APRIL
1956
50c

CQ

RADIO AMATEURS' JOURNAL



VHF Contest

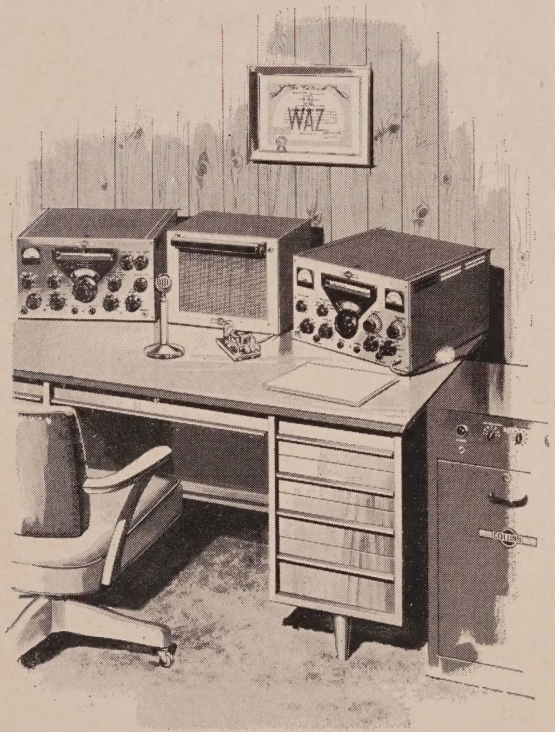
April 21-22

See Page 81

COLLINS NEW

Time Payment Plan

MAKES THE FINEST SSB EQUIPMENT AVAILABLE NOW



Collins 75A-4 Receiver, 312A-1 Speaker Control, KWS-1 Transmitter and Power Supply.

Collins Radio Company and its distributors have made it possible for you to operate the new Collins SSB rig while you're paying for it. It can be yours right now by taking advantage of the new Collins Time Payment Plan. A small down payment will team you and superior SSB performance on the Ham bands. Your present equipment may apply on the down payment, too. See your Collins distributor — he'll explain how that Collins rig can be yours for a few dollars a month, with up to 18 months to pay.

Here's how easy it is to own Collins SSB equipment

Take the Collins 75A-4 Receiver for example. For as little as $59.50 down, you take your 75A-4 home and start operating. You can choose the plan that fits your budget best — as low as $33.00 a month for 18 months, or fewer payments if you wish.

Here's another good point to consider. Collins advanced engineering and quality construction give you a station with lasting value. When it comes time to modernize your rig in the years ahead, your Collins equipment will retain its position of top trade-in value on the Amateur market.

Collins CREATIVE LEADER IN COMMUNICATION COLLINS



AIRCRAFT-MARINE
BROADCAST-POLICE
FIXED SERVICES
AMATEUR-DIATHERMY
FREQUENCY STANDARD
MOBILE-INDUSTRIAL



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

EXPORT SALES: Royal National Company, Inc., 8 W. 40th Street, New York 18, N. Y

• *hallicrafters introduces*

THE ONLY INEXPENSIVE COMPLETE RECEIVERS FOR 2 AND 6 METER BANDS...

Here are two new models Geared for VHF Use by Novice • Technician • Civil Air Patrol



Model S-102



Model S-106

Model S-102.....143-149 Mc. 2 meter band (Civil Air Patrol 148.14 Mc.) $59.95
Model S-106.....49-55 Mc. 6 meter band $59.95

Once again . . . Hallicrafters Quarter-Century policy of producing what the amateur wants and needs is reflected in these two new, low-cost . . . complete receivers.

Specifically developed to meet the need for an inexpensive, versatile . . . self-contained model . . . either unit is ideal for use by the novice ham—or in local phone work.

Old timers, too, will find both receivers an ideal complement to their present low frequency receiving equipment since each provides a low-cost means of contact with the growing VHF fraternity. These units also make the perfect corner stone for any VHF Civil Defense participation. For the ham interested in Civil Air Patrol the S-102 is a "must" addition for his shack.

Check these features at Your Jobber Today!

- 7 tubes plus rectifier
- Built-In 5" PM speaker
- High circuit efficiency
- Single Band Design
- Low Frequency Drift
- High Sensitivity
- Compact Design

FOR BOTH MODELS—

FRONT PANEL CONTROLS
Tuning: Volume—AC, on/off
Noise limiter, on/off
Receive/Standby

EXTERNAL CONNECTIONS
Antenna input terminals (coax and twin lead)
Standby terminals
Phone tip jacks
Speaker—5"

hallicrafters

CHICAGO 24, ILLINOIS

Vol. 12, No. 4 **CQ, The Radio Amateurs' Journal** April, 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.

★

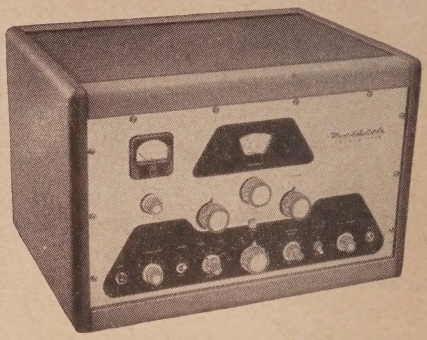
100 watts output on 160, 80, 40, 20, 15, 11, and 10 meters.

★

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.

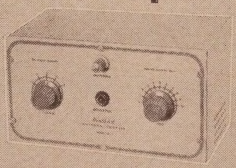
HEATHKIT

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

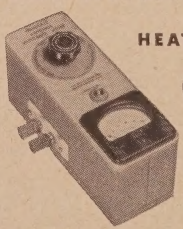
The Model GD-1B is a time-proven instrument. It will enable you to accomplish literally hundreds of jobs on all types of equipment. Frequency range is from 2 mc to 250 mc. A 500 ua meter is employed for indication, and a sensitivity control and headphone jack are provided. Includes pre-wound coils and 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.

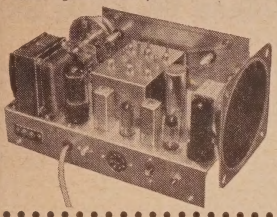
BENTON HARBOR 12, MICHIGAN

HEATHKIT communications-type all band receiver KIT

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

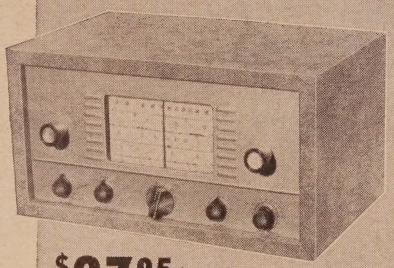
Slug-tuned coils and efficient IF transformers for good sensitivity and selectivity.

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 7¾" D. No. 91-15. Shpg. Wt. 5 Lbs. **$4.50.**

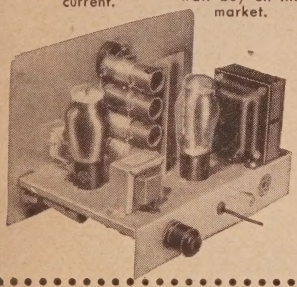
HEATHKIT CW amateur transmitter KIT

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

Panel meter monitors final grid or plate current.

Plate power input 25-30 watts.

Best dollar-per-watt buy on the market.



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



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

SPECIFICATIONS:

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

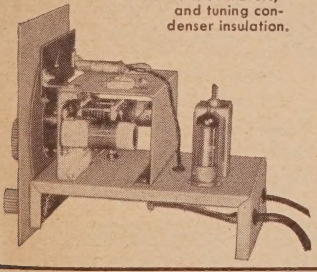
OA2 voltage regulator tube for stability.

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

Smooth-acting, illuminated and pre-calibrated dial.

6AU6 electron-coupled Clapp oscillator.

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



HEATHKIT vfo KIT

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

MODEL VF-1

$19.50

Shpg. Wt. 7 Lbs.



SPECIFICATIONS:

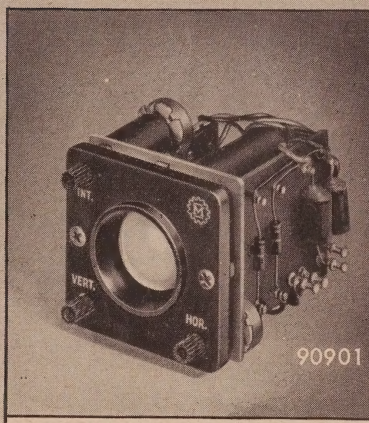
Output Frequencies—1750-2000 kc, 7000-7425 kc, 6740-6808 kc. **Calibrated Bands**—160-80-40-20-15-11-10 meters. **Tube Compliment**—6AU6 Oscillator OA2 Voltage Regulator. **Power Requirements**—250-350 VDC @ 15-20 ma. and 6.3 VAC @ .45 A.

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

Designed for

Application



The No. 90901
One Inch
Instrumentation Oscilloscope

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

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS



Feenix, Ariz.

Deer Hon. Ed:

Please sending me, rite away, list of all companies that advertising in your Hon. Magazine. Please also making much hasty with this request on acct. Scratchi wanting to mail letters to these companies reel quick-like,

Aha, I can heer you saying, that sly old feller Scratchi are having some slicky old stunt up his Hon. Sleeve. You can saying that again, Hon. Ed., yes indeedy. Boy oh boys, am I going to be in the bux! Scratchi are just coming up with idea of a lifetime.

I are not onlys going to have so much monies that I'll have trubble counting it, but also are going to having any old piece of amchoor geer what I wanting—for free, natchyourally. Lots of money, all the geer I wanting for the Hon. Shack—Hon Ed. it's a amchoor paradice.

How I doing it? Easy. In facly, so easy I wundering why other peeples not thinking of same thing before. Howsumever, it taking old geenyus Scratchi to thinking of reel simple, crackerjacks idea like this.

All I are going to do is advertise various amchoor products when I are on the air. This is reel 1/c idea, are you not thinking? Oh, I knowing it not legal, and that the F.C.C. would be taking away my Hon. Lisense. Don't letting that worrying you, Hon. Ed., on acct. Scratchi not having lisense for many years. Are finding it much easier to being on air without one, so can using almost any call-letters I wanting to.

Not only that, but clever old gentlefellow Scratchi are figyouring out way to advertising so it being legal. Supposing you working me, Hon. Ed., and I coming to back to you and saying—"Thanks for call OM. Boy are you coming in heer in Feenix, Your signal are S-9 plussedly-plus on my Acme SR-15 reseever. That are the reseever with the big three-inch lighted S-meter that also working as volt-ohmmeter."

"The Acme SR-15 reseever are also feet-youring the bilt-in electric 24-hour clock, the bilt-in awjustable-heet soddering iron, and the bilt-in printing press for making home-made QSL cards. Are also having five dubble-pur-

[*Continued on page 8*]

HERE IS YOUR CHANCE TO "CASH IN" ON . . .

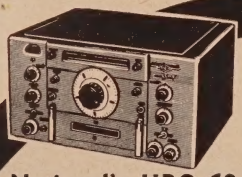
20 years of

OUR 20th ANNIVERSARY YEAR!

★ Great Trade-in Values
★ Easy Financing Experience
★ Personalized Service
★ Engineering Skill in the Amateur Radio Field
★ "Best-Price" Reputation
★ Fair Business Dealing

AT

"the Worlds' Largest Distributor of Amateur Radio Equipment"



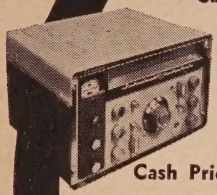
National's HRO-60
$29.97 Per Mo.
Cash Price: $550.00



National's NC-98
$11.92
Per Mo.
Cash Price: $149.95



National's NC-125
$15.90 Per Mo.
Cash Price: $199.95



National's NC-300
$20.16
Per Mo.
Cash Price: $369.95

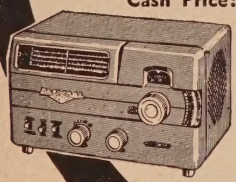
YOU PAY ONLY 10% DOWN

NEW LOW PRICE

National's SW-54
$5.00 Per Mo.
Cash Price: $54.95

National's NC-88
$10.00
Down
$7.95 Per Mo.
Cash Price: $99.95





National's NC-183D
$21.77 Per Mo.
Cash Price: $399.50





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Reconditioned Equipment List — Save up to 50% on Over 800 Items!

Please send me: ☐ Latest Catalog and complete information on items checked below! Quote your top trade offer on my _____ (make of present eqpt.) for your _____ (WRL Eqpt. desired)

C-4

☐ Wall-Sized Radio Map (25c) ☐ Recond. Eqpt. List

☐ _____ ☐ _____ ☐ _____

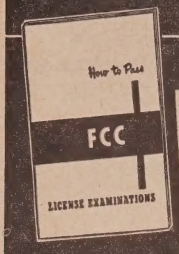
NAME: _____

ADDRESS: _____

CITY & STATE: _____

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World Radio LABORATORIES
PH. 2-0277
ELECTRONIC HEADQUARTERS
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Tells where to apply and take FCC examinations, location of examining office, scope of knowledge required, approved way to prepare for FCC examinations, positive method of checking your knowledge before taking the examination.

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2. Tells how we guarantee to train and coach you until you get your FCC License.
3. Tells how our amazing Job-Finding Service helps you get the better paying job our training prepares you to hold.



GET ALL 3 FREE!

MAIL COUPON NOW!

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk CQ-14, 4900 Euclid Bldg., Cleveland 3, Ohio
(Address to Desk No. to avoid delay)

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

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

Address .....

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

FOR PROMPT RESULTS SEND AIR MAIL

Special tuition rates to members of the U. S. Armed Forces
Electronic Training also available to Canadian Residents

[from page 6]

pose toobs and selling for eleventeen dollars and twelve sents at your favorite amchoor deeler."

Or supposing that are the skedyuled time to be advertising the Champeen-Presto-Jiffy soddering iron, I could saying: "QRX-ing OM until I finishing soddering this joint. I are using the new Champeen-Presto-Jiffy soddering iron with the never-tin tip. You'd be falling in love with this soddering iron once you trying it. It operates at such low heet it guaranteed never to burning out. Also, you finding you hardly ever using any sodder with this iron. Amchoor net price are two bux, cumpleet with extra-long three foots a-c cord. As an acksessory you can getting genyouwine hardwood holder for just ten bux extra."

You seeing how simple it being, Hon. Ed? How can F.C.C. be worrying abouts what I doing when I only having intellygent QSO with some other amchoor? Can I helping it if I using Acme reseever for one hour, then a Sooper-DX-er reseever next hour, then Winger-Ding reseever the next hour? And it only polite to telling other fellow what I using, are you not saying, Hon. Ed?

I'll betting you thinking Scratchi still reel stoopid becaws he forgetting one thing. On acct. what reeson are these companies going to letting Scratchi advertise there products? On reel good reeson. Everybuddies on the air going to be listening to Scratchi. Howcomes? Very simple. I just picking reel joocy DX call when going on air. Every amchoor in good old USA will be lined up on my freakwency waiting for turn to taiking to red-hots DX. Aren't that a reel slicky plan?

Let's see. If I menshunning each product twice each day I could charging one bux per day. For each company that are 365 bux per year. If I getting 100 companies to letting me do there advertising, that's . . . Wowiee!! That are 36,500 bux per year. Plus fact that each company are having to sending me free the product I advertising.

By the beerd of my sacred Ant Fuji!! All that money—36,500 bux per year, less a cupple hundred bux for income taxes. Hon. Ed., please sending that list of companies posty-haste speshul-rush. Each day I losing 100 bux until getting companies signed up.

Respectively yours,
Hashafisti Scratchi

see you at the 1956

Dayton Hamvention

SATURDAY, APRIL 14, 1956

QUALITY PRODUCTS BY B&W



DIP METER

This indispensable measuring instrument helps you get the most out of your equipment. It will save you time in initial transmitter tuning, neutralizing, antenna loading, and dozens of other jobs. Extremely versatile, the unit will serve you equally well as a sensitive grid dip meter, signal generator, absorption wave meter, or signal monitor from 1.75 to 260 mc. The calibrated, color coded dial is divided in five bands, matching each of the five coils supplied.

Net Price: Model 600 .....$39.75

AUTOMATIC T - R ANTENNA SWITCH

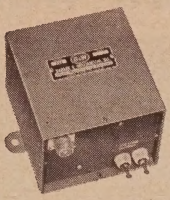


Fully automatic electronic antenna changeover from receiver to transmitter and *vice-versa* — suitable for all power applications up to the legal limit. Model 380B is ideal for voice operated SSB — AM phone and break-in CW —all with one antenna.

Net Price: Model 380B $23.70

ALL OF THESE FINE B&W products are available at leading distributors' everywhere.

1 KW BALUNS



Fill the gap between unbalanced feed lines and balanced antenna loads, provide maximum transfer; low power line radiation on transmission; high signal-to-noise ratio on reception. Models for rotary beam, folded dipole antennas.

Net Price: Models 700 to 714 .....$16.50

LOW PASS FILTERS



Fight TVI by attenuating undesirable harmonics and spurious radiation by a minimum factor equal to 17,780 to 1 with this new B&W low pass filter. Wave Guide principle and novel multi-sectional construction mean more attenuation in less space at lower cost.

Net Price { Model 425 (52 ohms imp.) / Model 426 (75 ohms imp.) } $14.85

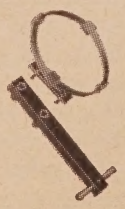
SINGLE SIDEBAND GENERATOR



The 51SB generator offers sparkling SSB performance with your present B&W, Collins, Johnson, or other commercial or composite home built transmitter, on 80 through 10 meters with the output frequency control presently in your transmitter.

Net Price: Model 51SB $279.50

PLUG-IN LINKS



Match present feed lines up to 600 ohms by pulling out one coil, plugging in another with correct number of turns. Wide range of sizes and turns available.

Net Prices for links, arms, and arm and hinge assemblies, range from $.60 to $1.86.

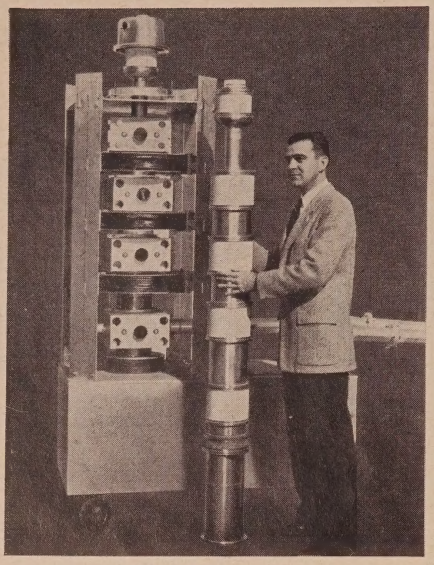
WATCH FOR the big value announcement on B&W's new L-1000A 1 KW Single Sideband Linear Amplifier!

All prices subject to change without notice.

Barker & Williamson, Inc.

237 Fairfield Ave., Upper Darby, Pa.

What's New with the Electron—1956



X602—75kw/CW UHF Amplifier Klystron, and amplifier circuit assembly.



4X250B Radial-Beam Power Tetrode and socket.

High power pulse and CW klystrons, new negative-grid tubes and receiving tubes of the ceramic variety were featured by Eimac at the annual Institute of Radio Engineers' Show and Convention in New York City last month.

With the X602—75kw/CW power output-amplifier klystron Eimac announced the most powerful electron-power tube ever produced for UHF operation. The giant six foot klystron is the most recent Eimac accomplishment for producing high power at higher frequencies. Pulse klystrons delivering 10 megawatts of peak power and high power klystrons serving as power sources for linear accelerators for applications including the processing of petroleum, plastics, chemicals and foods are among the current developments. Eimac klystrons have already contributed greatly to the revolutionary new art of forward-scatter communications in our continental defense system and are destined for extensive commercial application.

The development of ceramic receiving tubes is another important program at Eimac. Small and rugged, these tubes incorporate a radically new structural design and production technique, as well as being highly immune to damage by thermal and physical shock. In fact, the work at Eimac calls for tubes as permanent as resistors or capacitors—tubes that will be soldered into the circuitry.

Ceramic counterparts to the glass 6SN7 and 6AK5 are being delivered to the Air Force now in sample quantities.

Amid all the excitement about klystrons and ceramic receiving tubes at Eimac, the negative-grid tube is more than holding its own. Standard tube-types are being constantly improved and the amazing new 4X250B has created great enthusiasm in the amateur, commercial and military fields.

Speaking of shows and conventions, don't forget the National ARRL Convention in San Francisco July 6 - 8.

For a free copy of an illustrated brochure "What's New with the Electron—1956," write our Amateurs' Service Bureau.

Eimac

EITEL-McCULLOUGH, INC.

SAN BRUNO • CALIFORNIA

The World's Largest Manufacturer of Transmitting Tubes

EDITORIAL
WAYNE GREEN

. . . de W2NSD

NEVER SAY DIE

Subscription Delays

Complaints have been few and far between of late. There was a flurry of gripes during the latter part of January and early February from people who had sent in their subscriptions around Christmas time. Poor Harold, our subscription manager, hasn't seen his wife for weeks. We keep him in coffee and benzadrine in the hope that he will eventually get back up to date. At any rate, be patient. One of these days this issue will have arrived, didn't it.

Six Meter Projects

Our article in February on the Levittown Six Meter Project has apparently inspired quite a few clubs to similar efforts. I note that the Northwest St. Louis Radio Club already has a prototype completed and the club is going full blast on the duplication process. Six is going to be the most exciting band we've got come fall so isn't it time your club whipped up a clutch of rigs?

Keeping Clubs Alive

Ham clubs have a strong tendency to drop dead if left alone. It takes some pretty good brains and talent to keep puffing life into 'em. One of the main interests then for almost all amateurs is how to hypo their club. The Six Meter Project above is one good way for picking things up. Rivalry with another club is another good spur. The Frankford Radio Club and the Potomac Valley Radio Club have been battling each other for years now in every Sweepstakes and DX contest and they both gain strength with each battle. What would happen if your club challenged a nearby club to beat you in one of the coming contests? It might be that your club members could help each other get up better antennas, align receivers, and clean up rigs. Not only would the club flourish, but every one of you would get a lot more fun out of ham radio.

Another solidizer is a club frequency that is monitored. I understand that in some areas a mobile station can be assured of getting everything from friendly hello's to a place to put up for the night just by calling in on the local net frequency. *CQ* will be glad to list these areas and frequencies if you'll send 'em in. Ed, W2OCL, was telling me that he made a call on 3885 kc down in North Carolina and within minutes about six mobiles pulled up to say hello to him. I'll bet that almost every one of us would be glad to offer at least ten minutes and a cup of coffee to a passing mobiler, eh?

Hidden transmitter hunts whup up interest too. I have been hoping that we would get some more articles and pictures on events of this nature, but so far most of the clubs have apparently put the "Top Secret" stamp on their activities.

Our article on club bulletins has encouraged a lot of clubs to try them. Reports are universally enthusiastic. Be sure to put me on the mailing list too, so I can keep up with what's going on with your club.

RTTY

Some of you older readers of *CQ* may remember back a few years to the RTTY column which I used to write. When I stepped in as Editor some of the shaggier heads shook with apprehension and mumbled that it wouldn't be long before *CQ* was turned into an oversized RTTY bulletin. Since the bulk of the editorial staff of *CQ* was interested in RTTY this didn't seem like too remote a possibility.

When the RTTY column was started last year under Byron, W2JTP, it was intended as a bimonthly department. Byron did such a remarkable job that it was quickly changed to a monthly affair.

John Williams, W2BFD, the father of amateur radio-teletype, started this whole thing right after the last war. It has been largely due to his efforts that most of us have become involved. The unfortunate serious illness of his wife and increased activity of his VHF Teletype Society has robbed *CQ* of a Technical Editor. We do hope that he will find time to get in an occasional article for there are few amateurs who are as intense experimenters as John and the fruits of these labors should not be lost.

Alltronics of Boston (W1AFN, Tom Howard) has come out with a fine little converter for RTTY. I have been off RTTY ever since I lent my printer and converter out to a local

[*Continued on next page*]

[*from preceding page*]

ham club for a demonstration. Pleading, cajoling and threats have fallen on deaf ears for the return of the equipment. In desperation I recently bought a new printer and borrowed an Alltronics converter. It sure was nice to get back in there again, talk to the old gang, and meet the many newcomers to RTTY.

The Alltronics converter is, to my knowledge, the only converter being made for amateur radio use. Priced at $89 and change it should answer the bleats from those of us with too little time, talent or patience to build our own.

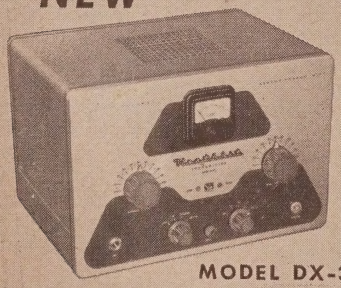
Commercial Equipment

Quite a few letters come in asking for more push on home made equipment. Brother, I am *all* for it. But first I need some answers to the arguments *for* Commercial Equipment. Why should a fellow spend several weeks building a rig when he can buy one that is all set to go? The commercial rig will cost a bit more than his home brew job, to be sure, but by the time you consider the high resale value of the commercial rig vs the low resale value of the home brew, the picture changes. When hi-fi came in it caught me with a whopping collection of 78 rpm classical records. They are of no more use to me than that pile of O1A's in the garage. Will it be the same with my twenty-year collection of parts, special bargains, surplus, etc., with which I have in the past been able to build almost anything that appeared in print right from stock? Practically my whole shack is home brew, but is it worth it to me to keep this up?

Perhaps a good compromise is the commercial kits. With these you can save quite a bit of money over the factory made units, have the fun and education of building it yourself and still take advantage of the resale value. Even though I have enough parts around for 90% of a Williamson Amplifier I still send for a Heathkit when I want to build one because it is cheaper in the long run. For not much more that the retail price of the chassis and output transformer I can have a resalable unit which has no bugs, can be assembled in an hour or two and is absolutely complete right down to the nuts and bolts.

What is the answer. Must home construction be limited to specialized and new gadgets in order to survive? SSB started out all home brew. Today few amateurs about to go on SSB consider anything except the price of the equipment as a deterrent. Oh, I know of a couple fellows who are building their own SSB equipment, but they are both blind hams and cannot be considered typical. ■

HEATHKIT NEW **DX-35** phone and cw transmitter KIT



MODEL DX-35

$56.95

Shpg. Wt. 24 Lbs.

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

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

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

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

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

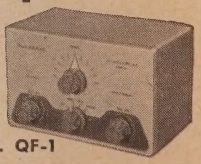
HEATH COMPANY

A Subsidiary of Daystrom, Inc.

BENTON HARBOR 12, MICHIGAN

HEATHKIT "Q" multiplier KIT

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



MODEL QF-1

$9.95 Shpg. Wt. 3 Lbs.

Power Packed

TWO-WAY VHF Radio for PRIVATE AIRPORT UNICOM • GROUND CONTROL • CIVIL DEFENSE • AIR-SEA RESCUE • AERIAL APPLICATORS • STUDENT FLIGHT TRAINING • CIVIL AIR PATROL • AIRLINE STANDBY up to 100-mile range*

AEROTRON "Tower Guard" VHF TRANSCEIVER

Versatile, rugged, top-performing, specially designed for dependable two-way VHF communications under all operating conditions.

Over two years in development, the AEROTRON Model 500 "Tower Guard" embodies the most advanced—yet thoroughly proved—electronic circuitry to provide a smaller, lighter-weight, more powerful and far more versatile communications unit than ever before offered in its class.

Transmitter features push-pull twin tetrode-type tube with 10-watts output. The receiver's 14 tuned circuits provide amazing sensitivity and selectivity, eliminating spurious responses and assuring reception of distant stations.

only $279.50



Housed in a beautiful deep-drawn aluminum cabinet, the Model 500 weighs only 15 pounds. It has an internal loud speaker, provision for headphones, automatic noise limiter, front panel squelch—an exclusive AEROTRON feature—and operates equally well from 6 or 12 volts DC or 115 volts AC.

Crystal control of *both* transmitter *and* receiver makes operation simple and positive. Packed with revolutionary features, the Model 500 stands as the leader in its field. See it, try it, buy it at your nearest AEROTRON dealer or distributor.

*Verified contact between two ground units.

Mail the coupon NOW for full details. You'll be glad you did!

You get more for your money from AEROTRON Trade-mark

AERONAUTICAL ELECTRONICS, Inc.
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ALL TAXES, WHERE APPLICABLE, ARE EXTRA. PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

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P. O. Box 6043 Dept. Q
Raleigh, North Carolina

Without cost or obligation, rush me full information on the AEROTRON Model 500 "Tower Guard", including the name of my nearest dealer.

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BEST CHOICE

BUD PRODUCTS
with EXCLUSIVE FEATURES

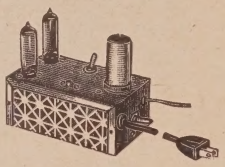
When you're selecting equipment or components to give your rig extra utility or flexibility always choose Bud products. Only Bud products have the extra features that insure satisfactory operation and yet they are priced no higher than ordinary products.



CODE PRACTICE OSCILLATOR AND MONITOR
CPO—128-A
Amateur Net
$17.25

THE ONLY OSCILLATOR WITH BUILT-IN MONITOR WHERE NO MODIFICATION IS NEEDED TO CHANGE FROM OSCILLATOR TO MONITOR AND BACK AGAIN. It has 2 tubes and a built-in 4" dynamic speaker. A volume and pitch control are included. Operates on 110 V AC or DC. Also available in earphone model CPO 130-A at $15.60.

FREQUENCY CALIBRATOR
FCC 90-A
Amateur Net
$19.20



THE ONLY SELF-POWERED MODEL. Permits accurate checking of transmitter frequency on all bands to 30 mg. Has 100 kc crystal. Uses 2 tubes and plugs into 110 V receptacle. Provided with on-off and standby switch.

See these and other Bud Products at your Distributors

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Dept. C
2118 East 55th St. Cleveland 3, Ohio

Letters . . . to the editor

K2ORS Editorial

Dear Mr. Shepherd:

I enjoyed reading your guest editorial in January *CQ* very much, and had several occasions to discuss it on the air with other amateurs. In the main, they felt that you were largely right in saying that most radio contacts only appear to be real social contacts, and that only the minority of contacts develop into friendships of considerable standing.

In one QSO we agreed that understanding of the problems and attitudes of various parts of the country would be promoted if hams could be persuaded to drop their usual reticence concerning controversial matters, and make an effort to objectively express the prevailing attitudes in their parts of the country. I do not recall ever hearing a real quarrel between two hams, and I think they could do this. Hams are not inclined to attack anyone on the air, and most of them (as you said) have a strong interest in subjects other than radio.

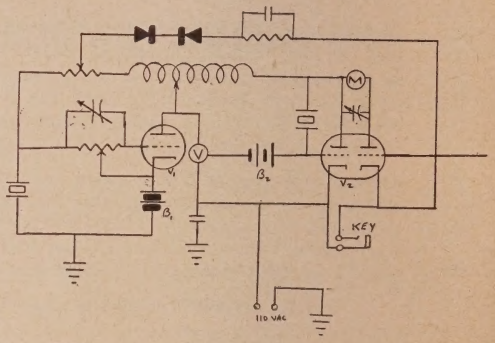
So it occurred to me that a panel control station could operate with limited participants in various states for discussion of predetermined subject matter. After the panel work, there could be time-limited call-ins. The details of procedure would have to be worked out, of course.

I have taken part in a *few* QSOs that developed into thoughtful discussions of matters of public and regional interest, and have found them to be extremely absorbing and mentally stimulating. Do you think that the idea could be developed as a sort of cross between TV panel and amateur net?

All good wishes and 73.

Robert B. McKnight, K5BKU
Tupelo, Mississippi.

Radically New Circuitry



Dear Wayne:

After many long hours of intense engineering W9FIP and I have evolved some new theories and have applied them to some new pieces of equipment.

Enclosed is a diagram of one stage of our new transmitter. Upon examination of this you will be sure to draw your own conclusions concerning our radically new antenna design, novice rig, and final amplifier tube.

We were wondering if you and your readers might want to know more about these astounding developments.

We will soon have pictures of these various pieces of equipment along with nice, big diagrams. What say?

Bob Heroux, W9SQP
Maywood, Illinois

Meter Holes

Dear OM:

I'll bet a lot of hams don't know how easy it is to cut meter holes with a coping saw. It's not too much of a job on steel and it's "duck soup" on aluminum.

Gerald Collins, W4ZPX
Covington, Ky.

[*Continued on page 16*]



GONSET

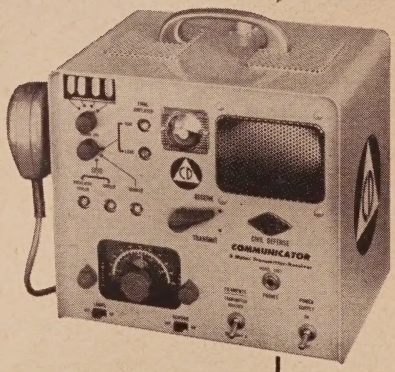
FCDA APPROVED

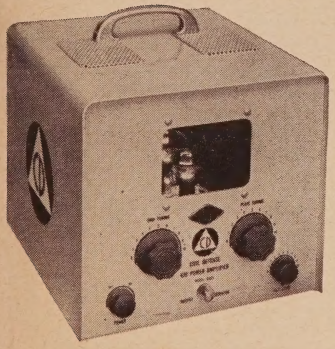
Communicators

Now Communicator models for 2 and 6 meters approved by FCDA. These outstanding models have several added features including provision for four crystals selectable by panel switch. A dynamic-type hand microphone and canvas carrying case are standard equipment.

FCDA 2 meter Communicators.
6V DC/115V AC.....Gonset part No. 3087
12V DC/115V AC.....Gonset part No. 3077

FCDA 6 Meter Communicators.
6V DC/115V AC.....Gonset part No. 3088
12V DC/115V AC.....Gonset part No. 3079





AT YOUR DISTRIBUTOR

LOOK FOR THE ATTRACTIVE YELLOW CASES

VHF Linear Amplifiers

Now linear amplifiers for 2 and 6 meters approved by FCDA are available for use with companion Communicators to increase power output to 50-60 watts. These FCDA amplifiers are supplied with carrying case as standard equipment.

FCDA 2 meter Linear Amplifier.....No. 3089
FCDA 6 meter Linear Amplifier.....No. 3090

A COMPLETE LINE OF ANTENNAS AND ACCESSORIES.

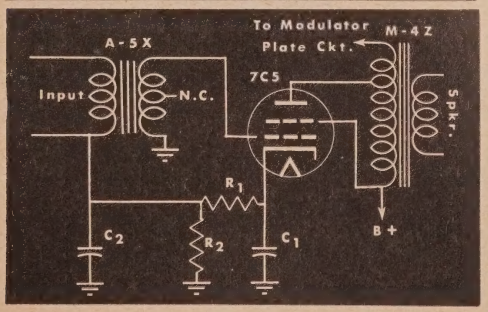
GONSET CO. 801 SOUTH MAIN STREET, BURBANK, CALIF.



The TRIAD A-5x high gain microphone transformer eliminates need for audio amplifier with substantial savings in cost and space. TRIAD'S M-4z or M-5z eliminates over-modulation and boosts audio power. Both types are minimum size and low in price.

Type No.	List Price	Application	Primary Impedance Ohms	Turn Ratio	Wt. Lbs.
A-5X	$4.15	Single button mike to p.p. grids—Hi-gain.	100	84	½

Type No.	List Price	Primary	Secondary Impedance	Secondary Ma.	Audio Watts	Wt. Lbs.
M-4Z	$3.40	5000 (Autoformer).	6750 4	100 (total)	10	¾
M-5Z	5.60	5000 (Autoformer).	6750 4	250 (total)	20	1½



Write for Catalog TR-55E

TRIAD TRANSFORMER CORP.

4055 Redwood Ave. • Venice, Calif.

LETTERS . . . . . continued

W2SN Testimonial Dinner

Dear Wayne:

The train ride home this evening began innocently enough. In fact, I was halfway through page two of the Newark News. Out of a clear blue sky I heard, "By the way, Tom, I was talking with Wayne Green today and I told him you would send him the poop on the dinner."—so said Fred Barkalow.

So, never let it be said I'm too pooped to pop off about the makin's of a darn fine ham radio affair.

Scheduled for the sixth of May at 6:30 P.M. at the Robert Treat Hotel in Newark, New Jersey, the testimonial dinner will pay due gratitude to Henry Yahnel, W2SN, for twenty-three years of extraordinary service as QSL Manager of the W2/K2 call area.

But that is only the miniature-sized picture of what we know will be a long-remembered event. Just for the occasion we have obtained a special dispensation to revive the spirit of Thanksgiving; that allows us to serve a home-style Turkey Dinner and at the same time say "Thanks" to Henry.

Of course the evening would run away from us too quickly after dinner if we wanted to chew the fat with some of the boys we haven't seen in a long time; so the doors to a "Rag Chew Room" will open at 4:00 P.M. There you can gab with that fellow you've worked on the air for so long—and, if you do what we hope you will do—your wife (whom you must bring, by all means!) can talk with the little lady whose voice was always in the background every time you worked that fellow.

"It wasn't a bad dinner, but there were too darn many speeches while we were eating!!" Wayne, I'll bet you've heard that a hundred times. You have our personal guarantee that won't happen at the dinner for Henry. The first bird who tries a "William Jennings Bryan" will be crowned Queen of the May with a pair of 46's thrown from a well-situated balcony. This is going to be a "Hams'" dinner—not a debate between Yale and Columbia.

On the way over to Newark you won't have to worry about parking space because the Treat's lot is "loaded" with empty spaces.

You won't slip a disc in your back leaning over the registration desk on your way in because you will be pre-registered. This happened when, well in advance of the dinner, you mailed your ticket money ($6.00 per person) to Rev. Charles L. Wood, W2VMX, at 15 Church Street, Fair Haven, New Jersey. In fact, tickets may be purchased *by mail only*. That way we'll know ahead of time how many people are coming—people who want to and will be made comfortable with adequate arrangements.

The deadline for ordering tickets is April 21, 1956.

We are honored in having Bill Leonard, W2SKE, the popular CBS Newscaster, as MC of the dinner. He'll contribute greatly toward an enjoyable evening.

A very nice gift—strictly from those who attend the dinner—will be presented to Henry. The gift is part of the six bucks.

If a group wants their own table, they can have it. Tell W2VMX how many you want at the table and your tickets will be marked with the table number. There's nothing much worse than sitting at a table 23 feet from the fellow who came with you.

That's the story, Wayne—in four thousand words chosen at random. Thanks for your help. We appreciate it very much.

Thomas J. Ryan, Jr., W2NKD
Scotch Plains, New Jersey

QSL Contest

Dear Ed:

. . . I'm all for your stimulating interest in QSL cards. I recently won a QSL contest here in Colorado—the RAPSCO Contest—and got a Viking II with VFO (factory-wired) as a prize! The interesting thing to me is that I made 2300 *different* contacts in 91 days and 2113 hams sent me QSL cards. That is a darned good percentage! . . .

Earl Cochran, WØUPT
Colorado Springs

Sometimes it takes a pretty outstanding card to jar non-QSL'ers out of the habit.—Ed.

World Globe

W2NSD:

New *CQ* World Globe is a terrific deal. Keep up the good work. Also W6SAI articles FB.

Laurie Parkhurst VE7IT
West Vancouver, Canada

[*Continued on page 18*]

PRINTED CIRCUIT 6-METER CONVERTER

Broad-Band Crystal Controlled Converter for 6 Meters



- Compact
- No alignment necessary
- Simple to assemble
- Output IF frequency can be changed by merely changing the crystal (crystal range of 40 MC to 50 MC).

Kit (with crystal less tubes..... $10.95

Complete, wired and tested with tubes and crystal..... $15.95

HOW TO ORDER

In order to give the fastest possible service, crystals, oscillators, and converters are sold direct. Where cash accompanies the order, International will prepay the postage; otherwise shipment will be made C.O.D.

Send for FREE Catalog covering International's complete line. Crystals available from 100 KC to 100 MC.

SPECIFICATIONS PRINTED CIRCUIT 6 METER CONVERTER

Freq. Range 50-54 MC (51 MC design center)

Sensitivity 1 microvolt or better

Output IF* (1) 600 KC to 1500 KC (2) 7 MC to 11 MC

Crystal Frequency 49.4 MC or 43 MC depending on IF desired. (Oscillator range 40 MC to 50 MC)

Plate Power 150 volts to 250 volts DC @ 15 ma to 20 ma

Heater Power 6.3 volts @ 600 ma

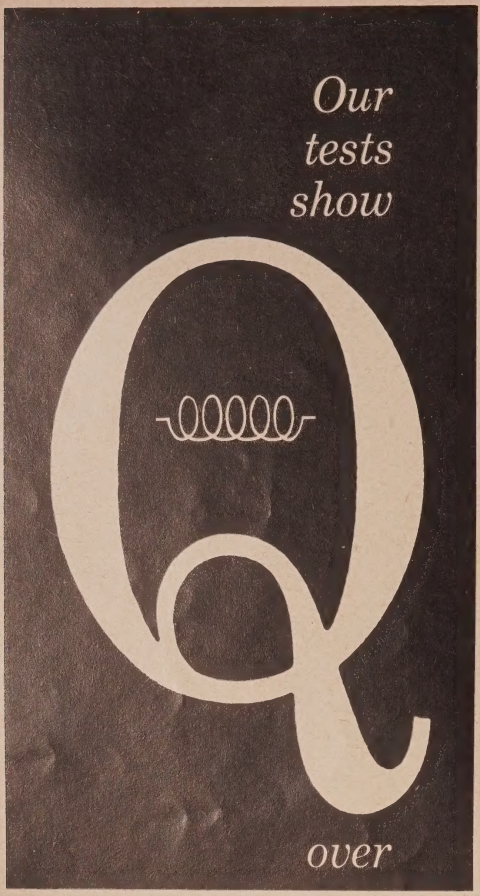
Tubes 6AK5 RF Amplifier 6J6 Mixer Oscillator

Size (overall) 4" x3½" x3½"

Weight 3 ounces

*Specify IF when ordering.

International CRYSTAL Mfg. Co., Inc. 18 N. Lee Phone FO 5-1165 OKLAHOMA CITY, OKLA.



400

HIGHEST KNOWN "Q" IN MOBILE COILS.

Get fixed station performance with these 4 precision coils. You choose maximum efficiency for band you want. Use with 60" whip, 36" base section. Tunes to compensate for your installation.

See the new Vaaro-Davis "500 Series" coils now at your distributors.

The "original" coils sold with a money-back guarantee

VAARO DAVIS ELECTRONICS

Vaaro Mobile Division
4002 W. Burbank Blvd.
Burbank, California

Write for FREE Literature

LETTERS . . . . . continued

Certificates

W2NSD:

Say, how about *CQ* starting the following certificates? Make up something nice to offer on 10 Meters to cover WAS/H to M, all states from Home QTH to Mobile; and WAS/M to M, all states from Mobile to Mobile.

Bill Passano K6ES
San Diego, Calif.

Good idea Bill, we'll see what we can cook up along these lines. This certainly could be incorporated in our forthcoming WUS Certificate.—Ed.

Attention Pole Climbers

Dear Sir:

I recently had a problem that should be of interest to other amateurs.

I have a ground-plane antenna mounted on 1¼" pipe sixteen feet high.

I needed the feed line to experiment with on another antenna. I couldn't climb the pipe as I am too well padded, and the pipe would not support me climbing a ladder.

I solved the problem by placing the two halves of an extension ladder opposite each other against the pipe, and had my helper climb the opposite ladder at the same rate as I climbed mine. When we reached the top the two ladders against the pipe were very solid and the feed line could be removed without taking down the antenna.

Thomas C. Jensen, W8TIC
Muskegon, Michigan

Enid (Inc.) Draws DX

Dear Ed:

The Enid, Oklahoma Amateur Radio Club, Incorporated (W5HTK) staged their 15th annual Hamfest on Sunday January 1st 1956. More than 100 hams and XYL's were in attendance. XE3CN and his XYL, XE3PN, Phillepe and Marcella Cervantes of Mexico, suffered a minor automobile accident near Enid, and while awaiting repairs attended the Hamfest, thereby winning the door prize for the Hams in attendance from the farthest point. Kansas and Texas were also represented, and participated in what was termed the "best hamfest" in Northern Oklahoma.

As the result of a number of the club members reading the recent article in *CQ* concerning the advisability of having an incorporated club, the Enid Amateur Radio Club was recently incorporated as a non-profit organization under the laws of Oklahoma.

E. A. R. C.

Hurrah! for Novice Q5'er

Wayne Green:

I am a new Novice, KN6PLM—

I built the Novice Q5'er by D. L. Stoner in your January issue. After correcting for the misprint (*see March CQ p. 36—Ed.)* I have a wonderful Converter —Best thing I've heard so far—Surprised some Old-Timer friends with it!

This is the stuff that makes a *good* Ham periodical! . . .

M. C. Robinson, KN6PLM
Long Beach, Calif.

Club Newspapers Pay Off

Dear Wayne:

The article "Club Newspapers Pay Off!" in the December 1955 *CQ* started our club off to more attendance at meetings, increased participation in club activities, and knit our group more closely together.

Our paper, "Harmonics," of which a copy is enclosed, is a sample of what can be done with a minimum expenditure. While still lacking in some respects, "Harmonics" is constantly being improved and the members of the Beachwood Amateur Radio Club seem to appreciate it (or maybe it's just that they like to see their names in print).

We would be glad to exchange papers with any other clubs anywhere in the country, or even abroad. In this way we hope to establish friendships and (sneaky, aren't we?) improve our own paper.

Keep up the good work, Wayne.

Ed Schwartz, K6JHR, Sec'y
Beachwood Amateur Radio Club, K6LTA
Post Office Box 508
Hollywood 28, California

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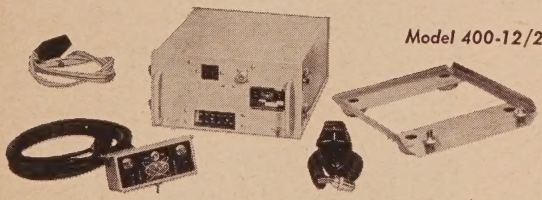
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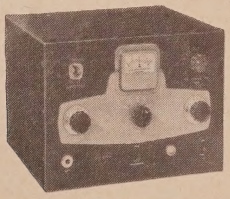
FIRST NOVICE EARNS WAC WITH VIKING "ADVENTURER"!

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During the past five years, novices all over the United States have been trying for this coveted award . . . and it took Frank Cuevas III, KN6JQJ, and a Viking "Adventurer" to finally make it. With 50 watts input, two simple dipole antennas, and two crystals, Skip (as Frank is known to everyone) worked: VQ4EO Africa; EI4J Europe; JA1AM Asia; CE3DZ South America; VE3ALJ North America, and VK4HR Australia. In addition, Skip has earned his WAS (Worked All States) and has worked 30 different countries with all contacts confirmed.



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A New Class A_2 Screen Modulator



6V6 Screen Modulator for 4E27 Transmitter. See Fig. 1.

Frank C. Jones, W6AJF
850 Donner Ave.
Sonoma, California

Many types of power amplifiers have been used to secure screen-grid modulation of tetrode or pentode r-f amplifiers. Nearly all types will produce some results, but the usual class C r-f amplifier has a non-linear screen-grid characteristic that prevents high levels of modulation at moderate or low distortion values. This screen-grid characteristic over an audio cycle may vary from an infinite resistance to a value of as low as perhaps 2000 ohms, which means that the modulator has a difficult load to work into most of the time. The peak audio power required may be several times as much as one would expect to use. However, a larger power amplifier or modulator isn't always the answer since excessive negative peak clipping and sideband splatter may result on the negative audio peaks.

Power tubes connected as cathode-followers with the r-f screen grids connected to the a-f cathode have been used with fairly good results. It is rather difficult to obtain enough positive peak a-f power from a cathode follower for some screen grid tubes. Keep in mind that with the cathode follower the load inpedance can vary greatly without much distortion, but the power output is limited.

Ordinary push-pull or single-ended tetrode power amplifiers will supply good peak power output but produce large amounts of distortion

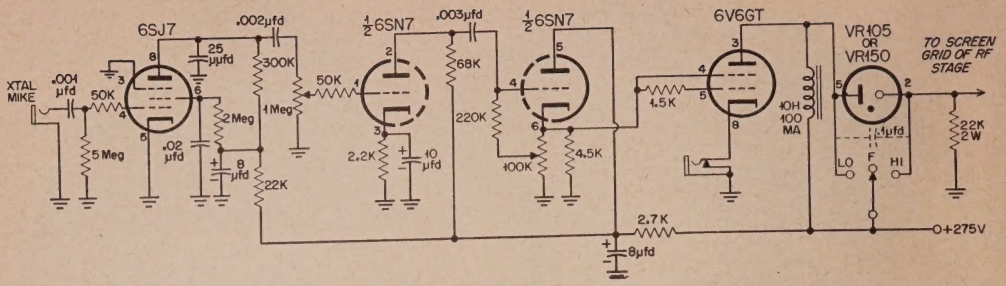


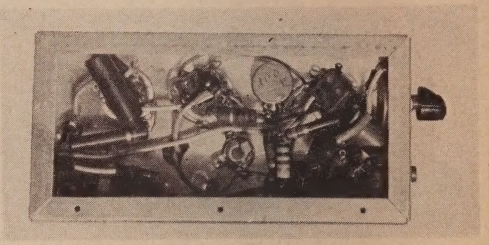
Fig. 1. 6V6 Screen Modulator Circuit.

when working into a variable load impedance such as the screen circuit of a class C r-f amplifier. Unless used carefully, this type of modulator can easily produce an unpopular signal on the air.

