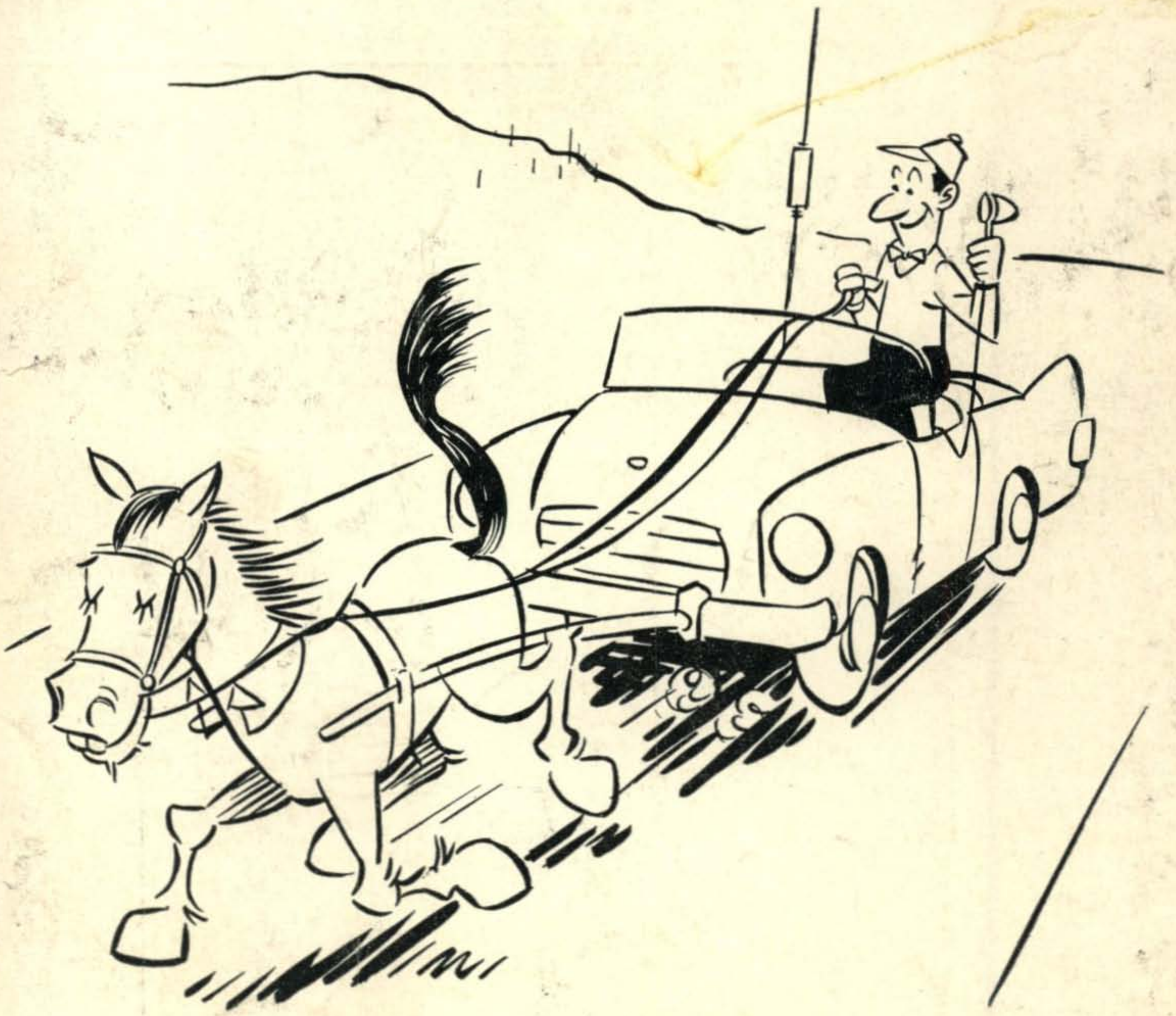
OCTOBER
1956
50c

CQ

RADIO AMATEURS' JOURNAL



the final cure for IGNITION INTERFERENCE

Why this rig is a soun
Financial Investment

The advanced design and careful craftsmanship in Collins S
equipment naturally result in a high, lasting value on the mark
After years of top performance, an important part of the purch
price will be returned to you as trade-in value. You'll be surpri
at the low cost per day.

A Collins SSB rig *is* a sound financial investment. You can n
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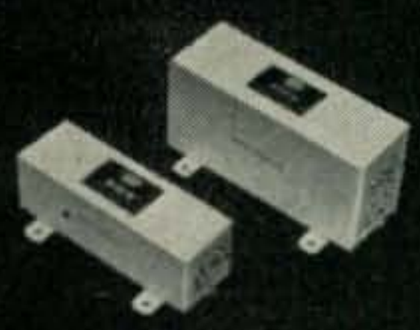
Collins CREATIVE LEADER IN COMMUNICATION

medium powered pi-network inductor



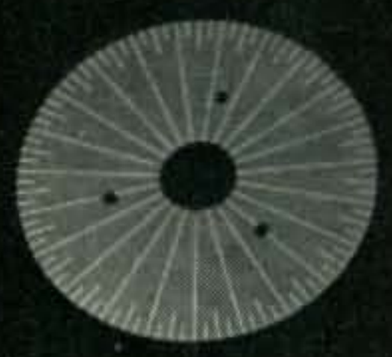
filament choke

r-f plate choke—transmitting type

insulated flexible universal shaft coupling

microphone adapter unit

tuning knobs



incremental dial plates

frequency marked dial plates

8 new quality products from B&W

MODEL 851 Medium Powered Bandswitched Pi-Network Inductor Assembly

An ultra-compact, highly efficient, integrally bandswitched pi-network inductor assembly for single or parallel tube operation 80 through 10 meters. Rated for 2000 VDC at 250 ma input SSB-CW . . . 1250 VDC at 200 ma input for AM. Minimum measured "Q" of 300.

NET PRICE $16.50

R-F Plate Choke—Transmitting Type

Ideal for parallel or series fed circuits. High quality grooved steatite form. Operates 80 through 10 meters. Rated for 2500 VDC at 500 ma.

NET PRICE ..... $ 3.75

Microphone Adapter Unit

Provides all necessary circuitry for switching a single microphone and push-to-talk features on transmitter-SSB generator combinations.

Use Model 51MCA with B&W 5100-5/51SB-B
Use Model 51MCA-B with B&W 5100/51SB
Use Model 51MCA-C with Collins 32V/B&W 51SB

NET PRICE $15.00

Tuning Knobs

Satin-etched, machined aluminum knobs dress up any piece of equipment . . . give it a professional appearance. Four sizes available, one plain, three skirted. Models 900-903.

NET PRICE 900 ..... $ 3.00
901 ..... $ 1.50
902 ..... $ 0.60
903 ..... $ 0.45

Frequency Marked Dial Plates

Ideal for use with B&W turret assemblies and other bandswitched assemblies. Measuring 2¼" in diameter, each is marked with five band positions.

Model 3818 is marked 3.5—7—14—21—28
Model 3819 is marked 160—80—40—20—10
Model 3829 (3½" diameter) is marked 3.5—7—14—21—28

NET PRICE 3818 ..... $ 0.36
3819 ..... $ 0.36
3829 ..... $ 1.65

Incremental Dial Plate

Just right for indexing any rotating knob. Highly attractive. Marked with white lines over soft grey finish. 3¼" diameter. Model 3828.

NET PRICE ..... $ 1.65

Filament Chokes For Grounded Grid Amplifier

Broadband characteristics 80 through 10 meters. Requiring no tuning. Used with standard type filament transformers. Model FC-15 is for use with one or two tubes drawing not more than 15 amps total filament current. Model FC-30 is for one or two tubes requiring not more than 30 amps total filament current.

NET PRICE FC-15 ..... $ 7.50
FC-30 ..... $ 9.90

Insulated Flexible Universal Shaft Coupling

Model 5300 permits a maximum of 30° angular as well as ⅛" axial misalignment of two opposing shafts. One shaft may be above ground potential. 15,000 volt silicone glass insulation.

NET PRICE ..... $ 8.60

Write for literature, or see these fine products on display at your distributor's

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

B&W

BARKER & WILLIAMSON, INC.
237 Fairfield Avenue, Upper Darby, Pa.

Vol. 12, No. 10 **CQ, The Radio Amateurs' Journal** October, 1956

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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.

★

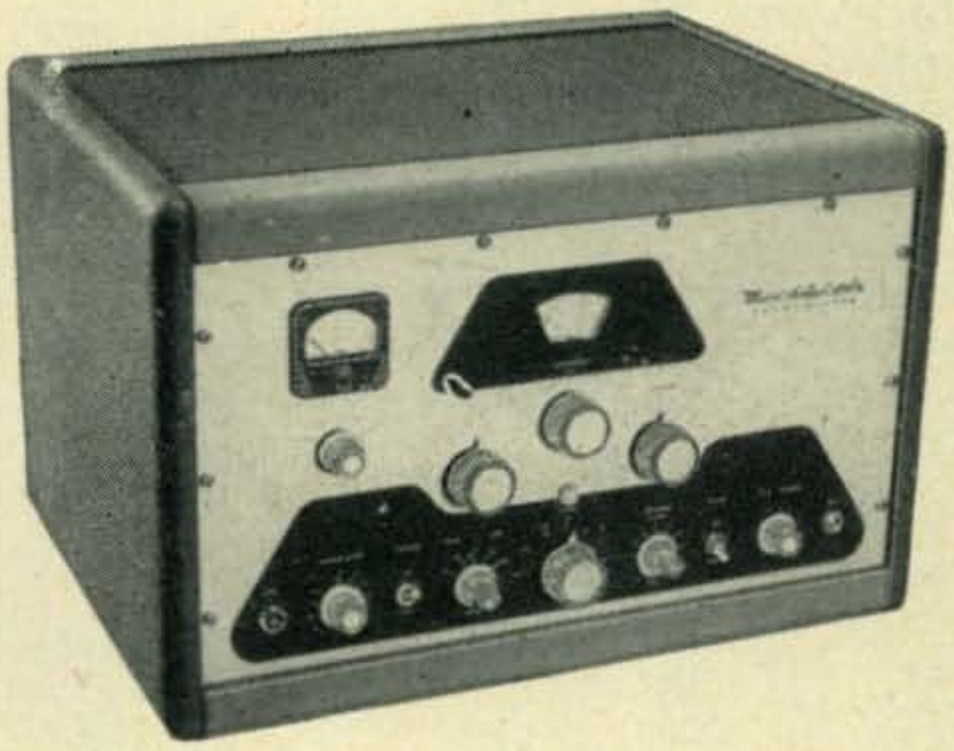
100 watts output on 160, 80, 40, 20, 15, 11, and 10 meters.

★

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.

HEATH COMPANY

A Subsidiary of Daystrom, Inc.

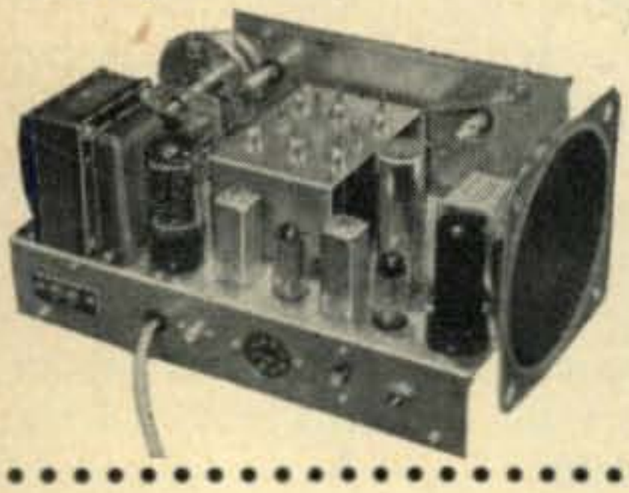
BENTON HARBOR 12, MICHIGAN

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 6¼" H. x 7¼" D. No. 91-15. Shpg. Wt. 5 Lbs. **$4.50.**

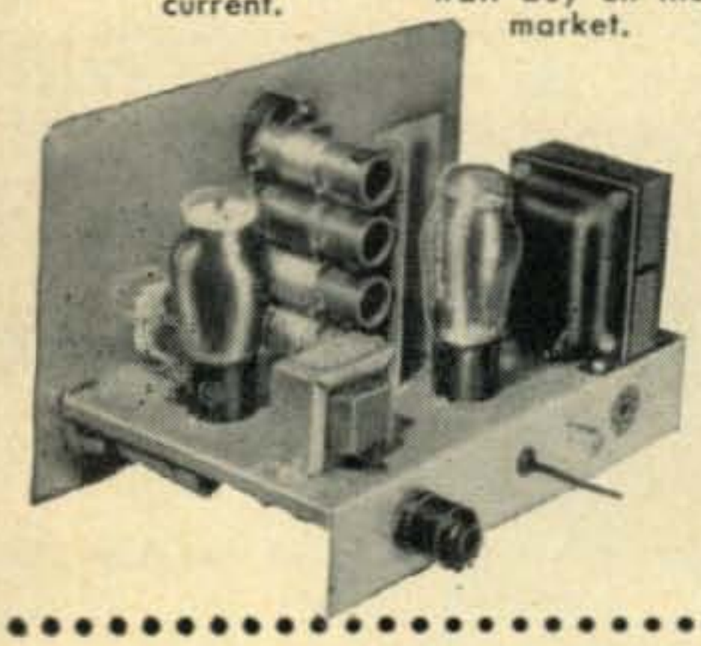
HEATHKIT CW amateur transmitter KIT

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.

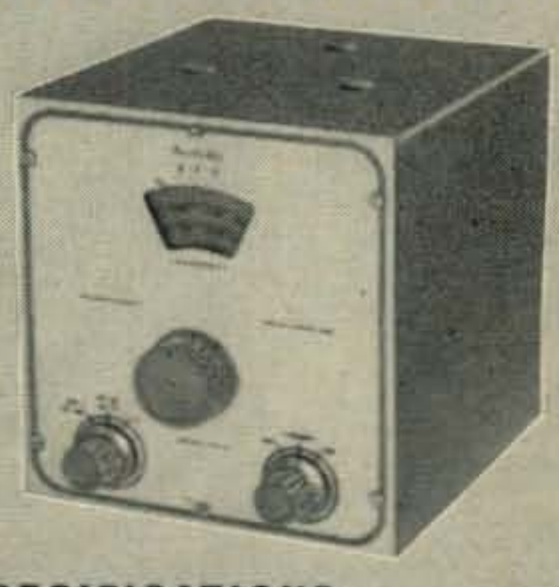
HEATHKIT vfo KIT

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 @ .45 A.

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:

Scratchi are doing it again. Yes indeedy, there are no needing for me to be modest about it; no needing for me to hiding lite under bushel; it are just plane fact, good old Scratchi, that lovable genyus amchoor of the Southwest, are hitting the idea jackpots again.

Most amazing is fact that Scratchi's idea are so simple, so obvious—can't figyouring howcomes nobuddys else are thinking of same. Of coursely, all reely grate ideas are simple, like taking the paper clip and the thum tack. It are also truely that simple ideas taking reely grate geenyus to thinking of them.

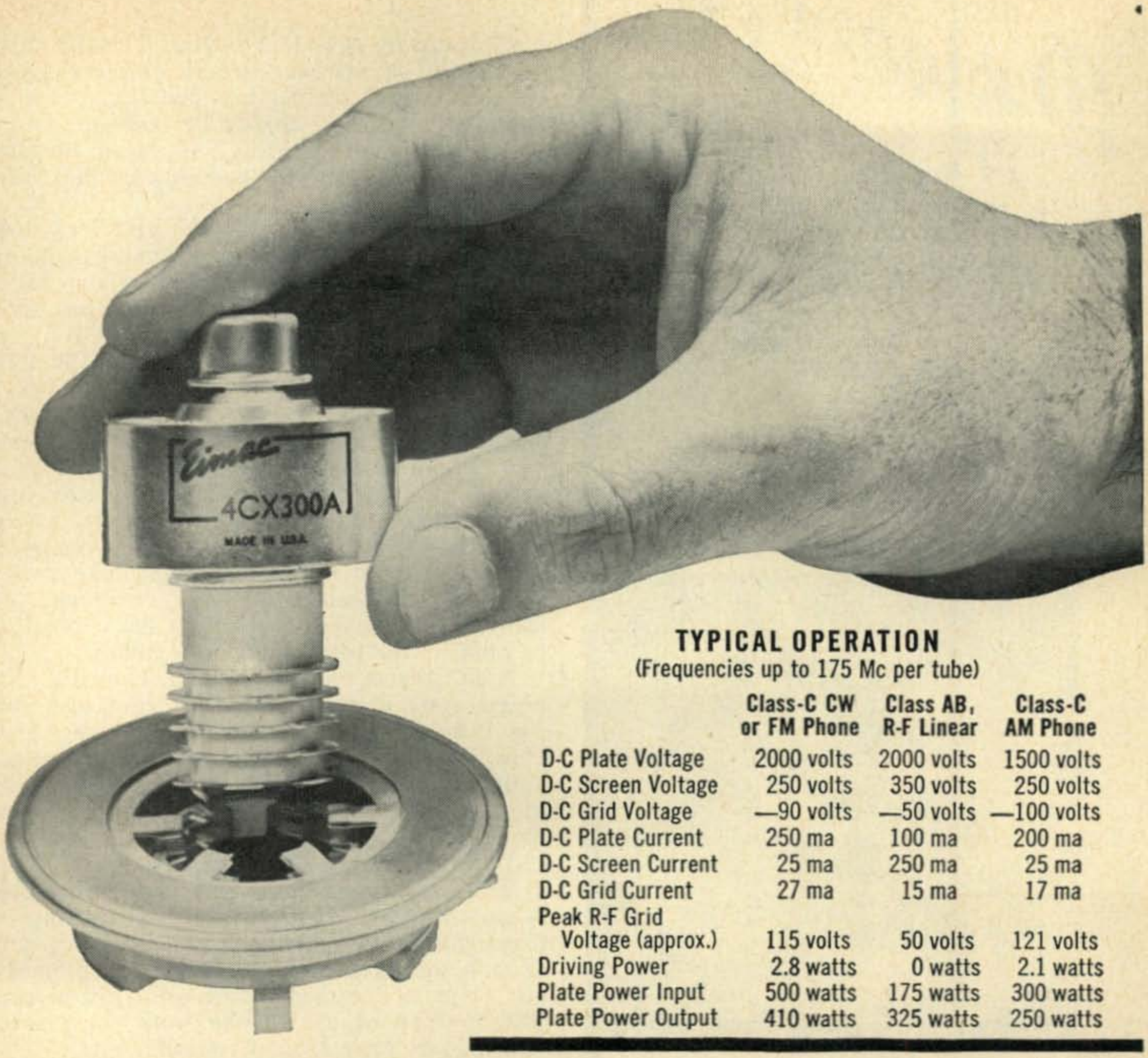
Howsumever, as I looking back on howcomes I getting this idea, I are reelizing that not only Scratchi geenyus are helping. No indeedy, Hon. Ed., there are sumthing deeper and finer also helping me to getting idea. Many peeples knowing that Scrachi are 1/c amchoor and grate feller, but not too many peeples knowing that at hart Scratchi are just a Boy Scout, trying to helping the other feller, devoting his life to easing the woes that befalling mankind.

So, Hon. Ed., that are howcomes Scratchi are coming to the aid of the Novice amchoor. My hart are going out to them when I thinking of there problems. Can you imagining having to working with maximum power of only seventy-five whats! In Scratchi's rig are losing that much power in resistance loss in hi-voltage power leads! Hon. Ed., in this day and age you can hardly talking across the street with that power.

So, I are thinking, what can we doing abouts this problem. How can we helping the Novice who are trying to get his messag thru all the Callyfornia and Arizona Kilowhats, to saying nothing of the DX Kilowhats (that are rig what are using Callyfornia Kilowhat for driver stage).

Yes indeedy, I thinking, if only can finding way to boosting Novice signal—and that are when Scratchi getting his grate idea. To understanding this reel simple idea, please excoosing if Scratchi lapsing into theery for moments.

You recalling, no doubtless, when single sideband first getting popular, everybuddys are



TYPICAL OPERATION

(Frequencies up to 175 Mc per tube)

	Class-C CW or FM Phone	Class AB, R-F Linear	Class-C AM Phone
D-C Plate Voltage	2000 volts	2000 volts	1500 volts
D-C Screen Voltage	250 volts	350 volts	250 volts
D-C Grid Voltage	—90 volts	—50 volts	—100 volts
D-C Plate Current	250 ma	100 ma	200 ma
D-C Screen Current	25 ma	250 ma	25 ma
D-C Grid Current	27 ma	15 ma	17 ma
Peak R-F Grid Voltage (approx.)	115 volts	50 volts	121 volts
Driving Power	2.8 watts	0 watts	2.1 watts
Plate Power Input	500 watts	175 watts	300 watts
Plate Power Output	410 watts	325 watts	250 watts

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

also discussing eggsalted carrier. This are thing you doing at reseever, where you are giving reseeved signal six dee-bee boost in pants by supplying adishonal carrier by reseever. Doing same thing when reseeving SSB signal, by turning on BFO to supplying carrier what SSB feller not transmitting.

You getting it, Hon. Ed? Not yet? Well, here it are again. With SSB reseever, you can taking any kind signal and by adding carrier inside reseever, you giving reseeved signal big boost and making it much more reedable. OK? That are known fact. Now, here are grate Scratchi idea.

Why not adding carrier from another stayshun!!! In other words, tooning over dial until you heering some Novice who having trubble getting thru. To helping him, just tooning your rig zero-beats on his freakwency, turning on rig, and Zambo! eggsalted carrier!! Of course, to playing safe, be surely that your mike switch are off. Also remembering, the more power you using, the more you eggsalting his carrier, so be surely you using your full gallon.

Aren't that a reely grate idea, Hon. Ed. No, please don't thanking me. It is enuf to knowing I helping all Novices everywhere. Also, Hon. Ed., you are having job to do. It are not enuf that Scratchi will be doing his alone. You must prevaling all your Hon. Rag readers to doing same.

Telling them all that whenever they seeing a fellow amchoor in distress, not being able to get thru the QRM, they should cranking up there power, zero-beating the distressed amchoor's signal, and throwing there rig on the air. Think of the many more solid 100 percent QSO's; think of the thanks from the Novice ranks. Start your Hon. Crewsade now!

Respectively yours,
Hashafisti Scratchi

17th YLRL Anniversary Party

YLRL Vice President W9YBC has announced that the 17th Anniversary Party will be held a month earlier than last year. Here are the dates: Phone—Nov. 7-8, 1956; CW—Nov. 14-15, 1956. All licensed YLs throughout the world are invited to participate; complete rules will appear in the November issue of CQ.

G0OF

50 MC Converter
July CQ: page 72

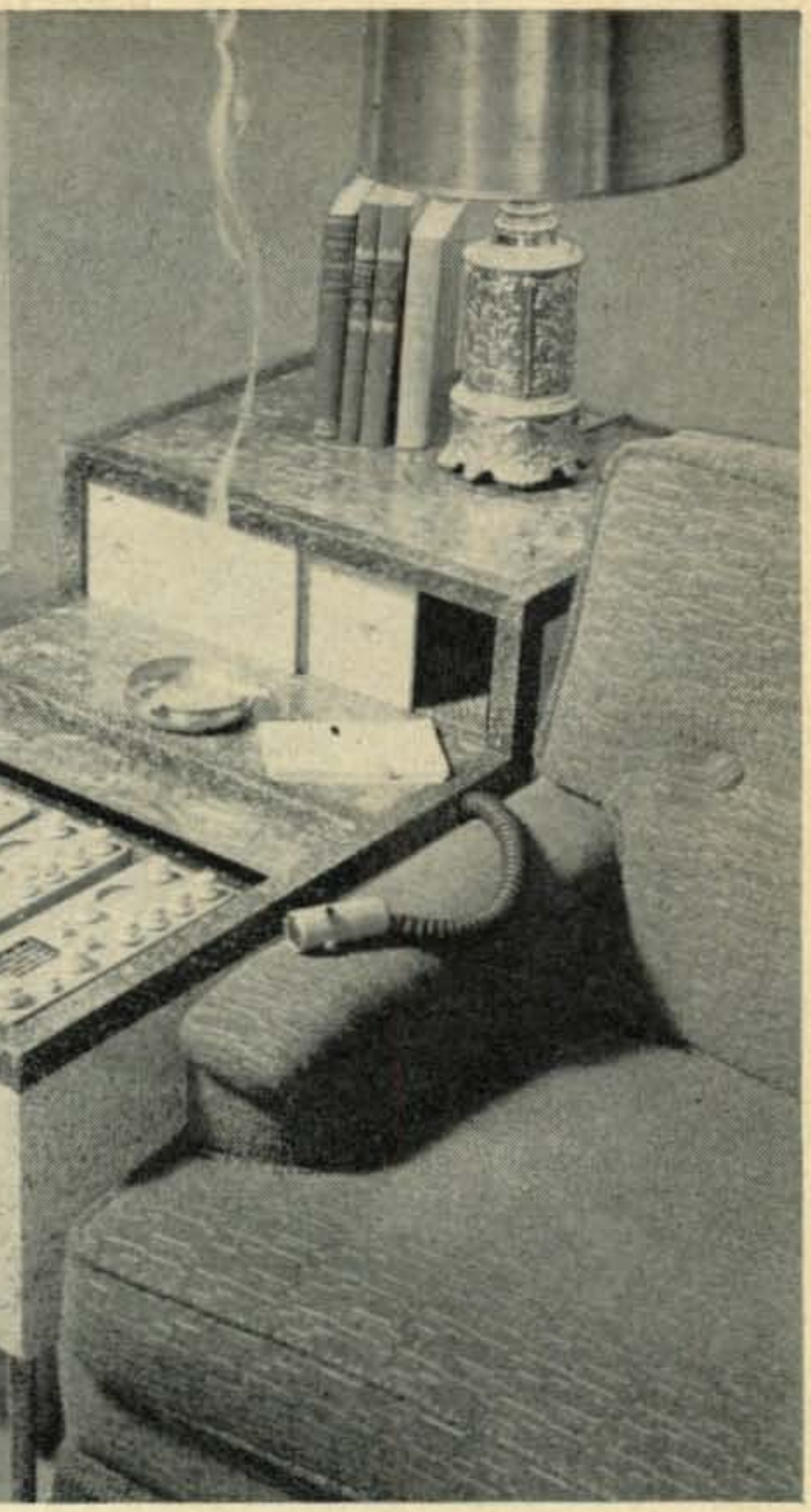
L_3 should be wound with #26 wire, not #16 wire as the coil table states.

L_7 and L_8 which are listed in the coil table as being 20 microhenries each should be 50 turns of #34 DSC on the specified form.

The L_8 link should be wound on L_8, not L_7 as the coil table states.

MORROW PRESENTS THE

ARMCHAIR HAM SHACK

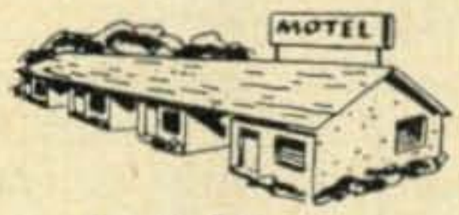


Featuring the
Morrow "TRIPLE-DUTY" MAH
In a New Concept

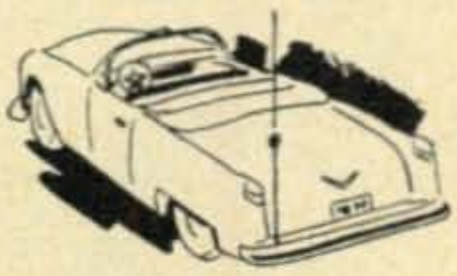
Just imagine the extra fun this outfit offers you . . . and the saving in equipment investment! The "Armchair Ham Shack" is an idea made possible by the new Morrow MAH . . . a complete outfit occupying less than a cubic foot of space . . . so compact it comes mounted in an end table, or you can mount it in your car, carry it anywhere. Transmitter is extremely stable, 90-watts CW, 60-watts phone, covers 80, 40, 20, 15 and 10 meters. Features simplified tune-up procedure and push-to-talk convenience. Receiver has exclusive Morrow "squelch circuit" to eliminate interstation noise, is sensitive to ½ microvolt, SSB, CW, AM reception on all bands. Matching AC Power Supply has built-in 8-inch speaker. All units beautifully finished in grey hammertone. The MAH "Armchair Ham Shack" includes MBR-5, MB-560A, RTS-600S, mike, cables, end table with fiberglassed mahogany top and blending zolotone finish. Amateur net $595.00

One compact outfit

for fixed station,



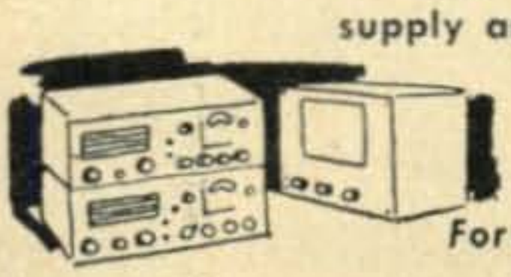
portable or



mobile operation

FREE DATA SHEETS — WRITE TODAY!

If bought separately, above units would total $644.90. Mobile power supply and antennas not included. Maple flakewood table top, $5 extra.



For easy terms — see your jobber.

MORROW
radio manufacturing co

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801 Dominion Bldg., Vancouver, B. C.
Prices and specifications subject to change without notice.

EDITORIAL
WAYNE GREEN

. . . de W2NSD

NEVER SAY DIE

One of our authors has done it. Stretch your memory a bit and you may recall a guest editorial or two by one K2ORS, name of Jean Sheppard. I have clutched in my hand his just released novel, "I, Libertine." Costs only 35¢ in the economy edition, Ballantine Books #165. There no doubt is a hard cover edition available for which you can pay much more. Strangely enough the book itself is excellent. But what I wanted to let you in on here is the story behind it.

Jean, as many of you know, is one of the most erudite disc jockies extant and has built up quite a following on his all night ravings over WOR. One day Jean wandered into a bookstore and asked for a book he wanted. The salesman looked it up in his catalog and said that no such book existed. If it wasn't listed it didn't exist! This shook Jean up a bit and he decided to get revenge on people who think along these lines. In a conspiratorial manner he lined up his audience and asked them to suggest the name for a completely imaginary book. Out of the thousands of suggestions he chose *I, Libertine*.

The next step was to get his audience to stop in at their bookstore and ask for this book. He picked the name Frederick R. Ewing as the author. After a few weeks of this the book world began to shake a bit and stores were frantically trying to find out about this *I, Libertine*. Caused quite a commotion. Mr. Ballantine decided enough was enough and gave Jean a call one day and suggested that this nonsense had gone far enough, sit down and write the damned book. Jean sat down with tongue firmly in cheek and turned out a darned good book. The photo and biography of Frederick R. Ewing on the back cover will collapse you. Even if you are too cheap to invest 35¢ in the future of K2ORS you should sneak a surreptitious look at the back cover.

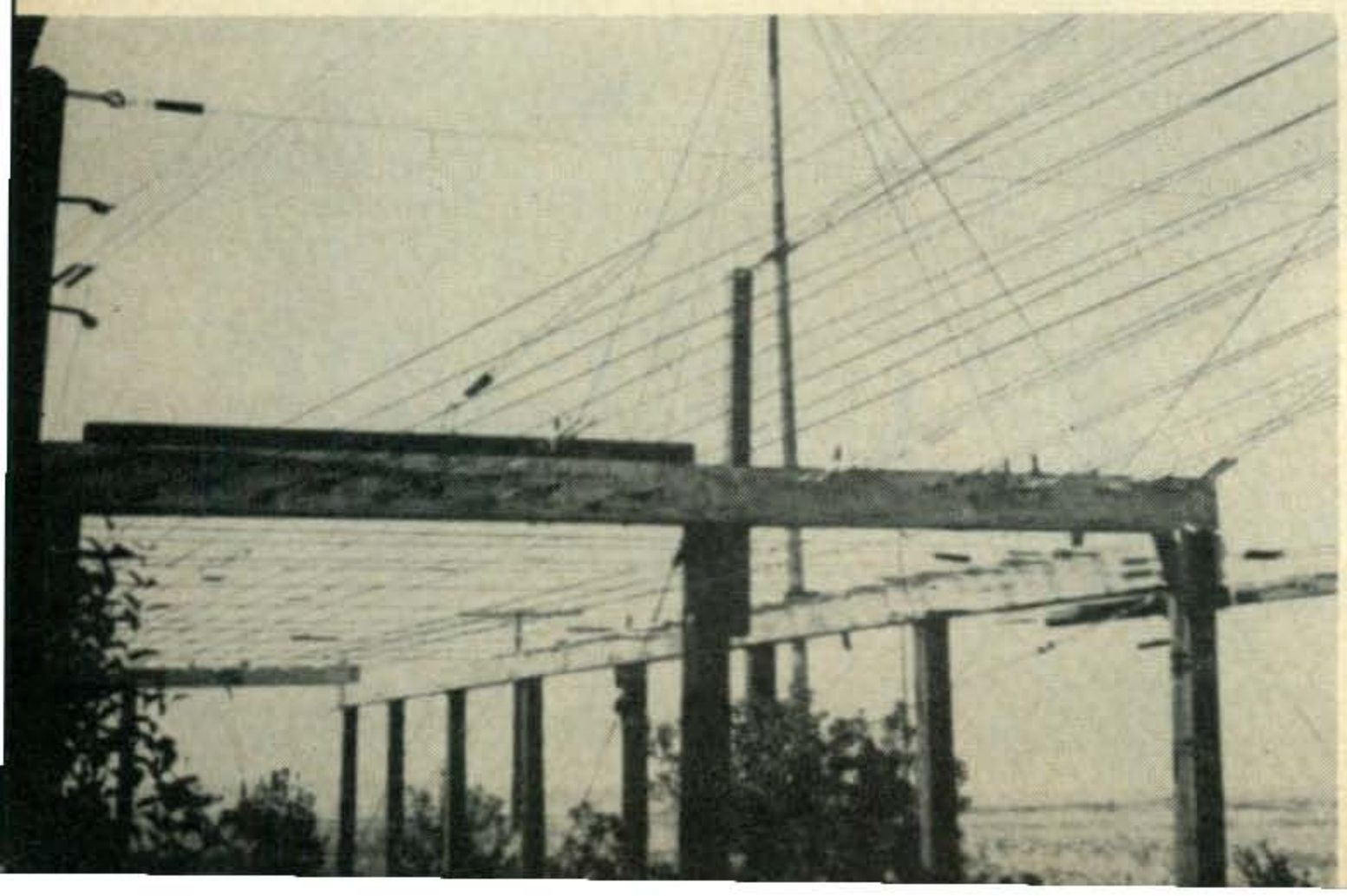
More More More

Turn about is fair play, they say. So, let me say a word of thanks to all of you reckless individuals who have been squandering your hard earned money on ham equipment recently. The result of this has been that our advertisers have been falling all over themselves (and our space salesmen) to buy more ads in *CQ*. This was fine up to a point, but as you'll notice in this issue they are beginning to gang up on the editorial department. The logical result is as you might expect: next month we again become the *New Bigger CQ*. It looks like we'll run 16 pages more.

The philosophy behind all this spending, as near as I can figure it out, is the logical argument that since conditions are so darned good these days, and getting even better, if we are ever in our life going to really enjoy ham radio we had better stop living in the future and get on the air now. Let's face it, this is our lifetime, right now . . . today. If your money is working for you that is one thing, but if it is just in a savings bank where the interest doesn't even keep up with inflation you might as well have the money sitting on your operating table in the form of a good receiver and transmitter. While visiting Key West recently I tried the strength and clarity of this logic on Bill, W4IIL to convince him to get in a B & W 51SB to hook into his Viking II. Even his wife bought the idea and he was hard at work the next day looking for the best bargain he could get on the 51SB.

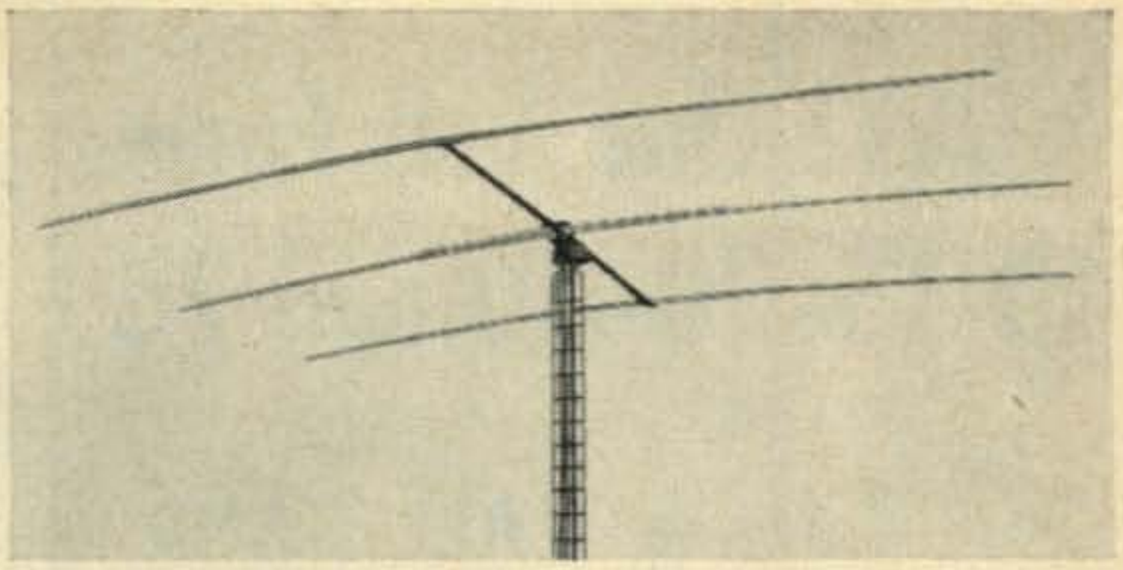
Gulp

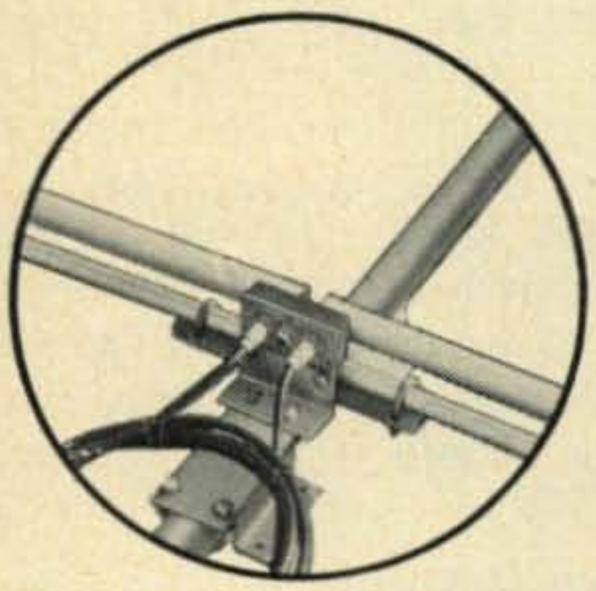
Somehow or other I missed out on hitting Mt. Greylock for our Summer VHF Contest. It came to a choice of going up there or head-



Transmission lines to the shack of W6AM.

PRE-TUNED BEAMS





FOR 20, 15 OR 10 METERS — HIGHER GAIN! LOWER SWR! RUGGED CONSTRUCTION!

Completely pre-tuned with balun matching sections, these new Semi-Wide Spaced Beams have shown in recent tests that they will outperform all other commercially available pre-tuned beams. No adjustments necessary . . . simply assemble, connect your coax feedline and you're ready to go!

- Greater than 9.0 db gain over dipole.
- Pattern is uni-directional, less than 55° beam width.
- Greater than 27 db front-to-back ratio.
- Covers entire 20 meter band with lower than 1.4 to 1 SWR.
- Extra rugged construction — beam clamps eliminate drilling and subsequent weakening of structural elements. Boom is galvanized steel — extra heavy element construction.
- No loading devices needed for flutter dampening or corona discharge.
- Mast arrangement permits stacking of up to three beams.

Complete with 3 element beam, boom, and balun.

Cat. No.		Amateur Net
138-420-3	20 meters	$139.50
138-415-3	15 meters	110.00
138-410-3	10 meters	79.50

THE VIKING MOBILE

60 WATTS MAXIMUM PA INPUT! BANDSWITCHING 75 THRU 10 METERS!

This power-packed Viking "Mobile" Transmitter is an outstanding performer on 75, 40, 20, 15 and 11-10 meters. Gang tuned exciter through final — series tuned link output circuits for each band ganged to a single front panel control! RF fixed bias supply saves up to 7 amperes car battery drain. PP807's modulating a single 807 provide terrific audio punch for cutting through QRM. Compact — only 6" high by 7" wide by 10" deep. Designed for under-dash mounting — all controls readily accessible. For 6 or 12 volt operation . . . requires power supply delivering 300 volts (30 watts PA input) to 600 volts (60 watts PA input) at 200 ma.

The Viking "Mobile" is available wired and tested or as a complete kit.

Cat. No. 240-141-1 Viking "Mobile" Transmitter Kit for 6 or 12 volts, less tubes, crystals, microphone and power supply . . . **$99.50** Amateur Net

Cat. No. 240-141-2 Viking "Mobile" Transmitter, wired and tested for 6 volt operation (240-141-12 for 12 volts), less tubes, crystals, microphone and power supply . . .
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ing for Florida for a few days' skin diving. I was met at the Sarasota airport by Bandel Linn, W4HXL, who does those wonderful cartoons for *CQ*. Since I used to live in Sarasota I had a wonderful time visiting all my old friends such as W4CCR and W4BU. I also paid a visit to SSB'er W4JIT, Ted Obrig, the inventor of contact lenses, and had a wonderful evening and dinner with him and his wife. As I understand it, Art Collins stopped by personally to install Ted's KWS-1. His Antenna is one of the W3DZZ three banders put out by Radio Specialties (see page 105) and is doing fine for him.

Dave, W4CCR, is the fellow who made the first U.S.-Cuba two meter contact. He runs one of those UHF Resonator 16 element beams and pokes a signal over most of Florida. Two meter activity down there is on the slow side and really could be worked into something good since the whole state is as flat as.

More Definite

New Hampshire has thrown discretion to the winds and asked me to say a handful of well chosen words at their hamfest in Concord September 30th. I'll be there. I have several days in which to think of something particularly inept to say, so I should be at least up to my usual form. When you shake hands with me have some money in your palm for your subscription.

Say

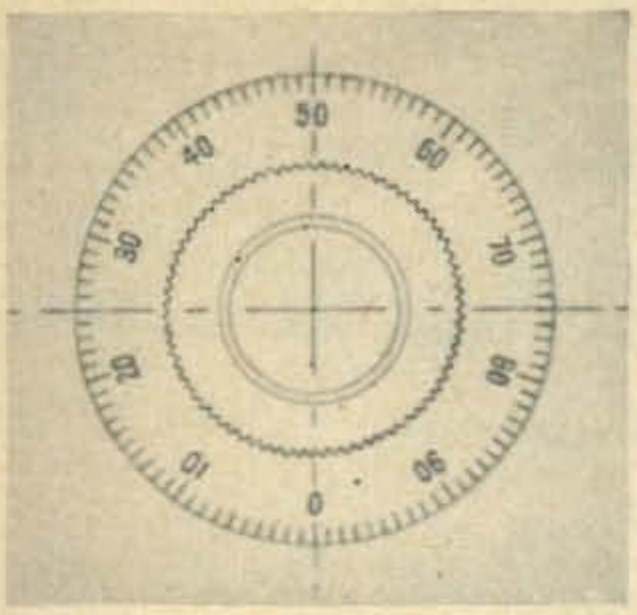
Are you *still* just thinking of writing that article? Off to the tripewriter with you . . . hup . . two . . three . . four.

Bill Orr

Has done it again. The New CQ Mobile Handbook is out . . . it is available. What're you waiting for, a second printing? This new

[*Continued on page 104*]

Jean Sheppard and I.



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Hallicrafters new SX-101 receiver employs heaviest chassis in industry . . . incorporates V.F.O. feature* . . . has 2000° disc logging counter.

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amateur net
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It's all amateur—and as rugged as they come! Hallicrafters presents the complete answer to ham reception, with every essential needed for today and for the future.

First—built like a battleship. Bigger. Heavier. Second—a marvel of stability—the result of 22 years of experience and development. Third—it brings you a long list of new features:

- **Complete coverage of 7 bands—160, 80, 40, 20, 15, 11-10 meters.**
- **Special 10 mc. pos. for WWV, plus coverage of major MARS frequencies.**
- ***Exclusive* Hallicrafters upper/lower side band selection.**
- **S-meter functions with A.V.C. off.**
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- ***Local oscillator output available for use in heterodyne V.F.O.**

PLUS: Band in use individually illuminated . . . built-in crystal calibrator . . . antenna trimmer . . . dual conversion . . . full gear drive from tuning knob to gang condensers . . . five steps of selectivity from 500-5000 cycles . . . sensitivity—less than 1 microvolt on all bands . . . direct coupled series noise limiter . . . 50 to 1 tuning knob ratio . . . and many more.

For full specifications see it at your Radio Parts Supplier today!

NEW

FROM

hallicrafters

CHICAGO 24, ILLINOIS

WHERE THE BEST IDEAS IN COMMUNICATIONS ARE BORN

EXPORT SALES: **Philips Export Co.**
100 East 42nd Street, New York 17, New York

Letters . . . to the editor

Code practice

Gentlemen:

This station, W6ODX, which has been sending scheduled code practice broadcast transmissions since September 21, 1955. has been requested to change the time of transmission of these broadcasts.

Heretofore, these code practice transmissions have been sent on 3552 kilocycles, slightly off the 3550 kc frequency of the International calling and traffic frequency, on Monday, Wednesday, Friday and Saturday evenings of each week, commencing at 1830 and ending at 1900.

The only reason for not sending skeds on Tuesday and Thursday evenings is because on those two evenings I'm teaching a class in amateur radio from 1830 to 2130 at Santa Monica City College. The code class is in session from 1830 to 2000, coffee break is from 20000 to 2030, and theory for the General class of radio amateur license is from 2030 to 2130.

The purpose of the Monday, Wednesday, Friday and Saturday code practice broadcasts is to give the students additional practice in their homes, the 18 through 22 W.P.M. speeds also helping licensed ex-students get set for their advanced license examination. However, several women graduates have told me they would like for the time to be changed to the 2000-2030 time because during the 1830-1900 period they are busy with household duties such as dinner, taking care of the kids, and what not, so for them the sked is changed to the 2000-2030 period, the days of the week and the 3552 kc frequency remaining unchanged.

Ron Reed, W6ODX

Cover info.

Dear OM:

In reference to the cover picture on August CQ, just received. Well! Say, can you tell me where I can get just such a rig? I refer mainly to the parabolic looking arrangement, that apparently, according to your caption, all typical hams have one. I want one too! I have only been a ham two weeks, but I sure want to be typical!

I think this would look splendid atop my house, since I already have a wind vane and anemometer, purchased some time ago, mounted atop the roof. I can read wind speed and direction right in front of my Xmitter.

Please to send me all the dope possible on this splendid antenna.

N. K. Thompson, WN1LWV

Soldering

Dear Wayne:

The article on soldering techniques by W6WYA in July CQ interested me very much and I would like to go on record as agreeing 100% with Mr. Smith. In my humble opinion the idea of wrapping solder joints is as antiquated as the spark coil. If a joint is soldered correctly, there is no need to wrap the pig tail. If there is a break, experience has proven that it will occur in the pig tail and not the solder joint.

We construct much of our own equipment and for several years have practiced the techniques described by W6WYA. We stress reliability and our solder joints have been completely satisfactory. Only yesterday, we had to replace a small audio transformer which had the leads wrapped about three times. In the process of unwrapping these leads, one broke. The lacing on the cable had to be cut so that enough slack could be obtained for the joint on the replacement transformer. I would like to urge manufacturers to investigate and revamp their ideas of making solder joints.

Bryson L. Lowman, W4TTH

New certificate

Dear Wayne:

Re the Certificate Seekers Directory, page 60, August 1956, the new and revised rules for the WTO (Worked Toledo Ohio) award are as follows:

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

The WTO award is available to any amateur who has contacted at least 15 amateurs in the greater Toledo area, including Holland, Perrysburg, Maumee, Sylvania, Curtice, Moline, Walbridge, Trilby, and Rossford. QSL's are *not* required, a list showing calls, names, dates, and frequencies is to be submitted. This list should be mailed to Don Priebe, W8MQQ, 1203 Mason St., Toledo 5, Ohio.

Don Priebe, W8MQQ
Custodian

Dear Sir:

Am enclosing picture of a class that took their novice examinations on April 16, 1956. All passed their code test and took their written examinations. They were having a party after 14 weeks of theory and practice. On the extreme left is Gordon Schumen, one of our teachers. Second from right with his call letters on coat lapel is Bob Austin, W9EVA, our other teacher. Both swell guys.

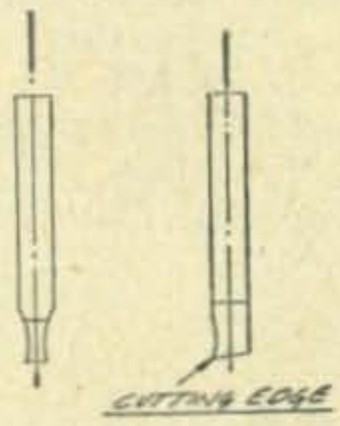
Me, Edward Slattery and my Son, Lawrence are not in the photo, as we took the pictures. We also took the test and are novices.

Edward Slattery
Chicago 32, Ill.

Plastic Cutting

Dear Sir:

When confronted with the problem of cutting holes in Lucite Panels, making dials or just plain cutting, I hit upon this idea.



Obtain a round piece of steel about the same diameter as the lead commonly used in Draftsman Compasses and pencils. Grind the end as shown in sketch. Insert in compass or lead holder and start cutting.

C. G. Smith, W8FDE

Surplus Conversion

Gentlemen:

I recently acquired a "Signal Corps Wireless Set. No. 19 MK II Transceiver." Are there available schematics or conversion data for this rig? Any info will be appreciated.

David. J. Wilke W3LSG
Pottstown, Pennsylvania

The only conversion we seem to have on the files here at CQ calls for 100 feet of 1" Manila line, one end of which is to be tied securely around the MK II Transceiver. This then converts the unit into a fine anchor for a small boat. If any readers have better conversions we will be glad to hear about them. —*Ed.*

Dear Editor,

Thanks for the article on the *Lil' Rig* in the August issue of CQ. How about a phone rig or modulator with the same rig. I remember an article on a phone rig using 117 tube and some others in the old Radio and Television Magazine Sept '41. This used Heising modulation.

Ken Emmons, W9FWD

[*Continued on page 100*]

SURE IT COSTS LESS . . .

BUT IT'S BETTER TOO!

only $169.00

the all-new HAMMARLUND HQ-100

It's at your Hammarlund dealers' now! The hottest communications receiver buy of all times. You've got to see the all-new HQ-100 to really appreciate what Hammarlund has done.

Only $169.00, but look what you get . . .

- ★ Q-Multiplier permits continuously variable selectivity to meet any QRM conditions.
- ★ Electrical bandspread tuning with direct dial calibration markings every 10 KCS on 80, 40, and 20 meter bands, every 20 KCS on 15 meter band, and every 50 KCS on 10 meter band.
- ★ Continuously tunable from 540 KCS to 30 MCS with sensitivity and selectivity surpassing anything in its class.
- ★ 10-tube superheterodyne circuit with noise limiter.
- ★ Individually shielded RF and oscillator coils.
- ★ Voltage regulated and temperature compensated high-frequency oscillator for stability.
- ★ Amazing new Hammarlund Auto-Response circuit adjusts audio response for **communications** or **high fidelity** reception. Eliminates speaker "hangover."
- ★ Brand-new ruggedized, futuristic front panel and cabinet design.
- ★ Optional Telechron automatic clock-timer for advance warm-up. Eliminates "waiting time." ($10.00 extra)

Send for complete technical description and specifications. ask for Bulletin

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Established 1910

So we made a **BOO-BOO!**

So we're sorry-

So-o-o-o-o-o!

GPR-90
COMMUNICATIONS
RECEIVER
Now $495.00
Including a BUILT-IN
calibrator . . . In Canada
$545.00

GSB-1
SINGLE
SIDEBAND
ADAPTER
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In Canada
$159.50

It takes too many parts and too much labor to make, and test and calibrate and sell the GPR-90 for $395.00. So you fellows that bought the GPR-90 for $395.00 got a bargain, but when the last of this run is over, the price will be $495.00.

We're not telling you that this is the new-improved GPR-90 because it isn't. It's the same receiver but with a BUILT-IN calibrator.

Incidentally, we think it's still a bargain. It outperforms many far more costly receivers but you know us boys, you're the judge and jury.

73

TMC

The TECHNICAL MATERIEL CORPORATION

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Surplus Conversions

Donald L. Stoner, W6TNS
Engineering Consultant
Box 137, Ontario, Calif.

SURPLUS

ASB-5 Radar Receiver to 420 mc

The APS-13 and the BC-645 made pretty good rigs for the 420 band. However, anyone who has ever used either of these units discovered their shortcomings right away. The modulated oscillator transmitter and the broad insensitive receiver left quite a bit to be desired when it came to working the real weak stations. Any transmitter, particularly the modulated oscillator, that is not crystal controlled is subject to frequency shifts as the modulated plate voltage changes (frequency modulation). The poor guy with a selective receiver has a tough time copying the carrier when it shifts back and forth through the receiver band pass, and beyond. The resultant frequency modulation makes the modulation difficult or sometimes impossible to copy. Fortunately, many fine tubes have appeared on the commercial market to make building a crystal controlled transmitter a snap. Higher frequency versions of the 829-B and the 832-A are capable of really pouring on the coal, even up on the 420 band. Not so, with receiving tubes. UHF converter manufacturers have found it to be too costly to include an r-f amplifier in their converters and for this reason, not too many good UHF r-f amplifier tubes have been developed. One of these converters, used at W6TNS for amateur television, consisted of a crystal diode mixer, a 6AF4 symmetrical triode for a local oscillator, and a 6BQ7 cascode i-f amplifier. The performance was real snappy when the converter was re-aligned to receive the 420 television signals, but as an A-3 converter into the communications receiver, it fell flat on its face. For serious work on the 420 band it is mandatory to have a receiver with an r-f amplifier, and that's where the ASB-5 comes in.

The ASB-5 uses a GL-446 "lighthouse tube" as an r-f amplifier. These "jugs" are currently available on the surplus market for about one dollar, making them very desirable for ham use. The 446 gets its "lighthouse" nickname from its disc type construction. This tube has two different cathode connections, one for d-c current and the other for the r-f path through a capacitor built into the base of the tube. *Pins 2* and *7*, of the 8 pin octal base are the filament connections and *pins 3, 5,* and *8* are the d-c cathode connections. Mounted over the base is a silver ring that connects to the r-f cathode, above that another ring for the grid and finally, a small silver plate cap. The connections are made smaller as the plate is approached, so that the tube will slide into a cavity plate end first. The cavities *Z101, Z102,* and *Z103* used in the ASB-5 are beautiful examples of UHF techniques, and they are silver plated and have all the capacitors and inductors made as integral parts of the cavities. Their resultant

Fig. 1—The ASB-5 receiver.

high "Q" is what accounts for the excellent performance of the receiver.

Looking at the front of the ASB-5, *fig. 2*, you will note that the r-f amplifier cavity *Z101* is on the left. This cavity is designed to use the 446 as a grounded cathode amplifier, with the antenna feeding the control grid. Directly above the antenna input is the r-f amplifier grid tuning adjustment and directly above that is the plate tuning screw. The output of the r-f amplifier cavity is coupled to another 446 in the mixer cavity, *Z102*, through a short piece of coaxial cable. This cavity is located in the center of the chassis and the little hole near the center of the panel in *fig. 2* is the mixer cavity tuning. Somewhat out of the ordinary is the fact that the mixer is a grounded grid type, with the energy from the r-f amplifier feeding the r-f cathode of the mixer tube. The mixer tube is also a GL-446 tube. Directly to the right of the mixer cavity is the oscillator compartment, that also uses a 446 tube. (No replacement problem here, just keep a spare

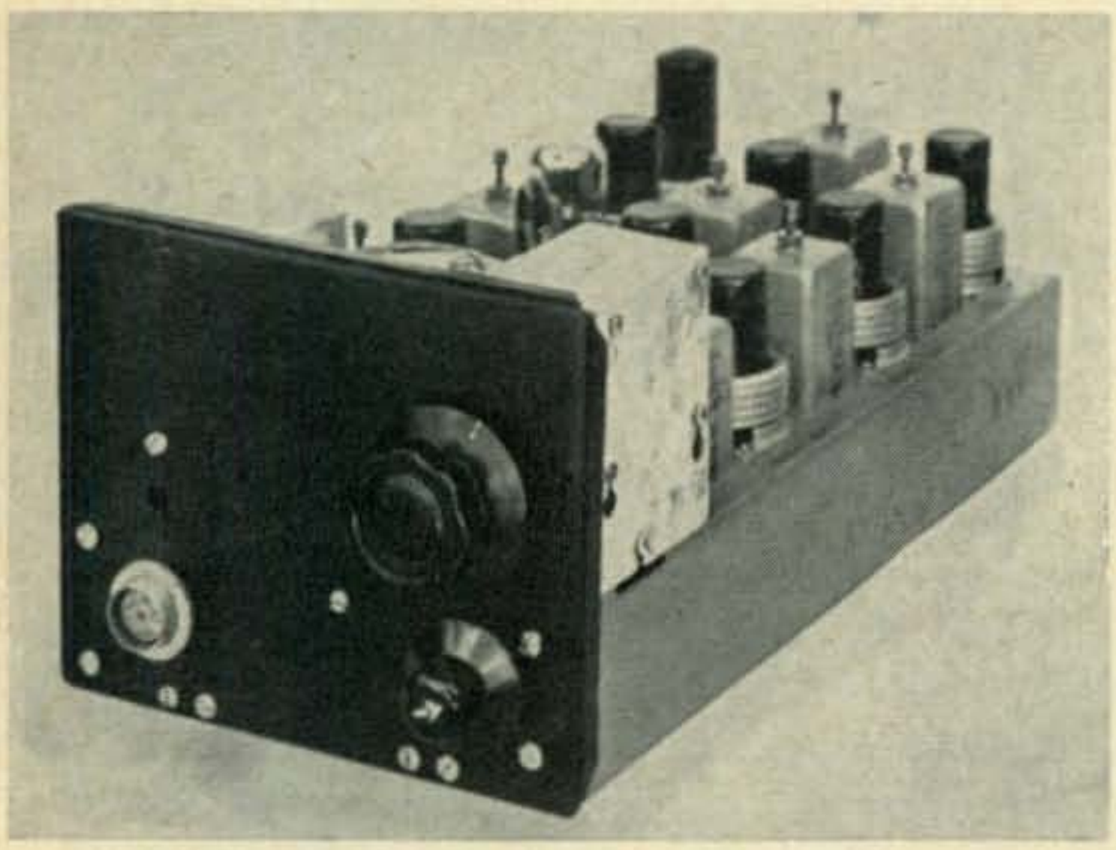


Fig. 2—The larger knob is the local oscillator tuning while the lower one controls the volume.

around.) The oscillator is an ultra-audion circuit with quarter wave lines for the tank circuit. The oscillator is not contained in a true cavity. Rather, the container acts to shield the circuit from external influences. It will oscillate on almost the same frequency even though the top and side plate is removed from the compartment.

The output of the mixer feeds a 2 stage 55 megacycle first i-f amplifier, *V102-1, V102-2*. Both tubes are type 6AC7's. To gain more selectivity, the 55 mc first i-f signal is converted again, this time to 16 megacycles in a 6AC7 mixer tube *V102-4*. Following the second mixer are three 16 megacycle i-f amplifier stages using some more 6AC7's, *V102-5, V102-6,* and *V102-7*. The detector, a 6H6, (*V103*) rectifies the negative half of the incoming i-f signal, and the demodulated output is coupled to a 2 stage video amplifier *V102-8* and *V104*, that is later converted to an audio amplifier. The ASB-5 contains a grand total of 13 tubes, not counting the rectifier added during the conversion.

Originally, the ASB-5 was the receiving end of a UHF radar unit (*fig. 1*). The tuning range was, I believe, in the vicinity of 509 to 556 megacycles. The r-f and mixer cavities can be retuned to the 420 band, but the oscillator will have to be re-adjusted internally. In addition, it will be necessary to construct a suitable power supply and to rewire the video amplifier. If you want to use a power supply that is already on hand, it should be capable of supplying 250 volts at 125 ma., for the B plus circuit and 6 volts at 4.5 amps., for the filaments. *Fig. 4* is the schematic of the power supply designed for use with the ASB-5.

Converting the ASB-5 Receiver

The following conversion instructions are based on the premise that you will want to do the deluxe conversion. This includes installing a tuning capacitor in the oscillator circuit. As it stands now, the receiver is tuned with a crank that is mounted at right angles to the front panel and it is very unhandy because there are no provisions for frequency calibration. However, it does require a little more time to install the capacitor and get the gear system working properly. To use the original system remove the external tuning mechanism and remove the old front panel, then replace the box and knob after the new panel has been installed.

First of all, let's get rid of that mourning black front panel and replace it with a "clean shaven" one. Remove the box marked *TUNING CONTROL*, that covers the dial gears. Remove the 4 screws, under this box, that fasten the front panel to the oscillator compartment. Remove all screws that fasten the front panel to the chassis, including the ones holding the connectors. The *SENS. SW., VIDEO IN, REC. OUT, and POWER SUPPLY* connector are removed. Clip the wires to the *SENS. SW.* connector. Clip the shielded wire at the *REC. OUT* connector, but not too short because it will be used later and it is pretty miserable to try to unbraid the shield once solder has flowed on it. Next, unscrew the *REC. OUT* connector nut ring and remove same. Unscrew the *REC. INPUT* nut ring. Disconnect the wire from the *VIDEO IN* connector (not too short, it is used later also) and remove the connector. At the power connector, remove the wires from *pin D* and *pin C*, solder them together and tape the end. In this particular receiver the wires on *pin C* were white, with red tracers and the wire on *pin D* was white, with a yellow tracer. (This color code may not be the same in all receivers, so be sure to check the pin letters.) Also, remove

the two wires from *pin E* of the power supply connector *J104*, solder them together and tape securely. Remove this connector and the front panel should come off. Now that you can get to the wires that were connected to the *SENS. SW.*, follow them back to their source, clip them, and remove them from the circuit.

Oscillator modifications

Skip this paragraph if you do not want to install the oscillator tuning capacitor. Open the oscillator compartment and remove the 446 tube. Remove *L103-A*, it will probably be necessary to insert the screwdriver blade sideways to remove the bolt unless you have one of those 90° screwdrivers. Be careful not to damage the oscillator lines. Using the Allen wrench that you will find on the rear of the oscillator compartment (maybe), loosen the collar holding the gears and remove this assembly. Saw off the thick steel bracket that is located in front of the oscillator compartment (*not so easy is it?*). This should be sawed off close to the chassis so that the tuning capacitor gears will clear it. On the front of the oscillator compartment you will note three holes in a vertical line. In the upper of the three holes mount a *Johnson* butterfly capacitor *5MB11*. If you have mounted the butterfly capacitor properly, the rear terminals will just touch the two silver plated oscillator lines. If you have not, and the capacitor is rotated by 90°, the capacitor will short out the lines and ruin the 446 as soon as power is applied. With a *very* short piece of wire, connect the ground tab of the capacitor directly to the front panel of the oscillator compartment. This tab connects to the rotor of the capacitor and is on the flat side of the capacitor. Although the rotor is very effectively grounded when it is mounted on a metal chassis, it will usually produce a very scratchy noise when it is tuned, after a short period of use, hence, the additional ground. To couple this tuning capacitor to the knob, and to obtain a reduction in the tuning rate, the author used two antenna coupling gears from an old defunct *ARC-5* transmitter. Fortunately, the large gear just fits the Johnson capacitor. The small gear was bolted to the end of a ¼" shaft which, in turn, is fastened to the tuning knob on the front panel. A ⅜" to ¼" bushing was mounted in the oblong hole so that the gear tension could be adjusted after the panel was secured to the chassis. By the way, the tuning reduction is almost mandatory because the capacitor goes from minimum to maximum capacity with only a quarter turn of the shaft. After you are sure everything is satisfactory, solder the two capacitor terminals to the lines with a good hot soldering iron. Finally, replace the 446 tube, and temporarily secure the cover in place.

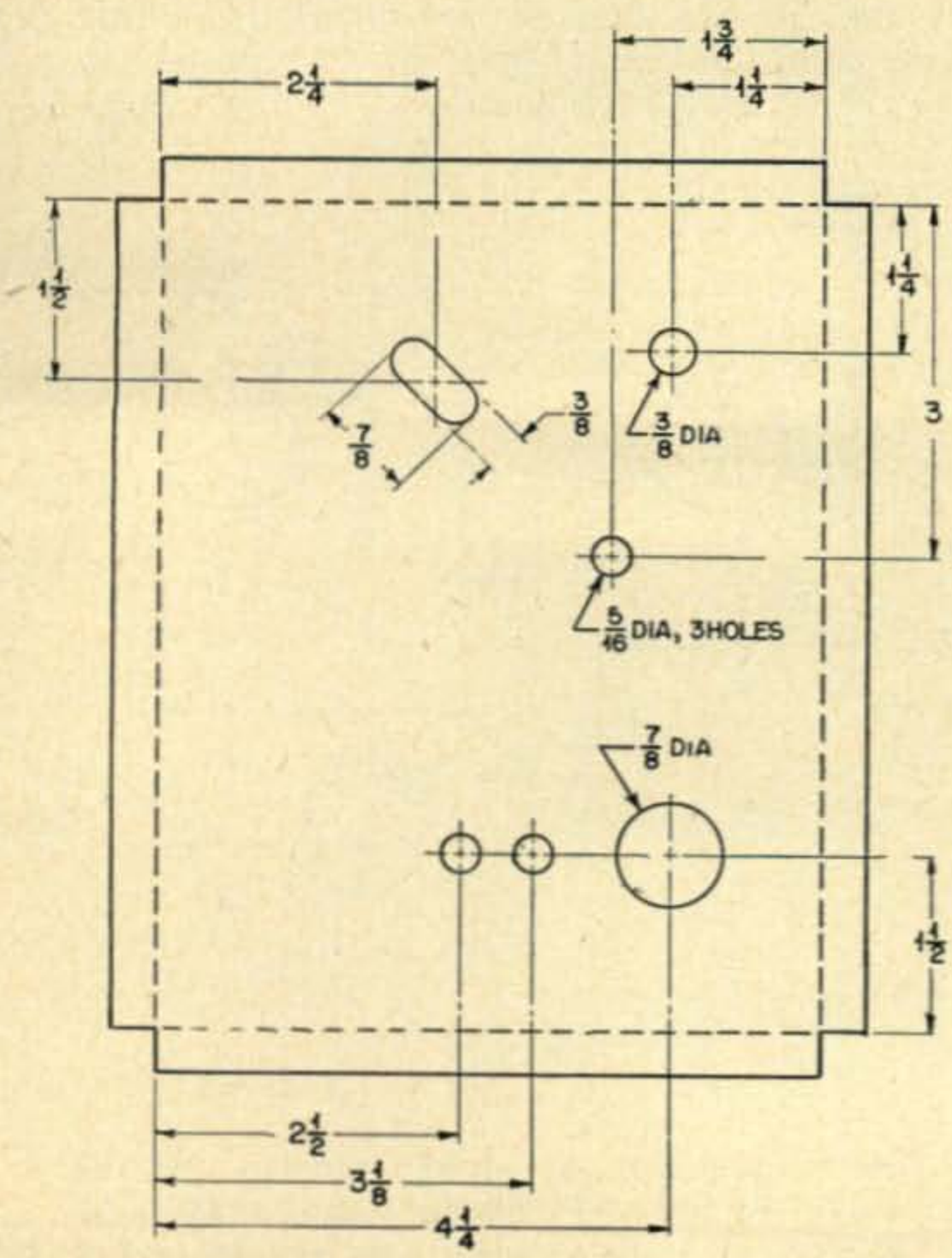


Fig. 3—The new front panel for the ASB-5.

