CQ

MAY, 1951



The Radio Amateurs' Journal

35¢

Proven Performance around the world!

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Model SX-62

Model SX-62—World's finest receiver for the all-wave listener. Outperforms any broadcast receiver on any frequency—continuous coverage from 540 kc to 109 Mc in six bands. Crystal calibration oscillator built in. Six position selectivity with crystal filter. Two stages r-f, three stages i-f amplification. 10-watt push-pull high fidelity output. Phonograph jack, 14 tubes plus regulator and rectifier.....**$289.50**



Model SX-71

Model SX-71—Value-packed with features specifically asked for by the Hams. Extra sensitivity, selectivity, and stability; double super-heterodyne, plus built-in, Narrow Band FM. One r-f, two conversion, and three i-f stages. Range 538 kc to 35 Mc, 46-55 Mc. Extra wide dials for Main and Bandspread Tuning. Sensitivity, Volume, BFO Pitch, Selectivity, and Crystal Phasing controls. AVC, BFO, Rec./Standby, ANL Tone, and Phono-Rec. switches. Phonograph input jack. 500, 3.2-ohm output..**$199.50**



Model S-76

Model S-76—The only double superhet with 50 kc second i-f and the only set now known with a giant sized 4-inch "S" meter. Another new Hallicrafters engineering triumph. One r-f, two conversion, and two i-f stages; temperature compensated, voltage regulated. Range 540-1580 kc, 1.72-32 Mc in four bands Separate electrical bandspread, with calibrated dial. Sensitivity, Volume, BFO Pitch, Selectivity and Tone Controls: AVC, Rec./Standby, BFO, ANL switches. Phonograph input jack. 3.2 or 500 ohm outputs 9 tubes plus voltage regulator and rectifier**$169.50**

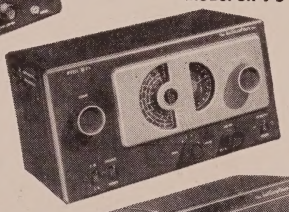
Model S-40B, S-77—New version of an old favorite. Temperature compensated oscillator; tuned r-f stage, two i-f stages for better selectivity. Covers 540 kc to 43 Mc in four bands. Sensitivity, volume, three-position Tone, BFO Pitch, controls; AVC, BFO, Rec./Standby, and Noise Limiter Switches. Built-in PM speaker. External power, remote control connections. 7 tubes plus rectifier.....**$99.95**

Model SR-75—A small transceiver for the novice class or beginning amateur; can also be used later as exciter unit. Receives on 540 kc through 32 Mc, transmits on 10, 11, 20, 40, or 80 meter bands. 10 watts input to final amp. Receiving section is substantially same as our S-38B Bandspread tuning, Speaker/phones switch, BFO switch. Rec./Standby switch; four tubes plus rectifier. Transmitting section uses electron coupled Xtal oscillator plus output tube of receiver. Voltage doubler rectifier to increase plate voltage. 5 tubes plus rectifier. With coils, less crystals...**$89.95**



Model S-40B, S-77

Model SR-75



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S-72, S-72L



Model S-38B

S-72—One stage r-f, two stages i-f amplification. Built-in loop antenna for broadcast, plus 61" collapsible whip for short-wave. Band-spread tuning knob for separation of short-wave stations. Sensitivity control combined with code (BFO) switch, Jack for headphones. Brown leatherette cabinet, space inside for power cord and headphones. 8 tubes plus rectifier. Less batteries. For 115 V, AC or DC or batt. 540 kc. to 30.5 Mc. in 4 bands.....**$109.95**

S-72L (Long Wave Model)—Marine Beacons, Aircraft Ranges, Towers 175-420 kc., Plus 540 kc. 12.5 Mc. **$119.95**

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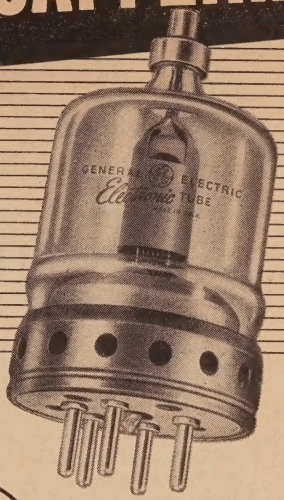
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See your G-E tube distributor for full ratings and price! Consider the GL-4D21/4-125A in relation to *your* need for a powerful final that needs only a whisper of grid-drive . . . so that, like a finely made automobile, you can "steer it with your little finger"!

Electronics Department, General Electric Company, Schenectady 5, New York.

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POWER TETRODE

Typical Operation, Class C Telegraphy

Filament voltage	5 v
Filament current	6.5 amp
Plate voltage	3,000 v
current	167 ma
input	500 w
dissipation	125 w
Frequency at max ratings	120 mc

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL ELECTRIC

184-KA6

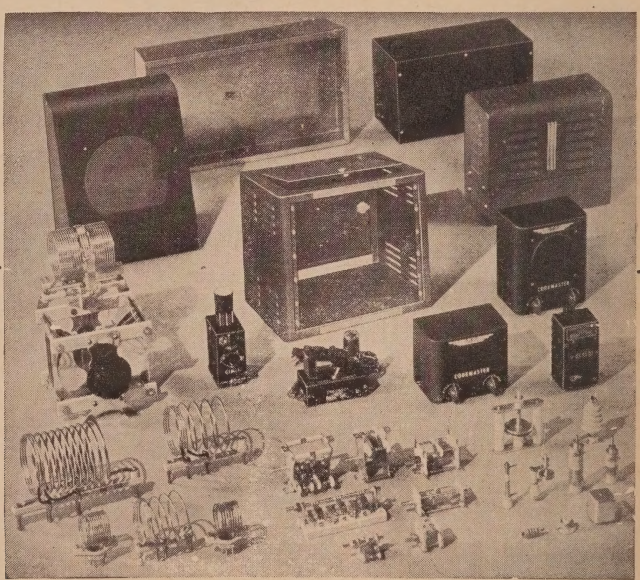
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Your distributor is doing everything in his power to give you service today. A large number of the parts and components he normally carries in stock are on the "critical" list because of the vital requirements of the Armed Forces and Defense Industries. As a result he is working harder, longer and going to far greater lengths than ever before to keep your needs supplied.

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BUD

BUD RADIO, Inc.

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CQ

VOL. 7, NO. 5 MAY, 1951

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OUR COVER

This is the model-antenna radiation-pattern setup at Boeing's laboratory. Tower at left can be wheeled out on wooden track; tower is wooden, small tower at top is all-plastic and all gears, bearings, etc., are plastic. Horn atop the laboratory building "illuminates" the model with radio energy. Shielded cable comes down from the model, leading the received energy back into the lab for recording on polar-pattern-recorder graph. See story on page 30.

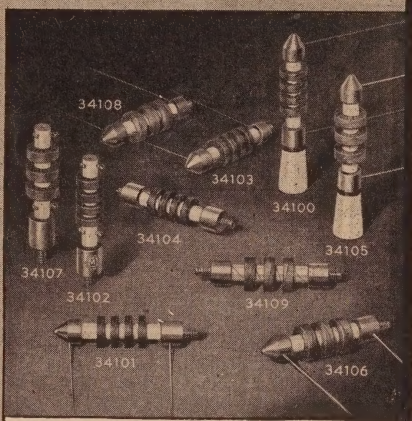
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MAIN OFFICE AND FACTORY

MALDEN

MASSACHUSETTS

M



Feenix, Ariz.

Deer Hon. Ed:

Something are always happening to spoil my fun. Scratchi are no sooner getting some nice little harmless racket about to going when FOOF, along come somebudy with bucket of water to throwing all over it. You are remembering that I are working like sixty to get Scratchi Island all fixed up so can charging hams to come out to island and be DX stations? If you were planning on coming, you can cancelling your bus reservation, Hon. Ed. on acct. the hole idea is washed up. The glue are coming unstuck and the bottom is fallen out of the idea. Of course, it all having some compensations, like—but then, I getting ahead of my story.

Last week-end Brother Itchi and I are out to the island with our barge all nicely anchored next to the island, antenna running from buoy to island, and we are putting transmitter in right places, getting receivers all set, and tidying up place in general so that having big opening the following week-end. Scratchi is even having brought out a nice big batch of freshly made two-year-old cacktus juice to serving for refreshments. We are working so hard that it are dark before we finished. Things are going along reel peachy until I getting idea that maybe I better try one of the transmitters to seeing how it working.

So, I borrowing a quarter from Itchi, and going over to juke-box transmitter, putting quarter in slot, and when filaments get warm I tossing out a seek-you. Are getting immediate answer from a neerby W6 on mainland, and are going into nice ragchew with him, when Brother Itchi running in off the deck to tell me that all of a sudden the neerby island are all lit up like board on electronic computer when it making an error. I run out to see, and sure enough, lights are on all over the place. We thinking this strange at the time, as we never seeing any sign of life at all on the big island. Anyway I go back to transmitter and continue with QSO.

Next thing we know there is very peculiar deep roaring sound and Itchi running in to tell me that big power boat is leaving island and heading this way. I quick sign with W6 and go on deck. Wowie! This big old PT boat are screaming right towards us. It veering circling island twice, then heading in toward our barge. By this time the barge is rocking back and forth like ten meter whip antenna

(Continued on page 62)

mars

FREQUENCIES NOW AVAILABLE IN PR CRYSTALS WITH .005% TOLERANCE

Net operation demands ACCURATE FREQUENCY CONTROL . . . with minimum drift . . . absolute "in channel" signal. Remember, MARS frequencies are outside of regular amateur bands and FCC tolerance requirements must be met! Men of MARS, you can get this perfect frequency control with PRs. Because of the growing demand for MARS frequencies, PR is making and offering *MARS channels in the Type Z-1 commercial crystal* AT A FRACTION OF THE REGULAR PRICE . . . only $3.75 . . . with frequency .005% plus or minus tolerance in our test oscillators. MARS frequencies, in PR Type Z-1 holders, are available through your jobber. If your jobber is one of the few not stocking PRs . . . order direct from the factory at address given below.



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2220.0 Kc	4025.0 Kc
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2360.0 Kc	5500.0 Kc
4020.0 Kc	5760.0 Kc

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ANTENNA

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1523 East 45th St. • Cleveland 3, Ohio

★ ★ Letters ★ ★

It's the same the world over

No. 5 Karong Ave.
So. Edwardstown,
So. Australia

Editor, CQ:

If I had a penny (or a cent) for every letter I've read dealing with the problem of QSL'ing —I'd be able to import that receiver I've always wanted—now it's time I had my say!!

Personally, this QSL business can be summed up in one word, it "stinks." ('Scuse please).

Seriously, as one of the majority from Down Under who use on an average of 40 to 50 watts, the dispatch, and particularly, the receipt of cards means a good deal, especially when it comes to W.A.S.

Now here's where I probably hurt somebody's feelings—taken on an average, W stations are by far the worst QSLers! Why?? To make W.A.S. in VK is no easy job, particularly when it comes to working Delaware, to name but one. But even if one is lucky enough to do so, he may just as well go bash his block against a B47 as count on a card. From my own log the percentage of replies from W's is 31%, and from G's 46% (or is that good?). A second type of "non-reply" is the man who asks, "Have you any stamps you don't want, OM?" In one case I parcelled up approximately $20 worth of relatively ancient and scarce VK stamps and sent 'em off. Did I get a reply? Not—likely!

If you don't want to QSL, tell the bloke on the other end; he won't be offended, and conversely, if you don't want his card, let him know.

Finally, after all the kicks, I would like to say that W's are the best rag chewers on the air, and here's wishing you all a happy, prosperous and DXing year. *Barry S. Clarke,* VK5BS

More on the Navel Reserve

320 E. Joppa Rd.
Towson 4, Md.

Editor, CQ:

I refer to page 48 of the March 1951 issue of "CQ", and offer the following important addition to the Reserve Officer requirements.

The eligibility requirements for General Line are as stated except that men eligible for selective service under the Act of 1948 as amended must apply for *immediate active duty* when applying for a commission.

Men eligible under the before-mentioned Selective Service Act are *not* eligible for Electronic Specialists commissions.

I am not submitting this as official information, but if anyone finds that the above is not the case, will they please notify me immediately. 73,

R. L. Ellis, Jr., W3QNC
U.S.N.R.

DX Predictions

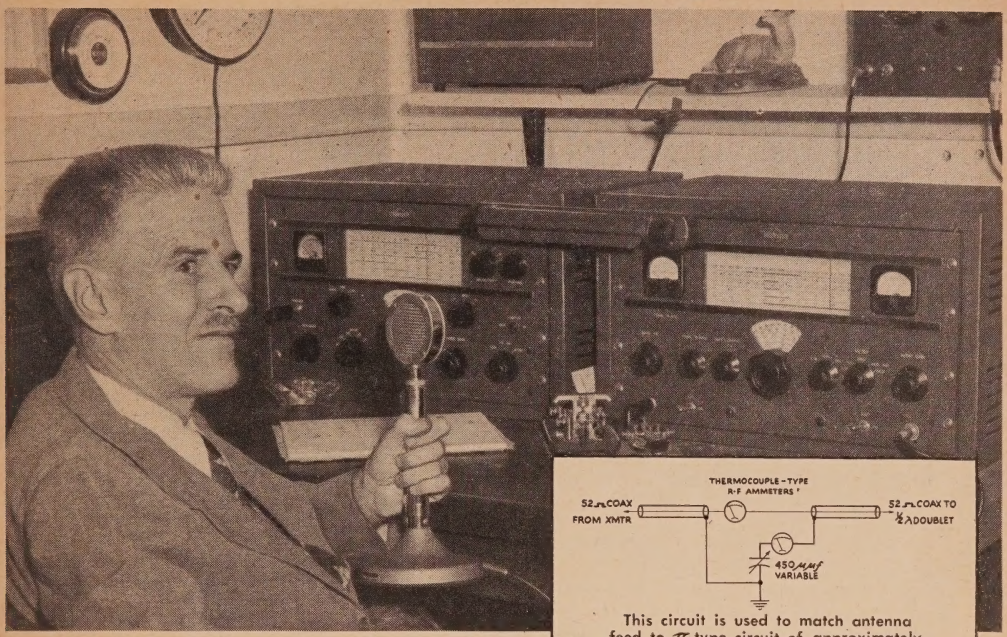
806 No. Broadway
Tyler, Texas

Editor, CQ:

I was very happy when I received my March CQ to find the Monthly DX Predictions in it again. I have been calculating my own from the Bureau of Standard's pamphlets but it requires

(Continued on page 60)

"Put in Sylvania Tubes and be sure" Says AEC Ham, "Mac" Megaw, W5PY



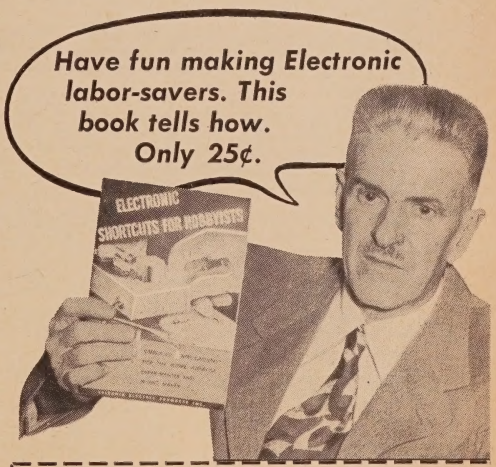
This circuit is used to match antenna feed to π-type circuit of approximately 50Ω in transmitter output

"When emergency messages must go through," says Mac Megaw, well-known radio Ham and AEC member of San Antonio, Texas, "you can't risk being hung up by tube failures. That's why I choose Sylvania, you can be sure of their long life and uniformly good performance."

Today, the Amateur Emergency Corps is performing an increasingly important service throughout the country. Members of this alert organization stand ready for instant service in any local or national emergency.

Naturally, the tubes and equipment they use must be tops in performance and dependability. The fact that so many AEC members now select Sylvania tubes speaks well for this product's outstanding quality.

Every Ham will also want a copy of Sylvania's fascinating book, "Electronic Shortcuts for Hobbyists." Tells how to build 24 time- and labor savers. Mail the coupon and 25¢ for your copy today!



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*Street*_____

*City*_____ *Zone*___ *State*_____

EVEN MY WIFE DOESN'T COMPLAIN . . .



SYDNEY J. FASS
84 VICENTE ROAD
BERKELEY 5, CALIFORNIA

March 3, 1951

Eitel-McCullough, Inc.
San Bruno, California

Gentlemen:

Last year I felt that if I wanted to stay on the air during television hours I would have to have a new transmitter built in such a way that interference to nearby TV sets would be eliminated.

I studied the available literature on TVI and talked it over with some of the gang. The general consensus of opinion was that if I built a final with the usual precautions, used Eimac tetrodes, and shielded everything well, my chances of success would be good.

You will be interested, I'm sure, in knowing that by careful construction, the grace of God, and a pair each of Eimac 4-250A tubes and Eimac vacuum condensers, the final was built and, without any alteration since enclosing it in its cabinet, has worked without a complaint from any of my neighbors. Even my wife, who is an ardent TV fan, has never been able to discern the least flicker on any of the local TV programs, although our receiver is located only a couple of rooms away from the transmitter.

My compliments to you for building such outstanding tubes.

Sincerely,

Syd Fass

Syd Fass

Syd Fass W6NZ — an old-timer (he got his ticket in 1909) from Berkeley, California — licked his TVI problem the way thousands of other amateurs are doing . . . with common sense engineering, modern circuit techniques, and of course Eimac tetrodes.

Complete tube data available . . . Free

Eimac TUBES

282

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San Bruno, California
Export Agents: Frazar & Hansen, 301 Clay St., San Francisco, California

ZERO BIAS

EDITORIAL

THE SECTIONS of our new regulations concerning the Extra Class license have been proposed for reargument before the FCC. While we do not agree with the ARRL on the basis for requesting changes, we do concur in believing that this license is not a practical concept as it stands.

If the Extra Class license were to be purely an incentive award, we would have no objection, but it cannot be considered as merely an incentive. For one thing, the Commission has already implied that additional privileges may be granted to such licensees. Still more explicitly, the new rules automatically set up the Extra Class license as the only way to Advanced 'phone for anyone who fails to qualify for the Advanced license by the end of next year. As we have already pointed out, anyone who does not qualify for a General Class ticket by the end of *this year* will not be able to present the one year of experience required for the Advanced Class exam before the Advanced exam is dropped. These people, and they will include just about all those entering the game via the Novice and Technician routes, will have to sweat out two years in the General Class bands before being permitted to *try* for the Extra Class ticket.

For these people, the Extra Class license will not be an optional incentive. It will be an arbitrary and discriminatory barrier, and as such will tend to decrease the interest of many newcomers. This restriction would not solve the congestion in the 4 and 14 mc 'phone bands, nor would it necessarily create more good CW men.

The ability to copy 20 per for a few minutes does not imply that a man also has the ability to carry CW in his head, has the necessary sense of rhythm to send good code, plus the various other attributes that go to make up a savvy CW operator. If hams have these attributes, they find it out for themselves, find pleasure in using code and continue to work CW whether or not they also work 'phone. If they aren't born with what it takes, no amount of practice will make them good, so why force them to do something they aren't fitted for and won't enjoy? Conversely, the ability to do a good job on CW has no bearing on a fellow's ability to put a good 'phone on the air, and should not be a factor in granting him extra 'phone privileges.

The ARRL bases its objections largely on the grounds that the introduction of the new license with its unknown privileges would prejudice the prestige and rights of present Class A licensees. We do not feel that this is a valid objection, nor do deprive them of any of their present prerogatives.

Aside from the unavoidable loss of frequencies we feel that the League is properly expressing the attitude of most Class-A licensees. We are pretty sure that most of these men are too progressive to insist upon squatter's rights, and none seem to be worried that the Commission will unreasonably through the years, amateur radio has never suffered when new regulations have been introduced to keep up with the "state of the art." Withdrawal of the right to use spark transmitters certainly represented the loss of an existing right, but nobody can say that the game suffered, even though a few die-hards dropped out. In the early'30s, the loop-modulated oscillators were kicked off the low-frequency end of 80 meters and you had to go down for the unlimited 'phone license if you wanted to join the gang who were putting stabilized rigs in the new band on the high end—remember?

Our point is that intelligent changes have made for a healthy growth in the hobby. Although we do not approve of the Extra Class license as it stands, we agree that the state of the art has progressed beyond the coverage of the present unlimited 'phone test, and we are in favor of an additional, more comprehensive examination. This should confer some additional privileges, which would not be available to any present licensee until he or she qualifies.

We do not favor any revision of present CW status; the 'phone bands are the ones that need more study. There just isn't enough room on 20 and 75 for all the AM phones. For over three years, the SSSC bunch has been showing us the way, and they are still carrying the ball. The time is approaching when it will no longer be fair to demand they they hang out on the extreme edges of the band or lose some of their technical advantages by having to fight AM carriers. If and when the FCC assigns them some exclusive territory in which to strut their stuff, this will be some very desirable r-f real estate. It would be a nice gesture if the present SSSC boys were given blanket use of it, but all the rest of the Class A holders, including yours truly, should be made to prove that we know something about minimum bandwidth 'phone. If we don't know enough about it, we don't deserve to be in there, and if we do, we should be glad to take an extra technical exam—no code—to prove it. The incentive is certainly there.

—Gene, W2ESO



WØDZS: "What more can a ham ask?"

"You may not recall," said Hugh Brenner, WØDZS, in a recent letter, "but we had several conversations about the time I acquired my 32V-1 a couple of years ago.

"Since then I have added a 75A-1, and have an order in with Lew Bonn for the second 75A-2 they receive.

"Thought you might be interested in my experience with this equipment. I operate all bands, phone and c-w, and it is the rule rather than the exception to have the other fellow on the QSO assume that I am running high power. I have not had one moment's trouble of any kind with either unit in over 2½ years with the 32V and over 1½ years operation of the 75A-1, not even a tube replacement.

"When the DX is in, it can be worked if anyone is working it and there have never been other than nice remarks about the audio, or the c-w tone.

"On 75 I work a daytime radius of four or five hundred miles and don't think I am QRM'd any more than many of the stations running considerably higher power. What more can a ham ask?

"The only reason I have ordered the 75A-2 is that Collins is making it, therefore it must be an improvement over the 75A-1, not that I felt the A-1 needed any improvement."

For the best in amateur radio, it's . . .

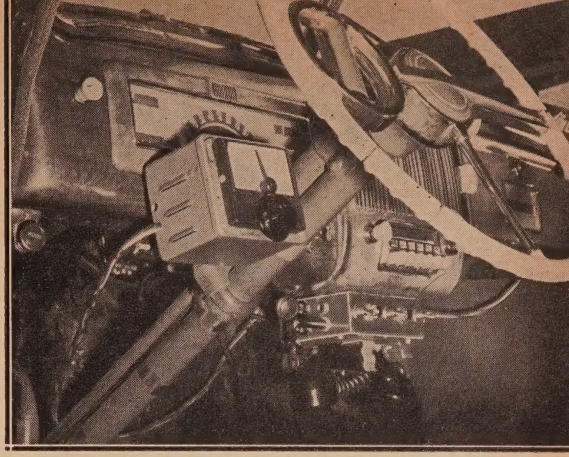
COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, NEW YORK 18 **2700 West Olive Avenue, BURBANK**

A Multi-Unit 2-Meter Mobile

ROBERT E. BUCKLEY, W2SNO*



W2SNO's de luxe installation is built in several packages. This makes for operating convenience, saves space, and makes both construction and maintenance easier. This unit is used regularly in the Nassau County Emergency Net.

With the coming of the summer season, interest in 2-meter gear is on the increase. This year, more than ever before, the need for efficient mobile installations is emphasized by the ever increasing amateur participation in civilian defense activities.

The 144 mc band is particularly suited not only for normal short range mobile communications but for local emergency work. 2-meter amateur emergency nets are organized and active in many parts of the country and the ham with a 2-meter mobile rig is an essential link in the emergency communications set-up in his community.

Many people conceive 2-meter mobile equipment to be either unstable, as in MOPA installations, or else unwieldy because of the long string of multipliers normally associated with 144 mc crystal control. However, with present day tubes and techniques this is no longer true. In designing the equipment presented here, several main points were considered as being essential to any successful mobile installation.

These were that the equipment should be simple to operate, normal operation of the vehicle should be interfered with as little as possible, the power requirements should not overtax the car's electrical system, nor should the installation and removal of the equipment entail any more labor or require any more tools than necessary.

For the reasons outlined above and certain other considerations the final installation consisted of six separate units. The function and location of each unit is as follows:

1. Power supply—mounted under hood
2. Transmitter—occupies 1/2 glove compartment.
3. Receiver IF and Audio Strip—fastened to back of car's BC set
4. Receiver Converter—mounted on the firewall
5. Receiver Remote Tuner—Clamped to steering wheel
6. Control Box—mounted under center of dashboard

The Transmitter

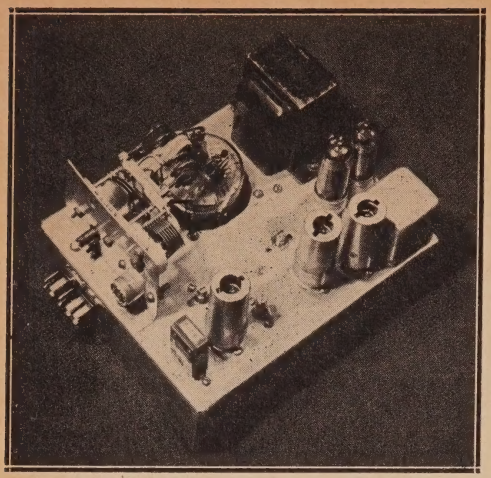
A top view of the compact transmitter unit is shown in the photograph. The final tank and antenna matching condenser are visible in the upper left portion of the chassis. As can be seen from the circuit the exciter portion consists of two dual triodes in which the crystal frequency is multiplied by 18 times. The first triode section operates as a previously described[1] harmonic oscillator in which a run of the mill 8 mc crystal oscillates on its third overtone. The second section of the first dual triode operates as a tripler, and both sections of the second dual triode operate as a push push doubler. The final is a standard push pull affair utilizing the 832A dual tetrode.

Little difficulty was encountered in getting the exciter to function properly, the main point being the selection of the proper tapping point on the oscillator coil. A tap about 1/3 of the way up the coil seemed to be the most satisfactory point.

In order to get sufficient drive for the final amplifier, many methods were tried, and the best result was obtained with a two turn link coupled to the doubler plate coil and driving the final grids directly. This method is effective because the link in conjunction with the grid to cathode capacity of the final forms a resonant circuit in the two meter region, thus effecting a maximum transfer of energy to the 832 grids. The final socket was submounted and a shield placed around the portion protruding beneath the chassis; with these precautions no neutralization was found to be necessary.

*78 Pine St., Rockville Centre, L. I., N. Y.

1 "Simple Crystal Control on 144 mc." Johnson & Bernstein, QST, Oct. '48.



The compact trasmitter chassis includes speech amplifier, modulator and antenna matching system.

The modulator section is a straightforward affair with the output tubes in parallel to match the load presented by the modulation transformer.

Needless to say, the components were chosen to be as physically small and rugged as possible in the interests of compactness and reliability. The microphone transformer was obtained from a surplus mike pre-amp and is only a one inch cube. The modulation transformer is a Stancor A-3871, which was the smallest obtainable. Its ratio is about 1:2 and the 2500 ohm load of the parallel 6AQ5's is stepped up to the 5000 ohm load presented by the final stage under normal conditions.

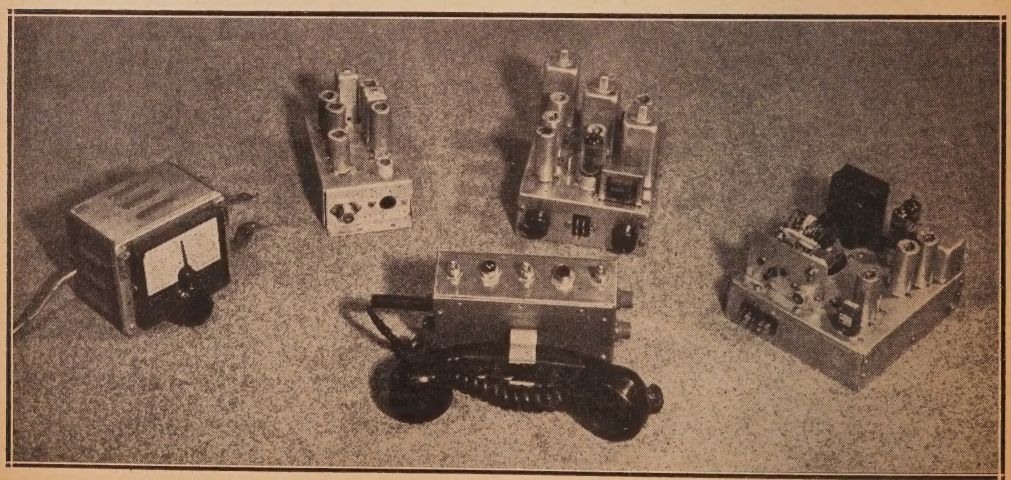
The whole transmitter is run from a 300 volt supply drawing about 200 ma, with the final running about 18 watts input for a measured output of 9 watts.

Tuning up can best be accomplished by the use of a 60 ma pilot bulb soldered to a small two turn coil of #18 wire. The loop is held next to the oscillator coil first and the condenser turned until the bulb lights; this is the point where the crystal starts oscillating. It would be best, at this point, to check to make sure that the circuit is oscillating only under control of the crystal. This is best done by using a receiver tuned in the vicinity of 24 mc. If the circuit oscillates over the entire range of the tuning condenser, back off on the tap until the crystal just oscillates.

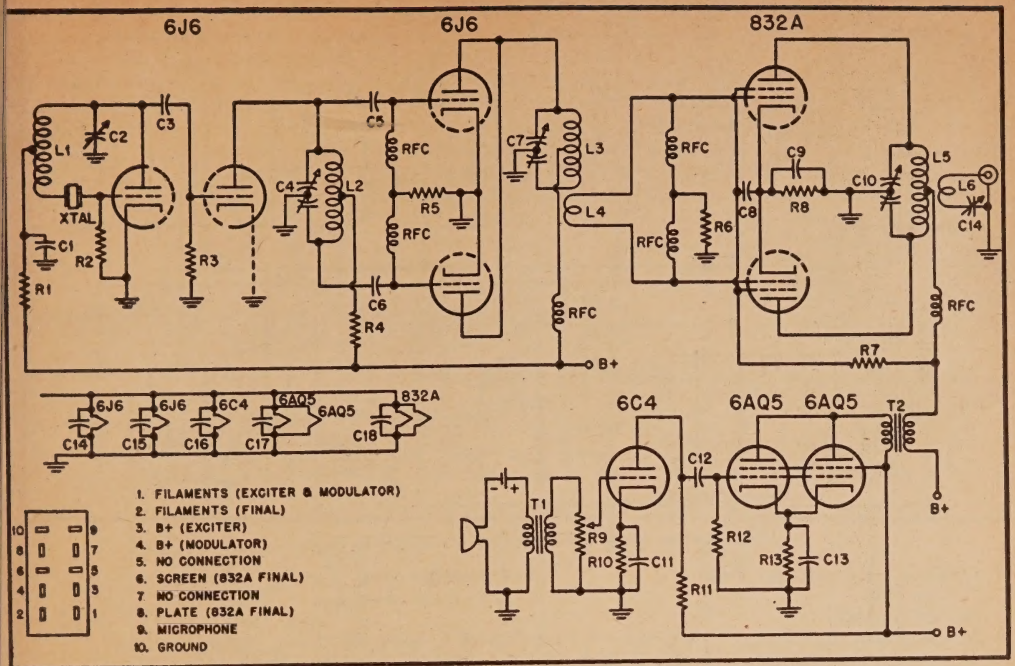
Next, move the tune-up loop to the tripler tank and again tune for maximum brilliance of the pilot bulb. [A word about the condenser used to tune the circuit might be appropriate here. The APC type condenser was converted to a split stator type with the aid of a jewelers blade. The front half of the stators are separated from their anchor on one side, and the rear half separated from the other side.] After the tripler has been resonated, the tune-up loop is moved to the vicinity of the doubler tank, which is tuned for maximum brilliance also. This point is rather sharp and can be checked by connecting a vtvm across the final grid leak and tuning for maximum voltage at this point.

