February 1967
75¢

CQ

ICD

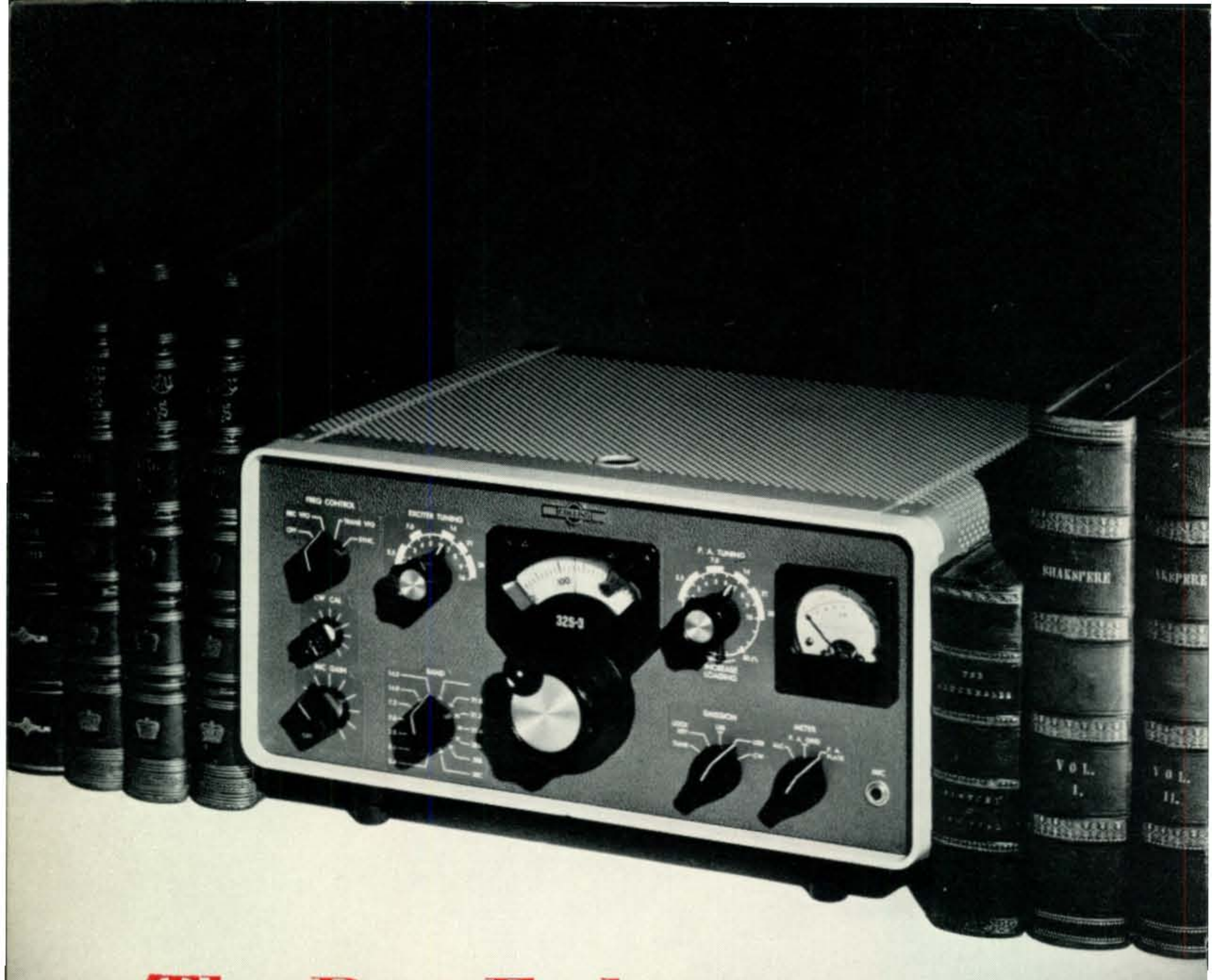
All-Band Coverage from the Ham-Band-Only Receiver:

The OMNIVERTER

A Radical Licensing Proposal

See page 19

The Radio Amateur's Journal



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For further information, check number 19 on page 112

COLLINS

For further information, check number 5, on page 112

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*Meters for final plate current and voltage built into P-2000AC power supply. Also Hi-Lo power switch.

amateur net:

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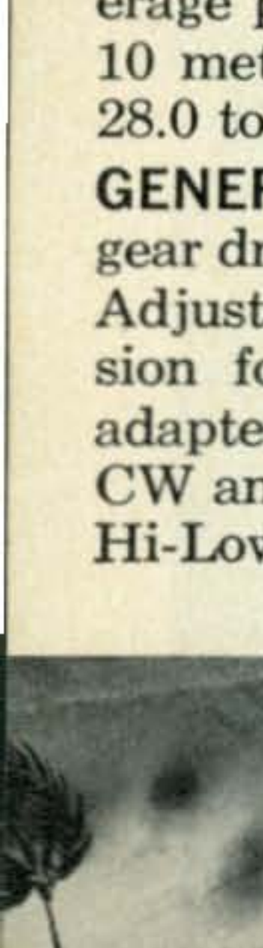
For further information, check number 7, on page 112



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CQ

FEBRUARY 1967 VOL. 23, No. 2

The Radio Amateur's Journal

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DEPARTMENTS

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ZERO BIAS

REGULAR readers of *CQ* have greeted the return of an old friend with a mixture of delight and disdain. Yes, Hashafisti Scratchi has come home again, after an absence of six long years. Where was he? Well, despite his explanation about being in South America, rumors are still circulating that ole Scratchi was home in Japan, putting bugs in transistor radios.

Whatever the explanation, though, he's back, and we hope to test our proofreaders intestinal fortitude with him for many months to come.

It's interesting to note that most readers react very strongly to Scratchi—they either love him and everything about him, or they passionately dislike him. There seems to be no middle ground. And so it is also with our charming and witty European commentator—the irrepressible Sylvia. I can't for the life of me understand how any mature person could less than enjoy her sparkling prose, and yet a battle-royal seems to be shaping up between the pro's and the con's, re Sylvia. Not a month passes without a dozen or so letters deploring the waste of a few more precious pages in *CQ* on such trivia as the human side of amateur radio. Ah, yes, we could be using those three of four pages to delve into the intricacies of some electronic phenomena which, chances are, the complainer wouldn't understand, if he even took the time to read it. But complaints, gripes, and grumbles are a part of life at any magazine. It's impossible to keep everyone happy at one time. Being fair-minded individuals, however, we've decided that even the complainers need to be heard; they need a little corner of their own in *CQ*.

Therefore, what we've begun doing this month for the first time, is devote a special section, (a small one—that's something to gripe about!), dedicated to the people among us who walk around with aching bunions and a pebble in their shoe and who just plain like to complain. The sections is entitled "Grumbles", by Sam. It's really an atrocious piece of writing, full of nastiness and about as irreverent and uninhibited as a column can be, but I think it fills a need. It's a place to turn when nobody else wants to listen to your gripe. Sam is quite a complainer himself—he's been practicing for many years. Won't you add your gripe to his list?

Who *is* Sam? Oh, he's just some guy with sore bunions and a pebble in his shoe.

Articles Wanted

Since changing our editorial format several months ago to one featuring many more individual articles and fewer "vertical" specialized columns, enthusiasm from readers has been really astonishing. Sales of *CQ* on the newsstands have jumped some 19%, and if you don't think that's a lot, ask someone in the business; he'll tell you it's unheard of!

We attribute the sales growth mainly to the broader interest range we're now able to cover in each issue. The more different items we run, the better the chances of having something that appeals to *you*, and the better our chances of winning *you* as a reader.

Needless to say, we've been going through articles like ice cubes at a New Year's Eve party, and before many months go by, we're going to be pretty hungry for material to run.

What kind of articles are we looking for? Well, what would *you* like to see?? Small projects using the new integrated circuits, field effect transistors, and those circuit modules available from several sources (Lafayete, Amperex, Round Hill, J. W. Miller, etc.), different approaches to v.h.f. equipment design—both receiving and transmitting, hand carried v.h.f. and 10-meter walkie-talkies, new ideas in the antenna field, mobile equipment, good modifications of commercial gear, and of course, surplus conversions. We've got ARC-5's coming out of our ears; how about something else for a change? Two meter preamps show up like sunspots—how about the bands above 2? Anybody got a good 1300 mc station or handy-talkie he's especially proud of? Or how about a 160 meter converter for the car radio or a hamband-only receiver? Say, what about a 160 meter transmitter and an article on how to build an effective antenna down there? Have I forgotten anyone? Oops! Forgot about the ham-TV boys—how about stepping out from under the lights long enough to tell someone else how you did it?

These are just some of the technical items you'll be seeing in *CQ* in the month's to come. Some of them are already in the works, others are still begging for authors who can make good use of our $20 per page rate of payment. Beginning February 15, by the way, payment for most articles will be made upon acceptance. We picked February 15 to allow ample time to clear our books of any as-yet-unpaid writers. We're almost there!

So if you've got something worth saying, particularly in a technical vein, but also in a non-technical area, start writing. It pays.

73, Dick, K2MGA

Our Cover

This month's cover is, we hope, a little less dizzying than last month's creation. Featured is the latest project to come out of the *CQ* Laboratory, (yes, it *does* exist!), called the Omniverter. What does it do? W2AEF, it's proud designer, claims that he can receive on *any* frequency between 14 kc (that's 14,000 *cycles*!) up to 51.5 mc without missing anything in between. It must be used with a ham-band-only receiver, and produces the same calibration, stability, etc. as the receiver itself is capable of. Cost? Under $100, buying all parts new at regular prices!

OUR READERS SAY

Contests

Editor, *CQ*:

Just a line or two to comment upon K8IQB's letter in *CQ* issue December 1966, objecting to c.w. contests on the grounds that they "disturb" his rag chewing. He says, "if something worthwhile must be done for ham bands, then an excellent first step would be in the direction of restricting these so called contests, etc."

My fifty-two years at ham radio should qualify me to venture an opinion qualified with some experience. It would seem to me, after all these years listening to every kind of transmission man has invented, that the boys the amateur fraternity could easiest get along without would be the rag-chewers.

All successful groups are made up of a lot of different people. Amateur radio is no exception. Even Heaven would be a very dull place to be if all of the spirits were just alike. Down here, some like rag-chewing, others go for DX. I myself go in for phone patching, but many hams do enjoy contests. These contests have a very definite place in our radio society, just as athletic contests have in our scholastic society. I cannot agree with the immature reasoning of K8IQB or his lovely XYL that the only worthwhile activity for the amateur is rag-chewing. As a matter of fact, it is my humble opinion that rag-chewing is responsible for a large percentage of our difficulties with FCC, TVI and QRM. They do nothing but yak, yak and yak, with no purpose. They chew for hours without saying a single thing, like several bored women at a sewing party. They usually splatter over 30 k.c., chew up their mike, turn up the gain until they violate every rule in the book, with what seems to me to be impunity. But on that score I do not advocate the elimination of them, but rag-chewers could go first if need be.

K8IQB's objection to c.w. activity is like the fellow who reads the sport pages only and thinks anyone reading the front page is crude. As a matter of fact, it is the folks who read the front pages that run the factories, invent the gadgets and create the jobs for the guys whose only interest is the football scores.

So, Mr. and Mrs. Braun, why not make room for all of us on the air doing what each likes to do? Let us not eliminate all those folks who are all out of step by you. Maybe it is you who can't march so well.

James L. Russell
Cleveland, Ohio

Editor, *CQ*:

Hurrah for the Brauns' comment in the December issue on contests. Dick Ross somewhat begged the question in mentioning "major" contests, which take seven week-ends a year for the ARRL and *CQ* DX ones, disregarding all others.

But there are many other "major" contests, so far as use of bands is concerned. One is the Field Day. Two more are the sweepstakes. Others are the ARRL Communication Department Party and the W/VE one. Even the RTTY one grows down into the c.w. region and consumes up to half of it.

Admittedly, sometimes it is possible to go on c.w. when the phone bands are clobbered; and on phone when the c.w. bands are clobbered; but recently, there was a contest on each at the same time!

Let us look at this from an international standpoint, because what the U.S. stations do, affects the rest of the world as much as us. On many of these weekends, the U.S. stations are having contests among themselves, interfering with the rest of the world. This is hardly fair to the DX, and must be a considerable source of irritation. This is a large disadvantage in such local contest.

The 160-meter test is one type with a purpose—occupancy of a band, and development of equipment for it. Some of the RSGB contests are one-band and two-band contests with the same result. There is much to be said for contests with a purpose, and with frequency restrictions.

The 14 mc band could be left out of some contests other than international DX ones. At the very least, c.w. work could be confined to, let us say, 14130 to 14180 kc. In the 21 mc band, there is considerable room between 21100 and 21200 kc which would hold a contest and leave the rest of the c.w. range undisturbed. The 28 mc band is wide enough to hold contests, particularly if at least half of the 28.5 to 28.7 mc region—the only section that many Collins owners are equipped with a crystal to use—is eliminated from contest frequencies. Even some parts of 7 and 3.5 mc can be limited for c.w. contests. It would be possible to use a segment of the phone parts, instead of running away from the broadcast and commercial QRM. Once, I found only three phones in the 7 mc band.

It would help if *QST* and *CQ* would join in a policy of giving no publicity to "QSO Parties" and special contests or parties which currently take up so much space in our technical magazines as well as in our frequencies.

E. H. Conklin, K6KA
La Canada, California

"Our Readers Say" welcomes letters about nearly anything of interest to amateurs, whether about *CQ* itself, the state of the hobby, or whatever else you have on your mind. The most interesting letters will be selected for publication each month; just keep them legible, keep them short, and above all, keep them clean! Something bothering you. We're not mind readers, OM, so drop us a line.

Expensive QSL's

Editor, *CQ*:

Somebody should comment on WAØLHR's letter about "High Cost of QSL-ing" printed in December issue of *CQ*, and I may as well be one to do that.

It is very unfair to imply that only "DX stations" (by which he means stations outside W/K) show a low QSL return. The experience is generally true, but only when including W/K hams as well, on the other side of the picture.

Not all stations open up a shop with received IRC's. How many QSL's obtain no result because of improper mailing address, mailing problems (forwarding of mail in many countries to somebody that moved may be highly unreliable) or errors on the QSL itself? Nobody can tell, but I have received quite a few cards with mispelled QTH and some with data that I could not match in the log even after a long search.

Another point missed by WAØLHR: It takes only one YV for DXCC, but how many W/K are there for each YV active on the bands? I QSL direct, sometime with unavoidable delay and prefer NOT to get IRC from stations that would think QSL-ing is a profitable job and I do not use a QSL manager because I think there are many stations in other countries, where it is more needed. I do join WAØLHR in his praise of QSL managers.

Pedro Seidemann, YV5BPG
Caracas, Venezuela

Editor, *CQ*:

I have read the letter from WAØLHR, but am somewhat confused. He mentions that he is not concerned with the "rare" DX, many of whom have QSL managers, but with the others.

I find it difficult to believe that there is really such a problem in getting confirmations from the large number of really "common" countries with thousands of amateurs. Surely there are so many G's, DL's, F's, I's, EA's, CT's, PY's, LU's, YV's, VE's, SM's, OH's, PAØ's, etc. on the air that no IRCs are necessary, nor is it even necessary to QSL direct to these and many other common countries. Even if only a small percentage QSL, one works so many of them that a few QSLs per country should turn up.

We would like permission to reprint Mr. Fisher's letter so that we may include it in our QSL requests in the future. Maybe this way we can bring this problem to the attention of other hams. With an article like Mr. Fisher's, we were surprised you didn't publish it on one of the front pages.

John E. Brown Jr.,
Philip H. Rapp
San Diego, California

Editor, *CQ:*

In answer to WAØLHR, I would like to make a few comments on QSLing practices. Working a DX station with a QSL manager works out 100%. I can think of several so called one man DXpeditions that have turned out to be a waste of time and IRCs for me. In each case I send 4 IRCs and so far am still waiting for a QSL card. I am also wondering what happens to the IRCs. They have made a believer out of me for expeditions that expect a small donation for a QSL card. I have worked one expedition at three different locations and have received a card from them on all three. I don't like to be a free loader so in each case I sent them a small donation. It is much cheaper than sending IRCs and come up with no response.

When I started out to work DX I thought I would QSL direct but I gave this up in a hurry. Perhaps a good rule of the thumb would be QSL via your bureau, and if they can't come up with your card, then you don't need it.

I have worked ten stations with SP letters and am still waiting for a QSL from them. Makes one want to bypass their CQs.

XE calls QSL 100%. Also most countries do a nice job of QSLing.

Paul Wise, WAØENI
Joplin, Missouri

Rising Equipment Prices

Editor, *CQ:*

Re January ZERO BIAS comments on the wrong turn made by amateur radio equipment manufacturers, and the rising prices of ham equipment. In the amateur radio equipment business, as in any business, the way to go is dictated by the market. The trauma of s.s.b. threw a transient into the industry, and like an underdamped tuned circuit, it responded quickly, but continues to ring. Like the tuned circuit, the oscillation will damp out and a new steady state will evolve. I say new but I mean different, for I believe that the steady state will not differ in any fundamental way from the old. The contemporary ham buys an expensive rig the same way he buys an expensive car. No one forces him to buy 4-grand worth of Detroit iron and he knows he can buy reliable transportation for half that amount. One thing is for sure, equipment prices will not go down so long as there is a demand for sophisticated, stable, high quality gear. As time goes on, the competition among manufacturers will sharpen and more will be offered for the same price. As an electronics engineer, I don't dig the steady state, since it represents an ebb in the area of creative design. But as an equipment user, the steady state is the time when quality, reliability, and value are tops.

Michael I. Neidich, K2ENN
East Northport, N.Y.

Editor, *CQ:*

. . . You said a mouthful on the cost of Ham gear. In self-defense I am buying a hunk of expensive gear advertised by one of your large mfrs. ad. Guess WHO! Well, either that or just stay up on the bands above six meters. And that price goes for color TV too. But one dealer here has come out with a 19" set for $299. Which looks good so I'll be spending a lot of dough for electronic gear it looks like.

I used to buy and sell ham and surplus gear off and on but have given it up. Last 2-3 years got several bad deals, misrepresentation, delays, not shipping etc. so I am done with buying from individuals. Maybe the ham fraternity is deteriorating. A Happy New Year to you and staff.

Al Johnson, W6EPO
El Cajon, Calif.

"Expert" Advice

Editor, *CQ:*

Bad publicity can hurt everyone, and here's an example of where a well-known amateur, chief engineer

[*Continued on page 104*]

For further information, check number 22, on page 112

Has WAØLHR really had any difficulty in getting QSLs from Germany or England or Canada, or Italy, or Brazil or Venezuela or Japan for example. About half the 100 needed for DXCC would seem to turn up automatically. It is the "rare" ones which are difficult, but here as WAØLHR agrees many of them have QSL managers.

I think the real problem which American amateurs experience in the cost of QSLing arises from the fact that ARRL does not operate an *outgoing* QSL Service. About 90% of my outgoing cards go via the very excellent RSGB QSL Bureau. (This service alone is well worth the subscription.)

The cost of sending cards through the bureau is only the cost of the cards themselves plus the *inland* postage in bulk to the bureau.

But as I understand it the ARRL does not operate an *outgoing* QSL Service. This is surely the nub of the problem.

I have been told that there is a law in the USA which prevents ARRL from running an outgoing QSL bureau. Is this correct?

If there is such a law, then I suggest that it is about time the US amateurs got this law changed. There was a law which prevented the US granting reciprocal licenses to foreign radio amateurs. This has been changed. If, therefore, there is a law which prevents ARRL running an *outgoing* QSL bureau, why should this also not be changed.

If there is no such law, then why does the ARRL not run an outgoing QSL Service?

Let me end by saying that I fully realize that this is really none of my business. I am not an American. I do not live in the USA, and I have a perfectly satisfactory outgoing QSL service run by the RSGB. So you may tell me to mind my own business. But having read the moan from WAØLHR about the high cost of QSLing, I felt I might make a suggestion which would save American amateurs a lot of money. Sometimes the person at a distance sees something that the people closer to the problem may have overlooked.

Edgar M. Wagner, G3BID
Eructation, London-NW3

Editor, *CQ:*

The undersigned names represent two brand new shiny ham enthusiasts just getting started in ham radio. Much to our dismay our shiny enthusiasm to this new field has worn a bit thin due to the bad QSL practices of some US and foreign hams. In your Dec. issue you published a letter titled "High cost of QSLing" by George Fisher, WAØLHR in Minnesota. We would like to echo Mr. Fisher's feelings.

As potential hams, we both have recently purchased receivers and have gotten our feet wet caught up in the excitement of receiving long distance communications. In an effort to qualify for s.w.l. awards for DXing we have started the process of buying IRC coupons, self-addressed and stamped envelopes and the other material needed to confirm a QSO. We have even tried recording unusually good receptions and sending the tapes along with our QSL requests. Not only has our batting average on returns been below 20 percent but we have yet to get any of our tapes back. The price of tapes runs considerably high than the usual 50 cent cost of QSLing. All of our QSL requests have stated correct time in GMT and we have given helpful data on program material, RST readings, types of receivers and antennas, and other bits of useful information. All of this data has been in the form of letters addressed directly to hams or stations. Our best luck so far has been from foreign hams. We have even monitored commercial stations in the US and received no reply. One of these silent stations happens to be in Minnesota, Mr. Fisher's home state.

On a whole, when you consider the costs of IRC's, US airmail stamps and envelopes and the time that we have enthusiastically invested in this new hobby, the results of receiving QSL cards are discouraging to say the least. To this date we have become annoyed at the attitudes of these hams that keep our stamps and IRC's and tapes and remain silent. If the only people who are going to take the little time to answer our letters are the guys in the next town or down the street, we may as well go out and get a CB license and rig and save some money.

Announcements

New Mexico Radio Directory

If you're looking for hams in New Mexico, and especially if you're interested in the County Award, you'll want to get a copy of the newly published New Mexico Radio Directory. It lists all hams in the State of New Mexico with call, name, address and county. Albuquerque hams are listed separately with calls and phone numbers, when available. The Directory is 8½ x 11 in size, with a spiral binding to open flat. For a copy send $2 to Irene Henderson, K5WZA, 120½—10th St., NW, Albuquerque, N.M.

Wheaton, Ill.

The Fifth Annual Wheaton Swap and Shop is being held at the DuPage County Fairgrounds, Wheaton, Illinois, on Sunday, February 19. A cordial invitation is extended to all Hams, CBers, electronic hobbyists, their friends and commercial exhibitors. Hours: 9:00 A.M. to 5:00 P.M. $1.00 donation at the door. Refreshments, unlimited parking, and non-profit. Contact W9BJO for additional information.

Toledo, Ohio

On Sunday, February 12, 1967, the Toledo Mobile Radio Association will conduct its 12th Annual "Amateur Radio Auction," at the Lucas County Recreation Center, 2901 Key Street (off Anthony Wayne Trail), starting at 10:00 a.m. and running all day. Refreshments will be made available. Manufacturers and distributors will display new amateur radio equipment. Tickets for door prizes and main prizes will be made available for a donation of $1.00. For further information contact Paul B. Gillespie, K8KFO, 4648 Harbord Drive, Toledo, Ohio 43623.

Moravia, N.Y.

Members of the Southern Cayuga County Amateur Radio Club are conducting a write in poll on incentive licensing. Send your vote or comment, for against incentive licensing in one sentence on a postcard to SCCARC-WB2NOD, Dept. CQ, Box 685, Moravia, N.Y. 13118.

Corrections

"CQ Reviews the Davco DR-30 Receiver," *CQ* Dec. '66, page 64: In the block diagram at fig. 1 the noisegate diode is shown connected with incorrect polarity. The cathode should go to R_3, the anode to R_2.

In the article "Real Cool Cooling and Silver Plating" which appeared in the Jan. 1967 issue of *CQ* on page 34 it was stated that the positive lead of the d.c. source is connected to the copper tubing to be silver plated. This should be the negative lead, as the negative lead is always placed on the item to be plated and the positive lead on the metal of the kind to be deposited.

Detroit, Michigan

The following items were reported stolen by the Dept. of Police in Detroit. If you have any information on the equipment please contact John Strubank, Commanding Officer, Communications Center, Tech., Dept. of Police, Detroit, Michigan, 48231.

(a) One (1) Cushman FM Monitor, Model CE-2B, Serial 617.
(b) One (1) Motorola Test Set, Model S1057A, Serial D82942 Complete with two (2) type AQL crystals and one (1) Model TKN 6025A adaptor.
(c) One (1) Motorola Test Set, Model S1056A, Serial 1-72785 Complete with two (2) type AQL crystals and one (1) Model TKN 6025A adaptor.
(d) One (1) Precision Volt-Ohmmeter, Model 120M, Serial 4146.
(e) One (1) Motorola AC, High Impedance Voltmeter, Model S1051B, Serial C20852.

Feenix, Ariz.

Deer Hon. Ed:

Hold the presses! Don't printing that next issue of Hon. Seek-You until you heering what Scratchi are doing. You are not going to buleeving it, Hon. Ed., but your Hon. Rag are going to be famous when you letting your reeders in on Scratchi's latest invenshun.

The reeson I riting you is that your magazine are always having in it 1/c tecknical articles, and what Scratchi are doing is reely tecknical as you seeing when I explaneing.

It all starting when I reeding article on integrated circuits. You knowing what they are, Hon. Ed. They little hunk of stuff about size of hed of pin, but they containing six or seven transistors, many diodes, and eleventeen resistors and capacitors.

Of course, nobuddies are making integrated circuit by taking regular transistors and diodes and resistors and capacitors, on acct. they be way too big and can't jamming them into small space like that. Hon. Article explaneing that making integrated circuit by putting lotsa layers of things together and things are working because of impurities in layers of stuff.

Well, Scratchi reel interested in this rite away, and desiding ought to having integrated circuit to experiment with. Howsumever, not seeing any ads so can buying any! So, desiding have to making own integrated circuit. Scratchi not knowing how, but that never bothering grate geenyus like Scratchi.

At first not knowing where to start, but then reelizing that I going to make bread-board version of integrated circuit, so getting nice toothpick and mounting narrow end in vise, leeving flat end so can working on it. Also needing leeds for circuit, so getting short piece of braided wire and unbraiding it, so having lotsa reel fine wires to using for leeds.

Then I reelizing I not having all things I needing, so taking trip to hardware store to picking up rest of materials. When getting home, are reddy to start Hon. Grate Experiment.

First I using spray can of cleer lacker, and coating toothpick reel well. Then taking wire and taping it around toothpick so end are resting on flat part of toothpick where I are

making integrated circuit. Next spraying on some aloominum paint then cleer lacker, then taping another wire to end, then more cleer lacker, then some bronze spray paint, then cleer lacker.

I going on like this, spraying stuff and putting wires on, and every so often I sprinkling some dust on it—to making impurities—and also once or twice I spraying on Hon. Bug Spray. Not planning to use it, but they having sale at hardware store so getting can of it and accidently grabbing it once or twice in my excitement.

After while are having hunk of stuff about one-eighth inch high so thinking no need to getting any fancier. Putting on last hunk of wire, spraying with coat cleer lacker, and when that dry are covering hole thing with cleer silicone so are having encapsulated integrated circuit. Pretty slick, Hon. Ed., you not thinking?

Only two problems. First not knowing what kind integrated circuit I are making, and also not knowing which leeds connect to what. Of course, to geenyus these not reel grate problems. All it taking are little cut and try tecknique.

So, taking toothpick to desk, propping it up in crack of desk, and getting batteries, earfones, mike and other things I needing. By using clip leeds are shortly having everything connected, including forty meter antenna. Listening on earfones and not hearing anything. So, keep changing leeds, back and forth and up and down. For quite a few minutes not having any luck.

Then all of sudden, are heering voice of amchoor I knowing in town. It coming in cleer as bell! Hackensake Hon. Ed., it are reely working! I unclipping antenna leed and not heering him. Putting it back on, and he cleer like bell again. Unclipping earfone, not heering him. Clipping it back on and heering him! Scratchi are making reel 1/c integrated circuit!! Boy oh boy, talk about excitement!

Are having mike wired into circuit, so grabbing it and pushing transmit button and hollering "Break, break." Only one problem. Amchoor friend not heering me. But integrated circuit are heering me. It breaking. As pushing transmit button are seeing little spark and little wisp of smoke coming out of end of toothpick.

Well, anyway, Hon. Ed., I going ahead and making new integrated circuit with grater dissipayshun just as soon as figuring out how to do it. Meenwhile you can printing this so your reeders knowing how to making integrated circuit of their own.

The more I thinking about it, I not mentioning that I using Hon. Bug Spray. It maybe killing impurities which making integrated circuit blowing up.

Respectively yours,
Hashafisti Scratchi

The Omniverter, a 14 kc to 51.5 mc continuous-coverage receiving converter. A Heathkit HW-12 cabinet and Datak "Instant-lettering" give it a commercial appearance. The large knob at left of center tunes the r.f. preselector ranges. The one on the right selects the proper heterodyning frequency for each r.f. band. The numerals at the right of the dial window indicate which amateur band is to be used for the tunable i.f. for each selected r.f. band. It correspondingly indicates the position at which the i.f. output selector must be set. Other controls, reading left to right at the bottom, are: R.F. GAIN, RANGE SELECTOR, I.F. GAIN, I.F. OUTPUT SELECTOR, and FUNCTION SWITCH.

All-Band Coverage from the Ham-Band-Only Receiver:

The OMNIVERTER

BY WILFRED M. SCHERER,* W2AEF

USING only 9 crystals in a frequency synthesizer, *the Omniverter in conjunction with a ham-band-only receiver, provides 103 consecutive band segments of 500 kc each. Besides being used for reception, the setup also serves as a wide-range direct-reading frequency meter. The Omniverter can be built at a cost of about $100, using available components, including pre-wound r.f. inductors.*

THE trend in recent years with ham gear has been toward amateur-band-only receivers either as independent units or of the transceiver type. Although such restricted coverage is all that actually is required for amateur communications work, the operator may find it desirable to tune to other portions of the frequency spectrum where a variety of interesting and useful signals may be heard, such as

*Technical Director, *CQ*.

those discussed at the end of the text.

This then would necessitate a second receiver of the general-coverage type, incurring a considerable expense for a piece of gear that still would not have many of the desirable features such as the selectivity, stability, calibration, reset accuracy, operating modes, no need for a bandsetting dial, etc., as found on the modern high-quality amateur-band receiver.

The Omniverter is a converter designed for use in conjunction with a ham-band-only receiver that has full coverage of the 80-10 meter bands. With the receiver's serving as a tunable i.f. and detection system, the Omniverter furnishes 103 successive band segments of 500 kc each to provide continuous coverage from 14 kc to 51.5 mc! In addition, since most amateur-band receivers are calibrated in steps of 1-5 kc, the same degree of calibration is obtained over the entire range afforded with the Omniverter. Where 1 kc linear calibrations are available, the setup also functions as a direct-reading frequency meter.

Principle of Operation

A crystal frequency synthesizer is used to provide 20 heterodyning frequencies spaced 500 kc apart between 12 and 21.5 mc. When one of these frequencies is mixed with an incoming signal, an i.f. within one of the amateur bands will result. The signal is then reproduced by the receiver, which is used as a tunable i.f., when the amateur-band frequency is used that corresponds to the sum or difference between the received signal frequency and that of the hetrodyning signal. An example of frequencies obtained using the various ham bands with a given heterodyning frequency are indicated at Table I. A complete tabulation of the amateur bands used with the 20 heterodyning frequencies for all the r.f. input-signal ranges is given at Table II. In some cases other combinations may be used for the same input signals, but they will result in "backward tuning." For those shown, tuning is always in the same forward direction (provided the receiver is likewise oriented on all bands) and

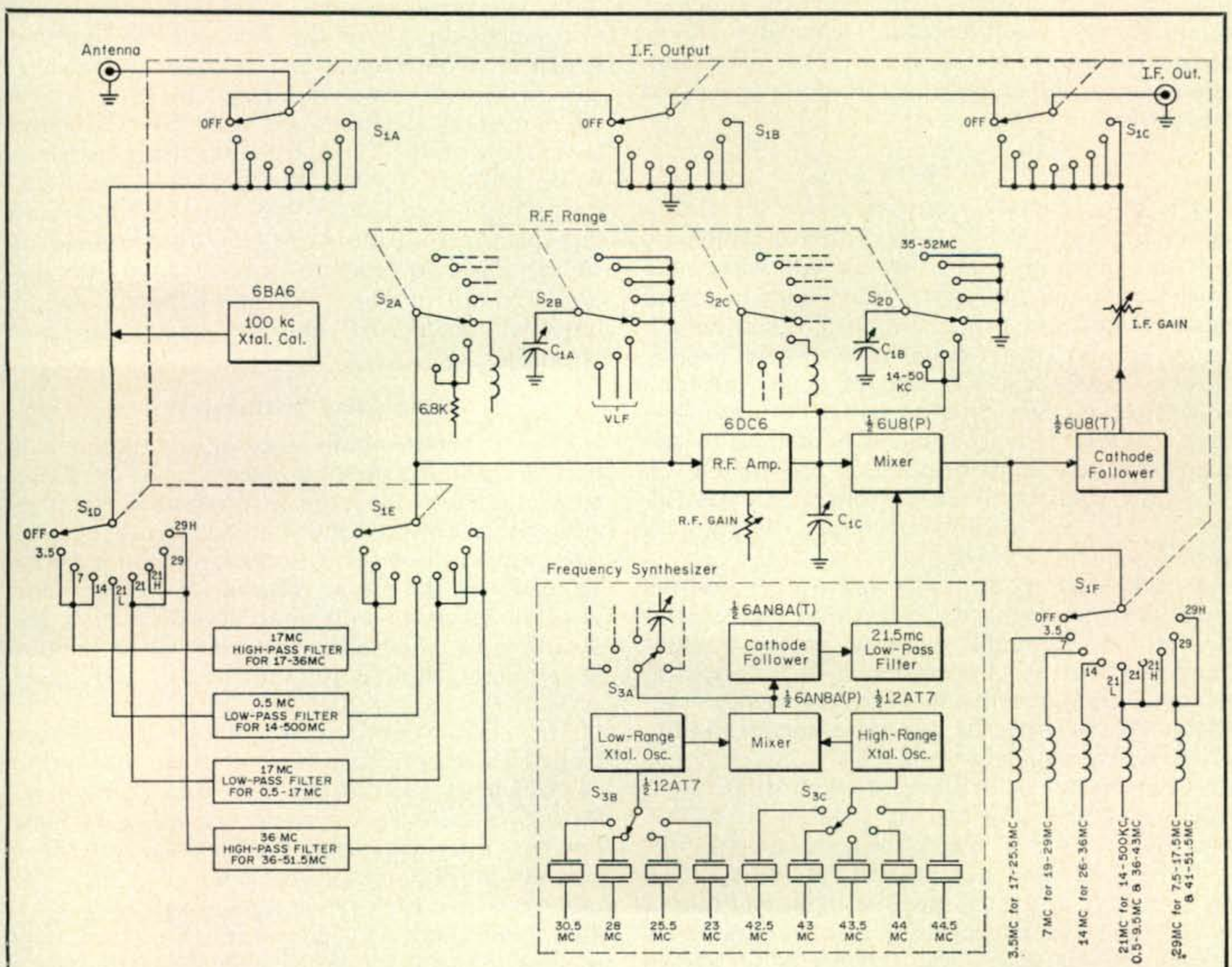


Fig. 1—The block diagram of the Omniverter. The i.f. output switch, S_1, selects the proper i.f. inductor at the mixer output and inserts the antenna-input filter required for the various r.f. ranges. S_2 is the R.F. RANGE switch which selects the proper r.f. inductors and connects the tuning-capacitor sections as described in the text where the r.f. range for each switch position also is given. On sections A, B, and D, the 3rd position (from the bottom) should be connected to the 4th position instead of as shown. S_3 is the 3-deck 20 position "MC-BAND" switch which selects the proper combination of low and high range crystals needed to produce the required heterodyning frequencies each of which are peaked by an individual trimmer at the corresponding position on S_{3a}.

TABLE I - FREQUENCY CONVERSION SCHEME				
R.F. Input Signal Frequency	=	Amateur Band Coverage	±	Heterodyning Frequency
1-1.5 mc	=	21-21.5 mc	−	20 mc
9-9.5 mc	=	29-29.5 mc	−	20 mc
23.5-24 mc	=	3.5-4.0 mc	+	20 mc
27-27.5 mc	=	7-7.5 mc	+	20 mc
34-34.5 mc	=	14-14.5 mc	+	20 mc
41-41.5 mc	=	21-21.5 mc	+	20 mc
49-49.5 mc	=	29-29.5 mc	+	20 mc

Table 1—An example of the frequency conversion scheme employed in the Omniverter showing the r.f. input-signal bands obtained with a 20 mc heterodyning frequency while the receiver is used as a tunable i.f. over each amateur band.

sideband positions are maintained throughout the range.

One of the problems encountered with the use of multi-conversion systems is that of avoiding spurious internal birdies or unwanted-signal responses. The heterodyning frequencies, along with the associated amateur-band frequencies required as a tunable i.f. for the various input-signal ranges, were therefore selected to minimize undesired responses and to provide adequate image, rejection and minimum i.f. signal feedthrough.

Circuitry

The basic circuit arrangement for the Omniverter is shown at fig. 1 (a complete schematic will be given in Part 2 which will cover the construction of the unit). The antenna signal passes through one of the input filters to the r.f. amplifier and then to the mixer where heterodyning takes place with one of the frequencies generated by the frequency synthesizer. The mixer output circuit is tuned according to the ham band that must be used as the tunable i.f. The i.f. output is obtained from a cathode follower that has a low-impedance output-gain control.

Switch sections S_{1A}, S_{1B} and S_{1C} enable the antenna to be connected directly to the receiver for "straight-through" operation on the amateur bands. When the Omniverter is in use, S_{1B} interrupts and grounds the interconnections between the switches to minimize the possibility of i.f. signal leakage.

A bandswitch selects one of eight different r.f. ranges: 14-50 kc, 50-150 kc, 150-500 kc, 0.5-1.6 mc, 1.6-5.5 mc, 5-17 mc, 17-36 mc or 35-51.5 mc. A three-gang capacitor is used for tuning. Two sections, C_{1A} and C_{1C}, tune the input and output of the r.f. stage, except on the two ranges below 150 kc. For these, C_{1A} is disconnected (as shown with the r.f. range switch at VLF) and the input signal from the 0.5 mc low-pass filter is fed directly from S_{1D} to the grid of the r.f. tube. A 6800-ohm resistor provides a termination for the filter. Detuning of the r.f. input circuit is not then experienced when different size antennas are used for the low ranges, and no special matching devices are needed, since in most cases the antenna impedance at these frequencies will be quite high. At the same time, the center section of the capacitor, C_{1B}, is connected in parallel with C_{1C} to increase the total tuning range at the amplifier output. An attempt had been made to switch *both* C_{1A} and C_{1B} across C_{1C}, but r.f. feedback through the switch circuitry caused intolerable instability. Then too, the added distributed capacitance nullified any improvement in minimum-to-maximum capacitance ratio that might increase the tuning range.

Other switch sections S_{1D}, S_{1E} and S_{1F} select the proper i.f. output circuit and insert the necessary filter at the antenna input. Operation is as follows: For the 14-500 kc frequency spectrum the 21 mc ham band is used with the i.f. output switch set at 21 L (L for v.l.f. ranges). This selects the 21 mc output circuit and also inserts the 0.5 mc low-pass filter at the antenna input to the r.f. amplifier. The filter attenuates local broadcast-station signals that might otherwise cause overloading and the generation of v.l.f. inter-station beats in the converter stages.[1]

The switch is set at 29 or 21 mc to select the corresponding i.f. output circuits for use with the 0.5-17 mc spectrum. In addition, either position inserts the 17 mc low-pass filter to improve rejection of unwanted-input signals at frequencies in the i.f. band. Similarly, the 3.5, 7 and 14 mc switch positions are used for 17-36 mc coverage with the 17 mc high-pass filter inserted; while position 21 H and 29 H (H for v.h.f. ranges) are used for 36-51.5 mc with the 36 mc high-pass filter. Filters are employed instead of simple traps, in order to provide good attenuation over *all* of one or more i.f. bands and to improve image and spurious unwanted-signal rejection.

Frequency Synthesizer

During the planning stage consideration had been given to the use of a phase-locked oscillator affair for furnishing the heterodyning frequencies, but a crystal controlled frequency synthesizer was decided upon instead, since one could be made for the job at relatively low cost made possible by using only nine crystals which are available in a specially packaged kit at a price lower than required for individually purchased crystals.[2]

The synthesizer consists of two crystal-controlled oscillators that feed a mixer the output of which is applied to the converter mixer through a cathode-follower stage and a 21.5 mc low-pass filter. One oscillator has four low-range crystals at 30.5, 28.0, 25.5 and 23.0 mc. The other has five high-range crystals at 42.5, 43.0, 43.5, 44.0 and 44.5 mc. Using appropriately tuned circuits at the synthesizer-mixer output to select the difference frequencies between various low-range and high-range crystals, 20 specific frequencies are obtained in 0.5 mc steps between 12.0 and 21.5 mc.

[1] "Low-Pass Filters for 5-500 kc Receivers," *CQ* Jan. '66, page 46.

[2] "TEX-5 Converter Kit" of crystals for the nine frequencies used in the Omniverter frequency synthesizer. Available for $22.50 from Texas Crystals, 1000 Crystal Drive, Fort Myers, Florida 33901.

TABLE II - DETAILED FREQUENCY COVERAGE AND CONVERSION CHART

	AMATEUR-BAND-ONLY RECEIVER TUNES (mc):							Xtal. Freq.		Hetero dyning-Freq.
R.F. Input Tuning Range (mc)	21.0-21.5	29.0-29.5	3.5-4.0	7.0-7.5	14.0-14.5	21.0-21.5	29.0-29.5	HIGH	LOW	
	———	7.5-8.0	25.0-25.5	28.5-29.0	35.5-36.0	42.5-43.0	51.0-51.5 * 50.5-51.0	44.5	23	21.5
	0-.5	8.0-8.5	24.5-25.0	28.0-28.5	35.0-35.5	42.0-42.5	50.0-50.5	44	23	21
	0.5-1.0	8.5-9.0	24.0-24.5	27.5-28.0	34.5-35.0	41.5-42.0	49.5-50.0	43.5	23	20.5
	1.0-1.5	9.0-9.5	23.5-24.0	27.0-27.5	34.0-34.5	41.0-41.5	49.0-49.5	43	23	20
	1.5-2.0	9.5-10.0	23.0-23.5	26.5-27.0	33.5-34.0	40.5-41.0	48.5-49.0	42.5	23	19.5
	2.0-2.5	10.0-10.5	22.5-23.0	26.0-26.5	33.0-33.5	40.0-40.5	48.0-48.5	44.5	25.5	19
	2.5-3.0	10.5-11.0	22.0-22.5	25.5-26.0	32.5-33.0	39.5-40.0	47.5-48.0	44	25.5	18.5
	3.0-3.5	11.0-11.5	21.5-22.0	25.0-25.5	32.0-32.5	39.0-39.5	47.0-47.5	43.5	25.5	18
	3.5-4.0	11.5-12.0	21.0-21.5	24.5-25.0	31.5-32.0	38.5-39.0	46.5-47.0	43	25.5	17.5
	4.0-4.5	12.0-12.5	20.5-21.0	24.0-24.5	31.0-31.5	38.0-38.5	46.0-46.5	42.5	25.5	17
	4.5-5.0	12.5-13.0	20.0-20.5	23.5-24.0	30.5-31.0	37.5-38.0	45.5-46.0	44.5	28	16.5
	5.0-5.5	13.0-13.5	19.5-20.0	23.0-23.5	30.0-30.5	37.0-37.5	45.0-45.5	44	28	16
	5.5-6.0	13.5-14.0	19.0-19.5	22.5-23.0	29.5-30.0	36.5-37.0	44.5-45.0	43.5	28	15.5
	6.0-6.5	14.0-14.5	18.5-19.0	22.0-22.5	29.0-29.5	36.0-36.5	44.0-44.5	43	28	15
	6.5-7.0	14.5-15.0	18.0-18.5	21.5-22.0	28.5-29.0	———	43.5-44.0	42.5	28	14.5
	7.0-7.5	15.0-15.5	17.5-18.0	21.0-21.5	28.0-28.5	———	43.0-43.5	44.5	30.5	14
	7.5-8.0	15.5-16.0	17.0-17.5	20.5-21.0	27.5-28.0	———	42.5-43.0	44	30.5	13.5
	8.0-8.5	16.0-16.5	16.5-17.0	20.0-20.5	27.0-27.5	———	42.0-42.5	43.5	30.5	13
	8.5-9.0	16.5-17.0	16.0-16.5	19.5-20.0	26.5-27.0	———	41.5-42.0	43	30.5	12.5
	9.0-9.5	17.0-17.5	15.5-16.0	19.0-19.5	26.0-26.5	———	41.0-41.5	42.5	30.5	12

Table 2—The tabulation of the r.f. input-signal bands obtained with the Omniverter using the various heterodyning frequencies when the receiver is tuned over the indicated amateur bands. The combinations of high and low range crystals used in the frequency synthesizer to obtain the different heterodyning frequencies are indicated in the columns at the right. (*For 51-51.5 mc coverage use the 29.5-30 mc band on the receiver.)

For example: 42.5 −30.5 = 12.0 mc, 43 −30.5 = 12.5 mc, 43.5 −30.5 = 13.0 mc, 44.0 −30.5 = 13.5 mc, 44.5 −30.5 = 14.0 mc, 42.5 −28.0 = 14.5 mc, etc. A complete rundown for all frequencies is given in Table II.

The crystals are 3rd overtone series-resonant types with a tolerance of ±.005%, making the worst possible net deviation amount to about 4 kc where the deviation is *plus* for a high-range crystal and *minus* for a low-range one. Where the deviation is in the same direction for both crystals, the error will be negligible. Many amateur-band receivers have a means for setting the dial calibration, in order to correct deviation errors, but where such is not the case, the synthesizer crystals can be "rubbered" to frequency using series inductive trimmers as will be explained under construction. A crystal calibrator is built into the Omniverter, since one installed in the associated receiver cannot be used without considerable rewiring and isolation.

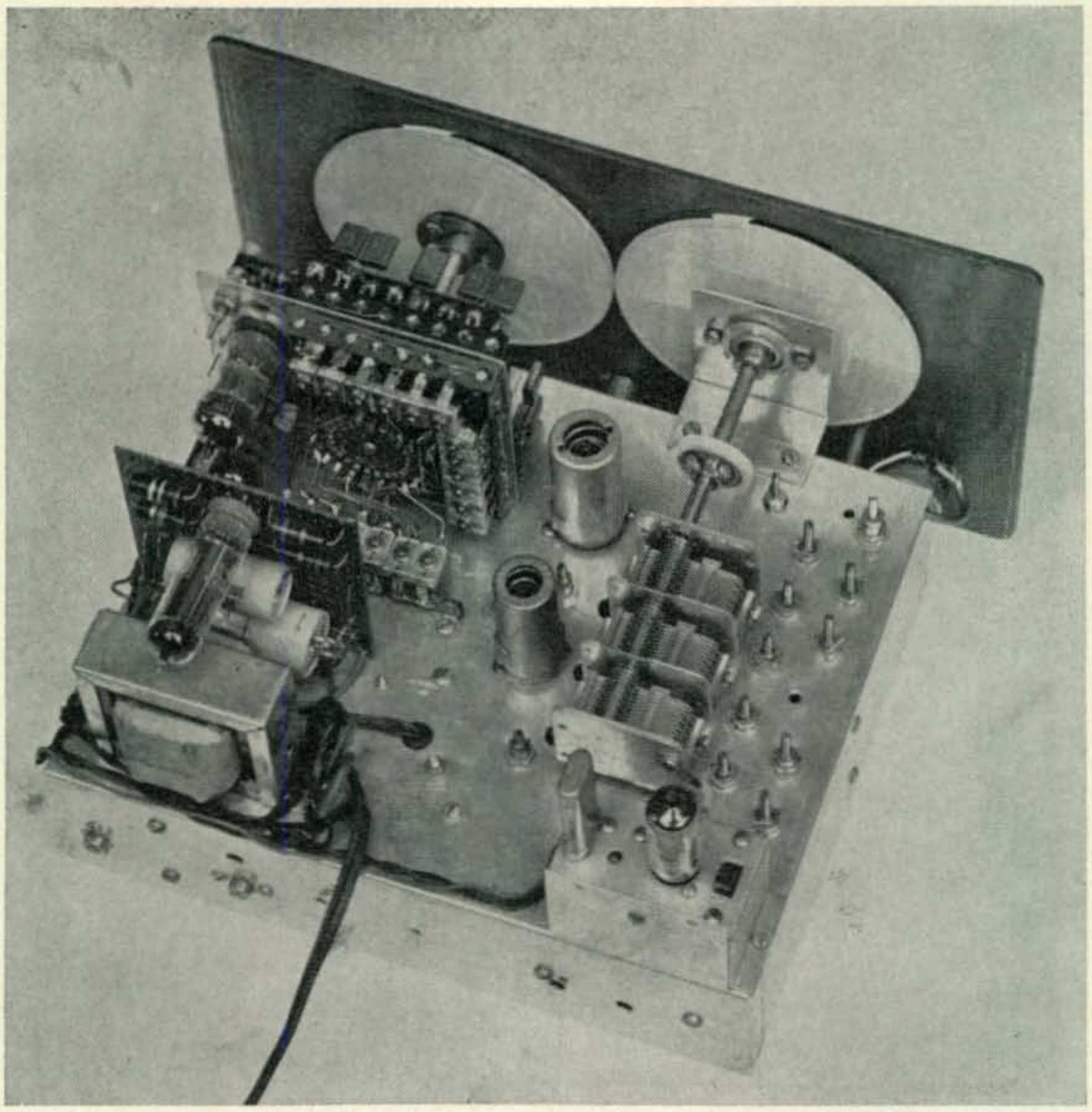
A very sharp-cutoff low-pass filter attenuates the fundamental and harmonic frequencies generated by the *individual* crystal oscillators, in order to minimize the chances of spurious input-signal responses. The filter does not materially aid in the reduction of harmonics caused by the difference frequencies used for heterodyning, because such harmonics can be generated in the receiver-mixer stage itself.

Performance

The first question usually asked about the performance of the Omniverter is "What about spurious responses or birdies?" The selection of the synthesizer-crystal frequencies and the heterodyning frquencies was indeed a tall order and although it may be possible that more ideal combinations could be found, those finally chosen, after considerable paper work and experimentation, made it possible to use as few inexpensive crystals as deemed wise and for a given net frequency deviation in c.p.s., while providing the extensive coverage with relatively little difficulty from spurious responses.

The most pronounced type of internal spurious signal will occur when the frequency of one of the synthesizer crystals, or that of the heterodyning signal, coincides with the received-signal frequency or falls in the amateur band used as the i.f. Fortunately these occur at only a few places and they fall at some particular integral of 500 kc at the start or end of an r.f. band, making it possible to avoid the offender by tuning to the opposite end of an adjacent band where the particular response will not be produced.

For example: Referring to Table II, the 14.5 mc heterodyning signal will appear as a discrete response at the start of the 14.5-15.0 mc band. Its second harmonic, although filtered out by the



The top view of the Omniverter. The frequency synthesizer is built on a vertical panel at the upper left. The crystals are mounted on lug-type terminal strips. The five high-range crystals may be seen at the top. Two of the low-range ones are at the left of the tube shield at the upper center. Trimmer capacitors, that tune the synthesizer-mixer output to each heterodyning frequency, also are mounted on terminal strips which are located around the 20 position switch. The power supply is at the lower left with all components, except the transformer, installed on a vertical printed-circuit board (Vero-Board or other perforated board). The right half of the chassis contains the r.f. preselector components. The r.f. input tube is at the center, the mixer is near the panel. The r.f. tuning capacitor is operated with a Jackson Bros. planetary drive (Model 4511 DAF) mounted on the right-angle bracket next to the dial. The 100 kc crystal calibrator is at the right foreground. It is a Knight-Kit job, Model X-10.

21.5 mc low-pass filter at the synthesizer output, still will be generated in the Omniverter mixer and thus will appear at 29 mc where the receiver is tuned. By switching to the 14.0-14.5 mc band, there will be no spurious of this nature, because the heterodyning frequency now is 15 mc and its second harmonic is at 30 mc. This example is an extreme case where the response falls within *both* the r.f. band and the i.f. range.

Similarly, a signal from the 23 mc synthesizer crystal may be sufficiently strong, in spite of the filter, to be heard when using the 23.0-23.5 mc band with the 3.5 mc i.f. combination, but it can be avoided by switching to the 22.5-23.0 mc band (where the synthesizer crystal is now changed to 25.5 mc) or by using one of the combinations with the 7 mc i.f. Other such responses may appear on some bands at 25.5, 28.0, 29.0, 42.0, 43.0 and 43.5 mc, but they may be avoided in a similar manner. The initial design called for r.f. coverage up to only 28 mc. The v.h.f. ranges were tossed in as an after-thought, so we were indeed lucky not to run into more serious problems in this area.

Spurious internal tweets also depend on the r.f. selectivity, overload characteristics and, to some extent, on the conversion scheme used in the associated receiver. Birdies may appear at various points when the heterodyning or synthesizer frequencies are close to the receiver-band and strong enough to produce front-end overloading of the receiver or to mix with oscillator frequencies from within the receiver. These birdies usually are fairly weak, but should they be a problem, they can be minimized by reducing the i.f. gain of the Omniverter as far as possible, consistent with obtaining sufficient i.f. output.

A case in particular is that which is found when the v.l.f. ranges are used. The 21 mc heterodyning signal may overload the receiver used for the 21 mc tunable i.f. and it may even desensitize the receiver to some extent. This can

be overcome by reducing the i.f. output gain.

Another type of spurious response is that caused by an input-signal image or by mixing of a signal with a harmonic of the heterodyning frequency. The degree to which this can occur depends on the r.f. selectivity in the front end of the Omniverter and on the level of the heterodyning signal. Such unwanted-signal responses, as well as those that may be produced by various other situations, were measured at being down 60-80 db in the model shown here.

Measurements of other characteristics were as follows:

SENSITIVITY: 0.5 μv or better for 10 db S/N on s.s.b. and c.w. when used with a receiver having a sensitivity of at least 1 μv. A.m. sensitivity is quite dependent on the receiver characteristics, but should average at least 1 μv for 10 db S/N (30% modulation with 400 c.p.s.). At 50 mc sensitivity is slightly less with a 6-7 db noise figure.

I.F. SIGNAL REJECTION (at the amateur-band frequency used for the i.f.): 70-80 db. Where the receiver itself employs an h.f. 1st i.f., input-signal response at that frequency was generally down 50-60 db.

OVERLOAD OR CROSS MODULATION: This was rather difficult to evaluate in general terms in view of the extensive range or other involved factors; however, a jack is provided for utilizing the a.g.c. voltage from the associated receiver for minimizing overload possibilities by automatically controlling the gain of the r.f. stage. In cases where a.g.c. may not be conveniently obtained, an r.f. gain control is provided to hold the r.f. level down if needed. Overload of the associated receiver can be prevented by controlling the signal level from the Omniverter by means of the i.f. output gain control.

Uses for the Omniverter

Although it may be obvious as to what can be heard over the range of the Omniverter or how it can be used for other purposes, we'll mention a number of possibilities.

The v.l.f. c.w. signals in the 15-100 kc range, such as those of NAA and NSS on the East Coast, NLK and NPG on the West Coast, GQD in England and many others throughout the world, not only provide interesting listening, but also are excellent sources for code practice using straight language or 5-letter code at various speeds. You'll find that the v.l.f. signals are solid copy day or night and without fading. From 200 to 400 kc are the airport beacons and aircraft weather-reporting stations. For the old sea-salt the 500 kc ship-to-shore signals should be of interest and when a shore station indicates a qsy to such-and-such a frequency in the 400-500 kc range, you can flip the dial of the receiver right on target for copying the traffic.

We next go through the standard-broadcast band, to the 160-meter amateur band and on to the marine-telephone channels and other weather stations. From thereon up are the various WWV channels, the short-wave broadcasters (many of which are interesting and enjoyable, offering a relief from some of the poor TV shows currently presented), commercial teletype and s.s.b. stations, the h.f. ship-to-shore communications channels, Russian satellites near 20 mc, MARS stations and of course the ham-band signals. If you want to get a real ear-full, you can listen to the 27 mc CB band. Above 30 mc are many communications services such as police, highway maintenance, emergency vehicles, tow trucks, the dog catcher, forestry service, etc. You finally end up with the lower portion of the 6-meter amateur band which also makes interesting listening.

If you're lucky enough to have a ham-band receiver that is accurately calibrated in 1 kc steps, such as found with the Collins 75A series, the Heathkit SB-300 or the Hallicrafters SX-115, the Omniverter will make the setup an excellent direct-reading frequency meter[3] for checking received signals, oscillators or crystals used therewith, v.f.o. bandspread adjustments or calibration, frequency drift, precise frequency from signal generator (particularly for checking filter band-widths), locating spurious signals, etc. Other test observations may be made on equipment operating outside the amateur bands.

The setup also may be used as a tunable i.f. to extend the range of a u.h.f. converter in which only one crystal is installed and which thus permits coverage of only a limited u.h.f. band segment when a ham-band-only receiver is used for the i.f.

The construction and operation of the Omniverter will be covered in a following installment.

[To Be Continued]

[3]Frankly, this was the original intention for whipping up the Omniverter.

New Amateur Product

Amperex

AMPEREX Electronic Corporation announces the availability of a newly completed Condensed Components Catalog. Containing descriptions and basic specifications of the expanding line of Amperex components, it provides designers and buyers with a handy, informative reference guide.

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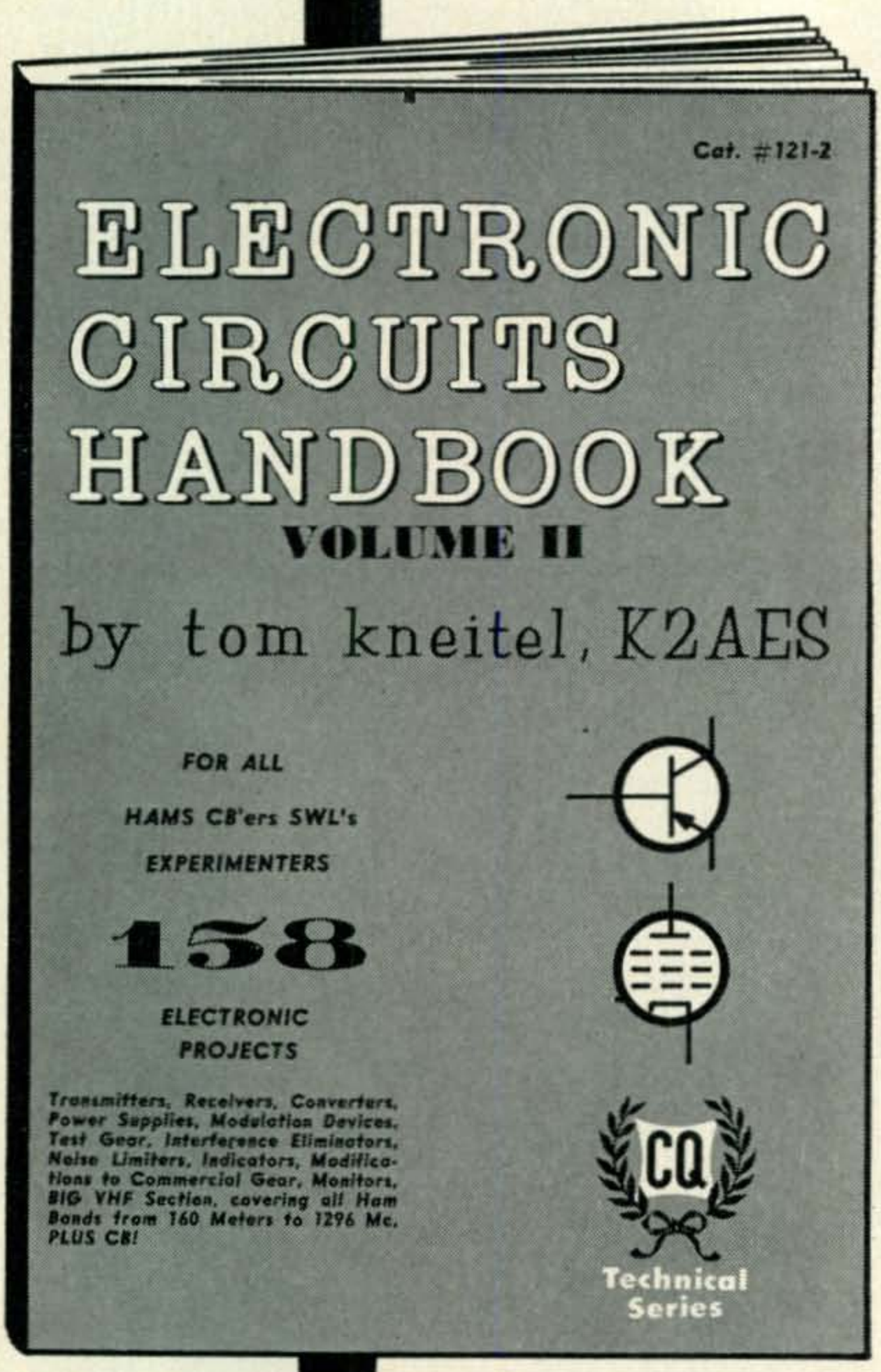
ONE MORE TIME



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A Radical Proposal

BY RAPHAEL SOIFER,* K2QBW/K1WXC, EX-WA4IJR

To most of those who know him, the author of this article is not much of a radical. The radical proposal of the title is the outgrowth of what he hopes is a reasonable analysis of the problems posed by the recent drop in amateur new-license statistics, which has been the subject of numerous editorials in CQ, as well as equally serious discussions in QST and the RSGB Bulletin. Whether or not you agree with all the specifics, if it gets you thinking about these problems, it will have accomplished much of its purpose.

