March 1958 50c

CQ

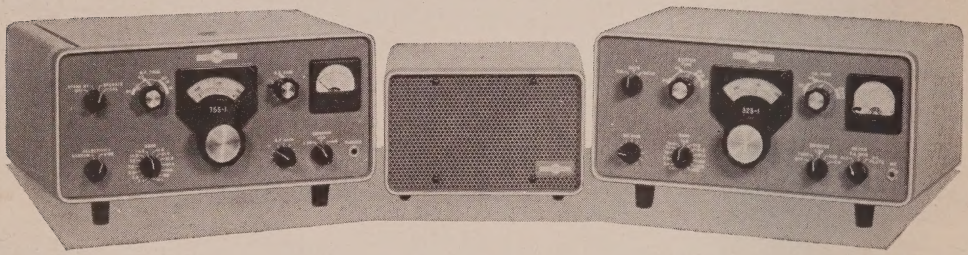
sideband



The Radio Amateur's Journal

First amateur station coordinated to operate as a transmitter-receiver or as a transceiver

Collins NEW complete SSB station



32S-1 TRANSMITTER	75S-1 RECEIVER
175 WATTS PEP INPUT	2.1 (furnished) AND .5 KC MECHANICAL FILTERS
80 THROUGH 10 METERS	BROAD POSITION FOR AM
10 DB RF FEEDBACK	CRYSTAL CALIBRATOR
AUTOMATIC LOAD CONTROL	UPPER & LOWER SSB, AM, CW
UPPER & LOWER SSB, CW	SENSITIVITY—1 uV FOR 10 DB S/N

Both units have the famous, stable Collins permeability-tuned VFO — Either operates separately, or, with the flip of a switch the station operates as a transceiver with the receiver VFO controlling —Each unit only 6⅞″ high, 14½″ wide, 11⅝″ deep.

Available in September . . . For further information, see your Collins distributor — he is taking orders now . . . Transmitter only $555 (tentative) less power supply . . . Power supply $135 . . . Receiver only $495 (tentative) . . . *Coming soon* — maximum legal power linear amplifier for the 32S-1 . . . also 2 and 6 meter Mixer-Amplifier for 32S-1 and Converter for 75S-1.

The 32S-1 and 75S-1 will be on display at the New York IRE Convention in New York, March 24-27.

Collins CREATIVE LEADER IN COMMUNICATION COLLINS

Make your reservation now for the ANNUAL SINGLE SIDEBAND DINNER. March 25, 1958. Contact The SSB Amateur Radio Association, 261 Madison Avenue, New York 16, New York.

For further information, check number 1 on page 126.

There's a PR for every Service!

AMATEUR



40, 80 and 160 Meters, PR Type Z-2

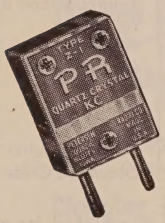
Rugged. Low drift, fundamental oscillators. High activity and power output. Stands up under maximum crystal currents. Stable, long-lasting, permanently sealed.....**$2.95 Net**



20 Meters, PR Type Z-3

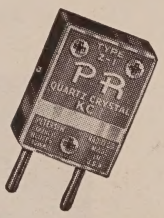
Harmonic oscillator. Low drift. High activity. Can be keyed in most circuits. Stable as fundamental oscillators. Fine for doubling to 10 and 11 meters or "straight through" 20 meter operation.....**$3.95 Net**

COMMERCIAL



COMMERCIAL, PR Type Z-1

Designed for rigors of all types of commercial service. Calibrated .005 per cent of specified frequency. Weight less than ¾ ounce. Sealed against moisture and contamination. Meets FCC requirements for all types of service.



SPECIAL TYPES

Type Z-1, AIRCRAFT

3023.5 Kc., .005%.....**$3.45 Net**

Type Z-1, MARS and CAP

Official assigned transmitter frequencies in the range.

Calibrated to .005%. 1500 to 10000 Kc. **$3.45 Net**

Type Z-6A FREQUENCY STANDARD



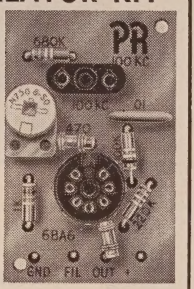
To determine band-edge. To keep the VFO and receiver properly calibrated.

100 Kc. . . . . **$6.95 Net**

PR PRINTED OSCILLATOR KIT

Has many uses—

- As 100 Kc. Marker
- As 1000 Kc. Marker for Check Points up to 54 Mc.
- As Foundation Circuit for Low Frequency SSB Crystals



Assembled in minutes. Kit contains everything but 6BA6 oscillator tube and crystal.

Each . . . . . **$4.50 Net**



Type 2XP

Suitable for converters, experimental, etc. Same holder dimensions as Type Z-2.

1600 to 12000 Kc. (Fund.) ±5 Kc. . . . **$3.45 Net**

12001 to 25000 Kc. (3d Mode) ±10 Kc. . . . **$4.45 Net**



VHF Type Z-9R

For Lear, Narco and similar equipment operating in the 121 Mc. region, requiring crystals in 30 Mc. range.

Each . . . . . **$4.95 Net**

Type Z-9A RADIO CONTROLLED OBJECTS

27.255 Mc., .04% . . . **$3.95 Net**



Type Z-1 TV Marker Crystals

Channels 2 through 13 . . . . . **$6.45 Net**

3100 Kc. . **$2.95 Net**

4100 Kc. . **$2.95 Net**

4.5 Mc. Intercarrier, .01% . . . **2.95 Net**

5.0 Mc. Sig. Generator, .01% **2.95 Net**

10.7 Mc. FM, IF, .01% . . . **2.95 Net**

ALL PR CRYSTALS ARE UNCONDITIONALLY GUARANTEED. ORDER FROM YOUR JOBBER.

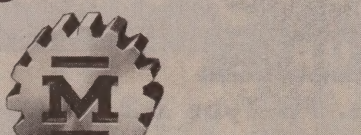
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2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

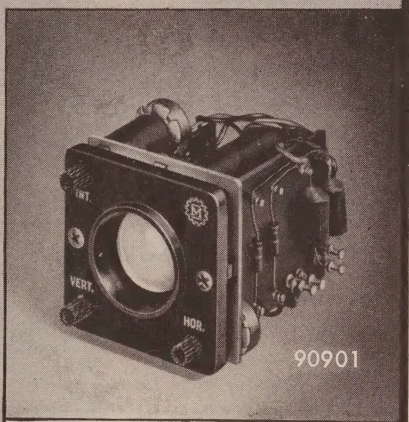
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For further information, check number 4 on page 126.

Designed for



Application



The No. 90901
One Inch
Instrumentation Oscilloscope

Miniaturized, packaged panel mounting cathode ray oscilloscope designed for use in instrumentation in place of the conventional "pointer type" moving coil meters uses the 1" 1CP1 tube. Panel bezel matches in size and type the standard 2" square meters. Magnitude, phase displacement, wave shape, etc. are constantly visible on scope screen.

JAMES MILLEN MFG. CO., INC.

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CQ, the Radio Amateurs' Journal is published for active hams by active hams. Not affiliated with any clubs or other political groups, CQ endeavors to be a true and honest reporter for those interested in the hobby. Suggestions for improvement are welcomed.

Authors would do well to send for the CQ Style sheet which will explain our confused system of abbreviations and symbols. The article "Author Author" (October 1952 CQ) tells all about how to write articles for CQ, how much we pay, etc. Reprints of this article are available from CQ if you have been improvident in keeping up your radio library.

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The WPX Award is granted for two-way contact with certain number of amateurs in different prefixes of the world. Full details are contained in the WPX Record Book which is available for 15c from CQ. Application forms are free.

The WAZ Award is granted for contacting all of the amateur zones of the world. Current standings of amateurs working for this award will be found in the DX column. A DX Zone map of the world is available free from CQ. Send stamped envelope.

Technical Information:

Please check the 11-year cumulative index which was published in the January 1956 CQ for information about articles in past issues of CQ. The December 1956 and 1957 CQ yearly indexes will bring you up to date. Most back issues are available at 50c from us. Check our "Back Issue" ad for details on those not available. Reprints of the Cumulative Index are available free.

For further information see the Ham Clinic column.

Disclaimer:

The authors and editors do the best they can to make everything as correct as possible in the articles. If for any reason any of them should happen to goof we hasten to point out that everything is experimental and we guarantee nothing.

For further information, check number 5 on page 126.

CQ—The Radio Amateur's Journal

300 West 43rd Street, New York 36, N. Y.

March, 1958
vol. 14 no. 3

An economical Half-Gallon Linear ..... Howard L. Smith, W6COU 28
811's and a snap to build.

VHF SSB ..... CWO Jack Drummond, W3YHI/DL4WW 30
Sideband is doing wonders on two meters.

Modulating The DSB Transmitter ..... John Webb, K2GZT (ex WØAHM) 32
More double sideband info.

Publicity For Your Club — Free! ..... Charles H. Curran, W1FIG 35
And boy, do we need the publicity!

The New Look In DC-DC Power Conversion ..... E. H. Sommerfield, W2UQB 36
$E = MC^2$

AC Portable Transmitter ..... Jo Emmett Jennings, W6EI 38
150 watt vest pocket do-dad.

Teletype Reversal Generator ..... Charles R. Teeters, K2DHE 41
Gadget for adjusting the keying of CW and RTTY rigs and things.

Changing The Class C 4-250 To AB_1 For SSB ..... E. N. Marriner, W6BLZ 42
Linearizing your final.

Visual Monitoring Of SSB ..... John W. Govier, W8QNW 44
Adjusting the linear amplifiers by 'scope.

Do-It-Yourself SSB ..... E. H. Marriner, W6BLZ 46
Roll your own SSB.

The Big Gun ..... William ORR, W6SAI 52
KW using a 450TH or other inexpensive surplus triode.

Departments

de W2NSD	9	YL	62	RTTY	80
Scratchi	12	Contest Calendar	65	VHF	82
Club Bulletin	16	Ham Clinic	66	DX	88
QSL Contest	51	Novice	68	Oops—Good Grief Dept.	93
Surplus	58	Propagation	72	Hamfests	14, 93
SB	60	Transistors	75	Mars Talks	16

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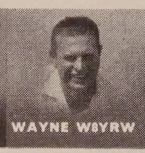


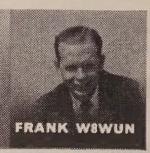
All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact. With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!







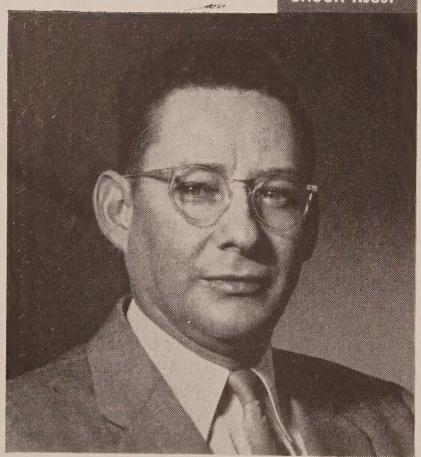






HEATH *hams work to bring you*



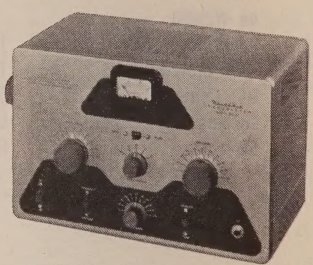


ROGER MACE (W8MWZ)
SENIOR HAM ENGINEER
HEATH COMPANY

HEATHKIT 50-WATT CW TRANSMITTER KIT

MODEL DX-20

$35.95



If high efficiency at low cost in a CW transmitter interests you, you should be using a DX-20! It employs a single 6DQ6A tube in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single-knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedances between 500 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you! Shpg. Wt. 18 lbs.

HEATHKIT DX-100 PHONE & CW TRANSMITTER KIT

MODEL DX-100

$189.50

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.



You get more for your transmitter dollar when you decide on a DX-100 for your ham shack! Recognized as a leader in its power class, the DX-100 offers such features as a built in VFO, built in modulator, TVI suppression, Pi network output coupling to match a variety of antenna impedances from 50 to 600 ohms, Pi network interstage coupling, and high quality materials throughout. Copperplated No. 16 gauge steel chassis, ceramic switch and coil insulation, silver-plated or solid silver switch contacts, etc., are typical of the kind of parts you get, to use in assembling this fine rig. The DX-100 covers 160, 80, 40, 20, 15, 11, and 10 meters with a single band switch, and with VFO or crystal operation on all bands. RF output is in excess of 100 watts on phone and 120 watts on CW, with a pair of 6146 tubes in parallel for the final Amplifier, modulated by a pair of 1625 tubes in parallel. Other tubes featured are: 6AL5 bias rectifier, 5V4 low voltage rectifier, 2-5R4GY high voltage rectifiers, OA2 voltage regulator, 12AX7 speech amplifier, 12BY7 Audio driver, 6AV6 VFO, 12BY7 crystal oscillator-buffer, 5763 r.f. driver, and a 6AQ5 clamp tube. VFO tuning dial and panel meter are both illuminated for easy reading, even under subdued lighting conditions. Attractive front panel and case styling is completely functional, for operating convenience. The DX-100 was designed exclusively for easy step-by-step assembly, and no other transmitter in this power class combines high quality and real economy so effectively. Listen to any ham band between 160 meters and 10 meters and make a mental note of how many DX transmitters you hear! This kind of acceptance by the amateur fraternity testifies to the performance and quality of the rig. Its the kind of a transmitter you will be proud to own, and one that will give you a very respectable signal on the air. Time payments available! Shpg. Wt. 107 lbs.

...top quality at lowest prices!

NEW HEATHKIT PHONE & CW TRANSMITTER KIT



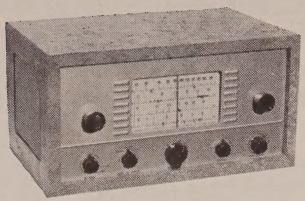
MODEL DX-40

$64.95



The new DX-40 incorporates the same high quality and stability as the DX-100, but is a lower powered rig, for crystal operation, or for use with an external VFO. Plate power input is 75 watts on CW, permitting the novice to utilize maximum power. An efficient, controlled-carrier modulator for phone operation peaks up to 60-watts, so that the rig has tremendous appeal to the general class operator also. Single-knob switching covers 80, 40, 20, 15, 11 and 10 meters. Pi network output coupling makes for easy antenna loading, and Pi network interstage coupling between the buffer and final amplifier improves stability and attenuates harmonics. A line filter is incorporated for power line isolation. The efficient oscillator and buffer circuits provide adequate drive to the 6146 final amplifier from 80 to 10 meters, even with an 80 meter crystal. A drive control adjustment is provided, and the function switch incorporates an extra "tune" position so the buffer stage can be pretuned before the final is on, and so the operator can locate his own signal on the band. Tubes used are a 6CL6 Colpitts oscillator, a 6CL6 buffer, a 6146 final amplifier, a 12AX7 speech amplifier, a 6DE7 modulator, and 5U4GB rectifier. The modulator, incidentally, has plenty of "punch" for clear, strong phone operation. A switch selects any of three crystals, or a jack for external VFO. A high-quality meter with D'Arsonval movement mounts on the front panel for tuning. Whether you are a newcomer or an old-timer, you will find the DX-40 an ideal rig in its power class! Shpg. Wt. 26 lbs.

HEATH COMPANY A Subsidiary of Daystrom, Inc. BENTON HARBOR 12, MICH.



ALL-BAND RECEIVER

HEATHKIT ALL-BAND COMMUNICATIONS-TYPE RECEIVER KIT

Ideal for the short wave listener or beginning amateur, this Receiver covers 550 KC through 30 MC in four bands. It provides good sensitivity and selectivity, combined with fine image rejection. Amateur bands are clearly marked on the illuminated dial scale. Features transformer type—power supply—electrical band spread—antenna trimmer—separate RF and AF gain controls—noise limiter—internal 5½" speaker—head phone jack and AGC. Has built-in BFO for CW reception. An accessory power socket is also provided for connecting the Heathkit model QF-1 Q Multiplier. Will supply 250 VDC at 15 ma and 12.6 VAC at 300 ma. Shpg. Wt. 12 lbs.

Cabinet: Fabric covered cabinet with aluminum panel as shown part 91-15A. Shpg. Wt. 5 lbs. **$4.95**

MODEL AR-3

$29.95



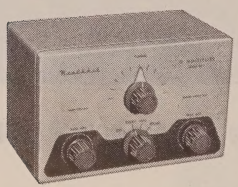
ELECTRONIC VOICE CONTROL

HEATHKIT ELECTRONIC VOICE CONTROL KIT

Here is a new and exciting kit that will add greatly to your enjoyment in the ham shack. Allows you to switch from Receiver to Transmitter merely by talking into your microphone. Lets you operate "break-in" with an ordinary AM transmitter. A terminal strip is provided for Receiver and speaker connections and also for a 117 volt antenna relay. Unit is adjustable to all conditions by sensitivity and gain controls provided. Easy to build with complete instructions provided. Requires no transmitter or Receiver alterations to operate. Shpg. Wt. 5 lbs.

MODEL VX-1

$23.95



"Q" MULTIPLIER

HEATHKIT "Q" MULTIPLIER KIT

This fine Q Multiplier is a worthwhile addition to any communications, or Broadcast Receiver. It provides additional selectivity for separating signals, or will reject one signal and eliminate a hetrodyne. Functions with any AM Receiver having an IF frequency between 450 and 460 KC that is not AC-DC type. Operates from your Receiver power supply, and requires only 6.3 VAC at 300 ma (or 12.6 VAC at 150 ma), and 150 to 250 VDC at 2 ma. Simple to connect with cable and plugs supplied. Effective Q of approximately 4000 for sharp "peak" or "null". A tremendous help on crowded phone or CW bands. Shpg. Wt. 3 lbs.

MODEL QF-1

$9.95

more fine ham gear from the pioneer



GRID DIP METER

HEATHKIT GRID DIP METER KIT

A Grid Dip Meter is basically an RF Oscillator used to determine the frequency of other Oscillators, or tuned circuits. Numerous other applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, designed procedures, etc. Features continuous frequency coverage from 2 MC to 250 MC, with a complete set of prewound coils, and a 500 ua panel meter. Has sensitivity control and a phone jack for listening to the "Zero-Beat". It will also double as an absorption-type wave meter. Shpg. Wt. 4 lbs.

Low frequency coil kit: two extra plug-in coils extend frequency coverage down to 350 KC. Shpg. Wt. 1 lb. No. 341-A **$3.00**

MODEL GD-1B

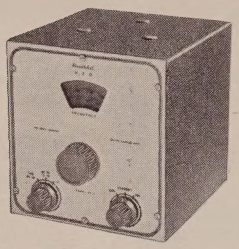
$21.95

HEATHKIT VARIABLE FREQUENCY OSCILLATOR KIT

Enjoy the convenience and flexibility of VFO operation by obtaining this fine variable frequency oscillator. It covers 160-80-40-20-15-11 and 10 meters with three basic oscillator frequencies. Better than 10 volt average RF output on fundamentals. Requires 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a, available on most transmitters. It features voltage regulation for frequency stability, and has illuminated frequency dial. VFO operation allows you to move out from under interference and select the portion of the band you want to use without having to be tied down to only 2 or 3 frequencies through the use of crystals. "Zero in" on the other fellows signal and return his CQ on his own frequency! Shpg. Wt. 7 lbs.

MODEL VF-1

$19.50



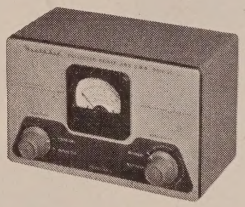
VARIABLE FREQUENCY OSCILLATOR

HEATHKIT REFLECTED POWER METER KIT

A necessity in every well equipped ham shack, the model AM-2 lets you check the match of the antenna transmission system, by measuring the forward and reflected power or standing wave ratio. Handles up to one kilowatt of energy on all bands from 160 to 2 meters, and may be left in the antenna system feed line at all times. Input and output impedances for 50 or 75 ohm lines. No external power required for operation. Meter indicates percentage forward and reflected power, and standing wave ratio from 1:1 to 6:1. Shpg. Wt. 3 lbs.

MODEL AM-2

$15.95



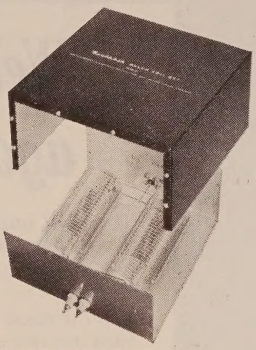
REFLECTED POWER METER

HEATHKIT BALUN COIL KIT

This convenient transmitter accessory has the capability of matching unbalanced coax lines, used on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance. Design of the bifilar wound Balun Coils will enable transmitters with unbalanced output to operate into balanced transmission line, such as used with dipoles, folded dipoles or any balanced antenna system. Can be used with transmitters and Receivers without adjustment over the frequency range of 80 through 10 meters. Will handle power inputs up to 200 watts. Shpg. Wt. 4 lbs.

MODEL B-1

$8.95



BALUN COIL

...in do-it-yourself electronics!



FREE 1958 Catalog

Send for this Free informative catalog listing our entire line of kits, with complete schematics and specifications.

☐ Rush Free 1958 catalog.

HEATH COMPANY

BENTON HARBOR 12, MICH. a subsidiary of Daystrom, Inc.

name _____

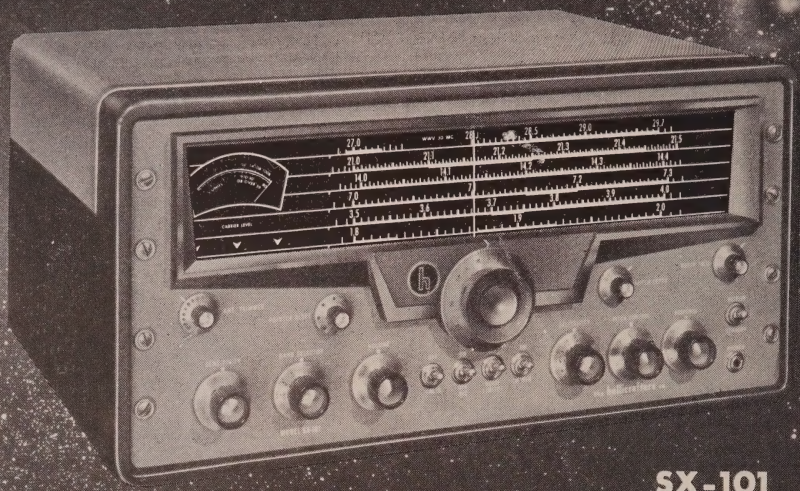
address _____

city & state _____

QUAN.	ITEM	MODEL NO.	PRICE

$_____ enclosed. Parcel post, include postage—express is shipped collect.

For further information, check number 6 on page 126.



SX-101
MARK III

Weigh this one against all comers!

The most important single standard of receiver performance is —your own judgement. And the one sure way to judge is to *compare*, not only on paper, but by an *actual demonstration at your distributor's.*

We'll stack the new SX-101 MARK III against *any amateur band receiver*—in overall performance and long-life reliability.

We're betting that you will, too.

Look for and compare these features

- **Utmost mechanical and electrical stability.**
- **Complete coverage of 7 amateur bands: 160, 80, 40, 20, 15, 11-10 meters.**
- **Exclusive crystal-controlled upper/lower sideband selection.**
- **S-meter functions with A.V.C. off/on.**
- **Tee-notch filter.**
- **Built-in crystal calibrator.**

PLUS: Band in use individually illuminated . . . antenna trimmer . . . dual conversion . . . full gear drive from tuning knob to condensers . . . five steps of selectivity from 500-5,000 cycles . . . many more features. *Available with convenient terms from your Radio Parts Distributor. See him today!*

Hope to see you at the Annual SSB Dinner in New York, March 25th.

Export Sales: International Operations
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For further information, check number 7 on page 126.

The new ideas in communications are born at . . .

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. . . de W2NSD

never say die

What About Eighty?

One of the big problems facing ham radio in the coming international frequency conference is our continuance on the lower frequencies. Let me elaborate.

In the past years the United States, being considerably ahead of most other countries, had pretty much its own way in the allocations of frequencies. Large blocks of friendly countries backed us up in most of our demands. Today we find that these countries are for the most part disillusioned. They have by now developed their own communications systems and have found that they have only a fraction of the frequencies available to them that they need. We won't, I'm sure, find them quite so willing to rubber stamp things next year. They will be in there fighting for enough channels to handle the communications problem that has built up in their country, and the heck with anything like ham radio which is of little value or interest to them.

For instance, what reasons could we suggest to Central and South American countries for the continuance of eighty meters as an amateur band? Only a handful of hams in those countries use those bands, the bulk of the use being right here in the United States. It is not likely that they will be much interested in keeping these frequencies for amateur use when they could use them very well for commercial and government communications.

And the U. S. could be put in a rough spot too. Suppose that several countries suggested a swap with them getting eighty meters for commercial use and the U. S. getting TV channel 1 (50 mc) for scatter use. Now, as you no doubt realize, the U. S. wants scatter frequencies so bad they can almost taste them, maybe even worse than they want ham radio. Sure, ham radio is valuable for interesting youngsters in science, for providing a manpower pool for wartime, for scientific developments, and for emergency service, but "why couldn't they do all of this on the VHF's and UHF's as well?"

Educated guesses now estimate that we will lose 160 meters, the lower 250 kc of 80 meters, the top 150 kc of 40 meters, the top 50 kc of 20 meters, and all or most of 6 meters. The prognosis may worsen as the preliminary talks develop.

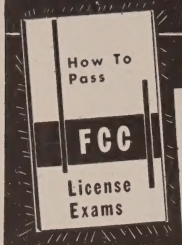
What is needed, badly needed, is a good argument for our holding our lower frequency bands . . . some reason why the amateur's use of eighty meters will contribute more to the advancement of communications than our use of two meters.

Fresno

Don Chesser and I met for the first time at the Fresno annual DX Conference in January. We worked out, with the help of several of the top DXers, plans for improving our DX coverage. Some of these you will find discussed in this months DX Column, some will turn up as time goes on. The meeting was not only productive, but immensely enjoyable. We took off for a few hours one morning for a quick drive up to Yosemite. We visited with several local hams, and had a fine visit with John Guerero, KL7BNJ/KC4USN, who had just recently returned from wintering over at the South Pole station. John is the chap who set up the six meter station at the pole and built up the new final when the regular rig went West (or do things go North at the South Pole, since there is no West?).

Down in Los Angeles after the Conference I borrowed a two meter Communicator from Gonset and fired it up from my rented MGA. Since I was visiting W6LLP way up in the hills of Sierra Madre I managed to work out pretty well most of the time. Two meter activity was disappointing though, with most of my time taken up calling CQ and just listening. It sure was nothing like operating around New York City . . . not at all what I had expected. One high spot was a call from my old friend Ed Simmons, W6CLW. I turned around immediately and zeroed in on his shack where I found all sorts of goodies. Ed has been doing

How To Pass FCC COMMERCIAL RADIO OPERATOR License Exams

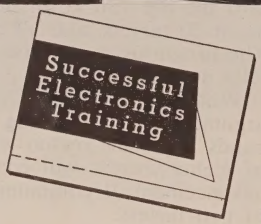


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Tells where to apply and take FCC examinations, location of examining office, scope of knowledge required, approved way to prepare for FCC examinations, positive method of checking your knowledge before taking the examination.

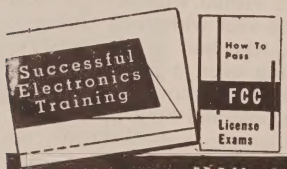
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CQ-38

a bit of facsimile work with both some Western Union and some surplus equipment. He also has Teletype machines all over the place, hooked up on every band. We called in on a two meter RTTY net and said hello, copied some fool K2 on twenty, and deciphered beedley beeps on forty. If you're interested in facsimile why don't you drop Ed a note and prod him into writing about it?

Clubs

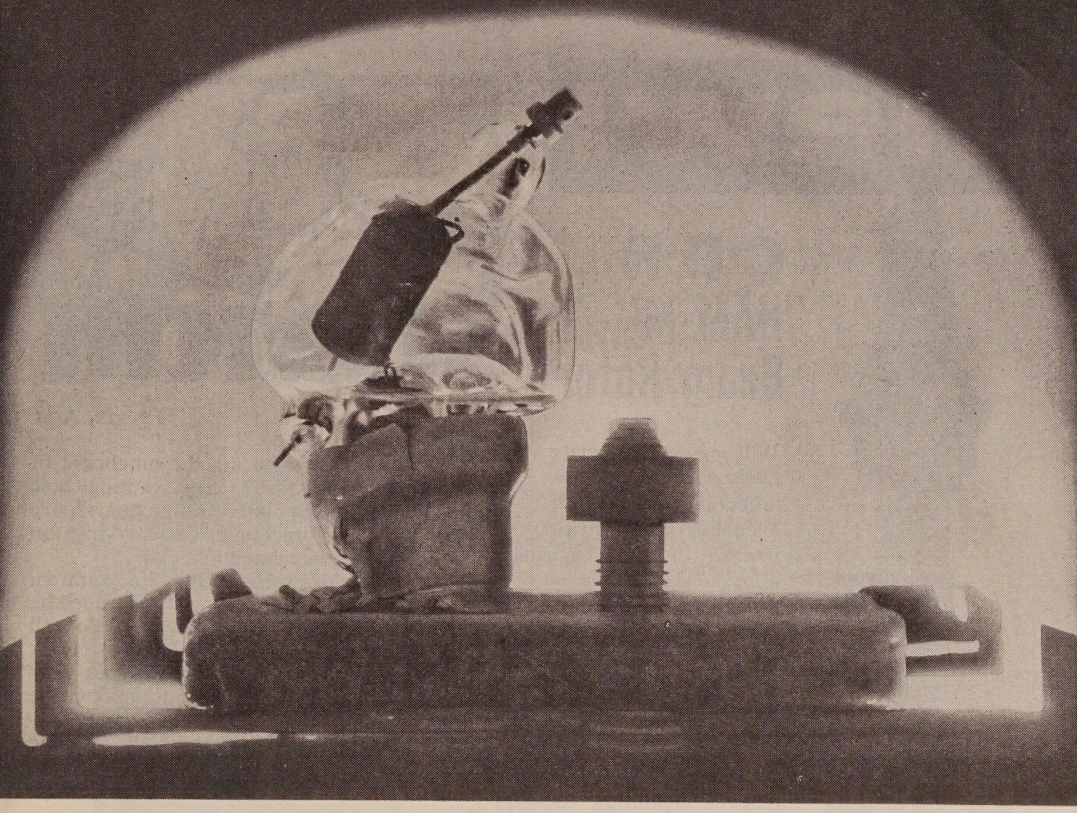
As I keep drumming into you, I am available now and then for a few thousand well chosen words to hold down attendance at club meetings. If you have some skullduggery that you want to vote through when most of the members are staying away then put me down on the program for the evening and settle back for a coup. What I lack in personal drawing power I make up in a psychic ability to provide the "worst weather we've ever had" for your meeting. I managed recently to hold down the attendance of the Pompton Lakes Radio Club to an all-time low by providing a blizzard with about six inches of snow and slush. At the Inglewood (Cal.) club I brought a couple inches of rain and flooded streets. The Radio Club of Brooklyn had an untimely blizzard last year for their trouble. The VHF Institute almost floated away when I came out to speak. And so it goes. Somehow, no matter what happens, I manage to get through to talk learnedly to the two or three brave souls that make it.

The Westchester (Cal.) Radio Club had no such problem since I dropped in unannounced. Leo, W6KVY (ex-W1MLJ of Barre, Vt.) had dinnered me and suggested that we go around the block to the meeting. There we found W6GL demonstrating an RTTY setup to the club. I fought my way to the front and got in half a hundred words and was about to start selling subscriptions when the president got things back in hand and thrust some coffee and doughnuts into my hands to shut me up. Another calorie coup was a recent visit with the Bell Labs group here in NYC, where I was lunched.

Oh, yes. As I started out to say, if your club has an open date you might get in touch with me . . . providing you are within 50 or so miles of NYC. Might even be that Ken Grayson, W2HDM, our Surplus Editor would be able to come too. He likes to drive his Porsche as well as I do mine, so we'll go most anywhere. He's interesting too . . . maybe you don't even need me. My usual talk covers how CQ works, our plans for the future, things we don't dare publish, anti-gravity, the secret behind the flying saucers, etc., plus answers to any embarassing questions you can ask.

As the forester said after chopping down a long line of elms: "At last,

Seventy trees, Wayne



Surviving Heat Extremes
is an Eimac Ceramic Tube Extra

In a high temperature furnace the difference between a ceramic tube and a glass tube is physically evident. But long before the glass tube reached the state of complete collapse shown above, it had become useless as an electron tube.

Before the temperature reached the softening point of glass, the envelope began giving off gaseous products that contaminated the tube's vacuum. The ceramic tube remained internally clean at temperatures far exceeding the softening point of glass. The materials used in Eimac ceramic tubes are stable to more than 600° C.— the temperature at which Eimac processes these tubes.

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The 4CX300A used in this test is just one of a complete line of compact, high-performance ceramic tubes with exceptional resistance to damage by heat, shock and vibration. The performance-proved reliability of Eimac tubes assures you of more watt hours per dollar invested.

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For further information, check number 8 on page 126.

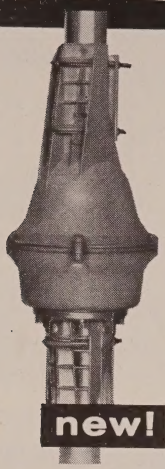
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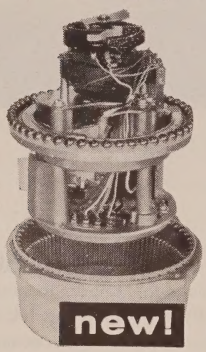
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CORNELL-DUBILIER Electric Corp., South Plainfield, N. J.
THE RADIART CORP., Indianapolis, Ind.
For further information, check number 9 on page 126.



Feenix, Ariz.

Deer Hon. Ed:

Are you wanting to seeing the amchoors of this country losing face? You wanting hole country to being disapointed in amchoors? Are not not wanting amchoors to carrying on gloryus herytage they having?

No needing to answering, Hon. Ed. Scratchi are knowing how you feeling. Yes indeedy, amchoors coming first with you. One for all and all for one are your motto, I am surely.

If that being the case, then, howcomes your Hon. Mag are not printing anything abouts the sityouayshun that are shortly going to be confronting all amchoors. Not one line, not one word am I seeing about it in your Hon. Mag., Hon. Ed? Howcomes? Howcomes indeedy? Huh??

Of coursely you knowing what I are speaking about. What are amchoors going to doing when we having space travel? Have you figyouring out grate implicayshuns when we having space travel?

Well, in case it slipping your Hon. Mind, Scratchi are riting this letter, on acct. I been doing lotsa thinking on subject and maybe can giving you some reel slicky hints on what to having artickles on in your Hon. Mag.

Just for instants supposing expeydishun goes to planut Joopiter and some amchoor wanting to handling traffick. He starts sending on trusty old key and message goes winging its way at 186,000 miles per second. You thinking message are getting there in winking of Hon. Eyelash? No indeedy. Joopiter are not so close you can touching it. In fackly, when are farthest away, planut Joopiter are 600 megamiles away.

Just to saving you working your Hon. Slide Rule, that meening that message traveling for almost one hour before getting there. And samewise likewise message coming back are taking another hour, so you having plenty time to starting cupple other QSO's.

But being carefool. Must knowing how far away are planut Joopiter. At closest point are only mere 367 megamiles away. So, if you going out to see movie between messages you missing message, on acct. it now going one-way in little over half an hour.

[*Continued on next page*]

HERE'S YOUR CHANCE

to get a B&W transmitter that:

- Covers All Bands from 80-10 Meters
- Permits VFO or Crystal Control on All Frequencies
- Provides Versatility for AM, CW and SSB with the 51SB-B
- Features Built-in TVI Suppression
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- And . . . All at the Lowest Cost for Comparative Value

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5100-B $525

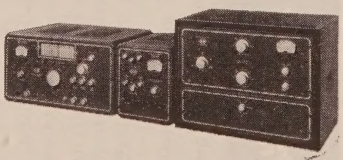
There isn't a transmitter on the market that gives you more versatility than the B&W 5100-B . . . regardless of price. In spite of superb performance, the 5100-B is as competitive in cost and often under many comparable units.

Designed for discriminating hams, the 5100-B is engineered to the highest degree by professionals. Layout and circuitry are skillfully designed to assure a minimum of harmonics and distortion.

As a basic for novice or oldtimer the 5100-B is perfect for future addition of SSB by plugging in a B&W 51SB-B. If you're ready for maximum power you can add the B&W L-1000-A Grounded Grid Linear Amplifier. This addition will give you 1000 watts peak envelope SSB-875 watts CW and 375 watts linear AM phone.

Here's your chance to get on the air with a top-quality signal. Buy a B&W Model 5100-B transmitter today. If you want additional information, before you buy, see your favorite "ham" dealer or write the factory direct.

Complete assembly 5100-B, 51SB-B and L-1000-A



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For further information, check number 10 on page 126.

OTHER B&W AMATEUR EQUIPMENT: Transmitters AM - CW - SSB • Single Sideband Generators • Single Sideband Receiving Adapters • Dip Meters • Match Masters • Frequency Multipliers • Low-Pass Filters • T-R Switches • R.F. Filament Chokes • Transmitting R.F. Plate Chokes • Audio Phase Shift Networks • Band Switching Pi-Networks • Cyclometer-type Counters • Antenna Co-axial Connectors • Baluns • Variable Capacitors • Fixed and Rotary Type Coils • Band Switching Turrets • Standard Inductor Materials • Miniductors • Complete line of Amateur Air-wound Plug-in Coils • Variable Plug-in Links • Faraday Shielded Links • Misc. Coil Mounting Assemblies • Misc. Frequency Marked Dial Plates • Misc. Knobs • Ceramic Jack and Plug Bars

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IMPROVED AND ADVANCED OPERATING FEATURES

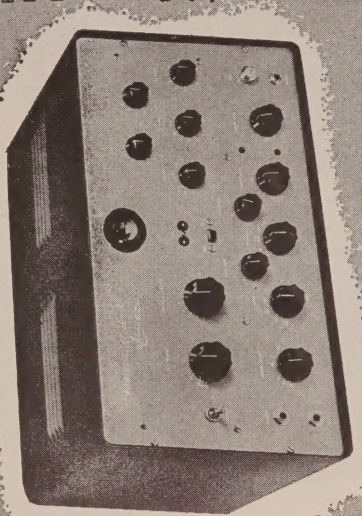
SSB or DSB suppressed carrier or with carrier, PM and CW.

6146 power amplifier delivers 65 PEP watts output, giving sufficient power to drive nearly all types of linear amplifiers INCLUDING grounded grid finals.

Calibrate control allows variable control of signal for zero beating VFO to receiver frequency or TOF (talk on frequency.)

Voltage Regulation of 6146 Screen and 9MC OSC.

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ALL BAND OPERATION

FRONT PANEL OPERATING CONTROLS

Emission switch with 5 positions for selecting CW PM — AM or DSB — Sideband 1 — Sideband 2

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MANUFACTURERS OF PRECISION ELECTRONIC EQUIPMENT

For further information, check number 11 on page 126.

SCRATCHI [*from page 12*]

On other hand, if expeydishun are going to planut Plooto, then you can taking in cupple double feetures and getting ate hours sleep to boot, on acct. Plooto are 25,000 megamiles away, so by time you heering from them up there it taking forteen hours. That is, unless planut Plooto are close, in which case it taking only ate hours both ways.

How sumever, amchoor reely having to working hard to keeping track of Hon. Planut when he trying to talk to planut Mars. When farthest away—248 megamiles—it taking 45 minutes to getting message there and back, but when it neerest—35 megamiles—it only taking six minutes, and this are hardly time to getting desent smoke before traffick coming back and keeping you busy.

It are not that I feeling all this are happening tomorrow, Hon. Ed., but maybe it later than you think for Hon. Artickle on subject. With Hon. Moon no trubble, natchyourally, on acct. message going there and back in cupple seconds. But after the moon, what will poor amchoor do?

Cupple things are worrying me. If I sending message to planut Joopiter when expeydishun are listening, and it taking message one hour to getting there, maybe they not listening one hour later. On other hand, that meening that I can sending message when they not listening, and yet if they listening one hour later they heering it hunky-dory.

You understanding that? Good, on acct. I not. If you understanding that, howsumever, maybe you can answering me this questshun. Spaceship are heding to planut Joopiter and are traveling at speed of light—same speed as radio wave. I sending message to spaceship. How can message ever catching up to spaceship?

Don't telling me it not possible. Amchoors never admitting anything not possible. When are your first Hon. Artickle apeering in your Hon. Mag?

Respectively yours, Hashafisti Scratchi

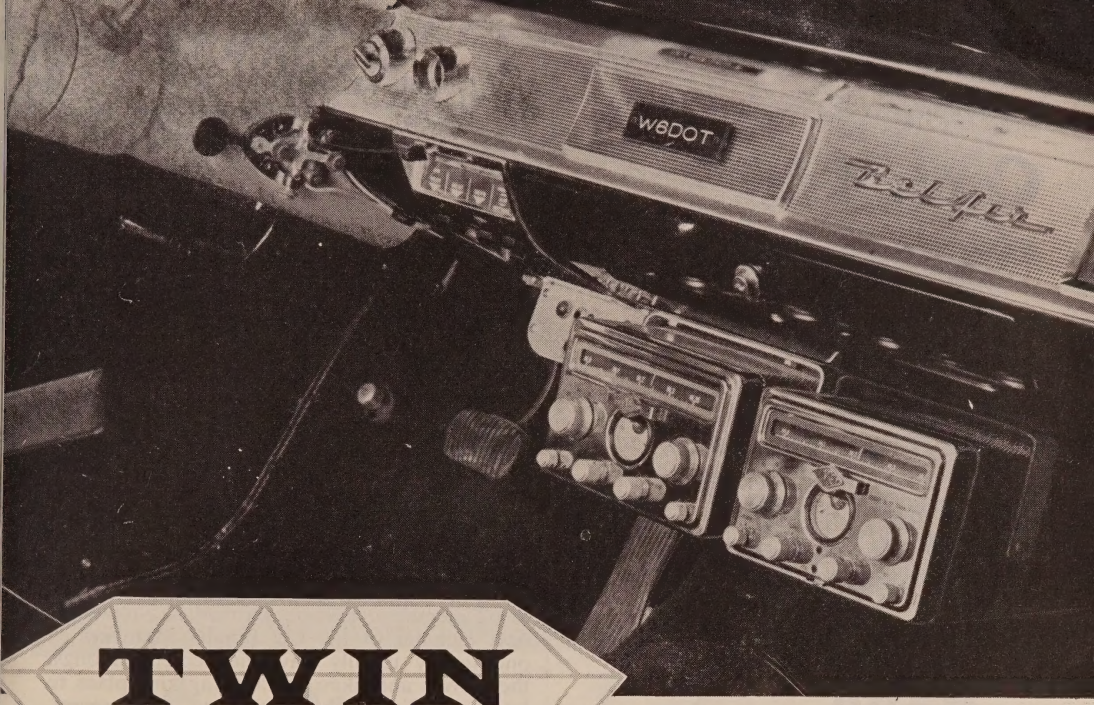
hamfest

Annual SSB Dinner

The Single Sideband Amateur Radio Association, Inc. (SSBARA) will sponsor the annual SSB dinner to be held in New York City on March 25th, 1958 in the Grand Ballroom of the Hotel New Yorker. It's expected to be the largest function of its kind to date. Accommodations for 900 guests have been prepared.

Outstanding communications personalities from the military, commercial and amateur ranks will be on hand. Talks by several well-known people will be included in the program.

Tickets are $7.50 each and can be obtained by writing SSBARA, 261 Madison Ave., New York 16, New York.

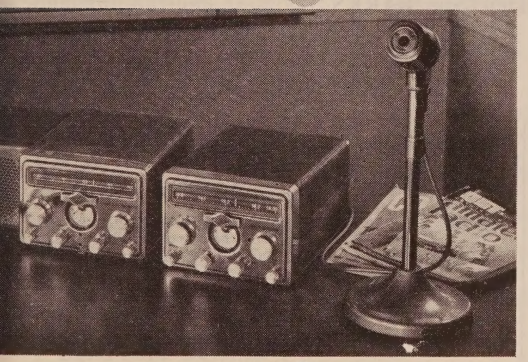


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G-66B RECEIVER . . . G-77A TRANSMITTER

Mobile-wise, don't be content with a slight lead . . . install this pair of sparklers and *go far out in front!*

G-66B . . . high sensitivity, stability, selectivity. Features include double conversion with crystal controlled first conversion oscillator, full-vision dial, complete band-spread, tuning meter. Squelch and noise limiter give big assist to mobile noise. Gives you superlative reception on standard broadcast and amateur 80, 40, 20, 15 and 10 meter bands. A *sparkler!*



G-77A . . . real power punch! 50-60 watts input fully modulated. Plenty of speech gain. Pi network output with 6146 amplifier. Excellent VFO with calibrated slide-rule dial. (Xtl optional.) Power supply and modulator in separate compact unit for convenient mounting. Unit covers amateur 80-40-20-15-10 meters. Now with universal power supply for 6-12V DC or 115V AC. *Another sparkler!*

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G-66B, less power supply . . . #3046 . . . . . 209.50

Universal "three-way" power supply/speaker unit. (6V-12V DC, 115V AC.) Factory wired 6V DC, 115V AC. With patch cable . . . . . #3098 . . . . . 49.50

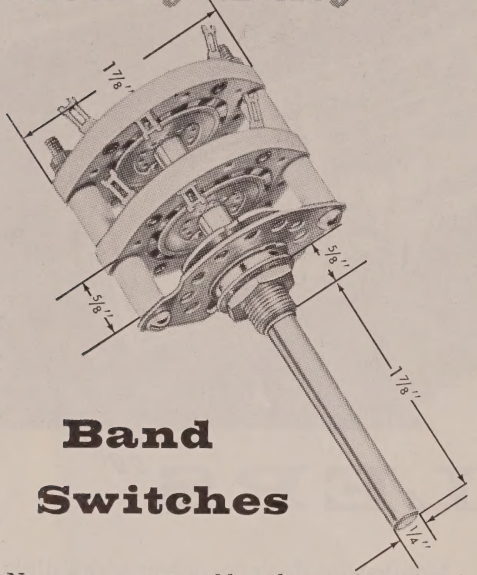
"Thin pack" power supply. (12 volt DC only) less patch cable . . . #3098 . . . 29.50

G-77A, Transmitter with universal power supply, (6V-12V DC or 115 V AC) and installation kit . . . (Factory wired for 12V DC) 299.00

For further information, check number 12 on page 126.

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Now you can assemble a heavy duty switch that permits the spacing, shielding and circuit insulation you need. With the new Centralab Band Switch components, you can quickly make 1 to 8 section switches that handle up to 6 bands. Components include preassembled index, preassembled ceramic sections, ceramic spacers, and all hardware.

- *Breakdown: 2000 volts AC-RMS between critical parts and to ground.*
- *For use with tubes up to 1 KV operating voltage and inputs up to 150 watts.*
- *60° Indexing: also available in 90° indexing for up to 4 bands.*
- *Fully assembled units, up to 5 sections, are stocked by parts distributors.*

For complete details see your Centralab distributor or write for Catalog 30 describing the full line of Centralab switches, controls, ceramic capacitors, PEC* and semi-conductor products.

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For further information, check number 13 on page 126.

CLUB BULLETIN

Marvin D. Lipton, VE3DQX
311 Rosemary Road, Toronto 10, Ontario, Canada

Most amateur radio clubs on this continent regard a club paper as an "added attraction". However the British Two Call Club is built entirely around QTC, its club bulletin. The club members are kept informed of club matters and vote through QTC, which has a circulation of about 200. The club secretary, G. V. Haylock, G2DHV, of London, England, edits the newsletter. The club was formed in 1950 to strengthen the friendship created among Hams that were sent overseas during W. W. II. The club paper, which is published quarterly, serves to renew old acquaintances every 3 months. QTC is one of the more remote members of the CQ news service.

To date, the Club Bulletin Department of CQ sends its monthly news release, CQ NEWS, to 62 members. This department is a relatively new member of the CQ family. Members of one family usually have no secrets amongst themselves and likewise CQ Magazine plans to let the affiliated club papers in on a secret. Every month CQ will give the members of its news service a sneak preview of the next month's magazine. This info will be sent to associated editors via CQ NEWS. Club editors may then share this "inside information" with their readers. Here is one more reason why you should ask your club to join us if they haven't already.

Sorry we have not got space for our membership list this month, but look for it in April along with the story of a thriving Midwest amateur radio club publication; the PRAIRIE DOG'Ssss BARKS.

73, Marv, VE3DQX

ARMY MARS TALKS

First Army Mars SSB Technical Net

Monday evenings, 9-11 PM EST,
4030 kc upper sideband

March 3—"Radioteletype for the Radio Amateur" by Al. MacDonald, Transmitter Supervisor, WABD, DuMont Television Network.

March 10—"Electronics for High Energy Particle Acceleration" by Martin Plotkin, Electronics Engineer, Brookhaven National Lab.

March 17—"Cuba to Florida Over the Horizon TV Microwave Link" by Julian Gulack, Project Engineer, Federal Telecommunications Lab.

March 24—"Panoramic Receivers for Spectrum Surveillance" by Nat Cohen, Senior Project Engineer, Radio Receptor Co.

March 31—"Travelling Wave Tubes & Associated Microwave Devices" by Dan George, Advanced Research Engineer, Sylvania Electric Products Co.

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Everything you expect in a receiver!

The all new

HAMMARLUND HQ-160

general-coverage receiver

The greatest value ever in a communications receiver! Chuck-full of features, performance and quality — at a price you'd expect to pay for just an ordinary receiver. Compare the HQ-160 to receivers costing hundreds of dollars more—and see how much more you're getting — and how much you're saving!

WRITE FOR COMPLETE DETAILS . . .

DUAL CONVERSION — 13 tube superheterodyne.
GENERAL COVERAGE — 540 KCS to 31 MCS in 6 bands.
SINGLE SIDEBAND — separate linear detector for optimum SSB and CW reception.
Q-MULTIPLIER — for continuous variable selectivity.
NOTCH FILTER — adjustable. Up to 60 db attenuation.
READABILITY — calibrated every 5 KCS to 10 MCS. Every 10 KCS from 10 MCS up.
B.F.O. — separate stabilized beat frequency oscillator for SSB and CW reception.
CRYSTAL CALIBRATOR — built-in, 100 KCS.
TUNED CIRCUITS — 14 tuned circuits in IF.
CRYSTAL CONTROL — 2nd conversion oscillator crystal controlled.
BANDSPREAD — electrical. Calibration of 80, 40, 20, 15 and 10 meter bands.
DIAL SCALE RESET — for both dials from front panel.

All this — and then some . . . for only $379.00

For further information, check number 14 on page 126.

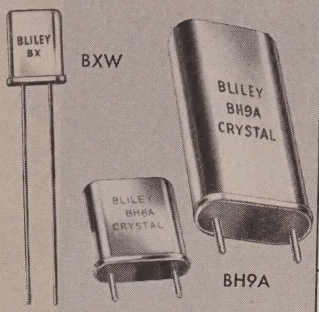
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HAMMARLUND MANUFACTURING COMPANY, INC., 460 W. 34th St., N. Y. 1, N. Y.

Export: Rocke International, 13 E. 40th St., N. Y. 16, N. Y. • Canada: White Radio Ltd., 41 West Ave. N., Hamilton, Can.

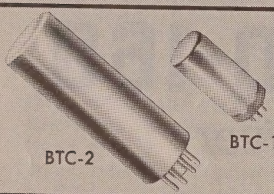
BLILEY CRYSTALS • BLILEY OVENS



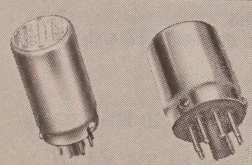
BLILEY HOLDER	DESCRIPTION	MIL CRYSTAL UNIT
BH6A (MIL HOLDER HC-6/U)	Hermetically sealed unit. Also available with wire leads as "BH6W." Freq. Range: 200kc to 125mc. Dimensions: 25/32" long x 3/4" wide x 11/32" thick (excl. pins). Bulletin #493.	CR-18/U, CR-19/U, CR-23/U, CR-25/U, CR-26/U, CR-27/U, CR-28/U, CR-32/U, CR-33/U, CR-35/U, CR-36/U, CR-44/U, CR-45/U, CR-46/U, CR-47/U, CR-48/U, CR-51/U, CR-52/U, CR-53/U, CR-54/U, CR-62/U
BXW (MIL HOLDER HC-18/U)	Subminiature hermetically sealed unit, wire leads. Also available plug-in as "BXP." Freq. Range: 10mc to 125mc. Dimensions: 33/64" long x 27/64" wide x 11/64" thick (excl. wire leads). Bulletin #502.	CR-55/U, CR-56/U, CR-59/U, CR-60/U, CR-61/U
BH9A (MIL HOLDER HC-13/U)	Hermetically sealed unit. Freq. Range: 4kc to 200kc. Dimensions: 1-17/32" long x 3/4" wide x 11/32" thick (excl. pins). Bulletin #501.	CR-37/U, CR-38/U, CR-42/U, CR-50/U



		DIMENSIONS
BG9 SERIES — BG9D-S, 100kc Std. — BG9A-S, 1000kc Std.	Sealed-in-glass crystal unit provides exceptional stability with minimum ageing. Used as reference source in secondary frequency standards. Bulletins #491 (1000kc) and #492 (100kc).	2-1/2" long x 1-9/32" dia. (excl. pins) Octal Base
BG6 SERIES	All glass, vacuum mounted crystal unit for tight tolerance performance with minimum change due to ageing. Advance process techniques assure high reliability. Freq. Range: 3mc to 125mc. Bulletin #496.	1-3/8" long x 3/4" dia. (excl. pins) Small Button Miniature Base
BG12 SERIES — BG12G-S, 100kc Std.	For primary frequency standards. Precision sealed-in-glass crystal unit combines high stability performance with minimum ageing. Temp. coefficient: Less than 0.2ppm per degree C. between +65°C. and +75°C. Bulletin #498.	3-11/16" long x 1-23/32" dia. (excl. pins) Octal Base



BTC-1	Subminiature hermetically sealed package combines crystal control and temperature stabilization in a single plug-in unit. Freq. Range: 5mc to 125mc. Stability: ± .0003%. Bulletin #494.	1-5/8" long x 51/64" dia. (excl. pins) Std. Noval 9-Pin Base
BTC-2	Hermetically sealed package combines all-glass vacuum mounted crystal with precise temperature control. Freq. Range: 4kc to 125mc. Stability: ± .00004% in range 800kc to 125mc. Bulletin #497.	3-3/4" long x 1-1/4" dia. (excl. pins) Octal Base





BLILEY TYPE	DESCRIPTION
TCO-1 OVEN SERIES	Plug-in ovens for temperature control of single crystal unit in Bliley BH6A or MIL HC-6/U holder. Stability: ±3°C. at 75°C. or 85°C. Supplied for 6.3 volt, 12.6 volt or 26.5 volt operation. Dimensions: 1-9/16" long x 1-3/16" dia. (excl. pins). Octal Base. Bulletin #499.
TCO-2 OVEN SERIES	Plug-in ovens for temperature control of two crystal units in Bliley BH6A or MIL HC-6/U holders. Stability: ±3°C. at 75°C. or 85°C. Supplied for 6.3 volt, 12.6 volt, or 26.5 volt operation. Dimensions: 1-9/16" long x 1-3/16" dia. (excl. pins). Octal Base. Bulletin #499.
TCO-21 OVEN SERIES	Plug-in ovens for temperature control of two crystal units in Bliley BH6A or MIL HC-6/U holders. Stability: ±2°C. at 75°C. or 85°C. Supplied for 6.3 volt, 12.6 volt or 26.5 volt operation. Dimensions: 1-9/16" long x 1-3/16" dia. (excl. pins). Octal Base. Bulletin #499.
TCO-2L TCO-2P OVENS	Plug-in ovens for temperature control of two crystal units in Bliley BH9A or MIL HC-13/U holders. Stability: ±4°C. at 75°C. TCO-2L for 6.3 volt operation; TCO-2P for 12.6 volt operation. Dimensions: 2-3/16" long x 1-3/16" dia. (excl. pins). Octal Base. Bulletin #499.
TC91 TC92 TC93 OVEN SERIES	Precision temperature control ovens for Bliley crystal units: FM6, BH81A, MC7, BH8, MC75, MS46A, AR23W, BG9A series and BG9D series. Stability: ± 1°C. Supplied for 6.3 volt, 18 volt or 115 volt operation. Dimensions: 4-7/16" long x 3-3/4" dia. (excl. pins). Giant 7-pin base. Bulletin #500.
TC97 OVEN SERIES	High precision temperature control ovens for Bliley crystal units: BH8, MC75, MS46A, and BG12G-S. Stability: ±0.25°C. Supplied for 6.3 volt operation. Dimensions: 4-23/32" long x 4-1/2" dia. (excl. pins). Giant 7-pin base. Bulletin #500.

