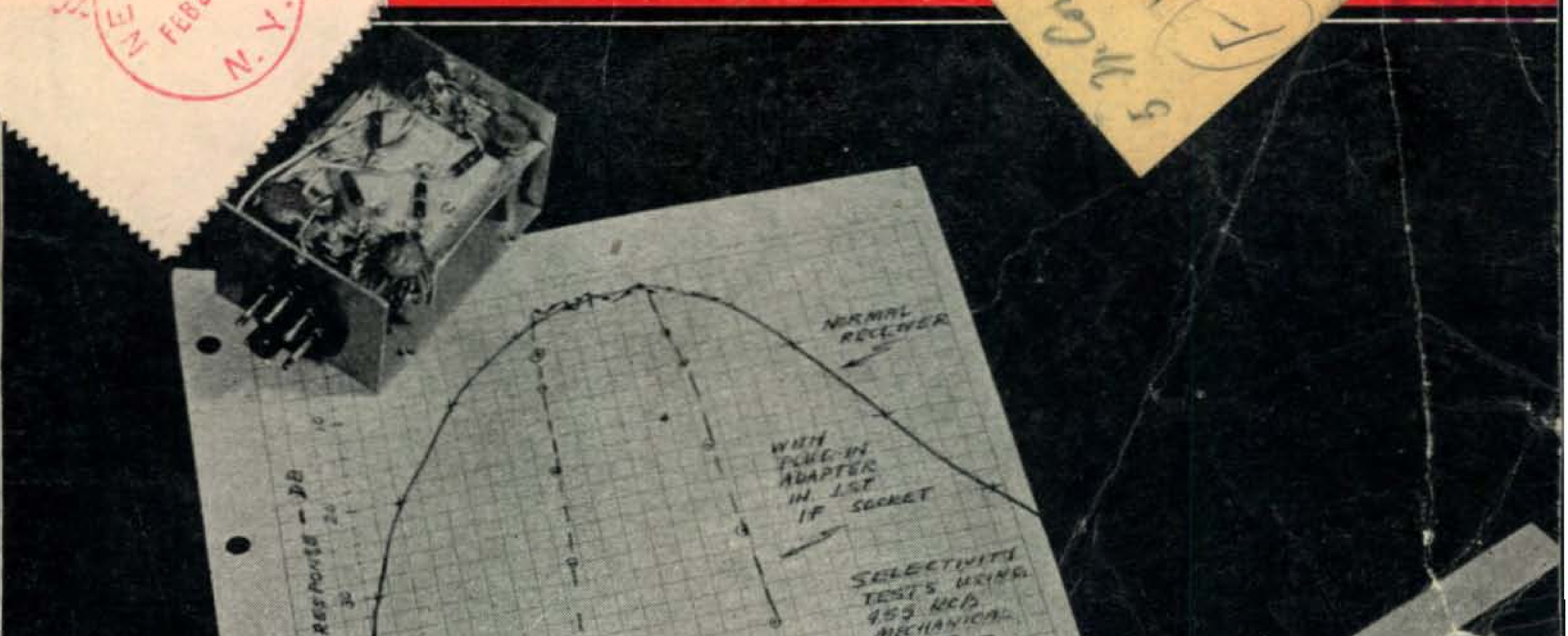
CQ RADIO AMATEURS' JOURNAL

MARCH 1953



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35c

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Another outstanding JOHNSON transmitter kit . . . the Viking Mobile! All stages metered and gang tuned . . . instant bandswitching, 100% modulation, sufficient audio gain for either high impedance or carbon microphones. Designed for maximum output on 75, 20 and 10 meters, the Viking Mobile is provided with a four position crystal selector switch, permitting 15 meter or other special frequency operation. Maximum PA input: 60 watts at 600 volts; up to 30 watts with only 300 volts. Under-dash mounting—all controls readily accessible and visible. Chassis may be quickly removed from cabinet without disconnecting power cables. In assembly, meter and crystal selector switch positions may be reversed for either right or left side mounting.

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807 Power Amplifier
6BH6 Speech Amplifier
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807 pp Modulator
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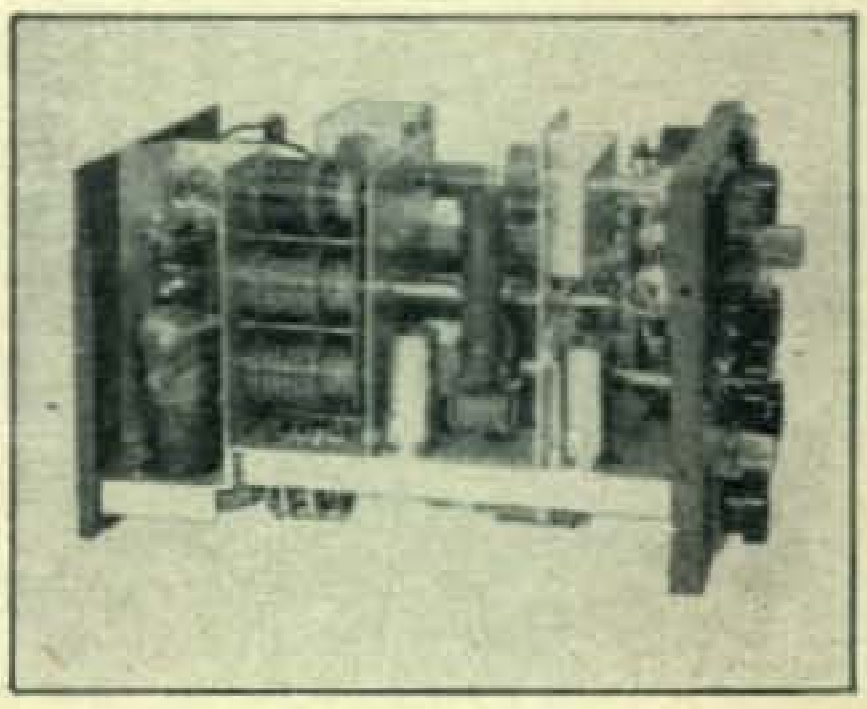

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- VFO RF input coaxial connector
- RF output coaxial connector
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- Male octal power and control cable
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- Microphone

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The recent ceremonies in Washington, D. C., at which the Edison Award and citations were announced, strongly evidence the high regard in which amateurs throughout the country are held.

Recognition of the contributions made by you radio amateurs, was enthusiastically given by national figures attending the presentation—from the American Red Cross Society, the Federal Communications Commission, and the Military Affiliate Radio System. In addition, you can take pride in the large number of individuals who gave so generously of their time to nominate candidates for the Award.

General Electric considers it a privilege to have helped focus public attention on the many humane and unselfish services performed by amateurs—and, with your help, will continue to call attention to these services by means of the Edison Award for 1953.

GENERAL ELECTRIC

166-183

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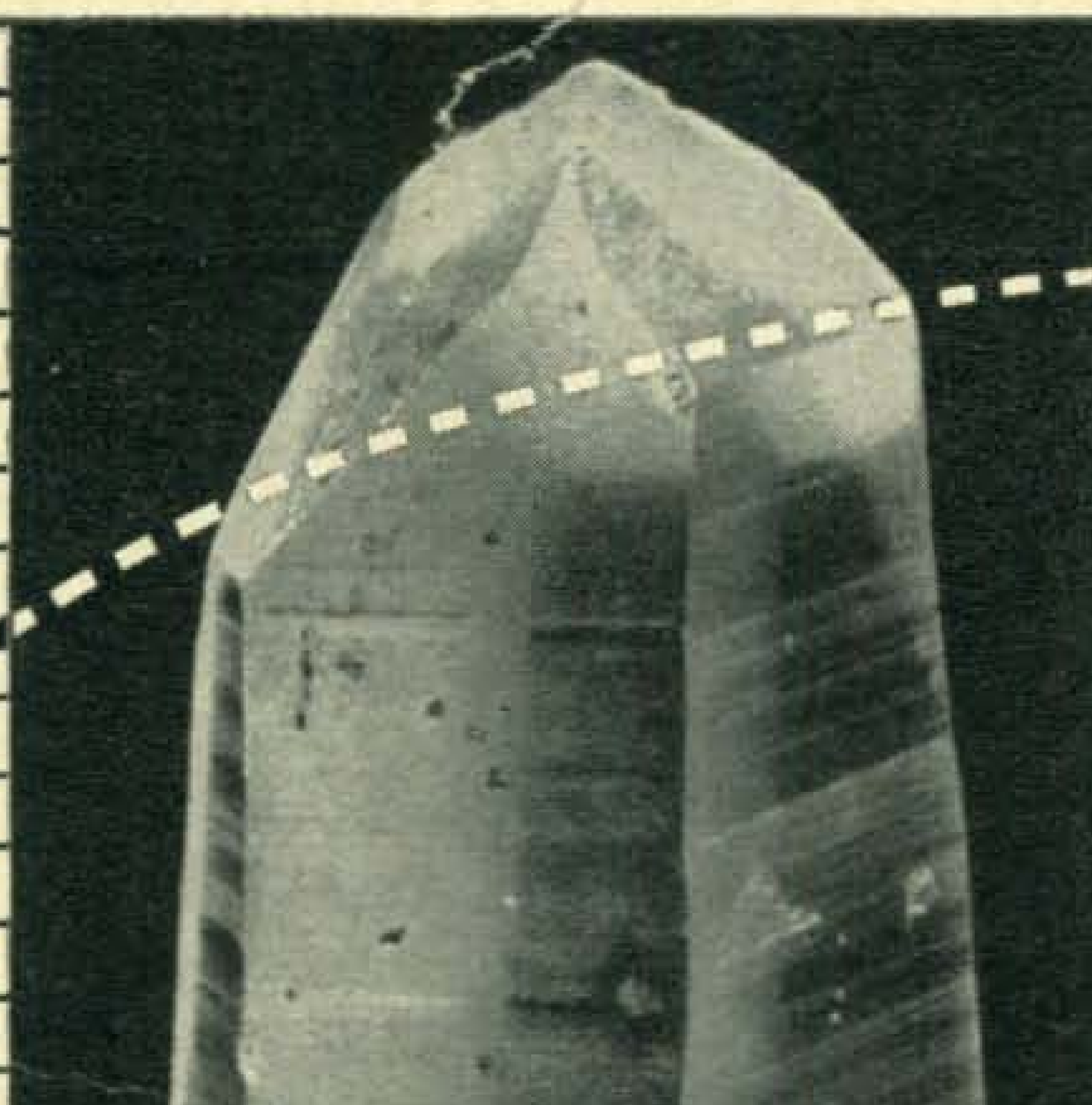

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CQ RADIO AMATEURS' JOURNAL

VOL. 9, NO. 3
MARCH, 1953

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FEATURE ARTICLES

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Miscellaneous

"I Read

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It's true that Hallicrafters equipment lets you hear more. It's equally true that you hear better—and are heard better—when you depend on Hallicrafters equipment. That's why for twenty years Hallicrafters communications equipment has been top favorite with the most critical expert in the world, the American amateur.

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The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 270 MC with generous over laps plus an arbitrary scale for use with special application inductors. Internal terminal strip permits battery operation for antenna measurement.

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Deer Hon. Ed:

Scratchi, the geenyus, are doing it again! Boy oh boy, are it collosus. I are getting idea that are so stewpendus that it scaring me. As soon as amchoors heer about this, Scratchi's name will be going down in fame with Steinmetz, Edison and Marconi. If Hon. Editors of Who's Who heering about it, they probably putting out speshull edishun so can having my name in it. Wowie! waiting till I tell you about it, Hon. Ed.

This are it. I are designing a brand new method of transmitting. No fooling! With my sistem amchoors can working all over the world with no trubbles. DX men will having to use Scratchi's sistem or they just not working out of there backyard. Those DX men what are using sistem having to get extra room in house to putting in all new QSL cards they will be getting.

Scratchi are calling new sistem Scratchi's Powerful Lalapaloozer Audio Transmitter. Also calling it SPLAT for short. The idea behind it are so revolushunary that it not surprizing nobuddy else thinking of it. Are so complicated I not even sure that I knowing how it work myself.

Here are theery of SPLAT. As you knowing, Hon. Ed., when listening on four megacackles foney band usually all you heering is mad mess of QRM. Every few cycles having reel strong carrier. Poor old S-meter on receiver not even moving, but just staying at top of meter in stait of shock. Same thing happening on fourteen megacackle phoney band. Hole spectrum solid with squeals, carriers and sum modulashun.

Now, Scratchi figuring, no sense trying to putting rock-crusher carrier in that mess to mixing it up like crazy with other carriers. Certainly no percentage doing it that way. But, I thinking, must be sum way to getting red-hots signal thru that mess.

Sum amchoors are using single-sideband and doing pretty good job, on acct. they not trying to putting big carrier on air, they just putting on one little old single sideband. It are at this point that Hon. Brain are going in high gear. If SSB boys barrelling through with one sideband, Scratchi should be able to murdering band with no sidebands. (No, Hon. Ed., if I murdering band it won't be dead.) All I got to do is using audio—no RF, just audio. SPLAT!!

It working this way. No need to furnishing a carrier, as they already all over the band. All having to do is putting great gobs of audio into antenna and letting it modulate all carriers on all bands. All you can heering on all bands is Scratchi's modulashun! Aren't this grate idea, Hon. Ed?

(Continued on page 8)

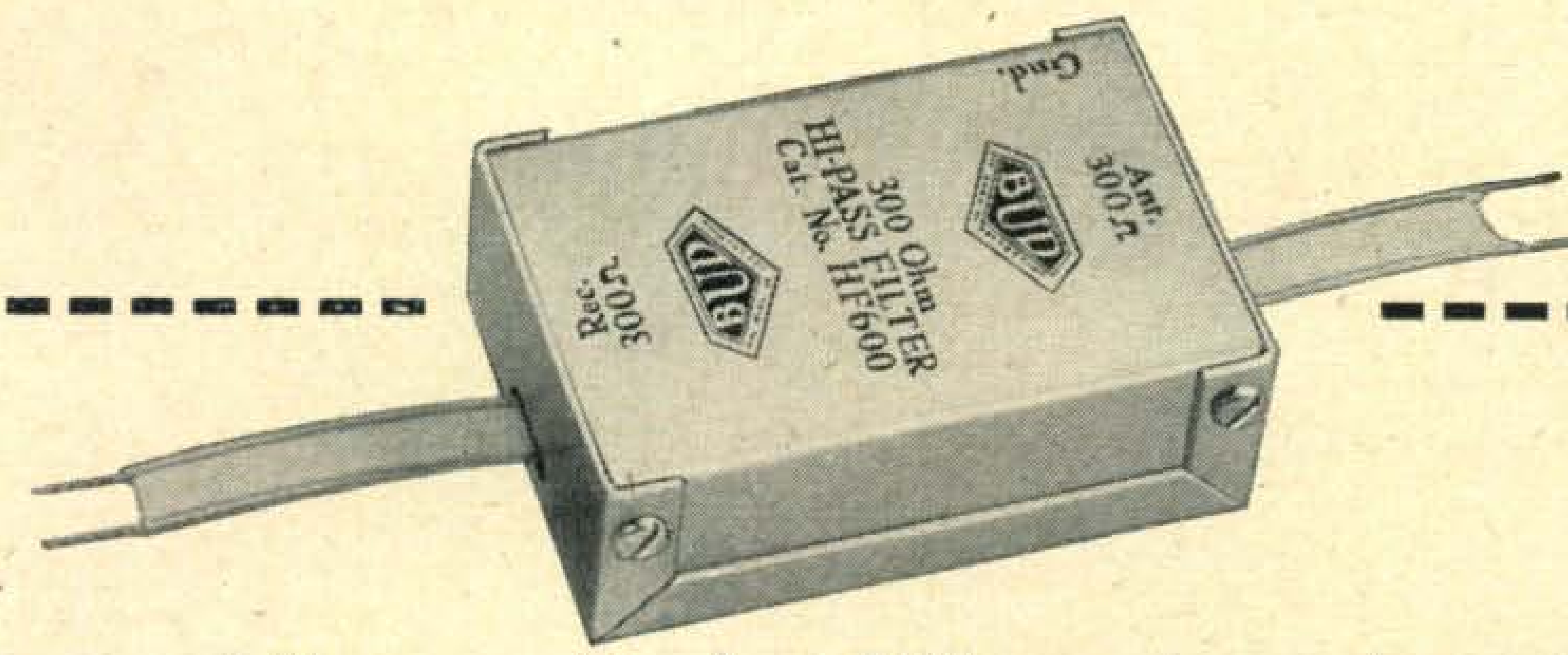
● Are You the Most unpopular man in your neighborhood?

● Are You forced to become a swing shift ham?

● You can be on the air more hours by explaining to your neighbors how the . . .

BUD HIGH PASS FILTER

Reduces T.V.I.



If your neighbors complain about T.V.I. everytime you're on the air, if you're forced to restrict your operations until after midnight you'll lose a lot of friends and sleep, too!

You can solve these problems by suggesting to your neighbors the installation of a BUD HIGH PASS FILTER. Not only will it reduce or eliminate interference from your rig but also from auto ignition systems, electrical storms, diathermy and X-Ray machines and from other annoying sources.

It is small, compact and easy to install. It's worth many times its low cost.

See the Bud High Pass Filter at your nearest Bud distributor—test it on your own TV set and you'll be sure to recommend it to your friends and neighbors.

Model HF 600 **Amateur Net $3.00**

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★ Frequency Range—1.75 to 260 MC. in 5 Bands
★ Adjustable Sensitivity Control
★ Wedge-shaped for Easy Access in Hard-to-get-at Places
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New Low Price: $39.75 net

A HIGHLY USEFUL INSTRUMENT FOR THE

Amateur • Engineer • Service Man
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The New B & W Model 600 Dip Meter provides you with a convenient means of doing the job in a minimum of time with dependable accuracy.

It is an extremely sensitive and reliable piece of test equipment having innumerable uses in the Ham Shack, Service Shop, Electronic Laboratory, or Production Plant.

Armed with this versatile and indispensable instrument, you eliminate the guess-work during measurement of—tank circuit frequencies, antennas, feed line systems, parasitics, and other pertinent tuned circuit characteristics, with speed and accuracy.

The handy instruction manual furnished with each instrument covers full information on how to use the Model 600 as an Absorption Meter, Auxiliary Signal Generator, R. F. Signal Monitor, and several special applications as well. See it at all leading electronic parts distributors throughout the U. S. A. and Canada; or write for descriptive bulletin.

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

(from page 6)

Just thinking. No need for crystal oscillators, buffers dubblers or finals. No trubble changing frequency as audio modulating carriers on all bands at once. Not even needing amchoor license, which are sooper-peechy, as mine having expired some eleventeen years ago. And, best of all, there not being any power limit on amount of audio anybuddy wanting to use. FCC say can't putting more than 1000 whats into final. Hah! Scratchi not having final.

Hon. Ed., don't rushing rite out to SPLAT yourself, on acct. I already got my SPLAT sistem about reddy to go on air. Having built huge audio amplifier. Plummers having come yestiddy and putting in new water line to cooling toobs in power output stage. For audio transformers using power company pole pots that I are finding one nite in junk yard rite next to power company.

So, pretty soon will be all set to go. Howsumever, please not telling anybuddy about SPLATS rite now, Hon. Ed. You see, if everybuddy start using SPLATS, there not being any QRM on band, and then Scratchi not being able to modulate QRM. You not having to keep seckrut too long, Hon. Ed.—just till Scratchi putting up audio antenna.

Now let's see. A half-wave antenna on 1000 cycles is 492 divided by 1 over one-thousand, which are 492,000 feet. To get antenna length in miles, dividing by 5,280, so getting . . . Hokendoke Hackensaki!! Hon. Ed., I needing antenna more than 95 miles long!! That almost as far as from here to Twosahn Arizona. Maybe you better keeping SPLAT under your hat till I figuring out where to digging up 95 miles of wire.

Respectively yours,
Hashafisti Scratchi

A certain engineer was hunting one Sunday morning out in the woods. He went down to the spring carrying his gun and pail to get some water to make his coffee. Upon straightening up from the spring he found himself face to face with a huge vicious bear. Dropping the pail, but hanging on to the gun he jumped a nearby fence in one bound only to find himself confronted with an enraged bull. Being a really super-engineer, however, he turned and fired his one cartridge through the fence killing the bear. He knew he could shoot the bull any time.

Anonymous, but last seen in the Bucktail Hamster

Errata

Getting on Novice Phone
(January, 1953—page 24)

First column, line 13, should read, "Wire in C6 between terminal 5, socket V3, and solder lug mounted on ceramic pillar between sockets V2 and V3."

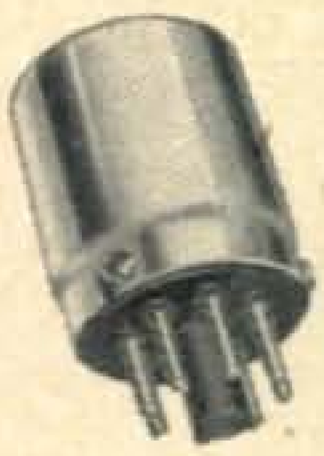
Second column, line 16, should read, "Connect R13 between pin 4, socket V5 and ground lug under pin 6. Connect R10 between pin 2, socket V5 and back lug (junction of R6 and red lead of T1) of terminal strip.

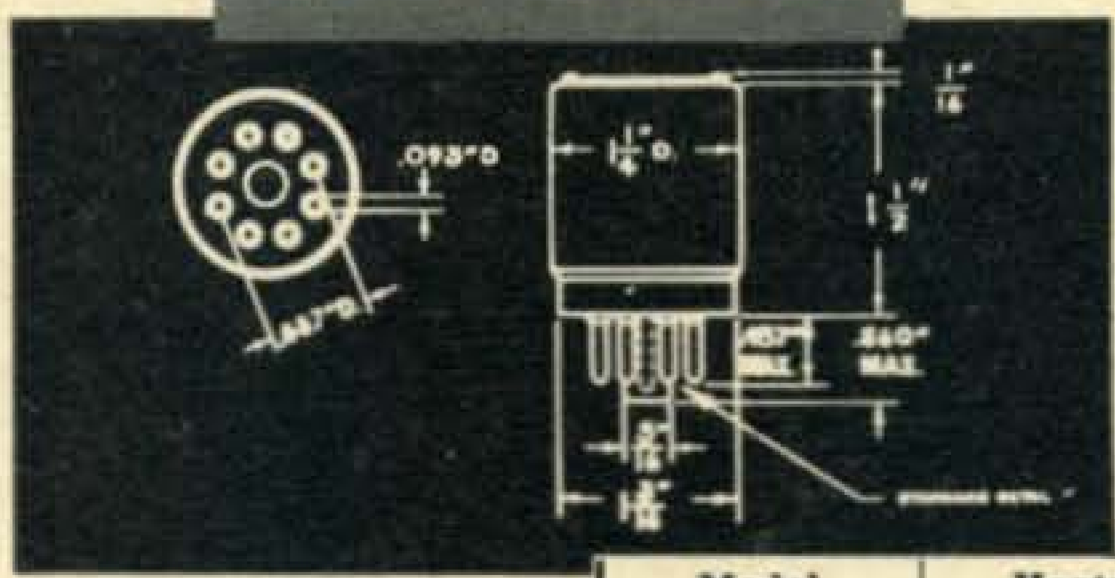
In paragraph under heading, "Coils," RFC2 should read RFC1, RFC3 should read RFC2.

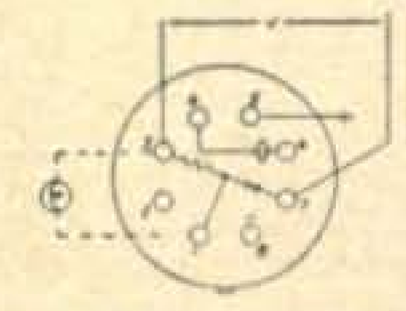
FOR EXTREME STABILITY .. *Bliley* CRYSTALS PLUS *Bliley* TEMPERATURE STABILIZERS

Crystal frequency stability is a finite factor determined by ambient temperature variation. Bliley Temperature Stabilizers, used with Bliley Crystals, are thermostatically controlled ovens engineered to deliver extreme stability regardless of ambient temperature changes.

TCO SERIES



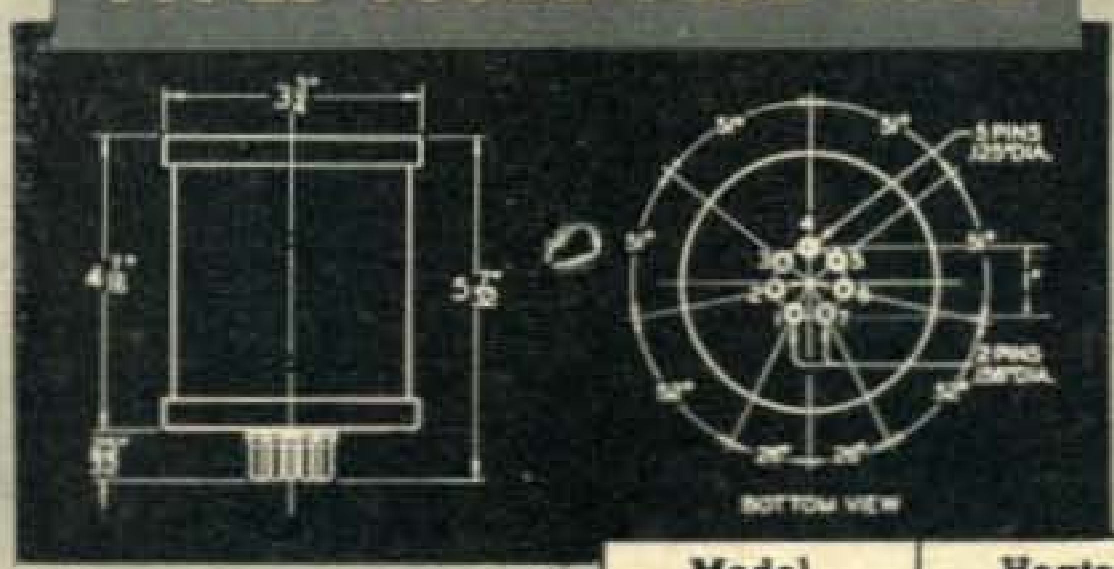


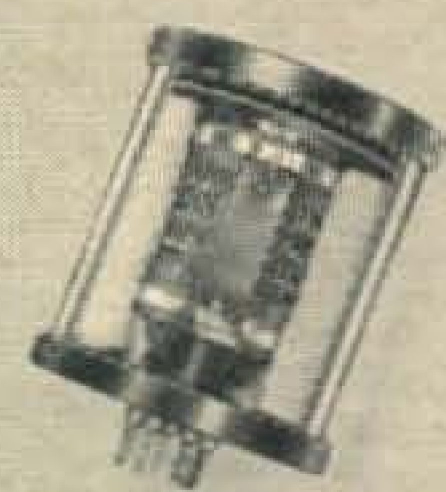


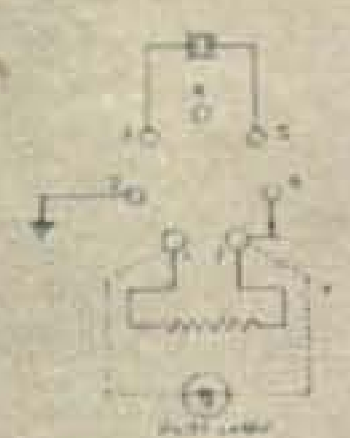
Designed specifically for use with Bliley types BH6A and SR11 crystal units. Standard models are supplied as indicated:

Model	Heater Voltage	Watts	Crystal Sockets	Control Temperature
TCO-1A	6.3	5.5	1	75°C or 85°C
TCO-1C	24 or 26.5	7.75	1	75°C or 85°C
TCO-2	6.3	5.5	2	75°C
TCO-2	6.3	7.9	2	85°C
TCO-2D	24 or 26.5	7.75	2	75°C or 85°C

TYPES TC911-TC92-TC93







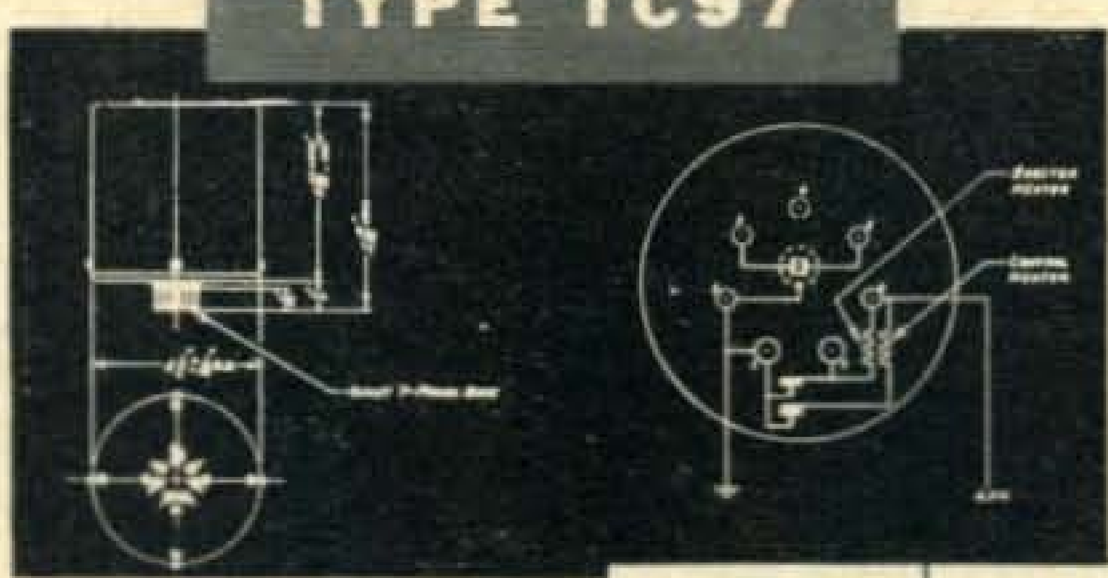
Designed specifically for use with Bliley Crystal units. Standard models are supplied, for crystal types, as indicated:

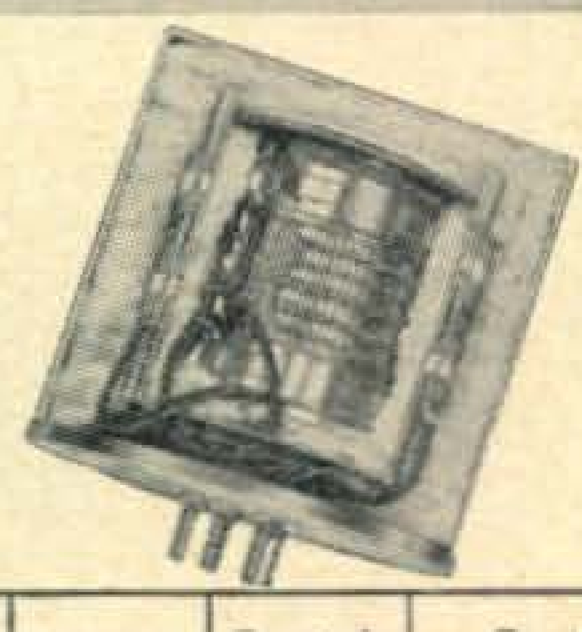
Model	Heater Voltage	Watts	Crystal Group	Control Temperature
TC911	115	10	B	70°C
TC92	6.3	10	A	60°C
TC93	18	10	A	60°C

Crystal Group A Types FM6, BH81A, MC7, AR4, AR5

Crystal Group B Types BH8, MC75, MS46A

TYPE TC97





Exceptional temperature stability is provided by two separate heaters, individually regulated by separate thermostats. Ambient temperature variations are first minimized by outer stage (booster) heater with final regulation by inner stage (control) heater.

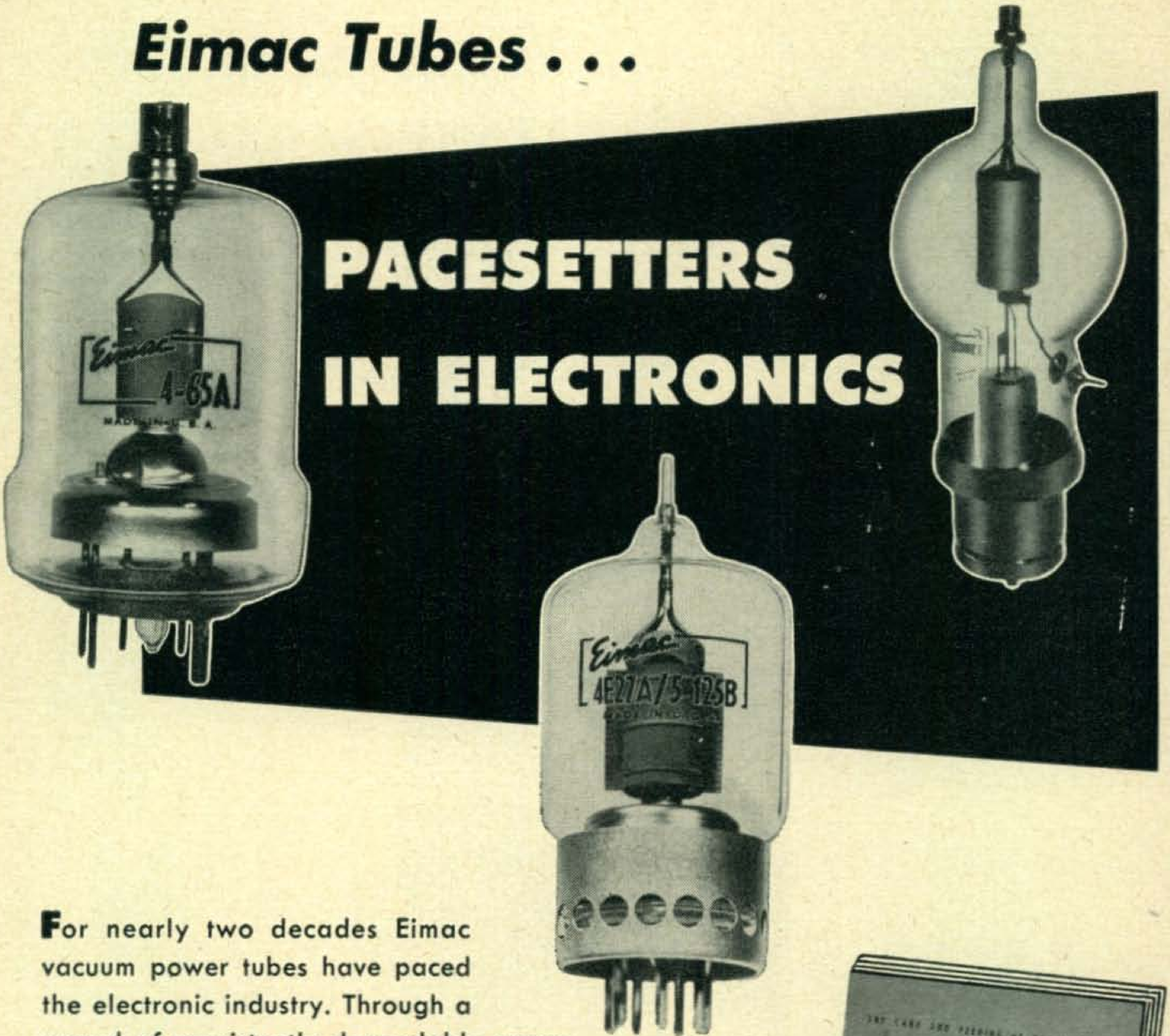
Model	Heater Voltage	Watts	Crystal Group	Control Temperature
TC97	6.3	11	A	75°C

Crystal Group A Types FM6, BH81A, MC7, AR4, AR5

BLILEY ELECTRIC COMPANY

UNION STATION BUILDING, ERIE, PENNSYLVANIA

Eimac Tubes . . .



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For nearly two decades Eimac vacuum power tubes have paced the electronic industry. Through a record of consistently dependable operation, Eimac tubes — whether a triode, tetrode or pentode — are being relied on by leading Amateur Radio Operators. Whatever frequency, power or system your rig is operating on, there is an Eimac tube to do the job with a minimum of driving power, high plate efficiency and simple circuitry. Eimac tubes vary in plate dissipation ratings from 25 watts to 20,000 watts and cover the spectrum from audio frequencies to 9600 mc. No matter what your power transmitting needs, as an amateur or engineer, you'll find time-proven Eimac tubes will perform efficiently, dependably and economically.

• For information and technical data write the Eimac Amateurs' Service Bureau. "Care and Feeding of Power Tetrodes," a handy 28 page booklet, that is all the name implies, is available free upon request.

Eimac TUBES

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CQ
The Radio Amateurs' Journal
COWAN PUBLISHING CORP.
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Dear Reader:

I have just returned from an interesting trip to Washington, D. C. -- interesting from the aspect that I was able to see, in a very short space of time, two very opposite reactions to amateur radio.

On the favorable side of the ledger was the Edison Award dinner which I attended on January 28th. The Edison Award is the General Electric Tube Department's recognition of outstanding public service by a radio amateur during the preceding year. It was awarded for 1952 to Don L. Mullican, W5PHP, of Searcy, Arkansas. The choice was unanimous, not only by the three judges, but by those in the audience who heard W5DVI describe the work and sacrifice of W5PHP after the Judsonia, Ark. tornado on March 21.

The judges also commended numerous other amateurs, either individually or collectively, who performed outstanding services during the year, and four special citations will be made. These citations will go to: W9NZZ for his QSO's with the North Pole weather stations, W8FYW for teaching ham radio to the blind, W6JJU for his message-handling from the Far East and W1DBM for his work in TVI reduction. G. E. should be applauded for this fine venture in behalf of amateur radio and the public welfare.

The other side of the ledger was not as favorable. I don't propose to offer CQ as a political sounding board on the question of Docket 10173 and the petitions for re-hearing, but I will say that irreparable damage has been done to the prestige of amateur service by attempting to attack the FCC through the Congress of the United States. Regardless of the merit of the petitions, the methods are suspect and tend to subtract from the stature of the entire amateur service.

As this is being written, two things of major import are taking place at the CQ Editorial Office. One is the production of a second "Special Mobile Issue," and the second is the preparation of a "Mobile Handbook." Both of these are the result of our experience in 1952 with amateur radio mobile operation. More information on them next month.

73,

Oliver P. Ferrell, Managing Editor

Event Of The Month

Don L. Mullican (left) W5PHP, Searcy, Ark., receives the Edison Radio Amateur Award trophy for 1952. Presentation was made by J. M. Lang, general manager of General Electric Company's tube department, at cermonies in the Mayflower Hotel in Washington, D.C., on Jan. 28. The 20-year-old winner took time off from his studies at Harding College, making his first plane flight to receive the award trophy and a 24-hour watch, presented for his outstanding public service as a radio amateur during the Arkansas tornado disaster of March, 1952.

TVI PROBLEMS ?

the 32V-3 has the answer

Because even the fundamental carrier frequency can cause TVI, *there is no such thing as a TVI-proof transmitter.* In the 32V-3, however, spurious radiations have been reduced to an absolute minimum. A high order of spurious attenuation has been designed into the 32V-3 by engineering measures including the following:

- The one-piece cabinet contains numerous small holes which provide adequate ventilation but prevent radiation of spurious energy.
- The r-f section is completely enclosed in a separate shielded compartment inside the main cabinet.
- External connections for a-c input, key, mike, receiver disabling, and antenna relay operation are well filtered where they pass through the cabinet.
- Grounded studs are provided for mounting and grounding a 35C-2 low-pass filter at the rear of the cabinet. In fringe-area installations, the 35C-2 filter may be necessary in order to provide additional attenuation of spurious radiations. Many fringe-area hams have found that the 35C-2 permits successful operation of TV receivers in the radio shack.
- A pi-L output network, developed by Collins, reduces radiations at frequencies higher than the carrier.
- Coaxial r-f output permits taking advantage of the inherent shielding and grounding of coaxial lines.

These TVI precautions are in addition to such well-known Collins features as precision frequency stability, a direct-reading, accurately calibrated dial, good audio quality, and clean keying without chirps or clicks.

The 32V-3 runs 150 watts input on cw and 120 watts on phone.

Net Domestic Prices:

32V-3 transmitter..............$775.00
35C-2 low-pass filter............$ 40.00

FOR THE BEST IN AMATEUR RADIO, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd St., NEW YORK 36 — 1930 Hi-Line Drive, DALLAS 2 — 2700 W. Olive Ave., BURBANK

New Life for your Equipment

Using The COLLINS F455A-31 Filter

E. MILES BROWN, W2PAU

Technical Advisory Editor, CQ

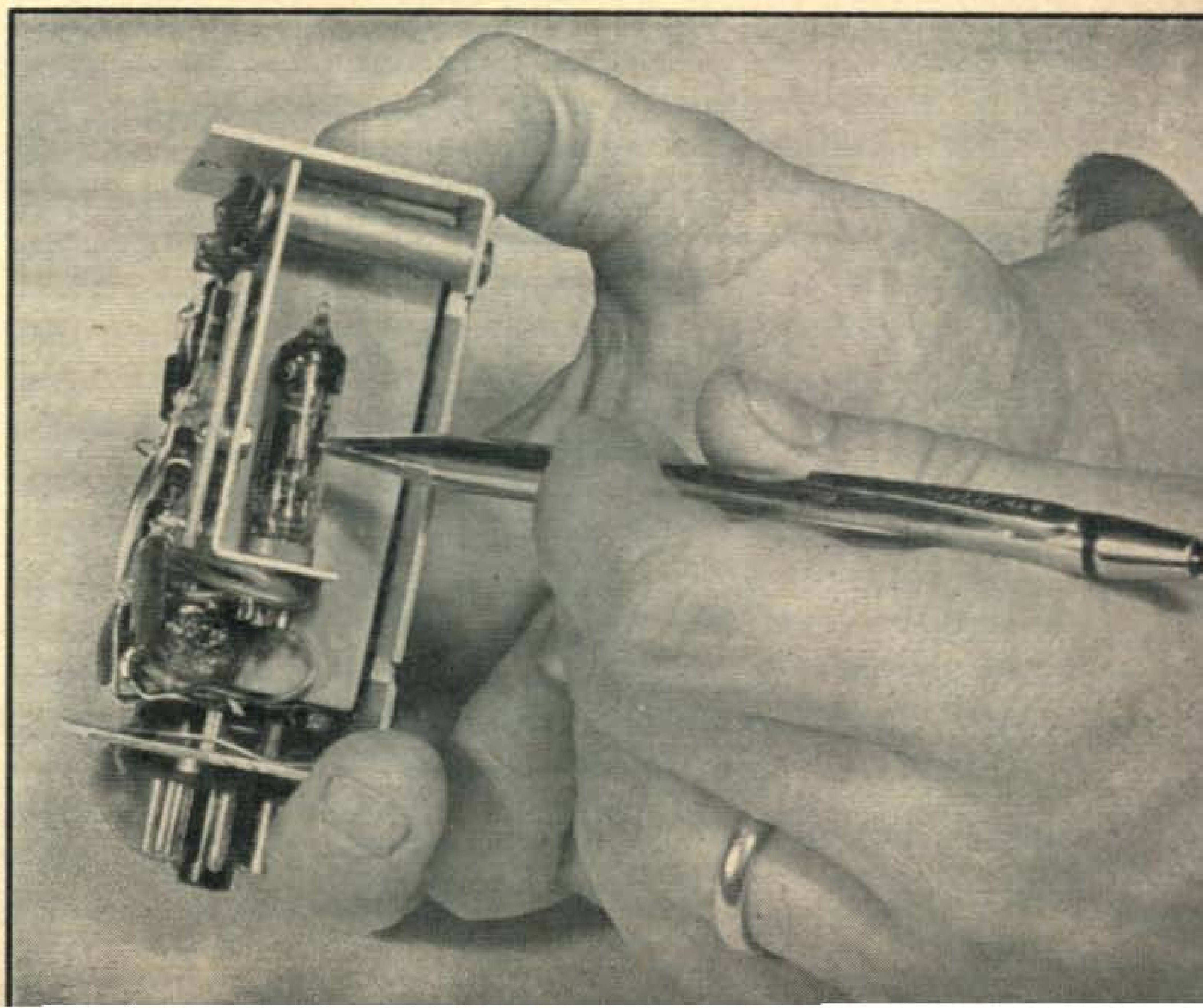
The announcement of the availability of the Collins F455A-31 Mechanical Filter as a separate unit immediately fired the imagination of the CQ Staff. Here was an opportunity for experimental development of i-f adapters that would provide optimum selectivity in ANY receiver. This article describes two models of such an adapter. Either one or the other can be employed in 90% of the radio amateur type communications receivers in use today.—Editor.

