CQ

May 1959
50¢

SPECIAL Receiver Issue

The Radio Amateur's Journal

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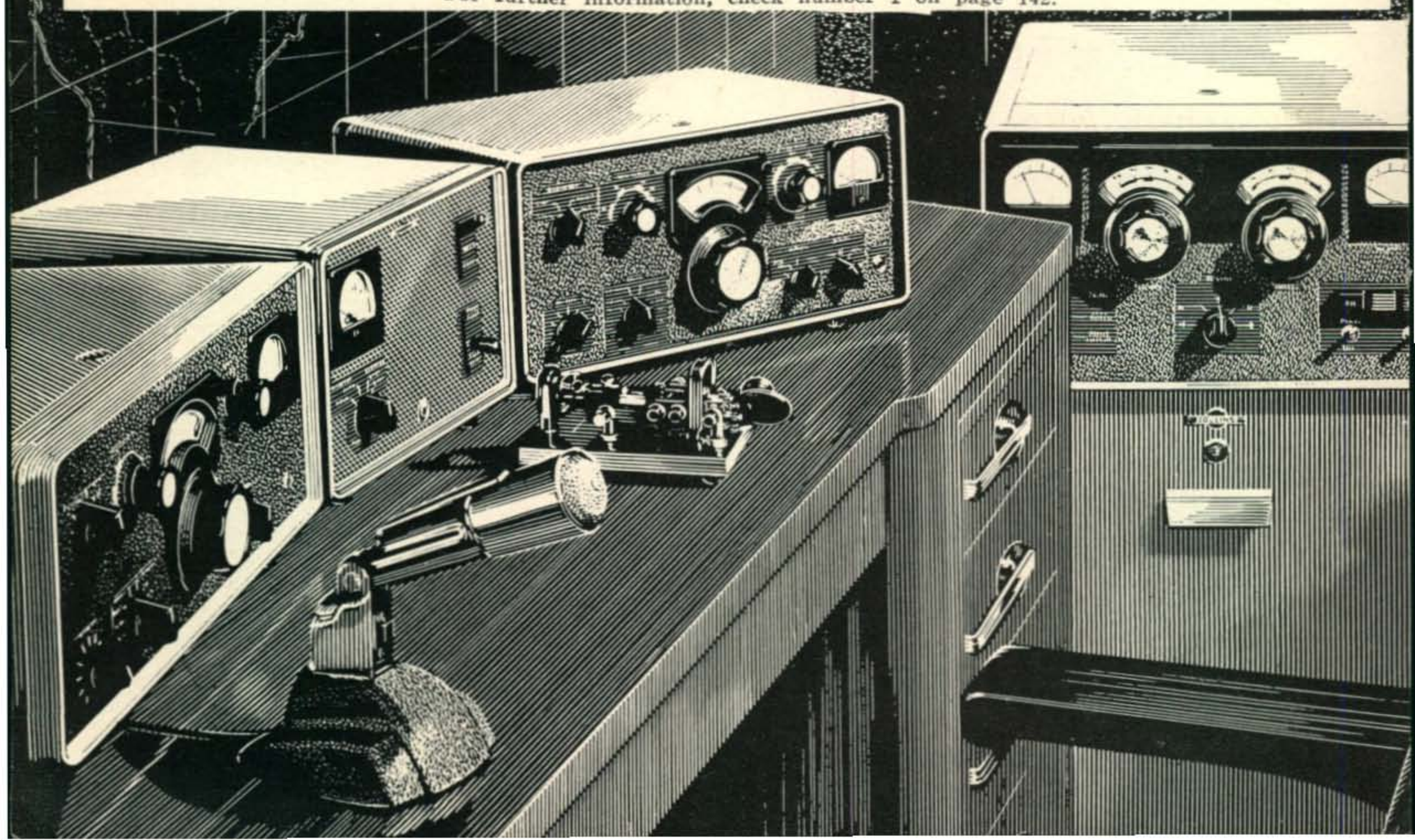
For further information, check number 1 on page 142.



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40, 80 and 160 Meters, PR Type Z-2

Rugged. Low drift, fundamental oscillators. High activity and power output. Stands up under maximum crystal currents. Stable, long-lasting, permanently sealed; ±500 cycles.....**$2.95 Net**

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Third overtone oscillator. Low drift. High activity. Can be keyed in most circuits. Fine for doubling to 10 and 11 meters or "straight through" 20 meter operation; ±500 cycles.....**$3.95 Net**

24 to 27 Mc., PR Type Z-9A

Third overtone; multiplies into either 2-meter or 6-meter band; hermetically sealed; calibrated 24 to 27 mc., ±3 kc.; .050" pins.

$4.95 Net

50 to 54 Mc., PR Type Z-9A

Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 mc., ±15 kc.; .050" pins.

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3023.5 Kc., .005%.....**$3.45 Net**

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Official assigned transmitter frequencies in the range.
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Type Z-6A FREQUENCY STANDARD

To determine band-edge. To keep the VFO and receiver properly calibrated.

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PR PRINTED OSCILLATOR KIT

Has many uses—

- As 100 Kc. Marker
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Assembled in minutes. Kit contains everything but 6BA6 oscillator tube and crystal.

Each . . . . . **$4.50 Net**

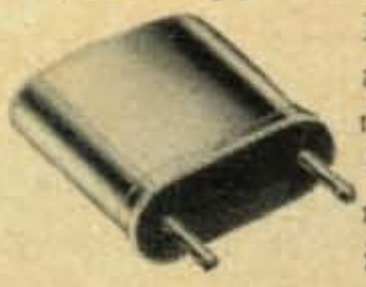
Type 2XP

Suitable for converters, experimental, etc. Same holder dimensions as Type Z-2.

1600 to 12000 Kc. (Fund.) ±5 Kc. . . . **$3.45 Net**

12001 to 25000 Kc. (3d Mode) ±10 Kc. . . . **$4.45 Net**

VHF Type Z-9R, Aircraft



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Type Z-1 TV Marker Crystals

Channels 2 through 13 . . . . . **$6.45 Net**
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4.5 Mc. Intercarrier, .01% . . . **2.95 Net**
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CQ, the Radio Amateurs' Journal is published for active hams by active hams. Not affiliated with any clubs or other political groups, CQ endeavors to be a true and honest reporter for those interested in the hobby. Suggestions for improvement are welcomed.

Authors would do well to send for the CQ Style sheet which will explain our confused system of abbreviations and symbols. The article "Author Author" (October 1952 CQ) tells all about how to write articles for CQ, how much we pay, etc. Reprints of this article are available from CQ if you have been improvident in keeping up your radio library.

CQ CERTIFICATES:

The WPX Award is granted for two-way contact with certain number of amateurs in different prefixes of the world. Full details are contained in the WPX Record Book which is available for 15c from CQ. Application forms are free.

The WAZ Award is granted for contacting all of the amateur zones of the world. Current standings of amateurs working for this award will be found in the DX column. A DX Zone map of the world is available free from CQ. Send stamped envelope.

Special SB Certificates are available from the Sideband Department for operators providing proof of contact (QSL cards) with stations in 50, 75 and 100 countries using two-way sideband. Send cards directly to the SB Editor.

TECHNICAL INFORMATION:

Please check the 11-year cumulative index which was published in the January 1956 CQ for information about articles in past issues of CQ. The December 1956 to 1958 CQ yearly indexes will bring you up to date. Most back issues are available at $1 from us. Check our "Back Issue" ad for details on those not available. Reprints of the Cumulative Index are available free. For further information see the Ham Clinic column.

DISCLAIMER:

The authors and editors do the best they can to make everything as correct as possible in the articles. If for any reason any of them should happen to goof we hasten to point out that everything is experimental and we guarantee nothing.

←For further information, check number 4 on page 142.

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BUILD YOUR OWN HAM GEAR

HEATHKIT®

HEATHKIT HAM EQUIPMENT IS DESIGNED BY HAMS WHO KNOW YOUR PROBLEMS AND NEEDS.

PROVEN, "ON THE AIR" PERFORMANCE

"SENECA" VHF HAM TRANSMITTER KIT

Beautifully styled and a top performer of highest quality throughout. The "Seneca" is a completely self-contained 6 and 2 meter transmitter featuring a built-in VFO for both 6 and 2 meters, and 4 switch-selected crystal positions, 2 power supplies, 5 radio frequency stages, and 2 dual-triode audio stages. Panel controls allow VFO or crystal control, phone or CW operation on both amateur bands. An auxiliary socket provides for receiver muting, remote operation of antenna relay and remote control of the transmitter such as with the Heathkit VX-1 Voice Control. Features up to 120 watts input on phone and 140 watts on CW in the 6 meter band. Ratings slightly reduced in the 2 meter band. Ideal for ham operators wishing to extend transmission into the VHF region. Shpg. Wt. 56 lbs.

HEATHKIT VHF-1 **$159.95**

HEATHKIT DX-20 **$35.95**

DX-20 CW TRANSMITTER KIT

Designed exclusively for CW work, the DX-20 provides the novice as well as the advanced-class CW operator with a low cost transmitter featuring high operating efficiency. Single-knob bandswitching covers 80, 40, 20, 15 and 10 meters using crystals or an external VFO. Pi network output circuit matches antenna impedances between 50 and 1,000 ohms. Employs a single 6DQ6A tube in the final amplifier stage for plate power input of 50 watts. A 6CL6 serves as the crystal oscillator. The husky power supply uses a heavy duty 5U4GB rectifier and top-quality "potted" transformer for long service life. Easy-to-read panel meter indicates final grid or plate current selected by the panel switch. Complete RF shielding to minimize TVI interference. Easy-to-build with complete instructions provided. Shpg. Wt. 19 lbs.

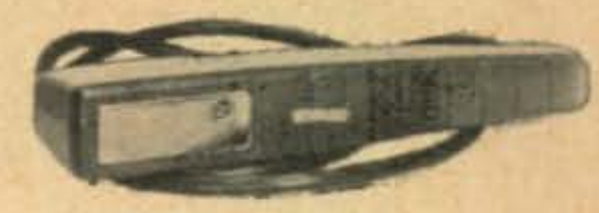
HEATH COMPANY Benton Harbor, Michigan — a subsidiary of Daystrom, Inc.

Mobile Gear...for the Ham on the Go!

"CHEYENNE" MOBILE HAM TRANSMITTER KIT

All the fun and excitement . . . plus the convenience of mobile operation are yours in the all-new Heathkit "Cheyenne" transmitter. The neat, compact, and efficient circuitry provides you with high power capability in mobile operation, with low battery drain using carrier controlled modulation. All necessary power is supplied by the model MP-1 described below. Covers 80, 40, 20, 15 and 10 meters with up to 90 watts input on phone. Features built-in VFO, modulator, 4 RF stages, with a 6146 final amplifier and pi network (coaxial) output coupling. High quality components are used for long service life and reliable operation, along with rugged chassis construction to withstand mobile vibrations and shock. Thoughtful circuit layout provides for ease of assembly with complete instructions and detailed pictorial diagrams to insure success. A spotting switch is also provided. A specially designed ceramic microphone is included to insure effective modulation with plenty of "punch". Plan now to enjoy the fun of mobile operation by building this superb transmitter. Shpg. Wt. 19 lbs.

HEATHKIT MT-1
$99.95



"COMANCHE" MOBILE HAM RECEIVER KIT

Everything you could ask for in modern design mobile gear is provided in the "Comanche" . . . handsome styling, rugged construction, top quality components . . . and, best of all, a price you can afford. The "Comanche" is an 8-tube superheterodyne ham band receiver operating AM, CW and SSB on the 80,.40, 20, 15 and 10 meter amateur bands. A 3 mc crystal lattice-type IF filter permits the receiver to use single conversion without image interference, and at the same time creates a steep sided 3 kc flat top IF bandpass characteristic comparable to mechanical type filters. The neat, compact and easy-to-assemble circuitry features outstanding sensitivity, stability and selectivity on all bands. Circuit includes an RF stage, converter, 2 IF stages, 2 detectors, noise limiter, 2 audio stages and a voltage regulator. Sensitivity is better than 1 microvolt on all bands and signal-to-noise ratio is better than 10 db down at 1 microvolt input. One of the finest investments you can make in mobile gear. Shpg. Wt. 19 lbs.

HEATHKIT MR-1
$119.95

MOBILE SPEAKER KIT

A matching companion speaker for the "Comanche" mobile receiver. Housed in a rugged steel case with brackets provided for easy installation on fire wall or under dashboard, etc. Uses 5 PM speaker with 8 ohm voice coil. Measures 5" H. x 5" W. x 2½" D. Shpg. Wt. 4 lbs.

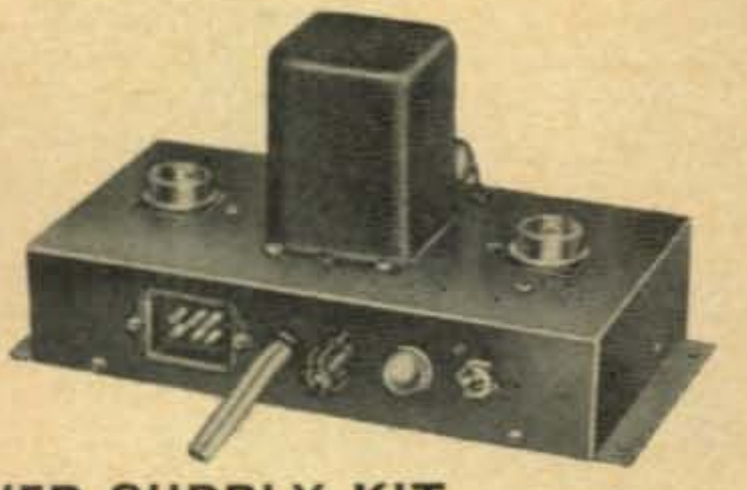
HEATHKIT AK-7
$5.95

HEATHKIT AK-6
$4.95

MOBILE BASE MOUNT KIT

The AK-6 Base Mount is designed to hold both transmitter and receiver conveniently at driver's side. Universal mounting bracket has adjustable legs to fit most automobiles. Shpg. Wt. 5 lbs.

HEATHKIT MP-1
$44.95



MOBILE POWER SUPPLY KIT

This heavy duty transistor power supply furnishes all the power required to operate both the MT-1 Transmitter and MR-1 Receiver. It features two 2N442 transistors in a 400 cycle switching circuit, supplying a full 120 watts of DC power. Under intermittent operation it will deliver up to 150 watts. Kit contains everything required for complete installation, including 12' of heavy battery cable, tap-in studs for battery posts, power plug and 15' of connecting cable. Chassis size is 9 1/16" L. x 4¾" W. x 2" H. Operates from 12-14 volt battery source. Circuit convenience provided by self-contained relay which allows push-to-talk mobile operation. Shpg. Wt. 8 lbs.

POWER METER KIT

This handy unit picks up energy from your mobile antenna and indicates when your transmitter is tuned for maximum output. A variable sensitivity control is provided. Features a strong magnet on a swivel-mount for holding it on a car dashboard or other suitable spot. Has its own antenna or may be connected to existing antenna. Sensitive 200 ua meter. Shpg. Wt. 2 lbs.

HEATHKIT PM-2
$12.95

HEATHKIT®

COMPANION UNITS

HEATHKIT TX-1 $234.95

"APACHE" HAM TRANSMITTER KIT

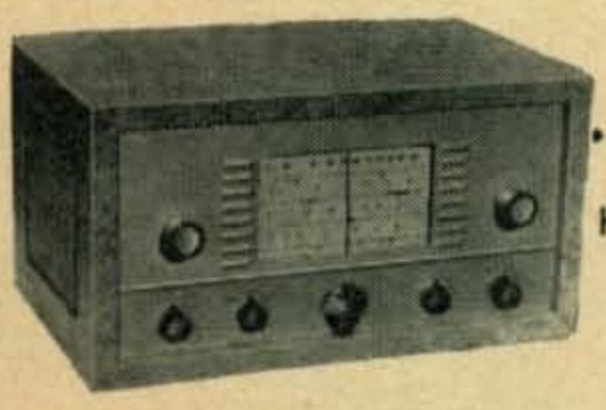
The many features and modern styling of the "Apache" will provide you with just about everything you could ask for in transmitting facilities. Emphasizing high quality the "Apache" operates with a 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, built-in switch selected circuitry provides for single-sideband transmission using the SB-10 External adapter. The newly designed, compact and stable VFO provides low drift frequency control necessary for SSB transmission. A slide rule type illuminated rotating VFO dial with full gear drive vernier tuning provides ample bandspread and precise frequency settings. The bandswitch allows quick selection of the amateur bands on 80, 40, 20, 15 and 10 meters. This unit also has adjustable low-level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation. The final amplifier is completely shielded for TVI protection and neutralized for greater stability. A cooling fan is also provided. The formed one-piece cabinet with convenient access hatch provides accessibility to tubes and crystal sockets. Die-cast aluminum knobs and control panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. A "spotting" push button enables the operator to "zero beat" an incoming frequency without putting the transmitter on the air. Equip your ham shack now for top transmitting enjoyment with this outstanding unit. Shpg. Wt. 110 lbs. Shipped motor freight unless otherwise specified.

HEATHKIT SB-10
$89.95

SINGLE SIDEBAND ADAPTER KIT

Designed as a compatible plug-in adapter unit for the TX-1 "Apache" transmitter, this unit lets you operate on SSB at a minimum of cost, yet does not affect the normal AM and CW functions of the transmitter. By making a few simple circuit modifications, the DX-100 and DX-100-B transmitters can be used, utilizing all existing RF circuitry. Extremely easy to operate and tune, the adapter employs the phasing method for generating a single-sideband signal, thus allowing operation entirely on fundamental frequencies. The critical audio phase shift network is supplied completely preassembled and wired in a sealed plug-in unit. Produces either a USB, LSB or DSB signal, with or without carrier insertion. Covers 80, 40, 20, 15 and 10 meter bands. An easy-to-read panel meter indicates power output to aid in tuning. A built-in electronic voice control with anti-trip circuit is also provided. 10 watts PEP output. Unwanted sideband suppression is in excess of 30 db and carrier suppression is in excess of 40 db. An EL84/6BQ5 tube is used for linear RF output. Shpg. Wt. 12 lbs.

MODIFICATION KIT: Modifies DX-100 and DX-100-B for use with the SB-10 Adapter, Model MK-1. Shpg. Wt. 1 lb. **$8.95.**



HEATHKIT AR-3
$29.95
(less cabinet)

ALL-BAND RECEIVER KIT

A fine receiver for the beginning ham or short wave listener, designed for high circuit efficiency and easy construction. Covers 550 kc to 30 mc in four bands clearly marked on a slide-rule dial. Transformer operated power supply. Features include: bandswitch, bandspread tuning, phone-standby-CW switch, phone jack, antenna trimmer, noise eliminator, RF gain control and AF control. Shpg. Wt. 12 lbs.

CABINET: Opt. extra. No. 91-15A. Shpg. Wt. 5 lbs. $4.95.

HEATHKIT QF-1
$9.95

"Q" MULTIPLIER KIT

Useful on crowded phone and CW bands, this kit adds selectivity and signal rejection to your receiver. Use it with any AM receiver having an IF frequency between 450 and 460 kc that is not AC-DC type. Provides an effective "Q" of approximately 4,000 for extremely sharp "peak" or "null". The QF-1 is powered from the receiver with which it is used. Shpg. Wt. 3 lbs.

OF DISTINCTIVE QUALITY

ACCESSORY SPEAKER KIT

Handsomely designed and color styled to match the "Mohawk" receiver this heavy duty 8" speaker with 4.7 ounce magnet provides excellent tone quality. Housed in attractive ⅜" plywood cabinet with perforated metal grille. Speaker impedance is 8 ohms. Shpg. Wt. 7 lbs.

HEATHKIT AK-5
$9.95

HEATHKIT RX-1 $274.95

"MOHAWK" HAM RECEIVER KIT

Styled to match the "Apache" transmitter the "Mohawk" ham band receiver provides all the functions required for clear, rock-steady reception. Designed especially for ham band operation this 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc and covers all the amateur frequencies from 160 through 10 meters on 7 bands with an extra band calibrated to cover 6 and 2 meters using a converter. Specially designed for single sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled wired and aligned front end coil bandswitch assembly assures ease of construction and top performance of the finished unit. Other features include 5 selectivity positions from 5 kc to 500 CPS, bridge T-notch filter for excellent heterodyne rejection, and a built-in 100 kc crystal calibrator. The set provides a 10 db signal-to-noise ratio at less than 1 microvolt input. Each ham band is separately calibrated on a rotating slide rule dial to provide clear frequency settings with more than ample bandspread. Front panel features S-meter, separate RF, IF and AF gain controls, T-notch tuning, T-notch depth, ANL, AVC, BFO, Bandswitch tuning, antenna trimmer, calibrate set, calibrate on, CW-SSB-AM, receive-standby, upper-lower sideband, selectivity, phone jack and illuminated gear driven vernier slide rule tuning dial. Attractively styled with die-cast aluminum control knobs and escutcheons. No external alignment equipment is required for precise calibration of the "Mohawk". All adjustments are easily accomplished using the unique method described in the manual. An outstanding buy in a communications receiver. Shpg. Wt. 66 lbs. Shipped motor freight unless otherwise specified.

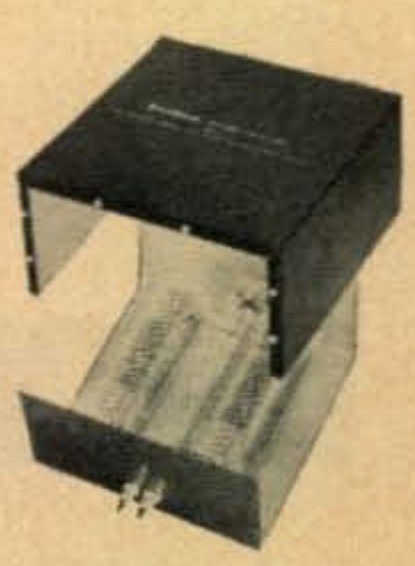
HEATHKIT AM-2
$15.95

REFLECTED POWER METER KIT

The AM-2 measures forward and reflected power or standing wave ratio. Handles a peak power of well over 1 kilowatt of energy and covers 160 through 6 meters. Input and output impedance provided for 50 or 75 ohm lines. No external power required for operation. Use it also to match impedances between exciters or RF sources and grounded grid amplifiers. Shpg. Wt. 3 lbs.

BALUN COIL KIT

Match unbalanced coaxial lines, found on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance with this handy transmitter accessory. Capable of handling power input up to 200 watts, the B-1 may be used with transmitters and receivers covering 80 through 10 meters. No adjustment required. Shpg. Wt. 4 lbs.



HEATHKIT B-1
$8.95

HEATHKIT VX-1
$23.95

ELECTRONIC VOICE CONTROL KIT

Eliminate hand switching with this convenient kit. Switch from receiver to transmitter by merely talking into your microphone. Sensitivity controls allow adjustment to all conditions. Power supply is built in and terminal strip on the rear of the chassis accommodates receiver and speaker connections and also a 117 volt antenna relay. Shpg. Wt. 5 lbs.

HEATHKIT VF-1
$19.50

VFO KIT

Far below the cost of crystals to obtain the same frequency coverage this variable frequency oscillator covers 160, 80, 40, 20, 15 and 10 meters with three basic oscillator frequencies. Providing better than 10 volt average RF output on fundamentals, the VF-1 is capable of driving the most modern transmitters. Requires only 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a. Illuminated dial reads direct. Shpg. Wt. 7 lbs.

Save 1/2 or more...with Heathkits

HEATHKIT DX-100-B **$189.50**

DX-100-B PHONE AND CW TRANSMITTER KIT

A long standing favorite in the Heathkit line, the DX-100-B combines modern styling and circuit ingenuity to bring you an exceptionally fine transmitter at an economical price. Panel controls allow VFO or crystal control, phone or CW operation on all amateur bands up to 30 mc. The rugged one-piece formed cabinet features a convenient top-access hatch for changing crystals and making other adjustments. The chassis is punched to accept sideband adapter modifications. Featured are a built-in VFO, modulator, and power supply, complete shielding to minimize TVI, and a pi network output coupling to match impedances from 50 to 72 ohms. RF output is in excess of 100 watts on phone and 120 watts on CW. Band coverage is from 160 through 10 meters. For operating convenience single-knob bandswitching and illuminated VFO dial on meter face are provided. A pair of 6146 tubes in parallel are employed in the output stage modulated by a pair of 1625's. Shpg. Wt. 107 lbs. Shipped motor freight unless otherwise specified.

HEATHKIT DX-40 **$64.95**

DX-40 PHONE AND CW TRANSMITTER KIT

An outstanding buy in its power class the DX-40 provides both phone and CW operation on 80, 40, 20, 15 and 10 meters. A single 6146 tube is used in the final amplifier stage to provide full 75 watt plate power input on CW or controlled carrier modulation peaks up to 60 watts for phone operation. Modulator and power supplies are built in and single-knob bandswitching is combined with the pi network output circuit for complete operating convenience. Features a D'Arsonval movement panel meter. A line filter and liberal shielding provides for high stability and minimum TVI. Provision is made for three crystals easily accessible through a "trap door" in the back of the cabinet. A 4-position switch selects any of the three crystals or jack for external VFO. Power for the VFO is available on the rear apron of the chassis. Easy-to-follow step-by-step instructions let assembly proceed smoothly from start to finish even for an individual who has never built electronic equipment before. Shpg. Wt. 25 lbs.

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NAME

ADDRESS

CITY ZONE STATE

QUANTITY	KIT NAME	MODEL NO.	PRICE

For further information, check number 5 on page 142.

editorial / WAYNE GREEN

de W2NSD

never say die

. . . . in Europe

Word had reached me in Munich that there was a letter at the CQ office in New York from Bill Orr giving directions for finding his villa on the Riviera. I had his address and figured that I would be able to find him with that . . . and had indeed planned the trip to include this visit. By one of those strange quirks of fate that so often influence our lives, G3BIT happened to be in Munich at the same time as I and introduced himself at the radio club meeting there. He had just come from visiting Bill and drew a cryptic map on an envelope for me so I would be able to find the Orr hideaway.

Even with this map and the full address I was unable to find anyone who had ever heard of Bill Orr, or the Orr Villa. I drove up and down the mountainside outside of Nice looking for the name on gates, etc. After about an hour of this I had him localized a bit and was driving up and down just one street. I was just pulling up out of a very steep driveway when someone stepped out from behind a pillar carrying a rubbish can . . . he didn't see me coming so I jammed on the brakes . . . it was Bill! Two feet more and I would have loused up 3A2AF!

Bill is living in a cute villa perched high on a hill overlooking the beautiful French Riviera. Nice is down to one side and Monaco to the other. If you saw the picture "To Catch A Thief" you had a good view of the Moyen Cornish, the beautiful winding road that threads its way along the side of the mountains. With him in this wonderful spot are his attractive wife and three youngest harmonics. The three older were off at a Swiss school for the winter.

Bill and I spent two days talking about the coming I.T.U. frequency conference in Geneva, going over the galleys of the 15th edition of his handbook (which finally came out in March), visiting local hams in Monaco, getting my Porsche its 1500 mile inspection in Cannes, and ransoming an S-40 from Customs for about 50,000 Francs. The receiver had been sent over free of charge for Bill to use at 3A2AF. After many frustrating delays he finally got it by putting up almost the cash value of the receiver to guarantee that it would be shipped back out of the country when he left.

An HT-32 was on its way over and we shuddered to think of how much this would cost to get through Customs. There seemed to be a distinct possibility that he might have to go on with a small borrowed CW rig.

Life in Europe can be pretty frustrating to the American wife too. In the American military centers we have brought America with us in the form of the PX, but elsewhere they have to "Live On The Economy." This makes for quite a change in living. No frozen foods, no cake mixes, darned little refrigeration of anything, no Kleenex, and the toilet paper is like our onion skinned writing paper . . . thin, very glossy, and not dependable. In Germany they have some that is a lot like our paper hand towels. As soon as I discovered this situation I rushed to the nearest PX (in Paris) and bought some American toilet paper. I restocked at the Munich PX.

When I unpacked the car to move in with Bill and his family I noticed their eyes bugging out at the American product. What could I do? I was a guest . . . I had something they coveted. . . . I had to give it to them! They were very appreciative and all of them thanked me over and over again . . . at odd intervals. I have to admit that I saved enough to last me to the PX at Wiesbaden, barring unforeseen difficulties.

Rain, which had been my constant companion everywhere except Venice, caught up with me here too.

The schedule was tight and I was due in Zurich in two days so I drove off in the light

rain from Villefrance-sur-mer and headed up through the French Alps for Geneva. The road up through Digne and Gap is a twisting one running along the sides of the mountains with thousand foot gorges on one side and bare cliff faces on the other. This is one of the roads used on the Monte Carlo Rally each year. I drove for all I was worth, sliding around the corners and using the whole road (traffic was just about nil) . . . I made about 42 *mph* average. The Monte Carlo Rally has to travel 51 *mph* on the same road! In the *snow*.

Speaking of Monte Carlo, I visited the casino the night before leaving the Riviera and won 10,000 Francs at the craps table. That's $20. Pretty stodgy place, nothing like the action in Las Vegas.

Geneva

Late in the afternoon I arrived at the Swiss border. A quick inspection of my papers and I was through. There are money changers at every border so I changed my remaining French francs for Swiss francs which are worth about one hundred times as much. A few minutes later and I was in fog enshrouded Geneva . . . with a bit of drizzle. My guide book recommended the Hotel Richemonde as being nice but not too expensive so I made that my stop.

Early the next morning I went to the Palais Wilson, a few blocks away, to say hello to some of the hams who work for the International Telecommunications Union (I.T.U.) which is going to have a wold-wide frequency conference starting late this summer and ending in December. The conference could make some profound changes in our hobby so I felt it was important to find out what I could. One of the American amateurs in the I.T.U. was kind enough to introduce me to several other of the licensed amateurs working for that agency and we had quite a hamfest. We also went visiting some of the amateurs in the U.N. and other agencies there. It was quite a day. We used my car for the visiting and it apparently made quite an impression for I had a letter from him recently saying that as a result he had gotten a sports car too . . . a Lancia Spyder (hoot mon!).

There are quite a few amateurs among the many thousands of Americans living in Geneva. Most of them work for one or the other of the international agencies centered there or else for some branch of our government. The ones I met seemed to know what the situation was internationally as far as the amateur frequency allocations were concerned. I heard little of encouragement from anyone. They pointed out that although there will be many amateurs present at the international conference this fall, few will be able to speak or advise as amateurs since they will have allegiances with government or commercial interests which will prevent them from this. They seemed to feel

One Thing is *Crystal Clear*—Your Signal

HT-32A
transmitter

Exclusive HT-32A High Frequency Crystal Filter System a major, proven advance... cuts unwanted sideband at least 50 db.

Now proven superior—vastly superior to any other type filter—is Hallicrafters' exclusive 5.0 mc. quartz crystal filter system.

Result of a three-year research program, the system makes possible, for the first time, *high frequency filtering.* Result; unprecedented rejection of unwanted sideband—50 db. or more—and the *cleanest signal of all,* bar none.

This and another major technical advance—Hallicrafters' exclusive Bridged-Tee Modulator—make the HT-32A the most wanted SSB transmitter in history.

Certified for F.C.D.A. Matching Funds.

Export Sales: International Division
Raytheon Manufacturing Company
Waltham, Massachusetts

Compare these features

- **5.0 mc. quartz crystal filter cuts unwanted sideband 50 db. or more.**
- **Bridged-Tee modulator; temperature stabilized and compensated.**
- **SSB, AM or CW output on 80, 40, 20, 15, 10 meter bands.**
- **High stability, gear driven V.F.O.**
- **144 watts peak power input.**
- **3rd and 5th order distortion products down 30 db. or more.**
- **Keying circuit for RTTY.**
- **PTT.**
- **VOX.**

Proof of the HT-32A's superiority is heard on ham bands night after night. Listen. You won't be satisfied with anything but the cleanest signal on the air.

Available with convenient terms from your Radio Parts Distributor.

For further information, check number 6 on page 142.

The new ideas in communications are born at . . .

In our 25th year of service

hallicrafters
Chicago 24, Ill.

that it would be very prudent to have as many amateurs with a thorough knowledge of our hobby and its needs on hand to give advice and lobby as possible. They also pointed out that we would be judged as a group by the conduct of these "representatives."

Berne was knee deep in confetti when I drove into town, with crowds of people marching in the streets and everyone in a gay mood. I was looking for the hotel "opposite the railroad station." About twelve years ago a chap stopped at our house for dinner a few times and was introduced to ham radio. All we had at the time was ten meters and in the evening we would have some wonderful round-tables going locally. Since I had a remote control for the station in the living room I frequently put on visitors for a few words. On this occasion Jack Gauer of Berne was introduced to the group, who questioned him closely about Switzerland. One chap, W2OCL I believe, asked Jack about the Swiss yodeling. Jack answered by giving a demonstration. Sure, I knew it wasn't legal, but we were all enjoying it so much I didn't stop him. None of us have ever forgotten that QSO, for I am reminded of it every now and then when I run into one of the (now) "old timers."

Jack had mentioned that he owned the best hotel in Berne, right across from the railroad station. The marching crowds made it difficult to find my way through town, but after a couple passes through the main street I spotted the hotel, the Schweizerhof. Jack put me up in one of the best rooms of the hotel . . . I lived like a king for one night.

Berne was a very beautiful and old town, but I couldn't stay because I had to be at a radio club meeting the following night in Zurich.

Next month: Holland.

Our Cover

This being a special receiver issue a few of the local hams got together all of the receivers they could for the cover shot. It was windy and below freezing and we all suffered terribly. Sufferers, left to right, are Hank W2EZJ, Barry K2IEG, Stu K2RBM, and the Porsche Club photographer Charlie Gellis on top of my Detroit station wagon. Inside, keeping a bit warmer are Adolph W2KHE and K2MNW.

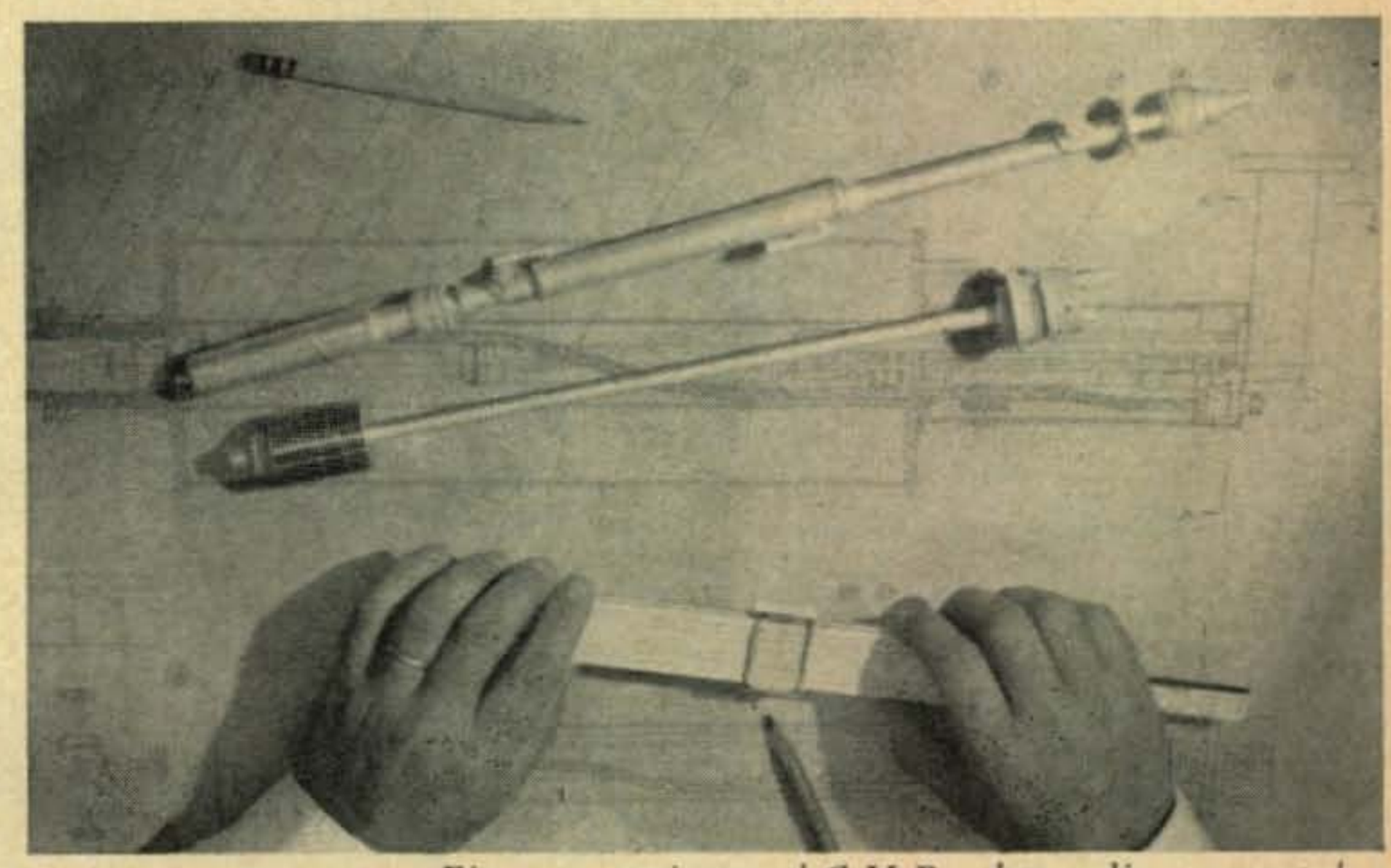
What's New with the Electron...1959

Visitors to the Eimac display at the 1959 Institute of Radio Engineers Show and Convention in New York City in March were able to demonstrate to themselves the simple, non-critical operation of economic Eimac external cavity klystrons by tuning an on-the-air klystron amplifier. Most participants found that the amplifier was as easy to tune as a ham transmitter. This demonstration, focal point of the Eimac display, consisted of an Eimac klystron amplifier operating at 800 megacycles with an output power of one kilowatt. The tube is typical of the broad line of ceramic-metal, external-cavity power amplifier klystrons manufactured by Eitel-McCullough, Inc. Eimac Klystrons have seen extensive service in such tropo-scatter systems as Dew Line, White Alice, and Texas Towers with exceptional reliability and performance.

Engineers find Eimac Klystrons easy to tune

Also of considerable interest was an animated display designed by Dr. Oskar Heil, head of Advanced Research at Eimac who invented the technique of velocity modulation in 1933. This display showed graphically the velocity modulation and bunching of a klystron electron beam as it passed through the interaction gaps of a klystron mock-up.

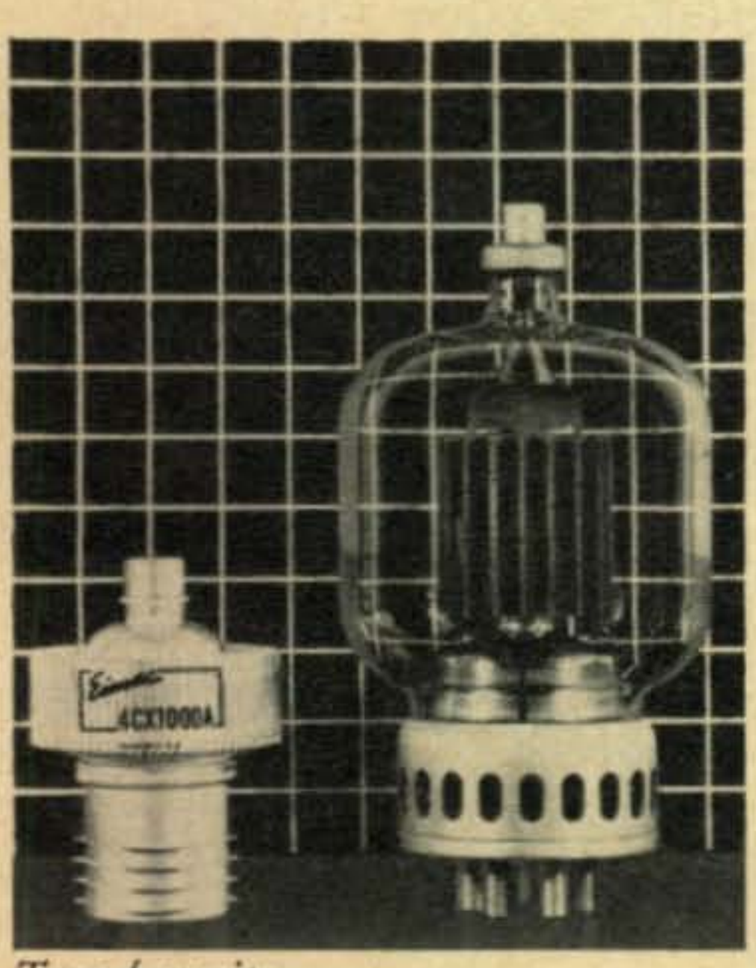
A wide selection of Eimac klystrons, reflex klystrons, traveling wave tubes and negative grid tubes were displayed. The Eimac line consists of over 100 commercial tube types. Of these, more than 40 now incorporate the advantages of Eimac ceramic-metal design which results in rugged, compact, high-performance tubes.



Eimac ceramic-metal C-X-Band traveling wave tubes

Eimac's advanced work in the traveling wave tube field was shown by two new ceramic-metal TWT's designed for use under rugged environmental conditions. The air-cooled X686 is a light-weight tube for airborne use covering a frequency range of 4000 to 7000 megacycles with an output power of one watt and a gain of 50 db. The water-cooled X620 achieves a minimum cw output power of 100 watts in the 4000 to 7000 megacycle range.

Of particular interest to amateurs as well as commercial equipment designers were the ceramic-metal 4CX250B, 4CX300A and 4CX1000A tetrodes, all ideally suited for SSB use. Eimac's popular internal-anode glass tubes were also shown. Many of these tubes, developed by Eimac 20 years ago, still enjoy widespread use in commercial and amateur equipment of all types.



Two favorite Eimac 1000-watt tetrodes

For detailed information on these latest Eimac developments write to our Amateur Service Department and request a copy of "What's New With The Electron . . . 1959."

EITEL-McCULLOUGH, INC.
SAN CARLOS, CALIFORNIA

For further information, check number 8 on page 142.

Feenix, Ariz.

Deer Hon. Ed:

Having most horribul dreem last nite. Maybe you not thinking it horribul — maybe you thinking is just most pekoolyur. Maybe even you thinking it being good idea.

Can't imagining why are having dreem. Staying up to watching Tee-V, seeing six strate cowboy and western shows, then watching late show — old western — and late late show (same thing, different plot).

Making notes when awaking in cold swet, so here are what I are dreeming. Sitting in front of Hon. Tee-V set, and new show coming on. It called "Having Black Saddle Bag with Ham Rig and Restless Mike — Will QSL". It are the story of how the West being tamed by amchoor radio.

This not to bad, but holding on to Hon. Sombrero, Hon. Ed., here are the shocker. Gessing who starring in show!! You gessing it — Transistor Scratchi, the Terror of the Bad Man.

Opening seen are showing Hon. Transistor Scratchi riding into western town in mid-1800 movie set. I riding on white horse with black saddle and black saddle bags. Neet whip antenna mounted between horses ears (horses name are Relay). Left saddle-bag having transistor xmitter and reseever, other having mercury-cell battery pack.

I not looking where going, as riting in log. Just finished QSO with Hon. Sheriff and cupple ranchers back in the hills, and not wanting to getting in trubble with C.C.C. (Colonial Communications Commishun).

First thing I knowing, are practikally running down two Bad Mens beeting up No Gun Pete (No Gun Pete are former Fastest Gun who turning strate and narrow).

Camera coming in for close-up on my face. I smiling. (Having xmitter off-on switch fixed so it turning on when I are smiling). "7AA to Sheriff . . . 7AA to Sheriff" . . . "Sheriff to 7AA" . . . "To Bad Guys Beeting up No Gun Pete in front of Cacktus Jooce Saloon, 7AA by" . . . "Sheriff to 7AA . . . Ten-For, on my way".

Close-up next on Bad Guy's face. He looking

[*Continued on page 18*]

For further information, check number 10 on page 142.

NEW GONSET SSB Xmtr and SSB LINEAR AMPLIFIER...

GSB-100 SSB TRANSMITTER

GONSET HYBRID PHONE PATCH

Exclusive VU Meter Eliminates Overdriving Phone Lines!

Gonset's new Hybrid Phone Patch has an exclusive VU meter that permits easy monitoring of phone line levels and eliminates overdriving them, a cause of so much cross-talk and interference in the past. The Gonset Hybrid Phone Patch gives you a positive method of measuring your level, from —20 db to 3 db.

Not only that, the Hybrid can be used VOX with SSB units, for which it was specially designed, eliminating the need for manually switching the transmitter on and off. The unit comes in beautiful chrome styling, three-color front, and wrinkle cabinet. Wt. 5 lbs.; 4"x 6⅛"x 7⅞".

SPECIFICATIONS:
Line Impedance: 600 ohms.
Receiver Impedance: 3.4 ohms.
Transmitter Impedance: High-impedance-mike input.

Gonset Hybrid Phone Patch . . . $44.50

GSB-100 SSB TRANSMITTER

The GSB-100 operates on SSB with selectable sidebands. When used on AM, it transmits both sidebands, which makes 100% modulation possible without the distortion that accompanies highly modulated carrier-and-one-sideband signals when received on a conventional AM receiver.

Exclusive Filter-Phasing • Uses Gonset's exclusive filter-phasing system that greatly improves SSB quality. Unwanted sideband suppression 45 db.

Carrier Elimination • Quartz crystal filter suppresses carrier by more than 60 db, eliminates need for adjusting carrier balance and sideband suppression.

Selectable Sidebands • AM, PM, or CW, with excellent keying characteristics.

Frequency Control • By fixed quartz crystals and exceptionally stable VFO. Complete band coverage with 5-kc calibration on 10½" drum for each band. Only band in use shows. Precision 100:1 gear-ratio dial drive.

VOX • Voice-operated control system. Complete with anti-trip circuit. Biasing voltage available for linear amplifier cut-off when receiving.

Coverage • Flexible pi network output, quick band change in 80, 40, 20, 15 and 10 meters. All operation controls on front panel.

Power Supply • Built-in heavy-duty AC.

GSB-100 SSB Transmitter, Model 3233...479.50

Write for technical data, specifying equipment in which you are interested

GONSET

For further information, check number 11 on page 142.

GONSET

POWER-PER-DOLLAR OUT DX THEM ALL!

Some people are still driving jalopies, others are roaring down the road in powerful new sportscars. If you're still plodding through the airways with out-dated equipment, there's no better way to roar down the bright new road of single sideband than with the power-packed Gonset GSB-100 SSB Transmitter and the Gonset GSB-101 SSB Linear Amplifier!

The 100-watt P.E.P. power input makes the GSB-100 a complete transmitter. When used as an exciter with the GSB-101, it gives you far-reaching power at an unmatched price! Alike in styling, both units have exclusive features that give you the best power-for-dollar your money can buy!

GSB-101 LINEAR AMPLIFIER

GSB-101 LINEAR AMPLIFIER

If you've been reading a lot of claims about **input** these days, consider what you're really getting in down-to-earth watt-per-dollar **output.** Only **Gonset's GSB-101 Linear Amplifier gives you up to 65% efficiency!**

Built-in DC-Operated Antenna Relay • Means quiet operation. Four 811A tubes and two 866A rectifiers.

Power Input • 1000 watts P.E.P. Grounded grid principle does not waste drive power by swamping exciter. Driving power appears in output of final.

Driving Power Required • The Gonset GSB-100 easily supplies the required 60 to 70 watts. Similar 100-watt-class transmitter may be used.

Coverage • 80, 40, 20, 15 and 10 meters.

Other Features • Full bandswitching; easily loaded, flexible pi network output — matches 30-200 ohms; built-in power and bias supplies.

GSB-101 Linear Amplifier, Model 3262...439.50

COIL-LESS GONSET 3-BANDER CAN BE TUNED WITH A TAPEMEASURE!

The new Gonset 3-element full-length beams, with improved mechanical design, give you high-gain and superior performance in 10-, 15-, and 20-meter bands — without coils of any kind to blow out! Unique, multiple-sleeve concentric elements are pre-cut to correct electrical length. Tuning sleeves resonate concentric cavities to isolate element sections which act together for 20M, and electrically disconnect successive sections for 15M and 10M.

SPECIFICATIONS:

Frequency Coverage • 14-14.35 mc; 21-21.45 mc; 28-29.7 mc.
Typical Forward Gain • 10M, 8.4 db; 15M, 8.1 db; 20M, 8.2 db.
Front-to-Back Ratio • 24-28 db.
Typical VSWR • Not more than 1.4 to 1 across the phone or CW band segments at heights greater than 35 feet.
Feed • Beam is fed with single RG8/U cable.
Weight • 65 pounds.
Capacity • Beam will handle 1 KW AM, 100% Modulated.

3-Element Beam, #3220 . . . 124.50
2-Element Beam, #3219 also available at 84.50

DIVISION OF YOUNG SPRING & WIRE CORPORATION

801 South Main Street
Burbank, California

For further information, check number 12 on page 142.

SCRATCHI [*from page 14*]

like feller getting Grand Island QSL card. Finely he speeking . . . "Lets getting out of here . . . its Transistor Scratchi, the Terror of the Bad Man". As they galloping off, I gently picking up No Gun Pete, dusting him off, slapping him on back, then smiling . . . "7AA to Sheriff . . . To Bad Guys hedding south out of town."

This time close-up on Hon. Face showing what looking like lip mike on upper lip. It are reely transistorized two-way radio, which brodcasting to mane rig back on horse (getting it, Hon. Ed., mane rig on horse). Rig there being controlled by little xmitter-reseever on lip, so Relay are reely relay which relaying what saying on lip-rig to big rig which sending out more powerful signal.

Hon. Ed., paying atenshun, or you not knowing what I saying, as you having to being awake to finding out what I doing when I asleep.

Feeling powerful thirst after rescueing No Gun Pete, so sauntering into Cacktus Jooce Saloon and walking over to bar. Are just about to asking for yewshewal, when feller in black chaps, black shirt and black hat saying . . . "What's your busyness here, stranger?" I answering back . . . "None of yours, stranger."

He comes back "Well, I'm making it my busyness, stranger." I saying . . . "You keep a 'calling me stranger. Don't you know who I am?" "Nope," he says. "I'm Transistor Scratchi, the Terror of the Bad Man," I replying.

"Knowing who I am," he asking "Nope," I saying. "I'm the QRM KID," he saying. "Never heering of you," I replying. "Smile when you saying that," he coming back.

"No reason to smiling," I saying, "not wanting to run down the batteries on my xmitter."

"T'wouldn't do ya no good — ya couldn't call for help anyway," says the QRM KID. "I can smile faster than you can draw a gun," I says.

"Ain't carrying a gun," he says. I look. He isn't. I look at his face. There's a switch on his cheekbone, fixed so when he sneers the switch turns on. It connects to a small black box behind his ear.

"I think I'll QSO the Sheriff," I say. "Go ahead," he says, "won't do ya no good."

I smile. He sneers. The reseever lets out an awful noyse. "I'm being jammed," I yell. "Sure," he says, "that's why they call me the QRM KID. Next time study countermeasures." Then he hauls back and slugs me in the Hon. Stomach with his fist. I dubble up in pain.

Hon. Ed., just then I wake up with a terribul pain in my stomach. What I want to know is this. Did the dreem give me Hon. Pain in Hon. Stomach, or you thinking that the lobster alamode with dill pickles I having before going to bed are cawsing it?

Respectively yours,
Hashafisti Scratchi

new 5 BAND VERTICAL
new 2 BAND VERTICAL
AVAILABLE NOW!!

MODEL V-5 Work 10, 15, 20, 40 and 80 with one antenna . . . one RG/8U feed-line!
Designed and built to meet United States Air Force electrical and structural specifications. The V-5 is 100% rust proof and performs brilliantly on each of the 5 bands. It is capable of handling power of 1 KW *to the antenna!* Weatherproof trap assemblies are used throughout . . . no external loading coil needed.
Maximum length of antenna is 43 feet, 8 inches. Supplied complete with polyethylene guy rope, heavy duty base with internal coax fitting and all necessary hardware. For best results radials (not supplied) should consist of 12 wires, each approximately 64' in length.

Amateur Net $118.50

HEAVY DUTY BASE MOUNT supplied with Models V-5 and V-4-8.

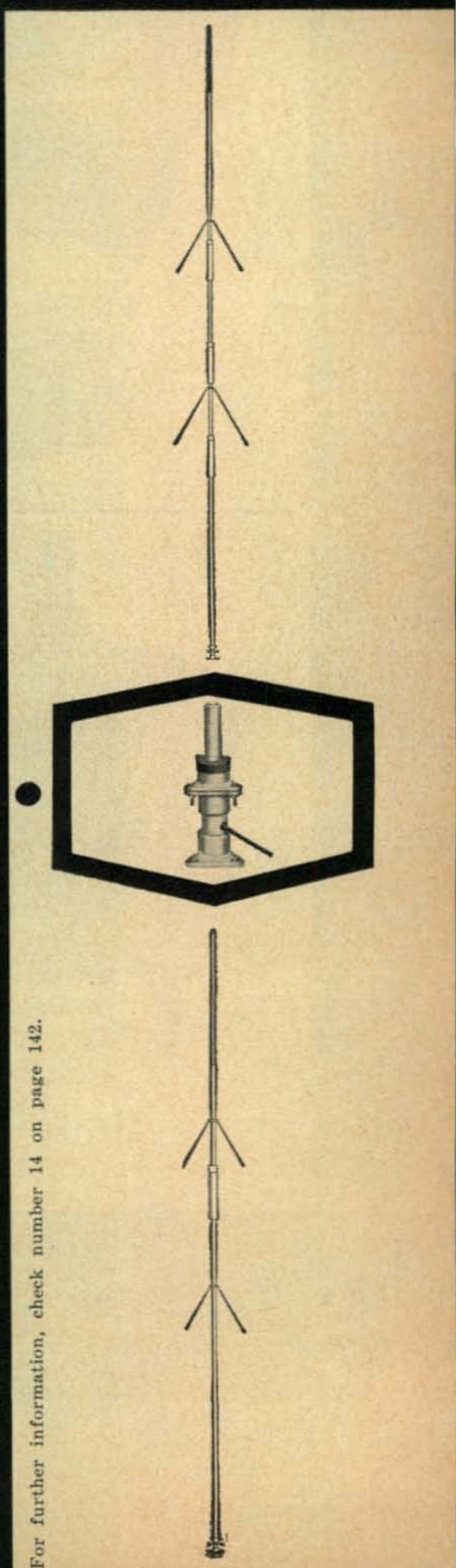
TRAP MASTER

MODEL V-4-8 For 40 and 80 meter bands. Equivalent to a separate ¼ wavelength vertical on each band. Heavy duty 100% rust proof construction. Husky oversize trap assembly handles 1 KW (AM) in the antenna. Maximum overall length of the antenna is 52 feet, 3 inches. The antenna requires 12 radials each 64 feet in length for best performance. Antenna comes complete with base mount, described above, polyethylene guy rope, hardware and detailed instructions.

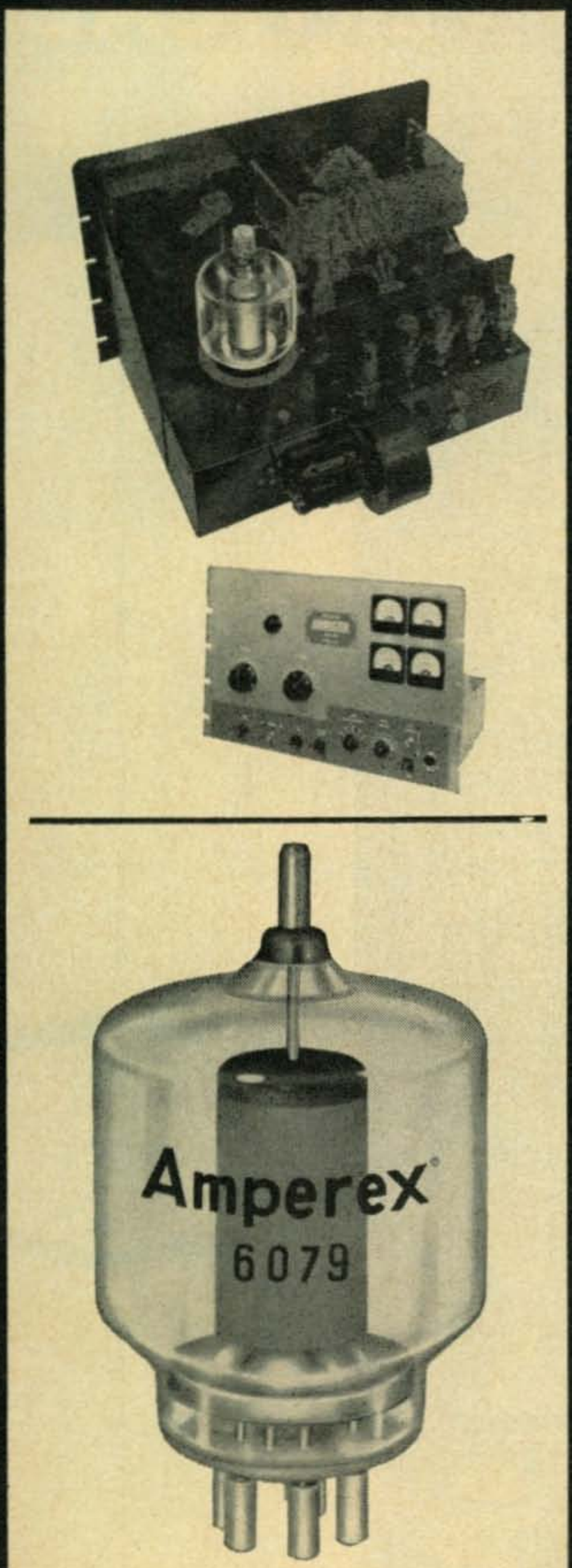
Amateur Net $85.00

Mosley Electronics Inc.

8622 St. Charles Rock Road
St. Louis 14, Mo.



For further information, check number 14 on page 142.



CIRCUIT BY

CREATIVE ELECTRONICS

Economically powered by the famous AMPEREX Type 6079 tetrode, the conservatively designed "AIR MASTER" kilowatt sideband amplifier, Model H-316 by CREATIVE ELECTRONICS is outstanding for its unremitting ability to provide continuously efficient operation in the face of extremely rugged operating conditions. Complying in full with FCC requirements, the "AIR MASTER" offers complete coverage 80 through 10 meters, requires only 15 watts driving power, and provides 1 Kw average input two-tone, 1 Kw single-tone input, 1 Kw CW input, 650 watts AM linear input, and 2 Kw peak envelope power with 3rd order distortion products at 30 db minimum—all at CCS ratings.

POWER BY

Amperex®

Ruggedly designed for efficient operation as an RF power amplifier, modulator or frequency multiplier, the AMPEREX 6079 is now available at the lowest tube replacement cost in the industry. The 6079 is conservatively rated at the maximum amateur input of 1 Kw in AM, CW and SSB classes of service; typical plate voltage in all classes of service is 3000 V.D.C. and the typical plate current is 333.3 mA; plate dissipation is 500 watts. Small wonder then, that CREATIVE ELECTRONICS selected the superb AMPEREX Type 6079 to power the all important final of their equally superb "AIR MASTER". Net price to user is $60.00.

AMPEREX ELECTRONIC CORP., 230 Duffy Avenue, Hicksville, L. I., N. Y. In Canada: Rogers Electronic Tubes & Components, 116 Vanderhoof Avenue, Toronto 17, Ont.

ask **Amperex**

about tubes for communications applications

FIRST WITH THE FINEST!

THE NATION'S FASTEST GROWING LINE OF AMATEUR RADIO EQUIPMENT!

GLOBE for MORE WATTS per DOLLAR

New Globe Champion 350

350w CW. 275w AM

450w (PEP) SSB - DSB (Suppressed Carrier)

W/T: $495

- ★ All modern design new cabinet
- ★ New filtered keying circuit virtually eliminates key clicks
- ★ Improved VFO circuitry for greater stability
- ★ Tailored for more "power punch" in the voice frequency range
- ★ Improved shielding for TVI-protection and stability, eliminating RF feedback

Revised and tested to perfection, this 10-160M bandswitching transmitter is TVI-suppressed, filtered & bypassed. Built-in VFO. High level Class B modulation with new compression circuit. Pi-Net output, 48-300 ohms. Push-to-talk, antenna changeover relay, time sequence keying. Single knob bandswitching.

Sidebander DSB-100

100w PEP DSB, Suppressed Carrier

Wired & Tested: **$139.95**
In Kit Form: **$119.95**

Double Sideband, AM, CW at Low Cost

A complete Xmttr., self-contained, bandswitching 80-10M, 100w PEP DSB Suppressed Carrier, 40w AM, 50w CW. Min. 45db carrier suppression. 3-stage RF section allows straight through operation. Automatic balancing & floating grid circuit. Speech clipping & filtering for min. band width. Accessory socket on chassis rear apron. Use barefoot or as driver for higher power Xmttr. Covers most MARS and CAP frequencies.

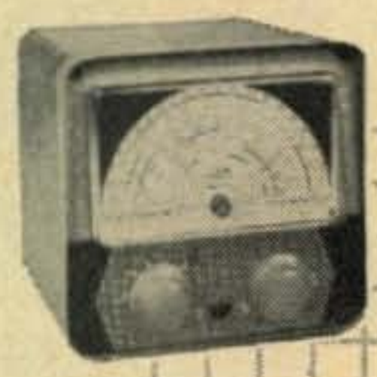
Globe Linear LA-1

Grounded Grid, Class B or C

W/T: **$124.50**
Kit: **$99.50**

For 6-80M, complete with well-filtered power supply, 200w input AM Class B, 300w DC or 420w PEP input Class B linear SSB or DSB. 300w Class C for CW. Pi-Net 80-10M: 52 ohm Pi-Link coupled on 6M. Extensively TVI-protected. Meter for monitoring final plate currents also indicates approx. RF output voltage enabling operator to tune for max. efficiency and output.

Globe VFO 755A



W/T: **$59.95**
Kit: **$49.95**

10-160M

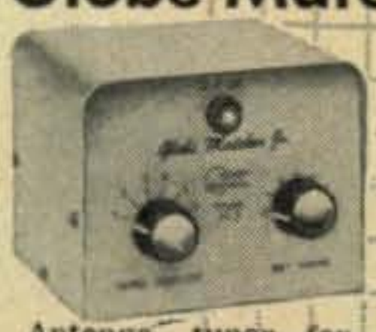
Complete with well-filtered power supply with voltage regulation. Output on 40 & 160M. Vernier drive with shock absorbing features. 13:1 tuning ratio. Approx. 50 RF volts output. Temperature compensated for utmost stability for DSB, AM, CW.