AMATEUR radio justifies its existence and its continued frequency allocations on the basis of "the public interest, convenience, or necessity," or, more specifically, in terms of adherence to and fulfillment of its officially-stated basis and purpose, and the relevance of that basis and purpose to present and future conditions. Let's look at our position, as seen from this viewpoint, in light of current trends. To do this, we must first back up slightly, and look closely at what our "basis and purpose" is supposed to be, as stated by the Federal Communications Commission.

Article 97.0 of the FCC Rules sets forth five elements comprising the "fundamental purpose" of the amateur radio service. These are:

a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

e) Continuation and extension of the amateur's unique ability to enhance international good will.

These five principles were drafted in 1934, and no doubt were well met by the amateurs of that day, according to the standards and conditions then in existence. But what about today? More importantly, what about ten years from now? When measured against the background of a 1977 electronics industry, what will the amateur radio service have to show as recent evidence of its continued adherence to these principles? Let's look at the situation step by step.

A. Value as a voluntary noncommercial communication service.

This has long been the lifeblood of amateur radio's public justification for existence. Through emergency communication, both local and long-range, long-distance overseas phone patch traffic, military morale traffic, and the like, amateur radio has, in recent years past, met genuine needs. In ten years, it still will. By 1977, however, the impact of this area on the public interest will have lessened somewhat. In the first place, an amateur service of around 300,000 will have serious problems competing with Citizens' Banders for the local emergency traffic mission.

CB equipment is simple, portable, rugged, and virtually foolproof. There is lots of it around, and it is relatively inexpensive. Any person over 18 may use it, without examination

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—that includes all non-technical CD personnel. The main operational problem, QRM, may be silenced by FCC order in real emergencies. The remaining technical difficulty is the shortness of operating range. However, with the advent of satellite communication facilities, long-range commercial telephone service will become more reliable. It will fail less often.

This lessened need for amateur long-haul traffic facilities will affect international service as well as domestic; as commercial facilities improve, amateur facilities are not as much in demand. This is not to say that they will be obsolete; some need for them will always persist. We, as amateurs, should of course do what we can to strengthen them, both for long-haul (phone patch, nets) and short-haul (AREC, RACES). In the competitive race for frequencies, however, their power in negotiations may lessen over time.

B. Contribution to the Radio Art

Here, we are in trouble. With few exceptions since World War II, improvements in the technical side of amateur radio have been of benefit only to amateurs, not to the industry as a whole. This is in part due to the inevitable specialization within the communications field, but due also to the fact that radio is just getting complicated.

The two main amateur contributions to propagation since 1945 have been meteor scatter and trans-equitorial *E*-skip, and in circuitry, the exploitation of single sideband. Yes, these have been important, though less so than the great advances of the 1920's and 1930's. By 1977, however, an increasingly microwave-dominated communications industry will have less reason to look to amateurs for leadership. Amateur progress in v.h.f. and microwaves, startling as it has been, just has not been startling enough to keep pace. Even that which we have had has been dominated by individuals who are not strictly amateur.

By 1977, the problem of how to keep pace with commercial developments, not so much of how to lead them, will be serious. Even today, amateurs have been relatively slow to adopt transistor circuitry, phase-locked loops, and FMFB, to name just a few. In the laser era, things will get worse.

C. Rules providing for advancing skills

If the Commission approves the incentive licensing proposals made by ARRL and supported in principle by *CQ*, things will be in fairly good shape. There have been various proposals for making s.s.b. compulsory in h.f. phone bands, but a.m. seems to be receding without the need for legislation.

D. Reservoir of trained personnel

This and the following point represent probably our best hope for the future. While the day is probably over when an ARRL official can be directly commissioned a colonel in the Signal Corps on the basis of knowledge gained in amateur radio, training of electronics technicians is an area in which amateur radio has been doing well. Incentive licensing should aid in this purpose.

By 1977, however, the emphasis will shift a little. As the technical bases of amateur and commercial circuitry and practices diverge, technicians will require more academic training; our present two-year technical institutes may even lengthen their programs. Amateur knowledge will become less useful in and of itself, but amateur spirit and enthusiasm will be more useful than ever. As a means of interesting young people in scientific and allied professions, amateur radio has always been outstanding and has great future potential, if its numerical growth can be maintained. This subject will be returned to later.

E. Enhancing international good will

During the past five years, amateur radio's progress in this area has been faster than at any time since the discovery of short waves. The combined effects of reciprocal licensing and the OSCAR satellite program toward international cooperation on the personal and technical levels point toward much more of the same in the future. There are two clouds on this horizon, however; one is relatively minor and the other could be serious.

The first minor one is the bad feeling stirred up by some DXpeditions and, more generally, by the countries race itself. Fortunately, however, this feeling tends to be localized to the direct participants, who again fortunately are relatively few. There are simple administrative steps which are available to us through ARRL to clear this up should it be deemed important, but failure to do so would not be catastrophic.

The major cloud is, again, the possibility of sustained interruptions in the growth rate. The more people who take part in amateur radio, the greater will be the benefits to international understanding; the fewer, the lesser. There is a potential QRM problem on the h.f. bands from increased growth, but by 1977 technical ways will exist by means of permanent OSCAR satellites to internationalize additional ranges of frequencies to take up some of the overload; one more reason for pushing Project OSCAR.

The Growth Rate Again

We have seen that, of the five principles forming the basis and purpose of amateur radio, two will lessen in relative importance during the next ten years, one will remain well satisfied, and two will grow in value as negotiating tools for preserving our precious frequencies. However, that growth will be negated if we fail in attracting more people, especially young people, into becoming licensed amateurs. The reasons for the slackening of growth are many, but they fall into three broad categories:

a) *Cyclical variations.*
b) *Competition from other "scientific" hobbies.*
c) *Competition from Citizens' Band radio.*

About the first little can be done; the sunspot

cycle is on the upswing anyway. The second, it seems to me, has been overrated. Certain observers have mentioned the manned space flights as a competitive influence, but unless you're W5LFL, they lack a real element of personal participation. People watch them, but they do not supplant participant activities. Amateur astronomy has always been with us; it is far older than hamming. If that were the problem, electronic hobbies as a class would be dropping; they are not.

The most important problem, to this writer and to most others, is Citizens' Band. As has been stated before, the route which this writer took to amateur radio, from s.w.l. in 1948 to Novice in 1955, is becoming less well traveled. People do not bother to copy amateur c.w. and s.s.b. on their short-wave radios; they tune to 27 mc where they can understand what is going on. Many start out as CBers to begin with, skipping the s.w.l. stage entirely. What are we supposed to do?

This writer has one proposal. It may not be the only thing we can do, we may not even do it, but it can possibly help. That proposal is to attract likely candidates away from CB by means of a specially-constructed Restricted Class license. To be effective, such a license must not have a c.w. requirement as an initial step, for learning the code seems a waste of time to the CBer. That is, he *thinks* it is a waste of time because his personal exposure to the world of amateur radio which he can unlock for the price of 5 w.p.m. is too little.* To be acceptable, such a license must not seriously degrade amateur standards, and must fit in with the incentive licensing scheme. A no-code license, even a nonrenewable one such as is discussed here, might conceivably pose a problem, but this can be minimized by placing its frequency privileges in bands which are not heavily used by present amateurs. The provisions of the license, specifically, would be as follows:

TERM: *Two years, nonrenewable, the same as the ARRL proposal for Novice Class. A Novice license may be held concurrently.*

QUALIFICATIONS: *Any citizen of the United States, other than previously licensed amateurs. Reciprocal privileges where negotiated by treaty.*

EXAMINATION: *No code test. Theory examination substantially equivalent to the present Novice Class.*

TRANSMITTER: *75 watts input, crystal controlled.*

FREQUENCIES AND EMISSION: *According to the following table:*

Band	Emission
146-148 mc	*A1, A2, A3, n.f.m.*
222-225 mc[1]	*A1, A2, A3*
436-450 mc[1, 2]	*A1, A2, A3, F1, F3*

*The author is not by any means anti-c.w. He holds Extra Class, CP35, and CP40 (CWA).

[1]In this band, harmful interference may not be caused to the Government radio-positioning service.

[2]To be added in place of the 22 mc band or in addition to it if demand warrants, at the Commission's discretion.

In addition, the exclusive c.w. segment at 147.9 mc would be relocated to 144.0 mc, where the serious v.h.f. men wanted it in the first place. In fact, if the reader will look closely at the suggested frequencies, he will observe that every effort has been made to keep those portions of the affected bands now used for serious work out of the Restricted Class segments. 144-146, 220-222, and 432-436 mc are not included; a segment has been left at 420-432 mc for experimentation by Technicians and higher licensees with ATV, facsimile, and other wideband modes. About the only problem would be the 146.94 mc f.m. channel; this might have to be moved back to 145.26.

Efforts have also been made to minimize TVI and other interference. None of the bands in question has a serious TVI problem except 220 mc, and in this case, the lower Restricted Class band limit is placed 10.75 megacycles away from the Channel 13 picture carrier. To minimize adjacent-channel sound interference, the use of f.m. by Restricted Class licensees on this band is prohibited. This allows the a.m.-limiting action of television audio units to further reduce interference.

The inclusion of a two-meter segment is bound to be controversial, but to my mind this may be necessary because of the need to protect radiopositioning stations from co-channel interference on frequencies above 220 mc. In case the Restricted Class amateur has to QSY to protect such a station, a band should be provided in which operation by large numbers of amateurs will not interfere with a service having primary jurisdiction over the frequencies in question. Incidentally, the prohibition of wideband f.m. at 146-148 mc applies to Restricted Class stations only, and is intended simply to prevent QRM.

Also, in case some readers did not realize it, the granting of amateur licenses without code tests for frequencies above 144 mc is expressly permitted by the Geneva regulations, and has its counterpart in the v.h.f.-only licenses of many other countries.

Now, what will this license have to offer the CBer? For one thing, 75 watts, highly directive antennas, and low noise figures promise greatly extended local range and reliability of communications. For another, the granting of five (or19) megacycles in place of 23 channels will greatly ease QRM, and the operator will be free of QRM from quasi-commercial CB stations, who would of course be barred from the amateur bands. Conversely, the departure of many of the hobby-type operators from CB would free that band for the quasi-commercial service for which it was originally intended. FCC approval of the Restricted Class license could be accompanied by further tightening of the conditions for operation in the CB regulations to further eliminate hobby-type activities.

To get on the air in Class D now costs something like two hundred dollars for a good transceiver and antenna; first-generation gear for amateur frequencies mentioned should not be too

[*Continued on page 104*]

GRUMBLES

by Sam*

HAM radio seems to be one of the last outposts of any substantial gathering of jolly old souls, but even ham radio of late is being infiltrated by roving bands of noisy and obnoxious peple who seem to be catering to (and even cultivating) malcontents. Good! *CQ* has been a "nice guy" (man, do I hate that expression), for far too long. Matter of fact, every time they come on with that hi-de-ho about "having no axes to grind" I run for the "motion sickness bag."

I don't know about *CQ*, but I sure have an axe with a few nicks in the edge that could use a bit of grinding. Frankly, I usually have very little truck with those who claim to represent me and then hint that they're looking at the world through rose colored 6146's. Most people I've spoken to are annoyed about one thing or another in ham radio; maybe it's the kid down the block who's causing all the TVI you're being accused of; maybe it's being separated from a buck for a DXpedition QSL; maybe it's even that highly touted piece of gear which you bought only to learn that it served no more useful purpose than being an impressive array of knobs and switches.

So, fellow grouches, here we are with a sounding board of our own. From time to time we'll be here to needle manufacturers who either fudge on their specs or who grind out unadulterated garbage, and to generally take a few whacks at the people and things in and around ham radio which bug us. This is no monopoly, mind you; if you've got a thorn in your hindquarters about something, you're invited to pass it along for inclusion in our rantings (please sign full name, call, address; we will withhold if you wish).

I'll also be here to offer you coverage on items which bug me because they *aren't* usually covered in *CQ;* possibly it will be a summary of the latest contest and award cheating methods, or even a nostalgic look into some almost forgotten corners of ham radio (remind me to tell you the story about Mary Sue Higginbotham, girl radio operator, my first true love). Let me know the stuff which you feel is *missing* from *CQ*, [not that it will do any good!—*ed.*].

Say, maybe *I* bug you! That's ok. By the time I get your comments the feeling will probably be pretty much mutual. Does *CQ* get under your hide sometimes? Certainly not as much as it does mine, I can assure you—well, I'm not afraid to yank the tails of a few sacred cows. As a matter of fact, I have every intention of devoting some space to a richly deserved raking over the coals for *CQ*, [Ha!—*ed.*]; basically good but sometimes downright dull. That's a long story for another day. We'll also track some muddy shoeprints to West Hartford (talk about fuddy-duddies, *QST* usually makes ham radio as fascinating as a home course in embalming), and *73* (frequently good, sometimes great, but too often inexcusably insipid, poorly done and even harmful to the hobby).

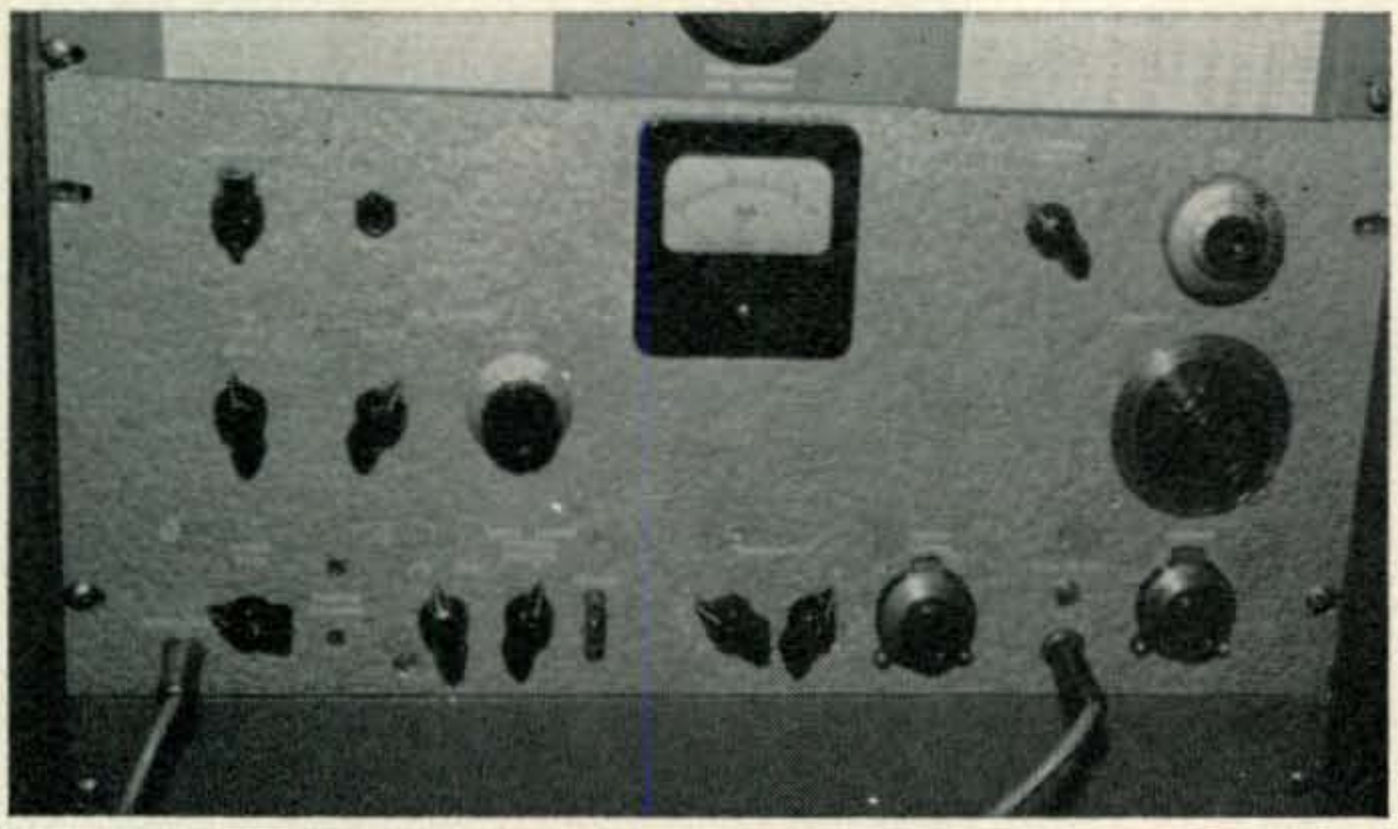
Oh, I just gotta let you in on a little open secret. Did you know that the ham radio market is in beastly shape? Manufacturers have been crying the blues for several years now and the whole thing is getting progressively worse. You'd better believe it, and unless they get a better understanding of the market they are trying to sell they're going to have to branch out into other fields just to pay the landlord.

Today ham radio should be the most swinging thing this side of the frug—electronics has become a part of our everyday life, spootnicks are flying all over the place sending our c.w. over the TV networks, even the biggest clod in the world can get a start in radio communications via the CB route. In actual fact, as has been pointed out elsewhere, ham radio is laying a bomb. Somebody must be doing something wrong somewhere along the line.

Sad but true, the manufacturers must bear a heavy portion of the responsibility; as a result of an infection they caught from the CB industry they have created hideous Frankenstein monster which already has its bony fingers at their throats.

[*Continued on page 102*]

*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050.



Front view of the general coverage ssb exciter. The controls to the left of the meter are, top: CARRIER LEVEL, VOX/MANUAL; center; DRIVE, V.F.O. AMPLIFIER BANDSWITCH and TUNING; Bottom row l. to r.; Microphone, A.F. GAIN, CARRIER BALANCE (screw adj.) V.F.O./CRYSTAL switch, SIDEBAND SELECTOR, crystal socket, BANDSWITCHES (2), DRIVER TUNING, PUSH TO TEST switch, key jack, LOADING. Top row to right of the meter are: LOADING SWITCH; COIL TUNING. Below the coil tuning is the PLATE TUNING capacitor.

THE ULTIMATE SSB EXCITER

BY CAPTAIN PAUL H. LEE,* W3JHR

At the start of the Navy MARS program in January 1963, I decided that I should equip my station to operate on all the assigned Navy frequencies between 2 and 30 mc as well as in the amateur bands. The frequency coverage of the s.s.b. exciter which I described in a previous article[1] was adequate for the 80, 40, 20 and 15 meter amateur bands and several hundred kilocycles beyond their edges, but it did not cover all the required Navy frequencies. I also wanted to be able to operate on the 160 and 10 meter amateur bands which were not covered by the earlier exciter. Therefore, I decided to build a new s.s.b. exciter which would be "general coverage," to cover all frequencies between 1.8 and 30 mc, in six overlapping bands.

The s.s.b. exciter described in this article is the result of many hours of careful planning and design work, plus extreme care in assembly and wiring. The results of this labor have been well worth all the time spent. The capability of 160 meter s.s.b. operation is certainly of considerable value. The manufacturers have unfortunately neglected this useful band.

Mechanical Arrangement

Before getting into the details of the circuitry, a look at the photographs will show the mechanical arrangement. When viewed from the front, the left end of the exciter is the i.f. chassis, which is a standard 7" × 3" × 12" aluminum chassis. This chassis is subdivided into several compartments by shield partitions of sheet aluminum. At the left end near the front panel is the audio compartment. Directly behind it is the balanced modulator. The next compartment is the first crystal filter. This is followed by the 480 kc. i.f. amplifier stage, and the final compartment in the rear is that of the second crystal filter. Now, heading back towards the front panel, the compartment adjacent to the second crystal filter is that of the first mixer stage. In front of that is the 1500 kc i.f. amplifier stage. The next compartment toward the front is the vox unit. Immediately in front of that is the 480 kc master crystal oscillator. The last compartment, at the front panel, is the v.f.o. amplifier/crystal oscillator unit. This completes the i.f. chassis.

The next chassis is 6" × 3" × 12" in size. It is firmly bolted to the side of the i.f. chassis. Beginning at the rear, we have the second mixer compartment, followed by the h.f. crystal oscillator compartment. Then comes the third mixer stage compartment, and adjacent to the front panel is the r.f. driver stage compartment. The third chassis, which is 4" × 3" × 12" in size, is firmly bolted to the preceding one, and it is used for the 6146 output stage. The tube sockets are in a small compartment near the front panel, and the output tuning capacitor of the pi-network is in the compartment to the rear. Needless to say, all this shielding and compartmentation took considerable time and careful design and layout

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[1]Lee, P. H., "Crystal Filter Type S.S.B. Exciter," *CQ*, Nov. 1961, p. 32.

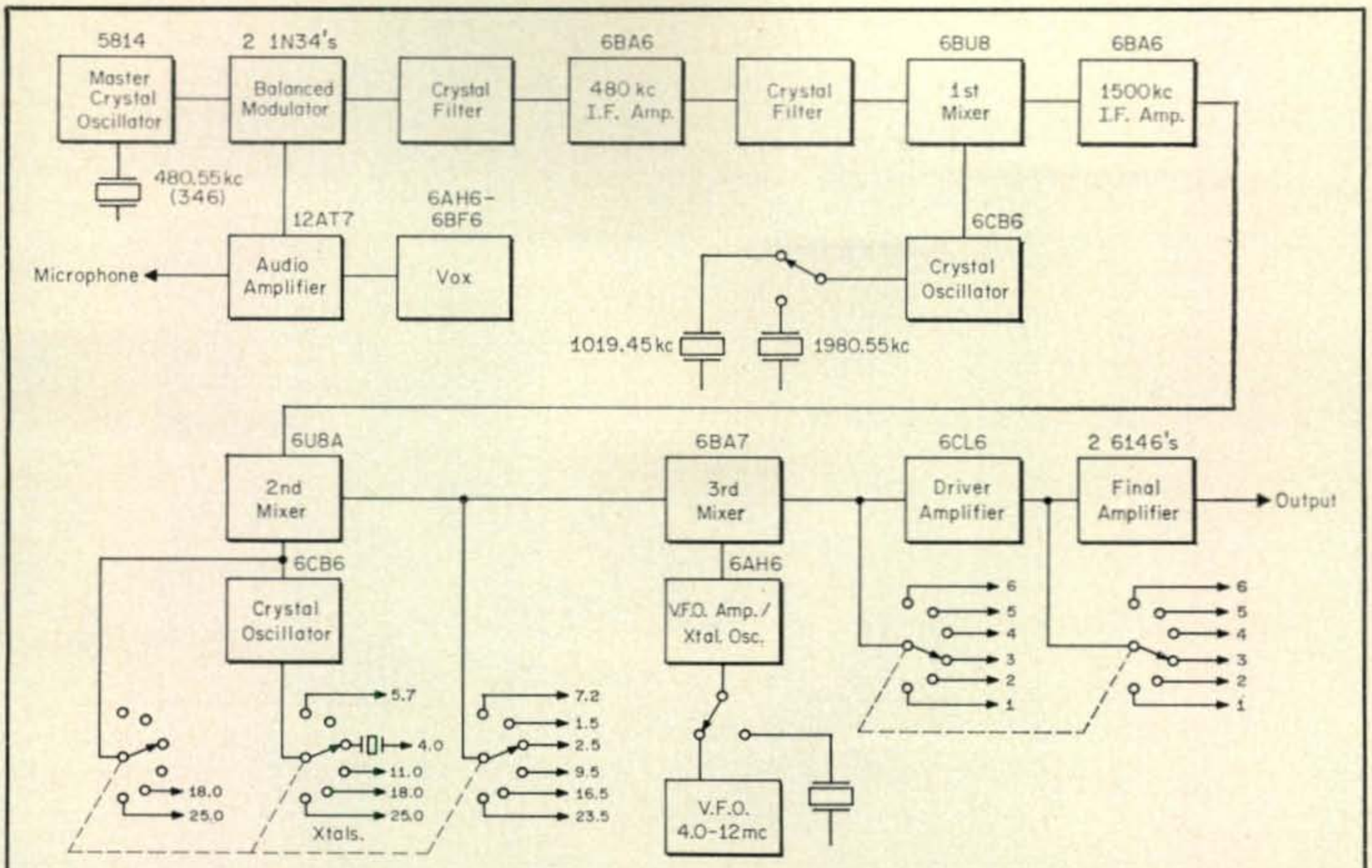


Fig. 1—Block diagram of the general coverage s.s.b. exciter. The v.f.o. shown is not part of the unit described.

work. Shaft holes had to be exactly lined up so that switches, variable capacitors, etc., could be ganged through several inter-compartment shields. Holes for interconnecting wiring and for components, had to be carefully pre-positioned in shields and chassis. The mechanical design and assembly of this unit required several months of evening work. The result of this painstaking labor is a fine layout which went together quite easily, with a parts lining up properly. The use of three separate chassis bolted together also makes it a very sturdy unit. The front panel is ⅛" × 19" × 8¾" in size.

Block Diagram

A block diagram of the exciter is shown in fig. 1. A dual sideband i.f. signal is generated at 480 kc and the upper sideband is rejected by a two-section filter. Sideband reversal takes place in the first mixer whose output frequency is 1500 kc. The second mixer is fed by a crystal oscillator whose crystals are selected by a section of the bandswitch. These frequencies are 5.7 mc for band 1, 4 mc for band 3, 11 mc for band 4, 18 mc for band 5, and 25 mc for band 6. There is no crystal for band 2. The 1500 kc i.f. is fed right through the mixer on this band.

The six output frequencies from the second mixer are 7.2 mc for band 1, 1.5 mc for band 2, 2.5 mc for band 3, 9.5 mc for band 4, 16.5 mc for band 5 and 23.5 mc for band 6. These are *fixed* frequencies. The proper one of these frequencies for the band desired is fed into the 3rd mixer, where the v.f.o. is brought in. The injection frequency into this mixer from the v.f.o. amplifier is in the range of 4.0 to 12.0 mc, and its exact value depends on the band desired. The next stage is the r.f. driver stage.

The secret of the mixing process in this exciter is the use of two bandswitches, one of them for the third mixer and r.f. driver stages, and the other for the h.f. crystal oscillator and second mixer stages. A table of frequencies in the mixing process is shown in fig. 2. Because of the mixing process used, the "polarity" of the sideband reversal switch is the same on all bands. The bandswitch positions are shown in parentheses in this table.

The 6146 stage is designed for continuous coverage from 1.8 to 30 mc, and it can operate with either one or both 6146 tubes in the sockets. The exciter can be used by itself as a low powered transmitter, or it can be used to drive a high power amplifier such as my 4-1000A unit.[2]

EXCITER FREQUENCY TABLE						
I.F.	1st. Osc.	2nd. I.F.	2nd. Osc.	3rd. I.F.	V.F.O. Range	Output Freq.
480	1980/1020	1500	5700	7200(1)	8900-10500	1700-3300(1)
480	1980/1020	1500	—	1500(2)	4400-7000	2900-5500(2)
480	1980/1020	1500	—	1500(2)	6500-11000	5000-9500(3)
480	1980/1020	1500	4000	2500(3)	6000-12000	8500-14500(4)
480	1980/1020	1500	11000	9500(4)	5000-6000	14500-15500(4)
480	1980/1020	1500	11000	9500(4)	5000-12000	14500-21500(5)
480	1980/1020	1500	18000	16500(5)	4500-8000	21000-24500(5)
480	1980/1020	1500	11000	9500(4)	7500-12000	18000-21500(6)
480	1980/1020	1500	18000	16500(5)	4500-12000	21000-28500(6)
480	1980/1020	1500	25000	23500(6)	5000-8500	28500-32000(6)

Fig. 2—Exciter frequency table showing the operating frequency of each stage for output from 1.7 to 32 mc. The numbers in the brackets indicate the bandswitch settings. All frequencies are in kilocycles.

[2]Lee, P. H., "The Big Brother Linear," *CQ*, Sept. 1960, p. 32.

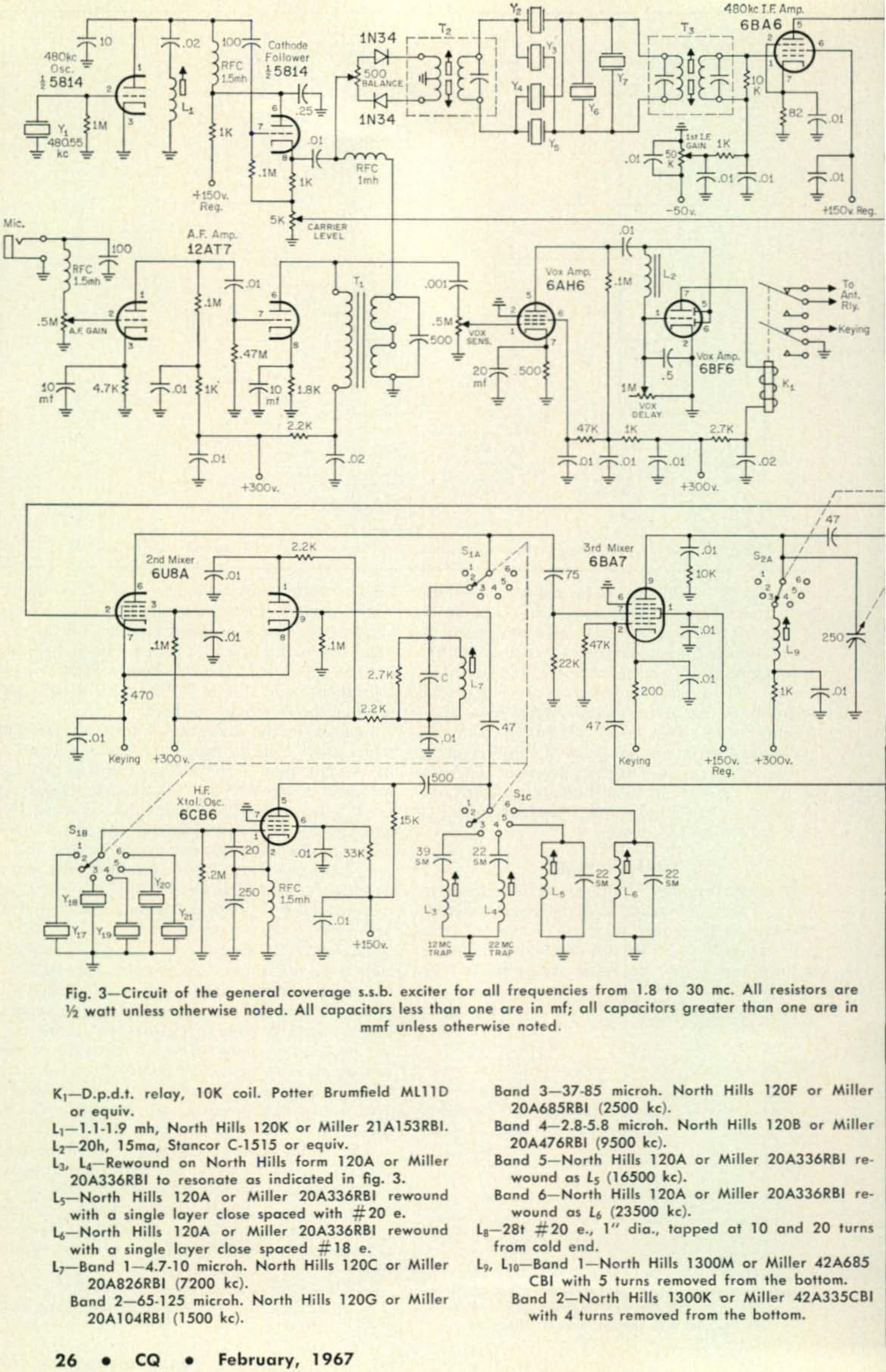


Fig. 3—Circuit of the general coverage s.s.b. exciter for all frequencies from 1.8 to 30 mc. All resistors are ½ watt unless otherwise noted. All capacitors less than one are in mf; all capacitors greater than one are in mmf unless otherwise noted.

K_1—D.p.d.t. relay, 10K coil. Potter Brumfield ML11D or equiv.

L_1—1.1-1.9 mh, North Hills 120K or Miller 21A153RBI.

L_2—20h, 15ma, Stancor C-1515 or equiv.

L_3, L_4—Rewound on North Hills form 120A or Miller 20A336RBI to resonate as indicated in fig. 3.

L_5—North Hills 120A or Miller 20A336RBI rewound with a single layer close spaced with #20 e.

L_6—North Hills 120A or Miller 20A336RBI rewound with a single layer close spaced #18 e.

L_7—Band 1—4.7-10 microh. North Hills 120C or Miller 20A826RBI (7200 kc).

Band 2—65-125 microh. North Hills 120G or Miller 20A104RBI (1500 kc).

Band 3—37-85 microh. North Hills 120F or Miller 20A685RBI (2500 kc).

Band 4—2.8-5.8 microh. North Hills 120B or Miller 20A476RBI (9500 kc).

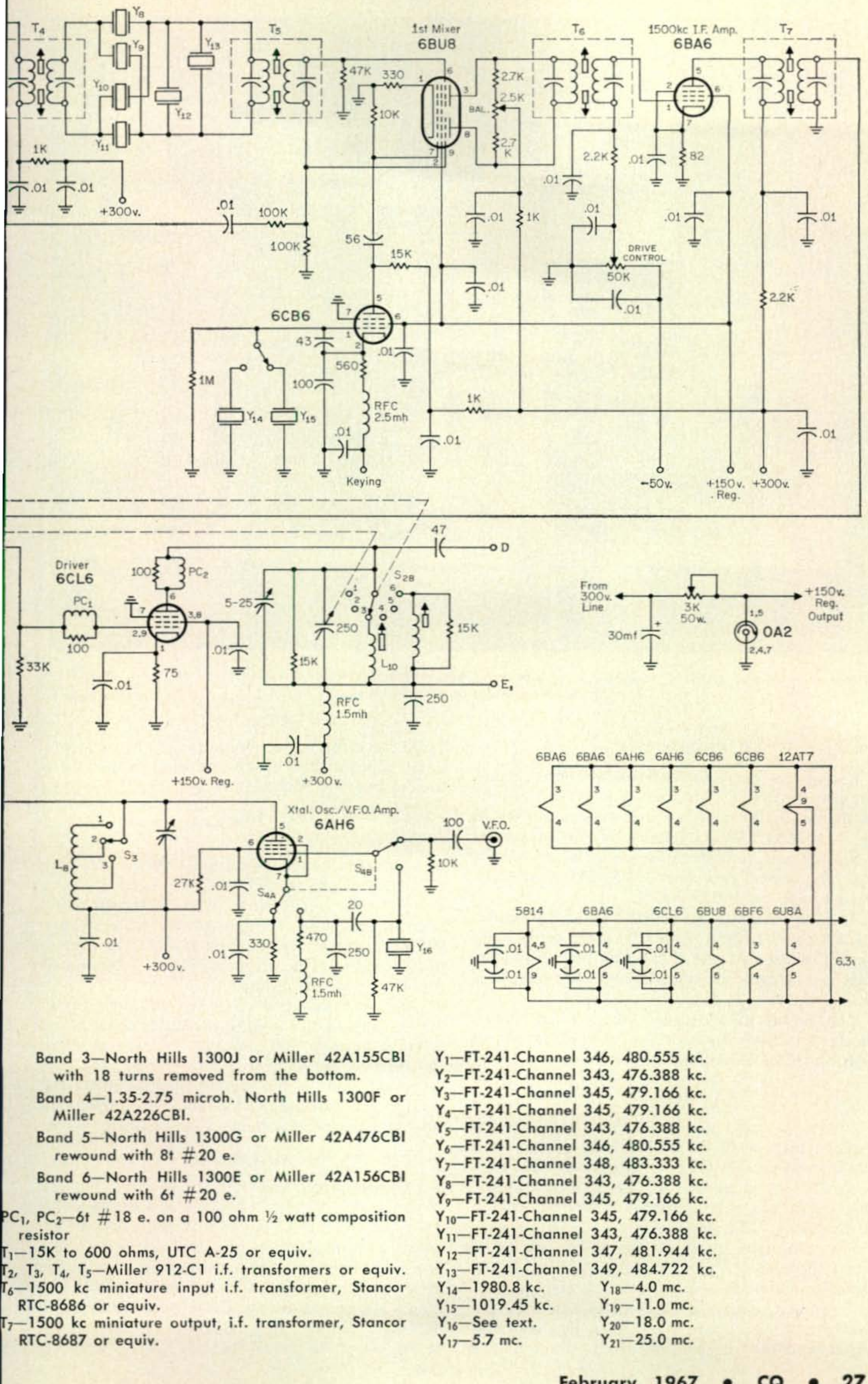
Band 5—North Hills 120A or Miller 20A336RBI rewound as L_5 (16500 kc).

Band 6—North Hills 120A or Miller 20A336RBI rewound as L_6 (23500 kc).

L_8—28t #20 e., 1" dia., tapped at 10 and 20 turns from cold end.

L_9, L_{10}—Band 1—North Hills 1300M or Miller 42A685 CBI with 5 turns removed from the bottom.

Band 2—North Hills 1300K or Miller 42A335CBI with 4 turns removed from the bottom.



Band 3—North Hills 1300J or Miller 42A155CBI with 18 turns removed from the bottom.

Band 4—1.35-2.75 microh. North Hills 1300F or Miller 42A226CBI.

Band 5—North Hills 1300G or Miller 42A476CBI rewound with 8t #20 e.

Band 6—North Hills 1300E or Miller 42A156CBI rewound with 6t #20 e.

PC_1, PC_2—6t #18 e. on a 100 ohm ½ watt composition resistor

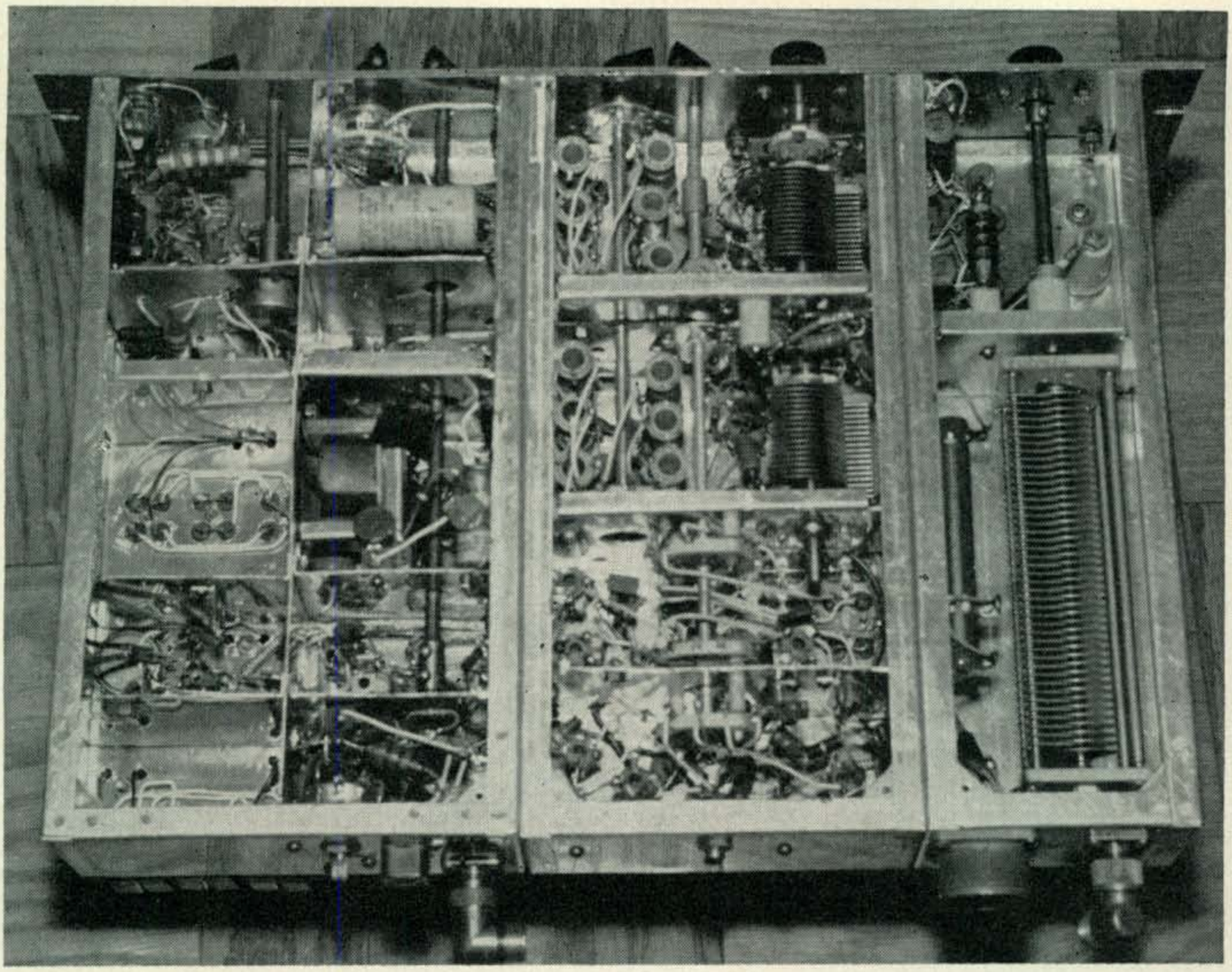
T_1—15K to 600 ohms, UTC A-25 or equiv.

T_2, T_3, T_4, T_5—Miller 912-C1 i.f. transformers or equiv.

T_6—1500 kc miniature input i.f. transformer, Stancor RTC-8686 or equiv.

T_7—1500 kc miniature output, i.f. transformer, Stancor RTC-8687 or equiv.

Y_1—FT-241-Channel 346, 480.555 kc.
Y_2—FT-241-Channel 343, 476.388 kc.
Y_3—FT-241-Channel 345, 479.166 kc.
Y_4—FT-241-Channel 345, 479.166 kc.
Y_5—FT-241-Channel 343, 476.388 kc.
Y_6—FT-241-Channel 346, 480.555 kc.
Y_7—FT-241-Channel 348, 483.333 kc.
Y_8—FT-241-Channel 343, 476.388 kc.
Y_9—FT-241-Channel 345, 479.166 kc.
Y_{10}—FT-241-Channel 345, 479.166 kc.
Y_{11}—FT-241-Channel 343, 476.388 kc.
Y_{12}—FT-241-Channel 347, 481.944 kc.
Y_{13}—FT-241-Channel 349, 484.722 kc.
Y_{14}—1980.8 kc.
Y_{15}—1019.45 kc.
Y_{16}—See text.
Y_{17}—5.7 mc.
Y_{18}—4.0 mc.
Y_{19}—11.0 mc.
Y_{20}—18.0 mc.
Y_{21}—25.0 mc.



Bottom view of the general coverage s.s.b. exciter. Observe the excellent compartmentation used to achieve maximum isolation and stability.

I.F. Chassis Circuits

Let us first turn our detailed attention to the circuitry on the i.f. chasssis. The crystal master oscillator, audio, and vox circuits are shown in fig. 3. A 12AU7 dual triode is used as the crystal oscillator and cathode follower isolation amplifier. The crystal is a surplus FT-241-A unit for channel 346 on 480.55 kc.

The very simple and stable balanced modulator is a pair of 1N34 diodes. Balance is obtained by adjustment of the 500 ohm potentiometer. This is a screwdriver adjustment, and once set it is left alone.

The audio unit consists of a 12AT7 dual triode. This provides plenty of gain for low level high impedance dynamic microphones.

VOX

In the vox unit a 6AH6 voltage amplifier is used to fully drive a 6BF6 which is used as a self-biasing rectifier. The vox relay (K_1) is normally pulled in, but releases during talking. One set of vox relay contacts opens the keying returns of several stages when not talking, providing complete cutoff of carrier or any small mixer products which might leak through to produce interference in the local receiver. A second set of contacts on this relay operates the coaxial antenna changeover relay in the transmitter and the receiver silencing relays in the 51J-2 receivers. The operating sensitivity and delay time of the vox are adjusted by means of the 0.5 and 1M potentiometers.

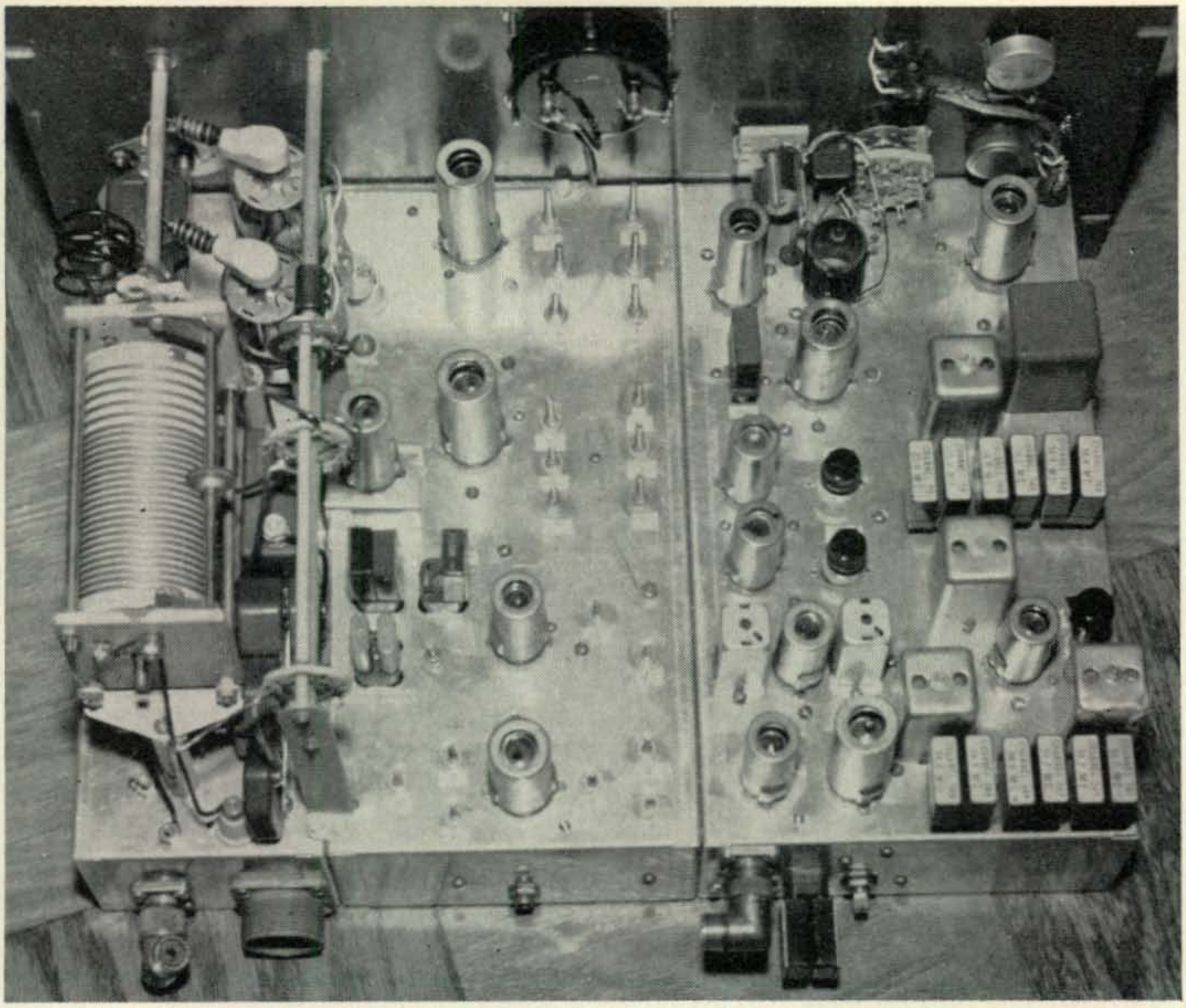
Filter

The 480 kc i.f. amplifier and filters are shown in fig. 3. This stage uses a single 6BA6. Its gain control is on the chassis, and once set for proper drive level it is left alone. The i.f. transformers used in this unit are high quality Millier Type 912-C1 iron core units. The primary of the input transformer is stripped off and rewound as a bifilar 25 turn winding.

Crystals for channels 343 and 345, with about 2.8 kc spacing, are used in the series arms of the filters. Channels 346 and 348 are used in shunt in the first filter, and channels 347 and 349 are used shunt in the second filter to reject the carrier and unwanted sideband. The unwanted sideband rejection is better than —40 db.

First Mixer

The first mixer and 1500 kc i.f. amplifier are shown in fig. 3. The 1st mixer is a 6BU8 color TV tube which has two control grids, two plates, and a common screen grid and common injection grid. This tube lends itself beautifully to use as a balanced modulator. Balance is easily obtained by means of the 2.5K potentiometer in the plate circuit. The injection oscillator is a 6CB6, which is driven by one of two crystals,



Top view of the W3JHR general coverage s.s.b. exciter. Note neutralizing tab near the 6146 output tubes.

either 1019.45 kc or 1980.55 kc, for sideband reversal. The 1500 kc output frequency is then amplified by a 6BA6 stage. The drive control for the exciter which is located on the front panel is the potentiometer which varies the bias on this stage. Standard miniature 1500 kc i.f. transformers are used in this stage.

V.F.O. Amplifier

The v.f.o. amplifier/crystal oscillator unit consists of a single 6AH6 tube which can be used to amplify the output of my transistor v.f.o.[3] which has been modified with a bandswitch to

[3]Lee, P. H., "A Stable Transistorized V.F.O.," *CQ*, Sept. 1963, p. 25.

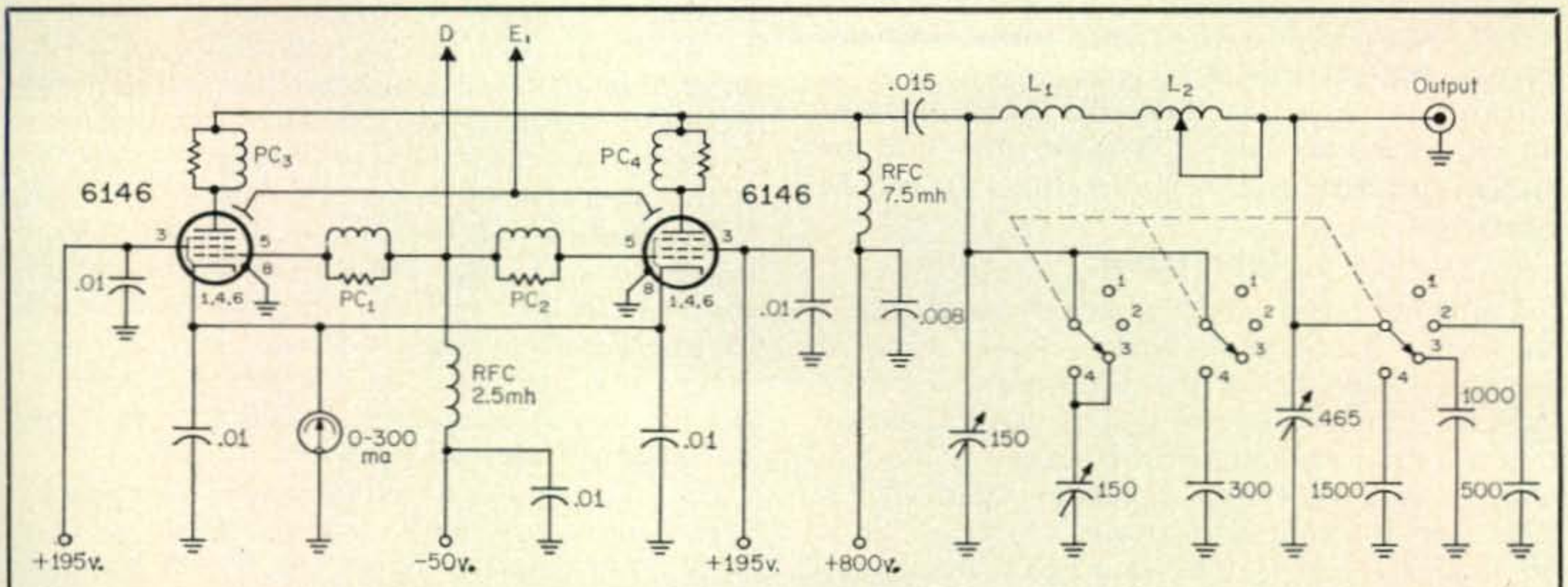


Fig. 4—Circuit of the power amplifier that is part of the general coverage s.s.b. transmitter/exciter unit. Capacitor values greater than one are in mmf; those less than one are in mf.

L_1—4t #12 e., 1" dia., 1" long.
L_2—18 microhenry variable inductor. Johnson 229-202 or equiv.
PC_1, PC_2—4t #22 e. on 150 ohm ½ watt composition resistors.
PC_3, PC_4—4t #18 e. on 100 ohm 2 watt comp. res.

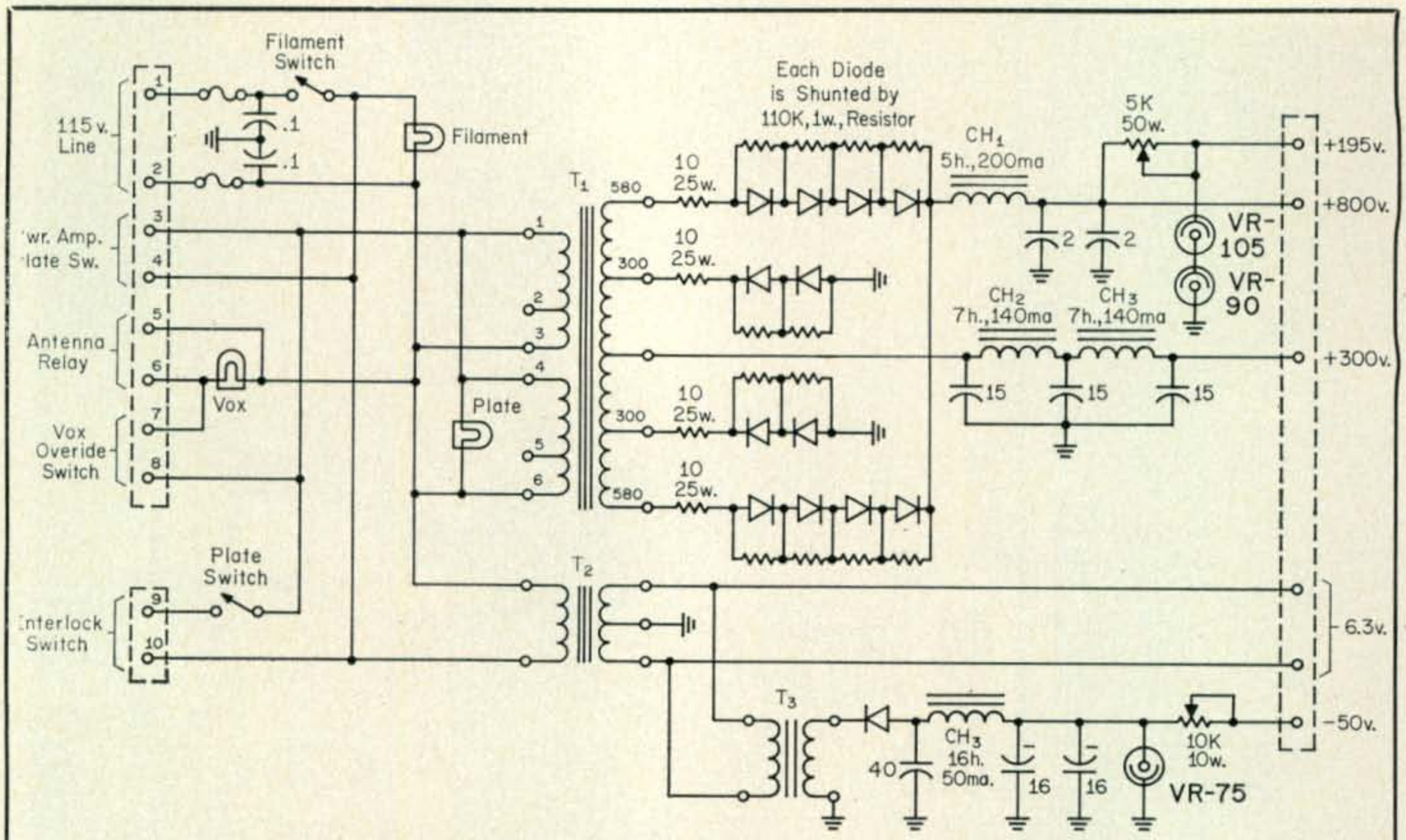


Fig. 5—Circuit of the exciter power supply.

CH_1—5 h, 200 ma. Stancor C-1646 or equiv.
CH_2, CH_3—7 h, 140 ma, Stancor C-1421 or equiv.
CH_4—16 h, 50 ma, Stancor C-1003 or equiv.
T_1—580-0-580 v.a.c. at 400 ma. UTC CG-301 or equiv.
T_2—117 v.a.c. to 6.3 v.a.c. at 10 amps. Stancor P-6308 or equiv.
T_3—117 v.a.c. to 6.3 v.a.c. at 3 amps. Stancor P-6466 or equiv.

cover the range 4.0 to 12.0 mc, or it can be used as a crystal oscillator in itself, for fixed-frequency crystal controlled operation. It can also be used as a frequency multiplier when a v.f.o. of limited frequency range such as an LM is used. The switch changes this unit from the amplifier to the crystal mode.

R.F. Chassis Circuits

The r.f. chassis is the next one to which we shall devote our attention. The second mixer is a 6U8A. It is fed by another 6CB6 as crystal oscillator. The three-section portion of the bandswitch associated with these tubes switches crystals and slug-tuned coils as shown. A 2.7K resistor is used to load down the 2nd mixer output on 1.5 mc on band 2, because otherwise the straight-through drive on that band would be excessive.

Third Mixer

The third mixer and r.f. driver stages use a two-section bandswitch with a larger type of slug-tuned coils. These two stages are gang-tuned by means of two 250 mmf midget variable capacitors. A small compression trimmer is used in parallel with the tuning capacitor of the 6CL6 stage, for tracking adjustment. Once set, it is left alone, and the 6BA7 and 6CL6 track very nicely.