Class A push-pull triode amplifiers such as 2A3 tubes will make a good screen grid modulator if the proper input and output transformers are available, but the cost doesn't make this type of modulator very popular. If cost is no factor, a person should go to plate modulation.

A single tetrode such as a 6V6GT or 6L6GT can be used with negative feedback to produce very good screen modulation if care is taken in the negative feedback circuit design. Unfortunately, these amplifiers often have had high frequency peaks or even oscillatory peaks, producing extra sidebands and other distortion or disturbing effects. Negative feedback over two stages can be used successfully for screen modulators but there are difficult adjustments involved.

Recently the idea of using Class A_2 modulators, in which the tube or tubes are operated only in the positive grid region, was put to work on several transmitters at W6AJF. The idea is to use a very high mu power triode with its grid or grids biased with a positive d-c voltage so full d-c plate current is maintained. The grid is then driven by a small cathode follower tube so the modulator grid swings from its normal positive bias value down to zero on the negative peak swings and to twice positive values on the positive peak swings. The power available is comparable to that from a power tetrode stage but with much less distortion when connected to a screen-grid circuit. The efficiency of a positive grid amplifier is high, and in practice a 6V6GT tube will produce from two to four times as much audio power when comparing its operation as a triode in each type. In negative grid operation a 6V6 or 6L6 would have its grid number 2 tied to plate, while in positive grid operation, grid 2 and grid 1 are tied together. Some high mu triodes such as 809s and 811 can be used as Class A_2



Bottom view of 6V6 Modulator.

modulators in a single ended amplifier. Small tetrode tubes such as type 6AQ5, 6V6GT, 6L6GT, etc. make very good modulators when connected as high mu triodes with G_2 and G_1 tied together directly or through a small resistor. It is sometimes desirable to connect G_1 through a 1000 or 2000 ohm resistor to G_2 which is then directly coupled to a cathode follower stage, since a little better impedance load may be obtained for the driver stage.

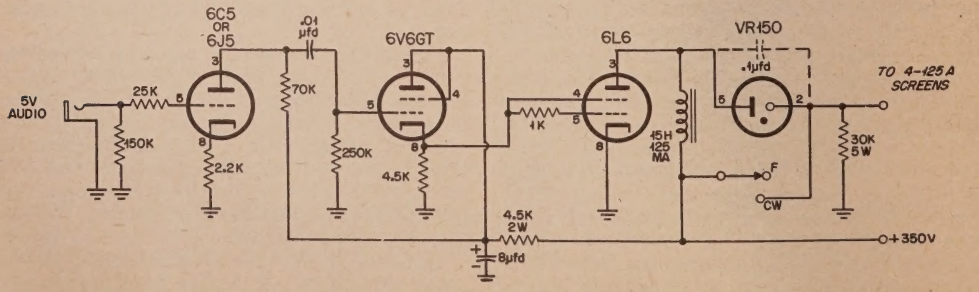


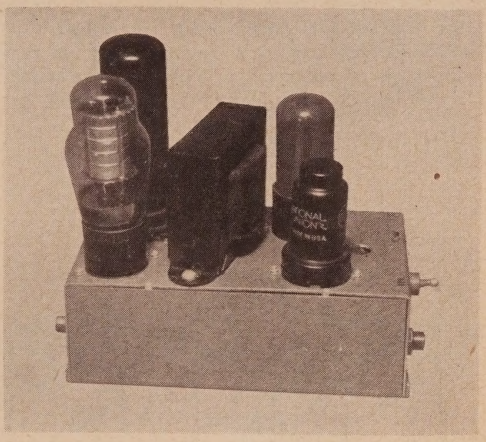
Fig. 2. 6L6 Screen Modulator Circuit.

The modulator of *Fig. 1* was built to connect to a 4E27 r-f amplifier on the six and ten meter bands. Since the 4E27 requires a very high d-c screen voltage when the suppressor-grid (G_3) is grounded, this problem was simplified by connecting G_3 and G_2 (the normal screen-grid) together so the tube acts as a tetrode. With this connection the desired plate input of 150 watts was obtained with approximately 125 volts on the "screen-grid". The G_1 grid bias was about −60 to −75 volts with between 5 and 10 ma. of current.

In *Fig. 1* a 6V6GT tube serves as a high-mu triode driven by half of a 6SN7 connected as a cathode follower. The plate current for both of these tubes are adjusted to Class A_2 operation by returning the 6SN7 grid leak to a potentiometer connected from cathode to ground. This determines the resting plate current through the 6SN7 driver and since its cathode bias is positive, the 6V6GT grid bias is positive, and this value sets the resting plate current of this modulator tube. A small 75 or 100 ma. 15 henry filter choke connects the 6V6GT plate to a 250 to 300 volt power supply. The d-c voltage to the screen of the r-f amplifier is reduced to about 125 volts by connecting a VR-105 or VR-150 regulator tube in series from the plate of the 6V6GT tube. The VR tube may be shunted by a small condenser of not over .1 μfd to insure bypassing higher audio frequencies on to screen circuit, though it is doubtful if this condenser is needed. The 22,000 ohm 2 watt resistor shunted to ground is necessary to provide a small degree of audio loading on negative a-f cycles and as a "keep-alive" device for the VR tube. If the VR tube were to go out during modulation the distortion would be prohibitive. A VR tube is rated up to 40 ma. d.c. so probably 75 to 100 ma. of peak a-f current can be safely passed through it.

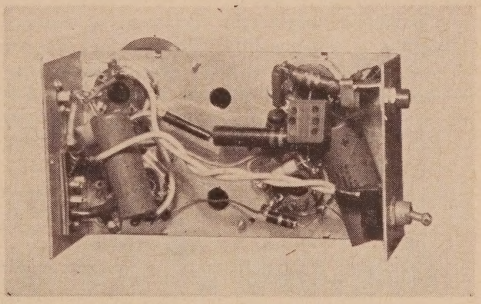
In any screen-grid modulated r-f amplifier, high d-c plate voltage is very desirable since much less screen current is required for a given output. For example, a 4X150A tube on 2 meters runs at about zero resting screen current with 1750 volts on the plate and 175 on the screen, while at 1000 volts on the plate the screen will run at about 20 ma. or so with 175 supply. This means that the d-c screen voltage has to be reduced to 125 or so to get linear modulation and the carrier output is reduced to a low value. Under full modulation the d-c screen current kicks upwards 5 or 10 ma. with some increase of plate current also. It is desirable to use an oscilloscope to check the degree of positive and negative peak modulation since the latter is greatly dependent on the degree of antenna loading. A trapezoidal pattern will show proper adjustments quickly since light antenna loading will curve over or flatten the wide part of the "triangle" pattern and any "tails" or excessive brightening of the small end of the triangle will indicate excessive negative peak modulation.

Returning to *Fig. 1* and the pictures of the modulator built on a 4 x 8 x 2 inch chassis, the remainder of the circuit is conventional. A 6SJ7 tube and half of a 6SN7 tube serve as speech amplifiers for connection to a close-talking crystal microphone. Some series grid resistors and a shunt plate r-f bypass were



6L6 Screen Modulator for 4-125A finals. See Fig. 2.

added to prevent r-f feedback and howling which can be troublesome in the higher frequency amateur bands. The grid coupling condensers were made rather small to reduce low audio frequency response since this unit is for voice communication, not high fidelity. For the same reason the high audio response is limited by using screen r-f by-pass condensers totalling .006μfd. or more in each transmitter.



Bottom view of 6L6 Modulator.

The modulator of *Fig. 1* can be used to screen modulate an 829, a pair of 807s, a single 4E27 or an 813. The total drain from a 250 volt supply is less than 75 ma. so a very economical phone transmitter can be had from a c-w transmitter since the screen-grid tube or tubes should run at full c-w ratings of d-c plate voltage in either case. A small SP3T switch

in the modulator output permits phone operation, low power c.w. or high power c.w. by switching the VR tube in or out.

The compact modulator shown in *Fig. 2* requires a separate speech amplifier furnishing about 5 volts of a.f. This unit was for use in a 1 kw c.w. 2 meter transmitter with a pair of 4-125A's. This rig can be used for phone operation at a little over 500 watts input. With from 500 to 600 watts input on phone, the maximum modulation is around 80%. If full modulation is required, it would be necessary to have two suitable VR tubes in series to reduce the input to the 4-125As to about 400 watts. At W6AJF another 2 meter transmitter is available for voice operation. It consists of a pair of 4X250 B tubes screen modulated with the unit shown in *Fig. 3* (built behind a 3½ x 19 inch relay rack panel). Three modulator tube sockets were wired up in parallel, with plate parasitic suppressor resistors, so several combinations are possible. Three 6V6GT tubes are used at times or two 6L6 tubes. Either combination does a good job of modulating 500 watts input with 100% positive peaks and 80 to 90% negative peaks. The 250 watt plate modulation unit and its bulky power supply are seldom used since over 200 watts of carrier can be obtained on 2 meters with the screen modulator.

In the circuits of both *Fig. 2* and *3*, a 6V6GT, connected as a low-mu triode, serves as a cathode follower, driving the modulator tubes. The driver tube has to be capable of furnishing nearly one watt of peak driving power when the modulator tubes are putting out 15 to 20 watts of peak audio power. Miniature tubes such as 6AR5 or 6AQ5 tubes can be used in place of 6V6 type tubes. Tube handbooks give the triode connected characteristics for most tetrode tubes for the low-mu connection, with G_2 connected to P. High mu connection with G_2 and G_1 used as the input grids, require a study of the 811 tube curves, and the old time type 46 tube with its two grids tied together. Most receiver tube handbooks have had these 46 curves available. Type 6F6, 6K6, 6V6, 6L6, 6AR5 and 6AQ5 tubes with the grids connected together have characteristics similar to the 46 tube with peak audio outputs only a little less than the plate dissipation ratings given in the handbooks. ■

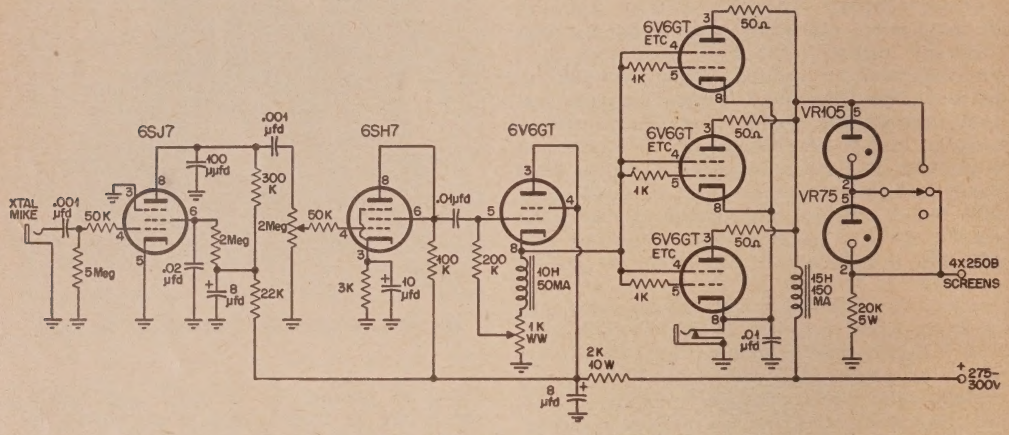
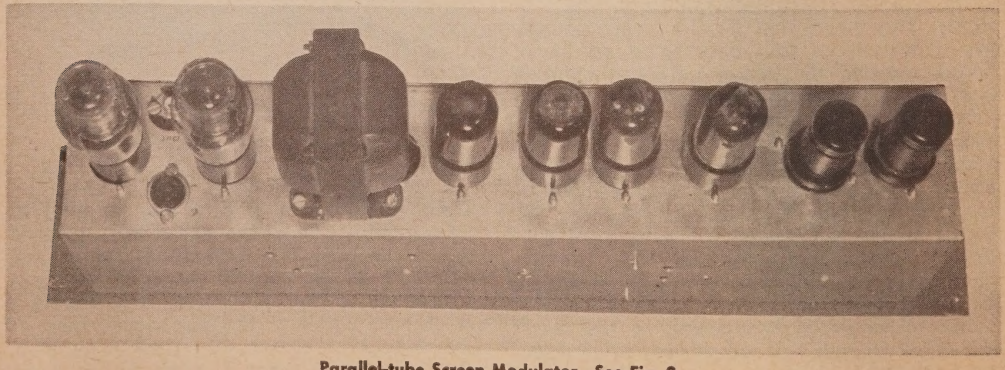


Fig. 3. This will modulate 500 watts easily



Parallel-tube Screen Modulator. See Fig. 3.

Sideband Switching the SS-75 Filter Rig

Being Figmo, (Finally I got my orders) and awaiting air transportation to the ZI, affords me this opportunity to pass along to the SSB fraternity a simple and logical device born of necessity at DL4 Apple Pie. I happen to have an SS-75 (filter) exciter and had during these dreary winter months been content to enjoy 80 meter SSB rag chewing with the continental and UK sidewinders when news leaked through of a new spring rash of stateside 20 meter SSB activity. It was too much for "ole isch" ("me" in Deutsche), so with visions of SSB conquest I straightway cut down my 80 doublet (over 4-story apartment roofs) so I would quit yaking and start converting—besides I needed the coax to finish up my half-completed V-Beam. After grid-dipping the high level mixer, and 811 power peaker (GE Ham News) to 20, I hung the light bulb dummy on the output and with swelling pride called in the XYL & 5 kinder (Deutsche for Harmonics) to witness it flash up in normal 80 meters fashion as I yelped in the D-104.

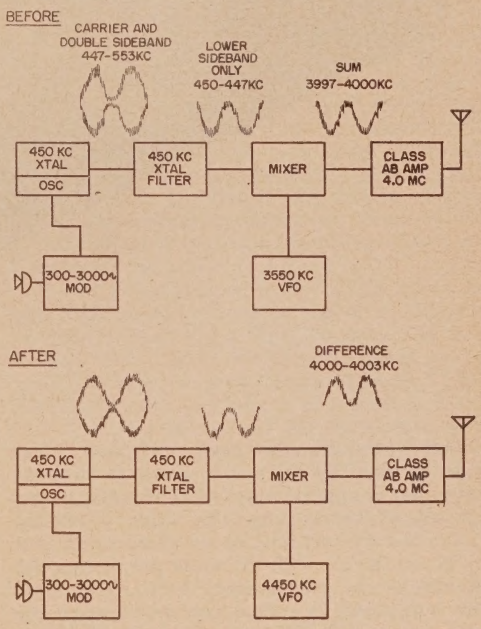
With trembling hand I cranked up the gain of the ole Super-Pro and sat smugly back to leisurely "pick" my #1 "W" sidewinder. You can imagine my shock after having cooed a most inviting CQ when there were no takers. I called a longer one, and another—still no results —something must be wrong!

Reluctantly I uncranked the receiver gain and all those W's that were rolling through crawled back into the speaker. After some changes I again called CQ, but this time on the *right* sideband and seemingly the whole East Coast came pounding back at me—I haven't been thrilled like that since my first CQ was answered twenty-one years ago.

This is what I did between sidebands. Remember I've an SS-75 filter exciter (without sideband switching) and found myself on the wrong sideband with just about 10,000 times less signal (40 db. down) than I had intended. Consulting my lone reference, a dog-eared sideband manual, I found on page 88 an interesting article on sideband switching by my good friend and neighbor Jim Freund, DL4YU. I was ready to follow his lead, but being naturally lazy and also devoid of shop facilities I first set about what seemed a simpler idea.

The sideband selected by the xtal filter of the SS-75 is mixed with the VFO frequency of 3550 kc to result in 4 Mc. Customarily on 80 the lower sideband is selected by the filter and 3000 cycle modulation results in 447 kc, which when added in the mixer with the 3550 kc VFO would total 3997 kc. A little sharp pencil exercise confirmed my hunch of inverting the radiated sideband at 4 Mc. by mixing the difference of the xtal and VFO instead of the sum. This simply meant sliding the VFO to the high side of the mixer, or to 4450 kc (if this had happened originally I'd have been two days earlier in meeting the "W" Sidewinders.) But to my chagrin neither the padder or coil—slug, or both, would permit a 900 kc shift. This crisis called for "Soldgery"! After preparing the patient I replaced its 600 $\mu\mu$fd. silver mica v-f-o grid padder with a 500 $\mu\mu$fd. and everything lined up on the nose.

Having changed sidebands from lower to upper by moving the VFO in the same direction, it was a simple matter to return to the lower by replacing the missing 100 $\mu\mu$fd. when

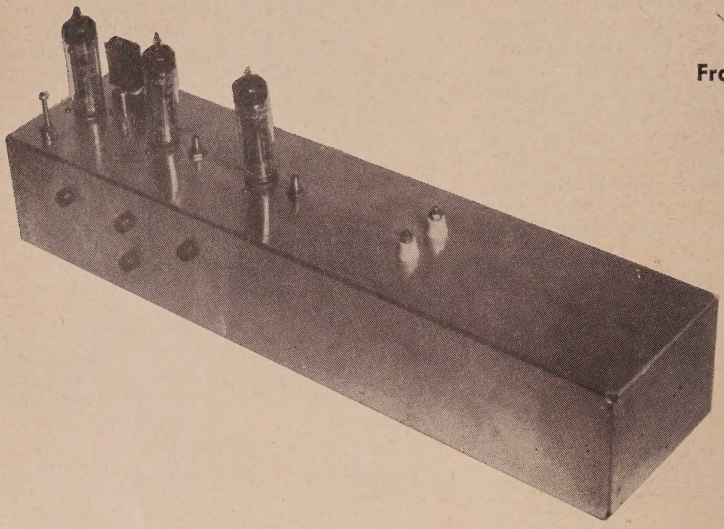


VFO'ing on 3550 kc. In the case of the SS-75 this was facilitated by the v-f-o band switch including positions A, B, C, & D which selected four 50 kc bands in respective descending order of frequency. "A" band omitted a 50 $\mu\mu$fd. padder while each of the three remaining scales added a separate 50 $\mu\mu$fd. padder for independent calibration of that respective band. Leaving A & B scales untouched left me with a 100 kc upper sideband VFO. By lifting the C-band 50 $\mu\mu$fd. padder off the v-f-o band selector switch and laying it on top of the D-band padder terminal of the same selector switch I could return the VFO to 3550 and "presto", sideband switching. This device works as slick as a whistle. I definitely recommend it to fellow users of the SS-75 and in principle to all filter sidewinders who find themselves on the wrong side of center or who desire a sideband switching capability.

Kenneth N. Keyte, DL4Apple Pie.
(Soon Again WØTGL)

Three Tubes: Two-Twenty

Frank Heubner, W2IQR
10 Park Terrace East
New York 34, N.Y.

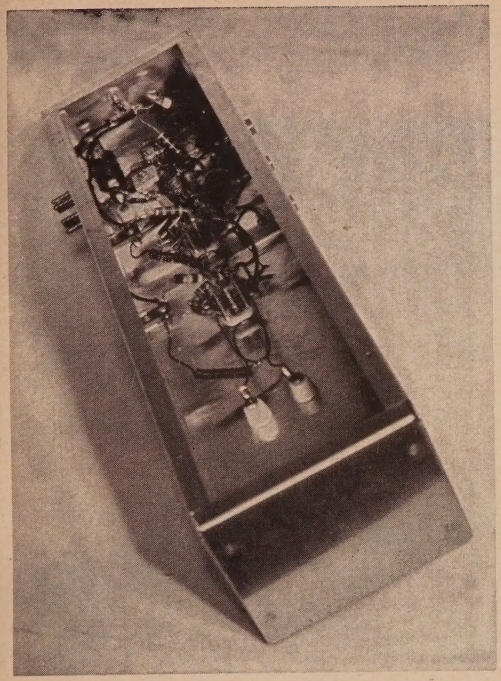


That is correct. You need only three tubes to get on the 220 Mc. band. There is no more excuse for not operating on 220 Mc. due to the high cost of transmitting tubes either. Now for a total cost of only $12.00 for three tubes you will be on the air with the same power that the majority of the gang is using today. This three tube transmitter is crystal controlled using the same Amperex ‡6360 type tube in each socket. No special sockets required nor fussing with delicate plate pins like those on the 832 and 829 tubes previously used on this band. There are only four tune up points on the transmitter making the alignment simple and the design economical. Besides this, provision has been made that some day in the future a 100 watt final may be added on the same chassis. This will be described at a later day if the Editor finds there is a demand for higher power. (*I so find . . . Ed.*)

Looking at the circuit diagram you will note that one-half of the first 6360 tube is the commonly used overtone crystal type circuit. Using an 8 Mc. crystal the plate of this section is slug tuned to 24 Mc. Then the second half of the same 6360 triples to 73 Mc. The next 6360 is a push-pull tripler to 220 Mc. which drives the final 6360 amplifier with a carrier output of 10 watts.

The transmitter was constructed on a standard aluminum chassis 3″x4″x17″. This provides sufficient room to add a ‡5894 final at a future date. If you are only planning on three tubes a shorter chassis may be used. Looking down on the top of the chassis, lay out your holes as follows. Draw a center line down the length of the top deck. Starting at the left end of the chassis mark off 1″ in on the center line. This is the center of the first 6360 socket. From the center of this socket place a mark 1¼″ further right. This is the center of the 73 Mc. slug tuned coil. 1¼″ further to the right is the center of the second 6360 socket. Continuing 1″ more to the right is the center of the butterfly condenser. Make a mark 2″ further to the right on the center line which is the center of the final 6360 socket. 1″ further to the right is the center of the final butterfly condenser. Then 3½″ further right is the center of the two antenna post insulators. Return now to the extreme left to the center of the first 6360 socket. On either side of this socket 1-3/8″ away is the center of the crystal holder on one side and 1-3/8″ away on the other side is the center of th 24 Mc. slug tuned coil.

All the 6360 sockets when viewed from the bottom should be mounted in the chassis so that *terminals 6* and *8* of each socket face toward the antenna posts. This will insure that the hairpin loops *L3*, *L4*, *L5* and *L6* will be equidistant from each tube, parallel and over each other. On the front of the chassis are mounted four



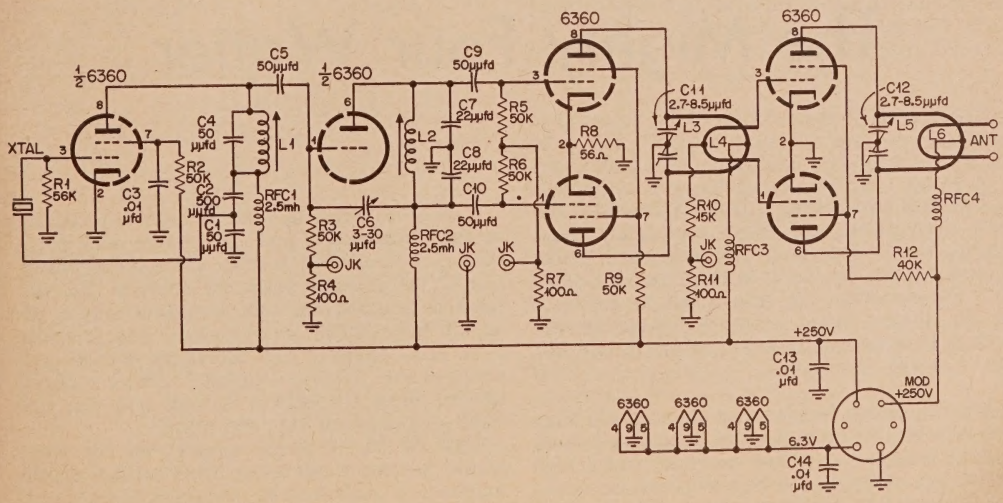
pin jacks. They are designated on the circuit diagram and are used with an external milliammeter to measure the grid drive on the 73 Mc. tripler, the 220 Mc. tripler and the 220 Mc. final. The pin jacks are mounted in this order looking from left to right. The lower pin jack is grounded. On the rear side of the chassis the six pin power plug is mounted.

A power supply for use with this transmitter should deliver a minimum of three amperes at 6.3 volts a.c. and 250 to 300 volts d.c. at 250 mils.

After drilling the chassis, mounting and wiring the components, connect the transmitter to the power supply leaving "B" voltage disconnected. Put the three 6360 tubes in their sockets and make certain they light. Assuming you have rechecked the wiring a couple of times and have plugged in your crystal, apply "B" voltage of 250 volts only to the first half or crystal section of the first 6360 tube. Disconnect the "B" voltage from *r-f choke 2, 3* and *4*. At the same time connect a milliammeter of 0-5 scale across the first pin jack and the ground jack. This will measure the grid drive at 24 Mc. into the second half of the 6360 tube. Now tune the slug in coil *L1* for maximum drive which should read 1 to 1.5 mils. As an initial setting condenser *C6* is backed off one full turn from maximum capacity. On a communication receiver check to see if you can detect this carrier at three times your crystal frequency or about 24 Mc. If no receiver is available borrow an absorption wavemeter or grid dip meter.

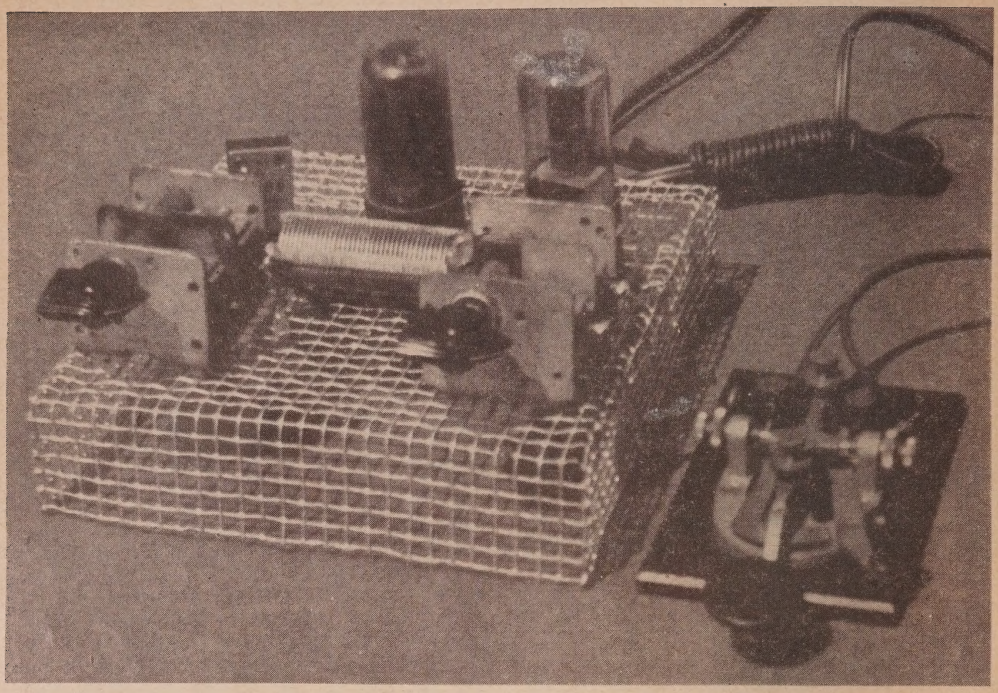
Before proceeding with any further alignment you must make certain that the drive indicated on your meter is the third harmonic of your crystal. Move your meter connection to the second pin jack to read the grid drive at 73 Mc. Reconnect the "B" voltage to *r-f choke 2* and tune the slug in coil *L2* for maximum drive which should be about 1.5 mils. Ascertain with the grid dip meter that this stage is now tripling and tuned to 73 Mc. or nine times your crystal frequency. With this completed, move meter to

[*Continued on page 127*]



Schematic for the 220-Mc 3-tube transmitter.

we hear sneers from the High Power Corner—
but can they duplicate that peculiar thrill that
goes with a Vest-Pocket rig Contact?



Howard Weisberg, W6QXH

The Mighty Four Watter

This is a novice rig. It is not a beautiful rig, with shiny panel and knobs and fancy panel decals. But it does have features which make it ideal for the beginner, and for the old-timer with the arm-chair rig who wants to get back on the novice bands, where a contact in the next state is something to be proud of, and not just a boring interlude.

It's a cheap rig. In fact it's a che-e-ep rig. You can buy all the parts for ten dollars and have enough change left to buy a crystal and a key. Better yet, most of the bigger parts are commonly found in old broadcast radios, in junk boxes and in radio "bargain" stores.

It's easy to build, as you can tell from looking at the photographs and the circuit, and don't forget, that's all there is to it. No external power supply, no antenna tuner, no nothing. All you need is a soldering iron, long-nose pliers, diagonal pliers and a screw-driver. Just to make it a little easier I am including step-by-step construction details, although there's nothing special about the way it is built and you can build it just about any you want.

Best of all, it really works! To see what would happen I put it on Forty with a dipole antenna. I worked three novices in three states, and the first station I called came back. With the feeders of the antenna tied together I

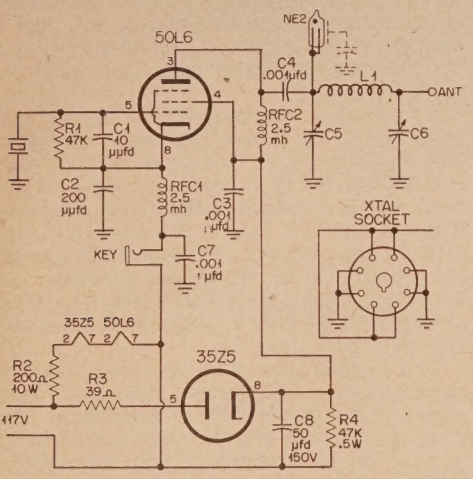
worked out on eighty meters with an RST 579 report. Any novice who builds a rig like this can be sure of hundreds of contacts in many states, if he tries.

The Circuit

A glance at the diagram will show that the circuit is just about the simplest, most basic there is. I admit that by adding a few more parts you could run more power, have crystal switching, etc., but remember that as it now stands there is practically nothing in it that could be eliminated or replaced by a less expensive part.

A 50L6 grid-plate crystal oscillator and a 35Z5 rectifier are used in an a.c.-d.c. circuit. *R2* is the filament dropping resistor, and *R3* is a surge limiting resistor, to protect the 35Z5 during warmup. *C8*, the filter condenser, can be a multiple-section unit from a radio. An electron-coupled oscillator circuit is used, and reports are, "No click, no chirp, no hum!"

A pi-network circuit using variables of the type used in broadcast receivers is used, eliminating the need for an antenna coupler. The coil is cut for supposedly optimum performance at 5 Mc, but a little fooling with pi-network formulas, plus my actual experience, convinces me that there would have been little point in using separate inductances for 80 and 40 Meters. An *NE2* neon lamp is coupled to the hot end of the coil to serve as a resonance indicator, and gives a satisfactory idea of where to set the loading condenser.



Parts List

R1, R4, — 47,000 ohm ½ watt resistor
R2, — 200 ohm 10 watt resistor
R3 — 39 ohm ½ watt resistor
C1 — 10 µµfd capacitor
C2 — 200 µµfd capacitor
C3, C4, C7 — .001 µfd capacitor
C5 — 365 µµfd (one section of BC variable)
C6 — b.c. variable, all sections in parallel
C8 — 50 µfd 150 volt electrolytic
L1 — 4.2 µH., 34 turns B&W #3011 or Air Dux #616 (¾" diam., 16 turns/inch, #20 wire)
RFC1, RFC2 — 2.5 mH. choke
3 — octal sockets
1 — NE2 neon lamp
1 — line cord and plug
1 — 7x7x2" chassis
2 — knobs
1 — 35Z5
1 — 50L6

13 — ¼" 6-32 machine screws; 7—6-32 hex nuts; 2—¼" rubber grommets; 12" spaghetti, 2' hook-up wire, solder.

key

crystals

antenna

Construction

As can be seen, the rig is built on a chassis of quarter-inch hardware cloth, which is commonly available at (believe it or not) hardware stores. This material is easy to work with. Cut a piece ten inches on a side, cut out 1½-inch squares from the corners, fold up the sides, solder the edges and you have a chassis. Diagonal pliers do the cutting.

Almost everything needed is shown in the parts list. The line cord, plug, variable and electrolytic condensers, and the tubes can be salvaged from old radios. It is better to use new parts for the rest, since the cost is low.

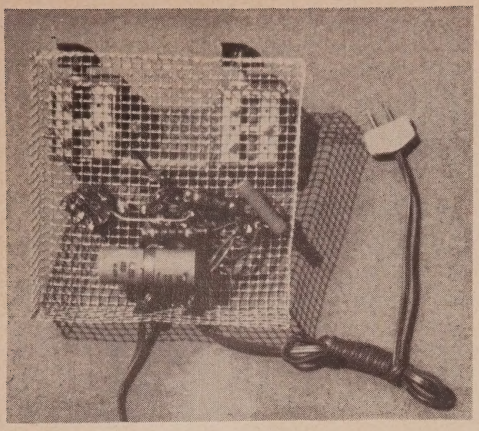
The three sockets are mounted in a row, four inches from the front. Viewed from the front, with the chassis upside down, the four sockets are as follows, from left to right: (A) the 35Z5; (B) the 50L6; and (C) the crystal socket.

For simplicity and clarity, the wiring instructions will be given in the form used by kit manufacturers. Thus, B1 indicates pin *one* of the 50L6, (S) indicates solder and (NS) indicates do not solder yet.

Connect a wire from A7 (S) to B2 (S). Connect a wire from A8 (NS) to B4 (NS). Connect a .001 µfd condenser from B4 (S) to the chassis (solder all chassis connections as made). Connect a 47,000 ohm resistor and a 10 µµfd condenser in parallel from B4 (NS) to B8 (NS). Strip two inches from the end of the hookup wire and thread it thru C5, C6, C2 and C1 (solder all four pins). Connect the other end of this wire to B5 (S). Connect C3, C4, C7 and C8 to the chassis (S).

Connect a 2.5 mh. r-f choke from A8 (NS) to B3 (NS). Connect a 47,000 ohm resistor from A8 (NS) to B7 (NS) (use spaghetti on leads). Connect a .001 µfd condenser from B6 (NS) to the chassis. (Note: A6 and B6 are used as tie points.) Connect a 200 µµfd condenser from B8 to the chassis. Connect the 39 ohm resistor from A5 (S) to A6 (NS). Connect the 200-ohm 10-watt resistor from A2 (S) to A6 (NS).

Now insert the line cord and a length of lamp cord which will be connected to the key thru grommet-lined holes in the chassis. The grommets fit into half-inch square holes. Tie a knot in each wire to act as strain relief. Connect one wire from the line cord to A6 (S). Connect the other wire from the line cord to B7 (NS). Connect one wire from the key to B6 (NS). Connect the other wire from the key to B7 (NS). Now mount the electrolytic condenser if



Bottom view of the under-$10 4-watter

it has a mounting strap. Connect the negative (black) wire to B7 (S). Connect all positive wires to A8 (S). Connect a 2.5 mh. r-f choke from B6 (S) to B8 (S). Connect one end of a .001 μfd condenser to B3 (S) (use spaghetti). The other end goes thru a half-inch hole in the chassis to where the stator connection of the input tuning condenser will be.

Now mount the two variables condensers. Viewed from the front, the input tuning condenser is on the left and the output condenser (*C6*) is on the right. While handling, it is a good idea to leave the condensers fully meshed to protect them from bending. If a continuity tester or ohmmeter is available, check each section for shorts at all settings, measuring of course from the stator connections to the frame of the condensers.

Take *L1* and peel or cut turns until you have 34 turns and half-inch leads. To the stator connection of the larger section of the input condenser, connect and solder one end of the coil, both leads from the neon lamp and the other end of the .001 μfd condenser. Connect all stator sections of the output condenser together. Connect the other end of the coil to a stator connection of the output condenser. Push the lamp thru one of the holes in the chassis, to give extra capacity to ground, and thus a brighter indication. This completes the wiring.

Operation

As with all a.c.-d.c. equipment, there is a certain shock hazard present. One side of the key is connected to one side of the a-c line, and which side depends on which way the plug is plugged in. One side of the power line is at ground potential, while the other is not. If the plug is not plugged in properly and you are touching the metal part of the key and a ground, such as a radiator, water pipe or electrical conduit, you're in for 110 jolts of a.c.

First, find the side of the plug that is the "cold," or "common" side, which is connected to B7 and one side of the key. This can be done with a continuity tester or an ohmmeter. Mark this with paint or crayon. If your wiring is polarized, the common side is connected to the larger prong. If not, connect a voltmeter or light bulb from a ground alternately to each prong of the outlet. The one which lights the bulb is hot, the other common.

(Not wishing to lose readers through electrocution we normally hesitate to publish a.c.-d.c. circuits such as this. A safer approach is to run just one wire to the line plug and have a separate wire to clip onto ground to complete the circuit since one side of the 110 is grounded. In this way you cannot reverse the plug and get flipped on your ear. Make it a practice to always run a good substantial ground connection to every piece of equipment in the shack.—Ed.)

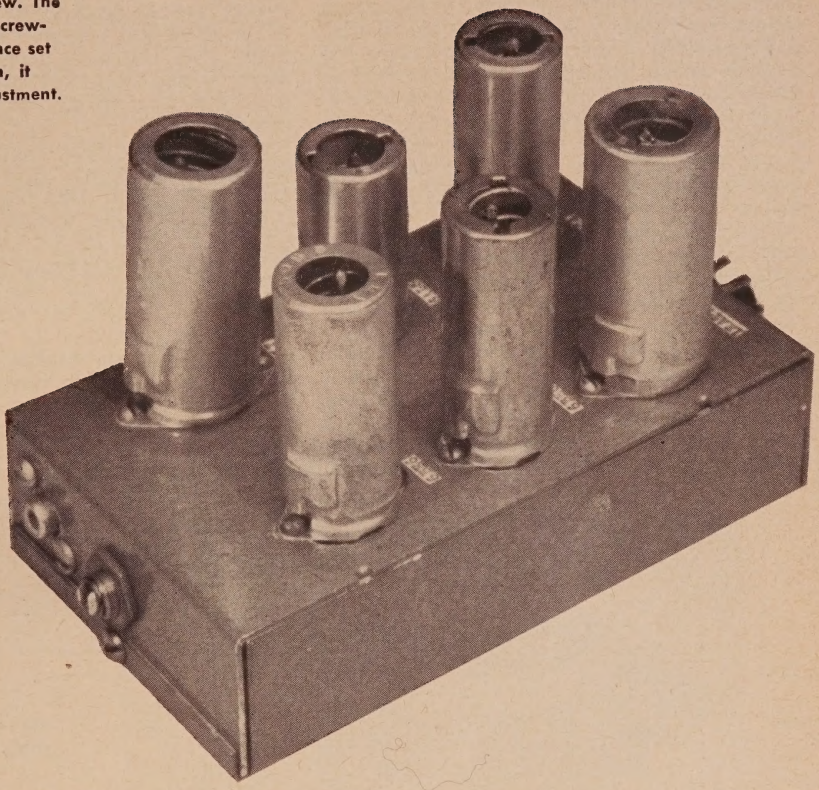
Plug in a crystal, preferably for 80 Meters. Connect the key and plug in the rig. The tubes should light, and there should not be any fireworks. Allow fifteen seconds for warmup. Mesh both condensers and do not connect an antenna yet. Press the key and rotate the input condenser. With an 80-meter crystal, the bulb should light at two settings. The setting of greater capacity (plates more fully meshed) is for 80 Meters and the other one is for 40. Bear this in mind and make sure that you do not tune up on your second harmonic. If a 40-meter crystal is used, the condenser will have only one resonance setting.

Now connect an antenna, and set the input condenser to the proper resonance point as indicated by the bulb. The bulb may not light, especially on 80. If so, connect a 600 μμfd mica condenser in parallel with the output condenser. If it still does not light at resonance, try 1200 μμfd. In any case, once the bulb is lit, decrease the capacitance of the output condenser and resonate the input condenser again. Repeat this process until the bulb is fairly dim at resonance. The rig is now tuned up.

This method may seem too inaccurate, but checking with a field strength meter and a plate-current meter showed that as long as the input is set at resonance and the output condenser is set near the point where the bulb starts getting dimmer, ouput will be as much as you can get any other way, give or take a few milliwatts.

Antennas

This rig will load up almost any antenna. Resonant antennas, such as half-wave dipoles, etc., work well. A random length of wire will work well provided it is up in the clear, is well insulated at all points and is worked against a good ground (transmitter chassis well grounded). Either way, a good ground helps. Connections to water pipes, ground rods, buried radials, counterpoises etc., are effective grounding methods. If a separate receiving antenna, run well away from the transmitting antenna, is used, no send-receive switch will be needed, and "break-in" operation can be used. 73, and good luck with the Mighty Four-Watter. ■



Microphone input connector and output level control are shown in this view. The output control is a screwdriver adjustment. Once set for 100% modulation, it needs no further adjustment.

Limiting Speech Amplifier

Edgar E. Landefeld, W8DCC
710 Milburn Road N.E., Massillon, Ohio

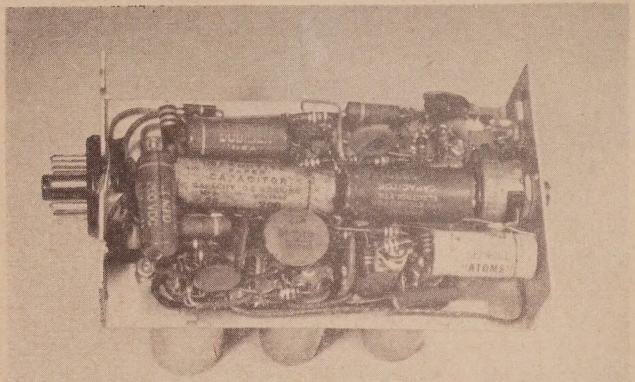
Overmodulation of phone signals and the attendant splatter has been the subject of numerous editorials in amateur publications and many letters from irate victims of such misguided efforts to "get a lot of audio." That overmodulation and broad signals go hand in hand is well known to most phone operators. Equally well known, however, is the fact that a 100 watt transmitter 100% modulated is equal in communication effectiveness to a 400 watt transmitter 50% modulated, and gives less heterodyne interference. There is also the sad fact that a "little overmodulation" pays off. When the going gets rough, there is the tendency to get just a little closer to the microphone, to talk a little louder, in order to get through and complete the QSO. Most amateurs are good citizens, and there are only a few incorrigibles who deliberately take up more than their share of the band. Most of the trouble comes, then, from our salt-of-the-earth John Q. Ham, who either is not sure just where his 100 modulation point is, or who pushes it "just a little" because the QRM is so rough.

What is needed to alleviate this situation is some device that will let our friend talk just so loud, and no louder: some device that will ease up on the gain when he takes the mike in his trembling hand and bellows softly into the mike at a distance of ⅜ of an inch.

There is such a device in use in a number of amateur stations, who are well aware of the disadvantages as well as the advantages of overmodulation, and who prefer to respect the

former. These learned gentlemen are also aware of the advantages of 100% modulation, and this device, commonly known as the speech clipper, gives them a high level of modulation, and effectively prevents overmodulation, if properly set up. Speech clipping is not used as widely as it should be, however, possibly because considerable clipping will noticeably affect the voice quality, or perhaps because of the filtering necessary to remove the higher order harmonics generated by the clipping action.

There is another approach to the problem that has been made quite attractive by new developments. This is the method of speech limiting, as opposed to clipping. A limiting amplifier functions in much the same way as the a-v-c system on a communication receiver. The a-v-c system increases the gain of the receiver when receiving a weak signal, and cuts back the gain when a strong station is tuned in. If the a-v-c system is "flat," the gain change exactly compensates for the difference in signal strengths, and the output of the receiver is the same in both cases. The same principle applied to audio amplifiers ran into considerable difficulty, and those designs which worked satisfactorily were quite complex, and would hardly be likely to appeal to the average amateur. Recently a manufacturer of communication equipment developed a simple limiting amplifier for a piece of his equipment which appears to be ideal for amateur use, and can be readily duplicated in the home workshop.



Bottom view shows parts placement.

The Circuit

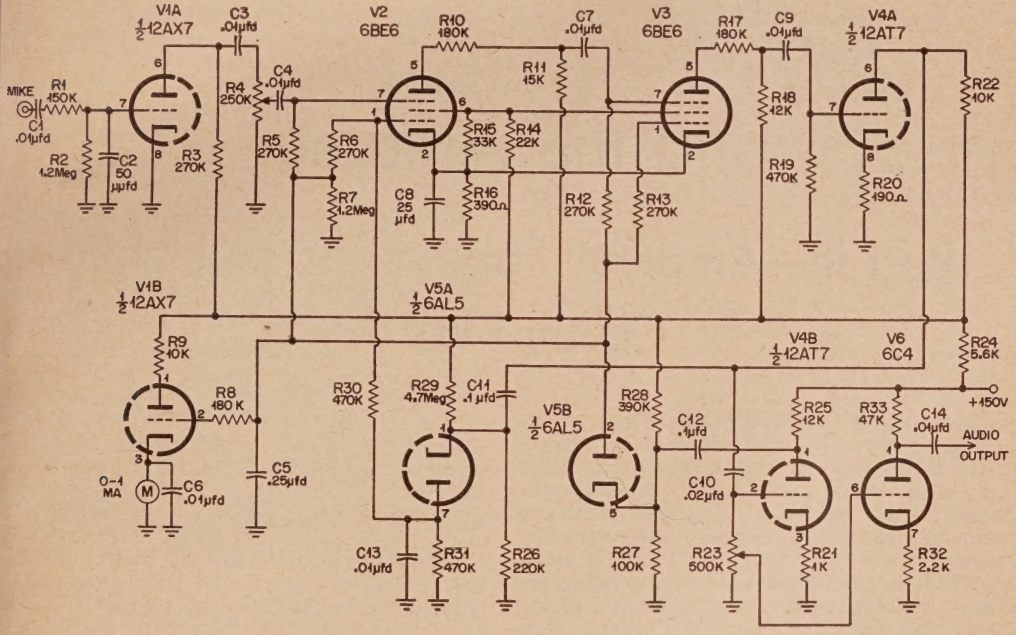
Referring to Fig. 1, half of a 12AX7 is used as a mike preamplifier, followed by the microphone gain control. This gain control determines how loud a sound will be required to produce limiting. Obviously, it is not desirable to have the TV set in the next room, the little children tussling playfully, and other household sounds modulate the transmitter 100%. Following the gain control are two stages of amplification using 6BE6 tubes. Each 6BE6 has a divided plate load resistor, with the following grid tapped down to receive about 1/10 of the developed voltage. This arrangement actually gives a gain of about unity in the two stages. These stages are used as gain control stages only, and are not designed or expected to raise the level.

Following the 6BE6's is a 12AT7, the first section of which acts as a straight amplifier, and it is from this plate that the audio voltage is taken, in this case through coupling capacitor C10, at the grid of the second section. This first section not only provides output voltage to the potentiometer, but also to the grid of the second section and to one cathode of the 6AL5. The voltage applied to the 6AL5 does nothing until it reaches an amplitude greater than the reverse bias supplied by resistors R26 and R29. When the audio voltage is greater than this, the diode conducts, rectifying the audio, and applying a negative voltage to the grids of the 6BE6's, lowering the gain. It will be noticed that this action will be fast, as the time constant of this portion of the rectifier, R 31 & C 13 is fast, being 470K & .01 μfd. respectively. The voltage applied to the second section is amplified and is used only for further control. This voltage is applied to the remaining diode section of the 6AL5, and the reverse bias voltages are so proportioned that this section does most of the work. It will be noted that the a-v-c bus on this diode section has a much slower time constant, set by R 7 & C 5 which are 1 meg and .25 μfd. respectively. By using a fast and a slow time constant, the system is able to limit sudden sounds, and the beginning of words and syllables, and the slow time constant holds the gain reasonably steady, to prevent the AVC system from removing normal syllabic variations of speech.

The plate supply recommended is 150 volts regulated with a VR 150. At this voltage, limiting is moderate when speaking in a conversational tone about two feet from the usual crystal

microphone. At the point where limiting begins, the audio voltage at the plate of the first section of V4 is approximately 3 volts r.m.s., and will hold at that level as the input to the microphone is raised, up to about 30 db. increase, at which point the 6BE6's will begin to cut off, and the output will drop. In our case, we needed a little more than the 3 volts available from the limiting section, and the output was applied to an additional amplifier, a 6C4, through potentiometer R 23. The potentiometer then sets the maximum amount of audio available from the amplifier, and when once set for 100% modulation on a whistle, or audio oscillator, it will be impossible to overmodulate, but a high percentage of modulation is available at all times.

ical in any way. Several of them have been built of extremely compact construction with no difficulty in getting them to work properly. Hum in one was cured by the 25 μfd. capacitor bypassing the cathodes of the 6BE6's, and a tendency toward a "pumping" action when a steady signal was fed in at just the limiting level in one of the amplifiers was cured when it was noticed that the a-v-c bus was slightly positive with no signal. This was traced to a tube, and replacing the tube cured the trouble. As is evident from the explanation above, the four tubes V2, V3, V4 & V5 actually comprise the limiting amplifier, and there is no reason why this section could not be built up on a small sub-chassis, to be inserted into the normal



Complete schematic for the Limiting Speech Amplifier.

The second section of V1 is used as a limiting meter, and is not necessary to the operation of the amplifier. A 1 ma. meter is placed in the cathode and the resistor in the plate lead chosen to give a suitable reading on the meter. The grid is connected to the a-v-c bus through a 180K decoupling resistor. When a sound of sufficient volume to cause limiting is inserted into the amplifier, the diodes conduct, causing the a-v-c bus to assume a negative potential. This potential is applied to the grid of the 12AX7 section, lowering the plate current, which causes the meter to deflect downward. Thus, whenever the milliameter is kicking downward, even slightly, the transmitter is being modulated 100%. It is impossible to cheat this amplifier—if you talk louder, it just cuts you down to size.

