better, for worse' idea. It was all rather a bore at first, and nothing happened for some time. Then one day I went in to check and the band was *open*. And I couldn't do anything about it! What would you have done? Right. In six months, there was my ticket, hanging proudly on the wall. The Class A came along in 1941. And when I catch the band open now—Boy, oh Boy!

"Up until a short time ago we had only 30 watts on 6 meters, but we (W5AJG-W5JKM) won the 1940 u-h-f marathon, and have to our credit Alaska, Mexico, England, Switzerland, the Netherlands, and Canada, as well as 38 states.



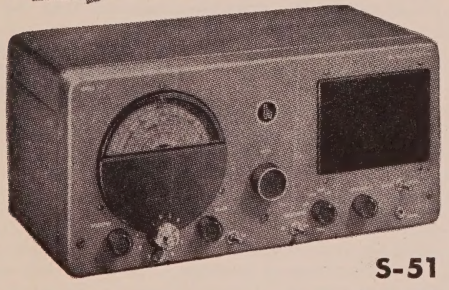
Bernice May, W5-JKM, YL of the Month.

"Present equipment is, briefly:

"*Receivers:* VHF152A into an SX43. For v.h.f. there is a converted 522 receiver for frequencies up to 150 mc. From 150 to 225 mc there is a converted BC-1068A radar set. For the 225-mc band a converter from an ARR1. For 420 mc a superhet from a Navy ASB7 lighthouse receiver. Other receivers, or rather converters, are under construction for 1200 mc as well as 2400 mc. These will work into a common 30-mc i.f. strip.

"*Transmitters:* These will be separate 300-watt

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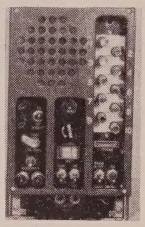
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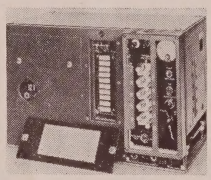
FAMOUS BC-659 PORTABLE FM TRANSCEIVER, 27 to 38.9 Mc, xtal controlled; ideal for "hams," police, seismograph crews, park service, etc. Battery operated power supply 6, 12 or 24 volt. As shown, with all tubes, speaker and meter, less handset & xtals.

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BC-683 and BC-684, used, good, both for **35.00**
Set of 80 xtals in drawer for BC-684 (when purchased with xmtr) **14.95**

20 to 30 Mc FM RECEIVER BC-603 for 10 & 11 meters; looks just like BC-683 above; superhet, BFO, squelch; 10 pushbuttons & manual tuning. Makes fine IF strip for 88 to 108 Mc wide-band FM; with 10 tubes, speaker, diagram; 12 or 24 volt **$11.95**

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20 to 30 Mc FM TRANSMITTER BC-604 for 10 & 11 meters; looks just like BC-684 above; 10 channel pushbutton xtal controlled; with all tubes, meter, diagram, case & covers, less xtals; 12 or 24 volt. Used, good **$11.95**

COMBINATION OFFER: BC-603 & BC-604, both for **22.95**
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transmitters, one for each band. At the moment, the eight exciters are complete and three of the finals (2, 6 and 10). Work is progressing on the other finals. A rotary switch selects any transmitter—no retuning—separate antennas and all. It is quite a deal requiring only 15 seconds to change bands. 3 and 4-element beams are used atop a 70-ft. tower in the back yard, and on 80 the tower itself is shunt-fed as the radiator.

"We may not have rugs in the living room, but sister, we have transmitters and stuff in the radio room—which, incidentally, is the best room in the house! South-side, acoustically treated—and so on.

"Chief among my other activities come my adored offspring Mike, age 8, and Suzie, age 2. The OM has the W5 QSL Bureau, and I claim to be assistant manager. We had a fling at raising cocker puppies one year, and I am also an ardent planter. Gardening is too refined a name for the way I do it. I just plant so many flowers that some are bound to survive, no matter what.

"All this, as you can see, leaves practically no time for sweeping and dusting. The OM, too, believes in the 'for better, for worse' idea, and hardly ever looks under the rug for dirt and never complains of pork and beans!"

— . . . —

What do you think of the meaning the Germans have evolved for "88," the new "swastika" which is being painted or chalked on walls in Berlin? According to Martin Sommers, foreign editor of *The Saturday Evening Post*, writing in the March 22nd issue, the Germans have it figured thusly: The 8th letter in the alphabet is H—therefore 88 would be H.H.—and H.H. used to stand for "Heil Hitler!"

Well, at least "33" is still untarnished. So—33 until next month.

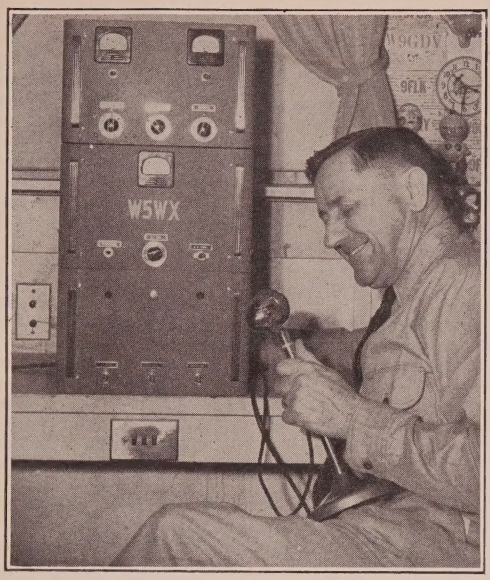
V. H. F. - U. H. F.

(from page 49)

the LUs and OAs with just a folded dipole in the room. On Feb. 28, he had a cross-band contact on 28–50 mc with OA4BG. Now with a 522, recently purchased, Larry, KZ5AY, hopes to join in on the DX. KZ5FM, also at Howard Field, has ordered a VHF-152A and plans to be on very soon. With the distance being 1650 miles from New Orleans to the KZs, this summer might see someone make the hop, for at least there is now some activity.

The question comes up as to just what type of skip is taking place on these South American openings. Ferrell, in his article in January *CQ*, gave a possible answer; now we are faced with the 7600-mile skip between LU-KH6, when the OAs were on, yet unable to hear KH6 although the OAs are some 2000 miles closer. Also when LU7WA worked into W4, his location is 1000 miles south of Buenos Aires, yet we know the Buenos Aires gang were on, but did not work the W4s. As a starter, let's look back a bit, and go into the matter a little more thoroughly.

