NOVEMBER
1956
50c

CQ RADIO AMATEURS' JOURNAL



Q-Multiplier

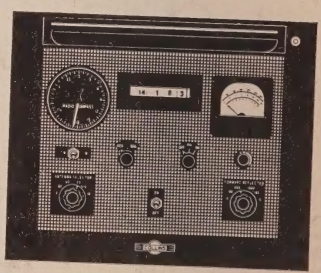
S-9'er

Product Detector!

Something new in the picture

COLLINS SC-101

Station Control System

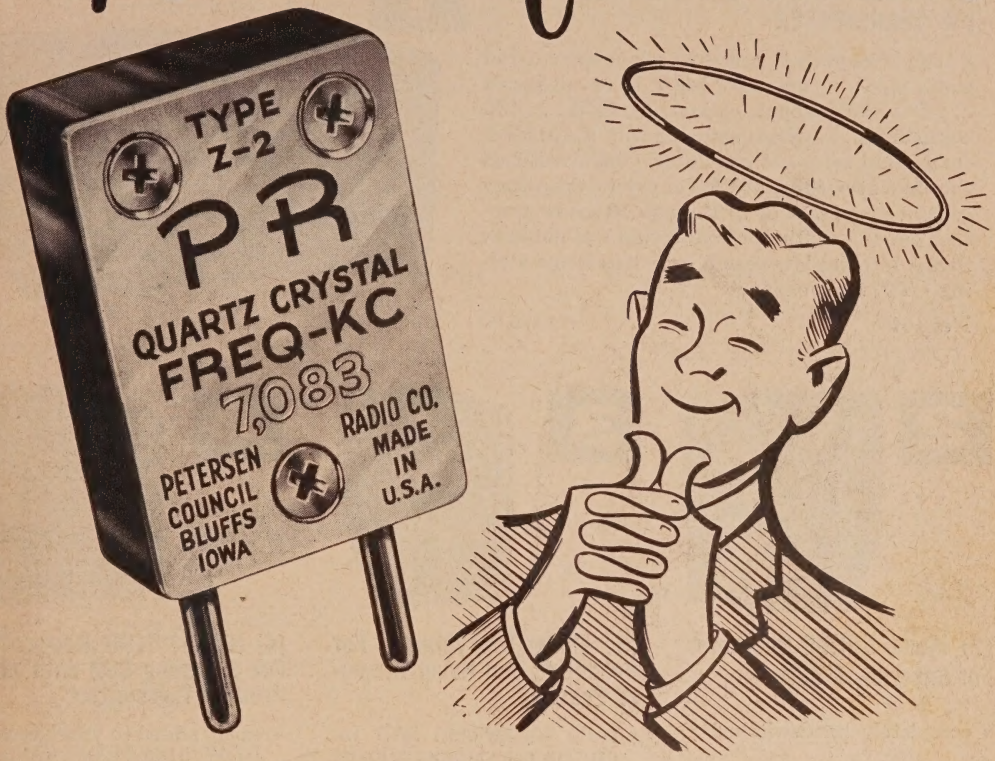


The superior performance of Collins SSB is smoothly coordinated into an orderly system with Collins SC-101. It provides the necessary equipment to connect the transmitter and receiver, beam direction indicator, beam control, phone patch circuit, standing wave ratio meter and remote selection of any one of six antennas.

Like all Collins equipment, the SC-101 can be yours now on the Collins convenient Time Payment Plan. Contact your nearest Collins distributor for complete details.

Collins **CREATIVE LEADER IN COMMUNICATION**

Peace of Mind



If halos were in style . . . PR owners would be wearing them . . . because the happiness and serenity of T9X has no substitute. With PR Precision CRYSTALS controlling your rig, frequency worries take a fast and permanent QSB. You can put your worrier to work on more important problems than "where am I?" For instance . . . the old grey matter can get busy on that super-duper dream beam you have been planning all these years. Yes—PRs give you peace of mind. For better accuracy, stability, activity and output . . . PICK PRs! They're UNCONDITIONALLY GUARANTEED . . . at your jobber!

20 METERS, Type Z-3, $3.95 • 40, 80 AND 160 METERS, Type Z-2, $2.95

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
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4 steps to superior signals with B & W

(1) MODEL 5100-B—AN OUTSTANDING AM-CW TRANSMITTER

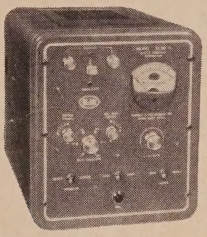
1



• high level push-to-talk AM telephony . . . 140 watts input • clean CW break-in on all bands . . . 180 watts input • sparkling SSB . . . 180 watts input . . . when combined with the 51SB-B companion sideband generator • bandswitched throughout • integral VFO or crystal frequency control • coverage of 80 through 10 meter amateur bands • unitized construction • pi-network final • integral low-pass filter • handsome styling • TVI suppression.

Net Price $475.00

2

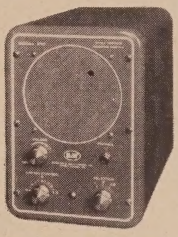


(2) Model 51SB-B Generator For Superlative SSB

- completely bandswitched
- voice operated control
- powered by 5100-B transmitter
- No wiring required
- push-to-talk • speaker deactivating circuit—TVI suppression • unitized construction.

Net Price $265.00

3



(3) Model 370 Adapter For Reception You Never Dreamed Possible

- truly exceptional SSB reception, select upper or lower sideband at the flip of a switch
- true single signal CW operation suppresses unwanted heterodyne by 50 db
- select either sideband of an AM signal
- may be combined with any communications receiver
- normal operation of your receiver is not disturbed in any way

Net Price $131.50

4



(4) Model 51SB Generator For Sparkling SSB With Your Present Transmitter

- easily added to your present B&W 5100-5100B, Collins, Johnson, or other commercial composite home built transmitters
- complete with power supply and tubes
- outstanding SSB transmission from 80 through 10 meters with frequency control provided by your own transmitter
- all the features of the 51SB-B SSB generator at left.

Net Price $279.50

WRITE FOR LITERATURE OR SEE THESE FINE PRODUCTS AT YOUR DISTRIBUTOR'S

Prices subject to change without notice.

B&W **BARKER & WILLIAMSON, INC.**
Bristol, Pennsylvania

CQ, The Radio Amateurs' Journal

November, 1956
Vol. 12, No. 11

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Foreign Subscriptions

England: RSGB, New Ruskin House, Little Russell St., London WC 1.
Australia: Technical Book Co., 297 Swanston St., Melbourne C1, Victoria, Australia.

CQ—(title Reg. U.S. Post Office)—is published monthly by Cowan Publishing Corp. Executive and Editorial offices, 67 West 44th Street, New York 36, N. Y. Phone MUrray Hill 7-2080. 2nd Class Mail privileges authorized at New York, N. Y. Subscription rates in U.S.A., Possessions, **APO FPO, Canada & Mexico, 1 year $4.00; 2 years $7.00;** 3 years $10.00. Pan-American and Foreign, 1 year $6.00; 2 years $11.00; 3 years $16.00. Single copies 50 cents.

Printed in U.S.A. Entire contents copyright 1956 by Cowan Publishing Corp. CQ does not assume responsibility for unsolicited manuscripts.

POSTMASTER: SEND FORM 3579 to CQ, 67 WEST 44th ST., NEW YORK 36, N. Y.

HEATHKIT

DX-100

PHONE AND CW

transmitter

KIT

FEATURES

Design proven through actual signal reports.

★

Only top-quality components used throughout.

★

5-point TVI suppression, and pi network output to match 50 to 600 ohms.

★

Detailed construction manual for simplified assembly.

★

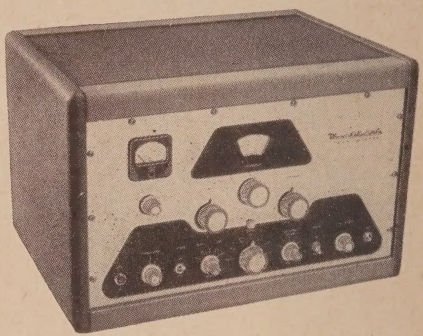
100 watts output on 160, 80, 40, 20, 15, 11, and 10 meters.

★

Attractive and functional physical design.

The Heathkit Model DX-100 Transmitter is rapidly becoming the "standard" ham rig in its power class. The high quality and outstanding performance it offers can be matched only in equipment costing many dollars more. It features a built-in VFO, modulator, and power supplies, and is bandswitching for phone or CW operation on 160, 80, 40, 20, 15, 11, and 10 meters. The kit includes a detailed construction manual, the cabinet, all tubes, prewound coils, and all other parts necessary for construction.

Push-pull 1625 tubes are used to modulate parallel 6164 tubes for RF output in excess of 100 watts on phone, and 120 watts on CW. May be excited from the built-in VFO or from crystals. Features pi network output circuit, illuminated VFO dial and meter face, and 5-point TVI suppression. High grade, well-rated parts supplied. Schematic diagram and technical specifications on request.



MODEL DX-100

$189.50

Shpg. Wt. 107 Lbs.

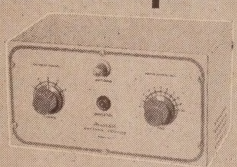
Shipped Motor Freight unless otherwise specified. $50.00 deposit required on all C.O.D. orders.

HEATHKIT

antenna coupler KIT

MODEL AC-1

$14.50



Shpg. Wt. 4 Lbs.

In addition to matching a low power transmitter to an end-fed long wire antenna, this antenna coupler incorporates a 3-section low-pass filter, to attenuate output above 36 mc and reduce TVI. Handles up to 75 watts, 10 through 80 meters. 52 ohm coaxial input—tapped inductor and variable capacitor—neon RF indicator. Ideal for use with the Heathkit AT-1 Transmitter.

HEATHKIT

grid dip meter KIT

The Model GD-1B is a time-proven instrument. It will enable you to accomplish literally hundreds of jobs on all types of equipment. Frequency range is from 2 mc to 250 mc. A 500 ua meter is employed for indication, and a sensitivity control and headphone jack are provided. Includes pre-wound coils and rack. Indispensable for the ham, serviceman, and engineer. Extra coils available to extend frequency down to 350 kc.



MODEL GD-1B **$19.50**

Shpg. Wt. 4 Lbs.



HEATHKIT

antenna impedance meter KIT

MODEL AM-1

$14.50

Shpg. Wt. 2 Lbs.

Used with an RF signal source, the AM-1 will enable you to match your antenna-receiver-transmitter system for optimum operation. Will double as a phone monitor or relative field strength meter. Uses 100 ua meter, and covers 0 to 600 ohms. Frequency to 150 mc.

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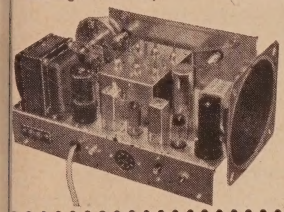
BENTON HARBOR 12, MICHIGAN

HEATHKIT communications-type all band receiver KIT

Slide-rule dial—electrical bandspread—ham bands marked.

Slug-tuned coils and efficient IF transformers for good sensitivity and selectivity.

Transformer-operated power supply for safety and high efficiency.

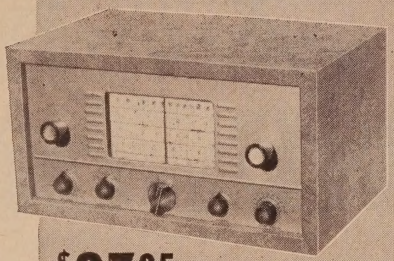


The Model AR-3 receiver features new high-Q slug-tuned coils, new layout, and new-type IF transformers. The result is high sensitivity and selectivity and better image rejection on all bands.

Transformer-type power supply, electrical bandspread, RF and AF gain controls, antenna trimmer, AGC, BFO, headphone jacks, socket for Q multiplier, 5½" PM speaker and illuminated dial.

SPECIFICATIONS:

Frequency Range—550 kc to 30 mc on four bands.
Tube Complement—1—12BE6 oscillator and mixer • 1—12BA6 IF amplifier • 1—12BA6 second detector, AVC, first audio amplifier and reflex BFO • 1—12A6 beam power output • 1—5Y3 full wave rectifier



$27.95 (Less Cabinet)
MODEL AR-3
Shpg. Wt. 12 Lbs.

CABINET: Fabric-covered cabinet available. Includes aluminum panel, speaker grille, and protective rubber feet. Measures 12¼" W. x 6¾" H. x 7¾" D. No. 91-15. Shpg. Wt. 5 Lbs. **$4.50.**

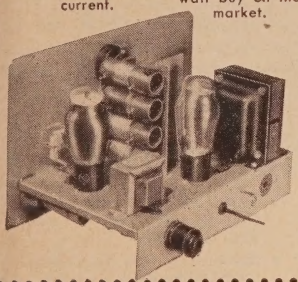
HEATHKIT CW amateur transmitter KIT

Single-knob bandswitching for 80, 40, 20, 15, 11, and 10 meters.

Panel meter monitors final grid or plate current.

Plate power input 25-30 watts.

Best dollar-per-watt buy on the market.



The AT-1 is complete with its own power supply, and covers 80, 40, 20, 15, 11, and 10 meters with single-knob bandswitching. Designed for crystal or external VFO excitation. Incorporates key-click filter, line filter, copper plated chassis, pre-wound coils, 52-ohm coaxial output, panel meter, and high quality components throughout. Easy to build, even for the beginner. Employs 6AG7 oscillator and 6L6 final. Up to 30 watts power input.



$29.50 **MODEL AT-1**
Shpg. Wt. 15 Lbs.

SPECIFICATIONS:

RF Amplifier Power Input	25-30 watts
Output Connection	52 ohms
Band Coverage	80, 40, 20, 15, 11, 10 Meters
Tube Complement:	
5U4G	Rectifier
6AG7	Oscillator—Multiplier
6L6	Amplifier—Doubler

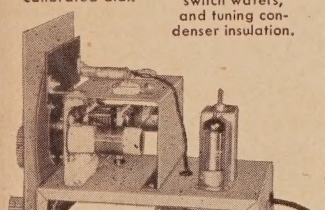
OA2 voltage regulator tube for stability.

Covers 160-80-40-20-15-11-10 meters.

Smooth-acting, illuminated and pre-calibrated dial.

6AU6 electron-coupled Clapp oscillator.

Copper plated chassis—aluminum case—profuse shielding—ceramic coil forms, switch wafers, and tuning condenser insulation.



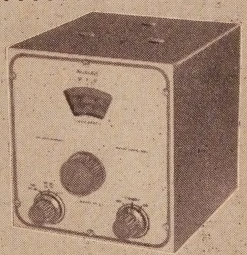
HEATHKIT vfo KIT

The Model VF-1 features illuminated and pre-calibrated dial scale. Cable and plug provided to fit the crystal socket of any modern transmitter. Covers 160-80-40-20-15-11 and 10 meters with 3 basic oscillator frequencies. Better than 10 volt average RF output on fundamentals. Derives operating power from transmitter power supply. Has VR tube for stability. Go VFO for more operating enjoyment.

MODEL VF-1

$19.50

Shpg. Wt. 7 Lbs.



SPECIFICATIONS:

Output Frequencies—1750-2000 kc, 7000-7425 kc, 6740-6808 kc. **Calibrated Bands**—160-80-40-20-15-11-10 meters. **Tube Compliment**—6AU6 Oscillator OA2 Voltage Regulator. **Power Requirements**—250-350 VDC @ 15-20 ma. and 6.3 VAC @ .45A.

ORDER DIRECT FROM THIS AD . . . OR WRITE FOR FREE CATALOG. Describes more than 65 interesting "build-it-yourself" projects. Amateur equipment, hi fi amplifiers, and the complete Heathkit line of test instruments. Get yours today!

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



Feenix, Ariz.

Deer Hon. Ed:

If it not being that I are wanting that reseever so badly, then I not be sitting here now kicking myself in stumack when Hon. Back are turned. But who could be thinking that a dog could, or that there being a lady across the street that having one. When feller getting all the bad brakes against him are sure tough to making honest bux, are you not thinking, Hon. Ed?

But, letting me giving you more detales so you can figyouring outs for yourself. Cupple weeks ago local amchoor are giving me a call on landline. Understanding, Hon. Ed., this fellers are no bother to talking to, on acct. he got plenty of bux and are bigshots in town.

It are seeming that he heering I needing mobile reseever for my Hon. Car, and he offering to letting me have his brand new one for free. For free, that is, if I doing him a little fayver. At first listen it sounding like appel-pie easy job. He are resently having motor and geers put on garage door, and he wanting me to installing foto-electric door-opener meckanism for him, acct. he so busy and not having time for same.

I getting in car and driving over to his house to having look-see. He showing me how garage doors working with motor, and that are reel slicky. Then he showing me two posts he alreddy putting in, one on each side driveway, right neer to garage, on which he wanting me to putting foto-electric stuff. Scratchi are figyouring it not taking me more than cupple hours to doing job, so I telling him he having deel.

Sure enuf. Next morning I popping over to his house and getting job done in no time. Testing hole thing by putting hand in front of foto-toob housing, and garage doors going up and down like sixty. I telling his XYL everything are hunky-dunky, and the OM can sending over the mobile reseever anytime he wanting to.

I are barely getting home when he calling me on landline. Are he calling to thanking me? No indeedys. He calling me to telling me to getting back to house in hurry, on acct. something are rong. Doors going up and down

HEATHKIT NEW DX-35 phone and cw transmitter KIT



MODEL DX-35

$56.95

Shpg. Wt. 24 Lbs.

- Built-in modulator for phone operation.
- Bandswitching on 80, 40, 20, 15, 11 and 10 meters. Pi network output coupling.
- Switch selection of three crystals—provision for external VFO excitation.
- Attractive and functional physical design.

This brand new transmitter model provides phone and CW operation on 80, 40, 20, 15, 11, and 10 meters. Plate power input to 65 watts on CW and controlled carrier modulation peaks to 50 watts on phone. Completely bandswitching.

Employs two-stage 12AX7 speech amplifier, 12AU7 modulator, 12BY7 oscillator, 12BY7 buffer, and 6146 final. The buffer stage assures plenty of drive to the final on all bands. Pi network output coupling employed for easy antenna loading. Switch selection of crystals. Crystals changed without removing transmitter cabinet. Husky power transformer and choke are potted, and the circuit is well shielded. Meter indicates final grid or plate current.

Truly a remarkable transmitter package for the price. Ideal both for the novice and for the more experienced operator.

Send for free 1956 Heathkit Catalog describing more than 65 interesting "build-it-yourself" projects.

HEATH COMPANY

A Subsidiary of Daystrom, Inc.

BENTON HARBOR 12, MICHIGAN

HEATHKIT "Q" multiplier KIT

Provides extra selectivity for separating signals, or will reject one signal to eliminate heterodyne. Effective Q of 4,000 for sharp "peak" or "null." Tunes any signal within receiver IF. Operates with 450 to 460 kc IF. Will not function with AC-DC type receivers. Requires 6.3 VAC at 300 ma, and 150-250 VDC at 2 ma.



MODEL QF-1

$9.95 Shpg. Wt. 3 Lbs.

With the NEW Model HT-30 Transmitter/Exciter

HALLICRAFTERS RAISES THE STANDARDS OF SSB TRANSMISSION

For almost a quarter of a century the constant goal of Hallicrafters engineers has been the improvement of receiving and transmitting equipment standards. This policy of continuous improvement is again reflected in the design and engineering of Hallicrafters amazing new HT-30 Transmitter/Exciter.

Here's a transmitter that's built to give you greater performance . . . greater dependability. And the HT-30 guarantees you greater enjoyment because it incorporates all these wanted features . . .

CHECK THEM AT YOUR JOBBER TODAY!

- BUILT IN V.F.O. READS DIRECTLY IN KILOCYCLES.
- V.F.O. STABILITY IS EQUAL TO MOST CRYSTALS—.009% There are also provisions for 1 crystal for fixed frequency operation.
- SELECTIVE FILTER SYSTEM IS USED FOR RELIABLE SIDEBAND SELECTION. The circuitry employs the proven r.f. selective filter system used by major commercial communications companies. This sytem assures continued suppression of unwanted side band energy and distortion products. Hum, noise and unwanted side band are down 40 db or more, while undesired beat frequency is down at least 60 db. New 60 db range meter for constant monitoring of r.f. output and carrier suppression. Voice control system built in with adjustable delay and anti-trip features.
- SSB, AM, AND CW ARE ALL PROVIDED FOR IN ONE COMPACT UNIT. Front of panel full function control allows selection of AM, CW and upper or lower side band. Only 18" x 9¾" x 12"; the unit is powerful—35 watts peak output on SSB.

FRONT PANEL CONTROLS

Band selector 80, 40, 20, 10 meters.
Driver tuning.
Finial tuning.
Speech level.
Carrier injection —0 to 100%.
Meter sensitivity.
Calibration level.
Power off, stand-by, warm-up, transmit.
Operation control. VOX, Calibrate, MOX.
Function selector—AM, CW, upper, lower side band.
Tuning—V.F.O.
10 Meter tuning control.
V.F.O.—Crystal.

hallicrafters
CHICAGO 24, ILLINOIS

AND 15 OTHER FEATURES IN MODEL HT-30 AT ONLY $495.00



Designed for

Application



The No. 90801

EXCITER-TRANSMITTER

The No. 90801 Exciter-Transmitter is of the most modern design including features and shielding for TVI reduction, band-switching for the 4-7-14-21 and 28 megacycle bands, circuit metering. Conservatively rated for use either as a transmitter or exciter. 5763 oscillator-buffer-multiplier and 6146 power amplifier. 90 watts input for CW. Can be keyed in the oscillator and/or amplifier or by means of keyed external V.F.O. such as the 90711. 67 watts input phone. Rack mounted 3½" panel height.

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY

MALDEN

MASSACHUSETTS

when not supposed to be and it driving XYL crazy.

So, I go back. I noticing that doors going up and down and there not seeming to be any reason for same. In fackly, doors cawsing so much fuss that white dog are barking hed off as doors going up and down. I finally shooing dog away as barking starting to cawse Hon. Hed to ake. Noticing that when dog not there, doors not going up and down.

Well, to make long story shortly, Hon. Ed., you not buleeving it, but when white dog neer doors, sunlite reflecting off dog are triggering meckanism and doors going up and down, up and down. I telling lady of house to keeping dog away and everything okeydoke, but she telling me that are there dog, and how can keeping him away?

That evening getting call from the OM, and he saying he sorry he cawsing me all this trubble, but he figyouring way to opening doors that dog not trubbling. He are buying speshul sooper-sonic horn for car what putting up awdio signal what so hi-pitched only speshul awdio amplifier are heering it. He asking if I minding coming up and taking out foto-electric junk, which he donating to me, and putting in new sooper-sonic sistem he buying.

So, back I go next day. This time taking me all morning, but finally getting it fixed up Jimpeechy. Are testing it with speshul whistel he buying. One toot and door go up. Another toot and door go down. I seeing his XYL and telling her everything now fine, and telling her OM not to calling, just bringing my mobile reseever over rite away.

He calling, howsumever. Yes indeedy, he are calling. That afternoon, to be strickly. It seeming that garage doors are going up and down, up and down. He saying that not wanting to cawsing me any trubble, so he are watching doors and are finding out what are problum. They having naybor what having dog. When they wanting dog, they blowing whistel for it. You gessing it, Hon. Ed., whistel they using are sooper-sonic whistel. Kind only dogs can heer. Kind only dogs and speshul sooper-sonic awdio amplifier can heer. So when they calling dog, doors keep going up and down, up and down.

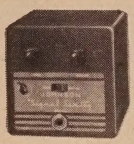
He saying not to worrying about it, on acct. he buying new-fangled r-f amplifier what working on speshul radio-control freakwency band, and he know it are cawsing me lotsa trubble, but would I mind coming out tomorrow and installing same—and I can having sooper-sonic sistem for myself.

You know what I telling him? I'll bet you can gessing. Among other things I menshunning fellers with model airplanes and eleventeen other kinds peeples all using that radio-control freakwency, and if he thinking I going to putting that in for him he better be thinking twice. At least.

[*Continued on page 116*]

accessories for *Every* amateur station!

BIG in value!
BIG in performance!



"SIGNAL SENTRY"

Monitors CW or phone signals without regard to operating frequency. Energized by transmitter RF. Mutes receiver audio for break-in. Serves as code practice oscillator with simple modification. Power obtained from receiver or other available supply. Wired, tested, with tubes.

Cat. No. 250-25 Amateur Net $18.95



SWR BRIDGE

Measures standing wave ratios for effective use of a low pass filter and antenna coupler. 52 ohms impedance can be changed to 70 ohms or other value. SO-239 connectors and polarized meter jacks.

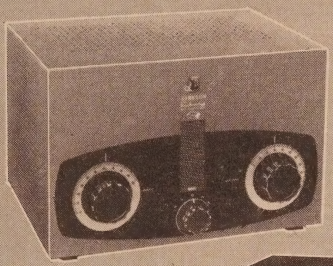
Cat. No. No. 250-24 Amateur Net $9.75



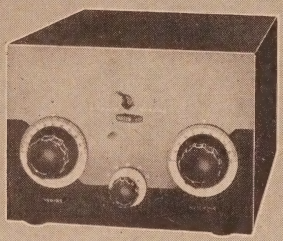
LOW PASS FILTER

Four individually shielded sections—handles more than 1000 watts RF, provides 75 db or more attenuation above 54 mc. Insertion loss less than .25 db. Replaceable Teflon insulated fixed capacitors. SO-239 coaxial connectors. Wired and pre-tuned.

Cat. No. 250-20 Amateur Net $13.50



KILOWATT "MATCHBOX"



275 WATT "MATCHBOX"

Bandswitching . . . self-contained . . . no plug-in coils!

VIKING KILOWATT "MATCHBOX"—Bandswitching 80, 40, 20, 15, and 10-11 meters—self-contained. Use with transmitters up to and including 1000 watts input—handles unbalanced line impedances from 50 to 1200 ohms and balanced line impedances from 50 to 2000 ohms. No coils to change, no "tapping down" on the inductor. Transmit/receive relay grounds receiver antenna terminals in "transmit" position. Adjustment for matching antenna to receiver input. Fully shielded. Provision for RF probe.

Cat. No. 250-30 Kilowatt "Matchbox", assembled, wired and tested . . . . . **Amateur Net $124.50**

VIKING 275 WATT "MATCHBOX"—Performs all antenna loading and switching functions required in medium power amateur stations. Bandswitching 80, 40, 20, 15, and 10-11 meters. Matches balanced antennas from 25 to 1250 ohms and unbalanced or single wire antennas from 25 to 3000 ohms. Input impedance, 52 ohms, rated, 275 watts. Built-in transmit/receive relay grounds receiver antenna terminals in "transmit" position. Independent adjustment for matching antenna to receiver input. Fully shielded. Provision for RF probe.

Cat. No. 250-23 275 watt "Matchbox", assembled, wired and tested . . . . . **Amateur Net $49.85**

IMPORTANT NOTE: A suitable RF measuring device such as the Johnson 250-24 SWR Bridge is essential for proper tuning and adjustment of any antenna coupler.

E. F. Johnson Company

2940 SECOND AVE. S.W., WASECA, MINNESOTA

EDITORIAL
WAYNE GREEN

. . . de W2NSD

NEVER SAY DIE

New Bigger CQ

I had expected to add 16 more pages to *CQ* this month, but we don't have quite enough advertising to support such a move yet. I don't want to expand until we are sure we will be able to keep the bigger size. Just a couple more pages of advertising will swing it, perhaps we will be set to go for December. A lot of this depends on you and your support of your advertisers. Many of them are astounded at the results they are getting from *CQ* . . . astound the rest of them.

As we expand we will be needing more and more articles. If all of you who have promised articles would sit down and send them in we would have some terrific stuff. How about that article you've been intending to write? I've been trying for two years to get someone to write an authoritative article on relays and control circuits . . . three W6's have promised, nothing has come. I have been shifting nervously from one foot to the other waiting for a promised article on Panadaptors. And a hundred others. Remember: we pay money ($$).

Columns

People are always grabbing me by the lapel at hamfests and saying the "everyone" is interested in thus and so and I should get a column going. We already have 14 regular departments so I have to tread lightly toward more such industrialization. The postcard in the October issue (haven't you sent that in yet?) will give us some pointers on this.

A Mobile Column probably would be a good thing. The rise of mobile clubs seems indicative of a rise in esprit de corps which might support such a venture. But where on earth would I find a ham so unbalanced that he would consider taking on the ego inflating low paying job of conducting such a thing? That is quite a problem since the fellow has to be able to write, be dependable, know his subject and put up with occasional visits from the editor with an outward show of good grace. Par is three out of four.

MARS, CAP, and SWL are all outside ham radio and do not, to my way of rationalizing, fit into the *Radio Amateurs' Journal*. Back before the Novice license I might have considered something for the SWL for in those days it took six months to a year, not just a few weeks, to get your ticket and thus we had quite a few earnest SWLs. The Novice Column covers this group these days. MARS and CAP operate outside our bands. I would like to see an occasional article telling us more about these functions, but they are not yet of general enough interest to warrant regular reporting.

Serving

You know, whether we are appreciated or not, we still have an obligation to serve in every way we can. Besides all that it is plain good business sense too. Whenever we serve our community we are storing good will up in our favor, good will that will be very important when a TVI hassle, tower, or some such threatens us. Keeping this in mind you can understand why *CQ* tries to promote and push amateur radio applications to community events and emergencies.

If your local club or group would try to make amateur radio communication available for every local event where it could help it would pay off far beyond the fun you would get of participating and the friends you would make directly among those you are helping. There are hundreds of community applications for two or more mobile stations, why not get into them?

A letter from K4HEN, Harry Dreyer, of Key West, whom I had the pleasure of visiting recently, pointed out that down there the local gang copied the weather advisories on the low frequencies as soon as they were first sent out and repeated them on 3810 and 7205 kc in order to keep people advised on the latest movements of any threatening hurricanes. The local weather bureau was hopelessly unable to cope with all the phone calls and the broadcast station was usually several hours behind so such aid was of real value to the seagoing population of Key West.

W9SKF, Norm Krohne, of Milwaukee has written an article on the use of ham radio for telethons. This will appear in *CQ* soon. How can you help your community?

[*Continued next page*]



TYPICAL OPERATION
(Frequencies up to 175 Mc per tube)

	Class-C CW or FM Phone	Class-C AM Phone	Class AB, R-F Linear
D-C Plate Voltage	2000 volts	1500 volts	2000 volts
D-C Screen Voltage	250 volts	250 volts	350 volts
D-C Grid Voltage	—90 volts	—100 volts	—50 volts*
D-C Plate Current	250 ma	200 ma	
Zero-Sig D-C Plate Current			100 ma
Max-Sig D-C Plate Current			250 ma
Screen Current	25 ma	25 ma	15 ma max
D-C Grid Current	27 ma	17 ma	
Peak R-F Grid Voltage (approx.)	115 volts	121 volts	50 volts
Driving Power	2.8 watts	2.1 watts	0 watts
Plate Power Output	410 watts	250 watts	325 watts max

*Adjust grid voltage to obtain specified zero-signal plate current

Meet Eimac's New Ceramic Power Tetrode

Scheduled for commercial and defense applications, and also designed to power fine amateur rigs, the 4CX300A is in a class by itself. Its ceramic-metal construction, along with Eimac's high temperature processing techniques, means a "harder," cleaner tetrode. It also inhibits deterioration of electrical characteristics even while the tube operates continuously at an envelope temperature of 250°C. It also provides the ruggedness that enables the 4CX300A to withstand 11 millisecond, 50g shocks without internal shorts or mechanical damage.

Featuring extremely low series lead inductance, the 4CX300A functions at full ratings through 500 megacycles, and operates over a wide range of plate voltages — 500 to 2000 volts — with power inputs from 125 to 500 watts.

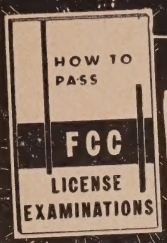
Shown with the 4CX300A is its new Eimac air system socket. In addition to providing the optimum in cooling arrangements, this air socket employs a screen-to-cathode bypass capacitor for stable high-gain operation, a lock-in socketing action, and extremely low inductance terminals.

For further information contact our Amateur Service Bureau.

Eimac

EITEL-McCULLOUGH, INC.
SAN BRUNO CALIFORNIA
The World's Largest Manufacturer of Transmitting Tubes

How To Pass FCC COMMERCIAL RADIO OPERATOR License Exams

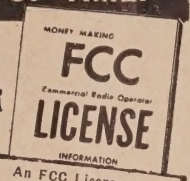


Free . . .

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.

GET YOUR FCC TICKET IN A MINIMUM OF TIME!

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—TELLS HOW . . .

1. Tells how thousands of brand-new, better paying radio-TV-electronics jobs are now open to FCC License Holders.
2. Tells how we guarantee to train and coach you until you get your FCC License.
3. Tells how our amazing Job-Finding Service helps you get the better paying job our training prepares you to hold.



GET ALL 3 FREE!

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Desk CQ-21, 4900 Euclid Bldg., Cleveland 3, Ohio
(Address to Desk No. to avoid delay)

I want to know how I can get my FCC ticket in a minimum of time. Send me your FREE booklet, "How to Pass FCC License Examinations" (does not cover exams for Amateur License), as well as a Sample FCC-type lesson and the amazing new booklet, "Money-Making FCC License Information." Be sure to tell me about your Television Engineering Course.

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

Address .....

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

FOR PROMPT RESULTS SEND AIR MAIL
Special tuition rates to members of the U. S. Armed Forces
Electronic Training also available to Canadian Residents

More Publicity

In line with our article on getting publicity and my intention to try to make clubs publicity conscious this item from the San Fernando Valley Radio Club should be of interest.



Andy Devine, honorary mayor of Van Nuys, California, and star of countless film, radio and TV westerns, is named honorary president of the San Fernando Valley Radio Club, Inc., by the active president, Arnold Dahlman, W6EUI (right), who affixes a badge to Andy's expanse to prove it.

Editor Wins Big Prize

The Concord Brasspounders held the 18th Annual New Hampshire State ARRL Convention in Concord on September 30th, and a very nice convention it was indeed. I drove up to Boston on Saturday and visited Sam and Hellen for the night. I got lost for a few minutes on the way and was straightened out on two meters by W1DEO up in Maine . . . the next day I think fifty different fellows approached me and said that they had heard the QSO.

I got Sam out of bed as early as I could the next morning and we headed for Concord. Once we got there I lost track of Sam and didn't see him again the rest of the day. Both of us were caught up in a swirl of friends and were kept busy. As is my usual habit I conned as many people as possible into subscribing to our obscure magazine. I was very pleased to run into my old friend Sib, W1MCS (One More Country Station) who comes from my home town of Littleton, N.H. Hey, where was Homer, W1KPL?

[*Continued on page 99*]

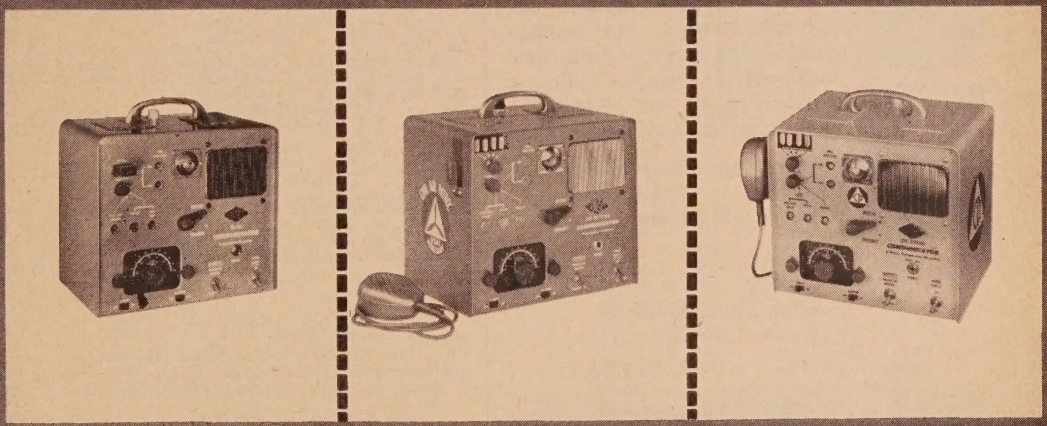


a neat package....

A neat, tidy package, the Gonset Communicator, long ago set the pace for commercial-built VHF amateur and emergency equipment. This practical, resourceful scale-down of a complete VHF station into "Package" form serves as the basis for Gonset's well known Communicator slogan, "Compactness without compromise".

Communicators—"Packages"—for 2 and 6 meters. For ground-to-air. For industrial. For C-D. Now a special new model for C.A.P. Pace setters—winners—all.

Today, thousands of 2 meter Communicators are in use. The demand for the comparatively new, but already performance-proved, 6 meter models increases daily.



2 and 6 meter models. New models for C.A.P. Civilian Defense models

Available RF power amplifiers increase output power ten fold

GONSET CO. 801 SOUTH MAIN STREET, BURBANK, CALIF.



COMMUNICATIONS ENGINEERS

Operating or Amateur Experience

PREFERRED



GPR-90



GPT-750



GSB-1

We want several men with good technical background to grow with our organization.

We manufacture and sell a complete line of H.F. Communications equipment and we need men to expand our line of new products.

We do not need men in the genius category, but require people who can translate their technical knowledge into a physical piece of equipment which can be manufactured.

Salary is open, benefits second to none, in a friendly, low pressure environment.

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E. A .MATSON, Sr.
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NEW YORK

Letters . . . to the editor

Q-Multiplier

Berkeley, Calif.

Dear Sirs,

In case anyone is interested in using the excellent Heathkit Q-multiplier on 915 kc, the following data will save them some time:

Remove the ferrite shield from the 1.5-3.0 mh coil by soaking the joint a little in acetone. Remove 155 turns from the coil. Be sure to get all strands of the Litz wire clean at the free end. The wipe-off compound sold at ordinary radio houses does wonders in this respect. Replace the shield on the 120-150 μh coil and remove 19 inches of wire. Same procedure and precautions. Use plenty of acetone.

Replace the 3300 $\mu\mu$f condenser with 1420 $\mu\mu$fd (or so) silver mica or add 2500 $\mu\mu$fd silver mica in series with the 3300 $\mu\mu$fd one. When seriesed, the condensers lie on top of each other, with the plane of the condensers parallel to the chassis.

Replace the 1100 $\mu\mu$fd condenser with a 470 $\mu\mu$fd one or add 820 $\mu\mu$fd silver mica in series with the 1100 $\mu\mu$fd one. These condenser values are all approximate.

Remove 3 of the 6 rotor plates on the variable condenser.

This Q-multiplier is fantastic. Not only better selectivity but 2 S-units more gain above noise level! And it is really worthwhile to get the Heathkit model in spite of the deceptively simple nature of the circuit, because of the greater convenience, reliability, and facility of the unit.

R. L. Gunther. W6THN

Free Maps

Gentlemen,

We have a supply of Geographically correct desk maps of the United States, size 18" x 32", printed in color. Although our supply is limited, we will be glad to mail one of these maps free to any Ham requesting it up to 500. It will also be necessary to fold the map for mailing in an envelope. Address your request to P. M. Bunting, Cotton Belt Railway, P. O. Box 959, Tyler, Texas.

M. Bunting

QSL's

Dear Sir,

QSL's, letters and Bulletins for Austria may be sent only via; Oe V.S.V., W. Blaschek OE 3 WB, P. O. Box 15, Klosterneuburg 2, Austria.

Sekretariat:
Osterreichischer Versuchssenderverband.

KA2SK

Dear Wayne,

I have returned from Japan and would like to advise anyone who missed out on a card from me that I am available at my new QTH: 609 8th Street, Riverside, N. J. Look for me on SSB from now on out.

S. F. Kasper, W3ZGG/2

Correction

Wayne,

The CW Receiver in the October CQ has an error on page 46, fig. 1: The condenser marked C16 from the top of R9 to ground is supposed to be C13. Its value should be .005 mfd.

W5SOT

PUZZLER ANSWER

The chauffeur made his trip in thirty minutes less time, meaning that he saved fifteen minutes each way over his regular trip. This means he met the man at 4:45. (If he'd driven 15 minutes more he'd have been at the station.) Our man started at 4 PM; he walked 45 minutes.

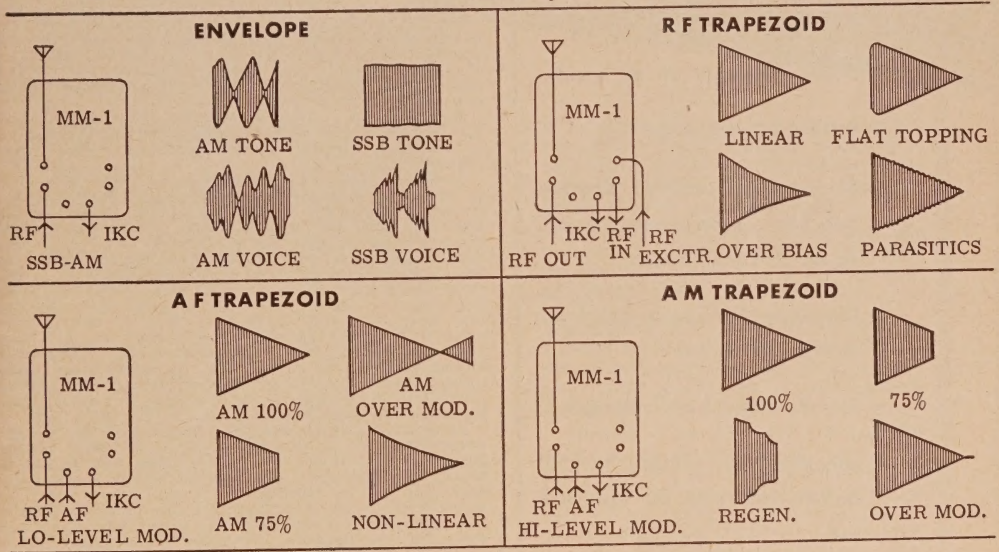
NEW MULTIPHASE MODEL MM-1
RF ANALYZER



Amateur Net - Kit . . . $99.50
Wired . . . 129.50

- NO TUNING required. Broadband response flat 1 MC to 55 MC at power levels of 5 watts to 5 kilowatts. Useful indications to 200 MC.
- Built-in 1 KC audio oscillator has less than 0.5% distortion.
- Automatic blanking protects CRT during standby.
- RF attenuator controls height of pattern, calibrated in 3 db steps.
- For use in "Series" with 50-72 ohm co-ax lines. A short pickup antenna is recommended for other systems.
- The MM-1 provides: SPEECH ENVELOPE patterns without annoying 60 cycle double trace.
- TONE ENVELOPE patterns automatically synchronized with self-contained 1 kc audio generator.
- AF TRAPEZOID patterns for HIGH LEVEL AM systems.
- DOUBLE TRAPEZOID OR BOW TIE patterns for analysis of LOW LEVEL LINEAR AM systems.
- RF TRAPEZOID for determining linear amplifier "LINEARITY" by sampling input and output signals. CONTINUOUS AUTOMATIC MONITORING OF SSB-AM-CW.

One compact unit provides oscillator and 3" scope for alignment of SSB exciters and general modulation analysis.



OTHER MULTIPHASE PRODUCTS

Model 20A Bandswitching SSB Exciter	$249.50	Kit . . . $199.50
Model 600L Broad-Band Linear Amplifier - immediate delivery. . .		$495.00
Model GC-1 Gated Compression Amplifier . . .	$59.50	Kit . . . $49.50
Model 10B 10 Watt Multiband Exciter	$179.50	Kit . . . $129.50
Model B Slicer and Q Multiplier	$99.50	Kit . . . $69.50
Model A Slicer, less Q Multiplier	$74.50	Kit . . . $49.50
Model AQ Q Multiplier for Slicer	$29.50	Kit . . . $22.50
Model DQ Desk Type Q Multiplier	$29.50	Kit . . . $22.50
Model 458 VFO Conversion Kits and Cabinet . .	$25.00	

WRITE FOR LITERATURE

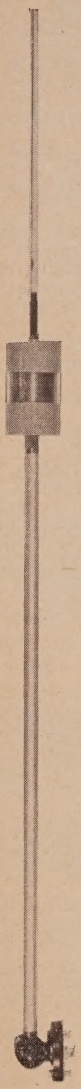
MULTIPHASE EQUIPMENT

Central Electronics, Inc.

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MULTIPHASE – THE OVERWHELMING CHOICE OF HAMS EVERYWHERE.

NOW! One Coil For— 10-15-20-40 and 75



Bassett ALL BAND VACUUM COIL Tops in Mobile

- Evacuated and filled with pure Helium
- Hermetically sealed against weather
- Extremely high "Q"
- Super efficiency on all bands
- Instant band change
- Simply rotate coil 45 degrees and you are on selected band, 75-40-20-15-10 meters
- Dial indicator shows band selected and in use
- Standard ⅜-24 end fittings
- Use with your present 36 inch bottom rod and 60 inch top rod
- UNCONDITIONALLY GUARANTEED

See your Distributor or write for brochure and pricing information on the BASSETT All Band model VC-1075 Vacuum Coil.

REX BASSETT, INC.
Bassett Building
Fort Lauderdale, Florida

stolen from

AUTOCALL

Wash. D.C. Mobile Radio Club

New Puzzler

Quite a few people got all shook up over the Ladder Problem on page 114 of the September *CQ*. We have been receiving more answers since we printed these on page 100 in the October issue. Next month we will try to wind up that situation with several different solutions, including one feature length article inspired by the problem.

This month we can't leave you high and dry so here is our head scratcher, as usual stolen from the Washington D.C. Mobile Club "Autocall."

A man has a steel tape 1000 feet long and .001 inches thick. He winds it up on a core one inch in diameter. What is the diameter of the wound-up tape? Have fun.

Utah License Plate Law

AN ACT PROVIDING FOR THE ISSUANCE OF SPECIAL AUTOMOBILE REGISTRATION LICENSE PLATES TO LICENSED RADIO AMATEURS IN LIEU OF REGULAR PLATES TO FURTHER THE CAUSE OF PUBLIC SAFETY AND CIVIL DEFENSE.

Be it enacted by the Legislature of the State of Utah:

Section 1. The state recognizes the valuable assistance which mobile amateur radio stations can render in time of emergency and civil defense and recognizes that value of having these mobile stations distinctively marked with unique license plates so that they may be readily identified.

Section 2. An amateur shall be deemed to be any person licensed by the Federal Communications Commission to engage in private and experimental two-way radio operation.

Section 3. Any bona-fide conditional class equivalent, or higher class licensed Amateur Radio operator, who is permitted by law to operate a fixed station in the State of Utah, will be allowed to register one vehicle per radio license issued by the Federal Government and receive for such vehicle distinctive license plates in lieu of regular plates. The number thereon will be the same combination of figures and letters that make up the radio call sign of the amateur radio operator. The first letter will be either "W" or "K". The second character will be the figure "7". The next two or three characters will always be that combination of figures or letters assigned by the Federal Communications Commission and indicated upon the amateur's radio station permit; provided that in no case shall the license number be of less than four or more than five characters.

Proof of holding an amateur's license from the Federal Communications Commission must be furnished to the State Tax Commission before the plates will be issued. Should the amateur's radio permit expire during any year and not be renewed, the special plates must be surrendered to the State Tax Commission in accordance with provisions of Sec. 41-1-62. Utah Code Annotated 1953, for the issuance of regular plates. Any person failing to comply with this provision is guilty of a misdemeanor.

Section 4. Amateurs will notify the State Tax Commission at a time to be set by the commission of their intention of this act. Failure to do so will result in such amateur being required to accept regular plates should the commission be unable to procure the special plates provided herein. Special plates may still be procured when available but amateurs will be subject to usual transfer fee.

Section 5. Whenever an amateur transfers or assigns his title or interest to a vehicle specially registered under this act the registration shall expire, but such amateur may hold his special plates which he may have reissued to him upon the payment of the required transfer fees. He may only display such plates after receipt of new registration from commission.

Section 6. A fee of not more than $3.00 per set of plates over and above the regular fee for the same class of vehicle will be charged for the amateur's special plates, regardless of the time of issue. This fee must accompany the application for license and is not refundable. The exact amount of this fee shall be set by the State Tax Commission.

(Passed in 1955) ■

NOW!

world's first and only

TRANSISTORIZED

Amateur Band Converter

Regency

ATC-1



4¾"x 3¼"x 4⅛"—weighs only 30 ounces

a tiny self-powered converter that connects INSTANTLY to any receiver



● No other converter like it! REGENCY's new ATC-1 is truly portable. Hooks up in seconds to *any receiver* (including car radios)—only connections are to an antenna and to receiver's antenna input.

The ATC-1 takes no power from the receiver. It is self-powered by three tiny Penlight cells which have a current drain of only 450 to 600 micro-amperes.

World's Smallest Converter. Use of transistors instead of bulky vacuum tubes makes this remarkable unit as easy to carry as a candid camera—it's actually less than half the size of this page!

The ATC-1 provides AM, CW and SSB reception on the 80, 40, 20, 15 and 10 meter amateur bands. Sensitivity is 5 to 10 mv for 6 db signal-noise ratio. A modified "Q" multiplier circuit improves sensitivity and selectivity for phone operation. Smartly styled aluminum cabinet is covered in dark grey tweed with satin finished aluminum front.

With features that can't be duplicated at any price, the transistorized REGENCY ATC-1 is available now at just. . . . **$79.50**
amateur net

See and hear this miniature marvel at your local distributor.

Bulletin giving complete details and specifications yours on request.

REGENCY Division • I.D.E.A., Incorporated

Dept. C, 7900 Pendleton Pike, Indianapolis 26, Indiana

YOUR BEST BUYS...

HQ-100

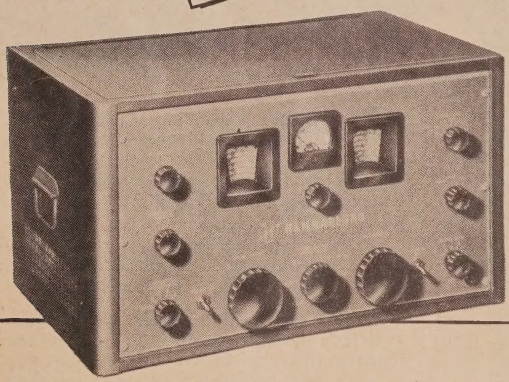
Q-multiplier for continuously variable selectivity. Electrical bandspread tuning. 10-tube superheterodyne with noise limiter. Auto-response circuit for finest fidelity under all conditions. Optional Telechron Timer. Completely voltage regulated and temperature compensated. Continuously tunable from 540 KCS to 30 MCS.



$169.00 (Timer $10 extra)

HQ-140-XA

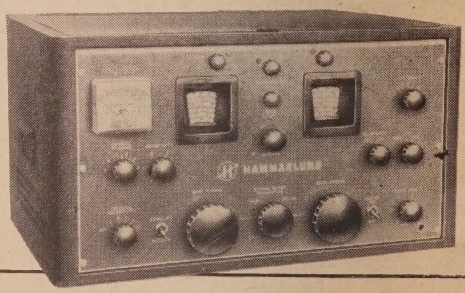
New, smooth-as-silk tuning. Crystal filter for extreme selectivity. Electrical bandspread tuning. Extremely high signal-to-noise ratio. Positive noise limiter. Full 2-watt undistorted output. Continuously tunable from 540 KCS to 30 MCS with adequate selectivity to separate crowded signals.



$249.00

HQ-150

A really different receiver. Combines Q-multiplier with crystal filter to provide the widest range of tuning techniques. Extra fine superheterodyne circuit with full noise limiter. Full 2-watt output. New, improved S meter with illuminated scale. Built-in crystal calibrator.



$294.00

Established 1910

See these Outstanding Buys at your Hammarlund Dealer, or write for literature on all three . . . Bulletin C-1156

Hammarlund Manufacturing Company, Inc.
460 West 34th Street, New York 1, N. Y.
International Division; 13 East 40th Street, New York 16, N. Y.

HAMMARLUND SETS THE PACE

CQ Staff

Product Detector

Here is another little gadget that you can whip up in a few minutes, simply connect into most receivers with little or no changes, and get amazing improvement in operation. As with the Q Multiplier and S-9'er you will probably see this circuit included in many of the popular receivers of the next few years. (It already is in the 75-A4, NC-300, etc.)

The purpose of this device is to give you improved SSB and CW reception. Did you ever wonder how come SSB signals don't sound quite as good as AM signals? Now when you get right down to it you know that the trouble isn't all those transmitters . . . the trouble is closer to home.

Here is the problem: if you turn down the RF Gain control in order to balance the BFO injection with the incoming signal you have to turn up the AF Gain and you get distortion as a result. If you turn down the AF Gain to get linear operation of the AF amplifiers then you have to turn up the RF Gain control and the unbalance of the incoming signal and the BFO injection causes distortion. There you are caught in the middle, no matter which way you turn you are wrong.

So we have to either get those AF stages linear with the AF Gain all the way on or rig up some way to get around the problem of distortion due to unbalanced BFO/signal. The latter problem turns out to be the easiest to solve. It is all done by plugging in a new type of second detector in your receiver. Most receivers have an accessory socket in the back which provides filament and B+ voltages for gadgets. Most of them also feed out the output of the i.f. for panadaptors, oscilloscopes, etc. With little or no change in this arrangement you can plug the Product Detector in this accessory socket for a remarkable improvement in SSB and CW reception.