The construction of the amplifier is not critspeech amplifier chain, to provide the advantages of limiting without rebuilding the rig. As shown in the photographs, the entire amplifier of six tubes was built on a 6 x 3 x 1 inch chassis, which is small enough to serve as a plug-in adaptor replacing the microphone amplifier in some of the less compact rigs.

25 db Limiting

The operation of this device is quite amazing to those who are aware of the difficulty previously experienced in the design of limiting amplifiers. The output waveform shows no distortion on a 'scope until the amplifier is limiting from 20-25 db. In this region a slight distortion of the wave-form becomes apparent, and slowly gets worse as the limiting is increased. At about 30 db. the distortion of the

[*Continued on page 118*]

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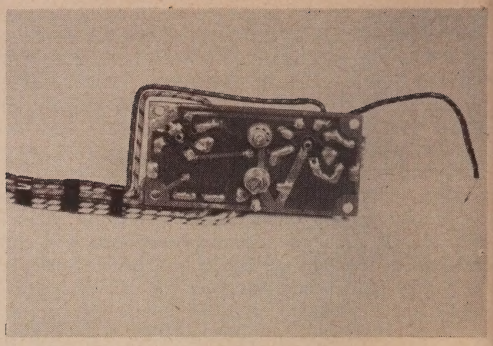


Fig. 1. Finished etched circuit board.

Printed Circuits and the Amateur

Part III—Amateur Fabrication of Etched Circuit Boards

The current popularity of etched circuit boards is attested to by their frequent appearance in commercial and military electronics apparatus. While the ultimate advantages offered by this integral chassis, mounting strip, terminal board and—indeed—interconnecting wiring cannot be fully utilized without mass-production, certain inherent unique properties make their application to amateur equipment most desirable. The "how" of making these intriguing panels with their rigidly mounted components and neat interconnecting foil strips need no longer be a mystery. The technique of photoengraving, long a coveted skill of one section of the graphic arts trade, is the basic process in amateur fabrication of etched circuit boards. Of principal interest to the amateur, is that now he, by employing the simplified process described here, may make his own etched circuit boards in his own workshop by using only such tools and implements as are readily available around the XYL's kitchen.

Part I[1] described numerous ways of making etched circuit boards and showed their relation to the over-all printed circuit concept. The ever-important master drawing was prepared and the circuit board material chosen as outlined in Part II.[2]

1. *CQ*, Feb. 1956
2. *CQ*, March 1956

Making the Negative

From the master drawing, which has been prepared to a 4:1 scale with black India ink or black pressure-sensitive tape on a suitable white Bristol board, a photographic negative is made. Assuming that the circuit design is made as compact as possible, and that logical unitization is employed to enhance subsequent maintenance, then an arbitrary size limit of 4 inches by 5 inches may be chosen for the circuit board. This size negative can be handled by the popular 4 x 5 camera and a circuit board of less than 4 inches wide will fit into the average tray which may be chosen for the etching solution.

Like other "process" negatives, our negative should be in perfect focus and have the maximum in contrast between the light and dark areas. Gray values as seen in common snapshot negatives are unacceptable. The type film used is important. Process film such as "Kodalith"[3] is used in commercial line copywork and it, as well as other similar films, is suitable for the circuit board negative. Some amateurs may desire to have their negative made by a local portrait photographer. If so, he will probably be obliged to accept the cost of a complete package of the specialized process film.

A special photographic service is offered by

3. Eastman Kodak Co.

some companies[4] wherein a negative is made of your master drawing for a reasonable charge.

Minor corrections are made to the negative to delete dust marks or other minute imperfections. A fine artist's brush is used to apply India ink or a commercial water-soluable graphite opaque to the emulsion side of the negative. Very small unwanted black areas may be removed by carefully scraping the emulsion away with a razor blade. Cleanliness in making and handling the negative is one important prerequisite to a successful etched circuit board.

Sawing Copper-Clad Phenolic (Figure 2)

Copper-clad phenolic laminate of the NEMA grade XXXP[5] is one of the least expensive and is quite adequate for most amateur applications. It can be sawed with a fine toothed hack saw and the edge dressed with a file or sandpaper on a block of wood. Care should be taken to avoid tearing or separating the .00135 inch copper foil from the plastic base.

When cutting out the blank for a circuit board, it should be made approximately 1/4 inch larger all around than the finished board.

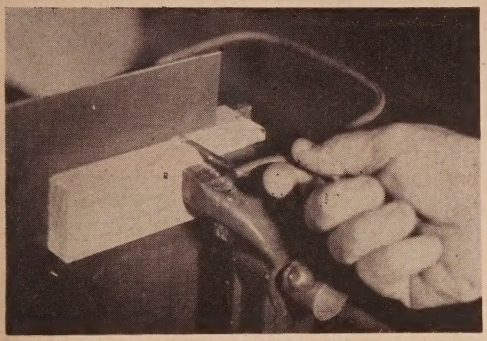


Fig. 2. Sawing copper clad phenolic laminate.

This permits handling during the photoengraving process and avoids necessity for accurate register when preparing for the exposure. A #50 hole is drilled near one corner within the border for attachment of a short length of string for subsequent twirling.

Cleaning Copper Surface of the Circuit Board (Figure 3)

Oxides form very rapidly on the clean surfaces of copper. While they may not be sufficiently heavy to be detected with the unaided eye, nor impair contact conductivity, they do have an adverse effect on the ability of the light sensitive emulsion to flow evenly and adhere to the copper. Removal of oxides, grease and finger marks is accomplished with a fine abrasive. Number 4 pumice or one of the common household cleansers does a good job. A free flow of water is used and the cleanser scrubbed onto the surface with a ball of cotton or a sponge. A thorough rinse is mandatory to remove all trace of the cleanser. Additional brightening of the copper surface may be achieved if required, by immersing the circuit board for 2 minutes in a hot (approximately 140° F) solution of 1 teaspoon ammonium dichromate per cup of water, with sufficient household ammonia added to produce a light straw color. Adequate cleanliness has been achieved when a film of water will remain unbroken on the copper surface. The circuit board is now ready for immediate application of the sensitizer and should not be touched with the fingers or left where dust can settle on it.

Preparing the Sensitizer (Figure 4)

Numerous photoengraving sensitizers[6] are available and used commercially. They may be procured and used by the amateur directly without further formulation as herein described. However, a home-made sensitizer may readily be prepared using water, fish glue and ammonium dichromate crystals in the following amounts:

1/2 cup—Water
1/4 cup—Glue
1-1/4 teaspoons—Ammonium Dichromate

The three constituents are thoroughly mixed and strained through a wad of cotton in a semi-darkened room. A dark brown bottle is used to store the mixture for it is now sensitive to light. If not used the same day, 2 or 3 drops of household ammonia should be added as a preservative and to correct any over-acidity. Blue litmus paper may be used as an indicator of acidity and if it turns red, the ammonia should be added.

The glue used to make the sensitizer is an ordinary fish glue such as Rogers which is sold in most hardware stores. However, a refined photoengravers glue[7] is recommended for more precise work. Animal or hide glues, while being

4. Keil Engineering Products, 4356 Duncan Ave., St. Louis, Mo. & Techniques, Inc., 178 Central Ave., Hackensack, N. J.
5. National Electrical Manufacturers Association

6. Including: Kodak Photo Resist
Mallinckrodt TUF TOP Enamel
7. Including: LePage's Photo-Engraving Glue
Roger's Photo-Engraving Glue

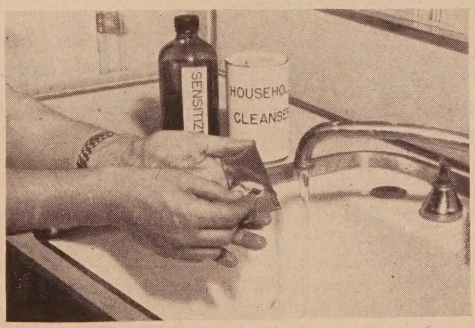


Fig. 3. Cleaning copper surface of the circuit board.



Fig. 4. Preparing the sensitizer.

able to be sensitized by the chromate, do not generally give a durable enough resist to withstand the etchant. Other organic compounds which have been used as a "glue" for this purpose include egg albumen, condensed milk, casein or hide glues and gelatin.

Ammonium dichromate crystals are a bright orange color, and because they absorb moisture readily, should be kept in a dark tightly sealed container. Ammonium *dich*romate and ammonium *bich*romate are used interchangeably. *CAUTION*: The chromates are toxic and repeated contact with the skin causes irritation and dermatitis.

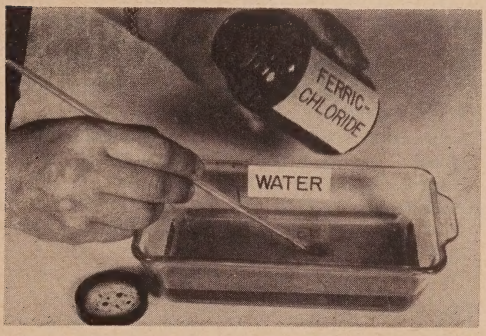


Fig. 5. Mixing the etchant.

Mixing the Etchant (Figure 5)

Ferric chloride or nitric acid may be used to etch away the unwanted portions of copper foil from etched circuit boards. The former is preferred however, due to inherent dangers in handling strong acids such as nitric acid. Ferric chloride is very hygroscopic, yet its yellow lumps sometimes require several hours to become completely dissolved. *CAUTION*: When mixing, care should be exercised to prevent splashing, for stained clothing and burned skin could result.

Into a glass pie pan or flat Pyrex baking dish place one pint of water and add one pound of ferric chloride. Mix with a wooden stick and store in a dark glass jar. The solution may be reused several times if kept free from scum and dirt.

Applying the Sensitizer (Figure 6)

Immediately after the copper foil surface has been polished and its ability to sustain an unbroken film of water tested, the sensitizer is flowed on. While some may prefer to use a soft brush for this purpose, it has been found that maximum cleanliness may be assured by pouring the sensitizer onto all areas of the circuit board face and the surplus allowed to run off. Here again, caution is practiced in avoiding contact with the chromated sensitizer solution. If rubber gloves are not used, the hands should be immediately washed and dried. A salve or petroleum jelly is recommended for chapped or dry skin.

This and subsequent operations, up to making the exposure, are performed in subdued light. While not requiring the degree of darkness of photographic developing and printing, these operations can be carried out in the presence of a small bedroom type night light at a distance of ten feet away.

A thin uniform coating of sensitizer is essential to a hard uniform resist pattern. A twelve inch length of string is attached at the hole provided for the purpose in one corner of the circuit board and the board twirled to distribute the sensitizer.

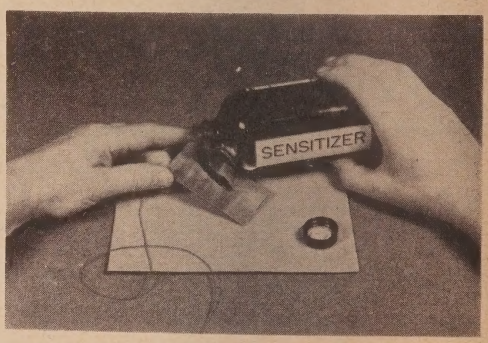


Fig. 6. Applying the sensitizer.

Distributing the Sensitizer by Twirling (Figure 7)

Thickness of the coating is dependent upon consistency of the sensitizer and speed of twirling. Too thin a coat will accentuate pin holes and promote feathering of edges. Too thick a coat requires excessive exposure and increases possibility of break down in development or

etching. The coating should not be so thin that it shows rainbow colors when tilted toward the light, nor so thick that it has a deep yellow color.

Cleanliness is to be emphasized in all phases of handling sensitizer and sensitized circuit boards. Streaks and comets showing up on the surface result from dirt in the sensitizer or dust in the air when the twirling is done.

Drying the Sensitizer (Figure 8)

Twirling should continue for about one minute at which time the sensitizer has taken an initial "set". Drying of the emulsion is continued by playing a stream of hot air on the surface until all trace of stickiness has disappeared. A small portable hair dryer is excellent for this purpose. However, continued twirling or heating in the kitchen oven will also serve to completely dry the emulsion. Temperatures must not be allowed to exceed 125° F. Complete drying is essential, and if one of these accelerated methods is not used, the sensitized circuit board should be left in a dark place over night to insure adequate dryness.

Preparing for Exposure (Figure 9)

Intimate contact between the negative and the sensitized surface of the circuit board is necessary to achieve a sharp line detail. When contemplating making the exposure with artificial light, a heavy glass plate may be used to "weigh down" the negative against the circuit board. A new negative is relatively flat and does not present difficulty. However, a negative which was overheated in a previous exposure may have become wavy, requiring a heavier glass over, or a resilient pad under the circuit board. A hinged back printing frame such as used for making photographic contact prints is well suited for exposing circuit boards. It is especially useful when making the exposure to natural sunlight. The negative is placed emulsion side down on the sensitized circuit board and adjusted so that the image is in the center of the circuit board blank.



Fig. 7. Distributing the sensitizer by twirling.

Exposing to Harden Image (Figure 10)

Specific chemical actions which take place during exposure of the sensitized emulsion are not too well understood. However, it is generally known that light, particularly actinic light in the ultra violet spectrum promotes "tanning" or hardening of organic glue by chromates. Glue thus tanned is rendered insoluble in water and remains to serve a resist function in subsequent etching. It is necessary to remember that hardening of the glue is required throughout its thickness. Therefore, length of exposure time has a direct relationship to thickness of the sensitized emulsion.

If daylight is used for exposure, many variables will be present including time of day, time of year, latitude, nearby reflective surfaces and sky condition. However, the range of satisfactory exposure is not so narrow with glue-dichromate sensitizers that these variables are unsurmountable. The exposure times given in Figure 11 have been successfully used at the different humidities listed.

A number 2 photo-flood lamp at 36 inches will require approximately double the exposure shown in the table. Arc lights are used commercially for this purpose, and if available, can be employed at approximately the same exposure as for natural sunlight. It is suggested that the first trial circuit board be subjected to various exposures from one to ten minutes by intermittently masking successive portions of the cover glass while making a trial exposure. Temperatures at the sensitive surface should be kept below 125° F when making the exposure.

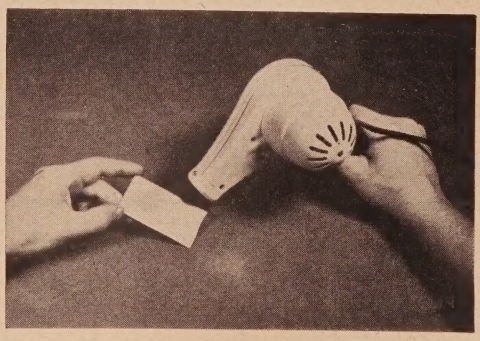


Fig. 8. Drying the sensitizer.

It will be found that humidity has a significant bearing on exposure time. For more serious work and for repeated jobs, a hygrometer with a modified dial as shown in Figure 12 will save some trial and error.

Developing Image With Dye (Figure 13)

Dye is introduced at this point dissolved in water as a developer. This dye is required to effect a contrast between the amber colored sensitizer and the polished copper foil to permit visual inspection of image development.

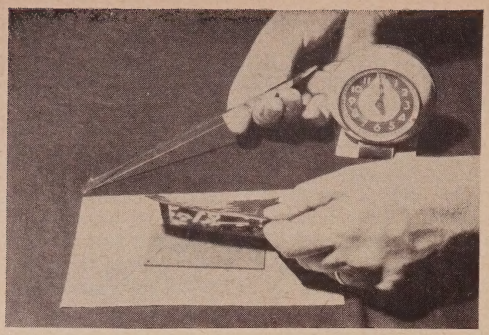
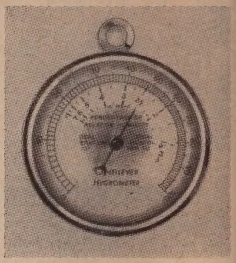


Fig. 9. Preparing for exposure.



Fig. 10. Expose to harden image.

Fig. 12. Hygrometer exposure control dial.



Under favorable circumstances of proper emulsion thickness and proper exposure time, it should not be necessary to observe this development because the difference in hardness of the exposed and shielded emulsion is adequate. However, if it is preferred to accentuate the image to assist identification, diluted cake coloring may carefully be applied with a soft brush or by dragging a saturated cotton swab lightly across the surface. The amateur may prefer to apply the dye after the unhardened sensitizer has been washed away.

Washing Away Unhardened Sensitizer (Figure 14)

Actual developing is done by the water and consists of dissolving the unhardened glue which had been shielded from light by dark areas of the negative. Whether dye is or is not used, dissolving of the soft emulsion is by water.

Exposed circuit board is immersed in water for about 30 seconds. Development is completed when the unexposed areas are completely swollen and begin to wash off the circuit board. A tuft of cotton is used under a gentle stream of water to remove scum and clean up stubborn areas. The remaining image is somewhat tender at this stage and care must be excercised to prevent rupturing or sliding it with the cotton swab. After development, immerse the circuit board two or three times in a solution of ½ teaspoon of chromic acid per cup of water. This is important for it helps the resist qualities. Wash all chromic acid off carefully.

RELATIVE HUMIDITY	RELATIVE EXPOSURE TIME	
PERCENT	MIN.	SEC.
20	6	0
30	4	0
40	3	0
50	2	24
60	2	0
70	1	42
80	1	30
90	1	20

NOTE—EXPOSURE TIMES SHOWN ABOVE ARE FOR BRIGHT SUNLIGHT AT NOON AND WILL VARY FOR DIFFERENT LATITUDES AND SENSITIZER FORMULATIONS. EXPERIMENT SHOWS THAT EXPOSURE AT 36" TO A#2 PHOTOFLOOD BULB SHOULD BE APPROX. TWICE THIS VALUE.

Fig. 11. Effect of humidity on exposure time.

Heating to Dry and Toughen Image (Figure 15)

A "burn-in" is necessary to toughen the etchant resisting image. The same number 2 photoflood lamp used for making the exposure can be used as a source of heat for this operation, although the distance is cut down to approximately 9 inches to increase the heat. A kitchen oven can also be used, but under no condition should the surface heat now be allowed to rise above 250° F., for blistering of the foil will be caused by captive volatile products of the bonding agent. If heat is not applied, the circuit board should be allowed to thoroughly dry by standing overnight. Thin areas and pin holes can be strengthened or masked by applying liquid asphaltum with a fine artist's brush.

Etching Away Unprotected Copper Foil (Figure 16)

The ferric chloride solution previously prepared, is placed in a shallow non-metallic dish. In place of the string, a length of solid hook-up wire is attached at the corner hole in the circuit board border and the board immersed face-up in the etchant. Intermittent agitation of the circuit board accelerates the etching action which should be completed in 2 to 10 minutes. Elevating the temperature of the etchant also speeds its action. However, this is to be avoided to prevent unnecessary impregnation

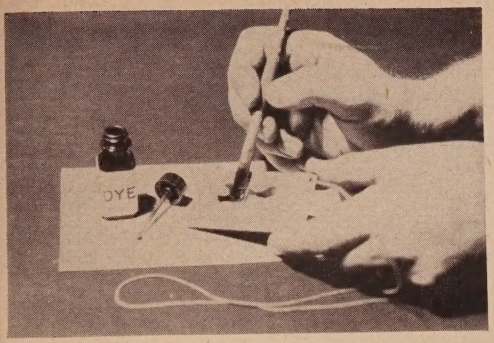


Fig. 13. Developing image with dye.



Fig. 14. Washing away unhardened sensitizer.

of the ferric chloride into the plastic base. Excessive etching will cause undercutting and failure of good line detail. Proper time in the etchant bath will be determined by critical examination of the apex of an acute angle or other sharp point in the circuit pattern.

Washing Thoroughly to Remove Etchant

Duration of the washing period should be not less than twice that period spent in the etching solution. However, if prolonged exposure to water is used, it must be followed by a "bake-out" to remove absorbed water. In non-critical applications, this is not so important for the absorption rate of 1/16 inch thick NEMA grade XXXP phenolic impregnated paper base board, for example, is only 1 per cent in 24 hours.

Removing Hardened Sensitizer (Figure 17)

Alcohol and household cleanser are used to remove the etchant resist which has remained on the copper foil throughout the process. In dip soldering as used in mass production, it is essential that the copper be perfectly clean and free from all resist enamel. With hand soldering it is also necessary to have a clean surface to effect rapid soldering and to obtain a good joint. After the resist has been removed, the necessary drilling, assembling and soldering should be done at an early time so as to prevent accumulation of oxides on the copper surface which would hinder subsequent soldering. A water-borne lacquer has sometimes been used to retain the bright copper appearance and it is "burned through" when making individual soldered connections. Electroplating could also be used to apply a corrosion resistant coating to the circuit board stock before photoengraving.

Drilling for Mounting of Components (Figure 18)

Holes for tube socket terminals and component leads are carefully made with the appropriate size drill. If tearing or lifting of the foil is experienced, the drill may be dull or unevenly sharpened. When resharpening twist drills for use on etched circuit boards, a slight negative rake should be employed. This reduces the "chisel" action of the cutting edge. Separation of the foil can also be minimized when drilling larger holes by clamping the board securely between two pieces of hardwood and, guided by pilot holes previously aligned, drilling through the complete sandwich. Socket punches of the type commonly used on metal chassis can not be used on 1/16 inch thick phenolic without first heating it to approximately 250° F. In this case, caution must be exercised to prevent permanent deformation of the circuit board.

The border previously left for handling is now trimmed off with a fine toothed hack saw and the edges dressed with fine garnet or sandpaper on a block of wood.

Soldering Components into Place (Figure 19)

Tube sockets are inserted in their holes, as are the leads or terminals of the other larger components. These are preferably soldered prior to inserting the leads of smaller resistors and condensers.

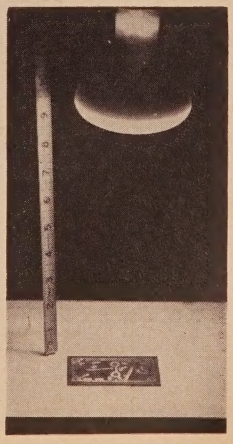


Fig. 15. Heating to dry and toughen image.

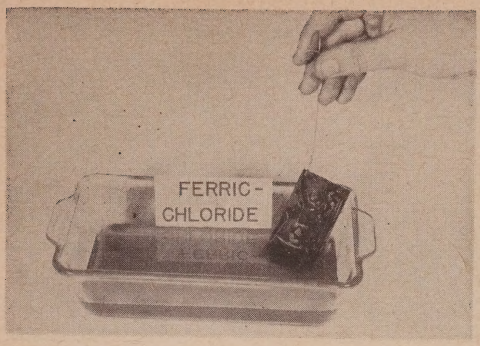


Fig. 16. Etching away unprotected copper foil.

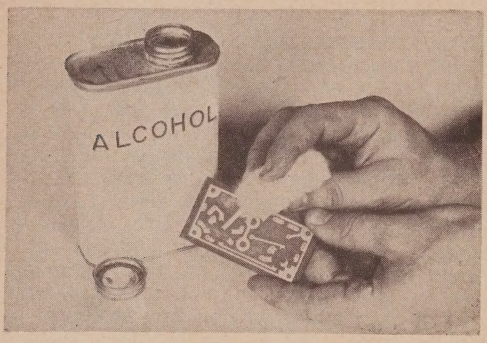


Fig. 17. Removing hardened sensitizer.

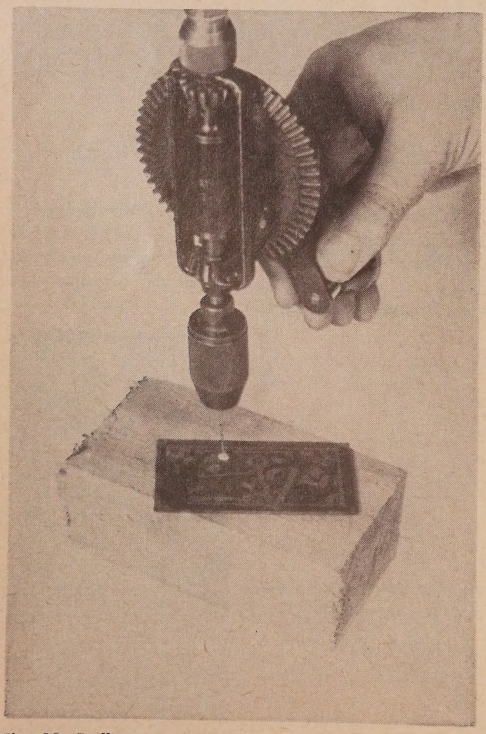


Fig. 18. Drilling for mounting of components.

Rosin core solder *only* is to be used. Observance of this admonishment as well as use of one of the smaller soldering irons will do most to guarantee a satisfactory soldering job. Excessive heat, of course, separates the foil strips from the insulating base and the snapping, frying sound which may be heard is due warning of this error. Solders recommended for etched circuit board work are known as "eutectic solders" and melt at about 400° F. For hand soldering, conventional lead-tin solder now on hand can be used with complete success.

It will be found helpful to bend the component leads slightly and clip off all but about 1/32 inch of the protruding lead before soldering. This prevents an excessive fillet due to capillary action along the surplus lead. It also produces a smoother and neater appearing solder job as well as lessens the amount of heat needed to make the connection. Good and absolute solder joints should be assured, for a "cold joint" can not be readily detected later due to the rigidity of the components on the circuit board. A little practice on a spare or trial circuit board will promote confidence and proficiency.

Finished Circuit Board

Again alcohol is used to clean the circuit board. Excess rosin being thus dissolved, is brushed away with a tooth brush or other small stiff bristle brush. Because rosin absorbs water, it is important that it be removed from between all conductors. Several applications of alcohol will assure its removal and produce a clean, neat, homogeneous appearing surface. Some amateurs may prefer to spray the finished circuit board on both sides with clear acrylic plastic spray. If so, old tubes should be inserted into the sockets, and other active contact areas likewise masked to prevent their being covered.

The etched circuit board shown in Figure 20 is for the familiar 6J6-6AQ5 oscillator-doubler-amplifier combination used in many mobile transmitters. It will be noticed that bulky items such as the Pi network and components requiring frequent manipulation, such as the crystal switch and sockets are to be mounted separately from the circuit board. This prevents placing undue strain on the circuit board and allows certain RF leads to be run point-to-point.

The finished circuit board will give the amateur immeasurable satisfaction in operation as well as appearance.

Acknowledgments

Acknowledgment is made of the services and materials made available by the following:

Photography—Charles Holbrook, Springfield, Va.

Art Work—William O. Morgan, Arlington, Va.

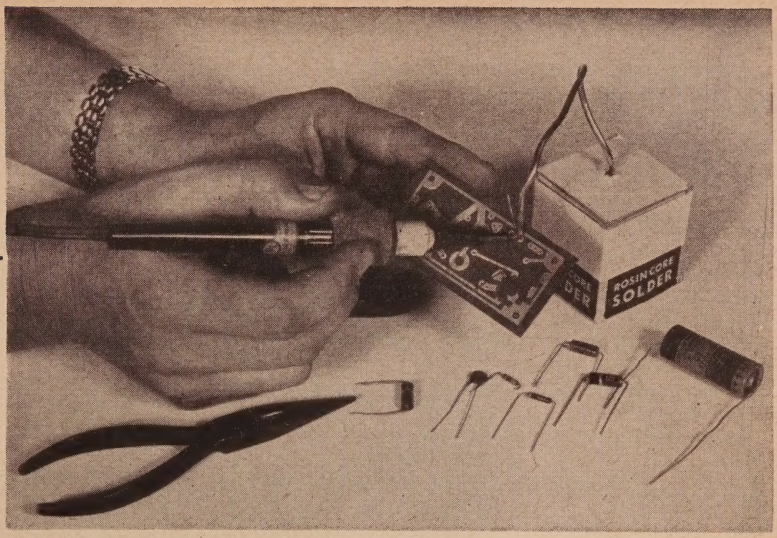


Fig. 19. Soldering components in place.

Sample circuit board—D.C. Engraving Co., Washington, D.C.

Sample circuit boards—Heath Company, Benton Harbor, Mich.

Copper-phenolic laminate—National Vulcanized Fibre Co.

The counsel and advice of the following individuals was invaluable in conducting this work:

W. A. King, LePage's Inc., Gloucester, Mass.

W. S. Parsons, Centralab Div. of Globe Union Inc., Milwaukee, Wis.

E. A. Corkhill, Mallinckrodt Chemical Works, New York, New York

Supplies are also available from the following:

Chemicals—Fisher Scientific Co., Pittsburgh, New York, Washington, D.C., St. Louis, Montreal, and Toronto
Mallinckrodt Chemical Works, St. Louis, New York
Eastman Kodak Co., Rochester, New York
Le Page's Inc., Gloucester, Mass.
Rogers Isinglass & Glue Co., Gloucester, Mass.

Copper-plastic laminate—Taylor Fibre Co., Norristown, Pa., & LaVerne, Calif.
National Vulvanized Fibre Co., Wilmington, Del.
Synthane Corp., Oaks, Pa.
Plastilight Inc., Stamford, Conn.
Formica Co., Cincinnati, Ohio
The Richardson Co., Melrose Park, Ill.
Mica Insulator Co., Schenectady, N. Y.
Continental Diamond Fibre Co., Newark, Del.

Notes

1. Inclusion of the name of a supplier does not imply specific recommendation of his product over those of another manufacturer.
2. Permission or license to use or practice the processes described is neither conveyed nor implied.

Additional Information

For information on printed-circuit kits, special services, parts, etc., write to:

Keil Engineering Products
4356 Duncan Ave., St. Louis, Mo.

Techniques, Inc.
178 Central Ave., Hackensack, N. J.

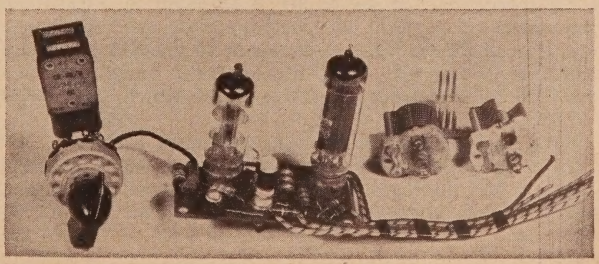
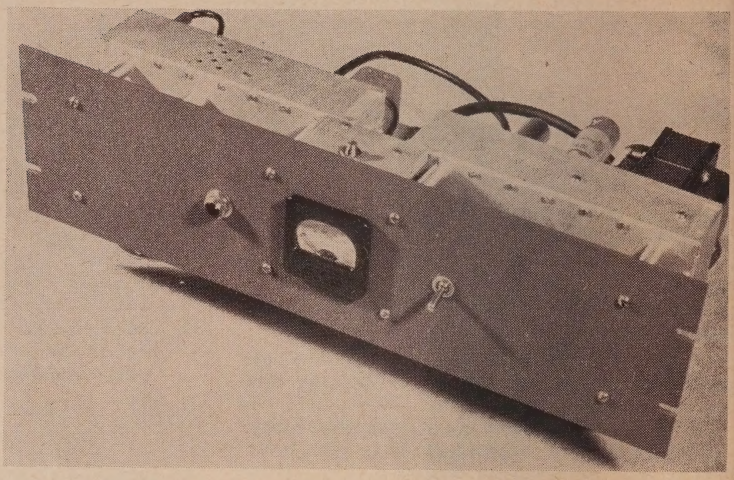


Fig. 20. R.F. section of mobile transmitter.

a crystal-controlled converter for 144 Mc with a measured noise figure of less than 2 db . . .

Noise Figure: 2

Len Garrett, W7JIP
3003 S.E. 71st Ave., Portland, Oregon



Front view of converter. At left is pilot light; center, meter which measures plate current to the 416-B; right, on-off switch. In center (over meter) behind the front panel is the cathode potentiometer for the 416-B.

To ask "Why waste time striving to get a noise figure lower than four or five db on Two Meters?" is about like asking "Why buy a Cadillac when a Ford will do?".

To the VHF man who appreciates the ultimate in equipment, this 144-Mc crystal controlled converter utilizes the finest tube available in the industry for the purpose. Besides an extremely low noise figure, the converter has a flat response over the entire two-meter band, plus freedom from extraneous beats or *birdies*.

The 416-B

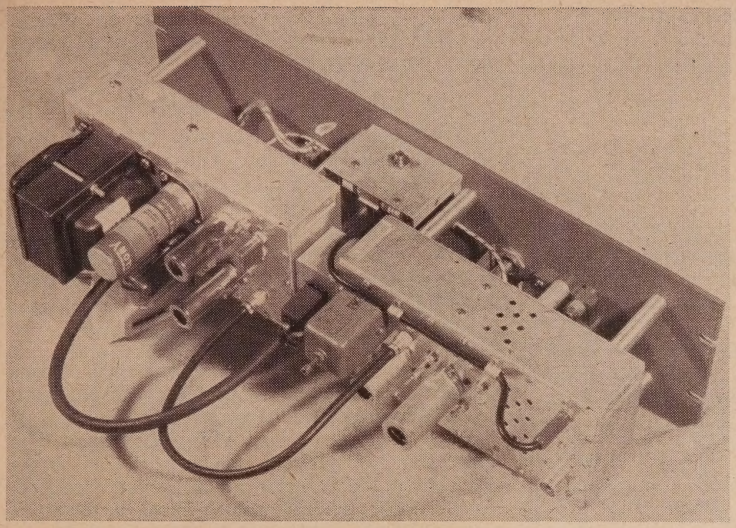
The heart of the converter is the *W.E. 416-B* Planar Triode. This tube was designed by *Bell Laboratories* for use as an r-f amplifier at frequencies up to 4000 Mc. With nominal ratings, this tube has a transconductance of 50,000 micromhos, extremely low transit time, and very low interelectrode capacity; all of which add up to a low low noise input tube.

With the high gain of the *416*, care must be given to decoupling and good shielding. As shown in the photograph, the tube is screwed into a ⅛-inch silver-plated brass shield. This serves as a mounting for the tube as well as a low inductance for the grid return. Notice the baffle between input and output sections of the 6BQ7-A. All leads entering the various compartments are decoupled with feed-thru bypass condensers and r-f chokes. In fact, every lead entering the converter is decoupled. Every precaution is taken to assure complete freedom from regeneration, which is a *must* if the lowest possible noise figure is to be realized.

The grounded grid 416-B stage is followed by a series cascode 6BQ7-A stage. This tube is a natural second stage because of its good noise figure, stability and bandpass characteristics. The choice of the mixer at this point is strictly non-critical. A pentode was chosen because of the better isolation provided by the screen grid to unwanted signals. Over-coupled bandpass transformers are used between stages. These are air-wound and tuned with small tubular trimmers. The use of this type of coupling provides a constant response within ½ db over the two-meter band.

Optimum Input Impedance

Computations have shown that the source impedance for optimum noise figure should be about 250 ohms. The purpose of the quarter-wave section of RG/62U *(L1)* is to transform the 50 ohm-generator impedance to something



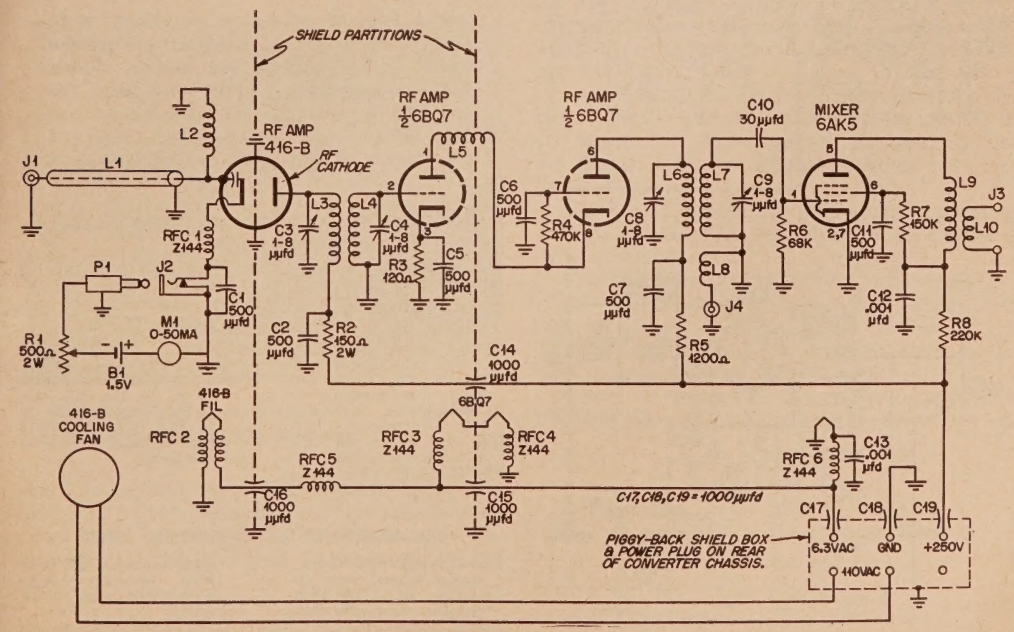
Rear view of converter. Chassis on the left contains the power supply and oscillator-multiplier chain. Right-hand chassis contains the two r-f stages and the mixer.

closer to this optimum. It should be noted that with unity input impedance transformation, that is, with the cathode excited directly from a 50-ohm source, the amplifier is close to a power match with the generator because the cathode input impedance is close to 50 ohms. However, the noise figure deteriorates by approximately one db.

Care of the 416-B

A word of caution: The 416-B should be treated with care. This tube has extremely close electrode spacing. If it is allowed to become too hot due to excessive plate current or operation without forced air cooling, warping may result causing either leakage or a short as the tube cools.

As shown in the photograph, cooling is accomplished by a small blade fan, the motor of which is similar to that used for timing purposes. The fan is completely noiseless so don't worry about it masking any weak signals. For adequate ventilation and cooling, holes are provided in the chassis as well as a heat-dis-



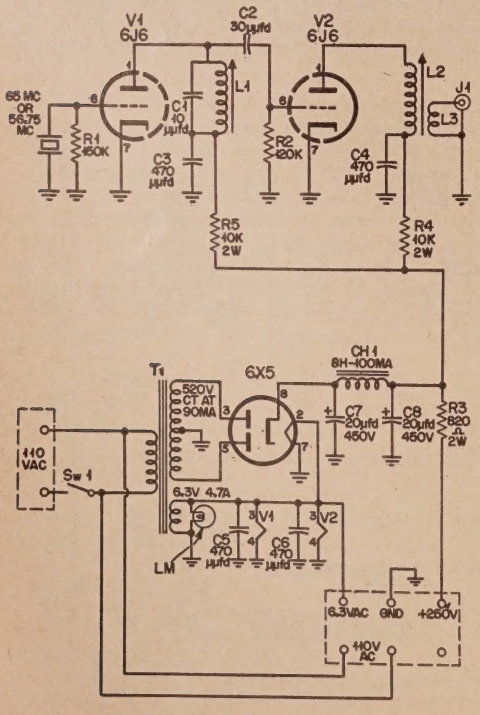
R. F. & Mixer Section of the low-noise 416B Converter.

R.F. AND MIXER CHASSIS PARTS LIST

R1—500 ohm 2 watt potentiometer
R2—150 ohm 2 watt
R3—120 ohm ½ watt
R4—470,000 ohm ½ watt
R5—1,200 ohm ½ watt
R6—68,000 ohm ½ watt
R7—150,000 ohm ½ watt
R8—220,000 ohm ½ watt
C1, C2, C5, C7, C11—500 μμfd. Silver Button Mica
C3, C4, C8, C9—1 to 8 μμfd. Tubular Trimmer Erie #352-B
C14, C15, C16, C17, C18, C19—1000 μμfd. Feedthru Erie #357-102
C12, C13—.001 μfd. Disc Ceramic
C10—30 μμfd. Ceramicon
RFC1, 3, 4, 5, 6—Ohmite Z-144
RFC2—25 turns #22 E. Bifilar wound on ¼ inch form and removed after coating with coil dope.
J1—Standard Coax Chassis receptacle
J2—Miniature Switch Craft Closed Circuit Jack
J3—Twin Coax chassis receptacle
J4—Miniature Coax Chassis receptacle
P1—Miniature Switch Craft Phono Jack
B1—1.5 volt flashlight cell
M1—0 to 50 milliampere meter

R.F. AND MIXER CHASSIS COIL WINDING DATA

L1—16½ inches of RG/62U — ¼ wavelength matching transformer
L2—3 turns #14 Silver plated wire ⅝ inch long, ⅜ inch inside diameter
L3—4 turns #14 Silver plated wire ⅜ inch long, ⅜ inch inside diameter
L4—3 turns #14 Silver plated wire 5/16 inch long, ⅜ inch inside diameter
L5—10 turns #24 Enamel 7/16 inch long, 3/16 inch inside diameter, air wound
L6—4 turns #14 Silver plated wire ⅜ inch long, ⅜ inch inside diameter
L7—3 turns #14 Silver plated wire 5/16 inch long, ⅜ inch inside diameter
L8—1 turn hook-up wire wound cold end of L7
L9—14 to 18 Mc, 40 turns #28 Enamel Close wound on ½ inch slug tuned shielded form. 30 to 35 Mc, 15 turns #22 Enamel Close wound on ½ inch slug tuned shielded form
L10—14 to 18 Mc.—10 turns #26 D.C.C. on cold end of L9. 30 to 35 Mc.—5 turns #26 D.C.C. over cold end of L9



Oscillator-Multiplier schematic.

sipating cap for the 416 anode. In several months of operation here, the 416 anode shows no discoloration due to heat.

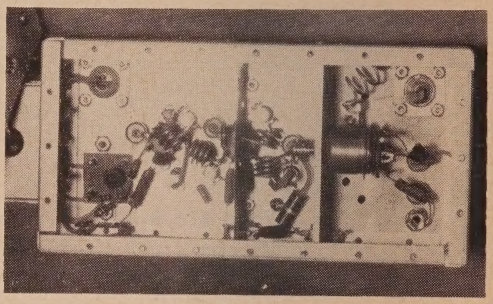
Multiplier Chassis

The second chassis contains the power supply and multiplier chain. This unit consists of a conventional overtone crystal oscillator circuit and doubler, with the output link coupled and fed through coax cable to the converter chassis. This complete isolation of the multiplier chain is instrumental in eliminating spurious beats.

Construction Notes

The converter and multiplier-power supply chassis are mounted on *SEE-ZAK* 2x4x8 inch rails. All except the converter top plate are of aluminum and standard *SEE-ZAK* items. The converter top plate is made of 1/16" brass and silver plated after all holes are punched.

The 416 Grid Mounting Plate is made of



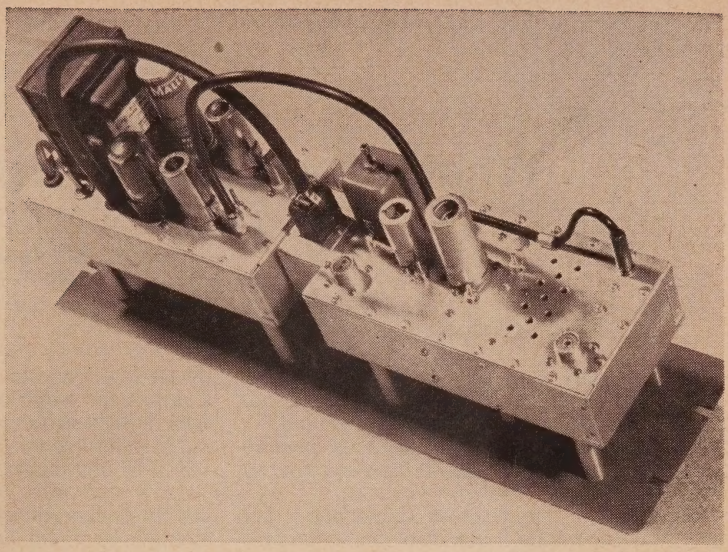
Bottom view of r-f and mixer chassis. Right compartment houses 416-B (center) with antenna input coil and cathode and filament chokes. Center compartment contains 416-B plate coil and 6BQ7-A input coil. Left compartment contains 6BQ7-A plate coil and 6AK5 mixer grid coil. Shielded i-f coil is visible in lower left corner.

POWER SUPPLY AND OSC. MULTIPLIER CHASSIS PARTS LIST

R1—150,000 ohm ½ watt
R2—120,000 ohm ½ watt
R3—820 ohm 2 watt
R4, R5—10,000 ohm 2 watt
C1—10 μμfd. Ceramicon
C2—30 μμfd. Ceramicon
C3, C4, C5, C6 — 470 μμfd. disc ceramic
C7, C8—20/20 μfd. 450 volt Electrolytic
Ch1—8 HY 100 ma. 375 ohm—Merit C-2995
T1—260-0-260 volts A.C. @ 90 milliamperes
6.3 volts A.C. @ 4.7 amperes Merit P-3148
J1—Miniature coax chassis receptacle
SW1—S.P.S.T. Toggle switch
LM—#47 Dial Lamp
X—5th Overtone Crystal 14 to 18 Mc. I.F. use 65 Mc. Crystal 30 to 35 Mc. I.F. use 56.75 Mc. crystal (NC-300 Receiver)

OSC.-MULTIPLIER COIL WINDING DATA

L1—6 turns #20 tinned copper spaced wire diameter on 5/16 inch diameter powdered iron slug tuned form.
L2—6 turns #20 tinned copper spaced twice wire diameter on 5/16 inch diameter powdered iron slug tuned form.
L3—1 turn hook-up on cold end of L2.



Rear view of chassis showing connecting cables. Large cable with Jones plug is the power cable. Small coax is the oscillator injection to mixer stage. Coax chassis fittings on right hand chassis are for two-meter antenna input (lower right) and i-f output (left).

⅛-inch brass; the mounting hole was turned on a lathe and is ¾" in diameter and cut forty threads per inch.

The shield across the 6BQ7-A is made of flashing copper and formed to fit inside the chassis. Notice that the neutralizing coil passes through this shield.

Contact to the 416-B r-f cathode is accomplished by a 3/16-inch-wide silver-plated soft copper band cinched together by a 4/36 bolt and nut.

To the rear of the converter chassis is a small LMB box containing the power plug and feed-thru bypass condensers for all power leads entering the converter. It also serves as a junction box for the 110 volt a-c leads to the fan motor.



Fan assembly and mounting method. Ventilating holes are visible in side of chassis.

The fan is mounted on the bottom plate of the converter and is positioned directly across the 416 mounting plate. This allows the air stream to pass around the body of the tube as well as across the anode heat-dissipating cap. Ventilating holes provide an outlet for the air stream and increase efficiency of the fan.

Adjustment and Operation

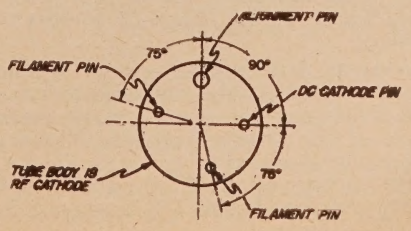
Mixer Plate coil-winding data is given for an intermediate frequency of 14 to 18 Mc, or 30 to 35 Mc; the latter frequency is for the new NC-300 receiver. No modification of the Oscillator-multiplier coils is necessary when the intermediate frequency is changed, as the tuning range of the slug forms will take either crystal (65 Mc for the low i.f. and 56.75 Mc for the high i.f.).

The injection frequency for the 14 to 18 Mc range is 130 Mc and 113.50 Mc for the 30 to 35 Mc range. Injection voltage measured at the mixer grid should be between one and three volts.

A noise generator should be used in tuning up the r-f stages if the lowest noise figure is to be realized.

The 416-B operating values are as follows: Filament, 6.3 volts at 1.75 amps.; Plate, 250 volts at 20 to 25 mills. Plate current is adjusted by means of a cathode potentiometer and battery to a value of 20 to 25 mills.

Below is the base diagram of the 416-B showing pin connections. ■



Why you don't get out, and how to change it so you do.

What's Your DX Rating?

Bill Leonard, W2SKE
WCBS-TV, New York

Let me start with this flat statement. The majority of amateurs haven't the foggiest notion of how well or how badly they "get out."

Put it reciprocally, too. Most of us have almost no idea of how well, or how poorly, we receive!

Reason? Our only basis of comparison is our own past experience—our own *limited* experience.

Let's take a couple of hypothetical examples. For years Joe has been content with his 50 watts to a 20-foot high folded dipole on 20 fone. He knows he can work with fair success around the U.S. (except on weekends) and that occasionally, and accidentally a *G* or *DL* will come back to his call. Over the years this becomes his standard of "getting out." Sure, he reads contest results and DXCC standings and realizes there are plenty of others who must hear more and work more with better reports, but he dismisses this with remarks like "Oh, well, you can't compete with the super-beam boys," or "After all, look at the location he's got."

The fact is—except for the wholly specious QSA—S signal report system—there is no way an amateur can measure, on the basis of a generally accepted standard, the real radiation efficiency of his station on any particular band.

We do know that if we increase power we will get out better.

We do know that gain in the antenna will result in better receiving and transmitting conditions.

We do know that the higher we get that skywire off the ground the more we are likely to hear, and that our DX signal reports are likely to be better.

We do know we'll do better if the home QTH is "in the clear"—better than if we will nestle among an assortment of 30-story office buildings.

What we lack is some sort of reasonably accurate standard linking these factors to provide a measurement—even a rough measurement—of the absolute radiation efficiency of our particular set-up.

The author has tried to combine a little theory and considerable DX experience at all power levels and in many locations to provide a means for empirically establishing the radiation rating—in terms of decibels—of any amateur station in the HF bands over an average DX path of roughly 4000 miles.