For quite obvious reasons many amateurs who will read this may first ask, "what is the ideal selectivity characteristic for a ham communications style receiver."

The first requirement is that the receiver must be capable of handling the full amount of information contained on the received carrier. It should accept all the important components of the desired input signal and amplify them equally. A receiver which does not meet this requirement is guilty of subtracting information from the received signal, and hence may not provide good readability. Furthermore, all components of the input signal should be treated in the same manner by the receiver—if there is a time delay involved in the passage of a signal through the receiver circuits, the delay should be the same for all components of the input signal, otherwise the arrangement of the information contained in a complex input signal may be garbled in transmission through the receiver. This basic requirement is as important in a narrow-band CW receiver as in a television receiver.

The second requirement is that the receiver reject all signals which do not fall within the limits of the pass-band. This seems to specify that the ideal selectivity curve should have a flat-top response in the pass-band and very steep skirts, changing from full amplification to complete rejection in the narrowest possible transition region.

In practice, a "square-top" selectivity curve is not completely desirable because of the fact that a sudden transition from full gain to very low gain cannot be accomplished without violating the basic requirement which demands that a uniform time delay be imposed on the entire input signal. Any components which fall in the transition region of the selectivity curve will be garbled. Also, interference may be experienced from other signals in this region. A good example of this effect is noticed when attempting to copy weak signals in the presence of noise. In a broadly selective receiver the noise impulses and the desired signal are reproduced faithfully at the output of the receiver, and we must rely on our ears to separate



This adapter has been built into a small metal box (cover removed for photographing) and is entirely self-contained. Two sub-miniature 5899 tubes are used as the necessary coupling medium into and out of the filter. In practice, the first i-f tube is removed and the adapter substituted—just as simple as that!

the signal from the noise. A highly selective receiver may so garble the nature of the noise impulses that they no longer sound like noise at the output of the receiver but rather sound like extended "boinngs"—capable of producing more interference to the desired signal than the original noise impulses.

Actually, there is no one "ideal" selectivity curve shape which suits all receiver applications. Working in the crowded low-frequency bands where the interference consists mainly of signals transmitted by other radio stations, the "square-top" selectivity curve with steep sides and only slightly rounded corners will give good performance if its band width is adequate for the type of signals being received. It should have excellent "adjacent channel" attenuation, to sift out those kilowatt-plus signals crowding in on both sides of the desired signal. However, for working in the v-h-f bands, where we often encounter extremely weak signals hiding beneath the receiver tube noise, a selectivity curve with more rounded corners and more gently sloping sides might better fill the bill.

Band Width Requirements

The first and most important selectivity requirement was that the receiver should accommodate the full band width occupied by the incoming signal. Let us analyze the various types of signals which might be encountered in typical amateur operations and attempt to determine the band width requirements.

A double-sideband AM signal, voice-modulated, occupies a band approximately 6000 cycles wide. (Admittedly we often hear amateur signals which are much wider than this, but this discussion will be confined to the theoretical minimum requirements for reasonably intelligible communication.) It should also be noted that the intelligence in a double-sideband signal is duplicated in the upper and the lower sidebands—if one sideband could be removed at the receiver without appreciably altering the other sideband or the carrier, full intelligibility would be retained.* Thus, we might get away with a receiver band width of only 3000 cycles, if its cut-off characteristic were such that the rejected sideband was cut out without violating the second basic requirement of a selective filter—uniform time delay in any region of the selectivity characteristic where appreciable signal energy is contained. Unless this is the case, the supposedly rejected sideband would be deformed and re-arranged in the selective circuits and would be present in some degree to interfere with the intelligibility of the desired sideband.

For good voice transmission, a single-sideband-suppressed-carrier signal should occupy a band about 3000 cycles wide.

A hand-keyed make-break CW signal, at sending speeds of about 30 words per minute, has "sidebands" which extend out about 50 cycles on each side of the radiated frequency.

An amateur FSK radioteletype signal, transmitting 60 words per minute and using 850 cycles carrier shift, requires a receiver bandwidth of about 1000 cycles for faithful reproduction of the keying pulses.[1]

Historical Background

The problem of obtaining optimum selectivity in a communications receiver is one which has claimed the attention of receiver designers since the very first days of radio. Some of the earliest crystal detectors used the multiple-tuned input circuit or "wave filters" in an attempt to lessen interference from man-made or natural noise sources. The advent of vacuum tubes suitable for r-f amplification stimulated development of multi-stage tuned r-f amplifiers designed to amplify only the desired signal. The superheterodyne receiver rapidly found favor because it was simpler to provide many tuned circuits at the constant intermediate frequency —the selective filters did not require tracking.

In 1932, James Lamb, W1AL, introduced the idea of using a quartz crystal as a resonator in the selective system, thus providing a filter element with much higher "Q" than was attainable using coils and capacitors. Lamb's crystal filter had an additional advantage, a sharp rejection "notch", which could be moved across the receiver passband to eliminate a specific interfering signal.

Basically, the principles discussed above are still standard practice in modern communications receiver design. Some designers have followed the idea of increasing the number of tuned circuits in the i-f amplifier to the point where adequate rejection of off-frequency signals is obtained. Others have selected very low intermediate frequencies, since it is easier to obtain a narrow response at a low frequency than at a higher one. The single-quartz-crystal resonator has remained a part of the i-f system of most high-quality amateur receivers. However, despite all the effort that has been spent on the selectivity problem, we know of very few amateurs who in view of the crowded bands do not believe that their equipment could be improved.

The reason for their dissatisfaction is easy to explain in the light of the basic requirements outlined above. A receiver using ordinary L/C tuned circuits in its selective system must use a very large number of circuits to achieve adequate off-frequency rejection. This places a great burden on the receiver designer, who must arrange each set of tuned circuits to pass the full band width of the input signal.

Similar remarks apply to the use of ultra-low intermediate frequencies. It requires a large number of tuned circuits to obtain adequate rejection, and the problem of providing adequate "nose band width" is complicated at the lower frequencies.

* See "Getting Started on Single Sideband," this issue page 27

[1] "Reference Data for Radio Engineers", Federal Telephone and Radio Corp. 3rd Edition, Page 17

The single quartz crystal filter is, in the opinion of many qualified radio operators, not much help. Judging from some of the published selectivity curves of receivers using these filters, the explanation is obvious. The band width at the nose of the selectivity curve is usually very small —often not even wide enough to pass the 100-odd cycle band width required for good CW reception. Close to the nose of the attenuation vs. frequency curve, the slope is steep, which violates the second basic filter requirement, i.e., in the region where considerable signal energy is present, the time-delay characteristics of the receiver are badly distorted. The crystal filter does not, by itself, provide adequate rejection of considerably off-frequency signals. In short, the nose is too narrow, the skirts are too wide, and in between, the shape of the slope is wrong! The thing that can be said in favor of a single quartz crystal filter is that the deep notch provided by the phasing control is extremely useful, in cutting out a specific, stable signal which lies in the pass-band of the receiver. The notch is so sharp that it may not seriously affect the intelligibility of the desired signal.

Obviously, what is needed is a circuit which more nearly approaches the ideal characteristic—flat on top, rounded corners, and extremely steep sides. Research laboratories have been busy on the problem. The idea of using filters composed of more than one quartz crystal, perhaps in a lattice arrangement, has been proposed, but in general has been found too complex and expensive for widespread commercial application. Meantime, work progresses on improved tuned circuit networks which can fill the bill and are used in some of the modern communication receivers.

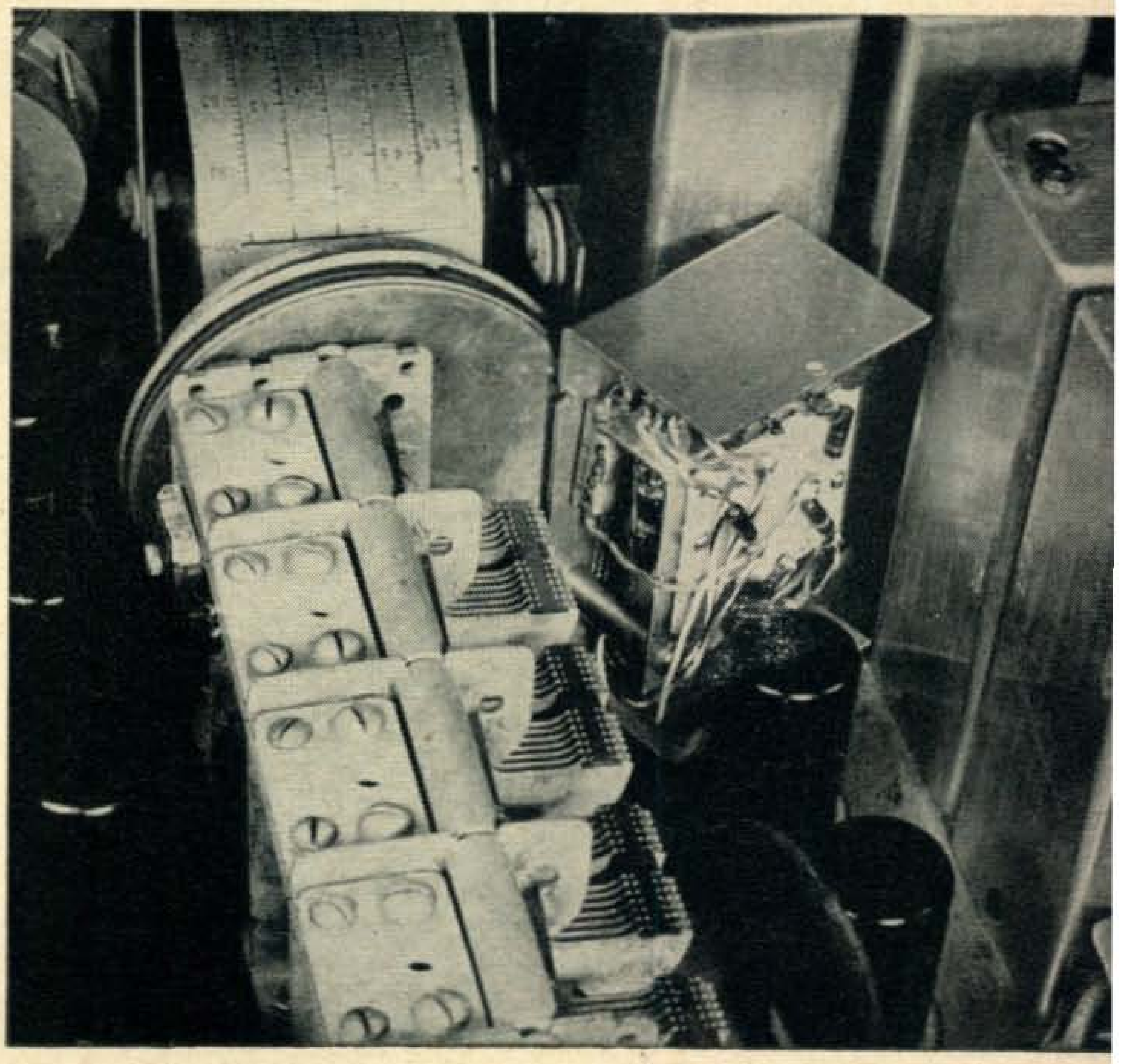
Recently the idea of using small pieces of metal as mechanical resonators—in a fashion somewhat similar to tuning forks—was proposed.[2, 3] These metallic resonators could be driven by magnetic effects from an electrical circuit; perhaps piezoelectric effects could be used, or they could be excited by the magnetostrictive effects developed in the metal itself. This basic idea seems to have hit the jackpot. The resonators are machinable, small and rugged. They use relatively cheap and readily available material. They seem adaptable to large-scale production methods, and they produce the desired result!

The Collins Filter

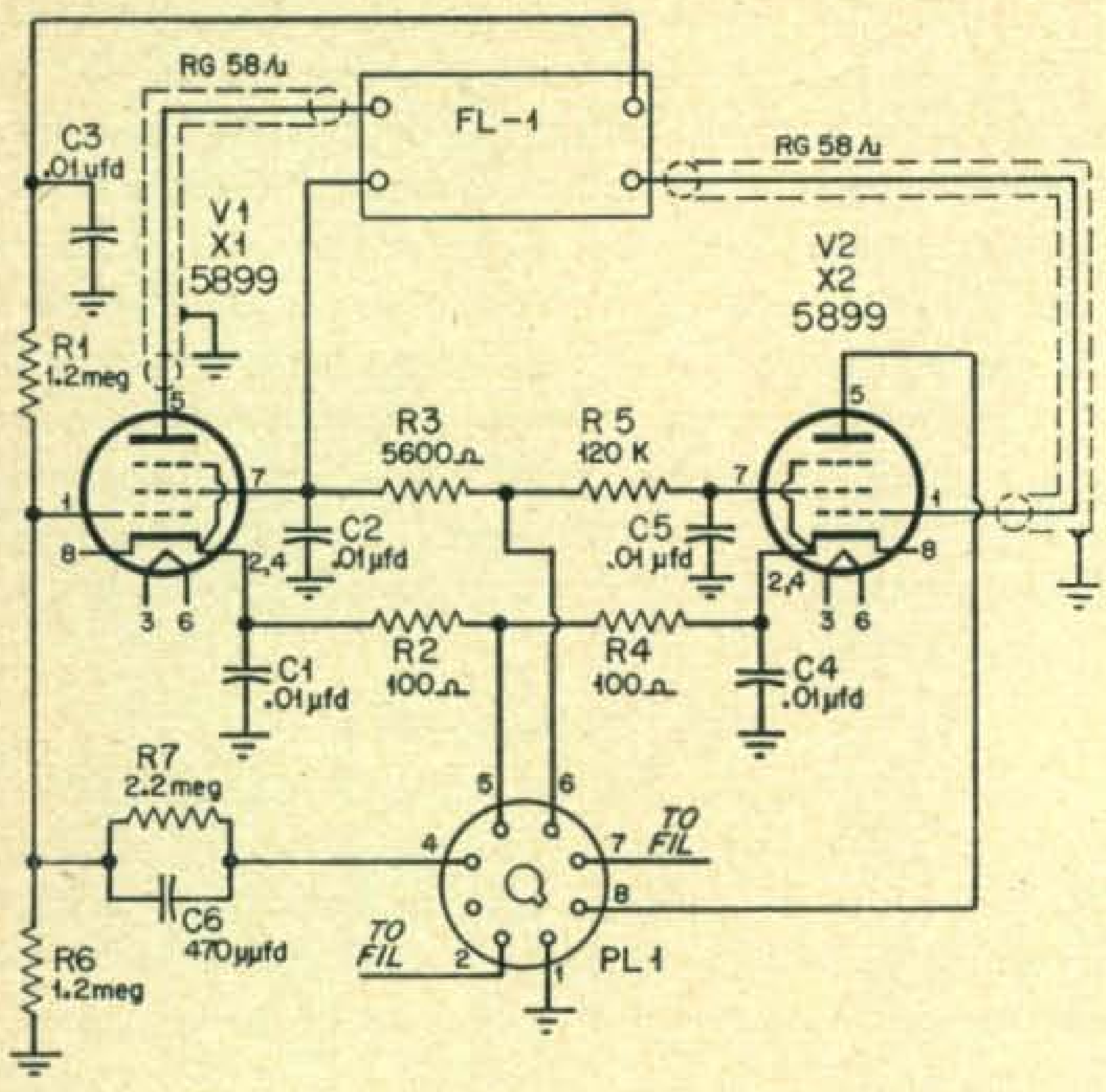
After five years of research and development the *Collins Radio Company* has successfully produced Mechanical filters which can be built to operate on frequencies within the range of 200 to 500 kc. One of their first semi-productions units is an assembly known as their Type F455A-31. It is a small box measuring roughly 1 x 1 x 3 inches, with two input and two output terminals. This little box is a band-pass filter; its response is centered on 455 kc., and it provides by itself more selectivity than all the i-f tuned circuits of a conventional Ham receiver!

According to the published characteristics, this filter has a bandwidth of approximately 3 kc.—and its response is very nearly uniform across the entire pass-band. The skirts are phenomenally steep, judged by ordinary standards, dropping from full response to 60 db. attenuation as the frequency is changed only about 1000 cycles. The corners of the response curve are smoothly rounded. In short,

2. "Mechanical Filters For Radio Frequencies", W. Van B. Roberts and Leslie L. Burns, RCA Review, Vol. X, Sept. 1949, p. 348.
3. "Compact Electromechanical Filter," R. Adler, Electronics, April 1949, page 100.



This is the adapter shown on page 13 (again with the cover removed) as inserted in a pre-War Howard 490 receiver. A 6SK7 i-f tube has been removed. Note that care must be exercised in the "keying" position of the octal socket so that the adapter will fit in the available space.



C1, C2, C3, C4, C5—0.01 $\mu\mu$fd. disc ceramic, Erie or equivalent
C6—470 $\mu\mu$fd. Hi-K, Centralab DD-471
R1—1.2 megohm, ½w. carbon, ± 10%
R2, R4—100 ohms, ½w. carbon, ± 10%
R3—5,600 ohms, ½w. carbon, ± 10%
R5—120,000 ohms, ½w. carbon, ± 10%
R6—1.2 megohms, gain adjust resistor (see text)
R7—2.2 megohms, ½w carbon
X1, X2—Cinch type 13686 subminiature socket for T-3 based tubes
V1, V2—type 5899, Sylvania or equivalent, cut leads to .2" length
PL1—octal tube, base style male plug Amphenol 86-CP8.
FL1—Collins band-pass filter, type F455A-31

Fig. 1. Wiring schematic for using the Collins Mechanical Filter in either of the adapters shown in this article.

this filter comes very close to achieving the "ideal" characteristic described above. It is a low-impedance device; the input and output impedances are both 8000 ohms. The filter shows about a 26 db. insertion loss.

There is still one serious objection to this device, and that is its price. It is not cheap, in fact, one could buy one of the lower-priced communications receivers for the price of this filter alone. The high cost is no doubt due to the extreme precision required in machining the mechanical filter elements and adjusting them to the proper electrical characteristics. Such excellent performance cannot be obtained by quick and dirty manufacturing techniques. We can only hope that as the demand for this type of filter increases and as experience is gained in solving production problems, the price may fall to the point where every Ham can afford one! After all, when one considers what must be spent to obtain the finest types of receivers available today, the added cost of this filter is justified, if it makes possible a significant improvement in operation.

Adapting the Filter to an Existing Receiver

Although many applications for the little 455-kc filter practically suggest themselves, we were especially anxious to try it in our old faithful station receiver just to see how much improvement we would notice. We didn't want to butcher up the wiring of the receiver, for, after all, it represents an investment of a couple of hundred bucks which could be seriously devaluated by careless modifications. Also, we wanted to try the filter out in the other fellows' stations, without hauling the complete communications receiver around for the demonstration. And there was always the fear that the performance of the receiver with the filter would not be optimum for some of the types of operation which we now enjoy, so any alterations involved in using the filter should be quickly reversible!

It was decided that a small plug-in adapter probe, which could be inserted in place of one of the i-f tubes of the existing receiver, would fill the bill. The circuit shown in *Fig. 1* was devised to plug into a single-ended octal tube socket, such as might be used for a 6SK7, 6SG7, 6AB7, or what have you . . .

It was decided to use two tubes in the adapter probe. One was required to act as a buffer amplifier between the high-impedance tuned i-f transformer winding which normally fed the replaced tube, and the low-impedance mechanical filter input. The other was used to avoid placing the low-impedance output of the filter across the tuned plate winding of the i-f stage. The adapter was required to supply not only the gain of the single i-f stage which it replaced, but also to make up for the loss in the filter unit. It might have been done by a single stage, but not so easily.

To avoid serious de-tuning of the existing i-f cans, it was decided to mount the adapter tubes as close as possible to the adapter plug. This practically made it necessary to use sub-miniature tubes. Type 5899 tubes are quite a good choice for this job, with adequate transconductance to produce the required gain, and having good remote cut-off characteristics for a-v-c operation. Sockets, and the tubes themselves, can be obtained through commercial outlets.

All voltages necessary to operate the adapter are derived from the original i-f stage socket. The a-v-c voltage, which appears at the socket grid terminal is applied to the first tube through a resistive bleeder. This network is necessary in order to reduce the amount of a-v-c bias applied to the 5899, which has a somewhat sharper cutoff characteristic than the typical tubes the adapter will replace. The condenser C6 will bypass the i-f signal around the network and into the grid of *V1*. A-v-c voltage is also applied to the second 5899 tube through the decoupling filter R1-C3. Because the tube ratings specify relatively low maximum plate voltages, the plate voltage for the first 5899 was derived from the screen terminal of the original i-f stage. After some experimentation it was decided to take a slight calculated risk and run the second 5899 at the full plate voltage of the original i-f stage, but its screen resistance was made quite high to insure that the dissipation would be within ratings.

A small amount of cathode resistance was included in each stage to provide added decoupling in case the original cathode bypass was inadequate. Care was taken to provide full shielding between the input and output sides of the adaptor.

The first model was entirely self-contained in a 1⅜ x 2⅛ x 3⅜-inch metal box. An *Amphenol* octal plug was fitted to the bottom of the box. There was ample room for the filter tubes, and a terminal board inside the box. This board was tailor-made from glass-based insulating material, 1/16th-inch thick. No shielding was provided for the output lead or filter leads because the layout appeared to offer sufficient shielding. The input grid lead was made up of co-ax cable due to its greater length.

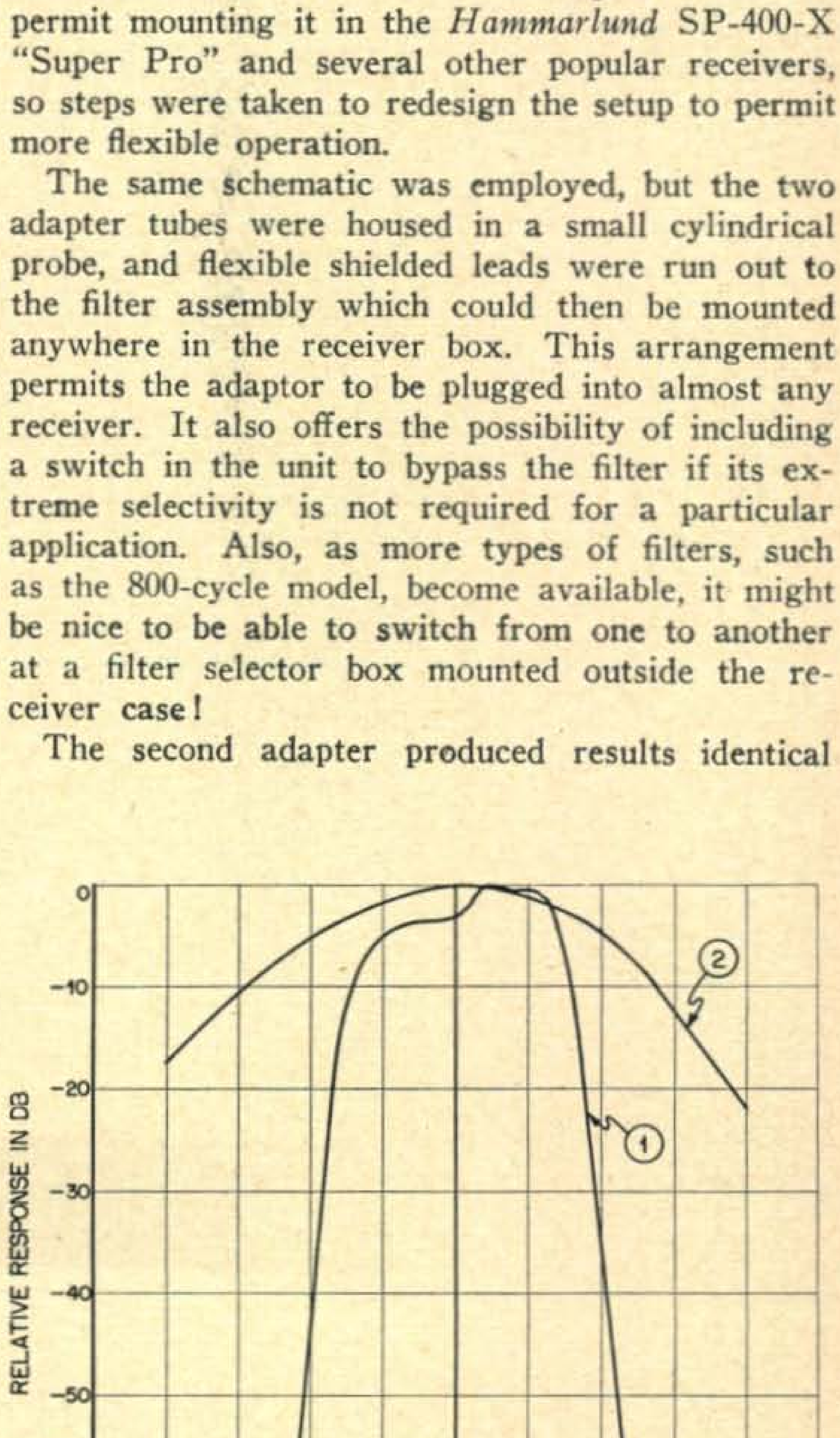
This unit was especially designed to suit an *RCA* type AR-88 receiver, and it fit into the first i-f tube socket with room to spare. Performance tests showed that only one refinement was necessary; in the AR-88 there is an unbypassed cathode resistor in the first i-f stage which caused some mutual cross-coupling in the adaptor unit. This was cured by adding an additional capacitor, 0.1 μfd., from pin five of the adaptor socket to ground. (This is not shown on the schematic as it was decided that the added space required for the capacitor was not fully justified in all cases—the AR-88 being an exception.

The i-f alignment was not changed in any way during the tests. Performance was excellent. The overall selectivity curves obtained with the adapter closely approximated the filter manufacturer's published data. And there was a truly worthwhile improvement in the performance of the receiver—especially on CW—this despite the fact that this particular receiver is one of the best as regards adjacent channel rejection. The overload characteristics of the receiver were slightly impaired. At the moment we are not sure whether this is due to the associated amplifier or the filter and would not care to hazard a guess. In any case, we noted that the receiver "blocked up" on a slightly weaker signal with the adapter in than with it out. The second receiver tested was a pre-war and much-modified *Howard*, model 490. By a coincidence, there was adequate room for the adapter box in this receiver. It was necessary to realign, as the *Howard* was designed for a 465 kc. i.f. Again, the results looked good, but measurements showed that there was not as much improvement as had been noted in the tests on the AR-88. It was found that there was some stray coupling from the front end of the i-f strip into the back end, around the adapter, which cleared up nicely when the i-f lead dress under the receiver chassis was improved. With the adapter, this receiver, from a selectivity standpoint, could hold its own in any league. The measured curves were almost as good as those taken on the much more expensive AR-88. In actual on-the-air tests, on both phone and CW, the old *Howard* has proved quite adequate, capable of doing a better job than a much fancier and more modern receiver under bad QRM conditions.

The size of the box-mounted adaptor would not permit mounting it in the *Hammarlund* SP-400-X "Super Pro" and several other popular receivers, so steps were taken to redesign the setup to permit more flexible operation.

The same schematic was employed, but the two adapter tubes were housed in a small cylindrical probe, and flexible shielded leads were run out to the filter assembly which could then be mounted anywhere in the receiver box. This arrangement permits the adaptor to be plugged into almost any receiver. It also offers the possibility of including a switch in the unit to bypass the filter if its extreme selectivity is not required for a particular application. Also, as more types of filters, such as the 800-cycle model, become available, it might be nice to be able to switch from one to another at a filter selector box mounted outside the receiver case!

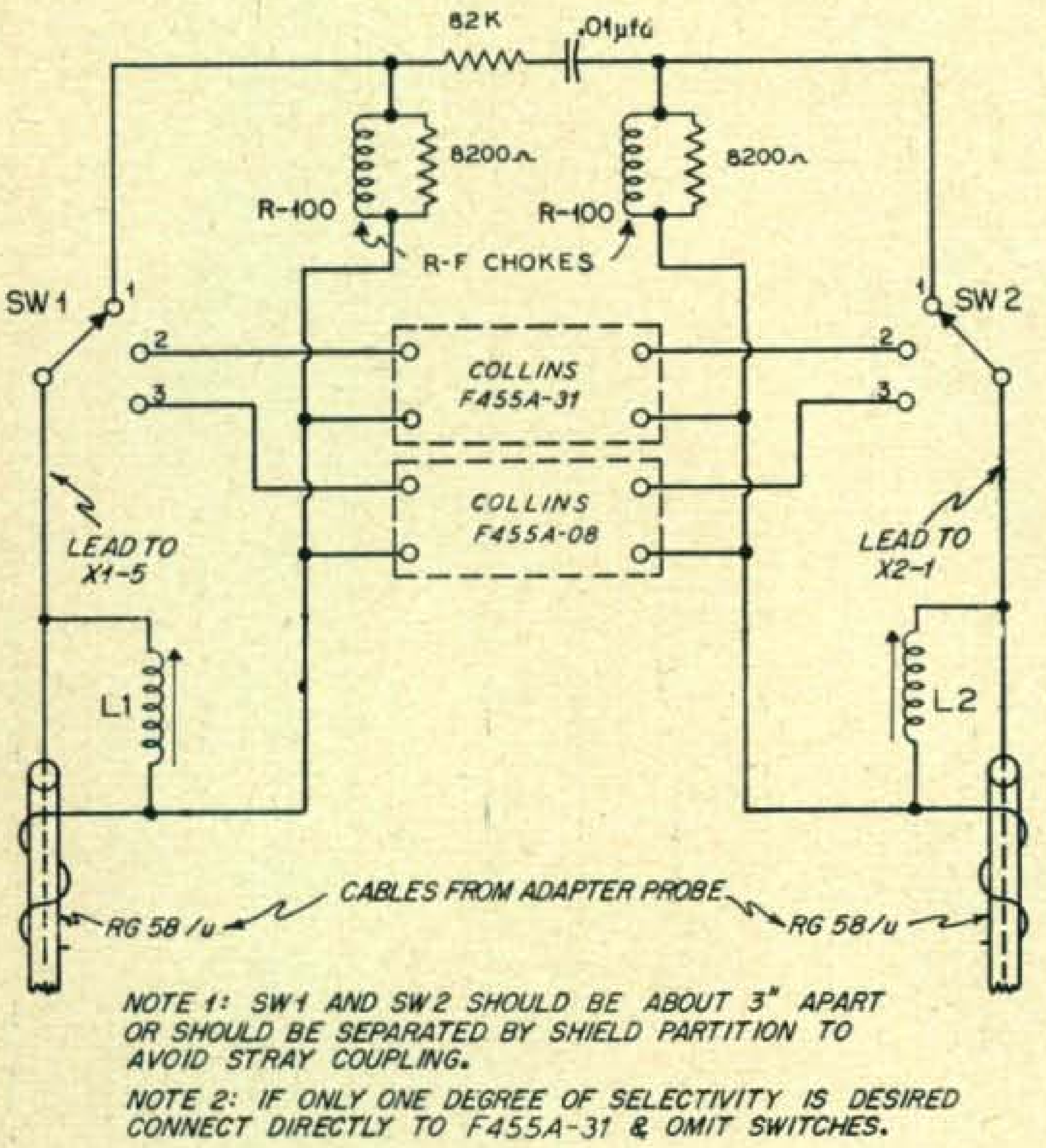
The second adapter produced results identical



These are the selectivity curves as measured by the author. Curve 1 illustrates the passband as measured on the Collins filter, serial #1071. Curve 2 is the averaged selectivity of three communications type receivers which were available for test.

to the single-unit job. It worked equally well in the AR-88 and the *Howard,* and fit easily into the restricted space in the Super Pro. As expected, the results on the Pro were almost equivalent to those obtained on the other receivers. However, the Pro uses a 6K7 first i-f stage, so the adapter was plugged into the second stage. This made the overload situation in the adapter worse. In our case, however, this did not cause any difficulties in actual operation, except when trying to copy a strictly local signal with our beam antenna pointed right at him. If the adapter were to be used exclusively with this particular receiver, it might be advisable to modify the adapter design to facilitate plugging it into the 6K7 socket in order to further postpone the overload point.

The second adapter (in the photograph on the opposite page) produced results comparable to the single-unit model. The long leads connecting the filter to the probe exhibit capacitance which must be tuned out. This is accomplished through the use of slug-tuned coils which resonate with the cable at the frequency of the filter. These are not shown in *Fig. 1* since they were found only to be necessary with the long leads in the second model. They are mounted with the filter in the separate box and were made from the windings of a standard 455-kc i-f transformer.



The second model of the adapter was designed so that the sub-miniature tubes could be built into the probe which would be inserted in the i-f stage tube socket. As shown on the opposite page, the filter and selector switch are mounted in the separate unit. Position 1 on the switch returns the receiver to normal selectivity without the mechanical filters. Coils L1 and L2 are small 455-kc windings from a standard i-f transformer. They are "peaked" for maximum signal through the circuit.

Constructing the Adapter

The general layout of both the box-mounted adapter and the probe-type adapter can be seen from the photographs. Any similar layout should provide equally good results, provided good shielding is maintained between the input and output sides of the adapter and the filter.

The hardest-to-get items will be the tubes, their sockets, the thin sheet insulating material used in the terminal boards and the miniature terminals (which are staked into the terminal board using a prick punch). Each of these items is available direct from the manufacturer, but the chances are that most jobbers and distributors are not yet set up to supply sub-miniaturized components. (Our bet is that they will be, soon!)

Working with the small-sized components takes a little getting used to. We used extremely thin, tinned, solid, copper wire, approximately #26, covered with thin "spaghetti" where there appeared to be danger of short circuits developing. Use a small soldering iron tip, and very little solder. The tube sockets are force-fitted into their mounting holes. If the holes are cut to exact size, the sockets will be firmly retained. If they are a little sloppy, it may be necessary to secure the sockets with a couple of drops of household cement. Working with sub-miniature parts is not too bad once one gets the hang of it! The author is famous for the lack of workmanship in his wiring jobs, but this adapter went together easily and worked on the first try!

This is not primarily intended to be a constructional article. Further information on the mechanical layout and wiring of the probe adapter shown here may be made available directly from the *CQ* Editorial offices if there is sufficient demand. It is felt that this article should be informative, rather than step-by-step construction, although if there are enough requests the full plans showing the detailed construction of the adapters will be made available at a moderate cost.

Testing and Operating the Adapter

Initial tests should be performed with the shield cover removed from the probe. The tubes should light when the receiver is turned on, and the electrode voltages should be checked (at the appropriate points on the terminal boards) before using the unit. The screen and plate voltage of the first tube should run in the order of 100 volts, depending somewhat on the design of the associated receiver. The second stage should have less than 250 volts on its plate, and the screen should run around 50 volts. The cathodes should develop a small voltage, about 1 or 2 volts, to ground. In some sets the cathode voltage may change with the r-f gain control setting.

If the receiver uses a 455 kc. i-f system, no realignment should be necessary. Just set the receiver up for maximum bandwidth and the filter should do the rest. If, however, the receiver is aligned on some slightly different i-f channel, it will be necessary to peak up all the i-f transformers for maximum gain using the filter adapter. This realignment may render the crystal filter feature of the receiver inoperative, unless a 455-kc crystal is substituted for the normal one.

In general, the receiver gain using the filter adapter should be about the same as it was before. The noise output may be lower due to the extra selectivity provided by the filter. If the gain, for some reason, cannot be made normal, even by realignment, it may be necessary to drop the value of the cathode resistors in the adapter to 56 ohms, and lower the screen dropping resistance of the second tube to 56,000 ohms.

The operation can best be checked by tuning in a CW carrier, using the S meter of the receiver to indicate the point of maximum response. Then switch to manual gain control, turn on the BFO, turn up the a-f gain control and set the r-f gain control to produce a good strong output signal. Turn the pitch control to produce zero beat note. Then rock the receiver main tuning control. The beat note should remain about uniform in strength until it reaches approximately 1500 cps and then it should just disappear! The same sharp cut off should be noted on each side of zero beat. If this sort of performance is not achieved, there may be some leakage of signal around the filter, the set may be badly out of alignment at the filter frequency, or there may be some leak through the i-f wiring.

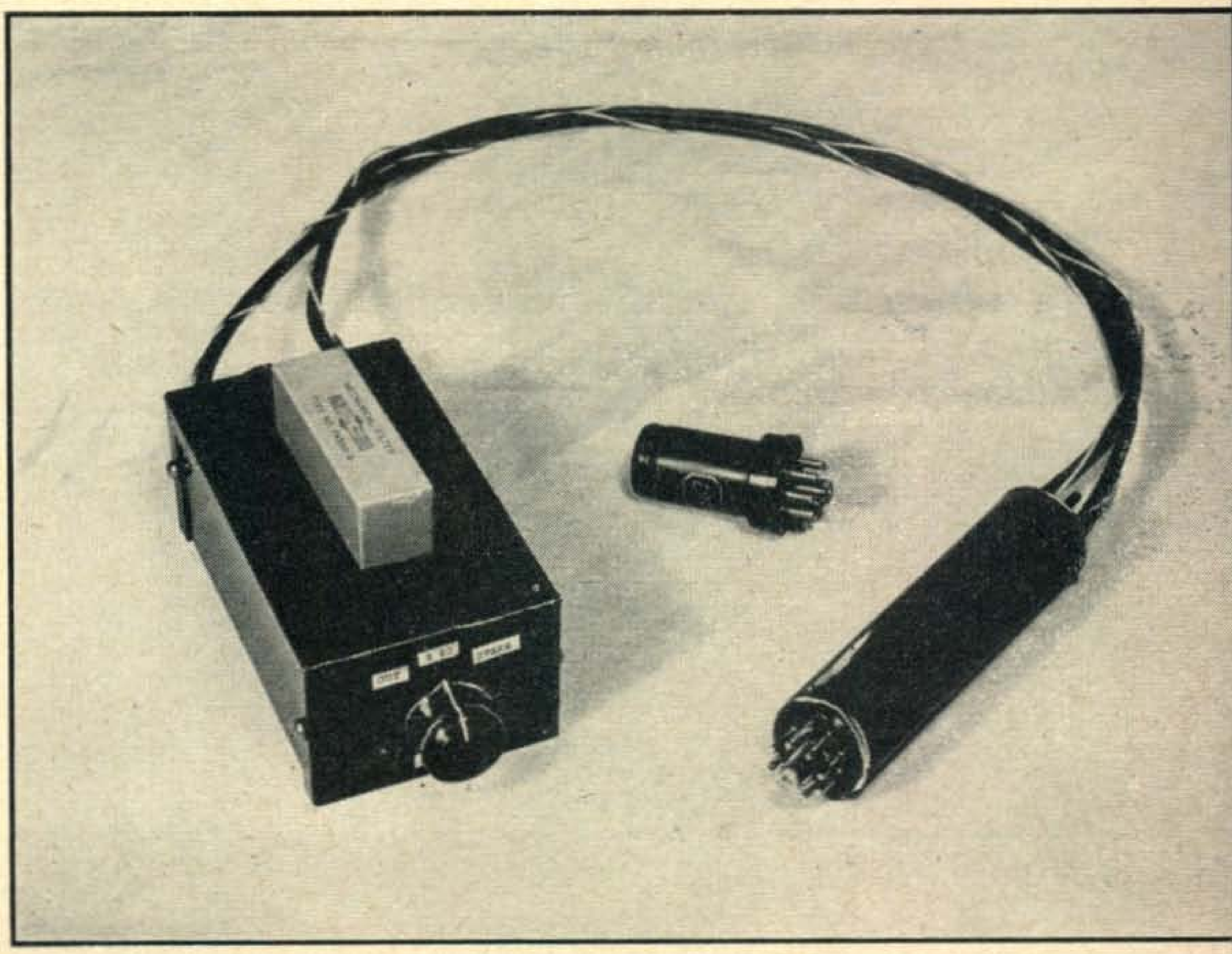
The receiver S meter will be somewhat desensitized by the addition of another tube in the AVC-controlled system. This may not be a hardship—in our particular case we found that the calibration of the station receiver averaged closer to 6 db. per S-unit with the adapter in place than with it out! And, as mentioned before, the resonant-overload characteristics of the receiver may be poorer with the adapter in. This is a point which requires further investigation.

In actual operation, it will be found that the filter is a "natural" for CW work. We were frankly amazed at the single-signal effects that were obtained. Tuning is not at all critical, as it is when using the crystal filter. The crystal filter can still be used, however, and it helps in nulling out a single strong interfering signal. It is amazing, though, how seldom it seems necessary to switch to crystal reception when using the mechanical filter.

For normal 'phone working, a different tuning procedure than is generally used will be found advantageous. If the carrier is tuned to the center of the filter response curve, speech will sound quite muffled. This is due to the fact that the 3-kc bandwidth of the filter is not adequate to reproduce the full range of voice frequencies in both sidebands. If, however, the carrier is tuned on one side of the filter's pass band, one sideband is transmitted through the filter and produces full 3 kc. reproduction, while the other sideband is almost completely eliminated.

The filter is ideal for single sideband work, and interfering carrier heterodynes in the region above 2 kc., which may be heard when using the normal receiver, disappear entirely when the adapter is used.

In short, having once used this device, we wouldn't want to be without it! As soon as the narrower-band models are available, they will be added to our adapter set-up.



The second adapter was divided into two parts. The probe is plugged into the 1st i-f stage tube socket to replace a single-band pentode amplifier. The two sub-miniature tubes are mounted in the probe and are connected to the Mechanical Filter through lengths of coaxial line. The chassis containing the filter (s) has a switching arrangement to remove the filter from the circuit returning the receiver to normal selectivity.