Small parasitic suppressors were necessary in the 6CL6 grid and plate leads. They are made of 100 ohm ½ watt resistors wound with about 6 turns of number 18 enamelled copper wire. A film type non-inductive resistor of 15K value was used to load the 6CL6 stage on all bands, and a second one was used to additionally load it on band 6, to prevent self-oscillation and improve linearity. With these loading resistors and with the parasitic suppressors, the 6CL6 stage is quite tame. The 33K grid resistor is a film-type non-inductive one, also, as is the 10K unit in the plate circuit of the 6BA7. Linearity of these two stages is excellent with this type of loading.

Output Stage

The output stage uses one or two 6146's as desired. They operate in parallel as shown in fig. 4. If only one tube is required as a driver for a high powered amplifier, the second 6146 is pulled from its socket, and slight readjustment of the 6CL6 stage slugs is required. The 6146 stage output circuit is the familiar pi-network. A four-position r.f. switch is used to cut in various sections of input and output tuning capacitors in order to cover the entire range down to 1.8 mc. The fixed capacitors used here are Sangamo mica types of 2500 volt rating. The input variable capacitor is a dual section type. Only one section is used above 5 mc.

The rotary inductor is a type 229-202 made by E. F. Johnson. A small auxiliary fixed coil of 4 turns 1" in diameter is also used. The variable output capacitor is located under the chassis, and is a surplus 465 mmf unit made by Hammarlund. Its size and shape are ideal for its position under the chassis. It shares its compartment with the 3000 ohm 50 watt dropping resistor for the 150 volt circuits, for which a single 0A2 regu-

lator tube is located above the chassis next to the 6146 stage.

Parasitic suppressors are required in the grid and plate circuits of the 6146's. The stage is neutralized by means of an aluminum plate which is mounted on a feedthrough insulator (point E_1 in fig. 4), and whose position with respect to the tube anodes is varied by bending the plate. Once set, it is left alone. An SO-239 coaxial fitting passes the r.f. output out of the rear of the chassis. The 6146's are metered in the cathode lead by means of one of the very nice 1 ma square Japanese meters sold by Lafayette Radio. It is shunted by a short piece of resistance wire, to give a full scale reading of 300 ma.

Power Supply

The exciter is powered from the same supply which was used for the previous exciter and is shown in fig. 5. This supply gives 750 volts plate voltage and 195 volts regulated screen voltage for the 6146's, 300 volts for the low-powered stages, a fixed negative bias of minus 50 volts (regulated by a VR-75) for the 6146's and 6.3 volts for the filaments. Some of the bias is also bled off and fed to the drive control for the 6BA6 i.f. stages. The pair of 6146's can be driven up to 300 ma plate current with maximum carrier insertion. Resting current is about 30 ma. A single 6146 will show one half of these readings.

Alignment

The i.f. strip should be aligned to obtain the curve shown in fig. 6. Since the crystal frequency is at the edge of the curve, care must be taken to get the proper curve. A sweep alignment using a sweep generator and oscilloscope would be ideal but it can be accomplished with an LM or BC-221 frequency meter also.

The LM or BC-221, set up as a low frequency signal generator, may be fed into the i.f. strip and output measurements can be made with a v.t.v.m. and a diode probe at the required points. The generator frequency can be shifted across the i.f. bandpass and the output plotted.

The slug-tuned coils in the r.f. stages can be set roughly with a grid dip meter, and then peaked to full output with the v.f.o. driving the exciter.

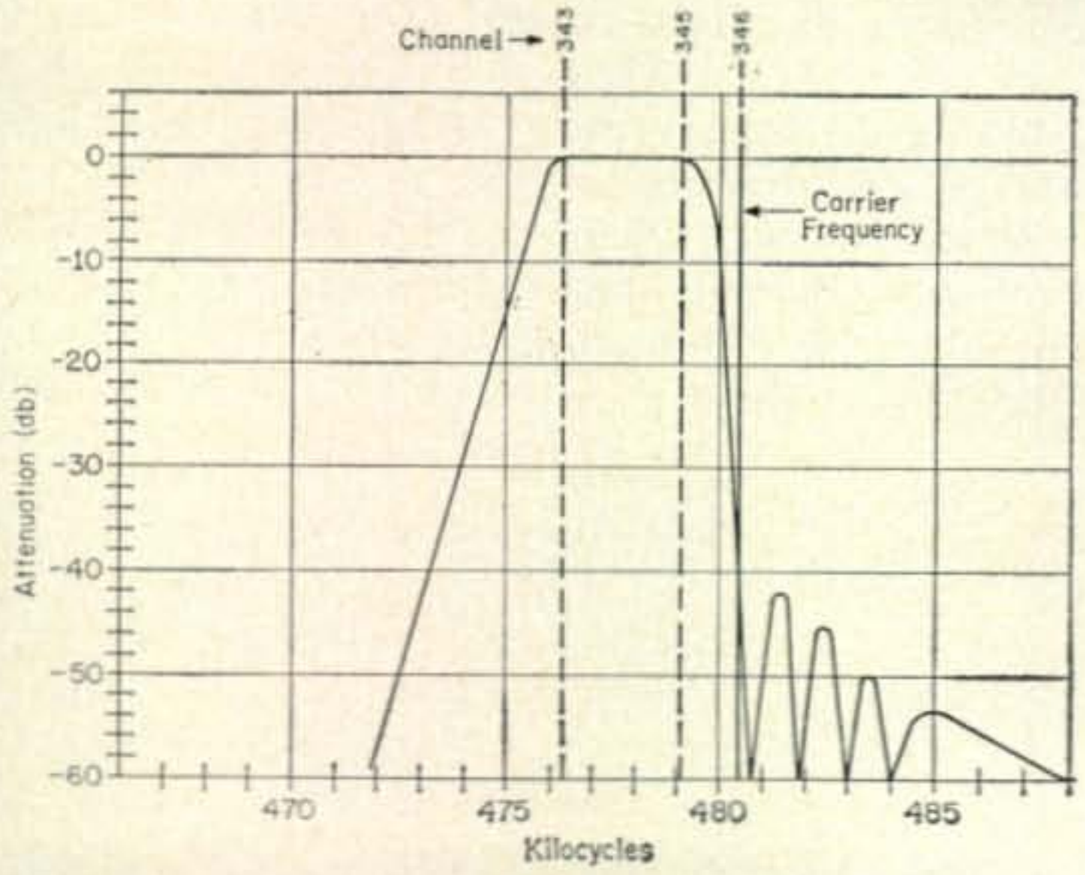


Fig. 6—Response characteristics of the crystal filter.

Operation

The controls on the front panel of the exciter are: CARRIER LEVEL, VOX-MANUAL switch, DRIVE, VFO AMP BAND SWITCH, VFO AMP TUNING, AUDIO GAIN, VFO-CRYSTAL switch, SIDEBAND SELECTOR, BANDSWITCH 1, BANDSWITCH 2, DRIVER TUNING, OUTPUT LOADING, OUTPUT COIL, OUTPUT TUNING and OUTPUT LOADING.

A microphone jack and key jack are provided, and there is a push-to-test switch in parallel with the key jack. A crystal socket is provided on the front panel for an external crystal for crystal controlled spot-frequency operation when the v.f.o. is not used.

In spite of the number of controls, operation is quite simple. A calibration chart has been mounted on the transmitter, on which all settings are recorded for both amateur band limits and for 29 Navy frequencies. Retuning is but a matter of about 30 seconds. The exciter operates so smoothly that it is a real pleasure to set the dials and switches to the desired frequency, and then apply power and operate.

Conclusion

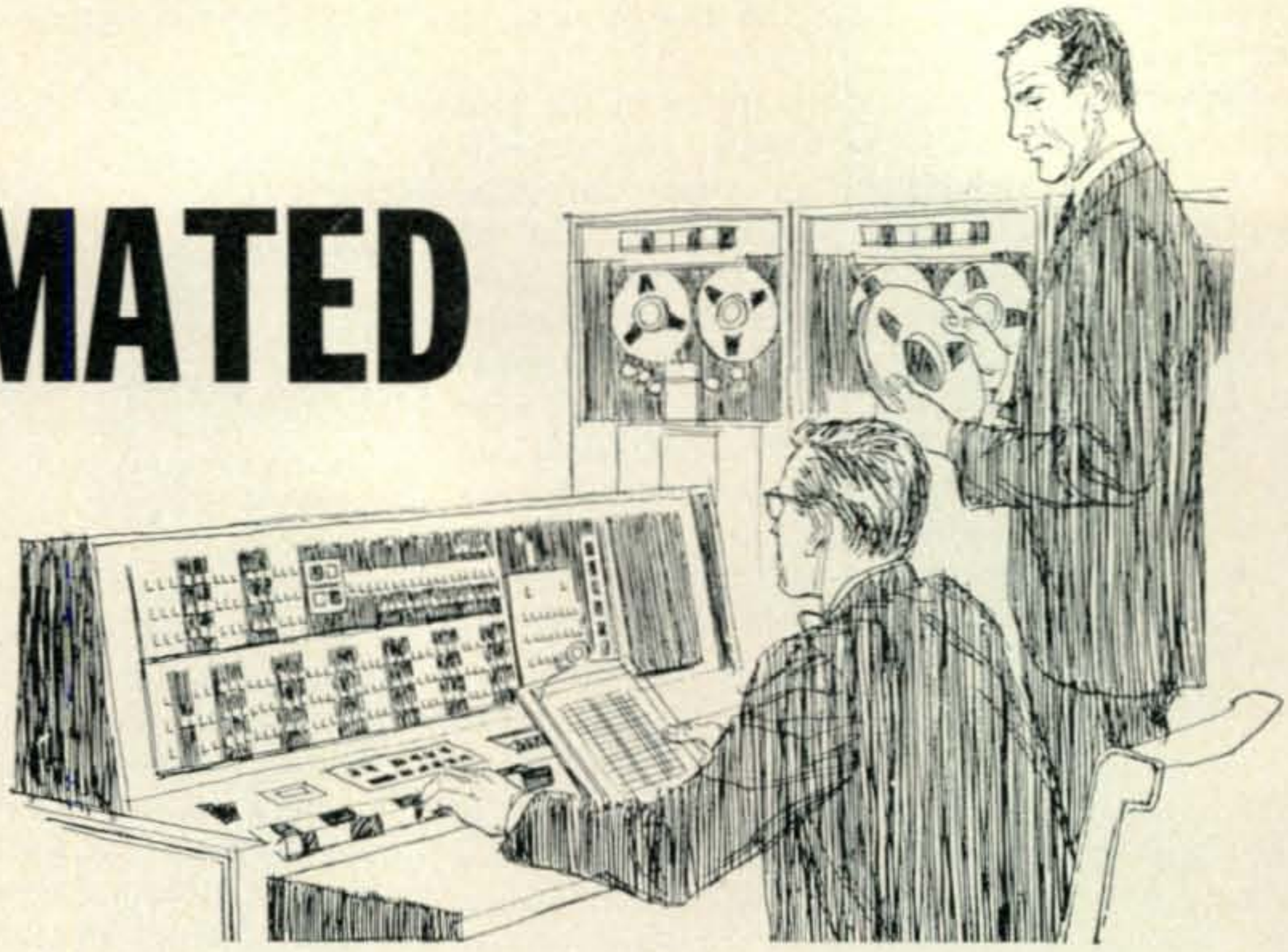
This exciter, like its amateur band predecessor, gives excellent service, and puts out a beautiful signal. During initial adjustment it was surprisingly clean of distortion, which certainly spoke well for the design effort. The little bit of distortion that remained was removed by listening to it on a dummy load while playing hi-fi music through it, making adjustments in bias resistors, and grid and plate loading resistors. If there is anything that will show up distortion it is listening to good music through the unit. Some have written to ridicule this method of testing which I mentioned in the earlier article, but not everyone can afford an expensive spectrum analyzer!

The unit has plenty of reserve power for driving my 4-1000A power amplifier. The 6146 plate meter barely kicks up to 100 ma when the 4-1000A is driven to an average one kilowatt on voice.

I find much pleasure in building a fine piece of equipment in preference to buying a commercial unit off the dealer's shelf. Design and construction is a challenge which is well worth undertaking. This exciter has provided me with a means of getting on 160 meters, which unfortunately has been neglected by most commercial manufacturers in their transceivers and kit packages. This neglect is a shame, and I hope that some enterprising manufacturer will provide the amateurs with a means of using this band for s.s.b. Meanwhile, why not try building this unit?

I shall be happy to answer those inquiries about this unit which are accompanied by a stamped envelope, as my time from Navy duty and consulting engineering work permits. However, I cannot undertake to conduct a "Ham Clinic" nor do design work for others. ■

AUTOMATED C. W.



BY DOUGLAS L. JONES,* K3AAY

RECENT articles in ham magazines have described automatic CQ callers utilizing mechanical means. The unit described here is, perhaps, a bit easier to use as there is no necessity for punched-paper tapes or metal phonograph discs. It is designed to work from a home entertainment tape recorder.

Circuit

The output of the tape recorder is fed to the input of the automatic keyer, J_1. Resistor R_1 acts as a load to prevent any possible damage to the tape recorder output circuit. The a.c. signal voltage developed across R_1 is fed to the voltage doubler formed by the two 1N91 diodes. The pulsating d.c. output is filtered by C_2 and trips the relay, K_1. The relay contacts connect to the transmitter keying circuit through J_2 or J_3.

A mercury wetted relay was used in the unit constructed and so polarity was observed and the relay mounted vertically. If another type of relay is used be sure it can follow your keying speed.

Resistor R_3 in conjunction with C_2, provides the proper RC time constant. The value was chosen for keying speeds in the range of 10 to 25 w.p.m.

*1121 Walnut Street, Allentown, Pa., 18100.

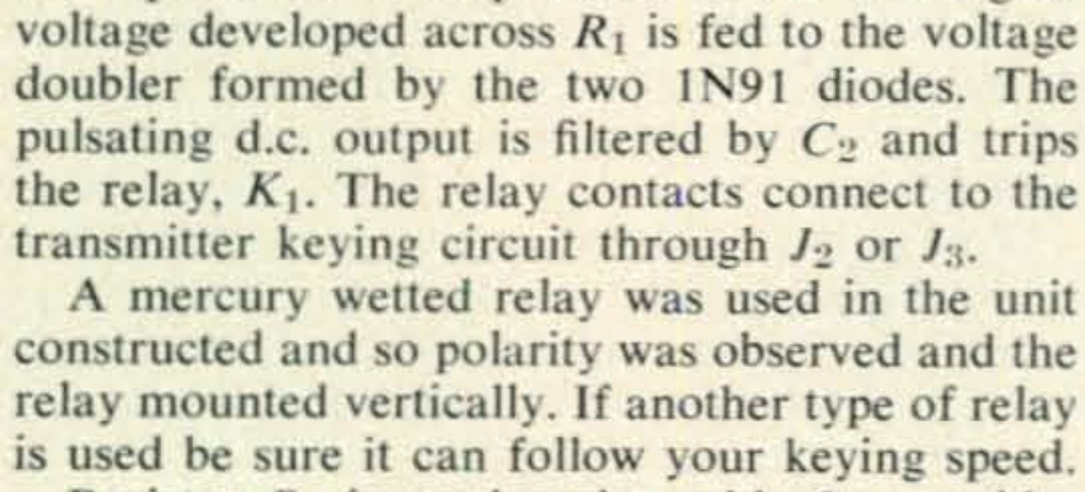


Fig. 1—Circuit of an automatic keyer driven from a tape recorder. All resistors are ½ watt unless otherwise noted and all capacitors are in mf. The relay coil is 4000 ohms at 1.25 ma, mercury wetted type.

A bug or hand key can be placed in parallel with the relay contacts through J_3 for quick manual operation.

Tape Strip

The tape is formed in the shape of a Moebius strip as shown in fig. 2 and strung between the two tape reels. The message "CQ SS" or "CQ CQ de . . ." is then recorded on the tape.

Operation

The keyer, when used with a conventional transceiver such as the NCX-3 provides the utmost ease of operation. With each alternate pass of the loop the transceiver will jump into the transmit mode with an enticing CQ.

At the end of the message, the start of the second pass of the loop, the transceiver falls back to the receive mode allowing monitoring of the frequency until the loop starts another pass.

When a station is heard answering your call, it is a simple matter to stop the Moebius loop and load the tape recorder with a reel of tape containing the classic QSO: "FB OM. . . . UR RST is. . . . MY QTH is. . . ."

While the author does not condone "hit and run" QSOs, this system does automate the formalities of c.w. Time permits a neat log to be made out, and the operator can make himself a bit more comfortable in preparation for a brass-pounding ragchew. ■

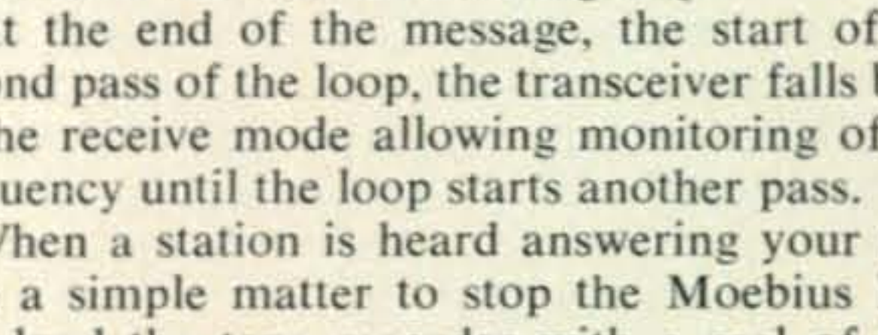


Fig. 2—Moebius strip tape loop used for the recorded message.

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C. W. CONVERSION FOR THE HEATHKIT HW-TRANSCEIVERS

BY JOHN J. SCHULTZ, *W2EEY/1

This article describes, in detail, a simple conversion for c.w. operation of the HW-12, HW-22 and HW-32 transceivers. The author explains why each step of the conversion was done so that much of the information can also be of value to anyone with another make of phone-band only transceiver to be converted.

THE Heathkit HW series of one-band SSB transceivers lend themselves to a variety of modifications to the extent of making tri-band units of them. One of the simplest modifications which can be made is to convert them for c.w. use. The modfication requires no mechanical alteration and does not affect original operation or appearance. The modification is well worth while especially if no linear amplifier is used. Many times the "barefoot" HW unit will not cut through the kw QRM on s.s.b. but will provide fine contacts on c.w.

Frequency Shift

The two main features of the conversion of any transceiver for c.w. coverage are extending the frequency range and providing a keying system. The frequency range can be extended to include the c.w. portion of a band either by changing the v.f.o. coverage (switching in another v.f.o. coil or extra padding capacitor) or by changing crystals in the transmitter crystal-controlled mixer stage. Working on the v.f.o. is generally to be avoided because of the danger of compromising the v.f.o. stability and because of mechanical difficulties. In the HW conversion, the v.f.o. coil in the HW-12 is switched but only because the HW-12 has no crystal-controlled mixer. Switching mixer crystals is usually simpler and does not affect stability. It may affect dial calibration slightly, if the v.f.o. dial is linearly calibrated, because of crystal tolerance. The error may be 1 or 2 kc but since the frequency readout on most transceivers is not better than 2 kc without a calibrator, it is not significant.

Keying

Modifying a transceiver for keying is not difficult but one should be aware of several factors. Obtaining enough carrier for c.w. operation is usually no problem since most transceivers have some provision for carrier insertion to allow tune-up on s.s.b. It is possible if more carrier is inserted than the manufacturer recommends for s.s.b. tune-up to overdrive the p.a. stages so they are no longer operating Class AB or possibly B. The result is higher power output on c.w. but also possibly aggravated TVI and BCI problems.

Another possible problem arises from the a.l.c. circuits used on most transceivers. The time constants used in these circuits usually tend to distort the keyed waveform. The simplest solution is to disable the a.l.c. function on c.w. by grounding the a.l.c. feedback voltage. Actual circuit keying can be done by any conventional method, usually cathode or grid-block keying. Since most transceivers cutoff the transmitter section in the receive mode by means of a high

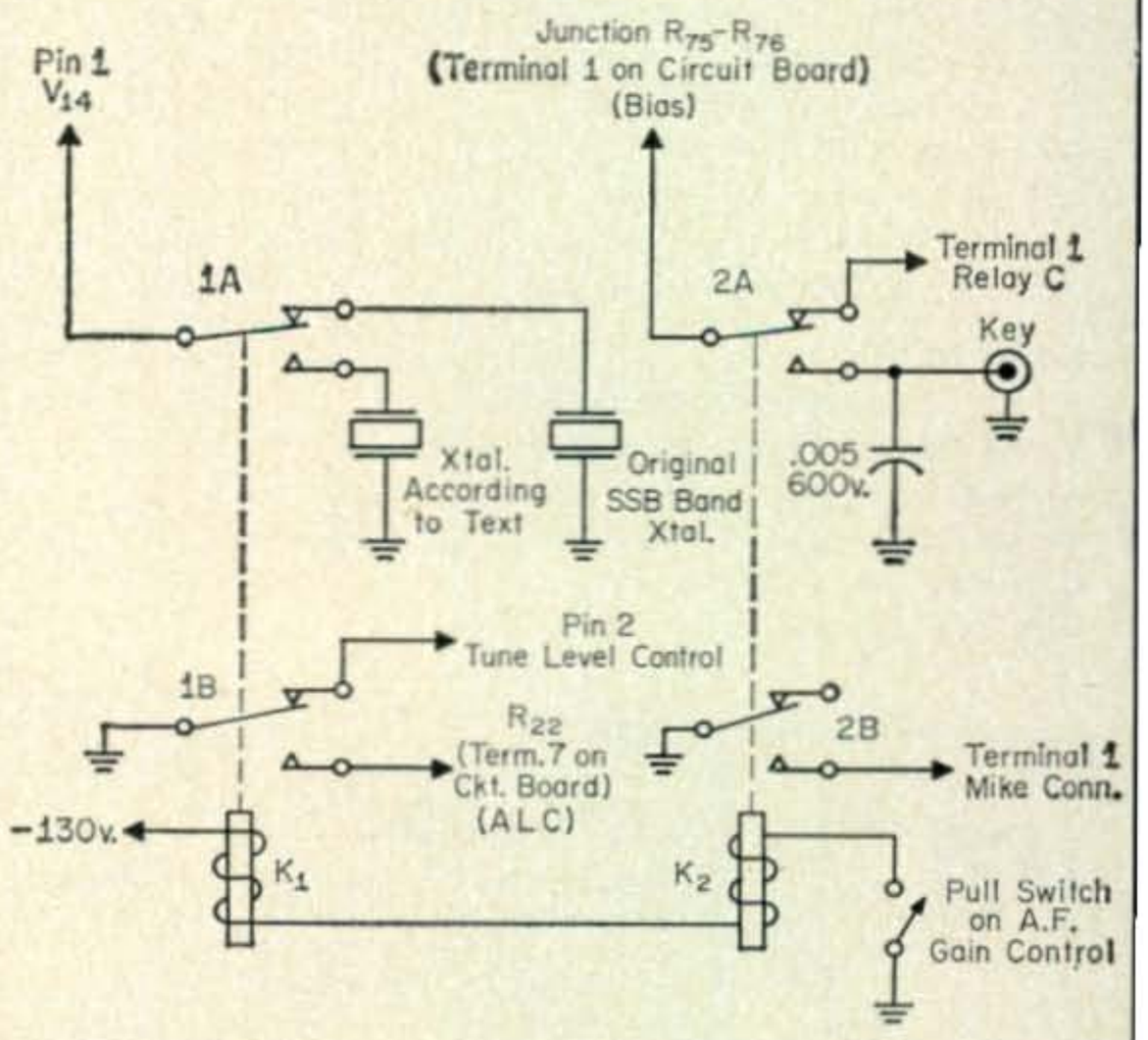

Fig. 1—Conversion circuit data for the HW-22 and HW-32. The relays are Phillips type MK2C but any small plate type d.p.d.t. relays may be used.

*40 Rossie Street, Mystic, Conn. 06355.

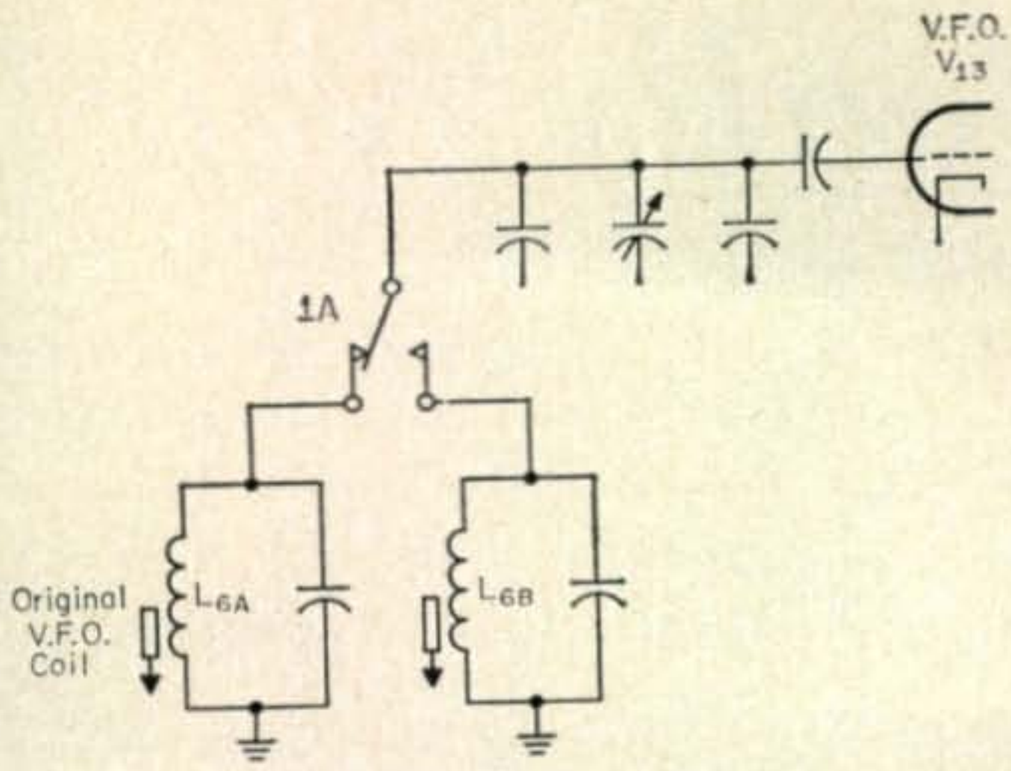

Fig. 2—Conversion of the HW-12 requires switching v.f.o. coils instead of mixer crystals. The relay must be mounted as close as possible to the v.f.o. circuit. Inductor L_{6B} is a Heath coil #52-25 tuned for the c.w. portion of the band.

negative bias applied to the transmitter driver and p.a. stages, it is usually possible to use grid-block keying by keying the cutoff voltage either directly or through a relay.

Since the carrier oscillator is normally used as the receiver b.f.o. no beat note will result on c.w. when someone replies exactly on your frequency. One solution for transceivers that do not have incremental tuning on receive is to switch in a different b.f.o. crystal on receive differing about one kc from the carrier oscillator frequency. I didn't get involved in this refinement for the HW series modification because in practice, few stations zero-beat each other exactly. Even if they do, moving the transceiver frequency a half kc or so will usually not result in a station being lost.

HW Series Modification

All the functional switching necessary to convert the HW units for c.w. is accomplished by means of two miniature d.p.d.t. relays. The relays are energized by the pull-out switch on the A.F. GAIN control. This switch was meant to control an optional 100 kc calibrator. Those who have a calibrator and want to retain its use can install a potentiometer with a pull-out switch in place of the simple potentiometer for the R.F. GAIN control. The relays shown in fig. 1 are high resistance plate relays which conveniently work directly from the bias voltage supply. Less expensive relays, operating from the 12 volt filament supply can be used. The only criteria is that they be small enough to fit underneath the chassis. In the HW-22 and HW-32 both relays are mounted on the underside chassis wall forward of V_2. This allows the shortest possible leads for crystal switching. In the HW-12, one relay must be mounted next to the original v.f.o. coil, L_6. The added v.f.o. coil is then mounted next to the relay.

The relay contacts do the following:

1. Switches crystal in the mixer stage, V_{14}, to provide c.w. band frequency coverage. In the HW-12, the v.f.o. coil, L_6, is switched.
2. Inserts keying connection in transmitter cut-off bias line to effect grid block keying.
3. Grounds mike input to prevent accidental modulation since B plus remains on the audio stages.
4. Grounds a.l.c. line to prevent keying distortion.
5. Removes ground from CARRIER LEVEL potentiometer to allow full carrier insertion. (This change is optional as explained later.)

Mixer Crystal

The new mixer crystal should be chosen as many kc below the original mixer crystal as the starting frequency of the c.w. band desired. For example, in the HW-32 the original crystal is 18,275 kc. To start frequency coverage 200 kc lower (from 14.2 to 14.0 mc), a new crystal of 18,075 kc is required. The connection for the key can be made to any of the unused phono plugs on the rear chassis apron, usually the "external relay" or "receiver antenna" plugs.

In the HW-12 conversion, the new v.f.o. coil must be aligned to cover the desired portion of the c.w. band. The surest way to do this is in conjunction with an accurately calibrated receiver with the transmitter energized and working into a dummy load or with the p.a. tubes removed. The HW-22 and HW-32 require no alignment. The c.w. band coverage for any unit remains the same as the original v.f.o. range (200 kc for the HW-12, 100 kc for the HW-22 and 150 kc for the HW-32). Therefore, the original 2 kc dial markings will still be valid.

In fig. 1, maximum carrier insertion is accomplished on C.W. by removing the ground from the TUNE LEVEL control. If one wants to accept lowered output (about 15 watts instead of 70) but be assured that the p.a. stages are linear, the ground connection should not be removed on C.W. However, in the SSB TUNE position, the TUNE LEVEL control should be set as high as possible as long as the "bias set" level does not exceed S3.

C.W. operation is simple. Activate the c.w. changeover relays and set the FUNCTION switch to TUNE and the METER switch in the BIAS-SET position. Close the key and set the final TUNE for minimum plate current dip (about S7 to S9 with full carrier insertion). The function switch is turned from TUNE to VOX to act as a send-receive switch. ■

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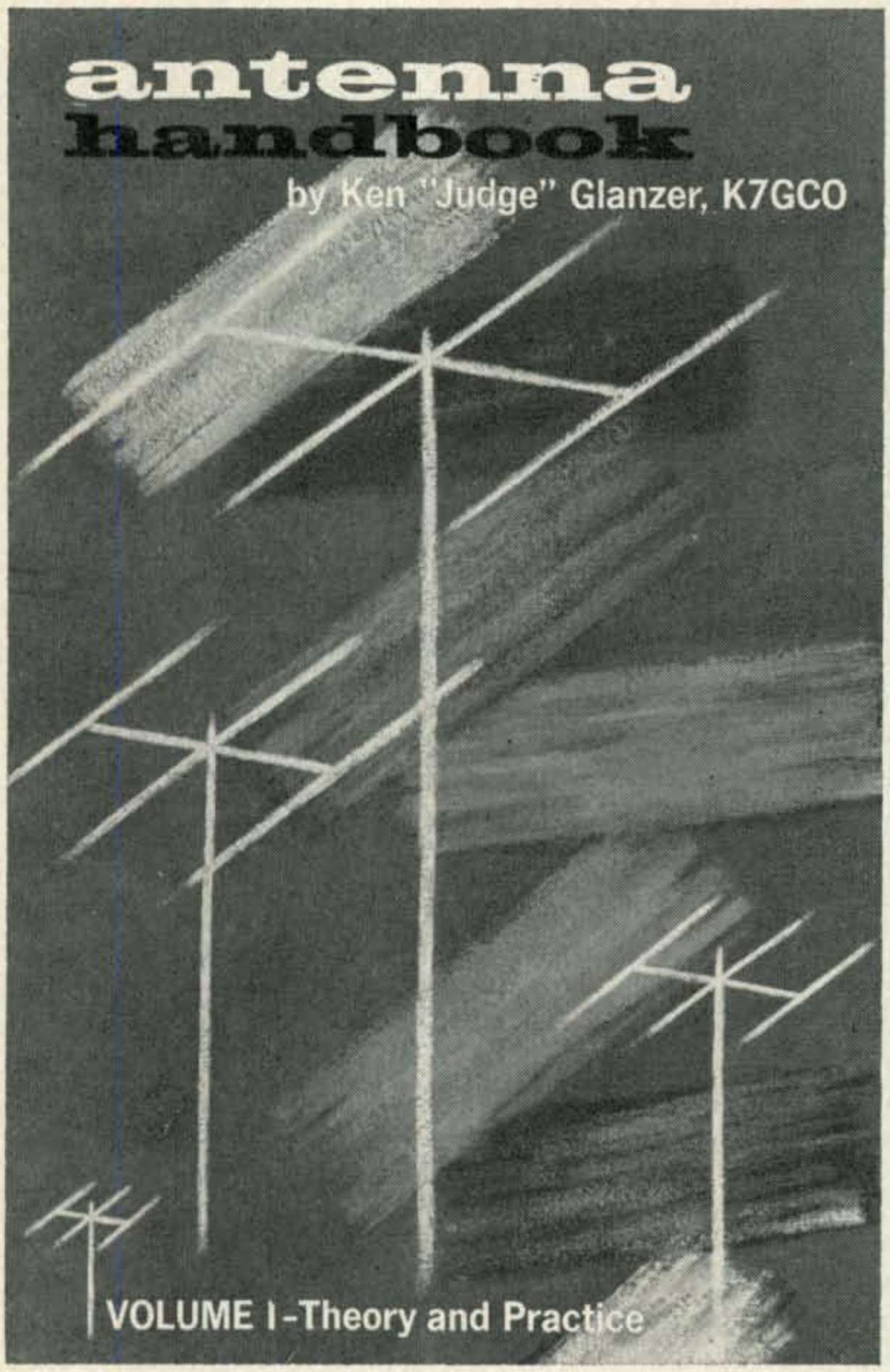

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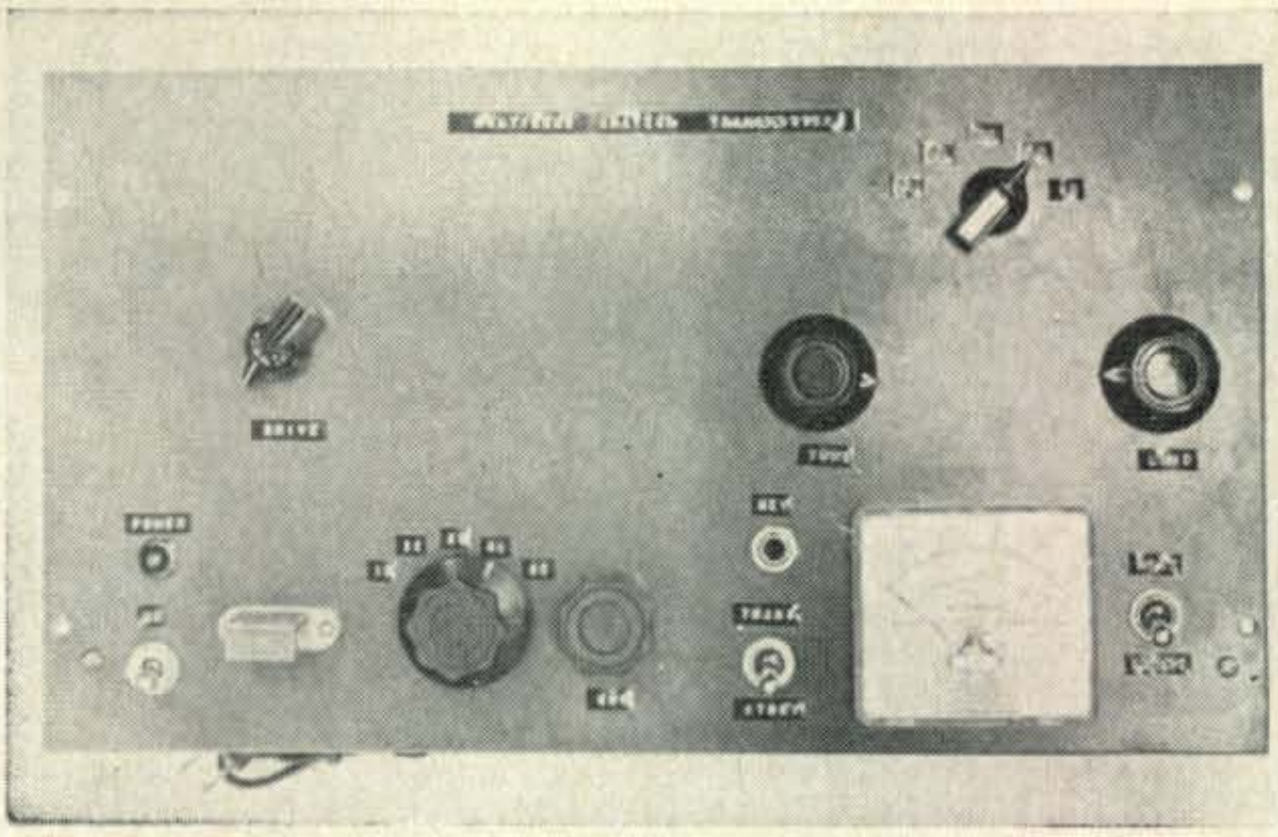


Front view of the blocked-grid transmitter. Along the bottom of panel, from left to right, are the POWER switch, S_1 and the power indicating pilot light, crystal socket, oscillator BANDSWITCH S_3, OSCILLATOR TUNE, C_1, KEY JACK and TRANSMIT-STANDBY switch. At extreme right is the METER switch. Controls along the upper part of the panel are the DRIVE potentiometer, R_1, PLATE TUNING capacitor, C_3, final amplifier BANDSWITCH, S_4, and the OUTPUT LOADING capacitor, C_4.

AN ALL BAND C.W. TRANSMITTER WITH GRID BLOCK KEYING

BY STEPHEN G. RUDIN,* W9IZF/W1WSN

An all-band low powered transmitter for the Novice or General, featuring grid block keying for a clean, click free signal.

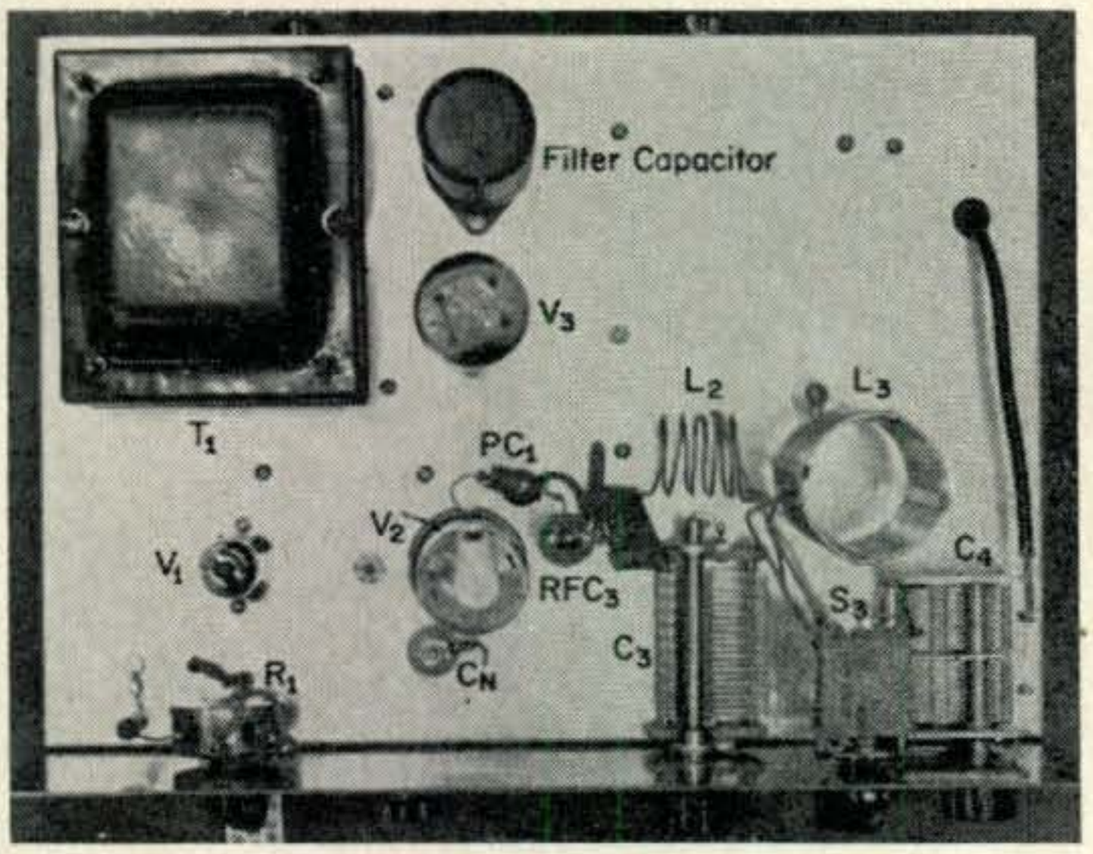
To anyone who has spent at least the last five or ten years on the bands as an active ham, particularly on c.w., it becomes quite apparent that both homebrew and commercial transmitters are, for the most part better designed from the standpoint of keying.

Commercially available equipment designed for the General class boys has swung to differential or blocked grid keying, improved regulation, and in general, has done a considerable amount to make the c.w. portions of the bands more comfortable for all.

The Novice or General who is in the market for either purchasing or building a good low powered transmitter, though, is, for the most part, left out in the cold; the majority of novice-tailored schematics in the books nowadays are cathode keyed in both oscillator and amplifier stages. This makes for simplicity, but also makes for some pretty horrendous signals, complete with broad key clicks, chirps, and also very unhappy local hams, trying to work some weak signals about ten kc away!

Out of these observations came the little rig described in this article. Much of the circuitry is classical and borrowed from various articles in the magazines and the handbooks.

*c/o University of Illinois, 376 Education Building, Urbana, Illinois 61801.



Above-chassis view of Novice or General low powered transmitter. Note the mechanical arrangement of components in the final tank circuit. The tube shield for the 5763, removed for photograph, should be in place for stable operation.

Circuit Description

Power Supply—The power supply was constructed mainly of parts salvaged from a dis-

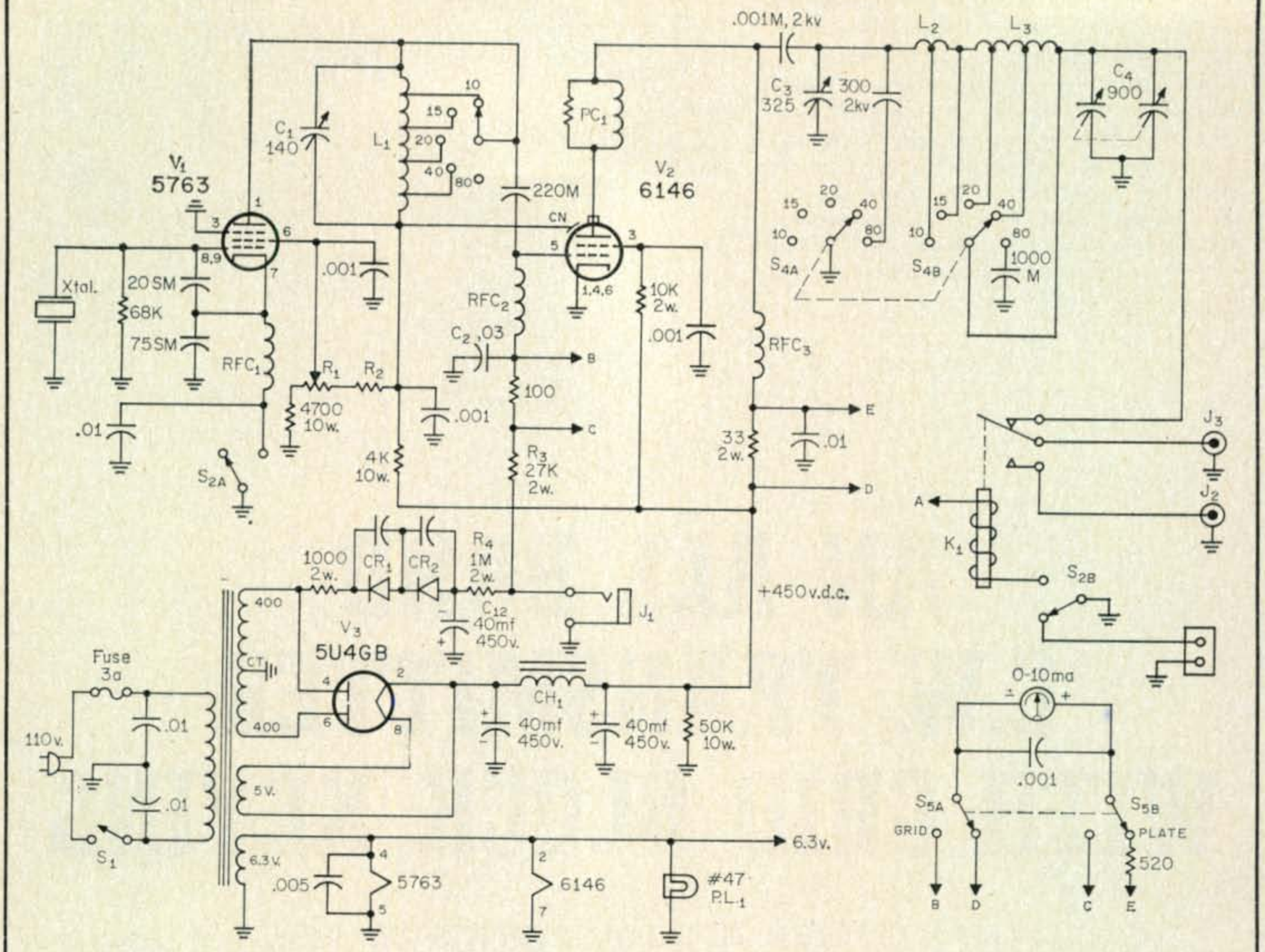


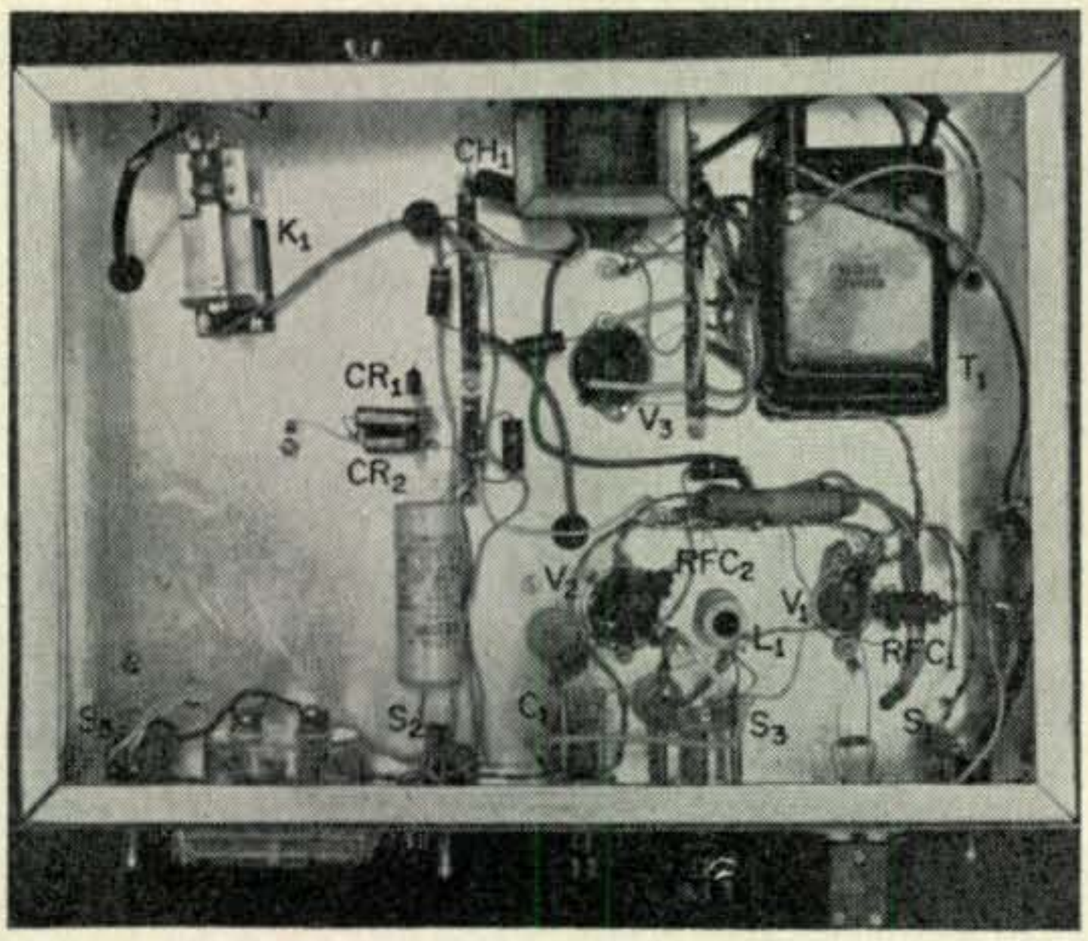
Fig. 1—Circuit of a five band grid blocked c.w. transmitter suitable for use on the Novice bands or as a driver for General use. Unless otherwise noted resistors are half watt and capacitors less than one are in mf, greater than one in mmf. Capacitors marked SM are silver micas, those marked M are micas and all others except the electrolytics are disc ceramics. The switch that is switching L_1 is S_3. The 6.3v line also goes to point *A* on K_1. C_2 should be .03.

C_1—140 mmf variable. Hammarlund HFA 140 or equiv.
C_3—325 mmf variable. Hammarlund MC325M or equiv.
C_4—900 mmf variable, broadcast type; both sections in parallel. Allied Radio 61H059 or equiv.
CH_1—10 henry, 200 ma filter choked salvaged from TV receiver or a Triad C16A or equiv.
CR_1, CR_2—500 ma 600 p.i.v. silicon diodes. May be GE-504 or equiv.
J_1—Open circuit key jack.
J_2, J_3—Coaxial chassis connector, Amphenol SO-239 or equiv.
K_1—S.p.d.t. relay, 6.3 v.a.c. coil. Potter Brumfield KT11A or equiv.
L_1—50t #24 e., 1¾" long, ¾" dia. on poly or ceramic rod, tapped at 5, 8, 13 and 25 turns from plate end.
L_2—5½ #14 bare wire spaced 4 t.p.i., 1" dia., tapped 3¼ t from the plate end.
L_3—15t #14 bare wire spaced 4 t.p.i., 1¾" dia., tapped 6½ and 10¼ t. from the output end. (B&W #3021.)
PC_1—3t #20 bare wire space wound on a 100 ohm 2 watt carbon resistor.
R_1—25K 4 watt w.w. pot. Mallory M25MPK or equiv.
R_2—23.5K 4 watts made up of two 47K 2 watt resistors in parallel.
S_1—S.p.s.t. toggle switch.
S_2, S_5—D.p.d.t. toggle switches.
S_3—1 pole 5 position non-shorting rotary switch, Centralab 2501 or equiv.
S_4—2 pole 5 position non-shorting ceramic rotary switch, Mallory 151L or equiv.
RFC_1, RFC_2—2.5 mh r.f. choke, National R50 or equiv.
RFC_3—2.5 mh r.f. choke, National R100 U or equiv.
T_1—800 volts at 200 ma salvaged from a TV set or a Triad R121A or equiv.

carded television receiver. It uses a 5U4GB full-wave rectifier tube in the interest of economy, but a few inexpensive silicon diodes could be substituted. A power transformer with higher voltage ratings could also be substituted in the interests of higher power input, with suitable changes in dropping resistors made for oscillator and final screen voltages. Bias for the final keying circuit is derived from the secondary of the transformer and rectified by CR_1 and CR_2.

Oscillator—The reliable 5763 is employed as an oscillator multiplier, and provides adequate grid drive when used with appropriate crystals. The oscillator cathode is controlled by the TRANSMIT switch, permitting this stage to run continuously, during transmissions, for improved stability of the signal. Drive to the final grid is controlled by a pot, R_1, in the screen of the 5763.

Amplifier—The 6146 was chosen for duty here simply because it was handy. A 6DQ5, 807, or similar tube would also serve the purpose. Some slight tendencies towards instability were noted on the higher bands, and these were eliminated by the insertion of a neutralizing stub between



Bottom view of the all-band low powered transmitter suitable for Novice or General applications. Choke CH_1 is mounted on the rear wall of the chassis to conserve space and multiple tie points are used to eliminate mid-air splices and prevent clutter. The neutralizing feedthrough insulator can be seen just below switch S_3, near C_1.

the cold (B+)end of L_1 and the glass envelope of the 6146.

Keying—In the key up condition, the 6146 is driven beyond cutoff by the application of a high bias voltage. When the key is closed, the bias voltage is shorted to ground through R_4, allowing the tube to draw plate current. The keying waveform is shaped by means of R_3, R_4 and C_2. The values specified in the schematic are starting points and may have to be shifted slightly to suit the needs of any one particular case. The theory behind value assignment of these components is discussed quite thoroughly in the handbooks.

Switching—The TRANSMIT switch, S_2, energizes the internal antenna relay as well as shorting the oscillator cathode to ground. A 0-10 milliameter, appropriately shunted to read 0-300 ma in the PLATE position, is switched to read final grid or plate current. The main power switch, S_1, applies all operating voltages to the transmitter simultaneously. A terminal strip can be wired to S_{2B} for receiver muting as shown in fig. 1.

Construction

The transmitter is built on a 10 × 14 × 3 inch aluminum chassis. An aluminum plate (8 × 14 × ⅛) is used as the front panel, and fastened to the chassis by four screws at the corners, with extra strength provided by the lower chassis-mounted components. As can be seen from the photographs, construction is relatively straightforward, with the liberal use of tie-point terminal strips recommended to make wiring simpler and neater.

The oscillator tuning capacitor, C_1, must be insulated from the chassis. This was accomplished by the use of fiber washers.

The oscillator coil, L_1, as originally used (as seen in the photographs) was a specially wound ⅝" slug-tuned tapped coil, but in the interest of economy and ease of duplication, the coil described in the parts list was later used, and held to the underside of the chassis with a short 6-32 screw threaded into a tapped hole in the coil form.

The final tank circuit inductors, L_2 and L_3, may best be mounted as shown in the photographs. Inductor L_2 is supported by C_3 and L_3, while L_3 itself is mounted vertically, supported by its tap leads and a ½ inch ceramic stand-off bearing a solder lug which is crimped around the bottom turn of L_3 and soldered.

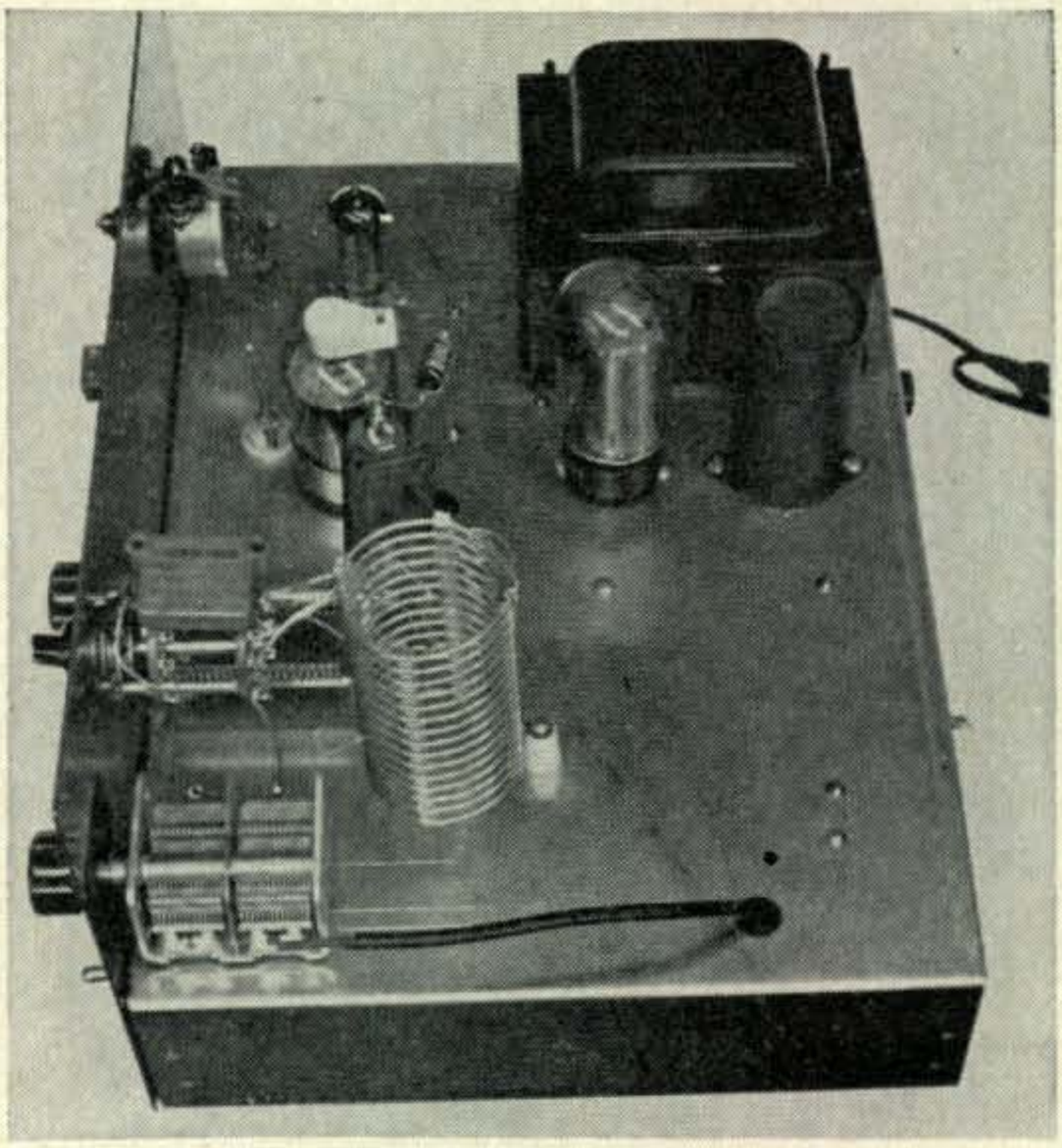
To aid in neutralizing the final (something which may or may not be required), a small feedthrough insulator was installed between S_3 and C_1. A short length of wire connects the feedthrough to the bottom end of L_1, and a 3 inch piece of heavy wire runs from the insulator parallel to the glass envelope of the 6146. It can be positioned for best stability.

Parts layout, while not exceedingly critical, should be similar to that seen in the photographs. A fair amount of manipulation of some of the r.f. circuitry was required to obtain good performance, and so any great departures from the suggested placement may involve some "debugging." Assuming that care is exercised in construction, however, the transmitter should perform well with little or no difficulties encountered.

Tuning and Operation

For operation on 80 meters, crystals for that band are employed, with 7 mc crystals being used for 40, 20 and 15 meters. Either 7 or 14 mc crystals can be used on 10 meters, with the latter giving slightly higher grid current.

To test the transmitter, a 60 watt light bulb will function well as a dummy load. When the load has been connected at J_3, power should be



Oblique view of top of five-band low powered transmitter. Note the manner of support of L_3 on the small stand off insulator. Also visible in this view is the neutralizing stub of #14 wire which was included in this particular project but which may or may not be required. Note also the length of RG-58/U (or RG-59/U as desired) which connects C_4 to the antenna relay.

applied, and after allowing a few minutes for warmup there should be no indication of plate current with the key up and the rig on STANDBY. The TRANSMIT switch should be thrown to transmit; the key *briefly* closed, and C_3 tuned immediately for a dip.

Switch the meter to read grid current, close the key, and tune C_1 for maximum current. The grid current should be in the vicinity of 2 ma, and may be brought up or down by adjustment of the drive control, R_1. Switch to plate current again, and by alternately adjusting C_4 and C_3 for resonance, bring the final plate current to about 100 ma. This should correspond to about the brightest indication of power from the dummy load.