Bliley CRYSTALS

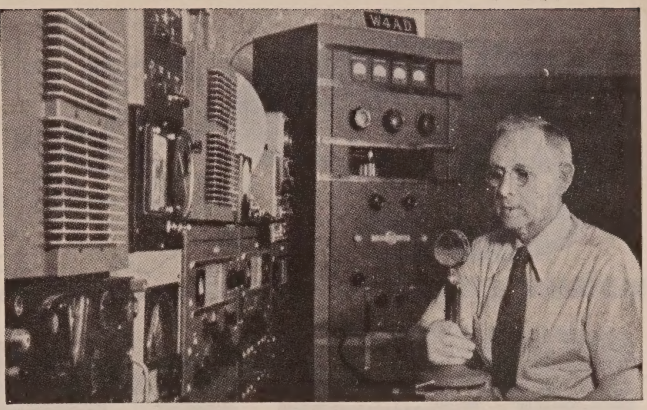
BLILEY ELECTRIC COMPANY UNION STATION BLDG., **ERIE, PENNSYLVANIA**

SEE US AT THE IRE SHOW, BOOTH 2736

For further information, check number 15 on page 126.

GORDON L. HIGHT, W4AD, of Rome, Georgia. First licensed in 1913—ex 4BQ, ex W4ISC. Attended International Radio Congress in Paris with Hiram Percy Maxim and K. B. Warner.

Mr. Hight has established a Community Emergency Station at his office where he recently installed a MOSLEY Model TA-33 "Trap Master" 3-Band Beam Antenna.



One of Hamdom's "Old Timers", W4AD - tries out his 18th Beam. . .

Read his verdict!

Our sincere thanks to Mr. Hight for this unsolicited letter and for permission to publish his highly regarded opinion of our product.

Hams, everywhere, can enjoy this same gratifying experience when they purchase a beam antenna. Simply tell your favorite Ham Dealer you want a MOSLEY "Trap Master" Beam. Available in 2—element and 3—element types. Model TA-32, $69.50; Model TA-33, $99.75. Specify, "No substitutions, please!"

GORDON L. HIGHT
116 SECOND AVENUE
ROME, GEORGIA

Dec. 9, 1957

Mr. George E. Mobus, WØRXK
MOSLEY ELECTRONICS, Inc.
8622 St. Charles Rock Road,
St. Louis 14, Missouri

Dear George:

We received the TA-33 "Trap Master" 3-Band Beam purchased through Specialty Distributing Company at Atlanta and were somewhat delayed in installing it due to bad weather. However, we now have it on the air and are delighted with the results. It is all your advertisement claimed for it.

I wish to take this opportunity to thank you for the efficient and courteous manner which you handled my business. I cannot recommend too highly your product to any Amateur that is in the market for a first-class beam.

This is the eighteenth beam I have tried out and yours excels most of them and none has surpassed the "Trap Master" in results.

Very 73,

GORDON L. HIGHT
W4AD

GLH:D

Write MOSLEY main office for free Catalog and other literature.

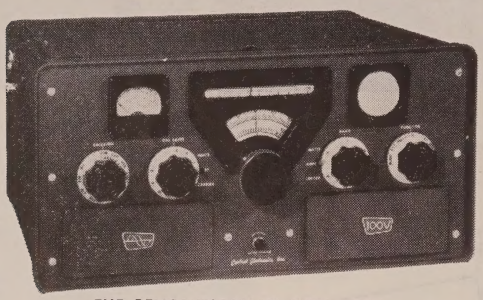
Mosley Electronics, Inc.

WEST COAST BRANCH	EXPORT DEPARTMENT	MAIN OFFICE AND PLANT
1406-08 South Grand Avenue	15 Moore Street	8622 St. Charles Rock Road
Los Angeles 15, California	New York 4, New York	St. Louis 14, Missouri

For further information, check number 16 on page 126.

THE BROADBAND TWINS





THE REVOLUTIONARY NEW 100V EXCITER-TRANSMITTER

NO TUNING (except VFO), uses famous CE BROADBAND system. PRECISION LINEAR VFO—1KC Calibration. Single Knob Bandswitch 80 thru 10. SSB—DSB—AM—PM—CW and FSK. RF Output adjustable 10 to 100 Watts PEP. Meter reads Watts Input, Amps Output and Carrier Suppression. 2" RF Scope. Speech Level and Load Mismatch Indicators. Audio Filter — Inverse Feedback — 50 db Carrier and Sideband Suppression.

IN PRODUCTION SOON.....PRICE $595.00



FAMOUS MODEL 600L BROADBAND LINEAR

NO TUNING CONTROLS — CE BROADBAND Couplers in HIGH EFFECIENCY CLASS AB² using single 813. Easily driven to 600 Watts PEP Input 160 thru 10 by a 20A or 100V. Built-In HEAVY DUTY POWER SUPPLY — 45 MFD PAPER Capacitor. Meter reads WATTS INPUT, GRID DRIVE, RF AMPS, and SWR. Completely shielded — TVI suppressed — parasitic free. REMEMBER there is LESS than ONE S UNIT difference between the 600L and a 2 KW PEP job. .....PRICE $495.00

MODEL 20A



THESE MULTIPHASE EXCITERS PIONEERED AMATEUR SSB

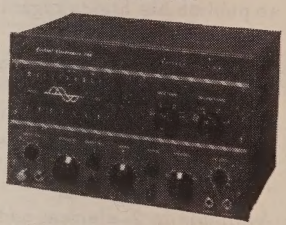
MODEL 10B — 10 watts PEP. Plug-in coils 160 thru 10 meters. Perfect voice control on SSB—DSB—AM and PM — CW breakin; Carrier and calibrate level controls. 40 DB suppression.

Wired.....$179.50 Kit.....$139.50

MODEL 20A — 20 watts PEP. Bandswitched 160 thru 10 meters. SSB—DSB—AM—PM and CW. Magic eye monitors carrier null and peak modulation. Ideal for driving AB1, AB², and most Class B linears.

Wired.....$279.50 Kit.....$219.50

MODEL 10B





MODEL GC-1. Gated Compression Amplifier. Connects between receiver and speaker. Automatically brings all received signals to same level—no blasting. Compensates for receiver AVC deficiencies. Compresses a 40 db increase in level to less than 3 db. Magic Eye continuously monitors compression value. Keep peace with your family and neighbors — buy a GC-1.

KIT....$49.50 Wired....$59.50

MODEL MM-2. 3" RF analyzer scope for use on SSB—DSB—AM—PM and CW. MONITORS RECEIVED AND TRANSMITTED SIGNALS thru new electronic switching circuits. NO TUNING — BROADBAND response 1MC to 55MC at power levels of 5 watts to 5 KW. SIMPLE CONNECTIONS. Built-in 1KC oscillator for exciter alignment. Plug-in IF adapters available for 450-500 KC, 80 KC and 50 KC.

IF adapter RM-455 or RM-80 or RM-50 .....$9.95
MM-2 (less adapter) wired.$129.50
Kit $99.50



For further information, check number 21 on page 126.

WRITE FOR INFORMATION ON THE COMPLETE MULTIPHASE LINE.

MULTIPHASE EQUIPMENT

Central Electronics, Inc.

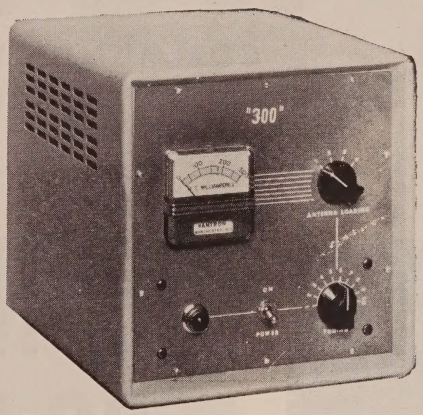
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MULTIPHASE THE OVERWHELMING CHOICE OF HAMS EVERYWHERE

HIGH POWER AT LOW POWER PRICES!

NEW!

VANTRON "300" LINEAR AMPLIFIER



$99.50

F.O.B. Manchester, N. H.

- Negligible harmonic output
- Power input ratings:
  C. W. — 300 watts
  S. S. B. — 430 watts P. E. P.
  A. M. — 100 watts
- Frequency range:
  3 — 35 M. C. continuous
  (no plug in coils)
- Matches 50 — 100 ohm antennas
- Driving power only 15 watts maximum
- Driving power only 15 watts maximum
- Will easily drive a grounded grid amplifier with 4000 watts P. E. P. input
- Tube complement — four 6CL6. Rectifier 5R4.
- Minimum tuning adjustments
- Size 8¼" high x 8¼" wide x 10½" deep
- Weight — 18 lbs. Fully guaranteed.



MODEL 2000
$8.75



MODEL 3000
$13.50

TRANSITRON'S T/R SWITCHES

TRANSMIT-RECEIVE Switches, 1 KW max. power, 3 to 30 MC, no tuning adjustments, no RF relays; Low VSWR; insertion loss less than 1 S-unit; Model 2000 has integral receiver muting relay. Low cost, high efficiency. Widely used in communications and amateur equipment.



TRANSITRON'S Q-PROBE

3-40 MC CIRCUIT PROBE

Low-cost oscilloscope attachment for RF scope displays 3 to above 30 MC, continuously variable, high sensitivity; sync output locks scope sweep. Views RF signals; checks two-tone patterns, SSB carrier nulls, filters, RF squegging, parasitics, overall transmitter modulation characteristics.

Electronics Division

VAN NORMAN INDUSTRIES, INC.

186 Granite St., Manchester, N. H.

ELECTRONIC DIVISION, Van Norman Industries, Manchester, N. H.

Please send me free literature and further information on your Vantron "300" ☐

Q-Probe ☐ T/R Switches ☐

Name _____

Address _____

City _____ State _____

For further information, check number 18 on page 126.

Presents the

NEW

COMMUNICATIONS RECEIVER

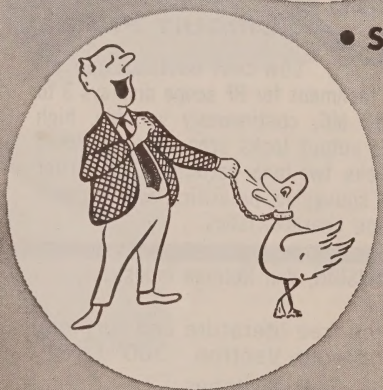
R-840 URR

the

GPR-90 RX



- .54 TO 31.5 MCS
- EXTERNAL HFO POSITION
- 100 KC CALIBRATION
- SSB — POINT TO POINT OPERATION



There has been considerable demand for stabilities in Single Sideband Operation which can only be achieved by crystal or synthesizer operation. As a consequence, T.M.C. has developed the Model GPR-90RX Receiver which not only provides the high quality characteristics of the regular GPR Receiver, but also permits the use of 10 precisely adjustable crystal positions available from the front panel plus a rear deck input for an external high stability control oscillator or synthesizer.

Because of the ease with which the crystals may be adjusted, point to point and net operation become simple and straight forward operational procedures.

You can depend on it — TMC meets its published Specifications.

WRITE FOR
BULLETIN 205

The TECHNICAL MATERIEL CORPORATION

IN CANADA
TMC Canada Ltd., Ottawa, Ontario

Main Office: MAMARONECK
NEW YORK

For further information, check number 19 on page 126.

It's NEW! Send for this FREE Booklet today!

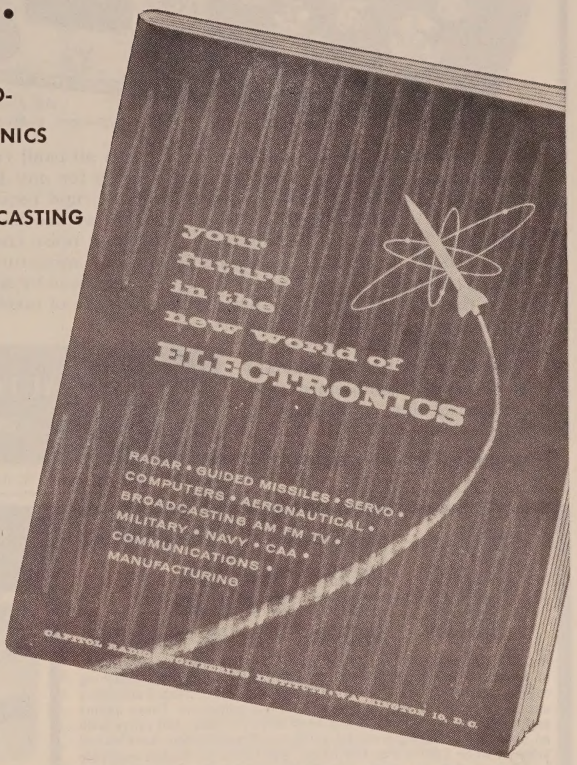
• *See what can be yours in the rapidly expanding field of...*

ELECTRONICS

INCLUDING: **GUIDED MISSILES • RADAR • INSTRUMENTATION • COMPUTERS • AUTOMATION • ASTRONAUTICS • SERVO-MECHANISMS • AERONAUTICAL ELECTRONICS • TELEMETERING • COMMUNICATIONS • MANUFACTURING • TELEVISION • BROADCASTING**

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All these benefits can be yours if you act now! Take that first big step this minute—No obligation whatsoever! Write Capitol Radio Engineering Institute, Dept. 293-E, 3224—16th St., N.W., Washington 10, D. C.

TAKE A MINUTE TO MAIL THIS COUPON FOR FREE BOOKLET!

CAPITOL RADIO ENGINEERING INSTITUTE

ECPD Accredited Technical Institute Curricula — Founded 1927
Dept. 293-E **3224 16th St., N. W., Washington 10, D. C.**

Please send me your course outline and **FREE** illustrated Booklet **"Your Future in the New World of Electronics"** . . . describing opportunities and CREI home study courses in Practical Electronic Engineering Technology.

H

CHECK FIELD OF GREATEST INTEREST

- ☐ Radar, Servo and Computer Engineering Technology
- ☐ Electronic Engineering Technology
- ☐ Broadcast (AM, FM, TV) Engineering Technology
- ☐ Television Engineering Technology
- ☐ Aeronautical Electronic Engineering Technology

Name.....Age.....

Street.....

City.....Zone.....State.....

CHECK: ☐ Home Study ☐ Residence School ☐ Korean Veteran

If you have the equivalent of a high school education, and are good at mathematics, if you have *some* electronic experience (advanced amateur, experimenting, military, or industrial), you can qualify for CREI Home Study Training. (No experience required for Residence School admission.)

To help us answer your request intelligently, please give the following information:

EMPLOYED BY.....

TYPE OF PRESENT WORK.....

EDUCATION: YEARS HIGH SCHOOL.....

YEARS COLLEGE.....

ELECTRONICS EXPERIENCE.....

FCC LICENSE: ☐ Amateur ☐ Commercial

For further information, check number 20 on page 126.

NEW, IMPROVED **PIERSON KE-93**
communications receiver



Receiver *AC Pack, Speaker, S-Meter*

The Pierson KE-93 is a full-fledged, 12-tube all-band communications receiver of superior performance for *any* purpose. It readily meets and conquers all of the rigid requirements for a quality mobile receiver – such as shock and vibration, temperature and humidity extremes, noise conditions and power regulation – thanks to military, miniaturization techniques. Most important, in actual "side-by-side" tests, the Pierson KE-93 has been proven capable of meeting or beating many high-priced receivers of the table top variety! Your local dealer will be happy to arrange a complete demonstration of this "little giant" at your convenience.

NOW...REDUCED IN PRICE!

Thanks to you, production has increased and these savings are now yours!

- Extreme selectivity and sensitivity.
- Receiver Size: 6" wide, 5" high, 9" deep.
- Highly effective noise silencer and squelch circuits of new design.
- Function switch provides ideal settings for A.M., C.W. and S.S.B. operation.
- 6 or 12 V.D.C. or 110 V.A.C. power packs.

Write today for complete detailed information and address of your nearest dealer.

AUTOMATION ELECTRONICS, INC.
1500 West Verdugo Avenue, Burbank, California

For further information, check number 49 on page 126.



BALUNS AND RF TRANSFORMERS

INCREASE EFFICIENCY
REDUCE TVI AND BCI
INCREASE Your RIG Versatility

Maximize effective radiated power, and stop sacrificing top performance to mismatch inefficiencies. Baluns are indispensable when matching coax to balanced lines. Minimizing standing waves increases efficiency and helps stop TVI, BCI and other spurious emissions. These baluns and transformers are true broad-band devices; cover full range with no switching or tuning from 1.5 to 30 mc. Standard line handles full kilowatt when SWR is 2 to 1 or better. See below for models available in economical Junior series for use up to 200 watts input—ideal for B & W 5100, Collins 32-V, Heath DX-100, and others. For SIX METER enthusiasts both series have similar models covering 14 to 60 mc range (same price—order by affixing "B" to catalog number). Weather. proof—conservatively rated.

ATTENTION: GOONEY BOX owners: TB-2C matches 75 ohm coax to twinlead, 10 w, 30 mc to 500 mc, UHF coax fitting, ¾" dia. x 3", $4.95

Standard 1 KW Series—3½" x 3" x 4½", Wt. Approx. 2½ lbs.

Baluns for 50 ohms coax:

TB-5 matches 50 ohms balanced	$ 22.50
TB-7 matches 75 ohms balanced	24.95
TB-3 matches 200 ohms balanced	19.75
TB-6 matches 300 ohms balance	24.50
TB-8 matches 470 ohms balanced*	150.00

Baluns for 75 ohms coax:

TB-4 matches 75 ohms balanced	19.75
TB-2 matches 300 ohms balanced	17.50
TB-1A matches 600 ohms balanced*	150.00

RF Transformers:

T-1: 50 ohms unbal. to 75 ohms unbal.	19.75
T-2: 50 ohms unbal. to 200 ohms unbal.	19.75

Junior Series—150 watt—2" x 2½" x 4½", weight approx. 1 lb.

Baluns for 75 ohms coax:

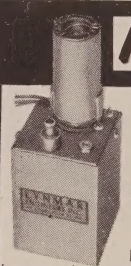
TB-4J matches to 75 ohms balanced	11.95
TB-2J matches to 300 ohms balanced	11.95

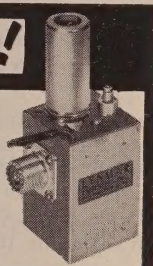
RF Transformers:

T-1J: 50 ohms unbal. to 75 ohms unbal.	11.95
T-2J: 50 ohms unbal. to 200 ohms unbal.	11.95

NOTE:—For 14 to 60 mc range, affix "B" to Cat. No. above.
*Case 6" wide, 13" long, 4" deep, wt. 10 lbs.

It's Here!





AN ELECTRONIC T-R SWITCH THAT REALLY WORKS!

Frequency Range 1.5—60 MC

(TypeTRS-1) (TypeTRS-2)

FEATHERWEIGHT • MIDGET-SIZE • 1KW

Type TRS-1: Don't confuse this great, new electronic Transmit-Receive Switch with anything similar you have ever known. See article June, 1957, QST by S. Sabaroff. Designed for mounting in transmitter; does not add any TVI; no dead spots; makes most receivers work better giving up to 15 db increase in sensitivity. This TR Switch is a must for every Ham Transmitter.

Type TRS-2: Designed for those who find it impossible to mount a TR Switch in the transmitter. This TR Switch is of the customary type connected to transmission line by means of a T connector (Amph. 83-IT). The gain is approximately unity or more over the frequency range.

For those who wish to make their own — RF Output Transformer, only, type TRS-1T (with instructions) $3.45

Both types use negligible RF power for operation and take 6.3 volts filament and 100-150 volts for plate of type 6AH6 Tube, ordinarily delivered by the transmitter, receiver or simple, external supply.

Dimensions: 1½ x 1½ x 2¼ Weight: Approx. 4 oz.

PRICE each $11.95 (with tube)

LYNMAR ENGINEERS, Inc. Consultants and Manufacturers
1432 N. Carlisle Street • Philadelphia 21, Pa.

For further information, check number 50 on page 126.

International's

NEW 1958 *Catalog!*

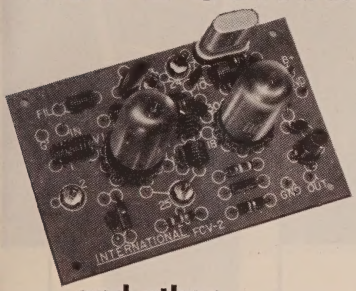


NOW AVAILABLE
Precision
CRYSTALS
and
Electronic
EQUIPMENT

Send for your FREE copy . . . Today!

Ask About the NEW

FCV-2 CONVERTER



Model 50
6 Meters
Model 144
2 Meters

and other
PRINTED CIRCUIT UNITS

- *T-12 12-Watt Transmitter*
  3500-4000 KC 7000-7300 KC
- *VFA-1 Cascode Preamplifier*
  For 2 Meters or 6 Meters
- *IFA-10 IF Amplifier*
  For Use Between Converter and Receiver.
- *FO-1 Printed Circuit Oscillator*
  For Generating Spot Frequencies with Guaranteed Tolerance from 200 KC to 60 MC.
- *FO-1L 100KC Oscillator*
  For Band Edge Calibration and Frequency Standard Use.
- *FMV-1 10 KC Multivibrator*
  Used with FO-1L Oscillator
- *FO-6 Oscillator and Buffer Assembly*
- *C-12 Alignment Oscillator*
  12 Most Used Frequencies Instantly Available. 200 KC to 60 MC.

ONE DAY *Processing!.*



FA-9 CRYSTALS

For AMATEURS—
EXPERIMENTERS 1500 KC to 50 MC

Wire mounted, plated crystals for use by amateurs and experimenters where tolerances of .01% are permissible and wide range temperatures are not encountered.

CIRCUIT: Designed to operate into a load capacitance of 32 mmf on the fundamental between 1500 KC and 15 MC. Designed to operate at anti-resonance on 3rd overtone modes into grid circuit without additional capacitance load. 5th overtone crystals designed to operate at series resonance. **(Write for recommended circuits)**

Prices Pin Diameter .093"
Pin Spacing .486

(FA-9 Fits Same Socket as FT-243)

FREQUENCY RANGE	TOLERANCE	PRICE
1500-1799 KC	.01%	$ 4.50
1800-1999 KC	.01%	4.00
2000-9999 KC	.01%	3.00
10000-15000 KC	.01%	4.00
Overtone Crystals—3rd Overtone Operation		
15 MC-29.99 MC	.01%	$ 3.00
30 MC-54 MC	.01%	4.00
Overtone Crystals—5th Overtone Operation		
55 MC-75	.01%	4.50
76 MC-90 MC	.01%	6.50

PRECISION CRYSTALS
COMMERCIAL USE
F-6 SERIES
1500 KC — 50 MC

NOTE: The FA units will not necessarily have the correct correlation for Commercial use.
For commercial applications, the F-6 type unit should be used. Write for details!

One Day Service! Specify exact frequency and crystal will be calibrated to .01% or better of this frequency, when operated in the specified operating circuit.

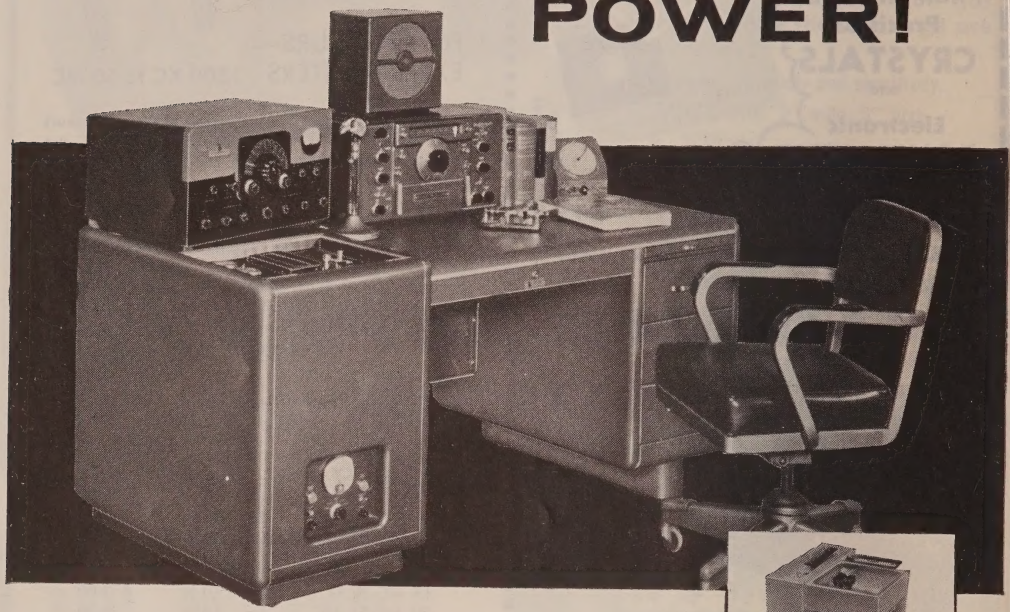
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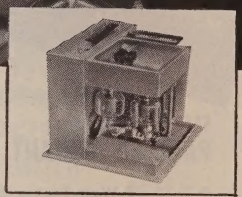
New, revised circuitry and a pair of 4-400A tubes in Class AB_2 easily deliver maximum legal power of 2000 watts peak envelope power input in SSB mode—provides a full 1000 watts input in AM mode with a husky modulation transformer and a pair of push-pull Type 810 tubes in Class B modulator service. 1000 watts input in Class C CW mode. High efficiency pi-network output circuit will match nominal 50 to 500 ohm antenna loads and will tune out large amounts of load reactance.

Compact pedestal contains the complete kilowatt—rolls out for easy adjustment or maintenance. Excitation requirements: 30 watts RF and 10 watts audio for AM; 2-3 watts peak for SSB. Completely wired and tested, with tubes.

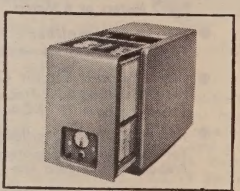
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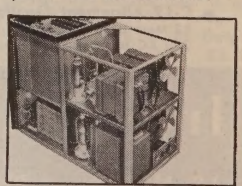
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Interior view showing conservatively rated power equipment, heavy duty modulator.

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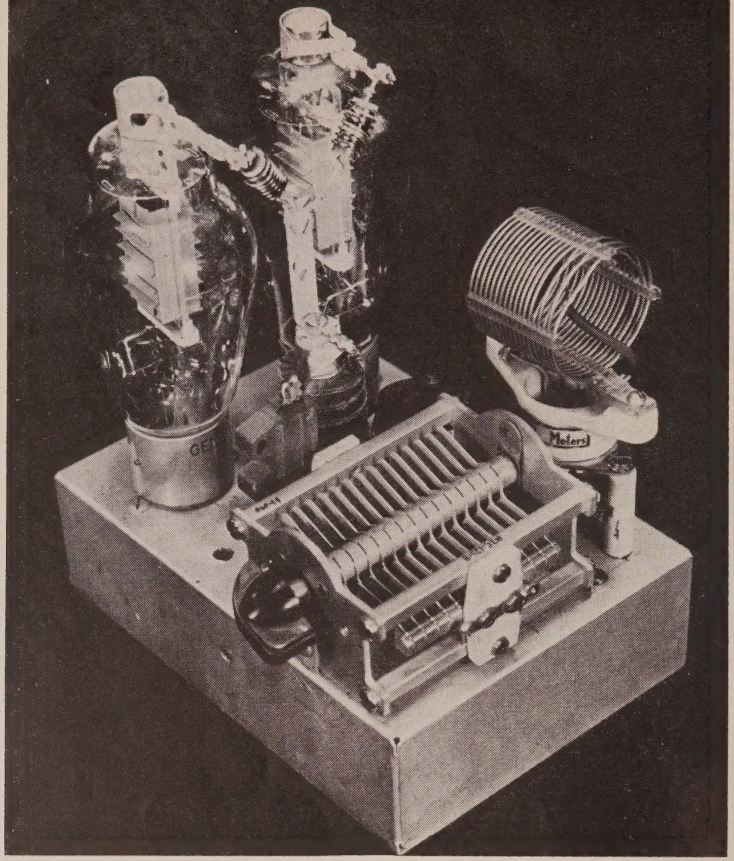


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An Economical Half-Gallon Linear

by HOWARD L. SMITH, W6COU
5532 East National Avenue, Fresno, Calif.

The linear R-F amplifier about to be described is not the finest amplifier in the world. There are no new principals envolved. It is not spectacular. In fact, in the form presented here, it is not even designed to handle the legal kilowatt limit. However, it is doubtful if you could find a linear capable of handling in the neighborhood of a half kilowatt (SSB, DSB, or CW) as simply and as economically as this arrangement. The popular 811A tubes used probably offer more plate dissipation watts per dollar than any other tube. In addition, no expensive sockets are required. No blowers are necessary. Only two supplies are required: filament and plate.

After the amplifier was placed in operation at W6COU, the author began receiving requests for the dope on the device. This was slightly amazing at first since, as mentioned before, nothing new had been invented. Apparently, however, the big attraction was the economical efficiency. Evidently a great many of us are still interested in getting the most output per dollar input.

As may be seen in fig 1, a pair of 811A tubes are used in a grounded-grid circuit. It will be noticed right off the bat that the secret of the simplicity is the filament choke. A year or so ago this amplifier would not have been so simple and easy to come by. The commercial type filament choke is a wonderful invention and makes everything just fine and dandy, not only for this but for just about any other kind of grounded-grid amplifier you might desire.

The input signal is fed through C1 to the filaments of the 811A's which are kept above ground for rf by means of RFC1. Capacitor C1 is necessary merely to prevent short-circuiting the filament to ground through the output

coil of the driver. If the driver has a series capacitor in the output C1 will not be necessary. Capacitor C2 is used to keep both sides of the filaments at the same rf potential. Capacitors C3 and C4 are used to keep the "cold" end of the filament choke more or less firmly tied down to ground for rf. None of these capacitors are critical as to value.

Parasitic suppressors R1 and R2 were found advisable to prevent a slight tendency toward instability on the 10- and 15-meter bands.

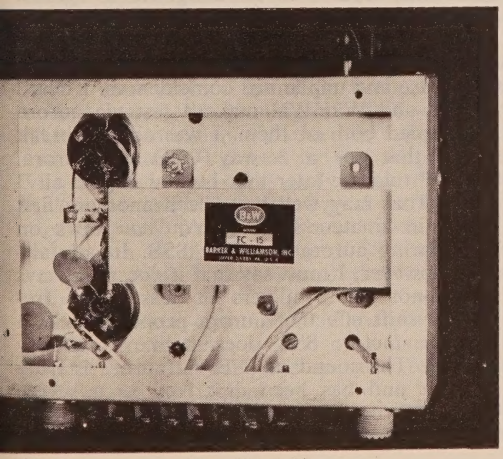
The plate choke, RFC2, must be suitable for use over the range of frequencies to be used and must, of course, be capable of handling the plate current. The cold end of this choke is tied to ground by means of C5, whose exact value is not critical but must have a working voltage rating well over the value of the plate supply potential, preferably at least twice as much.

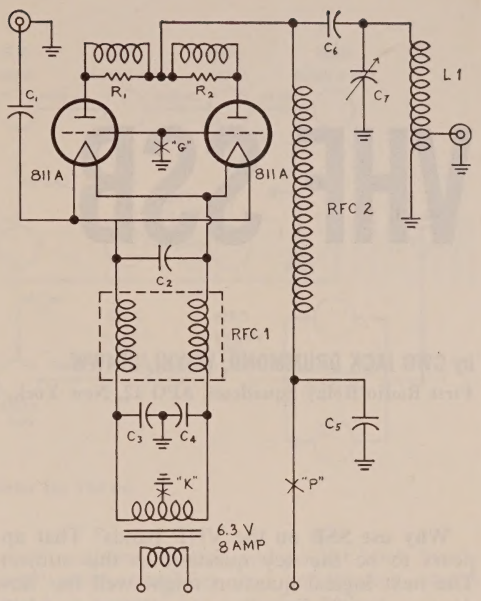
The exact capacity of C6 is not critical, its purpose being to block the dc plate voltage from the output circuit, while at the same time offering a low impedance to rf. This capacitor should have a working voltage rating of at least two or three times the value of the plate voltage.

The plate circuit (C7-L1) is the conventional parallel-tuned circuit. The approximate values of C and L are given in Table I. These values are based upon a plate voltage of 1250, plate current of 350 ma., and a Q of 12. The loading is adjusted by varying the position of the tap on L1.

If operation is to be confined to one or two bands, the plate tank circuit shown should be quite adequate. Plug-in coils may be used. However, if so-called all-band operation is desired a PI-net arrangement in the output would be preferable since it is more adaptable to band-switching. For this the reader is referred to a recent article by W6GEG/3.*

Metering may be accomplished in different ways. Plate current may be read by breaking the lead at point "P" and inserting a milliameter. An alternative is to break the lead at





Schematic diagram

point "K" and insert the milliameter. This latter point will, however, indicate the sum of the plate and grid currents. Grid current alone may be read by inserting a milliameter between the 811A grids and ground at point "G". If this is done, the grids should be grounded for rf, preferably at the sockets, through .01 mfd ceramics.

The amount of power that can be run to this amplifier will depend upon the driving power available. Single-sideband exicters such as the Pacemaker, the HT-30 or HT-32 will drive it to the full safe input of approximately a half KW. The author has found that the Central Electronics 20A exciter will drive it to about 250 watts on the lower frequency bands and about 150 watts on the higher frequency bands. The addition of a driver such as a single 837 in grounded-grid in between the 20A and the amplifier should enable operation at four or five hundred watts input. Indications are that it requires 30 to 40 watts peak power to drive the amplifier to its full capabilities.

The proper tuning and loading for a linear amplifier has been discussed in a number of excellent articles so no attempt will be made here to go into this phase. However, some important points might be mentioned. Tuning of the plate circuit may be done by the usual dip method, although a much better method is to use a field-strength meter or rf ammeter in the transmission line in conjunction with the plate meter. One very important point to remembers is to keep the amplifier heavily loaded to avoid limiting, although not to the extent

*"Simplified Loading of Pi Coupled Amplifiers," by Norman R. McLaughlin; CQ, April, 1957.

[*Continued on page 106*]

VHF SSB

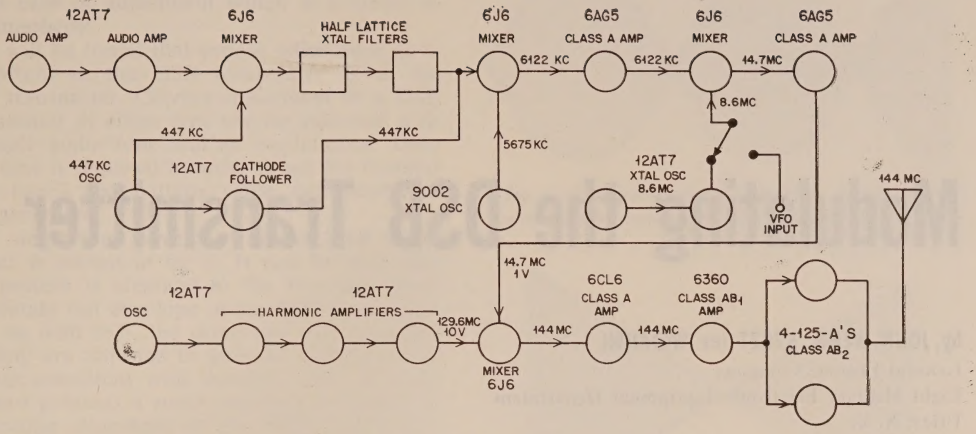
by CWO JACK DRUMMOND, W3YHI/DL4WW
First Radio Relay Squadron, APO 12, New York, N. Y.

Why use SSB on the VHF bands? That appears to be the key question to this subject. The next logical question might well be "how do you do it?" I'm going to attempt to cover those aspects for you this evening. Incidentally, I don't own stock in any SSB manufacturing concerns so if my own enthusiasm carries me away, please blame me and not industry. I'm "sold" on it.

As to the first question, "why use SSB on VHF," let me begin by giving you an idea of my own experiences with it on 2 meters. In April of 1956 I started keeping schedules 4 nights per week with W2JJC in New Market, N. J. that was about 190 miles airline distance. At that time, Arnie was running 400 watts of SSB and was the only station that I had then heard using SSB on 2 meters. I was then running 120 watts into my old reliable 829B on AM and CW. I had gained a healthy respect for my 829 rig as I had used it both in Europe to run up contacts with Germany, France, Belgium, Holland, Switzerland, Austria, England and here at Washington for contacts with 19 states plus Canada and Nova Scotia. But, it just couldn't "cut the mustard" for day in-day out contacts with W2JJC. I soon found that I was using CW more often than fone in order to get through. At the same time, W2JJC was constantly dangling a nice fone signal under my nose by using SSB. This finally got under my skin, so I built my own rig for SSB in July 1956.

I had not previously played with SSB and wanted to find out for myself about the so-called advantages of SSB over AM. With that in mind, I designed my SSB rig to use the same final amplifier tube (829B) working at the same plate voltage (500) and to operate on the same frequency using the same microphone and antenna. I frequently switched transmitters during QSO's to compare the "talk power" of the SSB rig against both the AM and CW from the old rig. I measured the average output power of the SSB rig at 41 watts. How did it stack up? My old CW-AM rig has been gathering dust ever since. I now use it only for ballast to hold my rack solidly on the floor. I found that if my CW could be copied, my SSB could also be copied. Why pound away on the "idiot stick" with CW when you can do the job quicker and more pleasantly with fone via SSB? I have since raised my power level a bit by replacing the 829 with a pair of 4-125A's.

I completed more than 190 QSO's with W2JJC without a single case in which we could not carry on the contact. During the winter of 1956 I carried on similar tests with W4SOP in Burlington, N. C., at about 250 miles with the 829B on SSB. The results were the same although the signals were down in the noise at times. We found it possible to carry on QSO's when the signals were so weak that the receiver "S" meter refused to move except on noise pulses. The next question then was "what would happen during aurora?" By that time, SSB was booming on 2 meters. There were 4 of us using it—W2JJC, W3HWN, W4SOP and myself. It took a bit of doing but finally the chance arrived by one of those rare and unplanned coincidences. I heard W2JJC and W3HWN make a test via aurora and copied both of them. I was able to break in on that for a 3 way QSO via aurora. W4SOP told me later that he had copied all 3 of us. That may well have been another "first night" in amateur history. You *can* work on fone during aurora by using SSB. In all fairness, however, I must say that it doesn't always work—not on 2 meters at least. The frequency shift effect of aurora propogation is a variable factor. SSB doesn't like frequency shifting. The sound of SSB via aurora is truly peculiar and has been described as a severe case of laryngitis eminating from the bottom of a pickle barrel. I recently had the pleasure of



500 watt SSB transmitter for 144 mc.

proving to W9EGH in Goshen, Indiana, that it does work. His remark was typical, "I didn't think it could be done."

Some of you may not be too well versed on SSB. Let me take just a moment to touch on a few points about it. You can copy SSB on a conventional receiver if that receiver is reasonably stable. I used a battered old BC-779 running barefooted and had very good luck with it. You *can* get both AM and CW out of your SSB transmitter. How? Simply, twist a knob and reinsert the suppressed carrier. When the carrier is reinserted, you'll have AM with only one sideband. You can key that carrier for CW. So, in passing, the SSB transmitter does not tie you down to suppressed carrier operation unless you so elect. I reinsert carrier on those occasions when the other fellow's receiver can't handle SSBSC, and occasionally for CW. In all fairness I must point out that the ratio of contacts per call was low when I first went over to SSB operation. No one was using SSB in the area and some fellows thought my AM transmitter had gone wild due to the strange sounds they were hearing.

How about TVI? I didn't have it on AM and I don't have it on SSB. Both rigs were built "clean." By running the SSB rig with Class AB1 amplifiers with no grid current, you can eliminate TVI caused by grid rectification. You also have the sneaky advantage that even if someone might hear the signal on their TV receiver, they won't be able to read it!

In summing up why I prefer SSB for VHF, here are what I have found the advantages to be:

a. It is more economical of the power consumed. No power is wasted on a carrier that doesn't convey intelligence and that represents 50% of an AM signal.

b. No power is required for high level modulators. I use only one audio tube and have no investment in back and pocket book breaking speech amplifier and modulation equipment.

c. All of the signal put into the antenna is "talk power," and it's all packed into one sideband. The other sideband isn't necessary.

d. The old familiar VHF story "I can hear your signal, but it's too weak to copy" is gone for me. With SSB, I *can* be copied if my signal can be heard. How many times have you said or heard "I hear a lot of weak fone signals but can't identify them?" SSB would eliminate that.

e. My communications range has been greatly extended for weak signal fone work.

f. I can work as well on SSB fone as on CW for weak signal work.

Now for the second and last major question, "how do you do it?" SSB appears mysterious primarily only because it still isn't generally understood. There are no special tricks needed to get it into the VHF spectrum. Virtually nothing has been printed on the VHF application of SSB, but it really isn't needed. I'll go over a few basic points of SSB techniques for you. Bear in mind that they are true for all frequencies, including VHF.

You cannot multiply frequencies when using SSB. Why? You would multiply the modulation frequencies at the same time. The resulting signal would sound somewhat other than desirable. If you have a SSB signal on 75 meters and you want to put it on 20 meters, you do it by hetrodyning. This is exactly the same basic technique used in the super-hetrodyne receiver. If you have SSB on one of the "low frequency" bands and want to put it on VHF, you simply beat, or hetrodyne, the SSB signal against another signal to produce a third signal at the desired frequency. For example: a signal at 14 mc can be hetrodyned

[*Continued on page 116*]

Modulating the DSB Transmitter

by JOHN WEBB, K2GZT (ex WØAHM)
General Electric Company
Light Military Electronic Equipment Department
Utica, N. Y.

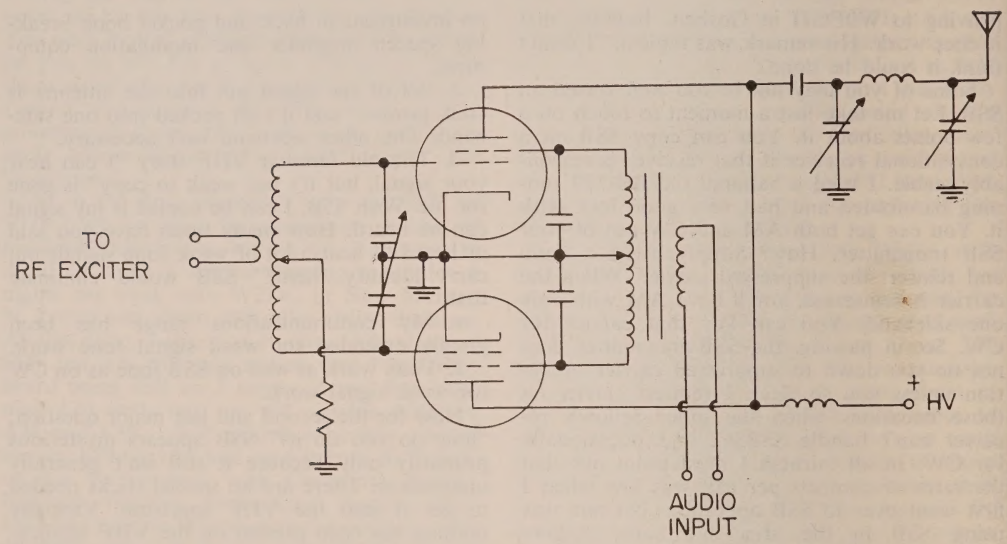


Fig. 1—Schematic diagram of high level modulated DSB transmitter.

With the increasing popularity of double-sideband operation on the amateur bands there appears to be a need for some information as to how to obtain optimum performance from the DSB transmitter. Most operators who have tried DSB have found that it has a few features which make it more desirable than either AM or SSB. It suppresses the carrier; has inherent diversity; is much simpler to build and operate than SSB; allows greater intelligence power output from the transmitter; and, when received on a synchronous detection receiver[1], it is a genuine pleasure to use.

There are two convenient methods of converting to a DSB transmitter. One method involves DSB operation of phasing type exciters in existing single-sideband stations. This is easily accomplished with the Central Electronics' exciters, and other similar equipment, by operating in the AM mode with the carrier suppressed by the CARRIER BALANCE control. The second, and least expensive method, is the high level balanced modulator circuit described by W2CRR[2]. A schematic diagram of the transmitter circuit is shown as fig 1. The circuit utilizes two screen-grid tubes driven in push-pull with the plates connected in parallel. The audio is supplied in push-pull to

the screens. The chief advantage of this method is its ease of adjustment which is a result of its simplicity.

It will be found that proper adjustment is as important in the DSB transmitter as in the SSB transmitter. Correct adjustment of a DSB transmitter of either type can be indicated with a single audio tone and an oscilloscope. Only one tone is required in order to get the familiar "two-tone" test pattern since two sidebands are generated.

A single tone envelope for the DSB transmitter is shown in fig 2. It can be seen that the pattern is identical to the two-tone equal amplitude test envelope in the SSB transmitter. Just as with SSB, the drive and final amplifier loading are adjusted to give the highest power output consistent with linearity. The "Bowtie" pattern presents a more convenient method of indicating alignment of the DSB transmitter. The bowtie corresponds closely to the trapezoidal pattern used in the adjustment of AM transmitters and is obtained with the same oscilloscope connections. Audio is fed to the horizontal plates and double-sideband rf output is fed to the vertical plates. Fig 3 is the pattern that will be obtained with a well adjusted DSB transmitter. Fig 4 shows some of the patterns indicating incorrect transmitter adjustment.

Fig 4a indicates either that the coupling on the final amplifier should be increased or that the audio driving voltage should be reduced. Fig 4b is what will be seen if tubes which need screen bias are operated with too much bias voltage. Fig 4c shows the effect of unbalance in the balanced modulator.

Note the "one-tone" test picture in fig 2. A most likely observation is that the envelope is not filled, or that the average power is less than the peak power. In fact the average power is one-half the peak power. This means that if a tone modulated DSB transmitter was measured as delivering 100 watts of average power to the antenna, the peak power would be 200 watts. This fact may be used to a great advantage if speech clipping is employed. When the peaks of an audio waveform are clipped, the effect is to raise the average power. The clipped speech is passed through a lowpass audio filter to suppress the higher order harmonics, or "splatter," generated in the clipping process. In effect, if the DSB transmitter is modulated with clipped speech it is modulated with square waves. Fig 5 is the DSB envelope displayed on an oscilloscope with a clipped sine wave as a modulating voltage. It is seen that the envelope has nearly constant amplitude or that the peak and average powers are nearly equal. It can be con-

[1]J. K. Webb, "A Synchronous Detection Adapter for Communications Receivers", *CQ*, June 1957

[2]J. P. Costas, "Single Sideband: Is It Really Better Than Amplitude Modulation", *CQ*, January 1957

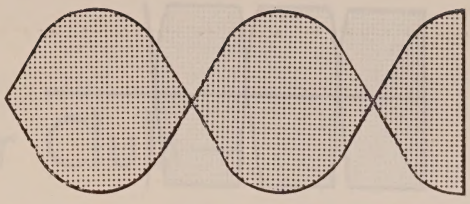


Fig. 2—Oscilloscope pattern showing envelope of a single tone modulated DSB transmitter.

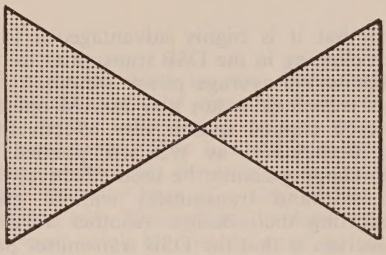
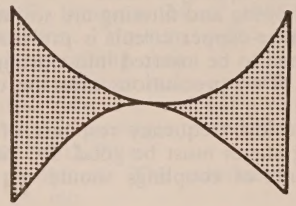
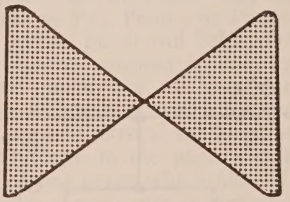


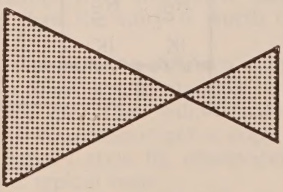
Fig. 3—Bowtie scope pattern obtained with properly adjusted DSB transmitter.



a—Output load impedance too high, or too much audio drive.



b—Excessive bias on screens.



c—Balanced modulator not balanced.

Fig. 4—Bowtie patterns indicating improper adjustment of DSB transmitter.

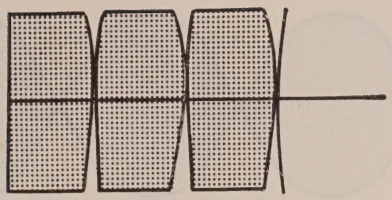


Fig. 5—Oscilloscope pattern showing envelope of a DSB transmitter operating with clipped speech.

cluded that it is highly advantageous to use speech clipping in the DSB transmitter in order to increase the average power output.

This technique is not new as AM operators have used clipped speech very effectively for years. Remember, as W2CRR pointed out, speech clipping cannot be used effectively with single sideband transmitters without greatly complicating their design. Another advantage that accrues is that the DSB transmitter power supply need not have dynamic regulation as good as that required by SSB transmitters since the envelope is of more constant amplitude when speech clipping is used.

Since clipping and filtering are so important, a simple filter-clipper circuit is presented here. It is designed to be inserted into existing speech amplifiers. Two precautions must be observed in its use:

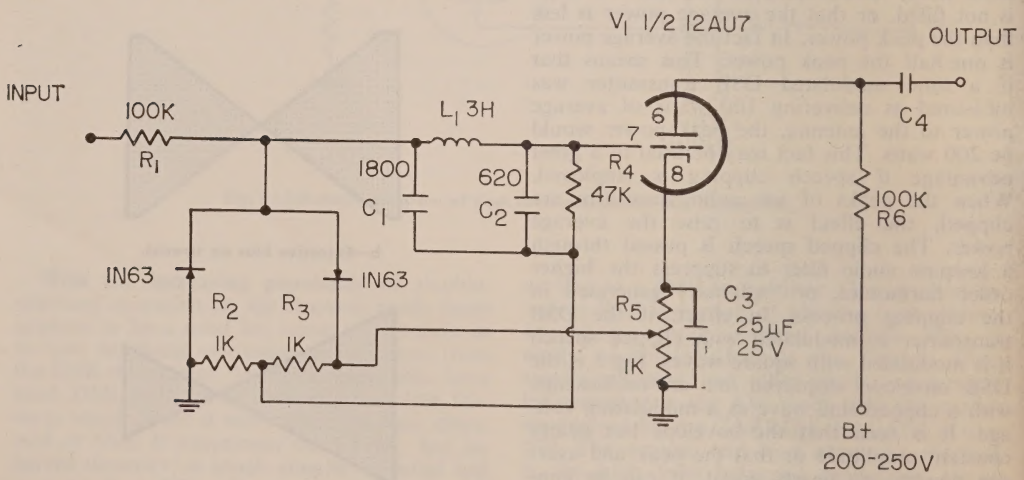
(1) The low frequency response of following stages must be good. RC time constants of couplings should not be less than .005 sec. For this reason, the clipper should not precede the existing pre-amplifier stages as their couplings are not usually this good.

(2) When the clipper filter is included in SSB/DSB exciters, it must be disabled in the SSB mode of operation.

Fig 6 is a schematic diagram of the filter-clipper circuit. The clipping function is accomplished by the two diodes which are biased beyond cut-off by the positive voltage obtained from R5. When the peak input voltage exceeds the bias voltage on either diode, the peak voltage is limited to the bias value. The filter, consisting of C1, C2, and L1, is a low-pass filter with a cut-off frequency of about 3000 cycles. A 10 Henry smoothing choke may be used for L1 if C1 and C2 are 470 mmfd and 330 mmfd, respectively. Either filter combination has nearly the same response, and about 10 db down at 4000 cps. The circuit has about a unity gain when the clipping is adjusted to 10 db and requires from .5 to 2 volts rms driving voltage from a high impedance source. The best place to install it is after the existing audio gain control. R5 then becomes the output level control and the existing gain control adjusts the amount of clipping. A 6AL5 dual diode will work just as well as the 1N63 diodes if it is preferred.

The information presented here should help in obtaining optimum perfomance from a DSB transmitter. The DSB transmitter will allow a much needed modernization of amateur bands with equipment that everyone can afford. ■

Fig. 6—Schematic diagram of speech clipper filter for installation in existing speech amplifier circuits.



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29 College Rd.
Providence 8, R. I.

Newspapers receive and print many "free" items. These are called free because the club or individuals sending in these news items are not paid or charged. Your Ham club can take advantage of this practice to get some free publicity.

The Rub

This free publicity is not as easy to get as it may seem. Of the total material sent in to a newspaper, only a small percentage ever is cast into print. This article seeks to help you increase your chances of having your club's news printed.

Here's How

1. Interest. The main commodity of a newspaper is news. That's what it sells. Therefore, any publicity release you send in should contain some newsworthy fact. Among the possible stories that may interest the readers of a paper are: CD news, emergency communications drills (Field days etc.), elections, awards made to members, and speakers scheduled for meetings. Any event to which the general public is invited is always a good story.

2. Style. The newsworthy fact should always be contained in the first sentence of the story. This is called the *lead,* and contains the classic five Ws: Who, What, When, Where, and Why. For example, if your club has an election, the story you send to the paper should begin:

"Four Podunk men (or local men-keep the interest local) were elected officers of the Podunk Amateur Radio club here last night."

The next paragraph should identify the men by name, age, and street address. Call letters may be included, but will not interest the lay reader, and may prove harmful (TVI, you know).

In following paragraphs, you can tell the reader a little bit about the club, in terms of that which will interest him: e.g. CD, Emergency activities, etc.

A good news story is written like an inverted pyramid. That is, the prime interest comes at the top, the opening lines, of the column. Other information follows in order of its importance. This is done because surveys have shown that the average reader reads only the first few lines of a story to see if it will interest him. If something in those opening lines doesn't catch his eye, he's not going any farther into it.

Unless a person is known to nearly everyone in the community, his name should never begin the story.

Bad: John F. Jameson, 24, of 1985 Elm St., (reader reaction: "Ho-hum, who's he?" turns page, reads something else).

Good: A local amateur radio operator has been nominated to receive a national award for his work in relaying messages to and from servicemen at the North Pole.

(Second paragraph) The nominee, John F. Jameson, 24, etc.

Every newspaper has its style rules. These have mainly to do with such matters as abbreviations and capitalization. Do they write, street, st., St., or Str.? Do they abbreviate Pennsylvania as Pa., Penn., or Penna.? These may seem minor, but it will help your chances of having a story printed if you follow the style of the paper, for all good-sized newspapers have a copy desk which examines every story and corrects errors, spelling, *and* makes the story conform to the paper's style.

I know of one paper which files all material received from a particular organization in the waste-basket, for they have seen from experience that copy from this source contains so many deviations from their style that it costs them more than the story is worth to correct them.

It may be possible to obtain a copy of your newspaper's *Stylebook*, containing its rules for abbreviations, etc. This will, of course be a great aid. If you cannot get a copy, you can learn the paper's style by observation simply by reading a typical issue.

A word now on the use of technical terms. Use them as if it cost you a quart of blood for each one. The ordinary reader will not know what a 16 element beam is, nor will he

[*Continued on page 108*]

The New Look In DC—DC Power Conversion

by E. H. SOMMERFIELD, W2UQB
Endicott, N. Y.

With great advances being made in the fields of semiconductors and magnetics, there is good reason to believe that we will finally see the end of the Electro-Mechanical method of dc to dc conversion.

This article is not intended as a detailed theoretical analysis, but rather to acquaint the average ham with the potentialities of this type of circuit.

There are two new concepts not normally associated with power conversion in the explanation to follow; transistor and magnetic. It will be easier to understand if more detailed step by step analogy is made in a comparison to the familiar vibrator supply.

We are all familiar with the basic vibrator method of changing dc to pulsating dc and then stepping up the voltage *(Fig 1)*.

The first step is to substitute power transistors for the vibrator contacts as in *Fig 2*.

(Note vibrator contacts dotted in.) In this application, it is also necessary to connect both collectors together since they must be physically attached to the chassis for heat dissipation purposes. At present, disregard the base return circuits. They will be explained later in this article.

If we now apply a negative square wave alternately between a—b and d—e respectively, then points a—c and d—f respectively will appear alternately as approximate short circuits (less than 0.1 ohms in most cases). This action will produce pulsating dc similar to a vibrator.

The next step is to supply this alternate square wave to the base circuits in the proper phase. It will be simpler if we look at each half separately *(Fig 3)*. The dot indicates points of instantaneous in-phase polarity.

Under basic transformer action, the electron flow and polarity relationships of *Fig 3* result. Proper operation of this circuit demands that the transistors be operated under saturated conditions for two reasons:

1. Maximum voltage across primary of transformer is obtained.

2. Minimum voltage drop and dissipation across the transistor.

This last statement, as shown by *Fig 4*, is very important, as it is the limitation of external loading.