Let's start with what we do know; that by doubling our power we increase our signal strength by 3 db. Let us assume, for practical purposes, that the minimum power radiated *at the antenna* of even the most modest amateur station is 12.5 watts. This might represent an average final plate input of 20 watts (who runs lower these days?). Let us assign such a station a power rating of 0 db. It follows of course that by doubling power to a radiated 25 watts we would have achieved a gain of 3 db. And so on, each time power is doubled, to a *maximum* efficiency (at 1000 watts input) of 800 watts, or 18 db.

We could then assume, *all other factors being equal,* that the station radiating 800 watts would be 18 db stronger than the station radiating 12.5 watts.

Sheer power, then, is *one* of the factors that must be taken into consideration in establishing a Radiation Rating, as *Fig. 1* illustrates.

But power, of course, is only one of the factors in "getting out"—everyone knows that

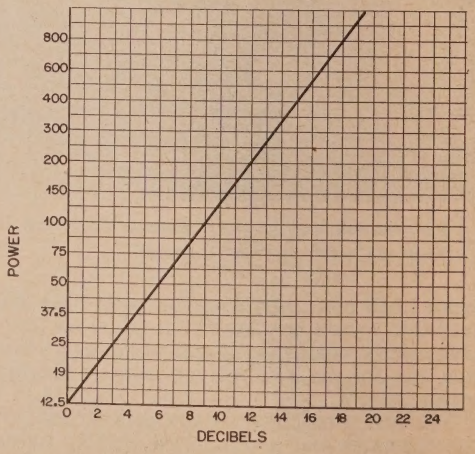


Fig. 1. Power Rating.

200 watts to a good beam will out perform a full gallon to a dipole. So our second factor in establishing a Radiation Rating, antenna gain, must immediately be added. Here we are on reasonably safe ground. Antenna gain is traditionally expressed in terms of db in the favored direction(s). So, simply add the power figure from *Fig. 1* to the gain (if any) of your antenna. *Fig. 2* shows typical antenna gains.

From this we note that, *all other factors being the same,* a station radiating 200 watts (12 db) with a 0 db antenna will be no more effective than a 25 watt carrier (3 db) helped by a 9 db skyhook.

But—but, again! Radiated power and antenna gain are patently not the *only* factors. In the author's experience the other factors can be reduced, for practical purposes, to two . . . and these two in turn can be translated roughly, from practical checks on the air, into decibels.

These two factors are:

1. Height of the main current lobe of the antenna above ground.

2. Character of the location in terms of soil and obstructing objects . . . in other words . . . *location.*

Fig. 2: Average db gain for various popular ham antennas.

	db
Dipole, groundplane, or vertical	0
2 element colinear	2
" " " (extended)	3
8JK	5
2-el Yagi	5
Lazy H	6
3-el Yagi	8
4-el Yagi	10
5-el Yagi	11
6-el Yagi	12
Stacking	add 3

Arbitrary decibel ratings of these factors have been established which when added to a stations radiated power and antenna gain (again in terms of db) establish the Radiation Rating of the transmitter for a given band.

Height

Let us examine the height and location factors. It is traditional to think of antenna height in terms of wavelengths, or fractions thereof, above ground. For practical purposes, however, on all bands from 160 through 10 Meters, where we are dealing with multi-hop DX paths, *the higher the better,* as they say. So, regardless of the band, height figures have been worked out in terms of feet above actual ground, rather than wavelengths.

Figure 3 gives your height factor, in db, ranging from a minimum of 0 db at 10 feet (or less) to a maximum of 10 db for heights

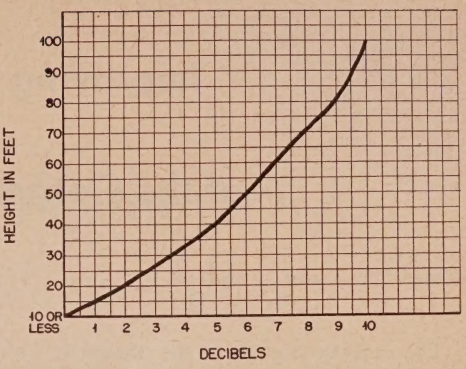


Fig. 2. Height Rating.

100 feet or more. In figuring Radiation ratings of vertical or groundplane antennas the height factor is assumed as 0 db and the location factor figures are doubled.

In terms of Radiation Rating we are saying, in effect, that a dipole (o db) at 100 feet (10 db) is as effective as a 4-element beam (10 db) 10 feet or less above ground. Practical experience would indicate—band by band—that this is about right for DX paths under average conditions.

Location

Finally we come to the all-important factor of location. Here again we must combine theory, fact, and practical experience to establish a comparative db value for various common types of locations.

Theoretically, of course, a KW fed into a high-gain beam 100 feet high could not be heard 50 feet away if the QTH were entirely surrounded by grounded copper screen. This is not, let us say, a normal ham QTH, although some of us may occasionally feel we are operating under about such a handicap. Practically, the worst conditions found in practice might be summarized about as follows, and assigned an arbitrary 0 db.

The following will serve as a guide in establishing a db rating for your QTH.

- 0 db Heavily built-up urban location, poor soil conductivity, serious obstructions in many directions along line of sight between the center of the antenna and 10 degrees above the horizon.
- 2 db Urban location, poor soil conductivity, considerable obstruction from buildings in several directions.
- 5 db Average location, suburban lot, fair conductivity, built-up area, some non-metallic obstructions in a few directions.
- 8 db Good clear suburban or country location with average soil con-

[*Continued on page 116*]

Improving the Selectivity of the Gonset Communicator

Wayne Green, W2NSD
Editor

The receiver portion of the two-meter *Communicator* is about as sensitive as any of the converters on the market, and a lot more sensitive than some. For ordinary use in day-to-day operating the receiver leaves nothing to be desired. Comes a band opening or a contest, though, and you have a different story. Then the lack of selectivity can put a serious hamper on your activity.

But don't stew over the QRM when it hits you, the misery can be cleared in a minute or two. All you have to do is couple the i-f output of the Communicator to your regular all-band station receiver (you have one of those, don't you?), tune to 6 Mc., and you are all set.

Let me go into the gory details. Receiver-wise all you need is something that will hit 6 Mc. The better the receiver, the better the final results. It is important in most areas to have an automatic noise limiter built in the receiver to cut down on ignition noise since the Communicator noise limiter is being by-passed. You will find the b.f.o. useful too since there are a few hardy displaced c-w men occasionally heard in the rarefied two-meter atmosphere. Then too, you may want to talk to W2JJC who is using SSB on Two Meters! (How *avante garde* can you get?)

A wire run from the antenna terminal of the station receiver to the vicinity of the Communicator will usually give you plenty of coupling, but better results will be obtained if you use a section of coax, for this will keep out the pickup of stations operating on 6 Mc. I like to have the Gonset available for mobile use at the drop of a hat so I have the i-f pickup coax just stuck in the back of the Communicator. The still-insulated center conductor has a small hook in it which I hook into the hole in the top of the last i-f transformer. The braid of the coax sticks out at right angles about an inch and a half and can hardly help from coming in contact with a chassis or metal shield somewhere to make a ground connection. If you want a bit more pickup and you are not particularly troubled with QRM coming through on the 6-Mc frequency, then you can use a short (about ½") probe to stick down in the i-f transformer. This probe is made by stripping back the braid of the coax but leaving the polyethylene insulation intact to insulate the center conductor. Bend the end to a right angle so it will stick down in the transformer.

If you still have some trouble with 6-Mc signals coming through, you can usually tune the station receiver plus or minus a few kilocycles and find a clear spot in which to listen to the Gonset ouput. Once you have a clear spot (to turn off the Gonset i-f output, merely turn on the transmitter for a moment) you can leave the receiver dial set and from then on just tune the dial on the Communicator. I found it handy to put a much larger dial on the Gonset so I could get a firmer grasp on it for fine tuning. The bandspread is about 4 kc per degree of knob rotation, so you want all the size you can get without masking the calibrated dial. Keep the volume control of the Gonset turned down so you can hear the output of the double conversion setup alone.

A few minutes use of this system under QRM conditions will open your eyes. You'll be able to hear weak stations that are just a couple of kilocycles away from fairly strong local stations. During the last VHF contest there was only one station that was in such bad conditions that this double conversion system could not pull him through. There is one problem with this system, it must be admitted. This is the slight drift of the Communicator during the first few seconds of turning on the receiver after having transmitted. I find it fairly simple to correct the one or two kc by retuning, but you may want to dig into the rig and find out some way to settle down the Gonset local oscillator. It is probably not too difficult. This small drift is completely unnoticeable when the Communicator is used barefoot.

After four months experience with the two-meter Communicator plus the Gonset VHF Power Amplifier I have found that with my simple three-element Telrex beam I can hear anything that any of the other locals hear (and sometimes more). The 70 watts output is adequate to get answers from any station I can hear. Even though I have a 500 watt final amplifier available, there is no reason to use it for I never have any trouble being heard. When the time comes that I have installed a 417A converter, a large beam, etc., *then* I suppose the ½ KW will come in handy. ■

The C-Multiplier

Arthur L. Bennett, W9ADS
1145 E. 57th St.
Indianapolis 20, Ind

At the present time many amateurs are making the change from AM to SSB fone transmission and are therefore converting class "C" final r-f amplifiers to class "B" linear operation. Ordinarily the original class "C" stage has a pi-network output circuit feeding 50 or 75 ohm line since this combination is successful in reducing TVI and simplifies bandswitching; as a result the output stage is single-ended or uses parallel tubes, because a push-pull pi-network is somewhat awkward to arrange.

Since some of us may wish to have the flexibility of using AM after conversion, it is desirable to make the conversion in the simplest possible manner. Generally speaking, the change from a class C stage to a class B stage means that the plate load resistance goes down. This in turn means that the reactance values in the tuned plate circuit go down; in the case of the inductor this is not important because it merely indicates a reduction of turns (use a 40 meter coil on 75, etc.); however in the case of the capacitor it means a larger value of capacitance and this costs a substantial amount of money at the voltages involved. This article will present a method of avoiding the expense of buying a new variable capacitor or adding vacuum padders, particularly on 75.

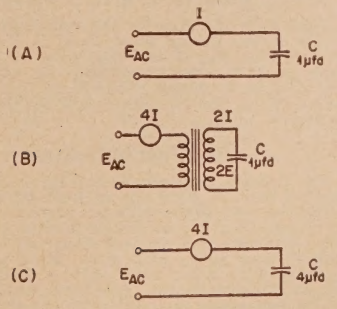


Fig. 1

One method of increasing the effective value of a capacitor is shown in *Figure 1*. Starting with *Figure 1-A*, suppose we wish to make capacitor *"C"* equivalent to 4 μfd. In *Figure 1-B* an ideal transformer has been used to double the voltage by a factor of 2. Since both current and voltage have been doubled at the capacitor, the primary current must be quadrupled and the capacitor now looks like 4μfd. from the primary side. The equivalent circuit of *1-B* is shown in *1-C*. This method has been used extensively in both the power and communication fields, particularly in low voltage circuits. It may be well to observe that the voltage rating of the capacitor must be higher after conversion.

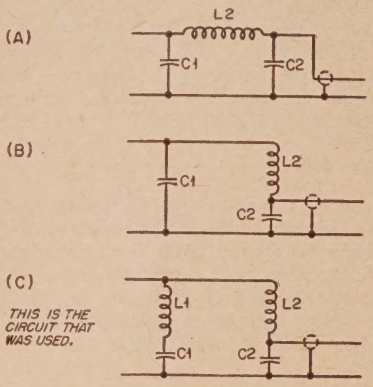


Fig. 2

To solve our original problem, we will use a method more suitable for high-frequency circuits. To begin with let us examine the pi-network circuit a bit. If the plate resistance is fairly high and the output is 50 or 75 ohms, capacitor *C2* in *Figure 2-A* is almost an r.f. short-circuit (when *C2* is changed by a relatively large amount, the adjustment of *C1* for plate current dip does not change much). Redrawing *Figure 1-A* to *Figure 1-B* and remembering that *C2* is a very low reactance and does very little tuning, we are back to an equivalent conventional parallel tank circuit.

The next step is to multiply the value of *C1* for the proposed lower input resistance circuit. This is accomplished by inserting a new inductor in series with the hot side of *C1* as shown in *Figure 2-C*. *L1* should be at right angles to *L2* to prevent inductive coupling between the two coils. To explain the functioning of the circuit it is best to draw a reactance diagram of a series LC circuit, of which *L1-C1* is typical; this is shown in *Figure 3* It can be seen from *Figure 3* that as we approach the resonant frequency f_0 from the low-frequency side, the

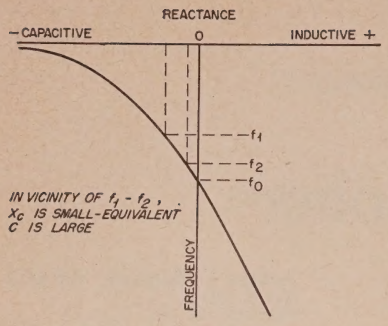


Fig. 3

reactance is capacitive and *small*. This means that branch 1 (*L1-C1*) looks like a large capacitor in this region. In the sample calculation which follows, the branch *L2-C2* is simply drawn as an inductor *L2* because this branch works far to the right of f_0 on its reactance curve.

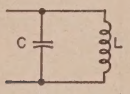


Fig. 4

$X_L = X_C = 500$ f = 4 MC
C = 80 μμfd
L = 20 MICROHENRY

In *Figure 4* let the required reactances of *L* and *C* be 500 ohms at 4 Mc. The value of 500 ohms has been calculated from the tube plate resistance by conventional methods. Generally these methods assume a Q of 4π for the plate resistance in series with tuning circuit. Incidentally $X_L = X_C = 500$ is typical for a class "C" stage.

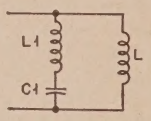


Fig. 5

$X_L = X_{BRANCH\ 1} = 250$ f = 4 MC
L = 40 MICROHENRY
IF C_1 = 80 μμfd AND
$X_{L1} - X_{C1} = -250$
$X_{L1} - 500 = -250$
$X_{L1} = 250$
L1 = 40 MICROHENRY

Now, in *Figure 5* we have our C-Multiplier circuit for the converted class "B" (SSB) stage. We will suppose that the required reactance in the two branches is 250 ohms, instead of the 500 which was required by the class "C" stage. Whereas *L* came to 20 microhenrys before, the new value is 10 microhenrys; if this were a plain parallel circuit the capacitor would have to be 160 μμfd. Suppose we wish to use the original capacitor of 80 μμfd. at *C1*; then what is the required value of *L1*? It's simply another 10 microhenry coil just like *L*.

It should be observed at this point that the voltage across the tuning capacitor is higher when using the C-Multiplier circuit; this is offset since it is used only with SSB and the linear stage doesn't have the high peak plate voltages of the class "C" stage which originally determined the capacitor plate spacing.

In conculsion it might be well to sum up the pros and cons of the C-Multiplier.

Debit items—

1. Requires some thoughtful calculation for design.
2. Preliminary adjustments must be carefully made.
3. Slight loss in harmonic suppression.

Advantages—

1. Economy—you can use your present tuning capacitor plus a simple home made coil.
2. It is easy to work out a single band switching system which will give optimum final plate circuits for both AM and SSB on all popular bands. ■

Hamfests, Etc.

West Vancouver, Canada

D. V. R. A. 11th A. O. T. N. R-U & B (T. D.)

How unimaginative can you get? You mean you haven't figured out that the above stands for the Delaware Valley Radio Association's Eleventh Annual Old Timers' Nite Round-up and Banquet (Turkey Dinner)? This well-known yearly event is dedicated this year to the 50th Anniversary of De Forest's grid-type vacuum tube, key to the vast electronics industry of today.

As usual the party will be *stag*. Date: Saturday evening, April 21. Turkey Dinner served promptly at 6:30 p.m. in the hotel ballroom, with a program including personalities prominent in early radio history. Awards given to holders of oldest amateur & commercial licenses, with a special award to the "Grand OM" whose operating experiences date back to the earliest days of wireless.

Everyone from Novices to Olde old timers are promised a good time. Make reservations before April 16. Write General Chairman Ed Raser, W2ZI, Delaware Valley Radio Association, Inc., Trenton, New Jersey.

Attn! N. Y. & N. J. Hams

April 21 is the date for the testimonial dinner for W2SN at the Robert Treat Hotel in Newark, N. J. Doors of the Rag Chew Room open at 4 p.m., main event at 6:30. Tickets available *by mail only* from Rev. Charles L. Wood, W2MVX, 15 Church St., Fair Haven, N. J. for $6. See details in "Letters to the Editor".

Hamfest in Orlando

The Orlando Amateur Radio Club holds its annual hamfest Sunday, April 8th, at Rock Springs, Florida. Festivities will begin with an auction of ham gear at 10 a.m. Here's your chance to clean out your junk box. Barbecue pork or beef dinner at 1 p.m., drawing for door prizes at 2 p.m. More than 50 door prizes will be given away with a special prize for advanced registrations. Advanced registrations will be $2. for adults, $1. for children, with tickets at the door 25% higher. Additional information may be obtained from Bob, K4BAK, 1008½ Lucerne Terr., Orlando, Fla.

Hamfest in Oklahoma

April 22 is the date set for the Hamfest sponsored by the Aeronautical Center Amateur Radio Club, Inc. Box 1082, Oklahoma City—at the American Legion Hall. Jot this one down on your calendar and/or drop them a card for more info on this gala event if you stand a chance of being anywhere in the vicinity.



Ever tasted an omelette made of Rockhopper Penguin eggs? Yum!

ZS2MI: Marion Island

Barry Jackson, ZS2MI
as told to William I. Orr, W6SAI

The time was 1600 GCT on a late fall day in 1955. Thousands of radio amateurs in W-land and throughout the world were going about their business of their hobby — traffic handling, VHF, local rag-chews, building equipment, or perhaps working DX.

To a small band of DX-hunters, it was a memorable day and an auspicious moment. Phones were firmly clamped over expectant ears, and a dozen receivers were tuned to 14,168 kilocycles. Twelve hams literally held their breath as they listened to Bryan Fordred, ZS6ANE of Johannesburg, Union of South Africa calling ZS2MI on schedule. A casual observer noting this tense situation would be puzzled. Why were a brace of dyed-in-the-wool DX-men wasting time over a mere ZS2 station? What was all the fuss about? Why this intense desire to work ZS2MI?

The tension mounted as ZS6ANE concluded his call and stood by. Twelve S-meters dropped from S-9 down to the noise level and there was a pause, broken only by background static and a lonesome diathermy, hurrying away for a rendezvous on 27 Mc. Suddenly a faint carrier appeared, disappeared and was then heard again. On occasional surges of signal strength, the buzz of a motor-generator set could be

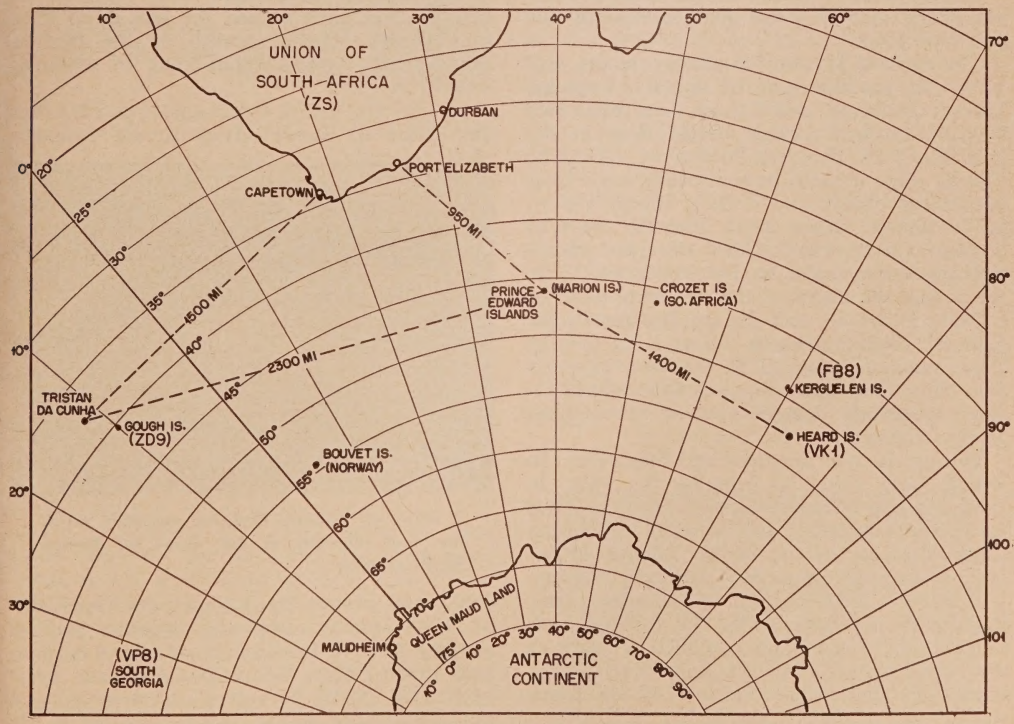


Fig. 1. Nine hundred and fifty miles from civilization, the bleak, wind-swept Prince Edward and Marion Islands are the location of a South African meteorological station and the home of ZS2MI. Swept by the winds from the Antarctic ice-pack, the temperature at ZS2MI averages forty degrees.



The Marion Island outpost is manned by nine men who remain on the island for approximately one year. The only other island inhabitants are birds and sea animals. The ZS2MI rhombic antenna is located to the right of the tiny settlement.

heard, putting a peculiar modulation hum on the phone signal. The casual observer noted the quickening of the pulse of the twelve listeners as the fluttery signal spoke: "ZS6ANE, this is ZS2MI of Marion Island calling you on schedule. I am ready to listen to the stations that are standing by for me. Over."

Marion Island! Where in the world is Marion Island, and why the great interest in this speck of land?

The story of Marion Island starts in the year 1772. On the thirteenth of January, Captains Marion Dufresne and Crozet discovered two bleak, windswept islands buried deep in the latitudes of the "Roaring Forties." Circling the islands, they marked them carefully upon their navigation charts and betook themselves to fairer climes. Crozet later gave the chart to Captain Cook, who sighted the two islands through stormy gales on December 12, 1776. He named the larger of the two *Marion,* after Captain Dufresne, and the smaller one *Prince Edward,* after the fourth son of King George III. Crozet, not one to be outdone, gave his own name to a bleak group of four islands located some ten degrees east of the original group (*Figure 1*).

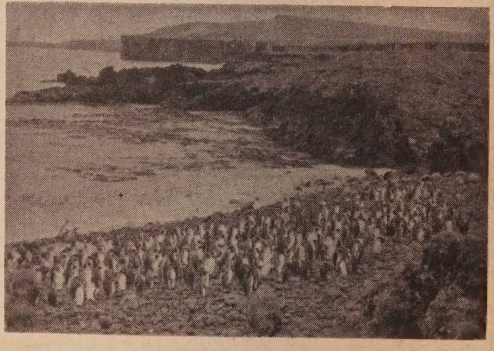
During the next hundred and fifty years the islands were visited at irregular intervals. In 1802 a group of sealers settled on the islands for a short interval, and in 1843 Sir James Clark Ross visited the islands on one of his famous expeditions to the Antarctic ice-cap.

Finally in 1873 *H.M.S. Challenger* under Captain G. S. Nares visited the isolated spot, sounded the waters and compiled a chart of the island. Until 1948 the only chart of the islands and the mysterious seas to the South was the one made by Captain Nares.

A mere handful of ships visited the Marion Island group up to World War II. In October 1940 of that year, *H.M.S. Neptune* landed a party on the island in search of allied prisoners of war thought to have been landed on the island by German raiders. It was thought that one of the German raiders known to have been operating in the South Indian Ocean in 1940, using Iles de Kerguelen (FB8XX-land) as a base, had visited the island. No POW's were found on the Marion Island group, however.

Treacherous waters and harsh and uncertain weather have caused the loss of at least four vessels in the vicinity of the Marion Island group, the last victim being the schooner *Seabird* in 1912.

In 1947 the British Government decided that the Union of South Africa should formally annex and occupy the islands. On December 28, 1947 Marion Island was annexed, and on January 4, 1948 Prince Edward Island became part of the Union. Soon after that date, amateur radio ZS2MI became a reality to intrigue the thoughts of ardent radio amateurs in all parts of the world.



A crowd of Emperor Penguins anxiously await the next shipment of QSL cards for Marion Island contacts.

What are the islands like? In the words of Barry Jackson, one of the operators of ZS2MI:

"Marion Island is entirely volcanic, rising

to a peak of 3890 feet, known as *Jan Smuts peak*. Geologically the islands are relatively young. All geologic samples that have been examined are identified as volcanic in origin, and in which constituent materials are fresh and which show no signs of weathering.

"There are no trees or shrubs of any kind on the island. What appears to be fertile soil is actually composed of waterlogged and fibrous vegetable matter very much like peat. In places this matter reaches depths of ten to fifteen feet. Walking over it is very tiring as well as dangerous. There is always the risk of sinking down through the growth, as in a quicksand bog. Above 2000 feet elevation this growth rapidly disappears. A Kerguelen cabbage is the only natural edible vegetation, and tastes not unlike spinach.

"As the islands are in the 'Roaring Forties,' very high winds are recorded, the maximum



The boys repair the feedline of the ZS2MI rhombic.

record to date being a blast of 108 miles per hour. Usual breezy days are limited to winds of 70 to 80 miles per hour.

"A depressing note was struck during the period November 1954-October 1955 when 90 inches of rain was recorded. Since it never rains heavily—usually only a drizzle—it can be seen that almost a year of constant rain was enjoyed (?) at ZS2MI. An average of just under 2 hours a day of weak sunshine was noted during this period. The temperature range during this exhilirating spell was –5°F to plus 62°F, averaging about 40°F for the period.

"The islands are the breeding ground of literally millions of birds and penguins. Several types of Albatross are abundant, including the Giant Albatross which grows to a wingspan of twelve to fourteen feet! Four types of Penguins, including the King Penguin have been noted, as well as different breeds of Petrel. The only land bird is a small Sheathbill, or 'Paddy' as it is known to the island staff.

"The only fish caught near the islands is a Rock Cod. There are thousands of Sea Elephants, some of them over twenty feet long and weighing three to four tons. Killer Whales are seen very often, which discourages sea bathing on the few tepid, mildly warm days.

"As for ZS2MI, the island staff usually numbers nine. Three Meteorological officers, a radio operator, radio mechanic, medical orderly, cook, carpenter and diesel mechanic. The purpose of the settlement is to make various meteorological and weather observations which are transmitted by radio to the Union of South Africa.

"Weather is noted by a Radio-sonde instrument, a little box gadget containing a light 2-meter transmitter attached to a balloon and released aloft. Radio pulses indicating air temperature, pressure and humidity are measured up to about 60,000 feet, at which altitude the balloon bursts, its mission accomplished. Coded radio signals from the transmitter unit relay this information to special receivers at the Marion Island Meteorological Base.

"Recreation on the island is usually limited to indoor activities. Photography, billiards, table tennis, reading, phonograph records and other diversions keep the men amused in their spare time. Outdoors, the only amusement is exploration trips over the bleak island, since boats are too dangerous due to the Killer Whale and very sudden weather changes. Each relief crew stays on the island about twelve months.

"And now we come to the greatest diversion for the men. Marion Island Radio Station ZS2MI! The complete station is located in one small building of the settlement and operates as station ZRS for commercial traffic. A *Standard Electric ITG-200* transmitter of 150 watts input is employed, feeding a Rhombic of 384 feet per leg which is beamed north-west on Capetown, South Africa. Primary power is obtained from a diesel plant. For several years, a *National HRO* receiver of ancient vintage was used, but a new *RCA type AR-88* receiver has been recently installed at ZS2MI.

"During 1955, ZS2MI abruptly disappeared from the 20-meter band as the lubricating oil supply was exhausted. Commercial schedules were maintained by running the power plant on home-made oil obtained from blubber taken from Sea Elephants!

"General amateur operation of ZS2MI has, in the past, been severely limited by poor radio reception conditions and a highly directive antenna, beamed on ZS-land. Permission has

[*Continued on page 112*]



A contact with Marion Island will produce one of these snappy QSL cards—a real collector's item.



Danny Weil,
VP2VB
/KZ5WD
/FO8AN
Tahiti

Aboard Yasme....Tahiti

My glorious arrival into Papeete harbor via the local pilot boat was quite a thrilling end to a successful voyage, and at 6 p.m., with the anchor well and truly embedded in Tahitian coral, I made haste to get myself cleaned up and get ashore. Needless to say, I wasted very little time in getting my dinghy over the side, and within a few minutes, I was safely ashore. The dinghy had almost filled up with water owing to all the planks opening up with the heat of the sun, leaving plenty of room for the Pacific to flow in. Quite frankly, I hadn't a clue where I was heading, except for the fact that I saw lights, and went towards them, only to find I had landed up in the local French Naval Base.

The guard, very much on the alert, warned me off, but my fortunate lack of knowledge of the French language, made our conversation a little difficult, and it finally finished up with him assisting me to get the dinghy out of the water, and then taking me to the officers mess. Drinks were soon flowing around the company there, and within 15 minutes, one of the officers who spoke English fairly well, invited me out to dinner. I explained to him that I was endeavoring to find Roland, FO8AD, and before we adjourned for grub, he made a detour around the town in an attempt to find him, without success.

Our next move was to a local restaurant, and there I saw my first Tahitian "Wahines" (pronounced *Wah-hee-nee*) . . . dames to you, and somehow, I seemed to lose my appetite . . . how would you feel, not having seen a real, live woman for two months? I knew at that moment my stay in Tahiti was going to be really good, and by the time I had tucked a load of real French cooking beneath my belt, I felt like a King.

By this time, it was getting fairly late, and the loss of sleep for three days, coupled with the food and the pleasant atmosphere, was making me feel drowsy, so my friend took me back to the Base, and there I embarked once again for the Yasme. Now most of you I expect would have fallen asleep without even stripping, but I found that the continual strain of being alert had made me more awake than ever, and finally I had to resort to a sleeping pill to get a spot of shuteye. I awoke bright and early . . . well,—early, anyway. I don't know about bright. I was feeling a little bleary-eyed, and my mouth tasted like I'd been eating a mixture of sawdust and seaweed.

I climbed out into the cockpit and looked around for my first real view of Papeete, and whilst I was hardly feeling in a poetic mood at that hour, it looked really good to me, and I was eager to see more of the place. Four cups of strong coffee, a dip over the side, then on with the engine, up with the anchor, and off we went to the quay side about a mile away. I wasn't too sure where I had to go, so I spent a pleasant hour cruising around in circles get-

ting my bearings, and very soon, I found the spot where other yachts were anchored. Out with the anchor again, and going slowly astern, I gradually brought Yasme with her stern close to the quay wall.

In no time at all I had many helpers aboard to assist with coiling up the ropes and taking the lines ashore . . . the ship was in a real mess, but before very long, with all my willing helpers, she was beginning to look less like a junk heap. A certain gentleman, whom I shall always remember as the "banana man," took several photos of my arrival and finished up with throwing me a large bag of bananas . . . he was the Chilean Consul, and afterwards we got to know each other quite well. Next thing, clearance by customs, which I must admit was made very easy for me. The officials were really decent in every way, in spite of the fact that I didn't speak the language. Permission was readily granted without any fuss, bother or red tape to bring all my radio gear ashore, plus my motor scooter and lots of other equipment. I found that this is customary with all yachtsmen, providing they ask first. Nothing is put in the way to hinder them, and I must admit the customs, police and other officials did all in their power to make my entry into Papeete an easy and happy one.

Reception Loud & Clear

Never in my life have I seen so many people to greet me. They were standing about 6 deep, and remarks in Tahitian, French and English were being passed back and forward about my single-handed voyage. Apparently I was the first Englishman to arrive in Tahiti single-handed from England, and as all Tahitians are sea-going people, they naturally appreciate anything out of the ordinary dealing with the sea. Within a very few hours, I had made many friends there, and they never seemed to tire of asking me questions about my voyage in their queer pidgin English. For one of the few times in my life, I felt really important, and the words of praise from these people, who, quite frankly, have forgotten more about the sea than I shall ever know, made me feel really good.

My first visit was to the British Consul to pay my respects, and also for mail. In the latter, I was greatly disappointed . . . there were very few letters, apparently, since Christmas time had delayed quite a bit of it, so it looked as though I was in for a long wait for my next letters.

The Consul, Freddy Devenish, was quite a feller, and my one regret was that all British Consulates through the world weren't supplied with a similar type of bloke. He had received a letter from Dick, KV4AA, advising him of my arrival, and also a request for an FO8 call. I must admit that he lost no time in getting on the fone to the Top Man, and within a week, I was furnished with a brand new license with the call FO8AN.

QTH?

The next problem was . . . where to put the rig? It had to be near Yasme and still be in a position where I could work without interference. Lo and behold, a very portly gentleman who is known to everyone who calls in Papeete as "Oscar", came forward with the very kind offer of the use of his home to put the rig. Oscar Nordman, to give him his full title, became more than a friend to me in my subsequent stay. His assistance in filling in all the necessary papers saved me lots of time, and he also gave me a small store room to put all my sails in. What more could I ask? He was always there to advise me what to do, where to go, and to tell me all those little things that make one's stay in a foreign port a happy one. . . . I know I shall never forget Oscar.

Up with the Skywire(?)

Now, the next item — fitting antennas up. This is something I shall always remember, as it reminds me of those happy times I spent



Just a few of my friends making merry at Perae, near Papeete.



Danny and chaperones

climbing the mast on Yasme, except in this case I had to climb a darn sight higher. Matters were made easy to start with by the use of a long ladder, but after that, I was on my own. That tree, believe it or not, was over 90 feet high, and by the time I'd reached the top, I hated everything dealing with radio and you know why. . . . I had left the darned insulators down below. Well, I lit a cigarette, sat, and looked around me, thinking . . . what the heck, what am I doing climbing up trees like a great big school kid? Below I had my usual audience, but to endeavor to ask one of them to tie the insulators on to the antenna if I dropped it down was beyond my linguistic abilities, and I realized that it would be far easier in the long run to go down again.

Oh boy, that trip down the tree was a darn sight more difficult than sliding down the mast of Yasme. I have no doubt that many of you have climbed trees, and can appreciate what I say when I tell you the descent is far more difficult. The thought that I would have to do this again didn't make me feel any happier, but the thought also came into my head that all the Hams would appreciate my very fine climbing efforts. . . . I wonder . . . I bet you mugs would have just laughed your blinkin' heads off to see me in that predicament.

By the end of the day I had finally rigged one end of the antenna. Now, the next part was to get on top of an adjacent building and fix it there. This meant climbing out onto a very narrow parapet, and as usual, the inhabitants of the hotel had their wash hanging out to dry, so when I came along with my nice dirty hands to fix this darned chunk of wire their remarks to me, mainly in Tahitian, were definitely not complimentary. I just smiled in a stupid sort of way, and hoped that they understood there were many more thousands of people like me called "Hams" in the world, and we were all slightly touched . . . we had to be to do what I was doing. Finally the receiving antenna was fixed. The transmitting antenna was a simpler job, as all I did was to fix one end to the top of the hotel, and the other I sloped down direct to Oscar's home.

And It Works!

Right . . . antennas OK, earth OK, now to try the rigs. My first contact was a fone with ZL1PA, and then shortly afterwards, JA5AF on CW, with FB reports from both, so it seemed that all that work and cussing had been worth it.

Now I have omitted here a very important item, and that is our friend's assistance. . . . Roland of Rapa fame . . . FO8AD. When I arrived in Papeete, both of the transmitters had given up the ghost, and my Hammarlund receiver was not really doing it's best. Without any discussion or delay, Roland had the whole shooting match around to his workshop, and within 48 hours, everything was 100% fine. I must admit now, in fairness to the Elmac transmitters, that in each case the trouble was very small, a resistor in both cases.



Painting the Yasme—my helpers.

Many of you have had contact with Roland in the past, and I would like to put it on record now that he's a good guy in more ways than one. Have heard from him today, and he tells me that he is returning to France in a month or so, so by the time this gets into print, if Wayne doesn't toss it into the waste basket first, Roland will probably be working from F-land.

Now before I go any further, you may as well know here and now that as far as radio is concerned, the rest of this little story will be deficient of all radio terms, arguments and what have you. Let it rest now, that I have been on the air practically every day on CW and Fone, have made lots of QSOs, and I hope, given

many of you a new country. I realize in my own little way that this is hardly a *rare* spot, but there are apparently many of you who still need an FO8 QSO.

Papeete

I have not yet managed to get clear around the island. My time has been pretty well accounted for in getting the Yasme ready — plus my radio work. But I have managed in my very short stay here to get a good idea of the people and the place. Papeete is the one and only real town here, and it is fitted out very thoroughly with all modern inconveniences. From a general standpoint, time does not exist, and to get a job done here is literally impossible within a few weeks. . . . I know . . . it took one man three weeks to connect a bottle of methane gas to my refrigerator, and for his very fast workmanship, he charged me the sum of 300 francs . . . around 5 bucks to do a job that should have taken 10 cents worth of time. I had the gas, but no darn connector, so he held the whip hand.

Everything here is expensive, so don't any of you guys think you can come and live here on 5 dollars a week. One can, if he can get a taste for native food, live really cheaply; I will give you an example of one week-end I spent with some Tahitian friends.

I drove out of the town for maybe 3 or 4 miles, then after going off the beaten track a short way, came to a small clearing in the forest of palm and mango trees. Situated right in the centre were three small huts, all built of the palm tree. First, about 6 uprights are buried in the ground made of the trunk of the palm, then cross members are added . . . same tree. Then, about 4 men or women will get cracking platting the palm fronds . . . leaves to you, and by a very nifty system, lay them in such a fashion as to form a roof, which I will tell you here and now is 100% water tight. Next they build a sort of half wall of the same material, leaving the ends of the hut open. The floor is usually well-trampled earth. The furniture, consisting of table and stools, is usually made of a wood called *Tou*. This is Tahitian for the name of the tree, but I must admit it is very hard and quite admirable for the use to which it is put.

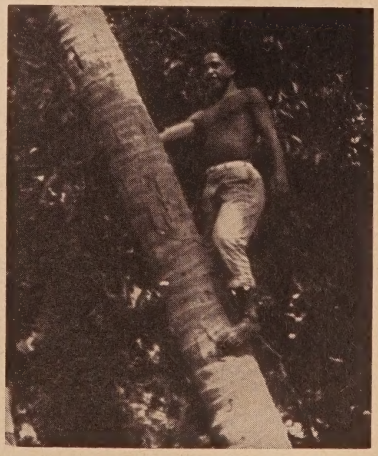
Next we come to the cooking arrangements. These consist of a fire which is first started with any odd wood that happens to be kicking around the joint, and this in turn heats lots of stones about the size of coconuts. The meat is then wrapped in banana leaves and buried under the stones for whatever time it takes to cook, and then is removed, ready for the table. Naturally, any stews, etc., are made in pots on top of the stones. This is an admirable form of cooking as there is very little smoke, and the meat is well and truly cooked. Incidentally, this fire is inside the hut.

Having disposed of the cooking arrangements, we come to the actual food itself. The meat invariably is suckling pig of which there's a great abundance on the island. In fact, in certain parts, there are thousands running wild. There is beef as well, but most of that, I believe, is imported. Fish, as you can well understand, is more than plentiful and these people know about two thousand ways of preparing it. Fruits are in abundance everywhere. This is the sort of meal I experienced on my first day in this little Tahitian compound: Before we sat down to food, Tahitian beer was passed around. (Oh boy, is this stuff potent!) I have never tasted the "moonshine" of America, although I have heard about it, but I think Tahitian beer will certainly give you boys some creative ideas.

First they crush up some bananas and pineapple, mix with brown sugar and water. This they leave for three days, and then . . . Wow!!!!!!! Now I am one of those blokes permanently on the wagon, but one has to accept everything from these very kind people, so just to be sociable, I knock back about a small wineglass full of this liquor. . . . I seem to remember waking up about two hours later, and what a head I had. Well, having got over that miniature jag, we all sat down to eat.

First comes a concoction consisting of raw fish, tomatoes and lots of green stuff mixed in . . . this is the hors-d'ouvre. After that, comes banana poi, made of bananas and the flower of the magnioc flower, all cooked together, then comes more raw fish and fried fish with other vegetables. Having disposed of this we come to shredded coconut mixed with bananas . . . I thought this really good, then we had loads of roast pig with sweet potatoes, and other vegetables that I can't even pronounce, let alone try to record them here.

For bread, we ate the bread fruit, which has



Fortunately I found a helper on the antenna project

a taste very similar to the taste of bread, but a tendency to be on the dry side. For butter, we had the Avocado pear, which, when opened up, has a soft inside tasting like butter. Coffee, locally grown, roasted and ground, was made, with coconut milk in lieu of cows milk, and to finish up, there were several types of fruit to eat . . . mangoes, pineapple, pawpaw, oranges, and other fruits far too numerous to mention.

Now you will see from what I have told you here that the genuine Tahitian has lived in the past, and will continue to live in the future, completely off the soil around his own little shack, until such time that civilization steps in and completely encourages him to eat canned foods. In years gone by, from what I can gather, the Tahitian had no real need to work . . . after all, he had a good roof over his head, and food in abundance within arms' reach, so why should he go out into our civilized world and work 8 hours every day to make lots of money? I know, as you do too, that ultimately the Tahitian will die out, but at the moment he is in many ways like his forefathers, and I am very happy to know that I can see and also live their way even for a short time.

Now to proceed with the weekend's entertainment. After we had all eaten our fill, and I can assure you the host continually pressed me to eat all the time (afterwards I could hardly move), we all settled down outside the hut and the music began. Guitars and ukuleles were brought out, and the whole company started to sing. Very shortly there were many of them dancing too.

I must confess right now that to describe this music is an impossibility for me. It has a rhythm I have never experienced before, and the singing was so well harmonized that one would think they had all been coached beforehand. The dancing, once again, is something I defy any man to write about. The Tahitian has a way of moving his body and that goes for both sexes, that really gets you, and I sat there enthralled for some hours just happy to watch, and all the time with this beautiful singing in the background. Naturally my camera was at work, but what can a "still" camera depict to you? I would have given anything for a movie camera just then. I had the tape recorder going, which was some help, and I only wish there were some way the music could be broadcast to all you lads and lassies. The music and dancing went on right through the night. Around daybreak the party folded up, and everyone wended his way homeward. I was invited to stay on the rest of the day, which I did, enjoying lots more of their very fine grub.

Late in the afternoon, a friend came along with his car to pick up me and the tape recorder, and I finally got back to the boat. Besides the cargo of recorder and camera, the car had been filled up with bananas, pineapples and far more fruit than I could eat in a week . . . all for me. How can I express my feelings about these kindly people? Nowhere in the world does one meet with such all-out hospitality. Please don't misunderstand me here, as I have said in the past how well I have been treated in KV4 and KZ5 land, but this Tahitian 'treatment' is so different that I find it hard to express myself.

Some of you will know that I have arrived in this place in the middle of the typhoon season, and whilst it's very nice to be holed up here for the bad weather, it's not so hot when I want to get all the varnish work and painting done. The last time I fitted the old tub out was in St. Thomas, and since then she's traveled over 7000 miles through some pretty tough weather. Every bit of the varnish has been washed off, and the paint work looks like nobody's business. Every sail has to be sewn, as they have all been ripped somewhere, so what with painting, sewing, and radio, I've not got much spare time around this joint.

The evenings can be spent very pleasantly in one of the local bars. There are 4 of some consequence, namely the Zizou Bar, Quinns (an American joint), The Col Bleua, and the Tropiques, which is really a super-restaurant. There are of course others, smaller and bigger, but one usually finds the locals stuck in one of these four places. For preference, I have always kept to the Zizou Bar which, although very tiny, always plays Tahitian music, and is so badly lit inside that one can be extremely comfortable and spend a very pleasant evening in any way one likes.

Now you probably think I am one of these very good blokes who can ignore women and



Two of the gal-manned racing pirogues

still be happy. Well, to tell you the truth, I can manage without them, but its definitely not unpleasant when there are plenty around, particularly those of the Tahitian type. One is not considered human if one does not associate sometime with a Wahine. Yes, I will admit that I have had some very pleasant times here, and when the day comes for me to depart, I won't like it, but it has to come sometime. Well, the sooner the better, I guess, as I am certainly itching to get to sea again, and that feeling has a greater call on me than anything else in this world.

I originally intended to stay here for two months, but the way things are going right now, it looks as though it will extend itself to three. I am dependent on the weather, and I'm afraid it's not being very helpful. But by the time you see this, I shall most likely be in Canton . . . I hope.

One of the big days here is when the schooner either leaves or arrives from one of the other islands. It is invariably loaded well below its normal water line with the biggest collection of things and people I have ever seen. There is bedding, boxes of odds and ends, goats, pigs and as many human beings that can be crammed onto the decks, and then off she goes to another island.

This happens about once a week, and I get quite a kick out of wandering down the quay side and watching all this great, big crowd sorting out their belongings. All the time they are in a good humor, and never have I seen any quarrels on these days. Another amusing experience is to travel on the bus here. That is usually crammed solid with people and animals, and with the poor old tub groaning under the weight, off it goes on its way. On numerous occasions it stopped for someone to get on, and whilst I thought it was already full, somehow or another, room was always made for someone else. I had to smile in one instance. Someone yelled for the bus to stop, and after catching it, told the driver that the rest of the family would be along later, so, most of us got out, had a stroll around, and when the rest of the crowd arrived, being eight in all, we all somehow squeezed in again and off we went.

Every time I saw something worth photographing, the driver always stopped for me, and never did I hear one complaint from anyone. Naturally there were the usual guitars on the bus and there we were bowling along the road at breakneck speed with everyone singing their heads off. When on odd occasions we stopped to let someone alight, it was quite a performance finding their luggage. I doubt very much whether these busses run on any sort of schedule. In fact, I might even say I doubt whether anything on this island is run to any specific timetable, but nobody seems to worry, and they are always happy. I did notice on one or two occasions in the late evening, several of the Tahitian lads would get aroused over something . . . usually a woman, in fact always a woman,



Relaxing after a more or less strenuous Hula

and there would be a fight.

Now these lads are really beefy, and I should hate to be on the wrong end of their fist if one ever let fly at me. I don't know why it is, but they are never really satisfied until one has actually been knocked clean out; then the victor will go away with his friends telling them all about how good he was and precisely how the battle was fought. The poor blighter that gets knocked out may or may not have someone help him up, in which case he either lies there until he comes around, or maybe someone will drag him to the side of the road out of harm's way. I'm afraid the vanquished here are not very popular.

One evening I noticed a big crowd, and being nosy like everyone else, I pushed my way through to have a look. Lying on the floor, literally tearing each other's hair out, were two Tahitian girls, and were they going it. No one attempted to stop them, and they really showed me how tough they were. The fight lasted maybe 20 minutes, and then the local gendarmerie rolled up to take charge. Even when the police had grabbed both of the girls, they were still struggling and trying to knock each other's block off . . . what stamina they must have! . . . I think they could maybe show the lads a few things about scrapping. Fortunately these sorts of fights are rare, and I learnt afterwards that if there is any fighting going on, its much better for me to have an appointment the opposite way.

Another great event here was the racing with the pirogues. Now for you types that don't know what the heck I'm talking about, a pirogue is a large chunk of tree, that has been laboriously hollowed out, pointed at both ends,



Temporary masthead of the Yasme

then with a couple of chunks of wood tied athwartships, one forward and one astern, they attach another piece which rests in the water to stop them turning the darn thing over . . . this chunk of wood being called the outrigger. The ones I saw racing were propelled by paddles, but others here are fitted with sails. They are reputed to be the fastest boats in the world, and under canvas with a fair trade wind, they'll reach 20 knots. The boats are prevented from capsizing by one of the crew climbing out on the outrigger, and another will sit and bail all the time, as they are certainly very wet boats to sail. It is steered with a massive great paddle which must need superhuman strength to handle. When they want to go back the other way, the boat is never turned around, they just alter the sail, and the helmsman will go to the other end of the boat, and the stern then becomes the bow.

Anyway, to get back to this racing racket. There were the single-hulled pirogues and the double-hulled. Some were manned by men, and others by gals, and *did* they make those chunks of tree nip through the water; The last race of the day was strictly for the Wahines, and they started away — all dressed in the native costume and looking really picturesque. When they had reached the far end of the course, which incidentally was about 4 miles away, a dirty great squall came up and down came lots of very wet water. It just dropped down in buckets full, and the girls had all their time cut out bailing the pirogues.

I was watching them through binoculars, and saw that half were bailing, with the other half paddling like blazes. There were fourteen of these lovely Tahitian specimens of femininity in each double canoe, and to see the way they put them through their paces was a sight for sore eyes. As the race gradually drew to a close, the rain came down heavier, and they paddled and bailed faster than ever, and then the race was over . . . but did they all fall over their paddles like a set of varsity blues at the end of a race . . . not likely, they all started again in the vicinity to see who could reach the shore first, and although they all looked rather be-draggled and wet, they were as usual all laughing and full of life . . . what gals! . . .

This race incidentally was put on in aid of two French warships that had come into Papeete, and I was one of the more fortunate ones who were permitted to go on one of them to take photographs.

These two ships stayed in Papeete for one week, and was that a week. I do believe that every girl in Tahiti and practically 95% of the girls from the adjacent islands were there in Papeete to look after the sailors. Every bar was full to overflowing, and dancing and singing went on interminably every day and all through the night, no one seeming to tire of the continual jollity. The whole town was lit up, as were all the sailors, and of course the local lads didn't go much on it, as I do believe that most of them lost their girl friends in that week.