You may find, to your dismay, that when the transmitter is properly loaded it continues to draw some plate current in the TRANSMIT mode even with the key open. This is a not too uncommon phenomenon found when block-grid keying is applied to one stage (final) of the transmitter alone. The simplest remedy (without redesigning the rig) is to *slightly* detune the oscillator capacitor (C_1) until the plate current rests at 0 ma. This does not affect operation of the transmitter, and any reduction in grid drive can be compensated for by adjustment of R_1. It might be noted here that this phenomenon was only noted at low frequencies when the oscillator put out its strongest driving power.

A final note should include mention of the fact that unless a keying relay is used, blocking voltages will appear at the key. This has not posed a problem to the author, but caution is indicated. Similarly, the key should *not* be closed when the transmit switch is in the STANDBY position, since this causes the 6146 to draw excessive plate current and could harm the tube.

Performance

Upon completion, the rig was turned over to WN9RBU, a new ham in the area, who immediately hooked it to a sixty foot wire through an antenna coupler and put it on the air. The results were quite unexpected, as report after report came in commenting on the excellent note and punch of the little transmitter. These comments, by the way, were *not* solicited!

A dozen states were worked in a third as many days, with the author taking note of a pleasant fact—his QTH is only a short distance from that of WN9RBU, yet even with the receiver tuned a few kc from his operating frequencies, not one click, thump, chirp, grunt or groan could be heard. Keying waveform as it appears on the scope here is excellent, and the rig continues to get outstanding reports on its distinctive tone daily.

As a Novice transmitter or a standby rig or exciter for the General, the little transmitter described here should provide a potent (for its size), clean signal and many hours of enjoyment.

Many thanks to James Hertter of the University of Illinois for the photographs of the transmitter. ■

TIME SIMPLIFIED

BY WELLS CHAPIN,* W8GVW

MAN has been dealing with time ever since he noticed his shadow change in length with the passing of the sun. Time is very important to many phases of electronics. We measure frequency, phase angles, the duration of a pulse or train of pulses, the return of a radar echo, how fast our radio waves travel, all by time intervals. Time, and especially accurate time has become very important in this space age of extreme speed where we literally beat the sun.

*2775 Seminole Road, Ann Arbor, Michigan 48104.

Time has always been a relative thing and science has been constantly searching for an unvarying reference. There are many time systems: astronomers use ephemeris time, other times are solar, sideral time, the calendar year month and day, the Tropical year, and finally Day and night. Europeans and our Armed Forces use 24 hour time; we in the United States use 12 hour time, and Universal Time for all countries is Greenwich Mean Time. In the early history of telling time, great rewards were given for inventions of instruments that accurately told time.

Chart I—Time Conversions

24 Hour Time	Eastern Standard Time	Central Standard Time	Mountain Standard Time	Pacific Standard Time	Greenwich Mean Time
0100	1:00 AM	12:00 Mid.	11:00 PM	10:00 PM	0600
0200	2:00 AM	1:00 AM	12:00 Mid.	11:00 PM	0700
0300	3:00 AM	2:00 AM	1:00 AM	12:00 Mid.	0800
0400	4:00 AM	3:00 AM	2:00 AM	1:00 AM	0900
0500	5:00 AM	4:00 AM	3:00 AM	2:00 AM	1000
0600	6:00 AM	5:00 AM	4:00 AM	3:00 AM	1100
0700	7:00 AM	6:00 AM	5:00 AM	4:00 AM	1200
0800	8:00 AM	7:00 AM	6:00 AM	5:00 AM	1300
0900	9:00 AM	8:00 AM	7:00 AM	6:00 AM	1400
1000	10:00 AM	9:00 AM	8:00 AM	7:00 AM	1500
1100	11:00 AM	10:00 AM	9:00 AM	8:00 AM	1600
1200	12:00 Noon	11:00 AM	10:00 AM	9:00 AM	1700
1300	1:00 PM	12:00 Noon	11:00 AM	10:00 AM	1800
1400	2:00 PM	1:00 PM	12:00 Noon	11:00 AM	1900
1500	3:00 PM	2:00 PM	1:00 PM	12:00 Noon	2000
1600	4:00 PM	3:00 PM	2:00 PM	1:00 PM	2100
1700	5:00 PM	4:00 PM	3:00 PM	2:00 PM	2200
1800	6:00 PM	5:00 PM	4:00 PM	3:00 PM	2300
1900	7:00 PM	6:00 PM	5:00 PM	4:00 PM	0000
2000	8:00 PM	7:00 PM	6:00 PM	5:00 PM	0100
2100	9:00 PM	8:00 PM	7:00 PM	6:00 PM	0200
2200	10:00 PM	9:00 PM	8:00 PM	7:00 PM	0300
2300	11:00 PM	10:00 PM	9:00 PM	8:00 PM	0400
2400	12:00 Mid.	11:00 PM	10:00 PM	9:00 PM	0500

Chart I—Comparison of the various U.S. time zones and GMT.

Chart II The time of the cities below is based on 12 o'clock Noon Eastern Standard Time.

Alexandria	7:00 PM	Liverpool	5:00 PM
Amsterdam	6.00 PM	London	5:00 PM
Athens	7:00 PM	Madrid	6:00 PM
Baghdad	8:00 PM	Mexico City	11:00 AM
Bangkok	12:00 Mid.	Montevideo	2:00 PM
Belfast	5:00 PM	Montreal	12:00 Noon
Berlin	6:00 PM	Moscow	8:00 PM
Bogota	12:00 Noon	Oslo	6:00 PM
Bombay	10:30 PM	Paris	6:00 PM
Bremen	6:00 PM	Rio de Janeiro	2:00 PM
Brussels	6:00 PM	Rome	6:00 PM
Bucharest	7:00 PM	Santiago, Chili	1:00 PM
Budapest	6:00 PM	Stockholm	6:00 PM
Buenos Aires	2:00 PM	Teheran	8:30 PM
Calcutta	10:30 PM	Valparaiso	1:00 PM
Cape Town	7:00 PM	Vancouver	9:00 AM
Caracas	12:30 PM	Vienna	6:00 PM
Copenhagen	6:00 PM	Warsaw	6:00 PM
Danzig	6:00 PM	Winnipeg	11:00 AM
Yukon	8:00 AM	Zurich	6:00 PM
Delhi	10:30 PM	The time on these cities is the morning of the following day.	
Dublin	5:00 PM		
Geneva	6:00 PM		
Halifax	1:00 PM		
Havana	12:00 Noon	Auckland	5:00 AM
Honolulu	7:00 AM	Hong Kong	1:00 AM
Istanbul	7:00 PM	Manila	1:00 AM
Johannesburg	7:00 PM	Melbourne	3:00 AM
LeHavre	6:00 PM	Shanghai	1:00 AM
Leningrad	8:00 PM	Singapore	12:30 AM
Lima	12:00 Noon	Sydney	3:00 AM
Lisbon	5:00 PM	Tokyo	2:00 AM
		Wellington	5:00 AM
		Yokohama	2:00 AM

About all we really need to know is that the U.S. Naval Observatory determines mean sideral, solar, ephemeris and atomic time. The accuracy is determined by the standard—a cesium beam atomic clock. This accurate time is available throughout the world through our standard frequency station WWV and WWVH.

The only problem we have left is to find out what time zone we are living in, and how to convert our time to other time zone figures. An interesting fact is that the everyday time we use is arbitrary as we have arrived at this time by simple division of two longitudinal lines that our zone occupies. If you really desire accurate time, you must figure your exact geographical location and calculate from there.

Your position on the globe is measured by imaginary lines called meridians and parallels. Meridians which are drawn around the earth through the poles are called longitudinal lines. The prime meridian, or zero, is the longitudinal line drawn through Greenwich, England. Everything starts from this line and is either east or west or plus or minus. The meridians running parallel to the equator are called latitude lines.

Time can be simply calculated from any map that shows longitudinal lines, as each fifteen degrees is an hours change in time. The physical length of a degree of longitude varies as the cosine of the latitude and is generally accepted as 69.17 miles at the equator. The length of a degree of latitude is approximately 68.703 miles.

For those interested, and especially the DX hounds, a graphical representation of the zones is shown in the Standard Time Chart of the world HO 5192 published by the Navy Hydrographic Office, Washington, D.C. This map shows the worlds 24 time zones with the Greenwich longitude as zero and all other points are referenced by plus time to the west and minus time to the east.

For those of you who just want a no strain no pain way of converting time, Chart I should be quite useful. Chart II shows a few selected cities. ■

New Amateur Products

Casey

CASEY is marketing a full page magnifier (7"×10") that enables you to view the entire page without scanning line to line. The magnifier sells for $1.00. For more information write to Casey's Corner, P.O. Box 1280, Dept. CQ, Hollywood, Fla., 33022, or circle 65 on page 112.

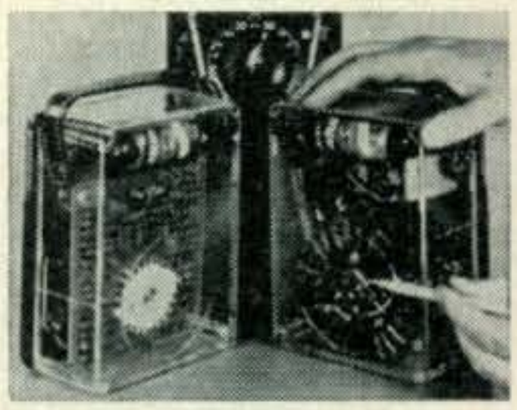
Shure

SHURE is re-issuing their reactance slide rule. The rule solves capacitive and inductive reactance, coil Q and dissipation factor problems. The rules are available for $1.00 each. For more information write to Shure Bros., 222 Hartrey Ave., Evanston, Ill., 60204, or circle 67 on page 112.

James

JAMES is manufacing a new compact 4 in 1 addition to the shack. It is a c.p.o., c.w. monitor, r.f. detector and component tester that sells for $12.95. For full specs write to James Research Co., 11 Schermerhorn St., B'klyn., N. Y. 11201, or circle 66 on page 112.

Triplett



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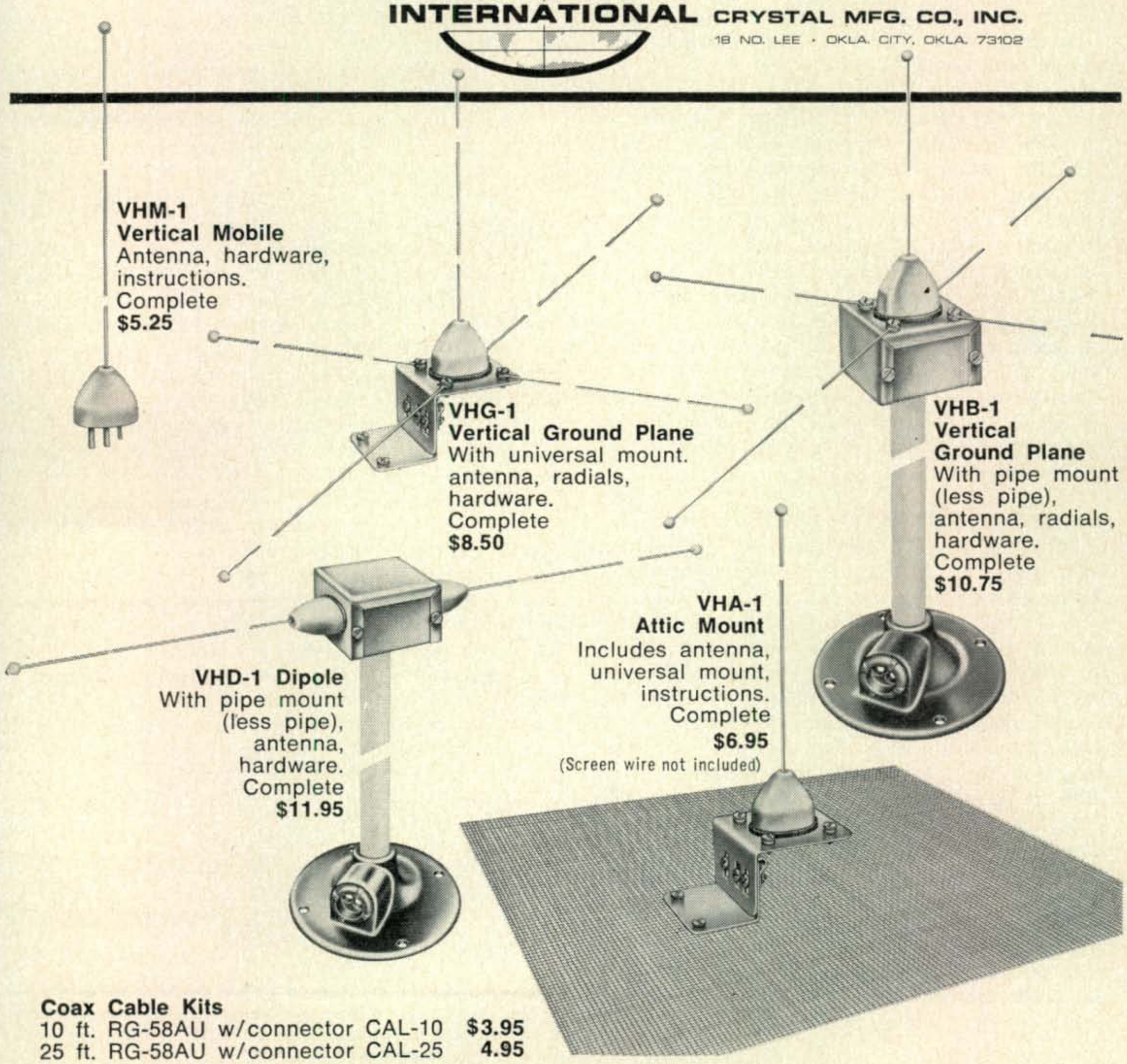

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For further information, check number 3, on page 112

POWER GENERATOR FREQUENCY METER

BY G. T. WHITE*

WHEN operating portable on non-commercial power, both the voltage and *frequency* of the power source become important. Many units, particularly the less expensive varieties, save money by using 60 cycle only transformers; these require less iron core than 50/60 cycle transformers of the same rating. Sixty cycle only transformers operated on 50 cycle power will overheat and eventually burn out or blow fuses.

The Problem

When operating on portable electric generators, the voltage and frequency vary considerably with load. The smaller the generator compared to the connected load, the greater the variations. Most equipments will operate satisfactorily from 105 to 130 volts and certainly should from 110 to 125 volts. As long as the frequency is at least 60 cycles there should be no frequency problem. Most 60 cycle type equipment will operate to 100 cycles, and much of it to 400 cycles with no noticeable effects. At 400 cycles, the output voltage of the equipment power supply may be a little more due to the higher efficiency.

Frequency Control

Most small generators have no voltage control, only a throttle-to-governor adjustment. Thus, although the instruction books often call it a voltage control, it is really a speed or frequency control. The proper setting is usually stated in terms of voltage because voltmeters are much cheaper and more plentiful than frequency meters. Under light loads the output voltage tends to climb, the governor holding the frequency to a reasonable value. However, if a 50 watt rig is connected to a 500 watt (or larger) generator, the voltage may be 130 volts or higher at 60 cycles. If the governor is set for 110-115 volts, the frequency will be about 50-55 cycles. The only safe way to calibrate a strange generator is with a frequency meter *and* a voltmeter.

In the example above, the only good solution is to set the frequency at 60 cycles for the heaviest load (or maximum generator output) and take whatever voltage comes out. If it is too high, particularly with small loads, and it often is, a variable transformer, a reverse-series connected filament transformer, a series heater element, a series capacitor, a dummy load, or some similar voltage adjusting device must be used. The frequency must never be reduced below 60 cycles for 60 cycle motors and transformers (incandescent lights and resistive loads don't care).

The Circuit

So, how do we measure frequency? Commercial reed frequency meters cost $30 and up. If the speed is varying, a reed frequency meter is most difficult to read. An electric clock with a second hand can be used by letting the clock run for 1 minute as measured with a wristwatch. The number of seconds the electric clock sweep hand reads is the frequency. However, this takes at least one minute every time the frequency is read making monitoring very difficult. The most desirable frequency meter is a needle pointing to cycles per second. The circuit described below does this for less than $5, if surplus parts are used.

The meter, M_1, can have any range from a few microamps to several milliamps full scale, but C_1 and R_2 will have to be adjusted for sensitivities other than 0-1 ma. Resistor R_2 provides for calibration and compensates for variations in the value of C_1 and the internal resistance of M_1. The double anode zener can be any convenient value, or two identical zeners of any reasonable voltage back-to-back. In the author's circuit, the zener produced 4.5 volts rms, 6 v. peak at 8 to 12 ma. drain current. This zener serves a two fold purpose. First, it all but eliminates changes in meter reading due to changes in line voltage. Second, it clips both halves of the sine wave and makes a fair square wave thus all but eliminates the effects of line noise.

If R_1 is made 1000 to 1500 ohms, the 10 volt output from an audio oscillator can be used to determine linearity. Control R_2 is set to 0.6 on the 0-1 meter scale. The instrument is quite accurate (within 2%) over the entire scale. Frequency being 100 times the scale reading. Meter M_1 can be a multimeter, but the adapter must have been previously calibrated with the particular meter or the different internal meter resistance will yield less accurate readings.

Components C_1, CR_2 and CR_3 form a voltage doubler which is discharged by the meter resistance. The higher the frequency, the more pulses per second, the higher the meter reading. ■

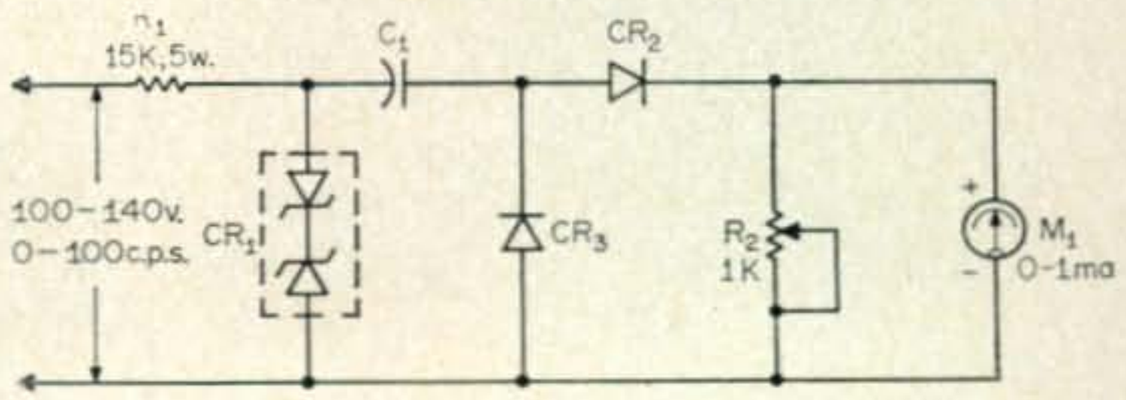
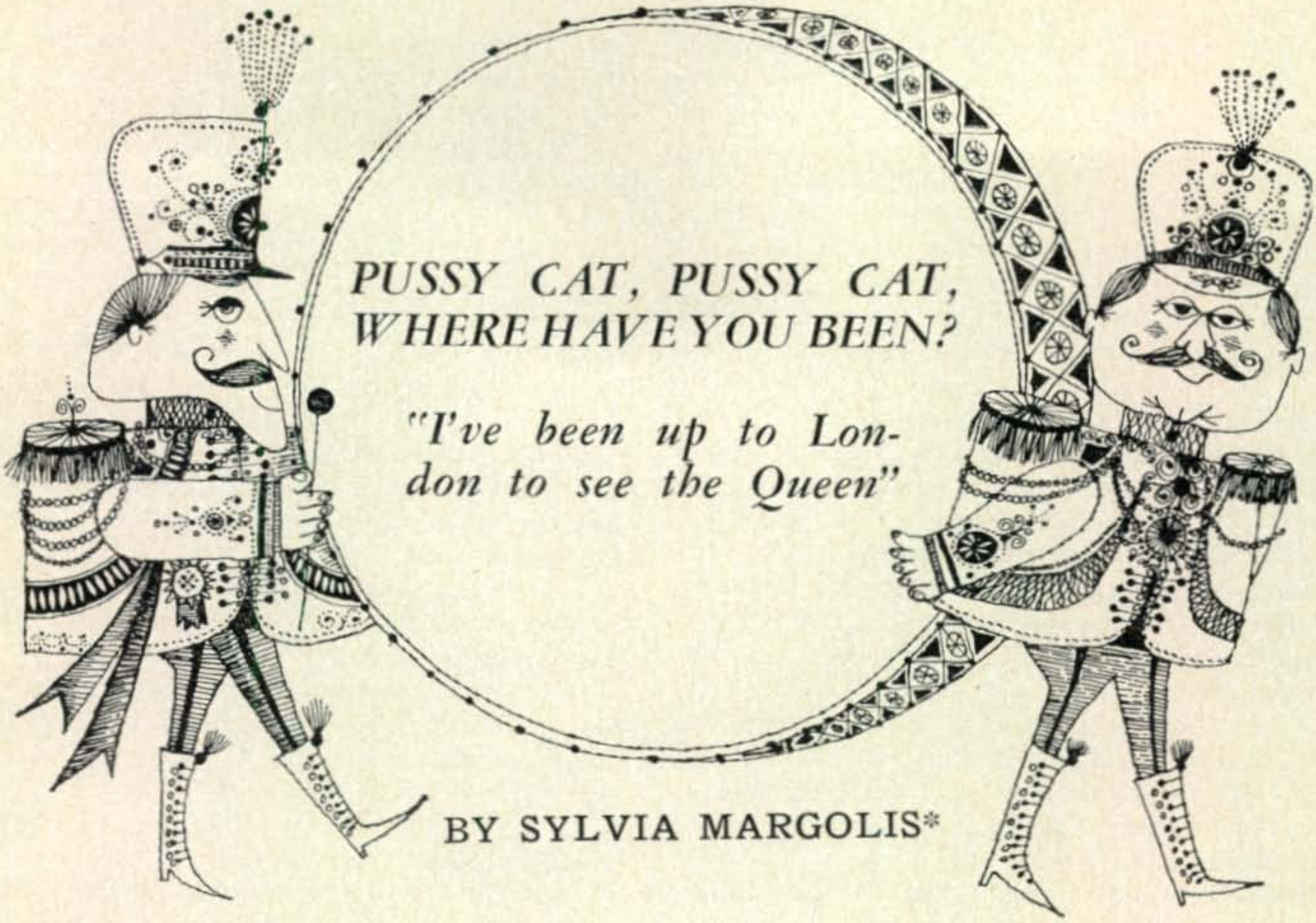


Fig. 1—Circuit of the frequency meter used to check the output of power driven generators. Diode CR_1 is a double anode 6 volt zener or two zeners back to back. Diodes CR_2 and CR_3 are 1N34's. $C_1 = 1.$ mf.

*118 Barbers Point Road, Naval Air Station, Alameda, California 94501.



PUSSY CAT, PUSSY CAT, WHERE HAVE YOU BEEN?

"I've been up to London to see the Queen"

BY SYLVIA MARGOLIS*

It wasn't Queen Elizabeth II we went up to London to see, on October 26, but her husband, His Royal Highness, the Prince Philip, Duke of Edinburgh, when he opened the 1966 International Radio Communications Exhibition.

And it was the greatest, grandest, most glamorous and glorious day that ever happened to amateur radio, anywhere.

Let's get one thing straight, first, and that is what the monarchy means to Britain.

We grumble about the monarchy, about the personal quirks of the sovereign, the rituals, the anachronistic concept of an anointed ruler, the pomposity, the snobbery, the expense, the inevitable crowd of parasitic hangers onto the Royal Bandwagon. We beef so loudly sometimes that a stranger might think himself in a cell of anarchists, listening to us.

That is our prerogative, as tax-paying (when we can't avoid it,) law-abiding (when the law is watching,) patriotic (when we remember) British citizens. But let that same foreigner as much as whisper a word of criticism and he is liable to get the nearest plate of roast beef emptied smartly over his head. It's our system and we know how to handle it. We know, too, that in the sovereign rest the symbols of Britain's greatness-traditions of decency, fair play and a right sense of values, that, whilst the monarchy flourishes, God will remain in His heaven and all will be right with the *whole* world.

Besides, it's less expensive to maintain a sovereign, with all the associated fal-lals, than to run regular Presidential elections!

The Duke of Edinburgh has been Patron of the Radio Society of Great Britain since 1952, but this was the first time he had ever participated officially in amateur radio. When he was unable to preside over the Society's Golden

*95 Collinwood Gardens, Clayhall, Ilford, Essex, England.

An exterior view of the Seymour Hall on October 26th.

The Duke arrives. R.S.G.B. President Roy Stevens, G2BVN, presents him to General Manager John Rouse, G2AHL. Note the London bobby in the background.

Jubilee Celebrations in 1963, we were all very disappointed, but it was assumed that amateur radio was to remain yet another of those many activities of which the Duke was content to be patron in name only.

There's a heap of jostling and lobbying to get any of the Royal Family to grace an event. Their presence is a certain guarantee of a huge attendance and gratifying publicity.

Royal encouragement had been extended, however, in 1965, when the President of the R.S.G.B., G3IIR, Eric Yeomanson, was invited with his wife to a Royal Garden Party at Buckingham Palace. These shindigs, in the biggest private garden in London, happen about three times every Summer. Three thousand people, prominent in public affairs, from all over the Commonwealth, are bidden to attend upon Her Majesty to take tea and strawberries and cream. It's all very dressy and pleasant and it nearly always rains.

Three thousand is a lot of people, but it was considered a significant honor to British amateur radio when our President went to see the Queen. We hoped that a personal presentation could have been arranged for him to meet the Duke, but it rained and everybody had to rush indoors to protect those hired top hats!

Nevertheless, there's an old European saying that one day the dog will widdle even on your doorstep, and the dog did come to amateur radio at last. Only weeks before the 1966 Exhibition opened, the R.S.G.B. were notified that His Royal Highness would be glad to perform the ceremony.

When they picked themselves up off the floor, the Society found that several things had happened at once. People who had faded from the scene long ago, who, for personal or business reasons, had never found it possible to give up a weekday to attend the Opening Ceremony, seemed to be able, this year, to do just that thing. A number of radio amateurs' wives, who had gone out of their way for years to obstruct their husbands' hobby with everything they knew (and they knew plenty), demanded new hats and could be heard arguing among themselves as to which husband had worked the greatest number of countries.

A week before the Opening we had a visit at home from a couple of "G5-plus-3's," the overseas radio amateurs who now operate with British calls. These two were U.S.A.F. officers and they brought their wives with them.

This is one of the nicest things about amateur radio. Strangers come to live in a country. Because of the immediate amateur radio link, they can make friends with the residents without any of that awkward probationary period that follows ordinary social introductions. And the friendships quickly become firm and true, held together by a strong web of shared interest and experience.

So these good friends were the kind that fit like an old shoe, comfortable and familiar. It was an occasion for second-best teacups and first-quality conversation.

The wives, confirmed democrats, were very excited at the prospect of seeing Prince Philip real close.

"Of course," I said, "There's every possibility that, as beneficiaries of the reciprocal licensing arrangements, you might be presented to H.R.H."

"H.R.H." is the "in" way to refer to a person holding that most exclusive of titles.

That set them fluttering. What do we do? What shall we wear? "Wear what you like," I added, "but you must be prepared to curtsey."

Curtsey? What red-blooded U.S. citizen is prepared to curtsey to anybody? And to British royalty at that? Shades of Farmer George and Lord North!

"Sorry, girls, but there it is—no curtsey, no prince!"

"So how do you curtsey?" muttered one of the girls darkly. I knew that the recipe she had promised to send me for pumpkin pie (so why shouldn't *we* celebrate Thanksgiving, too?) was going to have a vital ingredient deliberately forgotten.

I lined them up and we rehearsed. The right foot circles round and behind the left, as you sink down onto your heels. The back is straight and the head bent slightly from the neck. You raise your eyes only as you reach the upright position again. The movement is smooth, controlled and graceful *and utterly obsolete*, but I did enjoy teaching these two American ladies how to curtsey to a descendant of George III.

The three husbands stopped taking a transmitter to pieces on the dining room table and groaning "O-o-o-la!" into the mike to watch the circus and made remarks that were ribald, hilarious and not entirely within the terms of the licence.

To the established exhibitors the visitation was like a shot in the arm. Take the booth of the Amateur Radio Mobile Society, for example. For the first time in eight years, our exhibit was completed the night before the Opening, right down to the last electron. Usually we spend the whole of the first morning fixing things, squabbling about who should have remembered to bring along the Visitors' Book and whose bright idea it was to decorate that helically wound an-

The author celebrates her birthday at the Overseas Visitors Reception with VE3CJ and Barney Patterson, GI3KYP, Executive Vice-President of R.S.G.B.

Prince Philip pauses at the Amateur Radio Mobile Society booth. The Prince, the author and the surrounding visitors all seem to be awaiting the magical answer from the lady in the foreground to the Prince's question "Why just cars? Why not aeroplanes?" (photo courtesy of R.S.G.B.)

tenna with plastic flowers, which is hardly the way to further the "advancement of the science of amateur radio." There is a regrettable tendency among A.R.M.S. people to treat amateur radio as if it were something to be enjoyed.

So important was the occasion that the London *Times* commissioned me to write an article about it. The only thing they did to mess it up this time was to publish it two weeks too early!

Royal events are timed down to split-second schedules. H.R.H. would arrive at 11:30 A.M. He would be received by the President of R.S.G.B., the Immediate Past President, the General Manager and the Exhibition Organizer. The only sign that there was anything unusual happening was the presence of a brace of policemen, to whom this was a brief interlude in the day's program of booking unwisely parked cars. Some folk have a funny way of passing the time, even funnier than Don Miller's.

The old hands looked a lot posher than usual. The Englishman equates virility with B.O. The man who bathes daily and uses deodorants is suspect, no matter how much of a tomcat he may have proved himself to be. But today there was a noticeable increase of freshly-pressed suits, whiter-than-white shirts, gleaming shoes and tasteful ties. Prince Philip is listed as the world's Best Dressed Man and this lot weren't going to be caught with their pants down—or baggy.

During the count-down, when the men were straightening their ties and the women were peeking into vanity mirrors, we cracked silly jokes to relieve the unbelievable tension, calling friendly insults to other exhibitors. They then tried out the National Anthem on the P.A. system. The first four bars sounded gloriously through the big hall, all inspiring and eye-damping, until the tape came unwound and the National Anthem ground to a groaning halt. There was an embarrassed silence, repressed giggles, then a roar of laughter. Only with four thousand electronic experts present could a thing like that possibly happen and does happen.

At 11:30 the Duke's Rolls Royce glided to a precise halt at the entrance. Out bounded this slight, bronzed, immensely attractive extrovert, not as tall as you'd have thought, immaculate in a tweed suit, gay, uninhibited, ready to enjoy himself. The doors of the hall were flung open and the National Anthem boomed out without falling flat on its face this time.

When you hear an Anthem in the presence of the Head of that State it's like being in church. We stood, rigid, savoring every moment, hoping to remember it all for our great-grandchildren.

The trouble was a transistorised v.o.x. unit, for mobile use, which we had on the A.R.M.S. booth, with the circuitry published in the current edition of *Mobile News*. It was displayed hitched up to an illuminated sign which flicked on every time the v.o.x. was activated. Now the music of the National Anthem activated the sign, so that it flashed an enforced patriotism across the vision of the unfortunate, convulsed, excruciatingly aching-bellied few who were near it. At the loud notes it nearly did its nut and would have taken off and gone into orbit if it hadn't been bolted down.

The Duke had asked not to be jostled as he toured the exhibits. The British public are remarkably polite in these circumstances, recognizing that Royalty does a brutally difficult job like this superbly, gracefully and with good humor. Perhaps they were a little inhibited, too, by the reputation this particular Prince has for handling unseemly behaviour. He has been known to squirt water on over-obtrusive photographers and his robust manipulation of the English language would contravene the terms of the radio licence without any doubts whatsoever, Prince or no Prince!

In the course of his duties, opening things and patronising things, the Prince must be subjected to a variety of obscure and cookie activities. Amateur radio, however, just tickled the fancy of this practical, technological, supremely

The author with, l. to r. 4X4CJ, G5AAM/WA6ZIQ, ZL3RY and G5AAB/W3MDI.

inquisitive ex-sailor. H.R.H. went through the Exhibition like a dose of salts, making unnerving darts towards exhibits that attracted him, buttonholing passing visitors for unscheduled QSO's, peering at the callsign badges, asking briskly:

"Who are you? Where do you come from? What is your job? How long have you been a radio amateur?"

Maybe it was coincidence, more likely it was calculated, well-practised expertise in handling people, but his selection of victims embraced a whole cross-section of passers-by, from schoolboys to Britain's oldest amateur, a blind amateur, foreign amateurs, even a Methodist Minister, whom he asked, with the blandest twinkle: "WITH WHOM DO YOU HOPE TO COMMUNICATE?"

There were tycoons and clerks, doctors and busmen, teachers and grocers, lawyers and pensioners—all hauled unceremoniously into the Royal presence for a minute, subjected to the full laser beam of the Royal charm and left gibbering with excitement afterwards.

At 12 noon the party mounted the platform for the Ceremony.

The President of the R.S.G.B., G2BVN, Roy Stevens, is a practised and expert speaker who believes that a speech, like the miniskirt, should be long enough to cover the subject and short enough to be interesting. He introduced H.R.H.

H.R.H. said the formal things that were expected of him, and very nicely, too. Then he added some unexpected things—about how people visiting the Exhibition would leave it either kicking themselves for not having bought something, or would spend the whole journey home working out how to explain it away. He commented that the display of elaborate antennas made the place look more like a laundry than a radio exhibition, which was a most original thought.

His speech over, he turned to the President.

"Is that all?" he whispered.

"Yes, Sir."

"Thank the Lord for that! Now let's get on and see the rest of the exhibits!"

They brought him over to our booth and I thought that maybe time would stand still and let me die happy. Behind the distinguished visitor I could see Roy Stevens looking at me challengingly, with, maybe, a little friendly malice, as if to say:

"Right, honey, you think you can talk your way out of anything. Try this one for size!"

We were formally presented and H.R.H. asked what our Society did. "We specialize in mobile amateur radio operation from cars, Sir," I began and was just about to go into our Spiel about Safety in Mobile Operation, when he broke in:

"WHY JUST CARS? WHY NOT AEROPLANES?" he asked, then folded his arms, relaxed and let the furious, flustered arguments rage over his head as to why aeronautical mobile operation is not permitted in U.K.

Having done his damage, he said goodbye and walked off, followed by a grinning escort.

Not that we were the only victims. Nothing attracts Prince Philip like gadgetry and the prominent Royal nose was poked into a lot of unexpected crevices, with startling consequences. A booth displaying soldering irons had a single iron with a kit of ten tips, very clever stuff. The demonstrator explained how the thing worked and showed the box containing the special tips, to be dismayed that one of the tips was missing.

"There it is, on the end of the ruddy iron!" was the Prince's comment.

Then they took him into the bar for a formal Reception and to present the serving members of the R.S.G.B. Council, together with some distinguished overseas visitors, Bob Denniston, WØNWX, President of A.R.R.L., the representative of the German national amateur radio organization and W3OPT, Captain C. Dorian, Chief Communications Officer of the U.S. Coast Guard Service.

When our distinguished visitor had gone, we flopped with relief and excitement. There was a rush for toilets, for coffee, a buzz of talk, with everybody who had been involved trying the first run-through of a story to dine out on for weeks to come. Parrying comments about the *Royal* Amateur Radio Mobile Society, I met up with old friend Noel Eaton, VE3CJ, Canadian Manager of A.R.R.L. and he presented me to Bob Denniston, a dish indeed! We exchanged mutual admiration and he invited me to the 1967 A.R.R.L. Convention.

"Do you read '*CQ* Magazine'?" I asked.

"Of course," he replied.

"O.K., I'll come!" I replied.

Got to keep the customers happy.

But the wonderful morning was crystallized by the comments of Hazel Worrell. She is the wife of G5AAB/W3MDI, Captain Everett Worrell, U.S.A.F. As if being a member of the A.R.M.S. Committee weren't enough to confer extra distinction on this Officer and Gentleman, Ev was the very first recipient of a British reciprocal callsign to get on the air.

"What did you think of the Prince, Hazel?" we asked.

Hazel comes from Virginia.

"AH JUS' DAWED HIM!" she sighed.

So did we all. ■

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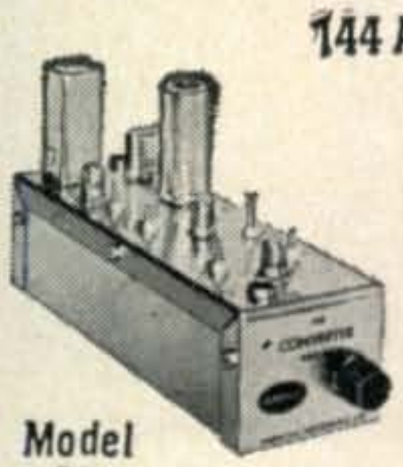

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For further information, check number 10, on page 112

The National 200 five-band transceiver. It is cleanly styled, ruggedly built and has a solid feel to the tuning controls. Starting at the top left are: The MIC GAIN, R.F. GAIN, A.F. GAIN, MIC JACK, FUNCTION SWITCH, V.F.O TUNE, P.A. LOAD, rocker-type M.O.X. SWITCH and EXCITER TUNE. The BANDSWITCH and P.A. TUNE are above the P.A. LOAD. A small knurled shaft at the right of the dial window adjusts the position of the hairline fiducial for exact calibration. For mobile use a heavy gimbal bracket is fastened at the sides by a large knurled-head bolt.

CQ Reviews:

The National 200 Transceiver

BY WILFRED M. SCHERER,* W2AEF

LIKE everything else the cost of manufactured ham gear has been going up, sometimes almost getting out of hand, but a move toward reducing this trend is the introduction of the National 200 Transceiver, a moderately-priced five-band job with full coverage of the 80 through 10 meter amateur bands for use on s.s.b., a.m. or c.w. with a transmitter peak-power input of 200 watts.

The 200 is a comparatively simple straightforward unit, featuring single conversion to a high i.f. with heterodyning obtained directly with a v.f.o. or by pre-mixing the v.f.o. with a crystal oscillator. It provides the desired features of high receiver sensitivity, good image and i.f. signal rejection, 2.8 kc selectivity, product or envelope detection, frequency stability, fast-attack slow-release a.g.c., simultaneous tuning of receiver and transmitter circuits, filter-type s.s.b. generation, identical calibration in 5 kc steps and high-ratio tuning rate on all bands (each range covers 600 kc), instantaneous switching between s.s.b., c.w. or a.m. operation, automatically switched dual-purpose meter, a.l.c., adjustable pi-network for matching to 40-60 ohm loads, rugged construction and neat functional styling. The unit may be used for fixed or mobile operation in conjunction with separate power supplies, one for 117/234 v.a.c. or one for 12 v.d.c. use.

S.s.b. operation is on l.s.b. for 40 and 80 meters, on u.s.b. for 10, 15 and 20 meters. Switchable sidebands are not provided, since the additional cost required may not be justifiable in view of the fact that very few amateur operators make use of this advantageous feature of s.s.b. operation.

Technical Details

A block diagram showing the receiver and transmitter lineups individually is given at fig. 1. For receive, the input signals are picked up by the r.f. amplifier and are then combined in the mixer where they are heterodyned with tunable frequencies that produce an i.f. of 5.2 mc. Selectivity and the desired sideband are obtained by means of the 5.2 mc crystal-lattice filter which is followed by two i.f. amplifiers the output of which is demodulated by the product detector with carrier inserted from the b.f.o. Audio output is obtained from the succeeding a.f. stages.

On transmit the process is reversed. With the a.f. from the mic amplifiers and the 5.2 mc carrier from the b.f.o. applied to the balanced modulator, a d.s.b. signal with a suppressed carrier is produced. This signal goes through the transmitter i.f. amplifier and the unwanted sideband is removed by the crystal filter. The 5.2 mc s.s.b. signal, thus generated, is amplified and then combined in the transmitter mixer with the same heterodyning frequencies as used on receive, thereby producing a signal in the desired amateur band. This signal is then applied to the driver stage for the following final-output amplifier.

Obtaining the heterodyning frequencies from a single-range v.f.o. or by pre-mixing the v.f.o. signals with those from a crystal oscillator eliminates the need for switching the v.f.o. ranges for the various bands and thus enhances stability and maintains a uniform calibration with a constant tuning rate. It also does away with the alternate method of using another signal-conversion stage, avoiding a possible source of distortion and also holding down costs. The heterodyning frequencies and how they are obtained for each band are indicated in Table I.

V.F.O.

The v.f.o. arrangement is somewhat unusual in that a pentode is employed as a grounded-cathode Hartley oscillator in conjunction with the control grid and the plate of the tube. It

*Technical Director, *CQ*.

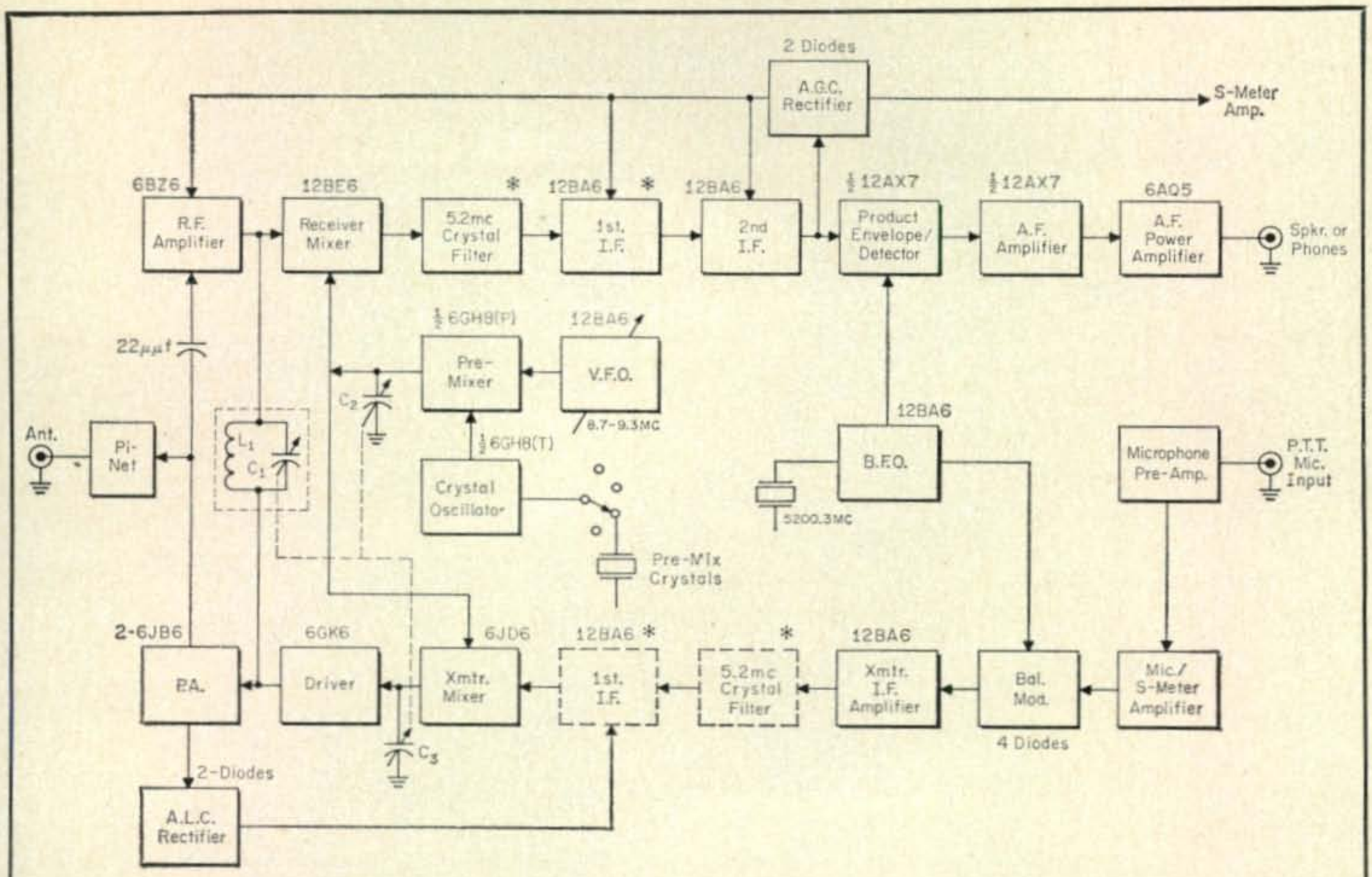


Fig. 1—Block diagram for the National 200 Transceiver. Receive and transmit lineups are shown individually. The crystal filter and the first i.f., marked with an asterisk, are common to both functions.

has a tuned circuit with an especially high C/L ratio, considering the 9 mc frequency of operation. The v.f.o. tunes over a 600 kc range. The pre-mixer stage is lightly coupled to the v.f.o. with output obtained from the screen-grid of the oscillator tube, thus minimizing the possibility of circuit-loading effects that might otherwise cause frequency instability. Circuitry is shown at fig. 2.

R.F. Circuits

L_1-C_1 tune both the output of the receiver r.f. stage and the transmitter driver. C_1 is ganged with C_2 and C_3 to also conjunctively tune the output of the pre-mixer/amplifier and the transmitter mixer. The input of the receiver r.f. stage is capacitively coupled to the transmitting-tube side of the Pi-network which then also tunes and matches the input for the r.f. stage. The whole arrangement is such that tuning up the transmitter also tunes the receiver and therefore eliminates the need for separately tuning each section whenever bands are changed.

TABLE I - NATIONAL 200 - FREQUENCY CONVERSION SCHEME					
R.F. Range	I.F.	Het. Freq.	Pre-Mix Xtal.	V.F.O. Range	Sideband
3.5-4.1	5.2	8.7-9.3	——	8.7-9.3	LOWER
7.6-7.0	5.2	12.8-12.2	21.5	8.7-9.3	LOWER
13.9-14.5	5.2	8.7-9.3	——	8.7-9.3	UPPER
21.6-21	5.2	16.4-15.8	25.1	8.7-9.3	UPPER
28.5-29.1	5.2	23.3-23.9	14.6	8.7-9.3	UPPER
28.6-28	5.2	23.4-22.8	32.1	8.7-9.3	UPPER
29.1-29.7	5.2	23.9-24.5	15.2	8.7-9.3	UPPER

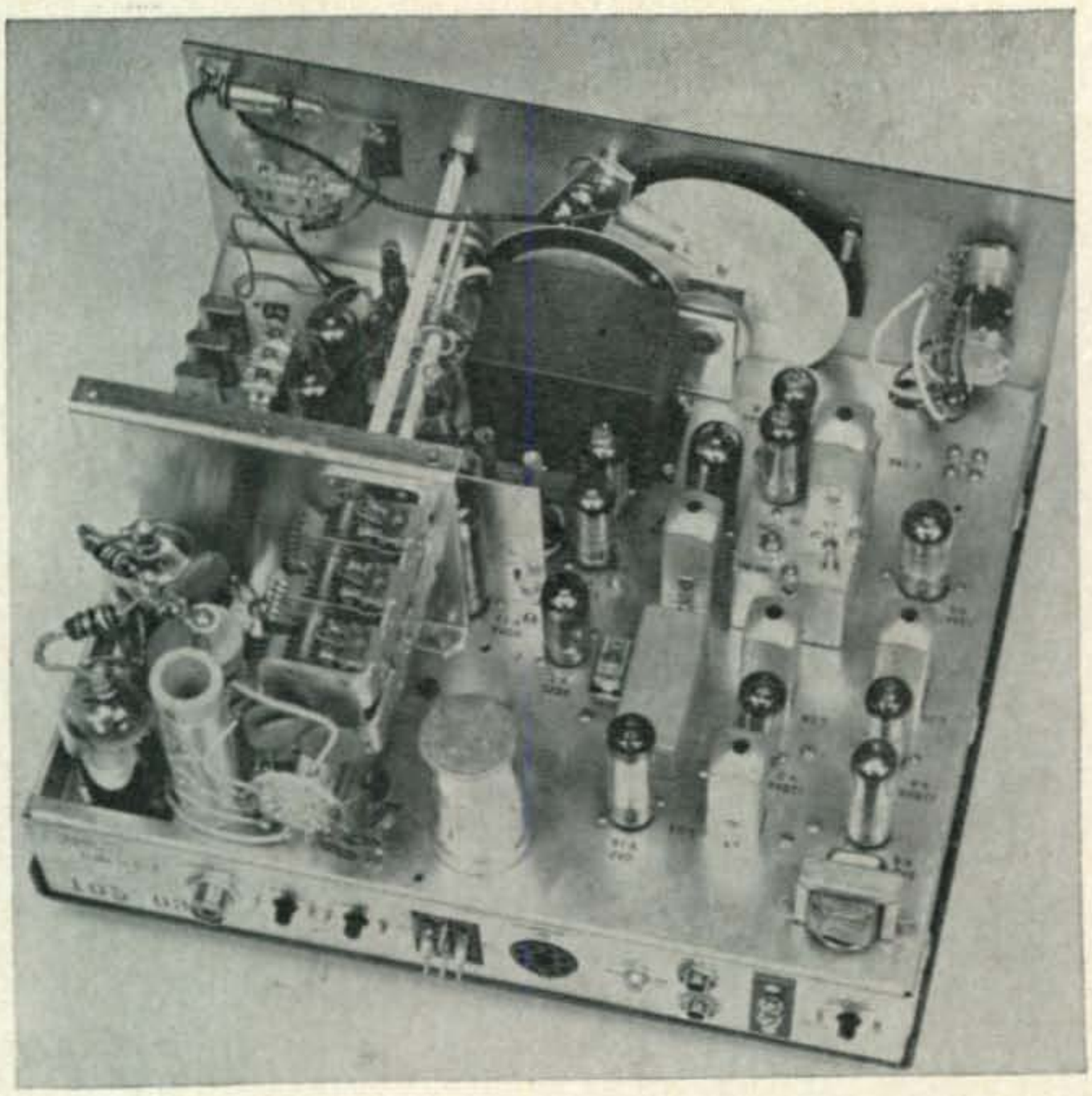
Table I—Conversion frequencies used in the National 200. The required heterodyning frequencies for each r.f. range are the sum or difference between the r.f. signals and the i.f. as indicated in column 3. The heterodyning frequencies are obtained either directly from the v.f.o. or by pre-mixing the v.f.o. with the crystals as indicated in column 4. Tuning for each range goes in a clockwise direction in the order as tabulated.

A different setup than generally found is that the 5.2 mc i.f. signal-rejection trap is installed in the cathode lead of the r.f. amplifier tube where the impedance relations are such that allow the use of a high-Q parallel-resonant trap with an effectively high impedance for better attenuation than can be obtained from the customary expedient of a series-tuned affair across the tube grid. This is shown at fig. 3.

The sideband filter is a crystal-lattice job designed for a 2.8 kc bandwidth at the 6 db points centered at 5202 kc and for a 6-50 db shape factor of 2.2 to 1.

The 10-meter band is covered in three segments: 28.0-28.6, 28.5-29.1 and 29.1-29.7 mc; however, there is only one switch position and one crystal socket, thus confining operation to the particular segment for which the crystal is installed, unless crystals are manually interchanged. Shifting to the 28-28.6 mc portion also necessitates disconnection of a capacitor. The set is supplied with a crystal for operation on 28.5-29.1 mc.

Referring to fig. 4, the product detector is a triode with the i.f. signal applied to the grid and the b.f.o. signal injected at the cathode which is maintained above ground potential by an r.f.



Top view of the National 200. The v.f.o. inductor and tuning capacitor are located in the black box at the top center. The pre-mix crystals are at the upper left. A perforated shield enclosure has been removed from the p.a. at the left foreground where the tank inductor may be seen wound on a ceramic form.

choke. For a.m. the function switch directly grounds the cathode, permitting the tube to function as a grid-leak type envelope detector. The switch also disables the b.f.o. during receive only.

Transmitting Modes

For transmitting a.m., circuitry from the control relay, routed through the function switch, applies a d.c. voltage to one side of the balanced modulator,[1] thereby upsetting its balance and providing a carrier, the required amount of which is adjusted with a carrier-insertion control that varies the d.c. voltage and thus the degree of unbalance.

The same arrangement is used for c.w., in which case a different setting of the carrier-insertion control must be made. Switching back to s.s.b. operation removes the unbalancing voltage, so the modulator is automatically returned to the normal balanced condition, eliminating the need for re-nulling the carrier. Also, once the carrier-insertion control has been set either for a.m. or c.w., switching to the corresponding mode automatically inserts the carrier as initially adjusted.

Since the carrier frequency is well down the slope of the filter skirt as needed for s.s.b., the a.m./c.w. carrier output from the modulator would normally be insufficient. The transmit i.f. amplifier is therefore used during these two modes of operation to overcome the filter attenuation. For normal s.s.b. operation a fixed bias is applied to this i.f. stage to hold its gain down, thus preventing the succeeding stages from being overdriven and allowing a higher degree of carrier suppression to be realized.

A.G.C. and A.L.C.

A.g.c. voltage is obtained using two diodes in a voltage-doubling circuit and it is applied to the r.f. input, the two i.f. and the S-meter amplifiers. A fast attack and a slow release is provided. The S-meter amplifier also is used to match the speech amplifier to the low impedance of the balanced modulator. Circuitry for

[1]The balanced modulator is a ring type using four solid-state diodes.

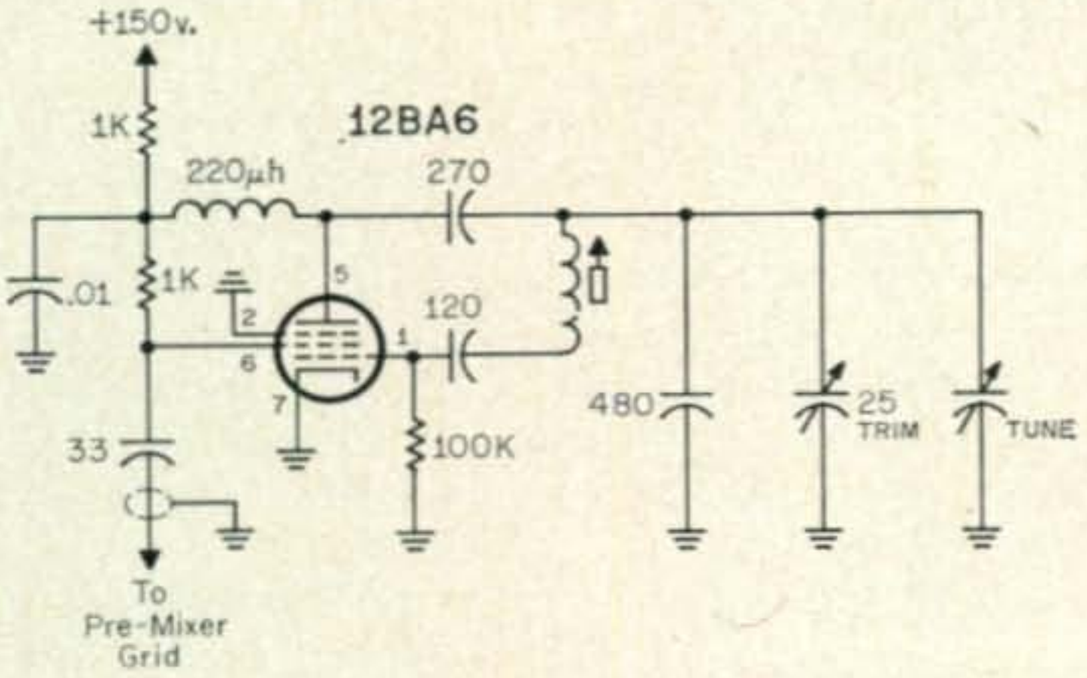


Fig. 2—V.f.o. circuitry used in the National 200. See text.

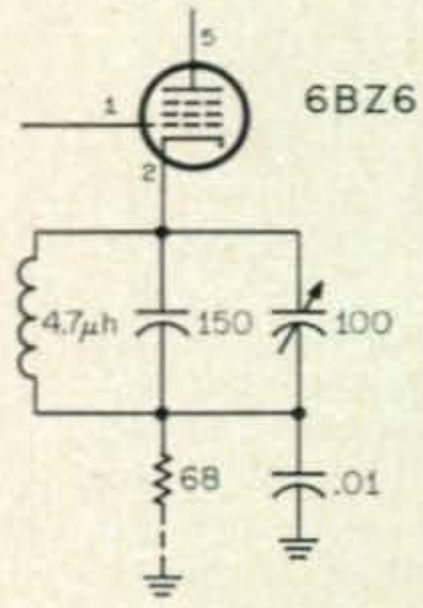


Fig. 3—Circuitry for 5.2 mc trap as used in the cathode lead of the r.f. amplifier tube.

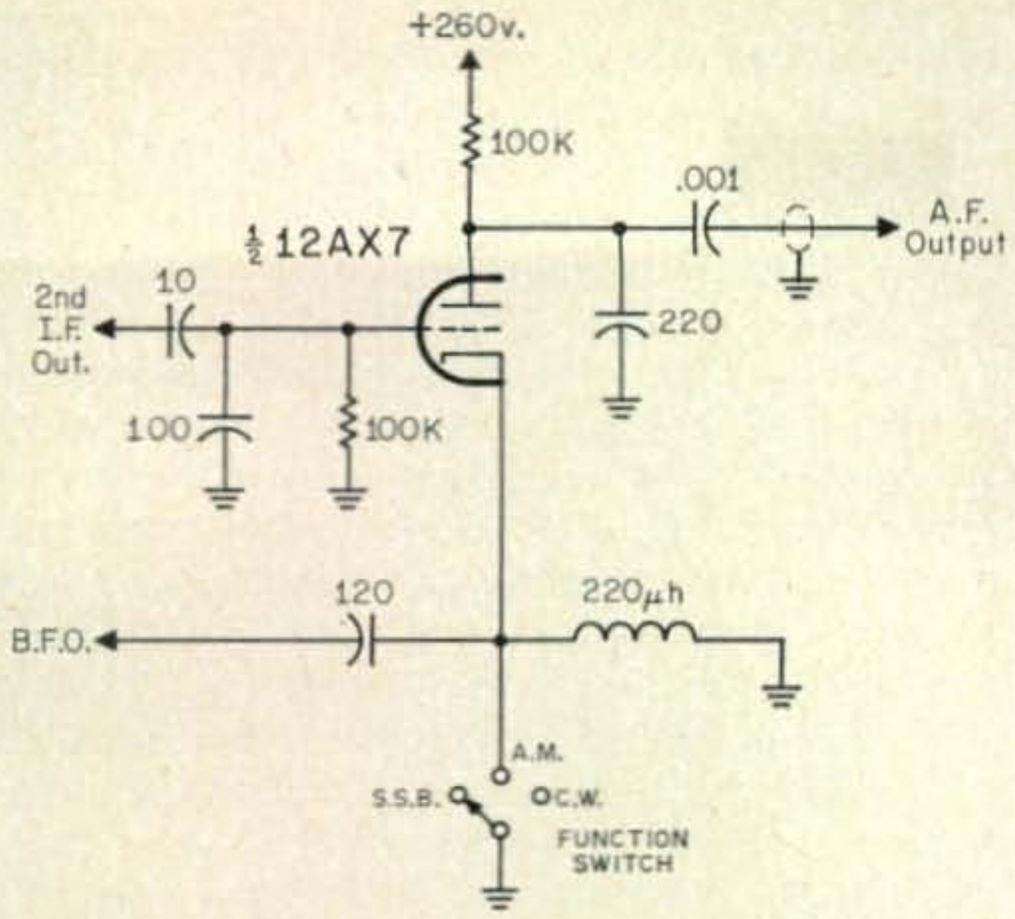


Fig. 4—Product detector arrangement. When the function switch is set at a.m., the cathode is grounded, allowing the tube to function as a grid-leak type envelope detector.

the amplifier setup is shown at fig. 5.