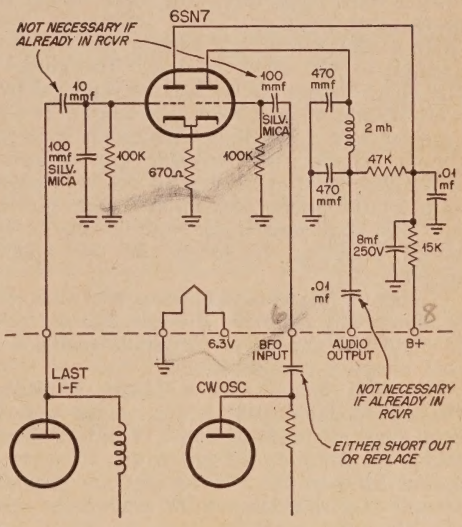


Fig. 1. This is the basic diagram of the product detector. The tube can be a 6J6 or 12AT7 with changes in the values as mentioned in the text.

How It Works

The regular second detector is a device which is non-linear and thus demodulates the i-f signal. But if we change this detector to a linear device we find that when we put in an i-f signal we get only the i-f signal coming out. This is not audible so we get no sound out. If we mix a second signal in the detector we will naturally get the two original signals plus the sum and difference frequencies in the output. Of all these four frequencies, only the difference frequency will be in the audio range and will therefore be heard. The other three will drop dead in the by-pass condensers and output transformer. The second signal comes from the BFO, as you may have guessed. With this type of detector you will hear no output unless the mixture

(product) of the BFO and i-f signals to produce audio.

Why all the bother? Well, if you give this a thought you will see that under these circumstances you can get good output from the circuit under a very wide range of input voltages from either the i.f. or BFO and the touchiness of the RF Gain tuning is eliminated. Shrewd, eh?

If your receiver doesn't have an accessory socket, hang this detector on the back panel. It is an excellent source of demodulation for exalted carrier AM reception and c.w. as the signal to noise ratio is kept at its best level because the injection voltage is not at a low level as in a diode detector receiver. For PM reception the product detector is less susceptible to selective fading.

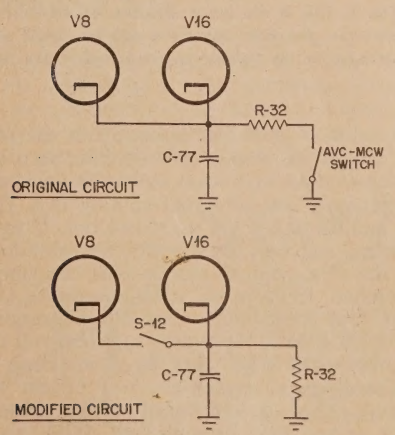
Fig. 1 shows the basic circuit for the detector. The values shown are for operation with a 6SN7 type tube. The same circuit will work using a 6J6 or 12AU7 (miniature tube). With a 6J6 the cathode resistor should be increased to 820 ohms however. The choke in the audio output circuit can be replaced by a 47K resistor if no choke is available. If your receiver has a coupling condenser from the output of the c-w oscillator this condenser will either have to be shorted out or replaced with a 100 mmfd condenser. When shorting out this condenser make sure to put a 100 mmfd coupling condenser in the adapter proper.

Either of the two basic adapters work well in almost any receiver. The selection of which to build will depend on materials available as well as space considerations.

The 6J6 model uses a Vector Miniature Plug-in, model C10-M which comes with an octal plug at the base and a 7 pin miniature socket on the top. Tie points for all parts to mount between the two sockets are provided as well as a shield can to fit around the completed assembly. Care must be exercised in construction to make sure that all parts will fit inside the cover. Prior to construction place the plug-in in the accessory socket to see if it will align mechanically front to back with the other square items in the receiver. To adjust the adapter loosen the spring retaining ring from the octal plug and turn until the adapter will align with the other parts in the receiver. Next loosen the nut and bolt which hold the assembly together and align pins 3 and 4 of the miniature socket over the respective filament pins of the receiver socket. This will allow the shortest line for the filament connections. Twist the two wires to cancel any hum tendency that might appear. The 8 mmfd filter condenser is about as large as can be used, all other condensers should be of the disc ceramic type with the exception of the silver mica to ground from the input grid.

The 6SN7 model detector uses a home built socket constructed as follows. Mount a flange type octal socket over a flange type octal socket using 2½" spacers. In the space between the plug and socket mount all the necessary components.

For receivers with miniature accessory sockets there are available commercial Vector sockets or small adapters can be built using the components themselves to hold up the top socket when the tube is of the miniature type.



The Switch in the NC-183D has to be re-wired as shown above.

NC-183D

After the adapter is built modify the receiver by carefully unsoldering C88 from socket X8 pin #2 and solder this to pin #6 of the accessory socket after first removing the ground wire. To remove the AVC, the AVC-MCW switch S12 must be rewired as shown in fig. 2. This involves unsoldering R32 from S12 and resoldering it to ground. The lead from pin #1 of V8 is now cut and soldered to one side of S12. Another wire must then be run from the other side of S12 to pin #1 of V8. The BFO can now be left on all the time. In operation the phono-radio switch becomes a Mode switch with the Phono position now functioning as CW and SSB modes of reception. For AM the switch is placed in Radio.

HRO-60

Receiver modifications are as follows. Remove the jumper on S-7, the NFM position audio lead, from the ground section and solder it to the adjacent AM position connection. Then unsolder C-125 from socket X9 pin #3. Replace it with a 100 mmfd ceramic condenser connecting the other end to the NFM socket as outlined in the NC-183 instructions. For operation S-7 need only be thrown to the CW position, as usual.

For other receiver types the basic plan can be followed. ■

William E. Buffington, Jr., W4FXQ
5208 Birkenhead Road
Jacksonville 10, Fla.

Save it—Spray it

No doubt one of the most useful chemicals for the electronic workshop is a can of Krylon ACRYLIC spray. The protective service it offers, and the time and work saved makes the small cost a very wise investment. And it can be applied to dozens of odd jobs, both small and large.

Name plates on motors, generators, transmitters and other equipment often become tarnished or corroded, sometimes to a point where the data on them becomes unreadable. Before this happens shine them up with steel wool or cleaning compound, wipe clean, give them a shot of Acrylic spray and they'll stay bright and readable for a long time.

INDUCTANCE EQUIVALENTS
By
Illumitronic Engineering

DIA	TURNS PER IN	B & W	AIR DUX*
1-1/2"	4	3001	404T
	6	NONE	406T
	8	3002	408T
	10	NONE	410T
	16	3003	416T
	32	3004	432T
5/8"	4	3005	504T
	6	NONE	506T
	8	3006	508T
	10	NONE	510T
	16	3007	516T
	32	3008	532T
3/4"	4	3009	604T
	6	NONE	606T
	8	3010	608T
	10	NONE	610T
	16	3011	616T
	32	3012	632T
1"	4	3013	804T
	6	NONE	806T
	8	3014	808T
	10	NONE	810T
	16	3015	816T
	32	3016	832T
1-1/4"	4		1004
	6	N	1006
	8	O	1008
	10	N	1010
	16	E	1016
1-1/2"	4	N	1204
	6	O	1206
	8	N	1208
	10	E	1210
	16		1216
1-3/4"	4	N	1404
	6	O	1406
	8	N	1408
	10	E	1410
	16		1416
2"	4		1604
	6		1606
	8	3900	1608
	10	3907-1	1610
	16		1616
2-1/2"	4		2004
	6	3905-1	2006
	8	3906-1	2008
	10		2010
3"	4	N	2404
	6	O	2406
	8	N	2408
	10	E	2410

*T M.

The above are constructed of tinned copper wire. AIR DUX* are also available in formvar covered and silver plated wire.

For protecting panels with lettering on them, or for permanently sealing freshly applied decals, it works wonders. After applying decals let the panel dry a few hours, mask off where necessary and spray.

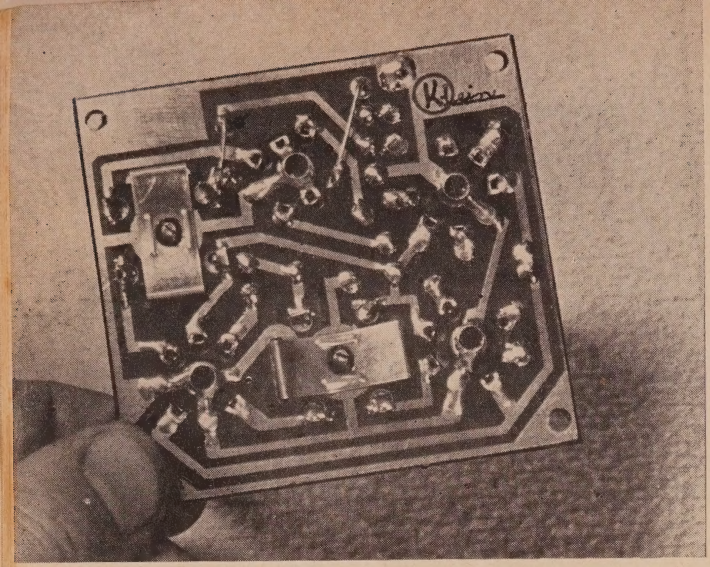
Try it on storage batteries too, both in the shop and in your automobile. Clean them good with soda water—all over, top sides and bottom. Be careful not to get any of the soda water into the battery as it will neutralize the electrolyte. When clean wipe dry, mask off the vent holes and spray all over. The battery will stay clean for months. When due for a cleaning again just dust off with a clean dry cloth or clean paint brush.

Articles wrapped in friction tape: tool handles, splices, etc., make natural magnets for the attraction of dust and dirt and really leave your hands sticky and smudged after handling them. Next time when using tape, spray your work with this wonder chemical and it'll stay clean, in new condition, and end the messy hands for good.

Use it to protect schematics, documents, and book covers. And as an extra added bonus, it makes a pretty good insulating material. When used on TV or transmitter hi-voltage circuits it helps prevent corona and arcing. Also use it to weatherproof antenna installations and outside electrical wiring.

For best results, take your time to do a good job, handle the spray can as you would for any spray painting job, and follow these cautions:

1. Keep the spray moving at all times and do not get too close to the object being sprayed. This is important, if neglected too much spray may be applied over too small an area and it will run.
2. Use in a well ventilated room.
3. Be sure one coat is dry before applying a second. Each coat should dry in ten to fifteen minutes.
4. For maximum protection more than one coat is recommended. ■



E. L. Klein, W4UHN

Bottom View of Finished Etched Circuit Board

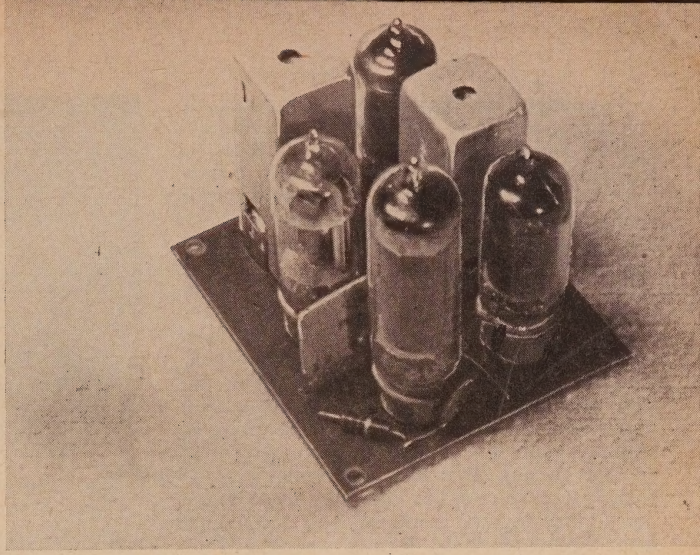
Printed use of

Comparison of PRINTED CIRCUIT KITS

SUPPLIER	NAME	NO.	PRICE 1/	Copper Clad Phenolic 2/						Hardware				
				Single Clad			Double			Sockets				
				Plain	Presensitized	Plastic Coated	Plain	Presensitized	Mechanical Negative 3/	7 Pin	9 Pin	Assorted	Connectors	Eyelets
"KEPRO" Keil Engineering Products, St. Louis, Mo.	Standard	S-101	3.45			36								
	Professional	P-101	5.40		36				36					
	Printed Circuit Lab 5/	L-505	31.50	45	187		18	133	400	10	10		1	3/
	Photo Layout	PL-2	2.95											
Techniques, Inc. Englewood, N. J.	Basic	5001P	3.75	29						1		2		24
	Experimenters	5002P	4.75	56			16			1		2		24
	Serviceman-Technicians	5003P	9.75	113			16					6		60
	Industrial Laboratory	5004P	27.00	205			164					10	1	60
	Prototype Laboratory 6/	5005P	47.00	205			164					10	1	72
Micro Circuits Co. New Buffalo, Mich.	Basic Laboratory 7/	S31	55.49											
	Industrial Kit	S21	10.47											

1. Net FOB factory as of 31 Dec. 1955
2. Numbers represent square inches of material furnished
3. Quantity of material not stated in available literature
4. Numbers represent ounces of chemicals furnished

5902 Brunswick St.
Springfield, Va.



Top View of Finished Etched Circuit Board Showing Placement of Components

Circuit Kits

Recently announced "Printed Circuit Model Makers Kit" is also available from Photocircuits Corporation, Glen Cove, New York for $25.00. 450 square inches of plain single and double clad phenolic are included as well as tube sockets, etching powder and tray, resist ink, pen and drawing guide.

ETCHED CIRCUIT KITS															LAYOUT KITS						PAINT KITS					
Chemicals 4/						Equipment									Adhesive						Paints					
Resist				Etch		Tray		Light							Resist		Photo									
Photo	Paint	Thinner	Developer	Solution	Dry	Developing	Etching	Safe	Printing	Printing Frame	Brush	Drill	Cleaning Pad	Cotton Swabs	Tape (roll)	Circles	Strip (inches)	Letters & Numbers	Graph Layout Paper	Illustration Board	Conducting 8/	Resistance	Magnetic	Solvents	Colloidal Graphite	Insulating Lacquer
	2			4			1				1		1													
			4	8		1	1			1			1													
	2	2	20	20		2	2	1	1	1	1	1	1	10		112	324	1/300	2	2						
																112	324	1/300	2	2						
					6		1					1			1	10			2							
					6		1					1			1	20			2							
	1			3/	12		1					1			1	20			2							
3/	1		3/		30		1					1			1	40			2							
3/	1		3/		30							1			1	40			2							
											1										9 Tr. Oz.	25 cc	2 Oz.	300 cc	1 Pt.	
											1										5/8 Tr. Oz.	40 Z.		10 Z.		10 Z.

5. Also includes one Kepro PL-2 Photo Layout Kit
6. Also includes silk screen printing equipment
7. Also includes one Micro Circuit Industrial Kit
8. Silver base

Advantages and applications of printed circuits are increasingly apparent as the basic and applied knowledge of them widens. With the availability of several different types of printed circuit kits on the market, the practical possibility of adapting printed circuits to single unit or small quantity production has been appreciably enhanced.

The layout of circuits using printed circuit techniques, and the production of etched circuit boards in the home workshop have been previously described[1]. Also, numerous commercial applications of printed circuits and their specially designed components have been displayed[2]. These commercial applications essentially apply to volume production; production, to be sure, in which numerous amateurs participate. Yet, to the amateur, the satisfaction of building and using can best be obtained from the actual doing. Printed circuit kits furnish the amateur this opportunity.

Choosing the Kit

Whether the amateur elects to make etched circuit boards, or printed circuits with conductive and resistive paints, he can choose from a number of excellent kits which contain all the necessary materials, tools and instructions to produce most gratifying results. The accompanying table illustrates the variety of

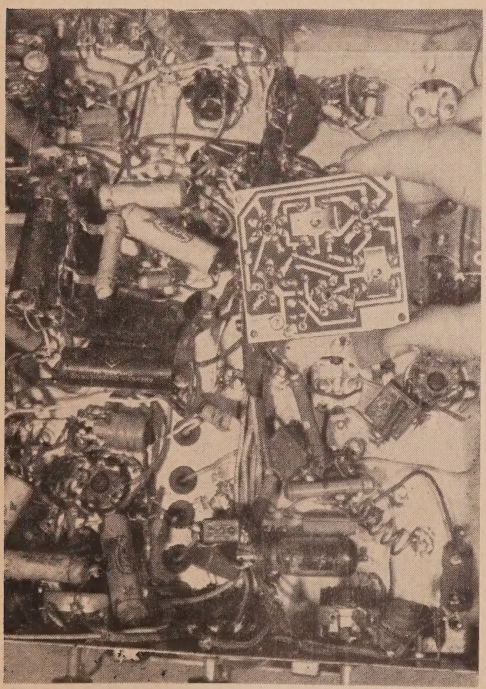


Fig. 1. Comparison of an Etched Circuit Board Made from Materials Supplied in Kit Form with Conventional Type Wiring in a Typical "Not Too Modern" Receiver

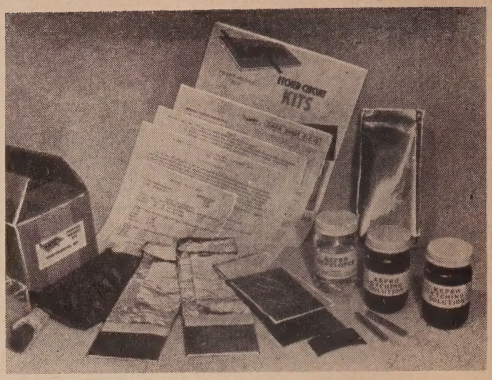


Fig. 2. Materials Supplied with a Typical Etched Circuit Board Kit

materials which are furnished and hints at the different possible methods of approach in the use of printed circuit kits. Extra circuit board stock, chemicals and conductive paints are available directly from the kit suppliers at reasonable costs[3] to replenish those materials consumed from the kit. In time, a preferred method of producing printed circuits will become evident to the experimenter, and he may then concentrate his purchases on the individual materials needed, thus realizing economies over buying the complete kit for each job.

Two other types of printed circuit kits are also available in addition to those listed in the table. One type contains materials and tools for servicing printed circuits[4]. The other provides for assembling complete items of test equipment such as oscilloscopes and vacuum tube voltmeters[5]. In these, as well as in others including one for a crystal calibrator[6], the etched circuit board is already made and the amateur constructor has only to assemble the parts thereto and accomplish the necessary wiring to the power supply or switches.

Circuit

For the purpose of demonstrating etched circuit techniques, an RF-IF-AF "strip" has been designed utilizing a 6BE6 mixer, 6BA6 IF amplifier, 6AT6 detector-first audio, and a 6AQ5 audio output amplifier. Added flexibility is afforded by the fact that these 6 volt heater tubes have 12 volt heater counterparts which are interchangeable. As can be seen in the photographs (previous page) the four tubes are placed along with the IF transformers and other components in a neat compact arrangement. A "couplate", which in itself utilizes printed circuits, has been chosen to couple the

1. "Printed Circuits and the Amateur" Parts 1-3, CQ, Feb, Mar, Apr 1956
2. "Applications of Printed Circuits", CQ, Sept. 1956.
3. For example, XXXP phenolic, copper-clad on one side and presensitized costs approximately 3½¢ per sq inch in small quantities.
4. General Cement Co.
5. Such as Heath and Knight Kits.
6. International Crystal Mfg. Co.

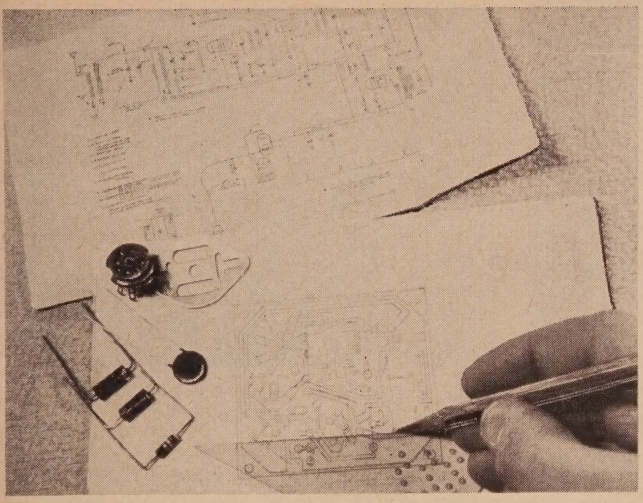


Fig. 3. Making a Pencil Layout from the Schematic Diagram

first audio amplifier triode plate section to the grid of the audio output tube. Manually operated parts, frequency determining components and power supply have been eliminated from this "strip" so as to maintain its versatility.

Materials

Also, for the purpose of demonstrating the use of typical printed circuit kits, the Kepro Professional Model kit has been chosen because it uses the photoengraving process and affords a choice of methods for making the master negative. As seen in *Fig. 2*, the materials furnished with this kit are from left to right—plastic etching tray with cover, steel wool cleaning pad, red cellophane for making a safe light, two presensitized copper-clad phenolic panels wrapped in foil, glass cover, cutting film and small sample for practice purposes, two clamps, bottle of developer, two bottles of etching solution, folded aluminum developing tray and literature.

Making the Negative

In the photoengraving method, it is first necessary to prepare a master drawing, from which a negative is made. The negative may be made either photographically or cut by hand. One supplier of kits[7] also furnishes a photographic negative service whereby a 3 by 6 inch photographic negative is made from the amateur's large scale master drawing at a nominal charge.

When making a hand cut or mechanical negative as it is frequently called, a special red coated plastic ruby cutting film is used. The coating is cut or scored to outline the desired conductors or conducting areas and the red coating peeled away in those areas. The remaining red coating prevents passage of actinic light, (principally ultra-violet), which in the clear areas, activates the sensitized surface of the copper-clad circuit board. Areas thus

7. Keil Engineering Products, 4356 Duncan, St. Louis 10, Mo. ($2.50 plus postage for 3 x 6 negative)



Fig. 4. Stripping Off Red Film Layer on Practice Strip

activated are rendered impervious to action of the etchant by subsequent developing and washing.

In this case, a full size drawing is made and actual parts including tube sockets, resistors and condensers are used as templates. While etched circuit boards do not offer the ultimate in miniaturization, the extra thought required for their layout usually pays off in reduced size and, to be sure, in neater construction. After the necessary revisions have been made to minimize cross-overs and achieve most desireable parts placement, the conductors and eyelets are carefully drawn in as shown in *Fig. 3*. Pencil is adequate for this layout work.

Prior to proceeding with making of the finished mechanical negative, it is advisable to experiment on the sample strip supplied with the kit as shown in *Fig. 4*. A pocket knife, stylus, razor blade or even a common pin is adequate for rupturing the upper red film layer of the ruby cutting film negative. After the outlines are thus defined the red layer readily separates from the heavier transparent base.

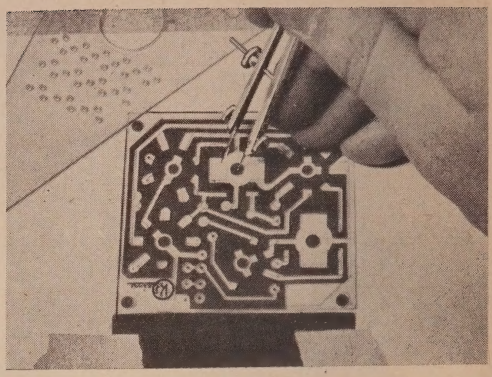


Fig. 5. Transferring Pattern from Full Size Drawing to the Ruby Cutting Film

This process of hand cutting a negative is similar to that used for a number of years by commercial artists in making silk screen stencils. A little practice will produce clean, sharp lines.

In transferring the image from the layout drawing to the cutting film as shown in *Fig. 5*, the semi-transparent film is laid over the pencil drawing so that the glossy red side is up. The two may be held in alignment with cellophane or drafting tape and this sandwich placed on a hard surface while tracing the outlines. Care should be exercised when using high tenacity pressure sensitive tape, for it may act to lift the red film from its base. Usually the pattern can be readily distinguished through the red film. However, if greater accuracy is sought, a draftsman's light table may be used, or the sandwich secured to a window pane so that light passes through it. Conductors of uniform width can be made by setting a pair of bow dividers to that width and drawing their points across the film surface at an angle of approximately 60° to the surface while applying a light downward pressure. Experience has shown that, as with other mechanical drafting, circles should be cut first, followed by straight lines. Care is exercised so as not to cut through or otherwise damage the transparent plastic base sheet.

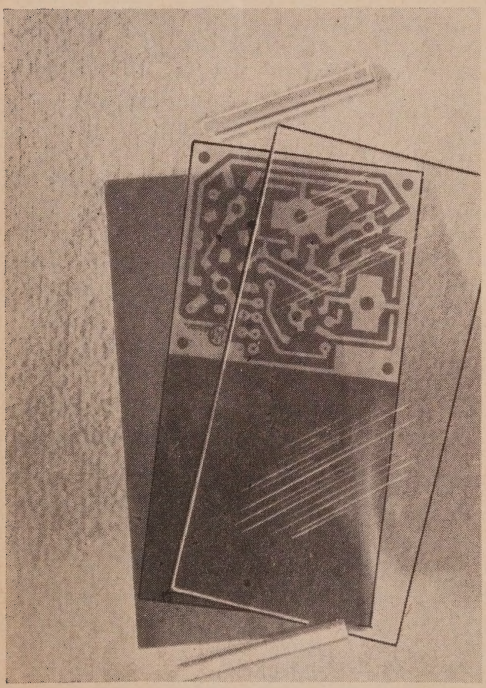


Fig. 7. Above, Assembling Negative and Presensitized Copper Phenolic Laminate for Exposure

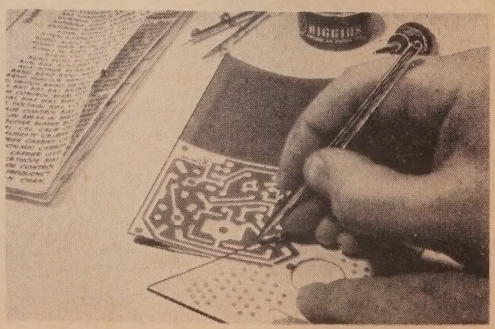


Fig. 6. Right, Touching Up with India Ink on the Reverse Side of the Negative

Slight errors can be corrected and nomenclature added by applying black India ink to the negative as is being done in *Fig. 6*. Ink adherance is best on the reverse side due to its satin finish. Component labels, trademarks and even operating instruction can be added by means of opaque decalcomania transfers. These must be added to the front side of the clear areas so as to be legible. Transfers such as used on the front panels of amateur equipment are quite satisfactory, provided that the use of an excessive amount of water is avoided.

Exposing

Working under subdued light, the hand cut negative is sandwiched between the sensitized surface of the laminate and the glass cover. Two aluminum clamps provided with the kit, and shown in *Fig. 7*, are slipped on either end, causing the glass to hold the negative in firm contact with the sensitized surface. Front and back surfaces of the sensitized clad phenolic can be identified by inspecting under reduced illumination and in time, simply by the touch. It is important that the entire surface of the negative is in intimate contact with the sensitized surface when making the exposure, and that those surfaces are free from all dust and lint. Only semi-dark conditions are required for handling this pre-sensitized material because the emulsion is responsive principally to light in the ultra-violet spectrum. A 15 or 25 watt incandescent lamp at least 7 feet away provides acceptable general illumination, but it should preferably be shielded with the red cellophane sheet provided in the kit. Fluorescent lamps should not be used for general illumination and the sensitized material should be protected with the foil in which it comes wrapped, when not being processed.

When using a standard number 2 photoflood bulb at 10 inches, as shown in *Fig. 8*, the exposure time is three minutes. Circuit boards larger than the effective beam diameter will require the lamp to be placed further away; in which case, the exposure is increased. A photographic light meter may be employed to correctly measure the light intensity. However, a handy rule to remember is that the exposure time increases in proportion to the square of the distance. Areas protected by the red parts of the negative are unaffected by light and remaining soluble, are removed in the developing process.



Fig. 8. Exposing to Harden Sensitized Surface

Developing

A folded aluminum foil tray is used to hold the developer which, due to its rapid evaporation, is poured slowly and covered with the plastic lid while being gently agitated. Breathing of fumes from either the developer or etching solution should be avoided. Also, the

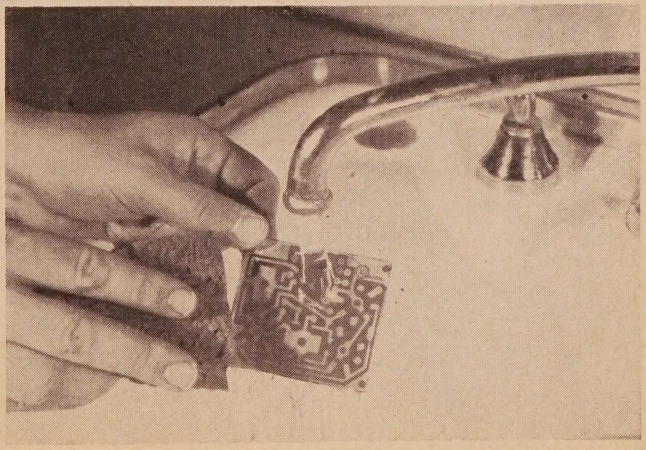


Fig. 10. Rinsing to Remove Developer and Dissolved Sensitizer



Fig. 11. Etching in Plastic Tray to Remove Unwanted Copper

developer should not be allowed to contact the plastic tray or its lid, for deterioration thereof will result. After one minute, development is complete and normal working lights may again be used. The developer is then returned to its bottle for further use and the circuit board allowed to dry for approximately 30 seconds.

Running luke warm water is used to flush the surface clean and a soft sponge is sometimes gently applied to remove any residue left from the dissolved sensitizer. Care is taken not to scratch or slide the image while it is soft.

Etching

A short length of wire threaded through a hole in one corner of the panel, as shown in *Fig. 11*, provides a convenient means for handling the panel while it is being etched. Etching time, usually 10 to 30 minutes, is dependent upon temperature, agitation and newness of the bath. The etching action is considerably accelerated when the surface is alternately exposed to the solution and to the air. When rocking the tray, it should be covered with the plastic lid, which comes with the kit, to prevent spilling. Upon completion of the etch, which is evident when all traces of unwanted copper are removed, the circuit board is thoroughly washed and the etching solution returned to its bottle for possible future use.

Removing Resist

Steel wool supplied with the kit, is used with soap and water to scour the remaining resist from the surface of the circuit board after etching—*Fig. 12*. When clean, the copper surface is susceptible to oxidation and will discolor in a short time impairing its looks and solderability. Assembly therefore should follow this cleaning operation within a day or so, otherwise the copper surface must again be scoured prior to assembly.

Assembly

Solder eyelets readily "spot" the holes for mounting components and hardware. Drill sizes which permit ready insertion of terminals, leads, etc. should be selected so as to avoid undue pressure on the circuit board and danger of its becoming broken. Templets made from a scrap piece of copper-clad phenolic greatly assist in locating holes of critical spacing such as required by some types of tube sockets. It is not necessary to center punch for the smaller holes. However, when drilling larger holes, greater location accuracy will be obtained by first drilling a small pilot hole. If the phenolic chips away on the back side, it is an indication that the drill is dull or that a hard backup block is needed. Separation of the foil on the front side may be prevented by sharpening the drill with a slight negative rake.

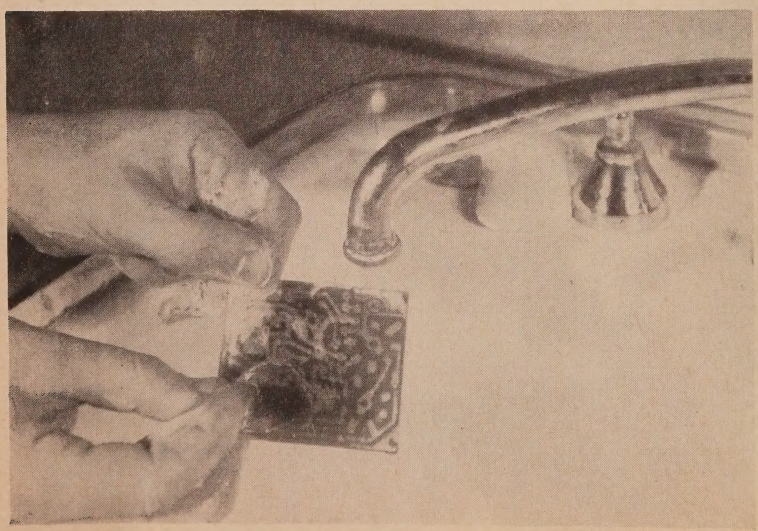


Fig. 12. Washing with Soap and Steel Wool to Remove Etchant and Sensitizer

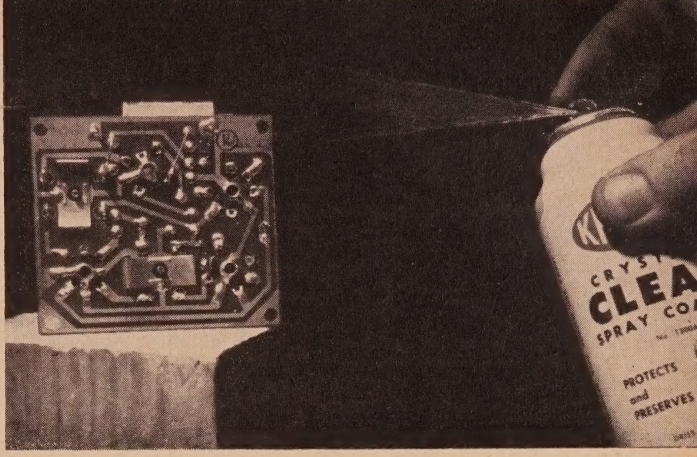


Fig. 16. Applying Plastic Spray Coat to Finished Circuit Board

After the leads of each component have been inserted into their holes, they may be bent over slightly to prevent the component from dropping out. Leads of resistors and condensers are cut off about 1/16″ from the board with a pair of diagonal cutters prior to soldering.

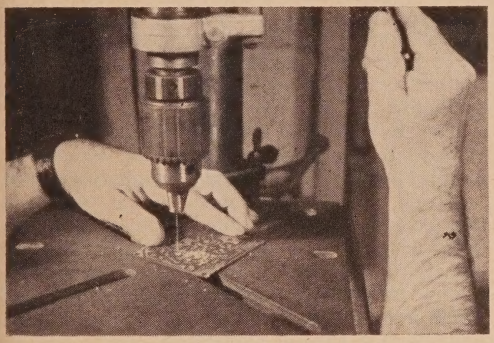


Fig. 13. Drilling Circuit Board for Sockets and Components

Only rosin core solder of the low melting point variety should be used. Both solder and the iron are simultaneously applied to the joint, as in *Fig. 14*, to obtain most efficient fluxing action. If the solder does not instantaneously flow to envelop the joint, it is indicative of insufficient cleaning or improper solder. Excessive heat should be avoided and special care taken not to disturb the bond between foil and phenolic because the adhesive bonding them together is actually fluid at soldering temperatures. Small pencil irons work very well under average conditions.

Finishing

A uniform workmanlike appearance can be given the finished circuit board by scrubbing away surplus rosin with an old toothbrush generously saturated with denatured alcohol. Some types of medicinal rubbing alcohol are unsuitable for this purpose due to other additives they contain.

The bright appearance of the polished copper and new solder can be preserved by coating the board with a plastic acrylic spray.—*Fig. 16*. Such coating also improves the insulation resistance between conductors and minimizes subsequent moisture absorption by the phenolic.

Conclusions

The completed circuit board is ready for operation when wired to tuned circuits, gain control, speaker and power supply which are mounted separately. This compact RF-IF-AF "strip" could be put to practical use in a mobile short wave receiver, broadcast receiver, conelrad alarm, marine radiotelephone, autocall, beginners communications receiver, and numerous other applications which will be apparent to the amateur.

Investigation of numerous printed circuit kits has disclosed considerable planning to have been spent on them by their suppliers. Complete with all chemicals, materials and tools necessary to produce an efficient and workmanlike job, printed circuit kits today are doing much to make the advantages of printed circuits available to the amateur. ■



Fig. 14. Soldering Components in Place

Use your receiver as the transmitter VFO for SSB.

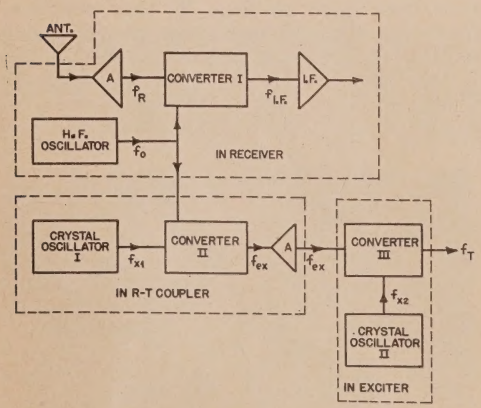
James E. Taylor, W2OZH
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Pleasantville, N. Y.

The R-T Coupler

For many years good amateur operating procedure has dictated that stations in contact with each other operate on the same frequency. This technique not only contributes to operating convenience but also greatly reduces QRM in our crowded amateur bands. With the advent of amateur single-sideband techniques the application of this method of operation has become imperative, and where control to within a few kilocycles was sufficient previously, now it is necessary to synchronize frequencies with a tolerance of but a few cycles. The manufacturers of receivers have responded to these increased requirements by providing a degree of receiver stability which was considered unattainable only a few years ago. Considerable attention has been given the stabilization of transmitter frequency and here also a dramatic improvement has been effected. However, these developments have been accomplished by a considerable duplication of effort so that a ham station boasting of modern equipment presents the spectacle of an expensive receiver equipped with an excellent bandspread dial and oscillator circuit, while alongside this unit rests a v-f-o unit embodying essentially the same features. The desirability of eliminating this duplication of equipment is obvious.

Since the station receiver is normally tuned to the desired operating frequency by adjustment of its high frequency oscillator, the transmitter frequency can also be derived from this oscillator.

The R-T coupler to be described was developed for a specific application, namely to couple from a conventional single-conversion receiver, the NC-173, on a single band, 75 meters, to an exciter having a 5-mc input, the 10A. However, it will be obvious that the principles can readily be extended to include other receiver-transmitter combinations and multiple band operation as well. It will also be obvious that several alternative circuit designs could have been used, but those given here were chosen mainly because of their simplicity of operation.



f_R = FREQUENCY OF RECEPTION
f_o = FREQ. OF RCVR. OSCILLATOR
f_{x1} = CRYSTAL FREQ. IN COUPLER
f_{ex} = EXCITER INPUT FREQUENCY
f_{x2} = CRYSTAL FREQ. IN EXCITER
f_T = OUTPUT FREQ. OF XMTR.

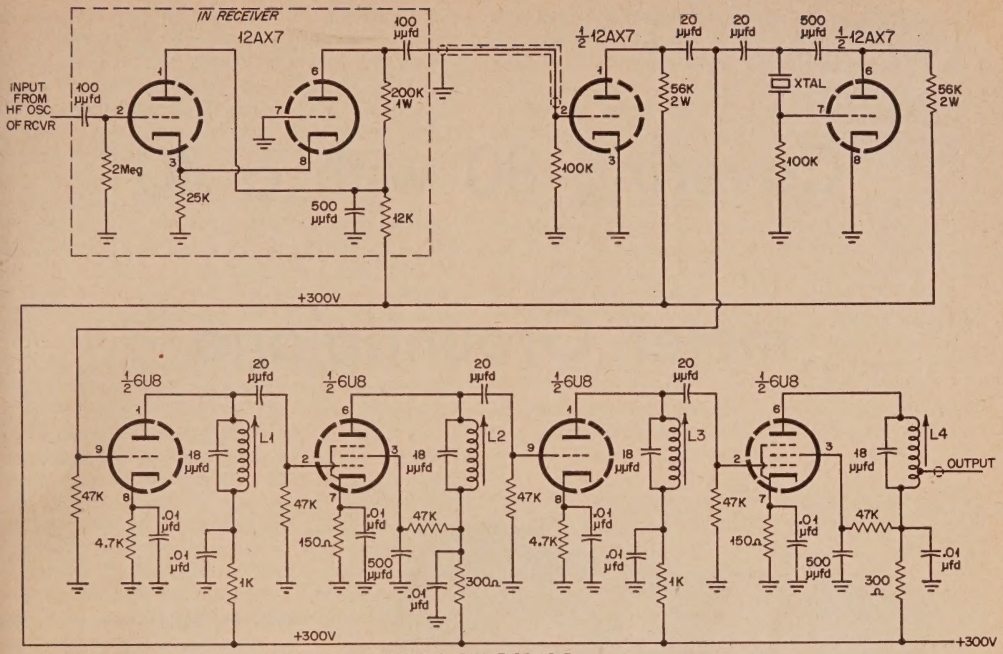
Fig. 1.

Principles of Operation

The basic circuit of the R-T coupler is a crystal-controlled converter. This converter utilizes the local oscillator output of the receiver to derive transmitter excitation power to replace that normally furnished by the v.f.o.

In this particular application three converter stages are involved: the mixer stage of the receiver, the converter stage of the R-T coupler, and that of the transmitter exciter. The equations relating the frequencies of these converter stages will be reviewed, since they direct the choice of the crystal for the coupler. These relationships will be given with reference to the overall block diagram, *Fig. 1*. Simple modifications will permit their adaptation to other receiver-transmitter combinations.

Referring to *Fig. 1*, the output frequency of each converter stage is equal to the positive



L1, L2, L3, L4 – CAMBRIDGE THERMIONIC SLUG-TUNED COILS, 5 MC TYPE LS-3.
XTAL – 9.455 MC CRYSTAL (VALPEY CM5).
UNLESS OTHERWISE SPECIFIED, RESISTORS ARE ½ WATT.

Fig. 2. Complete VFO from Receiver Output.

difference between the input frequencies. Thus, we have

$f_{i.f.} = f_o - f_R$ (The h.f. oscillator frequency is known to be *higher* than the received frequency.)

$f_{ex} = f_{x_1} - f_o$ (Exciter input frequency must *increase* as receiver frequency *decreases*.)

$f_T = f_{x_2} - f_{ex}$. (Exciter crystal frequency is *greater* than the input frequency.)

Eliminating f_o and f_{ex}. among the above relations yields

$$f_{x_1} = f_{x_2} - f_T + f_{i.f.} + f_R$$

Now if the transmitter output is to be on the received frequency, $f_T = f_R$, so we have:

$$f_{x_1} = f_{x_2} + f_{i.f.}$$

This equation states that, for the particular configuration of converter frequencies used, the transmitter and receiver will be on the same frequency if the crystal used in the R-T coupler has a frequency higher than that of the exciter crystal by an amount equal to the receiver i.f. frequency.

Now, in our particular case

f_{x_2} = 9000 kc (for the 10A)

$f_{i.f.}$ = 455 kc (for the NC173)

so that f_{x_1} = 9455 kc

Thus, in order to have our receiver control our transmitter to the received frequency it is only necessary that we insert between the two a coupler which contains a crystal controlled converter with a 9455 kc crystal, and which has suitable isolation and amplification!

Practical Circuitry

The prototype R-T coupler in use at W2OZH is composed of three parts: (a) A cathode-coupled 12AX7 double-triode isolating amplifier. (b) A crystal controlled converter stage using a second 12AX7 double triode. (c) An amplifier using two 6U8 triode-pentode tubes with tuned plate circuits. The schematic diagram of this circuit is shown in *Fig. 2*.

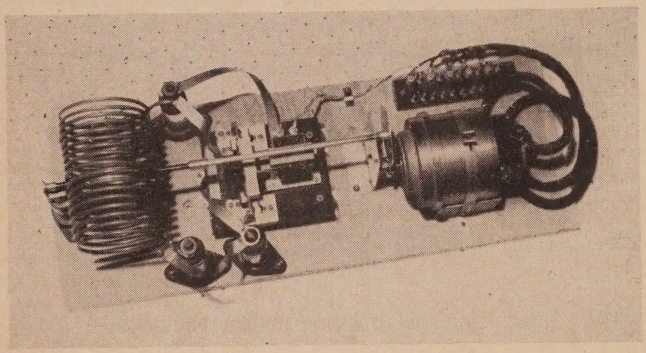
The cathode-coupled isolating amplifier is mounted under the chassis of the receiver close to the h.f. oscillator circuit so that the input coupling lead is short. The output from this amplifier is coupled through coaxial cable to the remainder of the coupler circuitry which is housed in a small separate box.

The crystal controlled converter is a simple double-triode mixing stage and it will be noted that there are no tuned circuits in either this stage or the isolating amplifier—a fact which lends itself well to the possibility of incorporating band-switching in the unit.

The plate-tuned amplifier is conventional in all respects and it will be seen that the gain is adequate to allow for losses in coupling lines and for variations in different receiver oscil-

[*Continued on page 130*]

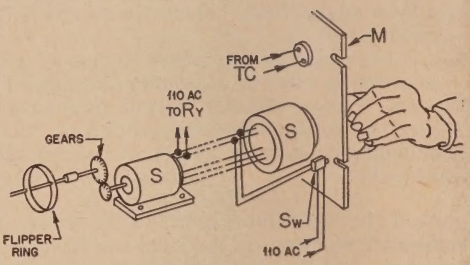
Covering 80 with a 40 meter Groundplane



When the Selsyns controlled from the shack are energized, the relay switches from 40 to 80. Below is the diagram of the Selsyns.

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A location in the city where long-wire antennas do not help the old "good Neighbor policy" is a plight encountered by many. Being in this situation, it was decided to try a tuning system which might overcome the restriction presented by a loaded (short) antenna, namely narrow bandwidth. The mobile whip is (on 75) an extreme example of this, and puts one way back in the pre-VFO days. Plus or minus ten kilocycles without some means of tuning is about the operating limit in the name of efficiency. Loading an eighth-wave antenna gives more range, however it is still necessary to change the inductance to permit operation over the band without large losses and insufficient loading on one or both ends of the band. The SWR for a loaded eighth-wave wire on 3750 kc may exceed 4-to-1 at the band edges of 4 and 3.5 mc as measured on a 50-ohm coax feed. Since the loading inductance is seldom within reach of the operating position for such a system, it becomes a problem to make quick frequency changes when desired.



There are many ways to build a variable inductance, such as the variometer, "trolley-inductor," etc. One seldom-used device is the adjustable disc or "flipper-ring" placed in the field of a coil. This type is found in some receiving or small transmitting coils as a slug of metal to trim the inductance by a screw adjustment. The ring is constructed to fit inside the coil, and is mounted on a shaft for rotation. It offers some advantages, where the inductance change need not be very large, over devices with pigtail connections like the variometer, or sliding contacts like the trolley coil. Beside having no direct connection to the coil, the ring may be made to turn with very little friction. This feature permits the use of "Selsyn" drive.

Having a pair of Selsyns on the shelf and a 7 mc vertical groundplane on the roof, it was decided to give the idea a try, the idea being to tune the system from the "shack" for quick frequency change and enjoy low SWR over the band. As it turned out, the thing works smoothly with an SWR of nearly unity over the whole band. Using a relay it may be returned to 40 quickly (or 21 mc if need be).

The antenna at hand is a rather conventional 7 mc groundplane made of aluminum thin-wall pipe, 2½-inches in diameter for the first 20 feet and 1½-inch for the remaining height, making approximately 32 feet above the radials. The groundplane is made of four radials, a quarter-wave long, sloping down the roof-line and guyed to points surrounding the house. A measurement of the 7 mc feed-point impedance was attempted using a "differential capacitance bridge" and also a *Q*-meter without success due to the terrific field-strength from local BC stations in the area. The bridge promptly flew off-scale and the *Q*-meter would not sit still in spite of a try at filtering-out the unwanted r.f. But, the antenna loads well on 40 using 50-ohm coax about 50-feet long. The point is, it seems to act as one might expect.

The Loading Inductor for 80.

To start with, a small 20 μh inductance of uniform pitch and diameter was placed between the base of the vertical and the groundplane. Setting a grid-dip oscillator on 3.5 mc, the tap (on the *GP* end) was moved till resonance was found. Using a calculator, the inductance was then found to be 15 μh at the low frequency end of the band.

If a full-legal-input type of transmitter is going to be connected to the antenna as it is here, or if low losses are desired, it is desirable to aim at a very high-*Q* inductance as may be seen later. Choose your winding form so that the length to diameter is near 1-to-2, for the highest Q. Since some 3/16" copper tubing was available along with a winding form about 4" in dia. (from pantry stock, see photo), the coil turned out to be 4.5-inches dia. and 5-inches long. The measured Q is over 400 for this coil. (A Q of near 600 may be obtained from a 10 μh coil at 3.5 mc using ⅛th-inch copper tubing with an L/D ratio of ½.) Eddy-current losses in large conductors start pulling the Q down as the conductor size is increased, so it may be the ⅛th tubing size is about optimum.

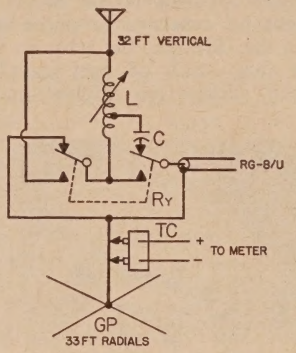
More Considerations

The antenna current on its way from the loading-coil to the base of the vertical comes to the base insulator. The capacitance at this point should be "low-loss" and as low as possible capacitance-wise so that the power division here will favor a path up the antenna. Where an ordinary Bakelite insulator will get by for low-impedance feed when the antenna is used on quarter-wave operation, this insulation will become lossy when fed and loaded at the lower frequency. A 2 by 6 inch glass insulator is used in this case, and an inverted plastic cup covers the top of it to keep the weather off.

Having taken care to lower the loss in the shunting base insulator, let's see what the loading coil does in this system as far as losses are concerned.

The series resistance of a coil is equal to its reactance divided by its Q. The reactance of 15 μh at 3.5 mc equals about 330 ohms. The Q of the coil used measures 440. Then dividing 330 by 440 gives a series resistance of 0.75 ohm.

The radiation resistance of a "short" dipole according to J. D. Kraus, *Antennas,* is shown to be 80 times pi squared, times the squared ratio of the length (of the short dipole) to its operating wavelength. The "80" in this case is a constant having nothing to do with meters.



C–MALLORY MH555 0.001 μFD MICA
L–RING TUNED LOADING COIL 15 μH MAX (SEE TABLE)
RY–ANTENNA CHANGE OVER RELAY DPDT
TC–THERMOCOUPLE HEATING UNIT G.E. 0.75 AMPS (FROM BC-442-A ANTENNA RELAY UNIT. BRIDGED ACROSS 3IN. PORTION OF ONE-HALF IN. COPPER-RIBBON GP LEAD.

Diagram of the vertical and wiring of the coil, relays, etc.

Taking the liberty of assuming a couple of assumptions here, we put two eighth-wave 33-foot verticals back-to-back and come up with a short dipole 66 feet long on 80 meters, fed in the center. This gives us a ratio of 66 divided by 284 feet (one wavelength on 80) which equals 0.23 nearly. Squaring 0.23 gives approximately 0.054, so putting the numbers together, it looks like:

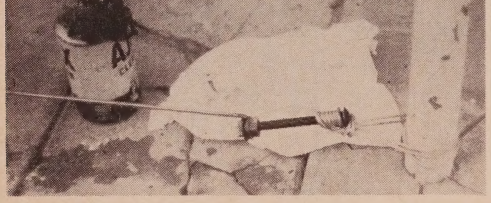
80 x 10 x 0.054 equals about 43 ohms

This, then, is what has happened to the "normal" 73-ohms for a (full size) half-wave dipole as it is shortened. This impedance is about twice the value of the eighth-wave vertical or monopole, so it may be permissible to say that this shortened antenna has about 21 ohms as seen at the base insulator (plus 330 ohms of capacitive reactance).

Taking one more liberty, say that the power is divided up between the antenna resistance of 21 ohms, and the coil resistance of 0.75 ohm. If 100 watts power is pumped into 21.75 ohms, then 96.5 watts appear across the 21 ohm part, and 3.5 get lost in the coil. Obviously the coil could be made into a small affair, but in doing this if the Q is reduced, the efficiency will be also. Anyhow we may feel pretty sure that the coil up there in the attic is not going to set fire to the cobwebs even if 35 watts get lost when running full input. (R. I. please note grounded-grid final.)

So there are 965 watts in the vertical—what then? Mr. Kraus has a handy rule showing that a short dipole is about 90% as efficient as a half-wave one.

Right about now, upon turning "on" the bamboo wireless, one might hear a large pile-up coming from stations using rotary-rhombics and other highly efficient aerials. Some of the remarks might be censored to polite queries like, "Pardon me, Brother, but why do you-all put-up with that stack of beer cans?", or, "What do they charge per kilowatt-hour out



. . . stretch till perfectly straight an 18 foot piece of the tubing.

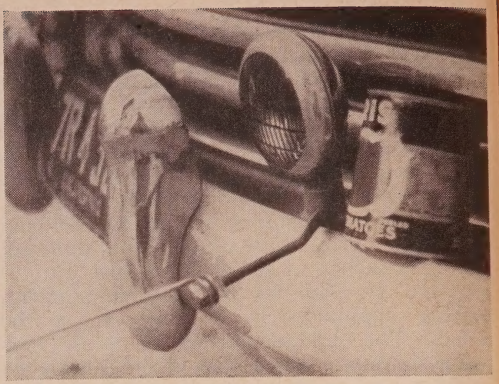
there?", or, "Get a V-beam, Bud!" Now there are two ways out. Get back on 40—for good—or turn the receiver "off" and get on doggedly with the short monopole approach. My old Aunt Harriet used to say, "Get mad enough and you can do anything!"

Combining theory, Aunt Harriet, misgivings, a carry-on-regardless attitude and what have you there in the junk-box, here we go!—to coin a few phrases.

Winding The Coil

Since coil-winding has become somewhat of a lost art, and the do-it-yourself idea is still on the up-swing, here are some pointers.

