July 1963
50¢

CQ

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To The
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On Their
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50 YEARS OF
AMATEUR RADIO

The Radio Amateur's Jo

LOUDMOUTH!

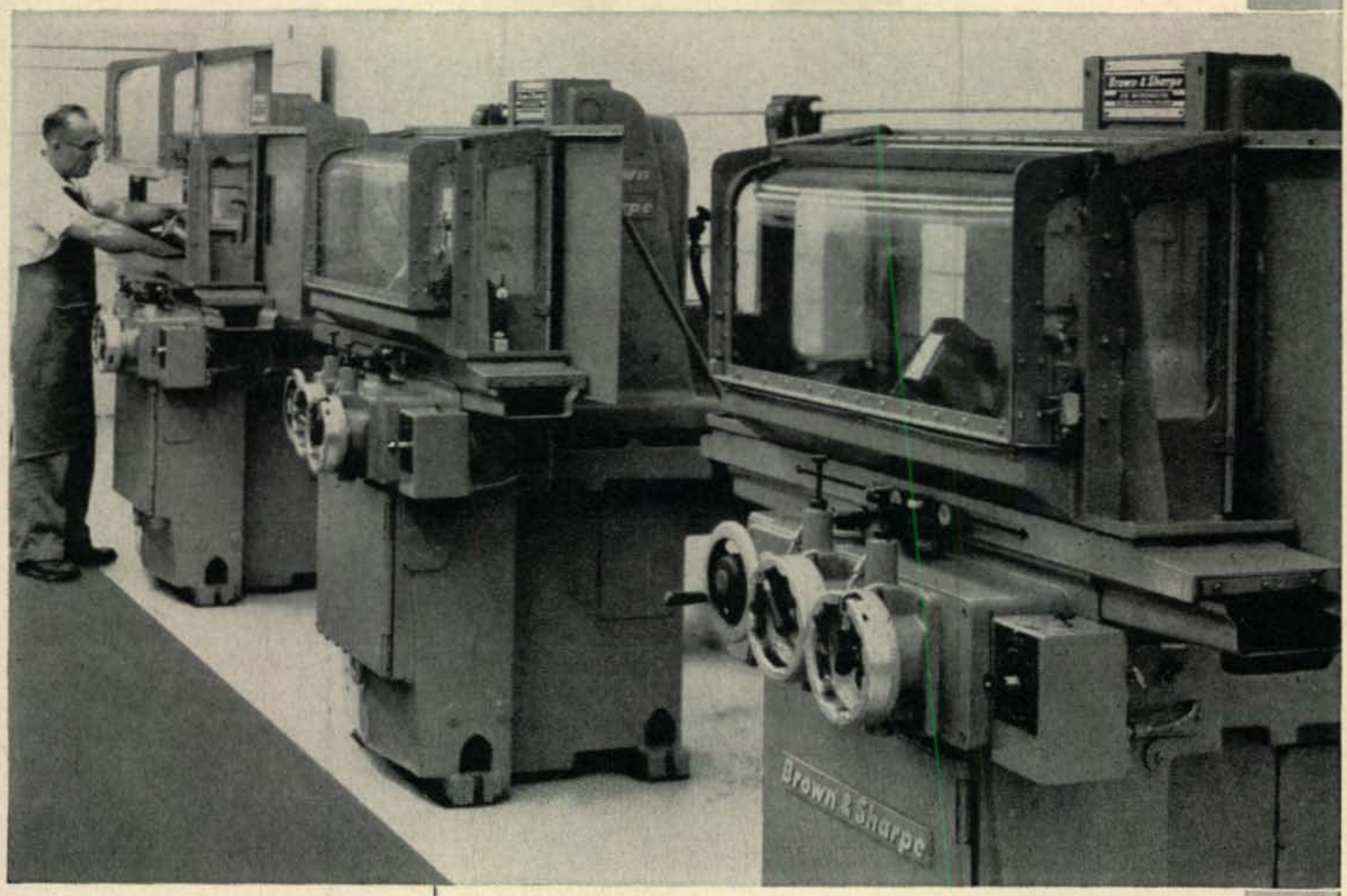
The Collins KWM-2 Transceiver brags on itself every time it's on the air. Performance alone prompts others to look into it and see if they can find an answer to the question, "How do they do it?" It prompts them to try to duplicate it. This is especially true when one of the features is as significant as single sideband, which was first used in mobile amateur equipment by Collins. In developing the KWM-1 and KWM-2, Collins equipment produced at least 19 industry "firsts". Some have since become standard in all amateur equipment, but Collins KWM-2 is still the only transceiver available which features all 19 in one unit. Use the list below to compare Collins KWM-2 with any other transceiver on the market. See for yourself why Collins KWM-2 leads all others. Then ask your distributor to demonstrate the KWM-2. It's still the best way to learn what the KWM-2 can do for you, and how little it costs to own the finest. ☐ Check these KWM firsts: permeability tuned oscillators, mechanical filters, automatic load control, 1 kc calibration on all bands, crystal controlled front end, Pi network, both sidebands without retuning, lighter unit weight, amateur SSB transceiver, noise blankers, systems engineering, restricted passband on transmit, 0.5 uv for 10 db signal-plus-noise-to-noise ratio, SSB-AVC, transistorized dc power supply, built-in antenna changeover relays, suitcase for portable applications, 100 watts output in a mobile unit and a transceiver which provides for automatic antenna selection. ☐ See your Collins distributor today.

Traveling through Iowa this summer? Stop and visit our Cedar Rapids plant.

COLLINS

For further information, check number 59 on page 110

These New Brown & Sharpe Automatic Slicing Machines Cut Raw Quartz to Make Blanks for PR CRYSTALS



AMATEUR TYPES

FUNDAMENTAL, PR TYPE Z-2—Frequency Ranges in Kcs.: 3,500 to 4,000 (80-M); 7,000 to 7,425 (40M); 8,000 to 8,-222 (2M); 8,334 to 9,000 (6M) ± 500 Cycles . . . $2.95 Net

(All Z-2 Crystals calibrated with a load capacity of 32 mmfd.)

Third Overtone, PR Type Z-9A, 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc. . .$3.95 Net

6 Meters, Fifth Overtone, PR Type Z-9A, 50 to 54 Mc., ± 15 Kc.. . . . $4.95 Net

Citizens Band, PR Type Z-9R .005% . . . . . $2.95 Net

ORDER FROM YOUR JOBBER

All PR CRYSTALS are made with the most modern precision equipment. Operators are highly skilled, and rigid inspection is the rule. Here is a view of the Cutting Room, where new Brown & Sharpe Micromaster Slicing Machines cut raw crystal into blanks of required thickness. Every PR Crystal is precision oriented by X-ray for minimum drift.

PR CRYSTALS have been the Standard of Quality since 1934, and every PR Crystal is Unconditionally Guaranteed. Get PRs from your jobber. They'll give you the finest precision frequency control that money can buy!

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

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

For further information, check number 8, on page 110

one good thing leads to another...

A single word, rather than any single feature, accounts for the enthusiastic acceptance we've experienced with the SX-117. The word is *"Versatility."*

No other receiver in its class lets you work so much territory so well —wherever your present or future interests may lie.

For instance: You get all important coverage from 3.0 Mc. through 30 Mc. (five crystals provided) plus four positions from 85 kc.–3 Mc. for use with HA-10 low freq. tuner.

You get *three-step variable selectivity*, including a transmitter-type V.F.O. that can be *locked on frequency* . . . less than *1 μv* sensitivity . . . extreme electrical and mechanical *stability* . . . up to *50 db.* attenuation to unwanted heterodyne in the pass band.

Looking ahead, you'll find interesting the oscillator output jacks for transceive operation with Hallicrafters' HT-44 matching transmitter.

The SX-117 costs $379.95. The HA-10 adds just $24.95 (less low freq. crystals).

SX-117 **triple-conversion receiver by** ***hallicrafters***

5th & Kostner Aves., Chicago 24, Ill.

Export: Hallicrafters, International Dept., Commercial Div. **Canada:** Gould Sales Co., Montreal, P.Q.

CQ

The Radio Amateur's Journal

Vol. 19, No. 7 July 1963

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300 West 43rd Street
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IF Output Coil

Oscillator Tuning Coil

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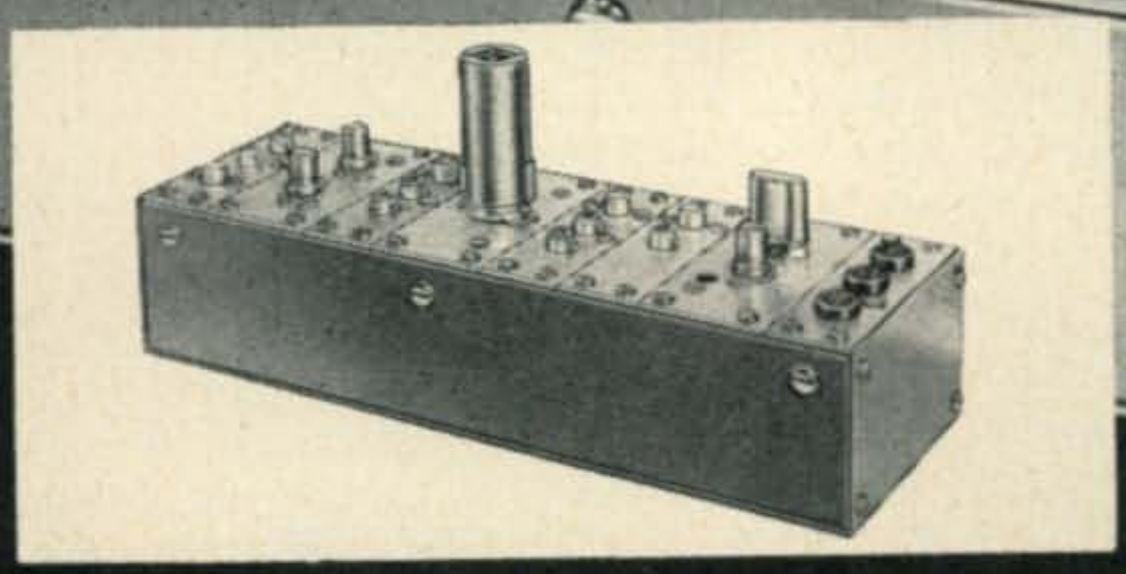

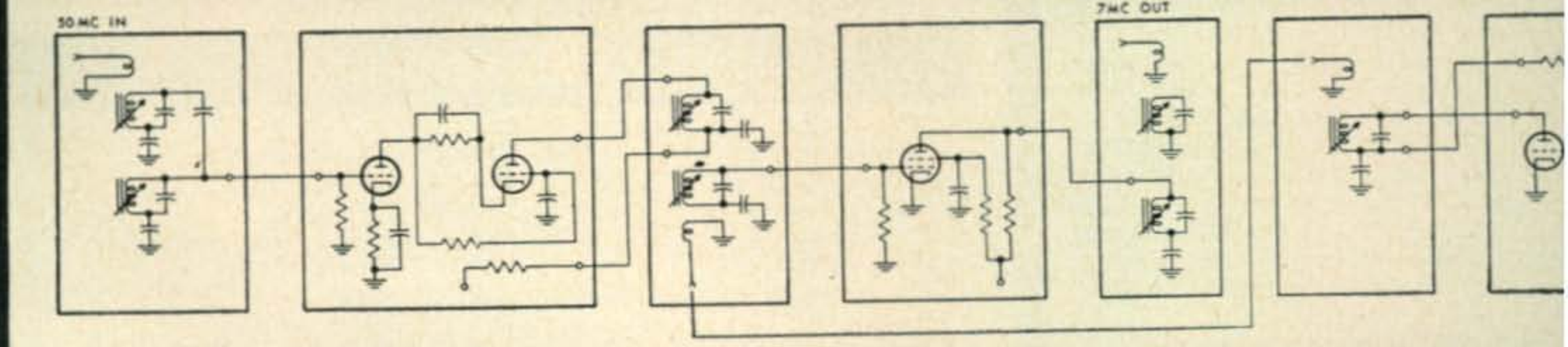

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mateurs and experimenters will discover a new and easier way to build wide variety of communication and electronic gear with International **OC** units . . . individually wired oscillators, preamplifiers, detectors, etc., ach tested and mounted on miniature metal chassis.

or example, the eight **AOC** units (illustrated) have been assembled to nake a 6 meter converter. Each circuit may be removed to make modifica- ons, or build other equipment. Simple to build, and so easy to change.

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BASE STATION VERTICAL

This antenna offers exceptional improvement of signal to noise ratio. Shunt fed, grounded radiator. Rigid aluminum and cadmium plated steel construction. Vertical length adjustable. Cat. No. 160-129 . . . . . **$27.95**

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Base loaded whip antenna for installation on roof of auto. May be mounted on trunk lid or door facing with International blind mounting bracket (Cat. No. 160-126) Sealed loading coil-adjustable whip. Cat No. 160-130 **$19.95**

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NORTH LEE • OKLAHOMA CITY, OKLAHOMA

International Crystal Mfg. Co., Inc.
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Please rush details on AOC units.

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For further information, check number 10, on page 110

ZERO BIAS

As MOST of you are aware, the six-meter band exhibits an extremely unbalanced appearance, both in population and operating characteristics. Other than the lower 100 kc c.w. segment (50.0-50.1 mc), phone operation adheres to the low edge of the band. With the exception of relatively few f.m. signals appearing in the 52 mc segment, operation rarely, if ever, extends beyond the lower two megacycles.

The only probable reason commercial interests have not sought this two-megacycle segment (52.0-54.0 mc) is the same confounding difficulty amateurs have experienced for many years; Channel 2 TVI!

The same lopsided situation is now proposed by the Board of Directors of the ARRL in asking the Federal Communications Commission to allow Technician Class licensees full operation over the entire two-meter band.

We hope our readers will not misconstrue and think that we are anti-Technician, or anti-anything for that matter. We sympathize with the Technicians plight of having the entire v.h.f. and u.h.f. spectrum available *minus* the upper and lower megacycle of two meters. It is imperative, however, that we keep in mind the future repercussions of a frequency reallocation such as this.

We all know that the serious v.h.f. operator has his beam tuned to that portion of the band in which he does most of his operating; we also know he often uses his converter in conjunction with a communications receiver to tune only the small portion of the 6- or 2-meter band in which his interests can best be served. It can therefore be expected that the Technician will abandon the middle two megacycles in order to mingle with the "DX" crowd at the low edge of the band; never again to return to the higher operating frequencies.

Although the FCC, back in April, 1960, felt that the public interest would be more keenly served by establishing the A1 portion of two meters at the upper end of the band (147.9-148.0), most serious DXers found it unrealistic to move an entire four megacycles, creating what is now a "gentlemen's agreement" leaving the lower 100 kc of two meters exclusively for c.w. operation.

Isn't it only reasonable to predict that with additional signals at the low edge of the band, two would soon become a mirror image of six?

In their Report and Order of July, 1959 (Docket 12728) originally giving the Technician 2-meter privileges, the FCC said:

"A large number of the comments in opposition to the proposal contained the argument that less than the entire 144-148 mc band should be made available to the Technicians. The reasons given were generally related to the belief that opening the whole band to Technicians would decrease the incentive of these amateurs to experiment with and develop higher portions of the spectrum, and to increase their code speed with the intent to advance to General Class licenses. These arguments appear to have merit and the Commission is led to concur therewith. It would appear that, to attain a more even distribution of occupancy of the v.h.f. amateur bands, increase participation of amateurs in civil defense activities, and still retain some of the incentive for Technicians to gain General Class privileges, only part of the band under discussion should be made available to Technicians."

It is hard to believe that the League, currently voicing strong appeals for amateur incentive, could persuade the Commission to change their attitude on this matter.

Unlike the upper end of six meters which lies unused and valuable to very few commercial radio services, the upper end of two stands ripe and fully developed, ready to be picked by any and all commercial interests.

We ask the League to reconsider their proposal and urge the Board of Directors to consider future implications rather than present patronage.

OUR COVER

Amateur Radio's first Golden Jubilee shouldn't go unnoticed — so what more could we do than put it on our cover?

July 5th is the actual date, so while most of us spend the fourth-of-July weekend congratulating ourselves on our birthday, give a few seconds thought to the "old" country; for if it wasn't for the Revolution, we might be sporting G-calls too!

Congratulations to the R.S.G.B. and the best of luck during the next 50 years!

Incentive Licensing

Editor, *CQ:*

I am only one of the thousands of amateurs whose phone operating privileges will be lost if the ARRL is successful in their bid to have the FCC follow their incentive licensing programs.

Won't you please, as Editor of *CQ* represent the many who will be affected by this change? If conditions do warrant changes, why must they select the many of us who have had our General license for years, and who operate with clean signals and with courtesies to others? . . .

As a member of ARRL I do not feel they have represented me as a member. Since there were no requests for ballots—how could these Directors cast their vote with the League, without first hearing from their membership.

Perhaps you can insert a slip sheet in your next issue asking for a yes or no vote from your readers. . . . I, like all others who believe in the democratic way of life, will accept the wishes of the majority.

However, I think this proposal is being made for the benefit of a select group. I do subscribe to *CQ*, and I believe your magazine is the only source of opposition we can hope for at this time.

C. L. James, K1REK
98 Riggs Avenue
West Hartford 7, Conn.

Editor, *CQ:*

I am sure you are aware of the heated opposition to the League proposals on incentive licensing. I will not attempt, in this letter, to set down the merits or lack of merits of this proposal. I and many many other amateurs feel that the League has ignored the response to their editorial, which requested comments regarding their incentive licensing proposal.

The League has their own journal. They can state their position; they also have the privilege of publishing whatever they wish. *CQ* has an opportunity as well as a duty at this time to fulfill the function of providing a voice for those amateurs who are no longer being represented by the American Radio Relay League. . . .

Arthur Freud, K2QHT
63 Robin Drive
Hauppage, New York

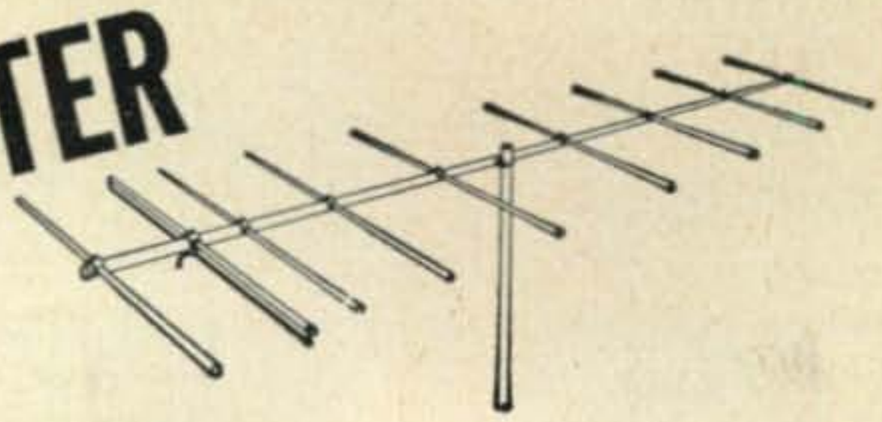
Editor, *CQ:*

Your Zero Bias in the June, 1963 issue of *CQ* was beautiful; right on target.

Amateur radio has a vast multiplicity of facets in which one can become very deeply engrossed. Many of our ranks do just that, and in doing so are unable to see the forest for the trees. Many seem to lose sight of the fact that amateur radio shares common ground with every other licensed class of radio service (in this country). The amateur, broadcast and citizens' classes of service all owe their existence to PICON. The Public

← For further information, check number 54, on page 110

NEW! SCOTCH! MASTER



2 & 6 Meter Antennas

MOSLEY Model A-92-S

An introduction to the New MOSLEY SCOTCH-MASTER two meter beam. This nine element antenna may be mounted vertically or horizontally, providing excellent front-to-back ratio, handling maximum legal power, amplitude modulated or 2,000 watts P.E.P. SSB. Mounting bracket fits masts up to 1½ inch OD. Antenna is matched for 300 ohm balanced line. Boom is made of sturdy medium weight wall 1¼ inch OD aluminum tubing to achieve maximum strength with minimum weight and wind loading characteristics. Stacked arrays feature 300 or 75 ohm balanced feed.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 14 DB. Front-to-back, 20 DB. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 41 inches. Boom length, 12 feet. Turning radius, 6.5 feet. Assembled weight, 4 pounds. Maximum wind surface area, 1.25 square feet. Wind load, 25 pounds. Antenna is shipped in kit form. **Amateur Net $16.40**

MOSLEY Model A-76-S

Also introducing for the first time, the MOSLEY SCOTCH-MASTER six meter beam. This seven element array provides maximum forward gain with excellent directivity. SCOTCH-MASTER will handle the full legal power, amplitude modulated. Mounting bracket fits up to 1½ inch OD mast. Antenna is "Gamma" matched for 52 ohm unbalanced line. Boom is of heavy guage 1¼ inch OD aluminum. Easily rotated with TV rotor and can be mounted vertically or horizontally.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 12 DB. Front-to-back, 20 DB. Boom length, 24 feet. Turning radius, 13 feet. Assembled weight, 12.5 pounds. Maximum wind surface area, 2.5 square feet. Wind load, 51 pounds. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $35.10**

MOSLEY Model A-56-S

The New MOSLEY SCOTCH-MASTER six meter beam features five elements, maximum forward gain and excellent directivity. This gamma matched beam will handle the full legal power amplitude modulated. Can be mounted vertically or horizontally. Feed with 52 or 75 ohm line.

SPECIFICATIONS AND PERFORMANCE DATA: Forward gain, 10 DB. Front-to-back, 20 DB or better. SWR, 1.5 to 1 or less at resonant frequencies. Maximum element length, 118 inches. Boom length, 12 feet. Turning radius, 7 feet 8¾ inches. Assembled weight, 6.5 pounds. Wind load, 32 pounds horizontally, 56 pounds vertically. Antenna is shipped in kit form, complete with detailed instructions. **Amateur Net $ 28.16**

••Mosley SCOTCH·MASTER Stacking Kits••

MOSLEY Model A-92-S-SK1

A kit for stacking two horizontally polarized A-92 SCOTCH-MASTER beams, one above the other. Comes complete with matching transformer, insulator, complete instructions and phasing line. Feed point impedance - 300 ohm balanced line. This stacked array will attain 3 Db additional gain over a single horizontally mounted beam. **Amateur Net $3.15**

MOSLEY Model A-92-S-SK2H

A kit for stacking four horizontally polarized A-92 SCOTCH-MASTER beams, two over two. Complete with support members, mounting plates, phasing line, insulators, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single horizontally mounted beam. **Amateur Net $44.35**

MOSLEY Model A-92-S-SK2V

A kit for stacking four A-92 SCOTCH-MASTER beams, two over two, in the vertical plane. Comes complete with support members, mounting plates, insulators, phasing line, hardware and instructions. Feed point impedance - 75 ohm balanced line. This stacked array will attain 6 Db additional gain over a single vertically mounted beam. **Amateur Net $44.35**

Mosley Electronics, Inc. 4610 North Lindbergh Blvd. Bridgeton, Mo.

For further information, check number 19, on page 110

Interest, Convenience, or Necessity must be served if we are to continue with our licenses.

Amateur radio, being the most privileged class of radio service, must ever be prepared to show due cause for its existence as a service, in the interests of PICON. When the time comes, and I hope it never does, that we cannot justify our existence as a service for PICON, then we shall cease to exist (as a service). It's that simple!

Al P. LaPlaca, K2DDK
28, The Beach Way
Manhasset, New York

Editor, *CQ:*

The group at ARRL who attempted to gain the top 50 kc of the 20 m. band for their exclusive use, is now trying a different tactic. The fact that those who received Extra-Class licenses without examination (grandfather clause) intend to operate on hallowed ground certainly shows from what quarters these suggestions arise. Their recommendations to the FCC demonstrate the complete lack of regard that the "control group" has for the opinions and rights of the majority of ARRL members, unaffiliated radio amateurs, and sidebanders, in particular. The erroneous conclusions that directed the Directors' illogical proposals to the FCC have been discussed at great length in periodicals and on the air. Despite the hue and cry of the majority of the membership, the Directors moved ahead with their schemes.

How should we—the "little" amateurs—handle this situation? I would suggest several courses of action to those not in agreement with the ARRL proposal to the FCC: 1—If the FCC publishes these proposals for adoption, we should forward our opinions (with fourteen copies) to FCC, Washington 25, D.C.; 2—Since these changes will require the additional expenditure of federal funds, we should notify our U.S. Representatives and Senators of our thoughts in these matters; 3—When the present Directors of ARRL reach the end of their present term of office, we should replace them with individuals who will further the interests of amateur radio using modern concepts; 4—We should actively support an Opposition Voice which will provide a system of checks and balances to some of the one-sided decisions that occasionally emanate from ARRL Headquarters.

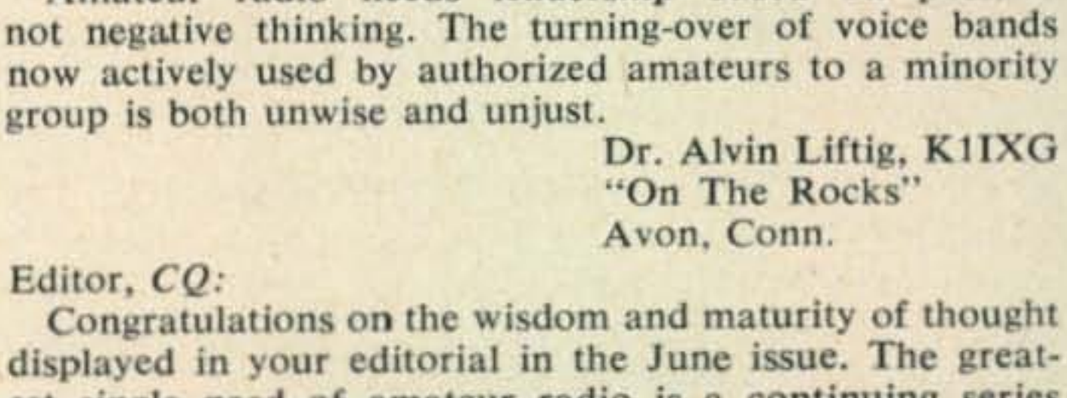
Amateur radio needs leadership based on positive not negative thinking. The turning-over of voice bands now actively used by authorized amateurs to a minority group is both unwise and unjust.

Dr. Alvin Liftig, K1IXG
"On The Rocks"
Avon, Conn.

Editor, *CQ:*

Congratulations on the wisdom and maturity of thought displayed in your editorial in the June issue. The greatest single need of amateur radio is a continuing series of articles (in every amateur magazine) on the techniques, the courtesies, the ethics, the unwritten "law," the national and international laws regulating operation on the amateur frequency bands. I hope you will lead the way to enlightened operation before we finish our degeneration to a sub-Citizens Band level!

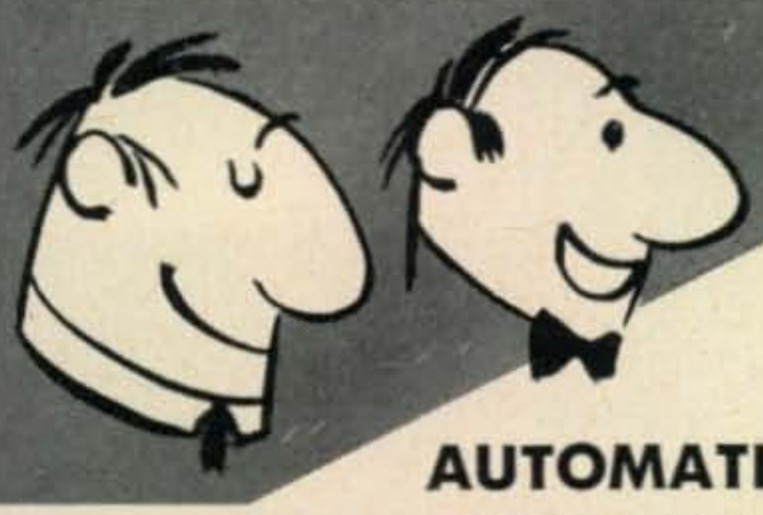
Carl C. Drumeller, W5EHC
5824 N.W. 58th Street
Oklahoma City 22, Okla.



Dominican Republic

Effective May 22, 1963 the Dominican Republic joined the list of countries permitting third party traffic to be exchanged with United States amateurs. The seventeen countries now on the list include: Bolivia, Canada, Chile, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela.

YOU WILL AGREE—
THEY *MUST* BE USING
MASTER MOBILE
DEPENDABLE POWER UNITS



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COMPACT. 8" High x 6¼" Wide x 7" Deep.

AUTOMATIC CHARGING — the charging current is automatically reduced as the battery approaches full charge, and drops to a trickle charge when the battery reaches full charge. Overcharging is completely eliminated.

HIGH CURRENT RATINGS. Model TC-15 for 15 amps, Model TC-30 for 30 amps — both types designed for continuous-duty operation.

IDEAL FOR mobile radio systems, or on boats requiring a 12-V ignition source. Unit is not only an excellent heavy-duty charger, but may also be used as a bench supply for repair of car radios...for marine application, electroplating, powering model trains, and wherever else a high current, stable 12-volt source is needed.

MODEL TC-15 $59.50
MODEL TC-30 $79.50

Your 12-V battery fully charged every morning!

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SMALL: 13½" wide x 6½" high and 12½" deep
COMPACT: 15½ pounds.

FEATURES:

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750 Watts PEP.

500 Watt self contained TRANSISTORIZED DC Power Supply employing a bridge of solid state rectifiers for excellent regulation.

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Ideal linear amplifier for any 50-100 Watt SSB exciter, such as KWM-2, SWAN, HALLICRAFTERS, SONAR, etc.

Covers 10, 15, 20, 40 or 80 meter operation with a heavy duty band switch.

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Wide range PI-NET output.

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MODEL K-73 $289.50 NET

MODEL RC-73 $17.95

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Five wire remote control cable for On-Off switch, Pilot Light, Plate MA or RF Output Meter and Push-to-Talk Antenna Changeover Relay.

POWER SUPPLY

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SMALL SIZE. 2¾" High x 8" Wide x 9" Deep...

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Model MPS-1250, 1250VDC @ 400ma, 300VDC @ 150ma, and a zener diode regulated —90VDC bias supply.

MODEL MPS-800 $119.50
MODEL MPS-1250 $139.50

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For further information, check number 1, on page 110

O.O.T.C.

In 1901-10-11 Hugo Gernsback published an annual Call Book listing U. S. and Canadian telegraph stations which included merchant vessels and amateur stations (total 1,086 names). The following list represents those who still survive and who now have a certificate to prove that they appeared in the original *Wireless Blue Book*. If you know of anyone who may qualify and is not listed, let Harold Voorhis know. His address is 60 Remsen Street, Apt. 9-C, Brooklyn 1, N. Y.

No.	*Name*	*1909-11 Call*	*Present Call*
A	Hugo Gernsback	*Honorary*	....
1	Irving Vermilya	VN	W1ZE
2	Clarence H. Pfeifer	RD	W2FG
3	Malcolm H. Smith	MSM	W1GV
4	Arthur E. Ericson	ZZ	W1NF
5	Carman R. Runyon, Jr.	YS	W2AG
6	George E. Burghard	GEB	W2GEC
7	Harry M. Ash	MH	K2BA
8	Anton C. Frey	ACF	W2JF
9	George T. Droste	GDT	W6IN
10	Harold V. B. Voorhis	NDM	....
11	Townsend J. Rigby	TJ	W7COH
12	Frank Merritt	BRM	....
13	Olin C. Brown	OBM	W1AI
14	Thomas Appleby	HNM	W3AX
15	Ralph Damon	RDM	K4CS
16	Charles S. Horn	CH	W3PM
17	H. Warren Godfrey	HX	W7IZ
18	Carl M. Schardt	CSZ	W8HG
19	Louis J. Matos, Jr.	CRN	W2CSS
20	Norman E. Soules	SEN	W1LW
21	James Scott	JS7	....
22	Arthur Batcheller	MI	....
23	Herbert Bohle	CHB	W3FIB
24	Paul W. Hickman	NA	K4DM
25	Edward Lipson	ELM	W3SD
26	E. M. Tellefson	MDN	....

Virginia

The 8th Annual Graveyard Network Picnic will be held at Bonnie's Lake, Virginia, July 6 and 7. W1WHL is handling the information and will send you a flyer on request. His QTH is 40 Amos St., Mt. Carmel 18, Conn. S.a.s.e. *please*.

New Jersey

The Gloucester County Amateur Radio Club will hold its annual hamfest on Sunday, Aug. 4 at Crystal Birch Lake, Chapel Hts., New Jersey. Watch for club signs. Program, refreshments and facilities start at 1000 EDT, until dark. WA2TDI is a committeeman and will help with details.

Wyoming-Idaho-Montana-Utah

The WIMU Hamfest will get together for its 31st annual outing on Aug. 2, 3 and 4 at Mack's Inn, Idaho. Cabins and camping available as well as a big program. W7GGV, SCM for Idaho is corresponding secretary and will enlighten you on directions, etc.

Ohio Valley

Sam Warnock, K8NLM and Jim Sparks, K8BNL are interested in starting an Emergency Net to extend from Pittsburgh, Pa. on the north to Cairo, Illinois, taking in all areas of the Ohio valley. Interested parties can contact him through the Scioto County Civil Defense Corps, Court House, Portsmouth, Ohio.

Microphone Facts

A new folder produced by Shure Brothers entitled "Fact & Fiction" offers some interesting information about microphones. Copies are available free of charge by writing directly to Shure Brothers, Inc., 222 Hartrey Ave., Evanston, Ill. Ask for Folder No. 184 and tell 'em *CQ* sent you.

Indiana

The annual v.h.f. picnic sponsored by the Wabash Valley A.R.A. of Terre Haute, Indiana will take place Sunday, July 28, from dawn to dusk. Turkey Run State Park, approximately 40 miles north of Terre Haute on U. S. 41 and Indiana 47 is the place. Registration is one dollar and a big turnout is expected. John H. Derry, K9CUN is president of the club and will give you more details.

1st Choice Among Nation's Amateurs!

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Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

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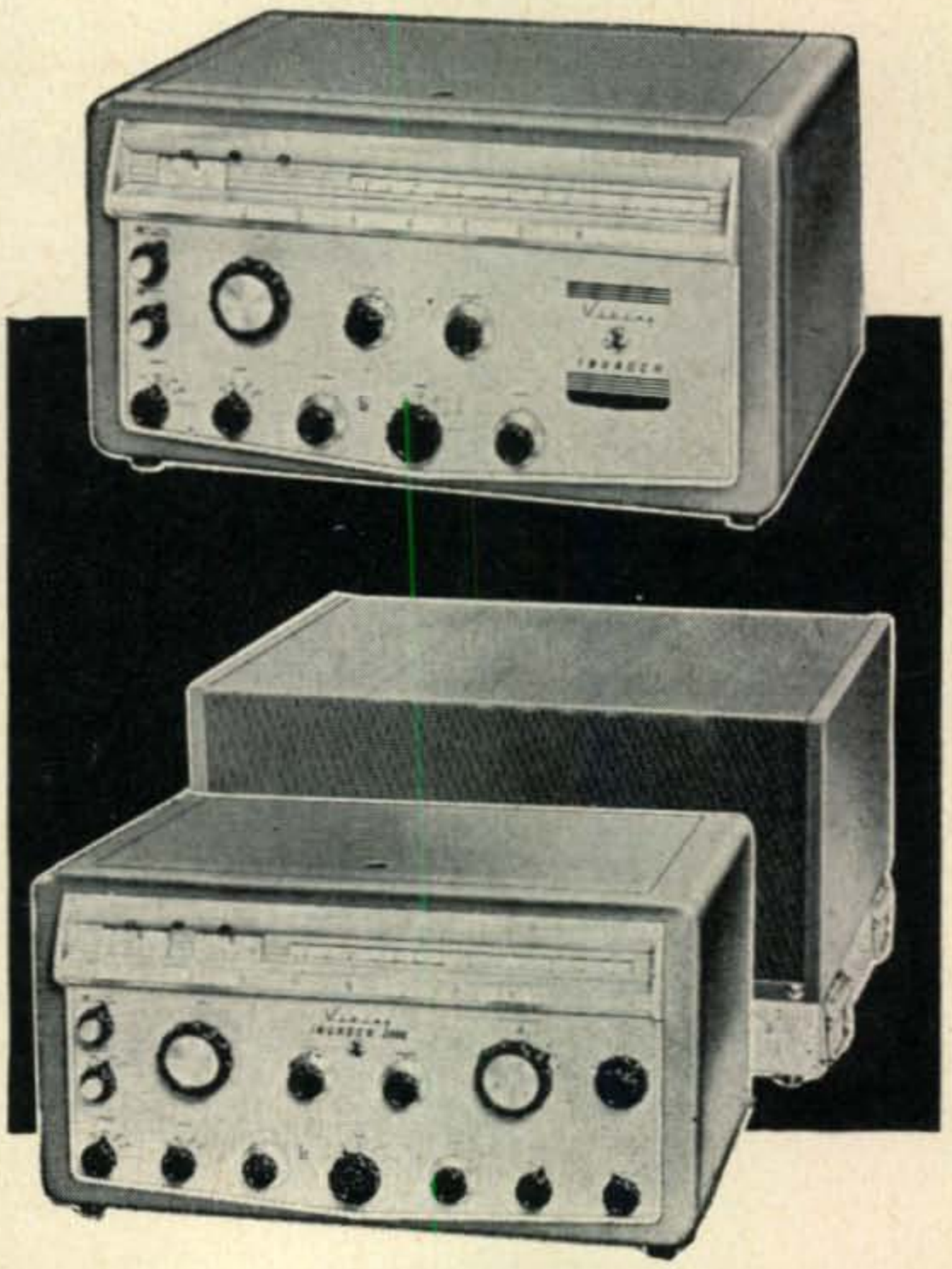

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For further information, check number 49. on page 110

Michigan

The Copper Country Radio Amateur Association will hold their annual "Upper Peninsula" hamfest on Aug. 3-4 at Laurium Airport in Laurium, Michigan. Lots of contests, prizes, etc. For additional info write: Gail Englund, K8VDT, 511 - 5th St., Calumet, Michigan.

Hudson Friary

St. Anthony Friary in Hudson N. H. will host what is believed to be the first meeting of priests, brothers and seminarians who are also amateur radio operators. About 50 delegates are expected to attend. K1QFT will be in operation during the July 23-24 convention. The Friars in Hudson have formed the "Padre Net" and also have a call book listing over 1000 priests and brothers who are hams.

License Fees

Docket 14507 dated May 6, 1963 and which will go into effect Jan. 1, 1964 is much too long to reproduce in its entirety here. Appropriate abstracts pertaining to the amateur service are shown below.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D.C.

In the Matter of Establishment of fees for the Commission's licensing and regulatory activities	Docket No. 14507

REPORT AND ORDER

By the Commission: Commissioners Bartley and Ford dissenting and issuing statements.

1. On February 16, 1962, the Commission issued a Notice of Proposed Rule Making looking towards the adoption of a schedule of fees for its licensing and regulatory activities. The Notice invited interested parties to file comments on or before April 16, 1962, and reply comments on or before May 16, 1962. On April 9, 1962, at the request of the American Radio Relay League, Inc., the Commission issued an Order extending the time for filing comments to May 16, 1962 and reply comments to June 16, 1962.

* * * *

22. Probably the most vigorous opposition of any one group to the fee proposal came from the licensees of the Amateur Service. Though we shall not attempt to set forth the numerous arguments presented in opposition to the proposed fee for applications filed in the Amateur Radio Service, suffice it to say that as a result of those arguments we have revised the schedule of fees for the Amateur Service. No fee will be charged to those who apply for Novice Licenses since such licenses are for a one-year term and applicants for such licenses are often young people who are starting out in a new hobby. Also, we are persuaded that a lesser fee should be charged for modifications. Thus, the fee for filing applications for modifications will be $2.00. However, since the license term for Amateurs (except for Novices) is for a period of 5 years, we feel that the charge for renewals and initial applications in such cases should be set at $4.00. The fee for Amateur Special Call Signs pursuant to Section 12.81 will be increased from $5.00 to $20.00. This service is costly, as it involves research, and is of no significance to anyone except to the Amateur concerned. Therefore, we feel the larger fee is justified.

* * * *

In view of the foregoing, and pursuant to authority contained in Section 4 (*i*) of the Communications Act, Section 140 of Title 5 of the United States Code, and Budget Bureau Circular A-25 of September 23, 1959, IT IS ORDERED, That, effective January 1, 1964, Part 1, Practice and Procedure, IS AMENDED as set forth in the attached Appendix.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Acting Secretary

It is still uncertain just what the FCC terminology of a modification entails, i.e., change of address, change of name, *etc.* It *is*, therefore, expected that the

[*Continued on page 108*]

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QSL contest

RESPONDING to our request in May for cards bearing three calls, a considerable number were received, four of which are illustrated here.

The winner, Ed Wells, used this card in 1931 when he was still an undergraduate at the University of Michigan. Later, Ed let the other two calls lapse and still retains W8EW at his present QTH. It is interesting to note that W8DED was printing cards even back then.

Although K7UAE (home QTH Idaho) has only one call, we think his card is interesting enough to qualify. Bob camped at the "4 Corners" of Utah, Colorado, Arizona and New Mexico and automatically became K7UAE/Ø/5/7 during his trip in May. His card confirms 4 states, 4 counties and three call areas!

Mike, K8WVJ, head of the Weber family runs a local ham emporium in Cincinnati and OM Bob Lemon is proud of the three consecutive calls in the gang.

Who's for *four*-call cards?

Q.C.

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SHAKE TABLE, shown with Faust R. Gonsett W6VR, is capable of simulating the vibration encountered in mobile operation or in shipment by rail or truck. Each unit is vibrated for one hour without power applied prior to any other checkout or operation. After complete checkout, each unit is operated for one hour at full carrier output while vibration tested.

GONSETT'S OCTOPUS, shown here with Bob Gonsett, WA6QQQ and mascot K9-CINDY, simultaneously makes seventeen resistance measurements to check over 170 individual components prior to power checks. This has eliminated the familiar "60 cycle smoke signal test" and assures that there are no marginal components in the unit.

In addition, each solder connection, each rivet, each bolt and nut, are checked individually in final inspection. All personnel in the checkout and final acceptance departments are active licensed amateurs. Final acceptance is made by staff personnel, responsible to Mr. Gonsett, personally.

Designed with the same components, processes, and care that is used in the space and missile industry — made by hams, checked out by hams, personally accepted and warranted by hams, SBE equipment will continue to lead the field of amateur-commercial radio equipment.

Faust Gonsett, W6VR
President

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Ask for the QC at SBE brochure at your SBE dealer for the complete story on Quality Control at Sideband Engineers Inc.

For further information, check number 21, on page 110

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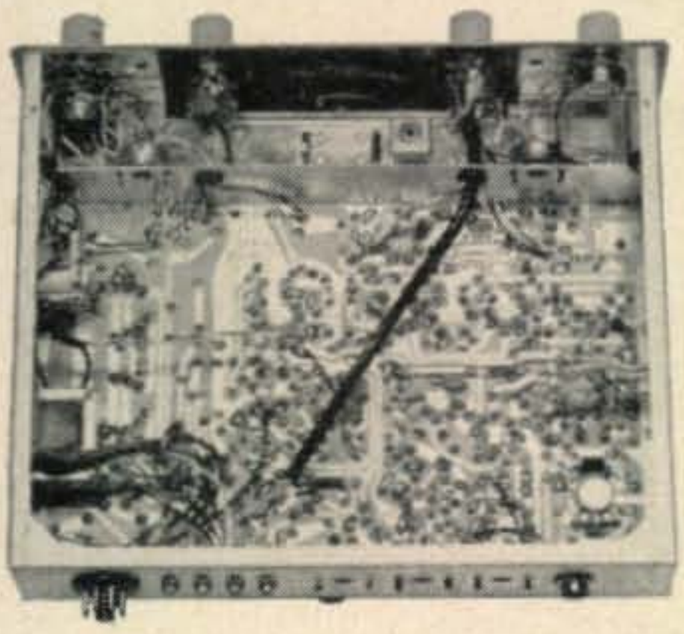
...TRANSCEIVERS JUST $119.95 EACH



SPECIFICATIONS—RF Input: 200 watts PEP. **Tube Complement:** Fourteen tube heterodyne circuit; (3) 6EA8 mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amps., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het. osc and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc., product det.; (1) 6EB8, Audio amp. and output; (2) 6GE5 R.F. output. **Sideband Generation:** Crystal lattice bandpass filter method. **Stability:** 100 cps overall after warm-up. **Carrier & Unwanted Sideband Suppression:** 45 db. **Frequency Coverage:** HW-12, 3.8—4.0 mc; HW-22, 7.2—7.3 mc; HW-32, 14.2—14.35 mc. **Receiver Sensitivity:** 1 uv for 15 db S+N/N ratio. **Receiver Selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32 USB. **Audio output:** 1 watt @ 8 ohms. **Mike Input:** Hi-Z. **Panel Controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter. Front panel screwdriver adjust for S-meter and VOX delay. **Rear Panel Controls:** Mike gain, tune level, final bias. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, —125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet Dimensions:** 6" H x 12" W x 10" D.

...80, 40 or 20 METERS

POWER SUPPLIES FOR ABOVE: Specially designed for SSB operation with emphasis on maximum dynamic regulation . . . may be used with most other popular SSB transceivers. Dependable solid-state circuitry is used throughout with long-life silicon rectifiers in both units and rugged power transistors in the HP-13 "mobile" supply. Both units provide output at: (HV) 800 VDC @ up to 300 ma, SSB duty cycle; (LV) 325 or 240 VDC @ 150 ma (selected by transformer tap), continuous duty to 175 ma; (Bias) —130 VDC and adjustable —40 to —80 VDC. The HP-23 AC supply also furnishes filament voltages of 12.6 VAC @ 5 amps or 6.3 VAC @ 10 amps. Extensive filtering assures low AC ripple content for smooth DC output. Input voltage requirements are 12-14 VDC for HP-13 DC "mobile" supply and 120 VAC, 50-60 cycle for HP-23 AC supply.

Kit HP-13. DC "Mobile Supply", available August, Price To Be Announced
Kit HP-23, AC Power Supply, available June, $5 mo. **$39.95**

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For further information, check number 3, on page 110

A Solid State Fixed-Tuned Receiver

THEO. A. BRUNNER*, W4MTM

This transistorized fixed-tuned receiver is designed to work with a tunable v.h.f. converter, and employs solid state devices for i.f. coupling, the new Clevite Transfilters. The resultant unit is small enough to fit into the converter cabinet producing a one package v.h.f. receiving system.

EXCELLENT articles describing the design and construction of v.h.f. converters are plentiful. All assume the availability of a good communications receiver to accept the output of the converter. This article is for the ham who has a tunable converter needing a receiver. It describes an eight transistor fixed tuned receiver. The receiver is small enough to fit inside of most converters and can secure its power from the converter. At full audio output, its total power consumption is less than ¾ of a watt. An additional feature is that the receiver requires no alignment. In fact there are no tuned circuits in the receiver; that is, no tuned circuits consisting of *L* and *C*.

The Circuit

The circuit, shown in fig. 1, is conventional except for the lack of i.f. transformers and oscillator and mixer tuned circuits. The i.f. stages use Clevite Transfilters® not only between stages (as used by Heath in their excellent GC-1A) but between mixer and i.f. and between i.f. and detector.

The local oscillator uses a fundamental crystal in a Pierce circuit. It couples to the mixer across a common emitter resistor. The tuned output of the converter is used for the mixer tuning. Most converters have a low impedance output which will nicely match the low impedance input of the mixer. The frequency of the oscillator crystal should be 455 kc higher or lower than the output frequency of the converter with which the receiver is used.

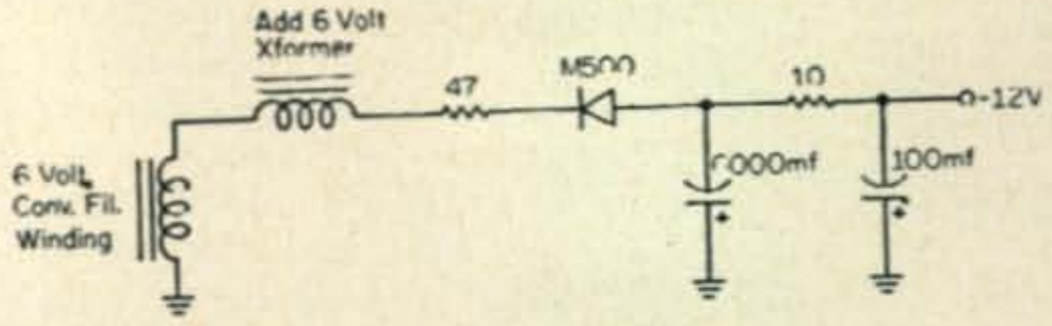

Fig. 2—Simple power supply makes use of the existing filament winding of the converter. A Sarkes Tarzian M-500 rectifier handles the load nicely.

Since the transfilters cause about a 3 db loss, three stages of i.f. were used. The result is an abundance of gain. The TF-01 filter across the emitter resistor of the third i.f. increases the selectivity but if desired, it may be replaced with a 0.05 capacitor.

The power supply uses a six volt filament transformer in series aiding with the converter filament winding and this twelve volts of a.c. is rectified by a selenium rectifier in a half wave configuration and filtered with a husky surplus capacitor as shown in fig. 2.

The B.F.O.

Originally the receiver was built without a b.f.o. circuit and one was subsequently added. The circuit is shown in fig. 3. With a 12 volt supply, more than 3 volts of output is available, enough for s.s.b. reception.

Without the 140 mmf padder, the frequency is close to 457 kc, the parallel resonant frequency

*2803 King Street, Augusta, Georgia
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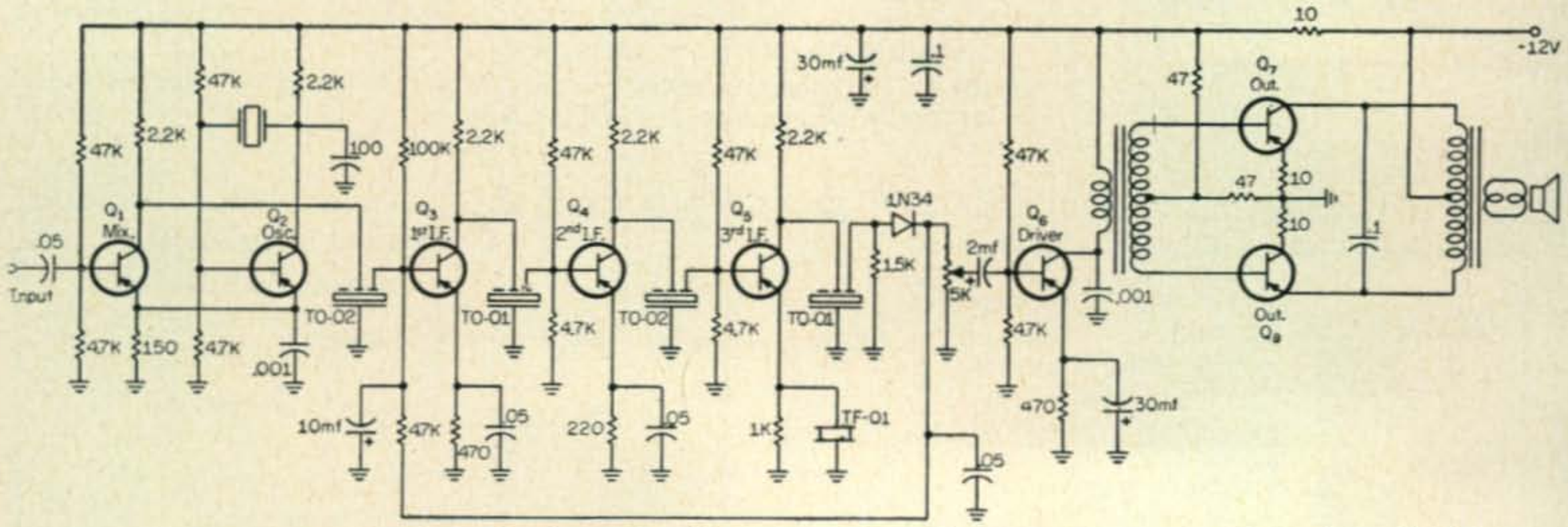


Fig. 1—Circuit of the fixed tuned solid state receiver. The crystal frequency, Y_1, is determined by the converter output frequency as explained in the text. All capacitors greater than one are in mmf unless otherwise indicated. Those less than one are in mf. All resistors are ½ watt.

of the TO-02A Transfilter. The 140 mmf padder will lower the frequency to about 453 kc for reception of the other sideband. Injection by coupling the b.f.o. output through a 100 mmf capacitor to the transfilter side of the diode detector gave good c.w. reception. However, for optimum results, disabling the a.v.c. by shorting out the 10 mf a.v.c. filter capacitor is advisable. The sensitivity may then be controlled by replacing the 4.7K bias resistor of the mixer with a 5K carbon pot. If the 5K potentiometer is mounted on a metal panel so as to add to the input capacity of the mixer stage, it should be connected to the base of the mixer transistor through an r.f.c.

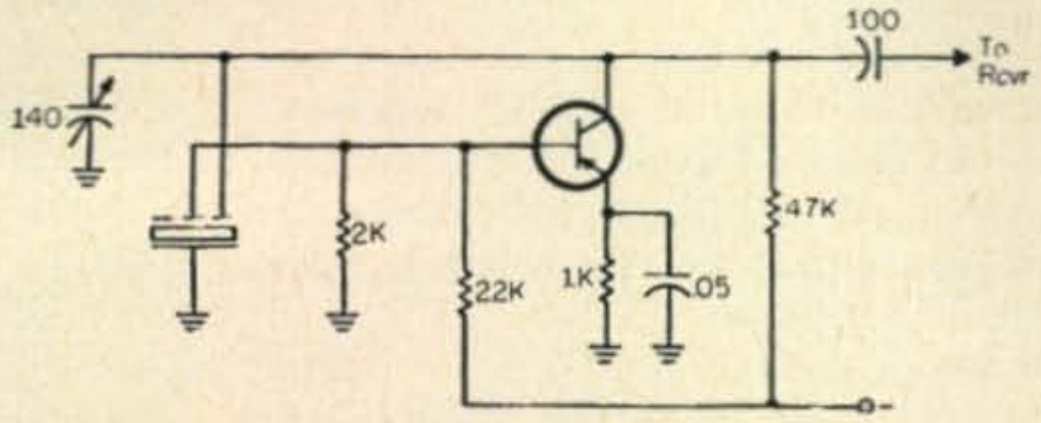


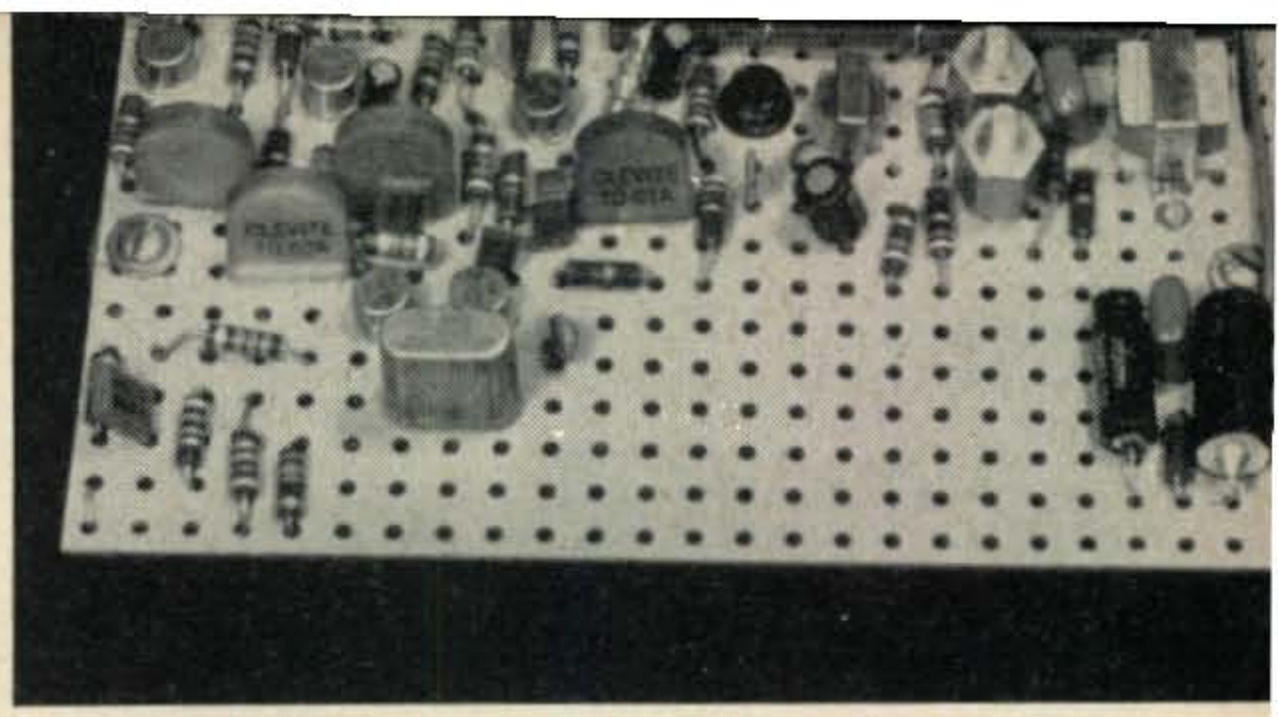
Fig. 3—B.f.o. circuit employing a Transfilter as the frequency determining element. The output is fed to the junction of the last Transfilter and the 1N34. All capacitors are in mf and all resistors are ½ watt.

Construction

The writer has found that for the home constructor the so called perf board is most easy to work with for transistor projects. Additional holes required, or existing holes to be enlarged or reshaped, can best be worked with a high speed hobby drill using a small burr in the chuck. The old standby, the ¼ inch drill is entirely too powerful for this work. A slip can cause extensive damage. By running a #20 bare tinned wire down the center of the perf board for a ground (+12) and a similiar wire along the two edges and connected the hot (—12) side of the power supply, the wiring can be greatly simplified and crossovers practically eliminated.

Transistor sockets are not used as they have been a source of trouble. The power supply was built in the converter. The volume control was also mounted in the converter in place of the power switch and the power switch became part of the volume control so the front panel was not disturbed.

Both the volume control and the power supply output connect to the receiver through a socket built into the converter. Shielded wire was used for the volume control leads. To keep from cutting a hole in the cabinet for the speaker, it was mounted on a thin board and located behind existing louvers in the cabinet. It was only necessary to drill two small holes in the cabinet to fasten the speaker baffle and another two to mount the receiver. Two 12-24 bolts and spacers were used to fasten the receiver, the spacers providing clearance between the bottom of the receiver and the side of the cabinet where it was mounted.



Top view of the complete receiver. The audio section is in the upper right.

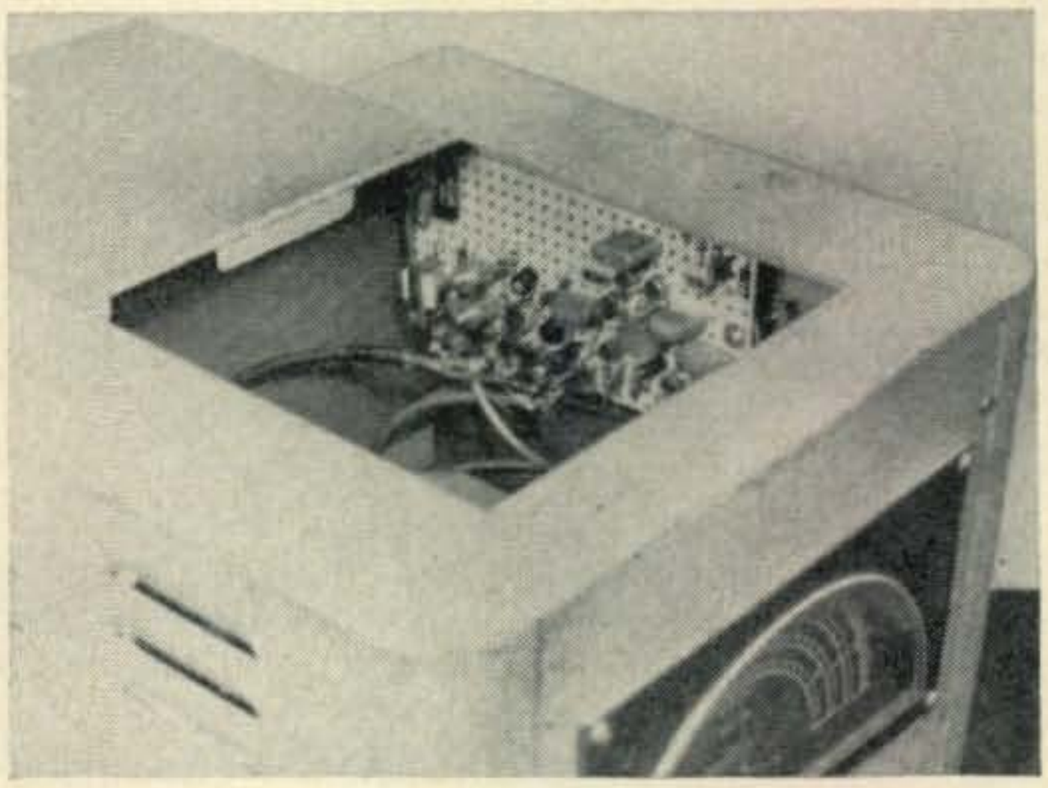
There are no alignment adjustments in the receiver. The output tuning of the converter which also functions as the mixer tuning of the receiver should be peaked. This will give maximum gain and rejection of the receiver image.

Transistor Types

The type transistors used need not be as shown as what was on hand was used and it is presumed that other builders will do the same. However for the audio driver a 2N192 and for the audio output a pair of 2N241's will do a fine job with the component values shown. For the i.f. oscillator, and mixer stages some computer rejects that happened to be on hand, were used. Any high beta, high cutoff frequency transistors will do a good job but the emitter resistors should be adjusted to a value giving the best gain and stability. The Philco T-2163 has been found to be a reasonably priced, rugged high gain transistor which will give a good account of itself. No trouble was experienced with oscillation or other forms of instability which was a most pleasant surprise.

The Transfilters are not generally available through distributors and may be obtained directly from Clevite Electronic Components, 232 Forbes Road, Bedford, Ohio, at a very reasonable cost.

If reasonable care is exercised in the construction the result will be a receiver with a noise level, sensitivity, stability, and even selectivity which would do credit to one of the better vacuum tube monsters. ■



View of the receiver mounted in the converter. The speaker is mounted behind the three louvres in the foreground.