Globe Matcher Sr., AT-4

Wired: **$79.50**
Kit: **$69.50**

Antenna tuner with built-in SWR bridge for any Xmttr. with final RF input up to 600w, 80-10M. Fixed link coupling. Coax input, 2-wire balanced or unbalanced output. Built-in switch allows bypass of tuner circuits for coax input and output. Special calibrated panel meter for monitoring actual SWR. Vernier dial.

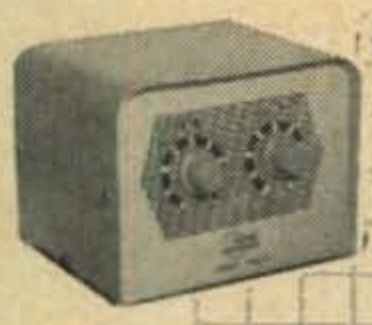
Globe Matcher Jr., AT-3



Wired: **$15.95**
Kit: **$11.95**

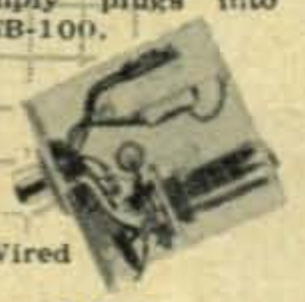
Antenna tuner for power input 100w CW, 75w fone, or less. Substantial amount of harmonic attenuation when properly tuned. Aids matching Xmttr. output to various antennas. Unbalanced output. Forward Look cabinet of steel for TVI-prevention.

Vox, Model 10



For voice operated control of the DSB-100 as well as the Champ and other similar transmitters. Extra contacts for auxiliary circuits. Simply plugs into rear of DSB-100.

QT-10



An anti-trip accessory for the VOX, Model 10.

VOX, Wired & Tested: **$24.95**
Kit: **$19.95** QT-10: **$9.95** Wired

Globe Scout 680A

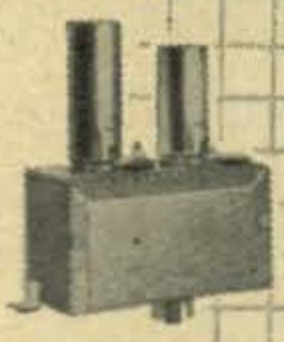
for 6-80 Meters

Wired: **$119.95**
Kit Form: **$99.95**

Plate Modulated — 65w CW, 50w AM

Completely bandwitching, self-contained, with built-in power supply. High level modulation maintained. TVI-shielded cabinet. Pi-Net output on 10-80M, Link-coupled on 6M, matching into low impedance beams. New type, wide view shielded meter. Kit contains all parts, tubes, pre-punched chassis and complete manual.

Power Booster PB-1



Wired: **$21.95**
Kit Form: **$14.95**

For straight through operation on 6M (Scout 680A or 680 only; plugs internally into Globe Scout). Approx. 50% more power output, while attenuating harmonics and further suppressing TVI.

Globe Patcher

Wired & Tested: **$29.95**

Mounts anywhere, easy to install & operate: switchable selection of 500-8 or 3.2 ohm speaker terminal. Nothing else to buy. Operates VOX on SSB or push-to-talk on AM due to hybrid system. Separate gain controls for receiver and Xmttr. Completely shielded and bypassed. May be used with all popular Amateur Equipment.

Visit Your Favorite Distributor for Details!

OTHER TOP FLIGHT GLOBE PRODUCTS

Globe King, wired **$795.00**; Globe Chief, w/t: **$74.50**, kit: **$59.95**; Hi-Bander, w/t: **$149.95**, kit: **$129.95**; VFO 6-2, w/t: **$59.95**, kit: **$49.95**; Power Attenuator, w/t: **$10.95**; Plate Modulator UM-1, w/t: **$49.95**, kit: **$32.50** (less tubes); Screen Modulator Kit, **$11.95**; 6-Meter Converter 6PMC, w/t: **$29.95**, kit: **$21.95**; Speech Booster, w/t: **$24.95**, kit: **$15.95**.

GLOBE electronics
3417 W. BROADWAY
COUNCIL BLUFFS, IOWA

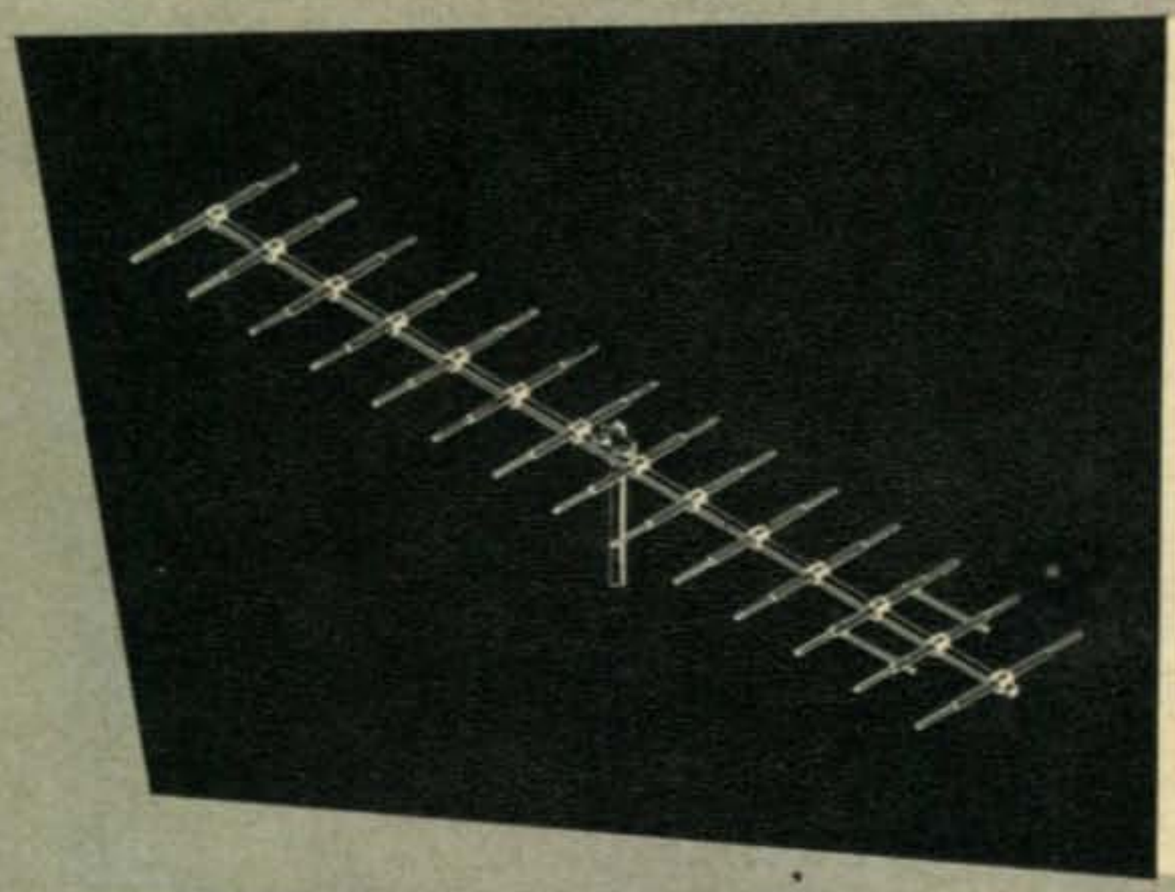
For further information, check number 16 on page 142.

◀ For further information, check number 15 on page 142.

NEW by Mosley

STRENGTH AND *PERFORMANCE !!*

Here are *NEW CONCEPTS* in VHF antenna design. Advanced Mosley POWERMASTER VHF antennas are ruggedly built to withstand the fury of gale winds and the relentless weight of snow or ice!

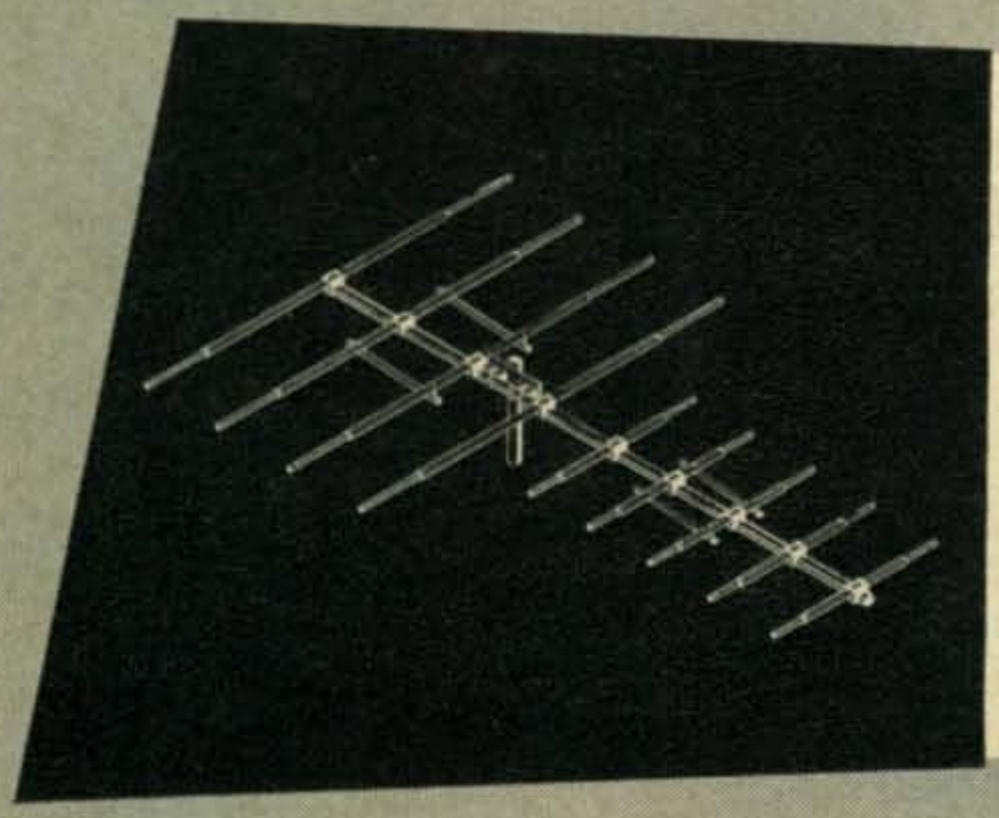


Model A-142
14 element, two meter beam.
Fwd. gain 13db. F/B 20db.
SWR 1.1 res. frequency

$48.75 net

Model SK-2
Stacking kit for A-142

$23.75 net



Model A-2N6
5 element, two meter, plus 4 element, six meter beam.

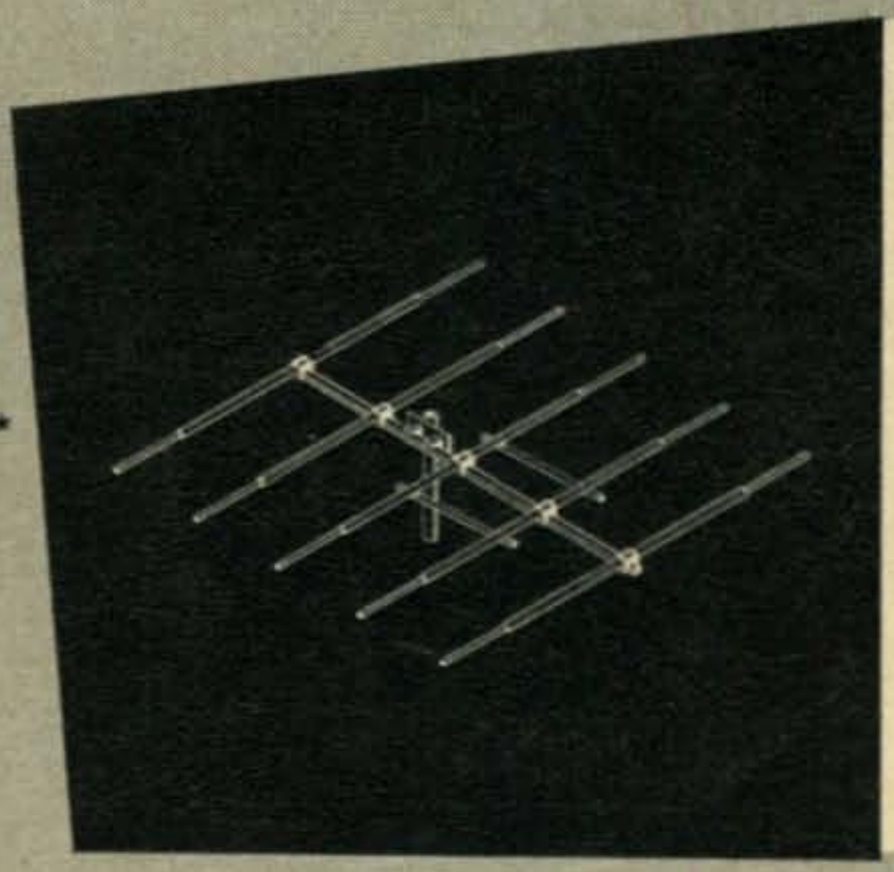
	2 meter	6 meter
Fwd. gain	11.4db	9.6db
F/B	11.5db	16.3db
SWR	1.1	1.1 res. freq.

$67.05 net

100%
RUST PROOF

100%
CORROSION PROOF*

5 YEAR
GUARANTEE



Model A-56
5 element, six meter beam.
Fwd. gain 11db. F/B 20db.
SWR 1.1 res. frequency

$41.95 net

Model SK-6
Stacking kit for A-56

$32.75 net

For further information, check number 12 on page 126.

If you are a "dyed-in-the-wool" VHF Ham, you'll want the antenna that stays on the job.....regardless of weather!
Mosley POWERMASTER VHF antennas.....

For further information, check number 17 on page 142.

*When Mosley Antenna Coat, supplied, is used as directed.

Mosley Electronics Inc.

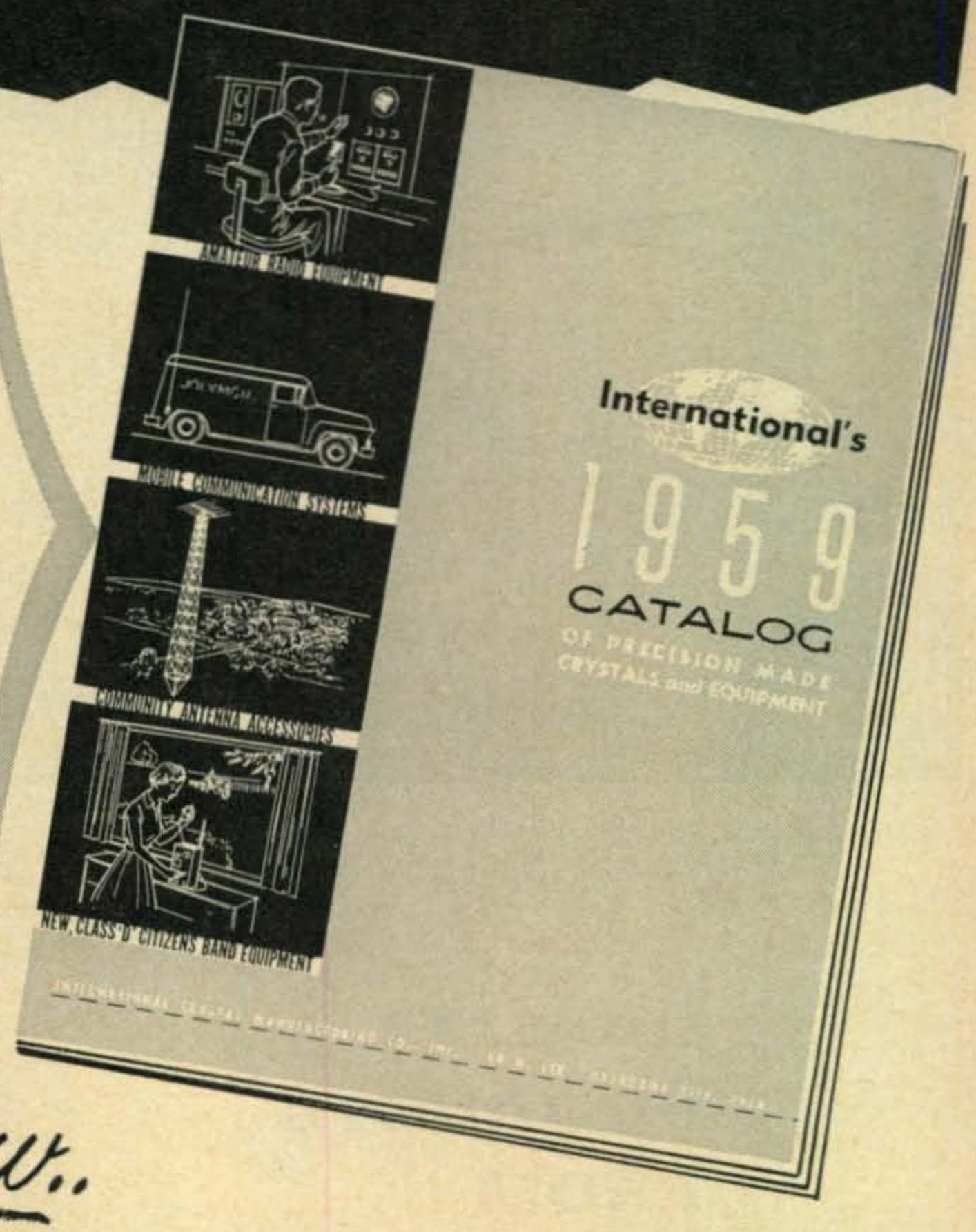
8622 St. Charles Rock Road • St. Louis 14, Mo.

Send for your FREE COPY

INTERNATIONAL'S

1959 CATALOG!

- AMATEUR and COMMERCIAL CRYSTALS
- PRINTED CIRCUIT COMPONENTS
- COMMUNITY ANTENNA ACCESSORIES
- TECHNICAL DATA



and the New..

CITIZENS BAND TRANSCEIVER

INTERNATIONAL
Crystal Manufacturing Company, Inc.

18 NORTH LEE
OKLAHOMA CITY, OKLAHOMA

Gentlemen:

Please send me my free copy of International's 1959 catalog.

NAME _____

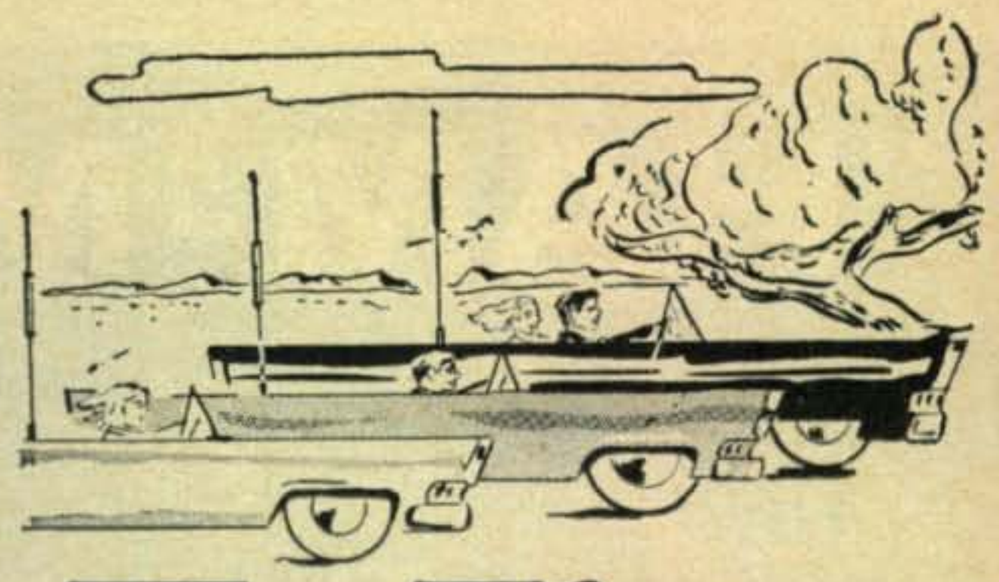
ADDRESS _____

CITY _____ STATE _____

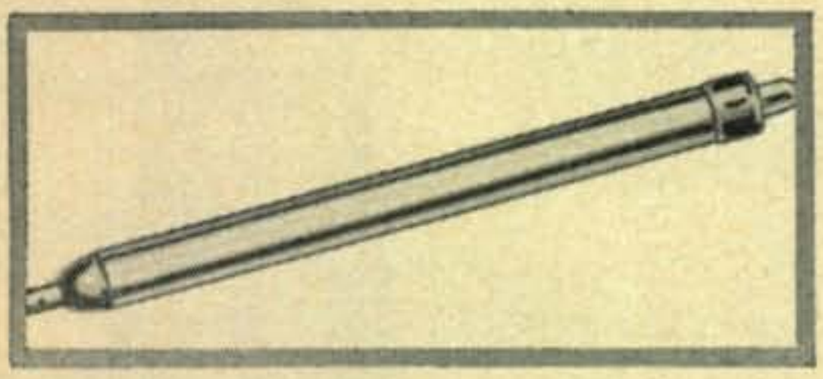
C-259

For further information, check number 19 on page 142.

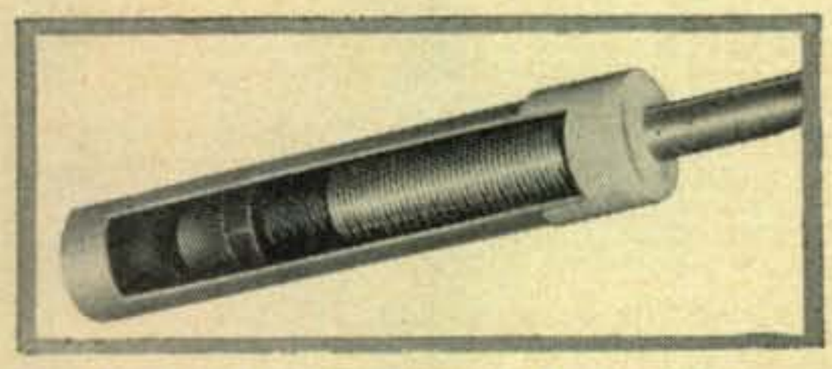
MOBILEERS . . .
facts and features prove your best buy is-



TRAP-MOBILE by Mosley



FEATURE: Trap is completely weather-proof . . . sealed against dirt, rain and snow!



FEATURE: Exclusive MOSLEY trap design assures stable operation. Inductive and capacitive values cannot change!

FEATURE: Base coil potted in high impact polystyrene. Unaffected by weather – road shock!

Overall Height Only 7' 8"

3/8" – 24 Threads

See "Trap-Mobile" at your nearest Ham dealer.

FACT: 3-Band Operating Convenience!

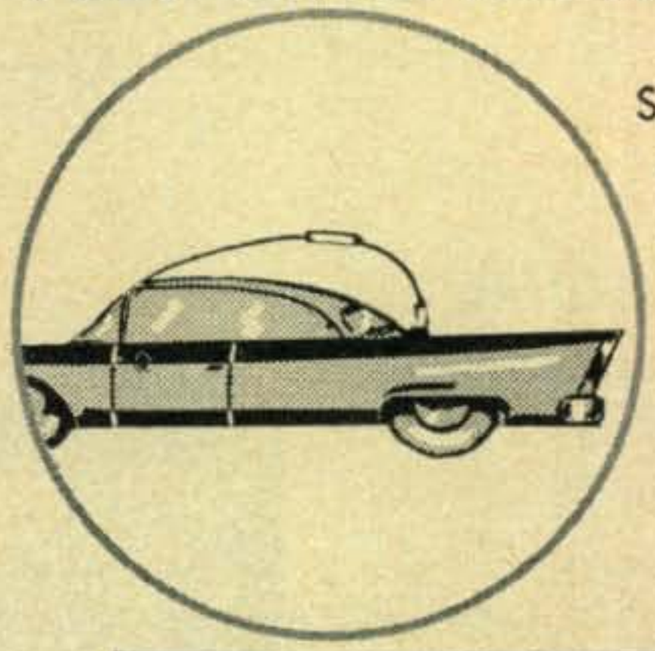
Real operating convenience is as close as your transmitter and receiver...*because thats where you change bands – for 10, 15 or 20 meters!*

"Trap-Mobile" never requires adjustment... functions without *switches, sliding contacts or other mechanical devices!*

FACT: Exclusive Trap Design!

"Slim profile" design cuts wind resistance... minimizes antenna occilation...maintains signal stability *while in motion!*

FACT: Will Not Take Set Or Warp!



Stainless steel whip sections (250,000 PSI) permit antenna to lay forward over car for "garaging".

GUARANTEED!
Will Not Take Set!
Will Not Warp!

May be used with any 40–80 meter base loading coil!

$19.95
Model MA-3

Mosley Electronics, Inc.

WEST COAST BRANCH
1406-08 South Grand Avenue
Los Angeles 15, California

EXPORT DEPARTMENT
15 Moore Street
New York 4, New York

MAIN OFFICE AND PLANT
8622 St. Charles Rock Road
St. Louis 14, Missouri

For further information, check number 20 on page 142.

"HAM-M" ROTOR by CDR

Thousands in use

COMPLETE PACKAGED SYSTEM.

Nothing else to buy. Can be installed atop *any* tower, and inside most towers.

EXTREMELY RUGGED.

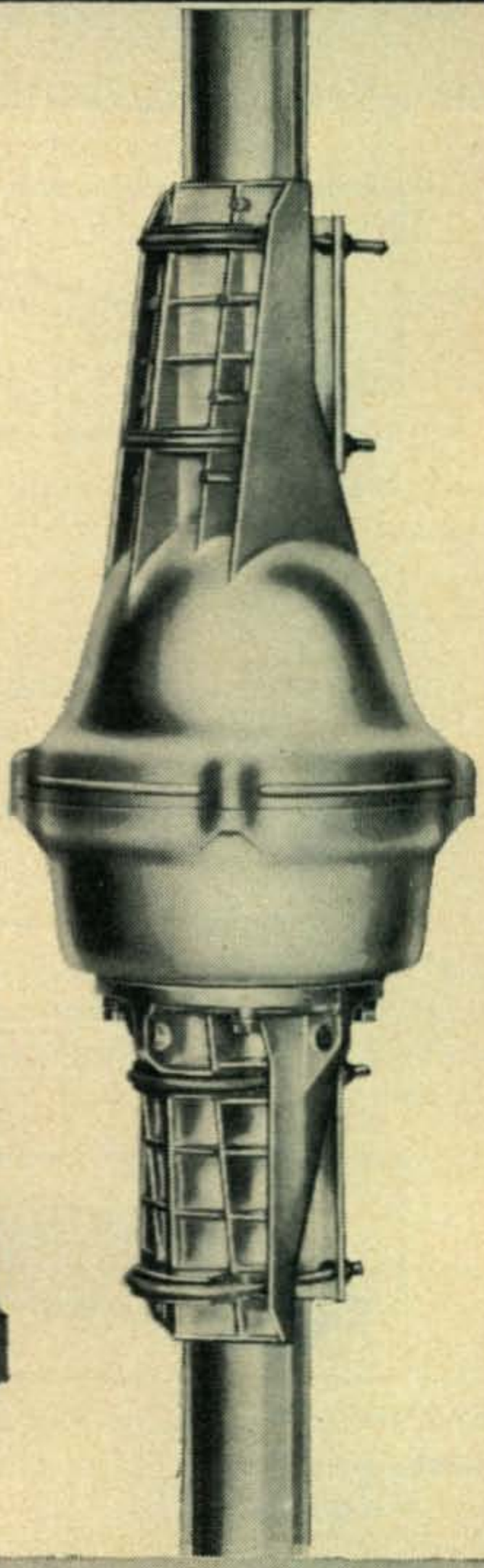
Extra heavy-duty. Thousands of "Ham-M" rotors are now in operation in every kind of climate, rotating every conceivable antenna combination. "Ham-M" is wind-proof, ice-proof, moisture-proof! Won't drift. Provides 3500 in.-lb. resistance to lateral thrust.

FIELD KITS FOR EASY INSTALLATION.

North-Center Meter Scale kit. Base plate for internal tower mounts. Anti-meter flutter kit. Mounts on shaft or flat on plate in 30 minutes.

WHY PAY MORE?

"Ham-M" is the pet of hams from coast to coast—and for good reasons! "Ham-M" gives better performance...holds heaviest antennas...stands up against the elements far better than other rotors, yet COSTS LESS! See "Ham-M" at your distributors: only $119.50



EXCLUSIVE OFFER: CDR "CALL-LETTERS" JEWELRY FREE! Handsome rhodium-finish tie-bar and key chain, both with your call-letters engraved FREE with your purchase of the "HAM-M." Both bear amateur radio emblem. Just *examine* the "HAM-M" and get both for only $3.60 (tax included), a $7.20 value for half price. See your CDR distributor for details.

CDR

HAM ANTENNA ROTOR

Cornell-Dubilier Electric Corp., South Plainfield, N. J.

The Radiart Corporation, Indianapolis, Ind.

For further information, check number 21 on page 142.

For further information, check number 22 on page 142.

HEAVY DUTY

MOBILE BASE MOUNTS

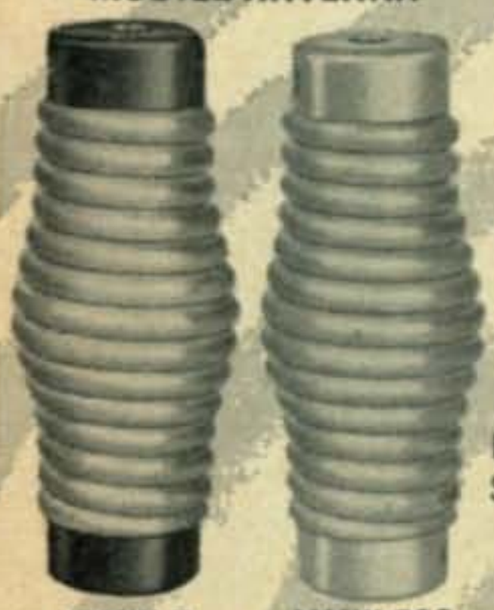
NEW!

MMW-3AE

MMW-3APS

Ebony Finish $6.95 Polished Finish $7.95
Ebony Finish, S. S. Hardware $8.95
Polished Finish. S. S. Hardware..... $9.25

PROTECTS YOUR MOBILE ANTENNA



MMW-7 MMW-7SS

NEW HEAVY DUTY

MOBILE SPRINGS

MMW-7 Cad. plated, black painted ends **$4.50**

MMW-7HC Heavy Cad. plated–Ex Protection **$5.50**

MMW-7SS Deluxe Stain. Steel.. **$8.95**

NEW MULTI-BAND ANTENNA COILS

New *Plug-In* type coils for the Ham, designed to operate with a standard 3′ base section and standard 5′ whip

No. 900 10-15-20-40-75 METERS

- Rigidly tested & engineered—found to have "Q" of 525
- Handles 500 Watts input
- Operates into a 52-ohm cable
- Positive contact—noisefree, troublefree operation
- Weathersealed
- Factory pre-tuned—no adjustments needed

No. 999 10-15-20 METERS

YOUR CHOICE **$14.95**

NEW! SLIM-JIM ALL-BAND BASE LOADING ANTENNA COIL

96" WHIP

FOR 10, 11, 12, 15, 20, 40, 80 METERS

SIZE 1⅜" x 19"

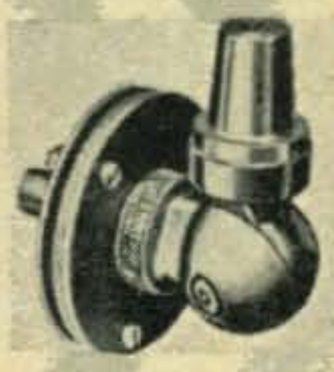
NO. B-1080

Positive action, just slide whip in or out to loading point and lock nut into position.

$17.95

Leaders in the Design and Manufacturing of Mobile Communication Equipment & Antennas

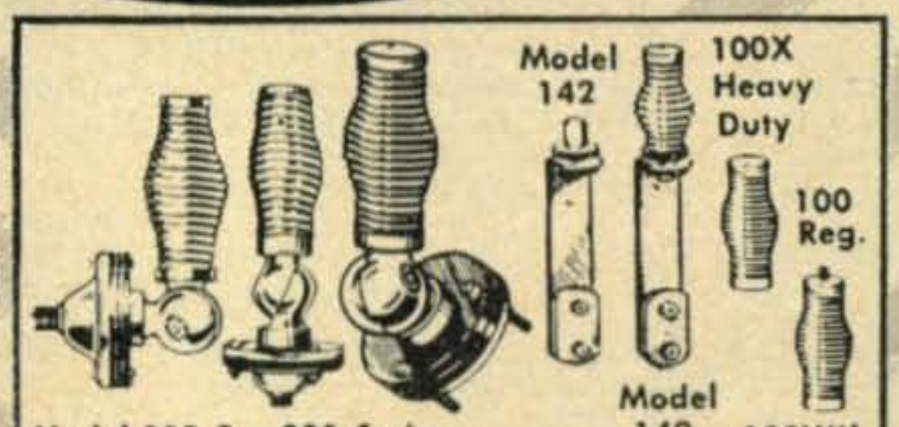
No. 321 BODY MOUNT $7.95



Automatically tunes the entire band from the drivers seat!

MASTER MATCHER & FIELD STRENGTH METER

6 or 12 volt models **$24.95**



Model 232-C 232 Series

Model 140 100WX

Model 142 100X Heavy Duty 100 Reg.

MASTER-MAGIC WAND

New easy-to-install, single band, top-loaded plastic covered fiber glass mobile antenna provides maximum performance at the most useful radiation frequencies.

10 Met–5 Ft. L. $12.95
15 Met-5 Ft. L. 12.95
20 Met-5 Ft. L. 12.95
40 Met-6 Ft. L. 14.95
80 Met-6 Ft. L. 14.95

NEW CITIZENS BAND
27.255 mc . . . $12.95

SUPER HY-GAIN CITIZEN BAND

Citizen band mobile stacked coaxial antenna provides 5 to 6 DB gain. 42" high from ground plane. Furn. with 12" extension for bumper mount. **$21.95**

FIBRE-GLAS WHIPS

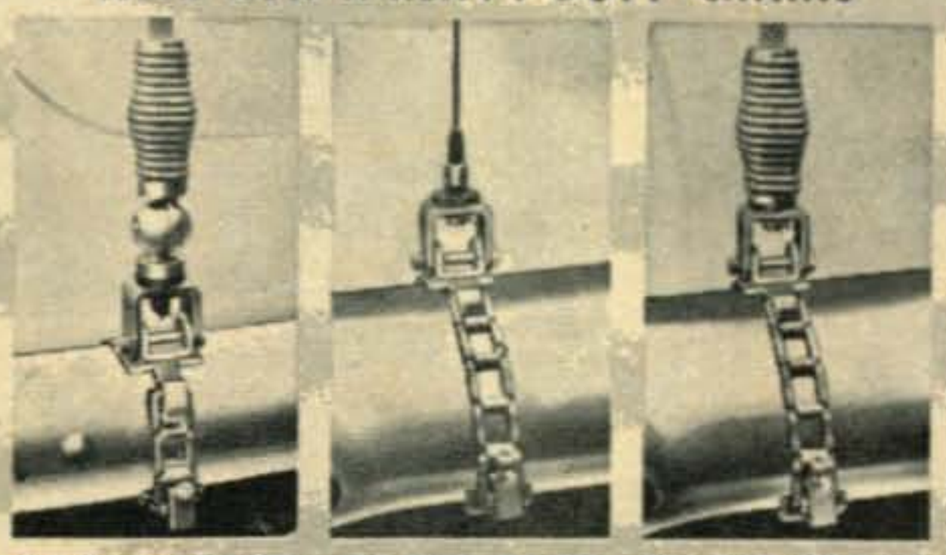
The Feather-Weight Antenna with Spring-Steel Strength!

The completely weatherproof, breakproof antenna with special flexibility that prevents accidental shorting-out against overhead obstructions which sometimes cause loss of signal or serious damage to your equipment.

FG-60 60" . . $4.95
FG-72 72" . . $4.95
FG-84 84" . . $5.15
FG-96 96" . . $5.20

BUMPER MOUNTS

WITH NEW X-HEAVY DUTY CHAINS



No.444 $17.80 No.445 $7.95 No.446 $13.45

Adjustable to any bumper. No holes to drill, easy to attach. High-polished Chrome Plated ⅜"-24 thread, to fit all antennas. Precision engineered.

EMERGENCY • COMMERCIAL • AMATEURS

EIA ELECTRONIC INDUSTRIES ASSOCIATION EST 1924

Master Mobile Mounts, Inc.

1306 BOND STREET • LOS ANGELES 15, CALIF.

AT LEADING RADIO JOBBERS EVERYWHERE

For further information, check number 23 on page 142.

NOW IN FULL PRODUCTION!

THE REVOLUTIONARY NEW CENTRAL ELECTRONICS 100V EXCITER-TRANSMITTER

BROADBANDED! ONLY ONE TUNING CONTROL, THE VFO ITSELF.

CENTRAL ELECTRONICS, THE PIONEER OF AMATEUR SSB IS PROUD TO BRING YOU THE FINAL RESULT OF THREE YEARS OF THE KIND OF PATIENT ENGINEERING, TESTING AND IMPROVING THAT MAKES FOR A SUPERIOR PIECE OF ELECTRONIC GEAR.

MANY OF THE TRIED AND TRUE PRINCIPLES AND FEATURES OF THE ORIGINAL MULTIPHASE EXCITERS HAVE BEEN RETAINED IN THE NEW 100V, ALTHOUGH IN VASTLY IMPROVED FORM. THE USE OF PATENTED BROADBAND CIRCUITRY THROUGHOUT PRACTICALLY ELIMINATES "COCK-PIT" TROUBLE.

REGARDLESS OF YOUR PREFERRED MODE OF OPERATION, IT'S ALL IN THE 100V. SSB, DSB, AM, PM, CW and FSK . . . AND ALL AT THE FLIP OF ONE SWITCH. ALTHOUGH THE 100V WILL PROBABLY FIND IT'S GREATEST USE AS A SINGLE SIDEBAND SUPPRESSED CARRIER EXCITER-TRANSMITTER . . . NO ONE HAS BEEN "LEFT OUT IN THE COLD" IN IT'S DESIGN. THIS IS THE KIND OF A RIG THAT HAMS DREAM ABOUT!

CHECK AND COMPARE THESE FEATURES

STABILITY: The new patented two tube permeability tuned VFO circuit is exceedingly stable and is immune to the effects of line voltage fluctuations and tube ageing. Built like a battle ship, it is tuned by a husky precision lead screw assembly running in ball bearings. This is a VFO to end all VFO's.

FREQUENCY COVERAGE: 80 METERS — 3.5 to 4.5 Mc. 40 METERS — 6.5 to 7.5 Mc. 20 METERS — 13.5 to 14.5 Mc. 15 METERS — 20.5 to 21.5 Mc. 10 METERS — 27.7 to 29.7 Mc. A spare X position provides for the installation of broad-band coils for 160 meters, MARS, etc. OR any 1 Mc. portion of the spectrum between 1.5 Mc. and 25.5 Mc. OR any 2 Mc. portion of the spectrum between 25.5 Mc. and 29.7 Mc. YOU DON'T SETTLE FOR HALF A LOAF OF FREQUENCY COVERAGE WHEN YOU HAVE A 100V!

THE TUNING DIAL: Band scales in the large slide rule window change with the band switch and are calibrated at each 100 KC point. Frequency is read directly in 1 KC increments by the circular KC dial without any computation whatever. Approx. 12 feet of bandspread on each band. A smooth running two-speed tuning knob allows fast tuning at 100 KC per turn and slow tuning at 750 CYCLES per turn. Calibration accuracy is 250 cycles between any two 50 KC points.

METERING: Reads POWER INPUT (0-200 watts) RF AMPS OUTPUT, AC LINE VOLTAGE and CARRIER SUPPRESSION IN DB DOWN TO 70 DB.

MONITORING: A 2" scope provides an instantaneous visual check on non-linearity resulting from improper loading. Also indicates proper setting of carrier injection for 100% AM modulation. Scope presents trapezoid pattern.

OTHER INDICATORS: Below the meter a neon indicator provides a check on the operation of the NEW AUDIO LIMITER CIRCUIT. Below the scope a second neon indicator starts operating if you have the antenna or load mis-matched.

NEW AUDIO FILTER-LIMITER: The new filter is composed entirely of R-C components, yet has the steep side response and rejection characteristics of a four toroid tuned filter but without the usual harsh, ringing effects. Bandpass is 200 to 3700 cycles. This filter precedes the phase shift system and will maintain 50 DB SUPPRESSION OF THE UNWANTED SIDEBAND. The new audio limiter maintains audio drive to the balanced modulator WITHIN 1 DB, REGARDLESS OF HOW HARD THE MIKE IS HIT. IT'S IMPOSSIBLE TO OVERDRIVE THE 100V BALANCED MODULATOR! Inverse feedback circuits allow 10 DB OF CLIPPING with negligible distortion.

NEW PS-2 AUDIO PHASE SHIFT NETWORK: A twelve cross-over point network is composed of heat-cycled components having .1% accuracy. Even changing the balanced modulator tubes has no effect on it's maintaining 50 DB OR BETTER suppression!

POWER OUTPUT: The husky, ultra-linear type 6550 tubes in the final of the 100V will deliver 100 WATTS OF SINGLE TONE POWER, EVEN ON TEN METERS! AND WITHOUT GRID CURRENT FLOW. Two tone third order distortion products are down in excess of 40 DB. A new POWER OUTPUT CONTROL eliminates the need for power dividers when driving AB1 or AB2 linears, since power output is continuously variable from 10 watts to full output.

SET AND FORGET CONTROLS: These seldom used controls are all located behind the flip down magnetic doors on the front.

GENERAL CIRCUITRY: Crystal controlled master SSB generation is at 8 MC. VFO injection is 5 to 6 MC. Crystal controlled heterodyne oscillators operate into mixer stages for various bands. This system, originally developed by C. E. is today the standard of the industry. Blocked grid keying of mixers and final amplifier provides perfect CW and PHONE BREAK-IN.

PHYSICAL DATA: Panel is standard 19" width by 8¾" high. Finish is smooth grey. Attractive heavy duty rounded corner cabinet is 15" deep, is finished in grey wrinkle and has a latch type access lid. Shipping weight approx. 90 lbs.

MULTIPHASE 100V complete..... Amateur net.....$595.00

Easily removed from the cabinet for rack mounting.

COMING UP! MORE SUPERIOR GEAR FROM C. E. THE SSB PIONEER

A NEW COMPANION RECEIVER: Which will TRANSCEIVE THE 100V or separate the two VFO's at the flip of a switch. The 100V has the interlock control sockets built in.

A NEW 2500L BROADBAND LINEAR AMPLIFIER. Big brother to the famous 600L.

A NEW HETERODYNE CONVERTER: To cover all of the 2 and 6 meter bands with the 100V. Interlock control sockets are in the 100V.

For further information, check number 24 on page 142.

MULTIPHASE EQUIPMENT

Central Electronics, Inc.

1247 W. Belmont Ave. Chicago 13, Illinois

A subsidiary of Zenith Radio Corp.

WRITE FOR LITERATURE ON THE COMPLETE MULTIPHASE LINE

CONTEST OPERATOR . . . OR "RAG-CHEWER" . . . THEY'LL ALL TELL YOU

Viking transmitters

Yes, dollar-for-dollar and feature-for-feature you'll get more of everything in a Viking transmitter . . . that's why Viking transmitters outsell all others! Write for your free Viking Amateur Catalog and you'll soon see why your best transmitter buy is a Viking!

NEW!

Crystal-controlled— instant bandswitching 6 and 2 meters — available in 4 output ranges!

"6N2" CONVERTER

Maximum Sensitivity! Low Noise Figure! Excellent Image and IF Rejection!

Compact . . . complete with self-contained power supply, this new Viking "6N2" Converter is instant bandswitching . . . converts 6 and 2 meter signals to your choice of 4 receiver ranges! (Data sheet No. 711 lists ranges and complete receiver cross-reference guide.) Utilizes the new 6ES8 dual triode with "frame grid" construction in a Cascode RF amplifier circuit . . . tube transconductance, 12,500 micro-mhos per section. High frequency overtone crystals in series mode operation produce outstanding oscillator stability—eliminating the multiplicity of sum and difference frequencies. Advanced IF amplifier design with a grounded cathode stage and a low plate resistance value insures stable operation and an effective impedance match to 50 or 75 ohm output coaxial cable. Silver-plated chassis and three silver-plated interstage shields. Available completely wired and tested or as an easy-to-assemble kit.

WRITE FOR DATA SHEET 711 — LISTING FREQUENCY RANGES AND RECEIVER CROSS-REFERENCE CHART.

Catalog Number	Range	Amateur Net
250-43-1 . . Kit	26 to 30 mcs.	$59.95
250-43-2 . . Kit	28 to 30 mcs.	$59.95
250-43-3 . . Kit	14 to 18 mcs.	$59.95
250-43-4 . . Kit	30.5 to 34.5 mcs.	$59.95
250-43-12 . . Wired	26 to 30 mcs.	$89.95
250-43-22 . . Wired	28 to 30 mcs.	$89.95
250-43-32 . . Wired	14 to 18 mcs.	$89.95
250-43-42 . . Wired	30.5 to 34.5 mcs.	$89.95

Watch for more exciting new Johnson 6 and 2 meter equipment

E. F. JOHNSON COMPANY

2905 SECOND AVENUE S.W.

outsell all others!

"KILOWATT" AMPLIFIER

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An outstanding power bargain when used as a transmitter or exciter! 90 watts SSB P.E.P. and CW input . . . 35 watts AM. Highly stable built-in VFO. Instant bandswitching 80, 40, 20, 15 and 10 meters. VOX and anti-trip circuits. Wide range pi-network output. Effectively TVI suppressed. With tubes and crystals.

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Cat. No.		Amateur Net
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More than one-half kilowatt of power and operating convenience! 600 watts CW input . . . 500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)—instant bandswitching 80 through 10 meters! All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Highly stable, built-in VFO or crystal control. Wide range pi-network output. Low level audio clipping—effectively TVI suppressed. With tubes, less crystals.

Cat. No.		Amateur Net
240-500-1	Kit	$749.50
240-500-2	Wired	$949.50

For further information, check number 25 on page 142.

A Transistorized Communications Receiver

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Massillon, Ohio

The author has long suffered from a suppressed desire to build a good communication receiver for the amateur bands. This desire was fed by the prospect of incorporating attractive circuits and features found in various commercial products, together with the satisfaction that would accrue from such a project.

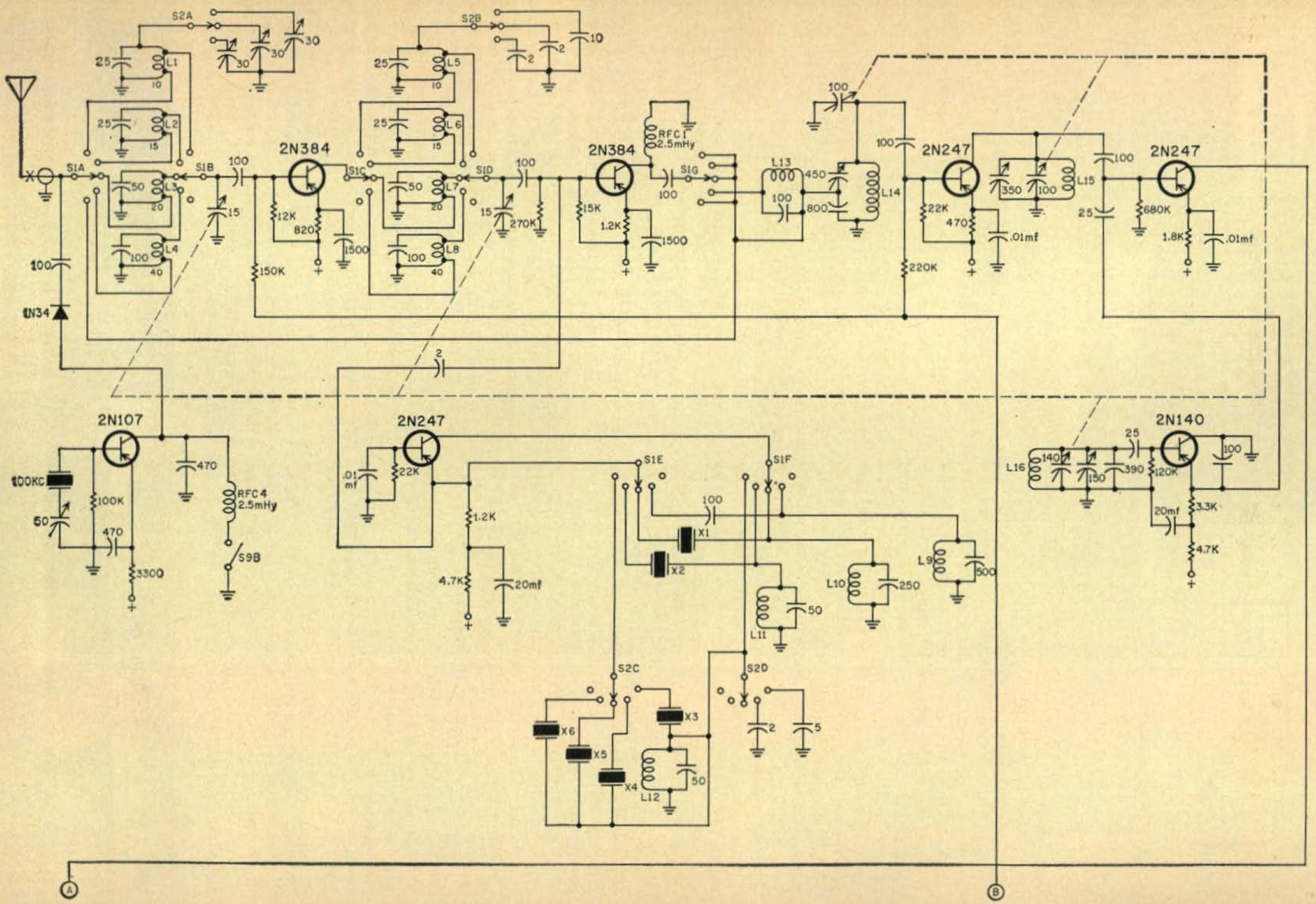
This desire was frustrated by the difficulties surrounding the design and contruction of a truly satisfactory receiver. Let's look at a few: A smooth-operating dial with direct-reading calibration on all bands, a tuning rate on all bands suitable for tuning SSB without strain, stability suitable for SSB without drift on all bands, and an *if* system with variable selectivity to accommodate the various modes of transmission now being used. Of these, the lack of a suitable dial mechanism was considered the most serious.

A recent series of experiments with transistors led to an interesting conclusion. It appeared that, providing the above design difficulties could be conquered, it would be just as feasible to build a good communication receiver using transistors as it would using tubes, with a bonus of saving weight, space, power, and HEAT. The pressure was on!!

The solution to the dial problem came with the selection of a National PW Dial drive which reads 0-500 directly with 180 degree rotation of the capacitor shaft. This dial was used to drive the tuning mechanism, with the oscillator set to cover 3955-4455 *kc* in a linear manner. Thus, in converting to an *if* of 455 *kc*, direct calibration of the 3500-4000 *kc* amateur band was obtained by adding 3500 to the dial reading. This basic range was then used as a tunable *if* amplifier to tune built-in converters for the higher-frequency amateur bands. The 7 *mc* converter uses an LC oscillator, since stability is no problem at 3400 *kc*. The higher frequency oscillators are all crystal controlled with the 28 *mc* band being covered in four ranges; 28.0-28.5, 28.5-29.0 etc. Notice how simply we have been able to solve the most vexing problem! We have a good dial, direct calibration by adding the *mc* prefix for each band, the same tuning rate on all bands, frequency directly readable to 1 *kc*, stability is referenced to the tuned oscillator on all bands, and of the major problems, only the *if* selectivity remains to be solved. The flexible 50 *kc if* system used by Hallicrafters was decided upon for selectivity because of its versatility and relative simplicity. Figure 1 shows a block diagram of how it all turned out.

The RF Converter Section

Now that the broad outlines have been sketched out, it might be interesting to examine the receiver step-by-step, to see how the various functions were accomplished, and incidentally, to see how gracefully (or otherwise) transistors fitted into the circuit. Referring to



2N384
2N384
2N247
2N247
2N107
2N247
2N140
S1A
S1B
S1C
S1D
S1E
S1F
S1G
S2A
S2B
S2C
S2D
S9B
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
L13
L14
L15
L16
RFC1 2.5mHy
RFC4 2.5mHy
1N34
100KC
X1
X2
X3
X4
X5
X6
12K
820
1500
150K
15K
1.2K
270K
22K
470
.01mf
220K
680K
1.8K
120K
3.3K
4.7K
20mf
100K
3300
A
B

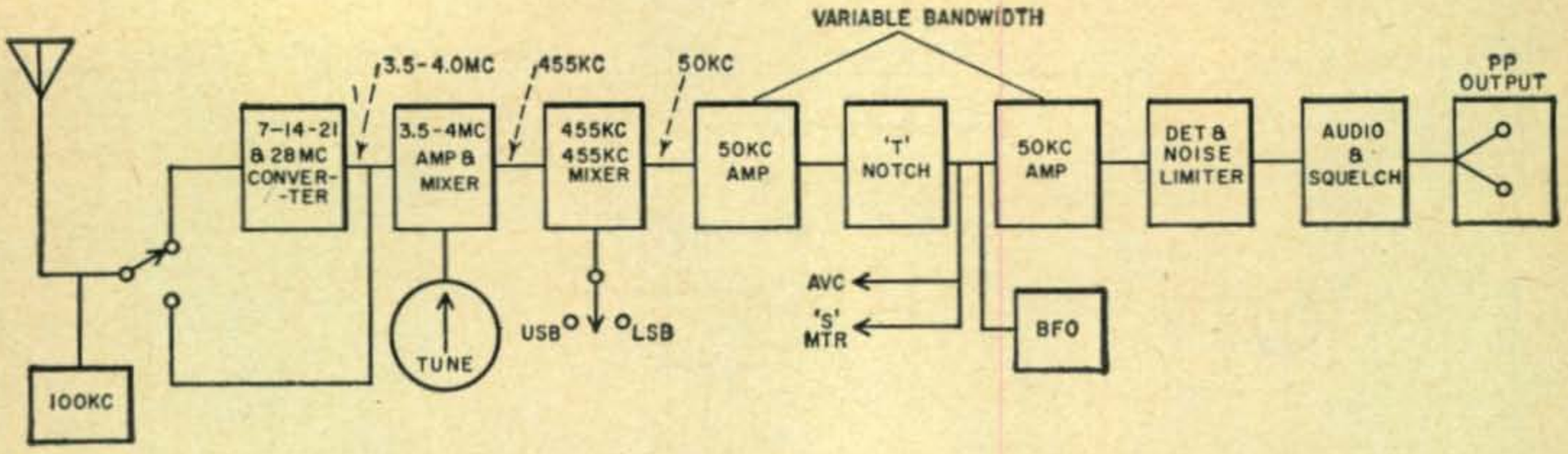


Fig. 1—Simplified block diagram of the receiver.

the schematic, the antenna comes in at low impedance to the arm of S1a which applies it to a tap on the selected converter coil, or directly to the 3.5 *mc if* strip. Following a signal through on 28 mc, the tuned circuit provides selectivity, and is tapped to match the base of the 2N384 *rf* amplifier. The output of the 2N384 is applied to the 28.0 mc mixer coil through the arm of S1c to the base of the 2N384 mixer. Band selector switch section S1e has transferred the selection of the oscillator crystal over to switch S2, which selects the portion of the 28.0 *mc* band it is desired to tune. Section S2c of this switch selects the desired crystal, while the other sections pad the antenna, mixer, and oscillator coils to compensate for the rather wide range of frequencies covered by this band. The end result of this is that oscillator signal of the proper frequency is injected into the base of the mixer to convert to the 3.5-4.0 *mc* range.

On 7, 14, and 21 *mc*, S2 is not used as the bandswitch selects the proper oscillator components directly. A dual section capacitor is driven from one side of the dial to tune the antenna and mixer coils across the frequency range involved. This eliminates the necessity for broad-banding the front end and improves gain and image rejection.

Tunable IF Section

The signal leaving the mixer will be in the 3.5-4.0 *mc* range, and is handled in the same way as a signal on that band. The output of the mixer, or the antenna, depending on the band in use, is applied to the tuned input circuit of the 2N247 amplifier. The amplified signal is applied to the mixer tuned circuit through a capacitor to the base of the 2N247 mixer. Injection of the tuned oscillator is to the base through a 25 mmf capacitor. Both the 3.5 mc amplifier and mixer input circuits are tuned across the 3.5-4.0 mc range by a ganged capacitor driven off the oscillator tuning capacitor.

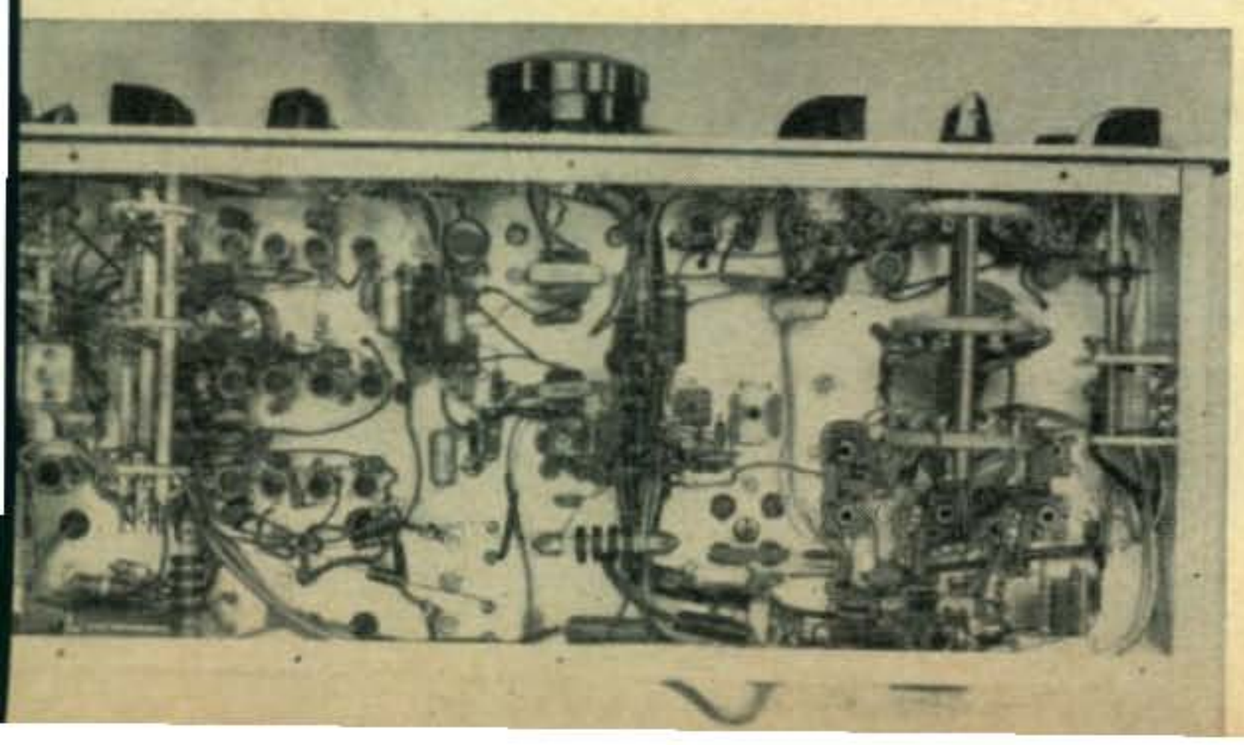
455 kc Mixer

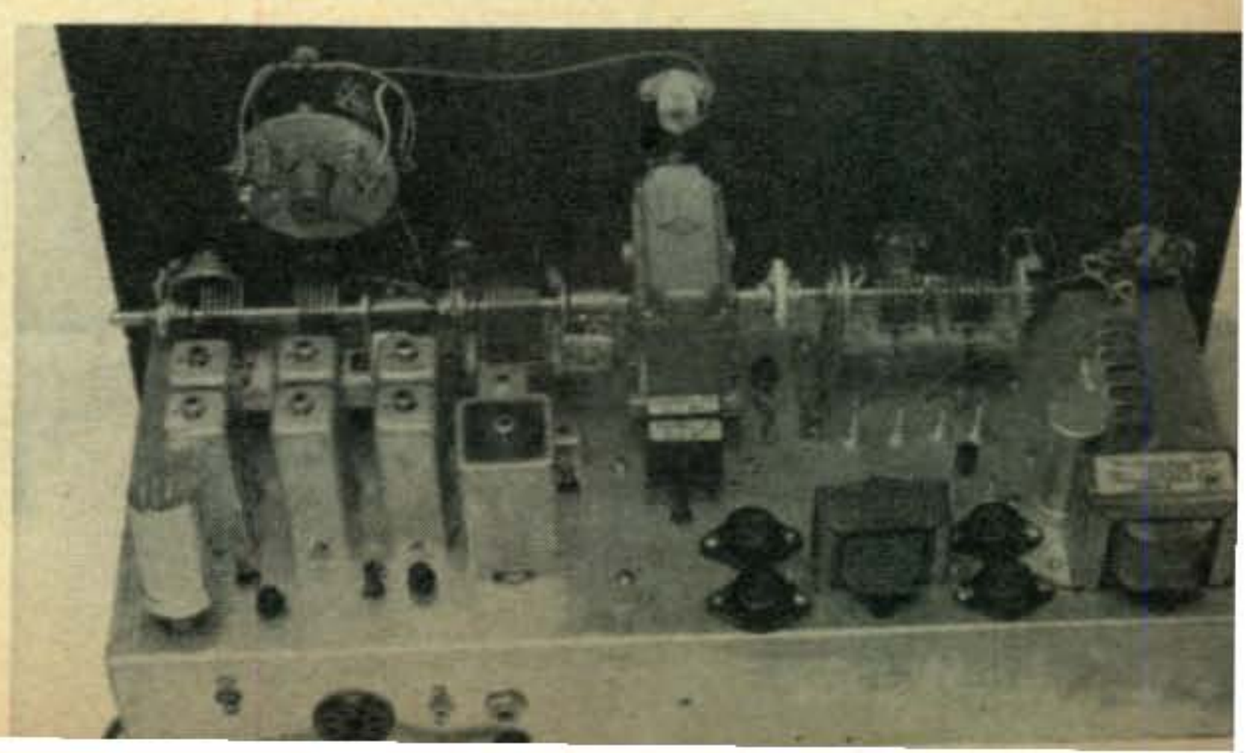
The 3.5 *mc* mixer output is at 455 *kc*. No amplification is necessary at this point beyond what is available in the 455 *kc* mixer, but it was desired to introduce this conversion for two reasons. It was felt that good design would require some further protection against internal images in the receiver if the conversion went directly to 50 k*c*, and surplus 405 and 505 *kc* crystals were at hand which would provide switched sideband selection at this point. A conventional transistor *if* transformer was used to couple the 3.5 *mc* mixer to the 455 *kc* 2N140 mixer. Injection is from a separate 2N140 crystal oscillator. The sideband selector switch selects either the 405 or 505 *kc* crystal to provide sideband selection.