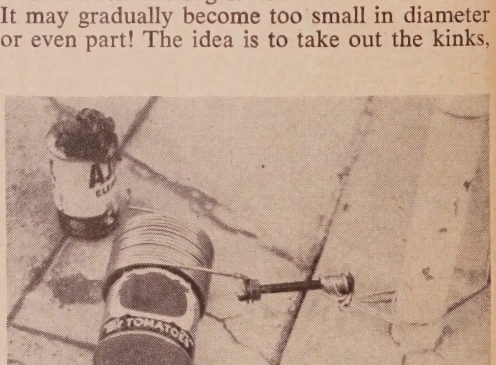
In practice the choice of coil dimensions is dependent on the coil-form available and also on the included flipper-ring which will give an inductance change required to cover the band. With the ring at right-angles to the turns the inductance is maximum,—parallel to the turns, minimum inductance. If this 90-degree rotation just covers the band, the band-spread will be maximum. The coil form is a mandrel on which to wind the tubing (see cut), and after-



. . . you may find that mere human pull is not enough.

ward may be set aside for other use. This leaves only air in the field with the ring. The coil is self-supporting except for the two insulators at either end. Since the required inductance has been measured (15 μh in this instance), a coil chart or calculator may be used to determine the turns per inch and length vs diameter for the working coil (see table below).

New copper tubing comes soft, therefore easily wound. From the following description you may wish to use eighth-inch tubing rather than the 3/16th O.D. illustrated. Unroll the tubing in a space about twenty-feet long with a well-mounted vise at one end (or a fence post). Secure one end of the tubing to the fixed point. Using a pair of lineman's pliers, stretch till perfectly straight an 18-foot length of the tubing. Some coil-winders may discover that mere human pull is not enough and wish to go to higher power. The pliers may be used to fasten the free end to the front bumper of the car as shown. With great ease the car will pull the tubing "straight as a die." Go no further than necessary, however, as the tubing will work-harden making it difficult to hand-wind! It may gradually become too small in diameter or even part! The idea is to take out the kinks,

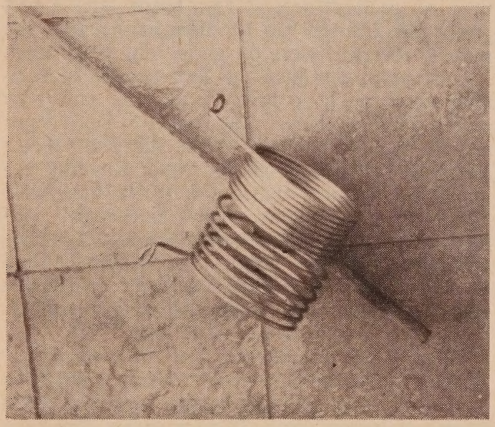


. . . the mandrel . . . may be set aside for other use.

then apply the emergency brake. If the span needs brightening-up, now is the time while it is held tight. Some household abrasive cleaner on a damp rag will do the job. With the pliers, cut one end free and close-wind the tubing on the can by holding the wound-end tight with the can underneath while leaning back on the pull of the other (fixed) end. The turns may now be spaced in the time-tested way of the old-school coil-winders. This is done with a half-inch rod in one hand while rotating the coil with the other as shown partly done in the illustration. The result will be a thing of beauty, ready to be mounted on its standoffs.

The Tuning Device

The flipper-ring is made in this case from a strip of copper-ribbon ten-thousandths thick by half an inch wide by about three-feet long. Three turns are wrapped spirally with turns



Space the coil turns by the time-proven method.

touching, to an outside diameter one-quarter-inch less than the inside diameter of the coil. If the ribbon is kink-free and polished to start with, the turns will practically form themselves into a true circle of the right diameter, and the turns may be sweated together with an iron and solder at the edges in several spots. A small *C*-clamp may be used to hold the winding tight while the outer-turn end is soldered first. The clamp may be removed and the edges soldered at three or four points on each side. In effect, a single shorted-turn is the result. It is also light in weight and will not cause mechanical oscillation in the drive system.

TABLE OF COIL DATA

Coil Diameter (I.D.)	*Length*	*Turns*	*Ring (O.D.)*	*Q*	*f kc*	*L μh*
4.25"	5"	15	4"	440	3481	15.3
				290	4020	10.6

Tubing required approximately 18 feet.

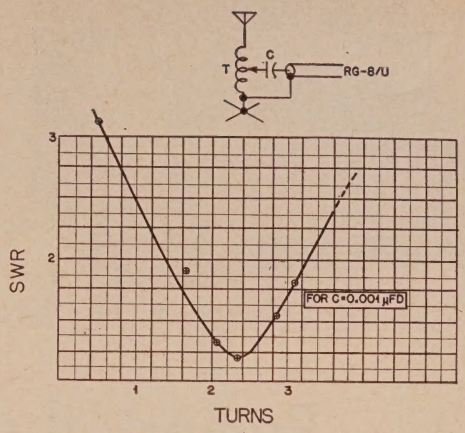


Fig. 3. Curve shows SWR vs. Turns for 50 ohm feed to the inductance for any frequency in the band to which the antenna is tuned.

Since the ring must turn only 90 degrees to cover the band, a 4-to-1 drive is used to allow one full turn of the Selsyn at the loading-coil end. A 5/8ths-inch diameter gear is used on the motor shaft and a 2½-inch gear on the ring shaft. The pitch is 16 teeth per inch. The Selsyn shaft and the ring shaft are both quarter-inch diameter. The shaft is Bakelite and is made in three pieces. The center piece is 3.94 inches long and just fits inside the ring. Both ends are faced true and tapped #6-32. The drive side extension is 2 inches or more long, faced and tapped on one end. The opposite piece is 2 inches also faced and tapped on one end. Brass #6-32 studs made from machine-screws are used after drilling two #28-holes at opposite sides of the ring, to hold the three pieces of shaft and the ring together. Use no iron hardware in the field of the coil. A small cup-type sleeve bearing is mounted on a stand-off insulator near the center and on the far side of the coil as may be seen in the illustration of the breadboard product. Two insulating washers are pushed over the extending ends of the

[*Continued on page 109*]

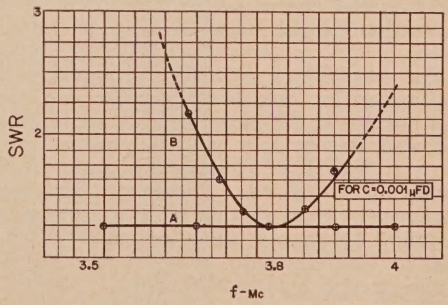
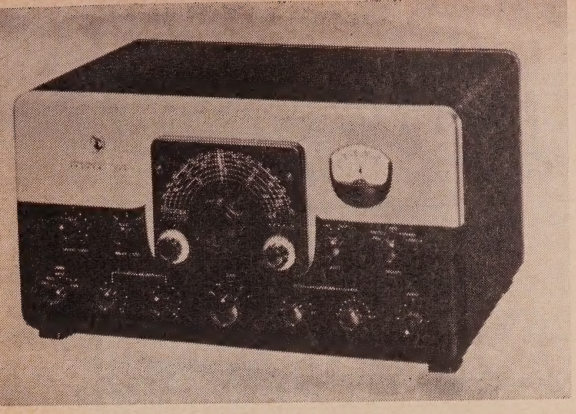


Fig. 4. Curve A: Standing wave ratio anywhere in the band. Curve B: SWR for the system tuned to a particular fresuency.



F. S. Harris, W1FZJ
VHF Editor, CQ

Pacing the Pacemaker

Among other things that are "as rare as" I think a new piece of gear takes top billing. Especially if its a real pretty piece of commercial gear that looks as ready to go as a 300 SL, and as businesslike as a bank president. The boot you get out of being the first to open up the carton and expose the brand new *Pacemaker* to view is all past for me. The memory will linger on, however, because there were no knobs on the little devil and, to make matters worse, no way to get them without pulling the case off. My screams of anguish could be heard for three blocks. (About one quarter of the way to the first house.) "My aching back! A new transmitter and the first thing I have to do is tear it apart." I don't know how this will go over with the boys who are afraid to lift the lid on their new Super Signal Germinators for fear of losing their warranties. However, it does serve one vital purpose. It stops you from plugging it in and blowing it up before you learn which knob controls the detonator. So it's down in the easy chair with a cup of coffee and the instruction manual for a short course in SSB.

All the information you need to operate and maintain the *Pacemaker* can be found in the instruction manual. It's well hidden but you can find it.

The instructions pertinate to readying the Pacemaker for operation, however, are clear and precise. If the recommended procedure is followed, step by step, you will end up with a 75 watt light bulb glowing brilliantly on the output jack of the completely assembled Pacemaker. From this point on the procedure to follow becomes a little ambiguous and it is well to carefully read *all* the operating procedure section before continuing.

This may sound like a lot of work to get a rig on the air but it really isn't. Within an hour of the time I arrived at home with my Pacemaker I was in contact with a couple of boys on twenty meters. Two hours later I had contacted stations on all five bands and the reports received were all good. (In strict truth I must point out that the first couple of contacts mentioned a little roughness on voice peaks. This roughness was found to stem from an overzealous effort to make the plate meter swing to full output all the time. Reading the instruction manual thoroughly in the first place would have prevented this.) Sixty-eight contacts, thirty states, five continents, ten countries and sixteen hours later, I regretfully pulled the switch and headed for the sack, a tired but fully convinced side winder. It was a real effort not to take it to bed with me.

Therein lies the real story of the Pacemaker. When you install it at your operating position, it doesn't look like something new has been added. It looks like it belongs there. The only thing the Pacemaker lacks to make a snappy operating station is the operator. And that's where you come in.

What is it?

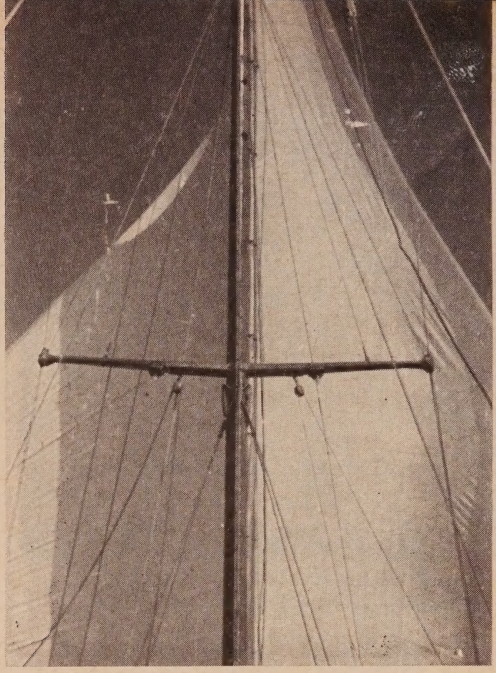
For those of you who still wonder what I'm talking about, the *Pacemaker* is a completely self-contained SSB transmitter. (It also operates CW and A.M. phone, but what you bought for your money is a SSB transmitter.) It is single knob bandswitching and covers the eighty, forty, twenty, fifteen and ten meter bands. And this one doesn't just say it works on all bands; it does. Like any other band switching Pi output rig, it is necessary to reload and resonate the final. Touching up the carrier balance and grid drive completes the band changing. About thirty seconds is par for the course after a little experience has been gained.

Power wise the Pacemaker is in just the right range. It has plenty of punch for use as a complete transmitter and still allows the use of a

[*Continued on page 116*]

Yasme:

The Yasme is a 40 foot Bermudian Sloop piloted by Danny Weil on a two year round-the-world one-man trip. There have been several exciting previous articles in this series, several more are to come.



Canton to Nauru

Danny Weil, VK9TW

I was given a regal sendoff. What a start for a voyage . . . the wind was perfect, the sea was smooth, and with my new sails I really thought that this was going to be an uneventful trip.

My joy at leaving Canton was unbounded. Only those stationed there can really appreciate this point. As it faded into the distance I heaved a big sigh of relief and looked forward to the next spot.

For several days, things ran smoothly, the wind held its position, and generally speaking, it was a real luxury cruise.

My refrigerator was now working and it was quite a pleasure to have a few cool drinks and unlimited ice available but . . . there was a slight snag. Everything I took out was frozen solid, and for the first time in my experience I took an egg out and broke the cup with it. I tried waiting for the egg to thaw out (cabin temperature at 104).

Finally, in desperation, I just chucked a couple into the pan, minus the shell, but with a few small portions of broken china attached to improve the flavor. I watched the two perfectly formed virgin eggs fry retaining their shape all the time. To see those two pieces of hen fruit chasing each other around the pan was quite amusing, and it certainly saved me the trouble of having to turn them over at the appropriate time . . . needless to say, they didn't have quite the same flavor in the end.

There is a slight rolling movement on Yasme in the trade winds, and I had to open that fridge door at precisely the right moment. Misjudgement of the roll results in the entire contents being flung out onto the cabin floor.



The "Jennies" or Genoa sails really pull in a following wind.



Yasme, looking aft. Note the lashed tiller permitting the boat to "drive herself."

One has to get the roll just right, open the door, remove the article and close the door again before the whole lot gets flung in your face . . . maybe I'll fix it with an automatic gyro . . .

The old Yasme was really making time. We should certainly make Nauru in record time. But, like all good things, they have to end some time. One evening, after I had completed my sked with Dick (KV4AA), flat calm settled in. The old iron horse had been plugging away quite happily (with the new magneto), and the heat in the cabin was enough to cook by . . . boy was it hot! The old tube will steer herself fine with sails up, but once that engine starts she will turn in circles unless I sit at the helm. Therefore: no grub, no radio, no nothing, unless I switch it off and drift. Then the rolling becomes severe. Skeds had to be kept to a minimum in this period. I was beginning to get really disgusted with the glassy calm of the sea and the buzz and fumes from the engine.

My friends the sharks displayed great interest in my movements and a couple of dolphins played around all the time so I was never short of company. The sharks were ably disposed of with a few slugs in the right place and the dolphin were left to gambol to their hearts' content. They are very friendly fish, and on several occasions I was able to give them a dig with the boat hook . . . they seemed to enjoy it and came back for more. I could have speared them very easily, but I have never yet killed anything other than sharks unless it was for food. My taste for tropical fish has never been developed so they are left strictly alone. I stick to Spam! (ugh! . . . ed)

The calm stayed for 24 hours. Since I daren't leave the Yasme drift while entering the Gilbert group of atolls, this meant no sleep. They are not a particularly easy lot to get through unless one has a perfect set of sights . . . and very good eyesight. Most of them are only visible for 3 miles from the deck of the Yasme.

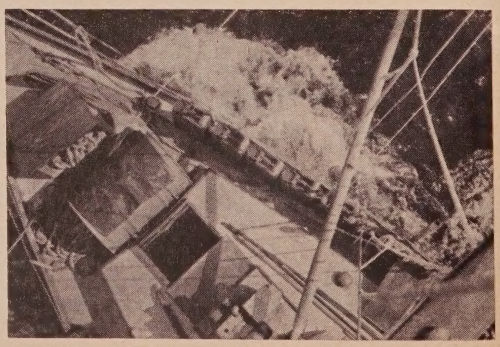
Squall

The next evening after I had finished my sked with Dick, I started up the engine again to get a move on. All the sails had been lowered and lashed securely to the deck and we were completely under power, like a motor boat. I had earlier noticed a slight breeze in my face which I attributed to the forward motion of the boat. After the sked, sitting out there at the helm, it seemed to be increasing in strength. This was most odd, as I was right in the trade wind area, and any wind . . . (according to the wind charts) . . . must automatically come either from the east, southeast, or northeast, in other words, more or less from behind me. This wind was coming from the WEST.

Of course, I had heard of the westerlies in this area, but . . . (according to these famous wind charts) . . . they weren't supposed to be kicking around until November, so I just thought it must be my imagination when I felt this breeze in the face. Imagination was out when the slight breeze decided to turn itself into a full gale. The sky, which up to that point, had been reasonably clear with the typical tropical stars lighting up the ship and the ocean, then turned itself into a black murky smudge, and everything was completely blotted out. For 30 minutes the wind built up in force, screaming through the rigging like a Banshee then it started to rain. I can hardly call it rain, it just fell out of the skies in sheets, and the wind picked it up and swept it horizontally across the Yasme.

At the initial blow Yasme staggered a bit, then she seemed to steady herself up, and with the engine running at half throttle she held her position in the storm. Whilst the sea was whipped up into a raging maelstrom, and spray was flung everywhere, still Yasme held her position with hardly a movement other than a gentle rise and fall as the big seas lifted her on each crest.

The bow looks like this from the top of the mast.



Two large buckets on the deck were filled in just over an hour and for the first time on my voyage, water seeped in through the cabin roof and around the window frames. I twice had to go forward on the deck to lash the sails more securely, and it was literally impossible to stand up against the force of that wind to make my way . . . I thought rather ironically of my earlier thoughts of nothing happening on this trip. My one dread was the wind getting into those furled sails on the deck. Had that happened they would have been ripped to pieces, and also possibly ripped half the deck fittings too when they went, but Lady Luck stayed with me and everything stayed put.

This blow lasted a full 18 hours, and in that time I got myself hopelessly lost. Prior to this blow I had been unable to take any satisfactory sights owing to excessive clouds, and was steering strictly on judgement . . . generally known in the sailing world as 'Dead Reckoning' . . . if you don't reckon right . . . you're dead.

By the time this blow had decided to fizzle out it was dark again, and whilst the wind had left us completely, it had left behind a disgusting sea which did everything except turn Yasme upside down. A thick mist very soon settled and visibility dropped to around 100 feet.

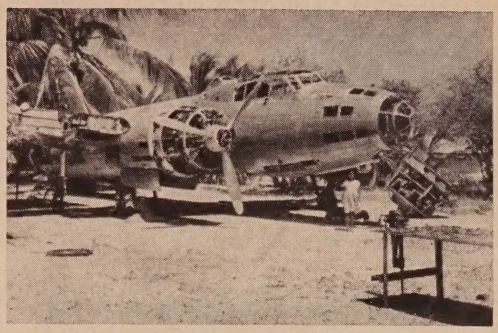
Reef!

I knew I was somewhere in the Gilbert group of atolls, but where I could only guess. If I continued to use the engine I could never hope to hear the seas breaking on a reef, and I was travelling too fast, even at half throttle, to get out of trouble should a reef materialize out of the murk. To stop the engine meant that



These Coral formations off Ocean Island with the ocean breaking off the reef in the background are typical of this area.

Yasme would immediately be left in the power of the very doubtful current, which might or might not have set her onto a reef. It was all very disconcerting. At the time I hadn't slept for three days and was feeling just a little bit tired. The first thing I did was to give myself a dose of benzedrine to keep awake, then shut off the engine and devoted all my time on the deck to the binoculars. The minutes seemed like hours as I walked around the deck straining my eyes through misted up binocs, and my ears were almost flapping trying to get that deadly



Ocean Island saw these Japanese remains.



sound of seas breaking on a reef. Many times I wanted to lie down and rest . . . even the drug seemed to have no effect on my senses, and that feeling of drowsiness kept on coming. To have seated myself at that time would have been utterly stupid . . . I would have dropped off to sleep in a second. I just had to force myself to walk around in that very restricted deck space, and continually take swigs of coffee to even keep reasonably awake. It's funny the things that pass through one's mind at times like that, and I was trying hard to figure out whether the seas breaking on a reef could be heard in a flat calm . . . they could . . . by golly they could! Out of that deathly silence, came a very distant swish of water, with periodical silences. Where it was, I just hadn't a clue, but as the seconds ticked away, so that swish became more apparent. I reasoned that I must be getting closer as the sound became louder, and it was obvious to me that a current must be pushing me on, but which way were we drifting?

Everywhere was thick mist, and to look at the surface of the water conveyed nothing to my dulled senses . . . it looked exactly the same all around and yet I knew we were approaching something that was alien to the open sea.

Perhaps I should have been all nautical and entered in the log the exact time I heard the noise, and also noted the mileage on the patent log towed astern, but one does not think of these minor items when one's ship may sud-

denly become a wreck. The suspense was terrible; I kept on hearing this deadly sound, and yet, it seemed to get no louder . . . maybe I was going nuts . . . I just don't know, I was feeling terrible . . . tiredness makes one imagine all sorts of things, and yet I knew that I had not imagined that sound. I was dying to rush into the cabin to start up the engine, but realized that its noise would blot out the sound of the sea on the reef. I kept worrying whether the engine would start if I sighted the reef, or whether it would play one of its dirty tricks and just fail to go at the right moment. Visibility still remained at almost nil, so I just stayed put on the deck and tried my hardest to penetrate the mist. How I prayed at that moment that the noise would get louder. I just had to sight that reef. The thought of the noise disappearing was not enough. I knew it was there, and I just HAD to see it, then I knew I could steer away from it with the engine. Time dragged on, and I nearly screamed in desperation. A quick glance at my watch told me it



Docking the hard way at Ocean.

was sked time with Jock (ZL2GX) but I dare not start up the generator to keep up that sked.

By this time the sea had settled to a glassy calm, and I thought that if I did strike the reef I would be able to get off easily enough. That was wishful thinking. The swell, whilst not apparent, was so big that had Yasme struck a reef she would have been picked up and thrown down with such force as to have literally smashed her up completely with one blow.

I then thought how far off this reef was from the actual island itself, and how long it would take me to reach the island . . . providing I knew in which direction it lay. A moment of panic came over me for a few minutes and I hastened to release the lashings on my matchbox sized dinghy. The rowlocks were nowhere to be seen, and in that darkness I could only find one oar . . . I thought what a fool I was to have things like that not available. Well, there was no time to go looking for the bits that were missing, and I hated to move anything that would cause even the slightest noise, so just forgot the entire thing and went on listening and looking.

Perhaps it was an hour, maybe 5 minutes, I just don't know . . . my senses by then had become extremely acute and all tiredness had left me . . . there, no more than a stone's throw, was a faint line of surf. I didn't stop to make sure or even take a second look, but shot into the cabin and pressed the starter button of the old engine. What a feeling of relief as it burst into song at the first touch . . . a few seconds to warm up . . . it seemed like a few hours, and then, very gingerly, in with the clutch, and a fast run to the cockpit to swing the tiller over. With the helm hard over Yasme picked up way and swung in a wide circle to the opposite direction, and whilst she was slowly swinging, I leapt out onto the deck and cast my eyes astern . . . there it was, the cause of all my worries for the last several hours. That long line of surf, just like a silver streak in the water, but beneath it I knew were some of the most dangerous and vicious reefs in the world. No-one can appreciate the feeling of relief that swept through my whole body, and, as I throttled down the engine to dead slow, I just collapsed on the cockpit seat with utter exhaustion. My eyes were aching, my whole body felt as though I had been given the biggest beating of my life, and yet I was happy for the first time in many hours. As the Yasme slowly forged ahead, now steeering due North, I carefully checked the log astern and noted the relevant facts. A very rough check of the chart gave me an approximate position, after taking into consideration my drift, etc., and I knew then that, providing I headed due North, no harm could come to me. I realized that this weather couldn't last forever; that before long the sun would be breaking through enough for me to get an exact position.

The rest of that night was spent sitting in the cockpit with the engine just ticking over. Whilst I was reasonably sure of my position, I was in no great hurry to get anyplace that might put me near another reef. By daybreak it was a very washed out crew aboard the Yasme . . . but, still afloat.

Perfect sights were taken that day and my position pinpointed. I found that my dead reckoning position wasn't out more than a few miles . . . dead lucky!

The flat calm still persisted, but the mist had cleared completely and I felt at peace once again. I made several half hearted attempts at eating, but the suspense of the past hours plus an excess of coffee and cigarettes had put me right off. By this time I was in open sea and free from all dangers. I knew that another sleepless night would really knock me out so I switched off the engine, left the old girl to drift and dived into the bunk.

Sleep came hard, but when it did it was almost permanent. I slept for 7 hours and I

felt like I had the biggest hangover in the world on awaking. A few buckets of sea-water over the old head put me back in the land of living. I noticed whilst attempting to come out of my coma that the Yasme had set up a slightly different motion, and on poking my head through the cabin, found, much to my delight, a slight breeze . . . in the *right* direction this time. The sails soon went up and it was quite a relief to be under way again without having to sit at the helm all the time.

I was feeling on top of the world and soon was brewing up some chow and loads of coffee. By the time I had eaten 4 solid eggs . . . (half fried, half frozen) and two large slices of bacon (in the same condition) I felt ready for a couple of hurricanes.

When sked time came up again for Old Jock, on went the switch. Not a spark, not a blinkin' whistle out of the old transmitter . . . seemed to me that bad luck was going to pursue me again, but no worry . . . I had plenty of transmitters aboard, so all it meant was of hooking another one up. After a while I got another fixed . . . switched it on . . . OH NO! Not *again* . . . yes, that one had gone out on me! What more could happen?

I dragged out the last one, but I had that strange feeling of doubt that comes at times. I wasn't wrong either . . . three transmitters, and not one of them working. I wanted to sling the whole lot over the side.

Now as I once told you before, to work on a rig aboard Yasme is not a simple job, but I did have a go.

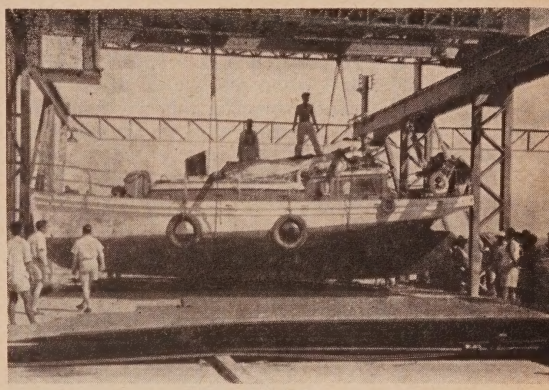
The first place I stuck the prods of the test meter gave me a wonderful flash. The needle of the meter swung over and almost poked a hole in the other side of the dial, there was a slight smell of burnt insulation, and then . . . one test meter out of commission. I knew I wasn't going to keep any skeds for some time, so put all the tubes back and just forgot about the whole thing.

I realized that many of the lads with whom I kept daily skeds were going to wonder at my silence, but at the time there wasn't a thing I could do about it. I was so fed up I just couldn't have cared less. I decided that the best plan would be to make for Ocean Island (which was on my route) which, with any luck, I should sight within 24 hours. I thought I could borrow a meter there and get back on the air to notify everyone that I was at least still above the surface of the Pacific.

A fine breeze had come up and we made really fine way. Around noon the following day Ocean Island loomed up right where it was put a few years ago. At least my navigation was right, so I had something to be thankful for.

My arrival at Ocean Island was totally unexpected. They knew I was on the trip from Canton, but my sked didn't call for a stop there.

Cruising up to the massive buoys alongside the island was quite an experience. Before many minutes had elapsed a launch came alongside to tie me up. Formalities were short and soon the Yasme was swinging to the buoy while I was ashore having one of the biggest meals in some time. That island was heaven for me. After spending three months on that barren atoll of Canton, and then to be among trees and grass again, and to be able to climb a hill . . . all these things to you lads seem



Shoe-horning Yasme in for repair.

trivial, but to me they meant everything.

The population consisted of Gilbertese, Australians, New Zealanders, and British, all devoted to the job of digging phosphate. Those people there were marvelous. They treated me like a king, and whilst my stay was only 24 hours I think that I must have covered practically everything of interest on the island.

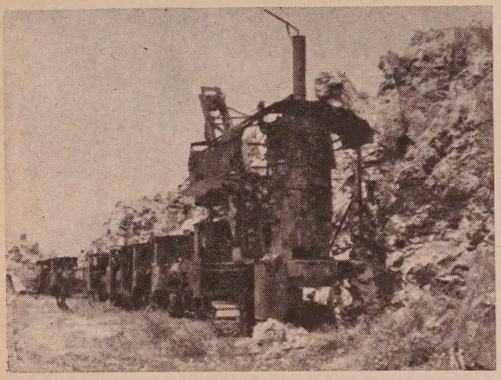


Radio equipment carried on Yasme out for overhaul.

Captain Town, the Port Captain, took me under his wing and we visited practically every European on the island. I also found the time to give a talk at the local school, which gave them a break from the normal school procedure.

I saw in that short time how the phosphate was dug, transferred to the crushing mill, dried, loaded into barges, and taken out to the British Phosphate Ships tied up to the buoys. The

whole episode of Ocean Island was like a swift kaleidoscope. I saw so many things in those few hours that I find it very difficult to write about them all. Naturally my camera was going full blast and I hope you can eventually see some of the shots. These phosphate islands (Nauru is one also) were originally under the water, but now are several hundred feet high. Apparently volcanic action pushed them up, and now one can see coral heads all over the island about 100′ above sea level and pick up fossilized shells. Whilst the shell is no longer in existence, the actual shape of the shell is there to see in the form of a solid chunk of phosphate. The phosphate is between all these coral heads, and when discovered many years ago the phosphate was dug out by hand. Today, with the latest equipment to do this work many thousands of tons are exported every week. There is sufficient there to be worked for the next 50 years.



This bombed out train is located in a quarry on Ocean.

The coral heads were quite unique, looking like something from the stone ages. Other parts of the island were equally interesting, but there was too much to see in too little time. The Japs had the island during the war and in several places there was still evidence of their occupation. One glaring example was the British Residency that had been completely machine gunned and then de-roofed to obtain the timber. My entire stay was devoted to sightseeing, eating, talking, and being introduced to the many islanders.

I sincerely regretted having to part company with those wonderfully sociable residents, but time was creeping on and I knew you lads were really bursting for me to get to Nauru . . . also, I had the weather to consider and it was going to be a little too close for my future comfort.

Ocean Island had received a radio message via Australia that I was overdue and that no radio contact had been made with me for three days. Fortunately an air-sea rescue plane had only been made ready and my arrival at Ocean Island had stopped any further action. I believe I have one or two hams and a very alert government service to thank for their kind thoughts and prompt action.

Loading phosphate.



Departure from Ocean Island was made around 11 p.m., as I wanted to hit Nauru in daylight. I had 167 miles to go and planned to arrive there 36 hours later. What I didn't plan was, one hour after departure, the wind dropping and leaving me with a flat calm again. This was most annoying, as I thought I would have a fine sail all the way, but that's the way the luck goes. On with the old engine again, and at an average of 5 knots, we plug along in the middle of the night hoping that a breeze will come at any moment.

Sometime in the night I went way off course when I fell asleep at the helm. Not knowing when I had fallen asleep made it rather difficult to determine my position when I woke up. At daylight I found the sky covered with clouds, so any sights to obtain my position were out. I was really mad with myself over this. Having only a short distance to go I did not have the usual opportunity to take sights on another day to fix my position. I just held course and hoped for the best.

By 10 a.m. I realized that I must be off course since I should have sighted the island on the horizon. This knocked out all my ideas of arriving there at noon, so I stopped the engine and decided to drift around until I could get a noon sight and figure my exact latitude. The old sun crept up to its zenith, and with the sextant reading, I quickly worked it out. . . . SEVEN MILES South off course . . . what a clot I'd been to go to sleep. I must have slumbered for a couple of hours. I swung the Yasme round onto the new course, and within 1½ hours Nauru peeped over the horizon dead ahead.

I was beating against the current and a very slight breeze had sprung up, so that little trip took over four hours and I managed to tie up to the buoy off the island by 5:30 p.m.

I realized that the time of arrival was awkward. Everyone had finished work, and all the boats had been removed from the water. I was surprised to see that despite the late hour they were lowering a launch into the water with

[*Continued on page 117*]

Two Meter SSB

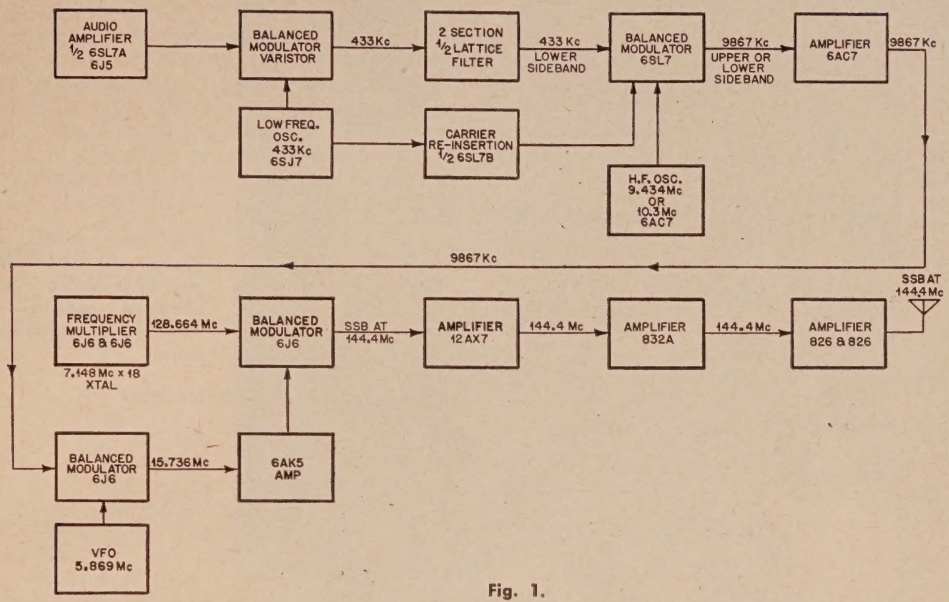


Fig. 1.

Arnold King, W2JJC
Box 374
New Market, N. J.

SSB has proven to be of as much advantage on two meters as it has on the d-c bands. Contacts are made over distances impossible to AM with a regularity that has shaken the Two Meter Old Guard. The narrow band width and lack of carrier provide a signal-to-noise improvement up to 18 db under difficult conditions over equivalent input power on AM. This is almost a power ratio of 100 to 1, with one watt doing the work of 100 watts! Under better band conditions this difference goes down to about 10 db improvement.

There are a few other advantages too . . . like for instance your oscillators are running continuously, reducing the drift problem. CW can be achieved by either feeding a 3 kc audio tone into the audio section of the rig or else inserting some carrier, either way the linear amplifiers make for ideal pulse shaping and your signal blossoms out clicklessly. AM is always available by inserting your carrier.

If you already have an SSB exciter you will have very little problem in getting it up to two meters. Consult *fig. 1* for my method. Being of a constructive nature I built all of my own gear . . . even the SSB exciter! Once you have this SSB generated all you have to do is run it through a high level mixer and beat it up to two meters. I generate my SSB at 433 kc since crystals are easy to get for that range and then beat it up to 9867 kc. Another oscillator and balanced modulator bring the signal up to 15,736 kc. Still another oscillator plus balanced modulator bring it up to 144.4 mc. Watch yourself on those injection frequencies and keep them attenuated as much as possible so you won't have all sorts of odd VHF frequencies in your output.

Your present SSB exciter plus a 522 and a little conversion would get you going. Just remember that you can't do any doubling or multiplying of the signal once you have mixed the SSB in with it. From then on you have to change your signal frequencies by adding or subtracting other frequencies in balance modulator circuits.

Silver plating of the final plate and grid tank circuits will give you a noticeable improvement in efficiency. In my case the same output was achieved with 50 watts less input. A grid-dipper should be used for the initial tuning of the tank circuits, thus protecting tubes from being out of resonance for any length of time during the tuning process. Linear amplifiers are easy to get going.

At the writing there are five of us here in the East using two meter SSB. The results have been so amazing that quite a few others are whipping up some mixers to join us. Give me a shout when you get yours fired up. ■



The final amplifier, like the rest of the transmitter, must be capable of rugged sustained operation so necessary for contest operation.

100 Watt Contest Final

Ol' Smoke

The design of a final amplifier for contest use requires a good deal of thought and planning. The amplifier herein described is the result of twenty years of cut and try planning on the part of the author, plus all the extra experience he could glean from his fellow contesters.

Out of this planning came a set of specifications for the *Contest Final*. While it is possible to vary from the set specifications to some small degree, the broad outline must be followed if good contest results are desired.

1. Final must operate at 100 watts input when fully loaded (this is in order to take advantage of the power multiplier).

2. Final must radiate the loudest signal on the band regardless of shorted feedlines, burned out rotators, or iced up antennas.

3. Final must be capable of being driven to full output by the usual station transmitter.

(P-304th's, 4-1000A's, etc.) In case of exciter failure, final should continue to radiate decipherable signal.

4. Neutralization must be accomplished in such a manner that the signal doesn't become too narrow. (This specification is based on the observed fact that most contest winners use wide band AM. CW winners prefer a strong parasitic just outside the low end of the band.) The writer feels that this latter violates the rules of gamesmanship. ([See W. Green "Gamesmanship and the Contest"], and, as a result, this feature is not included in the final.)

5. Tubes must be able to stand the severe overloads encountered in normal contest use. (For instance final tuned to low end of forty meters with exciter on low end of twenty meters.)

6. Balanced circuit must be employed. (This minimizes the effect of losing one tube and allows continued operation until repairs can be effected.)

Choosing the Tubes

Choosing the tubes to be used in this final led to considerable controversy among the faithful. The various advantages of triodes, tetrodes, pentodes, etc., were bandied about for some time. Final decision was made by Freddy (HB9MS) who arrived on the scene in the nick of time complete with a couple of dozen 750 TL's. In view of his unequivocal recommendation (plus his donation of the tubes) construction of the Contest Final was started immediately.

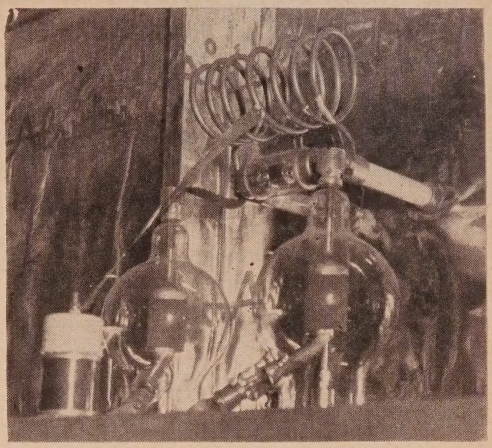
Circuit

Circuitwise there is little to say. The old-fashioned push pull type circuit is employed. Only the neutralization is changed to avoid stability. It was found experimentally that link neutralization from grid to plate was the most satisfactory. However, in order to obtain a wide signal, several innovations were required. The most noteworthy of these were the long willowy rods on which the plate neutralization link is mounted and the iron construction of the plate link. Due to the magnetic field in the plate coil, the iron neutralization link moves at a syllabic rate during modulation of the final. The resultant signal causes considerable consternation among the brethren and many cries of "Gawd, did you hear that W-1 on the low end of the band" will be heard. (Sure evidence of an attention getting "Contest type" signal.)

Power Supply

The power supply transformer used is a 6000 volt center tapped transformer rated at two amperes C.C.S. Standard full wave rectifier circuit using 872A's was first employed.

This view (with the blanket off) shows the aluminum sheeting on the wall.

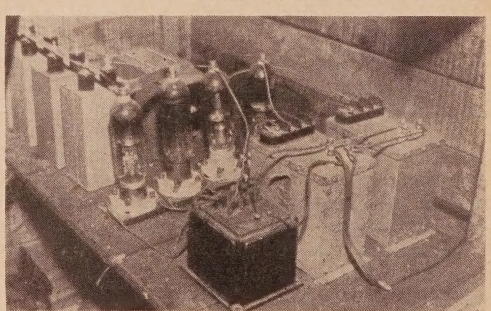


However, Freddy pointed out that he had used another type of circuit which gave much more output from the final. This circuit employs four 872A's in what he called a full wave bridge. In addition to relieving the strain on the center tap of the transformer, this discovery of Freddy's more than quadrupled the output from the final.

Metering

Before we "Freddyized" the power supply, the plate circuit meter (0 to 100 ma.) had given us some trouble. Even with the final unloaded it had indicated as much as 50 ma. plate current. (We had intended to run 50 ma. fully loaded as this, with the 3000 volt power transformer would give us an input of 150 watts which is well within the contest rating of 100 watts.) It was finally discovered that the meter was picking up some r.f. and the addition of a 2.5 Mh choke across the meter terminals brought the meter back on scale. After the changes were made in the power supply, the increased R.F. caused the meter to

[*Continued on page 104*]



The final amplifier power supply. The Modulator is conventional and has its own power supply similar to this one.



Fig. 1—The CFN-46ACW or BN-IFF converter "on the hoof" as you receive it from the surplus dealer. All photos courtesy Arrow Sales

An Inexpensive 2 Meter Converter from the BN-IFF

Don Stoner, W6TNS
Engineering Consultant
Box 137, Ontario, Calif.

If you have had a "yen" to give the 2 meter band a whirl, but have been slowed down by a lack of funds, now is your chance. Several of the dealers are selling a terrific war surplus 2 meter converter for a price that is little more than a carton of cigarettes. Technically, the title of this unit is the CFN-46ACW, BN and BN-1 receiver. For the sake of simplicity we'll just call it the BN converter.

The original tuning range of the BN converter was 156 to 190 mc but with the addition of 2 capacitors and a power supply, you can have a 2 meter converter that is second to none. The BN-IFF receivers were used on the Navy vessels to identify airplanes that appeared on the radar screen as friend or foe (IFF—identification, friend or foe). The BN model was rather large and cumbersome and it probably helped the ship displace a few more feet of water in addition to its job of identification. Technically speaking, the BN worked this way: Whenever an airplane would come within the range of the ship's radar, the IFF unit was automatically triggered to send out a powerful pulse. If the plane happened to be one of ours, it would pick up the pulse in a little "doo-dad" called a transponder (such as the BC-645). The transponder in the airplane generated a pulse code of its own and if it was the same spacing and duration as the pulse that the ship transmitted, the two sets of pulses coincided and were used to trip a bunch of relays that, in turn, caused another set of pulses to emanate from the transponder. In the interest of security, the code wheels that determined the size and spacing of the pulses, were changed each day. If the ship received the right code back from the plane, the ship knew that it was one of ours and they went on their merry way hunting the enemy. Occasionally someone would goof and forget to change the code wheels, causing the wrong pulse to go out. I understand we lost a few of our own planes that way! When the transponder in the plane answered the ship's pulse, a lamp would light up on the pilot's dash board (or whatever it is called) and he knew that it was a friendly ship. I dare say that it got a little confusing when there were a group of planes in the air and a lot of ships bobbing around on the water but apparently they had it pretty well figured out—somehow.

For amateur applications, the rest of the BN unit is rather useless, but the converter section is worth its weight in gold. For this reason many of the surplus dealers have been removing the BN converter from the chassis and selling it as a 2 meter converter. As with most pieces of Navy equipment there were several models of the BN-IFF produced. The two models featured here have appeared on the surplus market and because they are quite similar, they have been combined into one article. With the exception of the tubes used in the converters, both models require the same conversion. The power supply shown in *fig. 3* will serve for both. There are minor circuit differences between the BN and the BN-1 converter but they can be identified externally by the fact that they have 4 tubes and 4 tuning knobs and 3 tubes and 3 tuning knobs respectively. The 4 knob converter exhibits quite a bit more gain than the 3 knob model, but by the same token, it has a poorer noise figure. If you own one of the inexpensive communications receivers you would probably do better with the 4 knob converter. If you are like me and want to dig for that elusive DX, the 3 knob model is your best bet.

If you have examined the circuits of the BN converters you are probably wondering about that tunable oscillator. Does it drift? Frankly, yes. It is rather unreasonable to use a "free running oscillator" in a converter, connect it to a selective communications receiver, and then expect it to stay put right on the station.

They just don't work that way. If you have ever heard an f-m receiver without automatic frequency control, you may have noticed that it had to be retuned several times before it warmed up. It would literally "drift" right off the station until it had reached its proper operating temperature. This condition is magnified many times when we use a very selective receiver (possibly 20 times more selectivity than the f-m receiver) as a tunable i-f for our high frequency converter. The BN converter was used initially with a 7-9.1 mc Command Set receiver and after a few minutes warm-up, the converter settled down to stable operation. However, when it was connected to the station receiver (a Collins 75A) the drift remained quite objectionable. At this point it was decided to include information on crystal controlling the BN converter to eliminate the drift. More about that later. Let's just say that if you have trouble separating stations on your communications receiver then you probably have an excellent receiver to use with this converter, without crystal control.

How It Works

For the sake of some of the new members of the amateur ranks, a brief description of the converter is included. You old timers can skip this paragraph and go on to the how to do it part. The BN converters are quite similar to the one that was used with the BC-453 in the Novice Q5'er article (Jan. 56) with the exception of the operating range. You may remember that this converter used coils with many turns of wire and hence, it had the ability to convert only a rather low frequency. Because the BN converter tunes a very high frequency range (VHF), the coils consist of only 5 turns of silver plated wire.

The incoming 2 meter signal is amplified in one or two r-f amplifiers (depending on which model you have) and the now stronger signals are fed into the mixer tube. The mixer tube combines the 2 meter signal (let's take 144 mc as an example) with the local oscillator signal and in turn produces a new frequency (which is the difference of the two) and it is this new signal that is fed into your communications receiver. Assume that the oscillator in the BN converter is adjusted to generate a frequency of 137 mc. This oscillation will combine with our 144 mc signal and produce a new frequency of 7 mc. The new frequency is called the intermediate frequency (i-f). Whereas before we could not receive 144 mc on your communications receiver (because it probably only went up to 30 mc) the BN converter has changed the incoming 144 mc signal to a 7 mc signal and the receiver "picks it up" very nicely. As you can see, if we change the frequency of the oscillator, we can select the station that is heard in the communications receiver. In other words, only the station that is 7 mc above the local oscillator frequency is capable of being picked up in the receiver. Conversely, we can set the local oscillator at one frequency and change the frequency of the communications receiver to tune in the stations, it works either way.

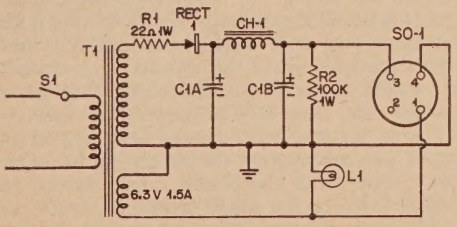


Fig. 3—Power supply.

In this manner we can convert the BN in one of two ways. You can simply change the frequency of the coils (as detailed below), connect it to a power supply and communications receiver and it is adjusted by tuning in the stations on the BN dial marked OSCILLATOR. Or you can make the above changes and in addition, install the plug-in crystal control unit to eliminate the drift that was mentioned earlier. If the crystal control adapter was generating a fixed frequency of 137 mc and the receiver dial set to 7 mc, we would have the ability to receive 144 mc (same as before) but what if we should tune the communications receiver up to 8 mc? Now we have the ability to receive a frequency that is 8 mc above the local oscillator, or 145 mc.

This brings us around to the subject of the i-f ranges. As you can see from the foregoing, it is possible and sometimes desirable to adjust the local oscillator to operate at one fixed frequency and to receive stations by varying the i.f. But what i.f. do we use? There is some pro and con as to which frequency is best, but in general the most popular frequencies are 7-11 mc and 14-18 mc for war surplus receivers that do not tune above 18 mc. The 14-18 mc range is quite popular because you can make the dial direct reading by inserting a number 4 between the two digits (14-144 and 18-148). Persons using the Collins receivers are forced to use the 26-30 mc ranges because it is the only 4 mc coverage on the receiver. If you are the lucky owner of a new NC-300, you can use the calibration on the receiver dial by planning on a 30-34 mc i.f. *Fig. 8* is a complete table listing the popular i-f ranges, the proper local oscillator injection frequency and the type of output coil (*L1*) and the crystal needed to cover this range.

Converting The BN-IFF

When it comes right down to it, there is not too much to do to convert the BN unit to 2 meter operation. The filament circuit is already wired for 6 volts so there is no need to expend any energy at that point (usually surplus equipment is 12 or 24 volt operated). Actually, when

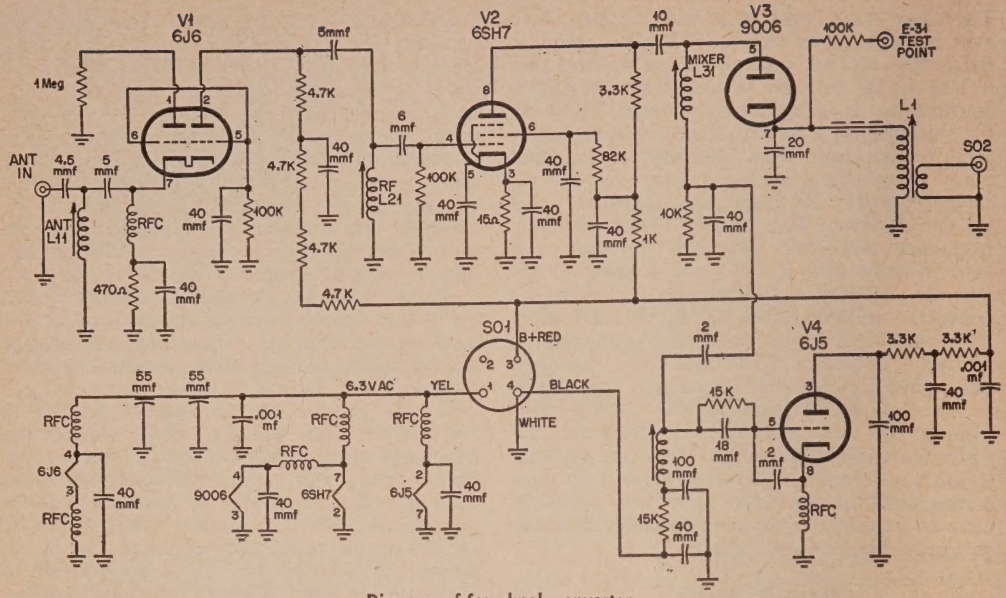


Diagram of four knob converter.

you receive the converter it is only necessary to install the tubes (if you bought it without them), install 2 capacitors into the circuit, connect it to a power supply and away we go. This is how you do it. The BN converter (4 knob) requires a 6J6 1st r-f amplifier, a 6SH7 2nd r-f amplifier, a 9006 mixer and a 6J5 oscillator tube. If you purchased the converter without tubes, install a WE-717/A rather than the 6SH7 and if you got it complete with tubes replace it anyway! The 6SH7 was designed for audio service and it is rather difficult to understand why it was used in a high frequency r-f amplifier. In any event, install the WE-717/A (it is a 6AK5 in a 6SH7 socket). It is superior to the 6SH7 and well worth the 50 cent investment.

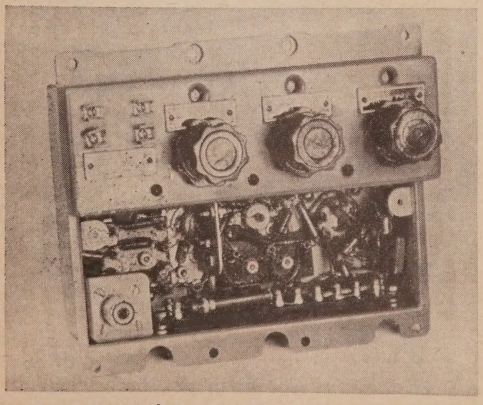


Fig. 4—Internal view of the BN-1 converter. This model uses only three tubes and correspondingly has three tuning adjustments.

The original tuning range is somewhat above the 2 meter band and therefore, it is necessary to lower the resonant frequency of the r-f and oscillator coils. The oscillator is modified by connecting a piston type of trimmer capacitor (1-8$\mu\mu$fd) from the grid end of L-41 to ground. This capacitor can be mounted on the side or top of the chassis as desired but be sure to keep the wire that connects the capacitor to the coil short! This capacitor is installed in both converters but it is not required if you use the crystal control conversion. Using an i.f. of 26-30 mc and with the capacitor set at 4/5 capacity, the 2 meter band will appear about 6 on the *OSCILLATOR* dial. To change the frequency of the r-f coils in the BN-1, remove the large capacitor near the antenna jack, *J11* (this capacitor is 4.5 $\mu\mu$fd and is identified as *C11*). Then remove the 4$\mu\mu$fd. capacitor *C12* connected to *L11*. Next, connect a wire from the centerpin of *J11* to *pin 2* (the cathode) of *V1*, the 6J4 r-f amplifier tube. This removes *L11* from the circuit, but produces an imporvement in the overall noise figure of the converter. In addition, connect a 100 $\mu\mu$fd disc capacitor across *C31* (the capacitor between *L31* and the grid *pin 6*) of *V3*, the 6J6 mixer. 2 meter signals will then peak up at about 5 on the dial associated with *L31*. Last, but not least, mount the i-f coil on the chassis very close to the stubby piece of coaxial cable that passes through the chassis. The details of this coil are listed on the data chart. Now ground the end of the coil nearest the mounting lug. Connect a wire from the center conductor of the coaxial cable to the other terminal of the coil. Wind about 4 turns of insulated hook-up wire around the coil and connect the two ends to

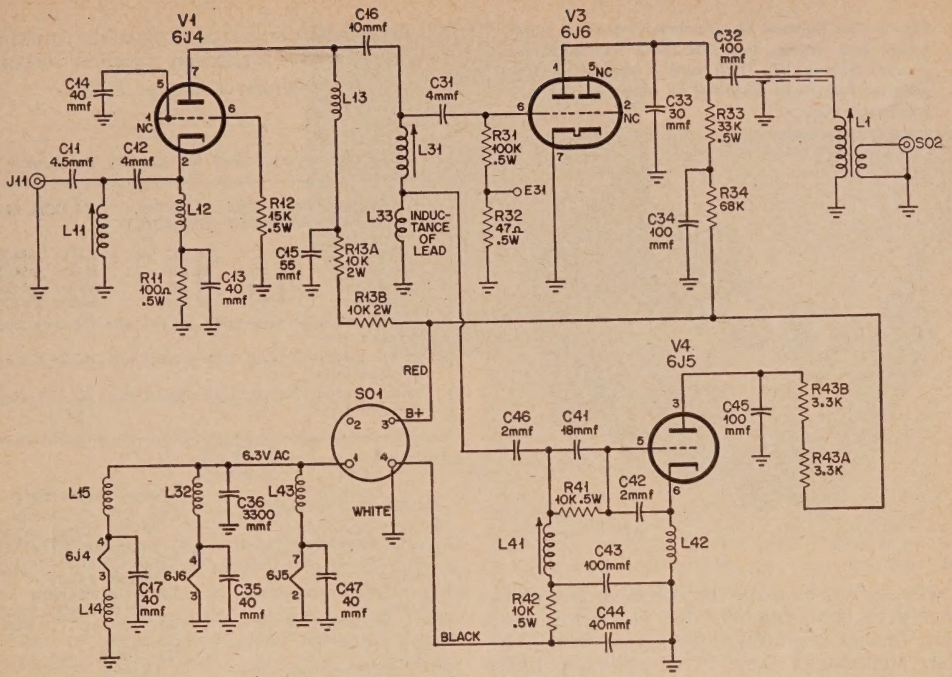


Diagram of 3 knob converter.

a phono jack that is mounted on the chassis (*SO-2* in the two BN circuits). The shielded wire that carries the i-f signal to the receiver then plugs into this jack. Connect the other end of the shielded wire to the antenna terminals of your communications receiver.