Speaking from an ionospheric point of view everyone is severely handicapped in attempting to analyze these South American openings. Most of the prediction data comes from systematic ionosphere soundings made at 40 to 50 ionosphere sounding stations throughout the world. In South America there is only one such sounding station and this continent is a blank spot in our ionospheric knowledge. F2-layer predictions are made by interpolation methods based on equal geomagnetic latitudes. The one observatory in South America is located in Huancayo, Peru



A. J. Arnold, W5WX, Amarillo, Texas.

(about 75 miles from Lima), and for a number of years before and during the first part of the war they incorrectly interpreted observations of sporadic-E. Within the past two years it has been definitely established that considerable daytime sporadic-E does exist sometimes capable of propagating frequencies up to 40 mc. However, it has not been until these recent 6-meter band openings that higher densities than this have been thought possible. Why do we say sporadic-E? Well let's look carefully at the series of 1947 openings.

Lima — Buenos Aires...1900 miles (15 openings)
Lima — Chuquicamata...740 miles (none reported)
Lima — Santos...2140 miles (none reported)
Buenos Aires — Santos...1010 miles (29 openings)
Buenos Aires — Mendoza...625 miles (15 openings)
Buenos Aires — Chuquicamata...1070 miles (11 openings)
Santos — Chuquicamata...1890 miles (incomplete reports)

Of these 70 known openings, 67 took place between 1800 and 2400 hours local time. The distance range is far too short for normal F2-layer work (the shortest 50-mc F2-layer hop was reported to be 2025 miles), although in several cases it is considerably longer than sporadic-E single hops observed here in the States. Possible explanations are still quite numerous the most recent of which is related to a sporadic F2-layer formation. This may appear far-fetched at this time, but some new data has just been correlated with the sudden and pronounced evening rise in the F2-layer height at Huancayo.

On the other hand, from all the information so far gathered it may be possible to correlate these openings with certain aspects of the sunspot cycle. Recent evidence from the CRPL indicates that sporadic-E MUF varies directly as the number of sunspots below 11.6° solar latitude. Naturally, the whole thing is still pretty much up in the air, but propagation laboratories, with the aid of this important amateur data, hope to get a reasonable answer very soon.

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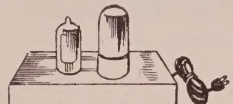
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porting any and all openings. The F2-layer reports which were sent in during the past Fall and Winter are proving to be exceptionally valuable. At this writing our propagation expert Perry Ferrell has prepared an analysis incorporating 1573 6-meter contacts during that period. This information shows the date, time, locations, approximate frequency, distance range and character figure. Copies are being distributed to the CRPL and to the National Physical Laboratory in England, while a technical paper will soon be ready to show the accuracy of the advance F2-layer DX predictions. Certainly we shall hear more about this later, but, again many thanks to all the 6-meter boys who so earnestly cooperated in this project. The next project is to cover the sporadic-E on 50 mc this summer.

Some of you have been wondering about the lack of mailed predictions of 50-mc openings. This has been due to the heavy work in getting the F2-layer analysis out and partially to the lack of 6-meter openings within the States. The sunspot cycle is well on its way down and during the past late winter it was below the corresponding values for 1945. This indicates that 6-meter F2-layer openings in the Northern Hemisphere are things of history.

Conditions themselves have been poor at writing, but the amount of sporadic-E predicted for this coming summer is very high. This corresponds to the increase in sporadic-E MUF incident with the low latitude sunspots. The sunspot cycle wanes as the sunspot groups go lower and lower in latitude. The next two years should see a considerably greater number of short-skip openings than in either 1946 or 1947.

50-mc Gang

Word of the first European opening is contained in this last-minute radiogram from G5BY. Hilton reports: "Worked ZS1T at 1305 GMT March 27 for first 2-way phone contact on 50 mc between G and ZS. His sigs R5 S7, mine R5 S8. My first 50-mc contact in 1948! Band open 1300 till 1427 GMT."

OA4AE mentions that when the band opens to LU, the signals have a very fast fade, making signals almost unreadable, yet they run S7-9 on the meter. XE1KE mentions nearly the same condition, although he terms it "aurora flutter" when the band first opens, then in about half an hour the signals settle down and commence to really roll in. Buz, OA4AE, mentions that the CRPL is now aware of a very heavy Es mass existing there, which is known as the "Huancayo scattering." A vertical 8JK seems to do as well if not better on the LUs, than a horizontal array, according to checks run by OA4AE. OA4AE, incidently, will be in the States by July 1, and will be on both 6–10 meters with the call W5AGG.

The re-opening of the LU-OA contacts caught OA4BG with his rig down, for he was trying to increase power with a new 75T final, when OA4AE called on the land line to say the band was open. Right in the middle of a nice opening to LU, OA4BG had to leave his house but fast, for an earthquake took place, but it was over in a few minutes and no damage done. (Ed note: to all you low-frequency ops, earthquakes don't usually take place whenever 6 meters opens—really!)

Via W8MVG, we hear that W8RLT heard a W2?/MM, near Italy working a station in India on 50 mc, with no dates or time given. Any info on this?

Both W9ALU and VE2KH received a heard report from ex-D3FBA in Holstein, Germany, who copied them on 50 mc last Nov. with a receiver using an O-V-1.

Bob Dryden, W4GYO, is ex-W5LQI from Tulsa, and is now in Gainesville, Fla., attending the U. of Fla. with W4EID. Before leaving Tulsa, Bob heard two DX signals from XE1KE and KL7DY. Now, being in the blessed state of Fla., for 6-meter DX that is, he has worked OA4AE, and mentions nightly contacts with W4EID, W4GJO and W4NEE.

Tim Quinn, W5JTI, the lone representative of Miss. on 6 meters, wants all the gang to know that his contacts are cut short to give the rest of us that badly needed state, and come the day that he can settle down to rag-chewing is really what Tim is looking forward to. The Miss. State Hamfest is being held in Jackson, on May 14–15, and in order to promote v-h-f activity, and also acquaint the rest of the Miss. gang about it, some good v-h-f-programs are to be presented. There is a possibility your scribe, WØZJB, may be able to make it.

XE2C, in Monterrey, had for his second 50-mc QSO LU9MA, on March 17. On March 19, XE2C was again heard by LU9MA. This is rather near the U.S. as Monterrey is not too far from Brownsville, Texas.