The time ultimately came for all the tars to get back aboard, and as the two ships pulled out of the harbor, thousands of Wahines stood and watched their old loves depart. The water was thick with flowers that had been thrown over the side by the sailors, as all of them had been fitted out ashore with the usual garlands around their necks and upon their heads. These garlands are made of the Tahitian flower called Tiare, and the garlands are called Hei Tiare . . . that's Tahitian lingo to you. Anyway, the local supersition goes that if the garlands drift back to shore, the person will return, and vice versa. Directly the ships cleared the pass, off went all the girls to their old boy friends, and those that didn't have old ones came looking for any odd bloke that happened to be kicking around the joint . . . needless to say, I'd got myself fixed up before the ships came in, so I wasn't worried . . . much.

It may interest you jokers that whilst I write this, I have a Wahine standing by my side . . . *strictly* for the purpose of getting the true facts down . . . Anyway, she is teaching me a little French and Tahitian (what else is she teaching me? Is that *your* business? . . . you stick to CW).

Oh! Life can be really wonderful here, and one loses all the inhibitions that civilization has had drummed into him, but for my part, I have to work darned hard, and have very little time

for relaxation, so it looks as though I'm going to have to sail around the world again one day with a little more time and money to spare, then I can stay in Tahiti a little longer, and not have to worry about getting to all sorts of queer spots in other parts of the world.

To get to another point, and away from my pet subject, I noticed that practically all the shops are run by Chinamen, and although I have covered the place pretty well, I have no recollection of seeing a Tahitian running a store.

The Chinese are very enterprising business people, and from what I can gather, originally came to the island as laborers, but soon turned the tables and became the men of substance with the Tahitians doing the laboring for them. It is a little odd to walk into these stores and find many of the wares described in Chinese. Since I've been here, I've had my hair cut by a Chinaman, a Tahitian and a Frenchman, and the one good thing I can say about them all is, I was able to sit back and relax without being bothered with a lot of idle talk . . . "I no comprez . . . Francais, Tahitian, Chinese", and that stops all the talk pronto.

Talking about business etc., here, there is no income tax, but the local government gets it another way, and that's by taxing every darned item that comes onto the island. I had a small idea of what the duty is here. A small parcel came to me from the States, and the actual value was 5 dollars; the duty payable worked out to about 2 dollars, but fortunately for me, one of the local Hams here, Joe Bourne, is an official of the Customs, and was able, by filling in a few forms, to permit me to have all the stuff put straight aboard the Yasme without duty being paid. This has helped considerably, as the old coffers are getting mighty low, and every cent that I can save can be put to a much better use than helping the local government. They do get a small income from the copra produced, but the price has fallen so low that things are a little tough for them. The trouble today is that so much stuff is being made synthetically, it doesn't pay to ship the copra, so it looks as though in a few years' time, they won't be making it any more. A fair income is made from the visitors, because this is a pleasure resort, but even that is seasonal, and at the present moment very few visitors are arriving. Some years ago, pearling was quite an industry in the surrounding islands, but once again the market seems to have fallen on pearls . . . seems they can't produce anything around here that is needed . . . except Wahines . . . now how the heck did we come around to talking about women again?

Have spent some considerable time here in getting photographs, and of course have been doing all the processing on board, also making the enlargements. I am sending a whole sheaf of them to *CQ*, but of course they won't be able to stick them all in the magazine . . . I'm wondering right now which ones they *will* choose . . . (this should separate the men from the boys up there).

You know, it's quite a job doing photography on the Yasme. I am working in temperatures of 85 to 90 all the time, and those who dabble in this art will realize that blowing up a 35 mm negative without grain under these temperatures is no easy matter. . . . Incidentally, I shall always be pleased to receive any advice from you photo fans re processing in high temps, in fact, I'm ready to receive advice on anything, so drop me a line sometime . . . mail is always very welcome. Now this business of my scheduled call at the Tokelau group. I'm saying right now, so that you will all know, I have checked and double checked on this group, and according to everything I've heard, there just ain't no place to anchor Yasme in safety, and as to getting all the gear ashore, well, that's practically an impossibility! So I'm real sorry, but the

[*Continued on page 118*]



Welcome but temporary crew of the Yasme



Forecasts By:

George Jacobs, W3ASK/W2PAJ

607 Beacon Road

Silver Springs, Md.

General Propagation Conditions, April:

The continued rapid rise in sunspot activity, and the increased hours of daylight in the Northern Hemisphere should result in a considerable improvement in daytime propagation conditions on the 15 and 20-meter bands. Around-the-clock DX propagation will be possible on 20 Meters and the 40-meter Band will open for longer periods of time during the hours of darkness. Propagation conditions will

ALL TIMES IN EST

EASTERN USA TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Western Europe	1100-1500 (1)	0700-1300 (3) 1300-1530 (4) 1530-1700 (2)	0500-0700 (3) 0700-1400 (2) 1400-1830 (4) 1830-2100 (2)	1730-0000 (4) 0000-0300 (2) 1900-0100 (3)*
Southern Europe & North Africa	1100-1600 (2)	0700-0830 (3) 0830-1300 (2) 1300-1630 (4) 1630-1800 (2)	0500-1400 (2) 1400-1700 (3) 1700-1900 (4) 1900-2100 (2)	1800-0300 (4) 2000-0100 (2)*
Near & Middle East	0900-1400 (1)	0700-1100 (1) 1100-1500 (2)	1300-1500 (2) 1500-1800 (3) 1800-2100 (2)	1930-2300 (2) 2000-2200 (1)*
Central & South Africa	0900-1200 (2) 1200-1700 (3)	1200-1600 (3) 1600-1730 (4) 1730-1900 (2)	1400-1600 (2) 1600-1930 (4) 1930-0030 (2)	1800-2300 (3) 1930-2200 (1)*
Central & South America	0800-1500 (3) 1500-1730 (4) 1730-2000 (2)	0600-0900 (3) 0900-1600 (2) 1600-2000 (4) 2000-0200 (1)	1600-1800 (2) 1800-2100 (4) 2100-0300 (3) 0300-0800 (2) 0800-1600 (1)	1700-1900 (3) 1900-0400 (4) 0400-0700 (2) 2100-0400 (2)*
South East Asia	NIL	0800-1000 (1) 1600-1900 (1)	0600-0900 (2) 0900-1030 (1) 1600-1800 (1) 1800-0000 (2)	NIL
Australasia	1700-2000 (1)	0800-1000 (1) 1700-1930 (3) 1930-2130 (1)	0630-0800 (3) 0800-0930 (1) 1800-2000 (2) 2000-0200 (3)	0200-0730 (3) 0300-0630 (2)*
Guam & Pacific	NIL	1500-1730 (1) 1730-2000 (2)	0630-0800 (2) 1700-2100 (2) 2100-0100 (3)	2100-0630 (1)
Japan & Far East	NIL	1600-1730 (1) 1730-1930 (2)	0600-0900 (2) 1700-1900 (2) 1900-2200 (3) 2200-0000 (2)	0000-0600 (1)
Antarctica	1300-1800 (2)	1200-1500 (1) 1500-1700 (2) 1700-2100 (3)	1500-1900 (2) 1900-0000 (3) 0000-0100 (2) 0100-0600 (1)	2300-0600 (2) 0000-0530 (1)*

ALL TIMES IN CST

CENTRAL USA TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Western Europe	1200-1500 (1)	0800-1100 (1) 1100-1230 (2) 1230-1500 (3)	0500-1200 (1) 1200-1400 (2) 1400-1700 (4) 1700-1900 (2)	1800-2000 (2) 2000-0130 (3) 2000-0000 (1)*
Southern Europe & North Africa	1000-1500 (2)	0630-1300 (2) 1300-1500 (4) 1500-1630 (2)	0500-1400 (2) 1400-1630 (3) 1630-1800 (4) 1800-1930 (2)	1830-0000 (3) 2000-2330 (2)*
Central & South Africa	0900-1200 (2) 1200-1700 (3)	1200-1530 (3) 1530-1730 (4) 1730-1900 (2)	1400-1600 (2) 1600-1900 (4) 1900-0000 (2)	1800-2200 (3) 1930-2130 (1)*
Central America & Northern South America	0900-1500 (3) 1500-1730 (4) 1730-1830 (2)	0600-0900 (4) 0900-1600 (3) 1600-1900 (5) 1900-0200 (1)	0530-0730 (4) 0730-1400 (2) 1400-2100 (5) 2100-0530 (3)	1800-0400 (4) 0400-0700 (3) 1830-0400 (3)*
South America	0900-1500 (3) 1500-1800 (4) 1800-1900 (2)	0600-1600 (3) 1600-2000 (4) 2000-0200 (1)	0600-0800 (3) 0800-1600 (2) 1600-2100 (4) 2100-0200 (3)	1800-0600 (4) 1900-0500 (2)*
Japan & Far East	NIL	1500-1700 (2) 1700-2100 (3)	0700-0900 (3) 1500-1700 (2) 1700-0000 (3)	0000-0630 (1)
South East Asia	NIL	0700-0930 (1) 1600-2000 (2)	0700-0900 (2) 1600-2000 (1) 2000-0030 (2)	2000-2300 (1) 0100-0730 (1)

ALL TIMES IN CST

CENTRAL USA TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Hawaii	1500-1700 (1) 1700-2000 (2)	1000-1600 (3) 1600-2000 (4) 2000-2200 (3)	2300-0400 (3) 0830-1000 (3) 1000-1600 (2) 1600-2000 (3) 2000-2300 (5)	2100-0730 (4) 2230-0630 (3)*
Australasia	1600-2000 (2)	0730-0930 (2) 1500-1700 (2) 1700-2030 (3) 2030-2200 (2)	0630-0800 (3) 0800-0930 (2) 1700-2000 (2) 2000-0100 (3) 0100-0400 (2)	0300-0730 (3) 0400-0700 (2)*

ALL TIMES IN PST

WESTERN USA TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Europe & North Africa	NIL	1000-1130 (1) 1130-1330 (2) 1330-1430 (1)	0800-1100 (1) 1100-1300 (2) 1300-1700 (3) 2200-0030 (1)	1800-2300 (1) 1900-2200 (1)*
Central & South Africa	1300-1500 (1) 1500-1730 (2)	0500-1100 (1) 1100-1400 (2) 1400-1730 (4) 1730-1900 (2)	1200-1400 (2) 1400-1600 (3) 1600-1900 (4) 1900-0200 (2)	1800-2200 (3) 1900-2100 (2)*
South America	0900-1100 (3) 1100-1600 (4) 1600-1900 (3)	0600-1300 (2) 1300-1500 (3) 1500-1800 (5) 1800-2000 (3)	1400-1600 (2) 1600-2000 (4) 2000-0500 (3) 0500-1400 (1)	1800-2000 (2) 2000-0000 (3) 0000-0400 (2) 2000-0400 (2)*
Guam & Mariana Islands	1300-1900 (2)	0700-0930 (2) 1100-1400 (3) 1400-1830 (1) 1830-2100 (3)	0700-0930 (4) 0930-1100 (2) 2100-2300 (2) 2300-0700 (3)	0100-0700 (3) 0200-0500 (2)*
Australasia	1130-1400 (4) 1400-1800 (3) 1800-2000 (4) 2000-2200 (2)	1000-1200 (3) 1200-1800 (2) 1800-2100 (4) 2100-0000 (2)	0300-0500 (2) 0700-1000 (2) 1000-1900 (1) 1900-2200 (2) 2200-0300 (4)	2200-0700 (3) 2300-0600 (2)*
Japan, Okinawa & Far East	1400-1600 (2) 1600-2100 (3)	1200-1400 (4) 1400-1900 (2) 1900-2200 (4)	0200-0700 (2) 0700-1100 (3) 1100-2000 (1) 2000-2200 (2) 2200-0200 (3)	0000-0630 (3) 0100-0530 (2)*
Philippine Islands & East Indies	1400-2000 (2)	0800-1100 (2) 1300-1600 (3) 1600-2000 (1) 2000-2200 (2)	0700-1000 (4) 1000-1300 (2) 2200-0700 (2)	0200-0600 (1) 0300-0500 (1)*
Malaya & South East Asia	1600-2000 (2)	0800-1100 (3) 1400-1600 (2) 2000-2200 (1)	0700-1400 (2)	0400-0630 (1)
Hong Kong, Macao & Formosa	1600-2030 (1)	1300-1500 (3) 1500-2000 (1) 2000-2200 (2)	0700-1000 (3) 1000-1400 (2) 2200-0200 (2)	0200-0600 (2) 0300-0500 (1)*

SYMBOLS FOR NUMBER OF DAYS CIRCUIT PREDICTED TO OPEN:

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

*Indicates time of possible eighty-meter openings.

The CQ Propagation Charts are based upon a CW radiated power of 150 watts and are centered on Washington, D. C., St. Louis, Mo., and Sacramento, California. These forecasts are calculated from basic ionospheric data published by the CRPL of the National Bureau of Standards and are valid through May 15, 1956.

be somewhat poorer on 80 and 160 Meters as a result of seasonal increases in ionospheric absorption and static levels. Sporadic-E propagation, capable of reflecting signals as high as 6 Meters for distances of upwards to 1300 miles or so, begins to increase during April.

The following is an overall picture of band conditions forecast for April, 1956 with a discussion of the qualitative changes in each amateur high frequency band from month to month. For specific times of band openings for a particular circuit, refer to the *CQ DX Propagation Charts* appearing on the opposite page.

6 Meters:

During the high solar activity period of the last sunspot cycle, 1947-51, it was observed that many late-afternoon or early evening 6-meter openings occurred on north-south paths during the spring and fall months. These openings occurred during periods of time when it was believed that the F-2 layer MUF was considerably *below* 50 Mc, and the mode of propagation responsible for these openings has not yet been completely explained. Nevertheless, since we are rapidly approaching another period of maximum solar activity, there is good reason to believe that openings of this nature may begin to occur again during April and the spring months. There is also a good possibility that the 6-meter band will open following the breakup of severe ionospheric storms, or following the occurrence of considerable auroral activity, both of which have a tendency to occur more often during the spring and fall months than at any other time of year.

10 Meters:

Fewer east-west openings expected during April, but north-south openings are expected to improve. World-wide DX will be possible during the daytime hours of many days during the month. Optimum conditions on this band will have a tendency to peak *later* in the day than during the winter months. Regular layer short-skip openings between distances of 1300 and 2400 miles is expected on several days during the month. Sporadic-E, short-skip propagation, will also increase during April with openings between 800 and 1300 miles possible for a small percentage of the time.

Last Minute Forecast

Moderate to severe ionospheric disturbances, with generally erratic shortwave conditions, are forecast for the periods April 15-20 and 26-27. Periods of exceptionally good shortwave conditions are forecast for April 8-14 and 22-24, with the remainder of the month seasonably normal.

15 Meters:

Daytime propagation conditions remain excellent on this band, with DX possible to all areas of the world. The band is expected to open shortly after sunrise, *local time,* and remain open until considerably after sundown. Optimum conditions will occur during the late afternoon and early evening hours. Regular layer short-skip propagation should be possible on most days, with the skip between 750 and 2400 miles. Sporadic-E openings, between distances of 600 and 1300 miles, are also expected to occur during several days. Since iono-

"The Sunspot Story: Cycle 19"

We have received a considerable amount of favorable comment regarding Part 1 of "The Sunspot Story: Cycle 19" which appeared in last month's *CQ*. Part 2 of this timely article was originally scheduled for publication in this month's issue of *CQ*. As a result of the tremendous interest shown, and because shortwave radio conditions during the next few years may be better than they have ever been in the history of radio, we have asked our Propagation Editor, George Jacobs, W3ASK, to expand the original Part 2 manuscript to include a more detailed discussion of the rapid rise in sunspot activity in relation to shortwave propagation conditions on each amateur band Six through 160 Meters. W3ASK will also discuss the effect of increased solar activity on the VHF spectrum and the possibility of long-distance, *world-wide* TV reception. The revised manuscript will also include a discussion of the influence of the solar cycle upon other phenomena. Because of the considerable amount of research involved in preparing this article, it is not possible to publish Part 2 of "The Sunspot Story: Cycle 19" until June. . . . It will be another *CQ* Exclusive . . . *don't miss it!*

spheric absorption on 15 Meters is approximately one-third the value of that on 20 Meters, this band is considerably better for low power transmissions than is 20 Meters.

20 Meters:

Fair to good world-wide DX propagation conditions are expected from sunrise to considerably past sunset, with several north-south openings possible around the clock. A higher degree of ionospheric absorption, as a result of the rapid rise in solar activity, may cause signals to be exceptionally weak during the late morning and early afternoon hours, with the band reaching optimum conditions during the late afternoon and early evening hours. Short-skip propagation between distances of 250 and 2400 miles will be possible during the daylight hours, and on several days the band should remain open until late in the evening, or possibly around the clock.

40 Meters:

Seasonal ionospheric absorption and static levels continue to increase on most circuits, but generally fair and sometimes good DX propagation conditions are expected from shortly before sunset to shortly after sunrise, *local time*. While signals during the early evening hours will be weaker than they were during the winter months, the band will remain open for longer periods of time during the hours of darkness. Short-skip propagation should be possible around the clock, with daytime skip distances between 50 and 750 miles, increasing to beyond 2400 miles during the evening hours.

80 Meters:

High static levels, and a high level of ionospheric absorption, will make DX propagation conditions on this band generally erratic. On several days however, fair propagation conditions should exist to many areas of the world during the hours of darkness, that is from after sunset until sunrise, *local time*. Short-skip propagation should be possible around the clock, being limited to a maximum distance of approximately 300 miles during the daylight hours, increasing to beyond 2400 miles during the hours of darkness.

160 Meters:

Because of heavy ionospheric absorption and high noise levels at these low frequencies, skywave propagation via the ionosphere *is not* possible during the daylight hours, and groundwave propagation is limited to only a few miles from the transmitter. During the hours of darkness, when ionospheric absorption decreases considerably, short-skip propagation up to distances of several hundred miles should be possible nightly, and when static levels are low the skip may extend beyond 2400 miles.

See you at the 1956

Dayton Hamvention

SATURDAY, APRIL 14, 1956

Mobiles may call in from anywhere in the 75, 40 or 10-meter phone bands. W8HEQ will monitor these bands continuously from 0700 to 1300 EST. 40 and 75-meter mobiles will be answered by W8HEQ on 3900 kc, 10-meter stations on 29640. Last year many mobiles gathered in "caravans" before arriving in Dayton, making many acquaintances on the way in and facilitating their prompt dispatching to the location of the Biltmore Hotel.

Sunspot Number

The Swiss Federal Solar Observatory has announced that the Zurich sunspot number for January, 1956 was 70. This results in a provisional 12-month *smoothed sunspot number* of 41 centered on July, 1955. This month's propagation forecast is based upon a predicted smoothed sunspot number of 80 centered on April, 1956. Solar activity continues to increase at a rapid pace. In last month's *CQ*, in an article entitled "The Sunspot Story: Cycle 19," this author discussed the origin of sunspots, the effects of solar radiation upon the ionosphere, and the trend of past sunspot cycles.

A forecast was also made that solar activity expected during the next few years will be of outstanding intensity, with a maximum likely to surpass all others hitherto observed. This maximum is expected to occur between September, 1957 and May, 1958. Part 2 of this article, discussing the effects of the rapid rise in sunspot activity upon shortwave propagation conditions on the amateur bands Six through 160 Meters, as well as the effects in the VHF range and the possibility of DX television, will appear in the June issure of *CQ*. *Don't miss it.*

DX Contest Review

As a result of an analysis of several dozen logs, as well as from reception data published

by the National Bureau Of Standards, it is now possible to compare the accuracy of the *CQ* Propagation Forecast for last fall's *CQ* International DX Contest. In the October column, general ionospheric conditions were forecast as follows:

October 22nd-24th (Phone Period) Normal with conditions fair to good.

October 25-28—Moderately to severely disturbed.

October 29-31 (CW Period) Normal with conditions fair to good.

Conditions were actually observed to be normal from October 22nd to 24th, with a general rating of good. A moderate disturbance began on October 25th, lasting through the 28th, with conditions being no better than fair, and several hours during this period were rated as very poor. Propagation conditions began to improve during the early hours of the 29th, with a rating of fair. Conditions were normal again on October 30th and 31st, with overall ratings of fair to good.

From all indications it looks as if the accuracy of the general ionospheric forecast, and the *CQ DX Propagation Charts*, held up extremely well during the Contest period. I want to thank all of you who sent logs and notes to me concerning reception during this period, with special appreciation to I1ER, G3CEU, W2ESO and W2SKE.

Five-Year Index

Throughout the five years that I have been conducting this column, a large number of topics relating to ionospheric propagation have been discussed at one time or another. During the past few months I have received several requests for an index of all the topics that have been discussed in this column. As a result of these requests, the following index has been prepared. The index lists alphabetically the various topics discussed in this column since March, 1951. For an index of other articles on the subject of Propagation appearing in *CQ* during the past eleven years, refer to the *CQ* 11-Year Index beginning on page 120 of the January, 1956 issue.

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YL

Monitored by

Louisa B. Sando, W5RZJ

Jicarillo Apache School, Dulce, New Mexico

Coming Conventions

First big convention of the season of special interest to the YLs is the Sixth Midwest YL Convention. This will be held May 25-27 at the Hotel Capri in St. Paul, Minnesota. The North Star YL Club of the Twin Cities will be hostess and WØKJZ, Lydia Johnson, YLRL D/C, is convention chairman. Here are details of the program: **Friday:** Registration, luncheon, tour of Minnesota Mining & Mfg. Co. Research Bldg., box supper social, games, technical talk. **Saturday:** Shopping tour, business luncheon, home movies, smorgasbord, program, prizes, dancing. **Sunday:** Church of your choice, noon appearance on TV "The Hobby Show." All YLs are invited. Registration fee is $2 and should be sent to KØBJZ, Rae Vigeant, 593 White Bear Ave., St. Paul, Minn. by May 10, if possible.



WØKJZ, Lydia Johnson, YLRL 10th district D/C, chairman for the 6th Midwest YL Convention at St. Paul, Minn.

All fourth district YLs are invited to attend an informal breakfast at the home of W4ZVW, Ellie, at 1617 Flamingo Dr., Orlando, Fla., on April 8 at 9 a.m. when the Orlando Amateur Radio Club holds its annual Hamfest at Rock Springs Park.

The **West Gulf Division Convention** will be held at Galveston, Texas on June 15-17. We have no details on the activities, but W5EYE, Marian, is thrilled to have ticket No. 1 for the affair.

National Convention July 6-8

The Eighth National Amateur Radio Convention will be held July 6-8 at the Civic Auditorium in San Francisco, Calif. Convention chairman, W6WB, has appointed W6PCN, Peggy Detsch, president of the YLRC/SF, to head up the women's activities, both YL and SW. Assisting Peggy with the YL doings will be W6FEA, Gertie Cassady, YLRL 6th D/C. Rose Buckley, SW of W6GGC, is heading the housing committee. Members of the YLRC/SF will be helping these girls.

It is too early (mid-February as this is written) to have a definite program, but Peggy assures us they will be very full three days with something for everyone. Of very special interest to the YLs will be the All-Woman Transcontinental Air Race which will start from San Carlos (20 miles south of San Francisco) during the convention, Saturday, July 7, and it will be a wonderful opportunity to see the take-off. W6FEA, Gertie, also is chairman for the radio end of the AWTAR for California.

For the convention itself there will be a special YLRL booth and a hospitality room for the gals at the headquarters hotel. A YL meeting will be scheduled for a time not to interfere with the many interesting technical talks. Other events will include golf tournament, banquet and ball, Wolfhong, group breakfasts and meetings, contests, excursions and other entertainment for the gals not technically inclined. Grand prize for the convention will be a *KWS-1* transmitter. Watch for more details as they become available.

With the Younger YLs

Two of our very young and very active YLs are Camille Storey, W5ILO, and Paula Bettis, W5IOZ, of McAlester, Okla. Both are 11 years old. Paula's Dad is W5GYW and it was Paula who got Camille interested in Ham radio. Then they studied together in a regular class tutored by Paula's father each evening. They received Novice licenses in Nov. '54, when they were 10 years old. They kept at their studying and operating and in June '55 received conditional licenses. Members of the Texas YL Round-up Net, they check in every Thurs. morning before going to school, and highlight of their



11-year-old YLs Camille Storey, W5ILO (left) and Paula Bettis, W5IOZ.

Ham careers to date was attending the first birthday meeting of the net at Dalls last November. They love Ham radio and operate at every available opportunity. One night when Camille stayed overnight with Paula the two crawled out at 4 a.m. to work the rig and had their farthest contact, with W6SFX. They both operate on 75 Meters, Paula using a homemade 813 transmitter running 175 watts, and a BC-348 receiver. Camille uses a Command transmitter and receiver and runs 60 watts. She and her mother are now planning to put together a Heathkit.

Much as they like Hamming, school takes up most of Paula and Camille's time, and both are "A" students. Both take piano lessons and Camille toots a sax in the school band. Paula loves acrobatic dancing and Camille sings with the Choirlairs, a city-wide grade school chorus. Camille also is vice president of the Washington School Student Council. Both girls were cheer leaders during football season and both play basketball. Camille and Paula are very active in Girl Scouts; Camille is president of her troop and Paula is the reporter. Both girls have dogs for pets, and in the summer they like to swim, play tennis—and go to Hamfests. FB, gals!

Another young YL who is making a fine record for herself is W3TTR, Eileen Joganic, of Pittsburgh, Penna. Eileen started with a Novice ticket when she was 12 years old after her brother Don, W3SIC, got her interested by letting her talk to some of his DX contacts. She received both Technician and General licenses at the age of 13. On March 9 she

---

MY BILL

by Lorraine Stuart, W7SFR

Seventy-five—that's what I like!
To sit me down before the mike,
And talk to Joe and Pete and Sam.
Oh how I love to be a Ham!
One fine day, QRM was nil,
I had my first QSO with Bill.

Now some OMs have nasal notes,
And some have frogs within their throats;
But Bill, not a thing was wrong,
His voice was full and deep and strong.
So many lovely things he said,
And after that we made a sked.

We chewed the rag day after day,
I could not tear myself away.
Pearls of wisdom from his lips,
And quite a few amusing quips.
He sent eighty-eights—romance bloomed,
My heart soared, my heart zoomed!

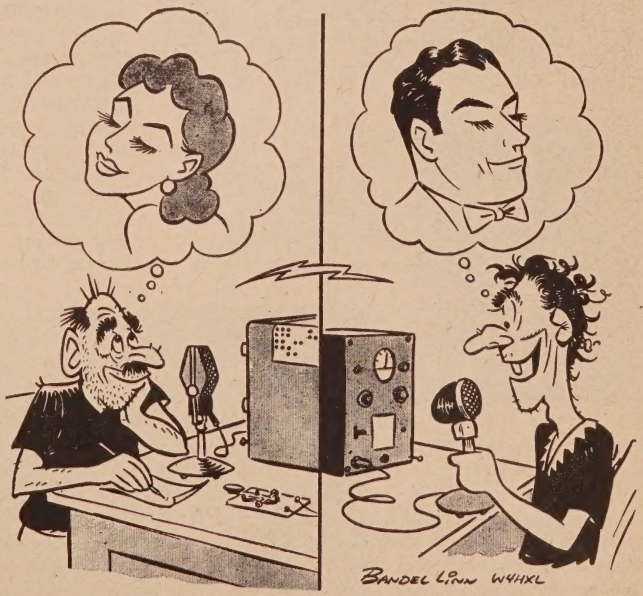
Perhaps 'twas Kismet—such my fate
That Bill would choose me for his mate.
I envisioned a cottage small
With ivy and twin lead on the wall,
And me and my Bill, hand in hand,
Twirling the dial across the band.

He said that he would see me soon,
And then one day, just at noon
A "CQ" on the doorbell rang.
I rushed to it, my heart sang.
There stood a man—"I'm Bill," he said.
Oh no! OH NO! My hopes fled.

Wrinkled and bent wtih hands that shook,
Watery eyes with a shifty look,
Hairless pate and toothless grin
(And I thought he'd look like Errol Flynn!)
We talked awhile of things mundane,
And then he had to catch a train.

Now you YLs—please don't make
The same disheartening mistake!
Woeful but wiser, back at the rig,
I'm listening now for a CW sig!

Contrary to the subject matter of this poem, Lorraine is happily married to W7EXC, whom she did not meet via Ham radio—hi! Though the poem was written before June '55 *CQ* appeared, this cover cartoon is a fine portrayal of "Bill."



(Cover cartoon, June '55 CQ)



W3TTR, Eileen Joganic, 17-year-old high school junior, has been active on the air since she started as a Novice at the age of 12.

celebrated her 17th birthday. She now has worked 47 states (N. Dakota is the holdout) and 12 countries, and has RCC. W3TTR consists of a Harvey-Wells transmitter which Eileen uses on all bands except 40 CW and for this band she uses a BC-458 running about 60 watts. The 458 also is used as a VFO with the H-W rig. Her receiver is an HRO-50T1 and she uses a 3-element beam on 10 Meters, a half-wave doublet on 40 and a doublet on 20 Meters. She also operates some 15 'phone.

Eileen is a member of the Amateur Transmitters Assn. and South Hills Brass Pounders and Modulators. She checks into the SHPB&M Net and the Breeze Shooters Net, of which she is secretary-treasurer. A junior at Sacred Heart High School, Eileen also likes to sew (this year she made her own winter coat and hat), plays the piano and enjoys all sports, especially tennis.

Twin YLs

We've heard of a number of OM twin Hams, but these are the only twin YLs we know of —Janet and Janice Robidoux, WØQXF and WØQXA, of Columbia Heights, Minnesota. Janet and Janice were first licensed in Aug. '53. They started with Novice-Technician, but never operated as such for they passed the General Class before they got on the air in Dec. '54. They assembled their own DX-100 and also put together a Heathkit grid dip meter. An NC-173 is their reciver. All equipment is jointly owned and they operate exclusively under the call WØQXF. They are active in



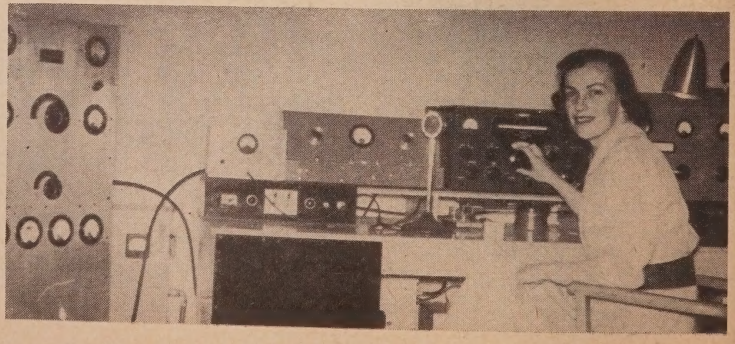
Twins, Janet and Janice Robidoux, WØQXF and WØQXA, are second-year students of electrical engineering at the Univ. of Minnesota.

the Minnesota Section Net and other than that spend most of their operating time on 80 CW. They add that their radio shack is a remodelled chicken coop, about 50 feet from the house, which they keep warm with a small oil burner. They also use this for all their studying.

Janet and Janice are students in electrical engineering in their second year at the University of Minnesota, the only YLs in their class.



Virginia Zitzow, W1HGM, wired a Heathkit DX-100 while waiting for her license.



W6PCN, Peggy Detsch, president of the YLRC/SF, is chairman for women's activities at the National Convention in San Francisco.

They also are members of the University Radio Amateur Society and the Minneapolis Radio Club besides the North Start YL Club. Right now their Hamming activities are concentrated on helping get ready for the Midwest YL Convention in St. Paul.

Musical YL

Many Hams are musically inclined, but this is the first YL we've known who actually became a Ham *because* of music. It was a rather involved process for Virginia Zitzow, W1HGM, of Reading, Mass., which started after attending her first concert. Gin was in the 7th grade then and started collecting records, buying them with her "lunch" money. She took piano lessons and soaked up all the music theory she could lay hands on. In college at Boston Gin studied art and the sciences, and took in the Boston Symphony concerts. Converting her record collection to LPs, she became very dissatisfied with the quality of her old phonograph so she went hi-fi, which made her curious about the amplifier she bought. After that she began to read the electronic trade papers and ask her future OM (Harold, W1OUS) questions. Later they built a Heathkit Williamson amplifier and a speaker cabinet. With her OM (an electrical engineer) she attended some of the IRE conventions, which sold her on electronics. Then she heard some CW. "That did it," she says. "It was so musical sounding that I just had to become a Ham so I could use it."

Gin studied for a year and got her General in Oct. '55. While waiting for her ticket she put together the DX-100 transmitter which they use. The receiver is an SX-96. Gin works 40 and 80 CW. She's tried phone but says she prefers CW because it is so musical. Her OM gave her a "bug" for Christmas but she says she hasn't dared use it yet. Besides their record collection (which numbers over 300 LPs and some irreplaceable 78s, from Gregorian chants to Bartok), Gin and her OM sing in the MIT Choral Society. Gin also likes to compose music and is a free-lance cartoonist. A jr. op, Robert, aged 1½, takes care of the rest of her time.

Club News

Another new YL club has been officially organized — *The Washington Area Young Ladies Amateur Radio Club,* with "WAYLARC" as the abbreviated title. The club was the idea of W3MSU, Ethel Smith, founder of YLRL, and she started organizational meetings last October. At their third meeting, Jan. 14, the club constitution was approved, the club name adopted and the following officers elected: W3MSU, president; W3CDQ, Liz Zandonini, vice president; W3TSC, Camille Hedges, secretary; W4ETR, Mary Ann Sturkey, treasurer; W4DEE, Beulah Barrick, executive committee additional representative. The club has applied for affiliation with YLRL. Charter members include: W3's MSU, CDQ, CNC, DHL, TSC, UXU, VHF, AKB, CZT, QOG, RXJ; W4's DEE, ETR, AHN, ENG; K4's BUN, ENC.

Current officers for the YLRC/San Francisco are: president, W6PCN, Peggy Detsch; vice president, W6FEA, Gertie Cassady; secretary, Myrtle Browne, ex-KN6CUT; treasurer, K6EEE, Vi Smith; board of governors: K6CUV, Lee Fisher; W6QMO, Jeri Bey, and Kay MacGillvray, ex-KN6HIW. The YLRC/SF held its second anniversary dinner on Jan. 14 at which the members presented retiring president W6QMO with a gift as thanks for her two years as president.

33 till next month—*W5RZJ*

Rescue

The North Eastern Area Barnyard Net was holding forth on 3960 kc, just as they had every day except Sunday for almost two years, when Norm, W1DUN, broke in with urgent traffic for any station in Gorham or Berlin, New Hampshire. Kay, W1BBS, Net Control, asked what was up? Norm said that a New Hampshire State Conservation Department plane which had been dropping small fish to stock the lakes of Northern New Hampshire was overdue and an accident was feared. The New Hampshire Civil Air Patrol was trying to make contact with their northern members. As luck would have it the only station in Northern New Hampshire that had called in so far was Pearl, W1ZHO, in Whitefield, who was sick in bed with a virus, waiting for the doctor to arrive.

Virus or no virus, Pearl jumped out of bed, bundled up and drove to town to phone. It is easier to make a phone call to South Africa than to get the Mount Washington Summit, but she finally got the call through to W1PS, Ken Thompson, the C.A.P. station operator. Ken soon had the C.A.P. circuit in operation to the Gorham and Berlin area.

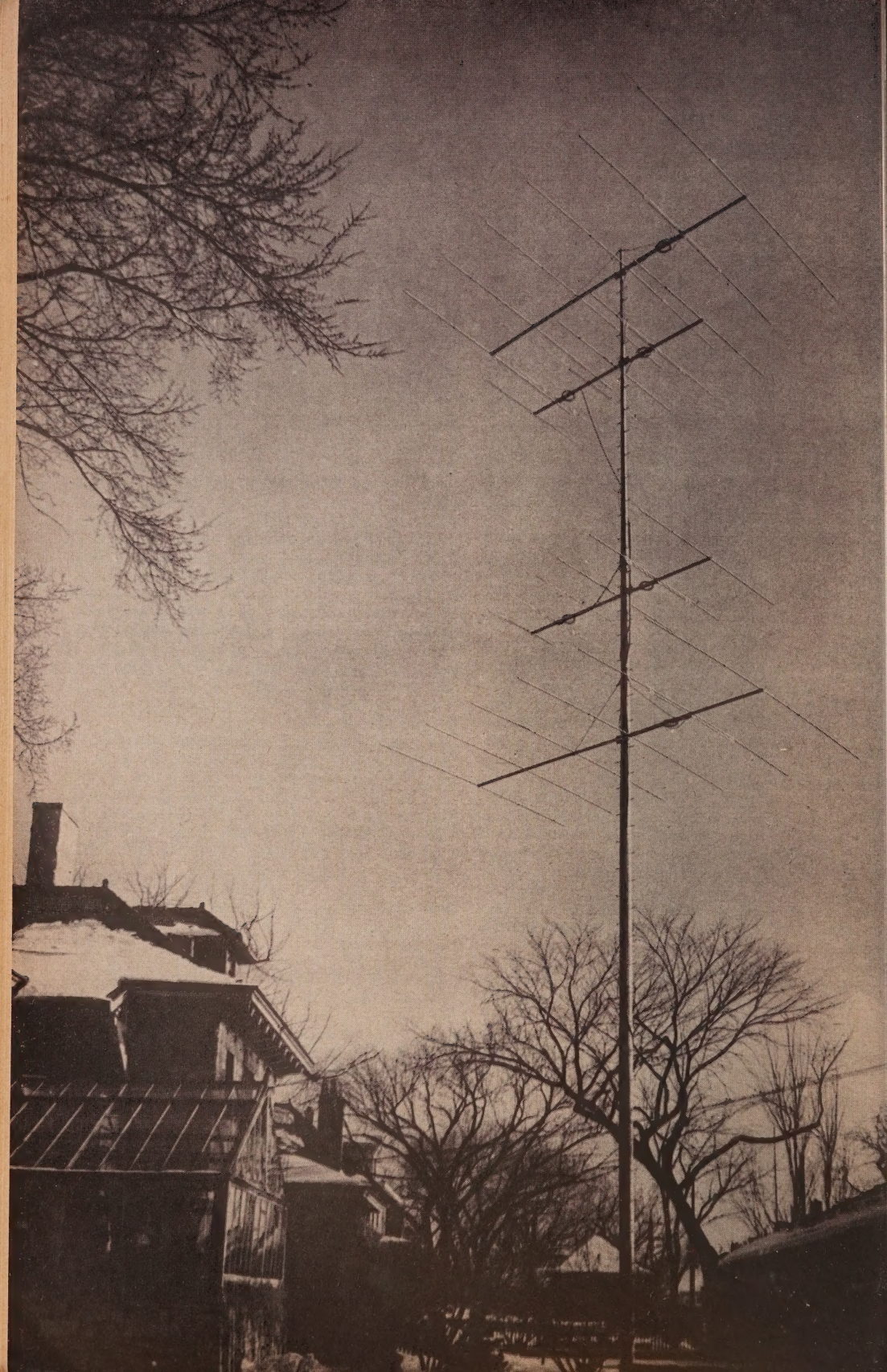
A helicopter and several light planes made the search, directed largely by the Mount Washington station. Al, W1VYA, kept the Barnyard Net informed of the progress. The downed plane was soon located and rescue of the injured pilot and passenger was completed.

Pearl's doctor arrived just after she had left for town and found the house open, no one home and the receiver going full blast. When a search of the house didn't turn up the patient he got worried and started a search of his own.

Eventually things returned to normal. Pearl and the doctor got together, and whipped the virus. The pilot and passenger got busy mending, the Conservation Department picked up the pieces of their plane and the Barnyard Net got back to talking about the weather and such.

All of us take a deep bow to Pearl for going out of her way to help in this emergency when she really should have stayed in bed. Ham spirit like that deserves commendation.

Byron Prescott Sr., W1UDD, Portland, Maine



DX

Gathered and reported by
R. C. "Dick" Spenceley, KV4AA
Box 403, St. Thomas, Virgin Islands

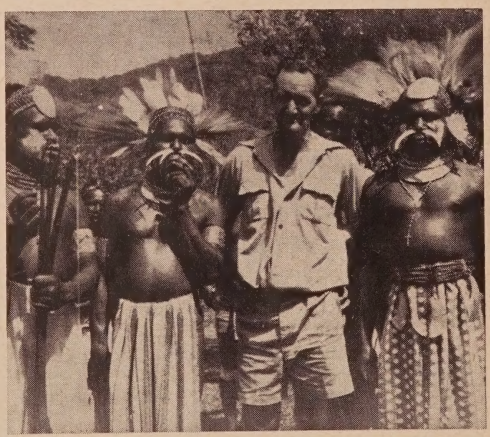
Our heartiest congratulations go to the following station upon his achievement of WAZ:

No. 316 W9FKC
MYRON "MIKE" HEXTER 40-231

Mike is the seventh W9 to join this group. A card from the recently released Bob Ford, AC4RF, turned the trick!

. . . . . .

FRENCH SAINT MARTIN, **FS7RT:** Without warning, FS7RT, appeared on the air during the afternoon of February 15th on Single-sideband (14297, later shifting just outside the U.S. band). This, to the best of our knowledge, is the first time that this rare spot has been represented by ham radio and the turbulence created was well up to specifications. This station is manned by Reg Tibbetts, W6ITH, who, after considerable effort, had just about given up hope of obtaining a French license for this purpose. He was, therefore, quite agreeably surprised when he received a phone call from the French Consulate in San Francisco giving him the go-ahead signal. As a result of much study of former DX'peditions Reg immediately went into action assembling all necessary items which even included window screens and DDT "bombs"! The radio gear comprised a KWS-1, 75-A-4, 1½ KW gas generator which, with all other items, made up a shipping load of 700 lbs.! This was flown to New York via United Airlines and then to San Juan, Puerto Rico via Pan American. In San Juan a twin-engined "lodestar" was chartered for the 200 mile flight to St. Martin. Anxious moments occurred when it was found that the KWS-1 power supply was too large for the lodestars hatch. It was then unboxed and, happily, slid through by the skin of its knobs. Arrival in St. Martin was made on the morning of February 15th, the station set up and FS7RT went on the air in the late afternoon. The French foreign ministry had wired the Guadeloupe authorities giving their blessing to this expedition and the word was passed to "Mayor" Fleming of St. Martin who was most cooperative. As St. Martin enjoys a somewhat independent colonial status, Reg was allowed to choose his call and settled for "FS7RT", the "S" standing for St. Martin and the latter two letters being his initials. The first six contacts from FS7RT, on SSB, occurred in this order: W8ASL/4, ZS6KD, W9QKN, W8BN, W8KKG and ZS6ACH. Four hours of operation the first night resulted in 123 contacts. Reg states that he will stay on St. Martin until he runs out of QSO's! Most operation will be on single-sideband rather than AM (for gas economy) but Reg promises some GW activity too. All bands will be used. QSL's should be sent to his home QTH, W6ITH, and his QSL's will probably bear a St. Martin scene presently being painted by Mrs. Tibbetts.



VK9RM, Pete Monfries, is quite active from Wau, New Guinea. He is seen here with some of the local talent. Yep—that's Pete in the shorts—.

This impressive array of stacked beams has a lot to do with the potent signal of WØNLY, Ted Moles, up St. Paul way—

COMORO ISLAND, **FB8BR/FB:** Hubert, FB8BR, has succeeded in obtaining a Comoro ticket and was due to be on from this spot from February 25th to March 1st. After this trip he will visit the



Danny Weil, VP2VB/P/KZ5WD/FO8AN (and soon to be VR1), with Mel Menges, KZ5EM, on the "YASME" during Danny's C. Z. stay.

Comoro Islands one day each month. Main frequency was 14078 xtl.

IFNI, EA9: KT1UX advises that KT1EXO is visiting Spain in hopes of obtaining a license for this spot. If successful KT1UX and KT1EXO will put this QTH on the map after March 28th. Recent operation by stations signing EAØI/Ifni and PJ2MB, who said "QSL via W6BP", was apparently pirated. W6BP does NOT know them. (Possibly "YA6GAL" on the loose again—pity!)

SIERRA LEONE, ZD1DR: This station has been active on 21 Mcs 2200 to 2300 GMT daily. The name is Dave and the QTH may be seen in the "address" column. Frequencies range from 21080 to 21150. Let's hope that this is a ZD1 that QSL's!!

CANTON ISLAND, KB6BA: Howie may be found near 14077 after 0330 GMT. His Viking puts forth a substantial signal.

GOUGH ISLAND, ZD9AD: This station promises increased CW activity on 14 and 21 during the next 60 days (From Feb. 15th). He will then close up shop and return to England.

FANNING ISLAND, VR3B: Deane is quite active near 14080 around 0300 GMT on. Activity is also expected from VR3C. VR3A is visiting the USA.

WALLIS ISLAND, FW8AB: We hear that the best time to nab this rare one is between 0600 and 0800 GMT, especially Sundays. QRG is 14040.

SOUTH SANDWICH ISLANDS, LU2ZY/LU3ZY: This expedition returned to Buenos Aires after some 1700 contacts during December and January. 800 W stations were worked. 300 contacts were made on 21 and 150 on 28 Mc. QSL's were promised early in March.

FALKLAND ISLAND DEPENDENCIES, VP8: These island groups are ably represented as follows: VP8BL, VPBAI and VP8BC Falkland Islands. VP8BK, South Georgia, VP8BT, South Orkneys. VP8BS, South Shetlands and VP8BM and VP8BR on Continental Antarctica.

BHUTAN, AC5PN: Chhawna has been quite active of late being heard and worked on 14090 or 14052 around 1320 GMT or 0115 GMT. QSL's should be arriving stateside by now.

PAKISTAN, AP5RH: This station will be active in the Punjab/Lahore area for the next eighteen months. He is Ray, ex-G3FNF and will be on daily around 1300 GMT and xtal frequencies will be 14101/25/40/50 kcs.

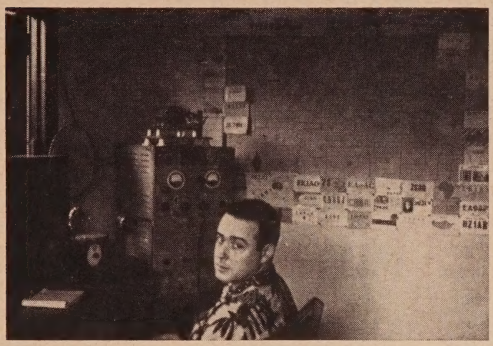
SPITZBERGEN, LA9LD/P: This station is located on Hopen Island. Carl is only on 3520 kc at present, around 0600 GMT. (No receiver for 20) He requests that contacts be made of the contest type as time and power are very limited. He will QSL 100%.

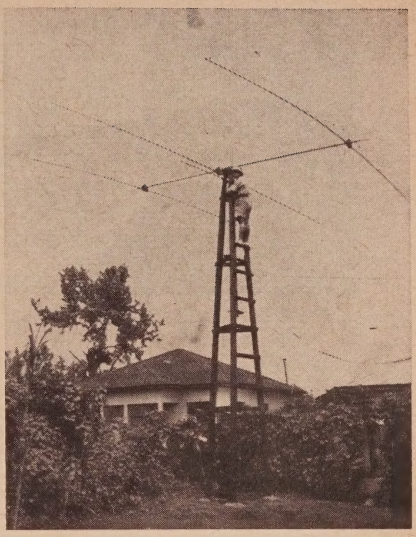
SWAZILAND, ZS7: ZS7C, ZS7D and ZS7H are all active from this QTH on 14 CW.



Odds are that you have worked one of these hams at some time or other. (Left to right)
First Row: K6DGB (ex JA2KW, W3KYF, KL7GB), W6GBG (ex W1DCE, W4DCE, W6YYW, 6KPHY, KG6AEF), XE2FB, K6IZJ (ex W4SVV, CN8EF), W6GWZ. Rear row: KN6ONU, W5GYU, K6LAI (ex KP4NQ, W7OGR, W6KXN), W6OQY, XE2NB, KN6JCW, W6EDG (ex W8LYZ, W7JMV, KL7NA).
The assembled characters represent some pretty good DX and, as one wag observed, some pretty terrible duty. The get together was in honor of the two Mexican hams from Tijuana, XE2FB and XE2NB. A regulation U. S. Navy mess hall luncheon was served and the gang congregated for some CQ's and conversation at W6KXN, club station of the Naval Radio Station, Imperial Beach, California.
(Courtesy W6EDG.—photo by K6LAI)

EAØAB, Angel Margello Barbera, of Spanish Guinea is always a popular catch. He runs 100 watts on 14185, A3, but will soon QRO to 350 watts. At times he appears on CW, 14085. Operating time is from 2100 to 2200 GMT daily. As the climate in Spanish Guinea is very wet frequent operating is a "must" to keep the rig dried out—bad for him—good for us!





SARAWAK, BRUNEI: ZC5GN visited these two countries and planned to be on as VS4BS and VS5BS.