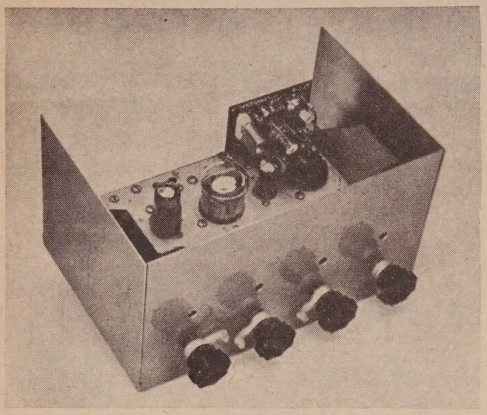
The BN converter (four knob model) is converted in much the same manner. After you have installed the trimmer in the oscillator circuit (as described above), remove the 4.5 $\mu\mu$fd input capacitor (the 4 $\mu\mu$fd capacitor) and connect a wire from the center conductor of the antenna jack to the cathode *(pin 7)* of *V1*, the 6J6. As before, this removes the input coil, *L11* from the circuit. Connect a 100 $\mu\mu$fd disc capacitor across the 6 $\mu\mu$fd capacitor that is connected between *L21* and the grid *(pin 4)* of the WE-717/A. In addition, connect a 5 $\mu\mu$fd disc capacitor from the plate (*pin 5*) of the 9006 to ground. When this has been accomplished, all the dials should read about 5 or 6 when correctly set for the 2 meter band. Last but not least, mount the i-f coil and the output jack as before.

To adjust the BN converter, first make sure that all the connections have been properly made and check to see if the signal cable is correctly connected to the receiver. When tuning across the i-f range that you have selected, you should not hear any stations of that particular frequency coming through. You should hear nothing but the "hiss" generated by the converter. If you do have a case of "i-f leakthrough," it indicates that the shielded cable is incorrectly connected, that the converter and the receiver are not properly connectd together or that it is entering the receiver somewhere other than the antenna. If you can still hear stations in the i-f range coming through with the antenna disconnected, it indicates that the converter connections are probably satisfactory. However, before the converter will perform satisfactorily, it will be necessary for you to determine how the signal is getting into the receiver and eliminate it.

Let's assume that everything is working correctly and that you are ready to proceed with the adjustments. First, peak up the i-f coil for maximum hiss in the receiver. Next, pre-set the mixer coil (and r-f coil if you have one) to 144 mc with the aid of a grid dipper. Also, pre-set the oscillator coil to the injection frequency. When this has been accomplished, you can put the coils "on the money" by peaking them up on a 2 meter signal. If you do not have a grid dipper, set all the dials to 5 and adjust the oscillator trimmer until you receive 2 meter signals. Then peak up all coils for maximum signal strength. If you know the frequency of the incoming station it is possible to calibrate the receiver dial. As an example, we know that a 144 mc station should appear at 7 mc for a 7-11 i-f frequency. If the incoming station happened to be 145.8 mc, we would set the communications receiver dial at 8.8 mc and adjust the *OSCILLATOR* knob on the BN converter until the station was heard. Then the rest of the band should locate itself between 7 and 11 mc of the receiver dial.

In order to crystal control the BN converter,

Fig. 2—The finished BN converter installed in an L.M.B. box. Notice that the 6SH7 has been replaced with a WE-717A and a crystal control adapter has been installed in place of the 6J5 local oscillator.



it was decided to make the oscillator and multiplier as a sub-assembly. Just about this same time, *International Crystal Manufacturing Company* announced their FO-6 oscillator multiplier. Although the unit was originally intended as a driver for a 2 or 6 meter transmitter, the company will supply it for any injection frequency within its range. As an example, if you wanted to use the BN converter with an NC-300 you would need an i-f of 30 to 34 mc. The chart (*Fig. 8*) tells us that for this i-f we need an injection frequency of 114 mc. Therefore, you would order a crystal ground to 57 mc (half the injection frequency) and an output coil resonant at 114 mc. The BN photograph (*Fig. 2*) shows the mounting of the FO-6. Notice that the 6J5 has been removed and an *Amphenol* 86-CP8 plug inserted in its socket to make power connections. *Fig. 6* is the schematic diagram of the FO-6. If you would like to build it out of parts on hand it should be possible to squeeze all the components on a 2″ by 3″ piece of aluminum. If the constructor finds it necessary to purchase the components, it would probably be cheaper to buy the completed kit from International. Because there are so many injection frequencies that constructors might like to use, no coil data is included, however, with the aid of a grid dipper you can "roll your own." *L1* is tuned to slightly higher in frequency than the crystal and coil *L2* is tuned to the injection frequency (the second harmonic of the crystal frequency for 30-34 and 26-30 mc i-f ranges and the third harmonic for the 14-18 and 7-11 mc ranges). If you should need more oscillator injection (as evidenced by all signals being weak) it will be necessary to increase the size of *C46* (the 2 $\mu\mu$fd capacitor that goes between the grid end of *L41* and the junction of *L31* and *L33*). After the crystal control adapter has been mounted and connected, adjust the multiplier coil and *L41* for maximum injection voltage at

[*Continued on page 104*]

Coil and crystal chart for the BN conversion

INTERMED. FREQUENCY	*INJECTION FREQUENCY*	*CRYSTAL FREQUENCY*	*IF COIL L1*
7-11 mc	137 mc	45.667 mc	Miller #4406
14-18 mc	130 mc	43.334 mc	Miller #4405
36-30 mc	118 mc	59 mc	Miller #4404
30-34 mc	114 mc	57 mc	Miller #4404

Miller #4406 34 turns #30 enamel wire, 3/8 inch slug tuned form

Miller #4405 18 turns #26 enamel wire, 3/8 inch slug tuned form

Miller #4404 12 turns #24 enamel wire, 3/8 inch slug tuned form

Parts List
BN and BN-1 conversion

100 $\mu\mu$fd capacitor
5 $\mu\mu$fd capacitor (used only on the BN conversion)
L1—I-F coil, see chart Figure 8
SO-1 Amphenol 4 pin male connector #86-CP4
SO-2 RCA phono connector

Parts List for the crystal controlled oscillator

C1, C2, C4, C5, C6—.001 disc ceramic
C3—4.7 μfd. NPO disc ceramic or silver mica
C7—5 $\mu\mu$fd. NPO disc ceramic or silver mica
R1—47K, ½ watt
R2, R4—18K, ½ watt
R3—100K, ½ watt
V1—6U8
Xtal—see Figure 8
L1, L2—see text
Socket — Amphenol 86-CP8

Power Supply Parts List

C1a, C1b—20-20 μfd., 150 WVDC filter capacitor (Sprague TVL-2415)
CH1—Filter choke 10 hy., 50 ma. (Triad C-3X)
L1 — Pilot lamp holder and #47 pilot lamp
R1—22 ohm, 1 watt resistor
R2—100K ohm, 1 watt resistor
Rect. 1—50 ma. selenium rectifier
S1 — single pole, single throw toggle switch
SO1—4 pin tube socket (Amphenol 77-MIP-4)
T1 — Power transformer 135 volts, 50 ma., 6.3 volts, 1.5 amps. (Triad R-30X)
Miscellaneous components —Chassis, line cord, 2⅜ inch grommets, power cable composed of: 3 feet of 4 conductor wire, 1-Amphenol 78-PF4 female and 1-86-PM4 male connector.

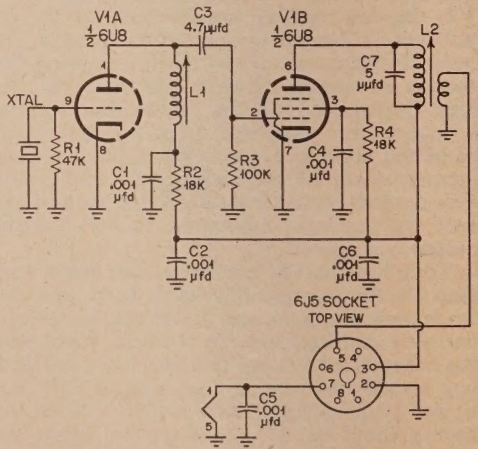
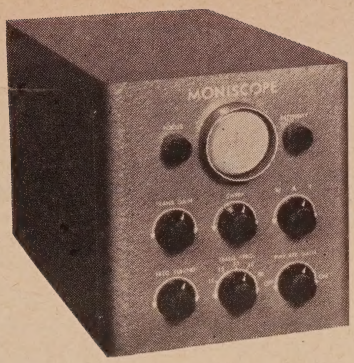


Fig. 6. Crystal oscillator circuit for converter. L2 is powdered iron core, not as shown.



CQ Tests the Moniscope

The Moniscope, first described in *CQ,* April 1954, p. 15, is certainly one of the most flexible and useful adjuncts to a ham station. This completely self-contained package gives either a visual or aural indication of the quality of a transmitted or received signal. Visual presentation is on a two inch cathode ray tube in the form of wave envelope, elliptical, or trapezoidal patterns. Headphones plug in for aural checking of the signals.

Thus you have a continuous indication of your own modulation as well as a convenient monitor of the percentage of modulation of received signals. The changeover from receive to transmit in the unit is automatic . . . there are inputs for both on the back of the Moniscope.

It takes about fifteen minutes to connect into the receiver and by watching the Moniscope, touch up the last i.f. a bit. The instruction book is very well done and leaves no room for confusion, even in our case. As soon as it was going we started checking everyone on the air. Several of the gang were running well over 100% modulation! After a few minutes with the Moniscope we could see just why a lot of fellows don't sound right.

The connection to the transmitter was even simpler, just one loop wire running close to the final to pick up some r.f. Instantly we had an accurate check on modulation percentage . . . well, running only about 80%. Tuning the rig, checking different microphones, and other tests were duck soup with the Moniscope.

This unit is being built by American Electronics Enterprises, 3603 E. 10th Street, Long Beach, California, and sells for $129.50. Specify whether you want the 262 kc i.f. model or the 455 kc model. ■

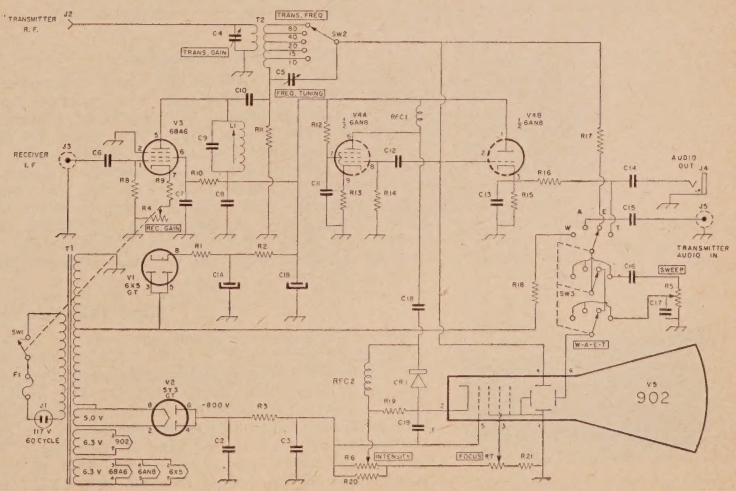


Diagram of Moniscope

The Morrow MB-560 Mobile Transmitter

CQ Staff

One of the greatest difficulties faced by the prospective mobileer is the objections of the XYL to that "great big box that is going to tear my stockings." Fellows, you've got an answer. Morrow has come out with what looks to us like the highest power mobile transmitter for its size ever marketed. This package will fit under the dash and leave plenty of room for the XYL, Nylons and all (4⅛" high). You can take it even one step further and take the rig out in a jiffy by using the supplied "Jiffy Mounts" which allow the transmitter to slide into place rather than being permanently bolted in as are most others. This also allows you to whip the unit out for use in the home or motel room on a moment's notice.

The r.f. design of the MB-560 is unusual too. It has a built in VFO which always operates on one half of the output frequency. This makes it possible to get the best possible band spread for every band. Remarkable stability results from a couple of extra isolation stages between the VFO and doubler. The crystal oscillator is also isolated from the VFO.

The final is pi-net tuned and is designed to work into the usual 50-75 ohm load. Impedances outside this range will require an antenna tuner, as with most other transmitters. Baluns can be used for coupling 300 ohm twin-lead directly to the transmitter.

The built in antenna relay has an extra set of contacts for controlling the receiver. The unit may be set to operate on either six or twelve volts, with 250 volts @ 90 ma., from 300 to 600 volts @ 200 ma. for the final, and 67½ volts @ .1 ma. bias. The bias supply need only be a battery, it is switched out of the circuit when the transmitter is off to prolong its life. The power *output* is rated at 50 watts on the lower frequency bands and up to 40 watts on ten meters! In actual practice we were able to load the final up to 65 watts input on all bands with 100% modulation shown on the *Moniscope*.

The instruction booklet sets a new standard for helpfulness. It gives all sorts of interesting and useful data, plus detailed operating instructions.

All in all, the Morrow MB-560 is an excellent transmitter buy at $214.50. ■

Right: Diagram of the MB560.

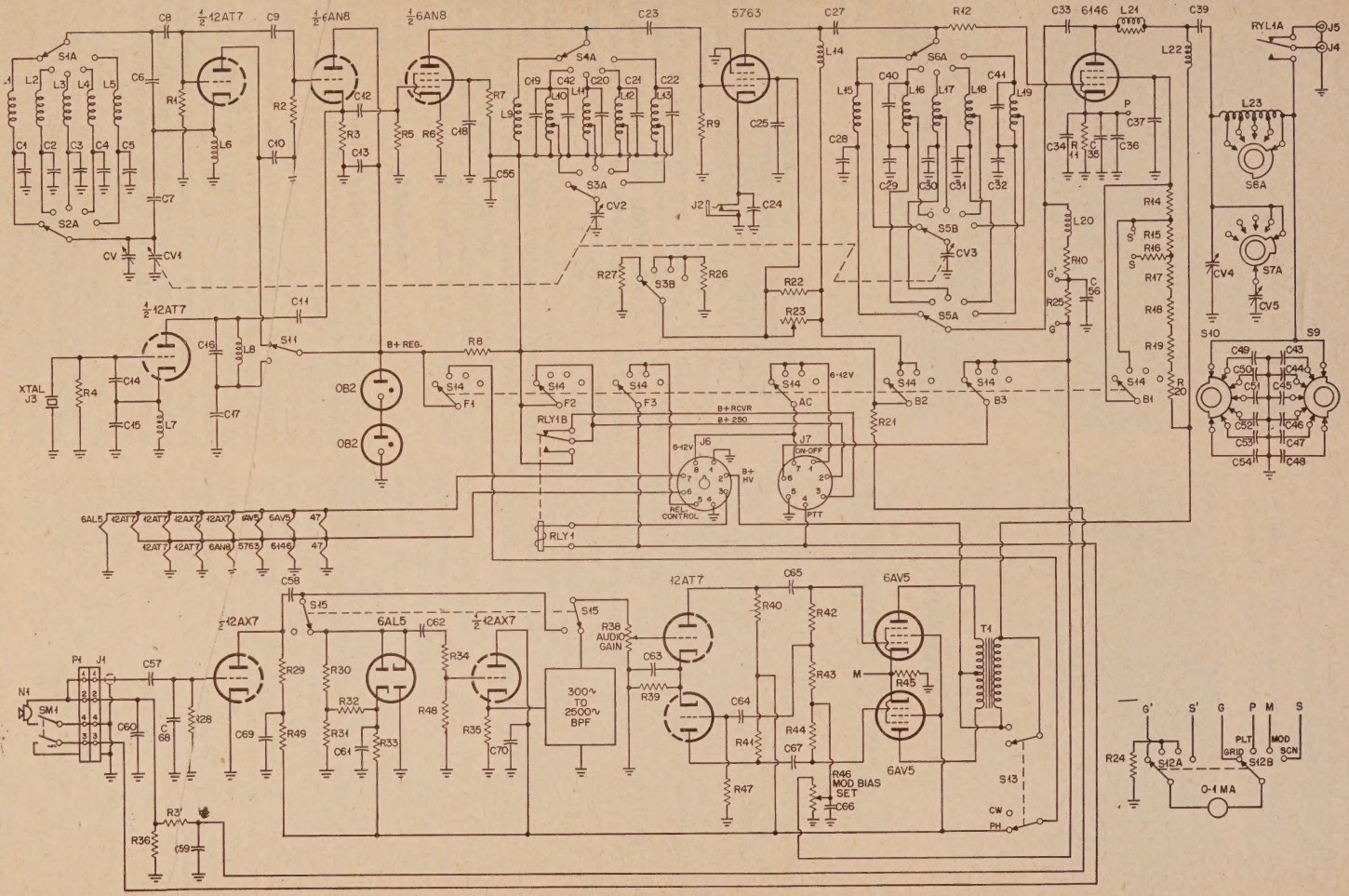
Two Meter Groundplane

Western Gear Corporation puts out one of the nicest two meter groundplanes I've ever seen. Besides working well electrically it is ruggedly built so that it should last for years without attention. The radiating element is 1" gold anodized pipe with a tightly soldered end plug to keep smog (if you are in Los Angeles) and rain out (elsewhere). The base is solidly cast and is black anodized. The ground plane elements are ¾" gold anodized pipes. The antenna comes equipped with a coaxial connector built in so you can plug in your 52 ohm coax feedline. The base comes with built in clamps to attach the antenna to your mast or tower so the erection shouldn't take but a few minutes. Costs $19.95 last I heard and is a good value. The six and ten meter antennas are more expensive, naturally. Look up their ads for more info on those models.



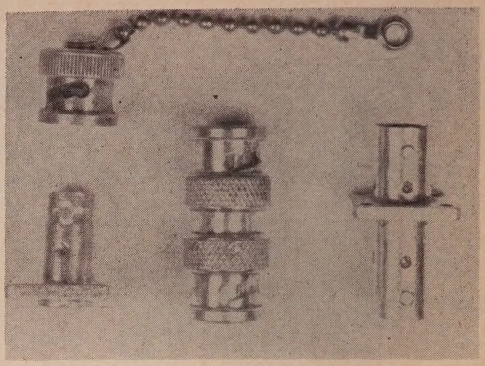
Blind Your Friends

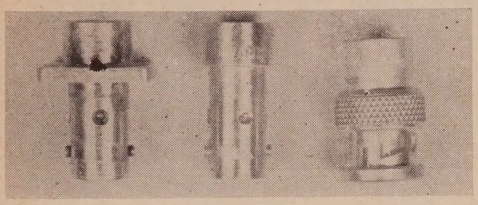
Aron Electronics of Detroit has come up with one of the handiest little ol' contraptions we've seen yet. For $22.50 (plus shipping) you can equip your car with a gov't surplus stroboscopic photo flash unit and really give those people who won't lower their lights what for. This unit makes a flash visible for seven miles; imagine the confusion on an approaching driver's face when he is instantly blinded while driving toward you at 60 mph! Bootleggers and heist men can mount the flash in the rear of their car to blind following police cars, etc. Can also be used to signal the approaching of revenuers from distant hilltop. A million uses. When writing mention 3830 Chene Street, it's the address.


½12AT7
½6AN8
½6AN8
5763
6146
RYL4A
J5
J4
S1A
S2A
S3A
S3B
S4A
S5A
S5B
S6A
S7A
S8A
S9
S10
S11
S12A
S12B
S13
S14
S15
CV
CV1
CV2
CV3
CV4
CV5
B+ REG.
B+ RCVR
B+ 250
B+ HV
6-12V
ON-OFF
REL. CONTROL
PTT
RLY1A
RLY1B
XTAL J3
OB2
OB2
6AL5
12AT7
12AX7
6AV5
47
12AX7
6AL5
½12AX7
12AT7
6AV5
AUDIO GAIN
300~ TO 2500~ BPF
MOD BIAS SET
0-1 MA
CW
PH
G'
S'
G
P
M
S
PLT
GRID
MOD
SCN
J1
P1
M1
SM1

Right: cap and chain, UG-290/U chassis receptacle, UG-491/U Male-Male adaptor, UG-414/U Female-Female adaptor.

Fig. 1. Below: UG-88/U plug, UG-261/U cable receptacle, UG-291/U chassis cable receptacle.





Kenneth B. Grayson, W2HDM
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474 E. Second St., Brooklyn 18, N.Y.

Modern Coax Connectors

With the increased use of the VHF and UHF bands, the amateur is finding that only coaxial transmission lines can be counted upon to carry the power to and from the antenna. Open wire lines (twin-lead) may be used for some applications, but coax has still proven itself the best all around transmission medium. While many types of coax exist, only certain types find application in the amateur communication system. For instance, RG-58/U and RG-8/U are both 50 ohm coax, but the thinner RG-58/U is more flexible and hence handier. The same difference exists between the thin RG-59/U 72 ohm coax and its larger counterpart RG-11/U.

When coax first came into being many problems existed. Among them was the simple one of connections. No really good connectors existed at the time. One of the first really coaxial connector systems to be developed was the UHF series. We know these as the PL-259 plug and its mate the SO-239 socket. Misnamed the UHF series, they provide only shielding and convenience, but fail at the UHF region because they do not maintain a constant impedance along the line. This in itself is serious enough to increase the standing wave ratio by a very large percentage. At low frequencies, or where the impedance match is unimportant this is an ideal connector.

The popular "auto radio" coax connector and the "phono-jack" types are also very poor substitutes for a coaxial connector of constant impedance as should be used on transmitter outputs and receiver inputs. Most engineers prefer to call this type of device a shielded plug.

When the limitations of the UHF type of connector became apparent, other types of connectors were developed to alleviate the situation. Among these types were the N, C, HN, LC and the BNC. Of all of these types the BNC seems to be the most suited to the needs of the amateur radio operator. The price is fair (considering the job they do), the quality is very high, and the connection is a constant impedance and therefore very good. Furthermore it is easily connected or disconnected resulting in simplicity especially for mobile operation.

Above are the basic BNC connector series. For RG-8/U coax the type C series similar to the BNC is available. The cost is higher but for convenience in quick-disconnect and where a waterproof constant impedance is required BNC and C type connectors are terrific.

Assembly

The most important thing to remember when using any connector, coax or not, is to assemble it properly. This is not as hard as it first appears—provided you follow the manufacturer's recommended procedure. Suppose we wish to attach a UG-88/U BNC type plug to a piece of RG-58/U coax. Our first step would be to examine the connector. It consists of six parts: the plug body, the male contact, the clamp, the gasket, the washer and the nut. They all come in a little plastic bag sealed for your protection. OK, we can start. Take the cable and cut only the vinyl (not the shield) ¼ inch from the end and fray the braid. Now cut the inner dielectric ⅛ inch exposing the inner conductor. Tin the inner conductor. Now slide the nut, washer, gasket and clamp over the body of the cable in that order. The inner ridge of the clamp must seat firmly against the outer cable jacket. *Fig. 2*

shows this assembly with the braid pushed back over the clamp and trimmed. The male contact is shown in place ready for soldering. The hole in the contact is to allow solder to flow into the center and onto the inner conductor. Be careful not to use more heat than is really necessary to do the job. The dielectric has a tendency to swell when heat is applied and this could prevent proper assembling.

Only the male contact is soldered. The outer conductor is connected by sliding the body onto the assembly as far as it will go and tightening the nut with a wrench. Slots have been milled on the body of the plug for a wrench to hold the body while assembling.



Fig. 2. Before soldering female and male BNC connectors the assembly should look like this.



Assuming this procedure was followed we will have a perfectly good connector assembled ready for use. The nut will push the gasket tight and in turn will clamp the braid against the body of the plug. When it is desired to attach a cable to a chassis or some other structure, a device such as is shown in *fig. 3* should be used. It is assembled exactly as before except that the inner conductor and dielectric should be left as long as desired. The result is a simple, neat termination, made with very little effort.

UHF coaxial connectors also require care for proper assembly. When attaching a PL-259 plug to heavy coax, the jacket must be cut back for 1⅛ inches and the inner conductor bared for ⅝ of an inch. The shield should be cut back to 1/16″ from the edge of the inner dielectric. The coupling ring should be removed from the connector and slid onto the coax in the proper direction. Now carefully tin the outer shield, the center conductor and then screw the cable into the plug body until the coax is seated. Some braid will be exposed through the hole in the plug body and should be

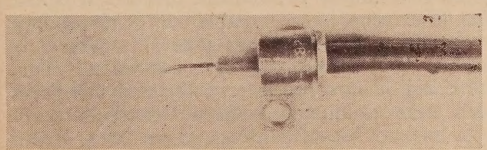


Fig. 3. Coaxial cable termination.

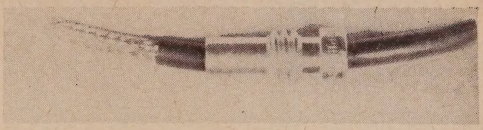


Fig. 4a



Fig. 4b

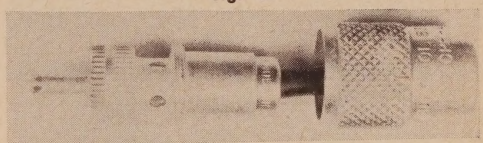


Fig. 5. Proper assembly methods for the UHF series of connectors to RG-58 coax.

soldered to the plug body. The center conductor is soldered to contact pin the coupling ring screwed back into position to complete the job.

When UHF connectors are used with a small diameter cable a sloppy job usually results unless a standard adapter is used. These adapters are low in cost and really simplify the job tremendously. *Fig. 4a* shows just such an adapter on RG-58/U coax. The braid has been exposed for a distance of ¾ inch, frayed and pushed back *fig. 4b*, and the center wire bared for ⅝ inch and tinned. Again, as with the heavy cable, put the coupling ring on the coax and screw the adapter assembly into the plug body. *Fig. 5* shows the assembled plug ready for soldering (through the body holes and on the center contact).

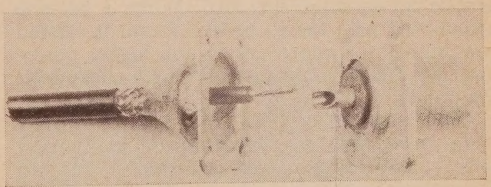


Fig. 6. UHF hood assembly.

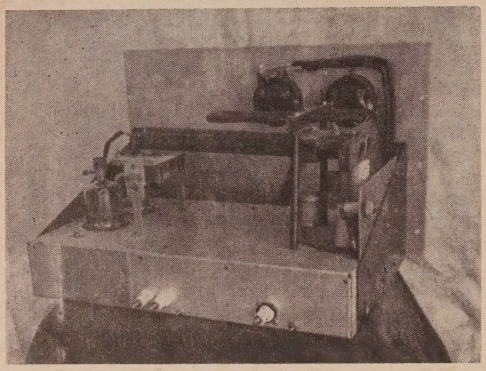
A final test with an ohmmeter should be given to all connector assemblies. It is surprising how much trouble a small piece of wire braid, twisted in the wrong direction, can cause.

Now that you are all experts on coax assembling you should find better results in that VHF and UHF equipment. That antenna that never worked just right may load up like a dream—the noise level on that converter may drop a db or two—who knows. Anyway, the satisfaction of doing the job right will be with you. ■

Use Your 522 or Gonset to Drive
This 500W Final

Reg Perkins, W6ZYH
3487 Golden State Dr.,
Santa Clara, Calif.

REAL POWER on 2



The final amplifier.

The idea of running high power on 2 meters is very attractive to most of us VHF enthusiasts. In most cases the builder ends up with a final that requires more power to drive than is reasonable. For the past few years I've been operating with 300 to 400 watts on 2 meters, but it took all the power my exciter could muster up to drive the final. When I became acquainted with the PL6549 I found it offered possibilities for improvement and higher power over my present transmitter with even less driving power.

The transmitter uses the new PL6549 pentode recently developed by *Penta Laboratories* in a screen-grid neutralized circuit. Quarter wave lines are used in the plate circuit in conjunction with a standard coil-condenser combination for the grid circuit. The modulator uses two PL6549's operating in class AB2.

The *Penta* PL6549 is a small aligned-grid pentode with a conservatively rated 75 watt anode. It is capable of operating over a relatively wide plate voltage range with good performance. The distinctive feature of a pentode is the suppressor grid. Among the many advantages is the low driving power required for a given power output as compared to a triode or even a tetrode. The 6549 can be operated as a tetrode, but it is better to use them as pentodes and do the little extra work needed to supply the voltage to the suppressors.

By doing this it helped my old Five-Tootie-Two driver so that it didn't bulge at the seams.

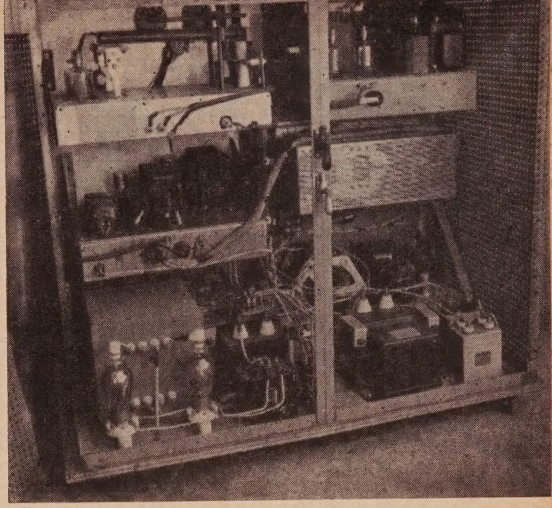
By now some of you are thinking of the letters TVI because of the high power. If reasonable precautions are taken in the layout and construction no harm will come to the one eyed monster.

The transmitter was first put on the air in the Santa Barbara area which is a fringe area for all TV channels from Los Angeles. Many hours were spent testing with operation of the tubes at power inputs as high as 700 watts with no sign of TVI. TVI shouldn't be any problem as a result of running high power in a 2 meter station, provided the final amplifier is not self-oscillating. Two meter TVI is not caused by the 2 meter rf but rather by harmonics of the low frequency stages that fall into the TV channels. Audio circuit pick-up within the speech section closely related to the old midget receiver BCI is another source of interference. Since TVI originates in these low frequency stages, reduce this power, do a reasonably good shielding job and you will decrease or completely eliminate your chances of causing trouble. In this particular set up, I use an SCR-522 which has been notorious for TVI until effective shielding and filtering was installed. I've also *reduced* the power output, since the PL6549 only requires about .7 watts drive per tube. Actually any suitable exciter capable of doing the same job will be sufficient. The PL6549s in conjunction with a suitable exciter will provide for the operator an input power capability in excess of 500 watts. As mentioned before it is possible to operate with 700 watts plate input. This is 200 watts above the specs for phone operation and 100 watts above the CW specs. I've merely pointed out this fact to show that the tubes are capable of withstanding tremendous sustained overloads. Of course this is only true under the best conditions. This point will be covered later in the text. All these tests were conducted without forced air cooling, but no harmful effects have been noted after a year's use. To keep the record straight,

if the builder desires to button the tubes up tight for r-f shielding and TVI, fans should be used.

The PL6549 ordinarily does not require neutralization in a well designed and shielded circuit, however for frequencies above 100 mc the screen and suppressor grid lead inductance introduces some feed back and it is desirable to series tune the screens to ground or to use the conventional cross neutralizing wires.

In the modulator it must be remembered that when operating pentodes or tetrodes under AB2 ratings both the grid and screen voltage must be obtained from a source having relatively good regulation. When a bias supply is used the resistance of the bias source should be of a low value (250 ohms or less).



Complete transmitter. Includes driver, power supplies, modulator and final.

Circuit Details

The SCR-522 will not be discussed in any detail as most 2 meter men either have one around the shack or have a transmitter of the same power level for use as a driver stage.

Quarter wave lines were not used in the grid circuit because of excess radiation inherent in this type circuitry. If you already have a tetrode final and decide to convert from tetrodes to the pentodes add a jumper of .015" sheet copper across *pins 3* and *5* on both sockets (for the suppressor grids), and a copper strap joining *pins 2* and *6* (for the screen grids). The suppressors are bypassed directly to the screen grids with the shortest possible leads of *C7* and *C8*. The *RFC's* are *Ohmite Z-50* and *Z-0's*. The *Z-0* is the old 2½ meter RFCs used in bygone days. The *Z-1* will work in place of the *Z-0's* if they are available. The grid tuning condenser is a *Hammarlund* HFD-15X with one stator and two rotor plates removed from both sides. The connections from *C2* to the grids is made with .015" sheet copper cut into 3/16" wide strips.

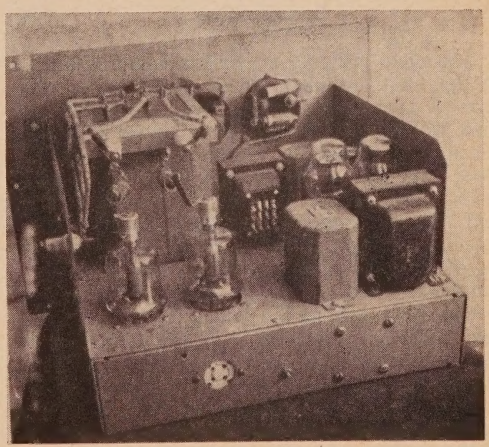
The neutralizing condensers *C5* and *C6* are small APC types available in many pieces of surplus gear. Modulation voltage for the screens and suppressors is obtained by placing audio reactor *L14* in series with the positive screen lead. If a separate screen supply is not available, modulation of the screen and suppressors may be effected by supplying the screen voltage through a series resistor from either the modulated or unmodulated plate supply. The suppressor grids only draw a few milliamperes of current at 70 volts, so a convenient method is to tap off the screen supply. The screen supply for the final is on the bottom left of the front panel, and is variac controlled, see *fig. 3*. The filament transformers for the final are mounted under the chassis.

The modulator *fig. 2* bias supply and regulated screen supply are on the same chassis with the modulator. Partial control of the bias voltage is provided by potentiometer R5 and control knob at the right of the modulator panel. Bias voltage control is required to set the stated value of zero-signal plate current according to the data sheet of the 6549's. Control *R10* in the regulated screen supply adjusts the bias on the control tube *V5* to the proper operating value and also acts as an output voltage control. This control was made available for testing purposes only and is the knob on the left of the modulator panel.

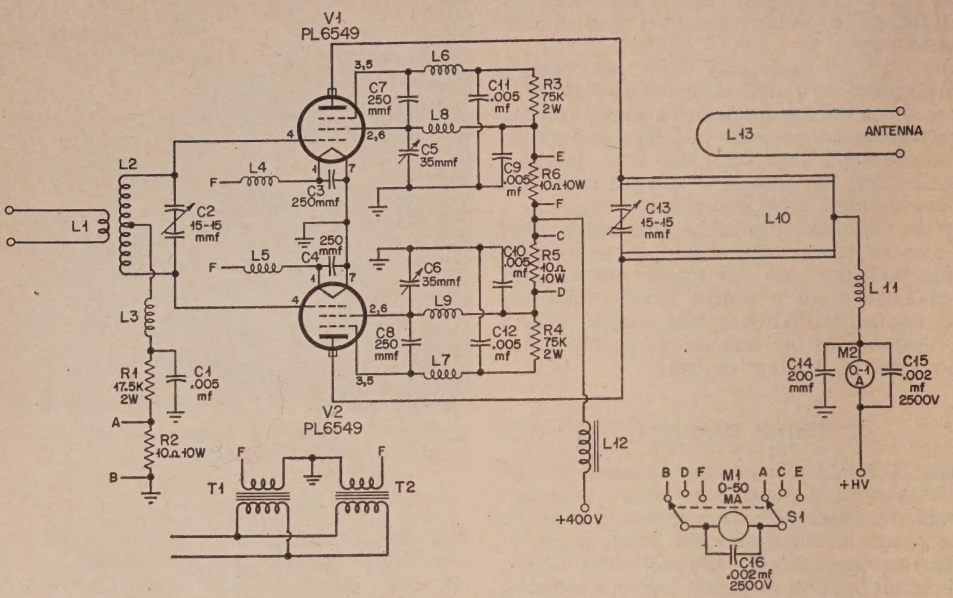
Two filament windings of *T8* are not used. Since the modulator screen supply is variac controlled, the primary of *T8* would be reduced and the filaments of the tubes in the supply would be operating below ratings.

A convenient way of obtaining bias voltage is with a selenium rectifier and two small filament transformers hooked back to back. *R3* takes the place of a small choke.

The driver transformer *T1* is mounted on the modulator chassis next to the modulation trans-



The modulator deck



Final amplifier diagram and parts list.

C1, C9, C10 C11, C12—.005 μfd mica 500V.

C2—15 μμfd per section, variable split stator. Hammarlund HFD-15X, see text.

C3, C4, C7, C8—250 μμfd mica, 500V.

C5, C6—APC 35 μμfd

C13—15 μμfd per section, National TMH-35D, see text.

C14—200 μμfd silver ceramic, 5000V.

C15, C16—.002 μfd mica, 2500V.

L1—1 full turn, #10 enamel, ⅞" I.D.

L2—2 turns, #10 enamel, 1" I.D.

L3—RFC, Ohmite Z1.

L4, L5—RFC, 19 turns, #15 enamel, ¼" I.D. closewound.

L6, L7 — RFC, Ohmite, Z-0 or Z1.

L8, L9 — RFC, Ohmite Z-50.

L-10—12" long, ¾" O.D. copper tubing, 1½" center to center.

L11—RFC, #14 enamel, 11/16" I.D., 9 turns.

L12—8 hy, 50 ma.

L13—16" long, ¼" O.D. copper tubing, bend into U shape 1½" center to center.

M1—0-50 ma D.C.

M2—0-1A. D.C.

R1—17,500 ohms, 2 watt

R2, R5, R6—10 ohms, 10 watt.

R3, R4—75,000 ohms, 2 watt.

S1—D.P. 3 throw selector switch.

T1, T2—6 vac @ 5a.

V1, V2—Penta PL6549.

former. Input to the modulator amplifier is through a small 4 prong *Jones* plug located on the modulator front panel.

Construction

The most critical part of the construction is in the final amplifier where symmetry of the circuits is important. The two sockets for the final amplifier tubes are 7 pin *Johnson* 122-101, for sub-mounting. They should be mounted as close together as possible to facilitate short leads. The APC neutralizing condensers *C5* and *C6* are mounted directly opposite the screen terminals of the sockets. If the APC's have ungrounded rotors, apply solder to the tuning shaft and the mounting studs. Be careful not to allow any of the solder to flow into the shaft bearing, otherwise you'll end up with a fixed capacitor. Join the APC's to the screen terminals with .010" or .015" strips of sheet copper. All RFC's are soldered with the shortest possible leads to the respective terminals of the sockets and are connected to a *one* connection terminal strip. The grid tuning condenser *C2* is mounted directly adjacent to the control grid terminals of the sockets. The connections to the grids are with short pieces of .015" sheet copper formed to connect on an angle. The grid coil *L2* is soldered to the grid terminals of the sockets; this places the electrical center of the coil nearer to the sockets and the RFC lead can be run inbetween the split section of *C2* and soldered directly to the coil. The driving link *L1* is mounted on two ¾" stand-off insulators; this provides a convenient tie point for the twin lead transmission line. This line is supported at the input end by two small pin jacks.

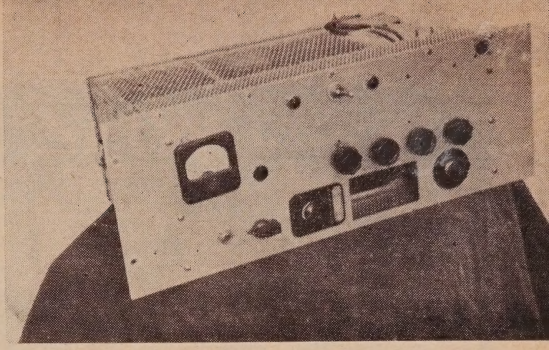
The filament transformer primaries and the screen grid power leads are connected to three separate feed-through insulators at the back of the amplifier chassis.

The amplifier plate lines are made from ¾" copper tubing, 12" long. The tubing is soldered into a 5" x 1" x ½" brass bar, with 1½" center to center spacing. The amplifier plate lines are supported at the d-c feed point by a 4" x ½" teflon rod. The shorting bar is ma-

chined from a 3" x 1" x 1" block of brass. The holes for the plate lines are drilled slightly over size, so that a strip of contact finger stock could be soldered into the holes. If no commercial finger stock is available some can be made by cutting thin strips of spring bronze and then cutting small slits along their length.

The plate lines are supported at the tube end by the plate tuning condenser. Two small brass or copper slugs were machined to fit the I.D. of the plate lines, then drilled and taped for an 8-32 bolt. This was to facilitate the attachment of a small copper L bracket bolted to the plate lines and to the condenser. The flexible plate leads are made from .010" copper sheet cut into 3½" x ½" strips and bolted to two heat dissipating caps. The plate tuning con-

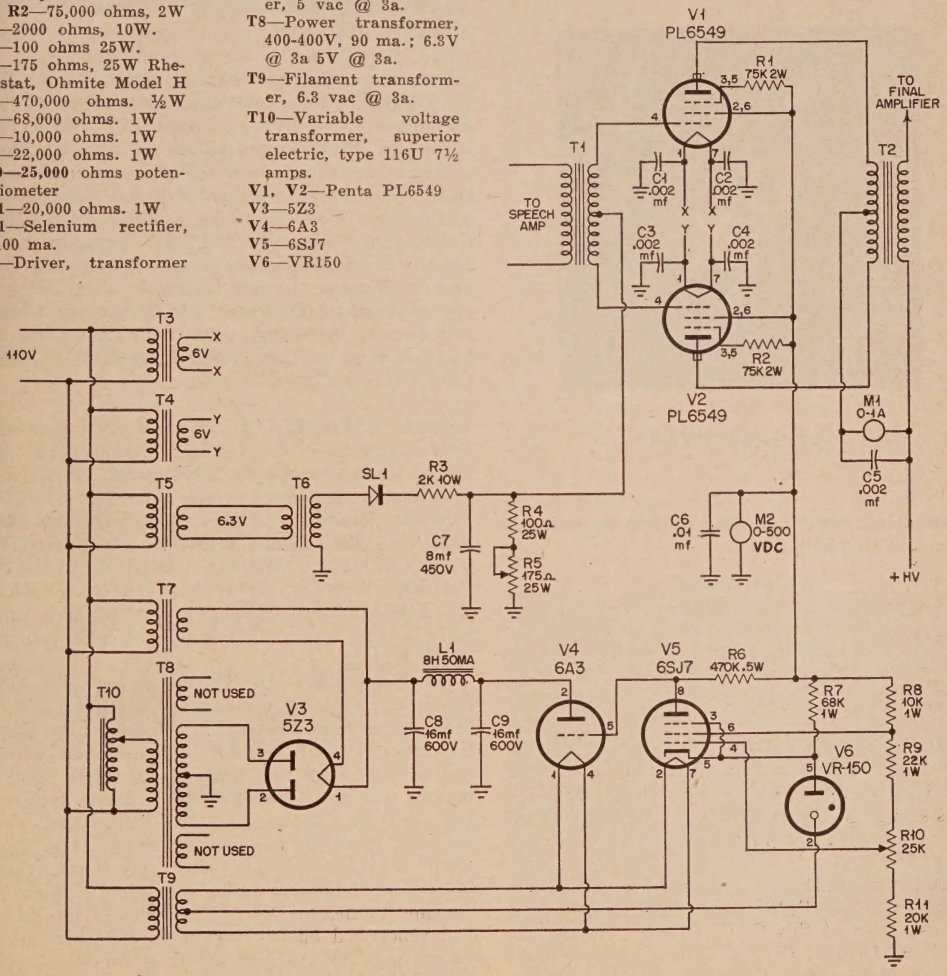
[*Continued on page 109*]



Doesn't look like a 522 does it?

Parts List

C1, C2, C3, C4, C5—.002 μfd. mica, 2500 V.
C6—.01 μfd. mica, 600V.
C7 — 8 μfd. 450V electrolytic.
C8, C9—16 μfd, 600V.
M1—0-1 ADC
M2—0-500 VDC
L1—8 hy 50 ma.
R1, R2—75,000 ohms, 2W
R3—2000 ohms, 10W.
R4—100 ohms 25W.
R5—175 ohms, 25W Rheostat, Ohmite Model H
R6—470,000 ohms. ½W
R7—68,000 ohms. 1W
R8—10,000 ohms. 1W
R9—22,000 ohms. 1W
R10—25,000 ohms potentiometer
R11—20,000 ohms. 1W
SL1—Selenium rectifier, 100 ma.
T1—Driver, transformer Thordarson T20D84.
T2—Modulation transformer, U.T.C. S-22.
T3, T4—Filament Transformer, 6 vac @ 5a.
T5, T6—Filament Transformer, 6.3 vac @ 3a.
T7—Filament transformer, 5 vac @ 3a.
T8—Power transformer, 400-400V, 90 ma.; 6.3V @ 3a 5V @ 3a.
T9—Filament transformer, 6.3 vac @ 3a.
T10—Variable voltage transformer, superior electric, type 116U 7½ amps.
V1, V2—Penta PL6549
V3—5Z3
V4—6A3
V5—6SJ7
V6—VR150



Modulator and regulated screen power supply as mounted on the modulator deck.



Some "nifties" may be seen in the WAZ line-up of QSL's by Gene, W7VY, of Seattle, Wash. This galaxy represents WAZ No. 326 (December CQ).



R. C. "Dick" Spenceley, KV4AA
Box 403, St. Thomas,
Virgin Islands

We welcome the following stations as newcomers to the HONOR ROLL:

W8JBI 39-247
W3VKD 39-203
W9BQE 39-200
W8PUD 38-177
W5VIR 36-154
W4HKJ 35-138

SIERRA LEONE, ZD1FG: This station has appeared near 14080 and augments the activity of ZD1DR from this rare spot. Art is ex-ZL2FG and cards should go via: A. W. Torrie, Prince of Wales School, Freetown, Sierra Leone.

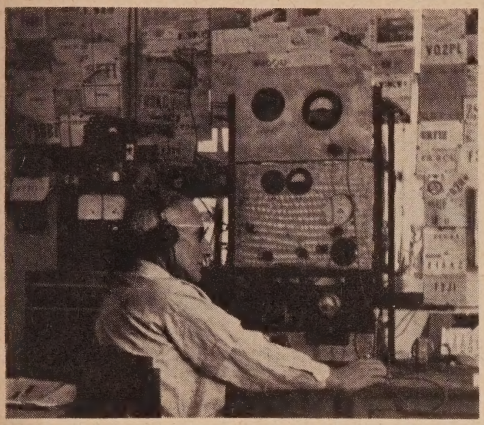
DUTCH ST. MARTIN, PJ2ME: For those who happened to miss PJ2MA or PJ2MC we now have a new station at this QTH, PJ2ME. He may be found on 14040 (xtl) and QSL's go to Vincent LaBega, Phillipsburg, Dutch St. Martin.

SPRATLY ISLANDS: This is one of the rare spots which Reg, W6ITH, has received permission to visit and operate from with the duly licensed call of DUØRT. This invitation was extended by Philippine citizen Tomas Cloma who claims the islands by virtue of occupation. On August 22nd a Vietnamese naval vessel visited the group, raised their yellow and red striped flag and claimed the islands for Viet-Nam. The Chinese Nationalist Embassy in Saigon then lodged a "strong protest" saying, in effect, that everyone knows that the Spratly (Nansha) Islands belong to them. Others laying claim to this group are Communist China and France. We imagine Reg will QRX a bit to find out if he will use DUØRT, BVØRT, FIØRT, CØRT or even 3WØRT!!

YASME EXPEDITION, VR4AA: Approximately 1650 contacts, in 55 countries, were made by Danny during his stay at Guadalcanal. "Firsts" by W districts on phone were: W1FH, W2PUN, W3JNN, W4ADY, K5BEU, W6KFQ, W7CFA, W8GAN, W9QLH and WØIOS. "Firsts" on CW were: W1DEP, W2HSZ, W3BZR, W4KYI, W5LFK, W6NZW, W7NKW, W8YIN, W9IRH and KØCAI. A decidedly uncomfortable bout with malaria kept him off the air part of Sept. 1st and all of Sept. 2nd.

On September 8th Danny sailed for Port Moresby, Papua, on what turned out to be one of his roughest hops. When only 100 miles from Cape Esperance YASME was hit by a hurricane which nearly wound up this venture—but good! Mountainous seas and 120 MPH winds nearly capsized him and all topside gear, which included new mainsail, small jib, gasoline drums and rope were swept overboard. Much water was shipped and everything, including radio gear, got a thorough dousing. Somehow, YASME weathered this blow and proceeded on her way with a broken tiller. Rough seas and complete overcast conditions persisted which made an accurate position extremely

Old-timer FB8BC, Victor Defaysse, Tananarive, Madagascar, runs about 50 watts phone on 7, 14, 21 and 28 MCS. Receiver is an AR-88. Vic has a "ZL-special" 2 element rotary beam. (Photo courtesy W2IWC).



difficult to obtain. On September 17th, while nearing Port Moresby, a leak developed in YASME's starboard side and it was thought advisable to alert the VK9 sea-rescue services. This was done by close-watching VK, ZL and VS6 hams and a rescue craft found Danny, taking him in tow at 1051 GMT. Due to sea conditions, towing him the 25 miles to port proved a rough chore and the towing hawser broke when nearing the harbor. YASME then finished the trip under her own power and arrived at 0500 GMT, September 18th. (Danny's account of this, appearing later, should be a dilly.) It is estimated his stay in Papua will be of two or three months' duration to effect repairs, operate and receive new mainsail. From there he will go to Darwin, Australia, and thence to CR1ØAB. Difficulties may be encountered in obtaining a license for operation at the Nicobar Islands (VU5) but it seems to be clear sailing as far as tickets for ZC3, Laccadive, Maldive, Seychelles and Aldabra Islands are concerned thanks to assists from VQ4ERR and VQ4AQ.

FRENCH SOMALILAND, FL8: F9RS advises that FL8AC and FL8AD will be active after January 1st. These, with the present activity of FL8AB, should make FL8-land easier pickings. FL8AA (unheard as yet) is Lt. Fremont, Officier de Transmissions. B. A. I. S. M. Djbouti.