Needless to say, the voltage has not been applied to the final plate or screen up to now. The final tank condenser is the butterfly unit used in the SCR-522 final; before using it, however, one rotor and one stator were removed from each section to make the tuning a bit easier.

Initial tuning of the final is best done with reduced plate and screen voltage, to avoid damage to the tube. The tune-up link can be coupled very loosely to the final tank, and the final condenser tuned for maximum brilliance. At this point it is best to use a simple wavemeter or field strength meter and tune the loading condenser C_{14} for maximum indication on this instrument. This method of tune-up is recommended, because it requires



Reading from left to right, the component units are: Remote oscillator for the receiver; receiver preamp and mixer; receiver i.f. and audio; transmitter. The control box is in the foreground.



The transmitter circuit, including modulator

C1—500 μμf mica
C2, C14—50 μμf APC type
C3—22 μμf ceramic
C4—25 μμf ceramic, See text
C5, C6—50 μμf ceramic
C7—2.7-8.5 μμf variable Johnson (160-208)
C8, C9—500 μμf ceramic
C10—15 μμf Butterfly, See text
C11—10 μf, 25 v
C12—.01 μf Hicap
C13—25 μf, 25 v
Xtl—8.0 to 8.2 mc
R1, R2—3,300 ohms, 1/2 w
R3—47,000 ohms, 1/2 w
R4—3,300 ohms, 1 w
R5, R7—68,000 ohms, 1 w
R6—22,000 ohms, 1 w
R8—330 ohms, 1 w
R9—500,000 ohms variable
R10—2,200 ohms, 1/2 w
R11—100,000 ohms, 1/2 w
R12—470,000 ohms, 1/2 w
R13—800 ohms variable, 2 w
L1—14 T, #18, 1 1/2" L, 1/2" Diam., tapped 5 T.
L2—8 T, #18, 1 1/4" L, 1/2" Diam., Tripler plate coil.
L3—6 T, #18, 1" L, 1/2" Diam., Doubler plate tank.
L4—2 T, #18, 1/4" L, 1/2" Diam., final grid coil.
L5—4 T, #12, 2" L, 1/2" Diam., final tank coil.
L6—2 T, #12, 3/8" L, 5/8" Diam., output link.
T1—Mic. input, 50:1
T2—Mod. xformer.—See text.
RFC—10,000 ohms, 1 w resistor wound full of #28E.

no meter switching, and after an inital tune-up, any retuning to another point in the band can be done with just a pilot bulb and a screwdriver. With a setup such as this, where the transmitter is in the glove compartment, it is easy to change frequency as often as needed in routine or emergency operation.

The Receiver

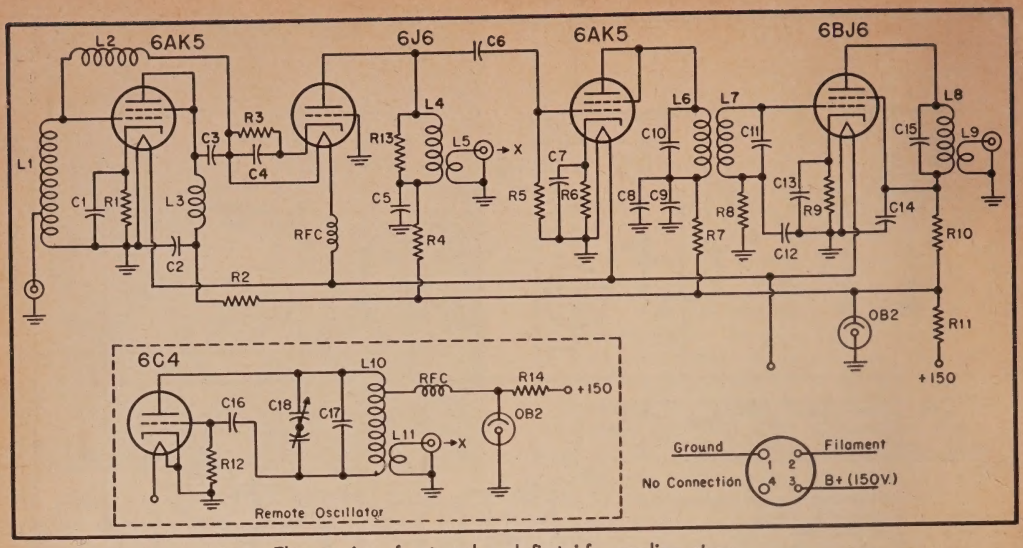
One look under the dashboard of the author's car was enough to convince him that because of the relatively limited space available, a receiver on two chassis would be desirable. After considerable thought, it was decided to put the i.f. and audio on one chassis and have the r.f. section separate.

Experience dictated that the receiver should have an i.f. bandwidth in the order of 30 kc., to allow for some instability in the h.f. oscillator, and to add to the ease in tuning.

IF and Audio Section

The i.f. transformers from the BC 455 6-9 mc receiver (2830kc) were available on the surplus market quite cheaply, and since their bandwidth runs around 30 kc, a set of three plus the b.f.o. transformer was purchased for $1.75. This more or less settled the design of the i.f. section. 6BJ6 pentodes, the miniature equivalent of the 6SS7, draw only 150ma of filament current, which makes them rather desirable for a mobile installation; therefore two of them were used for the i.f. amplifier.

The i.f. is followed by a 6AL5 detector, AVC, and noise limiter stage. The latter is the self-adjusting series type of noise limiter and performs very well on ignition noise. The 6AQ6 (another 150ma filament tube) and the 6AQ5 constitute the audio amplifier, and provide sufficient output to overide the noise of the car while in motion.



The receiver front end and first i.f. coupling stage.

C1, C2, C5, C7, C8—180 μμf Button
C3, C4—See text
C6—100 μμf ceramic
C9—.005 μf Hicap
C10, C11, C15—39 μμf ceramic
C12, C13, C14—.01 μf Hicap
C16—50 μμf ceramic
C17—10 μμf ceramic
C18—15μμf split stator variable
R1—220 ohms, 1/2 w
R2, R4, R7, R10—1000 ohms, 1/2 w
R3—82 ohms, 1/2 w
R5—1 meg., 1/2 w
R6, R9—330 ohms, 1/2 w
R8—22,000 ohms, 1/2 w
R11—820 ohms, 2 w
R12—27,000 ohms, 1/2 w
R13—4,700 ohms, 1/2 w
R14—2,700 ohms, 2 w

Coil Table

L1—8 T, 3/4" L, 3/8" Diam., tapped at 1 1/2 T.
L2—19 T, 3/4" L, 3/16" Diam.,
L3—3 T, 3/8" L, 3/8" Diam.
L4—5 T, 3/4" L, 3/8" Diam.
L5—2 T, 1/8" L, 9/16" Diam.
L6, L7, L8—28 T, #30E closewound on 9/16" slug tuned form. L6 and L7 spaced 3/16", likewise L8 and L9.
L9—6 T, #30E on 9/16" slug tuned form
L10—6 T, 3/4" L, 3/8" Diam.
L11—2 T, 1/8" L, 9/16" Diam. All #18 except where noted.
RFC—10,000 ohms, 1 w resistor wound full of #28E.

It was foreseen that a b.f.o., and "S" meter stage might conceivably be useful in the future, so a 12AT7 dual triode was included to perform these functions. In the author's case this tube is not plugged in at present, since these functions are not needed.

The i.f. as determined by the transformers just mentioned is 2830 kc, which is too low to provide sufficient image rejection at 144 mc; therefore it was decided that the receiver should be the double superhet type. A first i.f. of 10 mc is a convenient value, permitting the use of a 7 mc crystal controlled second oscillator. The crystal frequency can be anything between 7100 and 7200 kc. If frequencies outside these limits are chosen, it will be found that harmonics of the crystal oscillator will fall inside the 2 meter band limits. [Crystals in the 7500-7600 kc. range could also be used, if available, with an appropriately different i.f.] In the author's case, a crystal was picked that fell just outside the lower edge of the band, thus providing a marker at that point.

No difficulty in construction or operation was encountered, and tune-up is straight forward. It was found that a 30 μf electrolytic condenser had to be connected from B+ to ground, to cure an audio oscillation that was present due to the rather high power supply impedance. A larger output condenser in the power supply also would have cured this.

The RF Head

The next step was to design the receiver r.f. section. It was decided that for best sensitivity and low noise an r.f. amplifier ahead of the mixer should be used. Experience has shown that the cascode type of circuit provides excellent results in 2-meter receivers, and so this was used.

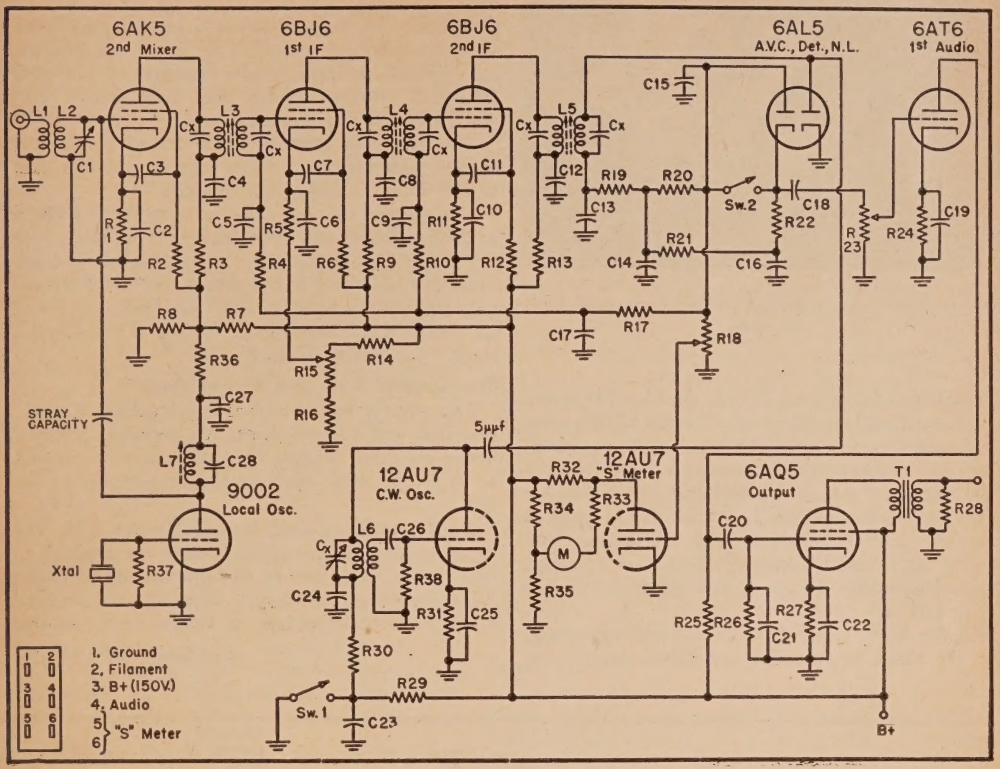
The local oscillator for the converter was housed separately in a small box clamped to the steering wheel. The advantages of this arrangement are in the resulting compactness of the tuning units. Also, better oscillator stability resulted by removing all the heat generating elements of the rest of the receiver from the oscillator section.

The construction of the oscillator must be as rugged as possible, and its power supply should be voltage regulated. A split stator condenser with double bearings was used and proved successful,

as did the OB2 voltage regulator, in providing a stable low drift oscillator.

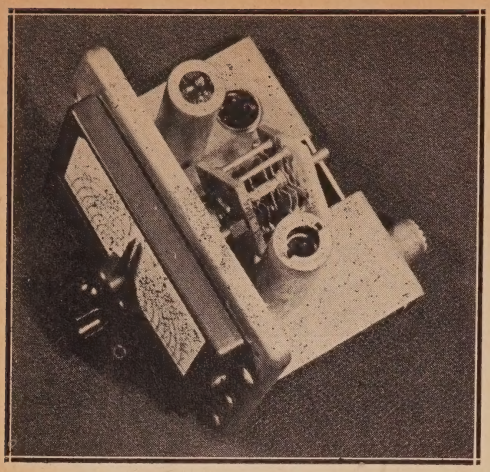
The local oscillator is coupled by a link and transmission line to the mixer. The transmission line is RG59U 72 ohm coax, cut so it is not a multiple of a quarter wavelength. Since the line is not terminated, it is possible for it to show resonant effects at the oscillator frequency, thereby altering the oscillator injection and affecting reception. If erratic operation is experienced as the oscillator is tuned through its range, it may be necessary to prune the connecting cable a few inches at a time until smooth operation is obtained.

The importance of making all leads as short and heavy as possible cannot be stressed too often. If this precaution is not followed, erratic opera-



Receiver i.f. and audio amplifier.

C1, C28—39 μμf ceramic
C2, C3, C4, C5, C7, C8, C9, C12, C20, C24, C27—.02 μf paper
C6, C11, C16, C23, C25—.05 μf paper
C10—.1 μf paper
C13, C14, C15, C26—100 μμf ceramic
C17—.01 μf paper
C18—.01 μf Hicap
C19—10 μf, 25 w.v. electrolytic
C21—270 μμf ceramic
C22—25 μf, 25 w.v. electrolytic
Cx—See text
R1—6,800 ohms, 1/2 w
R2, R12, R19—47,000 ohms, 1/2 w
R3, R4, R10—10,000 ohms, 1/2 w
R5—680 ohms, 1/2 w
R6, R9, R13, R36—2,200 ohms, 1/2 w
R7—6,800 ohms, 2 w
R8—82,000 ohms, 1/2 w
R11—33 ohms, 1/2 w
R14—68,000 ohms, 1/2 w
R15—5,000 ohms, pot, sens. control
R16—100 ohms, 1/2 w
R17—2 meg., 1/2 w
R18—250,000 ohm pot. "S" meter control
R20—270,000 ohms, 1/2 w
R21—1 meg., 1/2 w
R22—820,000 ohms, 1/2 w
R23—270,000 ohms, volume control
R24—1.800 ohms, 1/2 w
R25, R35—22,000 ohms, 1/2 w
R26, R32, R33, R34—47,000 ohms, 1/2 w
R27—330 ohms, 1 w
R28—27 ohms, 2 w
R29—100,000 ohms, 2 w
R30—4,700 ohms, 1/2 w
R31—2,200 ohms, 1/2 w
R37—47,000 ohms, 1/2 w
R38—100,000 ohms, 1/2 w
T1—Output xformer
Xtal—7 mc crystal (7100-7200 kc)
L1—6 T, #30E on 9/16" slug tuned form
L2—28 T, #30E on 9/16" slug tuned form
L3, L4, L5—i.f. transformers from BC-455 (ARC-5 rcvr.) (2830 kc)
L6—b.f.o. from BC-455 (2830 kc)
L7—35 T, #30E on 3/16" slug tuned form
M—0-200 ma meter
SW1—c.w. osc. switch
SW2—N.L. switch



The receiver's remote tuning oscillator removed from its case.

tion will undoubtedly result. All the high frequency by-passes should be silver mica "buttons," mounted firmly right at the socket terminal to be bypassed. The interstage coupling condenser just reaches from the plate and screen terminals of the 6AK5 to the cathode of the 6J6. This condenser is made of two 180 $\mu\mu$f "buttons" backed up against one another and held by a 3/16" length of threaded stock. This makes up a very low inductance coupling capacitor.

All the high frequency coils are self-supporting, and are tuned by stretching or compressing them. The neutralizing coil, L_2, is non-critical, and can be installed and forgotten. This is mainly because the converter is meant for a mobile installation where the noise is normally relatively heavy, and any improvement made by precise neutralizing would not be noticeable.

The point at which the antenna coil is tapped is rather critical, but it will usually be about three turns from the bottom of the coil for a flat 72 ohm line. The filament of the grounded-grid stage is kept at cathode potential by using, r.f. chokes, to eliminate heater-cathode capacity effects, and the other elements of the tube (the unused grid and plate) are grounded.

The mixer is operated as a triode (plate and screen tied together) since this results in less mixer noise, with no loss in gain.

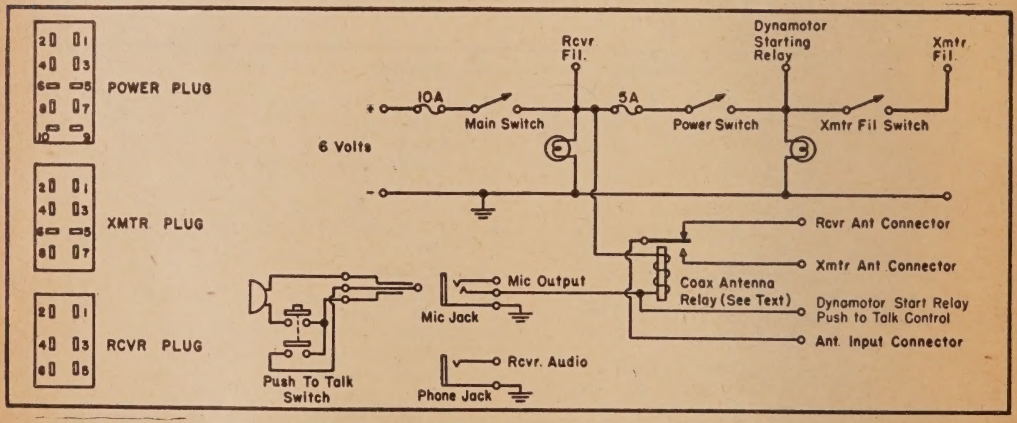
The initial tune-up was accomplished with a grid dip meter and the converter worked very satisfactorily. Subsequently, a signal generator became available and it was found that a 0.1 microvolt signal modulated 30% at 400 cycles produced an easily detectable signal, and a 0.5 microvolt signal was easily readable.

The Control Box and Power Supply

The control box combines the function of junction box and control point. All necessary components are fitted in a rather small space so as not to be in the way, when getting in and out of the car.

Push to talk is used to simplify operation and the necessary changeover processes are handled by two relays. The power changeover relay is located in the power supply unit, and the antenna relay, of the coaxial type, is located in the control

(Continued on page 65)



Wiring of the control box.

Power Plug
1. Ground
2. Filament (+6 v)
3. Rcvr Dyn. start
4. No connection
5. B+ xmt (+300 v)
6. Xmtr Dyn. start
7. No connection
8. B+ rcv (+150 v)
9. No connection
10. B+ xmt (+300 v.)

Xmtr Plug
1. Ground
2. Filament
3. +300 v B
4. No connection
5. No Connection
6. +300 v
7. No connection
8. Microphone output

Rcvr Plug
1. Ground
2. Filament
3. +150 v
4. Audio output
5. No Connection
6. No connection

A Simpler "AUTO CALL"

R. V. ANDERSON, W3NL*

The original "Auto Call" did an effective job, but left room for simplification. W3NL's latest version is easier to build and easier on the pocketbook.

IN A RECENT issue of this magazine[1], the writer described an automatic calling system which makes it possible to alert one or more stations even though their operators are not on the air at the time. This device has obvious applications for emergency communications, but the first model was rather complex.

Since the preparation of this article, there has become available, at bargain prices, a commercial unit (Hammarlund "Fleet Control") which was designed for mobile calling purposes. Apparently this model has been superseded by later developments. Although it employs a different type of operation than the original Auto-Call, and contains several features, such as "lock-out," which are unnecessary for amateur work, it can be altered easily to serve the same purpose as the original "Auto-Call." The result is a smaller, simpler and cheaper "Auto-Call" which has proved thoroughly practical in use.

This unit is wired for 6 volt operation and is designed for use with controlled pulses such as those produced by a telephone dial. It contains an audio filter, peaked at about 6000 cps. The use of this filter was abandoned because (1) its resonant frequency cannot be readily lowered, (2) most ham equipment will not efficiently pass the frequency, and (3) a bandpass filter is useless for the original purpose of the Auto-Call. If it is desired to use a tone of a specific frequency, the FL8 filter is highly recommended. These filters are inexpensive and work nicely although two of them may be required for adequate unwanted signal rejection.

1 R. V. Anderson, "The Auto-Call," CQ, Feb. 1951, p. 38

*2509-32nd St., Washington 20, D. C.

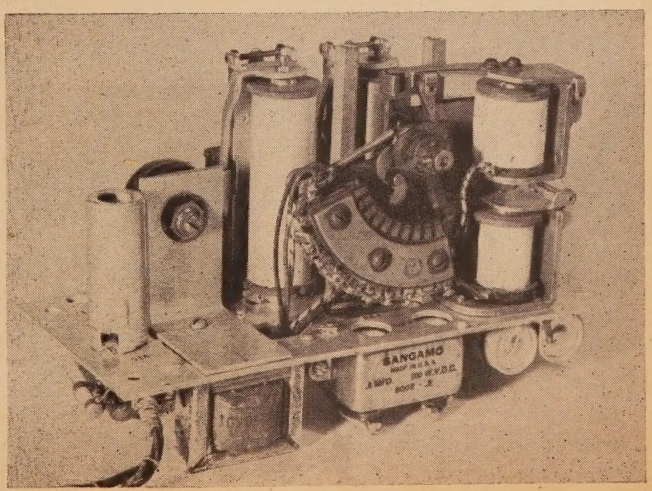
Filter

The most satisfactory high pass filter found evolved from a trick employed by the RTTY boys. The "I" laminations from a couple of ac/dc output transformers were removed, leaving only the "E" laminations, thus reducing the inductance. A piece of fiber or bakelite is used to replace the "I" laminations and the transformers reassembled. These transformers (one used as a choke with the voice coil unconnected) are used in a standard filter circuit. Several makes of transformers were tried, all of which gave an excellent drop in response below 1000 cps.

The filter is very important, since it is the only controlling factor in rejecting unwanted signals. Strong modulation will be passed by any filter because of the high harmonic content of the human voice. A good filter, however, will cut down the number of instances where voice will operate the stepping switch.

Operation

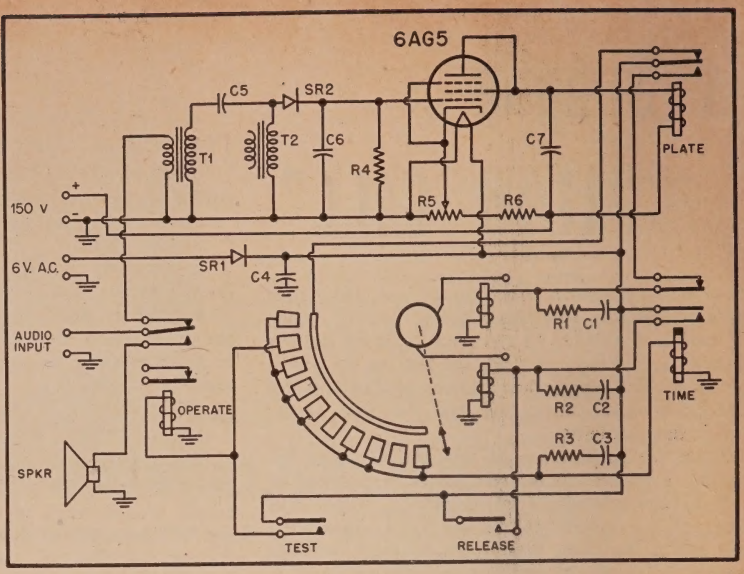
The revised circuit is shown in Figure 1. The receiver audio is disconnected from the speaker by the "Operate" relay, and is fed into the high pass filter. The high audio frequency (calling tone) passing through the filter is rectified by the IN34



Front view of the completed unit. The cathode potentiometer is to the right of the 6AG5 tube. Underneath from left to right are one of the output transformers used as part of the filter, a spark suppression bathtub condenser and two 500 μf 10 volt filter condensers.

PARTS LIST

R1*—15 ohms
R2*—10 ohms
R3*—10 ohms
R4 —250,000 1/2 w
R5 —5,000 wire wound
R6 —50,000 2 w
C1*—0.5 bathtub
C2*—0.1 bathtub
C3*—0.1 bathtub
C4 —1,000 μf 10 v
C5 —0.02 200 v
C6 —0.05 200 v
C7 —0.02 400 v
SR1—1 to 2 amp 10 v selenium rectifier
SR2—IN34 or 50 ma selenium rectifier
T1, T2—a.c./d.c. type output transformers with "I" laminations removed. See text.
*Spark suppression circuits. Components furnished with unit.

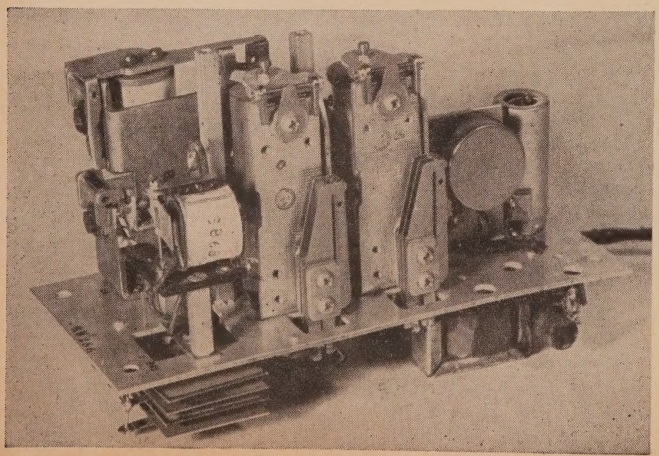


(or optional selenium rectifier), developing a voltage which is positive with respect to ground. The tube is operated at a bias point such that the "Plate" relay remains open normally, but pulls in when a tone signal decreases the effective bias. The filter condensers in the grid and plate keep the relay from following the tone.

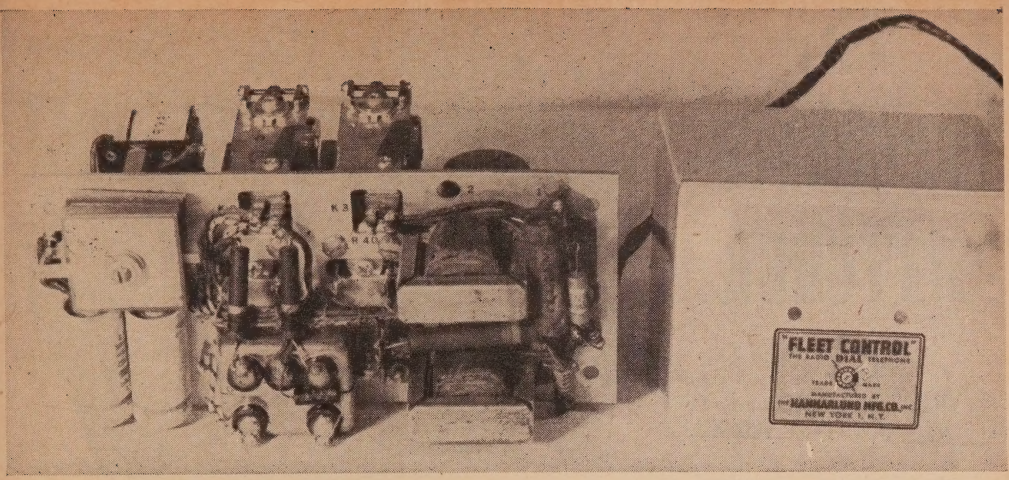
When the "Plate" relay operates, current flows to the advance magnet of the stepping switch, advancing the wiper. When the "Plate" relay releases, current is supplied by its back contact to the wiper. If the wiper is resting on a rejection point, the "Time" relay will be operated, supplying current to the release magnet of the stepping switch and returning the wiper to zero. If the point is not wired for rejection, the wiper will remain on the point. During a sequence of pulses, current will be supplied to the "Time" relay each time a rejection point is reached, but if the pulses are fast enough, the "Time" relay cannot operate because of its delayed action and the wiper will advance past rejection points. When the proper sequence of pulses are provided, the stepping switch wiper will be advanced to point nine, at which time the "Operate" relay will be operated, connecting the speaker (or operating a control circuit). The advance magnet of the stepping switch is connected through the contacts of the "Time" relay, so that both magnets of the stepping switch cannot be operated at the same time.

It may appear, upon examination of the circuit, that the wiper of the stepping switch will never reach point 10, since point 9 operates the "Operate" relay, thus stopping the pulsing. This would be true if a 6 volt storage battery were used as a power source, but the regulation of the power supply shown is such that the wiper must pause perceptibly on point 9 before the "Operate" relay will close. The wiper will therefore pass point 9 in a pulse sequence.

As in the Auto-Call, one pulse always precedes the actual coding required, in order to insure that the stepping-switch is on zero when the coded



Rear view of the unit. The rebuilt 250 ma. selenium stack (four plates in parallel) and the other output transformer used as filter are under the mounting plate.



Bottom view of the unit. The original cover has been retained to dustproof the relays.

pulses are given. With this added pulse, the unit is shown wired for 1-2-3-4.

Power Supply

To provide 6 volts direct current for the unit, the 6 volt filament supply of the receiver is rectified by means of a 1.2 amp 10-0-10 v. ac center tapped selenium rectifier with the plates connected in parallel and filtered with one or two 1000 mfd 10 volt capacitors. Alternately, a standard 250 ma. stack can be taken apart and four of the plates connected in parallel. The regulation is terrible but no difficulty has been encountered; in fact, the poor regulation actually assists in making the unit work properly.

Construction

Complete re-wiring is much easier than trying to use existing wires. Completely remove all wires, the two twelve-point plugs and the 6000 cps filter. Turn the two bath-tub condensers over so the terminals are on the bottom instead of protruding through the chassis. Remove the "off-normal" contacts on the top of the stepping switch as they are not used. Mount the additional units desired on the remaining space.

Depending upon individual design, it may be better to cut a large clearance hole in a chassis and fasten the unit to the top of the chassis. A

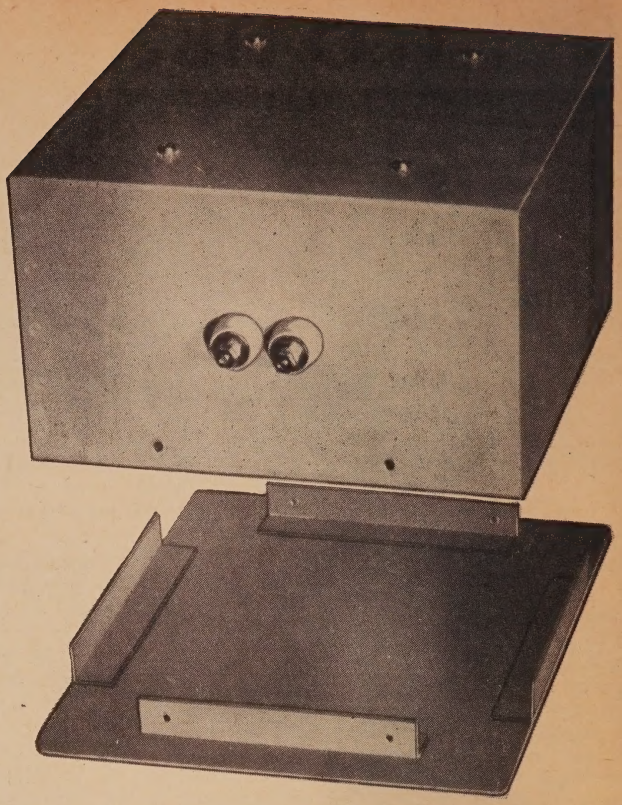
(Continued on page 71)



Front view of a complete unit employing an FL8 filter and power supply for the tubes. This unit is used on the two-meter band.

The IMPEDANCE-MATCHER

VINCE DE LONG and
BEN W. ROBERTS, WØIEU*



Exploded view showing construction of the shield box. Overall dimensions of the box are 8½ x 8 x 5 inches.

Presenting a wide-band unbalanced-to-balanced line transformer which also serves as a practical impedance transformer for transmitting antenna systems.

ELIMINATION OF SPURIOUS RADIATIONS that may cause TVI is the most urgent problem confronting the amateur of today. Experience has shown that most undesired output frequencies can be eliminated by the use of an output circuit consisting of a pi section followed by an L section. The pi-L network, a boon to bandswitching, is used in practically all commercial, bandswitching, TVI-proof transmitters such as the 32V and the KW-1. The pi network has been thoroughly covered in a recent issue of CQ[1]. Unfortunately, an unbalanced output circuit such as the pi or pi-L network may be used only for coupling to an antenna tuner or an unbalanced antenna system.

The Impedance-Matcher has two important functions. It gives either a 1 to 4 or a 4 to 1 impedance transformation and also has the ability to feed a balanced transmission line from an unbalanced transmitter output. In combination, these two characteristics make possible the use of a 300 ohm folded dipole antenna with a transmitter having a pi, pi-L, or other unbalanced output circuit. The unit illustrated will match a 75 ohm impedance or vice versa. This makes it possible to match the 72 ohm coaxial output commonly used on shielded, TVI-proof transmitters to the feedline of a 300 ohm folded dipole antenna as shown in Figure 1.