A.l.c. voltage is derived in the conventional manner using a voltage-doubling scheme to rectify the audio component of a voltage that is introduced across a grid-return resistor in the p.a. when the flow of grid current tends to occur. The resulting d.c. voltage (negative) then controls the gain of the 1st i.f. as needed to prevent overdrive and flattopping of the final. The a.l.c. voltage is isolated from the a.g.c. bus, that also feeds this i.f. stage, by means of a gating diode which is connected in series with the a.g.c. line. The diode is reverse-biased into non-conduction by the negative a.l.c. voltage on transmit.

Mechanical Details

The v.f.o. is tuned using a pinched-disc friction drive that provides a tuning ratio of 45:1 with an average of 5 turns of the tuning knob required to cover each 100 kc of the range. A split gear on the variable-capacitor shaft drives the dial which is a circular type that is calibrated in 5 kc steps spaced about 1/16" apart on a slightly non-linear scale which covers about 300 degrees of the dial perimter. On some bands the frequency calibrations increase in the normal clockwise direction, on others they go in a counter-clockwise manner as indicated at Table I. Individual calibration numerals are marked for each band. An adjustable hairline fiducial provides a means for indexing the frequency readout against a known frequency.

Besides the tuning arrangement, the panel has controls for a.f. and r.f. gain, exciter-tune, plate-tune, output-loading and mike gain. Pulling out the knob of the latter turns on a 100 kc crystal calibrator which is available as an acessory to be plugged in a socket on the rear of the unit. The meter is an edgewise-mounted type. There also is a standard 3-circuit jack for connecting a microphone that is equipped with a switch for p.t.t. operation on s.s.b. or a.m. V.o.x. facilities are not included. A rocker-type switch on the panel provides m.o.x. (manual) operation for use when the mike does not have a p.t.t. switch.

For c.w. the key is plugged into a standard jack on the rear of the set and the m.o.x. switch must be operated to activate the transmitter circuits. It must be returned to off for receiving, thus precluding break-in operation. Grid-block keying is used.

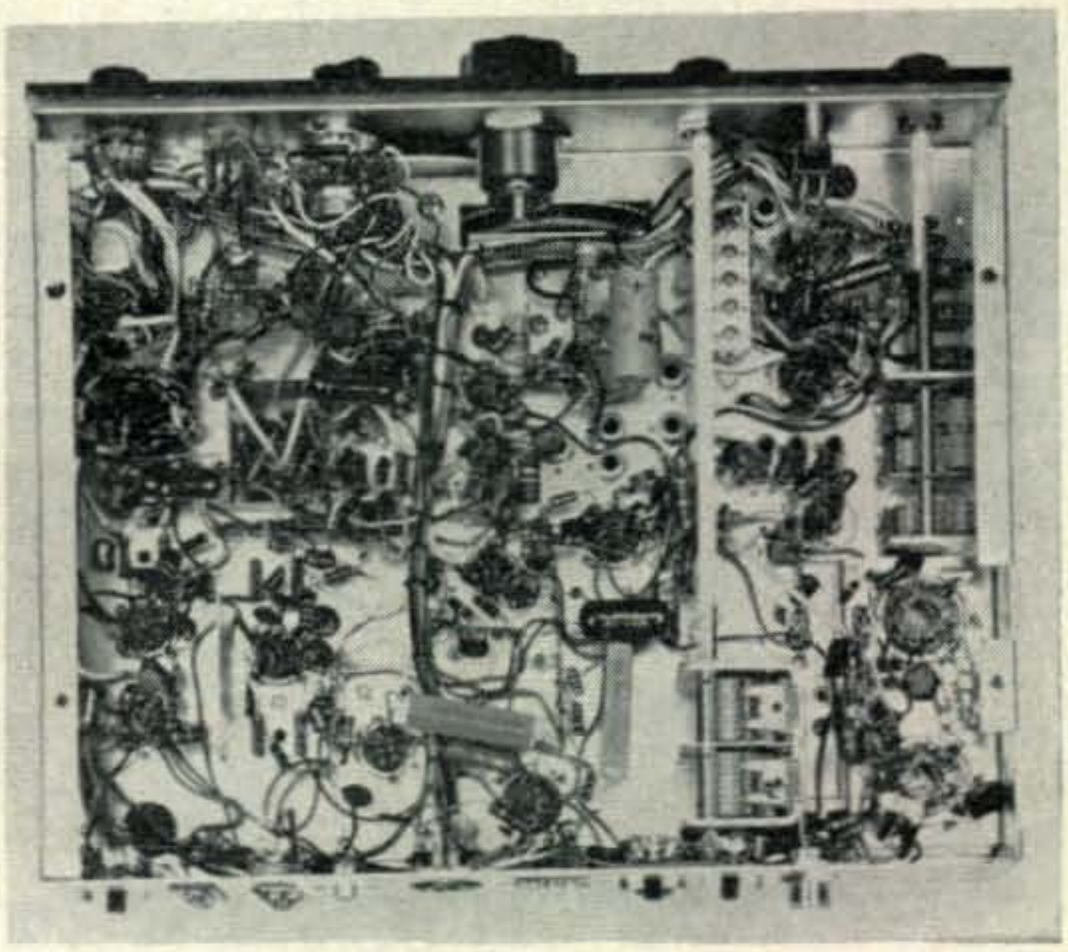
The carrier-insertion, bias-adjust and S-meter controls have knurled shafts for finger-tip operation and are located on the rear apron. The loudspeaker may be connected to two terminals provided on the power plug or it may be plugged into the phone jack which also is on the rear. A connector strip with screw-on terminals provides connections to s.p.s.t. contacts on the control relay for operating accessory gear, while a phono-type jack enables a.l.c. voltage to be obtained from a linear amplifier.

A heavy metal chassis is used in the conventional way with the p.a. enclosed in a shielded compartment. The tank coil is wound on a grooved ceramic form and the plate-tuning capacitor has double-spaced plates. The panel is 1/8" thick extruded aluminum with a satin-anodized off-white finish and the knobs are black with polished aluminum inserts. A perforated cabinet has a gray-blue wrinkle finish. The size of the set is 6 3/16" × 13 3/8" × 11" (H.W.D.) and it weighs 15 pounds.

Power-supply requirements are 700 v.d.c. @ 300 ma, 280 v.d.c. @ 200 ma, —80 v.d.c. @ 10 ma, 12 v. a.c. or d.c. @ 5 a. These voltages are obtained from a separate power supply, the Model AC-200 which allows operation from 117 or 234 v.a.c., 50-60 c.p.s.

Performance and Operation

The receiver sensitivity, rated nominally at 0.5 μv for 10 db S/N ratio on s.s.b. and c.w., measured an average of 0.25 μv on all bands, except 28 mc where it was 0.75 μv. The a.m. sensitivity, not rated, was between 2 and 4 μv for 10 db S/N (30% modulation at 400 c.p.s.). Image rejection, not rated, varied from 90 db on 3.5 mc to 55 db on 28 mc, while i.f. signal rejection was from 65 db on 3.5 mc to 56 db



Under Chassis view of the National 200.

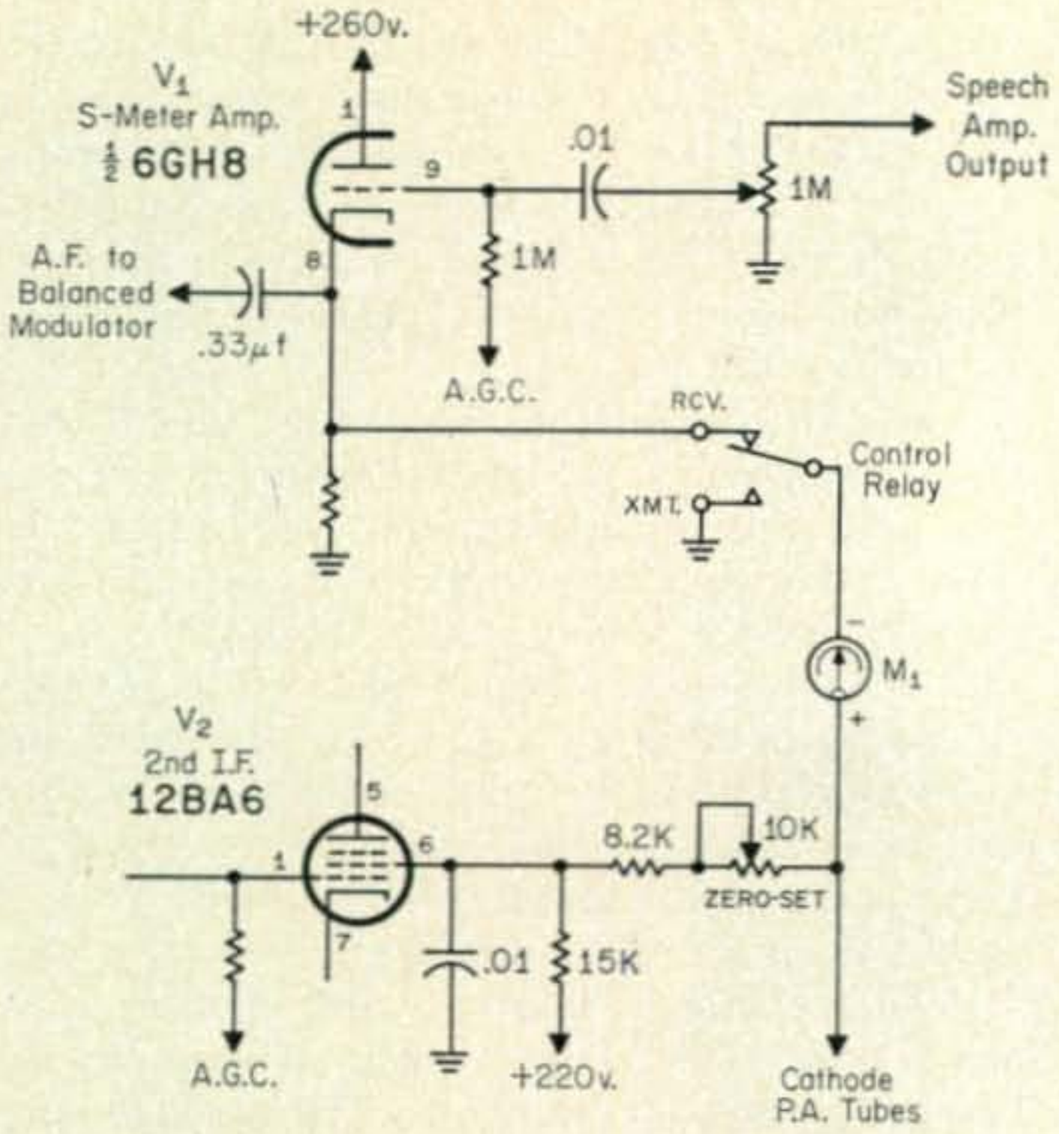


Fig. 5—Circuitry for the S-meter/speech-amplifier setup. When a signal is received, the negative a.g.c. voltage causes the cathode voltage at V_1 to decrease while at the same time it causes the screen voltage at V_2 to increase. Since these voltages are applied to opposite sides of the meter, double-barrel action takes place which in effect provides a net amplified voltage for activating the meter. During transmit, the control relay disconnects the negative end of the meter from V_1 cathode and grounds the meter, thus permitting it to read the p.a. cathode current. At the same time, V_1 functions as a cathode follower for matching the output of the speech amplifier to the low impedance of the balanced modulator. On receive the speech amplifier is biased to cutoff, preventing a.f. feedthrough from the mic.

at 28 mc. The unwanted-sideband suppression, rated at —40 db, was —35 db at 1 kc. A.g.c. characteristic showed an 18 db a.f. output change with an r.f. input-signal variation of 60 db (10-10,000 μv). The a.g.c. time constants provided smooth operation during widely varying input-signal levels. Plenty of a.f. gain was available. The high drive ratio provides smooth tuning of the v.f.o. Under some conditions it might be necessary to tilt up the set slightly to better discern the dial calibrations which may be partly hidden behind the top edge of the dial window.

The frequency stability, rated at a nominal 1500 c.p.s. during the first 30 minutes after a 5-minute warmup and with a long-term stability of a nominal 400 c.p.s., during several test runs measured an average of 1000 c.p.s. after the first 5 minutes from a cold start at 75 degree room ambient, 1400 c.p.s. the next 30 minutes, 200 c.p.s. the following 30 minutes and 100 c.p.s. or less per hour thereafter. With a ±10% line-voltage variation the frequency held to within ±60 c.p.s. Due to the degree of early-period drift, it would thus be well to let the set warm up for 30 minutes or so before going on the air, in order to avoid the necessity of frequent retuning, especially if the operating period is expected to be a short one.

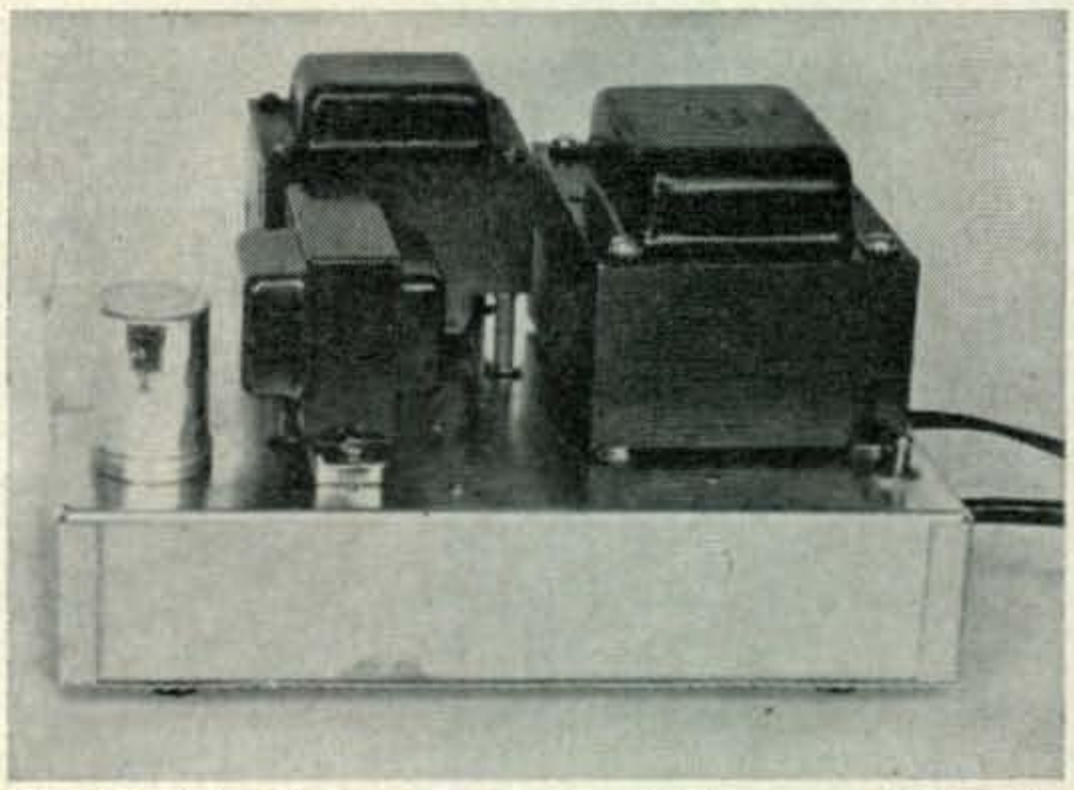
Some frequency modulation was experienced while receiving strong s.s.b. signals or when transmitting s.s.b. Chirp on c.w. also was found. This was due to the fact that the v.f.o. is very sensitive to plate-voltage variations and the particular 0A2 regulator tube in use at the time maintained the potential constant only to within 4 volts; however, after trying several other tubes, one was found to hold the regulation to within 1 volt, thus eliminating any objectionable f.m.'ing and leaving only a slight c.w. chirp.

Under normal transceive conditions the set would be matched to a low-impedance antenna source. This also is a necessity if only the receiver is to be used, inasmuch as it was found that with a high-impedance antenna input (such as with a random length of wire), on some bands the frequency could be pulled when either the plate tune or loading was adjusted, apparently due to r.f. feedback.

The transmitter section tunes up easily and quickly. Using the Model AC-200 power supply operating from 117 v.a.c., the steady-state output power during tuneup (or c.w.) was 130 watts on all bands when the loading was set for the specified plate current. Due to excellent dynamic voltage regulation afforded by the use of high-value capacitors and a swinging choke in the power supply, the p.e.p. output on s.s.b. with voice modulation, although rated at only 120 watts, was 150 watts. Carrier output on a.m. was a little over 30 watts. A.l.c. action was excellent and better than the average. Unwanted-sideband suppression was the same as with receive, carrier suppression was more than 50 db.

The National 200 Transceiver is priced at $359, with universal mounting bracket (gimbal type). The AC-200 power supply is $75. The manufacturer is National Radio Company, Inc., 27 Washington St., Melrose, Mass. 02176.

—W2AEF



The Model AC-200 power supply for operating the National 200 from 50-60 c.p.s. a.c. power. The toggle switch at the right front corner permits convenient changeover between 117 or 234 volt operation.

PLEASE USE YOUR ZIP CODE NUMBER ON ALL CORRESPONDENCE

For further information, check number 12, on page 112

For further information, check number 13, on page 112

THE NICK-KEY

An Electronic Keyer

BY F. R. NICHOLS,* W6JJI

THE idea for the Nick-Key circuit occurred after some time and effort had been spent testing a breadboard version of K2POO's "The Poo-Key Jr." circuit.[1] The author desired more flexibility of adjustment, such as individual weight and speed controls for "dits" and "dahs." It was decided that two modified Poo-Key Jr. basic circuits would be utilized, one to generate dits and the other for dahs. Each circuit would have to operate independently, without effecting the performance of the other circuit. The Nick-Key circuit, therefore, contains two saw-tooth oscillators and two amplifiers. The plate circuits of the amplifiers are common to the coil of the keying relay.

Nick-Key Circuit Operation

Referring to fig. 1, when the paddle contacts are closed, the B minus is connected to a saw-tooth oscillator and amplifier. The oscillator generates a train of "negative-going" sawtooth pulses. (The negative-going sawtooth pulse has a very fast rise time in a positive direction, and a comparatively slow decay time in a negative direction.) The pulse rate of each sawtooth oscillator is determined by the parallel resistor-capacitor network in each oscillator cathode circuit. Part of this cathode resistance is made variable, so that it can be manually adjusted to the desired pulse rate (speed).

Sawtooth pulses, taken from each oscillator cathode are fed into the grid of an amplifier through a "contact-potential" biasing resistor. Positive bias is applied to each amplifier cathode, through a manually-adjusted WEIGHT control for each amplifier. The setting of the WEIGHT control determines the level to which the oscillator output pulse must rise (on the grid of the amplifier), to cause the amplifier to conduct ("turn-on"). Conversely, the WEIGHT control setting determines at what level of amplitude the oscillator output pulse must fall to turn-off amplifier. The setting of the WEIGHT control, therefore, determines how long the amplifier will remain in a conductive state. During the time the amplifier is conducting, amplifier plate current flows and energizes the coil of the keying relay. The relay remains energized (contacts closed), until the amplifier ceases to conduct. This keying action repeats continuously, until the paddle arm is returned to its neutral position. Because the paddle arm makes and breaks the B minus lead to either oscillator-amplifier circuit, only the oscillator-amplifier circuit selected by manual operation of the paddle arm is placed into operation; the other circuit remains inoperative. This makes certain that only one oscillator-amplifier circuit is operational at a time. The fixed resistors (R_1 and R_8) connected across each SPEED control were added to flatten-out or make the speed change more gradual.

Because each circuit has its own WEIGHT and SPEED controls, all sorts of combinations can be manually adjusted into the circuit to obtain many variations of keying. So, for those who prefer a "banana-boat" swing, perhaps the Nick-Key is the answer.

The addition of a 0.006 mf capacitor across the relay coil can (in some cases) improve the "pick-up" response of the relay. The addition of a diode, CR_1, across the relay coil can (in some cases) improve the "drop-out" response of the relay. Either one of these additions may help an average run-of-the-mill relay to key at speeds in excess of 30 w.p.m. The eventual choice of the capacitor or the diode remains to be decided by the results of a cut-and-try approach toward improving relay operation. The value of 0.006 is not absolute, and can be varied to obtain the desired result.

Construction Comments

The Nick-Key circuit was bread-boarded primarily to make components easily accessible for quick substitution during the experimental test runs. No thought was given to circuit layout, other than keeping the leads short between components. Because of this reason, one 12AU7 was used for each oscillator-amplifier circuit, rather than splitting up this combination into one which could use one 12AU7 for both oscillators, and the second 12AU7 for both amplifiers.

Many articles have been written on the lay-out and construction of electronic equipment and so will not be repeated here. If you decide on metal chassis construction, remember that the B minus leads within each oscillator-amplifier circuit should *not* be grounded directly to the chassis. Only the paddle arm should be connected directly to chassis ground, so that the paddle controls the connection of B minus to the desired oscillator-amplifier.

Preliminary breadboard tests showed that if the WEIGHT control potentiometer *shafts* were grounded, the values of R_3 and R_5 had to be altered to restore proper WEIGHT control.

Power Supply Requirements

The power supply should furnish 6.3 volts a.c. for filaments, and about 105 volts d.c. for plate voltages. During test runs, regulated d.c. was used from a VR-105 in the v.f.o. power supply. If regulated d.c. is not used, it is suggested that you use a well filtered and moderately bled power

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*8257 DePalma Street, Downey, California
[1]*QST*, Sept. 1961, p. 50.

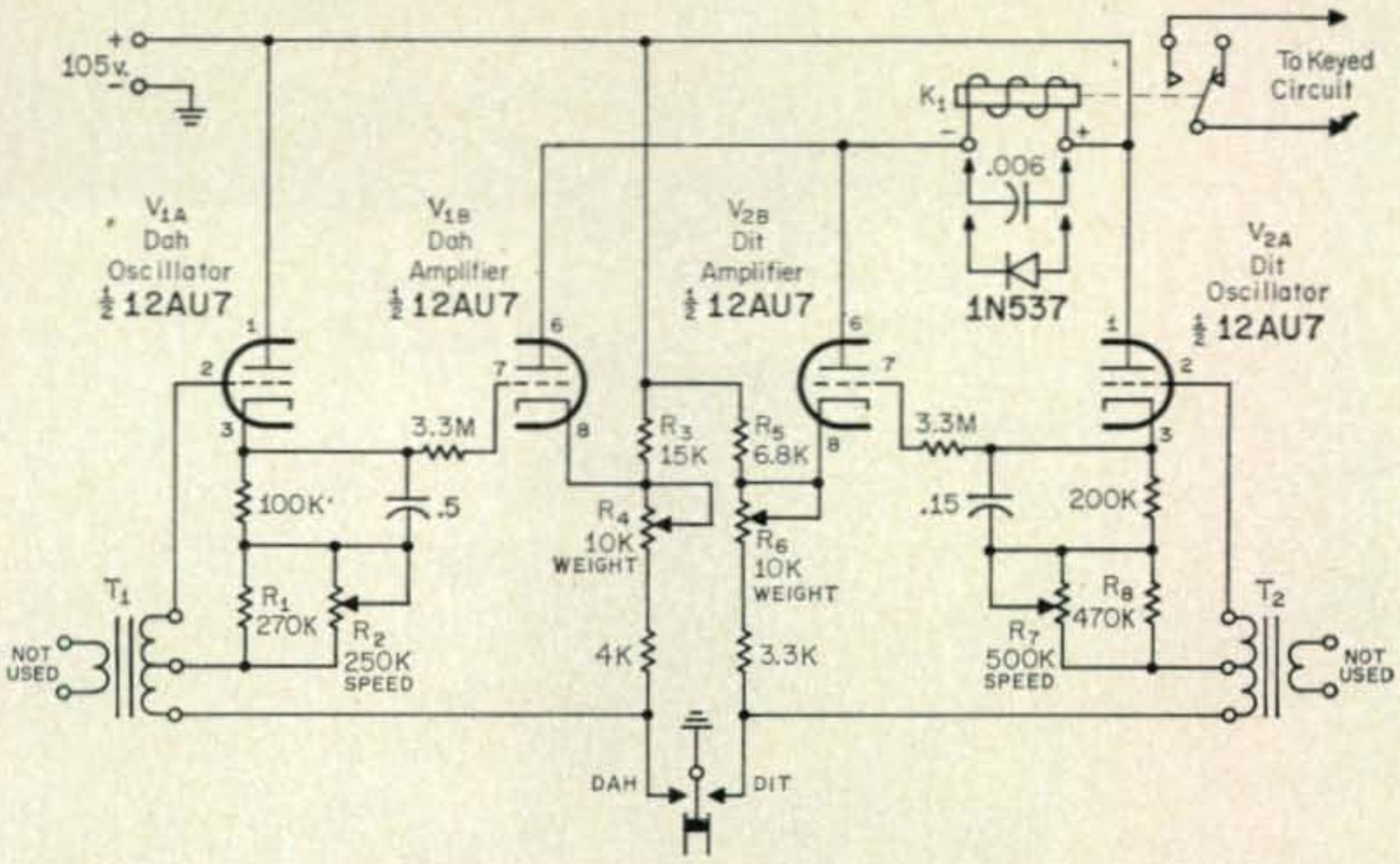


Fig. 1—Circuit of the Nick-Key, an electronic keyer. All resistors are 1 watt and all capacitors are in mf. All potentiometers have linear tapers.

K_1—S.p.s.t. relay, 10K a.c. coil resistance. Should pick up at approximately 1 ma.

T_1, T_2—Push-pull audio output transformers 12K to 14K primary; secondary not used.

supply, since voltage fluctuations could cause changes in the timing of the circuitry.

Circuit Adjustments

Ordinarily no circuit adjustments are required other than SPEED and WEIGHT control settings. WEIGHT control settings are easily determined by adjusting the WEIGHT controls while transmitting continuous strings of dits or dahs, and observing transmitter plate current readings. Dit transmission should cause the transmitter plate current to hover at 50 per cent of the key-down value. Dah transmission should cause the plate current to hover at 75 per cent of the key-down value. Once the WEIGHT controls have been set, no further adjustment should be necessary. The SPEED controls, however, should be calibrated to some extent to cut down on time spent hunting for a balanced speed condition between dits and dahs. Rough estimations of speed settings may be made as follows: Send alternate strings of dits and dahs, while adjusting the SPEED controls until the dits and dahs sound fairly well proportioned. Send plain text for one minute at the selected speed settings, and then count off 5 letters per word, to determine the w.p.m. Mark the w.p.m. opposite each dial setting of each SPEED control. Repeat this procedure for additional speed settings, until enough dial calibrations are made to satisfy your requirements.

Proper relay contact adjustment and relay armature spring tension play an important part in the over-all product of the keyer. Trial adjustments of relay contact spacing and armature spring tension should reveal which combination is the most desirable. When the "make" contact is properly adjusted, it should be possible to slide a piece of ordinary writing paper between the armature and the *pole piece* of the relay *when the relay is energized*. This amount of spacing will prevent the armature from hanging on to the pole piece after the relay is de-energized. If the "make" contact happens to be misadjusted so that the armature is *too* far away from the pole piece, chances are the relay will not follow keying.

Trouble Shooting

Trouble shooting calls for a methodical verification of all circuit connections, operating voltages, component values, relay adjustments, etc. This type of trouble shooting should be performed without specific direction. Obviously it is impractical to give detailed trouble shooting procedures for every possible type of trouble that *could* occur in the Nick-Key circuitry.

The following chart of *paddle-closed* circuit voltages are included as an aid in trouble shooting the Nick-Key circuit.

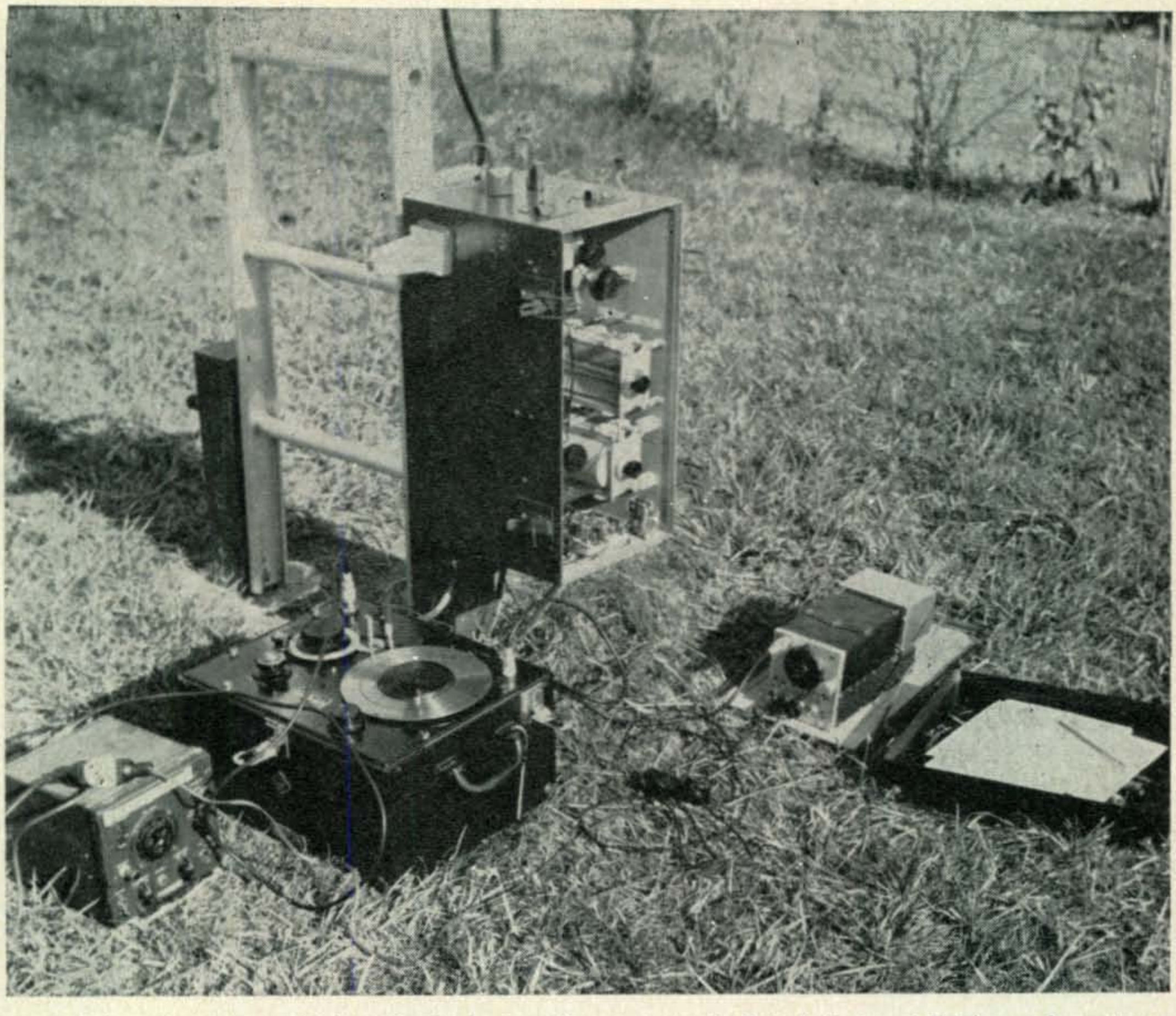
Measurement	V_{1A}	V_{1B}	V_{2A}	V_{2B}
Plate volts	+116v.	+94v.	+116v.	+100v.
Grid volts	−0.1v.	+17v.	−0.1v.	+17v.
Cathode volts	+24v.	+23v.	+25v.	+26v.
Note: Cathode voltage for V_{1B} and V_{2B} varies with WEIGHT control settings.				

Caution: When making voltage measurements, be sure that the negative lead of the v.t.v.m. is connected to the proper oscillator-amplifier B minus lead to the paddle. Failure to observe this caution will result in no voltage readings, or erroneous voltage readings. In other words, do *not* connect the v.t.v.m. negative lead to one oscillator-amplifier circuit and then proceed to check voltages in the other circuit.

The following trouble and remedy procedures are offered as a guide in locating trouble. When a remedy is self-evident, it has been purposely omitted.

Trouble: Keyer relay contacts close on initial paddle movement, and remain closed after paddle is returned to its neutral position.

[*Continued on page 99*]



View of the tuning set up used to obtain the impedances shown in figs. 4, 5, 6 and 7. The equipment consists of an LM signal generator, a 916A General Radio Bridge and an ARC-5 receiver used as a detector. The 4" × 4" supports can be seen with the 2" pipe running through the bottom rung of the ladder.

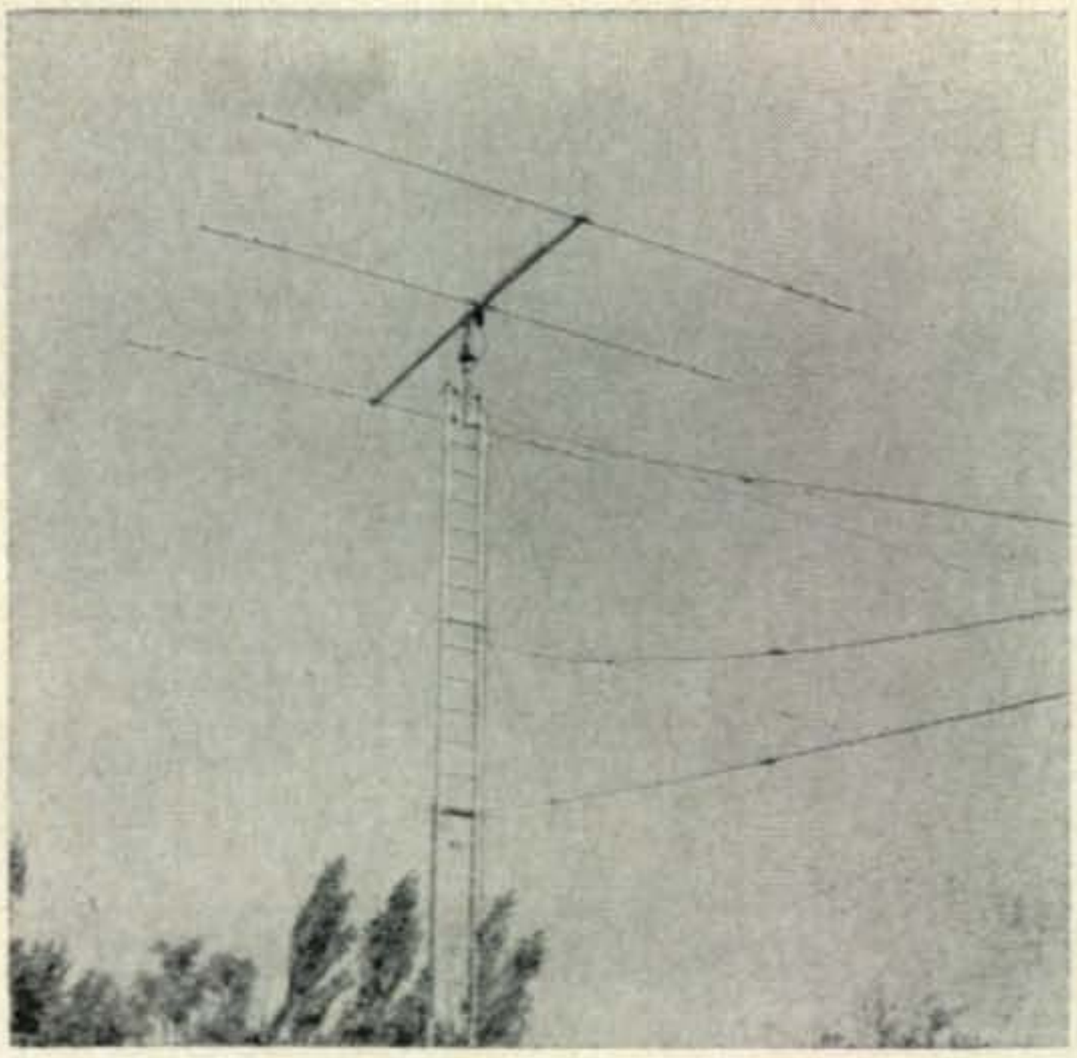
THE MARK IV DX ANTENNA

BY CAPTAIN PAUL H. LEE, U.S.N.R.,* W3JHR

This six band antenna operates as a vertical on 160, 75 and 40 meters and as a beam on 20, 15 and 10 meters. The tower is a 40 foot aluminum ladder that does double duty as the beam support and the vertical radiator.

THOSE of you who read this magazine regularly will recall that I am a strong proponent of vertical antennas for amateur use. In a previous article[1] I discussed the ways in which a vertical antenna can be useful at h.f., and compared it both favorably and unfavorably with horizontal antennas and Yagi arrays. That article and the one which followed[2] apparently provoked much interest, for I was swamped with mail asking for further information, and several subsequent articles appeared in this magazine and in others, both praising and condemning vertical antennas. The list of references which I offered[1] was sent to over three hundred readers. However, in spite of those who condemn, verticals *do* work as stated. To use a statement which applies well in such cases, the operator listening to the signal doesn't know it is coming from an antenna which can't work, so he is able to hear it QSA5. It is the purpose of this article to show how some simple principles of antenna design can be applied to a very common situation which exists in the backyards of many amateurs.

In July of 1966 it appeared that we would be moving our household overseas. I wanted to make a change in my antenna situation simultaneously with this move. First, I wanted an antenna for 10 meters. I had never installed one in the present location simply because of the sunspot cycle which had made the band quite useless for DX work for the past six or seven years. Second, I wanted an antenna which would discriminate against QRM from unwanted directions. This is one of the faults of the vertical antenna when working DX on 10, 15 or 20 meters, and I had pointed this out previously.[1] Third, I wanted an antenna which would be simple to erect and dismantle, and which would cover as many bands as possible with one structure, including the 160 meter band. Fourth, simultaneously and in common with the above



View of the upper twenty feet of the tower, showing the beam.

factors, I wanted to "buy" some forward gain on 10, 15 and 20 meters.

An ad in our local magazine "AutoCall" caught my eye. A local amateur was selling his HyGain TH3 Mk2 Thunderbird beam plus a CDR TR-44 rotator for half price! An idea formed in my mind immediately, and I bought the beam and the rotator, and stored them in the basement pending further study. Several of my friends heard of my purchase, and said, "You must be sick!" To that I replied, "No, I'm not—I'm going to make a top-loaded vertical radiator out of it." Some then thought I was completely mad, but others saw a glimmer of hope and light and decided to await further developments with interest. Meanwhile, I went on working stations with the Mark III,[2] stations who didn't know it could not work, on 20, 40 and 75 meters. There was a separate 5/8 wave whip for 15 meters.

*5209 Bangor Drive, Kensington, Maryland 20795.

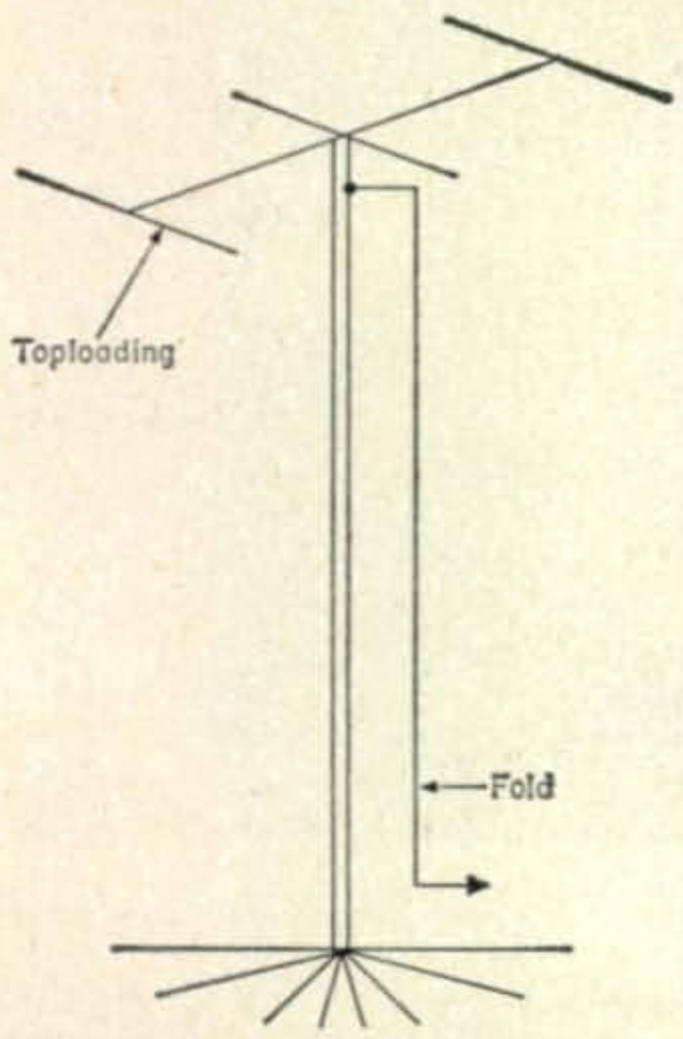


Fig. 1—Illustration of the top loaded unipole for 75 160 meters.

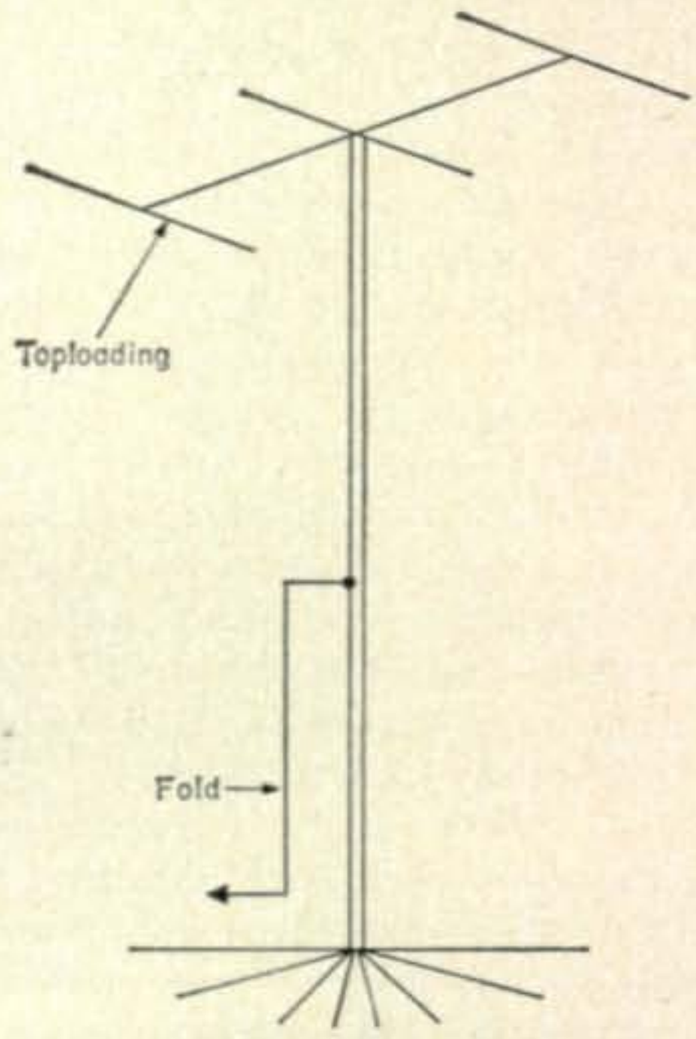
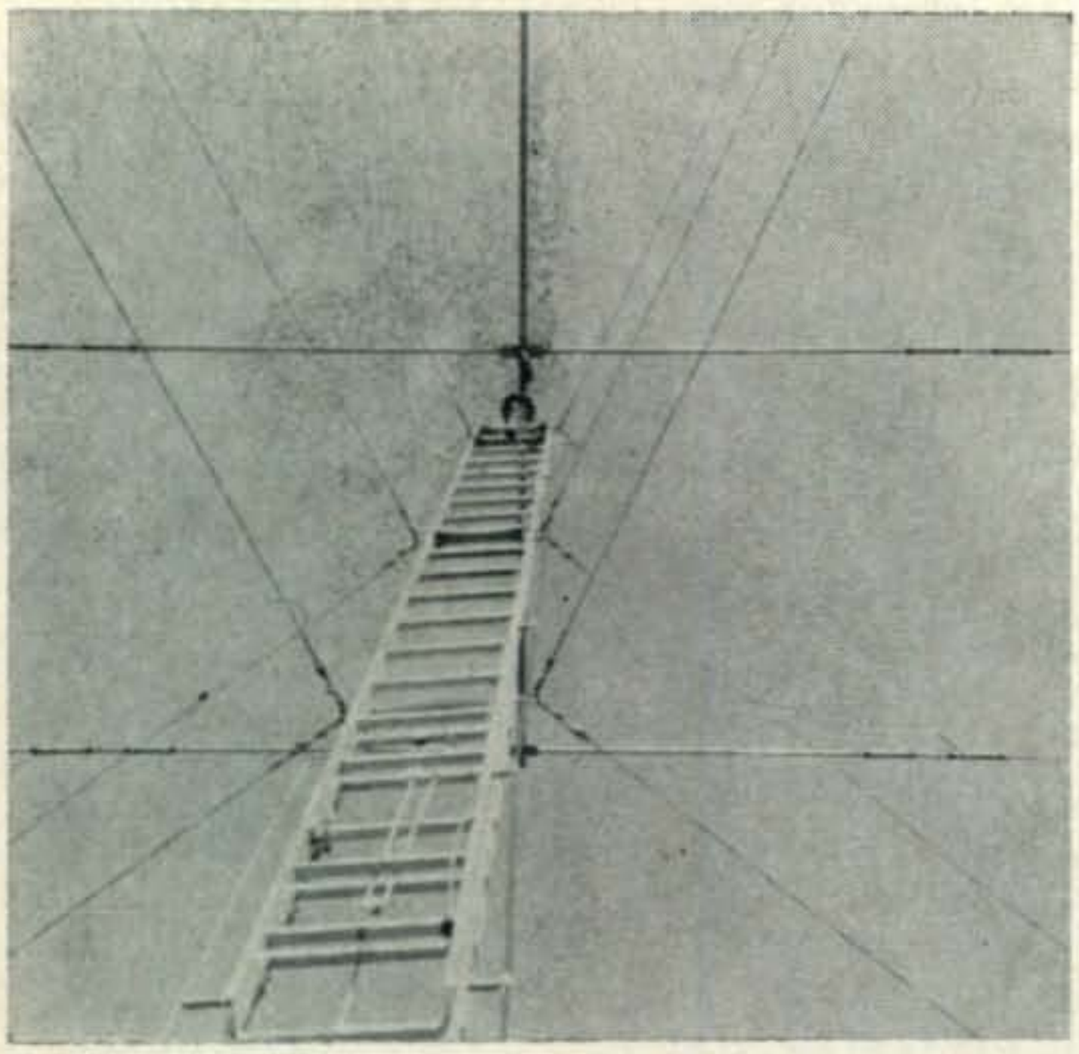


Fig. 2—The 40 meter unipole feed is made of 1" aluminum tubing tapped 20 feet up the mast.



View of the upper 20 feet of the tower. The coaxial line may be seen on the right side going up the tower on standoffs. The 40 meter feed wire, since replaced with one inch tubing, is at the left. The 2" cross-members for the beam support and at the guy levels can be seen in this view.

The Ladder Vertical

Having bought an excellent beam and rotator at a bargain, I wanted to do the same thing regarding a tower, bearing in mind that I wanted something easy to erect, dismantle, transport and re-erect. The mailman brought a sale "flyer" from Montgomery Ward. In it were listed aluminum ladders. I picked out a two-piece 40 foot type, and ordered it for the sum of $59.95 plus delivery charges. The 40 foot ladder would extend to 36 feet, and would be a very rigid support for the beam, when guyed. It would collapse to 20 feet, which would fit inside a moving van. It would be easy to erect, and easy to take down. It would also serve as a vertical radiator. It could be climbed with great ease. There would be a minimum of erection hardware.

Thus was the idea of the Mark IV six-band antenna born. The HyGain antenna would function as a beam on 10, 15 and 20 meters, at a 40 foot height which would be a fair compromise for all three bands.[1] The tower with the beam as top-loading would function as an efficient vertical radiator on 40, 75 and 160 meters. I especially wanted to be able to use it on 160 meters, because my s.s.b. exciter[3] covers that band. I do have a long wire for use on Navy MARS frequencies, but use of the vertical on 160 meters was very desirable. With the purchase of guy wire, guy insulators, and miscellaneous hardware such as thimbles, clips, eye bolts and turnbuckles, the package was completed within several weeks, and ready for erection.

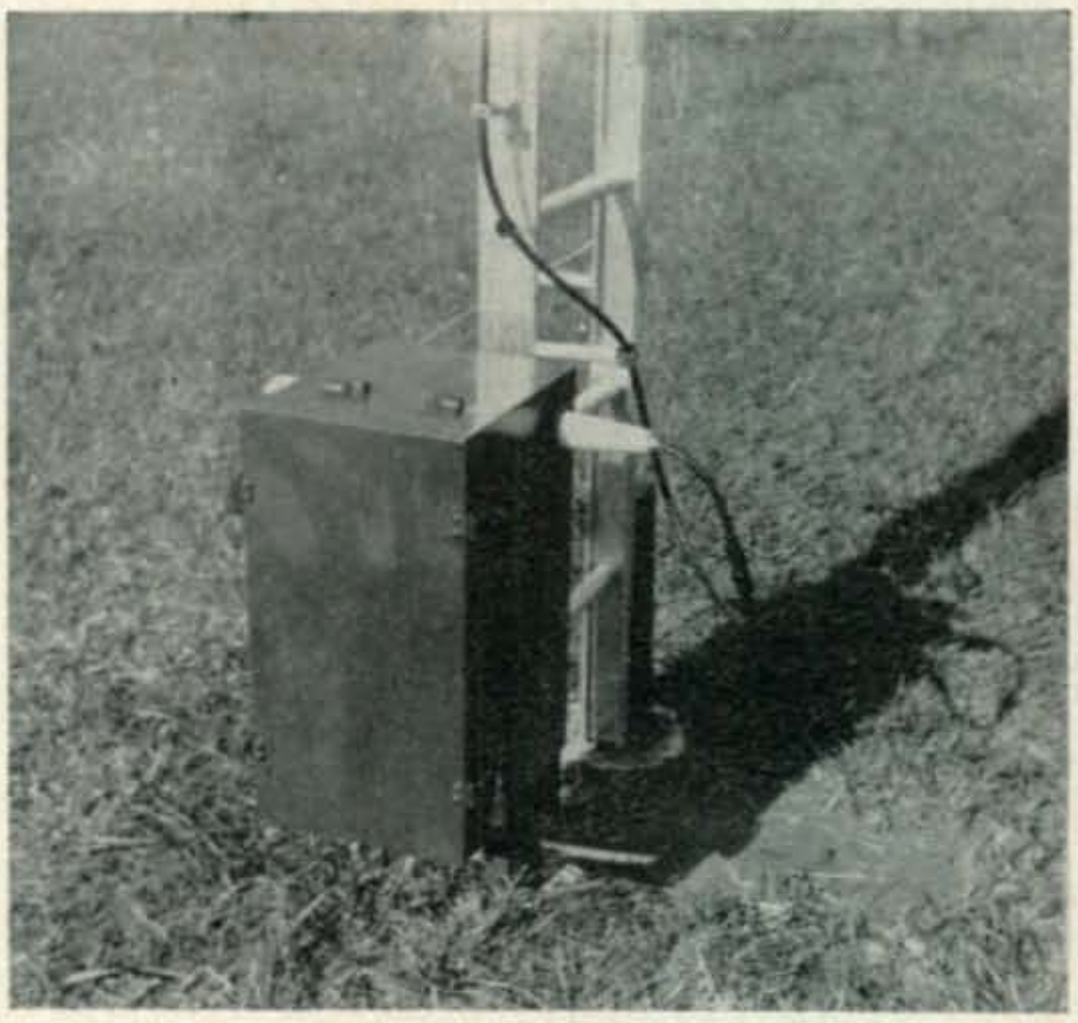
That job was done in one weekend, during which two other local amateurs helped me lift the Mark III out of its hole in the ground, and lay it down tenderly. It was given to one of them with grateful thanks for his help. Next came the erection of the new antenna. The rotator and beam were placed in position, with the ladder hinged at its bottom and lying on its side. The ladder was then pushed upright, and the bottom set of guys were fastened to their anchors. The ladder was plumbed by adjustment of guy tensions. The upper section of the ladder was then pulled up, the two upper sets of guys were fastened to the anchors and adjusted until the ladder was plumb all the way up to the top, and the coaxial line, rotor control cable, and 40 meter feed were put in position. The erection job was complete.

The beam was then tested on 10, 15 and 20 meters, with its coaxial line connected directly to the line into the station. The s.w.r. forward gain, and front-to-back ratio were exactly in accordance with the manufacturer's specifications, which pleased me very much. The dimensions of all elements of the beam had been previously set for the phone bands in accordance with HyGain's instructions, and I had left it that way. I did not use a balun with the beam, but wound a 12 turn coil of RG-8/U coaxial line 6 inches in diameter, in accordance with HyGain's suggestion, and used it as an isolation choke. It functions perfectly.

The next step was the rebuilding of the Mark III tuning unit to fit the new vertical radiator for 40, 75 and 160 meters. This was accomplished in another weekend, and the whole thing is now usable on 10, 15, 20, 40, 75 and 160 meters, with bandswitching from the control position in the station.

Unipole

That concludes the narrative—now for the technical details. First, the operation of the beam itself is exactly in accordance with Yagi theory, and it will not be covered here. It functions very well, and certainly speaks well for the design and manufacturer. But how do we cover 40, 75 and 160 meters with this structure? Well, we treat the structure as a folded unipole.[4, 5, 6]



View of the tuning unit, closed up. The 40 meter feed comes out the insulator on the left side, and the 75/160 meter feed (coaxial line to the beam) comes out the insulator on the right side. The line actually goes through the hole in the insulator. The box is water-tight, and locked.

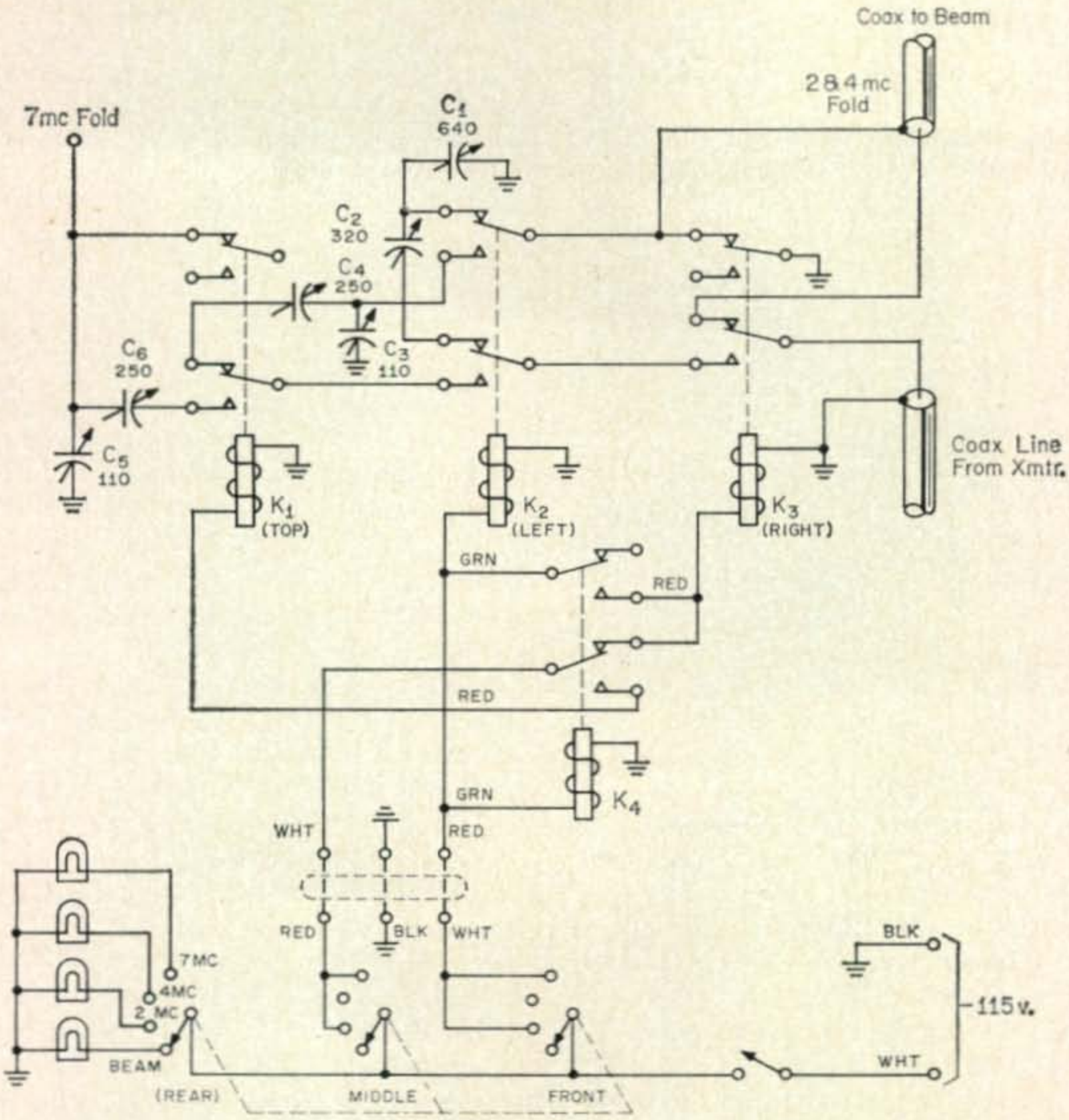


Fig. 3—Circuit of the tuning unit used to feed the six band Mark IV antenna.

You are all familiar with folded dipoles, I am sure. It is one of the most common antennas in use today, for the "driven element" of many TV receiving arrays is a folded dipole. If you mount a folded dipole vertically, cut off the bottom half of it, and replace that with a ground plane, you would have a folded unipole. If you add some top-loading[7, 8, 9] in the form of some radial wires, a top-hat, or the long horizontal boom and elements of a 20 meter Yagi array, you will thereby greatly increase the electrical height of a vertical radiator over its actual physical height.