From W5LIU we learn that W5FRD has left Ft. Worth, and is selling Belmont mobile units in the State of Oklahoma. However, the station formerly operated by W5FRD at TCU, will now be manned by W5LIU and others.

Russ Haller, WØVIK, in Denver, will be ready with both vertical and horizontal antennas for this summer. Russ now has separate r-f sections for 10-6 meters, so he will be able to take advantage of any openings.

Wilmer Allison, W5VV, who seems to miss out on all of the South America openings, and most others, has been working the San Antonio gang on bending. Wilmer has a new NC-183, and says that it is hotter than his converter on 50 mc. A hail storm tore 12 holes in the roof, so he and the XYL, Ann, mopped for 3 hours in their bathing suits. Fortunately, or otherwise, his plane was in Oklahoma City and escaped the hailstones, which did very heavy damage in the area. (Ed note: "Beautiful, beautiful Texas!) Wilmer would like to see the next v-h-f meeting held in the Middle West so it would be easier for all to get there.

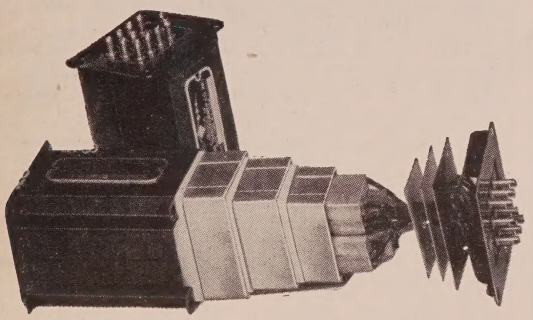
50-mc Openings

Feb. 17: OA4AE worked from 2055–2118 EST: LU6DO, LU4BO, PY2QK, with S9 signals. XE1KE made it with: LU9MA and LU6DO, between 1950–2030 CST, good signals. OA4BG added to his list PY2QK and LU8DJI.

Feb. 19: Between 1950–1953 CST, W7K?D was heard by

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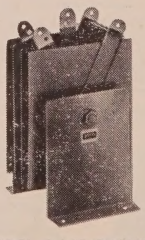
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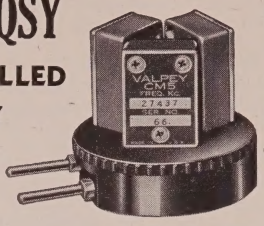
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XE1KE, an S3 calling CQ DX; at 2025 CST, LU6DO came through for a fair contact. OA4BG had QSOs with LU6DO and LU8DJI, between 1547–1600 EST. OA4AE also worked the same stations as OA4BG.

Feb. 19: OA4AE worked: LU6DO, LU4BO and LU8DJI, from 2020–2158 EST. XE1KE made it with LU9MA at 2007 CST.

Feb. 22: OA4AE worked LU6DO at 2152 EST. OA4BG had better luck with: LU6DO, XE1KE and LU6DO. XE1KE made contacts with: LU4DO, LU6DO, LU9MA, LU4CD from 1910–2033 CST, fair signals reported.

Feb. 25: XE1KE worked, between 1910–2042 CST: LU6DO, LU9MA, LU4CD and heard other signals. A check of 28 mc showed only one signal, an OA4 very weak. OA4AE heard LU6DO, then had to QRT. OA4BG heard the commercial harmonic of ZQL, at 0830 EST.

Feb. 26: XE1KE made it with: LU9MA and LU6DO, between 1930–2000 CST. XE1GE and XE1QE also worked LU9MA. OA4BG worked PY2QK, with heavy QSB at 1430 EST. OA4AE had better luck getting: LU6DO, LUDJI, LU4CD and heard PY2QK, LU9MA, XE1QE, between 1940–2300 EST.

Feb. 27: W9ALU heard WØQIN on aurora at 1930 CST. XE1KE and XE1A both worked LU9MA at 2010 CST. OA4AE heard PY2QK and LU6DO, weakly, from 1950.2105 EST. PY2QK, LU6DO and LU9AS were worked by OA4BG, from 1951–2038 EST, with fluttery signals.

Feb. 28: OA4BG heard CUW2, a commercial harmonic at 1340 EST; at 1900 CST, KZ5AY was worked cross-band. XE1QE, XE1KE and XE1A heard an LU4, very weakly, at 1915 CST.

Feb. 29: XE1QE worked LU9MA from 2050–2137 with very loud signals.

Mar. 2: XE1KE heard weak LUs, around 1845 CST. OA4BG worked: LU6DO, LU4CD, from 2005–2110 EST. OA4AE heard LU6DO calling the XEs at 2100 EST. At 2115, XE1QE broke through, but no contact was made.

Mar. 3: OA4BG, between 2005–2208, heard and worked: LU4CD, LU6DO, LU4BO, with good signals. XE1KE worked: LU6DO, LU4BO, LU9AS, LU5DJH and LU4CD, between 1902–2017 CST, with fair-good signals.

Mar. 4: XE1KE QSO'd: LU4CD, LU6DO, LU9MA, from 1845–2005 CST. OA4BG made it to: PY2QK, LU6DO, LU4CD, LU9MA, XE1A, from 2003–2133 EST.

Mar. 5: OA4AE worked, between 2120–2242 EST: LU4CD, LU9MA, XE1KE and LU6DO, with good signals. OA4BG made contacts with: LU4CD, LU9AS, LU9MA, LU5CK, XE1QE, XE1KE and LU6DO, between 2003–2133 EST. XE1KE, still at it, worked: LU6DO, LU5CK, LU9MA, OA4AE, OA4BG, from 1905–2121 CST, good signals.

Mar. 6: W4EID heard OA4BG and OA4AE, in local QSO at 1452 EST, fair condx. OA4BG heard W4EID an S8, but faded out before contact was made, at 1501. W5JTI was S9 for a nice QSO, at 1501 EST. 1951 EST, the LUs came through for contacts with: LU6DO, LU4BO, LU8BQ, CX3AA, until 2050 EST. XE1KE worked LU6DO at 1945 CST, and heard CX3AA at 1957, an S6. OA4AE worked, W5JTI, for 10 minutes at 1512 EST; then at 2027 EST, LU6DO was worked, ending up with CX3AA at 2050 EST.