50 kc IF And "T" Notch Filter

The 50 *kc* amplifier consists of two stages using 2N140 transistors, their associated coupling circuits, BFO, AVC and "S" meter amplifiers. It is admitted that it would be more desirable from an engineering standpoint if the selectivity could be obtained earlier in the receiver. The difficulty of such a procedure is apparent. A number of commercial receivers are designed on the same basis.

The 455 *kc* mixer load is a 50 *kc* tuned circuit. This tuned circuit is coupled "across the top" through 2 mmf to a second 50 *kc* coil. It is also "bottom coupled" in varying degrees by the reactance of different sized capacitors selected by the selectivity switch section S4a. Simultaneously, the Q of the second 50 *kc* coil is varied by another switch section S4b to vary its response. The result is that with light coupling and high Q, a bandpass of about .5 *kc* is achieved. With tight coupling and low Q, the





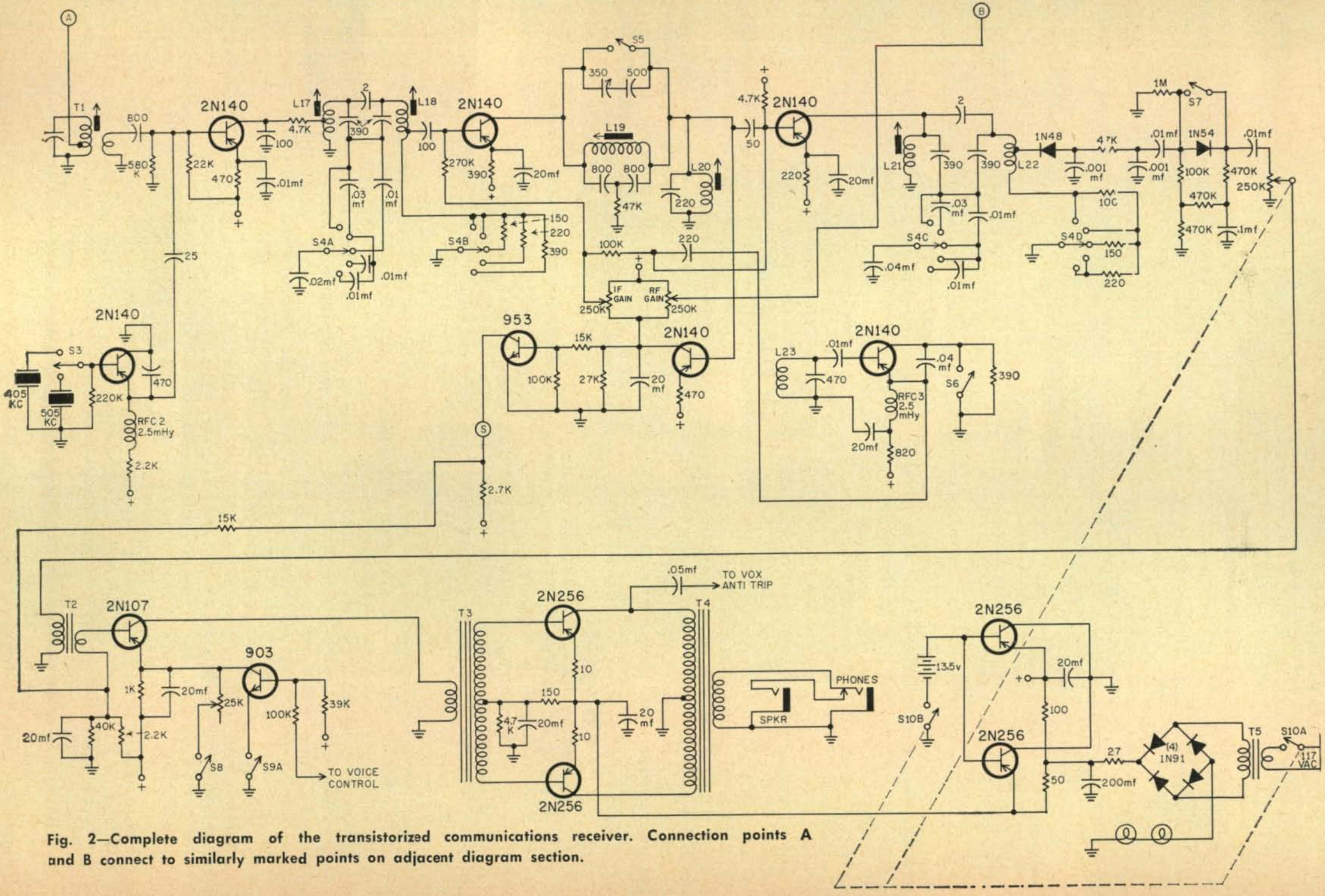


Fig. 2—Complete diagram of the transistorized communications receiver. Connection points A and B connect to similarly marked points on adjacent diagram section.

Parts List

Crystals

405 kc Surplus Channel 19-21.9 Mc.
505 kc Surplus Channel 73-27.3 Mc.
X1—20 Meter Band—10,500 kc 3rd mode
X2—15 Meter Band—17,500 kc 3rd mode
X3—10 M, 28.0-28.5—24.5 mc 3rd mode
X4—10 M, 28.5-29.0—25.0 mc 3rd mode
X5—10 M, 29.0-29.5—25.5 mc 3rd mode
X6—10 M, 29.5-30.0—26.0 mc 3rd mode
L1 & L5—9 turns #22 enameled on CTC # LS3 form
L2 & L6—16 turns #22 enameled on CTC # LS3 form
L3 & L7— 22 turns #28 enameled on CTC # LS3 form
L4 & L8—28 turns #28 enameled on CTC # LS3 form
L9 20 turns #28 enameled on CTC # LS3 form
L10 12 turns #22 enameled on CTC # LS3 form
L11 8 turns #22 enameled on CTC # LS3 form
L12 6 turns #22 enameled on CTC # LS3 form
L13 50 turns #28 enameled on CTC # LS4 form
L14 & L15—18 turns #28 enameled on CTC #LS3 form
L16 12 turns #28 enameled on CTC # LS3 form
L17 to L22 Hallicrafters 50C601 50 Kc. coil or Miller #6183 modified
L23 Hallicrafters 50C601 50 Kc. coil or Miller #6183 modified
S1 5 position, 3 section ceramic, 3 poles per section. (Made from Centralab assemblies) Bandswitch
S2 4 position, 2 section ceramic, 2 poles per section—10 meter range switch
S3 SPDT Rotary switch. Sideband selection
S4 5 position, 2 section ceramic, 2 poles per section—selectivity
S5 SPST toggle—"T" notch filter
S6 SPST toggle BFO
S7 SPST toggle Noise Limiter
S8 SPDT toggle Squelch or 100 kc calibrate
S9 SPST toggle Part of voice control-open disables voice control of rcvr.
S10 DPST on volume control—Power on-off
T1 Transistor i.f. transformer
T2 100,000 ohms to base Halldorson GH 10
T3 Audio driver Halldorson GH 110
T4 Audio output Argonne AR503
T5 25.0 volts @ 1.0 amp. Stancor P 6469

response is approximately 6 kc. This same arrangement is repeated later in the output of the second 50 *kc* stage. The two stages are coupled through a 50 *kc* resonant circuit, and, if desired, a "T" notch filter. The "T" notch is similar to that used by Hallicrafters, and is modified only to the extent that a variable capacitor, insulated from the chassis, is used to select the notch frequency, and that the "Notch Depth" control was eliminated. Instead, a fixed resistor was selected to give the best notch depth. Using this arrangement, the depth of the notch may very slightly from 50-55 *kc*, but the variation is not apparent to the ear.

AVC and BFO

AVC is taken off after the "T" notch filter. A 2N140 is used with no forward bias. It is driven by 50 *kc* signals, which cause it to conduct. The collector load is a 27K resistor to ground. Conduction causes a voltage drop across the 27K resistor, the more signal, the greater the voltage drop. This positive voltage is applied through the *if* and *rf* gain controls to the *rf* amplifier, the 3.5 *mc* amplifier, and the two *if* amplifiers to reduce their gain. A 20 mf capacitor across the 27K resistor produces a time constant suitable for SSB reception with considerable AVC action, yet leaves the AVC fast enough for normal AM operation.

The "S" meter amplifier is an NPN transistor, a 953 in this case, again operating with no bias. With no AVC voltage, it will not conduct. The positive AVC voltage biases it forward, drawing current through the "S" meter proportional to the amount of AVC action. The "S" meter reads full scale with 3 *ma*. The resistors in the base and collector circuits were tailored to give conventional action of the meter. The action of the "S" meter is not as logarithmic as on the usual tube receiver.

The BFO uses a TV horizontal oscillator coil for a tuned circuit. It is set to 50 *kc* and left there. The exact frequency will be half the difference between the two 455 *kc* conversion crystals. To set the BFO frequency, tune in a steady carrier to zero beat. Change sidebands with the sideband selector switch, adjusting the BFO till both sidebands give zero beat with the carrier. The main tuning dial will have to be readjusted, of course.

The BFO is coupled to the base of the last *if* transistor in order to increase the BFO voltage. Due to the low base input impedance and the capacitive networks involved, the BFO is effectively decoupled from the AVC, and no desensitizing or AVC action takes place when the BFO is turned on. By using the last 50 *kc* stage as an amplifier in this way, 18-20 volts of BFO are obtained at the diode detector with a supply voltage of 13.5 volts!

Detector and Noise Limiter

Diode detectors are scorned these days; all the plaudits go to product detectors. A product detector will often improve the operation of a receiver on SSB if that receiver has inadequate BFO injection or low audio gain. Before we get carried away with the virtues of these sophisticated devices, it is well to remember that the simple diode operates in essentially the same manner and will do the same job if the ratio of injection voltage to signal is kept high. It seems reasonable, then, in designing a receiver for the various modes of transmission, to use the diode, which will demodulate all modes, and let it do a good job by giving it adequate injection.

Modern diodes are quite good. The old saying, "You can't use a crystal diode as a noise limiter" no longer is true. The second detector and noise limiter circuit was taken directly from the ARRL Handbook. A high back-resistance diode was used in the noise limiter. Its action is comparable to the vacuum-tube counterpart. This noise limiter circuit is not effective in the presence of the BFO signal. If this is a disadvantage, one of the full-wave circuits with adjustable threshold may be substituted in this part of the circuit.

Audio, At Last!

A high-impedance (100,000 to base) transformer was selected to couple the detector output to the base of the first audio stage. This permitted the use of the conventional detector-ANL circuits with no modifications, together with a standard-value audio gain control. The first audio stage is a general-purpose, inexpensive 2N107 transistor, set up to do double duty. The schematic diagram shows a connection from the collector of the "S" meter amplifier over to the base bias network of this stage. When a signal is received, AVC action causes the collector of the "S" meter amplifier to draw current, which makes the collector more negative. This also causes the base of the audio stage to be somewhat more negative. Normally, this variation is around the normal operating point of the transistor, and has no effect. However, when switch S8, the squelch switch, is closed, the emitter of this stage is biased by a fixed value through the voltage divider. This voltage is set at a value just sufficient to cut off the audio stage in the absence of signal. When a signal is received, the additional negative forward bias produced by the "S" meter amplifier is sufficient to cause this stage to conduct, "opening the squelch".

The NPN transistor in the emitter lead of this stage is a part of the voice control scheme at W8DCC. The electronic voice control produces a positive voltage for receiver blocking when the transmitter is on. The positive voltage causes the NPN transistor to conduct. It, in turn, biases the audio stage to cut-off, silencing the receiver. This transistor, base bias resistors, and control switch can be eliminated if other voice-control measures are used.

The audio output stage is conventional push-pull Class B using 2N256 power transistors. The power capability of this stage is far greater than would normally ever be used. In this receiver, the maximum audio is limited by the capabilities of the driver stage and driver transformer. Substitution of a power driver and the proper driver transformer would raise the output of the audio stage to the low-power modulator class. With the arrangement shown, adequate output is available to annoy the rest of the household; considerably more than is required for normal listening.

Power Supply

A receiver of this type can readily be operated from dry batteries or from a 12-volt car battery. Total drain of the receiver at 13.5 volts to the regulators is 250 *ma*. Commercial power is the cheapest and most convenient for normal station operation, so the receiver was equipped with an *ac* power supply. This consists of a 25 volt transformer, bridge rectifier, and RC filter, followed by two power type 2N256 shunt regulators. The separate regulators are not absolutely necessary, but the class B audio stage will kick around considerably with the audio gain turned up. Since transistor oscillators are sensitive to voltage changes and the overall gain of the receiver is quite high, isolation of the output stage supply from the rest of the receiver is neceesary to preserve frequency stability and protect against unwanted feedback. The use of separate regulators for these two sections seemed to be the most positive method of assuring this isolation. The use of shunt regulators required only one reference battery (a Zener diode should be useful here) and allowed the collectors to be grounded directly to the chassis.

The additional regulator costs but little, as the transistor is an inexpensive type. The lamp assembly for the tuning dial grounds one side of the lamp directly to the panel. This required a power supply for the pilot lamps that could be grounded. By placing the dial lamps in series in the negative lead to the supply, they are made to do double duty by acting as a filter resistor for the power supply. This also removes the greatest source of heat (small as it is) from the chassis, placing it entirely out of the receiver in the case of the dial lamp. The other lamp is in the "S" meter, where a great deal of the heat is radiated outside the receiver. The result is a real cool receiver!

Design Considerations

Most people think of transistorized receivers as some sort of makeshift arrangement. They expect the performance to be poor. One reason for this attitude is probably the emphasis that manufacturers have placed on the low power consumption of transistors, making it possible for them to produce extremely compact portables with small battery power supplies, small speakers, with small antennas. Portable tube type radios have severe limitations, too.

The philosophy behind this design was to build a **good** receiver. Transistors are relatively cheap in their initial cost. They are even cheaper to operate. The designer of a tube-type receiver must limit the number of tubes for a given design, for the addition of each tube requires additional filament capacity to light the tube and additional plate power to operate it. This additional power also must be dissipated in the form of heat, which means either higher temperatures or a larger cabinet. Transistors can be added without paying such a penalty. Perhaps 1 or 2 *ma at* 13.5 volts adds practically nothing to the temperature or power supply. Unlike so many other things, a transistor's first cost is the greatest as there is virtually no upkeep.

Tube-set designers also face the problem of reliability. Tubes are the most frequent cause of failures. The more tubes, the greater the chance of failure. Next in line comes failure associated with the plate supply. This includes shorted by-pass capacitors etc. Again, the more

[*Continued on page 139*]

HQ129-X Receiver Improvements

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816 Adams NE
Albuquerque, New Mexico

What started out to be modernization of the converter stage and addition of the Twin Noise Squelch (TNS) to an HQ129-X grew like Topsy until the modifications encompass the following:

1. Modification of the converter stage from a 6K8 to 6X8 tube
2. Modification of the *rf* stage from a 6SS7 to 6SG7 tube
3. Reduction of warm-up drift on the 18-31 *mc* range
4. Addition of AVC to third *if* amplifier stage
5. Addition of Twin Noise Limiter and Squelch (TNS)
6. Full-wave voltage doubler second detector
7. "Sinking Diode" delayed AVC
8. Improved "S" meter sensitivity
9. Improved first audio stage

It became apparent many months ago, that the HQ129X just was not up to par, because 10 meter signals heard on the mobile rig (consisting of a Morrow 5BR Converter and Chrysler car radio with TNS[1]) could hardly be heard on the HQ129X, even with a matched vertical antenna.

It was realized that power-line noise was masking some weak signals on the HQ129X, but the difference between the two receivers could not be reconciled. Sensitivity was poor and receiver noise was high. In addition, the existing noise limiter left much to be desired when compared to the Twin Noise Squelch (TNS) circuit.

Converter Stage

It was finally decided to take the bull by the horns, so to speak, and revamp the receiver to bring it up to modern performance standards. Recalling a conversion article appearing in CQ about six years ago[2] as a starting point, the task was begun. The conversion article[2] was well written, 22, followed carefully and was completed in a short time. Listening tests were then made to determine what kind of audible improvement could be noted in signal-to-noise ratio and increased sensitivity. It was noted immediately that there was too much oscillator pulling when the mixer circuit trimmer was adjusted. It became apparent that it was caused by the new 22 mmf capacitor connected from pin 3 to pin 7 of the 6X8 tube which provides oscillator injection. This capacity was reduced in value but the condition still existed. Then the capacitor was eliminated completely, contemplating that sufficient oscillator injection might be had through stray capacity and injection within the tube. There was ample injection on the three highest frequency bands but, on the broadcast band especially, oscillator injection was insufficient and caused reduction in strength of received stations.

1 Wilfred M. Scherer, W2AEF, "The Twin Noise Squelcher" CQ May 1953, "More on the TNS" CQ May 1954

2 Santangelo, W1NXY "Second Guessing the Experts on the HQ129-X" CQ April 1952

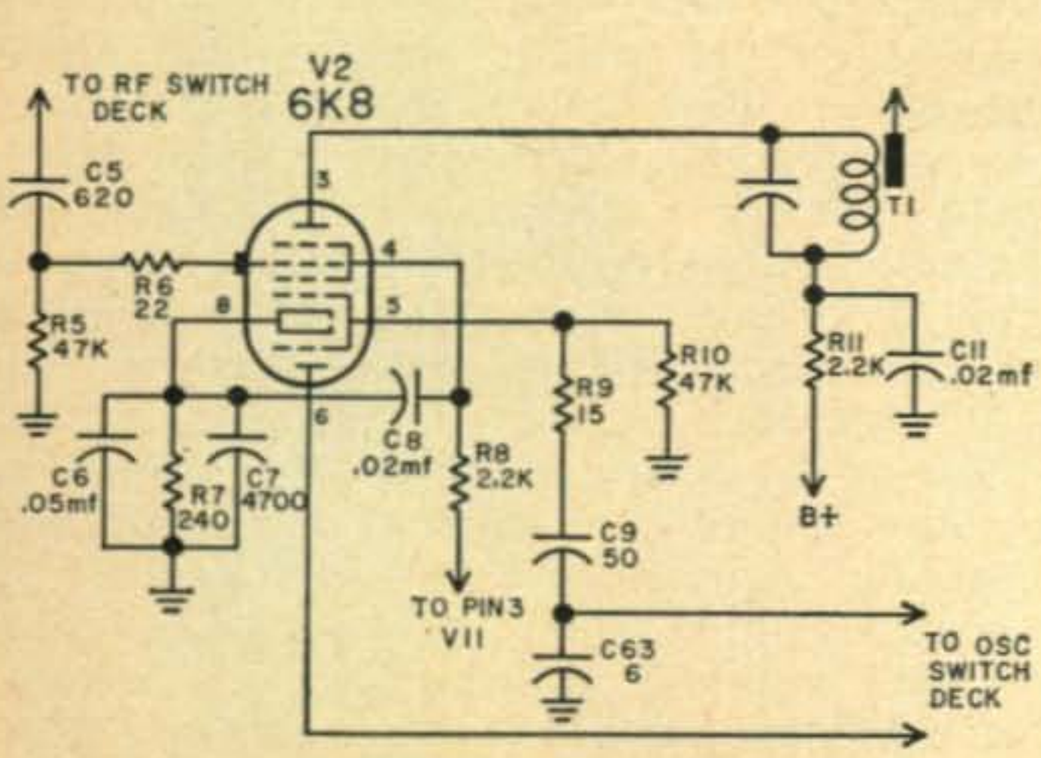

Fig. 1A—Original converter circuit.

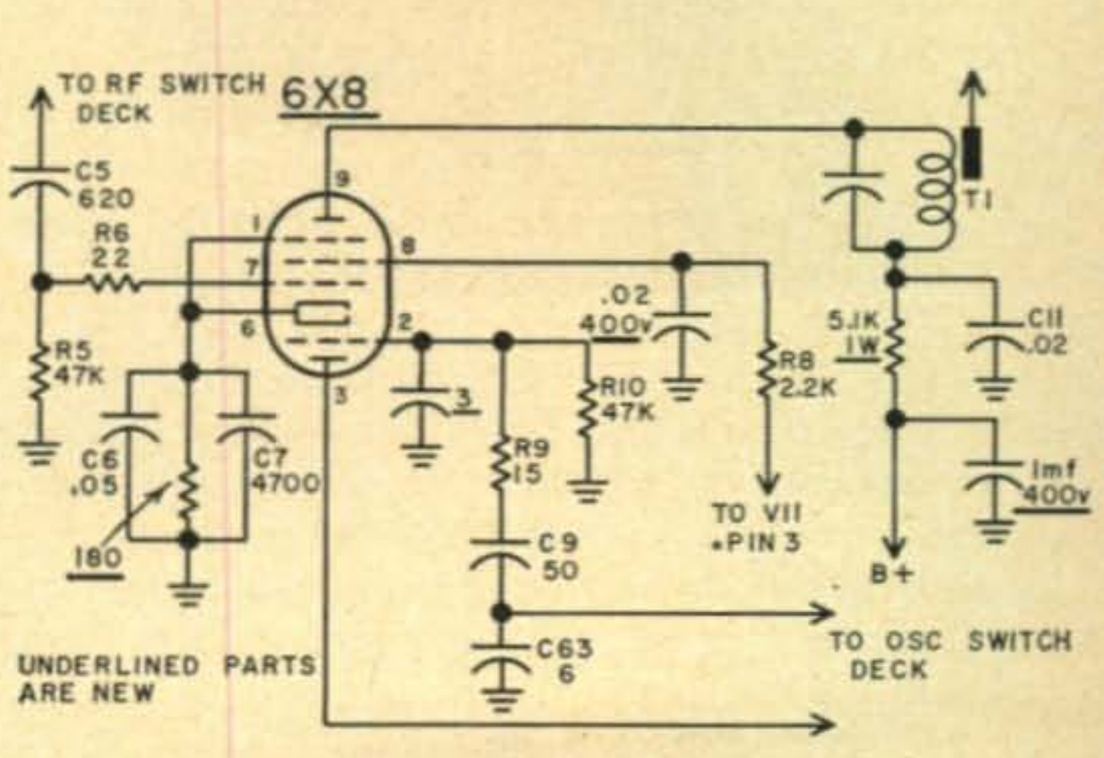

Fig. 1B—Revised converter ciruit.

About this time, serious digging into reference material began. A complete analysis of mixer-oscillator circuits was found in the Radiotron Designer's Handbook[3]. The tube manual was also consulted for proper operating curves, bias voltages etc. It was concluded that the 6X8 tube needed some bias and that perhaps by lifting the cathode above ground, oscillator injection could also be introduced internally and thus eliminate the 22 mmf capacitor. The cathode and suppressor, pins 1 and 6 were lifted from ground, pin 1 connected to pin 6, and a 180 ohm bias resistor plus the original cathode by-pass capacitors (a 4700 mmf and the .05 mfd) were installed from pin 6 to ground. The center shield of the socket was again connected to ground.

The receiver was tested and all the aforementioned difficulty disappeared. Now the mixer trimmer had no pulling effect on the oscillator and adequate oscillator injection was achieved on the low frequency bands. Conversion transconductance was not impaired as evidenced by "S" meter readings from a known signal source before and after the change. In addition, tube noise decreased, increasing the signal-to-noise ratio. The addition of the bias resistor and elimination of the 22mmf capacitor had no effect on oscillator tracking or calibration and the modernization of the converter section was considered complete. Refer to fig. 1 for the original and revised schematic of this section.

RF Stage

A simple improvement in the *rf* stage was then accomplished. In looking through the tube manual, it was noticed that the 6SG7 tube had approximately the same input and output capacitances as the original 6SS7 tube (V1) but has a trans-conductance of 4700 umhos compared to 1850 umhos for the 6SS7. A simple change of disconnecting the ground from the suppressor grid pin 3 of the 6SS7 tube socket permitted operation with the 6SG7 tube. Also, no retuning of the tuned circuits will be required unless one wants to "touch up" to get the absolute maximum results. Refer to fig. 2 for the original and revised schematic of this section.

Warm-up Drift

Warm-up drift has always been a problem on the 18-31 *mc* range of the HQ129X receiver. This is easily understood when it is noticed that an old fashioned compression-type trimmer is used in the oscillator circuit of the receiver. Drift was easily cured by removing the trimmer and replacing it with an Erie Type 557, N 750 type of 5—30mmf range. This trimmer is designated C75 on the manufacturer's schematic. It can be physically located when looking at the rear of the chassis, as the third trimmer from the right in the row of trimmers near the front panel. Alignment of the oscillator stage will be required and is simply accomplished with the aid of a grid-dip oscillator. The local oscillator operates 455 *kc lower* in frequency than the incoming signal on this band. Set up the grid-dip oscillator 455 *kc* lower in frequency than a receiver dial reading of 30 *mc* and place it near the 18-31 *mc* oscillator coil which is to the left of the trimmer just installed. Adjust the trimmer for grid-dip reading. Trimming up to exact frequency can then be accomplished with a calibrated signal generator. If oscillator drift is encountered on other bands, the same procedure may be used changing appropriate oscillator trimmers with the following point in mind. The local oscillator operates 455 *kc* lower than the incoming signal on the 18-31 *mc* and 10-18 *mc* band, but 455 *kc* higher than the incoming signal on all the rest of the bands. This completed the front end improvements.

AVC Action

At this time, it was considered a good move to include AVC on the third *if* stage (V5) of

3 Langford-Smith "Radiotron Designer's Handbook"—Fourth Edition

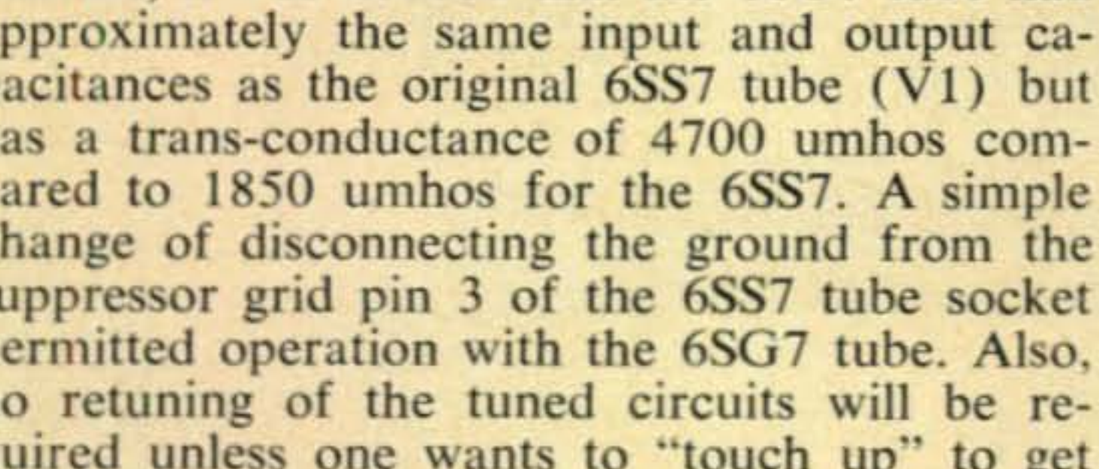

Fig. 2—The original and revised circuit of the rf amplifier.

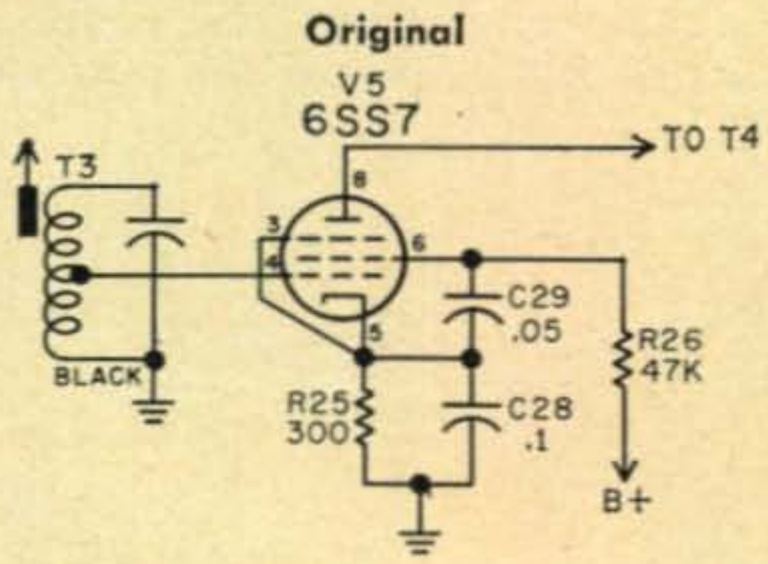

Fig. 3—The original and revised circuit of the third if amplifier.

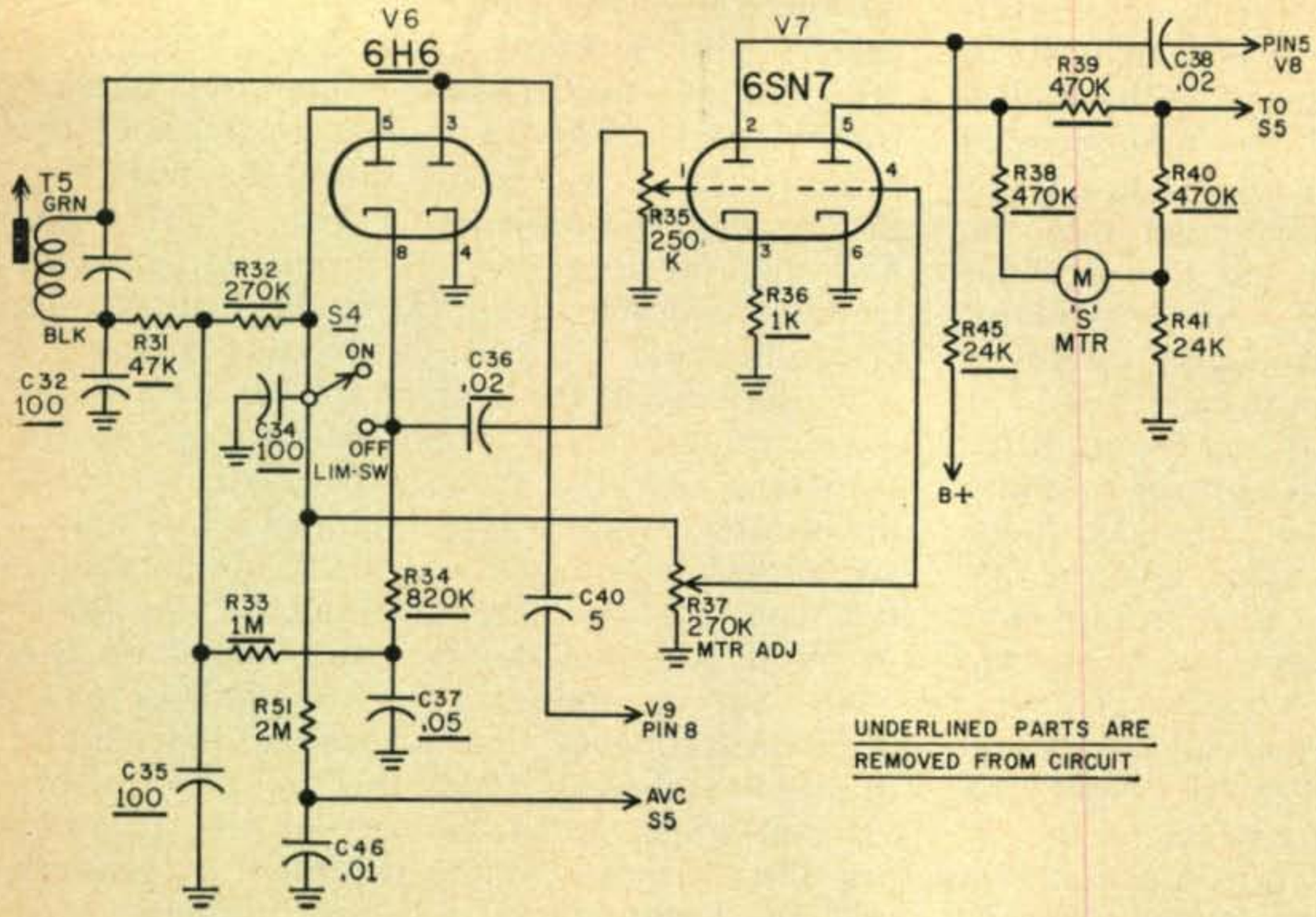

Fig. 4—Original circuit including the second detector, "S" meter, first audio and noise limiter circuitry.

the receiver to allow control of the stage gain and eliminate distortion caused by strong signals. Refer to fig. 3 for the original and revised schematic of this section. The black *if* transformer lead was disconnected where it hooks to the ground solder lug, a .02 mf capacitor installed from this lead to ground lug and a 10 *k* ½ watt decoupling resistor installed from the black lead to the AVC bus. The AVC bus can be easily identified by tracing the black leads from the previous *if* amplifier stages, noting their 10 *k* decoupling resistors and .02 capacitor terminations on the side lip of the chassis and connecting in to the common line. This line runs along the side lip of the chassis in a cabled harness and connects to a terminal strip on the lip near the third *if* amplifier stage. To hold the screen voltage on this stage within tube dissipation limits a 33 *k* ½ watt resistor was added from pin 6 of the 6SS7 to pin 5 of the VR105 regulator tube (V11).

TNS and Second Detector

The addition of the TNS circuit and second detector modification came next. Adding new *rf*, converter and TNS tubes with additional filament consumption called for eliminating the 6H6 second detector tube (V6) and replacing it with semi-conductor diodes. After much experimentation with circuits, the following improvements were incorporated. Added were the Twin Noise Squelch Circuit, a full-wave voltage-doubler diode detector and a Sinking

[*Continued on page 130*]

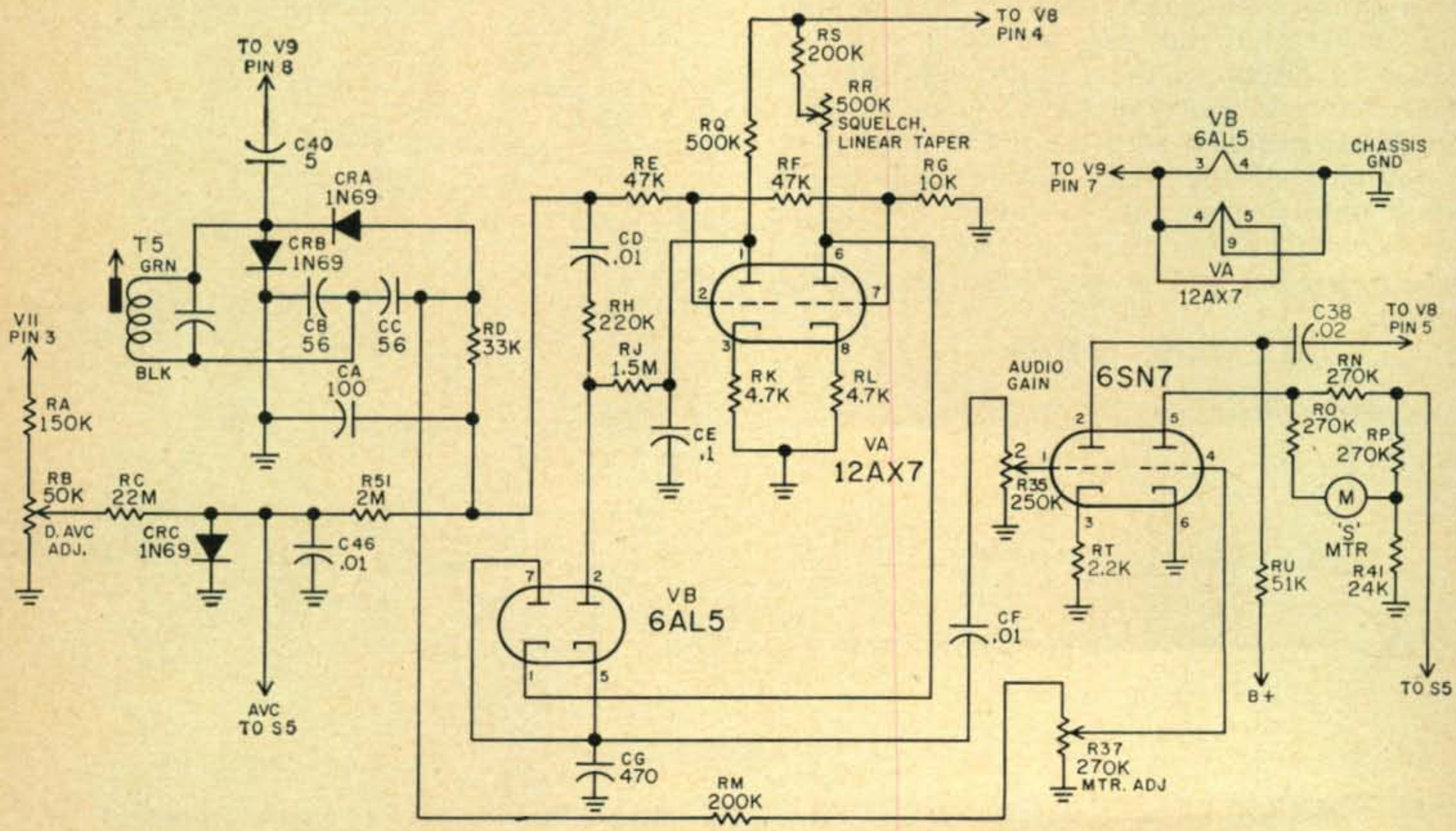

Fig. 5—Revised circuits for the second detector, "S" meter, first audio and noise limiter circuits.

NC-300 REVISIONS

Robert J. Murray, W1FSN
60 Main Street
Saugus, Mass.

The summer months of the year occasionally bring reports of calibration errors and ineffective crystal filter action in the NC-300, particularly in areas of high humidity. This is due to the second conversion oscillator drifting off its normal frequency of 2295 *kc*. This situation is evidenced by calibration errors on the dial in one direction on the high frequency ranges and in the opposite direction on the low frequency ranges and also by erratic operation of the crystal filter.

It is a simple matter to crystal control the second converter oscillator which effectively eliminates these problems.

The crystal and its associated components may be mounted in the shield can which formerly housed L6 the second conversion oscillator coil.

It should be remembered that there are now two crystals in the circuit which must be properly coordinated if the receiver is to work at maximum efficiency. Normal production tolerances in the grinding of the crystals may allow a situation to exist where the difference in frequency of the crystal in the filter (2215 *kc*) and the crystal in the second conversion oscillator (2295, *kc*) is not exactly 80 *kc* (second *IF*). If this is so the second *IF* strip must be adjusted accordingly, either slightly higher or slightly lower in frequency to compensate.

Improved Audio

An audio change that will improve the phone quality is shown in fig. 2. It consists of a 1 megohm resistor connected between the plate of the output tube and the plate of the preceding audio stage. This has a tendency to drop the audio level which can be restored by bypassing the cathode of V9, R45 with a 20 mf. 50 volt capacitor to chassis ground.

Dial Vernier

On the front panel of the NC-300 there is a plug button to the lower left of the main tuning dial. This originally was designed for removal of the bandswitch shaft without the necessity of dismantling the entire receiver. A vernier for the main tuning dial may be mounted in this spot if it so desired by enlarging the hole to ½" and inserting a National SB bushing. A neoprene or rubber washer cemented to the under surface of an HR or similar knob with a ¼" shaft going into the SB bushing will do it beautifully a la Atwater Kent Model 40 shades of 1928. Stick a cotter pin through the shaft so that it won't keep pulling out. ■

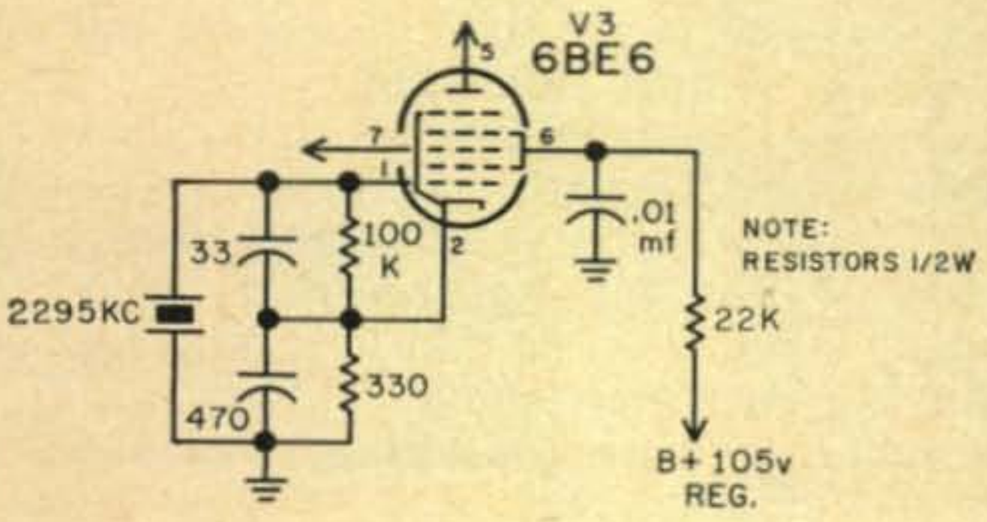

Fig. 1—Crystal controlled second converter.

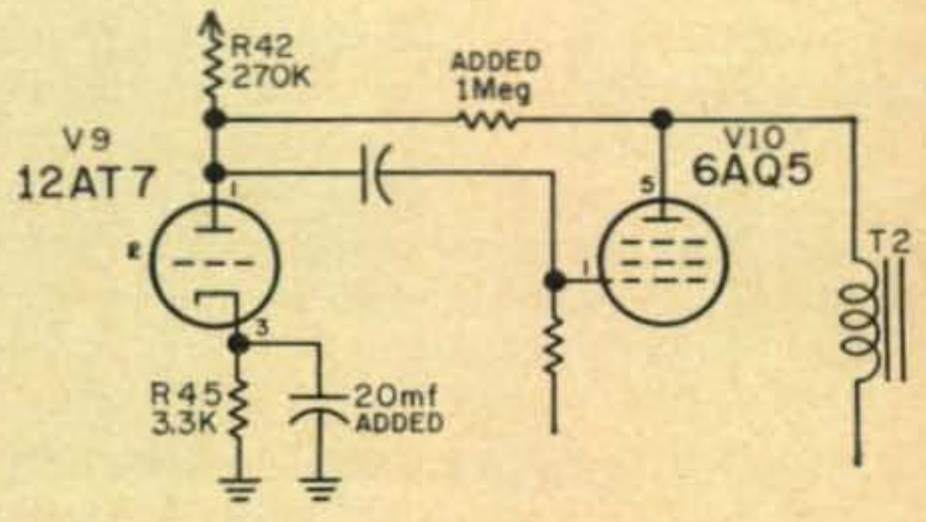

Fig. 2—Two new components improves audio.

The Madera Canyon Report

Dale A. Adams, W7BVA
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Tucson, Arizona

Sunday morning, November 16, 1958, began with a rare snowstorm in Tucson, Arizona. More often that not, winters in this part of the Southwest pass without a trace of this phenomenon except at the higher elevations. As usual, when nature springs her surprises, people are caught in situations which cause inconvenience and sometimes disaster.

In the city of Tucson the snow brought only slight damage even though this rare white blanket thickened to a 6½ inch record. However, 40 miles to the south in the Santa Rita Mountains, a tragedy began to unfold which triggered the largest manhunt in the history of the southern part of the state.

At 11:20 that Sunday morning the novelty of the unusual weather was broken for Dale Adams, W7BVA, by a telephone call from Orville Bair, W7SMZ. Orville had just received an emergency call on 75 meters from Val Hanson, W7FWP who lived in Madera Canyon and was requesting the assistance of the Catalina Radio Club for an emergency situation which had developed in that area.

"Apparently there are some people lost in the Santa Ritas somewhere," Orville said. "I understand they've been out overnight. They must be having a real storm down there. Val has requested that you alert the Catalina Emergency Net and stand by for him on 10 meters."

Further conversation revealed that the only telephone at the Santa Rita Lodge, a mile below Val's QTH, was out of order because of the storm. Val intended to hike back down the canyon to the lodge where his mobile was snowbound and attempt to contact Tucson. Further questions to Orville only brought negative replies except that he had notified the Pima County Sheriff's Department as Val had requested. More information would have to come from Val when he called the Net with his low power, 5 watt mobile at the lodge.

As soon as the telephone call was completed, Dale called Ralph Kimball, W7TFQ, who was at the head of the telephone alerting system. Ralph would call two people and each would then call two more until all members of the Catalina Emergency Net had been notified of the "red alert."

This was the first real emergency for the Catalina Radio Club which had practiced and drilled for just such a situation for the past two years. It turned out to be a three day, round the clock operation before amateur assistance was no longer needed.

The alert was started and in a matter of minutes member stations began to check in with W7BVA, who was acting as net control. First instructions to the net were for all stations to stand by for W7FWP who would be transmitting information vital to the formation of rescue operations. But repeated calls to Val brought no reports from net stations that his low power signal had been heard.

Val, meanwhile, had been transmitting emergency CQ's from his mobile which was held fast in the grip of heavy drifts. He had found out that six Boy Scouts had been brought in to the canyon the day before by John Early, the father of one of the boys. They had planned to hike to Mt. Baldy, the highest peak in southern Arizona, and back to their camp where they would spend the night. Early was to return for them the next day.

At dawn Sunday morning, prompted by the sudden adverse weather, Early rushed from his home in Tucson to Madera Canyon. Eventually he found three of the boys huddled under a picnic table, their tent collapsed by the weight of the snow. One was shoeless, his feet almost frozen, and all were dangerously cold. Early learned that the group had separated the previous afternoon and his own son, Mike, was one of the three that were still high on the treacherous mountain.

The need for help was desperate and Val, unable to raise a contact with emergency CQ's finally resorted to the international distress call "Mayday." The call was heard by Ray Cunningham, WØSIJ in Kansas City who had just received a request from the Tucson Net Control station to listen for Val. Ray managed to contact Val and acted as a relay until band conditions changed and contact was lost. But

by this time there were stations all over the eastern half of the United States who were standing by willing to help. This invaluable co-operation made it possible for Val to send important details to W7BVA at Net Control who in turn relayed traffic to the Sheriff's office, Davis Monthan Air Force Base, Civil Air Patrol and the frantic mothers of the lost boys. Information was sent back to Val, also by way of "skip" relays concerning the progress toward the formation of rescue teams and, most important, progress toward clearing the road into Madera Canyon which had been impassable since morning.

By late afternoon when skip stations began to fade out it became obvious that the communication emergency would extend through the night and possibly well into the next day. Contact with Val was eventually lost and it became apparent that a radio station with more power at the lodge would be a necessity.

Realizing this, Jay Sims, W7HXK contacted Ralph Stoll, W7FYL, and Dick Oaks, W7DME. Together they compiled enough equipment to build a complete amateur station and loaded it all into Dick's 4-wheel drive Jeep. Leroy Galhouse, W7LHF and Ralph Kimball, W7TFQ both monitoring net frequency, heard of their plans. Leroy had the club's emergency power unit and immediately delivered it to Dick's house where it was loaded into the Jeep. Ralph Kimball provided three handie talkie portable transceivers which could be assigned to search parties and thus increase the efficiency of the rescue operation.

Jay, Ralph Stoll and Dick left Tucson about midnight Sunday and in spite of a warning from the Pima Sheriff's office that "they can't possibly get through and might become casualties themselves," did manage to make it to the lodge with all their gear. By 2:30 Monday morning the station was complete and operating under Dick's call, W7DME as "Field Net Control" for the Catalina Emergency Net.

Sunday evening George Whitney, W7GFQ, emergency coordinator for the area began coordinating the efforts of the Catalina Emergency Net on 10 meters with the 75 meter net. Mobiles on both 10 and 75 were dispatched to a point four miles from the lodge where a Sheriff's car was also stationed. This provided a complete tie-in with both bands and the Sheriff's frequency at this point as well as at Net Control in Tucson.

Early Monday morning, Rex Phelps, W7LHM from Mesa, Arizona flew into the area in his Bonanza and searched from the air until helicopters arrived from Davis Monthan Air Force Base. He was in constant touch on 75 meters with the mobiles stationed four miles from the lodge. Radio reports from the search parties were negative as far as clues of the lost boys were concerned.

As the news spread, offers of help began to pour in, both from hams and from people who had the means to assist in other ways. Ranchers from the surrounding area came with trucks, horses and every conceivable kind of equipment. Students from the University came equipped with snowshoes, the Sheriff's Posse from Florence in Pinal County to the north brought more horses, the National Guard from Tucson and soldiers from Fort Huachuca in the southeast part of the state all came to search. The Red Cross moved in and set up facilities to feed the searchers. Later in the week Russ Cone, an experienced searcher, and his trained snow dogs were flown in by the Air Force from Fresno, California.

By Wednesday afternoon the military units had brought in enough of their own communication equipment to cover the need and the Catalina Emergency Net discontinued their operations on the recommendation of the emergency co-ordinator, George Whitney. The Field Net Control station, W7DME was dismantled after operating continuously since early Monday morning.

However, several of the amateurs, not content to go home, now that they had been relieved of communication duties, joined search parties in an effort to be of still further help.

Friday the 21st of November, six days after the boys began their ill-fated hike into the mountains, 320 more troops from Ft. Huachuca in a fifty seven vehicle convoy poured into the Mt. Baldy area. By Saturday morning over 700 men swarmed up both sides of the mountain.

It wasn't until December 4th, 19 days after the boys challenged the trails of "Old Baldy," that their bodies were found. David Greenberg, 12, was lying on a narrow ledge near the remains of a small fire. The body of Michael LaNoue, 13, was found about 50 yards from the fire. He had apparently fallen asleep and tumbled over the edge of the ledge. Mike Early, 16, had also fallen and was found roughly 25 yards away.

It was believed that the boys had probably died the second night, Sunday, when the high winds brought temperatures of 5 below zero to the narrow ledge 7,000 feet high in the Santa Rita Mountains. Exhausted and too cold to maintain their small fire they yielded, one by one, to the fatal temptation to sleep.

Of the amateurs who moved off frequency or who stood by for hours in case they were needed, there are many whose names or calls were never heard. They deserve as much thanks for their co-operation as those listed below who also participated: W7's HTQ, UCX, KNY, CKV, LHN, MWD, ZSE, PJM, PYL, CUP, LLO, GI, UXE, OZM, NYT, RTT, HMM, FCV, ACO, YXE, SQX, DRU, CBN, NUC, FRR, OXN, HQX; K7's CET, BJC, CPZ, CPY, EMM, GLC, DSR, CRO, ELZ, FMZ, BAV, ENA, FCV; W9VNL/7, WØGBG/7; W8's HPB and EGN; W9BBP, KØGXM, W5JNA/7, and W7IWJ. ■

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The S-9er, Mark II

A New Twist on a Proven Improvement

Many construction articles in amateur radio journals offer something for almost nothing—and this one is no exception.

Designed as one step in a complete receiver modernization program, the "S-9er Mark II" proved to be by far the best improvement made, in terms of results versus cost and time of construction.

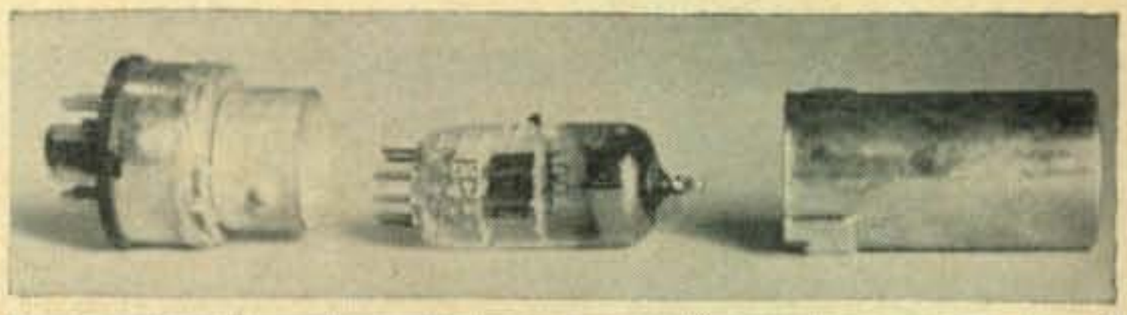
For an outlay of 75 cents plus tube and socket—which can probably come out of a well-stocked junkbox, as the prototype model did—you get an approximate 6 decibels extra gain in the receiver front end, plus a marked reduction in *rf* noise. The improvement is clearly noticeable on 14 *mc* and shows up to better advantage on higher-frequency bands.

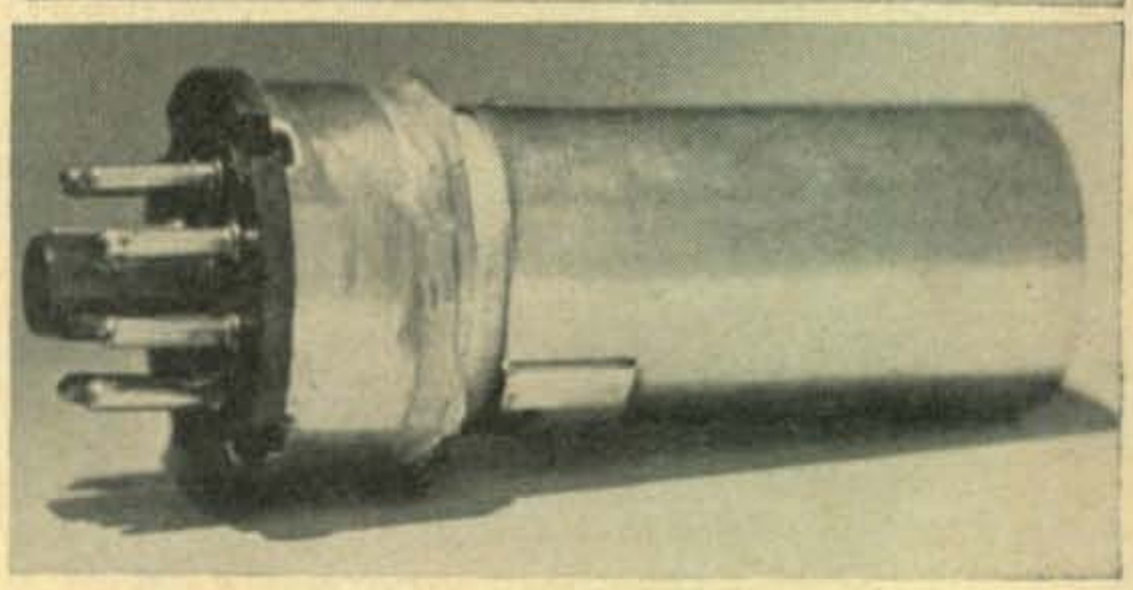
Like the original S-9er (CQ, May, 1956) the Mark II uses a 9-pin miniature television cascode twin triode tube to replace the receiver's original pentode first *rf* stage. And like the original model, the Mark II requires no changes whatsoever in the receiver.

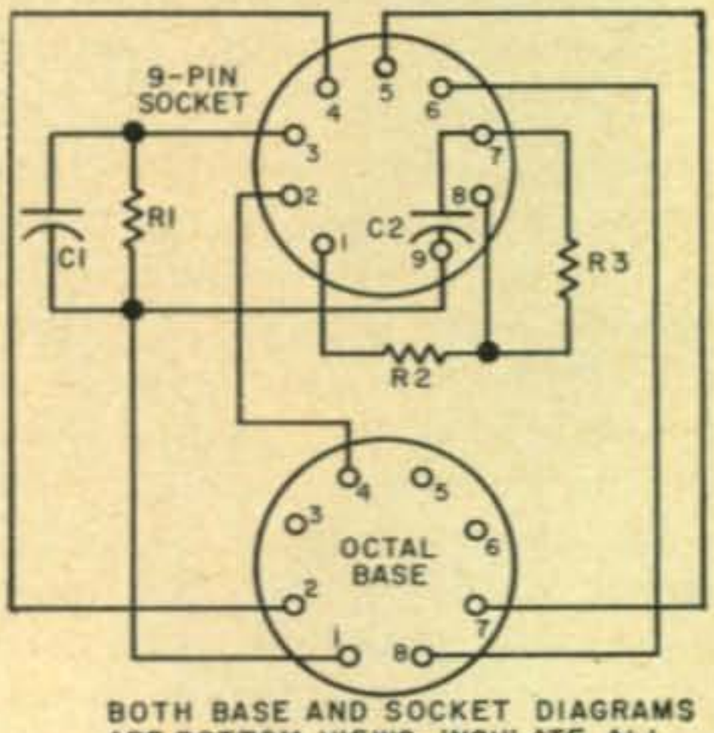
There, though, the similarity ends. The original model was a cathode-coupled amplifier. While it gave excellent results noise-wise, there was some loss of gain and several local amateurs reported serious problems of instability.

The Mark II, on the other hand, converts the receiver's pentode circuitry into the cascode the tube was designed for. Gain is comparable to the original pentode—and in some cases better, as it was in the designer's equipment—and the stability is excellent.

At this point, I might note that the term stability as used here refers to freedom from oscillation in the amplifier stage. Frequency stability of the receiver as a whole is not affected in any way.







BOTH BASE AND SOCKET DIAGRAMS ARE BOTTOM VIEWS. INSULATE ALL LEADS WITH SPAGHETTI.

R1—100 ohms, ½ w
R2—33 ohms, ½ w
R3—470,000 ohms, ½ w
C1, C2—.001 mf. disc

Fig. 1—Adapter base wiring to enable a 6BZ7 or a 6BS8 to replace a pentode (octal) rf amplifier.

Components of the Mark II include three resistors, two capacitors, a tube socket, an adapter base, and of course the tube.

Any of the popular cascode-design triodes will work well in the circuit. Designed for a 6BZ7, it is currently being used with a 6BS8 here. The 6BS8 was substituted because of its greater freedom from cross-modulation, and gave a bonus in the way of extra gain.

The adapter base used on the prototype came from a 2E26 which had gone west. After all glass and cement was chipped out of the tube base, the brass shell was burnished with a wire wheel to provide a good soldering surface.

Only unconventional feature in the cascode circuit which results when the Mark II is plugged into a conventional pentode stage is the lack of a neutralizing coil. At these frequencies, however, neutralization of a cascode circuit is not necessary for stability or gain. Its purpose is to provide the lowest possible noise figure.

While measurements will show the difference between a coil-neutralized cascode and one using merely a 33-ohm resistor between stages, no difference can be detected in on-the-air tests. For that reason, and to simplify the adapter, the resistor is used.

Note that the cathode of the first section is returned directly to ground through pin 1 of the octal-base socket. This removes the first *rf* stage of the receiver from the gain control line and converts the *rf* gain control into an *if* gain control, resulting in still more signal to noise ratio improvement.

If manual control of the first stage gain is desired, resistor R1 and capacitor C1 can be omitted and a lead run directly from pin 3 of the noval socket to pin 5 of the octal base. This retains the stage's original cathode circuitry.

In on-the-air tests of the Mark II, only one trouble spot developed on the original model. Using it above 38 *mc* with an SX-28 receiver, the stage had a tendency to oscillate. Below that frequency, it was as stable as the original stage.

Grounding of the tube shield with an external strap eliminated the oscillations, enabling the receiver to be used to monitor BBC TV transmissions in the neighborhood of 41.25 *mc*. These transmissions were barely out of the noise when using the original 6AB7 tube in the receiver.

Lack of laboratory measuring apparatus prevented accurate checks of improvement wrought by the Mark II. S-meter readings averaged 6 *db* higher—but difference in AVC characteristics between the 6BS8 and 6AB7 tubes make this comparison unreliable.

Signals sounded several *db* louder, and noise between signals on 14, 21 and 28 *mc* was reduced to the threshold of audibility. This, the designer feels, is the real test of improvement.

It might be well to note in passing that, although the Mark II was designed specifically to replace the 6SK7 family of *rf* pentodes, it can be wired with different basing to plug into virtually any receiver to replace any tube which operates with 6.3 volts on the heater and 250 to 300 volts on the plate. Lower plate voltages reduce its efficiency and are not recommended.

That's it, then—again, something for almost nothing. Vy 73, and best of luck with the S-9er, Mark II.

And before I stop, let me express appreciation to K5GVM and W5DRE for helpful comments and suggestions, and to Cliff King, a non-ham friend, for the photographs accompanying this article. ■

Setting The Multivibrator at 10 Kilocycles

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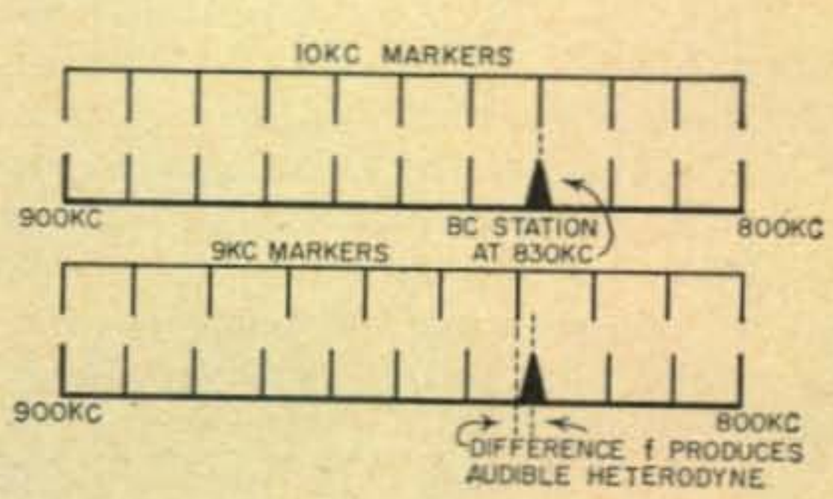
St. Paul 16, Minn.

If you have been in the habit of laboriously counting the 10 *kc* check-points between the 100 *kc* markers on your frequency standard to be sure there are 9 and not 8 or 11 as frequently happens, here's a much faster and easier way of doing it.

With the standard coupled to the receiver input, tune in any broadcast station operating on a frequency not a multiple of 100—such as 830 *kc*, 1210 *kc*, etc. If the multivibrator is operating at 10 *kc* it will be zero beat with the BC station, or very nearly so. If it is on 9 or 11 *kc* there will be an audible heterodyne. The sketch shown illustrates this. ■



Superpower

Excerpts from FCC Docket 12552

During the 1958 ARRL DX CONTEST, the Federal Communications Commission, Los Angeles area, conducted an inspection of several amateur stations in the vicinity of Los Angeles. Docket 12552 contains a detailed account of the inspection of amateur radio station W6BXL. We feel that the methods employed by the inspecting engineers and the results of this inspection will be of interest to the 4-1000A men in our midst. To follow, are the acutal excerpts from this docket:

1. On February 22, 1958, FCC engineers made an inspection of amateur radio station W6BXL, owned and operated by Mr. Charles A. Bailey Jr. As a result of this investigation, the Commission's engineers ascertained to their satisfaction that Mr. Bailey's station, W6BXL, was being operated with power in excess of 1000 watts. Following this inspection the Commission, on June 16, 1958 issued an order which, in the absence for the request for a hearing thereon, would have suspended for a period of six months, Mr. Bailey's amateur license.