The Impedance-Matcher consists of two transmission lines wound into coils and mounted inside a shielded box. Figure 2 shows the method of connecting the coils. There are no tuning adjustments to be made, and coil changing is not required when going from one end of a band to the other or when changing bands. After the unit shown here has been built and installed, it may be used on any frequency in any amateur band from 3.5 to 30 megacycles without further adjustment. For this reason, it need not be readily accessible and may be located at any point in the feed line. If the metal box containing the Impedance-Matcher can be made water tight, it may be located outside the shack near the antenna. Coaxial cable may then be used for a large part of the transmission line.

Theory of Operation

The problem of going from an unbalanced to a balanced circuit is solved many times in the construction of an amateur transmitter. On the audio level, this is accomplished by phase inversion or

1 "Pi Network Tank Circuits," E. W. Pappenfus and K. L. Klippel, CQ, Sept. 1950, p. 27.

*Collins Radio Co., Cedar Rapids, Iowa.

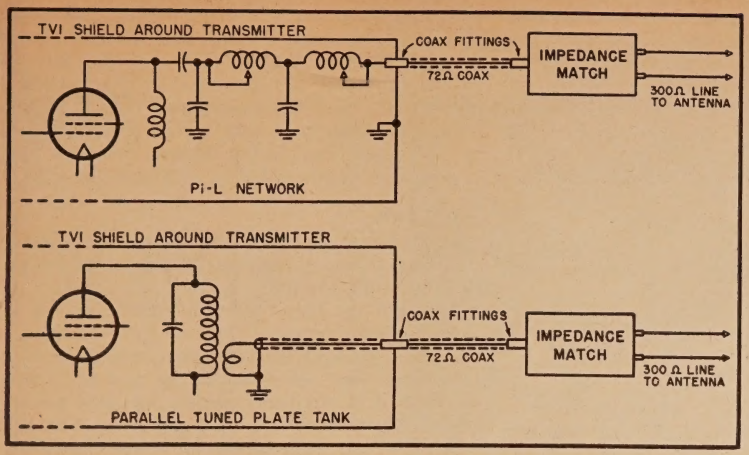


Fig. 1 Methods of connecting the Impedance Matcher to the feed line.

the use of an iron-core transformer. Tuned circuits may be used to solve the same problem in the r.f. stages. The Impedance-Matcher may be used to go from unbalanced to balanced circuits without the use of tuning controls.

Let us consider an ordinary transmission line. The distributed inductances and capacitances of such a line balance each other, and reflect a pure resistance to the transmitter when the line is terminated in its characteristic impedance. The Impedance-Matcher utilizes the distributed constant idea in combination with auto transformer action to give a 4 to 1 impedance change and provide a system where balanced currents are permitted to flow along the transmission lines, but unbalanced currents are prevented from flowing. Each coil looks like a transmission line when balanced currents are introduced into either end. However, unbalanced currents attempt to flow in only one wire and see the coil as a choke which will not permit them to pass. The same unbalanced to balanced operation is maintained when either set of terminals is used as the input. An impedance increase of four or a decrease of four may be had, depending upon the selection of terminals.

The Impedance-Matcher essentially consists of two open wire transmission lines made up with the proper wire size and spacing to give an impedance such that when they are wound into coils, the characteristic impedance will be a mean value between the desired input and output impedances. The impedance of the transmission line when wound up into a coil will be less than the calculated impedance of similar transmission lines used in an orthodox manner.

The unit illustrated here was designed to give an impedance match between a 75 ohm cable and a 300 ohm twin line. This requires a transmission line that will have a characteristic impedance of 150 ohms after it has been wound on the coil forms. By experimenting with the material at hand, it was found that line made up of No. 22 wire spaced .087 inches, and having a characteristic impedance of about 225 ohms, yielded the required 150 ohm characteristic impedance after it had been wound on a 2½ inch diameter ribbed isolantite coil form grooved for 11½ turns per inch (0.087 inch spacing) and mounted in the aluminum box. As shown in the inside view, the transmission lines on the two coils are connected in parallel on one end to give an impedance of one half the 150 ohm characteristic impedance, or 75 ohms. The other ends of the two coils are connected in series in order to double the 150 ohm characteristic impedance of the wound transmission lines and give a value of 300 ohms.

Construction

The box containing the Impedance-Matcher was constructed of 20 gauge aluminum and may be fastened together with spot welds, as shown, or with machine screws or self-tapping screws. It measures 5 inches high, 8½ inches wide, and 8 inches deep (parallel to the coil axis). A tight-fitting lid is constructed as shown in the illustration and mounted in place with self-tapping screws.

The two wires that comprise one transmission line are wound in adjacent grooves for the entire length of a coil. The length is not critical except to help determine the frequencies of possible holes in the spectrum where series resonance occurs. The unit described here operates satisfactorily on all amateur bands from 80 through 10 meters but has a series resonant point at about 12 megacycles and cannot be used at this frequency. Care should be taken to reproduce the physical layout shown here if the series resonant hole is to be located near 12 megacycles rather than in an amateur

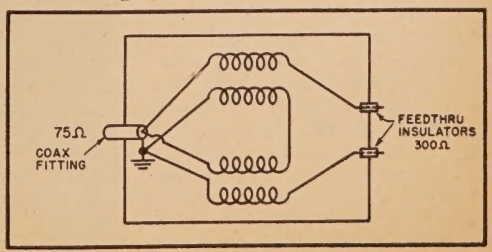


Fig. 2. Schematic diagram of the Impedance Matcher.

band. The spacing between the coils and the box has some effect on the location of the hole. Increased spacing is not likely to effect the series resonant point as much as decreased spacing.

Isolantite coil forms, 2½ inches in diameter, are used. They have 8 ribs and contain 56 turns with a winding rate of 11½ turns per inch Winding is accomplished by placing the two No. 88 wires of the transmission line in adjacent grooves on the coil forms. It is necessary to skip one groove axially along the coil during each turn of the wire in order to wind the two parallel wires without requiring a special coil form with double grooves. If the symmetrical connections shown in the illustrations are to be used, one of the coils must be wound in a left handed manner. Winding a left handed coil on a form with right hand grooves is not as difficult as it sounds. The use of ribbed coil forms greatly accelerates the left handed winding process by permitting the wire to be jumped from groove to groove between the ribs. Experimentation with a piece of string on the coil form will quickly show the winding method: Place the string in the first groove and wind one-fourth of a turn in a normal manner but in the "wrong" direction. Between two of the ribs, advance the string axially in the winding direction to the next groove. Wind another half turn and again skip forward one groove. Complete the winding by skipping to the next groove every half turn. When the winding is completed it will be seen that a space is available for the placement of a similar winding. This left handed winding is not essential but was used to give symmetrical connections between the coils. The coils are grooved for a total of 56 turns. The net result is 28 turns of transmission line on each coil. The ends of the wire may be secured to a small terminal board or piece of thin Bakelite held between the end of the coil form and the stand-off insulator that supports it. After the transmission lines have been wound, the two coils are placed in the box side by side with four inches between centers. 1¼" stand-off insulators are used to mount the coils.

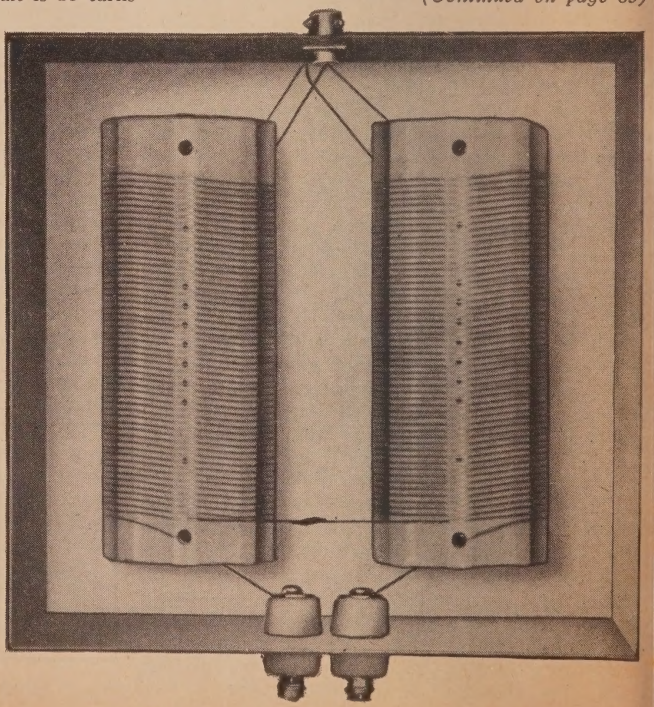
Operation

Operation of the Impedance-Matcher consists of installing it and forgetting it. No tuning or adjustments are required.

Altsough the unit illustrated here can only be used to match between 75 ohms and 300 ohms, a unit could be built for two other impedances provided that they are separated by a 4 to 1 ratio and that it is physically possible to wind the required transmission line on a coil form that will not crowd the transmitter out of the shack. An example of another convenient arrangement would be an Impedance-Matcher with a 50 ohm input and a 200 ohm output to match between a piece of 50 ohm coax and a T-match system.

Although the Impedance-Matcher was designed to work between an unbalanced transmitter output and an antenna system using balanced feeders, it also proves to be of value under nearly opposite conditions. Due to the lack of "free space" in the vicinity of most amateur antennas, a truly balanced antenna system is almost never attained. In cases where antenna unbalance causes the transmitter to be hot with r.f., it may be desirable to use the Impedance-Matcher even though the transmitter has a balanced output circuit. This will permit

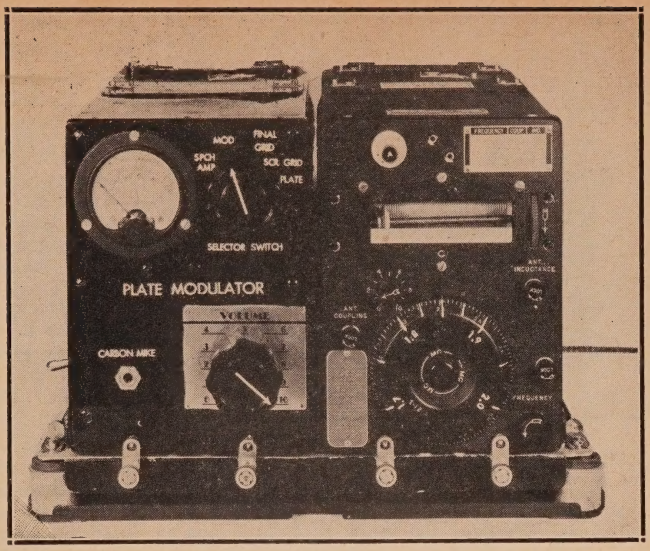
(Continued on page 65)



The inside view illustrates how closely the physical construction conforms to the electrical circuit. The coils are wound on 2½-inch diameter forms.

P. S. RAND, W1DBM*

WAR SURPLUS for CIVIL DEFENSE



This is the concluding installment of W1DBM's ARC-5 conversion series, the first part of which appeared in our April issue. Since these two articles contain the original circuits for the unmodified units, they form a handy reference.

IN PART I of this article we described the conversion of a BC 457-A or 459-A command transmitter[8] to the new Civil Defense frequencies in the 10 meter band. This month we will describe a 50-54 mc conversion of a BC-458-A or BC 459-A, which is interchangeable with the transmitter described last month, as well as an 80 and 160 meter conversion, all of which may be used with the same modulator and power supply. A Class "B" plate modulator will also be described.

50—54 MC Unit

If you use a BC 458-A, the v.f.o. tuning range will be 5.555 to 6.000 mc followed by two triplers. If you use a BC 459-A, the v.f.o must cover from 8.333 to 9.000 mc and must be followed by one doubler and one tripler. Here, as in the case of the ten meter transmitter, other SCR 274 transmitters may be used by altering the coil and condenser in the v.f.o., so that they tune either of the above ranges.

The conversion to be described used a BC 458-A, and to get more band spread on the v.f.o. dial, the powdered iron slug was screwed all the way out of the coil, and the air padder was turned nearly all the way in. We ended up tuning 5.555 to 6 mc with considerably more band spread as shown in the photos. Plates may be removed from the oscillator condenser to obtain added bandspread if desired.

When substituting a 2E30 for a 1626, the frequency will be lowered slightly due to the higher grid-to-filament capacity in the 2E30, so if you intend to use the present dial calibrations, be sure to compensate for this by adjusting the padder.

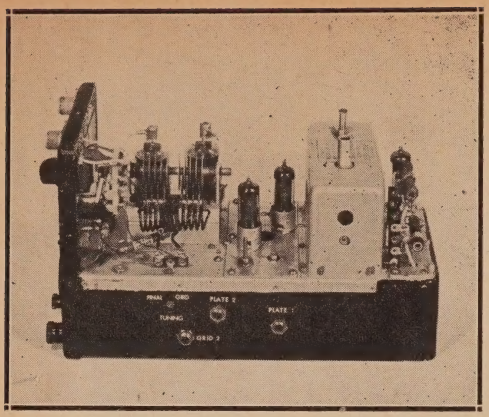
Frequency Multiplier

Regardless of whether you double or triple in the first 2E30 multiplier, its plate coil must tune the range of 16.666 mc to 18.0 mc. The next 2E30 triples to 50 to 54 mc, and is link-coupled to the push-pull 5516 grid coil. This exciter strip is built up on a small 2½" x 5" aluminum plate, and is mounted over a cutout on the chassis exactly as was described in Part I for the 28 mc transmitter. In fact, the entire chassis conversion, removal of parts, mounting coax connectors, antenna changeover relay, etc., is identical on both the ten and six meter units and so will not be repeated here. The reader is referred to April 1951 CQ for details.

If desired, the builder may dispense with the small APC variable condensers shown tuning the 2E30 plate coils, and utilize the fixed input and output tube capacities of the 2E30 and tune with the powdered iron slug in the National XR-50

8 CQ, April 1951, p. 11

* *Laboratory of Advanced Research, Remington Rand Inc., South Norwalk, Conn.*



Right hand view of the converted 50 mc transmitter. The remaining grid current jack is on the left hand side of the chassis.

coil form. Winding the coils is a little more critical as the tuning range with the slug is much more limited than with the variable condenser arrangement. Figure 7 shows the 50-54 mc circuit diagram. The first 2E30 multiplier plate coil tunes 16.6 to 18 mc and is shunted by 4.5 $\mu\mu$f, the plate-to-filament capacity, plus 10 $\mu\mu$f, the grid-to-filament capacity of the following 2E30, plus strays of about 5 $\mu\mu$f. This makes a total of around 20 $\mu\mu$f across the coil. The inductance necessary to cover the above range then becomes 3.8 μh to 4.5 μh. This can be made by winding 21 turns of 24 enamel wire on a National XR-50

TABLE III
Coil Data for 50-54 mc Output

Coil	Frequency Coverage	No. Turns	Dia.	Length	Wire	Form	μh
L1	16. 666 to 18. 000 mc	20	1/2"	5/8"	#22	XR-50	3. 0
L2	50. 0 to 54. 0 mc	6	1/2"	5/8"	#18	XR-50	.25
L3 & L4	Link	2	1/2"		#16		
L5	50. 0 to 54. 0 mc	11	5/8"	1 1/2"	#14	Air	.75
L6	50. 0 to 54. 0 mc	12	5/8"	2"	#12	Air	1.1
L7	Antenna Coil	3	5/8"		#16	Air	

See Text for coil dimensions if C_1 and C_2 are omitted.

The second 2E30 multiplier only has about 8 $\mu\mu$f across it, so it requires 1 μh to 1.2 μh to tune the range of 50 to 54 mc. This is a coil of 10 turns of #18 enamel wire wound on an XR-50 coil form. The link is 2 turns, wound on the cold end.

It is wise to check the ranges covered by the coils before applying the coil dope and mounting them permanently in the chassis. This is conveniently done by mounting them temporarily on the small sub-chassis together with the 2E30 sockets before the sub-chassis is mounted on the transmitter. The filament, screen grid, and other wiring is completed and the coils are temporarily soldered into the circuit. With both 2E30's in their sockets, the slugs are screwed from minimum to maximum while checking the resonant frequency with a grid dip oscillator. A turn or two is added or taken off from the coils as required, so that the slugs will tune the desired range with some leeway. The coils may now be "doped" and permanently mounted in place and the sub-chassis may be bolted to the main chassis. See Table III for coil

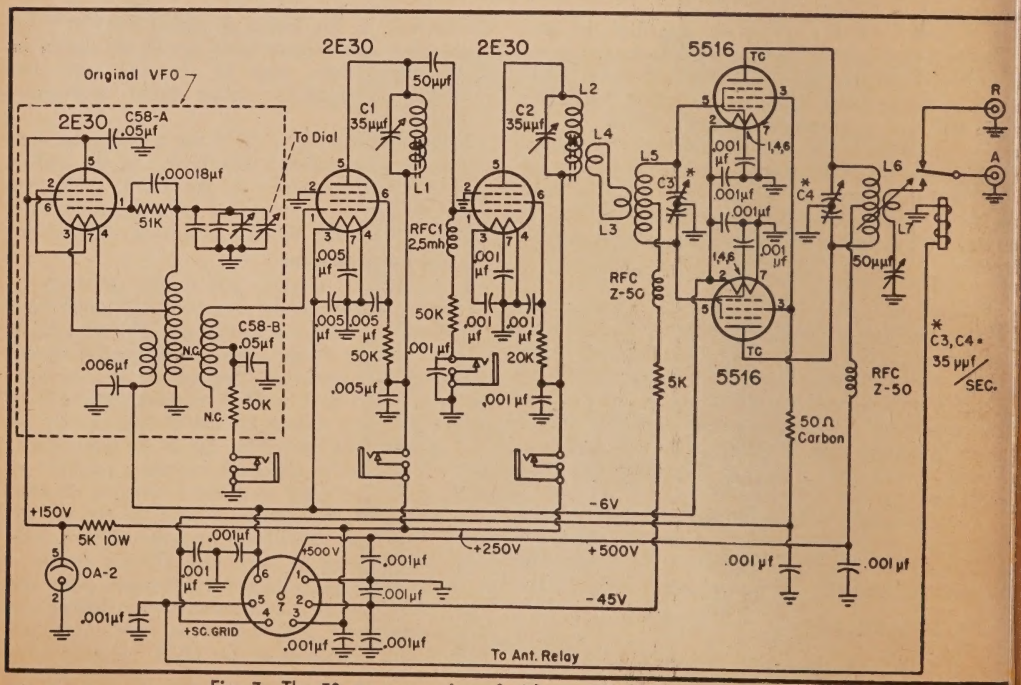


Fig. 7. The 50 mc conversion of either a BC-458-A or BC-459-A.

CQ

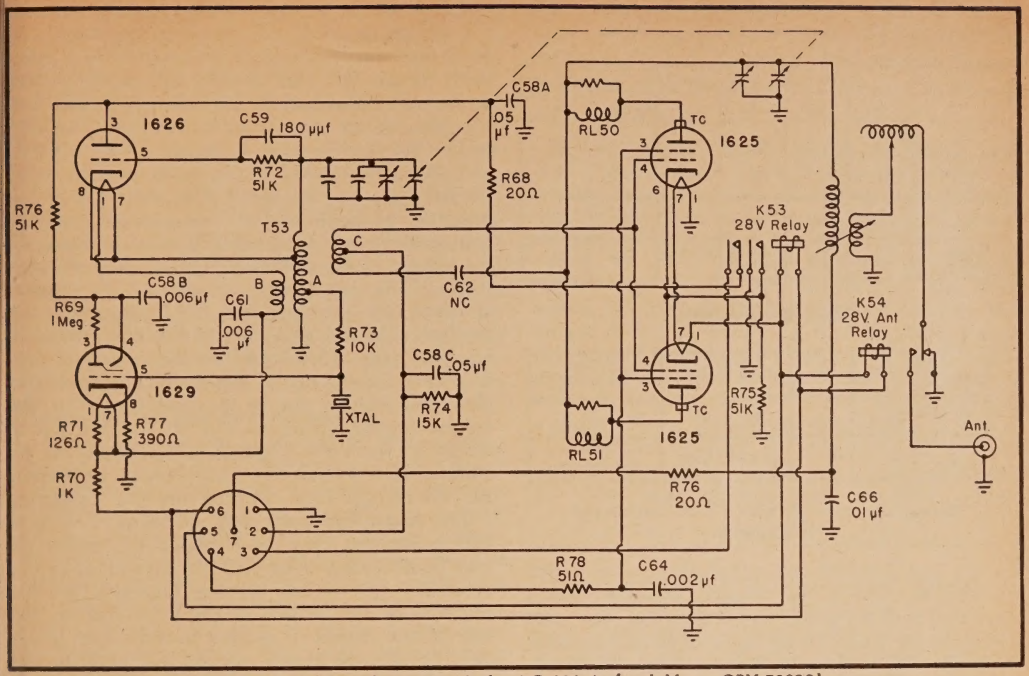


Fig. 8. The original circuit of the BC-696-A (and Navy CBY-52232).

winding data if parallel condensers are used to tune the coils.

Final Amplifier

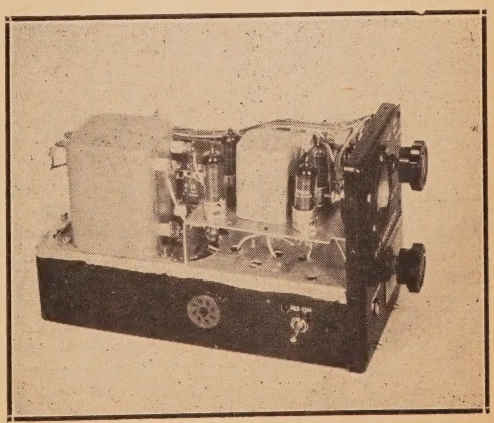
The components for the push-pull 5516 final amplifier are mounted in much the same fashion as for the 28 mc transmitter. The reader is referred to the photographs which show the general layout. The final tank condenser is raised off the chassis by means of a small aluminum bracket so that the plate leads will be short and so that the condenser shaft will protrude through a hole in the plastic window. The antenna loading condenser is mounted under the antenna change-over relay on the right hand side of the front panel. The grid tuning condenser is mounted for screw driver adjustment through a clearance hole in the right hand side of the chassis. Incidentally, to be sure to keep all your metering jacks and screw driver adjustments on the right hand side of the transmitters and all the switches, power plugs, etc., of the modulator on the left hand side, so that they will all be available when the two units are plugged in side by side in a double mounting rack with the modulator to the left and the transmitter to the right.

Tuning Up

The tuning up precedure for this 50 mc unit is similar to that of the 28 mc unit. First pretune all stages to the desired frequency with a grid dip oscillator so that they will be in approximate resonance when first turned on. Then with final screen and plate voltage off, peak the multipliers for maximum final grid current. Calibrate the v.f.o. dial in output frequency, marking the calibrations in white paint. Attach the antenna 52 ohm coax feed line and adjust the antenna coupling and loading for optimum output consistent with upward modulation as indicated by a flashlight bulb coupled to the final tank coil. See Table IV for operating voltages and currents.

1.75 to 2 mc and 3.5—4 mc Conversions

Inasmuch as these frequencies are proposed for communications between various disaster services and for some type of medium distance C.D. communications and probably will not be used for mobile work, these two units were designed for portable emergency use. They retain their original circuit details except for changing to 6 volt tubes,



The class B modulator; microphone and bias batteries are on the far side of the chassis.

TABLE IV
Voltage and Current Measurements 50-54 mc r.f. unit

	GRID		PLATE		SCREEN	
	Volts	MA	Volts	MA	Volts	MA
Osc. 2E30	-50	1.0	150		Triode Connected	
1st Mult. 2E30	-35	0.7	250	20	110	3
2nd Mult. 2E30	-100	2.0	250	20	110	3
Final 2-5516	-70	5.0	450 to 500	80-100	150	10

Class B Modulator

1st Sp. Amp. 2E30	-10	0	220	1.6	Triode Connected	
2nd Sp. Amp. 2E30	-22.5	0	220	25	220	5
Mod. 2-2E30's	0	0	450-500	5-80	Triode Connected	

Measurements made with V.T. Voltmeter and Milliameter.

a 6J5 and 2-807's,[9] and minor changes in wiring to enable them to be plugged into our shock-mounted rack for power and modulation. The units used are the 2.1 to 3.0 mc Navy Model CBY-52232, and the 3.0 to 4.0 mc Signal Corps BC-696-A. The conversion of these two units is identical except for changing the frequency of the v.f.o. in the Navy model. Figure 8 shows the original circuit diagram of these units before conversion and Figure 9 shows the circuit after conversion. Note that the relay under the chassis which originally broke the plus B for the oscillator and shorted the cathode of the 1625's has been removed. The plus B to the oscillator now runs directly to Pin #3 on the socket at the rear of the chassis, and the cathodes, and one side of the heaters of the 807's are now grounded. The antenna shorting relay on the inside of the front panel is removed and replaced by a s.p.d.t. 6 volt relay mounted on the outside of the front panel due to lack of space inside. This relay may be omitted if separate antennas are provided for the transmitter and receiver. The old grid leak of the final, mounted on spare pins #5 and #7 of the crystal socket, is simply clipped out of the circuit. A new 5000 ohm grid leak is put in the lead from Pin #5 on the crystal socket to Pin #2 on the power socket at the rear where it picks up minus 45 volts of battery bias. This is necessary to prevent the old resistor from shorting the bias battery.

The magic eye tube may be replaced with a 6E5, a six volt type, by changing the socket, or may be discarded along with the crystal. In either event the only circuit changes necessary are the rewiring of the heaters of the two tubes on the rear of the chassis in parallel instead of in series, and the removal of the resistor that parallels the magic eye tube heater.

In the event that you use a BC-696-A, it is of course all calibrated for the 3.5—4 mc range. However, you can use the BC-457-A, which covers 4—5.3 mc, just as easily by cranking in on the

9 "Mobile with the SCR-274N." George M. Brown, W2CVV, CQ. Jan. 1948, p. 22.

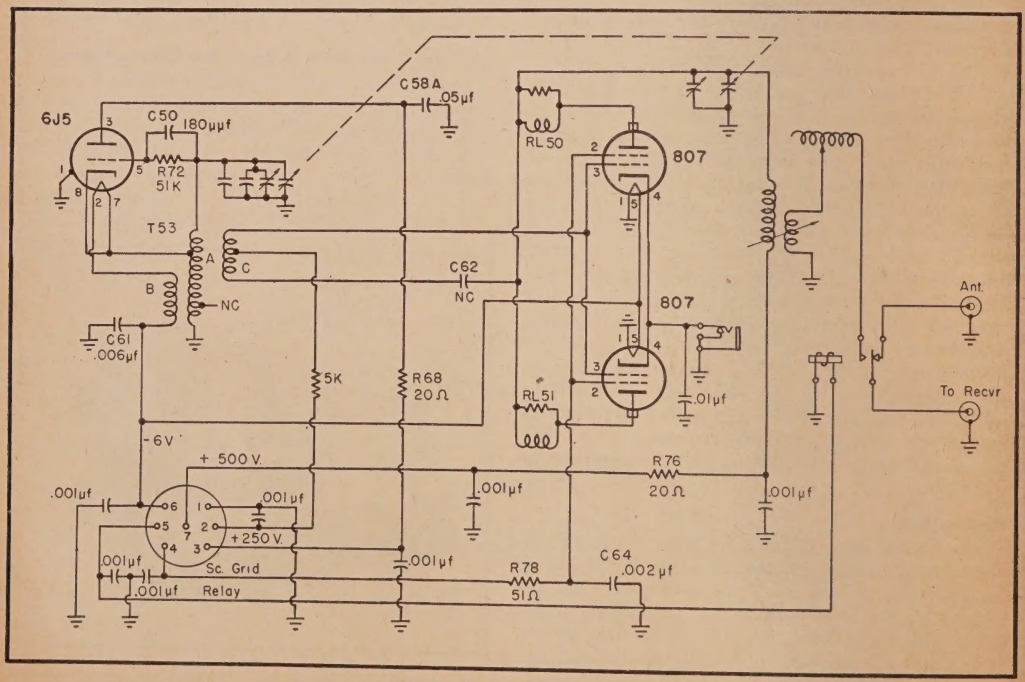


Fig. 9. W1DBM's 80 and 160-meter conversion from the circuit of Fig. 8.

two air padding condensers, one on the v.f.o. and the other on the final. (This is exactly what is now done on the Navy Model CBY-52232 to lower its frequency from 2.1—3 mc to 1.7 to 2.1 mc.) To do this, it is necessary to remove the cover from the v.f.o. and loosen the set screws on the shaft of the padding condenser. A 3/8" diameter hole is now drilled in the shield can so that the shaft of this condenser can be tuned with a screw driver after the can has been replaced. After the oscillator has been trimmed to cover the desired frequency range, the can is again removed and the set screws on the condenser shaft are tightened. Now replace the can and you are all set to re-calibrate the dial in the same fashion as outlined for the other units. Figure 10 shows my 160 meter calibration; yours should be similar.

Tuning Up on 160 and 80 meters

The voltage on the oscillators in the two low frequency units will run higher than in the 10 and 6 meter conversions, since there are no frequency multipliers pulling current through the voltage divider in the modulator unit. An auxiliary voltage divider may be built into each of these units if necessary, so that the correct voltage, +250, will be obtained. In tuning up these two low frequency units it is first necessary to couple a lamp load to the 807 tank coil and then switch the modulator to "filaments on all the time" position. Start the dynamotor and with a screw driver, "zero dip" the final padding condenser through the hole in the side of the chassis. This is the middle condenser under the chassis, and must have its set screws loosened first. After bringing the final to resonance, the set screws are tightened again, after which the final should track pretty well with the ganged-tuned v.f.o.

Antennas

It has been the author's experience that the 3-4 mc BC 696-A transmitters will feed voltage to a short antenna of from 10 to 30 feet in length, providing a 50 $\mu\mu$f condenser is connected from the antenna binding post to ground. They will also end feed an antenna approximately ½ wave long, between 100 and 150 feet. For other lengths it will be necessary to use a series condenser or a loading coil to shorten or lengthen the antenna electrically. With a little experimenting these units will feed a base loaded whip; however, the exact antenna will be left up to the reader. Probably the greatest C.D. use to which these low frequency units would be put would require the operator to drive to some favorable spot, park his car, string up a long wire to a tree and get a message through to some other city.

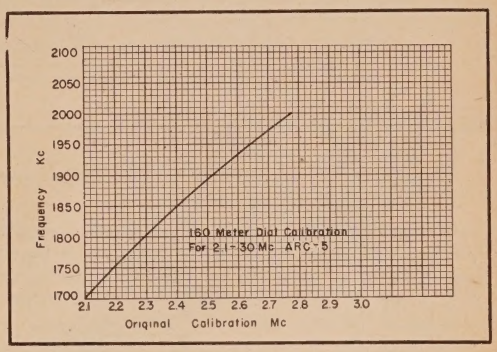
C. W.

If conditions require the use of c.w., this may be accomplished in a simple manner by inserting a key in the cathode jack of the 807's. This does not permit break-in operation; if much c.w. operation is anticipated, the reader is referred to one of the many articles dealing with improved break-in keying of these units.[10]

Plate Modulator

A good many hams will prefer to build a conventional push-pull Class B plate modulator on general principles, while others may wish to avoid some of the fussy adjustments necessary for the correct operation of screen grid modulation.

For the benefit of these who have some spare milliamperes left in their dynamotors and who would like to use regular plate modulation, the circuit shown in Figure 11 may be plugged into the rack interchangeably with the clamp tube modulator described in Part I. By so doing, you will gain: about half an "S" unit of signal strength, slightly higher percentage of modulation, oftentimes of better quality (no clipping), and greater ease of adjustment. Total cost: upwards of 100 ma more plate current drain at 500V, which



Figures 10.

equals 50 watts or more out of your storage battery while transmitting. At 6V this is another 10 amps.