Mar. 7: OA4AE worked W4EID, XE1KE and W4IUJ between 1330–1432 EST, then worked LU4BO, LU8DJI from 2130–2147 EST, good signals from either direction. XE1KE, QSOd OA4AE and OA4BG at 1250 CST, then made it with: LU9AS, LU9MA, LU4BO and LU1DO between 1935–2020 CST. OA4BG knocked off: W4EID, XE1KE, XE1QE, W4IUJ, W4FNR, between 1345–1452 EST, having repeat contacts with the W4s. Again the band opened at 2012 EST when LU1DO, CX3AA, PY2QK, LU9MA and LU6DO came through, until 2250 EST. Making a total of 6 countries worked or heard by OA4BG, in one afternoon and evening. W4FNR mentions a high noise level, when the OAs came through.

Mar. 8: OA4BG worked: LU9MA, LU6DO and CX3AA from 2030–2110 EST, good condx. XE1KE had a lone QSO with LU6DO at 1910 CST. OA4AE worked LU9MA at 2110 EST, then left a live band to hit the hay.

Mar. 9: KZ5AY, heard harmonics up to 52.35 mc, as well as OA4BG, LU6DO and LU6FE, all between 1835–2143 CST, using an inside antenna for receiving. OA4AE worked: W4GVO, W4NEE, XE1KE, W5BSY/MM (off Costa Rica), LU4CD, LU8DJI, LU4BO, LU1AM, CX3AA, PY2QK, CE1AH, LU1DO and LU4CD, all between 1330–0027 EST, the band really sounding like 28 mc with nice strong signals. W4EID worked both OA4AE and OA4BG, with good condx at 1330–1432.

OA4BG worked W4NEE at 1350 EST, S7, then went on to work south, from 2015–2326 EST, the following: LU9MA, CX3AA, LU4BO, W5BSY/MM (off Costa Rica), LU6DO, PY2QK, LU6DO, CE1AH, LU5CD, LU8DJI, all with excellent signals. XE1KE worked OA4AE, and LU9MA, between 1325–1950 CST.

Mar. 10: W4EID had a nice QSO with OA4AE from 1340–50 EST, with S7 signals. OA4BG got W4GJO, W4NEE, from 1313–1332 EST, all with little QSB and S8 signals. At 1947 the band opened south for OA4BG and the following were worked: LU6DO, W5BSY/MM (Panama Canal), LU8DJI, LU5CK, LU9EV, LU9MA, CX3AA, until 2202 EST. XE1KE worked LU9MA and LU6DO, hearing PY2QK for the first time, an S4. KZ5AY, again heard harmonics up to 51.9 mc, along with LU6DO, W5BSY/MM (in Canal Zone), LU6BA and LU1DO,

all from 1945–2045, signals averaging S8. OA4AE snagged a good one by getting PZ1A, also LU6DO, both between 1930–2042 EST.

Mar. 12: OA4AE worked, between 1925–2100: LU6DO, LU1DO, LU9EV and LU9MA, with good signals. KZ5AY heard an LU and OA4BG, around 1930 CST. KH6PP worked on 6 meters, both ways: LU9EV, LU6DO, LU4BO, LU1DO, between 1452–1627 HST.

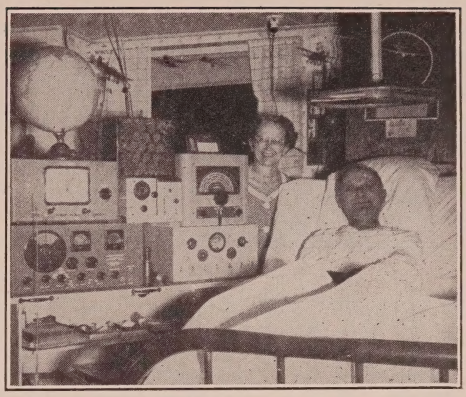
Mar. 13: KH6PP started off early to get: CX3AA, W6CDQ, W6ZBZ, W6BOS, W6UOV and W6QFT, from 1105–1206 HST; then LU5BJ, LU5CK, LU9EV, LU1AN, and LU9AS, broke in from 1211–1300 HST. KZ5AY heard OA4BG at 1517 CST, mentioning that the band always has a high noise level there. OA4AE had contacts with: LU9MA, LU6DO, LU4DJ, LU4BO and CX3AA, from 2010–2128 EST, with very good signals. W9ALU heard a WØ on aurora flutter, at 1920 CST.

Mar. 14: KH6PP again took off with the LUs, and had FB contacts with: LU6DO, LU1DO, LU3BD and LU9EV, hearing lots of Spanish being spoken, but Gene's Spanish, es muy malo. LU7WA, south of Buenos Aires by 1000 miles, broke into W4 land to get: W4GJO, W4EID, W4FLH, W4IUJ and W4FNR, between 1330–1450 EST. LU7WA left 6 meters while it was wide open to W4, to go on 20 meters, for more enjoyable contacts, he said.

Mar. 17: XE1KE worked LU6DO and LU9MA between 1940–1950 CST. LU9MA also worked W5VY and XE2C hearing W6UXN working a local W6.

Mar. 18: XE1KE had nice contacts with: LU9EV LU6DO CX3AA LU4BD LU4CD, between 1900–1025 CST.

Mar. 19: XE1KE worked LU6DO, LU4CD, LU9MA, LU9EV, from 1907–2055. LU9MA heard XE2C on c.w. very weakly.



An SWL who does an outstanding job for the 6-meter v-h-f men. Elmer Walker of Alderwood Manor, Wash., who spends many of his bed-ridden hours tuning the bands.

144-mc Openings

With the coming of the summer months, the 2-meter gang is looking forward to working some long-range DX, and with the increased activity here in the Middle West, there is a good possibility of a new DX record.

Not to be overlooked, is the haul from Florida to W1–2–3, for stations on 2 meters in Florida have really gone in for beams and higher power. W4FLH, in Miami, now has 500 watts to a pair of 4-125As, as well as W4FVW, who has 350 watts. Both of these stations now put in consistent signals to W4FNR, whereas the lower-powered Miami stations are only audible when bending is present.

A power increase has also helped WØKIW, in Topeka, Kansas, to put a good signal into the Kansas City area. WØKIW is running 90 watts to an 829B outboard, feeding a 3-element beam, and has pushed the S-meter up to S5 on several occasions here at Gashland, the distance being 75 miles. WØKRZ, in Topeka, with a far superior location than WØKIW, is just barely audible with his 18 watts to a 522, also using a 3-element beam. Again

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it appears that power definitely increases the signal and working area, after the normal ground-wave range is passed. Any more comments regarding these power increases, to better, or same advantages?