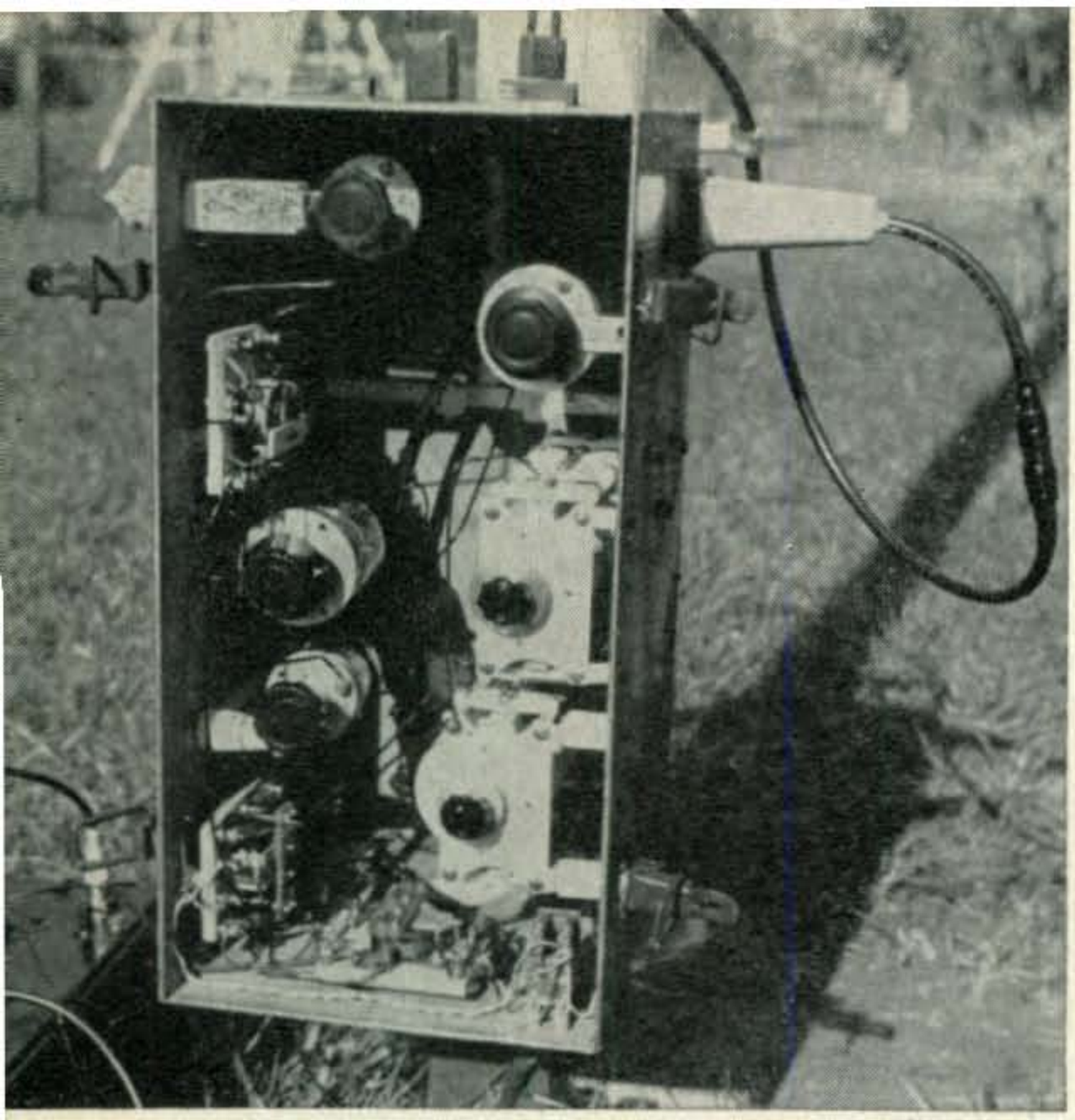
Figure 1 shows the schematic of the top-loaded folded unipole for 75 and 160 meters, as it is configured in this installation. Note that the feed wire or "fold" goes to the top of the vertical radiator. With the radiator grounded at its base, the impedance looking into the fold was about 2.0 + j140 ohms at 1.812 mc and about 35 + j370 ohms at 3.900 mc.

At 7.250 mc the impedance looking into this fold was out of range of the General Radio 916A r.f. bridge. Therefor, a separate fold was used for this frequency, and it was tapped on the radiator at a point 20 feet above ground. The impedance looking into this fold, made first of #9 aluminum wire, was 18 + j480 ohms. Changing the fold to 1 inch aluminum tubing lowered the impedance to 36.5 + j355 ohms. Figure 2 shows the schematic for the 40 meter feed.

160 Meter Fold

For the 75 and 160 meter fold, a separate wire is not used. The outer braid of the RG-8/U coaxial line which feeds the beam is lifted off ground, and is used as the fold wire to feed the radiator as a folded unipole. The RG-8/U outer braid is permanently connected to the top of the tower, but the RG-8/U runs down the side of

Close up of the coax line secured by the spring steel clips.



Interior view of the tuning unit. The air variable capacitors C_1 and C_2 are at the lower right. The others are all vacuum variables. Relay K_1 is in the upper left; K_2 and K_3 are at the bottom along with the extra control circuit relay. All r.f. wiring is done with #12 enameled copper wire. The 75-160 meter feed (coax to the beam) enters on the right and the 40 meter feed is visible on the left.

the tower on 3 inch standoff insulators. Thus, by ungrounding its bottom end and feeding it as a fold wire, the folded unipole feed for 75 and 160 meters is accomplished. The tower and the coaxial line don't know the difference, and this type of feed arrangement works very well. The 1 inch tubing fold is used for 40 meters, and it is supported on the opposite side of the tower on 4 inch standoff insulators.

Between the top of the tower and the top-loading formed by the beam elements there is the rotator motor and housing. I checked with representatives of CDR regarding inserting a rotator in an active r.f. element in this manner, and they saw no problems, because of the many internal contacts through the ball bearings in the raceways between the fixed and rotary shells. I did bypass all rotor control cable leads to ground with 0.01 mf ceramic bypass capacitors at the base of the tower, however, to prevent any possibility of r.f. being carried back into the house on the rotor cable.

The tuning unit was adjusted with the r.f. bridge with the beam elements parallel to the plane of the ladder. However, I subsequently note no change in transmitter loading nor in s.w.r. when I rotate the beam while the transmitter is operating on 40, 75 or 160 meters. I did not really expect much change.

Tuning Unit

The schematic of the tuning unit is shown in fig. 3. I used as much as possible of the Mark III unit, changing very little of the internal wiring. An extra relay was inserted, however, to provide a means for controlling the three r.f. relays with only two wires and one neutral in the buried cable. I did not care for the idea of pulling it out of the ground and replacing it. The extra relay was a much more expeditious solution.

The RG-8/U coaxial cable goes through the hole of an E. F. Johnson type 135-67 standoff insulator which serves as a feedthrough insulator. The hole is the exact size, and a bit of caulking compound is used to insure watertight integrity. The coaxial line must be insulated from ground so that it can be ungrounded and fed as the fold on 75 and 160 meters. Capacitors C_1 and C_2 form an L network for the 160 meter tuning. As shown in the table associated with fig. 3, relay K_3 is "on" for 160 meters. The shunt capacitor, C_1 is used to partially resonate the tuned circuit formed by the fold and the tower. Capacitor C_2 cancels out the residual positive reactance, and enables a perfect resistive match to the coaxial line from the transmitter.

For 75 meters, relays K_2 and K_3 are "on," and C_3 and C_4 form a similar L network for this band.

On 40 meters, all three relays K_1, K_2 and K_3 are "on," and the feed is transferred to the 40 meter fold, where C_5 and C_6 form the L network.

Capacitors C_1 and C_2 are a pair of large transmitting air variables obtained from Barry Electronics in New York. Substitutes may be used, but about 500 mmf is actually required in C_1, and about 120 mmf is required in C_2, in this particular installation. Capacitors C_3, C_4, C_5 and C_6 are small variable vacuum capacitors, but air variables can be used here if they have at least 2500 volts rating to handle 2 kw p.e.p.

On 10, 15 and 20 meters, relays K_1, K_2 and K_3 are all "off," and the power is fed directly through from the transmitter coaxial line to the beam via the upper contacts of relay K_3. Breaking the coaxial line and inserting relay K_3 caused a very slight amount of s.w.r. on 15 and 10 meters, but this is not s.w.r. in the beam. It is merely s.w.r. which exists on the line from this *relay* back to the transmitter. I know of no way to get rid of it, becuase this switching cannot be done with a coaxial relay, for the outer braid of the line to the beam must be lifted off ground for the 75 and 160 meter feed. Therefor I do not worry about the fact that the s.w.r. is 1.5:1 instead of 1.0:1, for example, on the transmitter side of the relay. *Que sera, sera.*

Impedance Plots

Impedance plots of the "L" network input impedances were made with the General Radio 916A r.f. bridge for 40, 75 and 160 meters. They are shown in figs. 4, 5, 6 and 7. The effects of the #9 wire *vs* the 1 inch tubing for the 40 meter fold are shown in figs. 4 and 5. It is obvious why I chose to use the tubing, for the bandwidth within the 2:1 s.w.r. circle is greater.

[*Continued on page 100*]

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2-CQ SPEAKER/ Q-MULTIPLIER & NOTCH FILTER: Plugs into a socket on the 2-C to provide increased selectivity and notching out of interfering hetrodynes and other interfering signals. Necessary controls are mounted on the 2-CQ.

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2-CS MATCHING SPEAKER

2-AC CRYSTAL CALIBRATOR: 100 kHz crystal oscillator corresponding to the numbered dial divisions on the Main Tuning Dial.

SPECIFICATIONS

FREQUENCY COVERAGE: 3.5 to 4.0 mHz, 7.0 to 7.5 mHz, 14.0 to 14.5 mHz, 21.0 to 21.5 mHz and 28.5 to 29.0 mHz with crystals supplied. Accessory crystals provide 500 kHz incremental coverage from 3.0 to 30 mHz.

SELECTIVITY: Selectable Passband Filter provides:
.4 kHz at 6 DB down and 2.7 kHz at 60 DB down.
2.4 kHz at 6 DB down and 9.0 kHz at 60 DB down.
4.8 kHz at 6 DB down and 16.8 kHz at 60 DB down.

DIAL CALIBRATION: Main dial calibrated 0 to 500 kHz in 10 kHz divisions. Vernier dial calibrated in approximately 1 kHz divisions. Main dial and Vernier adjustable for calibration.

STABILITY: Less than 100 Hz after warm up. Less than 100 Hz for 10% line voltage change.

MODES OF OPERATION: USB, LSB, CW, AM, RTTY.

SENSITIVITY: Less than .5 uv for 10 DB signal plus noise to noise on all amateur bands.

AVC: Amplified delayed AVC having slow (.75 sec.) or fast (.025 sec.) discharge and less than 100 microsecond charge. AVC can be switched off. Less than 6 DB change for 100 DB RF input change.

AUDIO OUTPUT: 1.8 watts with less than 5% distortion and .75 watts at AVC threshold.

AUDIO OUTPUT IMPEDANCE: 4 ohms.

ANTENNA INPUT: Nominal 52 ohms.

SPURIOUS RESPONSES: Image rejection greater than 60 DB. IF rejection greater than 60 DB on amateur bands. Internal spurious signals within amateur bands less than the equivalent of a 1 uv signal on the antenna.

CONTROLS AND JACKS:

Front: Main Tuning, Function switch, Band switch, Preselector, RF Gain, Mode, Selectivity switch, AVC, and S-Meter.

Rear: Antenna jack, S-Meter Zero, Mute Jack, Sidetone Jack, and Speaker Jack.

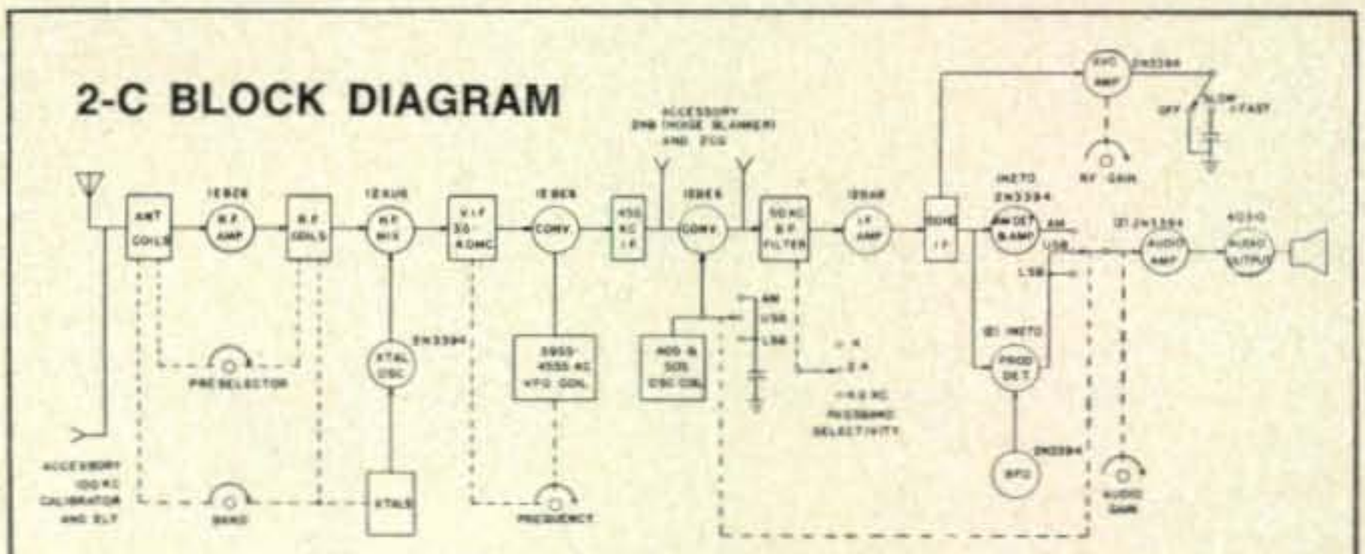
Side: Auxiliary crystal socket, auxiliary crystal — Normal switch, Phones.

Top Chassis: 2-CQ socket, 2-AC socket, and Noise Blanker socket.

POWER CONSUMPTION: 30 watts, 120 VAC, 50/60 kHz.

DIMENSIONS: 11 5/16" wide, 6 9/32" high, 9 3/32" deep, weight 13 1/2 lbs.

2-C BLOCK DIAGRAM



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For further information, check number 6, on page 112

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The Swan 250 is at its best in the SSB mode, for which it was primarily designed. With 240 watts PEP input and an average beam antenna, its talk power does an outstanding job. To w your AM friends you simply insert carrier to 75 watts in and they will read you loud and clear. AM reception is provi for by the receiver function switch. Also, a noise limiting cuit is effective on both AM and SSB.

The Swan 250 is engineered to provide the same excell voice quality which has become the trademark of all S transceivers. And, naturally, the same customer service pol second to none, applies to our VHF models.

If you are seriously interested in working 6 meters, see new Swan 250 at your dealer. We are delivering now, but back order list is getting longer, and we suggest you pl your order soon.

73 Herb Johnson W6QKI

SPECIFICATIONS:

- ★ **240 watts** P.E.P. input on single sideband, 180 watts cw input, 75 watts AM input with carrier insertion.
- ★ Two 6146B tubes in Power Amplifier.
- ★ Complete band coverage, 50-54 mc.
- ★ Velvet smooth vernier tuning covers 500 kc, calibrated in 5 kc increments.
- ★ Transmits and receives on Upper Sideband.
- ★ 2.8 kc bandwidth with crystal filter at 10.7 mc.
- ★ Single conversion design for minimum image and spurious.
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- ★ Receiver noise figure better than 3 db. 6HA5 triode R.F. amp., 6HA5 triode mixer.
- ★ **Separate AM detector.**
- ★ **Automatic noise limiter.**
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- ★ Pi output coupling for matching wide range of l impedances.
- ★ Meter indicates either cathode current or relative out for optimum tuning and loading.
- ★ Provisions for adding 500 kc calibrator, or plug-in unit.
- ★ Dimensions: 5½ in. high, 13 in. wide, 11 in. deep. Weig 17 lbs.
- ★ **Price, amateur net: Swan-250 .....$**

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14-117 12 Volt DC Power Supply.....$130.00
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2000 Watts P.E.P., two 3-400Z tubes. Includes Power Supply.
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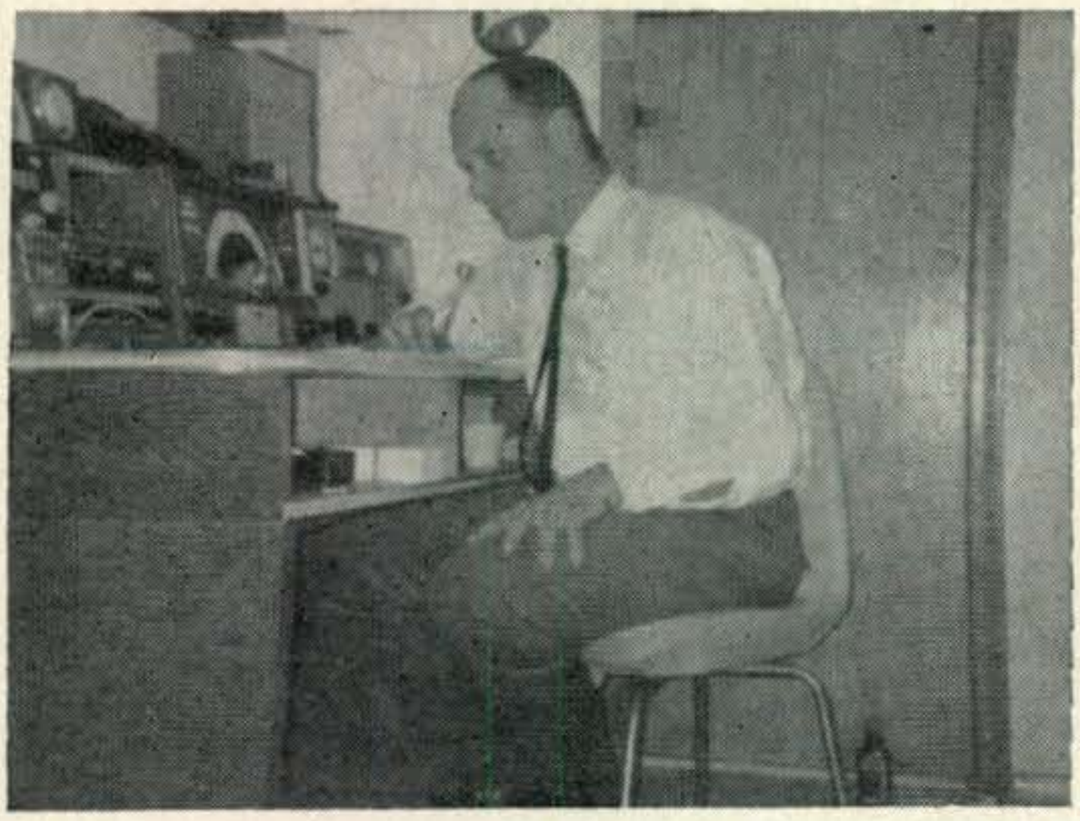
For further information, check number 16, on page 112

Harold M. King, W8HYB, a veteran employee at the Defense Electronics Supply Center in Dayton, Ohio, is shown being congratulated by Air Force Brigadier General Glen J. McClernon, DESC Commander, upon Harold's retirement after 27 years of Government work.

John Gayer (left), HB9AEQ, shown pinning membership button of the International Amateur Radio Club on beaming Jose Cardoso de Almeida Sobrinho, PY2AC, of Sao Paulo, Brazil. Jose, an old-timer in amateur radio, joined the IARC during a recent visit.

PEOPLE AND PLACES



This is Glenn Pohl, K8IYZ, winner of the "Ham of the Year" award sponsored by the Tawas Radio Club. The award was presented to Glenn at the annual Northeastern Michigan VHF Hamfest in Oct. at East Tawas, Michigan.

Father Dan Coffey, the young man behind the signal from OA6AM. Until a few months ago, Father Dan operated from Arequipa, in southern Peru, but now you'll find him on 20 meters signing OA6AM/1, from Piura, in the northern part of the country.

This could be titled "Boy is 15 meters Hot." Actually the photo shows the harmonic of Mickey Stephen, K5CWU of DeLeon, Texas. The junior ops name is David.

MY QUARTER OF A MILLION FRIENDS

BY ETHEL R. JOHNSON*

I have a quarter of a million friends. I have never met any of them, I do not know their last names, and they are unaware of my existence. I can visit with them at any hour of the day or night and find them at home, or I can refuse them admittance to my house if I feel so inclined.

You see, there are more than 250,000 licensed amateur radio operators in this country, and I am a constant short wave listener. I can't claim to have heard all of them, but I can count in the hundreds the number of people to whom I have listened, many of them day after day. I have shared in their joys and their sorrows, learned about their families and their jobs, their problems and their pleasures. I have rejoiced with them, wept with them, offered my prayers in their behalf, laughed with and at them, and learned so very much about so many things and places. Let me tell you about some of them.

Marty is my daily companion. He is an elderly priest presently stationed at a shrine in the business section of one of our largest cities. A former college professor, cultured, well read and much travelled, he has a way of describing his activities with such graphic clarity that one feels as if he had been along with him. In his spare time he takes long walks about the city. Through his eyes, or more properly, through his voice, I have watched the growth of a huge metropolis, old landmarks being demolished, and new skyscrapers taking form, sharing his sadness at tradition making way for progress. One of his favorite haunts is the waterfront, and he spends much time there, making the acquaintance of radio operators on all the ships which dock. He describes these experiences vividly to his friends on the air, and every QSO is a sheer delight.

Every afternoon I visit with Nan and Lucy. Both farm wives, they live some distance apart, and while they do meet occasionally in person, they chat daily via radio. They exchange recipes and sewing hints, and recently called upon their Yankee ingenuity to cope with a seemingly unsolvable problem. Both of them raise chickens, and have the task of killing and cooking the surplus roosters when they reach a certain weight. Their children consider them pets, and refuse to eat them. So, clever people that they are, the girls killed the birds, dressed them, and exchanged them. The children have no scruples about eating someone else's pets, so the problem no longer exists.

Evvie is a wonderful friend. When I first met Evvie and her OM on the band they were excited over the impending arrival of their first child after ten years of marriage, and I was delighted when Dick announced the birth of a lovely daughter. Three months later Dick was killed in an accident, and the courage and fortitude which Evvie displayed has been an inspiration to every one. She is back on the air, making the best of an almost intolerable loss, a little more subdued, but a charming, cheerful person, nevertheless.

Every evening I look forward to hearing John and his son, Johnnie. They converse from different states, exchanging family news, and I feel a real part of it all. I have shared the grandparent pleasures of the oldest child's first day in school, and followed the progress of the baby from his first tooth to his first spoken word. I've listened to Johnnie's problems with digging a new well, and shed a few tears of my own when the new puppy ran into the road and was killed by a passing truck.

One of my earlier acquaintances was Bud, and I was sorry to learn that he had recently lost his wife. He began to talk every evening with a YL, and the following year arranged to meet her in person at a Hamfest within travelling distance of both of them. Yes, you guessed it, their friendship continued to grow, and a few months ago they were married. Do you suppose they have His and Hers Rigs?

One of my pets is Dickie. He is twelve years old, and is extremely proud of the fact that he holds a general ticket, and is delighted when an older person will spend some time with him. He has another engrossing hobby, and uses ham radio to further his interest in that. He has become an ardent coin collector, and in every contact he wheedles his listener to look in his pocket and tell what coins he has available. If there is one he wants, he asks for it, taking great care to say he will send a stamped addressed envelope and enclose a coin of similar face value.

Another of my favorites is Otto. Soft spoken, with a delightful accent, he is a Hungarian refugee. He and his wife escaped during the Hungarian revolt by riding across the border in coffins in a hearse. A harrowing experience, for they didn't know through one long night when they might in truth become real corpses on their way for burial. Happily established in this country, Otto spends many hours on the air. Unfortunately, his wife takes a dim view of amateur radio, and will have none of it in the house, so he has spent a great deal of time building a shack in the back yard, and making it snug against the

*16 Lowell St., Woburn, Mass.

elements. I heard him complain once rather bitterly that he is a refugee for the second time in his life.

Ken is another who has his shack apart from his house. He has converted an old trailer to his personal use, and has furnished it rather sumptuously. He managed to heat it adequately through the winter, and this summer proved his mechanical ability by making an air conditioner from an old refrigerator at a cost of less than ten dollars. He was so pleased with this accomplishment that he gave details of the procedure to every one he contacted, much to the bewilderment of a man in South America who apparently knew little English, and hadn't the vaguest idea what the QSO was about.

I enjoy listening to Bill every day. He retired a year ago, and took up amateur radio. He is on the air practically all of his waking hours, and checks into one net after another. He must either have been employed by the Bureau of Vital Statistics or else owns stock in a greeting card business, for he passes along information from one net to another. He knows who is ill, who has died, who is getting married, or who has a birthday, and urges all and sundry to send along a card.

Many of my friends have pets, some of them a bit out of the ordinary, to say the least. Jim has an alligator, which he takes out for a walk on a leash. His wife has just finished making matching sweaters, one for Jim and one for the alligator. Two people I know have talking crows. One bird has an ingratiating way of saying, "Hel-l-l-o-o-o-", and immediately adds a raucous "Byebye". The other, and I recommend the acquisition of one like him to every licensed operator, calls CQ over and over—a real help on a night when the band is quiet, I should think.

One XYL owns a pet boa constrictor. She also has a passion for scorpions, spiders and such, and is still talking about a recent vacation in the Southwest where she was able to indulge her hobby to her heart's content.

There is also Timmie, a cat who loves ham radio. His owner is confined to a wheelchair, and Timmie spends hours curled in his lap. His gentle purr of contentment makes for very pleasant QRM in the background.

Early this summer one of my friends went into great detail about a contemplated camping trip, his first. With much advice from his pals he bought elaborate equipment, and took off for Nova Scotia, seven hundred miles away, with his wife, six children, and his mother-in-law. His report when he returned was hilarious. Apparently a good time was had by all, and the only fly in the ointment was two weeks in the company of his wife's mother, who insisted on having her sleeping bag in the same tent with him and her daughter.

Another good friend of mine is Phil. He is a pathologist attached to a large metropolitan hospital. His favorite form of relaxation is to take his car to the top of the highest hill in the area late at night. There he sits, watching the lights of the whole city below him, and talks over his mobile rig. He is wont to discuss his day's work, and at times it can be somewhat gruesome and disturbing. For instance, his graphic description of his findings with autopsies on victims of respiratory ailments is a much more telling argument against cigarettes than any written word could be. On the other hand it is comforting to note that he pauses in his transmissions to light one for himself.

Anything can happen on the bands, and usually does. One evening very late I heard a chap talking, and he QRX'd to investigate a commotion going on outside his home. He lives on the boundary line of two towns, and came back to say that the police cruisers from both communities were there, arresting a man for drunken driving—on horseback!

I heard Ben talking with his usual group of friends one afternoon, and he informed them that his wife was having their ninth child in an adjoining room. He stopped in the middle of his transmission, and switched on an intercom. The first cry of that new born baby came out loud and strong over the air—surely a first of some kind, unusual even for ham radio.

Another evening I heard Carl, who is a police officer, call and call a CQ on a very quiet band. Finally some one came back to him, and after the usual exchange of handles and QTH's Carl said, "Look, this our first contact. You don't know me, but will you let me talk a few minutes?" He went on to say that he had been in the police cruiser a short time earlier, and had been sent to a house where two very small children had been found trapped in an abandoned freezer. He had worked desperately to revive them until a doctor had arrived and pronounced it useless. He was so shaken by the experience that he felt he had to get relief by talking it out with someone. Fortunately the man with whom he was in contact was very understanding, and seemed to know just the right things to say to help him, and by the end of the QSO Carl had recovered himself, and was able to carry on.

There are many weekly rag chew nets to which I listen. One evening some one commented that Chuck didn't sound quite right, and wondered if he were having trouble with his mike. "No," came back the doleful answer, "just trouble with me. My wife is in Florida, I'm alone in a cold cellar, I have the mumps, there's nothing in the house to eat, and I'm hungry." Of course he took a ribbing, but within fifteen minutes the wife of one of the other boys arrived with a bowl of hot soup, a jug of coffee, and most welcome of all, an electric blanket.

Joey delights my soul. He is fond of ice cubes, but insists that they be germ-free. He found painting them with iodine to be a tedious task, so he resorts to adding a generous amount of an alcoholic beverage to the glass to get the same result.

I am fascinated by another group which gets together informally almost every night. They spend most of their time planning for an eyeball

for the following week, discussing at great length where and when they will meet. Sometimes it is to be a pizza party, sometimes a bowling match, and sometimes just a gathering at a beer parlor where they can sit and talk. After much debate all plans are made, and then two nights before the scheduled party they start to back out with all sorts of weird excuses. One will say he lost all of his money on the horses and can't afford to go, another will say his plane is out of commission, and he has no transportation, and still a third will say he has just gotten religion, and is spending every evening in church. I was completely bewildered by the whole thing until I learned from another source that most of them are physically handicapped, and are unable to leave their homes. My amusement is tempered by the pathos of the situation, but one can not feel sorry for people who are obviously enjoying themselves as much as this group is.

A quarter of a million friends can provide one with a quarter of a million different set of experiences.

I have learned all about Buddhism from one of my scholarly friends who was studying it simply out of curiosity. I have heard debates on both sides of every political controversy, and found it most enlightening. I have gone through the invasion of North Africa during the war, helped evacuate Dunkirk, fought at Anzio, and travelled down the Rhine with the Army of Occupation. I know what it is like to spend nine months at Thule at the top of the world, I've gone salmon fishing in Labrador, met up with a bear in the wilds of Maine, and caught an alligator in Florida. I have shared in sports car racing, horse racing, and have even found out the best way to catch a greased pig at the county fair. I have taken part in regattas, shot rapids in a canoe, and learned what it is like to be under a tree when it is struck by lightning. Vicarious adventures to be sure, but all of the thrills and pleasures are mine when I turn on my receiver.

These are but a few of the many people to whom I have listened, people I have grown to admire and respect, and am happy to welcome into my home, and call friend. They come from all walks of life, from all parts of the country, and represent every possible occupation, and all age groups.

No amateur radio operator need ever be lonely or bored, for he, too, has a quarter of a million friends with whom he can visit at the turn of a switch. ■

YLs In Sydney, Australia

BY LOUISA B. SANDO,* W5RZJ

PICTURED in the accompanying photo are four YLs who operate from the Sydney, Australia area. It was forwarded by Muriel Eagles, VK2AIA, who comments there are six other active YLs besides herself in New South Wales.

No doubt the most active of them all is Muriel, herself. She recently received WPX with seal for 350 (on phone), and adds she is just awaiting QSLs for the 400 mark. Other awards include WABE, WAC, WAP, WAZL, DXCC, KA25, WACYL, NZA, DXYL, ADXC. She holds three Mexican awards—WAXE and The Mexico Award, being the first VK to receive these two, and The America Award, the 2nd VK to receive the latter. Muriel is a member of YL International SSB'ers and holds half a dozen of their awards with seals. She has worked well over 100 YLs for YLCC, but cannot obtain sufficient QSLs to apply for it. (Come on, gals!)

Muriel describes herself as an "elderly widow." She adds that her OM was one of the earliest hams in Australia, receiving his first license in 1914 in the days of spark. It was then that Muriel learned the Morse code, but it was not until after her husband's death 14 years ago that she decided to study for the exam. She has held her license for 10½ years now and is so glad that she did make the effort. Using a Swan 240 and a ground plane antenna up 30 ft., she enjoys operating on 20, 40 and 80 meters, and also has a rig for 2 meters.

Along with ham radio, other hobbies of gardening, crocheting and volunteer work for an institution for elderly citizens, help keep Muriel a *Young Lady*. Congratulations, and good DXing, VK2AIA! ■

YL operators near Sydney, Australia pictured at QTH of VK2AOK. L. to r., Mona, VK2AXS (OM VK2AAK, Alex); Muriel VK2AIA; Hebe, VK2AOK (OM VK2AGZ, Dick, and son VK2ZGZ); Verle, VK2MM (OM VK2CM, Mark.) Muriel, VK2AIA, recently earned WPX on phone.

*4417 Eleventh St., N.W., Albuquerque, New Mexico 87107.

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Cat. No. 396-509

Frequency Range 150-470 Mc

Cat. No. 396-509 Discone Antenna is a skeletonized discone in which the disc element is fabricated of twelve ¼" diameter solid brass rods. The cone element consists of twelve ⅜" heavy wall brass tubes. Feed point insulator is fabricated of polycarbonate resin. The antenna assembly is mounted on a 4 ft. 1 in. IPS galvanized steel pipe. Cat. No. 396-509 is supplied with RG8A/U internal feed line terminated 18" below the support pipe with a Type N male connector and neoprene weatherproof housing.

Specifications

***ELECTRICAL**	
NOMINAL INPUT IMPEDANCE	50 OHMS
MAXIMUM POWER INPUT	500 WATTS AT 150 MC 150 WATTS AT 470 MC
VSWR	2.0:1 MAXIMUM
BANDWIDTH	150-470 MC
LIGHTNING PROTECTION	STARGAP
***MECHANICAL**	
ELEMENT MATERIAL	BRASS
DISC DIAMETER	20"
CONE—MAXIMUM DIAMETER	23-1/2"
SUPPORT PIPE	1-5/16" DIA. GALVANIZED STEEL
RATED WIND VELOCITY	100 MPH
LATERAL THRUST AT RATED WIND	24.5 LBS.
BEND. MOMENT 6" BELOW CONE	37.0 FT. LBS.
WEIGHT	16 LBS.

Communication Products Company

DIVISION OF

PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

Marlboro, New Jersey 07746 — Tel. (201) 462-1880

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International Mission Radio Association News

BY TOM AQUINAS COX, O.F.M. CAPUCHIN W2CBX*

In a previous article, I attempted to define and explain the purposes of the International Mission Radio Association. I think if we take a look at the word "mission" in the title of the organization it will help tell the story of IMRA.

What do we mean by mission? In a general way mission means purpose or task. A woman in the kitchen has a mission—to prepare dinner; a basketball team has a mission—to win the game.

As IMRA members the word mission brings to our minds people with a special purpose, a unique task. We think of the men and women with the task of aiding their fellow men in foreign lands. We think of the teacher in the jungle, the Peace Corps member, the doctor, the clergyman. We think of the man who helps a family, a town, by teaching them how to feed and clothe themselves better. The doctor, the nurse, the brother, the sister, the clergyman who leave their comfortable lives at home and go abroad to mend the wearied bodies and souls of their suffering fellow men.

The word "mission" to the IMRA member means the work of these kinds of people.

For these people with this special mission—to help their fellow men abroad—IMRA wants to provide two services. These missionaries want and need communications services both among themselves and with their families and friends back home. For this purpose IMRA hopes to establish a communications system that will provide as many contacts with as many parts of the world as band conditions will permit. Band conditions are getting better too, so we will have a big job. We need people with time and energy to contribute to the success of this communications service. We need "on the air" participation from all over the world.

Besides providing this communications system, we hope when and where possible, to provide the equipment to allow communications. Many of these Missionaries need help from IMRA to acquire good equipment. They need your ideas, time and unused good equipment to fill this need.

The word mission has application to the members of IMRA also. We have a job to do, a task to fulfill. We believe we have a real purpose in the world of Amateur radio.

What is this task for all of us? It is the task of stressing the value of the PERSON in communications. We want to stress something already present in the Amateur world—fellowship and friendship. We are concerned with real person to person communications especially on an International level. We expect our members to be thoughtful and considerate in their operating habits.

IMRA is not by any means an organization of dissatisfied Amateurs. We are, on the other hand, people who love amateur radio; people who want to put amateur radio to a good purpose.

In the United States, the enumeration of the purposes of Amateur radio by the F.C.C. does not include the word hobby. Radio is termed an art, a service, but not a mere hobby. We hope to further the ideals of the F.C.C., and the ideals of other governments, by putting our skill to a good purpose, namely, to serve those working in foreign lands with a communications system, and to foster good will on the amateur bands especially on the international level.

HI3XLL, Padre Luke Lafleur, is one of the many we hope to aid. Luke is a Canadian who has worked in the Dominican Republic for six years; he hopes to be there for life. Amateur radio has been a great help to Luke at his school in San Jose de las Matas, where he teaches. Amateur radio is his only means of rapid communication. There are no phones, no telegraph, and only poor roads in his area. Luke uses his radio to contact his family and friends back in Canada and in the States. Often on 75 meters he is able to patch his students into their families around the countryside.

You can find Luke on 20 meters almost daily at 1730 GMT. He is usually around 14.145 and looks for contacts all over the world. Luke runs an HT-37 with a Drake 2B and a cubical quad. You might hear him on the air with VE2BTU or HI3JBR. Luke is looking for a few contacts near Watertown, New York and the New England states for some of his fellow teachers. Twenty meter QRM gets to be too much for

*Mary Immaculate Friary, Garrison, New York.

the HT-37 at times. Someday a linear would help out.

IMRA wants to help this man and many many more like him. A good communications system could put him in contact with the areas he is looking for, and perhaps we could locate a linear for him.

Last month we had a little bad news, but there is some good news to go along with it. 5H3AC had to go off the air after ten years in Tanzania. Carl Woll has moved on to Kenya to fulfill another teaching post. At the present time foreigners are not permitted licences in Kenya. Carl and his wife, Laura, have been working in East Africa since 1936. We are sorry that we will miss you on the air Carl, 73 and 76 (God Bless).

As we say 73 to Carl for awhile, we can welcome Archie Jones to the airways from Guayaquil, Ecuador. I believe Archie's new call is HC2AJ. He is just getting on the bands, so look around for him. Archie is running a Galaxy 5 Transceiver on all bands. Archie too is a clergyman and a teacher. He along with Padre Luke would like to participate in the services of IMRA.

Archie is using amateur radio for contact with five mission stations in Ecuador and also for his work on an international level. Radio keeps him up on the "goings on" in the missions. He is also looking for contact with his family back in the States.

TG5HC is another missionary who requests the services of IMRA. Brother Pat, an old timer in Central America, trains teachers for schools among the Indians of Guatemala. Over sixty percent of the people in his area of Guatemala are illiterate. Pat has been in the field for 22 years and says he hopes to remain "many more." Brother Pat feels IMRA can be valuable by providing a communications system so that his fellow missionaries could speak to their families and friends back home. Pat also needs an a.c. power supply for his SR-160 and a beam antenna.

You can find Brother Pat on 20, 40, or 80 meters at 1800-2000 GMT. Amateur radio is important to him because it would be the only means of communication in times of emergency. Contacts with the folks back home is also a good morale booster.

Pat has often participated in the CQ DX contests both from YN4CB and TG5HC. Since 1949 Pat sent more than 3000 DX'ers a QSL card!

During his ten years in Nacaragua '49-'59, Brother Pat interested another group of missionaries in amateur radio. To this other group, headed by YN4CM, Padre Germain and YN4CF, Padre Dell, amateur radio has become a great asset over the years. They are now setting up ten more stations along the Eastern coast of Nicaragua. Rain, flood and jungle often delays communications for months. Amateur radio links these missionaries together and keeps them in contact with their homes in the States.

These are a few of the many interesting people IMRA wishes to serve. There are hundreds more. You will be reading about them soon. At present contacts are being made to bring the IMRA story to the Peace Corps and other international organizations.

To even try to fulfill its goals IMRA needs members—hundreds—thousands of members. People who are interested in amateur radio, and people who are interested in enhancing international good will. Thre is a job for you with IMRA. We need your participation in a communications service net; we need your ideas to better employ our goals; we need your support to aid our over-seas members; we need your imagination for progress; we need your dedication to the ideals of IMRA.

IMRA can be a wonderful asset to Amateur Radio with *you* as a member.

For further information, please write to:

Grail Radio Club, Grailville, Loveland, Ohio 45140

Radio Club, St. Anthony Friary, Hudson, New Hampshire 03051

Radio Club, Mary Immaculate Friary, Garrison, New York 10524

Mr. Murrill Burton, 1008 Mendenhall St., Thomasville, N.C. 27360

Rev. Daniel Linehan, S.J., Weston Observatory, Weston, Mass. 02193

Rev. Leonard Bose, 106 North Rangstorff Ave., Mountain View, Calif. 94041

Rev. Peter Bechman, O.S.B., St. Benedict Abbey, Atchison, Kan. 660002

Mt. St. Paul Amateur Radio Club, 500 Prospect Ave., Waukesha, Wisc. 53186

Rev. David Reddy, O.F.M., 601 McKinley Parkway, Buffalo, New York 14220

Maryknoll College Radio Club, Glen Ellyn, Illinois 60137

V. Mayree Tallman, 428 South West 28th Road, Miami, Florida 33129

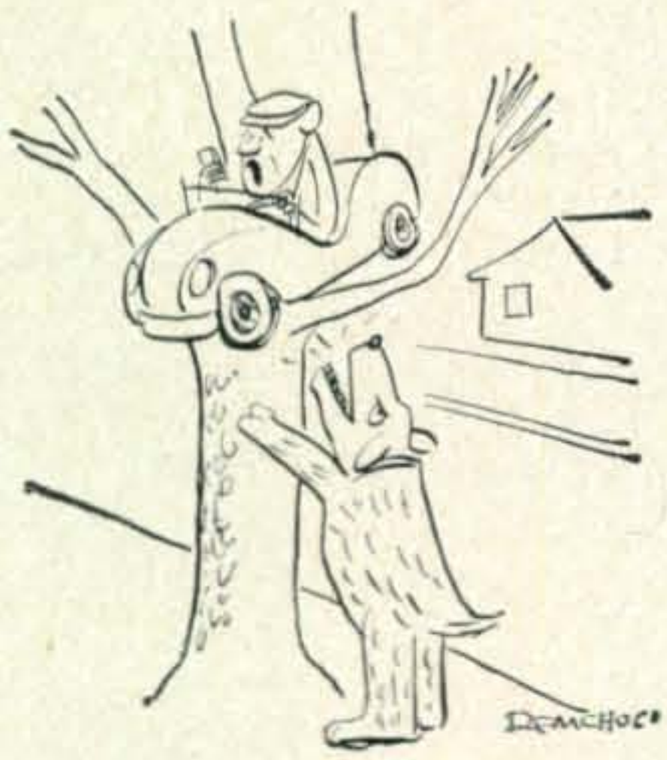
Mr. Roy Alciatore, 5700 Canal Blvd., New Orleans, La. ■

"... and everything here is gnome brew ..."

Clever Quips!

"Don't tell me we're in another of those 'Biggest Rig On The Air' battles again!"

"He wants us to send him some sort of contact card. . . ."



"Hon, do you know what happened to the transistors that I had in this aspirin bottle?"

"Finally talked the wife into that new transceiver, eh, Mr. Prenton?"

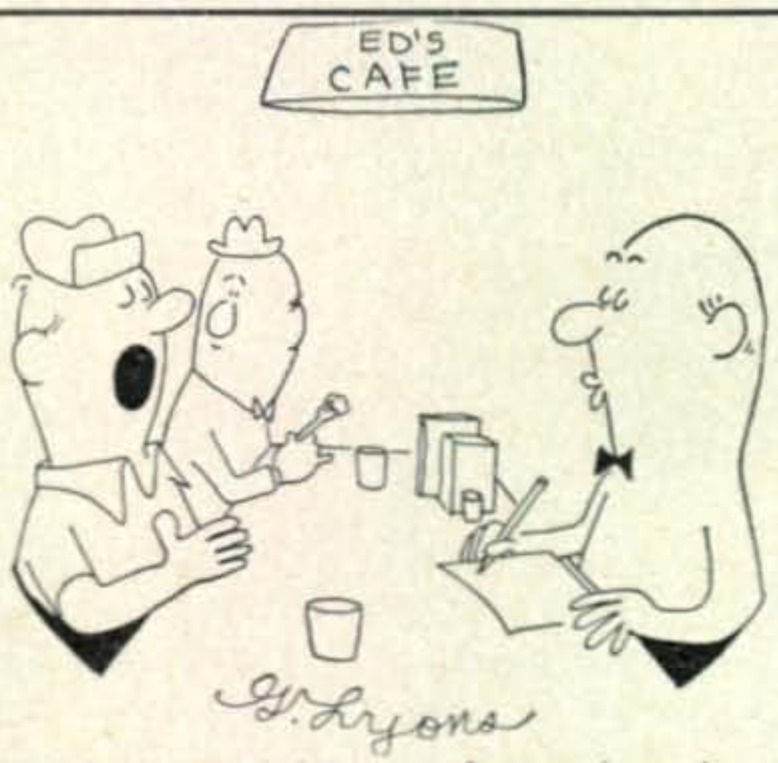
"Another 'Political Discussion' with Harry?"

"Have you met WE5CTZ?"

"I'm mobiling right along, OM!"

"I got my first s.w.l. QSL this week . . . WBAT!"

"It'll be out as soon as I've grid-dipped the antenna, dear . . ."



"Sure, I'm the ham of the year, but, quit saying, 'Here's the ham what yam'!"

"Stop complaining and pretend you're trimming your antenna or something."

"How is it you can hear a whisper half way around the world but you can't hear me calling you for supper?"

"I have a balanced circuit now, OM!"

DX

BY URB LE JEUNE,* W2DEC

Here and There

CEØ—Easter: Marc, WB2VJD/CEØ has been active on 14 and 21 s.s.b. He skeds his QSL manager K5GOT around 2200 GMT on 21 and 0200 GMT on 14, although usually starts operations at an earlier time. Approximate frequencies are 21350-370 and 14300. A hint to the effect that he is not a contest-style operator and likes to ragchew. *(Tnx Puerto Rican DXer)*

CR9—Macao: Besides his 14 and 21 mc operations, mainly c.w., CR9AH is also workable on or around 7005 kc. *(Tnx VERON)*

EA9 Ifni & Rio de Oro: It may be too late by the time you receive this, however, I'll take a chance. URE announces a DXpedition to Rio de Oro and Ifni to take place the middle or end of January. The operators will be Alvaro, EA7JQ, and Fernando, EA7GF. Operation will commence in Rio de Oro for eight days then to Ifni for three days. They have the loan of some equipment from Hallicrafters (SR-150, SR-500, and SX-117) and Hy-Gain TH3 jr. QSL via URE, Box 220, Madrid, Spain. They will accept NO contributions. *(Tnx URE)*

FO8 Tahiti: FO8BQ is active daily on 14 mc c.w. starting his operation at 0500 GMT. *(Tnx VERON)*

FW8 Wallis: Robert, FW8RC skeds the W7 area Saturdays and Sundays at 0600 GMT on 14244 s.s.b. and is QRV afterwards. *(Tnx Puerto Rican DXer)*

HS Thailand: HS1WF (ex SVØWF in Rhodes) has been active from Bangkok, with excellent signals to this part of the world on 14 s.s.b. to the dismay of the W/K wolf pak held back by "banned" status. *(Tnx Puerto Rican DXer)*

HV Vatican: HV3SJ often QRV Fridays at 1900/2000 GMT on 14230 kc. *(Tnx Geoff Watts)*

KC6 Western Carolines: KC6CK is operating on 14230 kc s.s.b. around 0900 GMT from Palau Island, Western Carolines. *(Tnx VERON)*

KS4 Swan Island: Jim, KS4CC, works 21040/60 or 21420 between 1400 and 1600 GMT *(Tnx Geoff Watts)*

LH Bouvet Is.: There might be a LORAN engineer on Bouvet Is. He is a ham and will be active if the plans go through.

ST2 Sudan: ST2SA operations were raising doubts but its proven he is legal and QSLing very fast after the QSO. Sid is active on c.w. only at this time but hopes to be on s.s.b. very soon. *(Tnx VERON)*

*Box 35, Hazlet, New Jersey 07730.

The following certificates were issued between the period from November 6th, 1966 to and including December 5th, 1966:

CW-PHONE WAZ

2254	OE1IZ	2259	SP5A1B
2255	W6ISA	2260	ZE1BK
2256	K4YYL	2261	UB5ES
2257	G5CG	2262	UA6MF
2258	DJ5BV		

TWO-WAY SSB WAZ

429	DL1PM	431	UA1ZF
430	PY2CTL		

CW WPX

753	SP9YP

PHONE WPX

136	DJ5BV	137	LU3BU

SSB WPX

255	K4WMB	258	YV4GD
256	W4HA	259	PY3AHJ
257	K1DPI	260	DJ5BV

MIXED WPX

128	YO4WU

300 TWO WAY SSB

17	WA2IZS

SU Egypt: Jack, E3FJZ/SU says that he QSLs direct from Rafah, but requests cards for him be sent to VE3AWU. Adds that he has been very active on 28 s.s.b., where he has found extremely good conditions to Central and South America after 0830 GMT. He usually hangs around 28.120 but also checks the American portion 28.5 up. *(Tnx Puerto Rican DXer)*

TJ8 Cameroun: Hermann, HK1QQ, is on the air now signing HK1QQ/TJ8. *(Tnx VERON)*

TR8 Gabon: TR8AG QRV almost daily on 14140 kc s.s.b. between 2000 and 2100 GMT. PY2PE, Eva, can arrange sked. *(Tnx Geoff Watts)*

TU2 Ivory Coast: TR2BD on 14266 s.s.b. at 0730/0800 GMT and TU2BK 14015/40 c.w. between 1730 and 2200 GMT. *(Tnx Geoff Watts)*

UAØ Zone 23: UAØYD 14001 c.w. around 1000/1100 GMT. UAØYP 14106 s.s.b. same time. *(Tnx Geoff Watts)*

UG6 Armenia: UG6SG has been very active at about 1330 GMT on 14205 to 14220. *(Tnx LIDXA)*

Stan, SP9YP, and his home brew station.

Lou, K6PWR, at the operating position.

VK9 Norfolk Island: VK9JA is a new station here using Japanese s.s.b. gear. He is on 14180. VK9RH continues in residence here but is not very active. Best bet to work VK9RH is to arrange schedule with the help of ZL2JO or ZL2UW. Also, W4CHA slated to be active from this spot in early February on 14065 c.w. and 14135 s.s.b. *(Tnx NEDXA and LIDXA)*

VKØ Macquarie Island: Shortly after the beginning of the year, VKØCR will be active from here, primarily on s.s.b. *(Tnx LIDXA)*

VR4 Solomon Islands: VR4CR is very active on 14 mc at c.w. at 0500-0600 GMT. *(Tnx VERON)*

VS5 Brunei: VS5MH is active on Monday, Wednesday and Friday. He is scheduling his QSL Manager, W1DGJ, at 1230 GMT. Frequencies: 14195/205 kc s.s.b. VS5JC is on daily on 14030 GMT-1600 GMT c.w. only. He says he will be active here until January 1967 when he moves to Malaysia and hopes to sign 9M2XX. VS5JC makes excursions some time to 7005.9 kc c.w. *(Tnx VERON and Fla. DX Report)*

ZD9 Tristan Da Cunha: ZD9BE is often active at 1700 GMT in sked with G3OFS on 14230 kc s.s.b. *(Tnx VERON)*

ZL Kermadec Islands: ZL1AI, on Roe Island, 14120 and 14130 a.m., is reported to be a new station active from here. He is crystal control and should be here for a while. *(Tnx LIDXA)*

ZL Chathams And Campbell Islands: At present there are no hams active from either spot, but John Washer, who operated from here in 1963, may return to Campbell. Ian (ex ZL5AA, 1ABZ, 3VB) has returned to New Zealand minus his three-element beam which was destroyed in a storm. *(Tnx ZL2GX)*

ZS2MI Marion Island: ZS2MI on 14190 c.w. at 1400 GMT and 14110 and 14170 a.m. at 12-1500 GMT, listening about 14205-10 for U. S. stations, via long path has been very active. QSL via ZS401. *(Tnx LIDXA)*

5U7 Niger: 5U7AK, Dave, regularly active with excellent signals using a dipole but should have a beam up by the time you read this. Schedule arrangements can be made through Mel, W8JEY, who will put you on the list for next operating session. *(Tnx Puerto Rican DXer)*

5W1 Western Samoa: "Just a short note about 5W1 activity should you be able to use this information in your column. I expect to finish up her toward the end of January 1967. Doubt that there will then be too much activity from here until about the middle of the year when it is expected that another fairly active ham will be stationed here for about three years. I've just caught up on a big backlog of QSLs and these have now been posted out. Those with SAE's went direct and those without went via the Bureaus. There were about 25 cards that I couldn't find log entries for. If any of the chaps have missed out on a QSL for either my ZK1BV activity from August 1961 to February 1964 or for my 5W1AZ stint from May 1964 to January 1967, they will be able to catch up with me via the "ZL" Bureau. There will be some delay while I'm getting resettled but all cards received for which I have entries in my logs will be answered. Have enjoyed my Islands activities and will be sorry to leave." Thanks George, 5W1AZ, for the above.

7Q7 Malawi: 7Q7EC active on 21410 kc s.s.b. around 1800 GMT. *(Tnx K8MMZ)*

New Record

Congratulations to W2FZY, W2IMU and Roger Abson and VK3ATN for their record QSO on 2 meters. The W2 boys were located at the Bell Telephone Lab using a 60′ Kennedy Dish and VK3ATN used 4 Rhombics stacked, each leg 360′. The QSO was on Monday morning November 28th. For those of you who want to know more about this fantastic feat, write to Ed, W2FZY.

New Prefixes

4Z4 is the prefix for Israel as the 4X4 series is filled up. 4Z4AG is active on 14 mc c.w. 8R1..3 is the new prefix for Guyana, formerly signing VP3. VP3JR signed 8R21 (now QRT), VP3AA is signing 8RIP.

The joint meeting of the Northern and Southern California DZ Clubs will be held in Fresno, Calif. at the Del Webb Town House Motor Hotel January 21st and 22nd, 1967. This meeting is open to club members and their invited guests, *i.e.* all interested DXers.

[*Continued on page 99*]

Stew, W1BB, doing a little MM/SWLing while on a recent Far East cruise.

HAM CLINIC

CHARLES J. SCHAUERS,* W6QLV

Due to the timely nature of the material we are dispensing with the usual question and answer format for this month to bring some observations and vital comments by Chuck Schauers. The standard format will be in next month's issue.

ALTHOUGH radio amateurs were the real pioneers of the h.f. and v.h.f. bands they have steadily lost frequency space allocated to them, until (today) they are narrowly confined to very small segments of the r.f. spectrum. The situation can grow much worse until hams worldwide (led by worthy organizations), do something *constructive* about it.

Hams have read and heard so much "malarkey" relative to the status of amateur radio that they are sick of it—not ham radio—the malarkey.

Oh yes, we have exponents who agree that ham radio must be "upgraded" and its public service aspects emphasized but has anyone, including the ARRL, International Amateur Radio Union (IARU), IAOR, IARC or any other ham society really tried a most *logical program* to preserve amateur radio? In my personal opinion they have not.

Crowded HF Bands

Now it is well known that the h.f. bands are crowded, and the crowding is due in large part to using these bands for shortwave broadcasting. *Some* nations pay little or no attention to International regulations and use frequencies as they see fit—the result? Chaos! No one benefits from the available spectrum, too much interference.

The International Telecommunications Union (ITU) headquartered in Geneva is continually receiving reports on radio interference and their actions to eliminate unlawful frequency usurpers have been and are quite successful except with Nations like Communist China (who does not belong to the Union), Egypt and others.

S.w.b.c. Operations

As I have pointed out before, shortwave broadcasting does have a place in the spectrum, but having traveled all over the world I can truthfully say, listening to the s.w.b.c. bands is not very enjoyable and I have found that few people who own s.w. receivers would rather (and do) listen to the medium wave bc programs. It is a well known fact that most countries tend to overestimate the size of their shortwave listening audiences. Oh sure, there are a few listeners in every country (including government monitors) but not enough to spend millions of dollars on for equipment and operations each year! Why, if s.w. broadcasting on the whole was commercial and depended on its existence for revenues based on listener audience size they would be out of business in 90 days!

Now the emerging nations are coming along wanting s.w.b.c. space, for as one emergent politician told me, "to tell our story to the world." What world? This particular gentleman comes from a country where there are few telephones, an international telephone call impossible and that contains few trained telecommunications technicians.

Like personality, the actual s.w.b.c. audience cannot really be accurately measured—it is intangible. But believe me, the average politician in most emerging nations thinks that the audience for his country's planned s.w.b.c. operations is a gigantic one—yet, he knows little or nothing at all about amateur radio. These are the people who have to be educated.

The answer to the s.w.b.c. (h.f.) frequency problem is *time sharing* and then all nations of the world could get their "messages" across. But this would be too simple for those who control the destiny of ham radio per se.

Advantages of Amateur Radio

Technologically advanced nations of the world such as the U.S., Russia, Germany, France, England, Italy, Switzerland—to name a few—realize the valuable resource they have in amateur radio. Here is the means for providing trained telecommunications manpower at practically no cost at all. Here is a service that has contributed, can, and continues to contribute to existing telecommunications technology. Here is a service that can be used in emergencies (as happens nearly every day). Here is the service that takes the young boy (or girl) and gives them encouragement to pursue the study of radio-electronics. And too, radio amateurs contribute to international understanding *and* peace by person-to-person contacts. Hams leave the religious, political, racial and other major problems out of their on-the-air conversations. Who can deny then, the need for such a service as the radio amateur in this nuclear age? No one with good sense who has the welfare of their nation at heart.

The Program to Save

When frequency allocation time rolls around the amateur needs help—he needs votes for keeping his bands. How can these votes be obtained? By *direct* action, led by *all* national radio societies the world over—and especially by the ARRL and the IARU!

*c/o *CQ*, 14 Vanderventer Ave., Port Washington, L.I., N.Y.

What can we do? Let me tell you.

First of all, we need an educational program aimed at educating those who know little about amateur radio worldwide. This should begin with a booklet which should be sent not only to telecommunications officials in every nation, ITU-CCIR delegates, etc., but also to high schools and politicians. Incidentally, the English edition can be put to good use here at home in the U.S. by getting it into the hands of the Citizens Band operators and other laymen.

Sure the program will cost money. But I am inclined to think that every ham all over the world would be willing to donate $1.00 to help save ham radio.

Next, amateur radio clubs should be started in the countries (at high school level) that do not have them. They will need equipment. This equipment will be donated by hams, manufacturers, and dealers alike. Certainly the major burden will be on the U.S. for it has the greatest ham population and the manufacturing facilities. So let us donate.

And finally, we will need ham volunteers. These volunteers can come from *any* nation. They will have their transportation, food and lodging paid for out of available "save amateur radio" funds for a period of 30 to 60 days in each country visited. They will start the ham clubs in schools—and will instruct—and when they leave, they will leave an operating station behind.

These volunteers will call on ITU-CCIR and other telecommunications officials and explain what has been done and what more there is to be done. It is hardly likely they will receive no cooperation when the highest officials of a government are for the program.

Result

The result of all this effort will garner votes to maintain the status quo of the radio amateur at the next and future frequency allocation conferences . . . that is what the over 400,000 radio amateurs throughout the world want.

Recommendations

I would like to point out here that the program I set forth here is not entirely mine, for it is well known that the ARRL started something like it sometime ago in Liberia through its erstwhile current national radio society president, Sewell T. Brewer Sr., EL2S. But why stop there?

A station was started in Ethiopia by John Gayer (HB9AEQ) past president of the IARC and not a few U.S. amateurs have introduced ham radio to a number of isolated areas of the world . . . but this is not enough.

I care less how the program is implemented and by whom, I recommend however, that because the ARRL has the most ham members in the world and is a going organization, that it be the *focal* point of all the effort.

So you hams who read this, just don't sit there and wait for "George" to do it—write the ARRL and tell them you want such a program to save amateur radio. Tell them what you have to donate (and this applies to dealers and manufacturers too). I for one volunteer my services to the ARRL for any assigned tasks, and I am sure *CQ* will be happy to help too wherever it can.

Make no mistake fellow amateur, the noose draws tighter on our frequencies—not only the high frequencies but others as well. If we do not do something along the lines I have suggested the day may come when we will have to depend entirely on OSCAR type satellites for our ham communications. If you love your hobby and want to see it continue, write the ARRL about saving amateur radio. NOW! TODAY! There is no time to lose.

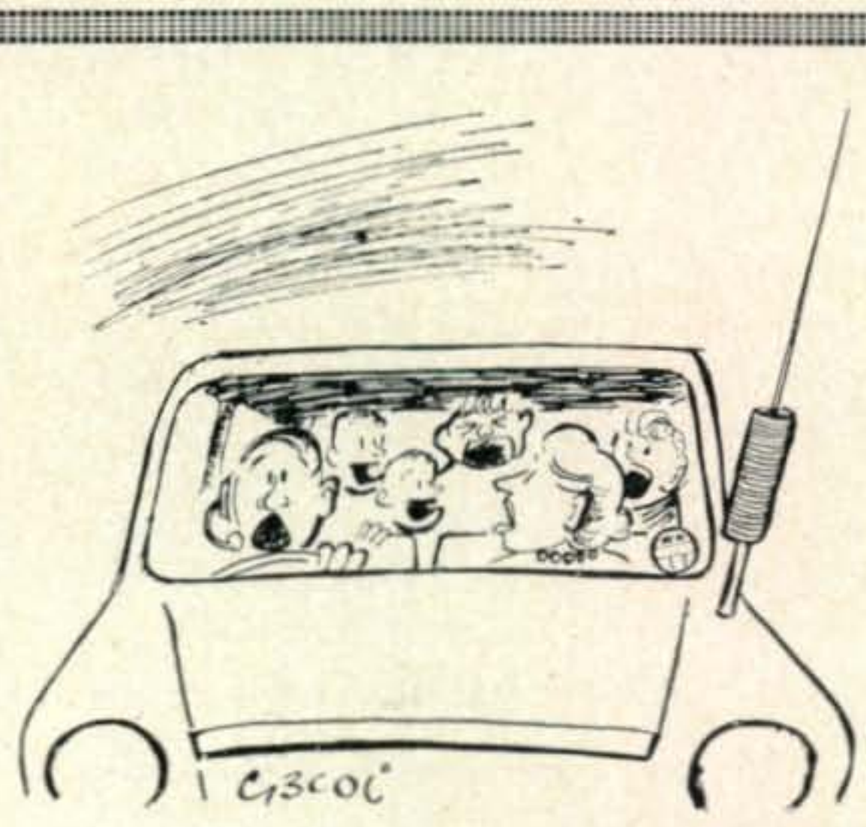
Now don't let those who should know better tell you that there is little danger, and we have fine representation at frequency allocation conferences etc., poppycock!