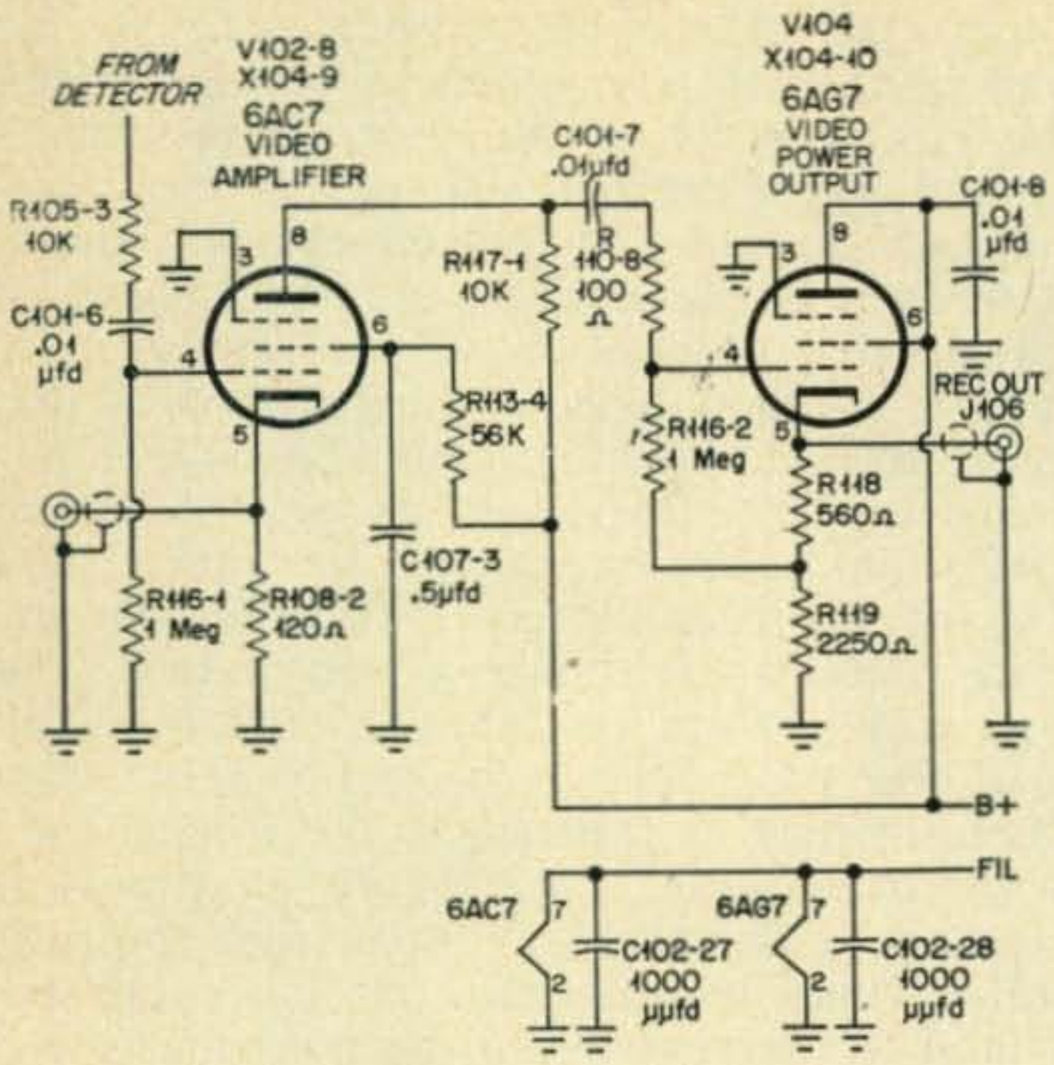
Making the New Front Panel

Fig. 3 shows the approximate dimensions of the new front panel. The panel used in this conversion was made out of sheet metal, such as that used for heating ducts. If medium gauge aluminum is available, it might be somewhat easier to work and possibly look a little smoother. For best results, the constructor should use his old front panel as a template. Normal production variations in the width of the panel might cause a loose fit if the outside dimensions of *fig. 3* are followed. The old front panel should also be used as a guide for locating the mounting holes, antenna input jack and the holes for the cavity tuning adjustments. Note that a ⅜ inch hole was drilled in the new panel where the power connector was located, and the new volume control installed there. Also, directly above this hole is a ⅜ inch oblong hole, 1 inch long and set at an angle of 45° from horizontal. This is the mounting hole for the receiver tuning knob bushing. It allows the ¼ inch tuning knob shaft (with the small gear on the end) to be butted against the larger gear on the variable capacitor and adjusted for proper tension, as the panel is mounted on the chassis.

Rewiring the Video Amplifier Stages

During the following steps, the part numbers referred to are those printed on the *ASB-5* chassis and on the schematic diagram provided with the *ASB-5*. For those not pos-

Original ASB-5 video amplifier circuit



sessing a schematic diagram, the parts value is also specified. Start the audio conversion by removing *R119* (2250 ohm, 10 watt wire wound). Clip off the leads to *R118* (560 ohms) and *R116-2* (1 meg.) that connect to one end of *R119*. Also remove the metal bracket that held *R119*. Remove *R117-1* (10K, 2 watt) that is connected between *pin 8* of *V102-8* and *pin 8* of *V104*. Remove *R116-2* (1 meg.) that is connected to *pin 4* of *V104* (the other end was left hanging by the removal of *R119*). Remove *R110-8* (100 ohm) that is connected to *pin 4* of *V104*. The two shielded wires referred to in the following steps will be used to carry the audio signal up to the volume control. When disconnecting these wires, be careful not to get them too short. The best bet is to unwind them from the terminal, rather than clipping them. Remove the shielded wire from *pin 5* of *V102-8* and connect it to the tie point on *TB-110* that was the junction of *C101-7* (.01 μfd.) and *R110-8* (100 ohms). Remove the shielded wire from *pin 5* of *V104* and move it to *pin 4* of the same tube. Clip out the jumper between *pins 6* and *8* of *V104*. Remove *R105-2* (10K) connected between *pins 1* and *3* of *V103* (6H6), and replace it with a 1 meg, half watt resistor. (You can use *R116-2* that was removed earlier if desired.) You will probably have to lift out *C107-3* temporarily to gain access to *R105-2*. Remove *R108-2* (120 ohms) connected between *pin 5* of *V102-8* and ground, and replace it with a 3.3K ohm, half watt resistor. Install a 100K, half watt resistor between *pin 8* of *V102-8* and *pin 6* of *V104*. Install a 25 μfd., 25 volt electrolytic capacitor between *pin 5* of *V102-8* and ground. Install another 25 μfd., 25 volt electrolytic capacitor between *pin 5* of *V104* and ground. When installing these two capacitors, make sure that the negative end is connected to the ground. Connecting them backwards will cause improper operation and may ruin the capacitors. Ground the end of *R118* (560 ohm) that was left hanging by the removal of *R119*. Next, connect the shielded wires at the volume control. Looking at the control, from the rear end with the terminals down, connect the shield braid to the right hand terminal. Connect the white wire, with the red tracer to the left hand terminal. This wire should go back to terminal board *TB-110*, check it with an ohmmeter to make sure. The remaining wire (white with a yellow tracer) is connected to the center terminal of the volume control. The other end of this wire should connect to *pin 4* of *V104*. If these wires get reversed somewhere along the line, the volume control action will be incorrect linear. This step completes the rewiring of the video amplifier. As a double check, the plate of *V104* (*pin 8*) should have nothing but a mica capacitor connected to it. If there is a wire there, move it over to *pin 6*. By the way, that .01 μfd. mica (*C101-R*) is a little trouble maker. Better yank it out and replace it with a good 600 volt paper capacitor. Power connection to the *ASB-5* is made by mounting a 5 pine male connector (*Amphenol 86-RCP5*) on the rear apron of the chassis, just below the tube socket of *V104*. With a little effort the chassis punch will fit, and the hole can be knocked out. Don't forget to punch a larger hole in the rear of the cabinet also. Connect a wire from *pin 1* of the new power connector to the *ASB-5* chassis (ground). Connect a wire from *pin 5* of the power connector to *pin 7* of *V104* (filaments). Connect a wire

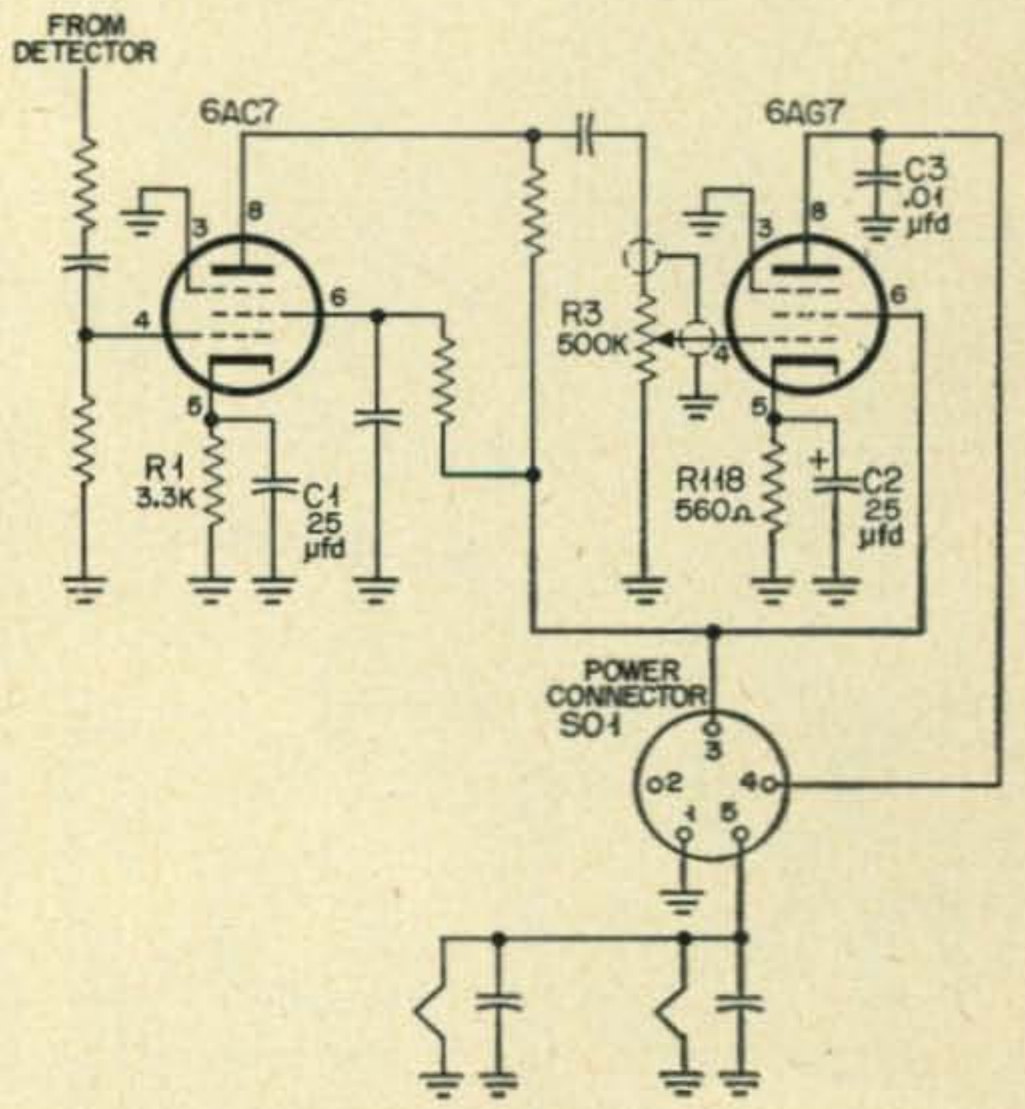


Fig. 6—The rewired audio amplifier. If you would like more bass in the audio, a .001 μfd. disc ceramic shunted across the volume control R3 works nicely.

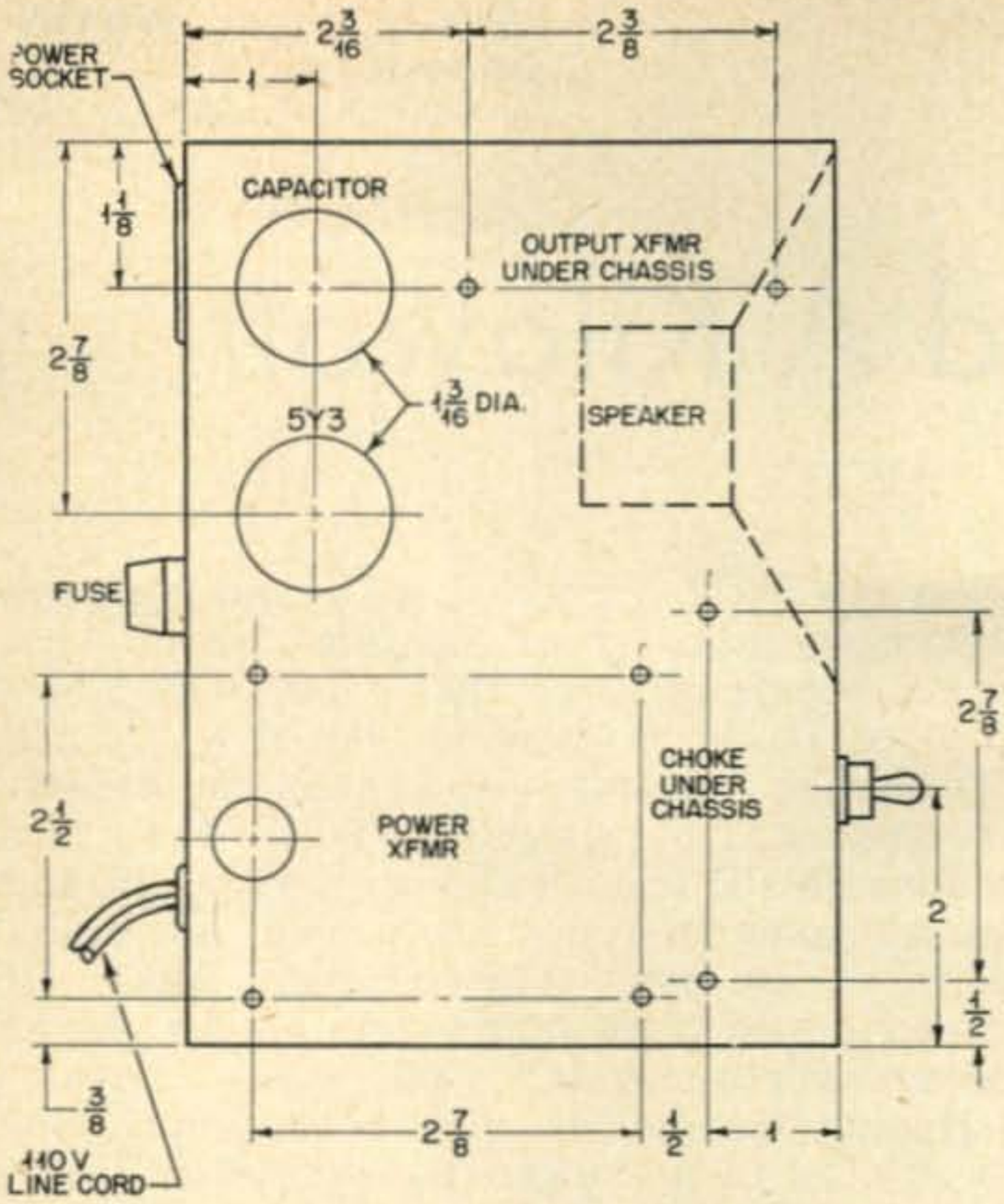


Fig. 5—Power supply layout. Switch should be 4¼" up instead of 2" as shown.

from *pin 3* of the power connector to *pin 6* of *V104* (B plus). Last, but not least, connect a wire from *pin 4* of the power connector to *pin 8* of *V104* (speaker line). For convenience, the speaker and matching transformer were mounted on the power supply chassis.

The power supply is rather conventional but there is one word of caution if you use components other than those specified. The capacitors used in the *ASB-5* are rated at 300 volts. Apply 301 volts and poof, out goes a capacitor. (It's not quite that close, but almost.) To avoid this, a heavy duty wire wound resistor was inserted in series with the B plus circuit and adjusted for a maximum B plus voltage of 250 volts. This resistor is identified as R1 in the power supply schematic, *fig. 4*. Actually, you will find that you can run the B plus voltage down to 175 volts or so, with only a slight reduction in audio volume and at this voltage the power supply and the tubes in the *ASB-5* will run much cooler. As you can see, the B plus voltage is not critical and 250 volts is selected as an arbitrary point, but it should never exceed this. The layout of the power supply chassis is shown in *fig. 5*. The components were mounted on an *LMB 145* chassis box, with the power transformer at one side and the filter capacitor and rectifier tube mounted near the rear. This allows room for the speaker to be mounted on top of the chassis, near the front, with two 90° brackets. The rear of the speaker was supported by a bracket fastened to a convenient mounting bolt welded on the magnet mount. The speaker is in no way critical and almost anyone on hand will be satisfactory with the exception the field coil types. There is so much audio available in the *ASB-5* that you can easily drive a 12" speaker to ear splitting volume. The speaker does not have to be mounted on the power supply chassis either. If you would like to use a speaker mounted somewhere else, mount a 2 lug terminal strip near the matching transformer for the secondary winding connections and run a twisted pair to the external speaker. Power is brought out the rear apron of the power supply chassis with a 5 pin female *Amphenol* connector (*77-MIP-5*). The power cable is a three foot length of 5 conductor cable with a 5 pin *Amphenol* male connector (*86-PM5*) at one end and a 5 pin *Amphenol* female connector (*78-PF5*) at the other end. Although the layout of the power supply is not critical, if you use another size chassis, be sure to keep the output (matching) transformer well separated from the power transformer. Once the power supply is connected the *ASB-5* is ready to go.

Adjusting the ASB-5

Upon applying power to the *ASB-5*, one of three things will happen. The speaker will be dead, the whole mess will go up in smoke, or a loud rushing noise will emanate from the speaker. Obviously, the third symptom is the desired one, the first two indicate somebody goofed! If you live in a channel 2 area, the i-f amplifier operation can be checked by connecting a 5 or 10 foot piece of wire to *pin 4* of *V102-1*. A loud buzzing racket (the video modulation) should be heard. Possibly by tuning the slug adjustment for *Z107*, you might hear some 6 meter stations boiling in. Assuming the i-f amplifiers are working satisfactory, let's proceed to the oscillator adjustments.

About the simplest method of oscillator adjustment is to use a grid dipper as a signal generator. The three tuning adjustments on the cavities should be turned clockwise until you feel the plates touch and then backed off about a quarter of a turn. Stick a short piece

[*Continued on page 110*]

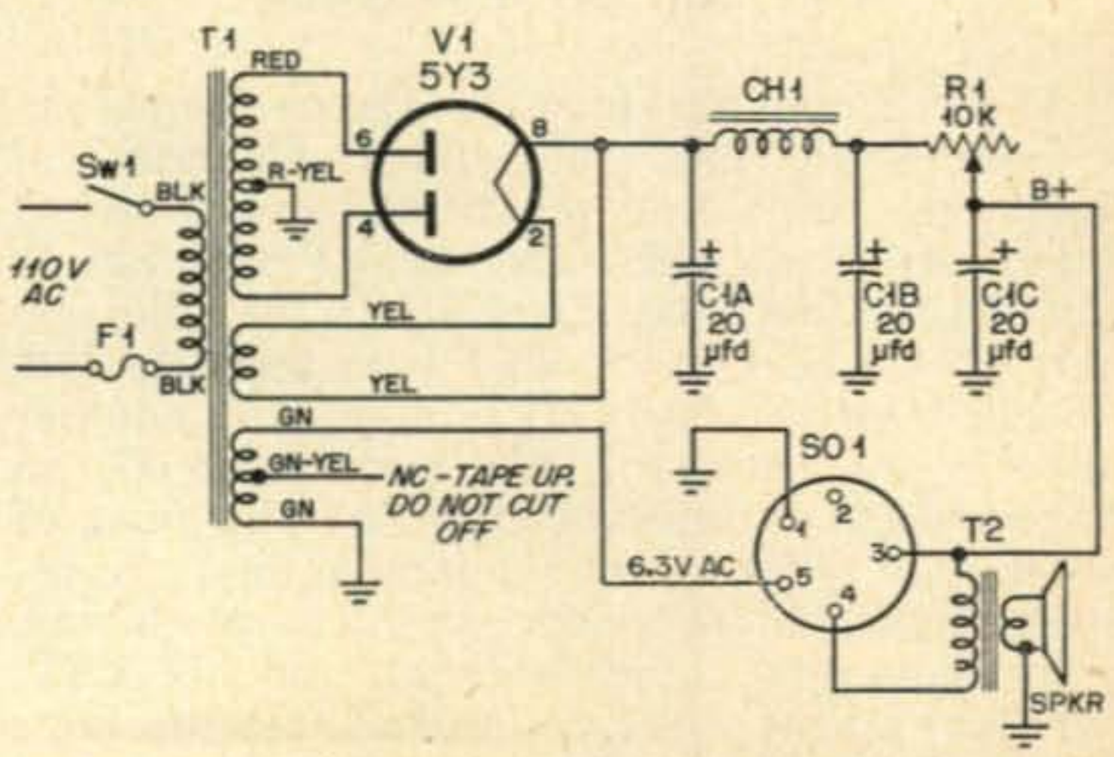


Fig. 4—ASB-5 Power Supply.

Mind you, it helps; but you don't need one. . . .

Mickey Unger, W8YIN
8329 Hendrie Blvd.
Huntington Woods, Mich.

You Don't Need A Kilowatt

Having just waged the Battle of VR1B, the desire to speak is rampant in my breast, and it must be done before pinning this Purple Heart next to the others encountered in the Battles of YA1AM, AC5PN, FS7RT, LU3ZY, etc. More correctly, the medals should be arranged on the XYL's bosom for she is the only one that sustained injuries in the above-mentioned forays. All I lost was sleep---------

But what about this DX game? And what about the essential ingredients required?

First, there is no longer any question regarding the mentality of the average DXer. It's his set of values that are nuts!!

What he has, after the long, lonesome, diligent hours spent chasing his quarry, is a twenty second QSO with a guy crazier than he or he wouldn't be rare DX in the first place. (Personnel of present Dxpeditions excluded from this remark—at least, until their QSL's show up.) Two bleary-eyed louts content with "TU OM, 559, QSL OK, TU CU," after six hours trying to make contact, must have holes in their heads. However, and alas, this kind of Dxing is standard today. (Whoever heard of asking a rare DX station, "You'll excuse the expression, OM, but c-c-c-ould you t-t-t-ell me your n-n-name??" —*Lid.*) and since standards are the relative measure of everything today, we glow and shimmer with the thrill of *the new one* and immediately begin playing the *Souza March,*

Hurrah for my beam and my kilowatt,
For I just worked another new country,

to all those who will listen, especially if they didn't work 'em.

You Can Be Interesting

There is another form of Dxing. Some say a more gentle, enjoyable and much more enlightening form, and it's being reborn today. Tune any band, even c.w., and you're apt to run across this quasi-Dxer. He's the idiot, so named by the Chaser, that is content to talk for one hour and thirty-six minutes with another idiot in his backyard; like a common G, an ordinary ZS, or a middle-class JA. This fella, of all things, talks about his family, his job, his radio interests, sunspots, politics, gardening, pets, geography, other hobbies, and his XYL. The lout on the other end talks about the same trite subjects. Net result—a good feeling toward fellow men in general; a very good feeling about this particular fellow man; and most important, a little bit of "learnin" about what makes people all over the world, *tick*. (This form of Dxing is growing—heard a PX call CQ on Ten yesterday—didn't get an answer. Everyone was busy *talking*—Tsk!!) Let's face it, boys, this is Ham Radio at its very best and you all know it. Hams are people; not multipliers. (Eds note—They're that, too.) Of course, please don't remind me of this during the next pile up on AC7XX!!

Having labored on the above points long enough, let us no longer digress with editorializing, but proceed to the meat of the problem. And there is a problem.

You see, there are, sitting amongst you, vast numbers of sun-spot smitten Hams who have gotten bitten by favorable conditions these past few months, and who would like to enter the DX game. But cowardly neophytes all, you sit on the sidelines watching the WAZ's go by because, "AW, Heck, I ain't got a *kilowatt.*" Well, pal, you don't need one. (The rest of you guys can stop right here and now. Hear that mess on 14,020 kcs?? Better fire up—May be a ZC2—GL CU TU, CHEERIO, LUCK, GB—)

Requirements

What do you need? What are the essential ingredients required for working DX?

There are four basic requisites;

1. Patience.
2. Compact, flexible, efficient equipment.
3. Efficient antenna system.
4. Good operating habits.

It's impossible to treat these items in order of their importance. What good is a good *Yagi* if the XYL hangs the baby's diapers on the feedline. Or worse yet, talks to you only during *Lent*. (Guess what you gave up.) Suffice to say, all sticks in the DX man's bag are necessary in varying degrees and should be treated to fit the individual's objectives.

First, *patience*. Your rig can't do everything. As a matter of fact, any good fifty watt rig with an efficient antenna system could do everything—if there weren't so many other birds around. Your peanut whistle will put out a signal heard 'round the world. All you have to do is make sure it's not being clobbered by some other peanut whistle. And you can never make sure of this; so you will never hook everyone

you call. About half is a good average, even for a kw. Some fellas settle for 5 or 6 DX QSO's per log sheet, and they are realists, not pessimists. So make up your mind that you won't work 'em all and don't fight it. Keep trying—until the cat needs putting out, or it's chowtime. Then, do your family chores, pull your Jr. Op out of the power supply, and come back for more. Be patient!!

Second, *compact, flexible, efficient equipment*. That's right! It doesn't make an iota's difference if your gear is home-brewed, commercial, or surplus, just as long as it's accessible and subject to frantic twists of the dials without breaking down and groaning. Many-a-time, a flexible peanut whistle will swoop down on the prey before the kw boys have tuned up. (You can lose more kws that way. Have you ever been on twenty listening to the gang trying to work AC5PN on the high end?? When FB8ZZ fires up on the low end, it's just like the Daytona Stock Car Track as the carriers come roaring and hurtling down the band. Some joker invariably breaks down in the middle of the race, around 14,050 kc, and settles for a KP4. And what do the kws find when they get tuned up on the low end? Firey red tubes and W2QHH in contact.) Low power has its advantages, and this is one of them.

Your transmitting gear must have three features. A VFO is absolutely essential; so is uni-controlled band-switching; and to keep peace in the family and on the block, single-ended pi-networks, shielding, and other TVI-proof gear is deemed wise. This type equipment is common-place, today. Thumb through any of the recent issues of *CQ* and you'll find many rigs that fit the bill. Or walk into your nearest jobber's shop and look over the fine commercial gear that is available today. If you have the time, build your own rig. If you don't, but have the money, buy a rig. If you have both, buy a kit. If you have neither, take up crocheting. After all, the fella on the other end shouldn't care whether he's conversing with home-brewed, push-pull 809's, or a *Collins 32V-3*. What he *should* care about is the guy he is talking to.

Regarding power, most experts on the subject will tell you fifty watts will do the job of 500, if conditions are right. And you can do a great deal to make conditions right, which is the major premise of this entire treatise. 150 watts will be more than sufficient for the bulk of Dxing you will be doing.

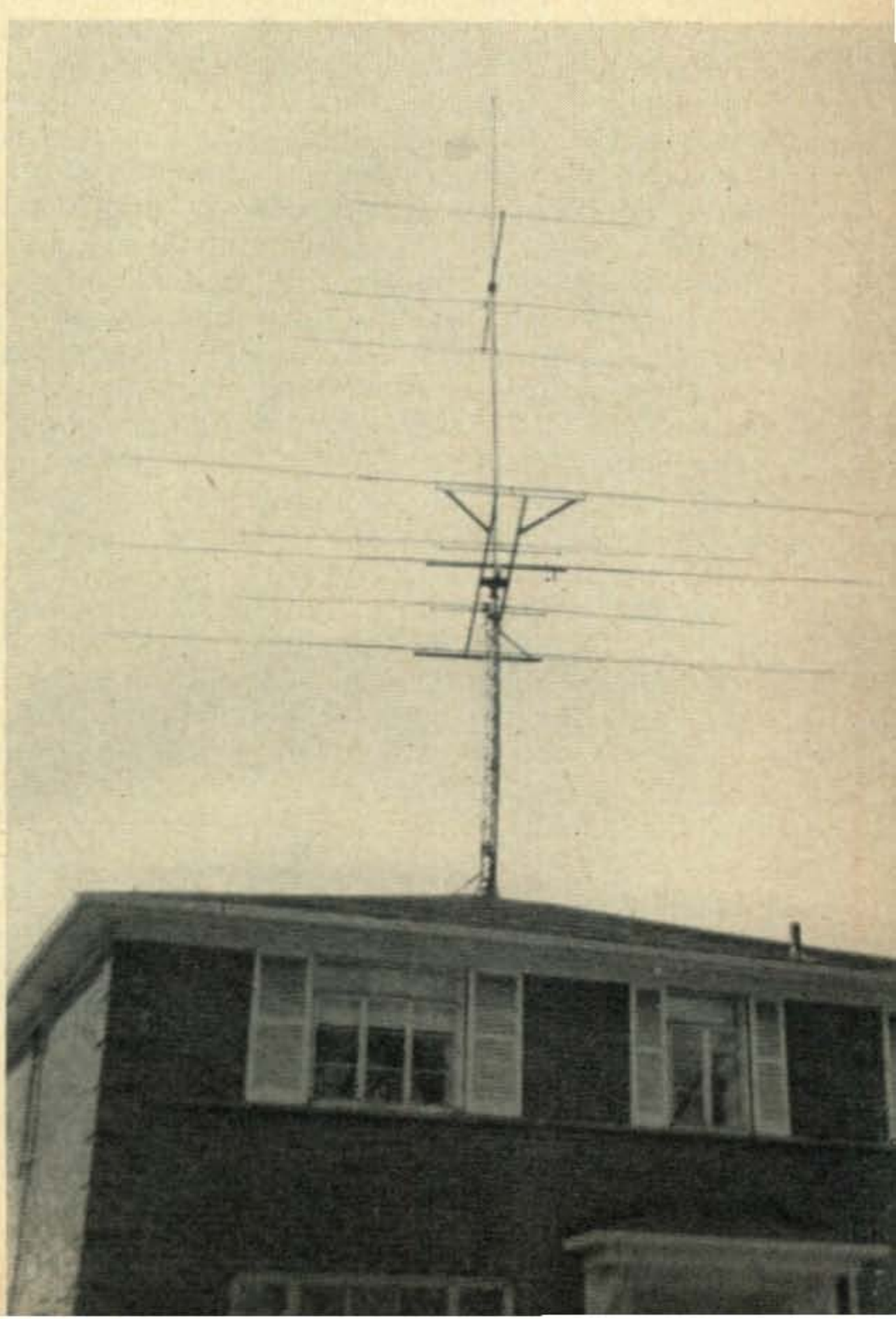
Your receiving gear is a simpler matter. Easiest thing is to buy a receiver that performs well enough to hear the average DX signal without busting your eardrums from strain. There are many suitable makes on the market such as the *Collins 75A-4*. Possibly, the one you're using now will be sufficient. A noise-limiter, band-spread, selectivity, stability, all these are necessary features and they are found on any good communication receiver today. To state an old adage, you must hear 'em to work 'em.

There is nothing more frustrating in the art of Dxing than hearing the gang working a XZ on 15 when you're doing business on 20. True, your receiver and transmitter are band-switching. You can get them up to 15 fast enough, but what about the antenna. After eight minutes of plugging, unplugging, twisting, untwisting, cursing, and pleading—you finally get the right antenna plugged into the right hole only to find, as you suck your bleeding fingers, that the XZ has completed his tour on 15 and is now off to the wide open spaces; namely, twenty meters. The simple answer to this predicament is a s-w-i-t-c-h with as many terminals as you have antennas. Coaxial switches of this nature are on the market, and for the foolhardy with a workshop, they can be constructed in your basement. (*Article on this in last month's issue.*)

Add to the above gear, an electronic key, a handy mike, *one* switch which will throw all the operating relays, and a neat, consol operating desk—now you have all the ingredients necessary for a flexible and capable DX catcher. Almost all, that is.

Reams of copy have been ejected from millennium typewriters on the subject of antennas. This humble writer will not attempt to add his two cents worth, other than to point out a few pertinent facts that the neophyte Dxer should be familiar with.

Neglecting those fortunate Honor Roll Climbers who have the space, time, money and *location* to erect multi-phased, collinear, side-fed, under-fired rhombics, rotating on last



year's circus merry-go-round, it is wise for the humble soul to settle for a tower erected high as possible supporting rotary beams on 10, 15, and 20-meters. (If necessary, you can settle for a lot less.) Other literature, readily available in this publication, will assist you in determining the number of elements per antenna, the method of feeding, the type of transmission line and match, methods of rotation, the height above ground, and other sundry details. Just make sure that whatever you put together is, *in fact,* an efficient system. Low SWR, cut for the desired frequency, easily rotatable, wind-resistant, weather resistant, tuned on the button, and other relative measures of putting the *soup,* consistently, where it belongs. Again, referring to the literature, the methodology and usage of the proper instruments to help you such as grid-dippers, antenna-bridges, etc., is easily attainable. All you need is someone to understand it so they can explain it to you. (This same someone is usually the fella what gathers the fellas what helps you put your aerial up in the first place.)

Now that you have the antenna up and the rig perking, it's best that you begin developing habits which will make your *operating technique* the envy of all the local DX club's constituency. These habits have been enumerated periodically by KV4AA and others but they bear repeating.

To be a good Dxer, you must be a good Scout. *Be prepared.* Many of the operating habits you must form will not be observed often on the Ham Bands; but, if you prepare well, your DX competitors will often observe the results.

1. Use a DX plan.

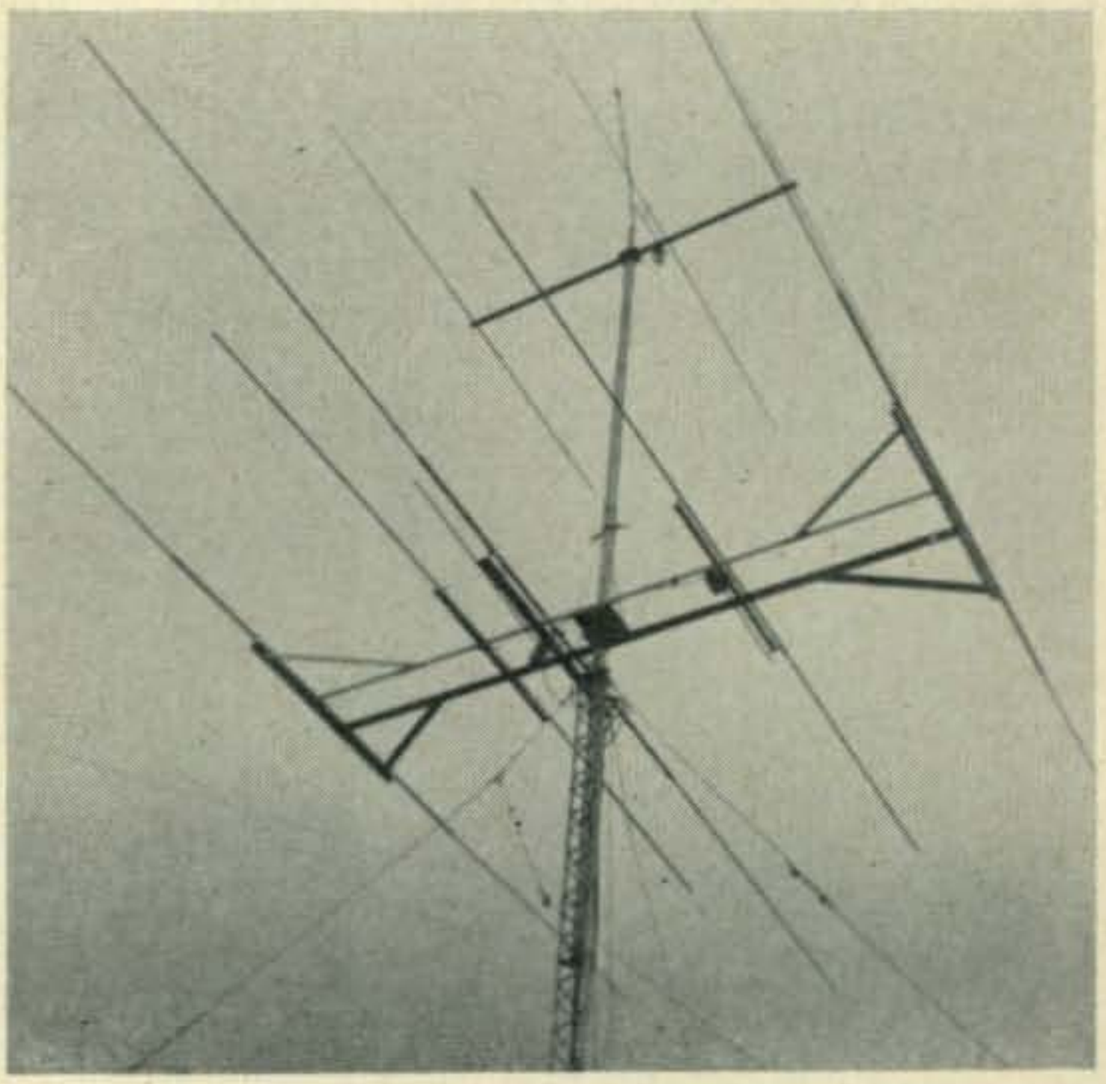
When DX from all sections of the world is pouring through on several bands you might spend half your operating time deciding what band to chose and where to point your beam. Then, when you finally fire up, conditions change and you have to start the process all over again. And when you finally engage in a DX QSO, you worry!! As you're trading wisecracks with GM8MN on ten phone, you're wondering if, maybe, FD4BD didn't show up on 20 c.w., after all. So there you are; never happy unless you discipline yourself with a varied and workable DX plan.

A plan yielding the minimum of grey hair might be this. On the even days of the month forget all about exotic DX. Pick out the highest band open, beam where the signals are coming in the best, and have yourself a ball gossiping with all the garden-variety DX that fill the bands. Use AM, SSB, or CW, whichever you prefer that day, but *talk.* When your Buddy down the street calls you on the landline to tell you about the VU5 that's coming through on twenty, laugh at him. This is your day to enjoy yourself; not to be a maniac. And stick to your guns! Don't you dare go after the VU5. If he wants a QSO, let him call you.

On the odd days of the month, you can take *your* turn at being Mr. Hyde. Gnash your teeth, grind your knuckles, kick your children in the slats, and go after the elusive stuff. Tune 20 c.w. first; then the rest of the open bands, until you run across a new one. Then, bring all your DX artillery into range until you land him. Of course, the higher your country total, the more days you will do nothing but tune and listen because no rare ones will show up. When this occurs, you can break the monotony by having a fast QSO with KV4AA, YU1AD, CE3AG, or DU7SV; or you can remind yourself of tomorrow when you will be sanely ragchewing with G3BXI again.

2. Use a filing system.

And it need not be elaborate. Have you ever been flattered upon contacting FB8BR for the first time in a year, only to have Hubert call you by name. He doesn't really remember it. He simply has a convenient filing system. And turning the strategy around, picture 4X4DK tuning ten meters after a CQ. 142 W's are calling him; he may pick on you if you call him by his given name, Ami. Why??



The authors beam close up. The house it sets on is shown on the previous page.

It's human nature—he has worked you before and it's always more enjoyable to work a fella the second time than the first. Now, you don't need a *Univac* to keep your file system. A simple *3 x 5 card index* with the calls filed alphabetically; the chap's name in one corner, a serial number in the other corner telling you where to look in the log to find the previous QSOs; that's all—

3. Be good copy.

Any DX station wants to contact someone they can understand. Carbon mikes and spark-gap keys are not the most intelligible equipment these days. So use something that is.

Good speech quality with well-rounded, full modulation is essential on phone. A 90%-modulated 100-watt rig will run rings around a 30%-modulated 500-watt rig. And a smooth, rhythmatic el-key will pull in QSOs that a dog-eared hand-key won't, if you know how to use it. So master your favorite form of communication and be good copy; even if the QRM never lets up.

4. Equip for Break-in.

Many DX stations are tickled to learn that you can work break-in. Mostly, because it cuts down on QRM if used properly. With conditions improving, many DX signals are "just like a local," so operate as if you were talking to a local. Use break-in.

Some DXers use half their QSO time identifying who they are and who they are talking to. Unless you are trying to convince your neighbor that the VK you're working is more interesting than the TV Commercial he's watching, you're wasting your time.

5. Know when to call "CQ DX."

If you aren't looking for a new country, you can have many enjoyable DX contacts as a result of a well-placed CQ DX. When the band is loaded with many strong DX signals, pick out a clear spot (Easier said than done) and have a go at it. Nine times in ten, you'll make contact, because, on crowded days, even the DX is looking for a signal out in the clear. On the other hand, when there are only 3 or 4 DX stations coming through to satisfy the appetites of the W's, you can junk your CQ's because the DX will have plenty of business without tuning for your CQ.

6. Maintain your equipment.

One of the great advantages of low power is that the equipment is easier to maintain 'cause there's less to blow up. Make good use of this. Once a month go over your gear. Check for soft tubes; dust out the corners; check wiring connections. A working peanut whistle is worth ten kws down for repair. Nuff said??

Who do you Know?

7. To be a good Dxer, you must keep the *right company*. And that isn't being snobbish! It isn't exactly *who* you know, but how much DX they work that counts. You'll enjoy and benefit from knowing the DX gang for several reasons.

A. Radio experience.

Every aspiring novice Dxer needs a radio buddy. And the higher he is on the *Honor Roll*, the better, for he's the guy that is going to help you get your equipment together, put up your antennas, and to generally help you get around. And his experience is extremely valuable—just as yours will be five years from now when some neophyte Dxer wants *you* to help match his antenna or climb his tower. (Whatever DX success this poor writer has had is greatly due to the patience, interest, and sweat offered and contributed by my very good buddy, W8RLT.)

B. Piggy-back QSO's.

Some of the boys frown on this type of DX snatching but it serves a very useful purpose for QRP Dxers. If you know the most successful Dxers well, and more important, if they know you and know that you are running QRP, they will graciously respond to your plaintive plea, (As YJ1AA stands by) — "TOM, QSP PSE, TU, W8YIN". During the next transmission they will inform Frank that you are lurking by but haven't been able to dent the kw barrier because you're QRP. Frank's very apt to call you after signing with your benefactor so that you'll work a new one, even though riding on someone's coattails. (Viz; W1CWX, W1FH, W4BRB, W4KFC, W4CEN, W4QCW, W5MIS, W5ALA, W6NZW, W6BAX, W8DMD, W8JIN, W8NBK, W8PQQ, W8OCT, W8KPL, W9NDA, W9HUZ, WØNWX, KV4AA, and other nice guys who have taken the time to help the writer notch up another.) And peculiarly enough, the occasion will arise when you will be able to pay back your obligation by helping one less fortunate than yourself work a new one. It may even be the kw that helped you once before.

Listen . . .

8. To be a good Dxer, you must know how to *listen*. Both before and during the QSO, of course, but the former is essential if you want to climb the *Honor Roll*.

While it is generally true that the rare DX you are desperately stalking will usually be found underneath the loudest, unmodulated carrier on the band, there are times when this situation does not occur and you're on your own. So you need a system just to find them. There are two rapid-fire methods of determining when a rare catch is on the band.

A. Listen for the biggest mess.

Turn down the r-f *gain* and tune across the band looking for something sounding somewhat similar to an asthmatic inhaling hot steam in a damp fog. This is known as a *pile-up*.

Underneath the pile-up should be what caused it—if he hasn't gone QRT in disgust. If it's a new country, you need not tune further. This is your hangout for the next few hours.

B. Eavesdrop.

On phone, turn the r-f gain *up;* then, simply tune the American portion first to see who the boys are calling. If there is a rare one on, you'll hear at least 400 stations stretching their larynx. Now, tune the DX portion and under three S-9 plus VE's, you'll find the elusive one. If this proves futile, tune about for some of your DX buddies; the kws that are always working whatever is the choicest. See what they're working—it may be just what you need. And

if this proves unfruitful, you're really on your own. This might turn out well as the kw gang may be in bed sleeping; more likely, they're sneaking about like you.

C. Hunt and scan.

Tune carefully, slowly scanning from one end of the band to the other, checking the calls as you go along. When you finally hear a prefix that's new, wheels in your built-in cerebrum pre-selector (All good DX men have them) will begin grinding and though you may not know what country this prefix represents, you'll know that you need it.

9. To be a good Dxer, you must be a good *prognosticator*—or have faith in what you read. It's essential that you have an understanding of propagation conditions and a working knowledge of what to expect on each DX band at any given hour. At noon, five kws on 3.5 mcs. will not get you a VP9; but 50 watts on 28 mcs. may get you a AP.

If you don't want to become a student of DX propagation conditions, *CQ* will do it for you. A complete report on DX conditions is published monthly in this *Journal* telling you what bands should be open at what time to any given DX area.

To make the cheese more binding, CQ also publishes monthly a very fine and comprehensive *DX Column* by one, Richard Spencely. Dick will tell you what the latest info on all the hard-to-get countries is and keep you posted as to what time and frequency is being used. A fast check between Dick's tips and the *DX Propogation Chart* will advise you on the probabilities, in your locality, of snagging the rare one.

Sneaky

Finally, to be a good DXer, you must master some of the *tricks of the trade*. They are numerous, but a brief listing of some of the most common is in order.

1. On CW, slide 2 or 3-kc either side of the center of the *pile-up*. Even few kws will make contact from the center for they will be busy slugging each other out of the running. A slight QSY either way can be very effective.

2. Wait until the *pile-up* has abetted to a small roar; then throw the big switch and send your call three times. This delayed buck can be very handy on phone and CW.

3. If you're after a Dxpedition and know how long the station will be active, work him the first hour of his adventure or wait until the last day. You'll avoid the tremendous QRM caused by the very anxious the first few days that the word gets around.

4. Work the bloke after his initial CQ. After his fourth or fifth QSO, if you still don't have him, you might as well forget him for that day as the gang is now alerted and you will be in the midst of a *pile-up*. Note his frequency, any identifying peculiarities about his signal, the time that he came on the air, and try to be there the next day———first!!

5. On either phone or CW, check your own frequency often. When you hear a good solid ground-wave signal, move—to a clear spot, preferably!

6. Make your DX calls short. Three calls, sign yours, break. If you don't succeed, try again. Adjust the length of your call to the time you think it will take the chap to tune to your frequency. Sometimes, on c.w., it isn't necessary to send his call; just yours.

The important thing is to use some imagination when you call a DX station. After all, this is the most important phase of the QSO for if your call isn't successful, you don't have a QSO. So place yourself where you judge your prey will be tuning; then, make short calls punctuated with listening so that you will be current on the situation as it develops. (The other day a certain East Coast Dxer was found prone on 14,080 kc, twenty-two minutes after VQ6LQ went QRT. The thing that really floored him was when he finally finished calling Chas., not only had Chas. hit the sack, but ZD3A had opened up on the same frequency, made eight QSO's, and shut down for tea.)

7. Follow instructions. Although some DX stations will call CQ Idaho and come back to a guy in New Jersey, they usually mean business. Don't encounter their wrath by disobeying because you may end up in the proverbial black book. Not only that, it pays to follow instructions for oft-times you will learn what the DX station is planning to do and where he's planning to tune. And while we're at it, the more you know the habits of the particular station being stalked, the more contacts you'll make with him. Many stations follow certain patterns; some will never tune their own frequency; some always begin tuning at a certain spot in the band, some prefer long calls; others prefer slow sending. The more you know his habits, the more QSO's you'll make.

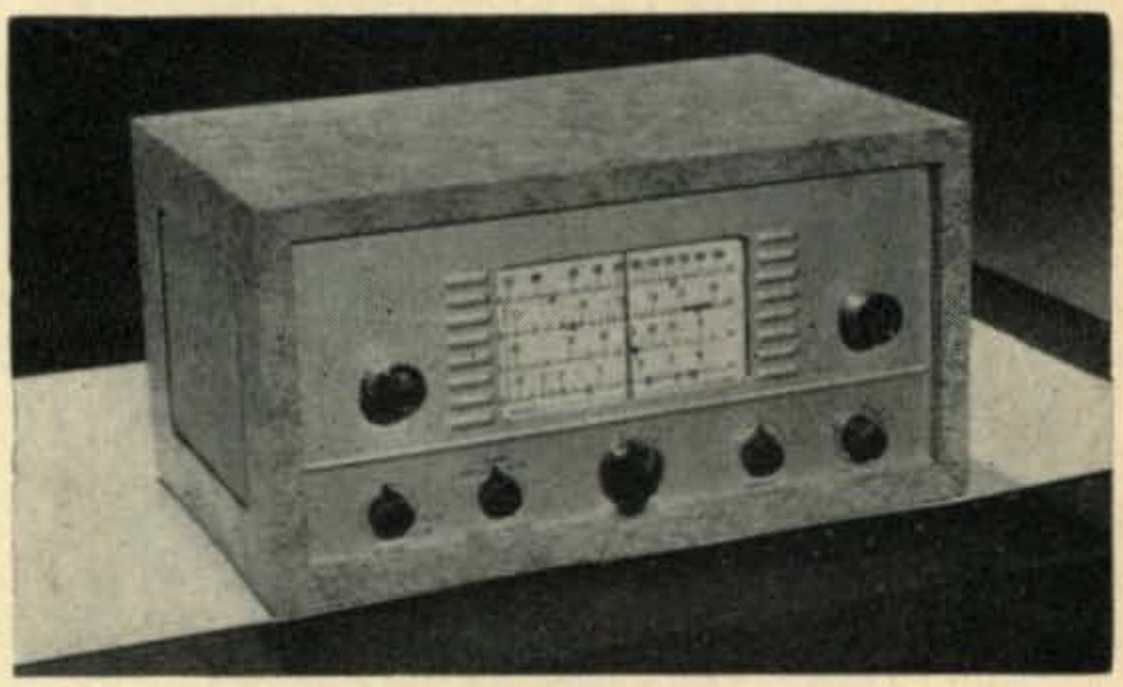
8. Observe prosigns. There is no better way *not* to make contact, than call a chap zero-beat after he has stood by for W2SAI with *KN*. Fortunately, the DX stations are making more and more use of *prosigns* so it behooves us to know them and observe them.

9. Master the art of Break-in. This is another little gimmick, frowned on by some, which can be very successful for the QRPer. As W5BNO begins signing with XW8AB, (Just as he says, "73's, MARCEL, CUAGN,") slide up or down about 500 cycles and send your call, once or twice. Never zero-beat because, if you do, you won't be heard at all. If you're on CW, transmit at a different speed than

[*Continued on page 112*]

Choosing Your Receiver

W. B. Bernard, Cdr., USN, K6EUS
Code 813, Buships
Navy Dept., Wash. 25, D.C.



Heath AR-3

First we may ask, "What is a radio receiver?" As a bare minimum it consists of a crystal detector and a head phone. This bare minimum has certain disadvantages. It isn't very sensitive so it must have a long antenna and a good ground in order to receive any stations at all. Once you have furnished the required antenna and ground you find that it receives a number of the strongest stations available. Thus we find the second disadvantage. This simple receiver isn't selective either. What can we do about it? We can tune up the whole system. This will result in a more efficient transfer of energy from the antenna to the detector and it will furnish some selectivity but the receiver will still not have much sensitivity or selectivity. We could hook some more tuned circuits into the system to increase the selectivity but we would find that additional selectivity could be obtained only at the cost of sensitivity. Any time that we use tuned circuits purely to increase selectivity we lose power in them.

What to do now? Well, the audion or triode tube was developed so it became possible to amplify the weak output of the detector. However there is a limit to the amount of audio amplification that can be used. This was especially true in the early days because the early tubes were pretty microphonic. If a housefly were to light upon the first tube of a high gain audio amplifier in those days the resulting signal was apt to deafen the operator, blow out the headphones or both. Even under good mechanical conditions thermal noise in the input circuits is a final limiting factor. Even though tubes have been greatly improved we are up against one of the laws of nature in the matter of thermal noise so even today we are limited in the smallness of the signal that we can profitably amplify. Several years after the audion was invented it was found that part of its output could be fed back to the input and that oscillation would ensue. It was also found that this feedback could be controlled so that the audion or tube could be held either just below oscillation or just weakly oscillating. From this the regenerative receiver was developed. By connecting the regenerative detector to the tuned circuit the tube would supply most of the tuned circuit losses thus increasing the effective Q of the tuned circuit.

This increased effective Q was the equivalent of a great amplification of any signal fed into the circuit so that in this one step we made a giant stride in receiver sensitivity. The increased Q also increased selectivity and for a great while the regenerative detector and one or two stages of audio were considered to be a very good amateur receiver. These were further improved by the addition of tuned radio-frequency amplifiers which eliminated the effect of the antenna upon the detector. Some receivers of this type were built commercially. The National SW-3 and the Pilot Super Wasp were examples. The Pilot Super Wasp could also be purchased as a do-it-yourself kit.

Regency TR-1

Came the Superhet

Increased activity on the amateur bands sounded the death knell for the good old regenerative receiver, it just was not sufficiently

selective. Although the super heterodyne receiver was considered to be noisy because most of them had no r-f amplifier, it was the only practical means by which the required selectivity could be obtained, so super hets which had been used for years as BC receivers within a few short years almost completely displaced the regenerative receiver. Some excellent superheterodyne receivers appeared on the market, the National HRO and the Hammarlund Super-Pro for example remained as standards for many years and even today the original models do not compare too badly with many receivers being sold.

Hallicrafters S-85

As a few more years passed the advantages of the super het were acknowledged and they began to be used at 5 meters and shorter wavelengths where previously only super-regenerative receivers had been used. In the process it was found that the r-f amplifier tube grid at high frequencies acted as a load upon the tuned circuit. This led to the development of the Acorn tubes and other tubes which were better suited for operation at very high frequencies.

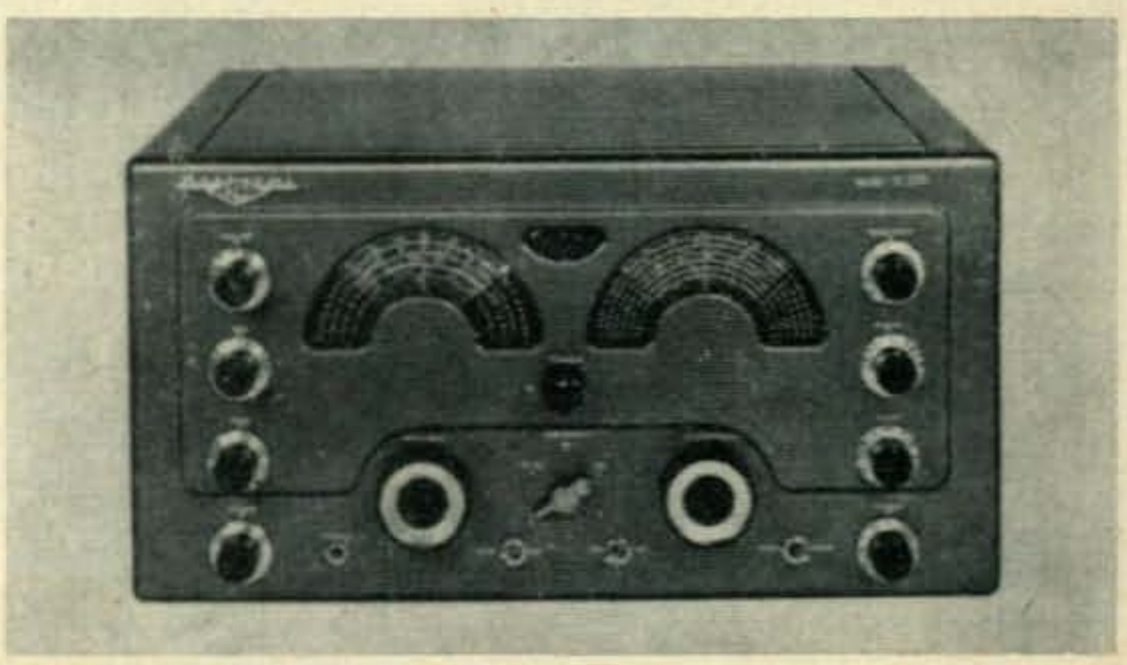
During World War II the requirements for radar and for VHF (very high frequency) and UHF (ultra high frequency) communications led to tube and component developments which have contributed to the improved performance of post-war receivers. The quest for additional selectivity has also left its mark upon the current crop of receivers, many of them being double conversion receivers with a very low frequency second i-f amplifier.

Receiver Requirements

If we compare our requirements for a receiver with the characteristics of the receivers now on the market it should help us make a better choice. Some of the basic characteristics of a receiver are:
Sensitivity,
Selectivity,
Stability,
Satisfactory Construction,
Suitability for intended use,
Satisfaction to user.
These characteristics are highly interrelated and it is difficult to consider them alone. Suitability for intended use is dependent upon many items including sensitivity, selectivity and stability, and satisfaction to user includes all of the above items plus such intangible ones such as the size of the tuning knobs and how it compares with Jonesy's receiver. Taking the items in order we may start with the definition of sensitivity. It is defined in the handbooks as the signal required at the input of the receiver to produce at the output of the receiver a signal which is a stated number of db. above the receiver noise level. At low and medium frequencies it is not difficult to produce a receiver which will be sensitive. At the higher frequencies large fixed capacities in a multiband receiver combined with loading effect of the tubes make it more of a problem to secure all the sensitivity desired. The problem is made more important because lowered atmospheric noise at the higher frequencies make higher sensitivities more desirable and the lower pickup capabilities of higher frequency antennas make the higher sensitivity essential. It can be seen therefore that high sensitivity at 20 Mc. and above is one way that a high quality receiver may surpass cheaper ones and if the user is interested in operation at these frequencies this should be checked carefully.

Noise Figure

As we go up into even higher frequencies sensitivity becomes even more difficult to obtain and instruments to measure sensitivity at these higher frequencies in the past were not accurate and even today are very expensive so that it has become the practice to compare noise figures of receivers for VHF and UHF. The noise figure is a comparison of the noise present at the output of a system to the noise which would be present if the system added no noise to the signal. The noise figure may be compared to sensitivity if the bandwidth of the system is taken into account. If two receivers have the same noise figure but one has a bandwidth four times that of the other the wider band receiver will require twice as great a signal input to give the same signal-to-noise ratio at the output. This occurs because noise power is proportional to the bandwidth.



National NC-183-D

TMC GPR-90

Thus if the bandwidth is increased by a factor of four the noise power is also increased by a factor of four and consequently will require four times the signal power to maintain the same signal-to-noise ratio. Since power is preportional to E^2 this means twice the signal voltage will be required.

Some idea of whether or not a receiver has a good noise figure may be obtained while it is still at the dealers. A resistor equal to the input impedance of the receiver should be connected across the antenna terminals and the receiver should then be fired up and set to the highest band of interest to the buyer. The gain should be turned up till the noise is clearly audible then the antenna trimmer should be varied. If the receiver has a good noise figure the noise should increase appreciably when the input circuit is tuned to resonance. The resistor should then be removed from the input and the antenna coil re-resonated. The noise with the resistor disconnected should be higher yet if the noise figure of the receiver is good.

The final proof comes when you get the receiver at the shack and the antenna connected. Tuning the input coil to resonance with the home antenna connected should peak up some noise that can be recognized as external to the receiver such as automobile spark noise from a distance or other man-made noise.

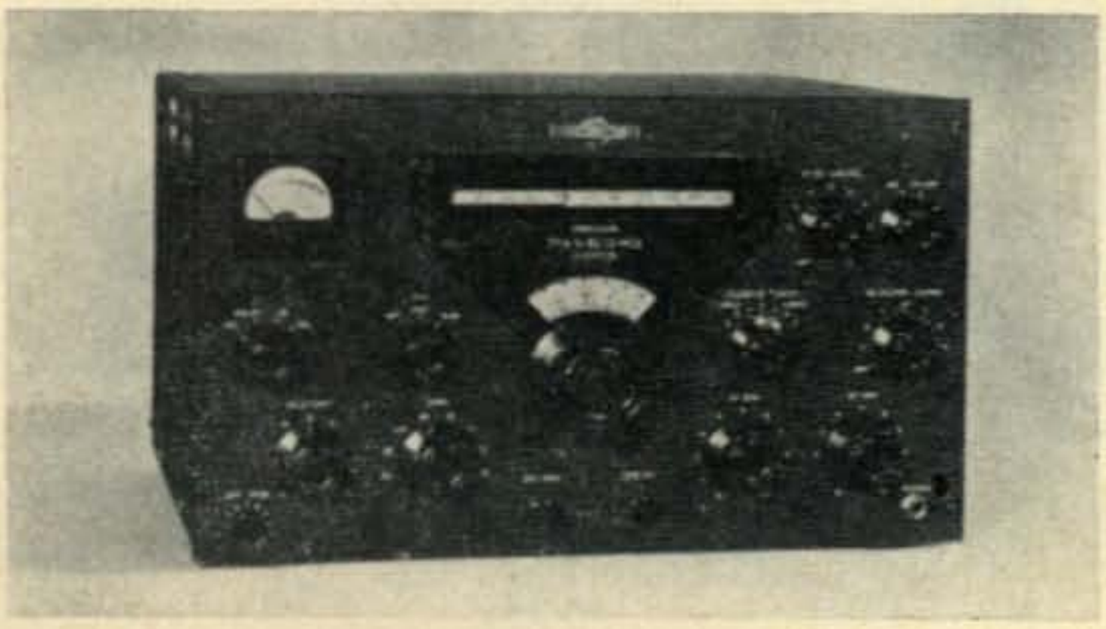
If under any of these circumstances you hear no peak of noise as you tune the input circuit through resonance the receiver does not have a good noise figure and will not get the weak signals for you. If you hear almost no noise with the receiver gain all the way up the receiver is deficient in gain and regardless of its noise figure it will not receive weak signals.

Band Width

Since all other things being equal, sensitivity will increase as band-width is decreased it seems desirable to investigate selectivity which is the characteristic controlling bandwidth. We need a certain bandwidth to carry out the basic function of communications. Hartley's Law sets this minimum bandwidth as equal to the highest frequency to be reproduced in the case of audio or equal to the number of bits of information per second to be passed in case of other types of circuits such as telegraph or Teletype. In the case of telegraph or Teletype a certain additional bandwidth is generally used to permit shaping the signals to something approximating a square wave. In all cases additional bandwidth in the receiver must be allowed for instability of the transmitter and receiver. This allowance is, in general, a percentage of the carrier frequency used and again we can see that circuit performance is penalized as we go higher in frequency. At microwave frequencies this bandwidth allowance for instability may be great enough that the difference in receiver bandwidths for different types of service may be negligible, however on amateur frequencies below 30 mc it is desirable to have adjustable bandwidth in a receiver, not so much to reduce noise, unless you consider all QRM to be noise, but to discriminate against adjacent interfering signals. This is a method of adjusting the receiver bandwidth to the optimum for a particular method of communication. This may range from about 2 kc for phone down about 100 cycles for CW.

In addition to adjacent channel selectivity, which is usually obtained in the i-f amplifier, we usually need other forms of selectivity which are furnished by the front end of the receiver. Some of the signals to be discriminated against are signals at the intermediate frequency, at the image frequency and spurious frequencies which may be produced when the front end of the receiver is overloaded.

Collins 75A-4



2nd I.F.

To secure sufficient selectivity in the i-f amplifier it is desirable to go to a low intermediate frequency. A low intermediate frequency lowers the image rejection of the receiver so we have two conflicting requirements for the i-f amplifier. First that it operate at low frequency so that it is very selective and second that it operate at a high frequency to give suitable image rejection. One solution to this dilemma which is being adopted by more and more manufacturers is to have two i-f amplifiers, one at a low frequency to give the desired selectivity and the other at a high fre-

quency to give image rejection. The double conversion receiver had many advantages with only one possible disadvantage; the second oscillator may cause "birdies" and other spurious responses unless it is well shielded.

A well shielded receiver with two or more circuits tuned to the signal frequency should give adequate rejection of input signals at the intermediate frequency. The major remaining requirement for selectivity is the prevention of overload at the front end of the receiver by strong signals emitted by nearby stations. Such overload is evidenced by cross modulation, "blanketing," and multiple responses. Before suggesting that your neighbor get the bugs out of his transmitter, which you hear all across the dial, it would be well to listen to him with the antenna disconnected because you may be suffering from receiver overload. Aboard Navy ships where there are always some high power transmitters near the receivers it is customary to have two tuned circuits ahead of the first tube to minimize such overloading. If you suffer from a great deal of interference of this type a well shielded preselector connected between the antenna and the receiver may be well worth while.

Stability

Stability is the next characteristic on the list. Primarily it will be used to mean frequency stability although its other meanings are of importance in that the receiver should be free of uncontrollable regeneration and undesired oscillations. Any such tendencies in a new receiver are likely to become worse as the capacitor wipers get dirty and as the electrolytics begin to dry up. Extremely selective i-f amplifiers and the increasing use of SSB are placing an increased premium on frequency stability of the receiver. This requires that the heterodyne oscillator and the BFO should be extremely stable. The problem of the BFO should not be too difficult since it operates at such a low frequency and it does not have to cover any appreciable frequency range. The heterodyne oscillator circuit should be carefully designed and the insulation should be ceramic where possible. One very successful method of obtaining maximum stability is to use double conversion with the first oscillator being crystal controlled. This system is used in the Collins receivers and in the home built setups where a crystal controlled converter is connected into a communications receiver which functions as a variable IF, second IF, and audio system.

A high quality receiver should be well constructed mechanically and well finished. The entire assembly should be rigid and a sharp blow on the receiver should not affect the reception of a signal. The i-f transformers should be air or permeability tuned and the oscillator trimmers should be air or variable ceramic types. The dial mechanisms should be inspected

Hammarlund HQ-150

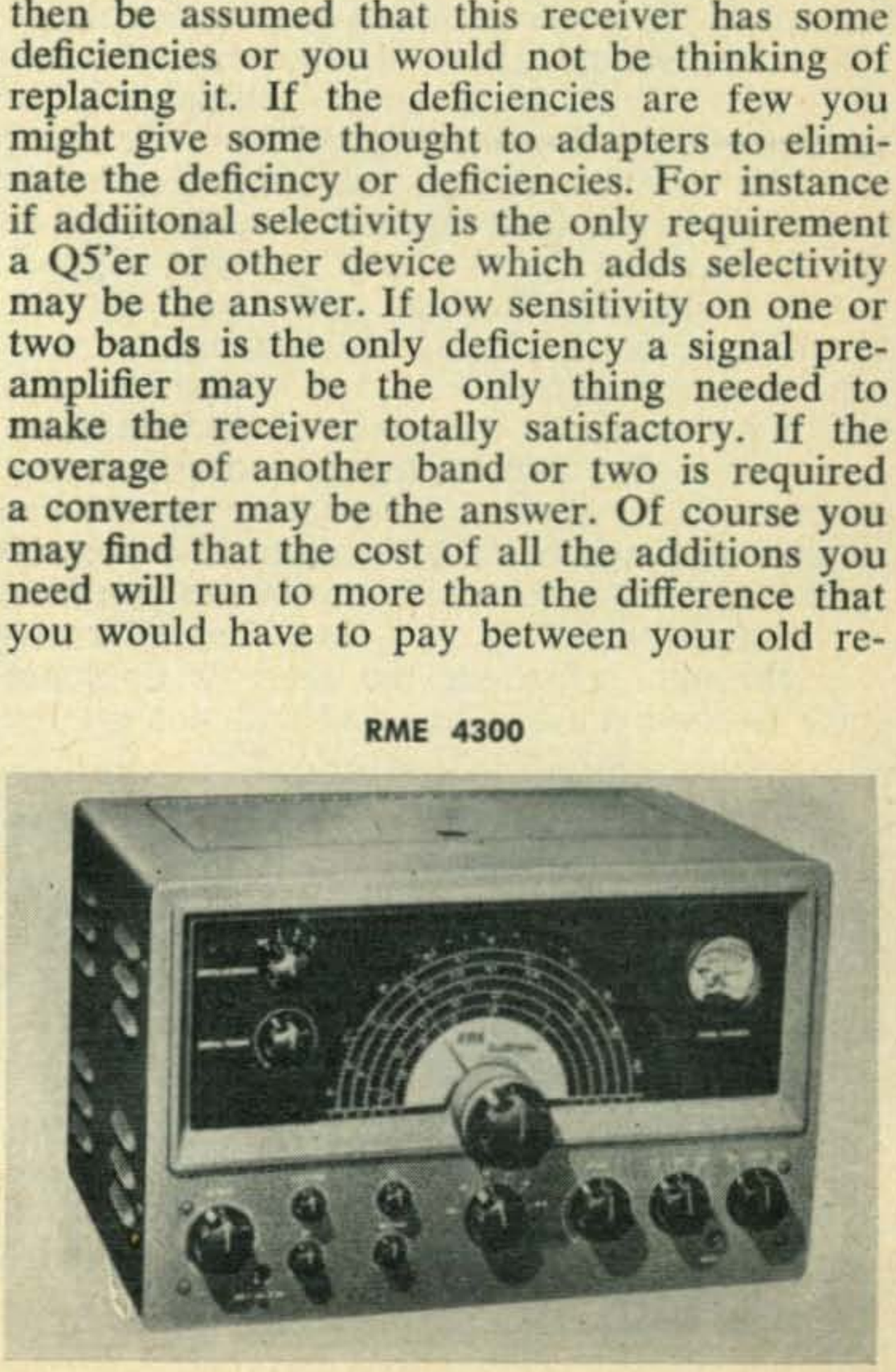
with a view of guessing whether they will stand being twisted for the life of the receiver.