Practical Design of a D.C. to D.C. Converter

BY CANTRELL SMITH*, K4JQG

Part III (Conclusion)

The third and concluding part of this article covers the actual construction of the d.c. power transformer and computation of the rectifier and filter component values. Additional details such as the heat sinks, choice of transistors, noise suppression and installation are also described.

THE concluding portion of this series covers the transformer construction, the specs for which were calculated in Part II. After the transformer is completed the rectifier and filter components are covered. Then we tie up all the loose ends.

Winding Instructions

The transformer is very simple to wind if the windings are placed on the bar and stops are used at each end of the bar. These stops do not have to be complicated. They can be made from fiber washers or can be built up with electrical tape. If thin fiber washers are used they can be left in place when the transformer is assembled. If the transformer is to be neat the stops should be slotted on one side for bringing out the taps. A layer of very thin electrical tape should be used between windings. Ordinary black scotch electrical tape can be used here if it is stretched tightly to minimize bulk. Sufficient space must be left at each end of the bar to fit the U in place. The order of winding is as follows:

1. Layer of tape on the core.
2. Primary winding (tap at 21st turn).
3. Layer of tape.
4. Feedback winding (tap at seventh turn).
5. Layer of tape.
6. Secondary winding (tap at 312th turn).

All windings should be in the same direction with each layer close wound, starting at one end of the bar and winding evenly all the way across. When you reach the other end of the bar let the wire fall naturally into place and wind back again, always winding in the same sense. You will probably find that the coil looks a little unbalanced when you get the primary wound. In other words you probably have more layers on one end of the bar than you have on the other. Don't let this bother you. The flux leakage here is very low and the operation of the transformer will not be impaired.

The feedback winding is wound in the same manner. However, it is not necessary that the winding be spread over the entire length of the bar. Instead, use it to fill in the valleys left by the uneven primary winding.

It is not necessary to find the *electrical* center for the secondary tap. The flux leakage will be sufficiently low that tapping at 312 turns will give a well-balanced secondary. Use the first couple of hundred turns of the secondary to fill in the valleys left in the transformer by the primary and feedback windings and then wind smoothly back and forth across the bar with the remaining turns.

When the windings are all completed a thin layer of tape should be wound tightly over the entire coil area to keep the windings in place.

Now the U should be placed in position on the bar and cemented in place with epoxy cement or held tightly with clamps. Epoxy cement can be purchased at almost any variety store. If the U is cemented in place the two sections must be clamped very tightly together while the cement sets. This point is emphasized most strongly. There must be an absolute minimum of air gap at this junction in order to minimize leakage flux and provide good efficiency in the transformer. If clamps are used to hold the assembly in place, they should be isolated from the core material with a layer of tape or some other non-metallic material. This is to keep the acoustical noise of the transformer to a minimum.

Bridge and Filter Components

For all practical purposes it can be assumed that the output voltage of this supply will vary directly as the variation in input voltage. Therefore, if the input voltage is increased to 16 volts the output voltage will increase by a factor of

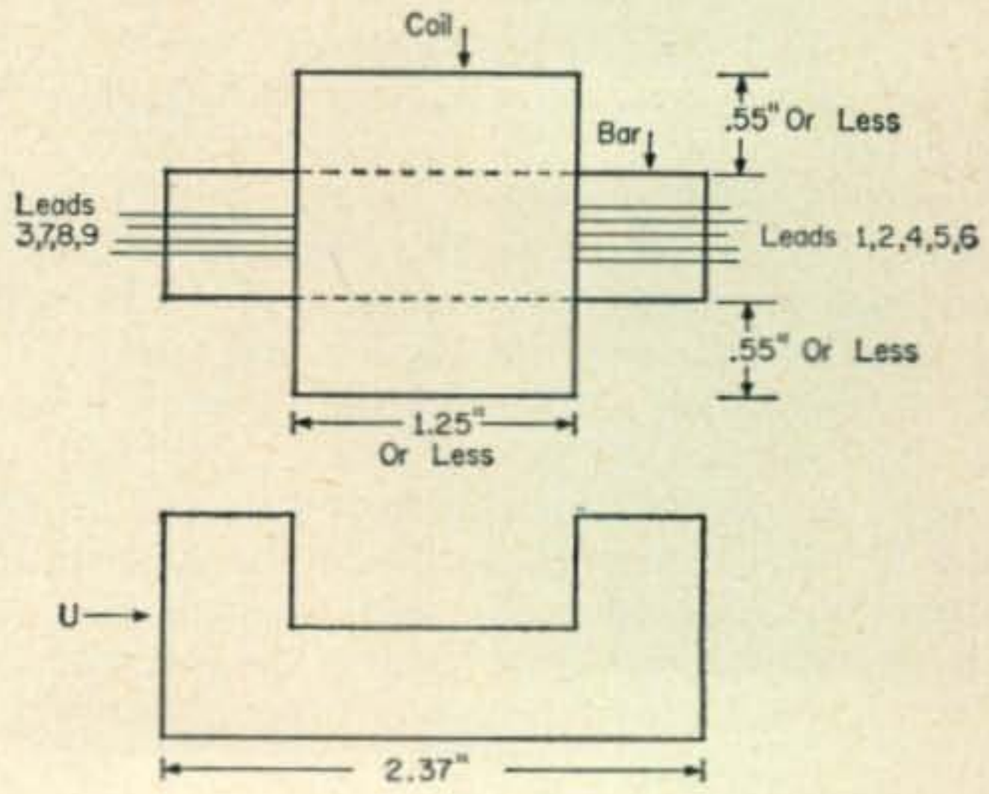


Fig. 5—Position of winding and locations of the leads are shown above with winding sizes.

* Technical Specialist, Communications Products Dept., General Electric Company, Lynchburg, Virginia.

(16/13.6) × 350 or to a peak value of 412 volts. Assuming a purely resistive load the output current will increase by the same proportion, or to a value of (16/13.6) × (200 + 30) = 270 milliamperes. Therefore, the rectifiers should have a current carrying capacity of at least 270 milliamperes. In addition, the rectifiers should be capable of taking at least a 20 ampere surge. A current surge occurs when the supply is first turned on due to the charging of the capacitors. If necessary, this surge can be minimized by inserting a 10-25 ohm resistor between the junction of CR_1, CR_3, and ground.

Like all unregulated power supplies this unit will also have a certain percentage of regulation. In other words, if the input voltage is held constant and the amount of current drawn from the supply varied, the output voltage will vary. The amount of variation in the output voltage depends mainly on the efficiency of the transformer. This being true, if no current is drawn from the supply there will be no transformer losses and the output voltage will equal the turns ratio times the input voltage. Therefore, if the worst condition is assumed of no load and an input voltage of 16 volts, the maximum output voltage will be:

$$E_{out} = \frac{N_s}{N_p} E_{in}$$

$$= \frac{624}{21} 16$$

$$= 475 \textit{ volts (approximate)}$$

This means the rectifiers should have an inverse peak voltage rating greater than 475 volts. The high voltage filter capacitor (C_4) should have a working voltage of 500 v.d.c. and the low voltage filter capacitors (C_5, C_6) should have a working voltage of 500/2 or 250 v.d.c.

Heat Sinking Transistors

There have been many articles written on heat sinking transistors. Most of these articles use long formulas based on the type of material used, heat transfer characteristics, etc. When the calculations are completed and the transistors mounted you turn on the power and allow the transistors to warm up. Then you check the collector stud temperatures and dig up a larger heat sink to try it again.

Frankly speaking, heat sink calculations are not too practical for the average person. The best I can do is give some estimates based on experience and from there you are on your own. The amount of heat sinking necessary is, of course, dependent on the amount of power dissipated in the transistors.

The two most common materials which make fairly efficient heat sinks are copper and aluminum, copper being preferred. The most important point to consider is surface area. An absolute minimum should be 10 square inches of surface area per watt of dissipation in the transistors. If more surface area can be obtained then by all means use it. If finned heat sink material can be obtained quite a large surface area can be realized with a relatively small piece of material. If sheet material is to be used it should be at least ⅛ inch thick copper or aluminum. Painting the material a dull black will improve its efficiency considerably.

The transistors must be completely insulated from the heat sink electrically. Either a mica or anodized aluminum insulator can be used between the transistor and the heat sink. The anodized aluminum insulator is preferred. A light film of silicone grease should be put on each side of the insulator to improve heat transfer. The nut on the transistor stud should be sufficiently tight to squeeze the insulator firmly between the transistor and the heat sink. The collector stud is isolated by a fiber bushing, or sleeving, and a mica washer is used between the collector stud washer and the heat sink. The hardware for mounting the transistors usually comes with them. However, just to be sure, the hardware should be requested when the transistors are purchased.

Miscellaneous

Inductor L_1 should be in the range of 0.1 to 0.3 millihenries and capable of carrying the input current of 7 amperes. It is important that this coil have the lowest possible d.c. resistance because any voltage dropped across it will cause a decrease in the output voltage equal to the transformer turns ratio times the voltage drop of the coil. Capacitor C_2 should have a voltage rating of 25 v.d.c. and be in the range of 25 to 50 microfarads.

Capacitor C_1 should have a voltage rating of 25 v.d.c. and a capacity of at least 25 microfarads. This capacitor absorbs voltage transients appearing across R_2 and also serves to insure fast switching of the transistors when the supply is lightly loaded. A larger capacitor here will do no harm.

Capacitor C_3 is a buffer for suppressing voltage transients due to the switching of the transistors. Its value is rather critical and must be chosen to meet the requirements of the type of transformer used. If this capacitor is too large it will increase the switching time of the transistors. This, of course, would mean additional power loss in the transistors and an overall decrease in the efficiency of the supply. If C_3 is too low in value excessive spikes appearing on the wave forms can exceed the inverse peak voltage ratings of the transistors and diodes thereby decreasing the life of the components or completely destroying them. If this transformer was wound according to instructions no capacitor should need to be added for C_3. The distributed capacity of the transformer should be adequate.

Filtering is difficult to calculate for this type of waveform but a good approximation can be made to serve as a starting point. In order to calculate the filter capacitor it is necessary to know the maximum ripple voltage allowable. The high voltage filter C_4 will be calculated, assuming a maximum r.m.s. ripple (E_{rms}) of 0.3 volts.

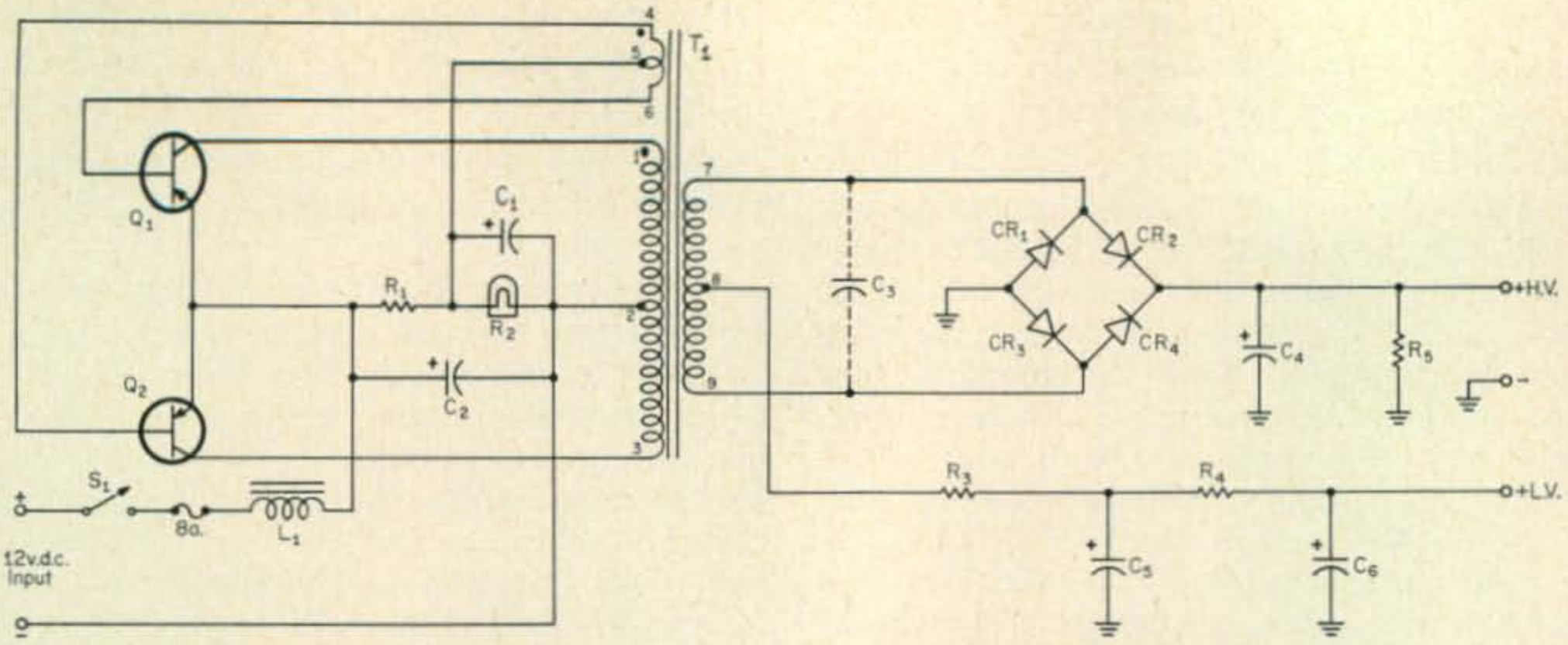


Fig. 5—Circuit of the d.c. to d.c. converter developed in this three-part article. A separate capacitor is not needed at C_3 in this circuit since distributed capacity provides proper buffer action.

C_1—25 mf 25 v.d.c.
C_2—25 to 50 mf 25 v.d.c.
C_3—Buffer capacitor (unnecessary with transformer shown).
C_4—32 mf 500 v.d.c.
C_5—10 mf 250 v.d.c.
C_6—20 mf 250 v.d.c.
CR_1—CR_4—400 p.i.v. 600 ma diodes. G.E. 1N1695.
L_1—0.1 to 0.3 mh 7 amp. choke.
Q_1, Q_2—Delco 2N442.
R_1—4.3 ohms ½ watt.
R_2—G.E. #1819 lamp.
R_3, R_4—100 ohms ½ watt.
R_5—500K ½ watt.
T_1—Wound according to text.

$$C = \frac{E_{out}}{4\,(\sqrt{3})\,(F)\,(E_{r.m.s.})\left(\frac{E_{out}}{I_{out}}\right)(10^{-6})}$$

$$= \frac{350}{(6.93)\,(3)\,(10^3)\,(0.3)\left(\frac{.350}{.2}\right)(10^{-6})}$$

$$= \frac{350}{(6237)\,(1750)\,(10^{-6})}$$

$$= \frac{350}{10.9}$$

$$= 32 \text{ mf } (\textit{approximately})$$

Where: C = capacity in microfarads.
E_{out} = voltage at point D (350 v.d.c.).
F = twice the operating frequency ($2 \times 1500 = 3000$).
E_{rms} = r.m.s. ripple voltage desired.
I_{out} = load current (200 ma).

Usually a lower ripple voltage is desirable in the low voltage section because it is more often used to supply the low level stages of the mobile unit. If R_3 and R_4 are each made 100 ohms, C_5 and C_6 can be approximated for a 15 to 1 ripple reduction without further calculation. Make C_5 equal to ⅓ the value of C_4 and make C_6 equal to ⅔ the value of C_4. If some other value of ripple voltage is selected for the low voltage supply or if the values of R_3 and R_4 are changed it will be necessary to calculate C_5 and C_6 individually. The calculations are the same as for C_4 except for the value of E_{out} and I_{out}. The current, I_{out} will be the load current of 30 milliamperes. When calculating C_5, E_{out} will be 350/2 minus the voltage drop across R_3. For C_6, E_{out} will be 350/2 minus the voltage drop across both R_3 and R_4.

Radiated and conducted noise from a transistorized power supply can be troublesome. For this reason it is suggested that the supply be completely enclosed and shielded from the rest of the mobile unit. The input and output d.c. leads should be bypassed with 0.005 microfarad capacitors at the point where they leave the power supply enclosure. If the entire supply cannot be isolated, the transformer should be electrostatically shielded on all sides. If these precautions are not observed, special steps will probably have to be taken to eliminate power supply noise in the receiver and transmitter.

CAUTION

Care must be taken not to reverse the input connections to the unit. If the supply is connected with the wrong polarity one or both transistors can be destroyed. The transistors could be protected by connecting a 10 ampere diode between points *B* and *C* in fig. 1, (Part I) the cathode of the diode going to point B. Then if the input connections are reversed the only damage will be a blown fuse.

Use at least No. 12 AWG wire between the unit and the battery. Any voltage dropped across these leads means wasted power and poor regulation.

The resistor R_5 is a bleeder for discharging the filter capacitors when the power is turned off. Any value between 100K and 500K can be used. A 500K, ½ watt resistor is sufficient for all practical purposes.

Notes on Operation

You will notice that the entire multivibrator circuit is floated. No ground is indicated here because the ground depends on which terminal of the battery goes to the frame of the car. The

[*Continued on page 99*]

A 220 Mc S.S.B. Mixer Amplifier From The AN/DMQ-2

BY LEROY MAY*, W5AJG

The AN/DMQ-2 is a beacon transmitter operating on 242.8 mc and presents an almost painless conversion to 220 mc s.s.b. service.

THE AN/DMQ-2 is a beacon type military transmitter operating on a frequency of 242.8 mc and is conventional in design and layout. In fact, it certainly appears that it was designed by a ham —— and as such has found quite wide favor in surplus circles. Easily modified to 144 mc[1] and used with practically no modifications on 220 mc a.m. type operation, it was considered for possible use as a 220 mc s.s.b. exciter-mixer unit. This project was completed some two years ago and has worked well in this application—and is described in this article.

If regular 220 mc a.m., class C type operation is desired, then one can expect around 10 watts carrier output from the unit. Since no instruction book or definite specifications were obtained with the rig, it was first fired up without modification on the frequency of 242.8 mc and fed into a commercial 52 ohm wattmeter good to 1,000 mc. Using 300 volts on the equipment, the carrier output was measured at 10 watts. With 250 volts, the output was 6.5 watts and when the supply voltage was 200 volts, the output was 3.5 watts. At 150 volts the output dropped to 1.5 watts. The circuit of the original unit is shown in fig. 1.

*9428 Hobart Street, Dallas 18, Texas.

[1]Grayson, K., "Surplus," *CQ*, September, 1960, p. 82.

Original Circuit

The first tube V_1, a type 6201 (12AZ7) double triode, functions as a crystal oscillator with the original crystal being 60.7 mc—with the second half of the triode doubling to 121.4 mc. The second 6201 (V_{2a}), doubles again to 242.8 mc, and the output tube, a type 6360 twin tetrode (V_3) operates straight through at this frequency. The second half of the second 6201 (V_{2b}) was used in conjunction with a code identifying wheel, keying an audio oscillator and which screen modulated the 6360 final (V_3). Both the wheel and audio oscillator components are discarded and V_{2b} is not used in this application.

It has been reported by some workers that the printed circuit wheel may be re-done with new call letters and used as a "V" or "CQ" wheel. The small motor driving the associated gear train is rated at 6 v.d.c. at 4 r.p.m. The arrangement of gears will result in the keying disc rotating at 10 r.p.m.

Conversion

As used at this station in 220 mc s.s.b. mixer-exciter service, tube V_3, the 6360 of the AN/DMQ-2 is converted to a mixer, with s.s.b. energy being cathode injected at 21 mc from a Central-Electronics 20A unit, and then being further amplified, after this mixing process, in another type 6360 twin-tetrode linear amplifier,

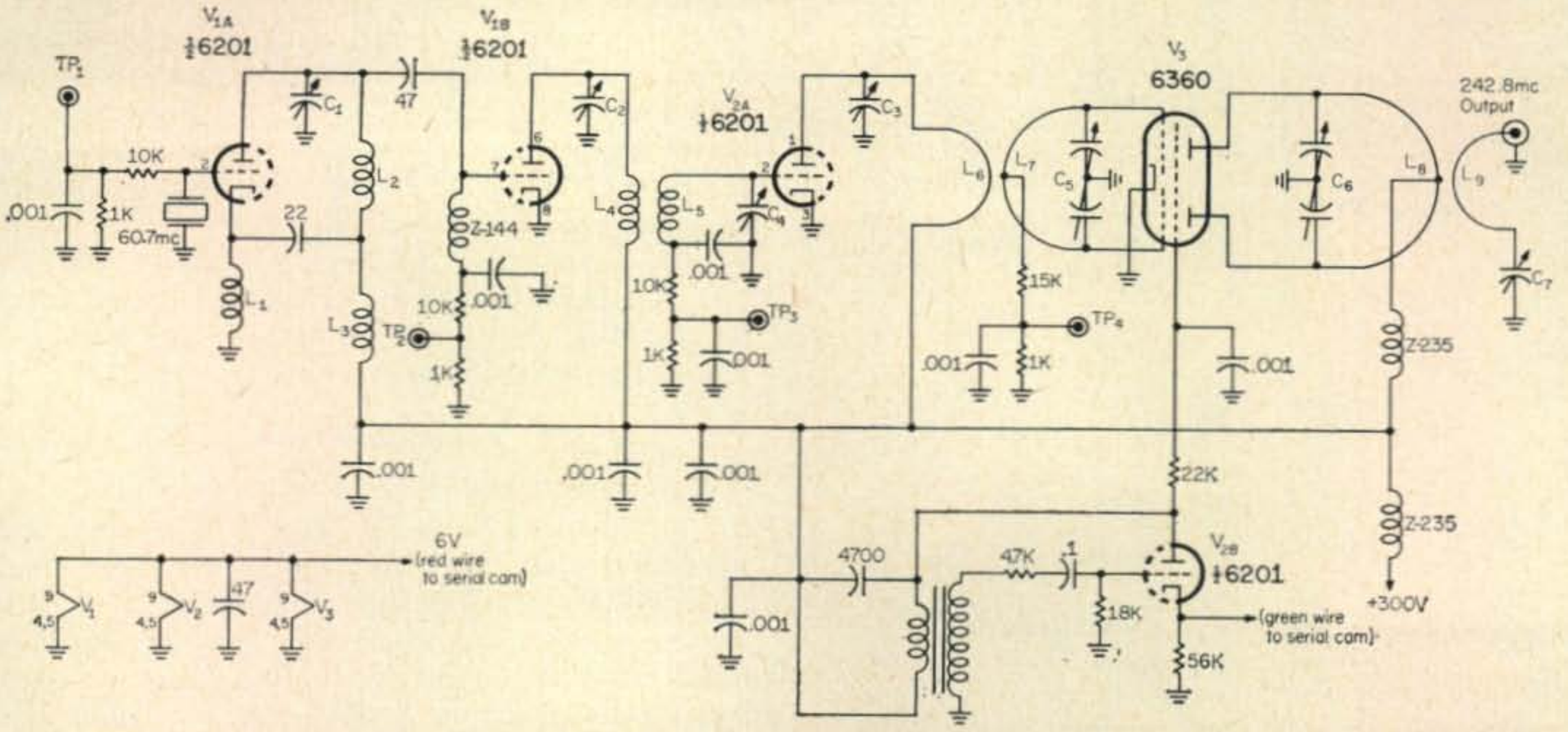
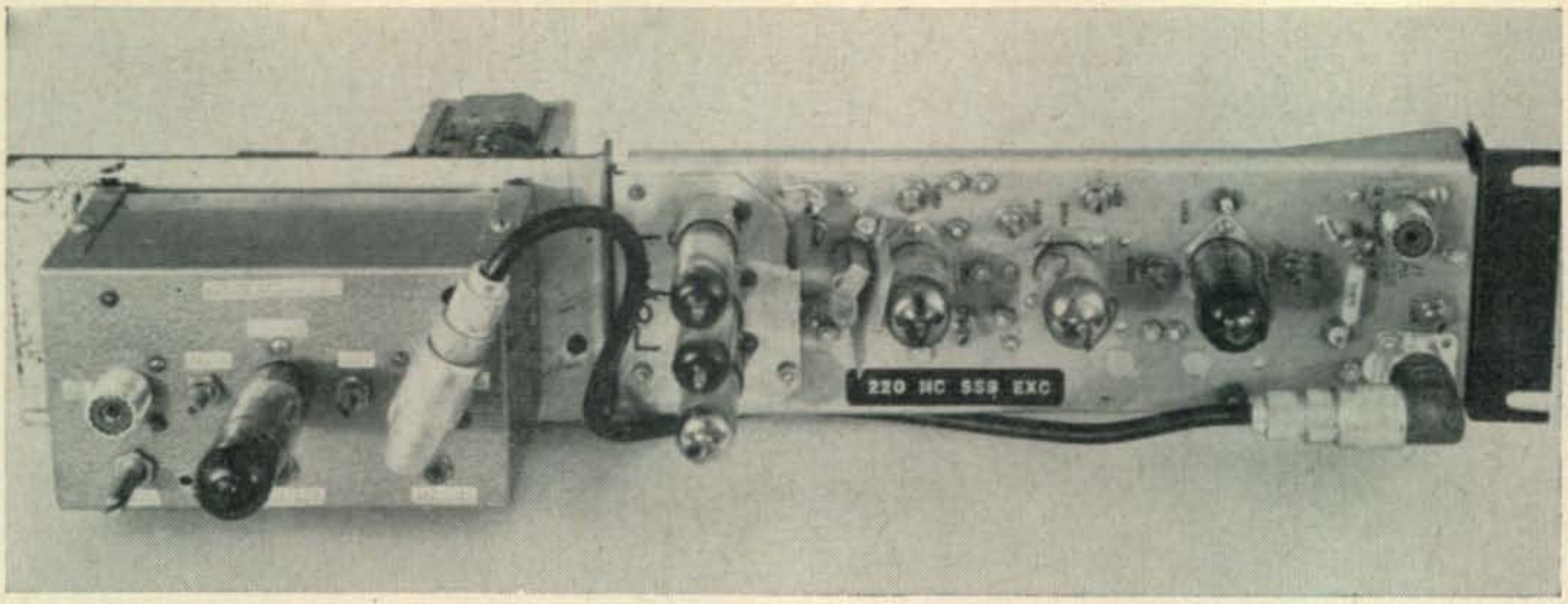


Fig. 1—Original circuit of the AN/DMQ-2 beacon transmitter. With 300 volts applied, as shown, a carrier output of 10 watts was measured at 242.8 mc.



Front view photograph of the converted AN/DMQ-2 unit. The added 6360 twin-tetrode linear amplifier is at the left contained in a minibox of 5 × 3 × 2 inches. Excitation from the 6360 mixer at the right is fed, via the RG/58-U coax cable. Three type 0B2 regulator tubes are seen in the space formerly occupied by the motor operated keying wheel. Ears are bolted onto the unit for standard rack panel mounting.

to finally drive a 220 mc linear 4X150B job (Modified TRA-19).

A front view photograph illustrates the AN/DMQ-2 joined with the 6360 linear amplifier which is mounted in a mini-box, all on a standard 19 inch relay rack panel. The voltage regulator tubes occupies the space that formerly housed the code wheel and motor.

The 20A generator is used at this station as s.s.b. excitation for all the v.h.f. transmitters operating on 50, 144 and 220 mc. The basic frequency of 21 mc was not originally chosen for any specific reason——14 mc would be as satisfactory——but we just got started with 21 mc and it so happens that it works well with the AN/DMQ-2 in this instance.

Mixing Frequencies

Now some consideration must be given as to the mixing process for 220 mc. This will depend on a couple of factors, number one being possible TVI. Since 220 mc minus 21 mc equals 199 mc, channel 11 (active in this area), a different frequency was considered. To get around this difficulty, the s.s.b. excitation of 21 mc and the injection frequency of 241 mc was considered. This, of course, is subtracting the two frequencies involved, rather than adding them, in the mixer, and works just as well. The sidebands are inverted, but this poses no problem, since at various frequencies on the 20A, one has to remember to take this inversion effect for various bands into account in any event. Furthermore, since the original AN/DMQ-2 operated on a frequency of 242.8 mc, very little needs be done to have it tune to 241 mc, other than change the crystal from 60.7 mc to 60.25 mc.

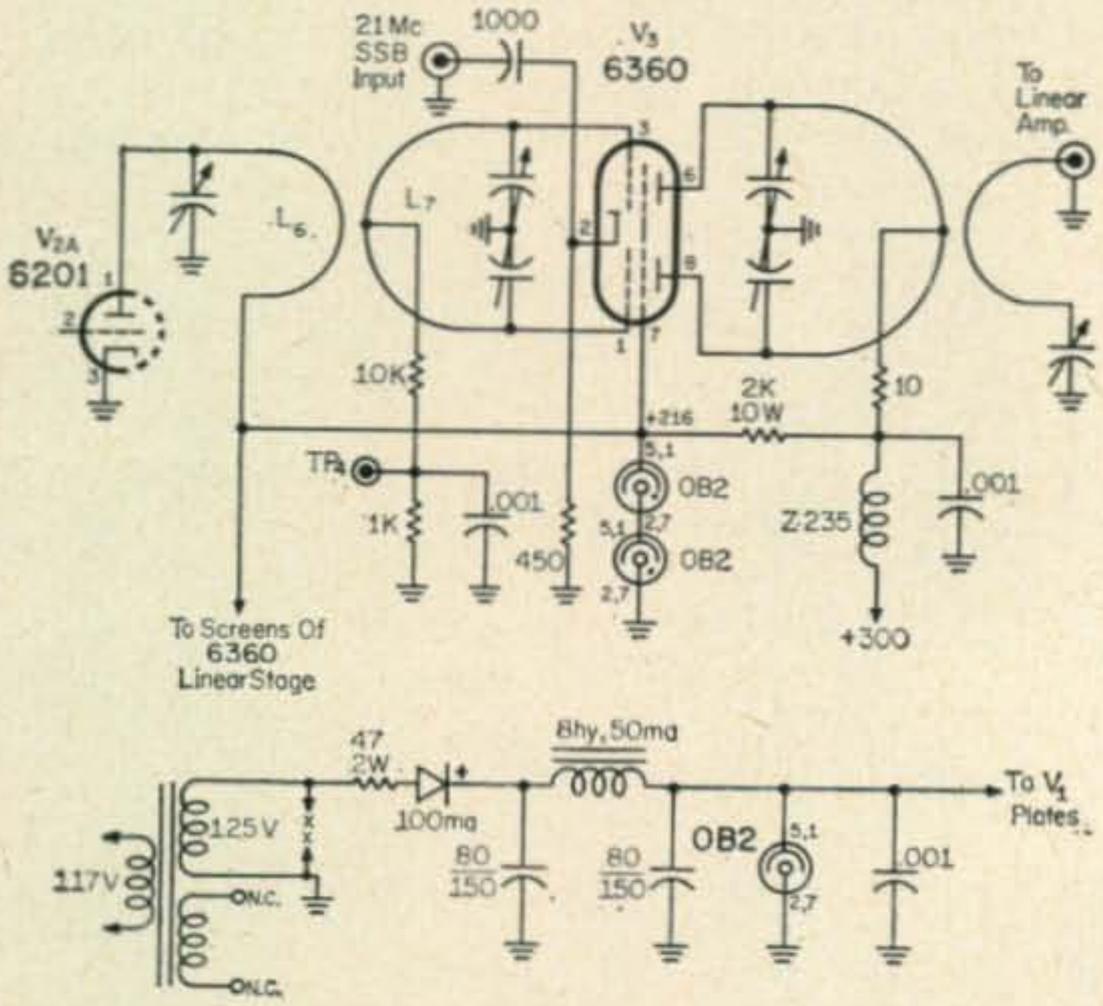
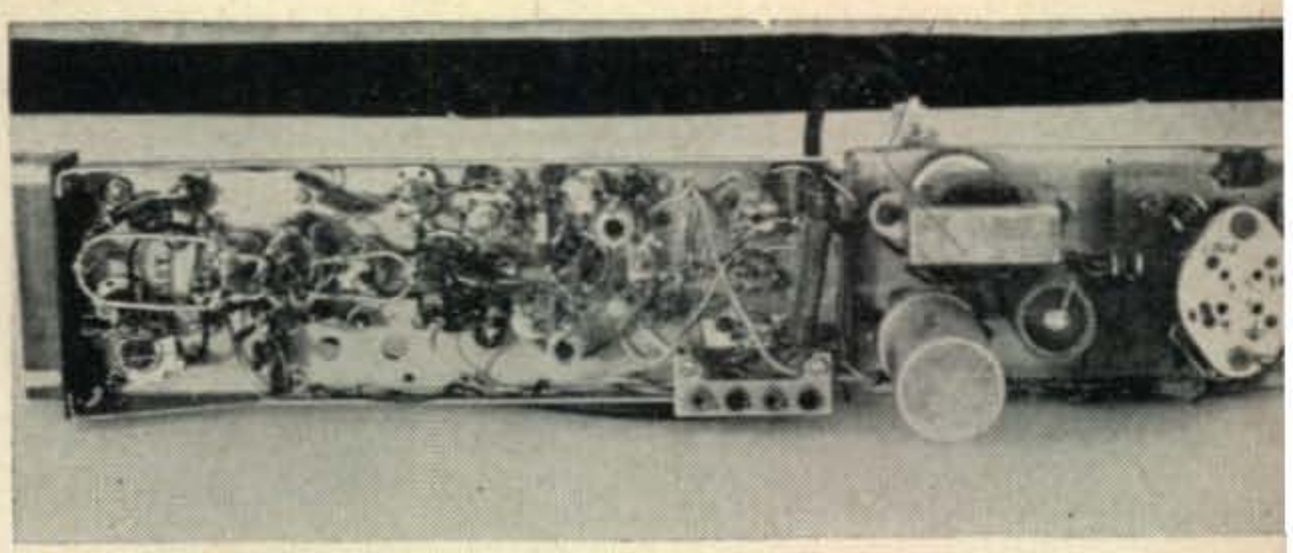


Fig. 2—Modified circuit of the AN/DMQ-2. The circuits of V_1 and V_2 remain unchanged. Tube section V_{2B} is not used at all and V_3 is rewired, as shown, for mixer service. The r.f. input from oscillator string is 241 mc with a 21 mc s.s.b. input. The regulated power supply feeds the oscillator and doubler stages.

Should one have s.s.b. energy available at a frequency of 22.18 mc, then the original 60.7 mc crystal will not have to be changed, since 242.18—22.18 equals 220 mc. Another route is one using the original 60.7 mc crystal and 21.0 mc s.s.b. energy, and the resultant mixed frequency will be 221.18 mc instead of the exact 220.0 mc edge of band frequency. Many combinations of the s.s.b. v.f.o./xtal and the AN/DMQ-2 injection crystal string will be possible. It all depends on just where the activity in the 220 mc band happens to be. In this area, we seem to have gotten started on a calling frequency of 220.220 mc, partly because it was easy to remember, but no doubt other areas would prefer some different portion of the 220-225 mc band. Available receiver tuning range would also enter into the determination of just where the proper place to settle would be.

Modifications

Referring to the original schematic, fig. 1, and the modified drawing, fig. 2, it will be seen that the major change will be that of the 6360 (V_3) tube of the AN/DMQ-2. Instead of a class C final amplifier, this stage now becomes the new mixer tube. Injection from the crystal string at 241 mc is fed to the grid of this push-pull tube and the 21 mc s.s.b. energy from the 20A is fed to the cathode. The grid resistor is changed



Rear view photo of the AN/DMQ-2 converted unit. The keying wheel has been removed and 0B2 voltage regulators installed in this space. The bias supply for the 6360's and the separate 108 volts supply for the crystal and doubler tube is at right. The rest of unit is pretty much as it was originally. The four jacks are test-points labelled $TS_{1, 2, 3, 4}$ on the schematic. The power plug on the right was later changed to a 5 prong male.

to 10K, the cathode is lifted above ground by 450 ohms and s.s.b. energy is coupled into the cathode through a 1000 mmf capacitor.

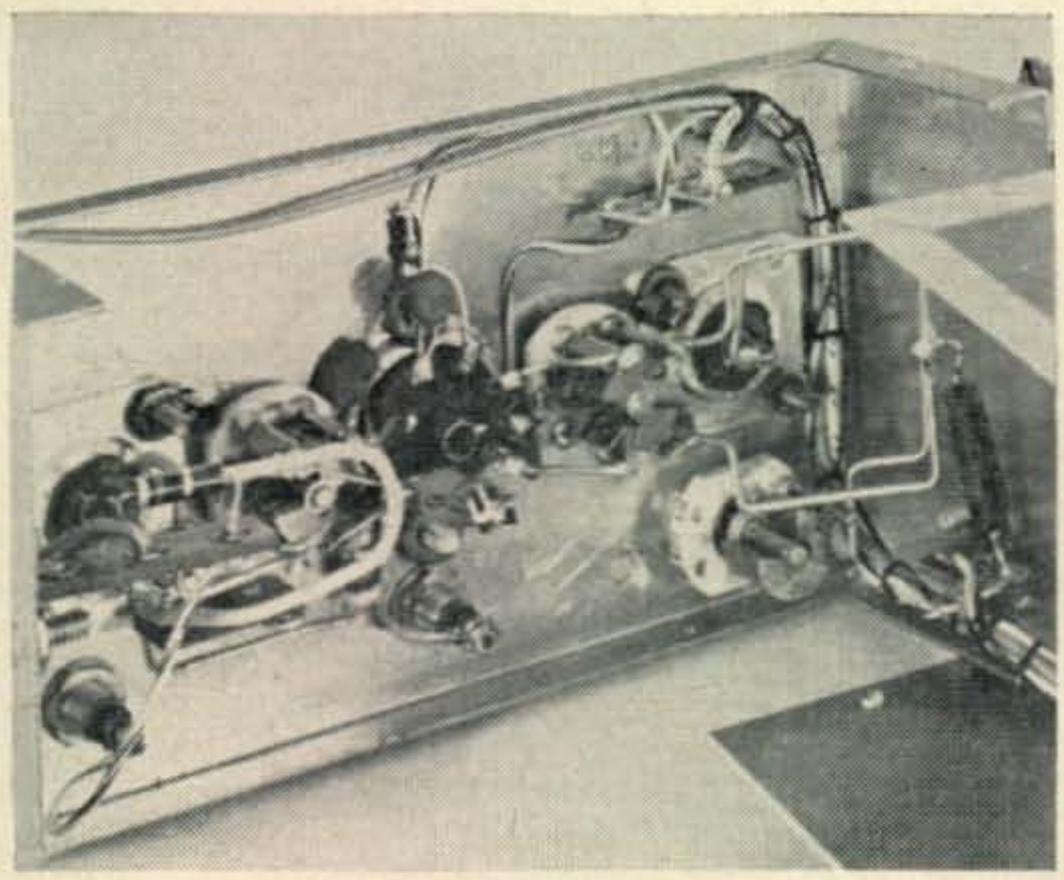
The plate circuit is tuned to 220 mc and is coupled by the coax cable to the added outboard 6360 twin tetrode linear amplifier stage shown in fig. 3. This additional linear stage employs hairpin type inductors in the grid and plate circuits and they are resonated to 220 mc with a grid-dip oscillator. Voltage regulation is brought into play in the form of a pair of 0B2s in series (216 V) for the screens of the two 6360's, and one 0B2 (108 V) to furnish regulated voltage for the crystal oscillator and its doubler. The plates of the two 6360's are supplied 300 volts from an external power supply of about 150 ma capacity.

Variable grid bias for the last 6360 linear amplifier stage is obtained from a small supply using a 65 ma silicon rectifier and is adjusted for optimum value when lining up the unit. This value will probably turn out to be between —20 and —25 volts. The power output of the last 6360 tube using 300 volts on the plates and 216 volts on the screens and operating class AB_1, will net around a minimum of 6 to 8 watts p.e.p. Plate current will peak at about 60-65 ma. Reinserted carrier will show about 4—5 watts or so average output. This is sufficient to drive a good size AB_1 linear on 220 mc. The TRA-19 modified 4X150A job previously described is driven to a little over 200 watts input quite easily with this arrangement.

The 6360 mixer tube output on the original AN/DMQ-2 chassis alone will realize about 3 watts p.e.p. and while this would probably drive a final amplifier directly, it is highly recommended that an additional linear-amplifier or buffer be used, as is done here with the second 6360. The added "Q" and selectivity of the additional tuned circuits will sharpen up the output response and help guarantee against spurious signals being amplified and transmitted by the higher power final. High flying aircraft do not need much signal to experience interference and this 225 to 400 mc spectrum is loaded with air-to-ground communications.

No special problems should be encountered in this lash-up. The g.d.o. is used initially to line up all the coils for the crystal and multiplier stages and the 241 mc range up to the mixer grid, and thence 220 mc from there on out. The separate 108 volts regulated and filtered supply for the crystal oscillator and first doubler is quite necessary for proper s.s.b. stability. This supply should come on with the heaters.

In the front view photograph, a small heat shield may be seen separating the crystal itself from the first tube, V_1. Without this shield, some drift of the 60 mc crystal may occur as a result of tube heat. ■



Close up view of the 6360 added twin-tetrode linear AB_1 stage. This is the minibox addition. The input is on the left and output on right.

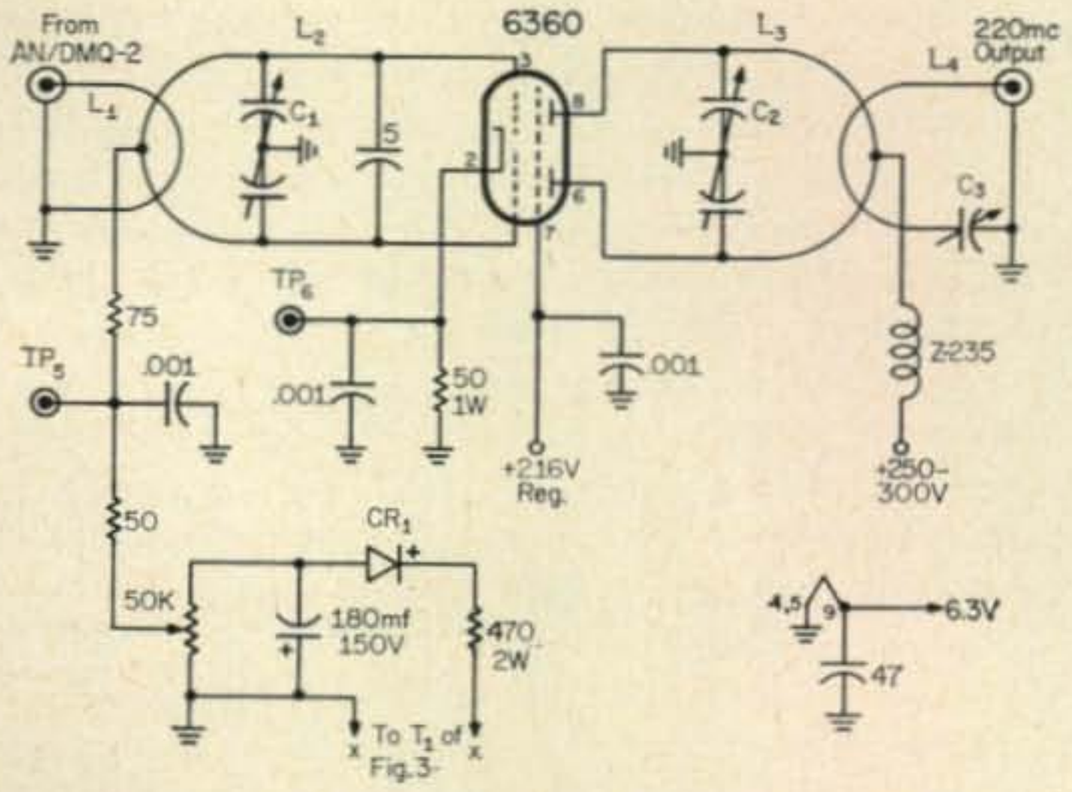


Fig. 3—Circuit of the outboard linear amplifier. The a.c. for the bias supply is taken from T_1 of fig. 2 and the 216 volts regulated for the screen is taken from the two 0B2s. Resistors are ½ watt unless otherwise noted. All capacitors are mmf unless otherwise noted.

C_1, C_2—1.8 to 5.1 mmf butterfly variable. Johnson 160-205.

C_3—2.3 to 14.2 mmf variable. Johnson 160-107.

L_1—#18 hookup wire hairpin loop, ½" dia. 1¾" l. Close couple to L_2.

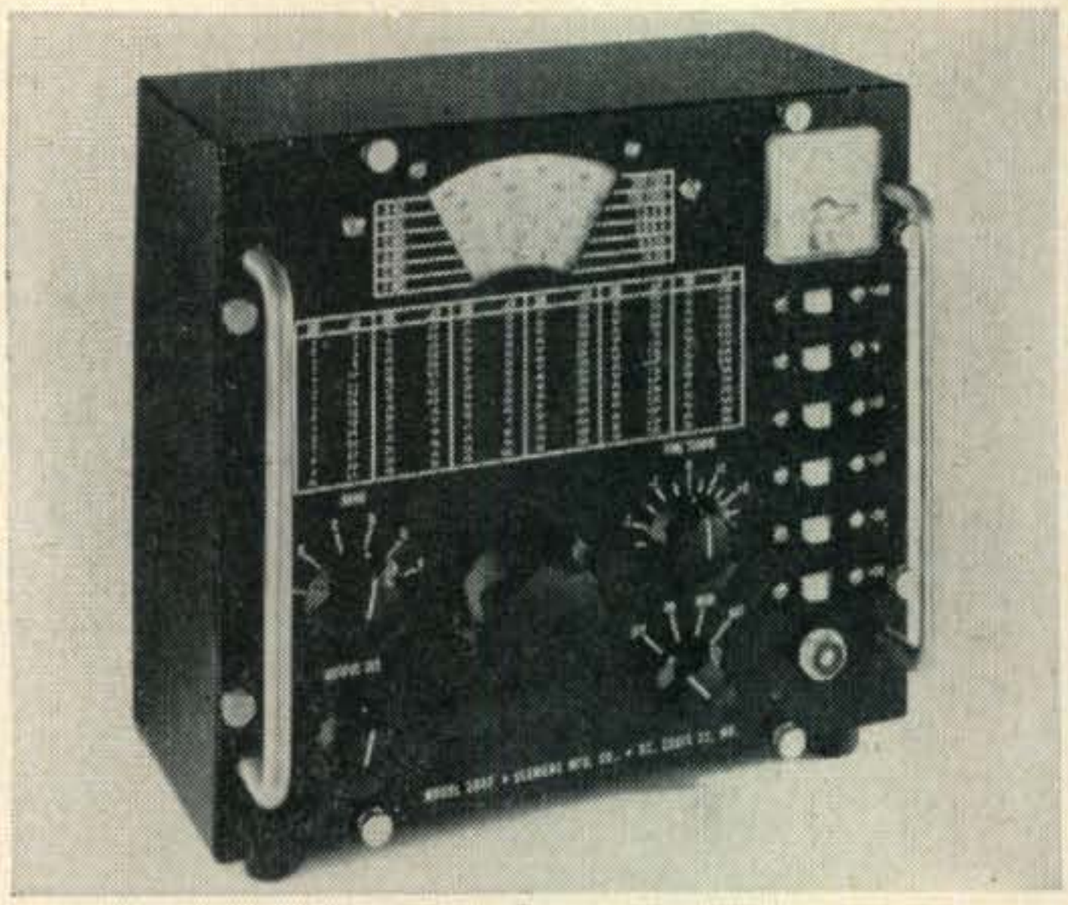
L_2—Hairpin, ½" wide, ⅝" long, #16 tinned wire.

L_3—Loop, 1½" wide, 1" long, #16 tinned wire.

L_4—Loop, ¾" square, #16 tinned wire.

CQ Reviews:

The Clemens SG-83 Standard Signal Generator



ORDINARILY "*CQ* Reviews" are concerned only with amateur receivers, transmitters and accessory equipment; however, a piece of test equipment recently has been made available which offers so many advantages over others of its type, that it's description herein is warranted.

This piece of test gear is the Model SG-83 Standard Signal Generator produced by the Clemens Manufacturing Co., 630 So. Berry Rd., St. Louis 22, Mo. It is a laboratory type of instrument which, at a relatively low cost, provides performance and accuracy heretofore obtainable with only the more exotic and expensive types used in commercial applications.

The SG-83 is a self-powered unit employing solid-state circuitry throughout with r.f. output over a bandswitched frequency range of 360 kc to 30 mc. Accurately known output levels of from 0.6 to 16,000 microvolts are obtainable. These are rapidly adjustable with various settings of a switch-type attenuator and output meter. Either modulated (30% at 400 cps)—or unmodulated output may be obtained.

R.F. Oscillator

The main feature responsible for the excellent performance of this instrument is a transistorized oscillator. This makes it possible to employ a self-contained 9-volt battery which not only makes the unit completely portable for use at any location, but most important of all, it does away with a line-power cord which usually is a source of difficulty with eliminating stray r.f. radiation. No such problem exists with the SG-83; in fact, due also to the extensive shielding employed in the instrument, tests using a probe antenna with a receiver of better than 0.5 μv sensitivity indicated external leakage to be non-existent throughout the entire range of the device.

The transistorized oscillator also insures an exceptionally high degree of frequency stability. Warm-up drift is not experienced, nor is warm-up time required. The unit always is ready for instant use on frequency.

Dial Calibrations

The specified accuracy of frequency calibration is 1% or better on six separate bands covering the entire range. This was found to be well within tolerance. The dial scale has an average length of 12 inches on each band, resulting in high resolution, easy readability and excellent reset accuracy.

By limiting each band to a 2:1 frequency range, uniform output is obtained over each band, so readjustment of the level control is not required as the instrument is tuned across a band. A fine-tuning control also is included for small changes in frequency. This is calibrated in half-kc steps over a range of plus and minus 2.5 kc with a center frequency of 455 kc, and thus facilitates low-frequency filter point-by-point alignment. The fine-tuning control also may be used to reset the main dial calibrations (against a known source) for particular frequencies over a *limited* segment in the event closer tolerance is required.

Modulator

A transistorized audio oscillator furnishes a low-distortion 400 cycle sine-wave signal which is used to modulate the r.f. oscillator by means of a diode modulator as shown in fig. 1. This is a silicon point-contact diode (CR_2) biased in the forward direction by a small potential from the battery. The attenuation introduced by the modulator diode is constant regardless of frequency or signal level due to the constant d.c. bias which greatly exceeds the level of the r.f. current passing through the diode. To obtain

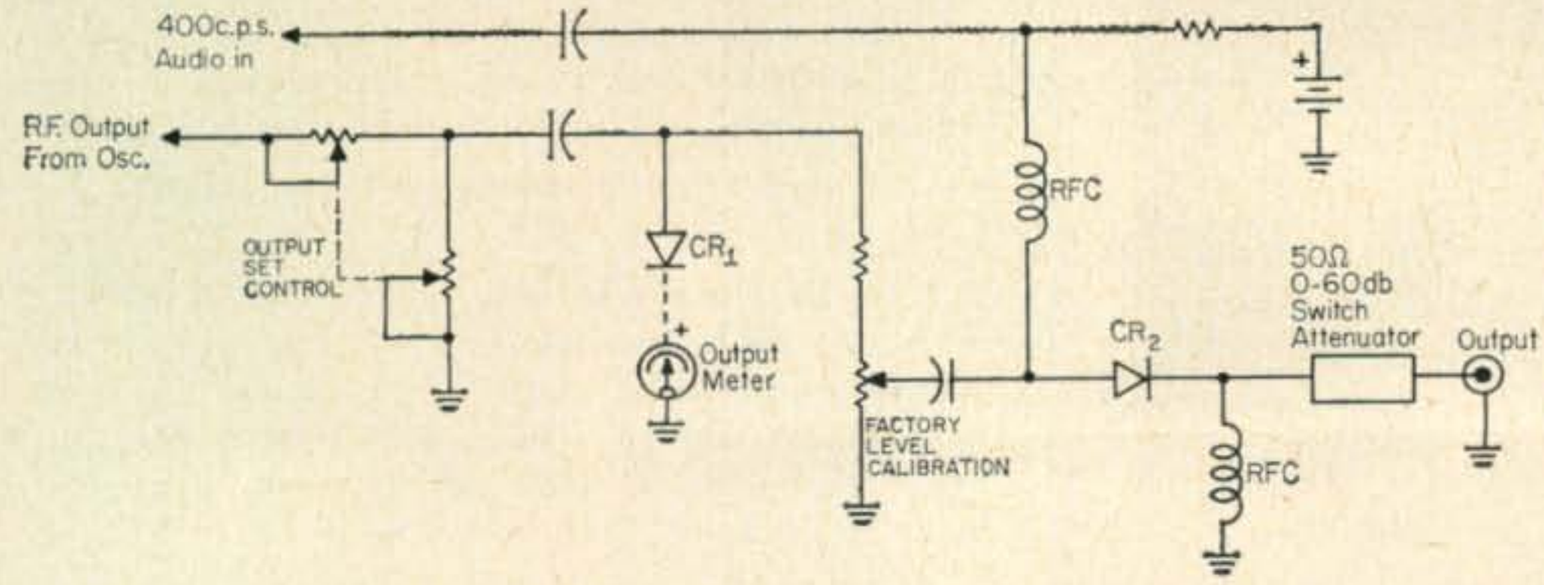


Fig. 1—Modulator system used in the SG-83 signal generator. Audio from the 400 cycle oscillator is applied to CR_2 so as to vary the d.c. resistance of the biased diode and so vary the r.f. output at a 400 cycle rate.

modulation of the output signal, the resistance of the diode is made to vary by superimposing an audio signal on the d.c. diode current.

This method of modulation has the important advantage of producing pure amplitude modulation. Frequency modulation of the oscillator is prevented because of a high degree of isolation between the modulator diode and the r.f. oscillator.

Output—Level Controls

The r.f. signal is brought out of the oscillator compartment by a shielded lead to a switch attenuator on the front panel. Slide-type switches are used, mounted in a straight line to prevent coupling around the attenuator from input to output. Each section of the attenuator has an *average* accuracy of better than ¼ db.

An output meter is provided to read a continuously adjustable r.f. level in db from —4 to +4 db, referred to 1 microvolt (at 0 db) across a 50-ohm load. Other levels depend on the settings of the switch attenuator which provides any combination of the following increments: 4, 6, 10, 20, 20 and 20 db.

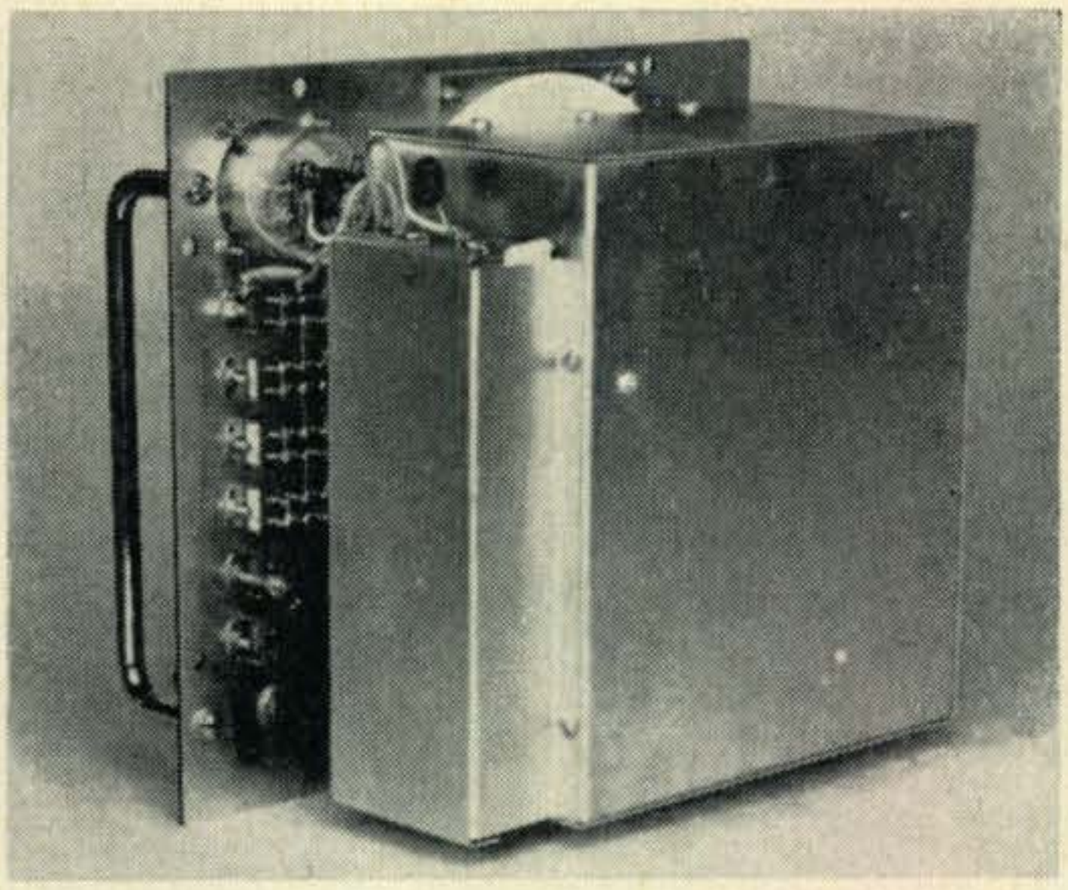
A big advantage of this arrangement is the convenience and rapidity of measurement which it affords. Instant changes in level may be obtained. Most of the applications, listed later, will involve relative db readings, in which case calibration of the attenuator settings in this respect is most handy. Where absolute signal levels (in microvolts) are required, a chart is located directly on the front panel to facilitate quick and convenient conversion from decibels to microvolts without requiring reference to a separate manual. Output accuracy at 1000-microvolts is held to within 5%.

Other Features

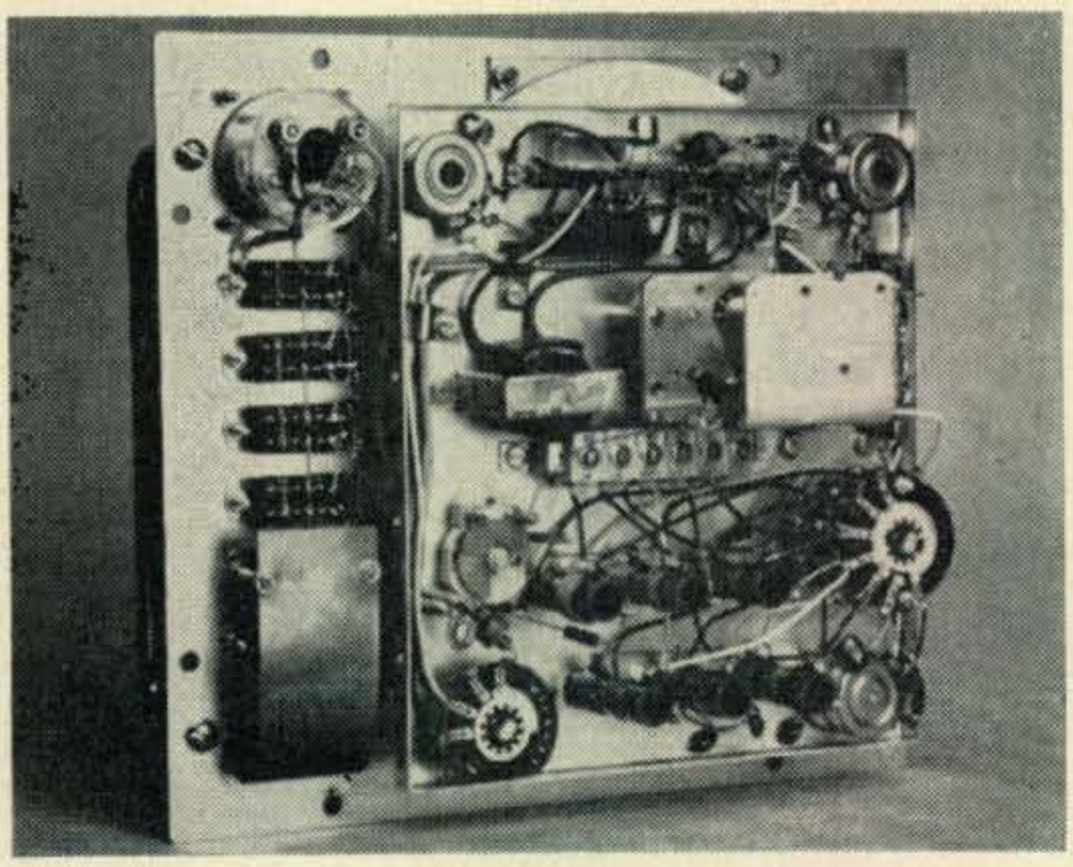
Another nice feature of the SG-83 is that the controls for frequency and output level recalibration, as well as for percent of modulation, are accessible for screw-driver adjustment through small holes in the front of the panel without necessitating removal of the instrument from the cabinet.

An output cable is furnished with a termination unit which contains a switch to provide either a 50-ohm load or an open circuit. Leakage fields *at the output terminals* are equivalent to less than 0.3 μv.

Battery life is given as 400 hours continuous operation, or one year in average use. Battery condition may be checked with the panel meter. The size of the SG-83 is 9" high × 9½" wide × 6⅝" deep overall. The shape factor may appear a little unusual; however, it has been found extremely convenient for operation with easy accessibility to controls and with a minimum of space required on the bench. Bar handles on the panel help protect the controls from damage during storage and afford a convenient means for carrying the instrument. The panel is attractively finished in black with white lettering for the various functions and the conversion chart.



Rear view of the Model SG-83 showing the internal shielded case containing the signal generating components. The battery is housed in a separate shield at the left of the cabinet.



Internal view of the Model SG-83 showing components mounted on the sub-chassis which is part of the internal shielded case. The arrangement is clean and all parts are easily accessible. The attenuator switches and resistors are at the left beneath the meter. A special groundstrap shield below these minimizes stray r.f. leakage through the output connector.

Applications

To describe in detail all the types of measurements possible to be made with the SG-83 would require another article by itself, so only mention of some of these will be made as follows:

1. Sensitivity and signal-to-noise ratio. 2. Response curves or alignment of i.f. filters, i.f. and r.f. amplifiers, especially with broadbanded circuits. 3. Image and spurious responses. 4. I.f. rejection with h.f. converters. 5. Sideband suppression. 6. S-meter calibrations relating either to S-units or microvolts. 7. R.f. marker signals with sweep generator. 8. General receiver calibration. 9. Gain or loss in r.f. stages. 10. R.f. leakage or cross talk such as encountered with switches. 11. Insertion loss of various devices.

While the Clemens SG-83 is priced higher than kit type instruments used by the amateur, its otherwise relatively low cost of $140 will be found well worth while for the serious minded amateur or laboratory engineer where accuracy and convenience are desired.—*W2AEF*

The Tri-Band Birdcage

BY GEORGE COUSINS*, VE1TG

The G4ZU Bird Cage in a previous issue of CQ inspired VE1TG to create this 3 band birdcage for 10, 15 and 20 meters.