Modulator Circuit

Referring to Figure 11, it will be seen that two 2E30's are used to drive another pair as modulators. The transformers shown in the photos are war surplus from the ART-13, which were used by the Signal Corps for 811's in Class B to modulate a single 813. They obviously will handle ten times the audio necessary in this case. However, they are cheaper and smaller than the usual 25 watt multimatch transformers which may be substituted of course. The r.f. load will be around 5000 to 6000 ohms, 500 volts at 80 to 100ma. This particular surplus modulation transformer has a primary to secondary impedance ratio of about 2 to 1 and, therefore, our r.f. load will reflect an impedance of ten to twelve thousand ohms in the primary. A pair of 2E30's in Class AB_2 requires 3800 ohm plate to plate load resistance, so we would have a pretty bad mismatch. We can correct this somewhat by putting both the r.f. plate and screen

10 "Modification of the SCR-274N," E. B. McIntyre, W8KHJ, CQ, July 1948, p. 43.

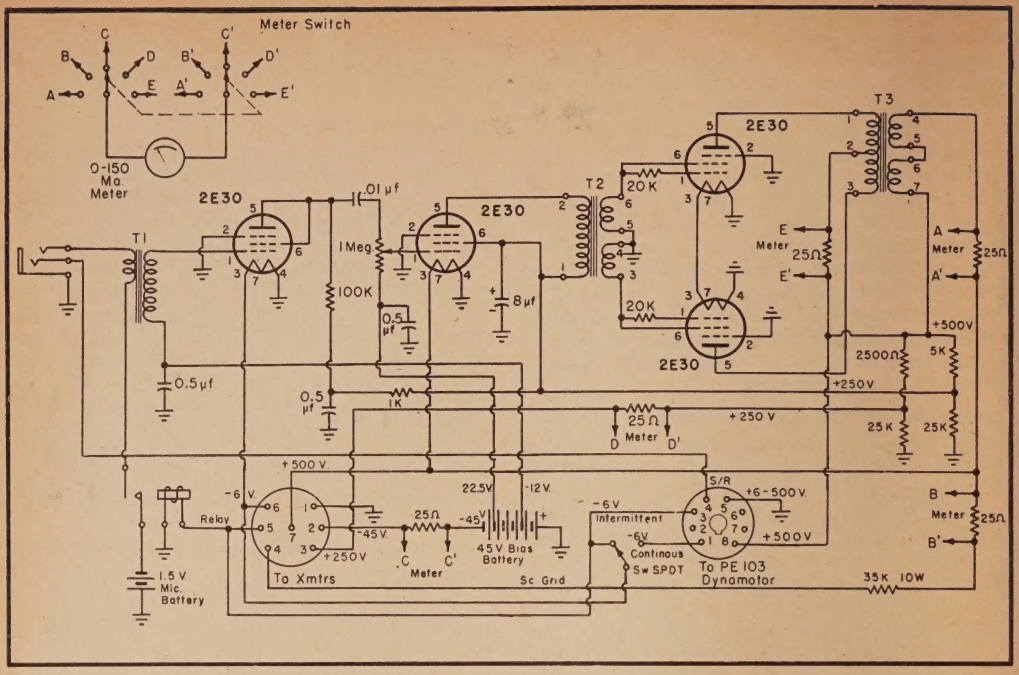


Fig. 11. The speech amplifier and class B modulator.

secondaries in series, assuming that an 813 screen winding will carry the 80 to 100ma without burning out. If the two windings are connected so as to add, we will get a 1.44 to 1 or a reflected impedance of between 8000 and 9000 ohms.

By using the 2E30's as triodes in Class B, we will save on the plate current drain from the dynamotor. One way is to tie the screens to the control grids so that zero bias may be used. A simple improvement on this method, which permits driving the screens to a higher potential than the control grids, uses dropping resistors in series with the control grids.[11] [12] For instant-heating filament tubes it is necessary to use transformer coupling. This requires a transformer, with a secondary that can handle the screen current of the modulator. In our case the surplus transformer used to drive the above mentioned 811's in Class B worked out satisfactorily. To get the required power to drive the modulator by this means, it was necessary to use two 2E30's from a single button mike, one triode and one pentode.

Additional information on suitable modulators can be found in the ARRL Handbook.

Construction

The chassis upon which the modulator was built was salvaged from a beat-up BC 457-A. All the parts were removed and a new front panel was bolted on over the old one. The four 2E30's were mounted on a small sub-chassis as shown in the photograph, with the driver transformer in the middle. The modulation transformer and relay are mounted on the rear of the chassis with the bias batteries along the right hand edge. Smaller batteries such as the hearing aid type may be used if available. All the voltage dividers, decoupling resistors, by-pass condensers and mike transformer are mounted at convenient spots under the chassis. The dynamotor plug and the filament switch are mounted on the left hand side, as in the clamp tube modulator previously described.[8] The meter switch, gain control and mike jack are on the front panel, together with the meter.

Tuning Up

The first thing to do in checking the modulator unit is to set the sliders on the variable resistors in the two voltage dividers so that around 250V is available under load. One of these dividers is for the exciter and the other feeds the modulator and speech amplifier.

The unit must of course be plugged into the dual transmitter rack with either the ten or six meter transmitter, while this adjustment is made. Once this has been done, the modulation of the transmitter can be tried out. If an oscilloscope is available, it should be hooked up to observe the modulation envelope and the gain control setting determined for 100% modulation. Be sure the antenna loading is the same as you will use in the car.

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11 RCA "Ham Tips," Vol. VII, No. 2, May-June 1947.
12 "A High-Power Modulator for Mobile Operation," George M. Brown, W2CVV, CQ, Feb. 1950, p. 20.

Calmly -- and Peacefully!

by OL' JOE

ALL THE AMATEURS I know are always "sweating out" something or other—first their ticket, then QSL cards for WAS or WAC, or something else. I don't get it. I've always acted on the premise that "everything comes to he who waits" and I've always approached every situation calmly and peacefully.

I got interested in amateur radio while visiting a friend. He was talking to another ham in Australia at the time, and let me talk a while—that did it! If he could do it so could I!

Being by nature calm and peaceful, I determined not to rush into it. Our local supply house was out of handbooks and license manuals. Did I get hot under the collar? Of course not. I calmly and peacefully picked up the telephone and called West Hartford and ordered the books out by air mail. Telephone charges were only $4.15 and air mail was $2.14. The books arrived OK, and I started soaking up everything in them—calmly and peacefully. I was only late for work three days the first week and after that, was on time every day. Of course, at the end of the first week, I was fired for sleeping on the job but there are plenty of jobs available for a good man so I immediately secured a position as night watchman in a mattress factory.

The inspector was due about a month after I got my books and I was ready for him. My code speed was adequate and I had memorized the license manual I had no fear from that quarter. The exam was scheduled for 9 a.m., so I left home at 7:15 a.m., to drive calmly and peacefully to the Federal Building which was a mile and a half from home. I didn't want to battle traffic and get all nervous. I only got two traffic tickets and crumpled one fender as I drove calmly and peacefully along, but my car is new and fenders are easy to get.

I couldn't see anything to get nervous about. The RI was a good fellow and took good care of me when I fainted after the code test. It must have been indigestion from the dill pickle and cheese sandwich I had for breakfast. I was sure I had made the grade—nothing to do now but wait for the ticket—calmly and peacefully.

While waiting, I built my rig—calmly and peacefully. I knew I'd have two or three weeks to wait for the ticket. My first job was to get a receiver. I couldn't get the kind in town that I wanted, so I called the manufacturer—it only cost $3.20, and the air express was only $28.13.

I built the transmitter calmly and peacefully—took two full days to finish it. I calmly and peacefully "threw the big switch" and then went downtown and bought a new set of tubes and had the fire extinguisher recharged. The insurance adjuster told me it was illegal to put 30 amp fuses in the house circuit.

Two days later I was ready again, and the rig loaded beautifully. I quit testing when I saw a truck with some electrical equipment driving up and down in front of the house.

At the end of three weeks, no ticket, but I was patiently waiting, ready to assault the DX records, but calmly and peacefully. I'd been without that ticket for 30 years, so why get impatient?

At the end of six weeks I was still calm—I was in the pokey. The postal inspectors had me put away for observation while they checked up to see why I spent my nights in the postoffice, pounding on the windows everytime a mail truck came in. They let me out in five days—the ticket wasn't here—I was still calm.



On the seventy-second day the ticket came. I met the postman seven blocks from the house. I strolled home calmly and peacefully. The city must have been working on the streets and raised the curb on Third and Main because I didn't raise my left foot high enough, skidded four feet and tore both knees out of my new $18.75 slacks. Must have been poor material. I found out three days later that I had also broken two ribs and two fingers on my left hand but I had the rig on the air just four minutes after the postman handed me the ticket. I could have shaved a minute off that if I hadn't been the calm and peaceful type.

Going down the basement stairs to the shack, my foot must have slipped—there were two teeth on the floor when I got up, but I was calmly and peacefully calling "CQ." Back came a KH—on my first call!

On the second transmission, he told me, "you're a little weak here, OM." I knew what to do about that—load it up heavier. Calmly and peacefully I reached in back of the rig to push the link in a little further.

They buried me last week.

Calmly and peacefully.



Boeing B-47 Statojet 600-mph-class bomber has no antennas that protrude beyond the airplane's streamlined aerodynamic surfaces.

The problems of streamlining aircraft antennas don't seem too closely related to the design of ham-band radiations, but it's always interesting to learn of new developments—and who knows, maybe somebody will be inspired to come up with a new approach to mobile antennas.

STREAMLINED AIRCRAFT ANTENNAS

LOUIS R. HUBER, W7UU*

So YOU THINK you had trouble with a folded dipole? Brother, you ought to spend a day in the Boeing Airplane Company's antenna laboratory in Seattle. The big problem there is not so much making the dipole act right (that's elementary): the big problem is to cram the dipole inside the airplane so it's completely flush mounted—and still working right.

This is not streamlining of antennas: it's hiding them inside the aerodynamic surfaces so they don't interfere with the air stream at all. This is something the aerodynamicists saw coming a long time ago. The electronics people didn't. It was so simple to hang an antenna on an airplane that they got to doing it just the way you hang up your hat.

This gave the airplane good communication—until the antenna iced up and fell off. But that wasn't all. There's a distinct division of domains in airplanes—and you'll find the electronics people respecting this division henceforth. Aerodynamics in one domain—antennas in another. And they must not be mixed!

Every antenna in the air stream is a "built-in headwind," an "anchor," a source of drag. The aerodynamicists knew it all along. They hated it. "Drag increases proportionately with the square of an airplane's speed," they said. But they were patient. They knew that communication is vital. And, they reflected, they could overcome antenna drag with greater power in the airplanes' engines.

They could, that is, up to a certain point—and that point was passed in a sudden burst of jet speed. It was almost as if that new speed wiped antennas right off the newer airplanes. The Boeing B-50 Superfortress (successor to the famous B-29) and the Boeing B-47 Stratojet bombers illustrate this point. The B-50, traveling more than 400 miles an hour, carries outside radio antennas. The B-47, a 600-mph-class airplane, is as clean of electronic protruberances as the proverbial hound's tooth.

In between the two bombers occurred a change in thought—and the creation of the Boeing antenna laboratory. It is one of the most advanced electronic research establishments in the country. You will see why it is both a necessity and an economy.

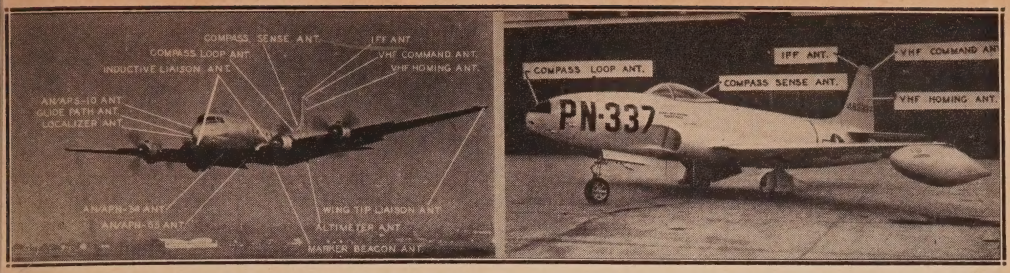
Antennas sticking out into the air stream are guilty not only of the sin of ever-increasing drag. As the airplane nears the speed of sound, they begin to create their own shock waves—and shock waves mean not just "square-of-the-airplane's-speed" drag: they mean drag on the order of a slightly-yielding brick wall. (The airplane itself, without the protruding antennas, may be free of any difficulty with shock waves in its speed range.)

Wind-tunnel tests revealed all this, and the lesson was plain: henceforth, antennas could not protrude outward from the smooth contours of high-speed airplanes.

Antennas may be easy enough when you put them up on your own roof, but they turn into complicated problems when you put them on a 600-mph-class airplane. It was up to the Boeing antenna lab to solve these problems.

Now, there are two ways of looking at an antenna laboratory. In one sense it is a research facility made necessary by the urgency of matching electronic with aerodynamic excellence. But in another way it is a welcome economy, and pays for itself even in the slower aircraft speeds. It functions, in the field of electronics, precisely as the wind tunnel functions in the aerodynamics field—and saves uncountable thousands of dollars that would otherwise have to go for flight tests.

* *1243 16th Ave. N., Seattle 2, Wash.*



Left: There are more than a dozen antennas buried under the skin of a C-54. The elimination of "drag" in this case saves several hundred horsepower. Right: The F-80 fighter has five buried radiators, including three in the tail (vertical stabilizer).

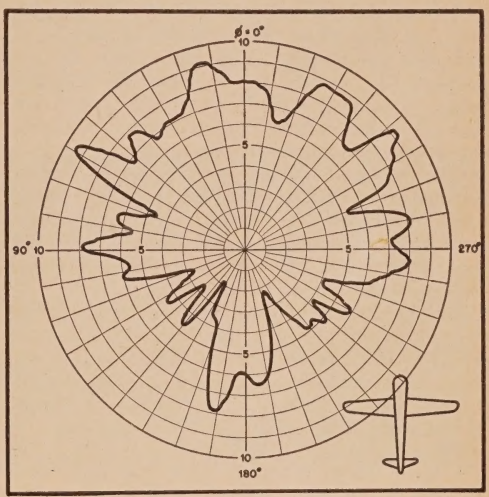
Antennas used on the surface of the earth can be arranged properly—spaced the right distance from the ground or other nearby objects, and buttressed with suitable reflectors for beaming.

On an airplane it's different. Compromise is imperative. Seldom can you place an antenna at the optimum distance from the airplane. It's like what would happen if you shifted the lamp in your automobile headlight away from the one place it must be for focusing the light on the highway: you'll get too much light where you don't want it, and too little light where you need it most.

Or it's like what would happen if you placed a reflector near a street light: the even distribution of light would be destroyed. More light would go in the direction faced by the reflector, and practically none behind it.

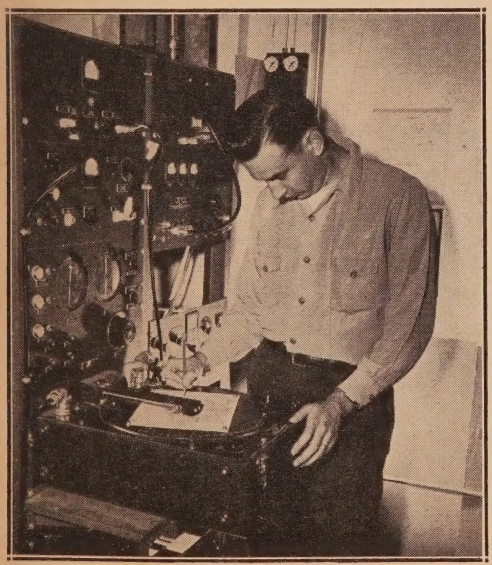
So it is with airplane antennas: you can radiate radio energy just like light: evenly, all around; or concentrated, in one or several directions. For general airplane communication you would want it uniform all around; but in special cases (particularly with military craft) you'd want concentrated energy—all in one direction, none in another, perhaps. In any event the radiation must be what is required—and to make sure of this, the radiation pattern must be determined. There are two ways to do this with airplanes.

The most difficult, least satisfactory and costliest (but until recently the usual) way is to fly the airplane in a tight circle at some distance from a given point. Since the receiving characteristics of an antenna are the same, essentially, as its transmitting characteristics, in such flights a receiver is used in the airplane and a constant-power transmitter is situated at the given point—say 50 to 75 miles away. As the plane flies in its tight circle, a graphic recording is taken of the received signal strength and, simultaneously, of the airplane's compass heading.

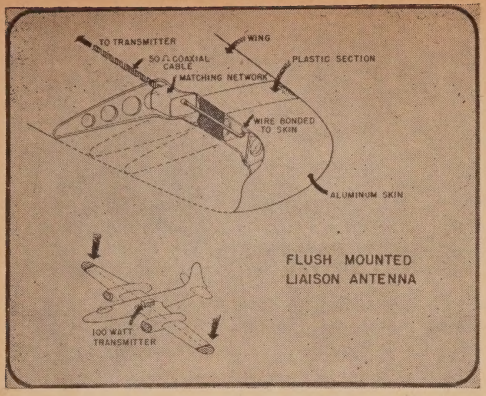


A 102 mc VHF stub's radiation pattern looked like this. Airplane outline (lower right hand corner) shows good radiation forward and directly to rear—but not so good in some other directions.

There are variations of this method, but they all involve flying the airplane and they all require actual construction and installation of the prototype antenna. If the antenna pattern turns out to be unsatisfactory, another prototype antenna must be designed and installed, and more flights must



As the airplane model is rotated in the setup shown on our front cover, the antenna pattern is automatically traced out by the polar pattern recorder.



Another way to get a zero-drag antenna is to insulate the wing tip, as shown here. Maybe we mobile hams should try this stunt on the fenders of our cars (?!)

be made. And test flights are expensive. Also, structual members of the airplane may be in the way of the design of the correct antenna—may prohibit its construction entirely.

Another fault of this method is its restriction to one geometric plane. The antenna pattern is ascertained horizontally only, unless you are prepared to fly straight up or down, fly 90-degree banks, and so on—which, of course, you're not. The horizontal pattern is good enough, of course, for most communication requirements; but it is strictly no good when you want to be sure of communication all around the spherical "clock" (with other aircraft overhead, with ground stations or other aircraft beneath you, etc.). Finally, the whole procedure must be repeated for each frequency the antenna will use.

This brings us right up to the door of the antenna laboratory. There, as we said before, the tradition of the wind tunnel is observed. The antenna-lab procedure, in fact, is very comparable to that of a wind tunnel. Small models are "flown" in order to reveal the antenna characteristics of full-size aircraft. Here's how:

A small metal model is built, and upon it is mounted a miniature antenna. The linear dimensions of the antenna, and all dimensions of the model, are reproduced to the same scale—a certain fraction of the dimensions of the real airplane and the antenna-to-be. The model is fastened to a rotatable plastic arm atop a plastic-and-wood tower, and wheeled out in front of a source of radio energy. A transmission cable from the miniature antenna on the model is brought down through the tower and led back to the antenna lab.

The radio energy directed at the model, constant in strength, also is "scaled." Its wavelength is that same fraction of the wavelength of the real antenna—or, in terms of frequency, it is the inverse multiple (that is, the reciprocal) of that fraction. For example, if the model airplane and the miniature antenna are 1/25th scale, the radio energy directed at the model will be at a wavelength 1/25th of the real wavelength, or at a frequency 25 times of the real frequency.

The radiation pattern (or reception pattern—they are the same) of the model antenna is secured in this way: with the received energy (at the model) being conducted into the lab through the shielded cable, it is a simple matter to amplify that energy and use it to run a stylus back and forth over a rotatable graph.

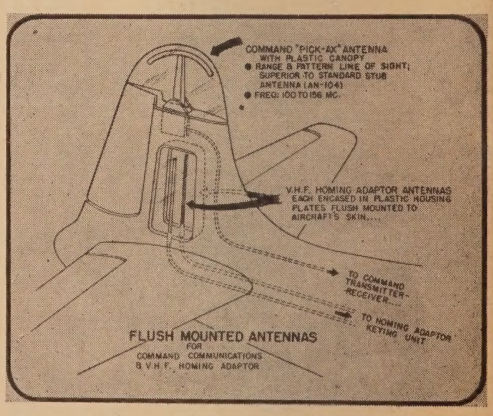
This graph, rotating throughout a complete circle, is positioned exactly as the model is positioned atop its tower—through selsyn-motor control. Thus, if the model is heading, say, 219 degrees, so will the graph "head" that way; and the stylus will be making a mark showing the signal strength received by the model-airplane antenna from that same direction. The turntable and its associated electronic equipment which make the record are called a "polar pattern recorder."

If you have an artistic eye, the stylus often turns out some fascinating studies: with only a little imagination you can see rabbits with huge ears, silhouettes of charging elephants, pictures of gigantic explosions, maps of never-never continents, etc. Where the line "bulges out" is where the antenna is working best—the direction, that is, in which it will send the strongest signals, and from which it will receive signals the loudest.

Each graph is the representation of one geometrical plane cutting through the airplane. For a complete pattern survey, as many as eighteen separate graphs must be made—each one a separate geometrical plane through the aircraft model under test. For an extremely painstaking survey, 36 graphs will be taken.

In obtaining these graphs, not a drop of high-octane gas, not a minute of costly test-flight time, nor the use of any real airplanes are involved. Yet the information obtained has the same degree of reliability as that obtained, in the aerodynamics field, from a wind tunnel. Finally, the antenna design thus obtained can be integrated with the structural design—avoiding those stone-wall im-

(Continued on page 69)



This is a closeup of some of the antennas mounted in the vertical stabilizer. Besides eliminating aerodynamic drag, flush mounting of antennas reduces precipitation static and protects against icing and moisture.



Conducted by HERB BECKER, W6QD*

ONCE AGAIN good old W6ENV takes over the column while yours truly takes in the IRE Convention in New York. As a matter of fact I am sitting in Gene Black's office after running through the column and, as usual, Andy does another first class job. It's been very interesting for me to again meet some of the East Coast boys, such as W2PEO, W2WZ, W2IOP (remember him?), then there was WØSQO and W1DX (remember him, too?). Also bumped into Al Kahn, W9KYM, and he's moving across the border and will become W8DUS. Another one moving is W2ZX, Allan Biggs, who will be W3ZP. Enough of this chit-chat; from now on it's ENV's.

Last month we had but one WAZ award to announce. Conditions must really be on the upgrade at last, because this time we have twice as many.

256	**ZS6FN**	Ralph Goldblatt	40 - 157
257	**W9DUY**	Don Holzapfel	40 - 216

Congratulations to both of you....we're happy to have you with us. Due to a slight mix-up a while back, it began to look like it would be more difficult to coax a certificate through the mails than to work WAZ, but this has been straightened out since, and we expect smooth sailing from now on.

The recent influx of stations in Kuwait is probably the best news most of us have had in quite a while. After several years of fruitless searching for VT1RF, four other VT's appear on the scene. VT1AB is reportedly on phone, VT1AC on 14 mc c.w., VT1AF on 14 and 28 mc, both c.w. and phone, and VT1DF on phone only. We understand that these call letters are temporary, being unofficial, and that official licenses with new call letters are expected very soon. Just what the prefix will be is still unknown. W6AM, W6LEE and W6VFR have managed to ship over a couple of 829's to VT1AF to replace one broken during the shipping of his rig from England. He is G4IX, you know, and don't rush him . . . he'll be there two years. W6SYG reports that a 100 watt rig was shipped to Kuwait some time ago, but not intended for any of the above mentioned stations! How many hams can this formerly rare spot afford?

Pierre, F8BS, tells us that FB8AX and the first operator of FB8ZZ have returned to Paris. We knew that there were two operators at FB8ZZ; now we wonder which was "le premier"? One was obviously a commercial operator, while the other appeared to be most familiar with hamming procedure. If our luck is like conditions, you can easily guess which one left. Now that Amsterdam Is. (8ZZ) and Kerguelen Is. (8XX) have been separated on the Official Country List, these boys had better watch out; one of them is no longer enough to satisfy the "W" appetite. In any event, Saturdays and Sundays are their days, and 28 mc is used as well as 14 mc. Phone is also available to them. FB8YY is now the only station on Adelie, Antarctica.



L. Richard, ON4UF, is rounding out 25 years on the air. Looks like a far cry from what his station must have been in 1926, when his call was EB B5.

KH6KL/KP6, Tom Pauley, is active and will try to work all stations needing Palmyra, and will answer all cards received. He requests those who have already worked KP6 to please refrain from calling him. He expects courtesy, keeps a black list, and will not answer break-in. Sounds tough but proper. KH6ACL/KP6 is also on Palmyra, and is exW6LIQ. All of this via W6ALQ. We are happy to have SM7MS enter the Honor Roll with 38 and 159 worked. Rune would like to locate W2TEA whom he worked as /ZC1. ZL3CP sent in his lists but missed the H.R. by one zone. Unfortunately, we had to drop the 33 zone c.w. group due to lack of space. 3CP says he has never heard W6QD, and wants to know if this is a record! Dunno whether it's a record or not, but

Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.

W. A. Z. HONOR ROLL

WAZ

CW & PHONE

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W7GUI	203
W6RM	202
W6OMC	202
W6PB	202
W6AOA	202
W6DLY	202
W6TS	201
W9KOK	200
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W6RBQ	200
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W7BE	156
KH6LG	156
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G3AAM	154
G2IO	154
W5KEV	153
G3YF	152
VK2QL	151
W6LEE	150
W6FHE	150
W6EYR	150
W6RLQ	150
W6LER	150
W6ATO	149
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W6LS	147
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W6RDR	133
W6AUT	132
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G5VU	124
W6NRQ	123
W6MLY	123
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W4OM	158
WØAIW	157
I1AY	157
VK4DO	156
W9YNB	155
DL1FK	155
W8VLK	155
W8WWU	155
I1AIV	154
W9HUZ	151
G3AKU	150
DL1AT	150
SM5WI	148
W2GUR	146
W2MEL	145
W6LGD	145
W5FFW	145
OK1AW	144
W6KYV	143
TF3EA	142
W6KYT	135
W9NZZ	134
VE7KC	133
W7ETK	132
W6TE	131
W6WJX	131
W7BTH	131
W5CPI	130
OE3CC	128
DL1DA	127
W6MUF	125
VR5PL	124
KG6GD	121
W7HXG	120
DL3DU	118
W6NRZ	117
KL7UM	117
ZS2EC	116
W6JWL	114
W6EYC	114
KL7GG	114
W6FBC	114
W6VAT	110
DL3AB	107
W7GXA	105
W6LEV	103
W7LEE	91

38 Zones

XE1AC	202
W2HMJ	192
W8HFE	186
W2PUD	181
CM2SW	174
W8KPL	173
4X4RE	168
W2SHZ	168
W8FJN	167
W2GVZ	160
SM7MS	159
W8EYE	158
W2UEI	156
LU7CD	155
W3LVJ	151
VE2BV	145
ZS2AT	145
W5MET	145
W8ZMC	143
WØAZT	143
ZL3AB	143
W9FKH	135
VE3ACS	134
W6ETJ	132
W4FPK	131
W2PQJ	130
W4LQN	130
W3ZN	129
WØRBA	127
W9MZP	126
FE8AB	126
W9TB	122
GW4CX	120
WØFET	118
ZL1QW	117
VE7VC	116
KL7PJ	115
W6CAE	113
W7EYS	107
W6FXL	92
C1CH	84

37 Zones

W1KFV	171
W2ZA	160
W3WU	157
W4IWO	149
W3FYS	147
ZL3CC	143
GM2UU	142
F9AH	141
W4ML	140
W9WCE	140
W2WC	136
W2AYJ	133
W7HKT	130
W4DIA	129
W1APA	128
VE5JV	126
W9LNH	122
OE1FF	117
VE1EA	116
W6AX	110
WØFWW	108
W7PK	104
W8HSW	104
W2BLS	99
W6WWW	99
OH3OE	99
KL7KV	88

36 Zones

W4HA	151
W5KUJ	142
OZ7BG	130
OA4AK	128
VE1PQ	128
I1IZ	126
W3AYS	124
F8TM	124
W9LI	124
G6QX	123
W2BF	115
4x4BX	112
G3BPP	111
W5CD	108
EA1AB	103
W2JA	102
W5BK	99

35 Zones

W2OST	146
W1BFT	141
W3MZE	134
W4DHZ	132
W9CKP	132
W5FXN	125
OE5YL	122
W5JUF	121
W6ZZ	120
W9RQM	119
CO6AJ	119
W9DGA	115
W9FNR	114
W8AVB	113
W2HAZ	111
WØGBJ	110
KZ5IP	108
KL7CZ	80

34 Zones

W1DEP	150
W8NSS	133
W1NLM	130
W4IYT	127
W1MRP	118
W5NTT	107
W8JM	102
G2BVN	91
W9WEN	83
W8PCS	80
W6EUV	66
W6OKL	61

PHONE ONLY

39 Zones

VQ4ERR	196
W6DI	192
W6VFR	174
G8IG	162
W7HTB	161
VE7ZM	145
DL1FK	125

38 Zones

W2BXA	168
W4CYU	160
ZL1HY	157
W1HKK	153
W6KQY	151
W9NDA	149
F9BO	145
W6AM	144

37 Zones

XE1AC	198
W9RBI	180
W1JCX	179
PK4DA	170
W3LTU	169
W8REU	163
CE3AB	163
W7MBX	158
VK3BZ	158
W6WNH	157
G3DO	155
W6PXH	153
W3JNN	150
W8BF	146
W6TT	142
F8VC	124
W7MBW	107
C1CH	83

36 Zones

W1NWO	176
W1MCW	172
W1BEQ	164
W9HB	160
W4ESP	152
W2DYR	140
W9BZB	139
GM2UU	135
W9HP	131
W6PDB	130
W4INL	129
W1FJN	128
W8AUP	128
G6BW	127
VE3BNQ	126
VE7HC	123
WØHX	120
W3GHD	114
W8CYL	112
W3DHM	96
W6SA	92
F8DC	87

35 Zones

HC2JR	165
ZS6Q	156
W6PCK	143
W4HA	142
W9RNX	140
W2RGV	136
HC2OT	134
W6CHV	133
WØPUE	132
W2GHV	131
WØEYR	131
W9PVX	130
W3EVW	128
WØPRZ	124
W9CKP	124
WØANF	124
G8QX	123
W8ZMC	122
W5LWV	108
W4OM	106
W3PA	105

34 Zones

W5ASG	142
W3KT	129
LU8CW	129
W2ZVS	126
W5KC	125
W4LZM	124
I1AXD	124
W6UZX	123
W8BIQ	122
W5JUF	117
W1BPH	105
W8UIG	100
W4IWO	100
W8QBF	92
WØBFB	70
W2NXZ	65

33 Zones

W9MIR	131
W5ALA	128
W9WCE	121
W2ZW	115
I1VS	115
W8BFQ	114
W8SDR	113
W8NSS	112
VE3BQP	108
W2POJ	100
W1DYV	92

it might be a frequent privilege. Recently, however, Herb had proof positive that his power supplies were still operating. Don't ask him about it sometime. . . . A number of you have been working AC4RM and AC4RN during the past year. May we humbly suggest that you start scratching? While on the subject of "Tibet", someone in the Northern part of Europe had themselves a field day last February 27th singing AC4NC. We have a hunch who it was, but . . . . scratch another one is all we can say for sure.

Well, of all things! Our very good friend A1, XE1AC, has finally found his key, and even more surprising, has joined the ranks of the c.w. brethern in the Honor Roll with 38 and 202. This is particularly noteworthy because A1 has long been "agin" the combining of c.w. and phone scores for H.R. purposes. He has some good arguments which are quite logical, but unfortunately, the majority seem to favor the existing system. In any event, we are glad that A1 has finally "weakened", and we welcome him to the new spot. He will soon find out, if he hasn't already, that there is a crying need for a c.w. DX man in Mexico. You'd be surprised how many Europeans need Zone 6 for WA, and we're sure that A1 is just the one to fix 'em up! He tells us that TI2ES, Edgar Solano, should now be operating as TI9ES on Cocos Is. on both phone and c.w. on 7 and 14 mc.

W3EPV has worked VQ6N in British Somaliland, and XE1AC worked I5ZC in Italian Somaliland on phone, both on 14 mc. FP8BX is now active on both 7 and 14 mc, near the low end. EA9AP is exEA9BB and can be found on 14 mc near the low end. Van, W9HUZ, says when his 14 mc beam reflector snapped off he was steered into some nice DX on 3.5 and 7 mc. These bands are really coming into their own again with 14 mc so spotty. With a little more foreign participation, 7 mc should easily take over as the international DX band for the next few years. VP5BH is a steady customer on 7 mc in the Cayman Is., with an occasional visit on 14 mc. VP5BM on Caicos Is. seems to try them all. WØPUE worked ZP2AE on 14 mc phone for a new one.