Suitability for intended use includes the aforementioned factors plus such items as covering the desired frequency ranges, amount of bandspread available, facilities for specialized use such as SSB or for use with a VHF converter. Satisfaction to user is made up of all the items mentioned above plus such things as ease of operation for the particular user and perhaps the prestige or other pleasure which may be derived from the ownership of a particular model receiver.

Your Old Receiver

Perhaps you already have a receiver. It may then be assumed that this receiver has some deficiencies or you would not be thinking of replacing it. If the deficiencies are few you might give some thought to adapters to eliminate the deficincy or deficiencies. For instance if addiitonal selectivity is the only requirement a Q5'er or other device which adds selectivity may be the answer. If low sensitivity on one or two bands is the only deficiency a signal preamplifier may be the only thing needed to make the receiver totally satisfactory. If the coverage of another band or two is required a converter may be the answer. Of course you may find that the cost of all the additions you need will run to more than the difference that you would have to pay between your old re-

RME 4300

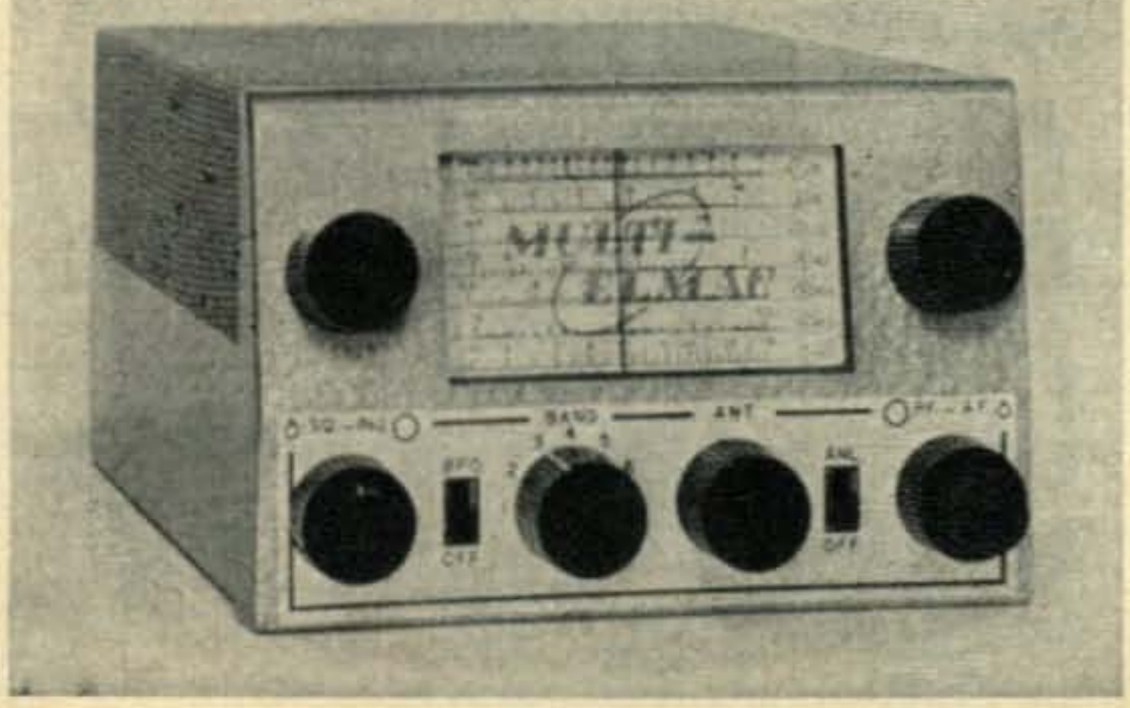


Gonset G-66

ceiver and a new one which has all the required features.

If your receiver cannot be modified to fill your needs and none of the standard models on the market will fill them you may find it necessary to build your own receiver or converter or to modify a standard receiver. The problems of construction of equipment cannot be discussed because of space limitations however a study of handbooks and current amateur magazines should uncover sufficient information to permit the builder to satisfy his receiver requirements.

Extensive modifications of a new receiver are usually rather uneconomical since the receiver loses most of its trade-in value if the modifications cannot be removed and the receiver restored to its original condition. If the modifications can be made by the use of plug-in adaptors or if they require only one or two small holes that can easily be covered up with screws the problem of restoring the receiver to its original condition is a simple one. A good used receiver may sometimes be purchased at a price such that the loss of trade-in value is not of importance and thus the receiver may be modified to any extent desired without undue financial loss.



Elmac PMR-7

Once we have spent all the grocery and clothing money for a new receiver we should give some consideration to how we should operate it and care for it in order to secure the most effective and economical use of it. First we should study the instruction book furnished by the manufacturer so we know what the receiver was designed to do and how the controls should be manipulated to secure the desired results. We should remember that the receiver is a device that must dissipate a fair amount of heat and that the designer expected that it would receive a certain amount of ventilation so it should not be crowded into a small cubby hole and left running for hours on end. It is better if you don't set your coffee cup atop it since sooner or later a cupful will be spilled onto the chassis which will not benefit at all from the treatment. Adjustments should not be made without consulting the instruction book. An alignment every six months or a year will help to keep it at peak efficiency. The antenna system should be designed so that the receiver is protected from the transmitter output. If the transmitter is very high powered it is worth while to have a second antenna relay at the receiver to short the receiver input when the transmitter is on.

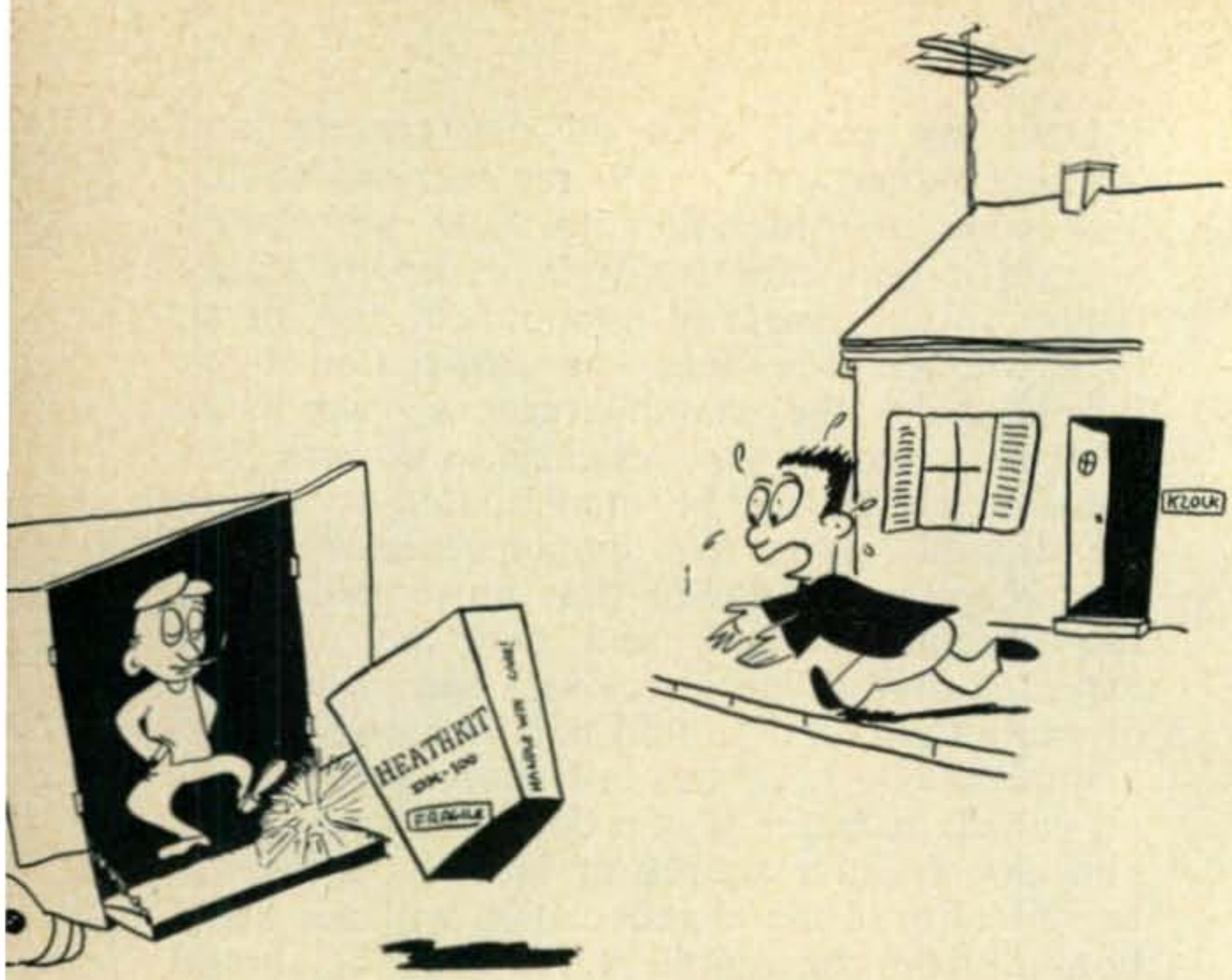
Morrow MBR-5

Moisture is bad for all electronic equipment so if the XYL has made you set up your shack in the basement or some ordinarily unheated building you really should give some thought to dehydrating systems for the space. Almost all equipment built nowdays has electrolytic capacitors in it. These electrolytics deteriorate much more rapidly when they stand unused than they do under constant use so it is advisable to turn everything on periodically to keep the electrolytics formed up.

Remember

Last but not least, although the old slogan "Save the surface and you save all" is not completely true in the case of electronic equipment it is still important to preserve the finish by periodic cleaning and care.

In closing I think that it can safely be stated that if you choose the right receiver and care for it properly you can obtain many years service at a low cost. ■



DX-100 Modifications

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Santa Barbara, Calif.

The DX-100 transmitter kit put out by the Heath Company created quite a stir when it was announced. By now thousands of them have been built and are in daily operation. As with any piece of electronic equipment there are bound to be some slight differences from one unit to another. This article will perhaps help some of you who have run into the same difficulties that I have met and conquered.

My DX-100 would not tune up easily on the 10 or 15 meter bands. When the final plate tuning was out of resonance by a slight amount, it would cause the grid drive to drop to less than 1 ma. or go to a high value of about 8 ma. With the knob turned to c.w. and the grid current adjusted for about 4 ma., then tuning the "Amplifier Tuning" through resonance would cause a severe change in the grid current. This is an old and reliable method for recognizing non-neutralization.

I have talked to dozens of owners who did not have to neutralize the final stage of the DX-100, and to dozens of other owners who have the same trouble I have had.

By studying the diagram, it will be found that the DX-100 uses a pi-network to drive the final, and it is obvious that we should be able to neutralize the final by putting a small capacity from the plates of the final 6146's back to the plate of the 5763 driver.

Neutralizing

To make my modifications, I slid the transmitter chassis out of the cabinet. Facing the transmitter front panel, I noted that the 5763 plate tuning condenser right hand lug of the stator has a lead going to the tapped vertical coil and another lead going down through a rubber grommet, through a condenser, to the plate pin of the 5763. The left hand lug of this condenser is unused. (See pictorial 9, page 46, of DX-100 instruction manual.) By looking at the plate tuning condenser for the 5763, it will be observed that the job should be simple. I drilled a hole about ¼" in diameter through the baffle plate in line with this lug, then soldered a piece of #14 bare wire about 4" long to this left hand lug. The wire was arranged so that it will not touch the sides of the hole, and will extend in the direction of the large RFC, feeding the 6146's. The wire was cut so that it will not reach the large lower pi of the RFC, to avoid a short in the high voltage. In my case, complete neutralizing was accomplished when the wire pointed toward the RFC. Bending the wire closer to or farther away from the 6146 caused definite unbalance. It required only a few minutes to find a place where neutralization was excellent, as indicated by tuning the final through resonance, and observing that the grid current did not change at all. Then I applied power to the final and tuned up. Now the grid current remains steady when the final is tuned from one side of resonance to the other! Only a fraction of a miliampere change—what a pleasure.

Pi-Net Output

I also had trouble with the pi-network output loading condensers. On the 10 and 15 meter bands I could not properly load my gamma matched three element beams even though the standing wave ratio is about 1.2:1 at resonance using 50 ohm cable to each antenna. With the coarse loading on 8, the fine loading variable condenser would load only to about 200 ma. With the coarse loading on 9, the fine loading condenser would have *no* effect, and the resonant load would be over 300 ma. The off resonance tuning of the final would go over 400 ma. The small mica 400-600-800 $\mu\mu$fd condenser and associated wiring ran extremely hot. This probably was caused by the condenser and associated wiring through the switch being near self resonance at these high frequencies. (See pictorial 8, page 38 DX-100 handbook.) I removed the 400-600-800 $\mu\mu$fd mica, the 200 $\mu\mu$fd mica condensers

and the original 250 $\mu\mu$fd variable condenser from the pi-output circuits. A new three gang broadcast-type condenser replaced the original 250 $\mu\mu$fd variable. The three sections were connected together in parallel to give a total of 1200 $\mu\mu$fd and a minimum of about 35 $\mu\mu$fd. It was easy to mount this condenser to the rear plate of the chassis using ⅜" collars and three 6-32 ½" bolts. The shaft of the 3 gang condenser was coupled to the 'fine coupling' shaft with a standard flexible insulated coupler. The coarse adjustment and its associated switch are left in place and are not used. The wire from *C2* on the band change switch was run directly to the output co-ax connector. A short wire about 1½" long tapped off the output lead to the new 3 gang condenser. Now it is possible to load the antennas on any band (all fed with RG/8U or RG/11U) through a *Johnson* low-pass filter with perfect control, and even after several hours of use, the condenser and antenna feed wire are cool. With the gain control full on and talking loud, there is no tendency for arcing between the plates. I have the original tank coil in the DX-100 and it does not over-heat. It is normally loaded to 250 ma. at 800 volts: 200 watts input.

Before this modification, I had severe TVI in my own TV receiver on Channel 3. Now there is only a slight amount of cross-hatch lines barely visible at normal viewing distances.

Co-ax Relay Output

Another modification may be of interest to owners of the DX-100. I used an *Advance* CB/1C-2C 115VAC co-ax relay with two sets of auxiliary contacts. The co-ax relay was mounted so that the 'normally open' output co-ax fitting was through the hole originally intended to hold the chassis co-ax connector. The relay was bolted on by the four 4-40 bolts holding the co-ax fitting to the relay. I soldered the pi-output antenna lead to the inner conductor of the co-ax fitting. This makes the relay a part of the transmitter and saves making up one length of co-ax line with connectors on each end. One pair of the auxiliary contacts on the relay is used for disabling my receiver while transmitting.

Low Drive on 10 and 15 Meters

If you have not been able to get enough grid drive on 10 and 15 meters, it is usually a simple expedient to spread the 10-15M coil shown in lower pictorial 7, page 34, so that the two coils are about ⅜" apart.

After making all of the above modifications, I feel that the DX-100 is ideal for my needs. Many pleasant contacts on phone have been had with all continents with perfect arm chair copy on both ends of the QSO. ■

Updating the Viking and DX-100*

*The same modification helps the Heath DX-100. There are few differences in the two transmitters in the plate power switching department.

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Viking II owners occasionally run into difficulty with the plate switch defuncting itself. My solution to this problem was to replace it with one of slightly different design which would also provide greater ease of operation on phone. The whole job doesn't take an hour and the changes are well worth the time and effort.

When the Viking is used on c.w. one half of the plate switch *SW2* connects the 115 v a.c. to the primary of the high voltage transformer. On phone the other half of this switch is used to key the transmitter by grounding the cathode of the 6AU6 oscillator, *V6*. See *fig. 1*. By substituting a three position (on-off-momentarily on) switch and adding a jumper at the switch we can use the extra switch position to zero beat or tune the low power stages of the transmitter for phone operation. This is done by having the switch key the transmitter without turning on the high voltage and makes it so you don't have to switch to c.w. and close the key for zeroing.

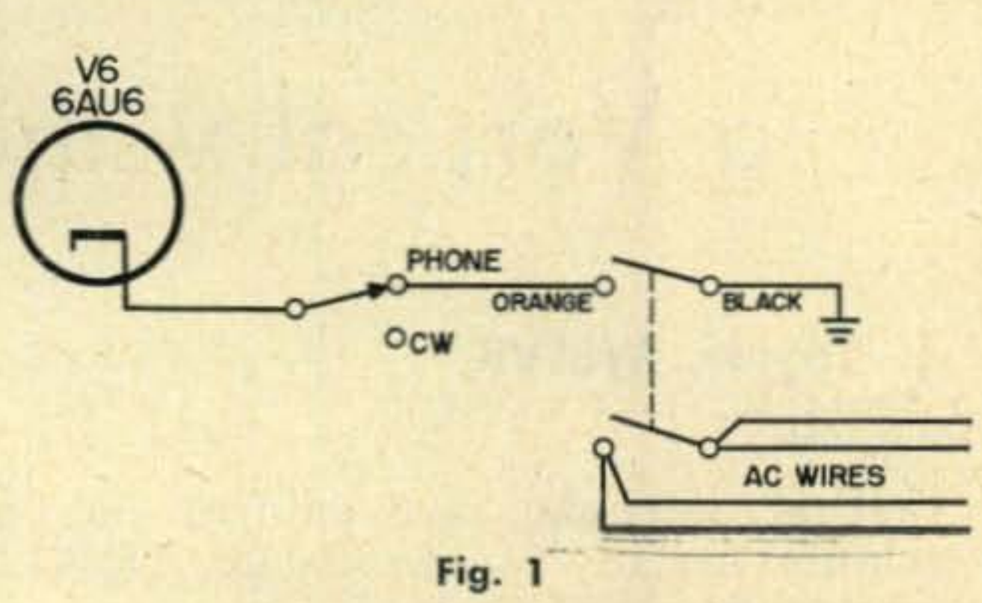

Fig. 1

The switch I recommend is a Carling ♯6GM68. If a switch with one position "Momentarily On" is not desired, a double-pole (ON-OFF-ON) switch without the

spring-return, such as a Carling #2GM54, can be used. Incidentally, the manufacturer is Carling Electric, Inc., West Hartford 10, Conn.

First, disconnect the Viking and turn it upside-down. Remove the bottom screen by removing the 22 screws. Remove wires from the existing plate switch one terminal at a time, and as you do, solder a teardrop terminal on each. On two of the terminals there are two wires; these are the a-c wires. To prevent a mix-up, solder these two wires to one teardrop terminal in both cases. Now make up a jumper

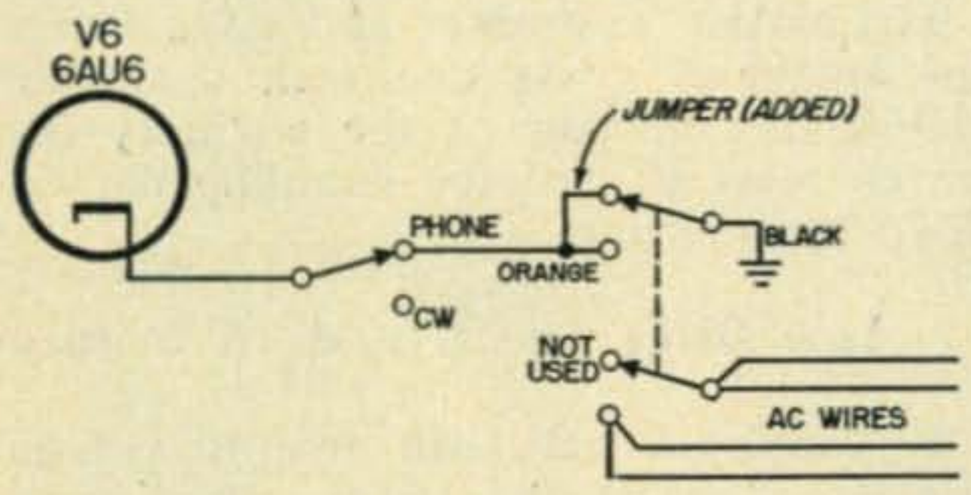

Fig. 2

wire about two inches long from insulated hook-up wire and solder a terminal on each end.

Carefully, so you don't scar the panel, unscrew the nut on the front of the transmitter which holds the switch in place. You will probably now find that an additional nut is located on the switch between the front panel and the chassis. If so, unscrew the switch out of this nut, maintaining a slight pull on the switch to prevent the hidden nut from turning. When you remove the switch the nut may fall out of place, so follow the bat handle of the old switch with a pencil to keep the nut captive. Install the new switch, pushing the pencil out with the bat handle so that the hidden nut is not allowed to escape. Adjust the collar nut so the switch protrudes the right amount and loosely install the nut on the front of the panel. The switch will be properly positioned if the "momentarily on" side of the switch is toward the bottom of the transmitter (which will be "up" as the Viking is now upside-down).

Refer now to *fig. 2* and use an ohmmeter if you aren't sure of toggle switch operation. Connect the jumper and the four terminals to the new switch as shown in *fig. 2*. Tighten the nut on the front panel (carefully) while making sure that the switch is not allowed to turn and that the terminals and switch connection screws cannot short out. If the light bulb for the red jewel touches the switch body, relocate the light bracket slightly to clear. Re-install the bottom screen, invert the transmitter and hook it up.

Turn on the low voltage supply switch, and turn emission switch to "Phone." After tubes are warm, hold the new switch in the "momentary" position. The red jewel should *not* be lighted. Still holding the switch in this position, you should be able to zero-beat and also to tune the oscillator and buffer stages of the transmitter and to adjust grid drive to the final. If these checks are satisfactory and you haven't changed frequency too much, flip the new switch up to the "normally on" position and resonate the final.

This modification can be accomplished on the Viking 1 transmitter, also. Electrically, the switch replacement is identical; mechanically, there will be some differences, but any amateur who is careful can accomplish the change.

While it is still fresh in your mind, change your transmitter schematic to show the new switch circuitry. Write "See CQ for Oct. 1956" on the margin so that when you have used the rig with this modification for awhile and found how convenient it is you can tell the other boys where they can find the article. And I'd suggest you get half a dozen of the switches; after I began telling on the air about it my stock of switches was soon gone. ■

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a Vertical without a Ground Plane

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Vertical antennas have enjoyed increasing popularity recently on the 40, 20, 15, 11 and ten-meter bands. However, there are many locations where the vertical antenna is impractical because the feed point is near the ground and the ground plane is sometimes difficult if not impossible to construct due to lack of space. The vertical antenna described herein is fed at the center, needs no ground plane and is very easy and inexpensive to construct.

Basically, this antenna consists simply of a half-wave folded dipole hung vertically from a tree, or a pole, or a clothesline strung between two trees, etc. The optimum height at which to hang this antenna to achieve maximum radiation at low elevation angles should receive some consideration. If the antenna is placed

over a perfectly conducting ground plane of infinite extent, the center of the antenna should be ¼ to ⅜ wavelength above the ground plane[1], or in other words, the lower end of the antenna should be within ⅛ wavelength of the ground plane. This theory does not apply, however, when the antenna is located above a ground that is not a good conductor, or when there are obstructions such as houses, hills, trees, etc., which would shield the reflected image of the antenna in the ground plane, and perhaps even shield the radiating antenna itself for low-angle radiation. In the case of the city dweller who is surrounded by obstructions, there is no effective image in an earth ground; therefore, the antenna should be placed as high as possible so that the direct radiation from the antenna will provide low-angle radiation. Anyone fortunate enough to be located in the wide-open spaces with few or no near-field obstructions may find better low-angle radiation if the lower part of the antenna is located within ⅛ wavelength of the ground. The optimum height to use will be dependent on ground conductivity and the antenna should be tried both at ⅛ wavelength and at the maximum obtainable height to determine which will furnish the best results. Do not try to improve conductivity under the antenna by chemical treatment or buried radials as the area of reflection for low-angle radiation will extend quite some distance from the antenna. The blessed operator that lives on a clear hill-top will definitely want to use this antenna within ⅛ wavelength of the ground, and it would be to his disadvantage to elevate it above this height unless for some reason he desires high-angle radiation.

There are several ways to construct the dipole. The easiest would be to use 300 ohm open TV lead-in as shown in *fig. 1*. The length of the antenna should be selected for the desired band as shown as ($l_1 + 21_2$) in table I. If it is desired to use flat TV twin-line, the

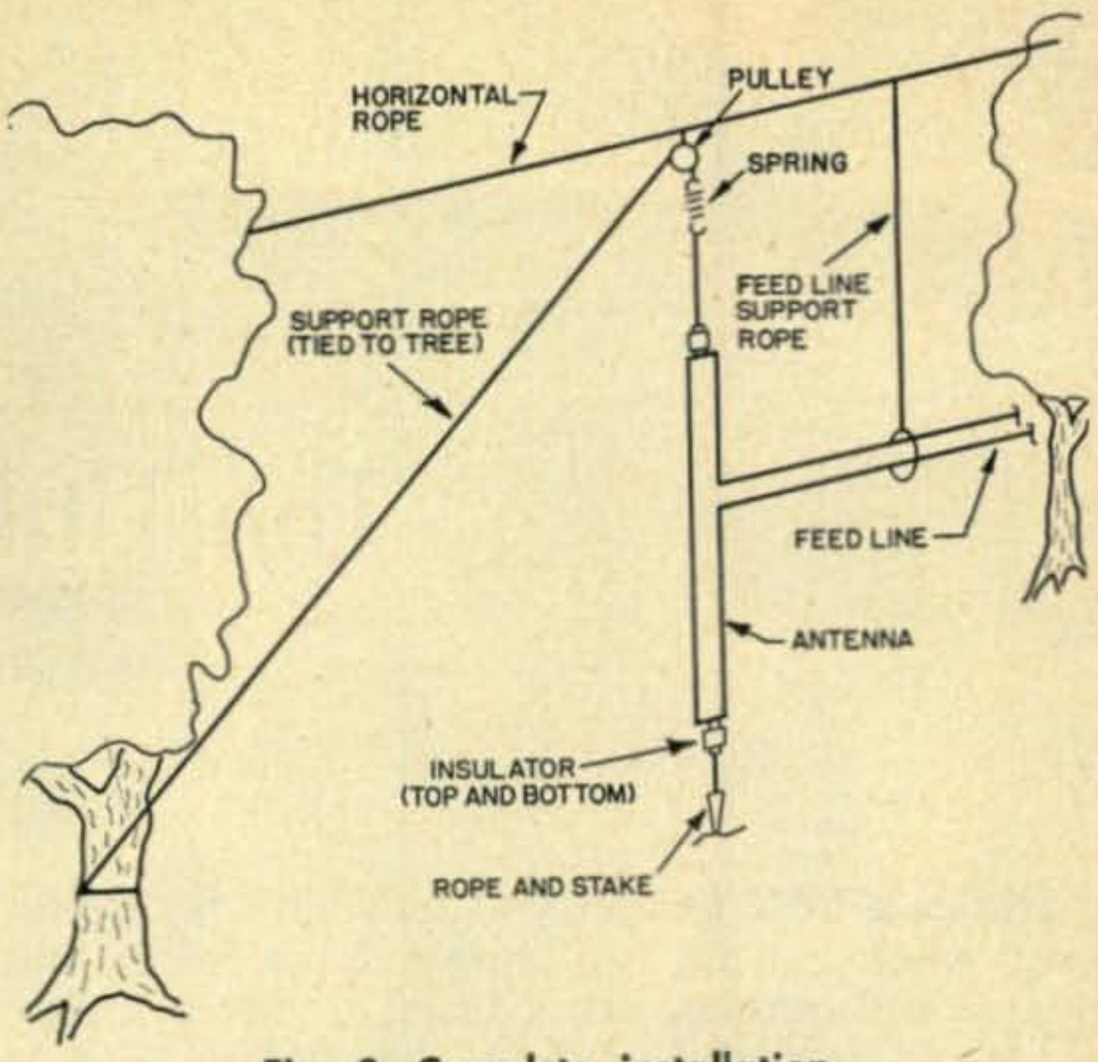

Fig. 3—Complete installation

impedance match and bandwidth characteristics of the antenna may be improved by constructing the antenna as shown in *fig. 2*.[2] The point at which the twin-line should be shorted is indicated in table I. If other than flat twin-lead or open-line is used, the lengths l_1 and l_2 may be calculated easily. The length l_1 is .94 x (free space half wavelength) x (velocity factor of the transmission line used.) The wire ends are cut to such a length that the overall length of the antenna is .94 x (free space wavelength), or it may be expressed in feet by 462/(frequency in megacycles). The velocity factor of the transmission line used should be obtained from the manufacturer and is defined as the ratio of the wavelength in the line to the wavelength

[*continued on page 114*]

	6M	10M	11M	15M	20M
L1	7' 9.2"	13' 11.8"	14' 10.9"	19' .4"	28' 6.0"
L2	6.7"	12.0"	12.8"	16.4"	24.6"
L1+2L2	8' 10.6"	15' 11.8"	17' .6"	21' 9.2"	32' 7.1"

Table 1

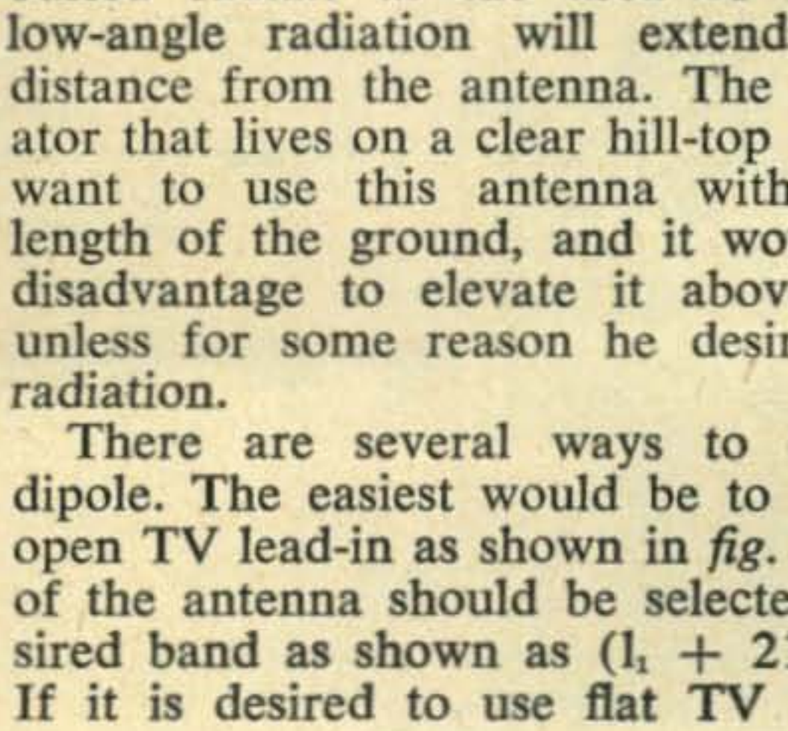

Fig. 2

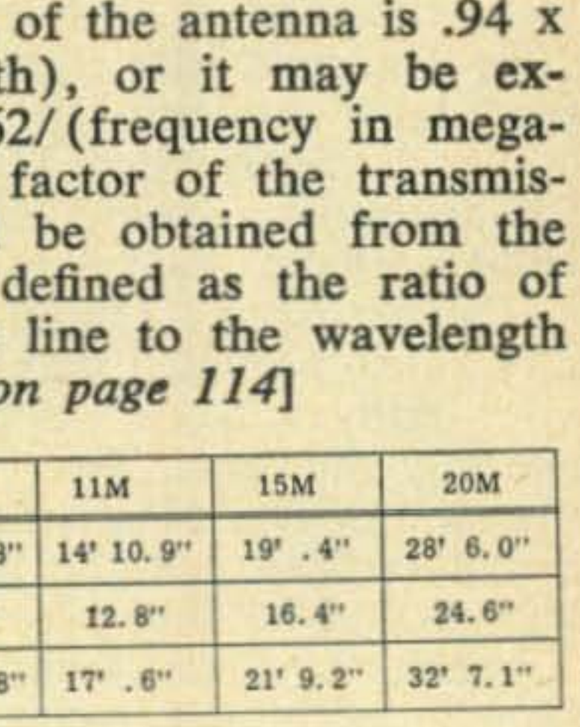

Fig. 1

1. "The ARRL Antenna Book" Fifth Edition, pages 48 and 58.

2. "The Radio Handbook" Thirteenth Edition by Editors and Engineers, page 300.

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The Little 'Leven

Here's a little gadget you may find handy to have when putting up antennas or when on picnics and outings. It's a little 11 meter transceiver, made to be used in conjunction with a fixed or mobile 11 meter station.

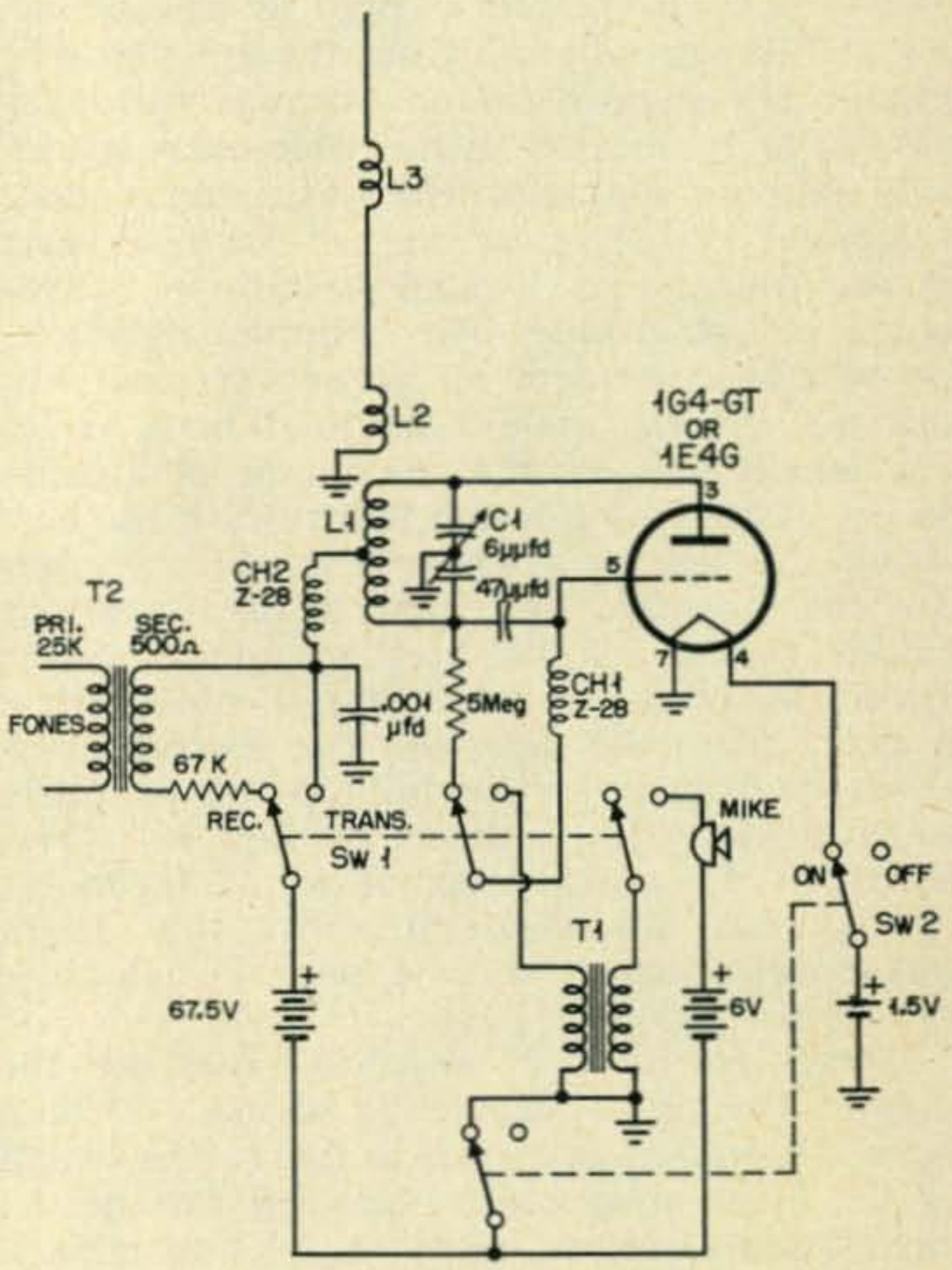
After examining the schematic diagram, you will see that in the receive position the 1G4-GT is a superregenerative detector. The amount of regeneration is fixed by a 67K resistor in the plate supply. A subminiature transformer is wired into the circuit in reverse to enable the use of crystal headphones and to keep B plus off them, but a pair of low impedance magnetic headphones may be connected directly if desired. The B drain is only two tenths of a milliampere when receiving.

In transmit, the 1G4-GT becomes a grid modulated oscillator. It is stable enough to be copied on a superhet. The B drain is eight mils for an input of one half watt. A base loaded whip is used as an antenna.

The transceiver should be constructed in a metal box provided with a metal handle. Then your body will act as ground when you are holding the unit. This will help to stabilize operation. The placement of parts and wiring is not critical, but the leads in the tuned circuit should be kept short.

When the transceiver is ready for testing, tune a calibrated receiver and listen for the transceiver's signal. Adjust the variable condenser until the signal falls in the 11 meter band. It may be necessary to prune the coil (L1). In fact, it would be wise to start out with more than 19 turns on the coil and peel off two at a time (one turn from each end) until you hit 11 meters. When the unit is on frequency, adjust the length of the antenna or the nummer of turns on the loading coil for maximum reading on a loosely coupled absorption type wavemeter or field strength meter. That's all there is to do. If the band is open, you should be able to hear strong locals and even dx with the little receiver. One afternoon when ten was really hot I heard W1, W2, W3, W4, W5, W6, W7, WØ, KP4 and Cuba.

A similar unit could probably be built for any ham band by substituting suitable r.f. chokes and tuning coils. An experiment was performed using Ohmite Z-144 (2 meter) r.f. chokes and a 6 turn coil. The unit oscillated on 2 meters.



Schematic diagram

All in all, this is a simple, enjoyable project, and it results in a transceiver that's really useful. My thanks to K2MDB and K2OII for their help in testing this unit. ■

Parts List

C-1, 6 μμfd (Cardwell PL6-076)
L-1, 19 turns B&W 3004
L-2, 4 turns #18en. ½" dia. ½" long spaced ⅜" from L-1
L-3, Approx 24 turns B&W 3004
CH1, CH2, Ohmite Z-28
T-1, S.B. Mic to Grid, Stancor A-4706
T-2, UTC S-03 (optional)
Mike, 100 ohm carbon
Antenna, 19½" whip, (rabbit ears or Communicator whip will do)
SW-1, 3 pole 2 pos. switch (Mallory 3242-J)
SW-2 D.P.D.T. switch

the Yasme at

Canton Island

Danny Weil, VR1B

Canton Island . . . As I lie here in the luxuriant grass, moist with the evening dew, the sun, gradually sinking below the horizon casts its golden beams through the waving palms causing flickering shadows to appear around me; the tiny waterfalls and babbling brooks, pick up these last rays of light and throw fascinating reflections onto the surrounding fruit trees. Dusky maidens sit at my side, stroking my brow, caressing me, and feeding me with the wonderful fruits in which the island abound, softly singing and making me dream of . . . dream . . . Yes, that's exactly what I am doing, DREAMING. Huh!!!!!! Canton Island, dew, babbling brooks . . . babbling HOOEY.

What the heck do you blokes think this place is? . . . Tahiti? First, let me inform you . . . there just ain't no trees, brooks, waterfalls, in fact, there just ain't nothing here . . . not even any fresh water, and, as for women . . . that was wishful thinking.

All this joint consists of is a horseshoe shaped chunk of coral about 9 miles by 4, and around 10 feet high if you stand on your toes. The sun burns down onto the glistening white coral, and if you have any respect for your eyes, you either close 'em or wear sun specs.

On this excuse for an island live a certain number of Americans, British, and Gilbertese natives, all who, in my opinion, deserve a great big medal and a pension at 30 for their bravery in staying here to maintain the air strip . . . personally I'd rather cross the Atlantic in a canoe than live here for any time . . . I must have aged around 50 years in my 3 month stay . . . Now, removing my beard from the typewriter, I will proceed.

This joint was apparently discovered, much to his regret, by a certain American sailing type in 1854 (when I was a lad . . . Hm! . . . Quite a young lad) this bloke ran his ship onto one of the reefs in which this place specializes, and, on coming ashore, found that no aircraft were due in for a few years, and the only inhabitants seemed to be a few moth eaten birds, and thousands of hermit crabs, all of which showed complete lack of interest in his arrival . . . the birds all went on being eaten by the moths, and the crabs crawled back into their shells leaving the skipper and his crew to fend for themselves.

This inhospitality of the local inhabitants turned the captain and his crew to their open boats, and sailed around 3000 miles to Guam Island. For this discovery, the island was called

Beautiful palm fringed coast of Canton Island

Canton . . . it has been called other names . . . not to be mentioned here. However, to make a short story long, the British also called here a few times, stuck up a beacon . . . possibly to warn people off, and also planted hundreds of coconut palms. Even the palm tree, renowned for its toughness the world over, couldn't take it . . . they all died . . . now what do you think about that? Anyway, the Americans and the British got together and decided that since they both had been mixed up in the place they should have some sort of an agreement in which they both governed it. So now they call it a Condominium . . . what a long word for such a small place.

Well, now to tell you types about me, radio, and the people here, not forgetting the old Yasme.

How the heck do I write a story about a place, when most of the time has been spent sitting at the rig gradually going nuts.

Suppose I had better start at the beginning and hope you don't all go to sleep before I reach the end, anyway . . . here goes.

As you all know, I was greeted most royally by the British Commissioner, the U.S. Island Manager, and Howie (KB6BA) on arrival, and, as I recollect, the last thing I was doing was feeding my face and then hitting the sack for a well earned rest.

The following morning no time was lost in nipping down to the Yasme and removing all the radio gear, and within 18 hours, thanks to Howie who gave me every assistance including the use of his shack, I was on the air with VR1B.

Needless to say, I was overwhelmed with QSOs, and, whilst the band remained open, I stuck at it until 3 to 4 a.m. each day. Each day for some time became exactly the same to me, and my whole life was devoted to key thumping and occasionally spouting on fone, but I must admit I thoroughly enjoyed myself and tried to answer every call that came through . . . for those that were unlucky I can only apologize, but I have stayed here much longer than the original month that was arranged, and for those that didn't make contact, I can only assume that cdx were too bad, or I just couldn't hear them but, I feel sure in my own mind that I have made contact with every interested ham.

Here I must admit that the little Elmac TX put up a fine job, getting out to nearly 100 countries . . . I just couldn't make my DXCC. The Collins 75A-4 did a really super job in picking up all those very weak stations, and by use of the rejection tuning coupled with that 800 cycle filter I was able to split up the twittering mass into separate readable sig-

Yasme, before the refit

nals. I feel that without this fine RX, my number of QSOs would have been considerably less.

As time went on, so other equipment started to come in for the job; Eldico shipped out the SSB 100A and the 500 linear amplifier . . . they came a little late in the day to be of any material use, but will certainly get a good bashing when I reach the other places, and I hope to get a few hours on SSB for the Donald Duck friends. A fine step down transformer was donated by W9YFV, as many of the later rare spots are 230 volts. A filter was sent by W6MUB for the Onan generator, and whilst I cannot possibly write all the names of the very kind types that helped, I must say I do appreciate what they did . . . also, I would very much like to give all you lads and lassies a great big hand for all your assistance, both monetary and for your good manners on the job . . . you all helped to make my work easier.

Well, so much for all that . . . not very interesting from a bed time story angle, but nevertheless, I want you to know how I stood on the DX side of things.

Poor Yasme

Now for Yasme. She had rather a bad caning from Tahiti . . . I'd not do that trip again for all the hams and radio equipment in the world . . . I wonder? Suppose I shall do precisely the same thing on my next trip around the globe . . . I'm mug enough for anything. When I think of all the hours I spent sewing those rotted sails together only to arrive here with the whole lot in tatters again; but, I couldn't have cared less, new ones were on the way and it was a wonderful feeling to think that when they finally arrived I could put away my needles and thread and forget that the Yasme sewing bee had ever existed. All my wonderful varnish work that shone so brightly in Tahiti was gone, the bare wood showing everywhere. The glistening white top sides were streaked with rust marks from the gas cans carried on the deck and dirty oil marks covered the water line, and generally speaking, she looked a wreck.

Incidentally, the last sail blew out just as I reached the pass into Canton lagoon. The engine managed to push Yasme into the harbor on one cylinder with the aid of the current before finally giving up the ghost altogether. So, as you can see, I did have to spend a couple of hours on getting the old tub shipshape again besides the DX work.

When I had got organized on the rig and found the times when the band was most active I devoted the other hours to Yasme. Both Howie and I trouped down to the boat, and between us, completely cleared out the whole shebang. It took us a full day to get all the junk out, all the things I had collected that might come in handy. The dockside was piled high with every imaginable sort of gear, and quite frankly I didn't know where to start to move it all. We used an old government surplus truck to move the stuff to a disused warehouse. It took four trips carrying

about a ton and a half a time to clear the dockside, and even then there was quite a lot more junk aboard that I just hadn't the strength to move. To sort all this lot out was impossible, so we just piled it all up in one big heap, turned our backs on it and changed the subject . . . it was too much to think about at the time.

The following day I got cracking on removing the engine. By around 5 pm it was all ready to lift out. I was so smothered in grease and oil that some darned idiot stuck a dirty

Danny and Howie operating VR1B

great hook in my ear thinking I was the engine to be lifted. Having removed the hook and stuck it in the appropriate place, we started hauling on the winch. That winch was made to lift two tons, but would that engine shift? It took me about ten minutes to discover that there were still a couple of 8″ bolts still holding it down; I feel sure we must have put a kink in the keel of Yasme on that effort . . . that makes two of us now with a kink.

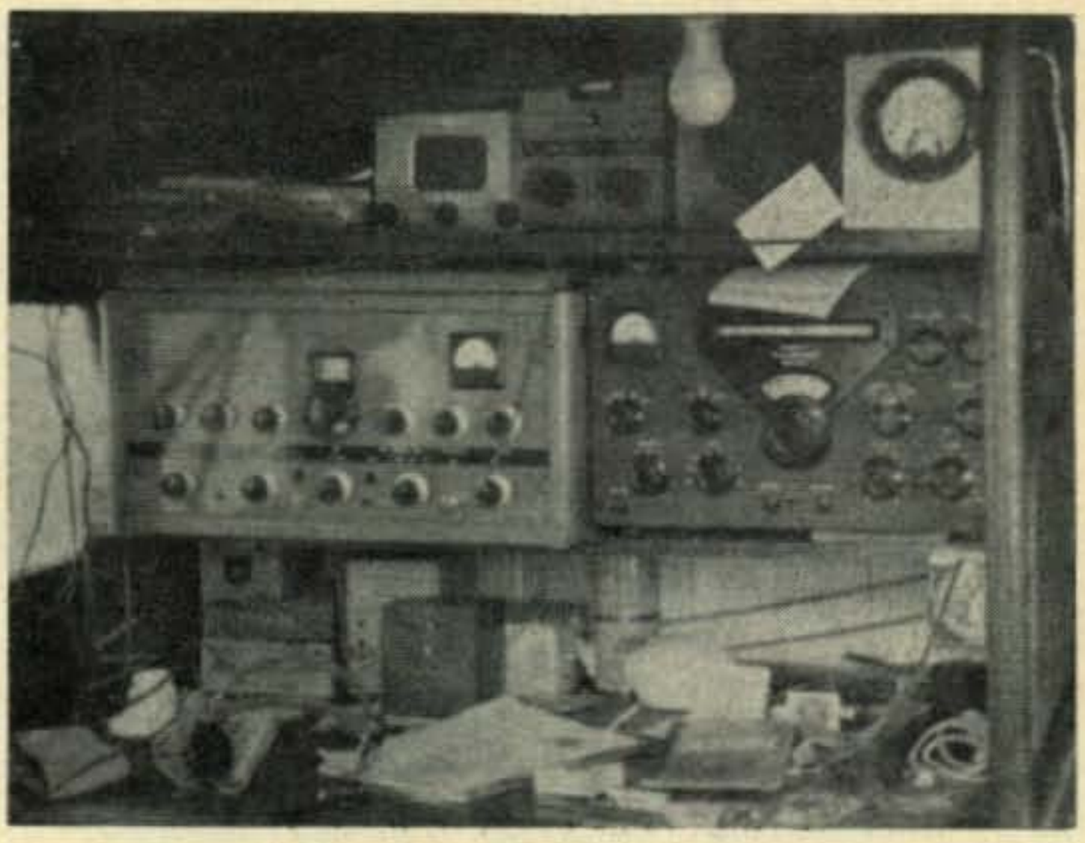
Well, with the assistance of two stout lads from the AKL, a US Navy boat, the winch, with Howie pulling, and of course me standing there grunting for all the lads every time they took the strain, we finally got it ashore and there it lay in all its glory. How I'd cursed that engine in the past, and other times I could have kissed it, but just at that moment I felt more like shoving it over the side of the dock and forgetting all about such things as internal combustion engines. We loaded it on the truck and bunged that on top of all the other junk in the warehouse, then tried hard to forget all about it.

Now before I say any more, I want you to know that this is exactly as things happened . . . nothing added, nothing taken away. After this fine effort, back on the rig again, feeling a little groggy, but still managing to continue until 2 to 3 in the morning without falling asleep over the key. Don't know why it was, but in those first weeks, I seemed to have unlimited energy . . . did I hear someone say "That's 'cause there ain't no women there" . . . ? . . . well, I dunno, but I seemed to be able to manage OK with 3 to 4 hours sleep and then feel fresh for the next day.

To continue with this thrilling episode of the engine; I finally managed to strip the whole thing down . . . right to the last bolt. Those old piston rings I'd stuck in the gear box had done a fine job on the teeth of the wheels. Half the teeth were missing, yet it still went OK, which once again goes to prove my point that these manufacturers always put more teeth on the wheels than necessary. Well, to tell you the truth, there was nothing really wrong with the engine even after I'd stripped it all down. There were four piston rings broken and the magneto shorting out in about ten different places, but apart from those odd items the engine was in absolutely perfect condition and I felt annoyed to think I had stripped it all down for nothing. Mark you, it did need a coat of paint badly, so that helped to ease my feelings. I made a good job of the painting too, it looked real good, although I'm sorry that no one can see the fine paint job I did on the cylinder bores . . . used first grade enamel too. The pistons were a bit hard to put back afterwards, but belting them lightly with a sledge hammer made them slide in beautifully.

Here I must say that Allan (ZL1PA) was responsible for all the spare parts for the job, which he very kindly donated to the expedition . . . makes me feel real good, these things happening to me.

Well, finally, the engine was assembled again, and there she stood in all her glory on a couple of chinks of wood all ready for the test start. I am sorry I wasn't able to get a foto of it . . . was too intent on finishing the job



Hamshack on the Yasme

and getting it aboard again . . . time was getting on and I wanted to get away soon as possible.

Now, as I said before, there she stood. I'd fixed up an old gas tank, coupled the hose pipe to the thing, and then, armed with the handle I started to wind . . . did I wind?

Blimey! ! ! I wound that thing until it almost seized up, but not a sound out of it. Then I got mad and gave it a real kick. When I returned from the hospital, complete with crutch, I decided to have one last pull just for the hell of it. Crikey! It started before I could get a full wind . . . Eureka (isn't that what Newton said when Eve threw an apple at him?) . . . maybe I'm wrong, it was Pythagorius and his theorem . . . yes, that's it, anyway, to disregard all these ancient blokes, all I knew was the old iron horse was going . . . mark you, a little erratic, but actually going 'round. Then, I thought I'd be really daring and give it the gun. The darn thing gave a loud bang, three gasps, and then died on me. By golly, I beat the hell out of that thing with my crutch, but there it lay . . . dead.

After much cogitation . . . good word that . . . finally decided that the magneto was not going to do its job, and although I must admit that many of the technical types here had a go at it, it just remained obstinate and refused to spark.

Where to get a Magneto

To say the least it was disappointing. Not much good grumbling, the only solution was to get a new magneto from England. Good old Dick (KV4AA) stepped in here and by virtue of a cable and a letter, ten days later the magneto arrived packed in lots of insulating material so that all the sparks couldn't leak out in the mail.

By this time I had installed the engine, lined it up, and was all ready to go to town with the new magneto. Half an hour later it was on and then the big moment again. This time no handle, just press the button. This is where I'm going to shake all of you . . . I pressed the button and away she went without a bang or a splutter. What a relief.

Having disposed of the engine, next came the problem of getting all the paint and varnishing done. By this time, I had just about had enough of working 18 hours a day, and the more I thought about painting, the less I felt inclined to start on the job. Lady Luck smiled on me in the form of the District Commissioner. With his aid I was able to get some of the Gilbertese natives to assist on the job, and in one week, we had turned Yasme from a dirty old hulk into something worth looking at again. These lads are really good workers and never at any time did I have to chase them.

I found that many of them would wander down to the boat and start cleaning up without a word from me, and on several occasions found that someone had been aboard, cleaned up the cabin and left without my being there. They have one thing in common with the Tahitians . . . they are always cheerful and ready to help out.

I must tell you about an incident that made me feel top of the world. The Commissioner told me that all the lads had invited me to one of their ceremonial dances in my honor. Once again I find myself in the same difficulty that I was in at Tahiti . . . to describe dancing and singing. First, it was totally different in every respect, and yet it had a charm of its own that cannot be described.

The music consisted mainly of singing and banging drums, but the harmony that emanated from around 40 of them, women and children included, must be heard to be appreciated. The dancing was carried out in the ceremonial grass skirts, but was much slower than the Tahitian style. They expressed themselves more by complicated hand movements than with the body. I must admit that whilst I couldn't understand the words, the hands gave a very good impression of the story of the song, and needless to say, the tape recorder was faithfully taking down every sound of each chant and song.

Exploring Canton

Up to now I had had very little opportunity to study the island but, as the work progressed on the Yasme and QSO's became less each day, I took time off to stroll around and see what the last war had left behind. It really shook me to see the gear strewn all around the place in the form of transport, buildings, and odd chunks of equipment . . . even to a complete dry cleaners shop. The majority of this stuff was on the South side of the pass . . . now completely used by the British. The North side, which was comparatively new, having only been recently built for the new air strip, also had quite a good sized scrap heap to show.

Many of the buildings have been taken down and reerected in more suitable positions, but the majority of the other stuff has decomposed to such an extent through rust and rot that it is useless.

Many willing hands helped with the work

Being a mechanically minded person it almost made me weep to see all this gear lying to waste, but it has been proven that the cost of salvage and transport back to civilization would cost far more than stuff is worth. So here it must lie until it finally crumbles back to its original state and disappears. Many times I have seen scenes like this at the movies, but never did I think I would ever actually see it in real life!

Howie, KB6BA with family

Fishing

To shoot into a subject for the keen fishing types . . . this place is the proverbial fisherman's heaven. Never in all my travels have I seen so many fish of varying types and sizes. One doesn't need to be an expert to catch fish here. I have watched children catching them as fast as they can bait the hook. When trolling, one considers it a bad catch unless he can bring back around 300 lbs in a couple of hours. The place abounds in tuna, bonito, and of course, our old friend the shark. I have on many occasions seen tuna of 100 to 150 lbs brought in using a hand line . . . (small note here . . . Yasme will be available to fishing trips daily . . . everything supplied except the beer and scotch) . . . so much for all that.

At the present moment the Yasme is tied up to one of the finger peirs which were used in the old seaplane days. The pier is very rickety and I think I shall eventually land in the drink when it collapses under my weight. To make a good job of the topsides and scrub and antifoul the bottom we decided to take her to the South side where we could beach her. We waited for one of the highest tides, then with the engine flat out, drove her straight up onto the sandy beach . . . one of the few sandy spots in the whole island.

Everything had been organized . . . there were two poles stuck in the beach to lean her against, but unfortunately we just couldn't get her far enough up the beach to utilize the poles. So the native lads got hold of a few oil drums and stuck them under her bilges. As the tide dropped the lads got cracking with scrubbing brushes and cleaning off the barnacles and weed. With the terrific heat of the sun it was soon dry enough to slap on the anti-fouling paint. Did those lads work fast! On one tide they did the entire job of painting both the topsides and the bottom. I had to raise the water line another 3" as the extra gear taken on here had made her sink far below her normal line.

Having completed all the painting possible under the circumstances, we all waited for the tide to rise to get her off. Gradually, the water rose and she became buoyant. All the oil drums were whipped out, and then, with all the lads pushing and the engine going full astern the old girl slid gracefully back into her own element again . . . ready for another little trip across the ocean.

The weather had been most kind to us that day; the wind, usually most boisterous, had dropped considerably and the waters of the lagoon had taken pity on me and had remained calm through the entire operation, so we were all most happy about it.

We loaded back all the deck gear that had been removed to lighten her and then, with quite a crowd of the lads aboard, we made a few circles in the lagoon and tootled off back.

Very soon I was back at the old finger pier safely tied up and then, with the aid of one of the boys, I did some more mast climbing to fit all the running rigging back that we had taken down for cleaning and greasing.

I also completely rewired the whole system of lights on the mast with screened cable . . . it looks quite pretty now . . . and the lights all work too . . . for a change. Between us we gave the mast two coats of varnish, just to make it more slippery when I have to climb up it again at sea . . . I love doing things the hard way.

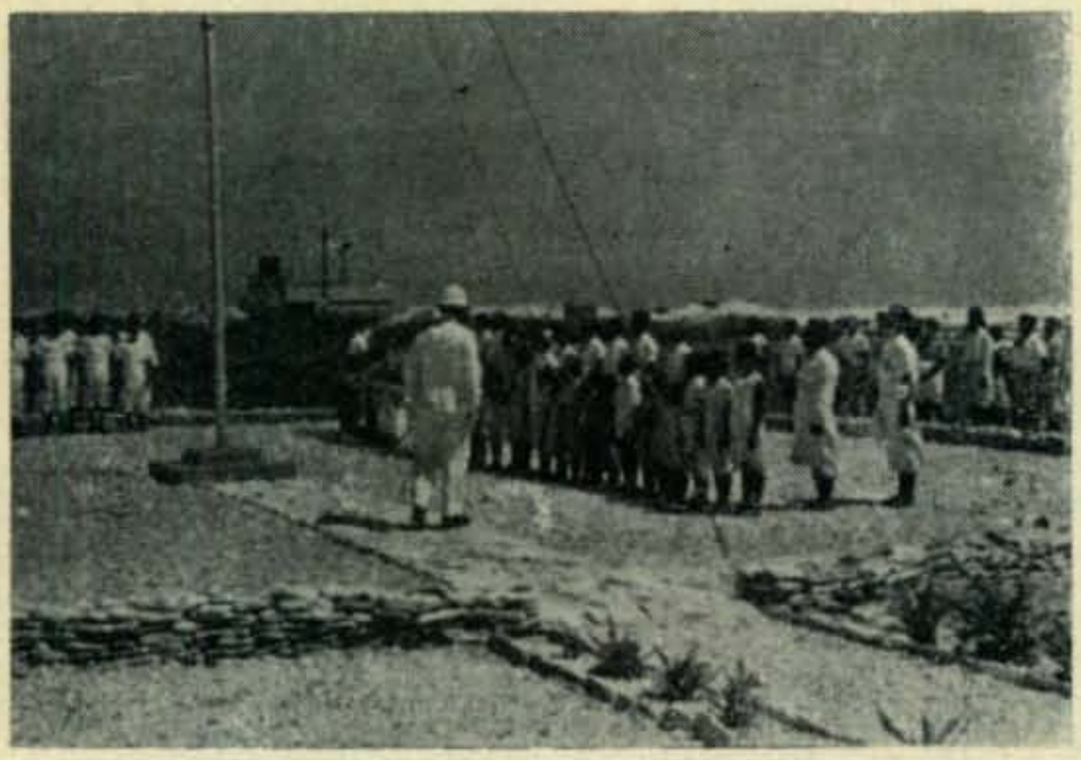
Extra Gas

I managed to get hold of two heavy galvanized 55 gal. gas drums from Standard Oil, brazed on a couple of tubes with caps to put in the gas, then installed one at the stern and one in the bows . . . I'm making sure I don't run short of gas again as I did on that trip up from Tahiti. These extra drums bring up my capacity to around 350 gallons so it looks as though I shall have to be careful where I drop my cigarette ends . . . Hi.

Another little project I managed to get done

was to install the Onan generator on top of the cabin roof instead of on the fore deck. Whilst it had given good service there for around ten thousand miles it wasn't helping it any to be half submerged every time the sea started to get a little rough. Now it is nice and high, so don't think I shall have any bother with it there. Here I must put in a word for these tiny Onan generators. I have had one running every day for over a year, and have drawn the full 750 watts from it at most times, yet when I stripped it the other day for a top overhaul, apart from cleaning out the carbon deposit, the valve seats were perfect and I just couldn't detect a sign of wear in the bore or valve stems. Now this has been stuck on that deck all the time and, apart from fitting new points and periodically cleaning out the magneto with carbon tet it is still going strong. I would however suggest to the makers that they fit the tanks 1″ higher, also fit copper pipe instead of iron for the gas supply . . . other than that . . . no complaints.

As you can see, apart from the DX work and the odd few boat jobs, I have had very little to do here so shall be very glad to get back to sea again and get some work done . . .



Pomp and ceremony breaks the deadly monotony

but this time, there won't be any sewing to do on those ! ! ! old sails of mine.

Today was the greatest day of my life . . . my new sails arrived from Hard Sails, Islip, New York. To the uninitiated in sailing, it is very difficult for them to realize the pleasure I got out of receiving them. They were beautifully made in Orlon, from Alexander Lamport and Brother of New York City, with stainless steel luff wires, in fact they were something that I never dreamed I should get in all my life, and quite frankly, I feel almost scared to put them up in case they get dirty or something. Naturally I haven't had the opportunity to fit them yet, but have spent some time just looking at them . . . boy, do they give me a kick. It's blowing a 40 knot squall at the moment and from the look of the sky it will continue to do so for many hours, so it will be a day or so before I shall feel happy about hoisting them whilst at anchor. The day just won't come fast enough for me to get them up and be on my way.

Excuse me jumping around like this, but these little things come into my mind at odd moments. The other day the lads took me out in one of their outrigger canoes . . . what an experience for a deep sea man. It was around twenty feet long and had I suppose about 100 square feet of sail up on a peculiar triangular mast. At the time there was little or no wind, yet it slid through the water like a surf boat. As we got further from shore the wind came up and before long we were skimming along around 15 to 20 knots.

The outrigger left the water and the idea was to just keep it planing on the surface to keep up the speed. The way that canoe pointed up into the wind was amazing, never have I seen a modern yatch that could point so well.

Tacking

The amusing part of all this was when we had to come about to tack. One of the lads grabbed the centre pole of the mast whilst another lifted the other part of the mast from the bows. With a very smart maneuver the mast from the bows was taken from one end of the canoe to the other and the bows of the canoe then became the stern and vice versa, and in a matter of seconds we were off on the other tack tearing through the water at breakneck speed.

These canoes are entirely made of wood and tied together at all the joints with string woven by the women from coconut fibres. Considering the tools, the joints are remarkable. I learnt that they rub charcoal onto one piece of wood and lap the other onto it until the joint is perfect. Tiny holes are drilled and the hole is tied with this string.

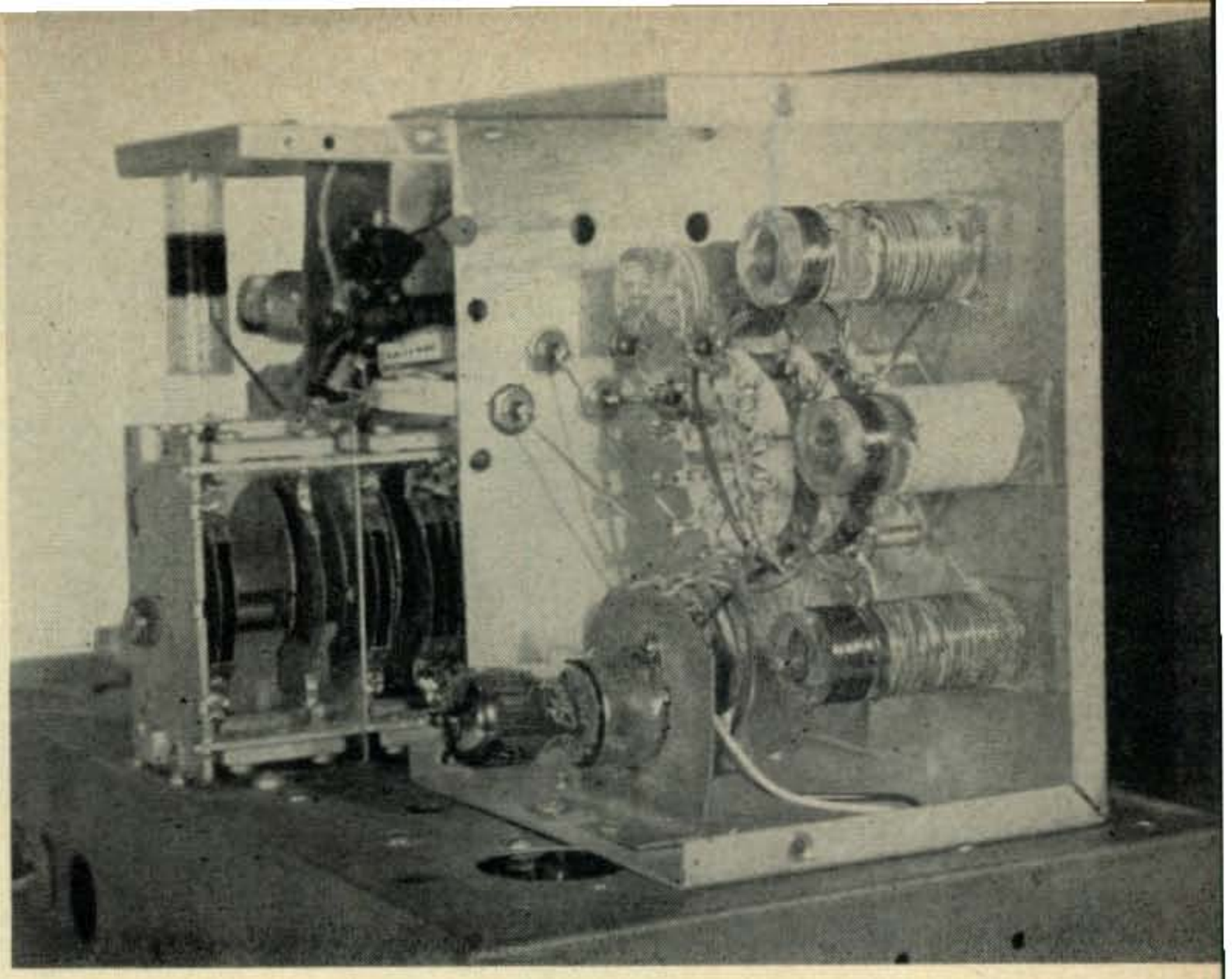
This particular canoe had been out in the sun for some time, yet even after two hours sailing we only had to bail it out once. The design hasn't changed in centuries, but apparently they have a certain shape about them which would be very difficult for the average yacht builder to copy. I could talk for hours on their design, but I still feel I haven't the knowledge or the skill to build one myself.