DX Notes

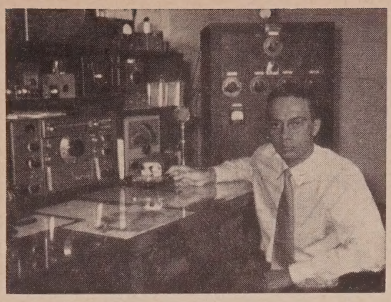
FB8BK suffered some damage to his shack on Tremelin Island which kept him inactive (storm damage) . . . Watch for FB8 activity from Glorieuse Islands in April . . . No ham activity from Kerguelen Island as FB8XX remains QRL . . . VP8BT opened up from Signy Island, South Orkneys in early February. See QTH's . . . UAØKTB is active from tannu Tuva (Zone 23) . . . The Soviet expedition to Antarctica will have the calls of "UPOLS" . . . Seems like Antarctica should be divided up into various quadrants and distribute some new countries among the American, British, Norwegian, Australian, New Zealand, French, Argentina and Chilean claims. After all—VK1EM was some 3000 miles from VP8BM etc. . . . W6LJQ's proposed trip to the Mediterranean Areas did not come off but John wound up with a better job in Syracuse N. Y. and now signs K4GRS/2 while awaiting his K2 call . . . W4ML reports contact with TA3EF who claims to be in European Turkey . . . Frank, OE1FF, advises that he may put HB1MX/HE on again during March. After that he will be signing OE9FF till June. . . . A local "expedition" to Coconut Island, in Hilo Bay, Hawaii, will take place during Easter vacation. Participants are KH6BIF, KH6BLH and WH6BLP. Main frequencies are 14150 and 14005 but all band above 3.5 will be worked with 25 watts or more . . . KM6AX was worked on 3835, A3 . . . FU8AA has been reported on 21 Megs . . . There is a CR8 station in Goa but he is very inactive. We have no further word about CR4AL's projected visit to Goa . . . CN8MM reports that Fred, SVØWK, is now in Cairo, Egypt, he plans fixed-portable operation from Yemen, and possibly Aden, in the near future. We will let you know . . . VU2RC is the QSL Mgr. for AC4NC . . .

YASME VP2VB/FO8AN

Danny should set sail from Papeete, for Canton Island, in mid-March where he will go ashore and use a VRI call (British Phoenix Islands). Licensing difficulties seem to have been overcome thanks to the kind help of KB6BA and cooperation of the British Resident Commissioner Mr. Laxton. Danny's stay at Canton will be of a duration designed to give all interested stations a British Phoenix contact. We are happy to state that, through the manufacturers cooperation, the YASME will receive a partial, or full, set of DACRON sails to replace the rotten ones he has been having so much trouble with. These will be delivered to him at Canton. In the meantime efforts proceed via England, New Zealand and Australia to obtain a NAURU license for Danny



Helvetia Certificate (see text regarding the Swiss contest).

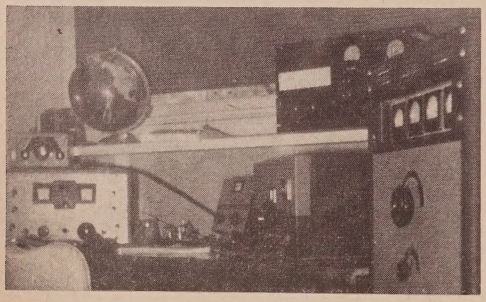


PY2AJK, Rod Rolim, Sao Paulo, Brazil, runs 300 watts on phone and CW. Receivers are a HRO-50-T1 plus a RME VHF 152-A and Millen R9'er.

so that he may put this rare spot on the air. ex-ZL1TZ, L. J. Wright, now works at the government radio station on NAURU and we are optimistic about the chances of NAURU ham operation. Contributions have improved somewhat but keep them coming. It takes quite a few of the dollar variety to make a workable amount and Danny still has a long way to go and many rare spots to hit!

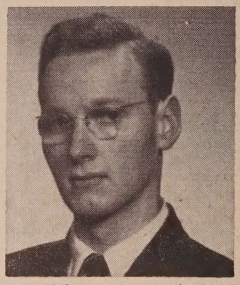
Addresses

ex-EL2X .....K2RAR, Nelson Raymord, 141-30 Pershing Crescent, Jamaica 35, L. I. N. Y.



The origin of the healthy signals of W6MUF is seen above. Op Eric Ledin pushes a pair of 250TH's with a VIKING II or homemade exciter. A 3-el beam is used on 14, a groundplane on 7 and a doublet for 3.5. Since 1925 Eric has had the calls 9ACW and W9LZM. W6MUF has been on since 1935 in Mill Valley. DX stands at 39-152. (*Photo courtesy of No. Cal. DX Bulletin.*)

ET2MZ .....Box 35, Asmara, Eritrea, Ethiopia.
F7 Bureau .....(New) A/1C T. J. Shytle, F7EZ, HQ US EUCOM, MARS RADIO, APO 128, PM. N. Y.
FS7RT .....French St. Martin. Via W6ITH.
I Bureau .....For I, Trieste, I5, IT, IS, M1, ET2. (New) A.R.I. via San Tomaso 3, Milan, Italy.
15REX .....Box 505, Mogadiscio, Italian Somaliland.
HH2Y .....Jean, Box 428, Port-au-Prince, Haiti.
KB6BA .....Howard Johnson, Canton Island, South Pacific. USPO 06-50000.
ex-KC6CG .....Via W2UDI.
MP4TAA .....Trucial Oman. Via RSGB.
OQ5CP .....Box 982, Elisabethville, Belgian Congo.



Finn Jensen, better known as LB8YB (now LA8YB), gave many their Jan Mayen contact.
(*Photo courtesy W2GT*)

SVØWL .....A. T. Beyer, APO 206, PM., N. Y.
TF6WAK .....Via A.R.R.L.
ex-VK1DY .....VK3ADZ, G. E. Delahoy, Eden Park Road, Whittlesea, Vic. Australia.
VK1IJ .....Via VK3ATN.
ex-VK1RA .....Via VK2BRW.
ex-VK1RG .....Via VK5RG.
VP7BC .....San Salvador Is. via W4TSZ.
VP8BT .....So. Orkney Is. Via S. M. Ward, Brentwood, 12 Lakeside Road, Palmers Green, London N-13, England.
VR3B .....Deane, Fanning Island, South Pacific.
VR6AC .....Floyd McCoy, Pitcairn Island, South Pacific. Via Balboa, C.Z.
ZA1KAD .....Box 731, Tirana, Albania.
ZD1DR .....Box 66, Freetown, Sierra Leone, Africa.
ZE1JG .....T. W. Rowe c/o Rhodesia Railways, Makwiro Station, Seland, So. Rhodesia.
ZK1BL .....Radio Station, Rarotonga, Cook Islands. So. Pac.
ZK1BS .....Bill Scarborough, Radio Stn. Rarotonga, Cook Islands.

Thanks to West Gulf Bulletin, K6BNH, W6SYG, VK3FH, W5CFG, W2QHH and W2OGE.

[*Continued on page 105*]

Honor Roll Endorsements

(To February 15th 1956)

W6AOA	40-258	W6ID	40-176
W8PQQ	40-257	KV4AA	39-251
G6ZO	40-251	W2NSZ	39-239
W3EVW	40-251	W8HUZ	39-234
WB8HW	40-249	W9FKC	39-231
W9VND	40-246	W4LVV	39-216
VE4RO	40-244	W1KFV	39-201
W5KC	40-237	W2GVZ	39-200
G3DO	40-210	W5MET	39-192
W6LRU	40-207	VK3XO	39-181
W6EHV	40-206	W4EPA	38-185
W6LGD	40-183	W9VP	38-187
W6PH	40-177	JA1CR	38-144
W4HA	37-203	K2GMO	35-166
W5FXN	37-196	W6HJ	35-125
W8KML	37-196	K6CJQ	35-123
W9WCE	37-171	K5ABW	35-102
W5HDS	37-164	PHONE ONLY	
W1APA	37-159	W3GHD	37-195
W3ARK	37-152	W8KML	37-194
W2OGE	37-143	G3DO	37-188
I1ER	37-119	WINWO	36-211
W@ANF	36-177	W4HA	36-193
W2HSZ	36-172	W3EVW	36-170
W1FZ	36-137	W8MWL	35-151
W8MWL	35-172		

Last complete HONOR ROLL appeared in the January issue.
Next complete HONOR ROLL appears in the May issue.

A preliminary Report:

1955 DX Contest

Frank Anzalone, W1WY
14 Sherwood Road, Stamford, Conn.

We have no estimate yet of how many stations participated in the 1955 CQ World-wide DX Contest. The Committee* has been too busy digging thru a pile of logs over 4 feet high to find time to count those that were in competition.

They came in all shapes and forms. A neatly bound book from I1BOB, a meticulous script on rice paper from JA3AB, one that unfolded to 7 feet long from G4CP, assorted scraps of paper from a K2, and one without identification which was traced to a W6 but was never claimed. We got a particular kick out of KZ5NB's log. It was written on the back of an Army-Navy Club menu. Boy! Wish we could eat at those prices up here.

To add to the woes of the already overworked Committee, a good portion of the logs had to be tabulated and scored before they could be checked. Whether this was because of a lack of knowledge of the rules or just downright laziness we cannot say. We hope, however, to correct this condition by having the announcement of the 1956 TESTS sent out well in advance and the rules written so that they will be understood by everybody.

The Committee bent over backwards to give all contestants every possible break, but there is bound to be some eye-brow lifting when some of the final scores are compared with the original claims. Not all the changes were because of corrections in arithmetic. Labrador and Newfoundland do *not* count as separate countries. Ditto Sicily and East Germany. Greenland, Bermuda, Cuba, etc. are still part of North America and count only 1 point for W's. We ran across a couple of fantastic scores, a million points plus. Zones multiplied by countries do make a fabulous multiplier. However, a few conservative souls did get their scores boosted.

Conditions on 3.5 and 7 mc were anything but favorable, but 10 came to life, and 15 and 20 were really "hot," so that evened things.

It's a bit premature to give you any details, but we can tell you that 82 "Band Hoppers" did better than 100,000 in the CW Section, which is almost twice last year's total, the highest so far in World-wide competition. Actually six of the boys did it on a *single band*. A W4 who makes a habit of always coming out on top did it again with over 170,000 points. A terrific performance on one band. A W3 claims DXCC on one band during the contest period. The first time it has been done, to our knowledge. But here's the pay-off—ten went well over 300,000, and the "Top Banana," a W2, was comfortably past 500,000. Not a new record, but the first time the 4x4 domination has been broken.

The Phone Section was also well represented. Thirty of the boys went over the 100,000 mark. Looks like a CX2 set a new record in the Single Operator Division. However, the same W2 who took top honors on CW claims over 400,000 points on Phone. This time he had the help of two other guys. One voice couldn't possibly do that much "yacking." And ON4DH claims WAC on 21 mc fone in 27 minutes.

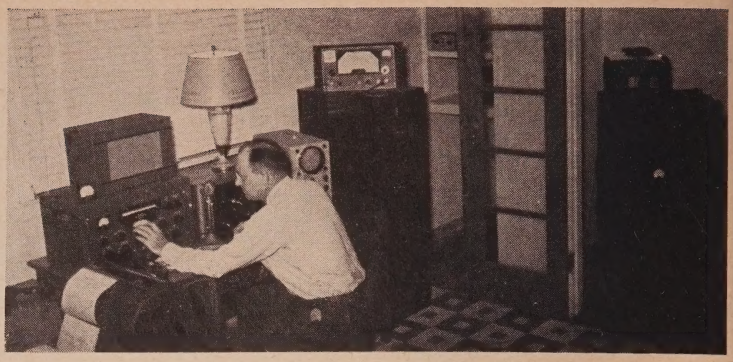
The returns from Europe and Asia were very gratifying, especially from Germany and Japan. On the other hand, Africa and South America were a bit disappointing, as was Australia. Perhaps advance publicity will correct this next year.

The comments were interesting and flattering. To quote a few—G2LB, "This is surely the contest of the year."—ZL1MQ, "The best Phone Contest I ever engaged in."—W6VUP, "CQ has regained my confidence by continuing this fine contest." (He had to send a second log. The first one was lost in an airplane crash.)—EI9J, "more extensive publicity of contest via other channels."—W6ALQ, "Anxious to see full listing of scores." (Will do, Max.)—And on their fine operating technique, HZ1HZ expressed admiration and thanks to the W Hams.—On the serious side, ZS6ABY collapsed and was taken to the hospital the day after the Contest. His log was thoughtfully sent in by ZS6BJ. We hope by now he has fully recovered.

This should give you an idea of things to come. Read all about it in the May issue of *CQ*. ■

full results next month

*Committee—**W1WY, W2BO, W2JB, W2DKF,** and **W2EQS.** With an assist from **W2GT** and **W1ODW.**



W5JBW, Lake Charles, Louisiana, station of Amos Burkett.
Printer: Model 26
Receiver: Collins 75-A2
Converter: W5HZF
VFO: Lysco 600
Transmitter: 4-400A
Operation: 40 meters, mostly, some 80 meters, too.

RTTY

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

International RITTY will soon be possible. With the column this month we have a picture of Bruce Rowlings, ZL1WB, who is quite likely to be at the other end of such a contact. Bruce first learned that New Zealand hams were permitted to use RTTY last June at the annual NZART convention. He promptly built up an FSK exciter and a W2PAT converter—and then learned that FSK was not as yet permitted! (As of January 1956 only make-break keying is authorized.) But that didn't stop Bruce. He has had the loan of a Model 15, so he has been busy copying and trying to talk other ZL's into RTTY. An autostart unit is also being developed, with some AFSK gear. It is very possible that, by the time this appears in print, ZLs will have their FSK privileges. You fellows who work 20 and 15 meters; don't be surprised if a ZL pops up on your frequency.

The grapevine (3620) says that Bermuda may soon be represented by VP9CA. Charlie, who is also W3TMM, is active on MARS nets and has a couple of 0-5/FR exciters. At this writing he is still looking for a machine.

Newfoundland will soon be heard from, too, according to WØANY/VO4. Loren has a page printer on the way from the U.S.A. and will be using a Viking II and an HQ-140X receiver. The East Coast Net will be looking for you on 3620 kc., Loren, Wednesday nights beginning at 7:00 p.m.

As far as we know, the RSGB (Great Britain) at this time discourages the use of RTTY. This is a rather sad thing, since a G-contact is most welcome on any band and in any mode. During World War II, with so much Teletype equipment in Great Britain with our armed forces, details were worked out to permit interoperation of American and British teleprinters. (This simply meant increasing the speed of the American governed motors to give 404 operations-per-minute instead of 368.1.) It seems to me that a few TG-7-B machines (15's) should still be floating around the British surplus market. How about it, boys?

Magazine deadlines being what they are, the story behind the proposed New York City RTTY Meeting will have to wait until next month. Suffice to say, this meeting was planned to be held during the IRE show March 19th to 22nd.

Back in the Feb. '56 *RTTY* column, a gen-

AMATEUR RADIOTELETYPE CHANNELS

National, FSK (mark frequencies; space 850 cycles lower) 3620, 7140, 27,200, 29,160, 52,600 kc.

National, AFSK (2125 cycles mark; 2975 cycles space) 27,200, 147,960 kc. calling & autostart; 144,138 kc. repeater & duplex

California, AFSK 147,850 kc. calling & autostart

Washington, D. C. AFSK 147,960 kc. calling & autostart; 147,495 kc. working

Chicago, AFSK (FM) 147,700 kc. calling & working

Detroit, AFSK (FM) 147,300 kc. calling & working

New York, AFSK 147,960 kc. calling & working

Narrow Shift Now Legal

Docket No. 11501 was released Feb. 10, 1956 as an order to amend our regulations as follows:

SECTION 12.107 OF PART 12, RULES GOVERNING AMATEUR RADIO SERVICE, IS AMENDED AS FOLLOWS:

12.107(c) When frequency shift keying (type F-1 emission) is utilized, the deviation in frequency from the mark signal to space signal, or from the space signal to the mark signal, shall be less than 900 cycles per second.

12.107(d) When audio frequency shift keying (type A-2 or type F-2 emission) is utilized, the highest fundamental modulating audio frequency shall not exceed 3000 cycles per second, and the difference between the modulating audio frequency for the mark signal and that for the space signal shall be less than 900 cycles per second.

eral description of most of the teleprinter machines in use by radio amateurs was given. Last month's column carried a fairly complete discussion on the Model 12, including circuit diagrams and a comprehensive description of its mechanical operation, courtesy of W2NSD.

This month most of the following space is given over to the Model 26. Most all of the machines on FSK these days are Model 26's, not alone because of their ever increasing availability and comparatively low price, but because they are essentially "noiseless" as far as operation on the h-f bands is concerned. Especially for the fellow who has just obtained a Model 26 and wants to hook it up, here are the electrical details.

The mechanical details, theory of operation, etc., we will leave to the specialists. As a partial list, the following RTTYers will in all probability be able to help you out if you have a mechanical problem: W1BGW, W2ZKV, W3CRO, W4BNI, W5TJE, W6SCQ, W7HRC, W8HP, W9GRW, and WØWRQ. (If anyone wants to be added to this list, please let me know.)

RTTY Principles & Practice

Part 2b—Model 26

The Model 26 is a page-printer machine such as the 12 and the 15; however, it is smaller, lighter, and quieter. It is being replaced by the wire services because it is made for 60-speed operation only. The Model 26 doesn't have type bars like the 12 and 15 machines, but has the type in the form of small movable pallets carried in a type wheel, something like a children's typewriter.

If possible, it is a good idea to try and ob-

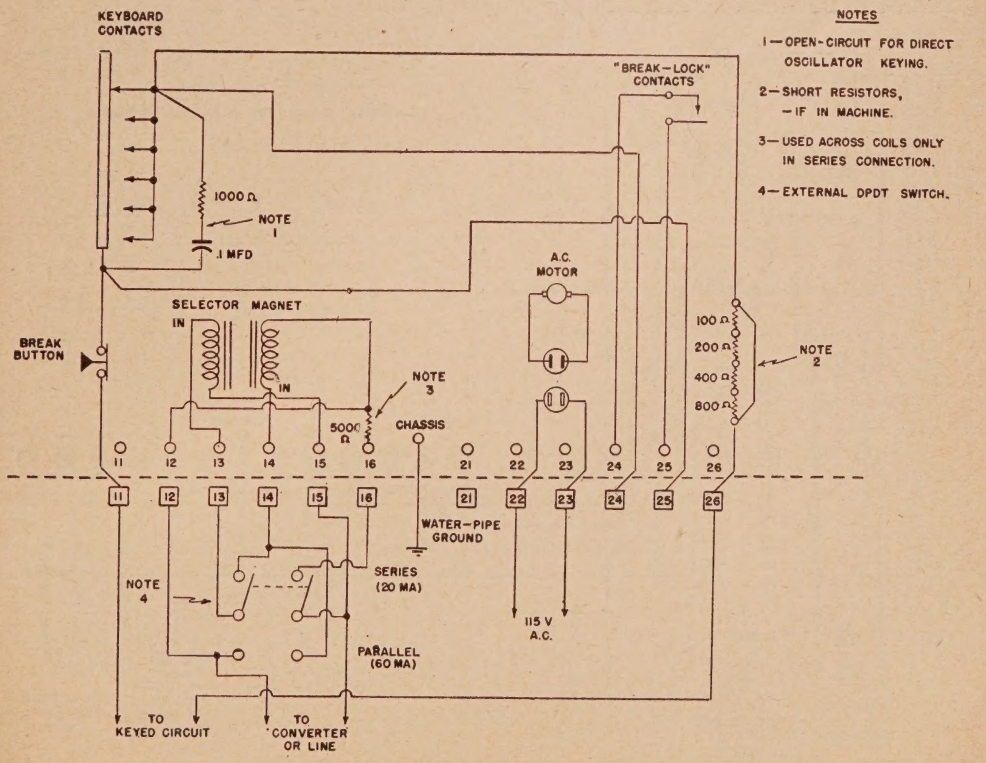


Fig. 1. Model 26 Circuit Diagram

tain a Model 26A table with the machine. Mounted on this table, the machine rests on vibration-isolation mounts, which keeps down the mechanical noise. The table also has a three-ganged switch mounted in the table top which is very handy for controlling the motor, the line, and/or your transmitter. Outlet boxes with polarized connectors are provided inside for the machine and d-c power supply connections, if you wish to use it that way. A small shelf inside and under the table originally held the d-c supply. This shelf can be useful in many ways, perhaps to mount a small converter or autostart clock unit.

Some machines are supplied with a socket and a Western Electric 215A polar relay. If your converter requires a polar relay, such as the W2PAT TU, this can be rewired for that purpose. The most common method in use, though, is to operate the selector magnets directly by the plate (or cathode) current of the output tube in the converter. More about this later.

Fig. 1 is a circuit diagram of the Model 26 machine. Note that there are actually *two* selector magnets. When these are connected in parallel, 60 ma. is required. When connected in series, 20 ma. will operate the printer. Shown in the diagram is a DPDT switch, added at the suggestion of W9GRW. This switch permits instantaneous selection of either the series or parallel arrangement. One reason for this is that converters can be built and adjusted more easily to supply the 20 ma. via the cathode current of a tube. The 60 ma. connection is provided because that is the standard wire-line "neutral"

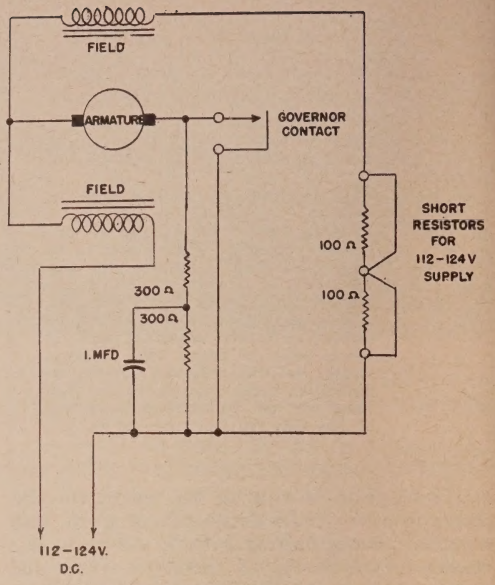


Fig. 4. Original D.C. Motor Circuit

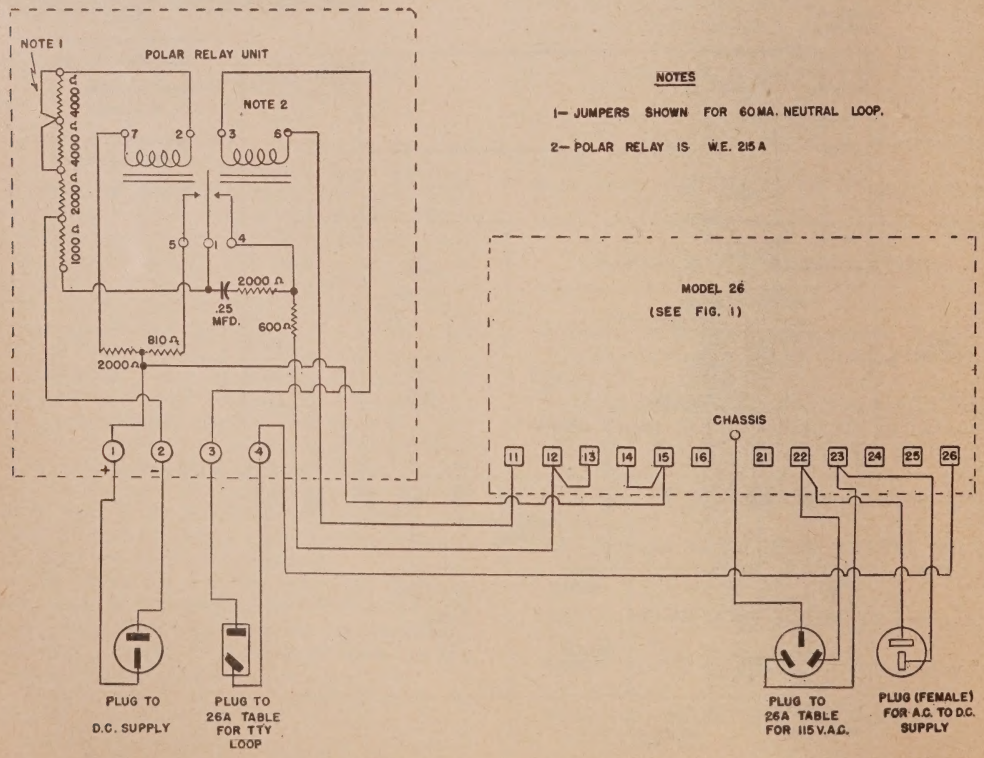


Fig. 2. Polar Relay Unit & Connections

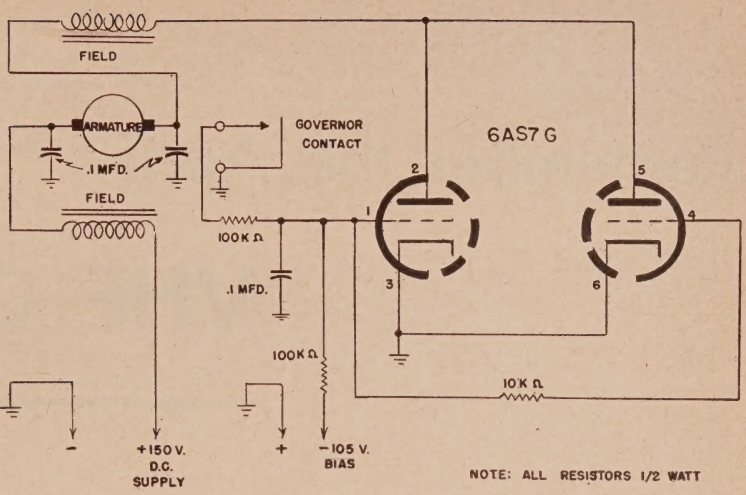


Fig. 5. New D.C. Motor Circuit

loop current and it's sometimes desired to operate the machine on a local loop for testing and mechanical adjustments.

Observe, too, that a capacitor and resistor are connected in series across the keyboard contacts as a spark suppressor. If you use the keyboard to directly key an AFSK oscillator, it will be necessary to disconnect those components. Some types of FSK circuits may also require the disconnection of this filter.

The series line resistors in the keyboard circuit (to terminal #26) are completely shorted out for the usual amateur RTTY application where the keyboard contacts themselves are used to key the transmitter.

Shown on the diagram, and also not usually used, are the "break-lock" contacts. In wireline use these are used, with the "motor-stop" function, to stop the machine on a blank signal

[*Continued on page 111*]

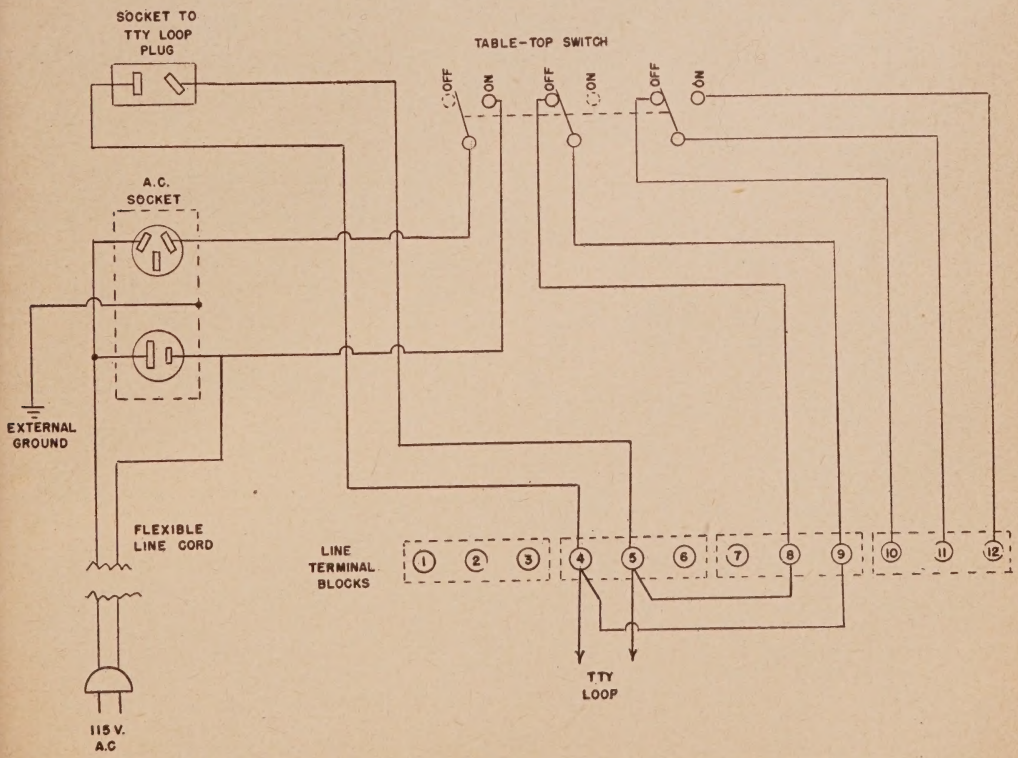


Fig. 3. Model 26A Table Diagram

Remember the April

VHF Contest

Pat (W1HIV) 110 feet up on the new Kuehne tower. Note the only set of guy wires 30 feet below him at the 80-foot level. Tower went up in one piece. Was subsequently lowered and outfitted with a 64-element two-meter beam and an 8-element six-meter beam. A week after it was finished we had a wind storm reaching 75 miles per hour. Kuehne tower bent like a buggy whip but withstood the test like a good tower should.



VHF Contest Instructions

What: A VHF contest for fun and fracas. Designed to give VHF operators an opportunity to test their VHF gear in competition.

When: 12:00 o'clock local time Saturday afternoon, April 21, 1956, 'til 12:00 midnight local time Sunday night, April 22, 1956.

Who: All amateurs in the United States and Canada.

Winners certificates will be awarded to the top scorers on each VHF band for each state or province. Separate certificates for the top-scoring Novice in each state.

How: Just fire up on your favorite VHF band and exchange contest information with as many stations in as many different *counties* as you can.

Contacts must be made on the band for which the log is submitted.

Separate entries may be made for more than one band but the score for each band must consist of contacts made on that band only.

Crossband contacts are permissible for extra contact points. Your transmitter, however, must be on the band for which your entry is submitted.

Only one contact per station is allowed, whether it be crossband or direct.

Station_____ Total # Contacts_____

Band_____ Total # Counties_____

County_____ Total Score_____

State_____

Transmitter_____

Contest Information

Your Msge #	Station Worked	County	State	His Msge #	Date Time	Report His	Report Yours	New Counties As Worked

Total Contacts this sheet _____ New Counties this sheet

Sample Log for CQ's April VHF Contest

Scoring:

For each complete exchange of information consisting of message number, county and

[*Continued on next page*]



Reported by

Sam Harris, W1FZJ

P.O. Box 2502, Medfield, Mass.

Aurora!

The night of February 21st provided a preview of things to come when at eleven o'clock the two-meter band opened up for a brief moment between the east coast and the Chicago area. We managed a quick contact with W8DX in Detroit, Michigan and the flurry was over. W8KAY in Akron, Ohio was calling CQ with signal strength well over the nine mark. This was the second good opening within a week. The previous opening was not available as far as Massachusetts although we heard the New York City area boys calling W9WOK. Our attention was called to this opening by K2APS who was hearing W9WOK and all points between.

By the night of the 24th we were pretty tired of flaying the band. A solid week had been spent trying to raise some northern lights. However, until midnight Friday the only sign of aurora we heard was a slight burble on W1MMN during our nightly 8:45 P.M. schedule. By twelve-thirty the beacon signals on Six Meters were peaking up to the north west and a contact with W1FOS was carried out by auroral reflections. While I continued to monitor Six Meters for any signs of activity, Bob (W1RUD) kept track of the two-meter band

state (or province in Canada), one point is accrued.

The total number of two-way contacts or message exchanges is multiplied by the total number of different counties worked.

For instance:

Total number of contacts	100
Total number of counties	50
Contest score	5,000

Counties in different states or provinces having the same name are obviously separate counties and count as such in the totalling of the multiplier.

The exchange of reports, while not required by the contest rules, is suggested as good operating procedure.

Gonset Multiplier:

Stations using Gonset Communicators *from their home location* are allowed an additional multiplier of 1.5. This multiplier only applies if the Communicator is used "as is" during the entire contest. Stations enjoying the benefits of linear amplifiers or mountain-top portable operation are not eligible for the extra multiplier.

Note!

As mentioned elsewhere in this issue, it is very desirable to end the contest with a round-table exchange of scores. In this manner preliminary contest reports can be gathered and published in an earlier issue.

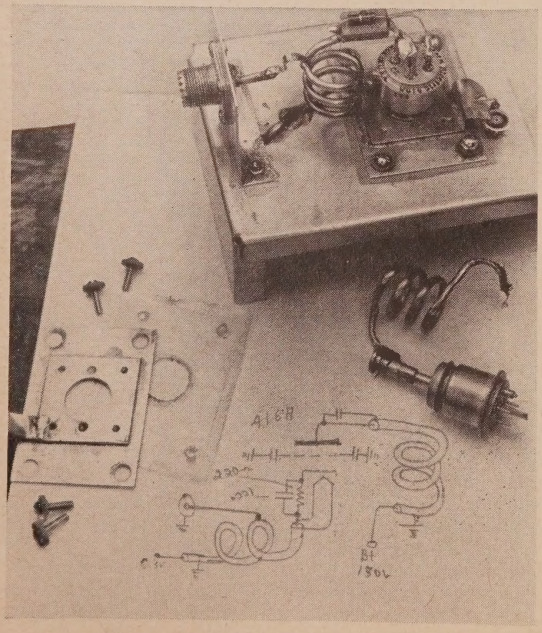
Contest logs must be received by the 15th of May in order to be eligible for certificate.

Address contest logs to:

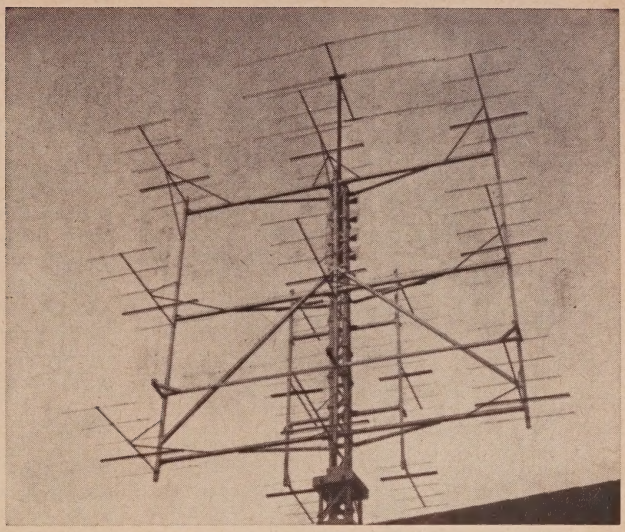
Log Department
P.O. Box 2502
Medfield, Massachusetts

(This was the second time in a row that Bob was caught at my place when the band opened up). W3WBM popped out of the woods at 2:00 a.m. with a solid S9 signal for the first sign of aurora on Two Meters. It is interesting to note that this was a full hour and a half after the six-meter band opened. A contact with Frank (W3WBM) and Russ (K2HKS) were the only signs of activity at this late hour. A call to the minute man in Toronto roused W9GAB in Beloit, Wisconsin for a new state and WØSV in St. Cloud, Minnesota was alerted. While Bob (W1RUD) and Paul (W1PYM) listened in the background I tried desperately to attract Bob (WØSV)'s attention. His aurora signals from St. Cloud, Minnesota were RST-5-5 in Medfield. Unfortunately he had to go to work at 4:00 a.m. and we were not able to make what might have been the longest-distance two-meter aurora contact in history (Sob!)

The opening showed all signs of staying all night so Bob, Paul, Sully (W1DDN) and John (W1UDU) took off for home to try and catch some for themselves. Meanwhile (back at the ranch), W8IZF and W8SDJ finished up a wee hours QSO and found themselves in the middle of a king-size band opening. The Cincinnati boys worked everything from Massachusetts to Wisconsin including W2ALR whose CW signal at times was stronger at my place than



In case you are wondering how to improve your receiving ability, regardez, s'il vous plait: 416A grounded-grid preamp complete with circuit. (Note the floating grid. I forgot to draw in the grid-bias resistor.)



Front view of W8DX antenna. Beam is fifty-five feet high, with: 45 elements on Two Meters; 30 elements on 1.4 Meters; 8-element bow tie for 0.7 Meters, and a 3-element six-meter beam.

W1OOP when he points at me.

It was certainly unfortunate that an auroral opening of this magnitude was attended by so few stations. Six Meters, while open across half the country, was occupied by W1FOS and (when not on Two) myself. No amateur signals which could be identified were heard (Looks like the six-meter band needs a Tony).

We did learn some things of interest. In the first place it is obvious that any aurora opening on Two Meters can be discovered by monitoring the six-meter beacons. A simple six-meter receiver and an alarm bell would keep the faithful awake on good nights. In case you try this, be sure to build in a long enough time constant to take care of the meteor bursts which are always present on Six. In the second place, it is obvious that the distances which can be covered on Two Meters on aurora are at least as long as any other method except possibly moon bounce. Furthermore, it points out the fact that the six-meter boys are sadly lacking in the art of aurora work. It is true that you can work aurora on phone. However, when the aurora is at its best and the greatest distances can be covered, the use of CW is an absolute necessity. Furthermore, good aurora work takes high power and big antennas. It's sort of like radar; the more you put out the more you get back.

CONTEST

This will be the last column before the Spring CQ VHF contest. We would like to take this last opportunity to remind you that the early reporting of your scores will aid in getting the results published in the earliest possible issue. Spend a few minutes after the contest in a roundtable exchange of scores. Appoint someone to send them in as a preliminary report. The more the merrier and the quicker the better.

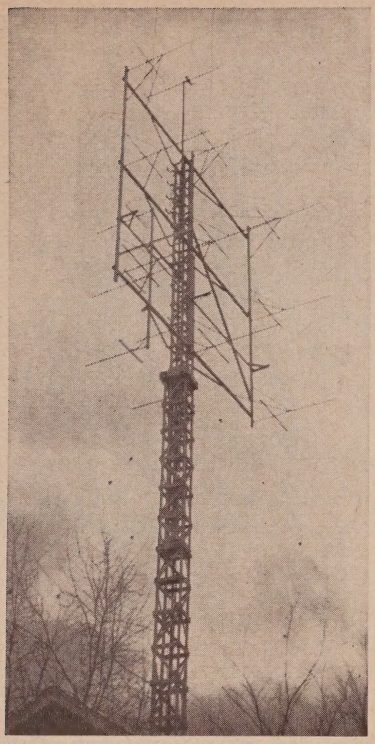
Visits

Received a visit from W8SRO in the middle of our last ice storm. Seems like Abbey was making a tour of the New England area. He just happened to have a scale model of the four-element six-meter beam which Bob (W8UKC) and he are in the process of manufacturing. I can describe the beam to you but you just have to see it to believe it (Incidentally you can hear it any old time in use at W1HOY). Being stuck in my driveway (as most people have been some time this winter), it was three o'clock by the time Abbey got out of here. Guess he made it home all right as the mail bag was filled with a full-scale model last week. We haven't had time to take a picture of it yet, although we have got it up in the air and Helen is keeping it well fed with her new 4-1000A final. If you just can't wait 'til next month, you might drop a line to Bob Weiss, W8UKC. I'm sure he will be happy to send you a poop sheet on same.

While on a trip to Bloomington, I was pleased to meet Ken Baldridge (W9ARA). Ken is on Two Meters in Bloomington and says that there is a modicum of activity in the central Indiana area. If any of you boys out there agree with Ken I wish you would drop me a line and tell me all about it.

We expect to be at the **Dayton Hamvention** on the fourteenth of April, complete with XYL and a few words of wisdom. Hope to see you there.

Our last foray took us down to the New York city area to pass a few words of wisdom to V.H.F. Institute down that way. Helen and I had a real nice time even if YE HON ED did make us fix his two-meter beam and rebuild his converter and shovel out his driveway (He was just getting even for being stuck in my driveway).



The Kluge in use by Dick Cotton (W8DX), Detroit, Michigan.

Teletype

Among other things which we brought back with us from the Big City was, of all things, a teletype machine. I don't know anything about teletype but if the things they told me are true you are about to hear some mighty funny noises coming out of W1FZJ and W1HOY in the near future. All in the interest of science, you understand.

Propagation Notes

Propagation on the VHF frequencies is generally meant to include those modes of transmission which do not involve the use of "E" skip. Ruling out the old standby "Sporadic E" and ignoring the burgeoning efforts of the sun spots to raise the MUF above Six Meters, we are left with several other ways of communicating with stations beyond the normal radio horizon.

The most familiar of these is "Tropospheric Bending" sometimes known on Two Meters as a "band opening". The great majority of all DX worked on the VHF bands can be attributed to this mode of propagation. While generally allowing reliable communication over distances of from 50 to 100 miles, tropospheric bending can, when conditions are right, provide communication paths in excess of 1000 miles. Unfortunately conditions of this sort, in addition to being almost totally unpredictable, are few and far between. The most important requirement for working DX on tropospheric bending is patience. It also helps to be there when the band is open.

The next most familiar type of propagation is "Auroral Reflection," generally (by an odd coincidence) called "Aurora." This type of propagation is directly traceable to the magnetic disturbances which occur in the polar regions and are generally accompanied by a visual display of "Northern Lights". Periods of auroral activity are predictable well in advance and can provide communication over paths well in excess of 1000 miles. Communication by auroral reflection is generally carried out by CW as the continual Doppler shift on the signals makes phone work very difficult.

The third mode of propagation, and one which is becoming more popular with the increase in the number of high power stations using large antenna installations, is known as "Tropospheric Scatter". This mode has the advantage of being totally reliable by amateur standards. It can support communication over paths up to 500 miles or more at all times of the year. Of all the modes, it is the most likely to succeed.

In addition to these methods there are the Moon Bounce and Meteor Scatter modes. Moon Bounce can quite possibly support communication over much longer paths than any other mode. Obviously high power, large high gain beams and the very best in receivers is a must for this type of operation. There are some pioneers working on this right now and there is a good chance that they will span the American continent before the year is over.

Meteor scatter is capable of supporting signals over distances up to 1500 miles. Once again this is a game for the high power, big beam boys. On Six Meters it is a nightly occurrence and while very little is being done by amateurs, the mode is open for anyone interested (I'm ready for skeds with anyone). On Two Meters, the meteor bursts, while always present, are seldom in sufficient density to support signals. However, on the occasion of meteor showers (such as the Persids) communication can be established over very long paths (as witness the contact from W4HHK to W7VMP).

Receivers

The type of receiver to use on the VHF bands is a good deal dependent upon the type of operation contemplated. A rag chewer, for instance, might want a receiver that covers the band in two or three turns of the dial. Noise figure and selectivity would be of secondary importance. A DX man, on the other hand, needs much more band spread and the noise figure just can't be too good. Selectivity for receiving weak tropospheric scatter signals needs to be

on the order of a few hundred cycles for optimum results. As a result, a crystal-controlled converter in front of a new super scooper is not the answer to a maiden's prayer for the casual VHF man who wants to relax at his hobby with a good solid contact. The question that comes up most often then is:

"What can I do to my present receiver to improve the performance on weak signals?"

The answer is very simple. Install a good preamplifier in front of it. Any converter from a 522 front end to a new End-It-All-And-Jump Super can be made to behave like the best by the simple addition of grounded-grid 416A in front of it. Now it's true that the 416A is about the scarcest thing that you can't hardly get no more (due in part to a rather short-sighted view by the telephone company). BUT you *can* get a 417A at the local *Graybar* outlet. Furthermore while thirteen bucks may sound like a lot of moola for a receiving tube it really isn't much when you think of it as the difference between a mediocre converter and just the best darn blinger you ever bent an ear to.

Now of course the next question comes from the man who just plain doesn't have thirteen bucks but just happens to have a couple of 6AJ4's laying around. What good are they? If you are the guy who is asking the question, the answer is simple. They are a lot better than what you are using now (This is working on the assumption that if you are curious as to the merits of a 6AJ4 you must not be using a 417 or 416A). The difference between a receiver using a 416A and one using a 6AJ4 is not insignificant but it is not as tremendous as some rabid noise figure fiends (like me) would lead you to believe. In fact it is very unlikely that the difference can be demonstrated in actual on-the-air tests (Oh, stop howling!) There have been people who claim that a good neutralized 6J6 can turn in an "on-the-air" performance that is hard to beat. Under some conditions I am inclined to agree with them. It's a case of progressive deterioration.

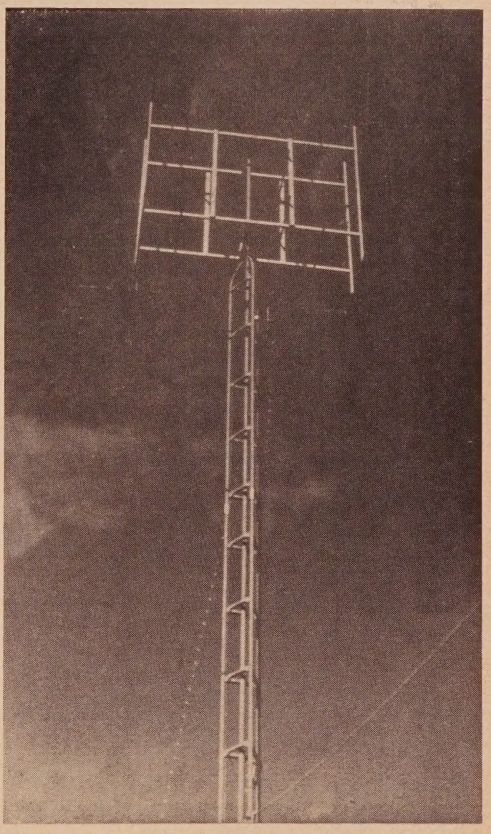
The 6AJ4 is better than a 6J6 by a very little amount, the 417A is better than the 6AJ4 by a very small amount and the 416A is better than the 417A by a small amount. The 416A is significantly better than the 6J6. The amount in fact is sufficient to make the difference between a good contact on tropospheric scatter and not even hearing the signal at all. It is a long way however, from making any difference at all on ninety per-cent of the contacts which you are likely to make in the next year of operating. It will not be a noticeable difference on aurora and you will be very unlikely to tell the difference on a band opening. It can probably be said that if you don't have a 32-element or bigger beam you won't ever be able to tell the difference.

Leave us not get any worse than a 6J6 however, or we will be back where we started. Do not be misled by the difficulty in demonstrating the superiority of a new preamplifier. If the noise figure is better, it is a sure thing that you will hear better. It's like having extra horse power in your automobile; you don't use it very often, but it's nice to have it when you need it.

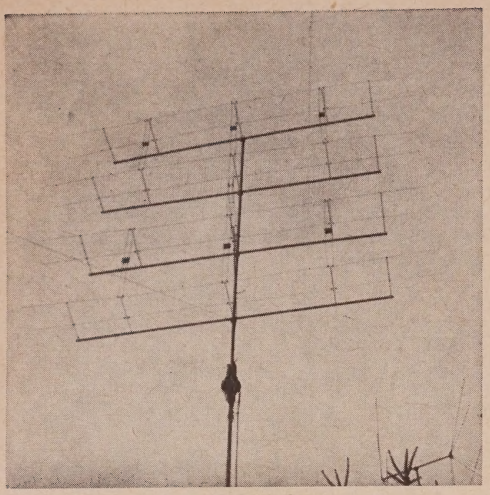
Letters

Los Angeles, California: The sunny part of the country comes through via Paul (K6CBD) with the following:

"I felt I should introduce myself, the *Two Meter and Down Club* and the new officers in order to let you know that there is some real serious thinking and doing in UHF, VHF and Micro-waves, out here on the West Coast. At our last Club meeting, the following persons were installed as officers: President, W. Paul Wilson Jr. (K6CBD); Vice-president, Stanley Benson (K6CBK); Secretary, Emily Riley (K6HOQ), the first YL officer of the Club; Treasurer, Cliff Wesler (K6CEO). The following members are serving on the Board of Directors: Donald Goshay (W6MMU), William Myers (W6IHK), and Frank Reinsch (W6RJS). This gives us a seven man or rather six men and one woman Board with four elected officers and three appointed directors. With the directors being active in their respective committees, it will take a big load off the shoulders of the President. (*And*



5 over 5 plus 5 over 5 on Two Meters with the same thing for 1.4 Meters on the inside. This array can be seen by visiting Tony Sheppard (VE3DIR).



Shelby Ennis (W4WNH) sends in proof that he is serious about Two Meters with this picture of his 32-element beam.

you sure are saying a lot when you say that, too.) Meetings will be held on the first Wednesday of the month only, with the Board of Directors meeting being held on the third Wednesday, when required. Our general meetings are held at Plummer Park, 7377 Santa Monica Blvd., Hollywood, California.

"Under the very able direction of our past president, Don Goshay (W6MMU), our club is really beginning to have some "Down" in it. We are now starting a 220-Mc "Build-it" project in an effort to stimulate more activity on that sadly neglected portion of the spectrum. I am building a full gallon job for the 220-Mc band at the present time, and it will be set up for AM, FM, and CW.

"Our plans for the future include the development and building of transmitting and receiving equipment (and the using of it) on the 220, 432, and 1200-Mc bands up through the upper frequency limits of the spectrum. Further, we are going to investigate meteor scatter and moon bounce propagation on 220 Mc.

"Our club will continue to be an amateur technical society, open to membership by invitation, for those persons seriously interested in experimenting with and developing the frequencies with wave-lengths of two meters or less." (*The whole deal sounds very, very good to us, Paul. Be sure to let us know what gives concerning outcome of the various experiments, tests, rigs, etc.*)

Fort Worth, Texas: From the wide-open spaces and Bill Bonnell (W5CVW) comes good news for the six-meter gang:

"W5CVW will soon be on Six Meters. The rig is a 4-125A driven by a Meissner VFO and a buffer-doubler. Input will be 350 watts. Antenna is a Gonset four-element beam, sixty-five feet high. Receiver is an NC300 with National six-meter converter. (*I'll be seeing you soon, Bill—on Six Meters, of course.—Helen*)

"On two meters I run 350 watts to 4-65A's soon to be replaced with 826's. Antenna is a 32-element beam seventy feet high. Operating frequency is 144.25 and can shift to 144.0, 144.4, and 144.6.