C9AA has attracted considerable attention of late. We understand that some of his mail has been returned, however, so don't hold your breath too long. KL7PJ worked C3GG who claimed to be on Lyang Island, wherever that may be. Chuck thought he said near Formosa (Taiwan), but we're inclined to think a little salt might be in order here. KL7UM has acquired a 4 element beam from KL7GG, who is leaving for Cairo with CAA.

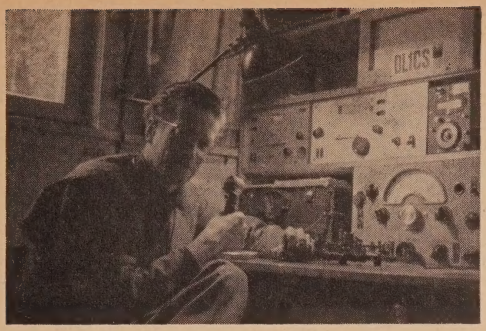
VE4RO would like to see 3.5 mc included in our DX Contest next Fall. With 28 mc almost gone, we may have to do this, George. DL1FF has moved into a new spot a short distance away, and now sports three Vee beams. Armin has an 18 tube double-conversion super with pre-selector and plans a Q-fiver soon. Judging from his signal in the recent ARRL contest, those beams really made a difference. G6RH will be moving back to Kent soon. Bob is anxious to locate Bill Crook, WØOZW, who was operating in KS6 a few years ago. Can anyone help him?

From the column of Art Milne, 62MI, we lift the following: Ken Smethurst, exMP4BAD and now G3GPE, will have some more MP4 cards available to finish the job of QSLing . . . . SU1MR is in the hospital . . . . TA3XOX is genuine, according to TA3FAS . . . . TA3GVU will be going home shortly . . . . G5FA reports working MP4BAM on 7 mc who gives his QTH as P.D.Q. % P.C.L., Bahrein Island . . . ST2TC may be found from 7010 to 7015 around 1930 GMT . . . . VS7KR has returned to G-land. QTH as per usual.

W2SHZ has a novel idea. He suggests that we run a list of all countries that W1FH has *not* worked, so that he and others can see if they have worked something that Charlie has not. From the way it looks here, this possibility is quite remote. If it is of any help, however, we can say that the country list contains 24 countries that have never been on the air since the war, to the best



HK1DZ, well-known on 10 and 20 phone. The big rig ends up with p.p. 813's, modulated by 811's. Receivers are 75A-1 and HQ-129.



Still another man with two receivers, DL1CS.

of our knowledge. By doing a bit of subtraction, it looks like there have been a total of 244 possible since the war, including Saarland and the split up of Amsterdam Is. and Kerguelen Is., which are not yet reflected in the published totals. Generally speaking, if you have worked YA, ZC2, Crete, Kerguelen, Nepal, CR8, Rio de Oro, Sikkim, Svalbard or Yemen, you are among the fortunate few, and to a lesser degree the same applies to Albania, Andaman Is., and Fr. Togoland. Speaking of Albania, does anyone know who ZA2AA really was, or in which country he was actually located? Some one in Switzerland must know.

Jack Spall, exVE8AS, has left White Horse and is now VE3AGP. W9ESQ sends along a nice list of European and African stations worked on 7 mc recently, adding more proof that this is the band. 4X4RE is giving 3.5 and 7 mc a whirl these days, so keep an eye open for him. CN8EP is state-side WØBAI. You'll find him on 14 mc phone and c.w. and occasionally on 28 mc phone when conditions permit. According to W6NTR, ZS3K is looking for Wyo., Ariz., Utah, Idaho and Montana; he is active on 3.5 and 7 mc, particularly on Sundays at 0400 to 0600 GMT, which seems to be the best time for W's. QSL's 100% too! KS4AC has QRT and will again be heard as W5HDF. W1RAN sends along some QTH's.... thanks. During a hurricane, W1AFZ lost his 5 element beam which reposed on top of an 80 foot pole. Proving that necessity is still the mother of invention, Dick wound up with a somewhat novel approach to the antenna problem, namely a pair of skis as a boom, mounted on the chimney!

One of our recent QTH columns gave W6AGS as the QSL medium for FK8AH. Just where this originated is somewhat of a mystery at this date. To clarify the situation, W6AGS hastens to inform us that "tain't so". He rather suspects that W6DFY might be at the bottom of all this, and if so, it would be well for George to go underground for a while. Needless to say, the FK8 cards have arrived en masse. You will perhaps recall that FK8AH is the son of FK8AD, deceased, and is employed as a ground radio operator by the French Colonial Government at Tontouta D'Aerdrome. AGS knows him well, having visited New Caledonia frequently in connection with Pan American installations. The correct QTH will be found in the usual spot.

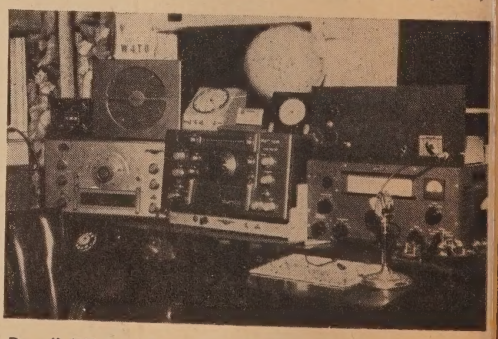
W6AM received an interesting card and set of snapshots from VP8AR, South Georgia, showing not only his station there, but views of the whaling operations for which this area is famous. Too bad that the photos were not suitable for reproduction. We hear via the grapevine from KH6BA that VR1F has left the Island. A couple of FG8's recently appeared, 8AB and 8OA, to be specific. So far they seem rather heavy on the underground and a little light on the background. In a word, we ain'tacountinem yet. W3EVW is coming along very nicely with his phone totals. From what we hear, it looks like Roger lost his key. How about that?

From the Southern California DX Club Bulletin, we lift the following: DL4QH says that there are no stations licensed in AR8, but that the government has given verbal consent to three stations to operate. A late letter from AR8AB stated that he was the only station on the air at that time with the verbal consent. Dunno what good all of this really does us when it looks like we can't count AR8 QSO's after December 21, 1950, and should not be working them according to the FCC. This whole business still sounds like a misunderstanding to many of us, but must be abided by at the moment. W6SYG has been hot after VR6AB since hearing that two CE stations had recently worked him. An answer to a letter to VR6AB leaves Frank cold as a TF3. The VR6 apparently has not enough equipment to throw a station on the air. Wonder who it was signing VR6AB . . . . will it never stop? OY3IGO made more of the West Coast gang happy, and even sent cards . . . . with a genuine signature!!

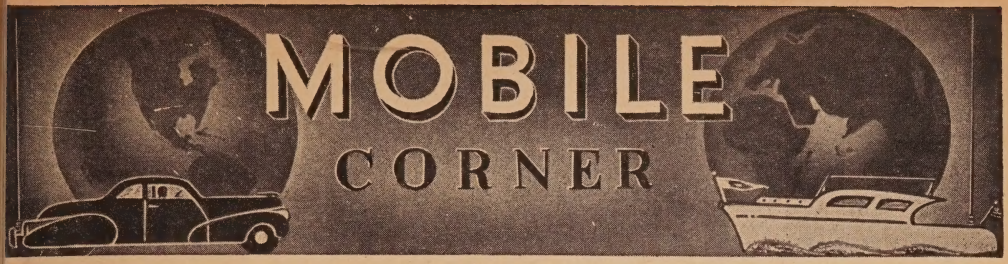
DL4FS mentions that most of the boys there have sent their equipment home due to the uncertainty of conditions . . . . not DX either. This should explain the late scarcity of DL4 signals. Another vague possibility to chalk up on the future list might be a joint trip to HV by DL4FS and 4QH. It's still in the planning stage, so don't hound 'em to death asking about it . . . . we'll all be notified in good time if it can be done.

Reviewing last month's blurb brings back this RST 519 business. Bill Orr probably didn't realize

(Continued on page 63)

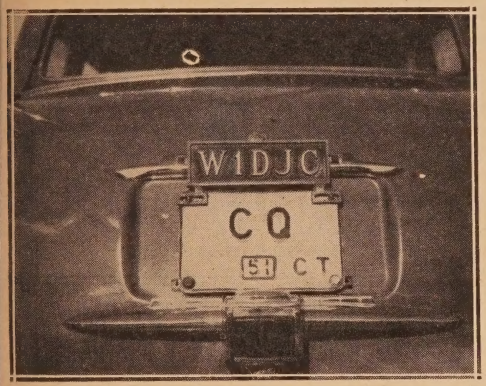


Do all DX men have two receivers? Here's the operating position at W4TO.



Conducted by RALPH V. ANDERSON, W3NL*

SOME HAMS have really been busy, judging by the number of State legislative bodies putting through amateur call automobile license plates. Florida, Georgia, Mississippi, Louisiana, Arkansas and Tennessee now have such plates. The Chicago mobile club reports favorable action there. Maryland, Minnesota, Wisconsin and Iowa have each made considerable progress. Hams in other states are also pushing. Indiana possibly may not authorize the plates due to an economy bill providing one plate only.



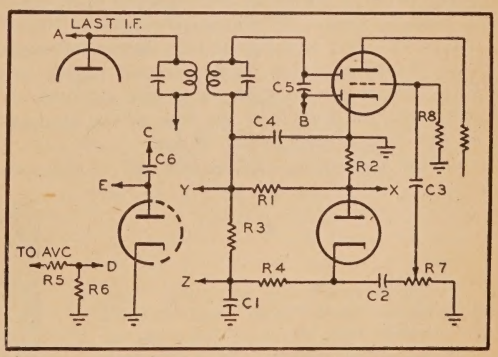
CQ was born about six years ago, but Fred Edwards started his free advertising for us six years before that. Mobile on 10, W1DJC is a member of the Manchester, Conn., CD system.

Noise Limiters

Possibly the greatest factor in the reduction of noise is the receive noise-limiter, since this is the only "control" over the other fellow's ignition noise. One type is used preponderantly since it is shown in all editions of both the Radio Handbook and Radio Amateur Handbook, is used in many war surplus receivers and is available commercially. Yet many amateurs have difficulty getting it to "clip" properly. An investigation of some of these "impossible" cases indicates that a great deal of difficulty comes from handling the automatic volume control in connection with the noise-limiter. The commercial version has internal connections for the a.v.c. and if the exact circuit for the second detector as recommended by the manufacturer is used, no trouble will be experienced. If the noise-limiter is an extra diode tube installed in the receiver, one section can be used for a.v.c. and the other section for the noise-limiter. It is highly recommended that the a.v.c. voltage be obtained from the plate of the IF tube preceding the second detector, thus separating the two circuits completely (Connections AC and DE). An alternative to this circuit is Connection DB, where the second diode of the second detector tube is used for rectification of the a.v.c. voltage. If sufficient space is not available in the receiver for the extra tube, an extra diode can be provided by changing the second detector to a 6T8 type tube; a.v.c. can be obtained from points X, Y, or Z. Each of these three connections have been observed in various commercial equipments—several X, a few Y, and only one Z. Try each of these and use the best one.

From our experiences little benefit is to be derived from "juggling" resistance values. R1-R2 and R3-R4 were replaced with potentiometers of various values and a number of tests were made.

(Continued on page 61)



Basic circuit of the most popular mobile receiver noise limiter.

R1, R2—250,000 ohms, 1/4 w
R3, R4—1 meg., 1/4 w
R5, R6—1 to 2 meg., 1/4 w
R7—Volume Control
R8—10 meg., 1/4 w
C1, C2, C3—.01 μf, 200 v
C4—100 to 250 μμf
C5, C6—25 to 50 μμf
Without separate diode: Connect D to B, X, Y or Z.
With separate diode: to C.

** Send contributions to R. V. Anderson, 2509 32nd St., S. E., Washington 20, D. C.*

The Monitoring Post

gleaned by THE BRASSPOUNDER

W3QFH REPLIES TO THE QUERY in the Lawton-Ft. Sill ARC bulletin: "Are there any amateurs in Deleware?" QFH writes: "There sure are, and I'm proud to say I am one of them. In Dover alone there are five, *W3QQV* on 10 phone and 40 cw; *MCD* on 40 and 80; *GUS* on 2, and 40 and 80 cw; *OPB* on 40 cw, and *QFH* on 10 phone week-ends, and 40 cw and 160 phone every night of the week. And as it appears that the gang need QSLs from Delaware for WAS, why don't they return the courtesy of QSLing? I need Oklahoma for WAS! I'm ready and willing to sked any of the gang on either 10 or 40 to help them make WAS. Just let me know and I'll be happy to work with them, and also to QSL. And the only reason Janie, the XYL, has not obtained her ham ticket is because we have a month-old YL here, Melodie Lark. But the ticket will be in use in the very near future and we are ready, willing and able to help all who need Delaware for WAS." QFH adds, "I would like particularly to get in touch with Les Schorn, out there in Tulsa, and some of the guys who remember W2ZTU—that was our old call, and we'd like to QSO some of our old buddies on 10." There is the answer to the Delaware query. QFH is letting himself in for some busy times on the air, but is willing to help all those needing Delaware QSLs.

VE8SF is in Hudson Strait, N.W.T., and QSLs but once a year—when the mailman pays him an annual visit. . . . *VE2CA* will forward your QSLs to him. . . . R9 and R9 plus are the reports *W9NN* enjoys on 7 and 14 mc since installing his Premax vertical antenna; four buried ground radials and buried RG-9-U coax cable, with lead cable to operate relay in the box at the base of the antenna; 33 feet long, overall height 41 feet. . . . *W1THX*, Fairfield University ARA, is the call of this new ham club with a very ambitious program; training for ham licenses, AREC and CD affiliation experiments on radio-astronomy, building and operating several UHF sources in addition to the present lab generator on 2450 mc; *W1NOA* is the first op at the station and promises QSL cards to all contacting W1THX.

W1MWC is a very busy fellow on 80 . . . he says he answers CQs to let the fellow know he is being heard, further explaining that he knows what it is to CQ, receive no calls, and then wonder whether his signals are getting out or not . . . "The Atlanta Ham" reports that henceforth automobile license tags with call letters will be issued to those Georgia hams desiring them; special applications will be used, and sheriffs of each county will be furnished with a list of such car owners so that in emergency he may call on hams for communications. . . . The 1951 hamfest of the Atlanta RC will be held on Sunday, June 10, at Robinson's Tropical Gardens, Paces Ferry Rd. at the river bridge; prizes galore and a swell meal will be served.

W1GOF, W3IGS, W4PL, W9OII and *EAM* and *WØJVR* put out some of the good signals that have been heard recently . . . Birthday congrats to *W1KZA, W1OS,* and *WØJVR*. . . . The Faye Emerson TV show brought some of the N.Y.C. CD hams into action; *W3IUC* and *W2MGE* were interviewed on the set where *W2AVA/2* was set up for portable operation at the studio; in mobiles, scattered around the city were *W2ZCS, RVY, EFA, YOO, DLP,* and *K2AR*, with *W2OUT* handling preparations for the show; it was a swell opportunity to show the public that TVI is not the only thing the hams contribute to American life.

(Continued on page 67)



There's an old ham saying that "They always come back," and W4AKJ proves that it's true. Once one of the old reliables on 80 and 40 meters in the '30's, military service and then raising a family kept him QRL for a long stretch. But he's back, with a remotely controlled kw, and we see he's getting his youngest Jr. op. (Carol, aged 2) off to a proper start.



Conducted by LOUISA B. SANDO, W5RZJ*

WITH THE MANY severe snow and ice storms across the country this past winter and the resulting emergencies, ham networks have had plenty of practice. Two YLs, at least, were active in this work, and no doubt there were many more. W5LGY, Helen Douglas, and W5SGR, Ruth Erickson, are the only two YLs in the 36-member Northeast Texas Emergency Net that meets on 3940. Both had a nice write-up in the Commerce (Tex.) *Daily Journal* following an ice storm in mid-February. With all telephone and telegraph lines down, W5LGY got on to handle personal messages, AP stories and highway department reports. Her own beam was downed by ice, but Helen strung up an emergency antenna.

Also during the ice storm W5SGR handled traffic for Western Union, civilians, and the railroad, among other things helping to locate an MKT freight train that in the snarled communications had become "missing."

From W7IDZ we received a clipping from the Lewiston (Wash.) *Tribune* of an FB write-up of ham activities in the Lewiston-Clarkston area. Emphasizing particularly their emergency communications network which has aided in floods and in searches for lost planes, it also contained a nice story and photo of *W7OOV*, Lou Liddiard.

New Book Features YLs

From *W2OLB*, Amelia, we hear that she has a book, "Kay Everett Calls CQ," being published. It's a fiction-adventure story, but there are several real YLs who are characters in the book—W7GUQ, Betty Fine, and W3VYU, Terry Korn. Entertaining for any girl interested in radio, it was written especially for teen-agers and is a selection of the Junior Literary Guild. The Vanguard Press in N.Y.C. is publishing "Kay," and copies should be available by the middle of April.

On the personal side Amelia adds, "Besides the book and caring for the Jr. op, the only other point of interest is a recent trip Norm and I took to the Virgin Islands. We flew down to St. Thomas, stopping off at Puerto Rico on the way back."

Also from N.Y.C. we hear from *W2OWL*, Ruth, that the N.Y.C. YLRL held their annual luncheon on Feb. 17th at the Charles French Restaurant, with fifteen members turning out despite a miserable rainy day. All had a good time and were especially pleased with the individual gifts from W2RAQ of beautiful flowers she had made by hand. New officers for the club are: President, W2QWL, Mignon Rosenfeld; vice-president, W2TBU, Kit Zionson; secretary, W2RAQ, Catherine McFadden, and treasurer, Helen Zuparn, SWL.

Albuquerque (N.M.) YLs

Practically our first endeavor on changing QTH to Albuquerque was to look up the local YLs. First on the list was W5IGO, Thelma Ferguson, earlier. Timing turned out to be perfect, for the for she had handled traffic for us some months very day we called her she had just returned from a two-month visit back home in Oklahoma to help "launch" her newest grandchild. Mother of two and grandmother of two, one would never guess it. Petite, pert and attractive, Thelma is a live-wire—holding a fulltime job at Sandia Base, keeping house, and much of the time being active in the traffic nets.

W5IGO is strictly a c.w. gal—in fact, her rig doesn't even have a modulator. Her station, built by W5JXO, is a neat rack and panel job with a Collins oscillator into a 250-watt final, and a BC-348O receiver. Working almost exclusively 80 c.w., she checks in on the Oklahoma Traffic Net and the New Mexico Net, often spending the entire evening handling traffic.

It was strictly curiosity that got Thelma started—she just "wanted to know what was going on" when she heard c.w. No urging from the OM either for, though he's worked many years at radio and is now a TV serviceman, he's never cared about getting on the air. After getting her ticket in '39 at Lawton, Okla., W5IGO joined AARS, and gained so much from the practice that when World War II started she went to work at Fort Sill as a radioteletype operator. So like the drills was the work that she sat down and started copying without even an hour's instruction. Transferring to Sandia Base two and a half years ago, Thelma still works for the Army as a teletype operator. Now she's glad to see MARS opened to civilians so she can join; she knows from her own experience that both the hams and the military benefit from the drills.

We soon learned of and visited another YL recently come to Albuquerque. Another attractive Oklahoman, a live-wire and bubbling with friendliness, she also works at Sandia Base—W5PKL, "Billie" Braffett. Billie and her OM, W5NSN,

** Address all correspondence to 216 North Pine Street, Albuquerque, New Mexico.*

moved to Albuquerque from Childress, Texas, where he spent a couple of years as KCTX transmitter engineer. It was at Childress that Billie got her ham ticket after studying code at Port Arthur earlier. Seems the OM was attending Port Arthur College and during this time they did all their living in one small room. W5NSN then was on 40 c.w. only and Billie, becoming frantic at constantly listening to dits and dahs and not knowing what was being said, decided she just had to find out what it was all about. Instead of getting help from her OM she went to the college and traded two hours of her time grading papers each a.m. for two hours of code practice and typing each afternoon! A good way to learn, but rough, too—the only girl in the class and code banging away at her for two hours straight each day.

Now W5NSN works 75 and 10 phone, fixed and mobile, so Billie no longer has to wonder, or copy, what he's saying. Now her concern, unlike most of us, is not over passing her Class A but her Class B exam, for at Childress she was far enough from an examining point to hold a Class C ticket.

The only other YL we've located here is WØPOI, Frances Fletcher. Formerly from Kansas, her OM works at Sandia Base, but Frances has not been active or had her call changed.

Friendship Award

Albuquerque these days is like one big hamfest. Between Sandia Base, Kirtland Field, Veterans Hospital, and the natural attractions of the country and climate, there are more hams from all districts gathered in this area than one might find even at a national convention. A mighty friendly group they are, too. And to help promote friendliness and personal acquaintance the Sandia Base Radio Club offers a Friendship Award in the form of an attractive certificate. For Albuquerque hams, contacts with 25 other Albuquerque hams are required, and the QSOs followed up with a personal visit to get signatures—and become better acquainted! For each additional 25 contacts and confirmations an endorsement is given to the award. Any non-Albuquerque interested in getting the Friendship Award may obtain it upon completing QSOs with 25 Albuquerque hams and submitting QSLs as confirmations. There are plenty of possibilities; a recent check showed over 225 hams in the area. Only QSOs after July 1, 1950, may be counted. Send your list and QSLs to the Sandia Base Radio Club secretary, W5FPB, E. H. Morterud, 2717 N. Jackson St., Albuquerque, New Mexico.

YL of the Month

To round out our "New Mexico column" (seems to be very nearly that!) for YL of the Month we'll tell you about the 5th District YLRL Chairman, W5DRA, Yetive Matthias, of State College, New Mexico.

"Teev" got into radio on her own, with no urging or help from an OM. Graduating from high school during the depression and unable to go to college, she worked for a couple of years. Then, feeling the need of more schooling, she decided to attend her local technical school where she took radio courses (having become interested while studying physics in high school) from 8 to 3, and business courses from 3 to 5. "My two sisters were taking beauty courses," says Teev, "and none of the family could quite understand my interest in radio. Actually, I think in my subconscious I was trying to impress my Dad. He, *I thought,* had had three disappointments (three girls) before his son finally arrived—funny how when you're a kid you can get notions like that!"

While Teev was attending the radio school they decided to hold night classes for anyone interested in studying for an amateur license. Having only a hazy idea of what ham radio was about—after calling one CQ from the school ham station—Teev hesitated about signing up. "At that point," she says, "a little fat boy in the class who was always teasing me said, 'Oh, she would never learn the code.' That did it! There were 40 in the class and I don't know how many got their tickets, but that was how *we* got W5DRA."

What strange influences get some of us into ham radio—in Teev's case, first because she wasn't a boy, and secondly because of a boy's teasing!



W5DRA, Yetive Mathias, YL of the Month.

Teev continues, "Here's something you might get a kick out of—my first rig, built right after I got my ticket in March '33. I wound the transformers down at the radio school, gathered up some junk parts from discarded BC sets, and on an old ironing board Mother had discarded strung out a 40 c.w. rig 'bread-board,' or should I say 'ironing-board', style. The receiver was an old Majestic BC set with converter, and the station was located in the basement between the furnace and the coal bin. Just checked the old log and see that I had 32 contacts before a transformer went up in smoke!"

About a year later Teev was driving along White Oak Drive in Houston one night when she saw an old Model A with W5CFX on the tire cover. She called him in code but her old Pontiac horn was too bloopie for c.w. so they both pulled over to continue the QSO in person. It was then W5CFX (original call was W5BIW which he got back when they moved to New Mexico) discovered she was a YL. To complete the happy ending, they were married a couple of years later in San Antonio.

(Continued on page 00)



Conducted by E. M. BROWN, W2PAU*

METEOROLOGICALLY SPEAKING, March is supposed to come in like a lion and go out like a lamb. Activity on the v.h.f. bands during the month, however, has a tendency to do just about the opposite! The advent of the warm breezes of spring herald the approach of the DX season on the higher frequencies, and the six-meter sporadic E season usually is not far behind. The DX specialists are coming out of their winter hibernation and starting to repair damages wrought by the winds and the ice of one of the worst seasons on record. In all parts of the country new "super-gain" antennas are taking to the air. Looks to us as though the gang will be ready and waiting for those early openings!

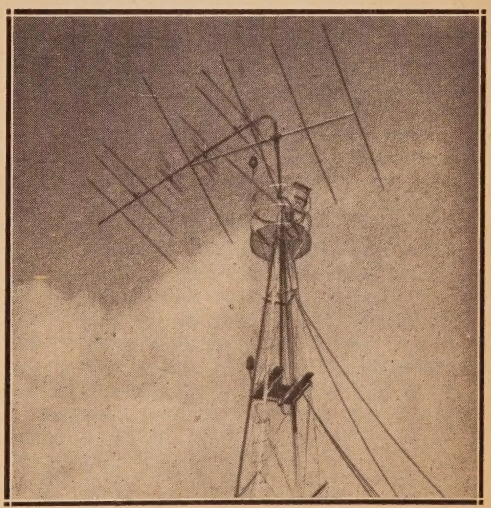
The six-meter band was full of surprises during the past month. Although it was supposedly quite late in the season for auroral openings and too early for extensive sporadic E, and though the sunspot cycle indicated that F-2 DX was out of the question, the devotees of the six-meter band proceeded to demonstrate that despite the theory, they could work plenty of DX via each of these modes of propagation! For example: HC2OT reports that the band was open for 2000-mile-plus contracts on March 3, 11, 15, 17, 21, 23, 24, and 25! Auroral openings in the north central part of the continent provided many opportunities for interesting QSOs, and permitted extensive records of this phenomena to be made by the research workers at Cornell University who have been utilizing ham signals for studying auroral propagation. Sporadic E was reported frequently, with at least one case suspiciously resembling double-hop propagation across the southern section of the country reported of the 16th. More details later.....

The two-meter band also opened up for long-range work during March, and on at least one occasion, near-record distances were reported. The VHF News for March, 1951, carries the story that during one early-March opening, W5VY and W5QNS were heard and worked by stations in the Peoria, Illinois area, a distance of over 900 miles! Auroral effects were also felt on the two-meter band, as far south as Falls Church, Virginia. W4AO was heard by VE3ANY on the 14th—a hop of approximately 350 miles.

More on Civil Defense

Civil Defense activity is on the up-swing. As if in answer to our plea for commercial equipment suitable for use on the two-meter band, a number of manufacturers have invaded the market with products designed specifically to meet the increased demand for efficient v.h.f. mobile gear. It remains to be seen how well it will solve the problems which have thus far confronted the v.h.f. mobile workers.

Judging from the specifications, some of the new designs should be just what the Doctor ordered —reasonable transmitter output and good receiver front-end line-up. But some of the ads which have appeared recently describing equipment as "suitable for v.h.f. CD use" should certainly be taken with a grain of salt. We wish to repeat our oft-expressed contention that it is not possible to do a *good* job of car-to-car mobile communications



Typical of the damage wrought by the recent ice storm in the Gulf States is this sad shot of W5ONS's tower on the morning after . . . The stacked 3-element six meter array, the 10-element two meter job and the 220 mc Yagi are all set for contacts with high-flying aircraft! During the storm the ice built up to almost 3-inch diameter on the beam elements.

** Associate Editor, CQ. Send all contributions to E. M. Brown, W2PAU, 88 Emerald Avenue, Westmont, Collingswood 7, New Jersey*

on the v.h.f. bands without reasonable transmitter output, good receiver sensitivity, and an antenna with some power gain over a simple ¼ wave whip. Tests made between mobile stations and well-equipped fixed stations are no criterion of what might be encountered in working from car to car. The ad writers should include the *facts* in their sales blurbs—such facts as transmitter power *output* on the band in question, percentage modulation capability, receiver bandwidth specifications, noise figure of the receiver front end, receiver audio power output, image and other spurious response data, etc. From these facts any technically-minded individual with a little experience in v.h.f. mobile communications should be able to decide whether the equipment can do the required job. We press this point because there is at this time a grave danger that inexperienced personnel working with some of the makeshift equipment currently being sold as "suitable for use on the v.h.f. bands" will obtain such poor results that they will then condemn these frequencies as being unable to handle the assignment. It has happened in the past.....

G2XC on VHF Activity

Despite the optimistic tone of the earlier paragraphs of this column we might as well admit that the v.h.f. bands could tolerate a little more activity! We have received several letters complaining that activity is far below the level that might be expected, considering the number of stations equipped to operate on these bands. This complaint is apparently not limited to any particular geographical location. A recent discussion of the activity problem by G2XC in his "VHF Bands" column in Short Wave Magazine seems so appropriate that we quote, verbatim:

"It is difficult to decide what is the answer to the inactivity problem. Some have suggested activity week-ends or nights. Such periods met with a measure of success on five metres some years ago, but what we really require is not just more activity on one week-end, but consistently night by night. The Contest entry showed that somewhat over 200 two-metre stations can be active at times. These are spread over the whole country, although London and the South account for about three-quarters of the total. A little thought will show that this number of stations can never provide a consistently high level of activity, for even assuming none of these 200 work on other bands, and that they never build new equipment, domestic responsibilities and other interests obviously set a limit to the time available at each individual station. The answer to the problem would appear, therefore, to be not so much an increase in the activity of the 200 existing VHF operators (desirable as that may be) but rather an increase in the number of stations equipped and interested in VHF band working, and your conductor suggests that our efforts should be directed to that end. If everyone of us persuaded just one more station to come on Two, the improvement would be noticeable.

"In the meantime, come on the bands as often as you can. If everyone who writes to us grumbling about low activity was genuinely active himself much of the cause of the grumbling would have been removed! When newcomers arrive on the band, make them welcome and do what you can to encourage them to stay on VHF. If conditions happen to be poor at the time, give them a hint of the exciting things that can and do happen every now and again. Complaints are made from time to time that the old-timers on 2 metres only want one contact with a newcomer and then refuse to answer any further calls from him. Such complaints are usually unjustified, but undoubtedly something of the sort does happen and they do not encourage the inexperienced operator to continue on the band. If we all endeavor to maintain local activity and interest, then when the band does open for DX there will be many to take advantage of it."

Six-Meter Conditions During March

The first few days of the month were relatively quiet, except for scattered openings on the South American continent. On the 8th, an auroral opening developed over the northeastern section of the country, during the early evening hours. VE3AET reported W8NQD; W2QGP copied the beacon transmitter VE9RB for almost an hour from 5 to 6 p.m. W2ZGP, at Cornell University, worked VE3AET and W1HDQ. Ken was also on the job the following evening, when another aurora session broke at about 5:30 p.m. W8NQD noticed the opening at about 6:45 (e.s.t.) as W9VPZ broke through with the characteristic auroral effects. W2ZGP and VE3AET were also heard. VE3AET caught W8ECU, W9VPZ, W4RBK, W2ZGP and W1CK. W1HDQ was also heard as late as 9:30 p.m. (e.s.t.) W2ZGP stuck around until the wee small hours of the 10th and logged the beacon station, VE9RB, until 3:15 a.m.! (Greater love hath no man.....)

Although there were a few hints of possible intercontinental DX on the 10th, no QSOs were reported to date. However, on the 11th HC20T found the band open to the States, and worked several of the W4s and W5s, during the afternoon hours. Signals were exceptionally strong. The band was also open later in the same day in South America, with contacts between LUs and OAs reported.

On the 13th, another fairly solid auroral opening was experienced, with most of the "aurora regulars" active. W2ZDG was busy again with his oscillograph and camera! From W1PWW in Maine to W9NJT and W9VZP in Wisconsin, the Northern Lights provided plenty of action on the six meter band. There were also a few reports which indicate that there might have been a sporadic-E opening up and down the Atlantic seaboard at the same time the aurora session was in progress. The following evening produced almost a repeat performance, but more of the gang were alerted after the frequent openings of the previous few days. Literally dozens of stations were active during this opening, and during the early evening

hours the low end of the six meter band sounded more like 80 c.w. (except for the fuzzy auroral notes!) The aurora effects were also noted on 144 mc by VE3ANY, W4AQ, W9UCH and VE3RM.

On the 16th the band opened across the southern part of the United States. W5FXN heard W4FNR on his mobile receiver while he was driving home from work. After QSOing W4FNR, Jim tuned the band and found W6OB and W6AWY coming through. An attempt was made to hook up the W6s and W4s to no avail. Meanwhile the band had been open in South America for several hours. Around 5 p.m. the good conditions seemed somehow to overlap, and the W5s and W6s were treated to a first-class opening into LU-land. W6OB worked LU5BM, LU6DO and LU8BQ. W5AJG's new beacon transmitter was heard continuously for about an hour in Buenos Aires. The short skip which had been observed earlier persisted throughout this opening until about 2200 e.s.t.