AFTER moving from Ontario to the Annapolis Valley of Nova Scotia in November 1959, the first problem was to find a place to live, and the second was to get back on the air. With winter coming on, the antenna problem had to be solved in a hurry, so between the trees appeared a scandalous conglomeration of long-wires, doublets and other arrays, mostly for 20 meters. Of course with my good friend VE1GA only four houses away across the field, it wasn't long before I was very conscious of the results he was getting with his 3-element wide spaced beam. The difference was that he is a permanent resident while I am a transient, so a beam was considered a bit too much for me to invest in. A good compromise seemed to be the cubical quad, so work was begun, with the XYL's clothes pole in mind for a support.

Two quads were built during the winter but didn't survive. Finally came spring, and with it a copy of *CQ*, complete with an article on the G4ZU Bird Cage[1]. This looked so interesting I was sold on it before I was half way through the article. The birdcage was constructed from the article for 20 meters only and was duly propped up against the clothes line pole.

The bottom elements were 2½ feet off the ground, but having no tower this couldn't be helped, so the thing was tuned up where it stood. All the methods tried, failed to bring the s.w.r. down under about 2:1. Deciding that the elements must be too long, we tried all sorts of capacitor arrangements, to no avail, so a pi-network coil from a surplus transmitter was placed in series with the coax and the s.w.r. came down very smoothly to 1.05:1.

The thing was pointed south and a tentative CQ sent forth on c.w. A PY7 came back immediately with a 5 8/9 9 report, so there was great rejoicing in the VE1TG shack. Considering the generally poor conditions on 20 at the time, this was considered to be pretty good.

The problem of rotating had to be solved. A hole was dug about 4 feet deep in the back yard and a piece of water pipe 6 feet long was inserted. The cage was placed on top of this, leaving the lower elements about 2 feet off the ground. It could be rotated with one finger, so a motor was considered unnecessary at this time.

Tri-Band Cage

After a tower was built, the cage was examined critically and immediately the thought came to mind; why not a tri-bander? So away we went, and this is the result.

Figure 1 shows most of the construction details. The mast is a 20 foot section of 2" o.d. aluminum irrigation tubing with a very thin wall and very light weight. A piece of 2" × 2" clear pine is turned down and driven into the tubing, making a solid wood insert a little longer than the length of the pipe, and so creating much greater strength than either would possess alone.

The elements were cut from lengths of 65S-T aluminum tubing, using 1" o.d. for the 20 meter elements, and ¾" o.d. for the 15 and 10 meter elements. The 20 meter elements were 0.052 wall and the others were 0.035. By careful planning

*27 Murray Drive, Aurora, Ontario, Canada.

[1]Bird, D., "The G4ZU 'Bird Cage' Ariel," *CQ*, April 1960, page 40.

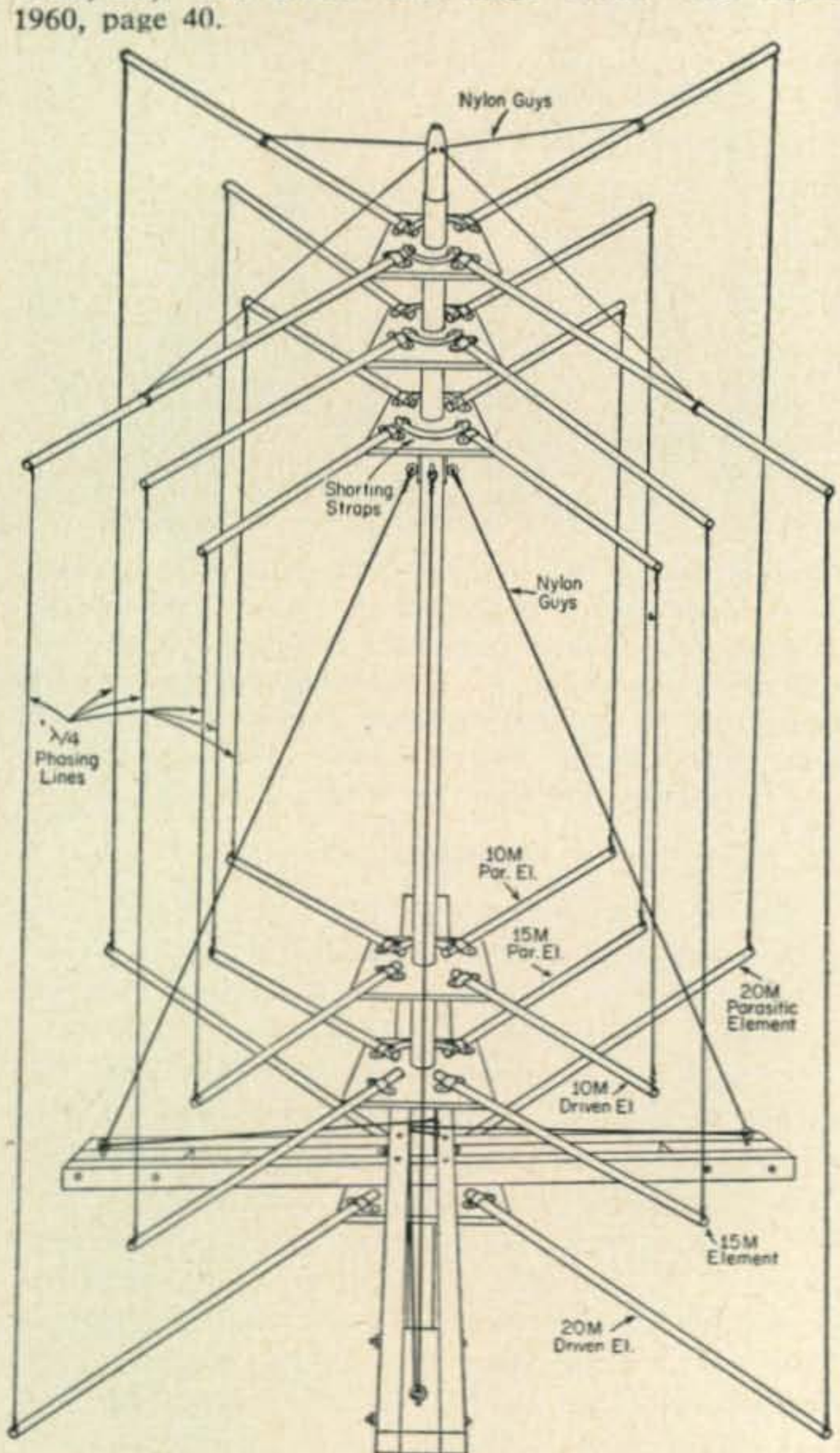


Fig. 1—Basic structure of the Tri-Band Birdcage for 10, 15 and 20 meters. The overall height is 18 feet and the turning radius is 9 feet. All guys are non metallic (nylon or Glass-line). The tuning devices are not shown in the drawing.

and checking to see what stock lengths are available, the elements can be cut with very little waste. Don't throw away any extra pieces; you may be making Gamma or T matches before you're through and they will come in handy. The phasing lines are made of #12 wire with solder lugs on the ends, which are then bolted to the elements. The aluminum should be cleaned before the lug is tightened into place. I also coated the whole joint with clear plastic which is available in most hardware stores. The lengths which I eventually ended up using are:

20 meters—elements 8′8″ Phasing lines 17′
15 meters—elements 5′8″ Phasing lines 11′7″
10 meters—elements 4′4″ Phasing lines 8′8″

The phasing lines are only approximate lengths and should not be cut until the points mentioned later are understood. There are 8 elements and 4 phasing lines required for each band.

Six mounting plates are required for the elements. They are cut from ⅝ or ¾ plywood, and should be primed and painted before mounting. The 20 meter plates are 1½′ square, and the others are 1′ square. Two inch diameter holes are cut in the center of the plates so that they will fit tightly over the mast. The plates are eventually bolted to the mast using non-rusting hardware and angle shelf brackets. Remember the spacing requirements for each band. The best method is to mark out the spacing required between the top plates and then bolt them in place on the mast, remembering to keep them in line with each other so that the elements will also be in line when they are fitted. The mast can be laid across two boxes or saw-horses while this is being done. By placing the top elements near the top of the mast, there will be about two feet of mast left at the bottom for fastening to an extension shaft.

The elements are fastened to the plates at right angles to each other using water pipe straps bolted to the plates. This is shown in Fig. 1. A brass wood screw is also run through the element into the wood to prevent the element from turning or slipping out. Remember to fasten shorting strips of copper braid or other suitable material to the top elements. Select two adjacent elements for the driven element and short them together. Do the same for the parasitic element. Do not allow the shorting strips or the elements to touch the mast, and remember as you proceed with the other bands, to keep the same relationship between elements all the way down.

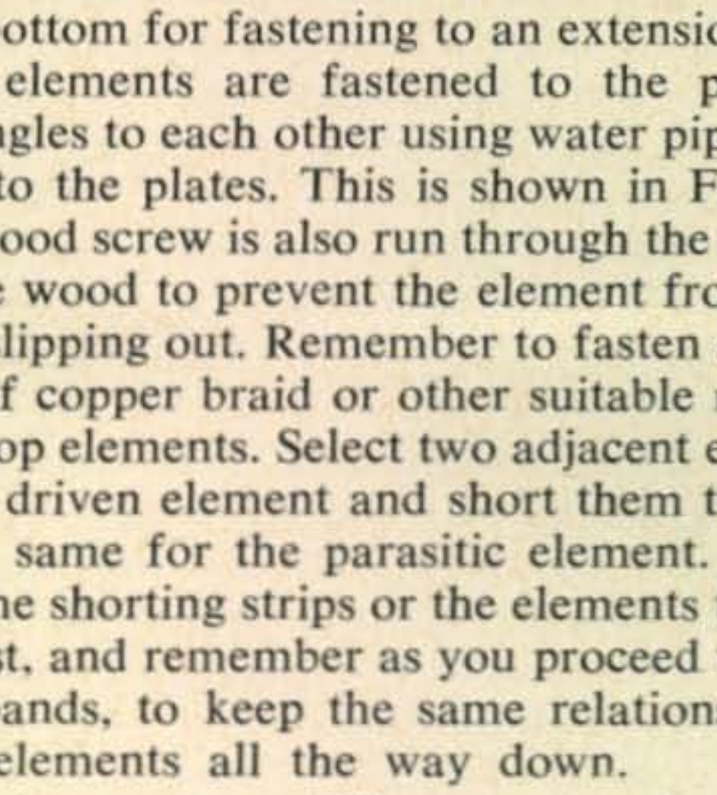


Fig. 2—Guy boom assembly, top view.

Not having much faith in a 9′ length of tubing suspended from only one end, I extended the wooden insert out the top of the mast by a couple of feet and then ran guys from the top of this extension to the outer regions of the 20 meter top elements. These guys are nylon here, but in any case should be non-metallic and of a material which is reasonably free from stretching or contracting when the weather changes. So far these guys have prevented any sag or bending in the elements.

Providing all has been done carefully, the top elements should be in place by now, and all lined up with each other. Now the phasing lines can be connected to the top elements and the bottom plates can be slipped on the mast. Install the bottom elements on the plates, but if you are going to tune it up on the ground don't bolt the bottom plates yet, as you will have to adjust the lengths of the phasing lines to bring the elements into the required resonance, and this will naturally mean having to move the position of the bottom plates. When this is all done, the plates should be bolted into place so that the phasing lines are stretched tightly between their appropriate elements.

If you intend to tune it up on top of the tower, cut the phasing lines for the lengths in the above table and bolt everything in place. This is what I did, so read on and see how it turned out for me; then make your own decision. An awful lot will depend on how easy it is to work on top of your tower or whatever you are going to stand the antenna upon. I found the tuning did not vary enough to worry about between ground level and 32 feet in the air. However this will depend on location and surroundings so should be left to the discretion of the builder. Everyone will have his own pet ideas but remember—be sure you can reach the 10 and 15 meter lower elements when you have it up there! If you can't you had better do at least preliminary tuning on the ground, and take your chances on how it will work up there. Here again a lot will depend on the design of the tower and also on how long a reach you have.

Raising The Antenna

After spending many hours reading articles on antenna construction, I notice very little is ever said about how to get the things up in the air. In this case it depends on the design of the tower, height, and facilities available. When the antenna is completely assembled on the ground you will have something resembling an overgrown porcupine and just about as easy to grasp. As soon as you decide to build the antenna (if you do) start cultivating friends—you'll need them for the Great Day. Also if at all possible I would suggest you try to tailor your tower to the needs of the antenna. Visualizing lots of fun when the big day arrived, I built the tower with a 3 foot square top and and with a platform about 4 feet down from the top. In this way three men can work at the top with lots of safety. This is a good thing to point out to your friends when request-

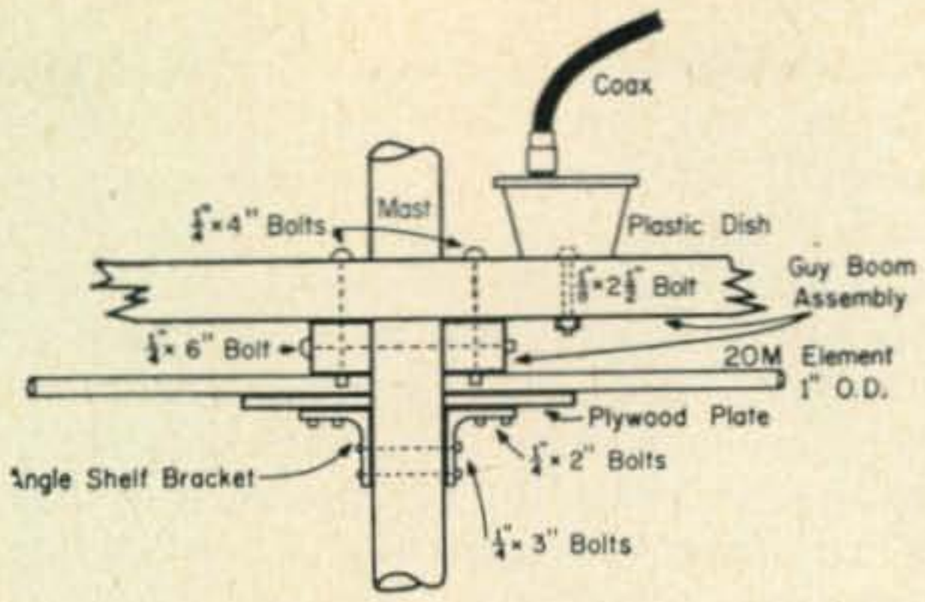


Fig. 3—Details of the guy boom and twenty meter element mounting assemblies. The plastic box contains the gamma capacitor.

ing volunteers for the raising. Even with this, there is a bit of fun in store when you get three men and an antenna all struggling away on top at the same time.

We raised the antenna all in one piece, completely assembled, by sheer manpower. Don't do it! We bent one element (one of the very top ones, of course) and also put a dent in the mast. Luckily both of these faults were remedied without too much trouble but they could have been a lot worse.

Further experimenting has proven that the easiest way to accomplish the task is one of the following:

Method 1—Mount a gin pole at the top of the tower, complete with a small block and tackle, and rig a rope sling around the mast in such a way that it can be raised vertically. The gin pole should be high enough so that the mast will clear the top of the tower and the base can be then swung into place.

Method 2—Release all the plywood plates except the top one. Slide them all up to the top of the mats in a tight group, and then proceed as before with the gin pole. The difference is that you now have about 18 feet of mast to grasp and also all your elements will be at one end—an important point when you're trying to keep an eye on all 24 of them at once!

Method 3—Remove the plates and elements as complete units. Stack them at the top of the tower in the correct order. Run the mast up through the inside of the tower and through the plates also. Bolt the top plate, slide the mast up, bolt the next plate, slide the mast up, *etc.*, until the elements are all in place.

A combination of method 1 and 2 was tried out when we had to lower the antenna in order to straighten out the top element and it worked out fine. The gin pole also serves to support the antenna while you're taking a breather and getting your support problems straightened away. You'll need a rest by this time and something has to hold the thing up!

Guying

Before tuning or anything else you must make sure the thing will stay up and I for one have little faith in a structure this high, standing there all by itself, in the winds we get around here. Guys there must be, but in such a way that they will not interfere with the rotation of the antenna. This can be quite a problem, in a closed loop system such as this.

The solution here, shown in fig. 2, was to install two wooden booms at right angles on the mast itself, as low as possible, without interfering with rotation. Mine are mounted just on top of the lower 20 meter elements, and each boom is made up from two lengths of 2″ × 2″ × 14′ lumber, with a piece of 2″ × 2″ × 3′ at each end. The center point of the boom is bolted through the mast and the ends are fitted with eye bolts. The guys should be non-metallic. I used a new type of plastic clothes line with a tensile strength of 750 lbs. Each guy is fastened to the mast just below the top 10 meter element and is then taken out to the end of the boom where it is passed through the eye bolt and run back in to the mast at the bottom. It is tied here and by adjusting the tension on each of the guys, the mast can be held straight.

Feeding

Separate coaxial cables are used to feed the three sections of the antenna. Though originally intended, I understand, to match 52 ohm, I decided to use the 72 ohm RG-59/U which I had on hand and had no difficulty in bringing the s.w.r. down. Possibly the Tri-Gamma match mentioned in W6SAI's Quad Handbook could be made to work here, but personally I prefer the separate cables.

When it comes time for tuning, if you don't have an s.w.r. bridge and a grid dip meter, beg, borrow or buy them. Also enlist the aid of another ham. It is necessary to have one man at the transmitter and one on top of the tower.

First decide whether you want a director or a reflector. The original article called for a reflector but this has been changed now to a director. In any case get the grid dip meter to work and check the driven Element. I found that, even though I had cut the phasing wires so that the total element was theoretically longer than the low end of each band called for, the measured frequency of resonance was considerably higher than the upper band limits. This may be due to the proximity of other wires for the other bands, but in any case is not too much to worry about. Faced with this problem on the ground. the phasing lines can be lengthened to the extent necessary to bring the element into resonance at the correct point. However I was on the top of the tower by the time I discovered this, so changing the lines was definitely "out". Instead, a small coil of about 6 turns of #12 wire 2″ in diameter was made of B&W coil stock and inserted in the driven element. The coil was then carefully pruned while checking with the meter until the frequency of resonance was as required. I adjusted for resonance at the center of the DX phone band in each case. However as will be seen, the exact frequency of resonance is not too important.

Having resonated the element, the coaxial cable was attached. The outside shield of the

cable was attached to the exact center of the small coil and the inner conductor was connected to a small gamma matching section. In the case of the 20 meter section, the gamma bar is about 30" long and the capacitor is a 75 mmf. I feel these values will serve as a good general starting point but would not necessarily always be correct. However this is no different than any other type of antenna matching arrangement.

With an assistant on top of the tower to tune the capacitor, the s.w.r. was quickly brought down to 1.1 on 20 meters. Checking across the band revealed a total swing of from 1.05 at the lowest point to 1.2 at the highest point, with no difficulty.

The 15 meter section was tuned in the same manner, as far as the driven element was concerned. Again it was necessary to use a small coil in the element. This one was constructed from 6 turns of ¼" copper gas line, 2" I.D., and close spaced. Again it must be realized that the necessity for these coils may not arise and even if it does, the size required may not be the same as mentioned here. However, it is well to know how the problem was solved here, in order to save time in another installation.

The 10 meter element was found to require a small coil of tubing containing 3 turns 2" I.D. and the spacing adjusted until resonance was attained. Figure 4 shows the gamma matches as they are here.

The directors are tuned by the use of wire stubs on each element. In my case the 20 meter stub is 4½ feet long, the 15 meter one is 36 inches long and the 10 meter one is 24 inches long. This will give a good starting dimension in each case. The final adjustment is done by any of the methods shown in antenna handbooks. I used the grid dip meter to set the directors for a frequency about 5% higher than the driven elements and then enlisted the aid of another amateur who lives a few miles away. Using his receiver and "S" meter the stubs were then given a final adjustment. The eventual lengths are very close to those given above.

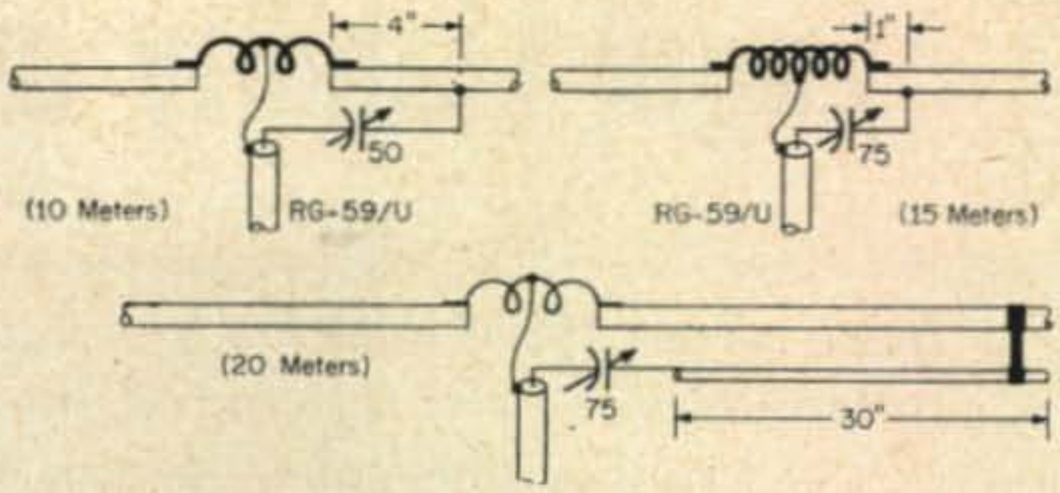


Fig. 4—Specifications for the gamma matches for each band. The coils are wound on a 2" i.c' While the exact number of turns will vary with individual installations, as will the feed points, the measurements used will provide some idea for a starting point. 10 M-3t ¼" copper; 15 M-6t ¼" copper; 20 M-3t #12. The gamma bar for 20 meters is a ¾" tube.

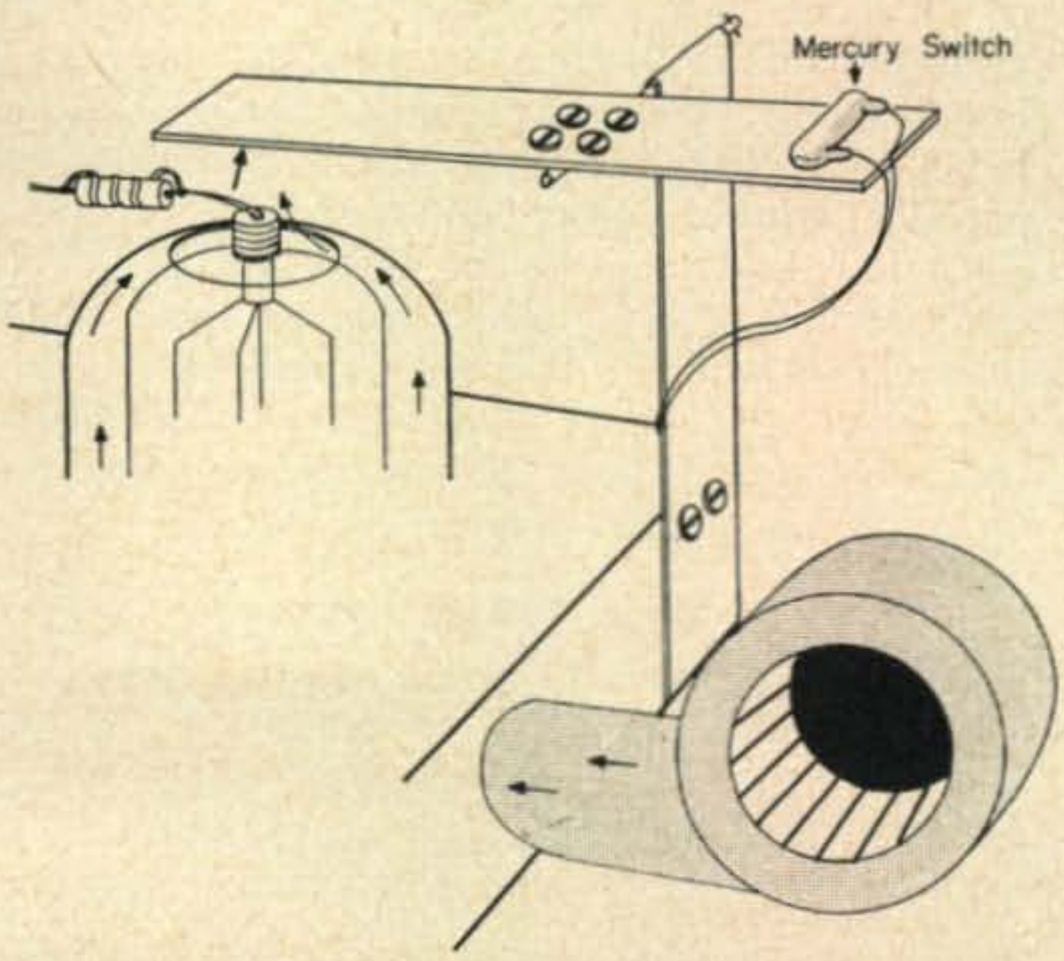
I would like to say a most heart-felt thanks to the fellows who gave so much of their time and labor to help put the thing into operation. These include VE1GA, VE1ZL, VE1ABJ, VE7AFT/1, VE1AGL and Joe Kyte, Jack Rooney, Ray Ortman and Bob Hawes of the Royal Canadian Air Force. The latter four aren't hams yet, and so I am even more grateful to them for the unselfish effort and the hours spent helping to get the antenna completed. ■

Air Blower Safety Switch

BY E. ROBSON*, VQ4ERR

WHAT happens to the high powered final tube when the blower fails? Many of these modern, high efficiency tubes are extremely temperature sensitive and require some sort of protection. The sketch illustrates a simple homemade device that uses the air stream flowing around and up the tube to lift a light plastic strip on which is mounted a mercury switch. The plastic plate can also be used to trigger a microswitch. When the plate is pushed up, the switch is wired to apply the high voltage to the final. When the air supply fails the plastic plate drops down and the mercury switch shuts off the high voltage supply.

It takes a little time to balance the plastic strip so it falls gently onto the tube cap when there is no air supply. The air column must be strong enough to push up the plastic strip. With a small mercury switch the weight distribution on the pivot is ⅔ to ⅓. The pivot is a piece of tubing slid over a bolt which is fixed to the metal post. I'm in the process of constructing a miniature switch to fit directly in the air stream. Any ideas? ■



*P.O. Box 30077, Nairobi, Kenya.

Legal Liability and Amateur Radio

BY RICHARD A FREEDMAN*, K2DEM

More often than not, the amateur equips his station and erects his antennas with little thought of the legal liability they may involve. The author illustrates several thought provoking situations.

A FEW years ago, a twelve year old boy, trespassing on a railroad right of way, decided to climb an electric pole which was located on this private property. The pole had "anti-climb" gate on the lower seven feet, which consisted of one-eighth inch steel plate padlocked over the rungs of the ladder on the pole. The boy somehow managed to get to the top of the pole, where he came in contact with 6,600 volts and suffered serious electrical burns. A law suit followed against the Pennsylvania Railroad Company. A sympathetic jury awarded $65,000 to the boy and $7,000 to his mother, deciding that on these facts the railroad should have realized the risk, and in spite of the cost should have provided even greater safeguards for their pole than the seven foot padlocked steel plate. The Supreme Court of Pennsylvania approved this finding, apparently feeling it to be a reasonable finding of the facts and monetary award for damages by the jury[1].

The Supreme Court of Pennsylvania also approved a similar finding of liability in a case where a child trespasser climbed an electric pole which had a seven foot fence around it![2]

By now the alert reader is probably thinking, "What if those electric poles were my tower or antenna masts instead?"

The purpose of this article is to discuss just this, and similar situations which the average ham could someday find himself in. Too often when we string up a haywire antenna system, or ignore elementary safety precautions in the hope of cleaning things up "some day," we are inviting trouble in the form of possible unexpected law suits aside from physical injuries. Rather large legal liabilities are not uncommon, especially where young children are involved, since it would seem to be easier for a jury to become sympathetic to an injured local child, than to an amateur that they think of as "that guy down the street that ruins my television reception" every time their next door neighbor turns on his electric shaver!

Legal Jurisdictions

It might be well to point out that there are fifty-one different legal jurisdictions in the United States (fifty states and D.C.). The law in each of these jurisdictions varies slightly as to what circumstances would indicate that the property owner took reasonable precautions to prevent others from harming themselves. The above cited cases may seem too extreme to impose liability in many states, but they certainly would be formidable precedents in Pennslyvania. I shall try to summarize the law in general, as it is today in most of our jurisdictions, and probably in Canada, Great Britain, and other countries with common-law legal systems.

In general, there are three types of people that could be in a position to come in contact with your station or antenna system. They are usually classified as "trespassers," "licensees" or "invitees."

Adult Trespassers

In the case of *adult* trespassers, in most jurisdictions you are only required to not deliberately inflict harm on them. Some jurisdictions require that you warn trespassers of hidden pitfalls on your property once you are aware of the trespasser's presence, so that he may leave without harming himself through your negligence. This would seem to indicate that a burglar, for example, that gets burned by an exposed antenna lead while practising his trade, does so at his own risk. However, in some places you must warn a trespasser of your antenna if it is hard to see and he may trip over it when you expel him from your property, or you may be paying his medical bills.

Child Trespassers

The situation for child trespassers is quite different and should be well noted by amateurs, especially those with climbable towers. Young children are specially protected by the law, this being an advantageous public policy for courts to pursue. The doctrine of "attractive nuisance" makes a child a special kind of trespasser. This doctrine states that a possessor of land is subject to liability for bodily harm to young children trespassers if the harm is caused by an artificial structure or condition maintained, if it is (or should be) known that children are likely to trespass on it, and that the artificial structure or condition involves an unreasonable risk to such child trespassers[3].

Usually this doctrine is applied if the children involved harm themselves *because of their youthful inability to realize the danger*. As a result, it is rare that a child over about fourteen

[*Continued on page 92*]

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[1] *Hyndman v. Pennsylvania Railroad Co.* (1959); Volume 396 of the Pennsylvania Reports, page 190.

[2] See *Bartleson v. Glen Alden Coal Co.* (1959); Volume 361 of the Pennsylvania Reports, page 519.

[3] *Restatement, Torts* (1934), section 339.

The equipment at the operating position is from l. to r.; field strength meter and control for the rotary inductor in the antenna feed line; Regency converter, Elmac AF-68 transmitter with the Coax Phase detector meter beneath it.

Mobile With the Coax Phase Detector

BY E. J. WANAMAKER*, WA2EJJ

Twelve thousand mobile miles with the coax phase detector has proven its worth. Here is a brief report on the actual use, in a mobile installation, of the coax phase detector which appeared in the January 1962 issue of CQ.[1]

BEING a brain surgeon, electronic brain that is, (I repair IBM Computers), I often get rush calls and have long distances to travel. Wanting to ham-it-up on 40 and 75 meters, and really make contacts while on the road, I must have a means to QSY all over the bands, quickly and safely. The means used to do this hamming are; an Elmac AF-68, a Master-Mobile Master Matcher (a remote controlled series inductance), a center loaded whip, and to do it all easily a "Coax Phase Detector."

As any mobileer knows, to QSY more than a few kc on 40 and especially 75, requires drastic retuning and reloading of the transmitter. To do this in motion is pure folly; however, with the Coax Phase Detector it becomes a breeze.

The indicator on my Phase Detector is a 100-0-100 microammeter, permanently shunted by a 1.8K resistor to calm it down. The actual operation is as follows: first, load the transmitter; this should be done with the car at a full stop; run the series inductor (in the antenna feed line) back and forth until the Phase Detector Meter is centered. This indicates a purely resistive load. At this point, the transmitter will have maximum r.f. output, for rated plate current.

We are now ready to go "mobile in motion." From now on, to QSY, just zero on the desired frequency and apply B plus to the final. Note which direction Phase Detector needle swings. This will tell you whether to add or subtract inductance in the antenna feed line. Run the inductor in correct direction until the Phase Meter needle centers. When it centers, your transmitter r.f. output will be maximum. The time it takes to QSY is 2 or 3 seconds on 40 meters and up to 8 or 9 seconds on 75. (On 75 much more coil is needed.) This all can be done quickly and safely.

The foregoing to me, is the best use of the Coax Phase Detector. However, it was built into the car in such a way that it could be easily removed for other jobs. It has been used to prune loading coils for other mobilers, and to resonate coils for backyard verticals, all very successfully. One can find the resonant frequency of a fixed or mobile antenna of any length in just one minute with the Phase Detector. Just swish through the v.f.o. range and watch where indicator needle centers and thats it. ■

The trunk contains the Master Matcher rotary inductor and Elmac power supply. The coax phase detector is in the foreground.

*147 Oxford Road, New Hartford, N.Y.

[1]Geiser, David T., "Building and Using The Coax Phase Detector," *CQ*, January 1962, p. 24.
Geiser, David T., "How The Coax Phase Detector Works," *CQ*, August 1962, p. 62.

Converting Commercial V.H.F. Gear To Amateur Use

BY ROBERT B. KUEHN*, WØHFK

A variety of articles will be encountered covering the conversion of specific pieces of commercial equipment for amateur use. Somehow they are never for the rig you have. WØHKF has boiled the procedures and ideas down to several basic steps and outlines the general procedures applicable to all commercial gear.

AIRLINES have changed from 14 to 28 volt systems. Taxicab, power and telephone companies have replaced fleets of 6 volt automobiles with the latest 12 volt models. The Federal Communications Commission handed down a dictum that all commercial f.m. communication equipment be modified or replaced to conform with narrower bandwidth requirements. As a result of these and other factors, quantities of very fine fixed frequency v.h.f. mobile communication equipment have reached the amateur market at quite moderate cost.

Nearly all of this gear can be easily modified for home or mobile use on the 10, 6 or 2 meter amateur bands. Many civil defense organizations and amateur radio clubs have already established spot frequency nets using this type of equipment. Contrary to past practice and theory, cross-mode communication (f.m. to a.m. and vice-versa) works out quite satisfactorily, especially on 2 meters.

The units come in a wide variety of packages, but all are quite similar electrically and fall into one of the following categories:

Frequency Range	Modulation	Input	Original Use
30-40 mc	f.m.	6-12 v.d.c.	Telephone, police, public utilities
120-130 mc	a.m.	14-28 v.d.c.	Aircraft companies
152-158 mc	f.m.	6-12 v.d.c.	Telephone, police, taxicabs

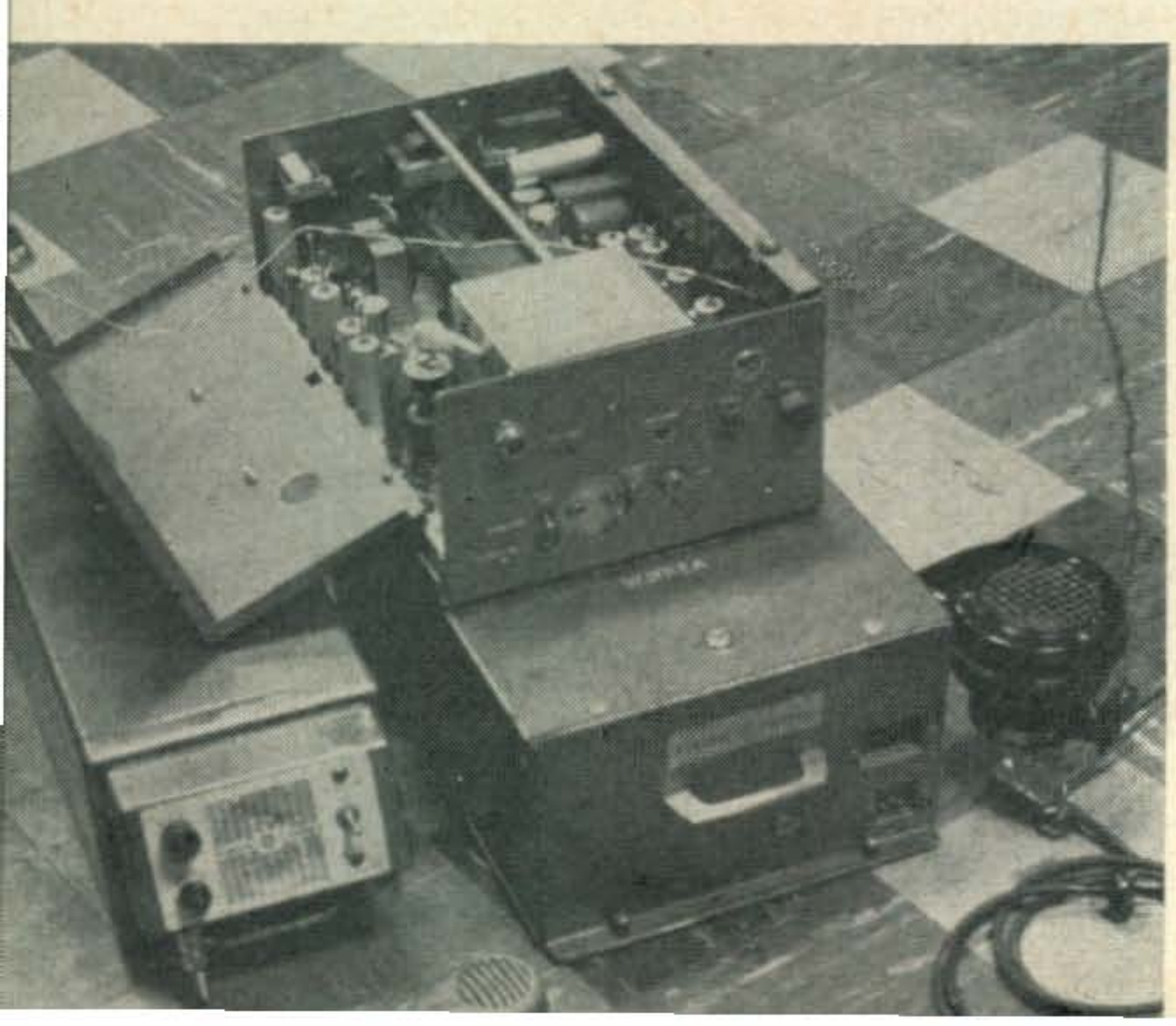
The slug tuned r.f. circuits permit tuning the 30-40 mc gear to either 6 or 10 meters, while sets in the last two groups will cover the 2 meter band, usually with little or no modification of the r.f. circuits. Occasionally, in the aircraft equipment, coil turns may have to be spread apart a little or a turn or two removed to reach the high frequency end of the 144 mc band.

Necessary Steps

In converting to amateur use, all or some of the following steps may be necessary:

1. Satisfying power input requirements: replacing dynamotors or vibrapacks, installing a.c. power and relay supplies, rewiring filaments, rewinding or replacing relay coils.
2. Reworking control cables and circuits.
3. Determining proper crystal frequencies for desired operation.
4. Installing a.m. or f.m. modulator as desired.
5. Retuning r.f. circuits to desired frequencies.
6. Complete tune up.

*641 S. Saratoga Street, St. Paul 16, Minnesota.



Some typical pieces of available equipment. At the left is an a.c. operated one watt transceiver originally used in railroad yards and other small areas. With a good antenna the range is 15 to 20 miles. On top is the 6 meter RCA mobile rig converted to a.c. operation. Below it is the G.E. 2 meter rig with the added blower projecting from the right side.

Conversion can be accomplished with the aid of ordinary tools plus an a.m. signal generator, grid dipper and volt-ohmmeter. A circuit diagram of the equipment at hand will simplify things considerably. A letter to the manufacturer may do the trick, or if you live in a larger city, pay a visit to the repair shop of the telephone, light or power company or to the airport. Invariably at least one or two hams will be employed there who will be glad to let you look over their data and give you the benefit of their experience.

Much can be learned about the equipment by just examining it closely. Look also for broken or damaged parts, attempted repairs and evidence of parts having been removed. If a tube checker is available, test the tubes. Many servicemen make a habit of checking 6.3 volt tubes with the filament switch in the 5 volt position and 12 volt tubes at 10 volts. In mobile service this lower voltage is what the tubes will most likely be operating at and, in addition, tubes which are about to go flat will drop off much faster at reduced filament voltage than will good tubes.

In determining the order of frequency multiplication of each stage of the transmitter, a grid dipper is almost indispensable. In most cases the oscillator is an overtone type of circuit delivering power output at 3 times the crystal frequency. The driver stage nearly always runs straight through at the same frequency as the final. The usual orders of multiplication are as follows:

144 mc out—6 mc crystals × 3 × 2 × 2 × 2
8 mc crystals × 3 × 3 × 2
30-40 mc out—2.5 mc crystals × 3 × 3 × 2

Converting to A.C. Home Station Use

None of the commercial transceivers were engineered for economy of battery power by amateur standards, and many may want to convert their units for a.c. use at the home station. Such a conversion is best begun on the transmitter. Certain leads should first be identified and marked.

The microphone lead is nearly always the only shielded lead in the rig, and it can be further identified by tracing it to its termination at the primary of the microphone transformer. Carbon mikes are universally used, the button current being usually obtained from the cathode resistor of an r.f. multiplier tube. In the a.c. conversion it could just as well be taken from the d.c. relay supply. Typical microphone connections are shown in fig. 1.

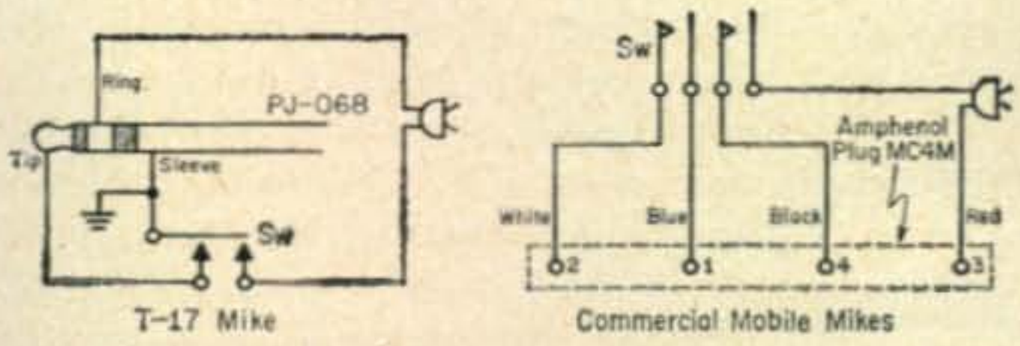


Fig. 1—Standard microphone connections encountered in commercial mobile gear.

Push to talk is accomplished by parallel connected relays, one side going to the supply voltage and the other side through the mike switch to ground. This relay control lead can be found by tracing the leads from the lugs on the relay coils, and confirmed by applying d.c. from a battery or a.c. of the proper voltage, after first removing the tubes and disconnecting the hot dynamotor and/or vibrapack primary leads. If a.c. is used, the relays will chatter, of course, but this procedure will still indicate whether the right lead has been found.

Actuating the d.c. relays in the a.c. conversion presents a small problem which is best solved by a simple halfwave rectifier arrangement using a selenium rectifier and a separate, low current transformer of the proper voltage. The power transformer filament windings can be used for the same purpose if desired since only an ampere or so of current is needed. This is shown in fig. 2, the diagram for the a.c. power supply.

If you happen to have a couple of ordinary seleniums in the junk box, the cost of the high-current, low-voltage unit can be saved by taking one or two of the former apart and restacking 6 or 8 plates, connecting them in parallel. Relays rated at 6 volts will operate reliably at 4 v.d.c. and those rated at 12 volts will close at 7 or 8 v.d.c. If a.c. relays are available, they can be substituted, of course, for the d.c. units and powered directly from the filament supply or from the a.c. line.[1]

The positive high voltage lead will simply be the ungrounded dynamotor secondary lead. In the case of a vibrapack, B plus will be the cathode of the rectifier tube socket, or in the case of a synchronous (self-rectifying) vibrator, the lead running from the vibrator directly to the filter capacitor. Many of the units used standard color coded wiring which is a great aid in tracing and identifying leads. Wires carrying positive high voltage are either red or white with red tracer. Filaments are brown or white with brown tracer.

Removing the d.c. power equipment will invariably provide space for the a.c. supply. TV replacement transformers work out very well. Such transformers normally include a high voltage winding (700 volts c.t.), a high and a low current 6.3 volt filament winding, and 5 volts for the rectifier tube (5U4, 5R4GY, 83, etc.). If desired, silicon rectifiers can be used to conserve space and cut down power consumption and heat. A filter choke is not usually necessary to keep hum level below acceptable limits for f.m. modulation. The supply shown in fig. 2 will give 300 to 325 v.d.c. at sufficient current for the entire transmitter at a power output level which will give a very respectable signal on the v.h.f. bands. If desired, a separate 250 volt supply may be provided for the exciter

[1] Blett, B. E., "Using Those Surplus Relays," *QST*, May 1956, page 28.

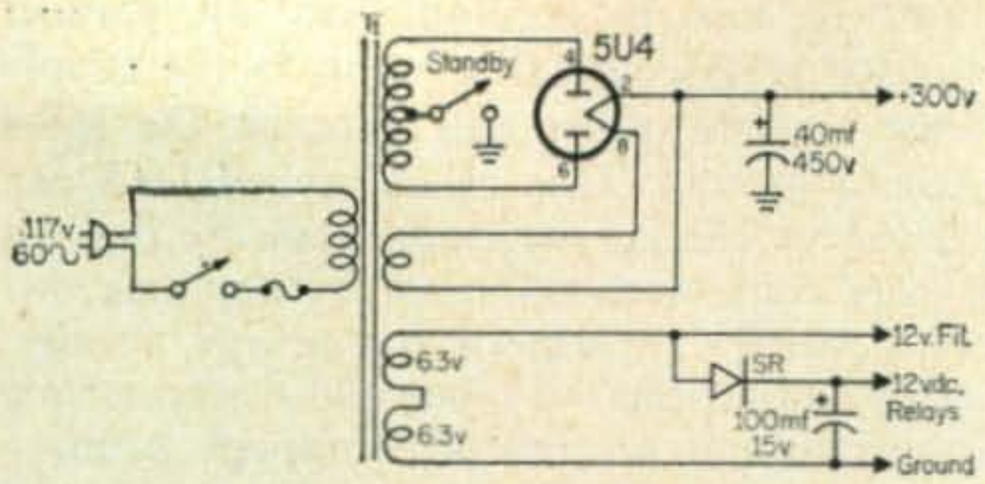


Fig. 2—Simple power supply that may be used for fixed operation of mobile commercial equipment. The low voltage rectifier must be capable of handling the relay coil current of the converted unit. The power transformer may be of the TV replacement type.

stages only. Standby is accomplished by breaking the center tap of the high voltage winding with a switch or relay contacts.

The numerous tubes and components in such a relatively small enclosure result in considerable heating, which may make installation of a small ventilating fan advisable. For the home station, an alternative would be to mount the power supply on a separate chassis, connected by a plug and cable arrangement.

As a rule, little difficulty should be encountered in tuning up. All commercial v.h.f. transceivers have provisions for metering the drive to each stage of the transmitter. Set the volt-ohmmeter on the 10 or 50 v.d.c. scale. It may be well to temporarily disconnect the final screen voltage while tuning up earlier stages. If difficulty develops at any point, first check the d.c. screen and plate voltages of the stage involved, then use the grid dipper to be sure the tuned circuit is resonant at the proper frequency. A 25 or 50 watt 110 volt household lamp works well as a relative output indicator, modified as shown in fig. 3, using a Motorola plug and a piece of number 14 wire.

V.h.f. transceivers used in aircraft service invariably are equipped with a.m. modulation.

Figure 4 shows an effective p.m. modulator which takes up little chassis space. The original a.m. modulator can be removed or left in as desired.

If more power output is desired, as for instance, in the case of a base station for a civil defense net, as high as 600 v.d.c. can be run on final stages in f.m. service using 829B or 807

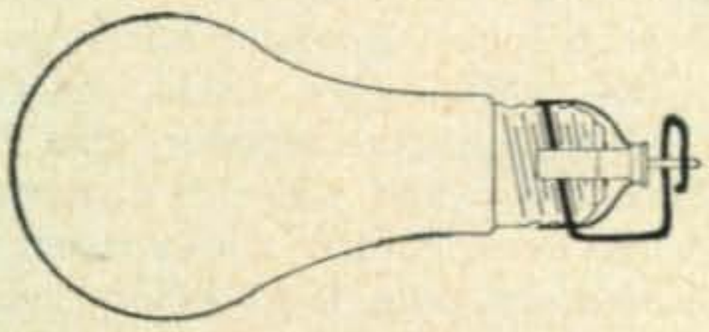


Fig. 3—A handy "quick disconnect" dummy load made from a 25 to 50 watt bulb. Four sides of Motorola Plug are spread apart and soldered to the brass base of the light bulb. Base contact of the bulb connects to plug pin. A piece of 14 bare copper wire bent into the shape shown makes contact with outside of chassis coax connector and holds the dummy load in place when in use.

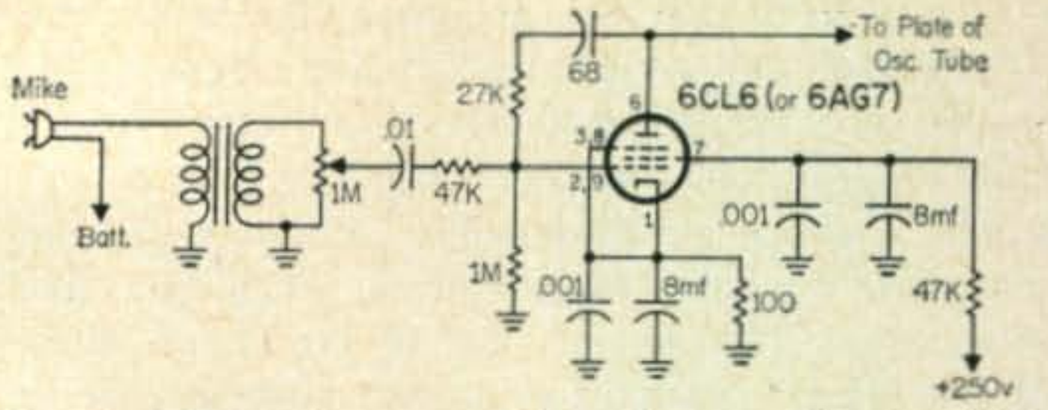


Fig. 4—Circuit of a one tube phase modulator that may be connected to the oscillator of a.m. rigs.

type tubes and up to 400 or 450 v.d.c. on 2E26, 2E24 or similar types.

In the case of a group preparing a number of sets for use on a net, it is well worth the effort to build up a set of fixed tuned wavemeters for quick and positive identification of the proper harmonics. A heterodyne wavemeter for zero beating to the net frequency is shown in fig. 5.

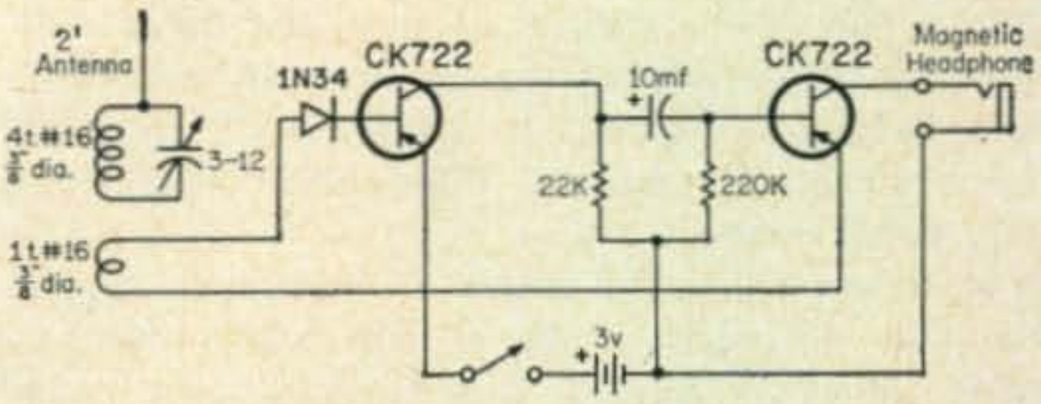


Fig. 5—A heterodyne detector that is useful for zero beating v.h.f. transceivers to a net frequency. The net control station may be considered as the standard and with both transmitters operating, a strong audio beat note will be heard in the output. Coil values shown are for 144-148 mc.

Receiver Conversion

To the faint at heart, digging into a strange receiver, with or without a diagram, may seem an awesome undertaking. Nothing could be farther from the truth. All radio receivers are basically very similar. If an orderly procedure designed to satisfy basic requirements common to all receivers is followed, you are bound to get results.

The following order of steps is recommended:

1. As in the case of the transmitter, check visually for signs of damage or parts robbery, etc. and test the tubes. If not familiar with the equipment, draw up a block diagram showing the function of each stage as nearly as can be determined.

2. Light the tubes. Most of the sets now available use 6 volt tubes. In the case of 12, 18 or 24 volt models, a series or combination series-parallel arrangement is used. A few such circuits can easily be modified for 6 volt operation, but most cannot. In the latter case, simply ground one side of each filament at the socket and reconnect the remaining terminals in parallel. For 12 volt operation, two similar types may be put in series or 12 volt equivalents installed. Although not always necessary, it is a wise precaution to bypass the hot side of crystal oscillator tube filaments as well as the following multipliers, if any, to ground with .001 disc ceramics.

Interior view of a v.h.f. aircraft receiver. The circular aluminum drum holds crystals for 72 channels. Removal of the frequency changing device leaves plenty of room for the power supply. The r.f., mixer and crystal stages are below the front deck.

3. Connect a speaker to the voice coil leads. Nine times out of ten the audio output tube will be a 6AQ5 or a 6AK6 with the plate pin going directly to the audio output transformer, which is usually adjacent to the tube. Connect the speaker voice coil to the transformer secondary and ground one side if not already grounded. Some aircraft equipment is provided with 500 ohm audio output. If in doubt, replace the output transformer with a standard plate to voice coil unit.

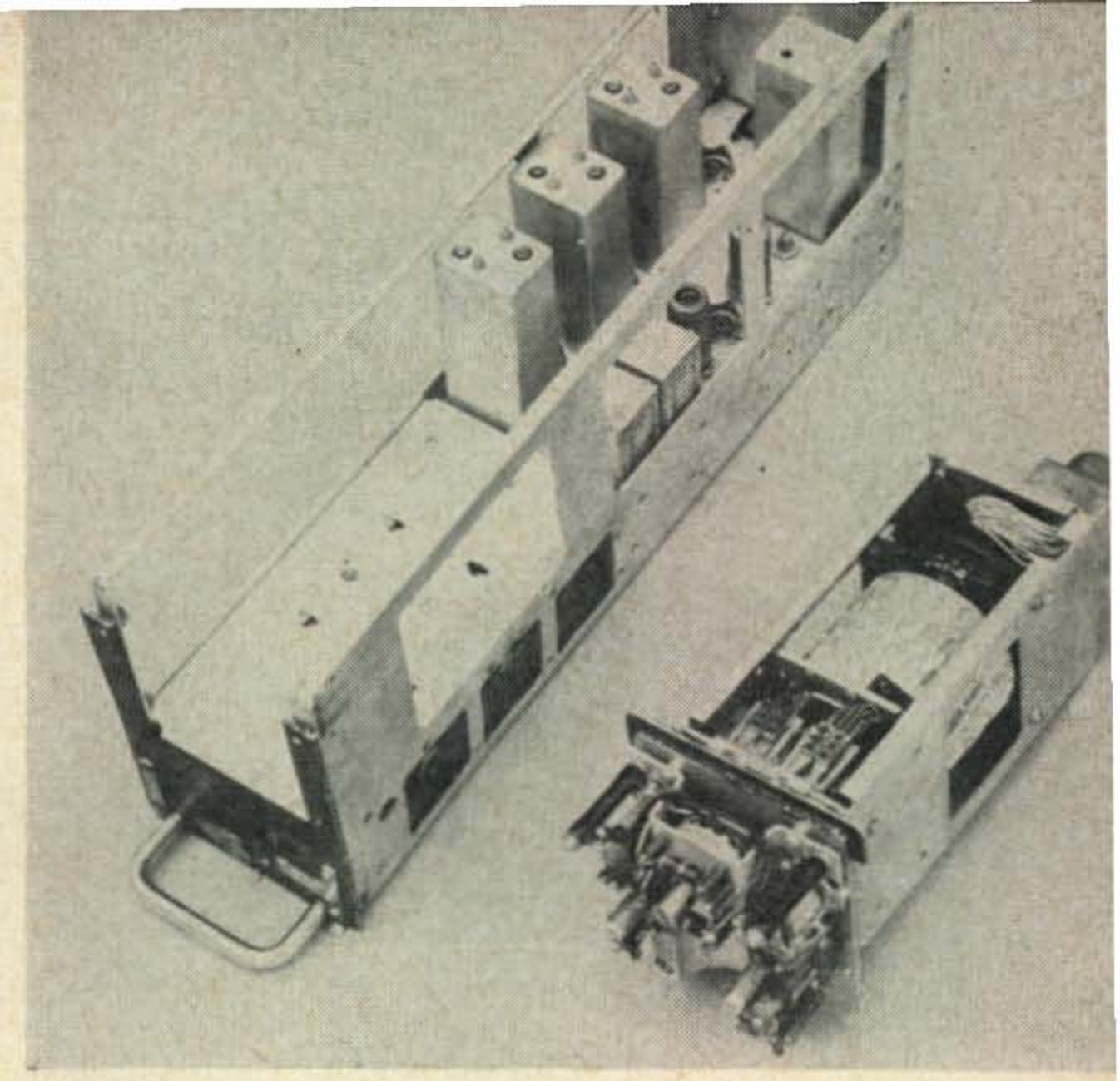
4. Locate squelch, volume and/or i.f. gain controls. The volume and sensitivity of mobile communication sets are controlled in a number of ways. Sometimes one or both controls are located on the receiver chassis, in which case they are usually identified by decals. If the converted set is to be operated from a remote control head simply use pots of the same value and connect them in parallel with those on the chassis. For panel control, perhaps the best solution is to extend the controls by means of flexible shaft extension and panel bushings.

In some units no audio volume control is included, the volume being regulated at the control head by means of a switch connecting 3 or 4 low value (1 or 2 ohm) resistors across the speaker voice coil. For continuous control a 5 or 10 ohm rheostat would work as well.

Use shielded leads when extending the audio volume control. The i.f. sensitivity and squelch controls carry only d.c. and can be extended any distance with ordinary hookup wire. Since one side of each control is virtually always grounded only one lead need be provided for each.

5. Determine B plus connection. If the receiver contains a filter capacitor (as it nearly always will), the high voltage B plus, 150 to 250 v.d.c., can be connected directly to this terminal. Other points where it can be connected as a starter in order to activate the receiver are the screen of the audio output tube, the B plus end of the output transformer or to the B plus terminal of one of the i.f. transformers. From any one of these points the distribution system will carry normal supply voltages to all points in the receiver.

Interior view of G.E. mobile transceiver converted for a.c. home station use. The power transformer left of the ventilated final enclosure occupies space left after removal of the dynamotor. The smaller power transformer on the right is in the space formerly occupied by a vibrapack which powered the receiver on stand-by position and exciter stages on transmit. On the extreme left, mounted horizontally, is a small filament transformer to provide relay current.