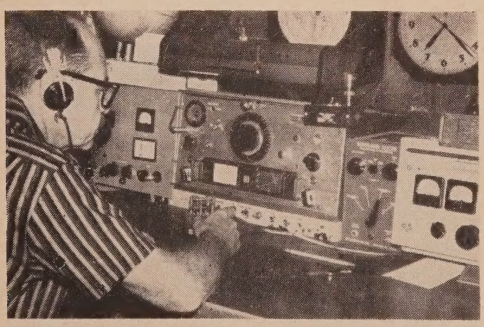
DX Notes

F3AT reports that PX1EX (Andorra) made 1010 contacts. They were hampered by weather conditions at their 7500 foot QTH plus engine trouble . . . All SM8KV/LA/P QSL's went forward in September. Contacts totalled 1049! . . . All FS7AA and VP2VK/VP2 cards have also gone out . . . UAØOM is not in Mongolia but in Gorodok, Buryat-Mongolian ASSR . . . Rumor has it that UAØON and UAØKOJ are active from Tannu Tuva (Zone 23). It is also reported that C8AA, and possibly other C8's, will be active soon . . . FG7XD is now active from Guadeloupes Ile de Marie Galante. See QTH's . . . XW8AB will be active for two more years from Laos. He was QRT during September . . . W2PRN reports CR8DL on 14036 at 0010 GMT while UM8KAA is known to be on 7015, 2100 to 2200 GMT . . . UN1AA is QRV daily on 14075 at 2100 GMT . . . YO3RF says 3A2GG was a "pirate" transmitting from HA-land . . . Ray, VS5KU is now G2KU . . . Doug, ZK1AB, is now ZL2AVQ . . . Leny, ex-VQ8CB, now keys from VQ8AB . . . F9RS received message from FB8YY (Adelie Land) who advises the two operators there have been much too busy for the ham bands but hope to get on in November or December . . . FE8AF, now in France, will be on from Cameroons in December. ZD4BK will also be on with an FE8 call . . . The deal which would give a prominent W3 a year's stay in Viet-Nam (plus ham ticket) is still pending . . . OQØVN has been active on 14 CW from Usumbura, Ruanda-Urundi (a "new one" for WAZ listings) . . . W2EQS's plans for FP8-land fizzled . . . VR2BZ advises that FW8AA should be on by now with an 813 final. He is ex-XW8AA . . . The FO8AD/MM raft expedition has been postponed till next year or later . . . ZC3AC was heard on 14056 1530/1600 GMT . . . An item in the Nairobi paper "East African Standard" tells of a DX'pedition planned by Kenya hams next year to the Seychelles and Aldabra Islands. Heading this trip are VQ4ERR and VQ4AQ. Seems these spots are not difficult to get to but the hitch is getting prompt transportation back from them. VQ4AQ mentions other islands which might possibly qualify as "separate" such as the Amirante Group, Coetivy Island, Cosmaledo Island, St. Pierre Island and Agalegg Island (We will pass these along to Danny) . . . F9RS speaks of a permanent operator in the Comores (Anjouan Island), R. A. Lienard, who might appear on the ham bands . . . ex-MP4ABW is now going to college in Ft. Wayne, Ind. He



QSL's bear witness to the DX activity of Roger Corey, W1JYH, Springfield, Mass.

may be reached via W9BHR . . . Via Bari, VR2BZ, we hear that ex-FW8AB, Adrien Monjoie, may be reached c/o Madame Riviere, 6 Rue Dugommier, Paris 12, France. After six months vacation Adrien wlil be re-assigned to Madagascar or West Africa . . . VR2BZ says no further news regarding ZM7 but that VR2BC and himself are planning a trip to VR5-land . . . Bob, ON4QX, and the gang that accompanied him to LX-land this year, plan a trip to San Marino next Summer (Keep after HV-land, Bob!) . . . Ray, ex-VR3A, is now VK3AFB . . . RAEM has reappeared on the air again as witnessed by contacts with W6GMF and W6DZZ. This is a special USSR hero award call! . . . New Zealand and Japanese expeditions will visit Antarctica. We understand the latter will have no ham stations on the air . . . Frank, YJ1AA, writes regarding activity in the New Hebrides as follows: Reg, YJ1RF, will be active for a couple of months more. He has received 1000 QSL cards and will QSL OK. I am training a native here who will be on the air shortly with a YJ call. FU8AC is still active on phone while Rene, FU8AA, is active on all bands both phone and CW. I hope to have another FU8 on in the near future if the Gov't. will waive the CW exam. If this goes through OK a local missionary, an ex-VR5, will also be on with a YJ call. The rig at YJ1AA runs ten watts to a 12A6 powered by a 12 volt car battery. This rig has worked 36 zones and 153 countries and I have, to date, sent 7353 QSL's to W-land! . . . West Gulf Bulletin notes advise that HC8GC came on the air September 1st giving his QTH as: William Guzman, San Cristobal, Galapagos Islands. YVØCT is N.G. G2MI has no idea who PK7ADM is and has forwarded his QSL's to VERON. Here are the skeds for KG6IG (Bonin Islands) as per letter to W3ECR: 1100 to 1200 GMT 14050 CW, 1200 to 1300 GMT 7050 CW, 0800 to 1000 GMT 14240 phone, 1000 to 1100 7250 phone, 1300 to 1400 GMT 3825 phone and 1400 to 1500 3550 CW. Leo, Phone op, at BV1US, Taipei, advises that there are two BV1US stations as the government will only allow one call. Van operates BV1US No. 2 which is located 260 miles south of Taipei. Both stations are on each alternate day sharing the same frequency . . . Many seemed disappointed about not nailing VQ1JO. Looks like his 20 watts was just a little too QRP . . . Via KP4YT the TI Bureau brands the recent TI9AA as a "pirate." There is no activity from Cocos Island (TI9) at present but the TI boys are keeping the matter of a DX'pedition there in their minds . . . Activity is expected from Thailand by now. He will be an LU signing an HS call . . . K6IEC advises that VS1GL (G3EET) will be returning to England shortly but VS1GL will continue operation as a club station (VS1 Bureau is now Box 2394, Singapore, VS1GV) . . . Effective July 15th W7ASG took over the W7 QSL Bureau . . .



DX'er WØANF, Harry Harvey of Kirkwood, Mo. The KW rig is located in the basement and remote controlled for bandswitching etc. DX totals are 39-200.

DXCC holders, OH1PW, OH1PN, OH1PZ, OH1NK, OH1OW and OH1PI, were snapped by OH1QE during July OH1 Field Day activities in front of a Finnish "sauna". Location was on the shore of Pyhajarvi Lake in Sakyla. (Photo courtesy OH1PI).



Paraguay Certificate

This award is available to any amateur submitting proof of contact with five ZP stations on phone or CW. Contacts must have been made after May 15th, 1952. Confirmations, including three IRC's, should be sent to Radio Club Paraguayo, Casilla de Correo 512, Asuncion, Paraguay.

Trip to Johnston

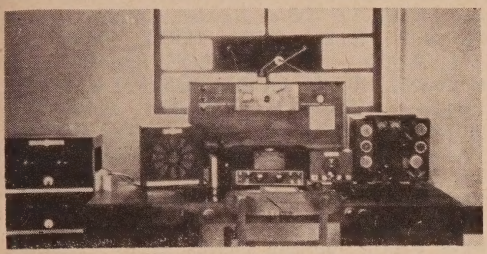
W7EMY, Lt. Col. William A. Pope, USAF
5032 Grayson St., Seattle 16, Wash.

During my operation as W7EMY/KH6 many foreign stations, particularly those in Europe had asked for help in working Pacific Island countries. I was able to arrange QSO's with KJ6BN for G6ZO and several others. However this was somewhat unsatisfactory as KJ6BN, altho very cooperative, was not experienced in DX work besides being handicapped with a poor antenna and poor receiver. He was also quite busy working phone patches into KH6 most evenings.

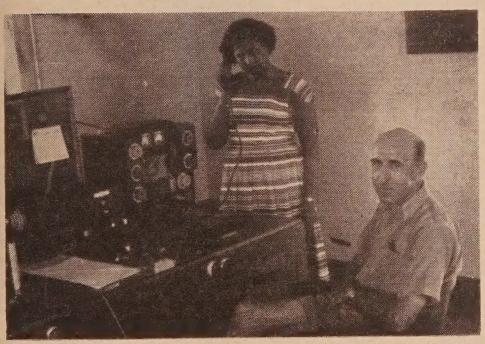
Since I expected to return to the States on July 31st, and I saw that I would be unable to complete DXCC from W7EMY/KH6, I conceived the idea of making one last splurge as "foreign" DX by a DX'pedition of my own to Johnston Island. My work with the U. S. Air Force called

for my making visits to that 6000-foot-long island about once per month, each visit being of two days and two nights duration.

Since my own transmitter was too bulky to haul by air conveniently, Airman Johnson, KH6BQT, of Hickam AFB, graciously consented to lend me his Viking Ranger for the trip. I then purchased and scrounged materials for a 20 meter ground plane antenna. For a receiver I hoped to borrow a BC-348 at Johnston Island.



Much sought for was VQ8CB the only ham station in the Chagos Island group. Photo shows operation position at VQ8CB with op Leny Mazery and XYL. Leny ran an 807 PA, modulated by 6L6's. The mike was built into a cocoanut shell and the mike stand and aluminum trim was salvaged from a wrecked Catalina. Leny now keys from VQ8AB in Mauritius.



My Super-Constellation aircraft departed from Hickam at 0220 GMT on the 19th of July and landed at Johnston Island at 0535 GMT the same day. I might mention here that Johnston Island is an Air Force emergency landing strip and has also an Air Force weather reporting station. It is located 713 miles SW of Honolulu and is about 6000 feet long and 2200 feet wide at its widest point. Immediately after landing I contacted the Base Commander who gave me the necessary authority to operate my station on this military reservation. Next I contacted M/Sgt. J. Marsalis, KJ6BN, who loaned me the 75A-4 receiver belonging to the MARS station. With the help of two of the Air Weather Service airmen I constructed the 20 meter ground plane antenna and mounted it on top of the rawinsonde station building. The transmitter was set up on the workbench inside this same station and W7EMY/KJ6 went on the air at 0845 GMT, July 19th. I pulled the big switch at 0400 GMT on July 21st. Since I had other business at Johnston Island I was not on the air continuously during this period but managed to put in about 20 hours of operating time. The ground plane also loaded up on 15 meters so that band was also used for a few hours. Fortunately I was able to work all the European stations I had previously told of my plans to go to this spot, plus a few more besides. Because of limited time and low power, etc., my accomplishments were not very spectacular but almost without exception I was a new country to those stations I did contact. I worked 93 stations in 18 countries and 30 states. It gave me a great deal of satisfaction to hand out a "new one" to even that many. I even worked Danny, VK9TW. Of course almost everyone asked about QSL's. As this is read I will be at Fairchild AFB, Spokane, Wash. and all KJ6 cards should have gone out by the end of September. If any are missing write me at the address given. Such is the story of W7EMY/KJ6. Wish I could repeat at KS6!

DX'ploits

Don, W6AM, leads off this month with an imposing 268 due to the addition of SM8KV/LA and CR8SA. His phone total comes to 209 with SM8KV/LA, AC5PN, XW8AC, VP8AQ, VR4AA, UG6AB and UB5WF . . . Frank, W6SYG hits 265 with SM8KV/LA while Oscar, W3JNN, goes to 263 with VR4AA, OQØDZ, YVØAA, XE4A and VK9TW. These plus UC2KAB, UP2KBC and SM8KV/LA pushed his phone total to 234 . . . Glenn, W8KIA, keyed with VK1RW for 263 as Jim, W8JIN, has an even 260 thanks to PJ2MC, VK9TW, XE4A, FL8AB and YVØAA . . . Ozzie, W9VND, nabbed VK1RW, UJ8AF and VQ1JO for 258 while Ben, W2BXA, came up to date with 258 plus a phone total of 211 with help from LZ1KBD, YVØAA, PJ2MC, FS7RT, FB8BP, etc. . . . Dewey, W6VE, is 257 with SM8KV/LA and YA1AM as Glenn, W6ADP, also hits 257 with XE4A, YVØAA, VK9TW, SM8KV/LA and PX1EX . . . Lindy, W8BHW, rises to 256 with YVØAA, VK9TW, PX1EX and SM8KV/LA. His country total on 21 Mcs. is now 166 with such as ZD6BX, VS6CT, HZ1HZ, 4S7GE and PX1ER . . . Luis, CE3AG, is now 252 with YVØAA, PJ2MC, FS7RT, VK9TW, SM8KV/LA, XW8AB and FL8AB while Horace, W6TI, adds YVØAA and UJ8AF to hit 249 . . . Van, W9HUZ, also rests at 249 with SM8KV/LA, AC3SQ and UL7CB as Norm, W6NNV, goes to 246 thanks to FR7ZC and YA1AM . . . Clint, W8SYC, is 241 with VR4AA and VK9TW while Art, VK2ACX, moves to 240 thanks to FG7XB, FB8BR/FB, VR1B, CEØAC, SM8KV/LA, VK9TW and FP8AP . . . Ray, WØDU, came up with XE4A, VR1B, PJ2MC, VK9TW and SM8KV/LA for 232 as Vlad, OK1FF, adds such as FU8AA, VR1B, SVØWN, KW6CA, PJ2MC, VK1RW and VP1SD for a 231 total . . . Bert, G8IG, hooked SM8KV/LA giving him 221 on CW/phone and 195 phone only while Dan,

W6PH, made it a double-century with VK9TW, VK1RW, VQ1JO, VR4AA and ET3AF . . . Clay, W6LGD, hit 195 with LZ1KAA as Vip, W6ID, went to 192 with SM8KV/LA . . . Dick, KV4AA, has 261 thanks to UL7CB while Ted, W8JBI, went to 247 with such as OQØDZ, IT1BXX, UI8KAA, UF6FB, UD6BM, VK9TW, XE4A and SM8KV/LA . . . Joe, W8UAS, has the beam going again and added YVØAA, VR4AA, UJ8AF, UI8KAA and SM8KV/LA for 242 as Ed, W3DRD, slid to 240 with SVØWN, KJ6BN, XE4A, UM8KAA, YVØAA, MP4KAC, YJ1RF, VQ8CB, VK9TW and SM8KV/LA . . . Gus, W2HMJ, made it 235 with SM8KV/LA and VQ1JO while Egon, 4X4RE, reached a like amount thanks to PJ2MC, FS7RT, CR8SA, XW8AB, VR4AA, VS4BO and SM8KV/LA . . . Buzz, W9ABA, rose to 232 with UI8KAA, SM8KV, PX1EX, FL8AB, VQ1JO and VR4AA as Sergio, CO2SW, nabbed YVØAA, VK9TW and CR1ØAA for a 222 total . . . Ren, W3KDP, moved to 220 with VR4AA, YJ1RF, YVØAA, PJ2MC, VK9TW and PX1EX while Doug, W9FDX, hit 219 with such as UD6KAB, UP2KBC, UR2KAA, FE8AE, UQ2AK, YK1AC,



On Reichenau Island, Lake Constance, we see Ned, W1RAN/DL4II, and Frank, OE1FF.

VK9TW and UG6AB . . . Bob, W1KFV, nipped FL8AB for No. 218 as Carl, W1ZL, moved to a like amount with KR6SA and VR4AA . . . Buck, W4RBQ, added YVØAA for 217 while Pat, W2GVZ, keyed with UL7CB, VR4AA and UI8AE to reach 216 . . . Hal, W6TXL, rose to 212 with UJ8AF, UC2KAA, PX1EX, SM8KV/LA, VK1RW, UR2AO, VK9TW, ZD9AE, YVØAA, PJ2MC and XE4A as Dan, W5LVD, went to 210 with VK9TW . . . Vic, W1TYQ, added 22 plus three new zones composed of UI8KAA, UAØAG and UAØKJA while Paul, K2GFQ, upped to 207 with PX1EX, UO5AA, FR7ZC, VR4AA and I1ANO/M1 . . . Walt, VE3AAZ, is now 203 with PJ2MC, FS7RT and VQ6LQ as Smitty, W9FNR, has an even 200 with CR5V, YVØAA and VR4AA . . . Lyle, VE8AW, also hits 200 with 22 additions which include YVØAA, ZS8L, XW8AB, ZP6CR, EA9DF and MP4QAL while Bob, W6DBP, rises to 194 with UB5CR, ON4CK/LX and VK1RW . . . Roger, F9AH, hooked 4S7LJ for 174 as Jim, WØRBA, is 168 with PZ1AH, HI8FR, VK9TW, LZ1KAA and VR4AA . . . Takeo, JA1CR, 159, worked HC1ARE for his 40th zone besides adding HK3PC, VR1RO, ZD9AE, FG7XB, FL8AB, CR1ØAA, UF6KAF, UH8KAA, ZP9AY and UN1AA while Fred, W8KML, nabbed PX1EX and VR4AA for 227 on CW and 212 phone only . . . John, W4HA, added a new zone with UAØKJA plus PX1EX, YVØAA, UR2AO, VK9TW, XE4A and SM8KV/LA for a 223 total. His phone total went to 207 with LZ1KAA and VK9TW . . . Charlie, W5KUJ, rose to 218 with XE4A, F9WT/FC, YVØAA, VQ8CB, CR1ØAA, VK9TW, 15RAM and CR5SP in spite of being beset with a series of misfortunes while Jim, W5FXN, hit 206 with such as VQ5GC, ZD1DR, VR1B, H18FR, VS9AS, VK9TW, YVØAA and VR4AA . . . Rip, W4EPA, hauled in KG6IG, VK9TW, SM8KV/LA and PX1EX for 205 as Hayden, K2BZT, went to 195 with FE8AG, AP2U, VK9XK, SM8KV/LA and KW6CA . . . Paul, W4LQN, has 190 thanks to FB8BX, UR2AK, PX1EX, SM8KV/LA, BV1US, VR4AA, OY7ML and YK1DF while Bob, W7NFE/6, adds 15 with such as VP2GN, UI8KAA, VR4AA and UQ2AK for 144 . . . Mickey, W8YIN, hits 209 with PX1EX, UR2AK SM8KV/LA and VR4AA as Francis, W2HSZ, pulled in HZ1HZ and VR4AA for a 196 total . . . Dixie, W2ZVS, on leave, went to 189 with VR4AA, YJ1RF, UC2KAB,



Gene, W6YC, San Francisco, Calif.

FE8AE, VK9SP, UA3KAA and (new zone) UA9DX while Gil, W1APA,, is 163 with SM8KV/LA . . . Skip, K6JQJ, added YA1AM for 174 as Paul, W9KXK, went to 172 with BV1US, PX1EX, VR4AA and KX6BP . . . Bob, W9NN, rose to 168 with SM8KV/LA and FB8BR as Aleta, K6ENL, hooked LU3ZY, UB5UB, YS1O, ZC5SF, UR2KAA, VR4AA for a 136 total plus UA9DX for a new zone . . . Miles, W6ZZ, made it 157 with PJ2MC, VK9TW, BV1US and VR4AA while Willard, W1NWO, miked with VK9TW and VQ8CB for a 222 phone total . . . Sax, W2SAW, rec'd WAC/YL No. 8 (for USA), NAA No. 6, first Hile Award issued to a W2 and worked HB1QO/VS to complete his H-22 . . . John, K4BAI, eases up to 83 with such as FP8AP, VK9TW, KW6CA and UA3CR while Fred, W3EOB, goes to 125 with VK9TW, DL1CR/LX and 4S7MR . . . LU3ZM was No. 123 for W4FYI and K2JTS added VR4AA, CT2BO and KJ6BP . . . FL8AB was No. 207 for YO2RF while Norm, DL4RI, reports the following contacts, all on 14 phone with a BC-610: MP4KDS 14138, YO3VA 14127, YO3VI 14162, VP1OLY 14124, HZ1TA 14125, SU1AS 14145, EA8BB 14192, EA9AR 14130, EA9AW 14215, ZP5ET 14133, AP2Z 14187, OD5LJ 14177, OD5AT 14139, OD5CD (YL) 14147, UQ2AN 14132, UA3CR

[*Continued on page 95*]



Last Minute Forecast for November

A moderate radio storm is forecast for the period November 14-17. Shortwave propagation conditions will probably be unstable during the period Nov. 1-2 and 25-29. Exceptionally good conditions are expected between Nov. 18-24.

George Jacobs, W3ASK
607 Beacon Road,
Silver Spring, Md.

Sunspot Cycle

At the time of writing this column, the Swiss Federal Solar Observatory at Zurich has announced that the monthly sunspot number for August, 1956 was 171. This is the highest monthly sunspot number since February, 1949 as solar activity continues to increase at an exceptionally rapid rate.

Sunspot numbers are given as daily, monthly and 12-month average values. The daily number takes into account the number of individual sunspot groups on the sun's face and also the number of individual spots counted within the groups. This result is multiplied by a factor to take into account the power of the telescope used for viewing the sun. At the end of each month the daily numbers are averaged into a monthly number. The monthly numbers are subject to considerable month to month variation and have little direct correlation with general shortwave radio conditions. To obtain a true long-term trend, not colored by the short-period variations, monthly averages are reduced to a 12-month running average, or *smoothed sunspot number*. This smoothed sunspot number is calculated monthly and takes into account the Zurich monthly numbers for a one year period. It is the smoothed sunspot number that exhibits the cyclic correlation with shortwave radio propagation conditions. The latest *smoothed sunspot number* of 97 is calculated for February, 1956 and takes into account all the monthly sunspot numbers observed between September, 1955 and August, 1956.

The latest sunspot forecast of Dr. Waldmeier of the Swiss Federal Observatory calls for the peak of the present cycle to be reached during January, 1957 with a record breaking smoothed sunspot number of 177. The Central Radio Propagation Laboratory of the National Bureau Of Standards, basing its forecast on a method different from that of Dr. Waldmeier's, also calls for the peak to occur during January, 1957 with a smoothed sunspot number exceeding 150. There appears to be little disagreement now to the fact that we are fast approaching the peak of the present cycle, and that it will be one of the most intense cycles ever recorded.

Propagation Conditions, November

In the Northern Hemisphere solar absorption and atmospheric noise level (static) continue to decrease. In accordance with other seasonal changes in the characteristics of the ionosphere, daytime usable frequencies are considerably higher and night time usable frequencies somewhat lower than during the summer months.

The following is an over-all picture of band conditions forecast for November, 1956, with a brief discussion of the qualitative changes in each amateur high frequency band from month to month. For specific times of band openings for a particular DX or Short-skip circuit, refer to the *CQ Propagation Charts* on the opposite page.

6 Meters:

With peak sunspot activity forecast for this winter, the 6-meter band is expected to open on a small number of days during the month. The best chance for an opening is towards South America during the late afternoon hours. The optimum time for Trans-Atlantic openings would be from the East Coast during the period 8 AM to about Noon. Trans-Pacific openings from the West Coast are most likely to occur during the late afternoon hours. Although not shown in the *CQ Propogation Charts*, the peak MUF on circuits from the Hawaiian Islands towards the Far East and Asia, peak over 50 Mcs between 00-04 GMT, and the 6-meter band should open on these circuits on nearly half the days of the month. Further on in this column the possibility of television DX propagation on frequencies in the range of 50 Mcs is discussed.

10 Meters:

Exceptionally good world-wide openings are forecast almost daily from shortly after dawn through the early evening. Signals from an easterly direction will peak shortly before noon, and those from a westerly direction during the late afternoon and early evening hours. Short-skip openings, between 750 and 2400 miles, are expected to occur almost daily from before noon until early evening. Because of low ionospheric absorption in this frequency range, signals are expected to be exceptionally strong, even when using relatively low power.

15 Meters:

It will be nip and tuck between 15- and 10-meters as to which will be the best band propagation-wise during the daylight hours. From shortly after dawn, until late evening, 15-meters should be open for DX on most, if not all days of the month. Signals from an easterly direction will peak shortly after noon-time and those from the west and south during the late afternoon and early evening hours. For a good part of the day, both 15- and 10-meters will be open simultaneously to the same areas of the world with exceptionally strong signals. Short-skip propagation, between distances of 750 and 2400 miles, should be possible on most days from a few hours after sunrise until after sunset.

20 Meters:

With fewer hours of daylight the 20-meter band will not remain open as long as it did during the summer months, but good world-wide propagation conditions are still expected from shortly before dawn through the evening hours, and on some circuits almost around the clock. Peak conditions for most circuits will occur during the early afternoon and evening hours. Short-skip propagation is forecast from shortly after dawn through the evening hours, with the minimum skip distance as short as a few hundred miles near noon time, and extending outwards to 2400 miles during the late afternoon and evening hours.

40 Meters:

With a seasonal decrease in absorption and static levels, fairly good DX propagation conditions are forecast from shortly before sunset until shortly after sunrise on about half the days of the month. Short-skip propagation should be possible around the clock, with the skip distance as short as a few miles during the noon period, increasing to beyond 2400 miles as the hours of darkness approach.

80 Meters:

A seasonal improvement is expected for propagation conditions on 80-meters, but the influence of peak solar activity will limit conditions on the band to no better than fair. Long distance openings are likely to occur on a small number of days from a few hours after sunset until shortly before sunrise. Static levels will be considerably lower than during the summer months, but signals will remain rather weak. During the daylight hours, ionospheric absorption will limit maximum range to about 250 miles, with the skip increasing upwards to beyond 2000 miles during the late afternoon and evening hours.

160 Meters:

With the seasonal reduction in static levels, the 160-meter band should be somewhat quieter during November. Circuit analysis studies show however that the increase in ionospheric absorption associated with the rapid rise in sunspot numbers will still limit 160-meter openings to distances generally less than 1500 miles, and then only during the hours of darkness. During the daylight hours, absorption will limit 160-meter propagation to the groundwave component line of sight range. On a small number of nights, when ionospheric absorption may be lower than usual, skip openings beyond 1500 miles may be possible.

Sunspot Number

This month's CQ forecasts are based on a predicted smoothed sunspot number of 155 centered on November, 1956.

Television DX

Because of the unusual high frequency propagation conditions forecast for November and the winter months, long distance reception of television broadcasts may be possible during this period. While this discussion might appear a digression from amateur radio matters, mail recently received indicates that television DX is of considerable interest to many readers of this column. The interference aspects of TV DX may also have some bearing on amateur radio.

During the winter months of the peak sunspot periods of the two previous cycles, 1937-39 and 1946-48, television signals on 41-46 Mcs originat-

ALL TIMES IN EST

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

ALL TIMES IN CST

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

ALL TIMES IN PST

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

CQ PROPAGATION CHART

(SHORT SKIP)

DISTANCE (MILES)

BAND (METERS)	50-250	250-750	750-1300	1300-2400
10	-	9A-3P (1)	8A-10A (2)	11A-4P (1)**
			10A-4P (3)	8A-10A (3)
			4P-6P (2)	10A-5P (4)
				5P-8P (3)
15	-	9A-4P (2)	7A-9A (2)	8A-6P (4)
			9A-4P (4)	6P-11P (3)
			4P-8P (2)	11P-2A (1)
20	8A-4P (3)	7A-9A (3)	7A-6P (5)	7A-2P (3)
		9A-3P (5)	6P-1A (3)	2P-10P (4)
		3P-8P (3)		10P-2A (3)
				2A-7A (2)
40	7A-8P (5)	7A-10A (5)	MID-8A (4)	4P-6P (3)
	8P-11P (3)	10A-4P (4)	8A-4P (3)	6P-7A (4)
	11P-2A (1)	4P-7P (5)	4P-MID (5)	7A-9A (3)
		7P-2A (3)		
		2A-7A (2)		
80	6A-11A (5)	8A-10A (2)	4P-6P (2)	6P-8P (2)
	11A-4P (4)	10A-3P (1)	6P-7A (4)	8P-5A (3)
	4P-6A (5)	3P-5P (3)	7A-9A (2)	5A-8A (2)
		5P-8A (5)		
160	5P-7A (5)	5P-7P (2)	5P-7P (2)	8P-6A (2)
	7A-10A (3)	7P-6A (5)	7P-5A (3)	
		6A-8A (2)	5A-7A (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 opening
* Indicates time of possible eighty-meter opening

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. They are valid through December 15, 1956. The CQ short-skip Propagation Chart is based upon a CW radiated power of 75 watts, using a dipole antenna a half-wave length above ground. They are valid through December 31, 1956. All forecasts are based upon ionospheric data published by the CRPL of the National Bureau of Standards, Boulder, Colorado.

ing in London were received in the N.Y.C. area, along the East Coast, and as far inland as Indiana. With the sunspot cycle rapidly approaching another peak, television signals will once again be liberated from their usual confinement to the horizon. With hundreds more TV stations operating throughout the world than existed in 1948 the possibility of DX reception is also increased greatly

[*Continued on page 118*]

Merrill Swan, W6AEE. W9TCJ Photo.



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	147.70 mc. AFSK on FM
Detroit	147.30 mc. AFSK on FM
Washington, D.C.	147.960 mc. AFSK on AM 147.495 mc. AFSK on AM
New York City	147.960 mc. AFSK on AM
Buffalo/Niagara	147.50 mc. AFSK (space) on AM
Boston	147.96 mc. AFSK on AM
Seattle	147.00 mc. AFSK on AM

RTTY history was made Tuesday evening, September 4, 1956, when ZL1WB worked WØBP. Three nights in a row, from that date, Bruce worked BeeP on 14,143 kc. and on 7143 kc. This, we believe, is something of a DX record for FSK —around 8,000 to 9,000 miles. But, it wasn't easy. Those of you who have operated around those frequencies know about the QRM. WØBP says that the contact was ". . . through murderous interference."

The story behind this historical contact points up the fact that RTTYers are not easily discouraged. ZL1WB first learned that ZL's were permitted to use RTTY back in June, 1955, at the NZART Convention. Bruce then almost immediately proceeded to build an FSK exciter and a terminal unit, only to learn that *FSK* was not permitted! At work Bruce had the good fortune to have available a military version of the Model 15, so he copied U. S. RTTYers, namely W6FDJ and W6WIS.

While waiting for the legalizing of FSK in ZL-land, Bruce applied for an import license and a dollar allocation to enable him to purchase a machine. This wasn't easy, either, as dollars are extremely difficult to procure in ZL-land. So a machine was ordered. Remember, that was in the early part of the year.

Many months went by—no machine. Bruce was burning, as his bank draft had been cashed! As the unhappy story unfolded, W6AEE decided to do something about it. He therewith packed up *his* Model 26 and shipped it to ZL1WB as a *gift!* It was scheduled to arrive in Auckland on August 1st, but it took until September to get it out of the clutches of the customs people. Seems that they couldn't fathom the *gift* angle!

In the meantime Bruce received the "teleprinter" machine ordered from the U.S. It turned out to be a beat-up Model 401-A *strip* printer, naturally with no sending facilities! No instruction manual accompanied the printer, either. (At this point an ordinary ham would have thrown the whole idea out the window.) Fortunately, by this time schedules had been established with WØBP on 20 and 40. For two weeks, BeeP gave Bruce repair data on cw and sent test tapes on FSK.

Well, to make a long story short, ZL1WB got his Model 26 on the air in record time and typed out his message of heart-felt thanks to W6AEE via WØBP. It wasn't easy, but it was a job well done.

Byron H. Kretzman, W2JTP
9620 160th Ave., Howard Beach 14, N. Y.

RTTY

RTTY Principles & Practice

Part 4—FSKing a VFO

Frequency shifting a CW transmitter oscillator is fundamentally a simple matter. Early FSK was accomplished by switching a capacitor across part of an oscillator grid circuit so that the *output* frequency of the transmitter shifted 850 cycles lower when the switch (relay) contacts were closed. This can be done to crystal oscillators, too, if you start low enough and multiply many times. (Adding capacity across a crystal lowers output and *can* stall it. Hence, the lower in frequency you begin, the less capacity needed because the shift is multiplied the same number of times as the crystal frequency.)

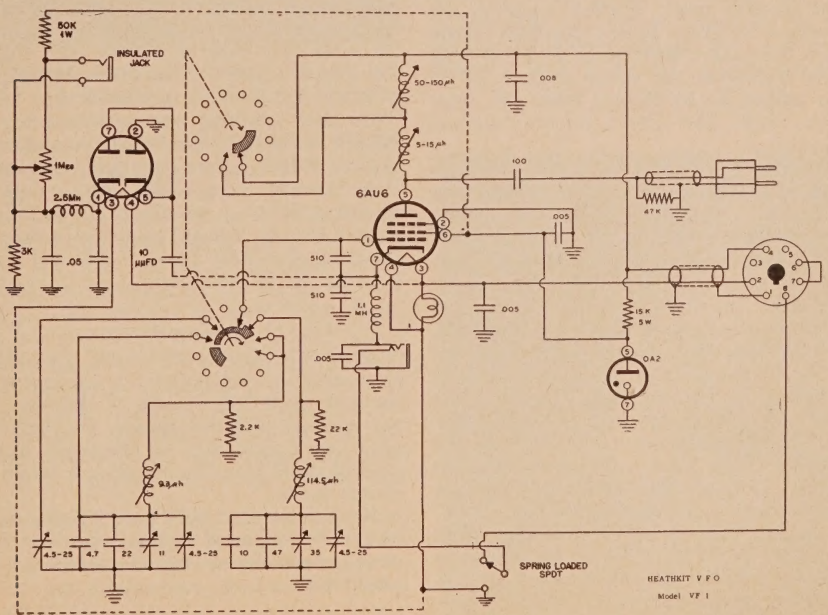


RTTY Breakfast Group. W9TCJ Photo.

Bear in mind, first of all, that it is standard practice to transmit *mark* as the higher radio frequency. Secondly, a *mark* signal from the keyboard means that the keyboard contacts are closed. *If* we could use the keyboard directly to switch a capacitor across a portion of our oscillator, we would have a "turn-over," or up-side-down keying. That is, the *mark* would be the lower frequency. To get around this, we can use the back contact on a relay to give us right-side-up keying. Many fellows do just that, using a polar relay. A possible disadvantage of using a polar relay for this purpose is that the polar relay must be perfectly adjusted and biased, otherwise distorted signals will be transmitted, making the signal difficult to print.

Most RTTYers believe that it is less complicated and easier to transmit FSK with little chance of distortion by using an *electronic* relay to correctly turn over the keyboard function. Also, as most RTTYers are using VFO rather than crystal, we are showing in *fig. 1* the schematic of the popular *Heathkit* Model VF-1 as modified for FSK transmission. The simplicity of the modification and its smoothness of adjustment of shift make it equally adaptable to most any VFO, as well as to the "brother" VFO in the DX-100.

A dual-diode is used. While not indicated on the schematic, the pin connections shown are that for a 6AL5 tube. A 6H6 or 7H6 will work just as well. Component parts are not critical, either. The



"3K" resistor can be 2.7k and the "50k" resistor can be 47k. The 1 Meg. variable resistor is a linear-taper volume control and it controls the amount of shift. Coupling to the 6AU6 oscillator cathode is through a 10 mmfd. silver mica capacitor. Note that the jack for the keyboard plug is insulated from ground. Be sure that no ground appears at any place in your keyboard circuit. It is recommended, too, that the d-c spark-suppression filter across the keyboard contacts be completely disconnected to avoid possible sending bias distortion.

Adjustment is fairly simple, too. If you are modifying a VFO already built and in operation it will be necessary to slightly reset the calibrating padders; a few minutes work if you have a 100 kc crystal marker and a fairly well calibrated receiver. In setting the amount of shift, be careful not to advance the shift control too far, as the shift will reverse if excessive voltage is applied to the 6AL5.

A more complete description, by W6ZH, of the operation of this circuit can be found in the April 1953 *RTTY* bulletin. Modification of the DX-100 was also covered in greater detail in the August 1955 issue of *RTTY*.

Across the Nation

Maybe it's kinda late, but methinks that you fellows who attended the RTTY "Breakfast Meeting" in San Francisco back in July during the ARRL Convention will be interested in the accompanying photo. W9TCJ took the picture. For the information of those of you who didn't attend, the fellow fourth from the right in the bottom row also has something to do with *CQ*. He reports that a very pleasant time was had by all.

The other interesting photo, again by W9TCJ, is that of Merrill Swan, W6AEE, one of the West's foremost RTTYers. In case you didn't know it, Merrill is the guiding light of the *RTTY Society of Southern California* and editor of their *RTTY* bulletin as well as the *RTTY Call Book*. ($1, from *RTTY, Inc.*, 3769 East Green Street, Pasadena 10, California.)

Describing the equipment at W6AEE, from left to right; a Model 28 *(Ye gawds! I thought only W9OCV had one of those!)*, a Model 14 typing reperforator, W6AEE terminal unit (*CQ*, Dec. '52), a DX-100 transmitter, and an SX-88 receiver.

More RTTY history: The first VE/W 2-meter work took place August 29th when VE7AOG and W7GQM made it both ways with AFSK. VE7AIK reports that, "Conditions were so terrible that Garry's 6-watts came and went with frustrating rapidity and regularity, although he said that Don's 829B was S-9 all the time in Seattle with solid printing. At times we couldn't even find Garry with the b.f.o. on, and its never been that tough before." VE7AIK asks, "How can I get back my Model 26 from VE7AOG, *now?*"

After writing last month's column about weather and RTTY, W8NIY floored us with some copy made on a Model 28 with weather symbols. (This he did at work.) Rolfe has a W9KLB converter (*CQ*, Feb. '56) and a Model 14 typing reperforator. By the way, speaking of weather, the *Manual for Synoptic Code (WBAN)* can be obtained from the U.S. Government Printing Office, Washington 25, D.C., for 70 cents.

W5EPA is attending Louisiana State University and would like to know if anyone would like to donate any RTTY equipment to the school station, W5YW. Anybody got an old Model 12 kicking around?

W2ITQ has some *Wheatstone* polar relays for sale. Very handy if you have a Model 12 on 2-meters. WØUSQ in Davenport, Iowa, is looking for some help. Any volunteers near Claude? K2JXQ just got his Model 26. W2BWN, W2ICA, W2NRQ, and W2ORX, all of the Livingston (N.J.) Radio Club, now have their Model 26's. W2JTP finally worked K2TKN in Pluckemin, N.J., on 2-meters—with QRM from W2JAV (near Camden) off the *side* of the 12-element beam!

RTTY Sweepstakes

The 1956 *RTTY* SS starts at 2100 (PST) November 2nd and runs to 0300 (PST) on the 4th of November. This is 30 hours of the merriest bit of RTTY operating you have ever heard. Both 20-meters and 15-meters should get a good work-out this year. If ZL1WB gets on, you will hear a pile-up such as you never heard before. Give a listen, even if you can't get in on the fun.

Chicago RTTY Meeting

Magazine deadlines being what they are, we won't have the story on this second annual get-together in Chicago until next month. Like last year, this meeting was timed in connection with the National Electronics Conference. Most of the program was scheduled for Sunday, September 30th, so as not to interfere with the conference and to enable others to attend who could not get away from work on a week day. Planned was a technical session at the *Hallicrafters* plant and a visit to the *Teletype Corporation*.

On the planning committee were W9JBT, W9SPT, W9GRW, and W9OCV. And, of course, W9BP/WØBP helped out with promotion, etc. Unfortunately, your RTTY Editor didn't get to go this year, but if you would like to find out what a good time he had at last year's meeting, dig out the December 1955 issue of *CQ* and read about it in the RTTY column.

Comments

As mentioned several months ago, W2JTP has been using a receiver with a product, or linear, detector preceded by an i-f limiter. This has proved very effective during the summer when QRN levels were high on 80-meters. Next month we will try to have the circuit and details for you. Watch for it.

How about some RTTY station photos, fellows? Somebody suggested that we offer a prize for the most fantastic set-up, but I'm afraid that W2NSD would win!

73, Byron, W2JTP

1931



W6DHV, Mae Amarantes, licensed in 1931.

Long-time YLs, Chapter II—

Louisa B. Sando, W5RZJ

U.S. Indian School
Santa Fe, N. M.

Upcoming YL Contest Rules are found on page 92

W1FTJ, Dorothy Wilkins (Evans), licensed in 1931, at her rig in 1932.



Alice Picard, of Staten Island, N. Y., received her call W2WP in 1930 after inheriting one of the early crystal receivers with cat's whisker detector. She hooked this up to her bedspring as a neighbor had done with his and listened to the few stations on the air after she went to bed at night. When W2BYU came on 80 meters and accidentally gave his QTH one night she was on the right track. Alice adds that when she went on the air there were eleven YLs with stations in New York State. A ragchewer and traffic handler, W2WP made BPL, handling over 500 messages regularly.

W2WP consists of a Hartley transmitter and an NC-100-ASD receiver. She finds this especially valuable because it includes the aircraft band 200-400 kc, for flying has been Alice's chief interest of recent years. She started flying gliders in 1931 and again in 1939 and in 1946 began to fly airplanes. She got her private license in '47, commercial pilot in '52 and she holds a ground instructor rating in metereology. From 1947 to 1952 Alice owned a Cub, 50 hp. Lycoming in which she flew solo over much of the U.S. and in Canada. In '52 she traded for a PT-19A with Ranger 175 hp. which she has flown on vacation trips to Canada and to attend a New England YL luncheon.

One of the most consistently active YLs on the air from the time she was licensed in *1931* to present is W1FTJ, Dorothy Evans, of Concord, N. H. Dot started out on the air in 1931 using the call of her brother Dan, W1BII. The following year she got her own station and call, W1FTJ. The second licensed YL in New Hampshire she dropped Wilkins in favor of Evans in 1938. Before this she and Carl, W1BFT had many c-w skeds during which

[*Continued on page 106*]



W6GA, Mary Necker Hoyt, with her first license, 1931, and gear used at the time. At left, TPTG transmitter using two 45s in PP operating on 40, 80 and 160; regenerative receiver using 199 tubes.

NOVICE

for the Novice and the Technician

Walt Burdine, W8ZCV
Waynesville, Ohio

There have been so many requests for reprints of my article in the November 1955 *CQ* on "Why and How To on Six," that *CQ* has seen fit to make them available. If you missed out on this article or need one for a friend just send a self addressed envelope to me so I can send you a copy. They are also available from *CQ* in New York if that is any handier.

Radioteletype

Kenneth C. Goodman, W8PFE, 1133 South High Street, Columbus, Ohio will be on six meters with radioteletype (RTTY) by the time you read this. He is open for any schedules. Look for us on phone now and then, Ken.

The Globe Scout on Six

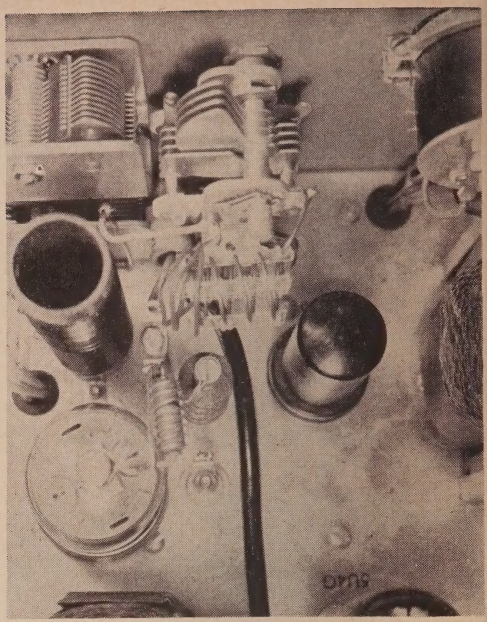
The *World Radio Labs* Globe Scout is one of the more popular pieces of equipment with Novices. This small bandswitching transmitter runs 45 watts on phone and 65 watts on c.w. from 10 through 160 meters and has its own built in power supply and modulator. It is housed in an 8" x 8" x 16" hammertone gray cabinet which looks good in any ham-shack.

The 6V6 oscillator is designed for either crystal operation or to work with the *WRL* VFO (or most of the other popular low priced VFO's). This 6V6 drives a 6146 class C final amplifier with a pi-network plate circuit allowing a good match to a wide range of antenna impedances. The final operates straight through except for doubling to hit ten meters. A 6L6 Heising modulator is driven by a 6C5 with a 6SJ7 speech amplifier giving plenty of gain to crystal microphones.

In contemplating the conversion of a transmitter to six meters it is a good idea to keep several general rules in mind. Most small transmitters will operate on ten meters (29 mc) by doubling in the final stage. To get on 21 mc the usual practice is to use a 7 mc crystal, triple in the oscillator and then amplify straight through in the final. If we change that crystal to 8340 kc (8334 kc and up) and tune the oscillator to 25 mc we will then, with a change of the final tank circuit, be able to hit 50 mc by doubling in the final. Most transmitters have coils and condensers in the final that are too big to tune to 50 mc. By consulting an L-C chart in a handbook or by using your grid-dip meter (haven't you got one of *those* yet?) you can make a new tank circuit. I recommend a condenser of about 35 to 50 mmfd and a coil which allows the condenser to tune to 50 mc when half open.

The parasitic choke in the plate lead will probably give trouble and should be either shorted out or have enough wire removed so it won't resonate near six meters. The one in the Globe Scout resonated at 51 mc! If you put in another final tank you may decide to use a sparate plate clip for it and not disturb the low frequency circuits.

Most final tubes will work quite well at 50 mc. Even the good old 807 will hold up pretty well here. The Harvey Wells TBS-50 ran the 807 all



Top view showing new tank circuit. The coupling can be varied by pulling the link away from the coil or by using a variable condenser in series with the link. Note shorted parasitic choke. Top view of converter-two-meter transmitter chassis. The six meter converter is nearest the edge of the chassis, tube placement is shown. Bottom placement view of converter-two-meter transmitter is shown. Some wiring was not shown for clarity of parts placement.

the way up to 144 mc and got away with it. The 2E26 and 6146 finals are ideal.

To convert the Globe Scout replace the small coil L1 with one made of 14 turns of *B&W* 3003 or *Air Dux* 416T with a tap at 4 turns from the switch end. The resultant 10 turns will tune to 25 mc. The front section of the bandswitch was replaced with a *Centralab* PA-30, 1 pole-11 position shorting phenolic section. The stop on the switch index was bent over so that the switch could be moved to the next position. If you are going to operate only six meters and do not wish to change the switch section, you can replace the small coil with one of 9 turns of *B&W* 3003 Miniductor (*Air Dux* 416T) and leave the final switch out of the remodeling. Solder the .001 coupling condenser (C14) to the new tank circuit. This seems to work best for me. SW5 is a 3 pole 3 throw ceramic switch and was also used to break the B plus lead to the 6V6 oscillator tube and switch the modulated B plus voltage from the 6146 tube to an external socket so that this could be used to modulate a two meter transmitter.

The switch diagram for this conversion will appear next month.

DX-35

There will be an article on converting the DX-35 to 6 meters appearing in CQ soon. It is ideal for 6 meters as a buffer stage allows the final to be driven straight through on six. Last month's modifications to the DX-35 were complete although from the looks of it you might think otherwise. Printers Devil and things like that.

Letters

William Silow, KN2STP, 165 Kings Highway, Middletown, New Jersey writes the first letter this month. He writes:

Parts List for 6 Meter Globe Scout

SW5—Small 3P3T ceramic switch

TC3—Hammarlund MC-50-M 50 mmfd condenser any available substitute can be used.

L6—4 turns B&W 3005 or 4 t #14 5/8" dia. 1" long

L7—2 or 3 turns of B&W 3007 or wind 2 turns of bell or hookwire around the ground end of L6



Globe Scout, New controls are the tank circuit and modulated B plus switches for the two meter transmitter and the six meter tuning condenser. Note position of the band-switch.

Nothing got away from this group of hams hunting the 432 mc hidden transmitter at the Dayton VHF est this Summer. They are l. to r. Jules, W8KSE, Phil, W8AXX, Jerome, W8NJS, Jim, W8WJK, Bob, W8VHU, Unidentified and Dave, W8UDX. (photo by W8DWT)



". . . I just had to get this letter off to you after completing the conversion of the AT-1 to six meters with no bugs encountered. A borrowed grid-dipper disclosed that it was right on frequency the first time it was tried.

I haven't received a call yet, but have followed your articles since the first. The Novice modulator was a real pip, it cost me only $12.00 to complete.

One thing I'm sure waiting for is a low cost power amplifier to boost those 6L6 and 6V6 rigs to higher power. Cost is an important consideration in any Novice equipment and your articles are appreciated for this all the more. That little 6AK5 pre-amp in the February CQ works dandy ahead of a cheap 6J6-6AK5 six meter converter. I used B&W Mininductor and the trial and error method to obtain optimum performance. I'll bet it would work fine as an i-f amplifier for low-cost converters and cheap receivers where sufficient gain isn't present.

I know that you welcome suggestion for articles so how about a low-cost grid-dipper and more conversion articles? I am sure just as many technician license holders read your column, so how about some v-h-f technique articles? 73. William."

Bill, the Heath Grid Dip Meter is a real buy. You can't hardly build one for that price.

Katherine Lev, KN6TQJ, 5914 Priory Street, Bell Gardens, California comes in 599x this month for California. She writes:

". . . I have started reading CQ and like the *Novice Shack* the best, especially the letters column. I am 13 years of age. I got my license two weeks ago and have worked only my state. I would like to arrange a sked with someone in another state.

The rig is a 6L6-807 combination and the receiver is an ARC-5. The antenna is a half wave. During the afternoon hours is the best time for me. I work on 7180 only, 40 meter c.w., 30 watts. 73, Kitty."

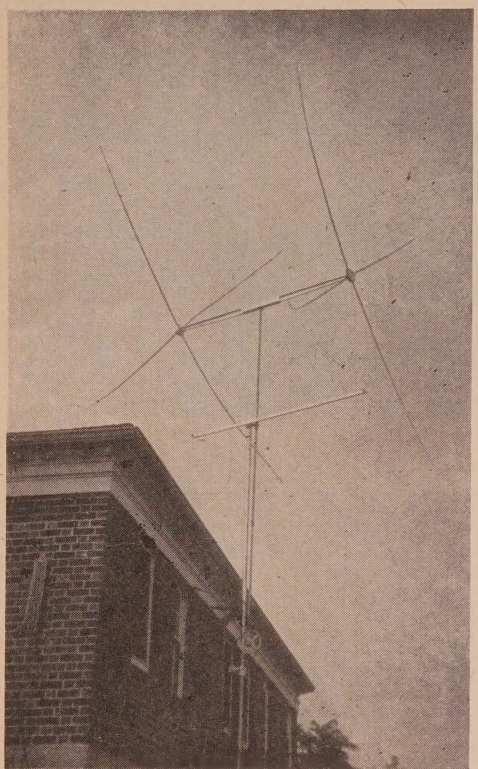
Les Franklin, WN1LDK, 54 Alabama Street, Mattapan 26, Massachusetts writes:

". . . I have been on the air for about three months and have had 143 QSOs. I've worked 20 states, best DX: Mississippi and Missouri.

The rig is a Hammarlund 4-20 running about 25 watts on 40 and 80 meters. The receiver is an S-38-D and the antenna is a 100 feet long wire and an AC-1 antenna coupler.

I would like skeds with Vermont, Delaware, states west of the Mississippi and anyone needing Massachusetts for any reason. I will answer all letters. 73, Les."

Ronald Collins, KN4GNW, R.F.D. #2, Box 356, Harrisonburg, Virginia bllilt this Quad for $7.00 including rotator and mirror direction indicator. He has 42 states and 4 countries. Ron works all novice bands but two meters.



Al, KN8AXU, Elkins, West Virginia comes thru with this letter:

". . . Just a line to let you hear from West Virginia. I have been on the air since April 4, 1956 and now have 43 states and 4 countries confirmed.

The rig is a DX-35 and an S-85 with Q-multiplier. I also operate 144 mc with an ARC-4. I hope to take my General soon (wish me luck).

I read the *Novice Shack* every month and enjoy it very much. Keep up the good work.

The antenna is a coax fed doublet on 40 which works very well on 15 meters. 73, Al."

John Hugentober, W8CSK, 1535 Northridge Drive, Cincinnati 31, Ohio writes:

". . . I enjoy reading your column every month. I really look forward to it.

As a Novice, under the call WN8CSK, I worked 33 states and 4 countries. I received my Technician license the first week in August and am planning to go on six meters. I am going to use the FB rig you designed and also the five element beam that you had in the November 1955 CQ.

I went downtown yesterday and passed the General. The examiner said that I will have the General in about a week since all it requires is to upgrade the Technician license.

Well, I sure hope I can work you on 6 or 40 meters someday soon. I am 17 years old and a senior in high school. When I get my General I will operate 40, 6 and maybe 20 meters.

CU on 6 and probably at the GCARA Hamfest at Cincinnati, September 9. 73, John."

Thomas Theodore Jr., W3COW, 113 West Patterson Street, Lansford, is Pennsylvania's representative for this month, he writes:

". . . I wish to state at this time that the novice column is the first that I turn to in CQ magazine.

I passed my technician test July 24th. I have no six meter equipment at present but have seen conversion jobs on all but the Viking Adventurer which I purchased as a Novice. Can you help me on this matter? I see this conversion deals with the Globe Scout. Fine business, but what about us Adventurer owners? Hi.Hi. I hope you can see your way to give me the information that I need to convert it to operate on six meters.

I own a National NC-101-X, what have you to say about converters for it on six meters? I wish to thank you for anything you may do to help me get on six meters? Thank You. 73, Tom."

(Tom, as soon as I can get the farm work finished and get an Adventurer, I will convert it to operate on six meters. I will publish that news for you as soon as I get it fool proof if I get some friend that needs one converted. They should work very well on six meters. I now have reprints of the six meter article from the CQ for November 1955 and you can get a copy for a stamp by writing to me: Walter G. Burdine, W8ZCV, R.F.D. #3, Waynesville, Ohio.

There was a diagram for a 10 watt transmitter, a beam and a good simple converter described in this article.)

Jim Tully, KN2SLV, 24 Jackson Avenue, South Glens Falls, New York writes this letter.

". . . I've had my call for about six months now and am having a bang up time with it. Most of my operation is on 80 meters with 15 watts, having lots of fun.

The reason I'm writing other than to say hello is for some information. I am buying a Heathkit DX-35 and would like to use it on six meters. I know you have converted other rigs and I am wondering if you could help me on this one—I sure could use some of your help.

If you ever get around 3716 kc when the band allows, look for me, I'll be there. Keep up the good work and lots of DX. 73, Jim."

Lee Hamilton, KN8CDM, Eaton Rapids, Michigan pens this note:

". . . I have just finished reading this month's copy of CQ and I must say that your material; both this month and in the past, reflects the utmost desire to satisfy the reader regardless of age or class of ticket.

I have had my Novice ticket four weeks and so far I have worked 34 states and Canada. The rig is a DX-35 running 65 watts into an AC-1 antenna coupler feeding an end fed antenna 66 feet long.

As a former navy radio operator, I realize that past experience helps in copying thru the QRM but I believe if more Novices would tune their receivers 25 kc each side of their frequencies they would pick-up a lot more contacts. By reducing the sensitivity they can still hear their own signal. Many of my K6 and K7 contacts have been the result of listening either side of my own frequency. Maybe that rare DX contact will be found in this manner. I hope this will be of some help. 73, Lee."

Ernie Crump, VE3EGG, 65 Barrie Street, Galt, Ontario, Canada sends this letter:

". . . I'm just letting you know how I'm getting along since I last wrote to you. The Heathkit v.f.o. made all the difference in the world. I now have 17 states. I've only had two Novice contacts, KN8ASI and KN2RSP, they are both good fellows. I get up in the novice bands but they don't come back to me, don't the

Novices like VE3s? I have almost given up trying.

The rig is the same 25 watts and the receiver is an S-38-C, about to be converted. I have my eye on the new WRL Globe Chief, 90 watts and I can do some jumping around the bands.

I might add that the 40 meter band seems to be crowded with all sorts of "stuff," not c-w signals either, but a lot of foreign broadcast and other trash. Walt, would a good 40 meter vertical help? (Good antenna and good operation technique will help any low-power station.)

I'm still 16 and from now on I will concentrate on the lower end of 40 c.w. not the upper 50 kc.

The Canadian license costs $2.50 per year, and we can only run up to 712½ watts input, 500 watts output.

Mr. Sep Gulich, I'll be looking for you, all 5 watts too.

You are doing a wonderful job, Walt, best part of the CQ magazine, its geared to the beginner. How about getting on 40 c.w., I would like to talk to you some day. 73, Your friend, Ernie."