One of the highlights of my stay was the celebrations for the British Queen's birthday. The Commissioner in full dress uniform had quite a smart turn out with his police force, and as the flag was broken out so their rifles were brought up for the salute.

I was quite impressed with the parade. The National Anthem, sung by the whole of the Gilbertese people, rang out with such force that one would have thought a full military band was leading them . . . it gave me food for

[*Continued on page 114*]

A non-rectifying direct coupled detector for simplicity and performance.



C.W. Receiver

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No matter how complicated a radio receiver is, it has some form of detector as its fighting heart. These devices provide varying degrees of satisfaction and to some extent are compromises to suit many interests. My own interest being in a c-w only receiver, I considered a radical change in the concept of our modern day detectors. Extensive experiments along this line produced a non-rectifying direct coupled detector of interest to c-w enthusiasts.

The circuit developed is shown in *Fig. 1* and its application in *Fig. 2*. The radio frequency and audio amplifying arrangements indicated are merely means to an end and not necessarily the best systems to be used.

This concept of a detector originated from a study of the obsolete autodyne principle. If this non-rectifying, direct coupled circuit could be made to oscillate, the incoming signal would heterodyne and become audible within the circuit. There would be no need for rectification or demodulation.

In order to test this concept, a c-w receiver was constructed. The results are: The circuit does oscillate, the incoming signal does heterodyne and there is no need for rectification or demodulation. The performance is startling. It has unusual sensitivity with good signal to noise ratio. In addition an unexpected feature is apparent. The stability of the direct coupled detector permits "hetero-nullifying" of an adjacent interfering signal. That is, an adjacent signal can be brought to zero beat, and, since no audible note is produced, a weaker signal can be copied. In operation it is found that control of regeneration is uniformly smooth. When set at the low end of a band, it holds for the entire tuning range of that band. Furthermore, the regeneration control serves as the "pitch control" much the same as the b-f-o control does on a superheterodyne receiver.

As might be anticipated, some form of isolation is required between antenna and detector. Amplification of the audio note is also necessary. The methods used here are minimum but adequate.

The device functions like this: *V1* operates much the same as any class "A" radio frequency amplifier with regeneration. Signal voltage appearing on the cathode of *V1* is impressed on the grid of *V2*. In turn *V2* amplifies it. Through the plate feed back winding of *V2* the signal is magnetically coupled back into the grid of *V1* in the proper relationship for regeneration to occur. Control of regeneration is accomplished by variation of the voltage applied to the plate of *V1* while the plate voltage of *V2* is held constant. *V2* then is operating near class "A" for radio and audio frequencies. Degeneration is introduced for audio by virtue of the small cathode capacitor *C-11*. Heavier bypassing at this point brings up the gain of *V2* but introduces undesirable

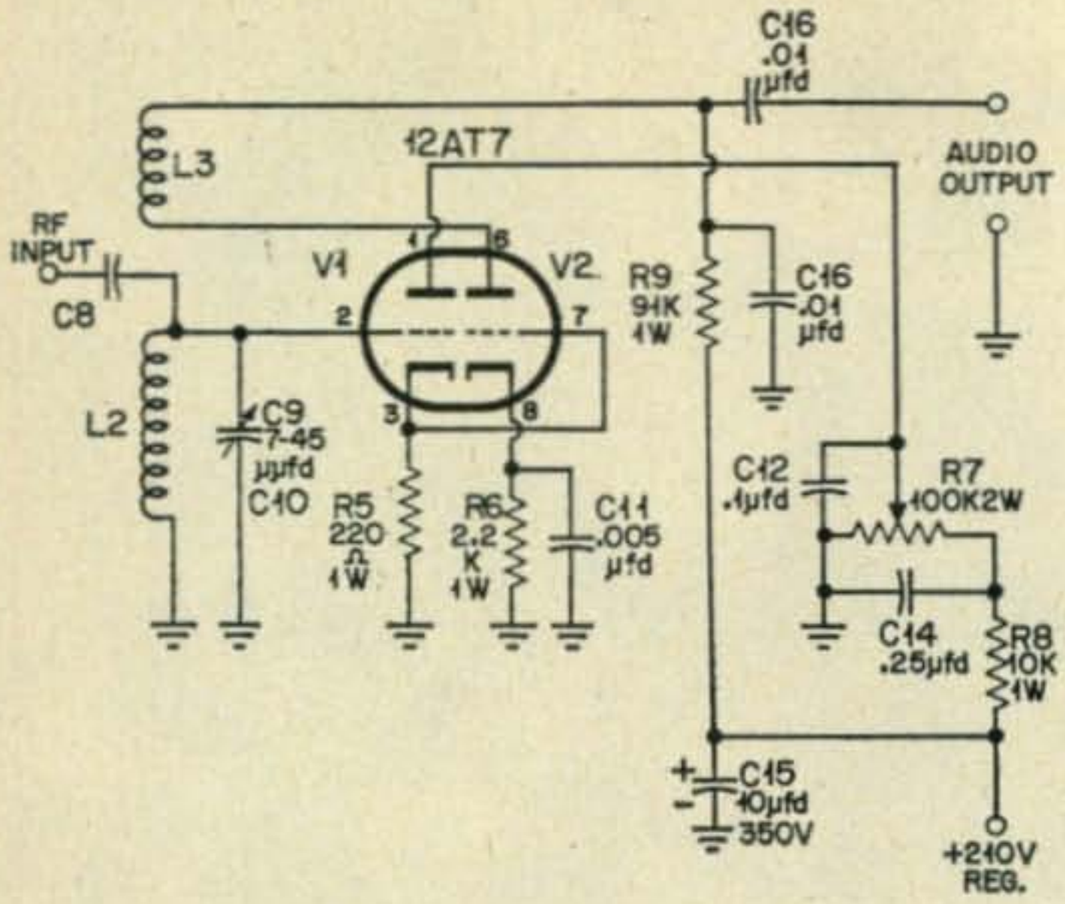


Fig. 1.

qualities so as to make control of regeneration difficult. The cathode of *V1* is left unbypassed to help stabilize the system through additional degeneration. The "cold" side of *V2* plate winding is brought to radio frequency ground through a capacitor which is small enough to leave the audio voltages unaffected. The audio voltages are taken from the plate load resistor of *V2* (*R9*) and passed along to the audio amplifying stages. A point of interest is that the system of *Fig. 2* is the equivalent of a six tube receiver and requires a modest 30 milliamperes at 210 volts.

Coils

Coils for five bands were hand made as follows:

Band	Turns	Wire Size	Tickler Turns	Spacing	Form D.	Form L.
80	44	#26 enam.	8 #24 d.c.c.	1/8"	1½"	1"
40	39	24 enam.	14 24 d.c.c.	3/16"	¾"	1"
20	19	20 d.c.c.	10 24 d.c.c.	¼"	¾"	1"
15	13	16 enam.	10 24 d.c.c.	½"	¾"	¾"
10	8	16 enam.	3 24 d.c.c.	½"	¾"	½"

All coils are close wound. Terminal leads are 1½" long. Winding length is indicated as "L" under "Form." Tickler spacing is the distance between the grid end of the main winding and the plate end of the tickler winding.

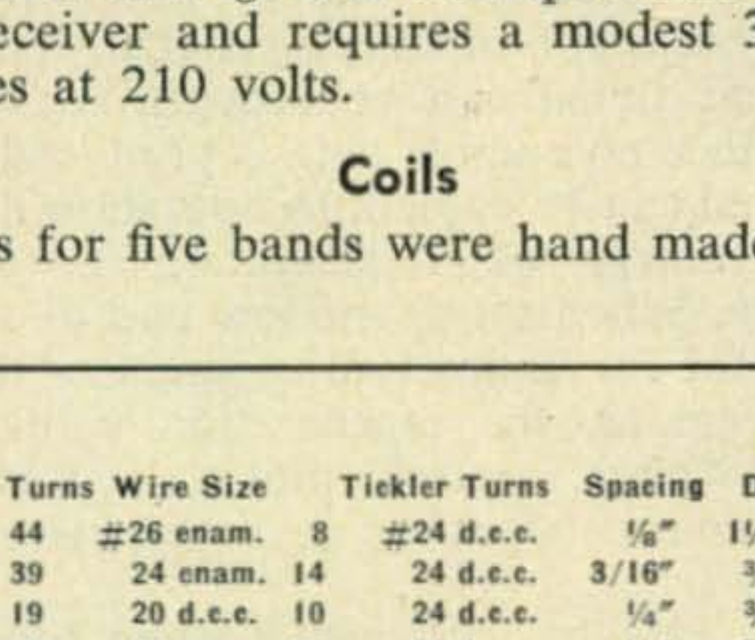
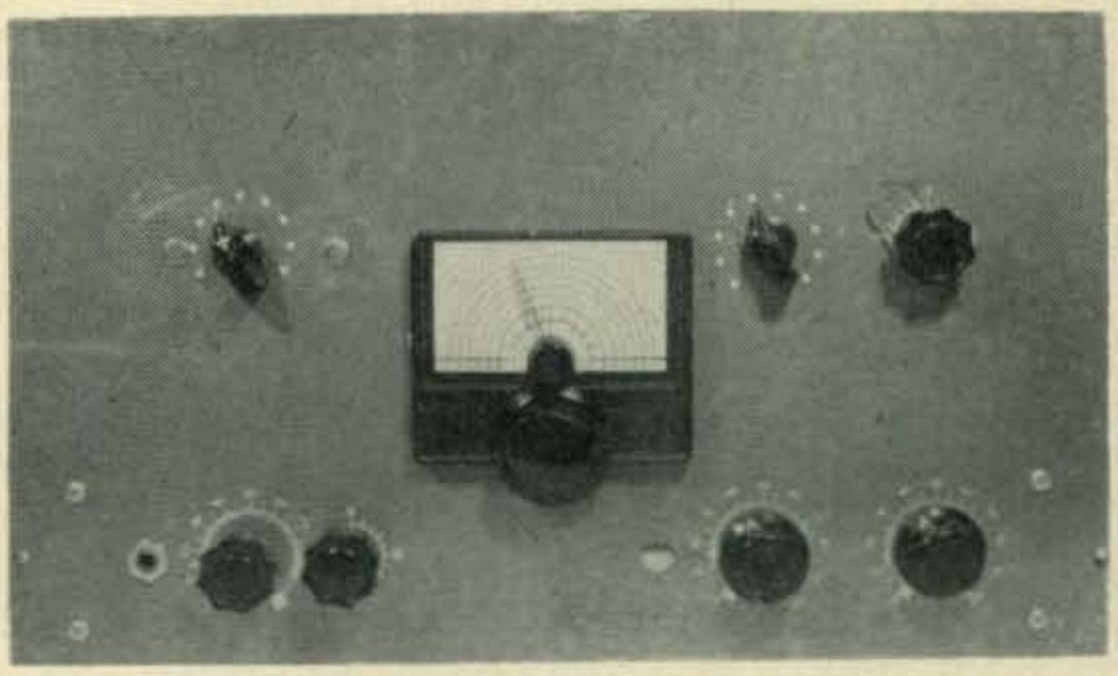


Fig. 3.

The coils are switched into the circuit by a 3 section, 5 position, rotary switch. Ground, grid and plate connections are simultaneously switched. This is done to prevent unwanted resonances from occurring in the coils not in use. A word of explanation is offered with regard to the high inductance low capacitance combinations selected for use in the direct coupled detector. Two effects were wanted. These were uniform gain over any particular range of frequencies, and, a large amount of bandspread. Therefore, the inductance values were chosen and the coils wound to measure 70 microhenries, 20.5, 4.2, 2.5 and 1.18 microhenries, in ascending order of frequencies. The stray capacitance of the unit was found to be approximately 20 $\mu\mu$fd. Therefore, a variable capacitor in the range of 3 $\mu\mu$fd minimum to 10 $\mu\mu$fd maximum would tune the coils to cover the bands indicated in the coil table.

Restricted Tuning

It will be found that the values given in the schematic and in this paragraph, will restrict the tuning ranges in the following manner: 3.5—3.75 mc., 7.0—7.15 mc., 14.0—15.0 mc., 21.0—22 mc., and 28.0—29.0 mc. This is not too disappointing however, and, if desired, these restrictions can be lifted by a slight reduction in the inductance value of the coils and/or changing the capacitor combinations. The main tuning capacitors used in this construction are part of a six section variable capacitor having the following values: 7—18, 7—33, 9—42, 7—33, 10—62 and 9—42 $\mu\mu$fd. This capacitor was obtained from Burstein-Applbee, of Kansas City, Missouri. By removing plates from the various sections, suitable tuning can be accomplished.



The complete receiver, controls on the front panel are: Left top, Detector Band Switch; Left bottom, Phone jack, Audio Gain, Audio Filter; Main Tuning and logging dial in the center; Right top, r-f Band Switch on the left, r-f Tuning on the right; Right bottom, Detector Regeneration on the left, r-f Gain on the right.

The coils for the radio frequency amplifier were wound as follows:

Band	Turns	Wire size	Form size
160-80	40	#26 enam.	¾" d. x ¾" long
80-40	22	22 d.c.c.	¾" d. x ¾" "
40-20	14	16 enam.	¾" d. x ¾" "
20-15-10	5	16 enam.	¾" d. x ¾" "

A variable capacitor of 30-365 $\mu\mu$fd is used to tune these coils. The antenna is capacitive coupled into the grid end of these coils.

The results of sensitivity measurements are shown below. These measurements were made in terms of how many microvolts of radio frequency energy were required at the antenna connection to produce a readable audio tone in the head phones.

Band	*Microvolts input*
80	less than 5 μv.
40	less than 5 μv.
20	less than 2 μv.
15 & 10	less than 2 μv.

The indicated inputs are an average for

[*Continued on page 94*]

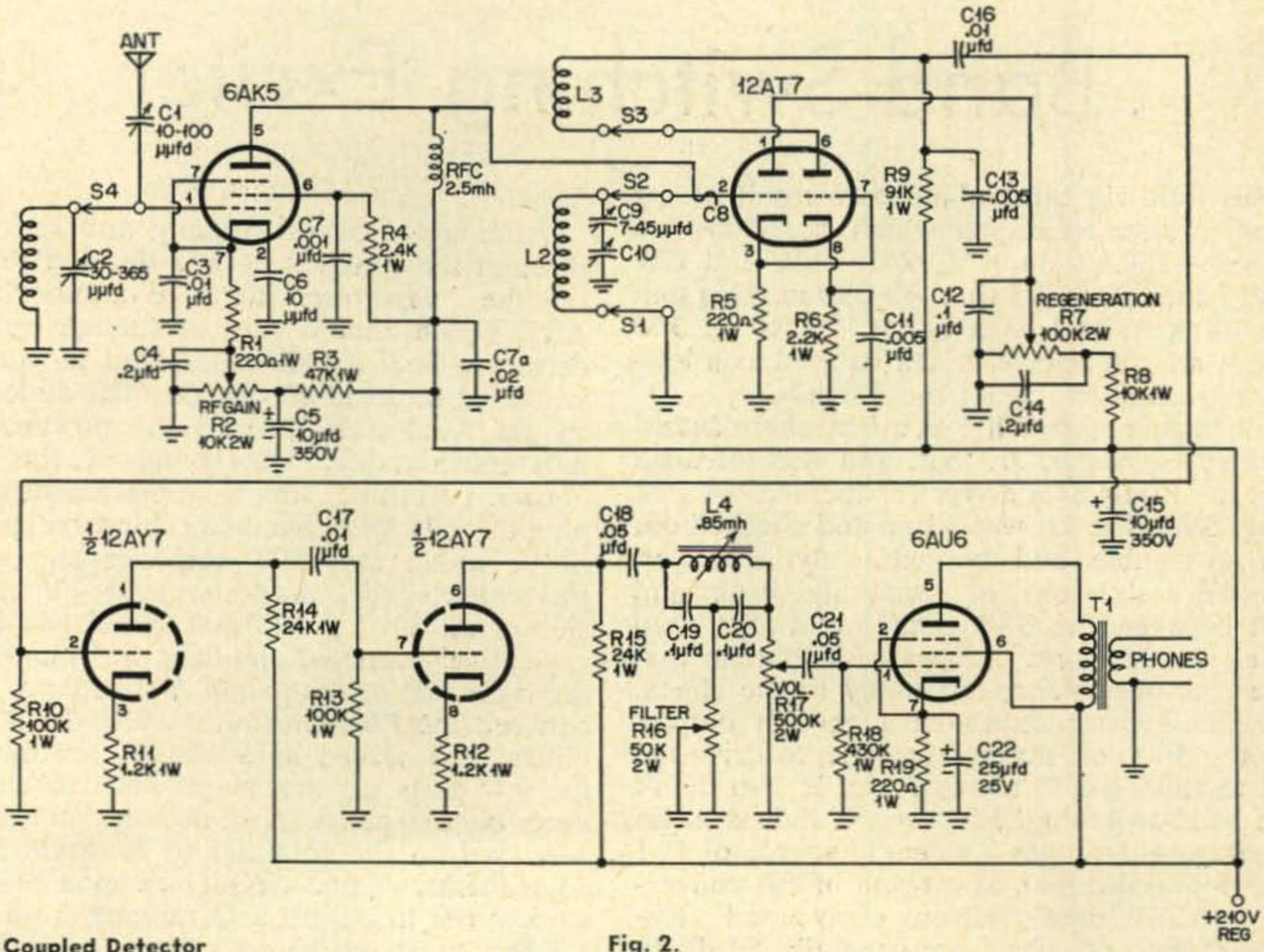


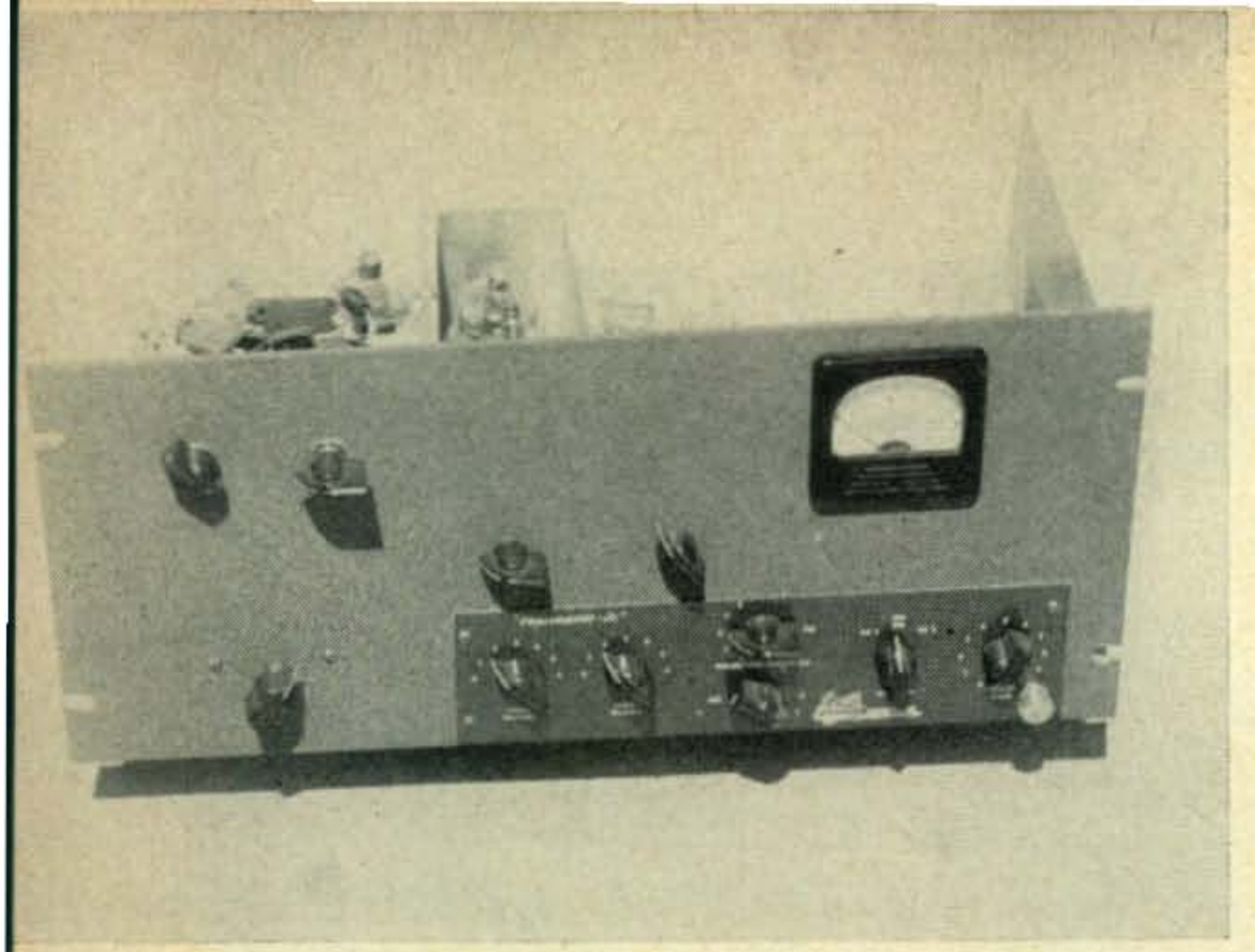
Fig. 2.

Direct Coupled Detector Parts List

C8—1 Turn Wire Around V1 Grid Wire
C9—7-45 $\mu\mu$fd Postage Stamp Variable
C10—Section of Six Gang Variable
C11—.005 μfd Ceramic 600V
C12—.1 μfd Paper 400V
C13—.005 μfd Ceramic 600V
C14—.25 μfd Paper 400V
C15—10 μfd Electrolytic 350V
C16—.01 μfd Paper 400V
R5—220 ohm 1w Carbon
R6—2200 ohm 1w Carbon
R7—100k pot 2w
R8—10k 1w Carbon
R9—91k 1w Carbon
L2—70 μh
205 μh
4.2 μh
2.5 μh
1.18 μh
L3—Tickler Winding on L2
V1, V2—12AT7

Receiver Parts List

C1—10-100 $\mu\mu$fd Var.
C2—30-365 $\mu\mu$fd Var.
C3—.01 μfd Ceramic 600 V
C4—.2 μfd Paper 200V
C5—10 μfd Elec. 350V
C6—10 $\mu\mu$fd Ceramic 500V
C7—.001 μfd Ceramic 600V
C7a—.02 μfd Paper 400V
C8—1 Turn of insulated wire around Grid Wire
C9—7-45 $\mu\mu$fd Postage Stamp Variable
C10—Sections of 6 gang variable
C11—.005 μfd Ceramic 600V
C12—.1 μfd Paper 400V
C13—.005 μfd Ceramic 600V
C14—.2 μfd Paper 400V
C15—10 μfd Elec. 350V
C16—.01 μfd Paper 600V
C17—.01 μfd Paper 600V
C18—.05 μfd Paper 600V
C19—.1 μfd Paper 600V
C20—.1 μfd Paper 600V
C21—.05 μfd Paper 600V
C22—25 μfd Elec. 25V
(All Resistors are carbon)
R1—220 ohm 1w
R2—10k Pot. 2w
R3—47k 1w
R4—2400 ohm 1w
R5—220 ohm 1w
R6—2200 ohm 1w
R7—100k Pot. 2w
R8—10k 1w
R9—91k 1w
R10—100k 1w
R11—1200 ohm 1w
R12—1200 ohm 1w
R13—100k 1w
R14—24k 1w
R15—24k 1w
R16—50k Pot. 2w
R17—500k Pot. 2w
R18—430k 1w
R19—220 ohm 1w
RFC—2.5 mh Choke
L1—Appropriate Coils for band in use
L2—70 μh, 20.5 μh, 4.2 μh, 2.5 μh, 1.18 μh
L3—Tickler on L2
L4—UTC VIC-11 set at 0.85 mh
T1—Midget Output Xformer
Tubes: 6AK5, 12AT7, 12AY7 and 6AU6
S1, 2, 3—3 section, 2 pole 5 pos. rotary switch
S4—4 position rotary sw., single pole



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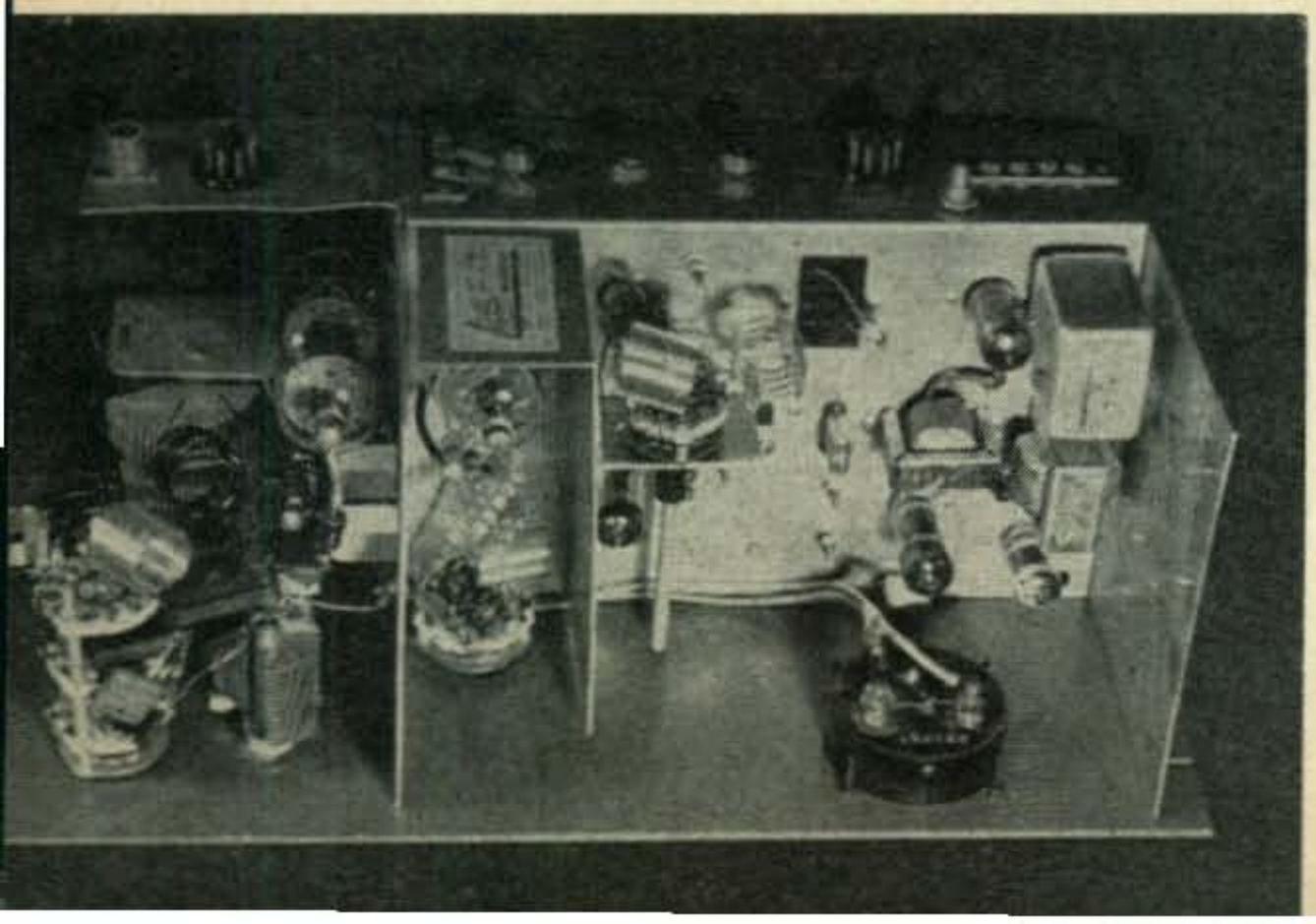
All-Purpose Band-Switching Exciter

This little rig came about as a result of my desire to have an exciter which would drive a pair of 4-250A's on AM, PM, SSB, and CW on all bands from 3.5 through 28 mc. This unit does all that, and as a bonus, works on 160 meters, too. Of course, it can be used as a low-power transmitter on all these bands.

The exciter started life as a *Lakeshore Industries "Phasemaster, Jr."* kit, and was intended to be used only as a driver for the 4-250A's on 14 mc SSB. The kit was wired and checked out with no trouble, and worked nicely. However, after several weeks of switching back and forth between the SSB exciter and that used for all other work, it became apparent that there was one exciter too many in the shack. The Phasemaster didn't have enough output, with the 500 volt supply available, to drive the final to full class C above 7 mc. It also didn't have band-switching. However, it did have the SSB feature, and was a splendid source of PM and AM. It also had, as a result of the conversion process used, various unwanted frequencies present. These are generally 50 db or more down from the desired frequency. However, when fed into a kw final and a high-gain beam, the unwanted signal may still be S9 all over the country, even with the 10 to 20 db extra attenuation furnished by the grid and plate tanks of the final.



Bottom view of exciter

Construction

After some headscratching and rummaging through the junkbox, it was decided to try to use the *Phasemaster* to drive another 807 in AB1, which should furnish enough output to drive the final on all bands, and to put band-switching tanks in all circuits. The added stage should (and did), reduce the unwanted signals considerably. The layout of the *Phasemaster* permitted simple replacement of the plug-in coils with band-switching tanks in the 6BA7 mixer and 807 amplifier stages. The *Phasemaster, Jr.* was mounted on the left side of an 8¾" x 19" rack panel and an 807 capacitively coupled amplifier was mounted on the right side of the panel. A shield was placed between the *Phasemaster, Jr.* and the 807 amplifier, and served as a chassis for mounting the few parts for that stage which couldn't be hung on the panel. A pi-network output tank was used on the amplifier to facilitate loading adjustments. Tank circuit components were worked out to permit a Q ranging from 10 on 1.8 mc, to about 20 on 28 mc, while feeding a 50-ohm load.

The circuit of the amplifier section is shown in *Fig. 1*. *C8* is actually a 150 $\mu\mu$fd variable, with a 180 $\mu\mu$fd, 1000 volt mica padder added by a section of *S1* to give a Q of 10 on 1.8 mc. A 3-section, 360 $\mu\mu$fd/section variable was used at *C9*, and one or two 1000 $\mu\mu$fd, 1000 volt mica capacitors are switched in parallel with it by another section of *S1*, to permit proper loading adjustments on 160. *C8* and *C9* would be satisfactory without padders if 1.8 mc operation is not required. A better solution might have been the incorporation of a 350 $\mu\mu$fd variable at *C8* and a 4-gang, 500 $\mu\mu$fd/section variable at *C9*. No padding would be necessary on 1.8 mc with

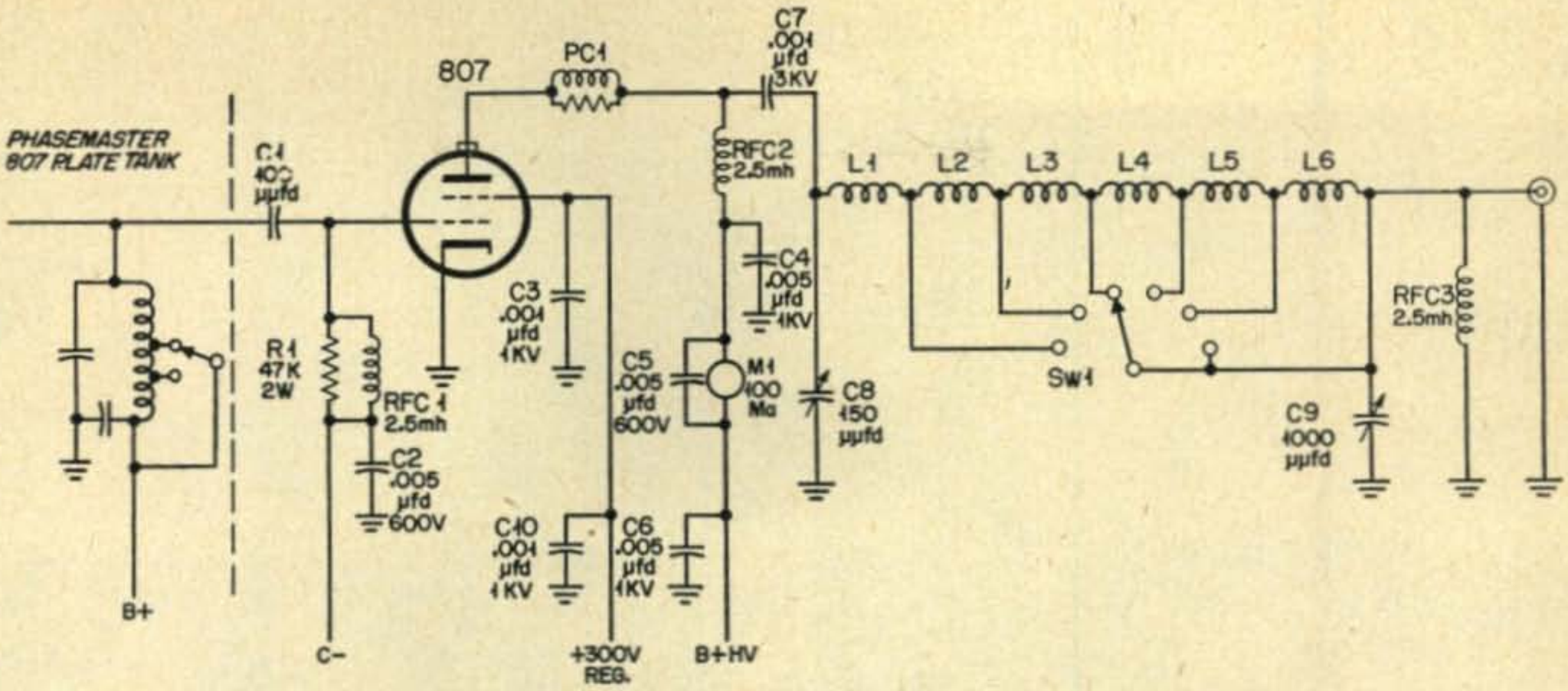


Fig. 1. Complete amplifier section

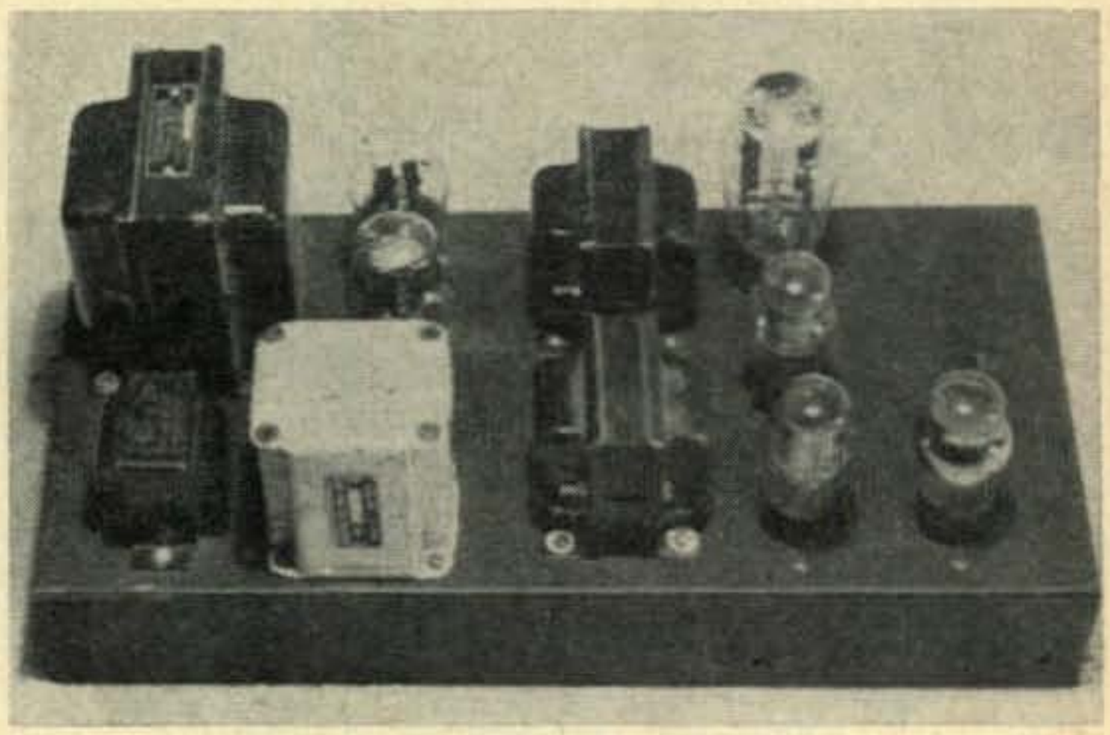
capacitors of these values. However, this also might have resulted in minimum values too high for 28 mc.

All coils were pruned with a g.d.o., and no trouble was experienced in getting satisfactory output on any band. Unfortunately, the output of the first 807 varies a good bit from band to band. The best place to control this appears to be in the grid circuit of the 807 amplifier, by varying the grid resistor, *R1*. Optimum value for this resistor is about 10,000 ohms from 1.8 to 14 mc, 22,000 ohms at 21 mc, and about 47,000 ohms at 28 mc. My solution was to leave the value of the grid resistor at 47,000 ohms, and to vary the drive with the balancing controls on the exciter for AM, PM, and CW, and with the audio gain control on SSB. A better approach would be to vary the grid resistor by switching. This could be done handily by adding another section to the switch in the 807 buffer tank in the *Phasemaster* section. *R1* would be left at 47,000 ohms, and resistors would be switched across it on the lower-frequency bands to bring the excitation to the desired level.

VFO

A 5.3 to 7-mc command set, retuned to give 5 mc output at the 5.3 mc dial setting, is used as a heterodyne oscillator. Only one of the 1625 amplifiers is used, and 105 volts regulated is used on the oscillator and amplifier plates and the amplifier screen. The fixed oscillator in the *Phasemaster* works on 9 mc. By means of coil switching and an auxiliary variable capacitor in the plate of the 1625, the proper heterodyning frequency is selected for each band. On 3.5 and 14 mc, the fundamental is used. On 1.8 and 21 mc, the second harmonic gives the desired beat. With the v.f.o. tuned down to 5 mc on the low end of the scale, the highest frequency that can be covered on the 28 mc band is about 28.7 mc.

With this arrangement, the ranges around 21 mc and 27 mc give some unwanted "birdies." On 21 mc this occurs because of the beat between the second harmonic of the 9 mc phasing section, and the third harmonic of the 6 mc



Power supply

v.f.o. On 27 mc it occurs because of the beats between the second, third, and fourth harmonics of the phasing section with the 27 mc output and the oscillator harmonics on 18 and 36 mc. This effect is troublesome over about 8 kc either side of 21 mc, and is also bothersome about 50 kc either side of 27 mc. Obviously, v.f.o.'s operating on their fundamental frequencies on the high side of the heterodyne output frequency would cure this problem.

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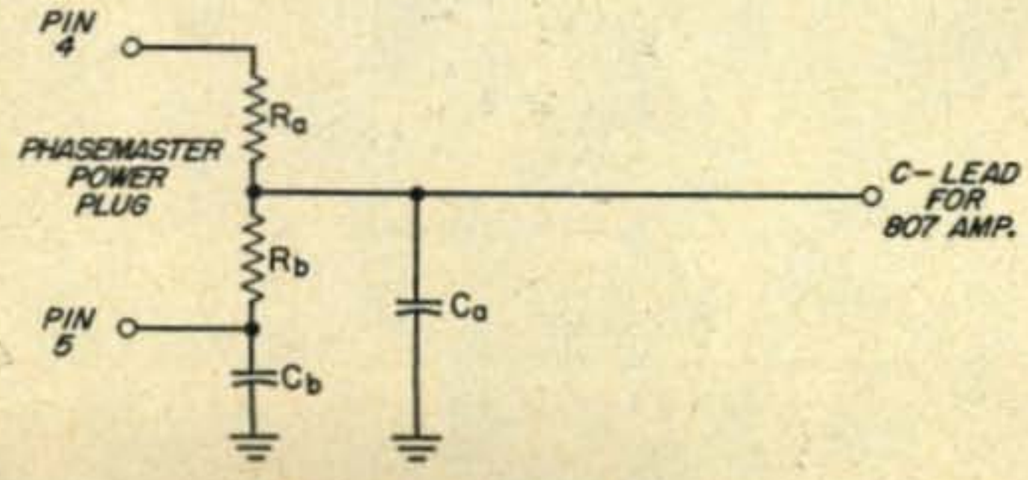

Fig. 2. Keying circuit.

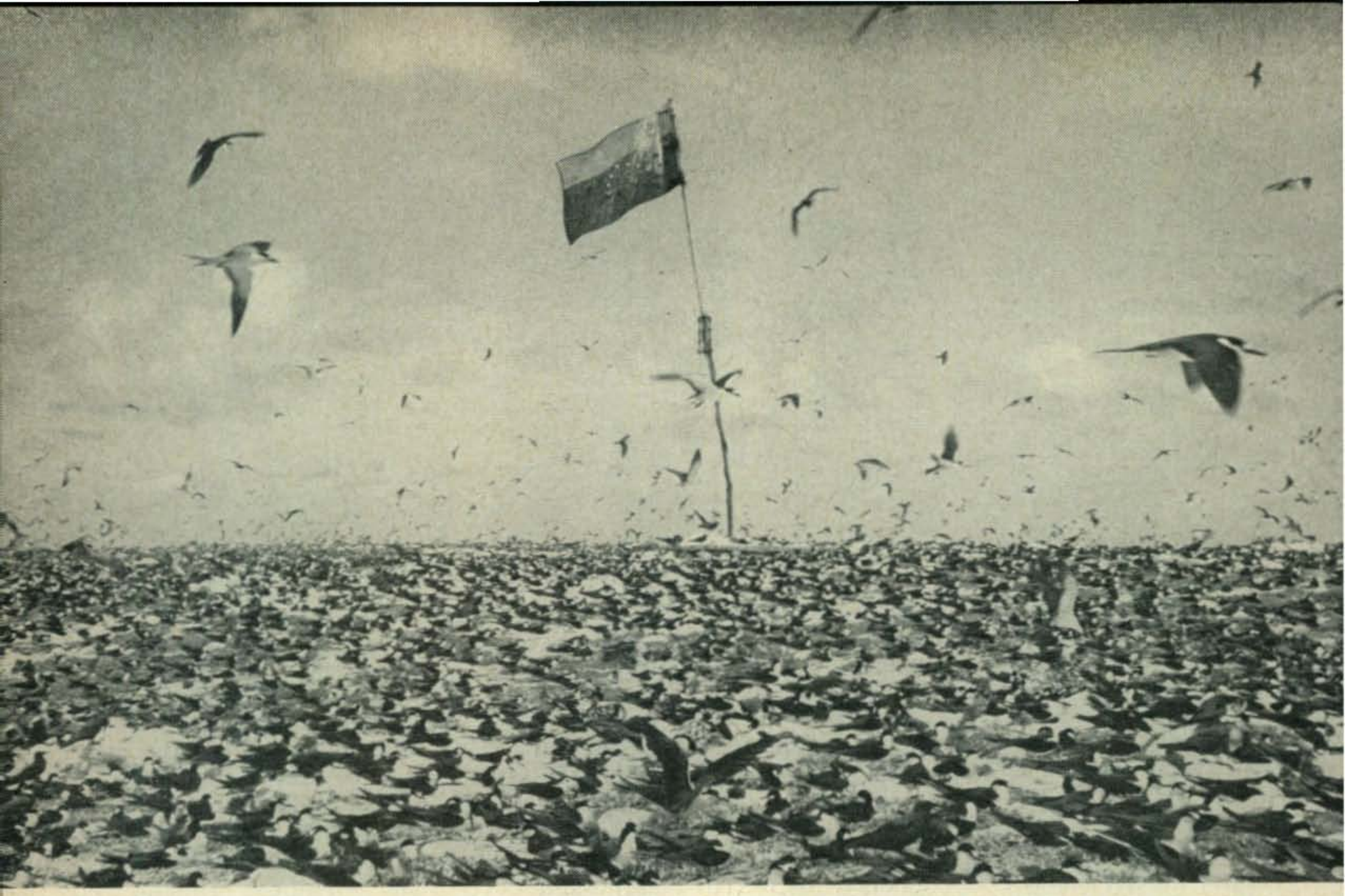

Photo credit: Dr. Guillermo Zuloaga and *Geographical Review*

Aves Island

YVØAA

Luis S. Alegrett, YV5BZ

Some time back our club decided to have a try at setting up a station on one of the 72 islands around the shores of Venezuela. Since there were only about six that really stood a good chance at counting as a new country our selection was simplified. Aves island had recently been in the news when some scientists had made a visit so that won the vote.

Our first solution to the major problem: how to get there, was provided by Dick Spenceley, KV4AA who suggested that we could fly to St. Croix and charter a schooner there for about $100 per head round trip. Bill, KV4BB, offered to come along and provide the equipment.

While all this was being worked out Dr. Oscar Colmenares Bacheco, YV5GC, the club chairman, secured government support for the expedition. This was quite a deal since it provided us with free transportation to the island and all the help we needed to set up and oper-

ate during the celebration of the Nation's Week in July. The government was also sending a bunch of scientists to study the island, map it, and set out a few hundred small trees, etc. We wouldn't be lonesome!

We Sail

Once planned, things moved fast. We had less than three weeks to get ready. As you might guess we finished packing only a few hours before departure. We moved everything aboard the armored tug *Felipe Larrazabal* and were shortly off on the first leg of our trip. YV5FR, a doctor, perked up those few who came down with sea-sickness. By the next day we had YVØAA/MM in operation and ran phone patches through YV5GU and YV5AG to our families.

The first stop was LaBlanquilla Island, inhabited by three people (who rented the island) plus cattle and pigs. We had a fine swim and then, our arms loaded with cocoanuts, went back on shipboard. This island would make a fine YVØ future expedition. We left there in the evening and arrived in the vicinity of Aves about daybreak. Since Aves is only about 10 feet high at best it took several hours to find it among the waves.

The ship was anchored as close to shore as seemed safe and we went the last 500 yards in a motor boat. The rest of the day was spent making a careful inspection of the island to pick the locations for our two stations and swimming around. Early the next morning we started moving ashore, tents first, then the rest of the equipment. We had to wade in from chest deep water with everything, since the boat couldn't get any closer to shore.

The island turned out to be about half the size it was when last measured, now being only about 1500 feet long, and from 150 to 200 feet wide. We set up our camps on the opposite ends of the island, each with a 1 kw gasoline generator and three 35 foot poles with dipoles hanging from them plus an end fed long wire. My first call was answered by YV5ET on 7 mc in the afternoon of June 14th. We kept signing the call YVØAA/MM since we wanted to start fresh with YVØAA in the national YV contest on the 16th and 17th.

The northern camp used a B & W 5100B and a home made all band 200 watt rig. Receivers were an NC-300 and an HQ-129X. The southern camp had a Viking II and another home made 200 watt all band rig. Receivers were a Hallicrafter and two NC-98's. The equipment was worked in shifts and everything worked well despite the sand and humidity. With 13 YV's along we were not ever short of operators.

Once our YV contest was over we opened up to the rest of the world. The first QSO was with HK1JO, followed by CO7KK, YV5AB and K4AIM. From the 17th to the 24th of June we made 1761 contacts, 743 on phone and 1018 on c.w. 72 countries were worked on phone, 56 on c.w. 1048 of the contacts were with W's. The QRM was terrible. Incredible! We could have worked many times the number of stations we did had stations been a bit more considerate. While operating on phone we were being blocked by c.w. stations calling us, while on c.w. stations would pile ten deep on our frequency and on the frequency of any station we worked. Probably two out of three of those trying to contact us failed as a result of the dog fights. All those who did make the grade will receive a QSL and souvenir banner.

We had to leave Aves a little earlier than we had planned due to an approaching storm. The winds over the island never went below 15 mph and frequently went to 30. The sand-blasting effect of sand and small pebbles hitting your bare legs at 30 to 40 mph drove us to long pants. Everything filled with sand . . . shoes, eyes, hair. When 40 mph winds were forecast for the next day we decided to get out first. We got out of there just in time for the seas built up to tremendous proportions and that night was memorable for the beds, barrels, etc., that

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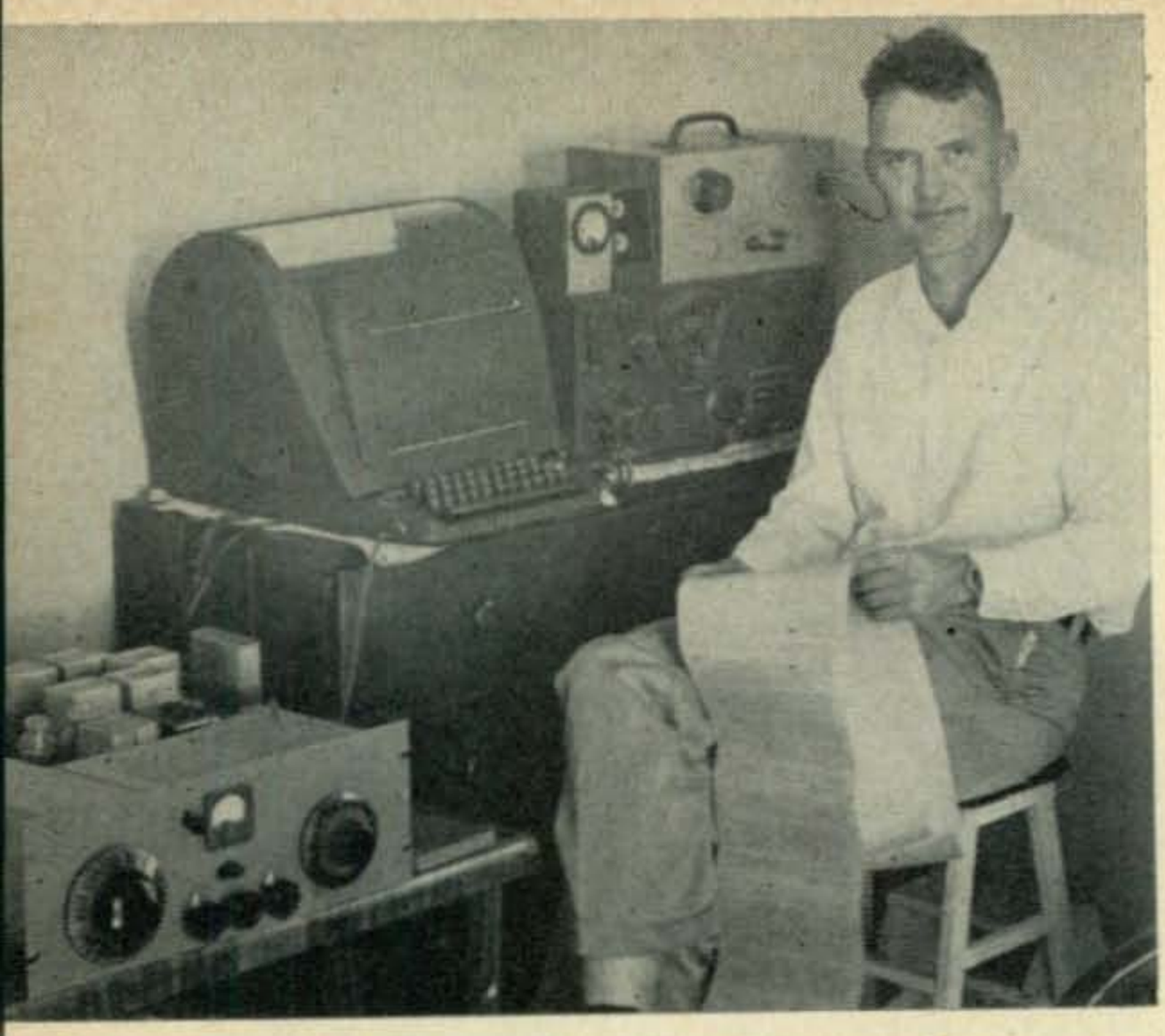


Bob Weitbrecht, W9TCJ, ex-W6NRM

RTTY

Byron H. Kretzman, W2JTP

9620 160th Ave., Howard Beach 14, N. Y.

Weather seems to be a subject in which many radio amateurs are interested. Sort of a second hobby, like skin-diving. Actually, weather reporting and forecasting tie in quite well with radioteletype, and a possible third hobby: flying.

RTTY weather information is available in two forms; that which can be printed on an ordinary machine, and that transmitted from a "weather keyboard" and directed to those machines equipped with the corresponding upper-case weather symbol type slugs. *Fig. 1* compares the "weather keyboard" to the standard "communications keyboard." To the best of my knowledge, the weather symbol type slugs are *not* available for the Model 26. Weather keyboards are usually found on Model 15 and Model 28 machines in CAA installations.

An ordinary machine, of course, can be used to copy weather information directed to airmen, if you don't mind doing a bit of translating, with the help of *fig. 1*. All you have to do is find an FSK station using only one channel and 850 cycle shift. Such stations invariably begin a line of text with a three-letter group identifying the airport, actually the air navigation radio aid call sign. For example, IDL identifies Idlewild (New York International) Airport, and LGA identifies LaGuardia Airport; both in New York City. The rest of the line then uses the symbols to indicate weather conditions at that airport, with other pertinent information.

Weather information in the other form, that directed to standard machines, still requires a translating job because this information is transmitted in the U. S. Weather Bureau "synoptic" code, a five-digit number code. Such transmissions are made from the east coast, using 850 cycle shift, on 5958.5, 8110, 13,620, and 16,250 kc from WSY.

Available from the U. S. Government Printing Office, Washington 25, D. C., is a very useful book, the *Pilots' Weather Handbook*, Catalog No. C31.138:104/2. If you are interested in weather, this book is well worth the $1.50 per copy.

As has been the custom, since the January 1955 issue of *CQ*, we are continuing our monthly technical section devoted to the newcomer in RTTY. This time we will discuss in detail the more common polar relays used in land-line *Teletype* and RTTY.

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 Principles & Practice

Part 3—Polar Relays

Polar relays do not have a spring to return the contact arm (armature) to a "de-energized" position, like the usual relay. Rather, they operate on the principle of reversing current. That is to say, current to the relay is not broken, but reversed in direction to move the armature from one contact to the other. This design permits much higher speed operation because of the lack of the spring.

Back in the early days of amateur radioteletype, a decade ago, Model 12's were supplied with *Wheatstone* type 1B polar relays made by *Morkrum-Kleinschmidt*. These had two 120-ohm coils and a screw mechanism for rotating the

mark and *space* contacts so that the contact arm could be put in the center.

Today, most polar relays in RTTY stations are of the *Western Electric* 215A or 255A type. These are considerably smaller than the *Wheatstone*, and have a very useful plug-in base. Mechanically, the 215A and the 255A are very similar. Electrically, they both have two coils; however, the 215A coils are 90-ohms each while the 255A coils are 136-ohms each. *Fig.* 2 shows the 255A with the cover removed, and *fig.* 3 details the arrangement of contact and coil connections.

Fundamentally, these relays may be used for neutral or polar operation. For neutral land-line operation, 60 ma loop current is applied to the upper, or operating, winding; and 30 ma (continuous) is applied to the lower, or biasing winding. Polarity of current in both windings, as indicated in *fig.* 3, must be observed. For polar land-line operation, the biasing winding and the operating winding are usually connected in series to form one winding. The polar loop current is then about 30 ma.

To function properly, the armature of a polar relay must operate equally well to the *mark* or *space* contact. Improper adjustment may produce biased signals, or unequal *mark* and *space* impulses. The end result: errors. It would be nice to have an I-193-A relay test set, however, none seem to be in surplus; but a reasonably good job of adjusting a polar relay can be done by hand and eye, with the aid of a simple feeler gauge and a nail. In the event *Teletype* tools are available, the gauge is a 74-D, and the "nail" is a No. 340 Tool, or adjusting key. Other useful tools are the KS-2662 file and the No. 265C contact burnisher.

Before adjusting, look over the relay carefully. Make sure that the contacts are clean and free from pits and build-ups; that the surfaces of the flexible contact springs which bear against each other are clean and in contact for at least 25% of their width; that the armature doesn't touch the inside of the spool; and that all parts are securely held in the proper places.

Armature and Spool Clearance: Find the natural mechanical position of the armature by backing off the contact screws and pole pieces with the 340 tool, or the nail. If necessary, center the armature horizontally by first loosening the screws holding the front and rear spool-heads to the base, then move the coil to the right or left to bring the armature into the center of the slot in the spool. If it is desired to center the armature vertically, loosen the heel-piece holding screws, then adjust the armature vertically until the contacts are correctly aligned. Check for clearance between the armature and slot in the spool, at both top and bottom. Make sure all screws are tight.

Contact Adjustment: With both pole-pieces backed off and the armature in its natural position,

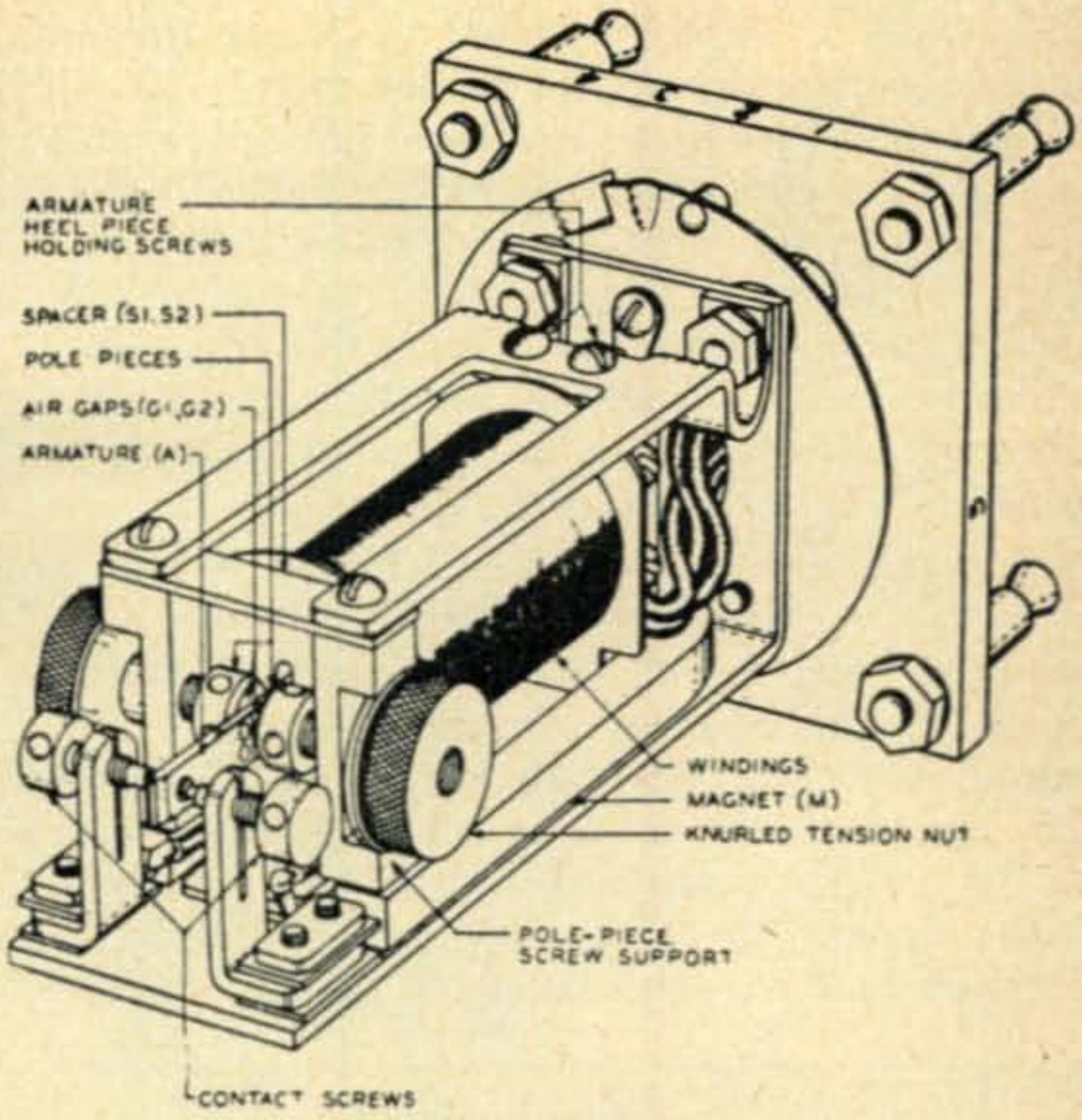
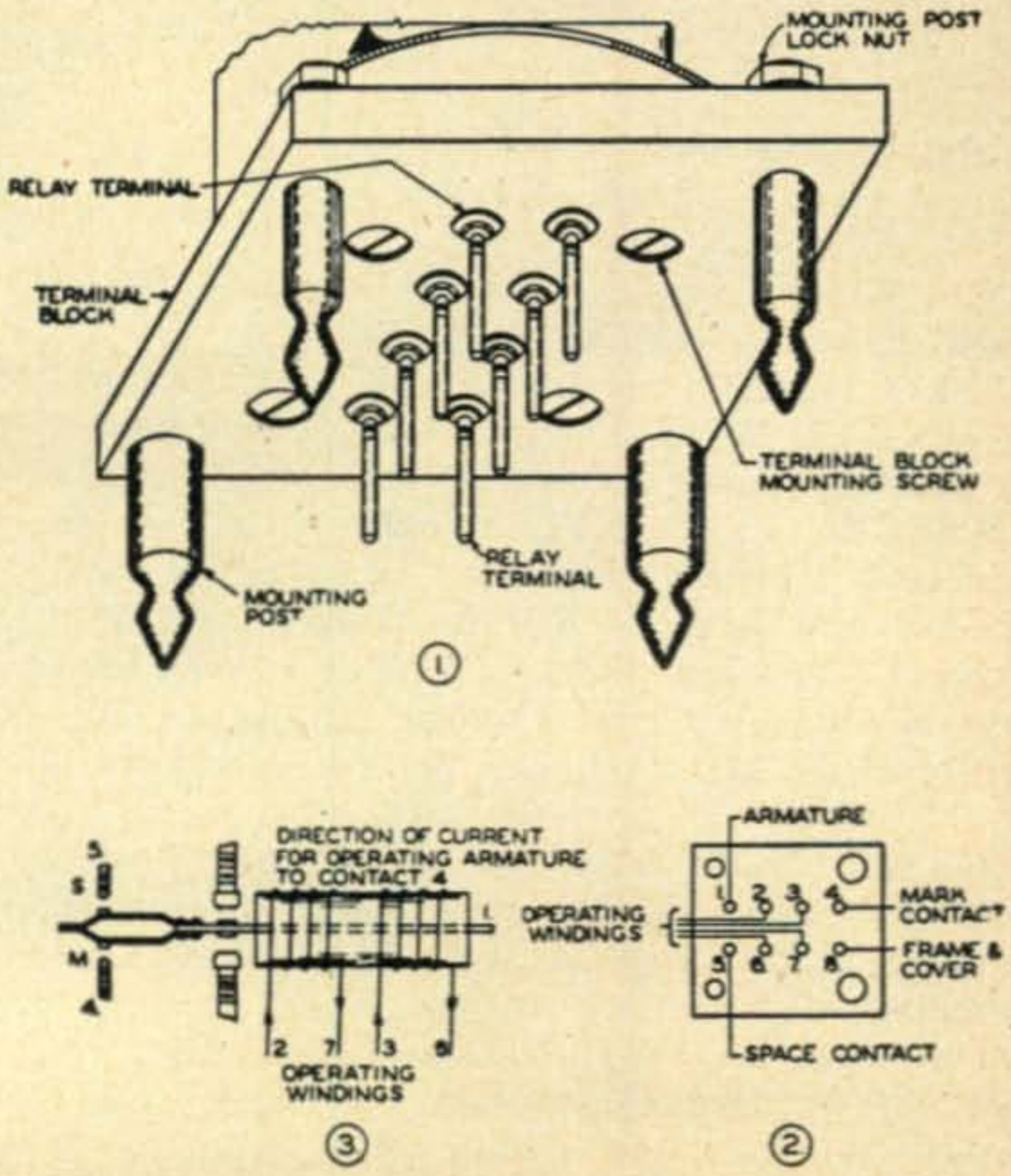


Fig. 2. 255A Polar Relay, Cover Removed

turn in one contact screw until it just touches the armature (use an ohmmeter), then back it off .002", using the feeler gauge. As a check, one-twelfth of a turn corresponds to .002". Repeat the above procedure for the other contact and then check with the feeler gauge to see that the total contact travel is .004".

Pole-Piece Adjustment: Turn in one pole-piece until the armature just rests against the *opposite* contact screw (use the ohmmeter, again), then back off the pole-piece screw slightly less than one half-turn and tighten the tension nut to hold

Fig. 3. 255A Polar Relay Connections



it. Now turn in the other pole-piece until the gaps on each side are as equal as can be judged by the eye, and tighten the tension nut.

If necessary, readjust the second pole-piece until the armature either stands midway between contacts or flips to either contact when moved by hand. Sensitivity is increased, up to a point, by moving the pole-pieces *away* from the armature.

Finally, check all screws and tension nuts for tightness, and make sure that the cover is clean inside and that it fits securely to the base.