The transformer core is manufactured by winding many wraps of ½" x 1 mil Deltamax Ribbon into a torroidal form having no air gap. It is a commercially available item. There are other factors involved, but basically the approximate expressions for frequency of operation and voltage output are:

$$f = \frac{(\text{Supply} - 0.8)\ \text{Volts}}{4 \times a \times N \times B_S \times 10^{-8}}$$

$$E\ (\text{output}) = E\ (\text{Supply} - 0.8\ \frac{N\ (\text{Sec.})}{N\ (\text{Pri.})}$$

This is not an exact expression due to variations in core material and area. It may be used, however, to put you in the ball park. "a" = core area in cm^2 as specified by the manufacturer, B_S = saturation flux density, also as specified by the manufacturer, nominally 15 Kilogauss for Deltamax. N = number of turns of the primary winding.

An experimental circuit *(Fig 5)* was constructed to demonstrate the advantages of this mode of dc-dc power conversion. With 6 volts input at 8.0 amperes, 400 volts output at 100 milliamperes was obtained. This is 83 per cent efficiency. Note that a bridge rather than a voltage double rectifier was used. This is so as each transistor works into the same load. R_1 and R_2 provide self-starting bias, and also provide a Thevenin equivalent series base current limiting resistance. C_1 and R_3 serve as spike eliminators by slowing the switching action slightly. They are similar to buffering components in a vibrator supply. With 12 volts input at 8.0 amperes, 400 volts at 210 milliamperes output could be obtained, at 90 per cent efficiency. There is a slight additional copper loss at 12 volts since the primary turns must be doubled. Note that this circuit becomes more efficient as the input voltage is raised because the voltage drop across the transistor becomes a lower percentage of the input voltage. This experimental model was designed to operate in the neighborhood of

1,000 cycles, well below the cutoff frequency of 4 or 5 kc, usually found in power transistors in the common emitter configuration. This is a common emitter configuration since the base return is to the emitter through a low resistance. At 1,000 cycles, using a full wave bridge rectifier, filtering is easily accomplished with a single 12 mfd electrolytic condenser.

Construction Details

The collector dissipation $W_c = V_{ce} \times I_c$, where V_{ce} = the voltage from collector to emitter, and I_c = the collector current. This wattage is limited because its dissipation raises the junction temperature above the maximum safe ratings published by the manufacturer. The junction temperature $T_j = T_m + (W_c \times T_g)$, where T_m = the temperature of the mounting base, W_c = the collector dissipation in watts, and T_g = the thermal gradient in degrees per watt. Both T_m and T_g are measured in Centigrade. For the 2N277, $T_j = 95$ degrees, and $T_g = 1.2$ degrees/watt. The expression for junction temperature illustrates the need for means to reduce the mounting base temperature T_m, since the lower T_m becomes, the higher W_c, the collector dissipation, can be. By mounting the transistors on a 6" x 6" x ¼" aluminum plate called a "heat sink", T_m can be reduced by conduction. For the heat sink to be efficient, its surface area must be large enough to dissipate the heat without undue temperature rise. Usually ¼" aluminum is used since it has sufficient thickness and conductivity to distribute the heat throughout its area. In addition, fins constructed from aluminum angle stock were added to increase the surface area. It is important, when mounting the transistors and angle stock to the heat sink, to make sure that both surfaces are clean so that contact is made over the entire mounting surface.

The application of silicone grease between the transistor and the heat sink will assure thermal contact over the entire transistor heat sink area.

In conclusion, I would like to state that there are those of us, and I hope that our ranks are steadily increasing, who enjoy improving the efficiency of the equipment that we use. When new components, such as those described in this article, become available, we like to translate them into practical circuits that the average ham can use. The subject circuit falls into this category. Its efficiency surpasses that of either vibratory or rotary converters. Therefore, for those who like to advance with the state of the art, I heartily recommend this new method of dc-dc power conversion.

[*Continued on page 102*]

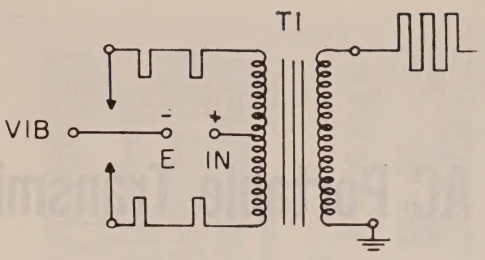


Fig. 1—Basic vibrator connection.

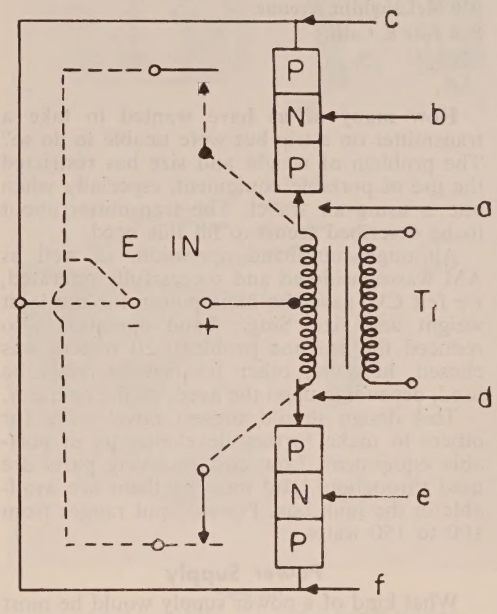


Fig. 2—Transistor-vibrator analogy.

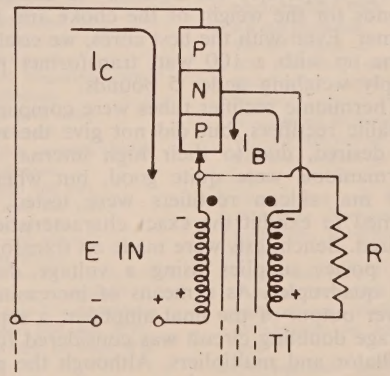


Fig. 3—Transistor circuit operation.

AC Portable Transmitter

by JO EMMETT JENNINGS, W6EI

Jennings Radio Manufacturing Co.
970 McLaughlin Avenue
San Jose 8, Calif.

How many of us have wanted to take a transmitter on a trip but were unable to do so? The problem of weight and size has restricted the use of portable equipment, especially when one is using air travel. The transmitter about to be described seems to fill this need.

Although multiband operation, as well as AM was considered and successfully operated, we felt CW gave the most power for the least weight and size. Single band operation also reduced the antenna problem. 20 meters was chosen, however, other frequencies could be used, depending upon the needs of the operator.

This design should suggest novel ways for others to make further developments in portable equipment. Low cost receiving parts are used throughout, and most of them are available in the junk box. Power input ranges from 100 to 150 watts.

Power Supply

What kind of a power supply would be most suited for this type of operation? Inverters could be a possibility, however the size and weight eliminated that method. Since a power transformer is generally incorporated in high voltage supplies, it was necessary to add several pounds for the weight of the choke and transformer. Even with the best cores, we could not come up with a 100 watt transformer power supply weighing under 5 pounds.

Thermionic rectifier tubes were compared to metallic rectifiers, but did not give the results we desired, due to their high internal drop. Germaniums were quite good, but when the 500 ma. silicon rectifiers were tested, they seemed to exhibit the exact characteristics we desired. Bench tests were made on transformerless power supplies using a voltage doubler and quadrupler. As a means of increasing the power output of the final amplifier, a separate voltage doubling circuit was considered for the oscillator and multipliers. Although the power output was higher when two supplies were used, reduced weight and size caused us to employ only one supply.

One more point regarding the use of the voltage quadrupler which should prove of interest, is the fact that we could take off half voltage from the center of the quadrupler and this would give us exciter voltage without an extra power supply.

Selection of Tubes

The radio frequency section would require the vfo, multipliers and amplifier. The exciter section should not be a problem since the miniature tubes would perform in the capacity desired. The PA stage should be small; have a high plate current capacity, and low filament drain. A single tube could perform this task with the exception of the high filament current at low voltage.

Our next idea was to employ a group of low voltage tubes each with moderate plate resistance, and combining series heaters to eliminate the filament transformer. Several types of tubes were tested with the elements connected in multiple, and the 12AQ5 finally was selected as the most satisfactory type. Of the various tubes tested in the oscillator and multiplier stages, the 12BA6 was selected as a good all-purpose type. Naturally, a compensating resistor was necessary to balance the filament currents in the series filament arrangement. So far, we have the oscillator, multipliers and final amplifier tubes, all operating with series filaments in the ac line without a filament transformer.

Preliminary Testing

When the signal was monitored, we had 60 cycle modulation which represented about 30% to 40% of the carrier. The R-C filter networks had no effect upon this modulation. Finally, it was concluded that there were harmonics in the power lines which were responsible for this problem. Simply by inserting a .001 condenser in parallel with the ac line, we were able to cut the hum in half. The hum level was still more than we felt was necessary. A .002 condenser was connected across the

output of the voltage quadrupler which did away with the hum. After installing voltage regulators across the vfo plate supply, we were well pleased with the over-all stability of the unit. What seemed to be a difficult problem to cure proved to be quite simple.

Radio Frequency Section

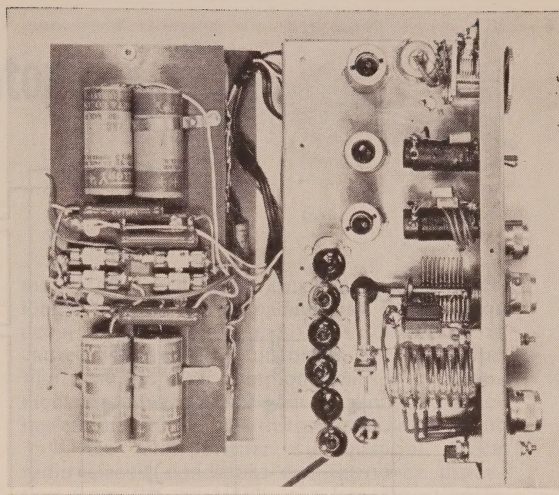
The vfo consists of a feedback type oscillator circuit using a Hi-C tank circuit with a feedback coil wound on a toroid. Approximately a .001 fixed capacity is used, having high temperature stability. The doublers are all conventional, and the keying for the CW is accomplished in the oscillator. In order to simplify the final amplifier, we used a very old neutralizing system consisting of a shunt feed tapped tank coil with one end grounded. A few turns of wire inductively coupled to this coil was used to supply the neutralizing voltage to the 12AQ5 tubes. The output matched from 10 ohms to 300 ohms simply by tapping the tank circuit. To save space and weight, a 2 volt .06 amp. pilot light is used to indicate antenna current. As can be seen in the diagram, a capacity rf divider supplies the small amount of current necessary to light the bulb. If the bulb should burn out, the transmitter will still function. No other form of metering is used sinced weight and space are of such importance. Power supply impedance, conservative ratings and stability, do not warrant the use of meters. The schematic diagram shows the simplified version of the Portable Transmitter.

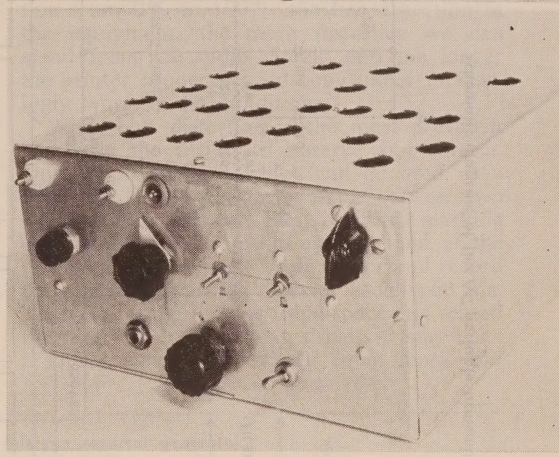
Final Tune-Up, and Operation

After each circuit has been checked and found to be operating correctly, the filaments of the tubes are turned on, then the power switch is turned to "on" position. As is shown in the diagram, a 200 ohm, 25 watt potentiometer is connected in series with the rectifier. The reason for this resistance is to limit the inrush current to the rectifiers. As soon as the switch has been turned on, the resistance is reduced to minimum and left in that position during the rest of the operating period. It is safe to leave the power supply on once the condensers are charged. I attempted to use just the power switch without a limiting resistor, but promptly destroyed the rectifiers, so for starting, a limiting resistor was inserted. Possibly a high/low switch would serve the same purpose.

The one thing regarding the power supply is lack of isolation. Do not, under any condition, ground the chassis to ground, because it will short out the rectifiers through the 115 volts. The antenna connection going to a 50 ohm or 300 ohm antenna has been isolated by a condenser in each leg in order to eliminate any possibility of grounding this equipment.

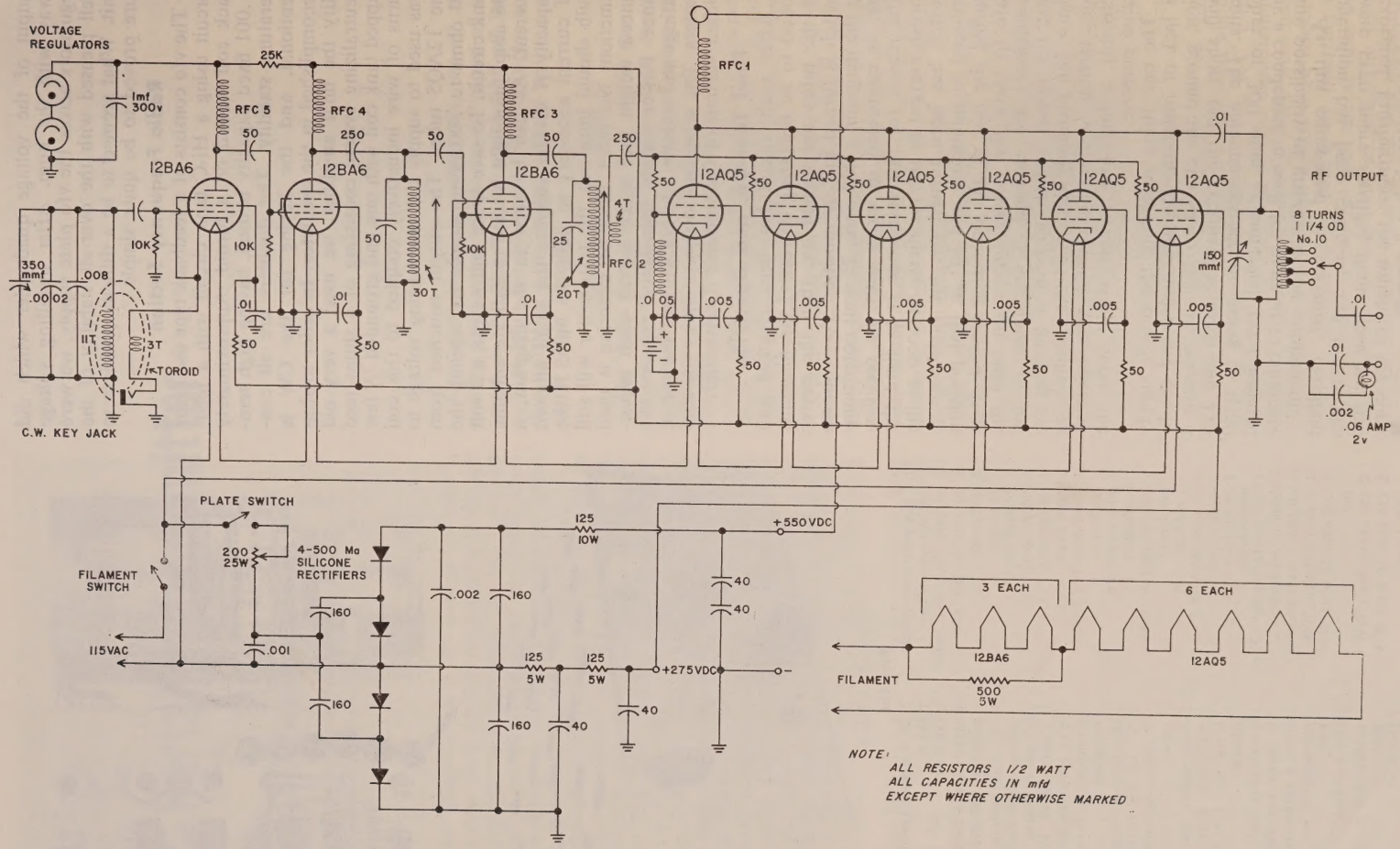
As this equipment is designed, excellent operation has been realized, and the results were even more startling than those we had expected. Furthermore, the weight of the completed transmitter is just 7 pounds. ■





Parts List

- 11 7 pin minature sockets
- 7 .005 mfd condenser
- 5 .01 mfd cond. disc. caps
- 1 .01 1200 V disc. caps
- 2 .002 cond.
- 1 .001 cond.
- 1 .000025 cond.
- 2 .00025 cond.
- 4 .00005 cond.
- 1 .0001 cond.
- 1 .0002 Negative temp. coefficient
- 1 .008 zero temp coefficient
- 1 .00035 variable tuning condenser
- 1 1 mfd 300 volt
- 8 80 mfd 450 volt electrolylics
- 4 40 mfd 450 volt electrolylics
- 1 150 mmfd tuning CE = 2005 or equivalent
- 15 50 ohm 1 watt resistor
- 1 5 watt 500 ohm WW
- 1 200 ohm 25 watt WW pot.
- 2 125 ohm 5 watt WW
- 1 125 ohm 10 watt WW
- 2 10 K 1 watt
- 1 25 K 6 watt resistor
- 1 OA 2
- 1 OB 2
- 4 M500 Sarkes Tarzian rectifiers /W clips
- 1 22½ volt battery-photographic flash
- 5 2.5 mh rf chokes
- 1 Toroid farad 11 turns #12 Formvar, feed back winding 3 turns #22 Formvar
- 1 slug tuning 40 meter coil ⅝" od 30 turns #26 Formvar cotton covered wire
- 1 slug tuning coil ⅝ od #16 wire, Formvar, 20 turns sec. 4 turns #22 plastic
- 1 Final tank coil 1¼ od, 6 turns per inch #10 wire, 8 turns similar to alumatronic or equivalent
- 1 CW key jack
- 1 cabinet 9¼ x 9¼ x 5" high
- 1 line cord



Schematic diagram of the AC portable transmitter.

Teletype Reversal Generator

by CHARLES R. TEETERS, K2DHE
1314 Birch Avenue, Wanamassa, N. J.

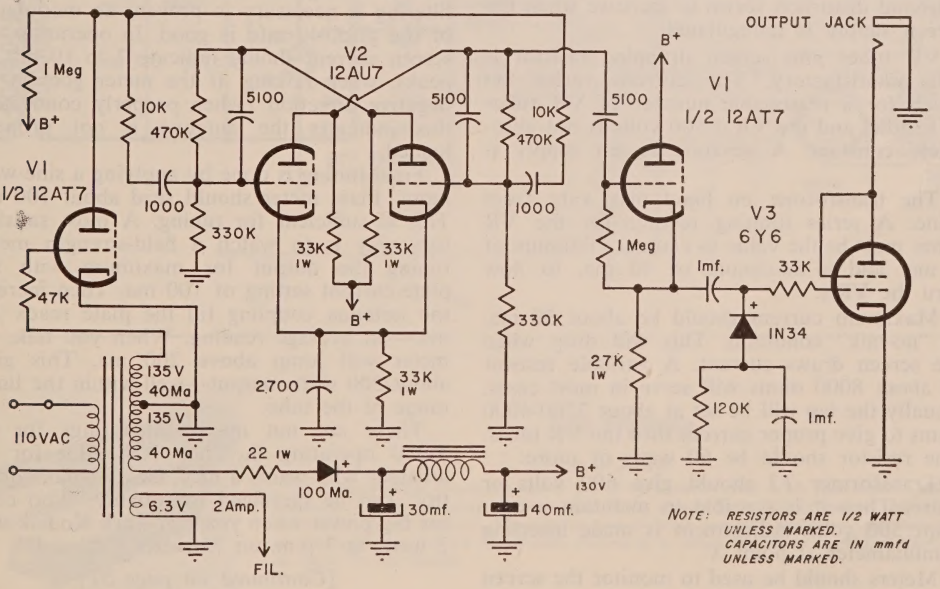
Amateur advances into the field of teletype during the past few years have been tremendous as far as operating equipment is concerned. But as for any teletype test equipment, the amateur has been left in the lurch due to cost and complexity. Commercial test equipment for radio teletype measurement is necessarily complex due to the standards that the commercial stations set for themselves, and that it is designed to operate under working conditions in most cases. Amateur procedure has been pretty much either "it prints or it doesn't" and measurements to reduce the distortion are lacking. The distortion that causes misprints in teletype copy can be introduced at three points; the transmitting equipment, the radio circuit, and the receiving equipment. Since we can do little to control distortion on the radio circuit, teletype test equipment is designed to measure transmitting and receiving equipment so that it can be adjusted to introduce as little distortion as possible.

The most common type of teletype distortion is Bias distortion which is the uniform lengthening of the mark or space pulses of the teletype signal. A mark pulse longer than 22 ms. at 60 speed is marking bias, and a space longer than 22 ms. is spacing bias. Both cannot occur at the same time. Bias distortion is caused by wave shape distortion of the teletype signal, and is most commonly caused in equipment by unbalance between marking and spacing circuits. If the bias distortion exceeds about 35% the teletypewriter will misprint. Since radio circuit conditions can introduce distortion from 0% to 100%, the less distortion in the equipment, the more distortion we can stand from the radio circuit, and the longer the printer produces good copy under increasingly worse radio conditions.

While bias distortion is the most prevalent it is also the easiest to observe and correct. One simple method which can be used as a local test at one station, or made between two stations is as follows. First establish marking condition at the transmitting loop and at the receiving loop connect a millameter and record the receiving marking current, usually 60 ma. Then repeat the process using space and record the receiving loop current, usually 0 ma. Then a square wave with exactly equal mark and

[*Continued on page 104*]

Schematic diagram of the teletype reversal generator.



Changing The Class C 4-250 To AB_1 For SSB

by E. N. MARRINER, W6BLZ
528 Colina Street, La Jolla, Calif.

"I have a beautiful final using a Class C 4-250. How can I use it on sideband?"

It's easy to switch from Class C to Class AB_1. Change the bias and screen supply. All else remains the same. More filtering of the high voltage power supply could help. 20 mfd minimum should be used.

An advantage in using Class AB_1 is that the grid meter may serve as an overmodulation indicator. When it flicks above .5 ma., for proper drive decrease the speech control slightly. TVI increases when the grid current kicks up.

In *fig. 1* the screen operates at 500 volts (*RCA* rating). Some amateurs run the screen voltage higher, at *Eimac* ratings. Since 500 volts is well within the dissipation limits of the tube, should the high voltage go off for some reason, the tube would be protected. A series resistor could be used, but I have found that sideband distortion seems to increase when the screen supply is unregulated.

VR tubes *plus* screen dropping resistor is still unsatisfactory. The current varies too much for a reasonable number of VR tubes to handle, and the VR'd 500 volts is not absolutely constant. A separate screen supply is best.

The transformer on hand may vary from mine. A series limiting resistor for the VR tubes must be the value to cause a minimum of 5 ma. and a maximum of 40 ma. to flow thru the VR's.

Maximum current should be about 30 ma. in "no-talk" condition. This will drop when the screen draws current. A variable resistor of about 8000 ohms will serve in most cases. Usually the tap will be set at about 2500-4000 ohms to give proper current thru the VR tubes. The resistor should be 60 watts or more.

Transformer *T3* should give 600 volts or more. Then it is possible to maintain a constant 500 volts. Adjustment is made inserting a milliameter at point *X*.

Meters should be used to monitor the screen and plate voltage. In Class AB_1 the plate current flows at all times, making a natural bleeder-voltage regulator for the power supply. For safety, a fixed 100,000-ohm 200-watt resistor is used across the power supply to discharge the condenser.

Plate current idles at 55 ma. The 2400-volt power supply drops to 2000 volts and remains essentially constant with talk. That is, when 20 mfds of filtering is used.

Bias should be measured with a VTVM. If a dc meter of 20,000 ohms-per-volt variety is used, it should be de-inserted from the circuit before applying plate voltage. An approximation of grid voltage is all that is necessary. The final grid-voltage adjustment is made watching the plate current for idle resting current of 55 ma. For this, a variable potentiometer is placed across the bias supply. Varying this varies the resting plate current. Set at 55 ma.

Grid voltage will be about —88. Good bias filtering is necessary to prevent ac modulation of the grid. 40 mfd is good. In operation, the screen current should indicate 7 to 10 ma. on peaks, when talking. If the meter goes in the negative direction (when properly connected) this indicates the antenna is not properly loaded.

Final tuning is done by applying a sine-wave input. Plate meter should read about 100 ma. This is sufficient for tuning. A most satisfactory way is to watch a field-strength meter, tuning the output for maximum with this plate-current setting of 100 ma. Then increase the antenna coupling till the plate reads 160 ma.—an average reading. When you talk, the meter will jump above 200 ma. This gives about 200 watts output—well within the linear range of the tube.

These are not maximum ratings for the 4-250 operating in Class AB_1. But for the amateur who wants a nice, clear signal, "quantity" can be sacrificed for quality. Who cares for big power when you can work Kodiak with 2 watts at 7 p.m. on 75-meter sideband?

[*Continued on page 51*]

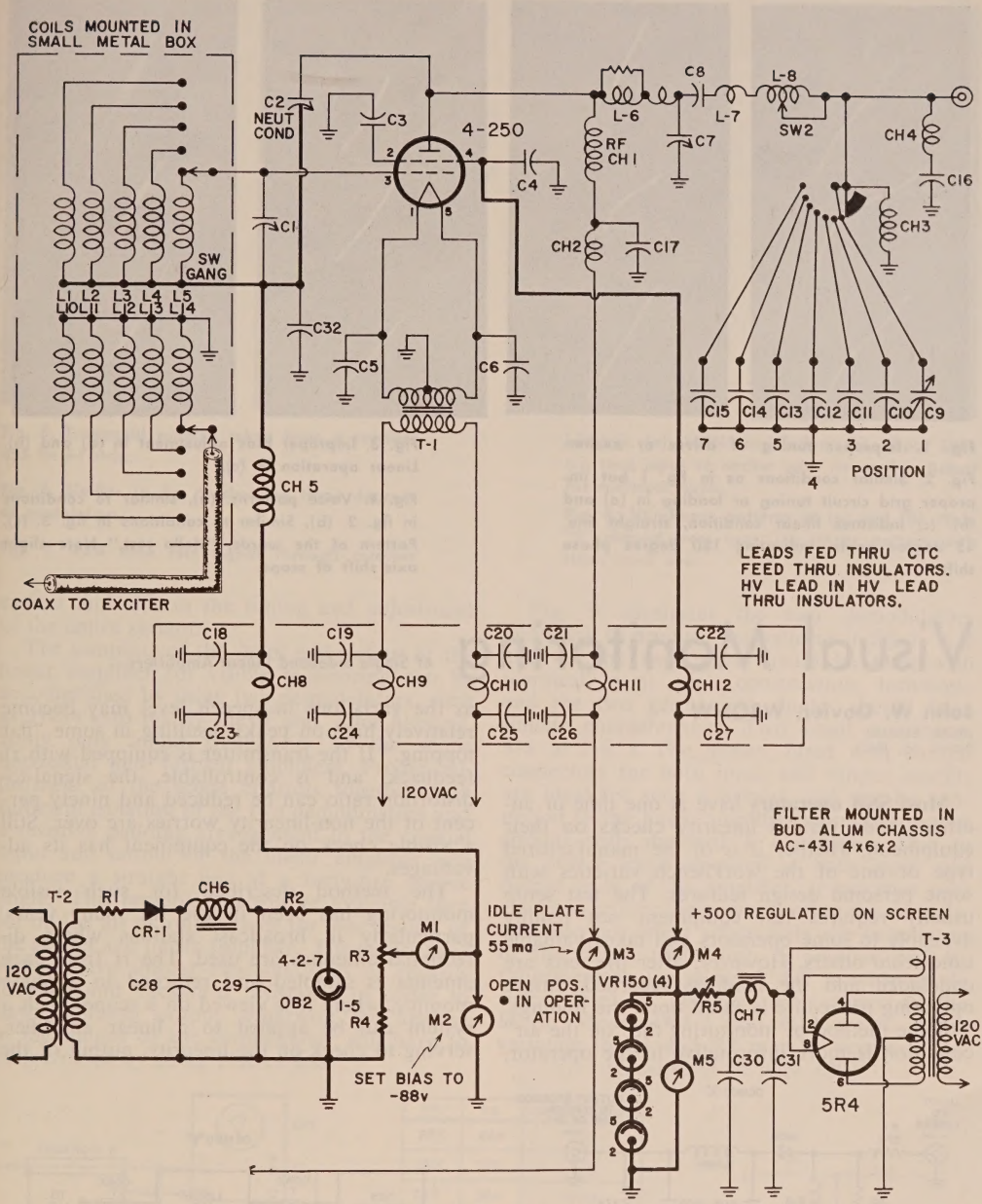
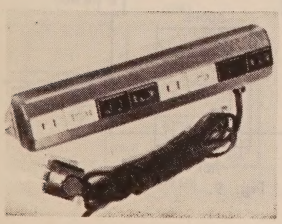


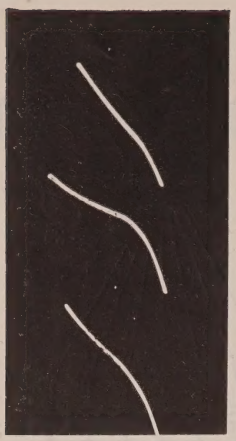
Fig. 1



New Products

Four Outlets

CBC Electronics Company has a heavy duty outlet unit with four outlets and a separate switch to handle each outlet. This should be a dandy gadget for every workshop and ham shack. The sockets and switches are replaceable and are mounted in a hammertone brown metal case. Rating is 15 amperes, 115 volts. Price? Circle F on page 126 for details.



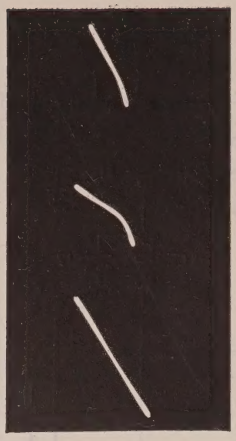


Fig. 1. Improper tuning of driver or exciter.

Fig. 2. Similar conditions as in fig. 1 but improper grid circuit tuning or loading in (a) and (b). (c) indicates linear condition, straight line, 45 degree angle, indicating 180 degree phase shift.

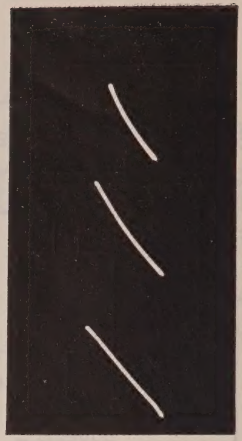




Fig. 3. Improper bias adjustment in (a) and (b). Linear operation in (c).

Fig. 4. Voice patterns. (a), similar to conditions in fig. 2. (b), Similar to conditions in fig. 3. (c), Pattern of the words, "Hello test." Note slight axis shift of scope.

Visual Monitoring

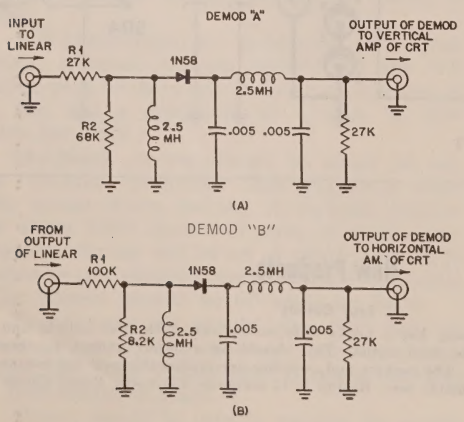
of Single Sideband Linear Amplifiers . . .

John W. Govier, W8QNW
18670 Gilchrist
Detroit 35, Mich.

Most SSB operators have at one time or another, made various linearity checks on their equipment, whether it is of the manufactured type or one of the workbench varieties with some personal design features. The test setup usually requires test equipment not readily available to some operators and takes valuable time from others. However, after the tests are concluded and the readings recorded, future operating procedure is based upon the findings.

Some method of monitoring the "on the air" condition is more informative to the operator, as the variations in speech level may become relatively high on peaks resulting in some "flat topping." If the transmitter is equipped with rf feedback, and is controllable, the signal-to-distortion ratio can be reduced and ninety percent of the non-linearity worries are over. Still a visible check on the equipment has its advantages.

The method described for such visible monitoring has been in use for many years, particularly in broadcast stations where directional antennas are used. The rf from each antenna is sampled and returned to a phase monitor, where it is viewed on a scope. Such a system can be applied to a linear amplifier, serving to check on the linearity, output of the



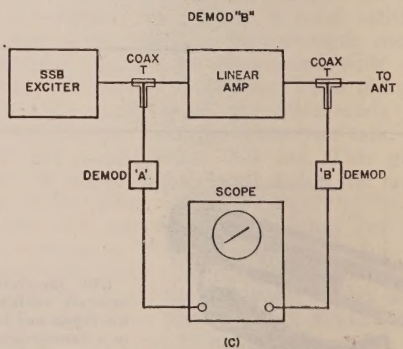


Fig. 9.

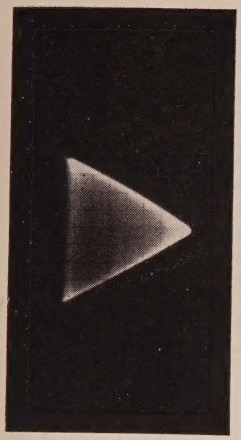


Fig. 5. Trapazoid pattern taken from a receiver 455 kc i-f strip.

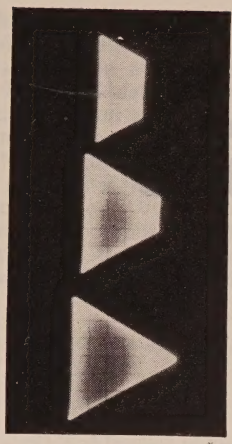


Fig. 6. Similar to fig. 5, showing three degrees of modulation.

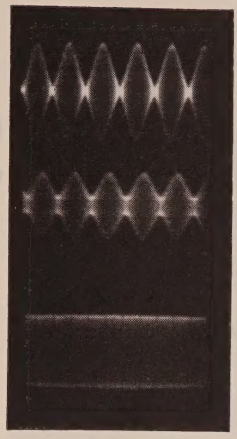


Fig. 7. Two tone test signal through receiver i-f strip. (a), 100% modulation, (b), about 50%, (c), tone input to exciter with no carrier. Adjust for minimum ripple.

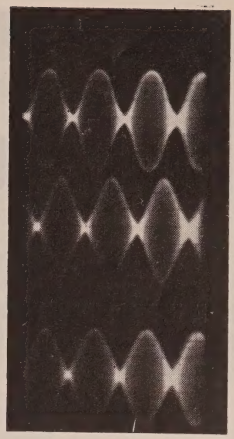


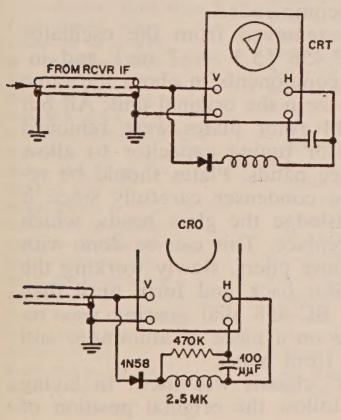
Fig. 8. Non-linear patterns in (a) and (b). Note "S" shaped cross over. (c), Linear pattern with clean cross over.

exciter and aids in the tuning and adjustment of the entire system.

The sampling of the input and output of the linear amplifier for visible monitoring can be accomplished by using two demodulators, such as 1N58's, to rectify the rf and, after filtering, apply only audio frequencies to the scope horizontal and vertical amplifiers. Proper adjustment of the scope controls together with sufficient isolation of the two demodulators and a resistive padding arrangement to the coaxial input and output of the linear amplifier will produce a straight line at a forty-five degree angle. This presentation will be available then for on the air mornitoring or for tone testing of the exciter and linear amplifier. The diodes used should have similar characteristics as regards forward and backward resistance in order to have sufficient output, otherwise the loading at the output of the demodulator will have to be increased by using 15K or less.

Fig. 9 illustrates the two demodulators necessary to produce the patterns in fig. 1, 2, 3 and 4. The two units should be built with identical parts and construction technique and the two germanium diodes should have similar characteristics. Two small mini-boxes 3¼ x 2⅛ x 1⅝ inches, fitted with coaxial connectors for both input and output circuits are ideal for such a demod, and can be connected to the linear amplifier input and output circuits with standard T connectors. Due to the power levels involved at both input and output ends of the amplifier, it becomes necessary to reduce the power level to the demods, and also not affect appreciably the impedance of the circuit under test. A resistive pad arrangement shown in fig. 9 will provide ample signal level to operate such scopes as the Heath Model OM-2 and O11 series. Some variation in R1 and R2 may be necessary de-

[*Continued on page 100*]



R1	R2	APPROX LOSS IN DB
27K	68K	3DB
50K	50K	6DB
68K	30K	10DB
82K	17K	75 DB
90K	10K	20DB
92K	8K	22DB
95K	5.6K	25DB

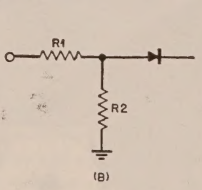


Fig. 10.

Do-It-Yourself SSB

by E. H. MARRINER, W6BLZ
528 Colima Street, La Jolla, Calif.

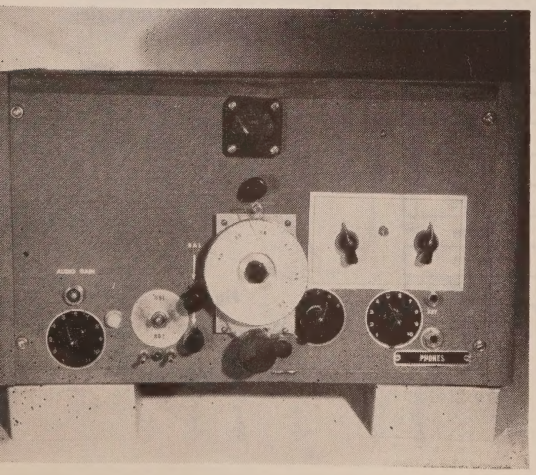
It has been some time since the publication of a construction project involving a phasing type SSB exciter. In this one minimum cost and maximum ease of construction were kept in mind. At first glance, an SSB exciter might seem quite complicated, however, given a set of instructions and perseverance, almost anyone can put himself on SSB. It is essential that you have, or can borrow, a grid dipper, scope and VTVM with an rf probe and an audio signal source of 1200 cycles at about 0.5 V. rms. There is quite a feeling of satisfaction in putting one of these together and getting it to work, and it can be done.

Construction

To begin with, I might suggest that you limit the project to the 80 meter exciter shown in the schematic. The other bands can be added later.

Perhaps the most important part of the exciter is the slug tuned coils used in the 9 mc oscillator tank, the mixer and buffer stages. These were wound on some surplus slug tuned coils, but you can use anything like the National XR50 iron slug coils or the J. W. Miller 1400 series coils. The diameter can be ⅜" to ½". If you would rather not wind your own, they can be obtained from Central Electronics as a complete set. The winding of L3 is critical since the windings must be balanced on each side o fthe center tap. Start with 6 turns of #20 enam. on each side of the center tap on a ⅜" diameter coil and allow room for spacing the turns to hit the proper frequency. The values of parallel condensers used with these slug tuned coils are not shown in the schematic, but if you follow roughly the values shown in the coil winding table you should be able to hit the proper frequency by turning the slugs or pruning.

View of front panel showing method of mounting dial gearing. From left to right the controls are: audio gain, upper/lower sideband selector, carrier balance controls, indicator level (under meter), vfo tuning, function switch, buffer tuning, calibrate level and final amplifier tuning.



This is where your grid dipper will pay for itself, because the inductance of a slug tuned coil will not follow the formula for air or form wound inductors, and they must be tuned approximatly with their respective parallel condensers before permanent installation on the chassis. Incidentally, I should warn you that if you should run into a form with a copper or brass slug, their behavior will not be the same: iron slugs are recommended.

The vfo was removed from the oscillator section of a BC-458 (5.3 — 7 mc) and installed with the components in about the same relative position as in the original unit. All but 11 stator and 11 rotor plates were removed from the oscillator tuning capacitor to allow coverage on three bands. Plates should be removed from the condenser carefully since it is possible to dislodge the glass beads, which are difficult to replace. This can be done with a pair of long nose pliers, slowly working the plates of the rotor back and forth until they come out. The BC-458 dial gearing was removed, mounted on a piece of aluminum and installed on the front panel.

A 10"x14"x3" chassis was used. In laying this out try to follow the original position of

the components since this makes a difference in how the various circuits behave.

The power supply was built on a separate chassis to avoid hum. It should deliver 300 v dc at 200 ma., 105 v dc regulated at 40 ma., 100 v dc bias voltage and 6.3 v ac at 4 amps.

Tackle one part of the circuit at a time, checking it out as you go. Probably the best place to start is with the audio and VOX circuit. Once you talk into the microphone and the VOX relay closes you will feel like you have accomplished something. The relay used

VOLTAGE CHART

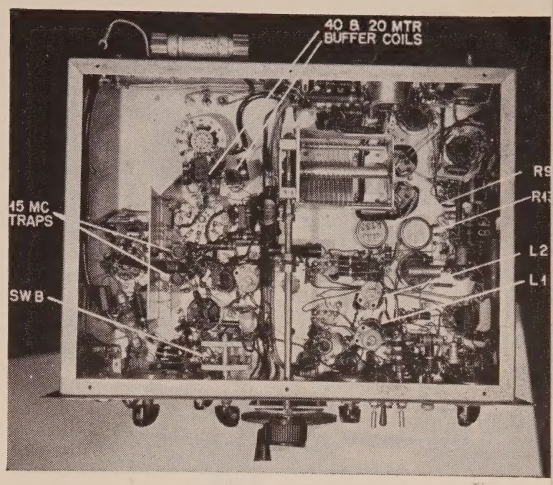
With one balance control unbalanced, the following readings should be approximate on 80 meter band.

	Using	
6BA7	R-F probe	D-C
Pin 1		108
Pin 2	6-8 v	−12 to −6 function of vfo output
Pin 7	5	−.3
Pin 9	18	300
6AG7		
Pin 4	5 to 15	−10 to −11
Pin 6		300
Pin 8	50	300 Loaded with 50 ohms.

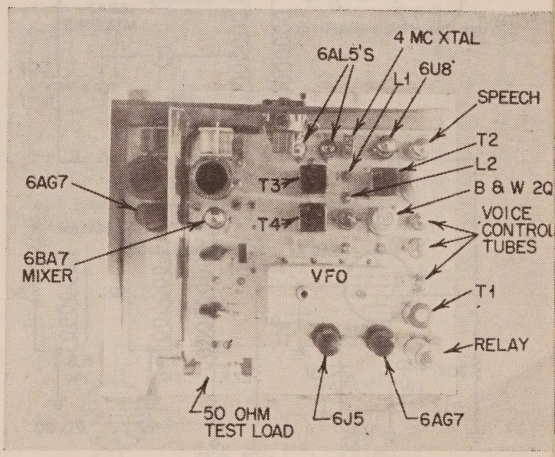
R-F voltage across 50 ohms probe 25 volts.

PARTS LIST

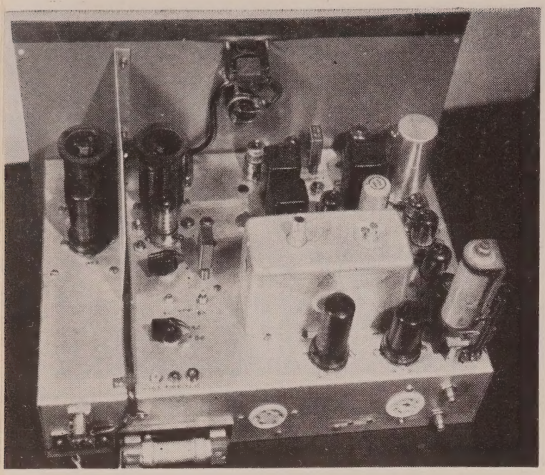
C-1—100 mmfd.
C-2—.001 mfd.
C-3, C-4, C-5, C-6—20-20-20-20 mfd 450 v elec.
C-7—29 mfd 59 vikt
C-12, C-8, C-16, C-17, C-21, C-23, C-24, C-25, C-28, C-31, C-32, C-33, C-34, C-37, C-38—disk .005 mfd.
C-9—200 mmfd.
C-10, C-11, C-15, C-18, C-19, C-22, C-29—disk .005 mfd.
C-13—75 mmfd.
C-14—3 mmfd.
C-20—150 mmfd.
C-26—.005 mfd.
C-27—.01 mfd.
C-30—.1 mfd.
C-35, C-36—380 mmfd. variable
C-39—200 mmfd. part of arc osc.
C-45, C-40—.05 mfd.
C-43, C-41—.002 mfd.
C-42—.005 mfd.
C-44—20 mfd. 50 volt.
C-46—.25 or .1 time constant condenser. Hold time.
C-47—8 mfd. 450 v
C-48—.25 or .1 mfd.
B & W—Phase unit 2Q4
R-1—5 k ½ w
R-2, R-9—1 meg ½ w
R-6, R-3—2.2 k ½ w
R-4, R-5, R-7—220 k ½ w
R-8—10 k 1 w
R-10—47 k ½ w
R-11—1 k ½ w
R-12—22 k 2 w
R-13—500 ohm pot.
R-14, R-15—270 ohm 1 w
R-16—500 ohm pot.
R-17, R-18—22 k 2 w
R-19—1 k 1 w
R-20, R-29—47 k 1 w
R-21—100 k 1 w
R-22—2 k pot.
R-23, R-24—1 k pot.
R-25—1 k 1 w
R-26—10 k 1 w
R-27—220 k ½ w
R-28—180 ohm ½ w
R-30—4.7 k 2 w
R-31—15 kc 10 w
R-32—10 k 10 w
R-33, R-36, R-34, R-37—1 k 1 w
R-35—22 k 1 w
R-38—20 ohm 1 w part of arc 5 osc.
R-39—10 k or lower across coil. 2-5 k 2 w in series
R-40—100 k ½ w
R-41—200 k ½ w
R-42—33 k 1 w
R-43—100 k pot.
R-44—220 k 1 w
R-45—470 k ½ w
R-46—2.2 k 1 w
R-47—68 k ½ w
R-48—47 k ½ w
R-49, R-52—470 k ½ w
R-50, R-51—1 meg ½ w
R-53—100 k ½ w
R-54—220 k ½ w
R-55—1 k
R-56—470 k ½ w
R-58—1 meg ½ w
R-59—100 k ½ w
R-60—1 k ½ w
R-61—10 k ½ w
R-62, R-63—1 meg pot.
RFC-1—Parasitic Suppressor 6t #20 on 50 ohm 1 w resistor
T-1—Ouncer UTC 200/500 ohms to 80,000—59¢ Universal Radio, Los Angeles, Calif. or any low to high impedance
T-2—20,000 ohms to 500 ohms
T-3—3 Transformers can be obtained
T-4—Box 206 Electronics Associated, Montclair, New Jersey—$7.95 or, Rex Radio Supply 88 Courtland Street New York 7, N. Y.—$5.00



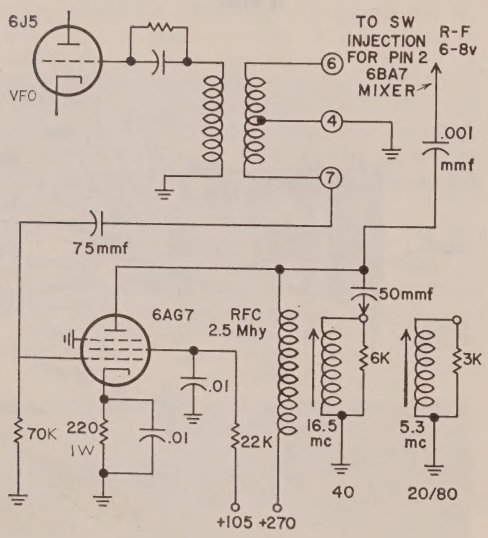
Underside of chassis. Note placing of shielding between buffer and amplifier stages and shield across the 6AG7 socket. All power and filament wiring is shielded and coax is used for rf wiring in strategic places. Wiring between coupling links of slug tuned coils is twisted to minimize stray rf fields.



Top of chassis showing placement of components. The 6U8 driver/xtal oscillator is just ahead of the vfo shield can. Balanced modulators are under the meter at front of chassis and audio, VOX and anti-trip circuits are at extreme right. The 6J5 oscillator and 6AG7 buffer are directly behind the vfo shield. To the left of center is the mixer tank coil L6 at front of chassis, and behind it in line are the 6BA7 mixer, the xtal-vfo selector switch and the buffer band switch. At extreme left is the 6AG7 final and its tank coil.



Suggested circuit adding buffer or tripler to VFO if 40 meter and 20 meter operation is intended. 6AG7 output kept low 6-8 volt R-f equal to VFO injection on 80 meters. Swamping across slug tuned coils broad band and keep output 6-8 volts. Some experimenting to get it exact.



Handy Reference Chart Showing VFO Frequency Mixed With 9mc

VFO set at:	Tunes when mixed with 9000 kc
5500 kc	3500 kc
5200	3800
5000	4000
16000	7000
16200	7200
16300	7300
5000	14000
5200	14200
5300	14300

here is a Central Electronics 12,000 ohm. Any similar relay will work, but make sure the contacts are in good condition. If the relay sticks it will be necessary to adjust the contacts for a wide arm spacing. If there is no screw adjustment a piece of Scotch tape can be placed under the keeper to break the residual magnetism. If the relay fails to close, first check the audio gain control by turning it up, then adjust the VOX control (R62). The control R63 controls the voltage from the speaker bucking the voltage that makes the relay work when LS operation is used. A little experience will show where to set this control to keep the speaker from tripping the VOX system.

Now wire the rest of the circuit, through the balanced modulator, mixer, vfo, and crystal oscillator and the mixer tanks. After this is done, check for vfo and 9 mc crystal oscillation by listening in a receiver. The vfo can usually be calibrated with the small capacitor on top of the fixed oscillator condenser in the field can. Now finish up the 6AG7 final and you are ready for final tune up.

Tuning Up

1. After warm up and checking for oscillation of the vfo and crystal oscillator, unbalance one of the carrier balance controls. Tune L1, L2, L3, L4, and L5 for maximum at 9 mc measuring the rf voltage with your VTVM and rf probe. If this is properly done the rf voltage at pin 7 of the 6BA7 mixer should be between 2 and 4 volts. The vfo output measured at mixer pin 2 should read 6 to 8 volts.

2. Now apply the 50 ohm, non-inductive,

COIL TABLE

No.	Freq.	Diam.	No. Turns	Wire Size	Length	Link	Appx C
L1, L2	9 mc	⅜"	22	#22 enam		4 t	100
L4	9 mc	⅜"	22	#22 enam		4 t	150
L3	9 mc	⅜"	12 Total	#22 enam			.001 ea half. S. Mica
L8	16.5 mc	⅜"	10	#22 enam			100 mmfd
	(loaded down with resistor to broad band.)						
L9	5.3 mc	ARC-5 VFO coil.					
L10, L11	15 mc	⅜"	Buy from Central Electronics or use LS-3 already wound.				
L6	3.8 mc	1½"	19	#20	2"		Var 365 mmfd
L6	7 mc	1½"	12	#20	2"		Var 365 mmfd
L6	14 mc	1½"	4	#20	½"		Var 365 mmfd
L7	3.8 mc	1½"	15	#20	Tight close space tap 4 t up from cold end for output.		
L7	7	1½"	12	#20	Tap up 4 turns cold end.		
L7	14 mc	1½"	4	#20	¼"		

dummy load to the output. Tune C35 (mixer tuning condenser) which should show output on 80 meters on the grid dipper coupled to L6 and used as a field strength indicator. Tune the 9 mc oscillator coil L2 to either side of the resonance peak and then make sure that L1 (coupled to it) is tuned to the opposite side of the peak. This gives us our 90 degree rf phase shift. To accomplish this, peak the crystal oscillator coil L2 for maximum and add just a little more capacity. Tune L1 for maximum and decrease the tuning capacity slightly. The capacitors used in the 9 mc tanks were the 7-45 mmfd ceramic type and can be seen in the underside view of the chassis mounted under L1 and L2. If your receiver has an S meter, tune about 3 db down from resonance. This rf combined with the 90 degree audio phase shift gives us our side band suppression when mixed in the balanced mixer tank circuit.

3. Now check the plate voltage of the 12AX7 modulator with about .05 v rms of 1200 cycle signal feeding into the microphone jack. The plates should be equal, about 210 volts each. Vary the cathode 500 ohm potentiometer and get them as near equal as possible. If the tubes won't balance and one remains at 300 volts and the other 210 volts something could be wrong with the transformers or the phase plug-in unit. A more exacting check is to clip the vertical and horizontal leads of the scope together and with the sweep off, apply first to one and then to the other arm of the carrier balance potentiometers R23 and R24. (The test points on the front panel are for this purpose.) When this is done, a 45 degree straight line should appear. (see fig 2). Adjust R16 so that both lines are the same length when changing the scope leads from one arm to the other. Balance the 500 ohm potentiometer R13 while clipping the vertical and horizontal leads across the arms of the carrier balance pots. A circle should appear and be approximately round when adjusting R13. This control will not be touched again after this adjustment is made.

4. Connect the scope as shown in fig. 3. We are now ready to set the 90 degree rf phase. Set the scope sweep frequency to 15 cycles per second and connect a lead from the exciter output terminal to the external scope sync terminal.

Turn off audio gain momentarily to adjust carrier balance pots R23 and R24 for minimum exciter output. Turn up audio gain and alternately adjust R16 and L2 for minimum ripple on scope pattern (fig. 3).

If L3 is properly balanced no appreciable change in the pattern should be observed when switching from upper to lower sideband.

5. Measure the rf voltage at the grid of the final amplifier with the carrier inserted (balance control). This should be about 5 to 10

[*Continued on page 119*]

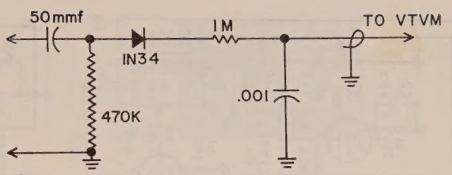


Fig. 1—RF probe.

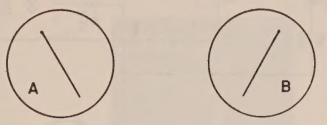


Fig. 2—Length of line A should equal length of line B.