Ronald Bafetts, KN9CEL, 5830 South Sacramento Avenue, Chicago 29, Illinois writes:

". . . the rig here is a 50 watt Knight and an SX-99. The antenna is a long wire in the attic. I operate 40 meter c.w. on 7175 and 7153 kc I've had about 60 QSOs in 11 states.

I took my General class test in June but flunked the code. I took it again last week and passed and I'm waiting for the new ticket. I'd like to get on six meters so could you please publish plans for converting the Knight transmitter to operate on six meters. 73 for now and best of DX, Ronald."

Mark Weiss, K6PBI, 4204 Stansbury Avenue, Sherman Oaks, California sends this note:

". . . I feel that the novice portion of CQ is one of the most interesting parts of the magazine. I am 13 years old and in the ninth grade at school.

Last November my best friend, the postman, delivered my novice license to me. Between then and March when my General came through, I had very outstanding reports on the East coast with an AT-1 on 15 meters.

My rig now consists of a Viking II, a 75-A-2 and a 2-element beam for 15 and 20 meters. I hold WAS, WAC, RCC, AREC and have 37 countries.

I will be glad to arrange a sked with anyone needing California for any reason, I QSL 100%. 73 es CUL, Mark."

Ray Schinzel, WN1LCX, R.F.D. #2, Skowhegan, Maine sends this letter for this month's Maine representative of the novice band:

". . . I am 15 years old and a sophomore in high school. My chief interests are rag-chewing and traffic handling.

The rig here is a homebrew 6L6 oscillator running 18 watts. The antenna is a 135 foot long wire and the receiver is a Howard 450. With this combination I have worked Brazil, Virgin Islands, Nova Scotia, New Brunswick, Ontario and 35 states on 40 meters. By the time this is printed I will have 75 watts on 40 and 15 meters.

I will sked anyone needing Maine for WAS, rag-chewing or for any other reason. 73 and DX, Ray."

Besides this nice Novice layout, Kenny Harbison, KN8AIC, Spencerville, Ohio, wants to put in a BC-1158 for six meter operation. Good for you Kenny we could use some six meter operation from your part of the state.



Ted Mastin, KN5EWT, Route 2, Box 136, Pampa, Texas sends this note to say:

". . . I have a Windom that runs east and west, a half wave 15 meter folded dipole and a single element rotary for 15 meters. I have a National NC-100 and a Viking Adventurer. I work 80, 40 and 15 meters and will sked anyone needing Texas for WAS.

I am a member of W5TSV, the local amateur radio club.

Keep up the good work in your column and the best of DX. 73, Ted."

Help Wanted

Can you spare these aspirants a little of your time to help get them going toward a ham license? Thank you.

Bill Ellington (13), 2015 Arnold Drive, Charlotte, North Carolina. phone: FR-7-6470. Bill needs help with code and theory.

Thomas Ivas, 6944 South Maplewood, Chicago 29, Illinois, phone: RE-7-6737. Needs help with code and theory, he has a code oscillator.

Dave Evers, 426 North Illinois Avenue, P.O. Box 188, Salem, Illinois needs help with code.

Pete Roussel, 6515 Brompton, Houston, Texas needs help and someone to give him the code test.

Bill Robinson (15), Box 761, Inverness, Florida needs help with code and theory.

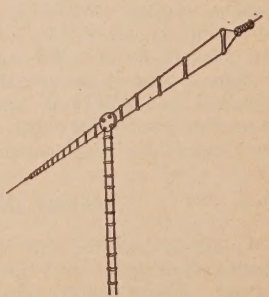
PFC. Clarence R. Stephens, RA15533428, H.Q., Fld. Sta. 8608, A.P.O. 108, New York, New York, (Munich, Germany) would like to have a ham from Cleveland, Ohio contact him to arrange sked back home and he would like to have help in code and theory.

Amos Hawkins, W8INQ, 4318 Owens Drive, Dayton, Ohio would like any information pertaining to getting SSB going on six meters.

Thanks for your time again, I'll see you next month at the same stand. 73, Walt, W8ZCV.

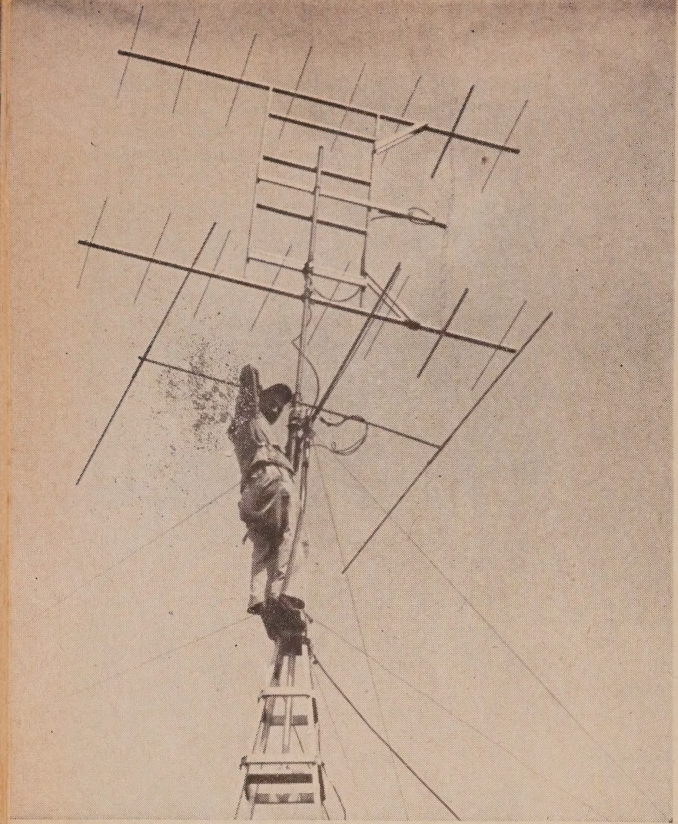
Weatherproof Folded Dipoles

By now you know that folded dipoles are pretty hot little items . . . the one problem with the twin-lead type is that comes rain they detune themselves. Illumitronic couldn't allow something like that to go unheeded so they have now announced their open line Folded Dipole Kits. The antenna part of the kit is made of steel core wire spaced 1" by polystyrene for ruggedness. The feedline is 300 ohm open line with special curved spacers which keeps any leakage due to dirty or wet insulators out of the maximum field and minimizes the effects. Brilliant idea. Kits for 80 meters sell for only $12.60, less for the higher frequencies. Write Illumitronic Engineering, Sunnyvale, California for their catalog.



Sam Harris, W1FZJ
P. O. Box 2502, Medfield, Mass.

V H F



K2CEH using hand power rotation on his stacked VHF array. (You can't figure out what it is?)

Meteors

The August Perseids meteor shower is over. Summer time done come and gone and now it's time to settle down to some serious DX working. That old crocodile eater down in Louisiana (W5HEZ) managed to scare up a meteor contact with Art (W8KAY) and George (W2CXY) for a couple of new states. Oddly enough a few nights later the band opened up for tropospheric bending and contacts were made with several stations in the Cincinnati area from Jack's station.

Meanwhile, we hear that W9WOK made it with W1KCS for a Rhode Island-Illinois contact. Speaking of John (W9WOK), we expect to go to the second annual V.H.F. Round-up at Syracuse, New York on October *6th* and hear him tell how it's done. I hope to see you all there.

W2AZL and W5JTI are credited with a contact via meteor scatter for what is probably the first New Jersey/Mississippi contact on two meters.

Meteor DX?

We are advised that both W8KAY and W2CXY have received heard cards from W7LEE in Parker, Arizona. These reports indicated reception of meteor scatter signals over a longer path than anyone has, heretofore, been willing to even hope for. In the interest of getting the most out of our opportunities in the future, the following comments by W1RUD are pertinent.

Meteor Scatter Simplified—

or

"Do as I preach, even if I didn't make it"
by Bolide Bob, W1RUD

Now that the Perseids are over . . . and we fellows can sleep again (those phone calls from 12:30 to 2:30 a.m. followed by skeds from 5:00 a.m. to 9:00 a.m. are not very conducive . . .), I have some observations to make.

We had skeds with W5HEZ, W5JTI, W5REZ, K5AEH, W4RFR, W4CPZ (I slept through this one, didn't even hear the alarm) and W8ILC. We heard W5RCI, W4RFR and W8ILC. We worked W8ILC. We were heard, it seems, on sked with K5AEH in Greenwood, Mississippi; by K5AEH but no go. Ron, however, was "duck soup."

Now, for the pertinent information. One thing I noted was the extreme optimism of most of the schedulers. There were a number of the boys on calling five minute, ten minute and longer "CQ's." This makes sure they are heard, but it also makes

sure that they never hear the other guy. If you want heard cards only, this is a fine method. I can think of none better. But, if you're interested in actually working the other guy, I suggest you read on.

W4HHK suggests one minute transmission periods with frequent breaks, with one station taking the odd minutes and the other, the evens. If most people are as bleary-eyed at 5:00 a.m. as I am, it's awful easy to find yourself on the wrong minute. This might not be too catastrophic since somebody is bound to be slightly out of phase with his breaks, but it sure can be nerve-wracking to find someone calling you when you're calling him. Also, anything longer than a one by one (for those phone operators this is best illustrated as, for example, W5HEZ de W1RUD Bk at twenty to twenty-five words per minute) is useless. A one by one at twenty-five words per minute takes about seven seconds and this, followed by a three to five second listening period and repeated, will bring maximum results. As to how long you do this, well, I use a five minute system. That is, I take the first five minutes and the other station the second and repeat with the odd five minutes mine and the evens his. The whole five minutes of mine is filled with one by one Bk, three seconds to five seconds listen, one by one Bk., etc., and he does the same on his. As to the reasons for five minutes, well, it's pretty hard to get on the wrong five minutes even at 5:00 in the a.m.; furthermore, unless you made BPL a hundred times in your old cw days and have a thirty-five words per minute sticker on the wall from W1AW, you have almost as much trouble as I do getting the proper swing to send W5HEZ at twenty-five words per minute on a bug at 5:00 in the morning, and five minutes gives you time to practice, Hi!

Now when you hear the other guy coming back to you on one of your breaks, or hear him on one of his, if you're the nervous type I suggest a strong dose of one of those tranquilizing pills I hear tell they sell nowadays; because, you have got between ten and forty seconds to send a report, get his report, roger his report, and his call, of course, and you had better be real snappy with break-in or your golden oportunity is gone, pfffffft, just like that. I use a foot switch for fast break-in and never, never let my fingers leave the bug.

One-hour schedules are, I think, the best. Perhaps you can make it in a half-hour sked, but your chances are better in a one-hour sked. Also, don't ever break the schedule times if you have only a partial contact. Keep the same timing. If you didn't get his report, he didn't get your roger and you can send the following, instead of a one-by-one. W1RUD R? Bk, W1RUD R? Bk. You don't need his call. He knows who he is, and your call, although superfluous serves to weed you out from others who may break in near or on your frequency.

Now, as to times to schedule meteor contacts. Although all this information is available in an excellent book, *"Radio Astronomy,"* Lovell and Clegg, Chapman and Hall, Ltd., 1952, I will undertake to point out the following facts:

(a) The radio echo is from the meteor trail not the meteor.

(b) The trail is composed of ionized gasses in the ionosphere because the meteor is very hot.

(c) The meteor is very hot because it is going fast *relative* to the earth, in fact,

(d) The faster it goes the better the ionization and the better the reflection.

With this information and a glance at Fig. 1, on page 90, we can note the following facts:

(a) The earth moves in its orbit with a tangential velocity of

$$\frac{2\ \pi\ (93 \times 10^6)\ \text{Miles}}{(365)\ (24)\ (3600)\ \text{Sec.}} \text{ or } 18.5 \text{ Miles/Sec.}$$

(b) The Perseids shower has an orbital velocity of about twenty miles/sec. as shown.

(c) The earth in Fig. 1 is at dawn for the section of country you are in, and in Figure 1b it is dusk. (Still on page 90.)

(d) Please note that in the dawn hours the earth's velocity *adds* to the meteors while at dusk it *subtracts.*

(e) Although the actual velocity of addition is somewhat more complex, the theory is similar and the results are still in the ball park.

(f) Corollary: 7:00 p.m. is the worst possible time for a meteor contact, sometime about dawn at the midpath is the best.

That's about all I have to say except that I talked to W2CXY on the phone the night before he worked W5HEZ and he agreed to try my method. No results up to then. I also believe some other fellows tried it. Would be interested to know if any results were obtained and would also be interested to hear any comment, pro or con, for the system.

Contest

The summer V.H.F. contest provided twenty-four hours of solid fun in the New England area and judging from the number of comments and logs did the same for the rest of the country. We operated the contest from home (due to a change in W2NSD's plans). Helen operated six from W1HOY with help from Southard, W1DDN, while Paul, W1PYM, and I operated W1FZJ on Two. We were ably assisted by Pat (W1HIV) and Jim Morriset (K20LK) and his company of scouts from Camp Robin Hood. Six meter score was 7,276 (107 contacts and thirty-four counties). Two meters netted 13,600 (136 and 50).

A word to those who are worried about the county award. The county award was initiated to give recognition to those stations located in areas where they could not possibly win the state award and yet who put as much effort in getting contacts as the state winner. The magic figure of ten logs was pulled from Wayne's hat on the spur of the moment. Be assured that anyone who won his county is eligible for an award provided that there was indeed a contest. This means that there must be at least one other log from your county

and the results of his log must show that he intended to beat you but couldn't quite make it. State winner certificates go to the high scorer in the state regardless of the number of logs submitted.

Incidentally, if anyone understood the rules for the last contest, please write and explain them to me. I take no credit for that botched up mess. Please send complaints to "CQ" magazine. Entries addressed to the contest editor listed on the mast-head are lost forever and will in all probability never receive an award unless duplicates are sent to me. (I guess Wayne uses him to fill up empty space on the mast-head instead of using larger type.) The rules for the mid-winter contest are being worked on and it is hoped that any ambiguities will be ironed out. We long ago gave up trying to please the majority. The squeaking wheel still gets the most oil, SO-oo-o, why don't you squeak a little?

Pictures

Speaking of squeaking, you will notice a large dirth of pictures in this column. This can be construed as a squeak on my part. If you fellows want to see some pictures in this column, you had better send some in. Snapshots are not suitable for reprinting and if an 8 x 10 glossy print is not available, it is necessary to include the negative with the picture. In this case if the snapshot appears promising I can then try to enlarge it to usable size. (I got enough trouble enlarging them, without trying to do photo-copying.) In any event the column is well illustrated with advertisements.

Moon Bounce

Moon Bounce transmissions were considerably curtailed by preparation for the contest. We hope to be back on schedule by the time you read this. Still no reports of our signals being heard, but they still are going up and coming back. All you got to do is listen. It would be very encouraging if someone else would volunteer for some transmissions. Preferably someone in the midwest or far west. Any takers? Don't just sit there. Speak up!

States Worked Column

I have been asked why we don't run a states worked score board in this column. The answer is up to you. If you want one, all you need to do is send in your totals and say so. If enough fellows want it we'll run it. Personally I look up the score in Ed's column and every time I do, I'm glad that I don't have to figure that out every month.

Visits

First stop in Ohio was at Gordon Conley's QTH (W8AIN) in Ashtabula, Ohio. Thought we had a convert to the VHF bands for a while but after calling several stations in Cleveland on six meters with our mobile rig and receiving no replies the thrill of six-meter communication died down and I'm afraid we lost Gordon again to the low frequencies.

Another stop in Ohio was at Willard Radcliff's QTH (W8LAH) in Fostoria, Ohio, where we talked for several hours and found that a lot of the Mansfield boys were using W8LAH beams on two meters. SO-oo-o from Fostoria to Mansfield. On the way into town we stopped to let Al (W8WXV) know by way of land-line that we were arriving for the night. He alerted the VHF gang in town and we finally heard Ben (W8HXT) calling us frantically on six meters. After making contact with Ben he directed us to his QTH where we relaxed and gabbed for a while. We met Ben's XYL, Eleanor, who was at that time trying desperately to forget that she'd had a session with the dentist that morning, and she wasn't being very successful about the whole thing. A swollen and aching jaw just doesn't let you forget so soon. Hope you don't have another such trip soon, Eleanor.

We also met Don (KN8ANC) at Ben's QTH and the following morning met Don's XYL, Mary Lou. However, after looking over Ben's rig and taking a few pictures that night, Ben and Don led us to Al's QTH, where we were met with open arms.

Al and Eleanor (his XYL) were waiting for us and brought out the coffee pot before we were hardly inside the house. Guess Al remembered from the "good old Days" that we practically exist on coffee. Poor Eleanor, ham radio is still something of a "What is it?" to her, but she most certainly held up her share of the burden (us) by listening as though it made sense to her. Funny, but most XYL's just fall into the habit of being hospitable to all in-coming hams if they've known them before or not. I guess Eleanor had probably *heard* of Sam (W8UKS) before but she'd never met either of us and still she was one of that great family of XYL's who make you feel at home immediately.

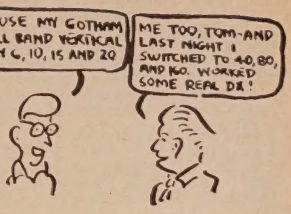
After gabbing until about 4:00 a.m. we decided that a few hours of sleep might help so we all turned in for the night. In the morning we made the rounds of the VHF antennas in Mansfield and took pictures to our hearts' content. Then once again we took off, this time in the direction of the home QTH and not knowing just where we would be stopping next. It might be at home in Massachusetts but again it might be at some other poor unsuspecting ham's QTH.

Brooklyn, New York Eugene Schlagel, (K2AKV) has asked a few questions which we are handing out for the gang to answer.

"I have recently become quite interested in six-meter activity, but due to the apparent unpopularity (*I object—Helen*) of the band, have been unable to obtain very much information on it. I would greatly appreciate any advice you could give me concerning band conditions, medium (100 watt) power rigs, and multiple element and ground plane arrays. Construction hints for transmitters and converters would also be helpful.

"TVI on channels two and four seem to be the greatest bugaboo in the New York City area. This problem seems to dissuade most interested parties from looking further into six-meter operation. Any information

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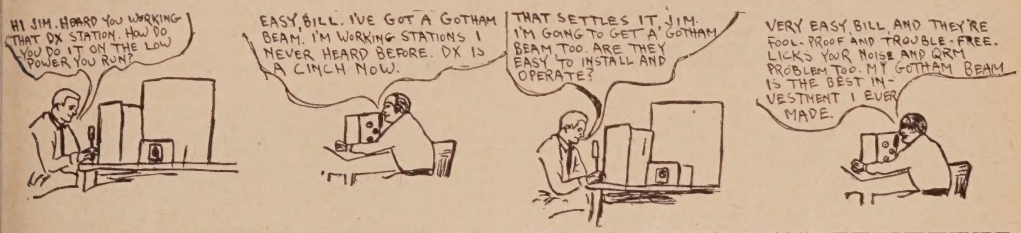


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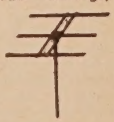
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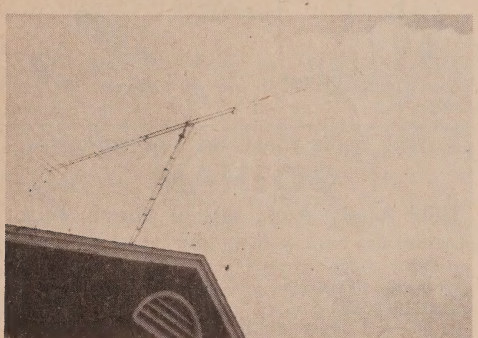
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City ..... Zone ..... State .....

you could give me as to overcoming this interference would also be of much help. If I can get a rig functioning on six meters with a minimum of difficulty and interference, I am quite sure I could persuade a large number of locals in joining me." *O.K. fellas, now is the hour to take your pen in hand and send Eugene some helpful hints.*

Fort Monmouth, New Jersey A bit of news about Florida VHF work via Fort Monmouth and P.F.C. Chauncy Barnes:

"It's seldom I notice anything written by Florida hams. (Me too.) You made a slight error in your caption of K4DMB's letter, as you said from Florida 'The Flower State.' We natives are so used to hearing 'Florida the Sunshine State.' However, what you said was true so we forgive you. (You'd better O.M., we looked it up in an encyclopedia, copyrighted in 1925.) VHF is yet to catch on very well in South Florida. Most of the hamming is done on ten meters with the 'Flamingo Net' carrying a large number of the fellows' interest.

"About a dozen stations perhaps in the last few years have been able to tear themselves loose and make it on two meters at one time or another, with a smaller number making it on six meters and one or two on 220. At the time I entered the service best DX on two meters by local stations was with Cuba and West Palm Beach, Florida.



23 elements on a fifty foot boom. Proves that someone is on two meters in Nebraska. In this case it s Thomas Leary (WØVTP).

"While home on Christmas leave, I tried to find some activity on two meters, and finally hooked up with W2FXT, Bill Townsend, who was staying nearby and had set up a portable rig. He had been trying for several days to get a contact.

"I recently heard via the ham grapevine that Ron Huffman, K2KFE, had recently made a visit to Homestead, Florida, had set up portable on two meters and worked approximately thirty stations. When I heard this I could hardly believe it, remembering my own experience.

"Apparently Miami now has a very active two-meter band and according to Ron, Civil Defense is now active on the band with about fifteen stations checking in." *Very glad to hear of the increased activity on two meters in Florida, seems to be picking up all over.*

Muskegon, Michigan A long time since we've had much Michigan news, so Stu Bonney (W8JUV), comes through with the following:

"Activity here on two meters is good, with new stations getting on all the time. Some of the boys are also giving 220 Mc a whirl, however, we are of the opinion that you have to concentrate on one band to get the most out of it. (*We've found it that way too, Stu.*) The setup here at the present time is rather modest—are living in an upstairs apartment which means that we can't put up much in the way of a big antenna. The situation should be rectified shortly however, as we have just purchased a home. (*Let me have a talk with the XYL, Stu. Signed—Helen.*) Have ordered a big self-supporting tower and plans are in the works for a twenty element beam to take the place of the present five over five. Also are working on a 'home brewer's' rack-mounted version of the Gonset Linear to hang on the end of your communicator. It's coming along even better than we had hoped for. For the fellows who have an extra 1000 volt supply on hand, it's a pretty inexpensive way to 'soup up' a Gonset or 522. Wonder if anyone would be interested?" *We'll never know until we've asked Stu, now we've asked and maybe you'll be hearing from some of the boys. Very glad to know that you're planning bigger and better things for two meters and the rest of the Michigan gang seems to be doing it too.*

Tulsa, Oklahoma From Charles Calhoun (K5BXG), come the following comments:

"I think that Fred (W2AMB) is on the right track about SSB on VHF. Boy that will be fine. I'm all for him, what do some more of the boys say? (*We're still waiting to hear.*)

"The rig here is a Globe Scout, six meter RF section combination, the receiving side has an SX 28 with an International crystal converter and a Heath QF-1 Q multiplier. The antenna is a five element beam." *Helen's waiting to work you on six meters Chuck, hope it's still this year.*

Madison, Tennessee From the southern section of the country Larry Perry (K4EFV), contributes:

"Thought I'd write you and let you know how the boys in Nashville and surrounding area are doing. We have been having very good turnouts for our net which meets each Monday and Friday at 1930 CST on 50.6. W4AY, K4GPO, K4DNG have been keeping regular schedules with W4PU in Louisville, Kentucky. There are about forty-seven stations on roll in the net. K4CWA and K4CWB recently took a trip to the mountains with their communicator and were heard by K4BWL in Crossville while they were operating from Clingman's Dome in the Smokey Mountains.

"My equipment consists of a TBS-50C with a *Tecraft* converter ahead of an S40B. The antenna is a three element beam about fifty feet up. I am interested in working long ground wave.

"A few days ago as I tuned across the band, six meters that is, I heard CO2XZ calling CQ on 50.1, incidentally this was the only signal on the band, so I gave him a shout. Lo and behold he came back to me and handed me a 5-7 report. (EUREKA!) Next thing I knew, after I signed, many of the Nashville boys were working him.

"W4RFR has his new 100 foot tower with his two and six meter beams stacked on the top. K4CPO has schedule every morning with W4ZZ in Knoxville at 0830." *Thanks Larry, we've worked a number of the Tennessee boys during openings but somehow have missed you.*

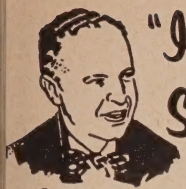
Beloit, Wisconsin Bob Mosher (W9GAB), writes a very interesting letter:

"Two meter openings here have not been too frequent during July, with some slight intensification of signals extending slightly beyond the usual pattern of signals. We had a good opening here July 30th into the south, but we couldn't get over those southern mountains into the deep south.

"Aurora openings have been few and far between during July, with several small openings noticed, but they were not strong enough to get through on. We missed a good opening the morning of the 23rd. It started around Midnight and lasted till the wee hours. We called CQ for over an hour, to no avail. According to the way the TV set was acting up it was a pretty good opening . . . Collins on 49.8 was over S9 on aurora reflection.

"Being that '56 is the 'year to fix,' I think we should look into our rigs, and receivers and get them perking in top notch order for the coming aurora season this fall and next spring. Let's get that key in that rig, and a BFO in the receiver, possibly increase the stability of our oscillators so we can take advantage of this coming new method of rag chewing.

"Also I think the gang in the middle west should get rolling and help some of the gang west of the Mississippi keep on the air by QSOing more with them and keep their interest up and not let them get disgusted with the lack of a few QSO's. Particularly the fellows in the plains states and out to the Rockies. Here's your chance to get your state score up in nick time, so get in on these openings, build up your score, and join in on the fun.



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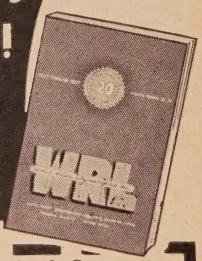
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"I have been doing a little advertising during the openings on six, trying to arrange skeds, and to get some of those lost hams back on two meters during these aurora openings to help out, pitch in; the more on, the more fun there is to be had.

"So what say fellows, let's get on and help out, to keep the spirits on Two, let's give the western gang that break, let's keep two meters rollin'.

"I will gladly set up schedules with anyone that is interested, and will be glad to give anyone the state of Wisconsin who needs this state for their WAS." *Well boys, if this doesn't get you back on two meters, then nothin' will. Thanks, Bob, for a very good "Pep talk," we surely needed it.*

Big Stone Gap, Virginia Bill Ray Coomer from Virginia sends the following request:

"I have recently built and modulated a Heath AT-1 transmitter and now I would like to increase my power to 150 to 200 watts.

"I wonder if you have or know of a schematic that has been used successfully with the AT-1 to do this.

"If not, could you please forward this request to someone who could help me." *There must be some of you boys who could give Bill this information. How about sending it to him?*

Anaheim, California Bruce (K6JYO/6), reports from California:

"Haven't read many reports from Southern California lately. Two meter activity is on the up-rise again with more new stations getting on every day. The traffic nets namely the 2-4-6 and the American Legion Net have been doing a real fine business job. In the last few months, check-ins have cleared over 1000 per month. Traffic is also up there.

"The DX end of the deal is really doing fine and more and more of the fellows are switching to horizontal polarization. They even got me converted." *Fine business, Bruce, sounds like California is getting along all O.K.*



Linc (W2QY) at his operating position. (Held in hands is Permanent Dog Bone award for pulling most boners.)

Ayer, Massachusetts George Cockle (W1GYU), emits with:

"Just a note with the CQ VHF contest results to once again say that the VHF contests are meeting with great success. Activities of this nature are the backbone to bigger and better equipment in the VHF spectrum, spurring we amateurs up the trail.

"I do wish to comment on one thing however, and that is the use of the two-meter band. Few, if any, use frequencies between approximately 145.5 through 147. I feel that if we don't use it, we should give it back. What say, can you pass the word to spread out over the band? I load on 146.71 and many times call myself sick—but no answers. They don't tune those frequencies." *Thanks for the encouragement and comments, Bruce. They're always welcome.*

Portugal We received the following from Peter N. Saveskie, K2ORR, all the way from Portugal:

"I wonder if you could straighten me out on a question that's been nagging me lately? Just what exactly is the purpose of a dummy antenna in measuring the sensitivity of a receiver (10 db s/n)? It does not seem to be a matching device between the signal generator and the receiver because at least some signal generator instruction manuals say to use a series resistor (in the hot lead) of

$$R \quad (Z—X)$$

Where:

R Series resistor
Z Impedance of the transmission line.
X Sig. Gen. output impedance.

"Nowhere is the impedance of the receiver input mentioned. Of course, the assumption could be that the transmission line and the receiver are matched but I've never seen this in print.

"Could it also be that the dummy antenna is used to simulate the loss of the regular antenna (or some standard antenna) in measuring the sensitivity? If so the sensitivity figure would be a combined sensitivity figure for the receiver AND antenna because the microvolts output of the signal generator is read on the signal generator output meter BEFORE the dummy antenna.

"If this is so, the RECEIVER alone, as such, has NO sensitivity but only the combination of the receiver and antenna as a *system.*

"Maybe I'm all fouled up in my thinking so could you please straighten me out with a basic answer?" *Well, I sent Pete my answer, does anyone else want to contribute their ideas on this one?*

Swarthmore, Pennsylvania R. A. Mathews (W3VDQ), sez:

"I wonder if in your files you might have some information on the power supply of the marine TBY unit type 43007. I have one and have converted it to crystal control, but the power supply has kind of got me stopped, would like to have some information on the original or some dope on building one so that it would still be portable." *O.K. you fellows who have this dope, send it on to W3VDQ.*

Bermuda A letter from Jules (VP9BM), regarding his two-meter operation:

"I will listen for five to ten minutes after my CQ's, concentrating on the low end of the band.

"I will usually have the beam heading on New York City, but can rotate it quickly.

"I have four, five element phased Yagi's, receiving end is a crystal converter, also a vfo converter feeding into a Super Pro receiver. The transmitting end is an 829 final with about 100 watts input. Frequency 144,350 kc.

"I will be glad to make any other skeds suggested by air or mail, or any VP9 you can contact. My phone on Kindley Air Base is 6266.

"I want to thank the many fellas who wrote to me last year and I want to say you were not forgotten. I'm only sorry I'm so dang slow in gg agn.

"If I don't hear from you, I'll be setting up down at Ramey Air Force Base, Puerto Rico, for the next three years.

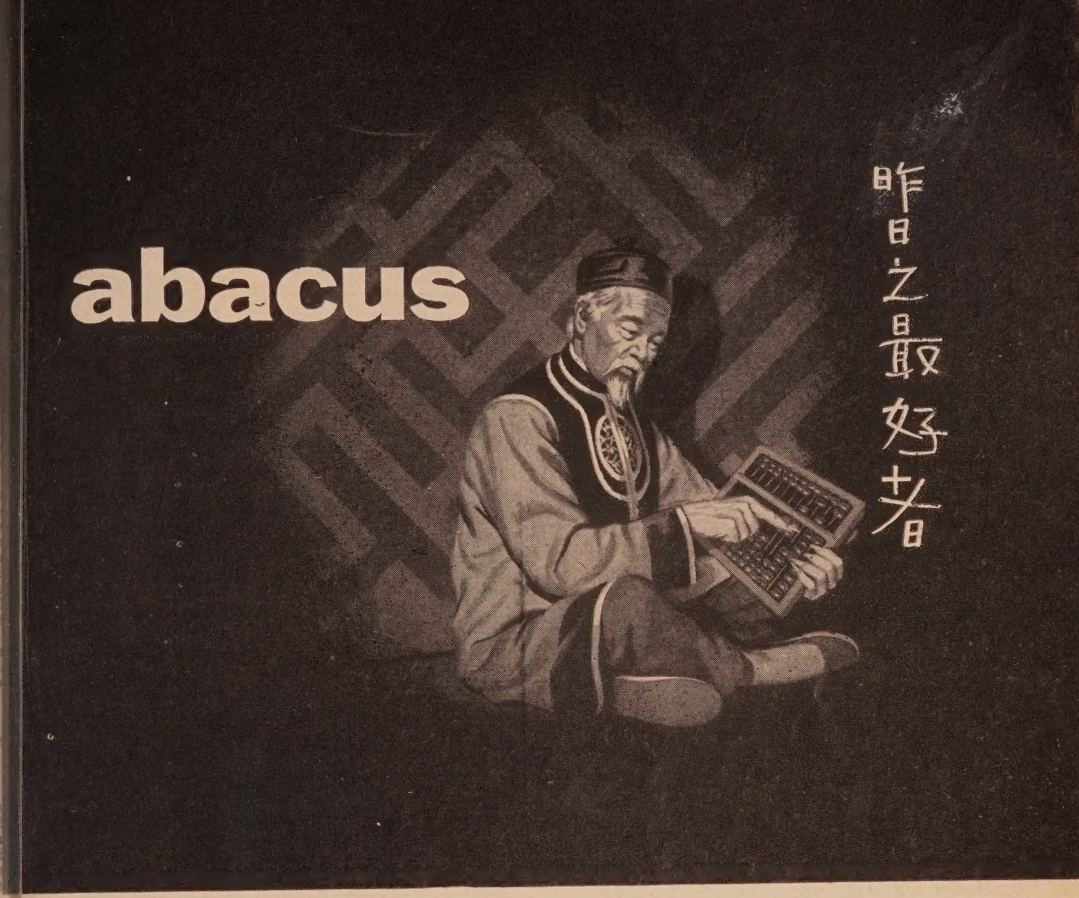
"I am sending this letter out to six of the more prominent stations, I think, so please pass the word around.

"Hope to QSO on . .—period." *This is all good news to have Jules, the boys will be rejoicing.*

Melvendale, Michigan A request from Lawrence Cook:

"Can you help me? I want to make a six meter 50-54 mc converter with pre amp and low noise level to use with my Hq-129x and would thank you very much for any help you can give." *Larry, I think you'll find what you want in the July issue of "CQ" titled "A Low Noise Converter for 50 Megacycles."*

[*Continued on page 90*]



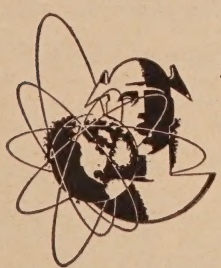
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W8DNY	54	VK3AAE	48
K2DW	53	ZL3IA	48
W2EWL	52	W2CFT	46
ZS6KD	50	ZL3PJ	44
		OZ3EA	42

On October 1st a KW SSB transmitter and receiver were installed on President Eisenhower's special railroad car, by Al Hart, W4FB, using the White House call, W3WTE. The tests were very successful and 45 of the 48 states were contacted as were SSB stations in Puerto Rico, Virgin Islands, Canal Zone, Alaska, etc. While this special train was 50 feet underground in the Cleveland railroad station many successful contacts were made including W2GG, who was the first to make contact.

When the train came out of the station Curt LeMay, KØGRL, made the first contact followed by Butch KØDWC. In all over 215 SSB stations were standing by including 12 foreign countries. We have received word that in the future any station working the Presidential train will receive a QSL card signed by the President and when he is aboard *Ike* will be available at times for comments.

Major General Butch Griswold, KØDWC, accompanied by Art Collins, WØCXX, begin another flight October 2 to Bermuda, Azores, French Morocco and England, etc. on a S.A.C. Globe Master equipped with SSB. They should provide the gang with many contacts during the flight.

On the 20th of October for about a month "Pete" Fernandez, W4SM took off from Donaldson AFB, S. C. for the South Pole via Alaska, Kwajalein, Australia, New Zealand, Antarctica, the South Pole (90°S), and return via New Zealand, Fifi Islands, Canton and Hawaii. W4PFH and K4ELF (Bob and Elmer) will assist with the operating on this month long trip. SSB, A1 and A3 will be used and operation on 10, 15, 20 and possibly 40 is planned.

CQ, in recognition of the rapid growth of SSB will award a certificate to all stations who furnish proof of having contacted fifty countries on two-way Single Side-band. To qualify you must send to *CQ* your QSL confirmation cards which indicate the contact was for SSB. These awards will be numbered from 1, so get your cards in quickly. We are also considering sponsoring an SSB "DX Contest" if enough interest is evidenced. Please let me have your opinions.

An association has been formed "for the furtherance of SSB." At the first meeting the following officers were elected: President, Tony, W2EWL; Vice-Presidents, Larry, W2ZG and Bill, W2AEF; Sect., Ben, K2KSW; and Treas., Al, K2BWQ. The next meeting will be held in New York. George Bailey, ex Pres. of ARRL, W2KH, has been awarded the first certificate for WAS-SSB. Congrats, George.

From W6HQL we learn that KC4USA and KC4USV are moving closer to the magnetic South Pole, and also that the present ops are returning to the States on rotation. New hams will take their places. Our thanks to Blaine and his crew for the splendid job they did during the long Winter nights when the mercury on many occasions went to 78 degrees below zero. Operation "Deep Freeze" demonstrated the superiority of SSB over "Ancient Modulation," and created tremendous good will for hams with the thousands of successful phone patches to relatives of the camp's personnel.

KA2FC, Mac, has changed over to SSB, thanks to an exciter sent by his Dad, W3BM, and his signals have been terrific. We welcome I1BGA, August, with his new 5100 exciter. Walt, VE1BZ is building a new linear for 20 and 80. OZ3EA, Peter, is expecting a visit from W3DQ and W2MDQ this month. Manuel, TG9AQ, is very happy with his new SSB rig. SM6SA, Jorn, is now on 20 using a 20A and 6001 linear and two element beam. He is building a new final with two 4-250As.

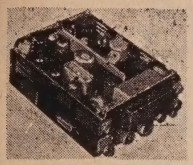
AP2BP, Bob, expects to return home in November for several months' vacation. His call in Wales is GW3ECH. We will miss Bob's big signal from Pakistan. AP2CR, Colin, has been off the air for several weeks while he was in Karachi on business. VS6BE received his KWS-1 and has a big signal from Hong Kong. Lloyd, W6DOB, reports SSB is providing his biggest thrills since becoming a ham in 1921. Among his 25 countries worked are CP5EK, CX5AF, VR2BC, CT1FY, OA4CS and VP7NQ. John, PY2JU with 8 watts worked

[*continued on page 112*]

ASB-5 RECEIVER for 420 Mc BAND!

As featured in "CQ" for October 1956. Easily converted, makes a marvelous receiver for 420 band, with RF Amplifier! Supplied complete with all tubes, OUR LOW PRICE **$14.95**

HAM SPECIAL! Famous BC-645



XMITTER-RECEIVER

With DIAGRAM for Easy Conversion to CITIZENS' BAND!

BRAND NEW

Makes wonderful mobile rig for 420-500 Mc. Easy to convert for phone or CW 2-way communication. CONVERSION DIAGRAM INCLUDED. This swell rig originally cost over $1000—yours for practically a song! You get it all, in original factory carton, BRAND NEW, complete with 17 tubes, less power supply. Conversion instructions included. Shpg. wt. 25 lbs. **$29.50**

PE-101C DYNAMOTOR for BC-645, has 12-24V input (easy to convert for 6V Battery operation) ..... only **$7.95**

UHF ANTENNA ASSEMBLY, for BC-645 ..... $2.45
Complete set of 10 Plugs for BC-645 ..... **$5.50**

CONTROL BOX for above $2.25
SHOCK MOUNT for above $1.25

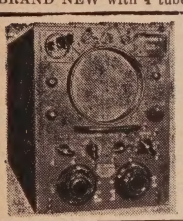
CONVERSION BOOKLET. Instructions for most useful surplus rigs **$2.50**

ARC-5/T-23 2-METER TRANSMITTER

Includes 2-832A, 2-1625 tubes.
Excel. Used **$14.95**
BRAND NEW $21.50

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**



APN/4 OSCILLOSCOPE

Easily converted for use on radio-TV Service Bench!

BRAND NEW
Completely Assembled

Supplied complete with 5" Scope type 5CP1 and RCA 100 Ke. Crystal Unit **$14.95**

DYNAMIC HANDMIKE, with "Press-to-talk" Switch, cord and plug—BRAND NEW, ... only **$2.95**

HI-FI DYNAMIC HEADSET WITH RUBBER CUSHIONS
Freq. Range: 40-14000 CPS. No distortion. BRAND NEW **$5.95**

DYNAMIC Headphone with Dynamic Mike, BRAND NEW, complete **$3.95**

MICROPHONES

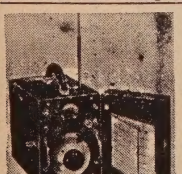
Model		Excellent Used	BRAND NEW
T-17	Carbon Hand Mike	$5.45	$7.95
CD-307A	Cords, with PL55 plug and JK26 Jack		.99

DYNAMIC HEADPHONES, 600-ohm impedance, with large earphone cushions, cord and phone plug. BRAND NEW, special **$2.95**

BRAND NEW CATHODE RAY TUBES

3CP1	$ .88	5BP4	$2.22
3FP7	.88	5CP1	2.45
5BP1	2.22	9LP7	1.88

RCA 826 Transmitting Tubes, NEW ..... Each 44¢

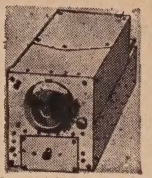


BC-906 FREQ. METER—VALUE $200.00!

Made by PHILCO

Cavity type, 144 to 235 Mc. BRAND NEW in original factory packing, complete with antenna, tube and calibration charts.
OUR LOW PRICE **$8.88**

BC-946B BROADCAST RECEIVER



520 to 1500 Kc. 6 tubes: 3—12SK7, 12SR7, 12A6, 12K8. For dynamotor operation. Easily converted to 110 or 32 Volt. 2—IF stages, 3-gang tuning cond. Complete with all tubes, in original sealed carton.
BRAND NEW **$19.95**

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**
BC-696 TRANSMITTER—3 to 4 Mc. BRAND NEW, complete with all tubes & crystal **$8.88**

SCR-274 COMMAND EQUIPMENT

ALL COMPLETE WITH TUBES

Type	Description	Used	Excellent Used	Brand NEW
BC-453	Receiver 190-550 KC	$9.95	$11.95	$14.95
BC-454	Receiver 3-6 Mc	7.19	8.29	11.95
BC-455	Receiver 6-9 Mc	5.25	7.95	9.95
BC-456	Modulator	2.24	2.75	4.24
BC-450	3 Receiver Control Box		1.49	1.95
BC-451	Transmitter Control Box		1.25	1.49
BC-696	Xmtr 3-4 Mc (like new)		6.95	8.88

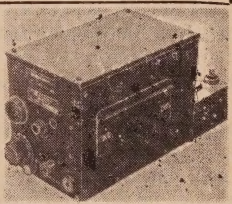
110-VOLT AC POWER SUPPLY KIT

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. No wiring changes needed. Complete kit of parts with metal case, instructions **$7.95**

SPLINED TUNING KNOB for 274-N RECEIVERS. Fits BC-453 BC-454 and others. Only **49c**

AN/ARR-2 RECEIVER



BRAND NEW—A Terrific Value! Tuning Range 234 to 258 MC. Tubes: 7-9001, 3-6AK5, 1-12A6. Only a few at this low price! Complete **$8.88**

With 28V 1.6A Dynamotor, complete $12.98

110 VOLT AC POWER SUPPLY KIT for above $7.95

SCR-522 FINEST 2-METER RIG!

Terrific buy! VHF Transmitter-Receiver, complete with all components. 100-156 Mc. 4 channels. Xtal-controlled. Amplitude modulated voice. They're going fast! Excellent condition. SCR-522 Transmitter-Receiver, complete with 18 tubes. COMBINATION ..... Special **$33.33**

Receiver Only, with all tubes $19.50
Transmitter Only, with all tubes $22.25

DYNAMOTOR VALUES!

Type	Input	Output	Excellent Used	BRAND NEW
DM-28	28V	224V .07A	$1.95	$4.95
DM-32A	28V 1.1A	250V .05A	2.95	5.95
DM-33A	28V 5A	575V .16A		
	28V 7A	540V .25A	1.95	3.95
DM-34D	12V 2A	220V .080A	4.25	5.50
DM-37	25.5V 9.2A	625V .225A	5.95	8.95
DM-40	14V 3.4A	172V .138A	1.75	3.45
DM-53A	28V 1.4A	220V .080A	3.95	5.95
DM-64A	12V 5.1A	275V .150A		7.95
PE-73C	28V 20A	1000V .350A	3.50	11.50
PE-86	28V 1.25A	250V .050A	2.95	5.24
PE-103	6V	500V .160A		
	12V	500V .160A	19.50	34.50
PE-188	28V 11A	400V .400A		6.95

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 **$2.24**

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Contest Scores

First figure designates number of contacts, second figure the number of counties worked, third figure the total score. Winners in each state are in bold-face type.

Results.. C.Q. Summer V.H.F. Contest

From the number of letters we received from satisfied contesteers, I would presume that the summer contest was a success. Many a bold man slaughtered by the ambiguous rules, but in the main a lot of good operating fun was had by all.

The top man in the multiband section was W8LPD, John, of Cincinnati, Ohio. Old John did such an outstanding job of racking up points that Helen and I are thinking of going back to Ohio to see what it is like to live in the center of V.H.F. activity. His all band score of 20,724 was top in the country and gives him possession of the MICRO WAVE ASSOCIATES V.H.F. TROPHY.

Details of the trophy presentation will be given in the next issue.

In runner-up position we found W3TDF of Langhorn, Pennsylvania. Ray turned in a beautiful score of 14,160 points using Six, Two and 0.7 meters. (I guess those Ohio boys got tired of seeing you win, Ray.)

Activity in the California area was led by the old pro in person. Frank (W6AJF for you newcomers) turned in a thumping 6650 points to cop the multiband award in California, and sweep the state on Six, 220 and 420 Mc. Runner-up and no mean slouch at turning in a score was W6BAZ. Paul scored 4928 points on all bands. Top two-meter score from California was turned in by K6DTR/6. His 4104 points just beat out W6ASH with 4080. A real close race.

Top two meter score for the country was turned in by W1PYM. Paul operating the rig at W1FZJ scored 13,600 points. Runner up was W1CLH. His 12,784 points gave Paul a hard time in the clutches.

Top six meter score for the country was turned in by W9BRN who turned in a score of 12,096 points. Runner up on six meters was W8LPD with a score of 7,904.

Congratulations to all who participated and see you in the Winter go. *Sam, W1FZU*

144 Mc.

CALIFORNIA

W6CUB	77	15	2310
K6DTR/6	**108**	**19**	**4104**
K6IMU	20	8	480
W6AJF	89	16	2488
W6BAZ	70	15	2100
K6HYX/M	43	14	1204
W6SKH/6	60	20	2400
W6GQZ	41	10	820
W6ASH	102	20	4080
KN6SDX	50	4	400

CONNECTICUT

W1ECI/1	38	13	988
W1CLH	**137**	**47**	**12,784**
WN1KFS	24	8	384

DELAWARE

WN3FYL	**2**	**2**	**12**

ILLINOIS

W9PPW	20	4	160
W9USI	65	8	1040
W9SEK	**70**	**29**	**4060**
W9DRN	25	11	550
KN9BBK	54	16	1728
W9NXI	57	20	2280

INDIANA

KN9BEH	5	4	40
K9AQP	**23**	**10**	**460**

IOWA

WØSMJ	**60**	**16**	**1920**
WØYPT	42	21	1764

LOUISIANA

W5HEZ	**7**	**5**	**70**

MAINE

WIHLP/1	**60**	**23**	**2760**
W1QCC	11	9	198

MARYLAND

W3GKP	**33**	**20**	**1320**
W3CJK	38	13	988

MASSACHUSETTS

W1GYU/1	40	14	1120
WIFZJ	**136**	**50**	**13600**
W1MEG/1	18	4	144
W1AAI	52	12	1248
W1BDF/1	30	14	840
WN1SQW	30	14	840
K6HEC/1	57	15	1710
W1ADE	31	10	620
W1EQM	6	2	24
W1YLV	18	7	252
W1RUD	99	35	6901

MICHIGAN

W8JUV	20	9	540
W8URO	47	18	846
W8PT	55	31	1705
W8JXU	31	10	620
W8SEB	10	3	60
KN8ARI	9	5	90
W8TDF	38	15	570
W8DX	**54**	**24**	**2592**

MISSOURI

WØLFE	**12**	**12**	**288**
KØDUV	15	7	210

NEBRASKA

WØVTP	**21**	**14**	**588**
WØWRT	14	6	168

NEW HAMPSHIRE

WIIQD	**10**	**7**	**140**

NEW JERSEY

W2CCU	13	9	234
K2CJK	12	7	158
K2HOD	47	26	2444
K2JVX	89	36	6408
K2BPX	5	3	30
K2YQI	81	31	5022
K2KGJ	82	20	3280
W2BLV	2	1	4
W2OSR	1	1	2
KN2TBJ	25	8	400
K2KIB	77	20	3080
W2ZUL	64	21	2688
KN2RLG	70	20	2800
K2TLI	**96**	**41**	**7872**
K2GJU/2	21	12	504
K2PRR	42	17	1428
K2DCF	60	29	3480
K2GLQ/2	42	27	2268
W2DZA	7	7	98
W2YMY	16	9	288

NEW YORK

W2RXG	25	13	650
K2MYS	43	14	1204
W2HJS	14	3	84
K2JLR	**86**	**28**	**4816**
W2JBQ	26	10	520
K2GLQ/2	29	21	1218
W2GBN	10	7	140
W2LXE	63	23	2898
W2AOD	29	17	986
W2PST	17	8	272
W2ALR	45	20	1800
K2MMT	49	18	1764
K2IXJ	45	27	2430

OHIO

W8LOF	66	28	3696
W8WAB	6	1	12
W8JOY	25	5	250
W8JSW	13	7	182
W8DPW	42	12	1008
W8LJQ/8	44	16	1408
W8LAH	**84**	**25**	**4200**
W8WUP	19	6	228
W8IPT	38	9	784
W8VAD/8	17	7	238
W8WYU	25	6	300
W8MVE	39	21	1638

OREGON

K6GQQ/7	**24**	**9**	**432**

PENNSYLVANIA

W3HYO	**66**	**19**	**2508**
W4WSF/M-3	7	2	28
W3FEY	68	17	1156
W3IMW	23	11	506

RHODE ISLAND

WIFEO	**4**	**3**	**24**

VERMONT

WIMMN	**8**	**7**	**112**

VIRGINIA

KN4JDJ	9	6	108
W4JCJ	**28**	**21**	**1176**

WISCONSIN

W9ZUZ	**40**	**16**	**1280**
W9TQ	9	7	126

WASHINGTON D.C.

W3WAF	5	4	40

144 Mc.

CANADA

VE3DNE	**58**	**18**	**2088**
VE3AIB	55	18	1980
VE3DNK	17	4	136
VE3EBD/M	10	4	80
VE3AEZ	36	15	1080
VE3DDC	7	3	42
VE3DIR	30	16	960
VE3DUU	42	15	1260
VE3DSU	31	11	682

50 Mc.

ALABAMA

K4BEI/4	13	8	204

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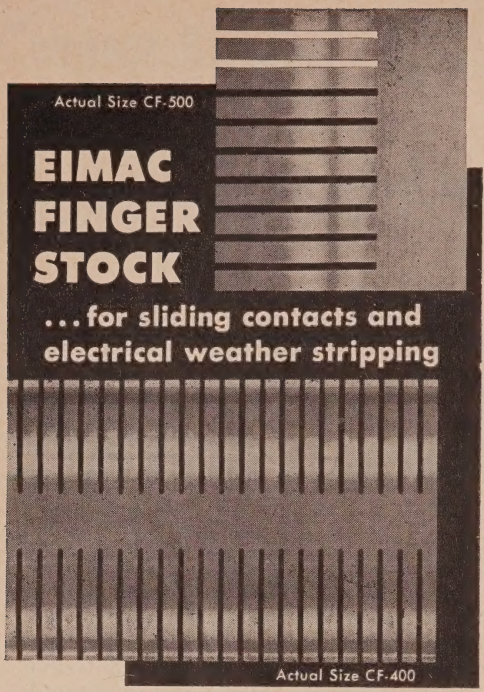
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CF-100	17/32	CF-200	13/16	CF-700
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CF-500	1⅜	CF-600	2¼	

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SAN BRUNO CALIFORNIA
The World's Largest Manufacturer of Transmitting Tubes

ARKANSAS

K5EZU	2	4	16

CALIFORNIA

K6RNQ	64	12	1536
K6BTJ	7	1	14
K6KDR	1	1	2
W6AJF	**83**	**13**	**2158**
W6BAZ	70	14	1960
K6HPZ	19	2	76
W6OJT/6	67	15	2010
W6IWS	16	6	192
K6BYR/6	76	14	2128

CONNECTICUT

WILGE	22	14	616

ILLINOIS

W9USI	34	8	544
W9BCE	45	12	1080
W9DEN	55	10	1100
W9YOI	**66**	**19**	**2508**

INDIANA

W9VDN	27	10	540
W9BRN	**112**	**54**	**12096**

KENTUCKY

W4DAF	38	10	760

MAINE

W1VRK/1	67	16	2144

MARYLAND

W3LCC	19	11	418

MASSACHUSETTS

W1UMK	2	2	8
W1CIX	43	15	1290
W1HOY	**107**	**34**	**7276**
W1AQE	39	15	1170

MICHIGAN

W8SDK	53	22	2332
K8BXZ	45	23	2070
W8SYO	22	9	396
W8BKT	48	29	2784
W8ESZ	50	19	1900
W8SSO	44	17	1496
W8VYG	19	4	152
W8CVQ	**73**	**29**	**4234**
W8HJR	53	23	2438
W8UIX	18	3	108

MISSOURI

KØEXG	34	4	272

NEW HAMPSHIRE

W1ULU	19	6	114

NEW JERSEY

K2KGJ	82	21	3444
K2GJU/2	22	12	528
W2ORA	25	16	800
K2ONU	39	15	1170
W2DZA	3	3	18

NEW YORK

K2ERQ	22	12	528
K2QIL/2	**40**	**18**	**1440**
W2JTE	16	7	224
K2ALZ	20	10	400
K2RTU	25	12	600

OHIO

W8PBX	29	9	522
W8QLB	30	18	1080
W8NAF	41	10	820
W8DNW	55	20	2200
W8WAB	11	10	220
W8SGX	60	37	4440
W8IMK	41	17	1394
W8JSW	56	19	2128
W8INQ	45	16	1440
W8EVY	45	16	1440
W8MVN	91	33	6006
W8MXR	33	12	792
W8LAH	84	24	4032
W8WUP	2	1	4
W8SVU	51	17	1734
W8PCK	57	21	2394
W8LPD	**104**	**38**	**7904**

OREGON

W7INX	9	6	108

PENNSYLVANIA

W3KWH	19	11	418
W3FKI/3	8	4	64
W3YRB	7	5	70
W3DMV/3	**32**	**19**	**1216**

RHODE ISLAND

K2ITQ/1	50	26	2600
W1UHE	18	13	468
W1FIG	15	9	270
W1WTR	8	7	112

TEXAS

K5DCQ	9	2	36
W5FEG	**23**	**4**	**92**
K5BDL	16	2	32

UTAH

W7QDJ	13	4	104

VIRGINIA

W4JCJ	13	2	260
W4AA1/4	**51**	**31**	**3162**

WASHINGTON

W7BEY/M	26	5	260

WISCONSIN

W9YAY	8	4	64
W9GXC	33	11	726
W9JFP	**54**	**19**	**2052**
K9AKI	40	9	720

DISTRICT OF COLUMBIA

W3DWU	54	28	3024

MULTI-BAND

W3TDF	120	59	14,160	Pennsylvania
W9AAG	41	27	2,214	Illinois
W6BAZ	77	32	4,928	California
W6AJF	95	35	6,650	California
W1RFU	105	52	10,920	Massachusetts
W9USI	69	18	2,484	Illinois
W8LPD	**157**	**66**	**20,724**	**Ohio**
W9VUL	119	71	16,898	Indiana

220 MC

W6AJF	87	1	174	California
W9USI	4	2	16	Illinois
W9DRN	3	2	12	Illinois
W2RGV	5	4	40	New Jersey
W8UIX	2	2	8	Michigan
W2DZA	6	5	60	New Jersey

432 Mc

W3IMU	24	1	48	Pennsylvania
W6AJF	**86**	**5**	**860**	**California**
W6BAZ	70	3	420	California
K6BYR/6	8	5	80	California

AERONAUTICAL MOBILE

W9DBZ/9	75	25	3750	Two Meters
W1GYU/1	40	14	1120	Two Meters
W8UAT/1/3/8/2	107	58	12,412	Two Meters

SAVE!...BARGAINS GALORE!...SAVE!