The 17th found the band again open across the South American continent, and around 3 p.m. W4FNR heard and worked HC2OT for almost an hour.

On the 18th during the afternoon, the West Coast gang were treated to a sporadic E opening during which W6GCG caught VE7DU, W7KGQ and VE7NM. During the same period XE1GE worked LU5CK.

The reports as we approach our deadline are incomplete, but they show that the band was again open between the W5s and LUs on the 24th. HC2OT also reported Stateside contacts on the 24th..... Aurora was reported in the Northeast on the 22nd..... You guys who have given up six meter operating lately have sure missed a good bet!

HC2OT is QRT

On the 27th of March one of the outstanding six-meter stations of our time pulled the big switch. Steve, HC2OT, is returning to the States after his long sojourn in South America. During his stay there, Steve provided many thrills for the six-meter operators of both continents, who could be certain that if good conditions prevailed to Equador, Steve would be on hand to take advantage of them. HC2OT founded the honorable fraternity of the "Tropical Tramps"—six-meter operators whose signals had crossed the equator and been received successfully in the city of Guayaquil by "Texas Steve". To date, 144 of the TT certificates have been issued by HC2OT. The last and one of the most deserving of the Tramps was W4MS, who had the rare misfortune to miss HC2OT on every opening until that of March 24. Eddie finally broke the jinx, and is now a full-fledged Tropical Tramp. (Incidentally, W5SNT earned the distinction of being Tramp #140. Since this call is not listed in the latest Call Book, the certificate has not yet been mailed. If W5SNT will communicae with the RASO Office at 121 S. Broad St., Phila., Pa., this condition will be rectified). HC2OT wishes to express his sincere thanks to the many six-meter operators who made his operations on this band so pleasant and successful. He also deeply regrets the fact that he missed some of the stations who have called him during the many busy band openings in which he participated.

A New Beacon Transmitter

A newcomer to the beacon business is W5CXS, of Brownsville, Texas. Operating on 50.016, and running an input of 15 watts, W5CXS is currently operating from 0900 to 1300 e.s.t. and from 1700 to approximately 2100 e.s.t. every day. On weekends this schedule may be stretched a bit. Identified by the coding W5CXS . . . followed by a long dash, this station is sure to be spotted frequently. On the 24th of March, HC2OT reported hearing this beacon.

California VHF Contest Winner

W6MVK has announced the winners of his VHF Contests. (See VHF Column for CQ, September, 1950 for the announcement of the contest.) The VHF Mileage Marathon was won



The winners of the Calfornia VHF contest receiving their awards from the contest sponsor, W6MVK. Reading left to right: W6IHK, Expedition award winner; W6MVK; W6BYE, Mileage Marathon winner, W6HZ, L.A. Section Activity champion and W6MJ, Secretary of the Two Meter and Down Club with the trophies for the other section winners.

by W6BYE of San Diego, who accumulated a total of 8070 miles in contacts with stations on two meters during the 4 month contest period. By the rules of the contest, a station could be counted as a contest contact only once during the entire four-month period. Second place was taken by our associate Frank Jones, W6AJF, of Sonoma, with 4235 miles. W6AJF was the only entry to take advantage of the generous multiplier allowed for operation on the bands above two meters. Third place was won by W6HBM of Chico with 4119 miles.

The activity awards, to the individuals in each of the California ARRL sections who worked the greatest number of stations on bands from 144 mc up during the contest period, were won by the

following stations: W6HZ, Los Angeles section; W6BYE, San Diego; W6EHX, San Joaquin Valley; W6UAO, Sacramento valley; W6MHF, San Francisco; W6AJF, East Bay; and W6ZYH of Santa Clara.

The award to the "Expedition Station" making the longest distance single two-way contact with a fixed station was won by W6IHK/6 who, using a portable set-up atop Mount Wilson, contacted the Santa Clara area over a distance of approximately 300 miles.

This was the first running of the contest, and most of the gang feel that there will be an even bigger turn-out next season. The sponsor of the contest, W6MVK, has his own big v.h.f. news release. Tom is moving to new quarters near Pamona. Insulated by plenty of distance from the nearest case of potential TVI, in a location where the TV signals run on the order of 20,000 μV/m, and with a full acre available for an antenna farm, Tom has plans for a v.h.f. DX factory that should make headlines next summer. Best of luck, Tom, and we certainly hope that all your dreams materialize!

Miscellany

W2TBD and W2UDD lost their antennas in the 70-m.p.h. winds that swept the Buffalo, N. Y. area on the 24th of March. W2TBD got his back up during the evening of the 27th, sparked by the rumor that the band was open to Syracuse! Norm, W2UDD, is taking the opportunity to convert his old faithful square corner reffector job into a 15-element affair—three stacked five-element Yagis—similar to W2TBD's. Apparently the reports from VE3LU that Norm's signals faded worse than Tom's convinced him!

W4FNR reports that during the six-meter opening of February 25th, the signals from HC2OT were so strong that a clip lead from the converter antenna post to an old whip antenna lying on the floor brought Steve's signals in with plenty of sock! Ab now claims five countries on six meters.

From Port Neches, Texas, John Naff reports a bang up two-meter opening on the 21st of March, during which W5DCV of Austin was coming in like a local. W5DCV also worked W5MPK that evening—approximately 400 miles. By the way, W5DCV is also State Coordinator for Civil Defense for Texas. Since he is a two-meter specialist it is a pretty good bet that the v.h.f. bands figure heavily in the CD planning in that part of the country.

W5NLP tells us that he and W5JTI have been working hard on a C.A.P. v.h.f. net for the State of Mississippi. Experiences with QRM and propagation pranks on the lower bands during the recent ice storm and other emergencies have demonstrated that for disaster work the v.h.f. bands are hard to beat. Well over 100 active stations are participating in this net, and most of them are using elaborate multi-element antenna arrays. With such equipment, consistent day-in day out contacts are possible over distances close to 200 miles.

For a while it seemed as though W8WXV (co-holder with W5VY of the present 1200-mile two-meter DX record) had done it again. It was reported that W8WXV had been received by G5YS! Upon checking up on the story, it was discovered that W8WXV had apparently strayed off the straight and narrow—he was heard in England on 160 meters! We understand that Al, the regular operator of W8WXV, has heeded his country's call and is serving a hitch in the Army—however, his station is being kept active for him by a friend. (Under these circumstances we'll forgive you, Al, for getting so far away from the v.h.f. bands!)

The hams in Springfield, Mass. have to contend with an almost intolerable TVI situation, according to W1CGY. Clarke claims that the situation is complicated by the fact that in the Springfield area, FM broadcast reception is very popular. The only good TV signal available is on channel 6, many of the FM receivers have the local oscillator tuned on the low side of the signal, 97 mc minus 10.7 mc = TVI = letters to the Editor and trouble for the hams!

W8NQD has created a six-meter monitoring receiver from a Pilot FM tuner. By changing the coils in the tuner front end, it was an easy matter to change the tuning range from the FM band to the six-meter band. The "ratio detector" FM discriminator is a cinch to modify to a straight AM detector. By the addition of an audio amplifier and a small speaker, Tom now has a receiver which will cover about 200kc bandwidth. When tuned to the low-frequency end of the band this system is ideal for monitoring local activity or spotting band openings.

The W9MBL Beacon

The 50 mc beacon transmitter (pictured in the v.h.f. column in CQ for April, 1951) has proved its reliability throughout the past six months by providing a signal on 50.1 mc better than 12 hours per day. The design on this rig is worthy of note, for, despite its apparent simplicity, the rig contains features which could well be duplicated by those who desire a simple six-meter job with reasonable power output, which can be operated in TV-infested areas with a minimum of trouble.

The r.f. line-up of the rig consists of a regenerative overtone crystal oscillator using ½ of a 6J6. The crystal employed in the beacon rig is an 8 mc fundamental cut unit (marked 8350) but in this oscillator it actually operates on an overtone so that the lowest frequency developed by the oscillator is 25.05 mc. (See QST for April, 1951, page 56 "Overtone Crystal Oscillator Circuits" by W1HDQ for a discussion of this type of circuit.) The second half of the 6J6 operates as a doubler, multiplying the frequency to 50.1 mc. The output of the doubler is fed via a low-impedance link and co-ax line to the tuned grid circuit of the 2E26 final amplifier. The 2E26 runs straight through with apparently no need for neutralization. The r.f. stages are completely enclosed in a metal shield box with the tubes, crystal and 2E26 output tank on one side of a chassis

(Continued on page 59)

Monthly DX Predictions

GEORGE JACOBS, W2PAJ*

A MAJOR CHANGE in propagation conditions took place when the sun's center passed the Equator. This occurred at the equinox period of March 21, when day and night were everywhere of equal length. In the Northern Hemisphere, after this date, days become longer than nights, and we enter into what is generally termed as summer propagation conditions. After March 21st, the day time MUF's should begin to decrease towards a minimum, which occurs during the latter part of June. On the other hand, night time MUF's continue their increase towards the summer maximum. Since, as we pass the March 21st equinox, daylight will last longer than darkness, moderately higher frequencies will be useful for considerably longer periods of time. To sum up, during the summer propagation period, generally from March 21st to Sept. 23, full daylight frequencies for most transmission paths will be somewhat lower, with no 10-meter trans-Atlantic openings expected. Twenty-meters will be open for longer periods of time, extending from the early morning to evening hours. During the full darkness period the MUF will be considerably higher than during the winter period, and except for sporadic openings of a noisy and erratic nature, both 40 and 80 Meters may be too far below the MUF to produce any DX signals.

Other characteristics of the summer propagation period in the Northern Hemisphere are an increase in ionosphere absorption factors and an increase in atmospheric noise levels. It is interesting to note that practically all atmospheric radio noise is now considered to have its origin in the lightening flashes associated with thunder storms, and these noises are propagated from their points of origin to a distant receiving point with the same propagation conditions and characteristics that control ordinary radio transmission. These higher noise levels and higher absorption factors tend to make the lower frequencies of 160, 80, and 40 Meters useless for most of the summer propagation period, especially on trans-Atlantic paths.

Conversely, in the Southern Hemisphere, the March 21st equinox marks the passing from summer to winter conditions, characterized by higher daytime MUFs, lower skywave absorption factors and lower noise levels. This accounts for the frequent Northern Hemisphere- Southern Hemisphere openings on 10 Meters when the band is completely closed to Europe.

In addition to the value of MUF varying with the hour of day, the season, and geographic location, the extent of solar activity will also determine the value of MUF. The presence of the various ionized layers is due principally to the action of ultraviolet radiation from the sun. Experimental data indicates that sunspots give a reasonable index of the amount of ultraviolet solar radiation. It should be pointed out that the sunspots themselves do not produce the ultraviolet radiation, but are just a relatively accurate index of the intensity of radiation. The monthly average sunspot numbers follow a long term trend in cycles with an average time interval of 11.1 years between the minima of two consecutive cycles. The last minimum was recorded in late 1943, the maximum in 1947, and the next minimum is expected in 1954. The monthly average sunspot numbers are therefore on the decrease, which indicates increasingly poorer propagation conditions. The Zurich, Switzerland observatory predicts a smooth monthly average of approximately 52 for May. All calculations in this forecast have been derived from basic propagation information appearing in the National Bureau of Standards publication CRPL Series D-782 and corrected for a sunspot count of 52.

The past six month period has been one of the most disturbed periods recorded in many years. Generally during May ionosphere storms are not as prevalent as during the winter months; however at the time of writing, the long range forecast seems to indicate that even May will have some major disurbances.

The following advance forecast for May is based on observations of ionosphere disturbances during March. These disturbances tend to follow a 27-day cycle. Based upon this phenomena and the latest available information at the time of writing, the most likely periods for disturbed propagation conditions are during the early part of the first week when a mild disturbance may produce lower than normal night MUFs, another mild disturbance about May 15th, and during the last week of May a rather severe disturbance is possible, affecting both day and night MUF's.

General Propagation Conditions for May 1951

Europe

With the start of summer propagation conditions characterized by considerably lower daytime MUF's (with the peak MUF bordering on 20 mc, no ten meter trans-Atlantic openings are expected.

Twenty meters is the only band that will permit consistent trans-Atlantic QSO's. This band will open for a longer period in May than it did in

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April. Signals will be heard on the East Coast of North America as early as 0900 GMT. These early morning openings on a good number of days may fade into the noise level about 1230 GMT and then come in strong again when the noise levels decrease after 2000 GMT.

Higher noise levels and increased absorption will make 40 meters very erratic and noisy, with few if any trans-Atlantic openings occurring during May. This will probably be the last month until next fall that we can expect any fair 40 meter openings to Europe.

Eighty meters will be too far below the MUF to permit any DX openings to Europe. This band as well as 160 will not open to Europe again until next fall.

Twenty meters, therefore shapes up as our only DX band to Europe during May.

South America

On the North-South paths the MUF is expected to rise above 28mc, providing us with some DX on the 10 meter band. Signals from Central and South America should first be heard about 1600 local time, and on some days signals may be strong.

Because of the increased hours of daylight, the 20-meter band should be open for a considerable portion of the day. The band should open shortly after sunrise local time with weak to fair signal levels, but as the sun approaches its zenith, absorption increases, and on many days the paths will fade out until a few hours before sunset. Signals will then start coming in again, building up to fairly strong levels and remain so well into the night.

Conditions on 40 meters to South America are expected to be poor, with only occasional openings on very quiet nights.

The 80 meter band is too far below the MUF to expect any DX openings to South America.

Far East

Because of the long distance of the paths, the high attenuation, noise and absorption factors (many of these paths cross the auroral zone), conditions from the Eastern and Central sections to be poor. On some days the 20-meter band may of North America to the Far East are expected open between 1200-1500 GMT, and on very quiet days an all dark path opening may occur on 40 meters between 0900 to 1100 GMT. No 10 or 80 meter activity is expected.

Conditions are more favorable for West Coast QTHs. Some spotty 10-meter openings are expected to occur during 0100 to 0600 GMT. Twenty meters may remain open for a considerable period of each day and some strong signals may be observed. During the dark hours, when ionosphere absorption and noise levels are at a minimum, an occasional 40 meter opening is expected to occur. Best times for these openings are between 0900-1400 GMT. Not much activity can be expected on 80 meter Trans Pacific paths.

Oceania (Australia & New Zealand)

It's the fall season down under, with the MUF rising and noise levels decreasing in that area.

The MUF from North America to the Oceania is expected to rise high enough in May to produce some good 10-meter openings. Conditions on 20 meters are expected to be fair with very strong signals observed on some days.

Conditions on 40 meters are expected to be fair during May. Since in most cases this is an all dark path, atmospheric noise levels and ionospheric absorption are at a minimum. However on may days in May the noise level on 7 mc may be a limiting factor.

In all openings, New Zealand hams will be heard before the Australians, and of course these paths to Oceania favor West Coast locations because of decreased absorption and attenuation on the shorter paths.

Sporadic E usually increases sharply during May and June. On many occasions (at present impossible to predict accurately) communications may be possible up to distances of 1400 miles by sporadic E on frequencies greatly in excess of the predicted MUFs. CRPL data indicates that Northern Hemisphere to Southern Hemisphere opening on frequencies as high as the six meter amateur band may be reached occassionally for a very short time.

We would appreciate your observations and comments. If there is any specific amateur path you would like analyzed in future forecasts let us know about it.

ALL TIMES IN GMT

EAST COAST TO (Centered on Washington, D.C.)	10 METERS	20 METERS	40 METERS	80 METERS
Scandanavia	Nil	1100-2100(0-1) 2100-0000(2-3)	Nil	Nil
Great Britain & Western Europe	Nil	1000-1200(2-3) 1200-2100(1-2) 2100-0000 (3-4)	0100-0400 (0-1)	0100-0400 (0-1)
Balkans	Nil	1000-2200(0-1) 2200-0200(2-3)	Nil	Nil
Central Europe	Nil	0900-1100(2-3) 1100-2000(1-2) 2000-0200(3-4)	2300-0300 (0-1)	Nil

	10 METERS	20 METERS	40 METERS	80 METERS
Southern Europe & North Africa	Nil	0900-1200(2-3) 1200-2100(1-2) 2100-0200(3-4)	0000-0600 (0-1)	0000-0600 (0-1)
Near East	Nil	2300-0100(1-2)	0300-0400 (1-0)	Nil
Central America	2100-0200(2)	1100-1500(3) 1500-0200(2) 0200-0700(4-5)	0500-1200(3)	0500-1200 (1-2)
South America, Northern Section	1800-2200(3-4)	0900-1300(3) 1300-2200(1-2) 2200-0800(3-4)	0000-0900(2)	0000-0900 (0-1)
South America, East Coast Section	1700-2200(2-3)	1100-2200(0-1) 2200-0500(3-4) 0500-1100(2)	0100-0730 (1-2)	Nil
South America, West Coast Section	1600-2300(2-3)	0900-1300(3) 1300-2200(0-1) 2200-0800(3-4)	0000-0900 (2)	Nil
Hawaii	0000-0200(1)	2200-0800(3-4)	0600-1000 (1)	Nil
Oceania	2100-0000(1-2)	0400-1000(2-3)	0800-1300(1-2)	Nil
South Africa	1700-1900 (1-2)	0500-0700(1-2) 2200-0000(3)	0200-0400(0-1)	Nil
Far East	NIL	1200-1500(2)	1000-1100(1)	Nil
West Coast USA	2100-0300(2)	1200-1900(0-1) 1900-0000(2-3) 0000-0600(4)	0400-1000 (2)	0400-1000 (1)

CENTRAL USA

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Great Britian & West Europe	NIL	1100-1300(2) 1300-2200(0-1) 2200-0100(3)	0200-0400 (0-1)	NIL
Central Europe	NIL	1000-1200(1-2) 1200-2000(0-1) 2000-0200(3)	0200-0400 (0-1)	NIL
Southern Europe & North Africa	NIL	1000-1100(2) 1100-2100(0-1) 2100-0100(3-4)	0100-0400 (0-1)	NIL
Central America & Northern Countries Of South America	1900-2200 (3-4)	0000-1000(4-5) 1000-1300(3) 1300-2200(1-2) 2200-0000(2-3)	0100-1000 (2)	0100-1000(1)
South America, East Coast Section	1800-2300 (2-3)	1200-2300(0-1) 2300-0600(3-4) 0600-1200(2)	0200-0800 (1-2)	NIL
South America, West Coast Section	1700-2330(3)	2300-1000(3-4) 1000-2300(1-2)	0000-1000(2)	NIL
Hawaii	0030-0300(1)	2300-0900(3-4)	0700-1100 (1-2)	NIL
Oceania	2130-0030(1-2)	0430-1030(2-3)	0900-1330 (1-2)	NIL

	10 METERS	20 METERS	40 METERS	80 METERS
South Africa	1700-1900 (00-1)	0500-0700(2-3) 2100-0030(2-3)	0100-0500 (1)	NIL
Far East	NIL	1000-1600(2)	1000-L230 (1-2)	NIL
WEST COAST TO:				
(Centered on Sacramento, Calif.)				
Europe	NIL	1600-2200(1-2) 2200-0030(2-3)	0200-0400(0-1)	NIL
Central America & Northern Countries Of South America	2000-0000(2)	0100-1000(4) 1000-1400(3) 1400-0100(2)	0400-1100(3)	0400-1100(2)
South America, East Coast Section	2000-2330(3)	0100-0900(3-4) 0700-1400(2) 1900-0100(0-1)	0200-0900(0-1)	NIL
South America, West Coast Section	2000-0100(3)	0200-1000(4) 1000-1400(2-3) 1400-0200(0-1)	0500-0900(2)	0500-0900 (0-1)
Hawaii	2200-0400 (4-5)	1500-1800(3-4) 1800-0200(2) 0200-1200(4-5)	0800-1400(3)	0900-1300 (1-2)
Oceania	2000-2200(2-3) 2200-0300(1-2) 0300-0400(3-4)	1800-0300(1) 0300-0600(2) 0600-1000(3)	0700-1200(1-2)	NIL
Japan & Far East	0100-0600(0-1)	0700-1300(3) 1300-1500(1) 1500-1700(2-3) 1700-0700(0-1)	0900-1400(1)	NIL
Phillipines & East Indies	0300-0600(0-1)	0800-1200(2-3) 1200-1700(1-2)	1100-1400(0-1)	NIL
Guam	0200-0500(1)	1400-1800(2-3) 1800-0700(1-2) 0700-1200(3)	NIL	NIL
East Coast USA	2100-0300(2)	1200-1900(0-1) 1900-0000(2-3) 0000-0600(4)	0400-1000(2)	0400-1000 (1)

Numbers in parenthesis indicate the general condition of the path and also the approximate percentage of the month that the band is expected to open as follows:

(0) NIL, No path opening expected.

(1) Openings on very quiet, normal days only. Openings probably will not exceed 10% of the days of the month.

(2) Openings about 25% of the days of the month.

(3) Openings about 50% of the days of the month.

(4) Openings about 70% of the month. This will be a very good circuit during normal conditions but may become erratic during disturbances.

(5) Openings about 85% of the month. This will be an excellent circuit during normal conditions, and a fair circuit during ionospheric disturbances.

All times shown in the Forecast Charts are GMT for periods of band openings along a given path. Since path analyzed is to an area rather than to a specific point, actual times of path openings and closings at your QTH may vary slightly from those indicated in the Forecast.

This forecast is based upon an effective radiated CW power of 100 watts into a horizontal dipole antenna of unity gain, with a radiation angle of less than 30 degrees. Propagation is skywave, considering F2 reflections only, over the shortest or direct Great Circle route.

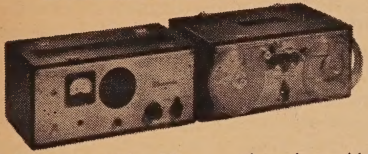
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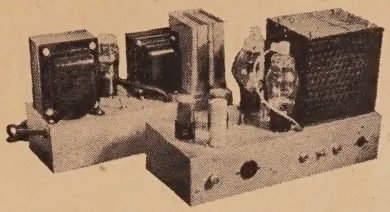
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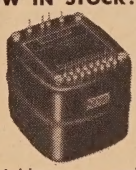


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Further Notes on Pi & L Networks

E. W. PAPPENFUS, WØSYF* and K. L. KLIPPEL, WØSQO*

THE DISCUSSION of pi network tank circuits presented in the September 1950 issue of CQ possesses some errors that should be corrected lest erroneous answers be obtained. The graph on page 30 should be corrected so that the Y ordinate reads "second harmonic attenuation," instead of "second harmonic distortion. On page 30 the general expression for X_{C2} is incorrect. The quantity R2/R1 in the denominator should be inverted. The correct expression will then read as follows:

$$X_{C2} = R_2 \left(\frac{R_1/R_2}{Q^2 + 1 - R_1/R_2} \right)^{1/2}$$

Figure 6 is merely an extension of Figure 3 and the Y ordinate on Figure 6 should be corrected to read $X_L/R1$. An error in calculation exists in Figure 7. The end point of the curve between R2/R1 = 1 should intersect the $X_{C2}/R1$ axis at 0.20 instead of 0.21. The portion of the curve between R2/R1 = 0.8 and 1.0 should be redrawn to agree with the correct end point. Inasmuch as these two curves are seldom used for power amplifier tank circuits, no probable harm has ensued but where antenna networks are under consideration, data may be needed from Figure 6 and 7 and the data obtained from the originally incorrectly labeled Figure 6 would be absurd.

Introducing the L Section

While it is possible to obtain a high degree of harmonic attenuation from a simple pi section, it is also possible to obtain still more filtering by adding an L section to the existing pi section. This addition is a relatively painless one and adds no new operating controls. However, it does mean that an additional switch section is needed if the final amplifier is to be bandswitched.

When a network such as shown in Figure 1 is used, the normal technique is to design the pi section to transform the Class C plate resistance (R1) to some pre-determined intermediate resistance (R2). The L section is then designed to transform the antenna resistance (R3) to this intermediate resistance. By inspection of Figure 1, it can be seen that, in this configuration, the intermediate resistance must be higher than the antenna resistance because of the series inductance between the two. This arrangement works very well in practical applications, especially where 72 ohm or 52 ohm transmission lines are employed.

The pi network is designed to transform the tube impedance, R1, to an intermediate value of between 300 and 450 ohms. The L section then transforms the intermediate resistance to 50 ohms. This value of 300 to 450 ohms for the intermediate desistance is not at all critical and has very little effect upon operation. In practice the choice of the higher value results in a loading capacitor, C2, of lower capacitance, but when the lower value of R2 is used with its resulting increase in needed capacity, the increase in capacitor size is off-set by its decreased voltage rating so that the physical size of C2 remains relatively constant. A safe rule to use is to assume R2 to be 450 ohms, as this value has been successfully employed in numerous equipments and involves reasonable components. The use of a higher value of intermediate resistance will result in higher harmonic attenuation, but increased circuit loss and the necessity of increasing the voltage rating of C_2 dictate a compromise value of approximately 450 ohms.

In order to design the L section, it is only necessary to know the intermediate resistance and the terminating line resistance. The L section elements may then be calculated from (A) in Figure 1.

The Q of the L section is determined by the

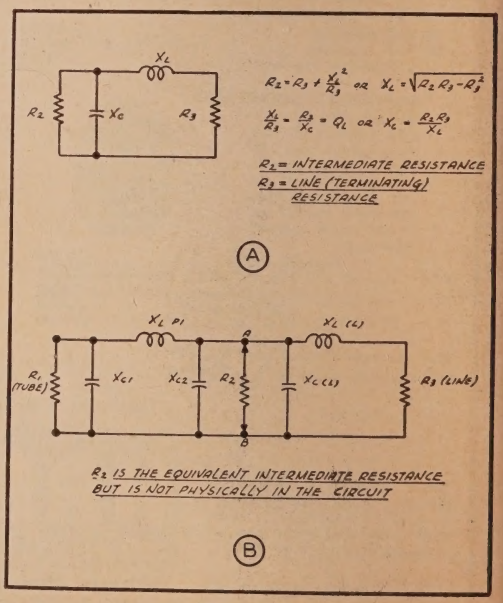


Figure 1

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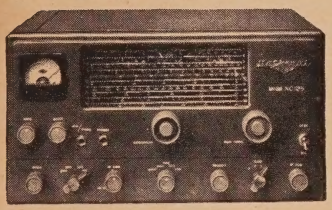
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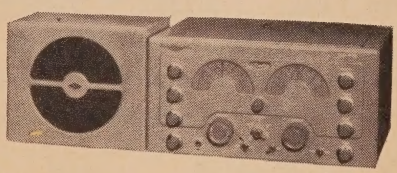
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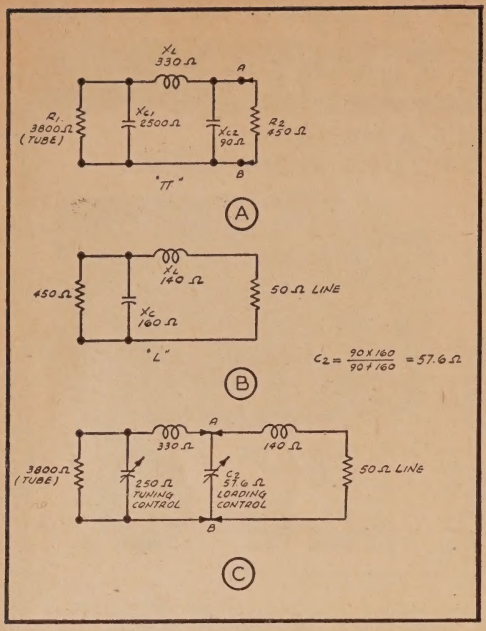


Figure 2

parameters of the L section itself; it has no effect upon the pi tank circuit operating Q and need not be considered for all practical purposes. The L section is added to the pi section as shown in (B) of Figure 1, and the the junction of the two is along the line AB. It can be seen by inspection that the L section capacitor and the output capacitor of the pi section are in parallel and, therefore, may be combined. This combination may be calculated in either one of two ways. If X_{C2} for the pi section is known and X_C for the L section is known, the resultant X_C may be calculated as follows:

$$\text{total } X_C = \frac{X_C \text{ (pi)} \times X_C \text{ (L)}}{X_C \text{ (pi)} + X_C \text{ (L)}}$$

It is also simple to calculate the value of C_2 in mmf and the value of C (L section) in mmf and add them together arithmetically. It is extremely important that the input portion of the pi network be shielded from the output of the L network. Care should be taken to minimize both electrostatic coupling and electromagnetic coupling. This is best accomplished by placing an adequate metal shield between the two sections and by placing the two inductances at right angles to each other. When an intermediate resistance and the line impedance are selected, the reactances of X_L and X_C are constant with frequency.

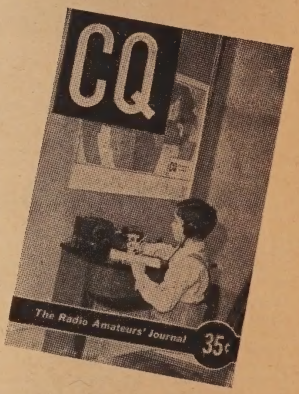
In view of the desirability of using coaxial feedlines, Table I is presented so that one may see at a glance the size of the capacitor that must

(Continued on page 58)

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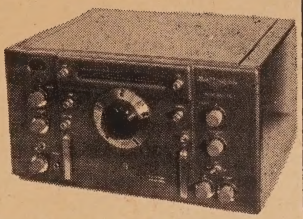
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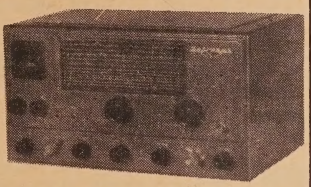


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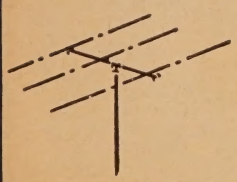


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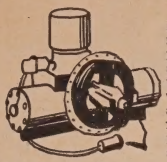
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A-5 AUTO PILOT SERVO M-1

Brand New-$4.25



Has ¼ Hp. 24 V. DC motor speed 6000 Rpm to pump hydraulic fluid to selected cylinder for rotation of cable drum. A ham with a little mechanical ability can convert this to rotate his beam by wrapping cable around the drum and his beam mast. Dog included for disconnect of drum for free rotation.

NEW—ORIGINAL PACK ..... **$4.25** ea.

LINK 150-160 Mc. MOBILE 2-WAY RADIO

We have received approximately 35 sets Link FM 150-160 Mc. mobile transmitters and receivers which we are selling at a fraction of their original price. This equipment consists of type 1906 transmitter and type 1905 receiver. The unit is complete with antenna, handset, handset mount, cables and ready for installation. Although these units are used, they are not abused.

PRICE - **$125.00** per set.

RADIO TUBES

Below is a list of brand new radio tubes which represents our present stock. Total quantities and quantity prices on request. All subject to prior sale.

7F7	6BG6G	9003	12SN7
7Y4	12Z3	6SA7	6SF5
7N7	2X2	0Y4	12SC7
VT67 or type 30	7C5	6F5	6Y6G
12A6	955	12J5	6L6G
6AG7	9001	12SH7	
6C5	9002	6B8	

807 JAN type ..... **$1.39** ea.
1625 (these are 12V 807's) JAN type **.39** ea.
7193 JAN type ..... **.19** ea.
1629 JAN type ..... **.39** ea.

M-9 PERISCOPE ..... 4.50 each

Here is a real Persicope designed for use on tanks, etc. by the U. S. Army. The periscope is made of heavy steel, size 14¾" x 6½" x 1¾" with 2 studs and thumb nuts for attachment. Easily removable lenses for all viewing applications. Mount one of these in the top of your car. Works better than a rearview mirror. Contains two prismatic lenses with 1½" x 5¾" faces. Units brand new. Weight 7 lbs.