Mr Bailey requested the hearing at which the following testimony was presented by the FCC engineers:

2 On February 22, 1958, there was in progress a contest sponsored by the American Radio Relay League in which amateur stations in the United States sought to communicate with amateur stations in foreign countries. As many such contacts are often made at great distances, the engineering staff of the Commission's field office in Los Angeles decided to ascertain if any of the amateur stations were using power in excess of 1000 watts, the maximum power authorized by Section 12.131 of the Commission's rules. On the day in question, three of the Commission's engineers were traveling in two cars. Each car was radio-equipped and in addition, the members carried a portable transmitter-receiver so communication between the three members could be and was maintained at all times.

3. At or shortly after 7:00 pm, after hearing station W6BXL on the air, an FCC engineer, in one of the cars drove toward the station and parked his car a short distance away from Mr. Bailey's residence. From the spot at which he parked, Mr. Baileys rotary antenna was in perfect view. During the several transmissions hereinafter mentioned, he was able to observe that the antenna was not changed or rotated. On the occasion in question, Station W6BXL was being operated on the 28 *mc* band. Using a National NC-125 receiver which was installed in the automobile, the engineer adjusted the "S"-Meter to read S-9 exactly. The S-Meter on the NC-125 was used and adjusted for the purpose of determining a point of reference and not to determine the precise intensity of the signal being observed. After the engineer had parked his car and adjusted his "S"-Meter as aforesaid, he advised the two other engineers of such fact by radio.

4. Two FCC engineers then presented themselves at Mr. Bailey's residence where they were admitted by Mr. Bailey's daughter who called her father. Mr. Bailey took the engineers to his operating room which was located in a garage at the rear of his residence. Here they asked that a test transmission be made without disturbing any adjustments on the transmitter. Such a transmission was made. Immediately after the transmission, the third engineer in the parked car informed the two others by radio that the signal sent was down possibly as much as 10 to 12 decibels. The Commission's engineers then measured the voltage and current to the transmitter. Looking around, the engineers noticed a two position switch on the panel of the high voltage supply. One was labeled "HIGH" and the other "LOW". They requested that the switch be thrown into the "HIGH" position and another transmission be made. Mr. Bailey was reluctant to do so. The FCC engineers recall that Mr. Bailey was fearful for the tubes in his power amplifier, especially if the grid drive were not adjusted. The engineers permitted said adjustment of drive. The transmission was made, and the engineer in the parked car reported that the signal intensity was almost the same as he had first observed—possibly down 1 decibel. Following this test, the engineers again measured the input power to Mr. Bailey's amplifier. These measurements indicated power in excess of 1000 watts. Subsequently, the instruments used in the investiga-

[*Continued on page 128*]

New Life For The BC-348

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Lisle, Illinois.

A lot of 348's are still in use today in spite of their design being over ten years old. The 348's primary use was by the airforce for their aircraft. A used 348 in good condition is an excellent buy and as the design is still up to date it need not be changed too much. The sensitivity of the 348 with the Xtal filter out is approx. 3 microvolts to produce 10 milliwatts into a 4,000 ohm load. From this you can imagine how a phone station would sound with the Xtal filter in. Therefore a very desirable feature would be an Xtal phase control, since the 348 only has a 1 position Xtal filter (on or off). Another desirable feature is an "S" meter for the would-be phone men who like to give accurate db readings.

Installing An "S" Meter

The first thing I did in converting mine was to add an "S" meter. The number of parts were kept to a minimum so it could be installed in the dynamotor well of the 348. The meter was installed above the on-off CW Osc switch. The variable resistor, R2, the zero adjustment control was also mounted above the CW Osc on-off switch alongside the meter. The tube socket was mounted on a bracket and screwed to the chassis in the dynamotor well with R1 mounted on this bracket. The heater of V1 can be wired for 6 or 12 volts but is shown wired for 6 volts. All leads running away from V1 and R1 should be shielded. The 150 volts for the plates of V1 can be obtained from the screen pin of the audio output or any other point having about 150 volts. (Higher voltages increase current drain unnecessarily.)

Theory of Operation

The theory of operation is as follows: R2 is adjusted for equal voltage at pin 3 and pin 8 of V1. The AVC voltage through R1 will drive the one cathode negative with respect to the other thus upsetting the balance and causing an upwards deflection of M1. The amplitude of the AVC will be controlled by R1 and once it is set should remain constant and only R2 should be moved for the zero adjustment.

Installing The Phase Control

Actually the 348 has a phase control already built in but it is built inside and can't be reached when in the cabinet. All we have to do is remove it and mount it on the panel. It should

[*Continued on page 128*]

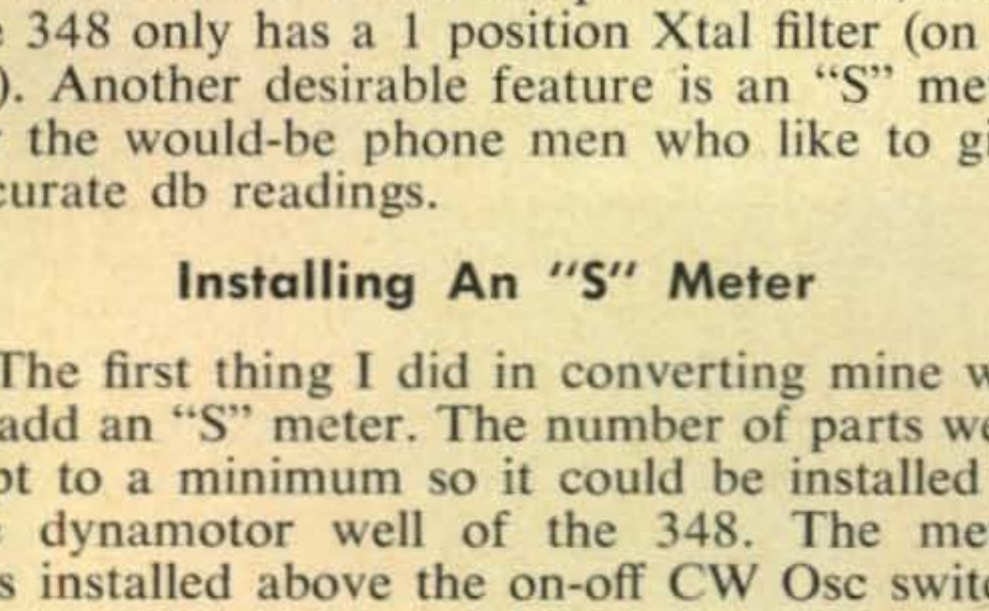


Fig. 1—Circuit of the "S" meter added to the 348.

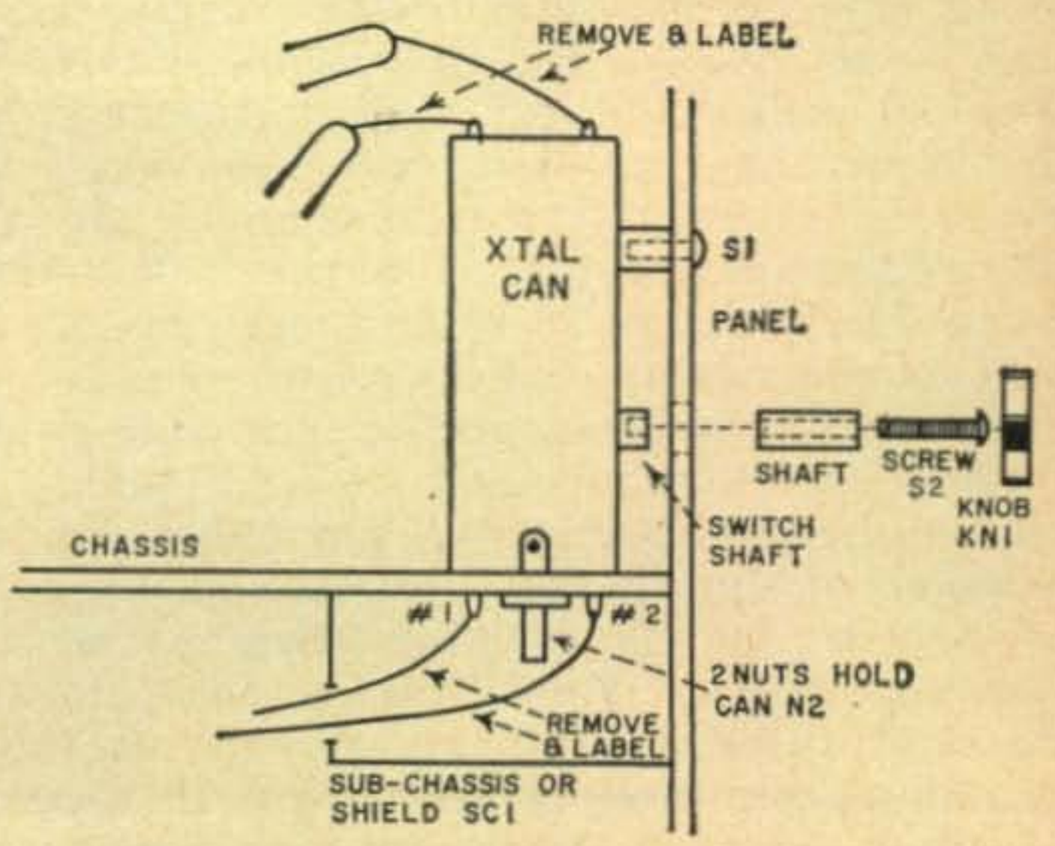


Fig. 2—Cross section view of the crystal filter.

Updating the SX-28

Barry A. Briskman, K2IEG
521 Ocean Parkway
Brooklyn 18, N. Y.

The Hallicrafters SX-28/SX-28A is perhaps the most widely owned communications receiver of World War II Vintage. While it embodies many praiseworthy features, the specifications that an adequate receiver must today meet are considerably more demanding than they were when the "Super Skyrider" was designed. With these facts in mind, we set about the task of updating the receiver to modern day standards; namely:

1. Improved Sensitivity, with a minimum of cross modulation on nine plus signals.
2. Increased Selectivity.
3. Additional Image Rejection.
4. High degree of stability in both the High Frequency and Beat Frequency oscillators.
5. Selectable Product Detector for SSB reception.
6. Bandspread calibration for the 15 meter band.

General Alignment

The first thing to be done to the SX-28 is to give it a thorough and accurate alignment to be sure that the existing circuitry is operating at the highest possible efficiency previous to making the modifications. This may be simply accomplished by injecting a low power signal from either a signal generator, *vfo* or stable grid dip oscillator to the antenna terminals on the rear of the chassis apron. Starting with 10 meters, set the reeciver frequency to the center of each ham band and align the proper slugs and trimmers beginning with the first *rf* stage and working through to the mixer. Figure 12 on page 15 of the receiver instruction manual shows a chart giving various slug and trimmer locations on the underside of the receiver. As an indication of peak tuning of each respective circuit, we can either use the S-Meter or (preferably) connect an *ac vtvm* across the 500 ohm output terminals of the audio amplifier. The vtvm is the superior method as it may be difficult to observe S-Meter variations due to instability when the receiver is sitting on end during the alignment procedure. *NOTE:* Unless it is necessary to align the receiver with the dial, the oscillator trimmers and slugs should not be altered.

After the *rf* amplifiers and the mixer (converter) have been aligned, inject a signal at 455 kc from the signal generator and peak the vtvm with each *if* slug starting at the first *if* and working through to the last. Be sure to use an insulated tuning wand for all above operations to minimize capacity detuning effects while working under the chassis. The alignment is now complete.

Increasing the Sensitivity

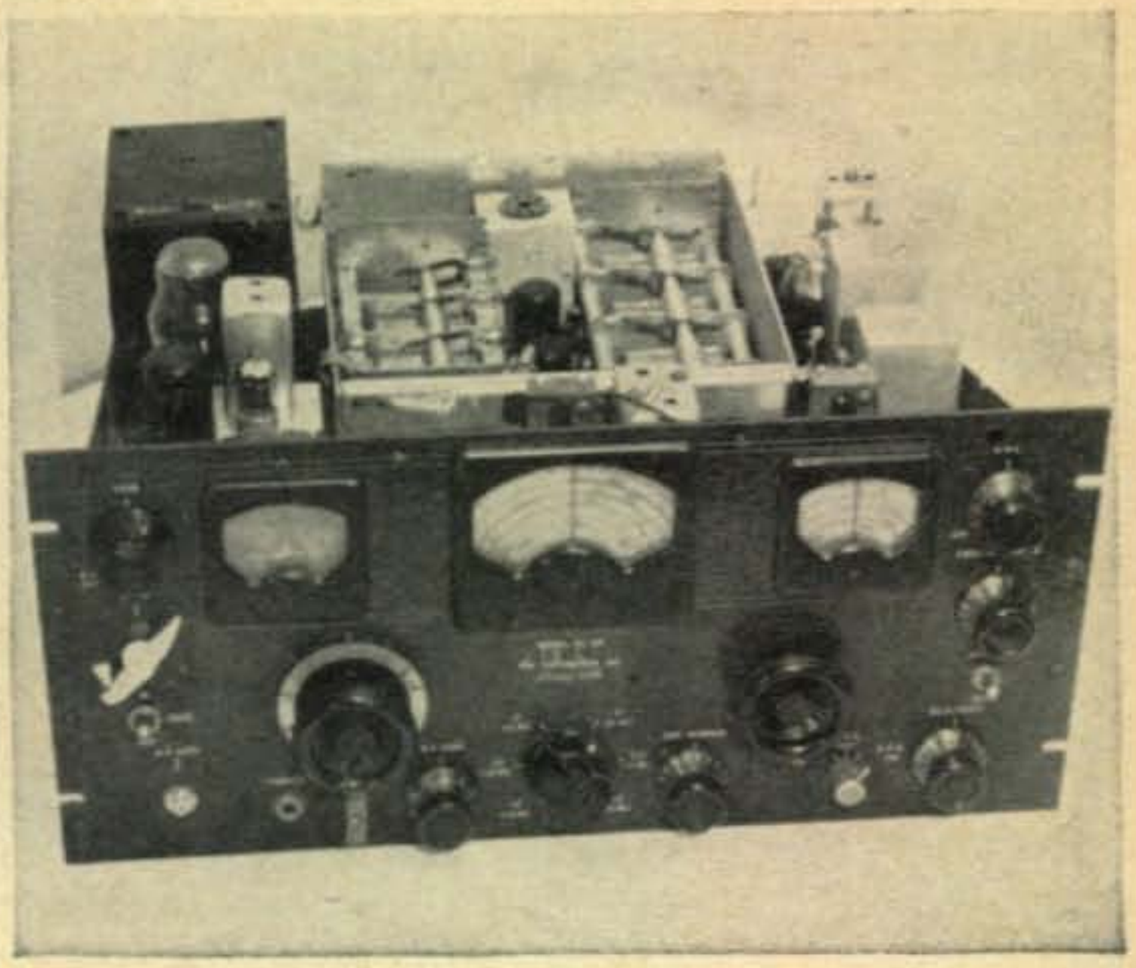
The sensitivity of the SX-28 seems perfectly adequate on all bands below 20 meters, however, it is greatly reduced on 20 and just about non-existent on 15 and 10. While the simplest solution appears to be the addition of an external preselector, it is a rather costly one, and therefore it seems more practical to add a S-9er type device in place of the first *rf* stage for improved sensitivity. At about the half way point of the first draft of this article, Wayne informed me that he had received an article dealing with an S-9er designed specifically for application to the SX-28 receiver. I made a hasty copy of all the pertinent data and decided that I'd build one and include it as part of this conversion. The S-9er was constructed and added to my receiver with the results being every bit as good as was suggested by Jim Kyle, K5JKX in his article. There was not only a marked improvement in the overall sensitivity of the SX-28, but also a definite improvement in signal to noise ratio. No performance deterioration due to increased cross modulation was observed as a result of the additional gain introduced by the S-9er.

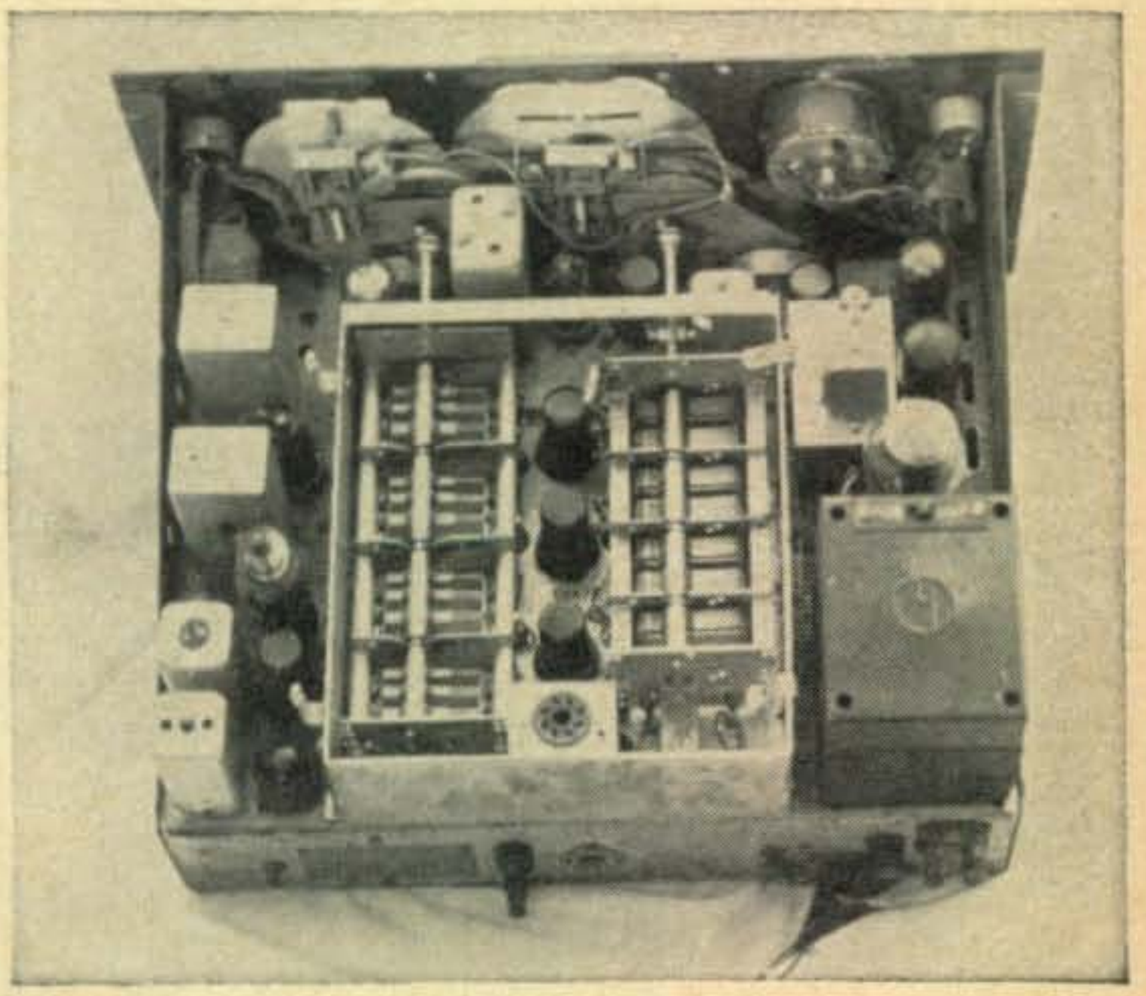
Selectivity; Modifying the *if*

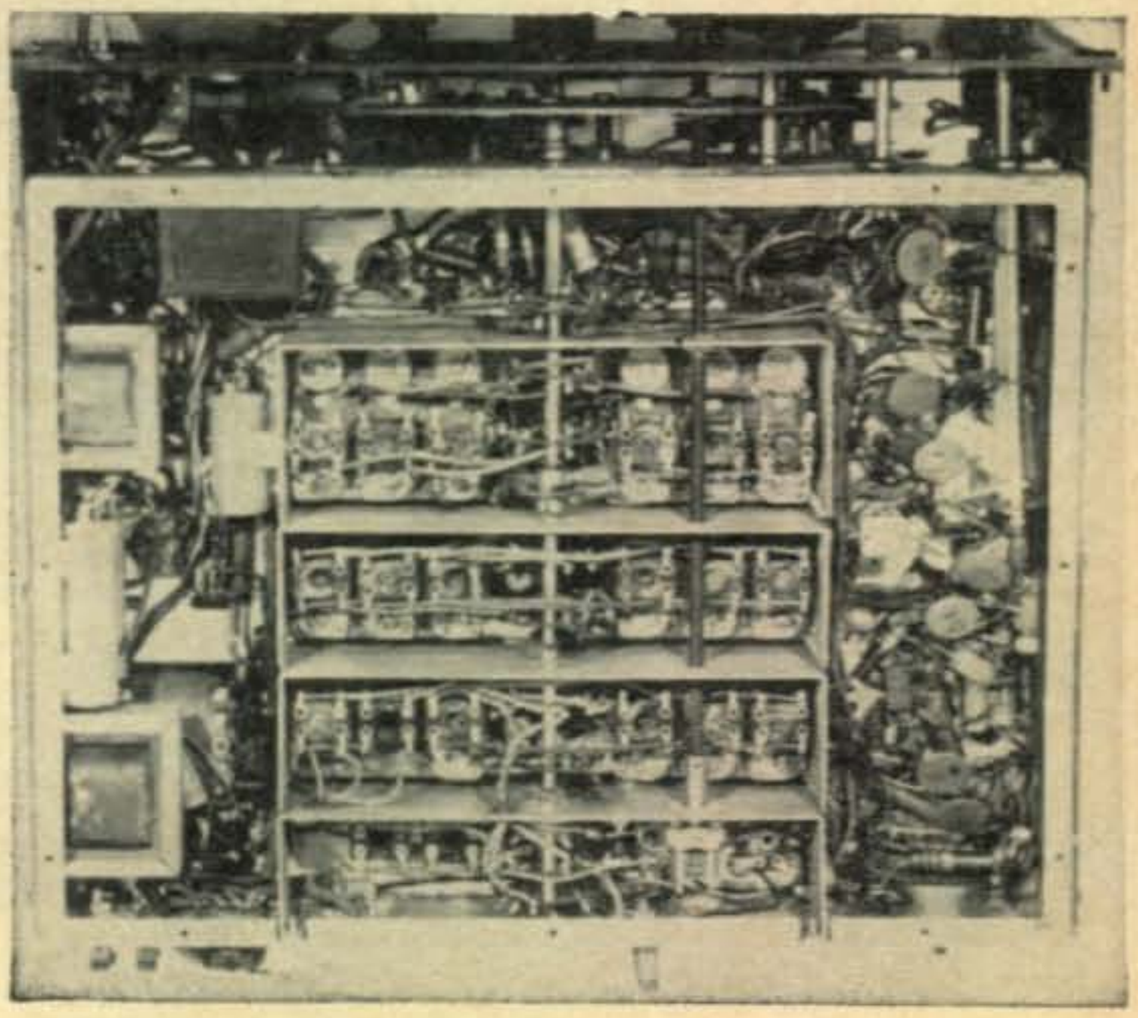
In order to achieve the proper degree of selectivity, it is necessary to add an additional stage of *if* at 455 *kc*. A 6BA6 (alternates 6AU6, 6BJ6) tube, miniature slug tuned *if* can and a handful of resistors and capacitors makes for a very simply constructed *if* stage at a minimum of expense. Best results are

obtained by adding this stage between V6 (6SK7) and V7 (6B8) as shown in fig. 1.

While the construction and insertion of this *if* stage is relatively simple (the only construtcion hint to observe is that of keeping lead lengths at a minimum) the problem is to locate a blank spot on the receiver chassis on which to mount the tube socket and transformer. It seems the designers of the SX-28 packed the components on the chassis like so many sardines in a small tin can. The only solution is to mount the stage on a small aluminum chassis box (about 3 x 3 x 2) and locate this on the left hand top of the chassis next to the 6V6 audio tubes and the output transformer. The leads are then run down through a grommet on the chassis and around to the front underside where the last *if* (T3) is located. It is necessary to make the lead which runs from pin 1 of the new *if* transformer to the plate of V6 (6SK7) out of RG-58/U Coaxial Cable, and do likewise with the lead running from Pin 5 of the 6BA6 to the top of T3. Now locate a 250 Volt point with a *vtvm* and connect a lead from the 2.7 K resistor on the primary of the new *if* transformer (Pin #2) to this point. Run the lead from the 100K resistor marked "To *avc* Buss" in fig. 1 to the bottom of R15, 100 K on T1. This allows you to keep *avc* on the new stage. An alternate arrangement is to merely ground the bottom of the secondary of the new *if* transformer, but experience has shown that the *avc* is necessary on this stage to prevent overloading on strong signals. Connect the cathodes return point to the slider of the *rf* gain potentiometer. The filaments of the 6BA6 are 3 and 4. Ground pin 3 and run a lead from pin 4 to pin 7 on either 6V6 audio tube. The new *if* stage is now installed. Turn on the receiver and tune in a signal from the generator. Adjust the trimmers on the new *if* can until a maximum deflection is observed on the S-Meter or vtvm. It may be necessary to re-tune T3 as well since the new stage presents some additional loading of the transformer. Having done this, you will note that the overall performance of the receiver with respect to selectivity, image rejection and S-Meter reading on the high bands has been vastly improved.







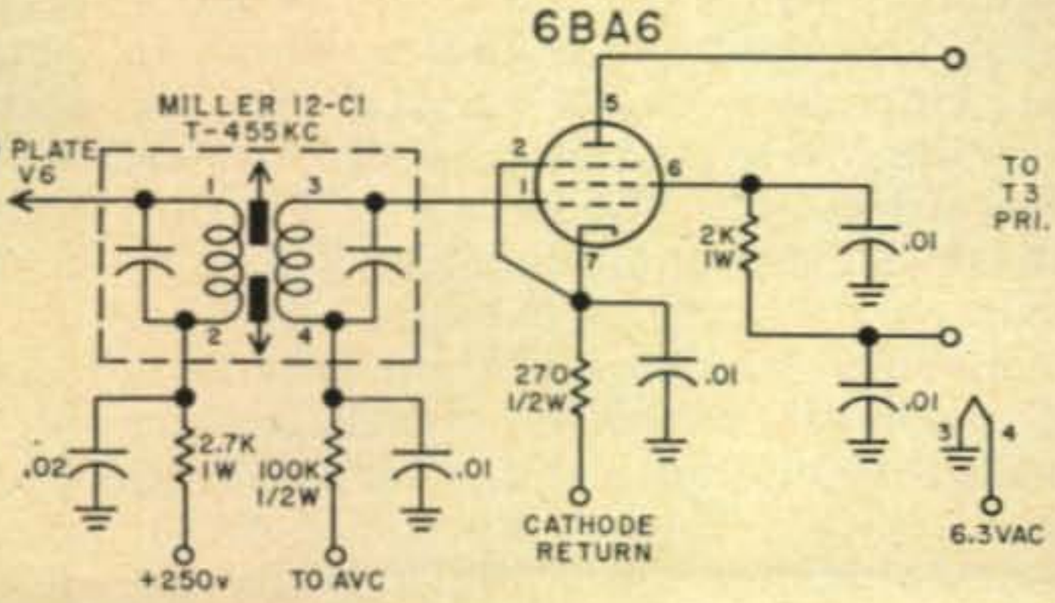


Fig. 1—Schematic of the added if stage.

Receiver Stability

One of the most serious problems that confronts us is the lack of stability in both the High Frequency and Beat Frequency Oscillators. This is due in part to the mechanical construction of the high frequency oscillator, but is mainly attributable to voltage fluctuations in these circuits.

Most of the paper bypass capacitors on the underside of the receiver have most probably deteriorated with age and moisture over the years. It is advisable to replace as many of these as is practical with either new papers of the proper voltage ratings or disc ceramics rated at 600 volts. This step is a good idea in general and may save hours of grief spent in searching for sources of difficulty at a later date. Firstly, it is necessary to add a voltage regulator tube to the oscillator circuits to stabilize the voltage applied to the plates of these tubes. The *hf* oscillator is V4 (6SA7) and the *bfo* is V11 (6J5). The voltage present on the plate of V4 (pin 3) is about 150 volts. An OB2 (VR-105) is mounted on the top left of the chassis next to the 5Z3 rectifier tube and the new *if* stage. As shown in fig. 2 pins 1 and 5 are tied together and connected to the junction of R6 (6.8K) and R71 (4.7K). This puts 105 volts regulated on the plate of V4. Condensers C68 and C69 are 10% tolerance units. They should be replaced with Silver Micas of like value but with a tolerance of 5% or better. This action results in greatly improved *hf* oscillator stability and tends to minimize overall receiver drift. Another suggestion is to include a tiny 6.3V, 1 amp filament transformer strictly for the filaments of V4. This would be connected directly across the line cord and would serve to keep V4 filaments on even when the main ac switch is in the off position. This particular feature is included in the SX-101 and is a real boon to receiver stability. The receiver will now require no warm up time before stability is achieved.

As far as the *bfo* is concerned several modifications are required. Those lucky souls possessing an xtal in the range 456.5 to 457.5 *kc*[1] might do well to add this xtal and modify the *bfo* to a highly stable crystal controlled oscillator. The above mentioned crystal would be for upper sideband reception. For lower sideband the frequency would be between 454.5 and 453.5 *kc*[2]. Both crystals could be added and an upper-lower SB switch installed on the front panel (see figure 3). Figure 3 should be disregarded if you have no desire to include a crystal controlled *bfo*. The *bfo* tube is V11 (6J5). To stabilize the existing circuit disconnect R45 (20 k) from the plate of V11 and run a 100 ohm 2 watt resistor from the plate (Pin 3) to the B plus side of the OB2 voltage regulator previously installed. Replace C73 (500mmf) in the *bfo* transformer (T4) with a 1% zero temperature coefficient ceramic or silver mica. Also replace C71 (100mmf) with a 5% or better silver mica and replace C75 (2 mmf) with a 5 to 7 mmf silver mica. This latter step results in improved *bfo* coupling to the product detector to be discussed later.

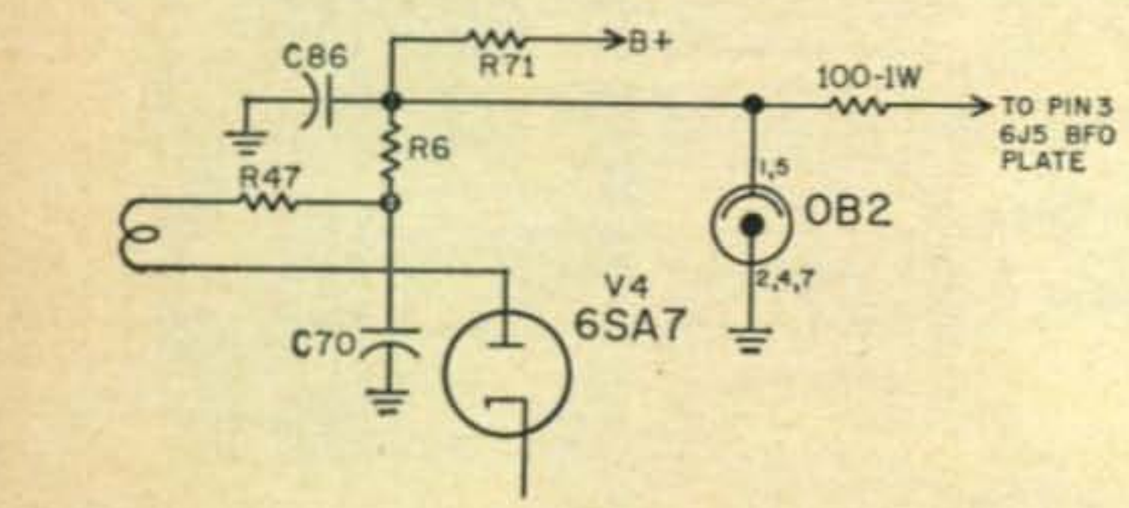


Fig. 2—OB2 regulator stabilizes the hf osc and bfo.

Bandspread Calibration for 15 Meters

In order to achieve bandspread calibration for the 15 meter band (this band was not yet allocated when the SX-28 was designed) one merely pastes a heavy piece of white paper over the upper logging scale on the bandspread dial, sets the main tuning and marks frequency calibrations on this paper in 5 *kc* divisions. An accurately calibrated frequency source will be required for this operation.

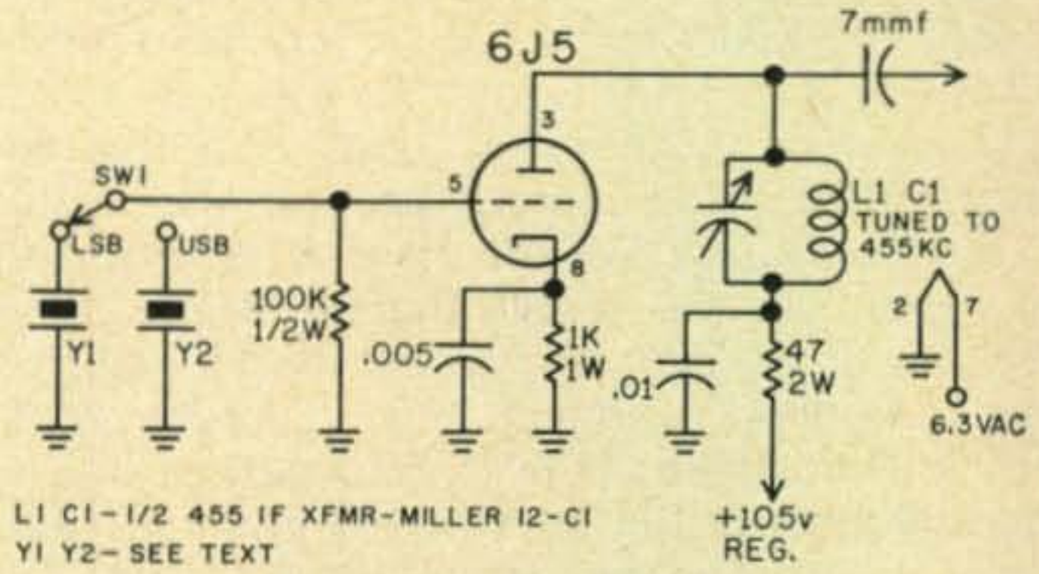


Fig. 3—Crystal controlled bfo.

Modifications for SSB Operation

In order to facilitate ssb reception it will be necessary to add a product detector to the SX-28. Figure 4 shows the circuit that was found to be the most advantageous.

Two 12AU7's are used as three triodes in this circuit. In order to allow distortionless reception with the *rf* gain fully advanced while receiving ssb, proper mandates require that the incoming signal from the *bfo* be ten times as great in amplitude as the incoming *if* signal; this latter is generally about 1 volt and therefore the *bfo* should be capable of delivering at least 10 volts to the detector. The *bfo* in the SX-28 delivers approximately 9 volts with 105 volts on the plate of the 6J5, and reception is completely free of distortion with the *rf* gain at maximum, except on signals of over 40 *db* strength. I did not feel that the additional effort of installing a stage of amplification for the *bfo* was worthwhile since the majority of signals

1. Surplus crystal channel 47
2. Surplus crystal channel 326

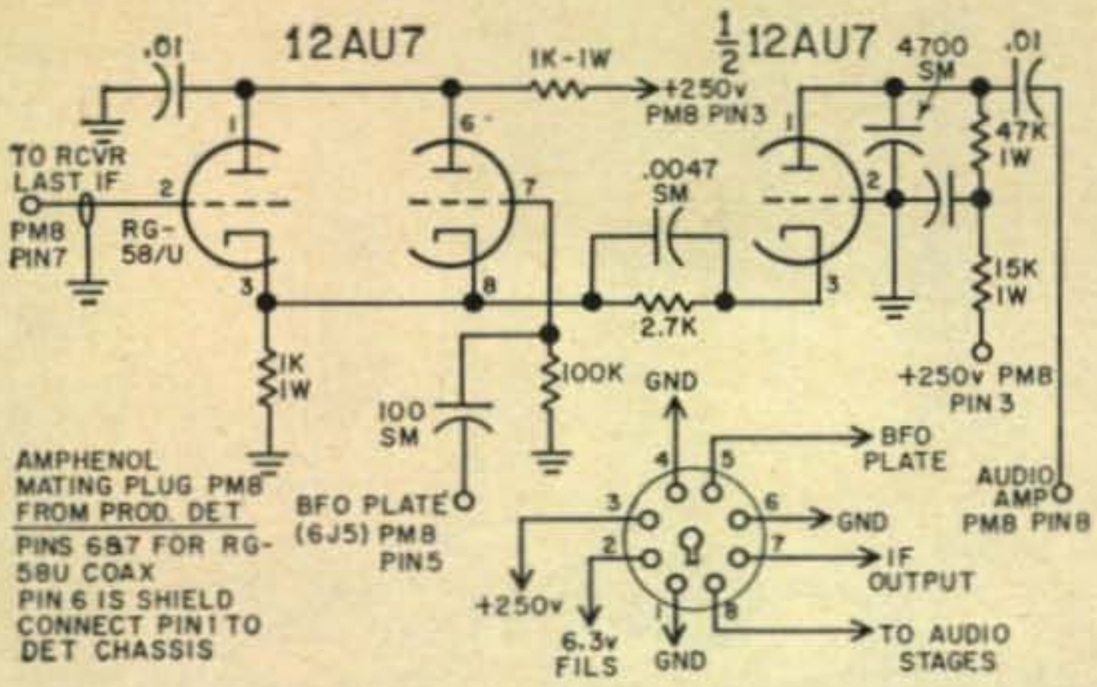


Fig. 4—Product detector and plug wiring. Socket connections are made to the receiver as indicated and the detector plug is wired to match.

received are below the 40 *db* level.

The product detector is simplicity exemplified to build and should be constructed on a small chassis box. An octal socket is mounted on the rear apron of the receiver and the product detector is mounted alongside this socket and connected to it by means of a Amphenol PM-8 plug on a 8 conductor shielded cable.

AVC Modification

Ordinarily, when the receiver mode switch is thrown into the *cw* position, the *avc* buss is grounded through the action of SW_3A. It will be necessary to lift the wire running from the *avc* buss to this switch section in order to keep *avc* on the receiver at all times. The S-Meter will now function on CW and SSB.

For those really finicky amateurs, it may be desirable to increase the delay on the *avc* buss. You can experiment by hanging various values of C between .1 and 1 mf from any point on the buss and observing both the sound of the received ssb signal and the S meter action. Surprising results can be obtained this way, but since every amateur has his own idea of perfection it must be left to individual discretion.

Once you have dragged out the soldering iron and actually performed the above operations, the resulting improvement in the SX-28 will give you many more years of listening pleasure; for the receiver is truly "Updated," 1959 style. Good luck. ■

CQ Reviews

The Knight-Kit Span-Master

The Allied folks have come up with another "simplicity exemplified" Knight-Kit. The Span-Master is a regenerative type receiver which covers standard broadcast as well as short wave, including American and foreign broadcasts, amateur phone and cw, ships at sea, and aircraft. The professional, contemporary styling of the cabinet makes this a receiver you'll be proud to display. The dials are clearly marked in white against black for added tuning ease and the panel is anodized aluminum.

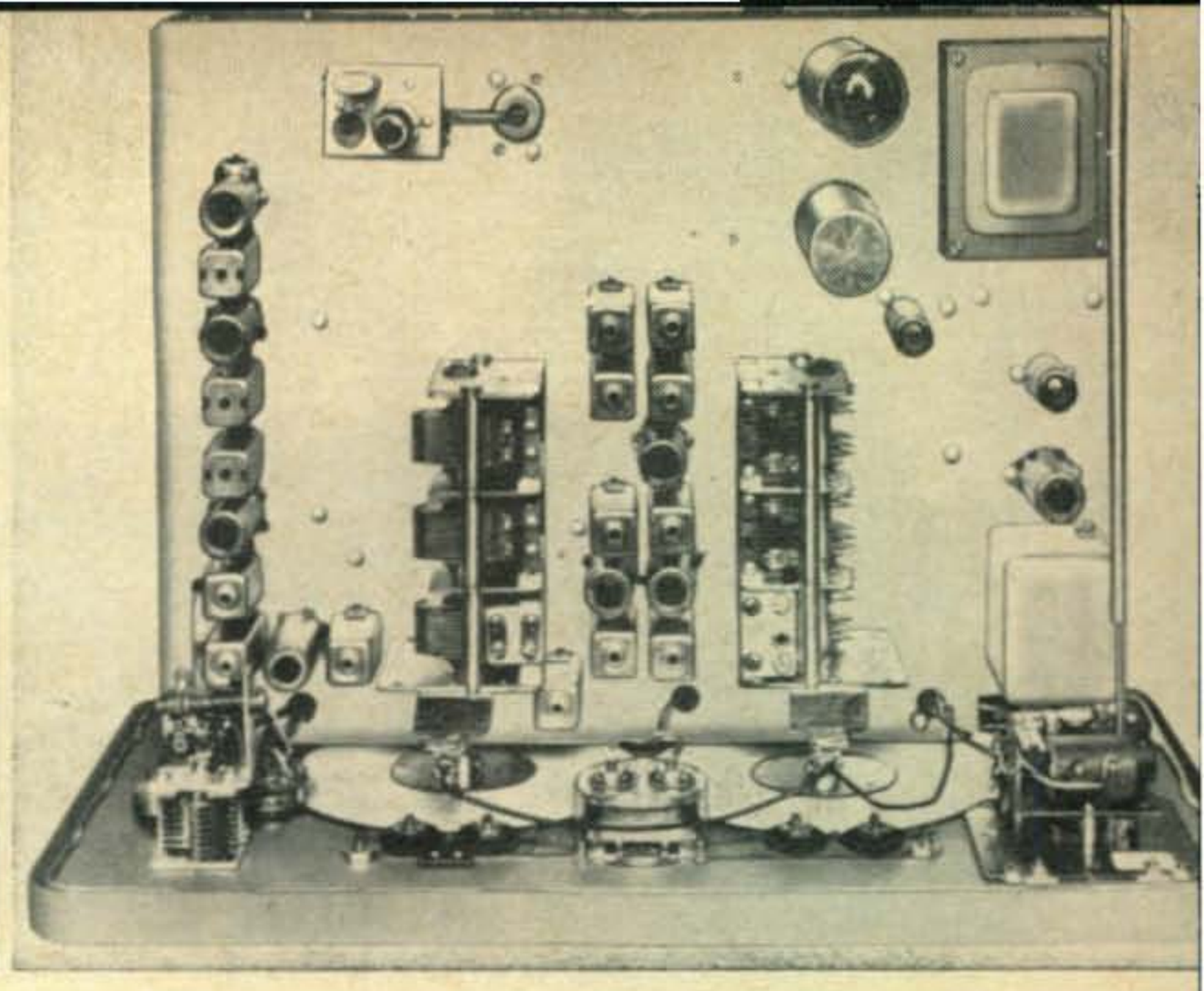
The money you conjure up by scrimping on lunches for a while buys you a host of features and the actual construction of the unit requires about 5 hours of the time you'd normally spend watching "The One eyed Monster" Like most Knight-Kits the assembly instructions are of a simple, clear and concise, step-by-step nature.

The Span-Master covers the frequency range 54 to 30 *mc* in four bands The unit also has electrical bandspread, which simplifies tuning crowded amateur bands and a built-in 4″ *pm* speaker as well as a headphone jack located on the rear panel. A Speaker-Phones switch is also included.

Technically, the Span-Master contains a 6B-Z6 operating as a regenerative detector. Two regeneration controls are brought out to the front panel; one for coarse and one for fine adjustment. By carefully adjusting the fine control, signals of extremely low intensity can be received. Once the signal is detected, it drives a half of a 6AW8 (triode section) which functions as an audio driver stage. This in turn drives the pentode section of the same 6AW8 which serves as the audio power amplifier and feeds the output transformer and phone jack.

One praiseworthy construction feature of the Span-Master is that the hook-up wire supplied is pre-cut to length and has the insulation already removed.

All in all, the Span-Master is a technically excellent and economically sound investment. ■



CQ Reviews

The HQ 145

The pleasing "New Look" has certainly invaded the amateur receiver field. Since many of the modern installations end up in the den or even the living room in many cases, the manufacturers have acceded to the pleas to dress up the drab black boxes which have large ugly dials all over the panel. Hammarlund has been one of the shining examples of manufacturers following this eye appealing trend. As the last piece of packing was removed from the new HQ145 — the broken fingernails left for subsequent repairs, — the distaff side was generous with their "ohs" and "gee, that's pretty."

Of course, to the skeptical, seasoned ham these outbursts were met with the usual "hmmm" and "let's see what makes it tick." To the surprise of this skeptic, the HQ145 performed as well as its good looks indicated right from the beginning.

For the amateur who wants a general coverage receiver with excellent selectivity, good image rejection on the higher frequencies, and, —wonder of wonders—an audio response that makes good music sound like good music—the HQ145 fills the bill all the way around. It is an eleven tube super with double conversion on frequencies above 10 *mc* and the complete frequency range is from 540 *kc* to 30 *mc*. A special 20 meter band spread position on the selector switch and special band spread ranges of 21.0 to 21.6 *mc* and 28.0 to 30.0 *mc* are included in the double conversion process. Electrical bandspread tuning is provided with direct calibration every 10 *kc* on the 80, 40 and 20 meter bands; every 20 *kc* on the 15 meter band and every 50 *kc* on the 10 meter band. One feature that has only been incorporated in the very expensive receivers up to now is the adjustable hairline marker which is an excellent calibration aid and an almost absolute necessity for precision operating.

The block diagram (fig. 1) shows the complete tube complement of the HQ145 together with the functions of each tube. Let us dig into the receiver and see what features it has that set it apart from its predecessors. A quick look at the *rf* stage reveals that both the grid and the plate circuits are tuned (except the plate circuit on the broadcast band). This gives added "oomph" to the signal on the grid of the first mixer tube (V2) and helps to accomplish a favorable signal to noise ratio. It was quite apparent that this signal to noise ratio was very favorable especially when copying DX signals in the foreign section of the 20 meter band. This receiver was checked during one of the DX contests and did itself mighty proud. The antenna compensator adjusts from the front panel giving a sharp peaking effect to the signal and offering an additional aid to gain and selectivity.

The converter stage uses a 6C4 separate oscillator (V9) and a 6BE6 mixer (V2). This combination is a hard one to beat for stability. On the lower frequency bands—those below 10 *mc* — the local oscillator beats 455 *kc* above the signal frequency. However, in the interest of image rejection, on frequencies above 10 *mc* the local oscillator is 3035 *kc* above the signal frequency. This gives excellent image rejection and on the 28 *mc* band the signal generator output had to be increased 10,000 X before an image could be found. This means that before an image was noticed the input signal had to be at least 10,000 microvolts. When the bandswitch is on the lower frequencies (below 10 *mc*) the crystal oscillator of the 2nd converter tube V3 ceases

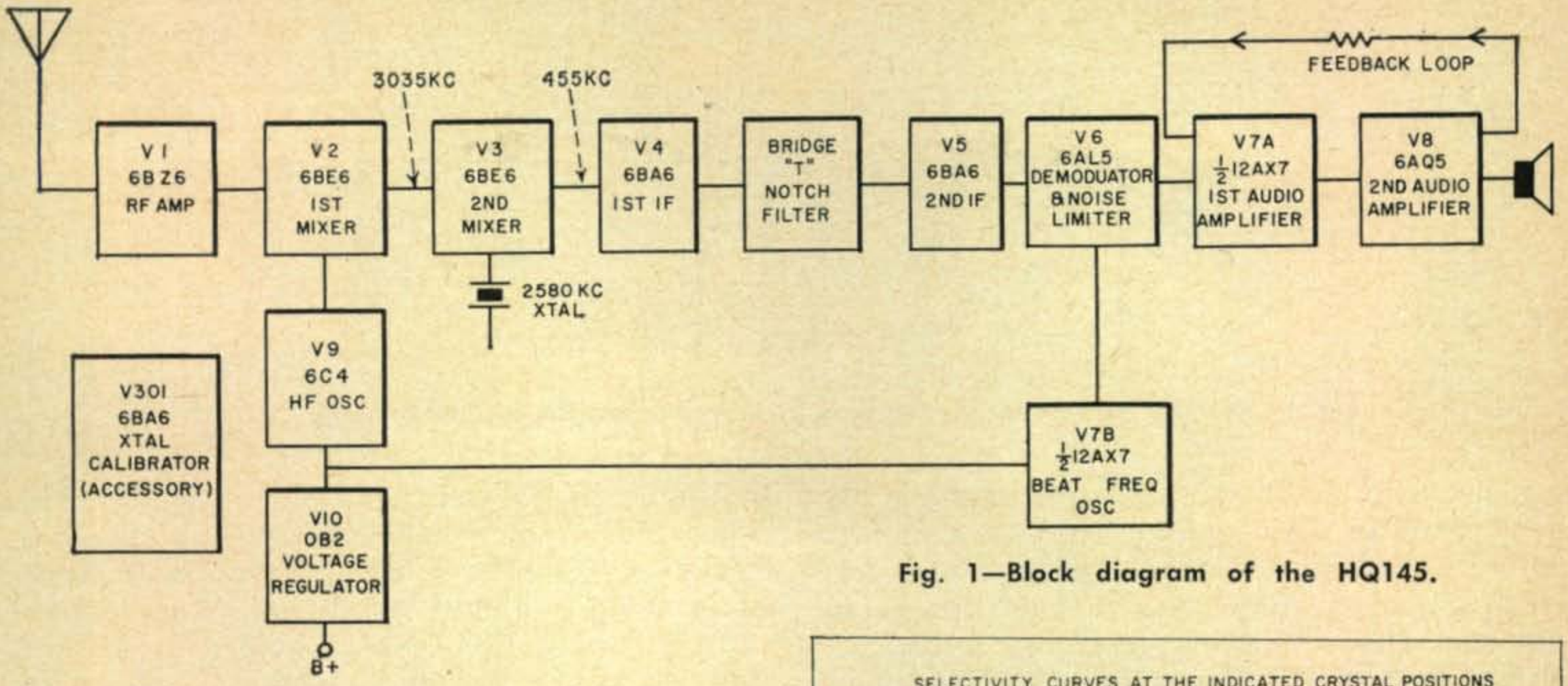


Fig. 1—Block diagram of the HQ145.

to operate and the sage becomes a regular 455 *kc* amplifier.

For the regular Hammarlund user, the 455 *kc* crystal filter in this receiver is nothing new but to the uninitiated, the Hammarlund crystal filter circuit is a pleasant surprise. When the going is rough and it takes real honest to goodness selectivity to "cut the mustard" on those weak ones, the Hammarlund crystal filter shows itself to best advantage. The selectivity curves (fig. 2) supplied by the manufacturer were remarkably accurate when checked with a BC221 and a Ferris Microvolter.

One of the most noteworthy additions to this receiver is the slot filter. With this little gimmick it is possible to take a "40 over 9" heterodyne and notch it out completely. In cases where some unthinking operator will choose a frequency just enough removed from yours to ruin a swell QSO and insist on tuning up on the frequency, it is possible to notch out the offender and carry on as though he wasn't there. This filter is practically indispensable on CW and in the novice bands it makes operating a pleasure instead of a chore. Don Stoner W6TNS first described this circuit in the New Sideband Handbook on Page 189 as it was used in the HQ170 receiver. It consists of a low impedance network which forms a balanced bridge arrangement known as a Bifilar "T" trap. The slot filter inductor L3 (fig. 4) and slot tuning capacitor C22 together with C20 and C21 form a tuned circuit which presents a very high impedance to signals passing through at the resonant frequency. This is quite evident when one sees the attenuation pictured in fig. 3. This slot may be moved across the *if* bandpass by tuning C22 and the depth of the slot may be adjusted by the resistive balance control R21 which is marked Slot Depth on the panel.

A series type noise limiter is included in V6. The reduction of automobile ignition interference was good when this noise limiter was switched in and it was one of very few that

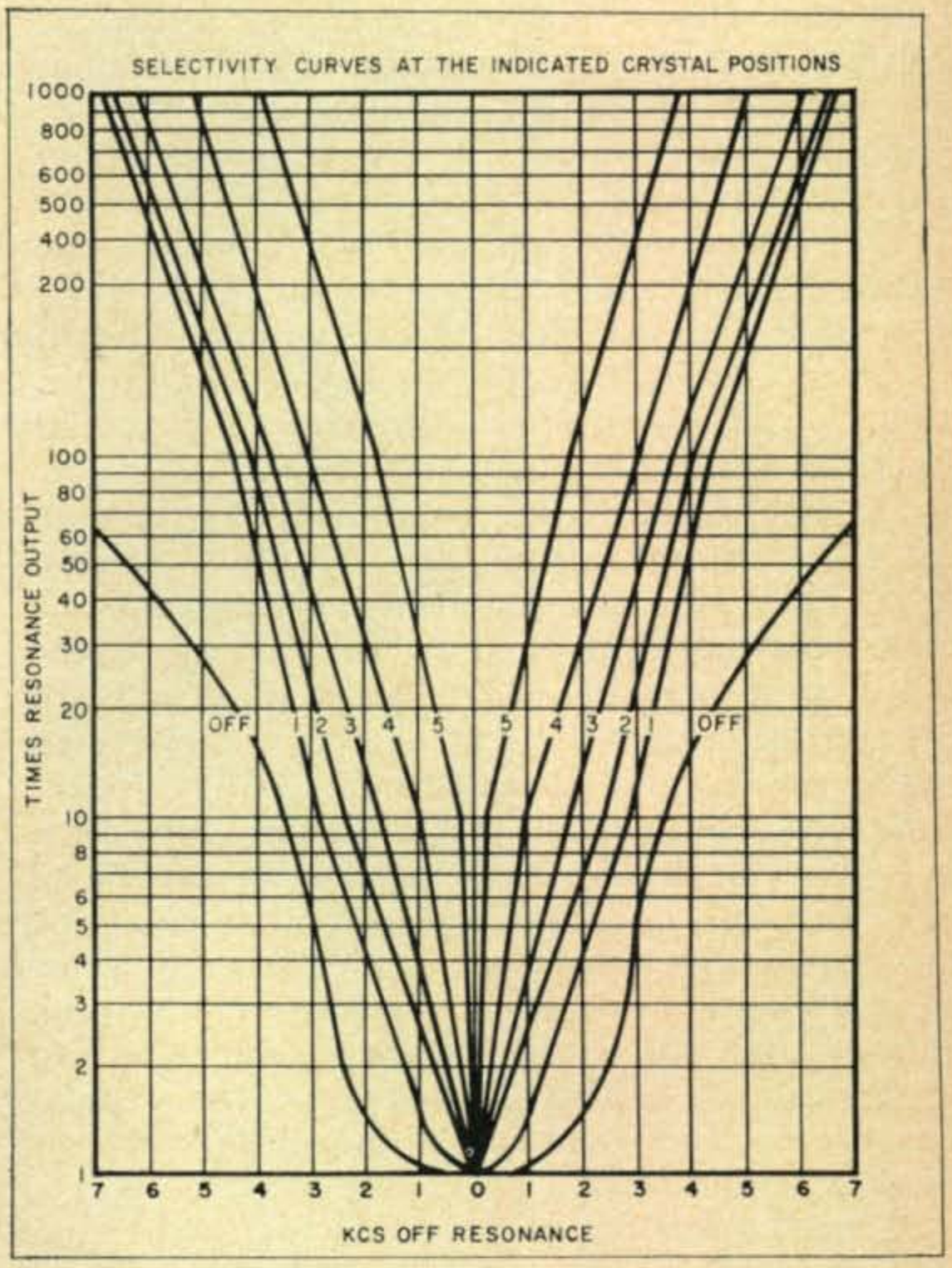


Fig. 2—HQ145 selectivity curves.

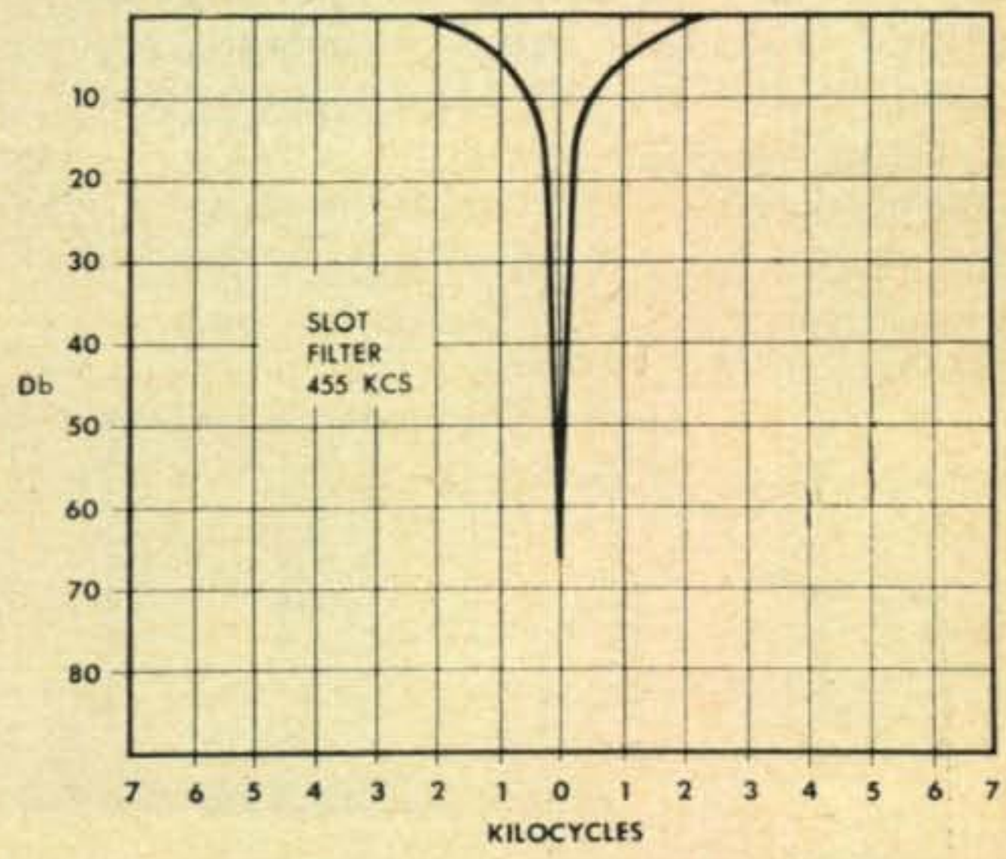


Fig. 3—Slot filter response curve.

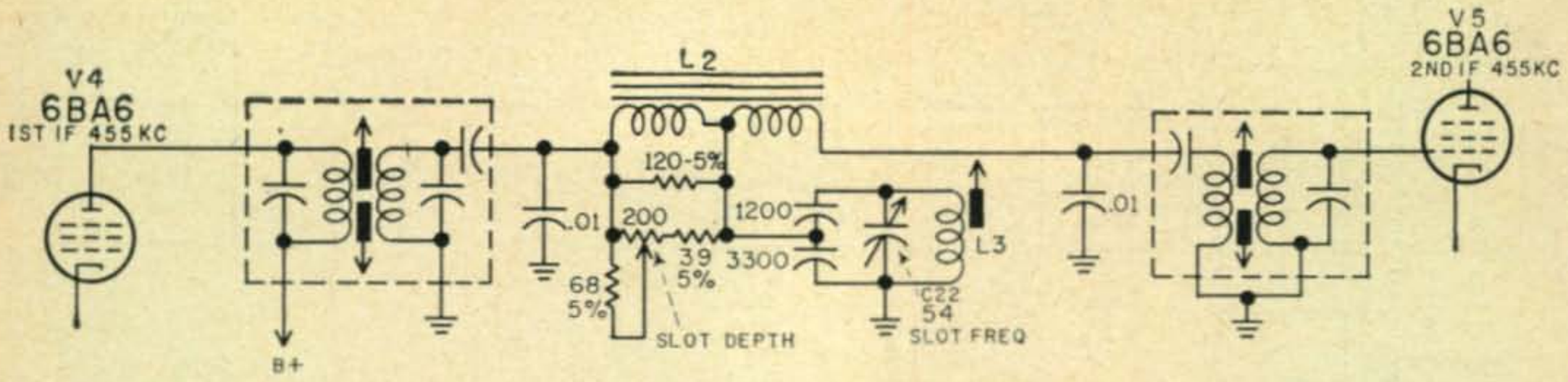


Fig. 4—Slot filter schematic. The slot may be moved across the if bandwidth by C22.

have been tested that maintain intelligibility when placed in the circuit.

Of the many communications receivers tested, few had audio quality that compared with the HQ145 when receiving broadcast stations. Still, on the amateur bands the quality seemed to adjust automatically to the strength of the signal. As the audio gain control was advanced the signal began to assume typical communications quality. A peek at the audio circuit (fig. 5) explained everything. Note that the low end of the volume control is not grounded directly but has a 47 ohm resistor in series with it to ground (R28). The junction of this resistor and the volume control is connected to the secondary of the output transformer through a 100 ohm resistor, R31. This provides a variable negative feedback which is controlled by the setting of the audio gain control, R27. At low settings of the control a maximum of feedback is provided giving good quality on these settings where sufficient volume is present, ie—broadcast stations. As the volume control is advanced less and less feedback is provided and the audio response changes — see fig. 6. This gives a measure of audio selectivity on weak stations and results in an increased signal to noise ratio. A further advantage is the critical damping of the speaker for the elimination of speaker "hangover."

Perhaps the most necessary item in the modern receiver is a really stable beat frequency oscillator with enough injection voltage to copy SSB adequately. The HQ145 was substituted for the usual sideband receiver and used to receive sideband over a week of operating. Although sideband selection is not incorporated in this receiver it does a very creditable job of receiving these signals. This is because of the excellent stability of the beat frequency oscillator which uses a Colpitts circuit with a high L to C ratio and temperature compensation. No difficulty at all was experienced even when working ten meter sideband stations and the tuning was almost as easy as on regular AM reception.