Taming Parasitics in Your 6146

E. H. MARRINER, W6BLZ

528 Colima Street, La Jolla, Calif.

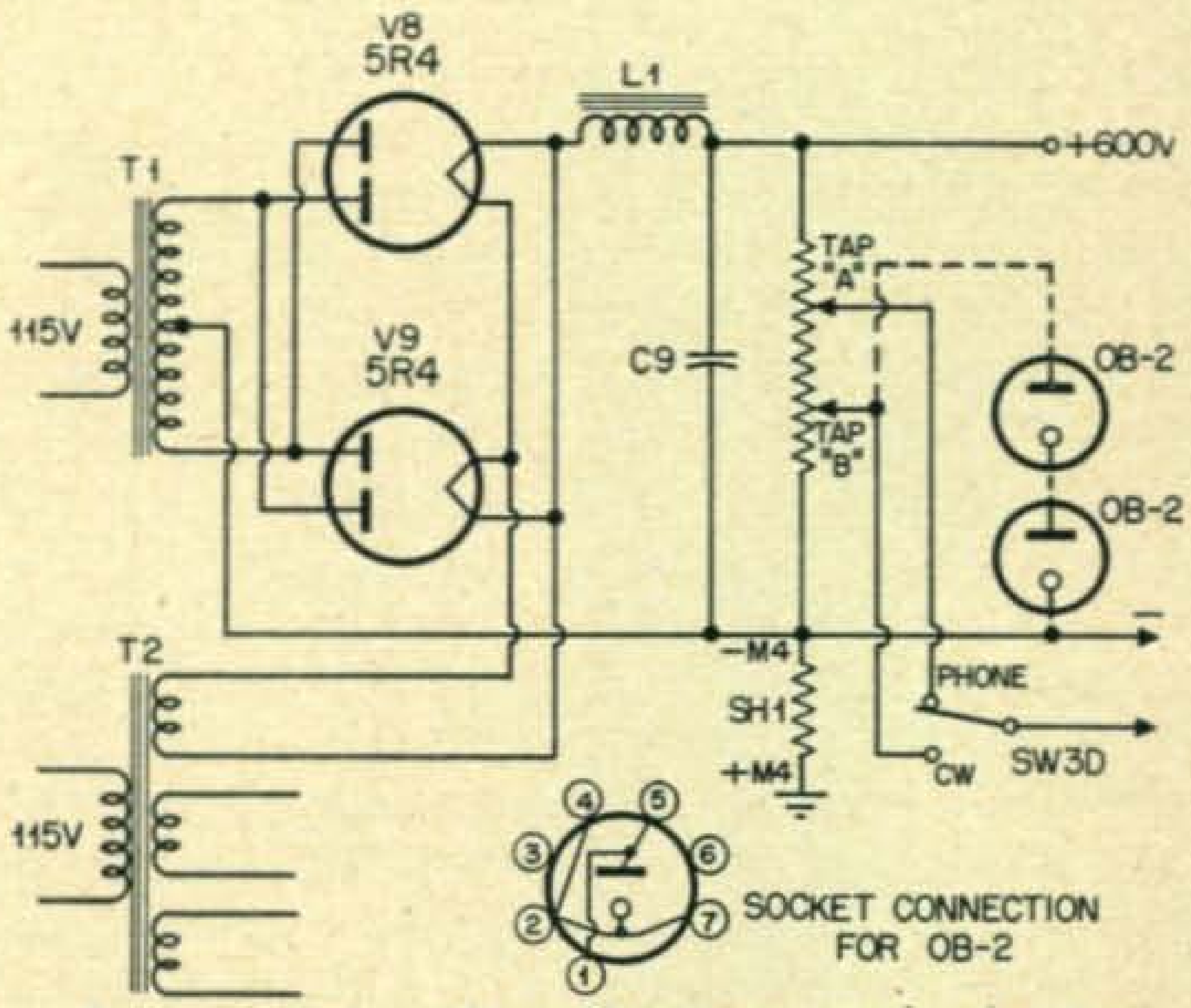
This is a timely article on the problem of curing a common trouble in circuits using the 6146 final amplifier.—Editor.

Quite a few of the amateur fraternity are having difficulty, with the new 6146 tubes, in trying to keep the plate current down in the "key up" position.

I have a *Viking II* using two 6146's, and every time I would let up on the key the plate current would go up. This had me baffled for a long time, as I apparently had enough fixed bias (-85 volts) to cut the tube off, and I could not find any v-h-f parasitics. Yet in the *key up* condition, enough power leaked through to light a lamp bulb.

At first I tried parasitic chokes in the grids and screens, plus a 100-ohm resistor, with no improvement in the situation. Also noticed that the plate tuning had no effect on the parasitic. Parasitic oscillations of a low frequency are generally caused by r-f chokes in the grid and plate circuits being coupled through the tube, so I tried shorting chokes. This did not seem to have any effect. At this stage of the game, there just didn't seem to be any answer to the situation, even after searching through the handbooks.

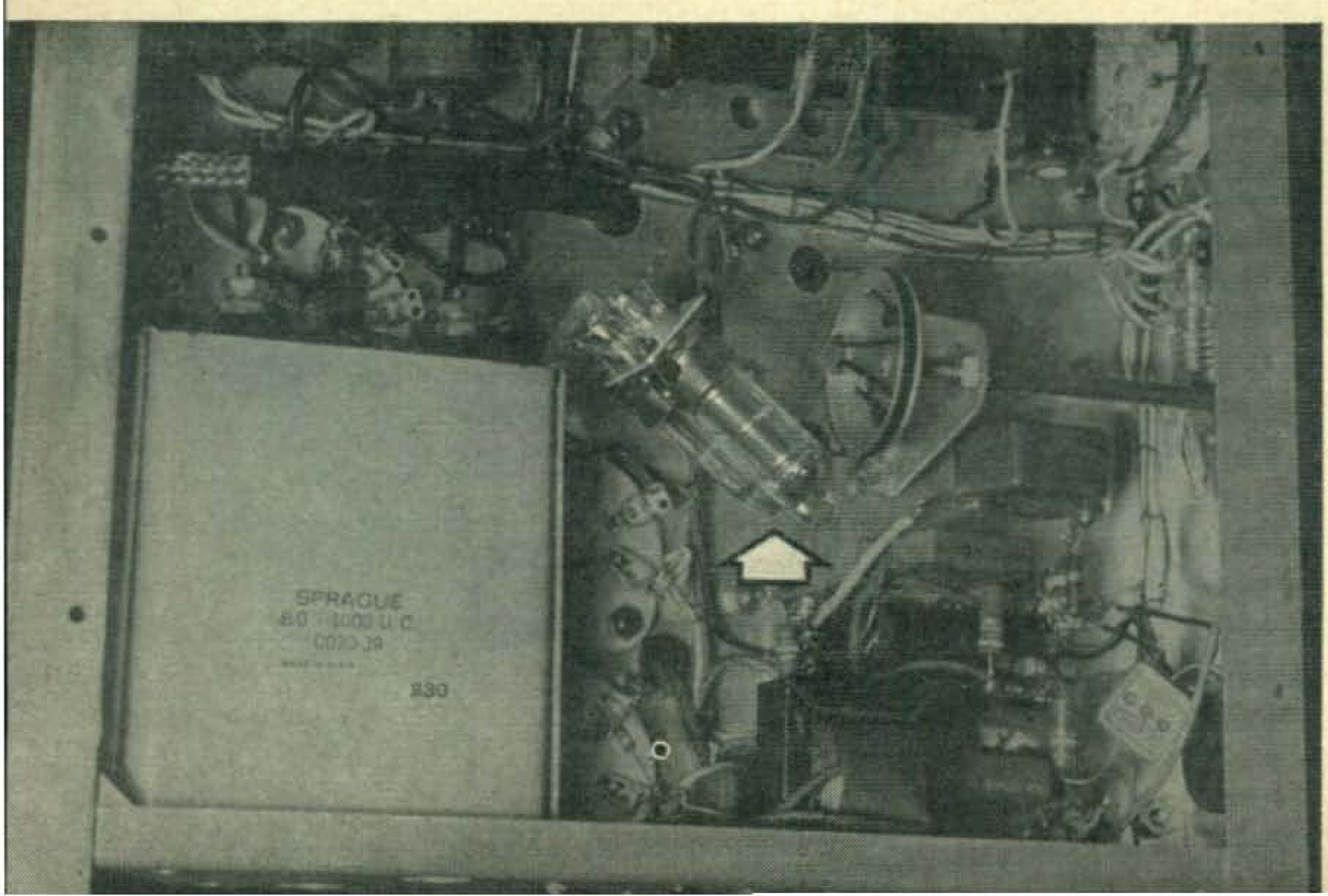
By chance, I found that the parasitic developed after the screen voltage went up over 250 volts, in the *key up* position. I finally found that it was situated at about 3700 kc. when I lost excitation. After thinking about the screen looking into a high impedance to ground in the bleeder, I decided to look into the possibility of using VR-tubes so that the screen would be looking into a zero r-f point. Shunting a 8-μfd condenser across the point where the screen tied on the bleeder gave the parasitic a pure note and proved conclusively that the trouble was in the 6146 screens.



Portion of the Viking II power supply showing the location of the OB-2 tubes in the circuit.

To be able to use a VR-tube I had to reduce the screen to the ICAS ratings of 175 volts; this gave me about 12,500 ohms on the upper portion of the bleeded to use in order to limit the current through a couple of VR tubes, which I would then hang on the screen bleeder top. Placing two OB-2 tubes from the screen tap on the bleeder to the bottom of the bleeder solved the situation. The current through the OB tubes in the *key up* condition runs at 26 ma., which worked out very nicely as their maximum current rating is 30 ma. During *key*

(Continued on page 55)



The OB-2 tubes are mounted under the deck of the Viking II on a small bracket. Solder the proper side of the tubes to the yellow wire at the junction of the shunt and the other side to the screen tap.

The Easy Way

Heterodyne Exciter

MAJOR R. H. MITCHELL, W6TZB

2442 A St., Lincoln, Neb.

Anyone who has tried to build a variable-frequency exciter that produces a T9 signal, keys well, and is stable enough to drive an SSB transmitter appreciates the difficulties involved. W6TZB, however, shows how to let someone else do most of the sweating.—Editor

While working on a single-sideband rig recently, the writer developed a simple method of converting 3 to 6-Mc and 6 to 9-Mc "Command" receivers *(BC-454* and *BC-455)* into heterodyne-type, variable-frequency exciters, covering the same frequency ranges. The stability of the converted units is outstanding, they key beautifully, and have sufficient output to drive a Class AB 807, a 6AG7, etc.

Heterodyne exciters have been described in the radio magazines for quite a few years; Their manifold virtues include good keying, excellent stability, and high reset accuracy. However, they are rather complicated and expensive to build. In addition, many are difficult to adjust and their output is full of "birdies." The conversion of a "Command" receiver into one, however, retains the advantages and eliminates the disadvantages. Besides the *surplus* receiver, a small handful of fixed condensers and resistors and an optional crystal are the only parts required. Unless you are unfortunate enough to possess nothing but thumbs, the entire job should take only an hour or two.

What Must Be Done

To accomplish our purpose, we change the receiver wiring around, so that, instead of high-frequency input to the antenna terminal being converted to intermediate-frequency output from the mixer plate, intermediate-frequency input to the mixer grid is converted to high-frequency output at the antenna terminal. *Figure 1* shows essentials of the high-frequency section of the receiver, where most of the simple, though necessary, changes are made. *Figure 2* shows the revised circuit.

Starting at the antenna terminal, change the present coupling condenser to 100 μμfd. and remove the small neon bulb. Disconnect *C3* and *R1* from the control grid (*pin No. 4*) of the 12SK7. Remove and save *R1*. Now, transfer the plate connection (*pin No. 8*) to the grid, and connect *C3* to the plate terminal. Feed plate voltage to the terminal through a 2.5 mh. r-f choke and a 200-ohm resistor in series, bypassing the resistor to ground through a 0.002-μμfd mica or ceramic condenser. Disconnect the bottom of *L2* from the *B* plus line, and ground. Believe me, this is important.

Proceeding to the 12K8 mixer stage, disconnect *L3* from the 12K8 grid cap. Also disconnect the wire between the 12K8 plate (*pin No. 3*) and the first i-f transformer. Then connect the plate term-

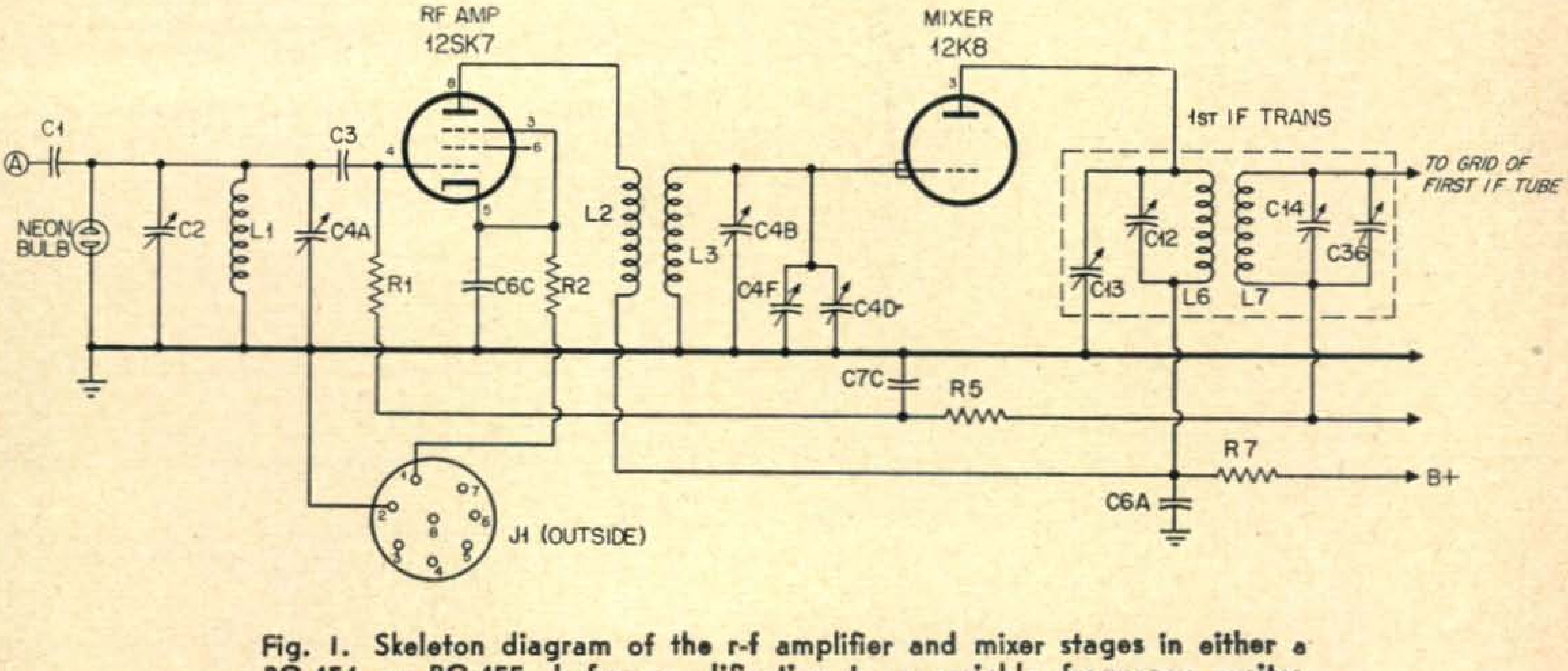


Fig. 1. Skeleton diagram of the r-f amplifier and mixer stages in either a BC-454 or BC-455, before modification to a variable frequency exciter.

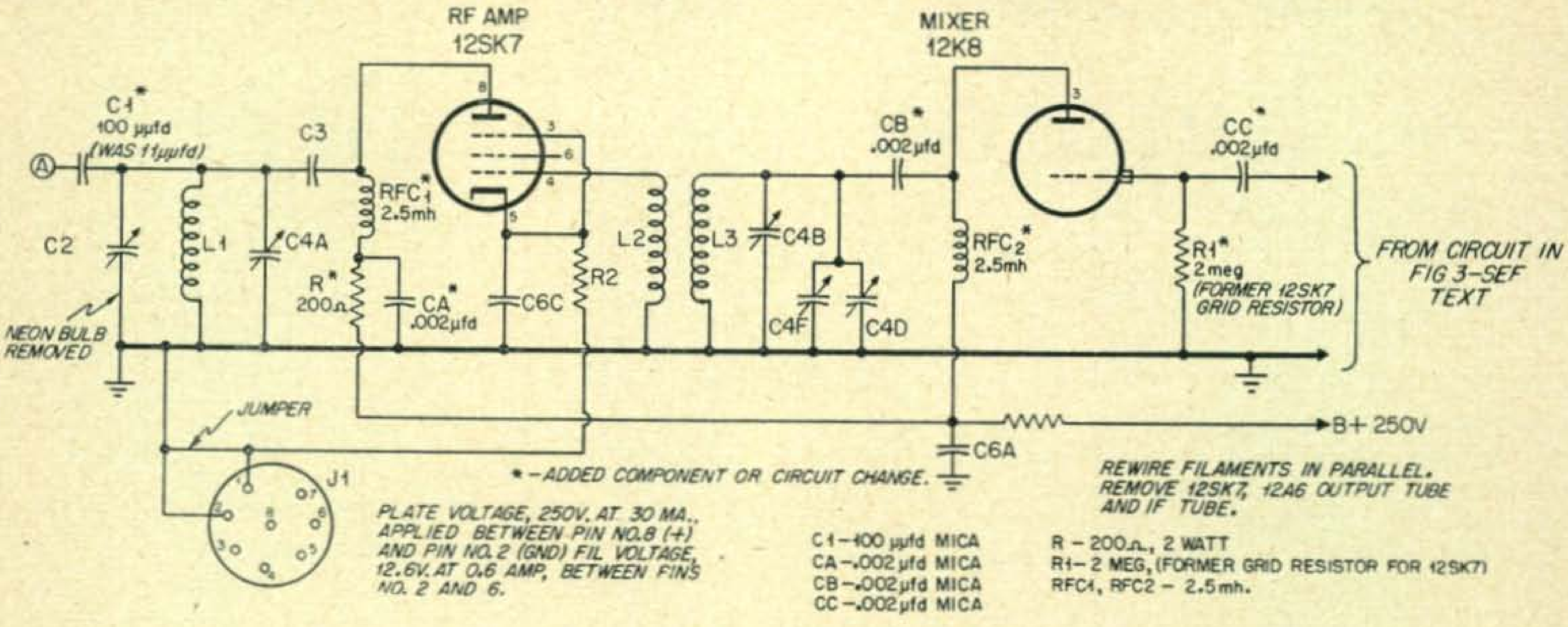


Fig. 2. The r-f stage and mixer, after modification.

inal through a 0.002-µfd midget mica or ceramic condenser. Feed plate voltage to the tube through another 2.5-mh, r-f choke. Connect the 2-megohm resistor (*R1*) salvaged from the r-f stage between grid and ground, and feed i-f energy into the grid through *Cc*, a 0.002-µfd midget mica condenser.

Obtaining Intermediate-Frequency Energy

In the first receiver (a BC-454) I converted, the input signal for the 12K8 control grid was provided by a single-sideband exciter ending up on 1415 kc. In the next one, the first i-f stage was changed into a crystal oscillator. (See *Fig. 3.*)

The grid lead of the first i-f tube was removed from the first i-f transformer, and the crystal connected between grid and ground. A 47,000-ohm resistor in series with a 2.5-mh, r-f choke across the crystal furnished operating bias. Output from the oscillator was obtained by disconnecting the secondary of the second i-f transformer from the grid of the second i-f tube and connecting it to *Cc* of *Fig. 2.* The double-tuned i-f transformer knocks out virtually all spurious "birdies" from the oscillator output. Incidentally, the crystal will not oscillate without the 10-µµfd condenser between grid and plate terminals of the 12SK7.

If a crystal of the proper frequency is not available, the receiver beat oscillator may be used instead. Referring to *Fig. 3,* disconnect the feedback condenser from the 12SK7 plate and use it to couple the beat oscillator to the 12SK7 control grid. To do so, connect the free end of the condenser to the control grid. (*pin No. 2*) of the 12SR7.

I have fed the output of the beat oscillator directly into the control grid of the 12K8. Results appeared satisfactory, however, the isolation provided by the 12SK7 stage is worth having, especially as it is already there, waiting to be used.

Two keying methods have been used. The first was screen keying of the 12K8 screen. No chirp was noticeable on either 3.5 or 7 Mc., but I was worried about the possible effect of the varying load on the oscillator section of the tube. Next I tried screen keying of the 12SK7 crystal oscillator (or isolation) tube. Keying was beautiful: so this system was retained.

Adjustment

As I said earlier, adjustment of the exciter is simple. First, get the low-frequency oscillator to work. Next, tune in the exciter output signal on a communications receiver. Then reduce the low-frequency output by decreasing the 12SK7 screen or plate voltage until the exciter output drops off a db. or two—a reduction barely noticeable to the ear or on the receiver *S*-meter.

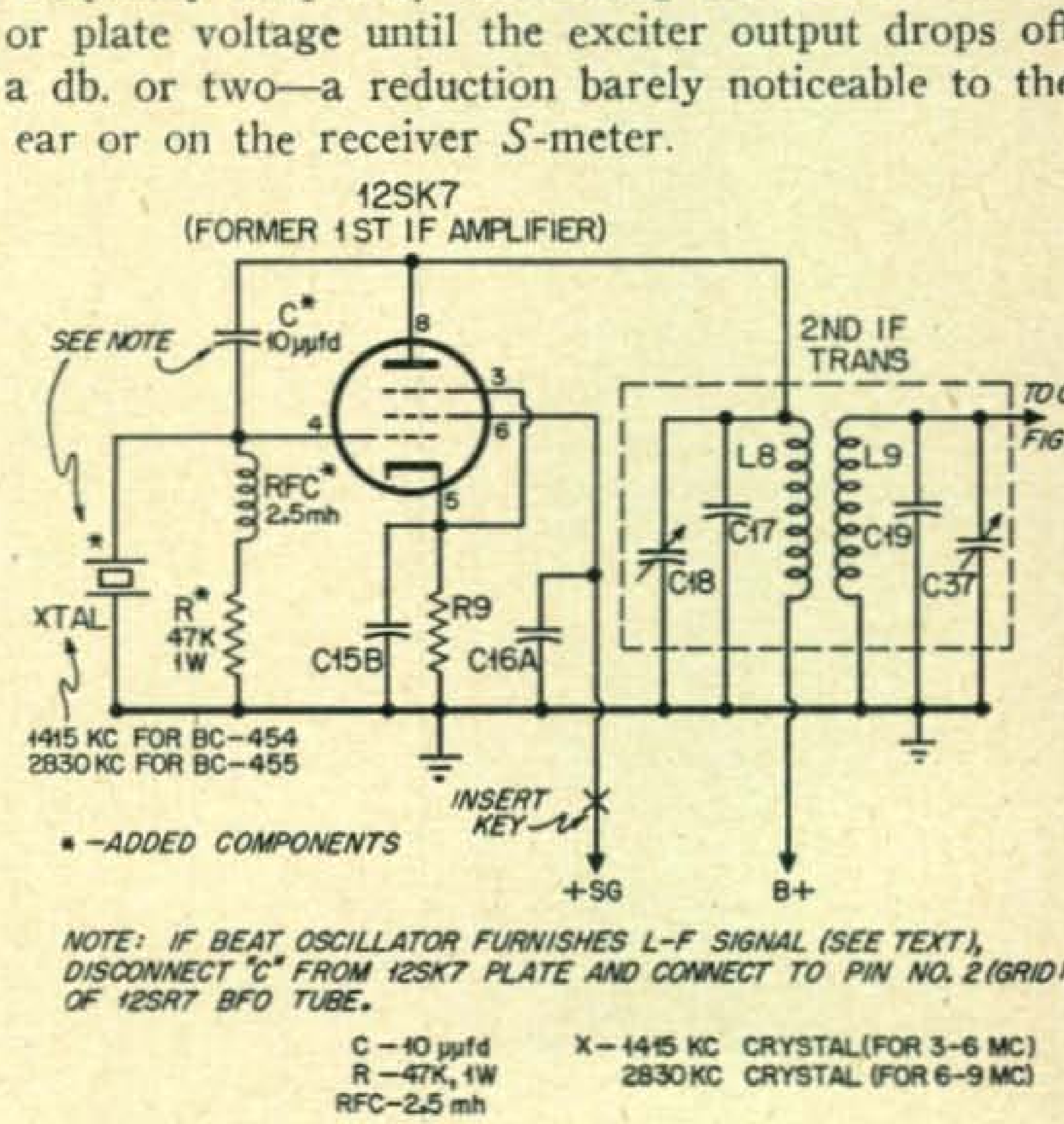


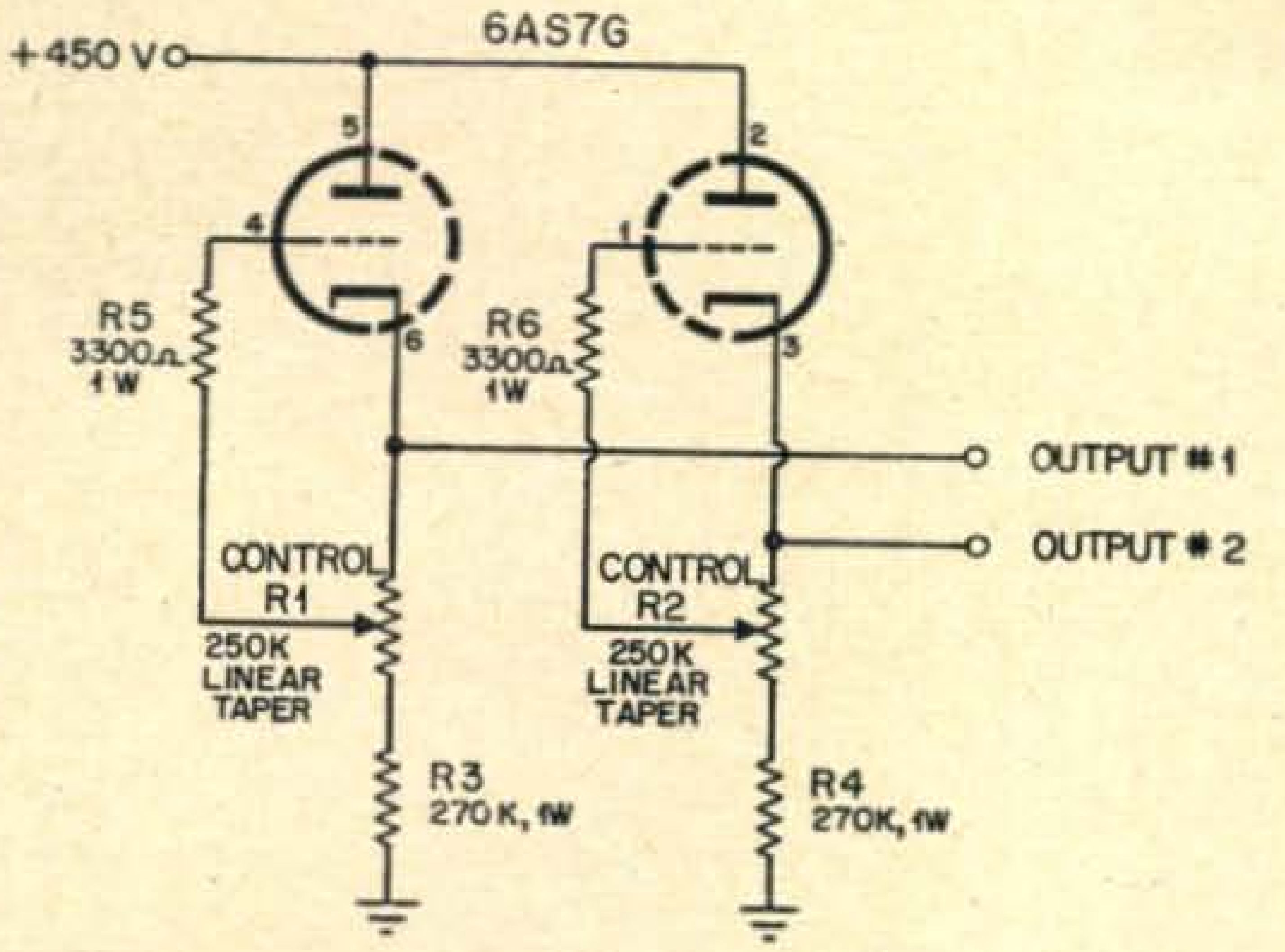
Fig. 3. This is how the first i-f stage is converted to a crystal controlled oscillator.

This adjustment produces maximum output at the desired frequency, commensurate with minimum spurious outputs.

After the low-frequency output is adjusted adjust the padders across *L3* and the antenna trimmer for maximum output. If necessary, the padders on the high-frequency oscillator should also be adjusted for accurate dial calibration. This completes the conversion.

(*Continued on page 52*)

Inside the Shack and Workshop

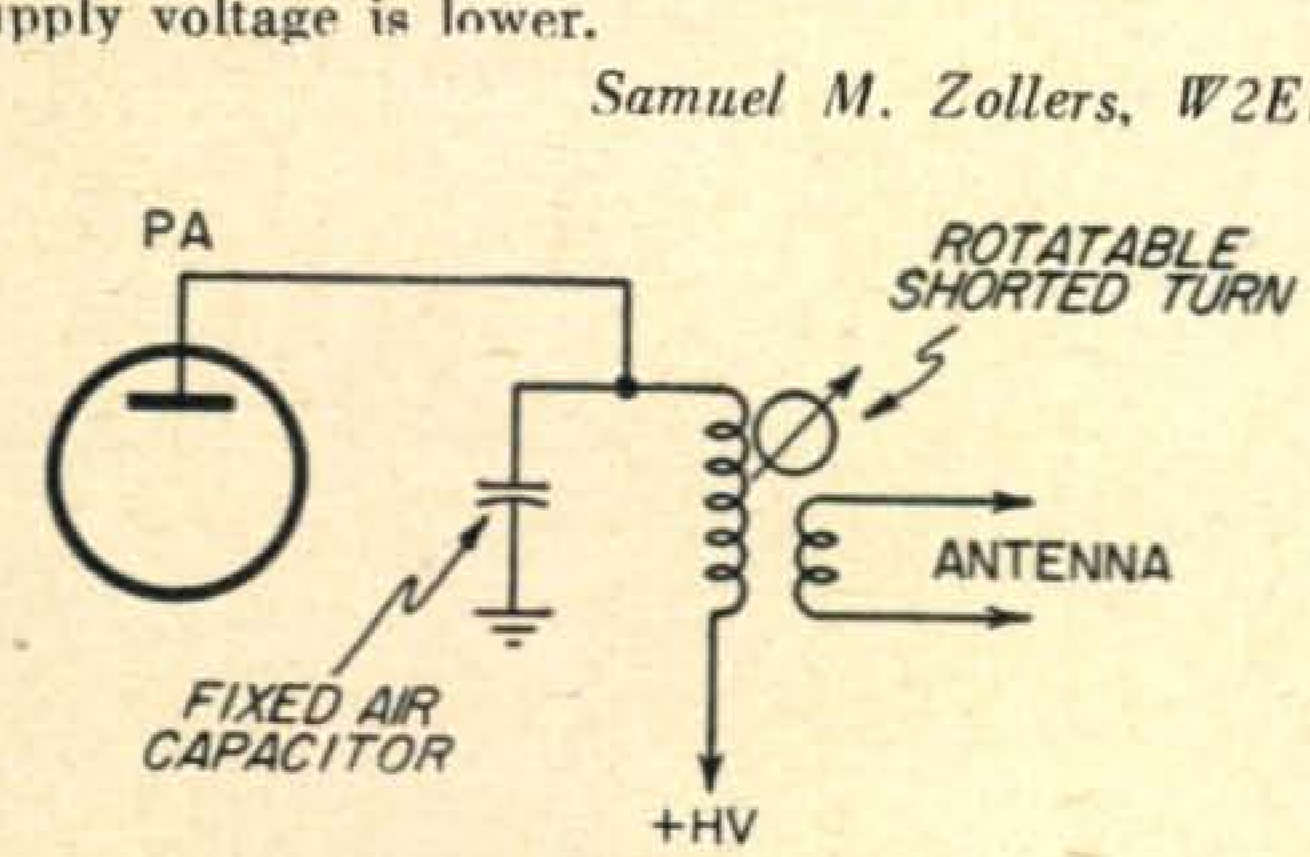


Variable Voltage Power Supply Attachment

A versatile and useful item around any Ham shack is a variable power supply. The following idea permits the constructor to adapt any supply with an output of about 450 volts into a variable supply. The range of adjustment with 450 volts input is between 200 and 400 volts output. The current ratings are approximately equal.

The circuit employes a low-mu twin power triode to provide two separately controlled sources of variable voltages from the same supply. Each triode section of the tube is capable of handling 125 milliamperes with a dissipation of 13 watts. Output voltage is controlled by adjustment of the potentiometers. Resistors *R3* and *R4* are used to prevent exceeding the plate voltage ratings of the tube. These resistances should be increased if the original supply voltage is higher and decreased proportionally if the supply voltage is lower.

Samuel M. Zollers, W2EWN



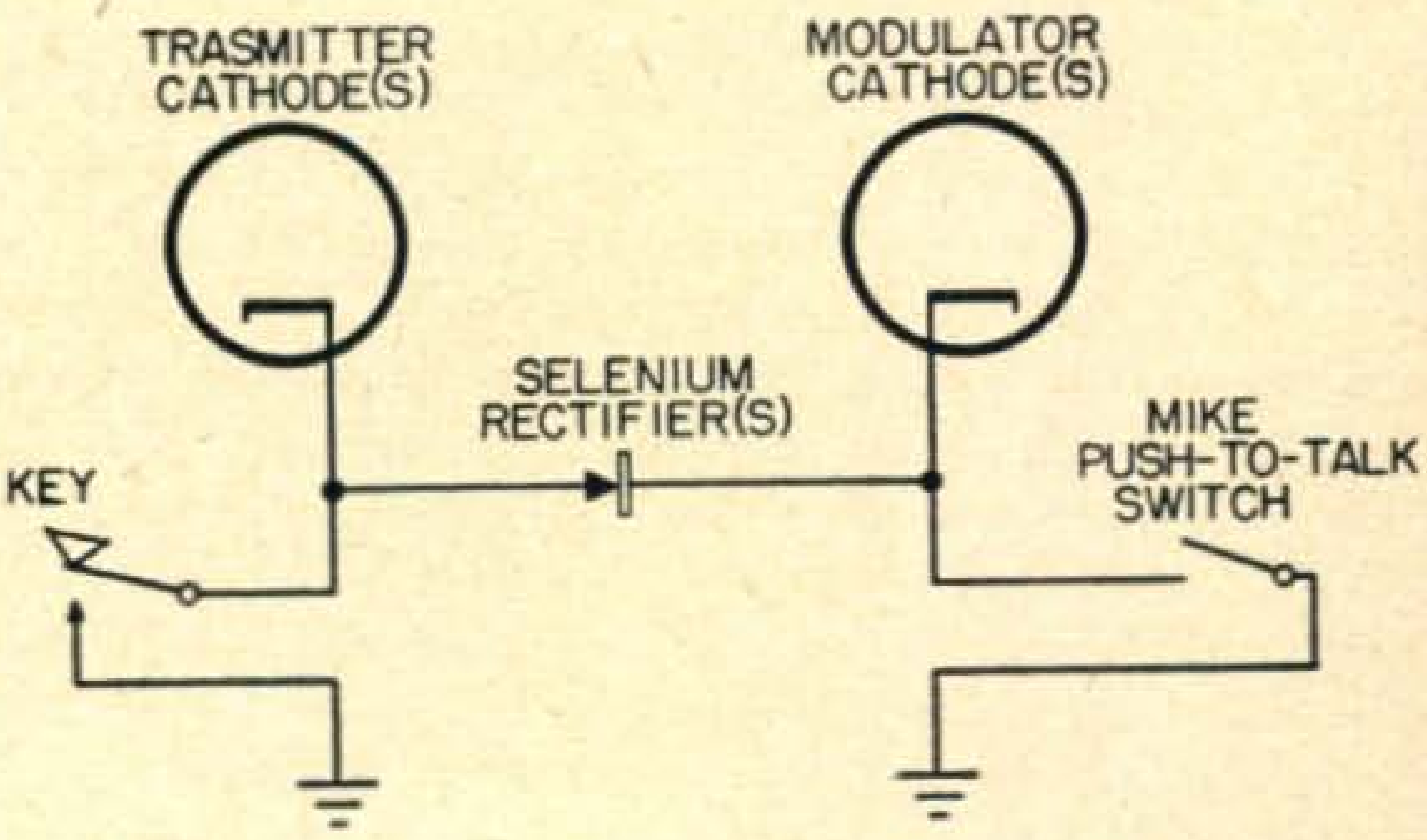
Fixed Capacity Final

The increasing number of amateurs changing over to single-ended tetrode finals with vacuum variables brought to mind this possible alternative circuit. While it would work nicely with single-ended finals I feel that some of the usual amateur ingenuity could convert it to push-pull, possibly with suitable mechanical linkage.

In place of the vacuum variable, a relatively cheap fixed air capacitor could be used once the proper L/C ratio had been established. Many of these fixed air capacitors are still available in war surplus at prices of between five and ten dollars.

To tune the final, a single shorted turn is rotated in the center of the coil. This varies the inductance and has the advantage of no moving parts connected to the r-f tank circuit. The shorted turn should be of fairly heavy material, such as a copper strap, and preferably silver plated. There is little loss with such a circuit and a surprisingly wide range of frequencies can be covered.

Marv Gonsior, W6VFR



A Push-to-Talk System

While pouring over the plans to my new rig, I was confronted with a problem that has probably bothered other readers. How could I possibly wire the rig so that push-to-talk using the switch on the mike would turn on the modulator, as well as, the transmitter.

A relay is always a good answer, but the following idea worked out very nicely for me. The selenium rectifier is connected in the circuit so that when the push-to-talk switch is pressed, the transmitter cathodes are grounded through the rectifier, while the modulator cathodes are grounded directly through the switch. Obviously this system will not handle really high power, but selenium rectifiers may be placed in series to handle different voltages appearing across the key. The rectifier current rating should be appropriate for the cathode current of the transmitter. Needless to say, keying high level stages is not possible.

Bert Walsh, W8JEF

How to Profit from Your Electronic Invention

ROBERT G. SLICK, W6PBX

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One of the first impressions many readers will get in perusing this article will be, "it just doesn't happen." But it does, and it could happen to you because the field of electronics is still very much in its infancy. Patent Attorney W6PBX lets us in on the basic problems in protecting your radio inventions. If you experiment, or even tinker, this is the article for you. —Editor.

Many amateurs have been successful inventors but probably an even greater number have left "pet" ideas on the shelf because of a lack of familiarity with patent matters. While the actual filing of a patent application is ordinarily left to an attorney, in the birth of every invention a number of steps take place before an attorney is consulted. The purpose of this short article is to help the inventor make a preliminary screening of his ideas and decide whether an attorney should be consulted, to enable him to take certain precautionary steps so that his interests are protected, and to aid him in selecting an attorney. Thus, this article might have been entitled "What to do till the attorney comes," after the fashion of the old-time medical books.

The radio experimenter occupies a unique position, since in few other fields can an individual hope to compete wth a large organization. For example, work in mechanics and chemistry requires enormous expenditures for equipment and supplies, but, on the other hand, every issue of the *Patent Gazette** shows many patents on novel electronic devices which are made from standard parts. Thus the amateur can utilize relatively inexpensive, interchangeable parts to make many novel devices and the individual frequently can compete in electronics on a par with the large organization.

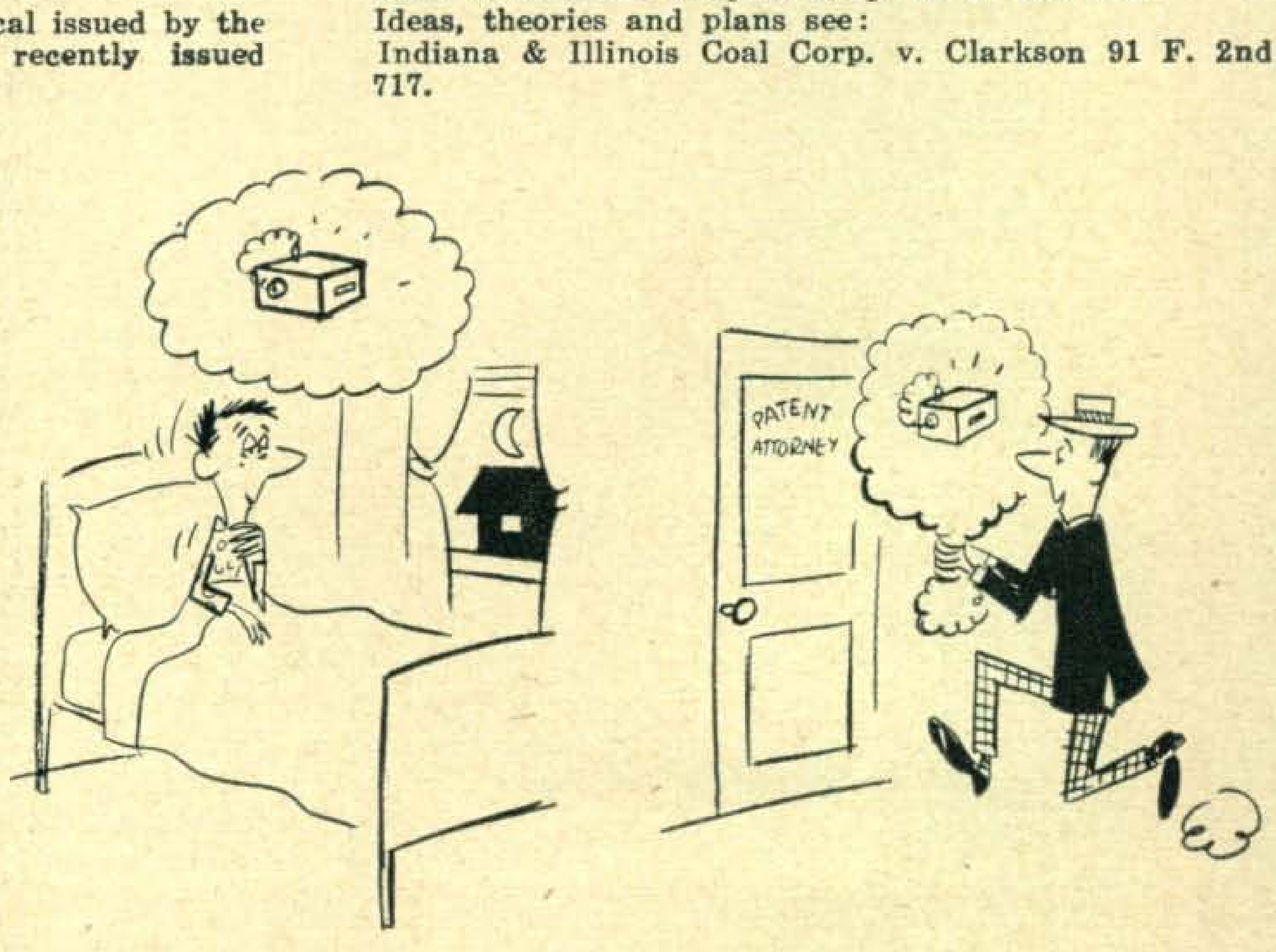
The first question which arises in the mind of the putative inventor is whether his brain child is patentable. Patents are granted for processes, machines, manufacturers or compositions of matter. Some things by their very nature are not patentable, such as mere ideas, theories and plans, methods of doing business and printed matter.[2] However, anything which the radio experimenter develops probably will fall into one of the general categories of patentable subject matter, although it may still be unpatentable for other reasons.

Assuming the invention falls into one of the above categories, a patent can be obtained if the device is new, useful and involves invention. Of these requirements only the last presents any real prob-

* The Patent Gazette is a weekly periodical issued by the Government containing abstracts of recently issued patents.

1. 35 United States Code 31.

2. Method of doing business see:
U. S. Credit System v. Am. Credit Indemnity 53 Fed. 818
Printed matter see:
Latz v. Reliance Graphic Corp. 98 F. 2nd 679.
Ideas, theories and plans see:
Indiana & Illinois Coal Corp. v. Clarkson 91 F. 2nd 717.



". . . some things by their very nature are not patentable . . ."

lem. It is probable that at least some aspect of the device is new and the Patent Office is rather lenient on the question of utility—But does the device involve invention? This is the sixty-four dollar question and one of the most difficult to answer in patent law. Many tests of invention have been proposed but none is fully satisfactory.[3] Ask yourself if what you have accomplished is substantially that which anyone would have done when faced with the same problem. If your contribution goes beyond that of the routine experimenter, "skilled in art" the chances are good that your device is patentable.

Is It Worthwhile

Perhaps the next thing the inventor should do is to make a realistic and impartial appraisal of his invention to see how it fits in the general economc picture and determine whether it is an invention which may be salable. There is a great difference between an invention which is merely patentable and one which is both patentable and salable. Many inventors are carried away by the cleverness of their invention and are blinded from facing reality. Ask yourself: "Is this invention one which solved a particular problem I had. or is it one of general application which many would welcome." Remember that manufacturers do not beat a path to the door of the inventor and that even the best of inventions require a great amount of faith and selling effort before the inventor can get any return from it.

One factor which the inventor frequently overlooks is that manufacturers are extremely cost conscious and if an invention increases the cost of an article, it will probably not be considered unless it has outstanding merit or unique sales appeal. Manufacturers ordinarily work on close margins and before an article gets to the ultimate consumer there have been a number of mark-ups: mere pennies in manufacturing costs are reflected as dollars to the ultimate purchaser. On the other hand, inventions which only slightly decrease manufacturing costs are eagerly sought by manufacturers. In other words, the easiest inventions to exploit are those which decrease manufacturing costs or those which have a real and positive sales appeal to the ultimate consumer.