"The January 7 VHF Sweepstakes provided the first test for the big beam and the NC300. Twenty contacts were made, four states and five sections worked. Conditions were only fair and nothing was heard from W4HHK-W5JTI or any of the Louisiana gang. WØZJB and WØTMJ/5 operating big stick put in fine signals here during the contest. WØTMJ/5 gave many of the boys their first Arkansas contact, as he was on KATV's 1000-foot TV tower at Pine Bluff, Arkansas. My score figured out an even 200 for the weekend. Too bad more signals weren't coming through. Am well satisfied with the Two Meter end and am open for skeds." (*Good to hear that you'll soon be operating two of the VHF bands, Bill. I'll work you on Two, Helen will work you on Six.*)

Nashotah, Wisconsin: From the land of Wispride Cheese and genuine butter Rip, W9JAQ emits with:

("Located about thirty miles west of Milwaukee on one of the highest points around here, about 1250 feet above sea level. Have a fifteen-element Telrex Long John that seems to be doing a nice job. Transmitter is 120 watts to an 829B at a frequency of about 144.08 Mc. Receiver is a Stacey-Walman converter into an HRO. The area between Madison and Milwaukee is loaded with two-meter activity, with new stations getting on every week, so have the boys swing those beams up this way occasionally. (*Well-ll-l boys?*) We're looking for skeds in this neck of the woods. Can make it day or night, daily except Saturdays." (*Get those new rigs on the air, Wisconsin, we need you badly. Beside that Aurora season is on, you know.*)

Trumansburg, N.Y.: Henry McPeak (W2SHT) came through again:

"Finished my new converter in late December and promptly worked W9WOK during one of the short Aurora's in January for a new State. (*Knew you could do it, Hank.*)

"Spent a day with W2WFB making noise-figure checks, and after removing filament chokes and carefully neutralizing, we arrived at a noise figure of 4.5 db, not bad for an easy-to-get NAN4. (*Hope you come through with an article Hank, the fellas would like to know about it.*)

Fort Worth, Texas: More from the large state and Roy Welch (W5SLL):

"I am new to VHF, having built up a station for Two Meters only seven months ago, but perhaps enthusiasm will eventually make up for a lack in experience. (*It helps, Roy*). The rig consists of a 522 running 18 watts input, an all metal twelve-element colinear antenna and a Tecraft in front of a BC-348H. I just finished building a noise generator with thoughts of lowering the noise figure of the Tecraft, but any suggestions along that line will be appreciated. (*Give, boys.*)

"Average contacts run up to a hundred miles consistently, but my best DX is WØGUD in Conway, Iowa, a distance of 578 air miles. Only three states worked, Texas (W5GEB, W5CUA), Oklahoma (W5SCX, W5JP), and Iowa (WØGUD)." (*Keep at it Roy, you'll surely enjoy VHF.*)

Maryville, Tennessee: W. Huffstetler, W4BXG, comes forth with news from that seldom-heard-from State:

"Activity on Two Meters in East Tennessee is increasing every day. We are attempting to get together a list of all hams either already on Two Meters or interested in getting on Two in this area. Anyone interested in having his name and call listed on a roster to be published and distributed to two-meter enthusiasts, please send the following information to the writer: Call letters, type antenna (i.e. vertical or horizontal), and frequency operated. Please send this information to the *Smoky Mountain Amateur Radio Club*, C/o W. J. Huffstetler, W4BXG, 234 Magnolia Street, Maryville, Tennessee." (*W4BXG included a list of twenty stations in Tennessee and two in Virginia that are on the air nightly, so get at it gang, now we're sure of those boys. Thanks for the information, OM, it helps to know these things.*)

[*Continued on page 109*]

see you
at the 1956
Dayton Hamvention
SATURDAY, APRIL 14, 1956

Ol' Sam will be there to participate in the VHF Forum and general festivities. BCNU?

Hobbies

Nancy Anderson*
1316 1st St. Manhattan Beach, Calif.

I hate hobbies!

The dexterity of the model builder who papers the floor with plans, spikes the rug with straight pins and dusts the household with a fine powdering of balsa wood leaves me cold. Or more accurately, it leaves me hot. I burn every time I have to vacuum in his wake. He's probably the messiest fellow alive.

Then, there's the mania of the clear-eyed birdman whose heart soars into the wild, blue yonder after a radio-controlled model plane.

Indifferent to burning heat or biting cold, heedless of his children's pitiful cries ("Daddy, I'm thirsty. Buy me a Coca-Cola", "Daddy, I have to go to the bathroom") he follows the plane's progress with the devotion of a Mohammedan turning toward Mecca.

Meal time means nothing to him. Sunday dinner or hell can freeze over for all he cares so long as he gets in one more flight.

Further, he tests his airplane motors in the kitchen. The din is outrageous and unending. Neighbors stop by and ask, shouting above the roar, "What's going on in here? Are you sanding the floor?"

Radio-control model addiction is not only annoying, it's contageous. It's adherent is a Typhoid Mary. Perfectly innocent souls who stumble into his path come away scarred for life. In no time at all, formerly decent family men have deserted home and loved ones for a life in the open with a model plane, all because they met a hobbyist.

It's useless for the bereaved families to urge a return to normalcy. Their only consolation is to loathe the seducer.

The aforementioned hobbyists are on the lunatic fringe, but the boys who've really crossed the line are the **amateur radio operators**.

These are truly the lost souls of the hobby world, lost to all sense of time, responsibility or physical comfort. Amateur radio addiction is akin to Yoga. It transports the mind from the body so completely that the "Ham" can stay up all night, forego all nourishment, and become stolidly indifferent to social customs and public opinion.

What matter if all his friends quit speaking to him because he's ruined their favorite television programs? What matter if his family has become suspect and is shunned by polite society?

"I have as much right to operate my ham rig." says the ham, "as Charlie has to watch television, and there's nothing he can do to stop me."

Of course the fact that Charlie is president of the bank where the ham expects to get a loan to buy more gear doesn't influence the radio bug. He's dead to reason. He'll receive and transmit all night every night though the heavens fall.

(The term "ham", incidentally, is derived from "pig"; i.e. "pig-headed".)

The two worst features of having a radio amateur in the home are:

1. His deadly-dull air-borne conversations
2. His friends.

The conversations may be bearable if the ham has his rig in a shack removed from family living quarters and if they don't come in on the family radio, the neighbor's record player or even (as charged in one case) on the neighbor's bed springs.

If the hobbyist wants to gab all night with a crashing bore, that's his business, but if all the world has to monitor the dialogue, that's different.

If the amateur would ask sensible questions like, "Does your wife have a new Italian boy hair do?" or "How much is leg of lamb out there?", there'd be a point to ham operations. But no! The give and take deals solely with tubes, antenna, and the weather.

Suppose the amateur has actually made a contact with Gum Stump, Nebraska where his wife's old school chum lives. The girls haven't seen each other for 25 years, and the missus gets pretty excited.

"Dear," she shyly pleads, "ask W7DAM if he has a phone patch. Ask him if he knows Gertrude Phinklewurst. I'd so like to know what she's doing now."

"Just a minute. Just a minute. I'll ask him in a minute. Be quiet, Dora, I can't hear. Keep those children quiet. Junior, don't study your spelling out loud, or I'll belt you one."

And into the microphone, "Now what was that, Old Man," (these maniacs are always "old men", that they should live so long), "I can hear you now. That was just the XYL. Now I'm using, etc. . . . . ."

After a while, the wife, her spirit broken, gives up and decides to send Gertrude a post card. Junior fails his spelling test the next day, but the ham, concluding his contact with Gum Stump, righteously assures, "I was just going to ask him about Gertrude when he faded out."

Now, about those friends!

*Mrs. W4QEG

The associates of the amateur radio operator have no sense of propriety. Their leisure and lack of judgment is shattering.

Citing cases, four total strangers arrive at the Sunday dinner hour to pay a pop call on a "ham" one of them had contacted. The host's children are breaking out with chicken-pox (the first blister and the pop-callers are sighted simultaneously), the baby is crying, and Sunday papers litter the floor.

Never-the-less, the "ham", with callous disregard for his bride's near-hysterics, cheerily cries, "Well, well, so it's old W4HEL. Come right in. Stay all day."

And even worse, the visitors do.

Here's another sketch, drawn from life: the amateur radio operator's bride is seeking oblivion in merciful sleep. It's roughly 2 a.m. and her spouse, naturally, has just made contact with Pooler, Ga.

Suddenly she's jolted awake. She has company in the boudoir. There are more "hams" in her bed chamber than in a Virginia smokehouse, and a stranger is sitting on the foot of the bed.

Seems some of her room-mate's confederates have dropped in to talk radio, and the man of the house has invited them back to look over new equipment.

Since the radio gear is neatly stored on his wife's dresser, the bed, and the bedroom floor, the fellows troop into the sleeping quarters regardless of the sleeper.

And that's the crowning indignity. The lads are so taken up with their wires and tubes, they don't even realize the lady's there. Honestly, girls, how much can a woman stand?

It's been said, the man with the hobby is the well-balanced man, to which I reply, "Phooie".

His whole life is completely askew. He arises and retires at odd hours like a baby with cholic. He reads only hobby magazines and is bored by and boring to anybody who doesn't share his special passion. He's anything but balanced. The hobbyist is as one-sided as a grid match between U.C.L.A. and Azuza Junior High.

It's also been ventured that the hobbyist lives longer than his neighbor. If so, it's through his neighbor's tolerance. Actually, he's inviting murder every day.

Like I said, I hate hobbies.

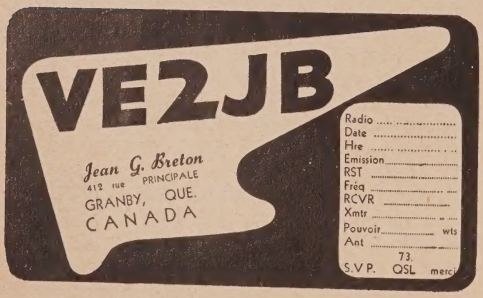
Of course, I have one of my own . . . writing . . . but I'm sensible about it. I indulge in moderation only. I keep my hobby in its place.

What's that you smell in the kitchen? Oh, probably the beans burning. I thought I'd write a few minutes while they cook.

They probably won't really stick for another second or so, and that will give me just about time to finish this page. ■

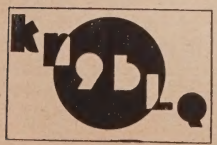
April QSL Contest Winner

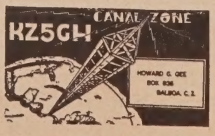
and runners up











Wel-l-ll, not a bad bunch of cards this month, but wouldn't you know it? the day after the April contest closed, in came not one, but several excellent cards that might have been winners a day earlier. Of course, they stand a pretty good chance in the May contest, but the competition is usually keener each month.

Incidentally, what the heck does the average ham do with off-size QSL's? Unless they're rare DX or extremely good-looking cards, they're likely to get shuffled around old drawers and boxes till they get lost, rather than being displayed neatly with others of standard size. So maybe it's clever to ship a card 1″ high and 3½ feet long, but it sure is unhandy in the recipient's shack. How about being creative within the confines of a standard 3½ x 5½″ card?

Edison Award

WASHINGTON, D.C. — A blind radio designer whose technical development and unceasing struggles have made it possible for any blind person to make his living in the swiftly expanding field of electronics today was named winner of General Electric's annual Edison Radio Amateur Award.

The winner is Robert W. Gunderson, 36, who operates amateur radio station W2J10 which is at his home at 984 Waring Avenue, The Bronx, New York City. Gunderson is editor of the non-profit Braille Technical Press, and teaches at the New York Institute for the Education of the Blind. He has developed special electronic test equipment that opens the entire electronic field to the blind as an occupation. The Award trophy and a $500 check was presented at a ceremony here February 16, at which Herbert Hoover, Jr., Under Secretary of State and one of the Award judges, delivered a speech.

Mr. Hoover and the other judges, E. Roland Harriman, President, American Red Cross; Federal Communications Commissioner E. M. Webster; and G. L. Dosland, President, American Radio Relay League—also named the following special citation winners:

Louis Arivello, WØCPI, Brentwood, Mo.—Arivello handles over 1000 messages monthly, principally from armed forces personnel stationed on Pacific islands and the West coast.

George F. Beard, K6HCI, Fullerton, Calif.—Presently instructing 25 youngsters as novice-class amateurs, making total over 240 since 1948. Furnishes training facilities and equipment for boys.

Paul M. Crawn, Jr., W3YAZ, Shawnee, Pa.—This Civil Defense assistant radio officer first aided in rescuing several hundred people marooned by the August floods, then operated the CD amateur network control station for 80 hours without dry clothes, sleep or relief.

Edmond A. Guardiani, W1TTN, Southbridge, Mass.—As Civil Defense radio officer for this town, Guardiani manned his mobile station single-handed for 72 hours during the August floods relaying vital information when a 12-foot high wall of water isolated 3000 inhabitants.

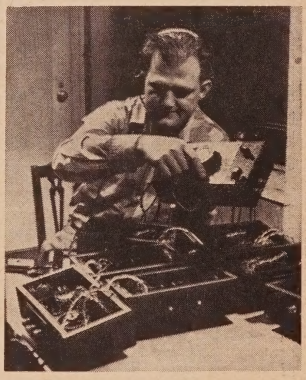
Roland E. Lemire, W1TZO, Torrington, Conn.—Even though his mother was drowned when his parents' home and possessions were swept away in the August Naugatuck River flood, Lemire activated the Civil Defense amateur radio control station according to established procedure.

Murton W. Lyon, W1BGT, Naugatuck, Conn.—Lyon worked around the clock the first day and an average of 19 hours a day for the 10 days following the Naugatuck River floods in August directing the operation of the effective Civil Defense emergency communications system he had previously established.



Bob Gunderson, W2JIO, receives Edison Award from Mr. Lang, Committee chairman (left) and Under Secretary of State Herbert Hoover, Jr., W6ZH (center).

Lewis J. Papp, W3MAC, Easton, Pa.—This amateur, though blind for many years, accurately predicted the worst Delaware River flood in history and handled emergency messages until forced by the rising water to abandon his equipment and escape over a steep, wooded embankment.



Blind Bob Gunderson's special test instruments have literally opened the field of electronics for the sightless.

Steven P. Temby, K6IRE, Oakland, Calif.—This 15-year old candidate answered emergency calls from the flood isolated Arcata airport, and for 30 hours handled many messages relating to obtaining relief supplies by air, additional aircraft and safety of aircraft operating in the devastated area. Five days later he again became the main communications link to Air Traffic Control in Oakland for several hours.

The judges also voted to award an emergency disaster certificate to amateurs participating in the 1955 flood rescue emergencies throughout the country. ■

A Rotary Dipole for 20 & 40M

The antenna to be described was erected for two reasons: first, to test the characteristics of the antenna, which I intended to use as a radiator in a 7 and 14 Mc., 3-element beam; in a C-D party, as I had taken down my 14 Mc. beam. Since the 7 Mc. feature was available, it was given a thorough on-the-air test in the same party.

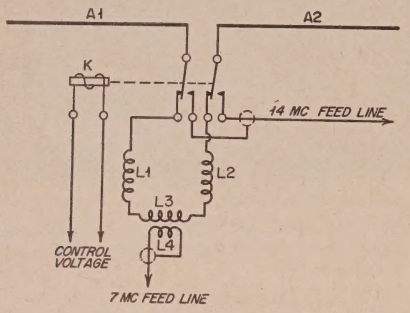


Fig. 1.

A1, A2 — each 15'6" lengths of 1" and ⅞" dia. aluminum tubing mounted on insulators on 6'x2"x4" fir cross arm.
K — D.P.D.T. ceramic-insulated "antenna-changeover" relay.
L1, L2—22 turns number 8 aluminum ground wire, 1½" dia., 6" long.
L3—20 turns number 8 aluminum ground wire, 1½" dia., 6" long.
L4—5 turns number 8 aluminum ground wire, 2¼" dia., 2" long, wound around L3.

The antenna, shown in *Fig. 1*, is basically a 14 Mc. half wave, with a d.p.d.t. relay used to insert coils in the center of the element to load the antenna to 7 Mc. RG-8/U cable is used to feed the antenna directly on 14 Mc. On 7 Mc., the antenna is fed through another RG-8/U line connected to a coupling coil wound around the center loading coil.

Initial tuning was done with the antenna mounted five feet above a ten-foot high flat roof. The 14 Mc. adjustment was made first. The feed line was connected through an s-w-r bridge, and the lengths of each half of the antenna were adjusted until a minimum s-w-r was reached at 14,150 kc. This turned out to be 1 to 1. The element length was left in this position. Then the relay was switched to the 7 Mc. position, and the loading coils were adjusted to give minimum s-w-r at 7050 kc. The coupling coil was also adjusted for minimum s-w-r, but it was found to have little effect.

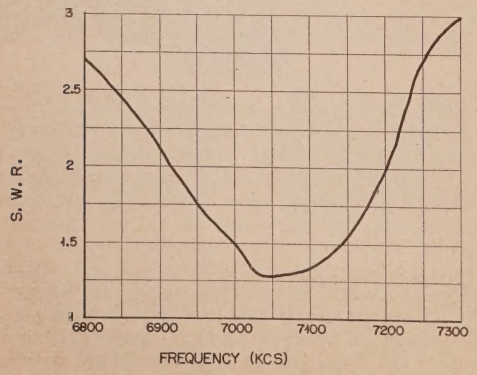


Fig. 2

When the antenna was mounted on a TV rotor on a 50-foot steel tower, the 14 Mc. s-w-r had changed very little, running from 1.1 to 1 at 14.2 Mc. to 1.15 to 1 at 14.0 and 14.4 Mc. However, the 7 Mc. s-w-r had changed appreciably, necessitating readjustment of the loading coils. The 7 Mc. s-w-r curve is shown on *Fig. 2*.

Receiving Tests

Receiving tests were made on several hundred signals in the 7 Mc. band. The comparison antenna was a base-fed half-wave vertical, which has worked out well for both U. S. and foreign contacts in the past. The horizontal antenna was better on about eighty per cent of the signals checked. On most signals, it was five to ten db better than the vertical, and in a few cases showed startling improvements of as much as 30 db. The two antennas were about equal on the other twenty percent of the signals, except for one South American phone station which ran about ten db stronger on the vertical. One considerable improvement noted with the horizontal was in the reduction of local noise. When our local power leak came on, it blotted out all but the loudest signals on the vertical, but ran only about S-3 on the horizontal.

Directivity

Some directivity was evident on both 7 and 14 Mc. Front-to-side ratio averaged about eight to twelve db on 7 Mc., and eight to twenty db on 14 Mc. No consistent correlation between distances and front-to-side ratio could be found.

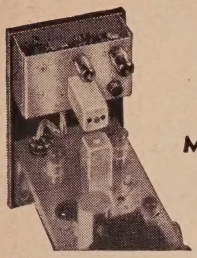
Performance of the antenna in the C-D party was quite good. Large numbers of stations were worked on both bands, and frequent comments were received concerning the strong signal on both bands. No attempt was made to work DX with the antenna, but one IT1 was worked —on request—to give him WAS on 14 Mc. On 7 Mc. a ZL was worked and an S8 report was received.

On the whole, this antenna has been quite satisfactory. While it has since been taken down, it will be up on the tower again soon as the radiator in a 7 and 14 Mc. beam. This is the only thing that could have made me take this antenna down after observing the improvement in performance over what I had considered to be an excellent 7 Mc. vertical.

R. H. Mitchell, W5DWT

NEW MULTIPHASE "Q" MULTIPLIER

- Peaks Desired Fone or CW Signal
- Nulls Out Interfering Carrier up to 50 DB. No Loss in Speech Intelligibility
- No Insertion Loss — New Two Tube Circuit
- Special High "Q" Pot Core Inductor

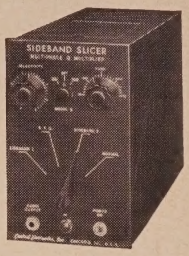


MODEL AQ



MODEL DQ

MODEL B SLICER



CONVERTS MODEL A SLICER

Plugs into Model A accessory socket, converting it into a Model B. New front panel and controls provided. Enjoy all the advantages of "Q" Multiplier selectivity on CW, AM & SSB with your present Model A Slicer.

Wired.....$29.50
Kit.....$22.50

FOR AM, CW, SSB OPS

Desk Model "Q" Multiplier for use with any receiver having 450 to 500 KC IF. In attractive, compact case with connecting power-IF cable. Power supplied by receiver. Also provides added selectivity and BFO for mobile SSB or CW reception.

Wired.....$29.50
Kit.....$22.50

BUILT-IN "Q" MULTIPLIER

Upper or lower sideband reception of SSB, AM, PM & CW. For use with any receiver having 450-500 KC IF.

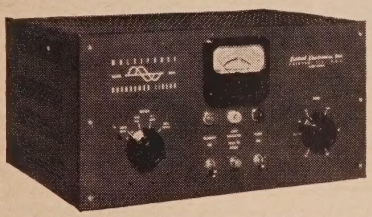
Wired.....$99.50
Kit.....$69.50

MODEL A SLICER

Same as Model B but less "Q" Multiplier

Wired.....$74.50
Kit.....$49.50

A NEW CONCEPT IN LINEARS



MULTIPHASE 600L

BROAD BAND LINEAR AMPLIFIER

NO TUNING CONTROLS!

SINGLE KNOB BANDSWITCHING 10-160 METERS

- Single 813 in Class AB_2. 500 watts DC input.
- New band-pass couplers provide high linear efficiency: 60%.
- Designed for 50-70 ohm coaxial input and output.
- Built-in power supply. Bias and screen regulation. Automatic relay protection.
- Exclusive metering circuit reads grid current, watts input, RF output, reflected power from mismatched load—switch to any position while on the air!
- Completely shielded—TVI suppressed. Free of parasitics! Low intermodulation distortion.
- Choice of grey table model (17⅝"W, 8¾" H, 13"D) or grey or black rack model.

Wired, with tubes.....$397.50*

*All orders received prior to March 1, 1956 will be filled at the old price.



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- Perfected Voice-Controlled Break-in on SSB, AM, PM.
- Upper or Lower Sideband at the flip of a switch, with 40 DB. suppression.
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- New AF Input Jack. For oscillator or phone patch.
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MODEL 20A

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NOVICE

Reported by
Walt Burdine, W8ZCV

We start off this month with a couple of firsts: We have the first picture of a YL for the pages of the *Novice Shack*, also since we have run out of W8 calls and are now issuing KN8 calls, we have the first KN8 call to be listed in the *Novice Shack*.

I have been asked many times if I would put in more theory, sample license exam questions, and some hints on how to learn the code. Other letters have asked for information on operating procedures and how to use the *"Q"* signals. Your letters dictate my column. I know that these subjects have in the past been covered by *CQ* and other magazines, however few Novice and Technician operators, being new at the game, have these back issues. Since *CQ* is the only magazine that publishes a column for the beginning amateur it is our duty to answer these questions for the beginner.

Now, about getting one of these ham tickets. First just how badly do you want it? The most important part of getting your ticket is in making up your mind that you are going to get it, no matter how much time it takes to learn the code and the small amount of radio theory the test requires. You will have to *earn* your ticket. The government grants this privilege to those people that can copy code at five words per minute and learn enough radio theory to operate an amateur radio station correctly. There is no cost to obtaining a license except perhaps fifty cents for a notary public when filling out the Form 610 application.

The aspirant for a Novice license should learn the code so that he can copy 6 or 7 words per minute. This will insure that he can copy the required 5 words per minute. Each letter of the alphabet counts as a letter, numbers and punctuation marks count as two letters, five letters count as a word. Although Novices are not required by the FCC to learn numerals or punctuation marks, I have yet to see an amateur pass someone without a knowledge of numerals. How in the dickens can you call a station if you can't send numbers?

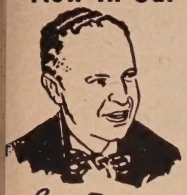
The other requirement for a license is a knowledge of radio laws, operating procedures and a limited knowledge of the technical aspects of radio. This knowledge can be gained while studying the code so you will be ready for both sections of the examination at the same time.

The code test for Novice, Technician and Conditional licenses have to be given to you by an amateur, a commercial telegraphic licensee or by some one who has been employed as a



The Novices are going all out to make the Dayton Hamvention a thrill for the YLs to attend. Pictured are Vi Van Patten, KN8AEE, Chairman, Arrangements Committee, and Betty Hall, WN8AXA, Moderator, YL Operator's Forum. Both are mothers, Vi has 1 boy and Betty has 2 boys and 2 girls. *photo by Dick Stone, W8VPG.*

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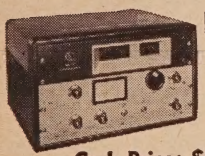
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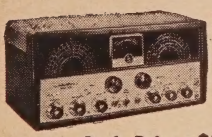
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United States Radiotelegraphic operator within the last five years. The written test can be given by any citizen 21 years of age or older. This can be the same person that gave you the code test. The person who gives you the code test does not have to be 21 years old just so long as he (or she) has the necessary license. Your local broadcast or television station can give you the name of a ham that lives nearby or perhaps their Chief Engineer will give you the test.

After becoming acquainted with the person who will give you the code test, satisfy yourself that you can copy the code at the required speed and master the technical aspects of radio well enough to pass the test.

Write the Field Engineer-in-Charge of the Federal Communications Commission district in which you live for the packet containing the Novice, Technician or Conditional examination. Note: the Conditional class license requires that the code test be passed at thirteen words per minute. This packet as received from the FCC shall NOT be opened by anyone other than the examiner. *Do not open this packet yourself.* The examiner will open the packet and hand you the little white FCC record card. You fill out this card and hand it to the fellow who is to give you the code test. He will give you a code receiving and sending test. If either is not passed, the examiner will state so on form 610 and send it back to the Engineer-in-Charge and you can take the test again in thirty days. If you pass both of these tests the examiner will certify to that on form 610 and you are ready for the theory part of the exam.

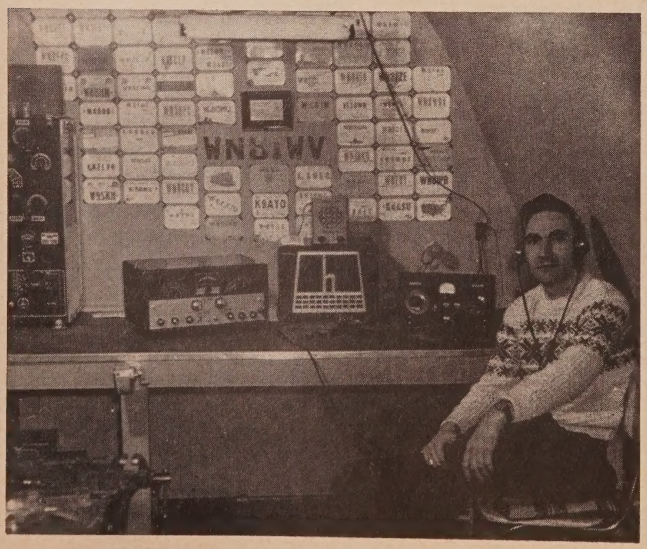
After you have answered the questions in the technical part of the exam the examiner will certify that you took the test in his presence without aid from any source. He will seal the envelope and send it back to the Engineer-in-Charge. Then, four to seven weeks later, the little white card that gives you the privilege of operating an amateur radio station should arrive. Brother, you have just begun to live. Come on . . . . . let's get going.

Learning the Code

Mastering the radio code is mainly a matter of practice, practice and more practice. Acquiring the art of transmitting and receiving the telegraphic code consists of: A. . . Natural Ability—5%. B. . . Psychology—10%. C. . . Study and practice—85%. Please note that study and practice portion. Keep in mind that it is best not to practice code more than 20 to 30 minutes at a time. More than 30 minutes seems to hold you back more than it helps.

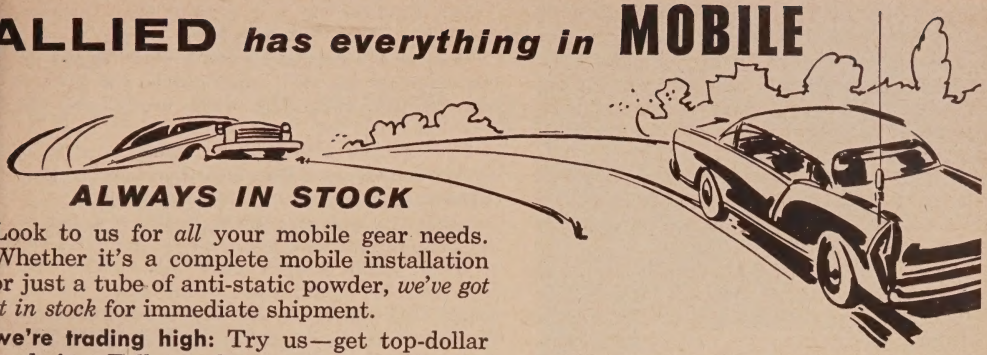
If you have a friend to help during your practice it will be more enjoyable. Try not to talk to one another except by using code, that will help you gain speed. Use your receiver to listen to code. It will be interesting and you will also become familiar with ham operating procedure. When you hear a *Q* signal, look it up. *Q* signals are used in telegraphic communication to speed up the transmission of intelligence. *Q* signals are actually what you might call radio short hand, a three letter *Q* signal replaces several longer words.

The code can be learned in a short time, depending upon the amount of time expended and the regularity of the practice periods. With regular practice periods you should be able to copy 15 words per minute in about 75 to 100 hours. When it seems that you are at a standstill it is likely that you are about to make a big jump in speed. You will find plateaus, speeds at which it seems impossible to copy code at any faster speed. When you reach a plateau keep right on copying. I would suggest that you keep at the code until you can copy as fast you wish to go.



Dean R. Flower, WN8IWV, 35390 Churchill Street, Richmond, Michigan says ham radio is the most interesting medium that he has ever run across. Flying gas powered radio-controlled model plane since 1936 led to ham radio. Rig is home-made 6AG7-6L6 running about 30 watts. On the air 1 month, Dean has had over 100 QSOs, all on 80 CW.

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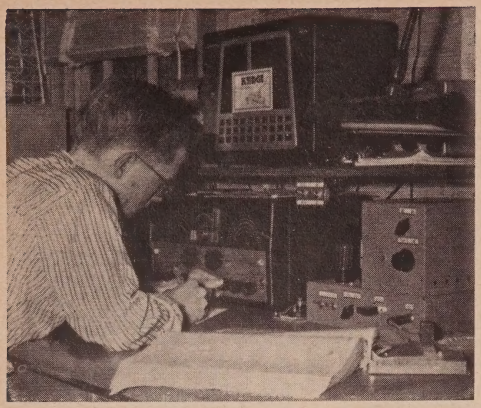
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Wesley Attaway, KN5DGI, Shreveport, Louisiana

To begin you will need a telegraph key and a code oscillator. The telegraph key can be bought for about two dollars at most any radio parts store or you can buy a surplus key for about a dollar from advertisers in most any electronic or radio magazine.

The code oscillator is an electronic device that generates an oscillation within the audio range (20 to 20,000 c.p.s.). Breaking the oscillating tone into pulses of long and short duration is the method of forming code characters, a short duration pulse is a dot (dit) and a pulse that is three times the duration of the dot is called a dash (dah). The spacing between parts of a letter is equal to one dit, between each letter is equal to three dits, and between words five dits. Incorrect spacing can make a letter sound like two other letters. For instance, C - . - . sent thusly - . -. becomes N N. The spacing of the letters, characters and words correctly is the mark of a good code signal, not the speed at which the code is sent. A good operator does not try to send faster than he can copy with ease. If you must brag about your abilities be sure that you can brag about your ability to copy solid rather than the speed at which you can send.

The International Morse Code is used by most nations when code is sent by hand key or by automatic senders. Learn the code by sound, not by dots and dashes as written. The dot is spoken of as *dit* and the dash as *dah*. Learn the code as a sound and you will be able to read the sounds of code on your receiver. In other words the symbol CQ would be dah-di-dah-dit, dah-dah-di-dah. A copy of the International Morse Code is printed below.

A	.-	N	-.	1	.----	Period (.)	.-.-.-
B	-...	O	---	2	..---	Comma (,)	--..--
C	-.-.	P	.--.	3	...--	Question (?)	..--..
D	-..	Q	--.-	4	....-	Quotation (")	.-..-.
E	.	R	.-.	5	.....	Wait Sign (AS)	.-...
F	..-.	S	...	6	-....	Break (—)	-...-
G	--.	T	-	7	--...	Error	.....
H	....	U	..-	8	---..	End of transmission	
I	..	V	...-	9	----.	(SK)	...-.-
J	.---	W	.--	Ø	-----	End of Message	
K	-.-	X	-..-			(AR)	.-.-.
L	.-..	Y	-.--			Fraction Bar (/)	-..-.
M	--	Z	--..				

The fraction bar (/) is used as a portable designator, thus: W8ZCV/VE6.

Ø is always written for zero so it will not be mistaken for an "O". Sometimes the zero is sent as one extra-long dash instead of the -----.

The international distress signal is sent as ...---... not as SOS. This signal carries precedence over all other communications.

Learn the code by sound, di-dah is *a* and so on. This should take you four or five evenings at most. Some people learn the vowels first and then the consonants. Some learn the dit letters first, then the dah letters, followed by the mixed character group of letters and then the numbers followed by the punctuation marks. You can use your own preference in the matter. After learning the code symbols you can proceed to copy from a practice oscillator and later from your radio receiver.

There are a number of stations that send code practice and these provide a good way to improve your code copying ability. These stations always send well spaced code characters. W1AW sends code almost every day at speeds varying from 5 to 35 words per minute. This code is always perfectly sent and at exactly the speed specified. If you can copy their code at the next higher speed you are ready to take your examination. You should be able to copy at from three to five words faster than the test speed to overcome "inspectoritis," a nervous condition that seems to affect persons appearing before any radio inspector.

Once the code has been learned it is time for you to learn how to send and receive. At first always write down every thing you hear, even if it is wrong. Never stop to think if you got this or that word right, just keep on writing. Make your copy periods about fifteen to twenty minutes in length. A change to the study of theory will rest you up for another try.

It is a good idea to have a friend help you study the code and practice with you. If you can't interest a friend then you can have real expert help by using your phonograph or one of the automatic code sending machines that are on the market. The phonograph record method is a good way to find out exactly how good code sounds. Some war surplus automatic keyers and practice tapes are still available. The TG-10 keyer has a very good code oscillator built in and has enough output for group practice sessions. Other automatic keyers are available to use with your own oscillator. These automatic keyers can be used to augment the practice periods with your friends.

Code lessons on phonograph records can be bought from most local radio or record stores, or they will order them for you on special order. The record method of learning the code starts at a slow speed and gradually speeds up as you progress. There is a booklet with most records that gives you valuable instructions for

[*Continued on page 98*]

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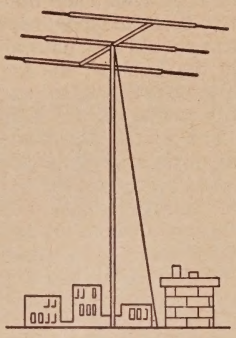
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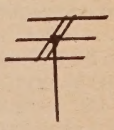
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☐ Deluxe 2-El Gamma match 31.95 ☐ T match 34.95
☐ Std. 3-El Gamma match 34.95 ☐ T match 37.95
☐ Deluxe 3-El Gamma match 46.95 ☐ T match 49.95

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

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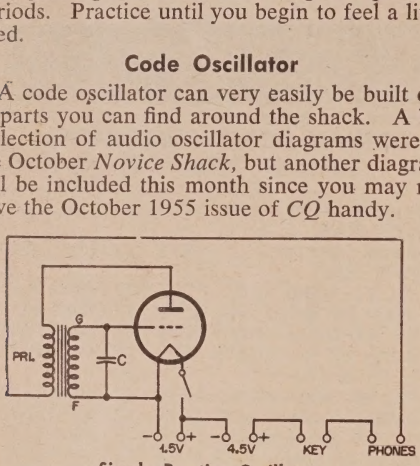
use in practice with sending and receiving code from your receiver.

The key and the correct positioning of the key are two very important assets to learning to send correctly. Use a straight key until you get your license.

The key should be placed about 18 inches from the front of the operating table (less than that for the younger set) so that the elbow rests on the table. The forearm should rest naturally upon the table. Hold the knob of the key lightly, with the thumb along the edge and the index and third fingers resting on the front edge of the key knob. The fourth finger will just naturally fall on the opposite side of the key from the thumb. Let your hand rest on the key gently. Hold the knob lightly. Relax and take it easy, don't try to hurry. Adjust the key so that the contact points are about 1/16" apart and adjust the spring tension until the key operates easily and smoothly. Nothing will help you gain speed more than regular practice periods. Practice until you begin to feel a little tired.

Code Oscillator

A code oscillator can very easily be built out of parts you can find around the shack. A big collection of audio oscillator diagrams were in the October *Novice Shack*, but another diagram will be included this month since you may not have the October 1955 issue of *CQ* handy.



Simple Practice Oscillator

Use any tube you have (type 30 or IG4 use 1½ volts filaments, as in Fig. 1), substitute the correct filament voltage. The transformer may be any small, inexpensive interstage coupling transformer. Condenser *C* can be changed to change the tone. *C* may be omitted entirely if the tone without it suits you. If the unit fails to oscillate, reverse connections to one of the windings of the transformer, not both.

Two Questions

Q.... What is the maximum power that may be run by a Novice radio operator and how can you compute that power?

A.... The maximum power that may be run by a Novice is 75 watts (and the transmitter must be crystal controlled). Power is computed by the formula: P=E X I where P=Power in watts, E=volts (e.m.f.) and I=current in Amperes. Example: 300 volts times 150 milliamperes equals 45 watts. (150 ma. is .150 amperes).

Q.... On what frequencies may a Novice operate a radio transmitter?

A.... The Novice may operate a transmitter on 3700 to 3750 kc, 7150 to 7200 kc, 21,100 to 21,250 kc for CW only and 145 to 147 mc for CW or phone. All transmitters must be crystal controlled.

Net News

The Mohawk Hudson Training Net (MHT) meets Saturdays at 1300 on 3716 kc. NCS is either Bob Goble, K2HQJ or Chuck Littlewood, K2EKS. The net is designed to give experience in net operation and traffic handling. All amateurs with or without traffic can call into the net. For further information call or write Bob or Chuck at the *Call Book* address.

The West Gulf and Delta Net meets every Sunday at 0800 on 7186 kc. KN5ARH, N.D. "Dan" Griffith is NCS. Anyone interested in meeting the net should get in touch with KN5ARH or W5HNS, Henry, 1743 Elms Street, both in Lake Charles, Louisiana. Dan, KN5ARH lives at 1312 Kirkman Street.

Letters

Lousiana came through with another letter. The letter from Wesley Attaway, **KN5DGI,** Shrevesport, says:

"Dear Walt: I have been wanting to write you since the *Novice Shack* was taken over by you, but I just got my license about a month ago. You have a swell column and I sure enjoy reading about other Novices.

"I got my license November 27 and since then I have made 243 contacts in 35 states on 40 meters. The rig is a 6146 oscillator running about 70 watts. The receiver is an *SX-99*. The antenna in a 66 foot dipole about 30 feet off the ground.

"I will take my conditional exam this week, don't know if I'll pass because I've been studying for midterm exams instead of radio theory. The states that I need most are in W1 and W7. I would like to make a sked with them or anyone needing Louisiana for WAS. 73, Wesley."

Martin A. Brody, KN2MOL, 42 Hemlock Lane, Roslyn Heights, New York writes,

"Dear Walt: Thanks to *Novice Shack* I got my ticket in April of last year. I have actually been on the air for about 7 months. In that time I have worked 43 states and 13 countries including Belgium, Sweden, Netherlands, Germany, Argentina and Hawaii.

"I have been working 15 Meters and I think that 15 is the best of all the Novice bands and more Novices should use that band and take advantage of the DX possibilities. My rig is a *Viking Adventurer* and an *NC-98* receiver. The antenna is a folded dipole (soon to become a rotary beam).

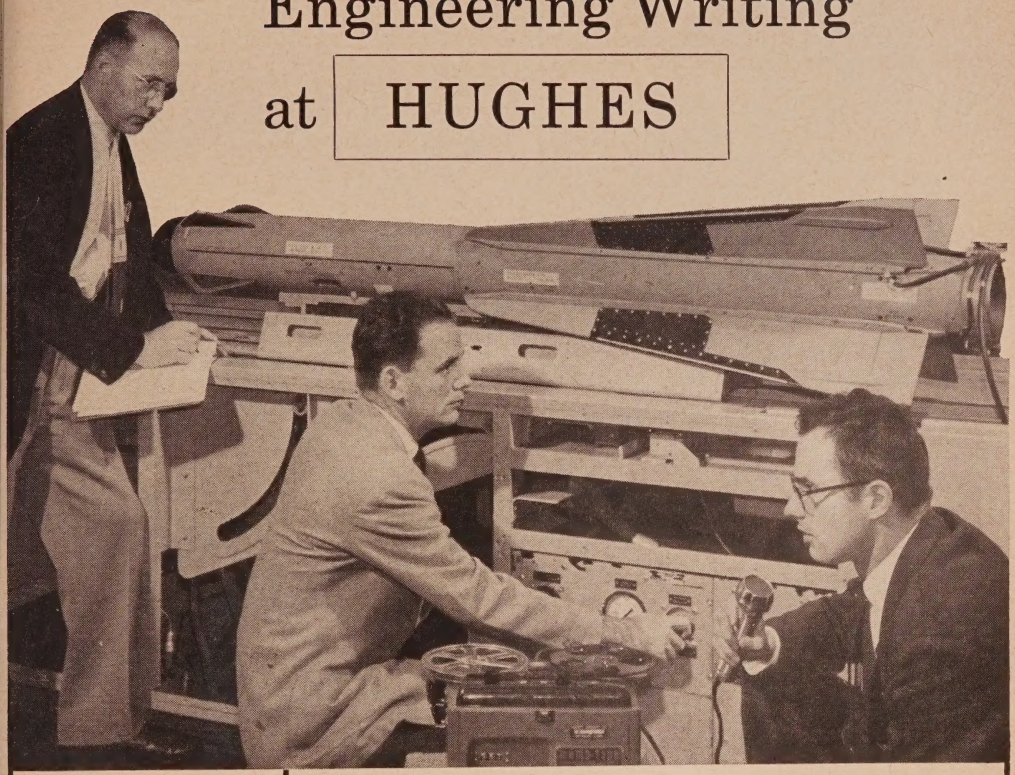
"I would like to arrange schedules with Utah, Nevada, Idaho, Wyoming, and Montana. I will answer all letters and be very happy to sked anyone needing New York. I QSL 100%. 73 es b cn u on the air. Marty."

Dick and Leo Jablonski K2MRI and KN2OYH, 32 Haller Avenue, Checktowaga, New York writes:

"Dear Walt: My father and I are writing to give you the lineup, which consists of a *Heathkit AT-1* and a *Hammarlund HQ-129-X*. The antennas are a folded dipole on 15 meters, a doublet on 40 meters and a 135 foot end fed longwire for 80 meters. When the rig is used in the Novice bands it is crystal controlled on both 80 and 40 meters, otherwise we use a *Heathkit VF-1*. Besides this equipment we are now in the process of building a final power amplifier running 150 watts to pushpull 807s. The best DX is California, Oregon and Texas. We have worked 25 states so far, we will sked anyone needing New York, *if* there is such a person. Best of 73, Dick and Leo."

[*Continued on page 100*]

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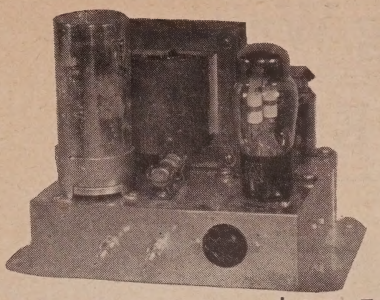
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*skeptics turn to page 102 for further information.

[*from page 98*]

Carlos Smith, K4CWS, 647 Vine Street, Chattanooga 3, Tennessee says:

"Dear Walt: I very seldom see a letter from Tennessee, so I thought I would say hello.

"The rig here is a *Globe Scout* and I have WAS and 7 countries on 40 CW running at 35 watts. The DX here is VE-1, 2, 3, 5, 7, KG4, KP4, KL7, CO5, CM8, KH6, and ZS7. The antenna is a half-wave doublet and the receiver is a *Hallicrafters S-19-R*. I have a *Q-multiplier* ordered.

"I am 16 and a junior in high school.

"The main purpose of this letter is to stimulate interest in a net we are organizing down here for the teen-agers. The net is called the *Rebel Teenage Net*, (Yankees welcome). They meet on Tuesday at 1615 EST on 7240 kc. Anyone that is interested can call into the net any Tuesday afternoon or write me direct.

"I will sked anyone needing Tennessee for WAS and will QSL 100%. Thanks and 73. Carlos."

The first letter from Delaware came in from **Dave Routzon, W3BEW, 1105 Monterey Place, Bellefonte,** Delaware and Dave writes:

"Dear Walt: I have been reading the *Novice Shack* for a long time and sure do enjoy it. I have had my General since May. Incidentally, along with W3ARE and W3AUX, I passed my exam on Friday the 13th at 1300 hours at 13 words per minute. Who says 13 is an unlucky number?

"I am 16 years old and a senior in high school. The rig here is an *AT-1* with an *S-40-A* as a receiver and a 67 foot end-fed antenna. I work just any band that I can get the rig to load on and I would be glad to arrange a sked with anyone needing Delaware for WAS, especially DX. I enjoy working the Novice bands but wonder why some Novices call CQ 32 times and his call 12 times and then repeats the same thing again?

"I am secretary of the school radio club, W3BHT. We have an *AT-1*, *HQ-140-X* and a Windom antenna about 80 feet high. So far we are very successful, having 5 Generals, W3AVX (pres.), W3ARE (sponsor), W3WCY (vice president) and myself. We have two novices, WN3DEZ and WN3CCT, with 8 future hams on the fire. Well Walt, I'll be saying 73 now and good luck on the swell column. 73 Dave.

"P.S. To anyone in the vicinity of Wilmington who needs help in code and theory my phone number is 79-89800. D.R."

Donn Fisher, K6KRK, AA6KRK, Box 344, Fort Ord, California writes:

"Dear Walt; I am sure that a lot of hams appreciate your articles on 6 meters as well as the Novice Shack, I hope you keep up both of them.

"The station here is a *Hallicrafters S-20-R* and an *AT-1*, *VF-1* and an *AR-2*. I operate CW only but hope to get on 2 and 6 meters as well as 10 meter phone. My main interests are traffic handling, CD work and rag-chewing.

"I am not sure if you know that MARS has special provisions for Novice and Technician operators. They are able to operate on specified frequencies and gain operating proficiency. It is an excellent way to become a trained and efficient operator. 73. Donn."

John Lawrence "JC", W5CEG, 804 Springdale, Arkansas writes to say:

"Dear Walt: I thought that I would write you and tell you how much I enjoy your article each month in *CQ*. I haven't seen a letter from Arkansas in some time so thought I would drop you a line and let you know that we are active in Arkansas.

"The rig here runs about 130 watts to a *B&W*. The receiver is an *HQ-140-X*. The antennas are a 75 meter doublet, a 40 meter doublet, a 20 meter ground-plane, a three element beam for 15 meters and a four element beam for 10 meters. I think more Novices should use the 15 meter band. There is plenty of DX in their portion of the band.

"Walt, I will answer all letters and be glad to make a sked with anyone needing Arkansas for WAS. I will be leaving Arkansas in about five months and thought that I would offer to help the novices out before I leave here. Keep up the good work, Walt and 73. JC."

Russ, KNØCJO, 4660 South Franklin, Englewood, Colorado writes:

"Dear Walt: I haven't read a thing from Colorado

[*Continued on page 102*]



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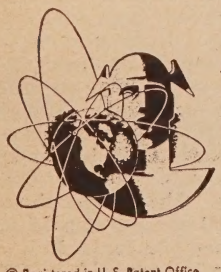
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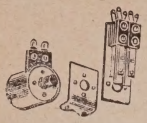
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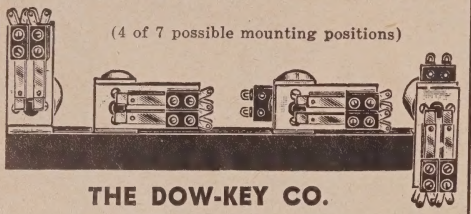
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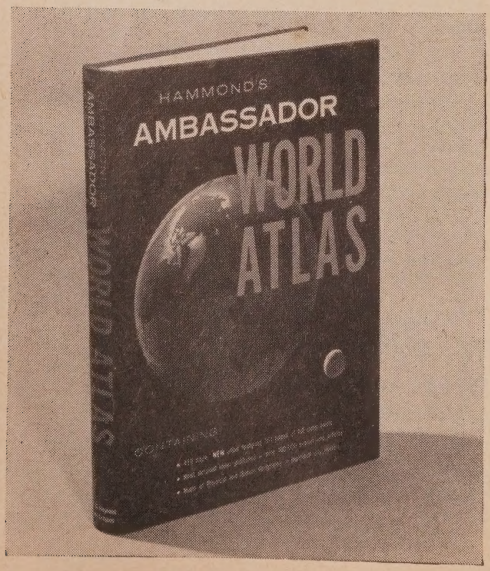
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[*from page 100*]

for a long time, so here is my 25c worth. First, congratulation on a fine job you are doing with the *Novice Shack*.