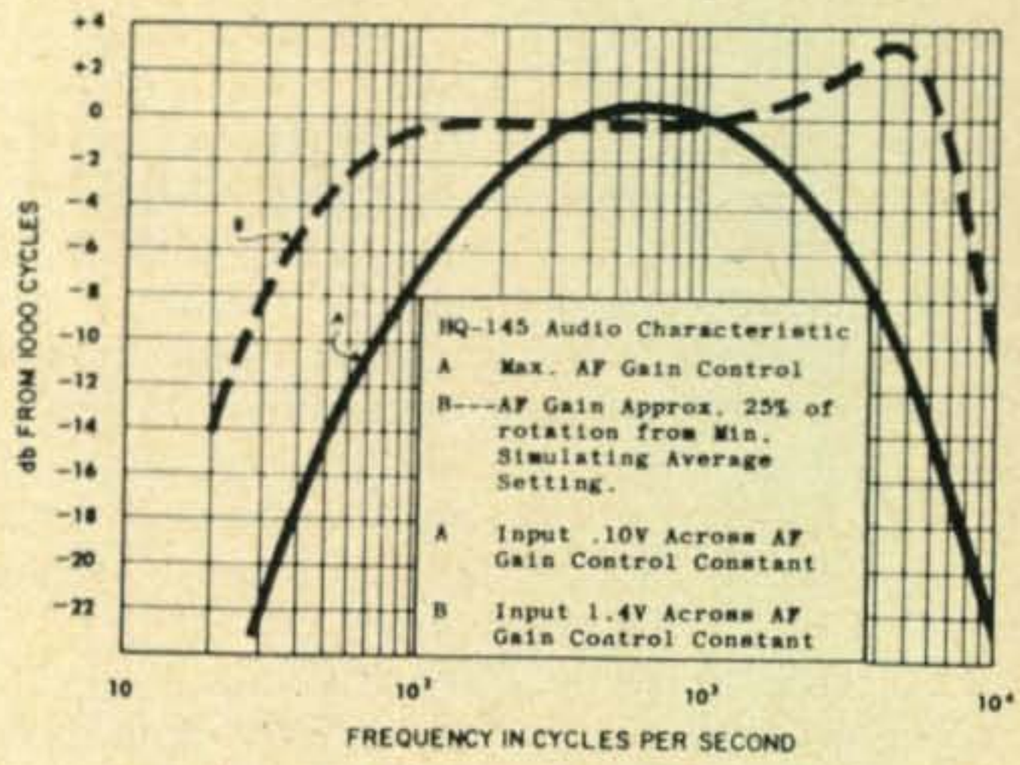


Fig. 6—Auto response curves.

Optional accessories on the receiver include a 100 *kc* crystal calibrator and a nice little electric clock which balances the panel symmetry. It is difficult to imagine operating in these crowded bands of today without some sort of calibrator, and this little accessory fills the bill very nicely.

This all adds up to a mighty good little receiver which should give the average ham years of trouble-free and consistent service. Its neat, ship-shape appearance goes a long way toward manicuring the looks of the operating position and its performance will satisfy even the most particular operator. ■

Adolph F. Suchy, W2KHE

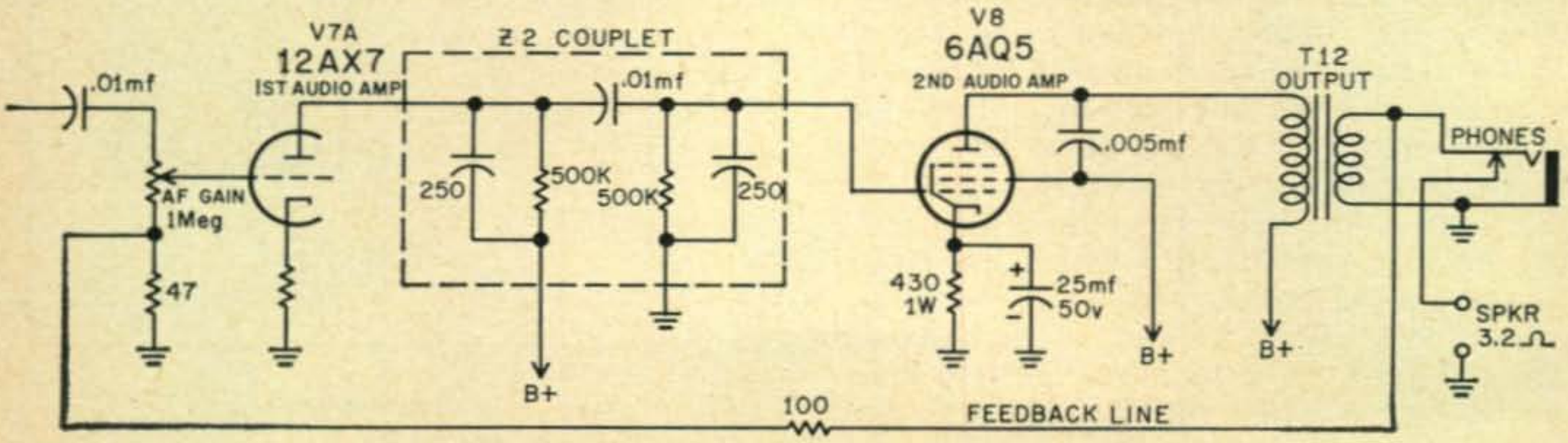
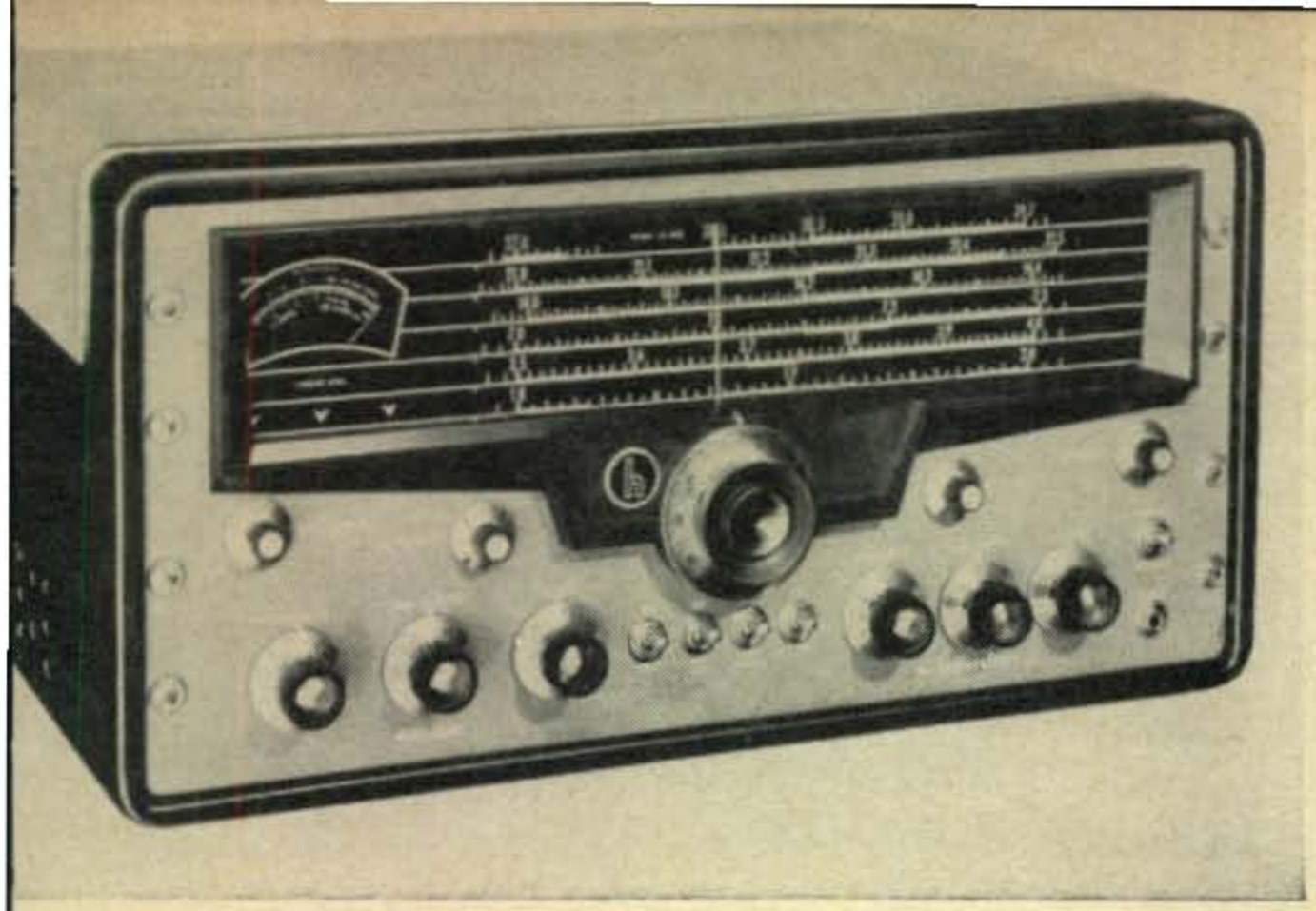


Fig. 5—Audio amplifier illustrating the automatic feedback.



CQ Reviews the

SX 101 Mark III A

A little over two years ago the ham bands were alive with the news of a new receiver about to challenge all existing receivers for stability, selectivity and ease of handling. One could hardly listen to an SSB QSO without the subject coming to the fore. Excitement ran high among the AM boys and the CW gang haunted the local ham emporiums from Boston to Frisco. Finally came the day when the now famous Hallicrafter SX101 made its appearance and the plaudits for the receiver began to be heard on every band. "Best receiver I ever owned; boy, what selectivity; stable as a rock" were the general evaluations of the fraternity.

Since then, thousands of SX100's began to make their appearance in ham shacks all over the world with the general comments that "this is a receiver that is going to be hard to beat." However, Bill Halligan's boys did not allow this to go to their heads but took another look to see how a good receiver could be made better. Hence, the SX101 Mark II came upon the scene with good stability made into better stability and a few refinements that added to our operating pleasure. More SX101's ended up in the receiving positions of ham stations. Again the Hallicrafter gang decided that there was just a little bit of drift (about 250 cycles) that they could eliminate and the Mark III with

[*Continued on page 100*]

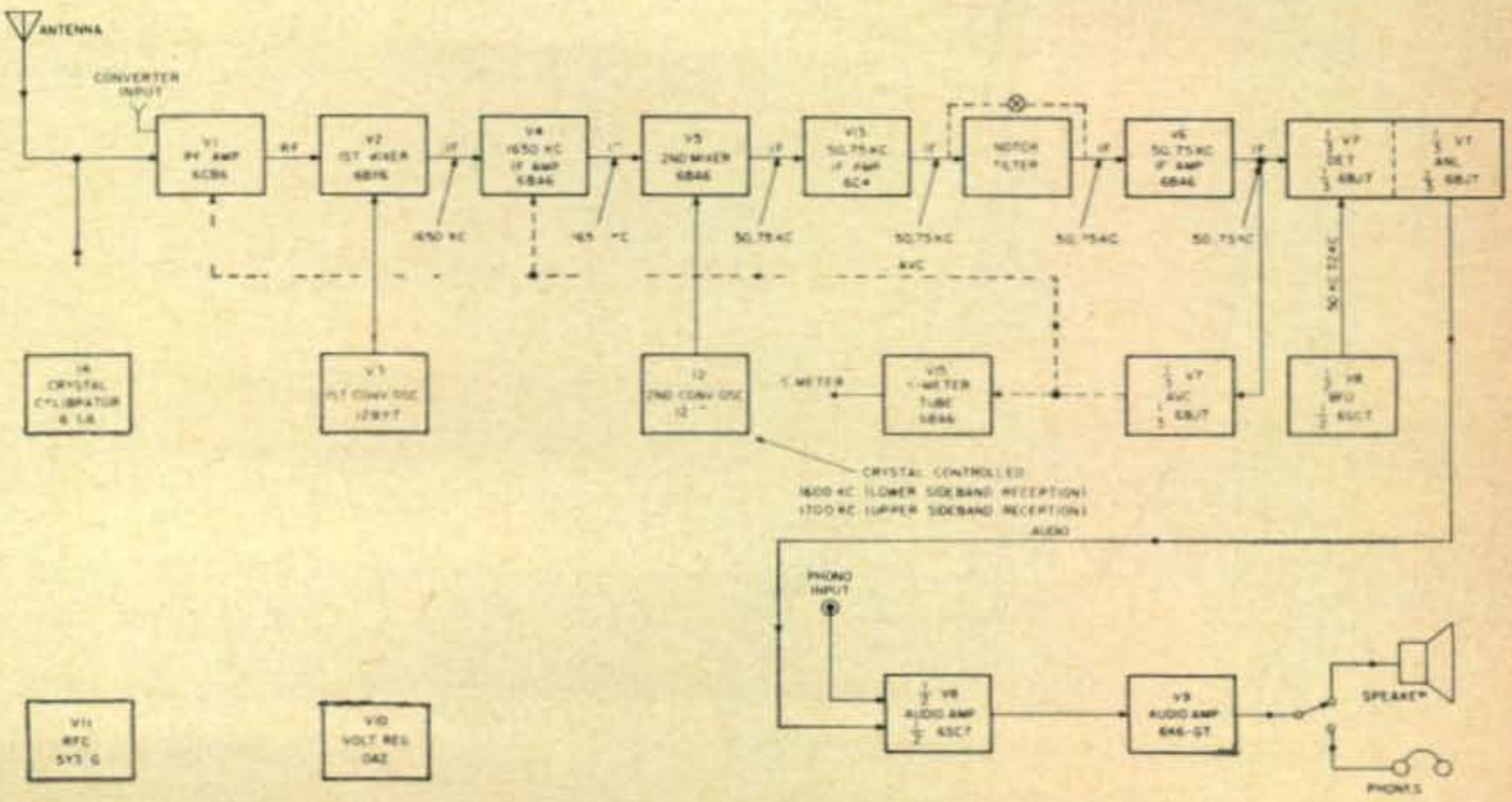


Fig. 1—Block diagram of the SX 101 Mark III A.

A Squelch—That Works!

Donald L. Steinbach, W7FLC
P. O. Box 536
Fairfield, Montana

Most of the new mobile receivers have come on the market with a self-contained squelch unit to mute the audio of the set unless a signal is being received. The author, like many other hams and SWL's, often desires to monitor a particular frequency for a possible call, or just wants to listen to aircraft, police, etc., without a lot of annoying static coming through most of the time. Most of us like to do this at home or in the shack, but who has provided us with a squelch for our fixed receivers? Such was the problem of W7FLC, and here is what was done about it.

One day it was decided that the SX-96 must have a squelch. It must be sensitive, *above all else*. It must work satisfactorily with the usual high noise level, and it must use parts and circuitry that all of us could afford. Back issues of *CQ* and *QST* for the last three years were examined and two circuits were found. Both of these were built and tested with truly remarkable results — neither worked!

Now what?

The control tube, it seemed, would have to have a pretty good amplification factor as well as a steep negative grid voltage vs plate current curve to be sensitive enough to do any good on the weaker signals. After all, who needs a squelch on the broadcast-band? Down came the tube manuals. It seemed that one section of a 12AT7 should work just about right. See fig. 1. The triode section of the 6AN8 or the 6C4 weren't too bad, but the plate currents were somewhat high (30 to 40 ma.) on the steeper portion of the curve and it was felt that the relay sensitivity would suffer. Out came the soldering gun and the starting model of fig. 2 was assembled. This out performed the two previous units with no trouble at all (but as the noise level increased, R1 had to be set so near the 'ground' end that changes in *avc* caused no changes in grid bias on the 12AT7. When the grid is tied to the chassis even 1000 volts *avc* couldn't bias the tube. This defect was remedied by the addition of a plate voltage divider as shown in fig. 3. A cathode divider was also tried but was unsuccessful. Usually R1 is set for maximum grid bias and the voltage to the 12AT7 adjusted to cut off at normal noise level. With a very high noise level it is necessary to set

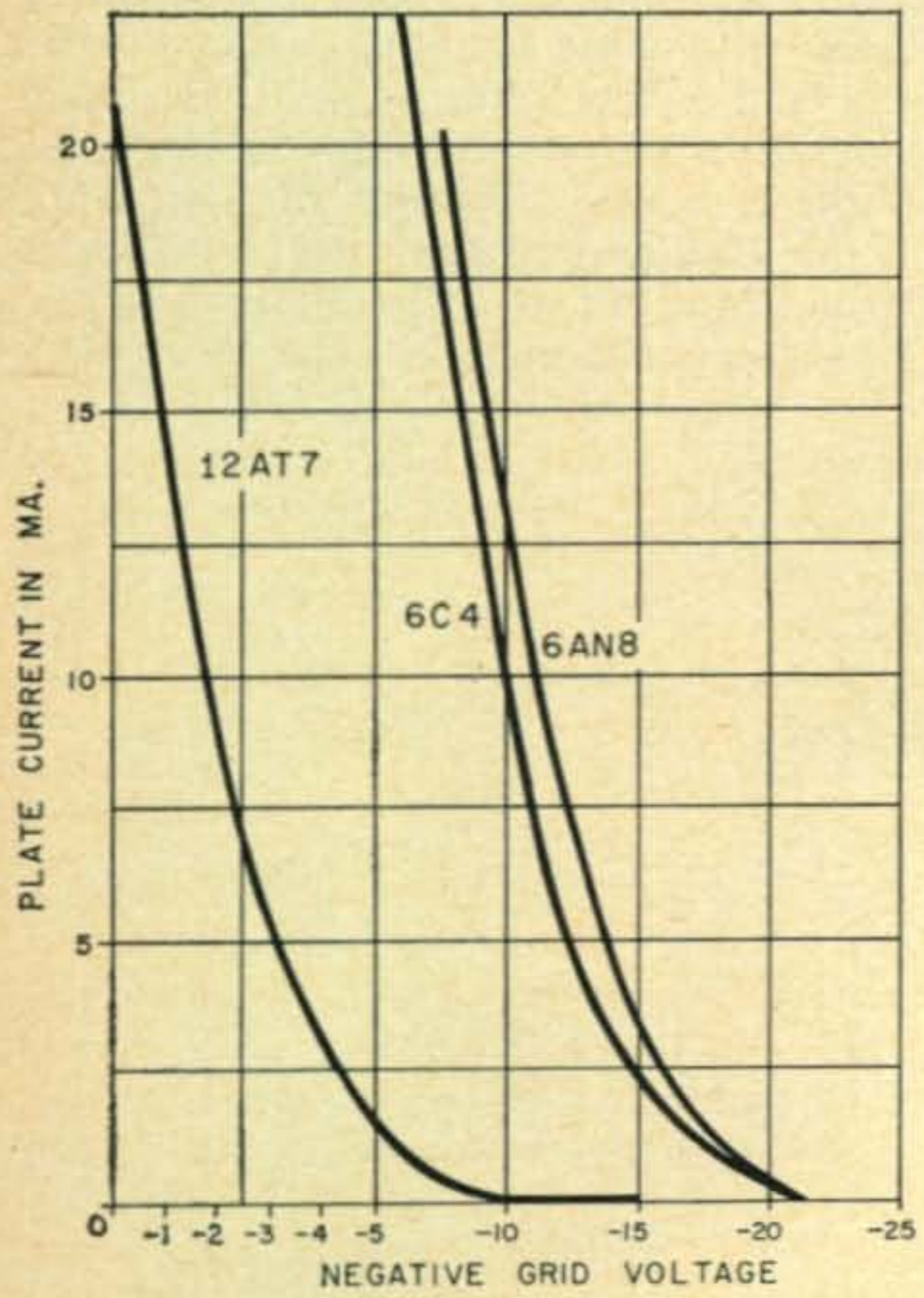


Fig. 1—Comparison of the 12AT7, 6C4 and 6AN8 characteristics.

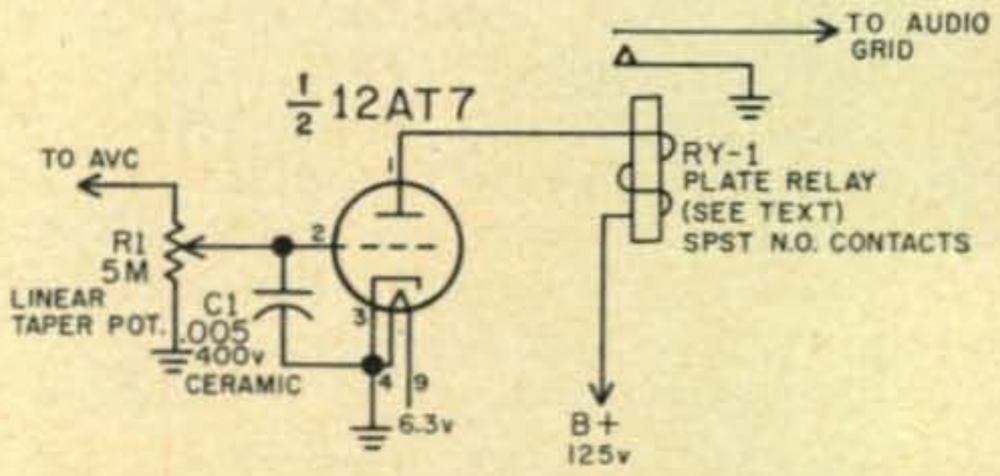


Fig. 2—Basic circuit worked well when the noise level was high

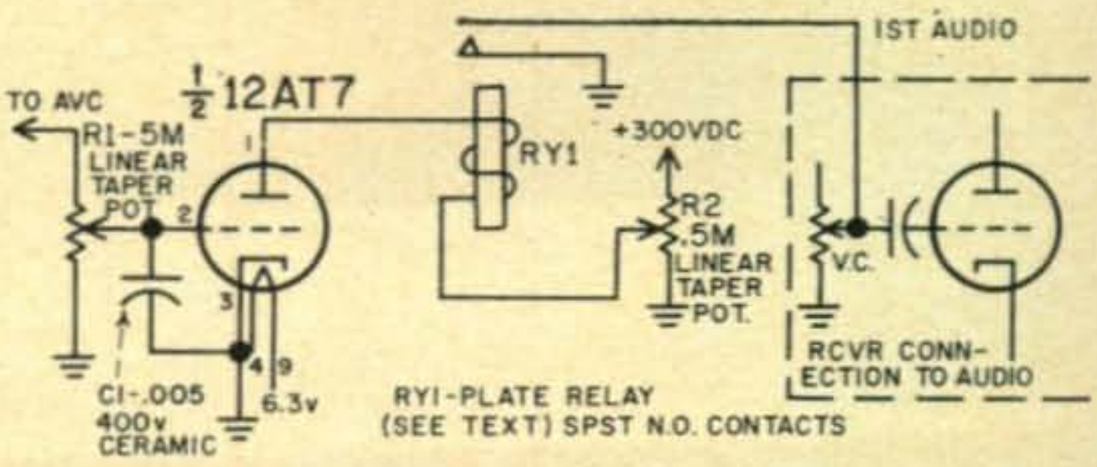
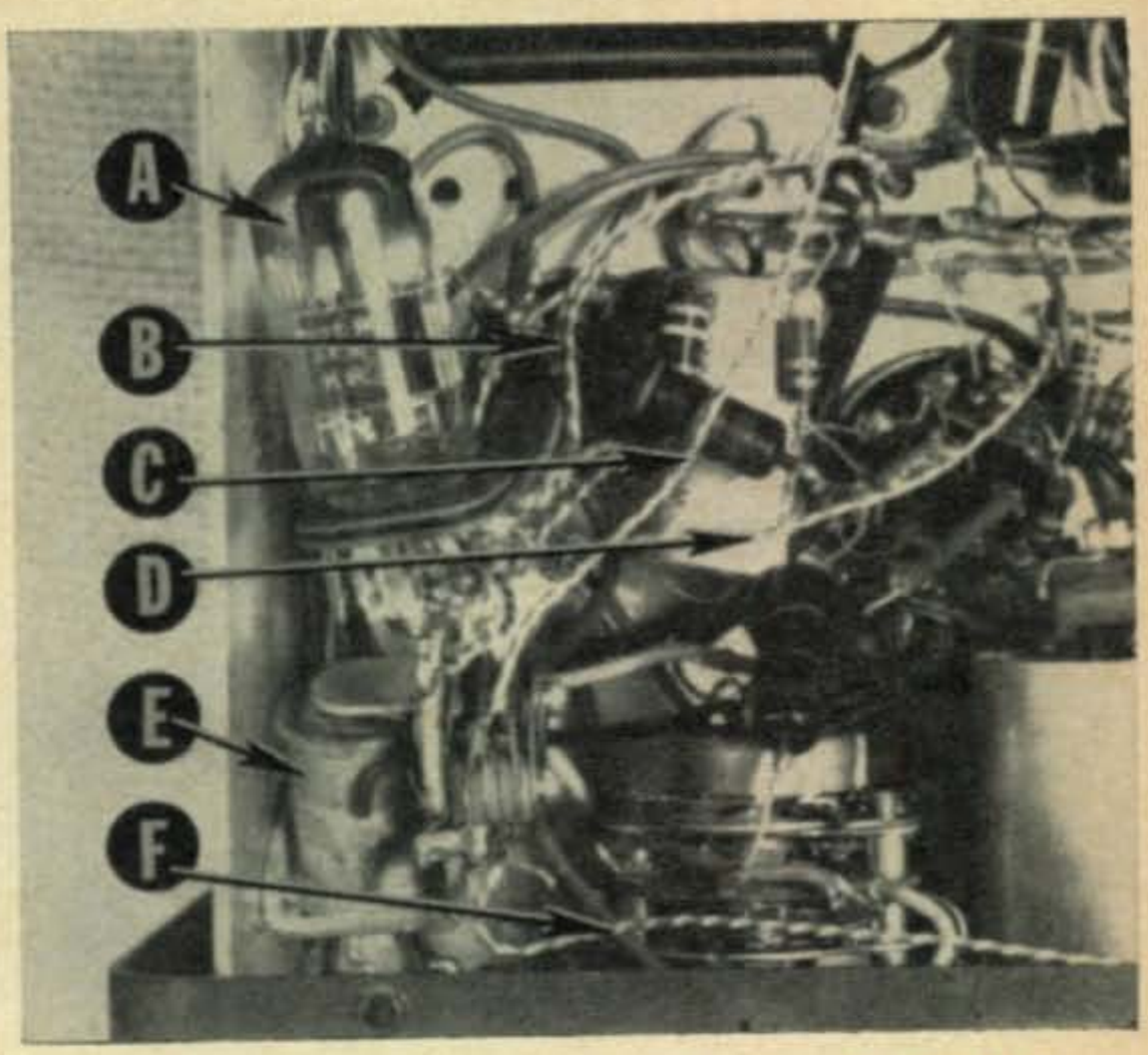


Fig. 3—Addition of R2 to act as a plate voltage divider provided more critical adjutsment.

the plate voltage at maximum and lower the bias to the tube with R1.

Tests on the improved version indicated that with a 20 over 9 noise level the squelch would respond to a 29 over 9 signal. Next R1 was set at maximum resistance and the *rf* gain control was varied to take care of the noise level. This was much better. With a 20 over 9 noise level the squelch would now open on a 22 over 9 signal. The normally open contacts of the relay were used to short the audio ahead of the capacitor in the first audio grid. The 3000 ohm relay came out of the junk box, although a more sensitive unit would no doubt work much better. Standard components were used throughout and carbon potentiometers were used for R1 and R2. A switch may be added to turn off the filament voltage, but is not necessary.

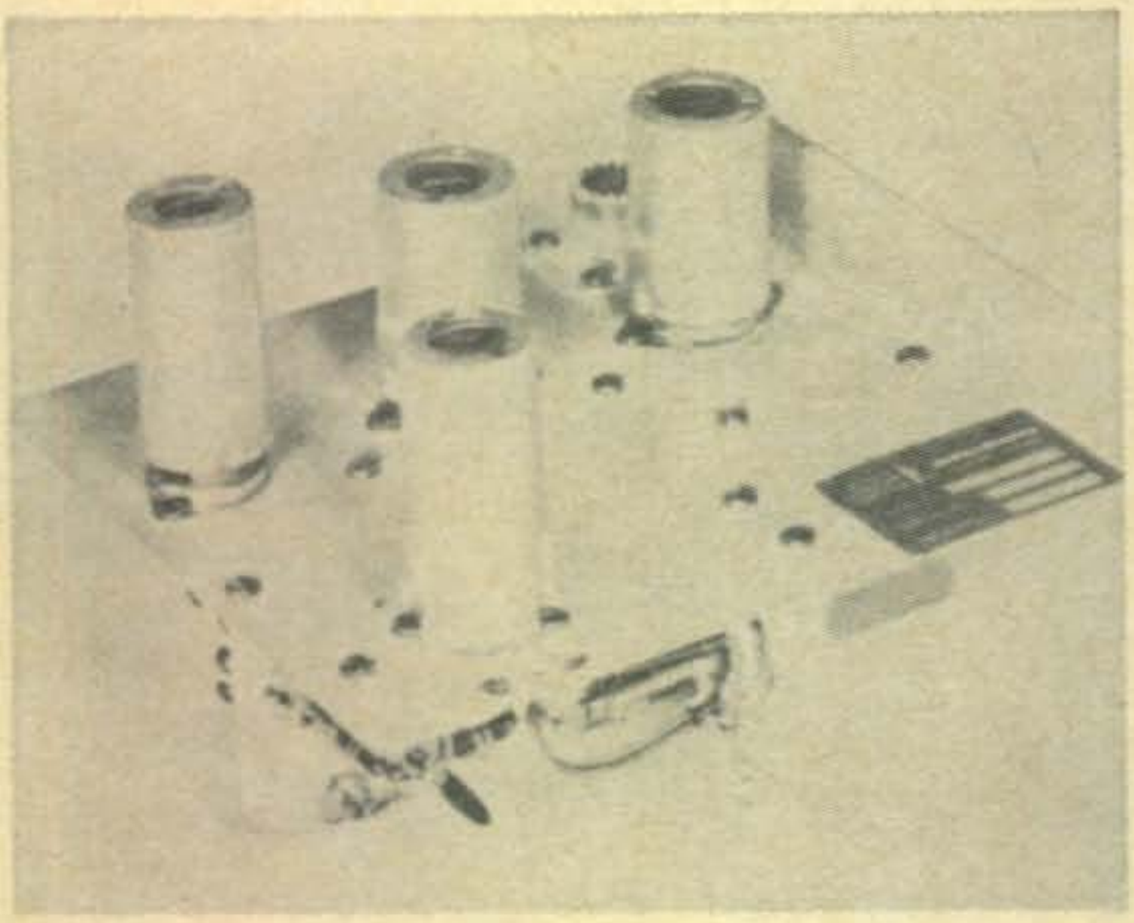
The unit is small enough to be tucked into any spare corner in the receiver and can be built as shown of entirely new parts for $5.16 using a *Sigma "F-6000G-SIL* relay. With the adjustable plate voltage any plate relay should work. All leads, including audio, were somewhat long, but no shielding was needed. This gadget works very well on all bands — even 40 and 80 meters with their high noise level. It will even follow CW signals. One note worth remembering: don't use the relay contacts to turn the B+ on and off, because it won't work! ■



Lead dress and component placement; A-12AT7; B-filament lead; C-B plus from R2; D-avc lead; E-relay; F-audio lead.

CQ Reviews

The Ameco Model AM Converter



Another interesting product gracing our workbench is a little 2 meter converter put out in the Golden Valley of The Sun, Phoenix, Arizona, by Ameco Division of Antennavision, Inc.

This unit is available in a variety of forms, all of which are meant to enhance the front end of that surplus SCR-522 stored in your cellar. While the unit has a 12 *mc if* output frequency just ideal for the 522, it is also available in other *if* frequencies for application to other gear. Models are available for either tunable or crystal controlled operation, with the latter being designed for Unicom, CAP and CD frequencies. Other models for 6 and 10 meters also available.

TECHNICAL SPECIFICATIONS

Noise figure: Better than 6 *db*
Gain: 20 *db*
Sensitivity: 1.0 *mv.*
Frequency Range (Tunable Model): 141.9 to 154.25 *mc.*
Tube Complement: 6AJA——, 6AM4—— } Cascode *rf*
6BC5——Mixer
6J6——Oscillator

The AM converter appears to have excellent stability and is certainly a reasonably priced means to high quality *vhf* reception. When tied on to my two meter vertical and compared to a popular crystal controlled converter ahead of my 75A3 the difference was negligible. With the Ameco AM and all those surplus 522's, there is no excuse for our not filling all those empty kc on 2 meters, huh?

144 Mc. Broad Band Receiver

John Wonsowicz, W9DUT
4227 N. Oriole Avenue
Norridge 34, Ill.

The use of xtal converters on 2 meters is good practice, providing the converters are of good quality and aligned properly. They must also feed into a receiver of better than average and extreme care must be exercised in shielding the inputs to keep out surplus beats from TV and commercial kilowatters. Usually such a set-up runs into a pretty high figure and unless you own an oil well, you might have to be content with something less than the Rolls Royce of communication equipment.

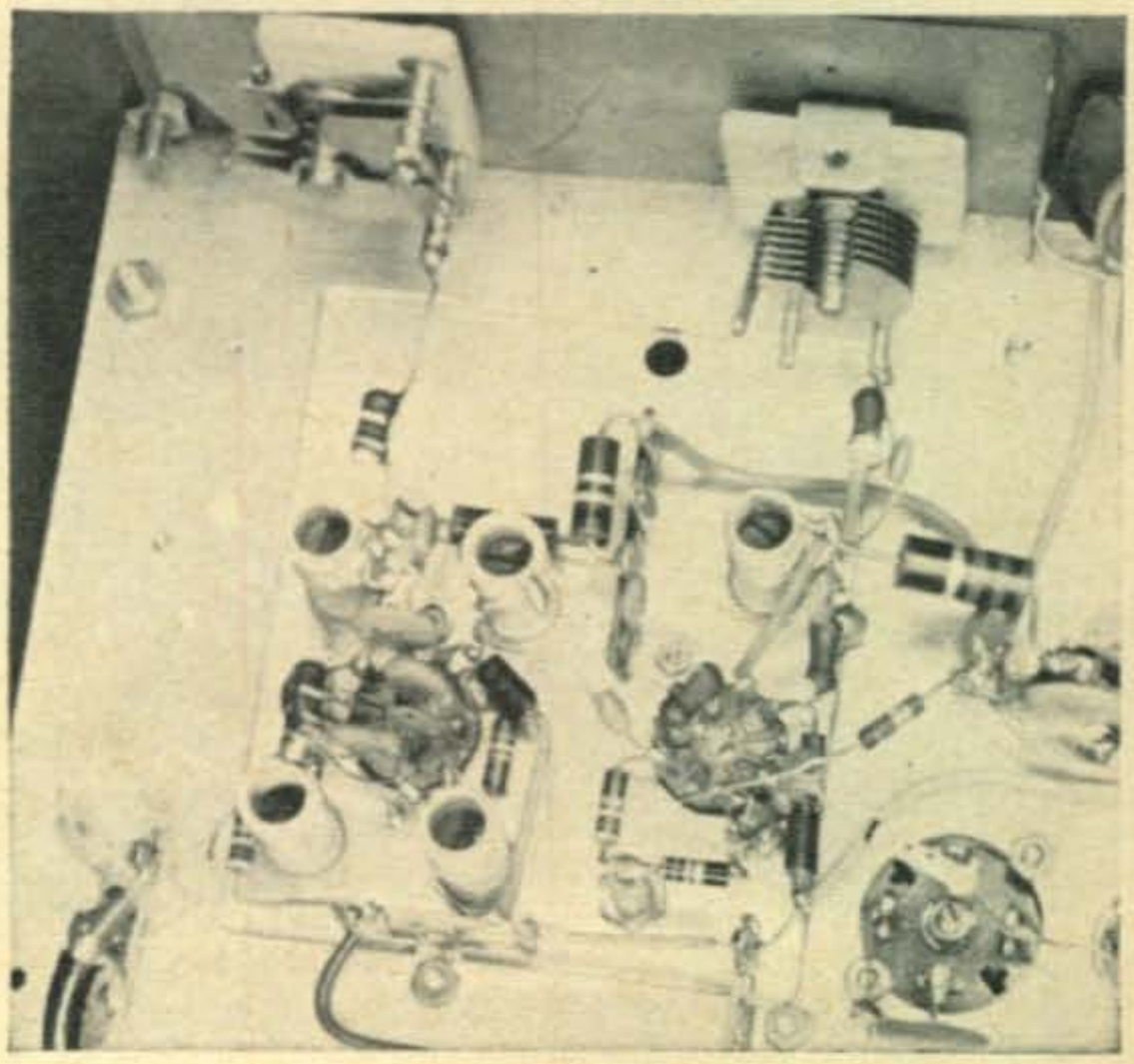
The receiver shown in the photo is the first one built for 2 meters. It was built about 4 years ago, primarily to explore the possibilities of the band. However, it performed so well that we didn't bother to tear it down after more elaborate receivers were constructed. Needless to say, it would require too many pages to go into details of the entire receiver and it would only be duplicating previous material published. However, a few words on the front end, and a general outline of the receiver might be of interest.

There are no birdies or images in this receiver due to the tuning of the *hf* oscillator, which incidentally, is on the low side of the incoming signal for better stability, and the 18 *mc if* which puts the image so far away that it is out of range of the tuning dial. Outside of the front end the receiver is the ordinary type and has the usual controls, such as Ant Trimmer, *rf* gain, *avc*, Squelch, *bfo*, *af* gain, stand-by switch, built-in speaker, "S" meter and hand calibrated metal stamped aluminum dial.

Of most interest to receiver builders would be the front end, because, a receiver is only as good as the *rf* section, and once that is built and aligned any *if* strip can be used. The receiver shown, uses two 6BK7 tubes in the *rf* section, one as cascode *rf* and the other as the oscillator mixer. All coil forms are slug tuned ceramic and space wound with #20 wire with the number of turns indicated in the coil chart. If you don't own a grid dipper and cannot borrow one, stay close to dimensions given on the coils, oherwise you might be tuning the air-craft or taxi bands.

One little item that most of us miss during our excursions in the electronic field is the possibilities of using large rugged variable condensers as tuning means in the *vhf* bands. Just because the frequencies are high is no reason to use "itsy bitsy" capacitors that wobble and never stay put. If you recall the standard formula for series capacitors, $\frac{C1\ C2}{C1+C2}$, you can see how easy it is to use a large tuning capacitor with a small fixed capacitor in series to get the desired tuning range. The front end shown here utilizes this means of tuning the 2 meter band and slightly beyond. It makes a rugged and well liked tuning dial.

As you will notice on the photo the complete *rf* section is built on an aluminum plate 3½ x



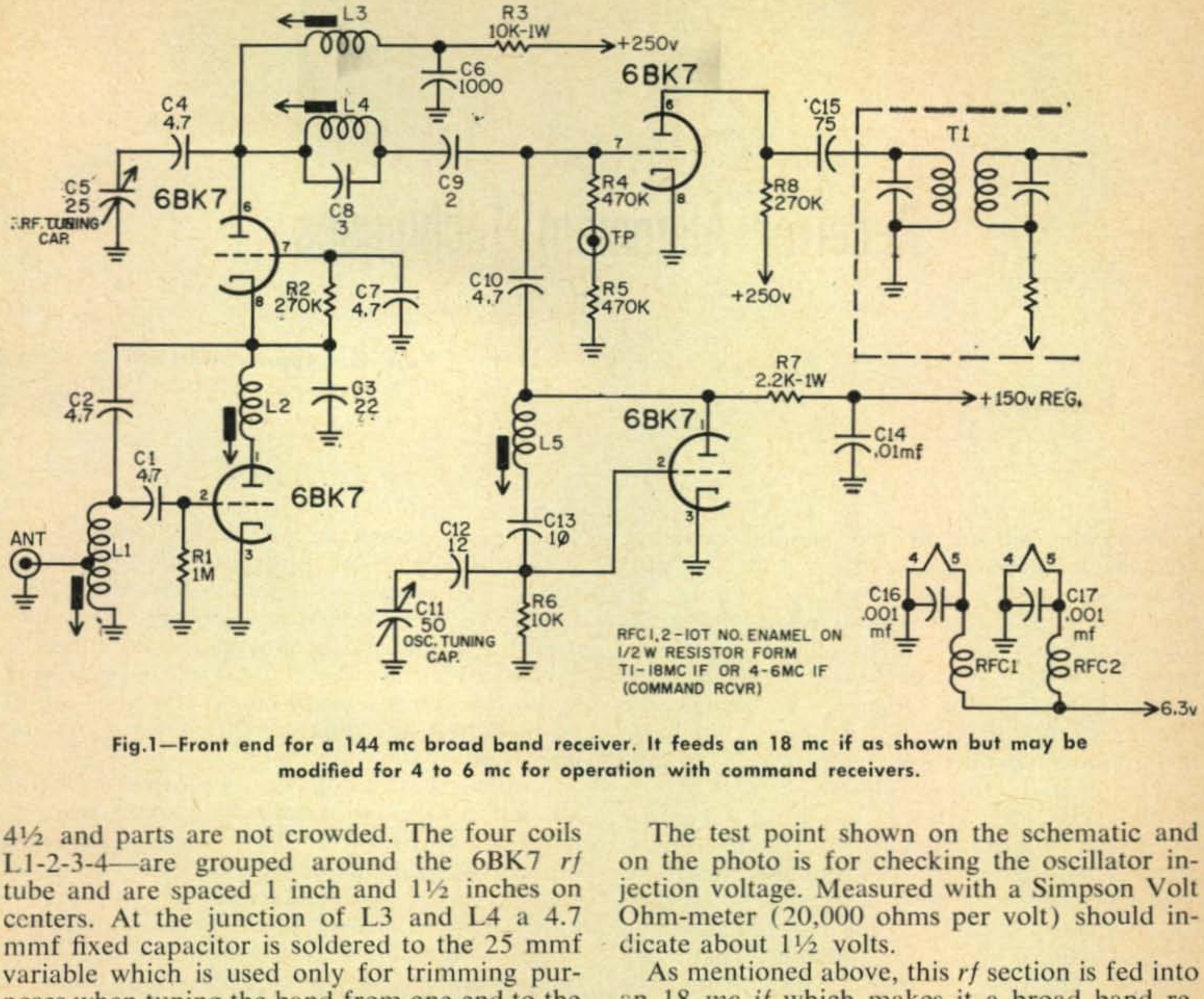


Fig. 1—Front end for a 144 mc broad band receiver. It feeds an 18 mc if as shown but may be modified for 4 to 6 mc for operation with command receivers.

4½ and parts are not crowded. The four coils L1-2-3-4—are grouped around the 6BK7 *rf* tube and are spaced 1 inch and 1½ inches on centers. At the junction of L3 and L4 a 4.7 mmf fixed capacitor is soldered to the 25 mmf variable which is used only for trimming purposes when tuning the band from one end to the other. It is engraved, "Ant. Trimmer" on the front panel. Coil L5 is the oscillator coil and is shown just above the socket of the second 6BK7 which is the mixer-oscillator tube. There are two small capacitors in parallel soldered to the main tuning capacitor (Osc.) That combination was tried for the desired tuning range and turned out to be 12 mmf. The oscillator tuning capacitor is a 50 mmf Hammarlund HF50 which is well built and has a good bearing. Of course any other make that has a good bearing and is on hand can be used. The two variables are mounted on a copper plate to carry a good ground return because the front panel is painted and could not be depended on for a good ground. If an unpainted aluminum panel is used the copper plate can be dispensed with.

Actually, there are no critical parts or hidden mysteries involved. Once the coils are wound, doped and put into place, they can be set on frequency by using a grid dipper and the rough calibration of the oscillator dial can be made at the same time. You will find that the frequency range of the slugs is quite broad so careful tuning and adjustment must be exercised. The final touch up should be made on a known signal when the whole receiving unit is operating.

The test point shown on the schematic and on the photo is for checking the oscillator injection voltage. Measured with a Simpson Volt Ohm-meter (20,000 ohms per volt) should indicate about 1½ volts.

As mentioned above, this *rf* section is fed into an 18 *mc if* which makes it a broad band receiver. It has wider selectivity characteristics than any commercial receiver operating in the two meter band. This feature is desirable for monitoring, and is used exclusively for that purpose in this shack. However if only one receiver is to be used for serious operating, it is suggested that a lower *if* frequency of 4 to 6 *mc* be connected to this *rf* strip. A command surplus receiver will make an ideal *if* strip and if one is used, only slight modification of the oscillator coil is necessary. It can be done either by substituting an iron core for the brass or aluminum slug, or removing one turn from the coil winding. That will bring the oscillator frequency up higher, making the difference between the incoming signal and the oscillator frequency smaller.

The sensitivity of this *rf* plate was never measured, but was compared with good converter-receiver combinations side by side and found to be on par; but of course without birdies.

"VHF Communicator" was engraved on the panel because intentions were to install a small transmitter on the same chassis and the powerful audio of the receiver would make a nice Heising modulator. But with more pressing projects in and around the shack, time never allowed it to materialize. ■

Receiver Alignment Techniques

Ken Grayson, W2HDM

With the advent of the general coverage receiver using several amplifiers, it became necessary to provide one knob for tuning. To tune several *rf* circuits simultaneously requires that all circuits behave identically, and to make them so behave is called alignment. It is the responsibility of the engineer to design the circuits so they do function properly, but to do this requires certain final adjustments to take care of manufacturing tolerances.

While the TRF (tuned) amplifier is popular today only as a preselector in a superheterodyne receiver, its alignment is nevertheless important. The superhet is the most popular type receiver today, mainly because of the constant selectivity and overall sensitivity possible. These two qualities are only possible if proper receiver alignment is achieved.

A receiver rarely goes out of alignment. Slight aging of tubes will often cause a loss of sensitivity, and dirt and dust may change the value of capacity of some variable, but, except for a true part failure, a receiver rarely goes out of alignment. If all other repairs fail to disclose the reason for a loss in gain, then, and only then, consider realigning the set.

As we have mentioned, alignment is the adjustment of circuits simultaneously tuned, to produce the identical or otherwise desired behavior in all stages. The term alignment also applies to fixed tuned amplifiers which require circuits to be tuned to specific frequencies for proper operation. Figure 1 is a typical superheterodyne receiver. Some of the circuits which are included in the receiver, and which require alignment are shown in fig. 2.

Equipment Needed

The equipments necessary to align a receiver are a good stable signal generator covering the range of the receiver and its *if*, an output meter or *vtvm* and a screwdriver of some non metallic, non-conducting material. The signal generator should have a well calibrated dial, a good attenuator for reducing the signal level, and very low leakage of signal from the case or any other place except at the output terminals. It should also have very little drift or FM on the carrier and should be capable of good modulation up to 30% for AM at 1000 *cps*. The meter used for output measurements should either be a *vtvm* or an *ac* meter suitable for measuring audio frequencies. Since only a few volts are to be measured, the range of the meter is not too important.

Since most signal generators owned by hams are not of the laboratory type some word is necessary as to how to improve the conventional kit type of signal generator. Kit types of signal generators are quite all right for all but the most sensitive measurements. They weren't intended to measure the noise of a receiver, or do other work at low signal levels. It isn't fair to compare a fifty dollar signal generator to one costing well over five hundred dollars. These expensive equipments are usually housed within several cases, each one acting as a shield for the next, so that signal leakage is extremely low. Likewise, all leads for power and controls are fully bypassed by filters, and not just simple capacitors. The high voltages are regulated by complex voltage regulation systems, and even the filaments are regulated and by-passed. The attenuator is often a type referred to as a "wave-guide beyond cut-off" type, which has a moving coil whose proximity to another coil is variable so that the coupling, and hence the output voltage, is very accurately controlled. A single dial is used to read the output voltage and this dial reads from one tenth volt to one tenth microvolt, logarithmically. The advantage is the accurate calibration, which is directly in decibels as well as in volts, and the constant output impedance over the entire frequency range of the signal generator. The input of the attenuator is kept at a constant voltage, by means of a meter, and the entire system is quite expensive. In contrast, the usually adequate signal generator does its attenuation by means of resistors, which reduce the signal level, but only approximately indicate the output voltage. This is still adequate for alignment, but not for absolute signal measurements.

Fig. 1—Block diagram of a typical superhet.

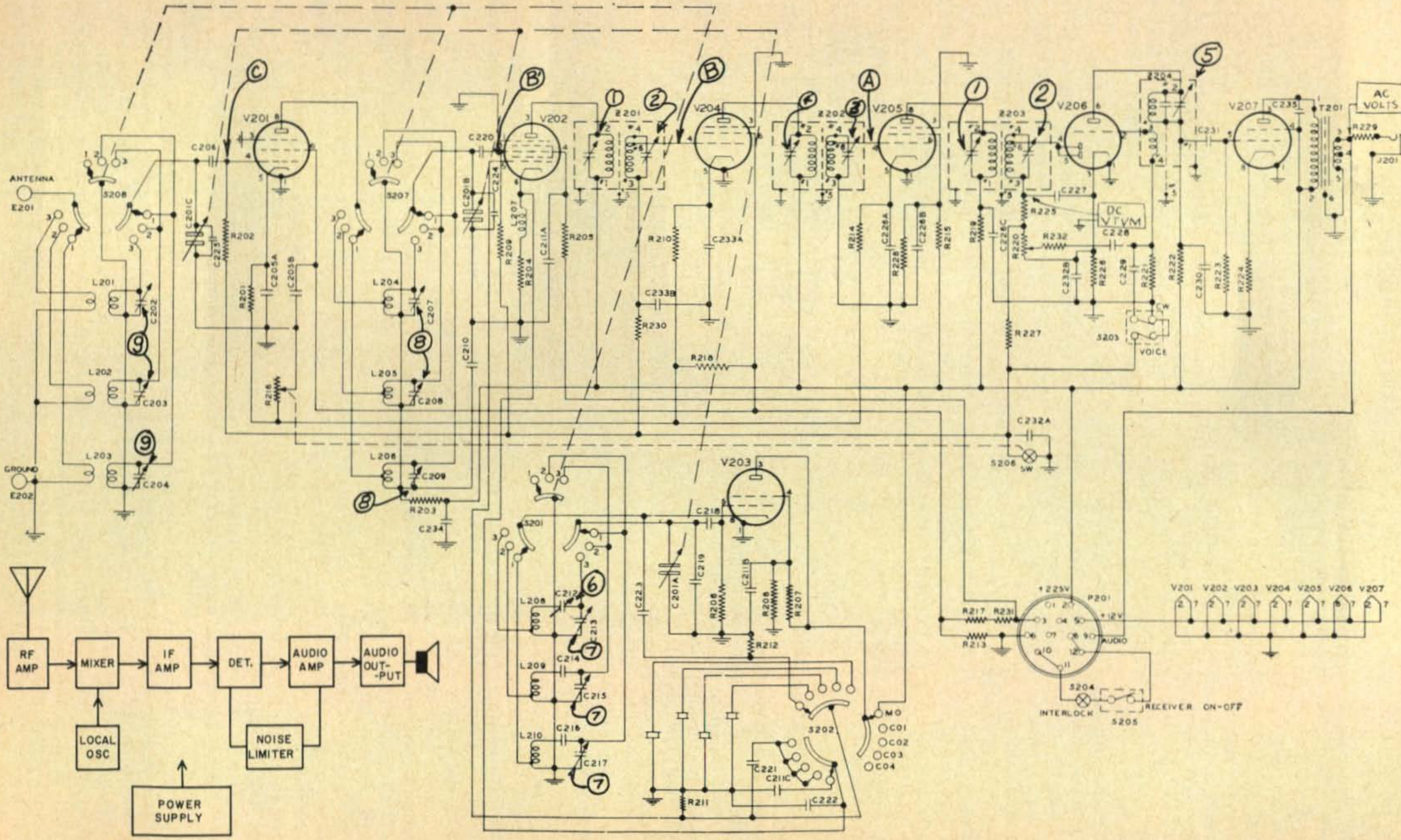


Fig. 2—Typical multi-band receiver with alignment check points indicated.

The problem of signal leakage is one which can be improved over its present condition. By carefully scraping paint where chassis meets panel, and where panel meets case, and making a mat of fine copper screening to aid in the mating of these parts, an electronic gasket will be formed which will greatly reduce the leakage from the places where it usually occurs. Bypassing the input power leads will reduce this radiation even more, and it would help too if there was a choke in each power lead and the choke and capacitors were mounted in a small shield can which was bonded to the chassis by solder, and which has the power leads going to the power line so placed that they do not enter the oscillator compartment at all. Shielding the oscillator would help too, as would wipers, made of spring brass, properly grounding all shafts passing through the oscillator compartment and all front panel bushings. The attenuator should be shielded, so that the input and output are isolated from each other, except through the attenuation network. It would be pretty silly to put a signal into an attenuator, only to find that the coupling from input to output is defeating the purpose of the attenuator in the first place.

Alignment

Alignment is accomplished by first ascertaining that the receiver is operating properly. Once this has been found to be true, the *avc* is disabled, either by turning it off when possible or shorting it out, The crystal filter is also turned off. This is necessary so as to prevent false meter readings. The next step is to connect the signal generator to the grid of the last amplifier with the generator set to the frequency of the *if* and AM modulated (point A, fig. 2) and connect the *vtvm* across the diode load resistor or the *ac* meter across the receiver output with the volume control turned up. Adjust the *if* coil slugs or capacitor (depending on the type of *if* transformer) as shown at points 1 and 2, for maximum output adjusting one at a time. When the maximum meter reading has been reached, disconnect the signal generator and connect it to point B. Repeat the adjustment at 3 and 4. Don't reduce the volume control to keep the meter on-scale. Do attenuate the output signal of the generator and keep the receiver controls set at their original places. Likewise, if there is a third *if* stage repeat the adjustment again for that stage. By now our *if* should be aligned.

If there is a crystal filter in the receiver, turn it on and set the phasing control to its center. Carefully tune the signal generator for maximum output. Adjusting the phasing control will sharpen the response, and may cause a slight shift in frequency, but very slight. Turn the crystal filter off and turn the *bfo* on. Set the *bfo* knob to its zero position and adjust the *bfo* tuning adjustment (point 5 fig. 2) to obtain a zero beat. Verify this by moving the *bfo* knob to either side of zero. Turn the *bfo* off. Now go back and realign the *if* at this new frequency, without resetting the signal generator.

Oscillator Alignment

Aligning the oscillator is one of the most important steps in the entire process. Should the oscillator be off frequency then the receiver dial calibration will be incorrect. First check and see how close your dial calibration really is. You may find it to be on or very close. Use a crystal calibrator or a BC-221 if you have one to check this. Make sure too, that your bandspread dial is in the correct position for reading the main dial. If it is only slightly off frequency the trimmer of the oscillator may be all that requires adjustment. If the set is really out of calibration then do the job as follows:

Broadcast Band Alignment

Since most communications receivers are of the general coverage type (i.e., cover more than one band) the variable capacitor is not of the cut plate type, but rather has some extra capacitor switched in the circuit to make the receiver track on the BC band. This is called the padder (fig. 2, point 6). With the radio and signal generator tuned to 550 *kc* adjust the padder for maximum output on the meter and change the generator and the radio receiver to the same frequency at the high end of the broadcast band, usually 1600 *kc*. Here you adjust the trimmer (See fig. 2, point 7). As a check, go back to 550 *kc* and see if the calibration is the same. It may have changed very slightly, but slight adjustment of the padder and trimmer will even this out. Check the dial calibration at several points and you'll find the dial is right on.

Short Wave Oscillator Adjustment

Since most receivers divide the bands into different ranges, we will refer to the ends of each band as either high (frequency) or low (frequency).

Most short wave coils are made with air cores. Some have tunable slugs, however, and when a tunable coil slug is used, it should be adjusted at the low end of a band, like a padder. Trimmers will have their greatest effect at the high end of any band. After slugs are adjusted (if any) the trimmers are adjusted. The procedure is similar to the BC adjustments. Set the receiver dial and signal generator to the same low end frequency and adjust the slug to obtain maximum output on the meter. Those sets without slugs are designed to have the oscillator adjusted only by the trimmer. Set the receiver dial and signal generator to the same frequency at the high end of the band. Adjust the trimmer to obtain maximum output on the meter. Check the dial frequency calibration with a calibrator, crystal or frequency meter by tuning across the band. Any errors should be trimmed out by minor adjustments of the coil slug (if any)

and the trimmer. It is sometimes necessary to reset the dial pointer or dial itself in order to calibrate the set properly. This is done only if the tracking is wrong on all, or all but one band. Cut and try is the usual method of adjustment of the dial position, however, adjust the band edges and try to position the dial to fit these points, and you'll be extremely close. This procedure of oscillator adjustment is applicable to all types of oscillators.

RF Circuit Adjustments

Having set our oscillator, the next step is to adjust the *rf* stages. This is usually done at the same time the oscillator of a particular band is adjusted. The same technique applies for the trimmer and slug as it did for the oscillator. The receiver and generator are tuned to the low end of the dial to adjust slugs (if any) and to the high end to adjust trimmers. The signal generator is connected first to point (c) (fig. 2) and set at a level which will keep the output meter on scale.

The adjustment is point 8, and some care will be necessary to reach a maximum on the meter. When it is obtained, connect a dummy antenna (fig. 3) to the receiver and connect the signal generator to the dummy antenna. This makes the antenna loading as close to the real thing as possible. Adjust point 9 (fig. 2) for maximum output and then readjust point 8 just once more. Do this to all of the bands and your receiver should be calibrated and aligned properly. Remove the short across the *avc* (if you used one) and the output meter and you are ready to go.

Alternate Procedure

When it comes to general purpose receivers, the above technique is the generally accepted procedure. However, when high quality receivers are undergoing alignment, there is a procedure for *if* alignment that produces a little better bandpass characteristic when the *if* transformers are overcoupled. Since it is not only applicable to the overcoupled *if* but to any *if* it can be used in lieu of the above technique.

Overcoupled *if* transformers rely upon reflected impedances to develop the bandpass. These reflected impedances can cause detuning of the two tuned circuits, as shown in fig. 4a. This is a typical case, and is not exaggerated. To obtain the desired characteristic shown in fig. 4b from the same transformer it will be necessary to tune the primary and second independent of each other. This can be accomplished by connecting a 1500 ohm ½ watt resistor, as shown in fig. 5, across the secondary of the transformer and tuning the primary to maximum output (as before) and then when the maximum is obtained, reversing the procedure. With the resistor across the primary tune the secondary for maximum. This is then done in

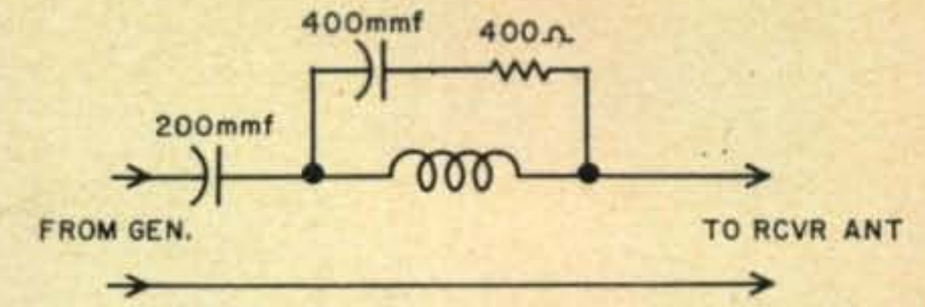


Fig. 3—Typical dummy antenna. Inductance is 20 microhenries.

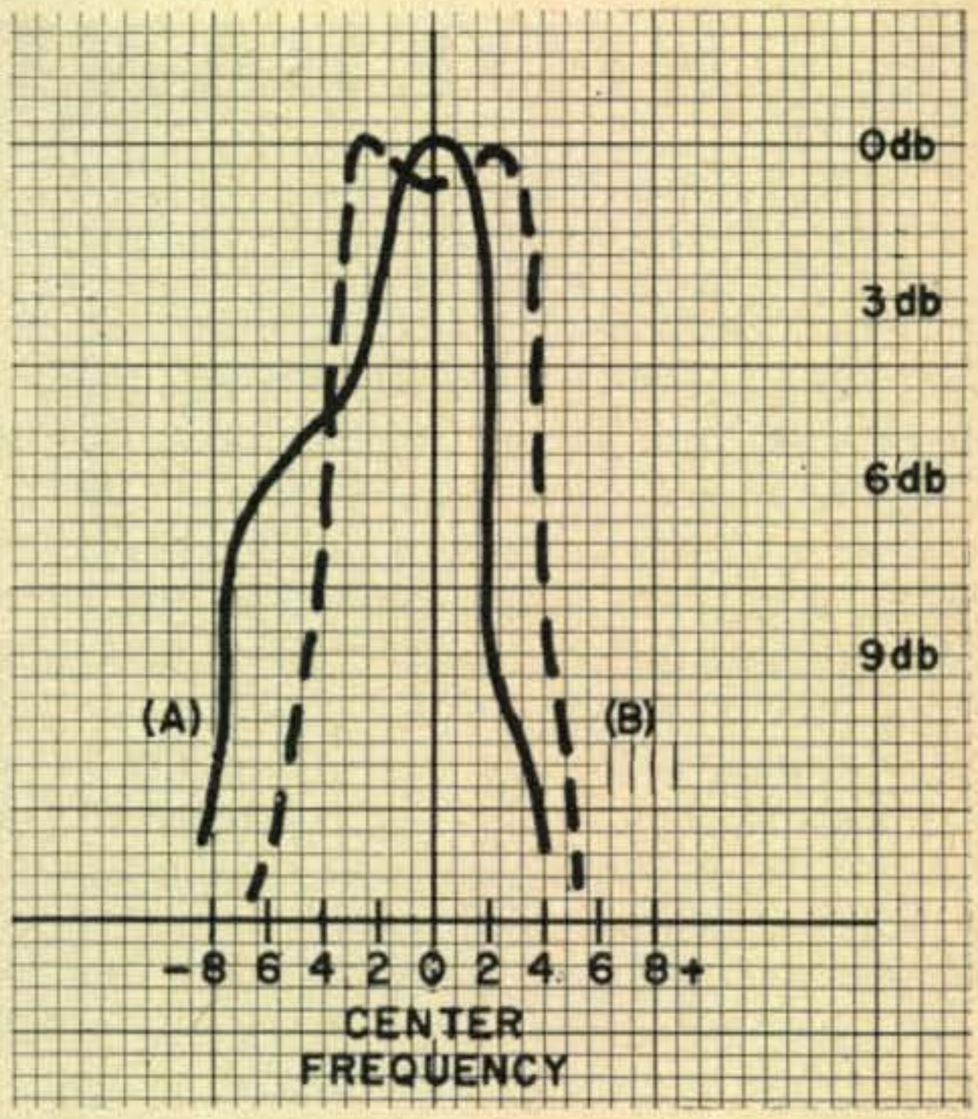


Fig. 4—Curve A is often the result of a conventional alignment. A procedure for obtaining curve B is described in the text.

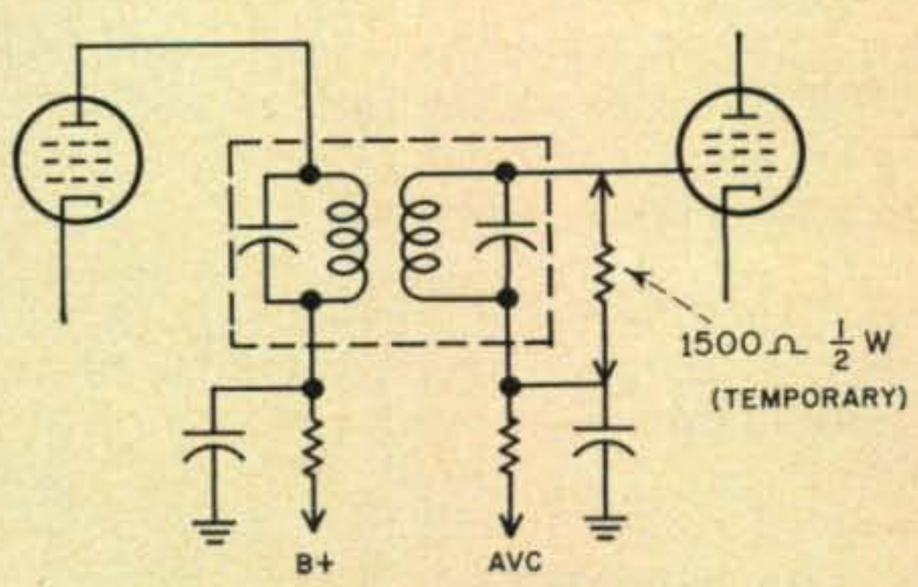


Fig. 5—Loading of one winding while aligning other winding improves results.

turn to each *if* transformer till the set is aligned. The result of this is to load down the transformer so only one tuned circuit is effectively in the circuit. The results will amaze you, especially in the quality of the audio now available.