When Did You Invent It?

After determining that the invention has some economic merit, the inventor naturally wishes to protect his invention. His first step in this directon is to keep good records of the work which is done. Amateurs are notoriously lax about such matters, but it is particularly important that a brief written description of the invention be made as soon as possible. This does not need to be elaborate or in any particular language, but it is important that it be signed and dated and witnessed by someone who understands the invention.[4] Similarly, there is little or no value in having your disclosure notarized. The notary would ordinarily be unfamiliar with the technical aspects of the invention and could not serve to corroborate you. It is possible to make changes on a document that has been notarized, particularly if the notary had no understanding of the actual invention.

One sometimes sees advice to the effect that it is only necessary to write a description of the invention and mail it to yourself by registered mail, preserving the sealed envelope to be opened in case of necessity. However, this is very poor advice, since if others assert rights to the invention, one needs corroboration and the best corroboration is a witness who can testify that he witnessed the disclosure of the invention on a certain day and signed it after having understood the invention. One can hardly expect the local postmaster to testify as to the invention for he did not see the papers and did not understand the invention. There are too many possibilities for fraud in the registered

". . . a patent can be obtained if the device is new . . ."

letter technique for it to be of much value in establishing the date of your invention.[5]

The Patent Application

The question frequently arises as to whether it is necessary to file a patent application before submitting an invention to a manufacturer. After all, the inventor has well authenticated proof that the invention is his, the manufacturer is honest and there is no hurry about filing the application. Unfortunately, most manufacturers have a policy of not considering any submitted ideas until a patent application is filed. They must do this for their own protection, since there are many hazards in considering ideas when the inventor's rights are not clearly defined. It is almost impossible to get a manufacturer to give any consideration to an

3. For a detailed discussion see "The Statutes and Decisions Presenting the Better Tests of Inventions" by Lawrence C. Kingsland (Commissioner of Patents) 34JPOS473.

4. Bering v. Haworth 1878 C.D. 84.

5. With respect to authentication of documents offered in evidence see "Interference Law and Practice" Rivise and Caesar Sect. 568.

idea unless a patent application has been filed.[6]

Although it is possible for an inventor to prepare and file his own patent application, this is not ordinarily desirable unless the inventor is familiar with patent matters.[7] The value of a patent is determined almost wholly by the claims which form a part of the application and unless these are drawn by an expert, the resulting patent will probably be of little value. In fact, the Supreme Court has stated that the specification and claims of a patent application are probably the most complicated of all legal documents to draft.[8]

". . . and witnessed by someone who understands the invention . . ."

In selecting an attorney, one important factor is finding one familiar with the particular field in which your invention falls. Although any patent attorney can be of great assistance, an attorney who has handled similar work and is familiar with the terms and problems of the field in which the invention lies can render by far the best service to you. It is desirable to select an attorney near at hand, for many questions can only be answered by personal discussion, and you will find it difficult to iron out all of your problems by your correspondence. If you do not know a patent attorney, your local Bar Association will be glad to recommend one.

Remember that just walking into an attorney's office does not obligate you. Don't be afraid to inquire as to the attorney's background and his qualifications for handling your work. Arrive at an understanding about charges before the work is commenced.

In approaching an attorney, one should remember that all he has to sell are time and experience and that the more of his time you consume the higher his charges are going to be. For this reason the inventor should have clear and understandable sketches and a description of the invention so the attorney can grasp the situation in the shortest time. If the inventor's ideas are nebulous and the attorney must make sketches and write up the basic description of the invention, it will naturally cost the applicant more money.

The attorney usually will recommend that a search be made before filing the application. This is inexpensive and often prevents the filing of an application on an unpatentable item. Do not rely on the fact that you do not know of a similar device on the market, as the Patent Office records reveal many devices which have never been placed on the market but which nevertheless may prevent you from obtaining a patent.

That Question of Money

Many inventors require financial assistance and the problems which arise between inventors and their financial backers are among the most troublesome which one encounters. It should be a hard and fast rule never to give or accept financial assistance in connection with an invention without a definite agreement in writing, establishing the rights of the parties. Your attorney should be consulted *before* such arrangement is made. Often the inventor and his backer will enter into some vague agreement about "sharing" the income from an invention without any definite understanding as to the manner in which the sharing is to be accomplished. By the time the inventor consults an attorney, the parties are often hopelessly deadlocked. In the early stages of the invention it is easy to arrive at a definite agreement, but after it is established that the invention is valuable, it becomes increasingly more difficult for the parties to get together as to the share each is to have. One pitfall to be particularly avoided is the mere assignment of a certain percentage of the invention to the financial backer. When two or more people own a patent jointly, each can license and use the invention without accounting to the other for any income received; in the absence of a definite contract between the two with respect to the granting of licenses and the sharing of income, the assignment of a percentage of interest in the invention is entirely unworkable.[9] The same is true of joint inventors who should have a carefully drawn agreement with respect to the granting of licenses and the sharing of income.

In brief, the inventor should keep careful records, select an attorney skilled in the field to which the invention pertains and be careful in his financial arrangements with backers. If these three rules are followed, the inventor should have no difficulty in securing the maximum return from his invention

6. Pamphlet "New Devices Activities of General Motors" available without charge from General Motors Corporation Phamphlet "Policies Concerning Submitted Ideas available without charge from General Electric Company.
7. Phamphlet of General Information on Patents available without charge from Commissioner of Patents, Washington 25, D. C.
8. Topliff v. Topliff 145 U. S. 156 (at 171)

9. Drake v. Hall 220 Fed. 905

Getting Started on Single Sideband

JACK N. BROWN, W4OLL

412 Spring St., Herndon, Virginia

Within the past two years many readers have questioned the CQ staff on their attitude towards SSB. Unable to originally visualize the impact and the rapid development of the SSB art, CQ has now drastically modified its "thinking" and is supporting, as well as encouraging, more amateur activity in this field. To accentuate interest we have requested a very well-known authority on SSB to prepare a series of articles that would serve as a primer. The series will continue monthly throughout this coming spring and summer.—Editor.

PART I

When the author was approached about doing a series of articles for *CQ* on the subject of single sideband (SSB), I welcomed the idea with enthusiasm. I thought that merely harnessing many of the soap box arguments and talks that I have taken part in would be duck soup. Upon more calm and collected meditation, however, I realized that it was no small task to assimilate all that has taken place in SSB amateur techniques since 1947 and present them in such a manner that a neophyte would not be overcome by the sheer volume of the material. Despite the fact that there has been considerable material published about amateur SSB, it is felt that a few recommendations in view of past experience would save the newcomer the job of looking up the more than forty articles appearing in *CQ, QST, GE Ham News, Electronics,* and other publications. It has been also pointed out that the average amateur does not have available all of the above-mentioned publications. The Editor of *CQ* told me to "shoot the works," and so, with this in mind the series is to cover the SSB subject "like a tent" while attempting to make some specific suggestions for the beginner who desires to get on the air. The articles are not prepared with the old-time SSB operator in mind, but are geared for those who have an appetite for the "stuff" but can't find a convenient place in which to sink their teeth.

What Is This Thing?

To better understand SSB we must start with something with which we are familiar and draw our analogies accordingly. Let's consider the ordinary double-sideband with carrier phone signal sketched in *Fig. 1.* This signal is an idealized phone signal. (Oh! that all AM signals could be like this.) By this I mean that only the necessary speech frequencies are transmitted. For good intelligibility, experience has shown that only the

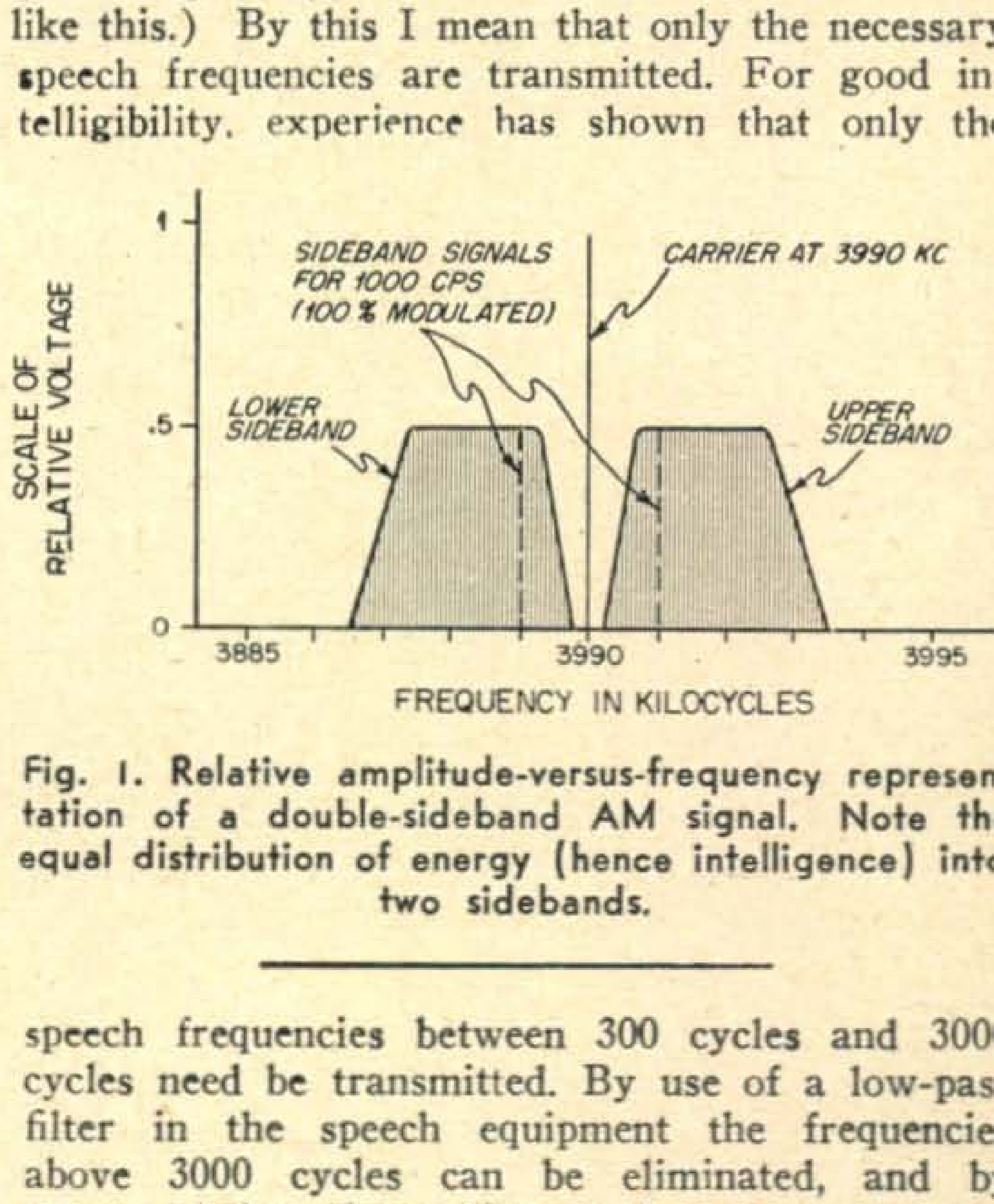


Fig. 1. Relative amplitude-versus-frequency representation of a double-sideband AM signal. Note the equal distribution of energy (hence intelligence) into two sidebands.

speech frequencies between 300 cycles and 3000 cycles need be transmitted. By use of a low-pass filter in the speech equipment the frequencies above 3000 cycles can be eliminated, and by proper choice of coupling condensers the power-wasting low frequencies below 300 cycles can be attenuated. The horizontal axis of *Fig. 1* is a scale of frequency as indicated, and the vertical axis is a relative scale of voltage just for comparison purposes. The shaded portions represent the general area occupied by each sideband. Any speech frequencies transmitted will appear as voltages lying under the boundary of the shaded area (for example the 1000-cycle tone which ap-

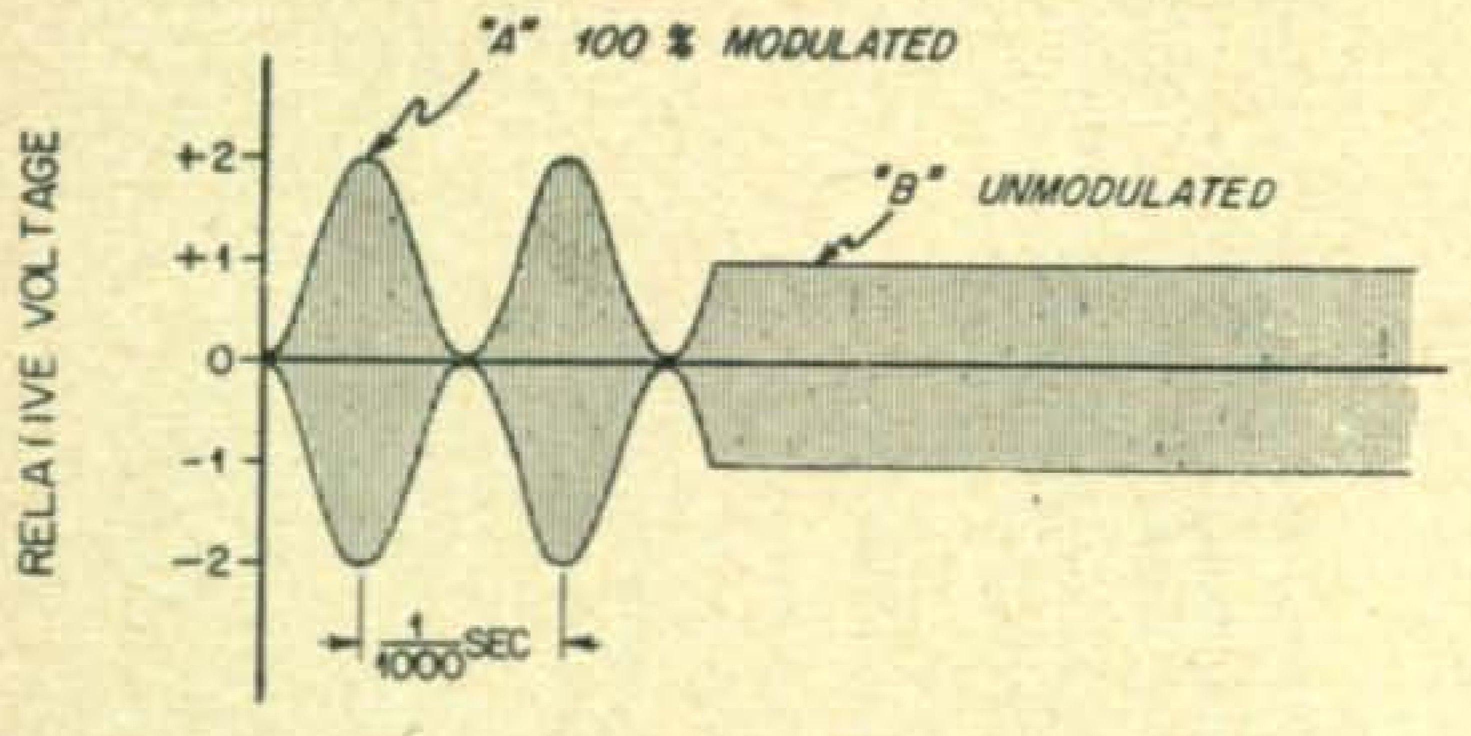


Fig. 2. This is the common r-f envelope pattern of a double-sideband AM signal with 100% modulation (1000 cycle tone) at the left. The envelope appearance in an unmodulated condition is shown at the right.

pears at maximum 0.5 relative amplitude). If there is more than one tone present in the modulation, as in speech, each frequency as represented by a sideband component under the shaded boundary cannot equal a maximum value of 0.5 relative voltage, as did the 1000-cycle tone above. Depending on the phase relationships between the speech frequencies modulating the transmitter, the peak voltage of the composite wave form could possibly be equal to several times the amplitude of any one of the individual frequencies. In more direct words (perhaps) the instantaneous sum of all the speech component voltages in one sideband cannot be greater than one-half of the carrier peak voltage. If the sum were to exceed the one-half limit, over-modulation would take place with all of its splatter and consequences.

Figure 2 shows the well-known 100% modulation 'scope pattern as compared to the unmodulated carrier condition. It can be seen that the instantaneous peak-to-peak voltage at "A" is twice that of the unmodulated carrier at "B." This means that across a dummy load the peak voltage will be twice that of the unmodulated carrier. Since *Power* $= E^2R$ where R is the dummy load resistance, the peak power at the instant of point "A" in *Fig. 2* will be ***four*** times that of the unmodulated condition. All this is leading up to following point. The final amplifier must be capable of delivering peaks of power four times greater than that of the carrier. Look again at the relative power involved in the carrier and the two sidebands. Take for example a 100-watt phone transmitter. The carrier has a power of 100 watts while each sideband contains only ¼ of that power, or 25 watts. Since each sideband carries the same intelligence and the receiver upon detection combines the audio from each in-phase, the total *useful* sideband power is 50 watts. Can this be true? Unfortunately it is true that to deliver *50 watts* of intelligence carrying power our final amplifier must deliver ***400 watts*** on peaks of modulation. What happens if we get rid of our carrier and generate only the sideband signals? The useful sideband power is still 50 watts and the maximum power required of the final amplifier is ***also 50 watts.*** **Ah-ha! The villain is the carrier. Friend, you don't know how much of a villain it really is. Come closer and I will tell you more.**

This screaming, tooting, heterodyning signal that calls itself a "carrier" doesn't "carry" a dad-blamed thing. Let's face it. The sidebands are perfectly capable of being propagated to your receiver without any assistance whatsoever from the carrier. What function does it serve? A very minor one actually: In the second detector of your superhet it mixes (heterodynes, if you prefer) with the two sideband signals to recover the original audio that was fed into the transmitter. Does it do anything else? Nothing else except hold up the needle of your S-meter. Then let's arrange the transmitter so that we do not transmit any carrier, but only the *two* sideband signals. Keeping the same peak sideband power (50 watts) take a look at your final tube. Cool as a cucumber, isn't it? Now, back to the receiver. Ugh! What a mess! It sounds pretty bad. Let us see if we can copy the double-sideband suppressed carrier signal by inserting a local carrier with the b.f.o. Unfortunately, it is practically impossible to do this. That villain carrier that we just got rid of *did* have one point in its favor. It was of the correct frequency and the correct *phase*. It is this *phase* condition that we cannot meet when we attempt to copy a *double-sideband* suppressed carrier signal by using a b.f.o. We can make a first approximation of the frequency, but never in this world will we be able to maintain the correct phase. We have failed in this attempt.

I would like to say at this point that it is possible to detect signals of this nature if a reduced carrier is transmitted. This carrier must be restored or "exalted" to a high enough level to demodulate the sidebands. For an explanation of DSRC radiotelephony (double sideband with reduced carrier) see Grammer[1]. Getting back

1. "D.S.R.C. Radiotelephony," Grammer, QST, May 1951, p. 11.

". . . but Comrade Commissar, the expression SSB does not constitute a derogatory reference to our Leader."

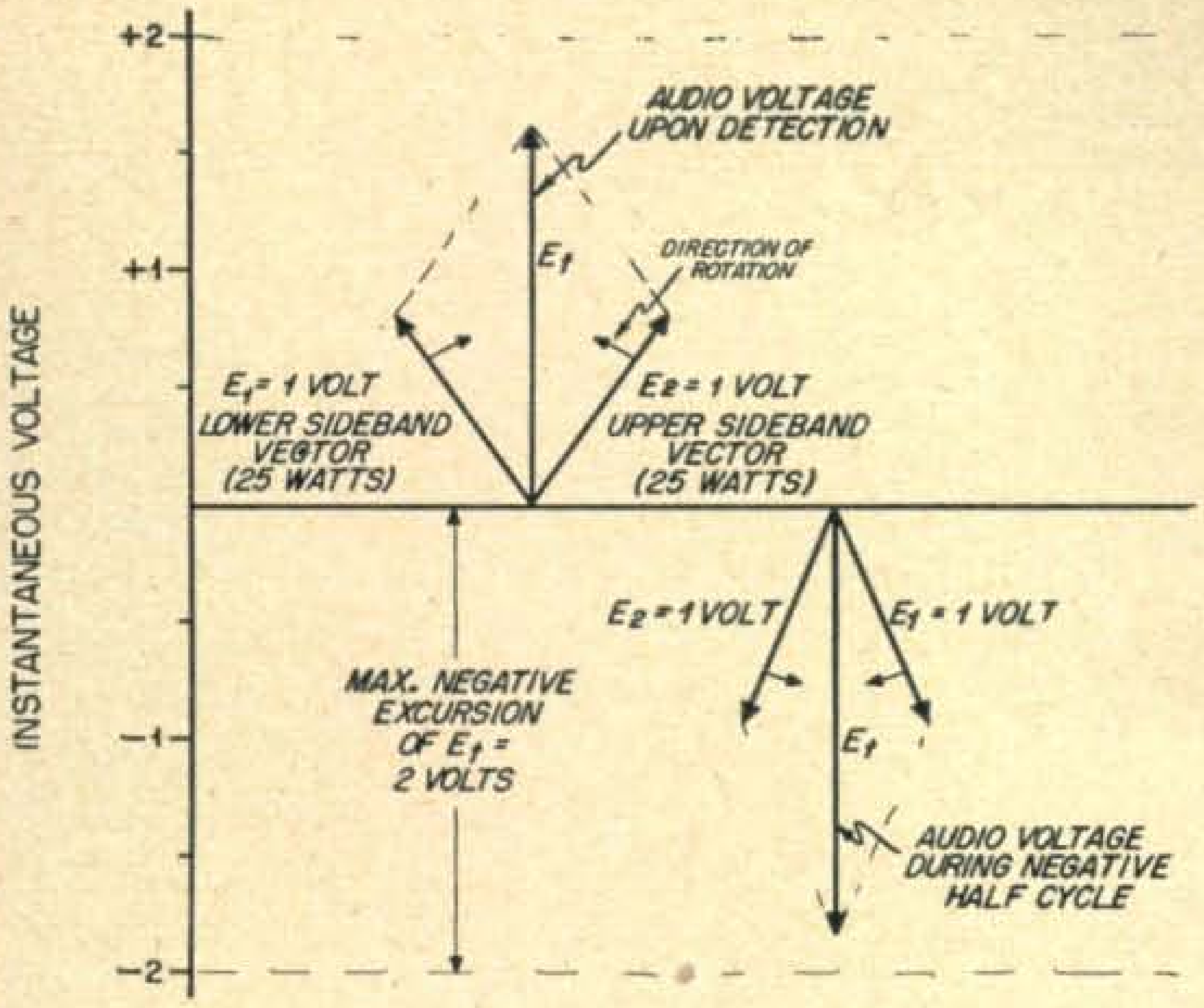


Fig. 3. Vector presentation showing two examples of how sideband voltages of a double-sideband signal combine in the detector of a receiver.

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to our little experiment, what would be the case if we just eliminated one of the sidebands? Better still we could run the 50 watts peak power in one sideband and still not increase the strain on the transmitter. Now back at the receiver once more, we *can* detect the single-sideband signal successfully by inserting a carrier at the correct frequency with the b.f.o. The phase relationship between the carrier and the sideband has no effect on the audio recovered. However, you will notice that the carrier supplied artificially by the b.f.o. must be very close to the suppressed carrier's frequency. How close? For distortion free copy about 50 cycles and for intelligible copy about 200 to 400 cycles depending on the signal.

Here is where the going gets rough and a little confusing for a while. If it is any consolation to you, I will admit that my own thinking has only recently been straightened out on what follows. Our double-sideband signal mentioned above with 25 watts maximum power in each sideband (total 50 watts maximum) will produce *twice* the *audio power* in our receiver than the 50-watt, single-sideband signal. Yes, this is true. I can see all the single-sideband old-timers simultaneously raising their eyebrows. This comes about for the following reason. The double-sideband signal produces in the receiver detector circuit the two sideband voltages that can be represented by the two vectors *E1* and *E2* in *Fig. 3*. Stay with me now! The two vectors are equal in amplitude (say for example 1 volt) but they rotate as shown in opposite directions at the rate of the modulating frequency. Example: A 1000-cycle tone modulated signal would have sideband vectors revolving at the rate of 1000 revolutions per second. These two voltages are added vectorially so that the resulting output voltage lies along the vertical line, and, in the case shown, the resultant voltage is *Et*. This *Et* will vary as the vectors whirl around from a maximum value of *2* volts in the positive (upward) direction through a zero value and downward to a maximum value of 2 volts in the negative direction. Thus we have a total change in audio voltage of 4 volts.

Now let us consider what happens with the 50-watt maximum power single-sideband signal. We said that we put all of our power in one sideband. To double our power in one sideband, we increase the sideband *voltage* by only a factor of 1.414 since Power = E^2/R. [Note: $(1.414^2=2]$ So in our detector we have only *one* sideband vector whirling around whose amplitude is 1.414 volts. See *Figure 4*. Since it has no other sideband vector to combine with, it swings around from a maximum value of 1.414 volts positive to 1.414 volts negative. This yields a total peak-to-peak audio voltage of 2.828 volts upon detection. Since the double-sideband signal gave 4 peak-to-peak volts and the SSB signal gave 2.828 peak-to-peak volts, the result is 3 db. in favor of the double-sideband signal. In order for our SSB transmitter to produce the same 4 volts at the receiver, we must generate 100 *maximum* (peak, if you prefer) power in the one sideband. Norgaard pointed this out in his 1948 article. *(See item #5 under Theory in the "Bibliography".)* This business of the 100-watt SSB signal producing the same detected audio voltage as the 100-watt (average carrier power) transmitter has been misunderstood by a good share of the brethren.

Getting back to the transmitter problem at hand, we notice that our maximum capabilities of the amplifier were 400 watts when using double-sideband-with-carrier. We can safely increase our single-sideband maximum power to 400 watts which gives us a power gain of 4 over the double-sideband condition. This gain of 4 is an increase of 6 db. in system gain attained at the transmitter.

It must be pointed out here that in order to

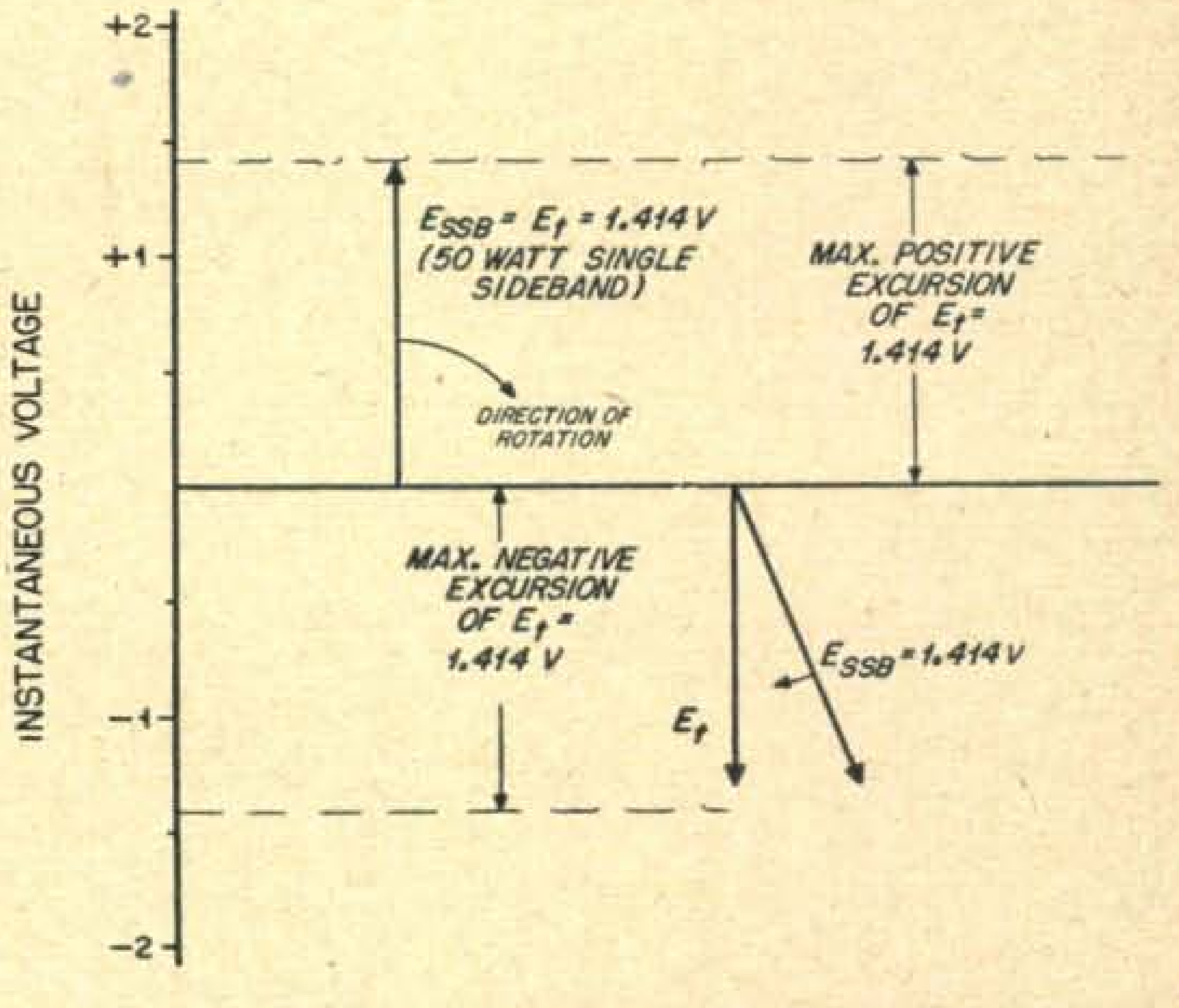


Fig. 4. This vector diagram illustrates how a 50-watt single-sideband signal yields 70% (3 db.) less audio voltage upon detection than a double-sideband signal with 25 watts in each sideband—see Figure 3.

make our 100-watt AM final amplifier deliver 400 watts on peaks in single-sideband service we will have to double our plate voltage. You can see that in the AM case the modulator furnished the extra voltage upon peaks of the audio wave-form It is not at all uncommon to find 1200 to 1400 volts being used on a pair of 807's used on SSB. The tubes still operate within rated plate dissipation, but the maximum value of peak power is in the neighborhood of a half-kilowatt!

Since our signal is now concentrated in one sideband we can now concern ourselves with possible improvements in our receiving system. If it is possible to reduce the bandwidth of the receiver to match the reduced bandwidth of the transmitted signal, we can also gain another 3 db. in system gain. This comes about for the following reason: For any given bandwidth the signal-to-noise ratio is the limiting factor that determines how weak a signal can be copied successfully. Where receiver thermal noise (hiss noise) is the limiting factor it is also true that the noise power will be reduced by 3 db. if we cut our receiver bandwidth in half. There is considerable difference of opinion whether there is any signal-to-noise improvement in halving the bandwidth in the presence of *impulse-type* noise. The nuisance value of this type of noise is strictly a subjective matter and as far as this writer is concerned has yet to be resolved to everyone's satisfaction. So, rather than be accused of trying to claim 3 db. that might not actually be merited, we will conclude (for now at any rate) that we can gain 3 db. in the case of thermal noise and none in the case of impulse noise. How much of this total of 9 db. is actually realized in actual operation? It all depends.

For the conditions outlined, the first 6 db. are sure-fire available. Since under most amateur operating conditions, signals are not usually marginal—that is—competing with receiver thermal noise, the extra 3 db. are not usually noticed even though they are there. However, there is the more insidious matter of co-channel and adjacent-channel QRM from our brother hams. This type of interference cannot be evaluated easily in terms of db. gain. Everyone knows that cutting down the receiver bandwidth will do wonders for this too. So you can safely conclude that we can gain 6 db. at the transmitter *plus* an undetermined number of db. at the receiver. The actual receiver advantage will depend on the conditions under which you are operating at the moment.

Power Economy

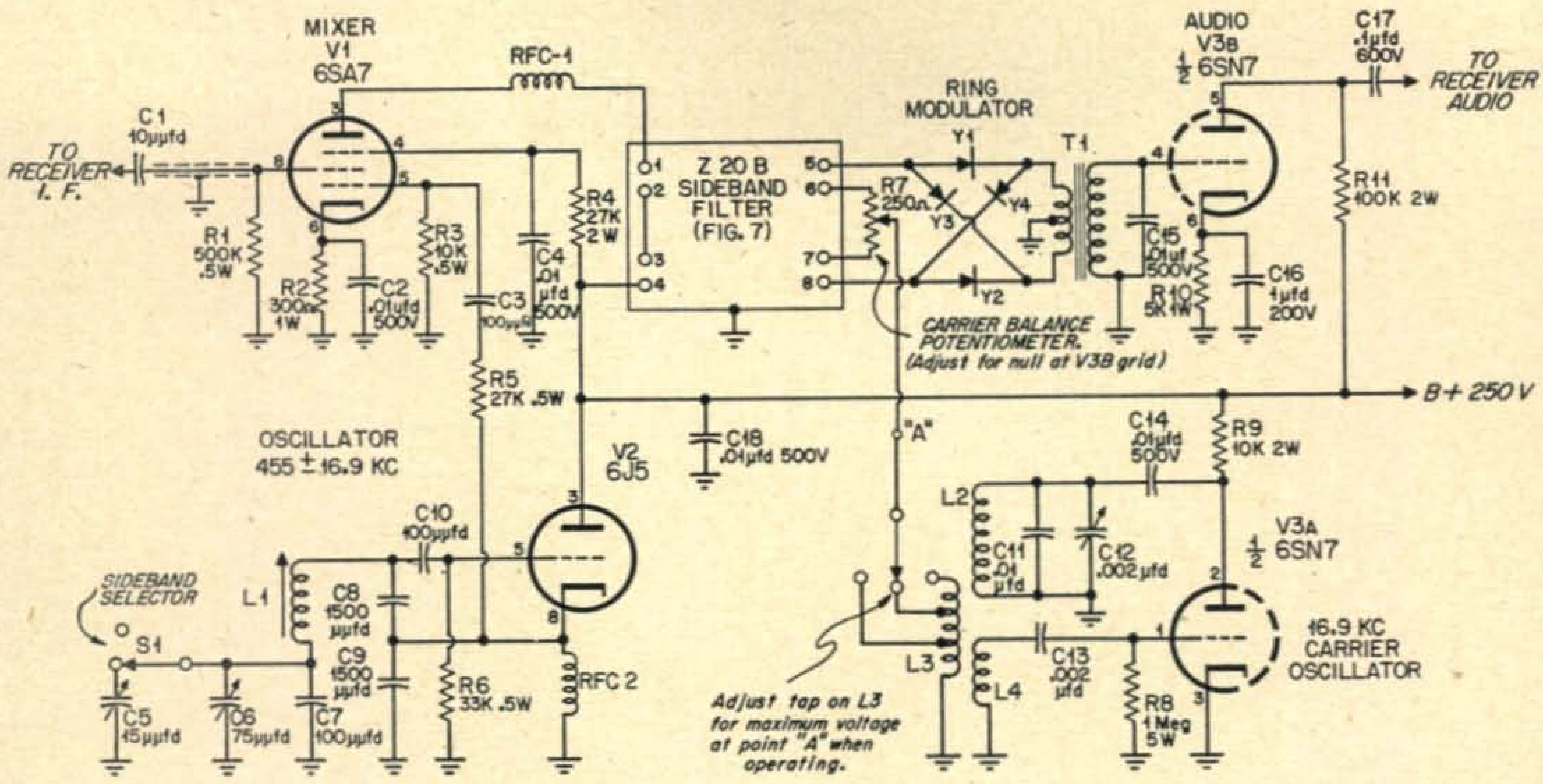
There is another way of looking at this double-sideband versus single-sideband comparison that I believe may be of interest and I offer it here. Suppose that we have a one-kilowatt, *average*-power, double-sideband AM transmitter and a one-kilowatt, *peak*-power, single-sideband transmitter. Please take a second look at the italicized words. Without regard to the bandwidths involved and assuming no noise or QRM problems, from the previous discussion we know that the two transmitters will produce exactly the same amount of audio at the receiver output. Again look at the underlined words. The conventional AM transmitter is running 1 kw. *average*-power all of the time when you are not talking, and 4 kw. on *peaks* of 100% modulation. On the other hand, the SSB transmitter probably runs about 300 to 500 watts (depending on the persons voice) *average* power only when you are talking. With no voice input, there is no transmitter output and only a small amount of idling plate power input (usually about 1/4 to 1/2 of the maximum plate dissipation of the final tubes).

In our foregoing comparisons of the AM and SSB operation of a transmitter we have neglected the slight differences in operating efficiencies of the Class C (in the AM case) and the Class B (SSB case) amplifiers. We feel that this is only worthy of passing notice since the Class C efficiency is about 75% while the Class B efficiency is about 65%.

There is one further point that should be made at this time. The FCC has interpreted its "one kilowatt input to the final amplifier" for SSB transmitters in this way: The product of the *average* plate current in the final amplifier and the plate voltage applied should not exceed one kilowatt. This average plate current is the maximum value to which the needle swings on normal voice input. The meter used must have a time constant not to exceed 1/4 second. This is the time constant found in practically all milliammeters normally

	100-watt AM Transmitter	Same Final Amplifier Used on S. S. B.
Maximum power on voice peaks	400 watts	400 watts
Average power	100 watts (continuous)	Approx. 100 to 200 watts (only when talking)
Sideband power	50 watts (2 sidebands)	400 watts (1 sideband)
Bandwidth	6 kc.	3 kc.
Receiver output power (relative)	1	4
D. C. plate voltage	600 volts (example)	1200 volts

Fig. 5. SSB and AM Comparison Chart.



R1—0.5 megohm, ½w.
R2—300 ohm, 1w.
R3—10,000 ohm, ½w.
R4—27,000 ohm, 2w.
R5—27,000 ohm, ½w.
R6—33,000 ohm, ½w.
R7—250 ohm potentiometer (carbon)
R8—1 megohm, ½w.
R9—10,000 ohm, 2w.
R10—5,000 ohm, 1w.
R11—100,000 ohm, 2w.

C1—10 μμfd. mica
C3, C7, C10—100 μμfd. silver mica
C2, C4, C14, C15, C18—0.01 μfd., disc ceramic, 500v.
C5—15 μμfd. midget variable
C6—75 μμfd. midget variable
C8, C9—1,500 μμfd. silver mica

C11—0.01 μfd. silver mica
C12—0.002 μfd. compression padder
C13—0.002 μfd. mica
C16—1.0 μfd., 200v. metalized paper
C17—0.1 μfd., 600v. metalized paper
S1—s.p.d.t. water switch
T1—Balanced 500 ohm to single grid transformer

RFC1—5 mh. choke
RFC2—2.5 mh. choke
Y1, Y2, Y3, Y4—Copper oxide varistor W.E. type D-98914 (Germanium diodes—1N34 may be used)

Fig. 6. This is the "modified Single Sider," filter type, SSB receiving adapter.

used for amateur work. No additional damping of the meter may be used. What does all this mean? It means simply that the average input power may go to one kilowatt while the peaks of the SSB signal go as high as the linearity of the amplifiers will permit. The peak-to-average ratio in the operator's voice will be the determining factor in this matter. The usual male voice ranges anywhere from 1½ to 1 up to 3 to 1 in peak-to-average ratio. Thus, the maximum power for a "legal 1 kw." SSB transmitter may be anywhere from 1½ kw. to 3 kw. input—and please note: *all* of this power is useful.

Tuning In SSB Signals

Using a conventional superhet receiver, we have a choice of two systems of tuning in single-sideband signals.

Method A: (Front-end carrier insertion[2, 3]): The receiver is operated in the usual manner for phone reception; that is, a.v.c. turned on, b.f.o. off, and r-f gain full-on. A BC-221 frequency meter, or similar auxiliary oscillator is used in conjunction with the receiver in the following manner: Center the SSB signal in the pass-band of the receiver's i-f stages by tuning for maximum kick on the S-meter. Tune the auxiliary oscillator slowly through the frequency occupied by the SSB signal and you will find that the signal will pass through the characteristic "Mickey Mouse" high pitched sound to the guttural "Mortimer Snerd" sound. In between these two extremes lies the narrow margin of intelligible copy. If by chance you have the artificial carrier on the wrong side of the SSB signal, the region between the high and low-pitched sounds will not yield understandable output, so move the oscillator signal over

2. "The Reception of Single-Sideband Signals," Wright, QST, Nov., 1952, p. 25.

3. "Carrier Generators for SSB Reception," Wright, QST, Dec., 1952, p. 25.

Coil Winding Data

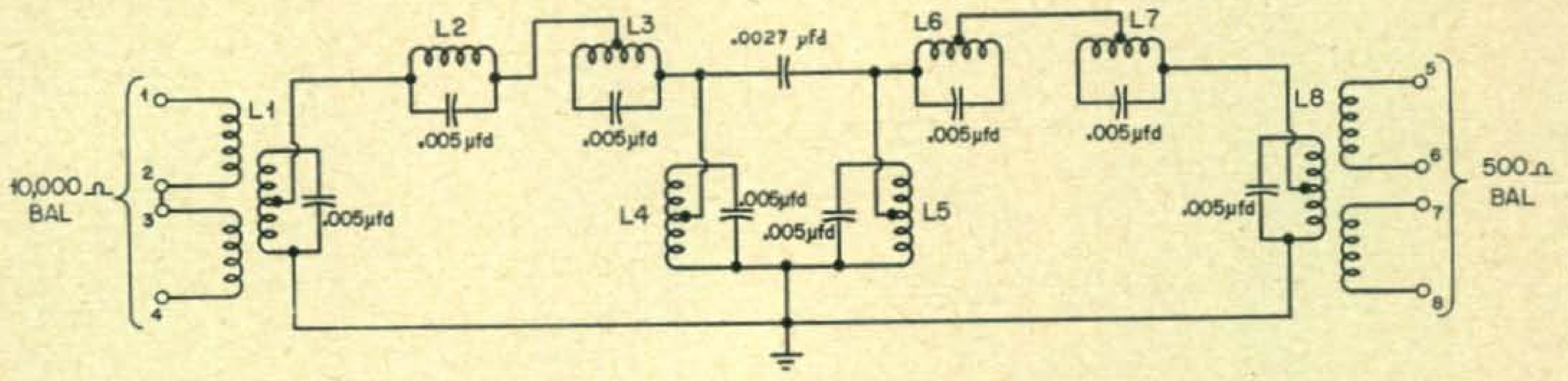
(Figure 6)

L1—single winding from 455 kc. i-f transformer (slug tuned).

L2—6.8 mh., wound on type P-476930 toroid form.

L3—¼ number of turns as on L2, wound on the P-476930 form, tapped every 20 turns.

L4—1/5 number of turns as on L2, wound on same P-476930 form.



Winding	Approx. Total Ind. mhy.	Ind. to Tap mhy.	Test Capacity ufd.	Test Freq. - Kc.
L_1 Primary 10,000	16.5 (total)	(Note: - This winding is not critical)		
L_1 Secondary	14.9	4.98	.01937 for tap	18.44
L_2	10.96	no tap	—	21.50
L_3	20.25	14.90	.006798 for tap	15.814
L_4	14.4	2.408	.029883 for tap	18.80
L_5	13.9	2.65	.026235 for tap	19.20
L_6	12.06	4.13	.014524 for tap	20.50
L_7	18.4	5.13	.018366 for tap	16.585
L_8 Primary	14.9	6.6	.011289 for tap	18.44
L_8 Secondary 500	1.09 (total)	c.t.	.068120 for total winding	18.44

Fig. 7. Sideband filter Z-20-B (courtesy F.M. Berry, WØMNN). Note that the test capacity is used only to adjust the coil inductance to the tap. The total winding must be tuned to the test frequency by its own 0.005 µfd. mica condenser, and then wired into the circuit. Molybdenum Permalloy toroid forms are used with the L1 and L8 forms being type P-476930 and L2 through L7 forms being type P-284395. The toroids may be purchased from the Arnold Engineering Co., Merengo, Iowa.

to the other side of the signal and try the other spot. You may have been trying to copy a lower-sideband signal as an upper-sideband signal, or vice versa. Here is a rule-of-thumb to remember. To tune in a lower-sideband signal the carrier must be on the high frequency side, and to tune in an upper-sideband signal the carrier must be on the low frequency side of the SSB signal. Assuming that you have the carrier correctly placed, you can tune the receiver itself back and forth across the combination of the SSB and oscillator signal for optimum receiving conditions.