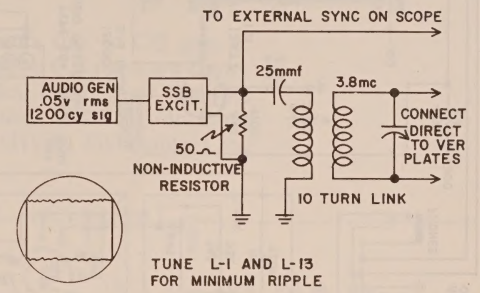
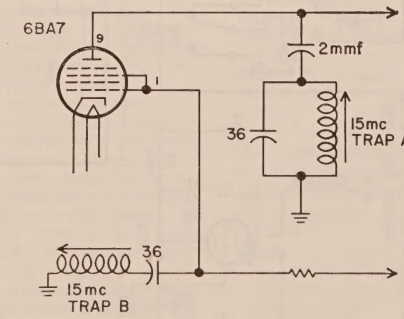
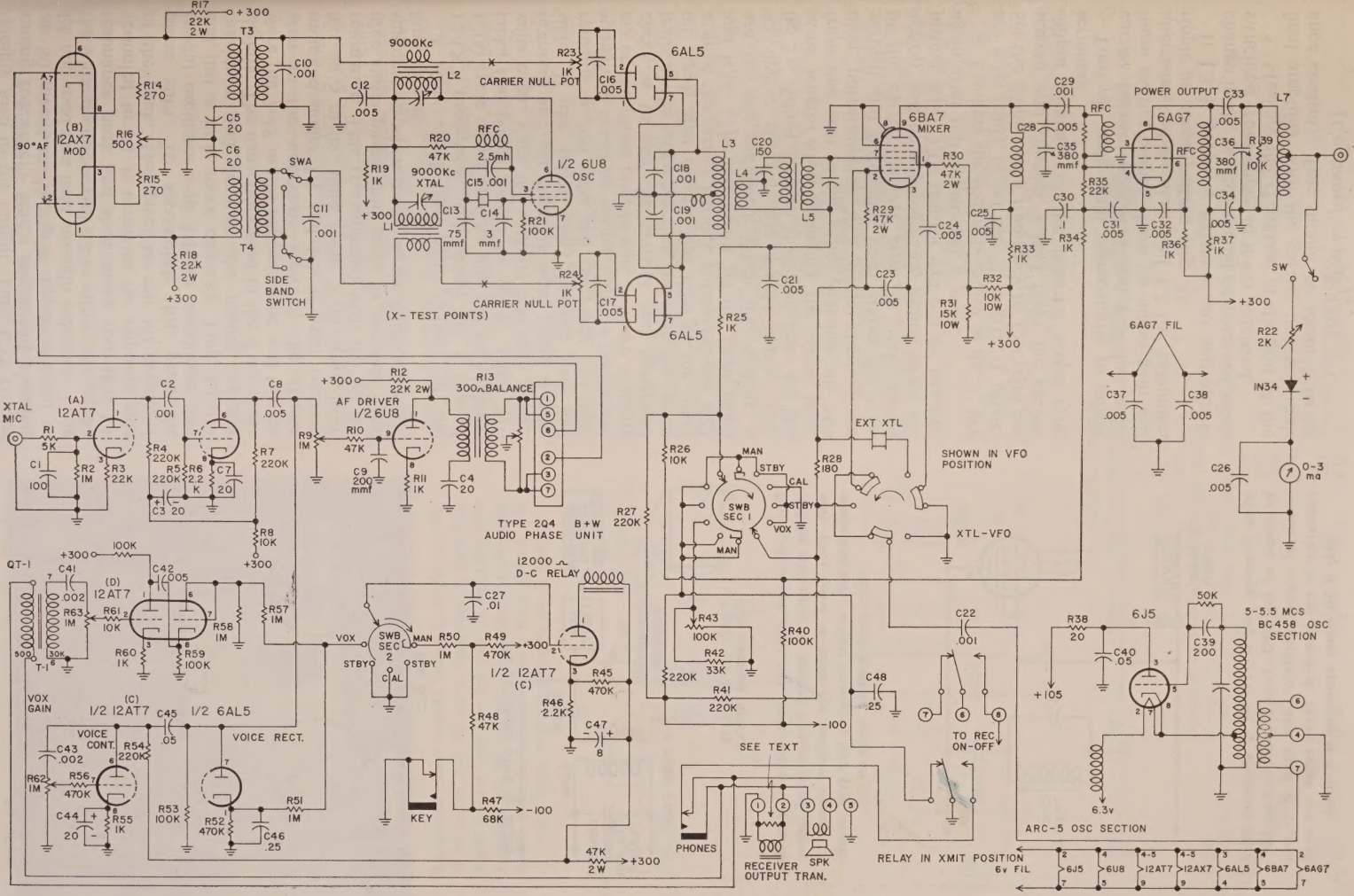


Fig. 3—If scope does not have external sync it will be necessary to control frequency of sweep with your hand to keep the pattern steady. If scope has sync, adjust frequency and sync amplitude until pattern locks in.



View showing trap A 15.4 Mc to eliminate third harmonic of the VFO. Trap B used to trap harmonic of crystal oscillator. Not used if crystal operation is not intended. These traps are used only if 20 meter operation is desired.



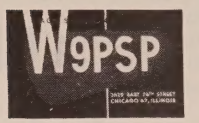
Note: R 13 should be 500 balance, R 30 should be 4.7K.

QSL contest



winner









This month's winner of a year's sub. to CQ goes to Lyn Carr, W4KCR, Charlotte, N. C. Losers are Henry Canvel, W6IWA, Los Angeles, Calif.; Jack Stanton, W9PSP, Chicago, Ill.; Len Julien, K9DEY, Villa Park, Ill.; and George Beyers, K5HVA, Oklahoma City, Okla.

4-250 to AB [*from page 43*]

PARTS LIST

*RCA HAM TIPS Vol. 14 #3

Grid Coil Data—Coils wound on micarta tubing. Cork glued in one end and 6/32 machine screw run through bolting coil to chassis.

L1—80 meters, 21 turns #29 enameled, 1½" dia. L10 Link 7 turns

L2—40 meters, 19 turns #29 enameled, ⅞" dia. L11 Link 5 turns

L3—20 meters, 8 turns #20 enameled, ⅞" dia. L12 Link 5 turns

L4—15 meters, 7 turns #20 enameled, ⅞" dia. L13 Link 5 turns

L5—10 meters, 4 turns #20 enameled, ⅞" dia. L14 Link 3 turns

L6—Parasitic choke, 8 turns #14 wire Shunt 3-100 ohm, 2 watt resistors across 5 turns of coil

L7—10 meters, 4 turns #12 tinned 1" diameter

L8—Final Tank Coil #3852 Johnson variable Roto-Coil.

C1—Cardwell type 6017, 140 mmfd variable

C2—National NC800A Neutralizing condenser

C3, C4, C5, C6—.005 mfd disk ceramic 600 volts

C7—Johnson 350D35, .080 spacing, 347 mmfd variable

C8—.005 mfd TV type ceramic 20,000 volt

C9—Variable 245 mmfd, .051 air gap peak voltage

C10—100 mmfd 2500 volt mica condenser

C11—200 mmfd 2500 volt mica condenser

C12—200 mmfd 2500 volt mica condenser

C13—400 mmfd 2500 volt mica condenser

C14—400 mmfd 2500 volt mica condenser

C15—500 mmfd 2500 volt mica condenser

C16—100 mmfd 2500 volt mica condenser

C17, C22, C27—.005 mfd TV ceramic type 10,000 volt

C18, C19, C20, C21, C23, C24, C25, C26—.005 mfd disk ceramic 600 volts

C28, C30, C31—2 mfd 600 volt oil filled

C29—40 mfd 150 volt

C32—500 mmfd mica. This condenser is critical as it is part of the neutralizing circuit and 500 mmfd should be used

R1—33 ohms, 2 watts

R2—1000 ohms, 5 watts

R3—30,000 ohms ww potentiometer

R4—2000 ohms, 5 watts

R5—2000 ohms to 6000 ohms, 60 watt with slider

T1—5 volts at 14.5 amps. UTC S-59 or equivalent

T2—125 volts at 30 ma bias transformer Burstein-Applebee #19B735

T3—600-0-600 volt, 120 to 150 ma

CR-1—65 ma Selenium rectifier.

CH-1—National 175A

CH-2—Z50 Ohmite

CH-3—2.5 MHY, 125 ma

CH-4—2½ Turns #14 Tinned ⅜" dia.—Resonate at channel 2

CH-5—2.5 MHY, 125 ma

CH-6—Midget choke 50 ma 4.5 Hy

CH-7—120 ma choke

CH-8-9-10-11-12—Ohmite Z-50

M1—0-5 ma

M2—0-150 voltmeter

M3—0-3000 voltmeter

M4—0-1000 voltmeter

SW-1—5 position double wafer

SW-2—Centralab P-1-S wafer single-circuit 7 position ceramic progressive shorting.

RCA Tube Rating for 4-250A Class AB1 CCS Rating

Class	*Service*	*Grid Voltage*	*Peak Grid Voltage*	*Zero Signal Plate Cur.*	*Maximum Signal Plate Cur.*	*Maximum Signal Screen Current*	*Maximum Signal Power Output*	*Screen Voltage*	*Plate Voltage*
AB 1	CCS	−88	88	55	200	11	230	500	2000
		−90	90	60	215	7	310	500	2500
		−93	93	60	205	5	370	500	3000

THE BIG GUN

a kilowatt amplifier for AM, CW, or SSB

by WILLIAM ORR, W6SAI
555 Crestline Drive, Los Angeles 49, Calif.

Combining the simplicity of a triode amplifier with the advantage of a pi-network output circuit, this kilowatt amplifier is inexpensive to build and foolproof in operation. It may be used for sideband work as a linear stage, or it may be operated class-C for AM phone and c-w.

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Let's face it. The cost of putting a "full gallon" on the air these days is high—and it will probably be a lot higher in the future. This bleak fact was brought home to my buddy, W6WWQ one fall day when he was busily engaged adding up the cost of kilowatt parts on a torn piece of cardboard with a microscopic pencil stub.

"E-gad!", quoth he. "By the time I buy the vacuum capacitor, the rotary kilowatt coil and the two tetrode tubes, I'll be in the hole over two hundred and fifty bucks".

"Too bad the 4-400A's aren't on the surplus market", I replied unfeelingly. Why don't you use some of those ninety-nine cent 304TL's?"

"The ninety-nine cent 304TL's are now nine dollars and ninety-nine cents," he replied. "Besides, who uses triodes nowadays? They're as extinct as the *Pilot Super-Wasp.*"

"Look here," I said. "A kilowatt is a kilowatt, no matter which tubes you use. You want a cheap gallon—right?"

"Right", he answered, "But there ain't no such animal—not with tubes at sixty bucks a throw, and expensive stuff like—".

"Wait! Stop!" I reached for a pencil and a piece of paper. "Don't sell the triode short! Here's the dope on a kilowatt final that I bet you can build for far less than one hundred dollars, including the price of a surplus tube. Let me sketch it for you."

"A triode tube with a single ended pi-network? How do you neutralize it? I think you're giving me the business", he replied weakly.

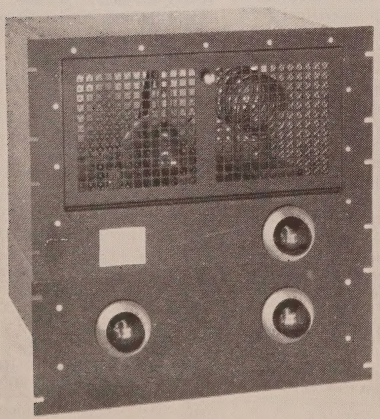
"This is it", I replied. "Look at the schematic, you lucky ham. You're practically on the air".

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The amateur designer is overlooking a good bet if he does not examine the possibility of using low capacity triode tubes for high level r-f amplifiers. Because of the ease of excitation, the use of pi-network output circuits, and the supposed freedom from neutralization, the tetrode tube has pushed the triode tube out of the limelight.

Actually, a pretty good case can be built up for the triode tube. Using modern exciters, excitation is not the problem that it used to be. Modern commercial exciters, such as the *Viking Valiant,* the *Heath DX-100,* and the *Hallicrafters HT-32* have power outputs of one hundred watts or more. Trying to use these

THE BIG GUN. An inexpensive triode amplifier designed for 14 mc operation. Using a single 450-TH triode, this pi-network amplifier may be used for phone, c-w, or SSB operation. Hinged door in panel top allows the plate coil to be removed. Control at center-right is the plate tuning capacitor, with pi-network loading capacitor directly below it. At the left is the grid tuning capacitor, with a tuning chart above it. Amplifier is completely enclosed for suppression of harmonic energy.



equipments to drive tetrode amplifiers usually leads the operator into the situation where he has to dissipate or throw away a great percentage of the output power of the exciter. This is easier said than done—and usually costs extra money, too! The excitation requirements for a triode amplifier are much more in line with the power level of these exciters, and extra driving power need not be squandered.

It is interesting to note that tetrode tubes *should* be neutralized. You will note that most of the modern transmitters employing tetrodes do neutralize them in order to obtain maximum stability. This punctures the old idea that tetrode tubes require less complex circuitry than do triodes, since the tetrodes supposedly do not require neutralizing circuits.

An "ace-in-the-hole" for the triode tube is that it requires no screen supply. Out the window go the regulated screen supplies and overload protection circuits required by the tetrode! Just look at *fig. 1*. Here is the circuit of a kilowatt triode amplifier. Did you ever see anything more simple than this?

The Neutralizing Circuit

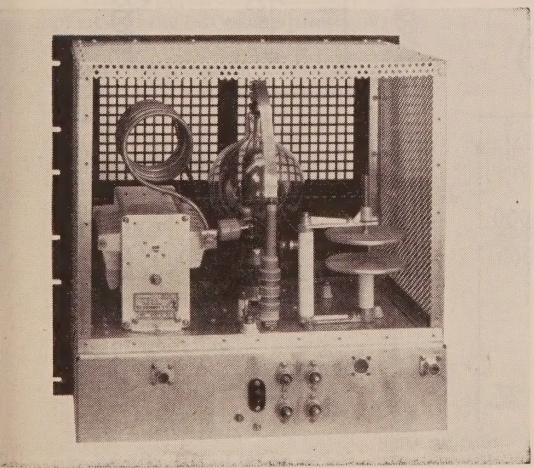
In order to use a pi-network output circuit, it is necessary to dispense with the usual split plate tank coil normally found in the triode amplifier. A form of grid neutralization is used to produce the necessary out of phase neutralizing voltage. A simplified schematic of this neutralization circuit is shown in *fig. 2*. Drawing *A* shows the essentials of the grid neutralizing circuit. Tank circuit L1-C1 has equal and opposite rf voltages at the ends, by virtue of the rotor of C1 being grounded. One end of the grid tank is attached to the grid of the tube, and the other end returns to the plate of the tube through the variable neutralizing capacitor, NC. When this circuit is redrawn as a bridge, as in sketch *B* the neutralizing action is apparent. For bridge balance the following equation must be satisfied:

$$\frac{CB}{BD} = \frac{CA}{AD}$$

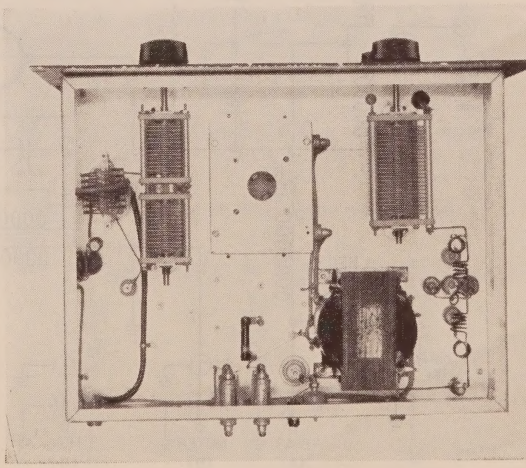
CA is the grid-plate capacitance of the triode tube, AD is the grid-filament capacitance of the tube. Both of these capacitances are fixed, and are determined by the structure of the tube. The capacitance BD may be considered to be the stray capacitance to ground of the neutralizing condenser. Both BD and AD are shunted by the capacitance of the grid tuning capacitor, C1. If the value of C1 is sufficiently large, any unbalance in BD/AD may safely be neglected.

To neutralize this circuit, therefore, if the two halves of grid tuning capacitor C1 are equal, it is only necessary to set neutralizing capacity NC equal to the grid-plate capacitance of the tube. In passing, it should be noted that the grid tank circuit should be high-C—as high

Rear view of the "Big Gun" with the top shield removed. Plate tank circuit is at the left of the 450-TH tube, with R-175A plate r-f choke and neutralizing capacitor shown in front of the tube. Heat radiating connectors are used on grid and plate terminals of the tube. Shielded enclosure is built up of ½"x½" aluminum angle stock and perforated metal sheet. Far end of plate tank coil is attached to 3-inch ceramic insulator mounted in front of the main tuning capacitor. Copper tubing lead then goes from the insulator, through the chassis to pi-network capacitor located beneath the chassis.



Under-chassis view of 450-TH amplifier. The front panel and tuning dials are at the top of the photograph. At the left is the split-stator grid tank tuning capacitor and grid coil. The 450-TH tube socket (mounted in the supporting box) is at center, with the coaxial filament capacitors on the right side of the box. To the far right is the pi-network output tuning capacitor, and the TVI filter. The filament transformer is at the rear (bottom) of the chassis. All power leads are brought out the rear lip of the chassis. Coaxial capacitors are used on all power leads, except the high voltage terminal.



as you can make it. The neutralization adjustment is apt to be fuzzy when a low-C grid circuit is employed. In this case, an effective capacitance of 70 mmfd is used for 14 mc operation. A neat "gag" is to use a 21 mc, 50-watt grid coil for 14 mc operation. It seems to work out just about right. The circuit works best with low-C tubes such as the 250TH and 450TH. High capacity "bottles" like the 304-TL are "out" as far as this circuit is concerned. (Aside to the reader: W6SAI had a single 304-TL tube on 3.5 mc CW for several years, using this circuit. It worked fine, but he never tried it on 14 mc.—*Editor*).

The Output Circuit

The output may be taken from point C and point D of *fig. 2*. This comprises a single-ended circuit, so the popular pi-network may be employed to match the amplifier to low impedance coaxial transmission lines. Real economy may be achieved by using a pi-network with home-made copper tubing inductances. If single band operation is contemplated, the plate coil may be bolted in place and forgotten. Such is the case with the amplifier shown in the photographs. Designed for 14 mc CW and SSB, the amplifier uses no costly plug-in jacks and plugs. The coil is bolted between the terminals of the tuning capacitor.

If desired, the TVI filter of *fig. 3* may be placed between the pi-network circuit of the amplifier and the coaxial output connector, J2. This simple filter may be seen in the under-chassis photograph. It requires no shielding, yet protects channel 2 with over 50 db of attenuation. The attenuation is even greater for the higher TV channels.

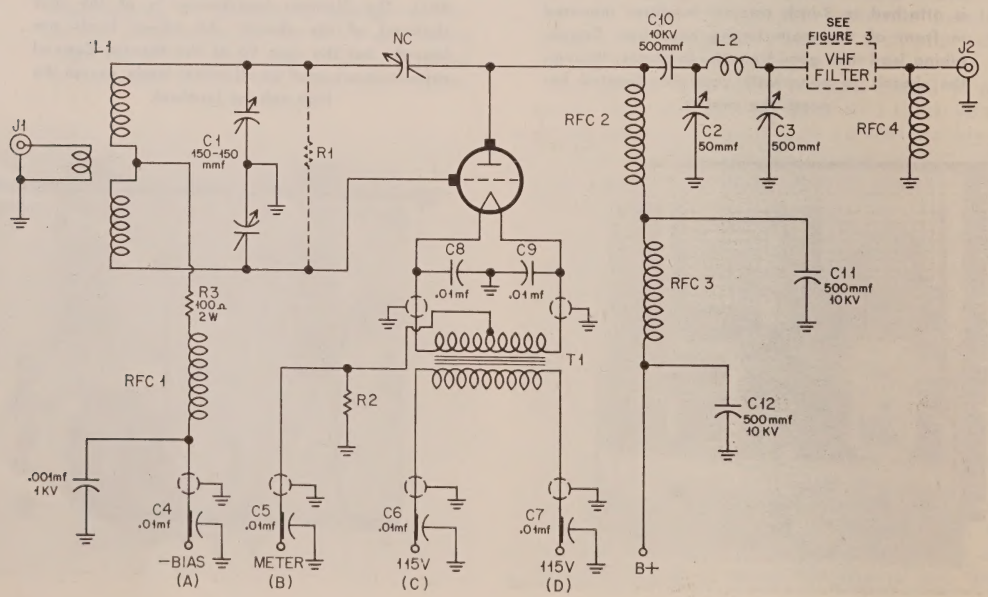
The Tube

The transmitter was designed for a single 450TH tube. This tube will run at a cool kilowatt at a plate potential of 2000 volts. The efficiency at this voltage is about 10% lower than that obtained at 3000 volts plate potential. Also, for SSB operation, 3000 volts or higher is to be preferred for best linearity.

A good tube that is available on the surplus market is the 6C21. This radar pulse tube is a "sleeper" in that the general characteristics are unknown to most dealers and hams. The going price of the tube is less than fifteen dollars, and it is a lot of tube for the money. In general, the 6C21 is a cross between the 450-TH and the 1000-T. The 6C21 has the 1000-T filament and grid, and the 450-TH plate. Filament requirements are 7.5 volts at 15.5 amperes for normal ham operation. The amplification factor is 30 (a little lower than the 450-TH) and the grid-plate capacitance is 4.3 mmfd (slightly less than the 450-TH). The 6C21 is available in quantity, and seems to be made by either *Matchlett, General Electric,* or *Westinghouse*. Of the three makes, the Matchlett is the huskiest, having a plate dissipation close to 900 watts. The plate dissipation of the other two makes is nearer 600 watts. (*Barry* in N. Y. sells tested 6C21's for $13.50 each.)

It is a smart idea to test the tubes before you purchase them. Many of these big tubes tend to go "gassy" after sitting on the shelf for a few years. If possible, ask the dealer to let you try the tubes out before you hand over your hard-earned money for them. This is easy to do. Attach a lead from the grid of the tube to one of the filament pins and apply filament

Fig. 1—Schematic diagram of kilowatt amplifier.



voltage. If all seems well, apply about 2000 volts d.c. to the plate. If the tube is gassy, it will light up with a bright blue glow, like an 866 rectifier. If the tube is "hard", it will draw about 500 milliamperes, and the plate will become a bright red in color. You'll have no difficulty separating the good tubes from the bad ones by this test. The schematic for the set-up is shown in *fig. 4*.

Amplifier Construction

The amplifier construction is shown in the various photographs. A *Bud* 17"x13"x3" chassis (*AC-420*) is used for the base, and a 17½" panel is made up of two separate panels. The top section has a hinged door in it for easy removal of the plate tank coil. The *Bud PS-815* ventilated door rack panel (12¼" high) can be used. The lower panel is 7" high (*Bud PS-1253*), making the total height of 17½". The lower panel is allowed to underhang the chassis about ½-inch or so to center the tuning knobs on the panel.

The triode tube is mounted in a standard "50-watt" socket that is submounted below the chassis to permit clearance between the plate of the tube and the top of the cabinet. A foxy way to mount the socket is to place it in the bottom of a 3"x4"x5" aluminum miniature box, as shown in the under-chassis photograph. The tube is centered on the chassis, and then moved to the left (viewed from the front of the chassis) a sufficient distance to clear the variable capacitor by about an inch. A large hole is drilled or cut in the chassis to clear the tube. The "top lid" of the socket box is discarded, and the side framework of the box is bolted to the chassis, directly beneath the socket hole. The 50-watt socket is mounted upon the "bottom plate" of the box. Two holes are drilled in the side of the box to mount the filament bypass capacitors, C8 and C9. These husky capacitors are required as an anti-TVI measure, in addition to carrying the heavy rf current flowing through the filament circuit of the tube.

The grid circuit variable capacitor C1 is placed to the left of the tube socket, with the grid coil beside it. To the right of the socket is the pi-network loading capacitor, C3. These capacitors are spaced so that the tuning dials are equidistant from the center line of the panel. To the rear of the under-chassis area are the filament transformer, the TVI filter, and the coaxial feedthrough capacitors mounted on the rear lip of the chassis.

Placement of parts may be seen in the rear view photograph. The pi-network coil mounts between a rear, insulated terminal of plate tuning capacitor C2, and an insulated terminal of loading capacitor C3, which is mounted beneath the chassis. The plate coil lead passes through a 1" hole cut in the chassis deck, and bolts directly to the stator terminal of C3. This insures an extremely low loss tank circuit.

The tube socket is oriented so that the grid pin of the 450-TH or 6C21 tube projects to the left (as viewed from the rear). A heat-radiating connector is used on the grid pin. Directly behind the tube (or in front of it, if you're looking at the rear view photograph) is located the *National R-175-A* plate choke. This choke does a heroic job at a kilowatt input. The usual "garden variety" of choke will go up in a puff of smoke when subjected to such brutal use. The specified choke, or the new *Raypar RL-100* rf choke are rugged enough to stand the gaff.

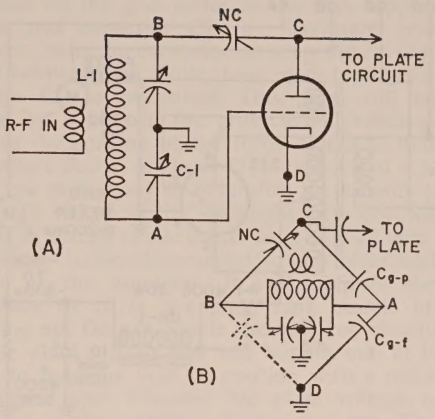
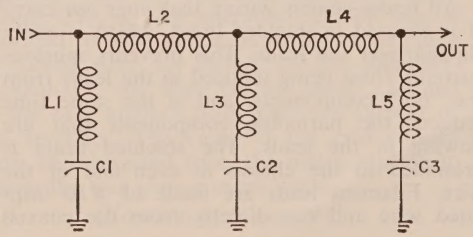


Fig. 2—Analysis of grid neutralization for triode tube. Equivalent bridge circuit is shown at right.

To the right of the rf choke (still looking at the rear photograph) is the disc-type neutralizing capacitor. A ½-inch wide copper strap runs from the top mounting bolt of the capacitor to the top terminal of RFC-2, and over to the 500 mmfd, 10KV television-type plate blocking capacitor. This unit is supported at one end by the insulated mounting terminal of the stator of tuning capacitor C2.

As a passing note, it should be mentioned that these TV-type capacitors employ a titanium-dioxide dielectric material that exhibits piezo-electric effects. You will notice this if you plate modulate this amplifier. The "TV condensers" in the B-plus lead will "talk back" to you after a fashion. No harm done, but it is a little startling to hear your own voice come back at you from the final amplifier! If you are inclined, you can substitute the *Centralab type 858* ceramic capacitors for the "TV ca-

Fig. 3—TVI filter for 52 ohm coaxial output circuit.



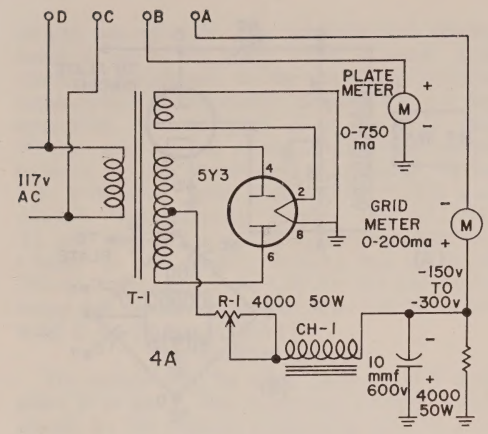


Fig. 4a

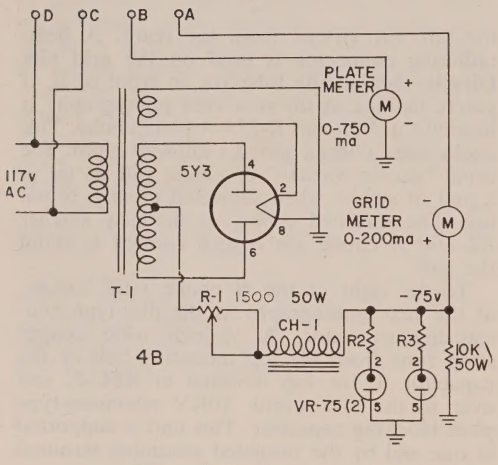


Fig. 4b

pacitors". These will not talk back, but they cost about twice as much as the latter.

The B-plus lead and the grid lead to the tube pass through the chassis via 2-inch ceramic insulators. A third feedthrough-type insulator mounts beneath the neutralizing capacitor(NC). A short piece of ½-inch copper strap is connected between this insulator and the bottom circular plate of NC. Under the chassis, the insulator lead connects to the opposite end of the grid tank tuning capacitor (C1) from the end attached to the grid lead of the tube.

All under-chassis wiring that *does not* carry rf is encased in shielded braid, which is easily slipped over the leads. This prevents spurious currents from being induced in the leads from the "hot" components, and at the same time reduces the harmonic components that are flowing in the leads. The shielded braid is grounded to the chassis at each end of the wire. Filament leads are made of #10 insulated wire and run directly from the coaxial capacitors mounted on the side of the filament box to the terminal lugs of the transformer. A short length of coaxial cable is used for the short run between the link terminals of the grid coil socket and the SO-239 coaxial fitting mounted on the rear of the chassis.

TVI Shielding

The complete transmitter is enclosed in an aluminum shield for TVI suppression. It is very well to bypass all the power leads of the transmitter and employ a low-pass filter in the output circuit, but unless these precautions are backed up with effective shielding of the *complete* amplifier, their effectiveness will be greatly reduced.

The frame for the aluminum shield is made from lengths of ½"x½" aluminum angle stock. The material shown was picked up in the local junk yard, but there is no reason why *Reynolds do-it-yourself* aluminum (available in most hardware stores) cannot be used. As you can see in the photo of the rear of the amplifier, the aluminum framework is about ¼" less in height than is the amplifier panel. Two strips of aluminum angle stock hold the two panel sections together, and form the front supports for the sides of the shield. A third piece of aluminum is bolted across the front of the panel at the top. The mounting bolts for the framework may be seen in the front photograph of the unit. Be *sure* to clean the paint off the back of the panels where they make contact with the aluminum stock. This will preserve the continuity of the shield.

Sides, top, and back of the shield are cut from perforated aluminum stock. Again, junk yard aluminum material was used, but there is no reason why the *Reynolds* metal cannot be used. The bottom plate (removed for the underchassis photograph) is also made of perforated material. The use of this type of material will insure maximum ventilation of the amplifier tube, which gets "plenty hot" when it is run at maximum input. Notice that the bottom of the tube socket mounting box has a one inch hole cut in it to allow convection cooling of the filament leads of the tube. The air passes through this inlet, up through the tube socket, and out through small holes that are located in the sides of the tube base.

The Bias Supply

The mode of operation of this amplifier depends upon the type of driving signal that is applied to it, and the amount of grid bias supplied to the tube. By juggling these two parameters we may make the amplifier operate as a class AB2 linear amplifier, or a class C amplifier. Bias requirements vary from −50 volts for Class AB2 operation to −300 volts for Class C plate modulated service. Maximum *peak* driving power for sideband service when the amplifier is operated at a plate voltage of 3000 is about 20 watts. To this power must be added the amount of power lost in grid swamping resistor, shown in dotted lines in *fig. 1.*

The input impedance of the amplifier varies over the rf cycle. When no grid current is drawn the impedance is almost infinite. At peaks of rf grid current the impedance drops to a value in the vicinity of 10,000 to 15,000 ohms. In order to bring this impedance excursion within reasonable limits it is necessary to place a swamping resistor across the grid circuit. A value of 10,000 ohms is approximately correct. In practice, the resistance should be lowered in value until a shortage of excitation is noticed. The lower the resistance value, the better the regulation of the grid circuit. The resistor may be made up of a number of 2-watt carbon resistors connected in series parallel to provide a dissipation of about 30 watts, or it may be a larger non-inductive resistor. Class AB2 operating characteristics may be determined for the 450-TH from the *Eimac* data sheets. The data for the 6C21 is not given for linear operation, but may be determined graphically from the tube curves. *Eimac* furnishes transparent overlays and instructions as to how this is done.

A bias supply suitable for class C phone or CW operation is shown in fig. 4A, and a bias supply for linear operation is shown in fig. 4b. The reader is referred to chapter 5 of *Single Sideband Techniques,* by Jack N. Brown, W3SHY for full information concerning the adjustment and operation of high powered linear amplifiers.

The TVI Filter

Before we pass on to amplifier tuning, let's take a quick look at the TVI filter shown in the under-chassis photograph. The schematic is shown in figure 3. The filter is designed to provide maximum protection for TV channels 2 or 3, depending upon which is in use in your area. Attenuation on the higher TV channels is very high. The filter coils are wound of #10 enameled wire. Coils L1, L3, and L5 are mounted vertically, between the capacitors and coils L2 and L4 which are mounted in a horizontal position. The coils are wound on lengths of dowel rod, and are then slipped off, leaving them self-supporting. The junction of coils L1 and L2—and the junction of coils L4 and L5 may be temporarily shorted to the chassis with a short length of ½-inch copper strap, and L1 and L5 may be grid-dipped to TV channel 2 or 3 with the aid of a g-d-o. This will insure maximum harmonic supression at these critical frequencies.

Amplifier Tuning and Adjustment

And now you've gotten the "big gun" completed! The tube is in the socket, and we're all set to tune it up! The first step is to neutralize the amplifier. Place a temporary short across coaxial output jack J2, and tune output loading capacitor to full capacitance. Turn on the filament voltage and adjust it to 7.5 volts. Apply the correct value of negative grid bias, and supply rf excitation to the amplifier until a grid current of about 40 milliamperes can be read on the grid meter in the bias supply. Tune grid capacitor C1 for maximum grid current, reducing excitation to keep the current level below 40 ma. Now, tune plate tuning capacitor C2 to resonance. This point will be noted by a kick in the grid current reading. Adjust the spacing of the turns of L2 so that resonance occurs at about 75% capacity of C2. You are now ready to neutralize the amplifier.

A 6.3 volt, 150 ma. flashlight bulb (brown bead) is placed in the center of a loop of wire. This loop is loosely coupled to the plate coil (L2) of the amplifier. It will indicate the presence of rf in the plate tank circuit by lighting up. Do not couple the bulb too closely to the plate coil, or you will burn it out. It is easy to hold the bulb in position with a piece of paper tape. *Caution!* No plate voltage is applied to the amplifier during this test. The B-plus lead to the amplifier should be completely removed!

Now, using a *fibre* screwdriver, slowly turn the top plate of the neutralizing capacitor. The top plate should be rotated back and forth until minimum rf is noted in the flashlight bulb. The bulb should be brought nearer to the coil and a finer adjustment is made. The neutralizing capacitor (NC) should be varied until an absolute minimum of rf is observed in the plate circuit of the amplifier stage. No deflection should now be noted on the grid meter as the plate tuning capacitor (C2) is tuned through resonance.

The jumper should now be removed from antenna receptacle J2, and the amplifier is connected to the coaxial antenna lead. Capacitor C3 is set at maximum value. Low plate voltage is applied (a thousand volts or so) and the amplifier is loaded to about 200 ma. plate current. If the amplifier is properly neutralized, detuning the plate capacitor (C2) either side of resonance will cause the grid current reading to decrease. If the grid current increases as the plate circuit is detuned from resonance, the neutralizing capacitor should be varied a small amount until the increase disappears. *Be sure* to turn the plate voltage *off* before you touch *anything* inside the amplifier enclosure! As a safety measure, remove the B-plus lead from the amplifier before you attempt any adjustments.

The amplifier may be loaded to the legal power limit at any plate voltage above 2000. A nice, convenient operating plate potential is 3000 volts. At a plate current of 330 ma. the amplifier runs a "cool kilowatt" for either phone, CW, or SSB operation. Cut-off bias is provided for CW operation so the exciter may be keyed with no danger to the amplifier. Incidentally, the plate current meter (located in the bias supply) reads *Cathode* current of the amplifier. The value of the grid current must be subtracted from the meter reading to obtain the true plate current value.

[*Continued on page 94*]

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SURPLUS

Some of the surplus on the market seems to be going to waste strictly because it is FM and as such can't be used on most of our phone bands. The SCR-608 series is one example of a fine piece of gear for 10 meters that could be used for CD and net operations. While the receiver is FM too, simple changes could convert it to AM—like changing the limiters to pure IF amplifiers and modifying the detectors. But the transmitters offer a lot—and at low cost too. One of the things overlooked on FM gear is that by not using the audio (not modulating) the transmitter is a CW job. By adding an AM modulator we have an AM transmitter—sounds simple—and it is.

Of course the problem of power supplies is always present but you need them anyway. So lets get into the theory of the modulators used.

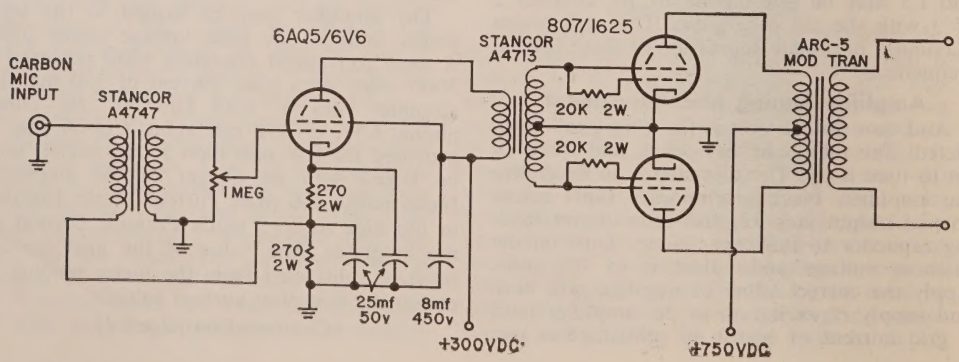
First of all lets get the transmitter going on the air (see CQ Jan 58 page 64) and make sure its working properly. Now by disabling the reactance (FM modulator) circuit we should completely change over to a CW rig. This can be done in several ways. For instance—not use the microphone input—although hum pickup may cause a slight bit of modulation. We could also remove the reactance tube and completely satisfy our problem. However if the set has series filaments we will possibly turn off other stages by accident. This can be overcome by substituting an empty tube base with an appropriate size resistor across the filament pins to complete the filament circuit. The other approach is to cut out the circuitry of the reactance circuit so as to completely disable the FM modulator. This latter step has one disadvantage—namely that should you ever have a need for the FM you won't have it—besides its extra work.

The next thing is to construct a modulator. Several factors determine the modulator to use. How much power is required? Carbon, crystal or dynamic microphone input? Size?

Of course power is determined by the stage to be modulated. If the input voltage to the final stage is 300 volts and the current 100 Mils then $\frac{300v \times 100\ Ma}{1000} = 30$ watts. The impedance to be modulated is $\frac{300v}{100\ Ma} = 3000$ ohms. Since our modulator must supply one half of our final input power for 100 percent modulation we need a 15 watt amplifier. We should allow a little extra for a safety factor.

With a carbon microphone (T-17 type or F-1 button) we need less gain than with a crystal or dynamic microphone. The carbon microphone is readily available and relatively cheaper than the other types. True it may not sound as good, but it does the job and that's what counts.

Fig. 1—15 watt modulator.



The circuits shown here are probably the simplest modulators you can build for surplus gear. I have used all three with good results. Figure 1 is suitable for any 10 to 30 watt rig. By adjusting the volume control to allow 100% modulation the output power is, of course, controlled. Some nice features are included—such as the class B output stage. This means that a smaller transformer can do the job. The maximum output is about 17 watts. The 1635 tube is a zero bias twin triode and can take quite a bit of an overload. It is surprising that this tube is used as little as it is. It draws only about 8 Ma with no signal and 350 volts DC on the plate, yet can pull 70 Ma with peak signal with no effort. Carbon microphone current is derived from the cathode resistors of the 6AQ5 (or 6V6). Gain is controlled by the volume control. The input transformer has a 137 to 1 gain,

FIG I

and actually eliminates some of the need for additional tubes. It is also shielded which makes for less hum pick-up.

This modulator will easily modulate any of the 2E26, 2E24, 832, 6V6, 6L6 class tubes to 100% modulation, and can be built in a 3 x 5" space with no cramped components.

A second modulator which will just about modulate anything up to a 200 watt rig can be built using the same basic circuit. By using a pair of 807's or 1625's in zero bias class B operation a full 120 watts output can be obtained with only three tubes. This circuit was used mobile on an ARC-5 for several years. The trick is to connect the screens and grids of each tube together with a 20,000 ohm resistor and drive the screens instead of the grids. The *plate* modulation transformer from an ARC-5 modulator was used as shown, while the 1625's are obtained almost for free. The output shown in figure II is for push pull or parallel 807's (or 1625's) RF stages, since both will show the same load to the modulator. If another impedance is required you may have to use a different transformer of a multimatch type.

The connection of these modulators to a transmitter is relatively simple. By locating the point within the transmitter where the B plus is supplied only to the final tube or tubes we

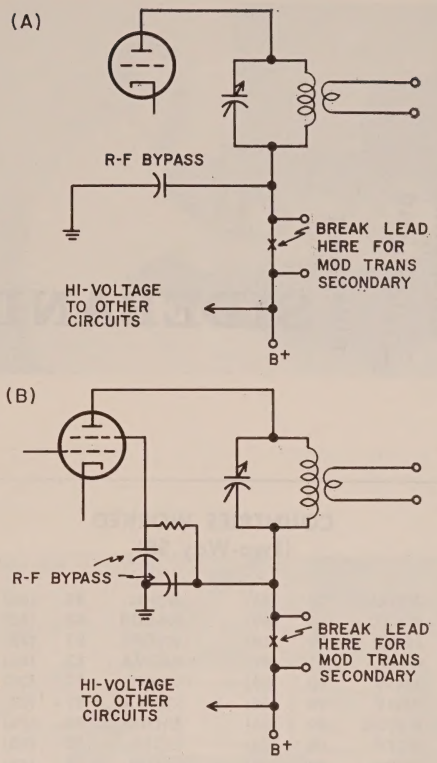


Fig. 3a—Triode circuit connections.

Fig. 3b—Tetrode circuit connections.

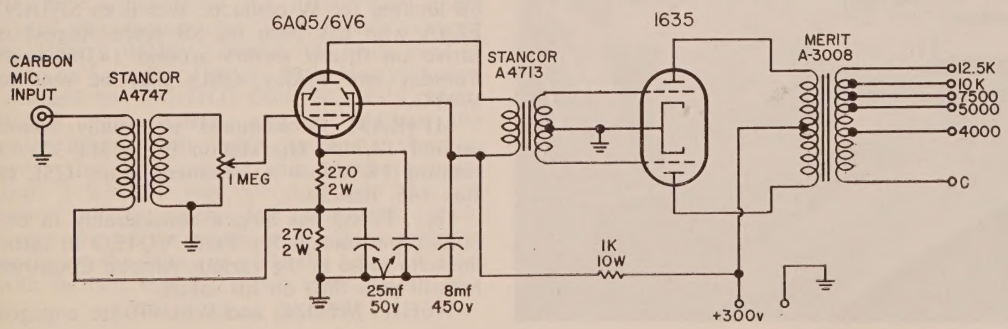
merely separate this point into two points and insert the output of our modulator between as shown in figure III.

If it can handle the current and is of the correct voltage, the transmitter power supply *can* be *used* to supply the modulator as well.

Shortly after the December issue went to print, a letter from an enterprising young chap arrived at CQ offering a handbook for the BC-1335. Inasmuch as the book is nigh onto

[*Continued on page 94*]

Fig. 2—120 watt modulator.



by BOB ADAMS, W3SW
919 McCeney Road, Silver Springs, Md.

sideband
sideband
sideband

SIDEBAND

COUNTRIES WORKED (Two-Way SB)

		*			
W2JXH	97	(81)	W3HN	83	(64)
W4IYC	95	(69)	W6DOB	83	(63)
ZS6KD	93	(58)	W9GPI	83	(75)
W2KR	91	(77)	K6GMA	83	(62)
DL4SV	90	(69)	VE4NI	83	(70)
G3MY	90	(65)	K2AAA	81	(67)
W2EGG	89	(36)	OH2OJ	80	(72)
W3ZP	88	(72)	ZL31A	80	(63)
W2CFT	87	(75)	W3SW	78	(43)
ZL3PJ	87	(70)	HR2WC	78	(66)
W∅QVZ	85	(66)	W2OGE	75	(61)
F7AF	86	(70)	YU1AD	75	(67)
G6LX	86	(61)	W6HIL	75	(59)
K2GMO	83	(67)	(*Indicates confirmations)		

KR6HN, Hal.



As announced last month Harry, W2JXH became the first SB station to work one hundred or more countries on two-way SB, and is now only ten QSLs away from qualifying for the first SB DXCC. Harry who has now worked 105 countries needs on ten cards from any of the following stations: FP8AR, OHØNC, KW6CE, KH6AED/KW6, CE7AY, UA1BZ, PY4APE, PY2BSI, VP2DB, LU7AS, ET2US, ET3GB, HC2AGI, MP4KAM, VS2DB. Harry holds SB-WAC number 1.

Cyril, VK3AEE worked his 100th country on January 2 and is also working hard to obtain all of the verifications. Congrats Cyrl!

The Annual SSB Dinner held each year during the IRE Convention in New York City will be sponsored this year by the Single Side-Band Amateur Radio Association with Harry Whiting, W2JXH as Chairman. Accommodations for more than 800 guests are provided in the beautiful Grand Ballroom of the Hotel New Yorker on March 25th, and tickets cost $7.50. Advance ticket sales indicate a sell-out. You had better send in your check to the SSBARA, 261 Madison Avenue, New York 16, N. Y.

Ted Henry's small 11 pound SB rig is now at VS1EW. VS4JT is active daily from 1130-1230 Z around 14,310 Kc. We welcome VS6AE, Pat to SB.

Wes, SP3DX is active on 144 and 50 Mc SB looking for W contacts. Wes is ex SP3AN. EL4A who has been on SB since August is active on fifteen meters around 1830Z each Tuesday and Friday. QSLs may be sent to W4TO.

MP4KAM, Mohammed is usually found around 14,315. His station is an HT-32, 33 running 1KW into a 3 element beam. QSL to Box 146, Kuwait.

Guy, F8RQ has helped considerably in obtaining permission for Paul, VQ4EO to operate ham radio in the various African Countries he will pass thru on his safari.

W6HIL, W6OZO and W6UPP are engaged

Top to Bottom: KG4AQ, Del. W8MFW, AL. OZ3EA.



in a very tight private contest for top SB-DX honors for Orange County, California.

ZD4CF, Hugh has returned to Ghana, which previously was the Gold Coast, and his new call is 9G1CF. His QTH is: Dr. Hugh De Granville, P.O. Box 4, Winneba, Ghana. ZD4BF, Joe who used to put such a terrific signal on the air from the Gold Coast is on the way back to his old location after a six month's holiday in Guernsey, Channel Islands. Joe hopes to have his station on the air again in February with a new 9G1 call.

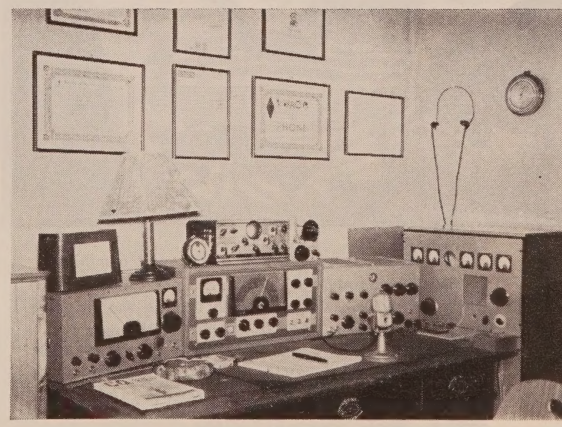
Don, W6TNS wrote in to say that CN8FV will forward all QSLs for Southern Morocco. The QTH is: ARS CN8FV, APO 113, New York, N. Y.

The Dx-pedition to Monaco by Pat, F7AN and Dickie, G3IRP on December 2, 3 and 4 last, provided 3A2 contacts for twenty W/K stations and 99 in other countries. Conditions were not too good during the three days of operation, due chiefly to the location of Monaco which is surrounded with mountains in all directions but to the southeast. The power supply problem was serious as the voltage fluctuated to 150 volts causing several rectifier tubes to give up the ghost. The call used was 3A2BX, and the station was set up in a small shack on the roof of the five story Hotel de Seicle. Plenty of fresh air was available as the glass was missing from the windows and the doors of the shack had been removed. Because of this trip Henke, 3A2AH who is a permanent resident of Monaco became interested in SB and is now on the air with his own rig. The fortunate W/K stations who contacted 3A2BX were: W2OQO, W6UOU, K2EXF/VO1, W2KR, W4MXI, W6HX/2, W4OPS, W4EUP, W2JXH, K4JOU, W4UKA, W2VZV, W2BXA, K2KGH, K2KGJ, W4WW, W2LV, W1ADM, W3ZP, and W3BWH. The best signals heard there were from ZL and VK. A three-band dipole was used on 10, 15 and 20. A KWM-1 and also a 2OA with 4-6AG7s in grounded grid with a 75A4 receiver completed the complement of the station.



A voyage from Florida around the islands in the Caribbean on the ninety foot ketch rigged, steel motor sailer "BAR-L-Rick", owned by Harry, W2JSW started off with lots of gusto on Saturday, January 11th. Harry's guests included Irv, W5HHT, Dan, W2GG/4, Mort, W2KR, Stu, W4HB, and in addition the radar, loran, depth finders, automatic steering, gyro pilot, and regular ship to shore radio gear, a KMM-1 was operating into two antennas nearly ninety feet above the deck. Every one of the guests were taking turns in operating the ham rig while the beautiful ship with its two GM 6-71 two cycle diesels was

[*Continued on page 96*]



YL

by **LOUISA B. SANDO, W5RZJ**
212 Sombrio Drive, Santa Fe, N. M.

Bina, Ziza and Eunice, three charming YLs from Brazil, are currently making an extended visit in W-land. The girls, all sisters and all licensed Hams, hail from Belo Horizonte, Minas, Brazil. Bina, otherwise known as Etelvina Gomes De Oliveira, is PY4APA. She is a post-polio patient in the Hillcrest Hospital in Tulsa, Okla.

Bina contracted polio about nine years ago and at first was paralyzed from the neck down. At the time she arrived in Tulsa last September she was still paralyzed from the waist down. As a result of treatment so far she has regained some use of her lower limbs and will possibly be able to walk with help during the coming year. Those who know her say her determination is terrific.



Sisters all, these Brazilian YLs inspect a miniature mobile, complete with antenna, presented to Bina, PY4APA (center) by the Oil Capital Mobile Club of Tulsa, Okla. Bina is receiving post-polio treatment at Tulsa while her sisters, Eunice, PY4AUT (left) and Ziza, PY4AUL, attend a seminary at Ft. Worth, Texas. Photo by K5GZY and courtesy of K5DVE.

Sisters Eunice, PY4AUT, and Ziza, PY4AUL, are students at the Baptist Seminary in Ft. Worth, Texas, and plan to be in the U.S. for two years. They visit with Bina during school vacations.

Due to language difficulties (she speaks Portuguese), Bina had a hard time making others understand she was a Ham and would like to meet other Hams. Through a former missionary who had known her and her family in Brazil, she got the idea across. By way of a newspaper reporter, who called the local CD office, her wishes became known to K5DVE, Lou, and her OM, K5DVF, and as Lou says, it was a big meeting—for lonesome Bina and for K5DVE also.

Of course the Brazilian YLs cannot operate while in this country, but Bina wanted a receiver so she could listen on the bands. When the mobile club of Tulsa learned of her wish, W5VDN provided a receiver and the fellows put up an antenna. Now she listens to the nets, mobiles, etc. and it has helped her in picking up English as well.

In her own country Bina works 40 and 20 meters cw mostly and most of it is DX. She has a stack of DX QSLs that would make many a DXCC seeker green with envy. She holds a Class A license which requires cw at 25 wpm and an additional test on theory. Her transmitter is home built with a pair of 807s; receiver is an SX-71, and she uses a doublet antenna. Sisters Eunice, PY4AUT, and Ziza, PY4AUL, hold Class B licenses and work 40 and 80 meters only. Their code (13 wpm) and theory tests are similar to our General Class ones.

In their visits K5DVE and Bina bridge the language barrier with Ham lingo and Q signals when the going gets rough. Another polio patient in the ward also comes to the rescue. Both Pat and Bina speak Spanish—Pat translates into Spanish and Bina understands. CW seems to be a natural "language" with her—both Lou, K5DVE, and Doris, K5BNQ (to both of whom we are indebted for the story of these PY YLs),



These YLs from the Houston area attended the TYLRUN celebration at Dallas. L. to r., front row: K5BWM, K5ALF, W5ERH, W5ZPD. Standing: W5EGD, K5LIU, K5BJU, W5EYE. All TYLRUN photos by W5IWL.



Members of the Dallas YL club, WHOOT, were hostesses for the 3rd anniversary luncheon of the Texas YL Round-Up Net. L. to r., top row: W5YKE, K5GRF, Evelyn Arnold, W5RYX, W5KEC. Middle row: W5WXY, KN5MTF, Dorothy Harrison, W5SPV, K5GHX, KN5MWN. Front row: K5KDY, K5GMI, K5BNH, W5BDB, K5BNB.



Members of the Ft. Worth YL club, WHO, attending the TYLRUN's 3rd anniversary included, l. to r., top row: K5INY, Elizabeth Roden, K5CRH, W5PFU. Middle row: K5GFI, KN5LAE, W5IHB, W5FUG, K5HEQ, K5LUA. Front row: Mary Brewer, W5GXG, K5MJW, K5DEF, W5ETH.



Three of the TYLRUN officers for 1957 and other YLs attending the net's 3rd anniversary included, l. to r., front row: K5BNQ, K5LWI, W5LGY, W5FBM. Standing: W5YSJ, K5DVE, K5IMD, W5YRT, K5MBS.

comment that during visits Bina can always be seen tapping out cw with her fingers on the arm of her wheelchair, or even tapping a CQ with one of her feet.

As you can see by the photo, Bina is now mobile in a wheelchair! The Oil Capital Mobile Club of Tulsa presented the miniature mobile (outfitted by W5ZBD) to Bina, along with credentials making her an honorary member of the club. She is hoping to attend some of the club meetings and become acquainted with other Hams in the area. In the meantime, she would be happy to receive a QSL card or a note from any of you who would care to take a few minutes to address one to her. Just send it to Bina, PY4APA, c/o Polio Ward, Hillcrest Hospital, Tulsa, Okla. Or drop in to see her—as Lou puts it, "That little gal will just steal your heart for her personality is as beautiful as her looks!"

9th Annual YL-OM Contest

Don't forget the YL-OM Contest. Phone section: March 1-2; CW: March 15-16. For complete rules check this column in Feb. CQ.

W4UF, Long-Time YL

One of the YLs we missed in the long-time YL series was Dorothy Chapman Saunders who operates W4UF from Englewood, Fla. in winter and W4ZKD at Atlanta, Ga. in summer. Dot got her first license in April, 1927 when a sophomore in H.S. This was at Ridgewood, N. J. and her call was N2BY. With the help of two neighboring Hams they built her gear. The transmitter was a breadboard affair using a 199 receiving tube with input of about 10 watts. Her DX with it, good for that time and power, was Youngstown, Ohio on 40 cw. Increasing to 15 watts power with a 201 tube (raw a.c.), she worked Europe and the U.S. Marines in Nicaragua and Calif.

Dot held her license continuously up through World War II but when the licenses that had been extended automatically expired she was out of the country. When she returned to the U.S. in 1951 she took the license exam again. Now she works 10, 15, 20, 40 and 75 with a Viking Valiant and SX-100 receiver. She also has a mobile rig for CD work on 75 and 40 meters. She enjoys DX and the YL nets and is publicity chairman for the Floridora YLs.

A graduate of Syracuse Univ., Dot took her M.S. and Ph.D. in Biology at the U. of Mich. She is Phi Beta Kappa and Sigma Xi. She has held a pilot's license since 1935 and in 1938-39 was Governor of the middle-eastern section of the U.S. for the 99'ers and editor of their newsletter. In 1930 she became an instructor in the Nat'l Rifle Assn. and an Examiner in Red Cross Lifesaving. She taught 4 years in a girls' college in Penna., lived in Peru for 3 years, has been a research agriculturist with U.S.D.A. in Peru, Ecuador, El Salvador, Cuba and Guatemala. In 1947 Dot married Dr. George Saunders, a research biologist with the U.S. Fish and Wildlife Service and together they did field research in Mexico for several winters. Asst. Prof. of Biology at U. of Fla. in 1953-54, this was followed by a Fullbright post-doctoral research scholarship to Egypt in 1955-56 where Dot worked on blood parasites of fishes of the Red Sea. Since early 1955 she has been research associate at the Cape Haze Marine Laboratory, Placida, Fla.

Dot's other hobbies include playing the piano, violin and alto recorder. She and her OM share a keen interest in photography and have their own laboratory-darkroom. In addition Dot speaks Spanish, French and some Arabic. A full and interesting career, Dot—we all are proud of you!

With the Clubs

The Texas YL Round-Up Net held its third anniversary celebration in Dallas on Nov. 9, 1957 with 55 attending (46 licensed YLs). A come-as-you-are breakfast was served by the YLs of WHO of Ft. Worth. Members of Dallas WHOOT were hostesses for the luncheon at which W5RYX was MC. Speakers included K5BNQ, president and NCS; W5KEC, VP and alternate NCS; W5LGY, sec'y-treas.; and W5YRT, P/C. Officers and WHOOT members wore corsages made of net, leaves, pipe cleaners and 5654's. Tyler, Texas was chosen as the site for 1958's anniversary party. The TYLRUN numbers 77 members and meets on Thurs. mornings on 7235 and 3880.

The Rhode Island Y.L. Club held installation of officers in Nov. with this new slate for 1958: President, K1AAK, Helen; VP, W1WED, Ruth; sec'y, W1GSD, Dorothea; treas., W1OTI, Louise. W1GSD, Dorothea, will be serving as net manager for the club and will conduct a 6-meter YL net Tuesdays at 8:30 p.m. She will tune the entire band in the event YLs from nearby states might like to participate. Look for W1GSD on 51.007, present calling frequency.

The Camellia Capital Chirps have elected these officers for 1958: President, K6ENK, Wanda; VP, W6HTS, Mildred; sec'y, K6UZA, Dorie; treas., K6HHD, Jan; publicity, K6HOI, Pat. The 3C's celebrated their 1st anniversary as a club with a dinner on Jan. 24 at which KL7BEW, Thelma Jean, and her OM KL7ASQ showed colored slides of their experiences in Alaska.

The Penn-Jersey Y.L.A.R. Club has changed the requirements for eligibility for their certificate. Instead of having to work 15 of its members, operators in the U.S. need work only 10 of the Penn-Jersey YLs (DX stations need work only 5 members). No QSLs need be mailed, only a list of stations worked, name, date, band and time. The custodian is W3GTC, Carolyn Currens, P.O. Box 523, Norristown, Penna.