I.F. and Crystal Frequencies

Crystal control of the oscillator frequencies is used and the closer the tolerance, the better the performance. Small trimmer capacitors are sometimes provided in parallel with the crystals in both the receivers and the transmitters for frequency adjustment. A very small change (especially in the transmit crystal) makes a comparatively large change in the operating frequency. Although a few of these v.h.f. communication sets use single conversion in the receiver, double conversion is by far the most common. In most cases the first i.f. is centered around 6 or 7 mc with the second at 455 kc,

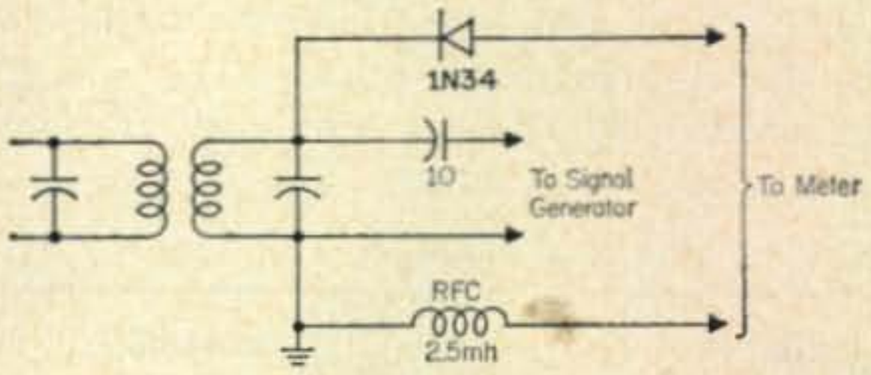
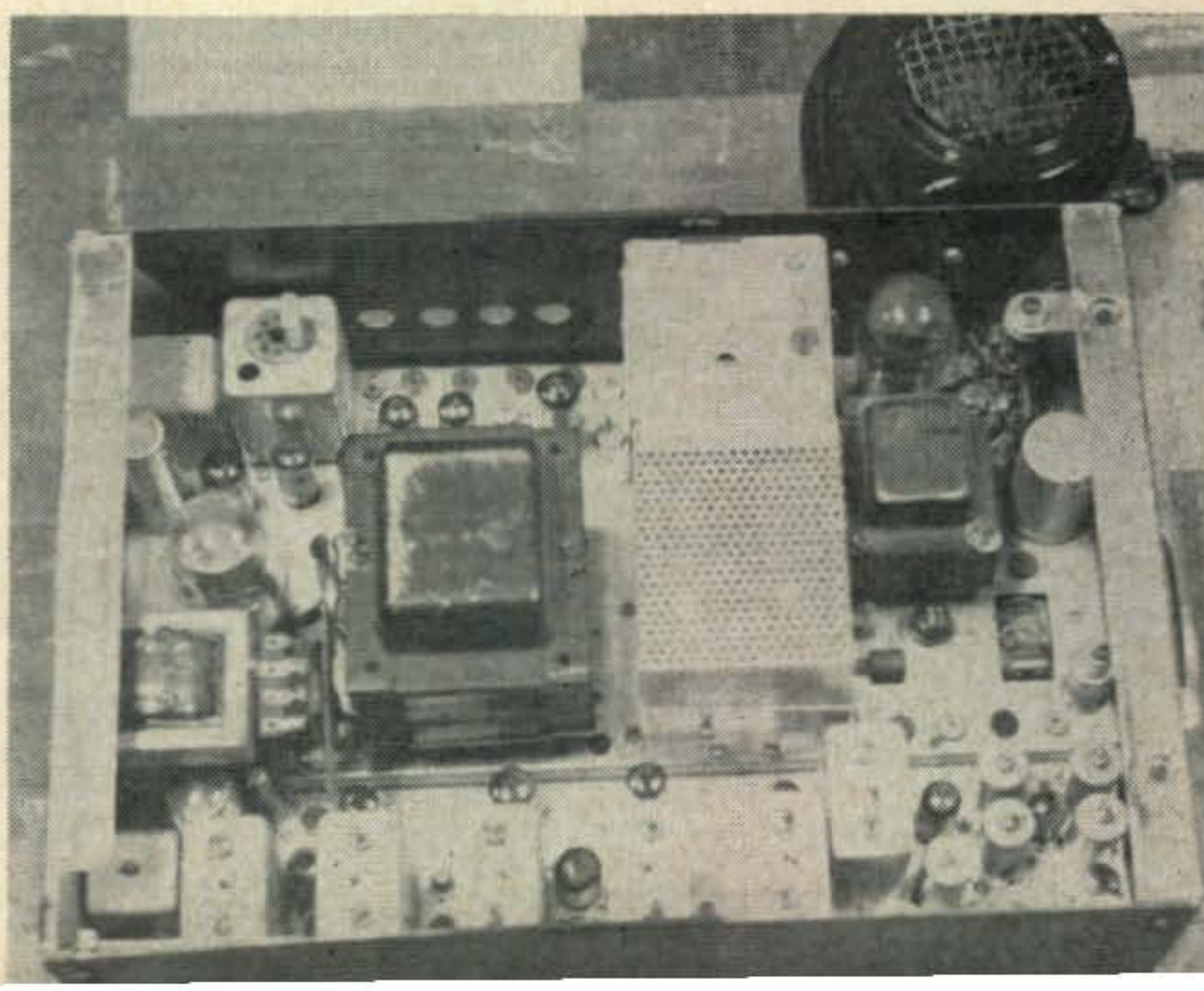
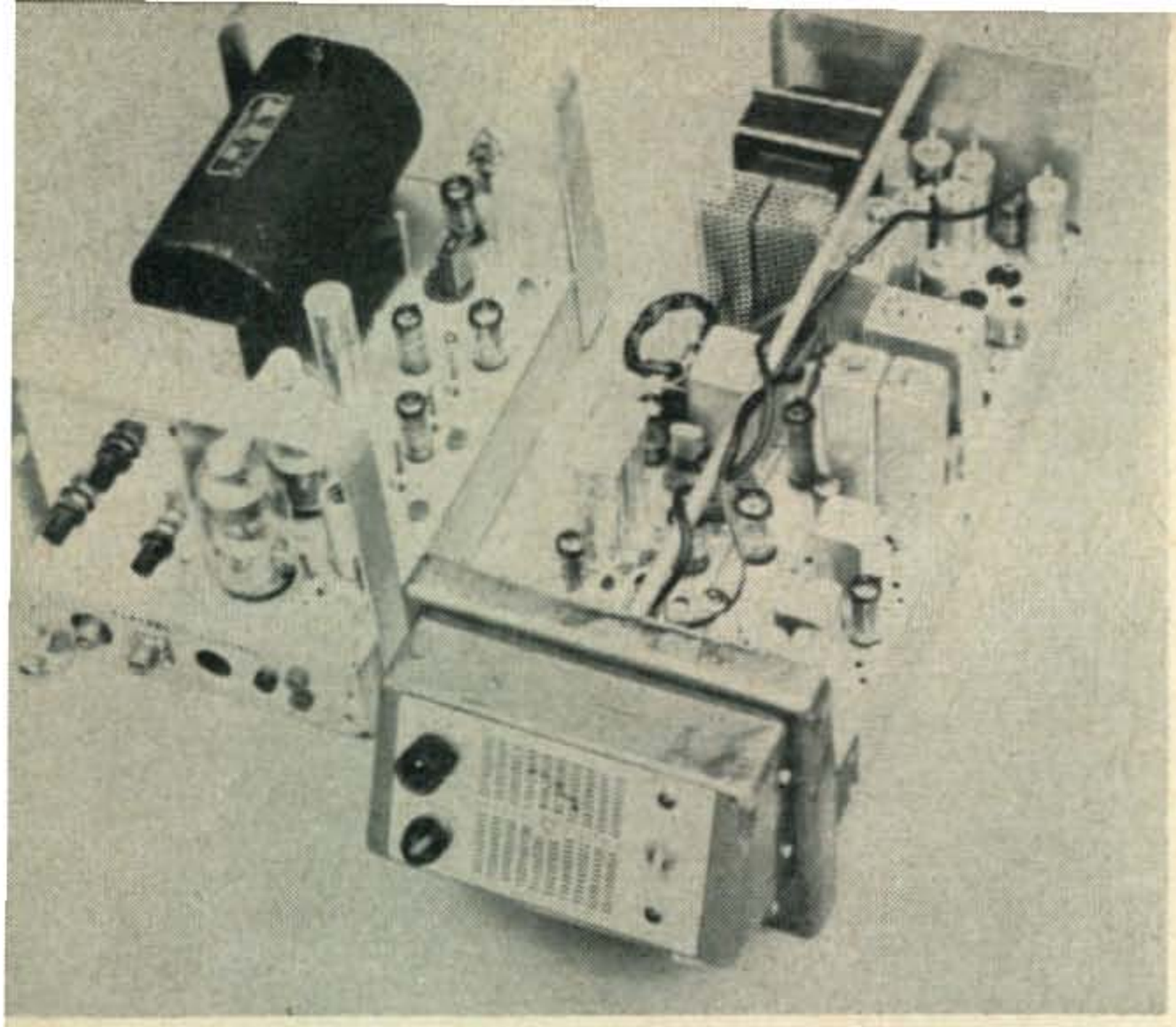


Fig. 6—Circuit used to determine the frequency of an i.f. transformer. The meter may be 0-1 milliamps, a microammeter or a v.t.v.m. on the low d.c. volts scale. As the signal generator passes through the resonant frequency of the transformer the meter will show a sharp rise.





At the left is the G.E. 50 watt, 6 meter, f.m. mobile transmitter that needs no modification for amateur use. The companion receiver, the same size, is not shown. At the right is an interior view of a one watt transceiver.

with a few exceptions such as the second being at 1000 kc. As a rule, the i.f. frequencies can be determined from such clues as the crystal frequencies supplied with the equipment, and if you're lucky, the frequency may even be marked on the i.f. cans. In any case, the nominal resonant frequency of any i.f. transformer can be quickly determined with the aid of the circuit shown in fig. 6.[2]

The h.f. overtone crystals must be held within very close tolerances and it is almost essential that they be ordered for the exact operating frequency desired. The second i.f. crystals, however, are simple fundamental mode oscillators and any good crystal will serve, or one can be ground to the frequency. Sometimes an h.f. overtone crystal which is close, but not close enough, can be used by varying the second i.f. crystal and tuned circuits. Table I indicates the approximate limits over which i.f. transformers of various nominal frequencies can be expected to tune.

Table I

Nominal Freq.	Variation
455 kc	50 kc
1 mc	250 kc
6 mc	1 mc

Alignment

Final lineup follows standard procedures, using the a.m. signal generator at the i.f. frequencies, either listening for maximum output or metering the limiter grid current at the jack provided for that purpose. If a transmitter at the desired frequency is available on the bench, it can be used to "force" a signal through the receiver. To avoid overloading, power output should be reduced either by reducing input to the transmitter or by removing successive tubes from it as receiver resonance is approached. Final touch-up should be done while listening to a moderately weak signal with an antenna connected to the receiver.

[2] Burgess, H., "Test Equipment in the Ham Shack," *CQ*, June, 1954, page 31.

With the meter in the discriminator jack, the discriminator transformer (single adjustments at top and bottom of can) should be set for zero reading with both signal on and signal off conditions. Manufacturers' instructions usually call for the i.f. sensitivity control to be left approximately 2/3 or full on. At this position, the squelch control should become operative at approximately mid-range.

Adapting for Amateur Mobile Operation

The v.h.f. transmitter-receiver units originally designed for mobile use required very little change, aside from retuning, for amateur operation. In commercial use, heavy-duty generators such as Leece-Nevill are used to insure full voltage at the set terminals. For use in automobiles with standard generators, every precaution should be taken to avoid excess voltage drop, especially with 6 volt systems.

A solid ground of high current carrying capacity must be used from the transceiver chassis to the car body. Grounding straps suitable for the purpose are carried by most filling stations and auto supply houses.

It is a good idea to have your voltage regulator checked and, if necessary, reset to maintain full battery voltage under load. With a suitable ammeter and voltmeter, you can do the job yourself with little trouble.[3]

Standard practice on most models is to provide one heavy lead which runs from the battery directly to the set and through the dynamotor start relay to the dynamotor. Another smaller lead connects from the battery to the control head, where it feeds through a switch

[*Continued on page 91*]

[3] Anderson, R. V., "Mobile Corner," *CQ*, October 1951, page 44.

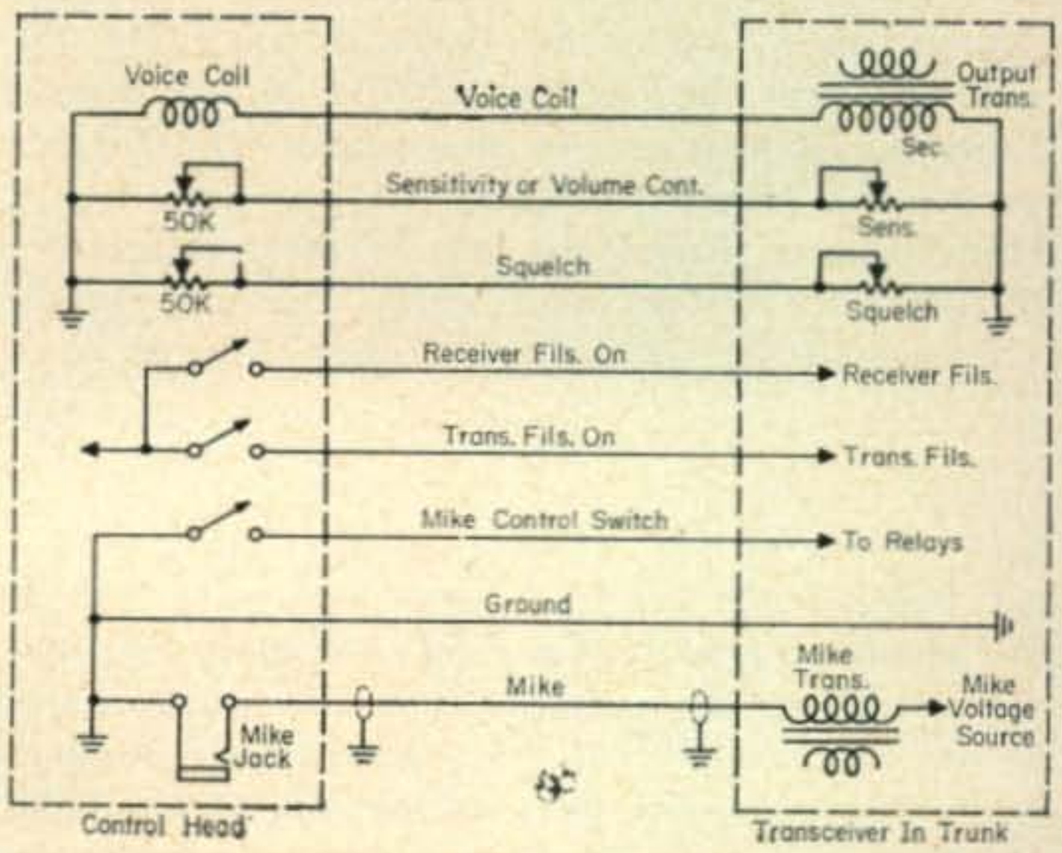


Fig. 7—Typical control head and cable wiring used with the commercial rigs.

A Low-Cost 12 Volt Charger

BY D. E. HASELWOOD*, K9IBZ

This simple charger permits the use of discarded 12 volt batteries for bench operation of mobile rigs.

HERE is a cheap-an-quick way to make a 12 volt d.c. power supply that will provide enough current to bench test a mobile rig. A used 12 volt car battery and a very simple charger does the job well and inexpensively.

Trade-Ins

Batteries traded-in on new ones can, with a little talking, be bought from service stations for about one dollar. Many batteries are traded in before they are completely "dead." If you are on good terms with a station attendant, and explain the use for the battery, he can usually steer you to one with a little life left in it. When picking one out be sure that the acid hasn't been drained. Tap water can be used to bring the level up. A little soap and water on the casing will help greatly in the battle with the XYL at the front door.

Circuit

A half-wave rectifier circuit using a filament transformer makers a simple charger. A number of variations may be used, however I will describe the type of circuit shown in fig. 1. Some consideration must be given to the diode ratings. The peak inverse voltage (p.i.v.) must be greater than 30 volts (50 volts or more is common) for a 12.6 volt transformer. The resistor, R_1, plus all other circuit resistance (transformer, leads, and battery) serve to limit the current in the diode to a safe value.

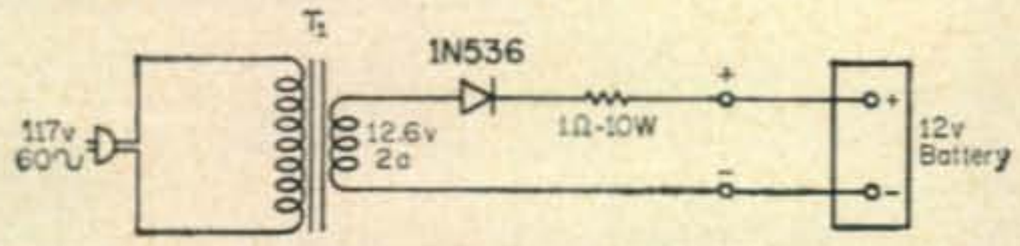


Fig. 1—Circuit of a half ampere charger permitting a 12 volt battery to be used for bench testing. The transformer, T_1, is a Stancor P-8130 or equivalent.

Most silicon power rectifiers may be run up to ¾ amperes if they are kept at room temperature. Some bargain flyers list high current types at low cost.

A junk-box filament transformer makes a good charger transformer, but one cannot count on getting as much d.c. average current as the a.c. current rating. This is because the current to the battery flows in short, high pulses, when the transformer voltage exceeds the battery voltage. This boils down to the transformer heating up at a lower d.c. charge current than a.c. current to a filament load. The transformer in fig. 1 ran quite warm at ½ amp average current.

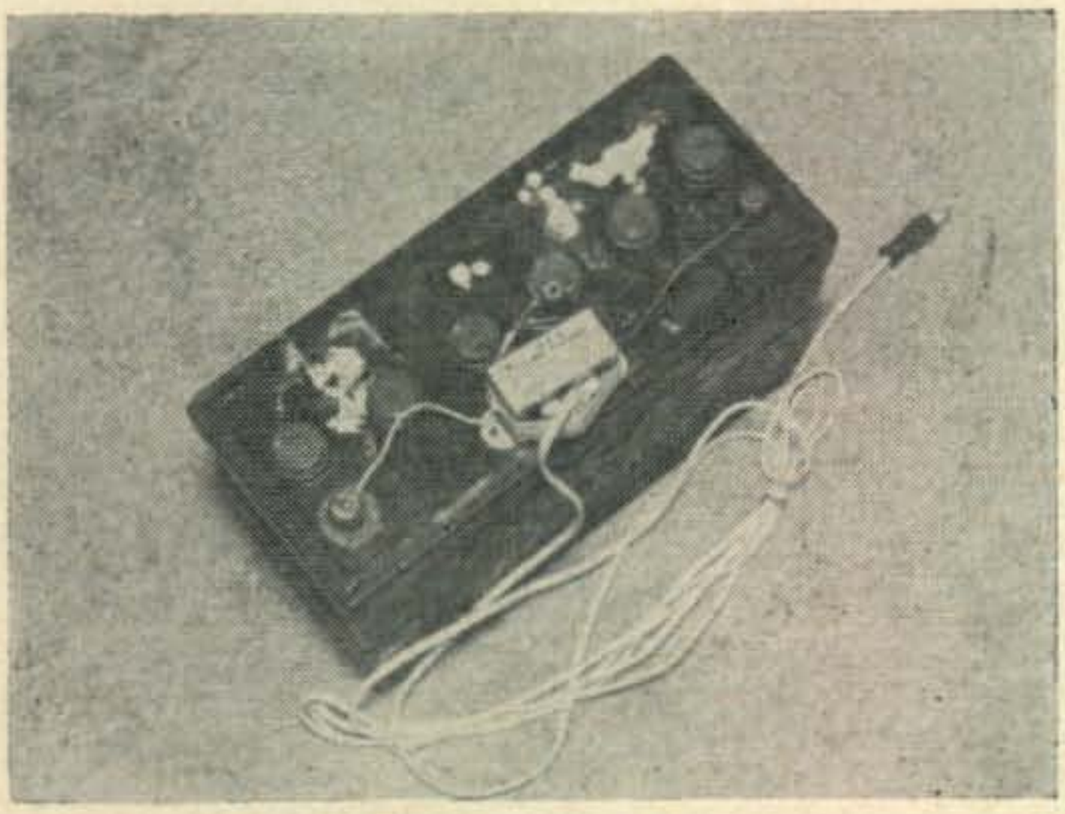
Battery Charger

It takes about one week to fully charge a dead battery with the charger shown. Since the charger does not take much power it may be left on continuously without costing much. It does not have to be disconnected from the battery when the power is off, since the diode blocks the discharge path. Battery charge condition is best checked with a hydrometer.[1]

Caution must be used with a storage battery. If ventilation is poor, hydrogen gas may form and explode from a small spark. The acid also presents a hazard. It is very corrosive to metal, and damaging to wood and clothing. A bottle of bicarbonate of soda and water may be kept close by to neutralize any spilled acid.

The 12 volt supply has sat under my bench for several months where it has been used to power the mobile rig while adjustments were being made. Though the battery won't last forever, it allows adjustments to be made indoors and costs about 10 to 20 times less than a battery eliminator. Two batteries, of course, makes some of the 24 volt surplus gear look better, too. It has proven to be a good and easy way to get high current d.c. voltage. ■

[1]Orr, W. I., *CQ New Mobile Handbook*, Cowan, 2nd Edition, p. 12.



A "dead" battery with the charger mounted on top. The white spots are baking soda.

*311 Ridge Avenue, Evanston, Illinois.

Construction and Calibration of a V.F.O.

BY JOSEPH A. SMITH*, W9ZDN

This stable v.f.o. exciter covers 80 and 40 meters and can, with slight modification, cover 160 also. Part of the package includes a super-regulated power supply and output is about 5 watts.

THE usefulness and dependability of a v.f.o. can be greatly enhanced by an accurate calibration to within one kc. To do this, naturally, the first step is to construct a truly stable v.f.o. that possesses both short and long run frequency stability; that is stability over a period of many days, not just one or two days. This article presents an example of a time proven v.f.o. of this extra-stable type. Its drift over a one week period usually does not exceed 0.04% or roughly that of the usual run of a non-precision crystal. In other words, although this v.f.o. is placed on STANDBY during reception periods of a QSO, it still doesn't drift more than 400 to 500 cycles during a week of operation. Naturally, a normal warm up period is used.

How, you may ask, is this stability obtained? Well, in the following manner:

1—The Clapp oscillator circuit is used.

2—A combined unregulated and super-regulated power supply is built-in to furnish 350 volts unregulated to the plates of the two buffer stages, and 150 volts (plus or minus one volt) for the oscillator and both buffer stage screen grids.

3—The v.f.o. operates in the 160 meter band, and output is taken from the plate tuned second buffer-doubler on 80 meters.

4—N.p.o. capacitors are used across the oscillator's silver mica grid capacitors.

5—All oscillator parts are firmly mounted.

*719 Jordan Street, Jacksonville, Ill.

Circuit Description

The circuit of the v.f.o. is shown in fig. 1. Actually it might more accurately be called an exciter for it has considerable output. A 6AG7 is used in a series tuned Clapp circuit in the 160 meter band. A 6F6 untuned buffer follows the oscillator to provide maximum isolation. This stage is followed by a doubler to bring the output frequency into the 75-80 meter band. This circuit will work well with an 80 meter coil in the oscillator tank circuit and double into the 40 meter band with a 40 meter tank coil in the output.

The power supply is super-regulated for the plate of the oscillator and all the screen grids. The plates of the 6F6 buffer and 6L6 doubler operate directly from the filtered 350 volt line.

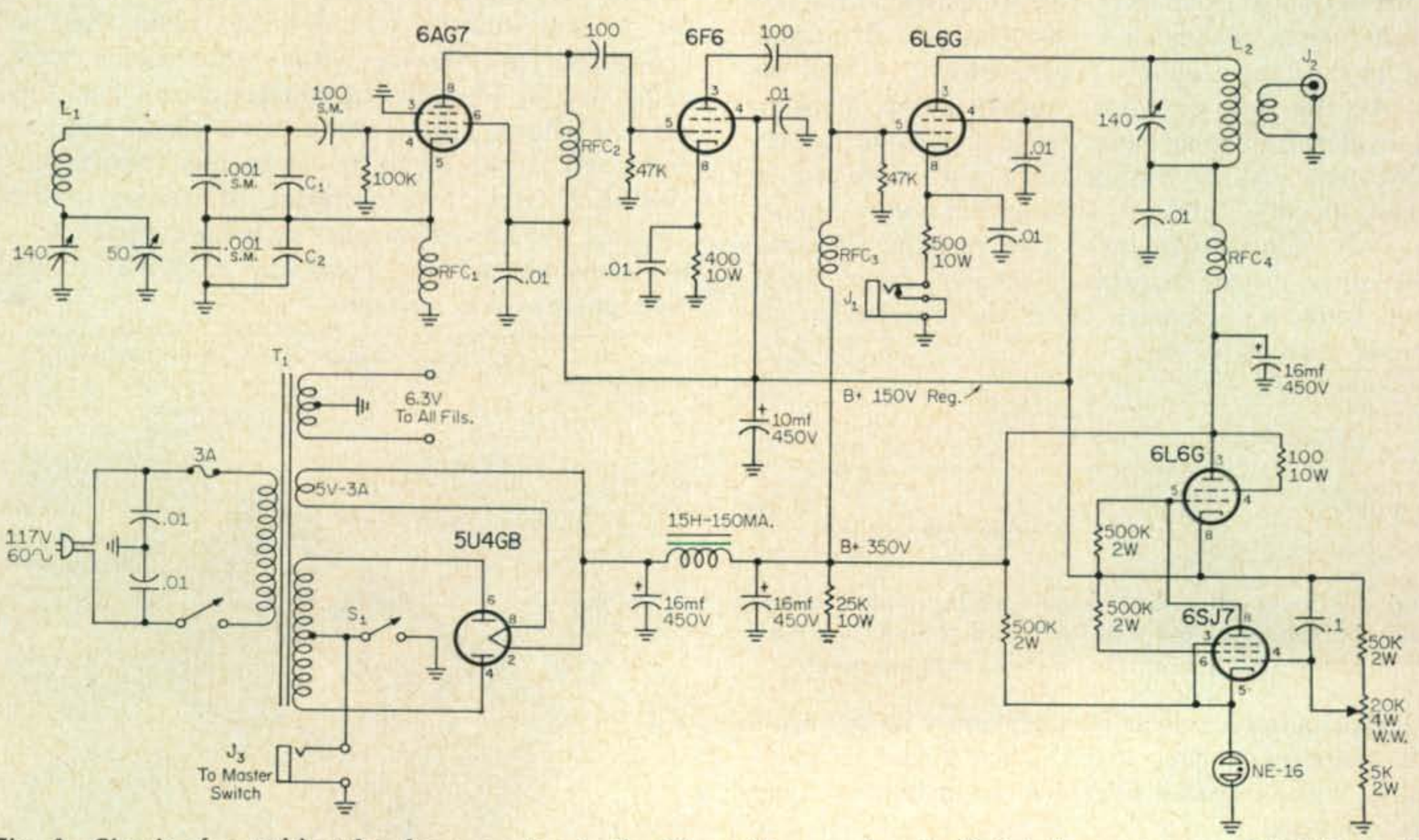


Fig. 1—Circuit of a stable v.f.o. for operation in the 80 or 40 meter bands. Switch S_1 can be paralleled through J_3 for break-in operation. All capacitors are in mmf unless otherwise noted. All resistors are ½ watt unless otherwise indicated.

C_1—39 mmf Centralab TCN (N750).
C_2—20 mmf Centralab TCN (N750).
L_1—B&W JEL 160 meter coil.
L_2—B&W BEL 80 meter 75w. coil.

RFC_1, RFC_2, RFC_3, RFC_4—2.5 mh, 100 ma.

T_1—375-0-375 at 200 ma, approx., 6.3 v. at 4 amps, 5v. at 3 amps.

Construction

The construction techniques used to build this or any v.f.o. are critical. Mechanical construction *must* be sound. For example a heavy steel or aluminum panel should be used and it should be thoroughly braced at the ends. Both variables in the oscillator circuit *must* be secured firmly so that they will cause no instability. There must be adequate ventilation and any shielding must be rigid.

The BANDSET variable is a 140 mmf/APC type located under the chassis near the oscillator coil. The BANDSPREAD capacitor is a 50 mmf double bearing type from which a number of rotor plates will be removed in the calibrating procedure to follow.

Calibration

The dial used is a National Type N Velvet Vernier and it is calibrated from zero to 109. A scale for subdividing a single scale division into tenths is also affixed above the main dial. The actual frequency calibration is done on a sheet of graph paper 22" by 17". It contains 16 large squares across and 21 large squares down. Each one inch square is further subdivided into ⅛" units. For this calibration each ⅛" division is equal to 2 kc. One kc therefore is a half of the ⅛" square. Two scales were plotted in our calibration. First the 80 meter band and then the 40 meter band.

The actual calibration procedure requires the use of some standards. An accurately calibrated receiver such as the Collins 75A line is desirable as well as a stable crystal oscillator.

With the BANDSPREAD variable at about half mesh adjust the BANDSET capacitor to zero-beat against a 3.75 mc crystal. The accuracy of this crystal can be checked against WWV on 15 mc, the fourth harmonic of 3.75 mc.

Next set the BANDSPREAD variable to minimum capacity and adjust the turns on the v.f.o. coil so that you are tuned just inside the upper limit of the 80 meter band.

Now, rotate the BANDSPREAD capacitor so that the plates are fully meshed. This should bring you close, *but inside*, the lower edge of the band. If you move outside the band, remove one rotor plate at a time until the frequency drops back into the band.

With crystals in the 80 and 40 meter band check as many points as possible making a listing of dial readings *versus* frequency. In-between points may be checked on an accurate receiver or a BC-221 frequency meter, if available. Plot all the points on the graph, dial readings on the horizontal axis and frequency on the vertical axis and connect the plotted points.

Finally, once each week, check the v.f.o. against WWV at 15 mc (v.f.o. at 3.75 mc) and correct any long term drift with the BANDSET capacitor. ■

The Fable of

THE LADDER THAT WAS THE MATTER

BY FRED S. ANDERSON*, KØIHG

ONCE upon a time there was a man who operated nothing but single sideband with a voice-controlled transmitter. He would sit in front of his S-line or his HT-32A and HT-33A or any of his other equipment and say "ahhhhhhh" over and over again. It soon became a bad habit with him. He would sit there and say "ahhhh" so his VOX wouldn't go off, even when he didn't have anything to say. He would sometimes draw out an "ahhh" for a whole minute or more. He soon developed remarkable breath control and was the talk of the whole amateur fraternity. Other hams would make bets with one another as to how long he could maintain a single "ahhhh" in a QSO.

One day he walked into his shack and turned on his transmitters. He called CQ with the S-line for half an hour with no result. He decided it must be defective and moved onto the next transmitter. Again he called CQ with no result. He tried all the transmitters and got no result. He was becoming quite concerned.

He finally found the trouble to be in the antenna. The feedline of his six band rotary beam was disconnected and he would have to climb up and reconnect it.

He walked out to the garage and took out his special 100 foot ladder to climb his special 100 foot tower. He set it in place and started to climb to the top. When he had reached the ninety-third step, the ladder rung broke. He tried to call for help but all he could do was scream "ahhhhhh" all the way down. It took three telephone company men with picks and shovels to dig him out. They were in the next yard at the time, but they thought he was a bluejay and didn't pay any attention. They donated all his gear to the Voice of America after the funeral. ■

MORAL:
Ladders Aren't Built Like They Used To Be.
or
He Who Ahhhhhs Longest Ahhhhhs Last.

*2921 Natchez Ave., Minneapolis 16, Minn.

Solid Copy, OM

BY JACK MEYERS*, W5KKB

"CQ, CQ DX, this is K5ALID calling CQ DX to any DX station, and K5ALID is tuning from 3.5 Mc. up the spectrum for any DX calls."

"K5ALID, K5ALID, K5ALID, this is DX-7XD/CRX7 calling and by."

"DX7XD/CRX7, this is K5ALID. OK, OM. FB. You have the strongest signal on the band —at least 93 or 94 db. over S9. There is a slight fade, and sometimes you are as low as 91 over, but I can still pull you through. Certainly would appreciate a QSL from you as you are the first DX7/CRX7 I have worked today. The handle here is Pip. That's Pneumonia Ichthyoid Phantom, Pip. So back to you OM; DX7XD/CRX7, this is K5ALID. Over."

"OK OM. K5ALID, this is DX7XD/CRX7 returning. Copied solid all the way, Sam. Best of 93's and 94's to you, too. Handle here is R. That's Roger, Romeo, Rogers, Rock, Riot, Reckless, Respiration, Republican. R. The transmitter here is a pair of tunnel diodes operating Class C linear with negative bias peak limiting, over-frequency squelch, and a radical cam. Receiver is a regular HQ-180 with a low-noise front end using a 2AP1A. So back to you, Jim, and I wonder what your QTH is. K5ALID, this is DX7XD/CRX7. Over."

DX7XD/CRX7, this is K5ALID right back. OK Roger. Well, Romeo, your signal is holding up pretty well here. You stayed at about 92.67 db over S9 the whole transmission, Rogers. Fine business on the rig, Rock. It sure puts out a solid signal, but I wonder how much power you are running, Riot. Rig here is a modified Voice of America station using parelled 2N170's in the final. Receiver is an AR-1 with 46 outboard i.f. stages for added selectivity. Each stage uses a 6146 and 16 crystals giving a passband about 40 kc wide at 3 db down. So, Reckless, how about the QSL? I sure need it for my DX7X/CRX7 certificate, Respiration. You see I have 58 and only need 7 more. So here it comes back to you, Republican! DX7XD/-CRX7, this is K5ALID. Over."

"Break!"

"Fine business, Ted. K5ALID, this is DX7XD/CRX7. Glad I have such a strong signal out your way, wherever it is. By the way, Bob, the name here is R. That's R, R, R, R, R, R, R! Sorry that I forgot to give you the power here. I am running—ah let's see—duh—6 times 89— minus 35—times π^3—divide by 35° F.—plus 3% sales tax—gives a power of 15.873 microwatts. It's amazing what kind of luck I have working DX with that power: lousy! I can't understand it. The shack here is pretty much messed up. The transmitter is real neat and small—its built into a pill box—but the power supply is spread all over. I am going to build it up neat as soon as the four 6 foot relay racks arrive. I'll be glad to QSL. You know all us DX stations just love to spend hours on end making out QSL cards, so if you'll just print your name and address on a $10 bill and send it to me, I'll see that you get a QSL. K5ALID, this is DX7XD/CRX7."

"DX7XD/CRX7, this is K5ALID. Say, that was pretty tricky to turn it over to me suddenly like that, RRRRRRR. I guess you thought I wasn't paying attention. I really wish you would answer my question about the QSL as I could really use one from you. Say, RRRRRRR, please stand by for a second. . . .

. . . . OK, I'm back. Sorry for the delay, but I never miss The Jack Paar Show. I wouldn't have taken so long, but the closest TV set is in a store window 5 blocks away. You should have heard Elsa Maxwell tear up . . . Oh well, that would take too long to tell, and I don't want to hold it too long, so back to you RRRR. DX7XD/CRX7, this is K5ALID. Over."

"Break! Break!"

"OK, Dave. K5ALID, this is DX7XD/CRX7 right back to you. Bill, I guess you have noticed that I take a few seconds to come back to you. That's because I have a special time delay on my push-to-talk so that any breakers will have time to come in. Say, Todd, I had to put out the garbage, so I missed everything you said after the part about the QSL and up to something about a store window with Elsa Maxwell in it. Say, I know a guy with one of those VOA stations. He said that if you use 2N170's you have to use negative voltage and if you use 2N107's you have to use positive voltage, so he used one of each and uses a.c. on it. You might try it if you have a spare 2N107 around. I have one I'd let you have, but I am using it in place of the house fuse. Pennies here are scarce, and a transistor works just as well if you flatten it with a hammer first. I will have to make this my final, Archie. So 73, 72, 75 to you and hope to hook up with you again. K5ALID, this is DX7XD/CRX7 signing clear."

"DX7XD/CRX7, this is K5ALID. OK RRRRRR. Say, I wonder if it's OK if I call you just plain R. It would save lots of time. I'd appreciate it if you would send me that delay circuit for that push-to-talk you have. I have one-switch operation, plus four pots. I won't hold it any longer, R., so best of 73's, 72's, 28's, 80's, and 6L6's to you, yours, and theirs,

[*Continued on page 90*]

*443 Centenary Drive, Baton Rouge 8, Louisiana
Note: Any resemblance to any living hams is purely intentional.

Considerations In Receiver Front-End Design

BY AL BROGDON*, K3KMO/DJØHZ

The author explains the importance of r.f. selectivity and linearity and methods of improving this important characteristic.

THE radio amateur is faced with a communications problem which is unique in many ways. One of these unique features is that the amateur is allocated continuous nonchannelized frequency bands through which he may romp at will. This is found in no other communication service. This freedom to choose an operating frequency, plus the fact that there are more amateurs in the United States than can be comfortably accommodated by the frequencies available for their use, results in mass mutual interference. This over-population of the ham bands will certainly never lessen; on the contrary, it appears as if it must become progressively worse. The major factors contributing to this increasing problem are the phenomenal rate of growth of the U.S. ham population, and the increasing pressure to reduce the amateur's frequency allocations.

Thus, we may look forward to more and more interferences on the high frequency ham bands. Practically the only approach to the solution of this interference problem is that of narrowing the bandpass of the communication receiver until it is just wide enough to accommodate the desired signal.

In the typical communication receiver, the high selectivity is built into the lowest frequency i.f. stages. The selectivity curves as shown in equipment specifications are principally the selectivity of these low i.f. stages. These curves lead us to believe that this is the performance capability of the receiver, but the sad fact is that this selectivity cannot be linearly transferred back to the antenna terminals of the receiver.[1] The reason for this is that the tuned circuits of the receiver are linked by vacuum tubes (or transistors)—nonlinear elements. So the actual bandpass characteristics of the receiver will be degraded by the amount of nonlinearity in the transfer. Let's take an example to show the difference between the i.f. bandpass and the overall bandpass characteristics of a receiver.

On field day, there will often be two operating positions in close physical proximity but on widely-separated frequency bands. According to the manufacturer's (i.f.) selectivity curves, there should be almost an infinite amount of attenuation at such far-band frequencies. Yet the interference is present. Let us consider the reasons for the existence of this theoretically impossible interference.

The level of the undesired signal becomes so great that it causes the r.f. stage to draw grid current, causing any of a number of types of interference to occur. The sensitivity of the receiver may be seriously degraded due to the extra bias placed on the over-driven stages through the excessive grid current. Cross-modulation may result because of the overdriven stage's nonlinearity. Harmonics of the undesired signal are generated, which may cause a spurious response. Two strong signals may combine in an overdriven r.f. stage to produce intermodulation products. When one of these products falls at the receiver tuned frequency, it will cause interference.

With all of these possible sources of interference, it becomes obvious that the linearity and selectivity of the r.f. amplifier stages become very important in the reduction of interference from undesired signals. Although most hams think of selectivity in terms of the i.f. selectivity, higher r.f. selectivity will pay off with better receiver performance in the presence of interference.

A.V.C. and Biasing

The use of proper biasing techniques in the r.f. amplifier stages is an absolute necessity. No r.f. stage should be operated without self-bias, and a.v.c. bias should be applied to all r.f. stages (plus the i.f. stages if desired). Two sophisticated systems that are recommended are the "delayed" a.v.c. and "hang" a.v.c. systems.

A delayed a.v.c. system is one in which the receiver is operated with the r.f. stages at maximum gain until a received signal reaches a predetermined level, after which the a.v.c. voltage is proportional to the signal strength. The hang a.v.c. circuit was developed for use with c.w. and s.s.b. reception, and features a fast attack time and a slow release time. This results in a.v.c. action which is applied at the first syllable (or c.w. character) with an unnoticeable delay, and holds in between words (or characters) to maintain a constant receiver output during a transmission.

R.F. Response

A spurious response can occur in a receiver when an undesired r.f. signal reaches the signal grid of the mixer. The selectivity of the r.f. am-

*Hq. USASAEUR, APO 757, New York, N. Y.

[1] Brogdon, A., "Two-Signal Selectivity Measurements," *CQ*, August 1962, page 60.

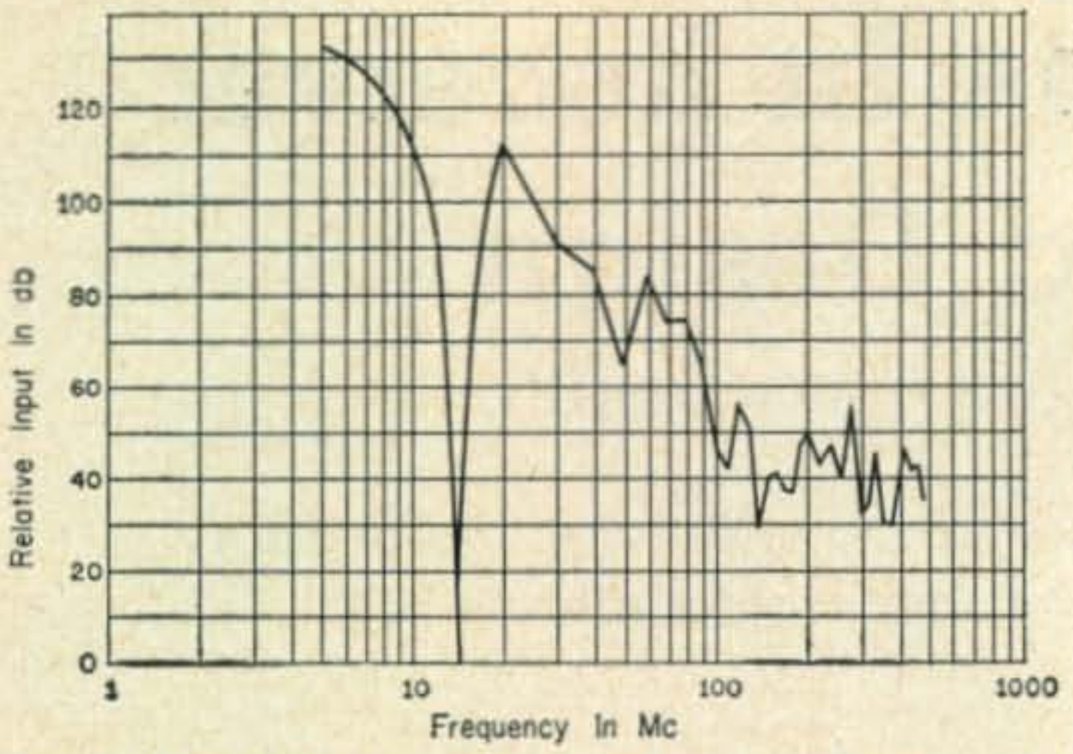


Fig. 1—Extended r.f. selectivity of a typical communications receiver tuned to 14 mc.

plifier determines the degree of rejection of the undesired signals. Therefore, the selectivity of the r.f. amplifier stages of a receiver must be considered over a wide frequency range. Figure 1 shows the r.f. selectivity curve of a typical 3 to 30 mc communication receiver. This curve was measured by injecting a signal at the antenna terminals of the receiver, and measuring the voltage developed at the signal grid of the mixer stage. Thus it includes the selectivity of all tuned circuits between these two points.

It can be seen in this figure that the off-frequency attenuation rises to a maximum just above the tuned frequency, then gradually decreases and decays into erratic valleys and peaks. Take a closer look at fig. 1 and note an interesting point. The receiver under test was tuned to 14 mc. The attenuation in the vicinity of the two meter band was only 30 db. Thus it would be possible for a ham using the tested receiver on twenty meter to experience interference from a nearby ham operating in the two meter band! Sometimes interference crops up in unexpected places.

It is possible to minimize the erratic behavior of the off-frequency selectivity of the r.f. stages, although it connot be entirely eliminated. The performance may be improved by using minimum lead lengths, shielding between stages, filtering of all leads except signals leads, and the usual good design practices. In addition, the over-all far-frequency attenuation may be improved through the use of external selectivity aids.

Most hams nowadays use a common antenna system for both receiver and transmitter, with either a T-R switch or antenna change-over relay to connect the antenna feedline to the transmitter and receiver. Also, most of these hams use low-pass filters to minimize TVI. If the antenna change-over system is such that the filter is between the receiver and the antenna, when the switch or relay is in the receive position, it will provide an additional 30-80 db of attenuation above its cut-off frequency. Also, some T-R switches themselves are frequency selective, giving the user an additional off-frequency attenuation of perhaps 10-30 db. Various bandpass filters have appeared in the ham magazines specifically for use in multi-transmitter contest operation, and will provide additional attenuation of undesired signals. All of these may be used to increase the r.f. selectivity of a communication receiver.

R.F. Preamplifiers

It would seem at first glance that the r.f. selectivity of a receiver could be greatly improved through the use of the commercially available preselectors. Actually, this title is not entirely accurate, since the units are primarily designed to act as preamplifiers, and may or may not have good selectivity characteristics. As example of this is the line of RME preselectors. The old DB-22A was not only a good high-gain preamplifier, but provided outstanding preselection through its three gang-tuned circuits. However, the current RME preselector, the DB-23, has only one tuned circuit for each frequency band. The preamplification is excellent, but the preselection is very poor. At some points, the rejection of far-frequency interference may only be 18-20 db, which may lead to interference being generated within the DB-23 itself. Thus, the DB-23 would be a very useful addition to a receiver if additional front-end gain was required, but would serve little use in providing additional front-end selectivity.

R.F. Amp. Noise Figure

Another consideration in the evaluation of the front end of a communication receiver, especially at the higher frequencies, is the noise figure. The r.f. amplifier and the first mixer are the stages which determine the receiver noise figure. Numerous articles in the past have treated noise figure considerations, but let us briefly summarize a few of the more important points as related to the design of a low-noise r.f. stage.

A low noise figure can be obtained through the use of low-noise tubes in the front end (e.g., 6BZ6 r.f. amplifier and 6U8 oscillator/mixer), and by obtaining a proper impedance match between the antenna and the grid of the r.f. amplifier. The gain should be just enough so that the receiver noise figure will not be affected by the succeeding stages. This will give the receiver the best rejection of cross-modulation, intermodulation and desensitization, and at the same time yield the optimum noise figure.

Summary

In closing, let us enumerate some of the important practices to follow is designing your own communication receiver front-end, or the points which should be considered in the evaluation of a commercial receiver:

1. The receiver should have at least one r.f. stage and two tuned circuits at the operating frequency. Two r.f. stages are desirable. The lack of an r.f. stage (antenna feeding directly to the mixer through a single tuned circuit) puts the receiver out of the "communication receiver" class.

2. Multi-tuned coupling circuits at the oper-

[*Continued on page 90*]

Reviewing The Radio Classics

The Power Supply Filter

BY DAVID T. GEISER*, WA2ANU

Number 7 of a Series

ONE of the few radio classics internationally recognized is the 1932 trilogy of Dellenbaugh and Quimby on power supply filtering in *QST*.[1] Good work was reported in occasionally pungent writing.

"A poorly smoothed power supply sounds like a sawmill. The analogy goes further as well. The first cut in a sawmill rips off the slabs and roughs out the log to its final shape. Further finishing operations each take a smaller and smaller slice. . . . In the same way the first filter section roughs off the rectified a.c. and does the biggest job of trimming down the ripple to suit the associated apparatus. It seldom requires polishing down as far as furniture, but added filter sections, like added woodworking operations, can be made." Reporting on a tremendous amount of experimentation (and some good solid theory) they said:

"The first choke will control regulation. For this purpose it must always have an inductance greater than the critical value; that is, very close to the load resistance in ohms divided by 1000.

"The first choke will control peak current in the rectifier. Maximum allowable current will be obtained when the choke has twice the critical inductance.

"The first choke must adjust itself automatically to all loads. The desired range would be from twice critical inductance at maximum current load to the 'critical value' at minimum current.

"The first choke will contribute to something. For this purpose it must not introduce harmonics or instability, and must not resonate with the first capacitor.

"In the second section, resonance around the circuit must be considered. With values of chokes in common use there is little danger of approaching resonance in the second filter section, but there may be very grave danger of getting into trouble with the first filter section. For good smoothing any approach to 60 or 120 cycle resonance must be avoided."

Why?

In dealing with a full-wave rectifier, as the authors did, they saw that pulses of d.c. (fig. 1) were delivered to the filter.[2] Where little inductance (compared to the critical value) is used in the first choke, the output voltage will approach the peak of the pulse voltage and heavy spikes of current will be drawn through the rectifiers. As greater inductance is used, the voltage drops sharply to 0.636 of the peak pulse voltage (fig. 2). This is near the critical value of inductance. The same effect occurs when load current is increased (lowered load resistance) and the figure $R = 1000 \times L$ is reached. Further load current increases have little reducing effect on output voltage. The voltage drop of a "critical inductance" is not wasted power; it is stored for filtering use. It protects the rectifiers.

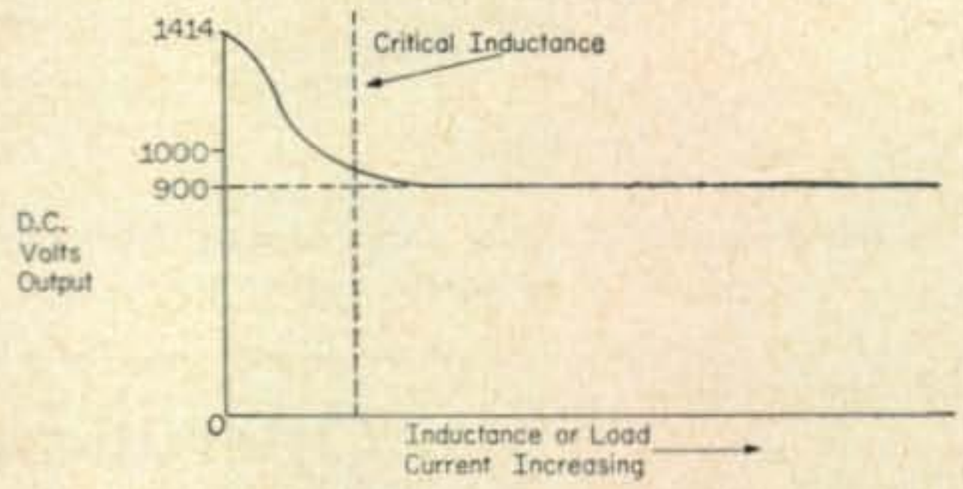


Fig. 2—Voltage regulation dependance on critical inductance or load current for a typical supply. The slight decrease to the right of critical inductance is caused by Ohm's Law voltage drop.

If the load resistance is so low that the first choke is twice critical value, the current pulses through the rectifier will be nearly square, and each last for ½ of the a.c. cycle. Under these conditions, the maximum possible safe current may be drawn from the rectifiers. If this condition exists, the rectifiers will have greatest life.

Summarizing, at light current loads the first choke should have at least critical inductance to prevent unwanted voltage rise. At heavy current loads a low inductance is enough for a twice-critical value. The inductance of an iron-core choke usually drops considerably with increasing

*Light Military Electronics Dept., General Electric Co., Utica, N.Y.

[1] Dellenbaugh and Quimby, "The Important First Choke in High-Voltage Rectifier Circuits," *QST*, February, 1932. Dellenbaugh and Quimby, "The First Filter Choke—Its Effect on Regulation and Smoothing," *QST*, March, 1932. Dellenbaugh and Quimby, "The Economical Design of Smoothing Filters," *QST*, April, 1932.

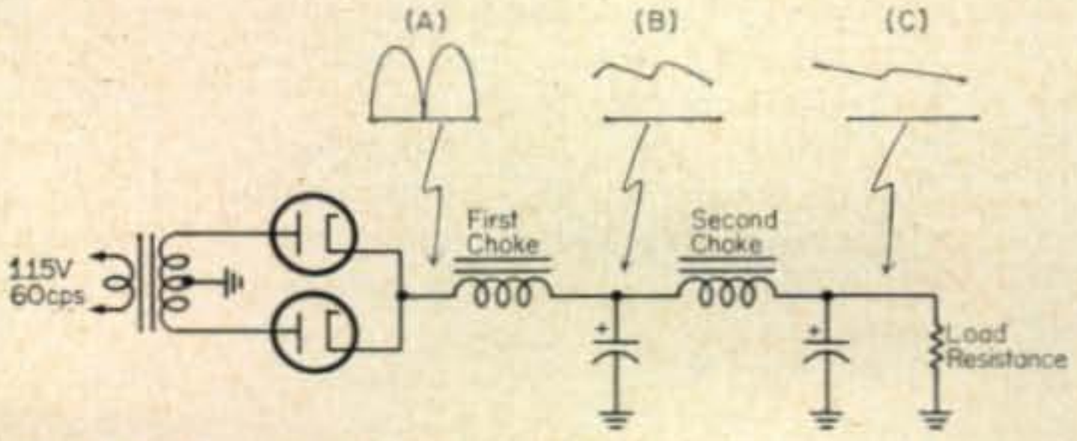


Fig. 1—A typical choke input power supply showing (A) voltages of filter input (B) input to the second section, and (C) output. For calculation of critical inductance, the load resistance includes resistance in the tubes, chokes, and transformers.

[2] Statements apply equally to full-wave center-tap and full-wave bridge rectification.

current if there is negligible air-gap in the iron frame that forms the magnetic path, and sometimes it drops too much. Here a happy event occurs: strong a.c. ripple makes the inductance look larger. Thus the heavy ripple imposed on the first choke (over 40% of the d.c. output) makes the inductance at high output current look higher. Careful choice of the air-gap, then, will permit design of a choke whose inductance "swings" with the load current, being greater than critical at low currents and approaching twice-critical at high currents (fig. 3). It is much cheaper and less bulky than a choke with enough inductance at low currents but also having the same inductance at high currents.

In the design of the choke saturation must be avoided. During the 1930s, Thordarson and Stancor put out transmitter manuals listing optimum power supply combinations, matching chokes and capacitors to avoid the pitfalls of improper combinations. Such charts are rarely seen today. Perhaps it is because so few hams design equipment. But back to saturation: a given choke core will accommodate only so many ampere-turns of energy storage, and when this value is exceeded the choke inductance will drop below the critical value. This causes cur-

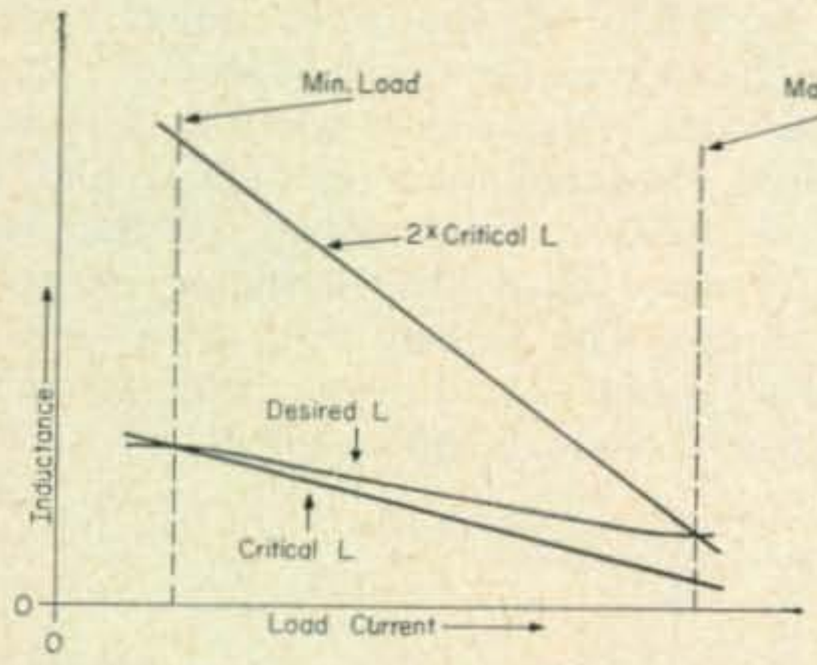


Fig. 3—The desirable curve of inductance vs. load current in a swinging choke.

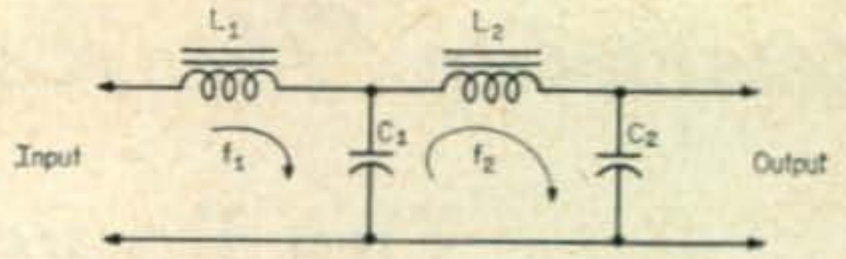


Fig. 4—Resonant loops to be considered in a choke-input filter.

rent and voltage surges, disturbing both the filtering and the rectifiers.

Filter circuit resonance is simply an *L-C* effect and can be calculated from the usual resonance formulas. The two loops involved are shown in fig. 4. While the basic output of a full-wave rectifier is at 120 c.p.s., resonances must be below 60 c.p.s. or there is danger that transient conditions in the filter will divert all of the current into one rectifier. Recent work[3] also points out the desirability of moving filter resonance away from load transient frequencies.

The degree of filtering obtained may be shown dependent on the product of all the choke inductances and filter capacitances in the power supply. If the first section is designed for proper operation, any number of added sections using smoothing chokes and capacitors may be cascaded.

Other Methods

A recent revival of the "resonant-choke" has occurred, particularly among sidebanders. This reviewer does not know of a definitive U. S. article on the topic. Briefly, it consists of parallel-tuning the choke to 120 c.p.s. to look like high impedance at the ripple frequency. It works, but makes special demand of the choke and capacitor.

Reminder

This feature is for the reader, and the reader is invited to make nominations of "classic" U. S. articles in the field of radio. ■

[3]Geiser, "The Effect of Capacitance on Power Supply Filter Bounce," *QST*, September, 1957.

Operation "Sky Top"

K4AIP, K4NQQ and WN4MIV, equipped with four transmitters, three receivers and a host of beams and dipoles, expect to begin a trip on July 11 which will take them to the highest elevations in fourteen different states.

A Ford Econoline Van with a custom built console will house the shack and a Lil' Beaver travel trailer will serve as portable living quarters.

The journey will take approximately two weeks and all contacts will be confirmed. A handsome certificate will be awarded if you happen to work them from five different locations. Some of the counties are extremely rare so keep a sharp ear open for USA-CA credit.

Look for them between 1600 EST and 0100 EST the next morning on the following frequencies: 7025, 7295, 14035, 14290; Novices can work them on 7163 and 21111.

ITINERARY

July	*Operating Location*	*County*	*Elevation (Ft.)*
11	Brasstown Bald, Ga.	TOWNS	4784
12	Sassafras Mt., S. C.	PICKENS	3560
13	Clingsman Dome, Tenn.	SEVIER	6642
14	Mt. Mitchell, N. C.	YANCEY	6684
15	Grandfathers Mt., N. C.	AVERY	5984
16	Mt. Rogers, Va.	GRAYSON	5720
17	Spruce Knob, W. Va.	PENDLETON	4860
18	Blackbone Mt., Md.	GARRETT	3360
19	Mt. Davis, Pa.	SOMERSET	3213
20	*Open*		
21	Highpoint, N. J.	SUSSEX	1803
22	*Open*		
23	Mt. Marcy, N. Y.	ESSEX	5344
24	Mt. Mansfield, Vt.	CHITTENDEN	4393
25	Mt. Washington, N. H.	COOS	6288
26	Mt. Greylock, Mass.	PERKSHIRE	3491
27	Mt. Frissel, Conn.	LITCHFIELD	2380

New Amateur Products

Gonset 2 m. Sidewinder Transceiver

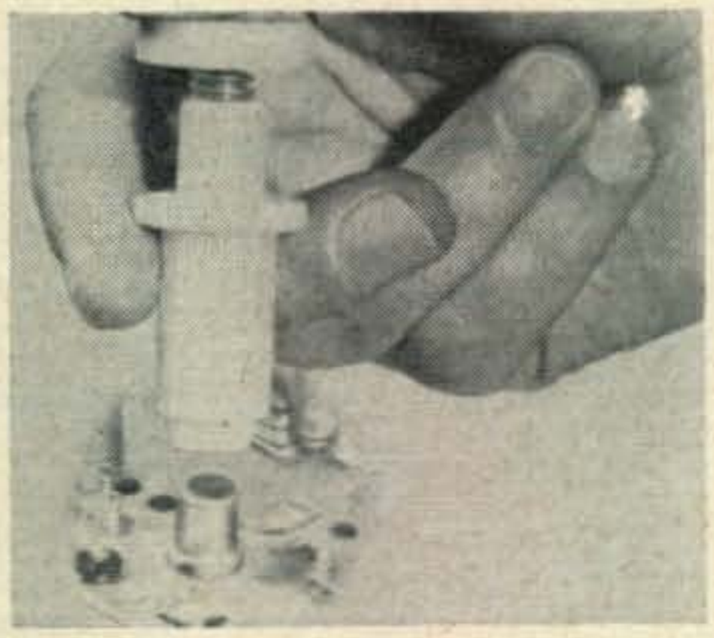
FOLLOWING its tradition of producing versatile and compact equipment for v.h.f., Gonset recently announced the "Sidewinder," a 2 meter single-sideband transceiver. The versatile package covers the entire 2 meter band in 1 mc segments providing 20 watts input on c.w. and s.s.b. and 6 watts on a.m. A crystal lattice filter is used on receive as well as transmit. The Sidewinder is transistorized nearly throughout, the only tubes being in the mixer, driver and final. The mobile power supply mounts to the back of the transceiver with snap fasteners. Overall size, less power supply, is 8¾" w. x 4¾" h. x 7" deep. Price (less p.s.) is $349.95. Circle A on page 110 for more information.

Shure Model 444 Microphone

THE Model 444 microphone by Shure is among the latest additions to this popular line. The controlled reluctance mike has high impedance characteristics with frequency response from 300 to 3000 c.p.s. Output level is —52.5 db. A push-to-talk switch bar is located in the base with an optional locking feature making the Model 444 equally useful for either vox or push-to-talk. The features include also a height adjustment of 2½ inches for comfortable operation. The 444 is priced at $25.50. For further information circle B on page 110.

Cinch Nuvistor Puller

REMOVING a sizzling-hot nuvistor from cramped quarters can be a trying experience, not to mention installing a new one. A new gadget recently introduced by Cinch Mfg. Co., however, makes it possible to remove and insert tubes in areas of a chassis where it is impossible to use your fingers. The Cinch TP-1 is designed to firmly grip the nuvistor by means of an internal spring mechanism without danger of denting or scratching. The TP-1 costs only 79 cents and is available at Cinch distributors.



118 Miles via Lasers

MEMBERS of the Amateur Radio Club at Electro-Optical Systems, Inc., Pasadena, California have transmitted a phone message 118 miles across the California desert on a laser beam, establishing a new record in overland communications with the new device.

The beam, from a helium-neon gas laser with confocal mirrors, was transmitted from Grassy Hollow in the San Gabriel Mountains to a point 12 miles from the town of Ballarat in the Panamint Mountains near Death Valley. The laser operated on a wavelength of 6328 Angstroms, and had a radiated output of 125 microwatts.

About 20 Electro-Optical Systems scientists participated in the experiment which was successfully conducted Friday night, May 3 from 10:55 P.M. to 12:05 A.M., and Saturday night May 4 from 9:15 P.M., to 10:40 P.M., between the mountain encampments. The laser unit was pumped and modulated using a Viking II. The laser beam was collimated through a 10-power telescope. In addition to the laser communication, there were also communication links on 2- and 6- meters.

The message was received with a 12½" diameter telescope, detected with an S-20 photomultiplier tube, amplified, and then fed into a speaker and recorder. Previous laser links have covered land distances up to only 25 miles and have not always accomplished an actual phone QSO.

The laser itself is a device which converts electrical energy or light energy into a coherent and collimated light beam. The laser beam is extremely narrow, and hence can travel great distances without appreciable spread.

At the transmitter site were: K6YTP; ex-W6KAQ; W6KHK; W6POP; and WA6THK.

At the receiving site were: W6QYY; K6GPJ; WA6LMV; and WA6AKM.

Other participating club members were: Chet Campbell; Vern Gallinger, K6VJJ; Ross Joe, K6CPB; Shirley Pattison, K6DPX; Henry Richter, W6VZA; and Ed Reed, K6IGC.