Don't think that a mechanical filter will obviate the necessity for good *if* alignment, because the overall response is dependent upon all circuit components, and not just on the filter.

Alignment will probably bring new life into many an old set, but it's not the answer in every case. Coils may have shifted position due to heat causing wax to melt. Moisture can change the Q of capacitors and other circuit elements. Crystals can change frequency due to aging, and so forth. A little effort will bring the set back to life, with very little expense . . . if you do it right. ■

sideband sideband sideband

SIDEBAND

By: Bob Adams, W3SW
P. O. Box 625
Silver Spring Md.

Worked 100 Countries

Two-way SSB

(in order of award)

W6UOU	W8GCN	W6IAL	PY2JU	PY4TK
W2JXH	W8EAP	K2JFV	W6UPP	K9EAB
F7AF	W8YBZ	W1ADM	W6PXH	W7IAA
K6GMA	WWØQVZ	TI2RC	WØCVU	VQ4ERR
W3SW	WØFUH	W2CFT	W4INL	W8MPW
W4IYC	W8PQQ	KØABH	W8YIN	W3MAC
TI2HP	ZL3PJ	ZL3IA	TG9AD	W1GR
W8QNF	K2MGE	W6BAF	W3NKM	W8JXM
W6ITH	W2OQO	W2TP	W6QFE	W5FDZ
VE3MR	W2VZV	W6RKP	W8MG	

Starting this month the format of the Side-Band Column will be drastically changed. Instead of reporting about Dxpeditions and other DX happenings which are history by the time they appear in print, we will utilize this column to bring you the "dope" on all of the newest side-band transmitters, receivers and accessories as they appear on the market.

We will also keep you advised of the various happenings as they occur which affect the "state of the art". In an early issue, the single-side band vs double side-band, suppressed carrier controversy will be discussed very frankly. This subject is becoming more involved as the number of stations employing DSBSC increase daily.

To inaugurate our new style we are pleased to present and describe the new Gonset GSB-100 transmitter which has only recently been announced.

Rated at 100 watts on a single-tone test, the GSB-100 is ready to operate as a SSB transmitter or it may be used as an exciter to drive a high power linear amplifier. The unit provides for selection of both upper and lower side-bands, with suppressed carrier, and in addition may be operated on phase modulation, amplitude modulation or keyed CW. On AM both side-bands are transmitted, thus 100% modulation is possible without the distortion present when carrier and one side-band are received on a conventional AM receiver.

Carrier suppression in the order of 60 *db* is accomplished with a combination of crystal filtering and phasing circuitry resulting in long term suppression stability. Constant check of carrier suppression is unnecessary as in some phasing exciters.

Excellent frequency stability is obtained by the use of fixed quartz crystal oscillators with the output heterodyned from a stable *vfo* which operates from 5.0 to 5.6 *mc*.

A large, easy to read slide-rule dial reveals only the band in use, with each of the six bands being 600 *kc* wide. The front panel is very attractive and each function knob is plainly marked. Precise tuning is accomplished with a 100:1 gear ratio dial assembly.

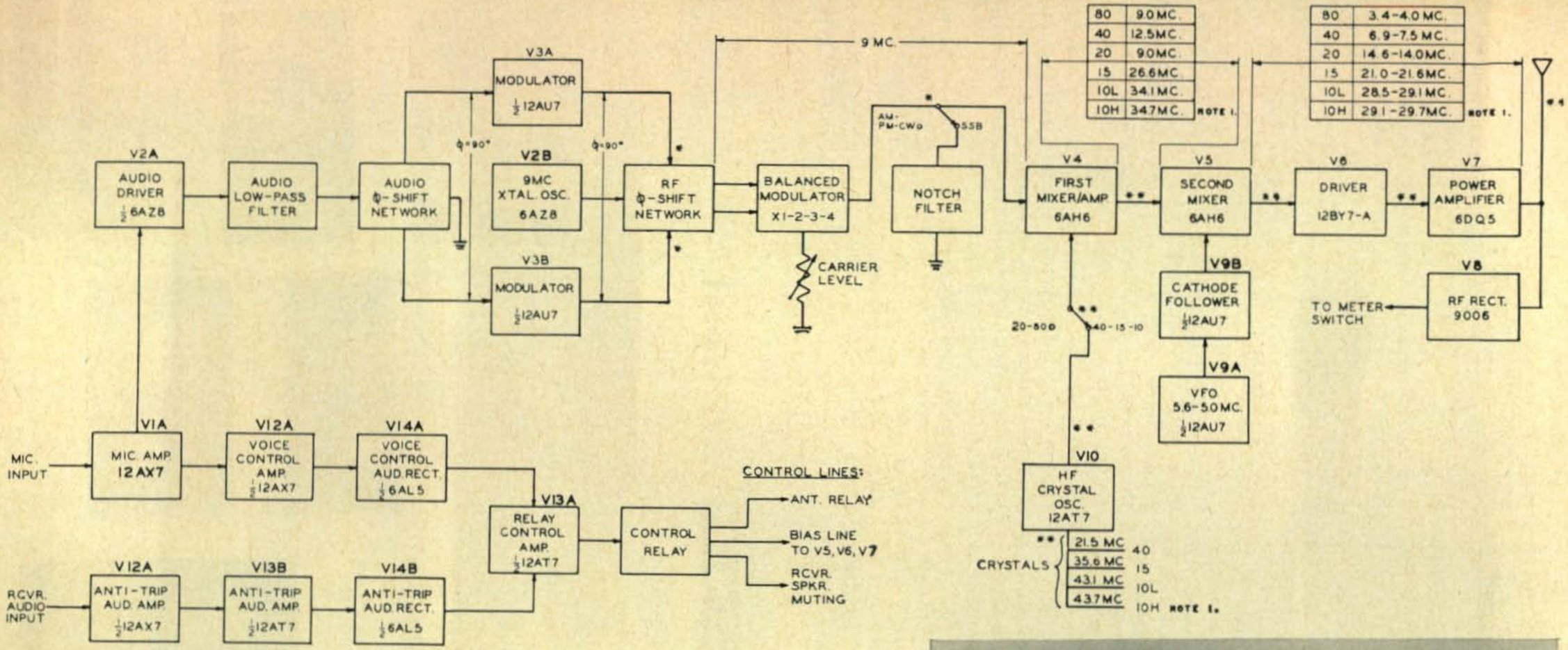
Referring to the block diagram shown in fig. 1, it will be seen that the SSB, AM, CW and PM basic signal are all generated at a reference frequency of 9 *mc*. The 9 *mc* reference carrier is generated by a crystal oscillator, V2B. The oscillator signal forms one injection to the *rf* phase-shift network.

In SSB, AM and PM operation, microphone audio is amplified by stage V1A, fed through audio driver V2A, and the speech components outside of the 300-3500 cycle range are attenuated by an audio low-pass filter. The output of the low-pass filter is applied to an audio phase-shift network, where speech components throughout the entire audio passband are "split" into 90 degree phase differentials. The two phased audio components are introduced into separate modulators (V3A and V3B), and transformers in the plate circuit of the modulators develop 180 degree phased outputs from each of the components. These four components form the second injection to the *rf* phase-shift network.

During SSB operation, the phased outputs are switched to cancel one sideband in the balanced modulator output. In AM operation the AM signal on one phased output is grounded from the phase-shift network and both sidebands appear in the transmitter output. In PM operation the PM output of the phase-shift network is selected, causing a phase-shift (proportional to the audio amplitude) to appear on the carrier output. During CW operation the audio output of the modulators is removed entirely from the carrier output.

The composite signal output from the *rf* phase-shift network is applied to a balanced modulator. When the carrier control is at 0 (full counterclockwise) the modulator attenuates the carrier portion of the composite signal by as much as 40-50 *db*, but sideband energy appears unattenuated in the balanced modulator output. When the carrier control is rotated clockwise the modulator is unbalanced proportionally and a variable amount of carrier injection results from the unbalance.

During SSB operation, with the carrier control at 0, residual carrier present after the balanced modulator is removed by a unique notch filter, and carrier attenuation is increased by as much as 30 *db* over that obtained with the balanced modulator alone. This feature results



NOTES:

1. CRYSTAL AVAILABLE FOR 10M CW (10H) AS FOLLOWS:

XTAL. FREQ.	V4 OUTPUT FREQ.	OPERATING FREQ. RANGE
42.6MC.	33.6MC.	28.0-28.6MC. (10M CW)

2. * SWITCHING OF THESE LINES CONTROLS TYPE OF EMISSION.
** SWITCHING OF THESE LINES CONTROLS BAND OF OPERATION.

Fig. 1—Block diagram and photo of the Gonset GSB-100.

in remarkable long term stability of the carrier attenuation during SSB operation.

In AM, PM and CW operation, the notch filter is by-passed and the required carrier level inserted by adjustment of the CARRIER LEVEL CONTROL.

The SSB output from the notch filter (SSB) or the modulated or steady carrier output from the balanced modulator (AM, PM and CW) forms the signal injection at 9 *mc* to the first mixer amplifier, V4.

Frequency derivation: On the 20 and 80 meter bands, V4 operates as a straight-through amplifier, and the 9 *mc* reference signal directly forms the signal input to the second mixer, V5. On the 40, 15 and 10 meter bands, the output from the crystal oscillator stage, V10 forms the injection frequency to V4, operating as a mixer. On these bands, the difference frequency of the signal input (9 *mc*) and the injection frequency (the crystal oscillator frequency, as selected) is the signal input to the second mixer, V5.

The output frequency of the variable frequency oscillator, V9A, isolated by cathode follower stage V9B, is injected to the second mixer grid, V5. The *vfo* operates from 5.0 to 5.6 *mc*. The crystals in oscillator stage V10 are selected, or the 9 *mc* frequency is fed "straight-through", so that the difference frequency (80, 40 and 15 meter bands) or sum frequency (20 meter band) of the signal and injection frequencies to V5 will fall across the amateur bands as the *vfo* is tuned through its 600 *kc* range. The proper heterodyned frequency spread is selected in the plate circuit of V5 and forms the excitation for driver stage V6.

The signal, now at final output frequency, is amplified by the driver stage and the PA stage and is coupled into the antenna system. The carrier level is detected by the *rf* rectifier V15 and the resulting *dc* level is applied to the front panel meter and indicator circuit for tune-up reference.

The VOX and ANTI-TRIP circuits are standard, but in the unit I tested appeared to work exceptionally well.

Gonset's engineering department seems to have succeeded very well in developing an exciter with the inherently good features of a phasing type generator, and yet have overcome the necessity of constantly touching up the carrier balance with their crystal notch filter.

They also took care of the hash and "monkey-chatter" which frequently appears past the unwanted sideband on most phasing rigs by utilization of a well designed sharp cutoff low-pass filter in the audio system.

Another point which I liked was the excellent keying provided by this transmitter. This is in no small way due to the very stable *vfo*. Less than 250 cycles of drift was detected in two hours from a cold start.

73, Bob, W3SW

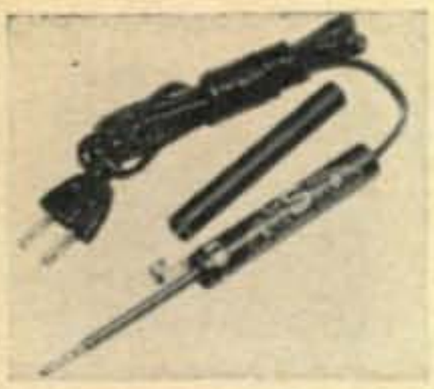
QSL contest

Grand Winner: W3YPI with a silk screened card of yellow on black card stock. Prize is one year of CQ magazine. Runners up are clever too, but ran against heavy competition this month: K7DEM, black and yellow with white letters; K8KZI silk screened white radiation pattern on blue-grey background, call letters and beam in rust; K9OUY has an interesting approach to the ham family QSL; SWL SM5-2735 features typical Swedish scenes; and SM5AX's printed circuit card.

WINNER

LOSERS

New Amateur Equipment



Liliputian Soldering Iron

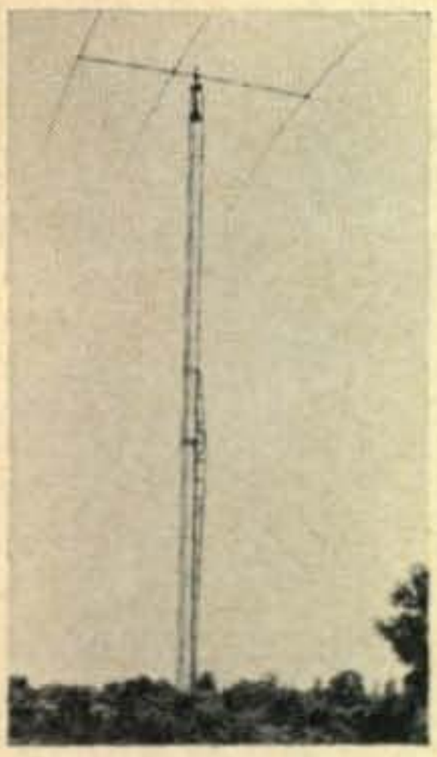
Anchor Products claims that the special alloy tip will not need reshaping or filing during the life of the iron. Element heats in less than one minute . . . 120 vac/dc. Model SL-10 weighs ½ oz. and is small to get into tight spots. Draws only 10 watts and comes with an insulated cover which allows the iron to be put away in the tool box without waiting to be cooled off. Glory knows what it costs, but if you mark A on page 142 you'll be one of the first to know on your block.

Coil Data Sheet

Air Dux (Illumitronic Engineering) has a new data sheet out that will be pretty handy around the shack. It lists inductance equivalents of the Air Dux coils, B&W coils, and gives the length, diameter, and turns per inch of all of them. This sheet will be handy for all constructors and invaluable to foreign hams who are occasionally puzzled by parts lists which merely give the B & W or Air Dux number of a coil. The sheet also lists the formulas for coil calculations of inductance, Q, mutual inductance, heating, wire sizes necessary for various power levels, pi-net stages, baluns, etc. Quite a good batch of info and all for free. Crayon C on page 142 for this gem.

Rotator

Moran Products Co. has a $39.95 antenna rotator which is supposed to handle up to 50 lbs of beams. The indicator gives continuous reading in both degrees and compass points. Locks in place when not turning. Pierce E on page 142 for data sheet, eh?

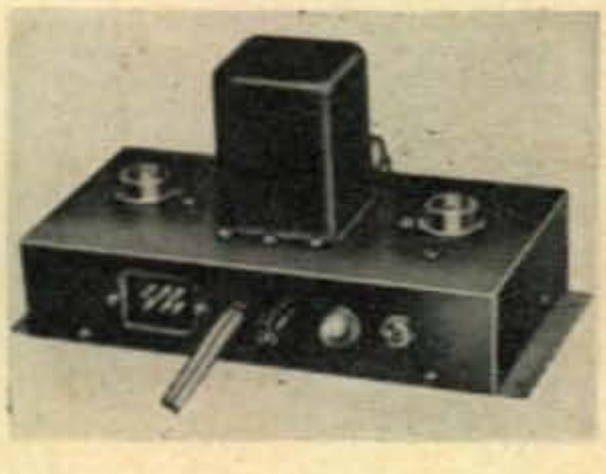


New Antenna Tower

ROHN Manufacturing Company announces a new "fold-over" antenna tower especially suited for use in amateur radio, experimentation and general purposes wherever the "fold-over" design is necessary or desirable. One big advantage of "fold-over" feature is that it allows working on the ground whenever servicing of antenna or rotator is required. The tower is available in a height up to 70 feet and is structurally designed to handle practically all sizes and types of antennas. Tower sections 12½" equiangular triangle design with "zig-zag" steel cross bracing, all electric welded. Sections are 10 feet in length for easy installation. Tower is complete and includes boom, cable and windlass and special hinged section. Details available by circling B on page 142.

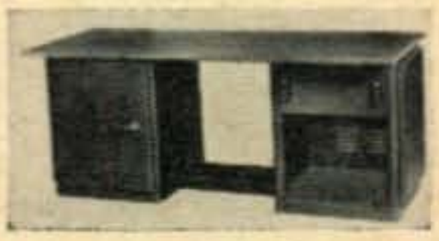
Complete Mobile Station

Heath has announced a complete mobile setup: transmitter, matching receiver, and power supply. The transmitter, the "Cheyenne," runs up to 90 watts controlled carrier (for minimum battery drain) to a 6146 on 80-10 meters, with a built-in VFO. The receiver, the "Comanche," covers the same bands and matches the transmitter, being designed to mount right with the transmitter. It has 8 tubes and uses a 3 mc xtal lattice *if* filter comparable to a mechanical filter and is designed to receive AM, CW and SSB. Quite a package. The power unit is transistorized and supplies 120 watts of dc power from a 12 volt source. Lacerate D on page 142 for full info and prices on these kits.



Console Assembly

Bud Radio has a new line of consoles which are ideally suited for amateur stations. The component parts are available individually so you can have any size or style desk or console you desire. Complete units would run from $100 to $200 for the one pictured. The pedestals are designed for regular 19" rack panels. Bud has a complete catalog of the console units available if you'll just mark F on page 142.



Novice

by **DONALD L. STONER, W6TNS**
P.O. Box 137, Ontario, Calif.

At this writing, the FCC is accepting comments from Amateurs with regard to Technician privileges on the two meter band. By the time you read this, it is quite likely that a decision will have been reached. I am guessing that it will pass because of the desirability of keeping the bands as populated as possible. It would be unwise for the Techs to move to the two meter band en masse, however. Before you start ripping into your two meter rig ponder this for a moment . . .

The six meter band is four megacycles wide. A typical commercial fm two-way radio link occupies about 50 *kc*. Any way you figure it, there is room for at least 80 commercial channels between 50 and 54 *mc* and the mobile radio services are lusting over those frequencies! If you doubt this, take a listen to the crowding and confusion bewteen 30 and 50 *mc*. Even though you may be permitted to "fire-up" on two don't forget the six meter band. We could lose it!

Snortin' Morton—Again

Jerry Fortier, W7IDI, 210-130th S.W., Seattle 66, Washington sent me the dope on an improved version of this combination keying monitor and code practice oscillator. According to his letter, the original version (appeared in my original Novice Column, March 57 CQ Mag.) "sounded like a sick mosquito". Jerry correctly assumes that the impedance mis-match between transistor and speaker caused most of the trouble in the original circuit. He located an ideal transformer for this application and found that it produced much greater audio output. Although he used a 2N109, it is not necessary for greater output. The circuit for Jerry's modified "Snortin' Morton" is shown in fig. 1. The purpose of the .03 mf capacitor is not explained, but this will give you something to experiment with—hi. Thanks for the information Jerry.

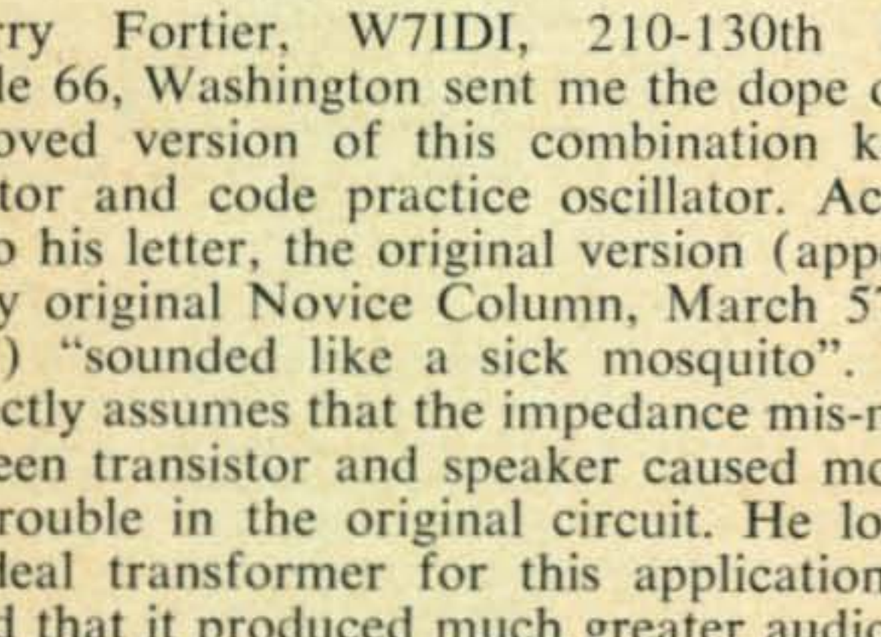


Fig. 1—Improved version of "Snortin' Morton" code practice oscillator and keying monitor.

DX News

Our European reporter, Tima Popovic, YU1FR, Banat Novo Selo, Yugoslavia did quite a bit of listening recently and sends a long list of Novice calls heard: Jan. 14, 1959, 1720-2040 GMT: KN1GMI, GTW, HWD, IIJ, ISJ, JGO, JKA, WV2AOJ, BLX, BPZ, DDF, DEF, KN2LOX, OQK, TQB, TZG, KN3CXI, DRU, ECM/3, EXM, GJH, HBU, HEE, KN4BMI, CPR, CPX, KNV, VSI, YAN, YLR, YTR, YWY, YWZ, ZDZ, ZHN, ZHZ, ZLO, ZVE, KN50VL, TJH, KN8LDF, LEZ, LKF, MKW, MLG, NGR, NJN, RLD, KN9MSX, OLH, KNØOPG. Jan. 15, 1820-2000 GMT: KN1, HFR, JKW, WV2BUH, KN2CZO, LKY, MMU, TDJ, KN3EPF, KN4ZVC, KN8KTZ, LHF. Jan 17, 1550 and 2030 GMT: KN1IAL, IFJ, IMP, WV2AMM, AXN, CBB, KN3ELR, ESJ, GWC, HCK, KN4BPU, CGT KWZ, YWZ, ZRH, ZXY, KN5QLJ/4, KN8LIB, KN9OFD. Jan. 21, 1854 GMT: KN2UVU. Feb. 15, 1842 GMT: WP4ANH. Feb. 19, 1651 GMT: KNIJTI. Feb. 22, 1614-2140 GMT: KN1GYT, HRF, HRO, ICH, IFE, IFJ, IKA, IKD, IRB, ISV, JCJ, JGX, JKA, JLN, JRA, WV2APQ, AQG, ARX, BFF, BIM, BPQ, BWV, CBB, CLX, CMF, CWY, DDH, DDM, DEF, DFF, DGG, DHL, DOS, DXV, EAL, EAQ, KWW, KN2RBH, RTE, TBM, TYK, TZR, UNF, UWA, KN3BBC, DMG, DPT, EGO, EVI, EXM, EXS, GAK, GBC, GBY, GCK, GFK, GLI, GLY, HCD, HGG, HLU, HPG, HPH, KN4AHC, BQU, CFV, CWT, CXH, DKL, DLJ, DMM, DRF, EBG, EDF, EGY, GZC, UOT, UPJ, VSJ, VTJ, YBB, YDP, YWL, YWZ, ZYU, ZZI, KN5BMA, PTB, QHZ, RIP, RLW, TKK, TLP, WV6AYL, BFN, KN7CUF, OJX, KN8JMA, JWS, KIX, KQL, KQW, KVR, KWB, LBQ, LEZ, LFY, LUZ, MJI, MKW, MPR, MUU, MWU, NJUM, NTN, KN9AKS, KWK, MBB, MDF, MRZ, OAJ, OMK, OUI, PFO, PGC, PME, POG, PPX, PQG, PQN, PZY, QFB, QJV, QWA, KNØRKF, RLW, KQF, SIA, SIU, SXV.

From Central America, Jack Hathaway, USAF Mission to Honduras, c/o U.S. Em-

bassy Tegucigalpa, Honduras writes to advise us that the following stations were received at his QTH: 80 metres—KN4VFU. 15 meters—KN1HEF, HLU, HVU, HZF, III. IQM, JGO, KN3, DPB, ESS, GKD, KN4CPX VSI, YBS, KN5SBX, KN6MQH, KNØQNU. Jack failed to note the dates or the times but the fellows listed will be glad to know that they were getting into this part of the Americas.

Our friend Ivor Stafford, VK3XB, 16 Byron St., Box Hill, E. 11, Victora, Australia has been having his troubles with 40 meter QRM, but did manage to pick up the following stations: Sept. 19, 1958, heard and called WV6AQC, WV6BMI, and KN9LQY. On Dec. 9, he heard and called KN5WOE, KN7CPL, and KN8LCM. Dec. 14 H&C KN4STV/P, WV6 ASU, BFR, WH6CXP, CXZ, and DAV. Dec. 21, H&C KN4ZDV, and KN5SWU. Jan. 13, 1959, H&C KN5TAH. Ivor will be active through the month of April and says this is the best month of the year for KN and WV DX.

Net News

Ron Kolmodin, 929 West 53 St., Chicago 9, Ill., would like you to know about a new net, The Evening Novice Net on 7180 kc, Mon., Thur., and Sat., at 2000 CST with KN9OUU as NCS. Everyone is invited to check in.

Help Wanted

Things are "slow" this month in the HW department. Looks as if everyone who desires a ham license already has one! If you would like to be placed on this list, and be contacted by a "helping hand" type amateur, drop me a postal card at the address at the head of the column.

W5—Deral Kent, Box 622, Lockney, Texas
W7—Pete Almada, 1328 E. 13th, Tucson, Arizona, Phone MA22496

Letters

Mac MacIntyre, 3009 Howe Avenue, Sacramento 21, Calif., WV6???, plunks away with a Globe Chief and lands 'em with a BC-312/M on 3732 kc. Mac belongs to the RAMS (Radio Amateur Mobile Society), will sked for any reason, and would like pen pals.

Dave Alsing, KN3HFB, 201 Illinois Drive, Glenshaw, Pa. has worked 28 states in two months of operation with his DX-40 and SX-99, coupled to a Gotham 3 element beam on 15 and a dipole on 20. Dave would like skeds with Del., Colo., N. Mex., and any New England states, and will be glad to sked anyone needing Pa.

Wayne Morris, KN4YEV, forgot to include his QTH but did say he was using a 75A4, Viking Ranger, and beam up 70 feet! Wayne has worked MP4, UAØ/MM, KW6, and so on for 36 countries. He will be glad to sked anyone needing Tennessee.

Ronnie Hill, 1730 Easy St., Hanford, Calif. racked up 6,123 points in the Novice Roundup, has a WAS of 47 (needs Del. and Maine), and wants to know the address of KN4ZZP.

Carl Pleasant, KN7GMN, Box 981, Rock Springs, Wyo., will be glad to sked anyone needing his "hard-to-get", along with Gene Murff, KN7GMD. Carl uses a Globe Scout and SX-100 to work 15 states, in two months.

Frank Krize, KN5SVC, 15 Montebello Dr., Natchez, Miss., has a DX-35 and Globe Chief 90A in the transmitter corner and a HQ-110 and Super-Pro for receivers, with a HyGain 3 element 15 meter beam, plus doublets for 40 and 80, he has worked 43 states, not to mention VE, WL7, KZ, TI2, ZL, and a VK7 on King Island! Frank would like skeds with R. I., Nev., N. Dak., Okla., and Wyo.

Tom Hartman, 420 N. Front St., Dowagiac, Mich. is still an SWL but would like to know how the DX-40 gets out on phone. Sounds like Tom is looking ahead, so what say you Generals.

Jim Woodman, 925 Adams St., Jefferson City, Missouri, holds call KNØQNU and would like skeds with Nev., Wyo., Idaho, Mont., and S. Dak., or pen pals from anywhere. Jim uses a DX-100 and a HQ-129X to a doublet.

That does it for another month gents. Not much mail this month, or pictures either, as you can see. So, stop working that juicy DX long enough to drop me a line and tell me about your activities.

73, De, Don, W6TNS

Just to prove you gents don't have a monoply on ham radio, let me introduce Gail Sumrall, KN5TNF, of Lake Charles, La. Gail is 16 and has her license since Jan. 9, '59. She is a "soph" at St. Charles Academy, plays the piano and takes voice lessons. The bandswitch on the Globe Scout 40A is on 80 meters, fellows. (photo by W5TVH)

by **DONALD L. STONER, W6TNS**
P.O. Box 137, Ontario, Calif.

semiconductors

The satellites currently whirring overhead will provide us with enough information to fill many volumes and magazines. The electronics sections of these amazing devices, particularly the transistor circuitry, will be of interest to readers of this column.

An unknown reader was kind enough to send me the circuit diagrams for the transmitters found in the Vanguard and Explorer satellites. Figure 1 shows the simple circuitry associated with the Vanguard six inch satellite. Actually, it contains two transmitters, one operating from solar cells (without energy storage devices), and the other operating from batteries which have long since expired. The crystal for one transmitter is located in the interior compartment, while the other crystal is thermally connected to the "skin". Thus the difference frequency between the two transmitters indicates the temperature of the satellite. At this writing, the 10 milliwatt solar power transmitter is still emitting *rf* and should continue to do so for several hundred years.

Although the Western Electric transistors used in these circuits are not available to Amateurs, standard 2N types can be used for ham applications. The Philco T-1324 ($1.65) or RCA 2N384 ($6.00) can be used in Figure 1, along with an International Crystals fifth overtone rock, up to about 75 *mc*. The practical limit for crystals is about 125 *mc* and the Philco 2N588 ($6.00) or 2N500 ($10.90) will work fine at this frequency.

The circuit in fig. 2 is the Explorer I transmitter, brain child of Jet Propulsion Labs in Pasadena. This consists of a crystal oscillator on 54 *mc* driving a buffer/doubler to 108 *mc*. The voltage from the subcarrier oscillators changes the collector junction capacity, producing a form of reactance modulation in addition to the amplitude modulation.

A very inexpensive version of this transmitter could be made to operate on the two meter bany by using the T-1324, 2N384, or 2N588 as a 72 *mc* oscillator with a 2N500 doubler/buffer. Cost of the T-1324 — 2N500 combination would be around $12.00. A more exotic version (more power output) would consist of a 2N500 oscillator driving a 2N502 ($12.40) as the doubler/buffer. In either circuit, the rf chokes should be self resonant at the operating frequency. The coil shunting the crystal should resonate with the crystal and holder capacity at approximately 5% higher than the frequency of oscillator.

Zener Diodes

Richard W. Lanz, WØGAA, suggests an interesting application for zener diodes. They are excellent for obtaining cathode bias in modulator circuits and have very good stability n the lower current range of the audio cycles. This is where "crossover distortion" occurs. Richard's circuit is shown in fig. 3. The fuse is included to protect the diode in case a tube shorts out. The diode can be either the Inter-

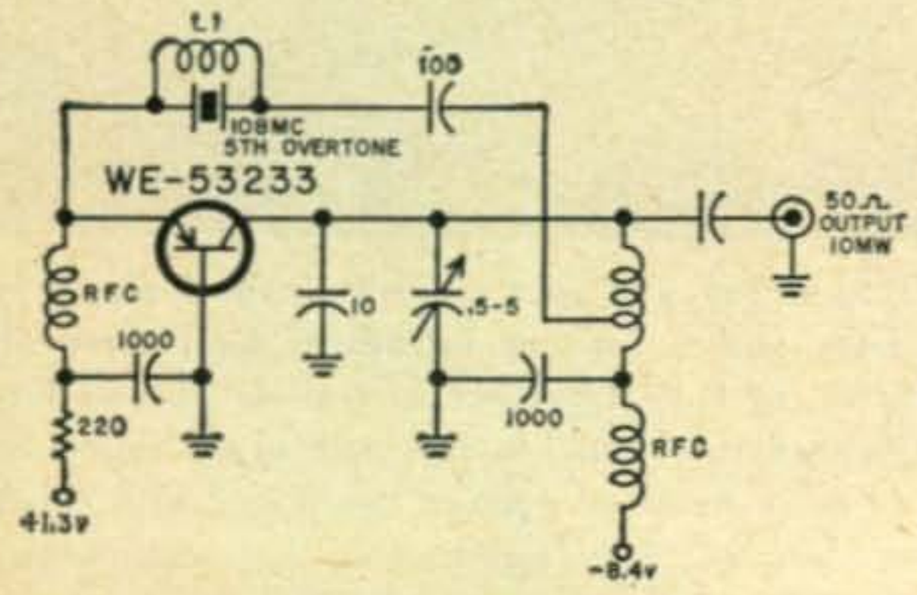


Fig. 1—Vanguard Satellite transmitter. The output is 10 milliwatts rf.

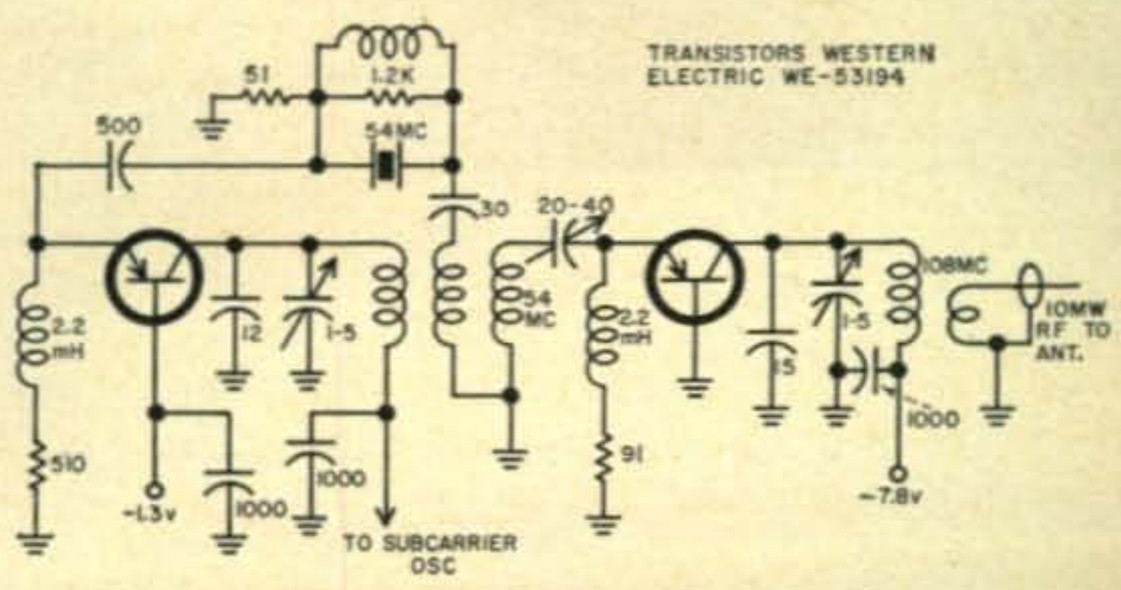


Fig. 2—Explorer I Satellite transmitter. The output is also 10 milliwatts.

national 1N1592 or 1593, or the Hoffman HZPR 8.2 or 9.1. The International 1N1592 is more stable at the modulator resting current level, and is rated at 3.5 watts dissipation.

Tom Lamb, K8ERV, calls my attention to the Hoffman HB series of silicon diodes. He says "These units are only 44¢ (Allied catalog) and range from 6.8 to 270 PIV. Out of 8 of the HB-1's checked, all showed an excellent Zener break at ten volts. These are the cheapest Zener units I have seen, and at a convenient voltage."

QRP Corner

With so much interest in kilowatt transmitters these days, it is refreshing to sit back and watch the QRP rigs come on the air. However, it would seem to be a good idea to have a rallying point where QRP fans can coordinate their efforts. To this end, the QRP Corner will be a regular feature of this column. Because of limited time on my part, Dick Griffith, W7MPQ, has kindly consented to collect the data on what the QRP hams are doing. By way of introduction I should tell you that Dick was the boy who got the QRP ball rolling by working Canton Island (KB6) from his home in Tucson, Arizona. His efforts gave me the bug to build The Mighty Milliwatt and Semiconductor Space Squirter featured in RTN and PE. So, if you are running less than one watt to a transistor rig, drop a line to Richard S. Griffith, W7MPQ, P.O. Box 925, Tucson, Ariozna, and tell him of your successes. Suggestions for QRP frequencies are appreciated.

Literature

The famous CBS-Hytron Transistor Course has been revised and expanded. The course is not free, but runs $25.00, which includes a correction and advisory service. There is a price break for groups of five or more. Write CBS, 100 Endicott St., Danvers, Mass.

Lots of free literature on solar cells (silicon) from International Rectifier Corp., El Segundo, California. Bulletin Number SR-275A describes unmounted commercial grade cells. Nine types available. Bulletin SR-276 describes ruggedized silicon solar cell modules (mounted or groups). Modules are available with one, two, or five cells, with conversion efficiency between 4 and 8%. Selenium photovoltaic cells are described in catalog PC-649A. Considerable technical data in this. Request on company letterhead.

General Electric Co. has added 58 additional low current silicon rectifiers to their growing line. Twenty of the new types are pig-tail lead devices, the rest are stud-mounts. These units are described in bulletins ECG-349 through ECG-353.

New from International Rectifier Corp., El Segundo, Calif., is a series of new 12 ampere diffused junction silicon rectifiers, with PIV ratings between 50 and 500 volts. Priced between $3.00 and $15.00! Bulletin SR-308 provides the details. Also new are the series of reference packs with output voltage either 8.4 or 16.8 volts. Built around the 1N430 reference element, these packs maintain the voltage within plus or minus 0.01% (see photo). Bulletin SSD-401 describes.

Motorola Semiconductors, 5005 E. McDowell, Phoenix, Arizona, have a new series of competitively priced silicon rectifiers, 1N1563A through 1N1566A, with PIV between 100 and 400. Data sheet available. Also new is their 2N350A, 2N315A, and 2N376A. These transistors are suitable for audio, switching, or regulation power supplies. Data sheet shows the circuits.

Pacific Semiconductors, Inc., 10451 W. Jefferson Blvd., Culver City, Calif., have a new series of high "Q" Varicap diodes featuring "Q"s five to ten times higher than the original device, plus wide tuning range.

Another amazing device by PSI is their "Microdiode" (see photo). It is basically a diffused silicon crystal element, identical to the PSI subminiature computer diode, but packaged for minimum volume and weight. The fact that 9 million can be packed in a cubic foot would tend to confirm this!

Speaking of satellites, Philco Corp. has

[*Continued on page 104*]

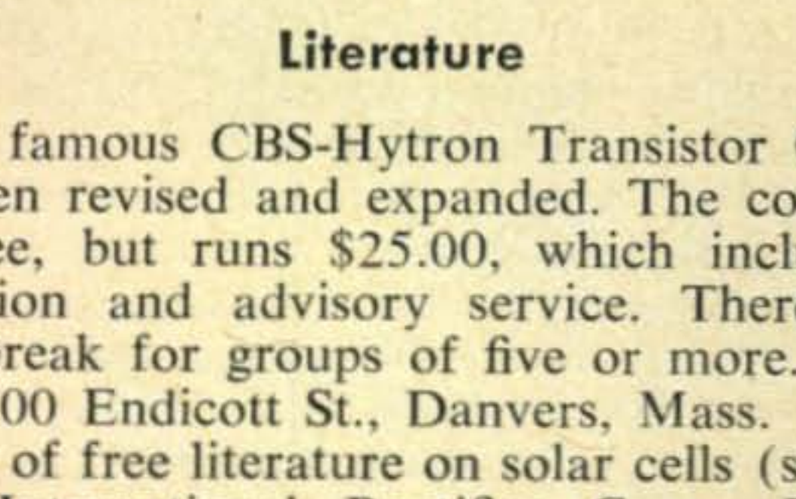
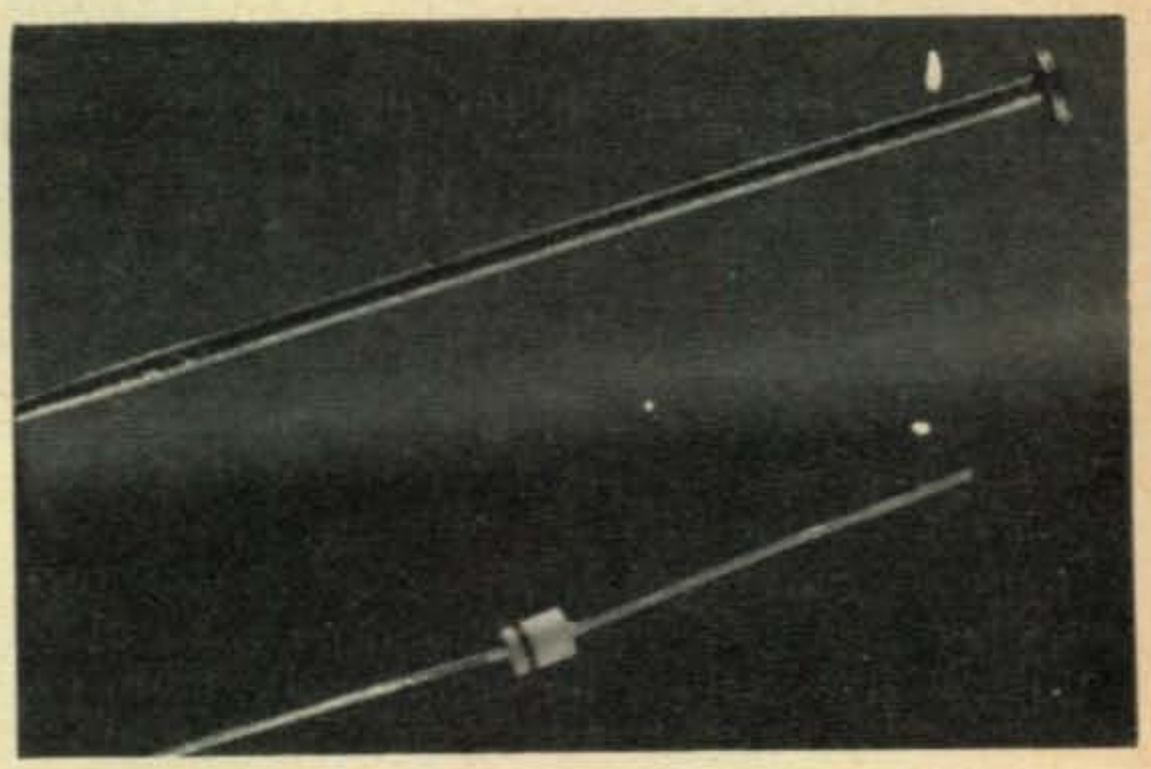


Fig. 3—Application of Zener diode in a Class B modulator circuit.



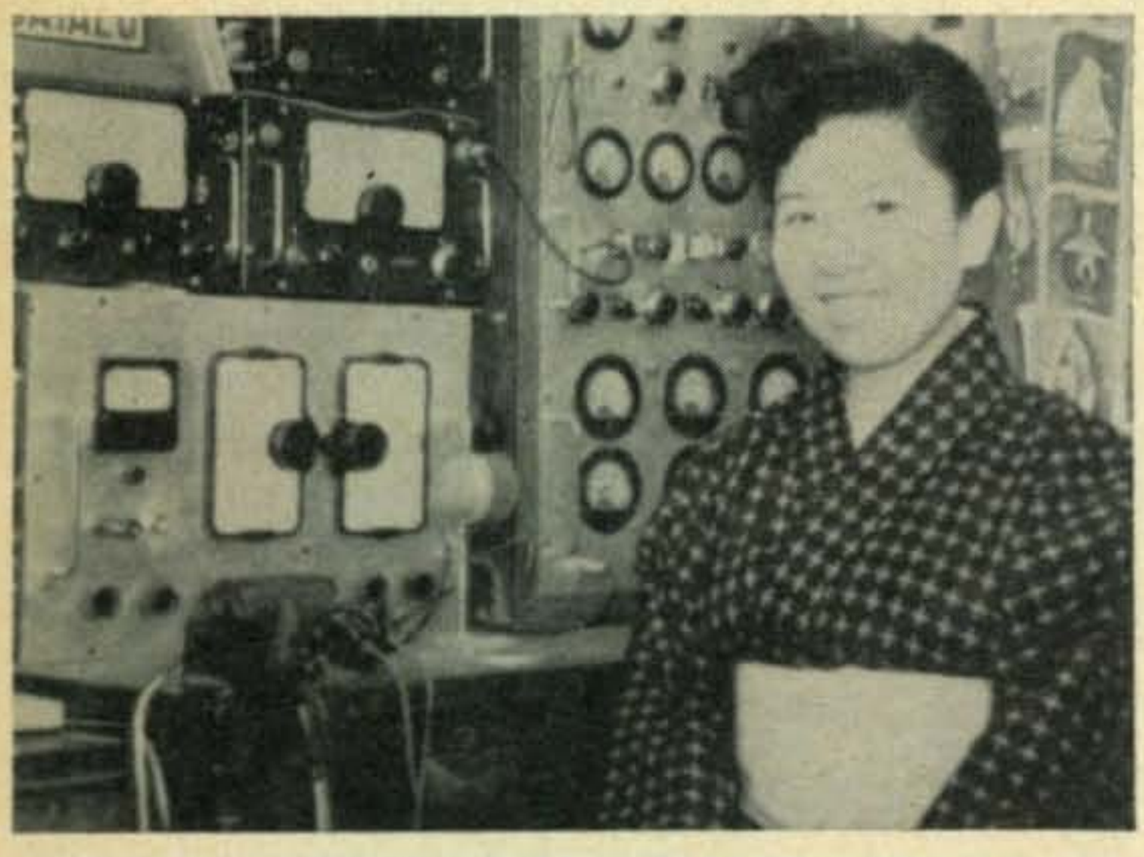
The Pacific Semiconductors, Inc. type XD Micro-Diode compared with a common pin! The diode is only slightly larger than the diameter of the shank and more than 9 million will pack into a cubic foot!

VHF

50mc. 144mc. 220mc. 420mc. and above

by Sam Harris, W1FZJ
P.O. Box 334, Medfield, Mass.

Angelic isn't she? Fran, K4PPX, at her hospital rig.



Six meter DX, Fumi Abe, JA1AEQ at her rig. Only YL (X that is) on six meters in Japan.

The gals have it this issue. This "purty" one is K1DTL and her O.M. W1FCH of Putnam, Connecticut.

W1QCC/VE1, W2WZR, W1RUD, K2BIQ, W4HJQ, W1PYM, W1FZJ, W1BU, W2AMJ, VE1TF, W8KDJ, W8LIO, W1ZBT, W2FDI (ex W1KFO), W1VDE, ZL1ACG, W1FRR, VE3AGW, W1TA, HB9IE, W2PEO, W6BQ, in addition to having a common interest in VHF are also to be found on ssb. Now there is nothing wrong with ssb that couldn't be cured with a good modulator but these guys are doing it on 75 meters. More particularly they are to be found on 3804 kc, lower side band. Topics of discussion run the string out from "how are you feeling tonite", "did you get your new antenna up," "did you hear the aurora last nite", "do you think Jo could possibly be as nice as she sounds", to "when you gonna get back on two?"

Now I don't want to give the impression that I think that 75 meters is a good substitute for the VHF . . . Far from it . . . A good way to keep in touch with the boys who are out of your normal operating range however. It's nice to know that old Russ (W1QCC/VE1) is coming home in a few months. Russ has a complete Heathkit station; receiver, transmitter and ssb adaptor. His six meter ssb signal speaks for itself.

W1RUD, W2FDI and K2BQI are all proud possessors of the new Collins 32S1 ssb transmitter. Seems like Collins has the VHFers in mind as they have brought out some excitation for use with a VHF converter on six and two. (The grapevine says that they are going to make VHF converters available soon.) There are several converters available now although I have not seen one that was satisfactory in all respects yet. What we need is a good construction article on a six and two meter ssb converter. Any takers?

Commercial Gear

While on the subject of commercial gear I had a chance to use one of the new Tapetone six meter receivers. Didn't have it long enough to give you a complete rundown on it but did get the impression that the boys at Tapetone have got something good going. The first receivers will have been shipped by the time you read this, so if you have one on order now is the time to start complaining—And—the guy you can complain to is none other than your old friend Paul Day (W1PYM). Guess they decided that if they were going to be in the VHF business they had better have a good VHF man on the payroll.

One other bit of commercialism is in the form of a piece of surplus labeled an AN/APA-38 Panoramic Adaptor. This device is a panadaptor working at 30 *mc* with a maximum sweep width of 10 *mc*. It is being sold for $22.50 complete with 60 cycle power transformer and instructions. I am using one on my two meter converter looking at the first two *mc* and another one on 220 *mc* looking at the first *mc*. (I need two more for six and 420.) The big advantage of these gadgets is that they can be hooked up to the output of your converter and will allow monitoring the complete band or any portion thereof without tying up your IF receiver. So—while you are working someone on one band you can see what is going on on the other bands.

As supplied the APA-38 has a very wide second *if* and in order to keep the signal pips down to a reasonable width it is necessary to sharpen it somewhat. I accomplished this by installing a couple of surplus 6 *mc* crystals. If anyone is interested in how, I would be glad to send details of same. Oh yes—I can't remember where I got the APA-38's but I know I saw them advertised a couple of months ago in some obscure radio magazine . . . I think it was "CQ".

Contest: April, CQ, VHF

Leave us not forget the spring VHF contest. April 25-26 from 2000 hours to 2000 hours local standard time. Rules in the March, 1959 issue of "CQ". It's true that everybody can't win but *YOU* can if you just try hard enough.

While we are not forgetting things . . . Put on your list the Dayton Hamvention, May 8th and 9th; and the Syracuse VHF Round-Up on October 10, 1959.

Last but not least the National ARRL Convention in Galveston on June 19, 20, 21st, 1959. Big doings by the VHF committee, Waldo W. Townley (W5FEK) presiding. Helen and I hope to see you at all of them . . . How about it?? See you there???

Parametric Amplifiers

Got another note from Jock (VK3ZDG) about his experiments with paramps. Seems like Jock and Les (VK3ZCN) have both gotten paramps going and aren't you ashamed. Guess the diodes they are using (GERMANIUM gold bonded) are not so hot on the higher frequencies but are giving good results at six meters. (See last month's "CQ".)

Apparently the biggest problem is getting more information on "how to". It is certain that Frank (W6AJF) will have an article in "QST" on a practical paramp and at least two more on higher frequency models in "CQ" in the next month or so. We have a complete converter article in the works. (Complete with paramp and xtal mixer.) Henry (W1OOP) has a transistorized 432 and 1296 transmitter working and will have the details ready for you in short order. (It's xtal controlled too.) To make matters even better the price is still coming down. (In small quantities comparable with 417A prices.)

In case you are still looking for a suitable pump for your amplifier I point out that RCA has an oscillator for sale which fills the bill to a T. The designation is JRC 5794. It includes the complete oscillator and sells for around $8.50. You can get them surplus for fifty cents or so and I bought one at a local radio store for $6.50. (They had it on the shelf for a long time and were glad to part with it.)

To sum up the paramp situation I would say that the biggest problem is that they are too simple. Whenever anything is really good someone always has to do their best to make it look so complicated that you and I are afraid to tackle it. Do not let anyone confuse you about paramps. *They are not complicated.* They are easy to make and just as easy to use. If you want to get all involved in idler noise, circulators, resonator and negative resistances . . . well go ahead. But for goodness sakes let the rest of us dumb heads build our non-sophisticated, non-degenerate, double port, non-recirculated, non-idler terminated, low noise preamps in blissful ignorance.

Receivers and such

I don't know why it is, but for some obscure reason the general consensus of opinion seems to favor multiple conversion type receivers. Looks like if you don't have at least triple conversion in your receiver you just aren't in the know. The facts of the matter are that the more times you have to convert in your receiver the more problems you have. Not only because of the additional mixer noise, but also because the extra oscillators and *if* amplifiers are more prone to produce birdies, easier to overload and more susceptible to cross modulation. (A usual by product of overload.)

Now if my memory serves me right the reason for going to double conversion in the first place was to improve the image ratio on the higher frequencies, while still maintaining good selectivity characteristics. However those were in the days when good high frequency *if* filters were hard to come by. Furthermore, the thinking was predicated on building general coverage type receivers. A most unsuitable type for VHF work at best. The poor unsuspecting ham is still reaping the deleterious effects of this double conversion kick and the worst thing is that he usually doesn't even know he is suffering.

You see, in the beginning, the designer had his hands full trying to get enough preselection ahead of his mixer to give any reasonable amount of image rejection. Then comes the high frequency first *if* and his problem is licked. So why bother with expensive, hard to track and keep tracked *rf* preselection? After all the preselection does not help to hear weak signals. You can get all the gain needed with relatively

wide band preamplification. And with modern tubes one stage and one low Q tuned circuit give all the gain you can use. Selectivity is obtained in the *if* and the front end of your receiver is wide open for any old signal that wants to come in. Now in most cases the *if* can peal off all the signals that don't fall in the passband and no harmful effects are noticed. That is until you put a decent antenna on the receiver and start to listen on a band where there are some loud signals. It sure is amazing how many key clicks there are now-a-days. And boy the way those high power phone boys splatter all over the band. Why when Louis comes on I can hear him in a dozen places in the band. But boy with the sensitivity and selectivity I've got in this new receiver I could hear a gnat wiggle his eyebrows if there just wasn't so much interference.

Hamvention

Dayton, Ohio is the place to be on May 8th and 9th of this year. The following dope is the reason why.

VHF BANQUET at the Biltmore at 1900, Friday May 8th. Tickets $4.00 and must be purchased by May 6th.

VHF PUEVOM initiation at 2300, Friday May 8th. Cast of members to give the ceremony from the Miami Valley VHF Club. $1.00.

Other Puevom ceremony initiations to be given on Saturday.

VHF FORUM Saturday at 1440.

"VHF from Eight Miles Up"—Major E. J. McElroy, USAF, W1AEO.

Film: "The World Above 50 *mc*"—Bruce Kelley, W2ICE.

"VHF in the Old Days"—Ken Houston, K8HNV.

"Parametric Amplifiers and Transmitters". Sam Harris, VHF Editor 'CQ', W1FZJ.

SEE YOU THERE!!!!

Syracuse VHF Round-Up

The annual VHF "Round-Up" put on by the "Syracuse VHF Club" each fall is another "must" on the VHF man's calendar. No details as yet, only the most important part, the date to be marked on your calendar is *OCTOBER 10, 1959.*

Hamorama Picnic

Annual picnic of the "Kew Valley Radio Club" of Kansas will be held on Sunday, May 17th at Lake Shawnee, Topeka, Kansas. Stations on 3920 and 29.6 (WHAT!) for directions. Mobile hunts on a number of bands *in-including 6 meters.* Registration $1.50—Coffee and soft drinks furnished.—Bring your covered dish.

Two Meter Meat Ball Net and Club

This very active group held their first annual dinner on Saturday, February 28th 1959. Purpose of this dinner (other than a good gabfest) is to raise funds for their summer hamfest which is coming up in July. No details as yet—they too are coming up.

We hear by way of Len, SM6BTT that the band was open twenty-five days to the U.S. during November '58, seventeen days during December and about ten days during January '59. Easiest state to contact was Florida where Len contacted fifty-four different stations; best signals occurred on November 30th and December 1st when Len's S. Meter hits the pin on some W4s' and W8's.

Len tells of an award offered by the local club there. Those who have contacted two of SM6ANR, SM6APB and SM6BTT send your QSL cards and 3 IRC to the WGSA Manager, P.O. Box 609, Goteborg 6, Sweden. Tell them in the application that both QSLs were made on 50 *mc.*

Otis A. F. B., Mass. Lanny Holt (K6HAA/1) let's us know that he's working on his VHF gear even though he isn't on the air as yet. "Don't know just when I'll be on the air but I'm working on gear for 50, 144, 220 and 432 *mc.* In southern California I worked out with 150 watts to a Gonset long John up 80 feet, and a pair of 6AJ4 gg for receiver. Heard W7JRG in Montana but no contact. This was via meteor scatter. I'll probably be on 144 *mc* soon with twenty watts, as soon as the bugs are out. At present I'm constructing a little exciter to cover 50 through 432 *mc.*" *Glad to know that you're now one of the East Coast gang, Lanny, know that you'll enjoy the high frequencies in our area.*

Chesterland, Ohio Our old friend, the five certificate man for six meter C.C.C. for '58, Jack Bayha (K5OQN) is awaiting his new call for W8 land. "Just got set in a house here in Chesterland, Ohio, on a hill-top of course; and will be back on the air before too long with a pair of Finco 4 element beams stacked for six meters."

"Project for this year will be to make WAS and WAC on six in a twelve month period." *I remember way back when—when Helen said that too!!*

"Received my QSL and a photo from JA1-BIR who I worked on November 21, 1958. At the time I heard Tamotu (JA1BIR) the whole southwest was calling him, but I managed to grab him by *not* zero-beating him. Had a ten minute QSO and when I signed, after having him zero-beat me, about 500 stations had also zero-beat me and were all calling him frantically. Last I heard of him, he was calling 'CQ' and looking for some station on a different frequency." *Makes interesting reading Jack and we appreciate the information. Good luck in the new QTH.*

Phoenix, Arizona A plea from an ex-low frequency man, namely—David Munyon,

[*Continued on page 110*]

Announcements

Hamfest, Boston Area

The first Hamfest in the Boston area since 1948 is to be held at the New Ocean House, Swampscott Mass. on Sunday, May 17. Thousands of dollars of radio equipment in prizes. A genuine mink stole for the lucky YL. Starts 9 AM. Manufacturers and distributors will have displays. FCC exams for General Class Amateur license will start at 10 AM. Technical lectures on Ham subjects. Transmitter hunts on 2-6 and 10 Meters. QSL card contest for the best original standard size card. Traffic and CD net meetings will be held. Special events for the YL's only. The QSL Bureau will be present for DX cards. Talk-in stations on 2-6 and 10 meters to help find the way. Registration at the door $3.00.

Fresno, California

The 1959 FRESNO HAMFEST will be held on May 2, 1959 at the Fresno District Fairgrounds.

There will be an open forum discussion, code speed contests for both Novice and general class licensees, four hidden transmitter hunts, mobile judging, special sessions for those interested in VHF, SSB, CD, traffic, and other events yet to be planned, such as special meetings for the YL operators, and for XYLs. Ticket price will be $6.25, which includes registration and the banquet in the evening.

Pittsburgh, Pa.

The Breezeshooters 5th Annual Hamfest is to be held at the Lodge, North Park, Pittsburgh, Pa. The date is May 24, 1959. The time is 1000 Hrs until 2100 Hrs. Registration is $1.00.

For further information contact Thomas J. O'Toole, W3SHT, 301 Orchard Spring Road, Pittsburgh 20, Pa.

Augusta, Georgia

The Amateur Radio Club of Augusta, Ga., will hold its annual hamfest this year on May 17 at the Julian Smith Casino and Park. The big prize has not as yet been selected by the hamfest committee, but it will be in the price range of from $400 to $500. As usual, there will be many other prizes, both for kiddies, ladies, and hams. Night before activities will include a Hamfest Eve party with dancing, swimming, and a dutch supper, served smorgasbord style. Dinner on Hamfest Sunday will be Southern Barbecue served family style on the table and all you can eat. Tickets are $3.50 for adults which includes meal, prize drawings, and most other activities. For more information contact either co-chairmen of the hamfest, Bill Towne, K4KAR, 359 Heath Drive, Augusta, Ga., or Randy Watkins, W4OKL, Martinez, Ga.

Moline, Illinois

The Quad City Amateur Radio Club announces the annual Mississippi Valley Hamfest, which will be held Sunday, May 24th, at the Gra-Ell picnic grounds. The location of the grounds is approximately 3 miles east of the Quad City Airport on route 6, outside Moline, Illinois. Advance tickets may be purchased for $1.50 and tickets on sale at the gate will be $2.00. Advance tickets may be secured from K9IDN, Bob Horton, 1808-9th Street, Moline, Illinois.

Cleveland, Ohio

The Indian Hills Radio Club is sponsoring the 4th annual banquet and get-together to which all amateurs in Cuyahoga County will be invited. It will be held at Eastown Motel, 15103 Euclid Avenue, Saturday, April 25, 1959 at 6:00 P.M. Reservations will be accepted until the room facilities are completely sold out.

Roanoke, Virginia

Blue Ridge Amateur Radio Society, Inc., is holding its Fourth Annual Hamfest at Lakeside Amusement Park, between Roanoke and Salem (U.S. 460) on May 17, 1959. Open House at W4CA on Saturday evening, May 16. Frequencies 3835 kc, 29.6 mc. and 50.1 mc. will be monitored for mobiles. Plenty of activities and prizes. Registration is $1.00, plus luncheon ticket $1.50. Children under 12 years 75¢. Hotels and motels plentiful, also lots of activities for XYL and Jr. Operators. For further info contact Ken Wyatt, K4BCP, P. O. Box 2002, Roanoke, Virginia.

Bremerton, Washington

Annual Bremerton "Ham Fest" May 16, 1959, will be held at Sons of Norway Hall Bremerton, Washington. Prizes, entertainment and fried chicken. First prize Hy Gain 3 ele. tri-band beam. Tickets $4.00 per person with reservation and $4.50 per person at door. Contact Ray McCausland W7UWT, 3236 Wright Ave., Bremerton, Washington for tickets or further information.

Bermuda Contest

Contest Period: 0001 GMT Apr. 25 to 2359 GMT Apr. 26, 1959
0001 GMT May 9 to 2359 GMT May 10, 1959
Bands: 7-14-21-28 mc.
Operators: Single operator only, W and VE.
Mode: Any mode may contact any mode. Only one contact per station per band.
Serial Numbers: RS and RST reports. VP9's will give RS plus Parish.
Points: 3 points per completed contact.
Multiplier: One for each Parish (add Parishes contacted on different bands).
Awards: Free one week trip to Bermuda for the highest scorer. Certificate to highest scorers in each call area, W & VE.
Logs: Send before June 15th to Radio Society of Bermuda, P.O. 275, Hamilton, Bermuda.

Topeka, Kansas

12th Annual Hamarama (formerly Christy Picnic) Sunday, May 17th. Lake Shawnee, Topeka, Kansas. Prizes, mobile hunts, XYL-YL activities, covered dish luncheon. Hams, guests invited. Kaw Valley Radio Club sponsors.

N. E. Montana

The North Eastern Montana Hamfest committee are making plans for their 6th Annual Hamfest which will be held on Father's Day, June 21, 1959.

Corning, N. Y.