The amplitude of the artificial carrier should be adjusted by varying the oscillator coupling to the receiver antenna terminal, so that the maximum audio is recovered from the SSB signal with no signs of distortion due to over-modulation of the carrier. If heavy QRM is encountered, inserting a stronger carrier will prevent "capture effect" of the second detector by other strong carriers.

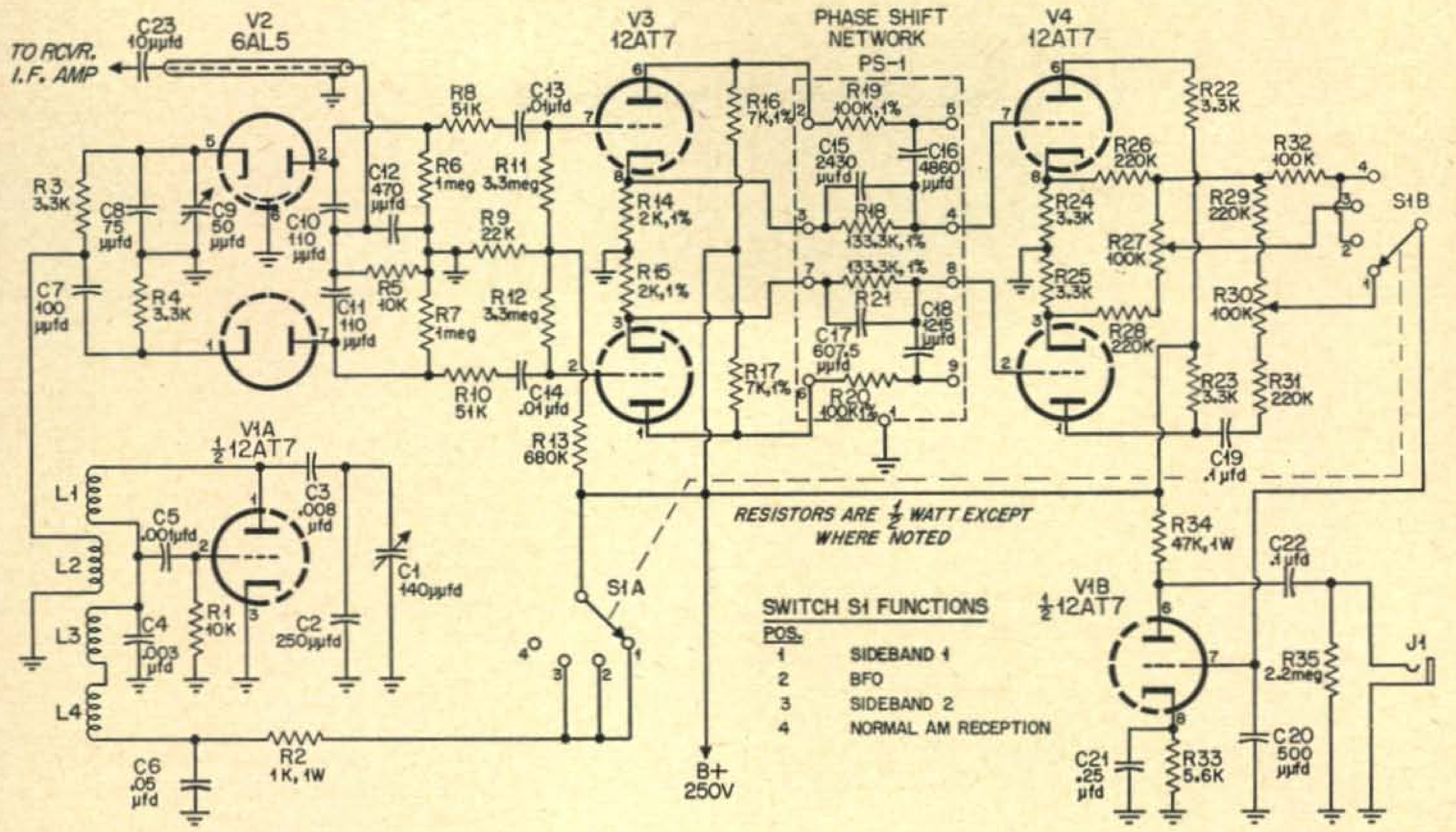
The crystal filter may be used in a normal manner to notch out interfering heterodynes and to reduce the receiver bandwidth to match the SSB signal bandwidth. You can tell which sideband is being transmitted by determining to which side of the carrier the receiver must be tuned in order to derive the maximum audio output from the signal. The receiver must be reasonably selective to do this, however.

Method B: (b.f.o. carrier insertion). With the receiver still in the conventional AM position, tune in the SSB signal for maximum S-meter kick. Turn off the a.v.c., back off the r-f gain, turn the audio gain up to maximum, and lastly turn on the b-f-o switch. *Slowly* tune the b-f-o pitch control (not the front end of the receiver) so that the b-f-o frequency passes through the band of frequencies occupied by the SSB signal. At one point in its journey the b-f-o will correctly demodulate the SSB signal and the "stuff" will come out as English and not Chinese. Bring up the r-f gain until a comfortable level is available. Advancing the gain too far will produce a garbled signal that cannot be detected no matter where you place the b-f-o carrier. Too much gain causes the SSB signal to overmodulate the b-f-o carrier causing plenty of second-harmonic distortion.

Adapters For Receiving SSB

There are three prime requirements that must be present in any *good* single sideband receiving system:

(1) Stability—need I say more?
(2) Selectivity—3 kc. bandwidth with rejection outside this range, this means good skirt selectivity.
(3) Exalted carrier reception—this means having the b-f-o voltage at least ten to



R1—10,000 ohms, ½w.
R2—1000 ohms, 1w.
R3, R4, R22, R23, R24, R25—3,300 ohms, ½w., 5%
R5—10,000 ohms, ½w.
R6, R7—1 megohm, ½w.
R8, R10—51,000 ohms, ½w., 5%
R9—22,000 ohms, ½w.
R11, R12—3.3 megohms, ½w.
R13—680,000 ohms, ½w.
R14, R15—2,000 ohms, ½w., 1% precision
R16, R17—7,000 ohms, ½w., 1% precision
R18, R21—133,300 ohms, ½w., 1% precision
R19, R20—100,000 ohms, ½w., 1% precision
R26, R28, R29, R31—220,000 ohms, ½w.
R27, R30—100,000 ohm pot.
R32—100,000 ohm, ½w.
R33—5,600 ohm, ½w.
R34—47,000 ohms, ½w.
R35—2.2 megohms, ½w.
C1—140 μμfd. variable
C2—250 μμfd. mica
C3—0.008 μfd. mica
C4—0.003 μfd. mica
C5—0.001 μfd. mica
C6—0.05 μfd. paper
C7—100 μμfd., 5% mica
C8—75 μμfd., 5% mica
C9—50 μμfd. variable
C10, C11—110 μμfd. mica (matched within 1%)
C12—470 μμfd. mica
C13, C14—0.01 μfd., mica or paper
C15—2,340 μμfd. (paralleled 0.002 μfd. and 170-780 μμfd. trimmer)
C16—4,860 μμfd. (paralleled 0.0043 μfd. and 170-180 μμfd. trimmer)
C17—607.5 μμfd. (paralleled 500 μμfd. and 9-180 μμfd. trimmer)
C18—1,215 μμfd. (paralleled 0.001 μfd. and 50-380 μμfd. trimmer)
C19—0.1 μfd. paper
C20—50 μμfd. mica
C21—0.25 μfd. paper
C22—0.1 μfd. paper
C23—10 μμfd. mica
J1—open circuit phone jack
L1, L2, L3, L4—National R-100 r-f choke modified so that second pi serves as secondary (L2). The remaining pi's are connected in series as shown.
PS-1—two channel, 90° phase shift network. See footnote eleven.
S1a, S1b—2-pole, 4-position wafer switch.

Fig. 9. The parts list and wiring diagram of a phasing type single-sideband adapter, modified by W9DYV, from the original design of W2KUJ.

(G.E. HAM NEWS, July-August 1951)

(3. Con't.) one-hundred times as great as any other signal that is present in the second detector. This reduces the monkey chatter caused by strong QRM-ing signals cross-modulating with each other upon detection.

I don't believe that much need be said about requirement (*1*), either you have a stable receiver or you haven't and in the latter case you may be forced to do something about it. I cannot hope to deal with this problem here. However, requirement *(2), selectivity,* can be dealt with to good results. The most desirable place to achieve selectivity in a receiver is as close to the front end as possible. This means immediately after the high frequency mixer. Pre-i.f. selectivity is desirable because it prevents strong adjacent channel signals from producing distortion products in the latter i-f amplifiers. These distortion products appear as splatter on the signal to which we are listening while in reality these products are not transmitted by the offending stations. The only means avail-

(Continued on page 59)

By J. G. ROUNTREE, W5CLP for the

CARAVAN CLUB

Continuing our series of columns edited by the various "mobile" clubs throughout the country is this report from the well-known CARAVAN CLUB, of Dallas, Texas. Future columns will be edited by the Phil-Mont Club of the Philadelphia area, the Mobile Amateur Radio Corps in Minneapolis, the 29.3 Net from Portland, Oregon and many others. If your club or group has not been contacted by the Editors of CQ, I urge you to write in today so that your club may have the opportunity to tell its story to the readers of CQ.

o.p.f.

The *Caravan Club* was formed in Dallas during 1948, in order to create an interest in amateur mobile radio operation, fraternize for mobile operation, provide mobile emergency stations, and to gain practice in organized mobile operation. From an initial membership of 14 members, the club has grown to include about 100 members, most of whom live in Dallas, but some of whom are located in other cities within a radius of 100 miles from Dallas. The club conducts regular meetings and drills each Sunday afternoon, except when a picnic or other outing is undertaken. Originally, most of the activity of the club was on the 10-meter band, with 29,150 kc. plus or minus 5 kc. as the chosen frequency. During the past two years, however, most of the members have changed frequency so as to operate in the 75-meter band.

The members of the *Caravan Club* are always mindful of the value of mobile equipment in expediting emergency communications, and many of the members have taken part in communications emergencies. In the early days of this activity, difficulty was encountered in obtaining recognition of officials at the scene of a disaster; occasionally it was even quite difficult to reach the disaster site itself. In an effort to overcome this difficulty and to provide effective liaison with responsible officials, the *Caravan Club*, during 1951, offered its services to the Dallas County Sheriff, Bill Decker, as emergency communications units. It happened that the Dallas County Sheriff had originated a plan some months before of establishing a Reserve Deputy Sheriff organization of trained personnel who would be able to serve as Deputy Sheriffs when called to duty in the event of an emergency. It was seen that amateur mobile units could provide communications for this group, and as a result, mobile units belonging to the *Caravan Club* members have been integrated into the Reserve Deputy plan to provide communications for a number of squads. The members of the *Caravan Club* participating in this activity have completed the regular training course given to Deputy Sheriffs. While the function of these members is, primarily, to furnish communications, each of them carries an identification card as a Reserve Deputy Sheriff and when called to duty is empowered to perform all functions of a regular Deputy Sheriff. Amateurs participating in this program do not, of course, receive pay for their services. Amateurs who desire to offer their services.

Caravan Club officials present the initial group of Radio Amateur Civil Emergency Service application forms to the Dallas Civil Defense Communications Officer. Reading from left to right are Dee Conner, W5QMF, Caravan Master; Dick Weeks, W5CPW, Assistant Program Director and past Caravan Master; Durward J. Tucker, W5VU, Dallas Civil Defense Communications Officer; and Gus Rountree, W5CLP, Emergency Caravan Master. (Photograph by Bert Wells, W5JNK, Secretary-Treasurer) and who have not had an opportunity to complete the deputy training course, form a reserve pool of operators, and are given identification cards as communications men.

When, during January, 1952, the Federal Communications Commission announced its proposal to establish a Radio Amateur Civil Emergency Service, the *Caravan Club* filed comments with the Commission supporting the proposal. Our group was one of the four clubs filing comments in this proceeding. The *Caravan Club* began at once to take action to conform its operation to that contemplated by the proposed FCC Rules.

During April, 1952, the "Alert America" convoy, supported by the Valley Forge Foundation, presented its Civil Defense exhibit in Dallas. The *Caravan Club*, in conjunction with the Dallas Amateur Radio Club and the Grand Prairie Amateur Radio Club, installed and manned an amateur station adjacent to the "Alert America" presentation. The station attracted considerable favorable attention from attending members of the public. The highlight of this activity, insofar as the *Caravan Club* was concerned, was the handling of the weekly *Caravan Club* roll call and drill from the station. During the activity, the Deputy Regional Federal Civil Defense Administrator from the Dallas Headquarters, Col. E. V. Hardwick, was called for at his home by one of the members in a mobile unit and was carried to the control station at the Civil Defense exhibit during the initial stages of the roll call and drill. There, he made an address over the control station regarding the activity of radio amateurs in Civil Defense, assuring the group that Federal Civil Defense officials are well aware of the value of Amateur Radio and that amateurs would have a part in Civil Defense planning.

Through the efforts of the Dallas Civil Defense Communications Officer, Mr. Durward Tucker, W5VU, equipment was made available for the establishment of a control station for amateur Civil Defense activities at a strategic location. Simultaneously with activation of this station, the club adopted the frequency 3995 kc. for its 75-meter mobile activities. This frequency lies within that band of frequencies available to the Radio Amateur Civil Emergency Service for Civil Defense activities. Formerly, the 75-meter activities had taken place, first, on 3990 kc. and later, on 3855 kc., but neither of these frequencies had proved to be satisfactory under the conditions existing in the 75-meter band. The frequency 3995 kc., being one of the frequencies available for Civil Defense activities, fits in well with the Civil Defense planning of the *Caravan Club* and Dallas Civil Defense officials, and, generally, has been more satisfactory than the other 75-meter frequencies used, despite the careless interference which certain uncooperative fixed stations in the area have caused from time to time.

The *Caravan Club* has served as the nucleus in planning and activating a Civil Defense communications plan for the Dallas area. As of the time that this is written in early December, the communications plan and a large group of applications for FCC authorizations in the Radio Amateur Civil Emergency Service have been submitted to CD officials for approval prior to filing with the FCC.

Members of the Caravan Club gathered at an outing on November 16, 1952. About one-fifth of the membership is shown in this picture. Reading from left to right are W5's KVS, KWL, JNK, DM, TCN, MIG, CLP, QMF, CPW, MTL, ITR, LNB, HB, SIF, DAM, SPB, TUU, QGJ, CNN, TAD and TER.

In carrying out a positive program of service in the public interest, members of the *Caravan Club* have taken part in a number of activities. Among these were participation in progress reports of the trophy races held by the Texas Private Fliers Association during July, 1948, when mobile units provided communications from six vantage points along the course. In addition, members have cooperated in a number of exercises held by the CAP.

During the summer of 1951 the National Model Air Races were held at the Naval Air Station near Dallas. During this activity, teams of *Caravan Club* members provided full-time recovery service for lost models. This activity was coordinated by an amateur net control station operated at the field by amateurs in the Naval Reserve.

During the summer of 1952, the Dallas County Sheriff discovered a cache of narcotics near Dallas. Fearful that the frequency regularly used by the Sheriff's office was being monitored by the criminals involved, the Sheriff obtained the cooperation of

(Continued on page 64)

Conducted by HERB BRIER, W9EGQ

385 Johnson Street, Gary, Ind.

As announced in last month's column, the Federal Communications Commission has authorized Novice CW operation between 7,175 kc. and 7,200 kc., effective February 20, 1953. General Novice regulations apply: namely, crystal-controlled transmitters and a maximum power input of seventy-five watts.

In addition, the FCC has also announced a Novice CW band between 21,100 and 21,250 kc. This band will be put into operation on March 28, 1953.

What To Expect on 7.2 Mc.

The new band compares to the 3.7-Mc band something like this: An antenna on 7-Mc need be only about half as long as a comparable 3.7-Mc. antenna. Daytime signals are much stronger than those emitted at nighttime. The average distance that can be covered is up to three times as great. "Skip," the inability to hear stations between a few miles and several hundred miles away, while more-distant signals are audible, is more pronounced. It is often not long after 10:00 P.M. that it becomes difficult to hear other U.S.A. amateurs. Quite often DX signals can be heard mixed in with U.S.A. signals. This "long skip" makes working DX a distinct possibility, but doing so consistently imposes much more rigorous demands on the antenna than working the less-distant stations does.

Jim Blaske, WN4YOX, Fort Lauderdale, Fla. Xmtr. is a TR-75TV, receiver is an S-38B, and antenna is a folded dipole. Jim's ambition is to work a YL operator, about 15 years old.

Based on the experience over the years, of low-powered stations with an average antenna, many Novices will find they will have the best results by operating in the 7.2-Mc band in the daytime and in the 3.7-Mc band at night.

Getting On The 7.2-Mc Band

Receivers: All commercial communications receivers cover the 7-Mc amateur band. And instructions for building an amateur receiver invariably include data for 7-Mc coils; consequently tuning the band with them presents no problem. You will probably discover, however, that the 7175 to 7200-kc segment occupies only a dial division or so. If you are using a home-built receiver, *Fig. 2* shows how the band-spread condenser may be tapped across a portion of the coil, instead of all of it, for increased band spread. The closer to the ground end of the winding you place the tap, the greater the band spread.

Some *surplus* receivers, such as the BC-454, whose frequency coverage is 3 to 6 Mc, will not cover the 7-Mc band. *Figure 1* is the diagram of a simple crystal-controlled, 7-Mc converter for such receivers. It uses a 12AU7, dual-triode tube and a 3.7-Mc band crystal from your transmitter (you won't be using it in the transmitter, while you are on the 7.2-Mc band), plus a couple of resistors and condensers.

The converter may be built in a small aluminum utility box and mounted on top of the receiver near the antenna terminal. It obtains its power from the receiver. The combination becomes a dual-conversion superheterodyne, and all tuning is done on the BC-454.

The frequency to which the converter responds is equal to the sum of the crystal frequency and the BC-454 frequency. For example, with a 3700-kc crystal, to receive a 7175-kc signal, the BC-454 is tuned to 3475 kc. And to tune to 7200 kc., the BC-454 is tuned to 3500 kc. Similarly, to cover the entire 7-Mc amateur band, the BC-454 is tuned between 3300 and 3600 kc. *C1* is merely tuned for the loudest signal. For the Novice band, it may be peaked up in the center of the band and forgotten.

Other crystal frequencies will work equally well, but, as the 3.7-Mc Novice-band crystal is available, it might as well be used.

Transmitters: Putting a 3.7-Mc transmitter on the 7.2-Mc band requires changing the crystal and changing or modifying the coils.

As was discussed in the August, 1952, *Novice Shack*, the proper ratio of inductance to capacity (L/C ratio) is required in a transmitter tank circuit in order to reduce the possibility of the harmonic frequencies, generated by the output tube along with the desired frequency, from being radiated by the antenna. On the assumption that the L/C ratio is correct on 3.7 Mc., the simplest way to retain the same ratio on 7.2 Mc. is to reduce both the inductance and capacity by half.

Other things being equal, the inductance of a coil varies as to the number of turns in the coil. To cut the inductance in half, therefore, requires that the number of turns be reduced by the square root of 2, or: $\frac{1}{2}L = T/\sqrt{2}$. In round figures, the 7.2-Mc coil will have seven-tenths as many turns as the 3.7-Mc coil. It will tune to 7.2 Mc. with about half the capacity required to tune the larger coil to 3.7 Mc. The same results could also be obtained by keeping the same number of turns and reducing the coil diameter a third.

A Message To CW Operators

As most of you know, W1AW, headquarters station of the ARRL, transmits code practice material every evening at 9:30 p.m., EST. Transmissions are made simultaneously on 1855, 3555, 7130, 14,100, 52,000 and 146,000 kc., with a power input of one kilowatt on the 3.5, 7, and 14-Mc frequencies.

On Sunday, Tuesday, Thursday, and Saturday, the code speeds are 5, 7½, 10, and 13 wpm. On Monday, Wednesday, and Friday, speeds are 15, 20, 25, 30, and 35 wpm. Approximately ten minutes are devoted to a transmission at each speed.

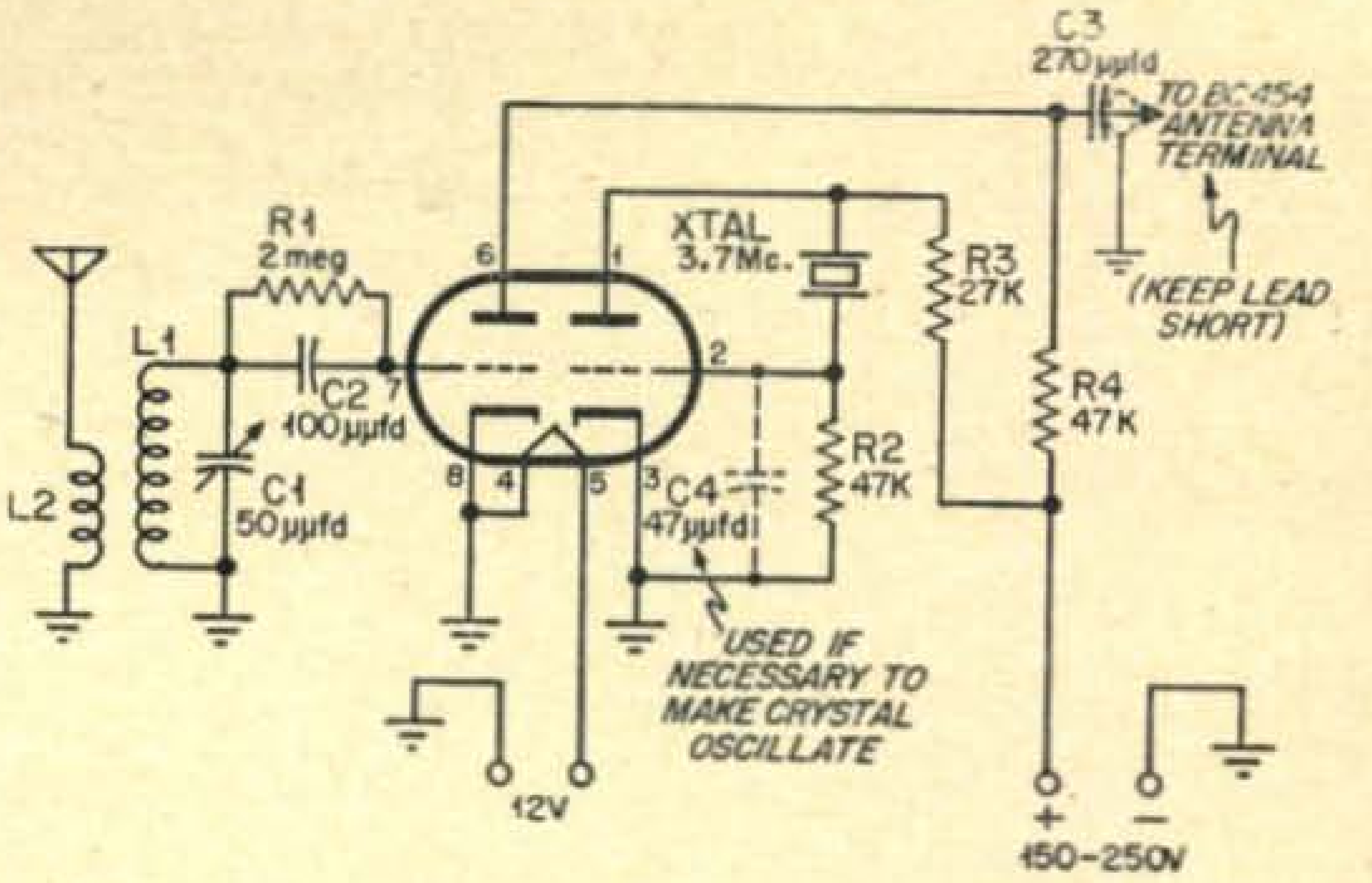
WN9UZP points out that the thoughtless operating habits of some amateurs are nullifying much of the value of these transmissions. He suggests that stations operating on or near these frequencies either stand-by or use a different frequency between 9:30 and 10:30 p.m., EST.

The *Novice Shack* heartily seconds WN9UZP's suggestion. Remember that few of those utilizing the code-practice sessions have super-selective receivers; try to give them a little more room than would be required with a really-sharp receiver. By the way, when was the last time *you* copied W1AW?

The desired inductance may be obtained by shorting out turns on the 3.7-Mc coil or plugging in a new one with the proper number of turns. Efficiencies are approximately the same either way, although some amateurs claim that shorting out turns increases coil losses. As many transmitters "fudge" a little on tank capacity on 3.7 Mc., it will do no harm if almost half the turns are shorted out for 7.2-Mc operation.

The number of turns required in coupling links usually runs about the same as or a trifle less than the number required on 3.7 Mc, depending largely on the load impedance and how close the link is coupled to the tank coil.

Crystals: With most transmitters, crystals between 3187.5 and 3600 kc, or between 7175 and 7200 kc. may be used to cover the 7-Mc Novice band.* The former have the advantage of being usable on the 3.5-Mc band when you get your General Class license. However, output on 7.2 Mc. from a single-tube transmitter, such as a 6AG7 grid-plate oscillator or a 6V6/6L6 Tritet oscillator, is somewhat less with 3.6-Mc than with 7.2-Mc crystals. This is also true of transmitters using an untuned Pierce oscillator and an amplifier (6L6, 6V6, 2E26, 807, etc.), because the output stage is then operating as a frequency doubler.



C1—50 μμfd., midget variable
C2—100 μμfd., midget mica
C3—270 μμfd., midget mica
C4—47 μμfd., midget mica
R1—2 megohm, ½w.
R2—47,000 ohm, ½w.
R3—27,000 ohm, ½w.
R4—47,000 ohm, 1w.
L1—18 t. #22 enam., close wound on 1" form.
L2—4 t. #22 enam., close wound, ¼" below L1.
Tube—12AU7

Fig. 1. The schematic and parts list for a simple 7-Mc crystal-control converter for BC-454 (3-6 Mc.) receiver. Build in small aluminum box and mount on top or side of receiver near antenna terminal.

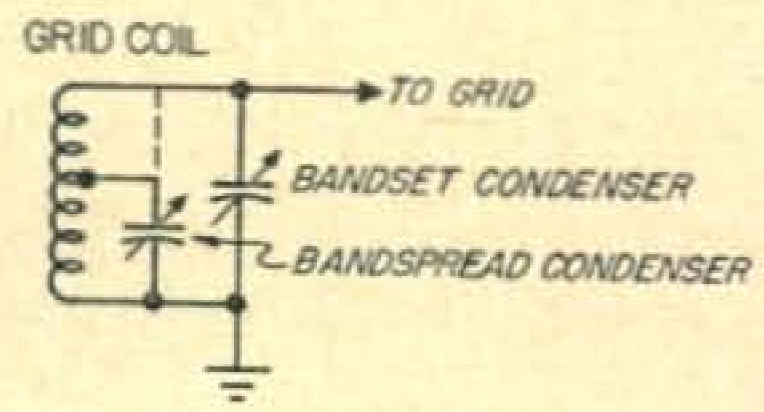


Fig. 2. The bandspread condenser in a home constructed receiver may be tapped down on coil in this way to spread the 7-Mc Novice band over more of the dial.

Also, a frequency multiplier generates more harmonics than a straight amplifier; therefore, having one feed an antenna is more likely to cause undesired harmonic radiations than the use of a straight amplifier. This is relatively unimportant with power inputs of less than twenty watts (especially when a separate antenna tuner is used), but it becomes increasingly important at higher powers.

In transmitters where it is possible to double the frequency in an earlier stage and operate the output tube as a straight amplifier, 3.6- or 7.2-Mc crystals may be used with equal facility.

(Continued on next page)

* An exception is the push-pull oscillator, "The Old One Two", described by Major R. H. Mitchell, W6TZB on page 38, CQ. March 1952.

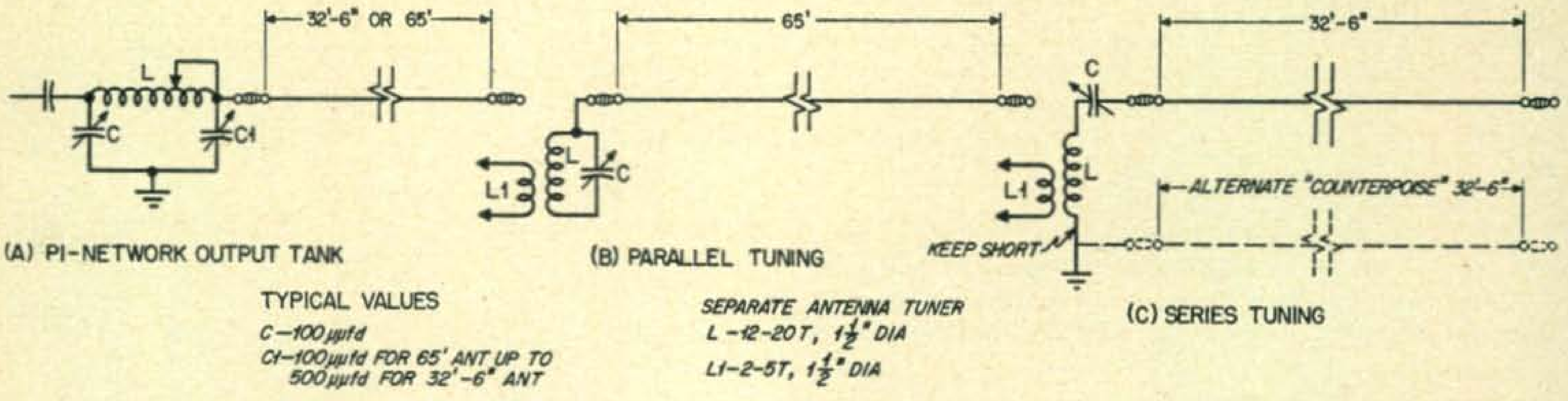


Fig. 3. Simple antennas and tuning methods for 7.2-Mc Novice band. For reasons explained in text, the longer one is to be preferred. In C, another 32'6" wire may be substituted for a ground connection.

Antennas: If you already have a 3.7-Mc antenna, it will probably work fairly well on the 7.2-Mc band. Two exceptions are ½-wave doublets, fed with low-impedance lines, and folded dipoles. They are both essentially single-band antennas. A possible solution here is to tie the feeders together and tune the whole thing up as a random-length antenna on 7.2 Mc. It would be better, however, to change the feed system of the first antenna to 300-ohm ribbon or (preferably) spaced line, connected either to the center, or to one end, of the antenna. This arrangement will result in an efficient antenna for both bands, although it will probably require an antenna tuner. For best average results, the length of the flat-top should be increased to about 132½ feet. The feed line may be 35 to 40 feet long.

Lacking a 3.7-Mc antenna, you can erect one especially for 7.2 Mc. A ½-wave antenna for the center of the band will be 65 feet, 1 inch long, and a ¼-wave one will be 32 feet, 6 inches long, both dimensions to the nearest inch. Either length may be tuned up as shown in *Fig. 3*, depending upon the space available.

The longer length is preferred, because ground losses are less and it is usually possible to get a greater percentage of its length high and in the clear. A 65-foot length of wire can also be used as a ½-wave antenna on 7.2 Mc. and as a ¼-wave antenna on 3.7 Mc.

The big disadvantage of bringing one end of an antenna into the operating room in order to feed it is that it puts part of the antenna in close proximity to objects that distort its radiation pattern

Novice station WH6ANQ, in Honolulu, Hawaii. Its operator, Adolph H. Bond, believes that the Novice class license should be renewable

and absorb part of the radiated power. Best results are usually obtained by placing the antenna in the clear and transferring power to it by means of a feed line. The simplest of these antennas are the ½-wave doublets, fed in the center with 75-ohm TV ribbon or coaxial line, and folded dipoles, fed with 300-ohm ribbon. Also, a ½-wave antenna may be fed with tuned feeders, as discussed a few paragraphs back.

Generally speaking, the antenna should be as high as possible. A good average height is thirty to forty feet. Lower antennas generally work well when "skip" is short, but not so well over longer distances. Higher antennas are usually better DX radiators, but are not always as good for shorter distances as a medium-height one.

Letters and General News

Larry, **W9TRK**, writes of a situation that may be more common than I realize, because I believe that, with determination and practice, any one can learn the code well enough to pass the General Class code examination. Be that as it may, Larry's plight may be shared by others who cannot or do not care to devote the time necessary to pass the higher exam.

He writes: Dear Herb, I am a Novice who has recently graduated into the ranks of Technician licensees. I am also unable to get my code speed up to pass the General Class exam. Thus it appears that I will be stuck (?) with the bands above 220 Mc. Therefore, I am planning to move up to 220 Mc., but I do not wish to be the only Ham on this band! I would appreciate it if any Hams, especially in the Chicago area, would drop me a line if they are interested in starting a little 220-Mc activity.

"My address is Lawrence R. Rubel, 1964 Sheridan Road, Highland Park, Illinois"—Larry, W9TRK.

Lane, **WN6PYG** (The fancy pig), writes: "At last! At last! I got on the air with own rig. I got my license a few days before entering the Army and being immediately sent to W1 land. So I was really looking forward to getting home to the rig. I put in quite a bit of my furlough time operating.

"My rig at home (San Francisco) is a home-built 6V6-6L6 transmitter, with 25 watts input, and an S-38B receiver. I am building a 2-meter station to use while here in the East"—Pvt. Lane Dam, WN6PYG/1, Ft. Devens, Mass.

EX-Novice **W6NNP** writes, "Dear Herb, Betty, W6OQP, dropped the N from her call about a month before I did. She now has a Viking II and an HRO-50T1. Ex WN'er W6RIG has a 90-watt 28-Mc phone rig. I borrowed the modulator and worked my first DX, KL7AON (Pse QSL!) on 28 Mc.

"I still operate in the 3.7-Mc band with my 30-watter. Best DX there is W4VHH in North Carolina. The local gang is helping me with a new all-band, phone/CW rig, running 60 watts. When it is finished, I hope to start handling traffic (third-party messages—Herb) in a big way.

"When I answer a CQ not right on my frequency, I call five times, sign my call a couple of times, and repeat

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Monitored by LOUISA B. SANDO, W5RZJ

959-C 24th Street, Los Alamos, New Mexico

YLRL 13th Anniversary Party

Congratulations to the winners of the YLRL 13th Anniversary Party—W3UUG, Miriam, who placed first in the phone section held Nov. 29-30, and W1FTJ, Dot, who took top place in the CW section held Dec. 6-7. This makes the third straight win for both of these YL's! Which means that W3UUG will retain permanent possession of the gold loving cup donated by W1MCW, and W1FTJ retains permanent possession of the silver loving cup donated by W4HWR. As in the 12th Anniversary Party a year ago, Dot came very close to making first in both sections, with only 221 points difference in the claimed top scores in the phone section. Though she had all the logs to check afterwards it didn't keep W3JSH from having fun in the contest and Dottie placed second in the CW section.

In the phone section 83 YL's participated, 61 YLRL members and 22 non-members, but of these only 31 sent in logs. The claimed scores:

W3UUG	9690	W2EEO	2991	W4RIG	990
W1FTJ	9469	W3QPJ	2800	W3LSX	880
W4SGD	5786	W2YTI	2730	W4LAS	800
W3MAX		W1QON	2604	W6WRT	606
(OQF)	5284	VE3AJR	2600	W6EHA/5	160
W3JSH	4352	W3NXU	2160	KZ5LM	90
W4KYI	3924	W1RTB	1870	W1QJX	60
W8GYU	3922	W1RYJ	1801	W1HPB(UQA)	10
W1SCS	3781	W2PVS	1600	W3MSU	10
W8HLF	2993	W3PVH	1540	W6NAZ	10
W1UBM	2991	W4OMW			
		(UTO)	1200		

In the CW section 50 YLs were active, 43 of them YLRL members and 7 non-members, with 22 submitting logs. The claimed scores:

W1FTJ	7416	W3LSX	401	W1ZR	40
W3JSH	3380	W3CDQ	400	KZ5LM	10
W3MAX	910	W2EEO	350	W1QJX	10
W3SVY	800	W1RLQ	250	W4RIG	10
W3QPJ	600	W1OAK	120	W6NAZ	10
W4UTO	501	W3MSU	91	W8WUT	1
VE3AJR	481	W1RYJ	90	W9JTX	10
		WN8KLZ	60		

New England YL Get-together

This year's spring luncheon meeting of the New England YLs is to be held on Saturday, April 11, at 1 p.m. at The Smith House, 500 Memorial Drive, Cambridge, Mass. Tickets will be $2.10 each with final date for advance reservations being April 2nd. If you wish further details contact W1UPZ, Helen chairman for the affair.

Novel by W8GJX

In this column in the December *CQ* we previewed the latest book by W8GJX, Helen Cloutier, and published by Pageant Press. Now we've had a chance to read it—"Sim Barton, Girl Radio Operator." It's the fictional story of a girl who became interested in radio as an amateur and decided to study till she could earn her First Class Radiotelegraph license. Sim wanted to be an operator on the freighters traveling the Great Lakes, following the footsteps of her father, a Lake captain until his death. Sim found men very loath to accept a woman as a radio operator, or to even have a woman aboard ship. After many difficulties and an off-again on-again romance with another shipboard operator, Sim finally battled through to success and happiness.

Helen's novel makes entertaining reading, but we could wish for not quite so much love story and a little more radio. But Helen makes it sound as real as if she herself had walked the waterfront and pounded the key aboard ship. Incidentally, Helen will be glad to autograph copies if you'd like.

Life In Hawaii

AG1AG, Lt. Robert Anderson, Jr., USAF, director of MARS at Hickam AFB, Oahu, Hawaii, is shown on the following page, kibitzing on WH6ATC, Lt. Muriel Johnson (W) USN. Anderson is Electronics Officer of the Pacific Division Military Air Transport Service at Hickam AFB and has been a Ham for many years, having started out by learning the code at six years of age. Muriel's interest sparked when he let her talk to friends back in the States, and thus began a cooperative effort between the Navy and Air Force while he helped her learn code and theory to get her ticket. WH6ATC is now on with a 10-watt transmitter and has a 75-watt one abuilding. Muriel goes by the handle of "Johnny"—rather confusing on CW, and not everyone believes it when she explains she's a YL.

WAS/YL

Again congratulations to W1FTJ, Dot—this time for completing WAS/YL. She is only the second person to attain this award! For some time Dot had all the states but Utah and finally worked WN7RRM, Janet. They had set up daily skeds for 5:00 a.m. EST and finally made it on Jan. 4th. Dot was Janet's first contact east of the Mississippi and she had worked only two other states besides Utah. Incidentally, Janet's is quite a Ham family—her mother, father and sister are all Hams.

If you're interested in going after the WAS/YL award, offered by YLRL, check the rules which appeared in this column in the January issue.

Help Wanted

Another plea for assistance—this time from W6VKY He writes: "I have a cousin living in Guthrie, Oklahoma, who has expressed considerable interest in amateur

(Continued on next page)

(from preceding page)

radio at various times, but she seems to believe it takes a degree in E.E. to pass the examination. If you know any licensed YLs or any working toward a license, in the vicinity of Guthrie, perhaps they would be kind enough to either call my cousin or go see her. I'm sure she would appreciate any encouragement you could give her. Her address is Mrs. Alta Chew, 108½ East Harrison, Guthrie, Okla." How about some letters, too, YLs, even if you don't live near by?

YL Century Certificate

The YL Century Certificate for confirmed contacts with stations operated by 100 or more different licensed women amateur radio operators is available to all amateurs throughout the world, and is issued by the Young Ladies Radio League at no cost to the applicant upon compliance with the following rules.

1. Two-way communication must be established on authorized amateur bands with stations, mobile or fixed, operated by 100 *different* licensed women amateurs. Any and all amateur bands may be used.

2. All contacts must be made from the same location. Within a given community, one location may be defined as from places no two of which are more than 25 miles apart.

3. Contacts may be made over any period of years, provided only that all contacts are from the same location as defined in 2.

4. Contacts with YLs anywhere in the world are recognized, provided only that confirmations clearly indicate the stations contacted were operated by duly licensed women amateur radio operators.

5. 100 QSL cards, or other written communications from the stations worked confirming the necessary two-way contacts, accompanied by a list of claimed contacts, including the full name of the operator, alphabetically arranged, and the date and time of contact, must be submitted by the applicant directly to the YL-CC custodian. Sufficient postage must be sent with the confirmations to finance their return by first class mail. The YLRL will not be responsible for any loss or damage to same.

6. Endorsements: Confirmations of contacts, accompanied by alphabetical list, as described above, from stations operated by additional YLs may be submitted for credit each time 50 additional confirmations are available. Endorsements will be made to the original certificate as application is approved.

7. Decisions of the YL-CC custodian regarding interpretation of these rules as here stated or later amended, shall be final. All inquiries regarding cards, applications, or the certificate should be addressed to her. Address: Dorothy Dickey, W7GLK, 614 Siskiyou Blvd., Ashland, Oregon.

Lt. Robert E. Anderson, Jr., USAF, MARS director, Hickam AFB, stands by to offer suggestions as Lt. Muriel Johnson, (W) USN, transmits a message.

With the Clubs

Congratulations to the **Milwaukee Radio Amateurs' Club Ladies Auxiliary**, just recently formed. This club is comprised of licensed YL's and non-licensed XYL's of members of the MRAC. Objectives of the club are to have the XYL's become better acquainted and thereby have more interest in their OMs' radio activities, to help those who are interested to obtain their amateur license, and to be of service to the OM's on Field Days, during conventions, etc. We think the idea of an XYL auxiliary is a wonderful one and would like to see many more such clubs.

The MARC Ladies Auxiliary elected W9MGT, Leonore Zavodnik, as president; WN9RUJ, Mary Meyers, 1st vice president: W9OMZ, Jeanne Pavek, 2nd vice president: Louise Kaetel, XYL of W9SNK, secretary: and Anita Thomas, XYL of W9WK, treasurer. Two other club members are licensed YL's, W9VCE and WN9QMA, and so far one other of the forty-one who joined the club is attending W9MGT's classes to become a Novice. Meetings will be held once a month at members' homes and will be purely social and include such activities as a theater party, book reviews, etc. The first meeting, held Dec. 16th, was a Christmas party.

The December meeting of the **Los Angeles YLRC** also was a Christmas party, with those present including: W6CEE, CQV, KYZ, LBO, LMQ, NZP, DQD, PJU, NLM, WRT, JMC, WSV, UHA, PPY, and WNs JCA and OBZ. After luncheon and exchange of gifts W6CEE, Vada, reported on the Los Angeles Council of Radio Clubs. Vada is custodian of the YLRC club call, W6MWO (the former Helen Cook's call).

Here and There

Congratulations to **W1UKR**, Eunice, and her OM, on the arrival of Barbara Ruth, born Dec. 10th . . . **And** congratulations to **W3NNS**, Anabel, on becoming **the XYL of W3QZ.**

WØCCK, Maxine, and OM are now operating portable 5 while awaiting their W5 calls. They are at Tyler, Texas, where Owen is with the Cotton Belt Railway . . . **WØRAW**, Bertha, and her OM are back in South Texas for the winter where they are operating from their trailer . . . **KH6TI**, Dell, is now back in the States. After many years in Hawaii, Dell is afraid she'll "freeze," for their first six weeks back were to be in Camden, N.J., where her OM is with RCA. Dell had to get rid of all her Ham gear and hopes to operate mobile as soon as they get a car. She says they'll be traveling around the States a lot so maybe some of us will be lucky enough to get a personal QSO . . . Another YL on the move is YLRL Veep, **W3JSH**. Dottie says her OM has taken a position in N.Y.C. starting the middle of February. They are dismantling all their gear and are house hunting,

(Continued on page 65)

Ionospheric Propagation Conditions

Forecasts by GEORGE JACOBS, W2PAJ

3620 Bedford Ave., Brooklyn 10, New York

Before starting with this month's commentary I want to thank the many readers from whom I have received correspondence in response to January's discussion. Next month I intend to discuss some of the recommendations and suggestions that have been made, and future articles in this department will reflect the preferences that you have indicated.