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued between the period from April 6th, 1963 to and including May 6th, 1963:

CW-PHONE WAZ

1794	DL3CM	Gerd Jarosch
1795	W8AJW	Jack Siringer
1796	OH2BC	Kari Leino
1797	WA6SBO	Bill Rindone
1798	DLITA	Dr. Karl-Heinz Birr
1799	K6AHV	Robert G. Ferrero
1800	W4BZ	B. W. Benning
1801	VK4XU	W. L. Nye
1802	W2SHC	David Beckwith

ALL-PHONE WAZ

197	K7GCM	David R. Brush
198	W4PDL	L. A. Dyson

TWO-WAY SSB WAZ

159	W8TMA	John L. Alline
160	K7GCM	David R. Brush
161	VE7CE	R. J. M. Gauvreau
162	W4OPM	Chas. J. Hiller
163	SM6SA	Goran V. Meyerson
164	VK4FJ	Sidney Roy Baxter
165	JA2JW	Yoh Hoshiyama
166	XW8AS	H. C. Sherrod, Jr.
167	K5JEA	Kermit Kruger

CW WPX

434	DJ3WP	Hans Wottrich
435	UC2CS	E. P. Khomenko
436	OK1ZL	Zdenek Mensik
437	K1KPS	Ernest H. Taves, M. D.
438	GI6TK	Frank A. Robb
439	W4HUE	George A. Mack
440	ON4FU	Julius Delsupehe
441	W5VA	T. Frank Smith

PHONE WPX

90	DL3RK	Walter Geyrhalter
91	OE1PC	Dr. Alex K. Pacher

SSB WPX

133	GI6TK	Frank A. Robb
134	K4HYL	Jacob H. Shartsis

MIXED WPX

69	W8JXY	Chester W. Bolg

WPX ENDORSEMENTS

	Mode	*Continent*	*Band*
W2PDB	CW		20
W3AYS	CW	E	
W6USG	Phone		20
W8KPL	CW	N	15
K9BVR	CW		20
W9DWQ	CW	E/F	
DL1PM	SSB	E	
DL1QT	CW		80/40
G3DO	Phone	O	
G3LPS	CW	E	
G8PL	CW	E	
KL7MF	CW	E	20
KP4AOO	Mixed	E	
OK3DG	CW	E	80/20
SM7MS	CW	E	
SP4JF	CW	E	
UA9DR	CW		20
UC2AR	CW	E	20
YU1AG	Phone	E	
	CW	F	
	Mixed	F	
ZS1ACD	CW	E	

A-Asia; *E*-Europe; *F*-Africa; *N*-North America; *O*-Oceania; *S*-South America.

Here and There

CEØ Easter Island: The new operator has arrived on Easter Island and has been active as CEØAB. Weekend operation is preferred on 14.040 about 0100 GMT. *(Tnx VERON).*

EP2 Iran: The following is from Dick, EP2RC. ". . . I received my ticket for Iran. New call sign is EP2RC, lucked out and got my initials again. Operating habits here right now mostly on 20 c.w. usually after 0800 GMT heaviest operating after 1300 GMT, band usually winds up about 1800 GMT but has been fluctuating lately.

"Anyone having QSL card due from ET2US/ET2 (Op Dick), ET3RC or EP2RC may send cards via my stateside call, K1KOM, or direct

*Box 35, Hazlet, New Jersey.

WAZ and WPX

THE WAZ and WPX certificates are awarded by the *CQ* DX department. WAZ is issued for proof of contact with the 40 Zones of the world as shown on the official WAZ Zone Map. WAZ is issued in three classes, *i.e.* Any mode, all phone and all s.s.b. For complete rules, see the January, 1962 *CQ*, page 50.

WPX is issued in four classes, *i.e.*, all c.w., all phone, all s.s.b. and Mixed. The number of prefixes required are: C.w.-300; Phone-300; s.s.b.-200; Mixed-400. For complete rules, see January, 1962 *CQ*, page 52. WAZ applications, Zone Maps and WPX applications may be obtained from the DX Editor at the address shown at the head of this column. Please send a self-addressed, stamped envelope or a self-addressed envelope and an IRC. All applications should be sent directly to the DX Editor.

WPX HONOR ROLL

C.W. WPX

W2HMJ	685	YU1AG	503	DL9KP	450	W4DKP	410	CT1PK	600	W5ERY	358	K4PUS	305	W8JIN	605
W8KPL	632	W5LGG	502	W8JIN	449	W1CKU	408	W8WT	576	W8JIN	356	DJ3CP	304	W3OCU	588
W5KC	629	W6YY	502	W9UZS	447	K4IEX	408	G3DO	576	PY2CK	354	K1IXG	303	K9EAB	578
W2AIW	617	DL7CS	502	W8RQ	445	K4JVE	407	W9YSQ	471	5A5TO	353	WA2SFP	300	W6YY	570
W2EQS	605	K2CPR	501	W3AYD	443	W5AFX	407	CT1HF	466	W1ORV	351	K2TDI	300	W4BYU	557
W6KG	574	W9SFR	501	OE1FF	442	W7HDL	405	W9UZC	462	LA5HE	351	W3VSU	300	W3AYD	552
W4OPM	571	W2EMW	500	W3BQA	437	W4YWX	404	MP4BBW	454	W6USG	350	W4NJF	300	YU1AG	552
W9UXO	566	W2FXA	500	LA5HE	437	GI3OQR	404	PAØHBO	453	ZS6IW	350	W4RLS	300	HB9EU	551
K6CQM	565	K2ZKU	500	ON4FU	433	KP4AOO	404	W6YY	448			KØRDP	300	W2GT	528
W5OLG	564	K9EAB	497	VE3ES	433	ZS4MG	404	G8KS	430			WØCVU	291	G8KS	520
DL1QT	552	W2MUM	495	W8UMR	429	K2ZRO	403	VK6RU	421	**S.S.B. WPX**		GI6TK	278	K9AGB	510
W2NUT	550	W1WLW	494	WØAUB	429	W9DYG	403	W3AYD	420			WA2EOQ	275	W5LGG	509
W1IJB	546	OK3DG	488	W2RA	428	W9IHN	403	F8PI	418	MP4BBW	462	VE3ES	274	K2ZKU	508
K2UKQ	546	SM5CCE	488	K5LIA	428	VE6VK	403	PZ1AX	413	W4OPM	451	K2JFV	266	W9DWQ	508
W9YSX	544	W4BYU	487	OK1MB	428	K4TEA	402	K9EAB	412	G3AWZ	428	K2MGE	263	W4BQY	505
W9GFF	538	W8PQQ	481	W3CGS	426	G8PL	402	K2CJN	409	HB9TL	423	W3AYD	262	W3KDP	501
SM7MS	534	W4HYW	478	W1EIO	425	WA2CBB	401	DL3TJ	404	W3NKM	402	W4EEU	262	W8UMR	500
ON4QX	533	W3OCU	466	KL7MF	424	K9BVR	401	W1UOP	402	G3DO	402	VE3BKL	259	LA5HE	500
W1EQ	528	K6SXA	464	SM5WI	424	WØVBQ	401	G3NUG	400	K9EAB	401	XE1CV	256	DL3RK	493
W2HO	526	W2KIR	463	WØPGI	420	IT1TAI	401	VE3BQP	386	G8KS	400	G3FKM	255	JA2JW	480
K9AGB	515	DJ2KS	462	HB9TT	419	VE3JZ	401	OE1FF	382	W3MAC	381	UR2AR	255	WØMCX	476
KP4CC	515	PY4OD	462	G3HIW	418	OE3WB	400	SP7HX	381	G3NUG	356	K5OGP	254	W3CGS	475
IT1AGA	515	JA2JW	461	W8IBX	416	SP4JF	400	TG9AD	381	TI2HP	356	W6USG	252	W9FVU	474
G2GM	513	W9WCE	458	WØMCX	416	SP6FZ	400	DL6VM	376	PZ1AX	345	TG9AD	252	G3FKM	463
W6WO	511	W3BCY	457	K2PFC	415	VE1AE	400	DJ3CP	375	VE3BQP	334			DL1YA	456
W2GT	510	OK3EA	456	VK3XB	415	VE4OX	400	PAØSNG	369	W2HXG	324			WØVBQ	452
W8LY	506	UC2AR	456	W5AWT	412	VK3KB	400	G3FKM	366	W2VCZ	320	**Mixed WPX**		PAØLOU	452
W9DWQ	506	DL3RK	454	W5DA	412			W8UMR	363	W6YMV	320			GI6TK	450
G3EYN	503	PAØLOU	451	K5LZO	411	**Phone WPX**		SM3AZI	362	W1UOP	318	W4OPM	629	HK3LX	450
		W3PGB	450	WA2DIG	411			SM3EP	361	W2YBO	318	W9YSX	622		
		DL1YA	450	W2PTD	411	W9WHM	600	W1DGJ	358	W8PQQ	315	G3DO	617		
										W1ORV	307	W8WT	607		

to Dick Cormier, USA TRS, APO 205, N. Y., N. Y. I have no means of handling QSLs for any other ET2 or ET3 call signs."

FK8 New Caledonia: Raoul, FK8AU, and Felix, FK8AC, are both active on weekends on 14,255 and 14,335 kc s.s.b. Best time is between 0400 and 0600 GMT. *(Tnx WGDXC).*

FU8 New Hebrides: FU8AG has been reported very active on 14,100 and 13,998 kc. Jean uses a DX-60 on c.w. only. The four other licensed FU8's operate only 7 mc phone. *(Tnx VERON).*

GC Jersey: According to Les, G8KS, the GC8KS Jersey DXpedition was very successful. They made 1690 QSOs with 60 countries during the four-day trip. Sixty percent of the contacts were on s.s.b. *(Tnx G8KS).*

GC Sark Island: A party of three will be on Sark, Channel Islands from 17th August to 1st September. We intend to operate on the highest frequency band open during the day and on Topband at night. I will use the call sign GC3PAI/A and if the other two have their tickets by then, they will use call signs of the form GC3—/A. Most operation will be c.w. but we will probably use a bit of a.m. (except on 1.8 and 7 mc). The transmitter will run about 50 w. (10w. on 1.8 mc).

Probable frequencies: c.w.-1.825, 3.505, 7 (wherever we can find a fairly clear channel). 14.050, 21.050, 28.100 mc. A.m.-3.610, 14.150, 21.200, 28.500 mc. When looking for Ws, I will use the given frequency and tune the U.S. subband.

On the last weekend, I hope to get up about 0400 GMT and see if there is any Topband DX (Ws, *etc.*). Thanks to John, G3PAI, for the above information on his trip.

HC8 Galapagos Island: Virgil, WA2WUV, did a wonderful job during his stay on HC8. Just about 5000 QSOs in the log. Virgil, who had never been on a DXpedition, received a "baptism of fire" and came through it a seasoned DXpeditioner. The Long Island DX Association, c/o W2MES is handling the QSLs.

JT1 Mongolia: JT1KAA is active almost daily 14,040-14,060, 1200 to 1300 GMT. *(Tnx WGDXC).*

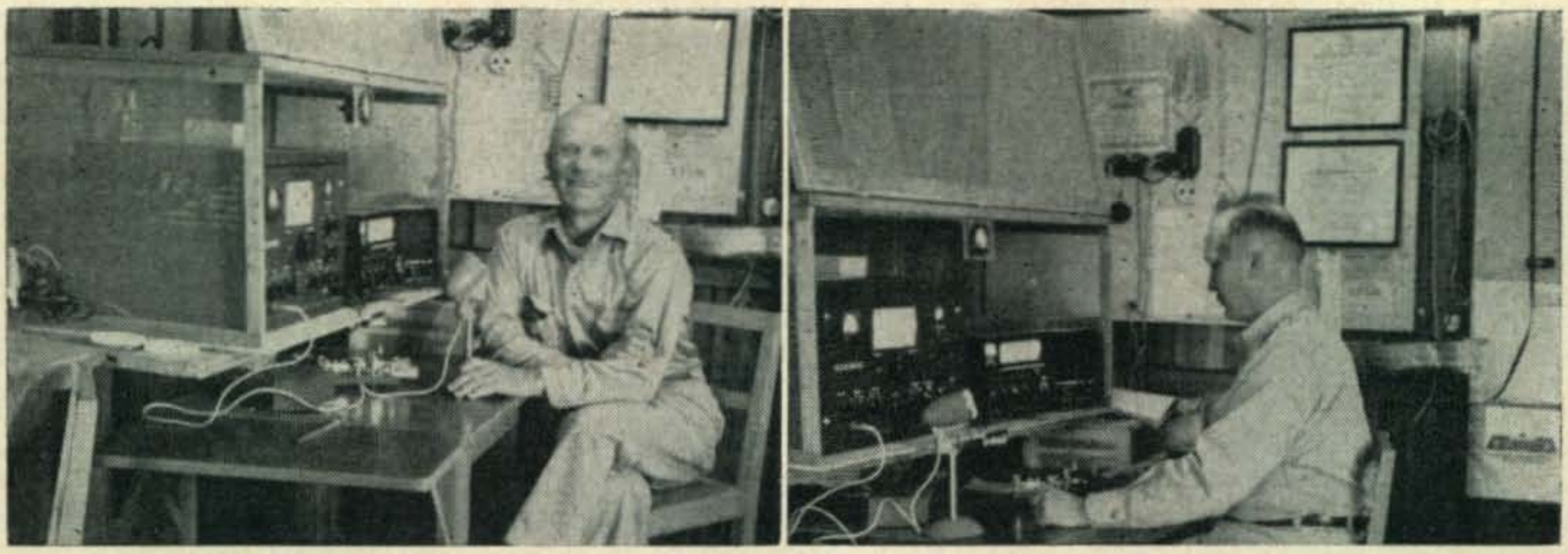
KB6 Canton Island: KB6EPN and KB6CB monitor 14,275 kc s.s.b. daily 0300-0600 GMT and if you don't hear them working, a call to them will probably raise them—QSL direct in care of the U. S. Post Office, Canton Island. *(Tnx WGDXC).*

KC6 Western Carolines: KC6BO is again active from Western Carolines. Look for him around 14,260 kc 1300 to 1400 GMT. *(Tnx WGDXC).*

PK Indonesia: VS1LP (ex-EP2BK) reports in DX magazine that the ban on PK stations has the possibility of being lifted. The Indonesian state of emergency was lifted on May 1st and Bob has had talks with the men concerned with communications and the strong possibility exists. Hal Leith, K4ORQ, of EP1AD fame, is slated for a tour of duty in the Indonesia area starting about August. Let's hope that it does come about as there is a rumor about that many DXers need this area. *(Tnx WWDXA).*

ST2 Sudan: Eric, ST2AR, now is active regularly on 14 mc s.s.b. He operates on 14,110 kc and

Dave Drummond, ZE5JF, whose only recreation out in the South African bush is ham radio; a.m. preferred. *(Tnx ZS6BBB).*



The inside of the ET3JK/ET3FW shack with Frank, ET3FW, on the left and Jack, ET3JK, on the right. The wire cage is to keep out the field rats. They have already chewed up a tape recorder and an AN/TRC-1 transmitter. *(Tnx ET3JK)*

listens for calls on 14,110 or 14,270 kc. *(Tnx VERON).*

SVØ Crete: "With a sigh of relief from the XYL and Lil' Harmonic, SVØWZ on the sunny isle of Crete pulled the big switch on 7 April, 1963. Gear was packed on the 10th of April. Will soon be leaving for W7FTU/5 down Texas way.

"Since 22 Sept. '59 with an old HQ-120 and Viking II managed to make CHC, WPX CW (360+ Cfmd.), DXCC (152 Cfmd.) and awaiting VE8DX's Zone 2 card for WAZ.

"Know some cards to me have gone astray even tho one I received thru local APO was addressed simply 'SVØWZ, Crete'! Anyone still needing my card can still get thru to me via W7FTU, W7/K7 Bureau, RSGB or ISWL.

"Enjoyed being DX for once and hope to make at least one more overseas tour before settling down in W-land for good.

"Crete is still represented by SVØWH, SVØWO, and the club station SVØWT. SVØWZ will be reissued immediately, maybe to someone awaiting a call on Crete." *(Tnx to Sarge SVØWZ for the above).*

SVØ Greece: SVØWI no longer belongs to Al Evans, W4EWO. Al pulled the big switch in June after 6,500 QSOs and a stay on Rhodes as SVØWI/R. Although Al sent over 5,000 QSLs, he will send another to anyone still needing one. He may be reached at 38 Emmons St., Milford, Mass.

UAØ Tana-Tuva, Zone 23: George, UAØYE, occasionally active on s.s.b. around 14,280 kc 1000 to 1500 GMT. *(Tnx LIDXC).*

VK9 Cocos-Keeling Island: Lionel, VK9LA, reports, via the West Gulf DX Club, that he will QRT and QSY in December '63 but will be very active in the meantime. His rig is now a HT-37 and Drake 2-A and a TH-4 beam. He operates between 14,260 and 14,300 on s.s.b. and around 14,056 on c.w. 1300 GMT is preferred.

VKØ Macquirie Island: VKØDM around 14,080 c.w. and 14,120 a.m. fone usually 1000 to 1100 GMT. *(Tnx WGDXC).*

VR4 Guadalcanal: There are two stations presently active on Guadalcanal. VR4CU is a new station who will be there another ten months. He will operate 20 meters exclusively using a ground plane and 70 watt transmitter.

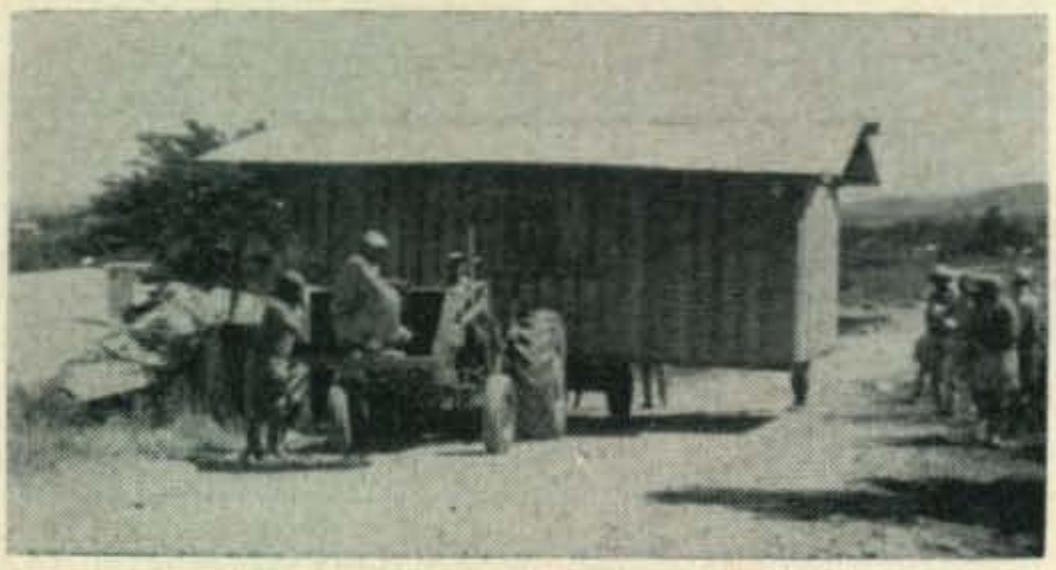
VR4CB is presently active on both 20 and 15 meters. Both stations may be QSL'd via Box 489, Wellington, New Zealand. *(Tnx K7SVO).*

VS9M Maldives: Collin, VS9MB, is on nearly each morning for those who need this area on s.s.b. He can be found around 14,310. I say 'around' as he moves quite a bit. He has good signals here on the West Coast from about 1500 GMT. QSLs go via the ISWL. *(Tnx WWDXA).*

ZD3 Gambia: ZD3A has been active on 21 and 14 mc c.w. 1900 to 2000 GMT. Fairly regularly, too. *(Tnx WGDXC).*

5N2 Nigeria: Mike, 5N2JKO, has returned to Nigeria after a 21-week leave. He will shortly be on s.s.b. in an effort to boost his contest score.

5U7 Niger Republic: 5U7AH is on 14,130 kc



The ET3FW/ET3JK shack being moved into position on top of a hill in Addis Ababa. *(Tnx ET3JK)*

A local hamfest ET3 style. L. to r.: in back row Al Peirce, ET3AP; J. E. Kear ET3JK; Al Shirk ET3MEN; F. Frost ET3AH/VQ2AF; Gordon Zuchegna ET3GZ, and Frank Woltemar ET3FW. Seated are Homer Garton ET3HG and Lyle Mabbott ET3LM. The occasion was a farewell party for ET3LM. ET3HG is also stateside now. *(Tnx ET3JK)*

and listens on 14,260-14,275 kc s.s.b., 2100 to 2200 GMT. Very active. *(Tnx WGDXC).*

6Y Jamaica: The new prefix for Jamaica is 6Y. The block 6YAAA to 6YZZZ has been assigned to the local government. They have interpreted the block literally and have assigned a call such as 6YABL (ex-VP5BL). I think this is a mistake and that the calls will be changed to 6Y5. WPX credit may be claimed for the new prefix because VP5 will still be used for Turks and Cayman.

7X2 Algeria: 7X2VX continues active on s.s.b. 14,340 to 14,350 kc 2100 to 2200 GMT. *(Tnx WGDXC).*

9M2 Malaya: 9M2GV has been active of late. John, as you may recall, has a very poor location from his home and so tours out into the various hills and operates from a gallon or two or three of gasoline. When the gas runs out, John goes home. He maintains an almost daily schedule with his QSL sender-outer, W7EMU. Again the frequency is close to 14,310 and at 1600 GMT. *(Tnx WWDXA).*

9N1 Nepal: Bill, 9N1DD, is active almost daily on 14,270-14,280 s.s.b., 1500 to 1600 GMT preferred. 9N1MM, Father Moran, also is active on 40 and 20 meter phone with low power. He operates on 14,263 or 14,105 at 1330 GMT and also 0200 GMT *(Tnx VERON).*

9Q5 Congo: 9Q5RK, who is LX1RK, back home worked 104 countries and 200 prefixes during his first two months of s.s.b. activity from the Congo. Bob is active every day between 1800 and 2100 GMT.

Gus

Gus, W4BPD, who is a DXpeditioneer without equal, has completed over one year on his present trip. His unbelievable activity has been as follows:

1–3A2BW	11–9U5ZZ	21–FR7ZC
2–VQ9HB	12–9U5BH	22–FR7ZC/J
3–VQ9A/MM	13–VQ2EW	23–FH8CE
4–VQ9AA	14–W4BPD/MM	24–5R8CM
5–VQ9C	15–ZD9AM	25–FR7ZI
6–VQ9A/7	16–LH4C	26–FR7ZC/T
7–VQ9A/AN	17–9U5ZZ/MM	27–FR7ZC/G
8–VQ9A/8C	18–ZS6IF/ZS8	28–FR7ZC/E
9–VQ9A	19–ZS5JY	29–5R8CM/FH8
10–VQ4AQ	20–ZS5QU	30–VQ4ERR

This trip has taken him to Arctic waste and unbearable tropic heat. Not enough can be said to give credit to Gus who has given his all to DXers. How he can keep his patience at times is something I'll never understand.

Thanks a million for everything Gus, and we'll be looking for you on 14,035 and 14,125.

Angus and Doris Murray-Stone

Angus and Doris Murray-Stone (ex-5N2AMS-5N2DMS, TY2AA, FD8AMS, 5N2AMS/TR8, *etc.*) left London in June to establish residence in Rigadh, Saudi Arabia, where they will be based for about five years in connection with his work in the electrification field there and in many other places in the middle east, such as Jordan, Syria, Bahrain, Dubai, Yemen, *etc.*, and is now laying

Ken Jarvis, VP2KJ, is now in Texas continuing his education in the study of agriculture. Ken will return to his rig on Nevis Island in November. Thanks go to Ken's QSL Manager, W4SSU, for sending the snap.

the groundwork for licenses in HZ1, JY1, MP4, YK, VS9, 4W1, AC3, 4, 5 and in addition, Angus has accepted a cooperative proposition from the Hammarlund Manufacturing Company to participate in their "DXpedition of the Month" so congratulations to Angus, Doris and Hammarlund for this association that will no doubt be of great interest to all Amateurs. *(Tnx WGDXC).*

License Expiration Notice Service

A new service is being provided by the Foundation for Amateur Radio; a license expiration notice service. Here is how it works. Address a postal card to yourself (no other form accepted). At the top (horizontally) write a date, month and year only. Add any note you wish to say to yourself. Send this card (in an envelope, of course) to: Joan Machinchick, K3KBI, Lake Drive, Cape St. Claire, RFD, Annapolis, Maryland. When the month arrives the card will be mailed. Choose a date a couple of months ahead of the actual expiration date.

QTHs and QSL Managers

Doc, W4HUE, reports he has received no logs from SV1AB in over twelve months so he has resigned as his QSL Manager.

A station signing VR4AI has been giving W3AYS as

[*Continued on page 90*]

Bill, PZ1AX; Bill, W4RUF/KP4, and Howie Lee during W4RUF's recent stay in PZ1-land. Bill and Howie enjoyed the hospitality of Bill, PZ1AX and his XYL, PZ1BR while taking time out from chasing the stolen Venezuelan ship *Anzaltiagi*. Bill and Howie fly a "Hurricane Hunter" from KP4-land. *(Tnx W4RUF/KP4)*

CONTEST CALENDAR

FRANK ANZALONE*, W1WY

CALENDAR OF EVENTS

August	3-4	Illinois Party.
August	4-10	Chattanooga Party.
August	10-11	WAEDC C.W.
August	17-18	WAEDC Phone.
August	24-25	JARL DX C.W.
August	24-26	N. J. QSO Party.
*Aug. 31/Sept. 1		LABRE C.W.
*September	7-8	LABRE Phone.
*September	7-8	Peruano C.W.
*September	14-15	Peruano Phone.
*September	14-15	S A C C.W.
*September	21-22	S A C Phone.
*September	28-29	MARC VE/W
*October	5-6	Oceania Phone
*October	12-13	Oceania C.W.
October	12-14	ARRL CD C.W.
October	19-21	ARRL CD Phone.
October	19-20	RSGB 7 mc Phone.
October	26-27	*CQ* WW DX Phone.
November	2-3	RSGB 7 mc C.W.
November	9-11	ARRL SS.
November	16-18	ARRL SS.
November	16-17	RSGB 21/28 mc Phone.
November	23-24	*CQ* WW DX C.W.
*December	7-8	OK DX C.W.

*Not yet officially announced.

Illinois Party

Starts: 1600 GMT Saturday, August 3.
Ends: 2200 GMT Sunday, August 4.

This is the first annual party sponsored by the Illinois chapter #17 of the Certificate Hunters Club.

Use all bands, phone and c.w. The same station can be worked and counted as a QSO point on each band and each mode. For example, a phone and c.w. contact with the same station on the same band counts 2 points.

Illinois stations score 1 point for each contact including contacts with other Illinois stations. All others score 1 point for each Illinois contact.

Illinois stations multiply total QSO points by the total number of different States, Canadian Provinces and Countries worked. All others multiply total QSO points by the total number of Illinois Counties worked.

Illinois stations indicate QSO number, RS/RST and County. Others give QSO number, RS/RST, State, Province or Country.

High Scorer in each call area of U.S. and Canada and each Country will receive a certificate. Illinois operators will vie for 1st, 2nd, 3rd, and 4th place certificates.

Logs must show dates, times, stations worked, exchanges, band, mode and score claimed.

Logs, postmarked not later than October 1, 1963, should go to Cliff Corne, K9EAB, 711 West McClure Avenue, Peoria, Illinois.

Chattanooga Party

Starts. 0001 GMT Sunday, August 4.
End: 2359 GMT Saturday, August 10.

Here is an opportunity for the certificate hunters to qualify for the Chattanooga Choo Choo certificate.

The Chattanooga stations will identify themselves, "CQ CCC" on c.w., or you can call "CQ Chatta." Any authorized mode of operation is permitted.

Stations in the Chattanooga area are competing for a special first and second place award.

Only one contact with the same station permitted and your log should show date, time, band mode and call of station worked.

Logs and applications go to the Frye Amateur Radio Club, Att: Contest Committee, P.O. Box 13, Chattanooga, Tenn. The deadline for logs is August 24th.

DARC WAE

C. W.

Starts: 0000 GMT Saturday, August 10.
Ends: 2400 GMT Sunday, August 11.

Phone

Starts: 0000 GMT Saturday, August 17.
Ends: 2400 GMT Sunday, August 18.

The 9th annual WAE DX Contest is once again being held in August instead of the usual winter period. The object of the contest as in the past, is for non-European stations to contact as many European stations as possible on all bands. (Note the WAE country list.)

Rules: 1. Use all bands, 3.5 thru 28 mc.

2. The usual six-digit serial number, RST or RS report plus a progressive three figure QSO number starting with 001.

3. Each exchange of serial numbers will count one point, except on 3.5 mc where it will count two points.

4. The same station can be contacted once on each band.

*14 Sherwood Road, Stamford, Conn.

5. The multiplier for non-European stations is determined by the number of European stations worked on each band.

6. European stations will use the latest ARRL country list to figure their multiplier. In addition each call area in the following countries will also be considered a multiplier. CE, JA, PY, VE/O, VK, W/K, ZL & ZS.

In addition UA9 and UAØ will count separately.

7. The final score is the total QSO points, plus the QTC points, if any, multiplied by the sum of country points on all bands.

QTC Traffic: Additional point credit can be realized by taking advantage of the QTC traffic feature.

A QTC is a report of a confirmed QSO which has taken place earlier in the contest and later sent back to a European station.

It can only be sent from a non-European station to a European station. The general idea being that after a number of European stations have been worked, a list of these stations can be reported back during a QSO with another station. An additional one point credit can be claimed for each station reported.

1. A QTC contains the time, call and QSO number of the station being reported, *i.e.:* 1200/DL1FF/123. This means that at 1200 GMT you worked DL1FF and received his number 123.

2. Only a maximum of 10 QTCs per station per band are permitted, although several contacts with the same station are permitted in order to complete this quota. Only the original contact with any one station has QSO point value however.

3. A QSO can be reported only once and not back to the originating station even though the contact was made on another band.

4. Keep a uniform list of the QTCs sent in your log, *i.e.:* QTC 3/5. This means that this is the 3rd series of QTCs sent and that 5 QSOs are being reported in this one.

Classifications: 1. Scoring will be determined on all band operation only.

2. There is both a single operator and multi-operator classification.

3. This year a new category has been added, a power classification. Class A up to 50 watts input, Class B up to 150 watts and class C more than 150 watts. It is therefore important that you indicate your power input on your log.

Awards: 1. Certificates will be awarded to the highest scorer in each classification, in each country and country/district as indicated under number 6 in the rules.

2. Continental leaders will be additionally honored. And 2nd and 3rd place certificates will also be awarded in areas where sufficient participation warrants.

3. Endorsements for WAE certificates will be given for contest contacts, providing the log of the requested station has also been received.

It is strongly recommended that you use the official DARC log form. A self-addressed envelope with 1 IRC (3 for air mail) will get you a supply from the DARC.

Mailing deadline for your contest reports is September 30th. They go to Dr. H. G. Todt, DL7EN, Chlodwigstr, 5, 1 Berlin 42, Germany.

WAE COUNTRY LIST

CT1, CT2, DL/DJ/DM, EA, EA6, EI, F, FC, G, GC, GD, GI, GM, GW, HA, HB/4U1ITU, HE, HV, I, IS, IT, LA, LA/p Bear Is., LA/p Jan Mayen, LA/p Spitzbergen, LX, LZ, M1, OE, OH, OK, ON, OY, OZ, PA, PX, SM, SP, SV, SV Rhodes, SV Crete, TA/European, TF, UA/UW 1 thru 6, UB/UT, UC, UN, UO, UP, UQ, UR, UA Franz Josef Land, YO, YU, ZA, ZB1, ZB2, 3A, OHØ, GM Shetland Islands.

JARL DX

Starts: 1000 GMT Saturday, August 24.
Ends: 1600 GMT Sunday, August 25.

Above information is unofficial and is based on last year's time and dates. We should have it for next month's CALENDAR.

New Jersey QSO Party

Starts: 2300 GMT Saturday, August 24.
Ends: 0400 GMT Monday, August 26.

Results 1962 Russian DX Contest

USA							
W9WNV	26,574	W3QLW	1,100	KH6CYT	286	K3MNT	12
KH6IJ	9,826	W8KSR	1,075	K8SWE	275	K5UYF	8
K5IKL	6,321	W9WCE	777	WA6PJO	270	W2NCI	1
W2WZ	3,776	W6MSM	758	W4WHK	240	K9ZMT	1
K6EVR	3,763	K3JJG	722	K2ZRO	234		
WA6DNM	2,952	WA6PMK	714	W1WY	195	Canada	
K3CYA	2,400	W3MSR	684	KL7DUZ	170		
W4ZYS	2,108	W2SVW	682	K4BVD	121	VE7ZK	3570
K1RTB	2,100	K3CUI	665	W4KXV	120	VE3AYX	3025
K2CXM	1,716	WA6NFC	552	WA6TLL	102	VO1DZ	1680
KL7BCW	1,651	W8JXY	528	WA6YFL	90	VE3HB	1485
W9GFF	1,392	K1UDD	522	KØVTG	80	VO2NA	1000
K2UYG	1,386	K7HID	448	WØMCX	65	VE2AYU	500
K6IPY	1,308	W4HOS	437	K4RQE	48	VE3PV	458
W3ADZ	1,300	W1NTH	405	W5HDS	48	VE2IL	210
W5NOP	1,269	W5BRR	368	K8OCO	48	VE3DGX	130
KL7DNØ	1,166	W9DRN	350	W9UZS	45	VE4ZX	63
		K7JCI	300	WA2VBW	16	VE2UN	57

The Garden State Amateur Radio Association invites amateurs the world over to take part in the Fourth New Jersey QSO Party.

Phone and c.w. are considered the same contest. A station may work another station twice per band, once on phone and once on c.w. The same station may be worked on other bands. New Jersey stations may work other N. J. stations.

The general call is "CQ New Jersey." New Jersey stations are requested to identify themselves by signing "DE NJ" on c.w. and "New Jersey Calling" on phone.

Exchanges will consist of QSO number, RS(T), and QTH (state, province, or country). New Jersey stations will send county for QTH.

Outside stations multiply number of complete contacts times total number of counties (maximum 21). N.J. stations multiply number of complete contacts times total number of states, provinces, and foreign countries.

Certificates will be awarded to the 1st and 2nd place stations in each section, and lower where deemed necessary. Novice and Technician awards will be issued when two or more logs are received.

Logs must also show time, date, band, and emission, and be postmarked no later than September 11, 1963. Logs go to GSARA, Red Cross Building, Broad Street, Shrewsbury, New Jersey.

Sixth Annual QCWA Party Results

Below is a listing of the top scorers in the QCWA QSO Party held in February. Only those who broke 100 QCWA member contacts are listed. First number is the QCWA members worked; the second is the total contacts.

W4FNQ	196	256	K6GIL	114	132
HC1DC	179	314	W5DWO	113	136
W6ZPX	147	167	W1DIT	109	139
W5UX	128	163	W2ZM	108	112
W6NWI	115	162	W3AHX	105	125
W5KC	115	144	W7AYO	105	112

1962 SP Contest

The first place winners for the USA in the 1962 SP Contest were W4KXV with 2,788 points on c.w. and K5IKL with 666 points on phone.

1962 VK/ZL Oceania Contest Results

The 1962 VK/ZL contest results are shown below for North and South America. No break-

[*Continued on page 90*]

SPACE COMMUNICATIONS

GEORGE JACOBS*, W3ASK

PROJECT OSCAR headquarters has announced that all OSCAR II QSL cards were mailed during early May. The card, similar to the one sent for OSCAR I reports except for color, has been sent to verify all observations and measurements made on the world's second radio amateur satellite, and reported to OSCAR headquarters. The back of the card carries the following statement:

OSCAR II

Orbital Satellite Carrying Amateur Radio

OSCAR II, launched June 2, 1962 was the second radio amateur satellite dedicated to the peaceful use of outer space. Transmitting the c.w. characters HI on a nominal frequency of 145 megacycles, OSCAR II circled the globe for 295 revolutions before the 100 milliwatt radio beacon failed during the frictional heating of the reentry. OSCAR II was launched at an inclination of 73 degrees and the initial period of the satellite was 90.55 minutes. Six hundred and eighty five radio amateurs in all continents provided more than 7000 tracking reports during the flight of OSCAR II.

Your reception report, hereby acknowledged, testifies to the proficiency in this continuing series of radio amateur space experiments.

As an extra bonus to those reporting OSCAR II reception, enclosed with each QSL card was a copy of the entry made on the IBM master computer log for the report for which the QSL was sent. Each OSCAR II report received at OSCAR headquarters was fed into the computer in order to determine tracking and orbital data as soon as possible, and to machine-evaluate the results of the experiment. The OSCAR II QSL card and the copy of the computer log are prized mementos attesting to participation in one of amateur radio's most thrilling experiments.

If a QSL card *has not* been received for an OSCAR II report sent to OSCAR headquarters by the time this appears in print, drop a note to: Project OSCAR Inc., P.O. Box 183, Sunnyvale, California, USA.

Send a copy of the original report with the request for the QSL card.

*11307 Clara St., Silver Spring, Md.

SYNCOM II

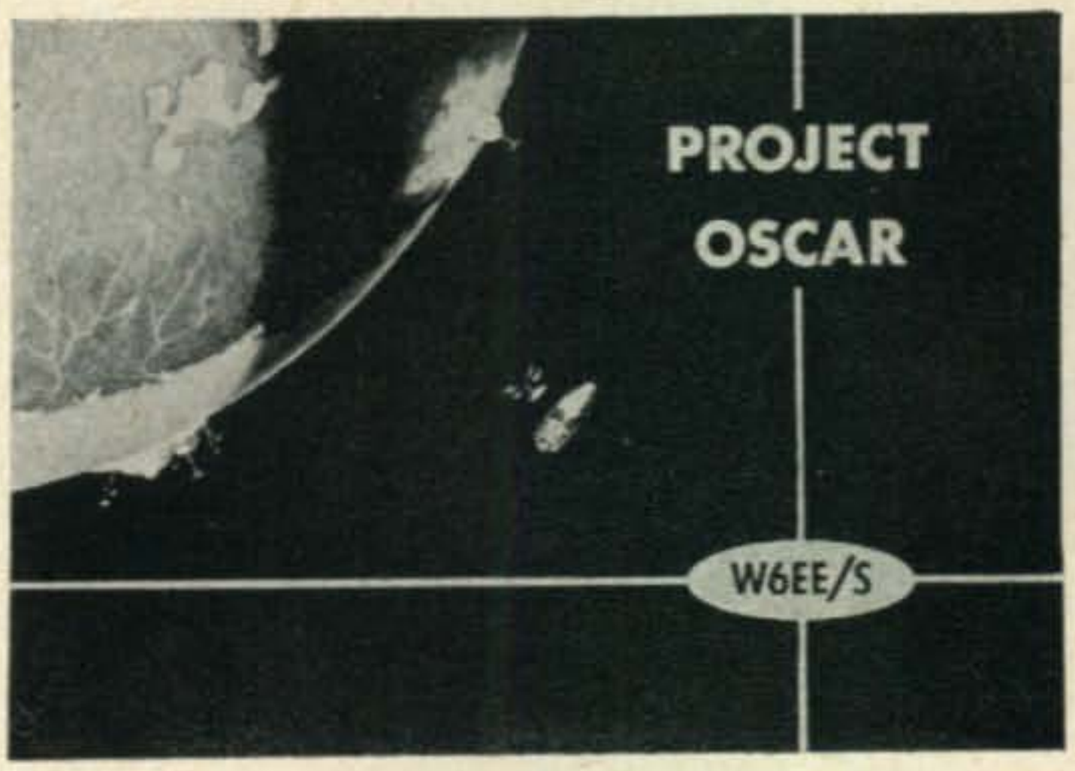
SYNCOM I, launched from Cape Canaveral on February 14, 1963, was intended to be an active communication satellite which was to have been placed into a "synchronous" orbit, 22,300 miles above the earth. At this altitude, the velocity of the spacecraft (6,380 m.p.h.) would equal the earth's velocity, and would appear to be almost stationary in the sky.

Despite a successful launch, radio contact with SYNCOM I was lost five hours and seven minutes after lift-off, as an intricate maneuver was being carried out to "kick" the satellite into the final leg of its orbit. Although the satellite has been located by radar, it has not been possible to re-establish communications with it.

SYNCOM II will be almost identical to SYNCOM I. A little over two feet in diameter, and standing almost two feet high, the cylindrical spacecraft weighs about 55 pounds. It will carry an additional 70 pound solid-propellant rocket system which will inject the satellite into the final leg of its synchronous orbit.

The communication relay equipment aboard SYNCOM II will consist of two independent receiver-transmitter systems, as well as command receivers and telemetry transmitters. The satellite will receive transmissions from powerful ground stations on a frequency of approximately 7360 mc. The transmissions will be relayed on

[*Continued on page 92*]



Measuring approximately 5 × 7", the OSCAR II QSL card is printed in green, light blue and buff against a solid black background. The card had been sent to verify each report of OSCAR II reception submitted to Project OSCAR headquarters.

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

Most hams have interests other than ham radio, and a good number pursue and enjoy other hobbies along *with* their families. Because of these secondary hobbies, ham radio becomes more enjoyable—especially if one can talk to a fellow ham with like interests.

However, we have with us (unfortunately), the *ham*. He talks, sleeps, dreams and sees nothing but ham radio—much to the disgust of his family, friends and *some* fellow hams.

On the air, this is the character interested only in signal reports and talking about his station gear, and all or most of his free hours are spent in the hamshack. Generally, his QSO's are short, unless he is lucky enough to have the ear of someone like himself. Thank goodness, this bird is not in the majority!

Ham radio is the finest of hobbies—but it certainly is not a ham's whole existence—at least it should not be.

Of course, there are times when ham radio *is* the one and only subject of conversation or pursuit; but after the usual exchange of ham talk, it is much more fun to use the hobby as a medium for cultivating friendships, discussing mutual interests and acquiring new knowledge—not only about the person to whom one is talking but a myriad of subjects. Also, the family can participate in these QSO's, for lone-wolfing it in front of the mike or any other place is not conducive to family harmony.

Remember: those who enjoy ham radio most are those who pursue the hobby with "vigah," but at the same time balance the pursuit with other interests and responsibilities.

Questions

Technical Tips—When a HAM CLINIC reader is kind enough to share his tip or kink and sends it to us for publication, it takes about three months before it will appear on these pages. Tips are acknowledged immediately, and we try to give you the exact publication date. However, please bear with us if it does not appear as scheduled. Always let us know that your tip is meant exclusively for HAM CLINIC and has not been sent to any other magazine.

*c/o *CQ*, 300 W. 43 St., New York 36, N. Y.

Batteries—"When do I use a mercury or a manganese battery?"

The mercury battery should be utilized where long shelf life, steady output voltage and size are considerations. The manganese battery should be used when you need high surge capability and good shelf life. Both batteries are far superior to the old lead zinc cells. Although costing more, the newest batteries are worth the price difference. Write: Mallory Distributor Products Co., PO Box 1558 (CQ), Indianapolis 6, Ind. for more information.

DX-60 Push-to-Talk Circuit—"How about an effective PTK circuit for a Heath DX-60?"

Sure. See fig. 1. This set up uses two relays. When the mike button is pushed, 6 volts a.c. is appled to K_1 thus feeding 110v.a.c. to relay K_2 and completing the high voltage supply circuit. A toggle switch may be installed in parallel with the mike switch and front panel mounted for c.w. operation or tune-up purposes. The relays may be mounted in any convenient location, but *not* close to r.f. or a.f. wiring.

BC-779 Tech Manual—"Where can I obtain a complete manual for my surplus BC-779 receiver?"

Try Propagation Products Co., Dept. CQ, PO Box 242, Jacksonville 1, Fla. Price: $7.50 including postage.

Antenna Wire—Thanks to K2KNJ for letting us know that a *half mile* of copper covered steel

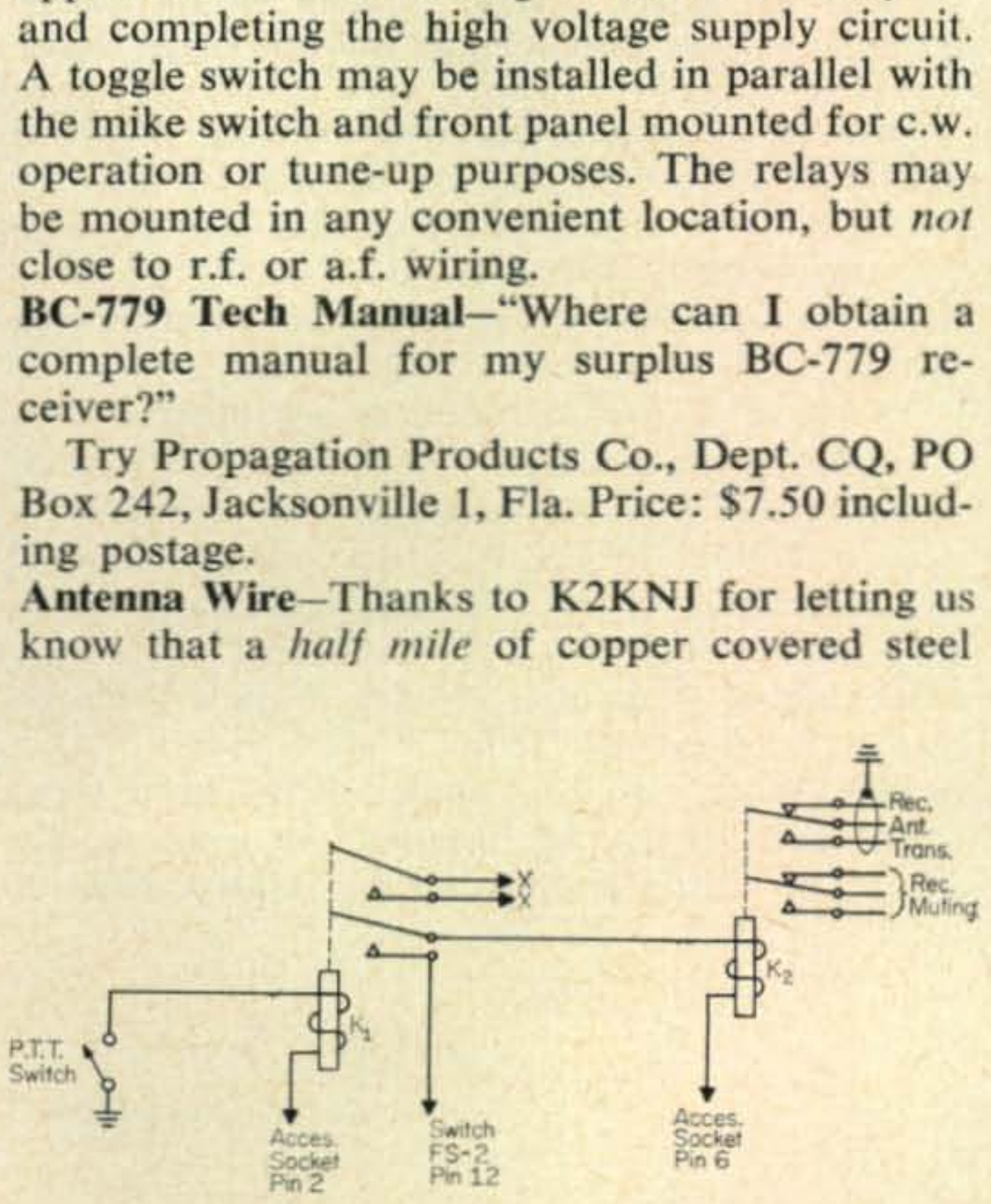


Fig. 1—Push-to-talk circuit for the Heath DX-60 transmitter. The center tap of the high voltage transformer is broken by relay contacts X-X. K_1 may be any 6 volt a.c. relay with proper contact arrangement while K_2 is a 110 volt a.c. Dow-Key antenna relay with auxiliary contacts.

wire can be purchased from Montgomery Ward for $9.15. Info is contained in Ward's Farm catalog, electric fence section.

HT-37 Tuning–K2BGL says that he has obtained better carrier suppression in the HT-37 by using his receiver S-meter. Receiver audio gain is OFF; R.F. GAIN control adjusted to give a half meter reading or S-9. When the HT-37 is placed on MOX position, AUDIO GAIN is reduced to zero and the balancing pots are adjusted for minimum carrier. Frank says he has obtained from 8 to 20 db suppression improvement by this method. Thanks OM.

R.F. Output Indicator for the DX-100–K6BYR sends in his version of a good r.f. output indicator for the DX-100 (fig. 2). The pot is placed next to the meter providing external control and is used to adjust for maximum desired indication on the band used. If operation is mainly on the lower bands (80-40 meters), it may be desirable to use a 7 or 10 mmf in place of the 5 mmf unit shown. The 5 mmf is adequate for use on 20 through 10 meters. The DRIVER CURRENT position of the meter switch was utilized, inasmuch as it is not often used on s.s.b. as is the DX-100 of K6BYR. Thanks OM.

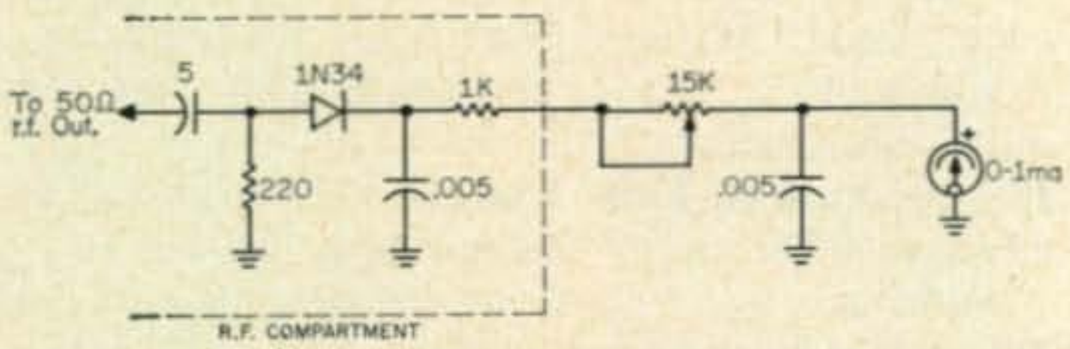


Fig. 2—R.f. output indicator used by K6BYR on his DX-100. The DRIVER CURRENT function of the DX-100 meter is removed and replaced with the circuit shown.

Improved Voltage Regulation–In the excellent article "Voltage Regulation the Easy Way" by W2LCB in the Oct. 1962 *CQ*, use is made of a circuit whereby two similar voltage regulator tubes are operated in parallel in a "compromise" circuit, with some loss of regulation.

In figure 3, silicon rectifiers are utilized thus eliminating the isolation resistors (in the original circuitry). The maximum loss of regulation is now only that of the forward voltage drop of the rectifiers. Additional stabilized output current can be obtained. Thanks G3HJL.

Checking or Matching Diodes–Figure 4 shows how to hook up your scope to check out or match diodes. When checking diodes of the same type, a comparison can be obtained by utilizing the *same* pot setting and noting the relative sizes of

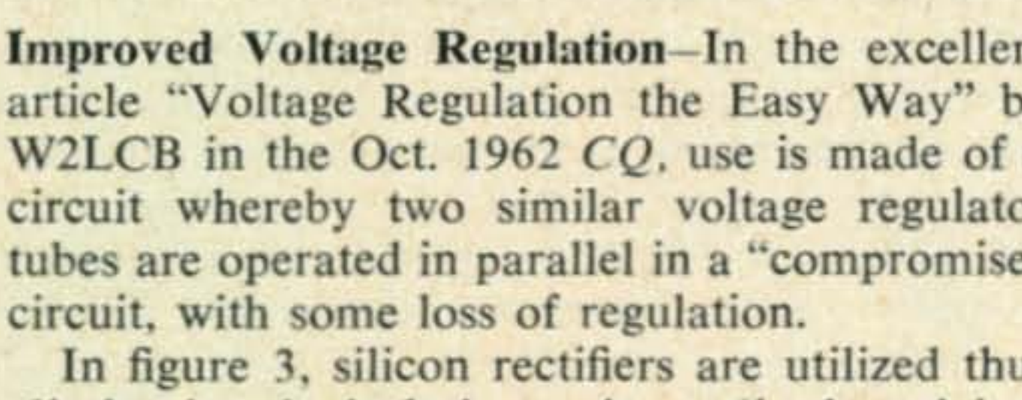


Fig. 3—Method of obtaining good voltage regulation over a wider range of load currents than obtainable with only one v.r. tube.

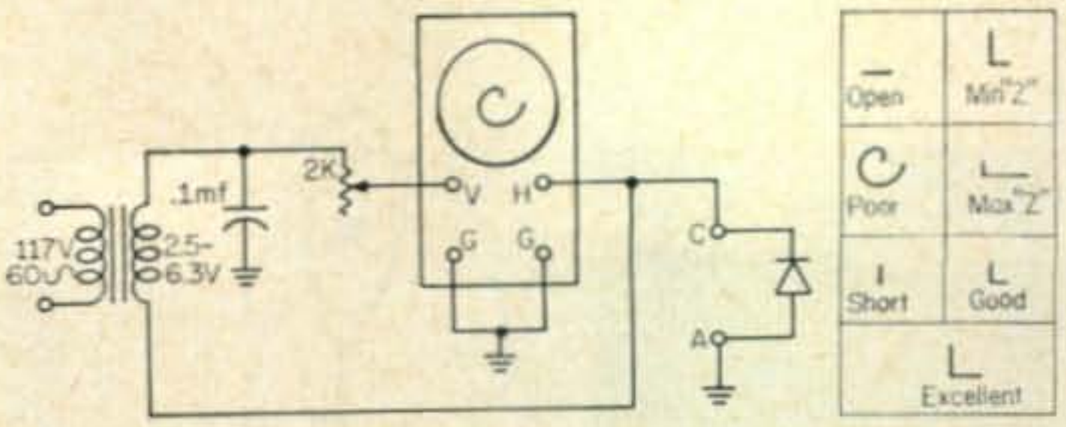


Fig. 4—A simple scope setup enabling the checking and matching of diodes.

the traces obtained. Choice of a transformer is not critical. In addition to the scope traces shown, look for any exhibition of "fuzz" or ripple. Even if the basic trace seems good, do not rely on a diode exhibiting either.

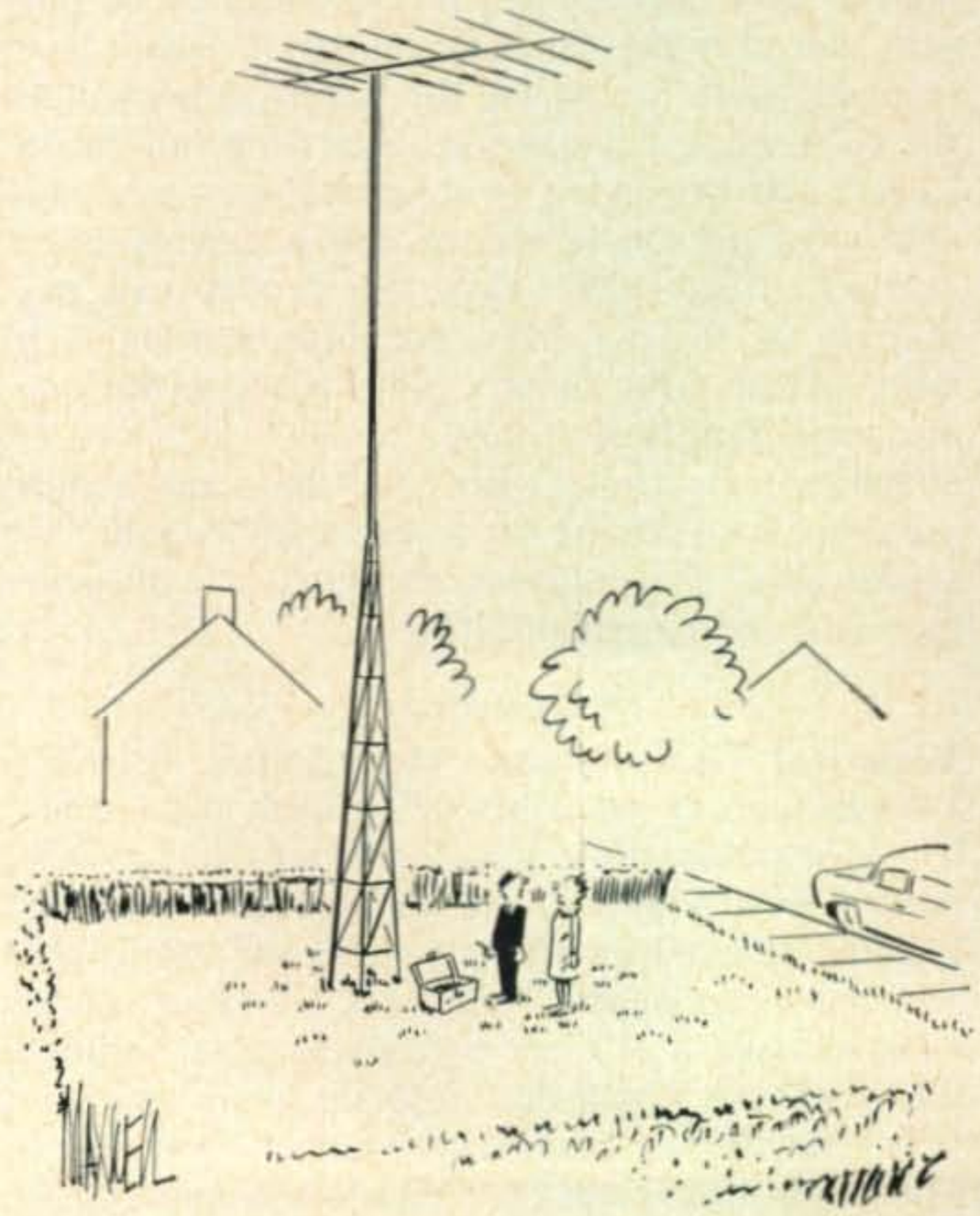
Thirty

Although the United States is still ahead of the world in radio-electronics technology, many European countries are making gigantic strides with the idea of catching up. I am inclined to think however, that they will never catch up unless we get so complacent as to allow this to happen.

Most of the European hams I have visited have home-made equipment, but all would love to have American gear if the tariff (import tax) was not so high. The few hams who have American equipped stations have money or have saved for a number of years.

With impending passage of the reciprocal privileges bill, let us hope that there will soon be some move to lower the import tariffs on ham equipment. A country not cooperating in this area is only hurting itself by not making available the tools for technological advancement of its own people.

73, 75, Chuck



"Now for a house."

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during July, 1963. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (July 11-12, 15, 18), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be disturbed, etc.

PREDICTED PROPAGATION CONDITIONS AND CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating higher than 6)* July 11-12, 15, 18	*Normal Days (WWV rating 5-6)* July 1-3, 5-6, 8-10, 13-14, 16-17, 19-20, 24, 26-30	*Below Normal Days (WWV rating 4)* July 4, 7, 23, 15, 31	*Disturbed Days (WWV rating less than 4)* July 21-22
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—is an excellent opening with strong steady signals.
B—is a good opening, moderately strong signals, with little fading and noise.
C—is a fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.
D—is a poor opening, signals generally weak, with considerable fading and high noise level.
E—is a very poor opening, or none at all.

THE following is a capsule description of propagation conditions expected during July for each amateur band 6 through 160 meters. For a more detailed forecast of band openings for distances up to approximately 2,400 miles, see the *Short-Skip Propagation Charts* appearing later in this column. A forecast of propagation conditions expected on world-wide DX circuits during July appeared in last month's column.

6 Meters: No DX openings forecast, but fairly frequent short-skip openings over distances ranging between approximately 1,000 and 1,400 are likely to occur during periods of intense sporadic-*E* propagation. Meteor-type openings are also likely to occur during the *Aquarids* meteor shower which should take place July 26-31.

10 Meters: Very few DX openings forecast, but frequent short-skip openings, between distances of approximately 750 and 1,400 are expected to occur as a result of sporadic-*E* propagation.

15 Meters: A few DX openings forecast for the daylight hours, mainly to tropical and southern areas of the world. Very frequent short-skip openings are expected, between distances of approximately 600 and 1,400 miles, as a result of sporadic-*E* propagation. Some *F*-layer short-skip openings, up to distances of approximately 2,400 miles, are forecast for the late afternoon and early evening hours.

20 Meters: Expected to be the best band for DX conditions during the daylight and early evening hours, with fair to good DX openings forecast to one area of the world or another from shortly after sunrise to a few hours after sunset. Excellent short-skip openings are forecast throughout the entire daylight period, for distances ranging between approximately 400 and 1,400 miles. During the afternoon and early evening hours, the range of short-skip openings is expected to increase upwards to a maximum one-hop propagation distance of approximately 2,400 miles.

40 Meters: Fair to good DX conditions forecast from the United States to many areas of the world from shortly before sunset, through the hours of darkness, until shortly after sunrise, but with noticeably higher static levels. Excellent short-skip openings are expected around-the-clock. During the daylight hours, short-skip openings should be possible over distances ranging between approximately 100 and 750 miles; during the hours of darkness range is expected to increase to approximately 500 to 2,400 miles.

80 Meters: Static levels are expected to be high on most days, but some DX openings are forecast during the hours of darkness. Excellent short-skip openings are predicted for the daylight hours over distances ranging between approximately 50 and 250 miles. During the hours of darkness the short-skip range is expected to increase to between approximately 200 and 2,400 miles.

160 Meters: Exceptionally high atmospheric noise levels and solar absorption are expected to

*11307 Clara St., Silver Spring, Md.

limit daytime propagation to groundwave distances, generally not exceeding several dozen miles. During the evening hours, fairly good short-skip openings are expected over distances of up to approximately 1,000 miles. Some openings considerably beyond this range may occur from time-to-time during the sunrise period.

Sunspot Cycle

The Swiss Federal Solar Observatory reports a monthly mean sunspot number of 30 for April, 1963. This results in a 12-month running smoothed sunspot number of 31 centered on October, 1962. Sunspot activity at the present time is approximately at the same level as was observed during the summer months of 1952. A smoothed sunspot number of 22 is predicted for July, 1963.