Officers for 1958 for the YLRC/San Francisco are: President, K6HIW, Kay; VP, W6BDE, Esther; sec'y, W6QPV, Rose; treas., K6UDT, Pat. Executive committee: K6CUV, Lee; K6CQL, Joyce; Elsie Bachman and Rose Buckley. The club gave Kay, K6HIW, a number

[*Continued on page 98*]

by **FRANK ANZALONE, W1WY**
14 Sherwood Road, Stamford, Conn.

CONTEST CALENDAR

March	**1- 2**	**R E F Phone**
March	**1- 2**	**YL – OM Phone**
March	**7- 9**	**ARRL DX Phone**
March	**15-16**	**CQ SSB**
March	**15-16**	**YL – OM CW**
March	**21-23**	**ARRL DX CW**
April	**4- 6**	**DARC WAEDC Phone**
April	**12-13**	**R E F CW**
May	**17-18**	**Helvetia 22**

R E F

Time: Phone, 1200 GMT March 1st to 2400 GMT March 2nd.
CW, 1200 GMT April 12th to 2400 GMT April 13th.

Serial Nrs: The usual progressive 3 digit number starting with 001 after the RS or RST report.

See February issue for scoring, multiplier and other details.

Send your logs to:

Reseau des Emetteurs Francais
B. P. 42 – 01
Paris – RP, France

YL – OM

The 9th annual YL/OM contest is well covered in Louisa Sando's YL column in the February issue of CQ. Our only comment on this one is the poor choice of dates. The conflict with the REF Phone contest might present a serious threat. However running the CW section on the same date as the SSB Contest is not too bad inasmuch as different mediums are being used.

ARRL

The first half of the annual ARRL DX party is now past history. If you didn't do so good in the first half you might be able to catch up in the second half. That's one advantage of having a two week-end contest but I still say it's too long a time for one activity.

DARC

The Phone section is still a month away but if the popularity of the CW contest back in January is any indication, this is worth preparing for by the Phone gang.

Helvetia – 22

This annual party sponsored by the HB Gang, offers an excellent opportunity to work some of those hard to get Cantons. The Helvetia – 22 is a very attractive certificate and really worth making an effort. The HB boys even go to the trouble of operating portable from some of the rare spots during this contest.

VE/W Contest Results

District Leaders

W1JYH	**93,571**	**VE1EK**	**44,298**
K2KFP	**56,045**	**VE2BN**	**63,450**
W3VKD	**60,919**	**VE3DSU**	**93,390**
W4CKD	**38,988**	**VE4SK**	**21,150**
W5LGG	**45,324**	**VE5DZ**	**19,215**
W6NZW	**39,965**	**VE6HG**	**5,940**
W7ENA	**9,355**	**VE7AFP**	**24,684**
W8UVZ	**62,888**	**VE80J**	**16,770**
W9NII	**63,356**	**VO2NA**	**23,100**
KØDHH	**26,317**	**KL7MF**	**298**

Gordy Webster, VE2BB, contest chairman, reported that the 1957 contest was the most successful of any held to date. This can be attested by the higher than usual returns and scores. The close battle between W1JYH and VE3DSU for Top Honors would also indicate that Gordy has finally come up with an equitable multiplier. To our knowledge, this is the first time the Trophy has been won by a station on this side of the border. Congratulations Roger.

Next month we hope to have a preliminary report on our own World Wide DX Contest.

BCNU fellows. 73, Frank, W1WY



ham clinic

by CHARLES J. SCHAUERS, W6QLV

CQ Magazine
300 West 43rd St.
New York 36, N. Y.

A large number of the hundreds of letters received thus far contain requests for information relative to the modification of various commercially made amateur radio transmitters for 6 meter operation. Some of these requests could not be fulfilled because the transmitters in question could not be modified efficiently without major mechanical and electrical changes which most hams are reluctant to make.

In our book, tearing up a beautiful transmitter like the 32V series to add a band is "sacrilegious"! Oh yes, it can be done but we do not think the effort is worth it.

Those who desire the 6 meter band figure this way: "I never use the 160 meter position on the rig so why have it? I'd rather try and convert it over to 6 meters!"

We are willing and able to suggest *general* modification information but we cannot promise detailed schematic treatises. Proper modification is work!

In transmitters such as the DX100, Viking I and II etc., 6 meter conversion can be accomplished without "butchering" up the set, but unless another stage is added, high efficiency will not be realized.

Generally, 6 meter conversion consists of removing 160 meter components (coils, trimmers, by-passes etc.) and replacing them with 6 meter coils etc., which will permit the exciter stages to double and quadruple to 6 meter frequencies. If 25 megacycle crystals are used, modification of the oscillator is usually necessary. Frequency multiplication with 7 or 14 megacycle crystals can only be achieved efficiently by adding a slug-tuned buffer-doubler (quadrupler) stage.

Tapping the final 10 meter coil is not encouraged but can be done. However, for maximum efficiency a separate final 6 meter coil should be utilized and the final *never* operated as a doubler.

Unless special precautions are taken when converting to 6 meters, TVI may be a problem. In addition to regular TVI suppression measures, additional shielding may be necessary; this being especially true if a slug-tuned stage is added.

If you want to get on 6 quickly, tapping down on ten meter coils and upping drive will get you there but at low efficiency. But again, this is not recommended—the danger of a "pink ticket" from Uncle FCC for harmonics hovers too closely!

Requests are still being received for information relative to old equipment for which we do not have the schematics. We would therefore appreciate inclusion of schematics when inquiring about specific gear. These will be returned with your answer. Be sure to include enough return postage.

You will note that no personal address has been included again this month. I am still in the throes of moving. If there is a little longer delay in answering letters and cards, please chalk up the tardiness to "living necessity" and not "calculated delinquency."

Observation of the Month

When Collins Radio of Cedar Rapids came out with their KWM-1 transceiver, amateur radio suddenly found itself in a new technical era. Designed for 10, 15 and 20 meters, this versatile SSB instrument seems to be at home in the car as well as the shack.

Operating K6OJO's (Steve) transceiver, every station heard and called was worked with glowing reports. The more I operated this "little giant" the more I want one.

Contacting a mid-west station, dial readings were compared and both were RIGHT on! This surely attests to electrical and mechanical perfection!

Although this little and very compact Collins package has only 3 bands (because it was desired to keep it small); and requires an adaptor for "cross frequency" operation, it is just the set for the DX enthusiast and those who do not want to buy two transmitters and two receivers for mobile and fixed station operation.

Now rumors are rampant that other manufacturers are either in the process of designing or coming out with SSB-AM-CW transceivers. If true, they will find stiff competition in the Collins KWM-1 even though it is not all-band.

This month's observation? Well, as time goes on, radio amateurs will see more radical changes in equipment design which will lean toward minification and higher efficiency. The day of bulky equipment with low stability is over! Competition, better market research by manufacturers and more extensive field testing will enable the average ham to obtain precision

equipment at prices he can afford.

Twists and Techniques

Although most of us never hear of the theft of mobile radio gear it nevertheless happens—and frequently. But after seeing some installations I wonder how a thief could possibly remove mobile components without at least four hours time!

To hinder and possibly stop the theft of mobile equipment, W6FQE (Tom) comes up with a simple but very effective idea.

On a selected bolt which assists in holding a piece of equipment to the under-dash, steering column or fire-wall, an insulated compression type washer is fitted so that when the bolt is turned (from the inside), contact will be made to the contact side of the horn relay. The wire to this compression washer is concealed as carefully as possible.

Few thieves will "carry on" with an auto horn blowing full blast and waking up half the neighborhood!

Now I would like to see someone come along to invent something to keep mobile antenna thieves from "lifting" an antenna fastened to the spring mount with a "quick mount" connector!

Questions

L. M. of Springfield wants to know how to eliminate dynamotor hash and whine. He operates a command receiver in his car.

Well Lou, the most frequent contributor to hash is of course dirty commutators and ill-fitting or worn brushes.

Commutators can be cleaned with crocus cloth with the aid of a piece of soft wood. If the commutators are clean, inspect for proper brush ride. That is, make sure that brushes are seated so that minimum arcing occurs and they are free to move. Check for binding brushes.

Inspect the high and low voltage commutators for rough uneven wear; perhaps they need undercutting on a lathe by an experienced machinist skilled in the art.

After brushes, commutators etc. are in order and you still have noise, try a .1 mfd ceramic across each brush to ground. If these do not help, then you may need a filter (pi type) in series with both high and low voltage output and input terminals.

A good sturdy rf choke bypassed with 5 to 10 mfds. will work ok for the high voltage. For the low voltage you will need a heavy input choke capable of carrying the starting current and this must be bypassed heavily. In some cases, as much as 5000 mfd. (yes, 5000), are needed.

Frequency Drift

"I have an Allied all-band receiver which seems to drift in frequency, especially 10 meters," writes R. C. from New York. Any hints as to what might be the trouble?

Yes, check your 6BH8 and OB2 tubes. Also recheck your soldered joints. Could be that you may have a bad condenser somewhere too. This is a good little receiver and if put together properly should give relatively little trouble. Even though you got the set second-hand from a friend why not write to Allied and ask them; they may have the exact answer. They have a swell bunch of hams working there.

Regulation

C. H. writes from Australia: "my mains regulation seems to be very poor, especially in the early evening hours. How about my using a transformer which can be switched in and out at will?"

The first thing I would do Carl is to ring up the power company down there and ask them to take a look at my "pole pig" (distribution transformer). If they won't correct the trouble you could use an auto transformer similar to our Variac. However, you would have to be careful that you didn't forget to switch it off, unless of course it is self-regulating. We have that problem sometimes here in the United States too, but usually one call to the power company will bring help.

Portable Power

F. S., Houston, Texas writes: "I'd like to buy a small portable 110 volt ac power supply of about 600 watts output. What would you recommend?"

Personally, I like the 750 watt generator handled by Marco Products Company, Foot of Jones St., Fisherman's Wharf, San Francisco, California. It is only $159.50 and a "steal" for that amount. It weighs only 50 pounds and is indeed a portable. (They advertise in CQ too)

Oscillator Tube

"I've used the good old 6AG7 for years as a reliable crystal oscillator and would like to know if there is a miniature tube that approaches it?" C. B. from Akron, Ohio writes.

Try the 6CL6, Charley.

Receiver Measurements

L. B. of Brownsburg, Ind. writes: "how can the average ham without extensive laboratory facilities measure the sensitivity of a home-built (or other receiver)?"

We are in the throes of getting accurate information from a well known receiver design engineer and will write an article on this subject. We agree that the literature on this subject is not extensive enough for the practical ham who wants to know the answers without having to wade through volumes of engineering data.

So because you suggested the article, we'll ship you an advance copy. We hope you have a screen room!

Schematic

Alvin J. Stewart, Apartado 568, Ciudad Trujillo, Domincan Republic, President of the Adventist Mission there is seeking a schematic for an old Gross radio transmitter, Model CB55, Serial Number 256, phone model. Any-

[*Continued on page 112*]

by DONALD L. STONER, W6TNS
P.O. Box 137, Ontario, Calif.



Novice

I am sure that the new Heath DX-40 will be of particular interest to Novices. Like its famous predecessor, the DX-35, it is a combination phone and cw transmitter. The power, however, has been "beefed up" to 75 watts on cw and 60 watts peak on controlled carrier phone. Since it runs a full "Novice kilowatt," and can be used on phone when the General Class ticket arrives, I am sure that it will be found in many Novice ham shacks.

The DX-40 is the same size as the DX-35, measuring 13″ wide, 8½″ high, and 9″ deep. The cabinet is finished in the usual Heath shade of grey wrinkle, with a silver and grey two-tone front panel. An elegant clear plastic meter now graces the front panel, making it look very professional, indeed. Naturally, a pi network is incorporated and allows the transmitter to load a non-reactive antenna between 50 and 1,000 ohms.



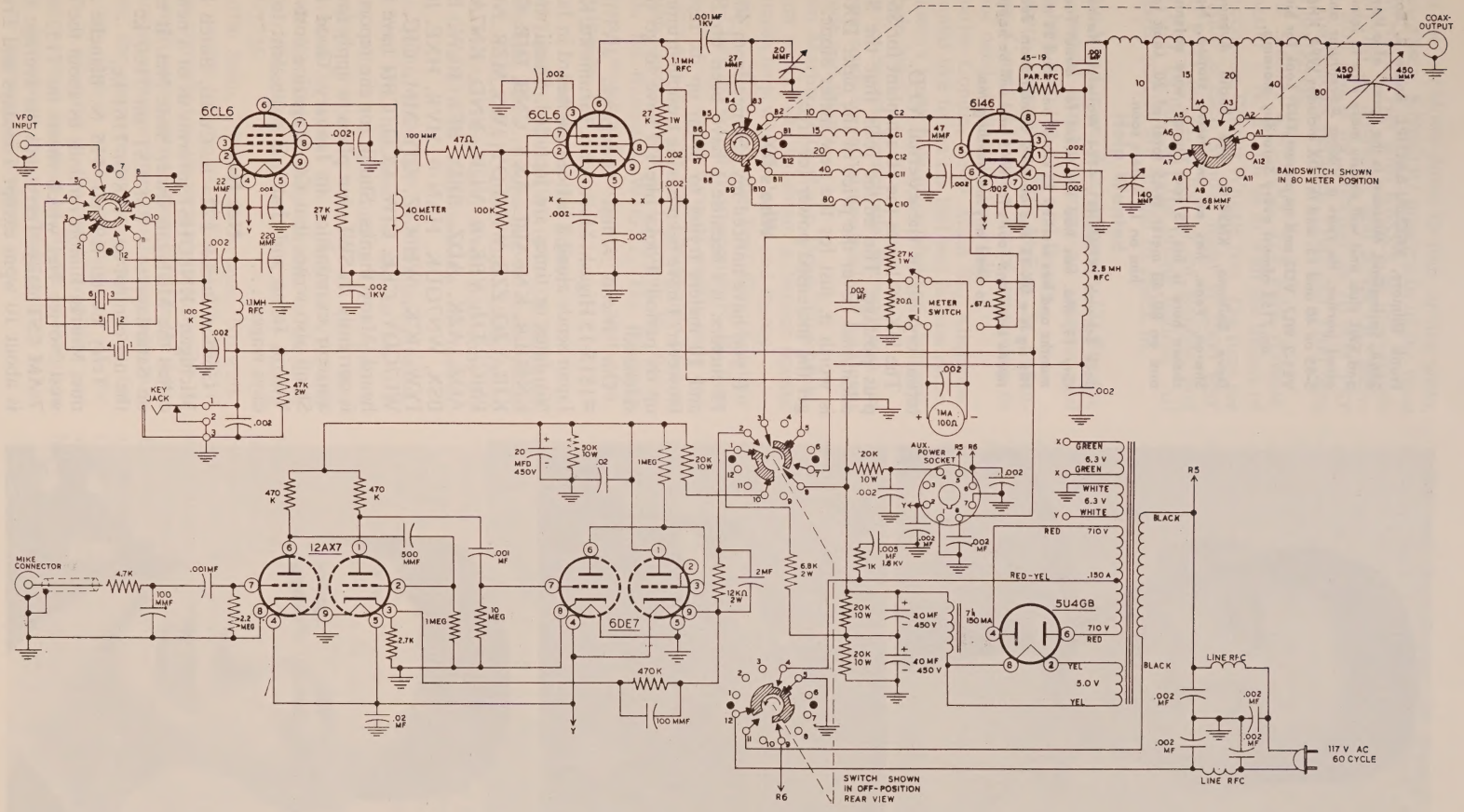
Heathkit DX-40 transmitter

Technically, the transmitter uses 6 tubes including a 5U4GB (a rugged 5U4G). The rf circuitry has been simplified and at the same time improved through the use of newer tube types and the incorporation of design refinements. A 6CL6 tube is used as a Colpitts oscillator and the plate circuit contains a single tank circuit tuned to 40 meters. On lower frequencies, it simply acts as an rf choke. More than adequate drive can be obtained on all bands by using another 6CL6 as a doubler-tripler or quadrupler, as the output frequency demands. In an extremely clever circuit Heath connects both the 6CL6 tubes in a series and they are connected across the 600 volt supply (300 volts each). This eliminates power wasting voltage dropping resistors.

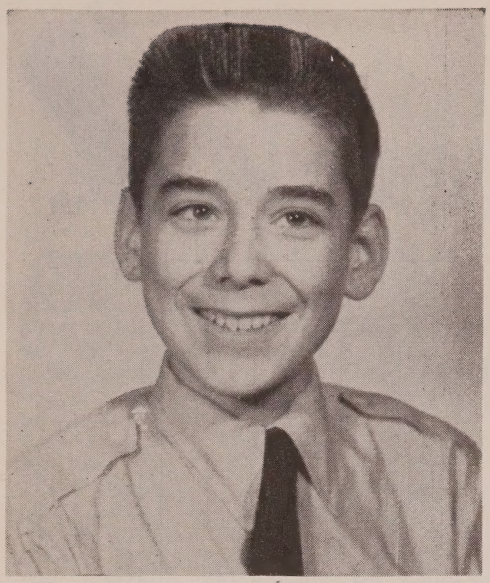
The 6CL6 buffer (or frequency multiplier, depending on the band) is coupled to the 6146 through a pi network similar to the output network that couples to the antenna. This circuit proves to be very effective in reducing television interference. Also, this circuit will only resonate on the desired ham band, eliminating the possibility of mis-tuning. Resonance of the 6146 grid circuit controls the amount of grid drive. Naturally, the 6146 operates "straight through" (it is not used as a doubler on any band).

In the phone section, a 12AX7 tube is used as a high gain two stage resistance coupled speech amplifier. The output of the speech amplifier is coupled to the 6DE7 through a low capacity coupling capacitor. This low capacity coupling, along with the 470K and 100 mmf capacitor forms a feedback circuit from the modulator cathode back to the speech amplifier cathode. This shapes the frequency response to favor the voice, thus allowing a higher average level of audio to be maintained. The 6DE7 is a new twin triode containing dissimilar sections. The driver section (left side) has a 1.5 watt rating while the right section is rated at 7 watts dissipation. The heavier section is connected in series with the 6146 screen and its conduction varies in accordance with the average voice level. This varies the 6146 screen voltage causing the tube to draw more or less current. When operated normally, the plate current will kick up to 125 ma from an average level of 50 ma. The power supply section is extremely husky, and no trouble should be encountered here. As a matter of fact, Heath has included an accessory socket so that power from the DX-40 can be used on such accessories as the Heath VF-1 VFO.

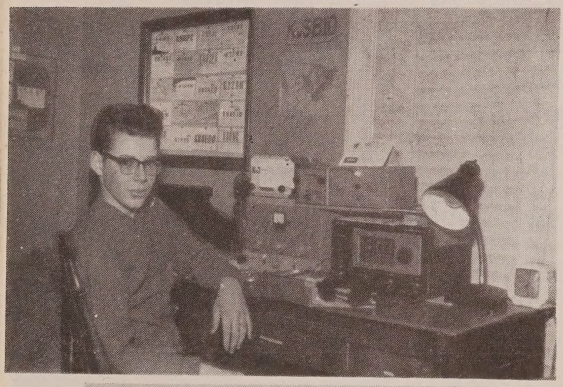
Heath has included a frequency spotting position on the function switch so that you can check your position in the band with respect to the other stations. Of particular interest to Novices is the keying characteristics. Excellent is the only suitable description. It is the finest I have heard short of the more expensive timed sequence keying systems. For the benefit of the Generals among us, the audio is crisp and clean. It is impossible to tell that the transmitter uses controlled carrier unless you notice the "S" Meter kicking around. Also, for the General ticket holders is the four position switch on the rear apron that can select between three in-



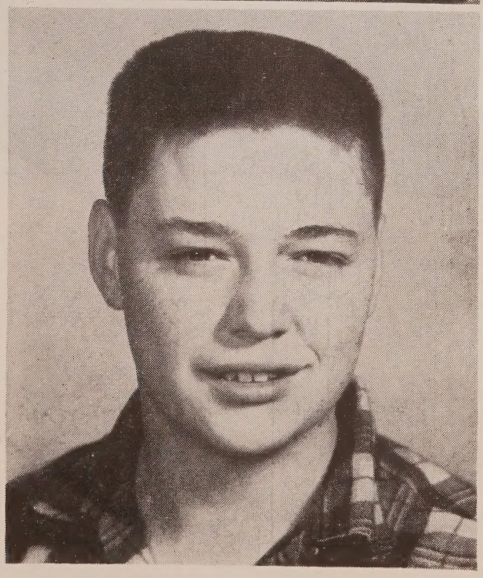
Schematic of the Heathkit DX-40



Frank Gilmore, KNØJPJ-AAØJPJ, Route 2, Box 286A, Springfield, Missouri is the "pres" of a Ham and SWL club and will supply more info to interested parties. He runs a Viking Adventurer and S-85 on 40 and 15, and the DX includes WP4, KH6, VE1-3 WL7, VO2 and an almost YU3! Look for him on 7152 almost every Saturday morning.



Dave Bellama, KN3BIO, 312 Euclid Avenue, Sharon, Penn. has an impressive station. Not shown here is his 75 foot "long" wire antenna and an 80/40 meter WAS total of 30. Look for him on 15 meters soon.



Jack Schwab (KNØLHR), 4124 Warwick, Kansas City 11, Mo. has had the ticket for about four months and has worked 21 states on 7 and 21 mc. His rig is a DX-35 and an AR-2 combination. Jack needs one's and four's for WAS and will be happy to sked anyone needing Mo.

ternal crystals or the external VFO.

The DX-40 leaves the Heath plant for $64.95 plus postage. The editor feels that the $8.00 additional (over the price of the older DX-35) is worth it, just for the new meter alone. You get the increased power for free!

Who's DX

If you have noticed my absence from 40 and 15 meters, it's because I have been on 20-15 and 10 meters trying to drum up dx reports. However, I have been having trouble drumming up dx period! Looks like I'll have to go single sideband!

Our friend Shinji Hasegawa, JA3-1050, #1815-15 Higashi Maiko-cho, Tarumi-ku, Kobe, Japan sends along a list of calls heard in Japan. No dates or times are included. Shinji writes: KN5OLR, KN6AUL, AXY, CNB, DJB, GSD, KJB, YZO, ZZB, WN6FOY, JWS, MZR, NQM, PMC, TJJ, VBK/6, VUH, YND, KN7AAV, AOZ, AZK, ADZ, BBD, BFI, BLW, BRE, BSX, WN7GUK, HAN/6, HVR, HXE, IQM, IYW, ICK, WH6CIZ, CIY/MM, CJC, CJJ, WL7CDY, CEE, CIW, CCO, CBH have been heard. Many thanks, Shinji, for the report. He is currently an SWL, but plans to apply for the amateur examination in January. Good luck. Shinji also writes that CQ Magazine costs 500 Yen in Japan and that it is equivalent to two days wages. . . .

Net News

Gordon Burke, 2224 E. Curtis, Burch Run, Michigan (KN8GHS) informs us of a new net called the Michigan Outer State Net. It meets on Saturdays at 4 PM EST on 7160 kc with the net control on 7158 or 7161 kc.

Terry Lentz, K9EDI, 115 N. Blanche Avenue, Morris, Illinois reminds us about the Midwest Novice Net which meets on 7152 kc at 7 AM CST daily. Terry says the average speed is about 10 wpm except Tuesdays and Fridays

when the net slows down to four or five wpm.

Ken Olsen, KN6COU informs us of the West Coast Novice Net with K6SXX as net control, WN6YOM as alternate, and KN6COU secretary. Roll call is on Saturday at 10 AM PST with frequencies between 7190 and 7200 with 7195 preferred.

Mel Stoller, KN2AOQ, 373 Park Avenue, Rochester 7, N. Y., fill us in with the details of the Rochester Peanut Whistle Net. The time for activation is each Sunday night at 2000 EST (8:00 PM) on 21.15 mc for cw stations, and 2100 EST (9:00 PM) for phone stations. All interested parties are invited to check in.

Help Wanted

Tom Van Cleave, 3327 Hlbee St. (?) Eureka, Calif. would like to become an amateur and needs help with the code and theory.

Robert Haberern, 230 McKee St., Manchester, Conn. (13) has a lot of gear ready to go, but needs help with the code.

Charles Condie, 1809 Main St., Aliquippa, Pa. would like to get his feet wet in ham radio, but doesn't know how to go about it. Can anyone help him?

Charles Sayers, Frenchville, Pennsylvania has the gear ready to go but needs a little help with the code and theory.

Tom Martin, RR3, Lake Drive, Greenfield, Indiana would like to obtain a Novice license and needs help with the code and theory.

Help is offered by the Port City Amateur Radio Club, W1WQM, Portsmouth, N. H., Post Office Box 622, in the form of weekly code and theory classes at 7:30 PM. Classes are held at the club headquarters at 1 Church St., Portsmouth. Ed Ramsdell, W1GXZ, The Publicity Chairman watches for letters from that area. Many thanks, Ed.

Letters to the Editor

Bob Lamkin, KN1DIW, (13) 38 Thornton St., Revere, Mass. would like to make skeds with Vt., Md., Del., N. and S. Dak., Utah, Ariz., Idaho, Mont., Oreg., and Wyo. Bob runs 50 watts to a DX-20 and operates 15 meters, mostly.

Ben Quinn, KN4QYP, 367 Wallace Avenue, Frankfort, Ky., has been on the air for 3½ months with an SX-99 and a QF-1, plus a Hammarlund Four-20 running 45 watts. Ben has worked 25 states. DX includes a VE2 and a KN6. He offers to help anyone in the area get their ticket and can be contacted by calling CA 7-2726.

Martin Sonn, 79 George Avenue, Norwalk, Conn. writes to inquire if the Heath WX-20 can be converted to six in a manner similar to the Knight conversion that appeared in the Aug. 57 Novice column. I see no reason why not, Martin, the same technique should work for both rigs. It is a matter of supplying 25 mc energy to the grid of the power amplifier and placing a circuit resonant at 50 mc in the plate circuit. Increasing the grid leak resistor value will also increase the output.

Bob and Red Brown, 67 Russell Avenue, Rahway, New Jersey hold the calls KN2ZSQ and KN2ZSP respectively and are a father and son team. They have two home made transmitters and favor 80 meters and use a BC-348-P receiver. The other transmitter is a two meter job with a 2E26 in the final. Bob and Red also add that they have had 900 contacts and filled three log books!

Tom Geiger, WN2KVA, 47 Grandview Avenue, Dobbs Ferry, N. Y. writes to complain about receiving Radio Moscow right smack in the middle of the forty meter Novice band, and 40 is the only band he can operate! Actually, Tom, by international agreement, they have a perfect right to be there. There are many other foreign broadcasting stations in the Novice band but you can't hear them because of the QRM. Overseas hams have a terrible time hearing Novices because of the broadcast stations. I am afraid that your only consolation is that maybe you are QRM'ing them as much as they are QRM'ing you—hi.



Boy, look at those DX cards on the wall of K2TLQ, Bruce D. Jenkins, shack. located on 3797 Redman Road, in Brockport, New York. Although Bruce is now a General, he still likes to work cw especially on 15 meters with his 40 meter dipole. Other antennas include an 80 meter dipole and a 10 meter rotary beam.

Doug Wilson, WN7JDK, 2349 Liberty St., North Bend, Oregon wonders if the "Q" Multiplier similar to that shown in the May 57 Novice column will work on his SW-54. As far as I know Doug, everything including the .001 mf capacitors will be the same.

Bob Ogren, KN1CVH, 931 Pleasant St., New Bedford, Mass. writes the "Exalted One" (Whadde say?) to describe his WRL Globe Chief 90 and NC-98. Bob also wonders about what my station is like. Maybe next month I'll have enough room to include a description of it.

That is about it for this month,

73, Don, W6TNS

by GEORGE JACOBS, W3ASK
607 Beacon Road, Silver Spring, Md.

PROPAGATION

Last minute forecast: March is expected to be a relatively disturbed month. Moderate to severe short wave radio storms are forecast for March 13- 5 and 22-23. Widespread auroral displays are likely to occur during both these disturbances.

March Highlights

An *increase* in the number of long-distant *6-meter* openings between the United States and areas in the Southern Hemisphere is forecast for March. On the other hand, *6-meter* openings to areas of the Northern Hemisphere are expected to *decrease* considerably during the month. Good world-wide DX propagation conditions are forecast to continue on *10-meters* from dawn until several hours past sunset. Excellent conditions are expected on *15-meters* from early morning through the early evening hours, and around-the-clock to some areas of the world. Optimum reception on *20-meters* should occur during the late afternoon, evening, and early morning hours, with the band open more often than during the winter months. Good daytime short-skip conditions are forecast for *40-meters,* with the band opening for DX later in the evening than during the winter months. Fair DX conditions are expected to many areas of the world during the hours of darkness. On *80-meters* daytime skip will be limited to less than 300 miles, increasing as darkness approaches. DX conditions on this band are usually poor during the spring and summer months, but may be possible to some areas of the world during the hours of darkness, when static levels are low. Fairly good propagation conditions are forecast for *160-meters* during the hours of darkness for skip distances up to about 1300 miles. Some openings over greater distances may be possible on a few nights during the month.

During the equinox period, from March through April, there is usually an improvement in *antipodal* propagation—that is, propagation to the opposite side of the world. This improvement should be noticeable on all the amateur bands between *6 and 160-meters.* Australasia, South Africa, and South East Asia are the approximate antipodes of the United States.

Static and atmospheric noise levels begin to increase during the spring months.

Auroral displays are known to occur more often during the equinox period than at any other time of the year. Coincident with this increase in auroral activity is a greater tendency for severe and prolonged radio storms to occur. An increase in auroral type openings in the VHF amateur bands also occurs during this period.

Minor meteor showers are expected to occur March 10-12 and on March 20th.

The smoothed sunspot number forecast for March, 1958 is 175.

The Zurich Solar Observatory reports a monthly sunspot number of 240 for December 1957, resulting in a smoothed sunspot number of 188 centered on June, 1957.

Short-Skip Chart

A change has been made in the presentation of the *CQ Short-Skip Propagation Chart* this month which should improve their accuracy. Two symbols are now used to indicate the number of days the circuit is expected to open. The first digit indicating the number of days the path is expected to open for the shorter distance range, and the second digit for the longer distance. For example, a *20-meter* opening for the range 750-1300 miles is shown as 5A—7A (2-3). This means that the circuit is forecast to open between 5 to 11 days for distances of 750 miles, and between 12—18 days for distances of 1300 miles. By interpolation, this permits the short-skip forecasts to take into account the variation of MUF with distance with greater accuracy than before.

IGY Progress

A review of the first five months of the United States IGY program has been released recently by the National Academy of Sciences, sponsor of the U.S. International Geophysical Year Committee. This report describes a wide range of early scientific results of this 18-month, international research program of our earth and its environment which began on July 1st, 1957.

The findings reported cover each of the dozen major scientific areas in which IGY programs are being conducted and reflect the work of hundreds of scientists and many participating scientific institutions, including amateur radio. They demonstrate also the constructive participation of many other nations.

The following is a summary of the scientific progress reported in the fields of ionospheric research and radio propagation. Some of this

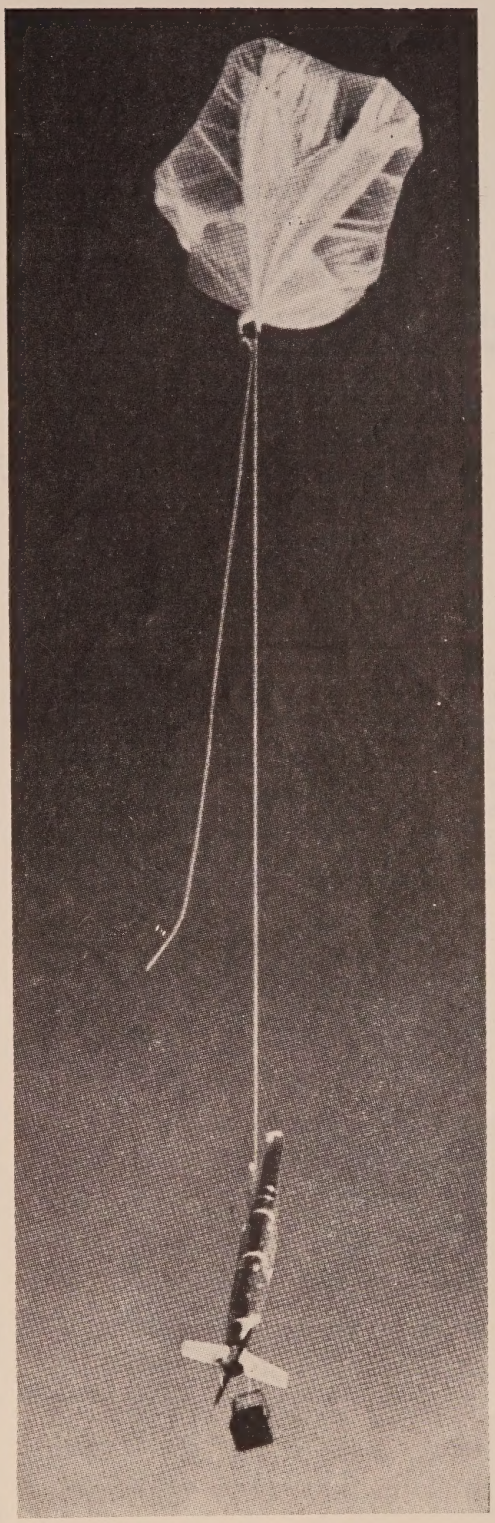
progress has already led to revisions in present theories concerning propagation of short wave radio signals.

United States scientists, gathering data at geomagnetic field stations in South America, and on several Pacific Islands, have discovered evidence of a powerful ring of current, termed the *electro-jet*, circling the earth high above the equator during magnetic storms. This discovery lends substantial support to the theory that magnetic effects observed in the earth's atmosphere (auroral displays, shortwave radio blackouts, magnetic variations, etc.) are caused by the influence of three great electric currents, of perhaps several hundred thousand amperes, believed to be circling the earth at the North and South magnetic poles and at the geomagnetic equator.

Further evidence of the simultaneous influence of these powerful currents results from the work of English scientists studying auroral displays. They report that simultaneous radar observations indicate that auroras occur simultaneously, and with some symmetry, in the Northern and Southern Hemispheres. This condition was long believed to be true by scientists, but was not previously established because of lack of data from the Southern Hemisphere. Additional polar radio data which provides further evidence of this has been obtained by U.S. scientists.

In another aspect of auroral research, U.S. scientists have for the first time been able to prepare synoptic maps for all auroral displays that occurred over the United States during the latter part of 1957. These maps are being used by scientists in studying certain characteristics of the auroras as well as such related phenomena as ionospheric and geomagnetic effects. Hundreds of *radio amateurs* contributed valuable observational data to this project.

Present theories of ionospheric radio propagation claim ultra-violet radiation from the sun as the prime ionizing source of the earth's upper atmosphere. Continuous soundings of the ionosphere over the South Pole, however, have shown that these ionized layers exist (with moderate intensity) through the long winter night and display daily variations despite the absence of the sun. Preliminary observations indicate that certain geomagnetic activity, rather than solar radiation, may in some way be responsible for this ionization. Evidence is also available which suggests similar ionospheric behavior at the North Pole. Analysis of these observations may appreciably



Several of the 81 rockets fired successfully by the United States during the first five months of the IGY were of the *Rockoon* type shown here. The Rockoon, carried 13½ miles aloft by a 90 foot diameter balloon before firing, travels deep into the lower layers of the ionosphere. Its instruments radio back data concerning ionospheric behavior, the earth's magnetic field, and the aurora.
(Photo Credit: U.S. Navy)

ALL TIMES IN E. S. T.

Eastern USA To:	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western Europe	10 A - 2 P (1)*	5 A - 1 P (3)	4 A - 10 A (2)	6 P - 8 P (2)
	5A - 7 A (2)	1 P - 6 P (4)	10A - 1 P (1)	8 P - 1 A (3)
	7A - 4 P (4)	6 P - 10P (3)	1 P - 3 P (2)	1 A - 3 A (2)
	4 P - 7 P (2)	10P - 5 A (2)	3 P - 9 P (4)	8 P - 2 A (2)**
			9 P - 4 A (3)	
Central Europe & European USSR	6 A - 11 A (2)	4 A - 7 A (2)	6 A - 1 P (1)	6 P - 8 P (1)
	11A - 3 P (3)	7 A - 10A (1)	1 P - 6 P (2)	8 P - 12M (2)
	3 P - 5 P (2)	10A - 1 P (2)	6 P - 9 P (4)	12M - 2 A (1)
		1 P - 5 P (3)	9 P - 1 A (3)	11P - 1 A (1)**
		5 P - 9 P (2)	1 A - 6 A (2)	
Eastern Mediterranean	5 A - 10A (2)	1 A - 4 A (1)	7 A - 1 P (1)	7 P - 10P (2)
	10A - 12 N (3)	4 A - 6 A (2)	1 P - 3 P (2)	8 P - 10P (1)**
	12N - 3 P (2)	6 A - 11 A (1)	3 P - 12M (3)	
		11A - 3 P (3)	12M - 7 A (2)	
		3 P - 9 P (2)		
North & Central Africa	9 A - 1 P (1)*	4 A - 11A (2)	7 A - 2 P (1)	6 P - 8 P (2)
	5 A - 7 A (2)	11A - 2 P (3)	2 P - 4 P (2)	8 P - 10P (3)
	7 A - 11A (3)	2 P - 6 P (4)	4 P - 9 P (4)	10P - 12M (2)
	11A - 3 P (4)	6 P - 12M (3)	9 P - 2 A (3)	10P - 12M (1)**
	3 P - 6 P (2)	12M - 4 A (2)	2 A - 7 A (2)	
South America	10A - 1 P (1)*	5 A - 9 A (3)	1 A - 9 A (3)	7 P - 10P (2)
	3 P - 6 P (1)*	9 A - 2 P (2)	9 A - 3 P (2)	10P - 4 A (3)
	5 A - 2 P (3)	2 P - 4 P (3)	3 P - 5 P (3)	4 A - 8 A (2)
	2 P - 6 P (4)	4 P - 10P (4)	5 P - 1 A (4)	10P - 4 A (1)**
	6 P - 10P (3)	10P - 2 A (3)		
	10P - 12M (2)	2 A - 5 A (2)		
Central & South Asia	10A - 12N (2)	7 A - 11A (2)	3 P - 6 P (1)	8 P - 10 P (1)
	12N - 4 P (1)	11A - 4 P (1)	6 P - 11P (2)	5 A - 7 A (1)
	4 P - 7 P (2)	4 P - 7 P (2)	11P - 5 A (1)	
		7 P - 9 P (1)	5 A - 9 A (2)	
Australasia	5 P - 7 P (1)*	8 A - 11A (2)	4 A - 7 A (2)	3 A - 8 A (3)
	9 A - 11A (2)	11A - 4 P (1)	7 A - 9 A (4)	5 A - 7 A (1)**
	11A - 3 P (1)	4 P - 7 P (2)	9 A - 7 P (1)	
	3 P - 5 P (2)	7 P - 11P (3)	7 P - 12M (2)	
	5 P - 8 P (3)	11P - 3 A (2)	12M - 4 A (3)	
	8 P - 11P (2)			
Guam & Pacific	4 P - 6 P (1)*	8 A - 12N (2)	7 P - 9 P (1)	10P - 5 A (1)
	10A - 3 P (1)	12N - 3 P (1)	9 P - 3 A (3)	
	3 P - 5 P (2)	3 P - 5 P (2)	3 A - 7 A (2)	
	5 P - 7 P (3)	5 P - 9 P (3)		
	7 P - 9 P (2)	9 P - 12M (2)		
Japan & Far East	3 P - 5 P (2)	8 A - 11A (2)	3 P - 5 P (1)	4 A - 7 A (1)
	5 P - 7 P (3)	3 P - 5 P (2)	5 P - 1 A (2)	
	7 P - 9 P (2)	5 P - 9 P (3)	1 A - 8 A (3)	
		9 P - 1 A (2)	8 A - 9 A (1)	
Antarctica	2 P - 5 P (1)	5 A - 2 P (1)	3 P - 6 P (1)	1 A - 7 A (2)
	5 P - 8 P (2)	2 P - 7 P (2)	6 P - 11P (2)	2 A - 7 A (1)**
	8 P - 12M (1)	7 P - 12M (3)	11P - 5 A (3)	
		12M - 5 A (2)	5 A - 10A (2)	

ALL TIMES IN C. S. T.

Central USA To:	*6/10 Meters	15 Meters	20 Meters	40/80**Meters
Western & Central Europe	10A - 12N (1)*	5 A - 11A (2)	6 A - 12N (1)	7 P - 1 A (2)
	6 A - 8 A (2)	11A - 1 P (3)	12N - 3 P (2)	8 P - 12M (1)**
	8 A - 1 P (4)	1 P - 3 P (4)	3 P - 6 P (4)	
	1 P - 6 P (2)	3 P - 5 P (3)	6 P - 10P (3)	
		5 P - 9 P (2)	10P - 6 A (2)	
Southern Europe & North Africa	10A - 1 P (1)*	4 A - 11A (2)	7 A - 12N (1)	7 P - 12M (2)
	5 A - 7 A (2)	11A - 1 P (3)	12N - 2 P (2)	8 P - 11P (1)**
	7 A - 11A (3)	1 P - 4 P	2 P - 10P (4)	
	11A - 1 P (4)	4 P - 7 P (3)	10P - 3 A (3)	
	1 P - 5 P (2)	7 P - 12M (2)	3 A - 7 A (2)	
Central & South Africa	11A - 3 P (1)*	6 A - 11A (1)	5 A - 12N (1)	6 P - 10P (1)
	5 A - 9 A (2)	11A - 2 P (2)	12N - 3 P (2)	8 P - 10P (1)**
	9 A - 12N (3)	2 P - 7 P (4)	3 P - 8 P (4)	
	12N - 4 P (4)	7 P - 10P (3)	8 P - 12M (3)	
	4 P - 6 P (2)	10P - 6 A (1)	12M - 5 A (2)	
South America	9 A - 12N (1)*	5 A - 9 A (3)	12M - 8 A (3)	7 P - 10P (2)
	3 P - 6 P (1)*	9 A - 2 P (2)	8 A - 2 P (2)	10P - 4 A (3)
	5 A - 2 P (3)	2 P - 4 P (3)	2 P - 5 P (3)	4 A - 7 A (2)
	2 P - 6 P (4)	4 P - 10P (4)	5 P - 12M (4)	8 P - 3 A (1)**
	6 P - 10P (3)	10P - 1 A (3)		
	10P - 12M (2)	1 A - 5 A (2)		
Japan & Far East	2 P - 4 P (2)	7 A - 11 A (2)	6 A - 8 A (3)	12M - 7 A (1)
	4 P - 7 P (3)	1 P - 3 P (2)	8 A - 2 P (1)	
	7 P - 9 P (2)	3 P - 9 P (3)	2 P - 9 P (2)	
		9 P - 12M (2)	9 P - 1 A (3)	
			1 A - 6 A (2)	
Central & South Asia	8 A - 11A (2)	7 A - 12N (2)	3 P - 10P (2)	NIL
	11A - 2 P (1)	12N - 3 P (1)	10P - 5 A (1)	
	2 P - 4 P (2)	3 P - 9 P (3)	5 A - 8 A (2)	
	4 P - 6 P (3)	9 P - 12M (1)		
	6 P - 9 P (2)			
Hawaii	2 P - 5 P (2)*	9 A - 3 P (3)	9 A - 3 P (2)	8 P - 10P (2)
	9 A - 11A (2)	3 P - 11P (4)	3 P - 6 P (3)	10P - 6 A (4)
	11A - 8 P (4)	11P - 3 A (3)	6 P - 4 A (4)	6 A - 8 A (2)
	8 P - 10P (3)	3 A - 5 A (2)	4 A - 9 A (3)	11P - 6 A (3)**
	10P - 12M (2)			
Australasia	4 P - 7 P (1)*	7 A - 9 A (3)	5 P - 8 P (2)	1 A - 8 A (3)
	8 A - 11A (3)	9 A - 3 P (2)	8 P - 12M (3)	2 A - 7 A (2)**
	11A - 4 P (2)	3 P - 7 P (3)	12M - 8 A (4)	
	4 P - 8 P (4)	7 P - 11P (4)	8 A - 10A (2)	
	8 P - 10P (2)	11P - 4 A (2)	10A - 5 P (1)	
Antarctica	12N - 2 P (1)	5 A - 12N (1)	3 P - 6 P (1)	12M - 7 A (2)
	2 P - 8 P (3)	12N - 6 P (2)	6 P - 9 P (2)	1 A - 6 A (1)**
	8 P - 11P (2)	6 P - 12M (3)	9 P - 4 A (3)	
		12M - 5 A (2)	4 A - 9 A (2)	

ALL TIMES IN P. S. T.

Western USA To:	*6/10 Meters	15 Meters	20 Meters	40/80**Meters
Europe & North Africa	6 A - 9 A (2)	6 A - 9 A (2)	11A - 1 P (2)	7 P - 11P (1)
	9 A - 1 P (3)	9 A - 1 P (3)	1 P - 9 P (3)	8 P - 10P (1)**
	1 P - 3 P (2)	1 P - 10P (2)	9 P - 3 A (2)	
			3 A - 11A (1)	
Central & South Africa	10A - 3 P (1)*	6 A - 10A (1)	12N - 2 P (1)	7 P - 10P (1)
	6 A - 10 A (2)	10A - 1 P (2)	2 P - 5 P (2)	
	10A - 1 P (3)	1 P - 3 P (3)	5 P - 10P (4)	
	1 P - 6 P (4)	3 P - 8 P (4)	10P - 12M (2)	
	6 P - 8 P (2)	8 P - 1 A (2)		
South America	10A - 1 P (2)*	12M - 8 A (3)	8 A - 2 P (1)	6 P - 10P (2)
	4 P - 7 P (1)*	8 A - 1 P (2)	2 P - 4 P (2)	10P - 2 A (3)
	5 A - 12N (3)	1 P - 3 P (3)	4 P - 6 P (3)	2A - 6 A (2)
	12N - 4 P (4)	3 P - 12M (4)	6 P - 2 A (5)	8 P - 1 A (1)**
	4 P - 8 P (3)		2 A - 4 A (4)	
	8 P - 11P (2)		4 A - 8 A (3)	
Guam & Pacific Islands	1 P - 5 P (1)*	8 A - 12N (3)	8 P - 10P (2)	1 A - 5 A (2)
	9 A - 1 P (3)	12N - 6 P (1)	10P - 4 A (4)	2 A - 4 A (1)**
	1 P - 5 P (2)	6 P - 12M (3)	4 A - 8 A (3)	
	5 P - 7 P (4)	12M - 3 A (2)	8 A - 10A (2)	
	7 P - 10P (2)			
Australasia	2 P - 5 P (2)*	7 A - 12N (3)	5 A - 9 A (3)	1 A - 4 A (2)
	8 A - 12N (3)	12N - 6 P (1)	9 A - 12N (2)	4 A - 7 A (3)
	12N - 6 P (2)	6 P - 1 A (4)	12N - 9 P (1)	4 A - 6 A (2)**
	6 P - 10P (4)	1 A - 7 A (2)	9 P - 12M (2)	
	10P - 12M (2)		12M - 5 A (4)	
Japan, Okinawa, & Far East	3 P - 6 P (1)*	11A - 1 P (2)	8 P - 11P (2)	1 A - 4 A (2)
	11A - 2 P (2)	1 P - 5 P (3)	11P - 3 A (4)	4 A - 6 A (3)
	2 P - 8 P (4)	5 P - 7 P (4)	3 A - 7 A (3)	1 A - 5 A (1)**
	8 P - 11P (2)	7 P - 11P (2)	7 A - 9 A (4)	
		11P - 2 A (2)	9 A - 12N (3)	
			12N - 6 P (1)	
Philippine Islands & East Indies	1 P - 4 P (1)*	8 A - 12N (3)	12M - 2 A (1)	3 A - 6 A (1)
	8 A - 12N (1)	12N - 8 P (1)	2 A - 6 A (3)	
	12N - 4 P (3)	8 P - 12M (2)	6 A - 11A (2)	
	4 P - 10P (2)	12M - 4 A (1)	11A - 2 P (1)	
Malaya & South East Asia	8 A - 12N (3)	7 A - 1 P (3)	12M - 3 A (1)	4 A - 7 A (1)
	12N - 2 P (1)	1 P - 4 P (2)	3 A - 6 A (2)	
	2 P - 7 P (2)	4 P - 9 P (1)	6 A - 8 A (3)	
	7 P - 9 P (3)	9 P - 2 A (2)	8 A - 11A (2)	
	9 P - 11P (1)			
Hong Kong, Macao, & Formosa	3 P - 6 P (1)*	7 A - 9 A (3)	12M - 4 A (4)	3 A - 6 A (2)
	12N - 8 P (3)	9 A - 7 P (2)	4 A - 9 A (3)	4 A - 6 A (1)**
	8 P - 10P (2)	7 P - 12M (3)	9 A - 11A (2)	
		12M - 4 A (2)	11A - 7 P (1)	
			7 P - 12M (3)	

CQ PROPAGATION CHART (SHORT-SKIP)

Band (Meters)	Distance (Miles) 50-250	250-750	750-1300	1300-2400
10			9 A - 12N (1-3)	12N - 4 P (1)*
			12N - 3 P (2-4)	7 A - 10A (2)
			3 P - 8 P (1-3)	10A - 5 P (4)
				5 P - 9 P (2-3)
15		11A - 4 P (0-2)	7 A - 10A (2-3)	7 A - 1 P (3)
			10A - 4 P (4-5)	1 P - 8 P (4)
			4 P - 9 P (2-3)	8 P - 11P (2-3)
				11P - 1 A (1-2)
20	9 A - 11A (1-2)	7A-10A (1-3)	5 A - 7 A (2-3)	4 P - 11P (5)
	11A - 3 P (2-3)	10A - 4 P (4)	7 A - 4 P (4)	11P - 1 A (3-4)
	3 P - 5 P (1-2)	4 P - 8 P (2-3)	4 P - 8 P (5)	1 A - 7 A (2-3)
		8 P - 10P (0-1)	8 P - 3 A (2-3)	7 A - 9 A (4)
				9 A - 4 P (3-2)
40	2 A - 6 A (1-2)	6 A - 10A (5-3)	6 P - 8 P (4-3)	3 P - 7 P (2-1)
	6 A - 8 A (3)	10A - 4 P (3-2)	8 P - 6 A (5)	7 P - 6 A (4-3)
	8 A - 10P (5)	4 P - 12M (5-4)	6 A - 9 A (4-3)	6 A - 9 A (2)
	10P - 2 A (2-3)	12M - 6 A (2-3)	9 A - 4 P (2-1)	
			4 P - 6 P (3-2)	
80	8 A - 11P (4-3)	8 A - 5 P (2-1)	6 P - 8 P (2-1)	5 P - 8 P (2-1)
	11P - 4 P (3-2)	5 P - 7 P (3-2)	8 P - 6 A (4)	8 P - 4 A (4-3)
	4 P - 7 P (4-3)	7 P - 5 A (5)	6 A - 8 A (2-1)	4 A - 8 A (2)
	7 P - 8 A (5)	5 A - 8 A (4-3)		
160	5 P - 7 P (2)	6 P - 8 P (2)	6 P - 8 P (2-1)	9 P - 5A (2-1)
	7 P - 7 A (5)	8 P - 5 A (5-4)	8 P - 4 A (3)	
	7 A - 9 A (2)	5 A - 7 A (4-2)	4 A - 6 A (2)	

SYMBOLS FOR NUMBER OF DAYS CIRCUIT FORECAST TO OPEN:

(1) 1-4 days (2) 5-11 days (3) 12-18 days (4) 19-26 days (5) over 26 days

*Indicates time of possible six-meter openings
**Indicates time of possible eighty-meter openings

Time Symbols: A - A. M. N - Noon
P - P. M. M - Midnight

The CQ DX Propagation Charts are based upon a CW radiated power of 150 watts at radiation angles less than thirty degrees and are centered on the Eastern, Central and Western areas of the USA. The DX forecasts are valid through April 15, 1958. The CQ Short-Skip Propagation Chart is based upon a radiated CW power of 75 watts, using a dipole antenna a half-wave length above ground. This Chart is valid through April 30, 1958. All forecasts are based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

alter present concepts of the process of ionization in the earth's atmosphere.

During the first five months of the IGY, the United States successfully fired 81 test rockets high into the earth's atmosphere. Many of these rockets were used to investigate ion-

[*Continued on page 110*]



transistors

by **DONALD L. STONER, W6TNS**
P.O. Box 137, Ontario, Calif.

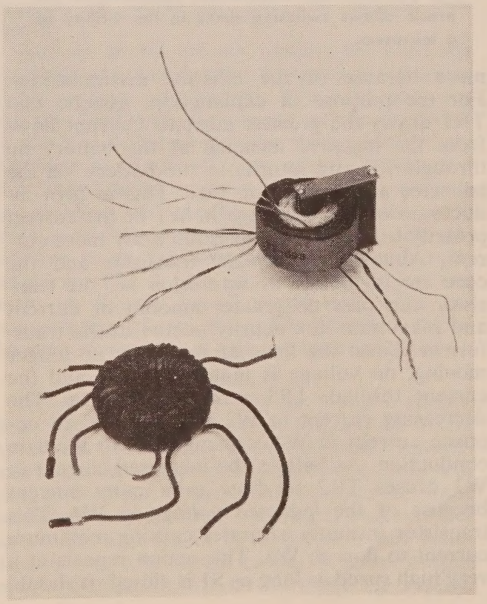
Transistorized Mobile Power Supplies

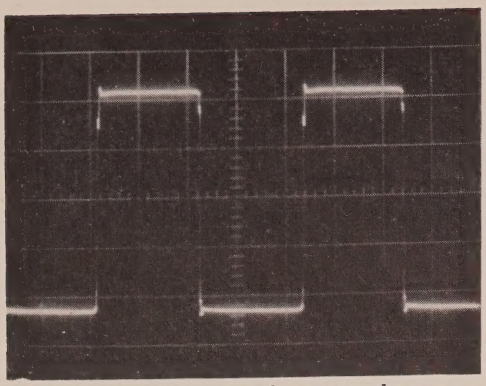
Transistorized power converters are the hottest item to hit the amateur mobile market since the PE-103's were unloaded right after WW II. Several companies are already offering the transistorized supplies to amateurs and one prominent manufacturer sells such a supply for use with their mobile rig.

Why all the excitement about these supplies, you might ask. First, and foremost, there are no moving parts. This means no more burnt and pitted vibrators to replace. Second, the conversion efficiency is extremely high. The theoretical maximum is 96% with 92% being a good figure for a 28 volt supply. Twelve volt units get up to 86%, or so. Compare this with your old PE-103 (about 52%) or a new vibrapack (66%, roughly)! To illustrate how important this can be to you, assume that you are using a PE-103 and your mobile rig consumes 25 amps from the 12 volt battery. If you were to substitute the above mentioned 12 volt transistorized converter, the battery power consumption would be only slightly over 15 amps! No matter how husky your battery is, 10 amps. is a worthwhile saving. Another feature of the new supplies is that they generate no hash because no contact is broken. Instant starting plus perfect overload protection is also on the "credit side of the ledger". If you should develop a short or overload in your mobile rig the supply instantly reverts to its stable state. No smoke, no fire, and no fuses blown.

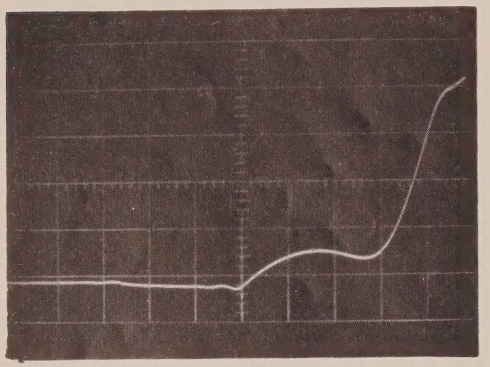
How It Works

To see how all these marvels came about, let's examine the workings of a simplified transistorized power supply (Fig 1). You will no doubt immediately recognize the similarity to a common vibrator power supply, however transistors have replaced the vibrating reed. Connected in this manner, the circuit represents a *magnetically coupled multivibrator*. The battery voltage and the transformer winding details determine the *free running frequency*. The action of the circuit is as follows: When switch S1 is closed one transistor will conduct





Collector to collector waveform. Note the near ideal square wave and the complete absence of "spikes". The horizontal axis is 100 microsecs per cm. (2.3 Kc) while the vertical calibration is 10 volts per cm.