Across the Nation

Starting way-across, W7CO reports on RTTY doings in the Seattle, Washington, area. Don, himself, has been especially active on 40-meters and brags about a two-hour rag-chew with WØBP. (What I wanta know is, who did most of the chewing?) A 2-meter net has been in operation in the Seattle area on 147.15 Mc. but

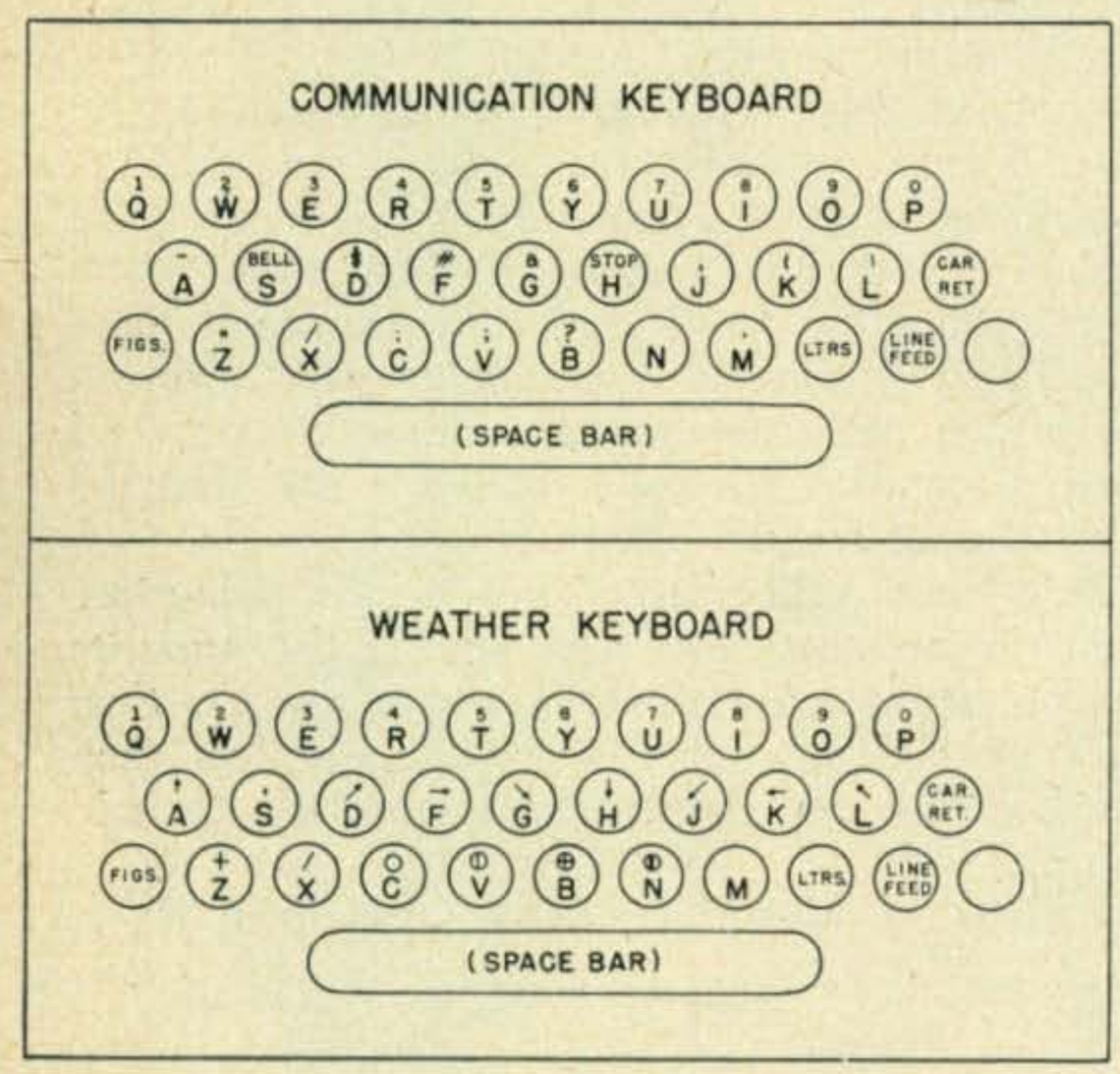


Fig. 1. Communication and Weather Keyboards, Model 15 Printer

is now being changed to 147.00 Mc. It meets on Tuesday nights and W7CBE, W7CCB, W7CO, W7FKO, W7GQM, W7KX, and W7LHL are regular check-ins. W7LHL, by the way, is well known for his high power and his 96-element beam.

W6AEE and his XYL enjoyed their visit to KH6-land. Merrill reports that KH6ZD and KH6LD now have a 1A Tape Head with a *WU* perforator, and that they are looking for DX with their newly built terminal units. (*CQ*, Dec. '52) KH6AED, SCM for Hawaii, is very active there on RTTY.

ZL1WB should have his Model 26 by now. Bruce has been copying us for some time, now, on a Model 15 where he works. It should be just a matter of time now to see whom that first W-QSO will be with. (Bets are on a W6!)

W1WEW, Belmont, Mass., (Boston area) worked W2JAV, Hammonton, N. J. (So. N. J. area) on 2-meter AFSK August 4th at 9:30 pm. Phil, W2JAV, says that he has worked him again and has heard him several times since. Ranny, W1WEW, has built himself a collapsible steel self-supporting tower to hold his 32-element beam. An 800-watt amplifier is in the works. W1BGW reports visits from W1PIL of Worcester, Mass., and W1PBS of Barre, Mass. Bob, W2PBG, also paid Jack a visit—right after net time! W1BDI schedules WØBP on 40-meters, for midwest and western traffic. BeeP in turn schedules K6GZ in California for the relay.

K2TKN, of Pluckemin, N. J., has his Model 26 and is rarin' to go on 2-meter RTTY. Bill has a very good location about 40 miles from New York City and a 100-foot tower to help. W2ZKV took a trip to Cuba armed with copies of *CQ* and *RTTY*. K2CSC has (probably *had*, by now) his Model 12, with keyboard, for sale for $35.

W9LIS, in Peoria, Illinois, has a Model 26 and is trying to FSK his BC-459 v.f.o. Art Brothers, W7NVY/2, *CQ*'s new Associate Editor, comes up with his own method of copying FSK. Art's receiver is none too stable on 40-meters, so he uses his Collins v.f.o. to beat directly against the received signal, usually W9TCJ or WØBP. Art, I *know* your 26 has a keyboard. How about some transmitting? John Orr, WØPHW, produced a short but very neat description of RTTY in the "Ham-Hum" bulletin of the Ak-Sar-Ben Radio Club of Omaha, Nebraska. An excellent job, John.

Comments

This month we would like to pay small tribute to Bob Weitbrecht, W9TCJ, truly one of *the* pioneers in radioteletype. Bob came from California, where he was W6NRM. Bob also was the fellow who milked dry the venerable Model 12. He developed a means of quieting (electrically) this old machine by shielding and by using vacuum-tube keyers. (*CQ*, Apr. '52) When the time came that FSK became legal, Bob was ready. The Model 12 *could* copy on 80 and 40.

The home station of W9TCJ is located at the Yerkes Observatory in Williams Bay, Wisconsin. There Bob is the specialist in electronic controls for the astronomical equipment. His services apparently are much in demand, as evidenced by a trip last fall to McDonald Observatory at Fort Davis, Taxas. Of course, Bob took along his portable RTTY gear! The photo shows his heterodyne-type FSK exciter, at the left. This I had the opportunity to examine, last October, and it is a master-piece of workmanship as well as design. And it is *stable*. The BC-348-Q receiver is "hot-rodded" with a hot r-f tube and a double converson Q-fiver. Bob's remote tuning system (from the keyboard) uses the "diode modulator" he described in April 1952 *CQ*.

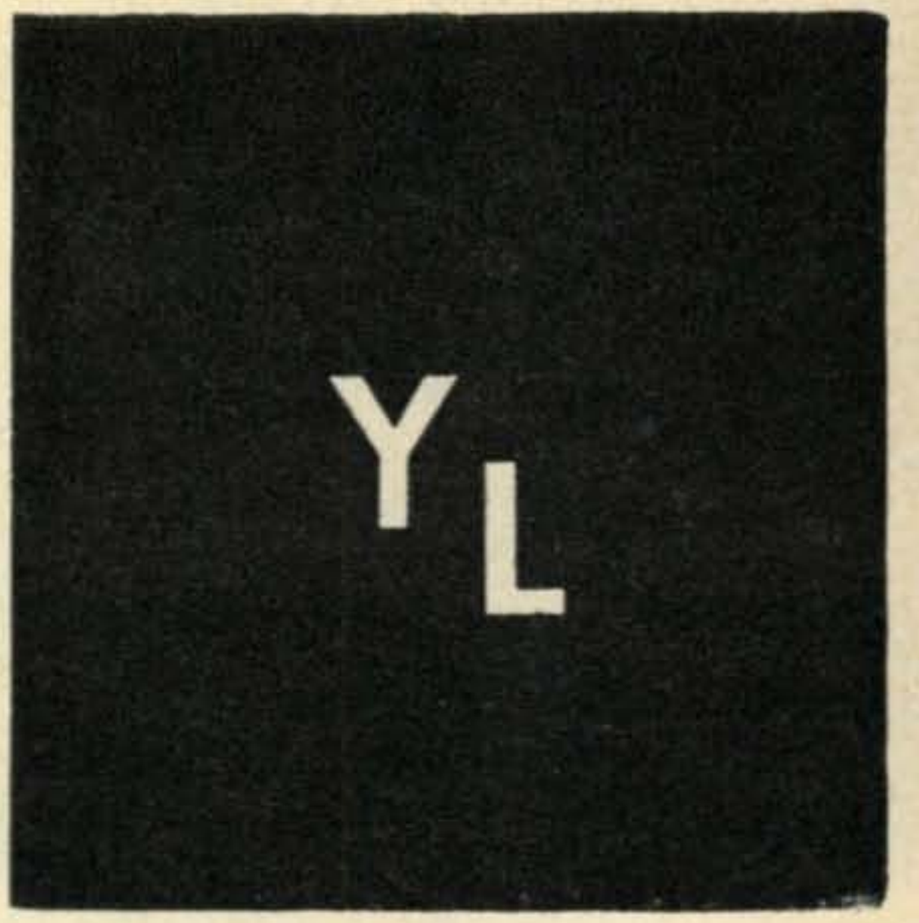
W9TCJ is not resting on his past performances, however. He is now occupied with two major

[*continued on page 121*]

Long-time YLs

Part I

Louisa B. Sando, W5RZU
Indian School
Santa Fe, N.M.



The report on long-time YLs, from 1915 to 1925, which appeared in CQ for March 1955 created so much interest we continued research on the subject to 1935. Beginning with this issue and continuing for the next several months we will present those YLs who have held their amateur licenses *continuously* for these many years.

W9TRD of *Call Book Magazine* kindly supplied a copy of the Spring 1934 issue. A search of this brought to light a total of 206 YLs in all call areas (after discounting the "Fay," "Coral," "Dorice," and other such names which proved to belong to OMs). Cross-checking this list against a Spring 1956 *Call Book* indicated 54 of these YLs to be still listed. For those who like statistics, the YL licenses, by call area, break down like this:

Call Area	No. YLs listed 1934 Call Book	No. YLs still listed in 1956 Call Book
W1	19	5
W2	24	9
W3	10	3
W4	10	2
W5	17	5
W6, K6	54	12
W7, K7	17	5
W8	13	1
W9	42	12
	206	54

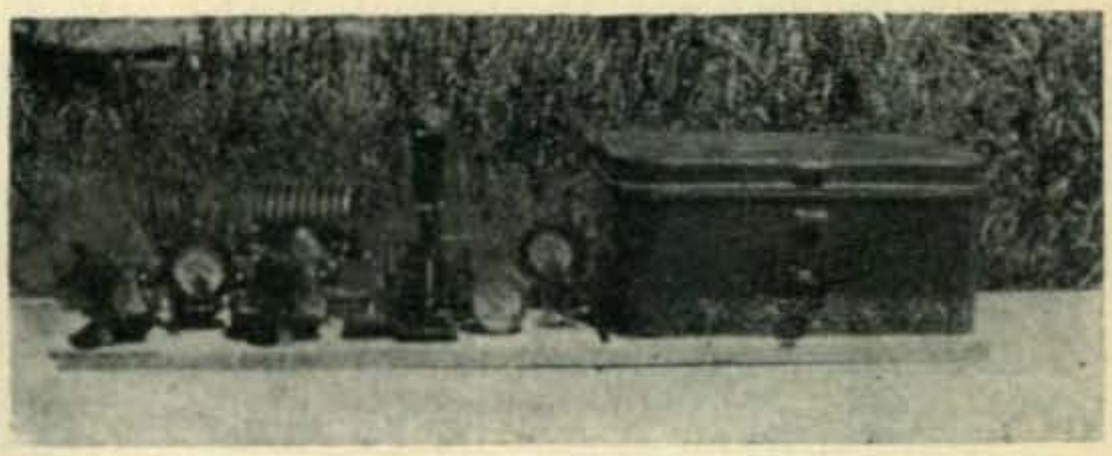
Of course, many other YL licensees came and dropped out during this period, but these figures represent an average of 26% of the YLs licensed in 1934 (or earlier) sticking with their hobby. Since this list includes the earliest YL licensee (1RO, 1919) to 1935 licensees, it represents from *22 to 37 years* of Hamming for these long-time YLs.

One YL we missed in Part I of this article was W6HEG, Harriet Gilbert, who was licensed in *1923*. In that year Harriet came on the air in Boise, Idaho, as 7SI with a roaring five watter. In QST for Oct. 1925 7OB reported that 7SI would soon be signing a "6" as she was going to Salt Lake City to attend college. Her traffic total for that month was 19 messages handled. The following month her traffic total was 30 messages handled, and according to W2ZI, who supplied the information, this was quite a super total for those early days of relaying. Harriet's OM is W6GAT.

Picking up now after 1925, W6AET, Florence Terrell, first went on the air in *1926*. She had learned the code at the age of eight from her father, who had a receiver. At 17, while skating with a sailor boy at the Mission Beach rink, and at the same time blowing code on a whistle, the boy pricked up his ears as he was a radioman at the U.S. Naval Training Station in San Diego. There followed a weekly Saturday night sked at the skating rink for Florence and the boy Lloyd, then W6AWW. Lloyd built a transmitter for Florence, assembled a receiver and spent much time working the rig at her home. Soon Lloyd got a new call, W6DOB, and Florence became W6AET. Lloyd was transferred to Washington, Hawaii and the Panama Canal Zone and part of the time they kept skeds on CW. Eventually they became

W5BKG, Ethel Henderson, received her license in 1929. Her station in 1934 was this rig with a pair of 211s in final on 40 CW crystal controlled. Receiver, homebuilt 9-tube superhet.

W6AET, Florence Terrell Jones, went on the air in 1926. Below: W6AET-W6DOB rig at that time consisted of a 210 HI-C Hartley oscillator driving a 211 in the final on 40 meters, 150 watts input.



Mr. & Mrs. Jones, and their son Eddie is K6ETS, now a commissioned officer aboard a submarine.

W6AET especially likes CW, on all bands, with special interest toward DX on 20 and 10. Their present station is a DX-100 transmitter, SX-71 receiver, a beam for 15, and half-wave center-fed antennas for each band 80 through 10. Florence is an instructor in the advanced code classes at the Red Cross in Santa Barbara, out of which many a new Ham has emerged. She also is treasurer of the Santa Barbara Amateur Radio Club.

1927 was the year that Frances Rice went on the air with W3AKB from Philadelphia. Before the war she was ORS, RM, Asst. SCM for Eastern Pa., and active in AARS, holding various positions including State Net Control of Pa. and Third Corps Area cryptographer. Cryptography then became her second hobby. For several years Fran was secretary to Dr. Zworykin at RCA. In 1942 Fran became an electronics engineer for the Navy's Bureau of Ships in D.C. and she has been there ever since. W3AKB's special interest was 80-meter traffic and ragchewing and one sure-fire sked was with W3BTW. When she moved to D.C. Fran became Mrs. Darne to keep that sked. W3AKB still works CW, running 50 watts on 80, 40 and 20.

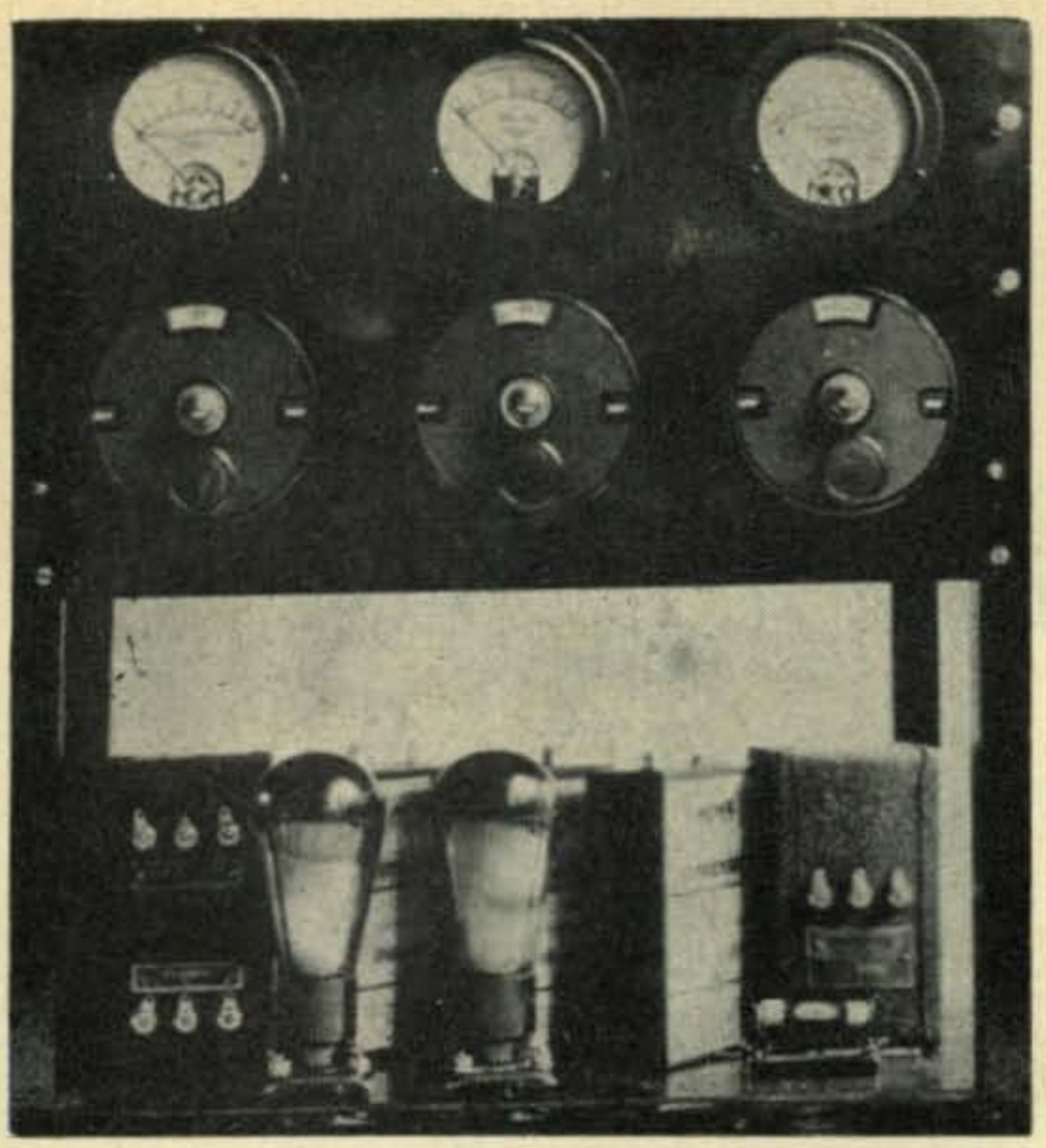
August *1927* saw W9QV, Ethel Sando, go on the air with a 210 TPTG transmitter. Her Dad was W9AFF. At present Ethel's operating is done from friends' stations, but she hopes to get her own rig on the air again soon.

W6MA, Bertha Wallace, went on the air in 1927 or '28. At present she keeps her license up, but that is about all, her OM, W6AM, being the dedicated amateur in the family.

1929 was the year Helen Hargreaves stepped into Ham radio with the call W9GJX at Manistique, Mich., after having attended radio school. Her interest was aroused the year before by listening on a neighbor's receiver to traffic from Admiral Byrd's party at the Antarctic. Her first station was a Hartley transmitter, about 15 watts on all bands, and a Silver-Marshall receiver, with doublet antenna, and with this she worked all States and plenty of DX. Helen was active in AARS, was ORS, held Al op and RCC. During the war (by now she was Mrs. Cloutier), Helen taught radio for the Air Force. After WW II Helen went back on the air as W8GJX at Escanaba, Mich. Her present station consists of a BC-610, BC-458 and 459 transmitters, SX-25 and BC-348 receivers. Helen has had many other interests besides radio. She has raised two boys, managed a beauty shop, played the organ, has taught dancing, has her own darkroom for photographic work, is the author of a number of books and writes for magazines and newspapers.

In *1929* Carrie Collins received her operator's license and in 1930 she went on the air as W4AXF. She and her OM, W4MS, had been married a year and Eddie was returning to the U. of Fla. for an extra year's study. Carrie remained at Pensacola where she was teaching in the high school. In one morning she memorized the code. After Eddie went on to school W4ABJ kept the first sked from the home station and after that Carrie kept

W3AKB, Frances Rice Darne, has been on the air since 1927.



W9QV, Ethel Sando, licensed in 1927. W9QV rig at the time was this 210 TPTG job.

the skeds with Eddie on 7 mc cw every day for the entire school year. Her station was a 204A TPTG transmitter and she used a Pilot Wasp receiver. Their present equipment is a B&W 5100-51SB, 10 B multiphase exciter with 250THs in Class AB2, 75A4 receiver, 3-element MIMs antenna. Carrie still is teaching, but will retire in several years and have plenty of time for Hamming. Their daughter, Gwynn, who will be a senior in high school this fall, is K4AGM.

The spring of *1929* saw Ethel Henderson go on the air as W5BKG at Corpus Christi, Texas, with her OM W5AQK. Their first rig used a 71-G tube with a 180-V Majestic B eliminator power supply, TPTG circuit operating on 40 meters and with a Zepp half-wave antenna. The receiver was a regenerative detector with one stage of audio using ux-99 tubes. There were few Hams in Corpus

W4AXF, Carrie Collins, licensed in 1929.

Christi then, in fact few BC receivers, but Ethel recalls an incident of a woman who lived several blocks from them accusing them of blowing out the tubes in her receiver with so much power from their "broadcast station"! Four jr. ops have taken up most of Ethel's time, but she still shares with her OM their present station: a composite band-switching transmitter covering 10, 20, 40 and 80 at 300 watts, with a KP-81 receiver. They also have a transceiver on 2 and a mobile rig on 75.

Another *1929* (May) licensee was Esther McClara, W6ALH. She recalls building her first receiver, a one-tube t.r.f. job, and her second, a Pilot Super Wasp, she put together on the dining table, a two-weeks job. Her rig was a TPTG circuit using a 210 tube and she used this with a Zepp antenna on 40 meters. She also recalls making "slop jars" for rectifiers before such tubes were available. Now W6ALH works mostly 75 using a Viking I and an HQ-120X with folded dipole. Esther has a grown daughter, and a granddaughter, and she is a teacher in the banking department of the Alameda High School.

[*To be continued*]

W6ALH, Helen Hargreaves Cloutier, was licensed in 1929 as W9GJX.

W8GJX, Esther McClara, has been a Ham since 1929.

PROPAGATION

Last Minute Forecast for October

Normal shortwave radio conditions are forecast for the phone contest period October 20-22. Based on the 27-day recurrent tendency, unusual sun spot activity is expected during the CW period October 27-29 with conditions varying between unsettled and disturbed. Other periods of radio storminess are forecast for October 3-5 and 16-19.

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

CQ DX Contest Special

The upcoming CQ DX CONTEST has a good chance of being the biggest and best ever recorded in the history of amateur radio. More hams and more DX countries are on the air than ever before, and even the Russians are back again—just in time for the big Contest. But most important of all is the fact that the sunspot number for October will probably be higher than during any other major DX Contest period. As a result of this exceptionally high sunspot activity DX conditions from all areas of the United States to all the zones of the World will be outstanding on the 10, 11, 15 and 20 meter bands, providing no radio storms develop during the Contest period. So send the XYL and Jr. Ops off to the mother-in-law, (God Bless 'em) get the pot of coffee ready and stand by for two of the most exciting weekends in amateur radio history—the CQ DX Contest.

Dates

The *Phone Section* of the Contest will be held from 0200 GMT October 20th until 0200 GMT October 22nd. The *CW Section* from 0200 GMT October 27th until 0200 GMT October 29th.

Forecast

It has become a tradition with CQ to devote the October Propagation Column to a special analysis of shortwave radio conditions expected between the United States and all areas of the World during the Contest period. Since there is an excellent chance that this will be an all-time record-breaking Contest, the crystal ball and ouija board have been used overtime to turn out the most comprehensive propagation forecast ever to appear in CQ, or for that matter in any other technical publication. This months *CQ DX Propagation Charts* are centered on *eight* areas of the United States, and there's one custom made for your QTH. The following key indicates the best *Chart* to use depending upon the State you plan to operate from.

QTH (State)	Use Chart Centered On:
Maine, Vermont, New Hamp., Mass., Conn., Rhode Is., New York, Pa., New Jersey, Delaware, Maryland, D.C., Virginia, West Virginia	Northeast USA
North Carolina, South Carolina, Georgia, Alabama, Florida, Miss., Tenn.	Southeast USA
California, Nevada, Arizona	Southwest USA
Oregon, Washington, Idaho	Northwest USA
Texas, New Mexico, Louisiana, Oklahoma, Arkansas	South-Central USA
Missouri, Illinois, Indiana, Ohio, Michigan, Wisconsin, Kentucky, Iowa	Central USA
North Dakota, South Dakota, Minnesota, Montana,	North-Central USA
Colorado, Wyoming, Utah, Kansas, Nebraska	West-Central USA

Those of you who may from time to time calculate your own circuit analysis data may be interested in knowing that over *three hundred* such curves were prepared for this month's *Charts.* These *Charts* can be used in several ways in preparing an efficient operating schedule during the Contest period. If you intend to operate in the *Single Band* category, for example on twenty meters, the following operating schedule can be devised from the data appearing in the *Charts.* The schedule shows the areas of the world for

which twenty meters is optimum during four-hour periods throughout the day.

Single Band Schedule
20 Meters, Northeast USA QTH

Time (EST)	Optimum Area
9 P - 1 A	Africa, Central & South America, South East Asia, Japan and Far East, Guam & Pacific, Australasia.
1 A - 5 A	Africa, Central & South America, South East Asia, Japan and Far East, Guam & Pacific, Australasia.
5 A - 9 A	Europe, Africa, Central America, Australasia, Japan and Far East.
9 A - 1 P	Europe, Central America (a good time to catch some sleep).
1 P - 5 P	Europe, Africa, Central America.
5 P - 9 P	Europe, Africa, Near & Middle East, Central & South America, Japan & Far East, Guam & Pacific.

On the other hand, if you are interested in *All Band* operation, similar operating schedules can be devised by selecting the optimum times for each band as shown in the *Charts*.

General Conditions

At the time of writing this part of the column it is a bit too early to determine if ionospheric conditions will be seasonably normal during the Contest period or not. Assuming that normal conditions will exist (and the *CQ DX Propagation Charts* are based on this assumption) then excellent DX conditions can be expected during the morning and afternoon hours on *ten meters*. Propagation conditions to all parts of the world are also expected to be excellent on the *fifteen meter* band from early morning until into the evening. On *twenty meters*, DX to one part of the world or another should be possible around the clock, with optimum conditions on the band during the late afternoon and evening hours. Night-time propagation conditions on *forty meters* should be fairly good to many parts of the world, and for certain hours of the night *forty meters* may be the optimum DX band. Because of more intense absorption associated with the rapid rise in the sunspot cycle, DX conditions on the *eighty* and *one-hundred-sixty meter* bands will be no better than last year, and perhaps a bit poorer. Generally fair DX conditions to some areas of the world can be expected on *eighty*, while conditions on *one-sixty* will be poor. During the evening hours when *eighty meters* may open on a DX path the same path will probably be open on *forty* and *twenty meters* at the same time, with conditions considerably better on the higher frequencies.

Six Meters

Although the six meter band is not included in this years Contest, it is of interest to note that maximum usable frequencies to several areas of the world from the USA, will probably peak above 50mcs. on about 10% of the days of October and early November. These six meters openings are most likely to occur during the same time periods that ten meters openings are shown in the *Charts* with a rating symbol of (4)

Sunspot Cycle

The sunspot cycle continues to increase at a rapid rate. The predicted smoothed sunspot number for October, 1956 is 148. If this level of solar activity is actually reached during October, it will be the highest value of sunspot number to occur during any major DX Contest period.

The monthly Zurich sunspot number reported for July, 1956 was 128.5. This results in a 12-month smoothed sunspot number of 88 centered on January, 1956.

Disturbance Forecasts

At the present stage of the art, long range forecasting of ionospheric distrubances is possible with only a limited degree of accuracy. Since ionospheric disturbances have a tendency to repeat themselves every 27 days or so, it is possible by carefully observing radio conditions during August and September—then projecting ahead 27 or 54 days—to obtain some idea of what disturbance conditions might be during the Contest period. The accuracy of this type of forecast is limited by the fact that not all disturbances repeat themselves, and there is no way of predicting when a new cycle may begin. A forecast for the Contest period, based on an analysis of this type, appears in the "last minute forecast" elsewhere in this column.

Up to the minute forcasts during the Contest period can be obtained from several sources. The most up to date forecasts are those broadcast by WWV on 2.5, 5, 10, 15, 20 and 25 mcs, at 19½ and 49½ minutes past each hour. WWV forecasts are intended primarily for north-Atlantic circuits and a similar forecast for north-Pacific circuits is broadcast from WWVH on 5, 10 and 15 mcs. at 9 and 39 minutes past each hour. The forecast consists of a letter-number combination transmitted in Morse Code. The letter "N" indicates conditions at time of issue are normal; the letter "U" that conditions are unsettled or erratic and the letter "W" that conditions are disturbed. The number indicates the average quality of conditions for the next few hours as follows:

1-useless	5-fair
2-very poor	6-fair to good
3-poor	7-good
4-poor to fair	8-very Good
	9-excellent

The *Voice of America* broadcasts a shortwave propagation report and forecast every weekday at approximately 1805 GMT (1:05 PM EST), and every Saturday between 1845 to 1900 GMT (1:45 to 2:00 PM EST). Several shortwave frequencies are used for these transmissions, and

ALL TIMES IN EST

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

ALL TIMES IN CST

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

ALL TIMES IN EST

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

ALL TIMES IN CST

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

latest schedules can be obtained from the Voice of America, Washington 25, D. C., Attention IBS/RF.

In the event that a radio storm should develop during the Contest period, all is not lost. Remember that *not all* areas of the world are adversely affected by an ionospheric disturbance. Those paths passing through or near the auroral zones will become weak, with considerable fading, and may "blackout" entirely, especially during the night-time period. On the other hand, North-South paths from the USA to South America, Africa, Australasia, etc., generally remain normal, and during certain types of storms radio conditions have actually been observed to *improve* on these circuits. If a radio storm should develop during the Contest period, concentrate on working East-West paths during the daylight hours and North-South paths during the morning and evening hours. The East-West paths appearing in the *Charts* with a rating of (3) or better

ALL TIMES IN CST

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

ALL TIMES IN MST

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

ALL TIMES IN PST

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

ALL TIMES IN PST

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

SYMBOLS INDICATING NUMBER OF DAYS CIRCUIT IS FORCAST TO OPEN DURING MONTH:

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

*Indicates time of possible eighty-meter openings.

Six-meter openings are likely to occur on approximately 10% of the days on these circuits for which ten-meter openings are shown with a symbol of (4).

The 160-meter band is likely to open approximately 10% of the nights on those circuits for which eighty-meter openings are shown with a symbol of (3) or (4).

The CQ DX Contest Special Propagation Charts are based upon a CW radiated power of 150 watts (equivalent to a double-sideband A. M. radiated power of approximately 500 watts) and are centered as follows:

Northeast USA: Maine, Vermont, New Hampshire, Mass., Conn., Rhode Island, New York, Pa., New Jersey, Delaware, Maryland, D.C., Virginia and West Virginia.

Southeast USA: North Carolina, South Carolina, Georgia, Alabama, Florida, Mississippi and Tenn.

Southwest USA: California, Nevada and Arizona.

Northwest USA: Oregon, Washington and Idaho.

South-Central USA: Texas, New Mexico, Louisiana, Oklahoma and Arkansas.

Central USA: Missouri, Illinois, Indiana, Ohio, Michigan, Wisconsin, Kentucky and Iowa.

North-Central USA: North Dakota, South Dakota, Minnesota and Montana.

West-Central USA: Colorado, Wyoming, Utah, Kansas and Nebraska.

These forecasts are calculated from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, and are valid through November, 1956.

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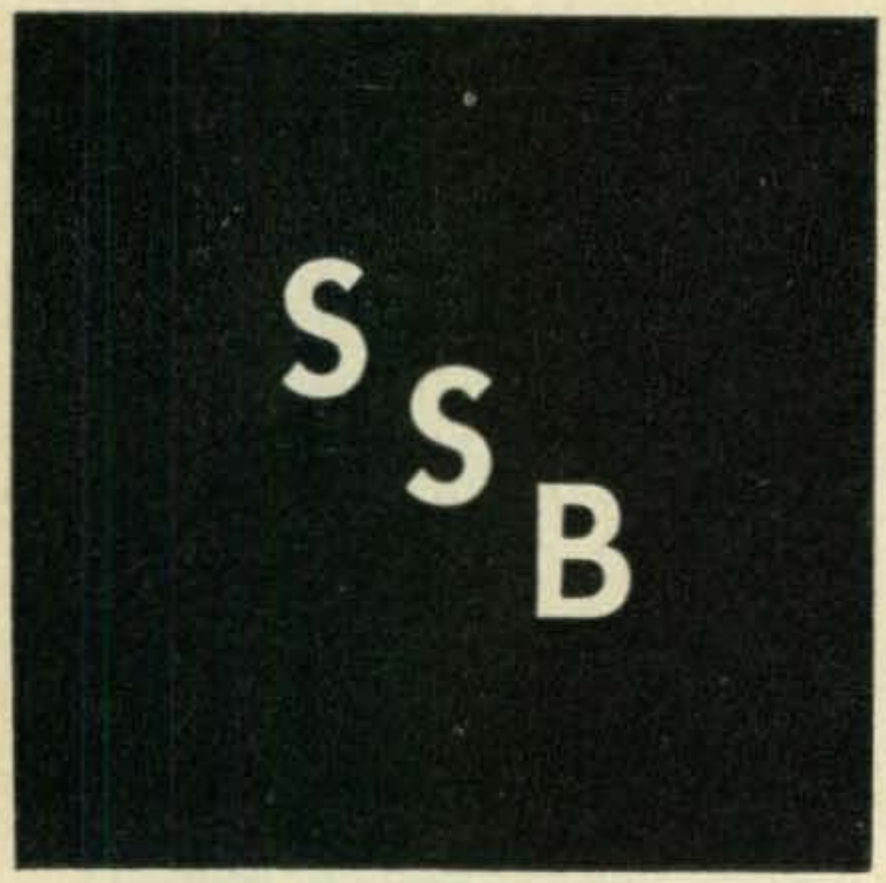
should hold up during all but the most severe type storms.

Post-Mortem

DX Contests, because of the large amount of activity on the various bands, offer an excellent opportunity for checking the accuracy of the propagation data utilized in developing the *CQ DX Propagation Charts*. I would appreciate any comments or observations readers of this column may have concerning the accuracy or inaccuracy of these forecasts during the Contest period.

Good luck to all of you participating in the CQ DX Contest.

73, George, W3ASK



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245 Revere Road,
Roslyn Heights, N.Y.

Here is the latest list of countries with SSB activity in the relative order of appearance. Are there any we have overlooked? W-K, KA, VE, ZS, KT, HB, OZ, ZL, VK, G, AP, LA, KH6, ZS3, 4S7, KR6, KV4, YV, CN8, ZD4, SM, KX6, KL7, CO, VU2, OQ5, F, ELØ, I, HR, KP4, VQ4, PAØ, FS7, VP9, VR2, VS6, SVØ, OH, CX, 5A2, 4X4, KC4, KG6, PJ, ON, ZB1, GW, EAØ, TF3, XE, KG1, PY, VP2 GM, EL, SP, UA2, HP and VK9. SP8, GD Empty, ZS6KD who now has worked 50 did it as follows, 4 in 1953, 13 in 1954, 14 in 1955 and 19 this year. He is rebuilding his beam during his vacation, but keeps his receiver on all the time.

DL4SV, Jim who is probably the oldest active SSB in Germany has worked 55 to lead the parade. He has several nice ones on 75 including the Isle of Man and Poland. John, GW3IVS, (ex VS6CW) has a new side-saddle linear using an 807. We hear that Albert, EA4BF is ready to go as soon as he receives an OK from the authorities to operate SSB. ZB1CZ, Steve, said it took him a year to build his phasing exciter. He is working out fine and has over 30 countries in only 3 months. His QTH is Malta Work Shops, British Forces, RENE, Box 51, Malta. EAØAC, Juan made his appearance on 20 with a tremendous signal. He made his W2UNJ phasing exciter in a spot without ham stores on each corner to pick up parts and help. Congrats Juan! We welcome KL7DRA on Barter Island, also CE2HV, KH6HQ, VO6C, ZS6AFF, VK6CF, KX6NB, KG6AA, G3HRO, and G2MA.

Ron, G6LX, reports the following are active on 80: PAØKC, GM2DAU, GM3FSV, EI4E and EI9W. How about getting on 15 and 20 fellows so we can hear you? We hear that EL2C and EI6W will soon be on SSB as will VQ5EK.

The SSB equipped Gatti expedition should be in the field soon. Their itinery includes VQ2, VQ3, VQ4, ZD6, ZS6, ZS7, OQØ, OQ5 and FQ8. (worth watching for)

TF3CJ, Carl has been very active on 20, and in the short time he has been on SSB has contacted

Countries Worked
(Two-Way SSB)

DL4SV	55	**VK3AEE**	46
K2DW	52	**W2CFT**	46
W2JXH	48	**ZL3IA**	46
ZS6KD	50	**OZ3EA**	**43**

most of the other countries. Carl is building a mobile rig and hopes to have it working soon. AP2BP continues to come thru to the USA regularily. G3AAO is active on 10, 15 and 20 with his ground-planes. Bruno, HB9FU has returned in his plane from his vacation in Corsica and is again active on 15 and 20. VQ4EO's home built crystal filter rig is putting an excellent signal into the USA and reports to your conductor that several other VQ4 stations are going SSB very soon. KA2YA, Ray is heard every morning around 0800 EST. George, KH6CT is handling lots of traffic on SSB. W2GU has moved to Red Bank, N.J. from Rome, N.Y. and is putting up his beam. Al, W2CFT returned from his trip to Europe and promised to send photos of all the SSB stations and ops whom he visited. We hope to include these next month. DL4SV has also promised photos. Jim, DL4WM is building a new linear and has been missed these past two months.

W2UOL, Don held a dinner in honor of Major General (Butch) Griswold, KØDWC in New York this month attended by some of the SSB gang. Among those present were W2KR, W2KG, W2KH, W2IJL, W2AVA, K2DW, W2JVO, K2DFW, K2CIV, W2GG. "Butch" flew back to Omaha the next day and operated air-mobile. He contacted hundreds of the SSB gang during the flight.

General Curt Lemay, KØGRL, SAC CO is active on SSB. W9AC, Bill Halligan is on a trip thru Europe. With all the activity in Europe on 80 we expect to see some excellent world wide contacts this Winter. Ten meters will also be a popular DX band for SSB according to the propagation experts.

We are receiving numerous requests to include technical articles and also some slick tricks in the column. Send them in; those with universal interest will be published. A list of countries worked two-way on SSB starts this month. Thirty one stations in the world have worked 40 countries so we have only included those with totals in excess of 40. Also, we can only include those totals which you send us, so if your call doesn't appear, remember I'm not psychic.

Each day there are many new stations appearing on twenty SSB, and the top twenty-five kc are over populated. Why not spread out more? Also most of the DX is heard between 14300 and 14315, with all the remaining 35 ks empty. If the DX stations would announce "looking around 14265 etc" when calling CQDX, they could help materially to prevent the pile up on the top 5 kc.

73, Bob, K2DW

QSL Contest

Plenty of losers this month. The winner's gold and shaded green stomped out all to take the two year subscription prize. Of course the better losers shown here get an extra copy to file away somewhere.

So how 'bout yours, is it a winner? try us and see.

WINNER

CONTESTS

Frank Anzalone, W1WY
CQ Contest Editor

Contest Calendar

October	6-7	WIA - VK/ZL - Phone
October	13-14	WIA - VK/ZL - CW
October	20-21	CQ W.W. DX - Phone
October	27-28	CQ W.W. DX - CW
November	10-11	ARRL - SS
November	17-18	ARRL - SS
November	24-25	RSGB - 21 & 28 mc Phone

VK/ZL

TIME: Phone — 1000 GMT October 6 to 1000 GMT October 7.
CW — 1000 GMT October 13 to 1000 GMT October 14.

SCORING: One point per QSO: multiplied by total VK and ZL call areas on all Bands.

SERIAL NUMBERS: Progressive as worked, 569001, 579002 and etc.

LOG: Separate sheet for each band. Include usual declaration that rules and etc. have been obeyed.

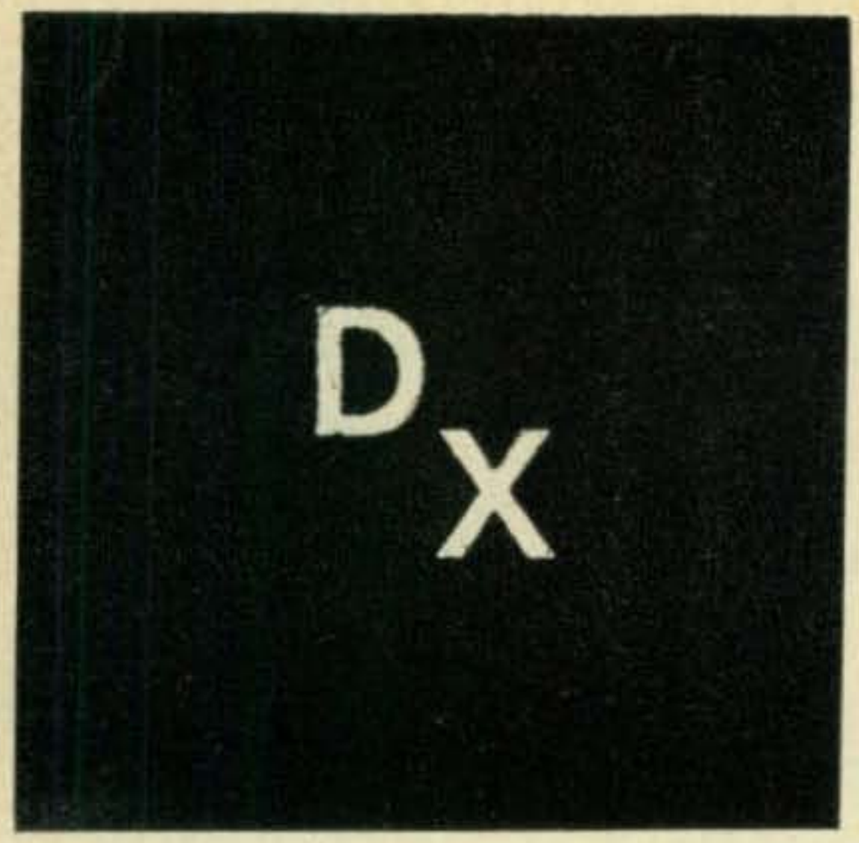
AWARDS: Certificate to high scorer in each country and USA call area. Logs should reach NZART, Box 489, Wellington, N.Z. before January 21, 1957.

CQ W.W. DX

TIME: Phone — 0200 GMT October 20 to 0200 GMT October 22.
CW — 0200 GMT October 27 to 0200 GMT October 29.

RULES: Same as last year plus addition of 27 mc as a separate band. Addition of a novice division. Minimum operating time increased to 8 hours.

[*Continued on page 121*]



Note: Last minute items are really last minute. Too late to add on the end of this column, they start on page 84.

Flash: Danny had a close shave on the 9th of Sept. A sudden squall and heavy seas caused the Yasme to almost capsize. The mast hit the water and all deck gear was lost including the main sail and jib. Yasme righted OK and Danny is proceeding to Port Moresby. More next month. . .

R. C. "DICK" SPENCELEY, KV4AA

Box 403, St. Thomas,
Virgin Islands

Congratulations to the following stations upon their achievement of WAZ:

No. 324 JAYME C. FREIXO PY2CK 40-244 (PHONE ONLY)
No. 325 GUNTER PFEFFER DL1IT 40-194

PY2CK's phone WAZ was completed with the arrival of a QSL from UAØKFD and is the third WAZ for phone and the fifth one to be issued to a PY station (Jayme also has WAZ for CW/phone). DL1IT's WAZ was the result of a AC4RF QSL. Gunter is the sixth DL to acquire this award.

We also welcome the following newcomers to the HONOR ROLL:

W2AYJ 37-145
VS1GX 37-122
W4NBV 35-152
W6PJ 38-189 (PHONE)

NAURU ISLAND, VK9TW: Danny was due to sail for Guadacanal, VR4, on August 19th after distributing some 2500 contacts from Nauru on phone and cw. First contacts from Nauru for each W and VE district were: W1BFT, W2PCJ, W3JTC, W4IHN, W5DGV, W6TSW, W7RT, W8PQQ, W9LNM, WØGUS and VE5EH. Arrival at VR4-land should be made about August 26th and a two week stay is planned. His VR4 call will be received after his arrival in the Solomons and should be well known as this is read. After VR4 the YASME will stop at Port Moresby, Papua, Darwin, Australia and Portuguese Timor. Through the efforts of some ZL hams we are happy to say that Danny has already acquired the call of CR1ØAB. Among the rare ones worked by Danny was VK9LW, Les Wright, also on Nauru. It is hoped that Les will be on frequently thereby keeping Nauru available for ham contacts.

The QSL policy, via KV4AA, maintained for VK9TW will be followed for other stops, ie: Small contributions are solicited along with your QSL to maintain this DX'pedition and allow Danny to devote his full time to ham radio at each port of call. This will result in an immediate reply QSL via airmail consistent with the receipt of Danny's logs (We hope to receive his logs daily, via QSO, as was very successfully done from Nauru). Cards received without contributions will be answered within six months via bureau. To the many whose kind cooperation has made the YASME's rare spots possible, Danny extends his sincere THANKS!

SEYCHELLES ISLAND, VQ9: VQ5GC regretfully advises that he has been unable to obtain transportation to the Seychelles at this time and his trip has been postponed until next year. This message came at a time when the necessary gear was just to be acquired and shipped.

ZANZIBAR, VQ1JO: This station came on the air as scheduled and was due to have been on from August 14th to September 3rd. QSL's go via ZE3JO.

SPITZBERGEN (SVALBARD), SM8KV (/LA/P): Olle, SM5KV, accompanying a Swedish geophysical expedition to this rare spot, came on the air August 3rd and gave many hundreds of hams a new country. QSL via SM5KV or SSA Bureau.

COCOS-KEELING, VK-RW: This station is now active from Direction Island. His name is Les and he has been heard, with good strength, near 14048 with a T8C QRI.

FRENCH SOMALILAND, FL8AB: This station has been quite active near 14040. QSL's go to Guy Depagne, Marine Nationale, Djibouti. FL8AB is ex-F8VD. FL8AA is also officially licensed at this QTH but has not been reported on the air as yet.

MONACO, 3A2BH: F9RS reports that HB9KB will be again active from Monaco (or *Monte Grace*, as he calls it) from September 9th to October 10th.

ANDORRA, PX1EX: This F DX'pedition again visited Andorra and came on the air August 6th.

Ruanda-Urundi and Sicily

As result of CQ DX Committee vote it has been decided to add these two countries to the official CQ country list. Credit for contacts with RUANDA-URUNDI, OQØ (ex-OQ5), and SICILY, IT1 (ex-I1), will be given on the WAZ lists immediately. QSO's are retroactive to World War II. With the exception of these areas the CQ list corresponds to the ARRL list. OQØ and IT1 will count as multipliers in the coming CQ World-wide DX Contest.

JA6AD, Hiro Tomumoto, Isuhaya, Japan, runs 200 watts Receiver is an SP-600. Hiro is an engineer at Nagasaki Radio.

While a goodly number of contacts were made, it is reported that they had power supply difficulties and PX1EX went QRT on August 13th. Ivan, F3AT (ex-FE8AB/FF8AG), accompanied the party this trip.

ROTUMA ISLAND: Greg, VR2BC, reports that he, along with Bari, VR2BZ, will visit this island (with ham gear) sometime in September or October. Rotuma is the principal island of a small group which lies about 240 miles N.N.W. of Fiji. Lat. 12.27 South, Long. 177.7 East. This island group has a population of about 4000 and is governed by a Resident Commissioner. Greg says Rotuma is under Fiji for administrative purposes only. It is remote geographically, from Fiji, and ethnologically different as the Rotumans, unlike te Fijians, are Polynesians. Better not pass this one up in case it might qualify as a "separate one."

DX Notes

Jim, G6ZO, is now active as CE3ZO . . . UA1KAE, Antarctica (George, Alex) is active daily around 1150 GMT, 14051 . . . UL7CB was worked 2315 GMT, 14080, and UL7KAA heard 14040, 1130 GMT . . . AC4NC will be on again when power supply difficulties are resolved . . . ZD8B was worked on 14043 . . . FI8BB (ex-F8SR), Jean, is active from Saigon with 100 watts and BC-348 Rx. QSL via REF . . . Friends of Bob Carragher will be glad to know that he will soon be going strong again from MP4BCC, Bahrain Island. He has a 32V-2 and 75A- set-up. Bob may be better known as ex XAFG/I1AZS/G3BQZ/MF2AA. He works at State Police Hdqtrs . . . W8PQQ reports that the two CR4's who went to CR8 were refused ham tickets—pity! . . . A new Marshall Island station is Bill, KX6BQ (W6UFS). See QTH's . . . CR5AE will be back on the air in time for the CQ contest . . . UH6KAA, Ahmed, 14060, 1130 GMT . . . Marcel, XW8AB, is on again, from same QTH, and will be active on all bands . . . ZC3AC writes that his receiver has been sent to Singapore for repairs (might be back by now). He was last heard on phone, 14154, 1334 GMT, is QSO with W6DZZ and W6MX . . . Jock, ZL2GX, says Kermadec trip is difficult. The only chance he would have, without risking his neck, would be to go with the Navy and the chances of them sending a boat during the school holidays (he's a schoolteacher) is remote . . . The West Gulf Bulletin reports that EA9DF will be in IFNI the first of October!! also—Bill, ZK1BS, advises he will appear with a ZK3 call shortly from an island QTH which may qualify as a separate one . . . Dave, VS1HC, got to VU5 but they wouldn't give him a license to operate! . . . Rumors have it that some C8's and C9's will soon appear—this will be nice Zone 23-wise . . . The So. Cal Bulletin reports W6KZL working an EA8/SAHARA who was working mobile from a Camel. This is our first case where "walking a mile for a QSO" might apply! . . . Many ponder HV2AB who gives his name as Pietro, QTH as Cita de Bella, Vaticana, and says QSL via ARI . . . W8BKP re-

HI6TC, Barahona, Dominican Republic, has been one of the few HI stations active over the years. Corrie is shown here in a 1954 photo. He has now moved to Ciudad Trujillo (Photo courtesy W9YFV)

KG6AGC, in Guam, is a very popular catch. Gordon is extremely active.

ports UM8KAB active on 21200, 1600 to 1700 GMT . . . Dave, ex-W9TO/W2CX/W9EJO, A3's from XEIRE . . . ZD1DR is back on 21 again . . . ZB2T, Archie, is heard on 14050 . . . Alan, VQ8AH, may be OK but wouldn't give his QTH . . . Norman, VQ5GJ, 2000 GMT, 14074, T8. See QTH's . . . We hear that John, W6MHB, will soon be on from Turks Island. Others there are VP5FH and VP5RR . . . Lord Howe Island, VK2FR, between Norfolk Is. and Australia may count as a new one . . . W2HSZ reports ZD3D active in Bathhurst, Gambia. Name: Alf Snow . . . 4S7PT returns to England in December. A couple of RAFT expeditions have been reported the first being the LAGARE II which is supposed to be transmitting on 3750 kc and was supposed to be in the vicinity of the Azores as we write. No. 2 is the Expedition TAHITI-NUI which is doing a KON-TIKI in reverse (West to East) and will sign FO8AD/MM this Summer . . . ON4QX may appear with an HV call soon. He has fulfilled all requirements for a ticket except the amateur exam . . . ZD9AE is on each Saturday morning around 1500 GMT, 14050. W6YY also reports UM8KAA, 7015, 2200/2300 GMT . . . CE3AG advises that he is receiving the logs of CEØAC and CEØAD via radio and is having QSL's printed to answer the many he has on hand . . . FO8AD made a trip with the new op at Wallis Island. He expects to be on in October. CW only . . . VK5AB, phone, and VK5MB, CW, hope to operate from North Australia after Wmas with a, possible, VK8 call.

Chilean Ninth District (Antarctic) Calls

Grahamland, Antarctica. Ohiggens Base: (Army) CE9AA, CE9AB, CE9AC, CE9AD, CE9AF.

Grahamland, Antarctica. Gabriel Gonzalez V. Base: (Air Force) CE9AG, CE9AH, CE9AI, CE9AJ, CE9AK, CE9AL, CE9AM.

South Shetland Islands, Deception Island. Pedro Aguirre C. Base: (Air Force) CE9AN, CE9AO, CE9AP, CE9AQ, CE9AR, CE9AS.

South Shetland Islands, Greenwich Island. Arturo Prat Base: (Navy) CE9AT, CE9AU, CE9AV, CE9AW, CE9AX, CE9AY, CE9AZ

(Thanks CE3AG)

Addresses

CE3ZO—Jim Kirk, Box 444, Santiago, Chile.

CN8JW—USNCF, Box 60, Navy 214, FPO NYC., N. Y.

EL2S—Sewell Brewer, c/o Government Radio Service, Monrovia, Liberia.

FF8AI—Box 5149, Dakar, FWA.

FF8BP—Henri Mialet, 120 Avenue Gambetta, Dakar, FWA.

FE8AG—Sgt. Georges Casiglia, BP 298, Douala, Fr. Cameroon.

FR7ZC—Paul Ferrand, Trois-Banius, Reunion Island.

FL8AB—Guy Depagne, Marine Nationale, Djibouti, Fr. Somililand.

KX6BQ—Bill Thompson, Box 2073, APO 435, PM., San Francisco, Calif.

LX1DW—Jim Schmit, 72 Rue Franz Boch, Rollingergrund, Luxembourg.

MP4BCC—H. R. Carragher, State Police Hdq., Bahrain Island, Persian Gulf.

OQ5FH—Box 614, Jadotville, Belgian Congo.

PX1EX—Via R.E.F.

SM8KV/LA/P—Via SM5KV or SSA.

UA6UI—Efim, Box 22, Astrakhan, U.S.S.R.

UC2KAB—Michael Kaplan, Radio Club, Gomel, Byelorussia, U.S.S.R.

UP2AS—Box 231, Kaunas, Lithuania, U.S.S.R.

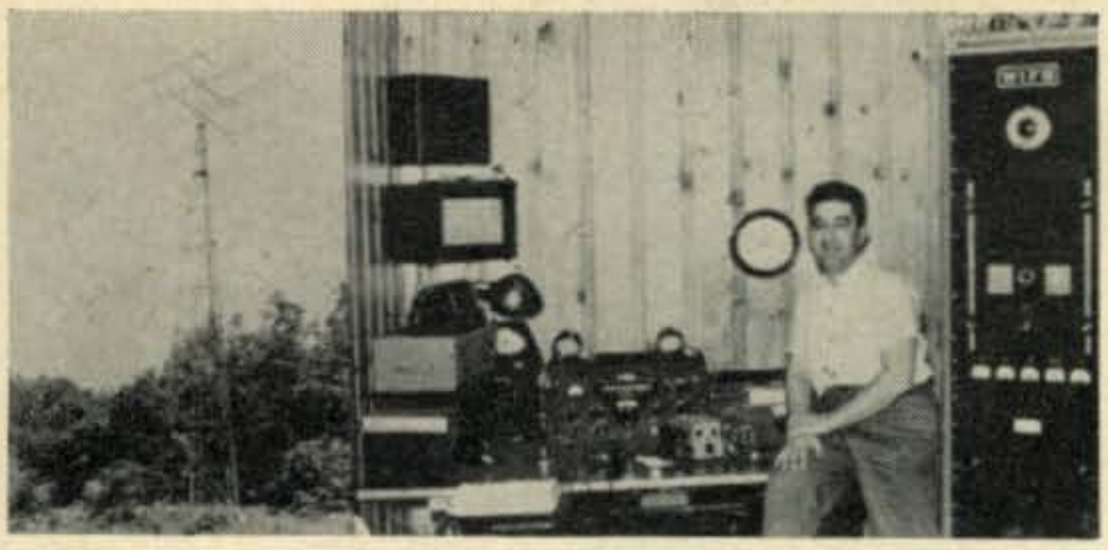
UQ2AN—Box 1601, Riga, Latvia, U.S.S.R.

VK1RW/ZC2—Direction Island, Cocos-Keeling. Via Perth, W. Australia.

ex-VP5DC—Lorne Creech, Apartado 78, Sabana de la Mar. Dominican Rep.

4S7MR, Ron Marriott, in far away Ceylon, puts a consistent signal into all areas. Photos show Ron at operating position plus the shack which is shaded by two "ZL" beams. (Photo courtesy W9YFV)

Ye olde DX maestro W1FH, Boston, Mass. leads the pack with some 268 to his credit. Yep, when Charlie don't get 'em they just ain't there!



VP5FH—(Turks Island) Via NCDXC, Box 75, Oakland, Calif.
VP5RR—(Turks Island) Via W5HVV, Box 954, State College, Miss.
VS1 Bureau—Box 2394, Singapore, Malaya.
VS4BA—Richard Hawkins c/o GPO Kuching, Sarawak.
VQ5GJ—Box 355, Kampala, Uganda.
ex-VS5CT etc.—P. H. J. Green, 65 Balcombe St., London NW 1, England.
ZA Bureau—Box 75, Tirana, Albania.
ZD2GWS—G.P.O. Buea 65, British Cameroons, South.
ZD3D—Alf Snow, Bathurst, Gambia.
3A2BH—Via USKW

Thanks to West Gulf Bulletin, F9RS, K2JTS.

DX'ploits

Andy, W6ENV, leads off this month with the acquisition of VK9TW and SM8KV for a 268 total . . . Don, W6AM, is close behind with 266 thanks to PJ2MC, VU5CAR, YVØAA and VK9TW while Walt, W6MX, rests on 265 with SM8KV, VK9TW, YVØAA and ZC3AC . . . VK9TW gave Frank, W6SYG, his No. 264 as Ed, W6DZZ moved to 263 with SM8KV . . . Jayme, PY2CK, also hit 263 with VR6AC, XW8AB, FS7RT, FB8BK (Tromelin) and AC5PN. His "phone only" total is 244 with the above plus UAØKFD . . . Frank, W6AOA, with SM8KV and Al, W8PQQ, with VK9TW and SM8KV are both at the 263 level . . . Glenn, W8KIA, rises to 262 with XE4A, YVØAA, VK9TW and CR1ØAA while Howie, W2AGW, with Danny, goes to 261 . . . Jesse, W3KT, goes to 259 with all the latest plus YA1AM. His phone total is 179 . . . Oscar, W3JNN, thanks to VK9TW, XE4A and YVØAA, reached 258 while shoving his phone total to 226 with these plus UQ2AN and UP2KBC . . . Roger, W3EVW, is 256 with YVØAA, PJ2MC and VK9TW while Gene, W6EBG, rises to 255 with these plus AC5PN, AC3SQ and SM8KV . . . Ozzie, W9VND, smeared SM8KV for 255 while Bill, W6SAI, reached a like amount with XE4A, YVØAA, PJ2MC and VK9TW . . . Dewey, W6VE, hit 255 with XE4A, YVØAA, UI8KAA, VK9TW and UJ8AF as Horace, goes to 247 thanks to PX1EX, SM8KV, VK9TW and XE4A . . . Van, W9HUZ, stands on 246 with UI8KAA, FR7ZC and VK9TW under his belt while George, W1GKK, hits 244 with UP2KBC, PJ2MC, YVØAA and VK9TW . . . Norm, W6NNV, ups to 244 with VK9TW, FL8AB, SM8KV, PX-EX, VK1RW (ZC2) and I1DCO/M1 as Clyde, WØELA, adds VR1B, FS7RT, XE4A, CR1ØAA, VK9TW, YVØAA and UP2KBC for 241 . . . Larry, W3JTC, has 241 with VK9TW while Clint, W8SYC, goes to 239 with VK9TW . . . Mike, W9FKC, goes to 237 with FS7RT, VR1B, XE4A, PJ2MC, VK9TW and SM8KV as Harry, VK4HR, submits additions jumping him from 213 to 237 . . . Guy, W6DLY, rises to 236 with XE4A, FS7RT, PJ2MC, OY7ML and PX1EX while Jack, W6NTR, adds such as VQ5GC, ZD3A, VR1B, ZS2MI, ZD9AE, UR2KAA, PJ2MC, VK9TW and XE4A for a 233 total . . . Ed, W6LDD, comes up with YA1AM, CR1ØAA, XE4A, ZD9AE, PJ2MC, YVØAA, VK9TW and UP2KBC to reach 226 as Burt, W6EHV, goes to 221 with VK9TW . . . Don, W6LRU, is 218 with XE4A, PJ2MC, YVØAA, ZD9AE and VK9TW while Don, W6BVM, goes to 208 thanks to YJ1RF, CEØAD, XE4A, ZD9AE, YVØAA, VK9TW and ON4CK/LX . . . Joe, W7ASG, hits 195 with UP2KBC, VK9TW and YA1AA as Dan, W6PH, goes to 195 with CR1ØAA, ZD9AE, ZS2MI, FS7RT and PJ2MC . . . Clay, W6LGD, rises to 194 with FS7RT, PJ2MC and VK9TW while Norm, W9YNB, keyed with EA6AW, FB8BX and VK9TW for a 192 total . . . Vip, W6ID, moved to 191 with such as XE4A, UR2KAA, OY1R, VK9TW, VP2GN and UP2KBA as Bill, W5ASG, hits 262 with SM8KV and VK9TW with the latter moving his phone total to 192 . . . Dick, KV4AA, reached 260 with SM8KV and VK9TW while Ross, W9RBI, jumped to 251 with such as YA1AM, FB8BR/FB, VK9TW, PJ2MC and XE4A. His phone total is now 232 with LZ1KSI, UQ2AN, UP2KBC, to name a few . . . Art, W9LNM, with VK9TW is 248 as Howie, W2QHH, hits 242 thanks to VK9TW also . . . Norm, W1HX, moves to 241 with VR1B, JZØPS, XE4A, VK9TW and SM8KV while Joe, W8UAS, keyed with XE4A and VK9TW for 237 . . . Gus, W2HMJ, kept pace

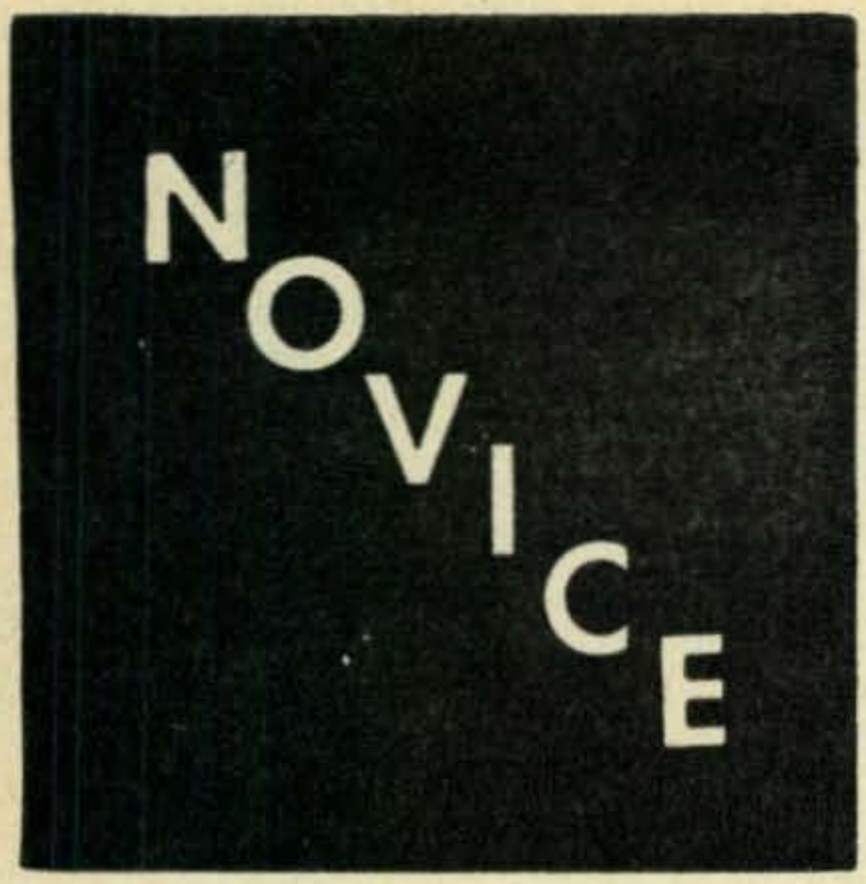
[*Continued on page 90*]

CQ World-Wide DX Contest

PHONE: 0200 GMT, October 20th to 0200 GMT, October 22nd.
CW: 0200 GMT, October 27th to 0200 GMT, October 29th.

VK/ZL DX Contest

Phone: 1000 GMT, October 6th to 1000 GMT, October 7th.
CW: 1000 GMT, October 13th to 1000 GMT, October 14th.



for the Novice and the Technician

Walt Burdine, W8ZCV
Waynesville, Ohio

Over the world the amateur radio fraternity numbers about 250,000 members performing a service defined in international law as one "of self-training, intercommunication and technical investigation carried on by duly authorized persons interested in radio technique solely for personal aim without financial gain." Of these quarter million amateurs, approximately 160,000 are citizens of the United States. If you are an amateur, pride yourself on being a member of the greatest family of juior electronic scientists in the world. This hobby is probably the most complex, both politically and technically in the world.

Internationally we are governed by The International Amateur Radio Union and nationally by The Federal Communications Commission, or its counterpart in other countries. Most countries have an organization comprised mostly of amateurs who help determine amateur policy within that country. Our policy organization is the ARRL who acts as our representatives in Washington and at International conferences. These organizations help us maintain our operating privileges and every ham should belong to his respective organization as well as his local ham club. There is power in number and union of membership.

Our greatest governing body is the amateur himself. In the U. S. we have been intrusted with the responsibility of giving license examinations to Novice, Technician and Conditional class aspirants. This in itself is quite a responsibility, yet I have yet to see the amateur that would shirk this responsibility or let down the bars to any aspirant for a license. We do not want our hobby cluttered up with licensees who are not real hams at heart. We learned the code and theory to get our licenses, they can do the same. The amateur will go out of his way to help any real aspirant get his license if that aspirant is willing to help himself. The amateur is a citizen of high personal integrity.

No hobbyist can boast of being able to serve the public in as many ways, or as adequately as can the amateur. In time of international difficulties (war) our members have aided in setting up communication networks in their respective countries. In time of disaster the ham is there with his rig to furnish emergency communication, saving many lives and untold misery. On other occasions hams have helped with research that has required large numbers of observants, all this, without financial reward. The ham has been in the forefront of many electronic advances that has made life more livable for you and I.

Probably no other hobby in the world has as many jealous commercial interests eyeing its assets. The general public has only a hazy notion of the many ways that the amateur serves his country. Too many of the public only know of the ham's existence when there is interference on their television or radios. This adverse publicity may be counteracted by telling about our public services. More information on this in August '56, CQ *Publicity*. However, part of our troubles are caused by carelessness in failing to clean up our own rigs.

This failure to clean up our rigs has brought in mail from over seven states at the rate of one letter a day for the past two months. All mention harmonic radiation causing interference to state police, airline communication services or CAP. This type of interference makes you eligible to receive a notice of violation (pink slip) from the FCC which is like a summons to appear in court for speeding on the highway.

By definition a harmonic is an integral multiple of a fundamental frequency. Bill Orr's *Radio Handbook* states, "Any periodic wave (one that repeats itself in definite time intervals) is composed of sine waves of different frequencies and amplitudes, added together. The sine wave which has the same frequency as the complex, periodic wave is called the fundamental. The frequencies higher than the fundamental are called harmonics, and are always a whole number of times higher than the fundamental. For example, the frequency twice as high as the fundamental is called the second harmonic."

Causes of Harmonics

Harmonics in tube plate circuits are generally due to distortion of the plate current wave shapes in the power stage of a radio-frequency amplifier. This is primarily due to the fact that, when an amplifier receives large grid-excitation voltages, the plate current is driven into the upper curved portion of the characteristic curve. Therefore, if the power-amplifier stage is adjusted to the point

Judy Rice (17), KN8AVP and Mom, Ruth, KN8ARA. Judy is entering Nurses training this Sept. (Dad is W8VOI).

at which the grid voltage is maintained so that the plate-current rise does not extend into the upper curved area, the generation of harmonics may be practically eliminated. If, however, the grid voltage is maintained at these limits, we cannot be sure what will happen when modulation is too small to be of any benefit to us.