Total Eclipse

One of nature's most interesting phenomenon is that relatively rare occasion when the moon passes directly between the earth and the sun to create an eclipse. When such an event takes

[*Text continued on page 93*]

CQ Short-Skip Propagation Chart
July-August, 1963

Band Openings Given in Local Standard Time

At Path Mid-Point (24-Hour Time)

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	07-09(0-1) 09-13(0-3) 13-17(0-1) 17-21(0-2) 21-23(0-1)	07-09(1) 09-13(3) 13-17(1-2) 17-21(2-3) 21-07(1)	07-09(1-0) 09-13(3-0) 13-17(2-0) 17-21(3-0) 21-07(1-0)
15	*Nil*	07-09(0-2) 09-13(0-3) 13-21(0-2) 21-07(0-1)	07-09(2) 09-13(3) 13-17(2) 17-19(2-3) 19-21(2) 21-23(1-2) 23-07(1)	07-09(2-0) 09-13(3-0) 13-17(2-0) 17-19(3-1) 19-21(2-1) 21-23(2-0) 23-07(1-0)
20	*Nil*	06-09(0-2) 09-15(0-4) 15-20(0-3) 20-00(0-2) 00-06(0-1)	06-09(2) 09-15(4) 15-18(3) 18-20(3-4) 20-00(2-3) 00-06(1-2)	06-09(2) 09-15(4-1) 15-16(3-2) 16-18(3-4) 18-20(4) 20-22(3-2) 22-00(3-1) 00-04(2-0) 04-06(2-1)
40	07-09(1-2) 09-15(1-4) 15-19(2-4) 19-23(1-2) 23-07(0-1)	07-09(2) 09-11(4-2) 11-15(4-1) 15-17(4-3) 17-19(4) 19-23(2-4) 23-07(1-3)	07-09(2-1) 09-11(2-0) 11-15(1-0) 15-17(3-1) 17-20(4-3) 20-23(4) 23-05(3-4) 05-07(3)	07-09(1-0) 09-15(0) 15-17(1-0) 17-20(3-2) 20-05(4) 05-07(3-1)
80	06-09(3-4) 09-17(4-3) 17-21(4) 21-04(3-4) 04-06(3)	07-09(4-1) 09-17(3-0) 17-19(4-0) 19-21(4-2) 21-23(4-3) 23-04(4) 04-06(3) 06-07(4-2)	07-09(1-0) 09-19(0) 19-21(2-1) 21-23(3) 23-04(4) 04-06(3) 06-07(2-1)	07-19(0) 19-21(1) 21-23(3) 23-03(4-3) 03-04(4-2) 04-05(3-1) 05-06(3-0) 06-07(1-0)
160	17-18(1-0) 18-19(1) 19-21(3-1) 21-23(4-2) 23-05(4-3) 05-07(3-2) 07-09(1-0)	18-20(1-0) 20-21(1) 21-22(2-1) 22-23(2) 23-05(3-2) 05-07(2-0)	20-22(1) 22-00(2-1) 00-02(2) 02-05(2-1)	20-22(1-0) 22-00(1) 00-02(2-1) 02-05(1-0)

Hawaii To:

*Openings Given In Hawaiian Standard Time**

	15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	11-14(1) 14-16(2) 16-18(1)	02-05(1) 05-07(2) 07-14(1) 14-16(2) 16-18(3) 18-19(2) 19-20(1)	18-20(1) 20-00(2) 00-03(1)	20-21(1) 21-23(2) 23-01(1) 22-00(1)†
Central USA	08-13(1) 13-16(2) 16-19(1)	04-05(1) 05-07(3) 07-09(2) 09-13(1) 13-16(2) 16-18(4) 18-19(3) 19-20(2) 20-22(1)	18-20(1) 20-02(3) 02-04(2) 04-05(1)	20-22(1) 22-02(2) 02-03(1) 21-02(1)†
Western USA	08-11(1) 11-14(2) 14-16(1) 16-18(2) 18-19(1)	04-06(1) 06-08(2) 08-11(3) 11-15(2) 15-18(4) 18-19(3) 19-21(2) 21-23(1)	18-19(1) 19-20(2) 20-02(4) 02-05(3) 05-06(2) 06-07(1)	19-21(1) 21-23(2) 23-03(3) 03-04(2) 04-05(1) 23-03(1)†

Alaska To:

Openings Given In Alaskan Standard Time§

	15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	*Nil*	03-06(1) 13-16(1) 16-18(2) 18-20(1)	22-01(1)	*Nil*
Central USA	17-19(1)	04-07(1) 14-16(1) 16-18(2) 18-20(1)	23-03(1)	*Nil*
Western USA	17-20(1)	05-16(1) 16-20(2) 20-22(1)	23-01(1) 01-04(2) 04-06(1)	01-04(1)

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of opening indicate the *total* number of days during each month of the forecast period the opening is expected to occur, as follows:

(1) Less than 7 days; (2) Between 8 and 13 days; (3) Between 14 and 22 days; (4) More than 22 days.

On the Short-Skip Propagation Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the longer distance.

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

All times are shown in Local Standard Time, using the 24-hour time system. In this system midnight is shown as 00, while 01 is 1 A.M., 02 is 2 A.M., etc. Noontime is shown as 12, while 13 is 1 P.M., 14 is 2 P.M., etc.

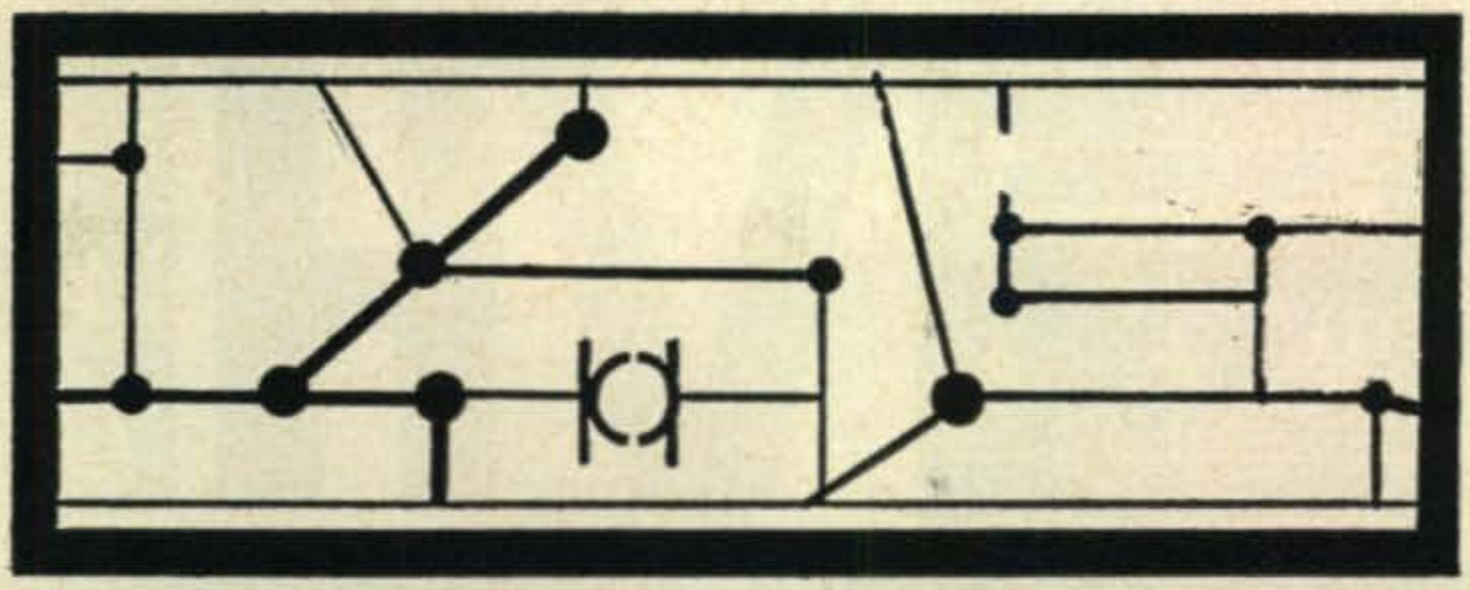
The *CQ* Short-Skip Propagation Charts are based upon a c.w. effective radiated power of 75 watts from a half-wave dipole antenna, a half-wave or higher above ground. The Charts are valid through Aug. 30, 1963. These forecasts are based upon basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

*Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST; 2 hours *behind* PST and 10 hours *behind* GMT.

†Time of possible 160 meter openings.

§Alaskan Standard Time (from Skagway to 141 degrees west longitude), is 4 hours *behind* EST; 3 hours *behind* CST; 2 hours *behind* MST; 1 hour *behind* PST and 9 hours *behind* GMT.

NOVICE



WALTER G. BURDINE*, W8ZCV

THE Dayton Hamvention has come and gone. I did get to meet some of you but did not get to attend the Saturday session. I will be there next year with bells on as it will be held on my fiftieth birthday.

I was listening and heard a visitor to the exhibits say, "I just don't understand what they talk about, they're speaking a foreign language. What do they mean by 10 meter bands, QSO's, QSL, SSB DXer, YL-chaser and a lot of other terms." I came home and strangely enough had two letters asking if I would explain some of the terms used in the column. Now could *you* sit down and explain the language we use so that a non-ham could understand it? Just try it!

I heard one young ham telling another that he had been working for two weeks on his transmitter and at the convention, had just found the trouble. He said it was worth the admission price just to get the rig going. Another was heard to say "Why is it so easy for him and so hard for me?" I often wonder about that too. Go to some of the hamfests and learn about ham radio. Meet friends and get acquainted. It will make your operating more pleasurable.

Classes of Amplifiers

A number of letters have asked me to explain the different classes of amplifier operation, so I will attempt to explain the differences of Class A, B and C operation.

Amplifiers were classed according to the conditions under which they operate by the IRE in 1938. Different operating conditions are determined by the amount of grid bias applied to the amplifier tube.

Class A amplifiers use a very small grid bias voltage. Plate current flows at all times while the tube is operating as a class A stage. In other words plate current flows during 360 degrees of the operating cycle.

If the grid bias is increased by a small amount the amplifier stage operates as a Class AB stage. Plate current will flow more than half the time (more than 180 degrees) but not during the entire operating cycle.

The Class B amplifier uses a grid biased to approximately the cut-off point. No plate current will flow until an a.c. signal is applied to the grid of the tube. Plate current flows during approximately one half the operating cycle.

The Class C amplifier, used only in transmitters, is biased to about twice the cut-off voltage of the grid. Plate current flows during only a small portion of each cycle of operation.

Applications

Class A amplifiers are used in practically all stages of a radio receiver, both the r.f. and a.f. stages. The amplifier used to amplify the small a.c. output of a microphone to the proper level to drive a modulator stage is operated Class A. The Class A amplifier is a voltage amplifier and must not be used to supply power.

Proper operation of a Class A amplifier stage requires that the grid bias voltage be adjusted so that the tube operates on the straight portion of the grid voltage-plate current curve of the tube operating characteristic curve. Plate current will flow during the entire cycle of the applied a.c. signal voltage and the output wave will be an exact replica of the applied a.c. signal voltage.

Distortion is caused by the tube operating on the non-linear portion of the curve. This can be caused by the wrong value of grid or cathode resistor or by a leaky or shorted cathode or coupling capacitor. A shorted or leaky cathode capacitor changes the cathode resistance. Leaky coupling capacitors cause distortion by leaking d.c. plate voltage to the grid of the tube following, along with the a.c. voltage to be amplified.

[*Continued on page 95*]

This DX corner belongs to David Scott, KN3VDD 1000 Water Street, Indiana, Penna. Dave says CQ was the first radio magazine he ever read and he still likes it. He says he does quite well with that set-up.

*R.F.D. 3, Waynesville, Ohio.

VHF

DONALD L. STONER*, W6TNS

INCREASING sideband activity on two meters is certainly keeping the surplus dealers hopping these days. Equipment which was considered a dog a year or so ago is now in demand. One example is the radar transmitter T-28/APT-1. Originally, this was a unit to generate a noise spectrum and foul up the other fellows radar screen. The APT-2 is capable of transmitting on frequencies between 90 and 225 mc. With some relatively simple modifications it can be converted to heterodyne 14 mc s.s.b. to 144 mc. By adding a high level modulator it could also be used as a nifty 20 watt input 2 meter rig.

The circuit of the APT-1 is shown in fig. 1. It consists of a pair of 6C4s connected in push-pull with feedback from the plate back into the grid circuit. This drives an 832A buffer which is grid modulated by the noise source.

This, in turn drives the final 832A. A conventional push-pull tuned circuit couples the 6C4's and 832A while roller coils are used between the buffer and final. A combination roller coil-tuned line is used to couple the final to the antenna.

Converting the APT-1 involves removing the circuitry associated with the 6C4's and installing the new crystal chain as shown in fig. 2. This consists of one-half hour 6J6 operating as a 43.33 mc overtone oscillator driving the second half tripling to 130 mc. A 6BH6 buffer-amplifier increases the signal sufficiently to drive the 832A high level mixer. The 130 mc signal is applied through a link to a new grid coil wound to self resonate at 130 mc with the 832 grid capacitance. This stage is also rewired to operate as a mixer with self bias and to apply the 14 mc sideband energy to the cathode circuit. The remainder of the circuitry is virtually unchanged with the exception of applying bias to the final to linearize its operation. It is also possible to modify the rig further to incorporate on 829B in place of the 832A final.

The unit is peaked in the customary manner by pretuning the coils with a grid dipper. Once they are in the ballpark, power can be applied to the plus 250 volt connection. Connect a v.t.v.m. to the grid of the 6BH6 and peak the oscillator-tripler coils for maximum negative voltage. With only filament voltage applied to the final, connect a milliameter between the negative bias connection on the terminal strip, and ground. Adjust the 6BH6 plate, link coupling, 832A grid and plate coils for maximum grid drive. Next inject about 1 watt of carrier into the 14 mc s.s.b. input jack and remove inductance from the 832 mixer plate tank until another peak is noted in the final grid current. With a grid dip meter, verify that the drive applied to the 832 mixer is 130 mc. Also check the output of this stage to insure the final is driven by the sum frequency of 144 mc.

When you remove the 14 mc injection (by balancing out the carrier in the exciter) the 832 final grid current should drop to zero. If it doesn't, stop right here as something is amiss. Assuming it does, it is now safe to apply negative bias and a source of 450 volts to the 832 linear stage. Adjust the bias source until the 832 resting current (with no excitation) is about 15 ma. This will require something between —15 and 20 volts. This adjustable power supply should be well filtered and reasonably well regulated, by the way.

Once the proper operating conditions for the final have been determined, apply a 14 mc two-tone signal. This can be done by connecting an audio oscillator to the exciter and inserting a small amount of carrier. Connect the deflection plates of a scope to the output of the transmitter loaded with 52 ohms. Adjust the carrier insertion on the exciter until the typical 100% modulation waveform is obtained. Increase the loading

Bill Ryan, WA5BJN of Fort Worth is credited with being the only amateur with a halo built into his head, and this picture proves it! This is Bill shortly after an automobile accident which netted him a broken neck. Two holes were drilled into his skull which formed the mount for a neck brace, which looks enough like a halo to be one.

*Alta Loma, California.

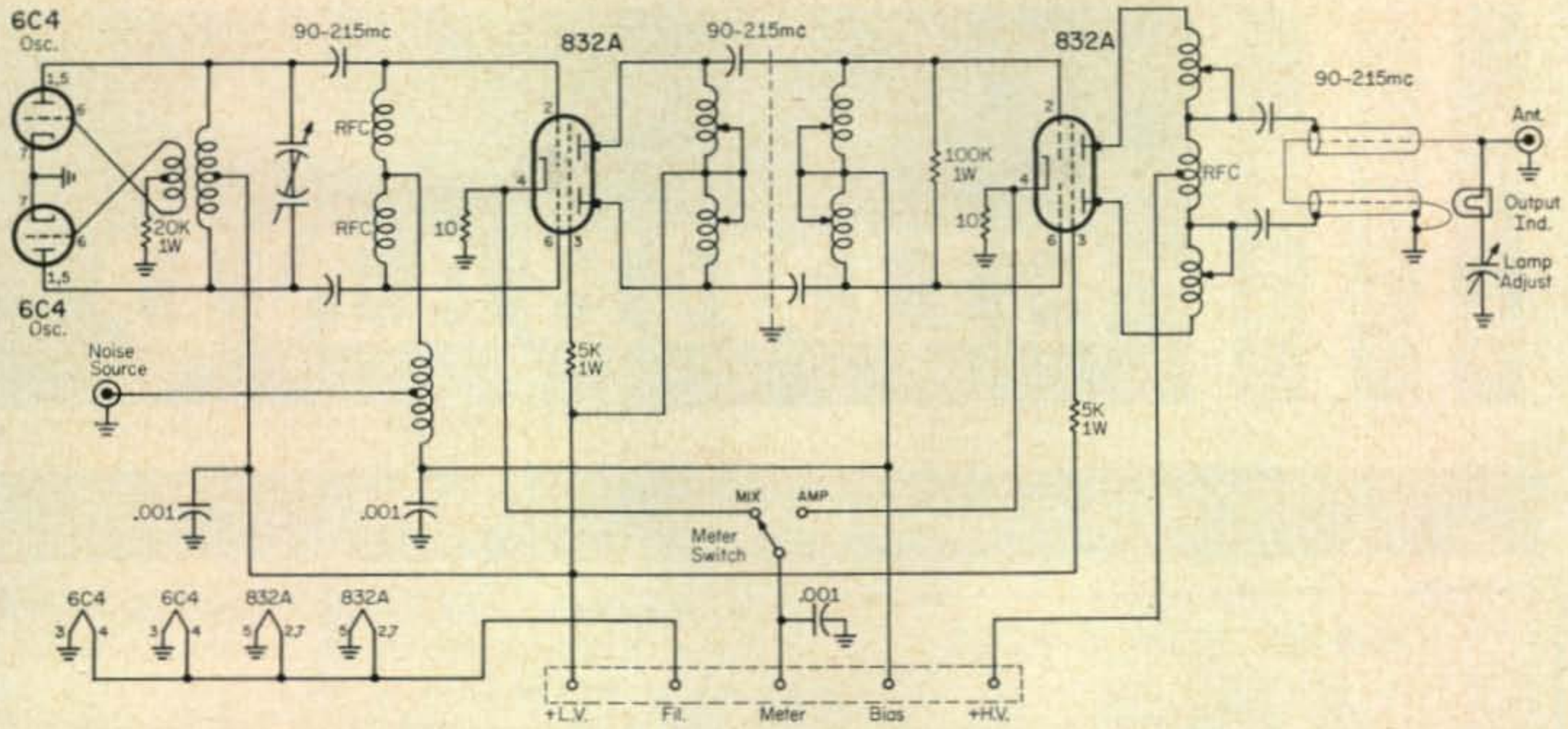


Fig. 1—Unmodified circuit of Radar jamming transmitter T-28/APT-1. Conversion to a high-level 2-meter s.s.b. converter is shown in fig. 2.

and signal level for the maximum power output consistent with good waveform linearity. As a final check, readjust all tuned circuits for maximum s.s.b. output.

Our thanks to Pete, AF5LHX, Director of the Central Technical Net (Texas Section) for supplying the basic conversion information.

VHF Around the World

I received an extremely interesting letter from Jim Pershouse, 9M2DQ, of Penang, Malaya. Jim lives on an island off the coast and depends on v.h.f. communications for his contact with the rest of Malaya. He writes, "In many ways Malaya undoubtedly has the best communication system in Asia with the possible exception of Japan. This is partly due to the 1948-1954 war here against the Communist terrorists and the good communications in no small way contributed to their defect and final withdrawal of the remants to the jungle of the South Thailand-Malaya border. Every police station in the county is on v.h.f. radio, as are most of the police vehicles.

"The method is state-by-state, with police transmitters and receivers (in many cases unattended) in the range of 80-100 mc on mountain tops. In the cities and large towns, Police/Military/Gov't. Operation Rooms are combined. These send up signals to and from the mountain relays by v.h.f. in the range of 130-140 and 150-170 mc which are then rebroadcast. In some cases spare transmitters and receivers can be turned on and off, and meter readings taken by radio remote control. The Kedah relay is on top of Kedah Peak about 3,500 ft. high and down south in Cameron Highlands relays as high as 6,000 ft. are used.

"The Tele-communications Department here is going more and more on v.h.f. instead of line communications. For example, on this rather remote and undeveloped island group we have a 40 line automatic exchange for local calls. On

[*Continued on page 97*]

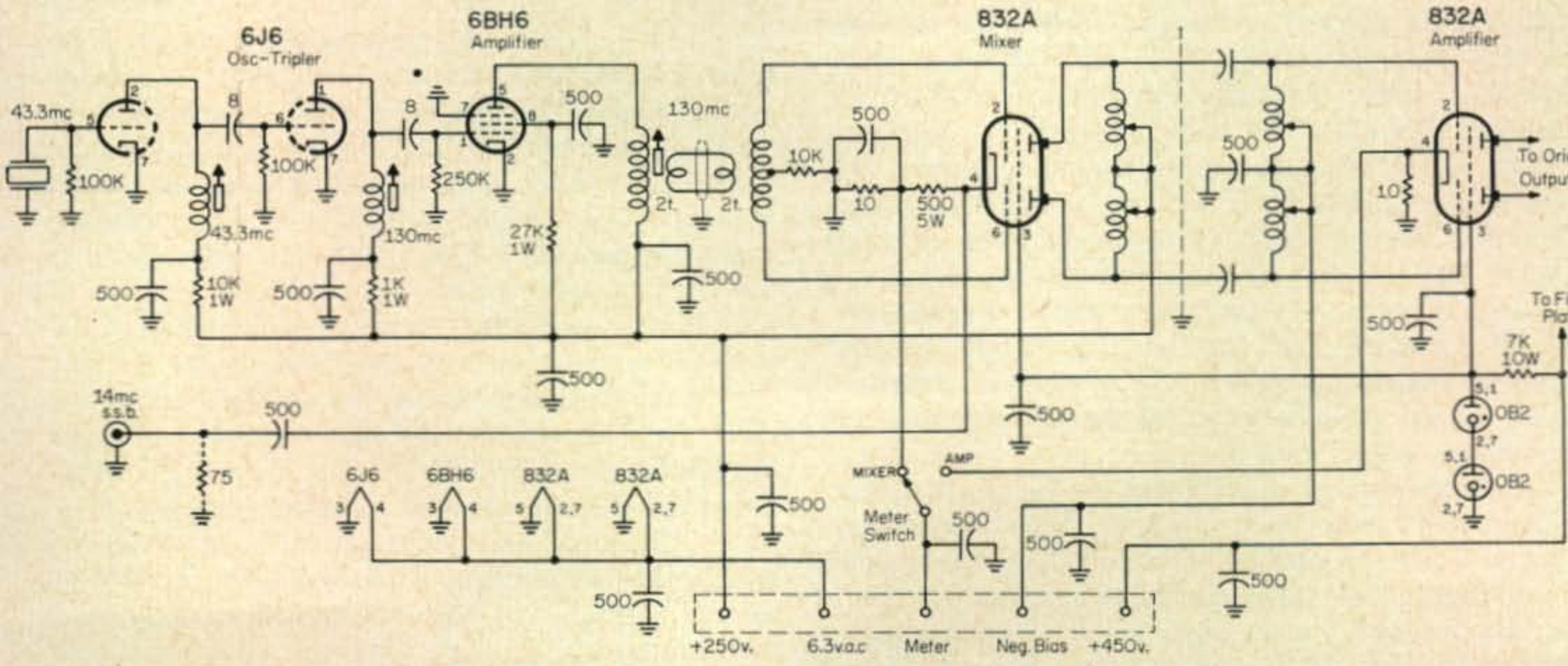


Fig. 2—T-28/APT-1 transmitter modified for use as a 2-meter s.s.b. converter. New coils marked only with frequency should resonate with tube capacity at the frequencies shown.

sideband sideband sideband

SIDEBAND

IRV & DOROTHY STRAUBER*, K2HEA/K2MGE

SSB DX HONOR ROLL

TI2HP	277	W1LLF	254	WØUUV	239
PY4TK	276	W2VCZ	253	K1IXG	238
W8EAP	273	K2MGE	252	W1AOL	238
W2ZX	273	PZ1AX	251	WA2IZS	235
VQ4ERR	273	W5IYU	250	W8YBZ	233
K8RTW	271	G8KS	248	K6ZXW	231
W8PQQ	269	G3NUG	248	W1ORV	230
W2FXN	269	W3KT	248	WØCVU	229
W6UOU	264	I1AMU	245	W2VZV	227
K9EAB	263	G3FKM	245	K4PUS	226
HB9TL	262	W6RKP	243	YV5AFF	226
K4TJL	262	G2BVN	242	PJ2AA	223
WØQVZ	260	W6BAF	242	VE3BWY	221
DL1IN	258	W6PXH	242	G3DO	220
W3LMA	257	K6MLS	240	WA6HOH	219
W4OPM	257	W6WNE	239	K4AJ	217
MP4BBW	256			K6LGF	216

SSB DX ENDORSEMENTS

DL1IN	250	W4PAA	175	W9OIJ	75
W2VCZ	250	W8WT	150	K2KGS	75
W1ORV	225	VK4RQ	150	K1KPS	50
W4UWC	200	WA2TAG	125	K6AHV	50
WA6AMZ	200	K3HQJ	125	W6NAT	50
W9SFR	200	W2QNE	100	WA2JBV	50
G3AIZ	200	K6KCI	100	W2FXA	50
W8KBT	175	K4VOF	100	G3KXT	50
W4RLS	175	ZB1A	100	K8IQB	50
WA2EOQ	175			W5ILR	50

As many of you will note, there have been a few changes in the Honor Roll listings with many scores being reduced due to official deletions of countries no longer in existence and, in some cases, due to inadvertent duplications and omissions. To refresh your memory, the following prefixes and countries should be deleted from your SSB DX listings: CN2, Tangier; CR8, Goa; FF8, French West Africa; FQ8, French Equatorial Africa; I5, Italian Somaliland; VQ6, British Somaliland; ZD4, Gold Coast; 9U5, Ruanda-Urundi. To these was added ET2, Eritrea, which had subsequently been deleted. If you have been credited with any of the above nine countries, please delete them and adjust your totals accordingly.

In going through the lists, we discovered that our bookkeeping system was in need of a change and so the male member of the family came up with the bright idea of a permanent listing form which would be distributed in duplicate to all interested s.s.b. DX chasers. This permanent form would be mailed back and forth for listings and credits, eliminating the necessity for filing many forms for each station and the subsequent difficulty of checking for duplications. We are working on a set-up for these forms and hope to have them available shortly at which time they will be sent in place of the current forms.

We're very pleased to see the existing high interest in the *CQ* SSB DX certificates and endorsements and invite all our readers to try their hand at achieving the many beautiful awards available.

At Last . . . . Swampscott

For the past several years we have heard tales of a fabulous prize give-away being conducted in a town named Swampscott up in Yankeeland; hams returning from this area, laden with prizes, have suggested that it is the closest thing to "Ham Heaven" they've experienced.

So, one bright Friday, together with Russ, K2RLY, we made the pleasant ride on the expressways, parkways and detourways to Boston and thence to Swampscott and the New Ocean House, site of the Hamvention.

We wish that we had enough space to really take you through the two day affair as it really should be reported! It lived up to the reports of previous years' visitors—in fact, it made some of the reports we had heard pale by comparison with the real thing.

Aside from the thousands of dollars in prizes, in the area of $25,000; hams came from all over the W/K 1 call area—thousands upon thousands of 'em! In cars (with and without trailers), sports cars, trucks, bicycles, by plane and by foot, hams poured into Swampscott, filling every nook and cranny of the spacious hotel, overflowing the acres of grounds between the hotel and the convention building and crowding into the commodious convention hall to view the exhibits presented by every major national manufacturer and New England distributor.

Officially, the 1963 New England ARRL Convention is sponsored by the Federation of Eastern Mass Amateur Radio Associations, and under the General Co-Chairmanship of Eli, W1HKG; Russ, W1EYZ; and Gene, W1VRK. Saturday was devoted to visiting exhibits, "eyeball" QSOing, and enjoying the program of entertainment put on in the Main Dining Room. Sunday began early with forums being conducted simultaneously in four different meeting rooms in the hotel. Herb Hoover, Jr., W6ZH, ARRL President; John Huntoon, W1LVQ, ARRL Gen-

*12 Elm St., Lynbrook, New York.

eral Manager; Bill Leonard, W2SKE; Carl Mosley; Bud Drobish, W9QVA; Chuck Carney, WØGDJ and Bill Dostal, WA2GMN of Collins and John Magnusson, WØAGD of E. F. Johnson, were among the many luminaries who presided and took part in the varied and interesting programs lasting through the day.

About 4S7IW

Thanks to Bob Lane, WA6ZIQ, we are pleased to share with you a letter sent to Bob by Ian Wollen, 4S7IW, who is the only station on s.s.b. in Ceylon at the moment.

"Many thanks for your letter and card which came this morning, with a whole heap of W cards. Very glad to work you on the 29th but I had a really frantic pile-up on the 2nd April! It really was frightening! My favorite freqs are 14,255, 14,278 (as 14,280 usually is jammed) and 14,285. At the moment, I am QSLing myself, either through the 4S7 bureau (which is quite efficient) or direct airmail if I get 5 IRCs. Times are 1630 GMT onwards, depending on the band.

"I am a tea-planter, been out here since 1949, aged 32, and hamming for the last two years. I don't have a G-call yet, though I passed the G-license while on furlough.

"Equipment was originally a single 807 (17 watts), then a Heathkit DX-40 and AR-88. Then I got keen on s.s.b. and built the W4IMP exciter to a 2E26 linear. I only got it adjusted (crystals are impossible to get here) just before going on leave to the U.K. in October, 1962. Had a wonderful home leave, met a lot of Gs, and obtained a KWM-2 from W9ADN. This is the rig I am running at the moment, both fixed and mobile to a ground-plane, and, when mobile, a Webster Bandspanner. I have the Waters' *Q*-Multiplier fitted; this helps a lot, except when the QRM is too much—such as when W-land comes through!

"I shall be here for another two years before going on furlough again so hope I will work everyone who wants me by then. I really need a better antenna, and may get a TH-4 or similar one day. . . .

". . . It certainly is a fine life here—we live 4,300 feet above sea level in a very pleasant climate, 80° by day and 65-70° by night. I am in a bad position DX-wise as my bungalow is in a valley and we are surrounded on three sides by mountains. I'm sorry I don't have a photo of the rearranged shack at this time, but I will pretty it up (a little) and send you a good photo fairly soon. . . .

". . . Wonderful discipline on the band the other night, by the way. This one UA3 was calling me in the middle of the W pile-up. I said 'QXR one, fellers, there's a UA3 calling' and, boy, you could hear a pin drop! As soon as he was finished, all bedlam again broke out!

"Here's looking for many more pile-ups and hope we can ragchew one of these days. I also listen on 10, 40, and 15 but no luck so far. Have a 40-meter dipole and a long wire."

If we just said "Here's Marcia" everyone would know that we meant WA6MAZ of Vandenberg AFB, California. This lovely and charming XYL has made quite a name for herself on 20 meter sideband where she has a variety of interests and many, many friends.

London Dinner A Smash!

As if there were any doubt, proof that sideband has certainly come into its own was furnished by the huge success of the London Sideband Dinner on May 11. Organized by Joe Steele, G3KZI, and Norman Fitch, G3FPK, the Dinner attracted 400 sidebanders, mainly from the U.K. but also including visitors from the United States. The Netherlands, Sweden, Switzerland, Italy, and Bahrein Island. In addition to the many well-known Gs in attendance, the guest list included Jack, HB9TL; Harry, W2JXH, and his XYL, Florence; Stu, W2GHK; Ian, MP4BBW; Domenico, HV1CN; Rundy, OD5CT; Angus, 5N2AMS; Doris, 5N2DMS; Kees, PAØCS; Hans, PAØZD; Peter, ex-ZD2PJB; and Sten, SM5MC.

The festivities opened at 1430 (GMT naturally) with an informal get-together and a display of new equipment and continued on to the more formal portion of the evening. The Banquet lasted from 1745 to 2300. We heard that the meal was delicious; the entertainment delightful; and a number of prizes were raffled, including an HX-50 and guess who won that? John Savage, G3MSS, British representative for the Collins Radio Company! Amid much merriment, John gracefully returned his prize and it was re-raffled to the delight of Maurice Margolis, G3NMR, who found no conflict in accepting the prize.

Although we haven't had a chance to check with the organizers, we've already heard it mentioned on the band that there will be a similar dinner in London next year.

Powder-Puff Derby, 1963

Carolyn Currans, W3GTC, of Norristown, Pa., has again performed a magnificent task of setting up communications facilities for the Powder-Puff Derby which starts at 0800 PST on July 13 and finishes at 1200 EST on July 17. After poring through the *Call Book* and writing mountains of letters, Carolyn has come up with the following listing of hams at the official stops

In the short year since he received his call, Gil Chirinos, OA4PX, has well over 1,000 contacts, mostly with Stateside stations and he's still going strong. For anyone still needing Peru on s.s.b., look for Gil on weekends on 21 mc around 2400 GMT and on weekdays on 14 mc after 2400 GMT.

of the Powder-Puff Derby: Bakersfield, Calif., Harryette Barker, W6QGX, and the Bakersfield ARC; Las Vegas, Nev., Ron Phillips, K7RLX, and the Las Vegas ARC; Page, Arizona, Carl Hutton, W7MSC; Farmington, New Mex., Paul Blackman and the Totah ARC; La Junta, Colo., A. M. Gotton, WØPGX; Great Bend, Kansas, Bill Jones, KØCIY/Ø; Kansas City, Kansas, Cecil Oesch, KØOXK, and the Jay Hawk ARC; Springfield, Ill., Charles Barber, W9YJF, and the Sangamon Valley RC; Dayton, Ohio, Jim Dakin, K8BPC, and the DARC; Cumberland, Md., Tom Herndon, K3RWT, and the Mountain ARC; and Atlantic, N.J., station to be announced.

The Powder Puff Derby Net will use 75 meter s.s.b. as much as possible and will meet on 3.993. If necessary, 7.217 will be their frequency on 40 meters; and each evening at 2300 EDT, W3GTC will hold a 20 meter schedule with West Coast headquarters. Although we know that the timeworn phrase "A clear channel would be appreciated" has become overdone, it is hoped that all amateurs will appreciate the importance of the traffic being passed and will give this

Tony Petitjean, F8DC, earned his s.s.b. WAZ with a barefoot exciter, the Gonset GSB-100 shown here and a G4ZU Minibeam. His Phone WAZ was achieved with the 100-watt homebrew a.m. transmitter shown to the left. Tony is very keen on ragchewing with his numerous friends in the USA, and says he hears enough a.m. on 15 to convince him that sidebanders should make more use of that band.

endeavor their fullest cooperation.

Hats off to Carolyn Currans who, year after year, has done a wonderful job of insuring communications among the amateurs on the progress of the Powder-Puff Derby participants and congratulations to the many amateurs who have helped in this fine and noteworthy service.

Correction PLEASE!

In one of our recent columns, we went a little overboard in congratulating Alicia, KP4CL, on the occasion of her receiving the "Worked 200" Certificate, stipulating that she was the *first* XYL out of the USA to receive this award. Having met Alicia personally several times, it's not hard to go overboard for such a charming, gracious lady but due credit must go to Susanna Sanchez, YV5AFF, another charming, gracious lady and equally fine DXer who was awarded her 200 Certificate some months before. These outstanding operators, along with K2MGE and Meredith Henry, W6WNE, comprise the four XYLs out of 98 sidebanders to earn the "Worked 200" Certificate.

How *Not* to Get a QSL Card!

Although much has been written regarding the necessity of providing proper information on QSL cards, a large group of hams either have not taken this information to heart or else they must feel it is not of consequence. They could not be further from the truth! In talks with John Hern, VS9AAA, who is sending out the VS9ADV/4W1 cards, and Joe Hellmann, W2MES, who, with the Long Island DX Assn., is handling a similar chore for HC8CA, we were told that almost one-third of all cards received had errors either in date or time of the contact. The improperly made out cards had to be put aside until time was found to go through the logs, entry by entry, to see just when the contact was made, delaying considerably the receipt of the much coveted card. Joe was also amazed to discover that either a s.a.s.e. was lacking, or if an envelope was enclosed, it carried no postage! Come now, fellows—do you want those cards back quickly or don't you?

Just as soon as you finish reading this, we suggest that you set some clock in your shack to GMT and start immediately keeping your log in that time. GMT is universal and is not affected by local time or summer time and should be the *only* time used on your QSL cards, whether you chase DX or not. If you work a station at any time after 0000 GMT, that makes it the *next day* so be sure to keep this in mind.

Whether you are sending your requests to a QSL manager in the States or to the DX station himself, remember that he receives hundreds of requests monthly and that the easier you make it for him to process your card, the more promptly you will receive it!

On another facet of QSL cards—how about suggesting to the stations you work that they be sure to include the words "2-way s.s.b." on their cards? At one time, we knew most every foreign

[*Continued on page 99*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

FOURTEEN County Hunters bagged USA-CA-500 during the first two weeks of April before we headed off East on a two-week junket to a dozen states. We won't know total tally until we return to Bonita as we are writing our column on the road.

USA-CA-500 HONOR ROLL

K8JIC	209	K8TNE	214	VE7CE	218
KZ5JW	210	G2FFO	215	K4WVX	219
W7DZB	211	GI6TK	216	VE6UP	220
K3LXN	212	K3JYZ	217	KØRGU	221
W7OEB	213			K8IQB	222

Of the above, fourteen were endorsed for mixed operation, two were for all c.w., and one for all 14 mc A3.

We Get Letters and Questions

K7UGA/3, Barry Goldwater, ". . . it is I who should be thanking you for the good work which you have been doing for so long in expanding the potential of amateur radio for good in the world. I am asking each ham that I work to contact his Senators relative to S.920, and in turn ask other hams to do the same. With all my QSLs I enclose a copy of the Bill [Reciprocal Privileges] . . . Old Man's comment: On the copies of S.920 which Senator Goldwater sends to hams, he states: "Hello O.M.; Here's the new ham radio bill. Give your two Senators a call on this. Best 73, Barry Goldwater, K7UGA/3" Okey gang, let's give Barry the support he suggests by writing your two Senators.

W2EWZ, Tex, "Here's my application for USA-CA-500, and we aren't over emphasizing when we say the USA-CA is the most fascinating of all awards programs we've experienced in our 27 years of hamming."

K9YRA, John, ". . . the USA-CA has added significant meaning to ordinary U.S. QSOs and QSLs which is reflected in very noticeable rise in QSL card returns. Tell USA-CA hunters K9YRA and K9ENA will put Washburn County, Wisconsin on the map from now through August 16th operating 20 and 40 s.s.b."

W9OIJ, John, "USA-CA offers a highly interesting and educational challenge, particularly to QRPers and we folks who don't have the time to chase DX on relatively dead bands. What a thrill to operate from rare counties and chance to be on the other end of a pile-up."

WPE5OJ, David, "*CQ* has always been my favorite ham magazine and thanks for being the first top-level columnist to come out openly in favor of better ham/s.w.l. fraternal relations. . . ."

WA6KLL, Ron, (Pres. Livermore ARKlub), ". . . Might we QSP deep appreciation of your efforts to expand amateur interest beyond the ever dwindling scope of DX competition."

K1VII, James, "An odd publication twist: it is amazing that one has to read *CQ* to become aware of *CQ's* fine work in the USA-CA Program. This has given ham radio a big boost in the right direction."

K9UCG, James, ". . . After I got my General the novelty of ham radio began to wear off. Then I worked you one Sunday afternoon and you told me about USA-CA. Right there my whole outlook changed. . . ."

K1PMY, Bob, "Clif, now up to 650 counties confirmed. It is highly obvious the USA-CA Program has stimulated many state QSO parties and given emphasis and assured success when the county hunting feature is included. To me and many other operators these are the events generating sufficient interest to get us on the air."

Dayton Hamvention Highlights

On our swing East we naturally took in the Dayton Hamvention. As usual, Dayton was

This is the new State Capitals Award sponsored by the Newark News Radio Club in three classes. Class C, work 30 State Capital Cities; Class B, work 40, and Class A, work 50, all after January 1, 1960. Available to s.w.l.s. on heard basis. Send certified (GCR) list and $1 or 10 IRCs to SCA Custodian, S. J. Knox, WPE2HEA, 212 North Jerome Avenue, Margate City, New Jersey.

*United States of America Counties Award Custodian, Box 385, Bonita, California.

Mecca for congregation of well known personages from far and wide coming not only to enjoy convention fun but also to project individual opinions for solution of many of hamdom's mounting problems.

Of course the visit to Dayton gave opportunity to meet old cronies of long standing and enjoy first eyeballs with hundreds we'd met over the air. As usual, the North Jersey DX club out-DXed all competition both by volume and capacity.

We were indeed pleased to hear Mr. Herbert Hoover, Jr., orientate his Hamvention talk toward the public interest concept of hamdom's obligation, responsibility and participation, with emphasis on hamdom's present and future potential contributions to the public and national interests. He also projected that hamdom's acute problems are an integral part, not only of fast developing international complexities, but also internal public interest matters at Congressional level. He presented the immediate need that U.S. hamdom seek better public relations at citizen-public- and Congressional level in order that all be better informed of how hamdom's needs can best be integrated into whatever compromise serves the overall public interest. Without unduly downgrading that phase of our hobby related to personal enjoyment, he sought to convey a sobering realization that the future presented compromise solutions primarily serving public interest needs. He, in fact, admonished U.S. hamdom to face realities of possible compromise solutions in which the personal aspects of our hobby might have to give way to other communication services in the area of international, national and public interests.

We wholeheartedly agree with all Mr. Hoover said . . . it is exactly what we have been proclaiming editorially, plus the fact that the major part of all our endeavors has been to create better public relations between amateur radio and those who control our destiny. Hamdom, indeed, needs reeducation in this area of fundamentals of political science.

Here you see the Worked Hampden County (Mass.) Radio Association Award for working members after January 1, 1960. Hampden County stations and HCRA members work 25; others 15 for basic award, and seal endorsement for next 10. No charge except s.a.s.e. for seal endorsement earned separately. Send list with log data to Custodian C. Norman Peacor, 139 Cooley Street, Springfield 8, Mass.

Pictured here is the Alabama Counties Award, information about which we carried in last month's issue. Those receiving the first four awards were: K4HPR; W4AXO; K4KJD and W4AUP. You may be interested to know that K4KJD is a Polio victim confined to litter, yet he attended both Alabama banquet and Hamfair.

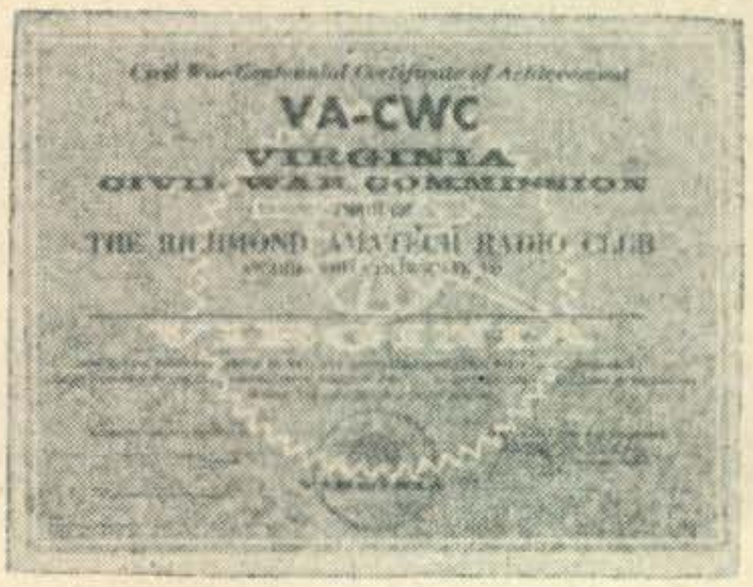
Why Amateur Radio?—Why USA-CA?

To past and present national leaders and to astute political scientists, there has been only one valid answer to the question: "Why Amateur Radio?"

Amateur radio serves the public interest, basic to national security; and seeks, under Constitutional government, to protect and strengthen our free society, or loosely expressed, "The American Way of Life." However, in the space age, public interest rapidly changes and must be accommodated within the realities of a national interest. Amateur radio is an integral part of these overall complexities.

The U.S. public interest is a vast composite of economic, political and social factors operating within the framework of the Constitution wherein our society is theoretically governed by laws rather than man; and in which a regulated free-enterprise economic system is supposed to support a healthy growth of a free society. Actually our public interest has created many contradictions.

Yesterday's public interest may not be today's public interest, however, amateur radio's major



The Civil War Centennial Award sponsored by the Virginia Civil War Commission and the Richmond A.R.C., Richmond, issued from the Capitol of the Confederacy, to commemorate the four years of the War between the States, 1861-1865. Stations in U.S. and Canada excluding Hawaii and Alaska, contact 25 Virginia stations of which 5 must be in Richmond; Rest of world work 10, of which 3 are in Richmond. Henrico and Chesterfield County stations are counted as Richmond. All contacts must be made during period April 1, 1961 through May 31, 1965. Send GCR list, 50¢ or 4IRC to Club, P. O. Box 73, Richmond 1, Virginia. As we write this, 107 VA-CWC awards have been issued.

Pictured here is new LARK award and rules by Ladies Amateur Radio Klub for working 10 members after September 1, 1962. No charge. Send list, verified by one licensed amateur or Notary that QSLs or full log data sighted, to Custodian: W9UON, Connie Kalinowski, 1045 Milwaukee Ave., Chicago 22, Ill. Members are: W4DEV; ZMV; W5ZUD; W6PCA; W8DQA; K8EBY; W9AYX; BCA, BJH, GJB, KFC, LDK, LOY, LRT, QXI, RTH, RUJ, SRJ, UON, YBC, ZXZ; K9BWJ, CCO, CZQ, EMP, EMS, FHM, GJC, GMF, HCY, IVG, IWH, IWR, JJS, KXO, QGR, SRD, TEI, TGK, TRP, ZWV. WA9ABG, CCP, DKN, GTV; WN9GGI.

contribution to the public interest remains fairly fixed. Let's take a look at a few factors which make amateur radio a continuing and important contribution to the public interest: First, over the years and in all past wars, our most critical shortage was trained technical manpower, especially in the electronics and communication fields. Amateur radio then serves the public interest by being an important institution, cranking out a mass of relatively trained technical manpower urgently needed for national survival.

Secondly, amateur radio helps subsidize many industries in such a manner that their resources and potentialities not only make major contributions to the national economy but provide immediately available plants and resources in event of national emergency.

Third, amateur radio demands from industry and helps create stimulating healthy competition of a nature that our engineers and scientists forge ahead with more frequent breakthroughs; all of which make major contribution to the public interest.

Fourth, amateur radio has a capability of providing emergency, disaster, Civil Defense personnel communications facilities, and services not otherwise available.

Fifth, amateur radio constitutes a media wherein each individual amateur has a capability to promulgate, in good taste, those things which enhance a free people, in a free society, toward the promotion of better international understanding, truths and good will.

Sixth, amateur radio provides incentive and outlet whereby the individual may indulge in hobby pursuits for personal enjoyment and satisfaction, which if the privilege is not abused, contributes to one or more of the public-interest factors related above.

One of amateur radio's failings in the past has been to subordinate the public interest factors to personal ego satisfaction in such a manner that our image has not been enhanced in the public eye. It is fitting that amateur radio engage in an effective endeavor to better acquaint both citizens and political leaders of the extent amateur radio serves the overall public interest.

A major designed purpose of the USA-CA Program is to help individuals, clubs, and organizations, through the media of an operating-achievement award program, to establish favorable community publicity and liaison, leading to higher level public relations rapport.

Every ham must be awakened to the fact that amateur radio exists because of political necessity in the public interest; that our future privileges hinge entirely upon political decisions which accept compromises within the overall national interests; which include consideration of the needs of other nations. Each amateur must become acutely aware that most major political decisions affecting U.S. amateur radio, especially for the future, will be through Congressional Bills and actions which are passed on to FCC for regulating.

Each amateur has two Senators who are his direct representatives and who heed well the stated needs of his constituents.

What's Cooking Department

What's cooking fills a whole pantry; however, the most important matter in the pot is the upcoming ARRL National Convention at Cleveland, Ohio, October 4, 5 and 6, 1963. The reason it is important is because ARRL is being supported by many independent organizations also headed for Cleveland.

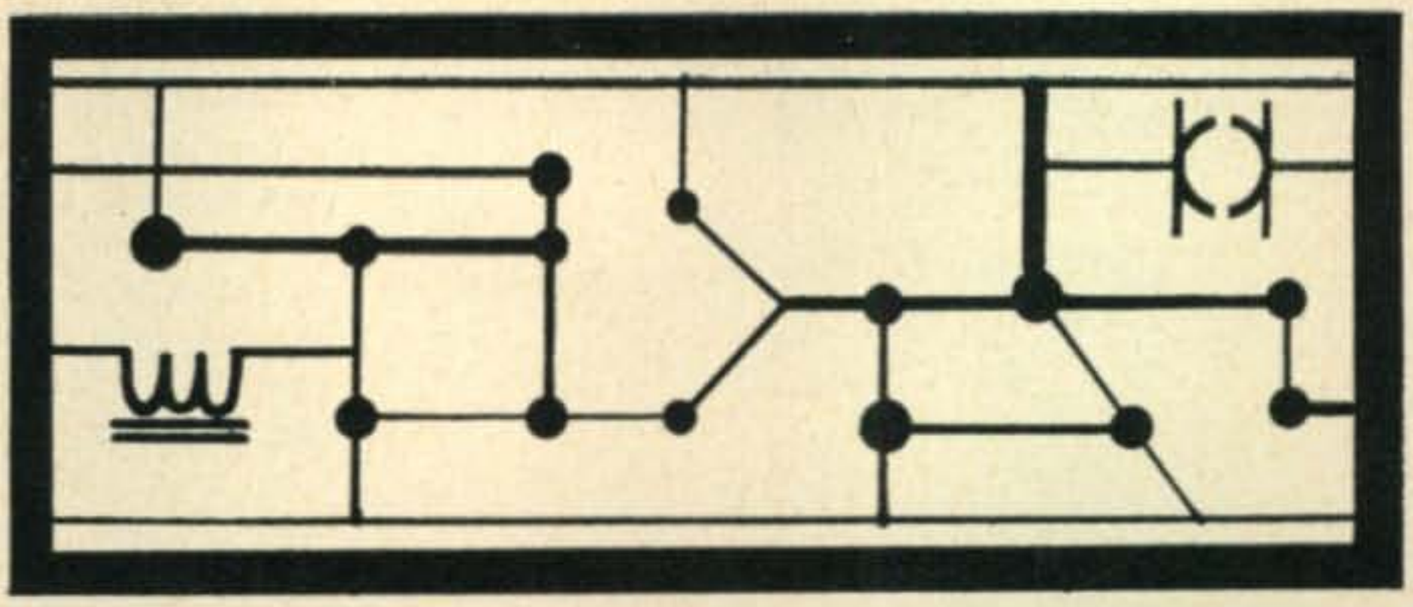
Organizations going to Cleveland are the Certificate Hunters' Club and Flying Hams' Club together with the new YL International SSB'ers, Inc., expected to have world-wide membership of over 1500 by convention date.

The Cleveland Chapter Quarter Century Wireless Association has invited the Old Old Timers' Club to join with them in a national level meet. Also coming are the International Ham Hop Club and the QRP Club. All three military services will be represented by Army MARS, Air Force MARS and Navy MARS. The Canada DX Club is working with the Newark News Radio Club in working up an s.w.l. forum. For the first time in hamdom history the s.w.l.s. are taking major part in a convention. Indications already are that all major communication equipment manufacturers will display their latest wares at Cleveland.

Without a doubt, Cleveland is to be the greatest hamdom convention of all times . . . it is one you should start right now planning to attend.

Thanks for listening, Old Man, K6BX

RTTY



BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc on h.f.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.60 mc
2 meters	146.70 mc

In the history of amateur radioteletype there is a small select group of hams who have contributed, individually, each in his own way, a tremendous effort towards the advancement of RTTY. Some of these contributions have been technical, like those made by W2JAV; while others, like the late WØBP, have made theirs largely in operational effort. Then there are those few, like W9GRW, who have helped make machines available to the fraternity.

"Buck" Buchanan, W6VPC of Oakland, California, is an RTTYer who has made his outstanding contribution in not just the field of activity but in the procurement and reconditioning of machines for fellow members of the Northern California Amateur Radio Teletypewriter Society (NCARTS). After an evening's work on the machines, Buck, assisted by his XYL Maribel, would work far into the wee small hours preparing countless tapes for RTTY bulletins that were forwarded and relayed all over the world for individual amateur information and for bulletin board display in leading electronic supply centers.

*431 Woodbury Road, Huntington, N. Y.

Banquet for W6VPC and XYL

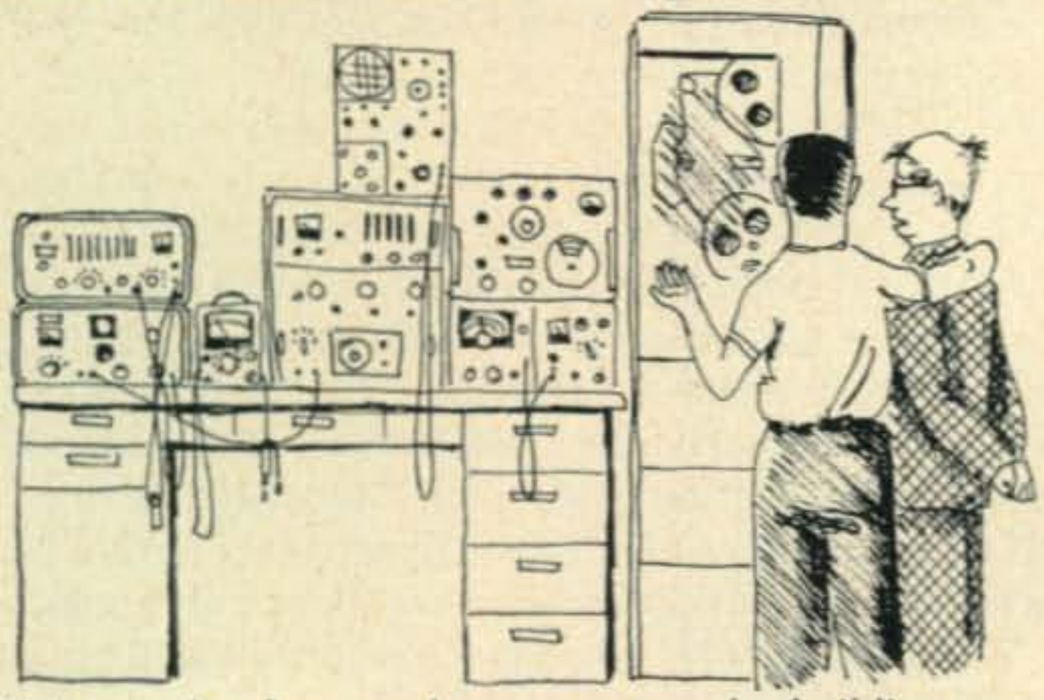
In appreciation of their untiring efforts given in behalf of RTTY activities in the Greater Bay Area, NCARTS members and associates filled to overflowing a banquet room in Berkeley, California, on March 30, 1963, to honor Maribel and Buck. Highlighting the banquet were letters of congratulation from all corners of the world; ARRL, RTTY Inc., MARS, and others. Among the many memoirs presented to Maribel and Buck was a life membership certificate to NCARTS with a paid-up-dues card. A standing ovation was then given the honored guests who so well deserved the plaudits.

Technical Tidbit

Those of you who have built the W2JAV Dot Generator described in the RTTY Column in the Dec. '62 issue of *CQ* quickly discovered that in the schematic diagram, fig. 1, a ground symbol was omitted from the collector circuit of transistor Q_1. Some other comments about this useful device may be of interest. One difficulty experienced was in getting equal *mark* and *space* pulses. If you do, try different GE 331 lamps. Some of these were found to have dissimilar character-

[*Continued on page 98*]

RTTY The Hard Way...No. 21



"It's amazing how much you can save by building your own terminal unit and filters. All it takes is good test equipment."

NCARTS banquet for W6VPC and XYL.

YL

LOUISA B. SANDO*, W5RZJ

JUST ten years ago, in June '53 *CQ*, the YL Column featured a "ham in pigtails"—10-yr. old Roberta Jean Middleton, of Pueblo, Colo. who had received her Novice license and call WØNCB. This was the beginning of a wonderful story of family participation in Ham radio which has progressed through the years and includes besides Roberta Jean and her dad, her mother, Eleanor, who holds WØVLS; three sisters, Linda, WØSKB; Mary, WØEPM; and Betsy, WAØAHD; grandmother, Mabel, KØJJJ, and an uncle, W6PWI.

The story really starts, of course, with WØNIT, Don, who was first licensed as W9NIT at Loveland. Don has taught communications for 15 years in the electronics dept. of Pueblo Jr. College (renamed Southern Colo. State College); he also operates the college station, WØENA, and is SCM for Colo.

Roberta Jean became WØNCB in '53, and she received her Conditional a year later. Throughout her college career at Colo. State Univ. at Ft. Collins she has kept in touch with home via her ham station. Roberta Jean is a National Merit Scholarship student majoring in physics, and graduated in June after taking but three years of college work. She hopes to do graduate work in physics next year in Australia on a Fullbright Scholarship. She holds a public service award for emergency communications with Canon City during the big snowstorm of '57.

YF and mother, Eleanor, WØVLS, began with a Novice in '54 and received her Conditional a year later. She has been active on the Colo. Weather Net and holds various awards for this work.

Linda, WØSKB, joined the family radio circle next with a Novice at age 9 and received Conditional when she was 12. Linda especially enjoys the Colo. High Noon Net. She is a scholarship student at Pueblo Junior College and is a whiz at calculus.

Mary was first licensed when she was 9 as KNØIYY. She received her Conditional in '61 with call WØEPM. Mary loves a good DX contact. She is 15 years old and an "A" student at Central High in Pueblo.

Betsy was first licensed when she was 8 years old as WNØAHD. Shortly after her tenth birthday in Dec. '62 she received her Conditional license and call WAØAHD. As a Novice she had her own rig and worked 11 states. She is an "A" student completing 4th grade.

Don's mother, Mabel, at Loveland, at the age of 83 is a Technician with call KØJJJ, and works 2 meters. (His father was KNØJII at the time he became a Silent Key in 1957.) Don also has a brother who is W6PWI and another brother is ex-W7EQW.

The Middletons use Collins gear; a 75S-1 with

*4417 Eleventh St., N.W., Albuquerque, New Mexico.

The photo of WØNCB (left) in June '53 CQ featured Roberta Jean Middleton as a "ham in pigtails." Ten years later, the all-Ham Middleton family of Pueblo, Colo. L. to r., seated: WØNIT, Don; WØVLS, Eleanor; KØJJJ, Mabel. Standing: WØEPM, Mary; WØNCB, Roberta Jean; WØSKB, Linda; WAØAHD, Betsy.

Depicting the gay mood of the evening luau during the Calif. Funfest are W6DXI, Gladys, and W6BDE, Esther.

KP4's CK and CL, Felix and Alicia, were guests at the Calif. Funfest. Alicia earned top score on phone in the '63 YL-OM contest.

a 32S-1 transmitter. Antennas are an 80m doublet with high impedance feeders and antenna tuner for multi-band operation, plus a Cubex cubical quad tribander up 45 ft. They operate RTTY with a model 26 machine and a W2PAT terminal unit. Don has completed their television transmitter conversion using an MRQ-7 on 441 mc, and the camera will use a videcon tube. Other gear includes a 25 watt a.m. mobile for their Jeep and a 3 kw emergency generator.

Now wouldn't this be a nice family to be adopted into?

USA-CA Hunters

USA-CA hunters—look for W4BWR, Ruth, about July 15 operating mobile for approx. 5 days from "rare" counties in Florida. She will be on 20, 40 & 75 s.s.b. W4BWR holds WAFC #1.

California Funfest

The Calif. Funfest, held at Santa Monica in early April, was most successful and proved again what a grand bunch of hostesses the L.A. club YLs are. K6BUS, Midge, was chairman. W6PJU made decorations for the Sat. luncheon; tea tiles (with YL's call) were used for place cards and there were favors for all. Following the fashion show the pre-registration prize, a painting by W6NZP's OM (known to many as "Mr. X") was won by WA6ZMG.

The evening luau was gay and informal with most in Hawaiian or similar dress. Following entertainment by Loki and her Hula Honeys, some of the OMs were given a hula lesson—which we hear was hilarious! Special guests were KP4CL, Alicia, and KP4CK, Felix, from Puerto Rico. Besides YLs from all parts of Calif., K5JFJ came from Tulsa and W7's NJS, HHH and DIC from Oregon. There were many prizes, a lot handmade by various YLs. The Chirps brought camellia blooms, and invited all to Sacramento for next year's get-together.

33, W5RZJ

1963 YL-OM Contest Results

After completing the monumental task of checking logs, YLRL V.P. K1IZT, Blanche, announces scores for the 1963 YL-OM Contest. Congratulations to all! Limited space precludes listing all entries, but here are the winners in each category and the top scores for each district.

1963 YL/OM Contest Results

	Contacts	*Sections*	*Score*
YL CW			
W1RLQ, Grace "Chata" Swenson	406	82	41,615
W8DUV, Katherine Anderson	401	65	32,581
K1IJV, Jean Peacor	347	71	30,796
OM CW			
W5WZQ, David Blaschke	93	47	5,347
K4BAI, John T. Laney	70	40	3,500
K9LVK, Guy R. Mathis	71	38	3,373
YL PHONE			
KP4CL, Alicia Rodrigues	1,009	108	109,061
W5DVV, Shirley Freeman	918	92	84,456
KØEPE, Marte Wessel	821	77	63,217
OM PHONE			
K5MDX, David L. Thompson	137	55	9,419
W5WZQ, David Blashke	106	50	6,615
K4JIG, Bill Egbert	98	47	5,757

Top District Scores

YL PHONE		KØUWZ	2,775	YU1BKL	1,812
K1LCI	15,966	VE1AFP	247	**OM CW**	
K2OEW	6,112	VE2IL	1	W1HOX*	1,836
K3ESD	21,505	VE3CBY	1,837	W2CVW	2,465
WA4DBP*	31,600	VE4ZX	114	W3VTT	2,351
W5DVV*	84,456	VE6UP	617	K4BAI	3,500
WA6OET	35,587	VE7ABK	990	W5WZQ	5,347
K7MRX	37,286	KH6BLX*	546	WA6KNE*	2,640
K8ONV*	33,306	KL7MF*	195	K7VMJ	2,425
K9QGR*	29,901	G3NFV	37	K8GWK	3,099
KØEPE*	67,217	**YL CW**		K9LVK	3,372
VE3BBL	9,497	W1RLQ	41,615	KØBPO*	2,880
VE4PE*	5,754	WA2WHE	25,001	VE1ADB	79
VE6RP	18,330	K3PKI	28,297	VE2IL	720
VE7BBB	925	K4ZNK	22,365	VE3DXD	2,337
KL7ALZ*	17,040	K5TXQ	21,760	VE4ZK	570
KP4CL*	109,061	WA6OET	22,129	VE6UP*	1,218
F9WY*	250	K7EQM*	26,202	W7UXP/KH6	594
G3LWY	2,464	W8DUV	32,581	KP4CC	44
ZL1LD	902	W9KSE	26,650	DL4FT	292
OM PHONE		KØGIC	20,809	DL6MK	150
K1POA	2,565	VE3BBL	29,920	G3WP	15
W2QKJ*	960	VE5DZ	1,950	HK7ZT	225
W3BVL*	2,640	VE6ABV	13,395	IT1AGA	150
K4JIG	5,757	VE7BBB	8,861	JA1DFQ	8
K5MDX	9,419	VK3KS	4,015	LA6U	11
K6CJF	1,485	KH6BTX*	23,688	OH5UQ	15
W7SFK*	2,112	KL7ALZ*	29,857	PAØVB	75
W8AJW	4,200	G3ORU	997	SP8HR	20
K9EAB*	2,516	SP5YL	735	TF3AB	61

*Indicates power multiplier of one (1) all others 1.25.