PRICE - **$4.50** each

AVIATION DYNAMOTOR—

BRAND NEW $2.95



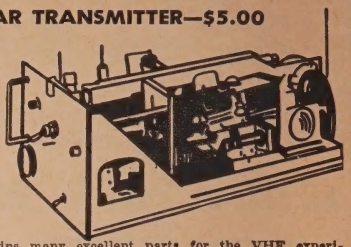
Eclipse Bendix. In-put 28 V. DC 4 Amp. Output 425 V. 163 Ma. Made to be used with GF-11 Transmitter but contained in base. Circuit fused. A fraction of their value . . . ONLY **$2.95**

CRYSTALS in SR-5 HOLDERS

Brand new, individually boxed. Choice of following frequencies ..... **79c** each

7250, 7260, 7270, 7280, 7290, 7300, 7320, 7340, 7660, 7670, 7680, 7690, 7700, 7710, 7920, 7940, 7950, 7970, 8124,.71, 8130, 8252.83, 8351, 8356, 8357.65, 8360, 8361.-43, 8362.5, 8367.27, 8400, 8450, 8451.43, 8452.94, 8476, 8477, 8480, 8486, 8488, 8520, 8530, 8540, 8541, 8547.

T-39/APQ-9 RADAR TRANSMITTER—$5.00



This is the transmitter described in the February "CQ" for conversion for the 420-450 Mc. Amateur band and is now being subjected to approval by the F.C.C. for the 465 Mc. Citizen's band. The oscillator has excellent frequency stability. Two-way communications for distances of 22 miles have been reported. If conversion is not desired, the transmitter contains many excellent parts for the VHF experimenter such as acavity oscillator using 2—RCA 8012 tubes. Other valuable parts such as switches, potentiometers, gears, revolution counter, etc. make this an offer not to be repeated. Less tubese, photocell housing and blower ..... **$5.00** ea.

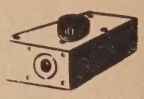
D-E OXYGEN CYLINDER 5 LBS



Made of stainless steel. Holds 500 cu. in. at 400 lgs. pressure. Non-shatterable. Ideal for air compressor, reserve tank, airhorn installations, floats, etc. Has approx. ½" dia. overall pipe thread at each end. Wgt. 5 lbs. Size overall 24" L. x 6" dia.

New **$2.25** each
Used, Good **$1.75** each

NEW BC-631-B JACK BOX 19c



This small box measures 2¾" x 2¼" x 1⅝" and contains a 10,000 ohm potentiometer with knob and a 6 terminal Jones type terminal strip. Ideal for remote volume control for headphones, etc. Worth the price for potentiometer alone. BRAND NEW, Moisture-proofed packed. **29c** ea.

SA-13/U ANTENNA KNIFE SWITCH



$1.49 ea. NEW
These are Brand New. Individually moisture proofed packed. Manufactured by Square D Mfg. Co.
Price New $1.49 ea.

AIRCRAFT COMPASS

These compasses removed from surplus aircraft and in good condition. Has 3 V. illumination bulb connected through resistor for proper aircraft pri. voltage. Self-contained compensating devices. Size 3⅛" dia. 3⅞" long, with 1¼" illumination socket extension PRICE **$5.95**

PHOTO TUBE — We have 3 types of photo tubes which we understand to be British manufactured. Characteristics etc. unknown. Tubes are new with wire leads in place of bases.
PRICE—3 various types—**$1.00**

Willard Radio Battery

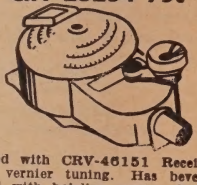
RE-CHARGEABLE 2 VOLT
PRICE BRAND NEW $1.39 ea.

This battery housed in plastic case size 4" x 3" x 5-1/16". Shipped brand new, dry-charged. Fill with 1.275 sp. gr. electrolyte (sulphuric acid, obtainable at drugstore). Each battery contains charge indicator consisting of vari-colored float balls. These batteries especially useful in portable radios, many pieces of Government surplus such as PE-157 for the SCR-511, etc. Shipping weight 4 lbs.

POWER TRANSFORMER

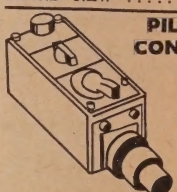
110 - 120 V. Pri., 550 V. CT Sec. 300 VA. Overall size 6" x 6" 6". Wgt. 22½ lbs. Heavy cast iron shelves with 3½" x 4⅞" mounting hole centers. Brand new. PRICE — **$1.95** each

RECEIVER TUNING CRV-23254 75c



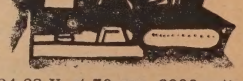
Used with CRV-46151 Receiver for vernier tuning. Has beveled dial with hairline cursor. Bands are 200-560, 560-1600, 1600-4450, 4450-9050 Kcs. Each band spread over about 28 degrees of dial edge. Has provision for flexible tuning shaft or can be adapted for direct drive on any tuning shaft. Black crackle finish. Size 5" x 3" x 2" overall. PRICE BRAND NEW **75c**

PILOTS CONTROL BOX TYPE CRV-23254 75c



Used with CRV-46151 Receiver for remote control of volume, selection of any one of six frequency bands. Has off/on switch or selection of C.W. and M.C.W. and M.V.C. or A.V.C. Black crackle finish. Size 2" x 2½" x 5" high. PRICE BRAND NEW. . . **75c**

(HRU) DC POWER SUPPLY



24-28 V. at 70 amp. 2000 watts gasoline engine generator with electric starter. Power supply which can be used to operate 24-28 V. equipment, start airplane engines, charge batteries, as a welding machine, lighting system, or for amateur radio station. 21½" x 17½" x 24⅝". Wgt. 115 lbs. These units sold as removed from aircraft: No check can be made but most look little used and no previous complaints; however, condition not guaranteed.
PRICE **$49.50**

METERS

Westinghouse 0-3 Amp. RF type NT-33 Ammeter. 2" face.
New ..... $1.95 each
Westinghouse 0-5 Amp. RF type NT-35 Ammeter. 3" face.
New ..... 3.25 each
Weston type 223P 240 Amp. Ammeter, with shunt.
New ..... 3.75 each
Weston type 250P 480 Amp. Ammeter, with shunt.
New ..... 2.95 each
Above Weston ammeters, used, less shunt, can be supplied at **$1.25** each.
0-15 Amp. charge indicating Ammeter. Manufactured for rectifier type battery charger. 2" face. Brand new **39c** each

MINE DETECTOR SCR-625 Brand New

ATTENTION "Ye" Gold hunters, precious metal prospectors, treasure hunters, timbermen, plumbers, factories, etc.
If there is a metal, or its resemblance, buried in the ground, mountainside, rocks, trees, or anywhere else that it would be possible to detect, by the use of a mine detector, this is the gadget you have been looking for. Truly the finest of all metal detectors, originally built for the U. S. Army to find mines: but, today's use suggests variety of thoughts. We have sold hundreds of these, through aids in science magazines and radio magazines and other advertising mediums. Actually fellows, there is a time in most anyone's life when a detector such as this would be useful. If you have a pipe buried under the yard of driveway, a nail or other piece of metal concealed within log or any other such what-not, this detector will find it quickly and surely. If you are prospecting for gold, silver, etc., why take hours for something that you might find in minutes? Do you know where there is a possibility of some hidden metallic money underneath the ground, in a basement wall or elsewhere? If so, that is the "Baby" you have been looking for. We have but 200 of these detectors left. They are brand new; in fact, they are still packed in overseas shipping boxes. Our price each, while they last .....

Batteries for above $6.00 per set

$120.50 *brand new*

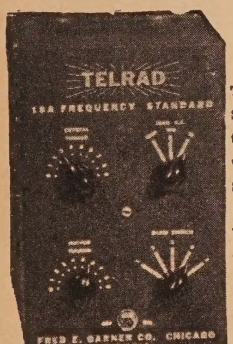
TYPE KJ CIRCUIT BREAKER REPAIR PARTS KIT

In heavy steel box. Box size 8" x 6" x 5¼" with hinged cover and hasp for padlock. Makes ideal change box. Parts contained are miscellaneous springs, contacts and coils. New Olive-drab finish. Wt. 10 lbs. PRICE - **$1.95** each

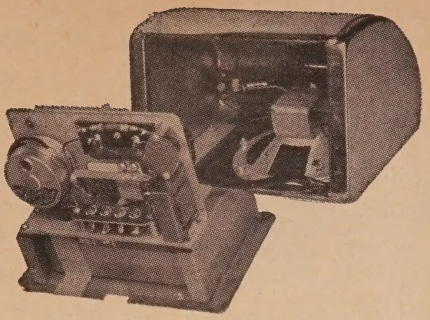
CO-AXIAL CABLE

The co-axial cable listed below can be supplied in lengths from 100' to 500'. Also full spools.

RG-7/U	**$13.50**	per 100'
RG-8/U	**12.95**	per 100'
RG-21/U	**15.00**	per 100'
RG-29/U Amphenol	**8.95**	per 100'



TELRAD 18-A FREQUENCY STANDARD. Checks signals in the range of 100 Kc. to 45 Mc. with a high degree of accuracy. Self-contained power supply is 110, 130, 150, 220, and 250 V. 25-60 cycle AC. Complete with tubes, dual crystal and instruction book. **$24.95**



- Sloping front
- PM Speaker 5" size
- Has 2 Pilot Lights for illumination
- Finished in chrome metal and grill with red plastic
- Accepts 1 to 6 nickels
- Each 5c coin gives about two phono records of music
- Should be mounted on a flat base
- Has Haydon Mfg. Co. timer
- Has provision for locks (not furnished)
- Easily removable coin box, size 6" x 3½" x 1½"
- Requires 4 wires from power unit
- A beautiful piece of equipment that could be built to house coin operated radio.
- Worth several times our asking price.

$3.50 ea.

PE-101C DYNAMOTOR $1.95

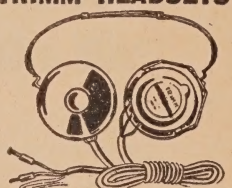


New—Original Packing
Made for the BC-654-A 420 Mc. Trans.-Rec.. Input 13 or 26 V. DC. Output 400 and 800 V. DC and 9 V. AC. Will operate on 6 V. DC. at reduced ½ voltage. Size approx. 4 in. dia, x 14 in. long. Shipping wgt. approx. 15 lbs.
CLOSE OUT PRICE **$2.95**

TRIMM HEADSETS

HEADPHONES
BRAND NEW

$1.19 ea.



Dual with cloth covered Trimm Rex type low Z

110 V. EVAPORATOR

These evaporators were used in refrigeration equipment for automatic defrosting but have been found very useful for sickroom and other applications where a small foolproof evaporator is needed. The evaporator consists of small Ball Mason jar size 3⅛" x 3½" with screw cover containing two carbon electrodes with attached binding post for connection to power line. Merely fill jar with liquid to any point above bottom of electrodes. Automatically cuts off when liquid is evaporated to a point below electrodes. PRICE ..... **29c** each

ESSE WILL BUY YOUR RECEIVER or XMITTER OR OTHER ELECTRONICS!

ESSE'S GUARANTEE

If not satisfied with any equipment purchased from us—you pay transportation both ways and return within 5 days for cheerful refund.

TERMS:

Cash with orders for prompt delivery. Or 25% deposit with orders, balance C.O.D. No orders under $2.00 can be accepted due to these special price concessions.

ESSE RADIO CO.

41 WEST SOUTH ST.
INDIANAPOLIS, IND

HAMFEST CALENDAR

ILLINOIS—July 15th, WELDON SPRINGS, PICNIC, 4 miles east of Clinton just off State Route 10 or US Route 51 at Weldon Springs State Park. This is a PICNIC for all the family. Bring your own basket lunch. No admission charge. Free soft drinks. Grab bag—bring a useable piece of radio gear, wrapped. Auction sale of radio gear. Sponsored by Central Illinois Amateur Radio Association.

"FREE FOR ALL—ALL FOR FREE"

Tulip Time Festival—Holland, Mich, May 16-19. This Michigan community is noted for its successful efforts in creating the atmosphere of an old Dutch town—tulips, wooden shoes, and all the rest. A hobby show will be part of this year's Festival, and the Holland Amateur Radio Club will have a station in operation. Russ Sakkers, W8DED, is in charge of the amateur radio display, and Charles Rich, W8GCW, will be in charge of the station. A special watch will be maintained for 10-meter mobiles.

SCOTT AIR FORCE BASE NEEDS TRAINING INSTRUCTORS

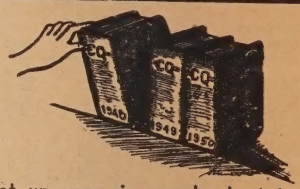
Men and women are needed to instruct Air Force, Air National Guard and Air Reserve personnel in radio equipment maintenance. Candidates should have a minimum of 4 years experience in teaching maintenance/repair or radio development, or a combination of these; certain types of college training may be substiuted for experience requirements. For additional information, contact the Civilian Personnel Officer, Scott Air Force Base, Illinois.

TECHNICAL WRITERS

WANTED

experienced in the field of radio-electronics, to write technical manuals, instruction books, etc. Must have good radio-electronics background. Experienced writers preferred. Write Box 51, CQ Magazine, 67 West 44 Street, New York 18, N. Y.

KEEP CQ at your fingertips with a CQ Binder ... ONLY $2.50*



CONSIDER the

APPEARANCE . . . Your shack, den . . . or wherever you set up your rig can be kept in shipshape when all your copies of CQ are in one safe place. The deep, red shade will blend perfectly with any color scheme . . . and, in addition, the backbone will be gold stamped with CQ and any year you desire.

CONVENIENCE . . . In a few seconds you can locate any article you want . . . no more fumbling around for last month's issue . . . just reach for your Binder . . . turn to the index . . . and presto, there it is.

WORKMANSHIP . . . Dupont Fabricord . . . stainproof and washable . . . Center channel to keep magazines securely in position.

Let your wife, sweetheart, or a friend, see this ad . . . Tell them that a CQ Binder would make the perfect gift for the "Ham of their life" . . . for a birthday, anniversary . . . or any other "special" day . . . or you can always buy one for yourself.

*(Foreign Orders add 25c per binder)

CQ Magazine
67 West 44th St., New York 18, N. Y.

ENCLOSED FIND $..... FOR ..... BINDERS

NAME ..... CALL .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

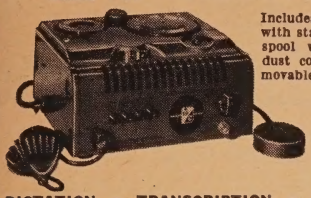
Year wanted ☐ 1947 ☐ 1948 ☐ 1949 ☐ 1950 ☐ 1951. Stamping: CQ ☐ Plain ☐

SOMETHING NEW UNDER THE SUN

Who Says Prices Are Going Up? Now At Sun They're Lower Than Ever!

WEBSTER — CHICAGO Dictation — Model 18 WIRE RECORDERS

Brand New — Discontinued Model



Includes microphone with stand, ¼ hour spool wire, plastic dust cover, and removable foot switch

DICTATION • TRANSCRIPTION • PLAYBACK

For Doctors, Dentists, Lawyers, Accountants, Secretaries, Clergymen, Speakers, Businessmen, Hams, etc. Including the following exclusive Webster-Chicago features.

- Automatic stops—shut off machine at end of wire
- Pushbutton record-listen switch.
- Immediate playback thru 2 inch speaker
- Neon recording volume indicator
- Removable take-up drum
- Elapsed time indicator

DRASTICALLY REDUCED FROM ORIGINAL PRICE OF $135.00 TO AN ALL TIME LOW OF

ONLY $89.50

RECORDING WIRE		
1 hour	½ hour	¼ hour
$3.50	$2.10	$1.40

PORTABLE CARRYING CASE — Reg. $12.50 — ONLY $8.95

CRYSTALS FOR S.S.B. EXCITER

Also many other uses— in FT 241-A Holder—½" Pin SPC. Marked in 54th or 72nd Harmonic MC Freq. Listed Below by Fundamental Frequency. Fractions Omitted. Lo Freq.

412	433	473	493	390	401	372	381	450	530
413	434	474	496	391	402	374	383	452	531
414	435	477	497	392	403	375	384	461	532
415	436	479	503	393	404	376	386	465	536
416	438	481	504	394	405	377	387	526	537
418	440	483	506	395	408	379	388	529	538
419	441	484	507	396	409	380			
420	442	485	509	400	411				
422	443	487	511			EACH		EACH	
423	444	488	516			**39c**		**99c**	
424	446	490	518						
425	447	491	519			**SPECIAL 200 KC XTALS**			
526	448	492				**without Holders. 21/32 x 23/32**			
427	462			EACH					
429	468	EACH				**69c ea. 3 for $2**			
431	472	**49c**		**79c**					

HAM CRYSTALS

4190	6873	7840	3735	3850	6473 7340 7573
5030	6906	7873	5305	5873	6475 7406 7640
5485	6973	7906	5677	5906	6506 7440 7673
6006	7740	7973	5706	5925	6540 7473 7706
6040	7773	8273	5740	5940	6573 7506 7806
6073	7806	8306	5750	5973	6606 7540 8340
6106			5760	6273	6640
6140			5773	6373	6673 **99c** EACH
6173	**49c** EACH		5775	6406	6705
6206			5806	6425	6740 10 for
6773	10 for		5825	6440	6806 $9.00
	$4.50		5840	6450	7306

SUN RADIO

OF WASHINGTON, D. C.

938 F STREET, N. W. WASH. 4, D. C.

SCR-522 XTALS

5910	6407.9	7480	EACH
6370	6522.9	7580	
6450	6547.9	7810	**$1.29**
6470			

BC-610 XTALS

2 BANANA PLUGS — ¾" SPC				
2045	2260	2415	3215	3570
2105	2282	2435	3237	3580
2125	2300	2442	3250	3945
2145	2305	2532	3322	3955
2155	2320	2545	3510	3995
2220	2360	2557	3520	EACH
2253	2390	3202	3550	**$1.29**

PAYMENTS must accompany order. Enclose 20c for Postage & Handling. Crystal shipped packed in cloth bags. All Shipments Guaranteed.

VARIABLE CONDENSERS

From SCR-522

2 GANG - 220 MMF per section

$1.29



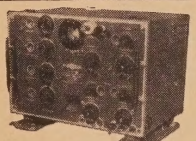
3 GANG - 220 MMF per section

$1.59



BRAND NEW with CONCENTRIC AIR TRIMMERS

BENDIX 100-W. TRANSMITTER C-W



Easily converted to 20-40-80 meter VFO and 10 meter crystal. Each ECO dial has 3000 divisions enabling quick precision shifting. This transmitter was constructed of the highest quality precision parts. Four separate output tanks; one 4 position selector channel switch having 7 sections which changes the ECO, IPA, and output tanks simultaneously. All controls are mounted on the front panel. The housing is cast aluminum. Shields and case are sheet aluminum dimensions 11x12x15 inches, WT-35 lb. Complete instructions furnished. Uses 3-807, 4-12sk7 — each a separate master oscillator. Has a 5 AMP R.F. meter. Requires 750 volt 300 MA power supply and modulator for phone operation. We cannot supply either the power supply or modulator. This is a complete coverage transmitter for the new or experienced amateur. A true ham value. Complete with tubes, not many of these units left. So hurry and get yours while they last.

NOW ONLY $29.95 LIKE NEW

NOW ONLY $19.95 USED



NAVY VHF

Brand New CW TRANSMITTER

Battery operated (67½V."B" and 1½V."A") Frequency 80 to 105 MC uses 2 1G4 Tubes - with instruction manual - less tubes and batteries.

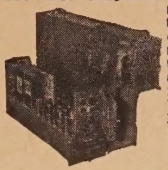
$4.95

TERMS

All items F.O.B., Washington, D.C. All orders $30.00 or less, cash with order. Above $30.00, 25 per cent with order, balance C.O.D. Foreign orders cash with orders, plus exchange rate.

WAVEMETER BC-1073A

Used. Good Condition. Covers 150-210 MC. Companion to BC-1068A receiver. Contains resonant cavity wavemeter, oscillator, heterodyne amplifier, tuning eye, 110 VAC 60 Cycle Power Supply. LESS TUBES



$4.95

RADAR TRANSMITTER BC-1072A

Used. Good condition. Covers 150-210 mc. Contains many parts, such as 110 V AC Blower, Gen. Radio—1 AMP variac, kilovolt meter, circuit breaker, 110 volt HI & LO voltage power supply, tubes, oil condensers, and many others. Companion to 1073A. Operates from 110 V AC 60 Cycles.

$19.95

Less Tubes. . **$9.95**



BC-645 UHF RECEIVER TRANSMITTER

"The Citizen's Radio" covers 420-450 mc. Consists of complete transmitter, modulator system and receiver, 15 tubes, and simple complete conversion instructions for Citizen band operation. Brand new **$14.95**

FAMOUS MAKE BUTTERFLY CONDENSERS

ALL NEW — ⅓ OFF!

.500 GAP.	.375 GAP.	.250 GAP.
96-22.15	11- 8.15	111-16.80
115-25.20	106-20.15	127-18.25
124-26.65	130-21.60	143-19.65
	141-24.50	159-21.00
	153-25.95	175-22.50
		192-23.95
Note: Figure in Left Column is Max. Cap. per Section		208-25.95

NATIONALLY KNOWN FAMOUS MAKE HEAVY DUTY SINGLE & DOUBLE STATOR TRANSMITTING CONDENSERS.

Max. Cap.	Gap	Price
300	.077	$ 5.32
230	.171	5.57
250	.219	12.85
500	.219	17.22
75	.344	8.96
245	.344	14.11
50	.469	7.05
100	.469	11.62
150	.469	12.95
75	.719	12.85
100-100	.219	14.11
100-100	.344	15.64
60-60	.469	14.11

CQ TO ALL HAMS DE W3PPQ

Handle here is "Pick" . . . call or write me for anything you need in ham gear or parts—Will be happy to expedite your order with best quality merchandise. 73's

PI & L NETWORKS

(from page 52)

be added to the output capacitor of the pi section and also the size of the L section inductance. In order to adequately describe the complete design process, the following typical design problem is outlined:

A power amplifier, utilizing a 4-250A operated at a plate potential of 2500 volts and a plate current of 300 ma, is to be coupled to a 50 ohm transmission line. The coupling network consist of a pi network and an L network and shall possess but two controls, a tuning control and a loading control.

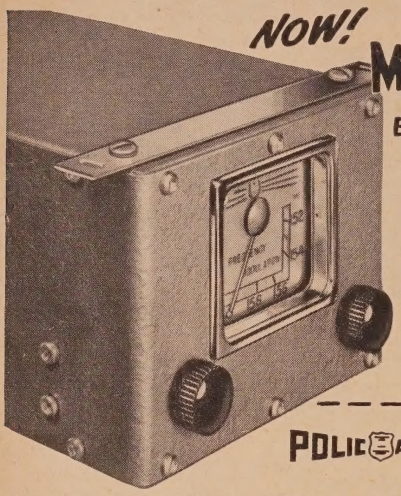
It is first necessary to calculate the plate impedance of the tube and to select the desired operating Q. The calculated plate impedance of the tube under the above conditions is 3800 ohms[1] and the operating Q is selected to be 15.

The pi section of the network then has the following known quantities: R1 = 3800 ohms, R2 = 450 ohms, Q = 15. Referring to the original pi network article in the September 1950 issue of CQ, values of X_{C1}, X_{C2}, X_L, for the prescribed transformation ratio are obtained from their appropriate graphs. From Figure 2 of the referenced article, X_{C1} = 250 ohms. From Figure 3, X_L = 300 ohms and from Figure 4, X_{C2} = 90 ohms. The pi network then appears as in (A) of Figure 2.

The L network reactances to be added are obtained from Table 1 in this discussion. Since a 50 ohm line is to be used, the added L section will appear as shown in (B) of Figure 2.

The two networks are then joined at points A and B and the pi output capacitor and the L input capacitor are lumped together as shown in Figure 2(C).

1 "Design Considerations for Class C Power Amplifier," K. L. Klippel, *CQ*, May, 1950.



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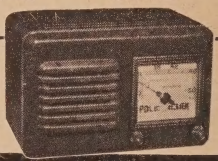
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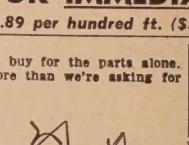
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TABLE I

For 50 ohm Line
(X_L = 140 ohms, X_C = 160 ohms)

Freq. mc	L (uh)	C_2 uuf*
3.5	6.4	280
7.0	3.2	140
14.0	1.6	70
28.0	0.78	35

For 70 ohm Line
(X_L = 160 ohms, X_C = 200 ohms)

Freq. mc	L (uh)	C_2 uuf*
3.5	7.2	220
7.0	3.6	110
14.0	1.8	55
28.0	0.9	28

*** (to be added to pi output C)**

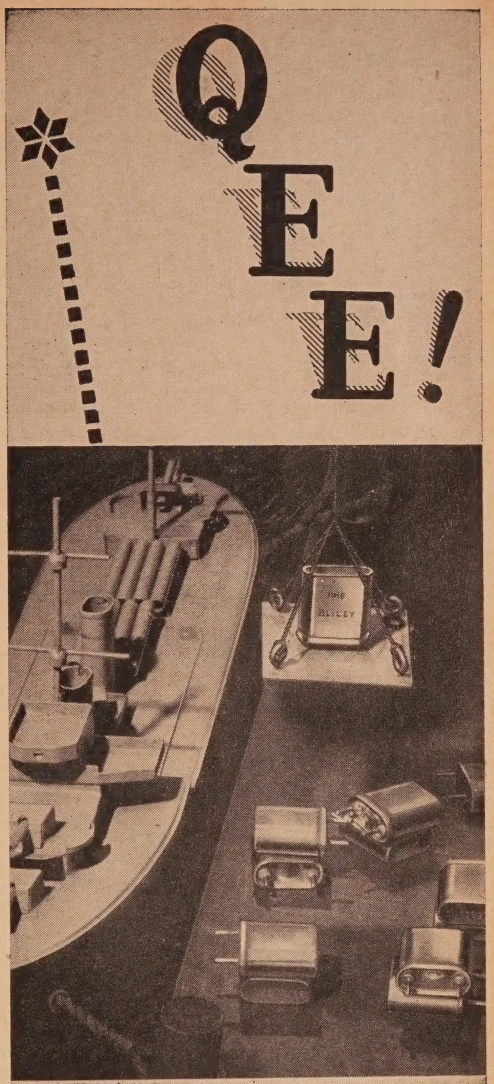
The design is now virtually complete and, in order to convert the reactance values to microhenries and mmf, apply the appropriate formula or use a reactance rule.

As shown above, the L network is a very simple device to use in conjunction with an existing pi network. The fact that at least 15 db of extra second harmonic attenuation may be obtained from it makes the pi-L combination good for at least 55 db second harmonic attenuation with higher order harmonics down correspondingly more. It should be remembered that it is very important to keep the standing wave ratio on the line as low as possible. With normal components, the circuit flexibility should allow an SWR of 2:1. Since the addition of the L section does not result in the addition of any new operating controls, it certainly makes an antenna tuner seem a poor investment when coax feed is used.

VHF-UHF

(from page 44)

within this box, and the remaining r.f. components below the chassis (but still within the shield box!). The power leads are filtered, and the filters are



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housed in small individual compartments mounted within the main shield box. The coils of the low-level stages are slug-tuned and it is necessary to remove the double-layer ventilated top shield plate from the top of the box to gain access to these slugs. The output of the final stage is fed through a co-axial line to a modified "Harmoniker" filter at the rear of the large main chassis. The modifications consisted of adding a parallel tuned trap coupled to each of the series coils of the Harmoniker to reduce further the possibility of transmission of second harmonic energy (on the FM broadcast band) through the filter to the antenna. Does all this sound unduly elaborate? Let's face it—in these days of TVI we've got to resort to the ultimate in shielding and filtering if we want to continue operating on the "TVI" bands!

Keying, for straight c.w. operation, is accomplished by the use of a 6Y6 clamp tube on the screen of the 2E26. By the use of a VR105 tube in series with the 2E26 screen circuit above the clamp tube plate, the 2E26 screen-grid voltage drops to zero when the negative bias is removed from the clamp tube grid. W9MBL found it necessary to provide a source of voltage to drive the screen grid slightly negative when the VR keyer tube was non-conducting, as with the usual circuit there was a small residual signal fed through the 2E26 and the plate current was not quite zero. Under "key down' conditions the 2E26 runs at about 30 watts input.

For "Beacon" operation, W9MBL uses a single-bay "Turnstile" antenna—two half-wave horizontal dipoles in the same plane a right angle to each other, fed with equal currents 90 degrees out of phase. This array produces a horizontally-polarized signal which is approximately omni-directional.

That is about the works, for this month. We would like to remind our readers that the information we use in preparing these columns comes from *you*. If you are already reporting six-meter activity to the RASO office, it is not necessary to send separate reports to us. When activity is subnormal, as it has been during the past few months, your letters and reports are especially welcome. Reports of activity should reach W2PAU before the 20th of the month to be included in CQ for the following month. 73 for now . . .

Brownie, W2PAU

LETTERS

(from page 6)

too much time to make the calculations for very many points.

It is my opinion that these predictions are of interest to a greater number of hams than any article you could put in the magazine. May I say thanks for starting up this column again and keeping up the good work.

Sincerely yours,
R. G. McCuistian, W5LMI

MOBILE CORNER

(from page 37)

No apparent improvement in clipping could be discerned over that obtained by equal values for R1-R2 and for R3-R4.

A few hams have successfully employed crystal diodes, rather than tubes, but a great many more have met complete failure when trying to use them; it is therefore recommended that a tube diode be used. Here are two items that do not make sense, but I've personnally observed both of them; often a 6H6 seems to make a better noise-limiter than a 6AL5, and better limiting can sometime be obtained by reducing the filament voltage of the diode tube.

National Mobile Calling Frequency-29.640 kcs.

It is noted that the national mobile calling frequency of 29.640 is included in the CD frequency allocation. Some hams do not realize the importance of this frequency, but it is constantly monitored in several cities—if you get into difficulty in any of these cities, a call on 29.640 will bring an immediate contact. In Washington, D. C., the Auto-Call (Feb. and May CQ) operates constantly on 29.640 with the code 1-2-3-4.

US/Canada Mobile Operation

Many mobile operators vacation in Canada, and it is noteworthy that an agreement has been made to permit U. S. mobiles to operate in Canada and vice-versa. While not yet final, it is expected that within a few months complete regulations will be enacted. Many of us who have been confined to listening while in Canada will welcome the opportunity to "open up" for a few qsos.

Mobile Phone Operating Instructions

The Washington Mobile Radio Club has prepared a mimeo operating instructions, covering all operations from calling to multi-net operating procedure. A copy will be mailed to anyone upon request to the editor of this column.

Maritime Mobile Amateur Radio Club

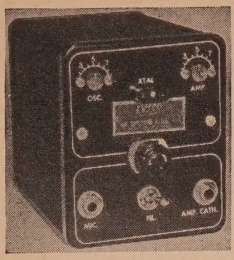
Fixed-stations: Send your 30 MM QSL's to W3OB, 1317 Orangewood Ave., Pittsburgh, Pa. for issuance of the MM certificate. No return postage required. Returned cards will be registered.

The MM's are having a tough time being confined to the ten meter band, where DX conditions are terrible. In addition many of the boys, formerly very active, are now QRT due to the ships being engaged in a military capacity. Among others affected are W6YYT, W5OFO, W3KKV and W5OCN. W5AXI went into "dry dock" March 5 and is touring his old haunts down Flordia way. His run is still S.A.—W6YYT is still on the European run.—W3OB visited W5OFO, "Rueben Tipton," while at Baltimore. He found that seafaring people do all their sleeping at sea, never in port. He also found out that you don't walk



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B-114	20 M	36V6GT	A-175	75 M	3-6AQ5
B-140*	160 M	3-6V6GT	B-175	75 M	3-6V6GT

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through "doors" aboard ship, you climb up and down the other side.—W4AYE, "Pioneer Wave" is running to the Far East, but appears to have gone "Whacky" in that he has a TV set on board. Says it works fine. Everyone else does his best to get away from TV and he lugs one aboard ship. Hears that Honolulu will have a TV xmtr soon so probably will have a TVI problem. Serves him right!—W5OTF has a new call, so when you hear W4RW you will know its the "old time fish." Hutch says it stands for "rotten whiskey;" Van says it is "rough weather." Van being a skipper, it might also be "real worried."

W4KEJ wants to know the MM to MM DX record, and offers as a starter a contact using his 20 watt rig from the Para River just north of Belem, Brazil, with W5OCN in the Singapore Straits. Ray figures this covered 9100 miles. Can anyone top this? Off the MM list: W3NUI in the Army, now K4WAG; W4PQB in school at Auburn, Okla. W2PFB in the Navy; W4OQR vacationing.

New Members: W3MCJ, "Tyson Lykes;" W5ITG, "Natali O. Warren;" W9VVZ, "American Robin."—MM certificate issued: TI2TG.