"The rig here is a *Heathkit AT-1*, and the receiver is an *S-85*. I have worked 14 states and will be glad to sked anyone from anywhere at anytime. Any ideas on upping the power of the *AT-1*? 73. Russ."

Puerto Rico sends its first letter to the editor from **Arvin Kensrue, WP4ACS, Naval Station, Box 8, Roosevelt Roads, Puerto Rico.** Arvin writes:

"Dear Walt: I am a very recent subscriber to *CQ* magazine but I have not noticed any letters from WP4's, so I decided to make a small contribution.

"Due to the very poor QTH I have only one confirmed QSO on 80 meters, but will do better soon. The receiver here is an *SX-99*. The transmitter is a *Johnson Adventurer* running 50 watts input. I would appreciate some technical advice from a good operator in this area. Keep up the good work. 73. Arvin."

This letter from **Prentice G. Goodwin, KN4CSX, Route 5, Trenton, Tennessee** is typical of about 40 letters that have been received here since I converted the popular *Heathkit AT-1* to operate on the 6 meter band.

"Dear Walt: I just got my *February CQ* and I read with much interest your conversion of the *AT-1* in the *Novice Shack*. I have a *Johnson Adventurer* and would like to know if you can whip up some conversion dope on said transmitter? If it is practical I would like to convert it to cover 160 meters as well as 6. What do you say Walt? Is it practical? Also I would like to see a crystal controlled converter for 6 and 2 meters. *(I have received 17 letters so far in January asking about converters, read note at bottom of this letter).*

"I am waiting for my Conditional license to come, and when it does I hope to be set up for all band vfo controlled phone and CW. I intend to modulate my *Adventurer* and work low-power phone.

"I have only 23 states confirmed so far. The receiver is an *NC-125*. I work 40 and 15 meters. 73 and BCNU, Prentice."

Note: The plans for a simple yet effective converter appeared in the November issue of *CQ* on page 52 in my article, *"Why and How to on Six"*. This is the six-meter converter that is in use at W8ZCV and will be in use at K9BOU this summer when I operate from there. After you get the hang of building converters you can build a more sensitive unit. A 15-meter converter was shown in the *Novice Shack* for September 1955 page 90. These units are not the best in converters, but they are very sensitive and they are simple to build. They were designed for the beginner and not for the engineer. In answer to those letters that have asked for two meter converter circuits: I have been trying to figure something simple to build, but frankly I can't seem to beat any of the circuits that have already been published in simplicity or sensitivity. I *am* working on a nice, simple and inexpensive two meter rig for you and as soon as all of the bugs are killed I will print it in the *Novice Shack*. Also there are plans afoot for 220 mc operations and some higher frequency experiments. I'll let you know about them as they progress. We must use the higher frequency bands. There is just absolutely no sense in using 500 watts to talk 15 miles on 75 or 40 meters when you could do it a lot better on two meters or 220 mc. with no QRM. You can work 15 to 50 miles on the VHF bands

[*Continued on page 104*]

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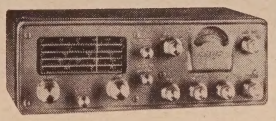
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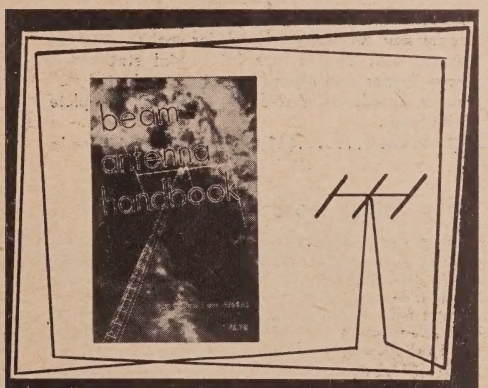
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[*from page 102*]

with 10 watts input an a fair antenna.

Joe Scott, KN9CDD, 1002 Grove, Danville, Illinois has been helped by *"Help Wanted"* and writes:

"Dear Walt: I enjoy novice shack very much. I was in the December *"help wanted"* and now I am KN9CDD, my call came January 23. I would like to hear from anyone nearby that is interested in the two meter band.

"The rig here is a *S-38* and an *AT-1*. I will sked anyone needing Illinois for WAS. A friend of mine got his call the same day, it is KN9CBL. I owe most of what I know about hamming to W9IIE, W9COS and KN9BBJ. I'll say 73 and keep up the good work. Joe."

Help Wanted

Gurdial S. Mann, 606 3rd Avenue S. Port Alberni, British Columbia, Canada wants some personal advice from a local ham to get going.

Ed Eubanks, 119 Beckes, Ann Harbor, Michigan needs help with getting started in ham radio, could use some help with the code.

Preston E. Tingle, 70- Box 15, Havelock, North Carolina. Telephone: Havelock 3228. Preston mainly needs some one to give him the test.

Joseph H. Stark, 73-36 197th Street, Flushing, New York wants to meet a local ham and needs some help with code and theory.

David E. Fisher (50) Towanda, Pennsylvania says that he has an ivory skull with some radio inside and he wants some one to help him get enough to get a ham license. He knew the code a few years back.

Fred Gatz (14) 5 Edward Street, Lancaster, New York needs help with code and theory. Fred will answer all correspondence.

Don Rendahl (16), Box 564, Central Valley, California needs help with the code.

Alan Eshleman (12), 100 Reed Street, Mill Valley, California. Alan's code teacher had to go on the night shift. Can you help him?

A/B Robert F. Raynol, AF 13550712, 90th A and E sq. Forbes AFB, Topeka, Kansas. Phone: 30571 ext. 445 days and 417 nights and weekends. Robert needs a little help with the code.

Al Quadros, 522 Maud Avenue, San Leandro, California wants some one to tell him how to layout a station and some help with code.

Joseph J. Jarosz, 163 Lewis Street, Buffalo, New York needs help in code and theory.

Maurice Bennett (16) 2202 Moffat, Dallas, Texas. Telephone: DR 4-3002. Maurice needs help in code and theory.

Chris Sorensen KN6DLB, 1127 Greenwood, Palo Alto, California, Telephone: DA 2-4924 needs help on the theory for his general ticket.

Roy LaDuke, 343 Hayward Street, Manchester, New Hampshire. Roy has equipment but needs someone to help with code and theory.

Thomas Sulas, 5808 80th Street, Elmhurst, New York needs help in code and theory. Thomas would also like to find a local who has finished the N.R.I. course in Communications.

Jim Staid, 1025 Rimrock Road, Billings, Montana, Telephone: 9-2171. Jim needs help in code and theory.

Bob Gulley (10) 2502 West Mulberry, San Antonio, Texas needs help for his general code and theory.

Samuel Thomas (13) 1119 North Side Drive, Atlanta, Georgia wants some one to help him get enough code and theory for a novice license.

Dan Tischleder (13) 817 Henry Street, Neenah, Wisconsin needs some one to help with his examination, possibly a little code practice too.

That's all for this month, fellows, and to those of you that can come, I will see you in person April 14, at the *Dayton Hamvention, Biltmore Hotel, Dayton, Ohio* where your reporter will head the Novice-Technician section of the Hamvention. I will have some good speakers to tell you more about the mysteries of ham radio.

For help in getting your license or just to get going, send your name and full particulars to Walter G. Burdine, W8ZCV, R.F.D. No. 3, Waynesville, Ohio by the 14th of the month. 73, Walt.

[*from page 74*]

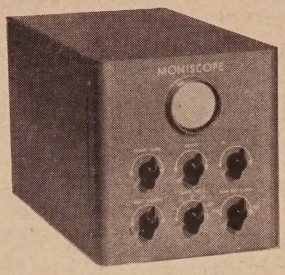
DX'ploits

Leading off this month is Frank, W6AOA, who steps to 258 with AC5PN . . . Al, W8PQQ, nabbed FS7RT for 257 while Jim, G6ZO, ups to 251 with 3W8AA . . . Roger, W3EVW submits new list totalling 251 with 170 on phone while Lindy, W8BHW, rises to 249 with VQ6LQ and XW8AB . . . Ozzie, W9VND, miked with HC8GI for his No. 246 as George, VE4RO, went to 244 with KC6CG and VQ6LQ . . . Vince, W5KC, hit 237 with MP4QAL while G3DO added VS4CT, VS5CT, VP8AQ, FY7YE and ZD6RM for a 210 total with 188 on phone . . . Don, W6LRU, ups to 207 with XW8AB, LU3ZY, EA9AP, FQ8AY and EA6AF as Burt, W6EHV, resumes his climb at the home QTH by adding MP4BBE, VR6AC and YI2AM for 206 . . . Clay, W6LGD, goes to 183 with LU3ZY and VP8BK while Dan, W6PH, snagged FFBAC, VQ6LQ, VP8BK and VP5BH to reach 177 . . . Vaughn, W6ID, made it 176 with PZ1LL and GD3IBQ as Dick, KV4AA, went to 251 with FS7RT . . . Weldon, W2NSZ, hit 239 with YJ1DL while Van W9HUZ, reached 234 with ZD1DR . . . Mike, W9FKC, added FD4BD, KC6CG, YA1AM and LU3ZY for 231 and awaits return of AC4RF QSL (From ARRL) to apply for WAZ . . . Chuck, W4LVV, comes up to date with ZD3A, HKØAI, KC4AB, ZD6EF, VQ6LQ, VP8BK, YJ1DL, ZS8L etc. to reach 216 as Bob, W1KFV, nabbed YJ1DL for No. 201 . . . Pat, W2GVZ, sets on the double-century mark thanks to VP8BK while Dick, W5MET, adds VS9AS and FB8RR for 192 . . . Lee, VK3XO, goes to 181 with XW8AB as Rip, W4EPA, nabbed VS9AS, LU3ZY and VP8BK for a 185 total . . . Doc, W9VP, ups to 187 with AP2C, VP2DA and I5AAW while Takeo, JA1CR, makes it 144 thanks to FB8ZZ, GS3AC, FQ8AX, 3A2BH, YJ1DL, KT1EXO and GW5TW . . . John, W4HA, hit 203, 193 phone, with AP2L and VQ6LQ as Jim, W5FXN, reaches 196 with MP4QAL, IS1FIC, LU3ZY, XZ2OM, ET3LF and 4S7GE . . . Fred, W8KML, hits 196 with ZK1BL, VP8BM and VP8BK. His A3 is now 194 . . . John, W9WCE, stands on 171 with VS2CR and FB8BS while Gil, W1APA, submits new list with a 159 total . . . Mario, I1ER, goes to 119 with OY2H, EA9DD, OA4ED, XW8AB and VP5AR as Harry, WØANF, nabbed VP8BK for No. 177 . . . Francis, W2HSZ, added VP8BK for 172 while Bob, K2GMO, went to 166 with VP8BK . . . Clarence, W6HJ, moves to 125 with CT3AB, YN1PM, VS1FH and YU3KT as Willard, W1NWO, pushed his phone total to 211 with ZK1BL . . . W2PZI goes to 105 on 21 with yours truly giving the necessary nudge . . . W9OBV nailed VQ3DQ, EL1A and ST2WB on 21 phone . . . KV4AA was No. 70 for W7VMF . . . W4BYJ hit 72 with HB1OP/HE and VP8BC . . . VK3CX made it 203 with FW8AB while Elliott, K2GLG, claims the first 4x4/Israel QSO on SSB when 4X4AA was contacted on Jan. 22nd. . . . Lloyd, DL4ZC, came

[*Continued on next page*]

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[*from preceding page*]

up with ST1AB, CR6DA, VK1RA, KG1KK, VK2XQ, VQ2XQ, VQ2AB and UA1KAI on 14 and LU4DEX and ZS5KA on 21. He reports fb openings on 21 from DL to all W districts . . . New ones with Guy, W6EFV, were PZ1BS, MP4QAL, FB8ZZ, LU3ZY and YI2AM as Aleta, K6ENL, added VU2JG for her No. 100 and went on to snag FY7YE, VP8BK and MP4QAL for 34 zones . . . John, W3UXX, is up to 33 zones with such as VQ8AY, YN1LB, ET2AG, HE1OP, PZ1LL and HZ1HZ while John, W1WMH, works towards DXCC on 7 Mc. with his 40 watter with such as KH6BCT, HH3DL, VK3MC for a 58 total on that band . . . Roger, W9HCA, has 21 countries to show for three months operation including such as OH2LX, EA3GF, OA8B, LA7X and ON4FN . . . George, W3AS, went to 151 with VU2BK and KJ6BN on 21 while Lindy, W8BHW, has a 21 Mc. total of 143 with MP4QAL, DU7SV, KG1 etc . . . W2DTV goes to 178 with CR9AI, UC2AA, KJ6AF and 3A2BH . . . Dave, W7UVC, running 15 watts to a 616 is up to 12 countries on 7 Mc. with such as VS1GX, VP7NM, ZL3KN, KP4CC and KZ5CP. A new 60 watter should be on shortly . . . Chas, W9ICL, reports 114 countries on 21, A3, since Sept. '55 with a Globe Champion and 3 element beam . . . Gene, W7VY, goes to 259 with VQ8CB . . .

160 Meters

Continuing W1BB's top-band reports the January 22nd "test" was conducted with clear weather on the Eastern Seaboard with WWV "N6". HOWEVER! a new LORAN station on 1850 has shown up and covers the DX band from 1820 to 1880 with S8 to S9 noise making it impossible to work DX there. HR3HH had a good signal, however, as worked a number of W's. Same with KV4AA. All in all, unless things pick up, the 160 meter band this year is only about one third as good as it was last year. The only other noteworthy accomplishment during the morning was W5SOT, New Mexico, on 1998, who worked W1BB and another station. Other stations participating in this test were: W2WZ, W2GGL, W2QHH, W3RGQ, W3EIS, W3TBG, W3CJT, W8KIA, W8IXG, W8FGB, W9MIF, W9THE, W9KRJ, W9CZT, W9NH, W9PNE, WØIFH, WØBBV, VE2LI. HB9CM heard W1BB, W2WZ and W8KIA. G5JU heard W9PNE. G3PU heard W2WZ.

Word from 3V8AX, via W2QHH, says the 3V8AX heard on 160 is a pirate.

SWL Robert Iball continues to send in his superb reports on every test giving all the calls and data that anyone could wish. On January 17th G3KPP reports hearing HR3HH working W3RGQ. DL6OO also called HR3HH. This again confirms that the N/S path is better than the E/W path this year.

The January 29th "test" was conducted with the same LORAN QRM. The only signal heard from Europe was HB9CM who QSO'ed W1BB. QRN was high but conditions were good and other

QSO's could have been made but for the LORAN.

Conditions spoiled HB9CM's expedition to HE-land this year and Philo did not hear a single W or VE altho many Europeans were worked. He will try again next year and we admire his patience, perseverance and cheerfulness about the whole matter. DX on 160 at W8ANO, Waldo, for this season includes contacts with TI2BX, KP4CC, YN1AA, KZ5PB, G5JU, G3PU, KP4DH, HR1LW (22nd country), KV4AA, HR3HH, G3FPQ and G6GM.

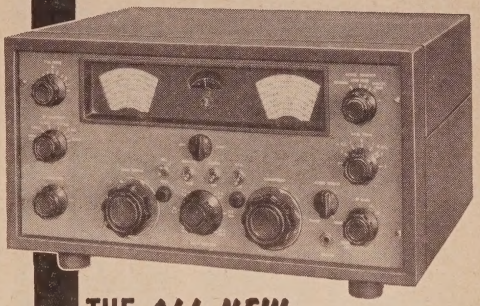
Here and There

W8VST reports that VQ4SS will head back to England shortly and leave quite a gap in Zone 37 . . . Joe, ex-W3COP/W2JME now keys from W1GET in N.H. . . . KV4AA had the pleasure of logging visits from W4YSW, W1WAK, W4YDD, W1HMP (Now working W1HMP/KV4), W8LRW, W3VKD/W3LXE, W2BBK . . . The VQ5 bureau says VQ5AB is NG! . . . W2HQL advises he is handling ALL PZ1 cards and that soon there will be a reorganization of the PZ1 calls . . . PZ1BS hope to put PZ1-land on phone when a modulation transformer is received . . . Via the West Gulf Bulletin we hear that John Garrett, W5LAK, was due to leave for Alexandria, Egypt, on Feb. 27th for temporary assignment with an oil exploration company. He expects to go to JY, VU or AP-land and, in addition, will try to get on from any rare spot possible. He has a Viking II, NC-183D and a pocket full of xtals. W5DML will take care of QSL's . . . ex-W9KCY/W2FRO, Jack, now keys from W5OVE, Lake Charles, La . . . CE3DZ received QSL from 3W8AA. It is apparent that the Saigon (South Viet-Nam) P.O. is returning, and not forwarding, mail for 3W8AA in Hanoi (North Viet-Nam). 3W8AA has received a flock of JA cards which probably came in from the North. 3W8AK is active on phone from South Viet-Nam . . . KT1UX would like someone to provide QSL's should KT-EXO and himself go to Ifni in April. Any offers? . . . W8EWS ponders one AC4TN heard on 14052 at 1400 GMT and called by many Europeans . . . VP5BE is on Turks Island . . . We regret to report the passing of W8BAE and ON4TA they will be very much missed . . . ON4QX needs New Mex, Utah and No. Dak. for WAS . . . PAØPOC is ex-PK3PL and offers to fill in any missing QSL's . . . The San Diego DX Club is conducting a marathon between its members for 1956 country and zone-wise. W6KSM jumped to an early lead in the CW section and W6CHV leads in phone . . . W6GBG expects orders to a DX spot in the Pacific in May . . . W6CAE built a new all-band pi-net KW final . . . ZA1KAD QSL's look good. One passed through here bound for KV4BB . . . MP4QAL took a quick leave and was QSO'ed in Dublin. He was due to return to MP4-land by boat leaving Feb. 21st . . . Bill, W5DGV, seeks duplicate QSL's from ZD2DYM '51, ZD6DH '49 and ZM6AK '50 which were stolen . . . ex-W4SLN/KØCZG now keys from DL4GD, Heidelberg . . . W8CLR has called our attention to an omission on our zone listings

[*Continued on next page*]

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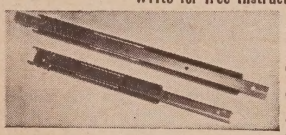
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[*from preceding page*]

which does not mention the good state of Michigan. For the info of all and sundry Michigan is in Zone 4 . . .

British Trans-Antarctic Expedition

(Short Wave Magazine)

This expedition should be heard on the air in March or April. Rhombic antennas will be erected beamed on Port Stanley, F. I., Capetown and, possibly, England. The transmitter runs 350 watts and will operate on a number of frequencies between 2 and 20 Mcs. The call is VRN but operation on the ham bands is planned and amateur calls will be allocated.

New Phonetic Alphabet

W6YY submits the following which is to come into general use on March 1st '56

Alfa	Hotel	Oscar	Victor
Bravo	India	Papa	Whiskey
Charlie	Juliett	Quebec	X-Ray
Delta	Kilo	Romeo	Yankee
Echo	Lima	Sierra	Zulu
Foxtrot	Mike	Tango	
Golf	November	Uniform	

Like it??

Annual Swiss Contest

The U.S.K.A., Box 1203, St. Gallen, Switzerland, announces the HELVETIA-22 Contest which will take place from:

1500 GMT, May 12th to 1500 GMT, May 13th 1956

Stations outside of HB-land will endeavor to work as many Swiss stations in the 22 Swiss Cantons as possible on all bands 3.5 through 28. CW/CW or Phone/Phone. The serial exchange will comprise six numerals (five on phone) giving the RST and number QSO ie: 579001/59001. Each contact counts three points with a possible multiplier of 44 (22 Cantons on CW and 22 on phone) for each band. Separate sheets must be used for each band and logs must bear the declaration: "I certify that my station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decisions of the Council of the USKA will be final in all cases of dispute." A Certificate will be awarded to the two high-scoring entrants from each country. Logs must be mailed out not later than May 1st 1956.

This contest is a big help towards attaining the HELVETIA-22 CERTIFICATE as pictured. Swiss stations will send suffixes denoting their Canton location.

Last Minute Items

Reg Tibbetts, FS7RT (W6ITH), completed his Saint Martin operations at 1700 GMT February 24th with over 3000 contacts to his credit. Altho little CW was planned, about 1000 QSO's on the

key were made to the gratification of the dot and dash adherents. About 130 countries were worked on all bands which resulted in by-products of WAS and WAC. We hope to be favored with a complete story by Reg in the near future which will highlight many interesting details. Reg now has his eyes on Aves Island and, knowing Reg, we would say that this spot has distinct possibilities of being put on the ham map sometime in the future . . . W2BBK, Doc, left KV4-land on Feb. 21st, Saint Martin bound. Legal permission seemed difficult to procure but it seems that Doc managed it as FS7AA appeared on the air in the late afternoon of February 26th (contest day) and practically turned the brawl into a one-man affair. More details in next issue . . . Many ponder VU5BC (Andaman Islands) who has been appearing on 21-Mc CW. He says QSL's should go via the VU bureau and claims the name of "Vzi." . . . Hubert, FB8BR/FB, Comoro Islands, appeared as scheduled on February 24th. First QSO was W9NDA at 1330 GMT. Other contacts reported were WØA1W, WØAZT, WØDXE, W6LRU, W2HZY. Hubert complains of very poor conditions and QRN level. He was due to QRT on March 3rd, but as mentioned, he will be on from the Comoros one day per month hereafter . . . Departure of VP2VB/P from FO8AN was planned for about March 7th. By this time we trust he will be going strong with a VR1 call. W7FA has generously forwarded beam elements to Danny which should give his signals a substantial boost from all stops . . . FA8RJ reports an Algerian Expedition to Oubangui-Chari. This trek will proceed by small motor cars from Algeria and will be on the road for seven months. Calls will be FA9NJ, changing to FF9GJ and then to FQ9NJ. Operating periods are from 0800 to 1300 and from 1400 to 2200 local time (GMT plus 1?). Frequencies 14100 CW and 14156/14300 A3 also 7 Mc at half frequencies . . . ZD4CC, ex-G3KFV, holds forth from Accra on 14042 around 1700/2200 GMT. Name is Dave . . . (VU5BC, 21090, 1700-2300 GMT.) . . . VQ5GC has been quite active of late near 14025 or 14090, 1800 to 2100 GMT. QSL address is: Neville Jackson, Box 23, Entebbe, Uganda . . .

73, KV4AA

VHF

[*from page 86*]

Langhorne, Pennsylvania: Ray (W3TDF) sends us some Aurora news:

"Had a nice strong Aurora opening on January 24th, lasting from 1920 to 2115 EST with signals peaking S6 from such stations as W9UTH, W9KLR, W9EQH, W8DRN and a raft of W2's. I worked W9UTH for state number twenty. Another session came on the 27th during which I heard calls from W8DX, W9WOK, W1KCS, W2WFB, W3BYF, W9KLR, some good, some poor.

"I've been thinking about a Maine-to-Florida relay since last spring and have drawn up a contemplated route, but there remains the gap between Wilmington, North Carolina, and the Florida gang. I will contact all interested parties in the very near future but

[*Continued on next page*]



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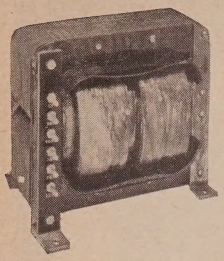
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*See article "The Phone Patch and the Law" in Sept. '54 C-Q.

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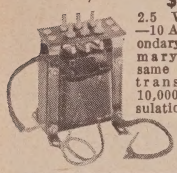


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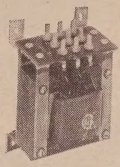
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1229 W. Washington Blvd. Chicago 7, Ill.

[from preceding page]

would like some assistance with that particular territory. The contemplated date is April 14th or 15th." (*Now is the time for all good hams to come to the aid of VHF and Ray, W3TDF, Langhorne, Pennsylvania. Let him hear from you.*)

Indianapolis, Indiana: "Hartz" (W9FVI) sez:

"I'm crusading for increased Two Meter activity back here and find more objections, on the part of the fellows occupying other bands, to the fact that they have to build the gear from scratch, than to any other reason. What we really need is good gear in the form of kits in the 25 to 120 watts and higher class. Such kits needn't be fancy but should be de-TVI'ed and capable of being keyed." (*Thanks for the letter Hartz, hope we hear from you regularly.*)

Salt Lake City, Utah: Ken (W7WLV) says he's finally working some 'sixes:

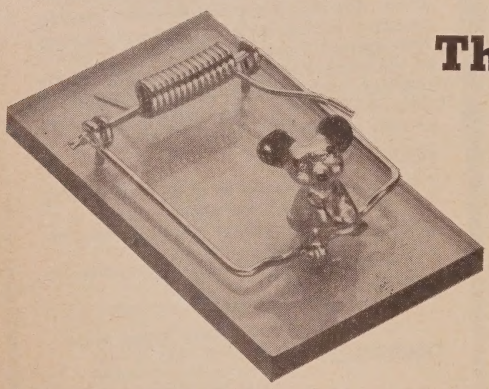
"Last evening, January 19th, I worked K6GMV, 6COE, 6GPG, 6DWX, 6IBY and K6JBY, all had S9 signals or better. I was running low power and no beam at the time. Wind took my beam down last month." (*What, you have that stuff in Utah too? You forgot to tell us, Ken if some of those 'sixes were W6's or K6's. Let us know, huh?*)

Amarillo, Texas: June Patterson (W5BXA) gives out with some six-meter news:

"Thought I'd drop you a line about the six-meter opening we caught on Wednesday, January 11th. It opened to California about 1900 CST and we worked W6's TMI, NDP, QUK and K6's GDI, IBY, GQX, COE, PBW, JBW, OBO, EWS and GRK.

"The band opened again about 1950 CST January 19th, and we worked the Los Angeles area again." (*Thanks June, glad to get the news from Amarillo.*)

[*Continued on next page*]



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[*from preceding page*]

Denham Springs, Louisiana: Dunc Carter, (W5IOU) springs a few queries on us:

"I would like to find out how SSB and grounded-grid works on VHF, also 826's on VHF. Anyone who can answer the above questions, please write and answer them for me. Duncan Carter, W5IOU, Rt. 1, Box 193, Denham Springs, Louisiana." (*There is a station on SSB located in New York—Dunc, W2JJC. Perhaps he can answer some of your questions.*)

Wichita, Kans: J. Smith, Jr. (WØTRX) has the following:

"I have an SX71, VHF 152A, a three-element beam thirty feet high, a TBS50 and the beam is a rotary. And what do I hear? Motor noise, powerline noise, and interference from the local channel 3 TV station. If I thought calling "6 ghost-band" would pep up activity here, I'd shout it from the highest wheat field. I also have a Techcraft mobile converter for six-volt operation. If any other Technicians or others in this area should complain, just set them on me." (*OK boys, get him. The boy needs encouragement and a few six-meter stations, too.*)

RTTY

[*from page 79*]

or an opened line. The "letters" key then has to be operated to restore transmission. This feature does not appear in all Model 26's, though.

Fig. 2 shows a diagram of the polar relay unit which is supplied with some machines. The connections to the polarized connectors that plug into the mating receptacles in the table are also shown. The two 4000-ohm resistors are shorted out to provide the proper spacing bias on the relay for the usual 60 ma. neutral loop circuit. This circuit is shown only as a matter of interest as it is not normally used in amateur RTTY.

Fig. 3 is a diagram of the 26A table itself. Shown on the diagram is a fuse of the "slow-blow" type. Some tables may not be equipped with the fuse in this manner.

Some Model 26 machines are being supplied with d-c governed motors, at a lower price than those with *synchronous* a-c motors. The a-c motored machines are to be preferred, naturally, because there are two problems with the d-c machine: speed adjustment and noise. In case you don't think that it is too much trouble to keep a d-c machine on speed and to take out

[*Continued on page 114*]

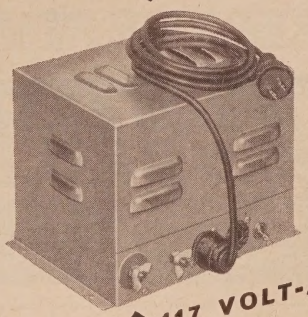
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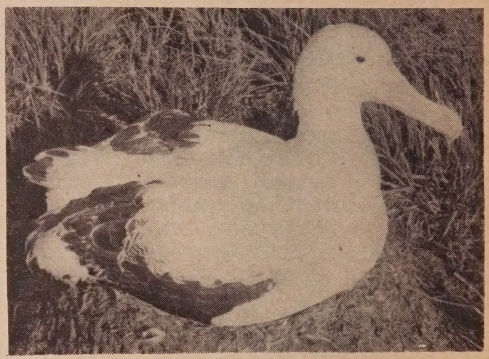
CITY.....ZONE.....STATE.....

ZS2MI . . . [*from page 53*]

recently been granted by the authorities for extra antennas to be erected in the form of V-beams, and perhaps a rotary 20 meter beam, so the operators hope that soon ZS2MI contacts will be less rare. The next ship to the island will carry a load of aluminum tubing for construction of a 5-element 20 meter parasitic array. The main drawback to such an antenna, of course, is the heavy and constant winds which blow up from the Antarctic ice-cap. Undoubtedly the beam would have to be designed to be lowered at a moment's notice.

"So far, ZS2MI has managed to work 37 countries on the single rhombic antenna, most of them being African and European stations in the path of the main lobe of the beam.

"ZS2MI usually operates on 14,168 kc fone, and Ken (the new operator) is also trying operation at the high end of the 'phone band as well.
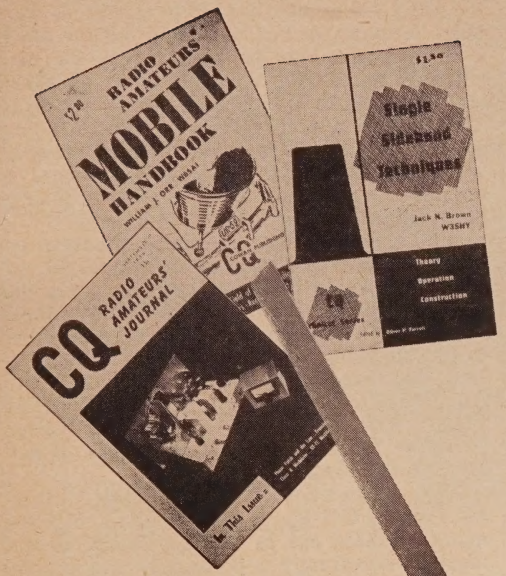


The Wandering Albatross, the ZS2MI mascot.

"In retrospect, I think perhaps the strongest signal ever heard in the amateur bands—apart from ZS stations—was WØCPM. He was S9-plus on a six-foot length of antenna wire located inside the shack! In general, signals were good from all parts of the world, conditions being anywhere near reasonable. There is a new power plant being installed on the island, and 2MI should then be heard much more often than during the past twelve months. Also, that rather peculiar ripple on the carrier will disappear. With the new power plant, and the V-beams and rotary, the operators of ZS2MI hope to put Marion Island on the DX-map with an S-9 signal to all parts of the world.

"I would like to thank ZS6ANE for his wonderful assistance in enabling 2MI to work DX, and in particular W-land under some very adverse radio conditions. Thanks also go to ZS6XL and to ZS6FN who handled our QSL cards—not a light task!

"Good hunting for those still looking for ZS2MI and 73 and good DX to all."

Barry Jackson, operator ZS2MI
(November 1954-November, 1955) ■



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(See Page 121 for subscription blank)

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[*from page 111*]

the noise, the original d-c motor circuit, as supplied, is shown in *Fig. 4*. Taking out the noise is a little more trouble than keeping the machine on speed, but it *can* be done. WØHZR uses a 6AS7 tube in the circuit shown in *Fig. 5*. This substantially cuts down the armature and governor contact noise. Don't forget—a *good* water-pipe ground to the machine frame is essential in any case. (This circuit originally appeared in the Aug. '54 *RTTY* Bulletin.)

Rather than go into a lengthy discourse on the mechanical operation of the Model 26, we thought it would be more useful to cover the machine's circuitry in this detail. Further Model 26 information, adaptations, etc., may be found in the following issues of the *RTTY* Bulletin: Dec. '53; Aug., Sept., '54; Jan., Feb., Jul., and Aug. '55. Thanks go to Merrill Swan W6AEE, Frank White W3PYW, and Ray Morrison W9GRW for supplying this abundance of material on the Model 26.

Next month we will cover the Model 15 (Signal Corps TG-7-B) in similar detail. Not too many of these are in amateur hands as this machine is currently in production and in commercial use, as it can be used with the newer 75-speed wire line systems. However, since this machine is available to some MARS stations, and particularly to some RTTYers in uniform, hook-up dope should be useful. (Wish the Teletype Corporation would build and sell more Model 28's!)

Narrow Shift

As this is being written, FCC approval for narow shift[1] has not as yet come through. W3PYW suggests that narrow shift will be a boon to the newcomer, since it will simplify the exciter problem, permitting crystal control to be used easily. W2JTP is now using a crystal controlled exciter on 3620 kc., but it ain't easy to get 850 cycle shift! The crystal is actually on 1810 kc., and it was found that various crystals exhibit various degrees of ability to shift when loaded with capacitance. Generally speaking, it seems that the larger the quartz blank, the easier it is to shift. It is also very desirable to be able to move the *mark* frequency around a bit in order to zero beat someone. This is the feature presently under development. (*Boy, is that an understatement!*)

[1]**Boyd Phelps, WØBP,** Notes on Narrow Shift, CQ, Dec. '55, p. 43.

Across the Nation

W1RBF in Plainview, Connecticut, is doing fine with his low power (a pair of 6146's). Ken reports that W1EVZ in Holyoke, Mass. has just returned to 2 meters and is getting his Model 12 oiled up for a little AFSK work. W1VIY in Trumbull, Connecticut is the out-

[*Continued on page 119*]

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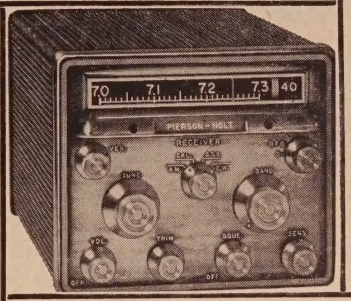
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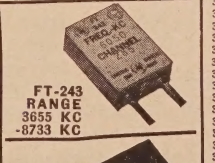
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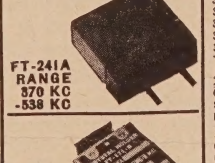
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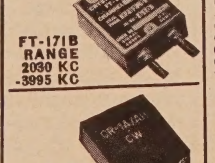
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379	401	422	491	513	537
380	402	—	492	514	538
381	403	424	493	515	540
383	404	425	494	516	
384	405	426	495	518	
385	406	427	496	519	
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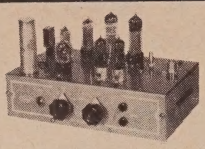
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4340	5660	6225	6825	7660	7975
4397	5675	6240	6850	7673	8240
4445	5677	6250	6875	7675	8250
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4490	5706	6275	6925	7706	8280
4495	5740	6300	6950	7710	8300
4535	5750	6306	6975	7725	8306
		6325	7450	7740	8310
4735	5773	6340	7473	7750	8316
4840	5775	6350	7475	7766	8320
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3885	6173	6606	7340	8280	8600
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DX RATING [*from page 47*]

ductivity, some trees or buildings in the immediate area, but a "clear shot" to 10 degrees above the horizon in all directions.

10 db Open country of excellent soil conductivity (or sea water). No obstructions in any direction.

The amateur, in figuring his location rating must interpolate between these arbitrary "conditions" to arrive at a fair figure for his particular location. And naturally, as we all know from experience, a location may be far better in one favored "clear shot" direction than in another, which can easily account for a difference in signal reports from these directions.

Now, by totalling the db ratings of the four factors detailed above we can arrive at a practical DX Rating for the particular station using a particular antenna:

DX Rating (db) = P + A + H + L

Where: P is the Power rating in db. *(Fig. 1)*

A is the gain of the Antenna in db. *(Fig. 2)*

H is the Height above ground in db. *(Fig. 3)*

L is the Location factor in db.

Let us take some practical examples:

Station *A* runs 150 watts to a Viking into a 3-element beam of good design 50 feet above ground in an average location.

His DX Rating?

He can figure his radiated power at the antenna as 100 watts (9 db). . . . his antenna gain at another 9 db. . . . his height of 50 feet gives him another 6 db, and his location 5 db or a total of *29 db.*

He will do better, on the average, than Station *B,* whose efficient full gallon (17 db) is fed into a dipole (0 db) 30 feet above ground (3.5 db), from his city location (2 db). B's total: 22.5 db.

On the average, Station *A* will outgun Station *B* by 6.5 db, or better than a full S-unit. . . . and haven't you seen it happen?

Try figuring *your* DX Rating. Then get on the air with a local friend and check his signal against yours at a DX point (any F2 hop will do). See how close the difference between his DX Rating and yours checks out on a remote S-meter.

The author makes no claims for absolute accuracy. Conditions can naturally bounce one signal way up, another way down. But the establishment of your own DX Rating will give you a solid notion of how well you can expect to do against the "big boys." Remember—the ultimate might be a very full gallon (18 db), stacked 6-element yagis (16 db), on a 100 foot tower (10 db) at that dream location (10 db) —a total DX Rating of *54 db!*

If your half gallon is reported 25 db down from *his* signal, now, at least, you can figure out why. ■

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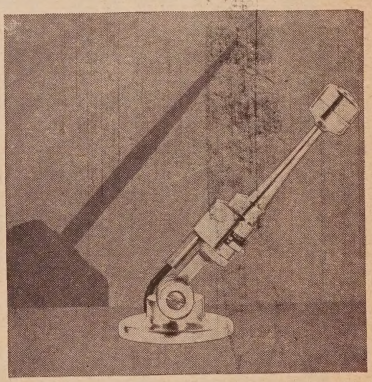
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YASME

[*from page 61*]

Tokelaus are out. After all, let's look at it in a logical way. Is it worth risking the boat, all the rigs and last but not least, *my neck*, just to get a new country, when there are many others I shall be calling at which are rarer? Please try to see it from my point of view. Were I not single handed, perhaps I'd have a bash at landing there, but trying it alone is dead stupid, and I didn't get as far as this by being a mug.

Well, I suppose I could go on for hours discussing Tahiti, but one has to fold up some time. I shall be here for a little while longer, but I do hope I have given you a rough idea of the place, and with the photos that I hope will go with the article, you will see some of the things I have had the pleasure of witnessing. My only regret is that I can't have my tape recordings stuck into the magazine as well.

I suppose the time has come to say Cheerio again, and we'll meet again . . . I hope . . . on Canton Island . . . who knows?

73's . . . pip, pip and all that.

Danny . . . FO8AN

LIMITING SPEECH AMPLIFIER

[*from page 33*]

wave-form is quite apparent, but still less than will show on a lot of the cheaper broadcast receivers!! At about the 30 db. point, any further increase in input will cause the pattern to collapse, and virtually no output will be obtained. The variation in output from the point where limiting begins to the point where the output falls sharply is about 2 db.

This amplifier was connected to the volume control arm of an FM receiver, and a subsequent amplifier connected to drive a speaker, in order to evaluate the effect of limiting on the audio listening quality. It was thought that program material would give a better check of any deterioration in audio quality than voice. The volume control of the receiver was set comfortably below the limiting point. As the volume control of the receiver was increased, the output level came up until the limiting

[*Continued on page 120*]

see you
at the 1956

Dayton Hamvention

SATURDAY, APRIL 14, 1956

FCC license exams will be given at the Hamvention. VHF, SSB, Novice & Technician activities, Modern Receiver Design, TVI, etc. will be well covered in technical sessions and forums.

CQ will be well represented by Editor, Assistant Editor, VHF Editor and Novice Editor, so don't expect to get by without being talked into subscribing or extending your subscription at the specal Hamvention rate. First among many scrumptuous prizes at the Hamvention is a *Hammarlund PRO-310*. Further info may be obtained by writing to Dayton Hamvention, P.O. Box 44, Dayton 1, Ohio and don't delay! April 14 is the date.

[*from page 114*]

standing 2 meter RTTY station, it seems to the fellows on Long Island.

Remember what we were saying last month about using all the tricks available in the *receiver* for FSK reception? W1FGL has a new NC-300 receiver which he uses in the SSB condition. "That leaves the a.v.c. on, which helps a lot," says Al.

Ed Handy, W1BDI, does a fine job in passing out official ARRL bulletins on RTTY. (Next best thing to W1AW.) Bob Weitbrecht, W9TCJ, has received his OBS appointment, and now sends out bulletins on 3717.5 kc. Wednesdays at 2030 and 2230 hours, Fridays at 2030, and Sundays at 1500 hours; all times CST.

W9BGC paid a visit to W1BGW recently. Joe reports several new stations: WØMTR in Cedar Rapids, Iowa; W2VLL in Niagara Falls, N. Y.; W9IQS in Western Springs, Illinois; and W9ROQ near Peoria, Illinois.

KL7BRU reports that KL7USA, the MARS station in Anchorage, Alaska, plans to be on RTTY with the "John Dollar" converter and exciter. Equipment available is a Viking Ranger and KW, and a few SX-88 and 75-A receivers.

K2IYN in Salem, New Jersey, writes in to say that he is interested in RTTY, but it ". . . sounds awful expensive." It needn't be, Dick, if you shop around a bit. Many fellows are selling their Model 12's now that the newer Model 26 is now more available. Look around, Dick. K2JMI in Woodside, New York, and W2GJJ of East New York, New York, are also looking for inexpensive ways and means to get on RTTY.

W3LHD is now in Westchester, New York, helping the CD get set up for RTTY. W6VPC is in the process of getting up a national call book. W6AEE reports over 500 Model 26 machines have been placed in amateur hands, and that most of them are on FSK amateur bands.

Comments

The mail bag is heavy with letters, as usual mostly from newcomers or oldtimers just thinking of getting on RTTY. As said before in the way of a suggestion, 2 meters is a good place to start out on RTTY *if* you are near a city or heavily populated area. It's easier to get going on 2 meter AFSK and once you get thoroughly acquainted with your machine and converter the next step, going on FSK, is that much easier.

Now, in the things-to-come department, are: a printed circuit, transistorized, miniaturized, AFSK tone standard; a hot-shot 2 meter receiver especially designed for autostart use (*please note, Sam!*); and an RTTY *Certificate of Achievement*. Stay with us, will you?

If any of you fellows have a picture of your RTTY ham shack, we would sure like to print it here. Glossy prints, 8" x 10" if at all possible, are preferred. ■

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LEECO 509 Skyview Drive Nashville 6, Tennessee

[from page 118]

point was reached, at which point a further increase made no noticeable difference in either the output level or the apparent audio quality. Several different musical programs were checked in this way, and it would seem that any distortion due to limiting was less than that inherent in the other parts of the system, which were not of hi-fi quality, but gave pleasant and better than average AC-DC receiver reproduction even under heavy limiting. It is also interesting to make an on-the-air check, talking in a normal tone of voice at about 3 feet from the microphone, gradually coming closer, till your lips touch the microphone, without changing your voice level, and then talking loudly right into the mike. The other end of the contact will invariably report no change, except a change in acoustics as you get very close to the mike, and a change in the character of your voice when you talk quite loudly.

Limiter Plus Clipper

There is another application for this amplifier which will be of interest to those who want the ultimate, and that is to use the limiting amplifier to drive a speech clipper. At first thought this may seem silly, and doing the same job twice, but there is a difference in the action of the two systems which makes it a very logical system. The limiting amplifier will assure 100% modulation and no more, but since it is essentially distortion-free, the ratio of peak to average values is not disturbed, and it is impossible to realize any of the increased audio power above this point that it is possible to obtain with clipping. On the other hand, with clipping, the louder you talk, or the further you advance the mike gain control, the heavier you clip, and the heavier you clip, the more distortion is produced, and the less natural your voice sounds. The ultimate, then, would be to use the limiting amplifier ahead of the clipper, using the output control on the limiting amplifier to set the amount of clipping. The output potentiometer could be calibrated for the various clipping levels it was deemed desirable to use, and that amount of clipping would always be available whenever the amplifier was limiting.

At the present state of the art, it would seem that every amateur phone transmitter should have some form of modulation limiting. For those who want the most "communication value" from a given amount of power, and are willing to tolerate some degradation of audio quality, a clipper-filter arrangement would be a logical choice. For those who prefer to maintain a high standard of audio quality, a limiting amplifier such as the one described will do a good job of keeping the audio "right up there" without sacrificing audio quality or detracting from the individual quality of the operator's voice. ■

Glad hands all around



and its nearly all your fault!

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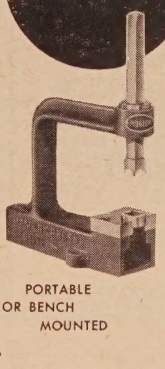
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#UL-1008 oscillation transformer, #UR-542 sockets, #PR-535 rheostats, all made during 1921 by the General Electric Company for RCA. Also a ¼ or ½ K.W. spark transformer, manufacturer does not matter. Also old battery operated radio sets and speakers. George N. DeLaplaine, Post Office Box 861, New Brunswick,, N. J.

$200.00 OR MORE for Tuning Units TN-54/APR-4 (2,000-4,000 Mc.). Also need parts, etc. Engineering Associates, 434 Patterson Road, Dayton 9, Ohio.

AN/APR-4 tuning units, ARC-3, ARC-1, good surplus and commercial laboratory items wanted. W8KTL, Far Hills Branch, Box 26, Dayton 9, Ohio.

WANTED: TUBES—Boxed and unboxed transmitting, receiving, and special-purpose industrial types such as Klystrons, etc. Also will buy excess test gear, Hickok tube checkers, Variacs, etc. Will pay cash or swap you for choice equipment and tubes. B. N. Gensler, W2LNI, 330 West 11th Street, New York 14, N. Y.

SELL YOUR back issues of CQ. We will pay 10¢ each for all issues before March 1954, in good condition. Send them to Circulation Dept., CQ Magazine, 67 West 44th St., New York 36, N. Y.

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WANTED: UNITED STATES stamps—collections or accumulations. Will swamp 4D32 (4); 4-65A (4); 750 TL (2); 4X150A (4); 829B/3E29 (8); 20 vols. Riders; QST in binders 1936-43; Geiger counter. All inquiries answered. Snow, 708 Chris, Altus, Okla.

WANTED. RCA dynamic demonstrator No. II for school use. No longer manufactured. Write W8GDI, 13500 Detroit Avenue, Lakewood 7, Ohio.

3 TUBES—220

[*from page 27*]

the third pin jack to read the grid drive at 220, Mc. Reconnect the "B" voltage to *r-f choke 3* and tune butterfly condenser *C11*. Maximum drive should be about 2 mils. Check the frequency on the grid dip meter or your 220 Mc. receiver.

You are now ready to tune the final. Solder two 6" stiff wire leads to a 7½ or 10 watt electric light bulb and connect the ends to the two antenna posts. Reconnect *r-f choke 4* to the "B" voltage and tune butterfly condenser *C12* for maximum brilliancy of the light bulb. Now that all stages are tuned you can, if you wish, raise the "B" voltage to 300. As there is some slight reaction between the tuning of *L1*, *C6* and *L2* these might need retouching if your final grid drive is below 2 mils. Trimmer *C6* will cause oscillation on other than the crystal frequency if its capacity is increased much more than one full turn from maximum capacity. When the antenna is substituted for the light bulb a twin lamp should be connected to the feed line and condenser *C12* retuned for maximum brightness of the twin lamp. A field strength meter located near the antenna may also be used as the means to tune the final for best output.

Neutralization of the final was not found necessary. Should your particular tube be unstable solder a 1/2" length of hookup wire to socket *terminal 6* and bend it toward *terminal 3*. Likewise solder a similar wire to *terminal 8* and bend it toward *terminal 1*. Adjust for perfect neutralization by bending these wires toward or away from the grid pins.

To voice modulate this transmitter a single 6L6, or better, two 6V6 tubes should furnish sufficient audio. The secondary of the output transformer should of course be connected in series with the "B" voltage feeding the final 6360 in the conventional way.

Any ham who is seriously thinking of operating on the 220 Mc. band should use a beam type antenna. A five element Yagi is a good start or preferably a twin five modeled after the design of the W2PAU[1] is desirable. In the greater New York City area all on the 220 Mc. band are horizontally polarized. As to the activity in the above area the author has personally contacted 35 different stations during the past year. As to my best DX it was with W3VIR in Willow Grove, Penn. Most of the gang here are on the low end of the band so pick your 8 Mc. crystal so you will be in where most of the activity is in your locality. 220 is a friendly band because having fewer hams to chat with you can't afford to lose a friend. This present condition of the band has advantages such as talking a whole hour without any QRM. How many of you can do this on 20 meters? We on 220 would welcome a few more, but please—not too many; we love it too much just like it is. ■

1. *CQ*, March 1950, p. 11

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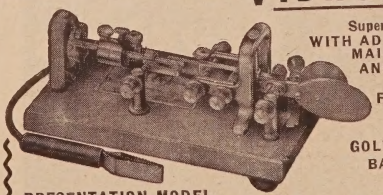
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What makes the NC-300 a "dream receiver"?

First of all, we ran a contest to find out what features hams dream about in receivers. And we got entries from hams all over the world. Then we incorporated a lot of the suggestions in the design of the NC-300. And when we released it to distributors and customers, it was hailed the world over as a true "dream receiver".

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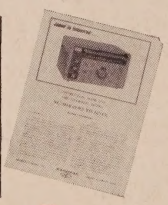
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