VHF AMATEUR

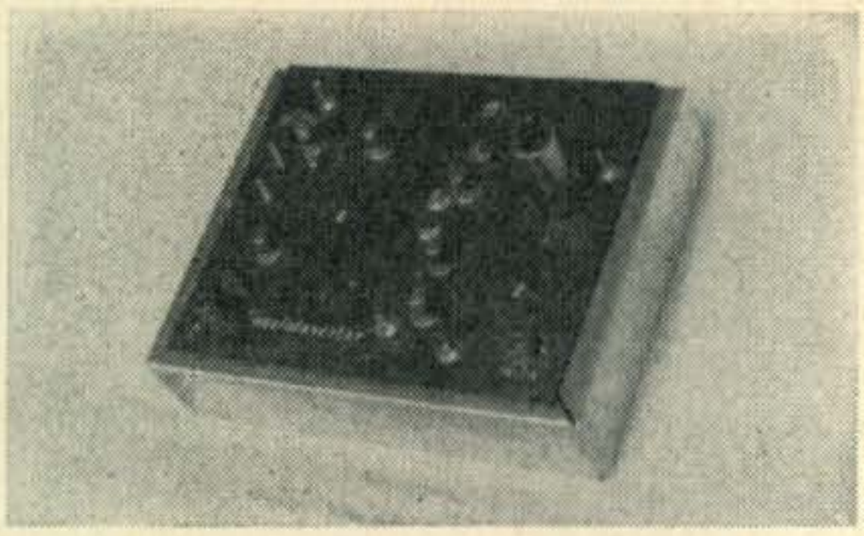
Vol. 5, No. 7—July, 1963

BOB BROWN, K2ZSQ, Editor

In This Issue

Cover: Installation at K2ZSQ/8, Spruce Knob, W.Va., during May Contest. Photo by WB2AAI/8.

Address all correspondence to: Bob Brown, K2ZSQ, Editor, *The VHF Amateur*, 300 W. 43rd St., New York 36, N.Y.



A low cost bandswitching 6 and 2 meter nuvistorized converter with power supply—all on one chassis!

THE NUVISTAVERTER

BOB HEIL, K9EID*
402 Border Street
Marissa, Illinois

SINCE THE INTRODUCTION of the RCA nuvistor to the amateur field, circuits have been free and easy to come by for an excellent converter to enable the operator to use his low frequency receiver on the VHF frequencies without any major overhaul to the station receiver. The only drawback is that many of the 6 meter operators do some work on 2 meters. This necessitates the use of two different converters and a bit of trouble to switch the two converters in and out of the line. This has been eliminated by the construction of this new converter here at K9EID.

What a pleasure to be able to have the entire converter assembly on a single chassis including the power supply! The power supply is made to operate all the time, 24 hours a day, the reason being that the filaments are fed to the oscillators in both the 6 and the 2 meter converters. I have encountered at various times during the "warm up" period some uncalled for drift. By leaving the filament supply on the two oscillators at all times this drift was cut in half, at least. When using this system with an extremely stable i.f. strip, drift is not noticeable.

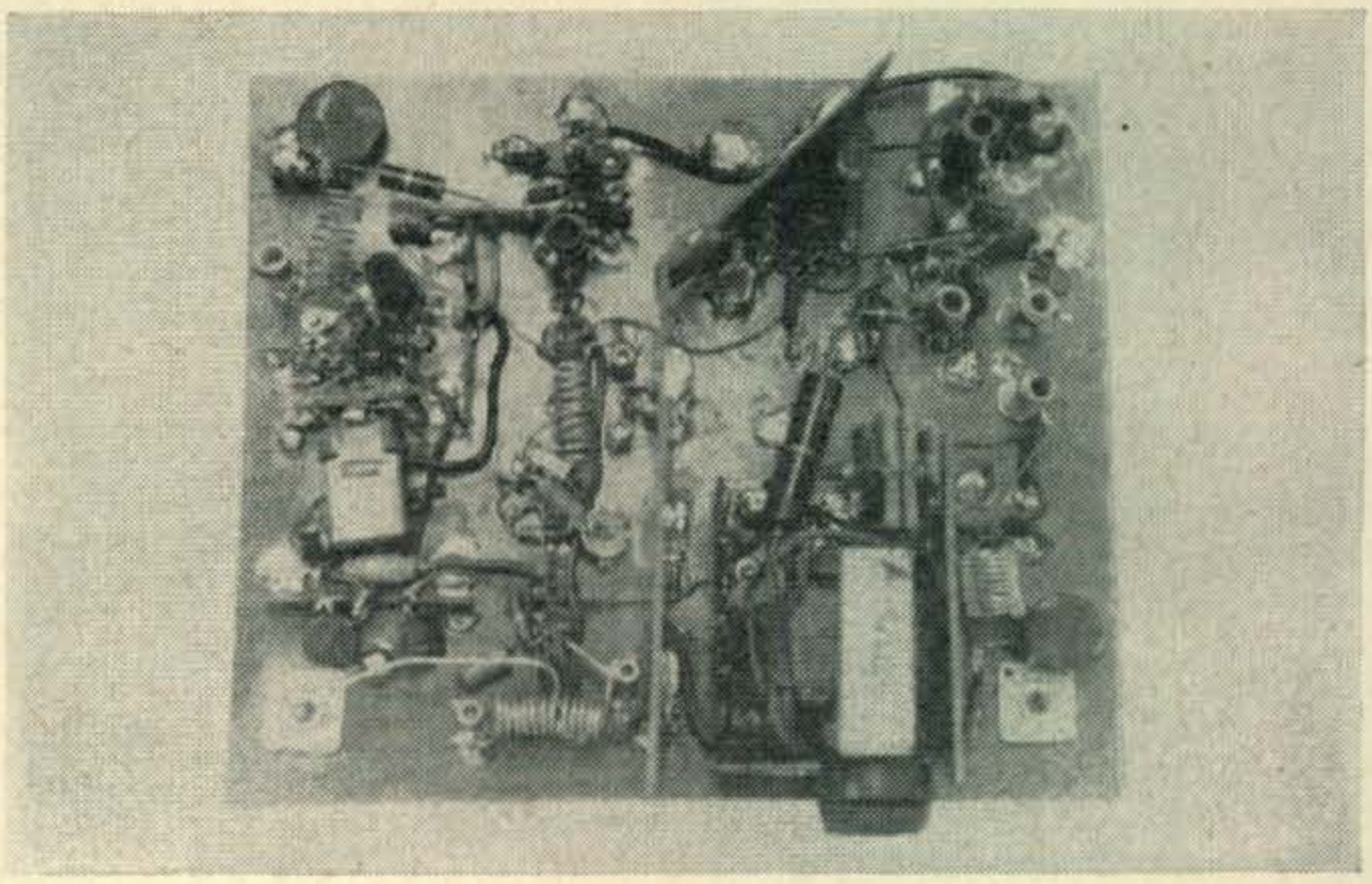
6 Meter Section

After trying many number of front end configurations, it was found that the grounded grid won out on six meters. The number one reason being that overload was absolutely at a bare minimum. This can't be the case with the other r.f. amplifiers tried. The gain is excellent for six meter operation. Comparison showed that the grounded grid gave as much gain as any of the other systems tried. An absolute bare minimum of parts are used to build this front end in comparison to the other types tried.

The mixer is the RCA tetrode nuvistor, the 7587. Here is a hot little number to be used as a mixer. It uses the same socket as the regular triode nuvistor and the screen takes over the triode plate connection, number 2 of the socket and the plate connection is made at the plate cap. All other connections remain the same. The oscillator is a very simple circuit using a third overtone crystal to operate on 22 mc. This puts the output of the six meter converter on the 28 mc band.

All parts except the bandswitch and power OFF-ON switch are mounted on a 7 × 9" piece of fiber epoxy board much the same as all of the other pieces of gear are built around here. This material is a dream for construction of this type. After all the parts are mounted, the board is turned up on the open side of a 7 × 9 × 2" aluminum chassis and mounted with sheet metal screws to the lip that was originally used to mount the bottom plate.

*VHF Sideband Editor, *The VHF Amateur*



Underside view of K9EID's Nuvistaverter. Two meter section is on the left, while a shield separates it from the 6 meter converter section on the right. Just right of shield is the power supply using selenium rectifiers and an inexpensive transformer.

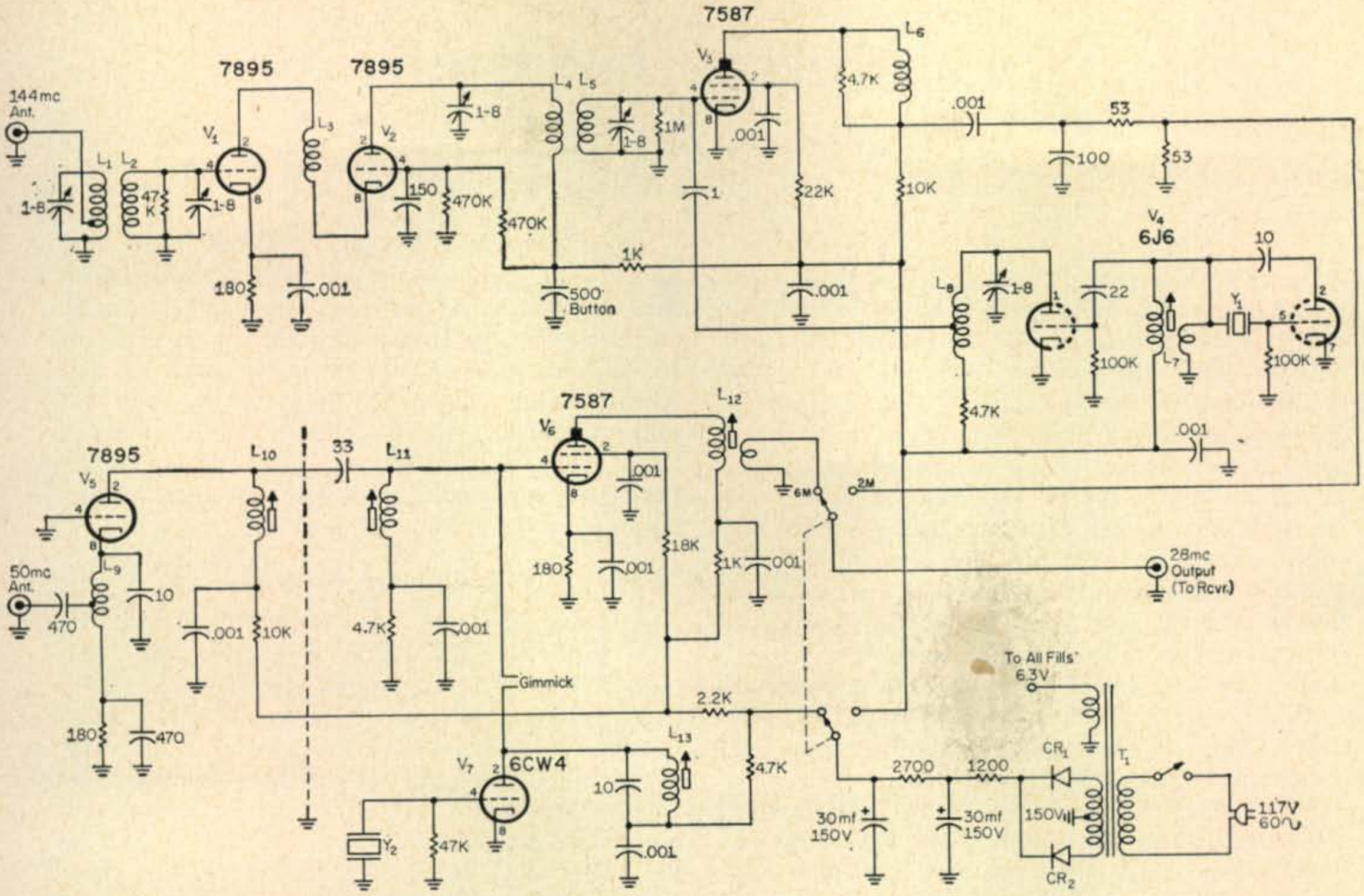


Fig. 1—Schematic diagram of the Nuvistaverter employing the new RCA tetrode nuvistor, the 7587. All variable capacitors marked 1-8 mmf are Erie trimmers, 532B. Gimmick capacitor shown is two 1½" lengths of hookup wire twisted together.

CR_1, CR_2—Selenium rectifiers. Sarkes Tarzian D-45.
L_1—7½t. #16 ¼" dia. 1" long.
L_2—5t. #16 ¼" dia. 1" long.
L_3—4t. #20 ⅛" dia. ¼" long.
L_4—5t. #16 ¼" dia. 1" long.
L_5—4½t. #16 ¼" dia. 1" long.
L_6—25t. #24e. ½" form.
L_7—10t. #24e. ½" form (ceramic) with 1 t. loop.
L_8—6t. #20e. ¼" dia. 1" long.
L_9—10t. tapped 2½ t. from cold end. B&W 3003.
L_{10}—18t. #24e. ¼" form.
L_{11}—16t. #24e. ¼" form.
L_{12}—25t. #24e. ½" form with 2 t. loop.
L_{13}—32t. #24e. ½" ceramic form.
T_1—TV UHF converter type, 110 v. primary, 150 v. secondary with 6 v. filament winding. Stancor PA-8421.
Y_1—38.667 mc third overtone crystal.
Y_2—22.000 mc overtone crystal.

The two meter circuit is hotter than a firecracker on 2 meters. Comparison to a commercial nuvistor converter here at this station showed that this converter was by far the better. The main reason being that the cascode front end is much hotter than the conventional grounded cathode r.f. amp which always has those problems of neutralizing to worry with.

As in the six meter converter the mixer was experimented with for quite some time to determine the exact tube to use. At the time the pictures were taken, the 7895 was being used as the mixer but later the circuit was changed to the 7587 tetrode as the one in the six meter converter used. It was found that the tetrode had a much lower noise figure than the triode. The oscillators-multiplier uses a 6J6 tube. The reason that the nuvistors are not used at this point is that the price here would go up another $10.00 and the performance would not change in any manner. An oscillator is an oscillator! An overtone crystal on 38.667 mc is used in the grid of V_{4A}. This multiplies out to 116 mc in the V_{4B} multiplier and puts the output of the two meter converter on 28 mc, the same as the 50 mc converter so that switching from the two converters will not effect the frequency of the receiver used. This makes it handy and simple for switching, plus more bandspread on both bands, as most receivers have two or three times the normal coverage on ten meters.

Construction was begun by marking the holes to be cut for the sockets and the coils. Using the fiberglass epoxy board makes this a cinch for constructing. Filament wiring and bypassing with the .001 mfd capacitors start the wiring procedure. Next step is to make the ground connections of all tube sockets. The coils can then be wound and put into place. The power supply is the last to be installed. A small transformer was taken from an old television UHF converter that was discarded. The B-plus voltage should be 100 volts coming from the rectifier-filter network.

The finished converter works very well and is a fine worthwhile investment for any 6 and 2 meter station. Hope you can get her going in time for all this summer DX, OM's! ■

Six Meters Is Open!

ALAN M. MARGOT, W6FZA
167 Leggett Drive
Porterville, California

YES, IT'S TRUE, SIX IS OPEN 365 days a year. A small portion of your six meter signal, no matter what power you use is returned to earth 600 to 1200 miles away. The returned signal is considerably weaker than a normal *E* opening and is due to the phenomenon of ionospheric scattering. Now ionospheric scatter brings to many minds the thought of 50 kw transmitters, stacked rhombics and the like, and these things are necessary for the 99.99% reliability that is required. But if we can be satisfied with 50% c.w. copy or so, the power requirements drop to the 500 watt—kw region. And if we can accept 10% to 20% copy in return for the thrill of using this type of communication, we are right down to 100 watt and 4 element beam variety of station.

More VHF hams are dabbling in this work every week, and the dabblers are becoming addicts. Signs of addiction are new and better antennas, higher towers, more power, and a glassy look around the eyes that comes from lack of sleep on weekend mornings. It appeals to one of man's most basic instincts, that of accepting nature's barriers and surmounting them. It is this "man against the elements" instinct that sends men hunting, camping, fishing and mountaintopping. Here, nature has thrown up a barrier to communications, and it is quite rewarding to be able to punch through.

The theory of ionospheric scattering has been published often. Simplified, it appears that the *D* and *E* regions of the ionosphere (50 to 100 miles high) are always partially ionized. The ionization is uneven, and the areas where it is heaviest could be pictured as "blobs." These "blobs" seem to be moving, disappearing and reappearing rapidly. A signal fired through this region reacts like a fast stream of water through a screen. Nearly all of it goes through unchanged, but a tiny portion is scattered in all directions by the blobs. As a result, a 50 mc signal is *always,* regardless of time, season or sunspots scattered weakly back to earth 600 to 1200 miles away. (The curvature of the earth begins to hide the scattering region from the antennas at ranges much greater than 1200 miles). Whether this signal is strong enough to beat out the noise at the receiving end is subject to many variables. The amount of signal varies tremendously in any given minute, and slightly with path and season.

At the same time, meteors are ionizing the atmosphere in the same region. As tiny meteors, usually the size of a grain of sand or smaller enter the earth's atmosphere, they burn up and make a small stream of ionization, several times more dense than the "blobs" mentioned above. The signal scattered back to earth from meteor trails is, therefore, considerably stronger, and usually lasts from one to thirty seconds or so. Meteor ionization is strong enough so that signals can be scattered to the receiving end from other directions than "on bearing." So a deadband 50-mc signal consists of a weaker, deeply fading background signal with stronger meteor bursts superimposed.

Equipment Needed

Although addicts are constantly improving their gear, it is not necessary to have the "ultimate" station to trade signals. A 50 watt station can produce good meteor bursts. Whether intelligence can be transmitted depends on the number of bursts and the skill of the operators. As a rule, powers of 500 watts or better are required to produce much background signal at the other end on a 365 day basis. On good "scatter" days, 100-150 watt stations have been able to communicate very nicely. Antennas should be as big and high as possible, although a 4 element beam 40 ft. off the ground will get you into the act. Since the signal arrives at an angle from horizontal to 20°, depending on the distance from the transmitting station, antennas should be higher than 40 feet to accommodate such an angle. Antennas 20 feet long or so are providing good results, although there are several in existence in the neighborhood of 40 ft. long. Stacked yagis are excellent, provided they are properly phased (this is harder than you think).

Almost all 50 mc converters presently in use are good enough to receive ionospheric scatter signals. And although any receiver following the converter will tune these signals, there are certain receiver qualities that pay off a thousand times. The ultimate scatter "tuner" has rocklike stability, slow tuning rate, narrow bandpass, calibration to within one kc, and good resettability. This can be accomplished with a BC-453, some junk parts, and surplus crystals (See Jan. '62 *QST*). The regular luxuries, a.v.c. b.f.o. pitch, S meters etc. take a back seat for this kind of work.

Procedure

Since much of the time signals are fragmentary, they can be recognized by frequency, fist, and character of signal (i.e. tone, chirp, drift etc.). So once these transmitting trademarks are adjusted to your satisfaction, don't change them. It is often easy for a good scatter operator to tell who he's listening to with only a few letters coming through the noise.

Many areas use a 2½ minute time period

for ionospheric scatter work. By advance agreement, stations in one area transmit the first 2½ minutes of each five, and stations in another use the last 2½ minutes, setting clocks by WWV. This has several advantages. Since signals fade in and out of the noise, this eliminates any question of when to transmit, and prevents lost time and double transmissions. It also lets all the locals transmit at once and receive at once, eliminating the problem of local QRM, and maintaining friends. Depending on signal levels, each bit of information is repeated several times to insure its getting through.

These signals are unlike tropospheric ones in that the fade patterns are not cyclic, but random, and they are very deep. The signal appears to have fades of many changing rates and depths, all superimposed. The letter "T" can be chopped into an "S," or a signal can disappear for a second or so. For this reason, the RST system of reporting is useless. On the West Coast, the DRT system has been adopted for these signals. With D for DISCERNIBILITY, R for READABILITY and T for TONE, percentages of time are expressed as follows: 1 = 10%, 2 = 30%, 3 = 50%, 4 = 70%, 5 = 90%. Thus a signal report of DRT 439 would mean discernible approximately 70% of the time, and readable about 50% of the time. This is of sufficient accuracy since it is impossible to estimate these percentages closer than 10%. If you receive a DRT 439 report, you could reason that two or three repeats of each bit of information would give you good chances of 100% copy at the other end. The nature of these signals is such that it always looks like one more db of signal to noise ratio will make it solid.

If you're a dyed-in-the-wool phone man, all is not lost. Some success has been had with a.m. and s.s.b. has been very encouraging. A signal of 50% readability on c.w. might be only 10% readable on s.s.b., but the information rate is fast enough to compensate for this if the upfades can be properly utilized. An effort to do this is being made with a sophisticated form of the "break" system. By prearrangement, the strongest station is designated the "control" station, and the other the "slave." Using v.o.x. (or fast break-in), the control station makes a series of two or three second calls, listening a couple of seconds between each call. The slave listens on the frequency until he hears a burst from the control, when he answers with a three second or so transmission. If the control hears the answer, he makes a two or three second transmission. They exchange extremely short transmissions as long as the burst lasts. When signals are gone, they revert to the original calling arrangement, with the control making short calls. The armed services are experimenting with this general type of system using pretaped voice messages, and automatic keying arrangements.

Digesting all the available information on ionospheric scatter yields the following generalizations. In mid-latitudes north-south paths are slightly better. Signals are generally better in Summer than in Winter. Data gathered over the years indicate that Winter afternoons are slightly better than mornings, with the reverse in Summer. Assistance from random meteors is best in early mornings. Boiling it down further, Summer weekend mornings offer the best opportunity to get started.

There are two or three ways to get started in this fascinating sport. Probably the best is to listen to the first few kc of six meters on Sunday mornings. If you hear any locals working ionospheric scatter, get in touch with them and find out who they are working, what time, frequency and direction. If no locals are on and no scatter signals can be identified, look in the DX REPORT column, pick out the calls of those who are active in this work and write to them. Most scatter addicts are glad to make skeds, and glad to correspond. The mail at this QTH has yielded two or three letters per week from interested parties since the writer began automatic sending last fall.

At first it may seem a hopeless task, to read bursting c.w., especially if you are a little rusty. The majority of ionospheric scatter work is done with the hand key at relatively slow speeds because of the nebulous, foamy character of the signal, however, so the slower speed operator need have no fear of being "burned out." After working with these signals, the operator tries to develop a combination of perception and intuition, to help in receiving.

Whatever your initial approach may be, you are invited to join the fun. Don't wait for the *E* openings, but make your own! With the next F_2 years some distance off and with interest increasing at its present rate, the writer hopes to hear the low end of six crawling with scatter signals on weekend mornings. So get on the air and make some noise, and we'll be watching for the signals, and for the surefire signs of addiction. See you on scatter, and remember, six is open if you want to try! ■

A new six meter transceiver has been announced by Utica Communications Corporation of Chicago. Dubbed Model 650 it is available as a dual package, one unit being the transceiver with built-in power supply for both 12 v.d.c. and 117 v.a.c., the other a v.f.o. that connects to the transceiver when desired. With 13 tube performance, the Model 650 uses 8 mc crystals to a straight-through Class C 2E26 final, approximately 15 watts input. Modulator is a 6BQ5 with a 6EA8 mike preamp. Unit comes complete with a push-to-talk mike and coil cord. An effective TVI filter has also been included.

Receiver section is dual conversion superhet with 3 kc selectivity at 10 db and 0.5 mv sensitivity for 6 db s/n ratio. First i.f. is 10.6 mc, second is 595 kc. Adjustable noise limiter and squelch, 3 position crystal selector, and general compactness of the unit are other features. Price, $189.95 incl. v.f.o. ■

16 Elements On 2 Meters

HAL DUNLAP, WAØDPN
2985 Walton Road
St. Louis 14, Missouri

AFTER BEING ON 20 AND 40 meter c.w. for over a year, the familiar "bug" bit and the next thing I knew I was getting my feet wet in VHF. The simplest way to start seemed to be a low power transceiver for 144 mc, which was acquired and performed most adequately. A true VHF ham, I have since learned, however, is never satisfied with existing apparatus. As yet unaware of this criteria, though I simply found that I must do better. A person of moderate means, I looked to the antenna. Here appeared the solution. With the low power transmitter and a no better receiver section of the transceiver, a high gain antenna system was definitely needed. Unable to afford most of the more elaborate long john beams commercially available, I decided on a homebrew job.

The yagi arrived at and employed here at WAØDPN is sweet and simple, nothing revolutionary, nothing "new." But it performs. As can be noted at the title, this beam has sixteen elements spaced moderately. The elements are fastened to the boom in a unique way. A hole is drilled through the center of the boom where an element is to be inserted. After the elements have been cut and straightened, push them through the holes and position them where they are to be left. Clamp these elements in position by use of a clothspin spring. The spring has to be hooked on both ends. Form the spring so that it will hold the element to the boom. This can be done by hooking the ends around the elements and taking up the slack by twisting with a pair of pliers around the elements. Now we have secured our elements uniquely and inexpensively!

The reflector and directors are made of #9 galvanized solid steel wire. Most galvanized clotheslines will work fine here. The boom is made of two 10 foot sections of steel TV tubing (thinwall) fastened together securely with two or three screws where the two mast sections meet. After all the directors and the reflector have been secured to the boom as explained above, the driven element should be made of ¾" thin wall tubing. The match to the driven element is a simple folded dipole. The match can be made of #9 wire, the same as was used for the elements. Form the match and driven element at two 90° angles (see drawing). The tubing in the driven element should be made 39½" long, bending both ends down about an inch. The match should be half as long from the boom to the end. The driven element and match should be 38" long.

The beam needs some support because twenty feet of boom length can be quite flexible. A five foot section of 1¼" steel tubing connected to the boom with a U bolt and about six feet of ¾" steel tubing at a 45° angle spaced four feet from the center of the boom and secured with sheet metal screws serves nicely.

I might conclude by mentioning that results with this antenna have been quite rewarding. At this writing (less than a week after construction) fifty mile contacts are commonplace. ■

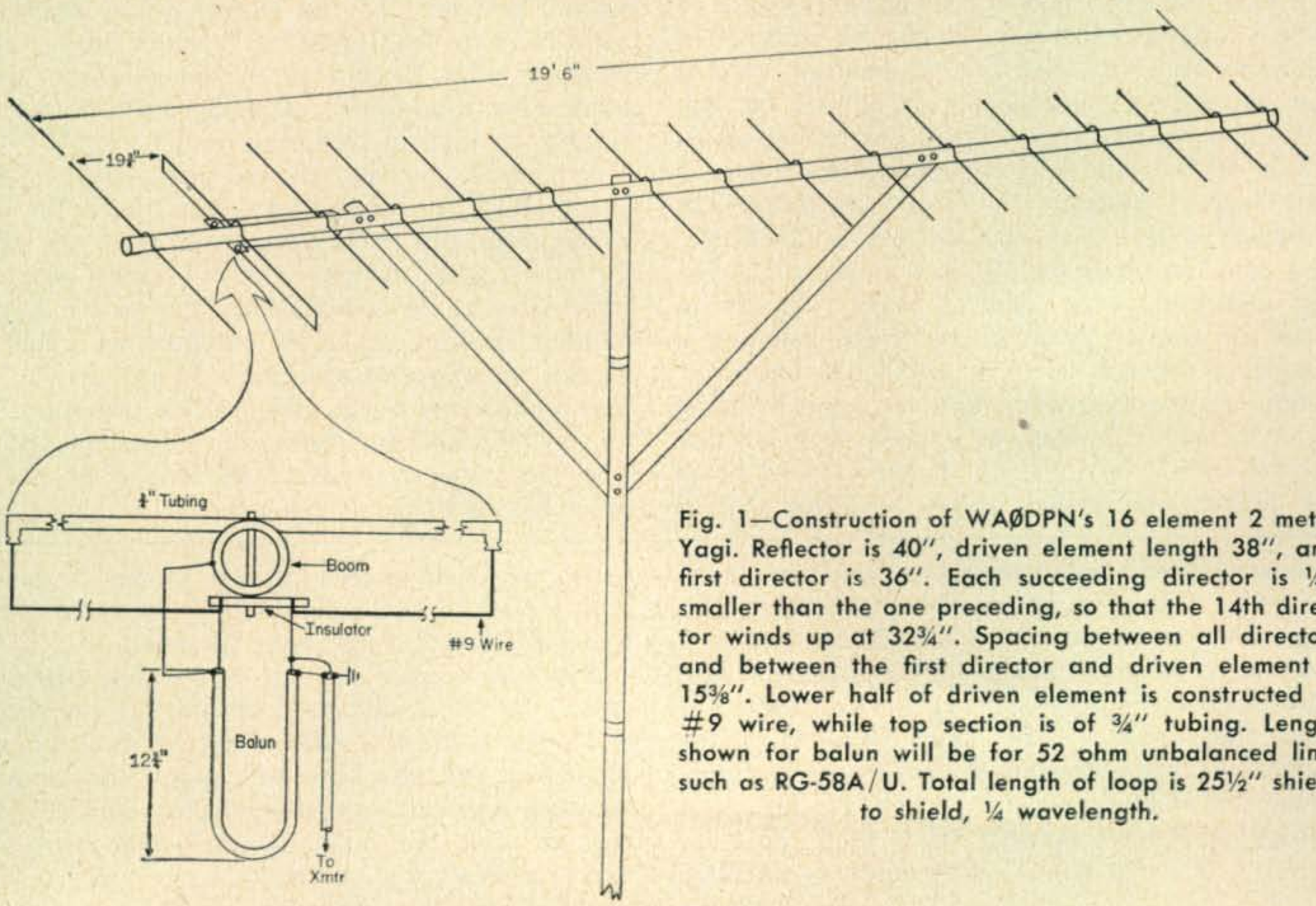


Fig. 1—Construction of WAØDPN's 16 element 2 meter Yagi. Reflector is 40", driven element length 38", and first director is 36". Each succeeding director is ¼" smaller than the one preceding, so that the 14th director winds up at 32¾". Spacing between all directors and between the first director and driven element is 15⅜". Lower half of driven element is constructed of #9 wire, while top section is of ¾" tubing. Length shown for balun will be for 52 ohm unbalanced line, such as RG-58A/U. Total length of loop is 25½" shield to shield, ¼ wavelength.

DX REPORT

an exclusive feature of The VHF Amateur

BOB BROWN, K2ZSQ*

THOSE OF YOU WHO participated in the *CQ* Spring VHF Contest in May perhaps recall hearing K2ZSQ/8 from West Virginia. In keeping with the spirit of the occasion, Tom Kneitel, WB2AAI, and I decided to really go all out for the affair and give points from a semi-rare state. Location was Spruce Knob, 4860 feet above sea level, and the weather was superb. What we didn't know about the area was that in order to reach the summit, 27 miles of all American road had to be traveled. This is *not* the type of thoroughfare for low-slung sports cars; I think now that perhaps we should have rented a Jeep. In any case we had a good time, although we didn't work great numbers of stations. In fact, we didn't even work our own county, Pendleton. From what I could gather, most of the West Virginia 6 meter activity stems from the northern areas. And we were a long way from any populated area, hamwise. Average groundwave contacts from Spruce Knob were over 200 miles away. Equipment was moderate: a Clegg 99'er, and *e.c.i.* linear amplifier, and a three element close-spaced Yagi. Noise level? There wasn't any! Perhaps the strongest, most reliable signal eminated from K8MMM in Novelty, Ohio, who ran consistently over S9 over a path of nearly three hundred miles. W2CVW and K3LOM were heard on bursts from the northeast, while K3LNU was worked from Washington, D.C. And then on Saturday afternoon FG7XT broke through, calling CQ. For three hours he called, getting no replies, although we sure tried. I believe that W3BWU was the only U.S. station he contacted that day. Sunday, however, a really substantial Sporadic *E* held the six meter world in suspense for hours. We had the pleasure of being "first West Virginia" for nearly everyone we contacted. Being so high at Spruce Knob, several things occurred which defy explanation. First off, Sporadic *E* signals were heard several hours before the country-wide opening occurred to South America, Puerto Rico, Guadelope, Bahamas, etc. Why were we able to hear KP4's in QSO with KP4's at S5 levels, yet get no QSO's? On Sunday when we were working South into Florida and Alabama, we found that our beam setting had to be West. When we were working West, signals peaked to the North. Our first thought was that the settings were wrong and possibly that East wasn't really East; after a quick check, however, we found that groundwave signals were being peaked where they should and we deduced that it probably had something to do with our height. Who knows? Have any of you ever experienced anything similar?

*Editor, *The VHF Amateur*, 300 West 43rd Street, New York 36, New York.

View from Spruce Knob, West Virginia, 4860 feet. This was QTH of K2ZSQ/8 in the May CQ VHF Contest. Photo courtesy of WB2AAI/8.

At The Other End

San Salvador, Bahamas: Harold Lund, VP7CX, writes on six meters at his end. One initial reminder: All QSL's for VP7CX should be sent via Edward J. Jensen, W9ZDI, 5521 S. 104th Street, Hales Corners, Wisc.

"May was off to a flying start. Six has been open almost continuously for the past three days. Most stations worked are on the East Coast. Had a very good opening to Indiana. Worked Illinois this afternoon for a new state. Worked FG7XT at 2310 GMT May 2. Many KP4's worked this week also. There was a VP2 on the band, but couldn't copy him because of KP4 QRM. I am still operating mostly on 50.046 mc. I go up to 50.105 once in a while, but go back down when QRM starts to get rough.

"I'm planning a trip to some of the islands south of here. Have applied for a ticket on Anguilla, VP2. Will be on low band s.s.b. mostly, but hope to have a 6 meter s.s.b. transceiver.

"Worked KØUDZ in Rapid City, S.D., at 1738 GMT Sunday (May 5) for a new call area and state. On May 9 at 0003 I worked K9VNM in Wisconsin for a new state also. At 0036 I worked VE4MA and VE4JX. They are both in Winnepeg. They were the first VE's I've worked. Please remind the boys about QSL'ing through W9ZDI. S.a.s.e. would be much appreciated. Have worked over 600 stations on six meters in the past ten days and the postage bill is getting out of hand." *Okay, Harold. And thanks for the QSL's for Tom and I*—ED. "Still no word of KV4CQ having been on. Worked 16 KP4's in a row and FG7XT was on at the same time so I'm sure that someone would have heard him had he been on."

Quick note from KV4CQ: "Had to take a short jaunt to Sarasota, Florida by necessity. Several KP4's heard here. Most of this area's DX is to W5 land. Plenty QRM. Worked W1INE/4 today. Will be back as KV4CQ soon."

Bermuda and VP9WB: Walt Bauer, VP9WB, reports on Stateside DX.

"Sunday, May 5th is a day that will be remembered by me for a long time to come, and I imagine that others will recall their first VP9 on 50 mc on that day. About 1300 local time I was tuning the 10 meter band and overheard a couple of stateside hams commenting on the 6 meter band being open. So out of curiosity I fired up my HE-45A, rotated my dipole and promptly fell off my stool when the speaker blasted forth with signals from W2, W3, W4 & 9."

Those First Two Weeks

I'm sure that most of the 50 mc crowd among us well remember those first two weeks of May, with their almost daily Sporadic *E* openings. A huge amount of mail here resulted from the excitement of that long-awaited DX. It seemed that everyone wanted us to know each and every DX contact he worked. Obviously we cannot present it in this manner since space would run into telephone book size, hence the daily reports below, listed in overall areas without specific times, etc.

Wednesday, May 1, proved to be a big day for a lot of operators, what with most of the East Coast being worked and heard. WAØCKX in Nebraska snagged KP4AXC, KP4AAN, and KP4AST while VE4MA was being worked by neighbor WAØDJK. While all this out-of-the-country DX was going on, K8PEJ in Michigan was busy electrifying Texas, Kansas, Ala., Okla., O., Fla., S.C., and La. K9DTB also worked La. W2's and W9's were worked by Oklahomite WA5EOG.

On Thursday, May 2, however, conditions improved notably with most of the Midwest working to the South and East, while the East was working South and Midwest. Needless to say, W4's were working 5's, Ø's, 9's, 8's, 3's, 2's and 1's. WAØCKX worked 10 different states that day. FG7XT worked K8WPW on 50.18 mc at 1920 EST (presumably double-hop), the only U.S. contact that day. Hat's off to K8WPW! WØGXJ's list of DX was also quite good that day. WA4IYZ-K1PDA's QSO was a real bang-up job, I understand.

May 3 finally provided the West Coasters some DX, with W6IEY reporting of the entire Midwest breaking through. The 9's and Ø's, of course, had another field day working both the East *and* the West Coasts. Lucky K9YEN (Ill.) snagged Maine.

Short-skip to southern California was reported by reliable W6IEY with contacts to WA6PJY and WA6SUU. Other than this extremely rare Sporadic *E*, nothing much else happened on Saturday (May 4) excepting K2ZSQ/8's hearing FG7XT and other South Americans.

The big free-for-all occurred the next morning when everything from VP7's to VE4's to VP9's to Idaho was being worked. WAØCKX snagged a slew of W2's, W3's, and W8's, while WA6UOE was working Oregon, Wash., and Utah! In the

[*Continued on page 84*]

UHF ROUNDUP

an exclusive feature of The VHF Amateur

ALLEN KATZ, K2UYH*

OLD RELIABLE, THE PERSEIDS of August, has provided more long-haul two meter contacts than any other meteor shower. It is for this reason that each year many 144 mc operators arrange schedules and prepare their equipment months in advance for the days of August 10-14, the time when this shower reaches its maximum hourly echo rate here on earth.

With all the success meteor scatter propagation has had on two meters, it is really a wonder that we have not heard of any m.s. work on 220 or even 432 mc. Signal strength for an underdense burst (the most common type of reflection) decreases as the third power of the wavelength, while the echo duration diminishes as the second power of the wavelength. This means that the strength of a signal reflected from a meteor trail on 220 mc will be 6 db weaker than one 144 mc. For 432 mc the signal strength drops off another 4 db to 10 db below that of a signal on 144 mc. However, this loss is not as bad as it first might appear. The higher gain obtainable from a given antenna size and the lower cosmic noise level present on these higher frequencies should more than compensate for the extra loss. The shorter reflection time unfortunately does pose a problem. There is little that can be done about it. You might try sending faster, though it seems like many of the two meter gang are already sending pretty close to the limit of human ability to copy.

In the final analysis a station will need good equipment, high gain antennas, and plenty of patience to make u.h.f. meteor scatter communication practical. If you have these qualifications, there is still time left to make some skeds for the Perseids.

Activities

Ted, W3RUE, reports on the big 432 mc opening:

"We worked 230 miles airline from our QTH to Toledo, Ohio, three times in three days. During the first opening on March 30, stations contacted included W8's TYY, DAU, CSW, and RQI. This opening seemed to be due to a huge atmospheric duct. Stations on 50, 144, and 432 mc were worked up to 250 miles away. 432 was open from West Virginia in the south to Toledo in the west.

"But, by Tuesday, April 1, the duct must have become smaller and only 432 mc signals got through from Toledo. I checked the u.h.f. TV band on both nights. On the first night I counted 15 different u.h.f. stations. On normal nights I can only copy 3. On Tuesday night I could only copy 5, which confirms my belief that the duct may have narrowed down." *Ted is interested in skeds with Virginia, Maryland, New Jersey, Eastern Pa., Indiana, and Ill. What do you say fellows?*

Left to right: Phil, K9ASK; Ed, W9CZJ; Dave, K9HJA; Ron, W9SEK. This photo was taken at a recent meeting of the Chicago Microwave Club.

Ben, W9OVL, on 220 transmitter problems:

"220 activity here in the Chicago area is good as usual, but there is nothing spectacular to report. We did run into one thing of interest. Occasionally we contact 220 mc operators who have trouble with their transmitters which cannot be located. K9DNG had this kind of problem with a new rig (6CL6, 6CL6, 6360, 6360). When he changed the last two 6360 sockets from bakelite to ceramic (porcelain), the rig worked FB. Bakelite sockets just don't have good enough insulation for 220 mc. You might pass this tip along, it can save a lot of problems." *Tnx for the tip, Ben. I am sure it will help many of the fellows.*

Stan, W4VMR, writes about interest in Amateur TV:

"I'd like to voice an intense interest in Amateur TV. I have been QRX four years while I was overseas, except for my last month in France (F7GT). A friend of mine who was overseas with me (KØJVZ, F7AY) is now in Albany, Ga. and is also quite interested in TV. We would like to contact each other via TV. Since I am at Eglin AFB, Florida, and we'll be limited to 50 watts." We hope to find another ham to act as relay in the 200 miles between us." *Anyone in the right position? Stan is also interested in meeting other amateurs in the Florida area interested in ham TV.*

Notes

Jim, WA4GHK, located in Palm Bay, Florida, is setup for 220 mc with a 5894 running 48 watts on 220.067 mc and 6 element yagi. During the month of March he worked K4RCV, W4VWH, on phone, and W4RMU (185 miles) on c.w. Look for Jim daily around 8:30 PM EST

[Continued on page 85]

*48 Cumberland Avenue, Verona, New Jersey

VHF SIDEBAND

an exclusive feature of The VHF Amateur

BOB HEIL, K9EID*

NOW THAT FIELD DAY is over and we find ourselves in a state of mass confusion, the gear can be unloaded from the family buggy and set back on the bench so the Summer DX work can be done before the season closes. I hope that you had a good weekend what with all the activity that made up field day operations throughout the country.

Since my return from the annual Dayton Hamvention, I have not had a chance to report to you. The pictures just returned and I think you can recognize some of the familiar VHF men. It seems as all the activity in the VHF field today is centered around s.s.b. Almost 95% of the VHF equipment displays were showing s.s.b. gear. You had to hunt to find any a.m. equipment! This is quite an advancement over the past years.

I was honored to speak at the VHF Forum along with Ed, W2LOY. The VHF Forum featured one of the most informative and interesting talks of the entire convention. Mr. Clegg spoke on his new s.s.b. gear that will be ready to go very soon. K9SGD and W9HOV from Halort Electronics and Gain, Inc., respectively displayed a miniature quarter scale model of the fabulous 64 element "J" beam. They discussed the entire history and operation of the antenna along with giving us VHFers invaluable material for getting the antenna system to work better. All the "big boys" of the VHF world were present at the VHF Forum. It would have been interesting to take an average of the states worked from that gathering!

One Forty Five Point Two—Growing!

Have *you* made the switch? It seems from the many letters that everyone else is doing it these days! The comments have been very favorable to make 145.20 u.s.b. the frequency of the day for 2 meter sideband activity. Troy, New York, has a new 2 meter sideband station ready: Cliff, W2CTH. He has his HX-30 on 2 with the SB-62, 2 meter section. The land of sun and fun is getting on the 145.2 map with about 25 of the Florida gang on 2 meter sideband. They operate on 145.20 and 145.01 if you need Florida. WA4DRJ is ready for action, along with K4NTD, W4RMU and many others.

WA4AET has been heard up through the Midwest on 2 meters recently thru his pair of 4CX250B's. This puts North Carolina on the map! W4SZK, W4RPC, and other two meter stations keep Bill supplied with someone to talk with usually. Turn those antenna systems around here fellows!

A new Chicago area station is barking like a fox squirrel these days. Hal, W9OEQ, gets in the 0000 Net with his 100 watts of s.s.b. on 145.20. He drives the final with a h.b. mixer and a 10B. K9PRB at Joliet, Ill., is on the 0000 Net with his new Halort HM-50 and the Heath HX-30 exciter driving his T-Bolt.

W2LOY, Ed Clegg and his lovely XYL relaxing at Dayton's Kitty Hawk room.

Sunday nights keep the frequency fairly active in the Midwest with K9OVR, K9VUX, K9RVG, K9BAO, K8TCA, etc. A few dates can be added to the list if you are looking on the frequency Sundays.

St. Louis has two new ones on, WØODI and WØWEQ, both using the new Halort mixer. Ron is on two mixing his h.b. 6 meter d.s.b. signal to 2 and Les is using his B&W 51SB to drive the mixer.

120 Element "J" Antenna Erected

Gain, Inc. has announced the erection of the largest "J" beam in the United States which will be up and going by the time this is released at K9EID. This is strictly a two meter man's dream. The antenna system has a capture area 30' wide and about 25' high. At this time, it is necessary to erect another tower 50' beside the 100' stick to get the big J up. It would be an impossible feat to keep it up 120' around here! All of the two meter operators will be invited to drop me a line for schedules during July and August before it is taken down for more tests in other parts of the country. The antenna will be driven with 1500 watts p.e.p. of s.s.b. and the receiving system is using an all nuvistor converter ahead of a Collins 51J3. Don't forget the schedule. Get in on the fun! Special QSL cards will be sent during the period that it is up.

Six Meter Band Is Open!

Six meter operators can't use the old sunspot cycle excuse for not getting to work the *E* skip this year! The band has been one complete heterodyne from top to bottom out here. The s.s.b. stations are all very active in the 50.1 —

*402 Border Street, Marissa, Illinois.

Here are some of those in attendance at the VHF Forum at Dayton: K8AXU, K9UIF, W8SDJ, W8GZW, W8IFX, W8QOH, K9SGD.

50.15 section which is a fine thing to see. This way the heterodynes are not bothered with since they are all up in the middle of the band causing that one big blast of screeches and hollers as you tune across the band during an opening. The fact that all the s.s.b. stations are cooperating makes it very easy to keep in touch with each other. Perhaps we can do the same on two at 145.2!

K7JUE and W8NAF/7 are keeping it possible to confirm Arizona this year on 2 way s.s.b. Be sure and look for them this season . . . The Ft. Wayne, Indiana bunch is making their town famous for six meter s.s.b. activity with K9THZ, K9GFQ and others . . . Everybody needs Louisiana for the two-way s.s.b. contact so look for W5GKP, W5BLE, W5AVQ, K5DKR, es K5VMC. Surely we can work some of them! . . . W6QMN, Bob reports from Hawaii that he is on 6 at 50.001 and 50.102 with the KWS-1 and the pair of 4X250B's so look for KB6CL/KH6, 1720 Ala Moana, Apt C-203, Honolulu 15 . . . W9CGI/8—Dave informs me that he is converting his a.m. rig over to the s.s.b. mode as a consequence of reading about the VHF s.s.b. activity here in *The VHF Amateur*. Take a look for him from Xenia, Ohio . . . The hard to find state of Michigan is on the s.s.b. mode around 50.110. Take a listen during the openings for W8PCZ, K8NKE, W8MRO, and K8RTM . . . Tad informs me that XE1OE is on s.s.b. now so we can all get another two way s.s.b. contact from there this season. He is using a 4-1000 on 6 and a pair of 4-125's on two. Gud luck Tad! . . . May 5 showed itself on 6 with K5UBL, K4OCK, W4GJO, KP4AAN, WA4DRJ all working into WØWEQ in St. Louis . . . K9SFX talked with VE4RE and VE4JX May 1 . . . May 3 K1PPM, KØTVD, K1PBE, K1OHU, W1WMO, KØKBQ, W9BLZ, KØJVB, KØRIR and K9SFX were all on the same frequency and they were all hearing each other by means of *E* skip, back scatter and forward scatter! . . . WA2TGC is on with his HX-30 and NC-300 combination . . .

73, Bob, K9EID

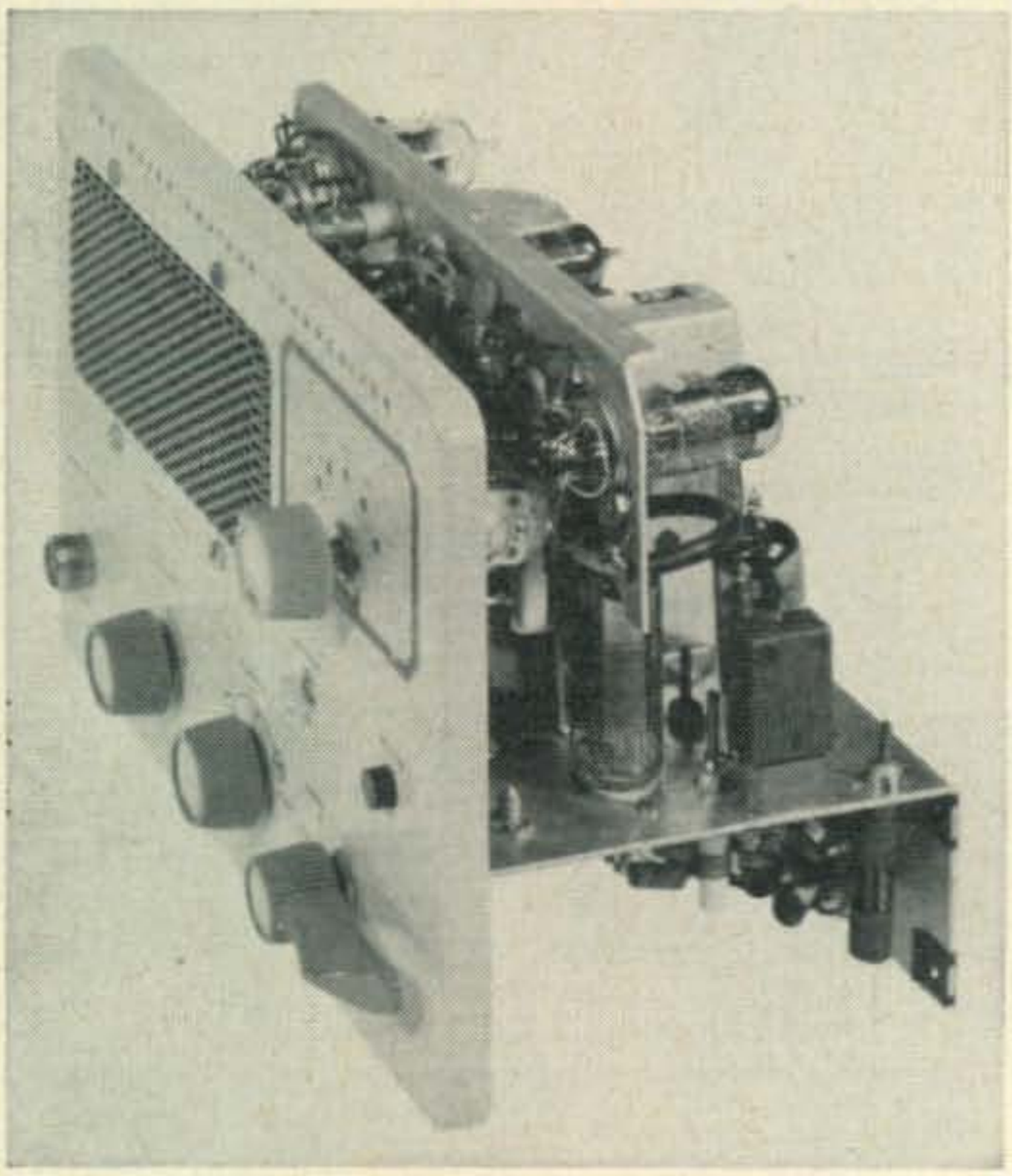
DX Report [*from page 80*]

meantime K8REG (Dayton) worked VP9WB in Bermuda. Even South Dakota reared its lovely head and joined in the fracas.

You might expect things to quiet down for another Blue Monday, but not so six meters. May 6 provided another countrywide hootenany for a short period, although not near so intense as Sunday's. VE1CL in St. Stephen, N.B., Canada was passing out contacts to many, including K8REG.

Tuesday, May 7, evidently yielded a relatively short lived opening to the South from the Midwest. Groundwave conditions in the Indiana-Illinois area appeared good, but normal for the rest of the country. WAØCKX (who must live at

New Modification Kit for Heath Twoer



A MODIFICATION KIT FOR THE RECEIVER in the Heathkit Twoer has been developed by Lawrence Engineering Company. When incorporated, this kit provides the Twoer owner with (1) a superheterodyne receiver for optimum mobile selectivity and (2) increased gain from conversion of the original r.f. amplifier-detector to a dual triode r.f. amplifier.

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his rig) made the most of every available minute with Miss., Ala., Ga., and Texas.

Winnipeg, Manitoba, Canada, and VE4MA broke through on Wednesday for K8REG amid the turmoil of another eastern-half-of-the-country opening. Everyone worked everyone, or so it seems reading logs at WA2ODR, WØGXK, K9DTB and K9YEN, who scooped everyone with their totals. Lack of Kentucky has maintained itself consistently with no single reporter working (or even hearing) that state. What happened?

Wyoming, and VE4AE were reported working many areas by K9YEN on Thursday, May 9. In addition to the now-common bedlam at the low end of six, California was worked by K8REG for some real nice double-hop catches. Calls: K8HNT/6, W6LMS, WA6PFA, WA6YCK and WA6IIF. Anyone else work into the West Coast that day? S.s.b. activity at low end building.

The only reports we have for the next week come from WØGXJ in Iowa who sez he worked K1JJI in R.I. on May 14 and WA2QZQ on May 15. Just listening on the band revealed quite limited DX.

KP4AST, FG7XT, and KP4AAN were heard by K9YEN in Illinois on May 16, while WA9DKA actually worked FG7XT. W7ZQX (Seattle) was worked by W6BUR, though VE6OH was heard. VP7CX snagged VE3's BHQ and BBX.

73, Bob, K2ZSQ

UHF Roundup [*from page 81*]

when he holds skeds with W4VWH (220.10 mc).

Ted, W9VZL/9, located in Madison, Wisconsin has got the u.h.f. TV bug and thus he has one KWM-2 for sale.

Walt, K1RTS located 1100 feet above sea level in Bethlehem, Conn., is looking for 220 mc skeds on Sundays at any time. Walt, what is your frequency on 220?

We have run some fine pictures of W8JLQ's TV contacts. Here are a few hints as to how Howard gets such clear pictures. "Horizontal definition in most cases was limited by my receiver bandwidth. We are using double sideband transmission with n.f.m. on the video carrier for sound, with negligible cross-modulation between the sound and picture. A good limiter ahead of the discriminator virtually eliminates synch buzz in the sound. Reasonable FM level for voice just barely effects the picture, or not at all."

73, Allen, K2UYH

VHF•• BCNU NEXT MONTH

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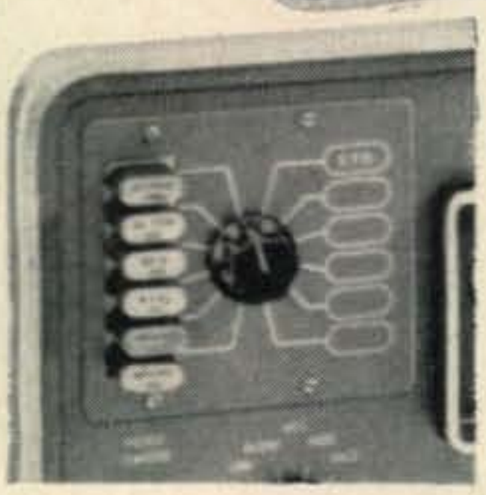

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Solid Copy, OM [*from page 44*]

and good DX, ragchews, contests, etc. to you, and if you hear us on give us a shout and we'll change bands or something. DX7XD/CRX7, this is K5ALID signing off, over, clear, out, closing station, and QRZ."

"Break! Break! Break!" ■

Front End Design [*from page 46*]

ating frequency will greatly increase the selectivity.

3. Thorough shielding of the r.f. stage should be employed to reduce the leak-through of undesired signals to the mixer.

4. Extreme care should be taken in the wiring layout. All signal leads should be kept short.

5. Filtering, decoupling and bypassing should be used on all leads in the front-end other than signal leads.

6. For best operation, r.f. stages should be neutralized. This is seldom done.

7. Care should be exercised in the choice of r.f. tubes to minimize interference effects. Some recommended tubes for r.f. amplifiers include the 6BZ6, 6EH7 and 6EJ7. The 6U8 makes an excellent oscillator/mixer tube, and yields a much lower noise figure than the common pentagrid converter tube. ■

DX [*from page 53*]

his QSL Manager but W3AYS reports knowing nothing of this chap so save your stamps.

CR6FY Box 244, Nova Lisboa, Angola.
CR7IZ via K2HQJ.
DJ0IR Donald E. Simonsen, Parkstr 47 bei Bressler, 35 Kassel, Germany.
DL5AO via W5EJT or DARC or Jahnstra 36, 867. Hof/Saale, Germany.
EP2RC via K1KOM.
EL8C via VE3DGX, George Hrischenko, RR#2, Maidstone, Ontario, Canada.
HC1DC/HC1AGI Donald McClenon, NASA U.S. Embassy, Quito, Ecuador.
HI8AKU Box 1211, Santo Domingo, Dominican Republic.
KZ5LC via W2CTN.
OX3JV via SM7ACB.
PJ5CG via KØGZN.
PX1OAC via F7OAC.
VP2GAC via W4OPM.
VQ4ERR via KØLEY.
VR1N c/o Hammarlund DXpedition, General Post Office Box 7388, N. Y. 1, N. Y.
VR3E Task Group 815, APO 86, c/o PM, San Francisco, Calif.
VR3O Now WA6MFY.
ZD3A Box 285, Bathurst, Gambia.
SU7AH via K9EAB.
ZB1CH Clive R. Burchell, Officers Mess, RAF, Luqa, Malta.
5X5IU R. Roberts, Box 355, Kampala, Uganda.
6O1ND via W4TUA or via Box 397, Mogadiscio, Somalia Republic.
6YABL via W3AYD.
7X2VX via W4UWC.
9G1DZ via WØEQN.
9N1DD Lt. Col. W. A. Gresham, U.S. Embassy, APO 959, Box KAT, San Francisco, Calif.
9N1MM Father Marshall D. Moran, c/o St. Xaviers School, Box 50, Kathmandu, Nepal.
9Q5RK via LX Bureau.

73, Urb, W2DEC

Contest Calendar [*from page 55*]

down is given but some of the scores are for single band operation and, according to the new rule changes, are certificate winners. The All-Band leaders from "down-under" are: VK6RU (11,660) and ZL1AH (16,765) on c.w. and

VK2AHT (7,470) and ZL1AIX (15,140) on phone.

N. America C.W.		WA6SBO	711	K6EVR	3244
K1RTB	1122	W6FYM	196	K6ERV	2014
W1WY	92	W6TMX	132	WA6SBO	228
W1CKA	68	K6IEC	32	K6AHV	85
W2IOP	810	W7PQE	4008	W7ESK	3960
W2WZ	248	W7EWR	30	K9ECE	208
W4AZK	1395	W8JIN	6169	KP4CL	224
W4KXV	133	K8QJH	994		
K4BAI	60	W8MCC	20	S. America C.W.	
W4NTE	44	KØVSH	16	HK7ZT	196
K5KBH	4758	KP4CC	18	HK7YC	112
W5WZQ	4100	XE1PJ	16	PY1ADA	190
W5KC	1900	PHONE		PY4GA	144
W5BRR	1854	K2GXI	204	PY4OD	87
W5PSB	553	W2WZ	30	PZ1AH	6
K5UYF	360	W4RLS	224	PHONE	
K5JZY	72	W4BVV	180	LU1DAB	144
W6HJT	8118	K5MDX	4425	YV5AQS	620
K6EVR	5236	K5KBH	2208	YV5AKP	235
W6ISQ	798	K5UYF	90	YV5AHG	217
		W5KC	108		

Ed. Note

Not too much to report at this early date. I guess it would be too much to expect to hear from the boys south of the border.

We are still debating whether we should continue the 2 points for QSOs between North American stations in our World Wide DX Contest. The overall comments were about equally divided. Those in favor were stations that confined their operation on the higher frequency bands. Wish you fellows would voice your opinions and let me know how you feel about it, whether we should continue it or not. Perhaps at least for the duration of the low sun spot cycle.

And a word to the many state organizations that are planning QSO Parties. To give you the proper coverage we must have this information at least 3 months in advance. Just as soon as we get a few more we will give you a separate listing of your own.

We hope to have the certificates out much earlier this year so bear with us and be a little patient, especially those of you in hard-to-reach over-seas locations.

That should do it for this month.

73 for now, Frank, W1WY

Commercial VHF [*from page 40*]

and via the control cable to the filaments. This long run may result in too low a filament voltage. The cure is to have the filament switch actuate a relay instead, which feeds the filaments directly from the heavy dynamotor lead, on the battery side of the start relay. Former telephone or police equipment sometimes comes equipped with a 10 or 12 pin Jones plug in the rear. This was for the purpose of connecting a selective calling system which lighted a warning lamp on top the squad car when the dispatcher called, or actuated the ringing mechanism in the case of radio telephone service. Disconnecting such gear does not affect the normal operation in any way.

Figure 7 illustrates the standard cabling and control head wiring for remote operation. ■

Space [*from page 56*]

one of the two 2.5 watt transmitters operating on approximately 1815 mc. Only one receiver-transmitter system will be able to operate at a time, the selection being made by ground control. The second system will be available as a spare in the event trouble develops in the system being used for relay transmission.

SYNCOM II will be launched from Cape Canaveral and will be placed in an inclined synchronous orbit centered above the mid-Atlantic. It will not be a completely stationary orbit, and the satellite is expected to drift very slowly between approximately 33 degrees north and 33 degrees south of the equator. From this orbit, SYNCOM II is expected to have line-of-sight contact with vast areas of north and south America and Europe and Africa. Initial experiments with SYNCOM II will be limited to a single two-way voice channel and will also evaluate the time delay (approximately 0.6 of a second) and echo problems that are associated with high altitude satellites.

A contract to study an advanced SYNCOM satellite was recently awarded by NASA to the Hughes Co. of Culver City, California, builder of SYNCOMs I and II. This version will be placed in an equatorial synchronous orbit, will weigh about 500 pounds, have a diameter of five feet, relay up to four television channels, and will employ a phased antenna array with 17 db gain. Launch date for the first of the advanced SYNCOMs is tentatively scheduled for late 1964 or early 1965.

Space listeners should be able to receive the 136.47, 136.98 and 136.77 mc beacon and telemetry signals from SYNCOM II for long periods of time, especially if the receiving antenna is orientated correctly towards the satellite's nearly stationary position in the sky.

ECHO II, NASA's second generation passive communication satellite, which is expected to be launched later this summer, will be discussed in next month's column. Radio amateurs will be able to participate in the ECHO II experiments.

73, George, W3ASK

Legal Liability [*from page 34*]

may claim its protection. Also, a jury is allowed to consider a structure's utility and cost to make safer as compared to the risk to children it presents. In the two cases cited at the beginning of this article, the juries felt that the extra cost necessary to place more safety devices on the electric poles was not unreasonable when weighed against the risk to children.