Here is some more real 2-meter DX to shoot at. KZ5DW and OA4NS are both on 144 mc, with 522s and are looking for contacts. KZ5AY reports to us that he heard a fading carrier on 146.1 mc, on March 13. In the tropics anything can happen, you know.

144 MC Honor Roll

W1IZY	12	4	VE1	W8QKI	7	4	VE3
W1IPV	11	4	VE1	W8PYY	7	4	
W3GV	8	5	VE3	W3RUE	5	3	VE3
W1JFF	11	4		WØWGZ	4	4	
W9ZHB	9	6		WØDDX	2	1	
W9LWE	8	5		WØMZH	2	1	
W9IPO	8	5		WØRNC	2	1	
W9BBU	8	5		WØZJB	2	1	
W3GKP	8	4					

Florida activity on 144 mc is confined mostly to small areas, with a gang on in Tampa and Miami, and W4NEE and W4GJO on in Orlando. W4GJO-W4NEE are unable to work the 80 miles to the Tampa gang, unless inversion is present, possibly because of the low power and small arrays in the Tampa area. W4EID in Jacksonville, 140 miles from W4GJO, is absolutely consistent, with signals the same on 2 or 6 meters. An attempted qso between W4GJO-W4EID on 2 meters has never failed, with signals averaging S5 on the meter. The Florida gang is now 100% vertical, but with the gang in Virginia going over to horizontal, they are contemplating doing the same—anyone differ? If so, they would like to know.

From Roanoke, Va., comes word of exploits on 144 mc by W4CA. Roanoke is situated in what is commonly known as the "Roanoke Valley," completely surrounded by the Blue Ridge and Allegheny Mountains, some of the peaks reaching 4000'. W4JFV and W4KQC took some gear to the site of WSLS/FM, twenty miles south, up some 4000', and really put a hefty signal into Richmond and Norfolk, some 160–200 miles respectively. W4FJV worked W4JAD, in Lynchburg, about 50 miles across the Blue Ridge, for the first out-of-town contact on 144 mc. Now with improved equipment W4KQC, W4ISA, W4CYK, W4JXE, W4KAK, W4BTL, W4KPZ all have heard W4JAD, showing that there is activity in the Roanoke area. Most of the gang are using 522s, feeding 5-element beams, although W4CYK has a square corner reflector, with a 3-element beam as the driven element. Anyone wishing schedules with the Roanoke gang is urged to write W4CA.

W7BQX says that local activity has moved to 2 meters, with most of the gang playing around with 16-element beams, using 522s, the best DX being 85–100 miles.

WØWHZ, in Red Oak, Ia., has 350 watts to a pair of 75Ts, but as his antenna is vertical, skeds with the Kansas City gang have not worked out. Roger, WØWHZ, is putting up a new 32-element horizontal and is out to extend the DX record, whenever the chance permits.

W6WNN, says the 2-meter gang is very hot around the San Diego area, with many arguments as

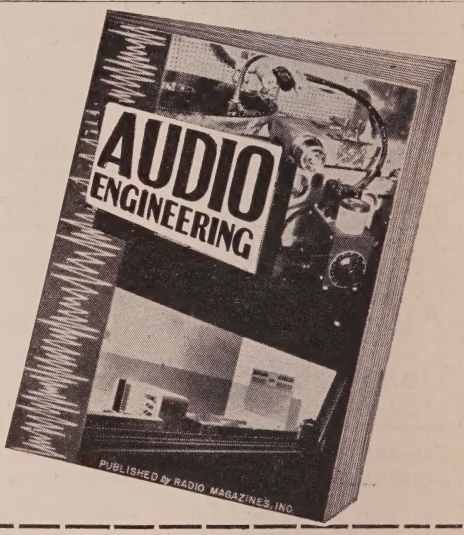
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to which the polarization should be, vertical or horizontal. Perhaps the motto on 2 meters should be, "polarize to harmonize," then contacts could be made, depending on the majority, naturally.

SK

Please have reports in our hands by the 16th of each month, as anything after that will have to be held over for the next month. Thanks for all the cooperation, and be seeing you on 2–6 meters.

PARTS AND PRODUCTS

(*from page 58*)

Features of all three types include: Single hole mounting, flats on mounting bushings to prevent turning; beryllium copper contact spring; split sleeve rotor bearings—no wobble to shaft; steatite end frames; long creepage paths provided; improved stator terminals provide dual low inductance path to both stator supports, eliminates possibility of loosening plates when soldering, avoids bending stresses on stator supports caused by wiring: voltage breakdown 750 v. r.m.s. at 2.0 mc—.017 spacing.

Catalogs

A new catalog illustrating and describing over 1,100 different products has just been issued by Bud Radio, Inc., of Cleveland. The catalog not only shows such standard items as sheet metal products, condensers, coils, insulators, etc., but many new Bud products such as the Gimix GX-79, the FCC-90 and the VFO-21. This new Bud catalog is free upon request to Bud Radio, Inc. 2120 East 55th St., Cleveland 3, Ohio.

Allied Radio Corporation of Chicago announces the publication of its new 1948 172-page catalog. More than 10,000 items are listed in this new Buying Guide.

The large amateur section features the latest communications receivers and transmitters. Comprehensive listings cover complete lines of Hallicrafters, Hammarlund, National and RME receivers—as well as parts, tools, meters and transmitting components by leading manufacturers. A large selection of microphones, keys, speakers, crystals, coils, transmitting condensers, power equipment, antenna accessories and code practice equipment provides a quick and easy choice of units to meet the needs of the amateur, serviceman, shop or laboratory and experimenter. The beginner in amateur radio will find complete listings of new kits, diagrams, accessories and books designed especially for the newcomer to the field.

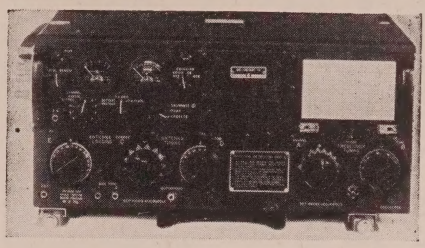
The book section will be of particular interest to amateurs, for it includes complete listings of standard textbooks and reference manuals covering the entire radio and electronics field.

A copy of this catalog will be sent without charge upon request to Allied Radio Corporation, 833 West Jackson Blvd., Chicago 7, Ill.