Sure we need proper representation and observers, sure we need some lobbying, but let us HAVE it. Let us not allow our frequencies to be taken from us without a *fight*. Strong talk, yer dern right!!

Pass the word. We expect help from every quarter including *"73"* magazine and the IAOR and every national radio society in the world.

Believe me, this will be just about your last chance to help SAVE AMATEUR RADIO!!!

"You will find the fault, my son, in the balanced modulator . . ."



"I'm sorry OM but you've gone right down into the noise . . ."

Propagation

BY GEORGE JACOBS,* W3ASK

DURING February, a slight seasonal decrease is expected in the range of frequencies that will propagate during the daylight hours, while a slight increase is expected during the hours of darkness.

While fewer 10 meter openings are predicted for February, some very good ones are expected to occur to many areas of the world, during the daylight hours. The 15 meter band is forecast to be the best band for world-wide DX propagation conditions during the daylight hours. Excellent openings are predicted to almost all areas of the world, with generally strong signals, and little fading or noise. The band should open shortly after sunrise, and remain open to some areas of the world through the early evening hours. Good openings to almost every corner of the world are also forecast for 20 meters from dawn through the evening hours. To some areas of the world, 20 meters is expected to remain open through the hours of darkness as well.

Fairly good propagation conditions are expected on the 40 meter band from late afternoon, and continuing through the hours of darkness until shortly after sunrise. Fairly high signal levels are predicted for many openings on this band. A seasonal increase in static levels is expected to result in somewhat poorer DX propagation conditions on 80 meters. Despite weaker signals and higher static levels, however, some DX openings are forecast during the hours of darkness. Openings on the 160 meter band may also be possible during the hours of darkness and the sunrise period, especially when static levels are low. Special propagation test transmissions will be conducted on 160 meters between 0500 and 0730 GMT on SUNDAY, February 5 and 19 (see December's PROPAGATION Column for more details).

Sunspot Cycle

The present sunspot cycle continues to rise at a relatively slow pace. The Swiss Federal Solar Observatory at Zurich reports a monthly mean sunspot number of 56 for November, 1966. This results in a smoothed sunspot number of 40 centered on May, 1966. This month's *CQ* propagation forecasts are based upon a predicted smoothed sunspot number of 66.

V.h.f. Ionospheric Openings

Auroral displays generally occur more frequently during February than during the earlier winter months. During such displays there is a tendency for ionospheric storms to take place, which disrupt conditions on the h.f. bands, but result in unusual short-skip openings on the v.h.f. bands. These openings, generally over distances up to approximately 1300 miles, take place on 10, 6 and 2 meters by way of reflection from the ionized regions produced by the auroral displays. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be "disturbed" or "below normal" during February. These are the days on which v.h.f. auroral-type openings are most likely to occur.

*11307 Clara Street, Silver Spring, Md. 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for February

	Forecast Rating & Quality			
Days	(4)	(3)	(2)	(1)
Above Normal: **3-4, 12, 16, 27**	A	A-B	B-C	C
Normal: **1-2, 5-7, 9, 11, 13-15, 17, 21-22, 25-26, 28**	A-B	B-C	C-D	D-E
Below Normal: **8, 10, 18, 20, 23-24**	C	C-D	D	E
Disturbed: **19**	D	D-E	E	E

How To Use These Charts

The following is an explanation of the symbols shown above and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

3—With the forecast rating noted above, start with the numbers in parentheses at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meanings: A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak with considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propagation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 1000 watts d.s.b. into a dipole antenna a quarter-wave above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9 and Ø areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid through March 31, 1967, and are prepared from basic propagation data published monthly by the Institute For Telecommunication Sciences And Aeronomy of the U.S. Dept. of Commerce, Boulder, Colorado.

No significant meteor showers are expected during February.

This month's *Propagation Charts* contain predictions for major DX paths for February and March. A short-skip propagation forecast for February appeared in last month's column.

CQ DX PROPAGATION CHARTS

FEBRUARY AND MARCH, 1967

Time Zone: EST (24-Hour Time)
EASTERN USA To:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1) 11-13 (2) 13-14 (1)	07-08 (1) 08-09 (3) 09-12 (4) 12-13 (3) 13-15 (2) 15-16 (1)	04-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-17 (3) 17-19 (2) 19-21 (1)	17-19 (1) 19-20 (2) 20-01 (3) 01-02 (2) 02-03 (1) 19-21 (1)* 21-22 (2)* 22-23 (3)* 23-00 (2)* 00-01 (1)*
Northern Europe & European USSR	08-12 (1)	07-08 (1) 08-11 (2) 11-14 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-18 (1)	18-20 (1) 20-22 (2) 22-02 (1) 20-00 (1)*
Eastern Mediterranean	09-13 (1)	08-09 (1) 09-11 (3) 11-13 (2) 13-15 (1)	07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 16-18 (3) 18-22 (2) 22-23 (1) 04-07 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
East Africa	10-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-18 (2) 18-21 (3) 21-23 (2) 23-01 (1)	19-00 (1) 21-23 (1)*
West & Central Africa	11-14 (1) 14-16 (2) 16-17 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 16-17 (2) 17-19 (1)	07-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-07 (1)	18-20 (1) 20-22 (2) 22-01 (1) 21-23 (1)*
South Africa	10-11 (1) 11-12 (2) 12-14 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	05-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-23 (1) 23-01 (2) 01-03 (1)	21-23 (1) 23-00 (2) 00-01 (1) 23-01 (1)*
Central & South Asia	*Nil*	07-09 (1) 18-20 (1)	07-10 (1) 19-22 (1)	05-07 (1) 19-21 (1)
Southeast Asia	*Nil*	07-09 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-10 (1) 19-21 (1)	06-08 (1) 17-20 (1)
Far East	17-19 (1)	07-09 (1) 16-17 (1) 17-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-20 (1) 20-22 (2) 22-00 (1)	05-08 (1) 06-07 (1)*
Guam & Pacific Islands	13-15 (1) 15-17 (2) 17-18 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	01-07 (1) 07-10 (2) 10-19 (1) 19-01 (2)	00-02 (1) 02-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Australia & New Zealand	16-18 (1)	08-12 (1) 15-17 (1) 17-20 (2) 20-22 (1)	00-03 (2) 03-07 (1) 07-09 (3) 09-10 (2) 10-13 (1) 13-15 (2) 15-19 (1) 19-22 (2) 22-00 (3)	03-05 (1) 05-07 (2) 07-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Northern & Central South America	08-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	07-08 (1) 08-11 (3) 11-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	00-03 (2) 03-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-00 (3)	18-19 (1) 19-20 (2) 20-03 (3) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-06 (1)*
Southern Brazil, Argentina, Chile & Uruguay	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	07-08 (1) 08-10 (3) 10-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	04-06 (1) 06-08 (2) 08-15 (1) 15-16 (2) 16-17 (3) 17-19 (4) 19-01 (3) 01-04 (2)	19-21 (1) 21-03 (2) 03-07 (1) 21-06 (1)*
McMurdo Sound, Antarctica	11-13 (1) 13-16 (2) 16-18 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-21 (1)	04-07 (1) 07-09 (2) 09-12 (1) 15-18 (1) 18-21 (2) 21-00 (3) 00-04 (2)	23-05 (1)

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA To:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-12 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-14 (2) 14-15 (1)	05-07 (1) 07-09 (3) 09-11 (2) 11-14 (3) 14-17 (2) 17-20 (1)	17-19 (1) 19-22 (2) 22-02 (1) 20-21 (1)* 21-22 (2)* 22-00 (1)*
Northern Europe & European USSR	08-11 (1)	07-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-17 (1)	19-01 (1) 20-23 (1)*
Eastern Mediterranean	09-12 (1)	07-09 (1) 09-12 (2) 12-14 (1)	23-02 (1) 07-12 (1) 12-17 (2) 17-22 (1)	19-23 (1) 20-22 (1)*
East Africa	10-15 (1)	07-10 (1) 10-15 (2) 15-17 (1)	06-12 (1) 12-17 (2) 17-20 (3) 20-21 (2) 21-23 (1)	19-21 (1) 20-22 (1)*
West & Central Africa	11-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	07-12 (1) 12-13 (2) 13-15 (3) 15-17 (4) 17-20 (2) 20-00 (1)	18-19 (1) 19-21 (2) 21-00 (1) 20-22 (1)*
South Africa	10-13 (1)	07-09 (1) 09-13 (2) 13-14 (3) 14-16 (2) 16-17 (1)	05-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1) 00-02 (1)	23-00 (1) 23-00 (1)*
Central & South Asia	17-19 (1)	07-10 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-22 (1)	06-08 (1) 19-21 (1)
Southeast Asia	09-11 (1) 16-19 (1)	08-11 (1) 16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-12 (1) 17-18 (1) 18-20 (2) 20-22 (1)	06-08 (1) 17-19 (1)
Far East	15-18 (1)	07-09 (1) 14-16 (1) 16-19 (2) 19-21 (1)	07-09 (2) 09-11 (1) 17-20 (1) 20-00 (2) 00-07 (1)	02-05 (1) 05-07 (2) 07-09 (1) 05-07 (1)*

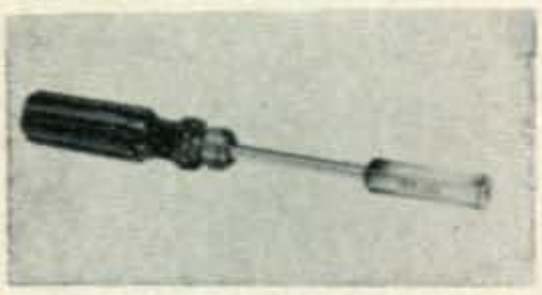
*Predicted 80 meter openings. Openings on 160 meters are also likely to occur during those times where 80 meter openings are shown with a forecast rating of (2), or higher.

Guam & Pacific Islands	12-15 (1) 15-17 (2) 17-19 (1)	10-13 (1) 13-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	06-07 (2) 07-09 (3) 09-11 (2) 11-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-06 (1)	22-01 (1) 01-06 (3) 06-07 (2) 07-09 (1) 00-03 (1)* 03-06 (2)* 06-07 (1)*
Australia & New Zealand	15-17 (1)	09-12 (1) 12-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	07-09 (2) 09-17 (1) 17-20 (2) 20-00 (3) 00-03 (2) 03-07 (1)	02-04 (1) 04-07 (2) 07-09 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Northern & Central South America	09-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-17 (1)	06-07 (1) 07-08 (2) 08-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-11 (3) 11-14 (2) 14-16 (3) 16-20 (4) 20-22 (3) 22-02 (2) 02-06 (1)	18-19 (1) 19-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 20-21 (1)* 21-02 (2)* 02-06 (1)*
Southern Brazil, Argentina, Chile & Uruguay	08-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	07-08 (1) 08-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-08 (2) 08-15 (1) 15-16 (2) 16-18 (4) 18-22 (3) 22-04 (2) 04-06 (1)	19-22 (1) 21-03 (2) 03-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	11-13 (1) 13-15 (2) 15-18 (1)	13-16 (1) 16-18 (2) 18-20 (1)	07-09 (2) 09-12 (1) 15-18 (1) 18-20 (2) 20-23 (3) 23-03 (2) 03-07 (1)	00-06 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA To:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-10 (1) 10-12 (2) 12-15 (1)	23-01 (1) 06-08 (1) 08-12 (2) 12-14 (3) 14-16 (2) 16-20 (1)	18-00 (1) 20-22 (1)*
Northern Europe & European USSR	*Nil*	08-12 (1)	23-01 (1) 06-07 (1) 07-09 (2) 09-13 (1)	19-23 (1) 20-22 (1)*
Eastern Mediterranean & East Africa	*Nil*	07-11 (1)	06-09 (1) 09-11 (2) 11-15 (1) 18-21 (1)	18-21 (1)
West & Central Africa	11-16 (1)	06-08 (1) 08-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-15 (2) 15-18 (3) 18-20 (2) 20-22 (1)	18-22 (1) 19-21 (1)*
South Africa	10-13 (1)	08-10 (1) 10-14 (2) 14-16 (1)	05-14 (1) 14-16 (2) 16-18 (3) 18-20 (1) 00-02 (1)	19-22 (1) 20-21 (1)*
Central Asia	17-19 (1)	07-09 (1) 16-17 (1) 17-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-19 (1) 19-20 (2) 20-22 (1)	05-08 (1)
Southeast Asia	16-19 (1) 09-11 (1)	08-09 (1) 09-10 (2) 10-14 (1) 14-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-21 (1) 21-00 (2) 00-02 (1)	00-02 (1) 02-06 (2) 06-08 (1) 02-06 (1)*
Far East	14-15 (1) 15-16 (2) 16-18 (1)	12-14 (1) 14-18 (2) 18-20 (3) 20-22 (1)	08-10 (2) 10-20 (1) 20-22 (2) 22-00 (3) 00-04 (2) 04-08 (1)	00-02 (1) 02-06 (2) 06-08 (1) 02-08 (1)*
Guam & Pacific Islands	12-15 (1) 15-17 (2) 17-19 (1)	08-12 (1) 12-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (1)	09-10 (2) 10-12 (4) 12-16 (3) 16-19 (4) 19-20 (3) 20-00 (2) 00-09 (1)	19-20 (1) 20-22 (2) 22-06 (4) 06-08 (2) 08-09 (1) 21-23 (1)* 23-06 (2)* 06-07 (1)*
Australia & New Zealand	11-15 (1) 15-17 (2) 17-18 (1)	10-12 (1) 12-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (1)	00-03 (1) 03-05 (3) 05-07 (2) 07-08 (1) 02-03 (1) 03-05 (2) 05-07 (1)
Northern & Central South America	10-12 (1) 12-14 (2) 14-16 (1)	06-07 (1) 07-08 (2) 08-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (2) 07-09 (3) 09-10 (2) 10-14 (1) 14-16 (2) 16-18 (4) 18-22 (3) 22-00 (2) 00-06 (1)	18-20 (1) 20-00 (3) 00-03 (2) 03-05 (1) 20-21 (1)* 21-01 (2)* 01-04 (1)*
Southern Brazil, Argentina, Chile & Uruguay	08-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	00-02 (1) 07-11 (1) 11-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	20-05 (2) 05-15 (1) 15-16 (2) 16-18 (4) 18-20 (3)	18-19 (1) 19-23 (2) 23-03 (1) 20-02 (1)*
McMurdo Sound, Antarctica	11-13 (1) 13-15 (2) 15-17 (1)	12-15 (1) 15-18 (2) 18-20 (1)	05-06 (1) 06-08 (2) 08-11 (1) 16-19 (1) 19-20 (2) 20-23 (3) 23-02 (2) 02-05 (1)	00-06 (1)

New Amateur Products



Hex-Loc

A new multiple socket wrench designed to fit nine different sized nuts from 3/16" to 7/16" has been introduced by General Implement, Inc. The price of the unit is $4.95, and it is guaranteed for one year. For complete details write to General Implements Corp., 946 Saratogsa St., East Boston, Mass., 02128, or circle 69 on page 112.

Denesco

DENESCO has developed a new line of miniature low pass filters, the 1-VE-50. It is .080 in dia. by .280 in length while maintaining an attenuation of over 50 db from 200 mc to 10 gc. For a complete spec sheet write to Denesco, Inc., 2408 San Mateo Place NE, Albuquerque, New Mexico, 87110, or circle 70 on page 112.

You say your taxes were raised?

You missed three payments on your Jaguar XK-E?

You had to turn in your Playboy Club Key?

Your salary was cut?

You say the F.C.C. has expressed interest in your four different calls?

You say food is so expensive it's cheaper to eat money?

You say you invited your boss to dinner and during the soup course the finance company repossessed your furniture?

You say your XYL backed the family car out of the garage after you backed it in the night before, and now you can't get to the Newsstand to get your monthly copy of CQ?

HOLD IT!!

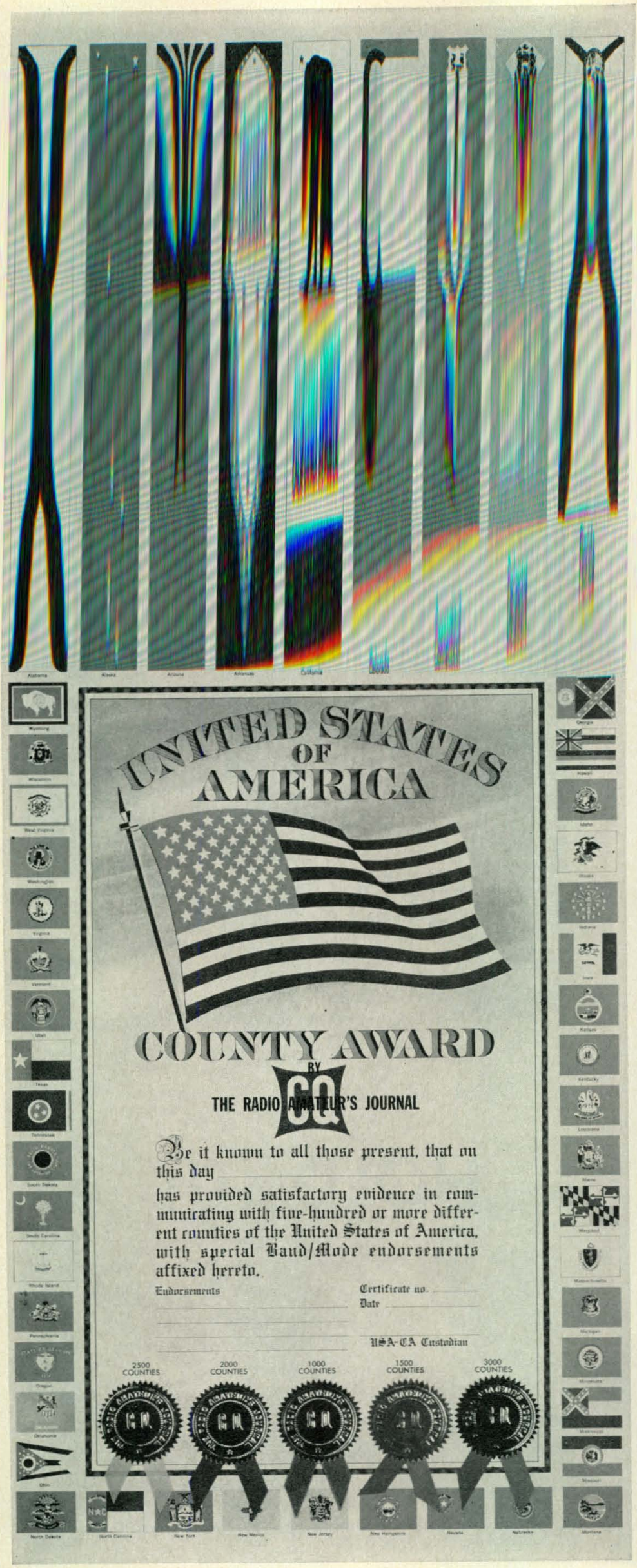
While we are in no position to alter the tax structure, give you a raise, or sway the F.C.C., we *can* save you a pile of cash on CQ! So drop that anchor, pick up a pen and dash off a CQ subscription right away!

1 yr. .....**I PAY ONLY $ 5.00**.....a savings of $ 4.00

2 yrs. .....**I PAY ONLY $ 9.00**.....a savings of $ 9.00

3 yrs. .....**I PAY ONLY $13.00**.....a savings of $14.00

And now with all this newfound money at your disposal, you can begin to really live again!


UNITED STATES
OF
AMERICA
COUNTY AWARD
BY
CQ
THE RADIO AMATEUR'S JOURNAL
Be it known to all those present, that on this day
has provided satisfactory evidence in communicating with five-hundred or more different counties of the United States of America, with special Band/Mode endorsements affixed hereto.
Endorsements
Certificate no.
Date
USA-CA Custodian
2500 COUNTIES
2000 COUNTIES
1000 COUNTIES
1500 COUNTIES
3000 COUNTIES

The United States Of America Counties Award

RULES and PROGRAM

The United States of America Counties Award sponsored by **CQ**, is issued for confirmed contacts with specified numbers of U.S. counties under Rules and conditions hereafter stated.

A. Awards Classes:

The USA-CA is issued in seven (7) different classes, each a separate achievement as endorsed on the basic certificate by use of special seals for higher class. Also, special endorsements will be made for all one band or mode operations subject to the rules.

Class	Counties Required	States Required
USA-500	500	any
USA-1000	1000	25
USA-1500	1500	45
USA-2000	2000	50
USA-2500	2500	50
USA-3000	3000	50

USA-3079-CA for ALL counties and Special Honors Plaque

B. Conditions:

1—USA-CA is available to all licensed amateurs everywhere in the world and is issued to them as individuals for all county contacts made, regardless of calls held, operating QTHs or dates whatever.

Special USA-CA's also available to s.w.l.'s on a heard basis.

2—All contacts must be confirmed by QSL and such QSLs must be in one's possession for identification by certification officials.

3—Any QSL card found to be altered in any way disqualifies applicant.

C. County Identity:

1—The Directory of Post Offices (P.O.D. Publication #26) will be the official guide in determining identity of counties of contact as ascertained by name or nearest municipality. It is suggested a copy of P.O.D. Publication #26 be obtained to facilitate operating reference and precheck cards for application purpose. Publication #26 is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Price $2.50)

2—Unless otherwise indicated on QSL cards, the QTH printed on cards will determine county identity.

3—For mobile and portable operations the postmark shall identity the county unless information stated on QSL cards make other positive identity. When in doubt of location, mobile stations should name the nearest municipality as identified by road sign or road map.

4—In the case of Cities, Parks or Reservations not within counties proper, applicants may claim any one of adjoining counties for credit.

D. Administration of USA-CA Program:

1—The USA-CA program will be administered by a **CQ** staff member acting as USA-CA Custodian, and all applications and related correspondence should be sent direct to him at his QTH.

2—Decisions of the Custodian in administering these Rules and their interpretation including future amendments are final.

E. Record Book and Bookkeeping:

1—The scope of USA-CA makes it mandatory that special Record Books be used for application. For this purpose, **CQ** has provided a 108 page, 8½ × 11" Record Book which contains application, and certification forms, a USA county map, maps of each of the 50 U.S. States showing county outline, and which provides record-log space meeting the conditions of any Class award and/or endorsement requested.

2—A completed USA-CA Record Book constitutes medium of basic application and becomes the property of **CQ** for record purposes. On subsequent applications for either higher classes or for special endorsements, applicant may use additional Record Books to list required data or may make up own alphabetical lists conforming to requirements. In this connection, through a printer's bust, the Record books left out the column for naming Cities/Towns, mandatory to validate County identity, so it is suggested that the time/date column be renamed and used for this purpose.

3—Record Books are to be obtained directly from **CQ**, 14 Vanderventer Ave., Port Washington, L.I., N.Y. for $1.25 each. Recommend two be obtained, one for application use and one for personal file copy.

F. Application:

1—Make Record Book entries necessary for county identity and enter other log data necessary to satisfy any special endorsements (band-mode) requested. It is mandatory that Cities and Towns or other specific location be named.

2—Complete application forms provided in Record Book, or, if preparing own lists for later applications, use special application forms available from the Custodian for s.a.s.e. or 1 IRC.

3—Have the certification form provided signed by two licensed amateurs (General Class or higher) or an official of a national-level radio organization or affiliated club, verifying that QSL cards for all contacts as listed have been seen. The USA-CA Custodian reserves the right to request any specific cards to satisfy any doubt whatever. In such cases applicant should send sufficient postage for return of cards by registered mail.

4—Send original completed Record Book and certification forms and handling fee of $1.00 U.S. or 10 IRC's to USA-CA Custodian, Ed Hopper, W2GT, 103 Whittman St., Rochelle Park, N.J. For later applications for higher class seals, send either Record Book or self prepared list per the rules and 25¢ or 3 IRC's handling charge. For application for later special endorsements (Band/Mode) where certificates must be returned for endorsement, send certificate and 50¢ or 5 IRC's for handling charges. Note: At the time any USA-CA award certificate is being processed there are no charges other than the basic fee regardless of number of endorsements or seals; likewise, one may skip lower classes of USA-CA and get higher classes without losing any lower awards credits or paying any fee for them.

the USA-CA PROGRAM

BY ED HOPPER,* W2GT

THE "Story of The Month" is about Fred Woodley, VE3-9301. For sometime I have had the idea that a story on an s.w.l. was long overdue. This was again brought to mind after reading a fine letter by a well known G3 in a recent issue of *Monitor*, the official Journal of the International Short Wave League. He defended s.w.ls, telling how helpful they had been with many antenna projects, etc. . . . and reminding us that we all *started* by listening. In most foreign countries, one must start as an s.w.l., with a receiving license, before becoming a ham. Which reminded me of this story—if your parents never had any children, the chances are that you won't either.

Fred Woodley, VE3-9301
Holder of USA-CA-500,
USA-CA-1000, 1500, 2000,
and USA-CA-2500 Awards

Fred began s.w.ling in March 1959 on a domestic receiver with no b.f.o. and no bandspread, using a homebrew toroid type antenna on the roof. In 1961 a used HQ-129X was obtained and is still in service, after modifications to the front end. The antennas now are a little more complex than in 1959 and consist of a 240 foot wire up 40 feet and fed windom style and a recent addition, a 2 element tri-band quad installed on a 60 foot tower against his home.

Fred works for CFPL-TV in London, Ontario on the production staff. . . . camera, audio and projection. He works weird and wonderful (?) shifts, allowing him to DX at all times of the day and night over any given period of time.

*103 Whitman St., Rochelle Park, N.J. 07662.

Ten years ago, Fred married Marg and they now have three children, Matt (9), Vicki (7), and Valie (5). Marg began s.w.ling in April 1965 and her call is VE3-12172.

Fred began chasing counties in the summer of 1963 after visiting his friend, Andy Rugg, VE2-8679 (who received the 1st s.w.l. USA-CA issued, #1-Z in Oct. '61) and seeing the beautiful USA-CA certificate. The County Hunters Net on 40 was discovered early the following year and that really got things rolling. USA-CA-500 Award #382 was received in May 1964 as well as #41 USA-CA-1000 Award which was the first issued to an s.w.l. In March 1965, #30 USA-CA-1500, #17 USA-CA-2000 and #8 USA-CA-2500 Awards were issued to Fred and these 3 were also #1 issued to an s.w.l.

His present score is USA-CA 2732; DXCC 295/285; all zones and 241 awards from all continents.

A great help in obtaining confirmations (I believe) is his very unusual and fine QSL card and Marg has a FB QSL card also. I feel sure that *most* hams would love to get one of these cards and would be happy to QSL.

Fred was co-founder of the Canadian DX Club as well as past Chairman/Editor of this same group. He was an early member (#6) of SWL-CHC and is a past SWL/CHC Affairs co-ordinator and a past-president of SWL/CHC. He is a long-time member of ISWL and also writes a monthly column on SWLing for *Electron*, a Canadian magazine devoted to the electronic hobbyist.

Fred has some 7500 QSLs from hams as well as another 400 from a.m./f.m./TV/s.w. broadcast stations. But since 1963 he has been interested in DX only on the ham bands. He is very proud of QSLs from 17 countries on 160 meters and 123 on 75 meters.

Fred is what has been labelled a "pro-s.w.l." in that he is not serving a short apprenticeship to getting a ham ticket. He enjoys s.w.ling and has no plans for a ticket in the immediate future, if ever. More power to him, there is room for all of us. Need I mention that Fred is the only s.w.l. listed in our Special USA-CA Honor Roll of the Top Twenty-Five County Hunters?

Fred Woodley, VE3-9301 and Mrs. Marg Woodley, VE3-12172.

Picapau Carioca Award

Nebraska Centennial QSL Award

Delaware VHF-UHF Award

Greater Kansas City Award

Letters

Mr. E. H. Proctor, Sec. CVARC, writes: "Early last year you published a cut and description of the Zone Five Award sponsored by the Canisteo Valley Amateur Radio Club.

At a recent meeting, it was decided to modify the rules for this award to include MOBILE STATIONS in all areas: Rule 2. Contacts with mobile stations DO COUNT.

A copy of the rules may be obtained by writing to Awards Chairman, c/o the club, Hornell, N.Y. 14843."

Ken, WA2IDH, writes: "Some time ago you were kind enough to mention the Bergen County Award. Our rules have been changed to allow stations more than 100 miles from Hackensack, N.J. to work only 5 different towns in Bergen County for the basic award. Other requirements remain the same: GCR list and 50¢. List of towns and rules available for S.A.S.E. to Ken Mac Neilage, WA2IDH, Awards Chairman, Bergen Amateur Radio Association, 322 Howard St., Westwood, N.J. 07675."

Ron, WA4WJE, writes: "I would like to advise that the S.P.A.R.K. Award described in *CQ*, 1966 is now available to s.w.ls on a heard basis. The same rules apply to both amateurs and s.w.ls. For full details, write, Ronald E. Rasnake, WA4WJE, Awards Chairman, Southern Peninsula Amateur Radio Klub, 71 Pine Chapel Road, Hampton, Va. 23366."

Jack, W6WPF, writes: "Effective at once, please ask your readers to write to Frank Smith, W5VA, P. O. Box 840, Corpus Christi, Texas 78403 for membership and awards data of the Old Old Timers Club." (And he will give you fast service—Ed.)

Awards

Delaware VHF-UHF Award: Issued at no cost by the Delaware Six Meter Nets for contacting 10 members within 50 miles of Dover, Delaware or work 5 members over 50 miles from Dover. Valid stations are: New Castle County-K3AFK, AMC, AXW, AZH, BAU, CNI, CPJ, FFD, FGF, FWE, JEX, JYG, JYP, KRH, LEG, LYX, MPZ, NYG, OBU, QPD, RRT, TAS, TNG, UHU, URP, VWX. W3CFA, CGV, GQP, HHW, JNL, KET, KOI, WHZ, WA3BAO. Kent County — K3EBB, KEO. W3UDR. Sussex County—K3CNH. Penna.—K3DEA & W3FAT. Maryland—W3ZVX. New Jersey—WA2IAZ & WA2SFY. Virginia—W4KRK. Missouri—WØHHW. Write: Certificate Chairman, Ralph Hairsine, K3MPZ, 1408 Wedgewood Rd., Wilmington, Delaware 19805. You must QSL the stations worked.

Nebraska Centennial Certificate: This award is given for 15 contacts with Nebraska amateurs on high frequency bands 5 contacts on v.h.f. bands. Outside of Continental North America. only 5 contacts are needed on any band. Contacts can be made anytime before September 30, 1967. Send a list of the contacts showing call, day, time and band to: Nebraska Centennial Commission, Hotel Lincoln, Lincoln, Nebraska 68508.

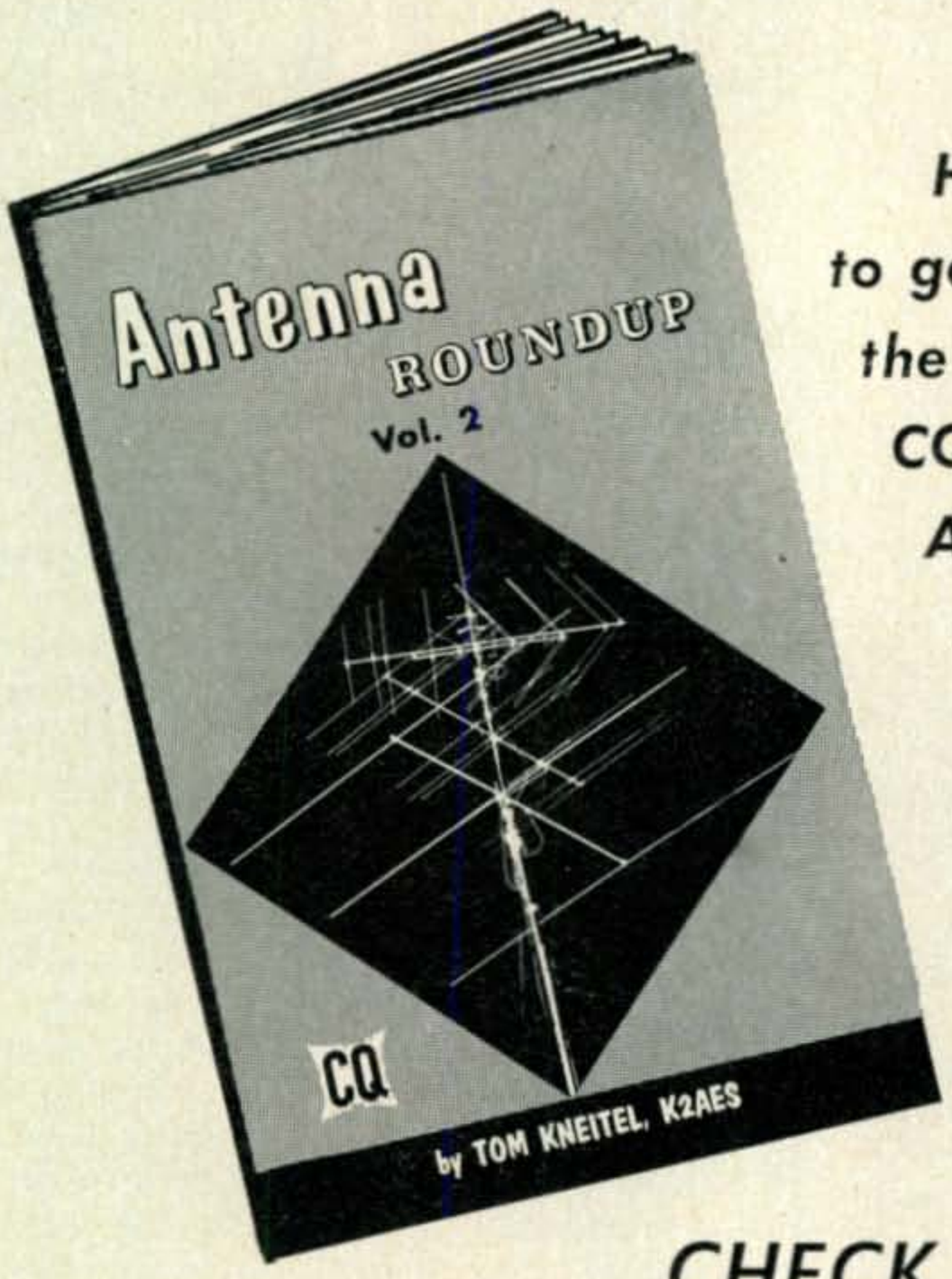
Unusually Fine Operator Award: Here is an unusual new award for the Amateur Radio Fraternity which can not be applied for nor recommended from one operator to another. It is awarded strictly on the basis of the operators "on the air" conduct after extensive monitoring. It was felt that in order to preserve the dignity of the UFO organization and to keep it from being pressured by individuals, the personnel must remain anonymous. It can be said however, that two established hams (over 15 years) are responsible for the project and are assuming all the expense. In addition, there are 6 monitoring stations located at key cities throughout Michigan, all licensed hams and not one of them knows who the other 5 are. Nominees for the award are submitted to Headquarters after a minimum of 5 monitorings or contacts along with a written report spelling out the qualifications as set forth in the wording of the award. This may seem like a slow process, but there is no intent of creating a "mill." The first award went to Phil Hogan, K8LQA. The awards are not necessarily confined to the State of Michigan if an outsider can be monitored often enough. After a year or so, it is intended to bring the award holders together for a banquet and these should include the "cream of the crop" of operators. *(Ed—NO I DO NOT KNOW ANY OF THE U. F. O. COMMITTEE).*

Picapau Carioca Award: This Award is sponsored by the Picapau Carioca (PPC) club of Brazil and perhaps it would help to explain the

[*Continued on page 99*]

UFO Award

HOOKED ON SKY HOOKS?



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Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

January 28-29	**CQ WW 160 DX**
January 28-29	Louisiana QSO Party
January 28-29	Arizona QSO Party
January 28-29	French Contest C.W.
February 4-5	ARRL DX Phone
February 10-12	QCWA QSO Party
February 12-13	Bermuda Contest
February 18-19	ARRL DX C.W.
February 25-26	YL/OM Phone Party
February 25-26	Vermont QSO Party
February 25-26	Tennessee QSO Party
February 25-26	Tacoma Logger Contest
February 25-26	French Contest Phone
February 26-27	Bermuda Contest
March 4-5	ARRL DX Phone
March 11-12	YL/OM C.W. Party
March 11-12	R.S.G.B. BERU
March 18-19	ARRL DX C.W.
March 26	EASTER
April 1-2	SP DX C.W.
April 1-2	Florida QSO Party
April 8-9	**CQ WW SSB DX**
May 6-7	**CQ Spring VHF**
May 20-21	YL Int. SSB

CQ WW 160 DX

Starts: 0000 GMT Saturday, January 28
7 P.M. EST Friday, January 27
Ends: 1200 GMT Sunday, January 29
7 A.M. EST Sunday, January 29

Just a reminder of an exciting week-end on the Top Band. Don't miss it if you've got something that will put a signal on 160 c.w.

Complete rules were given in the December CALENDAR. Mailing deadline for your log is February 28th. To CQ 160 Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Louisiana QSO Party

Starts: 1800 GMT Saturday, January 28
Ends: 2200 GMT Sunday, January 29

This one was covered in last month's CALENDAR. Mail your entry no later than February 28th to: Lafayette ARC, 612 Harding Street, Lafayette, Louisiana 70501.

Arizona QSO Party

Starts: 2100 GMT Saturday, January 28
Ends: 2100 GMT Sunday, January 29

This is the initial running of this party as explained in last month's CALENDAR.

Logs go to: Saguaro High School ARS, 6250 N. 82nd St., Scottsdale, Arizona 85251.

French Contest (REF)

C.W.: January 28-29
Phone: February 25-26

Starts: 1400 GMT Saturday
Ends: 2100 GMT Sunday in each instance.

Rules were received too late to be included in this issue but they are the same as previous years. Logs go to REF Contest, B.P. 42-01, Paris, R.P., France.

ARRL DX

Phone: February 4—5 and March 4—5
C.W.: February 18—19 and March 18—19
Starts: 0001 GMT Saturday, Ends: 2400 GMT Sunday in each instance.

The annual ARRL Marathon is with us again You can read all about it in the January *QST*.

QCWA Party

Starts: 2200 GMT Friday, February 10
5 P.M. EST Friday, February 10

CLAIMED SCORES
CQ W W Phone DX 1966

Single Operator All Band

WA2SFP	913,500
ZL1KG	906,182
I1BAF	857,472
KZ5TW	640,574
SM4CMG	506,688
WØPAN/KH6	428,705
W6NJU	428,100
W2RGV	314,987
CT1PK	303,050
KV4AA	245,651

28 mc

W2OKM	123,072
K4RLO	92,200
KA2RJ	81,380
ZD8SKI	80,625
W3ZPO	71,038
W1BFA	56,672
WA8LEO	50,048
K5IIN	44,462
K6CT	31,595
WA4ICB	21,830

21 mc

ZD8WZ	378,200
W2BXA	170,178
K9PPX	138,320
WA8AJI	137,686
W3TLN	130,180
W7PHO	121,182
W1UOP	87,516
WA4LMD	84,164
WB2NXL	75,516
W6PQW	77,697

14 mc

W3JNN	274,664
PAØEEM	256,680
VE1TG	188,190
K6EVR	175,427
SP5AKG	164,608
W1ZFV	150,144
WA2WVL	134,640
W7TDK	132,990
LU3EQ	124,836
WØIYH	90,120

7. mc

W3PHL	38,270
JA2BTV	26,585
YV4GD	11,480

3.8 mc

ON4UN	62,322
W2ZPO	7,280
KH6EPW	5,040

Multi-Operator Single Transmitter

ET3WH	2,139,000
HC1EY	1,125,000
CR6DX	1,097,000
VS6AJ	1,049,000
KG6AAY	1,048,000
KL7WAH	785,000
DLØAA	625,000
DL8RL	622,000
W2JT	441,000

Multi-Operator Multi Transmitter

YV9AA	6,195,000
K2GL	4,128,000
W3MSK	3,811,000
CE6CA	1,738,000
VP9BDA	1,547,000
HC5CRC	1,288,000
W8NGO	549,000
PE2EVO	468,000

*14 Sherwood Road, Stamford, Conn. 06905.

Ends: 2200 GMT Sunday, February 12
5 P.M. EST Sunday, February 12

This is primarily a party for members where old acquaintances are renewed each year.

There is no scoring involved, just see how many members you can contact. Don't overlook the 10 and 15 meter bands this year, especially the s.s.b. frequencies.

Your log should show in this order: Date/time in GMT, station worked, contact number sent and received, signal report, frequency, QTH, name and QCWA number.

Activity will be found on the following spots: **c.w.**—3540, 3790, 7005, 7035, 7110, 14110, 21110, 28110. **a.m.**—3810, 3950, 7230, 14240, 21340, 28900. **s.s.b./l.s.b.**—3804, 3995, 7204, 7299. **s.s.b./u.s.b.**—14315, 21410, 21440, 28690. **RTTY**—7105, 21140.

Dig down into the QRM for overseas members, and look for W4FNQ, W6ZPX and W8BNK who will be out to gain permanent possession of the QCWA Plaque.

Your logs should be in the mail before March 20th. This year they go to: Party Chairman, A. G. Wentzel, W2HX, 318 Gardner Ave., Trenton, N.J. 08618.

Bermuda Contest

Starts: 0001 GMT Sunday, Feb. 12 and Feb. 26
Ends: 0200 GMT Monday, Feb. 13 and Feb. 27

The Radio Society of Bermuda is holding its contest much earlier this year. It's open to all U.S. and Canadian amateurs. The "Top Banana" of the contest will be invited to spend a week in Bermuda as guest of the Society.

1. Single operator stations only permitted.

2. Operation will be confined to the 7 mc, 14 mc and 21 mc bands.

3. Both c.w., phone and cross mode contacts are permitted, however only one contact can be made with the same station on any one band.

4. The contact exchange will be the RS or RST report, in addition VP9 stations will also give their Parish. (Abbreviations for the nine Parishes: DEV, GEO, HAM, PAG, PEM, SAN, SMI, SOU and WAR)

5. Each contact counts 3 points. Final score: Total QSO points multiplied by number of Parishes worked on all three bands. (total of 27)

6. There are no equipment, power or time limitations.

7. A certificate signed by His Excellency The Governor of Bermuda will be awarded to the highest scoring station in each call area, W1 thru WØ and VE1 thru VE7 including VO.

The Grand Prize winner is not permitted to win two years in succession. Tie scores will be decided by the highest multiplier on each band.

8. Keep all times in GMT. You are expected to compute your score and carefully check your log. Print your name, call and address in BLOCK LETTERS, and sign a declaration that all rules and regulations have been observed.

Your log must be in the hands of the Contest Committee, Radio Society of Bermuda, P.O. Box 275, Hamilton, Bermuda, no later than April 15.

YL/OM Contest

Phone: February 25—26. **C.W.:** March 11—12
Starts: 1800 GMT Saturday. Ends: 1800 GMT Sunday in each instance.

Complete rules appeared in last months issue.

Mailing deadline for logs is March 20th and they go to: Marte Wessel, KØEPE, P.O. Box 756, Liberal, Kansas 67901.

Vermont QSO Party

Starts: 2300 GMT Saturday, February 25
Ends: 0300 GMT Monday, February 27

Once again the Central Vermont ARC is sponsoring a QSO party to activate this comparatively rare state. The same station may be worked on each band and mode for QSO credit.

Exchange: QSO number, RS/RST and QTH, county for Vt. stations, ARRL section for all others.

Scoring: Vermont stations; 1 point per contact, total multiplied by ARRL sections and foreign countries worked. All others; 3 points per contact, total multiplied by number of Vt. counies worked *on each band*. (Total of 14 for each band) A new and welcome change.

Frequencies: 3685, 3855, 3909, 7030, 7240, 7290, 14040, 14225, 14290, 21050, 21300, 28100, 28600, 50.250, 50.360, 144 thru 144.5, 145.8 and Novice frequencies.

Awards: Certificates to the highest scoring station in each ARRL section; 2nd, 3rd and 4th places in Vermont. Trophies to the Top out-of-state and Vermont stations. Multi-operator stations will also be rewarded.

The "Worked Vermont" award may be gained by contacting 13 out of the 14 Vt. counties.

Mailing deadline is March 31st. Logs go to: CVARC, c/o E. Reg. Murray, K1MPN, 3 Hillcrest Drive, Montpelier, Vermont 05602.

Tennessee QSO Party

Starts: 0000 GMT Sunday, February 26
Ends: 2400 GMT Sunday, February 26

This is the fourth Tenn. Party offering an opportunity to earn credits for the King Cotton, Chattanooga Choo Choo, Metro Nashville as well as the USA-CA awards.

There are no power or time limitations and the same station may be worked on different bands and modes for QSO points.

Exchange: QSO number, RS/RST and QTH. County for Tenn. stations, state, province or country for all others.

Scoring: One point per contact, multiplied by number of Tenn. counties worked. (Max. of 95) Tenn. stations will use states, provinces, countries and Tenn. counties for their multiplier. (Tenn. stations can use an additional multiplier of 1.5 if the operation is portable from another county.

Frequencies: 3530, 3900, 7030, 7250, 14070, 14275, 21050, 21325, 28300, 28900.

Awards: Certificates to the first three places in each state, province and country. Tenn. first 5 places, single and multi-operator. (Avoid the traffic nets on the penalty of disqualification.)

Mailing deadline is March 27th. Logs go to: Club Station WA4NZE, 612 Hogan Road, Nashville, Tennessee 37220.

Logger Contest

Starts: 1600 PST Saturday, February 25
Ends: 1600 PST Sunday, February 26

This is not really a contest but a fine chance to gain a "Logger Certificate."

Members of the Tacoma Radio Club will be on during the above time. Contact 10 members, give a list of the stations worked with dates to the 10th member and send your log to: Radio Club of Tacoma, Att: Edward Coles, K7CZM, 1249 S. Washington St., Tacoma, Wash. 98405.

Editor's Notes

It's going to be a bit confusing the last week-end in February. Fortunately the several events are in different call areas, so you can at least identify the one you are getting involved.

This once again points out the need of more space in the operating calendar, and better coordination between organizations holding events during the same approximate time.

The months of February and March have always been dominated by one major event which could easily be streamlined to single week-ends, thus releasing two full week-ends for other activities.

There are many state parties that have established dates over the years. However some newly announced events seem to have picked their dates out of a hat.

I have tried to help by distributing an "Anticipated Calendar of Events," but this can be only used as a guide. It's up to the involved organizations to contact each other and make their own decisions.

We have no authority to make any decisions, we can only advise you of the situation at the time. Once you have made an announcement we will be happy to publish it.

The list of "Claimed Scores" is only a cross-section of some of the leading scores we received, so don't panic if you do not see yours there.

73 for now, Frank W1WY

"I still think it would be easier to buy a radio than to grapple for that cable."

SURPLUS sidelights

BY GORDON ELIOT WHITE*

THE model 28 line of Teletype equipment has been produced for 20 years now, but has never been a common item in amateur hands, chiefly because it has been too good to get into surplus channels. The Cadillac of any shack, the model 28 has been priced in the thousands of dollars because few have been available except at list price, from the Teletype Corporation.

For years it has been a status symbol of the Pheasant under glass class to own a '28, for the only ones available before Teletype began selling to individuals were damaged ones, painstakingly rebuilt at a cost in parts and labor very near to the new value. The Bell System continued its quixotic policy of smashing Teletype equipment rather than repairing it, and a few battered model 28 machines have been salvaged from junk yards and put back into service at considerable expense.

The telephone companies are now at last moving on to newer teleprinter equipment, in a program of shifting to the American Standard Code for the Interchange of Information (ASCII). ASCII is an 8-level code, with greater scope for data as well as communications work, and the eventual capability for "even parity" or inherent error-correction. It makes all 5-level equipment commercially obsolete, including of course that desired for use by amateurs under Federal Communications Commission RTTY rules.

Amateurs can look forward to increasing quantities of "obsolete" model 28 material in surplus channels, although many foreign and non-Bell U.S. communications companies will continue to compete for the "retired" 5-level machines. Western Union International called me recently to ask about reconditioned model 28 equipment, and RCA, ITT and others are actively replacing model 19 and 14 sets with 28 and German Siemens machines.

The Bell System began to replace model 28 sets with the 100 word per minute, 8-level model 35 machines last year, with the aim of dropping all 60 and 75-word equipment. The slower speeds must be fed through complex speed-converters to operate in the Bell circuits, and will be abandoned as soon as practical. If Bell can go to 8-level at the same time, the Telephone companies will be able to make both changes at minimum cost.

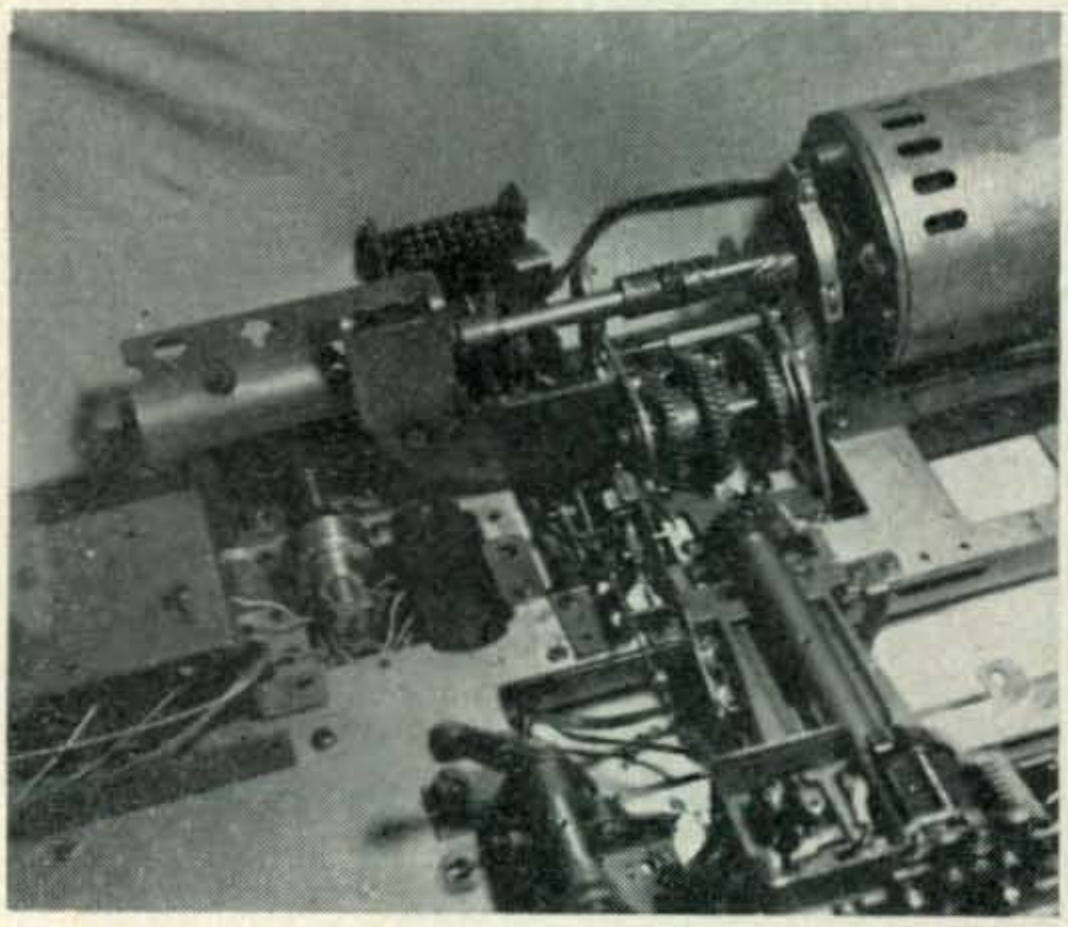
The prospect of phasing-out the model 28 equipment led Bell to give away some 28's in 1966 under the same waiver-of-commercial-use rules that have provided the older #15 and #19 machines to many amateurs in the past. The waiver-donation program was halted just before the 1966 elections, which put a heavy demand on leased Teletype equipment, and as I write this, all 28 machines are being returned to Western Electric Co., for overhaul and reissue to the Bell companies. This is probably a result of military purchase of Teletype machines which has hampered production of the newer 35's at Teletype Corporation's Skokie, Illinois plant. I predict that model 28 units will become available to amateurs in quantity in a year or two, once the Viet Nam war is settled.

In the meanwhile however, some model 28 gear is appearing, notably the typing reperforator, which is being phased out of some 30 military switching centers which are being replaced by electronic Autodin switches. The LPR set prints on tape as does the older model 14 machine, but is capable of 100 w.p.m. operation. It is often found in receive-only models with gearshifts allowing 60-75-100 word operation at the flick of a finger. The LARP perforator, also found in the older military centers, is a parallel-only unit, not readily adaptable to amateur use.

The MARS system has been issued some model 28 machines, and has gotten the cream out of the old switching centers, including both KSR and ASR page printers, although a freeze on disposal of Teletype equipment went into effect in the military last fall. Because of Viet Nam, only old, or damaged equipment may be sold as surplus at this time.

For the amateur with a bankroll, Teletype Corp. now sells the lightweight model 32 machine, new, at the relatively low price of $475 for the KSR (keyboard-send-receive) model, somewhat higher for the ASR, which has tape facilities somewhat like the old model 19.

The model 32 is a compact set, in a streamlined plastic case, quite suited to the amateur who buys good commercial gear, plugs it in and



3-speed gear shift (60-75-100 wpm) for the model 28 keyboard-send-receive page printer. This gearbox mounts in place of the single-speed intermediate gears. It may be adapted to the ASR machine with some minor modifications to the base.

*5716 N. King's Highway, Alexandria, Virginia 22303.

SURPLUS CORNER

The Northern Radio model 104 RTTY demodulator. This rack-mounted converter may be altered to receive two-tone amateur FSK signals.

operates. It has a light-duty rating in commercial use, and is obviously not battleship-built like the model 15, but should be quite reliable for amateur use. I have operated a 32 ASR on a Western Union TELEX line in my home for two years, with some maintenance.

But for the full-fledged RTTY man who likes to tinker, the pot of gold at the end of the rainbow is a model 28 ASR with all the goodies: automatic carriage return and line feed, local back space, reverse line feed, and the "here is" key that automatically sends the local name and call from a pre-coded drum on the printer; a typing reperforator which sits to the left of the ASR typing unit, on which you can perforate local tape while the printer copies an incoming signal; (the reperf will also copy a second incoming signal instead of perforating off the keyboard).

The complete ASR will have a 60-75-100 word per minute gear shift on the printer, to read those high-speed commercial and military stations. It will have an auxiliary reperforator under the "dome" which is a third complete receiving unit, also capable of 60-75-100 w.p.m. operation if so desired.

The last word will be a dual-headed transmitter-distributor, LCXD. Driven off the printer motor, this unit incorporates a climbing-head reader that will sense up to the last character punched by the keyboard perforator. Just in front of the pivoted-head transmitter is mounted a standard fixed-head "gate" which can be switched in to read previously-prepared tape such as a transmission you might have copied from a rare DX station, and want to retransmit for bragging purposes, or local station identification tapes.

Despite the relative scarcity of model 28 sets right now, it is possible to find damaged equipment and rebuild it yourself. Manuals and parts catalogs available from a number of sources, including Teletype Corp. itself, plus the ready availability of parts from Teletype, make build-it-yourself model 28's a practicality.

Sam Consalvo, 4905 Roanne Drive, Oxon Hill, Maryland, and Quaker Electronics, box 215, Hunlock Creek, Pennsylvania, sell Teletype books at nominal cost. Ritco Electronics, box 156, Annandale, Virginia, has the NavShips book on the military 28 KSR for sale.

Bulletins and manuals for model 28 teletype machines

Number		Description
NavShips 91713		TT-47A/UG and the 28 KSR printer.
NavShips 93241		TT-47C, D, E; TT-234/SGA-3 and the 28 KSR printer.
NavShips 93788 (3 vols)		Navy version of the 28ASR, including TD, reperf, and the keyboard.
	Vol. I	Adjustments and theory
	Vol. II	Parts diagrams
	Vol. III	Wiring diagrams

Teletype Corp. Bulletins

28 KSR Printer	216B	Description
	217B	Adjustments
	1149B	Parts
28 Relays	120B	Description and adjustments
	1044B	Parts
28 Reperforators	246B	Description
	247B	Adjustments
	1167B	Parts
28 ASR printer and assoc. units	249B	Description
	250B	Adjustments
	1169B	Parts
28 Transmitter — Distributor	258B	Description (LXD)
	235B	Adjustments (LXD)
	1161B	Parts (LXD)
	251B	Description (LAXD)
	252B	Adjustments (LAXD)
	253B	Description (LCXD)
	254B	Adjustments (LCXD)
	1171B	Parts (LCXD)

At the Teletype Corporation, 5555 Touhy Ave., Skokie, Illinois, Mr. E. F. Peschek, in the Customer Service Department, or Dick Lee, in the same office, can assist amateurs with literature or ordering information. Teletype manuals, showing theory and adjustments, plus exploded

The "Full House" model 28 ASR with LCXD Transmitter-Distributor; Auxiliary Reperforator, with 8-speed Gear Shift, Page Printer with Shift, and Keyboard Perforator.

parts diagrams and parts numbers, make ordering relatively straightforward. If you become a steady customer you might ask for the red price catalog from Teletype. I should note here that many low-demand parts are available from Teletype *even though they are not listed in the price book.*

When ordering from Teletype it is well to check your catalog numbers, as a one-digit error may bring you an expensive component that you didn't want, and Teletype has, quite reasonably, a 25 percent service charge on returned parts where the error is not theirs. Also, I feel that in most cases it is well to combine orders as much as posible to avoid 59 cent orders that cost Teletype $5 to process. If you have access to a TELEX or TWX circuit you can reach Teletype Corp. directly for the fastest service, often delivery by parcel post special handling in less than a week.

I find that by careful study of the manuals some money can be saved in ordering from Teletype. A $4 bracket on the dome reperforator in the ASR set can be omitted in amateur use. Other economies can be made by careful study, including nuts and screws, if you have a good junk box from the older machines.

The most-desired single item in the model 28 line is probably the three-speed gear shift for the typing unit (page printer). This can be bought as a modification kit from Teletype Corp. at $102. (specification 5948S). However, by eliminating certain brackets and a sub-base, and by *buying the parts separately* rather than as an assembly, you can pare the cost to about $75. If you have a shift unit from the receive-only reperforator, another $18 in parts can be salvaged from it for the KSR unit. The remaining $53 is still fairly expensive, but not as model 28 equipment goes.

I can supply a copy of the parts I used to accomplish this conversion at a cost of $1 for the reproduction work involved.

A similar conversion of parts from the R.O. reperf to mount a reperforator under the ASR

[*Continued on page 98*]

BRAND NEW FR-4/U/URM-79 FREQUENCY METERS

Here is a real hot item for you discriminating hams or labs who are interested in the ultimate accuracy in frequency measurements. All units are brand new in original crates with spare parts, instruction manual and two calibration books. The spare parts even include a spare crystal oven and crystals, and all tubes.