March is an interesting month from a propagation viewpoint. On March 21st the Vernal Equinox occurs. This is the day when the sun crosses the equator as it travels northward along its ecliptic. This solar phenomena has its related effects upon radio propagation and DX conditions. In the northern hemisphere daytime usable frequencies are decreasing, while nighttime usable frequencies are increasing. Atmospheric noise levels and ionospheric absorption are also generally increasing in this area of the world. These effects upon DX paths are discussed in more detail later in this article.

Forty Meter Phone

From a propagation viewpoint, the sub-allocation of phone in the forty meter band comes at an appropriate time. During the next few years of minimum sunspot activity, nighttime DX will generally not be possible on any amateur bands lower than forty meters. If phone were not permitted on forty meters, nighttime phone DX would have been restricted to the 75 meter band—a band that can be rather erratic for phone DX, especially during the summer months. With the addition of the forty meter band, however, phone DX-ers should now be able to work, theoretically at least, most areas of the world during the nighttime hours. We use the word, theoretically, because DX possibilities on forty meters will be limited, not so much by propagation conditions, but by QRM.

The Atlantic City International Radio Regulations of 1947 designated the band 7.0-7.3 Mc. exclusively for the use of radio amateurs only in the western hemisphere. In all other areas of the world, 7.0-7.15 Mc. has been assigned to amateur radio, and the frequency band 7.15-7.3 Mc. is allocated exclusively to International Broadcasting stations. The Broadcast stations that are operating in this band are there legally, and nothing can be done about the interference that they will cause American amateur phone transmissions in the band 7.2-7.3 Mc. At present, high power broadcasting stations in excess of 50 kw. are operated by the BBC, Tangier, Turkey, Radio Moscow, Poland, Hungary, RFE, Switzerland and Australia every night within the 7.2-7.3 Mc. band.

These stations can usually be heard in most areas of the western hemisphere with extremely strong signals. With poorer propagation conditions necessitating the use of lower frequencies, it can be expected that next winter more broadcasting stations will also be operating in this band. Despite favorable propagation conditions on this band, forty meter phone DX possibilities will decrease considerably because of the broadcast QRM. This, of course, is in addition to the general high level of amateur QRM that can be expected.

During the daytime hours, ionospheric absorption will not permit the broadcast QRM to be heard in the western hemisphere, and the forty meter band should be quite useful for QSO's up to a distance of about 1000 miles, depending upon the time of day and season of the year. The daytime skip on forty meters will always be longer than on 75 meters. Refer to the *Propagation Charts* for DX possibilities on specific paths. Although the *Charts* are based upon an assumed *CW* radiated power of 150 watts with an antenna at least a half wave length above ground, they can be interpreted for phone transmissions under similar conditions by subtracting one from the given rating symbols.

The most probable periods for ionospheric disturbances during March are the 1st-3rd, and 18th-28th. Conditions may be erratic on the 5th and 13th.

General Propagation Conditions for March, 1953.

The following is a brief discussion of expected shortwave propagation conditions for Amateur circuits from the United States to the five major areas of the world. For specific times of band openings for any particular circuit refer to the Propagation Charts. Basic ionospheric data used in this analysis appears in the Series D Publications of the National Bureau Of Standards, entitled "Basic Radio Propagation Predictions," and is based on a predicted smoothed sunspot number of 27 for March, 1953.

Europe:

No ten meter openings expected, and fifteen meters will taper off almost completely. With more hours of daylight twenty meters will continue to improve on these circuits, with the band remaining open about an hour later than it did during February. Forty meters should be a bit noisier, but the band is expected to remain open most of the night from the eastern and central areas of the U.S.A. during normal propagation periods. Not much change on eighty except for a bit more atmospheric noise. Conditions on

(Continued on page 48)

ALL TIMES IN E S T

EAST COAST TO: (Centered on Washington, D. C.)	10 Meters	15 Meters	20 Meters	40 Meters
Scandanavia	Nil	1100-1300 (0-1)	0700-1500 (2)	1800-2100 (2) 2100-0230 (1)# 0230-0430 (1-2)
Great Britain & Western Europe	Nil	1100-1400 (0-1)	0700-1530 (3-4)	1730-0100 (3-4) 0100-0330 (2)
Balkans	Nil	1000-1400 (0-1)	0630-1300 (2) 1300-1600 (2-3)	1700-2200 (2-3) 2200-0100 (2)#
Central Europe	Nil	1100-1500 (0-1)	0630-1600 (3-4)	1700-2200 (3) 2200-0300 (2)#
Southern Europe & North Africa	Nil	1000-1530 (1-2)	0600-1330 (3-4) 1330-1700 (4)	1700-0200 (3-4)
Central & South Africa	1030-1330 (1)	0830-1230 (1) 1230-1430 (2-3) 1430-1630 (3)	0600-1330 (0-1) 1330-1530 (2) 1530-1830 (3)	1730-2330 (2-3)
Near & Middle East	Nil	0900-1200 (0-1)	0600-1200 (0-1) 1200-1400 (1-2)	1830-2300 (1-2)
Central America & Northern South America	1200-1700 (1-2)	1000-1500 (3-4) 1500-1800 (4-5)	0600-0900 (3-4) 0900-1630 (3) 1630-2100 (4-5)	1900-0700 (4-5)
South America	1200-1700 (2)	0800-1500 (1-2) 1500-1800 (3-4)	0600-1600 (1) 1600-2000 (3-4) 2300-0300 (1)	1800-0400 (3-4)
Hawaii	Nil	1300-1800 (1-2) 1800-1930 (2-3)	1000-2000 (1-2) 2000-2130 (2-3)	2300-0700 (3-4)
Australasia	Nil	1600-1900 (1-2)	0800-1100 (1-2) 1100-1800 (0-1) 1800-2200 (1-2)	0100-0700 (2-3)
Guam & Pacific Islands	Nil	1600-1800 (0-1)	0900-1100 (0-1) 1400-2000 (1) 2000-2100 (1-2)	0200-0700 (2)
Japan	Nil	Nil	1600-2100 (1)	0300-0700 (1-2)
Philippine Islands & East Indies	Nil	Nil	1600-1800 (0-1)	0330-0630 (1)
India	Nil	Nil	0730-1200 (0-1) 1200-1300 (1)	1800-2030 (1)
West Coast, USA	Nil	1400-1800 (1-2)	1100-1730 (2-3) 1730-1930 (4) 1930-2100 (2)	2030-0100 (4-5) 0100-0800 (2-3)#

ALL TIMES IN C S T

CENTRAL USA TO: (Centered on St. Louis, Mo.)	10 Meters	15 Meters	20 Meters	40 Meters
Great Britain & Western Europe	Nil	1100-1300 (0-1)	0700-1430 (2-3)	1730-2000 (2) 2000-0230 (1)#
Central Europe	Nil	Nil	0700-1300 (2) 1300-1500 (3)	1700-2000 (1-2) 2000-0200 (1)#
Southern Europe & North Africa	Nil	1000-1400 (1)	0600-1300 (2-3) 1300-1600 (3-4)	1700-2300 (3) 2300-0100 (2)#
Central & South Africa	1000-1400 (1)	0800-1200 (1) 1200-1430 (2-3) 1430-1600 (3)	0500-1300 (0-1) 1300-1500 (2) 1500-1800 (3)	1800-2330 (2)
Central America & Northern South America	1200-1600 (1-2)	0900-1500 (3-4) 1500-1730 (4-5)	0600-0900 (3-4) 0900-1530 (3) 1530-2000 (4-5) 0000-0200 (1)	1800-0630 (4-5)
South America	1100-1700 (2)	0800-1600 (1-2) 1600-1830 (3-4)	0600-0800 (2-3) 0800-1600 (1-2) 1600-2000 (3-4) 2000-0200 (1-2)	1800-0400 (4)

ALL TIMES IN C S T

CENTRAL USA TO: (Centered on St. Louis, Mo.)	10 Meters	15 Meters	20 Meters	40 Meters
Hawaii	Nil	1300-1630 (2-3) 1630-1800 (3)	0930-1830 (2) 1830-2030 (3-4)	2130-0700 (3-4)
Australasia	1500-1800 (0-1)	0830-1100 (1) 1500-2000 (2)	0800-1100 (2) 1400-2000 (1) 2000-2200 (2)	0000-0700 (3)
Japan	Nil	1600-1900 (1)	0800-1100 (0-1) 1500-2000 (1-2) 2000-2300 (2-3)	0200-0700 (2-3)
India	Nil	Nil	0800-1300 (1-2) 1800-0000 (0-1)	1700-2000 (1) 0400-0700 (1)
Philippine Islands & East Indies	Nil	Nil	0800-1200 (1) 1500-1900 (1)	0230-1730 (1-2)

ALL TIMES IN P S T

WEST COAST TO: (Centered on Sacramento, Calif.)	10 Meters	15 Meters	20 Meters	40 Meters
Europe	Nil	Nil	0700-1100 (0-1) 1100-1300 (1-2)	1730-0000 (0-1)# 0600-0700 (0-1)
South Africa	Nil	0900-1400 (1) 1400-1600 (2)	0600-1200 (0-1) 1200-1600 (1-2) 1600-1900 (2-3)	1800-2300 (1-2)
Central America & Northern South America	1200-1500 (1-2)	0800-1500 (3-4) 1500-1800 (4-5)	0530-1500 (3-4) 1500-1900 (4-5) 2300-0200 (1)	1800-0400 (4-5)
South America	1200-1600 (2)	0800-1500 (2-3) 1500-1730 (3-4)	0500-1400 (1-2) 1400-1600 (2-3) 1600-1930 (3-4) 2200-0200 (1)	1800-0300 (3-4)
Hawaii	1300-1700 (1-2)	1000-1200 (3) 1200-1800 (4-5) 1800-1930 (2-3)	0800-1800 (3-4) 1800-0030 (4-5)	2000-0400 (4-5) 0400-0730 (2-3)#
Australia	1400-2000 (1-2)	1200-1400 (1-2) 1400-1800 (1) 1800-2000 (1-2)	0700-0900 (1) 1100-1200 (1) 1200-1900 (0-1) 1900-2100 (1-2)	0200-0600 (2-3)
New Zealand	1600-1900 (1)	1200-1800 (2) 1800-1930 (2-3)	1200-1700 (1) 1700-1900 (1-2) 1900-2130 (2-3)	2300-0600 (3)
Japan	Nil	1330-2000 (3)	1200-1800 (2-3) 1800-2200 (3-4)	2330-0530 (3)
Philippine Islands & East Indies	Nil	1300-2000 (1-2)	0800-1130 (2) 1300-1500 (1-2) 2000-2200 (1-2)	0300-0500 (1-2)
Marshall Islands	1400-1700 (1-2)	1130-1800 (2-3) 1800-1900 (3)	1100-1800 (2) 1800-2100 (2-3)	2200-0700 (3-4)
Guam & Mariana Islands	1400-1600 (0-1)	1230-1900 (2-3)	0700-0900 (2) 1100-1300 (2) 1300-1800 (1) 1800-2130 (2-3)	0000-0700 (3)
Hongkong, Formosa and Macau	Nil	1500-1900 (2-3)	0800-1000 (1) 1300-1900 (1-2) 1900-2200 (2-3)	0200-0500 (1-2)
India	Nil	1700-1900 (0-1)	0730-1200 (1-2) 1700-2000 (0-1)	0400-0600 (1)

Symbols For Expected Percentage Of Days Of Month Path Open:

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more

# Indicates conditions on 80 meters will be as good as, or better than, on 40 meters.

Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands

Our heartiest congratulations go to the following stations upon achieving WAZ:

No. 284 W7BTH Elwood R. Johns 40-135
No. 285 VS6AE Pat O'Brien 40-146

Pondering on the lengths, otherwise normal, Hams will go in this quest for DX brings to my mind the sad story of "Whirly" McShad.

Mac, a nice lad when off the air, which wasn't often, was exploring the depths of darkest Africa one good afternoon in hopes of snaring an FQ8 or VQ3, which were long overdue, when he was startled to hear a faint CQ followed by the letters VR3X. "Whirly" hadn't collected 179 countries without being "right on the ball," and before you could say "phut" his beam had roared into motion at a sedate 1 RPM sweeping the long arc from VQ2, CR7, ZS1, ZD9—PY, CE, XE, FO8 to VR3. The time consumed in this brief operation was negligible but Mac would have sworn it took an hour and ten minutes. He was further enraged to hear the VR3 swallowed up by about twenty-seven W6 kilowatts and never did hear him again.

A month and a half later a weird and awesome contraption was seen poking its nose up some sixty feet from the McShad yard. In answer to cautious inquiries Mac was kind of clammish but vowed that he would soon pass W1FH in the DX racket like a jet going past a 1902 Chevvie. Second-hand we got it that "the thing" was a three element beam with a large wooden hoop circling it and secured to the ends of each element. The gadget was inductively coupled and revolved at, roughly, 597 RPM via a 1-to-3 gear reduction on a quarter horse motor. The idea being, of course, that his signals would be squirted to all four corners of the globe at once much in the manner of a lawn sprayer gone berserk.

The first day of operation, and oddly enough it fell on April 1st, produced results that were nothing short of sensational. Whirly picked up nine new ones including a JAØ and a CR8!! The second day accounted for five more. Reports were T9, with a sort of whistling echo effect.

These happenings were probably called to the attention of some very high authorities who, no doubt, decided that enough is enough and the world was not yet ready for such progress. At any rate the next day, during a very unseasonal thunder storm, a bolt of lightning reduced Mac's beam to about eighteen odd 144-mc dipoles, all strictly out of phase. The motor vanished.

Whirly is up to 197 now and still plugging along but he'll never be quite the same.

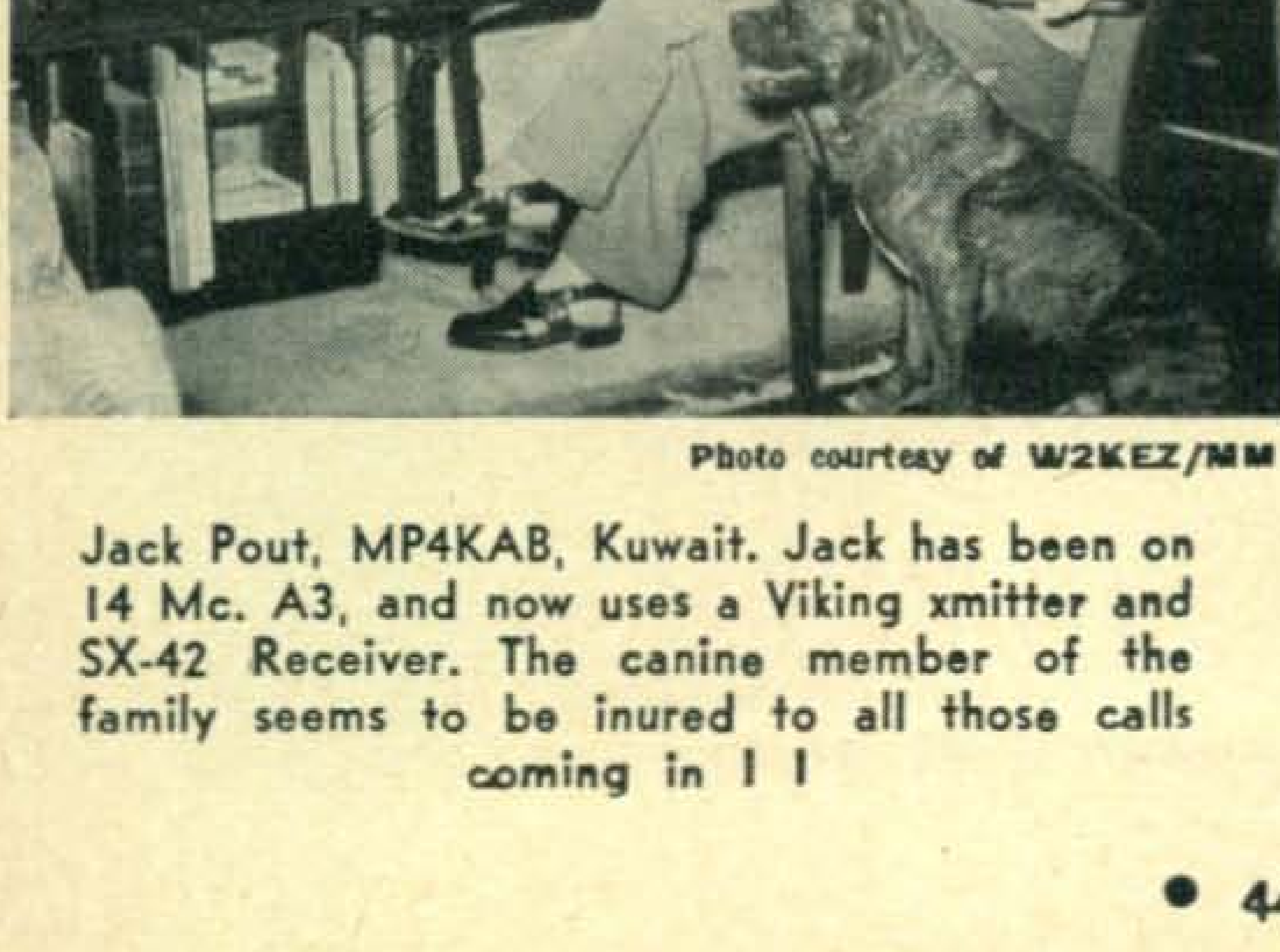

Photo courtesy of W2KEZ/MM

Jack Pout, MP4KAB, Kuwait. Jack has been on 14 Mc. A3, and now uses a Viking xmitter and SX-42 Receiver. The canine member of the family seems to be inured to all those calls coming in ! !

Honor Roll Endorsements and New Members

W6VFR	40-249	VK4DO	39-179
W3EVW	40-238	KL7PI	39-170
W7GUI	40-229	W5FXN	35-151
W6IBD	40-210	W2ZVS	35-142
W6CYI	40-210	W1RAN	35-139
WØELA	40-206		
W4CYY	40-186	PHONE	ONLY
W6NTR	40-181	W6VFR	39-178
W6ATO	40-164	G8IG	39-174
VS6AE	40-146	W6AM	38-166
W7BTH	40-135	W1MCW	36-199
W8KIA	39-235	W5ASG	35-167
W1HX	39-214	W3EVW	35-162
W5MPG	39-203	WØANF	35-141
W1ZL	39-197	YV5AB	34-149

Last complete HONOR ROLL appeared in the January issue.
Next complete HONOR ROLL will appear in the June issue.

At Time of Writing

VK1HM, Cocos Island, ex VK6HM, has been active since around December 16th. VK1HM operates regularly 1300/1430 GMT, VFO AM modulation and uses two V beams 400 ft. on a leg directed on South Africa and Australia. He will be there for two years and it is hoped that CW will soon be used. Mail service is via air and sufficient IRC coupons for airmail reply should be included. (Thanks to W5WI, ZS6BW, VK3FH and the West Gulf Bulletin.)

VS9AW, Sultanate of Oman, will depart around January 15th and will be replaced by VS9AS, who will operate the same rig. As of this issue the Sultanate of Oman is officially a separate country. Claims for this one for Honor Roll credit should be resubmitted. (Thanks to MP4KAC, SU5EB and W5MPG).

UAØAC, Franz Josef Land, has been worked by W8YIN and a couple of other W's. Time 2000 GMT, QRG 14055 . . . W6DLY nabbed VQ6AC 12/28/52 2201 GMT on 046. QSL via RSGB . . . YK1AH, Syria, has been active around 1400 GMT on 020. See QTH's. . . From ZL2MM we hear that FU8AB has been heard on 7075 phone only . . . ZS9I shows on 7037 0400 GMT while TA3AA may be heard at same hour on 7010. . . VR1A may be heard on 14068 xtl . . . W8HEV reports ZD3KF, 14032 at 1200 GMT. Thinks he may be ZS1KF . . . VR1B should be back on the job by now after three months vacation to VK land. He will be at VR1 for two years.

KF3AA, North Pole/Fletchers Ice Island, has been active recently on 085 and worked by W4FU, W2WZ and W1CWX. He is, from what we can gather, the same QTH, and possibly same operator, as W5AGB/FM. No word on his status as 'new one' yet. Late word from W4KE confirms that he is ex-W5AGB/FM and returns home around Jan. 25th. QTH, Box 143, Oakdale, La.

ZC5VS, British North Borneo, presently stuck on 7010 kc., is being sent a converted BC-459 by W6DFY. This will enable him to appear on 14 Mc. in the not-too-distant future. Hugh is presently using the control tower xmitter at Sandakan Airport. He is also in need of a receiver. . .Some light on the ZC5 prefix comes from WØELA, who advises that the island of Labuan was originally under the jurisdiction of Malaya, and probably inherited the VS4 prefix as an outgrowth of VS2. Now that Labuan is officially part of British North Borneo, any station there will probably carry the ZC5 prefix, which seems to have been designated for North Borneo. (These ZC things are sure scattered around. When a ZC4 works a ZC5 it will be an event!)

EDZ1, Rio de Oro, gave W8KIA his QTH as Smara, Spanish Sahara. QSO took place at 1715 GMT around 14036. Another QTH we have for him is: c/o Radio Avacion, Cape Juby, Rio de Oro. EDZ1 advises he can contact Hams when not busy with commercial skeds. Daily skeds are held with ECW1, Spanish Guinea, at 1700 GMT.

ZD3JY, Gambia (?). Many were heard calling this station on 14-mc phone recently. . .W2BLS skeds VQ4NZK. This is a movie expedition which will be over there until about April. They will also visit VQ3, VQ5 and, possibly, VQ1. So far VQ4NZK has made 200 QSOs with 50 countries. W2BLS has their logs and will handle QSL's. VQ4NZK uses a HARVEY-WELLS TBS-50 and a HRO50T-1. Sked time, each Saturday about 1730 GMT, 14076.

Exploits

W8FRD nabbed VP4LZ on 3.5 for his fifth continent on that band. Al runs 20 watts . . . W5ASG made it 167 on phone with MP4KAC. Also hooked were VS9AW A3 and MP4HBK, SU5EB and 4UAG on CW . . . PJ2AJ, just starting out, snagged KV4AA for No. 4. See QTH's. . .W2DEC is now a confirmed DX'er and shows a total of 43 countries for one month's work in this direction. Urban is on 14 and 21 Mc . . . WØANF rises to 141, phone only, with MP4KAC, FF8AS and VQ3BU . . .W6NJV has been on 14 and 7 Mc. stirring up such stuff as CE3AX, XE2OK, VP4LZ, ZL2MM and KH6ES . . .W6ATO added VS2AL, EA9DC, VS5ELA and VP8AU which puts Dick on 164. . .KL7PI ups to 170 with such as MI3LK, JY1XY, ZK2AB and LB6XD. Joe also nabbed OY2A, 7046, and ZC5VS. . .W6GPB hooked FB8BB, CR6CZ, ZD7A, VQ8AL, VP8AP, VP8AU and VP8AE, all on 14-mc CW during December. Joe now stands on 174. . .W1RAN went to 139 with LU4ZI and VP8AP between studies at Worcester Tech. Ned advises that Guy, W6EFV, is doing a fine job skedding and handling QSL's for VP8AP. . .W4KRR sent away some cards and in return received BERTA Certificate No. 639, WBE No. 1758, WAC for A1 and A3 and DXCC. . .W6IBD made it 210 with I5GO and OD5AB. Warren also has been knocking off such stuff on 3.5 as G5WP, G5VB, EA1BC, HB9KO, OK1KTU and DL1FF. . .WØELA went to 206 with HB1JJ/HE, ZD7A and VP8AT. Clyde vacationed in Miami over the Xmas holidays where some time was spent tickling Bucks El-bug at W4RBQ. WØELA admits possibility that another trip to Brunei could happen. . .YK1AH made it No. 201 for VK5BY.

VK3CX snagged ZS3U for 179. Alan says VU2DHF will be the call letters at the New Delhi Convention. . . W3CRA (W8CRA), who may be remembered as the holder of the original DXCC certificate No. 1, has devised a harmonic-less buffer circuit and now can operate during TV. . .Bill, VE8AW, sports a new final using PP 304-TL's. . .W7GUI soars to 229 with MP4KAE and OY2Z . . . W2CTO's Xmas gift was OD5AB . . .VK3XO finally nabbed SM2VP completing his WASM. . .W9MEM keyed with FP8AP, KA9AA, FF8AT, CT1DY and FF8AG. . .W8WZ and W8ZY got together to run up a score of over 239,000 in the CQ contest while 4X4BX, last years's champ, submitted a score of 426,363 which may well be tops again. . LU5AQ nabbed ZD4BJ, see QTH's, and also received QSL No 100. . .W2KEZ/MM, aboard SS GULFPASS, is now in U.S.A. waters after a round-the-world trip. He tells of DX on 28 Mc. that would make 14-mc DX'ers drool. Seems that no W's came through but about everything else did. Dave maintained a sked with KG6ADD, daily, without a miss, from Balboa C.Z. to Japan and thence to Kuwait . . . W1HX, Norm, added VK9XK, FB8ZZ and FB8BB to reach 214. . . W8PQQ hooked on to OD5AB. . .VK3FH grabbed FN8AD and JY1RT . . . KZ5CP wonders if one F9AE/FB 075 kc. is genuine . . . WØHVN QSO'ed ZP9AH on 21 for No. 50 that band . . . W6VFR reached 249 with VS5ELA and ZD7A. Marv's phone total went to 178 with MP4KAG . . . VK3XO pulled in YK1AH and FQ8AP. . .According to W5AVF, QSL's for ZS9I can go direct to Maun, Bechuanaland. . .Santa brought Al, W2WZ, a card from VS5ELA and a medal for his 1951 VK/ZL Contest score . . . W2GVZ's first 21-Mc. QSO was with ZS3Q!

W5FXN adds ZP6CR, VP2MD and VP8AU which gives Jim 151. . .W5MPG went to 203 with MP4KAC, OD5AB and I5ZC. . .W6NTR came up to date with eight new ones which drops Jack on 181. . .W5UTE/4 is 15 years old and getting a head start on DX such as ZS6DW, JA2KW, PJ2AA, VK3MA and HB9MQ. Mick is awaiting his new W4 call. . .XYL Lou, W1MCW, edges to 199, all A3, with VP8AP. . .W6AM ups to 166 A3 with SU5EB. . .Carl, W1ZL adds LU4ZI on 7 Mc. for No. 197. . .W2ZVS goes to 142 with OD5AD. . . W3EVW rises to 238 with XG6AJ, Sultanate of Oman. VS5ELA and ZD7A. Roger is up to 162 on A3 with I5GO and ZD7A . . . W8KIA, ex-W9ANT, keeps in the high brackets with EDZ1, VS9AW and MP4KAC. This gives Glenn 235. . .G8IG adds FQ8AE on phone for 174 A3 and 203 CW. . .W5VSS picked up MP4KAC, YK1AA, SU5EB, OQ5CZ, VQ4RF, VS9AW, ZD4BL, EL2P TA3AA and ZS9G putting him on 124 at the new QTH. QSL's are slow, however, standing at 78. . . W1DSF landed VS7WB for No. 133. . .TI2TG's first QSO of the year was with ZD9AA on 21,218 kc. 1500 GMT. ZD9AA is usually on daily on this xtl frequency

(Continued on next page)

Photo courtesy of W6FSJ

Stan Silver, VR1B, needs no introduction. The rig uses a pair of 807's. Stan, vacationing in VK land, should be on again from VR1 on March 1st.

(from preceding page)

between 1500/1600 GMT . . . Again from **W5UTE/4** who reports hearing ZD1C active on 7003 around 0700 GMT . . .**W6DLY** nabbed one VQ6AC on 046 at 2201 GMT. Sez QSL via RSGB . . . **W2QHH** awaits QSL from ZD7A to make it 100% at 214! . . .**W2WC** nabbed a new one on 7 Mc. with new ground plane antenna. It was CR5AF. . .**W6SAI** reached out and got ZD4AB on 3.5 while W6ZAT rounded out a 17 hour WAC on 3.5 Mc. with 5A3TU, ZL1CI, G5WP and VS7NG!!

CPIBX, Ted Westlake, La Paz, Bolivia. Ted running 55 watts to an 807, is responsible for most current CP QSO's and is active on 14 and 21 Mc. The gear consists (from l to r) SP600-JL Receiver, speaker and Transmitter. Rig was built by CPIBK on a BC-654 chassis.

CP1BX is doing big business on 14 and 21 Mc. between 1100/1300 GMT. Ted recently nailed ZS3K on 21 for the first CP/ZS3 QSO on that band. His 7-mc ambitions are curtailed, however, by the terrific phone and broadcast QRM on that band. CP1AS is also on with a converted ART-13, and CP3CB has been heard from Oruro, Bolivia. . .**W3AYS** nabbed a TA on 3.5 and brought his 21-mc total up to 45 with FF8AG. Bayard sports a new beam on 21 mc. . .**W6FSJ** nabbed FB8ZZ on A3 FB signals both ways, 14280, 1700 GMT. . **VK2AMB** hooked CP1BX for a new one along with VK3XO and VK3CX. . .**W2HTH** is going great guns on 3.5 Mc. with such as CE4AD, ZS2A, VP8AP, XE2OK, KH6IJ, FM7WD and ZLICI while VE1ZZ nabbed 5A3TU on the same band. . .**YV5AB** added ten on phone to reach 149. . .**FR7ZA** has left Reunion Is. and will probably turn up shortly with an FQ8 call. Another Ham will replace him on FR7. . .**W2QHH** nabbed FF8AG on 3.5 for his No. 97 on that band.

Here and There

Many who have forwarded a dollar to EA9DC (EA8AW) for his QSL have, so far, been disappointed. We hope Crescencio will do the right thing and get those much wanted pasteboards out. Many of the DX fraternity also await cards from **VK1VU**. . .**W9PQL/4** spent the Xmas holidays with his folks in Miami. Dick was due to return to W9PQL/MM in January. . .**W9NN** shifted the KW to 7 Mc. while brother-in-law W9RIL tasted DX via PJ2AK and FP8AP and now there's no holding him . . . **W1ZL** bemoans the DX gentry who insist on working a rare DX spot for the umpteenth time when the heat is on. With the limited time some fellers have to go after this stuff it seems only fair to ask the big shots to lay off. This particularly applies to stuff like **FB8ZZ** who returns home soon and is making efforts to snag those who haven't contacted him yet. . .Word from Roy Handley, **AP2R**, Box 151, Karachi, Pakistan, has been received giving a round-up of activity in that neck of the woods as follows: **AP2L**, A Pakistani with the RPAF, mostly on phone. **AP2K** is an ex-DL. **AP2N** is in Karachi along with 4UAG (ex-G3BVX) who is the official U.N. station. **4UAS**, in Kashmir is an ex-PAØ. **AP4UN** is the U.N. radio boss and is ex-**PAØBB**. He is located in Rawalpindi. AP2R is out to deliver AP QSO's to all needing them and may be heard daily around 14100 at 1200 GMT. Roy would appreciate receiving letters from any of the DX gang and would welcome copies of CQ, QST or other radio lit as reading matter of that type is very scarce.

W6DBT is quite ill from heart attacks. We hope this reading will find him much improved. . .**W1APA** received QSL from 3V8AB, old FT4AB, for QSO in Feb. 1948. Proving that while there's life there's hope . . . **VK4QL** is now active again as VK2QL. . .**W5AVF** shipped radio gear to ZD6HN via W2CTO . . . We nearly worked a new one the other day but it was only a "CQ de-troit" . . . Our old friend Dr. Bombard, mentioned in this column as a radio possibility is again in the news. Doc and his pneumatic raft, THE HERETIQUE (size 15 ft.) reached Stroud's Bay, VP6, 63 days after his last landfall, the Canary Islands. Doc said, "It was wonderful, terrible and interesting, but I never want to eat fish again.". . .We regret to record the passing of **G2YY**, Syd Young, on Nov. 8th. . .Bob. **W4PFH**, ex-W5DRJ, W3DRJ, after a brief stay in Tampa, reported for assignment in JA land in January. Keep your ears peeled for his KA signals. . .**ZL3OZ** is ex-VK9NR, Norfolk Is. . .**WØTKX** is going strong in his new QTH but can't take care of his antenna problems until there's less of the white stuff on the ground. . .**OQ5LL** now has 50-Mc rig going with PP 4E27's. . .Pete,**W2MDQ**, and son, **W2FDU**, visited KV4AA. Another visitor was "Jerry" Wyner, **W1PST**. Chas **W2OHF**, arrived in KV4 land Jan. 28th for short visit. . . We think earlier mention on **F9AE/FB** should have read F9AE/FF. We heard his working HH2LD this A.M. on 080. . .**W7PGA**, Phoenix, Ariz. is now **K2BZR**, Chatham, N. J. . .**W9YFV** has a 70 foot pole up. We hope the XYL will let Ed go ahead with the antenna. Pul—eeze.

KG6ADD was QRT on Jan. 15 and will QSY to W7. . . **AC3SQ** is having a bit of trouble with the power supply . . .**W8DAW** suggests we list each Zone and the prefixes therein. Will do soon, OM. . .**W7NCO** is now **W6YUS**. . .**W3ARK** has been missing a lot of DX but is now on with 50 watts at portable location after a three-year layoff. . .**OZ4FT** did some brasspounding at W6LW during recent visit. . .**W5BCT** is tangling with a new El-Bug. . .Up at Worcester Tech (Mass) Radio Club. W1RAN is Pres., W2YAY, V.P., W1UJQ, Sec. Treas. and W1RCS, Chief Op. The Club call is W1YK. . . From W1RAN we also hear that **ZL2RC** will be coming through the U.S. soon and that **ZL3OX** heads for Canada early this summer . . . On way from Manila to Okinawa

Photo Courtesy of **KR6KV**

DU7SV, Volt Sotto, left, and DU7AHS, Sandy Ocol, of Cebu City, Philippines. They use BC-610's, beams on 14 and 28 Mc. and Super-Pro and S-20-R receivers respectively.

KR6KV, Bill, visited DU7SV and DU7AHS on Cebu . . **VP6SD**, Sid, of phone contest fame, now leaves VP6 for VE2 and should be there on the first of March. All QSL's, after January, should be sent to the VE2 bureau, or to address shown in QTH column . . . W4COK, present 21-Mc. country leader has moved back to **W2COK** and will be on 21 Mc. as usual. See QTH's . . . Word from W6EFV advises that **VP8AP** desires to complete WAS before leaving in May. VP8AP will QRX for calls from So. Carolina, Alabama and So. Dakota nightly at 2215 **GMT**. On the odd days of the month he will

(Continued on page 67)

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Please include postage to cover parcel post and insurance for 4 pounds.

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PROPAGATION PREDICTIONS

(from page 41)

160 meters are getting poorer as atmospheric noise levels and ionospheric absorption increases. This will probably be the last month, until next fall, that 160 meters will open to Europe—and at that not much is expected on this band, this month.

South America:

Good conditions continue on these stable circuits. Some erratic ten meter openings are expected from all areas of the United States. Excellent fifteen meter openings should occur on a good many days, with signal levels extremely strong in the late afternoon and early evening. Twenty meters will be open almost around the clock on some days, with signals also at their best in the late afternoon and early evening hours. During the hours of darkness good DX conditions are expected on forty meters, with improved conditions to the countries south of the equator. On eighty meters atmospheric noise levels are increasing, but conditions in general will remain quite similar to what they had been during February.

Africa:

These circuits pass through regions of relatively high ionization and MUF's are therefore higher than on European circuits. There is the possibility of an occasional very erratic ten meter opening, with fairly frequent fifteen meter openings from most areas of the United States. Fairly good twenty meter conditions are expected to North and Central Africa, but high absorption will limit openings to South Africa. Good forty and eighty meter openings should be possible to North Africa during the dark hours. Because of ionospheric attenuation, African circuits become progressivily poorer as they become longer and more southernly, however, a general improvement is usually noticed on forty and eighty meters to Central and South Africa during the equinoctial period.

Australasia:

As we approach the summer season here in the United States, ionospheric absorption generally increases and atmospheric noise levels are higher than during the winter months. "Down Under," on the other hand, summer has just ended and the winter months are approaching with the usual lower noise levels and less ionospheric absorption. During the period of the equinox there is sort of a balancing effect upon radio propagation factors on circuits from the U.S.A. to Australasia. Usable frequencies are generally higher than at any other time of the year and overall ionospheric absorption is lowest. Some ten meter openings may be possible from the Pacific Coast to Australia and New Zealand, with fairly good fifteen meter openings possible from all areas of the United States. Only fair DX conditions are expected for twenty meters with the band opening at about 8 a.m. local time for a few hours on some days, and possibly also shortly after sundown. During March, forty meters will probably be the best band for DX from most areas of the United States to Australasia. Openings will occur during the hours of darkness, and signal levels may be rather strong at times. Some nighttime openings may also occur on eighty meters, especially from the Pacific Coast.

Asia:

No ten meter openings are expected on most of these circuits for the next few years—not until the sunspot numbers really start rising again. Conditions are expected to be generally poor on fifteen meters for Asiatic circuits, but some erratic openings may be possible from the Pacific Coast to the Far East. Twenty meters will probably be the best band for DX to Asia with some erratic openings from the eastern and central areas of the United States to the Middle East and Far East. Erratic circuits are generally characterized by weak signals and deep fading. Conditions are expected to be fairly good on both twenty and forty meters from the Pacific Coast to the Far East and the East Indies. Not much expected for eighty meters to these areas because of intense absorption and high atmospheric noise levels.

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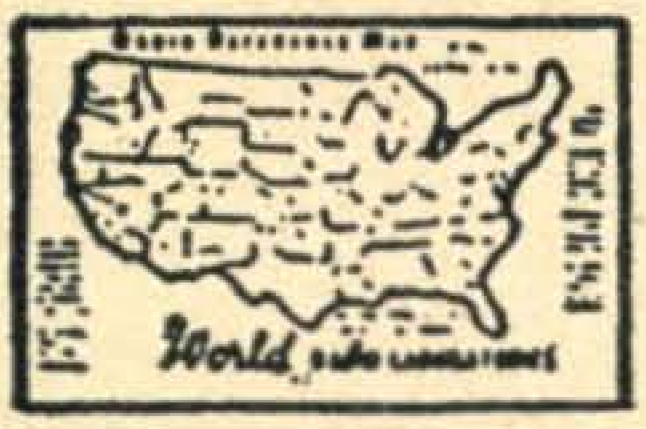

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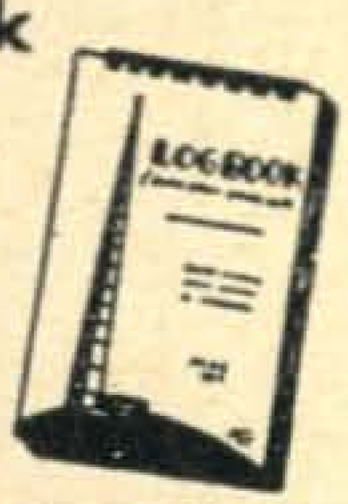

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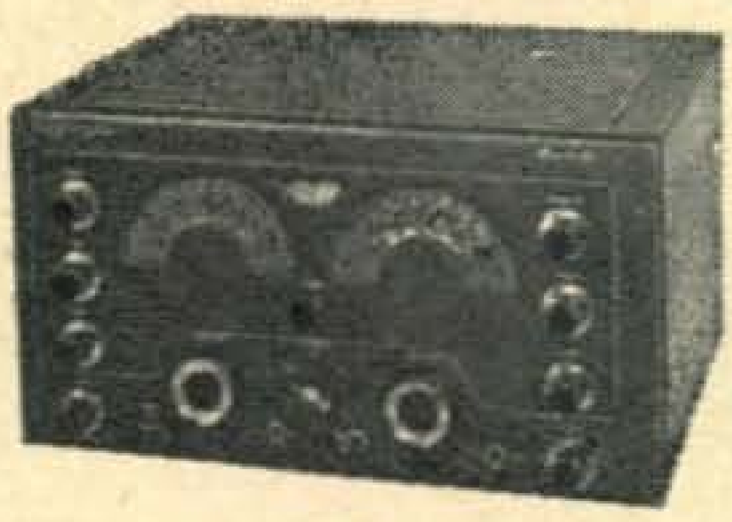

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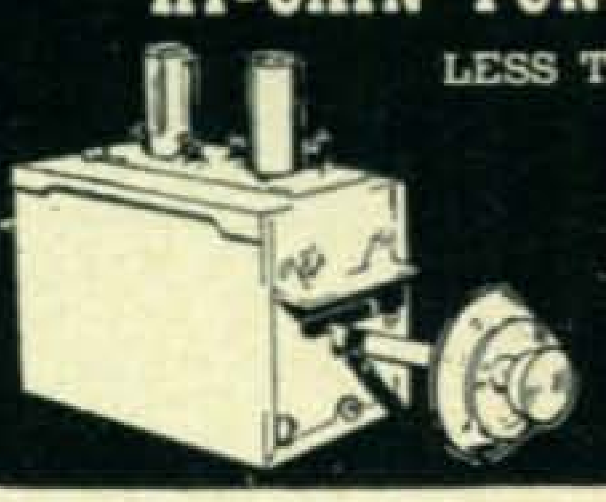

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Bandspread Dial For The Command Receivers

JESSE O. BOSTWICK, W7LDT

835 S.E. 187th Ave., Portland 16, Ore.

Figure 1 illustrates how a dial scale may be added to the tuning knob of a "Command-Set" receiver *(BC-454, BC-455, etc.)* to provide a bandspread calibration for the amateur band it covers. The scale shown is a typical 7 to 7.3-Mc calibration for a *BC-455.*

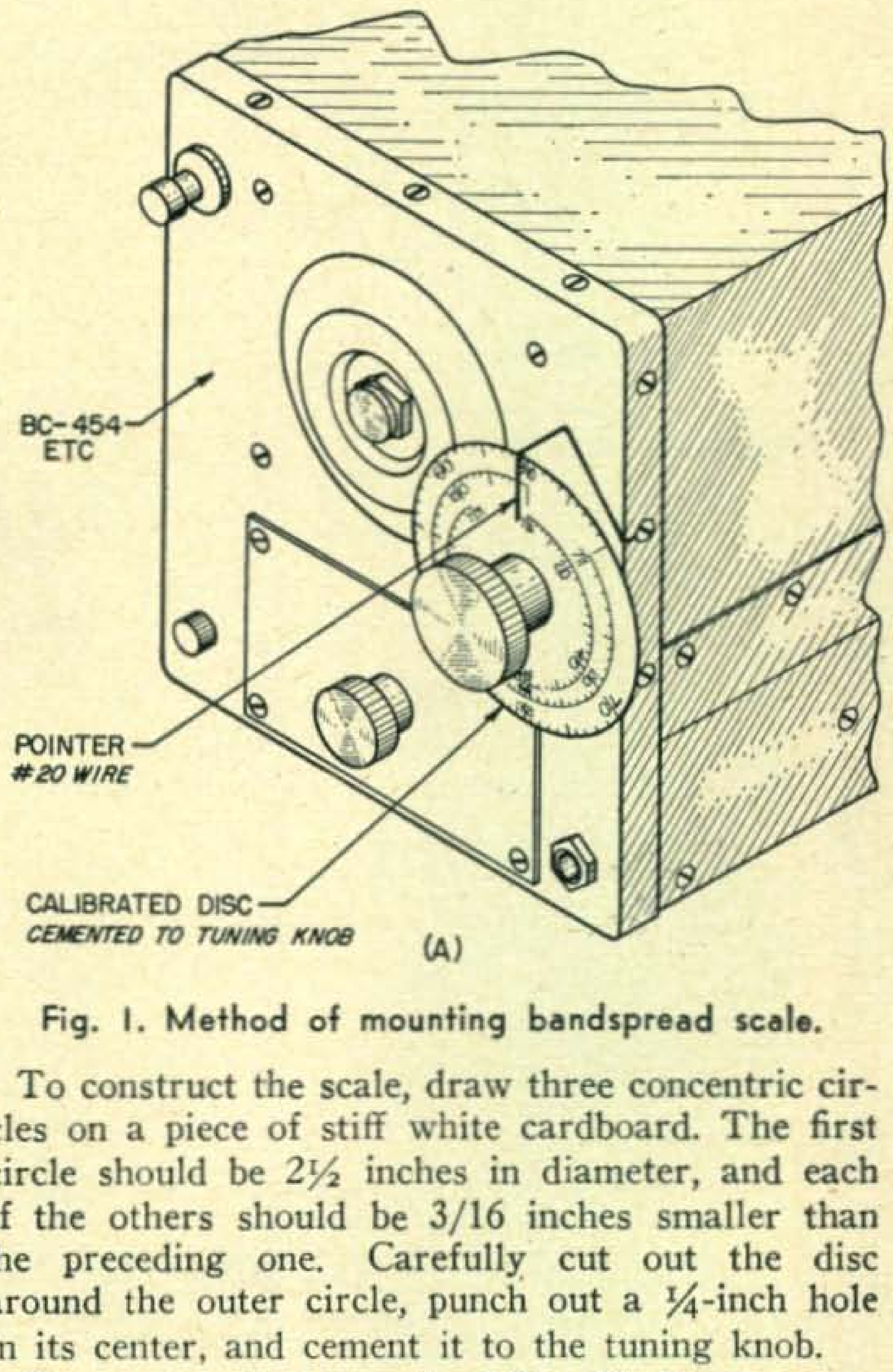


Fig. 1. Method of mounting bandspread scale.