ZERO BIAS

(*from page 13*)

are rather obvious—and most encouraging. It shows that with some person, or some group, willing to do the legwork, amateurs (or any other group of citizens) can obtain both a hearing and action before any competent group of lawmakers. It shows that a public official, regardless of his position, cannot pre-



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vent the passage of a good bill if it is properly handled And it certainly shows the need for close liaison between all organized radio clubs. Had the rumor, which was incorrect, become out of hand and the legislators been deluged with correspondence 180 degrees out of phase with the facts, the entire bill would have been jeopardized.

A word of thanks is certainly due all the individuals who assisted in having this New York State act passed. It should be an inspiration to amateurs in other states and communities who are encumbered by archaic laws written by people technically incompetent in the field of amateur radio.

—*W2IOP*

SPEECH CLIPPING

(*from page 21*)

of input voltage, assuming that the clipping level has been optimized at about 400 cycles, and the clipped waves no longer will have level tops. Instead the tops will be canted.

So long as this does not occur above about 200 cycles, and so long as bass suppression is incorporated in the speech amplifier, there is nothing to worry about. If it does occur above 200 cycles, then the Class B modulation transformer does not have sufficient inductance, or the output filter capacitor on the Class C amplifier power supply is not sufficiently large, or the output filter capacitor on the modulator power supply is not sufficiently large, or else a combination of these things is causing trouble. The condition should be corrected, whatever the cause.

Lacking a 'scope an acceptable interim job of adjustment can be done with only the station receiver. Tune it about 15 or 20 kc to one side of the operating frequency and then raise the plate-to-plate load on the modulator a step at a time, checking each time for splatter by running the gain wide open and talking loudly right into the mike. A point will be reached where a tremendous difference in splatter will be noted between two adjustments which differ only slightly in impedance ratio. This means that you are approaching or have arrived at the correct adjustment. The idea is to increase the plate-to-plate load on the modulators until there is no further reduction in splatter, or, to put it another way, to use as low a plate-to-plate load as possible without causing appreciable splatter under heavy modulation.

A phone monitor is useful when it comes to checking on the quality of the clipped signal, and to determine just how much clipping you wish to use. A volume indicator in the speech amplifier is a big help in providing a constant indication of the amount of clipping taking place, once the meter is correlated. The Class B meter is not too useful in this respect, because once a moderate amount of clipping takes place, an increase in gain (and clipping) will result in but little increase in the maximum Class B plate current under voice modulation. However, one method of using the Class B plate meter to set the gain to the maximum practical clipping level is to

increase the gain control setting until the weak consonant sounds such as "ssssss" produce almost as much swing of the Class B plate meter as do the loud vowel sounds. Under these conditions the quality will not be any too "natural," but you really will get through QRM and QRN. When you don't need the extra punch, just back off the gain.

The Modulator Must be Husky

It has been assumed that the Class B modulator is capable of delivering, at the modulator plate voltage employed, sufficient sine wave audio power to modulate the Class C input 100 per cent (allowing for modulation transformer losses) without exceeding the CCS ratings of the modulator tubes. If this is the case, the modulator tubes will not be suffering abuse under conditions of maximum clipping, even though the average d-c plate current will somewhat exceed the value obtained with sine wave input and the same peak percentage of modulation.

It has been more or less common practice in the past to use rather skimpy Class B modulator tubes for voice work on the basis of the high peak-to-average ratio exhibited by unclipped voice waveforms. However, when heavy clipping is taking place, the output wave is practically a square wave, and the ratio of peak-to-average is only slightly greater than 1.0. This is true regardless of whether the clipping is accomplished in a low-level clipper in the speech amplifier, or is accomplished in the modulator stage itself.

It is apparent, therefore, that when speech clipping is incorporated in a voice transmitter using Class B plate modulation it is not practical to skimp on the modulator tubes. After all, it is possible to realize an effective power gain of at least 10 db when using speech clipping, and one shouldn't expect to get something for nothing.

LETTERS

(*from page 8*)

Some of the things I want to get rid of are my prewar homemade transmitter (100 watts input) c.w. only, box of plug-in coils that go with it, a Grebe CR-18 receiver with 2-stage amplifier and plug-in coils, a Murdock oscillation transformer which is a left-over from ye good old spark days, a Navy IP-501A long-wave receiver with a 20,000-meter loading unit in perfect condition except for one burned out audio transformer, and another Navy receiver which has a stage of r.f. ahead of the detector with frequency range approximately 300 to 900 kc. (No power supplies with the above as these are all battery tube receivers.) I also have an old Triplett tube checker in A-1 condition, which checks all tubes up to and including the octal type, and this has a complete set of tube charts. I also have a few other incidental items.

I hate to turn this equipment over to a junk man as I would much rather donate it to someone who could actually make use of it. I would like to have someone call for and pick it up as I have no means of shipping it out of town. However, any interested party or parties should *write first* and make an appointment.

Norwood V. Bradshaw, W2ELN

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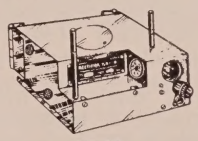
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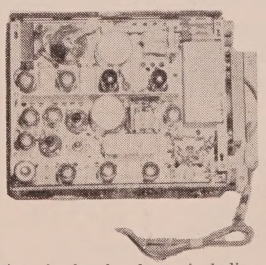
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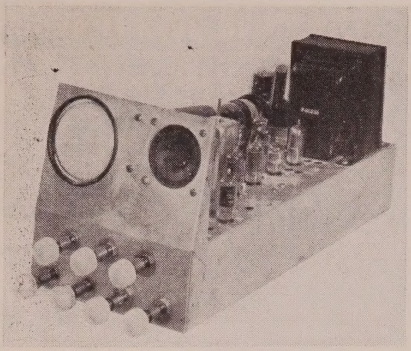
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WORKED ALL CONTINENTS

(from page 28)

sag, your mouth turns down at the corners, you pinch babies when their mothers are not looking, and you snarl at your wife. Your insides are probably all a dark chocolate color from the continued sloshing with black coffee as you sit with aching back, night after night, month after month, bulging eyes glued to the receiver dials. When you look away from the receiver the dials continue to float in mid-air two feet in front of your face. Your head has a permanent trough crosswise, the imprint of the headphones. You are a general wreck, but only the more determined.