In order to increase the efficiency of the amplifier the grid bias is increased to, or nearly to, the point of plate-current cut-off. This condition of operation is called class B amplification. When using class C amplification this bias is increased to from one and one-half to twice cutoff value. The grid-excitation voltage may be greatly increased to swing a good ways up on the straight portion of the curve. Operating within this portion of the characteristic curve increases the harmonic-current components of the output wave. Using a high grid bias voltage will affect harmonic generation, when the grid-excitation voltage is low the output wave form has very few harmonics. Harmonic radiation, particularly that due to the second harmonic of the fundamental frequency is the most objectionable. Although this frequency cannot be entirely eliminated, several methods can be used to reduce its intensity to a negligible degree. (*Now go back and read it again, slow.*)

The design of most small multiband transmitters tends to aggravate the suppression of harmonic radiation. They usually have enough grid drive to allow the final amplifier to act as a doubler stage on the higher frequency bands which gives maximum output on the greatest number of bands for the least money. This practice in itself causes harmonics which must be removed before feeding it up to the antenna. Preventive means of harmonic radiation therefore *must* be devised, otherwise the output frequency of the r-f amplifier will fall outside of our segment of the frequency allotment. Remember that the relationship of harmonics and parasitic oscillations are two different problems, and entirely foreign in nature to each other.

Two Questions

Q-1. Where is link coupling applicable in an oscillator-amplifier type transmitter? Why should it be used?

A-1. Link coupling may be used between the oscillator and the buffer stage, between two r-f amplifier stages, or between the final amplifier stage and the antenna. Link coupling simplifies adjustment of drive requirements, effectively prevents the transfer of *harmonics* and *spurious* signals and lastly aids in matching loads of different ohmic values.

Q-2. What operating conditions would be favorable for the generation of *harmonics* in a r-f doubler or a frequency multiplier stage?

A-2. The conditions favorable for encouraging generation of *harmonics* are high grid bias (negative), ample excitation and a high-impedance plate circuit tuned to twice the input frequency. A tripler would be tuned to a frequency three times that of the excitation frequency. The efficiency of a multiplier stage drops as the frequency multiple rises. The efficiency of a push-push doubler approaches that of an amplifier stage due to the grids receiving a pulse for each alternation of the excitation voltage.

Harmonic Suppression

Proper design and careful attendance to constructural details are two of the best ways to suppress second harmonics. All components should be laid out to keep r-f leads to a minimum. This not only keeps the resonances of grid-to-cathode and plate-to-cathode r-f paths at frequencies above the TV bands, but also helps discourage v-h-f parasitic oscillations. Link coupling should be used throughout the transmitter.

Use shielded wire in all power-supply wiring. Shielded wire is not only shielded against r-f pick-

up, but also acts to attenuate harmonics through its continuous capacitance to ground. The shielding should be grounded at every convenient point and at each end. Where shielded leads cross or run parallel, the shields should be spot soldered together. Be sure that the insulation is appropriate for the voltage used. Ignition cable covered with shield loom can be used for voltages above 1000 volts. Possibly coax cable could be used for this. Take care not to melt the insulation.

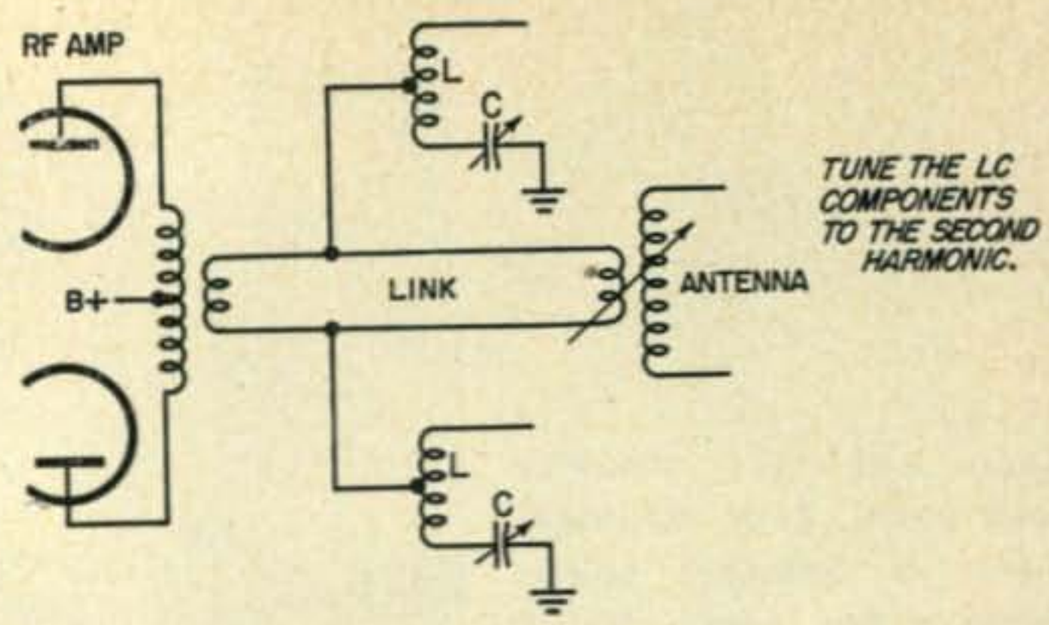
Complete electrical shielding of the transmitter helps to discriminate against harmonics. Be sure and connect the metal cabinet of the transmitter to an earth ground, keeping in mind that the ground wire should not be a multiple of a quarter wave at the frequency you are going to operate. A good ground is also a safety measure.

Keep all frequency multiplier outputs at as low a value as possible. Amplify the frequency to its final power level in as small a number of stages as possible. This will help keep the harmonic level (interference) to a minimum. Be sure when you dip the transmitter stages that you pick the *right multiple* of the crystal. Check the setting of all controls with a grid-dipper and record them for future use.

WAS and 35 countries as a novice is the report from Wally "Walt" Roeder (15) W7AOX. A wide spaced 3 element 15 meter beam helped.

Keep grid drive down, use only enough drive to allow upward modulation. If the dummy load (light bulb) shows downward modulation, increase the grid drive until upward modulation is obtained. Variable link coupling or a variable resistor in the screen-grid of the driver stage to adjust the output of the driver are two methods of controlling grid drive.

Capacitive coupling does not discriminate against the passage of harmonics. A Faraday shield between the r-f power amplifier stage and the antenna will prevent capacity coupling, the magnetic coupling will aid in suppression of parasitic and harmonic frequency radiation. When using a Faraday shield the transfer of power is mainly by magnetic coupling. The construction of a suitable Faraday shield for use in the output of your transmitter can be found in the radio handbooks.

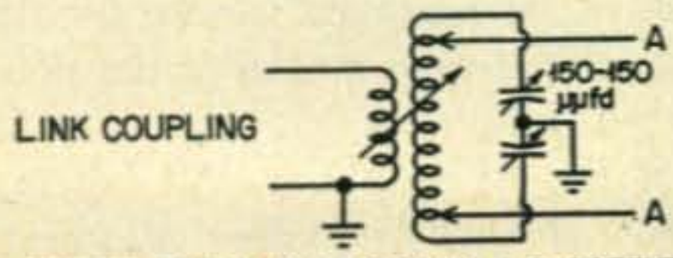


A pushpull output amplifier will eliminate the problem of *second* harmonic radiation (but not third). The output will be more than double that of a single tube too. This is because the fundamental frequency current flowing in each plate circuit is out of phase by 180 degrees. (When the circuits are properly balanced.) Be sure that the same amount of current flows in each side of the stage. All leads should be the same length from the respective condenser and plate connections. If these conditions are not fulfilled, additional even harmonics may be contributed to the transmission line load circuit.

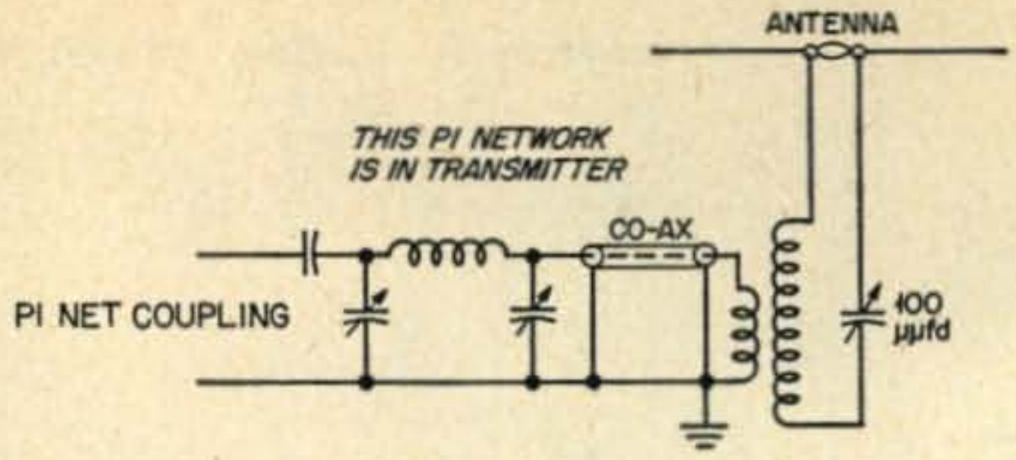
Tuned Antennas

Another way to prevent the radiation of second harmonic frequencies would be to use an antenna designed to provide maximum radiation of the particular frequency band in use at one time, in other words a different antenna should be used for each band. The so-called all-band antennas do not provide any discrimination of harmonic frequency radiation. If you must use an all-band antenna, be sure to use an antenna coupler between the transmitter and antenna. Never try to load a pi-network single ended final directly into an all band antenna, this is an easy way to be sure of getting a notice of violation from the FCC. Four antenna coupler diagrams are provided for your use, supplement these with study from the antenna section of your handbook. Read Bill Orrs' "Beam Antenna Handbook" and follow his advice. When your antenna is working at its best your ability to work DX will increase *and* you won't have to worry about getting a notice from the FCC. All LC components are to resonate within the band that is being used.

Check with a ham living a mile or so away to see if you have any harmonic radiation. If nothing can be heard, rest assured your transmitter is reasonably clean.



CENTER OF COIL IS AT GROUND R.F. POTENTIAL BECAUSE THE ROTOR IS GROUNDED.



Six Meters

Next month I will have an article on the use of the *Globe Scout* transmitter on six meters and also how to use this excellent little transmitter for two meters. For the beginner and the fellow that likes to run low power this is it. There will also be a diagram of a two and six meter converter. There are still some tests to run on this little station but I can assure you that lots of pleasure was derived from it. Lots of DX can be worked on either of these v-h-f bands and I'm sure you will be in for a big surprise at what can be done with low power. As the big rig rarely can be used on emergency power this combination is ideal for civil defense.

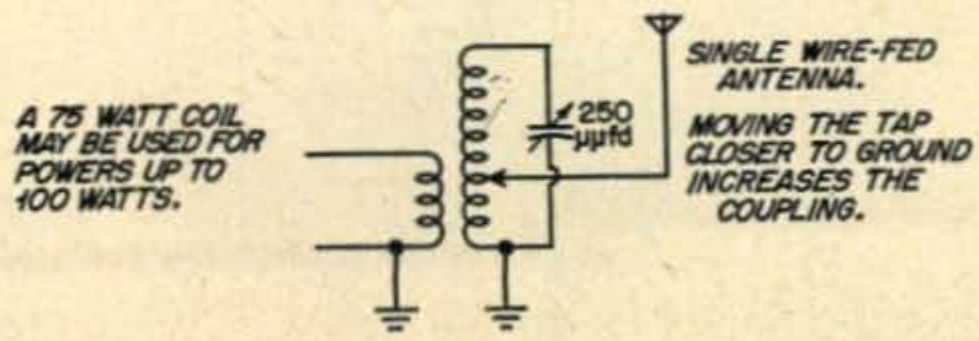
Six has been showing up with some surprises lately. Three countries were heard here in about 15 minutes and some new states have been coming through with fair signal strength. VP7BI, CO2ZX and CO2XZ have been putting in beautiful signals here but not worked.

Turkey Run VHF Picnic

On July 29 six members of the Dayton Amateur Radio Association travelled to the VHF picnic at Turkey Run State Park in western Indiana and met most of the VHF'ers from the central part of the United States. Amos Hawkins, W8INQ, his wife, Edith, and myself, rode in one car with Lt. Charles C. Gauder, W8JSR; Everett G. Taylor, W8NAF and Wyatt E. McDaniel, W8HTD in the other. We stayed at the same motel in Indianapolis, journeying on to the picnic early Sunday morning. Both cars kept in contact using six meters.

Hidden Transmitter Hunt

The 6 meter mobiles put on a hidden transmitter hunt the night we stayed in Indianapolis. This was my first time on a hidden transmitter hunt and believe it an excellent method to hold club members together. Indianapolis amateurs participating were John S. Morning, K9AMP (the fox, or hidden transmitter); George Lane, K9CBY; Milton E. Dobbs, K9CNQ; Carol Tracey, K9CYP and her OM, James R. Tracey, W9RYQ; John R. Robertson, W9JMD; Raymond E. Barnes, W9HPV; Donald C. Litwiler, W9MHP, and the families of these amateurs. Our car followed Don, W9MHP; Chuck and his carload followed another car. Indianapolis sure has a lot of streets. K9AMP was so well hidden that I think he had to call for help to find himself.



Letters to the Editor

The first letter this month has a warning, theory and some good explanations. The letter is from D. A. Helton, WØPME, c/o Radio Division, Missouri State Highway Patrol, Jefferson City, Missouri. Please read this letter and follow its advice carefully and fully.

"Dear Walt: I'd like to use the medium of your novice column to bring to the attention of as many of the new hams possible the seriousness of the harmonic situation on the 7.4-7.5 mc band. There is almost no hour of the day that novice activity cannot be found on that portion of the band, and during the evening hours the situation has developed to the point that it is difficult to tune 5 kc of this band without hearing some.

The important thing is that if they can be heard by others, they can be heard by the FCC.

During one evening last June I identified and notified over 30 stations in this part of the band. From that 30 alone, I received 7 different queries about harmonic reduction . . . from some of the comments I rather believe that a few of the newer hams are frightened off the air by the notices.

Jon Flower, W8GKB, 583 Moreley Avenue, Akron 20, Ohio. Age 14. As a novice he worked 47 states and 8 countries on 40 meters. Rig is a DX-35 and an S-85.

I'd like to point out to the novices that the purpose of the ARRL cooperative observer program is to help the amateur clean up his signal before he attracts the attention of an FCC monitor.

From the letters I've received in the past, I believe that 90% of those who are radiating harmonies are guilty of one or more of the following: attempting to load on 3.7 mc a 40 meter doublet, folded doublet, or vertical directly from a pi-network transmitter without an external antenna coupler, attempting to load short lengths of wire without an external coupler, or coupling a feedline directly to the link of a transmitter final tank in which there is insufficient tank capacity.

I'd like to repeat that the pi-network is an efficient low-pass filter ONLY WHEN PROPERLY ADJUSTED, and on 80 meters this usually means an output capacity of over 1000 μμfd when coupling to a 300 ohm load, and over 1500 μμfd when coupling to 52 or 75 ohms. If your antenna doesn't seem to be "taking the juice," and you're tempted to chop out almost all of the output capacity in the pi-network, you're asking for an FCC citation.

When using a parallel tank, 50 or even 150 *uuf isn't* sufficient tank capacity to give proper harmonic attenuation under the normal ratios of current to voltage used on the final. Refer to the handbooks for the proper tank capacity for the voltage and current you intend to run. A dividend of this will be increased ease of loading, and increased output from the rig.

If you *absolutely must* use a 40 meter antenna on 80, couple the rig to an antenna tuner, and couple the antenna to the tuner, *never couple the antenna directly to the transmitter.*

[*Continued on page 106*]

behold: no power supply! In this xtal controlled plug-in converter.

Newton E. Butler, W6WCH
3962 1st Ave., Apt. 5
San Diego 3, California

Phooey on Transistors

Here is a mobile or fixed converter that should prove to be of interest to many of the mobile gang. Installation time will run from one to two minutes, with five covering anything you may run into. It will operate quite satisfactorily from the broadcast antenna used on the car radio, however reception will naturally be better with the use of a transmitting whip.

To install: unplug the broadcast antenna from the car receiver and plug it into the converter. Plug the antenna lead from the converter into the car radio. Clip the shielded power lead on the ammeter or wherever you can get six or twelve volts. Turn on the switch, tune the b-c receiver to 850 kc and listen to the boys come in. When the converter is turned off the car receiver is restored to normal. No plugs, no clips, no nothing.

A two meter rock (8100 kc) was used to throw the i.f. into the middle of the broadcast band with the oscillator on the high side of the signal. It's a good idea to use a xtal frequency on the even hundreds because you can then get a pretty good idea of where the other guy is from the dial of your broadcast receiver. An 8100 kc xtal reads 900 for 7200 and 800 for 7300 kc. This goes backward because the local oscillator is on the high side. A 6400 kc rock will straighten that out if it is a problem to you.

The big problem was to get an oscillator to work satisfactorily with only six volts on the plate. The answer to that came hard but we finally got it. Use a high "Q" coil in the oscillator tank and it will behave like a gentleman. Different tubes were tried and some worked worse than others. Good results were obtained with a 12AT7 so this was used for the working model. A 3"x4"x5" utility box was used and worked out very nicely. The box can be mounted under the dash where you can get at the switch or you can (like me) hang it in the wiring going thru the firewall.

Construction

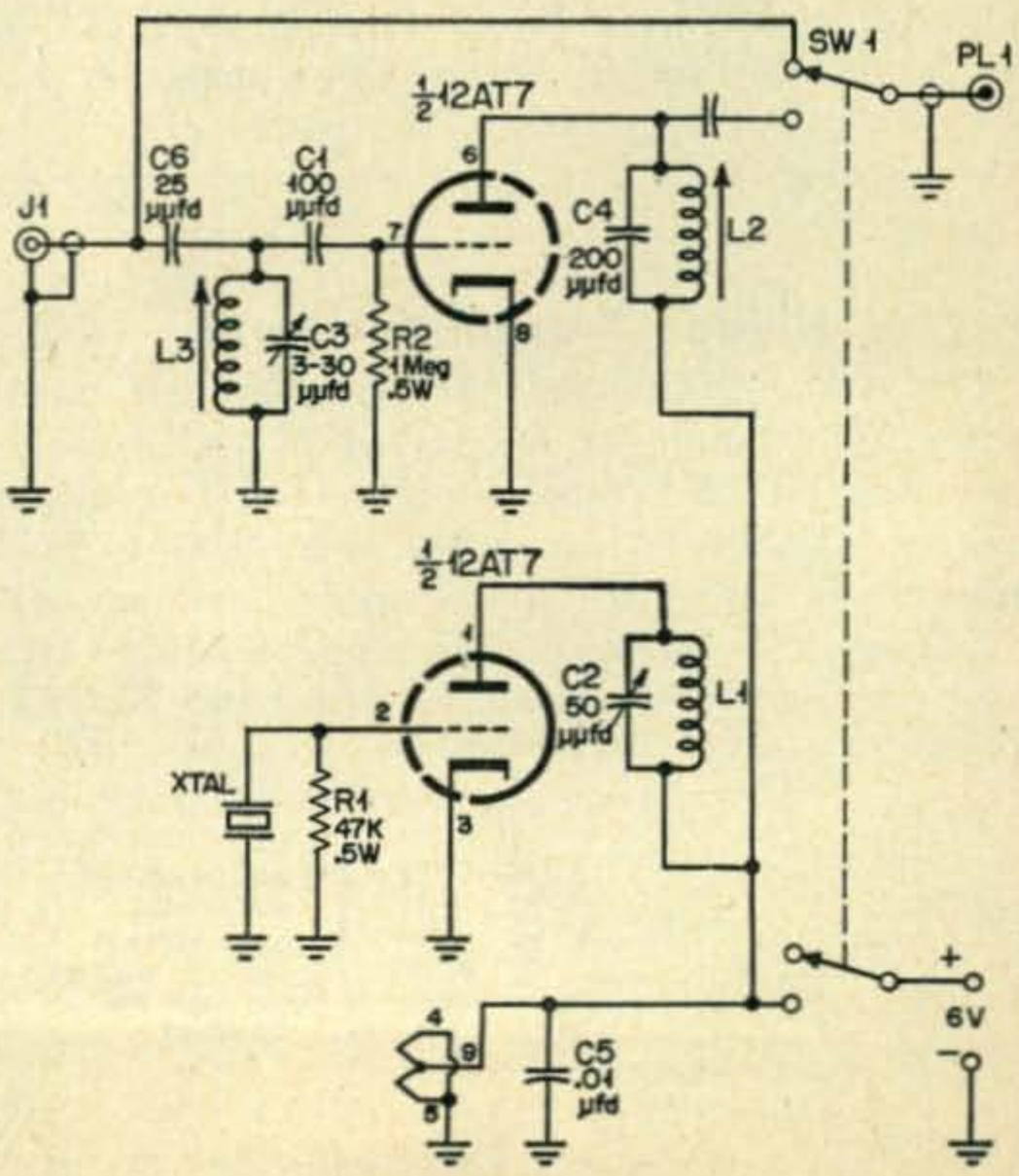
Build it any way you wish. The only thing to watch is the oscillator plate coil. Use one with the highest "Q" you can get and keep it away from the chassis and everything except the mixer grid coil. Mount them side by side if you wish. The rest can be slopped in to your own high standards. High "Q" is to be avoided in the mixer grid coil. One of the slug-tuned forms available surplus for about two-bits will do. If the "Q" is too high the gain will not be constant over the entire band.

A hotter converter, especially on 40, will result with the use of a 6AJ5 in the mixer and a 6AF4 in the oscillator. The 6AJ5 is similar to the 6AK5 and the book says 28 volts on the plate. It works like a hot rod with only six volts. You can even get pretty good results with no plate voltage at all.

The two tubes work better than the 12AT7, but the converter gets more complicated and tends to defeat its purpose. This started out to be a simple converter. Let's keep it that way.

Some pick-up of ignition noise was encountered in the loopstick used for the plate coil of the mixer. The offending coil was put in a

Fig. 1. Negative grounded battery.



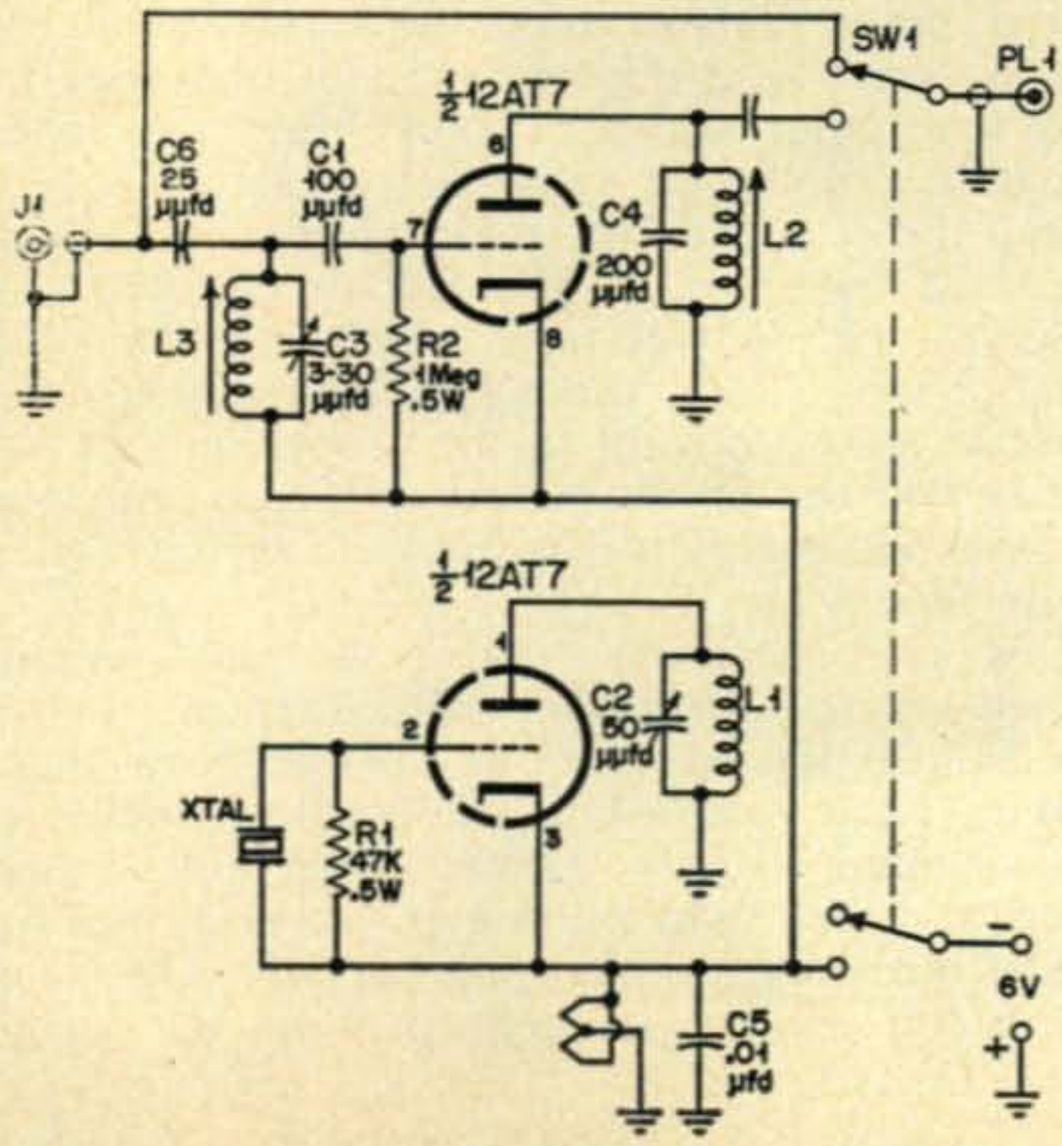
shield can made from the container that 35mm roll film comes in. This eliminated the noise and also lowered the "Q" of the loop-stick to the point where the gain was constant over the 40 meter fone band. On 75, the gain will drop off slightly at each end of the band, but not enough to bother.

An interesting sidelight and one that could bear looking into is the fact that this converter using a 6AJ5 will not generate any noise in the mixer stage. Anything you hear on the speaker is coming in on the antenna. Disconnect the antenna and you will think the thing is dead. Crank the gain way up to where you can hear the broadcast stations leaking thru. Now connect the antenna and it will blow you out of the car.

For the 75 meter converter I bought a 4900 kc rock for twenty five cents. This resulted in an i.f. of 1100 kc for 3800 and 900 for 4000 kc. Construction was identical for each converter and I suppose they could both be combined into one and bandswitching used, but that would be a big deal and again defeat our purpose.

This converter has been stacked up against the big names time after time. When they heard them I heard them just as well. Keep in mind that you are feeding this into a car receiver and the selectivity is determined by this car receiver. It's not the best in the world You can't throw rocks at the new mobile receivers but you can make faces right back at the commercially built *converter* in anyone's car.

Fig. 2. Positive grounded battery. Circuits shown are for 6 volt operation with filaments in parallel. For 12 volt operation connect filaments in series. All other connections remain the same.



In cars using positive grounded battery it will be necessary to follow the "upside down" method of construction. This means that the plates are returned direct to ground thru the plate coils. The screen grid of the mixer is grounded at the socket. Performance-wise there is not much difference between the six volt and twelve volt models. The twelve volt has higher output but the signal to noise ratio is no better so that leaves you with six of one and a dozen of the other.

Tune-up is standard with the exception of the oscillator. This will oscillate only on resonance and is fairly sharp. Plate current will run 40 to 50 microamps and will drop a few when oscillating. It is a good idea to listen to it on the home station during initial tune-up. The output level of the converter is about the same as the average broadcast station so the volume control will take about the same setting with the converter in or out. This is a little on the low output side for a converter and in some locations a broadcast station might sneak through. In good old Southern California the stations between 700 and 800 kc are fairly weak and offer no problem. The i.f. I selected for 75 was lousy. A few minutes spent checking the broadcast band in your locality for a fairly clear spot and selecting your xtal accordingly would be well spent.

A tunable converter can also be constructed following the general idea of the above. I am using one for 40 meter RTTY that feeds into a surplus Q-5er. The 6.3V a.c. is rectified with a 1N34 to provide plate voltage. Drift is absolutely nil and when the FSK tuning indicator (CQ, May, 1956, Page 46) shows a tilt it's usually the other guy. I have used other receivers for FSK and always come back to this combination.

In closing, this converter is useful not only for your own use but could be used in a second car, a company car, or any time that you would like to keep up with the band and do not want to or cannot go in for an elaborate installation. As I said above, this low voltage business could bear some looking into. I would appreciate hearing from anyone who builds this or anyone who has done work along similar lines. It's easy to build, easy to get working and works like a charm. ■

Parts List

R1—47K ½W
R2—1M ½W
C1—100 µµfd Disc Ceramic
C2—50 µµfd Variable (APC padder)
C3—3-30 µµfd trimmer
C4—200 µµfd Disc Ceramic
C5—.01 µfd tubular
C6—25 µµfd Ceramic
L1—Resonant with C2 at 8100 kc High Q.
L2—Loop stick
L3—Surplus slug tuned form or National XR-50
J1—Auto radio antenna jack
PL1—Auto radio antenna plug
SW1—DPDT switch toggle or rotary
J1 is mounted in converter cabinet. PL1 is on about three feet of auto radio lead in or small coax.

Clean Up the Shack

Jack Fulmer, W4HAV
55 Vernon Lane
Ft. Thomas, Kentucky

Are you proud of your station? When you have guests in the shack, do you start out with "things are kinda messed up here, but I haven't had a chance to straighten up"? When visiting hams come in, must you apologize for the fact that you have numerous "temporary" wires strung about. If your shack is like this and you want to keep it that way, read no further.

Most people want to feel proud of their jobs, wives, children, friends and anything else they are in contact with. Among these things is their amateur radio station. Not only do you want to have the rig work properly, but you would like it to look good, so that you won't have to apologize for the appearance whenever a visitor comes in.

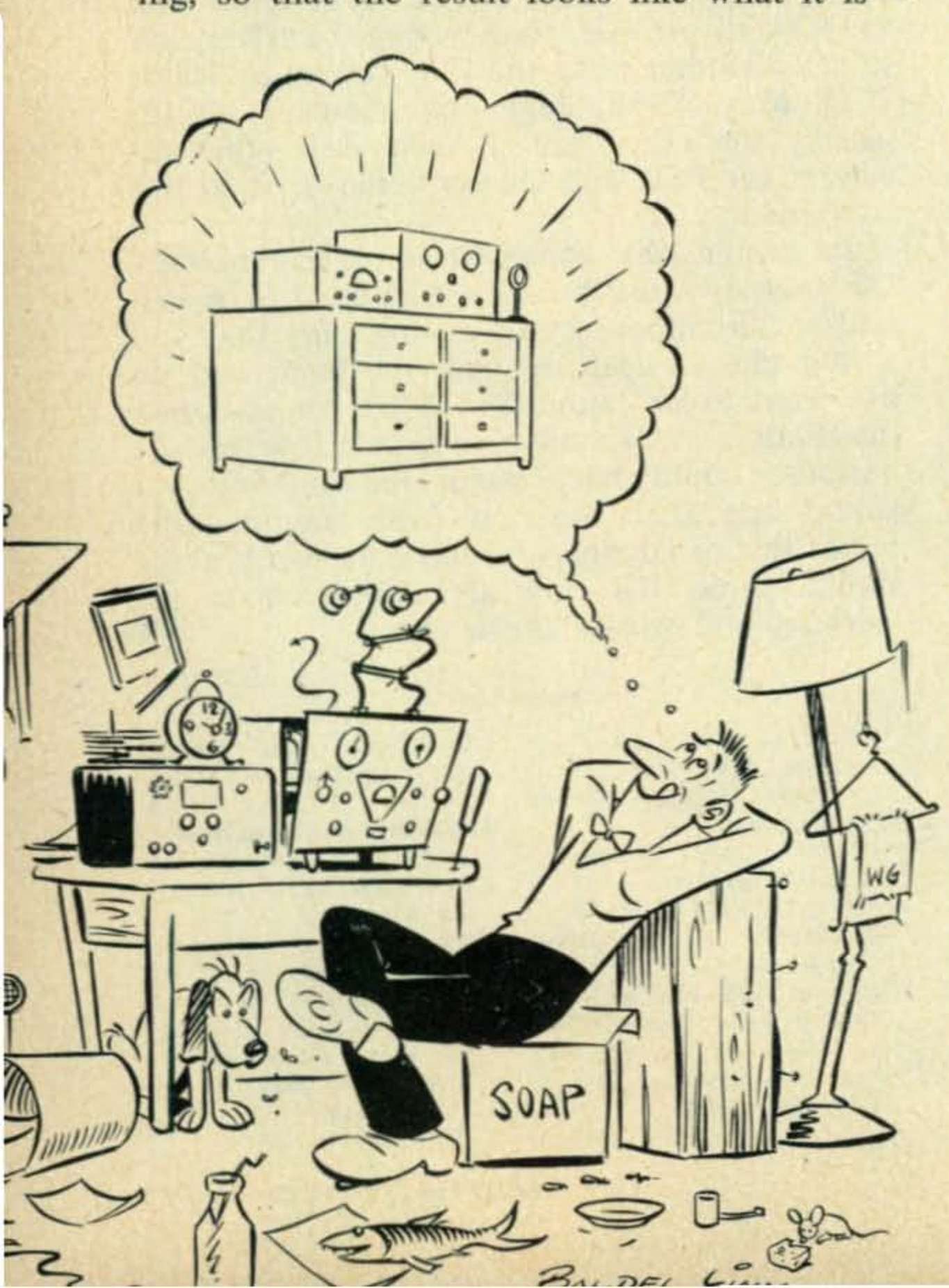
Commercial radio equipment is designed to do a job, and the appearance of commercial transmitters is usually pretty businesslike. There are very few frills and window dressing, so that the result looks like what it is—a piece of technical equipment intended to be used for a technical purpose. Thus we have come to prefer such an appearance in our home-made equipment, and one of the highest compliments that can be paid a ham is to tell him that his rig looks commercial. If you want to really butter him up, ask "What outfit built this thing?" This commercial look is not so hard to come by, if only a little time and money is spent in the attempt.

A transmitter, commercial or home built, must first of all work properly. I realize that no ham builds a piece of gear that won't work, but I thought I'd mention it. Furthermore, not necessarily in the order of importance, it must be reliable, it must be made in such a way that it can be easily repaired, it must be safe, and it must have an appearance, good or bad. Let's agree that it would be better, if only esthetically, to have a good appearance.

The "commercial appearance" is generally the result, in factory made equipment, of an effort to build into the transmitter utility, reliability, convenience, and safety. These same features can be incorporated in a home built rig only if you are willing to spend a little time and money on the job.

Let's first talk about mechanical construction. There are several inexpensive wrinkles to improve the mechanical construction of our equipment. The first that comes to mind is the use of the proper screws and nuts for the job, with lockwashers where needed. How many times have you assembled $100 worth of parts on a chassis using the screws from the junk box where no two of them match as far as size, color and type. Next time you invest a half a dollar in some new machine screws and throw away the assorted screws you inherited from your kid's erector set when he outgrew it. If you have a job that calls for a ¼" long screw, use a half inch if you must, but at least cut it off to the proper length. Not only will the job be neater, but you will have fewer odd points to get stuck on or have wires interfere with.

When mounting parts, terminal strips, sockets, etc., dress them all either parallel or at 90° to the edge of the chassis. How many times have you installed a bleeder bracket or a terminal strip by means of any convenient screw rather than putting it where it belongs if it involves another hole or so? The same goes for wiring. A large part of the wiring



in any gear can be of any reasonable length, so make up a harness, lace it up, and run it around the edges of the chassis. Not only will this make the job easier to look at, but it will leave more room for the critical wiring that must go point to point. After you have made up a harness and laced it, hold it in position with cable clamps. They are cheap, but when you fasten the cable down with clamps, it will stay put.

There are times when plugs are most desirable for taking wires away from the chassis to other equipment, and there are times when screw type terminal strips are better. In general, the plug will be a better deal wherever you expect to be undoing the connections from time to time. In either event, if the unit under construction is to be mounted in a cabinet with other gear and connected to other chassis, it is well worth while to make up an auxilary cable long enough to allow the unit to be removed from the cabinet and operated on the bench for maintenance purposes while it is still connected to the rest of the equipment. When the chassis being worked on is ready to go back in service, remove the auxiliary cable, install the chassis in the cabinet, coil up the auxiliary cable and let it sit until the next time it is needed. These "test" extension cables will save many times the time spent in making them up over the period the gear is in use, if your equipment needs maintenance as often as anything I ever built does.

Most equipment nowadays is built in the standard "rack" dimensions, and usually involves the use of an aluminum chassis and an aluminum panel, with the panel finished in black or grey crackel. To improve the looks of the chassis, give it the lye treatment as described in the handbooks, and not only will it have a nice satin finish, but it will look better for longer. Also, if you must drill holes through the panel to mount brackets, dials, etc., countersink the holes that will show and use flat head screws on them. As an added refinement, crackel the screw heads before using them with a little crackel paint and the XYL's oven. It only takes a few minutes, and makes the screws invisible. While we are on the subject of chassis, always put bottom plates on them. In addition to making it impossible to get your fingers in when they shouldn't be, a bottom plate will add to the shielding and keep out foreign matter such as bugs, cobwebs, etc., none of which will contribute to better operation. Don't forget to provide ventilation holes if needed.

Dials often cause a problem in home construction. The item to be controlled by the dial is either not in the proper position to come out on the panel conveniently, or it is desired to place the dial so as to match another, and the part cannot be placed behind the dial. There are various ways to have the dial and the controlled part not in line with each other but still work, and the fancy gear mechanisms used in some commercial gear is probably the best, but usually beyond the shop capabilities of the ham. Inexpensive and easier to use than gears are the sprockets and ladder chains sold by Boston Gear Works. Look them up in your yellow phone book under "gears," and ask for a catalog. They list various types of sprockets and gears with the ¼" hole that is standard on radio shafts. All you need then is a plain panel bearing. If the shaft motion must be changed 90°, use one of the small right angle couplings now available at most radio parts stores.

Lacing

Often each piece of gear in a ham shack is constructed in a workmanlike manner, but the shack seems to grow through the years until the wires connecting everything up begin to look like Medusa's hair. When you get to such a point all that can be done is to stay off the air for a Saturday and tear it all out and redo it properly. Again, use the harness principle. Lace up all wires that are going in the same direction, and fasten them down at frequent intervals, so that they will stay there. Cut cables to length, or coil up the excess neatly. Use plugs where indicated, and arrange the a.c. circuits so that they are all controlled from one position. There should be a master switch in every station, suitably labeled, that will turn everything off. While we are on the subject of labels, the advent of the "Techni-cals" on the market has made it possible for everyone to have neat professional labels on each control and plug. Incidentally, if you really want to put on the dog, use the large diameter indicator lights and label what circuit they are indicating on or off with decals on the back side of the jewel.

Keep Records

When your station has been put together with the above considerations in mind, and you have it working properly, you will probably operate for some time and then either pull out a piece of equipment to work on it, change it, or sell it. How many times have you opened up something you built a couple of years ago, only to spend a lot of time trying to remember just how you had that widget hooked in? If you built the gear yourself, you probably modified it from something else, so it is quite possible that there is no circuit, since you have lost the scrap paper you had the circuit on back in 1952. The moral is, draw a circuit and file it away in a notebook. Don't forget to also make one for the hook-up

[*Continued on page 84*]

John W. Campbell, Jr., W2ZGU
Editor: Astounding Science Fiction

the Sawing Machine

The gadget started out as a hi-fi test generator; it wound up proving to be one of the handiest testing devices around the shop. Given an oscilloscope and the Sawing Machine, you can find out a lot of things about a lot of pieces of equipment—things you never knew before, and, after you discover them, frequently wish you never had learned.

It started out as a hi-fi test device, because I discovered there was something strictly phoney about one hi-fi amplifier I had built, and, by the time I found out what was wrong, I had had to work out a whole new theory of music! What happened was, essentially, this:

I had an amplifier I'd built, using a new circuit system, that passed every one of the standard audio engineering tests for high-fidelity amplifiers with flying colors; it was absolutely flat from 15 to 40,000 cycles. Intermodulation distortion too low to measure. Harmonic distortion below 0.01% at 30 watts peak. It was wonderful! . . . except that it made a piano, an oboe, and a saxophone sound remarkably alike.

Skip the process of four weeks of trying and not-succeeding, and move along to that point where I'd installed a Vector turret socket plug-in system, so I could exchange one suspected circuit-and-tube system for another circuit-and-tube system. With the phase inverter system built on the plug-in turrets, I had two different phase inverter systems to try. #1 was the original; a standard, two-tube phase-inverter circuit. #2 was a trick DC-biased cathode-follower phase-splitter type.

With turret #1 plugged in, the piano, oboe, and sax were indistinguishable; with turret #2 in, the music was brilliantly clear and every instrument perfectly separated.

The difficulty turned out to be this; it's been taught for a couple of centuries now that music is a combination of sine-waves—and that happens to be false!

There's a trick in logic involved here, and it's been leading us down the wrong path; in logic, the whole is equal to the *sum* of the parts, and, therefore, if you *add* the parts, you'll necessarily obtain the whole. Right?

Good. Now a human being can be analyzed into about 25 chemical elements—carbon, hydrogen, oxygen, nitrogen, calcium, etc. Then all we have to do is to add these elements together, and, presto! You!

Nope. It'd come closer to say "Add them together and, presto! Goo!"

Just because something can be analyzed down to a series of simple elements does not mean that simply adding those elements yields the original. It is perfectly true that music can be analyzed down to simple sine waves—but *it is not true that music is simple sine waves.*

Accidentally, I'd succeeded in proving that beautifully, if frustratingly, with my perfectly wonderful-no-good amplifier. The trouble with the darned thing was that it would amplify sine waves perfectly—any sine wave between 15 and 40,000 cycles, absolutely perfectly. But . . . it wouldn't amplify aanything *but* sine waves perfectly! Now *if* music was in fact made up entirely of sine waves, *then* a perfect sine-wave-amplifier would be a perfect music amplifier. All the standard audio engineering instrument tests, however, have been based on that assumption!

A second sneaker assumption hiding in the bushes has to do with the behavior of resonant amplifiers. It is assumed—*and the assumption is false!*—that an amplifier which shows a perfectly flat response to all frequencies in a wide band, does not have any resonance in that band. That is, an amplifier that is absolutely flat from 15 to 40,000 cycles, it is assumed, cannot have any resonances in the audio spectrum.

Wrong! My trick amplifier was absolutely

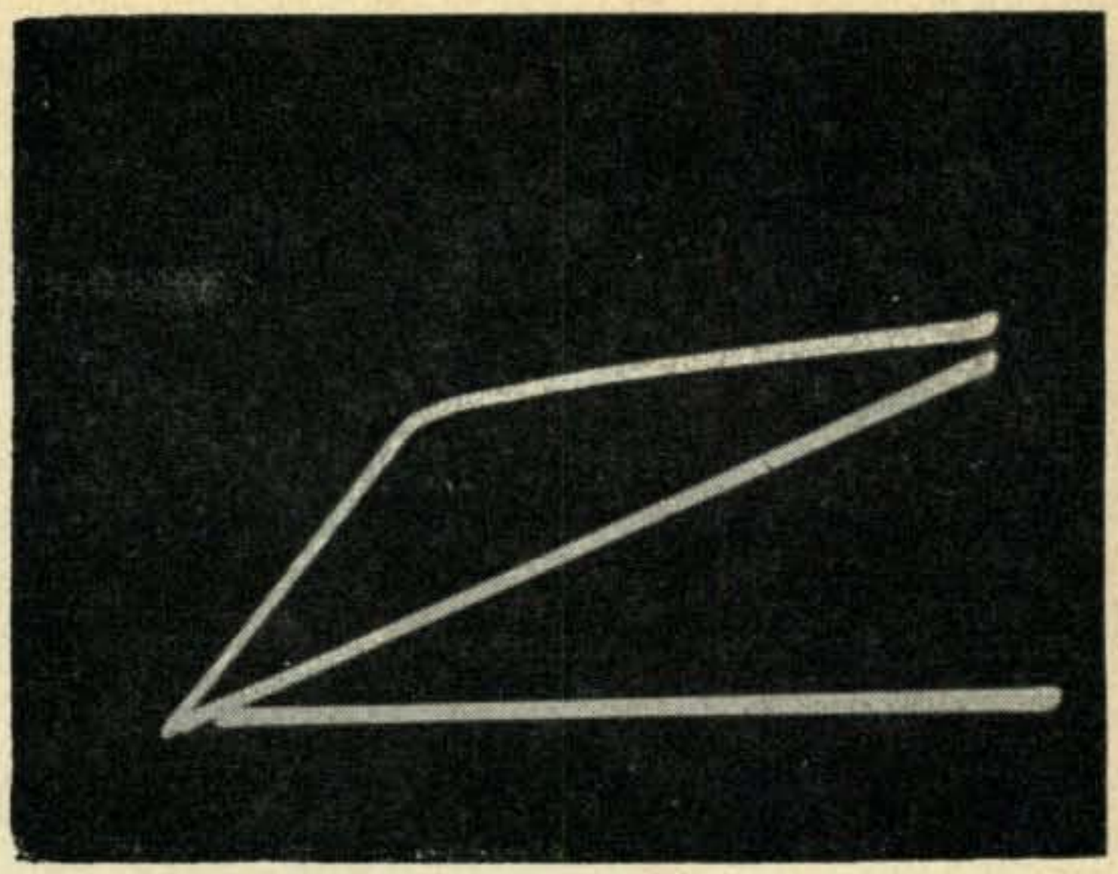
dead flat—plus or minus 0.0 db, to the limit of accuracy of a sensitive vacuum tube voltmeter—from 15 to 40,000—and yet had an extremely powerful resonance at about 750 cycles!

To express the undesirable characteristic, I had to invent a new term; *sineward* distortion. Meaning a device that distorted any input wave toward sine-wave form. Now in a theoretical orientation that holds that a "perfect" sine wave is *the* perfect wave form, and that all other wave-forms are distorted sine-waves, the idea of sineward distortion sounds wrong . . . queer. Yeah . . . but suppose that what you want is a square wave, or a sawtooth wave? That you do *not* want a sine wave? Then an amplifier that converts any and all incoming waves into a perfect sine wave is distorting the waves; the distortion is *sineward* distortion.

In an oscilloscope, for example, a badly designed horizontal amplifier would convert the sawtooth horizontal sweep wave into a sine-wave sweep—and the owner of the gadget could properly complain that he was getting a distorted, non-linear sweep as a result. Sineward distortion had set in.

Now this is the point at which I had to invent a new theory of music to figure out what a perfect hi-fi amplifier should be; since I had frustratingly and conclusively discovered that a perfect sine-wave amplifier was not a perfect music amplifier—what would be?

That led me a merry chase! What is "a musical instrument"? What is there that makes *all* musical instruments alike? The fact that we have a word for it suggests that there is some deep, basic similarity in all of them. Now find it! Sure; I *know* they all make music—but what's that? Men make thrilling, wonderful music on oil drums. They make powerful music on slabs of hard wood, lengths of string, pieces of wire, and by blowing air in brass tubes. What do *all* these things have in common?



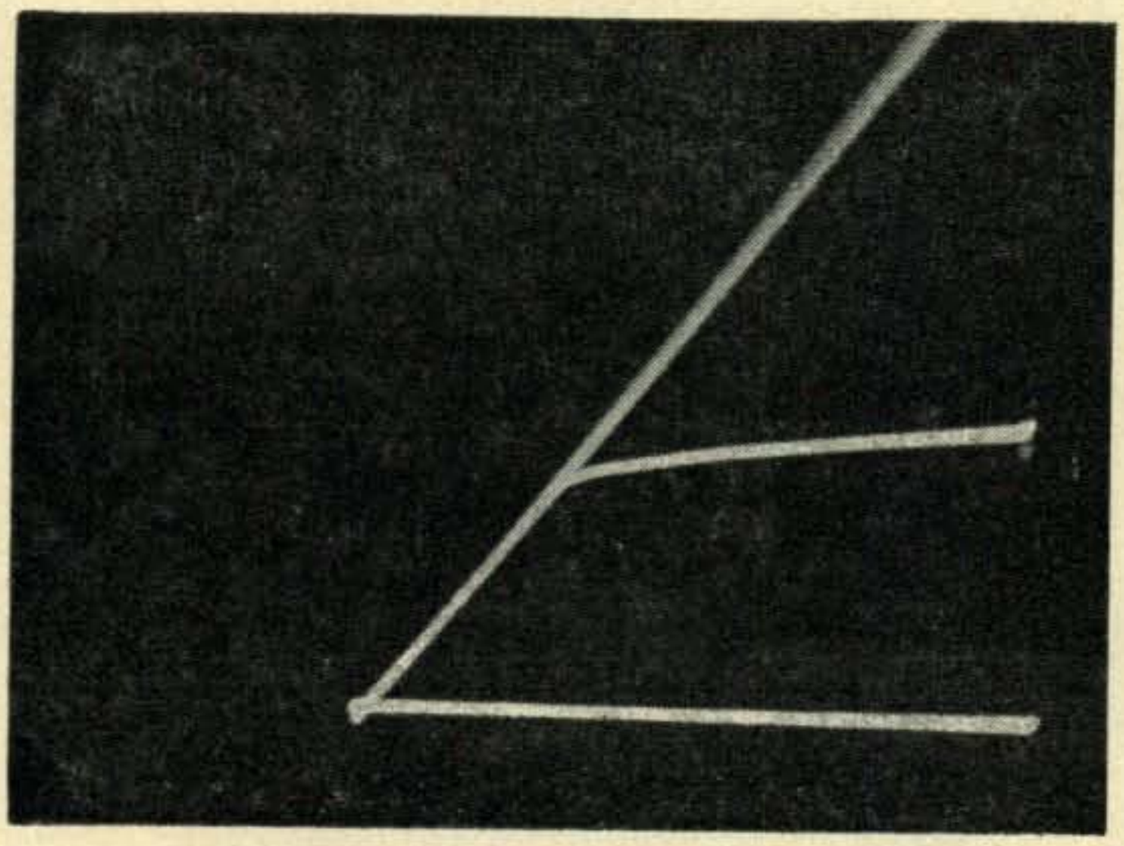
Triple exposure shows baseline, and voltage across an NE-2 tube, and a 50,000 ohm resistor, when each is fed through a 100,000 ohm resistor from the 150 volt sawtooth source. (Frequency approximately 1000 cycles.)

Answer: they are all used as shock-excited oscillating systems, coupled into tuned resonant filter systems.

But they are *all shock excited!* None of them starts with a sine wave; they *all* start with some form of shock-excitation. In the violin, this isn't obvious—until you remember that the rosined bow sticks to the string as it is drawn across. This sticking causes the string to be pulled aside, a tension is built up, until the rosin stickiness breaks down with a snap. Perfect sawtooth wave generator! It involves essentially precisely the mechanism you have in a voltage supply, resistor, condenser, and neon lamp; the bow supplies a steadily rising tension, and the breakdown of the rosin stickiness is exactly like the breakdown of the neon lamp, in relieving, suddenly, the tension built up in the condenser.

But the violin string imposes a tuned rate-of-repetition. Music doesn't consist of repeated sine waves; it consists of complex wave-form patterns, repeated at specific repetition rates. A piano, oboe, sax, violin, or trumpet playing the same note, say 440 cycles a second, will all be presenting the same repetition rate. Each, however, will be repeating *a different wave form* at that same rep rate.

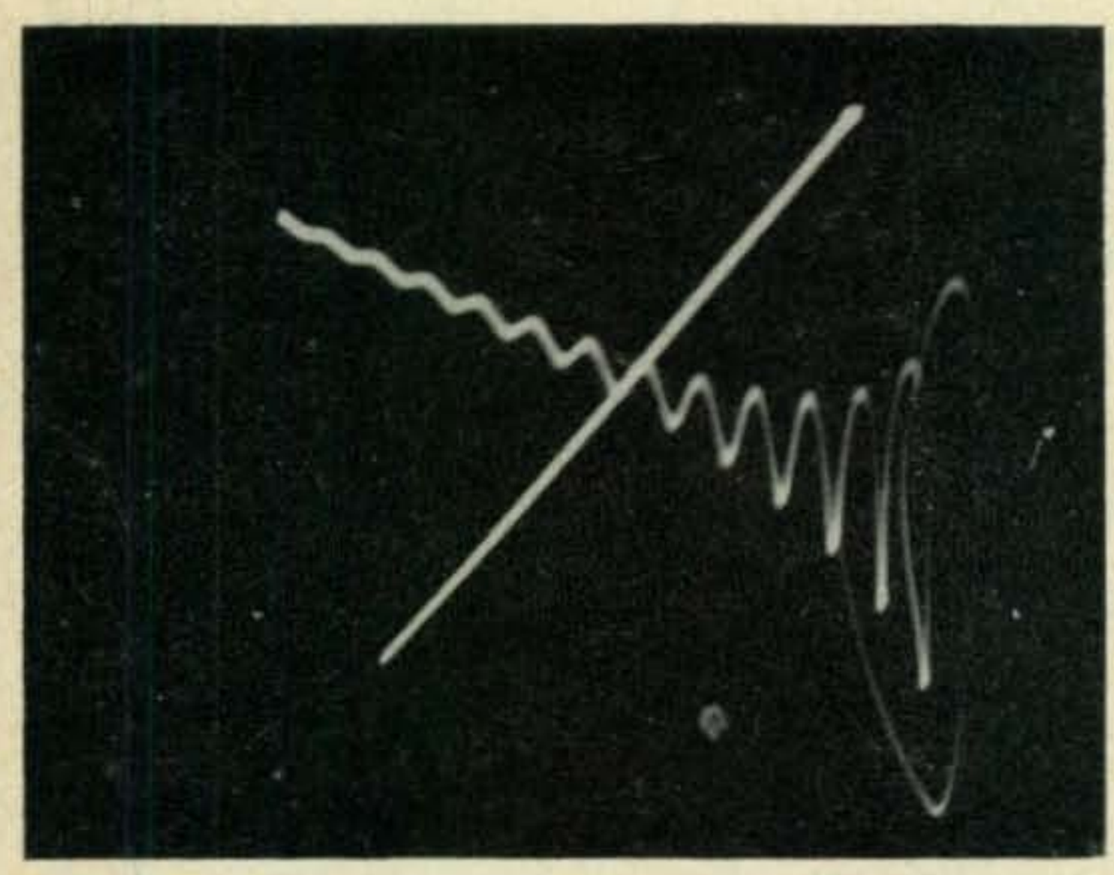
A perfect sine-wave amplifier would convert all of them to the same pattern—the sine-wave pattern, repeated at 440 cps. They would, then, all sound exactly alike—and like the theremin. The theremin is an audio engineer's idea of a musical instrument; it produces sine-waves—and no musician has any use for the darned



Triple exposure records baseline (horizontal deflection only) plus the sawtooth voltage applied, and the voltage regulation characteristic of a NE-2 bulb fed through a 100,000 ohm resistor.

thing; it's never been at all popular as a musical instrument!

Music consists of complex, *non-sine-wave* patterns having definite repetition rates. It is *always* generated originally by shock-exciting some resonant structure. In a trumpet, the shock excitation is applied to the air-column in the horn—and the shock-excitation is provided by the high-power Bronx Cheer the trumpeter blows into it. In the reed instruments, such as the saxophone, the necessary shock-excitation is applied by the fluttering valve effect of the reed. The human voice uses a fluttering valve—the larynx—which applies the shock excitation to the air columns in the resonant cavities of mouth, head and throat. The organ applies a jet of air to the lip of a tube; the air in the tube is resonant, and makes the jet flutter in and out of the tube, dividing over the knife-edge of the lip. The church itself then acts as the resonant chamber. (Incidentally, the old steam calliope dif-



Primary input wave—the 150 volt sawtooth—vs secondary output, from a Class B Driver transformer. Very high-quality hermetically sealed war surplus. Sawtooth rep rate about 2000 cycles. This tansformer tested practically flat from 150 to 3000 cycles. Peculiar "tinny" quality of speech output was explained by this oscillogram; speech contains sharp shock-excitation waves which evidently set the transformer to ringing. Sine wave tests did not reveal this characteristic at all.

fered primarily in not having a church around it to act as a resonant cavity.)

O.K.—then if all music is based on shock-excitation, the perfect music amplifier must be one capable of handling a shock-excitation wave without distortion. It must *not* have sine-ward distortion, wherefore a sine-wave test of any high-fidelity amplifier is not an adequate, or valid test!

Anyone who's looked at the speech pattern of a human voice on a scope, knows darned well that that's not any simple sine-wave system. Clarity in speech is *not* a function of sine-wave handling; it, too, requires shock-wave handling capability!

Now back to the statement above that an amplifier can have powerful resonances, without having any tendency to show response peaks, under a test for flat response.

The gimmick is this: if you test with sine waves—and that's what is implied when you say "flat from 15 to 40,000 cycles"—you cannot detect the resonance. But it will show up like a beacon on a dark night *if you use shock excitation*.

Here's why: Suppose you have a standard feedback oscillator—a regular tuned LC oscillator—with an adjustable feedback control. If the feedback is too low, there won't be quite enough excitation to keep it oscillating; if you start the device oscillating with the feedback turned up, then gradually cut down the feedback, there will be a point at which the oscillation can't quite maintain itself. Say it's tuned to 1000 cycles. At the critical point, the losses in the circuit due to resistance, radiation, etc., are a little bit greater than the amount of energy fed back into it. At this point, it cannot continue to oscillate, and if it is oscillating, the oscillation gradually diminishes.

It will, however, ring beautifully if you shock excite it.

But if you test this thing with a sine-wave generator, it will show a higher response at the 1000 cycle frequency. That's because it's an LC type oscillator; it has a Q of 10 to 50, perhaps. But suppose we have a resonant oscillator circuit with a Q of 0.01?

Impossible? Oh, no it isn't! It's known as an RC oscillator; it doesn't use inductance, and uses lots of resistance. The Q is way, way down in the fraction-of-a-fraction division. But it'll oscillate, if you have an amplifier with a gain of greater than 100 in the circuit! Reason: the *net effective Q* of the system is then 100 x 0.01—which is 1.0!

The damping in such a system, though, is so great that when you test with sine-waves of different frequencies, even when you try its natural resonant frequency there is no detectable hyper-response! The extremely low Q simply causes it to adjust itself to the quantity of energy being put in, and it "rings" at that level exactly.

But hit it with a shock-excitation wave, and it will ring for as much as half a second! Imagine what a half-second ring time would do to music!

The trick in that frustrating amplifier of mine was simply that the standard two-tube phase inverter circuit, in a negative feedback amplifier, actually constitutes a phase shift oscillator! Look at the circuit of *fig. 1*.

Consider the circuit that the signal follows in reaching tube *V4;* it passes through *C1*, *C2*, and *C3*, across *R1*, *R2*, and *R3*. The feedback

signal also passes through that system—and that means that there are three RC couplings in series in the feedback loop to *V4!* But that, my friends, is precisely how you build an RC phase-shift feedback oscillator! This circuit, then, has a built-in ringing circuit!

Fig. 2 shows the trick DC-biased phase inverter that licked the problem:—

In this one, *C1* is not inside the feedback loop, and *C2* and *C3* are parallel, not in series. There is one, and only one, RC coupling in the feedback loop to each of the two output tubes. The resistor network feeding the grid of the phase-splitter means that one half of the signal is lost—but amplification is cheap. For a pair of 807's, the driving signal required at *C1* works out to about 50 volts; a 6SJ7 or 6AU6 can supply that with very low distortion. And *this* circuit can handle shock-excitation waves without sineward distortion.

The DC-biased cathode-follower phase inverter shown, with 2500 ohm resistors instead of 15,000 ohm, using a 6C4, makes an excellent phase inverter for push-pull oscilloscope deflection, and works nicely up above 4 megacycles! Use a 6AQ5 and 100 ohm load resistors, and you can go even further.

By the time the problem of why the amplifier misbehaved had been worked out, the need for a proper test-signal source for hi-fi work was more than obvious. No sine-wave generator was a proper test-signal source for hi-fi amplifiers.

Now the curious thing is, generating clean, pure sine waves is a terrible job; they're hard to generate, and hard to control in amplitude. But generating shock waves is easy! But what wave form is the best test to use? Square waves? Triangular? Pulses? Sawtooth? What?

I settled for sawtooth, for several reasons. First, a truly linear sawtooth wave gives a

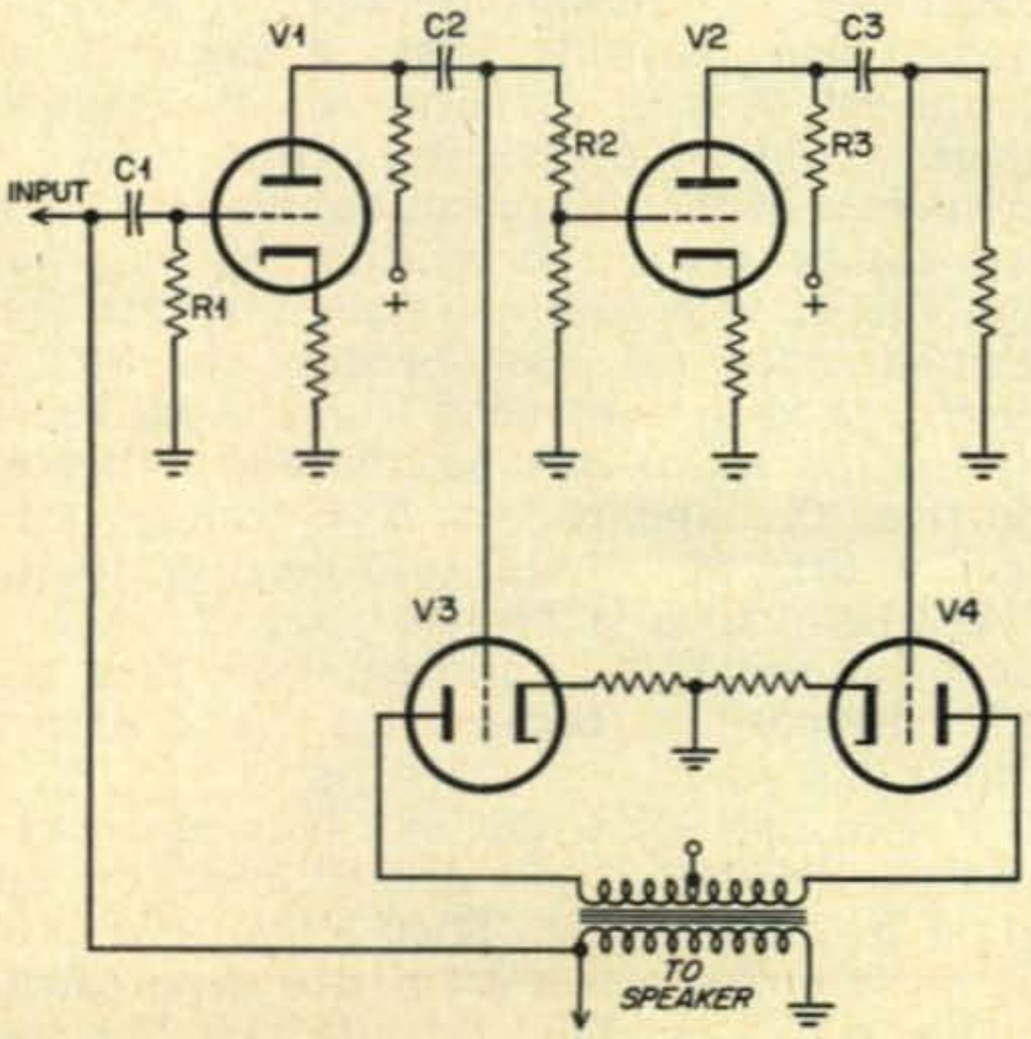


Fig. 1

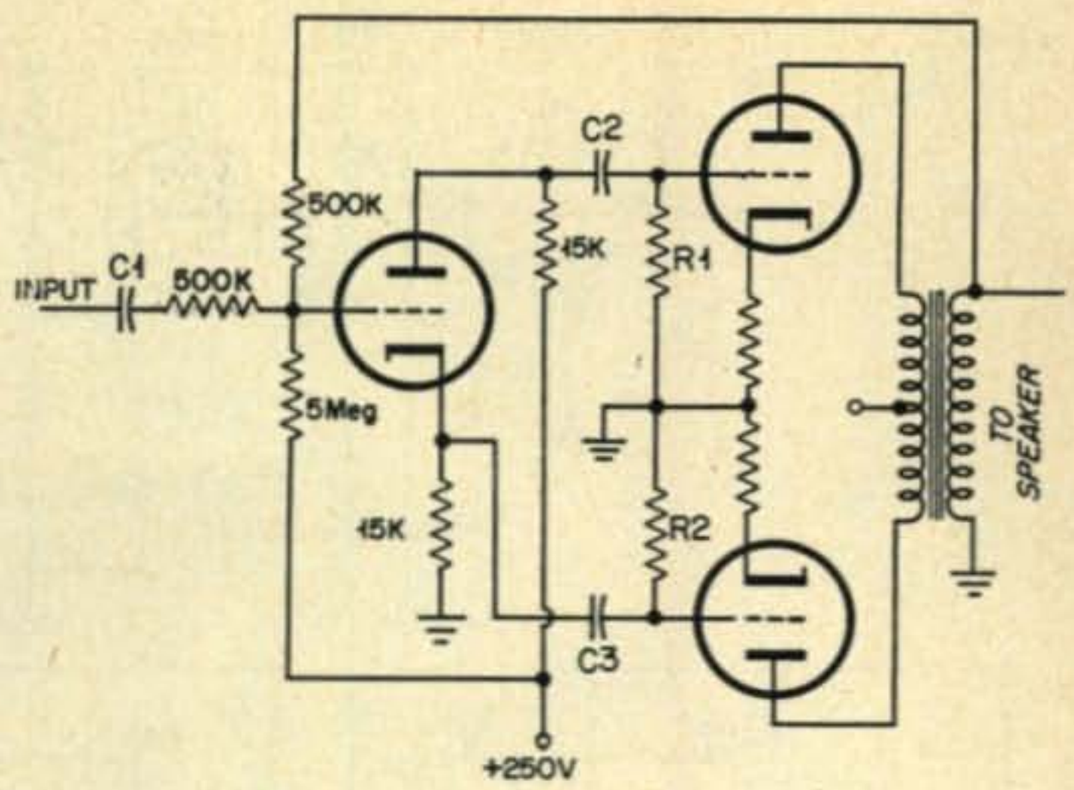


Fig. 2.

magnificent shock-excitation when the down-strike occurs. It really *whangs* the circuit it's hitched to. Also—the sawtooth wave is the typical wave-form used as the exciting shock in musical instruments of the violin family, and several others.

Square waves and short pulse waves yield fine shock-excitation—but they don't allow of another test that's needed. If you overload an amplifier hard enough, you'll get square waves—and if you're feeding square waves into an amplifier, you can't necessarily detect overload! Matter of fact, a stinking-bad amplifier can appear to be very nice and clean if you just send in square waves and overload it enough to make it clip the tops!

But a sawtooth wave has a long, straight-line rise on one side. You can guarantee that the first hint of a trace of a tendency to overload will show up; the straight line will curve. It'll be a darned sight easier to spot the beginning of curvature on a sawtooth wave than it would be to see the beginning of overload on a sine-wave, too. *Any* curvature on a sawtooth is distortion; a sine-wave is curved to begin with.

The slightest trace of a sign of ringing will show up like a sore thumb, too; the corners of that sawtooth wave should be sharp intersections between two straight lines—or else!

Finally, the simplest, easiest kind of oscillator there is is the dear old relaxation oscillator—the sawtooth generator. You can get the thing to generate everything from a fraction of a cycle per second to 100,000 cycles a second by the flip of a switch, and the twist of a potentiometer. Furthermore, the problem of variation of output is darned small—the gas discharge tube is itself a voltage regulator, of course! There is some variation, but nothing like the wild variations of a resonant oscillator over the range of 1 to 100,000 cycles per second!