Magnified collector waveform showing the square wave "rise time" (Base line calibration—1 microsec per cm.) The transformer described in the article allows switching times in the vicinity of 4 microsecs.

more because of the inherent dissimilarities. For the purpose of explanation, assume that TR1 draws the greatest current. Current flows from the negative terminal of the battery up through W2 and returns to the battery via the collector and emitter of TR1. This in turn induces an opposite voltage in W1 of the correct polarity to make the transistors draw more current. Almost instantly the transistor and the core are in a state of *saturation* i.e. the transistor can pass no greater amount of current and maximum flux density occurs in the transformer. Since the lines of force are no longer moving, no voltage is induced in W1 and the current through TR1 starts to decrease. The decreasing current in W2 now induces an opposite current in W4, causing TR2 to increase conduction. As before, the increased current in W3 causes TR2 to draw even more current because of the inducted voltage in W4. This transistor instantly saturates causing maximum current to flow in W3. This action repeats at a very high speed as long as S1 is closed. It should be noted that the transformer de-saturation does not occur instantly, in fact, compared to the actual switching time, it stays saturated for quite a while. A typical supply might switch in 6 microseconds, yet stay saturated for 1,000 microseconds. To simplify the preceding action you might imagine the transistors as a single pole, double throw toggle switch connected in such a manner so as to place the battery across W2 and W3 alternately. The current flowing through W2 and W3 also induces a near perfect *square wave* in the secondary (W5).

Now, let's see "what we got for our money". The transistors can switch many, many times faster than a vibrator. A typical vibrator runs about 120 cycles, yet transistors work quite nicely at one or two kilocycles. This means that a suitable filter would be a one or two mf paper capacitor rather than the 20 to 40 mf usually encountered. Also, since the transformer need not have any low frequency response a much smaller core area can be used. No doubt 400 cycle transformers (powdered iron core) could be used.

What Transistors?

If you have been following transistor ads, you may have noted the one, two, five, and ten watt ratings. You put two and two together and ask, "How can a pair of two watt transistors switch 30 watts of dc?" Usually, there is "no free lunch" in electronics, but this is an exception. A good rule of thumb is that a transistor can switch eight times its class A power output rating. Assume that the supply shown in fig 1 used a pair of 2 watt transistors. Eight times two watts is 16 multiplied by two transistors is 32 watts. An output rectifier system could easily supply 300 volts at 100 ma (30 watts) or 150 volts at 200 ma and so on. Two watt transistors such as the Sylvania 2N307 or the CBS 2N256 should work nicely and the more exotic RCA 2N301 is capable of even more. For transmitters, the Delco or Honeywell "brutes" would be used. A pair of Delco 2N174's will switch 660 watts! The foregoing rule of thumb assumes that a suitable heat sink is used to dissipate the transistor heat.

Transistors can take the beating because of the fast switching time. The thing that ruins the transistors is heat, and heat is created by IR losses inside the junction. When the transistor is saturated (conducting) the junction has virtually no resistance and no voltage can be dropped internally. Conversely, when the transistor is cut-off the junction represents an extremely high resistance so that only a tiny current can flow. In both the saturated and cut-off state, the transistor dissipates a minimum of power and generates a minimum of heat. Therefore, it is reasonable to assume that the faster we switch from on to off or visa versa, the lower the junction temperature will be. Use of a saturable core transformer allows a much faster switching time than a regular iron core. The square wave *rise time* (and fall time) is a good measure of how well the supply is working.

Winding a Transformer

The operating frequency of the supply is not an arbitrary matter. As the frequency is raised, the rise time is a greater part of the saturation time and the *transition loss* is greater. At higher frequencies, the cores tend to become inefficient and *core losses* increase. The *copper loss,* however, decreases sharply with higher operating frequencies. If all these losses are plotted on a graph one frequency will produce minimum total power loss. Naturally, this point is the operating frequency. I have found the design frequency of two kilocycles very successful for *tape wound cores.* Once the supply is operating, the best frequency can be found empirically.

For the purposes of explanation, let's apply the formula in fig 2 and design a transformer for a hypothetical power supply. A 300 volt, 100 ma receiver power supply would be most useful with a 12 volt automobile battery, so let's build it for that. An RCA 2N301 can easily switch 40 watts and they will make an ideal switch for the supply. It should be noted that the transistor *must* have a breakdown voltage of *at least twice* the supply voltage.

The core. Arnold Engineering "Deltamax" cores have been used by the author in several successful power supplies. The cores are made by winding a 2 mil thick special alloy tape into a spiral core. Fig 2 also illustrates the method of calculating the *cross sectional core area.* An Arnold T5233-D2 core was selected for the supply. This core has the following dimensions O.D.-1.5", I.D.-.375" and H-.5" and equals .094 square inches cross section area. The other thing that we need to know about the core is the maximum flux density (Ø is the saturation flux and is measured in gauss). Arnold Bulletin TC-101A lists the properties of "Deltamax" as having a peak flux density between 13,500 and 15,500 with a 14,000 gauss nominal. Now that we have all the parts of our equation, let's solve it.

$$N_c = \frac{E \times 10^8}{12.9\ F\ A\ \emptyset}$$

$$N_c = \frac{12 \times 10^8}{12.9 \times 2{,}000 \times .094 \times 14{,}000}$$

$$N_c = \frac{12}{12.9 \times 2{,}000 \times .094 \times .00014}$$

$$N_c = 35 \text{ turns}$$

And so for our supply we find that the collector winding should have 35 turns. It will also be necessary to place a center-tap on this winding for the power connection (see fig 3). The wire size for the windings is not critical but it should be known within two or three wire sizes. If the supply is to deliver 30 watts and has an estimated efficiency of 85% then roughly 36 watts or three amperes will be consumed from the 12 volt battery. On the basis of 1500 circular mils per ampere, The Radio Handbook wire table recommends #13 wire. Number 14 would work with slightly less efficiency and #12 would produce slightly more.

The next step in designing the transformer is to calculate how many turns will be needed in the base winding to sustain oscillation. The formula for this winding is:

$$N_b = \frac{N_c \times 2V_b}{2E}$$

N_c = total turns on collector winding

V_b = base voltage required for saturation

E = supply voltage

Referring to the characteristic curves for the 2N301 tells us that 3.5 volts will saturate the transistor with one volt on the collector. Therefore:

$$N_b \frac{(35)\ 2\ (3.5)}{24}$$

N_b 10 turns (round numbers)

Now we are heading down the home stretch. Hope I didn't lose you on any of the turns (no pun intended). The final winding is the step-up secondary winding. This winding delivers the high voltage square wave to the rectifier system. Referring to the original parameters, remember that the supply was designed for 300 volts. Because voltage will be lost in the wire (IR Loss) and some will be lost in the rectifier (two volts for silicons, 30 volts or more for vacuum tubes) let's plan on developing 310 volts. The formula for the secondary winding is:

$$N_s = \frac{N_c \times E_o}{2E}$$

E_o = output voltage

$$N_s = \frac{35\ (310)}{24}$$

N_s = 452 turns

A center top can be placed on this winding to provide an additional 150 volt output (see fig 3).

And so, if you are not reading the want ads by now, you and I have designed a transistor power supply transformer. The wire sizes for the base and secondary windings can be found in the wire table as per the Radio Handbook. The base winding will carry about 100 ma and #26 wire should be quite suitable. The secondary winding also carries 100 ma and the same wire is usable here also. Because of the on-off duty cycle, the wire sizes will be quite conservative. Fig 3 is a circuit suitable for use with our "newly born" transformer. The accompanying photo shows the finished transformer, along with a new commercial unit.

Bias

It was stated earlier that fig 1 was a simplified circuit, and so it was. Actually it would never start oscillating with any load. Transistors must be *forward biased* before they will start to conduct. Vacuum tubes, however, must be biased or they draw too much current. Resistors R1 and R2 in fig 3 perform this function. It was also stated earlier that the output could be shorted without harming the supply.

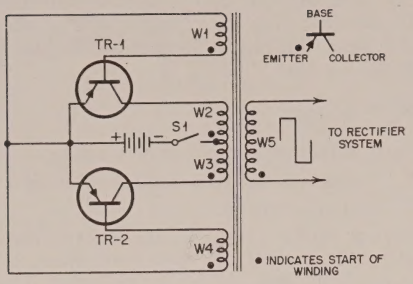


Fig. 1—Basic Transistor power converter circuit.

$$N_{COI} = \frac{E \times 10^8}{12.9\ F\ A\ \emptyset}$$

where:

A = cross sectional area of core in square inches
E = battery voltage
F = operating frequency in cycles
$\emptyset$ = saturation flux of core in gauss
N_{COI} = total turns in collector winding

Fig. 2 — Formula for calculating the number of turns for a transistorized power converter transformer.

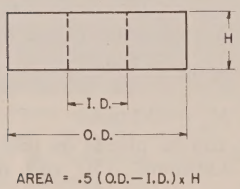


Fig. 2a — Method of determining cross section core area.

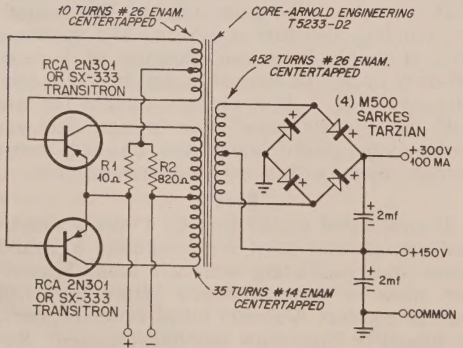


Fig. 3—A 300V. 100MA power supply incorporating the transformer designed in the text.

The reason is this: When the output is shorted, there will not be enough voltage induced in the base windings to sustain oscillation. The transistors will revert to a static current determined by the values of R1 and R2. These resistors should be adjusted so that the transistors draw just under their maximum class A rating with the secondary shorted. The circuit shown in fig 3 draws about 240 ma with the secondary shorted.

It should be noted that the greatest efficiency will occur at the design point. The supply shown in fig 3 has an efficiency of 86% at 100 ma. The primary drain was 2.84 amperes or 34 watts. However if the secondary load is reduced to 50 ma, the primary current will only drop to 2.2 amperes or 57% efficiency. Load 'em heavy for best efficiency.

Winding the Toroid Core

I have found the easiest way to wind these toroids is to wind up wire of the correct size on a pencil and use this for a *shuttle*. The shuttle is passed through the core in smooth successive turns. Try to plan the winding to make one "pass" around the core. In other words, the end of a winding should be adjacent to the start of the same winding. Wind on the secondary first, then the base winding, and last, the collector winding. The tighter the turns are wound, the less wire will be needed and the IR loss will be lower. A good grade of transformer tape, or glass tape should be used to secure the windings. Plastic tapes usually "skid" or slide after they have have been warm for a while, and should be avoided.

A Transistorized Power Converter

To test our newly designed transformer, an extremely compact transistor power converter was constructed in a 2" x 3" x 5¼" chassis box (LMB #136). The transformer, with an outside diameter of two inches fits easily into one end of the box. The paint was removed from the center area of the box with the aid of sandpaper and steel wool. A steel rule held at the edge of the area to be cleaned produces a sharp smooth line. The transistors were mounted and insulated as described under "Thermal Considerations". Four Sarkes Tarzian M500 silicon rectifiers form a full wave bridge rectifier. These rectifiers, along with a midget Winchester power connector were mounted at the other end of the chassis box. The filter capacitors are mounted between two #202 terminal strips, along with the bias resistors. Note that the filter capacitors are connected in series between the 300 volt output, the 150 volt tap, and ground. This equalizes the voltage across each capacitor. Although metalized capacitors were used, 250 volt electrolytics will work just as well. Another point of interest to constructors is the method of connecting to the 2N301 emitter and base pins. A seven pin molded bakelite socket was smashed, and the pins removed. These pins will slide on to the transistor connections and

provide excellent contact.

When the output of the supply is shorted, and power applied, the transistors should draw about 100 ma if the bias resistors are correct. Immediately upon removing the short, the supply should "take off" and emit a high pitch "scream". If it does not start to oscillate immediately, increase the 10 ohm resistor to 15 ohms. It will make the static current higher, but will not affect the performance. If it still does not start, reverse the base connections. It should then start easily. One last tip to those constructing the supply. *Do not,* I say again, *do not* reverse the polarity of the 12 volt supply. *If you do,* it will result in immediate, absolute, final and complete *destruction* of the transistors.

Thermal Considerations

Because some power will always be lost in the internal resistance of the transistors, they are bound to produce heat. It seems quite reasonable to assume that the more heat removed from the transistor, the "harder" they can be operated. Almost always, the manufacturers ratings specify a particular "heat sink" area. A *heat sink* usually consists of bolting the transistors to an aluminum or copper plate. The plate conducts heat away from the transistor and lowers the junction temperature. In many circuits (including the transistorized power supply) this is impossible because a short circuit would be created between the collectors, which are connected internally to the mounting flange. It is necessary to provide the transistors with a low thermal resistance and a high electrical resistance. This can be accomplished in one of several ways.

One common method is to insert a thin sheet of mica between the transistor and the chassis. By thin, I mean approximately two thousands (two mils). This is the method used in the construction project this month. A sheet of two mil mica was placed on the flat surface of the transistor and then it was bolted *securely* to the chassis. The resistance was then checked with a high range ohmmeter. It should measure at least 200 megohms in dry air. If you have any trouble with shorts check the surface of the transistor and the chassis to make sure they are flat and have *no* burrs. Feathering the edges of the holes with steel wool will remove them, if present. After it has been determined that no shorts exist, spray Krylon (clear plastic spray) on the transistors and the chassis to prevent oxidation.

Another method, which I prefer (but is somewhat more difficult), is the use of anodized aluminum washers. First saw a washer the same size as the mounting flange from a sheet of ⅛ inch aluminum. After drilling and de-burring, send the washers to a metal processing company and have them anodized. This process places a very thin film of aluminum oxide on the surface of the washer that will withstand at least 100 volts. The thermal conductivity is somewhat better than the mica washer. Mica, however was used in the construction process because it is easier to obtain and does not require such careful de-burring. Actually, I used mica that had been removed from an old transmitting capacitor. There are many other sources of mica, such as old flat iron heating elements and stove fronts (put down that hammer, son!). To obtain the desired thickness, try slicing the mica endwise with a razor blade or a sharp pen knife. It works! Keep cutting the sheet in half endwise and check with a micrometer until the desired thickness is obtained. This is not recommended for the heavy smokers and drinkers, but with a little practice *almost anyone* can do it.

One other thermal problem rears its ugly head and that is the transformer core. The correct size will depend on the power rating and it will increase proportionally. The *core volume* dissipates the heat. The temperature rise of the power transformer in the construction project was quite mild. The volume of this core can be scaled up to suit higher wattage power supplies. Core manufacturers will usually help you select the proper core size.

The temperature of the silicon rectifiers is only slightly higher than ambient. However in supplies where the current is near the 500 ma maximum rating of these rectifiers, they should be well ventilated.

A Commercial Transformer

A list of some of the many core manufacturers is included at the end of the text if you are interested in "rolling your own". Triad Transformer Corporation realizing the tremendous potential of the transistorized power supplies (no pun intended) has developed a transformer for this application. This unit is known as the TY-69S is capable of delivering 280 volts at 100 ma using a 12 volt supply. It is somewhat unconventional in that it uses a powdered iron core (more properly called a ferrite core) which exhibits high saturation characteristics. Although the price is not known at this writing, speculation has it at about five dollars. For more information, write Triad Transformer Corporation, 4055 Redwood Avenue, Venice, California.

The author wishes to thank Mr. Richard B. Hurley (on leave from Convair Pomona) for the invaluable assistance provided in preparing this article.

73, Don, W6TNS

Companies manufacturing suitable toroid cores and literature available:

Arnold Engineering Company, Marengo, Illinois. Manufactures "Deltamax", 4-79 Mo-Permalloy", "Supermalloy" and others. Bulletin TC-101A, SDC-110, and GC-106C

General Ceramics Corporation, Keasbey, New Jersey. Manufactures "Ferramic" Q, 02, H, and others. Bulletins #F-557, 857.

G. L. Electronics, 2921 Admiral Wilson Blvd., Camden 5, N. J. Manufactures "Deltamax", "Orthonol", "Hymu 80" and others. Bulletins TB-102

Magnetics, Inc., Butler, Pa. Manufactures "Orthonol", "Hy Mu 80", "48 Alloy". Bulletins TCW-150 and PC-103A

Westinghouse Electric Corporation, Special Transformer Department, Greenville, Pa. Bulletin 44-750

by **BYRON H. KRETZMAN, W2JTP**
16 Ridge Drive, High Hills, Huntington Station, N. Y.

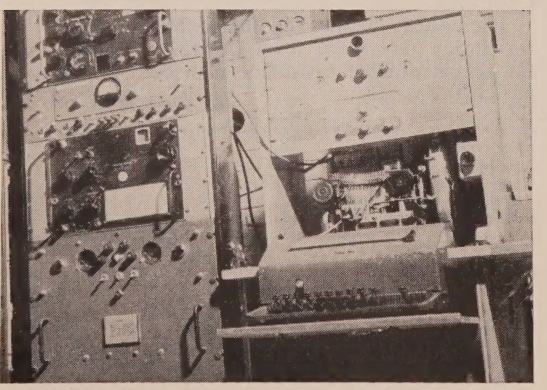
RTTY

Mac, WØATM, President of the Midwest Amateur Radio Teletypers Society, Inc.

W8NIY, Elkins, West Virginia.

Operator:	Rolfe A. Utz
Transmitters:	TCS-12, two; GO-9
Receivers:	TCS-12; RBM, two
Machines:	Model 14 typing reperf. Model 11A keyboard 1-A Tape Head





Amateur Radioteletype Channels

National, FSK 3620, 7140, 27,200, 29,160, 52,600 kc.
National, AFSK 27.2, 147.96, 144.138 mc.

Area Nets:

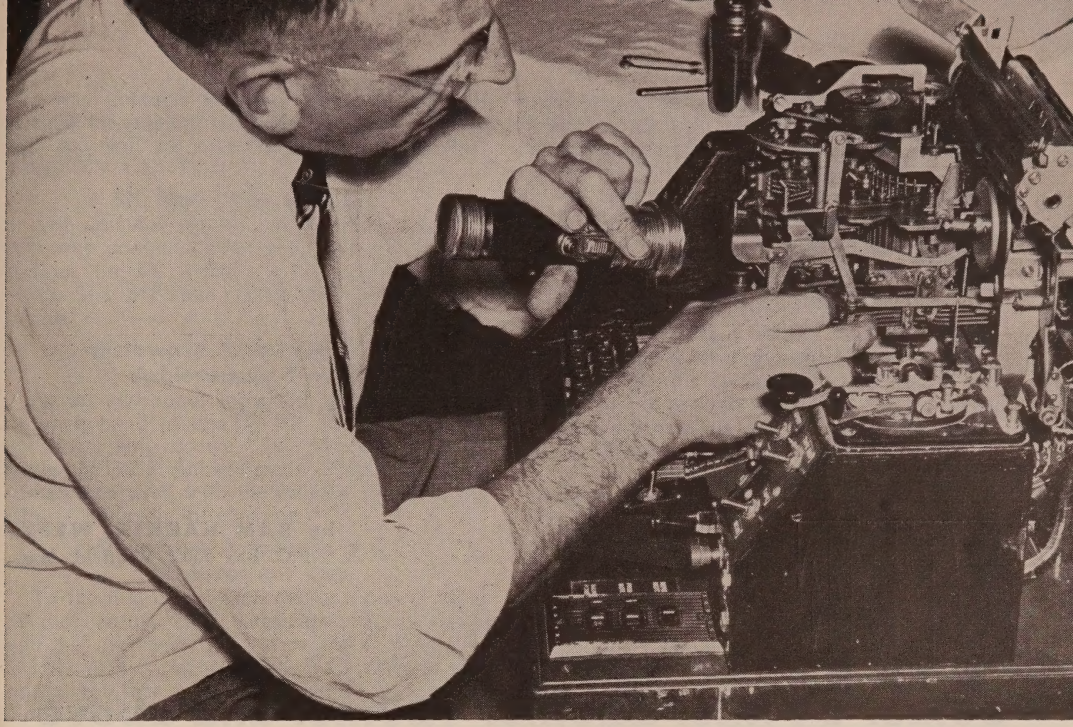
California	147.85	Mc.	AFSK on AM
Chicago, Ill.	147.70	Mc.	AFSK on FM
Detroit, Mich.	147.30	Mc.	AFSK on FM
Washington, D.C.	147.96	Mc.	AFSK on AM
	147.495	Mc.	AFSK on AM
New York City	147.96	Mc.	AFSK on AM
Livingston, N.J.	146.30	Mc.	AFSK on AM
Buffalo/Niagara	147.50	Mc.	AFK on AM
Boston, Mass.	147.96	Mc.	AFSK on AM
Seattle, Wash.	147.00	Mc.	AFSK on AM
Spokane, Wash.	147.15	Mc.	AFSK on AM
Minneapolis, Minn.	144.90	Mc.	AFSK on AM

KWS-1 owners have written me many letters asking if I knew of an "easy" way to frequency-shift this transmitter. (What they really mean is a way that won't affect the resale value!) Well, many owners are getting fsk by putting in two-tone audio, but you *do* have to be careful about what you are doing otherwise the gentlemen in Washington get unhappy, and when they get unhappy, *you* will get unhappy, too, sooner or later.

Frank White, W3PYW, found a better, and easier, way to do it, and he described it in the October 1957 issue of *RTTY,* the monthly bulletin of the RTTY Society of Southern California, Inc. ($2.50 per year via W6AEE, 372 West Warren Way, Arcadia, California.) So, with the kind permission of Merrill Swan, we would like to tell you just how Frank did it.

A diode shifter using a 6AL5 tube is mounted in a small *Mini-Box.* A potentiometer, the shift-adjust control, is mounted on top so that its knob or dial is accessible when the box is bolted in place inside the KWS-1. The metal box is bolted against the side of the r-f shield cover of the tuning unit by loosening one of the existing screws and slipping the lip of the box under it.

Fig. 1 shows the schematic diagram of the diode shifter, and here is how you hook it up: First of all, set up a local d-c loop with the keyboard, the selector magnet(s), and a polar relay all in series. The polar relay contacts will



Dick, W3CRO, gives the expert's touch to one of the W9TCJ machines.

then be available to key a *stabilized* d-c source to be applied to the diode shifter in the KWS-1. W3PYW suggests using a VR tube to get a stabilized 150-volts. The plates of the 6AL5 are connected through a 20-uufd mica capacitor and a small wire to the grid pin of the oscillator (V-001). Pull the oscillator tube, wrap the small wire around the grid pin (1) and plug it back in the socket.

Adding the extra stray capacity to the oscillator will move its frequency out of the range of the movable index, but don't let that bother you. Just loosen the set-screws on the shaft of the VFO (where it connects to the dial drive) and correct for the change so that the movable index is in the middle of the window.

To set the shift, zero beat the *mark* signal on your receiver. The polar relay contacts used should be *open*, so that no voltage is applied to the shifter. Now, with a continuous *space* signal, polar relay contacts closed (voltage applied), simply advance the pot until the frequency moves down 850-cycles. Once set in this manner, the shift will be correct for 80, 40, & 20 M.

Frank says, "You will note that the entire modification is one that can be removed easily if and when you decide to peddle your KWS-1 —but who is selling them? Wish I had one, too."

Good Grief

In the January 1958 RTTY column, *Fig. 1*, page 73 (!), the capacitor values associated with the RANGE switch, S-3, were lost somewhere:

S-3	RANGE	approx. value
1	0-100 cps	0.15 ufd
2	0-1,000 cps	0.015 ufd
3	0-5,000 cps	0.003 ufd
4	0-10,000 cps	0.0015 ufd
5	0-50,000 cps	300 uufd

Equipment

In the January 1958 issue of *CQ* we repeated Wayne's initial warning about a so-called "national" amateur radioteletype society. Recently we were informed by a mid-western group that this one-man society was attempting to unload (for a price) a batch of "miniature teletypewriters," obviously the Model 21A (page 28, *RTTY Handbook*), and neglecting to mention that these are narrow-strip printers *without distributors!* Fine for anyone going into the telegram business, but kinda rough on the newcomer.

[*Continued on page 113*]

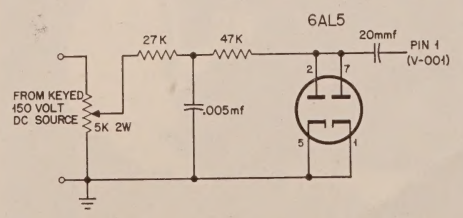


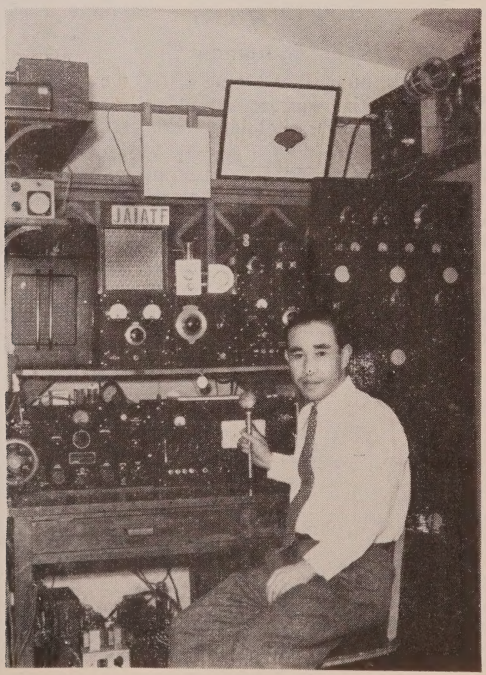
Fig. 1—Diode Shifter Schematic Diagram

VHF

50mc. 144mc. 220mc. 420mc. and above

by SAM HARRIS, W1FZJ
P.O. Box 2505, Medfield, Mass.

In case you think there ain't no activity on in Japan. Behold JA1ATF in person at the controls.



The news all seems to come from the six meter operators nowadays. I don't know if this means that all the activity is on six, or if the six meter boys just like to talk about it more. Suffice it to say: "the letters speak for themselves"! This should not be construed to mean that there is no work being done on the VHF bands above six meters. A quick glance at the states worked column will show that someone is burning the midnight oil. One thing is certain however, we just can't get enough news from the two meter and up boys, to be able to give you a good picture of what is happening on the real VHF bands. In order to put a little fuel on the fire, we are going to borrow from our British VHFers', the Century Club Certificate.

Two Meter Century Club

Any amateur station who submits proof of two way contacts with one hundred different two meter stations since January first (inclusive), 1958, will be awarded the "C.Q. TWO METER CENTURY CLUB" certificate.

Two Twenty Century Club

Any amateur station who submits proof of two way contacts with one hundred different 220 mc stations since January first (inclusive), 1958, will be awarded the "C.Q. TWO TWENTY CENTURY CLUB" certificate.

Four Twenty and Up Century Club

Any amateur station who submits proof of

two way contacts with one hundred different stations on amateur assigned frequencies above 420 mc will be awarded the "C.Q. FOUR TWENTY CENTURY CLUB" certificate.

Six Meter Century Club

Any amateur station who submits proof of two way contacts with one hundred different stations on six meters, will be awarded the "C.Q. SIX METER CENTURY CLUB" certificate.

Microwave Associates V.H.F. Achievement Plaque

As an additional incentive, the first station on each band to qualify for the century club certificate will receive "The Microwave Associates V.H.F. Achievement Plaque". Handsomely engraved with the number one Century Club Certificate information.

Microwave Associates V.H.F. Achievement Cup

To the first club which makes a grand sweep of the century club certificates for all hands will be awarded the "Microwave Associates V.H.F. Achievement Trophy". Certificates submitted for this award must belong to certified club members who were members in good standing at the time that the certificate was achieved.

Listings

Due to the paucity of stations available for getting your 220 and 420 century club certificates we will list claimed scores for these events. It will not be necessary to send proof of contact for listing in the century club column. A list of the stations worked, states worked and longest dx will be sufficient. Changes or additions to your listing must be received by the fifteenth of the month. Come on fellows. Let's see who wins that M.A. V.H.F. plaque and century certificate number one.

C.W. on Six Meters???

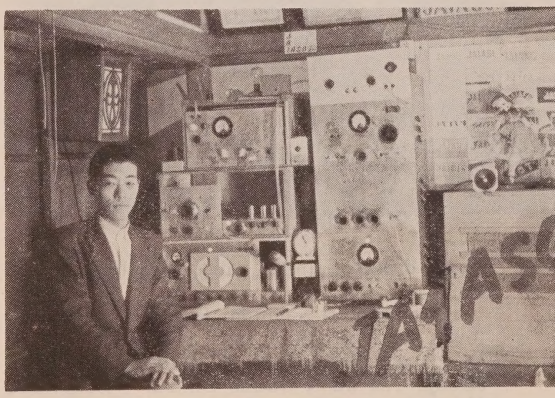
I don't like to mention it but..... It seems that there is a move afoot to set aside the bottom one hundred kc of six meters for the exclusive use of c.w. I wouldn't want to become involved in the riot that would undoubtedly ensue if this proposal were brought up for discussion at an otherwise peaceful gathering of the clan. There are certain facts to be considered, however. It is, for instance, true that communication by means of cw is possible when all other methods fail. (I didn't say it was worth the effort.) It is also true that you can't work weak cw through even moderately strong phone signals. It is not true however, that the elimination of phone on the low end of six will eliminate interference. It will get rid of one source of interference and this will give those skilled in the art, a much better chance to work that weak one. Whether the occasional dx hound should be so favored is a moot point. Some people would have you believe that the whole future of the six meter band hinges on whether old Joe works South Africa or not. I do not think that this is strictly true, although I am willing to admit that I wish I could work S.A. myself. (Yes, even on cw.) I have always held that a gentleman's agreement was the best way to legislate our bands. Rules instituted by a minority of "do gooders" are always the result of ignoring the rights of a dedicated minority. (As witness the ridiculous division of the lower frequency bands.) Let us, as the ZL's would say, be sporting about it. Give it some thought before you operate phone on the bottom 20 kc of six. If you decide that it is really necessary . . . go ahead. If you can't honestly think of any good reason for it; QSY please.

Hamfests and Such

There are only a few get-to-gethers for V.H.F.er's during the year. The next one is just around the corner. Yes, it's the Dayton Hamvention. Last years doings were just tops and this years bids fair to be the best yet. If you are planning on being there too, get in touch with old Ev Taylor, W8NAF, (1125 Highridge Avenue, Dayton 10, Ohio) and let him in on the good news.

VE7AQQ

Another one of the "getting to be very well known" hams *not* in our own country is VE7AQQ, Ike, away up thar in British Columbia. Ike is now well known to the six meter



JA1ASO (Akira) with his 50 mc station.

gang all over the country, due to the recent openings. It is really a great pleasure to hear Ike talking to hams anywhere in the states and sit and listen to his end of the conversation from W1 land. With luck, we also hear the other end of the QSO on backscatter.

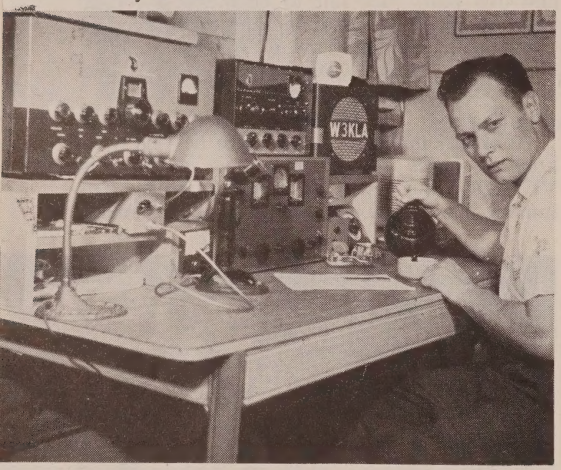
Here in W1 land we first heard Ike on November 2nd, 1957. Since that time we've had approximately fifteen contacts with him, and have managed to gleen the following information.

First and most important, Ike's XYL, Frances, seems to love ham radio, and according to what we hear it would be impossible

for Ike to operate without her. Log keeping, remembering handles, QSL's and other important data is Frances' department. She is of Scotch descent, Ike of Finnish descent. If you doubt Ike's accent, just listen to him and Toiva, W1GKE, sometime. How they do rattle on in Finnish, and they say women talk a lot. They even outdo Helen on the air.

At last count Ike had worked all Japanese districts except JA9 and JAØ, and his contacts in Japan numbered sixty-nine stations. On the seventh of January, the east coast stations were hearing Ike calling and working JA's off the back of his beam. Any information and pictures concerning the Japanese stations in this issue, are by courtesy of Ike.

On the sixteenth of November, Ike was apparently the first to hear VK's and ZL's on six meters. About the nineteenth of November VS6CB was heard (by Ike) calling him. On November 21st he heard SM7ZN, and on the twenty-ninth of December he heard EI2W at



Harold, W3KLA

three different times, about daybreak Ike's time.

Ike's QTH is Sointula, British Columbia, a town founded about sixty years ago on the co-operative plan. Still co-operating and going strong. The name means United, Wisdom and Harmony, and from the sound of those now familiar voices, Frances and Ike are full of them.

Ike has the following to say of himself, or rather his rig: "I have included a snap of my own beams, the six element, six meter beam on top with the three element ten meter beam about ten feet below. My rotator is a cream separator, driven by a ¼ horsepower electric motor connected to the spindle shaft. A Ford starter gear is welded to the crank shaft, and a Ford rim gear welded to the mast. It makes one revolution a minute."

"There has been no JA's since November 22nd but some KH6's came through on December 6th. Of these KH6IJ was strongest."

Letters to Ike, VE7AQQ

Yokahama, Japan from Nakay JA1AKK

"Thank you very much for our overseas contact on six meters, on the 20th of November. That was my first VE station, and was very excited."

"I heard VE7AFB on six meters yesterday, (December 3rd) but could not catch him. I will get him in the future."

"My station here is an 832A final, input is about 24 watts. My first stage is 6AC7 clapp VFO controlled job. My location is about fifty meters up on the hill and can see Yohohama Port. I live in a four story apartment building and the antenna is on the roof. My room is on the first floor, so I need at least 20 meters long feeder."

"Receiver here is crystal controlled, cascode, r.f. amplifier converter (home made) to the old type HRO receiver."

"I am working as a draftsman under the Japanese ship radio, transmitter, marine radar company. My job is design of radar scanner."

Kataharasho, Japan from Yasu JA2-6031

"On November 16th, 1957, at 2359 GMT working with JA6BI on 50.010 kc, when your signals were R5, S9, QRM-nil. QRN-slight QSB, B2 very good. My receiver is a Hammarland BC779 (Super Pro) with homebrew crystal controlled converter. The converter uses a 6BQ7A (cascode RF), 6AK5 (RF), 6AK5 (mix), and 12AT7 (osc.). The IF of the converter is 5 mc for 50 mc and my homebrew five element yagi beam is 12 m high, fed with 300 ohm TV feeder and tuned to 50.5 mc with T match."

"I am 21 years old and hobbies are stamps, photography, heavenly body observation and music."

Funabashi City, Japan Keitars Sekine (Ray)

No call included in this letter. Sorry.

"I was very glad to meet you on the air, for you are the first Canada station I've worked."

"I am 21 years old and a student of Waseda University (one of the greatest private universities of Japan), belong to the Radio and Electronics Engineering Section."

"I have started my 'ham' life only three months ago, having taken the examination five months ago, 1st time and passed it. Then I spent my summer vacation building up my shack."

"I have worked the following overseas stations: DU1GF, VK4NG, W7ERA, W7DYD and you. My record of the grand-wave dx on six meters reached about 250 km (150 miles) which was done with JA2MK."

JA1BLZ Sai to Masa Yuki

"Thank you very much for the nice QSO. I am very glad to meet you, for that is the first QSO with Canadian station on six meters."

"I am a student of School of Science and Engineering, Waseda University, and JA1BLV, JA1ASO and JA1BNR are my classmates. Now, recently we are listening for DX almost every morning and a few of us have QSO's with DU, VK, LU, CE, CX, PY, W6, W7, W9, WØ, KL7, KH6, KX6 and VE7. This station has worked DU, VK, W7 and VE7. I began operation on six meters on 11th of October, 1957."

Tokyo, Japan Akira JA1ASO

"Very pleased to make this contact with you, my first VE7 on six meters."

"Now I'm a student of the school of science and engineering of the Waseda University. My friends, JA1BLV, JA1BLZ, and JA1BNR with whom you've contacted, are my classmates."

Anchorage, Alaska — Jack Reich (KL7AUV), Activities Manager of the Anchorage Amateur Radio Club sends the following information:

"Listed below is the outstanding data concerning 50 mc operation in the Alaskan area since November 5th, 1957."

"Another opening occurred November 7th from 2345Z, to 0035Z, during which contacts were made with JA5BU and JA6PJ."

"On November 11th, at 2015Z, W7PKL was heard, but not worked, and KH6UK was heard and worked by KL7CDG. Jim (KL7CDG) also worked another—KH6PP."

"On November 13, another opening to Japan occurred, and contacts were made by KL7AH, KL7AUV, KL7CDG, KL7CDS, and KL7CHV. This occured between 2329Z and 0000Z."

"On November 15, KL7AUV worked KH6UK using cw, with very poor conditions prevailing, at 2103Z. At 2240Z,

JA8BU, JA8AO and JA1AXE were heard but not worked."

"Of course the big splash occurred the 16th and 17th of November. For evaluation, here are the results obtained by known Alaskan stations during these two days:

KL7AUV	Saturday:	1950Z to 2323Z — 50 contacts Areas: 1, 4, 5, 8, 9, Ø, — 14 States
	Sunday:	1815Z to 2155Z — 45 contacts Areas: 2, 3, 4, 5, 6, 7, 8, 9, Ø, — 6 new states
KL7CDG	Saturday:	1931Z to 2315Z — 47 contacts Areas: 1, 2, 3, 4, 5, 6, 7, 8, 9, Ø, — 20 States
	Sunday:	1826Z to 2203Z — 87 contacts Areas: 1, 2, 3, 4, 5, 6, 8, 9, Ø, — 7 new states Two VE's — VE3AET and VE3AIU. 2337Z to 0005Z—Three JA contacts.
KL7AH	Saturday:	2134Z to 2257Z — 30 contacts — 10 States Areas: 2, 5, 8, 9, Ø.
	Sunday:	1905Z to 1158Z — 47 contacts — 6 new states Areas: 2, 3, 4, 6, 7, 8, 9, Ø. 2339 to 0018Z — JA4AZ, JA6FR, JA6JY.
KL7CDS	Saturday:	2130Z to 2205Z — 2 contacts — 2 states Areas: 1, Ø. Kenny's transmitter-sour
KL7CDS	Sunday:	1830Z to 0035Z — 32 contacts Areas: 1, 2, 5, 7, 9, Ø. 13 new states
and KL7CHV		5 JA contacts during latter part of period.
KL7AYZ	Sunday:	Time unknown: 5 contacts. Areas: 8, Ø, and JA. Gibb is at Kwethluk, Alaska, near Bethel, and about 300 miles southeast of Anchorage.
KL7CDT		No data available, although we have heard of contacts made with the States. He is located in Whittier, Alaska, about 80 miles southeast of Anchorage.
KL7MS and KL7AZI		— No data available, although stations were heard working June and Woody. They are located at Sisters Island, just southwest of Juneau.

"This information was as carefully verified as possible, and should present a fair picture of the operation from the Alaskan end. Speaking for all of us, we intend to make as much of these openings as possible. The QRM we hear is terrific, so we may not be able to work everyone, but we are trying." *Thanks for a very thorough report, Jack. The gang really appreciates it.*

Dallas, Texas — From that large spot in North Americas we receive word from Ken Durham (K5MBV) concerning goings on:

"We have had several good openings here recently. EI2W was heard by some of the gang during the A.M. of November 16th. On November 17th, KL7's were coming through and were worked by a few of our locals. (I was at work as usual)."

"On December 16th and 17th there were openings to several states about 1700 our time. I missed these also. We came home early on the 18th and turned on the receiver at 1800; heard W8RLT and hooked him, then W8SWC, W9JCI, K9JVZ, W9HMB and K9AKI. Heard a number of others including VE3, W8, W7, 9 and WØ."

"Last stations heard were in Colorado and Nebraska, but they did not seem to hear our gang, although they were working stations in Houston and San Antonio." No more stations heard at my QTH after 2108. They rolled in solid for three hours with most signals at least 20 db over."

"The rig here is BC625 into a vertical and a P and K converter ahead of an old GE broadcast receiver (works O.K. with openings like this)."

"On December 19th, the band opened again and I worked WØHNV, W8HJR, K8ACC, heard VE3AIU in QSO with a local, worked W8WPD, K9BEO, K8AYQ, K9IEH, K9DVI and WØYWP. Also had a forty-six minute phone patch traffic with K9EAO in Skokie, Illinois. The band opened at 1800 sharp and closed approximately 2105."

"Again on the 20th I worked a number of W7's and W8's. The band was open at 1800 and closed about 2215."

"On about the 22nd, K5DXJ here in town, worked an SM7 in Sweden and I heard quite a bit of teletype about 51 mc."

"As I'm not yet in the call book the boys may not have my address even though I gave it to them during our contacts. It is Ken Durham, K5MBV—3328 B, Southern Oaks, Dallas, Texas." *Thanks for the very informative letters Ken, we don't hear much, via six meters, from Texas, so we appreciate your efforts.*

Markham, Illinois — From out Chicago way we hear from R. Oberg (W9ZKQ):

"Our net here in Chicago is doing fine. We have four net controls, one for each Tuesday in the month. K9HWY, W9NYO, W9RVG and W9ZKQ handle traffic and club business respectively, on Tuesdays 2230 CST, 50.400 mc. We sure would like to link up with other nets on 50.400 to handle traffic and messages East and West from Chicago. We monitor 50.4 mc, so it would seem simple enough to call other net stations at certain hours to take traffic."

"The possibilities of a six meter link are interesting and maybe could be done some day soon. Any stations interested should contact W9ZKQ for details." *Very interesting project O.M., it's been done both on six and two meters for coverage over an extremely large areas, and should be more than interesting with its starting point at Chicago.*



Contest winner in Indiana, Chuck Gibbs, K9COK. It takes lots of that stuff to win contests. Guess ole Harold had enough to win for Maryland.

Hinsdale, Illinois — Another inhabitant of Illinois comes through in the person of Russ Brown (K9DYE).

"I heard VE7AFB, AOD, AQQ, CN, and W7's ZOW, YJW, RPD, QGG, FAS, BYK, YJE, on January 4th between 1100 and 1300 CST on six meters."

"The receiver here is an FCV-1 International Crystal converter fed into an NC-88, suing an end fed wire."

"I have a technician license and am eighteen years old." *Thanks for the DX news from your territory Russ, always very glad to receive it.*

Youngstown, Ohio — Youngstown, Ohio comes forth via Bill Finger (W8SZN):

"I would like to report that I worked Steve, HB9QQ in Duebendorf, Switzerland on 50 mc crossband to 28.220 mc on the 30th of November, 1957. I believe it was the first W8 contact to Switzerland on these bands (six to ten meters). I also heard a lot of stations calling him, W1,

W2, W3, W4 and W8, but he said that due to QRM he was unable to copy anyone else." *Congratulations Bill, always nice to talk to Switzerland.*

Dallas, Texas – Another epistle from Dallas this time from old Leroy May (W5AJG) himself.

"Been working on six meters lately. Last few weeks have brought forth some DX from Europe. Nothing like the east coast gets daily though. What do we have down here? Hear the same stations over and over on six but hardly any new ones. Have worked such as LA9THA, EI2W, SM6BTT, SM6ANR, LA9T and LA8RB." *Who else do you think we work?*

"Hear lots of backscatter when band is in DX condition. Hear W9, WØ, W4, W7, W6, all scatter type mode. BBC TV on Channel two very strong on audio and video. Lots of garbage along in the band. Not video, but can't identify it." *Wonderful to hear, eh, Leroy?*

"I've worked several KL7's around noon CST." *Nice going, Leroy. Guess you just do have everything in Texas, even DX.*

"Don't believe that the Meteor scatter for the December 'Showers' was as good to me this year as last year on two meters. The stuff was awful short in duration."

"Managed to pick up state number twenty-one, Michigan, during the showers. Pitifully few states, I know, but they are hard to get down here with no Tropo and little aurora. Really have to work to get 'em here." *Congratulations once more O.M. Think we all know how hard it is to get 'em in Texas, and how hard you work for 'em too.*

Augusta, Georgia – Down South way, Will Strauss, (K4MWN) sez:

"It may be helpful to K4KYH (*and others tOO*) to know that I have successfully put the DX-35 on six meters. I followed the instructions in W9KLJ's article on page 48 of January '57 'CQ'. I did not follow the instructions to the letter, but I did make the same basic modification described in the text (I did it the hard way)."

"I am the only ham on six meters here in Augusta, and I got on the air less than a month ago. My first contact was with WØVZJ in Linwood, Nebraska (*Honestly Will, it isn't always like that.*) and on the twentieth and twenty-fourth, Santa brought me four new states. They were all W9's and WØ's, because my beam is pointed in that direction. I almost worked a W8 but another station came on top of him when he came back to me."

"I have yet to work a Georgia or South Carolina station on six (even next door)! I have observed that the skip favors me about twice a week and around 1930 EST." *Just remember one thing about six meters Will! You just can't ever depend that it will act normal, abnormal, subnormal, or whatever.*

Albany, Georgia – Just to get the Georgia boys acquainted, thought we'd put this one in from Ben (K4BLA) after the preceding letter.

"Not much to report this month, but here goes. First of all I got K4KIV on six meters here in Albany, and I'm wondering if anyone would be interested in the design that I used. It is very cheap to build. I used an old receiver power transformer and the international crystal oscillator with a 5763 final, modulated by a 6V6, no meters. Another item, K4CML, the Marine Corps supply center radio station is sporting a new Globe Scout 680A transmitter and will soon be heard on six meters."

"Heard no signals from the first through the fourth of December, worked W4ATP/4 on the fifth. No signals heard sixth through the sixteenth. On the seventeenth I heard W1SUZ at 1915, also heard W3UBH at 1917, but no other signals coming through. On the 18th K4KIV and myself were having a QSO and we had a breaker. It was K8AML. After that we worked a number of W8's, 9's, and Ø's, and heard many more. Picked up a new state that night, KØLAD, for Kansas. On the 19th and 20th, W9's and WØ's came in. Twenty-first, no dice. Twenty-second heard LA7Y and SM7ZN working North Carolina, Tennessee and South Carolina but no Georgia. Twenty-fourth, open to 8's and 9's. On the twenty-eighth heard W1's and 2's. Thirtieth, open to W8's. Thirty-first worked W4CCA, first time since September."

"1958 started off with a bang on six meters. Heard W4AZD and W4UUF in QSO. 4's, 8's and 9's were heard, also WØ's. One other piece of news, received my conditional class on the 16th of December." *Congrats, Ben. Once more, Thanks and CUL.*

Marissa, Illinois – Bob (K9EID) has a few words to say, and says them too:

"The local ground wave contacts are very few in the past two months as Channel 2 in St. Louis, (KTVI) chased everybody off six meters. But that doesn't bother us down here, sixty miles, S.E. of St. Louis, so we are wide open for DX as there isn't much competition."

"All of us around here have worked KL7's, VE7, LA's, SM7, SM6 and EI2W. We have never heard anything West of us though, except in the states. We did hear one JA but no VK's or KH6's. I've heard reports of many fellows working them, but we haven't heard them here."

"Now that we have forty-three states on six, the last eight (five) are getting hard, but we'll still be in there pushing harder now that the 829B is on the air." *F.B., Bob, on your work in Europe. We've heard rumors too, about working outside the U.S. to the west, but have heard nothing as yet.*

Porterville, California—Alan Margot (W6FZA) writes from that sunny (?) state.

"I worked EI2W on Tuesday, January 7, 1958 on six meters for WAC. I think it was the biggest thrill in twenty-six years of ham radio. I had been gunning for him (who hasn't?) since November, and was beginning to wonder if it wasn't all over for another eleven (?) years."

"I was leaving for the office about an hour late and was instructing the XYL (K6ZEH) where and how to listen for Harry. An S9 signal came on the channel calling 'CQ W7'. Knowing Harry could never beat that one down, I got up to leave. The signal signed EI2W, (*came back in a hurry didn't you Alan*) I called and he came back, giving me S9 plus 30 db. Toward the end of the QSO a strong W1 came on, announcing to whoever he was working that if anybody wanted to work EI2W, he was right on this frequency! Harry wasn't heard from again." *A helpful soul, eh!*

"I think the extra kick comes from the fact that the feat may not be duplicated for another eleven years. Anyhow, in my delirium I cabled him (WHAT!), and his card and a nice letter came yesterday."

"I still need confirmation on my one JA and one LU contacts. Worked the JA on November 10th and the LU last spring. *Come on fellas, you can see it's important to QSL.* My ZS3G card came in last week."

"The XYL is rapidly moving toward WAS, taking advantage of the phenomenal F2 openings. She worked nine new states in one four hour session last week, and has gotten five tough ones near here on backscatter during these recent Alaskan openings. She's been on only eight months, but her states total makes mine look sick. I sure get tired of sweeping house and doing dishes, though." *Sam gets tired of pushing through gift wrappings, pine needles, etc., from Christmas. – Helen.*

"Porterville is in that magical San Joaquin valley, south of Fresno, where the DX comes in. W6FZA rig runs 180 watts to a 4X150 A, receiver is homebrew with 6J4's. Antenna is a five element yagi, eighty feet high."

"Two meters is moving along. Have nightly contact with W6AJF (about 300 miles) with consistent signals." *Very interesting letter Alan, but boy oh boy, that cable gets me.*

Birmingham, Michigan – Hartland Smith (W8VVD) has an interesting TV story for us.

"I thought you might be interested in my experiments in receiving pictures from the BBC television signal on 45 mc."

"My monitor for the 40-50 mc range is an old prewar Meissner FM tuner. Since I noted that by late November, the BBC video was coming in much louder than an industrial paging service on 43 mc, which has a transmitter about fifteen miles away, I decided to see what kind of picture I could get on my old ten inch Westinghouse TV receiver."

"After scrounging through the junk box, I found an old two meter converter using a 12AT7. By changing the coils, I revamped it to convert the 45 mc video to channel five which is vacant in these parts. This didn't give me enough gain, so I added a 6AG5 preamp. Then, whenever the 45 mc video signal was coming through, I could sync the picture vertically. Horizontal synchronization was still

a problem. By adding 4000 mmf across the horizontal ringing coil, and by readjusting the slug of this inductor, the horizontal oscillator frequency was lowered to around 9000 cps and whenever the BBC signal was good, I could obtain horizontal sync."

I was able to see objects moving on the screen, but they were unidentifiable, due to the fact that an English picture appears as a negative on US receivers. This problem was licked by reversing the leads to the video detector diode. Now black appears as black, and white is white."

"On December 8th, around 1100, I was able to get a very good picture of a woman's face. Her hairdo and features were quite distinct. Also, a closeup of a man came through quite well. No results were had again until yesterday, when, during the running of a grade B gangster movie, a number of closeup shots of human faces were recognizable."

"Although the BBC video signal is often very strong, the identification of picture details is usually difficult. First of all, due to multi-path transmission, the average picture contains from six to eight ghosts. Second, the selectivity resulting from the use of a preamp and converter tends to smear out all but the larger details. Third, the interference from a number of U.S. stations operating near the BBC frequency result in quite a bit of TVI patterns on the screen."

"Nevertheless, now and again objects in the picture, especially large ones, are recognizable. Band conditions haven't been nearly as good since I got my receiving setup perking. I only wish I'd had it working in late November when signals were strong from before 0800 until 1330. Now the peak is around 1030 with reception only good for around a half hour, and then only on an exceptional day."

"The antenna, by the way, is a two element beam in the attic. A twinlead folded dipole and a wire reflector strung between the rafters."

"My attempts at photographing the tube screen have been rather hopeless, so far, but hope to get some decent shots." *Very, very, very interesting. Don't know of anyone else who is doing the same thing and it surely shows possibilities. Good luck and good DX with the TV.*

Dallas, Texas – W5AJG, Leroy, sends another quickie to let us know that he picked up state number twenty-two, Wisconsin on January 1, 1958.

Chippewa Falls, Wisconsin – Great good news from Willy Moulton (W9DSP).

"A quick note to tell you about November 16th, 1957, as regards some dx worked from the sticks here."

"Worked G4LX in the morning around 1100 CST which is unusual here this late. Followed it with ZE1JN and ZE2JV, at 1205 to 1214 CST. Later on worked four Alaskan stations on that date, which were KL7CDS, KL7AUV, KL7CDG and KL7AH. This followed by JA8CX, JAFY, JA7GB, JA2AQ and JA2GR. Made four continents in one day! What will six do next?" *Don't ask us, just wish we had days like that.*

"Also heard W1HOY in there on backscatter."

"November 17th was good but no Africans or JA's, but KL7's still rolling through and having themselves a field day working everything from W1's to W5's, from east coast to Colorado." *Mother told me there would be days like that, but I've still to hear them.*

Santa Rosa, California – Good ole' Paul (W6BAZ) emits with:

"Yesterday (January 9) I worked VE1HT at 5:33 P.M., Atlantic Standard Time, and he said it was completely dark there. That is quite late for F2. Understand that someone in W2 land heard an XE this morning." *Don't know, haven't heard.*

"So many reports of VE8, that I think something will be popping up there soon." *It did Paul, W2IDZ/VE8 worked W5SFW in Amarillo, Texas, on January 16th.*

"If someone would promise me an opening like the last few days, about this time of year, I would make a deal with W7ACD to go up to his place in Idaho, and be the most popular station the six meter band. *And we're all for it Paul!*"

"Just counting up and have had over four hundred contacts in the last thirty days, most of them being F2." *And they say I talk a lot. – Helen.*

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Power Gain: 2000 (33db)
Power Requirements:
a. 6.3V @ 1.3a
b. +150V DC @ 60 ma. regulated.

Noise Figure: 2.8 db; .085 microvolts will produce a 2 to 1 signal to noise ratio when used with a 5KC bandwidth I.F.
Tube Complement: 417A/5842, 6BQ7A, 6CB6, and 12AT7

60 db Image rejection, 80 db I.F. rejection and 80 db down on all other spurious responses.

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Tube Complement: 6BQ7A, 6BQ7A, 6CB6, and 12AT7

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For further information, check number 24 on page 126.

by DON CHESSER, W4KVX
R.F.D. 1, Burlington, Ky.

DX DX DX DX DX DX DX DX

WAZ

The huge hoard of Zone #23 cards flowing from prolific JT1AA proved most welcome to the majority of these well-known DXers who have just achieved the coveted WAZ award. Congrats, fellows!

#366	VE8AW	Lyle Geary	(10th VE)
#367	W2HMJ	Aug Nickel	(9th W2)
#368	W5JUF	John C. Papp	(6th W5)
#369	K5ABW	Jim Price	(7th W5)
#370	JA1AG	Akira Kurokawa	(3rd JA)
#371	KL7PJ	Charles H. Sappah	(2nd KL7)
#372	WØAIW	Lee Bergren	(13th WØ)
#373	W9YFV	E. G. Schmeichel	(11th W9)
#374	W7AC	Richard S. Crane	(21st W7)
#375	W2LPE	Frank Policastro	(10th W2)
#376	W3KDP	Reynolds W. Collins	(15th W3)
#377	W4LYV	Charles D. Harris	(8th W4)
#378	W4GXB	Charles G. "Tex" Price	(9th W4)
#379	W9LNM	Art Saboe	(12th W9)
#380	5UX	R. W. Carr, Jr.	(8th W5)
#381	K2DCA	Paul Tissot	(11th W2)
#382	K2GFQ	Paul Hallingby, Jr.	(12th W2)
#383	W8JBI	Ted Drake	(17th W8)
#384	W8MPW	Carl A. Drake	(18th W8)
#385	W2ZGB	G. A. Sellers, Jr.	(13th W2)
#386	W4ML	Tom S. Stuart	(10th W4)
#387	W5CKY	Robert E. Shank	(9th W5)
#388	W6GMF	Joe Lebenzon	(123rd W6)
#389	WØNLY	Edwin J. Moles, Jr.	(14th WØ)
#390	W6DBP	Bob McLellan	(124th W6)
#391	K6ENX	Otto C. Miller	(125th W6)
#392	W3ZAQ	Lawrence P. Flavin	(16th W3)
#393	W2SAW	Addison N. Ringler	(14th W2)
#394	W9VIN	Ray L. Burnett	(13th W9)
#395	W5TPC	Paul G. Cadwell	(10th W5)
#396	W5FFW	Harold E. Davis	(11th W5)
#397	W4LZF	Francis H. Melcher	(11th W4)
#398	W1BIH	J. H. Thompson	(5th W1)
#399	VE6VK	Russ Wilson	(11th VE)
#400	W6ZEN	Floyd McPherson	(126th W6)
#401	JA1AA	Hisao Shono	(4th JA)
#402	DL1BO	Theodor Flick	(8th DL)
#403	W9FJB	Harry C. DeMuth	(14th W9)
#404	JA1DM	Masayoshi Ebisawa	(5th JA)
#405	SM5KV	Olle Ekblom	(4th SM)
#406	W8UPN	J. N. Grieveson	(19th W8)
#407	W2PTI	Francis A. Waggoner	(15th W2)
#408	FA8RJ	H. Grossin	(1st FA)
#409	SM7MS	Rune Rasmusson	(5th SM)
#410	W6YY	John Knight	(127th W6)
#411	W5HDS	T. M. Hoffman	(12th W5)
#412	W6GPB	Joe Horvath	(128th W6)
#413	OK1KTI	Kockerov Radio Club	(9th OK)
#414	W4QCW	J. Robert Eshleman	(12th W4)
#415	HB9EU	Rudolf Faessler	(3rd HB)
#416	LA3DB	Thorleif Soloy	(2nd LA)
#417	W5EGK	Philip P. Lynch, Sr.	(13th W5)
#418	W2TQR	Robert L. Mast	(16th W2)
#419	W3RUT	Vincent J. Grechen	(17th W3)
#420	W8DHC	Onne L. Santti	(20th W8)
#421	W6UQQ	Edward Sassaman	(129th W6)
#422	W6ALQ	Max Anders	(130th W6)
#423	W8BF	J. Orrie Baumgardner	(3rd W8)
#424	W6OYD	Frank C. Eckert	(131st W6)
#425	W5RS	E. C. Townsend	(14th W5)
#426	KL7MF	Harold D. De Voe	(3rd KL7)
#427	W3EPV	Robert H. Stoner	(18th W3)
#428	G6YQ	George A. Massey	(27th G)
#429	W9UXO	Frank W. Veith	(15th W9)
#430	W3CGS	Harry W. Stark	(19th W3)
#431	W6QNA	Gene Hyatt	(132nd W6)
#432	W5BZT	Robert L. Mims	(15th W5)
#433	W5FXN	James M. Price	(16th W5)
#434	W8GLK	Paul E. Burkhead	(21st W8)
#435	W5ABY	Kenneth Montgomery	(17th W5)
#436	WØQDF	Bill DuBord	(15th WØ)
#437	WØBFB	John R. Hinegardner	(16th WØ)
#438	W3ECR	R. E. Hatfield	(20th W3)

Further congratulations are due the following who made WAZ the hard way—all phone!