You decide that the old homestead has too high a noise level and you begin to suspect that some sort of magnetic deposit on your property repels all your calls to Africa in such a way that they only cause QRM in Australia or Upper Mongolia. So . . . with your wife's sobs a faint sound in the background, you sell the old place and move down into the swamp where you have room for rhombics and a vast expanse of soggy earth underfoot. The house is a firetrap and the road into town is a quagmire but you are happy as you set up your junk and begin looking for Africans on twenty. It turns out that the place has ten times the noise level you had at the old QTH and, the jinx having moved with you, you work no Africans.

So you quit the job you've had for fourteen years and take another job up the coast so you can live in Dopeville where DX conditions are absolutely superb and you figure you can't miss. Of course the job pays only half what you were getting at the old place and you have to start out on the graveyard shift until some guy on the swing shift dies . . . but what of it? Your wife has left you by now anyway.

And so the years pass. You become pale and pallid, with bags under your eyes. Your eyelids droop, your hair is turning a dirty white, your fingers are brown from hanging onto thousands of hot cigarette butts. You mutter to yourself and your head is

full of ringing sounds. You've built up and tried every antenna and every gadget and every location within your reach. You are now employed as part-time janitor in a livery stable.

Then comes the day when you give up. Tired and beyond even the desire to work Africa any more, you give up. You sell all your gear for nickels and dimes. You take down the antennas. You shove all the old QSL cards into a bottom dresser drawer along with the empty bottles. You're through.

But not quite. One day you decide that an occasional rag chew on 40 with one of the local boys might help pass the time. So you rig up a 6L6G in a Tritet, borrow an 80-meter crystal and get on 40 meters, using the bed springs for an antenna. On your first CQ, a gent calls you on the spot where your old beat-up receiver happens to be tuned . . . and he signs ZS6ZZ. You drop dead.

CLICKLESS KEYING

(*from page 41*)

failure. I was quite satisfied with this arrangement (*Fig. 8*), until I read the article by Richard M. Smith, W1FTX, in the February, 1947, issue of *QST*.

Smith, instead of filtering the bias produced by the 813 r-f driving current, used the potential directly to operate a control tube shunting the 813 screen grid. This method permits a keyed r-f signal to operate the final stage. I promptly took out my r-f filter and the VR tube and operated the final stage as prescribed by W1FTX. Using cathode bias resistors in two multiplier stages and keying the first doubler permitted multiple-stage keying without the use of any fixed bias supplies.

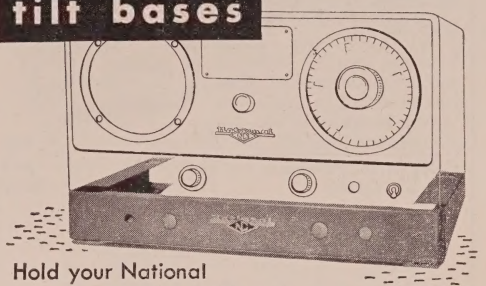
I put the VR tube back in the circuit, however, because of superior key-click control and because of the ability of the VR system to reduce the 813 plate and screen current to zero during "key-up" periods. Zero plate current is a nice status during spaces in c-w work, especially if the final stage is being pushed to maximum ratings. More important, however, is the condition of signal leaking through from an unkeyed oscillator stage. If the final stage is not killed completely in the "key-up" position, some of the signal may get through to mar an otherwise perfect c-w transmission. The feature of Smith's circuit of utilizing the r-f switched control-tube bias was retained in my 813 transmitter. The results have been very satisfactory.

Practical Circuit for the 813 Transmitter

Figure 9 shows the 20-meter transmitter line-up with v-f-o control. Most of the time, I use 250 watts input to the final, so the values given are the ones generally used at W2RYI.

The first doubler is the stage that is keyed. Screen keying is used there because it presents the least change of load to the v.f.o. Cathode keying would be more convenient inasmuch as low-potential leads could be brought out for direct switching, but each time the cathode circuit is opened, the load on the v.f.o. drops out completely. If there are a number of isolation stages in the v.f.o. separating the oscil-

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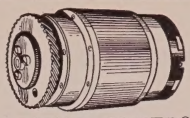
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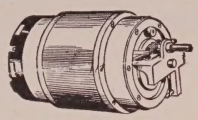
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lator from a cathode-keyed stage, a changing load at that point will not cause chirping. Most v.f.o.s have only one or two isolation stages, which is insufficient in many cases to give a crystal-like note. When screen keying is used at the first doubler, however, a single isolation stage between the oscillator and the keyed tube is adequate for chirpless c-w operation. T9Xs predominate my report column in the log in spite of the fact that I usually ask for a critical analysis of the signal.

Eighty-meter crystals are occasionally used for frequency control at W2RYI. These crystals are switched in at the control grid of the first doubler, and the same multiple-tap switch disconnects the v.f.o. With a crystal between the No. 1 grid and ground, the stage operates as a standard pentode oscillator.

At one point in the study of key-click elimination, I also had a VR keying circuit in the first doubler screen line. Although it worked very nicely, a relay at the same point behaved quite well, so mechanical keying was retained in favor of simplicity.

The 813 transmitter was amply tested for keying-transient behavior during April, 1947, when tests for television interference were run. After the harmonic radiation that interfered with television reception was suppressed and the picture was no longer spoiled by phone transmissions, c-w operation was checked. There were no indications whatsoever of keying transients in the picture or sound channels. By the way, all of the appendages to the r-f circuits in the 813 transmitter diagram are harmonic-suppression devices and have nothing to do with the keying circuits discussed in this article. They are included in the drawing in order to present the actual transmitter, but they also may serve as a reminder to those who have television interference problems to clean up the harmonic radiation first before tackling the keying transients.

The primary concern in the study of key clicks is the elimination of interference to all radio services, so no matter what methods of keying you use, a periodic search up and down the spectrum for possible spurious radiation is good operating practice. It is well worth the trouble, because it gives you the assurance that your transmitter is under control. A pleasant feeling of accomplishment comes, though, when the ham in the next block casually mentions the fact that he can copy DX perfectly within a few kilocycles of your own frequency.

TRANSMITTER FOR NEW AMATEUR

(*from page 27*)

'Loop-and-Lamp" Tester

A "loop-and-lamp" shown in *Fig. 2D* may be made from a six-inch length of wire, covered with spaghetti, formed into a 2-inch circle, connected to the terminals of a pilot lamp socket. A 2 or 6-volt pilot bulb is placed in the socket. Such a test device is almost indispensible when testing a transmitter, since the bulb will light when placed closed to an r-f tank circuit.