The Penn-York Hamfest Assn. will hold its first Hamfest in the Legion Hall, Elkland, Pa., on Saturday, June 20, 1959. Program will include speakers, contests,

[*Continued on page 104*]

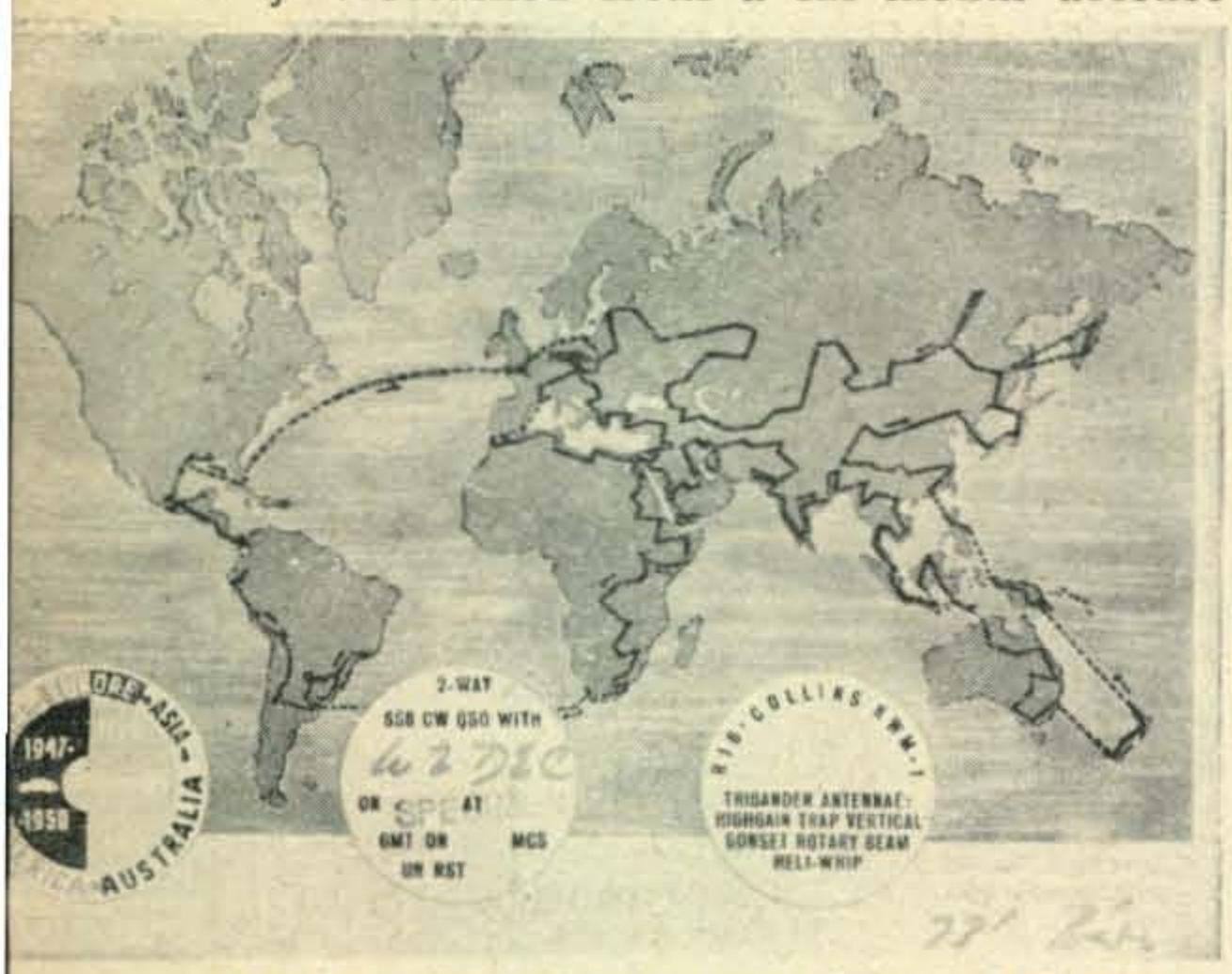
URBAN Le JEUNE Jr., W2DEC
416 North 15 St., Kenilworth, N.J.

DX DX DX DX DX DX DX DX

CR5 PORTUGUESE GUINEA—During a QSO with Anibal, CR5AC on February 28th, he stated that I was one of his last QSO's. He left CR5 for good on March 10th, returning to CT1. CR5JB is presently in Angola without a license, leaving Portuguese Guinea with very little, if any, activity. So, CR5 joins ZC6, JY, C, PK's, and others that had a great deal of action at one time with no activity.

EA9 IFNI—Jack, G3AAM, said there is a chance that a station signing EA9DG may have been a legitimate station operating in Ifni!

EAØ SPANISH GUINEA—Angel, EAØAB, has just returned from a six month absence and is presently catching up on his correspondence. Juan, EAØAC, is a doctor and is very QRL with his work. To make things even more difficult when he does have free time, it is almost impossible for him to work the ham bands. The local short wave station completely blankets all but the very low frequency ham bands. His only chance is Sundays when they don't go on the air until 1700 GMT.



Sample of the card OK7HZ expedition will be using.

FB8 COMORO ISLANDS—Andre, FB8CD, is back on the air. He has been worked by several west coast stations, including W7AUS, on 14145 AM fone around 1500 GMT. He has also been reported on 14060 CW. Andre is the only Comoro station. All other FB8C calls are on Madagascar. FB8CJ is ex FK8AO and still collects stamps if you're trying to get a card from him.

JT1 MONGOLIAN—JT1AA's replacement is now on the air. His call is JT1AB and his name is Bohous. He is not the Bohous of YK1AT. This is his first license. Ludvik ex JT1AA will be his QSL manager. QSL via the OK Bureau.

MP4D TRUCIAL OMAN—Andy, MP4DAA, is now on fone as well as CW. His present fone frequency is 14125 *kc.* Dick, W7FZA is sending him crystals for 14122 and 21220, and he should be on those frequencies just about the time you're reading this. His CW frequency remains 14048.

OY7 FAEROES ISLANDS—Martin, OY7ML, was on SSB for three months with a KWM-1 loaned to him by K6AXS who also handles his QSL's. He had 700 QSO's on SSB with 75% being W and K. He worked 30 zones and 54 countries which is a very good total for three months of operation on any mode. QSL's are being sent to all stations worked via the Bureau. Martin wants to thank all for their nice comments and cooperation when he was hunting for DX.

VQ9 SEYCHELLES—Robbie, VQ4ERR, and two other VQ4's have passage booked for a three-week stay in the Seychelles in August. More on this later.

VU7 NEPAL—An American communications company has taken a contract to install

three large SSB transmitters in Nepal. Tentative arrangements have been made for some of the personnel to obtain ham tickets for "morale" purposes. If they are successful, it will certainly raise the morale of a lot of hams throughout the world. The first full length American movie to be shot in Nepal is scheduled to begin shortly. One of these days, something has to happen there.

ZD8 ASCENSION ISLAND—Bob, ZD7SA, mentioned, during a QSO, that VP9DU will soon be on for a year's stay on Ascension. He will be with Cable and Wireless. Bob, 7SA, also mentioned that he has never been on SSB and someone borrowed his call for a little SSB activity recently.

160 METERS—W1BB furnishes us with the following 160 meter info. W6KIP worked HC4IE for the first W6 to South America QSO on 160. He was closely followed by W6HXT. It looks as though a new Loran system, which will be installed to supplement the present Loran system, may spell the doom for 160 meters in the states. ZL3RB worked W6KIP and W8ANO the former after a year of trying. W1BB has also been heard at ZL3RB, but no QSO to date. VP3AD is a new arrival on the band.

DXpeditions

CR1Ø PORTUGUESE TIMOR— The West Gulf DX Bulletin reproduced a very interesting letter from Bill, W7PHO. Bill received a letter from a gentleman whom he prefers to leave nameless at this time, who is all set to go to CR1Ø for two weeks. Mr. X and a Mr. Z, who are both commercial operators, have arranged for free round trip air transportation to Timor. They have gear that is portable enough to go and will operate CW and AM fone unless a SSB rig can be procured. They also have accommodations while in Dili. Mr. X and Mr. Z have already applied for operating permission. If they are successful, this could well be the most important DX pedition of all time. There are very few countries that have more blank spaces on countries list than CR1Ø. I personally know two honor roll members that would give their right arm for a CR1Ø QSO. I don't want to sir up a hornet's nest, but if you'll look on a map, you'll see that Portuguese Timor is split into two parts with foreign soil in between. Since this is one of the criteria for establishing separate countries (i.e. Alaska) we may have another country waiting in the background.

XE4 SOCORRO ISLAND—Quoting from a letter received from the San Diego Socorro Chairman, W6CAE—"The San Diego DX Club's DXpedition to Mexico's Socorro fsland is cancelled on word from XE1YF that only Mexican citizens will be permitted to go there, An all-Mexican XE4B may be heard in April or June, presently A3 only. Larry Higgins W6CAE, now ex Socorro Chairman". The San

Heinz, DL1BA and family during their mobile trip to Austria. Heniz is QSL manager for the DARC.

Bill, W6WTH and second op. WAZ is also hanging on Bill's wall now.

Diego Club, as you will remember, sponsored the very successful FO8AT Clipperton expedition. I'm not sure if it's the same expedition W6CAE is referring to, but XE1CV and XE1CP expect to operate as XE4PB for four days some time in the very near future.

OK7HZ EXPEDITION—The long awaited expedition of OK7HZ is supposed to get under way around April 22nd. One of the first stops will be OK7HZ/ZA. Jiri, OK7HZ, suffered a leg injury and has been operating his KWM-1 from his hospital bed. Pictured is the QSL that he will be using. QSL manager for the trip will be Beda, OK1MB. (Tnx OK1MB and W6KG).

ZL3DA EXPEDITION—The scope of Wins expedition has been enlarged to include ZK2, ZM6, as well as VR5 Tonga. He will more than likely be using the calls ZK2AC, ZM6AC, and VR5AC. The itinerary of his trip is as follows: Leave New Zealand May 12th by air, arrive Fiji the same day. Leave Suva May 13th by boat for British Samoa, arrive ZM6 May 14th and operate May 14th, 15th, 16th. Leave Samoa May 17th by boat, arrive in Nokual, capital of the Friendly Islands (VR5) May 19th, operate from VR5 from the 19th thru the 25th. Leave VR5 May 26th and arrive ZK2 the same day and operate for one day only. Leave ZK2 May 26th and arrive KS6 May 27th. No operation because of no

U. S. license. Leave KS6 May 28th and arrive ZM6 the same day. Operate from ZM6 until May 30th. Leave for home on May 30th and arrive in New Zealand June 3rd.

The rig will consist of a three-element beam and 150 watts of SSB. As I mentioned last month, don't hesitate to call him on CW, as he is an excellent operator.

YA AFGHANISTAN—A recent letter from Don, W6RRG, which appeared in the Northern California DX Club Bulletin intrigues me. "Just returned from a four-week jaunt to the Middle East; visited such exotic places as Beirut, Amman, Damascus, Bahrein, Karachi, Kabul, Kandahar, Teheran, Ankara, Istanbul and Tel Aviv. I will be spending lots of time in the Middle East; lots of business in that area. Incidentally, I'm all set up to operate in Afghanistan on my next trip there; will be operating as YA1NX with a KWM-1." Incidentally, the man said.

Danny—Thanks to the Northern California DX Club Bulletin for this letter received by Dick, KV4AA, from Danny, VP2VB, et al.

"Dear Dick:

To write this is the most difficult thing in the world. I feel as though I would rather be dead than face all the hams again.

I would love to be able to tell you that the weather was bad, or the engine failed at an awkward time . . . It has often been said that any excuse is better than none, but in all our associations I have never yet lied to you, regardless of circumstances.

The whole truth of the matter is, I went to sleep instead of being on watch. It is unnecessary for me to tell you I was tired. I have been over-tired for some time, and should have stayed over in St. Vincent for a few days, relaxing . . . I chose to move on. Call it what you wish—over enthusiasm—or just bloody stupidness—the facts still remain that I had no right to be sailing Yasme with so much at stake, feeling as I did.

I am feeling so badly now that I often wonder why I didn't finish off the job and drown myself, instead of inflicting myself on you and many others, again. I don't intend to go into the gory details and try to make a hero of myself . . . I know that I have not only let you down, but all the gang that have supported me. Your association with me will also be the cause of many nasty remarks from the 'know-alls', and to say I am sorry is more than an underestimation.

The feeling of despondency is growing every hour. Yasme is in a position where it is almost impossible to extract her. Her damage at the moment consists of a large hole in the starboard side where she has been lying on the rocks. Heavy seas and winds have caused the hole to get increasingly bigger . . . The latest report tells me that it is about 10 feet by 3 feet. I am dependent entirely on reports from others, as my foot injury prevents any real action which might produce results.

As the big rig was installed on the starboard side, it has suffered beyond any possible hope, and I doubt if I were able to remove it from the boat it could be made to operate after being submerged for so long.

If it is humanly possible to look on the brighter side of things, I have managed to salvage the following items, which, if they haven't been damaged in transit from the scene of the wreck to this QTH, should be o.k. One HT-32 and SX-101, two mikes and bug and a damaged cone speaker; both 2½ KW generators (thank heaven I disposed of 1½ DW in Dominica); my salvage pump and 12 volt gas generator (I doubt if either of these will work, having been submerged); this also includes my scooter; tower and beam are ashore; my two Leica cameras are o.k. Owing to my inability to move around, the Police have taken over and are getting off as much stuff as posible. I have learned today they have managed to do some fine work, there.

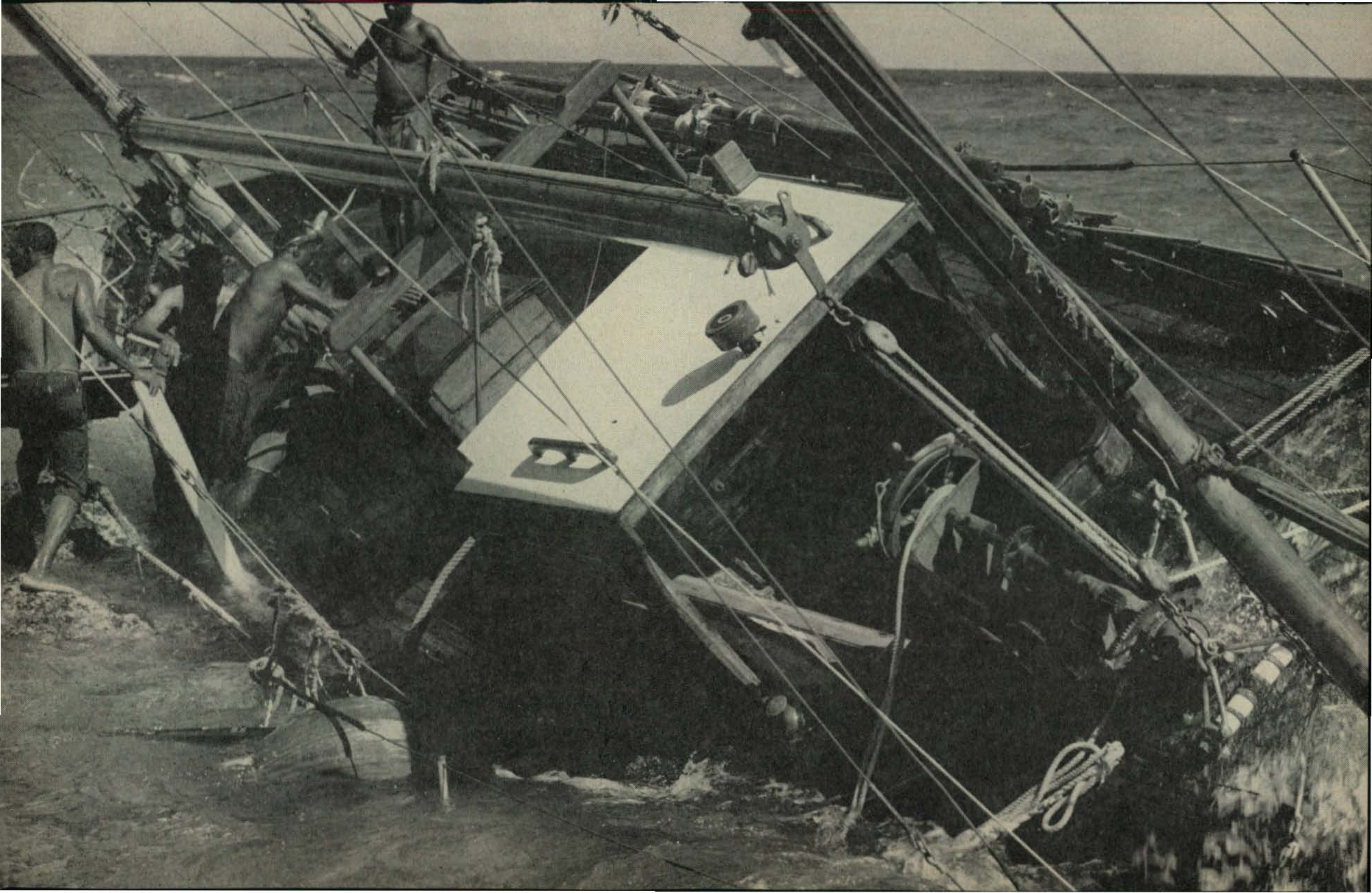
I have to face the ultimate, which is that Yasme cannot be salvaged. I shall be stuck here with a stack of odd gear . . . Naturally, I should strip the wreck of everything which is saleable . . . But, what to do with it all is something I cannot figure out in my present frame of mind.

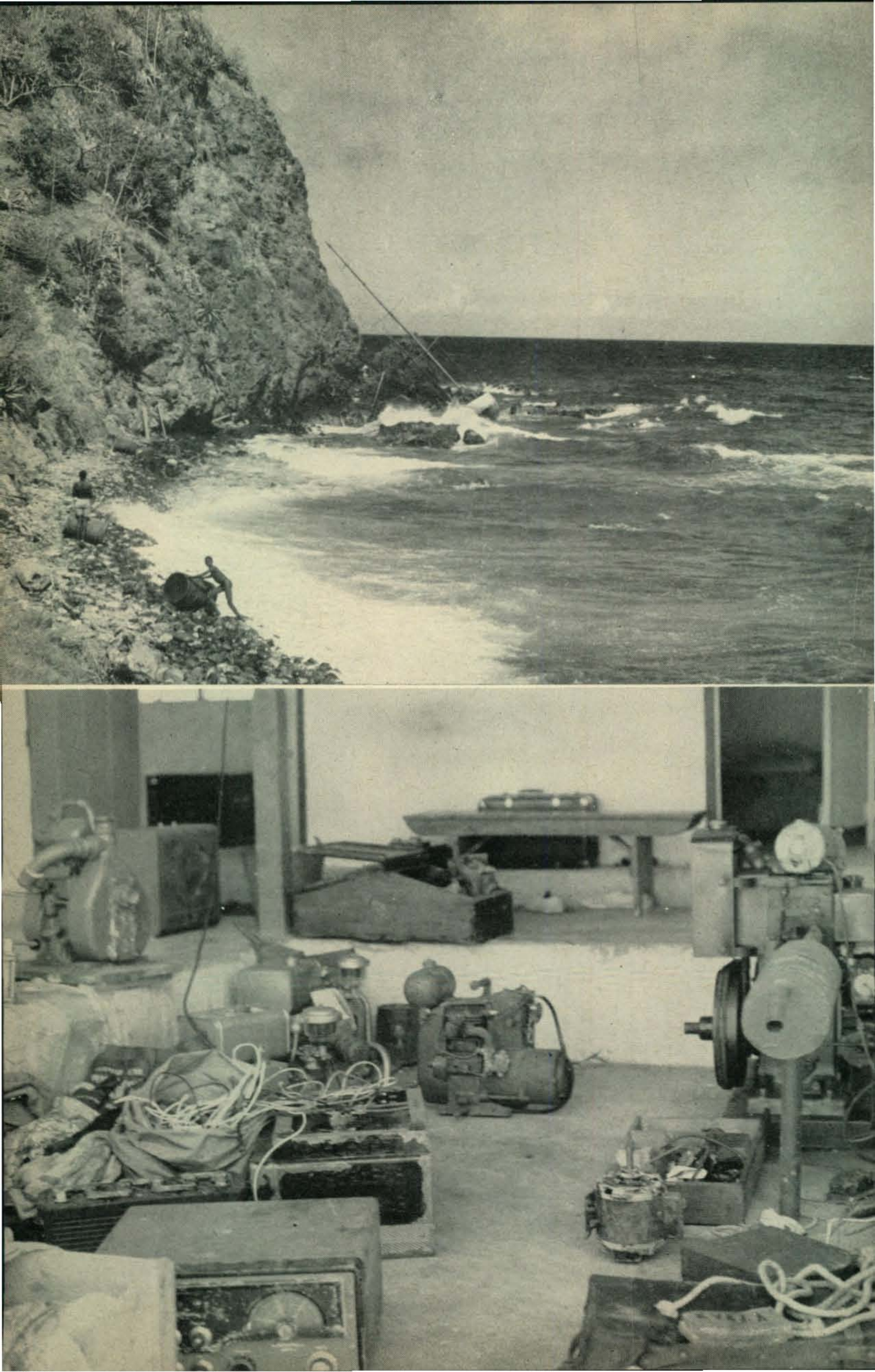
With the radio gear I have available I shall endeavor to get on the air, but, not having the circuits available (I cut all the wires adrift with cutters, to speed up removal of the gear) nor do I have any relay. In fact, I have strong doubts if I have any wire to string up a long wire, If, by some wonderful streak of luck (whatever that is) I can get on the rig, then things should be easier all around. But in my present state I doubt if I have enough strength, or common sense, to even start up a generator without blowing it up . . . Incidentally, I forgot to mention I also got the lathe off, with the motor, and practically all of my tools (I thank heaven now that you didn't send down the compressor).

Whatever you do, Dick, please do not mention my foot to my mother, I know this is unnecessary, but I have to say it anyway . . . Personally, I would happily cut off my foot to have Yasme back in the water again.

I had in mind chartering a boat to bring everything to St. Thomas and disposing of it there . . . the boat gear I am talking about, in the event of non-salvage here. What it would sell for, I haven't the slightest idea, but somehow I shall try to scrape up enough to buy some sort of boat without resorting to the hams. Somehow I am going to finish this expedition . . . How, I shall never know, but I still haven't lost the urge to carry on where I left off, even though I know I leave myself open to every form of ridicule. It would be justified, too!

I only wish I had a salvage expert available here, as I am confident Yasme can be saved





given the right guy to handle it, but here, there are few who can do a thing except talk, and, as time goes by, Yasme is getting more seriously damaged. Lack of communication with the outside world prevents me from getting in contact with anyone who could help. It is this lack of activity that is slowly driving me mad.

Speed is essential to save the boat, and I am afraid that by the time you get this letter, unless I have managed to get something worth while done, Yasme will be lost.

No more now . . . Many thanks for cheering cable.

Danny

We're all with you Danny, but let's not have any talk of your giving up . . . You're going to too many places we all need.

QSL Managers

QSL MANAGERS—Have you noticed the big upswing is stateside QSL managers for DX stations? These fellows sure deserve a tremendous vote of thanks from the DX Fraternity. A card that normally takes three months or more, plus many IRC's, to obtain can be had in about a week's time from the QSL managers. I was very surprised to hear from Mac, K2QXG, that only about 20% of stations sending cards enclose a self-addressed, stamped envelope. This is the least we can do for these fellows who devote quite a bit of their spare time helping out their fellow hams. I would like to run a complete list of QSL managers for DX stations on a world-wide basis, so if you handle cards for anyone yourself, or know of anyone that handles cards, please drop me a line.

WAZ and WPX

WAZ applications are running very high since a new batch of JT1AA cards went on their way. Please check your Russian zones over very carefully. Most applications which have been temporarily rejected have been because of mistakes on the Russan zones. For WPX, all cards must be submitted. There has been some confusion on this in the past. WPX and WAZ records have not yet been received, so WAX numbers and WPX endorsements cannot be given at this time. Please send all WPX and WAZ cards directly to me at the address at the head of the column.

Certificate Corner

"20-K". This nice looking certificate is offered by Mac, K2QXG. Rules are as follows:

1. Certificate will be issued on receipt of proof of contact with at least twenty (20) of the overseas bases of the U. S. operating under K. prefixes, from January 1, 1955, per the A.R.R.L. Official Countries List for that date, or any additions which may be made in the future, subject to possible change in requirements. Must be 1 each, 20 of the 24 possible.

2. Accepted general rules governing awards used by ARRL will prevail with the exception that photostatic or photographic reproductions will be accepted with the right to require the original QSL at the discretion of sponsor.

3. "K" and "KN" stateside will not be accepted. CN2 will not be accepted for KT1 nor OX for KG1, etc. Only *ONE* KC4, Antarctic, will be accepted, which must be land based.

4. The purpose of this award is to stimulate contacts with our overseas bases, therefore, the January 1, 1955 date will be strictly adhered to.

5. Application with cards or reproductions and list of stations and countries claimed, together with $1.00 U. S. money to cover costs should be sent to: L. L. McMaster, K2QXG, P. O. Box 206, Brightwaters, L. I., New York. Correspondence will only be answered when accompanied by S.S.A.E. Cards will be returned by registered mail, certificate by first class mail in mailing tube. Foreign will be returned only by first class mail. IRC coupons will be accepted from foreign countries *only*.

Note

Arrangements are being made for certain foreign clubs or stations to check QSLs from those countries. Since this award is under personal sponsorship, danger of loss to valued QSLs has been eliminated through cooperation of two well known DX men who will assume issuing of awards in event of personal inability. The sponsor assumes no responsibility for loss of cards in process.

At the present time the following countries are accepted: KA, KAØ, KB6, KC4-Navassa, KC4, Antarctic, KC6-Eastern Carolines, KC6-Western Carolines, KG1, KG4, KG6, KH6, KL7, KM6, KP4, KP6, KR6, KS6, KS4, KT1, KW6, KX6, KZ5.

I would like to thank the Northern California DX Club and the Ohio Valley Club for sending copies of their DX bulletins. They are a great help in getting this column together. I would greatly appreciate receiving any of the other DX bulletins if anyone feels kind hearted. I would also like to thank all who took time to write letters of encouragement. Well, that's about it for this month.

73es DX URB, W2DEC

QTH's—

DU6TY Po. Box 9, Roxas City, P. I.
HC5CN Cesar Nieto, P .O. Box 219 Cuenca, Ecuador
HL2AC "Chong" College of Engineering, National University, Seoul, Korea
SM5WN /LA/P QSL via SSA or SM5AHK
UA1DG Leningrad Pelrodworets, Kommuna Str. 20-1, Alekweew Anatol F
UO5AA Valen Glushkov, P. O. Box 1, Kagul, Moldavia SSR, USSR
VK9JG Box 55, Rabaul, New Guinea
VK2VK Sm5BBC and VK9VM via K2QXG
VS6AZ and VS4JT via K6GMA
XEØAEJ via K7AEJ
ZE8JJ via W6UNP
Thanks to W6KG, K6GMA, K2QXG, W6UNP, K7AEJ, OVARA, NCDXC for the above.

Congratulations to the following for obtaining WAZ:
OH6OA Alarik Wiik W6WTH Bill Wilson

[*Continued on page 113*]

1958 CQ World Wide DX Contest

Results Phone Section

Frank Anzalone, W1WY
14 Sherwood Road
Stamford, Conn.

The French are doubly endowed, they not only have Brigitte Bardot but also the new phone champ for the CQ World Wide DX Contest. Yep, they did it again. This year Paul Mandeville, F8PI did the trick with a walloping 585, 120 points on all bands. A new record for a single operator on phone. Paul used the same technique as Pierre, F8CH used last year. First a good multiplier, then a stack of contacts on 28 *mc*. Of a total of 802 QSOs, 515 of them were on 10. So that means that the Bill Leonard, W2SKE Trophy will once again make a trip across the pond to a permanent home in France. Congratulations Paul.

It was not a push-over for Paul however. Hot on his heels was 4X4GB with a higher multiplier but short on number of QSOs. A few more three pointers and Ben would have made it.

In the third spot is Dr. Val Lopez Banus, CO2BL, always a top contender but never able to overcome the handicap of one pointers from the US. This in spite of the fact that Val had by far the largest multiplier.

Close behind him in fourth position is ON4SZ. Pierre decided to do a single this year and almost equaled his multi-operator score of last year.

An ole' competitor CX2CO took over fifth place. Ricardo was "Top Banana" back in 1955 when the pickings were rather slim.

9K2AZ just did make the sixth position. Operating from a rare spot gave Bill an added advantage and his 100 watts made like a KW. However Bill claims that it was the W2BDS beam that did the trick.

I1AIM also found that his rare M1 prefix made a big difference. He had never been able to break into the charmed "Top Ten" from his home QTH. Alberto gave many phone men a new one from San Marino.

The score for the Radio Club of Uruguay was given a big boost by Horacio, CX3BH taking the eighth spot and Bill, 4X4FV gave Israel another "Top Ten" representative.

The final spot was taken over by another ole' contest man OE5CK. Carl has been handing out contest numbers for as long as we have been handling these October tests.

The W/Ks didn't even come close. Only two, W8NWO and W9EWC broke into six figures. W6YY was sorely missed.

In the Single Band division, Axel Tigerstedt, OH5NW on 28 *mc* made it no contest as he was so far ahead. The combination of 715 QSOs, 35 Zones and 92 Countries and a score of 228,727 points gave Axel high in all departments and easily won the new Don Wallace, W6AM Trophy for him. Nice going Axel.

There was plenty of activity on 21 *mc* too and CO2ZS took top honors with 137,013 points. This was John's first contest since he was only recently licensed. The only other station to break 100,000 was VP6FR and not too far behind was VP6LT. To think, all those signals on 10 and no VP6 to answer them.

It was rather tough going on 14 *mc* but CE2CC kept at it and easily took the top spot

OH5NW — Axel Tigerstedt, his 100 watt home-built rig, Geloso receiver and 4 El wide spaced 10 meter beam. ⟶

W6YMD — West Coast "Big Wheel." Reading from left to right — W6KFV, W6OXU, W6YMD, W6BXL and K6EWL.

for 20 with 92,150 points. Jose was also high with 334 contacts.

We never think of 7 *mc* as a DX phone band and in most cases it was only used by the All Banders to gain a multiplier. A few however did stick it out on 40 and SP3PL just did manage to nose out I1ZFF/M1. Julian was using 200 watts while Felice on a DXpedition to San Marino with I1AIM used only 25 watts. Incidentally K2GL was the only US station to get thru to both of them. Special mention must also be made of W6UED. Dennis was the lone entry on 40 from the US.

There was only one award winner on 80 and that is G5MP. It took a lot of perseverance to make 52 contacts and 1,092 points even with a European location.

Once again it was a run-away for the multi-operator crew at K2GL. (See cover March CQ). Their score more than doubled that of their nearest competitor, the group at W3AOH. The boys were out to break a million points but those poor conditions that had everybody moaning put the kibosh on any chances they might have had.

When we first started giving out cups, it was the wish of the donors that a trophy should not be won more than once by the same station. Therefore K2GL who won the mulit-operator award last year is not elegible for this year's Trophy. The Don Merten, K2AAA Cup this year goes to W3AOH with the next highest score. Now, what to do about K2GL for their magnificent performance. The Cups are mounted on a wooden base, one side of which holds an engraved plate, so we came up with the idea of adding an appropriately engraved plate each time a trophy owner wins a contest again. When all four sides are filled up we will think up another idea.

Close behind in contention for the Cup was the Southern California group at W6YMD. They didn't miss out by much and just a few more points in the multiplier would have done the trick. Better luck next time fellows.

In fourth place is DJ3VM, manned by a group of calls that usually appear in CW competition. And a group of GIs at KA2RB took over the fifth and final spot in the "Top Five."

The YLs were also in there pitching. To mention a few; KL7BHE, KX6CM, KZ5KA, OE2YL and ZP5JP; the first three being award winners.

Some real rare spots showed up too. Who wouldn't settle for 9G1CH, FB8XX, FB8ZZ, XZ2SY, 9K2AZ, AP2AD, HS1B, HS1C and I1AIM/M1. Not to mention a flock of those who didn't send in a log.

Again we must admit our disappointment in the lack of activity from areas that we know have many active phone stations.

However here it is, a complete report on that hectic week-end back in October. Read it and weep, or cheer.

Number groups after call letters denote the following: Band, final score, number of QSOs, zones, and countries. Letters designate power used. A—Up to 35 watts. B—Up to 150 watts. C—Up to 500 watts. D—500 watts and over. Winners are in **bold face** type.

Single Operator

NORTH AMERICA

United States

W1PDF	**A**	**84,826**	**188**	**51**	**115**	**D**
W1PCD	A	3,770	51	22	48	D
W1PLJ	A	8	2	2	2	A
W1ONK	**28**	**62,992**	**248**	**29**	**64**	**C**
W1ECK	28	27,708	102	21	47	—
W1FZ	28	14,580	84	22	38	D
W1OOS	28	8,300	62	17	33	C
K1AED	28	3,168	39	11	21	B
W1RWU	28	630	14	4	11	C
W1IUU	21	3,255	43	13	22	B
W1UOT	21	1,680	28	8	16	B
W1MGP	21	567	18	8	13	A
W2HTI	**A**	**75,460**	**194**	**50**	**104**	**B**
K2OPJ	**A**	**71,422**	**206**	**45**	**89**	**B**
W2BXA	A	52,545	180	42	71	D
W2DMJ	A	29,000	133	28	46	B
W2YTH	A	23,306	133	32	51	D
W2JVU	A	18,304	82	34	54	D
W2DEW	A	17,548	84	30	52	C
W2ESG	A	13,110	86	18	39	B
W2QKJ	A	2,280	26	9	21	C
W2OKM	**28**	**61,864**	**251**	**27**	**61**	—
K2VFR	28	34,000	150	25	60	C
W2DJT	28	7,656	61	15	29	B
W2DKS	28	4,620	48	8	25	C
W2VRE	28	3,108	31	13	24	C
W2GFO	**21**	**58,052**	**227**	**25**	**67**	**D**
K2BHP	21	26,404	125	25	57	D
H2HIY	21	11,328	78	20	44	B
K2PMZ	21	1,364	22	10	18	B
W2DVD	**14**	**19,592**	**93**	**26**	**53**	**D**
K2JGG	14	13,662	94	21	45	B
W3RPG	**A**	**42,100**	**221**	**35**	**65**	**D**
W3ZYO	A	10,659	77	15	36	B
W3AYD	A	8,628	60	18	35	C
W3UZF	A	3,910	33	16	30	D
W3ROA	A	91	6	3	4	B
W3ORU	**28**	**38,775**	**183**	**23**	**52**	**D**
K3BGX	28	21,714	106	23	54	C
W3EGD	28	19,604	115	18	40	B
W3KVB	28	19,344	128	17	35	C
W3AWG	28	3,990	45	8	22	B
W3KTW	28	2,619	33	6	21	B
W3HFD	28	1,404	26	5	13	D
W3ZQ	21	1,715	25	14	21	D
W3VTH	21	480	8	4	8	—
W4NBV	**A**	**89,936**	**173**	**61**	**115**	**D**
K4QIJ	A	39,600	146	43	67	C
K4OAQ	A	38,745	142	43	80	C
W4HKJ	A	15,960	74	32	52	C
W4HVH	A	2,628	29	15	21	C
K4OMR	A	1,045	19	6	13	B
K4UIV	**28**	**25,179**	**123**	**26**	**51**	**C**
K4BZJ	28	20,878	104	24	49	B
K4SJU	28	20,572	100	26	48	B
K4JQR	28	16,121	123	14	33	B
W4DS	28	810	15	8	10	C
W4NQM	**21**	**62,400**	**239**	**28**	**68**	**D**
K4GIB	21	21,386	111	23	51	C
K4TZD	21	5,243	62	17	32	C
W4WSF	21	2,542	35	11	20	B
K4PHY	21	2,142	34	11	23	B
K4ILW	21	1,809	24	11	16	B
W4OFR	14	1,711	21	11	18	—
W5DQK	**A**	**29,172**	**116**	**36**	**66**	**B**
W5INL	A	24,503	96	42	65	D
W5SU	A	12,096	79	32	40	—
W5ALB	**28**	**25,677**	**119**	**25**	**56**	**C**
W5HVV	28	10,168	66	21	41	B
W5JRE	**21**	**4,560**	**52**	**19**	**29**	**C**
K5BHV	21	3,010	35	17	26	B
W5KC	**14**	**5,175**	**55**	**18**	**27**	**D**
W5JWM	14	3,078	33	18	20	—
K6EVR	**A**	**93,353**	**231**	**65**	**102**	**D**
W6RCD	A	42,976	130	58	78	—
K6CTV	A	7,744	55	29	35	—
K6OCX	A	2,808	31	18	21	B
W6PQW	**28**	**17,010**	**99**	**25**	**38**	**B**
K6ERV	28	10,887	70	22	35	—
K6SXA	28	9,808	72	25	33	—
K6GQH	28	7,866	68	19	27	D
K6ICS	28	1,403	27	11	12	B
W6WDL	28	242	42	6	5	—
K6PDA	**21**	**8,478**	**62**	**21**	**33**	**D**
W6OSU	**14**	**8,580**	**67**	**23**	**29**	**D**
K6CTV	14	3,198	38	17	22	D
K6UFX	14	2,805	35	15	18	—
W6UED	**7**	**1,830**	**30**	**12**	**18**	—
W7WDM	**A**	**91,767**	**208**	**58**	**111**	**D**
K7FEM	A	19,116	94	36	45	B
W7NPV	A	884	16	12	14	B
W7VY	**28**	**25,988**	**131**	**26**	**47**	**D**
W7LEV	**21**	**5,796**	**56**	**17**	**29**	**B**
W7HQC	**14**	**23,147**	**101**	**28**	**51**	**D**
W8NWO	**A**	**100,085**	**232**	**65**	**120**	**D**
W8JIN	A	39,324	127	43	71	D
W8WT	A	33,580	115	43	72	B
K8JXK	A	5,015	66	24	36	B
W8TTN	A	4,104	39	15	23	B
K8HJS	A	3,876	47	14	20	B
K8AEK	**28**	**91,350**	**303**	**32**	**82**	**B**
W8NSS	28	20,856	113	22	44	B
W8UMR	28	17,812	103	18	43	B
W8BDP	28	16,353	85	21	48	C
W8BMX	28	3,888	43	13	23	—
W8UPN	**21**	**45,450**	**185**	**26**	**64**	**D**
W8BKP	21	40,467	126	37	76	D
W9EWC	**A**	**151,726**	**292**	**76**	**138**	**D**
W9NZM	A	70,152	182	59	99	D
W9DUB	A	59,004	149	47	85	D
W9RBI	A	9,782	51	28	45	—
W9MBF	A	7,356	67	23	38	—
K9IUF	A	3,430	40	18	27	—
K9CUY	**28**	**20,850**	**105**	**23**	**52**	**B**
W9ZTD	**28**	**19,435**	**112**	**21**	**44**	**B**
W9HPS	28	19,166	92	26	48	C
K9ALP	28	14,260	87	24	38	B
K9DZA	28	11,388	75	18	34	B
W9RKE	28	10,266	66	20	39	A
W9RKJ	28	3,404	34	14	23	B
W9UEM	28	1,071	18	8	13	—
W9VTV	28	585	13	3	12	—
K9CLO	**14**	**7,714**	**62**	**23**	**35**	**C**
W9LRH	14	3,780	36	18	24	D
WØGUV	**A**	**24,310**	**96**	**44**	**66**	**D**
WØAWK	A	18,620	93	26	44	C
WØVAF	A	9,966	55	24	42	B
WØMCX	A	8,448	51	25	39	D
WØVIP	A	1,292	26	9	16	—
WØAYR	A	396	10	8	10	D
KØBLU	**28**	**7,290**	**67**	**17**	**28**	**C**
KØRNZ	28	4,680	44	17	28	B
KØLFY	**21**	**3,154**	**45**	**13**	**25**	**B**
KØITF	**14**	**9,686**	**70**	**21**	**37**	**D**

Alaska

KL7CDI	**28**	**9,801**	**210**	**13**	**20**	**C**
KL7BHE	**21**	**28,386**	**285**	**19**	**38**	**B**
KL7CDF	**14**	**22,515**	**192**	**20**	**37**	**D**

Bahamas

VP6FR	**21**	**105,949**	**451**	**28**	**73**	—
VP6LT	21	90,132	333	28	83	B

Bermuda

VP9L	**A**	**105,844**	**349**	**53**	**99**	**C**

Canada

W1EXZ/VE2-M	28	1,140	24	7	13	A
VE3AIU	**A**	**167,316**	**331**	**67**	**124**	**D**
VE3BJO	**28**	**27,936**	**138**	**22**	**50**	**C**
VE3DYB	**21**	**25,688**	**128**	**22**	**54**	**B**
VE3BSJ	**14**	**3,432**	**41**	**14**	**25**	**B**
VE4RP	**21**	**2,590**	**30**	**13**	**24**	—
VE5DA	28	1,350	25	12	15	B
VE7ZM	**A**	**84,162**	**206**	**58**	**108**	**B**
VE7EH	A	31,280	139	47	68	B
VE8FO	**14**	**33,774**	**160**	**29**	**49**	**D**
W2ZRX/VO1	A	12,168	143	27	45	C
W4ZGD/VO1	28	31,903	235	17	44	B

Canal Zone

KZ5KA	**14**	**8,330**	**104**	**17**	**32**	**C**

Costa Rica

TI2OE	**A**	**286,098**	**619**	**85**	**161**	**B**
TI5JRS	**28**	**5,184**	**59**	**14**	**18**	**B**

Cuba

CO2BL	**A**	**529,859**	**704**	**95**	**224**	**C**
CO2ZS	**21**	**137,013**	**621**	**28**	**81**	**C**
CO8JK	21	6,815	63	21	26	C
CO2OZ	**14**	**58,363**	**325**	**28**	**68**	**B**

Dominican Rep.

HI8GA	**A**	**12,925**	**183**	**23**	**32**	**B**
HI8BE	**28**	**7,436**	**86**	**16**	**28**	**B**

Honduras

HR2MC	**A**	**66,932**	**331**	**47**	**69**	**B**

Mexico

XE1RE	**A**	**16,965**	**108**	**42**	**45**	**B**
XE1OT	A	8,203	111	23	26	B
XE1AE	**21**	**9,372**	**136**	**18**	**26**	**B**

Nicaragua

YN4CB	**A**	**39,312**	**250**	**46**	**58**	**B**

Panama

HP1AC	A	1,674	40	12	15	B

Turks Is.

VP5FP	**A**	**17,952**	**216**	**31**	**37**	**B**

AFRICA

Amsterdam Is.

FB8ZZ	**A**	**11,180**	**72**	**27**	**38**	**B**

Angola

CR6CF	**A**	**11,040**	**76**	**25**	**44**	**B**

Belgian Congo

OQ5FH	**A**	**154,809**	**425**	**55**	**112**	**B**
OQ5FV	**28**	**26,880**	**159**	**17**	**47**	—

Canary Is.

EA8CF	**A**	**173,376**	**361**	**54**	**114**	**A**
EA8CK	A	3,395	34	14	21	A
EA8AH	A	126	6	3	4	A

Cape Verde Is.

CR4AD	**A**	**80,430**	**261**	**37**	**68**	**B**

Ghana

9G1CH	**28**	**63,325**	**280**	**22**	**65**	**B**

Kenya

VQ4DT	**A**	**306,398**	**467**	**73**	**166**	**B**
VQ4FK	A	175,015	326	62	127	B
VQ4RF	**28**	**102,024**	**357**	**29**	**75**	**B**

Kerguelen Is.

FB8XX	21	280	10	7	7	C

Libya

5A3TO	**28**	**79,645**	**328**	**25**	**60**	**B**

Madeira Is.

CT3AF	**A**	**11,556**	**72**	**24**	**30**	—
CT3AI	A	4,726	44	13	25	—

Morocco

CN8IU	**A**	**139,984**	**455**	**29**	**75**	**B**
CN8ES	A	74,044	248	31	76	—
CN9CJ	A	16,240	100	15	41	C
CN8JC	**21**	**27,090**	**203**	**14**	**41**	**A**
CN8JX	**28**	**149,415**	**485**	**31**	**74**	**B**

Mozambique

CR7LU	**A**	**59,496**	**175**	**48**	**86**	**B**

Rhodesia, So.

ZE1JV	**A**	**258,624**	**481**	**59**	**133**	—
ZE2JA	A	201,214	338	76	142	—

South Africa

ZS6AJB	**A**	**76,452**	**198**	**54**	**84**	—
ZS4UP	A	45,262	146	45	77	—
ZS5PG	A	8,820	57	26	34	—
ZS1RV	**21**	**19,460**	**106**	**25**	**45**	**B**

ASIA

Burma

XZ2SY	**A**	**32,200**	**123**	**51**	**64**	**B**

Hong Kong

VS6AE	**A**	**4,343**	**49**	**19**	**24**	**B**
VS6BJ	**28**	**16,284**	**127**	**17**	**29**	—

India

VU2RM	**A**	**13,588**	**68**	**39**	**47**	**B**
VU2BK	A	12,996	71	32	44	A

Israel

4X4GB	**A**	**576,864**	**695**	**82**	**206**	**C**
4X4FV	A	398,536	563	74	174	B
4X4JS	A	241,944	413	63	141	—
4X4JT	A	71,133	199	37	94	—
4X4KK	A	38,976	162	27	57	—
4X4JA	A	1,055	18	6	16	—

Japan

JA1BF	**A**	**26,664**	**121**	**39**	**49**	**A**
JA3IS	**28**	**21,315**	**150**	**20**	**29**	**B**
JA1EC	28	13,100	103	18	32	B
JA3JM	28	3,795	41	15	18	A
JA2JW	28	3,150	37	15	15	B
JA1LN	28	2,134	41	11	11	A
JA1BQR	28	1,866	26	11	16	A
JA6BC	**21**	**18,126**	**111**	**21**	**32**	**B**
JA7AD	21	4,928	42	19	25	B
JA8AA	**14**	**23,790**	**148**	**26**	**35**	**C**
JA3MD	14	6,320	56	18	22	B
JA1BOW	7	630	24	8	7	C
KA2BE	**A**	**249,872**	**537**	**67**	**94**	**C**
KA2KK	**14**	**14,136**	**94**	**23**	**34**	**C**

Kuwait

9K2AZ	**A**	**406,083**	**640**	**66**	**157**	**B**

Pakistan

AP2AD	**A**	**33,088**	**137**	**34**	**60**	**B**

Ryukyu Is.

KR6JF	**A**	**106,398**	**279**	**54**	**84**	**C**
KR6RB	**21**	**66,645**	**232**	**33**	**72**	**B**

Soviet Union

UA9CC	A	1,904	23	10	18	B

Thailand

HS1B	**A**	**9,966**	**69**	**26**	**40**	**B**
HS1C	**14**	**4,240**	**53**	**18**	**22**	**C**

EUROPE

Aland Is.

OH0NC	**A**	**105,432**	**408**	**40**	**98**	**B**

Austria

OE5CK	**A**	**350,064**	**621**	**63**	**165**	**B**
OE2YL	A	207,334	443	50	116	B

Balearic Is.

EA6AR	14	180	9	6	6	—

Belgium

ON4SZ	**A**	**512,210**	**669**	**80**	**182**	**B**
ON4HU	**28**	**19,826**	**200**	**16**	**23**	—
ON4AK	28	9,380	103	13	22	—
ON4IW	28	1,533	28	10	11	—
ON4VD	**21**	**8,134**	**81**	**15**	**34**	—

Bulgaria

LZ1AH	**A**	**22,438**	**211**	**23**	**61**	**B**

Czechoslovakia

OK3KAB	A	1,872	32	10	26	B
OK3DG	**21**	**8,532**	**110**	**20**	**34**	**B**
OK3KGI	21	5,511	107	12	21	B
OK1HI	21	2,380	40	9	25	B
OK1MP	14	1,100	49	3	19	—
OK1MG	3.5	476	34	2	12	B

Denmark

OZ3WK	**A**	**9,130**	**156**	**24**	**35**	**B**
OZ7BG	28	6,125	50	17	32	B
OZ1PO	**21**	**6,174**	**73**	**13**	**29**	**B**
OZ4EDR	14	104	13	2	6	B

England

G2DYV	**A**	**117,813**	**291**	**52**	**121**	**B**
G2AJB	A	52,030	203	34	76	B
G3ABG	**28**	**56,610**	**249**	**26**	**59**	**B**
G3ILO	28	10,411	134	8	21	B
G3WP	28	465	13	6	9	—
G2JB	28	342	19	9	9	—
G2FRL	**21**	**58,563**	**274**	**27**	**54**	**B**
G3LGA	**7**	**2,310**	**59**	**7**	**26**	**B**
G5MP	**3.5**	**1,092**	**52**	**3**	**18**	**B**

Finland

OH5NQ	**A**	**250,838**	**475**	**74**	**192**	**B**
OH3AA	**A**	**56,544**	**237**	**41**	**73**	**B**
OH3ND	A	15,323	133	25	52	B
OH5NF	A	6,356	107	9	19	B
OH2HK	A	5,764	42	18	26	B
OH2XK	A	1,664	57	7	19	A
OH2FT	A	1,120	33	7	21	—
OH5OP	A	980	23	8	12	—
OH2LA	A	792	22	7	17	B
OH2FC	A	625	21	9	16	B
OH5NW	**28**	**228,727**	**715**	**35**	**92**	**B**
OH3SE	28	2,295	42	9	17	—
OH2GC	28	550	19	6	16	B
OH2IK	28	364	27	4	9	—
OH5QN	**21**	**64,272**	**323**	**31**	**73**	**B**
OH5PN	21	3,090	74	5	25	B
OH6OM	21	1,260	34	8	13	B
OH6AA	**14**	**14,280**	**133**	**19**	**49**	**B**
OH1SS	14	13,629	153	18	41	B
OH2LX	14	5,130	66	12	33	B
OH8OA	14	5,120	95	11	29	B
OH2KO	14	3,348	72	8	28	B
OH3TH	14	168	7	6	6	B

France

F8PI	**A**	**585,120**	**802**	**78**	**198**	**B**
F9GL	A	32,780	134	39	71	—
F3GL	A	29,952	145	36	60	—
F3NG	A	4,482	39	21	33	—
F3MB	A	3,649	51	13	28	A
F2ME	A	2,924	81	7	27	B
F3JI	A	1,147	27	11	15	—
F8XP	**28**	**19,208**	**101**	**16**	**40**	—
F2IG	**21**	**27,432**	**191**	**20**	**52**	—
F7BK	**A**	**8,360**	**76**	**18**	**37**	**B**
F7ER	**21**	**36,608**	**176**	**28**	**60**	**B**
F7DG	21	8,575	93	14	21	B
F7CV	**14**	**11,092**	**186**	**13**	**34**	**B**

Germany

DJ1BZ	**A**	**197,184**	**390**	**71**	**137**	**C**
DL1LH	**A**	**123,228**	**335**	**50**	**113**	**B**
DL3YO	A	93,104	229	59	117	C
DL1FK	A	88,502	241	53	84	B
DJ1NY	A	78,750	241	47	79	B
DL7AD	A	55,200	154	55	83	C
DL9OE	A	44,394	200	42	105	B

DJ1ZN	A	39,808	151	43	85	B
DJ2UU	A	7,659	88	18	51	B
DJ2YS	A	4,800	45	20	28	B
DL1YA	A	621	22	8	19	—
DJ1LP	**28**	**105,676**	**397**	**29**	**63**	**B**
DL7AA	**28**	**65,912**	**266**	**31**	**57**	**C**
DL1HL	28	56,662	258	28	54	B
DL7BA	28	29,160	127	28	53	B
DL6VM	28	24,857	152	21	46	B
DL7EX	28	24,750	122	28	47	A
DJ4OP	28	18,522	117	21	42	A
DL9SQ	28	8,004	91	19	27	B
DJ3LC	28	7,106	80	14	29	B
DJ4PU	28	780	22	8	12	—
DL7FP	28	350	11	6	8	A
DL3TJ	**21**	**40,860**	**189**	**28**	**62**	**B**
DJ2AE	**14**	**30,014**	**229**	**26**	**60**	**C**
DJ3CP	**14**	**25,040**	**136**	**27**	**53**	**B**
DL4YE	**A**	**243,432**	**623**	**49**	**98**	**B**
DL4FS	**14**	**4,895**	**47**	**20**	**28**	**C**

Greece

SV1AB	**A**	**43,282**	**205**	**40**	**94**	**—**

Hungary

HA5DG	**A**	**12,240**	**99**	**22**	**58**	**A**
HA8CZ	14	861	41	3	18	A

Italy

I1ZFT	**A**	**176,272**	**425**	**61**	**123**	**—**
I1CHJ	A	130,339	330	57	130	—
I1UA	A	18,715	137	28	67	B
I1AHW	**28**	**33,594**	**187**	**23**	**43**	**B**
I1BAF	28	368	10	8	8	A
I1NE	**21**	**5,124**	**82**	**11**	**31**	**A**

Malta

ZB1BG	**A**	**15,147**	**107**	**25**	**56**	**B**

Netherland

PA0HBO	**A**	**268,620**	**506**	**66**	**154**	**—**
PA0UC	**A**	**31,320**	**144**	**41**	**94**	**—**
PA0KN	A	15,972	75	24	42	—
PA0HSJ	A	10,557	84	24	45	—
PA0TAU	A	6,365	57	22	45	—
PA0CM	A	3,952	36	19	33	—
PA0VP	A	3,570	48	18	24	B
PA0CF	A	324	16	4	10	—
PA0OTC	**28**	**51,558**	**234**	**28**	**50**	**B**
PA0XX	28	27,450	161	23	38	B
P11RRS	**21**	**18,270**	**175**	**19**	**39**	**—**
PA0 WWP	**14**	**10,080**	**115**	**15**	**41**	**B**
PA0HIL	14	1,204	34	7	21	A
PA0LL	14	294	21	3	11	—
PA0 WFS	14	195	10	5	8	—
PA0PRF	14	63	6	3	6	B

Norway

LA8LF	**A**	**65,090**	**226**	**42**	**73**	**B**
LA4HF	A	49,149	173	44	83	B
LA4LE	21	11,542	126	15	43	—

Poland

SP7HX	**28**	**10,098**	**90**	**17**	**34**	**B**
SP9NH	**21**	**13,052**	**168**	**17**	**35**	**A**
SP3PH	21	6,179	108	13	24	B
SP1BC	21	1,325	23	11	14	B
SP3HC	**14**	**10,854**	**134**	**14**	**40**	**B**
SP8AG	14	4,629	111	7	27	B
SP9KAO	14	96	6	3	5	C
SP3PL	**7**	**3,102**	**79**	**8**	**25**	**C**

Portugal

CT1PK	**A**	**306,033**	**506**	**76**	**171**	**C**
CT1FM	**28**	**22,288**	**158**	**17**	**39**	**—**
CT1JG	28	12,672	111	18	48	—
CT1MQ	28	12,080	123	15	25	—
CT1IW	28	2,150	50	8	17	—

San Marino

II1AIM/MI	**A**	**406,017**	**751**	**61**	**168**	**B**
II1ZFF/MI	**7**	**3,051**	**102**	**5**	**22**	**B**

Scotland

GM3FJP	A	2,562	34	16	23	—
GM3BCL	**28**	**5,880**	**104**	**8**	**12**	**B**
GM3MBC	**21**	**33,696**	**198**	**23**	**55**	**B**

Sicily

IT1CDS	**A**	**106,548**	**389**	**47**	**109**	**—**
IT1ZDA	**14**	**24,568**	**199**	**16**	**58**	**A**

Soviet Union

Ukraine

UB5CI	**A**	**16,320**	**98**	**35**	**61**	**A**

Georgia

UF6FB	**A**	**16,320**	**95**	**16**	**48**	**C**

Estonia

UR2BU	**A**	**97,032**	**360**	**46**	**110**	**B**

Spain

EA3KT	**A**	**110,544**	**295**	**60**	**128**	**B**
EA7GF	A	104,345	272	65	140	B
EA3LA	A	19,402	148	24	65	—
EA1GG	A	17,347	131	26	57	—
EA2EF	**28**	**6,533**	**59**	**15**	**32**	**B**
EA3GT	28	1,400	24	9	11	—
EA3IX	**21**	**21,252**	**173**	**22**	**55**	**A**

Sweden

SM3BIZ	**A**	**113,620**	**358**	**53**	**137**	**B**
SM2AKA	**A**	**87,575**	**334**	**52**	**103**	**B**
SM6BOU	A	17,220	129	21	39	—
SM5CZD	A	12,069	121	21	60	—
SM4BTF	A	8,960	92	20	50	B
SM3BFR	A	7,052	62	24	37	B
SM6BDS	A	4,704	60	16	40	A
SM6AMR	A	3,311	62	11	32	—
SM3EP	**28**	**75,686**	**370**	**26**	**56**	**B**
SM5XP	28	40,748	255	19	42	B
SM5TR	28	18,564	122	23	45	—
SM5CO	28	9,835	65	22	45	C
SM2BPE	28	7,296	87	13	25	A
SM7BFT	28	7,172	63	17	27	—
SM3AZI	**21**	**18,368**	**125**	**18**	**46**	**B**
SM5AJR	21	5,880	111	10	30	B
SM7AFK	21	1,925	44	11	24	B
SM2CSA	21	1,225	29	8	17	—
SM6SA	**14**	**40,068**	**218**	**26**	**58**	**C**
SM7CAB	14	3,999	64	12	31	—
SM5BRS	14	513	23	6	13	—
SM2BGS	14	493	22	4	13	—
SM5AGU	14	144	16	2	7	—

Switzerland

HB9MO	**A**	**60,788**	**212**	**51**	**116**	**C**

Wales

GW3HXX	**A**	**30,345**	**123**	**41**	**105**	**B**
GW3FPH	**28**	**72,297**	**304**	**26**	**61**	**B**

OCEANIA

Australia

VK2AKF	**A**	**28,126**	**131**	**36**	**46**	**B**
VK3HL	**A**	**11,840**	**68**	**30**	**34**	**B**
VK3MX	21	540	10	8	10	B
VK4BG	**21**	**6,148**	**48**	**18**	**28**	**—**
VK5AB	**21**	**46,560**	**173**	**31**	**66**	**B**
VK6RU	**A**	**131,026**	**243**	**75**	**116**	**B**
VK6CL	**21**	**14,625**	**77**	**22**	**43**	**B**
VK7WA	**A**	**21,175**	**103**	**33**	**44**	**B**
VK7LZ	A	16,985	81	35	44	B
VK7SM	**14**	**5,006**	**55**	**17**	**19**	**B**

Hawaii

KH6IJ	**A**	**317,832**	**800**	**62**	**74**	**D**
KH6CLC	**28**	**41,122**	**480**	**13**	**16**	**C**
KH6PM	**21**	**38,162**	**231**	**22**	**39**	**C**
KH6CJJ	21	5,070	67	14	16	A

New Zealand

ZL1MQ	**A**	**69,068**	**200**	**55**	**69**	**B**
ZL1KW	**28**	**63,729**	**299**	**28**	**45**	**B**
ZL4BO	**21**	**37,412**	**156**	**29**	**65**	**B**
ZL1ACI	**14**	**39,285**	**182**	**26**	**55**	**B**

Marshall Is.

KX6CM	**A**	**69,948**	**369**	**32**	**35**	**C**

SOUTH AMERICA

Antarctica

VP8CR	**21**	**4,590**	**45**	**13**	**21**	**—**

Argentina

LU9FAY	**28**	**55,200**	**238**	**26**	**54**	**B**

Brazil

PY3QX	28	2,025	25	9	18	B
PY5AM	**21**	**55,936**	**211**	**31**	**61**	**C**
PY1BIG	21	28,361	125	26	53	C
PY1AKT	21	16,214	89	25	42	B

Chile

CE3HL	**A**	**146,870**	**288**	**66**	**124**	**C**
CE3GI	**28**	**104,468**	**398**	**28**	**63**	**B**
CE2AN	28	57,196	260	26	53	—
CE2AY	**21**	**46,330**	**206**	**27**	**55**	**—**
CE2CC	**14**	**92,150**	**334**	**32**	**65**	**D**
CE2HO	7	1,188	23	12	10	—

Colombia

HK3FZ	**A**	**213,378**	**411**	**59**	**124**	**C**
HK1DZ	21	3,451	50	12	17	C

Netherlands, W.I.