To look at this in practical terms, substituting antenna wires or towers for the electric poles in the cases cited, it means that you could be liable for injuries to a small child trespasser that climbs your tower unless you take the necessary safety precautions. Specifically, if an eight year old child trespasses on your property which is located in a neighborhood where chil-

dren are common (children *are* likely to trespass), and decides to climb your antenna tower or swing from your dipole (artificial structure), like Tarzan, you may well be paying his doctor bills unless you have made some effort to "child-proof" your antenna which otherwise would be quite attractive to a mischievous child. In Pennsylvania a high fence with a padlock may be necessary, but in most places simpler methods of reducing access by children will probably be sufficient. Certainly antennas should not be strung too low and towers should be made unclimbable. I put a lock and chain around the cranking handle of my crank-up tower so that a child cannot try to crank down the beam to have it fall down on him.

Other Categories

The other categories of persons liable to come in contact with your station or antenna system—licensees and invitees—can be disposed of fairly quickly. A licensee is one that is tolerated on your private property, *i.e.* not specifically invited or chased off. If people commonly take a short cut over a path on your property, and you make no effort to stop them, they are licensees. Trespassers that you become aware of, but do not expel, may become licensees while they remain. Invitees range from invited social guests to invited business guests. The owner of a property is given a greater responsibility for insuring the safety of people as they increase in status from licensees to business invitees. The distinction between each category is broad and overlapping and it is often better to look at specific cases and use common sense. A licensee would surely have to be warned of hidden pitfalls such as low invisible antennas while one would have a high degree of responsibility for the safety of a business invitee that had to enter your radio shack as part of the business.

In general, normal safety precautions inside your ham shack should be sufficient unless small children commonly play there. If you are in a neighborhood where small children often roam around, it would be wise to look over your antenna system with them in mind. If the thought of someone getting injured is not enough to make you run a safety check today, consider having to pay a $100,000 court judgment in addition!

This article is intended to give a general look at the law as it affects the setting up of your station and antennas. For specific information about the state of the law in your jurisdiction, I suggest you speak to your lawyer or liability insurance salesman. ■

Propagation [*from page 60*]

place, there are certain locations on the face of the earth where it can be seen as a *total eclipse*, that is where the moon completely shelds the view of the sun from the earth. Scientists travel from all parts of the world just to be at the right location to view the total eclipse and record certain scientific data that can only be obtained

during such an event.

An eclipse of the sun will occur on July 20. It will be visible as a total eclipse over a narrow arc extending from southern Alaska, across Canada, and through the central part of Maine. Throughout the rest of Canada and the northern areas of the United States it will be seen as a partial eclipse. In the United States, the eclipse will be seen in totality first over southern Alaska. The city of Anchorage will be able to view it at approximately 11:40 A.M. local standard time (2140 GMT). The arc of totality will extend eastwards at the speed of 3,300 miles an hour. Passing over the Northwest Territory of Canada, the total eclipse will be visible over Yellowknife at approximately 3:02 P.M. local standard time (2202 GMT), over Port Nelson on the western shore of Hudson Bay at 4:16 P.M. local standard time (2216 GMT), over Quebec city at approximately 5:30 P.M. local standard time (2230 GMT), over Jackman, Maine at 5:41 P.M. local standard time (2241 GMT) and over Bar Harbor, Maine at 5:45 P.M. local standard time (2245 GMT). Check your daily newspaper for the times that the eclipse will be seen, either totally or partially, in other areas of the United States and Canada.

An eclipse is more than a passing natural attraction; it is an event of great scientific interest which has always had special significance to radio researchers. During such an event, and only during such an event, is it possible for the ionizing radiation of the sun (which forms the various layers of the ionosphere) to be cut off in the middle of the day. This affords the opportunity to observe the effects upon shortwave radio circuits, as rapid changes in ionization take place.

As far back as 1925, scientists discovered that during a total eclipse, radio waves of frequencies which are propagated best at night, showed a remarkable increase in intensity during the daylight hours when the moon obscured the sun. Daytime frequencies showed a corresponding decrease in the intensity of the received signal. The total eclipse effect was, in fact, observed to transform day propagation conditions into night conditions during the period of the eclipse. In fact, it was the result of similar observations made during the total eclipse of 1927, that led to the formulation of present-day theory that the ionized layers above the earth's surface are formed principally by radiation from the sun. During a total eclipse, solar radiation is cut off as the moon passes between the sun and the earth, causing a temporary decrease in the electron density of the ionized layers.

The eclipse of July 20 offers a rare opportunity for radio amateurs over large areas of the United States and Canada to observe unusual ionspheric effects. This will be the last total eclipse that will be visible in the United States until 1970. The eclipse should transform day conditions into night conditions for those circuits whose ionospheric reflection points pass through the area of totality. For example, between approximately 5 and 6 P.M. Eastern Standard Time, (2200-2300

GMT), there should be a rapid improvement on 40, 80 and possibly 160 meter openings between the United States and Europe, while a decrease in signal strength is expected on 20 meters during the period of the eclipse. The editor of this column would appreciate receiving reports of unusual propagation effects which may be observed during the period of the eclipse on July 20.

73, George, W3ASK

Novice [*from page 61*]

If the grid of an amplifier tube is biased to cut-off so that plate current will flow only during the positive half cycles of the applied a.c. signal voltages the circuit is called a Class B amplifier. Since plate current flows only during the positive half cycles of the applied signal the plate current wave form is not a replica of the applied signal.

The Class B amplifier was designed to amplify an amplitude modulated signal from a small transmitter. It can also be used to amplify an audio signal or the output of a single sideband transmitter.

The voltage regulation of all supplies for a Class B amplifier must be very good because the plate current swings from zero to maximum at an audio rate. This requires good regulation to keep the voltage from changing by any great extent. The Class B amplifier requires more drive to the grid than the Class A, as it must swing the grid voltage high enough to override the grid voltage. The Class B amplifier can be used as a single ended or pushpull r.f. amplifier or as a pushpull a.f. amplifier stage. Never use a single ended Class B stage for audio because of the non-linear amplification characteristic of the single tube circuit. The efficiency is about 50 to 60 percent.

Almost all of the r.f. amplifiers used in a.m. or c.w. transmitters are operated Class C. The advantage of Class C operation is that it has high efficiency, efficiencies of 75 percent not being uncommon in well constructed and operated r.f. amplifiers. Class C amplifiers are never used in audio or s.s.b. since they have a high degree of distortion.

The Class C stage is operated at near twice cut-off grid voltage and should also use a high voltage power supply with good regulation. The amplifier tube should have ample cathode emission and ample grid drive.

The circuit diagrams of all class amplifiers look alike, the difference being in the drive, bias and loading parameters.

I hope that this has enlightened you to the point where you can read more from the handbooks and understand the ABCs of amplifier operation.

Letters

New Mexico finally has Novice representation in NOVICE again. WN5EUT, Kenneth Ruffner of Hobbs, New Mexico sends this newsy letter:

"Dear Walt: I have been waiting to write this letter for about 5 months now. The rig here is a DX-100 with a Johnson Viking 275 matchbox.

The receiver is an SX-101-MK III. The antenna farm consists of a 270 foot long-wire up about 45 feet, a 15 meter folded dipole, a vertical (V-80) with which I have worked my best DX and a dipole for 40 meters used as an inverted V with the apex at about 45 feet. With this combination I have confirmed 48 states (need KL and KH), VE2, 3, 5 and 6, XE2 and KP4. The lowest signal report received was 569X. I will be glad to help anyone in my area to get a license.

"I want to thank Bruce, K5SMA, John W5NQG, and Bob, W5JVX for getting me interested in ham radio and for explaining the theory that I could not get from the books. I stay up late on the week-ends and will be looking for you and the KH6s and KL7s. Thanks and 73, Kenneth."

From Garfield, New Jersey comes this letter:

"Dear Walt: I just passed my general about a week ago and I figured I had better write while I still had the "N".

"The rig here is a DX-40 and an SX-111 with a home-brew 15 meter beam and a dipole for 40 and 80 meters. My WAS is 35/32 and DX is 5/2. I especially like to get in contests and any kind of competition on the air. As far as awards go I only have RCC and a 20 w.p.m. Code proficiency. Well that's about it from this end Walt, so 73, Bob."

Bob Kovarcik, WN2CRX sent this letter and like the one above, mentions the fact that he should have written. Have you been putting it off and waiting for someone else to write?

Robert W. Green, WNØFMG, 239 East Park, Owatonna, Minnesota was loaned a surplus Beam Filter, a Navy item identified as N.A.F. 68304. It has two jacks and a three position switch. He would like to know where he can get one of these units for his station. He says it added 100% to his listening enjoyment. It sounds like this should be an excellent item for any c.w. station to add to his equipment, and would make those hard to copy stations come right through the QRM.

Rhode Island's representative, Edward J. Radlo, K1LDK, 10 Edgemere Road, Pawtucket, Rhode Island sent this letter:

"Dear Walt: I am taking this opportunity to write you after reading your plea in December NOVICE asking to hear from us youngsters who belong to CHC, etc.

"Well, I got CHC #584 last year when I was 16; I am now 17. I have had my General since I was 14. My other awards include WAS, WAC, WBE, DUF, WUNA, CP-30 and the DXCC total is 96/86.

"Thanks for a lot of interesting reading, and, although I am a General, I read your NOVICE column all the time. 73, Ed."

Thanks Ed, for the note and I think it would make interesting reading to have a column of the accomplishments of the younger set and later one of the Novices well into their second childhood, say 70 or older. So, what say you "oldsters" stand up and be counted.

73, Walt, W8ZCV

dialing 'O' one is put through on v.h.f. three channel carrier relays via Kedah Peak to the main exchange in Alor Star (capital of Kedah). Frequencies about 68 mc and 76 mc. I can talk to Singapore 500 miles away usually quite clearly.

"The main North-South Route is progressing. From Singapore to Kuala Lumpur, 280 miles is by v.h.f. relay 7 cm giving 600 simultaneous phone channels plus teleprinter and TV relay when required. From K.L. North to Penange, still v.h.f., only 125 channels, but will be u.h.f. later. From Penang to South Thailand now on v.h.f. relay."

At the risk of dabbling in the internal affairs of another country, I would like to comment on another portion of Jimmy's letter. It seems that all 6 and 2 meter operation has been suspended in the area. This is truly unfortunate for 9M2DQ, it is probably the only station in all Southeast Asia capable of communicating via the forthcoming OSCAR satellite. To date, the Malayan Amateur Radio Transmitters Society, ARRL or IARU has been unable to correct the situation. It would appear that the 144-146 mc international amateur band is being earmarked for other purposes in violation of 1959 Geneva Convention agreements. Let's collectively hope that someone who cares can correct this unfair condition so that the Federation of Malaya may add its voice to the many other nations using the international amateur radio satellite, OSCAR III.

Our reporter from Britain, G2DHV, has been driving around the continent operating 144 mc mobile and has been licensed as ON5ZQ, PA9DHV/M and DJØAA.

Who's News?

K4NTD reports that Channel 12 from Jacksonville, Florida, was getting clobbered on the evening of March 17/18 as was 12 from Winston in the area. Jack heard K4YYJ, K4MHS, W4MKT, and W4FSO just barely as they worked W4RMU and W4MNT. After calling CQ for 2 hours, W4BUZ signals popped up and was worked. Jack regrets not being able to hook YYJ and MHS. He recalls an opening into Charleston, S.C., last summer that was good in Orlando 1 hour before it was good in his Oakland QTH. W4BUZ notes that 30 miles can make a big difference, too, on tropos.

Even faithful Walt, K1RTS, reports that he has the 220 section of his MARK II B-19, rig working and is looking for skeds in the area. Walt needs the Nov. '51 issue of *Radio Electronics* or Feb. '57 issue of *CQ* to complete the B-19 conversion. Can anyone send him a copy? He also reports the club ARC-4's are now using Gem Electronic preamps (about 2" square) which are a great help in improving the sensitivity of the unit.

That shuts down our repeater for another 30. 'Til then,

73, DE Don, W6TNS

istics. W2PEE found that substitution of 100 ohm 5% resistors for the lamps solved his problem. W2JTP found that matching the two multivibrator transistors solved the same problem. Also, if much use is contemplated, don't use the little "model" dry cells. The larger Everready #1015 penlite cells made for transistor radios last much longer.

On the Bauds

W1OQA of Enfield, Conn., is running 500 watts on 80. W1HRC of Pittsfield, Mass., and W1LWV of Millinocket, Maine, are also on 80.

WB2CVN is now NCS of the East Coast RTTY Net, on 3620 kc Wednesday nights at 8 P.M. Check-ins include W1OHM, W1CTV, W1EV, W1CFR, W2JAV, W2PAT, W2JTP, W3YEA, W8OVJ, and VE3DTY. W2PEE of Old Brookville, Long Island, is on 146.70 mc f.m. with a Motorola 140-D, and K2AAA of Roslyn, Long Island, is on with an 80-D. W2ABV of East Syracuse, N.Y., is on 3620 kc. K2BEH, WA2KND, and WA2CGN are all on 6 meters in the Rochester, N.Y., area. K2ZBA of Floral Park, N.Y., is on 80 with an HT-37 and a Model 26. W2OKO of Summit, N.J., W2RYB of Titusville, N.J., and K2HWL of Hampton Bays, Long Island, are all on 80.

K3HHH of Levittown, Pa., is looking for a Model 26. K3BYY of Silver Spring, Md., is on 80 with an Apache, an inverted Vee dipole, and a Model 19. W3YLT of Phaladelphia, Pa., also works 80.

W4MGT of Lexington and W4HMN of London, Ky., work narrow shift on 80 meters. W4RVH of Charlotte, N. C., has a Model 26 *with auto-car-return and line feed* for sale. K5PLR of Beaumont, Texas, has a Model 19 that needs a few parts. (*Try WØNOY, Bob.*)

WA6FKN of Dixon, Calif., is building W2JAV transistor units. NCARTS made K6TCD President, W6ZVV Vice President, and K6ZBL Secretary-Treasurer. W6ULL of San Diego, Calif., is on 20 with 100 watts. K8RWL of Dearborn, Mich., got a Model 15 from W8DLT. K8JOR of New Philadelphia, Ohio, is on 80 as is W8UUS of Kalamazoo and W8QMI of Midland, Michigan.

W9RRL of Chicago, Ill., has a Model 19 for use with his KWM-2 and W2JAV transistor gear. K9DOF of Elkhard, Ind., is looking for an EPUT (counter) meter. W9SPT of Chicago, Ill., reports the CATS are now operational on 146.70 mc f.m. W9DRN of Des Plains, Ill., is on 80 as is K9EAM/9 in Williams Bay, Wis., and K9CCX of Glenview, Ill. WØDOP, telephone company CD Radio Officer for Minnesota was heard on 20 with tape gear. WØTUO of Wilmar, Minn., is also on 20. WØJRQ of Denver, Col. is on 20 as is WØYTL of St. Paul, Minnesota.

VE2MG of Montreal is building W2JAV transistor units. VE2AZF, also of Montreal, is on 80 working VE2FY. DL4UC in Offenbach,

Germany, is on 20 *above* 14,100 kc, pouring a good signal through the s.s.b. hash.

Things to Come

Those of you who attended the New York City RTTY Meeting on March 25th were quite impressed with the transistorized narrow shift gear demonstrated by Phil Catona, W2JAV. Briefly, this equipment is somewhat similar to the gear described in the February, March, and April ('62) RTTY Columns. The tone channel is centered on 2125 cycles instead of 2550 as used with 850 cycle shift. The new transistor TU shown by Phil is of the discriminator-type and it will accept different values of shift up to about 300 cycles. The narrow shift a.f.s.k. oscillator uses the same circuit as the one for 850 cycle shift, but is set up for 2040 c.p.s. for *mark* and 2210 c.p.s. for *space*. We hope to have the details soon, so keep your eye on the RTTY Column.

73, Byron, W2JTP

Sideband [*from page 66*]

station who was on s.s.b. so if, inadvertently, they omitted to indicate a 2-way s.s.b. contact, our familiarity with their operation permitted us to accept their cards for certificate credit. However, with the tremendous increase in sideband operation all over the world, it is impossible to keep up with all the new sideband stations. Quite often, recently, we have had to deny credit for a confirmation which may have been for a 2-way s.s.b. contact but which gave absolutely no indication of such. In order to spare yourself any disappointment, remind your contacts to stamp or mark their cards properly!

73, Irv and Dorothy

D.C. to D.C. Conv. [*from page 24*]

supply can be used with either a plus or minus ground. The important thing is to be sure that proper polarity is maintained at points *B* and *C*.

The polarity of the feedback winding (terminals 4, 5, and 6) must be correct in order for the supply to oscillate. If an audible 1500 cycle tone is not heard when power is applied the connections to the feedback winding are probably incorrect. In this case turn off the power and interchange the connections to terminals 4 and 6. If the 1500 cycle tone is not heard after switching connections a defeat is indicated in the transformer or transistors, or there is an error in wiring. The wiring should be checked carefully.

If there is a shorted turn on the transformer the supply could be oscillating above the audible range. This can be checked by connecting a scope from collector to collector of the transistors. If no scope is available check the high voltage point *D* for a d.c. voltage. If there is a d.c. voltage here, the supply is oscillating at some frequency above 15 kc and a shorted turn is indicated in the transformer. The connections to terminals 4 and 6 must be interchanged for each of these checks to be sure that connections are correct. ■

For further information, check number 46, on page 110

Ham Shop

Rates for the Ham Shop are 5¢ per word for advertising which in our opinion, is non-commercial in nature. A charge of 25¢ per word is made to all commercial advertisers or organizations. Since we do not bill for Ham Shop advertising, full remittance **must** accompany all orders.

Closing date is the 15th of the 2nd month preceding date of publication. Your copy should be typewritten, double spaced on one side of the page only.

Because the advertisers and equipment contained in Ham Shop have not been investigated, the publishers of CQ cannot vouch for the merchandise listed therein. We reserve the right to reject advertising which we feel is not of an amateur radio nature.

QSL's? WPE? CB's? Largest variety samples 20¢ (refunded). Sackers, W8DED, Holland, Michigan (Religious QSL samples 25¢).

QSLs Samples 25¢ Rubber stamps; name, call, address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSLs—$2.00 per 100 postpaid U.S. only. Glossy, red and green. Free sample. Hobby Print Shop, Umatilla, Fla.

QSLs SWLs that are different, colored, embossed card stock and "Kromekote." Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QSL Kromekote 3-color . . . order 200 get 25 each of 8 different styles . . . many styles. Samples 10¢. Progress Printing. Box 1154, Biloxi, Miss.

QSLs four colors glossy stock, forty designs—send $5 for 200 and get surprise of your life. 48 hour service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

GLOSSY 3-color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service 7 Fairfield Rd., Somerset, N. J.

QSLs—SWLs samples 10¢. Malgo Press. Box 375 M.O., Toledo 1, Ohio.

QSL Cards in 3 colors $2.50 per 100. Free samples and catalogue. Garth Printing, Box 51Q, Jutland, New Jersey.

QSL cards: 2 color, glossy; 100 for $2.50. Samples, Dime, Ramsbottom Printing, Box 237F, Kirksville, Missouri.

QSLs Samples, dime. Print Shop, Corwith, Iowa.

QSLs CBL's—Finest quality—extra fast service on stock or custom designed multicolor cards. Samples and catalogue 25¢ (refundable). Dunnahoo, 516 Prospect, Fairview, Mass.

RUSPRINT QSLs—SWLs 100 2-color glossy $3 postpaid. QSO file cards $1 per 100. Rusprint Box 7507 Kansas City 16, Mo.

QSLs SWLs XYL-OMs (Sample assortment approximately 9¾¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fantabulous. DX-attracting. Protopay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSL's—100—$2.50. Samples. Dime. AMEE's Printery—W9FXQ—Box 138, Oak Lawn Illinois.

QSL Cards Brownie, W3CJI—3110 Lehigh, Allentown, Pa., Catalog with samples 25¢.

QSL's . . . Eyepoppers . . . Samples Dime. Filmcrafters . . . Martins Ferry, Ohio.

TOROID RTTY Kit: Mark-Space Discriminator and Bandpass filters. Includes 4-88 mh and 1-44 mh uncased, like new toroids; Information sheet, mounting hardware and six mylar capacitors. $5.00 Postpaid. Toroids: Specify 88 or 44, less capacitors, $1.00 ea., 5/$4.00 Postpaid. KCM Products, Box 88, Milwaukee 13, Wis.

TOROIDS Uncased 88 mh like new. Dollar each. Five $4.00 p.p. DePaul, 309 South Ashton, Millbrae, Calif.

7000 volt variable air capacitors 300 mmf $14.95. Hinckley Mfg. Rutland, Vt.

TELETYPE PAPER original and carbon copy. Perforated, stapled, folded. Dollar per fifteen pound box. Write WA5GGB, 3102 Shorecrest, Dallas, Texas.

WØGFQ Leo has big discounts on overstock of used equipment, due to so many trades on the fabulous new Galaxy SSB Transceiver. Now's the time to save on reconditioned equipment. Write for our latest list—over 1,000 items. World Radio Laboratories, Box 919, Council Bluffs, Iowa.

LOOKING? Shopping? Trading? Trying to save money? Write Bob Graham for special deals on new and reconditioned used gear. Cash or budget. Graham Radio, Dept. B, Reading, Massachusetts, Tel: 944-4000.

FREE Bargains Bulletin! Write: "Brand's Bulletin", Sycamore, Ill.

TRANSFORMERS How to design them $1.50. Ralph Devins, WA2UYW, 48 Woodruff Ave., Bklyn, N. Y.

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Sensitivity is 1.0 microvolt for 10 db. Signal to Noise ratio. Selectivity is ± 0.8 KCS at —65db with Q-MULTIPLIER.

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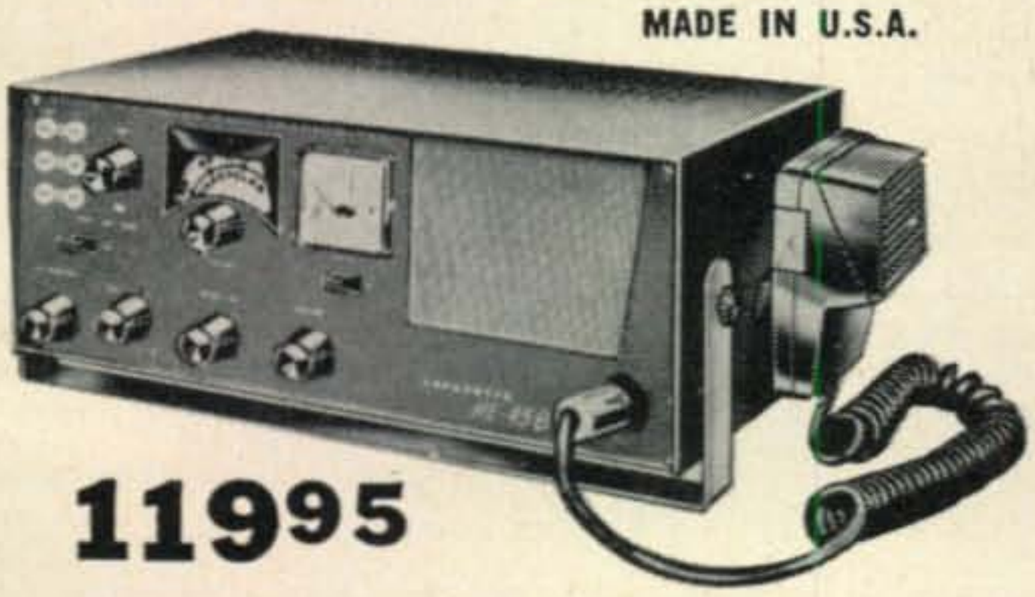

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29.95 HE-56 6-METER

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For further information, check number 9, on page 110

220mc. Information Frequency, Equipment, Schedules. Postage Returned W9DJ.

STILL LOOKING for old wireless gear before 1925. Will pay good money or trade and particularly want certain spark equipment, a C.R.L. Paragon with amplifigon or matching tube panel, De-Forest Type O radiotelephone with tubes, catalogs, government call books and other books. File of QST's is almost complete but need a few issues of 1916, 1917, 1919 and 1923. If you are lucky, enough to own any copies I need, I will pay real money for them. I want them that badly. Also need quenched sections number SE1001 for SE1075 ship transmitter. In writing please give complete information plus price or specify what you need. W5VA/W5AI, T. Frank Smith, P.O. Box 840, Corpus Christi, Texas.

FOR SALE: Complete instructions including 28 page booklet and 22" x 36" schematic for converting the ART-13 transmitter to a.m. and s.s.b. Satisfaction guaranteed. $2.50 Sam Appleton, 501 N. Maxwell St., Tulia, Texas.

COMMUNICATION Teletype unusual surplus bargains, Free flyer. MDC-923 W. Schiller, Phila. 40, Pa.

MULTIPLEX Adapter—Circuit board set of 5 coils, sockets and complete instructions $15.00. D. L. Stoner, Box 7388Q, Alta Loma, California.

READY CASH for your AN/GRC, PRC, TRC, TCC, ARC, all Military communications Equip't. Also test gear: TS-; AN/UPM, URM, etc. We Pay Freight. Call K2BBC collect at TR 8-5222 or Write Space Electronics Co., 218 W. Tremont Ave., Bronx 53, New York.

TRADE-ins accepted on purchases of demos and brand new Ham, CB, Marine and Hi-Fi equipment. We are one of the largest retailers in the country and carry complete lines of new equipment of almost all manufacturers in stock. Time payments—up to 24 months—arranged. We will also buy your used equipment for high cash prices. Many specials available. Call Bob at Crown Electronics, 64 Cortland Street, N. Y. 7, N. Y. Worth 4-0790 for real money saving deals, whether you have something to trade-in or not.

WANTED Radio correspondence course, also back issues of Electronic World and Popular Electronics. Thomas Condon, 321 Moreland St., S.I. 6, New York City.

SELL KWM-2 purchased Dec. 62, Ser. 13642 $940; A.c. pwr. supply $90; VFO-matic for 75 A receivers, $80; Johnson Matchbox-275 watts, $30; all guaranteed perfect, F.O.B. Lamb, 1219 Yardley Road, Morrisville, Pa.

FOR SALE R-388/URR receiver $250; Viking invader (new) $500; TT-55/mgc teletype $100; Magnecorder tape recorder $100; TV50 Genometer $25. Simpson 480 Genescope $100; 4X250 B tube $10; used Vidicon tube 6198—$25; used Motorola 2-way radio & BC-1031C Panoramic adapter. Harry L. Parker, P.O. Box 303 Georgetown, So. Car.

WANT 220 432 gear. W9DJ.

FOR SALE Johnson Viking Challenger xmtr, excellent condition postpaid anywhere $65; Complete Gonset Mobile station consisting of G-66, G-77, universal power supplies, all cables, manuals, coax body mount and Webster short band-spanner antenna, like new, unmodified, all original, $275 postpaid anywhere. Two new 813 tubes $8 each, new Shure model 51 mic and desk stand $20; Dumont 304A five inch oscilloscope $35; Hickok 600A tube tester $50; three 4-65A tubes $5 each; TS-352B/U multimeter $30; eight 832A tubes $4 each; Scope shipped FOB other items postpaid, tubes are new surplus. Ten tapes for TG-34A keyer $2 each (new). Paul Scottland, P.O. Box 6622, Jacksonville, Fla.

TOROIDS 88mh $.60 each or 6/$2.50. H&H Box 34, Dixon, Cal.

NEED MONEY? Get that new rig now—no need to do without! Borrow money to buy it quickly, confidentially, as thousands are doing, from National Loans by mail. Easily arranged, repay in small monthly amounts. Borrow $100 to $600 without co-signers or collateral. For our quick 73, write, tell us how much you need. National Loans, Dept. Q, 101 S. Tejon, Colorado Springs, Colo.

LOW PASS audio filters (5) FB for SSB Toroid 300/2500 cps. New. See Harvey Radio ads $4.85. W8BJS, 428 Roland, Grosse Pointe Farms, Mich.

HUNTER Bandit Linear for sale, Demonstrator $450.00. E. Shafer, 3479 Kersdale Rd., Cleveland 24, Ohio.

SELL Compl. Drake 2-B receiver, Q-Multiplier/speaker and crystal calibrator. Like New. First $235 takes it. Josef Schilling, 806 S.W. 68th, Oklahoma City 39, Okla.

HRO-60 with nbfm, XCU-50-2; coils ABCDEFGHJAD, $400; DB-22A, $25; Heath AT-1 with 6146 per July 1957 Popular Electronics, VF-1, QF-1, AC-1, make offer. Ralph Falconer, VE4RD, Lynn Lake, Manitoba.

RCVR RME 6900 mint condition. Must sacrifice for $200, with instruction manual. M. F. Kavanaugh, W5GBG/6, 520 E. Belleuve, San Mateo, Cal.

SELL because of college expense—Central Electronics 10A complete with vfo, QT-1, and coils in excellent condition—$99. New condition Drake 2-B, few hours use and original carton $229. Whit Daily, W9EWL, McLeansboro, Illinois.

SELL Polycomm PC-6AC, Excellent condition, $175. Kellersman, Stonybrook Road, Darien, Conn.

FOR SALE 1957 Motorola Communications Center—1 B44AAB-1 Base Station; 1 DS-9645 Antenna; 1 DS-9632 Transmission Line Kit (115′ #740); 1 FSC-2(a)1 Remote Console; 1 TU-151 Microphone; 4 T44AAV-1 Mobile units; 3 P-92 Accessory Groups; 1 F-94 Accessory Groups; 3 TU-433 6 volt speakers; 1 TU-433 12 volt speakers; Original cost of equipment—$4,802.50. Will sell for $1,000. A. M. Westerman, 18841 John R. Street, Detroit 3, Michigan.

SELL SX 101A $250; HC-10 s.s.b. converter $75; Transtenna T-R switch Model 102, outboard $50; all like new and F.O.B. . . . Lamb, 1219 Yardley Rd., Morrisville, Penna.

HRO-60 one owner guaranteed perfect, recently aligned, coils for 500 kc thru 30 mc $349. Don Parrott, Box 277, Idaho Springs, Colorado.

WANTED old radios manufactured before 1925, especially Grebe, Murad, Paragon and Zenith. J. Worcester, R.D. 1, Frankfort, N.Y.

QUESTION Want to design a QSL or CB card?—25¢ for a Sampler Instruction Kit. ($1.50, $2.50, $4.50) per 100 for reproducing design on the card stock of your choice. A New Ideal! Offered by: SAMCO, Box 203 Wynantskill, N. Y.

TWO EACH 4CX300A tubes and sockets $40.; 2C39A $5; Precision Resistors $4 hundred. W7POS, 2319 East Indianola, Phoenix 16, Arizona.

VALIANT f/w $275; SX-101A $275; Both for $500. Viking mobile xmtr w/vfo and Regency converter $100. Ken Powell, WA4AIT. 8101 Rory Way, Louisville 18, Ky.

SELL Heathkit Comanche MR-1 with utility power supply UT-1 and matching speaker AK-7. Like new. $100.00 Leslie Roberts, 110-A Redmond Road, Rome, Georgia.

51J-4 for sale, serial #3881 with 1, 3, 5 kc mechanical filters. Apply, Apt. 5 South, 747 9th Ave., N. Y. 19, N. Y.

SELL complete station: am-ssb-cw, $350. DX-100B, SB-10, SX-71, with speaker, TR switch, mike. Excellent. Will ship anywhere. K6SWY, 1012 Finch, El Cajon, Cal.

FOR SALE 75A-3 with one filter—$300; matching speaker—$10; 500 watt Thordarson modulating transformer—$35 or first best offers. Need money for college. K1JAR, Lynn, Mass. Tel: 592-1657.

FOR SALE Tecraft transmitter TR-21/144, Telrex 3 element beam with 10′ mast and coax cable, Dow Key coax relay and S-38 receiver. All for $60. Albert Pontarelli, W9TWY, 199 W. Jeffery Ave., Wheeling, Illinois.

FOR SALE 1 Hallicrafters SX-99, 1 Hallicrafters Sky-Buddy, 1 Knight Spanmaster, all receivers cash. Best Offer: Package Terry Hughes Box 202 Hughes, Springs, Texas.

FOR SALE Eico 720 transmitter excellent condition $65, antenna relay excellent $7. Clark Cramer, 817 Macon Place, Raleigh, No. Carolina.

GLOBE DSB 100. $75, S-40B, $60, Heath HG-10 vfo, $38; or all for $160. Bob Brandt, 1610 High, Eugene, Oregon.

CHICAGO area, for sale NC-300 serial 481-0038 and matching speaker; Gonset monitor; Stancor 202A cw xmtr 100W; DeLuxe Vibroplex; vertical antenna 10-15-20 and miscellaneous $275 or offer. W9RFO, 163 Maple Ave., Elmhurst, Ill.

SX-42 excellent; Lysco 600; pa with power supply, spare tubes. $185 for all. K4AWJ, 318 Glenway Rd., Bristol, Tennessee.

ANNUAL Wyoming Hamfest August 10-11. Ham vacation in the beautiful Big Horn mountains. For information write Box 141, Sheridan, Wyoming.

SELL Eico 723 60 watt xmtr very gud condx, 40 ft. RG-8/U coax, Blitz lighting arrester for $60. WA8DFI, Rich, 15800 Winter, Spring Lake, Mich.

MUST SELL HQ-110 $175; Johnson Ranger $175; Elmac AF-67 $80; Lafayette HE-30 $70. Excellent condition with manuals. William K. Zapotczny, Box 36, Midkiff, Texas.

MORROW Mobile Twins for 6 or 12 vdc, MB-565, MB-6, RVP-260B, TV-600A, cables, mike and manuals in like-new condition. $285. WA6ZSB, 785 Kavanagh, Hanford, Cal.

SELL Hallicrafter SX-100 rcvr, in top condition with spkr. $180. Also sell Navy-type RBS-1 rcvr, like new. Covers 2 to 20 mc $70. A first-class receiver for even Novices. Curt Olofsson, W6GTY 3809-A 18th St., San Francisco 14, Cal.

RANGER ptt with Johnson L.P. filter and Dow antenna relay mounted; electronic keyer also Paddles; vibroplex key; 221 frequency meter; Drake Q-Mult.; Baldwin type E also C headphones. Olson, K2EN, 914 YO 3-7187 evenings.

WANTED Tuning coils for National HRO-7. Advise which type available and price. R. B. Mitchell, 1430 30th St., Des Moines, 11, Iowa.

STEAL 6-80m am-cw 75w HT-40 and Globe Deluxe vfo 160-6m perfect condition $100. 8 el. Hi-Gain 6m beam $20. Santella 43 Seaview Ave., Norwalk Conn.

COLLINS 75A-4, $445; Viking Invader 2000, $700; Viking two, $130; National NC-300 with calibrator, $225; SX-62, $155. Consider KWM-2. W7HCJ, E. 6904 Sprague, Spokane 63, Wash.

SELL Hy-Gain 15 meter 3 element gamma matched beam with instructions and 80 feet of RG-8/U—$23. QST magazines 1957-1962, $5 takes the lot—you pick up. W1CWU, 2 Hickory Lane, Danvers, Massachusetts.

"Hi! I'm Lowell McNeil, W9PTN, president of the West Racine Bank in Racine, Wisconsin. As a banker, I can assure you that Collins radio equipment is an excellent investment. It has quality, performance and top trade-in value. These are the things we bankers look for. Many banks offer special finance rates on Collins equipment, just as Terry is offering here. I have KWM-1 at the office and a complete Collins station at home. I've been 'all-Collins' for many years."

It takes a banker to know a good buy

. . . Collins

S S B EQUIPMENT . . .

and it takes Terry, W9DIA

to come up with a LOW LOW 5% INTEREST RATE

LOW AS 10% DOWN PAYMENT — TAKE 1-2-3 YEARS TO PAY!

	Amateur Net	(1 yr.) (10% Down)	(2 yrs.) (20% Down)	(3 yrs.) (30% Down)
30L-1 Linear Amplifier	$ 520.00	$ 40.95	$ 19.06	$ 11.62
30S-1 Linear Amplifier	1556.00	122.53	57.05	34.79
32S-3 Transmitter	750.00	59.06	27.50	15.81
62S-1 VHF Converter	895.00	70.48	32.81	20.01
75S-3 Receiver	680.00	53.55	24.93	15.20
75S-3A Receiver	750.00	59.06	27.50	15.81
KWM-2 Transceiver	1150.00	90.56	42.16	25.71
KWM-2A Transceiver	1250.00	98.43	45.83	27.95
51J-4 Receiver	1464.00	115.29	53.68	32.73
51S-1 Receiver	1828.00	143.95	67.02	40.87
351D-2 Mobile Mount	120.00	9.45	4.40	2.68
MP-1 14V DC Power Supply	198.00	15.59	7.26	4.42
PM-2 Portable Power Supply	150.00	11.81	5.50	3.33
CC-2 Carrying Case	85.00	6.69	2.99	1.90
CC-3 Carrying Case	107.00	8.42	3.92	2.28
516F-2 AC Power Supply	115.00	9.05	4.21	2.57
312B-4 Speaker Console	195.00	15.35	7.15	4.36
312B-5 PTO Console	350.00	27.56	12.83	7.82
399C-1 PTO Speaker	164.00	12.91	6.01	3.66

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☐ Send latest reconditioned equipment bulletin.

For further information, check number 24, on page 110

PRINTED CIRCUIT boards for many do it yourself projects. Board for Silver Sentry vfo, $2.85; 6BE6 Product Detector, $1.15; 100 kc Oscillator, $1.00; Speech Amplifier, $2.50; Many more available. Send for free catalog. P/M Electronics, Box 6288, Seattle 88, Washington.

COLLINS 75A-2A, one filter $269.00; 32V Transmitter $169; Johnson Thunderbolt Amplifier $289; Ranger $169; Hallicrafters SX-100 $165; 88 mh toroids $3 for six postpaid. Alltronics-Howard Co., Box 19, Boston 1, Mass. Richmond 2-0048.

LIGHTWEIGHT but sturdy "Space Guns" added to your present tri-band or 20 meter beam's driven element, provided it is fed directly with co-ax and does not employ any type of match such as the Gamma, etc., gives you a rotateable dipole on 40 meters with a figure 8 pattern. Four band operation on one feed line. Simple tuning and installation instructions included. Immediate delivery. Net $39.95 per pair, f.o.b. Nettles Manufacturing Co., P.O., Box 614, Denver, Colorado, USA.

HIGHLY-EFFECTIVE home study review for FCC Commercial Phone Exams. Free literature! Wallace Cook, Box 10634, Jackson 9, Mississippi.

KWM-2 with late vox, 516F-2 ac supply. Like new with cables, manual and factory cartons. Both for $795 firm. Closing down station so no trades please. Save $120 plus over a dealer. W7PGA/6, 1139 Doon Court, Connyvale, Cal. Tel: 244-9267.

SELL Mobile power supply—Multi-Elmac PSR 612 for PMR-7 or similar receiver $15; Dynamoter; suitable for mobile transmitter power supply. Input 6v, d.c.; output 450 v @ 100 ma $10. Risch W2CMQ, 2301 Kings Highway, Brooklyn 27, N.Y.

HEATH Shawnee in very good conds. Factory aligned and calibrated less than 6 months old, $199.95. Johnson Messenger CB with xtals. Very clean. $85. Wally Shapiro WA2OHN, PY 1-4783.

FOR SALE Collins 75S-1 mint condition $300. Johnson Pacemaker ssb $175. No shipping. Will demonstrate. Harold Grigsby, K4MFF, 11613 108th St., N. Largo, Fla.

FOR SALE Heath TX-1 Apache transmitter. Perfect condition, electrically and physically. Best offer over $185. HQ-110 rcvr $175. Manning, P.O. Box 393, Macon, Ga.

DRAKE 1A with crystal calibrator $155; C.E. 20A rack mount with QT-1 in HT-32 type cabinet $135. David Dennis. K8ATS, Box 28, Prudenville, Mich.

WANTED 3000-0-3000 volt 400ma transformer. Stephen Clifton, WA2TYF, 800 West End Avenue, New York 25, New York.

KWS-1 perfect, $795; KWM-1, $395; 10B exciter $79; 351D-2 mount & cable (KWM-2), $75. George Barnes, 3451 Ridge Ave., Dayton 14, Ohio.

HQ-100AC Hammarlund, Heathkit GC-1A for sale. Latest Models, like new. Changing hobbies. David Snyder, Strasburg, Ohio.

ELDICO SSB-100A 100 watt side band exciter-transmitter, all bands, full vox, $325; Eldico SSB-1000AF 1000 watt linear, two new 4X250B tubes, $225; both A-OK all systems operational. Jonathan, W2WK, phone 516 FR 8-1155, 548N Brookside, Freeport, New York.

WANTED Army sets or parts, GRC, PRC, FRR/URR, TCC, SB, SCR. Send listings. Quick cash. Anker Electronics, 1617 So. Main St., Box 26Q, Wilkes Barre, Pa.

WANTED Type D Bandspread Plug-in coil for HRO-5 receiver. K7VNT, 934 W. 15th. Spokane, Washington.

BARGAIN Brand new HQ-170-C used less than one hour with telechron clock, factory speaker, new chrome Speedex Deluxe speedkey, custom built code oscillator with built in speaker, new Murdock P-23 headphones all for $295 cash FOB Boise, Idaho. Bill Knipe Route 2, Meridian, Idaho. Phone Boise 342-3940.

FOR SALE Heath Cheyenne, d.c. power supply, mike, mobile mount, Gonset Super 12 $175. Will deliver up to 50 miles. W2PWF 212 FI 3-9382, Floral Park, N. Y.

A-1 RECONDITIONED equipment. On approval. Trades. Terms. Hallicrafters S-85, $79; S-108, $99; SX-99, $99; SX-110, $119; SX-101A, $249; Hammarlund HQ-100, $119; HQ-110, $169; HQ-170, $239; Collins 75S-1; 75A-4, 32S-1, National, Gonset, Elmac, Heath, Johnson, RME and many others. Write us for lists. Henry Radio Company, Butler, Mo.

FOR SALE Reconditioned, excellent teletype 60 wpm sunc. M15 w/keyboard $90. W/auto-carriage-return-line-feed $150; M19 w/table & TD $240; M19 keyboard $55; M14 typing reperforators w/keyboard $125; w/o keyboard high or low base $75; with line count switch and/or distributor (requires external tape head) $15 each, extra. FPR5H $45; 9 channel TD $150; tri-channel TD $90; (AN/TG C cover CQ January 63) ANTGC set (tri channel TD + 2 typing-reperf.) $175; Automatic Electric auto-tape relay equip. AN/GGC-2 75 wpm available, 60 wpm. Excellent cond. Dual channel $325. Single channel with tape in storage $245. Repairs and reconditioning. M14, M15, M19. Frank Holloway, Jr. 513 N. Pinehurst Ave., Salisbury, Md.

HAMS Convert any television to sensitive, big-screen oscilloscope. Simple changes. No electronics experience necessary. Illustrated plans, $2.00. Relcoa, Box 10563, Houston 18, Texas.

RTTY WE255A relays $3.50. Sockets for same $1.00 postpaid. Jerry Copeland K8OQI, 8423 Newells Lane, Kalamazoo, Mich.

TWO METER package, Heath Twoer transceiver with field strength meter and one Novice band crystal, $45. 8 el. 2 meter beam, $10. Both for $50. Bob Brown, K2ZSQ, Box 528, Rahway, New Jersey.

SELL Filter King 2 meter converter, 28-30 mc i.f., 2 switched crystals, ideal for 75A-4, etc., $30. UTC CVM-3 125 watt mod. trans., used, $12. S-22 250 watt mod. trans., used, $16. Drake TV-1000-LP filter, $6. Matched pair Gold Lion KT-88's, GZ-34, two B-759's, brand new, all for $10. K2EEK, 75-15 177 St., Flushing 66, N. Y., JA 3-5420.

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☐ Place my order for immediate delivery. Enclosed find $_____

☐ Send complete specifications on 62S-1.

Name_____ Call letters_____

Address_____

City_____ Zone_____ State_____

For further information, check number 20, on page 110

Announcing [*from page 14*]

Commission will clarify this point before the order comes into effect on January 1, 1964.—*Editor.*

Glacier-Waterton

The 29th Annual Glacier-Waterton International Peace Park Hamfest will be held on July 20-21 at Waterton Lakes, Alberta. This is one of the biggest events in the Northwest and you can expect lots of fun. Cliff Cartwright, VE6AGM is taking the pre-registration fee of $3.00. His QTH Box 941, Lethbridge, Alberta.

DX Contest Corrections

We are terribly sorry to report that part of the c.w. results of *CQ* World-Wide DX Contest were not presented in last months issue. The following material was omitted and our apologies are extended to all those who were anxiously awaiting the scores.

In the phone results (*CQ*, May, 1963, pg. 48), W4BCV shown as an All-Band entry should be the W4 twenty-meter winner. Sorry!

Additional logs received too late for inclusion in the official results are UA4's: HE, IB and KHA.

SINGLE OPERATOR

Africa

CT3VA	A	33,198	174	24	42

South America

Bolivia

CP5EZ		74,354	309	40	54
		(CP5EZ, CP5EQ)			

Uruguay

CX2CO		1,103,721	1628	83	150
		(CX2CO, CX7CO)			

W8NGO		67,944	159	60	92
		(W8NGO, W8VSK)			
W4NUC		66,156	164	57	91
		(W4NUC, W3IPO, WA4IVL)			

Asia

4X9HQ		1,681,988	1975	184	224
		(4X4DH, FA, MU, PQ, YL)			

MULTI-OPERATOR
Single Transmitter

Oceania

Guam

KG6AAY		115,080	404	47	58
		(K5DRP, W7ZQV, KØYJE)			

Hawaii

W7UXP/KH6		147,545	455	54	61
		(W7UXP, K1KBH)			

Marshall Is.

KX6BU		205,734	703	47	55
		(Navy Club)			

MULTI-OPERATOR
Multi-Transmitter

North America

W3MSK	1,043,415	932	121	272	
	(W3MSK, FYS, KZQ, MCG, PZW, 4IYR, 6HOH/3)				
W6RW	820,725	795	121	232	
	(W6RW, AOA, BXL, 6OSU, WB6AEK)				
K6EVR	763,569	815	112	221	
	(K6EVR, JIC, LEB, W6GFE, UPH)				
W4KXV	517,626	606	98	200	
	(W4KXV, K3EST, WA4JFY)				
W3AOH	400,722	480	90	204	
	(W3AHO, LMM, QJJ, UHN, VKD, K3DKD)				

Europe

DJ3JZ	815,490	1222	87	219	
	(DJ3JZ, 1BP, 4LI, DL1CR, 7BA)				
UB5KCA	728,752	1756	78	218	
	(UB5CG, 5FG, 5FJ, 5FL, 5HZ, 5MZ)				
OH1AA	302,509	895	58	171	
	(Club Station)				
SL6BH	179,478	918	46	123	
	(School Station)				
GI3KYP	106,262	519	43	91	
	(GI3KYP, AXI, GAL, HXV, JXS, 5UR)				
4U1ITU	48,048	301	29	59	
	(HB9UD, HB9XJ, HS1UN)				

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Doc - W9HJS
Manager Chicago Store

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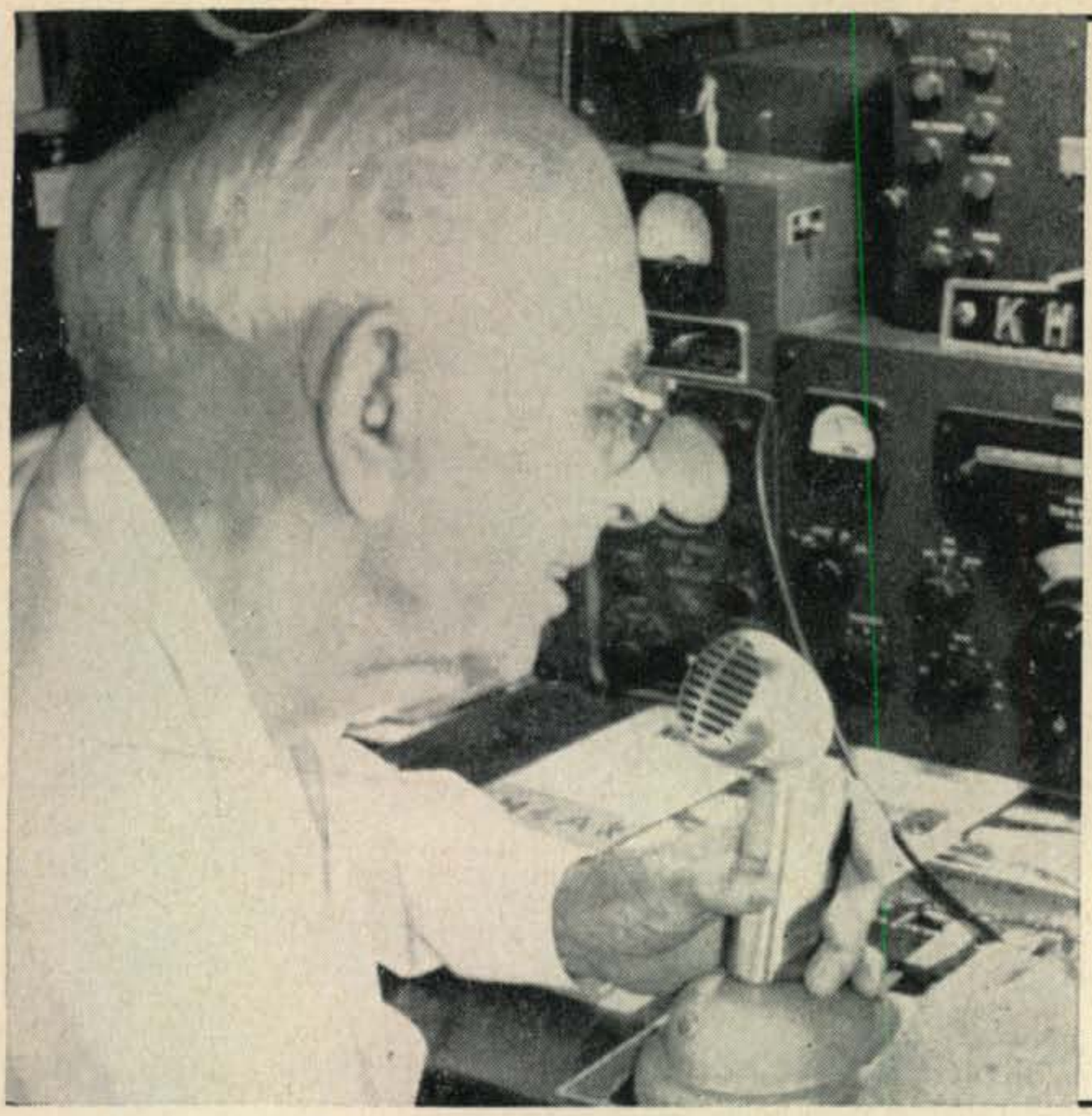
advertisers index



KH6AR

Wahiawa, Oahu, Hawaii reports:

"most natural sounding SSB mike yet"

We'll let Ken Bryan's (KH6AR) letter to us speak for itself:

"I've been using my Shure 440SL on regular skeds with people who know my voice from eyeball QSO. That includes my daughter who doesn't ordinarily like the tone of sideband. Everybody tells me that it's the most natural sounding SSB mike yet . . . especially my daughter.

"The pick-up is great. The tendency of local splatter and unwanted sideband is *considerably* reduced over three other mikes I compared it with. Humidity doesn't affect it at all. All in all, I feel it's the best SSB mike I've ever had, including one that cost me over $50.00!"

ONLY **$28.50** net

(complete with stand, grip-to-talk switch, 7 ft. highest quality 2 conductor shielded cable.)

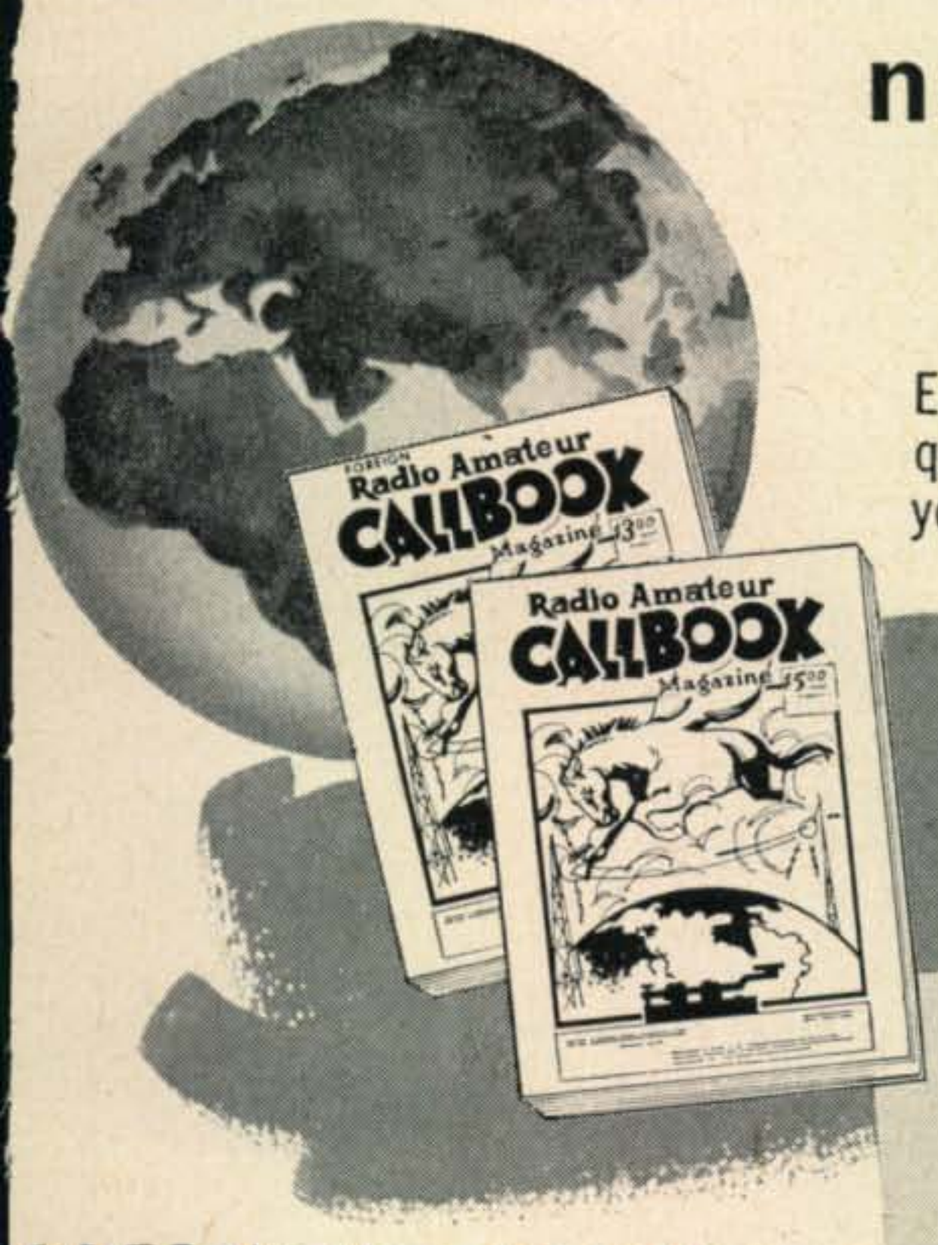
A87K Modification Kit. *Instant switching from VOX (with muted microphone position) to push-to-talk. $3.25 net.*

SHURE 440SL

CONTROLLED MAGNETIC SSB, AM, FM MICROPHONE

Literature: Shure Brothers, Inc., 222 Hartrey Ave., Evanston, Illinois

For further information, check number 26, on page 110



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Want to experience that wonderful feeling that comes from knowing you're getting maximum power into your antenna? The easy-to-build Knight-Kit Model P-2 "in-line" type SWR/power meter makes it a breeze to eliminate the power waste occurring in transmission lines with high SWR. It measures relative power being fed to your antenna, and SWR reflected from it. Negligible insertion loss permits unit to be left in the line permanently—providing a constant check on your rig's efficiency. The P-2 SWR/power meter is actually two separate units—a coupler and an indicator connected by a 4-foot shielded cable. Units are designed for unbalanced 50-72 ohm lines. They handle a full kilowatt from 1.8 to 432 mc (require 35 watts for full-scale deflection on 80 meters). Meter reads SWR from 1:1 to 20:1 and relative power from 0 to 10, with better than 10% accuracy. Sizes: coupler, 2 x 5 x 2½"; indicator, 2⅞ x 6¼ x 3". Complete with all parts and easy-to-follow instructions. Shpg. wt., 2 lbs. Get maximum signal punch from your rig—order today!

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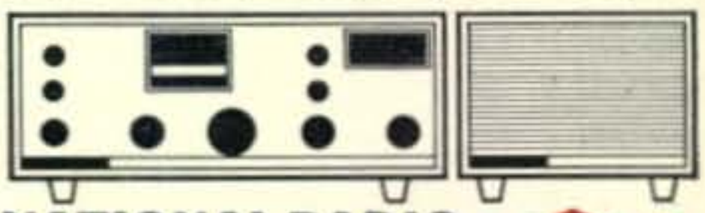
For further information, check number 2, on page 110

It's got guts!

more than handsome, functyling to make a great trans-. . In plain language, it takes guts. The rugged good looks CX-3 were styled by Industrial Designer Gregory Fossella lement the performance and features engineered into the y National's Advanced Development Team. Take a good k at the photo below. 18 tubes and 6 diodes add up to the ;/CW/AM transceiver in the $300-$400 price range that u the features you want and need — with the conservated parts, handsome layout and wiring workmanship that ect from National. The NCX-3 wasn't designed with the n of providing marginal "condensed communications" — lot of parts. But notice that components run at right angles circuit tracing and service . . . that it isn't necessary to r three layers of wiring to get at one component . . . that e resistor color codes all run in a parallel direction! wonder that the NCX-3 is backed by National's One Year ee, or that the NCX-3, by actual dealer count, outsells all ansceivers. It's no wonder, because the NCX-3 at $369 is transceiver in its price range with built-in important features required for fixed station as well as for mobile applications: • Complete coverage (with overlap) of the 80, 40 and 20 meter phone and CW bands • Built-in grid-block break-in keying • Built-in Vox, as well as push-to-talk • Built-in RF-derived SSB/CW AGC without annoying pops or thumps • Built-in S-Meter and PA current meter • Built-in AM detector for fully compatible AM operation • Conservatively rated Pi-network final amplifier runs black at full 200 watts PEP • Mobile mount included in the price!

A lot of sideband transceivers have been advertised recently . . . nevertheless, we suggest you take the time to compare all of them with the NCX-3 — we know of no better way to satisfy yourself that you'll be happy with your choice — that you've chosen a rig that does what you want it to do. As a first step, write us today (enclose 50¢ for handling and postage) for a copy of the NCX-3 Instruction Manual. In the meantime, ask your National Dealer to give you an actual demonstration of the NCX-3 Tri-Band Transceiver.



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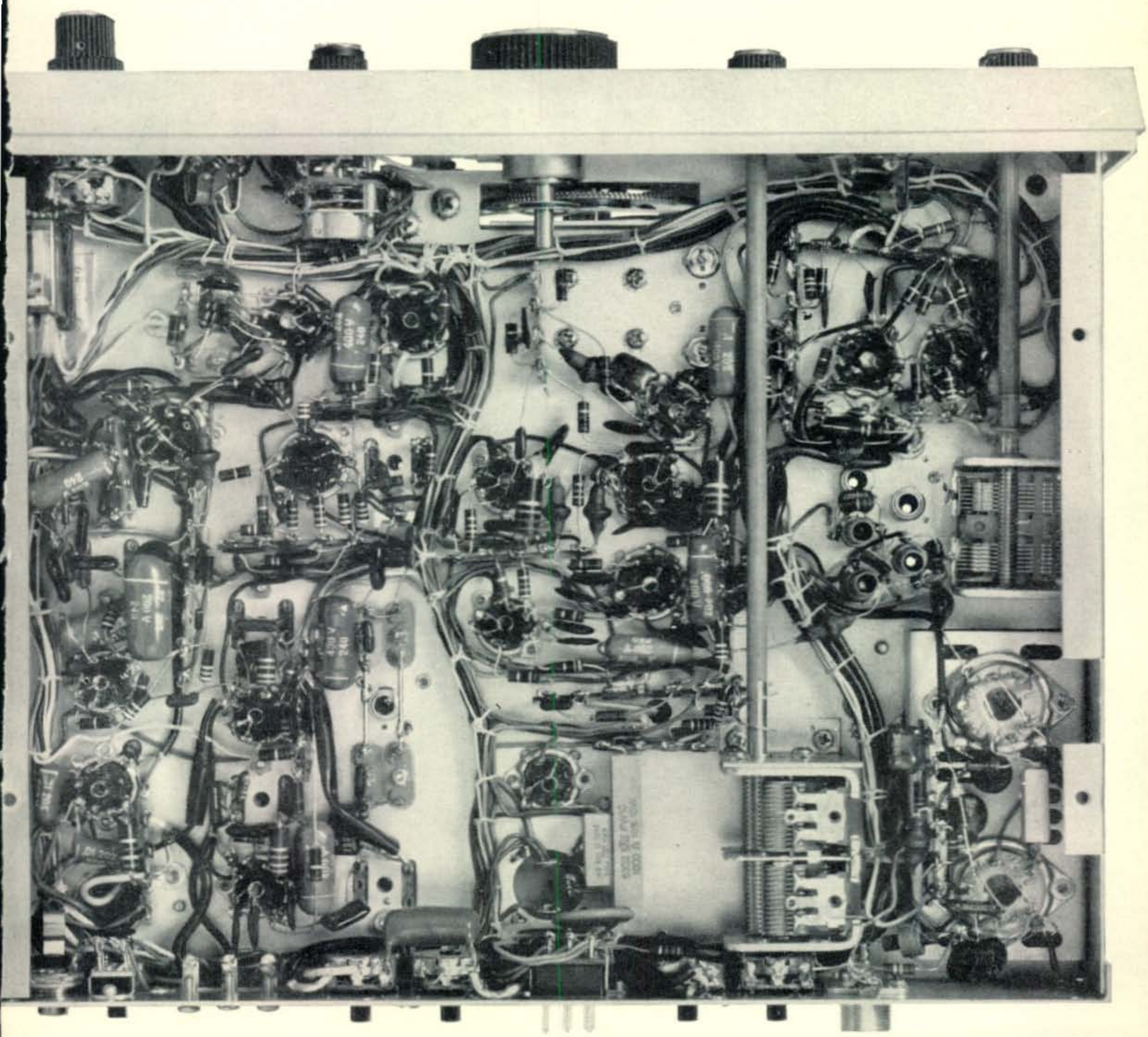
Department CQ-07

For further information, check number 60, on page 110



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7035/ 4X150D	26.5	250	250 500	500 150	Glass-Metal
7203/ 4CX250B	6.0	250	500 500	500 175	Ceramic Metal
7204/ 4CX250F	26.5	250	500 500	500 175	Ceramic Metal
7580	6.0	250	700 (PEP)	500 30	Ceramic Metal

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