MOBILE ANTENNA

(*from page 45*)

of the line does not appear to be critical. With the clips opposite each other as shown in the illustration, slide them up and down until the transmitter loads sufficiently or if on *receive*, until the incoming signal is the loudest. The usual 2-meter lengths for the elements is about 19 inches for the matching stub and 57 to 58 inches for the long whip. When using a super-regen as a receiver it may be best to work with the elements a little longer than usual as this will displace the *dead-spots* to the low frequency side of the band.

Once the antenna has been installed and tuned up there is little left to say about its operation. Anything below the shorting bar and into the regular BC has no effect on the mobile performance of the ham rig. When the XYL wants to use the BC set, just simply switch off the mobile rig and listen to your favorite BC program. No wires to switch and no relays to be thrown.

SCRATCHI

(*from page 10*)

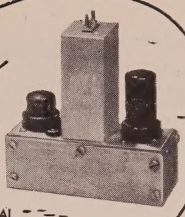
Next programs are fellow reviewing a book, so I are deciding to try out rig on see-w as are getting too late for phone contacts on ten meters. Heering a VK7 calling seek-you, I are plugging key in and going back to him. As I are starting to call him I are heering voices from downstairs, but I go ahead and call the VK7. He are going back to a W9 so I are getting disgustipated and going down to television set again. Everyone are very disturbed as when fellow giving book review his head are turning upside down then right side up, all at reel fast rate. When landlady are telling me that it stopped just before I came downstairs, Scratchi are beginning to see lite—television antenna not hurting ten meter antenna, but dipole antenna for rig are reely messing up television program!!

I are doing some reel quick thinking, and so I are telling landlady that probably sum little thing wrong with television set, and as I are somewhat of a expert on radios, I will fixing the set for her. I are getting my tool kit and spending next fifteen minutes behind television set, unplugging tubes and putting them back in, unsoldering connections and soldering them back again, and in general making it look like Scratchi are high-powered whiz-bang radio expert. After plugging in television set it are natchurally working, so landlady and everybody reel happy now, as they are knowing that pictures will not be turning upside down, seeing as how Scratchi are doing good fix-up job.

Scratchi are now having 1/c problem on his hands. Only way television set stay fixed is for Scratchi to stay off the air. So, I are going to put on thinking cap and solving this problem. Of course, I are lucky in that my ten meter sigs only cause television picture to turn upside down. If you are having any suggestions, please letting me know.

Respectively yours,
Hashafisti Scratchi

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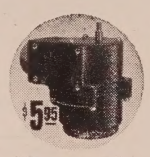
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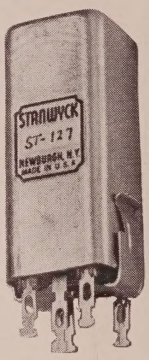
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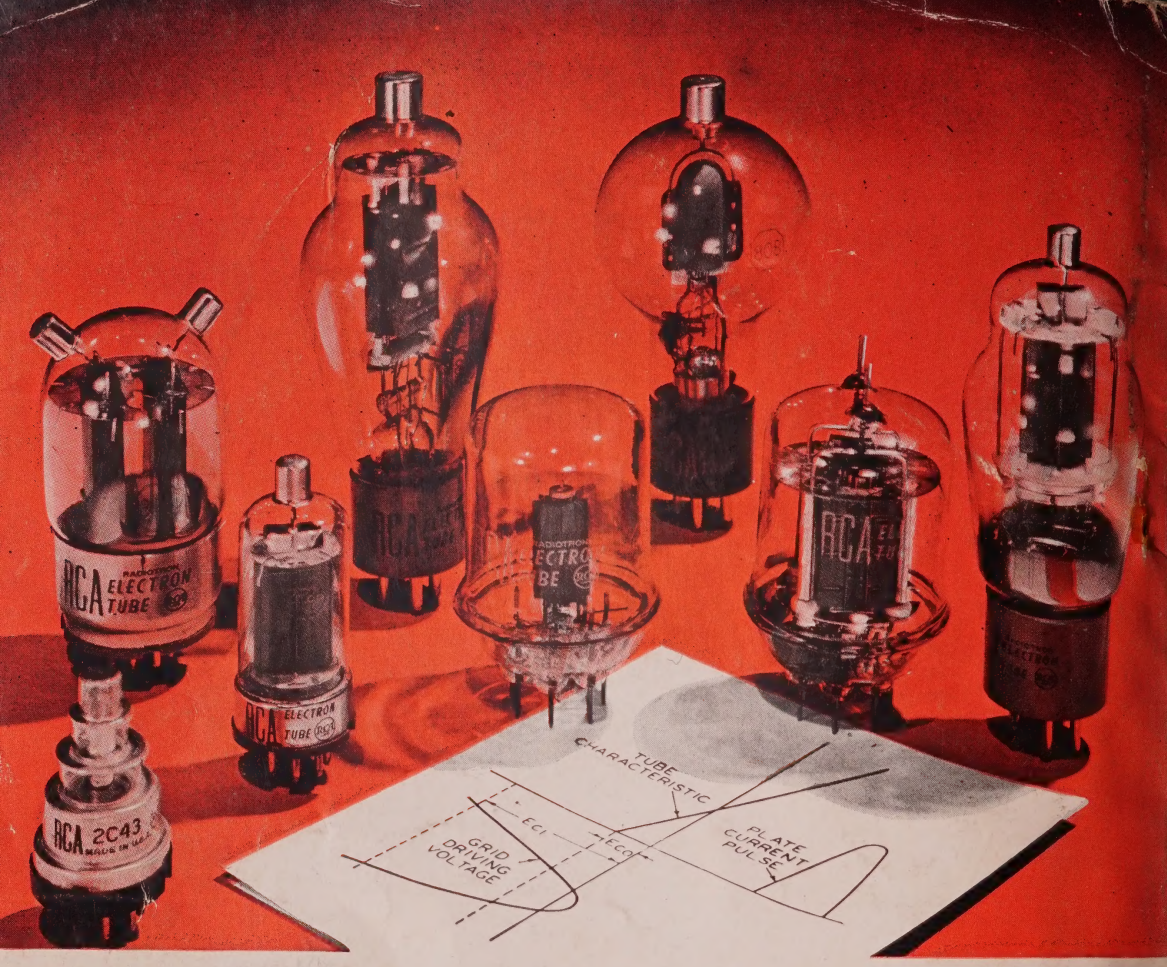


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