#12	W8BF	J. Orrie Baumgardner	(3rd W8)

A 1946 phone QSO with C8YR paved the way for Orrie's grand slam.

Lack of space prevents further description of the achievements of these forceful gentlemen, but we must point out the feat of K5ABW, to our knowledge the first American K call to win WAZ, indicating a period of operation only during the past few years. Jim's 40 confirming gems were all dated within the past two years. Others in the above list, some hiding behind W calls, were novices not many years ago. Ted Moles, WØNLY, for example, a novice only five years ago, now has WAZ and 246 DXCC countries, nearly every one confirmed.

Ted's incredible performance is rare, indeed, but the increasing frequency of new calls and young talent on the WAZ lists is a refreshing sign—proof that young blood is creeping into the exalted DX ranks, and proof that youngsters are now competing successfully with old timers with decades of experience. The old timers, greying at the temples if not white or shiny on top, burning less and less wee small hours oil these nights, would be first to acknowledge and acclaim this welcome development.

CQ DX Department Changes

Since taking over the reins of this DX column a short but frantic three months ago I have given much thought to suggestions and plans to make this department more effective and efficient. Much time and consideration have been devoted to discussions of the subject with big and little DXers from coast to coast. Some of the results I've relayed to Wayne, W2NSD, chief editor of this rat race, for his official opinion. He has complied gladly, usually ending his remarks with: "But it's your DX department, Don. Do as you think best." Consequently, I have no one to blame but myself if the plans go awry, or if there is more than the usual criticism of the following department changes.

Two major topics kept popping up during these discussions: first, please devote more time and space to the youngsters and new hands to DX than in previous years; and, second, do something about the ambiguous "CQ count" of DX countries.

The first topic needs little amplification, for

few will deny the vital importance of new blood in any organization or endeavor. Amateur groups and DX clubs around the world have at least one common problem and subject for debate—how to attract fresh, young talent into their ranks. Many clubs deem this "Topic A", of life-and-death importance to their future existence, and act accordingly to create interest in amateur radio in general and DXing in particular among their local youngsters. Acknowledgement and credit for their efforts is one way to attract their interest.

Even more important than the various clubs is the very existence and future of amateur radio itself. We are warned, and CQ will publicize the facts and dangers in future issues, that we are in grave danger of losing much of our HF, DX bands in the forthcoming 1959 international radio convention. Foreign governments and commercial interests are again eyeing our bands greedily, and they intend to do some wholesale carving if they can.

To hold our frequencies we must continue to prove our necessity in the public interest. Amateur radio has proven invaluable as the source and training ground of most of our top electronic scientists, who started in this hobby as youngsters. We must enlarge that pool of talent many times over to keep pace with modern scientific requirements. Only by so doing will we prove our public necessity. On the young rests our future.

The second topic, the "CQ count" of DX countries, presented not so clean-cut a resolution, although here again I was in complete agreement.

It is indicative that no one of the dozens of DXers approached for an opinion approved of the so-called "CQ count". They thought it superfluous, confusing — even silly. A surprising number asked why we bothered with Honor Roll lists at all. Critics insisted they meant little because they were not backed by confirming QSLs — that anyone whose honor may be slightly exceeded by ambition could enjoy an unearned high position on these lists—that in fact some do. An impressive number of DXers stated they had submitted an Honor Roll score only because it was required for WAZ listing, but that they submitted no further activity on the lists because they felt the scoring had no real basis of fact—no backbone.

Discarding the "CQ count" and requiring confirmations seemed a simple and sensible solution until it was pointed out we would be left with a direct copy of QST's DXCC listings. Why have exact duplicate lists in the two magazines when one covers the subject so adequately? Why indeed!

Further influence in this decision was this situation: I've sat at DX meetings and conventions for hours listening to heated and sometimes bitter arguments among DXers and between DXers and ARRL about what, pre-

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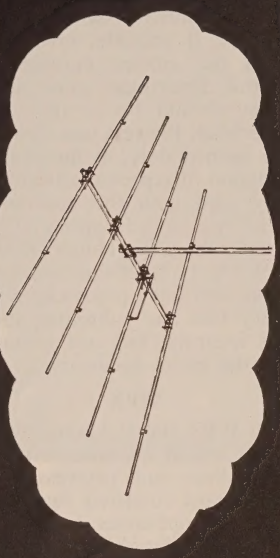
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cisely, constitutes a separate country, and about the inconsistencies and vagaries of DXCC. The most recent opportunity and case in point was the Northern and Southern California DX convention at Fresno January 18th and 19th. This delightful, high-powered, high tension annual get-together of many of the world's top DXers proved hand-tailored for the clarification of some of my problems.

One such resolution, without delving into personalities or controversial subjects, was that I should avoid, if possible, involving this department in the storms currently engulfing DXCC. If this department must suffer storms, at least they should be of its own making. With this decided, the rest was clear.

Effective immediately, at the suggestion and recommendation of representative DXers across the country, and with the approval of CQ's management, we are dropping all countries-worked lists from CQ's Honor Roll, and will substitute WPX. I regret this inconvenience to those of you who have painstakingly compiled your country lists and submitted them to this department recently, but our untenable position makes the move necessary.

WPX

Don't sell WPZ short! Upon investigation I believe you'll find it an even better indication of a DXer's ability and prowess than DXCC, for it divides most countries into geographical subdivision. It emphasizes land masses with the highest concentration of amateur stations, thus inviting active operating rather than passive listening. Its more than 700 possible prefixes as against less than 270 countries accentuates the positive. And it is more flexible, for it offers several basic certificates of award, plus stickers for single-band accomplishments.

Further, WPX avoids all confusion and arguments over constitution of a separate country. Prefixes are prefixes, without room for doubt or controversy. New prefixes will be honored as they are issued by the various world governments; without notice or judgement by CQ, this department, or any committee.

And, perhaps most important in this scientific age, WPX promotes and supports our youngsters, for about 40 novice prefixes are assigned, here and overseas.

Basic rules for WPX were published in the January, 1957, issue of CQ. Exactly how WPX will be handled by this department or how scores will be listed in these pages have not yet been decided. Further decisions, plus possibly some minor rule changes, will be announced in future issues. Suggestions are always welcome, and will be thankfully received.

One thing is certain, however: WPX will have backbone, for confirming cards will be required for all basic certificates and for all scoring above those figures, at the least.

We urge your participation in this new and different DX scoring system. Administration of WPX, including correspondence and application blanks, is now being transferred from CQ's New York office to this department. Please send all WPX cards, applications, and correspondence, as well as WAZ and DX matters, to the address at the head of this column. Good luck!

The Honor Roll (sob!)

Before we bid a sad farewell to the countries lists, special recognition should be paid those two giants of DX, Don Wallace, W6AM, and Charlie Mellen, W1FH, for their success in heading the lists these many years. Don wound up with 280 countries on CW by working PY7AN/Ø on December 13th, and 235 on phone. At the last report, not current, Charlie had 276 on CW. Congrats, fellows! Now how about a try at WPX?

Expeditions

PY7AN/Ø and PY7ACY/Ø successfully put Fernando de Noronha on the DX map for three days recently, Dec. 13th through 15th. 1049 QSOs, mostly with Ws, resulted on 14 mc phone and CW, W1FH scoring on both. It appears 40 or 45 countries were worked, although results are still being tabulated at this writing. Equipment included an NC183D, HQ100 and preselector, 813 CW rig running 120 watts, ART13 phone rig, and doublet antennas. Operation was from the schoolhouse in the village of St. Anna.

The idea for this expedition was conceived by Major Mafra, Governor of the Territory of Fernando de Noronha, who expects his own ham ticket soon. By personal trips to Rio he succeeded in obtaining the prefix assignment PYØ for the island, and arranged for the trip by Vic and Odacy. Two other hams, Sgt. Camilo, PY7LR, and Capt. Macedo, PY7SC, are now stationed on the island, as is an American ham, Phil Hendricks, WØYFE/YJU, attached to the RCA missile program. Permanent activity is anticipated by the Brazilians, but not by Phil. He's been trying since last September to get authorization to operate, but Brazil licenses only native-born Brazilians. "It seems hopeless for American hams ever to operate here unless rules are changed," concludes Phil.

Fernando de Noronha has been accredited separate country status by ARRL and cards may be submitted later this year for DXCC credit. PY7AN and PY7ACY promise QSLs 100%, and cards may be sent them at their callbook addresses, via LABRE, or via Phil C. Hendricks, RCA/PAA, Fernando de Noronha AAFB, c/o Patrick AFB, Fla.

The OVARA Cincinnati group which stirred up a commotion as VP5BH, Grand Cayman, last March, is planning another trip this year, but at this writing we don't know where we are going. First choice is either Socorro (XE4)

[*Continued on page 92*]

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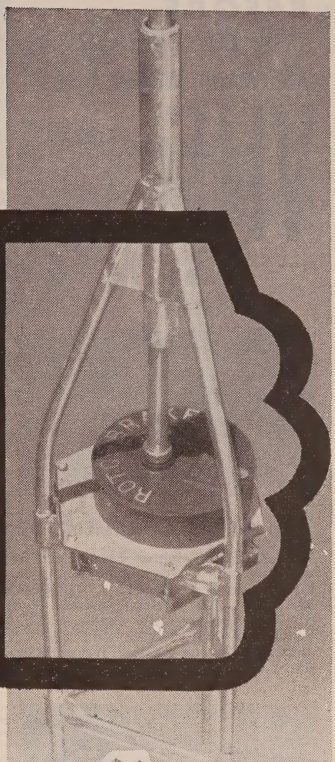
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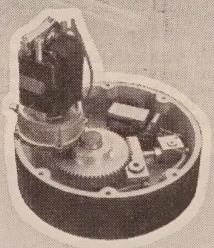


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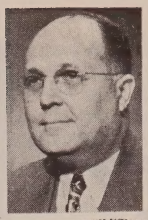
Multi-colored Great Circle wall map indicator, 16" in diameter. Moving wedge of light, 10' wide at perimeter indicates beam direction. Countries outlined and call areas labeled. Control box mounts under operating table.

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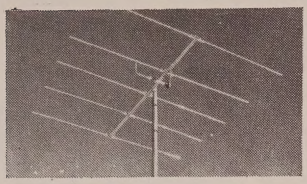
1135 NO. 22ND • LINCOLN NEBRASKA

For further information, check number 40 on page 126.

BEFORE...
YOU BUY OR TRADE...
SEE WARD W2FEU



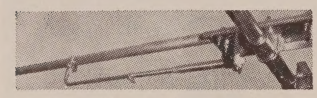
VHF FOR
FOR 1¼, 2 & 6M
from hy-gain



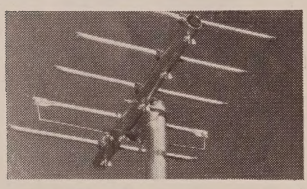
6 METER
5 ELEMENT
$12.95

6 METER, 8 ELEMENT BEAM: $24.95

The hy-gain 6-meter beams are adjustable for max. gain over the entire band, from our instructions. No further tuning necessary. Calibration Chart supplied with each instruction manual. Factory preassembled, these beams feature heavy wall ½" aluminum elements of 6061T6 alloy and 1¼" diameter aluminum booms. May be stacked for additional gain. Stacking Bars available at $3.95 extra.



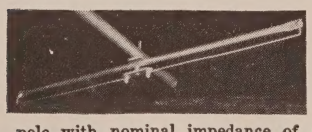
New, precalibrated (GAMMAXIAL) Gamma Match assembly with coaxially formed reactance cancelling capacitor built in, makes possible for the first time a perfect 1:1 SWR. Coax connector for 52 ohm feed incl. Developed exclusively by hy-gain for use in the hy-gain single-band beams.



2 METER
5 ELEMENT
$6.95

1¼ METER, 10 ELEMENT BEAM: $9.95
2 METER, 10 ELEMENT BEAM: $10.95

The hy-gain 1¼ & 2 Meter Beams are factory preassembled; elements snap into position for immediate use. Features ⅜" aluminum elements of 6061T6 alloy & 1" diameter aluminum booms. Easy to put up and into operation, these beams may be stacked for additional gain. Stacking bars available at $3.95 extra.



The 1¼ & 2 meter beams incorporate the Folded Ratio Dipole with nominal impedance of 450 ohms. A 1:1 SWR with 450 ohm open wire transmission lines for max. efficiency at VHF frequencies may be realized.

Write for Detailed Information!

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WARD J. HINKLE, Owner TEL. VICTOR 2-8350

For further information, check number 26 on page 126.

or Clipperton (FO8), probably XE4, but this depends on the successful acquisition of a boat from California. Negotiations are now in progress, and results will be announced as soon as possible.

Alternate destination is Guadeloupe (FG7), although here again troubles and delays are being experienced obtaining French licensing permission. Plans should be well developed by the time you read this. Contact W4KVX on 14010 kc 0000GMT most evenings, or see the DX Bulletins, or drop us a card, for further details.

DX News

JT1AA is going on phone in February, which news should create a ripple among the staid phone brethren and a still longer work-week at W4KVX! Ludvik's Czech friends have shipped him a NBFM exciter, advises YU1AG, and he may be on 21092 kc phone by the time you read this. Language barriers may be considerable, and may require HV1CN-like operating through Czechoslovakian interpreters. Meanwhile, JT1AA is now active on 21040 and 21092 kc CW, usually the latter, at 1000 to 1100GMT, with good signals. Ev, KP4KD, among other happy souls, recently worked him on this new band. We understand Ludvik intends to try 28 mc phone and CW later this year.

Effective January 1, 1958, Ghana's prefix changed from ZD4 to 9G1, although the suffix letters of individual calls remain the same. Jim, W10KG, contacted 9G1CF on Jan 12th on 21 mc SSB, believed to be the first 9G1/W SSB QSO.

Kuwait is well represented by Bill, MP4KAC, these days, especially Fridays, advises Elmer, W3ROA. Friday is the Mohammed day of rest, similar to Christianity's Sunday, and since it's Bill's day-off he hams all day. He uses 40 watts to a 3-element beam. Elmer worked him on 14170 kc phone, but look for him also on 21 and 28 mc phone.

Frank, DL4EAC (W2NDS), informs us Turkey is back on the DX map temporarily and semi-underground. Ole, DL4GF/TA, says he has sort of unofficial official permission to operate 14 mc CW only, and is trying to push authorization for full TA licenses.

Reg Tibbetts, FS7RT et al, opened up as VPØRT from Anguilla, Leeward Group, Jan 20th on 21 mc SSB, writes Mickey, W8YIN. This island is part of the newly founded "Federation of the West Indies", which includes VP2, VP4, VP5, VP6, etc. Mickey asks, "I wonder what this country status is?" An excellent question! The new call, VPØRT, is a bonafide license issued by the new government. QSL via W6ITH.

73, Don, W4KVX

OOPS...

Good Grief Department

A note from Leonard Geisler re his "Souping Up the Super Pro" article in the December CQ: the blue wire from the last i.f. can not only ties to the 120K resistor, but is also connected to pin 5 of the 6H6 in fig. 3. The unmarked cathode resistor of the top 6SL7 in fig. 2 is 1.5K. The terminal strip layout is correct as printed . . . if yours differs Leonard will be glad to help you out if you send a sketch of yours. His QTH appeared on the article. He suggests the use of Aerogrammes which save considerably on postage to Japan. One last hint: if you happen to have an oscillation in the i.f. when using a glass 6H6 you can replace it with the metal type.

February, page 61, listed a li'l 'ol transistor at 30 amps instead of 30 microamps. Tests indicate that it works better at 30 microamps.

hamfest

Annual Goose Bay Amateur Radio Club QSO Party

Time: Commences 0000 hours GMT 4 April 58 ends 2400 hours GMT 10 April 58.

Bands: All bands and either phone or C.W. or both may be used.

Exchanges: RST, name and QTH.

Awards: A worked all goose (W.A.G.) certificate will be issued free to the following: All amateurs in Canada and U.S.A. who submit logs showing they have worked five (5) VO2 stations during this period.
All other amateurs who submit logs showing they have worked four (4) VO2 stations during this period. Show date, time and frequency, of QSO's.
Submit logs to Ted Harvey, VO2AB, awards manager, AERADIO, Department of Transport, Goose Bay, Labrador.
No QSL cards are required for these awards as logs can be cross checked locally.

Following VO2 stations will most likely be on during this period.

VO2's AA-AB-AH-AM-EA-GD-HR-IA-NA-RS and UA.

Get your W.A.G. certificate and that missing zone two (2) during this QSO party.

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For further information, check number 54 on page 126.

BIG GUN [*from page 57*]

Parasitics?

Five different versions of this amplifier have been built and so far no parasitics have reared their ugly heads. One amplifier was tested at 7500 volts (E-gad! — *Editor*) with complete stability. Of course this does not mean that a written 10,000 mile guarantee is being given that *your* particular amplifier will not have parasitics. Chances are—if you duplicate the parts placement and layout closely—it won't. If, by chance, one does show up, a parasitic supressor placed right at the grid terminal of the tube will do the trick. Try two 50 ohm, 2-watt carbon resistors in parallel, shunted by three turns of #14 wire, wound into a coil ¼-inch long and ½-inch in diameter. That should do the trick. The *Radio Handbook* (published by Editors & Engineers, and available through The *Radio Bookshop, 1379 East 15th St., Brooklyn 30, N. Y.*) has complete information concerning parasitic supression in high power amplifier stages.

Operation on Other Bands

This particular amplifier was designed for 14 mc operation. It is essentially a one-band affair, in that no bandswitching system is used. Both grid and plate coils must be changed for a QSY to another band. Operation on 40 and 80 meters is possible if the grid coil is cut to resonate with the tuning capacitor (C1) nearly fully meshed. Each section of C1 should be padded with a 100 mmfd 2000 volt mica capacitor for 40 meter operation, and with a 200 mmfd capacitor for 80 meter operation. In addition, the capacitance of C2 must be increased to 150 mmfd for 40 meter operation, and to 300 mmfd for 80 meter operation. Additional fixed capacitance must be paralleled across the pi-network loading capacitance (C3) for 40 and 80 meter operation. 15 meter operation is possible if the grid coil is trimmed to resonate with a maximum setting of C1. Coil L2 should be reduced for 15 meter operation. Operation of the amplifier has not been attempted on the 28 mc band. ■

Parts List for Figure 1

C1—150-150 mmf split stator capacitor (Johnson 150FD20)
C2—50 mmf, 13,000 volt capacitor (Johnson 50C130)
C3—500 mmf capacitor (Johnson 500E20)
C4-C9—Coaxial "Hypass" capacitor, 0.1 uf, 600 volts. Bulkhead mounting. (Sprague 80P3)
C10-C12—500 mmf, 10KV, "TV-type" capacitor (Erie 413)
NC—Disc-type neutralizing capacitor (National NC-125)
L1—Grid coil. 50 watt plug-in type, center link (see text)
L2—Plate coil; 6 turns of ¼" copper tubing, 3¼" l.d., 4" long. Adjust coil to resonate with C2 about ¾ meshed
RFC1—2.5 mh. (National R-100)
RFC2—Heavy duty choke. (National R-175) see text
RFC3—20 turns #16e, ⅜" diam., 1" long self supporting
RFC4—2.5 mh. (National R-100U)
R1—Swamping resistor for SSB operation. Non-inductive (see text)
R2—Safety shunt for meter. 100 ohms, 10 watts
R3—100 ohms, 2 watts
T1—Filament transformer. 7.5 volts at 15 amperes (Thordarson 21F17 may be used with 450-TH-12 amperes)
J1, J2—Coaxial receptacles, SO-239 (Amphenol)

Parts List for Figure 3

C1, C3—40 mmfd (Centralab type 850, 5kv)
C2—100 mmf (Centralab 850 5kv)
L1, L5—6 turns #12 E, ½" i.d., ¾" long
L2, L4—8 turns #12 E, ½" i.d., 1" long
L3—1½ turns #12 E, ½" i.d., ⅛" long

Parts List for Figure 4a

CH-1 3 henry at 150 ma (Chicago-Standard C-2309)
T-1 440-0-440 volts at 130 ma (Chicago-Standard P-6143)
Adjust R-1 to provide proper operating bias

Parts List for Figure 4b

CH-1 3 henry at 150 ma (Chicago-Standard C-2309)
T-1 250-0-250 volts at 70 ma (Chicago-Standard PC-8403)
R2, R3—20 ohms, 1 watt
Adjust R-L for current of 35 ma through each regular tube

SURPLUS [*from page 59*]

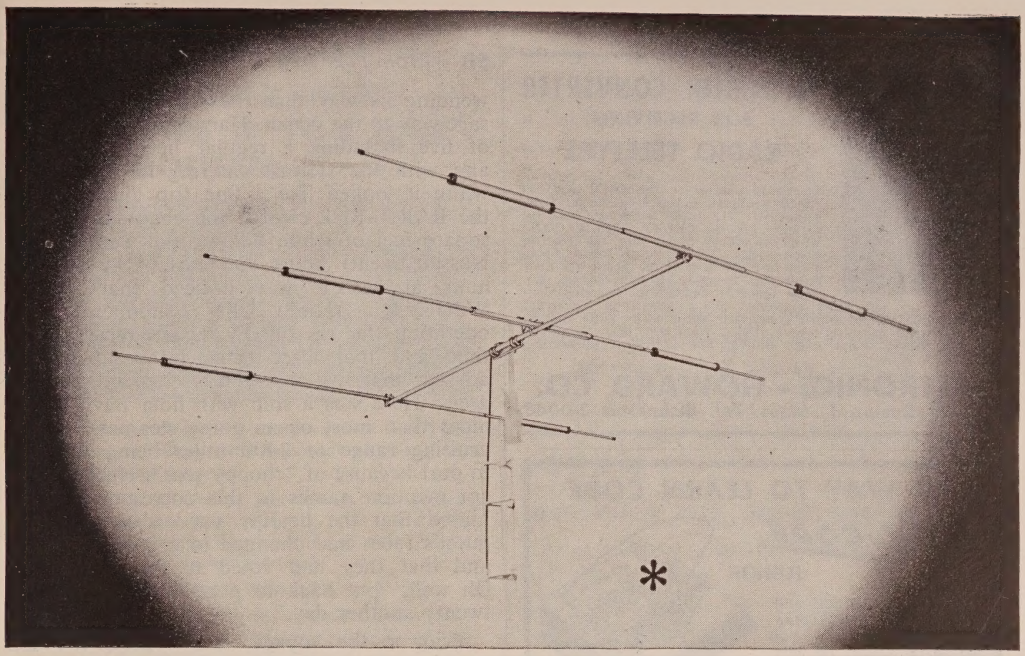
impossible to obtain this offer would have been appreciated—except that he wanted six-fifty for it. This kind of got us mad. First the idea of six-fifty for a book worth a buck was a wee bit too much. Secondly, we are hams, and especially to the surplus user, extremely interested in keeping the price down. I guess he just forgot this is a hobby.

All of this started us thinking. There is a demand for handbooks, and many of us have handbooks we don't even use anymore. As a result, CQ is commencing a service, via the Surplus column. While we will not directly participate in any transaction, we would be glad to list any handbooks that are needed, and your call. If someone has the particular book he contacts the party directly—*NOT CQ*. From then on the swap is between two subscribers. CQ can take no liability. Just about all we can do is list who needs what book. As it is now, our mail is tremendous, and we couldn't possibly handle the swaps personally.

As a beginning, W6PHU is looking for a conversion of the GO-9/TBW series, while KN9IKY wants the BC-1267A handbook and Rudy Platek, W3OUA is looking for anyone who has any conversion on the RU-19 receivers. W2GZ is looking for any three band conversion of the ARC-5 VHF transmitter.

Let's give these chaps a hand with this info.

73, Ken, W2HDM



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TRAP MASTER

EXCLUSIVE TRAP DESIGN – LIFETIME WEATHERPROOFED!
ANTI-SAG CONSTRUCTION!
LOW SWR – REMARKABLY FLAT ACROSS BANDS!

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Model **TA-33**
Beautifully constructed 3 element beam for operation on 10, 15 or 20 meters. Forward gain is 8db, front-to-back is 25db, and SWR is 1.5/1. Maximum element length is 28 ft. and weighs only 47 lbs. Boom is just 14 ft.
$99.75

Model **TA-32**
Similar to Model TA-33, but has 2 elements operating on 10, 15 and 20 meters. Forward gain is 5.5db, front-to-back is 20db and SWR is 1.5/1. Featuring a short boom of just 7 ft. and max. element length of 28 ft. Weight is 34 lbs. Converts to Model TA-33.
$69.50

Model **V-4-6**
This low cost, high performance vertical antenna covers all bands from 10 thru 40 meters. Requires little space and may be mounted on ground or roof-top. Low SWR and band switching is automatic. Loading coil available for 80 M.
$27.95

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For further information, check number 27 on page 126.



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FOR RECEIVING
RADIO TELETYPE

To receive amateur or commercial teletyped messages by radio, you need the following equipment: (1) Good communications receiver. (2) A TELEWRITER CONVERTER which plugs into the receiver phone jack. (3) A Polar Relay which plugs into the back of the Telewriter Converter. (4) A small 110 volt, 60 ma, d.c. power supply, to operate the selecting magnet(s) in the teleprinter machine. (5) a teleprinter (teletype) machine, which is an electric typewriter controlled by radio signals. (Used teletype machines are available from $75 up.) Telewriter Converter **$89.50.** Polar Relay **$14.75.** For additional information write: Tom, W1AFN.

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K'WICKPATCH *The high speed high quality patch*

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PE-101C DYNAMOTORS

12 volts in, 600 volts at 200 Ma. out with 325 volt tap. Brand new in original cartons—**$10.95**
New, not in original cartons, weathered and handled but guaranteed—**$6.95.** Shipping weight: 13 lbs.

BC-366 JACK BOXES

Includes 4" x 3" x 2" aluminum box, phone and mike jacks, 5 position switch, gain control. Brand new—**$.75.** Wt. 1 lb.

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SB [*From page 61*]

wending its way thru the smooth inland passage-way to the ocean. Harry maintains a crew of five including a regular licensed captain, and with the stewart catering to their every whim it looked like a fine trip ahead. When the BAR-L-Rick cleared the channel, its 2662 square feet of white billowy sail was set with Nassau twenty hours due East. After the first hour at sea it was noticed that Danny, W2GG/4 a retired USN Commander was operating the rig on 15 meters most of the time and that after three hours at sea he advised that the course was changed 180 degrees. Here was a ship with finer navigational aides than most ocean going steamers, with a cruising range of 2400 miles being returned to port because of "choppy seas". Harry would not mention names to this correspondent but hinted that the healthy tan on some of his guest's faces had changed to a greenish pallor and that they had voted to return to port. Oh well, "put back to port today and be on twenty another day."

Prior to the voyage, Bill, W2KG/W4VEC was host at a dinner to bid bon voyage to the sailors. Among the guests were Butch, KØDWC, Art, WØCXX, W4GL, W4BMR, W4QS, W4ERK, W2MDQ, W4CF, W4FH, and W4HB. A picture is promised for next issue.

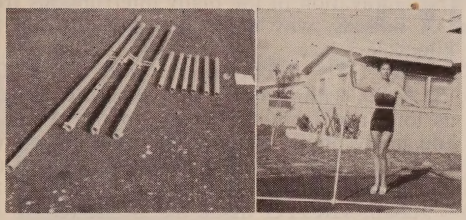
We have just learned from Alan, W3ZP that 4X4DK will soon be on SB with an exciter sent to him by VE3MR.

By the time you read this column, at least those in the US, you will probably be getting ready for the Second SB-DX Contest to be held from 1800 GMT March 15 until 1800 GMT March 16th. This one should be terrific, due to the increased activity of SB throughout the world, and the definite advantages of SB over AM for voice-break contacts. It is expected that there will be over 100 countries participating in the contest, and after it is all over there should be many stations with DXCC on SB. Don't forget that the contest will be on all amateur bands, with regular DX Contest multiplier point systems applying. Lets make history in these twenty-four hours of competition.

While on the subject of DX, how many times have we gotten all riled up when, right in the middle of a nice friendly chat with some one around the top end of twenty, some big signal pops on the frequency calling a DX station, without regards for your feelings. Actually the DX station being called is outside of the American phone band, and there was absolutely no time for the station calling him to tune down and check his frequency first. That will always be one of the "hazards" of holding QSOs at the top of the band. It could happen even lower down in the band if the

[*Continued on page 98*]

YOU COULD WORK WONDERS IF YOU HAD A GOTHAM BEAM!



Study these specifications — compare them — and you too will agree, along with thousands of hams, that GOTHAM beams are best!

TYPE OF BEAM. All Gotham beams are of the full half-wave plumber's delight type; i.e., all metal and grounded at the center. No wood, tuning stubs, baluns, coils, or any other devices are used.

MORE DX CONTACTS

GAIN. Gotham beams give the maximum gain obtainable. Our 2-element beams give a power gain of four (equivalent to 6 db.); our 3-element beams give a power gain of seven (8.1 db.); and our 4-element beams give a power gain of nine (6.6 db.).

THOUSANDS IN DAILY USE

MATCHING. Matching of the transmission line to the beam is extremely simple and quick. No electronic equipment or measuring devices are required.

ASSEMBLY AND INSTALLATION. No special tools are required for assembly and installation. Entire job can be done by one man in less than an hour. Full instructions are included with each beam.

YOU WILL WORK THE WORLD

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use 5/8" and 3/4" tubing elements; the deluxe models for these bands use 7/8" and 1". In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

TRIBANDER BEAMS — TWO BANDER BEAMS

A full half-wave element is used on each band. No coils, traps, baluns, or stubs are used. No calculations or machining required. Everything comes ready for easy assembly and use. *Proven Gotham Value!*

TECHNICAL CHARACTERISTICS

S.W.R. On Each Band	1:1
Diameter of Elements	7/8" & 1"
Number of Booms	2
Diameter of Booms	1"
Boom Length	12'

6-10-15 Tribander

GAIN	F/B RATIO
6.5db on 6 mtrs	23db on 6 mtrs
7.8db on 10 mtrs	27db on 10 mtrs
6.5db on 15 mtrs	23db on 15 mtrs

10-15-20 Tribander

GAIN	F/B RATIO
6.5db on 10 mtrs	23db on 10 mtrs
7.8db on 15 mtrs	27db on 15 mtrs
6.5db on 20 mtrs	23db on 20 mtrs

All Two-Bander Beams Have A Forward Gain Of 5.8db On Each Band, And A F/G Ratio of 17db.

Two-Bander Beams Available In Following Combinations: 6-10; 10-15; 10-20; and 15-20. See Coupon.

You could work KC4USA in the Antarctica with only 90 watts on 15 meters, as W4SK did.

You could work over 100 countries with a three element 10 meter beam, and be a top man on the frequency, like WØDEI.

You could work terrific skip and DX with reports of 20 over 9, with as little as 36 watts input on 20 meters, as W. E. Woods did.

You could work 29 states in three months on six meters, with low power, as K2LHP did.

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- ☐ 10-15 TWO BANDER 34.95
- ☐ 10-20 TWO BANDER 36.95
- ☐ 15-20 TWO BANDER 38.95

TRIBANDER

☐ 6-10-15 $39.95 ☐ 10-15-20 $49.95

2 METER BEAMS

☐ Deluxe 6-Element 9.95 ☐ 12-El 16.95

6 METER BEAMS

- ☐ Std. 3-El Gamma match 12.95 ☐ T match 14.95
- ☐ Deluxe 3-El Gamma match 21.95 ☐ T match 24.95
- ☐ Std. 4-El Gamma match 16.95 ☐ T match 19.95
- ☐ Deluxe 4-El Gamma match 25.95 ☐ T match 28.95

10 METER BEAMS

- ☐ Std. 2-El Gamma match 11.95 ☐ T match 14.95
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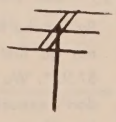
20 METER BEAMS

- ☐ Std. 2-El Gamma match 21.95 ☐ T match 24.95
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- ☐ Std. 3-El Gamma match 34.95 ☐ T match 37.95
- ☐ Deluxe 3-El Gamma match 46.95 ☐ T match 49.95

(Note: Gamma-match beams use 52 or 72 ohm-coax. T-match beams use 300 ohm line.)

NEW! RUGGEDIZED 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.



- ☐ Beam #R6 (6 Meters, 4-El) $38.95
- ☐ Beam #R10 (10 Meters, 4-El) 40.95
- ☐ Beam #R15 (15 Meters, 3-El) 49.95

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3BP1..... $1.75 5JP2 ..... $3.45 5GP1/5BP1XXX $2.45
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10 hy/500 mils; 100 ohm; 2000 volt RMS ..... 30 lbs..... $6.95
Dual 2.2 hy/550 mils; 27 ohm; 2.5 KV test ..... 40 lbs..... $5.95
3 hy/400 mils; 34 ohm; 1780 v RMS .....10 lbs. ..... $2.45 ... 3/$5.95
10 hy/150 mils; 160/210 ohm ..... 5 lbs..... $1.69 ... 2/$2.95
15 hy/100 mils; 240 ohm; 1500 v RMS . 3 lbs. ... $1.19 ... 2/$1.95
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TRANSFORMERS — All have 115 volt, 60 cycle primaries
800 vct/175 mils; 5 v/3a; 2.5 v/1.75 a; 6.3 v/2.5 a; 6.3 v/2.5 a; 80 volt bias tap; Stancor P-4004 ..... 10 lbs. ... $5.95
790 vct/120 mils; 5/3; 6.3/4.4; 6.3/0.6; HS .....10 lbs. ... $2.95
550 vct/240 mils; 5/3; 6.3/11.1; 17/1.2; HS ..... 14 lbs. ... $3.45
Scope special . . . 6.3 v/1.85 a; 6.3 v/0.6 a; 700 vct/30 mils; 525 v/5 mils; 2.5 v/1.75 a; 6.3 v/0.6 a; 2000 and 3500 volt ins; upright shielded double shell ..... 5 lbs. $3.45
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Dual 120 vct/10 mils; cylindrical, potted .... 1 lb..... 95c 3/$2.45
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2.5/10; 6.3 vct/5.5; 6.3 vct/1; 1000 volt ins..... 13 lbs..... $2.29

MISCELLANEOUS VALUES — These are worth examining carefully
Triple 20 mfd/400 DCWV; octal elect. cap..... 4 oz. 2/95c
1200 mfd/3 DCWV; can type electrolytic..... 2 oz. 6/95c
456 KC IFs; single air trimmed, ceramic..... 8 oz. 2/95c
6 pole, 3 position phenolic rotary switch ..... 3 oz. 4/95c
"Super Pro" table rack cabinets (black/grey)..... 33 lbs..... $7.95
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BC-606 control boxes with cable hardware..... 3 lbs..... 3/95c

VACUUM TUBES — All are in original boxes
701-A ... .. $3.95 a pair 725-A ..... $1.69 417-A $1.69
717-A, 2X2, 1642, 958-A ..... 35c each, $2.95 a dozne

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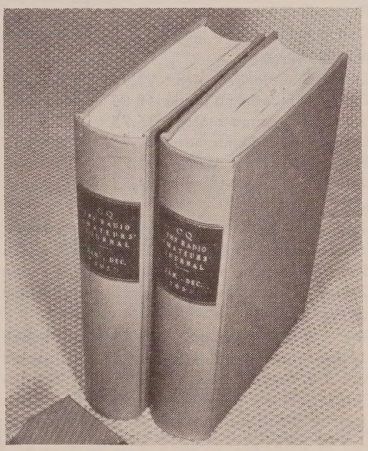
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CQ MAGAZINE

300 West 43rd Street, New York 36, N. Y.

SB [*From page 96*]

DX station indicates that he will "tune around 270", but not nearly as frequently as it will between 14290 to 14297. So, when skip is long, and you just want to rag-chew without the aggravation of the many interruptions from DX hounds, why not stay below the top ten kilocycles?

The USN Icebreaker, USS BURTON ISLAND, with W4VEI, Bob aboard completed its long run from the Arctic to the Antarctic and many phone patches are being made from KC4/land over the one kilowatt SSB rig aboard the Burton.

Julian, HK3TG made his debut on SB recently and is very popular on twenty. He has a fine signal on twenty.

Sam, OHØNC is now active from his new QTH on Aland Island. Sam, ex OH2OJ told me the other day that he was not all settled as yet but that the ham gear was all installed. He is lucky his XYL is also a ham, OHØND.

We are nearing the completion of two years as Editor of the SB column, and now nearly twenty-four issues of CQ later, our biggest kick is in receiving all of the wonderful letters from our readers which indicates to us that you are pleased with our efforts. We want to do much better, and would like to receive more photographs and news from you. We acknowledge with thanks information received this month from Mickey, W8YIN, Steffy, W4IYC and Doc W6UPP.

73 and see you in the Contest, Bob, W3SW.

tell them you saw it in CQ

YL [*From page 64*]

of LP albums for her new HiFi set in appreciation of Kay's furnishing her den as a club meeting place for the last year.

The Georgia Peaches have changed the frequency of their YL net from 3.985 to 7.260. By moving to 40 meters they'll have better statewide reception and also allow YLs outside Georgia to join in the net—or work the girls off net time for their Georgia Peach certificate.

Here and There

A card from W4UDQ, Dot Wilson, cleared up a mystery (to us). It was Dot who won the portable TV receiver, main prize for the YLs, at the International YLRL Convention in Chicago. . . . W4VCB/3, Ev, holds DXCC and has 119 countries confirmed. . . .

W6QGX, Marryette, YLRL's treasurer, had a happy surprise when a model 80 crystal mike arrived from the Turner Co. complete with stand. Seems our pix of her in Dec. CQ showed Harryette using a Turner mike. With the model 80 came a note saying, "This is our way of saying thank you to all Hams using Turner products." Now don't *all* of you start sending us photos showing Turner mikes—hi!

33, Louisa, W5RZJ



LEO I. MEYERSON
WØGFQ

Leo says: *Here's the Nation's Best Deal!*

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$159.50 Amateur Net

THE NC-188

Here's a quality amateur receiver at a popular price. Directly calibrated for the 4 general coverage ranges and 5 bandspread ranges for amateur bands 80 to 10 meters. Also covers 540 kc to 40 mc. Voice or CW. Large, easy to read 11" slide rule dial. Built-in "S" meter on front panel.

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the ham's choice: **GLOBE SCOUT 680A:** $9.90 per mo.
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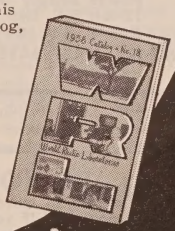
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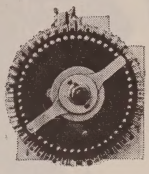
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This unit is complete with 18 tubes operating from either 6- or 16-volts D.C. (self-contained power supply. Crystal control. Sensitive superhet circuit. Approx. dimensions 11" x 10" x 6". Approx. Weight 24 lbs. Unit complete with tubes, schematic diagram and pre-setting instructions.
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12- or 24-Volt D.C. Dynamotor..... **$ 3.95** *each*

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Same description as BC683 excepting range is 20-27 mc. This unit complete with tubes.
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Manual with schematic for BC603 and BC604 ..... **$1.00** *each*

BC659 FM TRANSCEIVER
29-40 mc. 2 channels, crystal control. Unit complete with tubes, built-in speaker and dual meter for testing filament and plate circuit. Approx. dimensions 16" x 13" x 7½".
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Manual with schematic for BC659..... **$1.00** *each*

MP48A MAST BASE for mobile unit
New ..... **$2.95** *each*

For further information, check number 30 on page 126.

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1. Tear your name and address label off the wrapper of this issue and paste it in this box right over these words, or make a complete and accurate copy of your old address label.
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3. Cut out this whole box and mail it to: CQ Magazine, 300 W. 43 St., New York 36, N. Y.

VISUAL MONITORING [*From page 45*]

pending upon the exciter and linear amplifier output.

To prevent phase shift occurring on the scope patterns, the coaxial cable from the demod boxes should be kept even as possible and should some phase shift be present it may be corrected by placing a 500 mmfd mica capacitor in series with a 250K potentiometer, and connecting these two components in series with the inner conductor of either coaxial cable from the demod. This connection is made at the scope terminals.

The test setup used for taking the following photographs is simple and can be duplicated as follows. Connection to the scope can be made from the last if of the receiver through a 47 mmfd mica capacitor to the vertical input of the scope, for indications such as those represented in fig. 5, 6, 7, and 8. Some receivers are equipped with an AVC amplifier stage, and connection to the plate circuit will cause less detuning of the receiver if than connecting directly to the if strip. With either method, indications can be obtained similar to fig. 5, 6, 7, and 8. Fig. 9 shows a simple demodulator using a germanium diode and filter to be connected to the horizontal amplifier of the scope, which is necessary to obtain patterns as in fig. 5, and 6. Fig. 7 and 8 are obtained with the internal sweep of the scope.

With proper bias and excitation applied to the linear amplifier a two tone test signal or voice frequencies modulating the exciter will produce a forty five degree, straight line on the escope as shown in fig. 2c, 3c, and 4c. Any non-linear condition being generated in the exciter such as overdrive or insufficient loading, will be indicated o nthe scope, and thus a constant check can be made as to the operation of exciter and linear amplifier.

The equipment used in the tests consisted of a 20A exciter driving a JKW linear amplifier, (page 39, July 1956. CQ), a National receiver with sideband slicer, and a Heath Model OM-2 oscilloscope. The camera used was a Polaroid, and all tests were conducted at 28.5 megacycles. ■

remember:

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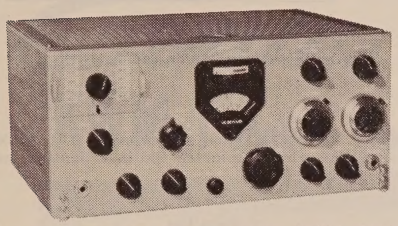
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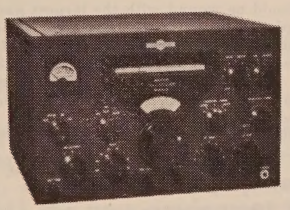
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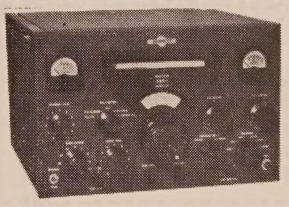
73, Bil Harrison, W2AVA

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• Small – approximately 3x3x5 in attractive case – patch may be placed near your Xmtr and connected in about five seconds when needed. Just connect to your Xmtr mike connection and receiver phone jack. NO INTERNAL CONNECTIONS. Complete, simple instructions.

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BC-659 FM Receiver-transmitter, xtal controlled, two channels, freq. range 27-38.9, 9 Mc, 13 tubes, built-in speaker, dual meter for testing filament and plate circuits. Exc. **$6.95**

BC 620—Same as above except less speaker and 20 to 27 Mc. **$4.95**

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BC 603. Same as above except to 20 to 27 Mc. $6.95
12 Volt Dynamotor for above receivers. Exc. ..... $2.95 ea.

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NEW LOOK [*From page 37*]

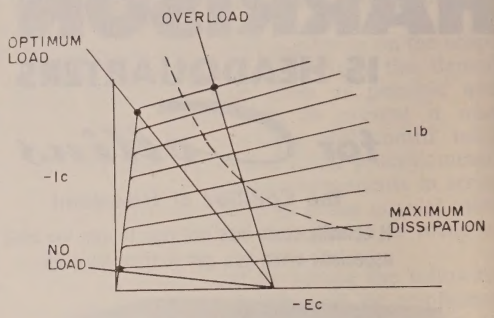


Fig. 4—Typical collector characteristics.

"Switching Transistor" that appeared in the March 1, 1957 issue, and which prompted the investigation leading to the preceding paper.)

Parts List

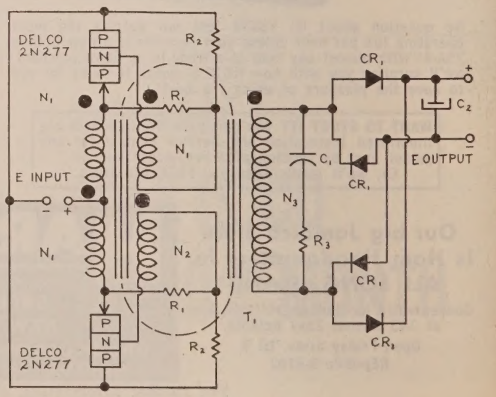
R1—10 Ω 2W
R2—240 Ω ½W
R3—470 Ω 2W
C1—.005 mfd 1600V
C2—12 mfd 450V Electrolytic
CR1—2 Raytheon 1N539 in series, or, 6X4 with both plates tied together, or, a 600 volt 300 ma. silicon rectifier. (Note: CR1 is used in 4 places in a bridge rectifier).

T1—Arnold Engineering Corp. Marengo, Ill. Cat. No. 5778-D1 or equivalent. Cross sectional Area = 1.2 cm^2 (Cost Approx. $8.00)
Turns wound on T1

Winding	*6 Volts Input*	*12 Volts Input*
N1	12 turns No. 16 Enamel	24 turns No. 16 Enamel
N2	15 turns No. 24 Enamel	15 turns No. 24 Enamel
N3	1,000 turns No. 32 Formvar, or Enamel.	1,000 turns No. 32 Formvar, or Enamel.

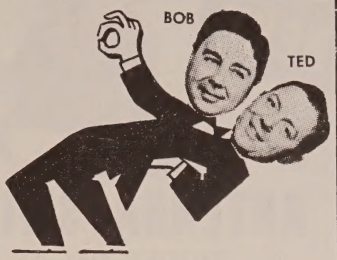
N1 should be wound with the largest gauge wire that will physically fit on the core. N3 should be wound on the core first and should cover about 320 degrees, in one direction, either clockwise or counterclockwise. A layer of insulation is then placed over N3 to insulate it from both N1 and N2 windings which are wound on last.

Fig. 5—Experimental circuit.

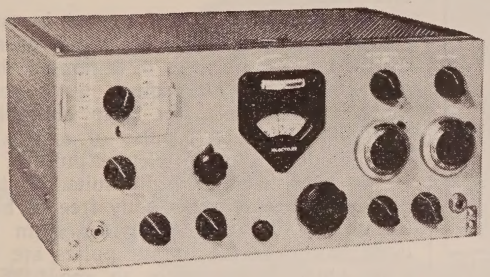


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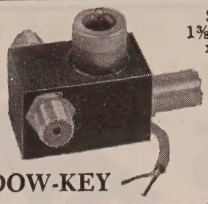
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DOUBLE MALE-CONNECTOR (DKF2) for mounting relay directly onto output of transmitter.....$1.45

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DOW KEY CO., INC.

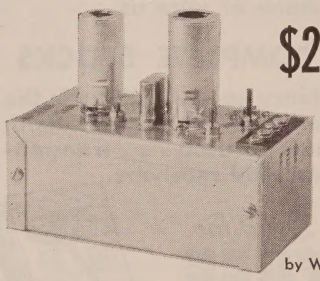
THIEF RIVER FALLS, MINNESOTA

For further information, check number 35 on page 126.

THE NEW

AMPCO

CONVERTER



$29.95

PLUS SHIPPING

by W2SHU

Can be used with any receiver!
Available for 80, 40, 20, 15, 10, **and 6 meters.**

When placed in series between antenna and receiver the AMPCO converter offers

- Image rejection 80db
- Noise level 4.5db
- Gain 30db

Includes 6CB6, 6X8 and removable xtal.
(State band desired and receiver and model.)

AMPCO PRODUCT SALES, LTD.

2 Lambert Circle **Westfield, N. J.**

For further information, check number 36 on page 126.

GENERATOR [*From page 41*]

space time elements is introduced at the transmitting loop, and the meter reading at the receive loop recorded. If there is no bias distortion then the time elements are equal at the receive loop also and the meter will vibrate half way between the recorded mark and space values. With the values of 60 ma. mark, and 0 ma. space, the meter should vibrate at 30 ma. If there is marking bias distortion in the equipment the meter will vibrate closer to the recorded mark value, and with spacing bias closer to the recorded space value. For example if the meter vibrates at 35 ma. with the mark and space values mentioned before then there is about 17% marking bias. While the square wave signal is being transmitted any balancing, tuning, or alignment adjustments in the equipment should be made to bring the bias reading to 0% (half way between mark and space values).

The teletype keyboard cannot be used for generating the square wave signal because of the stop pulse which is 42% longer than the other 6 pulses. The square wave generator must be completely free from bias distortion itself and generate a pulse of approximately the same length as the teletype pulse of 22 ms. A binary divider is ideally suited to this application since it is perfectly free of bias distortion. By driving the divider from the 60 cycle A.C. line the output pulses are 17 ms. long which is equivalent to about 75 speed teletype, and adequate for checking 60 speed circuits and equipment.

The circuit of *fig. 1* shows how such a reversal generator, as it is called in teletype, may be constructed. Tube VIa provides negative half cycles to drive the binary divider V2, from the power transformer. The 1000 mmfd capacitors at the grids of V2 differentiate the pulses to spikes to operate V2. V2 then flips back and forth at a thirty cycle rate, producing a square wave which is fed to VIb, the buffer amplifier. The buffer is connected as a cathode follower and drives the keyer tube V3 across the clamping circuit using the IN34. The keyer tube is connected into the transmitting loop circuit in place of the keyboard. The only precaution here is that the polarity of the loop power supply must be positive on the plate of the keyer. A simple power supply is included with the unit to make it self contained.

In operation the unit can be checked by placing a meter in series with the keyer tube. The meter should read half of the full marking current. The reversal generator can also be used in adjusting the keying of CW transmitters by connecting it in place of the key, and monitoring the output of the transmitter with an oscilloscope, while adjusting the keying circuit constants. Synchronization of the oscilloscope sweep is done with the 60 cycle power line. The oscilloscope can also be used with teletype equipment in place of a meter. ■

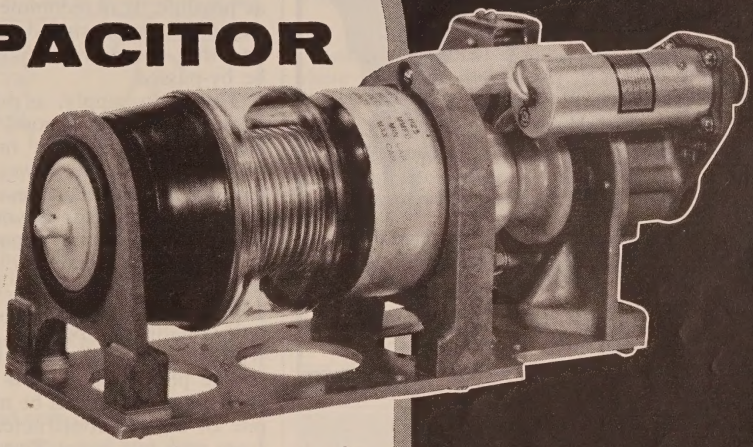
NEVER BEFORE OFFERED!

A Terrific "Buy" from **HARVEY RADIO!**

JENNINGS

VARIABLE VACUUM CAPACITOR

—Just what you've been looking for!



BRAND NEW! INDIVIDUALLY PACKED!

Ideal for remote or push-button control of your new 1 kilowatt DC input linear amplifier. The Jennings Model (UCSX) Variable Vacuum Capacitor with 24 volt motor drive is yours for a fraction of the original cost!

Look at these features—capacity range from 20 to 675 mmfd.; operation up to 10,000 volts, D.C. maximum current carrying capacity 45 amperes. The motor operates on 24-volt DC and is reversible. Mounted on it is an engage/disengage clutch and limit switches. A potentiometer is provided for remote indication of percentage of rotation with additional circuitry.

The entire unit is completely insulated to operate at its rated voltage on its own mountings, as shown in the illustration. For manual operation, simply remove the motor drive.

Only an exclusive buy makes this low, low price possible. Original catalog price of capacitor alone $200.20. Yours, at Harvey's, for only

$39.50 Net F.O.B. N.Y.City

Recommended Accessories:

Barker & Williamson #850 A
All band variable inductor **$35.00**

Barker & Williamson #3902
Counter Dial **$14.55**

Johnson #116 -208 -4 Dial **$9.80**
With lock **$11.10**

These are just a few of the recommended accessories for use with above.

hrc

OUR 31st YEAR

NOTE: Prices Net, F.O.B., N.Y.C. Subject to change without notice.

Established 1927

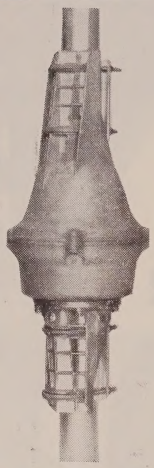
HARVEY RADIO CO., INC.

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For further information, check number 37 on page 126.

CDR ROTOR

- All New-Heavy Duty
- Stainless Steel Gears and Pinions
- Motor, Brake and Indicator operate at 24 volts or less
- Stainless Steel Mounting Hardware, prevents corrosion
- Complete with Control Unit
- Automatic Positive-Locking Brake will hold under any wind condition



$99.50

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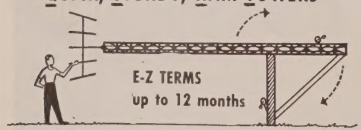
For further information, check number 38 on page 126.

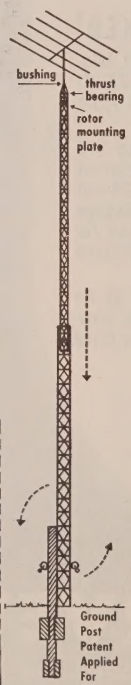
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World famous "Wonder Post" exclusively E-Z Way

- Crank up or down - 1 minute!
- Tilts over for easy access to beam!
- Brute steel in attractive design!
- 30 types from which to choose!
- No material lost in moving . . . no guys, no concrete!

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. . . from conception thru erection!
***"QUICK, STURDY, HAM TOWERS"**





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Type of Rotor .....
Name .....
Address .....
City ..... State .....

E-Z WAY TOWERS, INC.
P. O. BOX 5491 - TAMPA, FLA.

For further information, check number 39 on page 126.

HALF-GALLON [*From page 29*]

that efficiency falls off. Nothing beats a scope for making sure of good linearity in the amplifier. It has been found that when the 811A's are properly loaded the plate current will be approximately ten times the grid current.

This amplifier is so simple that only a few words are necessary on construction. The input and output circuits should, as in all amplifiers, be well separated from each other. The common practice of mounting the input circuit (in this case the filament circuit), below the chassis and the output circuit above the chassis serves very well. The usual precautions should be taken of making all rf leads (which in this case means almost all leads) as short and heavy as possible. It is recommended that those leads which are not designed to carry rf be shielded and that the power leads entering the chassis be by-passed.

The plate supply, as for all Class B amplifiers, should have good regulation. A good practice is to put as much capacity in the output side of the power supply filter as you can dig up. You can never get too much. The only limiting factor is your ability to pay and pay for high-voltage capacitors.

Up to approximately 1300 volts on the plates no bias will be required. If it is desired to run 1500 volts on the plates, an inexpensive 4.5-volt C battery in between the grids and ground will give practically shelf life.

The photos show how simple and compact such an amplifier can be made. The unit shown, one of several constructed, was made entirely from junk-box parts. This includes the 5" by 7" by 2" chassis, as the unused holes will testify. By using a larger chassis, a band-switching pi-net output circuit may be used in place of the plug-in arrangement shown. Also a third 811A might be added, providing the filament supply will handle it. The filament choke, rated at 15 amps, will easily handle three 811A's. Three tubes will lower the input impedance and thus give a closer match to the 50-ohm output of most commercial exciters. Also the total plate dissipation rating will be increased, permitting inputs of up to about 600 watts for SSB, DSB, and CW. ■

Parts List

C1, C2, C3, C4—.01 mfd, 400-volt disk ceramic.
C5, C6—.001 mfd, 5000-volt.
C7—300 mfd variable, 0.1 inch spacing.
R1, R2—7 turns No. 18 enamel wire wound on and connected in parallel with 47-ohm, 2-watt resistor.
RFC1—B&W FC-15 filament choke.
RFC2—2.5 mh 500 ma. or better.
L1—See Table I.