To construct the scale, draw three concentric circles on a piece of stiff white cardboard. The first circle should be 2½ inches in diameter, and each of the others should be 3/16 inches smaller than the preceding one. Carefully cut out the disc around the outer circle, punch out a ¼-inch hole in its center, and cement it to the tuning knob.

Form a two-inch length of No. 20 tinned copper wire into a pointer. Fasten it by means of the screw on the side of the receiver nearest the knob. The pointer should extend vertically in front of the scale and about ¼ inch beyond the inner circle.

With the aid of a calibrated oscillator, set the main dial to exactly 7000 kc., and put a light pencil mark on the outer circle of the disc directly under the pointer. Tune the receiver to 7020 kc. and make another mark. Repeat every twenty kilocycles, until 7100 kc. is reached.

Mark the 7100 kc point and subsequent twenty kilocycle points on the second circle until 7200 kc is reached. Then drop to the inner circle and continue to 7300 kc.

Remove the disc from the knob and ink in the

(Continued on page 52)

HARVEY FIRST TO STOCK... FIRST TO DELIVER

The COLLINS 75A-3 Receiver

With Mechanical Filter

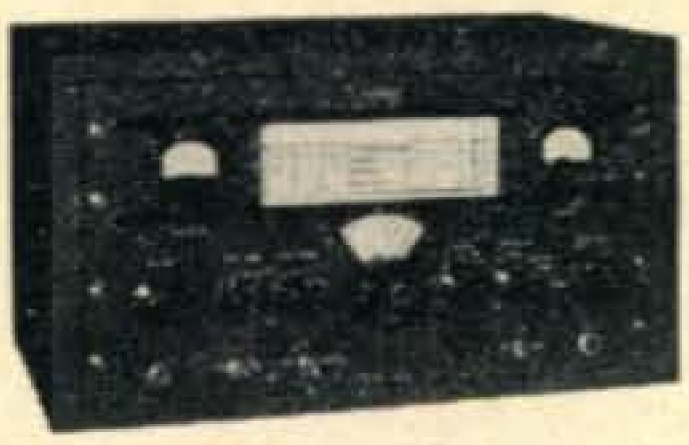
The familiar Model 75A-2, redesigned and modified to provide for the use of mechanical filters. Supplied with one 3 KC filter, and facilities for one additional. A 2-position front panel switch permits selection of filter desired.

with speaker **$550.00**

1 KC Mechanical Filter........ **75.00**

COLLINS 75A-2 still continues in popularity........with speaker **440.00**

COLLINS 32V-3 Transmitter



A VFO controlled bandswitching, gang-tuned amateur transmitter. 150 watts input on CW and 120 watts on phone. Covers 80, 40, 20, 15, 11 and 10 meter bands.

Dimensions: 21⅛" wide, 12-7/16" high, 13⅞" deep.

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COLLINS KW-1 Amateur Transmitter

The Collins KW-1 was engineered to provide the amateur with the maximum power permitted by his license. Covers frequencies: 10, 11, 15, 20, 40, 80, and 160 meters. Complete bandswitching of exciter, driver, and power amplifier is accomplished by means of a single front-panel control. Inherent design of the KW-1 reduces spurious radiation to an absolute minimum, particularly on TV frequencies. Tubes: Oscillator—two 6BA6... Exciter—one 6BA6, four 6AQ5, one 807W, two VR105, and one 6A10 Ballast Tube... Power Amplifier—two 4-250A... Speech Amplifier — one 12AX7, one 6AL5, two 12AU7, two 6B4G, and two 810... Rectifiers — two 872A, five 5R4GY, and three 5V4.

Complete with Tubes........**$3,850**

NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F. O. B., New York City.

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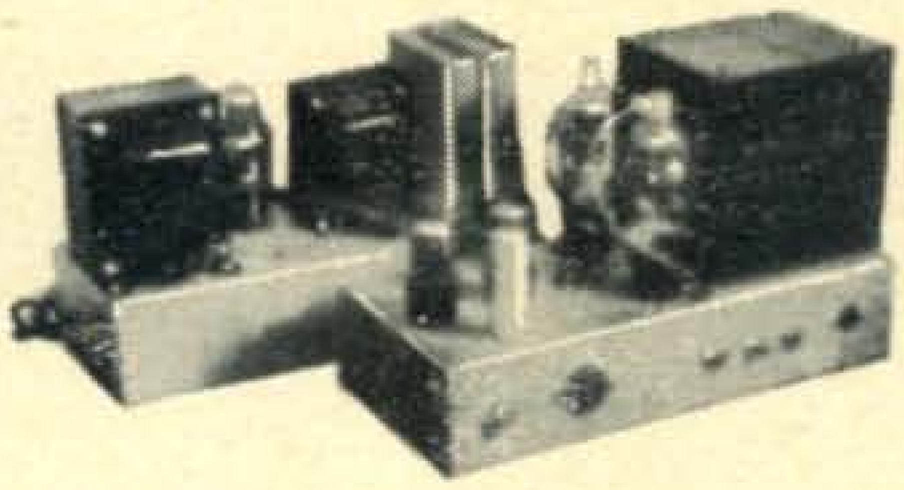
WILLIAMSON HR-15 AMPLIFIER KIT



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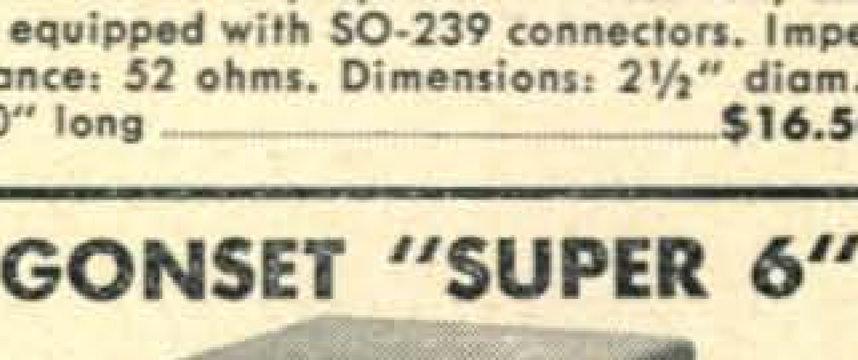

A 4-section filter with less than .2% insertion loss providing harmonic attenuation in excess of 75db. Adjusts for maximum attenuation between Channels 2 and 6. Has 44 Mc cutoff. Handles 1 kw, fully modulated. Employs Teflon insulation, and is equipped with SO-239 connectors. Impedance: 52 ohms. Dimensions: 2½" diam., 10" long **$16.50**

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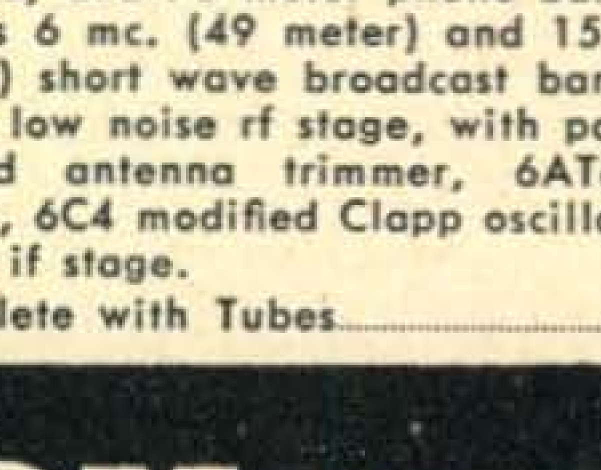

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(from page 50)

circles and calibration lines. Make the 100-kc lines slightly heavier and longer than the others. Next bisect the twenty kilocycle divisions with short lines. Finally, put four equally-spaced dots between each pair of marks.

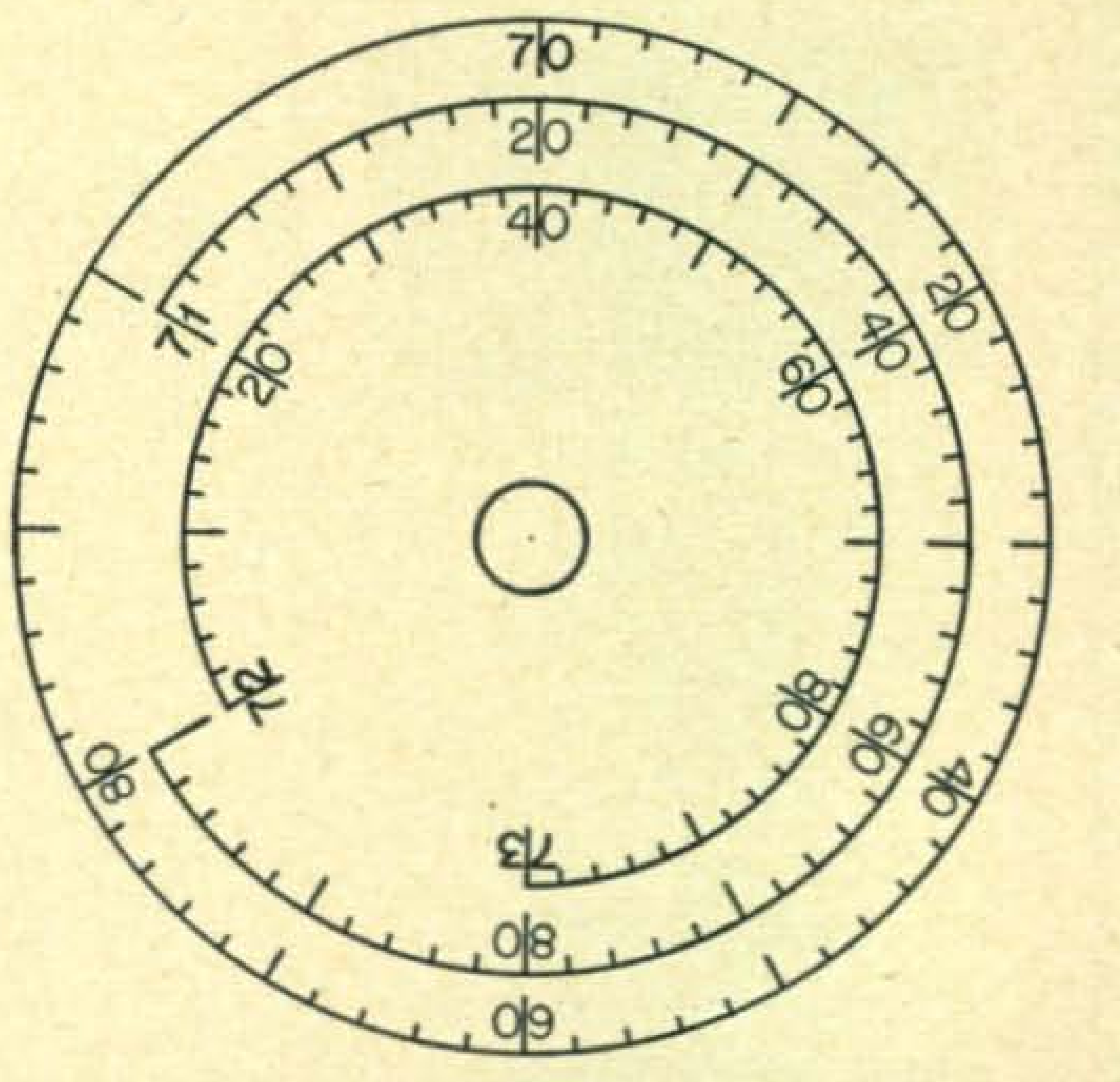

Fig. 2. Typical 40-meter band disc for the BC-455.

Identify the calibration points thusly: Number the 100 kc. points 7.0, 7.1, 7.2, 7.3. Then number the intermediate twenty kilocycle points 20, 40, 60, and 80. Re-cement the disc firmly to the tuning knob, taking care to see that the 7000 kc. points on it and the main dial correspond.

In operation, a glance at the main dial shows in which 100-kilocycle segment the receiver is tuned, and the auxillary scale indicates the exact frequency. If the work is done carefully, frequencies can be read to two kilocycles and estimated to one kilocycle with good accuracy.

The procedure for making a 3.5-to 4-Mc calibration disc for a *BC-454* is similar, except that the circles are required.

EASY WAY HETERODYNE

(from page 22)

Operating Notes

The impedance at the output terminal of the exciter is high, being suitable for direct coupling into the grid of the next stage. Keep the length of the coupling lead reasonably short.

The diagram of the 6 to 9 Mc. BC-455 differs from the one shown, in that the i-f transformers are single tuned; however, conversion is exactly as described. *(Some of the ARC5 equivalents of the BC-454's and BC-455's use a somewhat different i-f tube lineup; consequently, it would be wise to study a circuit diagram of them before starting to convert one into an exciter.—Editor.)*

In operation, greatest frequency stability is obtained by leaving d-c voltages on all tubes and opening the keyed circuit during "standby" periods.

He Went Out to Meet Them

WITH FLARES AND WHISTLES and blaring bugles, the Reds had been attacking fanatically all night. Wave after wave they came, in overwhelming numbers.

By dawn, Jerry Crump could see that his position alone was keeping them from overrunning L Company. Twice he went out to meet them with his bayonet. Once he retook a captured machine gun. And four times he left shelter to bring in wounded comrades.

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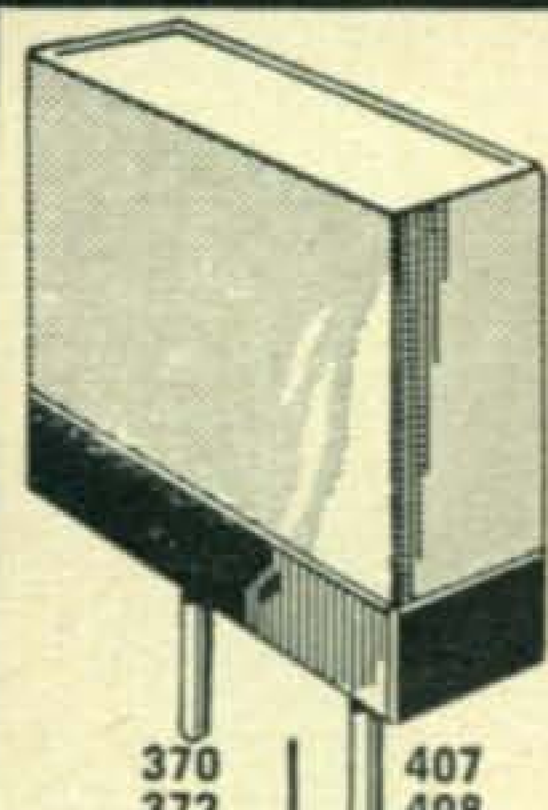

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376	412	448	481	514
377	413	450	483	515
379	414	451	484	516
380	415	452	485	518
381	416	453	486	519
383	418	454	487	520
384	419	455	488	522
385	420	456	490	523
386	422	457	491	525
387	423	458	492	526
388	424	459	493	527
390	425	461	494	529
391	426	462	495	530
392	427	463	496	531
393	429	464	497	533
394	430	465	498	534
395	431	466	501	536
396	433	468	502	537
397	434	469	503	538
398	435	470	504	540
400	436	472	505	
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477,700-Mile DX on Two Meters

E. M. BROWN, W2PAU

Technical Advisory Editor, CQ

FALLS CHURCH, VIRGINA. JANUARY *28, 1953.* Signals from an amateur transmitter operating in the 144 Mc. band have been "bounced" off the moon and received at a point remote from the transmitter location. The successful climax of severals years' experiments was announced by W4AO and W3GKP, who, in cooperation with W3LCK and W3LZD, have pioneered this approach to true DX on the v-h-f and u-h-f bands.

Test transmissions were made from the home location of W4AO at Falls Church, Virginia, with a transmitter input power of approximately 950 watts. The antenna consisted of stacked horizontal rhombics, which were approximately 140 feet on each leg, and horizontally-directed to utilize ground reflections for maximum gain.

The transmitted signals consisted of CW "dots", each approximately 1.5 seconds in duration, repeated every six seconds. The echos from the moon were delayed about 2.4 seconds (corresponding to a round trip of 477,700 miles at 186,000 miles per second). Several consecutive echos were recorded on more than one occasion. They were received by W3LZD at Dunmore, near Scranton, Pa. and also at the transmitter location by W4AO. Both receiving setups employed home-built crystal-controlled converters (using low-noise r-f preamplifiers of the latest design) working into standard communications receivers. W3LZD used an additional narrow-band, low-frequency, i-f amplifier, and W4AO used a conventional 455-kc. i-f crystal filter. Reflected signals received at W4AO were audible with the receiver set up for normal CW reception, and were clearly visible on a graphic recording of the receiver's a-f output signal. W3LZD's receiving antennas included a 32-element broadside array and a horizontal rhombic, 30 wavelengths on each leg.

The significance of these experiments should not be underestimated. Radio echos scattered from the moon should be detectable over the entire Earth's hemisphere facing the moon. Experience may eventually show that the strength of v.h.f. echoes is relatively unaffected by ionospheric and atmospheric conditions. Here, perhaps, is a reliable medium for inter-continental DX!

The idea is not entirely new. Signal Corps experimenters demonstrated in 1946 that radar echoes could be obtained from our satellite. [1, 2]. Several amateur operators proposed that efforts be made to utilize moon echoes for two-meter DX contacts, among them the late W2RH. Further experiments on lower frequencies and the u.h.f. bands [3, 4] demonstrate that a wide range of frequencies may be employed.

To those who may explain that the equipment used in these experiments is too large, complex and high-powered, we can only point to the typical station descriptions in the DX column and to W2SAI's antenna to illustrate that these considerations have not hitherto limited progressive amateurs in their quest for DX! And when our much-publicized man-made satellite is launched, the idea should be even more practical. Who needs sunspots?

1. H. D. Webb, "Project Diana—Army Radar Contacts the Moon," **Sky and Telescope**, Vol. 5, pp. 3-6; April, 1946.
2. T. H. Dewitt, Jr. and E. K. Stodola, "Detection of Radio Signals Reflected from the Moon," **Proc. IRE**, Vol. 37, pp. 229-242; March, 1949.
3. F. J. Kerr and C. A. Shain, "Moon Echos and Transmission Through the Ionosphere," **Proc. IRE**, Vol. 39, No. 3, pp. 230-242; March, 1951.
4. "Lunar Reflection of UHF Communications," **National Bureau of Standards Technical News Bulletin**, Vol. 36, No. 3, pp. 35; March, 1952.

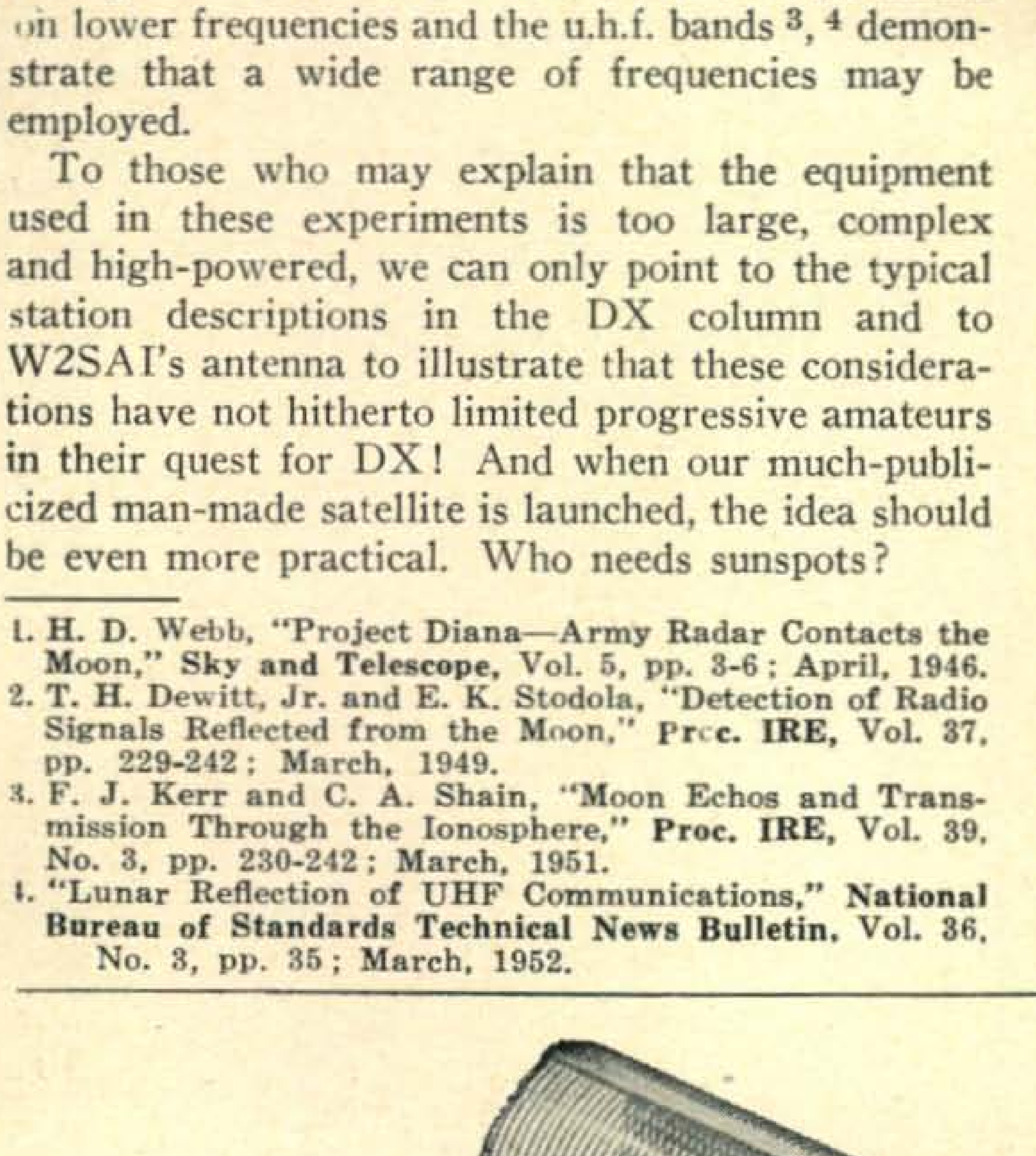
6146 PARASITICS

(from page 20)

down condition the tubes go out. The tubes aid in absorbing transients when keying by holding the screen at 216 volts, providing the parasitic with a low impedance path to ground. This point is held at 216 volts under *phone* condition, and does not affect the *Tap A*, which supplies the screens of the 807's. Please note: The *Viking II* in *phone* position uses *Tap A* for screen voltage on the 807 modulator and *Tap B* is not in use, since a series resistor, and not the bleeder, is used for the screens of the 6146's.

The OB-2's are mounted on a 1" wide by 2" long bracket, with a ½" lip which has one 8/32 inch hole drilled in it. There is plenty of room to mount this bracket near the hi-voltage condenser.

I find my 6146's now completely cut off to about 10 ma. plate current in the *key up* condition. This system works out well on all transmitters using the 6146's. To those interested in trying it on their *Viking II*, I submit the accompanying schematic, and remind them to return the bottom end of the OB-2 tubes to the bleeder, and not to ground, as there is a shunt in the circuit. When measuring voltage in this circuit, use a V.T.V.M. unless an r-f choke is used in series with the probe, as you will get a higher reading due to stray r-f pickup.



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Effective Radiated Power

DON EMERSON, W4MBS

Route 3, Tip Top Drive, Columbus, Georgia

There's one in every radio club and ours was no exception.

Sam was a Ham in every respect and when the rest of us couldn't do it with the "book", Sam invariably turned up an answer via soldering iron and junk box. He had the uncanny ability to cut and assemble antennas at the first crack and with the slightest glance he could tell you what size

". . . he simply probed around in the junk until he found what he was looking for, and then he handed it over . . ."

condenser to slap across which coil to tune to what frequency. This information wasn't relayed via micro-microfarads either; he simply probed around in the junk box until he found what he was looking for, then he handed it over. Oh, sometimes he'd out with a worn pair of long nose pliers and extract a few plates like some expert dentist or else he'd deftly tap your coil down to fit. . . .regardless, it always worked.

His rigs were wiring nightmares comparable to some hair-do's you see on the YL these days. The most interesting feature about Sam's "working" rig was the fact that he was never satisfied, and except for a few "hellooo test. . . .this is W—" announcements, we never heard much of him on the band.

Now, this wasn't Sam's idea in the first place—as a matter of fact it was brought up in a bull session and laughed off as a joke. Sam decided it wasn't so fantastic after all and set about to develop an antenna which, when shoved into the ground, would concentrate r-f energy in any desired direction. This simply reduced the matter of a directional antenna to thrusting a hat pin through a globe from where you were located to the point at which you wanted to throw your best signal; the angle the pin was thrust through the globe was the proper angle for you to adjust the array.

I didn't believe Sam was seriously trying to construct such an antenna until he showed up late for work one morning; his face had that haggard Field Day week-end look to it and there was no doubt that he was working on the biggest laugh the club had had in weeks.

Sam named his creation the *terra-firmaradiator*. We were standing in his backyard about dusk the same evening when he described the project to me in detail. And as I listened I knew I was standing in the presence of genius; my imagination pushed aside the years and I could visualize Marconi staring at cloudy skies and Dr. Armstrong working in his laboratory, telling some co-worker to "make it work first, then figure out why!"

The next day at the office brought no startling results . . . and no Sam. Instead we received a telegram about noon.

INFORM BOSS HAVE TAKEN TWO WEEK PAID VACATION PROMISED BY COMPANY FOR PAST TEN YEARS STOP AM DEVELOPING TERRA FIRMA RADIATOR AT THIS COMFORTABLE LAKE RESORT STOP NO FISH SO FAR STOP

SIGNED SAM
SUNNYLAKE RESORT

After that we were to hear from Sam daily for a few days. It would take up too much space to relate all the details involved in creating an antenna design from an idea to the real thing, but briefly he progressed as follows:

March 15—shot final tubes in rig . . . long discussion as to whether or not he could deduct this expense on income tax forms.

March 16—rig repaired, melted loading coil in special design antenna tuner.

March 17—caught "Old Smokey" elusive bass that had defied anglers for years, on 470,000-ohm resistor twisted around shank of hook.

March 18—antenna loaded up too good. We sent him a new r.f. ammeter by return mail.

March 19—no word.

(Continued on next page)

PE-101C DYNAMOTOR, 6 or 12 VOLT—(Reprints of original CQ conversion articles, Oct. & Dec., '52 furnished). This is the Dynamotor the Hams have been talking about. Easily adapted to supply 625 V. @ 152 MA and 325 V. 125 MA at 12 V.—or 300 V 90 MA and 160 V. 110 MA at 6 V (Illustration modified).
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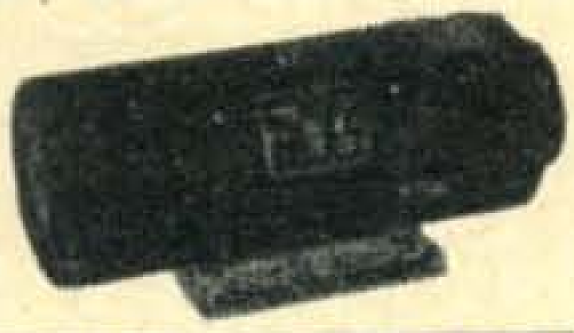

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(from preceding page)

March 20—no word.

March 21—letter from his XYL to mine describing Sam's failure in detail. In this letter I learned that Sam was losing his faith in his own abilities and had decided to give up ham radio and leave the state.

March 26—another communcation from Sam asking for a few parts and hinting that he might be on the right track at last.

March 30—found the following telegram in my hand:

> TERRA FIRMA RADIATOR PERFECTED STOP HAVE NOT WORKED OUT YET BUT ALL LOADING TESTS COMPLETED AND AM DEFINITELY RADIATING R.F. ENERGY THROUGH GROUND STOP SYSTEM APPEARS TO BE FAIRLY DIRECTIONAL STOP LISTEN FOR ME ON 75 STOP
>
> SIGNED SAM
> SUNNYLAKE RESORT

The receipt of that telegram brought the club together for a special session and the evening was spent gathered around the receiver and discussing our favorite inventors' other achievements. At midnight our thoughts were dampened somewhat and most of the fellows had gone home when the phone rang, and the operator read off the following wire:

> DESTROY ALL CORRESPONDENCE FROM ME CONCERNING TERRA FIRMA RADIATOR STOP AM PRESENTLY INSTALLED IN COUNTY JAIL UNDER FOLLOWING CHARGES STOP OPERATING BUSINESS WITHOUT A LICENSE STOP VIOLATION OF THE FISH AND GAME LAWS STOP USING HAM RADIO FOR PECUNIARY INTEREST AND GAIN STOP ALL FISH WORMS WITHIN TWENTY MILES ATTRACTED BY R.F. ENERGY STOP PENDING RESULTS OF ABOVE LAWSUITS WILL SELL FISH WORMS FOR ONE DOLLAR A CAN STOP ONLY ATOMIC AND RADIO ACTIVE FISH WORMS ON THE MARKET STOP PLEASE SEND TWENTY-FIVE BUX STOP
>
> SIGNED SAM
> SUNNYLAKE RESORT

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SINGLE SIDEBAND

(from page 33)

able to us to achieve pre-i.f. selectivity are crystal filters[4], [5], of some configuration, or one of the new mechanical filters recently introduced by *Collins Radio Co.* (See page 12). Use of one of these filters means that the receiver itself must be modified considerably. As the author feels that crystal lattices are perhaps beyond the understanding of the neophyte entering the SSB field, and that the price of the mechanical filter (at present production standards) may be a little beyond the reach of the average amateur, no more will be said concerning pre-i.f. selectivity.

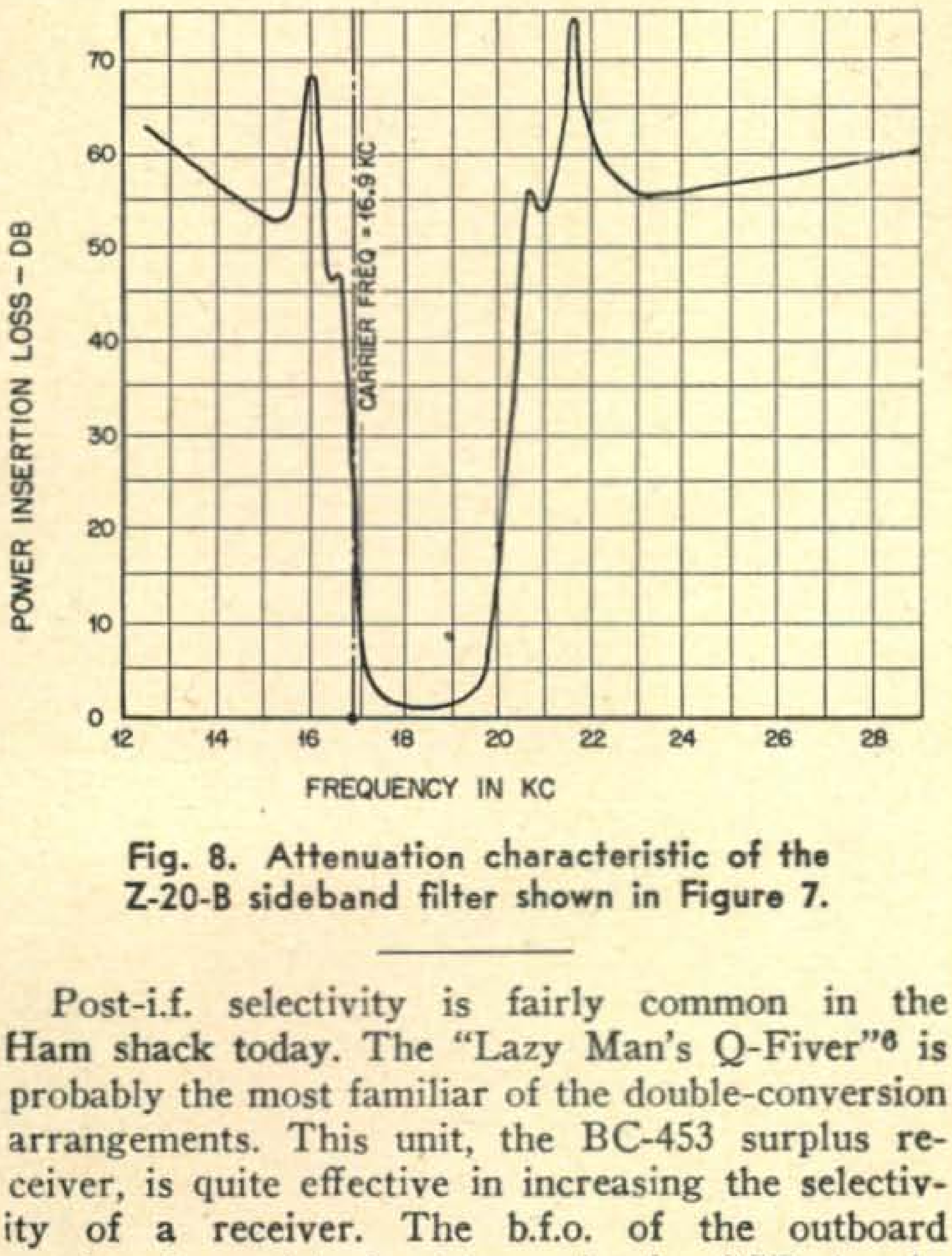

Fig. 8. Attenuation characteristic of the Z-20-B sideband filter shown in Figure 7.

Post-i.f. selectivity is fairly common in the Ham shack today. The "Lazy Man's Q-Fiver"[6] is probably the most familiar of the double-conversion arrangements. This unit, the BC-453 surplus receiver, is quite effective in increasing the selectivity of a receiver. The b.f.o. of the outboard receiver is used to furnish carrier for SSB signals. The b.f.o. frequency must be off-set either to the high side or the low side of the 85 kc. intermediate frequency to accommodate whichever is being copied—upper or lower sideband signals. The a.v.c. of most receivers is useful for listening to SSB signals when the BC-453 is used for detection.

More elegant means may be built to copy SSB signals. Two such adapters are described briefly. Complete details cannot be included for reasons of space. It is recommended that the original references be consulted for the whole story.

20 Kc. Filter Adapter

The first of such adapters is the double-conver-

4. "Crystal Lattice Filters for Transmitting and Receiving," Weaver & Brown, QST, Part I, June, 1951, p. 48; Part II, Aug. 1951, p. 52.
5. "A Crystal Filter for Phone Reception," Good QST, Oct., 1951, p. 56.
6. "The Lazy Man's Q-Fiver," Goodman, QST, Jan-

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For the Mobileer

(See CQ—August & December, 1952)

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(from preceding page)

sion 20 kc. filter adapter[7, 8] as seen in *Fig. 6*. Operation is as follows: The i-f signals from the receiver are mixed in the 6SA7 stage, *V1*, with the oscillator signal from the Clapp oscillator, *V2*, to produce i-f signals in the 20 kc. region. The conversion oscillator operates approximately 16.9 kc. higher or lower than the 455 kc. frequency. The signals then pass through the 2.5 kc. wide bandpass filter which selects only the desired signal. The signal is then detected by mixing it with an exalted carrier at 16.9 kc. in the ring-modulator mixer using copper-oxide rectifiers as diodes. Germanium diodes such as the 1N34 may be used. The detected signals are then amplified by a conventional audio amplifier, *V3B*. By leaving the reinserted carrier at 16.9 kc. and switching the first heterodyning oscillator from 16.9 kc. above to 16.9 kc. below the 455 kc. input frequency sideband switching may be accomplished.

Figure 7 shows the schematic of a very fine filter which can be used in the adapter. *Figure 8* shows the response curve of the aligned filter. I suggest that you consult an article by Berry[9] for particulars on how to wind toroids and for filter alignment procedures. Filters for this unit may be purchased for approximately thirty dollars.[10]

Phasing Type Adapter

The second adapter is the "Signal Slicer" originally described by Norgaard.[11] This unit, *Fig. 9*, utilizes the phasing principle of detection and post-detection combination to discriminate between sidebands of a received signal. The principle is very similar to that of the phasing-type single-sideband exciter. More of that in the next installment. The idea is roughly this: The incoming i.f. signals are detected by the two diodes in the 6AL5, *V2*, by mixing them with the r-f voltage from the 455 kc. oscillator, *V1A*. This r-f voltage is divided into two equal parts and shifted in phase with respect to each other by 90° in the R/C networks *R3-C8, C9* and *R4-C7*. The two separate signals after detection are passed through the phase-shift networks designated *PS-1*, and then combined in the output of *V4*. One stage of audio amplification, *V1B*, is included. The net result is that depending on the position of the switch, *S1*, the signals on one side of the 455 kc. oscillator frequency will be combined in such a way as to be cancelled out to a major degree while the signals on the other side of the oscillator will be reinforced and will be heard in the headphones. This unit effectively splits the receiver selectivity characteristic in half—rejecting the one half while receiving the other. Again, I suggest that the original article be consulted for detailed construc-

7. "The Single Sider," Bane, CQ, May, 1949, p. 13.
8. "The Modified Single Sider," Long, CQ, January, 1952, p. 33.
9. "A Filter Design for the Single-Sideband Transmitter," Berry, QST, June, 1949, p. 29.
10. Write: Fred M. Berry, WØMNN, 1200 East 49 Terrace, Kansas City, Missouri.
11. "Signal Slicer," Norgaard, G.E. Ham News, July-Aug., 1951.

tional information and for alignment. The phase-shift network, *PS-1,* is available commercially from two manufacturers.[12] The unit is aligned and no further adjustment is needed. The complete adapter is also being marketed either in kit form or in wired form at a reasonable price.[13]

"Apparent" Broadness Of SSB Signals

This subject is just a little "touchy", but must be treated openly for the good of all. The complaint of many phone men of broad SSB signals adds up to about this: The receiver used is being operated with a.v.c. turned on and at full r-f gain. When tuned to a channel next to that occupied by a SSB station and copying no signal (or at least a weak one) the receiver is really wide open. The non-existence of a.v.c. voltage has raised the gain of the r-f and i-f stages so that the *effective* bandwidth of the receiver is perhaps 15 or 20 kilocycles instead of the 3 kilocycles measured by the manufacturer at the "half-power" points. Naturally, when the adjacent-channel—SSB signal starts up it is going to be heard and quite loudly! The "jumping-up-and-down" of the SSB signal creates quite a terrifying effect on the a.v.c. system too. Consider now what the case might have been if the SSB signal had been an unmodulated carrier of the same peak amplitude. The receiver a.v.c. voltage would have been raised and held there, the result—reduced receiver sensitivity. The effective receiver bandwidth would have been reduced some and depending on its strength the desired signal might not have been heart at all. In the SSB case, the remedy is to increase the receiver selectivity by using the crystal filter, turn off the a.v.c., and manually adjust the r-f gain for just enough gain to do the job. You may be surprised to find that the SSB signal is not broad after all. I recommend that you read "The Other Foot."[14]

END OF PART I.
PART II WILL APPEAR IN APRIL.

12. Part PS-1—Central Electronics, Inc., 2125 W. Giddings St., Chicago 25, Ill.
Millen Part No. 75012—James Millen Mfg. Co., Inc. Malden, Mass.
13. "Sideband Slicer," Central Electronics, Inc., 2125 W. Giddings St., Chicago 25, Ill.
14. "The Other Foot," Goodman, QST, April, 1949, p. 44.

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THEORY OF SSB

1. "What is Single-Sideband Telephony?", Goodman, QST, Jan., 1948, p. 13.
2. "Single Sideband Power Gain," Grammer, QST, Mar., 1948, p. 42.
3. "Single Sideband: Its Pros and Cons," LeKashman, CQ, May, 1948, p. 42.
4. "Understanding Simplified SS," Norton, CQ, Sept., 1948, p. 23.
5. "What About Single Sideband?", Norgaard, QST, May, 1948, p. 13.

RECEIVING SSB SIGNALS

1. "Tuning and Checking SSB Signals," QST, October, 1950, p 34.
2. 'S.S.S.C. and S.S.S.R.." Grammer, QST, April, 1948, p. 19.
3. "The Reception of Single Sideband Signals," Wright, QST, Nov. 1952, p. 25.
4. "Carrier Generators for SSB Reception," Wright, QST, Dec., 1952, p. 85.

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The two units described below are published in order to augment the ARC-5/SCR-274 mobile converion shown on page 55 of the "1952 Special Mobile Issue" (May).—Editor.

Receiver (BC-445)

As the receiver already covers the desired frequency range, its' conversion is very simple. The basic modifications are very similar to those described in our original article. We added the tuning knob, the BFO switch, and the r-f gain control, as in the other units. However, in this unit we did not wire all the filaments in parallel, for operation on 12 volts. We merely substituted 6-volt tubes for the 12-volt tubes in the first four positions, as follows: 6SG7 r.f., 6K8 mixer, 6AC7 1st i.f., 6AC7 2nd i.f. We could find no simple substitute for the 12A6 which would work in series with a 6SR7. Therefore, we did connect these two filaments in parallel, and left the 12SR7 and 12A6 in place.

With the installation of the coaxial jack on the front panel, and the proper connections to the power plug on the rear, the modification is complete. We now have a very "hot" little receiver for forty meter phone or CW work. Even if you aren't interested in mobile work, it still is a valuable addition to a fixed staton.