NEW LOW PRICES! — EFFECTIVE NOVEMBER 1st

COMMAND TRANSMITTERS & RECEIVERS
ARC-5 and SCR-274 as available



BC 455
XLNT—$5.95
NEW—$7.95
Receivers, w/o dynamotors

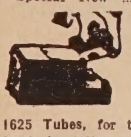
R-25 Marine, 1.5-3 MC, used $5.95, new 7.95
R-26 or BC-454, 3-6 Mc, used $6.95. New 7.95
R-27 or BC-455, 6-9.1 Mc, used $5.95, New 7.95
R-28, 100-156 Mc, Exlt 13.95
R-4/ARR-2,234-258 MC, as is w/o tubes, $2.95, w/tubes, used 4.95

Transmitters, w/o modulator or dynamotor

T-18 Marine, 2.1-3 Mc, as is, w/tubes, 3.95, used 4.95, boxed 7.95
T-19 or BC-696, 3-4 Mc, as is w/tubes, 6.95, used 7.95, boxed 8.95
T-20 or BC-457, 4-5.3 Mc, as is w/tubes 2.95, used 3.95, boxed 5.95
T-21 or BC-458, 5.3-7 Mc, as is w/ tubes, 2.95, used 3.95, boxed by depot 4.95
T-22 or BC-459, 7-9.1 Mc, as is w/tubes, 3.95 used 5.95 boxed 8.95
T-23, 100-156 Mc, used, 13.95, xlnt 14.95
Special—one usable R-28 and T-23, both for 25.95

Misc. Command Equipment as available

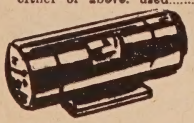
Receiver dynamotors 28V, new $4.95, used ..... $ 3.95
BC-456 SC Mod w/tubes, new 4.95, used 3.95
MD-7 ARC-5 Pl Mod w/tubes less dyn. Xlnt 8.95
28 v dynamotors for above unit 3.00
Mounting Racks, used, 1.49, new 2.49
New 24V Trans, ct at 12v, 1A 3.50
Plugs for rear of receiver 1.00
Jennings VC40 or VC50—15 KV Vacuum Condensers Special New 7.95



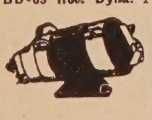
110 VAC power supply for Receiver, cont. above trans & Selenium Rect. kit 8.95
Wired & Tested 12.95
Receiver Conversion kit; cont. schematic, BFO Sw, 25 K Pot, phone jack and spinner knob, with instructions 1.95
1625 Tubes, for trans & mod, 50¢ 3/1.00
832A for VHF trans 8.00

Popular Dynamotor Specials

DM-34 Recvr. Dyna, 12 V in 220 @ 80 ma Out. new 4.95
DM-36 Same as above, 28 V. new 4.95
either of above. used 3.95



PE-101C Transmitter, 12 or 24 v input, 500 v at 200 Ma out, (300 v 6v in) new 8.95
DM-42, 12 V in, out 1000 and 500, ea at 215 Ma. used 12.95
DM-35, 12V in, 600 at 260 Ma out, Like New 12.95
Wincharger Dyna. 12 v in 440 @ 220 MA Out, new 12.95
BD-69 Rec. Dyna. 14 v in, 220 at 80 Ma out, new 9.95



PE-73, 24 v in 1000 at 350 Ma out New 8.95, used 6.95
PE-94, 28 v in, for 522, 300 at 250 Ma, 150 bias, and 12 V 10 A, new 4.95
RK-65 Tetrodes, 500 watts each, 6 watts drive, special 2 for 15.00

WESTON—SANGAMO—YOUR CHOICE
METERS. ALL NEW, 2" SQUARE

0-2	Ma	0-200	Ma
0-5	Ma	0-300	Ma
		0-500	Ma
0-15	Ma	0-20	VDC
0-50	Ma	0-40	VDC
0-100	Ma	0-300	VDC



3.29 each, Special, 3 for 9.00

Heavy Duty Collins choke, 300 Ma. can take 500 Ma peaks, new 3.95
Bleeder resistors, 50 K 100 W, new 1.95
Bantam 1-watter. BC-746 plug-in transmitter tuning unit from WALKIE TALKIE. 140 mmfd APC type variable cond. plus assorted parts including chassis. Builds into low power transmitter (See CQ March '54) ..... New, $1.29

OIL CONDENSERS

2 mfd 5000 vdc new	$5.95	10 mfd 600 vdc new	1.49
4 mfd 5600 vdc	2.25	8 mfd 600 vdc new	1.49
2 mfd 2500 vdc new	2.95	4 mfd 600 vdc new	3 for 1.00
2 mfd 1000 vdc new	1.95	2 mfd 600 vdc new	3 for 59¢

Mobile Microphones, newly assembled, W.E. D173015 similar to the TC-128, push-to-talk switch, 3 cond. 5' curl, cord, new 3.95
Brand New Headphones, your choice of HS-23, 2000 ohms, or HS-33, 600 ohms, complete with brand new rubber cushions 3.95



Used HS-23, w/o cushions 1.95
New small cushions, pr. ..... .49
Used chamois cushions, pr. ..... .49
New lg rubber cushions, pr. ..... .29
Brand new Impedance matching transformer, plug in, 2000 ohms to 600 ohms, takes std plug, boxed 69¢ each, 3 for 1.95



CD-307A cords, has JK-26 on one end for phones, std plug other end brand new, boxed ..... .97
Build your Modulator, Input trans., 1.50, driver, 2.50, mod. trans. 2.95, 2 new 1625 tubes, value 7.70 all for 6.95
Stewart Warner Ammeter, 60-0-60 Amps, brand new, 95¢, 6 for 5.00
Phone-CW Filters, 1020 cycles, new, FL-5, 69¢ FL-8 with switch 1.89
GP-7 transmitter with all tubes and 80 meter coil unit only 13.95
Less tubes and coil unit 7.95
TU-7, 4.5-6.2 MC; TU-8, 6.2-7.7 Mc; TU-9, 7.7-10 Mc; TU-10 10-12.5 Mc; TU-26, 200-500 Kc, choice, used, each 2.29
T-30 Throat Mikes, used, 5 for 1.00
3' Mast Sections, MS-49 thru 52, 50¢ each. 53 and above, 75¢ each. Special 1 each MS-49 thru 54, makes 18' vertical 2.95
MN-26C direction finding Equipment
MN-26C Receiver w. dyna 10.95
MN-20E Loop 4.95
MN-52H Az Cent Box 2.95
All above new, special, 1 each for 17.95



Antenna Insulators, Bendix MT-48C, plated end caps, new 15¢ ea., 10 for 1.25
Control Box w/5 Ma S meter, special ..... .98
SCR-522, exc. condition. Contains Receiver, Transmitter, Modulator, tubes, tunes 100-156 MC, covers 2 M w/o modification 34.50
New transmitters, GF-11 for 12 volts, or GF-12 for 24 volts, with tubes and built in modulator—less tuning unit, GF-11, $6.95, ... GF-12 5.95
Tuning Unit for above 1.95

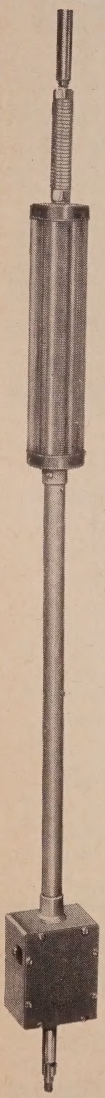
2.00 Minimum Order. All prices Subject to Change without Notice. Canada & Mexico minimum 10.00. Cash with Order. Sorry, no COD. California Orders Include 4% tax. Prices FOB Los Angeles

SAM'S SURPLUS, 1306 Bond St., Los Angeles 15, California

NOW! Antenna

REMOTE TUNING

MOBILE ANTENNA



Autenna (Pat. applied for)

CHANGE BANDS WHILE DRIVING

With this new simple - to - install AUTENNA mobile antenna you can bandswitch by remote control without leaving the wheel of your car. Your receiver and Transmitter are bandswitching . . . NOW—your antenna!

AUTENNA Tunes Amateur Bands
75 - 40 - 20 - 15 - 10 Meters

- Band Indicator (optional) Instantly identifies band the antenna is tuned to. No guessing!
- Positive Noise Free Silver Plated Contacts
- High Dielectric Center Support
- Coil Wires Embedded in Polystyrene Rods
- Installed or Removed in Seconds with Kwik-On Connectors for Trunk Storage
- Designed for Transmitters with Pi-Net Final—Will Handle up to 100 Watts
- Weather Resistant Finish
- Factory Tuned — Tested — Guaranteed

ONLY

$69.95

Amateur Net—Plus Postage
Calif. residents include state and applicable local sales tax

Designed for use with 60" whip. Complete with Control Switch, two Kwik-On Connectors, Whip Flexor Spring and Indicator Network. Calibrated Meter Scale for 2" 0-1 MA. Meter.

Meters available at additional cost
See Your Local Parts Jobber

REPRESENTATIVES WANTED
A few choice areas on the East Coast still available.
Write for details

RAFRED ENTERPRISES

Box 47725, Wagner Station
Los Angeles 47, Calif.

VHF [*Continued from page 82*]

Riverton, New Jersey Joe Taylor (K2ITP), sez:

"I would appreciate hearing your ideas on the following antenna set-up. I want to stack two five element yagi's, which are made for one of them to match 75 ohm coax.

"The idea seems O.K. to me, since one of the yagi's alone matches 72 ohm line. Then when these two lines are paralleled at the Tee connector, it would come down to 36 ohms. The 52 ohm ¼ wave 'Q' section should match this O.K., I think!" *Looks good to me, Joe, does anyone have any comments? See Sketch, Fig. 2.*

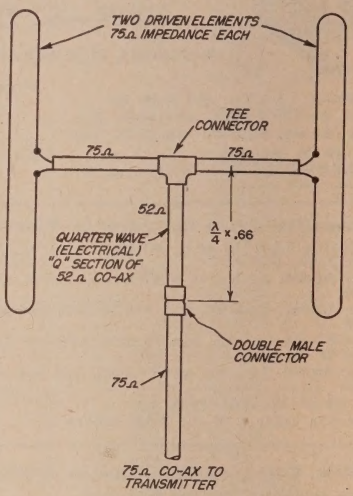


Fig. 2.

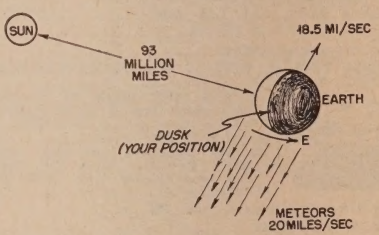


Fig. 1, note that meteor velocity relative to earth's atmosphere is 18.5 + 20 = 38.5 miles/sec.

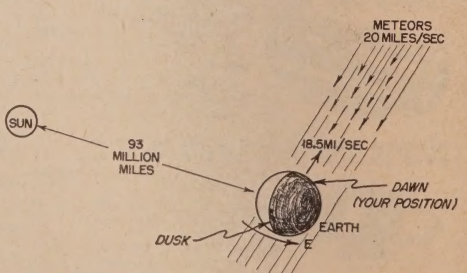


Fig. 1b, note that meteor velocity relative to earth's atmosphere is 20 — 18.5 = 1.5 miles/sec (they really have to puff to even catch up).

Systems Career: a

laboratory for learning



. . . an exciting and rewarding career awaits the E.E. or Physics graduate who joins this highly respected Engineering team.

As a Field Engineer at Hughes, through training and assignment you will become familiar with the entire systems involved, including the most advanced electronic computers. This knowledge will broaden your experience and learning for future application in either the military or commercial field.

The national respect which Hughes commands in the field of advanced electronics is in no small part due to the technical support provided by the Field Engineers. Other contributors to the success of the Field Service and Support Division are the Technical Manuals Engineer, Training School Engineers, Technical Liaison Engineers, and Field Modification Engineers.

This Hughes activity is a highly trained organization of expert engineers, giving support to the armed services and airframe manufacturers using the company's equipment. Locations are in Southern California, continental U.S., overseas. We invite you to join this team. For further information write us at the address below.

Some extra advantages for Field Engineers include:

Training at full salary for 3 months.

Generous moving and travel allowance between present location and Southern California (Culver City).

Additional compensation plus complete travel and moving on assignments away from Culver City.

Ideal living conditions in the unsurpassed climate of Southern California.

Reimbursement for after-hours courses at UCLA, USC, or other local universities.

Employee group and health insurance paid by company, retirement plan, sick leave, and paid vacations.

HUGHES

Scientific Staff Relations
RESEARCH AND DEVELOPMENT LABORATORIES
HUGHES AIRCRAFT COMPANY
Culver City, California

HAMS AND EXPERIMENTERS!!

Last Chance On Gov't Surplus

Selling Out Entire Stock

HEADPHONES: MA-2/M-160

Complete with short cord, leather band, and rubber ear cups. High impedance. HS-23 Signal Corps.
$3.95 New—$1.95 Used

PROP PITCH MOTOR:

X/D-1 Heavy duty model! 3 ton thrust bearing will support the heaviest beam. Pipe mounts into top of unit. 7000:1 gear ratio. 20-35 volt motor—AC or DC. Approximately ⅓ H.P. Reversible on AC or DC. Overall size 10" x 17". $18.00

ARC-5: VHF TRANSMITTER:

With 1625 xtl., 1625 mult., 832A mult., 832A final. Antenna change-over relay. Motor turret band switch; perfect for remote operation. For 2 meter operation but any or all channels may be converted to 6 or 10 meters. Crand New $24.95

VARIABLE CONDENSER:

10-80 mmfd. .050 in. spacing; good for 2500V pk. steatite insulation. ¼ in. diameter shaft, ⅜ in. long. Ideal for that new final. Brand new, boxed $1.50

RELAYS:

BB-3/R-25	6VDC	SPST (N.O.)	$1.95
BA-2/R-2	6VDC	DPDT	$2.95
BA-4/R-27	12VDC	SPST (N.O.)	$1.95
BA-3/R-15	24VDC	SPST (N.O.)	$1.95
BB-2/R-8	24VDC	SPST (N.O.) Heavy Duty	$2.95
BA-3/R-17	24VDC	DPDT	$2.95

TRANSFORMERS:

115V 60 cy primary and many hermetically sealed.

C/D-2	HV. & Fil.	4400V @ 4.5 ma and 5V-3A	$6.95
B/D-31	HV	5000V @ 2 ma	$4.95
A/D-24	Plate	870 VCT @ 400 ma	$4.95
C/D-10	Plate	900 VCT @ 450 ma	$4.95
C/D-12	Plate	850 VCT @ 100 ma	$2.95
A/D-18	Plate	750 VCT @ 500 ma	$3.95
B/D-53	Plate	500 VCT @ 130 ma tapped pri.	$3.95
T-43	Power	800 VCT @ 150 ma, 5V @ 3A, 2 X 2 .5V @ 3A	$4.95
B/D-57	Power	500 VCT @ 150 ma, 6.3V @ 4A, 5V @ 3A	$3.95
A/D-27	Power	600 VCT @ 150 ma, 6.3V @ 5A, 5V @ 3A	$3.95
B/D-37	Filament	10V @ 6A	$2.95
B/D-60	Filament	2 x 6.3V @ 7A	$2.95
B/D-54	Filament	2.5V @ 10A, 10 VCT @ 3.25A, 6.3V @ 1A	$3.95

FILTER CHOKES:

KC-4/MX89	16 hy 450 ma oil filled	$4.95
EA-4/T-34	3 hy 400 ma open frame	$3.95
C/D-9	3 hy 275 ma, 2 X 17 hy 125 ma (mult. sect.—herm. sealed)	$3.95
A/D-14	4 hy 85 ma, 6 hy 90 ma, 12 hy 65 ma (mult. sect.—herm. sealed)	$1.95

SURPLUS RADIO INC. P.O. Box #651 Bayville, N. Y.

VHF

[*Continued*]

Omaha, Nebraska Tom Leary (WØVTP), sends us some pictures of his new two-meter beam along with description:

"It has 23 elements on a fifty-one foot boom, using a truss type of construction with cables on each side to cut down the side sway. It is mounted on a 60 ft. crank up tower and kept tied down at the 20 ft. level except when in use. Rotor is an AR-22 which does a remarkable job considering the inertia of a boom this long. The nose is about 20° wide at the half power points. Elements are clothesline aluminum wire and it is fed with a combination of open wire and RG-34U coax line. The whole thing weighs less than 40 pounds.

"Am working on a pair of 304-TH's for a CW final, to be driven by the present 829B rig. Needless to say, this requires half wave lines in grid and plate circuits." *Looks like you've done a lot of work, Tom, and have a lot more planned to get a good signal on two meters. Three cheers!*

73, Sam, W1FZJ

YL

[*from page 71*]

YLRL 17th Anniversary Party Rules

Dates

Phone—Start Wed. Nov. 7, 1956 at noon EST. End Thurs. Nov. 8, 1956 at 12 midnight EST.

CW—Start Wed. Nov. 14, 1956 at noon EST. End Thurs. Nov. 15, 1956 at 12 midnight EST.

Eligibility

All licensed YL or XYL operators throughout the world. Non-members of YLRL may participate but are not eligible for awards. Contacts with OMs do not count as the YL/OM contest will be held in February.

Operation

All bands may be used. Cross-band operation is not permitted.

Procedure

Call "CQ YLRL" or "CQ YL."

Exchange

QSO number; RS or RST report; name of section, State, U.S. possession, VE district, or country.

Maryland and the District of Columbia count as one state.

California is divided into eight (8) sections as follows: Santa Clara Valley, East Bay, San Francisco, Sacramento Valley, San Joaquin Valley, Los Angeles, San Diego, Santa Barbara.

Scoring

a—Add total number of contacts. Multiple contacts with same station, regardless of number of bands used, will count as *one* contact.

b—Multiply total of a. by number of different sections, States, U.S. possessions, VE districts, or countries worked.

c—All contestants running 150 watts or less input *at all times* may then multiply the result of item b. by 1.25.

d—Phone and CW contests will be handled as separate contests. Stations and multipliers will count only once in each contest; example, a station contacted in the phone section of the contest may be worked in the CW portion of the contest for additional credit.

Awards

For YLRL members only (certificates will be awarded to non-members).

Highest phone score—Cup.

Highest CW score—Cup.

Cups will be awarded on a permanent basis instead of the progressive basis that was formerly used.

Another first for YLRL—a gavel will be awarded to the highest YL club entry. The aggregate scores of phone and CW reported by club secretaries and confirmed by the receipt of contest logs by the Vice President shall constitute a club entry. Segregate club entries into phone and CW totals. Both single and multiple operator scores may be counted as club entries. Only the bonafide club members in a local territory may be included in club entries.

Certificates will be awarded for high place phone and CW winners. Highest score in each district, U.S. possession, VE district, and country, where at least three (3) entries are received will receive certificates. Highest single operator CW score and phone score in any club entry will be rewarded with a club certificate where at least three (3) single operator phone/CW scores are submitted.

Only single operator stations are eligible for awards. Multiple operator scores will receive separate listings in the final results.

Winner of the phone cup is not eligible for the CW award and winner of CW cup is not eligible for the phone award.

Logs

Copies of all logs, phone and CW, must be postmarked not later than Nov. 30, 1956 or they will be disqualified. Please file separate logs for each mode of operation. Send them directly to YLRL Vice President Gloria Matuska, W9YBC, 2322 South Second Ave., North Riverside, Illinois. ■

Free BROCHURE

Also Time Payment Plan
Mail this for full information

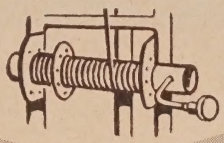
NAME _____

ADDRESS _____

CITY _____ STATE _____

CQ-11

TELESCOPES
CRANK DOWN TO ADJUST



3 SIZES — 30 - 40 - 50 FT.

The answer to your prayer—crank it up or down. Used by hundreds of hams—testimonials available. Lower it for storms. Install it yourself. SPRING LOADED RACHET WINCH can be padlocked. Good looking, husky, yet light. ¾ in. aircraft type tubular steel. Hoist cable tested for 920 lbs.

50 ft.—$96.50 (100 lbs.)
40 ft.—$73.95 (80 lbs.)
30 ft.—$59.75 (60 lbs.)
F.O.B. St. Petersburg

Also 40 ft. layover available.
All packed in strong shipping carton.

PIPE BASE eliminates concrete

EAVE BRACKET simplifies installation

HINGED BASE Easy to service

10 ft. sections build up to 80 ft. Easy to install with simple lock joint. Strong aircraft type tubular steel—light weight.

20 ft. Towers (35 lbs.)—$34.25
10 ft. Towers (20 lbs.)—$16.00

Tele-Vue TOWERS, inc.
701-707 49th St. So., • St. Petersburg, Fla.

Prices subject to change without notice

Contest Calendar

November	10-11	ARRL—SS
November	17-18	ARRL—SS
November	24-25	RSGB—21 & 28 Phone
December	8-9	DARC—WAEDC—Phone
January	19-20	DARC—WAEDC—Phone
January	5-6	DARC—WAEDC—CW
April	6-7	DARC—WAEDC—CW

SS

If you are still working on your WAS or WAVE certificate or if you are a "speed merchant" and like to rattle off the contacts, this is the time to get it out of your system. It's strictly a US/Canadian affair and not for DX men.

RSGB

This is a new one and for Phone men (and YLs) only.

TIME: 0700 GMT, November 24th to 1900 GMT, November 25th, 1956.

RULES: United Kingdom vs The World on 21 & 28 mc Phone. Stations outside the British Isles can only claim points for contacts with G, GC, GD, GI, GM and GW.

SCORING: Each completed QSO counts 5 points. An additional bonus of 50 points is given for the first contact with each British Isles country/numerical prefix, e.g., G2, G3, G5, GW2, GM3, GI5, etc. (There are six prefixes, each with six numbers so this could run up to a sizeable bonus.) There is no multiplier. It's contest points plus bonus points for the Final Score.

SERIAL NUMBERS: Progressive as worked, 57001, 56002, etc.

DIVISION: The contest is divided into two sections:

(a) Low power, 25 watts input or less.

(b) High power, maximum licensed power. (ARRL DX Contest committee, please note.)

AWARDS: Certificate to the leading station in each country outside the British Isles and each call area in VE, VK, W, ZL and ZS.

A....Always
B....Buy
C....Columbia

BC-605 AMPLIFIER GIVE AWAY!

Originally used in GI vehicle. Employs 2-1619 amplifier tubes. New cond. Complete with tubes AND schematic. BUY IT NOW! Only $2.49 Only $2.49 Only $2.49 Only $2.49

STOP-THE-PRESS BUYS!

1/40th H.P. MOTOR: With shaft. 115V. 60 cy.....$2.95
MAGNETIC RECORDING HEAD: Take it for only 1.00
12V. DYNAMOTOR: 500 V at 400 mils 7.95
BC-604 10 METER FM TRANSMITTER: It's hot! 9.95

POTENTIOMETERS-RHEOSTATS

Wire-wound. 2-3 inches in diam. Brand new, orig. pack. KIT of 10..... $1.95

DE LUXE METAL CABINET—A STEAL!

17¾" wide x 12" deep x 11½" high. New crackle finish. Ideal for housing receiver, radio, amplifier, etc. Self-locking front lid; back lid opens too. Original cost $28.00. Each..... $2.95

YOUR OWN CRYSTAL BANK!

100 Assorted FT-241 & FT-243. Brand new U.S. Gov't surplus. Good, useful, popular frequencies. Special $9.95
50 ASSORTED CRYSTALS.....$5.49
25 ASSORTED CRYSTALS.....$2.95

COMMAND GEAR—EXCELLENT COND.

BC-453 RECVR. 19-.55 MC Q 5'er.....$12.95
BC-454 RECVR. 3-6 MC. 80 meters. Only..... 4.95
BC-455 RECVR. 6-9.1 MC. 40 meters..... 4.95
BC-457 XMTR. 4-5.3 MC. Special!..... 2.95
BC-458 XMTR. 5-3.7 MC. It's a steal!..... 2.95
4-5.3 MC. XMTR. Brand new, boxed. Only..... 4.95
5.3-7 MC. XMTR. Spanking new! Boxed!..... 4.95
BC-456 MODULATOR: Excellent cond..... 4.95
BC-442 ANTENNA SWITCHING RELAY: with vacuum capacitor. New, low price..... 3.49
TRIPLE RECEIVER RACK. With shock mount..... 2.50
DOUBLE XMTR. RACK. With shock mount..... 2.50
ALL PLUGS: For SCR-274N or ARC-5. Ea..... 1.00
1625 TUBES: For spares. New, boxed. Ea..... .25
TRIPLE RECEIVER CONTROL BOX. BC-450..... .95
TRANSMITTER CONTROL BOX. Only..... .95
18 FT. FLEX CABLE TACH SHAFTS. To control receiver remotely. Special..... 1.95

"CITIZEN'S BAND!"

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5654	.77	6J6	.47
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9006	.47	70L7	.77
6C4	.47	12A6	.47
6AK5	.47	826	.47
1625	.27	832A	4.87

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LOS ANGELES 18, CALIFORNIA

LOGS: Don't forget the usual declaration that rules, etc., have been observed and be sure to certify the input power to the final. Entries must be postmarked not later than December 10, 1956 and should be mailed to:

R.S.G.B. Contest Committee
New Ruskin House
28/30 Little Russell St.
London, W.C.1

Ed. Note: Cannot understand why this contest was limited to phone only. There is plenty of phone activity in the 21 and 28 mc bands. Therefore it would seem to me a CW contest would have been a "shot in the arm" where there is a definite lack of activity.

The Club de Radio Aficionados de Guatemala held a contest on the week-end of Sept. 15/16. Unfortunately notification was not received in time for publication. However those who participated should send their logs to:

Apartado 115
Guatemala, C. A.

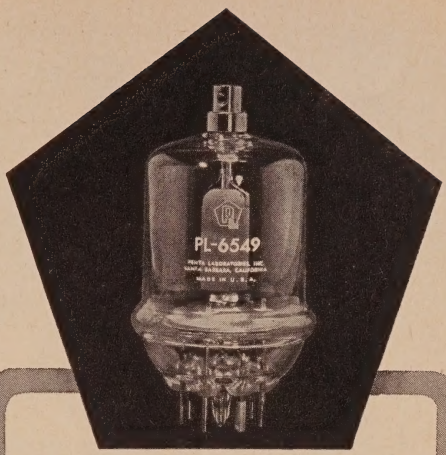
WAEDC

We only just received the official dates of this contest. Note that the dates differ radically from those used last year, and each section has been extended to two week-ends. This was made necessary due to a full contest calendar this Fall and the addition of the new RSGB contest. We hope to have the rules and other pertinent information in our next issue.

73, Frank, W1WY

DX [*from page 64*]

14160, UA1KAI 14147, OY2Z 14120, SVØWJ 14233, UC2KAB 14103, ET2US 14210, VQ4AQ 14106, 4S7FW 14127, 4S7YL 14190, LZ2KN 14106, UP2AS 14179, YK1AC 14170, YK1DF 14190, 3V8BB 14152, OQ5FH 14190, UR2KAA 14157, UB5KAA 14173, UC2AA 14132, KA2LZ 14198, SP5BQ 14110 and FA8CF 14118 . . . Joe, W9JUV, added UA9KYB, VR4AA, ZD3D, UC2KAB, HZ1AB, PX1EX, VK9TW, XE4A, UN1AA, UQ2AS and MP4QAL for 165 . . . Jim, W9WIO, picked up 3 new zones as per HZ1HZ, UA3CR and VK6UF while Len, W6WO rec'd his WAP award from NZART . . . Mike, K4CHK, added KX6ZB on 21 phone plus KH6BSF, PAØQF and KL7FAK on CW as Alf, K2BSM, got a full size beam going and nailed VS6AE, FB8ZZ, KG6AFT, UA9DX and VK9XK for a 125 total . . . Latest at W1ZZK are VQ8AG, I5RAM, UO5AA, UA9CM, UF6KAC, UL7CB, VR3B, YA1AM, KX6BP, all on CW. Phone accounted for M1B, YK1AC, ZA1UB (P.O. Box 75, Tirana), UQ2AN, MP4KDS, FB8BC and LX1DA . . . Lee, W8CED,



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PL-6549
BEAM POWER PENTODE

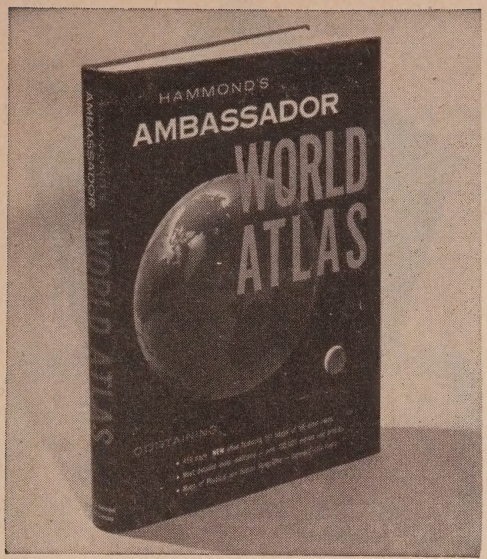
This rugged, versatile power package, when used as a class C amplifier, delivers 60 watts at 600 volts . . . 110 watts at 1000 volts . . . with driving power less than ¾ watt. An efficient modulator, amplifier or oscillator. Provides distortion-free, high peak power for class AB, single sideband service. Beam pentode construction offers a combination of peak power and linearity unattainable with conventional tetrodes. Rugged—ideal for all mobile applications.

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Filament, Thoriated Tungsten (quick heating)	
Voltage	6.0 volts
Current	3.5 amps
Plate Voltage, Max.	2000 volts
Plate Current, Max.	150 ma.
Screen Voltage, Max.	600 volts
Plate Dissipation, Max.	75 watts

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moved to 203 with such as SM8KV/LA, UJ8AF, PX1EX, AP2M, IS1FIC and VR4AA . . . Miles, W6ZZ, now has his YL-CC Certificate, Hilo-15 award and may be the first to get the new British "Worked British Counties" Certificate from two locations (One WBC from W1WV) . . .

Honor Roll

(To September 15th 1956)

Last complete HONOR ROLL appeared in the September issue.
Next complete HONOR ROLL will appear in the January issue.

W6AM	40-268	W2HMJ	39-235	W5KUJ	38-218
W6SYG	40-265	4X4RE	39-235	W5FXN	38-206
W3JNN	40-263	W9ABA	39-232	W4EPA	38-205
W8KIA	40-263	CO2SW	39-222	K2BZT	38-195
W8JIN	40-260	W3KDP	39-220	W4LQN	38-190
W9VND	40-258	W9FDX	39-219	W8PUD	38-177
W2BXA	40-258	W1KFV	39-218	W7NFE/6	38-144
W6VE	40-257	W1ZL	39-218	W8YIN	37-209
W6ADP	40-257	W4RBQ	39-217	W2HSZ	37-196
W8BHW	40-256	W2GVZ	39-216	W2ZVS	37-189
CE3AG	40-252	W6TXL	39-212	K6JQJ	37-174
W6TI	40-249	W5LVD	39-210	W1APA	37-163
W9HUZ	40-249	W1TYQ	39-209	W2AYJ	37-145
W6NNV	40-246	K2GFQ	39-207	W9KXK	36-172
W8SYC	40-241	VE3AAZ	39-203	W9NN	36-168
VK2ACX	40-240	W3VKD	39-203	W5VIR	36-154
WØDU	40-232	W9FNR	39-200	K6ENL	36-136
OK1FF	40-231	VE8AW	39-200	W6ZZ	35-157
G8IG	40-221	W9BQE	39-200	W4HKJ	35-138
W6PH	40-200	W6DBP	39-194	PHONE ONLY	
W6LGD	40-195	F9AH	39-174	G8IG	40-195
W6ID	40-192	W2OGE	39-172	W6AM	39-209
KV4AA	39-261	WØRBA	39-168	W2BXA	38-211
W8JBI	39-247	JA1CR	39-159	W3JNN	37-234
W8UAS	39-242	W8KML	38-227	W8KML	37-212
W3DRD	39-240	W4HA	38-223	W1NWO	36-222
				W4HA	36-207

Addresses

AC4NC, AC5PN—Via VU2AX.
CR6CV—Americo, Box 3078, Luanda, Angola.
CR5SP—Alcibiades O. Da Silva, C.T.T.U. Ihla de S. Tome, Port. W. Africa.
DL4RI (W1WIQ, ex-K6BTE)—Box A-26, 6901 SPCMGRU, APO 61, New York.
EA8BP—Box 215, Tenerife, Canary Islands.
ET3AF—Via G2MI.
FB8BI (Juan de Nova Is.)—Pierre Hardy, Chez M. Giraud, 10 Ave. de la Liberation, Tananarive, Madagascar.
FE8AF—Moise Saury, Service Technique Scoa, Doula, Fr. Cameroons.
FG7XD—P. O. Box 27, Ile de Marie Galante, Guadeloupe, FWI.
FL8AA—Lt. Fremont, Officier de Transmissions, B.A.I.S.M. Djbouti, Somalia.
FM7WR—Jean Levara, PTT-TSF, Forte-de-France, Martinique, FWI.
FR7ZB—Leo Benard, Usine du Gol, St. Louis, Reunion Island.
FU8AC — V. M. Fonsagrive, Port Vila, New Hebrides.
HC8GC—William Guzman, San Cristobal, Galapagos Islands, Ecuador.
HH2OP—P. O. Box 691, Port-au-Prince, Haiti.
IT1AGA — (New) 18 Via Generale Digiorgio, Palermo, Sicily.

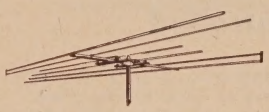
KG6IG (Bonin Is.)—NAVFAC, Navy 905, FPO, San Francisco, Calif.
ex-KB6AY—Fred Carpenter, 3318 Sierra Dr. N.E., Albuquerque, N. Mex.
KX6NC/KC6—A. K. Leong, US Weather Bureau, Ponape, Eastern Caroline Islands.
LJ3D—Club Radio Station, Graakallen, Trondheim, Norway.
ex-MP4ABW—Via W9BHR.
OA5G—P. O. Box 1229, Lima, Peru.
OA6M—P. O. Box 98, Arequipa, Peru.
PJ2ME—Vincent Labega, Phillipsburg, Dutch St. Martin, NWI.
PK3US (?)—P. O. Box 222, Surabaja, Indonesia.
RSGB Awards—G4CP, Ron Perks, "The Maples," 74 Long Lane, Newtown, Staffs. Eng.
SVØFV—(Ex-F9HY) Georges Dubois, Ambassade de France, Athens, Greece.
SVØWE—H. B. Wood, Alexandrow, Diakow 13, Rhodes, Dodecanese Is., Greece.
SU1AS—P. O. Box 2034, Cairo, Egypt.
SVØWJ—P. O. Box 134, Salonika, Greece.
UP2AS—Sakalas, Tvirtoves 6, Kaunas, Lithuanian S.S.R.
VE8MC—c/o Arctic Project, US Weather Bureau, 24th and M Sts., Washn., D. C.
VK9TW—Via KV4AA.
VP4IG—5 Bay Ave., Point-a-Pierre, Trinidad.
VR4AA—Via KV4AA.
VS2CR—P. O. Box 109, Ipoh, Malaya.
VQ8AL—Miss Marie Therese Pitot, Reunion Road, Vacoas, Mauritius.
VS4FC—Chang Foo Chee, c/o P. and T. Dept., Kuching, Sarawak.
VS9AS—Via G3ANK.
W7 Bureau—W7ASG, J. P. Vogt, 3599 Karen Ave., Salem, Ore.
XE2BM—Roberto Blum, P. O. Box 59, Durango, Dgo., Mexico.
ex-YA1AA—R. L. Peck, 3428 South St., Lafayette, Ind.
YO3VA and YO3VI—P. O. Box 79, Ploesti, Roumania.
ZC4BV—Box 116, Famagusta, Cyprus.
ZD1FG—Art Torrie, Prince of Wales School, Freetown, Sierra Leone.
ZD2DCP—Don Piccirillo, Radio Officer, P and T, Ikeja, Lagos, Nigeria.
ZD3D—Alf Snow, Box 285, Bathurst, Gambia.

Thanks to the West Gulf Bulletin, North and South Calif. Bulletins, K2JTS, W1JOJ, F9RS, W6GMF, W1APA, DL4RI, W2ESO, W1HZ, W9BEM, K6EYT, W9HUZ and K4BAI.

Here and There

Every chance he gets W1OGU lets DX listen for his TRANSISTOR rig which is thrown over on the beam. Best reports, so far, are a 339 from OZ7BO and a 439 from TI2PZ. Power is 80 MILLIWATTS! . . . No doubt the near future will bring many transistor rigs on the air, suitable awards will be thought up, and another fascinating phase will be added to ham radio . . . 4S7MR seeks

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For the price of
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with the
"Super-Twin" for 15 and 10
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- 7.9db gain or better on both bands!
- F/B ratio, 20db or better!
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Yes! Two Full Beams!

The MOSLEY "Super-Twin" is two complete beams—3 elements on each band, 15 and 10. Designed as a unit, yet each beam functions alone for top performance on each of these favorite DX bands.

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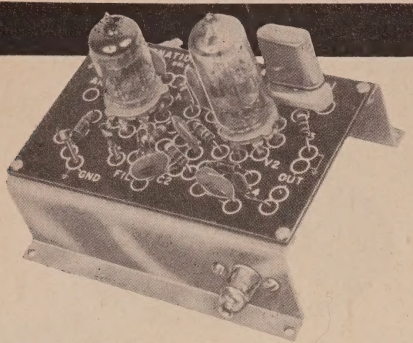
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- 47 LBS. ASSEMBLED WEIGHT

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Compact, Broad Band Crystal Controlled

● *No alignment necessary . . . Simple to assemble . . . with snap-on connectors for power leads!* Output IF frequency can be changed by merely changing the crystal (crystal range of 40 MC to 50 MC).

Specifications

Freq. Range	50-54 MC (51 MC design center)
Sensitivity	1 microvolt or better
Output IF*	(1) 600 KC to 1500 KC (2) 7 MC to 11 MC
Crystal Freq.	49.4 MC or 43 MC depending on IF desired (Oscillator range 40 MC to 50 MC).
Plate Power	150 volts to 250 volts DC @ 15 ma to 20 ma
Heater Power	6.3 volts @ 600 ma
Tubes	6AK5 RF Amplifier 6J6 Mixer Oscillator
Size	(overall) 4" x 3½" x 3½"
Weight	3 ounces

KIT (with crystal less tubes)..... **$10.95**

COMPLETE, wired and tested with tubes and crystal..... **$15.95**

*Specify IF when ordering

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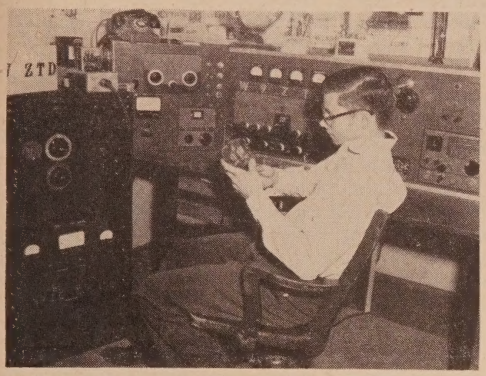
18 N. LEE PHONE FO 5-1165
OKLAHOMA CITY, OKLA.

Nebr. and No. Dak. for WAS . . . W8VDJ advises he is handling VK1BS cards for W8's. He also sold his HRO-60 to VP2DA, who will be back home next June, and also has VP2DA's log should any QSL's be missing . . . Ed, W3MSK, will be operating a W3MSK/VE4, at Fort Churchill, until December 1st . . . FE8AE seeks N and S Dak., Nebr., Utah, Wash, Nev. and Wyo. for WAS. He is on 14 CW 2000/2200 GMT . . . Alex, VE2AFC, is back home after a 12,000 mile tour of Europe, where he met hams in 18 countries, and wishes to express his thanks for the wonderful hospitality shown . . . The annual W1-DXCC get-together was due to have been held at the Harvard Club, Boston, on October 13th . . . KV4AA was happy to log visits from KP4AAN, KP4CN and W2AOX . . . W1LHE is now K2TAX in NY. . . . W4CXA and WØIIN visited SP3PL in August . . . Beverly, KP4YX is now K6TSO in San Jose (soon will go to Long Beach) . . . W6IAY now keys from KR6DJ . . . Ned, W1RAN, keys from DL4ZQ and also has his own call, DL4II . . . W8VOX moved from Cincy to Hastings-on-the-Hudson and now signs W8VOX/2 . . .

Last Minute Items

A summary of activity from SM8KV/LA/P shows that Olle made 1049 contacts from this rare spot, 277 being on phone. He came on the air at 1634 GMT on August 3rd and pulled the big switch at 2208 GMT August 16th. First 15 contacts were: W7PHO, DJ1BZ, SM5LK, W7BD, W7HQC, SM5ARP, SM5BTI, W6BYH, W7GUV, W6LW, G6BS, VQ4AQ, W6CUY, LA6VC and SM1BSA. First QSO and first W was W7PHO. First W in each W district were: W1BLF, W2HMJ, W3GAU, W4QCW, W5ADZ, W6BYH, W7PHO, W8BTI, W9RBI and W/NLY. Stations completing first WAC were: DJ1BZ, VQ4AQ, 4X4DK, ZL1KN, W7PHO and PY2CK. First CW to phone QSO was with VQ4AQ while first phone to phone was with SM5LL. All QSL's went out, via bureaus, by September 14th . . . W1HX worked VS4BO, 1514 GMT. Norm reports that John, VS4BO, operates on phone 21185/21195 kc and runs 120 watts to a homemade G4ZU antenna. QTH is: Amateur Radio Station VS4BO, P. O. Box 300, Kuching, Sarawak . . . Via F9RS, W6OWM and W2KJZ we are advised that FB8YY, Terre Adelie, Antarctica, is on 14080 kc daily from 0500 to 0700 and 2300 to 2400 GMT . . . FLASH! Via OK1MB and the West Gulf Bulletin we learn that UAØKTT will be active on 14 and 21 Mcs from TANNU TUVA (Zone 23) from December 1st to January 1st. QTH will be either Kyzyl or Turan! . . . Via W4NYN and HB9OP we hear that 3A2BH (Monaco) was due on the first two weeks in October . . . Dick, W4EMF/KS4, will be active from SWAN ISLAND until about the first of the year. He was QSO'ed on 14022 and works 14 Mc, phone and CW, mostly. He will QSL after the first of the year and cards go to him via the W4 bureau . . . F9RS advises that FO8AD will not accompany the NUI AURA Tahiti raft expedition. Instead it

will be FO8AP/MM who will be on CW only on the following frequencies: 7015-7030-14042-14103-21042. Times QRV, 0100, 0700, 1850 GMT. This venture MAY leave about October 15th . . . K2JTS now handles QSL's for EL2S. Send self-addressed, stamped envelope . . . (Via W2HQL) QTH of ZS9P is: Norman, Box 35, Francistown, Bechuanaland . . . We regret to report the passing of Buck, W4RBQ, on September 23rd. His signals



Here is the extremely neat set-up of Les Bannon, W9ZTD, Indianapolis, Ind.

will be missed . . . As we write, Danny, VK9TW, is set-up ashore at Port Moresby, Papua, and quite active. All efforts are being made to rush him a new mainsail, without which he cannot leave Papua. Weather conditions are such, in that area, that he must leave for Darwin (or CR1ØAB) on or before November 1st or be stuck in Port Moresby until (possibly) next March . . . Via G3AWZ and West Gulf Bulletin we hear that G3IDC is going on a tour through the middle east and far east with the R.A.F. and will run a 25 to 30 watt rig, CW only, on the following frequencies: 14050, 21050 and 28100. Here is his schedule of stops: Oct. 23rd 5A2, Oct. 24th VS9, Oct. 25-26th VQ4, Oct. 27 to 30th VS9 again, Nov. 1st to 3rd 4S7, Nov. 4th VS2, Nov. 5th to 8th VS6, Nov. 10th to 13th VS1, Nov. 15-16th AP2, Nov. 17th YI2AM, Nov. 18th to 21st ZC4, Nov. 22-23rd ZB1, Nov. 24-25th ZB2. Nov. 26th Home. The call G3IDC/ (proper prefix) will be used.

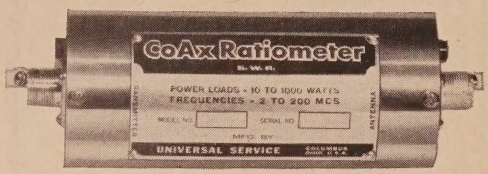
73, Dick, KV4AA

Big Prize [*from page 12*]

After the dinner I held up the drawing of the prizes for a few minutes with a short nervous speech advertising our new spectacular magnificent terrific fabulous (haven't you got one yet?) Mobile Handbook. When the crowd started to get unruly I snuck backstage to safety.

The prizes committee of the convention must have worked overtime for I sat and sat and sat while they drew numbers out of the box. I didn't pay much attention for I have been going to hamfests and conventions for years and

How to Eliminate Guesswork on Your Transmitter to Antenna Match



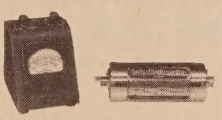
The CoAx Ratiometer

The CoAx Ratiometer is a new SWR indicator that shows you your standing wave ratio at all times. It can be permanently installed in the line to any coax-fed antenna or antenna tuner.

New design principle permits these advantages:

- **frequency range: 2 to 200 MC**
- **power range: 10 to 1000 watts**
- **no condensers to balance**
- **no resistors in line to dissipate power**
- **rugged • foolproof • compact**
- **full one year guarantee**
- **52 or 72 ohm**

Model KW4-M



includes CoAx unit, combination switch box and meter and universal mounting bracket

$45.00

Model KW4



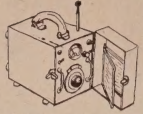
includes CoAx unit, switch box without meter (use 0-100μa) and universal mounting bracket

$27.50

See your local distributor. If he doesn't have the CoAx Ratiometer, send us his name and your check. We'll ship direct to you, postpaid.

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FREQUENCY METER BARGAIN!



BC-906 is also a wonderful **Grid Dip Meter** and **Relative Field Strength Meter!** Frequency 144-225 mc. covers VHF communications and upper TV channels. You tune a silver-plated cavity to resonance with a large National Velvet Vernier dia. A probe in the cavity feeds the diode plate of 1S5 and the rectified negative voltage applied to the grid of the same tube dips the plate current as shown on a 0-500 dc microammeter. The dial is individually calibrated with a curve showing 100 kc per dial division. The entire unit is in a compact carrying case only 12½ x 8¾ x 6½" with a leather handle. Schematic is pasted inside. Includes plug-in antenna. Specs inside for one ea. 1.5 V. and 45 V batteries. This precision laboratory device is like brand new and only..... **$7.95**

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Extremely easy to make power supplies for both. Both come with schematics and instructions for the simple modifications required. Both are super-sensitive, super-selective superhets.
2 METERS: R-28/ARC-5, 100-156 mc, in excellent condition with all 10 tubes. Best 2-meter revr built.
420 MC: CPR-46ACJ, double conversion, 2 IF's, 3 lighthouses, brand new with ALL 12 TUBES!
YOUR CHOICE EACH..... $9.95 BOTH FOR ONLY..... $17.95

THE BEST PORTABLE MOBILE 10 & 6

The best for back-pack and automobile. 28-80 MC, AM. Modifications necessary for amateur use are easy and explicitly shown in simple instruction sheet furnished with your order. This is the famous Marine Corps TBY. Original power supply not included, but power supply which you can use is spelled out in these instructions.
Transceiver Unit only, excellent, used condition, with tubes. Special..... **$14.95**

COMBO DEAL: The above transceiver and instruction sheet PLUS headset and microphone and **AN75 Antenna** all for only..... **$24.95**

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Both in one compact unit! Brand new with schematic. Also 5.25 and 30 mc. inputs. The only modification required is to replace **only one** power transformer with 60 cy. units we show you how to find in your hell box and how to connect.
ID-60/APA-10. A gem that cost govt. $1,000! Yours for only..... **$49.50**

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Big Prize [*from page 99*]

only once have I managed to break the jinx. (Out in Dayton where they have 2000 prizes for 2000 people I managed to get a dandy microphone.) By the time half of the people had gotten prizes I decided to go outside for some air and had just about set up my display stand to sell subscriptions when I heard my number being repeated for the last time. Goody! Maybe I would get a Callbook or something, I sure need one of those badly.

I stumbled up onto the stage and was presented with a box of numbered cards. Seems that you pick out your prize by lot after you get up there. I picked out a card, number 99 . . . no, I had it upside down . . . it was ⅄66. The prize committee turned ashen . . . that was the BIG PRIZE, a Hallicrafters SX-100. What a predicament! Much as I wanted the receiver and could have used it, I realized that most people figure that I can get anything I want for free and would be pretty disappointed to see it go my way. C'est la vie.

I reached into the ticket box and drew another fellow's number. I read it out slowly to torture them as long as possible . . . the winner of the SX-100 was W1EIQ. Oh well, my SX-28 will last me a while longer.



Editor presents SX-100 to W1EIQ.



QST Editor Dick Baldwin, W1IKE addresses Concord Convention.

Sarasota

While down in Sarasota recently I had the pleasure of visiting Ted Obrig, W4JIT, whom I had worked several times previously on SSB from my home in Brooklyn. Ted got his "Free Dinner for the Editor" out of the way (See Card in October *CQ* which you should have already sent in) and we had a lot of fun talking and trying to work K2CBO in Brooklyn. The K2 we called apparently never heard SSB before for he came back after each transmission and told us that our modulation was bad and he couldn't read us! Good grief!





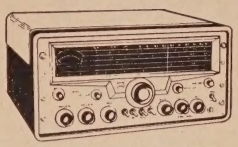
W4BU, Capt. Jim Nicholson happened to be back in Sarasota for a visit during my trip through Florida. We mulled over old times.