Calibration of the relaxation oscillator isn't too stable—but who cares? Believe me, you've got frequencies from here to away-out-yonder present anyway, when that sawtooth starts sawing. And if you do want a precise, particular frequency—the relaxation oscillator is so easy

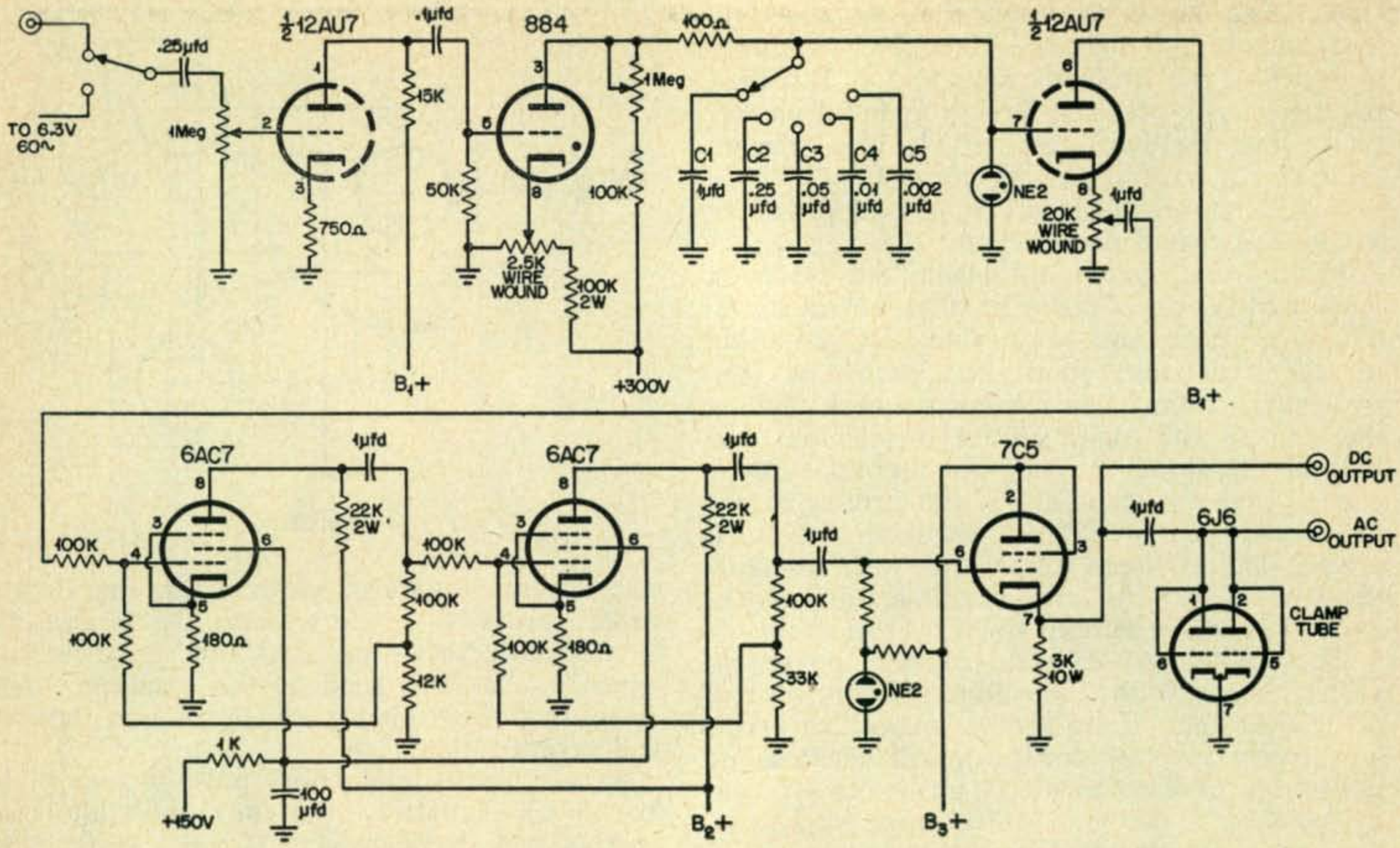
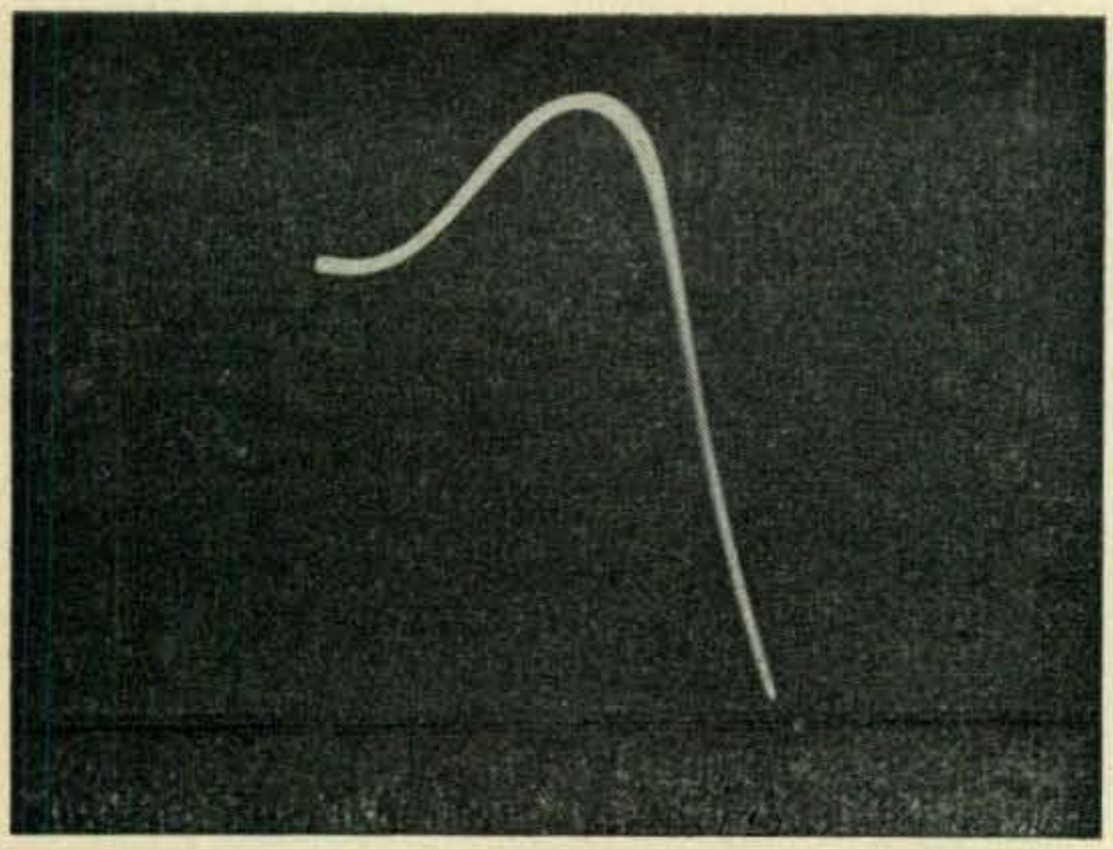


Diagram of sawtooth oscillator. The two resistors above the NE2 are .5 meg.

to synchronize with any stable oscillator!

When I started the project, I decided I wanted a unit that would provide adequate drive for any stage, including the final power-output stage, of any audio amplifier, so that the sawtooth pattern could be applied to any stage in the amplifier directly. Thus if a low-level stage was doing the sineward distorting, it could be determined by bypassing it and feeding directly to the power-stage grids.

Some of the higher power tubes call for some high-voltage grid drive; I decided on 150 volts output.



The speech sysem had also been sensitive to hum. This shows output when a 60 cycle rep rate sawtooth is fed in. Sine wavetest indicated great fall-off of response below 150 cycles, but did not reveal the transformer also tended to ring at 60 cycles!

To handle a sawtooth properly, the load-impedance of the output had to be low; that meant a cathode follower stage. To drive that, I'd need about 200 volts of signal—and that meant 200 volts of clean, perfect sawtooth! If the test-source isn't perfect, then deficiencies in the unit under test can't be spotted.

The result was the circuit shown. The circuit employs several gimmicks whose purpose may not be clear at once.

First, the 2nd triode unit of the 12AU7 has its grid seemingly hung on no-return-to-ground, since it's hitched directly to the 884 plate, which is in turn hitched only to B-plus and a condenser to ground. Reason: I wanted as darned-near perfectly linear a sawtooth as I could get. Any grid resistor on the following stage would be a resistive bypass across the condenser in the relaxation oscillator. This system means there is *no* resistive link to ground. But the 12AU7 grid can't get very far above ground, none the less—because the 884 will discharge to its cathode if it did. And, because during the warm-up time, the 884 is not conductive, the application of B voltage would tend to drag the 12AU7 grid positive, the little NE-2 neon tube is installed; under no conditions can the 12AU7 grid get more than about 65 volts positive, because the NE-2 tube will fire at that point.

But in operation, the 884 fires at about 40 volts, so the NE-2 tube doesn't affect the operation in the slightest. That NE-2 tube is one of those puffed-wheat-grain size neon tubes.

The 6AC7 amplifier circuits look like something our friend Crecy McStupp Kidd dreamed

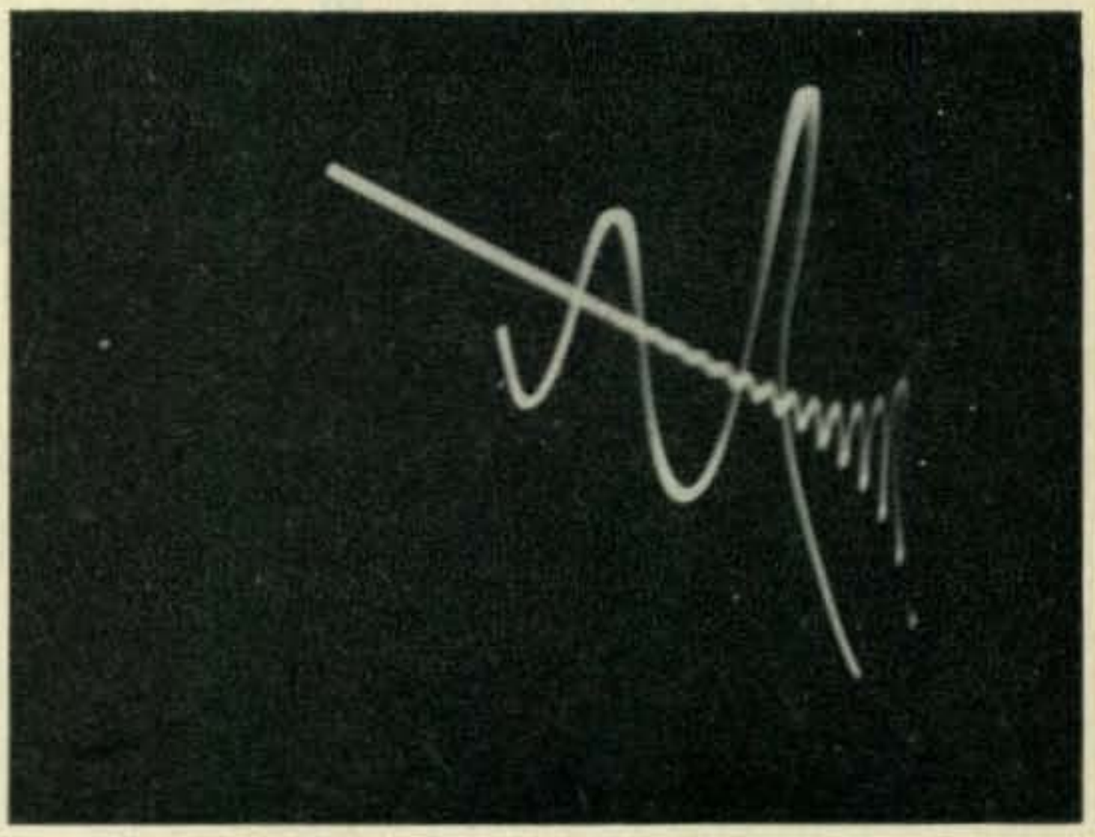
up, I know. Crecy didn't though; they're based on the circuit used in analog computer amplifiers, where absolutely perfect linear response *must* be obtained. These units are linear from about 5 cycles a second to well above 100,000 cycles. The amplifiers in this test generator *must* have characteristics far exceeding anything expected of the most ultra-fine audio amplifier—or the test-unit can't really test the unit under test. It's the old story about "How do you teach a dog tricks?" "Well, first you've got to be smarter than the dog." To test an amplifier, the test-unit has to be superior to the unit tested.

The circuit of the 6AC7's is one that gives a purely resistive feedback loop, and allows a huge amount of feedback. The voltage gain of the 6AC7 in these circuits is probably on the order of 100 times; in the first 6AC7 circuit this is cut back to a gain of only 10 times. The second 6AC7 is called on to deliver a very large output voltage—up to 200 volts—so the feedback is made even greater, and the net gain of the circuit is only about 4. But believe me, that feedback system makes the gain come out exactly the same over an enormously wide frequency band. The amplifier is truly linear.

The 7C5 cathode follower circuit uses another NE-2 tube; this one serves to give a fixed positive bias of about 65 volts. The 7C5 cathode then floats about 75 volts above ground. This allows the cathode to swing nearly 150 volts. This system of getting the required positive bias on the 7C5 cathode is a lot simpler than the usual method of returning the grid to a point on a tapped cathode resistor, and it's a lot more stable; the NE-2 is a voltage regulator.

The very-high-capacity condensers both in the filter circuits and in the coupling circuits, are there for a reason. Sawtooth waves are really rugged things to handle. When you have a sawtooth down around 10 cycles a second you have to really nail down the voltage supply for the amplifiers—and 6AC7's draw healthy slugs of plate current. Also, that 7C5 is going to be whamming a load onto the power supply; it needs nailing down *hard*. The 1.0 μf coupling condensers can be reduced to 0.5 μf without much loss, but remember that perfection must be maintained in the test generator. The 1.0 μf output from the 7C5 cathode is inadequate for anything but the higher frequencies; about 2000 cycles it's O.K.; below that it isn't. For lower frequencies, external condensers can be hitched in through the direct line to the 7C5 cathode.

If you're testing an amplifier with a 0.5 megohm input impedance, of course, the 1.0 μf output is adequate all the way down—but if you're testing something with a 10,000 ohm impedance, you need about 20 μf of oil-paper condensers for the low-frequency tests. Mounting those big brutes on the chassis is impractical, however.



Double exposure showing both transformer defects; low-frequency rep rate was 20 cycles—high was about 1000 cycles. Wonder why the speech sounded so peculiar, when the sine-wave tests "proved" the unit was flat from 150 to 3000, with good drop-off above and below those frequencies—ideal communication equipment response?

Originally, as I say, the gimmick was built for testing hi-fi amplifiers. But it proved most exceedingly useful in a lot of other ways. A scope which allows direct access to the deflection plates makes an excellent DC instantaneous voltmeter. Since the output of this unit is a linearily increasing voltage, installing that 6J6 clamp-tube means that the voltage goes negative at so many volts per millisecond; the movement of the spot on the scope-tube is then a direct, linear measurement of voltage.

Got a condenser that seems to be breaking down irregularly? Hitch it on to this unit and a scope, and you can measure nicely the voltage at which it breaks down; the voltage across it will rise linearly to that point—and then the line on the scope will turn sharply aside.

Nonlinearity in an amplifier shows up, of course, by a curvature of the line; apply the output of the Sawing Machine to the horizontal plates, and to the amplifier with the output of the amplifier applied to the vertical plates. So long as the line on the scope is a straight line at 45°, the amplifier is linear; the slightest departure from a straight line means the amplifier is distorting.

[*Continued on page 105*]

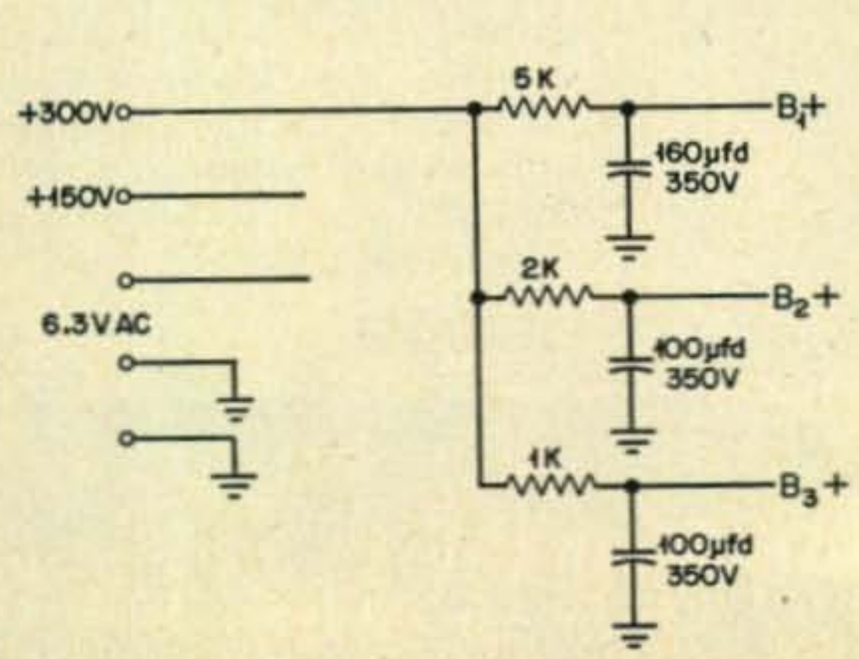


Fig. 3. From power supply.

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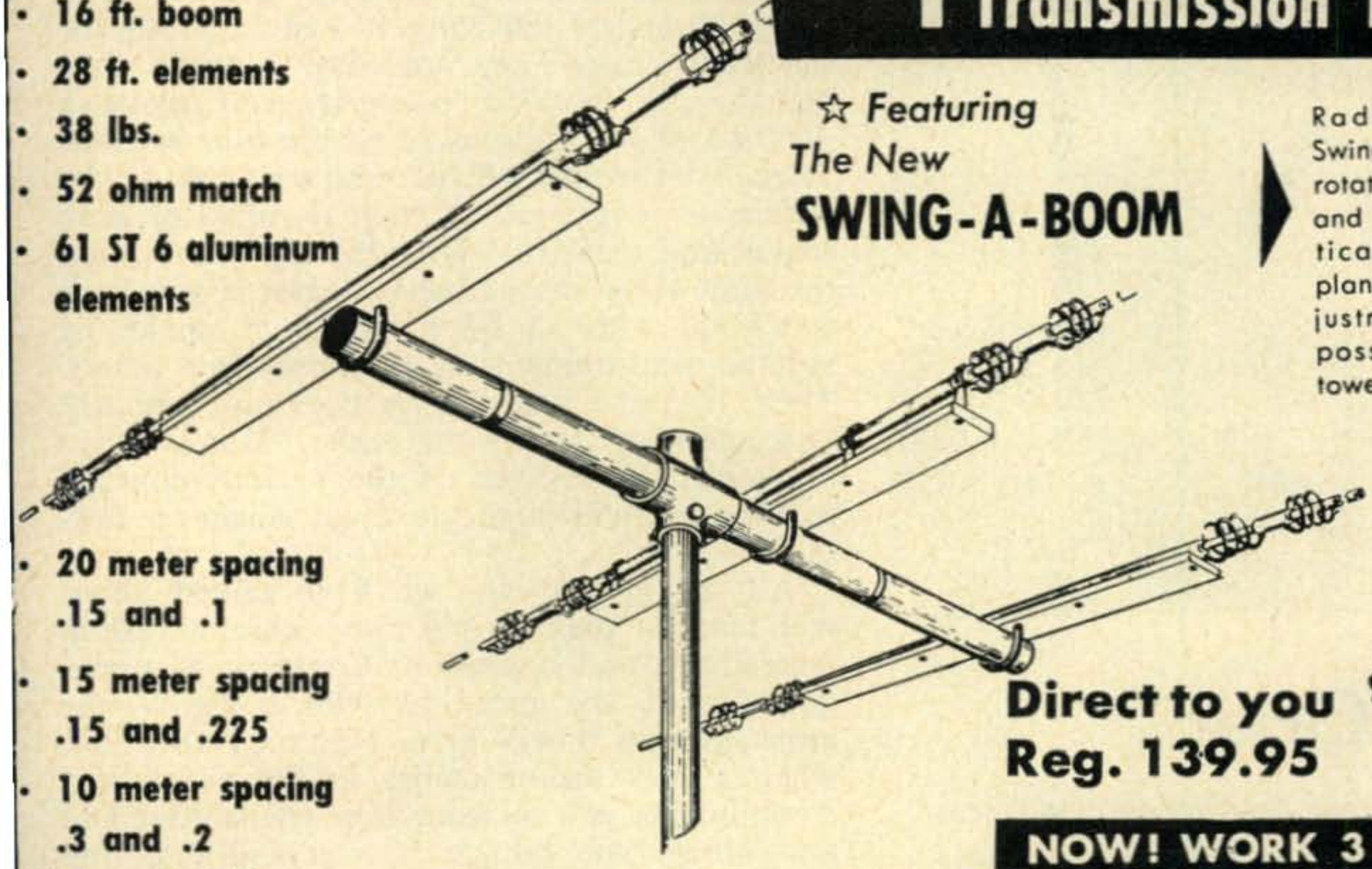

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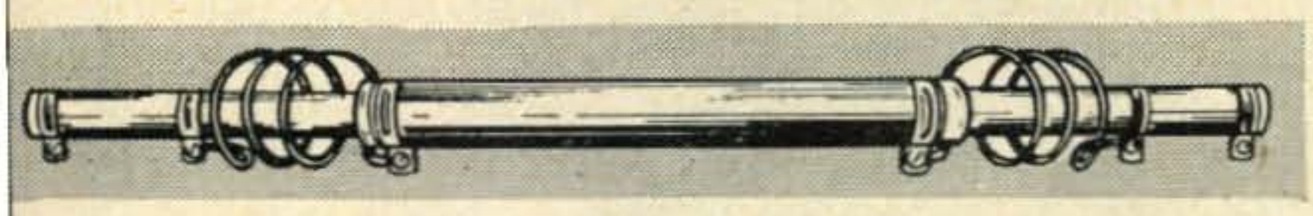

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Clean up

[*from page 75*]

between units, too. With your receiver you got a nice instruction book that included a voltage chart and a resistance chart. These charts come in handy when the set goes out, and such charts will come in just as handy for the transmitter. They are easy to make. Just get the rig working properly, and make a diagram of the bottoms of all the tube sockets. Then (with power off, of course) measure the resistance to ground of each terminal at each socket and record it. With the rig running, do the same thing measuring voltages. If you have a VTVM with an r-f probe on it, make r-f voltage measurements at all appropriate points. Then, the next time the rig goes out, you will find servicing somewhat easier. Don't forget to record the settings of the various controls so that you will duplicate them whenever testing.

All of these things we have talked about will tend to make a rig more commercial in appearance and operation. Contrary to popular opinion, the more haywire a rig is, the more trouble it will give. Not only that, but when a new visitor comes in the shack and compliments you on your new transmitter and asks where you bought it, you will feel well repaid for the time and money spent. ■

Our Cover

This solution to interference is one of the many illustrations from the New Mobile Handbook, do you have yours yet? See page 93 for details.

DX LAST MINUTE ITEMS

Danny, VK9TW/MM, arrived at Guadalcanal, Solomon Islands, on August 26th. Having the choice of calls he picked VR4AA and came on the air August 28th, VR4-time. Starting out on phone his first 25 contacts were: ZL2GX, W7CFA, W7HQC, W6KFQ, W7FAW, W6UOU, W4ADY, K6BEU, W5PQA, W8GAN, VE7MD, CO2BL, CO2BK, W6GVM, WØIOS, W7BD, WØCPM, W7AJS, K6LZI, W7WWM, VE7EL, W6BHQ, TG9AD, ZL1PV, W6CHQ. He was due to leave for Port Moresby, Papua, around September 15th . . . XW8AB, again active from same QTH, says his XYL is arriving with 3000 QSL's at which time all outstanding cards will be taken care of . . . KH6PM reports that W6BOY/VR4 became active on August 19th. He will be on 21160 CW and 21260/21360 phone . . . KG1GB and KG1BF will QRT shortly. QSL's for both go via W2UGL . . . UN1AA is QRV daily 14075, 2100 GMT . . . UH8BA was worked on 14005 at 2015 GMT (He drifts downward each transmission) . . . UI8AE in on daily, near 14070, 1400 GMT . . . UL7KAA was heard 14052, 1120 and 1545 GMT . . . FB8ZZ, 14026, 1130 GMT . . . KP4YT reports HR3HH/9 on 21 phone operating from Utica Island in the Bahia Group 30 miles north of HR (Not a separate one) . . .I1AIJ was due to have operated from San Marino (I1AIJ/M1) September 6, 7 and 8th using 14, 21 and 28 Mcs . . . Art, W3VKD, has the logs of VP3LF (deceased) dating from Sept. 3rd, 1952 to April 13th, 1956. All desiring QSL's are requested to send self-addressed, stamped envelope . . . We regret to report the passing of Ivan, VP2VA, on August 20th . . . Via W8QJR and the West Gulf Bulletin we hear that Johnny and Bill, SVØWJ, plan a trip to SV7 or Crete about the middle of October. YA1AA has returned to Lebanon. Full QTH of VK1RW is: R. C. Widows, H.M.W.T. Station, Direction Island, Cocos-Keeling, Indian Ocean . . . Activity may soon be expected by W6ITH again. Reg has received permission to operate from three other (un-named) spots much needed DX-wise . . . MP4QAJ is now G3HEH if anyone needs a card . . .

"SIGNAL REPORTS TERRIFIC WITH DAVIS '500 SERIES' HI-Q COIL"

SAYS HAM TERRY STERMAN IN WINNING WISCONSIN CONTEST

"Had the highest field strength reading in yearly contest held at Bager Emergency Net Picnic. The signal reports were terrific and everyone wanted to know what I was using. Second place also taken by fellow with Davis 500 Series Hi-Q Coil."

W9DIA

Terry is manager of Amateur Department, HARRIS RADIO CORPORATION, Fond du Lac and Manitowoc, Wisconsin.

NEW! 500 "HI-Q" COILS

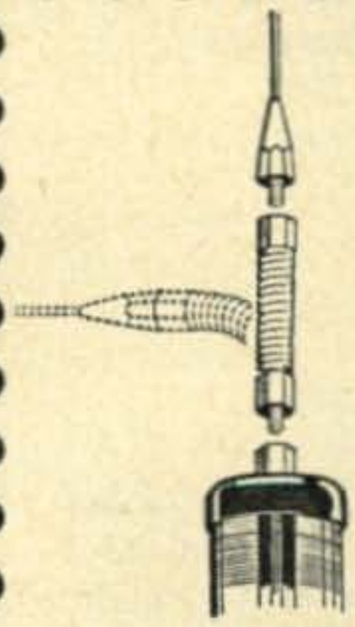
"Q" Over 400! Highest known "Q" in mobile coil to date. 1 coil per band (80, 40, 20, 15) plus new attachment for quick conversion to 10 meters. You choose the band you want with maximum efficiency. Coil peaked at factory. Use with 36" base section, 60" whip. No pruning necessary due to advanced tuning method. Color coded for fast selection. Mount coil in 10 seconds.

Amateur Net: $6.25 ea. coil
$3.95 ea. shorting bar • Complete set: **$26.95**

NEW! DAVIS IMPROVED ALL-BAND HIGH-Q MOBILE COIL

All bands 10 through 80 meters. New tuning shaft and silvered tuning contact give you positive, long-wearing action. Select band quickly and lock in position. Maximum efficiency under all road and weather conditions. Tough tenite, solid brass fittings. Standard ¾"-24 thread.

Model V102 Amateur net: **$14.95**

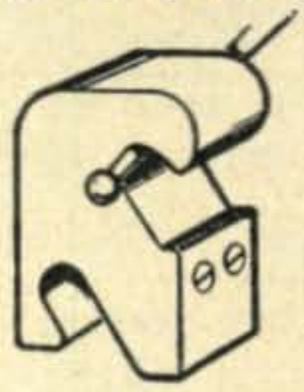


IN-LINE WHIP FLEXOR

Keeps base section rigid by eliminating base section spring. Whip stays upright. Bends for storage, passing under trees.

No. V-110S (Standard Model)
Amateur net: **$1.95**

No. V-110D (Deluxe Model)
Amateur net: **$2.95**



NEW! CONTOUR WHIP CLAMP

Another Davis advancement. This whip clamp fits the natural bending angle of the whip. Protects whip, gives long life. Clamps onto rain drain of any car. Rustproof.

No. VD-109 Amateur net: **$1.25**

Other Davis Mobile Products

Fibreglass Whips
Base Sections *Body Mount*

***Friendship Offer!* YOUR OWN SCOTCH-LITE CALL LETTERS**

Visible a quarter of a mile away in the dark! Weatherproofed adhesive backs. Complete set at our cost, only 50 cents. (Worth $1.50.) Your distributor has "Call Letter Coupons" or can get them from Davis Electronics.

***FREE!* COMPLETE CATALOG AT YOUR DISTRIBUTOR OR WRITE TO**

DAVIS ELECTRONICS
4002 W. Burbank Blvd., Burbank, California

HP1JF advises us that third party traffic will be allowed between Panama and U.S.A. stations as of September 1st 1956. This is the seventh country to have such third party treaties with the U.S.A. The others are Chile, Cuba, Liberia, Ecuador, Peru and Canada.

Prince Edward Island

Phil, W3LEZ, says here is your opportunity to work the rare Canadian Province of Prince Edward Island. He will be there between September 18th and October 4th 1956 using all bands from 3.5 to 28 Mcs. on CW and AM phone. W3LEZ/VE1 will take part in the W/VE contest, last week-end of September, using CW (Phone QSY on request). This will be a good one for those working towards the Canadian WAVE award. QSL via ARRL or W3LEZ, Phil Boardman, 2644 Kirk Ave., Broomall, Penna.

Need South Dakota?

To aid those needing South Dakota for the Worked-all-states award, the Sioux Falls Amateur Radio Club has planned a DX week-end December 8th to 10th. The following frequencies will be monitored by members alert for "CQ SD" calls: 0100 GMT, December 8th to 0600 GMT, December 10th (Plus or minus 10 kc) 28050, 29200, 21050, 21320 and 14085 kcs. 14085 will also be monitored from 0100 to 1400 GMT on December 13th. Active will be WØBLZ, WØPHR, WØRRN, WØSMV, WØZRA, WØHON and others. There will also be several WØ novices on 21 Mc.

DX-35 Modifications

Dear Sirs,

The three changes in the oscillator circuit will improve the stability and increase the efficiency of the oscillator.

1. Remove the 100 mmf capacitor between H8 and G2. Install a 33 mmf capacitor.
2. Remove the 47 K resistor on tube D between pin D2 and ground lug on tube socket. Install a 100 K ½ watt resistor.
3. Remove the 1 mh RF choke and the 3300 ohm resistor that is connected between switch lug E12 and the 40 meter coil adjacent to tube D. Install a 470 ohm 1 watt resistor.

The replacement of the 68 ohm resistor in the grid of the final amplifier will increase grid drive on 10 meters.

1. Remove the 68 ohm resistor between pin 5 of the 6146 and the 1 lug terminal strip. Install a 22 ohm resistor ½ watt.

Excessive grid drive on 40 and 80 meters can be corrected by lowering the value of the 15 K resistor across the 80 meter coil and placing a resistor across the 40 meter coil. The values listed have been found to be average. In the case of an individual transmitter it may be necessary to raise or lower these values. Optimum performance can be obtained by a grid drive of approximately 2¼ mils. In no case should it exceed 3 mils.

1. Remove the 15 K resistor which is parallel the 80 meter oscillator coil between switch lugs B10 and D10. Install a 4700 ohm 1 watt resistor.
2. Install a 3900 ohm 1 watt resistor across the 40 meter oscillator coil on switch lugs B11 and D11

ALL-BAND VERTICAL ANTENNAS

GOTHAM'S sensational new vertical antennas give unsurpassed multi-band performance. Each antenna is absolutely complete, can be assembled in less than two minutes, and requires no special tools or electronic equipment. Radiation is omni-directional, with maximum radiation at very low, DX angles. Perfect multi-band operation is secured through simple, efficient design and superior materials. In the V160, resonance in the 160, 80, 75, and 40 meter bands is secured through use of the proper portion of the loading coil. Yet, when the coil is eliminated or bypassed, the V160 will operate perfectly on 20, 15, 10 and 6 meters! The same idea applies to our V80 and V40 multi-band verticals. No guy wires needed, rugged, occupies little space, proven and tested. Send for your vertical multi-band antenna today!

V160 (for 160, 80, 75, 40, 20, 15, 10 and 6 meters)..... $18.95
V80 (for 80, 75, 40, 20, 15, 10 and 6 meters)..... 16.95
V40 (for 40, 20, 15, 10 and 6 meters)..... 14.95

Complete instructions included with each antenna—literature on request

WORK THE WORLD WITH A GOTHAM BEAM

Study these specifications—compare them—and you too will agree, along with thousands of hams, that GOTHAM beams are best!

TYPE OF BEAM. All Gotham beams are of the full half-wave plumber's delight type; i.e., all metal and grounded at the center. No wood, tuning stubs, baluns, coils, or any other devices are used.

GAIN. Gotham beams give the maximum gain obtainable. Our 2-element beams give a power gain of four (equivalent to 6 db.); our 3-element beams give a power gain of seven (8.1 db.); and our 4-element beams give a power gain of nine (9.6 db.)

FRONT-TO-BACK RATIO. We guarantee a minimum F/B Ratio of 19 db. for any of our 2-element beams; 29 db. for any of our 3-element beams; 35 db. for 4-element beams.

MATCHING. Matching of the transmission line to the beam is extremely simple and quick. Everything is furnished and the matching is automatic. No electronic equipment or measuring devices are required.

ASSEMBLY AND INSTALLATION. No special tools are required for assembly and installation. Entire job can be done by one man in less than an hour. Full instructions are included with each beam.

MAST. Any Gotham beam can be mounted on a simple pipe mast. Diameter of the pipe should be between ¾" and 1⅝".

STANDING WAVE RATIO. A very low SWR of approximately 1.5 to 1 will result from following the instruction sheet, depending on the height above ground and the surrounding area. If an SWR indicator is available, Gotham beams can be quickly and easily adjusted to 1.1.

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use ⅝" and ¾" tubing elements; the deluxe models for these bands use ⅞" and 1". In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

HOW TO ORDER: Send coupon with check or money order directly to GOTHAM or visit your local distributor. Immediate shipment by Railway Express, charges collect. Foreign order, accepted.

GOTHAM DEPT. CQ
1805 Purdy Ave., Miami Beach, FLA.

Enclosed find check or money-order for:

☐ V160 $18.95 ☐ V80 $16.95 ☐ V40 $14.95

2 METER BEAMS

☐ Deluxe 6-Element	$9.95	☒ 12-El	$16.95

6 METER BEAMS

☒ Std. 3-El Gamma match	12.95	☐ T match	14.95
☐ Deluxe 3-El Gamma match	21.95	☒ T match	24.95
☐ Std. 4-El Gamma match	16.95	☒ T match	19.95
☐ Deluxe 4-El Gamma match	25.95	☒ T match	28.95

10 METER BEAMS

☐ Deluxe 2-El Gamma match	18.95	☐ T match	21.95
☒ Std. 3-El Gamma match	16.95	☐ T match	18.95
☒ Deluxe 3-El Gamma match	22.95	☒ T match	25.95
☐ Std. 4-El Gamma match	21.95	☐ T match	24.95
☐ Deluxe 4-El Gamma match	27.95	☐ T match	30.95

15 METER BEAMS

☒ Std. 2-El Gamma match	19.95	☐ T match	22.95
☒ Deluxe 2-El Gamma match	29.95	☐ T match	32.95
☐ Std. 3-El Gamma match	26.95	☒ T match	29.95
☒ Deluxe 3-El Gamma match	36.95	☐ T match	39.95

20 METER BEAMS

☒ Std. 2-El Gamma match	21.95	☐ T match	24.95
☐ Deluxe 2-El Gamma match	31.95	☒ T match	34.95
☐ Std. 3-El Gamma match	34.95	☒ T match	37.95
☐ Deluxe 3-El Gamma match	46.95	☒ T match	49.95

(Note: Gamma-match beams use 52 or 72 ohm coax. T-match beams use 300 ohm line.)

NEW! RUGGEDIZED HI-GAIN 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

☐ Beam #R6 (6 Meters, 4-El)..... $38.95
☐ Beam #R10 (10 Meters, 4-El).... 40.95
☐ Beam #R15 (15 Meters, 3-El)..... 49.95

Name .....
Address .....
City ..... Zone..... State.....

VHF

For some obscure reason we don't have a VHF column this month. To those frantic souls who want to know if they won here are a few of the high scores reported for the Summer CQ VHF Contest.

All Band		144 mc		50 mc	
W3TDF	14,160	W1FZJ	13,600	W9BRN	12,096
W1RFU	10,920	W1CLH	12,512	W1HOY	7,276
W6AJF	6,650	K2JVX	6,408	W8MVN	6,006
W6BAZ	4,928	K2YQI	5,022	W8SGX	4,440
W9USI	2,484	K2JLR	4,816	W8CVQ	4,234

DX

[*from page 67*]

with VK9TW, YVØAA and XE4A for a 233 total as Roger, W1JYH, is just behind with 232 thanks to YA1AM, VR1B, PJ2MC, VK9TW and XE4A . . . Ray, W2BJ, also reaches 232 with XE4A, YVØAA and VK9TW while Hal, W5FFW, comes up to date with such as ZS8L, VQ5GC, CR1ØAA, FB8RR/FB, LU3ZY and YA1AM to rest on 230 . . . Carl, W9ABA, goes to 226 with PJ2MC, ZS2MI and VK9TW as Chas., W3DKT, is 222 with YVØAA and VK9TW . . . Bob, W1KFV, rises to 217 with VQ1JO, UP2AC, SM8KV, XE4A, VK9TW and UI8KAA while Buck, W4RBQ, hooked CR5SP, VK9TW and YVØAA for 216 . . . Carl, W1ZL, goes to 216 with SM8KV and VK9TW as Eric, OZ7BG, also added SM8KV for No. 214 . . . Pat, W2GVZ, snagged VK9TW, YVØAA, YA1AM, UR2AK, SM8KV and PX1ER for 213 while Paul, K2GFQ, ascended to 202 with UP2KBC, VK9TW, KG6IG and SM8KV . . . Bob, WØQVZ, also passed the 200 mark with FL8AB, VQ8CB, UP2KBC, FG7XC and VK9TW for 201 as Harry, WØANF, added zone 19 and jumped to 200 with such as UAØKJA, UR2AK, ZB2T, UD6AL, EA6AW, YJ1AN, UG6AG and UA9CM . . . Smitty, W9FNR, went to 197 with AP2N, ZS7H, I5RAM, CEØAD, BV1US, UP2KBC, PJ2MC and UA9KYB while Bob, W6DBP, hit 191 to the tune of ZD9AE, UR2KAA, ZS2MI, PJ2MC, FS7RT, VK9TW, XE4A and YVØAA . . . Jim, W9LI, keyed with VK9RM, VU2AS, 4S7MR and VK9TW for a 184 total as Fred, W8KML, submits new list for 225 on CW and 211 on phone . . . Glenn, W7ADS, has an even 200 with UR2KAA, YVØAA and UC2KAB while Bob, K2GMO, rises to 199 with such as FE8AE, UF6FB, UJ8AF, YA1AM, UD6KAB, AP2BP, I1DCO/M1, KP4KDS, HC8GI, VK9TW etc. This total represents 18 months effort at K2GMO . . . Rip, W4EPA, adds SM8KV, KR6IG, VK9TW and PX1EX for 199 as Hayden, K2BZT, adds 28 to jump from 163 to 191 . . . Carl, W1BFT, goes to 189 with such as VK9TW, UF6FB, KJ6BM, ZD3A, ZA1UB and VS1GZ while Paul, W4LQN, hits 182 with XE4A, MP4KAC, UP2KBC, PJ2MC, YVØAA, VQ5GC and VK9TW . . . John, W9WCE, rises to 181 with FS7RT, KB6BA, VR3B, I5RAM, VR1B and VK9RM as Bob, W7NFE/6, adds 15 for a 129 total . . . Juan, KF4CC, keyed with YK1AK, YVØAA, VK9TW and I1DCO/M1 for 209 while Bud, W2HSZ, adds 16 including such as HI8FR, VQ5GC, UR2AK, VK9TW and UD6KAB to reach 194 . . . Skip, K6JQJ, quickly adds 21 more for a 173 total as Bob, W9NN, rises to 166 with VQ6LQ, HI8FR, UB5UB, XE4A, UC2AA and LZ1KDP . . . Aleta, K6ENL, reaches 130 thanks to FS7RT, PJ2MC, I1BRN/M1 and VK9TW as Guy, W6DI, pushes his phone total to 224 with 3V8BH, MP4QAL, XE4A, PJ2MC, YVØAA and VK9TW . . . CE3AB add 27 to his A3 total which is now 213 while

The Defense Projects Division of

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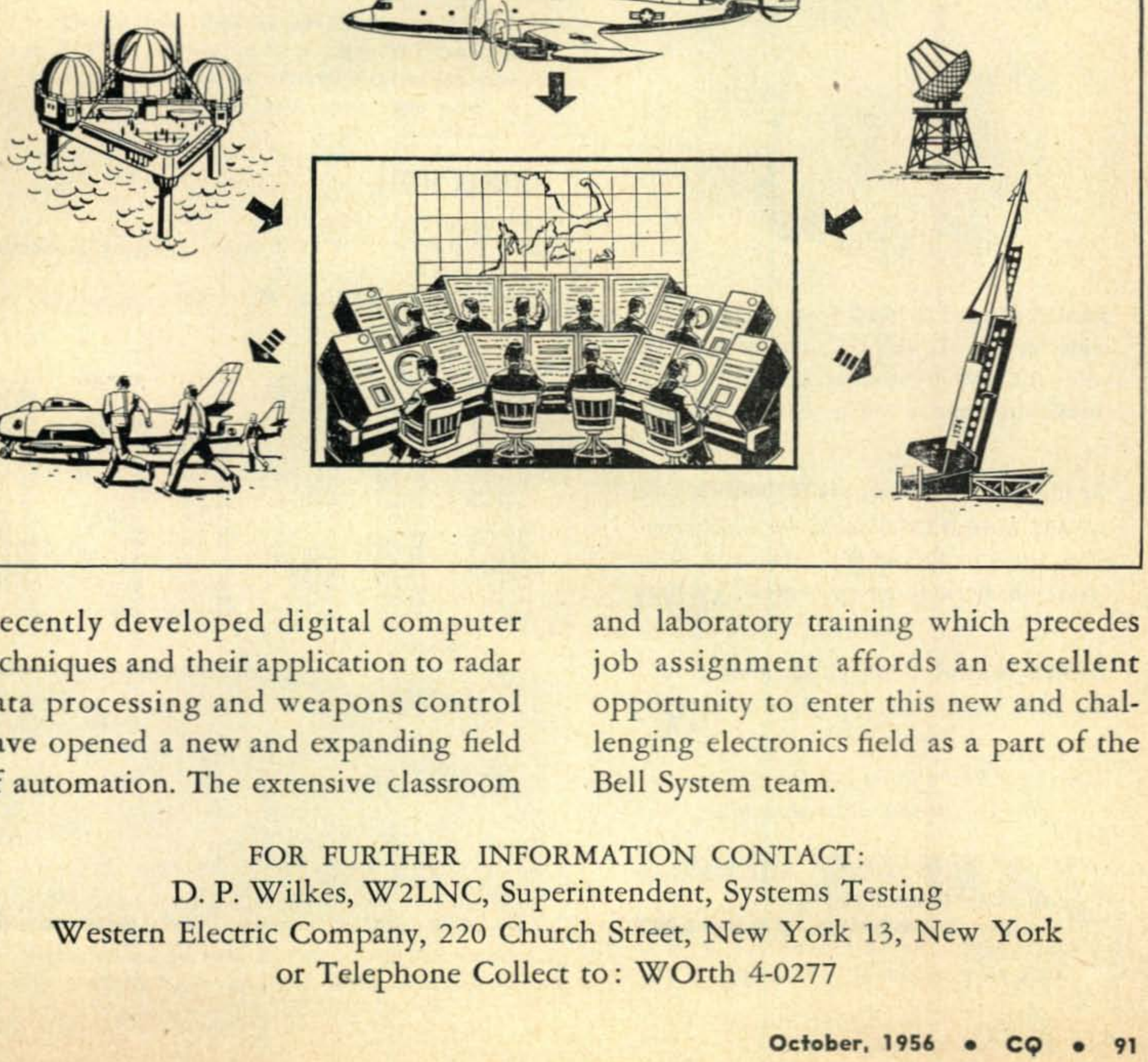
has opportunities for Engineers, Physicists, Mathematicians and Technicians for field work in testing the new Air Defense System.

SAGE

(Semi-Automatic Ground Environment)



Recently developed digital computer techniques and their application to radar data processing and weapons control have opened a new and expanding field of automation. The extensive classroom and laboratory training which precedes job assignment affords an excellent opportunity to enter this new and challenging electronics field as a part of the Bell System team.

FOR FURTHER INFORMATION CONTACT:
D. P. Wilkes, W2LNC, Superintendent, Systems Testing
Western Electric Company, 220 Church Street, New York 13, New York
or Telephone Collect to: WOrth 4-0277

L to R are UP2AW, UB5KAG and UP2AS of Kaunas, Lithuania, U.S.S.R. Sakalas, UP2AS, is very active from UP2KBC which has given many a "new one" since June 1st.

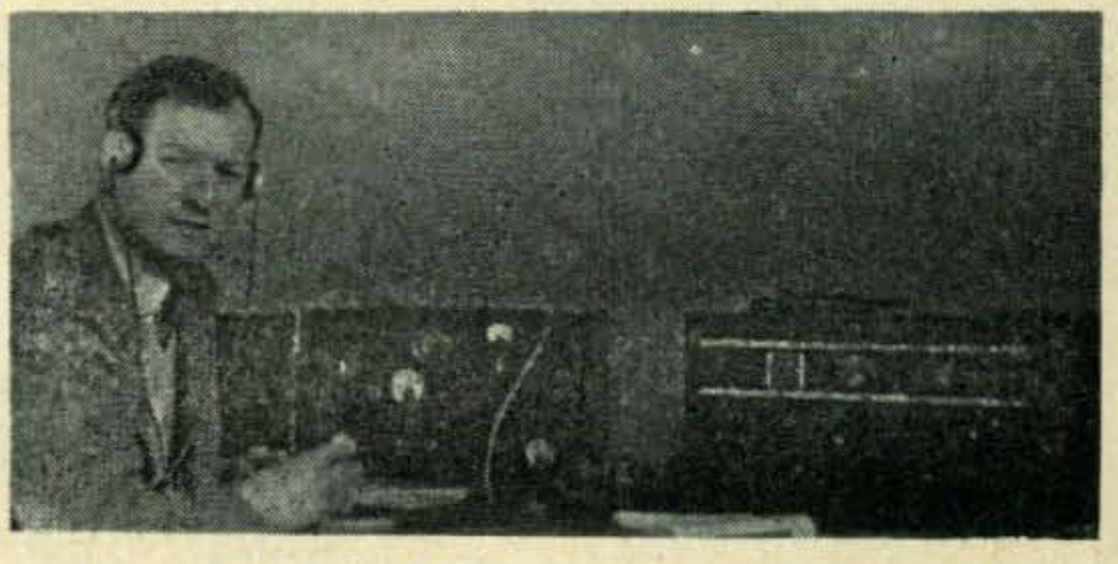
HONOR ROLL

(To August 15th 1956)

Last complete HONOR ROLL appeared in the September issue.

Next complete HONOR ROLL will appear in the January issue.

W6ENV	40-268	W9HUZ	40-246	W9YNB	40-192
W6AM	40-266	WIGKK	40-244	W6ID	40-191
W6MX	40-265	W6NNV	40-244	W6BUY	40-163
W6SYG	40-264	WØELA	40-241	W5ASG	39-262
W6DZZ	40-263	W3JTC	40-241	KV4AA	39-260
PY2CK	40-263	W8SYC	40-239	W9RBI	39-251
W6AOA	40-263	W9FKC	40-237	W9LNM	39-248
W8PQQ	40-263	VK4HR	40-237	W2QHH	39-242
W8KIA	40-262	W6DLY	40-236	WIHX	39-241
W2AGW	40-261	W6NTR	40-233	W8UAS	39-237
W3KT	40-259	W6LDD	40-226	W2HMJ	39-233
W3JNN	40-258	W6EHV	40-221	WIJYH	39-232
W3EVW	40-256	W6LRU	40-218	W2BJ	39-232
W6EBG	40-255	W6BVM	40-208	W5FFW	39-230
W9VND	40-255	W7ASG	40-195	W9ABA	39-226
W6SAI	40-255	W6PH	40-195	W3DKT	39-222
W6VE	40-255	DLIIT	40-194	WIKFV	39-217
W6TI	40-247	W6LGD	40-194	W4RBQ	39-216



DX'er Jim Kirk, G6ZO, is seen at his new QTH in Santiago, Chile. Jim now signs CE3ZO

Bill Orr has been at it again!

CQ proudly announces a

completely

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MOBILE HANDBOOK

Mobiling 1957 . . . the *latest* dope
Over one full year in the writing
Every chapter is worth the price of the book
Alive with clear photos
What antenna system *really* works?
Factual information on antennas
Primarily new material
Not a bunch of reprints
Dozens of simple rigs, converters, gadgets
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Kill all noise once and for all
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240 pages

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Sirs: My ☐ check or ☐ Money Order for $..... is enclosed. Please send me postpaid ..... copies of the 240 Page NEW MOBILE HANDBOOK at $2.95.

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Honor Roll (Continued)

W1ZL	39-216	W1BFT	38-189	W6DI	39-224
OZ7BG	39-214	W4LQN	38-182	W6AM	39-200
W2GVZ	39-213	W9WCE	38-181	W9RBI	38-232
K2GFQ	39-202	W7NFE/6	38-129	CE3AB	38-213
WØQVZ	39-201	KP4CC	37-209	W6KQY	38-203
WØANF	39-200	W2HSZ	37-194	W6PJ	38-189
W9FNR	39-197	K6JQJ	37-173	W3JNN	37-226
W6DBP	39-191	W2AYJ	37-145	W8KML	37-211
W9LI	39-184	VS1GX	37-122	W1NWO	36-220
W8KML	38-225	W9NN	36-166	W5ASG	36-192
W7ADS	38-200	W4NBV	35-152	W3EVW	35-171
K2GMO	38-199	K6ENL	35-130	W6CHV	36-163
WA5EPA	38-199	PHONE ONLY			
K2BZT	38-191	PY2CK	40-244		

Ernie, W6KQY, ups to 203 on "phone only" with XE4A, 9S4AX, UQ2AN, YVØAA and VK9TW . . . Willard, W1NWO, moved to 220 on phone with UC2AA as Ralph, W6CHV, added four on phone to hit 163 . . . Carl, W3TYW, nabbed OD5LX, VK9TW and XE4A for 93 . . . John, W3UXX, received WBC (British Counties) Award . . . Charlie, W1LHZ, has received his Helvetia 22 award. It was No. 100 and the fifth one to be issued to a W . . . Russ, ZL1AFA, goes to 166 on 21 Mcs. with 5A3TV, FS7RT, MP4KAC, HH2GR, VR1B, VS4BO, VQ5EK and CT3AN . . . FO8AB was No. 175 for F9AH . . . Paul, W9KXK reaches 169 with XE4A, UQ2AS, YI2OT, MP4QAL, LZ1KEP and YJ1RF.

Here and There

KV4AA was happy to report visits from K2CBO, K2HEZ, K2JZG and W9CAZ . . . VK4YP reports a QSO with PK3US who gives his name as "Lim" and QTH. Box 222, Surabaja, Indonesia. The contact was on 21080 at 0845 GMT. We hope this indicates a loosening of restrictions on ham radio in Indonesia. The international call-block for this area is YB/YH.

73, Dick, KV4AA

CW Rec. [*from page 47*]

three frequency points in each band.

The selectivity of the detector is such that either side of zero beat, an audible note is produced by an incoming signal. This indicates that the selectivity of the receiver is more dependent upon the audio amplifying technique than upon the radio frequency sections. With the filter shown between the 12AY7 and the 6AU6, all audio frequencies above 1000 cycles can be attenuated sufficiently so as to be conspicuous by their absence in the head phones.

In several stability tests conducted, it was found that within 3 minutes after applying power, the detector became stable and remained so for hours on end on all bands including the 10 meter band. However, it is necessary to have a regulated power supply. The supply used had two VR-105 tubes in series across the line to provide the 210 volts. Some interaction between the gain control of the radio frequency amplifier and the detector

plate voltage will occur. This is most noticeable when the detector is operated on the very fringe of oscillation.

Construction of the detector should be in accordance with the best v.f.o. building techniques. Loose wiring and poor coils will result in radically inferior performance.

Typical voltage measurements under operating conditions are:

Supply line: 210 v.d.c. regulated
Cathode *V1*: plus 0.4 v.d.c.
Plate *V1*: plus 50 v.d.c.
Cathode *V2*: plus 2.2 v.d.c.
Plate *V2*: plus 100 volts d.c.

These readings were taken with a 20,000 ohm per volt V-O-M meter with respect to chassis which is the negative side of the power supply.

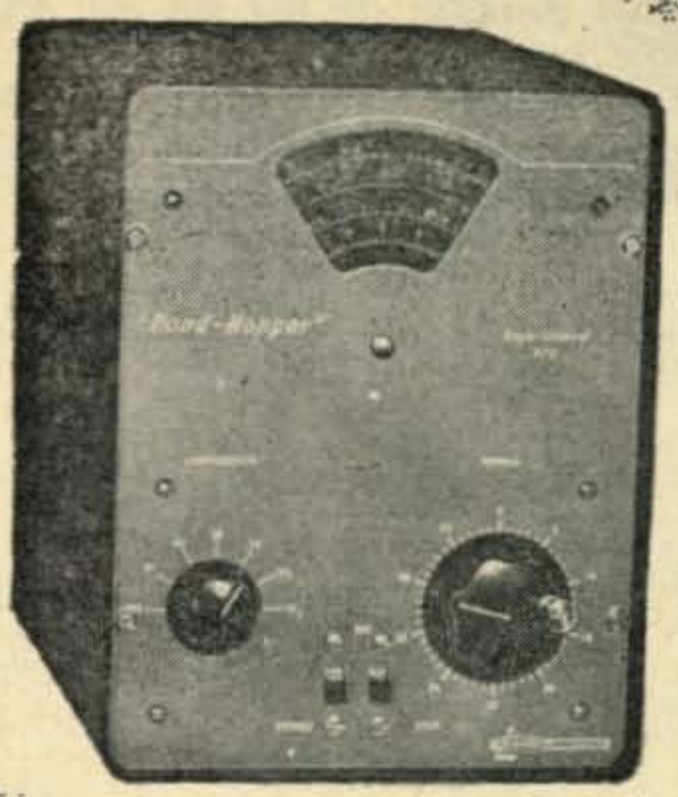
Although no experimenting has been carried out with this detector in a superhet circuit, it is quite possible that it could be used to advantage for c-w, s.s.b. and a.m. reception. If the detector's ability to perform in the 80 meter band is any criterion, a detector of lower frequency should prove of considerable interest. Amplitude modulation can be received but not with real satisfaction. As previously stated, a c-w receiver was the primary aim in this development. However, it would not require much ingenuity to alter the detector so that it would respond to a.m. One method, shown in *Fig. 3*, would be to switch the grid of *V2* over to a capacitor resistor combination which would make that section of the detector into a grid leak type detector.

The accompanying photographs show the front panel of the receiver and a close-up of the detector section. The detector coils are arranged in a clockwise circle around the band switch. 10 and 15 meters at the top, 20 and 40 meters at the side, with the 80 meter coil just visible behind the tube. The grid end of the coils occupy one half of the middle section wafer. The ground end of the coils are wired to the wafer nearest the front panel. The plate end of the tickler coils go to the right hand half of the wafer nearest the tube. The right hand half of the middle wafer is cross connected to the left hand half of the visible wafer. A one turn loop of insulated wire around this cross connection forms the capacitor *C8*. The left hand half of the visible wafer is used to connect the tuning capacitor combinations into the detector circuit.

Portions of the radio frequency amplifier and the main tuning capacitors are visible on the left and to the rear of the detector. Aluminum boxes 5 inches by 6 inches are used to house the detector and radio frequency amplifier for purposes of shielding. The audio system is assembled under the main chassis which measures 7 inches by 13 inches by 3 inches. ■

LOOK .... it's here!

"Band-Hopper"



1. BANDSWITCHING – 160M – 80M – 40M – 20M – 15M – 10M.
2. 100.1 GEAR DIAL DRIVE. FOR SMOOTH ACCURATE TUNING. CALIBRATION OF DIAL 5KC.
3. VFO TEMPERATURE COMPENSATED AND EXTREMELY STABLE.
4. BUILT-IN REGULATED POWER SUPPLY.
5. STANDBY SWITCH PROVIDES ROCK STABILITY FOR IMMEDIATE OPERATING.
6. HETERODYNING PRINCIPLE PROVIDES FOR MAXIMUM STABILITY ON HIGH FREQUENCY BANDS.
7. FOR USE WITH ANY 9MC PHASING SSB TRANSMITTER SUCH AS PHASEMASTER JR., DELUXE PHASEMASTER JR., PHASEMASTER II OR 10B-20A.
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VFO FOR SSB

Only **$139.50**

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MANUFACTURERS OF PRECISION ELECTRONIC EQUIPMENT

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GONSET COMMUNICATORS. Combined receiver and transmitter. Models for 2 or 6 meters; 6 or 12 VDC and 110 VAC input. Net.....**$ 229.50**

Beginners, novices, and oldtimers alike know that the place to go for all their amateur needs is Walter Ashe. Whether you are looking for inexpensive gear for a starter, or a shack full of the best there is, Walter Ashe has it in stock for immediate delivery. And just in case you haven't heard, Walter Ashe is known as the house of "Surprise" trade-ins. We have specialized in amateur equipment for 34 years so, when you think of amateur gear, think of Walter Ashe. The one place to shop for all your amateur needs.

HALLICRAFTERS SX-100. Less speaker. Net $295.00

NATIONAL NC-88 Built-in speaker. Net $119.95

NEW JOHNSON VIKING "6N2"

Bandswitching transmitter for 6 and 2 meters. 150 watts input on CW, 100 AM. Crystal or external VFO control. Derives power from Viking I, Viking II, or similar power supply-modulator combinations. Complete kit with tubes.
Net.....$ 99.50
Wired and tested.....$ 129.50

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Parts kits: Buy in Kit Form and Save $$$

Many of these kits may be purchased for less than any single item alone. Convenience of having parts at hand save you time and money. All new useful parts. No dogs. All popular brand mdse. Your word-of-mouth advertising makes our business. Satisfaction guaranteed or money refunded. Illustrated are kits like those you receive.

A. KIT Power Resistors

$2.99

Navy power resistor kit. 50 of various values from 10-160,000 ohm 25 to 200 watts. Check what the 160,000 ohm 200 watt bleeder would cost separately. Ship wt. 11 lbs.

B. Kit Variable Condensers

$2.99

10 new popular replacement variables from one to five gang. Ship. wt. 9 lbs.

C. Kit Midget Variables

$2.99

Includes 10 assd. variables such as 100 mmfd. BUD MC1265 31 plate (reg. net $2.45), 243 mmfd. dual 33 mmfd, also 3, 15, 35, 50 and 100 mmfd. All midline types. Ship. wt. 3 lbs.

D. KIT Paper Tubular Condensers

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50 popular sizes including plastic and metal encased from .001 mfd. to 1 mfd. 600 V. and cathode by pass types. Popular brands, no freak types or sizes. Ship. wt. 3 lbs.

E. KIT Tube Sockets

$2.99

829, 832, Steatite, XU-4 Pin, Acorn, miniature, octal, loctal, wafer, and molded types. A whale of a buy. 50 in all. Sip. wt. 3 lbs.

F. KIT Radio Knobs —100

$2.99

100 various knobs for radio & television. Push on, set screw, pointer, audio, red, brown, black and white. All for reg. ¼" shaft. Ship. wt. 3 lbs.

G. KIT Wafer Switches

$2.99

25 assorted bakelite and steatite insulated single & multigang types for band change and other circuits. Ship. wt. 4 lbs.

H. KIT Rheostats & Potentiometers

$2.99

25 assorted replacement, regular & midget types. Ship. wt. 4 lbs.

I. KIT Mounting Hardware

$2.99

100 pcs. various terminal strips of screw & solder types. Ship. wt. 3 lbs.

J. KIT Coil Kit

$2.99

50 pcs. Contains RCA TV IF's, Osc. HV. osc. RF choke, antenna, & RF coils. Ship. wt. 3 lbs.

K. KIT Insulators

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50 pcs. Includes aircraft strain, antenna, feed thru, stand off, and mounting types. All low loss. Ship. wt. 6 lbs.

L. KIT RF IF

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Contains 25 ass'd. IF, RF, OSC, antenna, and a $5.75 Meissner wave trapper. Ship. wt. 4 lbs.

M. KIT Lamp Bulb Replacement

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100 bulbs of radio, flashlight, and automobile types 2.5 to 12 V. Popular types. Ship. wt. 2 lbs.

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100 popular ass'd. cartridge fuses including 70 amp. type for the mobile installations. Ship. wt. 3 lbs.

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$2.99

3 assorted replacement yokes. Ship. wt. 4 lbs.

P. KIT Hook Up Wire

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Over 7 lbs. or 1000' of various cut lengths hook up wire all ready stripped at each end and tinned for easy soldering. A real time saver. Multi colors to give the professional look. Ship. wt. 9 lbs.

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20 miscl. electrolytics for filter replacement. Paper, can, and plug-in types. Ship. wt. 3 lbs.

R. KIT Oil Bathtub Cond.

$2.99

25 ass'd. bathtub by pass condensers for that rugged service construction. Ship. wt. 5 lbs.

S. KIT Box of 50 Crystals

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Assorted. Many for ham bands. Ship. wt. 3 lbs.

T. KIT Carbon Brushes

$2.99

Over 100 assorted new dynamotor and motor brushes, most with spring & bronze lead. Ship. wt. 3 lbs.

CHRISTMAS SPECIAL ! ! All 20 Kits $49.95

Save money and give the gift that will keep any radio man busy for hours going thru this treasure house of parts that will be the envy of his fellows. Over a $1,000 inventory. Remember, this is all the picked, useful, new merchandise, not the usual obsolete & junk items normally sold in kit form. All sold to satisfy or money refunded.

ESSE BARGAIN BOX

INCLUDE THESE ITEMS IN ORDERS OF $5.00 OR MORE OR REMIT 50¢ ADDN. FOR COST OF HANDLING. ALL NEW MDSE.

a. BUTTERFLY — 8 stator 7 rotor for 300-1000 Mc. Ship. wt. 3 lbs. Price $3.95

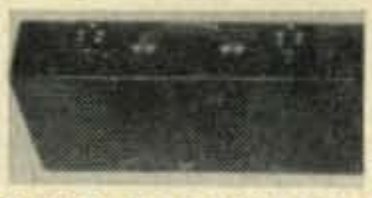
b. CO-AXIAL RELAY — 12 V. or 24 V. operated & can be connected for 6 V. operation with mtg. plate. Size 4⅝ x 5⅝ x 2½". Ship. wt. 2 lbs. Price..... $1.25 ea.

c. MINIATURE PUMP. Ideal for aeration of aquariums, labs, etc. with strainer. Ship. wt. 1 lb. Price ..... 79¢ ea.

d. J-47 KEY. Ship. wt. 1 lb. Price $1.00 ea.

e. REMOTE TUNING HEAD for CRV Receiver or other equip. 2:1 gear ratio. Ship. wt. 2 lbs. Price 79¢ ea.

f. FIELD TELEPHONE CASE. Ideal for portable equipment or replacement. New canvas or leather, choice. Ship. wt. 3 lbs. Price 79¢ ea.



g. WOOD VARNISHED INSTRUMENT CASE for precision instruments. Size 20" x 9" x 4¼". Ship. wt. 7 lbs. Price ..... $1.75 ea.

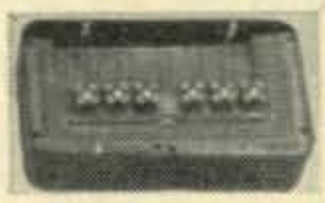
h. 1 RPM HAYDON TIMER MOTOR. Ship. wt. 1 lb. 24 V. AC... 79¢ 110 V. AC $1.49

i. 4 MFD — 600 V. CAPACITOR. Oil type. Ship. wt. 1 lb. Price 79¢ ea.

J. PUSH BUTTON CONTROL C30/ARC-5. Ship. wt. 2 lbs. Price..... 79¢ ea.

k. SHOCK MOUNTS. Lord 1179A/U. Ship. wt. 3 lbs. Set of four. Price ..... 79¢

l. THERMOMETER—40° to 110° F. Mount element thru wall for outside temp. Ship. wt. 4 lbs. Price .....$3.50 ea.



m. CAM OPERATED SWITCH. Six individual SP switches with roller type push buttons. Ship. wt. 2 lbs. Price ..... 79¢ ea.

n. AS 27/ARN-5 110-335 MC. ANTENNA. Ship. wt. 54 lbs. boxed. Price $1.25

o. AN-148A ANTENNA 150-180 Mc. Ship. wt. 8 lbs. Price ..... $2.79 ea.

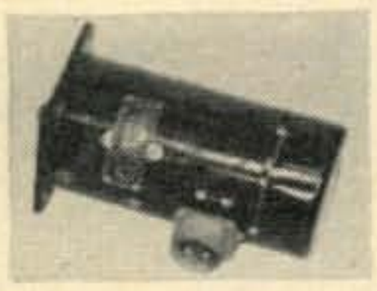
p. Dual .1 mfd. 4500 V. Cap. GE Pyranol type. Ship. wt. 2 lbs. Price..... $1.79 ea.

q. RBM 6 V. 35 AMP. Contact Relay. Ship. wt. 1 lb. Price ..... 79¢ ea.

r. .2 mfd. 5000 V. OIL CAPACITOR. Ship. wt. 2 lbs. Price ..... $1.79 ea.

s. .12 mfd. 15,000 GE PYRANOL CAPACITOR. Ship. wt. 9 lbs. Price $3.75 ea.

GOLF CAR MOTOR . . . $4.50



New 1¾ HP. battery operated motor for building up your golf car or other use. Operates from 12 to 24 V. with speed to 6000 RPM. Measures 4⅛" dia. x 9" long. ⅝" shaft. Wt. 11½ lbs. Ship. wt. 13 lbs.

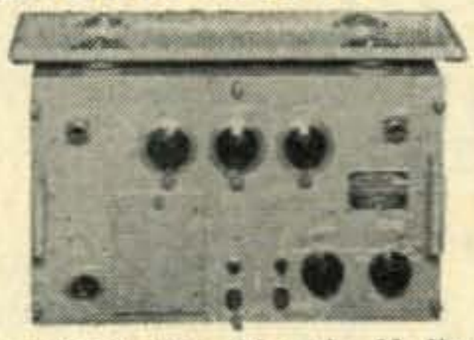
ANNUNCIATOR PANEL . . . $2.95

Contains four sensitive coils which drop announcing plate on energizing. Contains also 8 phone jacks for use on switchboard, door systems, etc. Panel size 7⅛" x 2½". Ship. wt. 3 lbs. New.

1 KW PLATE TRANSFORMER $17.50

Arma HV. Plate transformer for the construction of that 1 KW. Rig. Two CT 400 V. windings may be series connected for 800 V. Size 9½" x 9" x 8". Ship. wt. 100 lbs. New Navy surplus. Price $17.50 ea.