Wish we had space to print a long letter from W2UWC/MM about his "G" visit. G2AUC, G3FMA, G2AHH, G3FID, G6HO and G2AKR adopted him and really took him around town in fine style. While this happens quite often when MM's visit ashore, these "G's" really went to a lot of trouble including going into their meager rations, (even over objections), to insure a good time for Bill.

SCRATCHI

(from page 4)

when driver makes sudden stop, and waves from PT boat ars keeping us from standing up, almost. When things quiet down PT boat comes right up to us and cupple guys climbing on barge. From looks of things they are both Navy officers. One guy in particular are having enough brass on him to make ten-foot hunk of waveguide.

Big guy is waving his arms, and shouting, and wanting to know what we are doing, why we are doing it, and in particular why we are doing it out here in the ocean. and who owning this little island anyway. Brother Itchi, having given me his half of the island, are telling brassy officer that I sole owner, that we don't know what we are doing on acct. we don't know what his trouble is. Officer is calming down a little bits and asking if we have any radio equipment on board (I like that, on board, just like I captain of big ship). So, we showing them around, explaining how the transmitter work, and everything.

I are even telling him if he have a quarter I be happy to selling him a ham license so he can using rig. This are evidentally the wrong thing to do, because he coming right back and asking me where my license is. Scratchi are trying to explain how this are new country, well, not really new country but new country by amateur radio rules, and how I owning country and not needing

license, but I can see that he not believing me at all, expecially when I not being able to produce any kind of amateur license. The upshoot is that he are telling Itchi and me to come along with him. There is no point in arguing with him, because the PT boat are fixed up with machine guns, torpedoes, AA guns, pompoms, in fact, just about everything that can shoot except a 16 inch gun, and for all Scratchi know they are hiding that somewhere under a canvas cover.

Itchi and I get on boat, and it start up like jackrabbit who sitting accidentally on cacktus. In no time we arrive at big island, and you won't believing it, Hon. Ed., but boat are going into hole in island and ending up in cave. Before we get off boat, brassy fellow are pledging us to secrecy so we not telling anyone what are to happen. (I know you not breathing a word of this, Hon. Ed. which is why I telling you.) Well, it seems that this island are secret radar base with every square inch just covered with radio stuff, and when I start on my transmitter, I QRM'ing everything all over the place. Officers are saying that it our patriotic duty to staying off the air, as we wouldn't want to stopping the radar operation, would we? And besides, if we going on air again from the barge, they putting both Itchi and Scratchi in jail for ten years.

Natchurly, Itchi and I both very patriotic, so we saying that we will stay off the air, but what are we going to do with all the stuff we putting together for Scratchi Island? At this point brassy fellow are offering to buy our equipment and the island too. Well, he not exactly offering to buy, rather he are insisting that I selling.

So, Scratchi not mad at anybody. I are selling everything, and not even turning over half of the money to Itchi—after all, the laugh is on him. He not thinking my venture would be successful. HA! Not only selling everything, but they giving me back all my freshly-made two-year-old cacktus juice.

Respectively yours,
Hashafisti Scratchi

DX & OVERSEAS

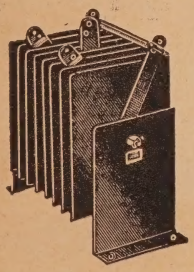
(from page 36)

that he was coining a useful report when he wrote that article . . . . W6EBG worked 3A2AB after four days of solid calling and got . . . . yes, RST 519! In justification, perhaps we should mention that Gene's antenna was a little lower than usual, or maybe the mountain behind his new QTH had something to do with it. Speaking of Bill Orr, W6SAI, reminds us that he has a vacation lined up for Mexico. Probably he wants to visit PX1A. Bill, among others, is talking about a trip to Clipperton Island.

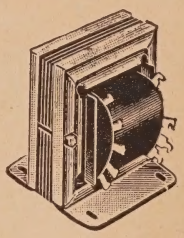
W6VFR is the happy recipient of a shiny new card from EAØAC. Marv reports working CW1TO on 14 mc who claims to be in Taipei, Formosa . . . . LU6AJ is understood to be claiming 193 confirmed on phone. FP8AW is none other than

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S-458A		4.5	1.75	8.95
S-167A		10	3.75	12.95
S-292A		40	12	35.95
S-296A	28, 27 / 25, 24	1.8	1.25	6.95
S-344A		5	5.75	13.95
S-172A		10	6	19.95
S-291A		20	12	35.95
S-297A		40	23	62.50

Select proper rectifier and transformer from table for your specific application. After proper selection has been made proceed as follows: Connect secondary terminals of transformer to yellow lugs of rectifier selected, connect black lugs to NEGATIVE input terminal of dynamotor, connect red lugs to POSITIVE input terminals of dynamotor. No changes in switching circuit of dynamotor are necessary if cables are included or cable are to be used with unit. Provide "on and off" switch in primary of supply transformer. Rectifier output can be connected to any dynamotor giving good regulation.

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RPS No.	Sec. V.	Sec. Am.	Extra Sec. Taps	Wt. Lbs.	Net Each
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8885	19.2	12	21.4, 20.4, 18.8	12	7.15
8886	17.2	46	19, 18.2, 16.5	35	22.95
8888	33	2	36, 35, 31	5	4.95
8889	32	6	36.7, 35, 31	12	7.95
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8891	32	46	36, 34, 30	78	58.00

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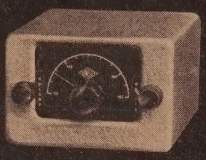
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CQ MAGAZINE
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HB9AW. We hear that he is planning to make the USA his home. SM4KP has recovered from his long illness and is again in Stockholm as SM5KP. KH6BA is keeping regular skeds with Ken Ellis, HZ1KE. Could it be that Ken is planning a new trip somewhere? Ralph Lenton, the original operator at VP8AP, South Orkneys, has been the object of an unsuccessful search covering a good portion of the world. He is now back in the Falkland Islands as VP8AQ, we are told, and will supposedly wind up at VP8AK eventually. Others keep asking us, so for once let's turn the tables and ask you . . . . how do you get a card from VP8AP? A sad pair of sixes would like to know . . . . MP4BAQ is reported at 14,044 kc. Anyone know his location?

I further see by last month's column that my old pal Herb took advantage of his loyal pinch-hitter. I'm referring to a nasty remark he made about ENV falling off the TV wagon, "Georgeous Gorge", Channel 2, and other allied, reprehensible matters. This, I feel, must not be passed off lightly. It's a very serious charge, like smashing your buddy's 450TH oscillator, and needs clarification, I think. To begin with, I used to think that TV was a necessary evil, but after getting a TV set, I realize that I was completely misinformed . . . . it isn't necessary at all. In fact, if all the flicker boxes in the country were placed end to end, it would be FB. As a matter of self-defense, I'd like to point out that the box was purchased for a definite purpose . . . . that of filling an empty spot in the living room . . . . and, believe me, it's fulfilling its purpose admirably. In a recent duel with the XYL, it finally boiled down to either a box, or a break-front secretary, and it seemed then that the box (with spare tubes) would be a better bet than a useless hunk of furniture like a secretary. The visual results of this last decision leave me pondering . . . . Now, as for Herb . . . . how come he's so familiar with all those TV programs? You don't get that way looking at 20 meters, or do you? Ask him about Groucho Marx and Rosemary LaPlanche sometime . . . . 73, W6ENV.

(I wonder why ENV asked me to see what they're using for TV antennas in New York—hmm? Herb.)

QTH COLUMN

CN8EP	C. D. Raynes, Navy 214, c/o FPO New York, N. Y.
I5ZC	Nicola Lucenti, Mogadiscio, Italian Somaliland, E. Africa
FK8AH	Robert Garbe, Tontouta D'Aerdrome, New Caledonia
KH6KL/KP6	Tom Pauley, P.O. Box 5392, Honolulu, T.H.
exMP4BAD	Ken Smethurst, G3GPE, 6 Alder Lane, Hollins, Oldham, Lancs., Eng.
OQ5FG	Box 271, Leopoldville, Belgian Congo
SP1JF	Box 30, Poznan 5, Poland
VP9AG	May Cottage, Warwick, Bermuda
exVS1CW	Sidney Clark (exVK5SC), 11a Burley Wood View, Leeds 4, England
exVS7KR	201 Chichester Rd., Bognore, Reqis, Sussex, England
VT1AF	Box 54, Kuwait, Persian Gulf

IMPEDANCE MATCHER

(from page 22)

the antenna to seek its own r.f. center without affecting the transmitter end of the feed line. For doublet antennas, a 300 ohm link should be used at the final tank coil and a 300 ohm line connected between the link and the Impedance-Matcher. The feeders from the doublet should be connected to the 75 ohm side of the Impedance-Matcher. If a 300 ohm folded dipole is used, a 75 ohm link will be required between the final tank and the Impedance-Matcher.

Each of the two important characteristics of the Impedance-Matcher—its ability to couple between an unbalanced transmitter output and the feed line of a balanced antenna system as well as its characteristic of giving either a 4 to 1 or a 1 to 4 impedance change—will suggest many other applications around the amateur station.

2-METER MOBILE

(from page 16)

box. The antenna relay was obtained from the VHF ARC-5 transmitter; the 24 volt coil was stripped of wire and wound full of number 30 enameled wire, which permitted it to operate on 6 volts very nicely. All the connections in the control box and the connecting cables should be made as solid and heavy as possible so that the voltage drops will be minimized.

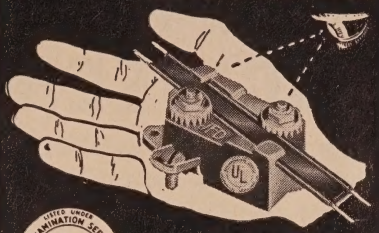
The problem of the power supply is more of an individual problem than any other part of the equipment, since almost any supply delivering 300 volts at 200ma is suitable for the transmitter, and a supply of 150 volts at 100 ma or so will do for the receiver. The best setup would probably be a vibrapack supply for the receiver (which is used



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1946	December
1947	June
1949	April, June, August, September, October, December
1950	January, February, March, April, May, June, July, August, September, October, November, December
1951	January, February, March, April.

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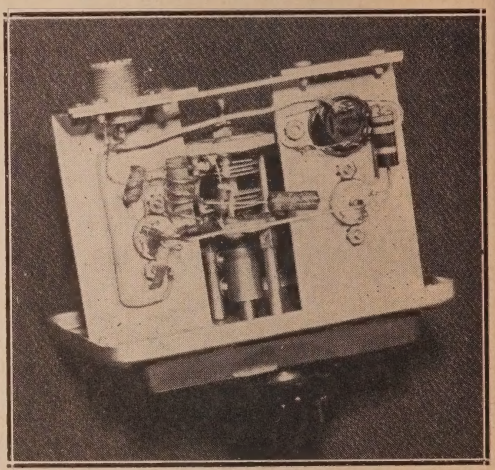
67 West 44th St. New York 18, N. Y.

the most), with a dynamotor supply for the transmitter.

In the author's case a dismounted PE 103-A is used with the transmitter; the receiver dynamotor is one originally used as the transmitting dynamotor in the Mark II tank set. This is a permanent magnet unit designed for 12 volt operation, when operated on 6 volts, it delivers approximately 150 volts under load of 125 ma. While this power supply setup is not too desirable from the current drain point of view, it is still within the capabilities of the average car electrical system. In our case the battery has never been run down, even with two hours and more of stationary operation.

The Antenna

The antenna on the author's car is a quarter-wave whip, 18.5 inches overall, mounted in the middle of the car roof on a surplus BC-645 antenna mount. The coaxial cable enters through the dome light reflector and out the side of the light, under the upholstery. The cable then goes down to the bottom of the car, and up under the hood,



Underside of the remote oscillator.

after which it goes through the firewall to the control box. If this type of installation is not desirable, almost as good results can be obtained by clamping a 1/4 wavelength antenna to the center of the windshield post of the car and running the cable down the post under the hood, or through the cowl ventilator, thus circumventing the need for punching any holes in the body of the car. If space is available, it would be desirable to install a 1/4 wavelength matching transformer of 52 ohm coax, right at the antenna. This transforms the nominal 35 ohm impedance of the 1/4 wavelength antenna to the 72 ohm impedance of the feeder cable, resulting in a better match and lower feedline losses.

Performance

In general the operation of this rig has been way over expectations, with 5/9 reports being re-

ceived from stations within the normal fixed station operating range. Ignition noise causes very little trouble, the noise limiter apparently doing a very good job in this respect. The only precautions taken to quiet the engine electrically, outside of those taken by the manufacturer of the car, have been the addition of a grounding braid from the engine to the fire wall, and replacement of the distributor suppressor.

The best DX to date is about 50 miles with the car in a rather poor location. No doubt even better DX is possible from an elevated spot.

The writer wishes to thank Everett Gibbs, W2FI, for his very welcome advice and assistance with the converter. This installation was made to prove to the author that mobile operation was as enjoyable as he had heard, and it has already paid back the effort expended to make it up. In the future it will no doubt be as useful in any emergency as it has already been in normal hamming.

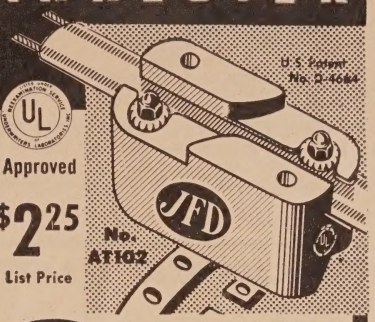
MONITORING POST

(from page 38)

Civil Defense amateur radio communications still is in the planning stages for the most part. Here and there we have nets operating, and hams have been appointed to posts of responsibility. Nevertheless, the slow progress of amateur radio in this field is mainly due to the inability of CD officials to determine exactly what communications the hams will cover. They seem unable to grasp the purpose of emergency communications, and reluctant to put too much confidence in ham radio. This condition is general, and due entirely to the fact that hams are not considered responsible, trustworthy people. The feeling that hams "play" with or at radio communications is somewhat justified, merely because we have not shown, beyond a doubt, that our endeavors are serious and that we are ready to take over should normal communications fail.

While the hams have taken over in hundreds of communications emergencies and have proven their worth and have been lauded by the press for their quick response and efficient operations during disaster, these instances have been such that the cause and result of the disaster itself have overshadowed the work of the ham in the local news. Radio broadcasters and newspapers never fail to call attention to the extreme effort on their part to "cover" the news as it happens, yet rarely is ham radio more than mentioned as a participant in this emergency "coverage." These short references to ham assistance, when they are mentioned, are read and soon forgotten. Therefore it is time for amateur radio to organize solidly in each and every community and to advise CD planners of the service we can furnish in CD communications. Point out that if and when things happen the normal means of communications will not be there. Unless amateur radio is considered seriously now, and given time to organize along lines that will best serve in each community, we can hardly be

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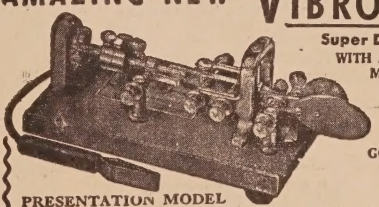
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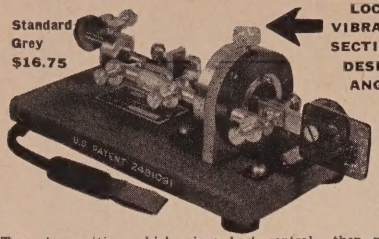
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expected to turn in a report that we did furnish communications where and when the need demanded.

Radio clubs should take the lead in pointing out the value of ham communications. Clubs should be organized immediately where they do not exist, and local CD officials informed. It would be the best approach to call attention to the existing telephone circuits being installed all over the country to supply needed communications in CD work. The job of the ham is to parallel these existing lines, so that when they go out for any reason, CD will still have a means with which to carry on its work. Do not wait until emergency facilities are needed. Prepare now and be ready.

Amateur radio has proven its value hundreds of times. The FCC knows this and is depending upon the hams to do a job. But it is not the business of the FCC to plan communications for CD. If CD will recognize that in setting aside amateur frequencies for CD emergency radio communications the FCC is in fact stating "Amateur radio can do the job and is herewith charged with this responsibility," then we will get the needed recognition, but it is up to us to acquaint our local CD officials with ham radio.

YL'S FREQUENCY

(from page 40)

"Dick was with GE there for six years," adds Teev, "and then for four years he was with the Signal Depot at Fort Sam Houston. Prewar we were very active on 10, 160, and Dick was on 75, too. But think we both have done a lot more operating since we came to New Mexico three years ago than we did in all the years before. Now we are on 10 (when it's open) 20 and 75 phone [W5DRA is Class A, too], and seem to be getting deeper into ham radio all the time, loving every minute of it. I am enjoying the work as secretary of the local Mesilla Valley Radio Club and as 5th district chairman for YLRL. Dick just recently took over as acting SCM while W5SMA has had to be away. He also is PAM for N.M., quite often is NCS for the N.M. 75-meter Emergency Phone net, and he is teaching the theory part of our club's radio class on Mondays and Fridays. We handle many schedules for folks here at State College, Mesilla Park and Las Cruces, and handle as much traffic as comes our way. The rig is a 400-watt Globe King, Meissner Signal Shifter, NC-183 receiver, with folded dipoles on 75 and 10 and an 8JK on 20. Also have a 10-meter mobile rig in the car. In the past we have dabbled in amateur photography, but as you can see we don't have time now for anything else besides ham radio!"

SK

Our sincere thanks for all the wonderful gifts, cards, letters and radiograms welcoming the arrival of our little Deryn. They have been greatly appreciated, and it's heartwarming to know so many friends are interested. 33, W5RZJ

AIRCRAFT ANTENNAS

(from page 32)

passes that occur when one part of a plane is completed while others are still in the design stage.

Boeing engineers have turned up some odd facts during these electronic "flights." One model that was tested, for example, happened to be the standard Stratocruiser desk ornament such as you may have seen in airline displays. (By using it, the work of building a special model was avoided.) During the test, the tiny propellers of this model turned in a breeze and it was found that their turning modulated the radio energy as it was received on the model's antenna.

What was happening, of course, was that, as each propeller blade crossed a part of the radiation path, the reflected energy from it either weakened or strengthened the passage of radio energy. This in turn weakened and strengthed the energy flowing in the antenna, and had the effect of making the received signal sound similar to an airplane engine.

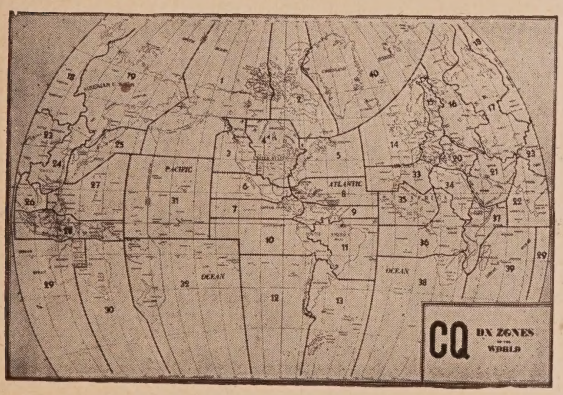
Next time you hear a radio transmission from a flying airplane, don't be too sure you are hearing the engines—if it's a propeller airplane it's coming from, you may only be hearing radio reflections from the prop blades!

As we implied in the beginning, the antenna lab is a necessity when it comes to matching electronic with aerodynamic excellence. In this work, oddly enough, it has been found that flush-mounted antennas in general are just as efficient radiators as were their drag-encumbered predecessors sticking out into the air stream. In short, the laboratory develops antennas which lose nothing electrically, but which gain a great deal aerodynamically for the airplane on which they are to be mounted.

Other work is done by the Boeing antenna lab, of course—some of it just as vital as pattern finding. The measuring and correcting of terminal impedances of proposed antennas, for example, occupies a large part of the lab's time—so that, when built, the antennas will "match" the transmitters and the frequencies they must serve. This work must be done on full- or half-scale antenna models, after pattern measurements have shown what type of antenna is most suitable. Sometimes the impedance studies require a re-run of the pattern work, using a different type of antenna.

The lab, of course, designs entirely new antennas to suit the particular communication needs of Boeing airplanes, as these needs are foreseen. Some of the new designs are built full-size as well as in scaled-model form. They may be ensconced in full-size mockups of portions of the airplane surfaces, and then tested in all ways.

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BARGAINS new and used transmitters. Receivers. Parts: Collins 32V1 $395; Globe King $315; HT-9 $199; HRO-7 $225; Temco 75GA $225; Collins 75A1 $295; new 150 watt phone $199; HRO-5T $175; NC-173 $139; Hallicrafters S-47 $139; HRO Senior $129; RME 45 $99; SX-17 $89.50; NC-46, RME 69 $69.50; VHF 152A $69; SX-24 $69; Bud VFO 21, $39.50; NC-100 $59; Glibe Trotter $57.50; new Meissner signal calibrators $24.95; MB-611 $29; 90800 exciter $29.50! Gonset 10-11 converters $25; XE-10 $19.95; and many others. Large stock trade-ins. Free Trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Laboratories, Inc., Council Bluffs, Iowa.

"NEW LOOK" reconditioned receivers. Electronic Labs, Box 1821, Lincoln, Nebr.

SELL: BC610E, 80 thru 10, speech amp BC614E. Cables, tubes, excellent condition. W1QUQ, 36 Harkness Avenue, Springfield, Mass.

USED MAGAZINES and call books to any DX willing to pay postage costs. W6CKS, P. O. Box F. Eagle Rock, Los Angeles 41, California.

FOR SALE: HT-17 transmitter with set of coils, $28 like new, no delivery. M. Manchik W2FYP, 3135 Godwin Terrace, Bronx 63, N. Y.

SELLING OUT—send for list. W5QDF, Clarendon, Texas.

REAL BARGAINS: New 10 meter trans., 300 watts $100.00; all band trans., 700 watts, A1 $250.00; 75 meter 1 KW $300.00; BC610, new, all coils $475.00; Meissner E.X. $59.50; Collins 75A1 $285.00; NC200 $95.00; SX43 $119.00; Hammarlund 4-20 Trans., with Mod. $69.50. Satisfaction guaranteed. Radio Equipment Co., Lexington, Ky

FOR SALE: TRANSMITTERS, receivers, tubes, parts. Write for list. Box 375, Winchester, Va.

FOR SALE: Dual 75 0.5" $7. 150-50-50-150-125-600 T-17 mike 40c, chest mike 75c, mike trans 50c. Dual 100-.045-200. 250 mmf. .04 25c. 570 v.c.t. 150 ma $1. 20 w. mod. 75c 60 w. $2. 90 w. $4. Write needs. D. Vettese, Box 4, Pomona, N. J.

MILLEN 50 watt exciter and 90281 supply, $75. Scope 90902 $25 brand new. SCR522 receiver, $5. VHF oscillator using 2C26, $2. 1000 volt 300 ma supply $25. 1350 volt 500 ma xfmr $15, 8 hy 500 ma. choke $7 new, 5-25 hy 500 ma choke $7 new. Brand new Millen 90881 amplifier, $50. BC 312, $60, 8005 $3.50, 815 $3. 3C24/24G 75c, 3BP1 $3.50, 5BP4 $2. A. E. Cybulski, W1RVR Box 272, Worcester 1, Mass.

COLLINS, National, Hallicrafters, RME, Lysco, Gonset, Eldico, Harvey-Wells, Stancor, Meissner and Johnson communication equipment available for cash, terms, or with trade-ins at Evans Radio, Box 312, Concord, N. H.

CRYSTALS: Marine, aircraft, communications types. Special prices to MARS, civilian defense groups. Furnish requirements, request catalog. R. E. Nebel Laboratory, 1104 Lincoln Place, Brooklyn 13, New York.

16"—17"—TV CHASSIS. Brand new in original carton, unopened. All tubes, less CRT. Regal model #2217 with standard tuner. Excellent for prize at hamfest, etc. F.O.B. 47-47 39th Place, L. I. C. 4, N. Y. W2PDH. ST 6-2259.

SWAP: Mark II transmitter, new and complete for S38 or equivalent. W9OJN, 782 Condit St., Woodriver, Illinois.

WANTED: BC-654 (SCR-284), PE-103, PE-104, GN-45: TCS sets, parts; RA-34 rectifier; ARC-1; BC-348; war surplus transmitters, receivers, power supplies, test equipment. Arrow Appliance, 525 Union, Lynn, Mass.

SELL: BC-654 portable transmitter-receiver with PE-104, PE-103, GN-45. TCS portable transmitter, receiver, and power supplies. TBL-13 transmitter, RA-34 rectifier, TBY and technical manuals, LM-8 frequency meter. DU-1 direction finder. T. Clark Howard, 46 Mt. Vernon St., Boston 8, Mass. (W1AFN) Richmond 2-0916.

WANTED: Back issues of science, ham and radio periodicals, texts. John Young, Halkirk, Alberta, Canada.

KP81 RECEIVER, excellent condition, $150; five 4X500F, new, each $75; four 829B new, $10 each; four 872 new, $5 each; Peak preselector, $5; Mallory vibrapack, 6v. d.c. to 300v. 120 ma., $20; Western Electric 110A broadcast limiter amplifier, $100; RCA BA-4C audio amplifier, $80; Collins 7B amplifier, $20; following meters 0-2 amp. RF Weston 3" $8; 0-5 amp. RF Weston 3" $8; 0-20 ma. d.c. Weston $5; 0-1 ma. a.c. 3" $5; 0-100 RF galvanometer Weston 3", like new, $10; two 6 ft. telephone type relay racks, open, $6 each. L. A. Benson, 7218 Cromwell Drive, Clayton, Missouri.

WORKING JEWELER, newcomer to ham radio, will trade lady's registered diamond ring set, appraised value, $600, for Collins 32V-2 transmitter, complete, or WRL 400 Globe King, complete with all accessories. Will pay freight. John Brownston, 912 Third St., Bakersfield, Calif.

USED MAGAZINES and call books to any DX willing to pay postage costs. Kaw Valley Radio Club, Topeka, Kansas.

COLLINS 30J Transmitter 400 watts, 813's PP Final, 80-40-20-10-6 meters. Speech clipper, negative peak limiter, push to talk custom built. 310C Exciter. Government paid $2500.00 for same type. 75A-1 receiver. Equipment like new. $1500.00 FOB Cedar Rapids. Buying Collins KW-1 and 75A-2. WØCVU, P.O. Box 224, Cedar Rapids, Iowa.

around in the Boeing antenna lab. If we weren't aware of their actual use we could mistake them for horns, tubes, pipes, bowls, or even bathtubs and shower sprays.

"Looks like plumbing, anyhow," we cracked, to a Boeing engineer.

"Long-distance plumbing," he cracked back. "With these fittings you might sprinkle the moon!"

SIMPLER "AUTO CALL"

(from page 19)

much neater job can be done and this procedure is virtually necessary in order to gain more space if you plan to use an FL8 filter or large components. The snap fasteners can be easily pressed out to provide mounting holes.

Adjustments

Test the pulsing unit separately. Apply 6 volts ac to the rectifier and manually operate the Plate relay. Since whistled pulses are to be employed, additional tension must be added to the armature of the Time relay in order to increase the operating delay. This is best done by fastening a light spring or a rubber band from the relay armature extension around the copper slug to a hole in the frame. Adjust this spring so that it exerts the maximum pull on the armature while still permitting the armature to be pulled in. There should be a delay of about one-half second from the time the magnet is energized until the relay operates.

Apply plate and filament voltages to the tube. With no signal adjust the cathode potentiometer until the Plate relay operates, then back off until the Plate relay unoperates. This is the most sensitive position. If the filter does not reject all unwanted signals, this adjustment may require further refinement.

Apply an audio signal of high frequency to the input. The plate relay should operate and stay operated for the duration of the signal. Pulsing the audio signal should operate the stepping switch.

In Use

It will be noted that, contrary to the original Auto-Call, no positive action takes place when the wiper of the stepping switch is pulsed to a point not wired for rejection. This means that nine pulses in sequence will operate the Operate relay. Since the original Auto-Call required a pause after each sequence of pulses, it was virtually fool-proof—modulation peaks operating the stepping switch would not trip it because the peaks would not appear in proper sequence. This unit may be subject to an occasional false-alarm but it has the advantage of permitting group calling. As a simple example, suppose that the codes for four stations are as follows: A—1224, B—3222, C—1242, D—1422. These stations may be called individually by these calls. They may be called by "pairs" as follows: AB—324, AC—126, AD—144, BC—342, BD—522, CD—162. By "threes"; ABC —36, BCD—72, ABD—54, ACD—18. All stations can be called with 9 pulses.

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BRAND NEW 12.95

VHF TRANSMITTER & RECEIVER: Receiver BC-688 operates approx. 450 mcs FM. Has co-ax RF front end using 956's, mtr. BC-689, for above receiver, uses 2-8012 in push-pull. This combo wonderful for 420 ham or citizens' band. Fair cond., less tubes. EACH UNIT: $4.50

BC-357 MARKER BEACON RECEIVER: Freq. 75 mc. 1-12SQ7, 1-12C8. Built-in relay fine for capacity relay or model control. Closes at .4 ma. and opens at .2 ma. Like new. HOT! $5.00

DZ-1 AIRCRAFT RECEIVER: 6 continuous bands from 15-1525 kcs. Makes swell DF set. Excel. concl. $24.95

ARD-3 VHF RECEIVER: 400-500 mc. Terrific for 420 ham or citizens' band. 26 VDC input or 115 V. 400 cyc. Easily converted to 60 cyc. Has 30 mcs. band spread. Less tubes. $7.50

TUNING UNITS FOR BC-223 TRANSMITTER: TU-18, 3000-4500 kc; TU-25, 3500-5250 kc. New in metal cases. EACH: $3.50

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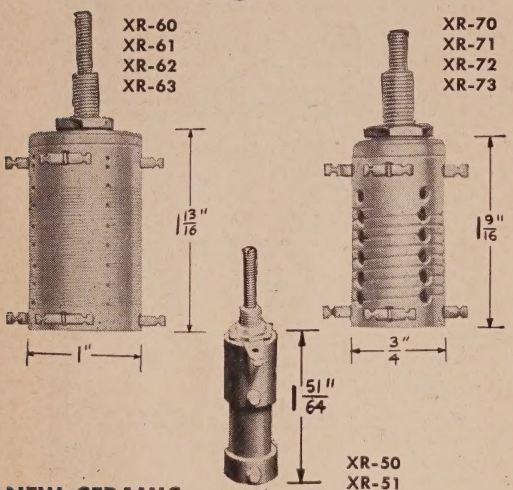
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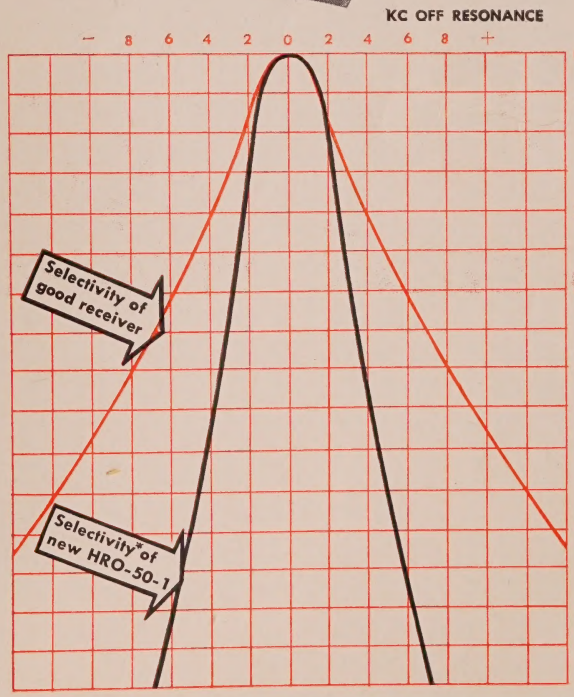
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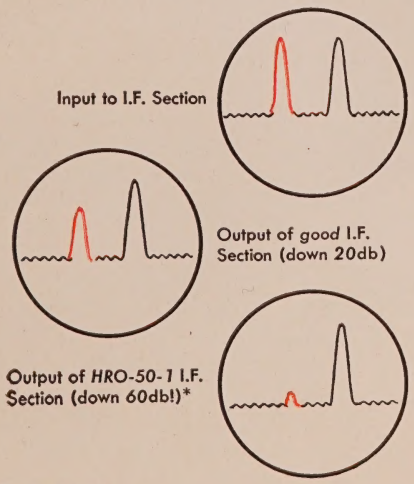
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