Table I

Mc.	C-7 (uufd.)	L-1 (uh.)
3.8	275	6.3
7	130	3.7
14	65	1.9
21	50	1.1
28	32	.9

Approximate values of C and L based on a plate voltage of 1250, plate current of 350 ma., and Q of 12.



"I am now using the Gotham V80 vertical antenna with only 55 watts, and I am getting fantastic reports from all over the world". VP1SD

ALL-BAND VERTICAL ANTENNAS



GOTHAM'S sensational new vertical antennas give unsurpassed multi-band performance. Each antenna can be assembled in less than two minutes, and requires no special tools or electronic equipment. In the V160, resonance in the 160, 80, 75, and 40 meter bands is secured through use of the proper portion of the loading coil. Yet, when the coil is eliminated or bypassed, the V160 will operate on 20, 15, 10 and 6 meters! The same idea applies to our V80 and V40 multi-band verticals. No guy wires needed; rugged, occupies little space, proven and tested.

Simple design and superior materials give all-band operation, and effective, omni-directional radiation. Gotham verticals are rugged, with low initial cost and no maintenance. Guaranteed Gotham quality at low Gotham prices. Perfect for the novice with five watts or the expert with a kilowatt.

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Switch from one band to another. Operate anywhere from 6 to 160 meters. Work the DX on whatever band is open.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.





PROVEN DESIGN

Over a thousand Gotham verticals are on the air—working the world and proving the superiority of Gotham design.

AND THE PRICE IS RIGHT!

"I worked LU3ZS on Half Moon Island in Antarctica on Dec. 26 at 21150 Kc. I was using my Gotham V80 vertical antenna and only 35 watts." KN5GLI

Airmail Order Today — We Ship Tomorrow

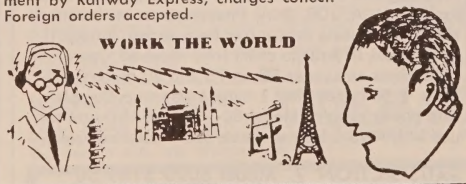
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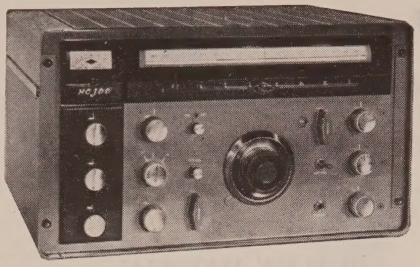
V40 vertical for 40, 20, 15, 10, 6 meters ..... **$14.95** ☐
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters ..... **$16.95** ☐
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters ..... **$18.95** ☐

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HOW TO ORDER. Send check or money order directly to *Gotham*. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.



GOTHAM 1805 PURDY AVENUE MIAMI BEACH 39, FLA.



THE NATIONAL NC-300

Features greatest sensitivity at any price! Greater stability than most receivers. 10 dial scales cover 160 to 1¼M with exclusive converter provision with scales calibrated for 6, 2 and 1¼M, using a special 30-35 mc. tunable IF selector—.5 Kc., 3.5 Kc. and 8 Kc. Provides super selectivity, gives optimum band width for CW, phone, phone net or VHF operation. Separate linear detector for SSB. High speed inertia tuning dial with 40 to 1 ratio. Exclusive optional RF gain provision for best CW results allows independent control of IF gain. Giant "S" meter. Dual conversion. Calibration reset adjustable from front panel. Crystal filter with phasing control and 3-position band width control. First IF freq. — 2215 Kc., second: — 80 Kc. 10 tubes plus regulators and rectifier. Antenna input impedance: 50-300 ohms. Output impedance: 8 ohms. Less speaker.

FULL PRICE **$399**

10% down — 24 months to pay. Your trade-in may cover down payment. Export business welcomed.

KEN-ELS RADIO SUPPLY

428 CENTRAL AVE.
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Cedar Rapids, Iowa
Phone: EM 4-1172

For further information, check number 41 on page 126.



COLLINS RECEIVER OWNERS

New V-F-O-MATIC Keeps Transmitter Automatically Zeroed to Receiver Frequency!

NEW V-F-O-MATIC... plugs into 75A-2, -3, -4 Collins receivers; requires no rewiring or changes; does not affect calibration, sensitivity or adjustments. Collins precision VFO furnishes RF source for both receiving and transmitting. For all SSB phasing type exciters (10A, 10B, 20A, Phasemaster, Hallicrafter HT-32, etc.) using 9mc mixer frequencies. Automatically zeroes in Xmtr to exact freq. received. Operates both upper and lower SB on 75 and 20 meters. Stability: ± 50 cycles after 1 minute warm-up. Complete with power supply. (Model 80-10 ALL-BAND unit for use with KWS-1 also available.) Immediate delivery.

SATISFACTION GUARANTEED / *Model 8020 $149.50* / *Model 8010 $219.50*

P & H ELECTRONICS, INC.
424 Columbia, Lafayette, Ind.

For further information, check number 42 on page 126.

PUBLICITY [*From page 35*]

be a bit interested in a local man getting 'phone WAZ, unless you tell him what these things mean.

The quart of blood price goes also for adjectives. If you describe the work of a ham in an emergency situation as heroic, that is editorializing, a capital sin, and definitely *verboten*. Tell the reader what the ham did and all pertinent circumstances, and let him decide whether or not it is a case of heroism.

3. Form: Here also you can increase your chances of being printed. All material must be typewritten. Even Mr. Palmer of Palmer Method fame could not expect handwritten copy to be accepted. Triple spacing or at least double spacing should be used. Leave generous margins (left 2 inches, right 1 inch).

The story begins about halfway down the first page to leave space for a headline to be written. Never allow a sentence to run over to the next page. Even a paragraph should not do so. Remember to number the pages. Use 8½" x 11" paper, by the way.

4. Photographs: Because it costs a bit to make an engraving for a picture, and because amateur photos usually lack quality, very few pictures are used in the free story. However, a good photo has a chance. Photos should be at least 5" x 7", but 8" x 10" is the preferred size.

All persons in the picture should be identified. All other pertinent information is included with the identification and pasted to the back of the photo.

5. Etc. Newspapers print such free material when and where they have space to fill. Generally speaking the hardest paper to try to make is the Saturday edition, since it is so small. The Monday paper is probably the easiest, because not enough happens on Sunday to fill it. Find out from the city editor when the deadlines are. Always have your material in well ahead of a deadline. It is advisable to bring your story in yourself in order to answer any questions the editor might have.

If your paper does outside printing work, you can create good will by having them print your dance tickets, hamfest programs, club stationery, etc.

Who am I to Tell You?

I offer the above advice from experience and from training received at a graduate school of Journalism. It summarizes what I have learned as it might be applied to a ham club looking to gain some free (no $$) publicity.

Public relations in the field of ham radio are just as vital as anywhere else. Good, accurate newspaper coverage of our activities is vital to the public understanding of our hobby. ■

ARC-5/28 RECEIVER



2-meter Superhet, 100 to 156 Mc in 4 crystal channels. Complete with 10 tubes. BRAND NEW..... **$22.45**

110 V AC Power Supply Kit for above.....$9.75

ARC-5/T-23 TRANSMITTER

100-156 Mc Includes 2-832A, 2-1625 Tubes, all crystals. BRAND NEW..... **$19.95**

SPECIAL OFFER!

Modulator for above. New, with tubes.....$4.95
Limited quantity ARC-5/T23 xmitters. BRAND NEW, less tubes.....$7.95
Excellent Used, less tubes.....$5.95

ARC-5 MARINE RECEIVER-TRANSMITTER

Navy Type Comm. Receiver 1.5 to 3 Mc BRAND NEW with 6 tubes..... **$16.95**

Navy Type Comm. Transmitter 2.1-3 Mc BRAND NEW with 4 tubes and Xtal..... **$12.45**



LORAN APN/4 OSCILLOSCOPE

Easily converted for use on radio-TV service bench.

Completely Assembled

BRAND NEW!

Supplied with 5" Scope, type 5CP1 only. **$19.95**

Excellent. Used $10.95

BRAND NEW SPECIAL PURPOSE TUBES

In Original Individual Packing

Type	Each	Type	Each	Type	Each
RK65	$7.25	815	$2.99	2X2	$.39
2C42	4.95	826	.44	6A7	.35
2C46	3.50	829B	7.50	6AG5	.33
2J724B	.35	832A	5.95	6J6	.33
VR105	.79	837	1.15	12SA7	.34
VR150	.79	1625	.29	12SQ7	.33
717A	.29	1626	.21	35Z5	.33
CRP-730A	4.50	1629	.27	50L6	.33
813	6.95				

NEW! Cathode Ray Tubes NEW!

3CP1	$1.18	5CP1	$2.45
3FP7	1.18	5FP7	1.44
5BP4	2.22	9LP7	1.86



BC-906 FREQ. METER—SPECIAL!

Cavity type, 145 to 235 Mc. BRAND NEW, complete with antenna. Manual incl.

OUR LOW PRICE **$9.99**

SCR-274 COMMAND EQUIPMENT

ALL COMPLETE WITH TUBES Type	Description	Excellent Used	Brand NEW
BC-453	Receiver 190-550 KC	$14.95	$18.95
BC-454	Receiver 3-6 Mc	9.95	12.95
BC-455	Receiver 6-9 MC	9.95	13.50

BC-457 TRANSMITTER—4-5.3 Mc. complete with all tubes and crystal. BRAND NEW..... **$7.88**

BC-458 TRANSMITTER—5.3 to 7 Mc. complete with all tubes and crystal. BRAND NEW..... **$7.88**

BC-459 TRANSMITTER—7-9.1 Mc. complete with all tubes and crystal BRAND NEW **$11.95**

ARC-5/T-19 TRANSMITTER—3 to 4 Mc. BRAND NEW complete with all tubes & crystal **$8.88**

110 VOLT AC POWER SUPPLY KIT

For All 274-N and ARC-5 Receivers

Can be assembled quickly and easily, on pre-drilled chassis. Plugs into the rear of any model 274-N receiver and delivers 24 volts as well as "B" voltage. Complete kit of parts with metal case, instructions **$7.95**

Factory wired, tested, ready to operate.....$11.50

SPLINED TUNING KNOB for 274-N and ARC-5 RECEIVERS. Fits BC-453, BC-454 and others. Only **59c**

DYNAMIC HANDMIKE with "Press-to-talk" Switch, cord and plug—BRAND NEW, only $2.95

DYNAMIC HEADPHONES, 600-ohm impedance, with large earphone cushions, cord, phone plug. BRAND NEW, special $3.95

WESTON 40-0-40 Microamp Panel Meter, 3" round, type 301, zero center. BRAND NEW including rectifier and resistance network for AC, extremely sensitive $4.45

WESTINGHOUSE 2½" round Panel Meter —10 to +4 DB. BRAND NEW $2.95

NAVY "HANDY-TALKY" TRANSCEIVER



Two way communication by voice or MCW up to 30 miles. Xtal controlled transmitter 140.58 Mc. Superregen. Receiver. Telescopic Antenna. Press-to-Talk Switch. Overall 15⅛" x 2⅝" diam. Our low price, less batteries, each..... **$22.50**

BC-357 RADIO BEACON RECEIVER—62 to 80 Mc, radio controlled, has 10,000 ohm plate relay, works on 24 V. AC. @ 5 A. and 220 V DC. @ 20 Ma. Fine for remote control, garage door opener, etc. BRAND NEW, WITH TUBES.....$4.45

SCR-522 2-METER RIG!

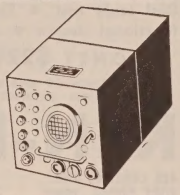
Terrific buy! VHF Transmitter-receiver, 100-156 Mc. 4 channels. Xtal-controlled. Amplitude modulated voice. They're going fast! Excellent condition.

SCR-522 Transmitter-Receiver, complete with all 18 tubes, top rack and metal case.

COMBINATION .....Special **$33.33**

Receiver only, with all tubes.....$19.50
Transmitter only, with all tubes.....$22.25
Shock mount for above.....$ 2.45
Accessories for above available.

BC-929 3" SCOPE INDICATOR COMPLETE



Originally used for IFF and Radar Navigation. Can be easily converted for general bench service work. Tubes included: 2-6SN7, 2-6H6, 1-6X5, 1-6G6, 1-2X2 and 3BP1 Cathode Ray Tube. A TERRIFIC BUY at our low price! Excellent used **$12.95**

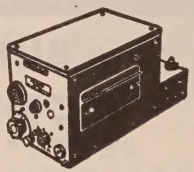
As Above, BRAND NEW $14.95

Conversion instructions for AC operation 65

INTERPHONE AMPLIFIER

Type BC-347C. Fully wired, ready to operate! Uses 6F8G tube. Housed in metal container 5¾"x3¾"x2⅜" high. A SPECIAL VALUE at our low price..... **$3.45**

234-258 MC RECEIVER AN/ARR-2



BRAND NEW 11-tube UHF Tunable Receiver with schematic. Only a few at this low price! Complete with tubes.... **$9.99**

With 28V 1.6A Dynamotor, complete $12.98

110 VOLT AC POWER SUPPLY KIT for above $9.75

BC-659 TRANSMITTER & RECEIVER

27 to 38.9 Mc F.M. Two preselected channels crystal controlled. 5 to 10 watts. Complete with speaker, tubes. Excellent Used **$11.95**

POWER SUPPLY for above, 117 V 60 cy AC.....$16.95

VIBRATOR POWER SUPPLY for above, works on 6-12-24 V DC .....$ 9.95

GOLD PLATED SPECIAL! TS-1/ARR-1 TEST OSCILLATOR

Portable, complete with two 955 tubes cavity and antenna. BRAND NEW, in metal housing 9¾"x6¾" x7" high. OUR LOW PRICE, each **$3.95**

FL-5 FILTER 79c

BC-442 ANTENNA RELAY



Wonderful Value! Consists of ¾ amp 2" RF Ammeter (antenna current indicator). 0-10 scale. Transmitter-Receiver Switching relay, in aluminum case with associated components. BRAND NEW..... **$2.49**

SCHEMATIC DIAGRAMS For any equipment on this page, each **65c**

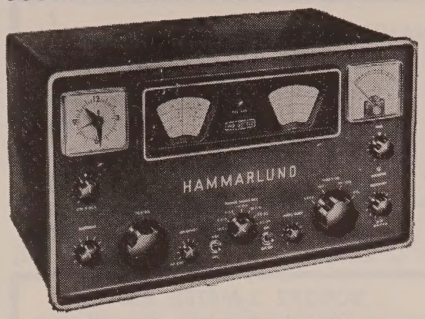
Please include 25% Deposit with order—Balance C.O.D. 50c HANDLING CHARGE on Orders under $5.00 MINIMUM. All Shipments F.O.B. Our Warehouse N.Y.C.

G & G Radio Supply Co.

Telephone: CO 7-4605

53 Vesey St., New York 7, N. Y.

For further information, check number 43 on page 126.



NEW HAMMARLUND HQ-110 RECEIVER

Dual Conversion • 6, 10, 15, 20, 40, 80 and 160 meter bands • Separate SSB linear detector • Q-multiplier • Dual dials • Crystal calibrator • Crystal control • Separate stabilized BFO • Dial scale rest • Excellent sensitivity • Modern functional design • All this, and much more for

ONLY $229* *Clock-timer $10 extra.

10% down—24 months to pay. Your trade-in may cover down payment. Export business welcomed.

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67 16th AVE., S.W.
CEDAR RAPIDS, IOWA
Phone EM 4-1172

For further information, check number 44 on page 126.

IN THE **BUFFALO** AREA

GENESEE

IS THE PLACE TO BUY

Collins **EQUIPMENT**

KWS-1
1 kilowatt Transmitter
w/Power Supply ------$2,095.00
75A-4 SSB Receiver ----------$695.00
KWM-1 SSB
Mobile/Fixed Station
Transceiver - - - $820.00
and a complete stock
of all Collins accessories.
Liberal trade-in allowance.
Convenient Time Payment Plan.

GENESEE RADIO & PARTS CO., INC.
2550 Delaware Avenue • Genesee Street
DE 9661 • Buffalo, N. Y. • CL 1970

For further information, check number 45 on page 126.

PROPAGATION [*From page 74*]

ospheric behavior, especially during radio blackouts and magnetic storms. The results of these experiments confirmed theories that radio blackouts occur as a result of abnormally high absorption in the dense, lowest layer of the ionosphere, the D-region. Rocket investigation disclosed that this region begins about 40 miles above the surface of the earth. Of perhaps even greater significance, rocket data shows that the ionosphere above the D-layer may remain more or less undisturbed during a blackout, contrary to previous theory which supposed that the reflecting layers became diffused, or disappeared entirely during a radio blackout.

The absorption present in the D- region during a radio disturbance had previously been thought to occur as a result of ultra-violet and other type radiation from the sun. In another recent IGY rocket experiment, however, it was ascertained for the first time that solar X-rays, emitted from the sun during solar flare outbursts, were responsible for increasing absorption in this region during blackouts.

New information about the farthest reaches of the atmosphere is also being obtained from the study of *whistlers,* whistle-like sounds which can be received at very low radio frequencies. These signals, believed to originate in lightening flashes at the surface of the earth, are thought to be propagated high in the atmosphere for thousands of miles along the earth's lines of magnetic force, returning to earth at the opposite end of the world from where they originated. IGY experiments with whistlers indicate that ionization of the earth's upper atmosphere may extend far beyond presently supposed heights, and that there may actually be a very thin atmosphere filling all the space between the earth and the sun.

While the report of the US-IGY Committee dealt primarily with progress U.S. scientists have made during the first five months of the IGY, it closed with the statement that data from nearly all of the 67 participating nations was beginning to flow into the three World Data Centers, in the US, the USSR, and in Western Europe and the Pacific. The data is expected to reach a peak early in 1958.

Scientific frontiers have been pushed forward significantly during the first five months of the International Geophysical Year. There is the promise of even more startling discoveries during the remainder of the IGY (which ends December 31, 1958) as thousands of scientists throughout the world unite in unprecedented studies of the earth, and the world about us.

Eighth Year

This begins my eighth year as Propagation Editor of CQ. With deep gratitude I want to thank all of you who, during the past seven years have helped in making this the most popular column in *CQ Magazine.*

73, George, W3ASK

PHONE PATCH TRANS.

No. C-161

$1.95

RANGE BEAM FILTER



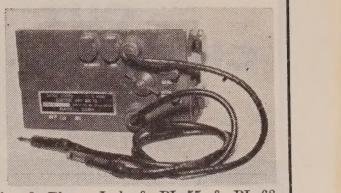
1020 cycle acceptance or rejection. W/PL-55 Plug & Cord for plugging into Rec. Two output jacks, New: $1.95
FL-8 Filter, Used $1.50
FL-5 Filter $1.00

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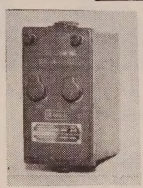
No. C-114

$1.95

TELEPHONE & CONTROL EQUIPMENT

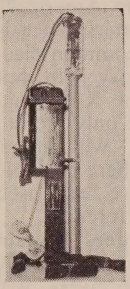


CONTROL UNIT RM-53—Used to operate radio equipment and provide remote control and intercom. of such equipment by use of the RM-52 Unit listed below. Up to ½ mile. Uses 2 flashlight batt. Internal transformer has High-Low impedance Sw. and Sidetone. Also Mic. & Phone Jack & PL-55 & PL-68 Plugs. Used: $2.95—New: $4.95



REMOTE CONTROL RM-52 — Can be used with RM-53 or used as a separate telephone system. Uses 4 flashlight batt. Also can be used as a direct remote control for radio equipment. Provides bias for Mic. & Sidetone to headset. High or Low imp., Mic. & Phone Jacks. Can be used also as a Phone Patch Unit. Used: $1.95
New: $2.95

TS-13 HANDSET for RM-53 or RM-52
..... Used: $3.95



RADAR TRANS.

Transmitter Frequency 143 to 194 MC. using one 3A5 Tube. In plastic case 4½" x 1½" mounted top of 58" Telescoping Antenna with 14" Dipole. Battery Case for holding 2/BA-30 1½ V. & BA-38 103½ Volt "B." Has on & off Sw. Tel. Ant. mounts side of batt. case.

Price: **$2.95**

AMPLIFIER



Using 2/6V6 Tubes, Carbon Mic. input and tapped output Transformer. Audio Oscillator for signalling. With tubes, less Dynamotor. BC-367—12 Volt, less Case, New: $1.95; BC-667—24 Volt, with Case, New: $2.95.

MISCELLANEOUS:

BC-191 TRANS. 100 Watt, Used: $24.95, New: $29.95.
PANORAMIC ADAPTER — Navy RDP, 60 cycle 30 MC. Used: $34.95.

GASOLINE ENGINE GENERATOR

1000 Volts DC 350 MA & 14 VDC 25 Amp. Gasoline Engine Generator. Engine is 2.5 HP 4 cycle—Generator output 1000 VDC 350 MA & 14.6 VDC 25 Amp. Control Box has starting switch, ammeter, circuit breakers, reversing switch, etc. Can be used for transmitter standby and low voltage can be used for charging battery. Gov't. reconditioned, like new, and with spare parts and tools. Shipping Wt. 300 lbs., F.O.B., Ky. No. PE-49 **$79.50**

25—40 WATT TRANSMITTER FOUNDATION UNIT



Plug-in Oscillator Unit as used in BC-610 Transmitter. Ideally suited for Trans. Foundation. Contains variable Cond., 1/140 MMFD. 2/100 MMFD, Fixed Cond., Coils, Crystal Holder, Switch, Knob, etc. TU-48 2.5—3.2 MC; TU-49 3.2—4 MC. Circuit Diagram included on each unit. Each: **$2.95**
TWO for $5.00 ..... Each

FM RECEIVERS & TRANSMITTERS

20 TO 38.9 MC And 150 TO 172 MC

TRANS.-REC.—150 to 172 MC FM—Fixed Freq. Crystal Control; less Crystal. Both units on a common chassis. Trans. 30 Watt—Separate 6 VDC Power Supply. Complete w/Cables, Control Unit, Mic. & Antenna. Used, Checked. Raytheon #21TR11A $59.50

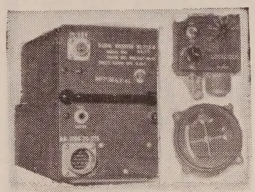
152—162 MC FM RECEIVER & TRANSMITTER:

Link Receiver—1905A—less Tubes & Power Supply—Used: $18.95
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Link Transmitter—1906A—less Tubes & Power Supply—U: $14.95
Link Transmitter—1906—less Tubes, with Power Sup.—U: $19.95
BC-603 FM RECEIVER—20-27.9 MC. Used: $14.95 Excel. $19.95
BC-683 FM RECEIVER—27-38.9 MC ..... Used: $24.95
BC-604 TRANS.-FM—20 to 27.9 MC—Used: $14.95—New: $19.95
BC-924 TRANS.-FM—27 to 39.1 MC—Used: $14.95—New: $19.95
BC-620 TRANS.-RECEIVER FM—20 to 27.9 MC ... Used: $19.95
BC-659 TRANS.-RECEIVER FM—27.9 to 30.1 MC Used: $19.95
6 or 12 VDC Power Supply for BC-620 or BC-659—U. $ 9.95
N. $12.95

SCR-522

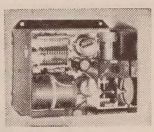
REC.-TRANS. AM—100—156 MC, complete with tubes—Used $29.95
Receiver Only—less shifters, With Tubes: **$14.95** Less Tubes: **$7.95**. Trans. Only—less shifters, With Tubes: **$18.95** Less Tubes: **$7.95**.

SATELLITE RECEIVER

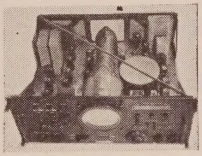


Receive Radio Signals being transmitted by the U.S. Satellite—on approx. 108 MC. This Receiver is AM and Crystal Control on Six pre-set frequencies in the 108.3 to 110.3 MC range. Provides audio and band pass filter output of 90 & 150 cycles for aircraft instrument landing for which it was originally used. Complete with Ten Tubes: 1/12AH7, 2/12SG7, 2/12SR7, 1/12SQ7, 3/717, 1/12A6, Crystals and Schematic. Voltage required: 12 or 24 VDC & 220 VDC 80 MA. Size: 13⅜" x 5" x 7". Also can be converted to FM Receiver 80 to 108MC.
Used, less tubes & crystals: **$4.95**—New, Complete with Tubes and Crystals $12.95
Control Box—New: **$2.00**—Cross Point Indicators, Used: **$2.00**
Plugs for Receiver, Indicator, or Control Box..... **$1.00** Each.

TRANSMITTER



Crystal Control — 3.5 to 4 MC, 50 Watts, MO—PA for CW. With Automatic Keyer Motor and Code Wheels. 2/1625 & 1/25LG Tubes. Complete with instruction book & Conversion. No. T-121 ..... New: **$5.95**



RADAR OSCILLOSCOPE

Control Indicator with 25 Tubes, consisting of: 12/6SN7, 5/6SL7, 7/6V6, & 1/5CP1. All Controls on front panel, such as horizontal, vertical, sweep, intensity, centering, input and output circuits, etc. Voltage required: 2400 VDC 300 VDC & 6.3 V. Size: 24" L. x 20" D. x 10½" H. Complete with tubes and circuit diagram..... NEW: **$14.95**

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1500 VCT/260 MA—6.3/3A; 6.3/5A; 5V/4.5A .. 7.95
700 VCT/150 MA—6.3/4.5A; 5V/3A 3.95
1890 VCT/12.6 MA Tapped 2.5V/2A 3.95
1100 VCT/80 MA—7.5 VCT/3.25A 3.95
560 VCT/70 MA—6.3V/2.1A; 5V/3A 2.95
16 Volt 35 Amp.... $14.95 9 Volt CT 35 Amp..... 5.95
5V/2 Amp. 3 windings; 5V/6A 2.95

TRANSFORMERS FOR SURPLUS EQUIPMENT:

1200 VCT/200 MA—12.5/2A; 12.5/2A; 5V/3A
H-108: $8.95
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500 VCT/80 MA—24V/2A; 5V/3A..... H-110: 4.95
12.6/2 Amp..... $1.95 24V/1 Amp..... 1.95
Dual Winding—12V/4 Amp. or 24V/2 Amp..... 5.95
CHOKE 12.5 HY/100 MA 1.95
CHOKE 10 HY/250 MA 4.95
CHOKE 8 HY/150 MA 200 ohm Open Frame..... 1.25
CHOKE 5 HY/150 MA 85 ohm..... 1.50

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53 to 88 MC — For remotely controlled radio systems on pre-selected fixed Freq. Complete with 6 Tubes: 1/6SN7, 3/6SL7, 1/6SG7, 1/6J5, and 24 Volt Dynamotor ..... New: **$6.95**

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Crystal controlled, 376 to 418 MC; 115 V 60 cycle input. Tubes: 6X5, 6K7, 6J5, 6V6, 6A8, & 3970. KC Crystal w/Schematic.
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12 VDC DYNAMOTORS:

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540 VDC—450 MA—DA-12	14.95	11.95
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225 VDC—100 MA—D-402	8.95	5.95
220 VDC— 80 MA—DM-34	5.95	2.95
230 VDC— 90 MA—PE-133	4.95	....
150 VDC—100 MA—DM-310X	....	2.95
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230 VDC— 90 MA—DM-21	....	5.95
275 VDC—150 MA—DM-64	8.95	....

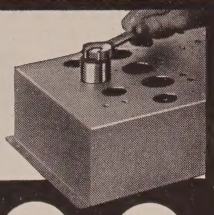
Write us your needs in other type Dynamotors, Inverters, etc.

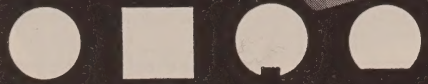
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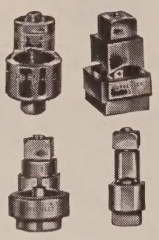
CUT CHASSIS HOLES FAST!





Smooth, accurate openings made in 1½ minutes or less with Greenlee Radio Chassis Punch

Quickly make smooth, accurate holes in metal, bakelite, or hard rubber with a GREENLEE Chassis Punch. Easy to operate . . . simply turn with an ordinary wrench. Round, square, key, and "D" types . . . *wide range of sizes* to make openings for sockets, plugs, controls, meters, terminal strips, transformers, panel lights, etc. Assure perfect fit of parts and professional finish to every job. Write for descriptive literature. Greenlee Tool Co., 2363 Columbia Ave., Rockford, Ill.



GREENLEE

For further information, check number 47 on page 126.

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1951—All issues, except May, Nov.
1952—All issues, except Jan., Aug.
1953—All issues, except May, July, Dec.
1954—All issues, except Feb.
1955—All issues, except Nov.
1956—All issues, except July.
1957—All issues, except Feb.*

50c per copy

*Gigantic Nov. issue $1.

CQ Magazine

300 West 43rd St., New York 36, N. Y.

HAM CLINIC [*From page 67*]

one help him?

Question of the Month

W. F. from Germany writes the following: "I live next door to a dentist and when he uses his X-ray machine it busts up my QSOs. What can I do? How is it done in America?"

Not too much Walter. If the interference is conducted, i.e., is carried over a common electrical system, brute force filters may help, but these must be installed right at the X-ray machine. If it is radiated interference only a complete shielding of the room (office) will suffice. However, there have been cases where portable metal shields (well grounded) have been used successfully to reduce radio interference.

In America, most X-ray machines contain suppression components and are carefully shielded. However, few radio receivers will operate well when they are close to the equipment and it itself is operating.

Perhaps your antenna is too close and could be moved. Have you thought of that?

Suggestions from CQ readers will be appreciated.

Book Review

During the last 15 years I have studied 5 languages and get a great kick out of talking to a foreign ham who speaks one of them. But little did I realize how much I did not know until I received a copy of the HAM'S INTERPRETER, available through the CQ bookstore.

For $1.50 this book which makes 7 languages (French, Spanish, Swedish, Italian, German, Finnish and English) easy to understand, not only covers operating procedures but many technical terms as well.

A "natural" for the DX man, it is easy to use and should be on the operating table of every ham.

Most foreign hams can speak more than one language; most American hams cannot. By using this book, we can show the rest of the world that we are interested in other peoples and their languages and really contribute to better International understanding.

Nous lisons lentement notre livre! C'est pour vous aussi!

Thirty

We enjoy receiving your many fine letters and are sorry that we do not have enough space to acknowledge publicly each and every one. However, we want you to know that we appreciate your encouragement and often, your kind assistance.

Next month we hope to devote the greater part of the column to questions which we feel are of interest to the majority.

Most of our spare time is taken answering questions but we have a deep satisfaction in knowing we are helping others with their problems.

So until next month.

73, Chuck, W6QLV

RTTY [*From page 81*]

We were also asked to pass along the word to beware of "package" deals that include tape equipment, especially a Model 26 with "Model 14 transmitter distributor." Real, live, Model 14 TD's are scarcer than hens' teeth these days, and when one changes hands, the amount is generally *twice* that for the "package" deal. *Caveat Emptor!*

15 and 20 Meters

RTTY activity on 15 and 20 has increased tremendously lately, and with plenty of "big guns," too. The DX-minded boys are having a field day with such tid-bits as KA8RA, Misawa, Japan, and KR6AK on Okinawa (21,090 kc) as well as KL7OOT, Point Bullen, on the Arctic coast of Alaska.

K2AAA, in Bayside, Long Island, is on both 15 and 20 with Kleinschmidt machines (including tape), and has been scheduling KL7OOT and Captain Kurt Karlsen, who has a machine aboard the *Flying Enterprise II*, but no fsk as yet, so the contacts are RTTY and SB combined. Most operation is on 21,095 kc around 2000 EST and on 14,320 kc around 2100 and 2300 EST. Traffic is always handled upon request.

W6CG in Temple City, California, needs only Europe for WAC-RTTY. (Isn't *anyone* on RTTY in Europe?) WØBP and W3PYW have also been on 21,095 kc. BeeP suggests that KR6AK hold up his QSL to W6CG until K6OWQ (XYL of W6CG) works him!

W6KUY/MM (maritime mobile) aboard the S.S. Pacific Transport was worked by WØBP while at the dock at Stockton and right up until sailing time from San Francisco. This was on a Wednesday. On Thursday Bud reported that he was 300 miles out in very heavy seas and high winds. Friday he was out 600 miles in heavy swells with a pitch and roll that bothered his carriage returns (new kind of QRM), but his antennas stayed up. Schedule time is 1930 CST on 21,090 kc and visitors are welcome.

A new RTTY DX station is KR6JL, also worked by DØBP. (I don't think BeeP ever goes to bed!) Jay is W5ORH from Oklahoma City. Until he got in a three way with BeeP and KR6AK, Jay had never met Cas!

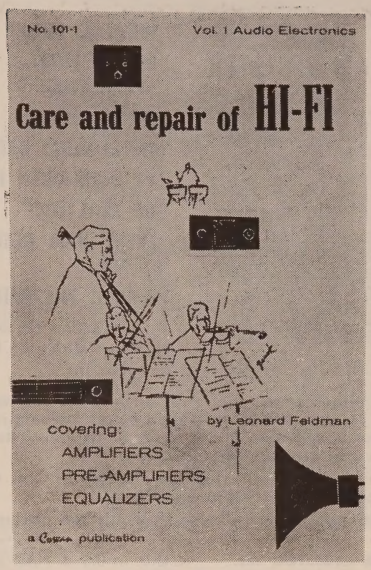
Some of the eight operators at KA8RA are W9QMU, W6UMB, W1IHZ, and WØKGH. The most consistent land-line printing comes from this powerful station in Asia.

40-Meters

The "Forty RTTY Net" meets at 2 pm CST every Sunday on 7140 kc. The NCS is WØBP. (*Again?* Ed.) Participation is very good, with 14 stations in 9 states checking in January 5th, for example. One object of this net is to handle message traffic. Page 48 in the November 1957 issue of *QST* gives all you need to know of the rudiments of the standard message form.

KL7OOT has also been active on 40-meters, working W6MTJ among others. He is looking for contacts with St. Louis.

[*Continued on next page*]



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EASY TO LEARN CODE



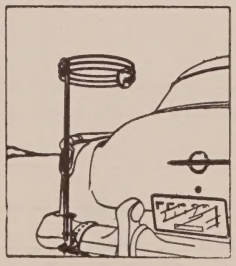
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AVAILABLE NOW.
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Fitchburg, Mass.

Keyboard Procedure

Almost all Model 26 machines used by RTTYers have a function that we more or less take for granted exists on all machines. This is the automatic *unshift-on-space* function. In other words, if we have been sending a string of numbers and we hit the space bar, the machine goes back to "letters" without the necessity of hitting the LTRS key. This is fine—if both stations in a QSO are using Model 26's. If one should have a Model 12 or a Kleinschmidt: confusion. If you have a Model 15 you have a choice. A lever in the deep confines of this printer will permit you to have that function or not to have it. (See page 24 of the *RTTY Handbook*.)

Now, if everyone uses the proper keyboard procedure, it won't make any difference what kind of machine you use. Just get in the operating habit with these rules:

1—Depress the "figures" (FIGS) key to shift the carriage from lower to upper case *and when spacing between groups of upper case characters.*

2—Depress the "letters" (LTRS) key to shift the carriage from upper to lower case.

3—Depress the "carriage return" (CAR RET) key to reset to the left margin of the paper. Always use *two* CAR RET functions to insure ample carriage return travel time as this may vary in machines.

4—Depress the "line feed" (LINE FEED) key to advance the paper one line.

So, in a normal QSO, when you reach the end of a line, hit the CAR RET key twice, the LINE FEED once, and the LTRS once. If QRN is high and the signals are weak, hitting the LTRS key twice is a good idea.

Comments

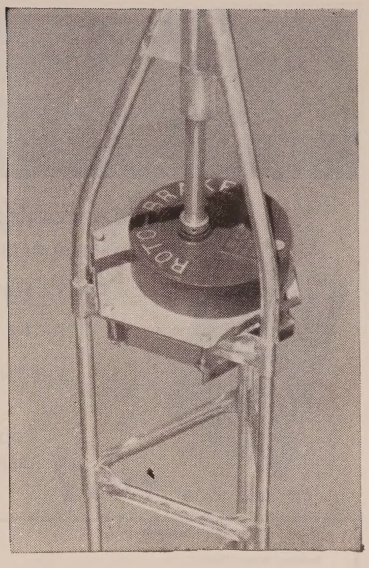
Don't forget the "Narrow-Shift Party" the week-end of March 14, 15, and 16. The suggested value of narrow-shift is 170-cycles. If you would like further details, contact or write Boyd Phelps, WØBP, 4232 Scott Terrace, Minneapolis 16, Minnesota.

73, Byron, W2JTP

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please tell them
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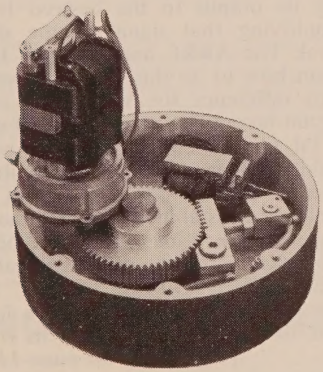
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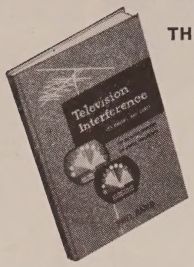


The rotating assembly is made up of twin 3600 rpm motors, giving 500 inch pounds of rotating power. Double twin motor units are available for $40 extra for use in places with extremely high winds and extra large antenna assemblies. The price on the whole works . . . rotator, brake, indicator, and control unit is only $139.95. Quite a package, eh? Circle 58 on page 126 for full info on this.

For further information, check number 58 on page 126.

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VHF SSB [*from page 31*]

with a signal at 36 mc to produce a signal at 50 mc, or with a 130 mc to produce 144 mc. You then amplify it to the desired power level. It's really just that simple!

Some fellows have used the old surplus 522 transmitters together with their "low frequency" exciters to get on 2 meters. How? Tune the rig up, right up to the grid of the final, to operate on 130 mc. Tune the PA tank circuit to 144 mc. Insert a tuned circuit for 14 mc in the screen grid circuit and couple it to a 14 mc SSB signal source. The result? SSB output on 130 mc plus 14 mc or 144 mc. The final tube is doing duty as a "mixer" to heterodyne the signal.

To further illustrate how simple it is to do this heterodyning to VHF, I'll touch lightly the parts of my 2 meter SSB transmitter after I've generated the signal and gotten it up to 14 mc. I like to use low power levels in all of my exciters to hold down TVI potentials, etc. This pays off. To get the 14 mc signal to 144 mc, I hetrodyne it with a crystal controlled signal at 130 mc. The 130 mc is furnished by 2 each 12AT7 tubes to produce the 16th harmonic of an 8100 kc crystal. These are conventional oscillator/multiplier circuits. The mixer tube is a 6J6 with only 200 volts on it. I feed 10 volts of 130 mc energy into the cathode of the 6J6 and 1 volt of the 14 mc SSB signal into one of the 6J6 grids. The other grid is grounded. The plates work in a conventional push-pull circuit tuned to 144 mc. The result is SSB on 144 mc. Sure the signal is weak, but you need only signal voltage, not power, to drive a linear amplifier. The output of the 6J6 mixer is link coupled to a 6CL6 Class A amplifier with 275 volts on the plate. That drives a 6360 amplifier which loafs along with 275 volts on it and a no-signal plate current of 35 ma rising to 60 ma on voice peaks. OK, so now I have a couple of watts on 144 mc. What next? The 6360 drives a pair of 4-125A's working in class AB2. It is capable of driving them to a full kilowatt! My power supply holds me down to the 500 watt region.

Any type of SSB signal generator can be used for VHF operation simply by hetrodyning its output to the desired frequency and amplifying that signal to the desired power level. The ARRL and CQ SSB Handbook explain how to do this for the lower bands. The only difference for VHF is to use tubes and circuit layouts that perform well on VHF.

I'd like to cover one final point—that of stability. Since you do not multiply the frequency of the SSB signal, you don't create multiplied instability as is the case in many of today's VHF transmitters. The only frequency multiplied is the hetrodyne signal. How about using VFO's? SSB is a "natural" for this since you can feed the VFO in at a low frequency and do not have to multiply its frequency. My

[*Continued on page 118*]



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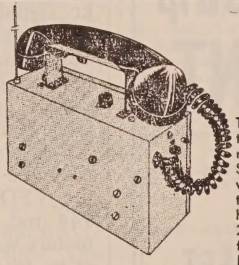
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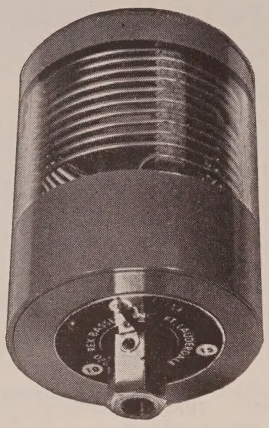
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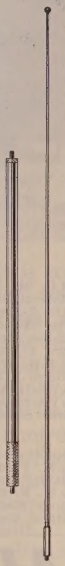
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VHF SSB [*from page 116*]

2 meter rig generates the SSB at 447 kc using half lattice crystal filters. I hetrodyne the 447 kc signal to 6.1 mc by beating it against a 9002 crystal controlled oscillator. The 6.1 mc SSB signal is then heterodyned to 14.7 mc by beating it against the signal from a 12AT7 crystal controlled oscillator on 8.6 mc. I replaced the 8.6 mc crystal oscillator with a VFO. The result is the same except that I can vary the output around 14.7 mc by swinging the VFO. Since that signal is hetrodyned to 144 mc, I now have VFO operation on 2 meters with the same stability as my VFO has at its frequency of 8.6 mc. Thus I have better stability on 144 mc SSB with my VFO than many fellows have with crystal controlled AM or CW rigs where they multiply both the crystal frequency and the drift.

This trick suggests one that could well be stolen from SSB for either AM or CW operation on VHF. Instead of trying to build a VFO stable enough to permit multiplying its frequency, why not a heterodyne VFO with, say, a clapp oscillator running at 10 mc heterodyned against a 40 mc crystal controlled signal to produce 50 mc output, etc. Such an approach would eliminate the big problem of unstable VFO's. It would be a very desirable feature to include within new transmitters as the basic exciter. ■

DO-IT-YOURSELF [*From page 50*]

volts with audio gain off. If there is insufficient drive to the 6AG7 it will be necessary to experiment with the mixer tank coil as it is very critical and should be of high "Q". This is even more important on the higher frequencies. Check to see that the leads going down inside the coil form do not cross or the output will be reduced.

Now if you have decided to stick to 80 meter operation this is a good time to stop and hang on a W6GEG* type grounded grid amplifier. You will now be on SSB.

40 and 20 Meters

If you want to continue on and have a three band job, the buffer shown in the schematic (fig. 4) can be added. The tank circuits here are also important and use the same type of slug tuned coils. The third harmonic of the vfo is used for 40 meters (16.2 mc) and the buffer tank for this band is swamped with a resistor to provide uniform output over the whole band. On 20 meters the buffer tank is tuned to 5 mc and swamped to even the output over the band. This is a critical circuit and should be capable of turning out the second harmonic of the vfo at 10 mc. Some experimentation may be necessary to get the swamping resistor just right. A 15.5 mc trap must be added to the plate of the 6BA7 to trap the vfo third harmonic. As mentioned previously, the mixer tank coil is probably the most critical part of getting full output on 20 meters. The Q of the coil must be just right to get enough output to drive the 6AG7. This can be checked by using the rf probe on the grid of the 6AG7 and varying the spacing and number of turns of the coils until there is enough drive. To tune the 15.5 mc trap, set the band switches for 14 mc operation, remove the 9 mc crystal from its socket and tune for *minimum* rf voltage at the grid of the 6AG7 amplifier. After the 15.5 mc trap is tuned, reinsert the 9 mc crystal and tune the 20 meter mixer tank circuit for maximum rf voltage.

As indicated in the photograph, a copper shield is placed across the socket of the 6AG7 to isolate the grid and plate circuits. The switch in series with the output meter is used to open the circuit when operating on 20 meters to get more output. The output meter is invaluable when balancing the carrier out, but will load the output circuit somewhat and isn't necessary after the exciter is tuned up.

The 27 ohm resistor across the loudspeaker terminals on the rear of the chassis is for the purpose of keeping a load on the receiver output transformer, thereby preventing damage when the speaker is switched off by the VOX control. The relay terminals disconnect the loud speaker and key the exciter. The author used the TR switch for antenna changeover as described in "CQ" October, 1955, by W9TRG.

*CQ, Feb., 1956 "Something For Almost Nothing," Norman R. McLaughlin. CQ, Sept., 1957 "Economy Power Supply For W6GEG's Final," E. H. Marriner.

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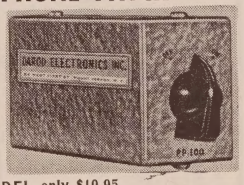
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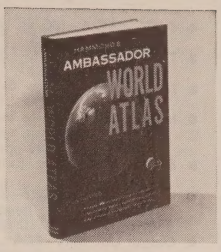
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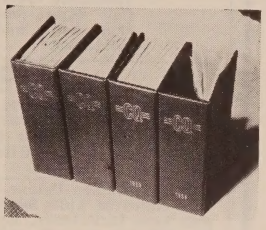
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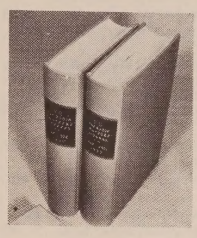


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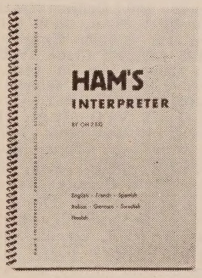
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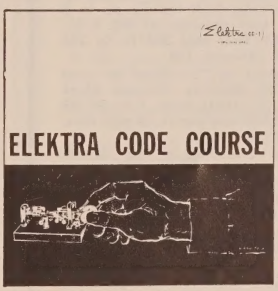
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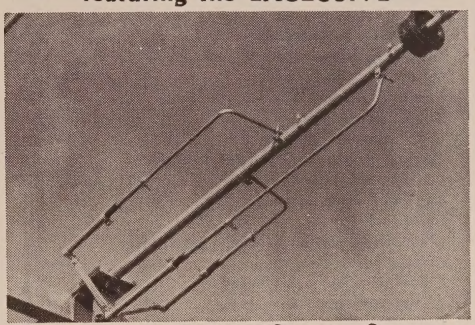
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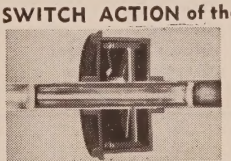


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Advertising Index

Aerovox Corp.	96
Adirondack Radio Supply	92
Algeradio Electronics Co.	117
Allied Radio Company	128
Alltronics-Howard Co.	96
Ampco Products Sales, Ltd.	104
Arrow Sales, Inc.	116
Automation Electronics, Inc.	24
Barker & Williamson	13
Barry Electronics Corp.	122, 123
Basset, Rex, Inc.	118
Bliley Electric Co.	18
C & H Sales Company	100
Capital Radio Engineering Institute	23
Care and Repair of Hi Fi	113
Central Electronics, Inc.	20
Centralab	16
Cleveland Institute of Radio Electronics	10
Collins Radio Company	Cover 2
Columbia Electronics Sales	124
Communications Associates	116
Cornell-Dubilier Electronics Corp.	12
Cushcraft	89
Darod Electronics, Inc.	119
Dow-Key Co., Inc.	104
Eitel-McCullough, Inc.	11
Electronics Illustrated	93
Evans Radio, Inc.	120
E-Z Way Towers, Inc.	106
Fair Radio Sales	111
Farr Distributors	96
G & G Radio Supply Co.	109
Genesee Radio & Parts Co.	110
Gonset Co.	15
Gotham	97, 109
Graves Radio Sales	124
Greenlea Tool Co.	112
Groth, R. W. Mfg. Co.	124
Hallicrafters Co.	8
Ham Register	114
HamSmith	124
Hammarlund Mfg. Co., Inc.	17
Harrison Radio Corp.	101
Harvey Radio Co., Inc.	105
Heath Company	4, 5, 6, 7
Henry Radio Stores	103
Hi-Par Products Co.	114
Hy Gain Antenna Prods.	91
Instructograph Company	114
International Crystal Mfg. Co.	25
Johnson, E. F. Co.	26, 27
Kalab Electronics	96
Ken-Els Radio Supply Co.	106, 103, 110
KwickPatch	96
K8DYW	102
Lakeshore Industries	14
Lynmar Engineers, Inc.	24
Millen, James, Mfg. Co., Inc.	2
Mosley Electronics, Inc.	19, 95
National Co., Inc.	Cover 3
Nelson Publishing Co.	116
P & H Electronics	108
Palmer, Joseph	98
Peak Electronics Co.	120
Peterson Radio Co., Inc.	1
Philco Corp.	119
RCA Electron Tube Div.	Cover 4
R W Electronics	102
Radio Bookshop	120
Rider, John F., Publisher	124
Springfield Enterprises	117
Tab	127
Tapetone, Inc.	87
Technical Material Corp.	22
Van Norman Industries	21
World Radio Laboratories, Inc.	99, 125

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6AB4 ..... .59	12SL7 ..... .79	1620 ..... 2.00
6AC7 ..... .79	12SN7 ..... .69	1625 .....4/$1
6AG5 ..... .69	12SQ7 ..... .69	1626 .....5/$1
6AG7 ..... .97	12SR7 ..... .69	1629 .....4/$1
6AK5 ..... .69	15E 1.19	2050 ..... 1.25
6AL5 ..... .59	15R .....4/$1	5517 ..... 1.25
6AQ5 ..... .66	FG17 ..... 3.49	5608 ..... 3.95
6AR6 ..... 1.95	19T8 ..... 1.16	5618 ..... 3.25
6AS7 ..... 3.49	24G 2.00	5651 ..... 1.35
6AT6 ..... .49	25A6 ..... 1.19	5654 ..... 1.20
6AU6 ..... .59	25A7 ..... 2.19	5656 ..... 4.25
6B8 ..... 1.35	25C5 ..... .81	5663 ..... 1.15
6BA6 ..... .59	25L6 ..... .72	5670 ..... 1.00
6BE6 ..... .59	25T 4.00	5686 ..... 1.75
6BG6 ..... 1.49	25Z5 ..... .72	5687 ..... 2.25
6BH6 ..... .79	25Z6 ..... .75	5691 ..... 4.70
6BJ6 ..... .72	26A7 ..... 3.69	5725 ..... 1.95
6BK7 ..... .99	FG27 ..... 8.28	5726 ..... .69
6BL7 ..... 1.95	HV27 .....19.39	5732 ..... 2.00
6BN4 ..... .69	28D7 ..... .89	5736 .....85.00
6BN6 ..... 1.08	FG33 .....15.00	5749 ..... 1.95
6BN7 ..... 1.99	EL34 ..... 3.49	5750 ..... 2.75
6BQ6 ..... 1.19	35A5 ..... .69	5751 ..... 1.25
6BQ7 ..... .99	35L6 ..... .59	5814 ..... 1.20
6BX7 ..... 1.11	35T 4.49	5879 ..... 1.20
6BY5 ..... 1.19	35Z5 ..... .57	No C—Write!
6BZ6 ..... .75	RK39 ..... 2.99	

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knight-kit "PRO" QUALITY HAM RECEIVER



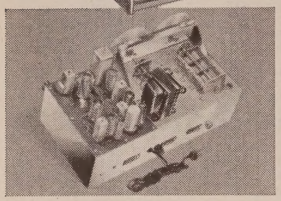
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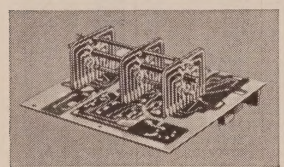
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$104.50
$10.45 Down



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Uses 6BZ6 as RF Amp.; 6BH8 as Mixer and H.F. Osc.; 12AX7 as Q-Mult.; 6AZ8 as 1st I.F.; 6AZ8 as 2nd I.F. and 1st Audio; 6BC7 as Det.-AVC-ANL; 6AW8A as BFO and Audio power output; 6X4 rect.; OB2 volt-reg.



Exclusive Printed Circuitry

Features 2 printed circuit boards with critical wiring already completed. Includes exclusive KNIGHT-KIT printed circuit bandswitch—a 'first' in any communications receiver, regardless of cost.

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The incomparable communications receiver kit value! Has all the features, selectivity and sensitivity of high-priced commercial units. Meets every Amateur need. Uses printed circuitry throughout, including the exclusive KNIGHT-KIT printed circuit bandswitch, for easy assembly. Covers 540 kc to 30 mc in 4 ranges; calibrated electrical bandspread on 80-10 meter Ham bands; slug-tuned Hi-Q coils; continuous VR tube-regulated B+ applied to HF oscillator lets you switch from standby to receive with no drift; built-in Q-multiplier peaks desired signal or nulls interference (*60 db notch really takes out interference*); delayed AVC; built-in noise limiter; provision for crystal calibrator (below). 455 kc I.F. sensitivity: 1.5 microvolts or better for 10 db signal-to-noise ratio, even at 10 meters; 4 μv on broadcast band. Selectivity: variable from 300 cps to 4.5 kc at 6 db down. Exalted BFO injection. Controls: Main tuning, bandspread, band selector, Q-multiplier, selectivity, Q-multiplier tune, null-off-peak, BFO pitch, RF gain, AF gain, BFO-MVC-AVC-ANL, off-stby-rec-cal, antenna trimmer, and phone jack. Both coaxial connector and screw terminal antenna input provided, for 50 to 300 ohm lines. Close tolerance coils reduce alignment time. Cold-rolled 1/16″ steel chassis. Handsome metal cabinet, 10 x 10¾ x 16″. With tubes, all parts, wire, solder and instructions. (Less phones, 8-ohm loudspeaker and S-meter.) Shpg. wt., 30 lbs.

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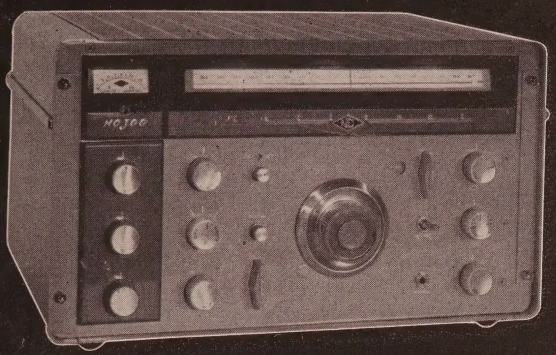
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For further information, check number 61 on page 126.



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"It is all that I had hoped for, all that others said it should be, and, above all, a piece of equipment that I am proud of!"

"By far the best receiver I've ever owned!"

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HOWARD DAVIS, W3VRT

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"Works 'FB'."

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"Very good receiver. Comparable to any I have used."

JIM BISHOP, W4IES

"It is truly a 'dream' receiver!"

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"Best receiver ever used."

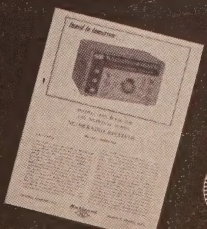
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For more output watts for your tube dollar...for a half-gallon input with lower voltage-rated components and power supply...for better plate loading at the high frequencies, RCA-7094 is your tube.

Designed especially for amateur transmitter service, here is a high-perveance beam power tube that will take 500 watts input ICAS on CW—*with a plate voltage of only 1500 volts.* High power gain enables you to drive the RCA-7094 to full input with less than 5 watts of driver power output at 60 Mc (a single RCA-2E26 or -5763 will do it). And note this important point: RCA-7094 will deliver more watts to your transmission line or antenna than low-current, high-voltage types with the same input *because the plate-voltage swing is lower—and, consequently, plate-circuit loss is lower.*

If you have been looking for a less-expensive way to QRO, design around the RCA-7094. The tube is now available at RCA Industrial Tube Distributors. A technical bulletin is available from RCA Commercial Engineering, Section C-15-M, Harrison, N. J.

RCA-7094
Typical Operating Conditions (ICAS) at 60 Mc

TYPE OF SERVICE	CW	AM	SSB AB1
DC Plate Volts	1500	1200	2000
DC Grid-No. 2 Volts	400	400	400
DC Grid-No. 1 Volts	—100	—130	—50
DC Plate Ma.	330	275	200*
DC Grid-No. 2 Ma. (approx.)	20	20	35*
Required Driver Power Output Watts (approx.)	4	5	4*
Useful Power Output Watts (approx.)**	340	240	250*

*Maximum-Signal **90% Output Circuit Efficiency

RADIO CORPORATION OF AMERICA
Electron Tube Division **Harrison, N. J.**

For further information, check number 3 on page 126.