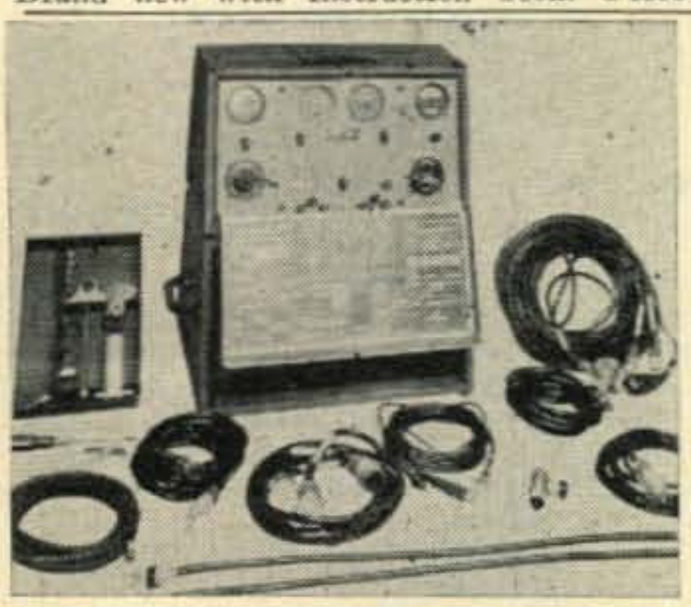
OAV-1 TEST SIGNAL GENERATOR . . . $19.95



This signal generator was used to provide a test signal of constant frequency for operation and alignment of IF amplifier stages in the CG-46ACQ type receivers. The generator covers the range between 150-250 megacycles. Amplitude modulated square wave output is obtained at frequencies of .1, 1, 10. and 100 Kc. depending on the position of the Freq. mod. Pulse switch. A 15 Mc. signal is also provided by a second osc. stage. Power is supplied by internal 115 V., 60 cycle AC supply connected to source by cord provided. Wt. of unit 62 lbs. Brand new with instruction book. Price $19.95

POWER SUPPLY KIT . . . $2.99

Components include power transformer, dual 12 henry choke, two 4 mfd. 600 V. oil condensers, rectifier tube & socket, and hook up wire. Use usual power supply circuits for full wave 250 V. 150 Ma. DC or half wave 500 V. 150 Ma. DC supplies. Ship. wt. 30 lbs. All for $2.99



TEST SET EE-1 New . . . $19.50

A test set for aircraft containing AC & DC volt, ohms, meter, tachometer, pressure gauge & test gauge cords & tools. In aluminum suitcase type case that opens forming sloping 2 sec. panel. Ideal for your test bench applications. Cost hundreds of dollars but yours in original evacuated shipping container for only $19.50. Ship. wt. 270 lbs.

Tube Checker . . . Dynamic Mutual Cond. . . . $22.50 ea.

Here is a real buy on a portable dynamic mutual conductance tube checker built for the Signal Corp. by leading mfgrs. Checks most of latest tubes including TV types. Some defect is in all but can be easily repaired by the radio man, sometimes only a tube needs replacement. Ship. wt. 18 lbs.

REMIT SHIPPING CHARGE AND INSTRUCTIONS WITH ALL ORDERS. OTHEFWISE ORDER WILL BE SHIPPED EXPRESS COLLECT. ALL ITEMS GUARANTEED TO YOUR SATISFACTION OR MONEY REFUNDED IF RETURNED PREPAID WITHIN 10 DAYS OF RECEIPT.

ESSE RADIO CO. 42 WEST SOUTH ST., INDIANAPOLIS 25, IND.

letters [from page 16]

Dear Sir:

A specially built 29 foot trailer has been equipped with a 75A-4 Receiver and KWS-1 Transmitter by Collins Radio Company and will start a tour of the midwestern states September 7.

The purpose of this tour is to acquaint the amateurs, first hand, with the advantages of SSB operation. Amateurs visiting the display will be given the opportunity to operate the equipment and thus have a practical basis for forming their opinions of SSB operations.

The station will be operating on 75, 20 and 15 meters.

The schedule for the trailer's tour is as follows:

September 27, 28, 29	Minneapolis, Minnesota
October 1, 2	St. Paul, Minnesota
October 4	Appleton, Wisconsin
October 5	Fond du Lac, Wisconsin
October 6, 7, 8	Milwaukee, Wisconsin
October 9, 10	Madison, Wisconsin
October 11, 12	Davenport, Iowa
October 15, 16	Peoria, Illinois
October 18, 19, 20, 21	Chicago, Illinois
October 22, 23	South Bend, Indiana
October 24, 25	Kalamazoo, Michigan
October 27, 28, 29	Detroit, Michigan
October 30, 31	Toledo, Ohio
November 2, 3	Cleveland, Ohio
November 5, 6	Akron, Ohio
November 8, 9	Columbus, Ohio
November 10, 12	Dayton, Ohio
November 13, 14	Cincinnati, Ohio
November 16, 17	Indianapolis, Indiana
November 20	Lexington, Kentucky
November 23	Chattanooga, Tennessee
November 25, 26	Memphis, Tennessee
November 28, 29, 30	St. Louis, Missouri
December 1, 3	Kansas City, Missouri
December 4, 5	Topeka, Kansas
December 7, 8	Wichita, Kansas
December 10	Salina, Kansas
December 12	Great Bend, Kansas

T. M. Stuart, WØREP

---

stolen from

AUTOCALL

Wash. D.C. Mobile Radio Club

Puzzler Answers

Well, we sure had a variety of answers to last month's puzzler. A few of the fellows said it was 20 feet, others said. . . .

In actual practice I find the alley to be exactly 26 feet wide. However, by mathematics it is 28.284 feet wide??
Jim Grant, W4UVU

The alley is 26 feet wide.
Ronald A Sobieraj, KN2THA

I found the "Ladder" problem quite easy. Although there was only the most elementary mathematics involved, I looked up a "mathematically interested friend" and we purchased two ladders measuring 30 and 40 feet respectively. Alley #35 fitted perfectly and measured 26 feet in width, though this may not be quite exact as the pavement sagged a little. Does anyone want to buy a slightly used ladder or two?
John W Stack, W5QQY

Dear OM,

$$\frac{10}{40^2 - X^2} + \frac{10}{30^2 - X^2} = 1$$

where X equals the width of the alley at 26.033 feet.
Bob Halley, W8DOM

FIELD ENGINEERING

WITH A FUTURE -AT RAYTHEON

Your opportunity: Raytheon needs men qualified for field engineering who are interested in building a future in electronics. Field experience has enabled many of our engineers to become Raytheon executives. Here's a partial list of former field engineer-hams who are now executives at Raytheon:

40 ft. high-gain radar antenna.

W1BBO—G. S. Humphrey, Asst. Vice Pres. & Mgr., Gov't. Equip. Div.
W1CLS—A. A. Farrar, Asst. Vice Pres. & Mgr., Gov't. Relations Div.
W1SZ —C. C. Rodimon, Mgr., Field Requirements Dept.
W1GWD—O. L. Dewey, Mgr., Gov't. Service Dept.
W1EEE—E. K. Doherr, Asst. Mgr., Gov't. Service Dept.
W1CMU—G. E. Dodge, Supervisor, Field Engineering Section
W1PAW—W. R. Burrows, Supervisor, Technical Section

You Can Participate In These Interesting Programs:

MISSILES—air-to-air, ground-to-air and guidance systems.
RADAR—bombing, bomber defense, countermeasures, search, fire control.
SONAR—ship and airborne.

You will have justifiable pride in affiliating with Raytheon—renowned for "Excellence in Electronics," the world's largest manufacturer of surface search radars, magnetrons, klystrons and transistors.

We are primarily interested in men who have field experience and a degree in Electrical Engineering. However, if you have an extensive electronics background which includes missile, radar or sonar field experience, send in your application. Valuable special training prepares you for your assignments.

Attractive salaries, regular reviews for merit salary increases, relocation expenses, paid life and accident insurance, other benefits and allowances. Interesting assignments. Write to Ed. Doherr for information.

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Excellence in Electronics

Raytheon Manufacturing Company

Government Service Department
100 River Street
Waltham 54, Mass.

New Puzzle

This is an old one that has recently been brought to our attention. It is quite easy, though you may not think so when you first read it. A man normally met his chauffeur at 5 o'clock at the railroad station. This time, however, he got off work early and arrived at the station at 4 o'clock. He started walking towards home, saw his chauffeur coming after him, flagged him down, got in and rode on home arriving there a half hour earlier than normal. How long did the man walk?

Aves Island

[*from page 51*]

broke loose on the ship and skated all over the place almost crushing several of us.

Here is a scene from Camp "A", YVØAA, Aves Island, with Luis, YV5BZ, operating and Oscar, YV5GC, assisting.

Camp "A", YVØAA, Aves Island, shows antenna masts, the expedition's ship and the wrecked schooner "Biscaya" still identified by its bronze nameplate. This is "off-season" for the birds who literally cover every inch of ground during the Winter months.

We arrived at La Guaira on June 26th . . . safe, sound and very tired. All we could talk about was our next trip. What island would we choose next time? We'll let you know as soon as we decide. ■

TREMENDOUS CRYSTAL CLEARANCE SALE!

Save Money—Order in Package Quantities!

All crystals tested and guaranteed to oscillate. Please include 20¢ postage and handling charge for every 10 crystals or less. Minimum order $2.50. No C.O.D's.

PACKAGE DEAL No. 1

25 Assorted FT-243 45 Assorted FT-241A
15 Assorted FT-171B 15 Assorted CR-1A

100 Crystals Our Choice **$8.95**

Assorted.....Regular value $66.00

PACKAGE DEAL No. 2

FT-241A Crystals for Single Sideband
379 KC–538 KC

35 Crystals Our Choice **$3.49**

Assorted.....Regular Value $14.00

PACKAGE DEAL No. 3

HAM BAND CRYSTALS—FT-243

For operating on 80, 40, 20, 15, 10, 6 and 2 meters—on either fundamentals or harmonics.

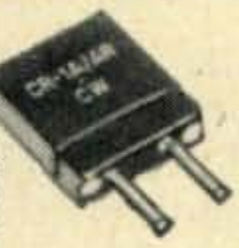
25 Crystals Our Choice **$6.95**

Assorted.....Regular Value $20.00

FT-243 RANGE 3655 KC –8733 KC

FT-241A RANGE 370 KC –538 KC

FT-171B RANGE 2030 KC –3995 KC



CR-1A RANGE 5910 KC –7930 KC

INDIVIDUAL CRYSTALS • Indicate 2nd choice—Substitution May Be Necessary

Low Frequency — FT-241A for SSB, Lattice Filter etc., .093" Pins, .486" SPC, marked in Channel Nos. 0 to 79, 54th Harmonic and 270 to 389, 72nd Harmonic. Listed below by Fundamental Frequencies, fractions omitted.

49¢ each—10 for $4.00

370	393	415	487	509	533
372	394	416	488	511	534
374	395	418	490	512	536
375	396	419	491	513	537
376	397	420	492	514	538
377	398	422	493	515	540
379	401	424	494	516	
380	402	425	495	518	
381	403	426	496	519	
383	404	427	497	520	
384	405	431	498	522	
385	406	433	501	523	
386	407	435	502	525	
387	408	436	503	526	
388	409	481	504	527	
390	411	483	506	529	
391	412	484	507	530	
392	414	485	508	531	

79¢ each—10 for $6.50

400	462
440	463
441	464
442	465
444	466
445	469
446	470
447	472
448	473
450	474
451	475
452	476
453	477
455	479
457	480
458	
459	
461	

79¢ each—10 for only $6.50

CR-1A SCR 522-EE Pin, ½" SP

5910	7380
6370	7480
6450	7580
6497	7810
	7930
6610	

FT-171B—BC-610 Banana Plugs, ¾" SPC

2030	2220	2360	3202
2045	2258	2390	3215
2065	2260	2415	3237
	2282	2435	3250
2105		2442	3322
2125	2300	2532	
2145	2305	2545	3955
2155		2557	3995

sun
PARTS DISTRIBUTORS, LTD.
514 TENTH ST. N.W., Wash., D.C. Dept. Q.

FT-243 — .093" Dia. — .486" SPC

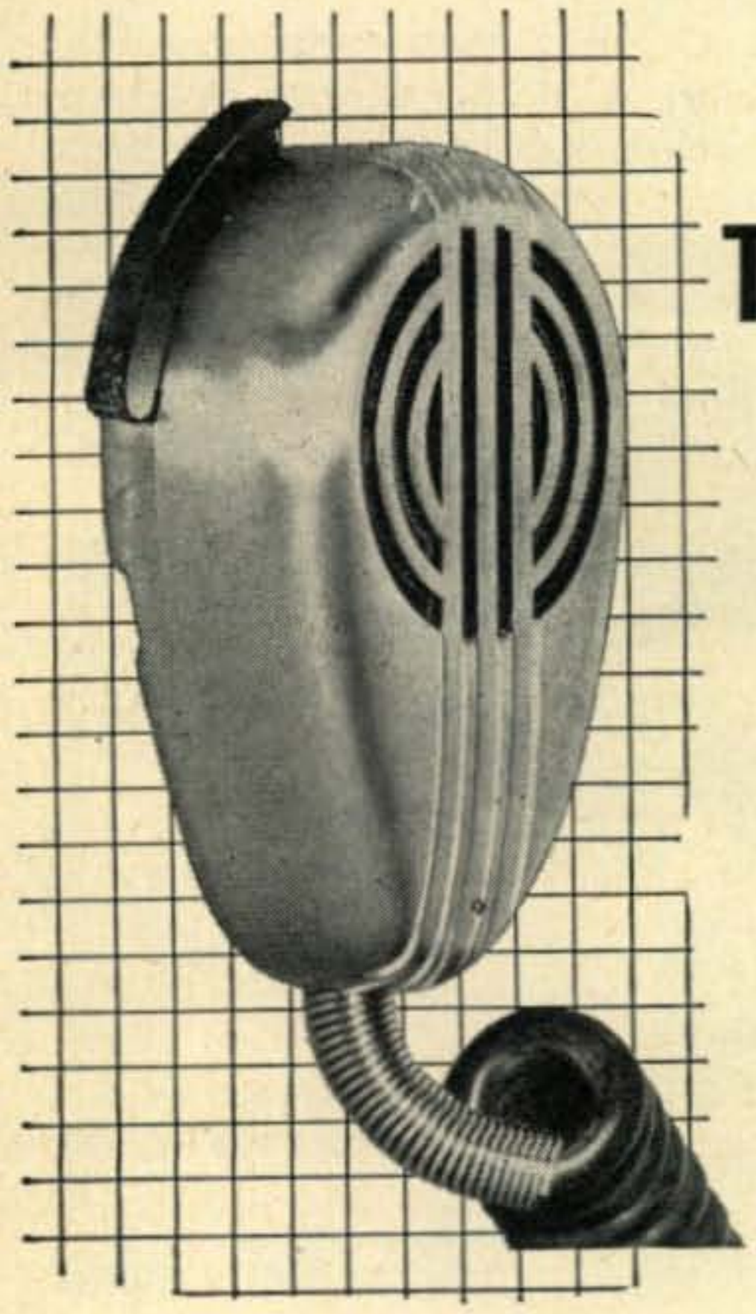
49¢ each—10 for $4.00

4035	5706	6306	7473	7750	8690
4080	5740	6325	7475	7766	
4165	5750	6340	7500	7773	
4190	5773	6350	7506	7775	
4280		6373	7520	7800	
4340	5780	6375	7525	7806	
4397	5806	6400	7540	7825	
	5840	6406	7550	7840	
4490	5852	6425	7573	7841	
4495	5873	6673	7575	7850	
4840	5875	6675	7582	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	
5500	6250	6925	7706	8310	
5660	6273	6950	7710	8316	
5675	6275	6975	7725	8320	
5700	6300	7450	7740	8630	

79¢ each—10 for $6.50

3735	6185	6625	8173	8525
3990	6200	6640	8175	8550
6025	6450	6650		8575
	6473	7000	8225	8600
6042	6475		8275	8625
6073	6500	7075	8280	8650
6075	6506	7125	8350	8680
6100	6525	7150	8375	8690
6125	6550	7300	8400	8700
6140	6573	7306	8425	8733
6150	6575	7425	8450	
6173	6600	7440	8475	
6175	6606		8500	

SPECIAL 200 KC XTAL in FT-241A HOLDER—$1.25—WITHOUT HOLDER—39¢ ea.—3 for $1.00



Everything you need for mobile amateur operations

TURNER 90 MOBILE MICROPHONES

- Superior voice reproduction—maximum response with minimum distortion.
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Book Review

Wow, hot foot it right down to your supply house and pick up your copy of Philco's handbook of Tubes and Semiconductors. For two bucks you get 207 pages, each 6" by 9" with a wire-x type binding so it will lie flat . . . lets you use both hands for other chores. This manual is in six sections and covers everything from aids and servicing to data on over 1,950 tubes and semiconductors. A whole slew of other stuff is mentioned but why not write Philco at 18th and Courtland Streets, Philadelphia, Penn. and let them tell you about it.

de W2NSD

[*from page 12*]

handbook is fabulous. It has everything you need to know to go mobile. This is one book you really can't go without. The chapter on the electrical system of the car will save you many times the cost of the handbook. There is a darned good reason why Bill Orr, W6SAI, is the most popular writer in hamdom. Most of you have the first Mobile Handbook, his Beam Antenna Handbook and the latest Radio Handbook (14th Edition) and thus know what a fine job Bill does in making things understandable. Send us the $2.95 for the Handbook or get one from your local parts dealer.

QSL Contest

As you know, CQ has been running a QSL contest each month with the winner receiving a two year extension subscription as a prize. We generally do not consider cards of unusual size due to post office regulations and difficulties of retaining clarity in reduction for printing, However, I received a card the other day from K5BSS whom I worked some time ago that I thought rated mention. It is a 1/10,000

share in an Oklahoma Dry Hole. The stock certificate is the real thing complete with seal, signatures and transfer instructions on the reverse side.

4.179², Wayne, W2NSD

Sawing Machine [*from page 84*]

There are lots of intentionally non-linear units; some of the photographs show plots of voltage-vs-current for various units, including some thyrite units, an NE-2 tube, etc.

You don't have to build a whole amplifier to test for unsatisfactory components; try the Sawing Machine on some of the audio transformers you've got around the shack—you may discover why your speech modulation seems "funny". Sine wave tests of the units may show they're just fine from 150 to 3500 cycles, excellent communication-voice-band units. But oh, brother! What the Sawing Machine shows is happening to the shock-excitation waves actually present in human speech! No wonder your voice "sounds funny" over the rig!

When the unit is built, the 884 bias control is adjusted for maximum linearity of the trace on the scope, and then can be left alone. In use, the resistance of the "Fine Freq. Control" should be kept as low as possible for the desired frequency; that is, use a large condenser, and a small resistance-value when you can, rather than a small condenser and a large resistance. Reason: an 884 is a gas triode—but it's an electronic triode, for a' o' that. There is a point just before the gas-discharge starts, when the grid bias is no longer sufficient to completely block electron flow, but electron-flow is not yet great enough to trigger the gas discharge. At that point, a few microamperes can flow, with no gas discharge. If the resistance feeding charge to the condenser is so great that it is feeding in only a few microamperes . . . whaddaya know! It'll just sit there till doomsday, without firing, because the 884's pure electron current is able to drain the current as fast as the resistor feeds it. If the resistance is low, and many microamps are flowing, the tiny electron current of the 884 won't appreciably distort the pure linear rise of the voltage across the condenser.

The reason for the clamp-tube is that, without it, the output from the condenser will run equally above and below ground. This means that the peak voltage-to-ground will be just one-half the available voltage. The clamp-tube makes the voltage run all negative. By inverting the clamp-tube circuit, you could make it all positive—but why complicate matters?

Without the clamp tube, the 150 volt output can barely fire a little NE-2 tube, because the voltage-to-ground is only 75. With the clamp-tube, the NE-2 fires easily, because the voltage *swing* may be the same, but the *voltage-to-ground* is doubled.

I didn't provide a switch for throwing the clamp tube in and out of circuit; my Sawing Machine is an open chassis, and the simplest possible switch is to grasp the 6J6 firmly, and pull. Put it in again when you want it. ■

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.

Novice

[*from page 71*]

In closing, I invite anyone who believes I'm exaggerating to spend an evening just listening between 7400 and 7500 kc. Don't be surprised if you hear both sides of a QSO (or, occasionally, a novice c-w net with several stations audible). I would also like to remind the novices to check with close-in stations, at least a mile or so away, but not too far, to see if they have any 7400 kc signal. Remember, for every one identified and notified by an ARRL observer, there are 10 others who were not, due to fading, skip, or commercial QRM . . . I find that I'm lucky to positively identify half of the novice harmonics I hear for these *very* reasons. But, just because I couldn't tag them is no sign that an FCC monitoring station won't. *They* have complete address files.

I would also like to caution those novices who work 15 meters to watch their oscillator harmonics on 20 meters. It is quite often possible to locate a novice between DX-ers on 20. One of the easiest ways to put out a signal there is to use a harmonic-rich oscillator driving a pi-net final on 15 meters. If the pi-net is coupled directly to the antenna and adjusted properly it will pass subharmonics very easily due to its lowpass filter action."

Thanks and 73. Dave.

Thank you Dave for the dope, I hope that this does not keep up for long as it will endanger the amateur's chance of being accepted in the inner circle so to say. There was an article on getting rid of harmonics in an earlier issue of novice shack. I would suggest that you look up that issue and read it carefully and apply the ideas therein to your rig. Read the handbook for further information.

K2ICX, K2DXC, K2DXD and brother taking exam in August shows they have an all ham family.

Ed Borow, K2OQA, 729 Avenue A, Bayonne, New Jersey, writes a note.

"Dear Walt: I owe my novice ticket to W2GKE, W2EYT and the rest of the fellows at the Bayonne C.D. Radio Club (W2ODV). Help with the general was given by K2MFF.

As soon as my ticket arrives, I hope to go on 20 fone and c.w. and on 10 fone. I sure hope to meet you there.

I'll write again soon to tell you of all the DX I've worked (hi hi)."

73, Ed.

Well here goes another rush of mail to Nevada, remember what happened the last time I printed a letter from Nevada? O K, I'll print it any way, get out your letter opener, Steve Woodward, W7AZF, 864 Daniel Drive, Reno, Nevada. Steve sends this Marsgram.

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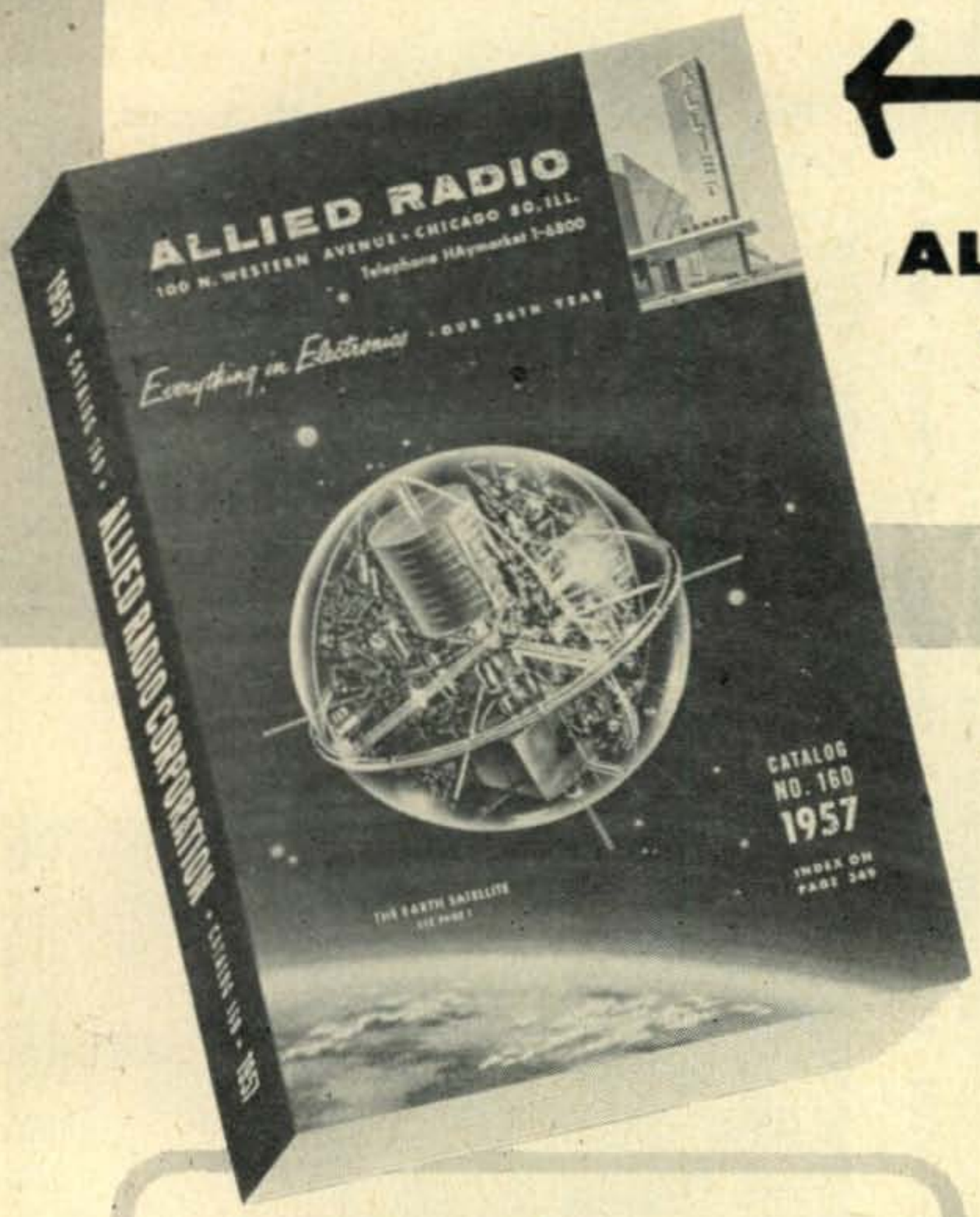

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"Dear Walt: I haven't seen any letters representing Nevada lately, so I thought I would write. My age is 14, and I have been a general since April, 1956.

My rig consists of a Viking Ranger and an NC125. I would be glad to sked anyone needing Nevada for WAS. I work all bands. I need Delaware and Maine for my WAS. My DX so far is KL7, KG6, VK3, ZL1, ZS5, YV5, JA1, LU, VE3, VE5 and KH6. I am putting up a 15 meter beam soon, then I can work some of that far away DX.

Well Walt I guess that's it. Best 73 from "The biggest little city in the world," I hope to work you soon."

73. Steve.

Pete Butler, W1BPW, 88 South Avenue, Whitman, Massachusetts, is S-9 with this note.

"Dear Walt: I thought I'd write and tell you how things are doing here at W1BPW. As WN1-NNQB manager things are pretty slow. I have only 5 or so envelopes in the bureau and some nice cards for the WN1s. Not many novices are cooperating.

I have a very good interest in DX. Most operation is on 20 where I have worked 38 countries using a long wire antenna. The best DX worked is VK, ZB1, PJ, ZS, and KH6. This interest was stirred up in QSO's with VP9BL, WP4ABD and KV4BK. I need Colorado and Idaho for WAS.

The rig is an Adventurer and S-20-R with an RME preselector. Antennas are a 20 meter folded dipole and long wire. What kind of antenna systems are the other novices using with the Adventurer? I will make a sked with anyone needing Massachusetts for WAS on 40 or 80 meters. I hope to see you in the near future.

73. Pete.

Joe Phillips, KN5EAO, 505 North 5th Street, Searcy, Arkansas will likely be in the Navy by the time he sees this picture. He worked 32 states, Canada and Hawaii with this homebrew 75 watter.

Kentucky comes in 599X this month with Stewart Schneller, KN4JOP, 137 South Crestmoor Avenue, Louisville 6, Kentucky, at the key. He says:

"I receiver my ticket June 11 this year. I am 14 years old and in the ninth grade at Barret Junior High School.

The rig is a S-40-B Adventurer. The antenna is a 40 meter half wave dipole. They do a swell job here.

I have 28 states with 22 confirmed. I would like a sked with any WN7 except Oregon. I also need the Dakotas, Mississippi, New Mexico, Rhode Island, Vermont and Colorado. My most treasured contacts have been with Delaware and Maine. I QSL 100% and will sked anyone needing Kentucky for WAS on 40 meters only. Good luck Walt, 73."

Stew.

[Continued on page 118]

RADIO OPERATOR-TECHNICIANS

THE U. S. Government has a continuing requirement for single and married men between the ages of 20 and 40 with radio operator-technician experience. Individuals with less than minimum required experience can qualify for training. Persons with past applicable experience, who for some time have been out of touch with this type of activity, will be refreshed. Assignments are overseas at interesting foreign posts.

STARTING annual salaries, which will be determined by the applicant's experience and ability, range from $3670 (GS-5) for trainees to $4970 (GS-8) for fully qualified men. Normal promotional progress within this salary range may be expected when quality of performance dictates. Beyond this latter level advancement possibilities exist on a selective and competitive basis. Standard government allowances are paid in addition to the salary.

A VARIETY of foreign posts is available. Rotation of the employee and his family from post to post is accomplished in accordance with standard government regulations and usually involves tours of 24 months duration at each post followed by Stateside leave between assignments. Work is challenging and varies from post to post. If you are in good health, not subject to military draft, and are interested in the above openings, please write—

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3. Military history including dates, schools, experience, grade or rank, and MOS (primary and others);
4. Civilian training and experience;
5. FCC license if any;
6. CW speed;
7. Typing speed;
8. Marital status and dependents.

If your letter indicates that you have the required qualifications, a local interview will be arranged in the near future.

of solder in the antenna jack to provide some coupling to the grid dipper, and set the oscillator tuning capacitor at maximum capacity. Now, starting down around 100 mc, tune the grid dipper higher in frequency, noting each frequency at which the grid dipper is heard in the *ASB-5*. As an example, when this *ASB* was fired up, the following frequencies were noted, 130 mc (4th harmonic), 172 mc (3rd harmonic), and 260 mc (the 2nd harmonic). This indicated the receiver was tuned to 520 megacycles, because it was the lowest frequency all the above frequencies would multiply to. It also indicated that the oscillator needed re-adjustment. The cavities in the *ASB* are very sharp (when they are peaked up, they are capable of receiving a band of frequencies about 3 mc wide) and they may require a little adjustment before the proper grid dipper harmonics can be heard. Also, do not couple the grid dipper too tight because you will pick up weaker spurious signals that will not add up to anything. Retuning the oscillator is accomplished by sliding capacitor *C103-2* up or down the oscillator lines. This capacitor is the little round disc that is mounted between the two lines. Loosening the two screws on each line allows the capacitor to be moved. Experimentally, move the capacitor and again check the frequency with the grid dipper. Somewhere on the line (usually near the bottom) the following frequencies will be noted: 105 mc (4th harmonic), 140 mc (3rd harmonic) and 210 mc (the 2nd harmonic). When you have reached this point, you have arrived, because it indicates the incoming frequency is 420 megacycles. Now, rotate the capacitor to minimum capacity and again check the frequency by the same method. It should be around 445 mc, if you have installed the capacitor correctly.

Adjusting the cavities: As a rough alignment procedure, the cavities can be peaked up on any of the harmonics of the grid dipper, that has been moved away from the antenna input. If you have a two meter receiver, adjust the grid dipper until a signal is heard at 144 mc. Then listen for the 3rd harmonic (432 mc) on the *ASB-5*. Move the grid dipper away from the antenna or reduce the length of the antenna until the grid dipper signal is very weak, then peak up the three cavity adjustments. Peaking the cavities on noise can be a little mis-leading because several peaks may be noted. However, there will be only one spot where the incoming signal peaks up. The acid test, of course, is to connect it to a good antenna and tune it up on a weak signal. If you know a ham who lives a few blocks away from you, who has a two meter rig, you might be able to pick up his 3rd harmonic on the *ASB-5*. If he has 420 gear, so much the better. Using the 3rd harmonic of your own two meter rig is not too good an idea because it will probably overload the r-f amplifier tube and generate all kinds of spurious signals. Most of the 420 stations are located near 432 mc, and this is the best frequency to peak the cavities. As stated earlier, the cavities are very sharp and the ASB will probably receive weak signals between 430 and 434 mc only.

If a little more selectivity is desired, the 55 mc and the 16 mc i-f amplifiers can be peaked up on tube noise. It is possible that doing this may cause the i-f amplifier to break into oscillation, but the gain can be reduced by lowering the power supply voltage or by installing a 3.3K ohm, 1 watt resistor between *pin 6* of *V102-4* and ground. Incidentally, if an r-f gain control is desired, a 100K ohm pot installed at this point does the job nicely.

If you have been in many of the surplus stores, you will see that there are several other models of the *ASB* series of receivers. One model uses two 955 tubes as oscillator-mixers and it is pretty sad without that r-f amplifier. Another model uses the 446 tubes, but the r-f amplifier and mixer are mounted in a single long cavity that runs down the center of the chassis. It is probably as good as the *ASB-5* although the author has never had one fired up. *Generally*, these conversion instructions should work for other models, with minor changes.

Incidentally, for you 420 television fiends,

ASB-5 Power supply parts list

C1a, b, c—20- 20- 20 μfd, 450 wvdc electrolytic capacitor (*Sprague* TVL-3780)
CH1—Filter choke — 10 henries, 90 ma., 270 ohms d-c (*Triad* C-7X)
F1—3 amp. fuse and fuse holder
R1—10K ohm, 50 watt wirewound resistor with slider (*Clarostat* K-50-NA)
SO1 — 5 pin female *Amphenol* connector (77-MIP-5)
SPKR — 4" permanent magnet speaker (see text)
SW1—Single pole, single throw toggle switch
T1—Power transformer —700 vct., 125 ma., 6.3 vct., 4.5 amps., 5v, 3 amps. (*Triad* R-14A)
T2—Audio output transformer, 5K ohms to 4 ohm voice coil (*Triad* S-5Z)
Miscellaneous parts required: Chassis 5 x 7 x 3 L.M. *Bender* (LMB-145), ⅜ grommet, nuts and bolts. For the power cable: 3 foot length of 4 conductor cable, 5 pin male cable connector (*Amphenol* 86-PM5), 5 pin female cable connector (78-PF5)

ASB-5 conversion parts list

C1, C2—25 μfd, 25 wvdc capacitor (Sprague TVA 1205)
C3—.01 μfd, 600 volt
C4—1.8-5.1 μμfd butterfly tuning capacitor (Johnson 5MB11) see text
R1—3.3K ohm, ½ watt
R2—100K ohm, ½ watt
R3—500K ohm volume control, audio taper (Centralab B-60)
R4—1 meg, ½ watt detector load (see text)

[*continued on page 113*]

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the *ASB-5* receiver is a natural for a television receiving converter. One was used for a time at W6TNS-TV by removing the 2nd i-f plate transformer *Z106*, winding a 2 turn link around the coil and installing a UHF coaxial connector on the side of the can. A coaxial cable was connected to the television receiver tuned to Channel 2. If excessive interference exists from a local Channel 2 station, the 55 mc i-f amplifier and the oscillator can be returned to produce an output on Channel 3.

An *ASB-5* was also used at W6TNS to monitor the 6 meter band for openings. A coax connector and a toggle switch were installed on the side of the chassis just below *V102-1*. When the receiver was not used on 420, a six meter antenna was connected to the grid of *V102-1* (*pin 4*) through the toggle switch. It was necessary to stagger tune the i-f amplifiers to cover the low frequency end of the band, and to retune the 2nd conversion oscillator *Z107*. Any signal of 2 or 3 microvolts really booms in. I suppose a d-c amplifier and relay connected to read detector voltage could be used to ring a bell, flash a red light, start a siren or energize a phonograph that plays the Star Spangled Banner whenever a signal appears on six. A combination of any or all of these alarms could be used, however, the idea has not been checked out as yet.

Tuning 420 signals on this receiver is really a pleasure. Signals that are not ever audible on an APS-13 would get an S-9 report from stations using this receiver. Now that you have a red hot 420 receiver, give a listen for me. I'm still working on that 420 WAS. ■

No KW Needed

[*from page 28*]

W5BNO as the contrast itself may tickle XW8AB's ear enough for him to identify you. Many stations will be attracted by this *Break-in* method and will give you contacts. Others will not—with those, don't try it because you're apt to end up in the little black book again.

10. Advertise. When you *are* in QSO with one of the choicer items, let the whole world know it. Do this at the end of the last transmission, when after . . .—. —, you send his call at least three times as you sign. This will insure a pile-up after *your* QSO and will mean less competition for you when you begin stalking your next kill. (A pile-up can be *good* for you, *after* you've plucked the fruit. As they say in the Navy, "Pull up the ladder, Mac, I'm aboard.")

This completes the treatise on how to work DX without a kw. Soul bared, this writer's QSL will probably never grace the wall of some faraway shack again. But, right or wrong, these are the things that have made DXing at W8YIN, successful. Ignore the DX

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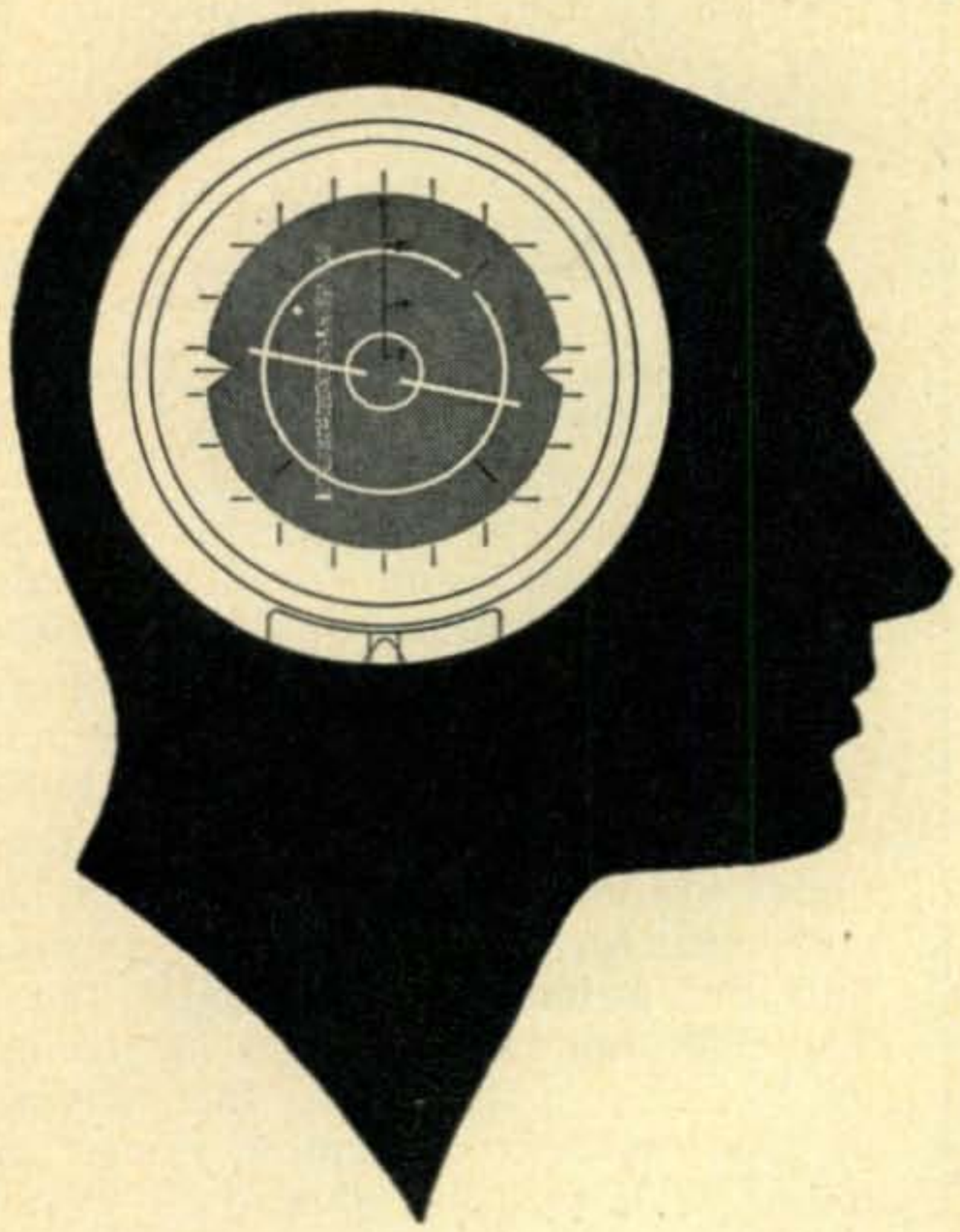

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bug if you can; harken to these humble words, if you can't. All comments can be directed to the author on 144 Mcs. No agonizing, frustrating DX-shenanigans up there. Just fresh air and wide open spaces.

If you must persist, here's a hearty cheer for you.

Good Dxing, OM, but *no* more power to you! ■

Vertical

[*from page 37*]

in free space. A single wire (either stranded or solid) may be used instead of the twin lead for lengths l_2 if desired.

The author suspended his test antennas, one at a time, from from an insulator and spring located on the end of a clothesline as shown in *fig. 3*. This clothesline ran through a pulley supported by another clothesline which was fifty feet high and supported by two large trees. The lower end of the antenna under test was secured by another clothesline and insulator combination to a stake driven into the ground directly under the antenna. The 300-ohm feed line ran horizontally from the antenna to the house, then down the side of the house to a window beside the transmitter. This feed line should be approximately at right angles to the antnena for as large a part of the run as is possible. This makes the antenna ideal for operators that are located in second floor or higher operating positions.

The length of the feeders is unimportant as they are untuned and can be fed by any balanced output circuit, such as a balanced antenna tuner, balun, etc. The author uses a set of *B & W* type 3975 bifilar balun coils which are in turn connected to the pi-output section of the transmitter by a short transmission line. ■

Yasme

[*from page 44*]

thought in those brief moments, and I wondered how the folks at home were taking this day. The parade over, everyone trouped back to the camp for a good feed and that evening they presented themselves at the American Club house to give everyone a perfect evening's entertainment with their singing. The few Fijians employed by PAA were there too and they, in their ceremonial dress, gave us an example of their very tuneful singing and dancing.

On the whole, the evening turned out very successfully, and the Americans certainly showed their enthusiasm. It is just as well that these little incidents occur here to break the monotony, otherwise I feel very sure everyone would go nuts.

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Departure had been delayed a couple of days awaiting mail so the time was spent giving the Yasme a general cleaning. I noticed one of the Gilbertese lads gazing enviously at my efforts so I invited him aboard to look around. His lack of English did not prevent him from showing his enthusiasm and before long he was assisting in the cleaning up process. This spontaneous action of helping out seemed to be prevalent with all the Gilbertese and this laddie, not content with working for about four hours, came back the next morning just before departure to do some more! What embarrassed me considerably was his insistence that I accept a small pile of dimes and pennies which he carefully placed on the saloon table. Another gift was a wonderfully woven sleeping mat. He indicated that the money, amounting to about two dollars, would help me out. Whilst happy to accept the mat and yet loathe to hurt his feelings I had to refuse the money and it was only by making a big show with my hands that I was able to convinct him that the money was not necessary—how the heck does one thank a fellow for that sort of gesture when one is unable to converse in the normal way?—Well I was very touched over the whole business and really regretted having to say goodbye to him.

Departure

Later that morning the British Commissioner and the Island Manager complete with their respective wives and a whole crowd of Gilbertese came to the quay to see the departure. The Commissioner had his launch ready and in piled practically everyone there to see me through the pass.

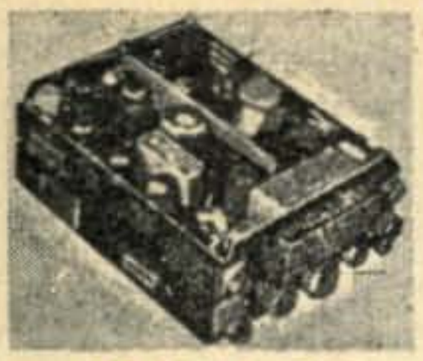
At precisely 1100, with the engine ticking over nicely, the shore lines were cast off and the Yasme moved sedately astern from the quay that had been its home for the last three months.

Once clear in the lagoon over went the helm, engine full ahead, and with the launch leading the way, Yasme creased through the pass feeling, I should think, as happy as I to be at sea again. Within ten minutes we were out of the sheltered lagoon and into the Pacific with its big swell. Directly as we had sufficient sea room up went my new Orlon sails to be christened with one of the finest trade winds I have known for some time. It took but a few minutes to trim Yasme to the easterly wind then, shutting off the engine and giving all my friends a final wave, we headed west at a pleasant seven knots—to what?—I could tell you half of it now but let's get the trip over first.

So, with a sailor's farewell, I bid you all adieu until we meet again at Nauru Island.

Cheerio and 73's, Danny, VRIB/P.

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. **$29.50**
Shpg. wt. 25 lbs.

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-5/28 2-METER RECEIVER

2 Meter superhet, 100 to 156 Mc in 4 extal channels. Louvred alum. cabinet 7⅞ x 4⅞ x 14". Complete with 10 tubes and 4 xtals. Excel. Cond. **$12.95**

ARC-5/T-23 2-METER TRANSMITTER

Companion for above, incl. 2-832A, 2-1625 tubes and 4 extals.
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 Kc. Crystal Unit **$14.95**

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

HI-FI DYNAMIC HEADSET
with large rubber cushions
Freq. Range: 40-14000 CPS. No distortion.
BRAND NEW **$5.95**

SOUND POWER Headphone with Dynamic Mike, BRAND NEW, complete **$3.95**

MICROPHONES

Model		Excellent Used	BRAND NEW
T-17	Carbon Hand Mike	$5.45	$7.95
T-30	Carbon Throat Mike	.33	.69
RS-38	Navy Type	2.45	4.95
TS-9	Handset		4.95
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

BC-906-D FREQ. METER—VALUE $200.00!

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 all 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-186	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**

WRITE FOR FREE CATALOG!

Please include 25% Deposit with order—Balance C.O.D. MINIMUM ORDER $3.00. All Shipments F.O.B. Our Warehouse N.Y.C.

G & G Radio Supply Co.
Dept. C-8
53 Vesey St., New York 7, N.Y., CO 7-4605
Branch: 5009 N. Neva Ave., Chicago 31, Ill.

Novice

[*from page 108*]

5-9 plus to Joe Phillips, KN5EAO, 505 North 5th Street, Searcy, Arkansas, for this communication:

"Dear Walt: I haven't seen a letter from Arkansas in your column, so here's one.

The rig here is a homebrew transmitter running 75 watts. The receiver is an NC-98 and the antenna is an old zepp, but I don't think I'll change it because I am 5-9-9 in Pennsylvania. So far I've worked 32 states and VE-3 and KH6. I QSL 100% and will be glad to sked anyone needing Arkansas for WAS. I work both 40 and 80 meter c.w.

I am 17 years old and have finished my high school this year. I plan to join the navy this fall. Keep the column rolling like you have been and I'll be watching for you.

Good luck and 73. Joe."

Help! Somebody let's get this lad rolling with some QSLs. Oklahoma sends Louis Horton, Jr. KN5GLH, 6710 East Independence Place, Tulsa, Oklahoma, to represent the novices this month.

"Dear Walt: I am 13 years old and have had my novice license about two months. I think you are doing a fine job on the novice shack.

I have been having trouble with my transmitter, but now I am on the air and would like to have some QSOs. The frequency is 7160 on 40 meters. I am running 60 watts to a TR-75-TVI and an S-38-D receiver. The antenna is a folded dipole. Good luck Walt."

73. Louis.

Tom Bell, KN2SEL, 402 Carvin Street, Clayton, New Jersey writes:

"Dear Walt: You are doing a FB job on the novice shack, keep it up.

I work 40 meters most of the time and some 15 meters after mid-night and before noon because of TVI, hi-hi. I have 32 states and 5 countries, VE, DL, KP, ZL and W of course.

I would like a sked with Nevada, Arizona, Montana, Wyoming and any needing New Jersey.

Rig is a Ranger and a 75A4. Best of luck. 73." Tom.

Charles Doringer, KNØGRS, 401—7th Avenue Southwest, Oelwein, Iowa sends this little note.

"Dear Walt: I thought I would drop you a line and tell you how much I enjoy your column in CQ.

I have been on the air for 26 days with 21 states worked. DX is California and Florida. I would like to sked anyone needing Iowa for WAS. I would also like to sked WN-1, KN-5 and KN-7.

The rig is an SX-99 and a DX-35. The antenna is an off-center fed dipole. (a what?) 40 meters is my favorite band. 73." Charles.

Oregon sends a nice letter this month, not many letters from the west, and I sure am glad to get it. The novice shack still has one state to go for WAS by letters to the novice shack, was it your state? This letter is from, Wally "Walt" Roeder (15). W7AOX, 4226 N.E. Alameda, Portland, Oregon. He writes:

"Dear Walt: I have been reading the novice shack ever since I received my novice ticket nine months ago. The general ticket came last week.

I still use the same Ranger feeding a wide-spaced three element beam on 15 meters. It has a 8 db gain over a dipole. The receiver is an SX-96. I use a multi-band off-center fed doublet fed through a set of balun coils for the other bands.

I have worked 35 countries and all states as a novice. I have 26 of those 35 countries confirmed. The total now stands at 42 worked, they include DL-3, F9, SM3, G3, EI, CN8, EA, LA, UA1, FK8, FM7, VR1, VP, VQ3, and OQ5. I hope to add a 20 meter beam and a power

SAVE!...BARGAINS GALORE!...SAVE!

NEW LOW PRICES! — EFFECTIVE OCTOBER 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 3.95

Transmitters, w/o modulator or dynamotor

T-18 Marine, 2.1-3 Mc, as is, w/tubes, 3.95, used 4.95, boxed 5.95
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, 2.95, used 3.95, boxed 6.95
T-23, 100-156 Mc, used, 12.95, xlnt 34.95
Special—one usable R-28 and T-23, both for 17.50

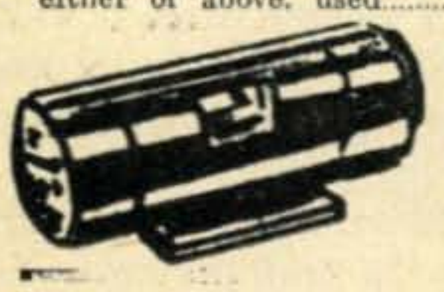
Misc. Command Equipment as available

Receiver dynamotors 28V, $1.00, new $4.95, used ..... $ 3.95
BC-456 SC Mod w/tubes, new 4.95, used 3.95
MD-7 ARO-5 Pl Mod w/tubes Xlnt 9.95
28 v dynamotors incl w/above mods. Separately, w/o mod 3.00
Mounting Racks, used, 1.49, new 2.49
Receiver spinner knobs 69¢ 3/1.50
New 24V Trans, ct at 12v, 2A 3.50
Plugs for rear of receiver 1.00
BC-442A Ant. Relay, cont. vacuum cap, 50 MMFD 5KV Send-Receive relay, RF ammeter, used 2.45, new 3.95

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-1010, Transmitter, 12 or 24 v input, 500 v at 200 Ma out, (300 v 6v in) new 7.95
DM-42, 12 V in, out 1000 and 500, ea at 215 Ma, used 12.95
DM-35, 12V in, 600 at 200 Ma out, New, 12.95 Used 9.95

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, ea 5.95

WESTON—SANGAMO—YOUR CHOICE

METERS. ALL NEW, 2" SQUARE

0-2 Ma	0-200 Ma
0-5 Ma	0-300 Ma
0-15 Ma	0-500 Ma
0-50 Ma	0-20 VDC
0-100 Ma	0-40 VDC
	0-300 VDC

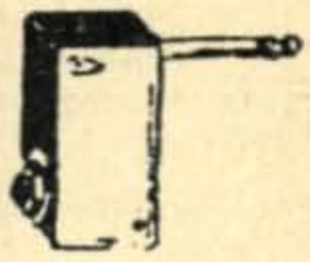
3.29 each, Special, 3 for 9.00

Heavy Duty Collins choke, 300 Ma. can take 500 Ma peaks, new 3.95
Bleeder resistors, 50 K 100 W, new 1.95
Transmitter Power Supply Kit contains chassis, 2 transformers, 2 tubes, 2 sets filters and bleeders, gives 500 VDC and 250 VDC, value of parts 23.34 Special ..... 15.95 Weight 22 lbs.
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 Cont 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

amplifier by this fall. I find phone a lot of fun, but prefer c.w. for real DX. Good luck." 73. Walt.

A card from Irv Taylor, W4JLK, 715 Fontaine Street, Alexandria, Virginia, says:

"Dear Walt: I have been on the air for 21 years but I am still a novice. I enjoy your column very much, keep up the good work.

I would like to see more articles on construction and antennas.

The station here is a Ranger built from a kit. The receiver is a 75-A2, antenna is a 3 element beam on 15 meters. Best. 73. Irv."

Indiana is represented by a note from Dave Dedman, KN9ELE, Box 54, Winslow, Indiana. Dave writes:

"Dear Walt: I have been reading CQ for about 6 months now. I really enjoy it very much.

I just received my ticket (KN9ELE) August 6th. The rig is a converted Heath-kit AT-1 and a National SW-54 receiver.

I would like to know if there are any novices on 40 meters (7187) who would like to sked or that have a net going.

Keep up the fine work on the novice shack, I'll be reading every word. 73." Dave.

Charles E. Smith, Jr., (Smitty), (41), KN4JGD, 2632 Berkley Drive, Red Bank, 5 Tennessee writes this letter.

"Dear Walt: I have been a reader of the novice shack for many months. But not until April of this year did I really get serious about "hamming," although my interest in amateur radio goes back some 15 years or more.

In April the Frye Radio Club here in Chattanooga announced they were going to have a class in code and theory for all would-be hams. I was one of the ham bitten brass-pounders who answered the call. I passed my exam, but on the second try (did not study enough theory). I received my call (KN4JGD) and have enjoyed every minute of it.

Since going on the air I have worked 38 states of which 35 are confirmed to date plus VE-3, KP4 and WH6. I need the following states badly for WAS; Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Utah, Vermont, Wyoming and New Hampshire. Anyone in those states needing Tennessee for WAS, let's trade QSOs. I am on the air most mornings from 0300 to 0700 EST. I operate 40 meters only as I have no space for an 80 meter antenna.

The transmitter is a Knight running 50 watts to a 40 meter dipole. The receiver is an SX-99.

Good luck Walt. 73." Smitty.

Help Wanted

These aspirants for an amateur license can use some help from you in obtaining their license.

Bob Streeter, 2154 Wesleyan, Columbus, Ohio can use help with code and theory.

Rebecca Morong (13), 172 Preble Street, South Portland, 7, Maine. Phone; SP. 4-8378 wants help with code and theory and some pen-pals interested in hamming.

Nick P. Telenko, Post Office Sturgeon Creek, Manitoba wants help with code and theory.

Bryan McKinney, (14), 3122 Westwood Avenue, Lansing 6, Michigan needs help with code and theory.

Johnny Spencer (15), 136 Frontenac Avenue, Noranda, Quebec needs help with code and theory.

Stuart Looney, (18), 656 Looney Creek Road, Grundy, Virginia needs help with code and theory and he would like to meet a local ham in Buchanan County to get some personal advice concerning ham radio.

I hope this column meets with your approval. The farm work is letting up a little for the summer and I will be able to devote a little more time to amateur radio. I hope to work exchange QSL cards with you all. I need three more cards for DXCC but my aim is to work DXCC on phone with less than 100 watts. It makes me feel good when you come back to me on six meters and tell me you're using the little transmitter and converter from the November *CQ*, or the converted TU-75 from the January issue. Next year you can say more than that. I hope you all WAC on six meters this fall. Good luck on all the bands.

73, Walt, W8ZCV

Contests [*from page 63*]

AWARDS: Certificate to high scorer in each country and each call area in the USA, Canada and Australia. Plus two cups, one to the Top scoring Phone station and one to the Top scoring CW station on all Bands in the world. Also a plaque to the DX Club showing the highest aggregate score from its members. See August CQ for complete details. Read rules carefully, and please fellows, score your logs before sending them in.
Contest logs and forms available from CQ but time now limited.
All logs must be postmarked no later than December 1, 1956.
They must be signed with the usual pledge and sent to:

CQ Magazine
67 West 44th Street
New York 36, N.Y.
Att: Contest Committee

RTTY [*from page 54*]

projects: narrow shift, and an h-f autostart system—a complete system for receiving messages unattended anytime, 24 hours a day, on any spot frequency on the lower frequency bands.

Bob is also an active RTTY traffic man, being NCS of the Midwest RTNET, which meets on 3617.5 kc. In addition, W9TCJ has an ARRL appointment as OBS (Official Bulletin Station). Like most of the other old-timers, Bob keeps us posted on his activities with an occasional letter or message via the Midwest and East Coast RTTY nets.

What have *you* been doing lately? Drop us a line and let us know, will you?

73, Byron, W2JTP

New Books

At last! The A to Z on Germanium Diodes, a fully-comprehensive, much-needed book titled *Germanium Diodes*, by S. D. Boon, is the latest addition to the Philips' Technical Library. Offering you a chance to grab off a relatively painless education on crystal diodes, this book goes on to show you how to put them to work in dozens of different circuits, with much practical data on the nature of germanium diodes and semiconductor circuitry. 92 pages, 100 illustrations, $1.95. Available in U. S. and Canada from: Elsevier Press Inc., 2330 Holcombe Blvd., Houston 25, Texas or 155 East 82 St., New York 28, N. Y.

Exciter

[*from page 49*]

It had been intended to put an aluminum case around the exciter. However, no TVI was experienced with the unit operating unshielded. Trouble with instability from r-f feedback was not encountered when operating into a well-shielded kw. final, which fed a 52-ohm coaxial line. However, some instability occurred when the shields were removed from the final. Thus, operation of the exciter is not recommended near an unshielded amplifier, nor in a location where high r-f voltages are present, unless a shield is placed around the exciter.

Keying

Originally, the *Phasemaster* system of blocked-grid keying of the 6BE7 and 807 buffer stages was used. However, heavy "shot" noise was present in the plate of the added 807 stage, and it was necessary to add this stage to the keying line. The keying circuit finally evolved is shown in *Fig. 2*. This gives clickless and chirp-free keying.

Operation

The exciter has proved to be quite satisfactory in several months of operation on all bands from 3.5 to 28 mc. (No operation other than testing on 1.8 mc has been done because of lack of a receiver and amplifier on this band.) The SSB signal is quite satisfactory. On AM, using the final as a linear, excellent

Parts List

C1—100 $\mu\mu$fd mica
C2, C5 — .005 μfd disc ceramic
C3, C10—.001 μfd 1,000v disc ceramic
C4, C6—.005 μfd 1 kv disc ceramic
C7—.001 μfd 3 kv disc ceramic
C8—150 $\mu\mu$fd var.
C9—1000 $\mu\mu$fd var.
M1—100 ma
PC1—5½T #14 wound on 39 ohm 1 w resistor
RFC1, 2, 3—2.5 mh
R1—47k 2w
L1—6T #14 1¼" dia x 1½" L.
L2—9T #14 ⅝" dia x 1¼" L.
L3—10T #14 ⅝" dia x 1" L.
L4—12T #14 1¼" dia x 1½" L.
L5—16T B&W 3016
L6—22T B&W 3016
SW1 — 3P12T Ceramic switch

Fig. 3

La—28 mc, 4T #16 ⅝" dia x ¾"L.
Lb—21 mc, same as La.
Lc—14 mc, 4T B&W 3013
Ld—7, 4, 1.8 mc. 35T B&W 3016 tapped at 8 and 15 turns
SW—SP 6 pos. Ceramic Switch

Fig. 2

Note: remove R32 in Phasemaster, Jr.
Ra—68k 2w
Rb—27k 2w (adjust to give desired resting plate current on 807 with key down and excitation removed)
Ca—.25 μfd paper
Cb—.1 μfd paper

reports on quality have been received. However, because of the splendid PM signal generated by this exciter, AM has been virtually abandoned. Reports on readability are better on PM than when using the final as an AM linear, and almost as good as those received when using plate modulation on the final. Hams in the immediate area using well-shielded and filtered 50 to 100-watt AM rigs encounter a great deal of trouble with rectification in BC sets, TV sets, telephones, etc., while I can operate PM with a kilowatt without the neighbors knowing I'm on the air.

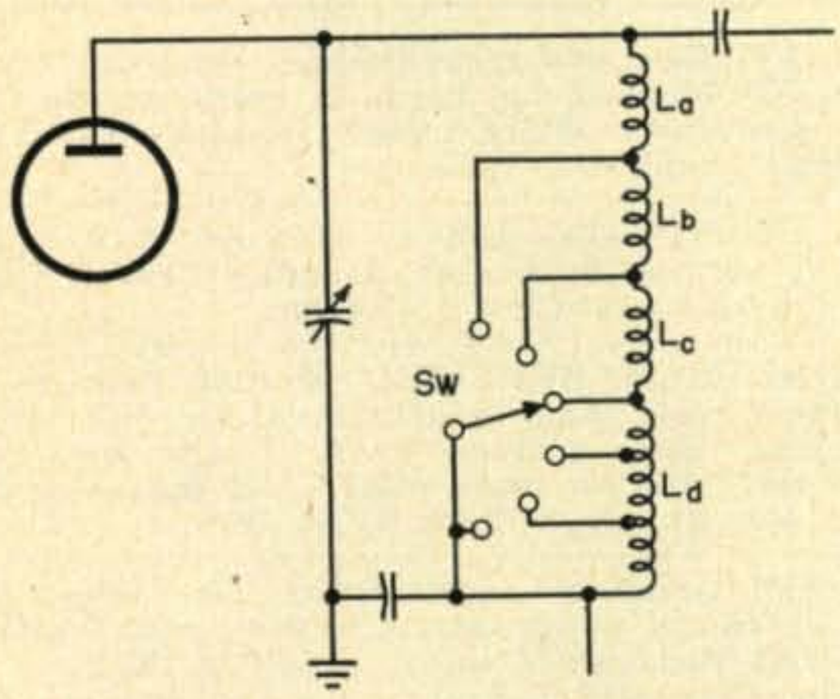


Fig. 3. 6BA6 and 807 plate tank sections in Phasemaster, Jr. section of exciter

I would make one change in the exciter, if I were doing it over again. The *Phasemaster* employs half of a 12BH7 as the crystal oscillator for generation of the 9 mc signal. The usual troubles with a triode crystal oscillator are encountered with this circuit. To prevent instability, the oscillator must be detuned so far that a severe loss of available exciter power is experienced. Even with the detuning, the oscillator kicks around considerably for about 20 minutes after being turned on. This is evidenced by a rapid shift in frequency over a 2 or 3 kc range. It then settles down to a constant frequency. (It was also found that stabilization of the oscillator plate voltage was necessary to prevent about a 100 cycle "yoop" when plate voltage was applied. The oscillator plate was removed from the rest of the *Phasemaster* B plus line and connected to the regulated 300 volts fed to the screen of the 807 amplifier.) I believe that this could be remedied by adding another tube used as a grid-plate pentode oscillator circuit for the 9 mc generator. Incidentally, this same trouble has been encountered in other SSB exciters using the same oscillator circuit.

This little rig is, admittedly, far from perfect. There are too many switches and knobs to turn when changing bands. However, my total investment was just under $100.00 for everything in the rig, as well as for the power supply and vfo, and a much greater outlay than this will be necessary to come much closer to the ideal exciter. ■

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GONSET COMMUNICATOR Model II deluxe 2 mtr. $150.00; Gonset Super Six $30.00. SX-71 with speaker $160.00. J. F. Riley, W8LPZ, 12234 Triskett Rd. CL 1-4613 Cleveland, Ohio.

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FOR AN unusual buy see Page 110 April '56 CQ.

QSL's

QSL'S??? LARGEST variety samples 25c (refunded). CALLBOOKS (latest) $4.00. "Rus" Sackers, W8DED, Holland, Michigan.

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QSL-SWL's high quality. Reasonable prices. Samples. Write, Bob Teachout, W1FSV, 204 Adams Street, Rutland, Vermont.

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HAMFESTS

V.H.F. 2nd Annual VHF Round-up of the Syracuse VHF Club will be held at Martins Restaurant, Liverpool, N. Y. on Oct. 6th. Pre-Regisitraton Necessary. Tickets Available from Jim O'Hern, W2WZR, 103 W. Roswell Ave., Nedrow, N. Y. Price $3.75 per. YL's and XYL's cordially invited. Tech talk by W9WOK.

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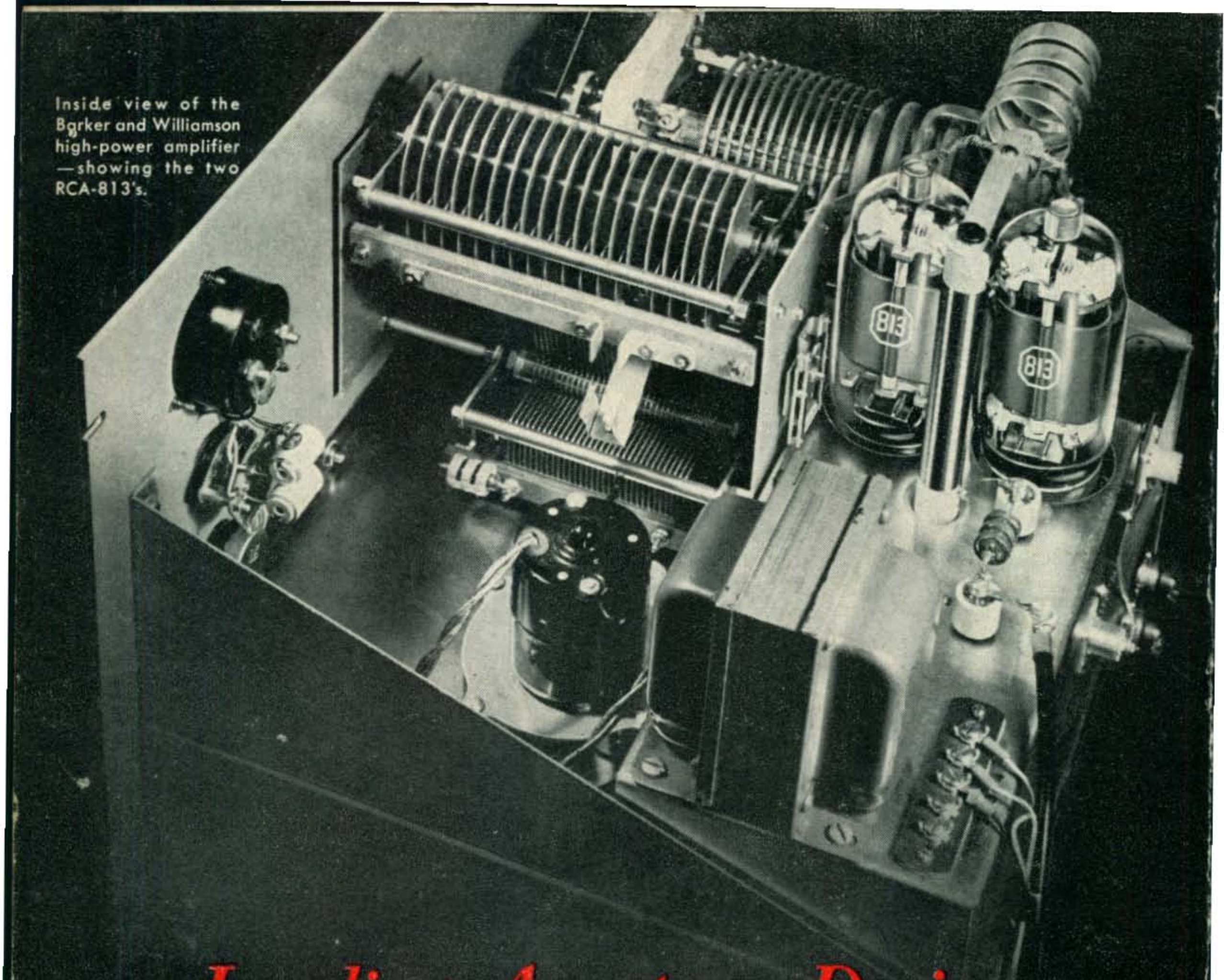

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