Transmitter (BC-458)

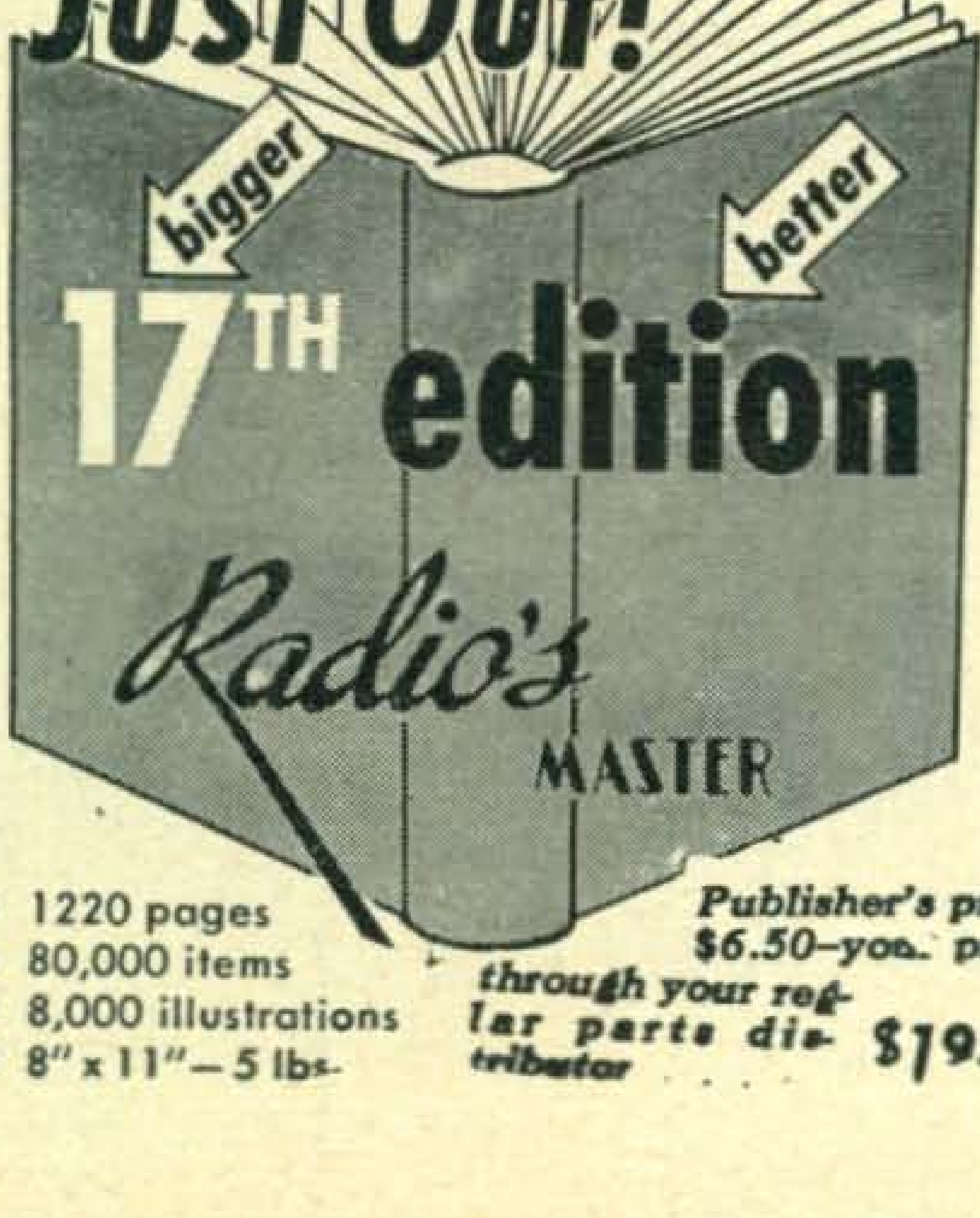
Now let's take a look at the transmtter. We could have made it very easy for ourselves and bought a 7-9.1 mc. transmitter in the first place. However, these units are more expensive for the obvious reason that they are useful for forty, so we purchased one of the 5.3-7 Mc units. With a very slight amount of work, in addition to the basic modifications, we can make this unit cover the desired frequency range and still make use of the calibrated dial.

The basic modifications, as in the 3.9-Mc unit previously described, consist of wiring the filaments in parallel for 12-volt operation, installation of two coaxial jacks on the front panel, removal of the old antenna relay and replacing it with the ceramic-insulated relay from below the chassis after modifying same, and installation of a plate current jack on the front panel. The final circuit diagram is the same as that of the 3.9-Mc unit, shown on page 58 of the May (1952) issue.

Now, for the frequency conversion. Remove the oscillator shield can, and loosen the set screws holding the rotor of the fixed padder condenser. Drill a ¼" hole through the shield can so that the shaft can be turned with a screwdriver when the shield is replaced. Now go under the chassis and loosen the set screws holding the rotor of the fixed p.a. padder condenser. Remove two rotor plates from the variable oscillator tuning condenser, and likewise two rotor plates from the variable p.a. tuning condenser. On the oscillator coil, short the last turn at the top, by soldering a short across it at the lug where it ends. Now go counterclockwise from the lug and solder another short across the top turn at this point. Solder a short across the top turn of the p.a. coil at the lug where it ends. Now replace the oscillator shield can, and plug the transmitter into the rack in the car, or apply power to it by other means. Set the tuning dial at 6.0, and by means of a screwdriver through the hole in the shield can, adjust the oscillator frequency to 7.0 Mc. Quickly tune the p.a. to resonance by adjustment of the padder condenser beneath the chassis with a screwdriver. Plate current at resonance should be about 40 milliamperes as read on the meter in the cathode lead. Now turn the tuning dial to 6.1. The frequency of the transmitter should be 7.1 Mc. With the dial set at 6.2, the frequency should be 7.2 Mc., and at 6.3 on the dial, the frequency should be 7.3 Mc. If the desired spread is not quite right, it can be adjusted by means of the variable slug in the oscillator inductance, adjustable from the top of the shield can, and by variation of the trimmer condenser, also reached through the top of the shield can. However, if these instructions have been followed, the calibration should be very close over over the whole 7.0-7.3-Mc. band.

The antenna loading coil is wound experimentally and checked for resonance on 7.2-Mc., by means of a grid dip meter. With the antenna connected to the transmitter, the p.a. plate current should be about 100 milliamperes at full coupling. Recheck the p.a. resonance, and the oscillator frequency, under full load, before tightening the set screws on the padder condensers. The rotating antenna loading coil is left at zero for operation into coaxial feedline.

If desired, the 6-Mc. markings on the dial may be painted out and 7-Mc. markings substituted. However, this is not necessary if you just remember to mentally add one megacycle to the dial readings to obtain your operating frequency.



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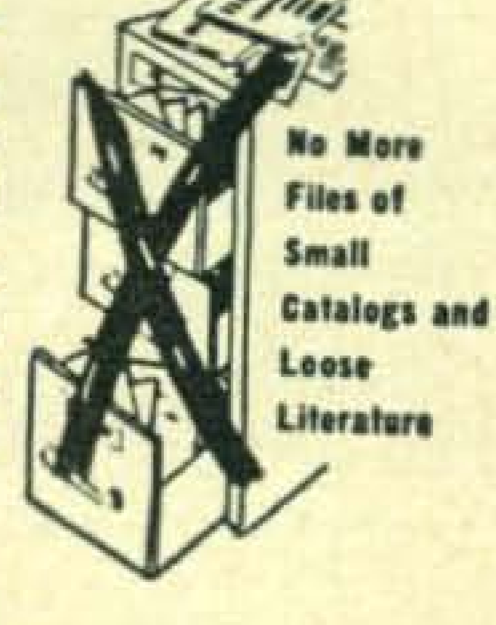

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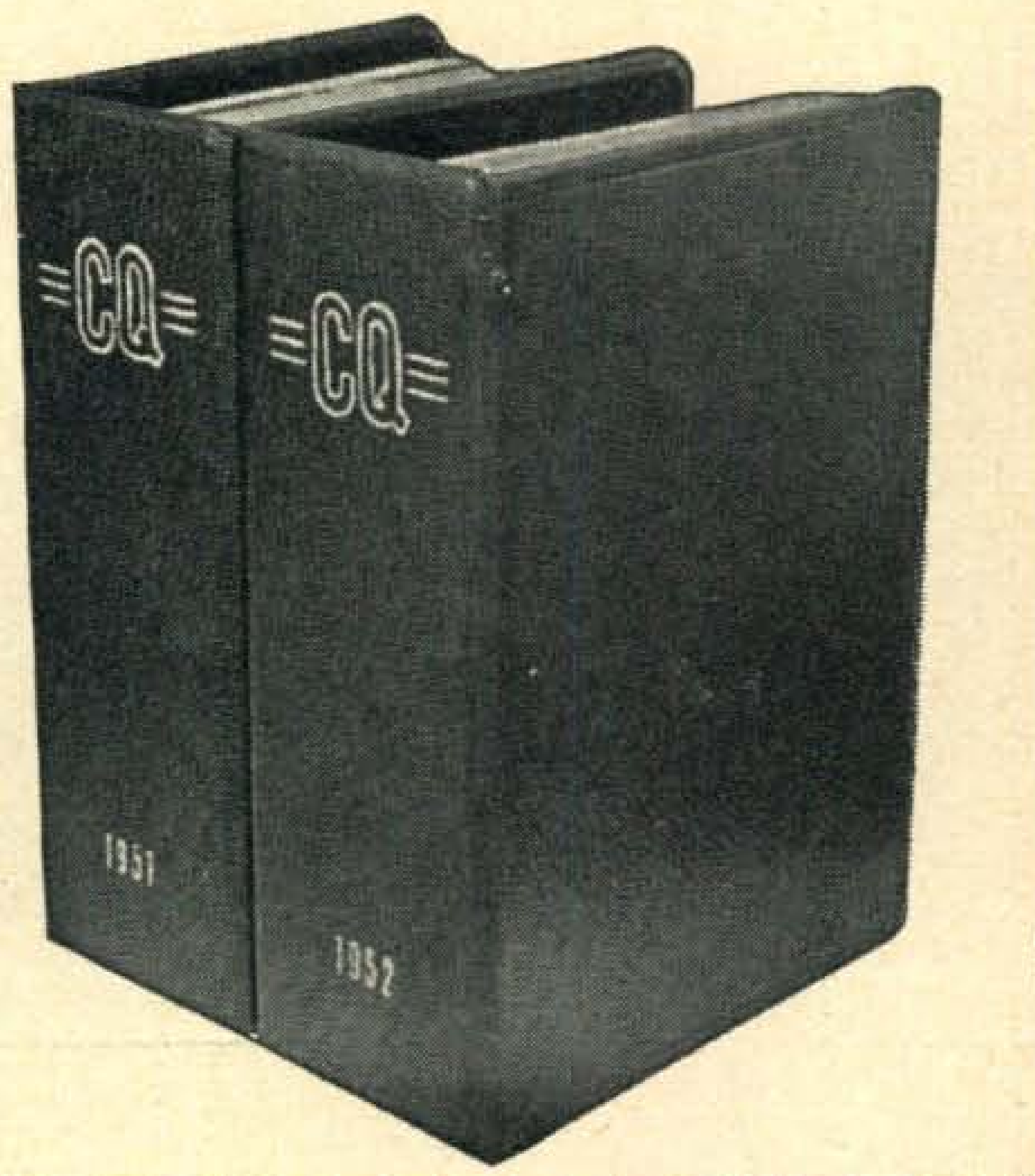

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MOBILE CORNER

(from page 35)

several Caravan Club members in providing communications for a "stake-out."

During October, 1952, club members provided communications for four squads of Reserve Deputies which joined regular police officials in a manhunt following a jailbreak in Dallas.

On October 12, 1952, the club participated in the nationwide Simulated Emergency Test. During the regular Sunday roll call and drill, without advance notice to the members, the Caravan Master dispatched mobile units to the homes of Red Cross officials to pick up and relay simulated emergency messages. Those messages, when received, were handled promptly on a priority basis. Replies were received to some of the messages within fifteen minutes and were relayed to the originating officials through the mobile units. The A.R.R.L. Emergency Coordinator, John Grady Owen, W5LEZ, observed the proceedings and assisted in relaying out-of-town traffic. As a result, the club activities attracted substantial newspaper publicity, and served to build up good will with the Red Cross officials involved.

On November 1 and 2, 1952, the club set up and operated its net control station from the polio ward of Baylor Hospital in Dallas. This operation served this dual purpose: polio patients were introduced to a fascinating hobby, and club members learned something of the problems which would exist in operating an emergency amateur station at a hospital location.

Club activities have included participation in Field Day activities each year, with equipment set up in the field under emergency conditions and operated around the clock.

The club frequently holds picnics and other outdoor meetings. At times these involve traveling, in caravan, as far as a hundred miles. A favorite activity in connection with these outings is hunting a hidden transmitter. Some of our successful hunters "sniff out" the hidden transmitter by signal strength alone, but most participants use a tuned loop, link-coupled to the receiver input. It has been found that an unshielded loop will yield surprisingly accurate results when operated *inside* a metal-bodied car, although the same loop will not produce a null when operated outside the car.

The membership of the *Caravan Club* is made up of men from a wide variety of trades and professions. Included are doctors, professional engineers, architects, business men, executives, technicians, pilots, contractors, salesmen, students and others.

The equipment used by club members is almost as varied as the membership itself. A great many *Gon-Set* converters are used, and most members use *Master Mobile* antennas. In some instances, other coils are used with the Master Mobile antenna in an effort to achieve improved efficiency. Transmitters include completely home-built units, ingenious modifications of surplus equipment, and manufactured gear. A passing note: Often as much ingenuity must be shown in making manufactured equipment work satisfactorily under mobile conditions as would be required in converting surplus equipment.

YL'S FREQUENCY

(from page 40)

but Dottie says she doesn't know whether they'll get back on the air again, as they don't want to advertise their presence as Hams by the immediate erection of beams, etc.—hi!

Our condolences to **W1UET**, Martha, whose OM died recently. She will be operating portable 4 for a while . . . From **W5IZL**, Ruth, we have the sad news that her OM is in the hospital after suffering from a stroke. "My Christmas cards just didn't get written," says Ruth, "and I would like my Ham friends to know why they didn't hear from me this year."

After a brief but FB QSO with **W5WUX**, Evelyn, we learn that she is the only YL in Little Rock or North Little Rock, Ark., holding a General Class ticket. "We are a mother and son combination here," says Evelyn. "My 15-year old son, W5UHD, received his General Class about a year ago; he was a Novice before that. I took my Novice exam last April and flunked—so got busy and passed the General Class in July."

At the January meeting of the Concord (N.H.) Brasspounders **W1FTJ** was elected vice president. Dot is the only YL in the club and feels it quite an honor to be V.P. Says she thought they might put her in as secretary some year, but never Veep. (You're lucky, Dot—too much work being secretary! We know, having recently found ourself in that post for the Los Alamos club.)

This interesting note from **WN2IQW**: "After 11½ months as a Novice I worked my first YL—WN3URU, Sarah, at Norristown, Pa. The next day I answered a CQ put out by WN3URT, June, also at Norristown. Asked her if she knew Sarah. She said she sure did—Sarah is her twin sister!"

From **W1UPZ**, Helen, comes a nice thank-you for the YL of the Month write-up in November CQ. Seems it resulted in her getting a new job—in Ham radio! Helen is now in charge of the mail order department at the Radio Shack in Boston. Any other YLs looking for a radio job? Let's hear from you!

33 es CUL—**W5RZJ.**

NOVICE SHACK

(from page 38)

once. It really works! When I call CQ, I use the 3 X 3 X 3 system. Three CQ's, followed by my call three times, and the combination sent three times. It is smooth and gets more replies than longer calls. One night, though, I heard WN6??? send 57 CQ's before signing!

"And I have a complaint. Why don't some Novices (and Generals too) practice sending with an oscillator before getting on the air? Fellows, a dash is supposed to be three times as long as a dot"—Russ (Preacher), W6NNP—Not Near Perfect.

"P.S. You mentioned in one of the columns getting a letter from Folsom State Prison. The writer is now WN6SXR. His name is Larry, and he is the Assistant Warden, not an inmate, hi."

Doug, **WN9UKG** is frustrated. "Dear Herb, am fourteen and got my license when I was thirteen. I can copy code at 18 wpm. It peeves that I can't quite get my 20-wpm sticker copying W1AW. I am always just a little short.

"I have handled three messages lately, but I have had a great deal of trouble getting them on their way. Some stations don't want to handle them, because they have trouble getting out, and others don't seem to know what to do with them. Could you discuss message handling in the Novice Shack?"—Doug, WN9UKG. (Yes, in the next few months—**Herb.**)

Attention Indiana Novices. The Indiana Radio Club Council is sponsoring an Indiana Novice WAS Contest, in which all licensed Indiana Novices are eligible to participate. The object of the contest is to work as many of the 48 States as possible. Each State worked counts 1 point, and each confirmation counts 2 points, making a possible total of 3 points per contact. Note that there is nothing to be gained by working the same State more than once after a QSL card has been received.

(Continued on next page)

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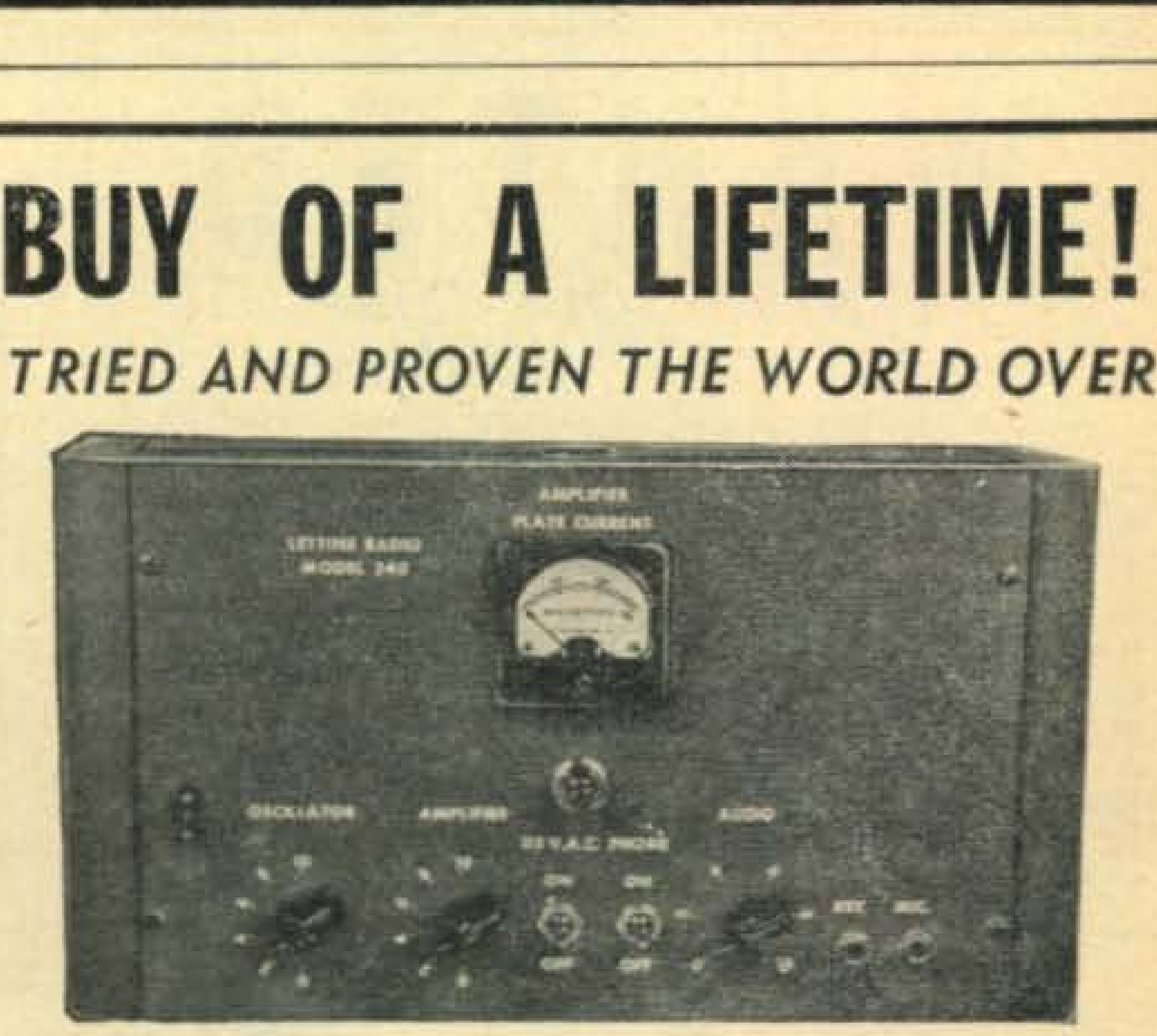

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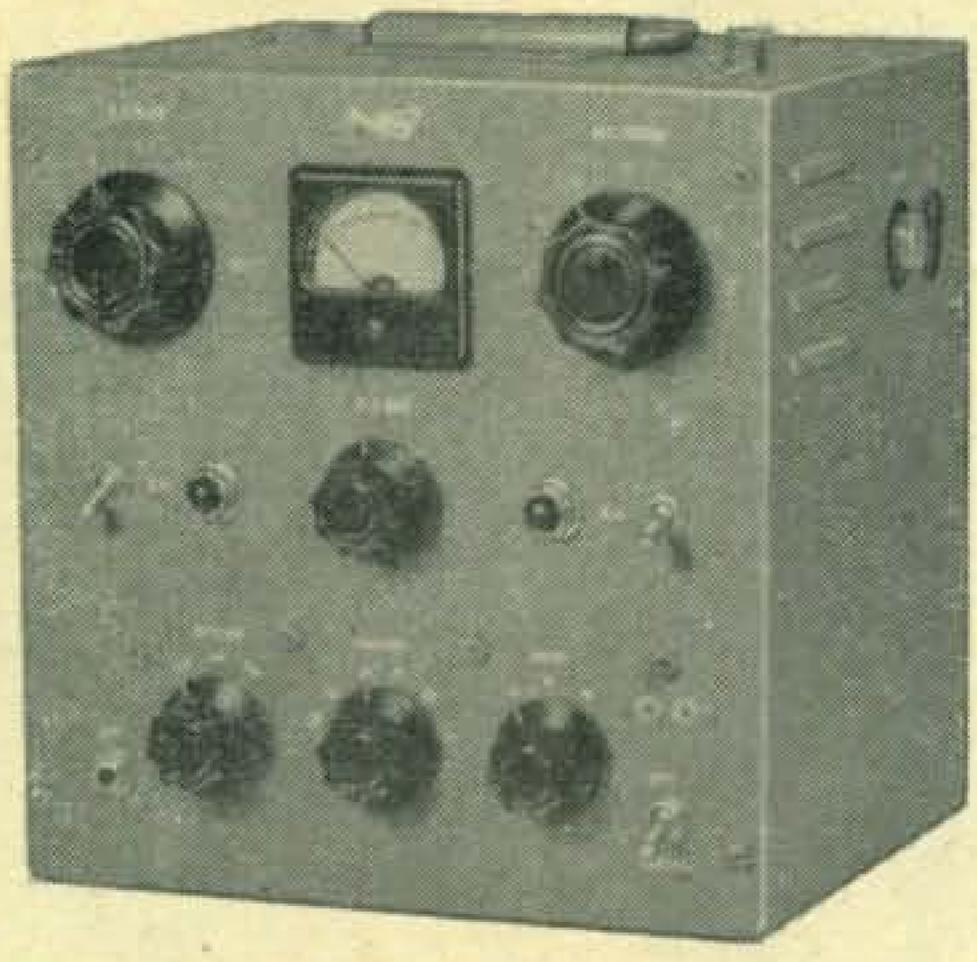

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(from preceding page)

Contacts made on all authorized Novice bands between January 1, 1953, and June 1, 1953, may be counted. The Judges' decision is final. In the event of a tie, date of latest confirmation will determine the winner. First prize: radio equipment valued at $50.00. Second prize: radio equipment valued at $20.00. Winners will be announced at Annual I.R.C.C. picnic in July.

As a matter of curiosity, if you were offered a piece of radio equipment worth $50.00, what would you choose?

Mike, **WN6TXH**, says, "I don't see how some Novices can work forty states with fifteen watts. After reading about such work in the **Novice Shack**, I get the DX bug and fire up the rig. There's where I get discouraged. After much work and sweat, I raise a W6 or a WN6, but no DX. I've had my call for three months and haven't worked outside of California! I have two transmitters, a home-built 6L6-807, with 60 watts input, and an HT-17, with 30 watts input. Receiver is an S-76. Antennas are a ¼-wave Hertz and a 136-foot Marconi. Any suggestions?"—Mike, WN6TXH.

John Hoffman, a short-wave listener (SWL) forwarded a clipping about KN2BSD to the **YL's Frequency** Department and Louisa forwarded it to me. KN2BSD is operated by Alan MacDonald, 1943 Clinton Park Road, Schenectady, N. Y. He is fourteen years old, and a sufferer of muscular dystrophy, so he has lots of time to devote to his hobby.

It wasn't long after Alan got his license that his dad obtained one, too. His sister, Crystal, who is twelve years old, thinks she, too, might become a Ham. Mother, although amused to hear her son and husband calling each other "old man," has no intention of learning the code herself.

Jerry, **WØHMA**, writes, "I just got my General-Class license. My transmitter is the push-pull 6L6 one described in March, 1952, **CQ**. With 70 watts input, I've worked eleven states. The antenna is 125 feet long, and I have two receivers: a BC-454B and an SW-54."—Jerry, WØHMA.

Short and to the point, "Dear Herb, After seeing the response Pete Stanck got to his request for help on the code, I thought I would try too. Anyone interested in helping me can drop a line to: Hans M. Mahr, 2717 Orchard Ave., Los Angeles 7, Calif. My phone number is PA 4448, after 6:00 P.M."

Another plea for help in becoming an amateur is that of Roy J. Irvine, 905 E. Buchanan, Harlingen, Texas. Roy is fourteen years old and will appreciate any help that is offered.

Jim, **WN4YOX**, writes, "Dear Herb, I have been licensed since November, thanks to the help of W4BMR and W4FNR. My transmitter is a TR-75TV, with 60 watts input. My antenna is a folded dipole. I get many RST599X reports up and down the state of Florida. Best DX so far has been W2JZF. Besides looking for DX, my main occupation is looking for a YL, say about 15 years old. No success here yet, hi.

"I am building the Novice 145-Mc transmitter described in December, 1952 and January, 1953, **CQ**. I have high hopes for it when I get it finished"—Jim, "the Ox," WN4YOX.

PFC James H. McCann, who gets his mail care of the Postmaster, San Francisco, has bet a friend that there is now a Novice who was licensed before his (or her) seventh birthday. He has hopes that Nancy Clute, mentioned in the June, 1952, column, will win his bet. Ladd Smach, her adopted father, has not reported on Nancy's progress lately. The youngest licensed Novice I know of is seven. Does anyone know of one younger?

Louis Schuh, who requested that Hams exchange QSL cards with him in the January **Novice Shack**, reports that he has received many cards as a result. You may recall that Louis has been paralyzed since birth, and spends his time listening to Hams on his S-38. If you would like to send him your QSL card, his address again is: 907 West Main, Russellville, Ark.

The last letter we will have room for this month is from Fred, **WN4WUQ**, an engineer at WINA, Charlottesville, Virginia. He is building a two-meter transmitter, which is probably now in operation. Fred is interested in organizing a two-meter net in central Virginia. He also offers to help prospective Novices in obtaining their licenses. He may be addressed Fred W. Bonavita, Jr., C/O WINA, Charlottesville, Virginia.

Until next month, keep writing and sending your pictures.

73, Herb, **W9EGQ**

DX NEWS

(from page 46)

QRX at 2359 GMT for any calls from Utah, and Nevada. The frequency will be 14040. AP is also active on 7 and 3.5 Mc. . . . **PJ2AJ** advises that since the Fall Callbook, PJ2A's have been augmented as follows: PJ2AJ, Don Kurtz. PJ2AK, C. Peeren. PJ2AL, H. Hansen. PJ2AM, G. Boogears and PJ2AN, A. Dikken. Cards may be sent via PJ2AA, Box 80, San Nicholas, Dakota Airport, Aruba, N.W.I.

After much being said re the evils of the CQ-DX calls we received a blast from W6AM entitled, "We need more and louder CQ-DX". Don goes on to say, "When I was in Europe I was appalled by the lack of quantities of W6's. They were all apparently sitting around, waiting for someone to "CQ-DX" for them. They were too lazy to do it themselves, hence a quiet band. I always appreciate it when I hear someone calling CQ-DX as it often stirs up an otherwise dead band. The foreigners are getting to be like us, they just sit around tuning their receivers. I, like many others,

Ossie Thomas, VE7DT (left) and Chas. Freeman, VR2CD, ex-ZL4FH/3AE/1BI. seen at the former's home in Vancouver. VR2CD is awaiting his immigration quota number for the U.S. and hopes to set up shop in KH6 in the not too distant future, when he will resume his 28- and 14-Mc activity.

think some more activity is desirable. It makes for more fun, like in the DX tests. A live band attracts more DX'ers—people have a tendency to gather where there's already a crowd. DX'ers are no exception. Hence, Yours for more and louder CQ-DX's."—While Don has a case there we feel that the "CQ-DX" call from its very nature is usually a very over-extended one and should only be applied when band conditions warrant its use. Should the length of the "CQ-DX" be kept as short as an ordinary CQ, and possibly be repeated at more frequent intervals, much of the opposition to it would not be heard. Anyway, Don, I hope a nice juicy one doesn't start up when you have just nabbed a 'legitimate' ZA station! (KV4AA)

160 Meters

December 28th Preliminary Test—Due to receiver trouble things were practically NIL at W1BB. However, reports show the band started clearing up around 0530 and W stations were heard calling or working the following: G6GM, G5RI, GI2ARS, G6GF, G5JU, G6GO, G3PU, KP4DV, G8KP, and KP4KD. It is believed that each of these stations were worked by at least one W or VE. It was interesting to note that WØ's and W9's were calling DX, showing that the DX signals were getting out. W9NH called G6GM and G6GO, W3HL called G5RI, VE3AAZ called G6GF, WØNWX called G5JU and W4VFD called G3PU. W2EQS turned in a fine performance by working G6GM, G5JU, G3PU, KP4DV, G8KP, KP4KD and an unidentified GI. Stations known to be in there trying were: W1BB,

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Box 2005 **Boston 6, Mass.**

(from page 67)

LYV, EFN; W2KNZ, UBS, TRK, KHC, WWP, EQS, JPW; W3EIS, HL, AJS, SKN, RGQ; W4LRN, UFP, VFL; W8NJC, HMF, GDQ, KBT; W9MXO, NH, CZT, QCQ; WØNWX, NUI; VE1EA and VE3AAZ.

January 4th, Non-Scheduled Test—Very optimistic outlook. W1BB licked his receiver trouble and worked 5 stations, VE1EA worked 7 and W2EQS worked 6. W5ENE worked G5JU for the first W5/G 160-meter QSO on record. Ben also heard G6GM and G3PU 469. W2EQS nailed VP4LZ, 1982, for first SA contact this season. The band seemed to peak up for G's around 0630 GMT.

January 11th, Scheduled Test—No report from W1BB yet. At KV4AA QRN prevailed but many W/G QSO's were noted. Heard in the Virgin Islands were W1BB, 489; K2ANR, 489; W1LYV, 489; W2HCW, 479 and W1OJM, 469. QSO'd were KV4AQ and KP4DV. Report from W2QHH says Howy QSO'd his first G, G5RI and also went on to get EI9J. QHH ran 16 watts! KP4KD QSO'd W2QHH completing the first W/KP4 seven bander. All in all things look mighty nice on 160, and before the season is out, we look for all kinds of records to be broken.

15-Meter Report

Condition on the band seems to be lagging a bit as far as KV land is concerned but the path from W1/2 and 3 to Europe seems to be consistently open in the mornings (1500 GMT) and we hear W2WZ and others QSO'ing right and left. W4COK is now back at Red Bank, N. J. (W2COK) where Bill will continue his 21-Mc streak. Last QSO at W4COK was with OD5YL giving him No. 66. Conditions opened wide for Tom, TI2TG, between 1300 and 1400 GMT, Jan. 11th when he worked the following in rapid succession: SM4BEC, SM5CO, SM5HH, DL2RO, SM7OY, DL3BJ, G3COJ, DL1TH, DL7BA, DL6QV and TF3MB . . . WOW! . . .

21 Mc. Standings

W4COK	66	G8KP	50	W6VX	45
G3GUM	63	KP4KD	50	TI2TG	45
DL7AP	59	WOHVN	50	W4KRR	44
G2BJY	55	W2WZ	50	G5BZ	44
DL7AA	54	W1BUX	50	KV4AA	44
DL3BJ	53	G6QB	49	W1RY	42
		PAOKW	46		

Latest QSL Addresses

KF3AA (W5AGB/FM)	Box 143, Oakdale, Ia.
LU6XC	Juan Lay, Avella Neda 275, Rio Gallegos, Santa Cruz,. Argentina.
OD5AD	P.O. Box 1202, Beyrouth, Lebanon.
PJ2AJ	Don Kurtz, Colony P.O., Lago Oil and Transport Co. Aruba, N.W.I.
PJ2CF	Marius De Pree, F. D. Rooseveltweg. 557, Hato Airport, Curacao.
VP4LK	Cad, 14 Jackson St., Curepe, Trinidad.
VK9YY	Box 13, Post Office, Lae, New Guinea.
ex-VP6SD	Sid Lashley, c/o 351 Oliver Ave., Westmount, P.Q. Canada.
VQ2HR	(New) Box 199, Livingstone, Northern Rhodesia.
VQ3BU	Phil, Williamsons Diamond Mine, Shinyanga, Tanganyika.
VQ4NZK,	Via W2BLS
VQ3NZK,	" "
VQ5NZK	" "
W2COK (W4COK)	Bill Frerichs, 42 McLaren St., Red Bank, N. J.
W3OFM/VO2	Andy, Naval Station, Arpentia, Newfoundland.
ZD4BJ	Sgt. Willis, G.C.R. Takoradi, Gold Coast.
HH2FL	Box 153 Port-au-Prince, Haiti.

Thanks to: **W2BLS, W3AS, LU5AQ, W6LW, W6QD and KV4BB**

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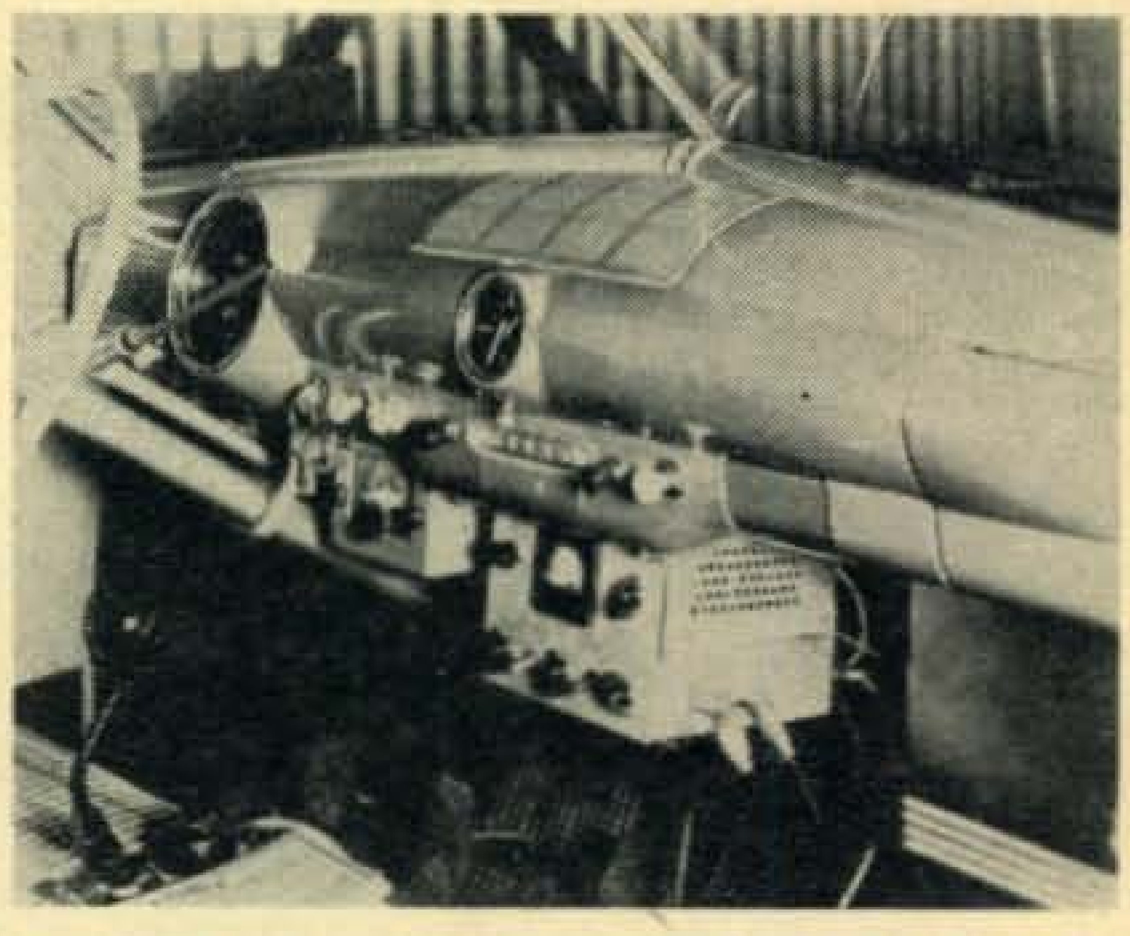

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RECEIVER WANTED: WN1WUP, Emmet Weber, 31 Wolcott Rd., Brookline, Mass.

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TUBES: Eimac 304TL's $15.00; 872A's $2.50; VT160 $1.00; 5CPI's $10.00. Kiefer, W2ZVS/3, 299 Warren Sq., Bethlehem, Pa.

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WANTED: Millen power amplifier 90881. State price and condition by letter to Wathen Brack, VE2ABR, The Canadian Bank of Commerce, La Sarre, Que.

FOR SALE: GF-12 transmitter 2000-9050 kc. CW & phone with RU-17 receiver 195-13575 kc. new, unused, in cartons complete with all plugs, coils, dynamotor, test meter, manual etc., $50.00. SX24 & speaker, $50.00. Want good SX42. W2HDR, John A. Schwerbel, 166-36th St., Lindenhurst, L.I., N.Y.

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WANTED: Millen type, 500-watt amplifier, 90881 with or without tubes, power supply, coils. Bill Monk, Box 112, Liberty, Texas.

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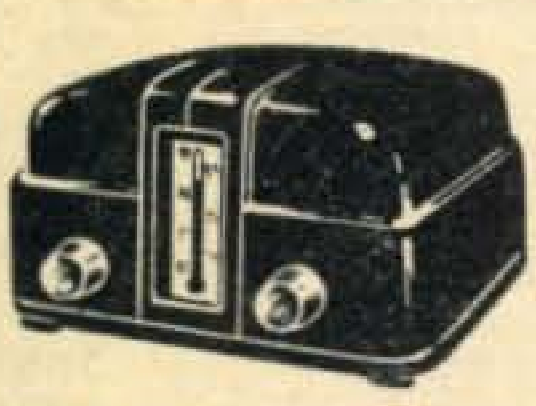

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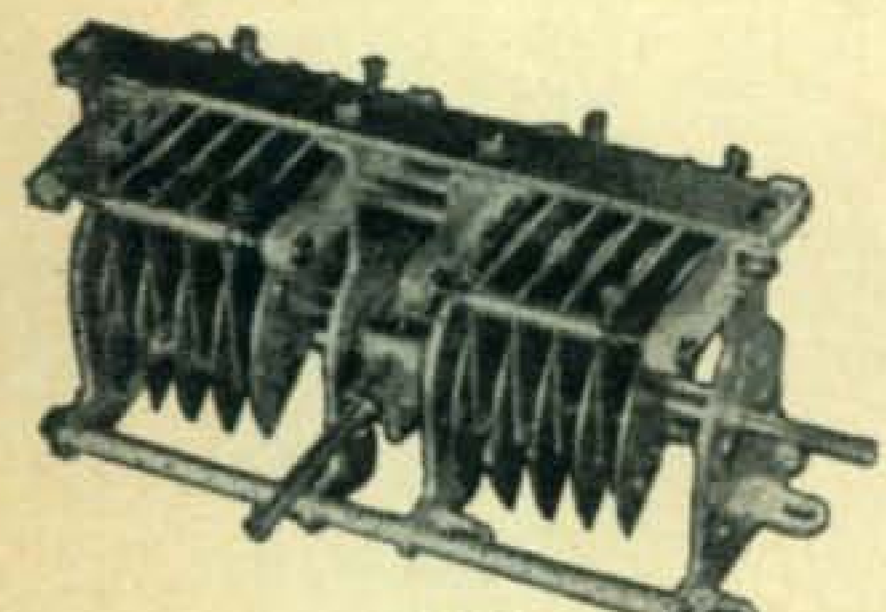

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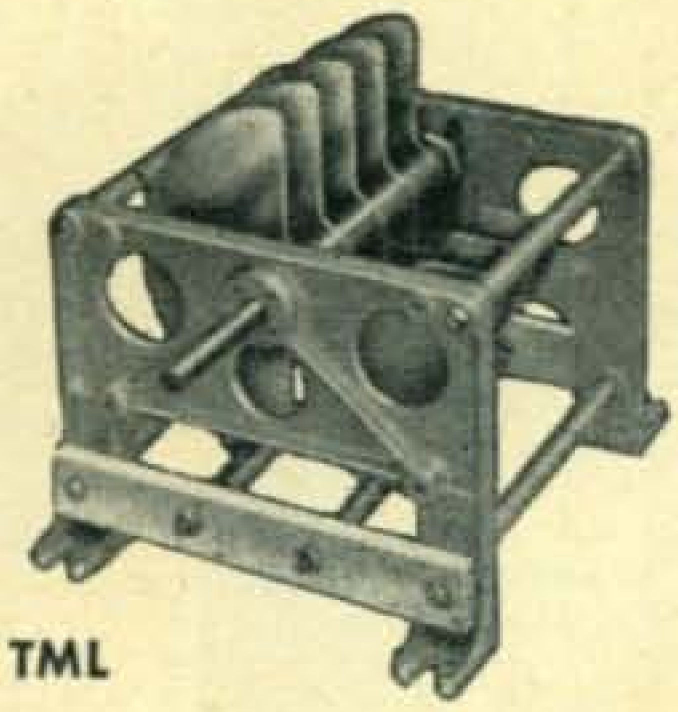

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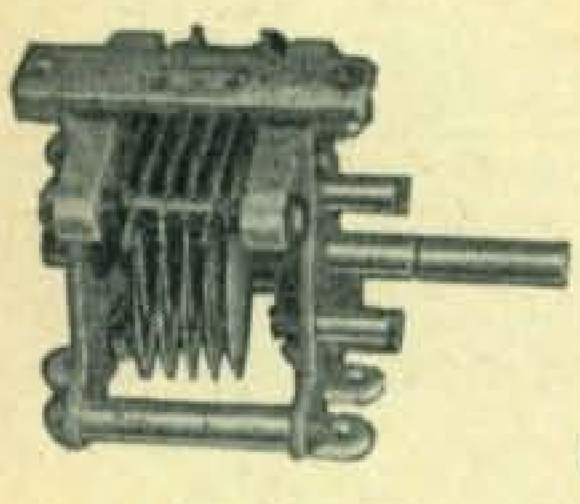

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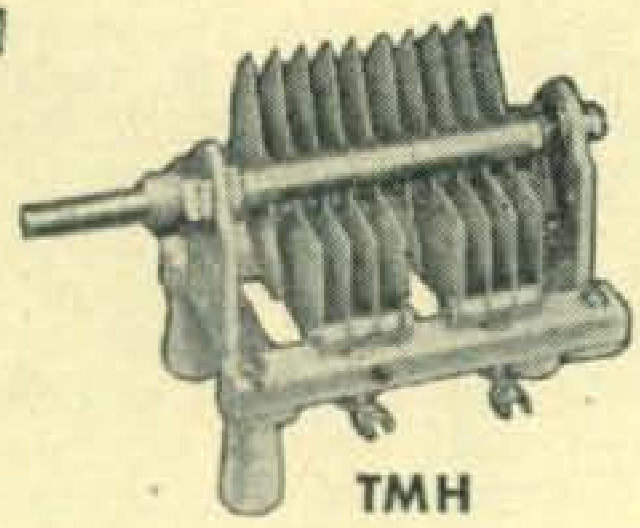

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Xtals: 100Kc,	6AG7M	368AS	5750
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