SPECS:

Frequency range: 100 KC to 20 MC (7 bands) usable to 1000 MC.

Oscillator freq.: 100 KC to 250 KC (proxy) 1250 KC crystal), 15 to 20 KC (interpolation), 10 KC (blocking)

Frequency stability: .0001%

Accuracy: .001%

R.F. Output: 100 microvolts min. in 51 ohms.

Audio Output: 2 MW min. in 600 ohms

Method of Interpolation: Visual, with built in oscilloscope

Tubes: 30

Harmonic selector: 9th thru 26th

Power Required: 115 or 230 V, 50 to 1000 CPS, 136 watts.

Weight: 146 lbs. in case

Size: 22"H x 26¼"W x 20¾"D

Description: a portable hetrodyne type frequency meter for portable or fixed use. May be removed from the case and rack mounted, or used in the case with the tilt base as a table model.

Shipping Weight: 160 lbs.

Price: $350.00

NEW INSTRUMENT OR RECEIVER TRANSMITTER CABINET

Panel space 19" wide x 12½" high with a clear depth of 13". Outside depth is 14½". Partial rear panel. Painted *black crackle*.

Price: $3.95 ea.

NEW CRYSTALS

100 crystals in a case originally for type MAR equipment. These crystals cover the range of 4844.44 KC to 7778.78 KC. There are 16 units in the 40 meter amateur band, and an additional 7 units are useable in the 6 meter band. Also 17 are useable in the 10 meter band. Complete with case.

Price: $12.95 2 for $25.00

RDR RECEIVER & SPARE PARTS WITH 10 CRYSTALS

Mfg. by RCA BRAND NEW

Freq. range: 225—390 mcs.

You get two wooden crates which include:

Box #1

RDR RECEIVER with 13 V dynamotor output is 385 VDC @ 500 ma

Box #2

1—set of spare parts which includes:

- 1 Headset
- 1 Set of operating tubes (spares)
- 1 Headset extension cord
- 10 sets of fuses
- 2 pilots lights
- 1 set of connecting cables and other parts too numerous to mention.

All this in original military boxes, receiver packed in Aluminum water proof case, manual included. Easily converted to 200 mc Ham Band or use as they are for UHF aircraft band. You get all that is required to operate except the 12 VDC Source and the Antenna.

BRAND NEW

Price: $34.95 each while they last f.o.b. our Warehouse.

PLATE TRANSFORMERS

Input: 110/220 60 cy. 1 ph.
Secondary: 2500-0-2500 400 mil.
Size: 11½" H. 7" D. 9" W.
Shpt. Wt.: 100#
Price: $19.95 ea. or 2/$35.00

MODEL 19 TELETYPE SETS

Complete—Mfg. by Teletype Corp.
60 speed—Some motors sync.—some governed.

INCLUDES:

- Perforator
- Transmitter Distributor
- Page Printer
- Power Supply (800 ma DC) 115V 60 cy. input
- Table

These units have been checked and overhauled, and are *guaranteed* to be operable for both Printing and Tape and are in EXCELLENT condition.

Price: $199.50 f.o.b. our warehouse
Shpt. Wt.: 350#

WE ALSO HAVE A COMPLETE LINE OF T.T. PARTS FOR MODELS 14, 15, 19.

DIRECT PLUG-IN REPLACEMENTS

PREMIUM 5R4 SILICON PLUG-IN REPLACEMENT
RECTIFIER RATINGS: 4000 PIV @ 1 amp. D.C.

These are a direct plug-in replacement unit that will eliminate tube replacements, greatly reduce heating, and provide instant warm-up. All units are properly compensated, potted and power tested at 1 amp. average D.C. current.

Price: $6.00

5U4/5Y3/5Y3GT/5V4/5V4GT/5AU4/5T4/5W4/5Z4/5AW4/5V3/5AX4/5AZ4/5Y3G (1800 PIV)

Our #SA will replace any of the above tubes.

Price: $1.95

SELECTRONICS SELECTRONICS

BRAND NEW PANADAPTOR PANORAMIC MODEL PCA-2 TYPE T-200

Here is another scoop by SELECTRONIC: A BRAND NEW GENUINE PANORAMIC RADIO PRODUCTS INC. PANANADAPTOR. These units are small and of a modern decor, so that they will blend with any station. They come complete with instruction manual.
SPECS:
Power Rec'd.: 115V 50-60 cycles
I.F. Range: 450-470KC
Screen Size: 2" dia.
Sweep Width: ± 100 KC to 0 KC
Tubes: 11
Size: 11"W x 6½"H x 10"D.
Shipping Weight: 20 lbs.
Price: $79.95

NEW RACK CABINET DESK

Complete with all hardware for mounting to a 19" rack cabinet. 10½" deep x 19½" wide desk area.
Price: $3.95 each

FLANGELESS SILICON DIODES

All rated at 1.5 amps.

50-200 Volts	.06 ea.	20/$1.00
200-400 Volts	.09 ea.	15/$1.00
400-600 Volts	.12 ea.	10/$1.00
600 plus	.15 ea.	7/$1.00

METER—PANEL TYPE— WESTON MODEL 1328

0-500 microamps Full Scale
Calibrated .005 to 500 Roentgens/hour.
Weston Model 1328, 270 degree scale, approx. 3" diameter. Excellent for wavemeter, etc.
NEW & IN ORIGINAL BOXES
Price: $1.95 ea. 3/$5.00

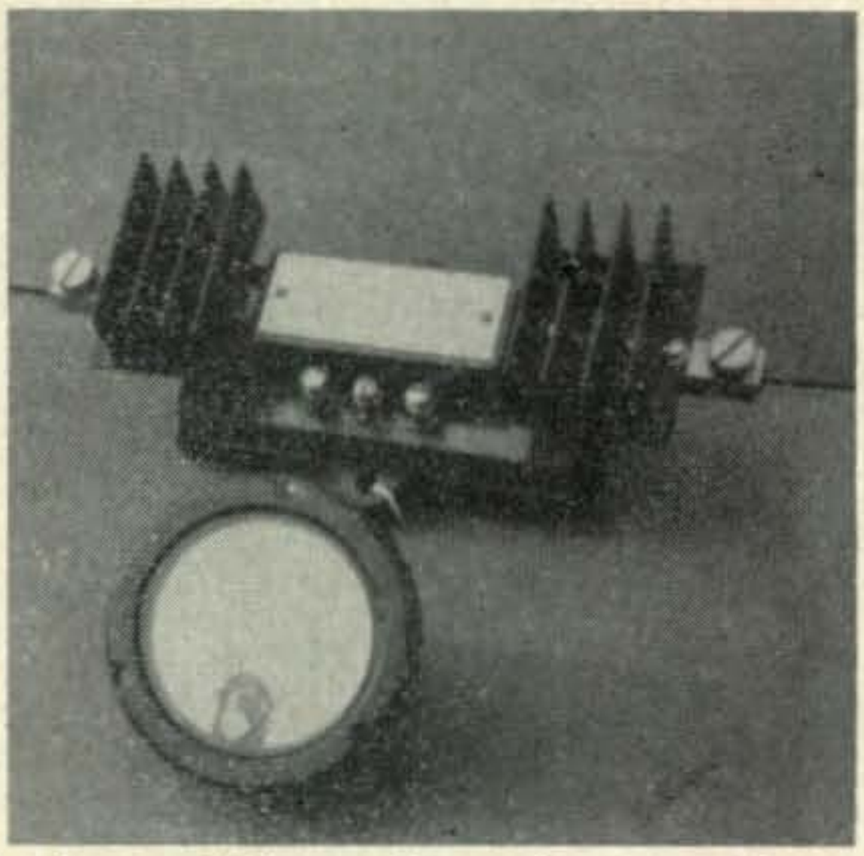
FACSIMILE RECORDERS

RD 92 A/UX
LESS MOTOR — *SOLD AS IS*
Price: $10.95
Shpt. Wt.:

RADIOSONDE UNITS

Sure to delight any gadgeteer or model buff and at a ridiculously low price. Contains a 3A 4 crystal oscillator using an FT-243 type xtal on 3135KC on its own separate little chassis that can easily be removed intact for other uses (marker oscillator, oscillator for small transmitter etc.), a 3 VDC keying relay, a 3 VDC low speed motor, a code disc with 3 pickups, a temperature transducer, a humidity transducer, and a pressure transducer and other small parts. Units are NEW & COMPLETE LESS BATTERIES (3VDC & 90-135VDC) and may be operated as received to read temp., pressure and humidity.
Price: $1.50 ea. 2/$2.50 or 5/$5.00

WESTON R.F. AMMETERS



A brand new 3½" round panel meter with external thermocouple unit calibrated for 100 R.F. amps. Full scale with the lowest scale reading 20 amps. Weston Model 1533 meter and thermocouple. These units are of particular interest to Broadcast Stations and induction heater users. There in negligible frequency error up to 30 mc and approx. 2% error up to 75 mc.
Price: $24.95
Shpt. Wt.: 5 lbs.

RACK CABINET & BLOWER

BRAND NEW 19" desk top rack cabinets that contain a NEW Rotron muffin fan with attached cord and plug for 115V 50-60 cy. mounted on the rear door. There is also a top door, 2 drawer rails with ball bearing rollers (removable), 3 alignment tools and two Allen wrenches. Front panel space is 19" wide x 14" high with a 13½" clear behind panel depth. The outside measurements are 16" high x 21" wide x 15" deep. There are four rubber feet on the bottom and the color is *dark grey*.
Price: $14.95 ea.

TELETYPE DEMODULATOR UNIT

Northern Radio Type 104 Model 3
11 Tubes
115 or 230V 60 cycle operation.
Complete ready to go.
A combination of this unit, a receiver, and a Teletype Machine is all that is required to receive teletype.
Front panel indicators and controls.
Input gain
Speed control 50-100-250-500-1000 WPM
SENSE + or —
Switch=neutral—polar
Switch-current reverse
Current control
Tone monitor jack
Power on light
75-0-75ma. D.C. meter
SUPPLIED WITH SCHEMATIC
Price: $49.95 50# Shpt. Wt.

All prices are FOB our Philadelphia warehouse. All merchandise described accurately to the best of our knowledge. Your purchase money refunded if not satisfied. Terms are cash. Minimum order is $5. The public is welcome to browse. We're open weekdays 8 to 5 and Saturdays 8 to 1.

SELECTRONICS 1206 S. NAPA STREET PHILA., PA.
HO 8-7891 HO 8-4645

For further information, check number 9, on page 112

dome would cost about $42, plus $12 for the tape bin and other possibly nonessential parts, against a total cost of $83.60 for the entire shift mechanism new.

The shift *lever* mechanism from the R.O. reperf can be adapted to the dome-mounted unit, although it requires some filing and fitting. The KSR printer shift unit can be used on a 28 ASR, again with some filing and adjustments, although it will shift *only the printer*, not the T.D. or the keyboard perforator, which will continue to run at 60-speed, as their fixed gears are driven directly from the motor shaft.

There is a shift unit which will change the entire ASR set from 60 to 67 and 100 w.p.m. operation. It is modification kit #195154, and is listed at $212.

A number of amateurs around the country specialize in selling and swapping Teletype parts, and may be a source of complete machines or damaged units with which to start, or of the gearshift cluster gears, and other parts. Five I can recommend are: Fred Schmidt, 405 N.W. 30th Terrace, Fort Lauderdale, Florida, 33311; Jack Thomsen, 11001 South Pulaski Road, Chicago, Illinois, 60655; Phil Rickson, box 96, Morrisonville, New York; Jim Cooper, 834 Palmer Avenue, Maywood, N.J., and Elliott Buchanan, 1067 Mandana Blvd., Oakland, California, 94610.

A word on the newer machines, which are replacing the model 28, and which have even been seen in amateur hands: The model 32, mentioned above, is a lightweight 5-level printer. The model 33 is an eight-level version, virtually identical except for the four-row keyboard.

The model 35 is basically a model 28, with 100 speed gears and relatively minor modifications to adapt it to 8-level operation. Probably 90 percent of its parts are the same as the 28, but the transmitter-distributor operates off an independent motor, and the cabinet installation has been updated, with a highly-flexible switching set-up in the base. The typing reperforator is 95 percent identical to its 28 predecessor. The 35's came out in 1964.

The U.S. Government, and the Bell System, aim eventually to go to the Teletype model 37, an eight-level machine designed for 150 word per minute operation. So far only the KSR model is available, but a full line will be out later this year.

The 37 differs from the 28 basically in that its typebox does not return to a "letters home" or "figures home" position after each character is printed; instead it goes directly from one character to the next by the most direct motion, a speed-increasing configuration.

When the federal government and all its military agencies switch to the model 37, a flood of model 28 gear is expected to hit the surplus market. After a year or so, the supply will undoubtedly force the price down to amateur levels, although that day probably is still some way off.

In the future beyond the model 37 is another Teletype machine, so far known only as the "ink squirter." This is a 2400 word per minute console, designed for government applications. It "prints" through a line of miniature nozzles which squirt electrosensitive ink past high-voltage deflection plates similar to the beam deflection plates of a cathode ray tube. I doubt that the "squirter" will ever be popular on the amateur market, if only because of its three-ton weight.

The Kleinschmidt Corp., has produced a high-speed printer which is more attractive to the surplus man, although he will not find many of these in surplus yet. This is the Model 311, or the model 321 ADS (Kleinschmidt's version of ASR). These printers, which appear fairly conventional, contain a constantly-rotating platen, into which the characters are engraved.

The 311 "reads" signals as fast as 400 words per minute electronically, printing with a short-stroke hammer that drives the ribbon against the paper and the type character behind it. The set will work at 60 w.p.m. as well as at higher speeds.

In my roundup of RTTY converters in August, 1966, one item I did not mention was the Northern Radio model 104 demodulator. This is a single-tone converter, with electronic D.C. keying and excellent automatic gain control, plus polar or neutral output. Good noise filtering is provided, with controls adjustable for various reception speeds. Normal-Reverse and bias control are also provided. The unit uses 11 tubes, is seven inches high, and mounts in a standard 19 inch rack. It operates off 117 or 230 volt 60 cycle a.c. power.

Any single amplitude-modulated one between 400 and 10,000 c.p.s. may be fed to the input at a level between −20 and +30 db (0 db=1 milliwatt into 600 ohms).

Conversions might include addition of appropriate filters for a single tone such as 2125 cycles per second, or additional input circuits and filters to give the set a mark-space differentiation capability, as is commonly used to copy frequency shift RTTY keying.

The manual can be bought from Northern Radio Co., 147 W. 22nd Street, New York, for $2.50 plus 50¢ postage.

The 104 demodulator is available quite cheaply at several surplus outlets including Sasco Electronics, 1009 King Street, Alexandria, Virginia, Ritco Electronics, Box 156, Annendale, Va., and Selectronics, 1206 S. Napa St., Philadelphia, Pa.

Finally, Bill Tyrrel tells me that he has a quantity of hard to find facsimile gear, including the fine Acme machines and converters, for sale or swap to amateurs in the New York-New Jersey-Connecticut area (most of it is too bulky to pack and ship). He has AFR-180 recorders

which can be converted to 240 rpm to copy satellite transmissions. He also has the MFM fax converters, for receiving frequency-shift fax signals. His address is 24 Bellecrest Ave., East Northport, L.I., New York 11731.

USA-CA [*from page 87*]

meaning of those words. Picapau is a bird with a chisel-like bill known to us as a woodpecker. Carioca is an old expression ascribed to the natives (Indians) meaning the people of Rio de Janeiro (Guanabara). Woodpecker is a nickname widely used to describe the telegraph key and c.w. operators. The Award is issued for stations in U.S.A., Argentina and Uruguay for 10 two-way c.w. contacts with 10 different PPC members. For all other countries, 5 contacts are required. Members are: PY1AVV, BAK, BAT, BCA, BHQ, BLC, BQO, BXO, CBW, CCE, CCO, CFS, CGU, CIP, CKG, CKV, CKZ, CLJ, CMB, COG, GU, HX and ZM. Send application to PICAPAU CARIOCA (PPC) c/o LABRE-GUANABARA, P. O. Box 58, Rio de Janeiro, GB, Brazil.

Greater Kansas City Award: Sponsored by the Jayhawk Amateur Radio Society, Inc., of Kansas City, Wyandotte County, Kansas for confirmed contacts with amateur radio operators in the greater Kansas City area consisting of Clay, Jackson, and Platte counties in Missouri and Jackson, Leavenworth, Wyandotte counties in Kansas. Issued in three classes—Class C—work 25 stations including at least one member of J.A.R.S. Class B—work 50 stations including at least two members of J.A.R.S. Class A—work 100 stations including at least 4 members of J.A.R.S. Contacts with amateurs in any of the above mentioned (6) counties count, contacts must be made on or after January 1, 1960. A specific call sign may be claimed only once. No endorsements for special bands nor modes. J.A.R.S. contacts must be members on date of QSO. Memorial Club station WØLB counts as a member contact. Send GCR list showing date, time, station worked, city and county of each contact and $1.00 or 8 IRC (DX stations only) to Custodian, Ella Koons, WØAYL, Route 1, Box 180, Edwardsville, Kansas 66022.

Time and space have run out, sorry, but how was your month? 73, Ed., W2GT.

The Nick-Key [*from page 59*]

Cause: 1. Relay armature coming into physical contact with pole-piece.

2. Relay armature spring tension too weak.

3. Relay contacts breaking too much current, and are momentarily welded together.

Trouble: Dits (or dahs) blur together, and cannot be cleared by manual adjustment of WEIGHT control.

Cause: Amplifier positive cathode bias not high enough to prevent tube from conducting continuously regardless of WEIGHT control setting.

Remedy: Reduce the value of either R_3 and R_5 as required.

Trouble: Dits (or dahs) too light, and cannot be made heavier by manual adjustment of WEIGHT control.

Cause: Amplifier positive cathode bias too high.

Remedy: Increase values of R_3 or R_5 as required.

Note: Changing the value of R_3 or R_5 changes the amount of positive voltage available at the WEIGHT control, because these resistances are part of a voltage divider across the d.c. voltage source.

Note: If a relay having less than the specified 10K ohms d.c. resistance has been substituted, it may not "pick-up" because the amplifier plate current is not high enough to energize the relay coil. ■

DX [*from page 77*]

QTHs and QSL Managers

K8MMZ would like to offer his services as QSL manager to any DX station.

W5VA advises he is no longer QSL manager for 4S7NE and 4S7DA.

Jack, W2CTN, reports that he no longer acts as QSL manager for the following: CP3CN, CP5EZ, FG7TC, FG7TD, FG7XJ, HK2YO, HK3RQ, HP1AC, HP1IE, KV4CI, OA4FM, OA8D, OX3UD, PJ2ME, PZ1AX, PZ1CW, VP2MV, VP6AH, VP6AP, VP6BW, VP6PJ, VP7NS, VP7NW, VP9BY, ZB2AP, ZS2SS, ZS40F, ZS6CN and 9H1R.

CT2AN	via CT1IW	**SVØWL**	via W3CJK
ET3GB	via K5LRE	**SVØWU**	Box 66, Rhodes Island, Greece
FG7XJ	via W8GIU		
FL8HM	via W7WLL	**VK5XK/ VK2**	via W5LGG
FL8AC	via W4NJF	**VS6AZ**	via K6GMA
FL8RA	via W2LJX	**YS1RK**	via W6FUF
FP8DD	via WB2RSW	**VP2VC**	via WA4AYV
JX5CI	via Norwegian Embassy, Reykjawik, Iceland	**VP8HO**	via K6GMA
		VS5JC	via W5VA
		WB2VJD/ CEØA	via K5GOT
KG6IF	via W6ANB	**XT1AC**	via K9HOL
KG6IG	via K6ZDL	**YASME**	Box 2025, Castro Valley, Calif. 94545
LU-ZD, ZJ, ZU, ZV, ZW, ZX	Sub. de Mayor Carlos E. Cejos, Red. Sirme-Sec. Comunicacioner, Comand en Veje Ejercitio, Cabildo 65, Buenos Aires, Argentina	**ZD9A**	via W2GHK
		ZF1EP	via W4PJG
		ZL3AB	via K6GMA
		3AØAV	via I1ZBS
		4Z4HQ	IARC Clubstn. Box 4099, Tel Aviv, Israel

All other LU-Z stations—Sub. de Pral Aldo Veneria, Estado Mayor General Naval Communicaciones, Ministerio de Marina, Canzallo 55, Buenos Aires, Argentina.

6O1PF	via KØOMM	**9H1AU**	via W8QGP
7Q7EC	via W5GIQ	**9J2MM**	via W4NJF

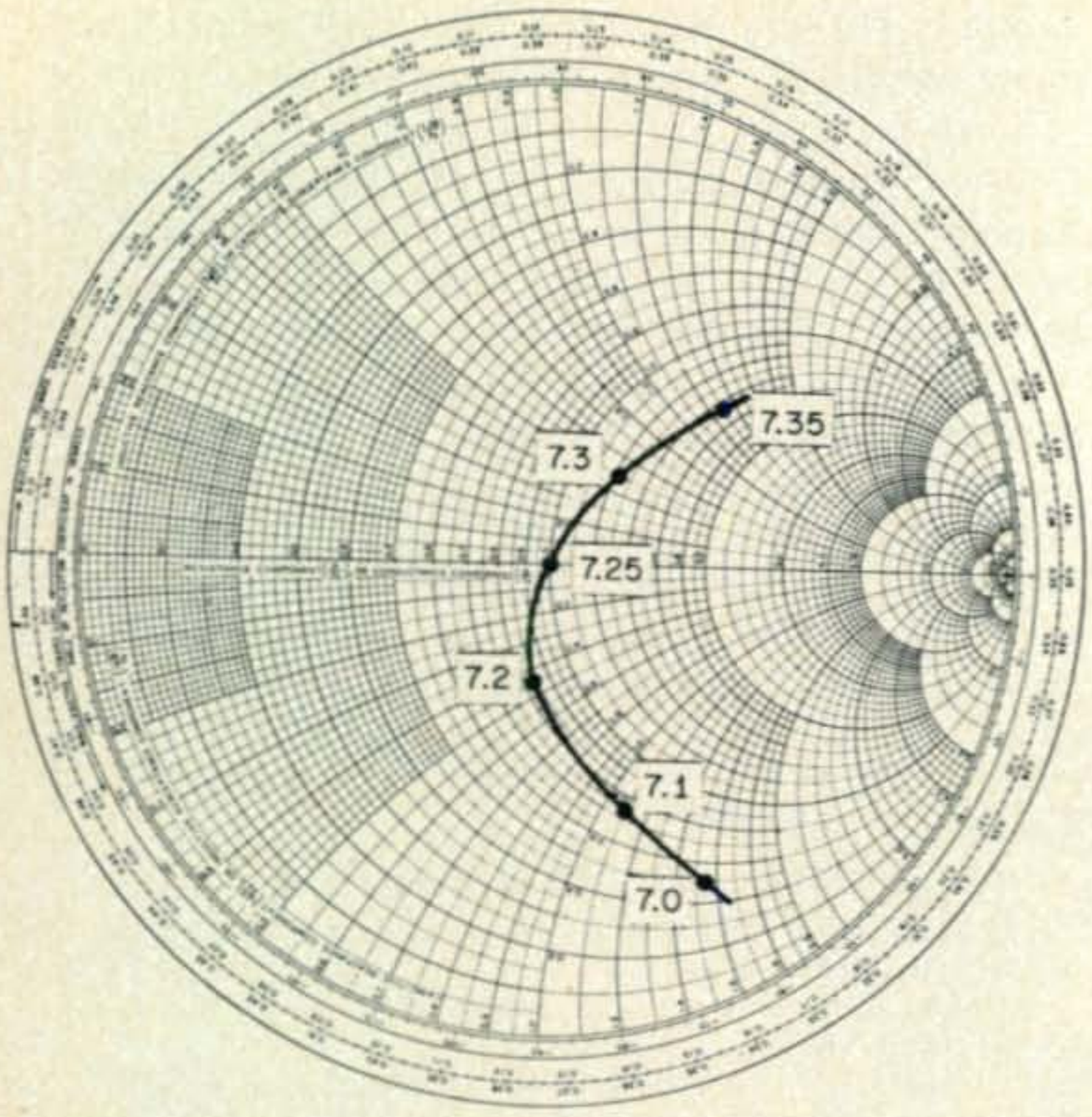


Fig. 4—Plot of the network input impedance for 40 meters using a #9 wire for the fold.

Mark IV Antenna [*from page 64*]

Figure 6 shows the effect of setting the 75 meter L network to produce an input impedance of 40 + j0 ohms versus an input impedance of 50 + j0 ohms at 3.9 mc. With the former, the s.w.r. is never 1.0:1, but it is better than 2.5:1 over the limits of the 75 meter phone band. The s.w.r. across the band is better with this impedance setting than with a setting of 50 + j0 ohms. The same thing may be said for fig. 7 which shows the impedance plots of the 160 meter "L" network when set for an input impedance of 30 + j0 ohms *vs* one of 50 + j0 ohms at 1.812 mc. With the former, the s.w.r. is never 1.0:1 across the band, but it is only slightly over 3.0:1 at 1.800 and 1.825 mc. However, when the network is set at 50 + j0 ohms, the s.w.r. at the band limits is about 5.0:1.

Radials

The 16 ground radials of the Mark III[2] are used with this antenna on 40, 75 and 160 meters. Connection is made to the tuning unit and to the base of the tower. Also, a 6 foot ground rod is driven into the earth at the base of the tower, to function mainly as a static and lightning drain.

Tower Rigging

There is nothing special about the rigging of the tower, except that at points of guy attachment to the ladder, no reliance is placed on the rungs of the ladder to take the lateral strain. A length of 2 inch aluminum tubing, with ends flattened and bent over, is securely bolted in at each such level, and two pieces are used as supports for the pipe holding the beam rotator. The ⅜ inch eye bolts to which the guys are attached are actually bolted through the flattened ends of the 2 inch tubing, making a very strong guy attachment.

In addition to being held by "U" bolts to two of these 2 inch crossmembers, the rotator pipe is bolted to one of them by a 5/16 inch through-bolt which prevents the rotator pipe from twisting. The rotator is similarly secured to its upper and lower pipe sections, so that no twisting can occur.

One of the illustrations shows the spring steel clips by means of which the coaxial line is secured to the ends of the 3 inch standoff insulators. These were found in a hardware store, and apparently were intended to fasten tools to a tool board. There is also one such clip under the screw which holds the inboard end of each insulator, and the rotator cable is slipped into these. In this way both the downcoming coaxial line and the rotator cable may be very easily detached and left hanging when it is desired to lower the upper section of the ladder.

Also, there is a coaxial connection using two PL-259 plugs and one PL-258 connector in the line just outside the feedthrough insulator, so that the coaxial line may be detached from the tuning unit. This junction is taped with several layers of waterproof vinyl tape.

The connection of the coaxial line to the top of the tower is made with two PL-259 plugs and one PL-275 adapter. The PL-275 adapter is fastened to the tower by a ⅛ inch aluminum plate. This junction is also well taped with waterproof vinyl tape and enables the beam to be detached and removed from the tower if desired, without removing all of the coaxial line from the tower. In doing such a waterproof tape job, one begins winding at the bottom of the junction, and spirals upward. Thus each layer is on top of and outside of the one below. A coat of quick-drying varnish is then applied.

The rotor cable bypass capacitors are contained in a small waterproof can which is

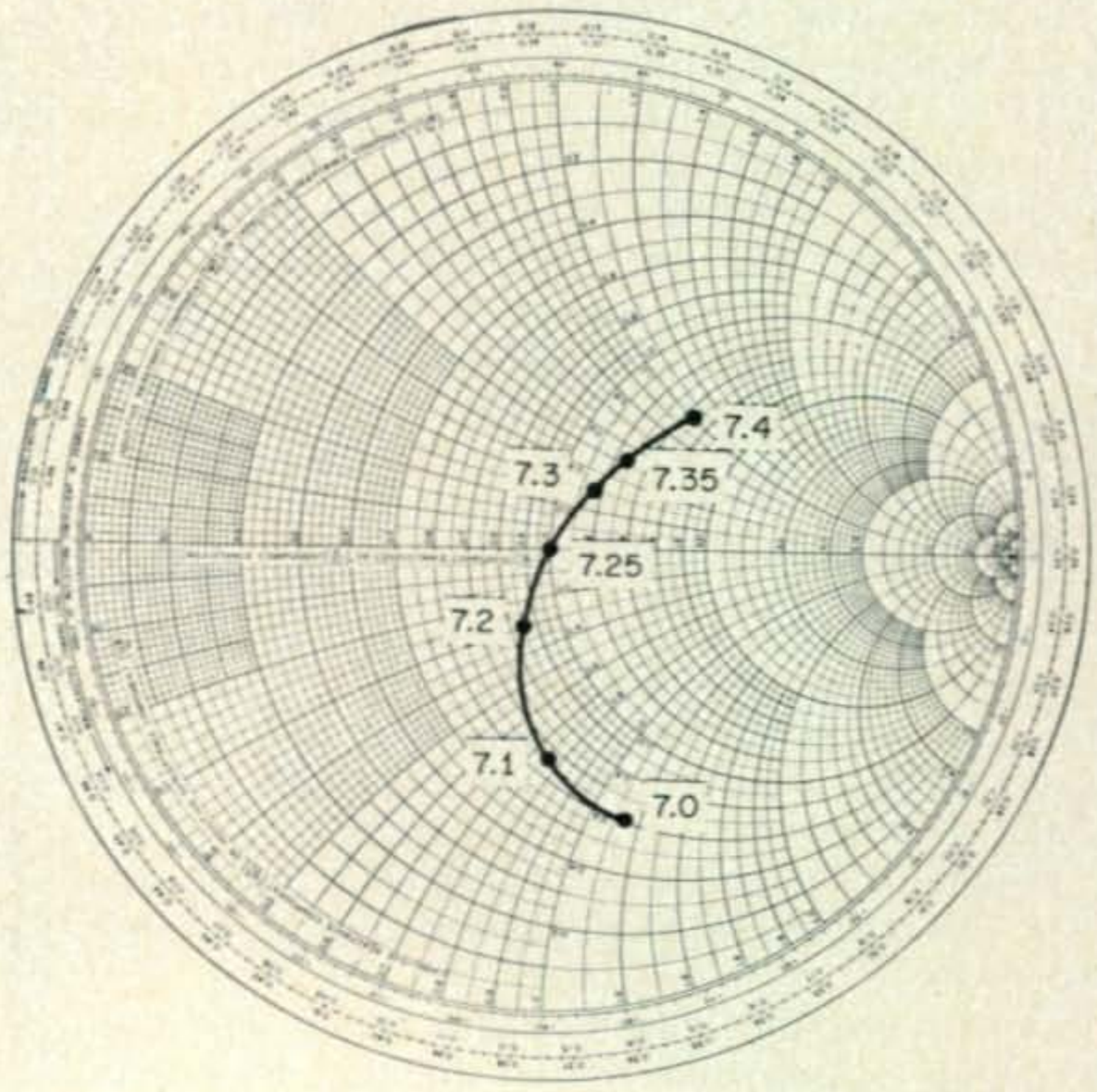


Fig. 5—Plot of the network input impedance for 40 meters using one inch aluminum tubing for the fold. Note the increased bandwidth in the 2:1 s.w.r. circle.

mounted on one of the 4 × 4 ladder supports. One lead of the cable is *ground*, and the other six are bypassed to it, and it is connected here to the ground bus.

Tower Support

The 4 × 4 supports are amply strong to hold the weight of the structure, being imbedded in 4 feet of concrete. A 1 inch iron pipe through the bottom rung of the ladder serves as a hinge, for laying the ladder over on its side.

The guy cables are of fourteen strand wire rope. Each one has its own turnbuckle for adjusting tension. Each cable is insulated from the tower and is also broken up into sections of less than 12 feet by small egg or "johnny ball," insulators. I have noted no change in s.w.r. on 10, 15 or 20 meters when I rotate the beam, which speaks well for its isolation from surrounding objects.

Results

The results on all bands have been outstanding. The beam performs exactly in accordance with the manufacturer's specifications, and I have had many excellent DX contacts with it. Apparently its height is a good compromise for all three bands, 10, 15 and 20 meters, although it is not as high as it should be for good low angle radiation on 20 meters.[1] It performs best to date on 15 meters, and it has brought me many reports of being the strongest signal on the band from Europe, Africa, New Zealand and Australia.

As yet good DX openings have not been very plentiful on 10 meters, and I have not had so much opportunity to evaluate it on that band as I have on 15 meters. However, those contacts I have made with overseas stations on 10 meters have resulted in excellent reports.

The beam top-loads the 40 foot radiator so

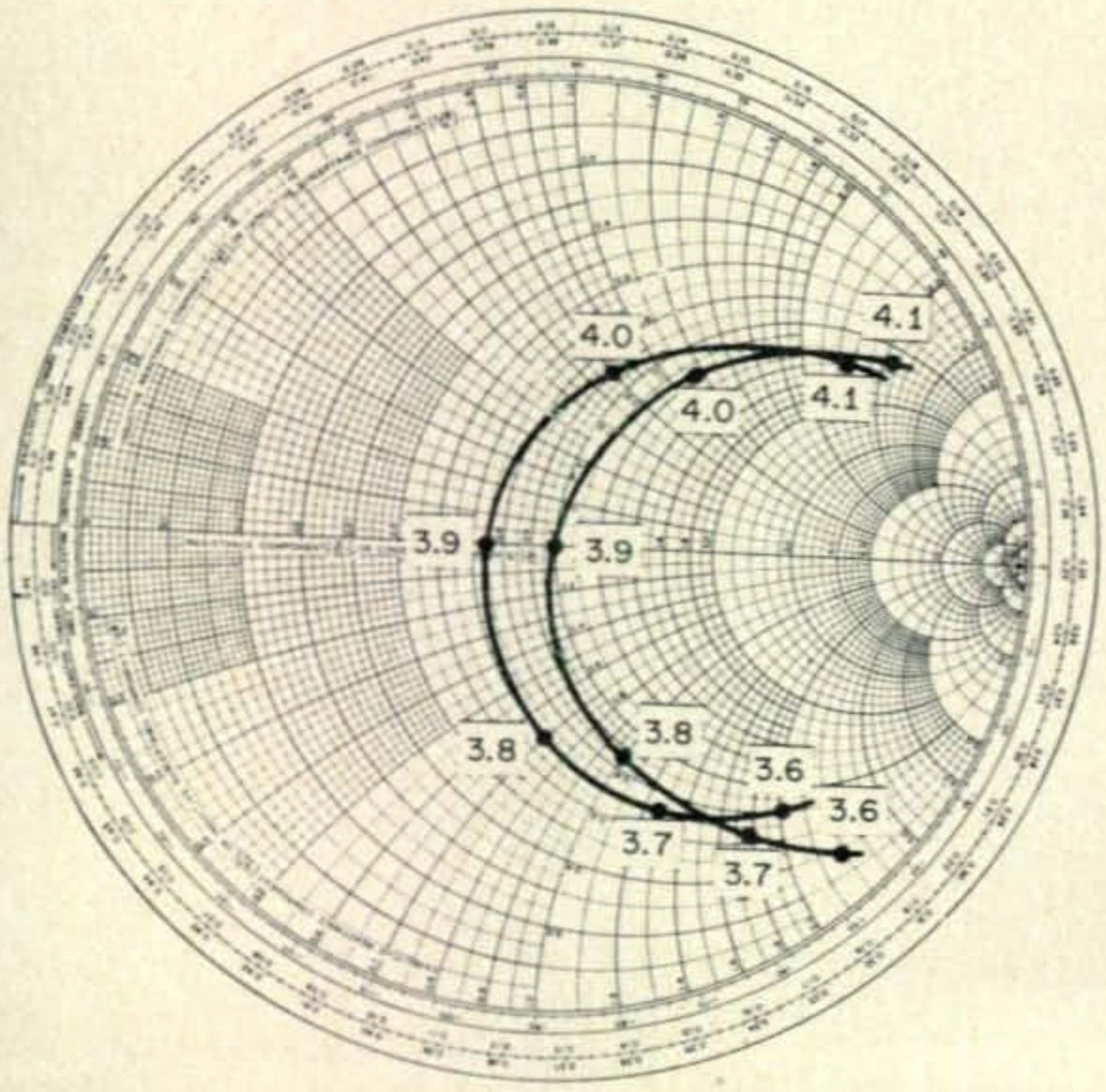


Fig. 6—Plot of the network input impedance for 75 meters.

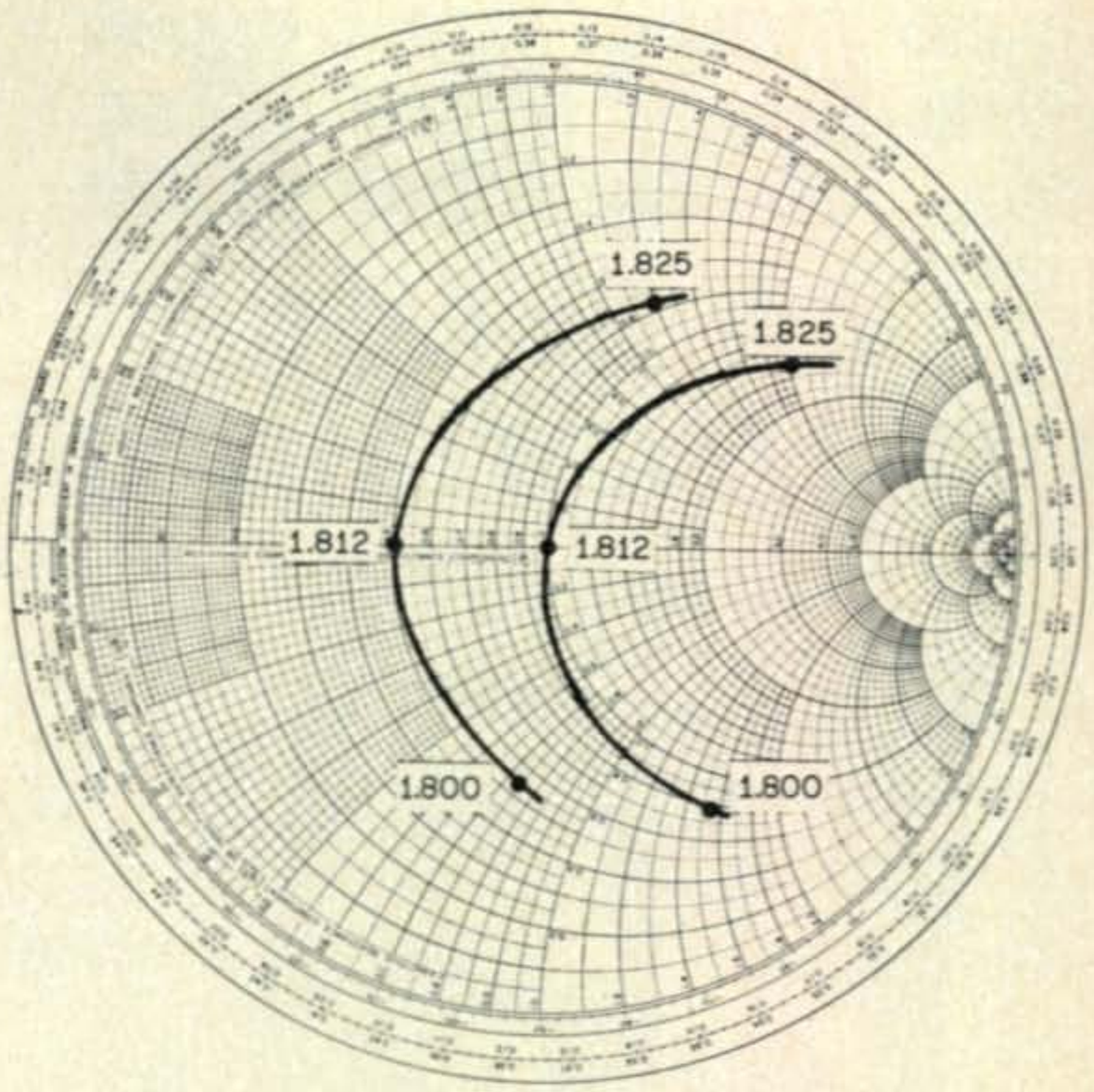


Fig. 7—Plot of the network input impedance for 160 meters.

that it is quarter wave resonant at about 3350 kc. It is thus a bit over ⅛ wave high at 160 meters, and about ⅝ wave high at 40 meters. These are excellent heights for the bands involved, and vertical patterns are produced which are optimum for the propagation on those bands,[1] with good radiation efficiency.

On 160 meters I have worked stations up and down the east coast, and in the midwest, with the exciter[3] "barefoot" and reduced to 50 watts at night. On both 40 and 75 meters there have been excellent contacts out to 2000 miles. Full power of 1 kw voice (2 kw p.e.p.) is used on all bands except 160 meters.

This antenna will be with me for a long time. If we do move, it will be easy to dismantle, move, and re-install. I am quite pleased with its operation. If any reader has a question about this design, I will be happy to answer an inquiry which is accompanied by a *self-addressed stamped envelope*. (This is the only basis on which I can undertake to reply.)

In conclusion I wish to express my sincere appreciation to my friend and associate, John H. Mullaney, W3NGJ[6] president of Multronics Inc., for his interest, ideas and help in connection with this project. ■

[1]Lee, P. H., "Optimum Antenna Design for DX," *CQ*, Nov., 1962, p.49.
[2]Lee, P. H., "The Mark III DX Antenna," *CQ*, Dec., 1962, p.43.
[3]Lee, P. H., "The Ultimate SSB Exciter," *CQ*, Feb., 1966, p.xx.
[4]Leonhard *et al*, "Folded Unipole Antennas," *IRE Transactions on Antennas and Propagation,"* July, 1955.
[5]Lewis, "Use of Folded Monopoles in Antenna Arrays," *op. cit.*
[6]Mullaney, "The Folded Unipole Antenna for Broadcast," *Broadcast Engineering*, Jan. 1960.
[7]Smith and Johnson, "Performance of Short Antennas," *Proc. of the IRE*, Jan. 1960.
[8]Monser and Sabin, "Antenna Design for Maximum LF Radiation," *Electronics*, June 3, 1960.
[9]Smith *et al*, "Very High-Power Long Wave Broadcasting Station," *Proc. of the IRE*, August, 1954.

Grumbles [*from page 23*]

One of the good things to come out of the Never-Never land of CB was the transceiver—the concept of an entire communications center in one neat capsule. Ham manufacturers quickly attempted to cash in on this little gadget so today we have reached the ultimate plateau in ham transceivers. You simply plunk down mucho bucks for a rig, unpack it, press a button and instantly melt down the front end of every receiver within 10 miles. And *what* you get for your money; super sleek and compact in design and with every possible feature a ham could want to have and still stay within the FCC's rules! It's a great convenience.

What the manufacturer doesn't realize is that by selling you this he has lost you as a potential customer for himself and the rest of the ham market for at least 5 or 10 years! You simply have no need to buy anything else for the shack, except maybe an antenna.

And look at the prices! Thumb through this issue, $285, $359, $420—once you've made your limited choice and spent your money you no longer represent cash on the hoof for ham radio.

When I got started in ham radio, I spent months making up charts and performance graphs on receivers alone. What an array of goodies there were, too. Hallicrafters had S-38's, S-40's, S-53's; National had the SW-54, the NC-88 and NC-98 and Hammarlund also had a line of gear.

When it came time to get a transmitter I devoted endless hours to comparing the merits of the efforts of Lettine, LW Labs, Johnson, Hallicrafters, Heath, Knight, Ameco, World, and a number of others.

Eventually I put together a low cost station which may not have made me the scourge of the county but sure made me proud. I had a damned good time and eagerly looked forward to the day when I could scrounge up enough bread to upgrade my station or add a v.f.o., or a linear to help me creak through that last few miles of QRM. Life was a constant stream of buying, selling, trading, building, improving, experimenting with different rig combinations. I guess that I probably had more kicks and spent more money (spread over a period of years) than the clown that went out and bought the computer designed shoebox which spews out a couple of kw.

When I got started you had to work your way up to a full gallon by gradual steps. Anybody who had the unmittigated gaul to show up on the band with a new callsign and a kilowatt got the message by the time he had called his 199th fruitless CQ.

It's sad, no *tragic*, that you can't get into ham radio today unless you are prepared to be relieved of a bare minimum of $350. The few pieces of component equipment which are still available are given such a soft sell that most newcomers aren't even aware of them.

No, ham radio isn't for paupers anymore.

Well, I'm getting a bit wound up on this and I can see that if I say even one more thing about it that it's going to become a big, involved deal which will elbow into oblivion the space normally occupied by LeJeune's DXpeditions to Flatbush and Anzalone's silly numbers. Besides, I don't want to impose on the *CQ* editorial staff; they're nice guys and all that.

Anyway, if you're irritated about some of the stupid things going on all around you, why not scratch out a few lines on the back of a pink ticket and fire it off in this direction. Oh, I'm also on a quest for the absolutely ugliest QSL card in the world. If your *regular* card is seedy and chintzy, be sure to send it in to enter my contest; lush, opulent, multi-colored Hollywood productions need not apply. (Seriously, a trophy will be awarded.) 73, Sam

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Radical Proposal [*from page 21*]

much above that figure or interest will be discouraged. Given enough demands, a 75-watt unit for $300 is not unthinkable. Then, too, as amateurs they would be entitled to build their own gear without the need for commercial operator certification.

So much for the ex-CBer. It is clear that he wins something. How about amateur radio? It is assumed in this proposal that a significant percentage of Restricted Class operators will find it possible to advance to Technician Class during the two year period. If this does not materialize, then amateur radio wins nothing. If it does, however, then by wisely investing a few megacycles of relatively unused spectrum space, we hams will have opened up a new channel into amateur radio which might well restore our foundering growth and momentum. Many of us recall that back in the early Fifties, when the current licenses were last examined, there was much talk about "a vast reservoir of technicians waiting just outside amateur radio." These people are our current CBers. The Novice and Technician licenses, for a variety of reasons, were not a good-enough marketing approach to get them. Is this? ■

Letters [*from page 9*]

of a 50 kw broadcast a.m., f.m., and TV station, might well have started a TV viewer hunting for an amateur in the neighborhood.

In a direct telephone conversation with a listener on a radio program wherein this engineer seeks to give answers to technical problems, he was told that the listener lived very close to a powerful radar station and was asked if the interference being present in her TV set could be caused by the radar installation. The engineer, without hesitation, stated that radar would not cause interference to TV reception. This, in the viewers mind, absolved the radar station of any blame because of the prestige of the engineer.

The point is that anyone who has worked with radar on land or sea or studied Element #8 of any good Q & A book knows that radar interference can make amateur harmonic interference and its cure seem like child's play. Close proximity to a powerful radar installation can completely disrupt not only TV reception but can

WHERE IN THE WORLD ARE YOU?

If you've been living anywhere but in a cave for the past ten years or so, you just may have noticed a change or two in the world around us . . . little things like new countries, new boundaries and enough name changes to tangle a Greek's tongue. In fact, things have been changing so fast recently that the old World Atlas you've been depending on as "the last word" is 43% WRONG if it's more than just a few years old!

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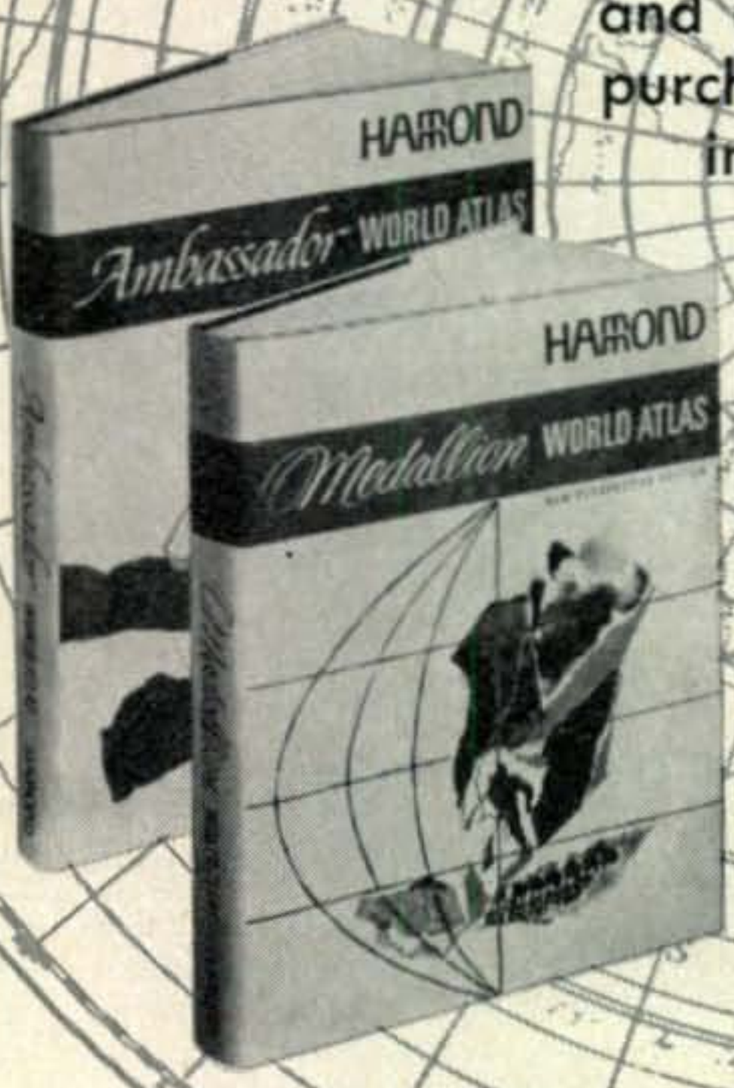

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Letters [*from page 104*]

make impossible all other radio communications. It will make ship auto-alarms inoperative as well as direction finding equipment. It is possible to find radar interference on practically any communications frequency due to the innumerable harmonics generated by pulsing. Communications receivers usually note the interference as a steady tone due to the pulsed rate. TV is affected by this as well as the "hash" generated. The interference has a particular affinity for power lines and antennas of the TV type. Even Loran is disrupted by vertical pulses and "grass" near the scanning lines. Improper installation, long leads, and poor grounding at the radar station can cause cessation of all other forms of communications including radio, TV, DF, Loran, Auto-alarm, etc.

Though this widely listened to broadcast may have absolved the blame for interference from the radar installation, it is certain to make the questioning viewer seek another source which could well be a neighboring amateur whose rig is "clean!" From experience, I know how this can happen. My amateur equipment was, for a time, blamed for everything from TVI to interference with our rural phone lines which then used the old M-1 type sets utilizing power lines for phone transmissions. The fault lay with a powerful radar installation located at an Air Force Base 12 miles from my home and as far from many of the ones who complained of my activity.

It is unfortunate that this engineer, who is eminently qualified in his particular field, should have made such a broadcast statement over one of the most widely listened to radio stations in a metropolitan area.

I write to warn those of us who maybe want to give free technical advice to be certain that they are completely familiar with their subject. Great harm and inconvenience can come to our fraternity by such information as that mentioned here.

Geo. W. Smith, Jr.
Pottsboro, Texas

Sylvia

Editor, *CQ:*

I have read many articles *about* Sylvia Margolis and *by* Sylvia Margolis. I say nuts to anyone who does not appreciate her kind of writing. She handles herself beautifully on practically any subject the ham might bring up. In her last article, appearing in the December, '66 *CQ,* she treats "Field Day" type operations all over Europe in a way that, to my knowledge, no person has been able to do. She humorously relates to many habits of the hams and their somewhat stupid remarks. She writes as if she has been a ham for many years, and she always handles any technical matters, such as fixing a generator, very well. I say—good show, and keep up the good work, Sylvia Margolis!!

Ron Vincent, WA7CGR
Eugene, Oregon

Editor, *CQ:*

Ever receive a gift-wrapped package of garbage? Well, I did! Your nice Holiday edition arrived, containing another Margolis spasm!

Knock it off, OM!

R. E. Baird, W9NN/W9JJ
Des Plaines, Illinois

Amateur's Shorthand

Editor, *CQ:*

It was a pleasure to read the article by W6BLZ in the October issue, [The Amateur's Shorthand]. However, he failed to zero in on the — — • • — — boys with electronic keyers.

Back in the days past, punctuation was cut out because the telegraph and radio companies charged an extra word for such.

I recently wrote a short paragraph for the local club paper claiming that with a hand key I could beat the — — • • — — boys with their electronic bugs set at 50 w.p.m. (by using Phillips Code). Using that you have to be pretty sharp with a mill, but in commercial practice that is how it is done.

Parley James, W7BAJ
Salt Lake City, Utah

Letters [*from page 106*]

C.W. Still Tops

Editor, *CQ:*

Re October, 1966 issue, pages 6 & 8. I refer to the letter traffic relative to keeping c.w. and your kind comments.

Many of the old timers and quite a few of the newcomers to the hobby have had little opportunity to do any traveling for any great distance nor have the experienced operating from many different QTH's over the globe in a relatively short time. Those of us in the hobby that are also in the Armed Forces have had ample opportunity to experience all the joys and heartaches of this facet of hamming. Travel is broadening. To us it is more broadening than most imagine.

Although I have only been licensed a rather short time, (6 years), I have operated from 19 different prefixes in many parts of the world under every condition imaginable. Also, I have had the pleasure of operating mobile from aircraft, ships and my own bolt-bucket. I mention these things only to authenticate my claim that *every* ham should be qualified with c.w. As a matter of fact, I'd underline the "every".

When I finally won my ticket, I told myself I was thru with that c.w. jazz. Other guys could use it, but this kid had had it as far as c.w. was concerned. How foolish was I. Although I very seldom deliberately get into c.w. QSO's, I find myself using c.w. more and more. As WØVPK says, c.w. is the only way to fly here in Vietnam. I concur with his letter. If I was asked for a reason different from his, I could only add that "Charlie" has many men trained to intercept English language transmissions, few if any copy c.w.

Some hams will remember me from KR6LF during the typhoon season of 1961-2. More will remember me from KINAP during Hurricane Betsy, 1965. We found during those storms that the people in the affected areas that needed the help most could barely copy the s.s.b. sigs at times due to: 1) Atmospherics and 2) Receiver drift and noise from emergency power units. C.w. was the only answer. Therefore, we made it a permanent part of the emergency nets in both cases. Many of the stations contacted during Betsy were only c.w. equipped. You wouldn't believe the difficulties in receiving emergency traffic while on emergency power during a destructive storm.

Also, it has been my pleasure to assist a few maritime mobiles in trouble that had only c.w. capabilities.

If we are to be of any help at all to fellow amateurs in their emergencies, I feel it our duty to equip and train ourselves in more than one mode and band. For instance, I have worked several old timers that have admitted right over the air that they do not even own a key, nor have they used one for many years. Then too, I have met some that do not own a mike. That is their business, of course, but I do not think it is fair to the amateur fraternity as a whole for them to be that way.

By the length of the foregoing epistle, you would think I was an avid a.m.er. This is not the case. Actually, I don't like a.m. and can't understand why anyone else would.

Gerald E. Murphy, K8YUW
FPO, New York

Scratchi

Editor, *CQ:*

I was so pleased to see Scratchi's letter from Feenix, Ariz., I didn't know what to think. I have fond memories of Scratchi and thought he had departed from the scene forever. With his missives in the mag it's almost like the old days all over again. I'll be even more anxious to receive *CQ* every month with Hashafisti's letter in there.

Bernie Van Camp, K6GDF
Vallejo, California

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FREE Hamshop Ads
CQ, The Radio Amateur's Journal
14 Vanderventer Avenue
Port Washington, L.I., N.Y. 11050

That's all there is to it.

A few logical limits have to be imposed: Due to space limitations, only six columns per month can be allocated to the New Free Ham Shop, so ads must be run on a first-come, first-served basis. Postmark will be the determining factor. If, because of late arrival, your ad can't make a given issue, it gets first preference for the very next issue, but still you'll want to get your ad in early. Only one ad per subscriber per issue. Your mailing label is an absolute **must;** no label, no free ad.

April CQ is the next issue you can make. Deadline is February 6. Mail your ad today.

No ads from commercial enterprises, please. This service is designed to aid the cash-tight **amateur** only!

The publisher reserves the right to refuse any ad he feels is unfairly deceptive or unsuitable for an amateur magazine. He also reserves the right to withdraw this offer without notice.

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25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	Total Inquiries				

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For further information, check number 39, on page 112

advertisers index

An Antenna Coupler Will Not Improve Your Antenna

We sell antenna couplers as made by Johnson and Millen but because so many hams have an erroneous notion as to the correct function of an antenna coupler, I feel obliged this month to devote our space to an explanation of the proper usage of this device and its limitations.

Here are some basic facts which we all must accept as being true:

A. Modern transmitting equipment—including linears, exciters and transceivers—have pi net output tanks all of which are unbalanced. Most are designed to match impedances between 25 and 90 ohms.

B. The natural impedance of a ½ wave dipole in free space approximates 52 to 72 ohms, when excited with energy at the resonance frequency of the antenna.

C. The impedance of most ¼ wave whips approximates 20-35 ohms at resonance.

D. The band pass of acceptable signals to any antenna varies inversely with frequency—in other words, the lower the frequency, the sharper the band pass.

E. The VSWR considered acceptable to a modern commercial rig is 2.5 to 1 or lower ratios.

More and more hams are operating today than ever before and as a consequence more of us are finding physical limitations and obstacles for the erection of a proper antenna. It should be known that the most effective signal will be that coming from a balanced dipole—suitably coupled by means of a balun from a coaxial transmission line, the characteristic impedance of which will match the natural impedance of the antenna when fed with a signal of the same frequency.

If, however, operation is on any frequency other than the exact resonant frequency of the antenna, then the impedance reflected back to the transmitter will no longer be 50 or 72 ohms, even though the coax may be rated 50 or 72 ohms impedance. Obviously, a pi net output circuit, engineered with limitation of 25 to 90 ohms, will not mate or match appropriately and as a consequence, your rig won't be properly loaded. Worse still, this same condition will reflect itself with a high VSWR. The resulting backwave will then add to the electrical burden of the final tank and output tubes—often disastrously.

The knowledgeable ham will then consider an antenna coupler or impedance matching device. Such a black box is actually an RF transformer. Commercially, such units will couple 50 ohms into any value from 10 to 600 ohms and sometimes higher values. **When so connected, the antenna coupler may be regarded as a device which absorbs the liability of a high VSWR antenna and alternatively protects your set from poor loading.** Being objective, however, it is soon realized that the attendant reflected wave will likely cause heating of the internal components of the coupler or cause flashover. When flashover occurs, this will definitely cause a similar difficulty back in your final.

But will a coupler improve your radiation pattern or cause you to have a better signal? Will it make your antenna work better? Positively not! A coupler or Z-match will only aid you in the loading of your rig—it will not make your antenna work better. The antenna coupler, when installed at the transmitter end of the transmission line, will not correct the VSWR of the transmission line. To the extent that you can work farther away from the resonant frequency of your antenna and still load your rig, a coupler is advantageous. A matchbox or antenna coupler does provide additional harmonic attenuation of the transmitter's output by at least 15 db and this, of course, is an advantage. But the very best results will occur when your set is properly matched to a good quality line and when that line looks into a similar impedance at the resonant frequency of your antenna. Put another way, you'll be ahead of the game if you can learn to operate at the frequency that your antenna is cut to or within such excursions as will not result in a VSWR greater than 2.5 to 1.

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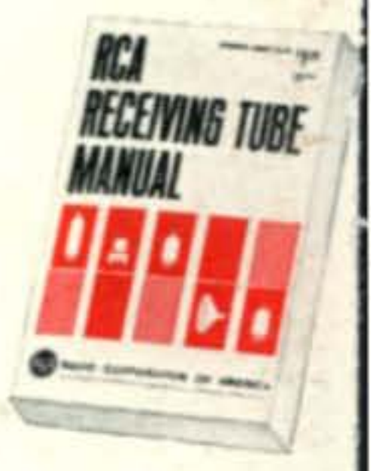

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