Dick Dead Eye

I always had the brains not to peek into a live waveguide to see if I could fry my eyeballs. From the lack of warnings in the field I guess that most other people have been similarly cautious. A note just received from Stamford University sounds this warning saying that you should watch your step with anything over the 1/10th-watt level. They also recommend your not looking down the open end of coaxial cables that might have microwaves lurking about.

for your best buys

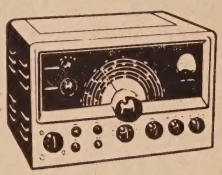
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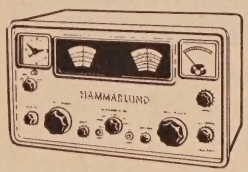
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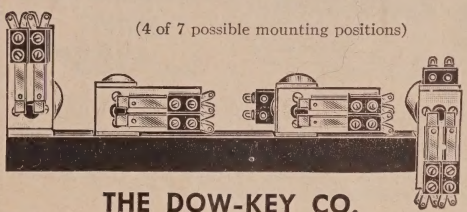
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(4 of 7 possible mounting positions)

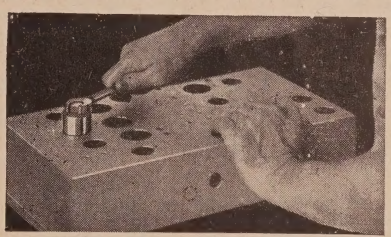


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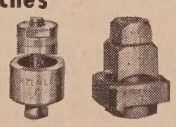
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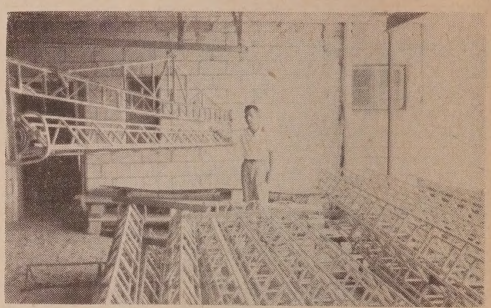
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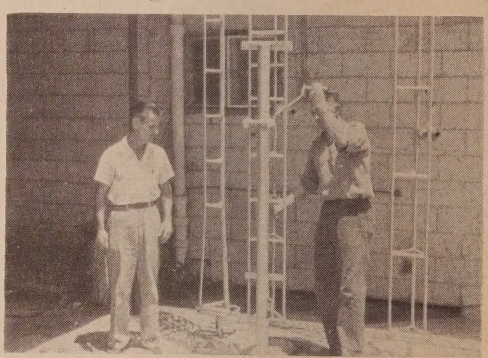
TOOLS FOR CRAFTSMEN
GREENLEE

Editorial [*from page 101*]

Some time ago by a strange coincidence two almost identical articles were submitted to *CQ* within a few days of each other. One showed a Product Detector built to plug in the HRO-60 and the other one for the NC-183-D. While I was looking from one to the other trying to decide which to print, *QST* broke with an article in May 1956 by W2CSY covering somewhat the theory of the unit and describing a much larger and more complicated unit than had been submitted to *CQ*. I decided then to hold our article for the feature in this issue.



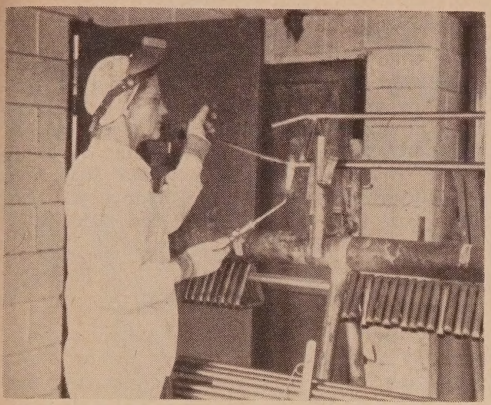
While down Florida way I stopped in for a visit at Tele-Vue Towers, Inc., in St. Petersburg. They rolled out the carpet and gave the plant tour.



The Tele-Vue towers crank up or down very easily.



A second crank tilts the whole business over for work on the beam.



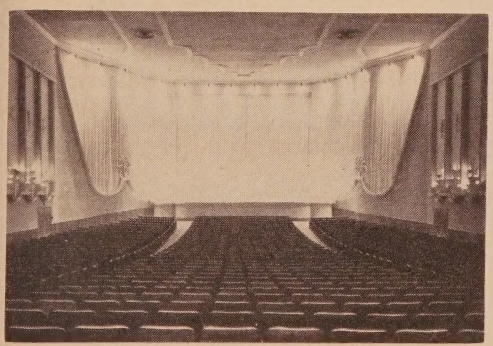
All the construction is done in their own plant. Here is one of their expert gal welders forming a top section.

Weddings, Bar Mitzvahs

One of the by-products of my traipses around the country has been an interesting (to me) set of Kodachromes. Many of the local groups hereabouts have already slept through my Virgin Island set of slides, but now I am armed with two more sets: Bermuda and Coney Island. Chairmen of activity committees of clubs here in the east take notice: Editor available, has projector, will travel (somewhat). Just drop me a line and let me know what dates you have open. It is understood that part of the deal is my ten minute commercial on **CQ,** like on TV. Fare enough?

Luminaries

The **CQ** office has not been well enough hidden to keep really interested hams from paying us a visit. Of particular note was the call made by Jayme, PY2CK, one of the top DX men in the world. Here is a small cut of the interior of one of his many theaters down Brazil way. Join me on my free pass?



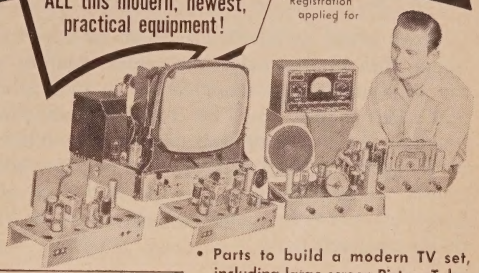
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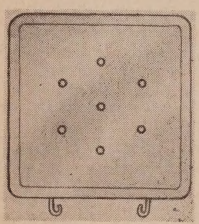


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CONTEST SPECIAL

[*from page 45*]

go off scale again and the R.F. choke smoked excessively. Once again Freddy came to the rescue by pointing out that the way to keep the R.F. out of the meter was to provide a low inductance path across the meter. A piece of .010" thick, half inch wide copper strip was soldered directly across the meter lugs. The meter now read 50 ma. with the final fully loaded.

Loading and Tuning

Power is removed from the final by a three turn, 5" diameter, ¼" copper tubing link. Proper loading is indicated by comparing the tube plate with the filament of a 600 watt light bulb. When the tube plate is slightly brighter than the 600 watt bulb and the plate current is at minimum, the proper loading has been obtained.

As can be seen in the photograph, the final tank coil is fixed tuned. Resonance is obtained by adjusting the turn spacing on the plate coil. Once adjusted for the center of the band, no further adjustment is required.

T.V.I. Proofing

The layout of the final is such that there are no spurious resonances in the plate circuit. The net result of this careful layout is complete freedom from any sort of T.V.I. The aluminum sheeting on the wall is to prevent excess heat from charring the wall of the garage.

Results

The reports which we have received during on-the-air checks are positively fantastic. (However, this magazine has to go through the U. S. Mail so we won't repeat them here.) ■

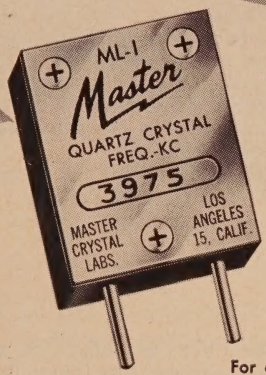
SURPLUS [*from page 50*]

test point *E31*. To measure this voltage, use a vacuum tube voltmeter and if everything is satisfactory, you should obtain a low negative voltage at this point.

The Power Supply

The power supply (*Fig. 7*) uses a Triad R-30X power transformer to provide 135 volts d-c at 50 ma. and 6.3 volts at 1.5 amps. It is a conventional half wave supply using a selenium rectifier. Do not forget to include the surge resistor (*R1*) or you will probably burn out the selenium rectifier. Also, check the B plus circuit with an ohmmeter to make sure that

YOU MAY AS WELL GET THE FINEST!..*AND SAVE!*



A crystal oscillator is the heart of your transmitter or converter, etc. Inadequate frequency control only tends to make radio operation difficult. (Novices are required to use crystal control only.) Today you can equip your rig with the finest in crystals . . . and at lower prices, too! Master Crystals offers you the largest selection of precision crystals, calibrated to the exact frequency you require.

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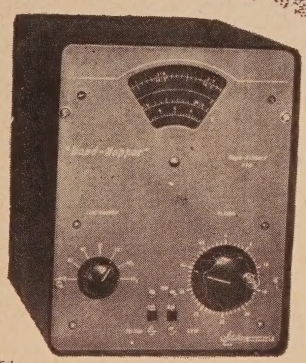
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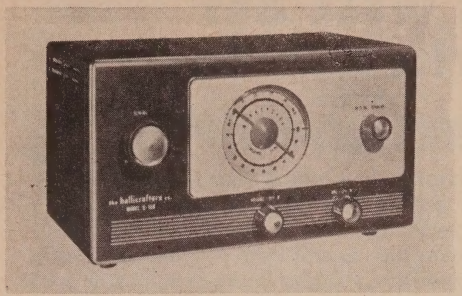
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there are no shorts and observe the correct polarity when connecting the rectifier and the filter capacitors. This can also ruin th erectifier (not to mention the filter capacitors). Not only is it expensive to replace a selenium rectifier because of carelessness, but if the XYL ever got a whiff of the hot selenium, it could be the end of your ham career (the odor is quite powerful to say the least). Chassis layout is not included because most hams will probably have a few of the components on hand. The circuit is in no way critical and reasonable component substitutions can be made. Also, any supply capable of producing the correct voltages and currents can be substituted for this one.

So now you are all set up for receiving 2 meters at low cost. If someone locates a supply of transmitters for the same price, let me know. ■

YL [*from page 71*]

they interspersed their sending with straight Morse code to confuse any eavesdroppers! They still each maintain separate stations and often operate in friendly competition during contests.

W1FTJ operates both c.w. and phone, likes DX, ragchewing, working YLs and contests. She holds many certificates—Al Op, 35 CPC, WPR25 and 50, WAS, WAC, WAS-YL, and public service awards. She has been twice president of YLRL, and also secretary, winner of the first YLRL A.P. cup, and the A.P. CW cup in '52 after top score for three straight years. With Carl in the wholesale radio business, with which Dot helps, her radio gear is varied, but she is active on most of the bands. Philately and dogs are her other hobbies, and Dot has won several "firsts" with her cocker spaniels in the dog shows. Sons Ira and Johnathan and daughter Martha occupy the rest of Dot's time.

Across the country in California 1931 also saw YLs Mary Necker on the air as W6GA, and Mae Amarantes as W6DHV. Mary was attending UCLA in 1929 where she met her future OM, W6VN. In order to enable Mary to hear his transmitter they built a two-stage regenerative receiver using 199 tubes and installed it in Mary's room at the Tri-Delt Sorority. Listening to c.w. and phone and phonograph recordings—the latter sent for the then legal "testing purposes"—Mary was quite the object of envy by her sorority sisters. Soon she learned theory and got her call, W6GA. Following graduation John taught in Puente and Mary taught in San Marino. Mary comments that in those depression days when long distance phone calls were out of the question they kept twice daily skeds, all on c.w. because phone equipment was too expensive. After John obtained his Navy wings in 1936 Mary became Mrs. Hoyt. They combined their equip-



CLIFF OSBORNE SAYS THE HALLICRAFTER SX-100 IS . . .

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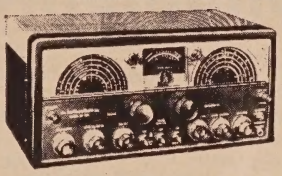
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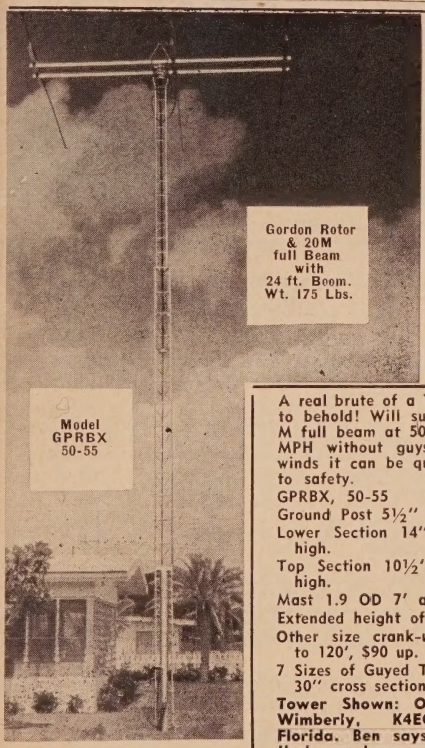


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ment and put a phone rig on 1900 kc. Since the war they have operated a BC610, NC100A and Q5'er on 75 with a 120-ft. doublet and on 10 with a 4-element beam.

Mae Amarantes, W6DHV, built her own first station which she put on the air in 1931. The rig was a TPTG oscillator using 210 tubes, a regenerative receiver, and a half-wave Zepp antenna. Mae says she joined the Royal Order of Wouff Hong in 1938, became a member of the Old-Timers Club in 1951 and is former secretary of the Santa Clara County Amateur Radio Assn., their first and only YL officer. She also was active in Ham politics as her OM, W6FBW, was formerly alternate director of the Pacific Division. The present rig at W6DHV is a 6V6 Pierce oscillator and an 807 final amplifier operating on 40 and 80 c.w. where Mae likes to ragchew and handle traffic.

W9ILH, Carrie Jones, of Alton, Ill. first went on the air in 1931. Carrie especially enjoyed c.w. and held 35 CPC, but later found 20 phone interesting too. She liked to work DX and had well over 100 countries postwar. She handled traffic, held Al op, RM and served two terms as SCM, and holds public service award for flood work. Her OM is W9ICN. Carrie has held commercial tickets and during World War II taught communications at Scott Field. At present she is not well and has been off the air for a couple of years. ■

[*To be continued.*]

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1. The names and addresses of the publisher, editor and business manager are: Publisher: Sanford R. Cowan, 6 Embassy Court, Great Neck, N.Y.; Editor: Wayne Green, 67 West 44th St., New York 36, N.Y.; Business Manager, Sanford R. Cowan, 6 Embassy Court, Great Neck, N.Y.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Cowan Publishing Corp., 67 West 44th Street, New York 36, N.Y.; Sanford R. Cowan, 6 Embassy Court, Great Neck, N.Y.

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(Signed) S. R. COWAN, Publisher

Sworn to and subscribed before me, this 18th day of September, 1956.

EMANUEL M. VIRSHUR, Notary Public

denser is of unknown origin. However the capacity is the most important thing, it measured 15 $\mu\mu f$ max. per section and 3 $\mu\mu f$ min. per section. A close substitute for the plate tuning condenser is a *National* TMH-35D. The antenna link is made from a 17″ length of ¼″ copper tubing bent into a U shape. This link is supported by a 5″ x ½″ x ½″ bakelite or plastic strip with 2 holes drilled 1½″ apart, so that the link is free to move back and fourth for adjustment of the loading. This whole unit is supported above the plate lines by two 5½″ x ⅜″ brass rods drilled and taped for 10-32 bolts at both ends.

The modulator is assembled in a straight forward manner. The 4 tubes in the regulated screen supply are grouped on one side of the chassis to form a compact assembly. The two meters *M1* and *M2* are mounted on the left of the front panel to allow room for the modulation transformer. The two PL6549's are mounted directly behind the modulation transformer on *Johnson* 122-275 sockets, sub-

[*Continued on page 120*]

40M [*from page 35*]

shaft before assembling the ring through the middle of the inductance. These are quarter-inch I.D. to fit the shaft, by half-inch O.D., and eighth-inch thick. The washers center the ring in the coil, and minimize any fore-and-aft play in the shaft. The gears are kept in adequate mesh by a single bearing-plate on the ring shaft close to the large gear. The motor (Selsyn) mounts with slotted holes to the board allowing adjustment of the mesh-spacing. If the shaft is true, there will be no trouble with the arrangement. A shaft coupling and some quarter-inch brass rod complete the drive shaft.

The Try-Out

Connect the coil with its ring to the antenna terminals. Set the ring at right angles to the coil turns and adjust the inductance to 3.5 mc using the GDO to check resonance. No feed or coax is connected yet. Turn the ring till resonance at 4 mc is indicated by GDO. The ring should now be close to parallel with the coil turns. If the resonant point with the ring in this position is too far out of the band, the ring diameter may be reduced. If resonance falls short of 4 mc, the ring must be made larger in diameter. Chances are if the L/D ratio of the coil is unity or less (4L x 5D for instance), the ring will more than tune the band.

Checking Feed-Point and SWR (RG-8/U or 52 ohm line)

Connect the coax outer-conductor to the groundplane terminal and the center conductor



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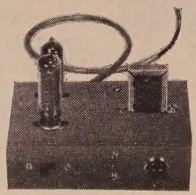
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via a good mica or air capacitor of about 1000 $\mu\mu$f, to a point near 2 turns up the coil from the "cold" end. If the capacitor is mica, use one with strap-type short leads rather than a small one with #20-wire leads, as the current may be something over 4 amps on high power. The voltage on the line is low however, so a receiving variable is within reason too, and has the advantage that the coupling reactance may be "tuned out" of the line completely. A combination of the two types might be your answer. Connect an SWR bridge (52-ohm type) such as the *Johnson #250-24* to the sending end. With drive from the GDO if powerful enough, or the exciter, set somewhere in the band, the SWR may be measured, and the tap on the loading coil adjusted to the point where the minimum standing wave ratio occurs. It is assumed that the Selsyn drive is in operation so that the antenna may be tuned to resonance (see diagram). If it is convenient to use RG-11/U, a different tap-point and capacitor will have to be determined by measurement.

Testing

A 60-watt lamp was connected to the end of the coax and adjusted to normal brilliancy by comparison with another bulb at 60-cycles power input. The coax was then connected to the loading coil (and antenna system) and the transmitter checked for equal power input or loading. An r-f thermocouple meter was connected between the cold end of the coil and the groundplane terminal for this check. The meter read about 10% lower than the correct answer for I-squared R which was somewhat encouraging considering all the assumptions and that the meter has some resistance of its own.

The left-over turn and a half was removed from the coil, as it was determined from the following that the surplus tubing was not doing any further good. To prove the point, academic or not, two coils were wound on ceramic forms of equal dimensions. One had 10 μh and the other, 14 μh. On the *Q*-meter, the 10 μh coil measured 300. The 14 μh coil was tapped-down (unshortened turns) to 10 μh and the Q was 230. Then the same coil was tapped-down with shorted turns to 10 μh and its Q measured only 175. The above would go to show that a trolley-inductor might be fairly poor for use in a circuit of this kind, though it does not mean that in the "final" plate circuit it is doing too much harm since the normal "loaded *Q*" is in the order of 15.

Results

After sending a long dash (AØ type emission is not permitted on 80), a quick trip to the attic showed the 0.001 μfd coupling capacitor to be unswollen and cool, and the coil still copper-colored and also cool. Full power was used during this test. Another important result is that the lights in the house do not come "on" during transmission, which means that the



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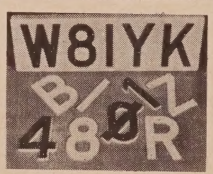
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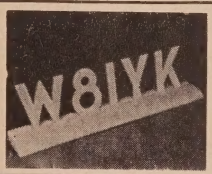
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power is mostly concentrated in the space between the vertical and the groundplane. The more positive result is that stations worked never suspect that they are copying signals coming from a "short" monopole. Best of all is, there's no need to leave the rig to QSY, or get back on 40. ■

SSB

[*from page 84*]

the following on 15: W9YSM, W6DMK, KH6AQ, CP5EK, WØNTA, W2SHC, W6DOB, HR2WC, ELØAm/m, WØCXX, F7EM, DL4YU, W1CIS, W9JBH, G6LX, G3GKF, W6JIE m/m, W5HHT, W2VZV, W4MXI, CX5AF and W6TTB. Seems to be plenty of activity on 15.

PAØIF will soon visit the States. He has just received his new 75A4 receiver. KT1LS, Les, has a new cubical quad on 20. We welcome the following new SSB stations: ZL1BL, VK4LR and HH5DR. VK9FA was heard by many of the SSB gang testing on 20. We hope this is not a phony as VK9 has been silent since Danny on the YASME moved on.

ZL3AR is on 144 SSB and is working the two meter gang in Australia. DXer Chat, ex W1ATE, is now on SSB with his new call W2ATE at Princeton, N. J. An old "die-hard" Mike, W2BDS, Pres. of Telrex, is expected on SSB soon. They will all be with us before long, and the day is rapidly approaching when the heterodyne will be a thing of the past. W2KG, Bill, is waiting for his Telrex "Big Bertha" antenna. Last month we received another flood of letters congratulating us on the column. Thanks, fellows, and we will try to present all the news.

73, Bob, K2DW

Kansas

"The Fourth Annual Dinner of the Johnson County Radio Amateur's Club of Kansas will be held at the Quivera Country Club starting at 6:30 PM on 10 November 1956. The Division Director will be the speaker of the evening, followed by the first showing of the movies of the Socorro Island DX-pedition, XE4A, together with a discussion by its participants. A dance will be held following the movie. Pre-registration cost is only $3.25 until 5 November, after that each ticket will cost $3.75. Reservations should be sent to James R. Gossett, WØGLN, 7507 Lowell, Overland Park, Kansas."

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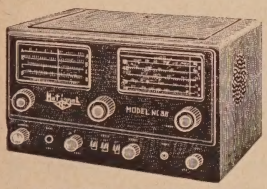


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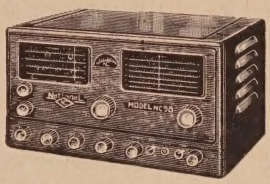
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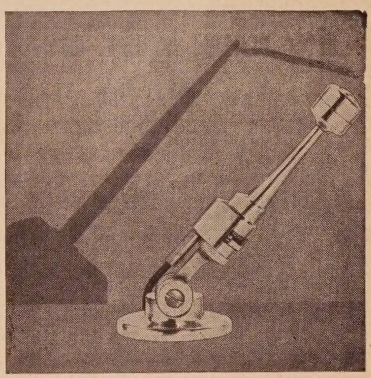
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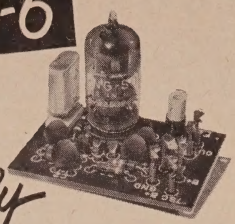
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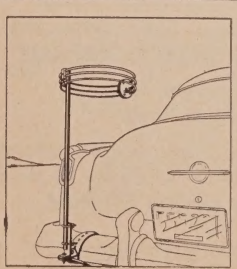
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RT COUPLER

[*from page 31*]

lator outputs as well as for variations in exciter drive requirements. The output of the coupler is coupled by means of a five turn link through coaxial cable to the exciter input.

The mechanical construction inside the R-T box is conventional in all respects. Normal attention was given to shortness of r-f leads, and ground connections were confined to a single bus so that ground current loops are eliminated. If these normal precautions are observed no trouble should be encountered in duplicating the author's results.

Adjustments

There are no adjustments required in the coupler after the initial alignment settings of the tuning slugs in the amplifier. Therefore, the box can be tucked away behind the receiver, or if the circuit layout is made compactly, the entire coupler can be placed right in the receiver. The initial alignment settings can be made by simply adjusting for maximum transmitter output although it is well to use a second receiver for the first adjustment to make sure that the output is following the receiver tuning.

Due to the cumulative tolerances in crystal frequencies and receiver i.f. alignment, the transmitter output may not initially fall exactly in the center of the receiver pass band. In the author's case, this disparity amounted to about three kilocycles and was readily corrected by repeaking the receiver i.f. amplifier slightly.

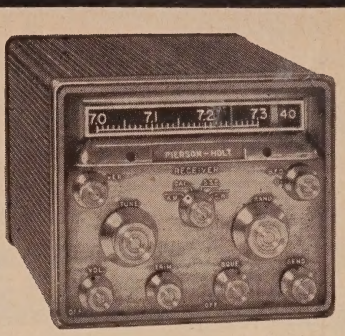
Conclusion

As was mentioned at the outset, this circuit design was chosen for simplicity of operation. No effort was expended toward elegancies of design such as the reduction of the number of components. However, the circuit worked from the first time it was turned on without any changes in wiring or design. This in itself provides some justification for claims of simplicity. The first model has displayed a maximum difference between received and transmitted frequencies of less than 400 cycles and the principal contribution to this slight warm-up variation is from the sideband slicer oscillator used in conjunction with the receiver. In general, the operation of the coupler has been excellent and it is quite a rewarding experience to tune across the band knowing that the transmitter is always "zeroed in" without ever touching a v-f-o dial!

It is hoped that this article will stimulate interest not only among individuals interested in the coupler for personal use, but also among manufacturers. The device should find considerable demand not only as a separate unit, but also as an integral part of the receiver design. ■

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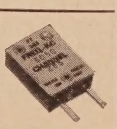
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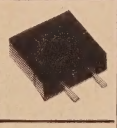
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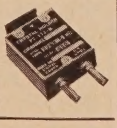
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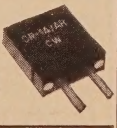
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CR-1A RANGE 5910 KC – 7930 KC

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370	393	415	487	509	533	400	462
372	394	416	488	511	534	440	463
374	395	418	490	512	536	441	464
375	396	419	491	513	537	442	465
376	397	420	492	514	538	444	466
377	398	422	493	515	540	445	469
379	401	424	494	516		446	470
380	402	425	495	518		447	472
381	403	426	496	519		448	473
383	404	427	497	520		450	474
384	405	431	498	522		451	475
385	406	433	501	523		452	476
386	407	435	502	525		453	477
387	408	436	503	526		455	479
388	409	481	504	527		457	480
390	411	483	506	529		458	
391	412	484	507	530		459	
392	414	485	508	531		461	

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6450		2065	2282	2532	3955
6497		2105	2300	2545	3995
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7480		2155	2390	3215	
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4190	5775	6373	7520	7800
4280	5780	6375	7525	7806
4340	5806	6400	7540	7825
4397	5840	6406	7550	7840
4490	5852	6425	7573	7841
4495	5873	6673	7575	**7850**
4840	5875	6675	7583	7873
4852	5880	6700	7600	7875
4930	5892	6706	7606	7900
4950	5906	6725	7625	7906
5030	5925	6750	7640	7925
5327	5940	6775	7641	7940
5360	5955	6800	7650	7950
5385	5973	6825	7660	7975
5397	6206	6850	7673	8250
5437	6225	6875	7675	8273
5485	6240	6900	7700	8300
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5675	6275	6975	7725	8320
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3735	6200	6640	8275	8625
3990	6450	6650	8280	8650
6025	6473	7000	8350	8690
6042	6475	7075	8375	8700
6073	6500	7125	8400	8733
6075	6506	7150	8425	
6100	6525	7306	8450	
6125	6550	7300	8475	
6140	6573	7425	8500	
6150	6575	7440	8525	
6173	6600	8173	8550	
6175	6606	8175	8575	
6185	6625	8225	8600	

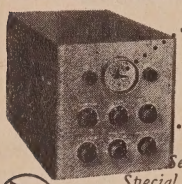
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Scratchi

[*from page 8*]

I are also telling him if he wanting me to reely fix things, I can doing it, but I are doing it my own way. He not for this idea at first, but he finally giving in.

Next day I going out to his house. On post where foto-electric meckanism are, I putting wooden arm. On this arm I putting SPST switch. Kind you working with key. Wiring switch to door mechanism. Now, when you driving up, you putting key in switch, turning switch, and door opening. Let's see a dog jimmy that sistem!!

The OM are reel mad when he se what I having done, on acct. he saying when it raining he getting his arm wet to turning switch. I finally pointing out that it not raining enuf in Feenix to making spot on blotter, so finally he saying I prolly rite, so he giving me his new mobile reseever.

Now, Hon. Ed., this are where the story gets reel sad. You would be thinking that after all my hard work, the brakes would be with me. But no. But no, indeedy. The mobile reseever I getting are new alright. No problums there. It so new, in fackly, that it designed to working on 12 volts. Don't misunderstanding me, Hon. Ed., I would love to having new car with 12 volt sistem. It just so happening I don't. So. . . .

Say!! Would you be intrusted in ackquiring one slitely used foto-electric door-opening sistem and one slitely used sooper-sonic ditto same, in trade for 12 to 6 volt converter? What say? Writing posthasty.

Respectively yours,
Hashafisti Scratchi

Pacemaker

[*from page 36*]

final after it without looking ridiculous. The 6146 in the output stage has 750 volts on the plate and on SSB and CW loads up to 120 MA.

VFO

The built in v.f.o. has all the stability you can use, even on ten meters. I wasn't particularly impressed by the ease of zero beating signals. There seems to be a slight tendency for the dial to spring back, making it necessary to over-travel a little in order to achieve zero beat. Fortunately the tuning rate is the same for all bands except ten meters, where it was necessary to increase the v.f.o. coverage somewhat to cover the extra bandwidth. Tuning range is 3 to 3.5 mc. on the lower bands, 3 to 4 on ten meters.

The Johnson people are aware of the v.f.o. tuning difficulties and have a cure for it. (I've got one coming but it isn't here yet so I can't comment on how it works.) Best thing I can

say for the v.f.o. is that after using it for a week I am already in the habit of asking the other guy to get back on frequency.

VOX and Anti Trip, SB1, and SB2, AMLO, AM Hi, etc.

These peculiar hieroglyphics mean something and probably a dyed in the wool SSB man would recognize them on sight. I found out that the VOX and anti trip are a real necessary addition to a ham station. The Pacemaker has them built in and they really work. Level control for the VOX (voice operated transmit) is independent of the modulation control allowing VOX even during high background noise conditions. The anti trip circuit is a new gadget at my place and I don't see how I got along without one. It allows you to run your speaker at normal volume without tripping the VOX relay. This is accomplished in a neat and straight-forward manner by feeding signal from the speaker terminals to the anti trip amplifier. The anti trip level control allows this signal to be adjusted to cancel out the audio signal which travels from the speaker, then the microphone to the VOX amplifier. Nothing critical about the adjustments. Just set them once and enjoy a real operating convenience.

SB1 and SB2 turn out to be upper and lower side bands respectively. AMLO allows A.M. operation with lower side band only. AM Hi is for use when driving a high power A.M. final. Audio is fed to a plug on the rear of the chassis in this position of the function switch.

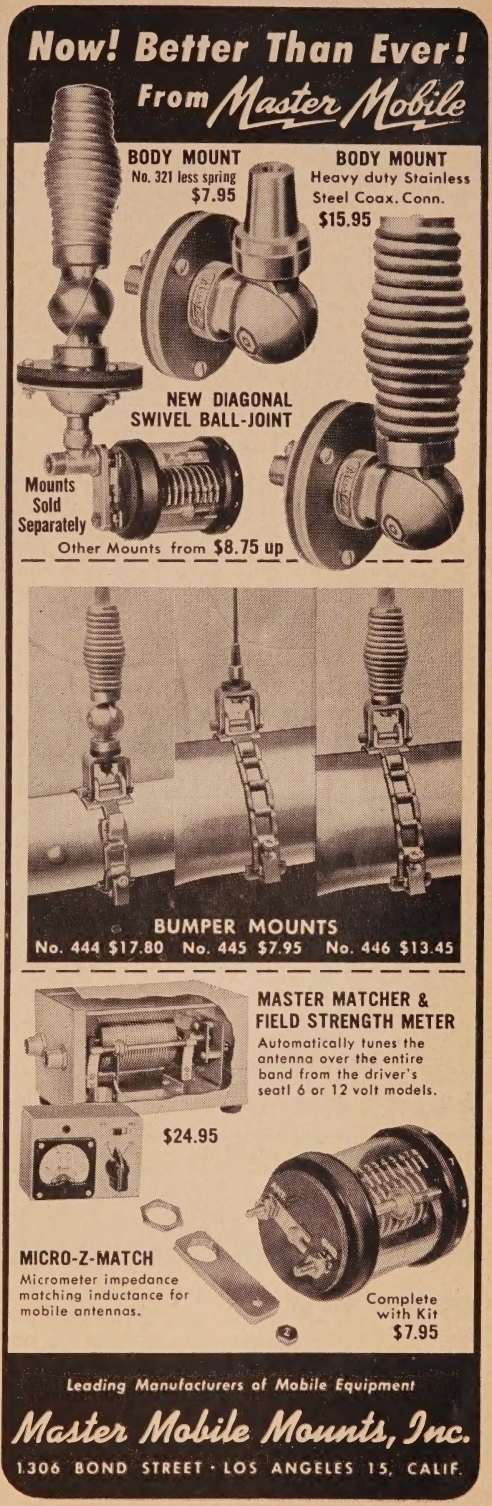
My honest opinion of the Pacemaker is as follows. It is the first honest to goodness *complete* SSB transmitter to hit the market. There are no hidden power supplies or missing finals. All the frequencies on all the bands are covered. All the conveniences needed for good, modern operating are included. Furthermore they were integrated with the transmitter design, not tacked on later. Your problem isn't whether you can afford to buy it, but whether you can afford not to. ■

Yasme

[*from page 42*]

their big crane, and shortly afterwards the Port Doctor and Chief of Customs were aboard. The formalities took very few minutes. I elected to stay aboard for the night as I realized it would cause them great inconvenience to bring me back later . . . the custom there is to take all their small craft out every day and put them ashore. After arriving 5 hours late, I didn't want to put them to any more bother.

I had a wonderful night's sleep and the following morning got ashore quite early in a Nauruan canoe. The first man I met was Harry Freeguard who immediately took me home for the typical British breakfast. After that my life became one mad rush around in his car to be



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MPT2	√	√		0.25/0.25	0.2-1.0	.004	2	0.7	250
MPT3	√	√		0.5/0.5/0.5	0.2-1.5	.002	3	1.0	250
MPT4	√	√		0.5/0.5	0.2-1.5	.002	2	1.0	250
MPT5	√	√		0.5/0.5/0.5	0.5-2.0	.002	3	1.0	500
MPT6	√	√		0.5/0.5	0.5-2.0	.002	2	1.0	500
MPT7	√	√	√	0.7/0.7/0.7	0.5-1.5	.002	3	1.5	200
MPT8	√	√	√	0.7/0.7	0.5-1.5	.002	2	1.5	200
MPT9	√	√	√	1.0/1.0/1.0	0.7-3.5	.002	3	2.0	200
MPT10	√	√	√	1.0/1.0	0.7-3.5	.002	2	2.0	200
MPT11	√	√	√	1.0/1.0/1.0	1.0-5.0	.002	3	2.0	500
MPT12	√	√	√	0.15/0.15/0.3/0.3	0.2-1.0	.004	4	0.7	700

AUDIO TRANSFORMERS

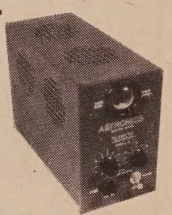
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Catalog No.	Application	Impedance Prim. Ohms	Ct.	Impedance Sec. Ohms	Ct.	DC Current Prim. P. Side MA	DC Current Max. Unbal. MA	Max. Level DBM
MGA1	Single or P.P. Plates to Single or P.P. Grids	10K	√	90K Split	√	10	10	+15
MGA2	Line to Voice Coil	600 Split		4, 8, 16		0	0	+33
MGA3	Line to Single or P.P. Grids	600 Split		135K	√	0	0	+15
MGA4	Line to Line	600 Split		600 Split		0	0	+15
MGA5	Single Plate to Line	7.6K 4.8T		600 Split		40	40	+33
MGA6	Single Plate to Voice Coil	7.6K 4.8T		4, 8, 16		40	40	+33
MGA7	Single or P.P. Plates to Line	15K	√	600 Split		10	10	+33
MGA8	P.P. Plates to Line	24K	√	600 Split		10	1	+30
MGA9	P.P. Plates to Line	60K	√	600 Split		10	1	+27

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ALLTRONICS Box 19, Boston 1, Mass. *Tel. Richmond 2-0048*

Next Month:

The inside story of the first

2 Meter WAS

introduced to everyone that happened to be available. Being Sunday, very little could be organized in the radio line, but I did manage to get the *Elmac* ashore and make around 210 QSOs. . . . ALL c.w. . . . my modulation was still out.

On Monday things moved really fast. The Island Manager immediately jumped into the breach from the shack angle and supplied me with a complete bungalow for myself. He then organized my antenna and within 24 hours I had one put up exactly as I wanted it . . . 40′ high and 250′ long. An earthing post 9′ long was smacked into the ground and a launch was made available to get all the gear ashore. All I had to do was to connect the gear, everything else was done for me. It seemed to me that whatever I required was carried out immediately, and everyone tried to do their very best to assist in some way or another.

Les Wright, an ex-ZL who is in charge of the radio station also gave me a hand with the defunct gear, and as I write this we have two of them in top condition. To endeavor to write everyone's name here and what they did would be an impossibility, but I feel all of you lads and lassies all over the world should know that there is such a place as Nauru Island . . . it's very tiny, but those who live here have really big hearts. I can never thank them enough for their hospitality and I know all of you who read this also appreciate what they have done too . . . it's for you as well as me that they have done all this.

Now, the time has come to close down again, and if I have the strength, to start bashing away on the key again, so . . . Hams, Hammesses, and hammlets, please forgive me if I say adieu . . . we shall meet again in VR4 land.

All the best, and cheerio. . . .

Danny, VK9TW

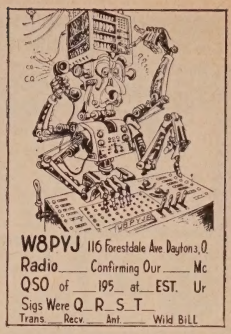
PROPAGATION

[*from page 67*]

with the best possibility for reception on the lower channels. In the European area, channel 1 is used by several countries, and lies roughly in the range of 40 to 50 mc depending on the technical standards used. The new high-power London transmitter on channel 1 has its video carrier frequency on 45 Mcs and its audio carrier on 41.5 mc. Since the MUF on the circuit between London and the East Coast, USA is forecast to rise above 42 Mcs between 9 AM and Noon on at least half the days of November, reception of the BBC transmissions should be possible on quite a regular basis providing of course one has a TV set capable of tuning to the British technical standards. The BBC transmits a 405 line system compared to our 525, their sound is A.M. compared to our F.M., and there are other differences in bandwidth, carrier separation, etc. Transmitters in France, East Berlin and the Saar also operate on channel 1 and reception



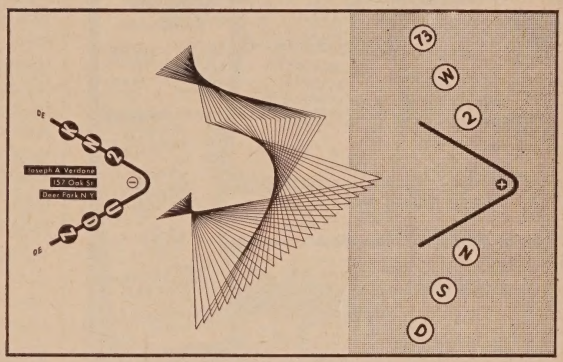




QSL Contest

Month after month our hardy QSL Contest staggers on with no letup in the large number of uninspired wall fillers submitted by hopefuls with an outsized imagination. It is depressing to see what a volume business is being done in standard hack QSL cards. I must hasten to admit that we did have a big batch of darned good cards this month though and had a hard time limiting ourselves to one winner and three runners up.

The winner, as you may have noticed, gets a two year subscription to *CQ*. The runners up don't. Slip one of your cards into an envelope and get 'em in for next month's contest.





This vinyl plastic 18″ globe now has a new mount which works either on a table or hanging from the wall. Why not ignore this page and go out and get one from your local world globe supplier for the low low price of $24.95? Why not indeed! The main reason is that while they last (and they will last a long time) you can get this DX aide from friendly *CQ* for only $19.95. Wow! In addition to the tears of gratitude which will stain your package you will be forced to accept a one year subscription to *CQ*, new or renewal. Pity. One more year subscription if we print a picture of your shack with the Globe. Send 'em in.



BC221'S WANTED

LARGE quantities needed! Highest prices paid if your unit has not been altered mechanically and bears nomenclature AK, AL or AN. For such instruments our offer is between $65 and $85. For 2-lettered models without original modulation, we can pay $65–$75. For all other models, $40–$55. Original calibration book must be supplied. For those instruments which have been altered with a.c. power supply, etc., write, giving details. For your convenience shipments may be sent Rail Express C.O.D., provided you specify on the brief "Company Check Accepted." Ship rail express to Clinton, Mass., advising us by separate letter:

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2, 6, 10 — Meter
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of these stations may also be possible if one has an appropriate receiver.

Long distance television broadcasts most likely to be received on American TV receivers are those from countries using the 525 line American standard and operating on channel 2 between 54 and 60 Mcs. These would include transmissions from Brazil, Mexico, Puerto Rico, Canada, Cuba, Alaska and Hawaii. The 6-meter openings shown by ** in the *CQ DX Propagation Charts* can be used as a guide in determining the best times to listen for TV DX from the above mentioned countries.

While the long-distance reception of television signals may provide the DX'er with several instances of enjoyment, in most cases Mr. Average Public will see it only as interference to his favorite local TV program, esecially if he lives in a fringe reception area. The interference will show up on his screen not much different than the TVI caused by the ham on the next street, and no doubt many amateurs will inadvertently be blamed for this type of interference. So while the outlook for long distance reception of TV signals is better than ever, in the long run this may be more of a nuisance than an oddity.

73, George, W3ASK

Real Power [*from page 109*]

mounted with small ¼" spacers to allow for greater convection cooling.

The parasitic suppressors shown in the photograph were used on the original tubes employed in the modulator. They are not needed with the 6549s but since they did no harm this neat plate lead construction was retained.

The high voltage lead is fed into the modulator by a *Miller* Hi-voltage safety type connector #37501,37001, and the output is fed to a feed through insulator right next to it.

The associated transformers and parts mounted under the chassis are grouped to suit the above chassis layout.

Adjustment and Operation

After a check of the wiring for possible errors, the various power supply connections may be made to the final amplifier, leaving the modulator temporarily unconnected.

Apply grid excitation to the amplifier, rotating *C2* for maximu mgrid current as indicated on *M1*. The plate and screen voltages should be off during these adjustments. Adjust the driving link for an optimum amount of grid current, 3 to 5 ma per tube, prior to the neutralizing step. On unneutralized tubes the grid current may be as high as 10 to 15 ma per tube; don't worry about it, when neutralized the grid current will fall at the right place.

Resonate the plate tuning condenser *C13* until a slight flicker in the grid current is

noticed, this will be the approximate point of resonance for the plate circuit. Preliminary neutralizing can be done using a small neon bulb coupled tightly to the plate lines near the plate caps or by use of a small flashlight bulb with a loop. Adjust the neutralizing APCs for minimum brilliance in the light bulb or neon bulb. After this is done it may be necessary to readjust the grid drive by pulling the link in or out of the grid coil. An indication of 6 to 10 ma total grid current is sufficient. The next step is the final touch up of the APCs with the aid of a grid-dip meter or rectifier type wave meter tuned to the transmitter frequency. Loosely couple the meter to the plate lines and adjust the neutralizing condensers *C5* and *C6* again for minimum feed through of r-f energy as indicated on the meter. The setting of the condensers is rather critical but the neutralizing will hold over the entire band and then some.

After the amplifier is neutralized the plate voltage can be applied. As a precaution, apply only about 700 volts d.c. to the plates and then 200 screen volts. If no variac is available, wire some light bulbs in series with the primaries of the plate and screen transformers, this will drop the voltage to a safe limit. After the amplifier plate tank has been tuned to resonance, plate voltage may be increased up to 2000 and the screen voltage to 400 volts.

The modulator is the next item to be checked out before being put into operation. Make a check of the wiring for possible errors before applying voltage. Here again if no variac is available the voltage should be reduced in case some difficulty might arise. After the final has been resonated at low voltage the modulator can be brought to the proper zero signal plate current by adjustment of the bias and screen supply. The bias voltage should be about—78 volts for a zero signal plate current of 40 ma with 400 v. on the screen and 1500 v. on the plates. Once the final and modulator have been set up, the speech amplifier can be attached and tried out. With full modulation the peak plate current should be 285 ma. A check of the modulated signal should be made on an oscilloscope. Hum and distortion, if present, should be removed by one of the prescribed methods in the amateur hand books.

This amplifier has operated at 700 watts input for short durations. This is about a 30 per cent over load of the plate. At maximum rated input, the plate dissipation is well below 75 watts. The color of the plates during operation is a reddish color.

I'm not advocating that the tubes should be operated at the high power input of 700 watts, the manufacturer's data sheet should be followed as close as possible to prolong the life of your investment. Before winding this up I'd like to point out that the PL6549's make nice finals or drivers for the lower frequencies, too. ■

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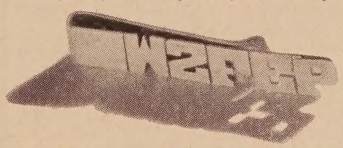
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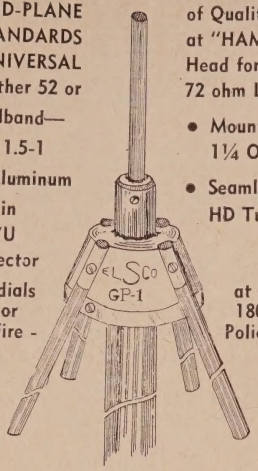
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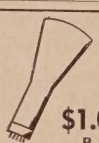
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FOR SALE: NC125. Brand new, 3 months old. $150.00. KN2TGS, 353 Tryon Ave., Englewood, N. J. Lo 8-4293.

FOR SALE: DX-35 modified for increased drive and improved keying by Heath engineers. $55; Also Hallicrafters S20R in excellent condition. $45. Perfect novice station. Glen W. Speck, 1243 Primrose Dr., Orange, California.

SELL: NC300 perfect condx used only few months with speaker $300.00; S-53A perfect condx also and used only few months $65.00. Rod Swanson, Box 4112, Santa Fe, N. M.

RECEIVER, Hallicrafters SX-71 with speaker. Used little and in excellent condition. $115.00. W6ECW, 15 Mesa Ave., San Francisco 16, California.

FOR SALE: KW1 in good condition. Highest offer over $2000.00 takes it. Free delivery within 200 mile radius of M. D. Ercolino, W2BDS, RD1, Asbury Park, N. J.

SELL: DX-100 $180; SX-99 $100; Both in excellent condition. Write: K2PHE, 31 Sherman Ave., Yonkers, New York.

FOR SALE: BC-610C and 614E with accessories for 80, 40, 20, and 10, including antenna coupler and TVI'd. $500 or will trade for Viking "Pacemaker" or used Globe King 500. Jim Gilbert, 4818 Bancroft, Lincoln 6, Nebr.

FOR SALE: Collins 32V3 transmitter. Perfect condition, in operation, and appearance. $575.00. FOB Chicago. Anthony Martinka, 3723 Magnolia Ave., Chicago 13, Illinois.

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FOR SALE: Large variety ham parts; tubes, capacitors, transformers, power supplies, what have you; also dynamotors, vibrators supplies, various mobile equipment; also TV repair parts, Sams books and test equipment; also 1950 Crosley station wagon needing motor work, trade and cash considered. Need TR4 type rotator. Come on over. Marc Felt, W2GYQ, 50 Prince Lane, Westbury, Long Island, ED 4-5135.

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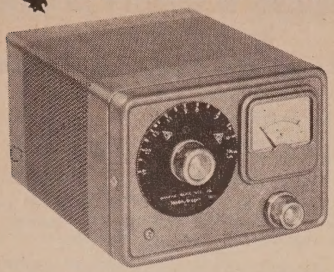
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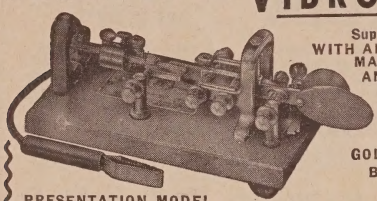
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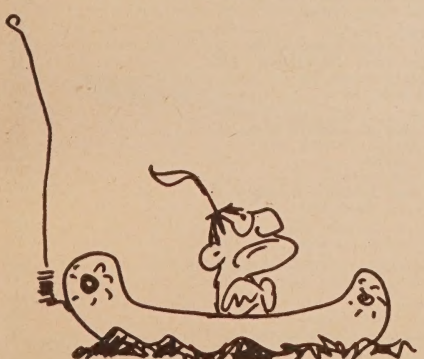
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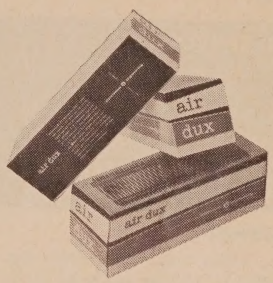
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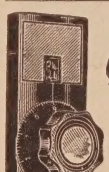
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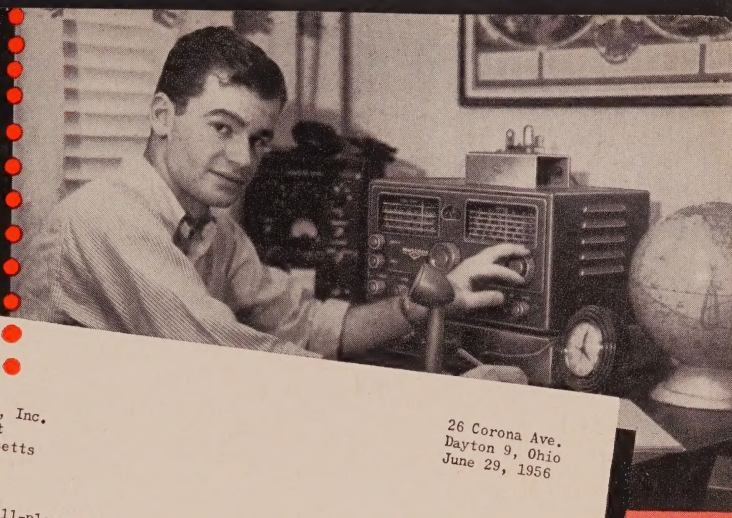
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BOB GRENELL *(W8RHR)*

has equipped his shack with, among other gear, a National NC-98. Here's what he thinks of it . . .



National Company, Inc.
61 Sherman Street
Malden, Massachusetts

26 Corona Ave.
Dayton 9, Ohio
June 29, 1956

Gentlemen:

I have been the well-pleased owner of a National NC-98 for nearly three years. During this period I have logged nearly 700 stations in 52 countries on the short-wave broadcast bands and many more amateur stations in 83 countries - a total of exactly 100 countries overall to this date. For the most part this was not accomplished by searching for DX; the majority of these loggings, which include rare ones such as Afghanistan, Luxembourg, Zanzibar, and Albania, were made while tuning across the band.

I have often used various VHF converters ahead of the NC-98, always with excellent results. For example, I recently logged 13 states within three days on six meters using a 6AK5 to 6J6 converter, while I was sitting around waiting for a new transmitter to arrive.

I have found the image rejection on ten to be amazingly good when the antenna trimmer is carefully peaked on the band, especially since the NC-98 is a single conversion receiver with 455 kilocycle if's.

I can heartily recommend the NC-98 as being the most receiver for the money available anywhere. Even now its performance delights and amazes me. It is ruggedly built and has one feature which sets it in a class far beyond other receivers in its price class - durability. Since I have owned my '98 it has required no realignment and there has been no perceptible deterioration of performance.

I purchased the NC-98 because of National's reputation - and I have found it to be a receiver which proves that reputation is well-founded.

Yours truly,

Robert L Grenell

Thank you, Mr. Grenell

National ®

61 SHERMAN ST., MALDEN 48, MASS.

tuned to tomorrow



NC-300



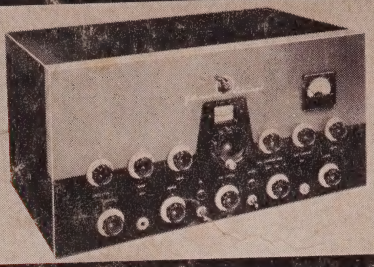
NC-98

National Company has immediate openings for junior and senior electronic engineers with experience in communications.

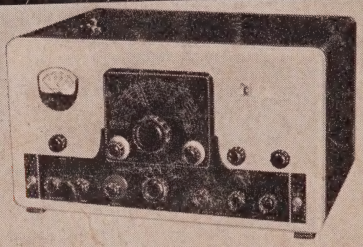
Contact Mr. John Bigelow, Director of Industrial Relations.

Leading Amateur Designs...

USE RCA TUBES



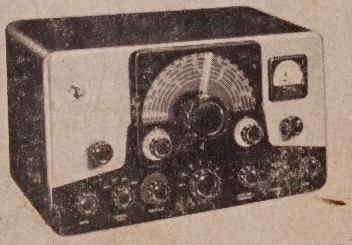
• Viking II uses t RCA-6146's in t final



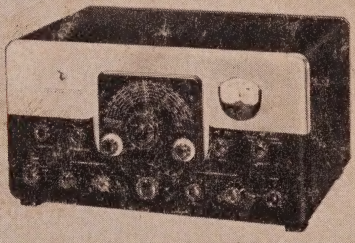
• Viking Valiant uses three RCA-6146's in parallel in final, two RCA-6146's in p-p cla s AB_2 modulator.



RCA-6146 Beam Power Tube. Up to 90 watts input CW; 67.5 watts on phone



• Viking Ranger uses one RCA-6146 in the final



• Viking Pacemaker uses one RCA-6146 in the final

With a range of power-input ratings from 75 up to 275 watts, these handsome Johnson transmitters are making communications history with their outstanding signals. Significantly, *RCA-6146 Beam Power Tubes deliver the "punch" in all four rigs.*

Here's why one of the world's largest manufacturers of amateur transmitters specifies RCA-6146's in new transmitter after transmitter. (1) RCA-6146 delivers the required power at relatively low plate voltage. (2) Because of its high power sensitivity, the RCA-6146 enables the circuit designer to use fewer stages and fewer tuning controls. (3) RCA-6146 is well-suited for compact designs and bandswitching circuits. (4) And this tube is built to stand the gaff of day-in, day-out operation.

For a signal with a wallop, choose a design using RCA-6146's. These beam power tubes are waiting for you today—at your RCA Tube Distributor. For technical data on the 6146, write RCA, Commercial Engineering, Section K15M, Harrison, N. J.



JUST OUT!

New 256-page RCA Transmitting Tube Manual TT-4 covers 108 power types and 13 rectifier types. Includes theory, data, installation, application, and useful circuits. See your RCA Tube Distributor. Or send $1.00 to RCA, Commercial Engineering, Harrison, N. J.

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Tube Division Harrison, N. J.