PJ2AQ	**A**	**65,232**	**254**	**46**	**78**	**B**

Paraguay

ZP5JP	A	2,709	27	20	23	—

Peru

OA4AO	**A**	**58,164**	**174**	**53**	**78**	**B**
OA4HK	A	29,575	123	39	52	—

Uruguay

CX2CO	**A**	**448,154**	**658**	**80**	**158**	**D**
CX3BH	**A**	**402,820**	**643**	**73**	**147**	**D**
CX3AA	A	31,740	150	50	65	B
CX2AN	A	22,117	114	26	32	—
CX1AK	**28**	**104,040**	**418**	**27**	**58**	**B**
CX9AJ	28	76,908	305	26	61	A
CX6BM	28	55,944	230	28	56	B
CX3CJ	28	9,282	65	19	32	—
CX2CN	**21**	**21,735**	**113**	**21**	**42**	**B**
CX9CO	**14**	**9,000**	**75**	**19**	**26**	**C**

Venezuela

YV5ABD	14	4,440	39	17	23	B

Multi Operator

NORTH AMERICA

United States

K2GL A 777,218 851 102 232 D
(K2GL—W2CMM—W2GLM)
(W2IWC—W2LEJ—W2SKE)

W2JT A 27,600 102 31 61 D
(W2JT—W2DEW)

K2SUX A 15,054 76 28 50 D
(K2SUX—W2HZY)

K2MDL 28 10,896 82 16 32 B
(K2MDL—K2ZGH)

K2ZAU 21 18,018 110 21 42 C
(K2ZAU—K2YFI)

W3AOH A 367,454 496 91 178 D
(W3AOH—K3DKD—W3LMM)
(W3MVQ—W3QJJ—W3VKD)

W3DYT 28 19,684 100 26 48 B
(W3DYT—W3CNM)

W3DAO 28 15,232 99 19 37 C
(W3DAO—W3BYX)

W4QKK A 118,490 236 66 139 C
(W4QKK—W8RDL/4)

KØKWY/4 A 21,200 84 44 56 —
(KØKWY—K4VQO)

W5KFT A 27,108 107 45 63 D
(W5KFT—K5BFR)
(K5CVL—W5DON)

W6YMD A 365,037 528 97 174 D
(W6YMD—W6BXL—K6EWL)
(W6KFV—K6OXU)

W6AM A 65,274 186 59 79 D
(W6AM—W6OZ—W6KPC)

W6ALQ A 12,408 76 28 38 D
(W6ALQ—W6OEX)

W8NGO A 162,259 303 70 141 D
(W8NGO—W8ONA—W8CLR)

W8EEN A 5,940 50 18 27 B
(W8EEN—W8CPU—W8FEM)

K9COL A 5,945 49 29 36 B
(K9COL—K9LMN)

KØIJL A 13,398 78 32 45 C
(KØIJL—WØISJ)

Alaska

KL7FAK A 15,250 129 25 36 D
(KL7BZE—KL7CBC—KL7CCJ)
(KL7CJS—KL7CLD)

KL7BES 14 4,329 62 16 21 C
(KL7BES—KL7BDG—KL7BWR)

Bermuda

VP9DY A 38,080 168 42 70 —
(VP9DY—VP9BO—VP9EM)

AFRICA

Ethiopia

ET2US/ET3 A 15,372 101 22 41 B
(ET2BG—ET2JH—ET2TO)

Morocco

CN8IG A 327,402 778 49 92 —
(CN8IG—CN8IT—CN8HR)

South Africa

ZS5OA A 82,228 204 56 92 B
(ZS5OA—ZS5OB)

ASIA

Cyprus

ZC4JB A 160,710 337 48 117 A
(ZC4JB—ZC4AM—ZC4FM)

Japan

KA2RB A 336,140 596 69 127 C
(KA2CR—KA2MK)
(KA2ZZ—W9GMN)

EUROPE

Czechoslovakia

OK1KKR 14 13,747 184 14 45 —
(Club Station)

England

G3IZW A 120,506 302 56 122 B
(G3IZW—G3KLK)
(G3JXC—G3MJL)

G3HTA A 36,415 219 21 43 B
(G3HTA—G2FCI—G3LTH)

G3MGL A 12,008 151 24 52 B
(G3MGL—G3MER—G3MSK)

GB2SM 28 82,620 381 28 53 B
(G5CS—G3IIE—G3LOV)

Germany

DJ3VM A 357,775 551 88 187 C
(DL1CR—DL1CX)
(DL3AO—DJ3JZ)

DLØBH A 37,878 280 34 73 B
(DJ2HH—DL9CQ)

DL9JLA A 3,696 55 15 33 B
(DL9JLA—DL1HD)
(DL1QC—DJ3IF)

DL4AAA A 46,120 202 40 85 B
(DL4ACZ—DL4DY)
(DL4EA—DL4HE—DL4HI)

Netherlands

PAØSNG A 105,435 293 47 118 B
(PAØSNG—PAØEEM)

PI1MID A 14,896 103 25 52 —
(Club Station)

No. Ireland

GI3CDF A 209,270 496 53 114 B
(GI3CDF—GI3CVH)
(GI3FJA—GI3GSB—GI3ILV)

Poland

SP5KAB 21 26,565 243 19 50 C
(SP5SP—SP5ZA)

SP6KBE 21 17,728 163 21 43 C
(SP6-075—SP6-080)

SP1KBK 14 1,836 45 6 21 B
(SP1VU—SP1-604)

Roumania

YO2KAC A 17,271 177 18 51 B
(Club Station)

Sweden

SM6ANC A 310,080 625 72 156 —
(SM6ANC—SM6APH)
(SM6CZE—SM6BSK—SM6NN)

SM5AQB 21 19,656 130 26 52 B
(SM5AQB—SM5AQN—SM5WI)

Ukraine, USSR

UB5KAB A 49,473 247 35 89 C
(Club Station)

UB5KCE A 13,024 111 22 52 B
(Kharkov Univ.)

OCEANIA

Australia

VK5NO A 39,516 138 46 65 C
(Jeff & Lind)

Marshall Is.

KX6AF A 306,642 771 59 88 C
(K2CBO—K4VYV—W5BJZ)
(W6NDP—K6ZPR—WA6CHL)

Phoenix Is.

KB6BH A 118,766 504 36 50 C
(KB6BE—W8DGF)

SOUTH AMERICA

Paraguay

ZP5CG A 57,155 181 44 71 —
(ZP5CG—ZP5JP)

Peru

OA1K A 44,032 183 40 46 D
(OA1A—OA1T)

Uruguay

CX8BM 28 54,390 267 22 48 B
(Bob & Fern)

SP3PL — Julian Jarzomek made world high on 7.

Check logs were received from the following stations for which we wish to thank them, as they sometimes proved helpful in our checking.

W1MDO	I1ZCN	SP6RT
W2CGJ	LU9FAY	VE2AJD
W2DEC	OH2RF	VE3EIL
W2VLS	OH3UJ	XZ2TH
W2WZ	OK1KDC	YN1JR
K4ILW	PAØBW	BRS-21763
W6OJW	PAØPOL	YO2-1623
HB9J	PAØTV	
HK1DZ	SM6RS	

The number of reports received this year exactly duplicated the returns of last year, 529 logs. The 86 countries represented shows an increase of seven over last year. However a check definitely showed that over 100 countries participated. It's a pity that some of those missing rare ones could not have sent us a report.

But taking into consideration the very poor conditions encountered on the first day of the contest and the lack of activity in certain areas, the results were not too disappointing.

Upward of 250 certificates will be mailed out to deserving winners within the next month or so, which should prove that we are doing our part in making this the Dean of all DX Phone contests, both in size and awards.

Next month we will tell you how the CW gang made out, and is that going to be a walloping report.

TOP TEN

All Band
Single Operator

F8PI—585,120

4X4GB—576,864 9K2AZ—406,083
CO2BL—529,859 I1AIM/M1—406,017
ON4SZ—512,210 CX3BH—402,820
CX2CO—448,154 4X4FV—398,536
OE5CK—350,064

TOP FIVE

All Band
Multi-Operator

K2GL—777,218

W3AOH—367,454 DJ3VM—357,775
W6YMD—365,037 KA2RB—336,140

HIGH FOR EACH BAND

Single Operator

28 mc—OH5NW—228,727
21 mc—CO2ZS—137,013
14 mc—CE2CC— 92,150
7 mc—SP3PL— 3,102
3.5 mc—G5MP— 1,092

G2DYV — Joe Ostle, high man for England for the 2nd straight year.

EA8CF — Ramon Monteverde and his homemade rig. There's all of 20 watts behind that panel.

9K2AZ — Bill Burgess and the neat lay-out of probably the most popular station in the contest.

DL4YE — Ist Lt. Bob Nielson, stateside W9QVY. Bob was high man for Germany.

KX6CM — Marge Ryburn, the distaff side of the contest. Marge did OK too, see her score.

CONTEST CALENDAR

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

April	25-26	CQ VHF
April	25-26	PACC CW
May	2-3	PACC Phone

VHF

This one has been covered quite thoroughly by Sam Harris in his VHF column the past two issues. Just for the record, it will start at 8:00 PM Local Standard Time on April 25th and end 24 hours later at 8:00 PM on April 26th.

Send your logs to the Microwave Associates, Log Department, Burlington, Mass.

PACC

CW

Starts: Saturday, April 25th at 12:00 GMT.
Ends: Sunday, April 26th at 24:00 GMT.

Phone

Starts: Saturday, May 2nd at 12:00 GMT.
Ends: Sunday, May 3rd at 24:00 GMT.

Work as many PA stations as you can on all bands, 80 thru 10. Use the standard serial number, RS or RST report plus a progressive three digit number starting with 001. Each QSO counts three points and your multiplier is the QST will fill you in on that one.
number of PA provinces worked on each band.

Last month's calendar had a sample log and all other details. Send your logs to: P.v.d. Berg, Contest Manager, Keizerstraat 54, Gouda, Netherlands.

A reminder concerning contests that have taken place the past month.

HELVETIA 22

The postmarked dateline, April 20th has already passed, so if you haven't already mailed your log you might try Air Mailing it with a good excuse (and tears) to the U S K A att: Acklin Frank, HB9NL, Knutwil/LU, Switzerland.

R E F

The deadline for mailing your Phone logs is May 3rd. Send them to the R. E. F. Contest Committee, B.P. 42-01, Paris R P, France.

CQ WW SSB

Logs for this one must be in the hands of Bob Adams at the CQ offices not later than June 10th to qualify.

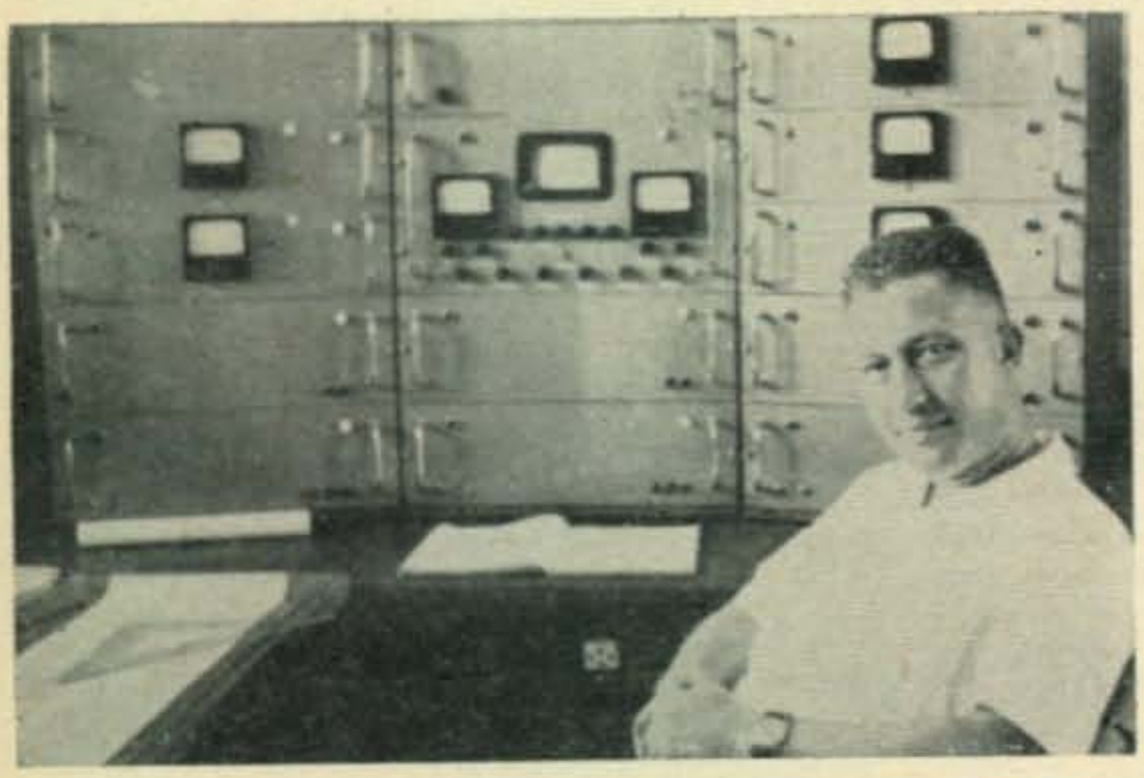
No more contests in sight for the next couple of months, except that Field Day affair in June when the OMs make like Boy Scouts.

73, Frank, W1WY

PROPAGATION

by **GEORGE JACOBS, W3ASK**
607 Beacon Road, Silver Spring, Md.

During May and early June typical summer time propagation conditions become more apparent. As a result of normal seasonal variations in the intensity of ionization of the earth's upper atmosphere, maximum usable frequencies will be considerably *lower* during the daylight hours, and somewhat *higher* during the hours of darkness, than were observed during the winter and early spring months. Very little *6-meter* DX is forecast, although an occasional opening to South America (perhaps by the T.E. mode), and from the West Coast to Australiasia may be possible. *Ten-meters*, while opening less frequently than during the winter months, will continue to provide openings to almost all areas of the world during the late afternoon and early evening hours. The best band propagation-wise during the daytime, and early evening hours, is expected to be *15-meters*. World-wide openings are expected on most days of the month, with signals exceptionally strong during the late afternoon hours. Good propagation conditions are also forecast for *20-meters* during the late afternoon, evening, and early morning hours. With diminishing hours of darkness as summer nears, *40, 80, and 160-meter* openings are expected to be less frequent than during the winter months.



Serge Canivenc, FQ8AP, Propagation Editor for Radio REF, the Radio Amateur Journal of France. Serge has recently returned to Paris (F8SH) after two years of scientific work for the IGY at the Geophysical Center at Bangui, French Equatorial Africa.

A photo of two famous "down-under" hams. In the operating position is Mick, ZL3RB, responsible for the southern end of the recent record 160-meter openings between New Zealand and the U. S. A. Browsing through CQ is Wal, VK2AXH, the first man ever to use radio in the Arctic (1912), and the founder of the Wireless Institute of Australia. (Photo courtesy W1BB).

Static levels are steadily increasing towards summer peak intensities, and solar absorption is increasing as the sun appears higher in the northern sky.

During May, and continuing through the summer months, a sharp increase in sporadic-E short-skip propagation can be expected. These openings are most noticeable on *10 and 15-meters*, between distances of approximately 400 and 1400 miles. During intense periods of sporadic-E ionization, openings in excess of 1,000 miles may also be possible on *6-meters*, and occasionally on *2-meters*.

There is the possibility of meteor- type short-skip openings of *10, 6* and *2- meters* during the *Aquarids* shower expected to occur between May 1st and 6th.

Sunspot Data

The *Zurich Observatory* reports a monthly relative sunspot number of 140 for February, 1959. This results in a 12-month running smoothed number of 184 centered on August, 1958. The sunspot cycle continues its very slow decline from the maximum it reached during March, 1958. This month's *CQ* forecasts are based on a *predicted* smoothed sunspot number

[*Continued on page 120*]

Last Minute Forecast—May

Exceptionally good shortwave propagation conditions are forecast for May 11-16. A moderate radio storm is likely to occur between May 19 and 22, with the remainder of the month seasonally normal.

MAY, 1959

ALL TIMES IN P.S.T.

WESTERN USA TO:

	6*/10 Meters	15 Meters	20 Meters	40/80** Meters
Europe & North Africa	2P-6P (1)	7A-9A (1) 9A-12N (2) 12N-6P (3) 6P-9P (2)	12N-2P (1) 2P-5P (2) 5P-11P (3) 11P-3A (2)	7P-11P (2) 8P-10P (1)**
Central & South Africa	10A-12N (1) 12N-3P (2)	6A-11A (1) 11A-1P (2) 1P-4P (3) 9P-12M (2)	12M-2P (1) 2P-4P (2) 4P-6P (3) 6P-9P (1) 9P-12M (3)	6P-10P (2) 7P-9P (1)**
South America	12N-6P* (1) 6A-12N (3) 12N-5P (4) 5P-9P (3) 9P-12M (2)	1P-3P (3) 3P-12M (4) 12M-4A (3) 4A-1P (2)	7A-3P (2) 3P-5P (3) 5P-11P (5) 11P-3A (4) 3A-7A (3)	9P-12M (2) 12M-4A (1) 10P-2A (1)**
Guam & Pacific Is.	8A-5P (2) 5P-8P (3) 8P-10P (2)	10P-3A (3) 3A-8A (2) 8A-10A (3) 10A-12N (2) 12N-10P (1)	8P-10P (1) 10P-12M (2) 12M-4A (4) 4A-8A (3) 8A-11A (1)	1A-5A (1) 2A-4A (1)**
Australasia	3P-7P*(1) 10A-1P (2) 1P-6P (3) 6P-10P (4) 10P-2A (2)	10A-12N (2) 12N-7P (1) 7P-4A (4) 4A-8A (2)	5A-8A (3) 8A-10A (2) 10A-9P (1) 9P-2A (3) 2A-5A (4)	12M-2A (1) 2A-6A (2) 6A-7A (1) 2A-6A (1)**
Japan, Okinawa & Far East	12N-2P (1) 2P-8P (2) 8P-10P (1)	8A-12N (3) 12N-8P (2) 8P-1A (3) 1A-8A (2)	11P-2A (2) 2A-4A (4) 4A-7A (3) 7A-12N (2) 12N-11P (1)	1A-6A (2) 2A-4A (1)**
Philippine Is. & East Indies	8A-11A (2) 11A-4P (3) 4P-10P (2)	12M-2A (2) 2A-7A (3) 7A-10A (2) 10A-12N (1)	11P-3A (1) 3A-8A (2) 8A-11A (1)	3A-5A (1)
Malaya & South East Asia	10A-2P (1) 2P-6P (2) 6P-8P (1)	12M-3A (1) 3A-6A (2) 6A-8A (3) 8A-11A (2) 11A-4P (1)	2A-6A (1) 6A-8A (2) 8A-1P (1)	NIL
Hong Kong, Macao & Formosa	12N-2P (1) 2P-8P (2) 8P-10P (1)	7A-1P (3) 1P-10P (2) 10P-2A (3) 2A-7A (1)	11P-2A (1) 2A-7A (3) 7A-10A (1)	2A-6A (1)

MAY/JUNE, 1959

CQ PROPAGATION CHART (SHORT-SKIP)

BAND (METERS)	DISTANCE (MILES) 50-250	250-750	750-1300	1300-2400
10	NIL	NIL	8A-2P (1) 2P-9P(1-2) 9P-12M(1)	8A-2P (1) 2P-4P (2) 4P-8P(2-3) 8P-10P (1)
15	NIL	8A-12N(0-3) 12N-6P(0-2) 6P-12M(0-1)	7A-12N (3) 12N-6P(2-4) 6P-12M(1-2)	7A-4P(3-4) 4P-8P (4) 8P-11P(2-3) 11P-1A (1)
20	NIL	6A-9A(1-3) 9A-2P(1-4) 2P-8P(1-3) 8P-6A(0-2)	6A-10A(3-4) 10A-3P (4) 3P-10P(3-5) 10P-6A(2-3)	6A-10A (4) 10A-4P(4-3) 4P-11P (5) 11P-6A(3-4)
40	7A-10P (5) 10P-7A (4)	6A-10A(5-4) 10A-5P(4-2) 5P-12M (5) 12M-6A(2-4)	5A-9A(3-2) 9A-7P(2-1) 7P-1A (5) 1A-5A (4)	5A-7A (2) 7A-5P(1-0) 5P-8P(3-1) 8P-5A(5-4)
80	8A-10A(5-3) 10A-7P(4-2) 7P-8A (5)	8A-6P(2-1) 6P-8P(3-2) 8P-4A (5) 4A-8A(4-3)	7P-9P(2-1) 9P-3A (4) 3A-6A(4-2) 6A-8A(3-1)	8P-10P (1) 10P-3A(4-3) 3A-5A(2-1)
160	6P-8P(3-2) 8P-7A (5) 7A-9A(3-2)	7P-9P(2-1) 9P-3A(5-3) 3A-7A(4-2) 7A-9A(2-0)	8P-10P(2-1) 10P-3A(3-2) 3A-5A(2-1)	9P-4A(2-1)

SYMBOLS FOR THE NUMBER OF DAYS CIRCUIT FORECAST TO OPEN

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

(5) over 26 days

* Indicates time of possible six-meter openings
** Indicates time of possible eighty-meter openings

The CQ DX Propagation Charts are based upon a CW radiated power of 150 watts at radiation angles less than thirty degrees and are centered on the Eastern, Central and Western areas of the USA. The DX forecasts are valid through June 15, 1959. The CQ Short-Skip Propagation Chart is based upon a radiated CW power of 75 watts, using a dipole antenna a half-wave length above ground. This Chart is valid through June 30, 1959. All CQ forecasts are based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

MAY, 1959

ALL TIMES IN E.S.T.

EASTERN USA TO:

	6*/10 Meters	15 Meters	20 Meters	40/80** Meters
Western Europe	9A-11A (1) 11A-3P (2) 3P-5P (1)	5A-12N (2) 12N-7P (4) 7P-9P (2) 9P-5A (1)	8A-2P (1) 2P-5P (2) 5P-12M (4) 12M-5A (3) 5A-8A (2)	7P-1A (3) 10P-12M (2)**
Central Europe	11A-3P (1)	5A-7A (2) 7A-1P (1) 1P-3P (2) 3P-7P (3) 7P-12M (1)	6A-2P (1) 3P-6P (2) 6P-11P (3) 11P-6A (2)	8P-11P (2) 9P-11P (1)**
Eastern Mediterranean	9A-11A (1) 11A-3P (2) 3P-6P (1)	11A-3P (1) 3P-7P (3) 7P-10P (2) 10P-12M (1)	1P-3P (1) 3P-5P (2) 5P-9P (3) 9P-3A (2)	8P-10P (2) 8P-10P (1)**
North & Central Africa	8A-11A (1) 11A-4P (2) 4P-6P (1)	5A-9A (2) 9A-1P (1) 1P-6P (4) 6P-9P (3) 9P-5A (2)	5A-3P(1) 3P-5P (2) 5P-12M (4) 12M-5A (3)	8P-12M (2) 9P-11P (1)**
South Africa	9A-11A (1) 11A-3P (2) 3P-6P (3) 8P-8P (1)	12N-2P (1) 2P-5P (2) 5P-8P (3) 8P-1A (2) 1A-3A (1)	8A-5P (1) 5P-7P (2) 7P-11P (3) 11P-2A (2)	8P-11P (1)
South America	12N-6P (1)* 6A-8A (2) 8A-1P (3) 1P-7P (4) 7P-9P (2) 9P-1A (1)	2A-10A (3) 10A-2P (2) 2P-5P (3) 5P-10P (4) 10P-2A (3)	7A-3P (1) 3P-6P (2) 6P-3A (4) 3A-5A (3) 5A-7A (2)	7P-1A (2) 1A-5A (3) 5A-7A (2) 1A-5A (1)**
Central & South Asia	5P-8P (1)	8A-12N (1) 12N-5P (2) 5P-8P (1)	2A-6A (1) 6A-10A (2) 10A-2P (1) 2P-5P (2)	NIL
Australasia	3P-5P (1) 5P-8P (2) 8P-11P (1)	8A-12N (2) 12N-3P (1) 3P-6P (2) 6P-11P (1) 11P-1A (2)	6A-9A (3) 9A-12N (2) 12N-12M (1) 12M-6A (2)	2A-7A (2) 4A-6A (1)**
Guam & Pacific	5P-7P (1)	9A-12N (2) 12N-5P (3) 5P-11P (2)	1A-6A (1) 6A-9A (3) 9A-11A (2) 11A-1P (1)	NIL
Japan & Far East	5P-8P (1)	8A-10A (1) 12N-2P (1) 2P-5P (3) 5P-11P (2)	1A-6A (2) 6A-9A (3) 9A-12N (2) 12N-5P (1)	NIL

ALL TIMES IN C.S.T.

CENTRAL USA TO:

	6*/10 Meters	15 Meters	20 Meters	40/80** Meters
Western & Central Europe	11A-1P (1) 1P-3P (2) 3P-4P (1)	6A-11A (2) 11A-5P (3) 5P-7P (2) 7P-10P (1)	1P-4P (2) 4P-7P (3) 7P-10P (4) 10P-1A (3) 1A-1P (1)	8P-12M (2) 9P-11P (1)**
Southern Europe & North Africa	9A-12N (1) 12N-2P (3) 2P-5P (1)	4A-12N (2) 12N-7P (3) 7P-10P (2) 10P-4A (1)	4A-6A (2) 6A-3P (1) 3P-5P (2) 5P-10P (4) 10P-4A (3)	8P-12M (2) 9P-11P (1)**
Central & South Africa	8A-11A (1) 11A-5P (3) 5P-7P (2) 7P-9P (1)	11A-1P (1) 1P-4P (2) 4P-7P (3) 7P-1A (2) 1A-4A (1)	2P-4P (1) 4P-10P (3) 10P-2A (2)	8P-11P (1)
South America	12N-6P (1)* 7A-12N (3) 12N-6P (4) 6P-10P (3) 10P-2A (2)	2A-6A (2) 6A-10A (3) 10A-2P (2) 2P-4P (3) 4P-2A (4)	8A-3P (1) 3P-6P (2) 6P-2A (4) 2A-8A (3)	7P-12M (2) 12M-3A (3) 3A-7A (2) 12M-4A (1)**
Hawaii	10A-3P (1) 3P-5P (2) 5P-8P (3) 8P-10P (1)	8A-11A (2) 11A-5P (3) 5P-10P (4) 10P-12M (3) 12M-4A (2)	8A-12N (3) 12N-6P (2) 6P-4A (4) 4A-8A (2)	8P-10P (2) 10P-5A (4) 5A-7A (2) 11P-4A (2)**
Japan & Far East	5P-8P (1)	8A-10A (2) 10A-2P (1) 2P-9P (3) 9P-12M (2)	9P-2A (2) 2A-6A (1) 6A-9A (3) 9A-11A (2) 11A-3P (1)	NIL
Central & South Asia	3P-8P (1)	8A-11A (1) 11A-1P (2) 1P-4P (3) 4P-10P (1)	4A-7A (1) 7A-9A (3) 9A-1P (2) 1P-4P (1)	NIL
Australasia	7A-9A (1) 1P-4P (1) 4P-10P (2)	7A-10A (2) 10A-1P (1) 1P-10P (2) 10P-12M (3) 12M-3A (1)	10P-12M (2) 12M-4A (4) 4A-7A (2) 7A-10A (3) 10A-1P (2)	1A-6A (2) 2A-4A (1)**
Antarctica	12N-2P (2) 2P-5P (3) 5P-8P (2)	9A-12N (1) 12N-3P (2) 3P-7P (3) 7P-10P (2)	9A-3P (1) 3P-6P (2) 6P-8P (3) 8P-10P (2)	8P-3A (2) 10P-1A (1)**

YL

by LOUISA B. SANDO, W5RZJ
212 Sombrio Drive, Santa Fe, N. M.

National Convention

The GAYLARKS of Houston are planning three major projects for the National Convention at Galveston, June 19-21. Chairman is the club's president, W5EGD, Lillian. The YL breakfast, for licensed YLs only, will include an open YLRL Forum. Mae, K5ALF, will handle decorations for the breakfast. Betty, W5ERH, will be in charge of a national YL display booth where certificates and other items from YL clubs will be shown. Harriett, K5BJU, will arrange for a Hospitality Room for licensed YLs.

All other ladies' activities will be handled by the Galveston County A.R.C. and their YLs: W5JSV, Dorothy; W5DJC, Jem; K5GNC, Thelma; K5CRJ, Sarah; Mary Bess Sherrod and others. A reduced registration fee of $5 entitles unlicensed gals to special ladies' prizes in addition to all other prizes.

W5SGD, Lillian (left), receives the president's gavel (and gaylark emblem) at installation meeting, Jan. '59, from K5BJU, Harriett, founding president of GAYLARK at Houston. Their club will sponsor YL activities at the National Convention in June.

Oregon State

The OARA State Convention, which is to be held at Roseburg, Ore. May 2-3, will feature a Saturday luncheon with style show for the YLs and YFs. The Sunday breakfast will include an earring contest—judged as the most comical, unique or glamorous. At 12:30 Sunday the YLs will meet for a Coffee Hour in the Coral Room at the Hotel Umpqua.

K3EEA, Roberta Eisenstein, 11 yrs. old.

WRONE Luncheon

The spring luncheon for WRONE will be held Saturday, May 2 at the Pillar House, Newton Lower Falls, Mass., (Routes 16 & 128 at Exit 49) 12 noon until 4 p.m. with luncheon to be served at 12:30. All YLs welcome whether members of WRONE or not.

Calif. YLs to Meet May 23

Members of the YL clubs and all other YLs in California are invited to attend a YL Hamfest at Santa Barbara on May 23-24. W6DXI,

Gladys, V.P. of YLRL, and K6KCI, Irma, are planning the meeting. It will be held at the centrally located Hotel Carrillo.

9th Midwest Convention

Last call for the 9th Annual Midwest YL Convention—May 22-24 at the Polly Valley Motel, Milwaukee, Wis. Get reservations to W9RUJ by May 10.

Olympic Trials

Several YLs helped operate the rigs set up

WV2BUT, Barbara Olexa, age 13.

at Squaw Valley, Calif. to provide communications during the North American Alpine and Nordic Ski Championships during the latter half of Feb. and early March. The gals included W6BDE, Esther, W6DCQ, Sue; W6FEA, Gertie; K6SBL, Fran, and K6QCL, Joyce. They had six transmitters operating at around 32.1 and 170 with one repeater on a mountain top. All Army gear, it was set up by Army regulars and with help from some OM Hams. For the Cross Country races two stations were set up about 10 miles away. The schedule called for 6 hours on duty and 24 hours rest. Most of the work was done in the daytime with one night operator from 1900 to 0100 and another from 0100 to 0700. In the transmitter shack was an emergency switchboard which the radio ops handled from 2200 to 0700. Contact with the first aid station, security guard, ambulances and ski patrol was maintained with walkie-talkies. The YLs are looking forward to operating again at Squaw Valley during the Olympic Winter Games in Feb. 1960.

With the Clubs

Officers for The Georgia Peaches during 1959 are: Pres., K4KKR, Peggy; V.P. and certificate custodian, K4DNL, Olivia; S-T, K4AIQ, Carolyn; NCS, K4CYV, Olga; historian, K4GCT, Helen; membership chm, K4QYL,

W8WUB, Marolyn Gwinn, 15 years old.

Lexie. The Georgia Peach YL Net meets on Thurs. 0900 EST on 7260.

The Los Angeles YLRC annual YL-OM Valentine Banquet was a huge success with over 100 attending. W6MFP, Agnes, made ceramic hearts for each YL with her name and call. Special guests were W9's RUJ and YWH. The L.A. Jan. meeting featured a demonstation tour of the Pacific Telephone Co.'s largest L.A. office. It included direct distance dialing facilities, automatic switching equipment, teletype operating center and national radio and TV network distribution center.

New Chirp-tificate Custodian for the Camellia Capital Chirps is K6RLR, Jane Willis, RFD 1, Box 524-J, Holly Ave., Chico, Calif. The Chirps, whose number have grown to 33, had a very enjoyable 2nd anniversary party on Jan. 23. Lots and lots of camellias (it *is* the Camellia Capital) and little pipe cleaner figures of a man and woman with transmitter between them, made by K6KCK, served as table decorations.

Young YLs

Speaking of young YL's we've had another visitation of the printer's devil. Get out your copy of CQ for March '59—p. 111, the two captions at the bottom of the page should be switched, or just take off the arrows—K2TSR is at the right, K4SAF on the left. Sorry, gals!

K3EEA, Roberta Eisenstein, is an 11-yr. old 6th grader at Levittown, Pa. Roberta got her Novice license in May 1958, just a week before her 11th birthday. She passed her General in Dec. Her dad, K3BBE, got her interested and together they share a Gonset II on 2 meters and a DX-20 (which Roberta put together) on 40 and 20. Receivers are an NC-240 and SX-99. K3EEA likes cw the best and is working on WAS. Roberta's other hobby is music; she plays clarinet in the school band and sings in the chorus.

WV2BUT, Barbara Olexa, of Avenel, N.J. is the jr. YL of W2FZG. She operates on 7172 with a Johnson Adventurer and an S-76 receiver, getting on most afternoons. Barbara is 13 years old and in the 8th grade.

W8WUB, Marolyn Gwinn, of Huntington, W. Va., is a 15-yr. old sophomore at Huntington H.S. She started as a Novice in April '55

[*Continued on page 123*]

ham clinic

by CHARLES J. SCHAUERS, F7FE/W6QLV

CQ Magazine, 300 West 43rd St., New York 36, N. Y.

For the ham just starting out, the interpretation of block, schematic and wiring diagrams can be and often is a chore. Of course, it is essential that one learn a large number of symbols in order to draw the diagrams required by the FCC in their examinations; but it is not mandatory that one need know *every* detail of specific circuit action. Most diagrams are memorized (and believe it or not, this is *good*), because as one acquires more technical experience, what they have memorized "falls" in line with the study of circuit analysis.

According to the American Standards Association, there are three distinct and separate types of diagrams, viz., wiring, block and schematic. The symbols and their connections are described in Y32.2-1954, a book entitled, "American Standard Graphical Symbols for Electrical Diagrams" available from the Association for $1.25.

Before one can run, one must learn to walk . . . the same reasoning applies to circuit analysis and advanced troubleshooting.

Schematic and block diagrams are very simple to understand because they utilize circles, rectangles, single-line diagrams etc., and are general in nature. That is, they do not cover the little details found in wiring diagrams in which the practicing ham has the most interest.

Wiring diagrams on the other hand are *detailed* and show everything, i.e., color coding; terminals on tubes, switches, transformers, etc.; all conductors and voltages are indicated.

In colleges where electrical engineering is taught, much time is devoted to learning electronic symbols and circuit interpretation. However, it is in the drafting class that the prospective engineer really learns how the symbols are put together.

If you are studying alone, the best way to learn the symbols is to obtain a good handbook (see book review which follows) which not only shows a particular symbol but accompanies it with pictures of the part it portrays. Better still, obtain the parts, hold them in your hand; look at the symbols and the picture!

Many arguments have been advanced pro and con as to the most desirable symbol configuration. For example, in your own CQ the system which has been used for many years without change, continues. When QST switched over to the "new" system only a few changes were apparent. For one, coils were drawn differently; chassis ground (fig 1A) instead of the generally used fig 1B is shown; loop over connections are not used and conductor connections are indicated with a heavy dot. The differences between the diagrams in CQ, QST, WRA, REF, RSGB Bulletin, DL/QTC, QSO/CQ and other ham publications are insignificant. I notice however, that many European magazines do not evidently employ a draftsman and one can find wiring diagrams using symbols of many different sizes.

After one has learned the symbols, the logical next step is to study very *simple* wiring diagrams. Doing this enables the newcomer to acquaint himself not only with the parts themselves but specific circuit action as well.

The third step is a little more difficult; this is where *two* separate and complete stages are analyzed. For example, a radio receiver *rf* stage feeding a mixer stage.

The fourth step is of course an extension of the third and involves additional stages and many separate circuits.

A circuit can be defined in broad or narrow terms. I like to think in both. Let us take a receiver *rf* stage for example. The tube the stage contains, tuned circuits, resistors, condensors, switches, *rf* chokes etc. comprise the complete stage. The stage itself (because it is part of the overall receiver) can *broadly* be called a complete *rf* amplifier *circuit*. Looking at individual sections of this *circuit*, we find other circuits. For example, the screen circuit, plate circuit, grid circuit and filament or cath-

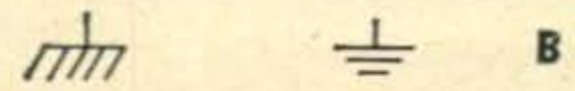


Fig. 1—Two common ground symbols.

ode circuit. To understand the operation of the *entire* stage it is essential that one *know* how each of these *individual* circuits function. The same reasoning is applied to the stages of the receiver which preceded or follow the stage under analysis.

Circuit-meshing (i.e., the "marriage" of one circuit with another) is not easily learned in a day. Input and output impedances, current and voltage requirements and *separate* circuit functions must be carefully analyzed and calculated so that the desired electronic *effect* (yes, *effect*!) is obtained.

What happens when a resistor in a receiver or transmitter say, cooks itself and its color code along with it? If Mr. *Average* Ham has no diagram he is usually stuck. What does he do? Well, he usually looks through handbooks, CQ etc., and attempts to find a circuit with the same tube and the same applied voltages; from this he tries out a cathode, plate or screen resistor for size. This method works but it certainly is not efficient!

Had he taken out the time to learn circuit analysis and how to calculate the various parameters in *most* tube circuits, the task of figuring out "which" resistor or condenser to use "where" would be no major problem—without a diagram.

Circuit tracing modern commercially made ham gear is not *always* an easy matter; especially in equipment which is so compactly put together that it takes tweezers, a mirror and patience to replace some parts.

This may sound ridiculous, *but every circuit has a beginning and an end*. Simple? Not so fast! Ask one of your fellow hams sometime what he measures (with a single meter) when he measures a tube's cathode current. Some of the answers you receive will amaze you. (Of course, cathode current is the *total* current (screen, plate etc.) taken by the tube).

Unless you are adept at reading wiring diagrams, circuit tracing with an ohmmeter has its pitfalls. The most common mistake is to use the *highest* range or most sensitive position of the meter for *every* circuit. It is figured (and usually wrongly) that this high range is the most sensitive and therefore will enable the tester to measure *every* circuit. But how can one tell the difference between a short and a normal *low* reading when the meter is on the 2 megohm scale?

Circuit tracing to be effective must be a piecemeal process—circuit by circuit; stage-by-stage. There is no other way. To be able to design and repair your own equipment requires a keen knowledge of circuit analysis; without it you'll have to depend upon someone else.

Observation

W2KPQ, S. E. Piller is trying to obtain sufficient funds for a non-profit organization to operate radio nets (on special FCC allocated frequencies) which will enable professional personnel to exchange technical information. Personally, I would like to see such nets come into existence (as long as no ham frequencies are utilized).

If this venture is as successful as the technical talks broadcast by A2KPQ, then it will certainly emphasize the importance of contributions made by the radio amateur not only to amateur radio itself but to the further advancement of education.

We sincerely hope that he raises the funds and obtains the necessary authorizations for clear channel frequencies, for we can think of no better way to exchange scientific information on a large scale. Participants will not only benefit but those who listen in as well. Good luck "Ed" from your fellow hams!

Good Books

"How to Read Schematic Diagrams" is a book written by David Mark and published by *Rider*. Its 147 pages are full of good useable information because it not only covers symbols and how to read them but it also goes into the mniute details of circuit analysis. It is not a mathematical treatise and is an ideal book for either the novice or advanced ham who wants to be able to read and interpret the circuit diagrams associated with the equipment he owns. He who obtains and studies this book carefully will find that it is very easy to read and makes the learning of symbols and circuit action a pleasant task. It is worth $3.50 of anyone's money.

RTTY

I have always been interested in ham radio teletype (RTTY). Although I have never had an RTTY station of my own in operation, I have to think about and work it in my job every day on a large scale.

Recently, I started to "dig" for some information on RTTY for ham use and I found myself a little bewildered. All the books I could lay my hands on were those containing information of interest to the man commercially engaged in RTTY work. Then I was lucky enough to receive a copy of the "Radio Amateur's RTTY Handbook" by Kretzman and Green. Believe me, this book gave me more information than I could obtain from four different texts on the subject.

From RTTY history to a cavity filter for 2 meter RTTY, the book runs the gamut in a very readable and understandable manner. It explains basic principles of RTTY; how signals are received and transmitted and contains circuits which evidently have been tried and NOT found wanting. A number of ham RTTY *experts* contributed portions to the book which enhances its authoritativeness.

If you are interested in things mechanical as well as electronic, AND pleasant communica-

tion, RTTY is for you. Honestly, I cannot find anything else to top the RTTY Handbook and I do recommend it. It is only $3.00 and like the *Rider* book on schematics can be obtained from the *Radio Bookstore* 1379 East 15th St., Brooklyn 30, N. Y.

Questions

SX28A Modifications

"Some time ago one of your readers requested information on modifications of the fine old receiver, the SX28 (A). You said you would try to obtain as much information from *Hallicrafters* as you could. Any results?"

YES SIR! Thanks to the fine people at *Hallicrafters* we now have a lot of information.

To start off, information is included this month which will enable you to obtain better noise limiter action, a crystal calibrator plus a low impedance (cathode follower) output for connection to an oscilloscope for measuring modulation percentage or a panoramic adaptor. All this **without** butchering up the set.

Some of you have already made these changes or had them done by a *Hallicrafters* Authorized Service Center. If you're the type who does not like to tear into a set, then by all means contact your nearest Service Center for assistance. For a modest fee they'll do the work PLUS proper realignment of your SX-28 (A).

Let's take the noise limiter circuit first. Referring to figures 2 and 3, it can be seen that the 6H6 is done away with completely and is replaced by a 6AL5 in a series type circuit. This 6AL5 is mounted as close to the 6B8 detector as possible on a small bracket. The tube socket from which you pulled the 6H6 is filled with a 6SL7 which will provide you with a crystal marker oscillator and cathode follower.

To make the changes you should have an original diagram to work from.

All wiring must be carefully done and be kept as short as possible. Shield and ground the leads to the ANL switch *independently*. DON'T deviate from the diagrams if you want these changes to work the *first* time.

Be careful when "digging" into tube connections that you do not disturb wiring, switch contacts etc.

The marker oscillator can be used on 1 *mc*, 500 *kc* or 100 *kc* depending upon your choice of crystal. A switch in the cathode circuit of the 6SL7 can be used to control the oscillator. No direct coupling is necessary because the oscillator has sufficient radiation to provide the coupling.

Grid pin 5 of the 6L7 (V-5) will be open and this may be grounded or left open. Figures 4 and 5 show the crystal and low Z changes.

Alignment of the receiver must be rechecked with a good signal generator as a certain amount of detuning will occur.

These changes are really worthwhile. If you run into trouble, drop us a line.

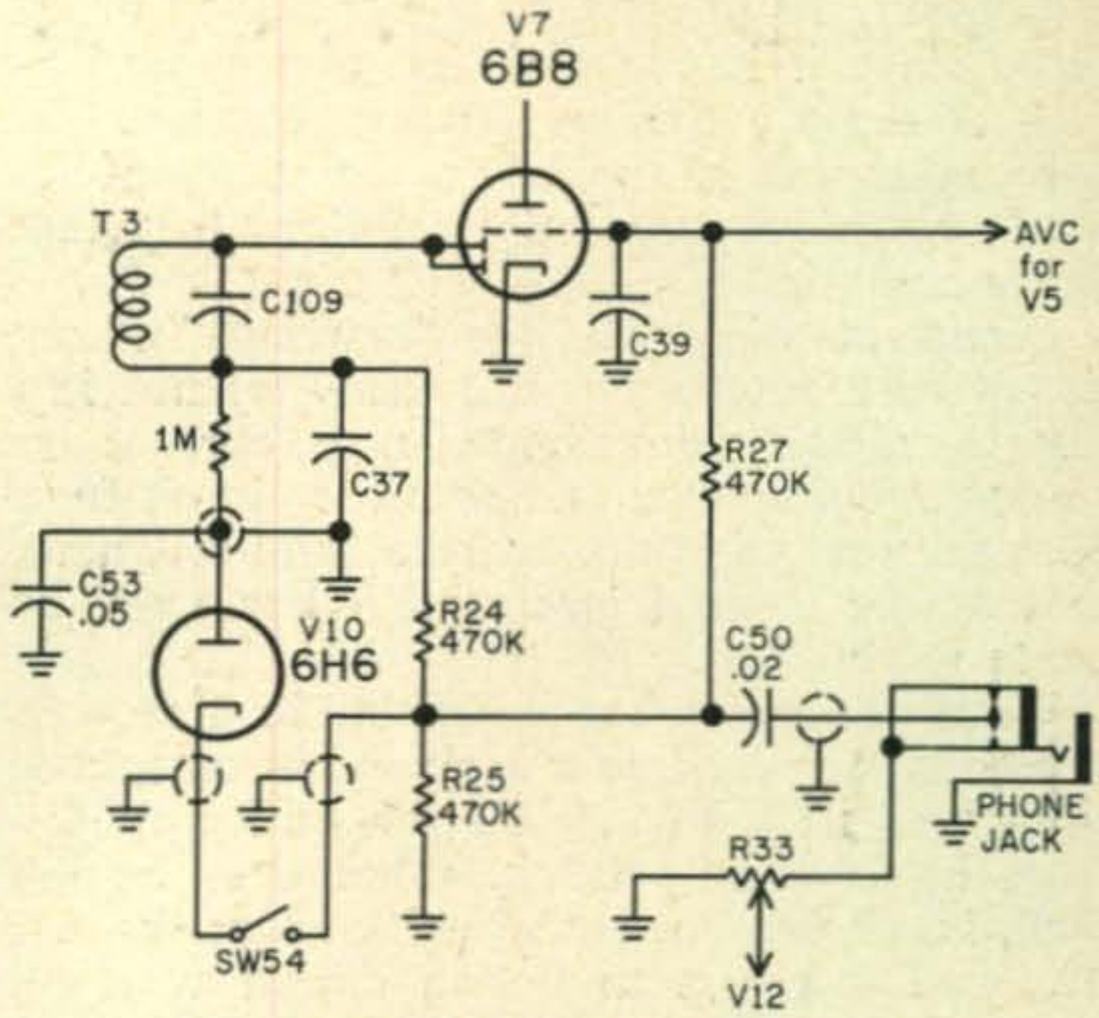


Fig. 2—Original noise limiter circuit.

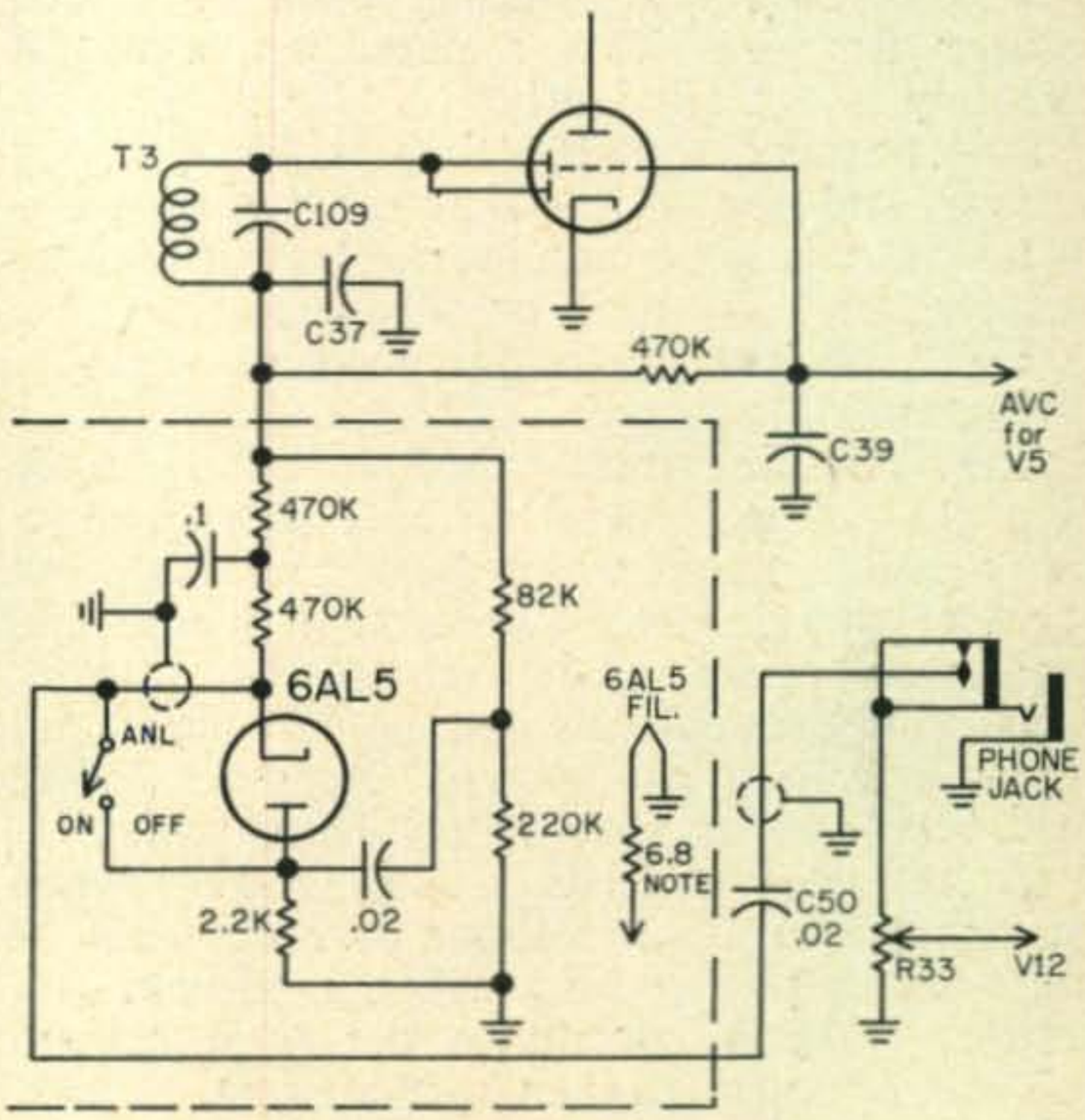


Fig. 3—Revised limiter ciruit.

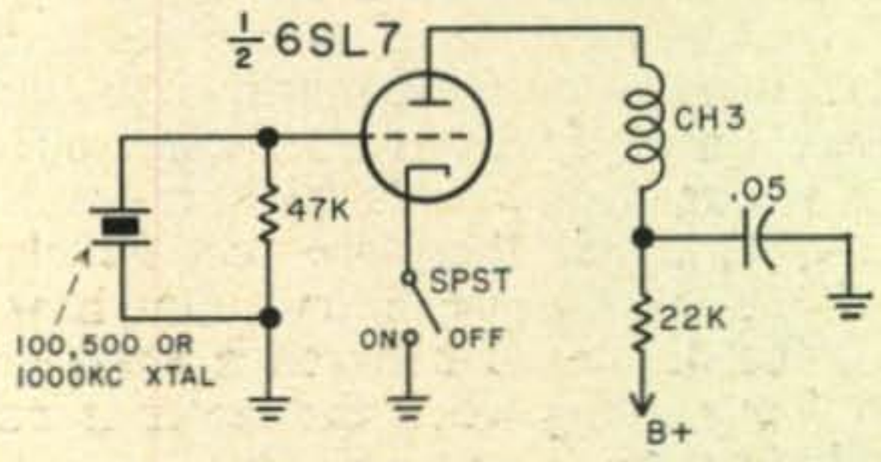


Fig. 4—Crystal marker oscillator.

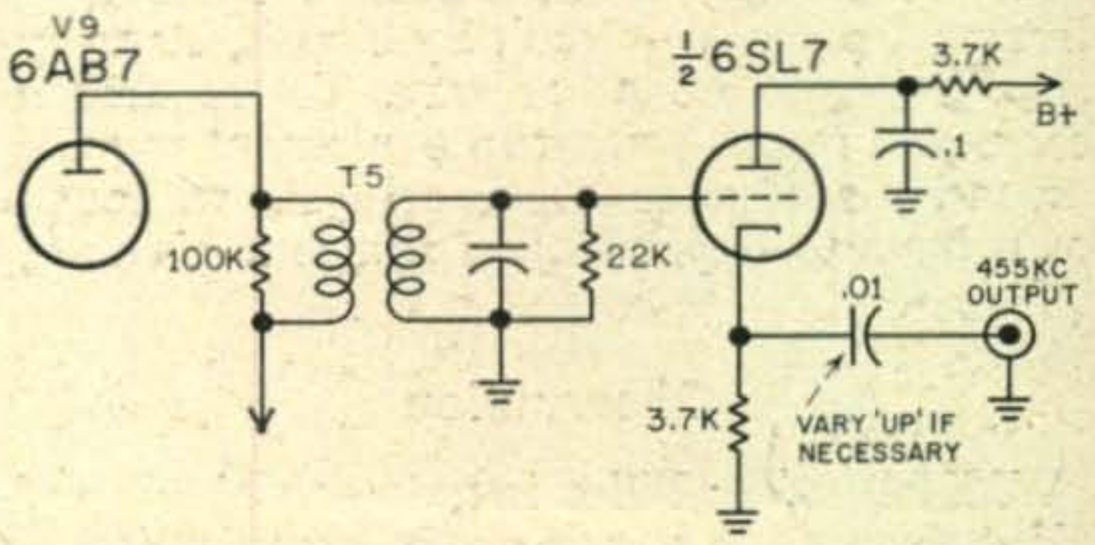


Fig. 5—Cathode follower output for pan unit.

SX 101 (Mk.III)

"My buddy and I both have an SX-101 which perform beautifully, but we notice that both receivers have different signal strength readings on the same antenna and frequency (same station). How come?"

Read your instruction manual under "use of the S meter" and the "note" thereto. It says: "variations in the microvolt indications between receivers is not indicative of overall sensitivity but is caused by *normal* tolerances in vacuum tube conductances which are reflected in the AVC/S meter curve. Thus, two receivers with identical sensitivities could, under the same signal conditions indicate signal levels of 5 microvolts and 25 microvolts and yet each be a *perfect* receiver." You're both lucky in having 101s—it's a top set!

HRO

"What do I do for backlash in my HRO?"

Backlash in the HRO series receivers according to a *National* Service Bulletin is traceable to the right end-bearing not seating properly or poor centering of the oscillator rotor caused by reseating in transportation.

To correct it (thanks to *National*), set the receiver up with the CW switch on, tune in some steady CW signal on about 14 or 15 *mc*. Then, with the *bfo* set for a beat note of about 500 cycles, adjust the right end bearing to produce the lowest possible beat note without touching the main tuning dial. When this is done, the rotor and stator plates should be electrically centered and then the locknut on the end-bearing must be carefully tightened. Contact your *National* Service representative for help if you cannot do it.

S Meter Amplifier

"I would like an S meter circuit which can be used with any receiver with *avc*. How about it?"

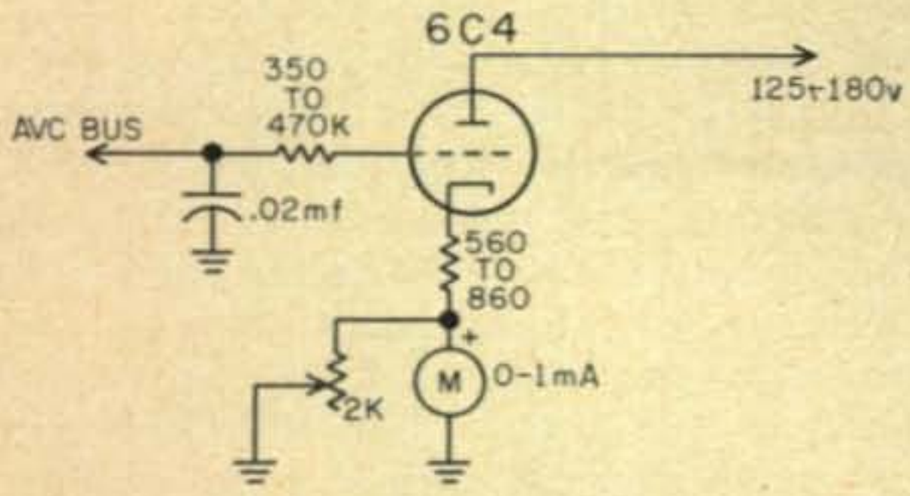


Fig. 6—S meter amplifier.

Sure. Take a look at fig. 6. A 6C4 is used but nearly any other similar tube will work. The meter will, incidentally, read backward. On the surplus market you'll find a number of 0-1 meters which will work fine.

BC Interference

"I have interference on all bands of my receiver from a local broadcast station whose transmitter is only a short distance away. Any way to reduce or eliminate this interference? The station is on 1480 *kc*."

Suggest you try a trap in series with your antenna. This would consist of a loop-stick coil paralleled with a 365 mmf midget variable (type used in transistor sets). This tuned circuit should be shielded. On the other hand you may have an *if* type of interference; very little can be done about this. If the signal from the BC station is really strong, shock excitation may be occurring and there is little you can do about this.

Mohawk Receiver

"I have a Mohawk *Heathkit* receiver, Model RX-1 which I assembled myself. It has worked fine until a few days ago when I noticed that the OA2 voltage regulator tube would flash intermittently. I checked my line voltage and it fluctuates only a volt or two. I tried another OA2 and it does the same thing. I noticed a little drift too. What now?"

First, recheck your soldered connections, especially on pins 1-5 and 7 of the OA2. Check the joints at the 2.5K resistor to pins 1 and 5 and to the 7 henry choke in the 5V4 rectifier output. Check calibration switch for intermittent. Check all tubes and connections associated with the load on this VR tube.

HQ 100

"My receiver is an HQ 100 and I am happy with it but I would like to remote another speaker from it. Does this set have enough audio output to drive 2 speakers?"

The HQ 100 uses a 6AQ5 in the output; *Hammarlund* says it has an output of one watt. For short distances (up to 25 feet) I would say yes, if you use a small speaker.

HQ 160

"Why does *Hammarlund* use so-called 'Auto-Response' in the HQ 160 and what is it? Any good?"

The *Hammarlund* Auto-Response circuit is nothing to sneeze at. This is an *af* feedback type circuit which controls frequency response. On strong signals wide frequency response is available; on weak signals with the *af* gain open, the frequency bandwidth is narrowed to between (175 and 2500 *cps*) for better intelligibility. The system also dampens the speaker response and minimizes speaker "hangover" (inertia). Certainly it is good. This is a top set too! (See review of HQ 145 in this issue.)

Double-Doublet

"How come one now seldom hears of the good old reliable double-doublet antenna used quite extensively in the '30s for receiving?"

The antenna is still being used. However, it is broadband and was originally designed for shortwave (BC) listening. RCA popularized

[*Continued on page* 124]

SURPLUS

by **KENNETH B. GRAYSON, W2HDM**
Care of CQ 300 West 43rd Street, N. Y. C. 36, N. Y.

For the past year we have been receiving requests for the conversion of the BC-659 equipment. Because of the similarity between this and the BC-620, only the BC-659 will be covered here, but any changes are applicable to both equipments. The BC-659 is an FM transmitter receiver covering the frequency range of 27.0 to 38.9 *mc*. The receiver is a superheterodyne with an *if* frequency of 4.3 *mc*. The receiver is crystal controlled. The transmitter has an output of 1.5 watts which should produce a range of about 5 miles minimum. The transmitter is *vfo* in operation, but held on frequency by the receiver, which detects the signal (in a discriminator) and corrects any oscillator drift by means of a reactance tube across the oscillator. By this means only one crystal is used to obtain almost crystal stability in the transmitter.

The actual conversion of the BC-659 is one of supplying power and mounting in your car or home. Power required for the transmitter is 150 volts B plus at 50 *ma* and 7½ volts *dc* at 0.3 amp for the filaments. The receiver power is 1.5 volts at 0.94 amps filament supply and 90 volts at 28 *ma* for B plus. On transmit the current consumed by the receiver increases to 48 *ma*. While we used batteries for our installation several power supplies are available to allow operation from six, twelve or twenty four volts. The PE-117-C will supply power from six or twelve volt inputs while the PE-120-A operates from all three inputs.

Tuning The Receiver

The frequency of the output is of course dependent upon the crystal used. The actual crystal frequency is the channel frequency minus the 4.3 *mc* intermediate frequency divided by four. For example 29,300 *kc* would be 29,300 less 4300, divided by four, which gives 6250 *kc* as our required frequency. The three digit number of the channel stamped on the crystal holder is the frequency in megacycles, providing the decimal point is placed before the last digit.

Two crystals are provided, and a front panel switch selects the desired channel, which can be any frequency within the range of the equipment. The channel switch selects the appropriate pretuned circuit elements. Tuning is accomplished by first presetting the receiver. Remove the BC-659 from its case and set switches SW-1 and SW-2 to OFF. Set the panel meter to CHECK. Insert the crystals in the proper channel sockets with nameplates facing outboard from each other. Plug in the mike and headset and set the trimmers of each stage according to Table I. Don't force any of the trimmers and if a setting is far from that shown in the table recheck the other settings since something is wrong. The test meter may be used for several measurements. When the OFF-ALIGN switch is in its normal position it allows the meter to read the filament voltage, plate voltage as shown in Table II. When the OFF-ALIGN switch is in the off position it enables the meter to measure several additional equipment functions as shown in Table III. Use of the test meter in aligning the BC-659 is simple. The receiver is aligned first by setting the OFF-ALIGN switch to align. Set the volume control full on and note the meter reading. This should be between 1.5 and 2.5. Hold the pin probe free and note the meter reading. If there isn't a change of at least 5 divisions replace the 3D6 or BA-40 (the battery) or both. A Fahn-

[*Continued on page 126*]

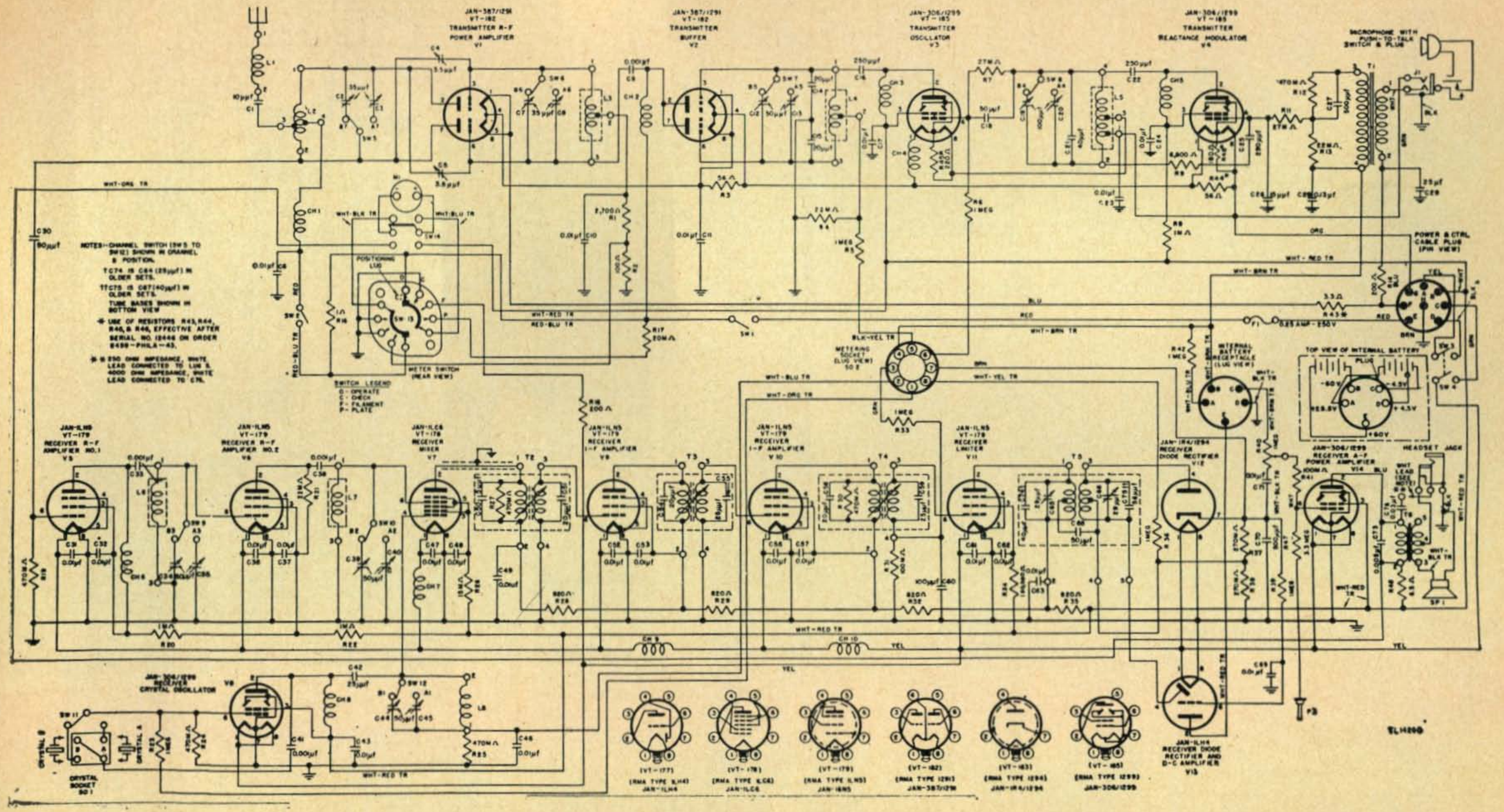


Fig. 1—Diagram of the BC-659 receiver and transmitter. See next page for power supplies.

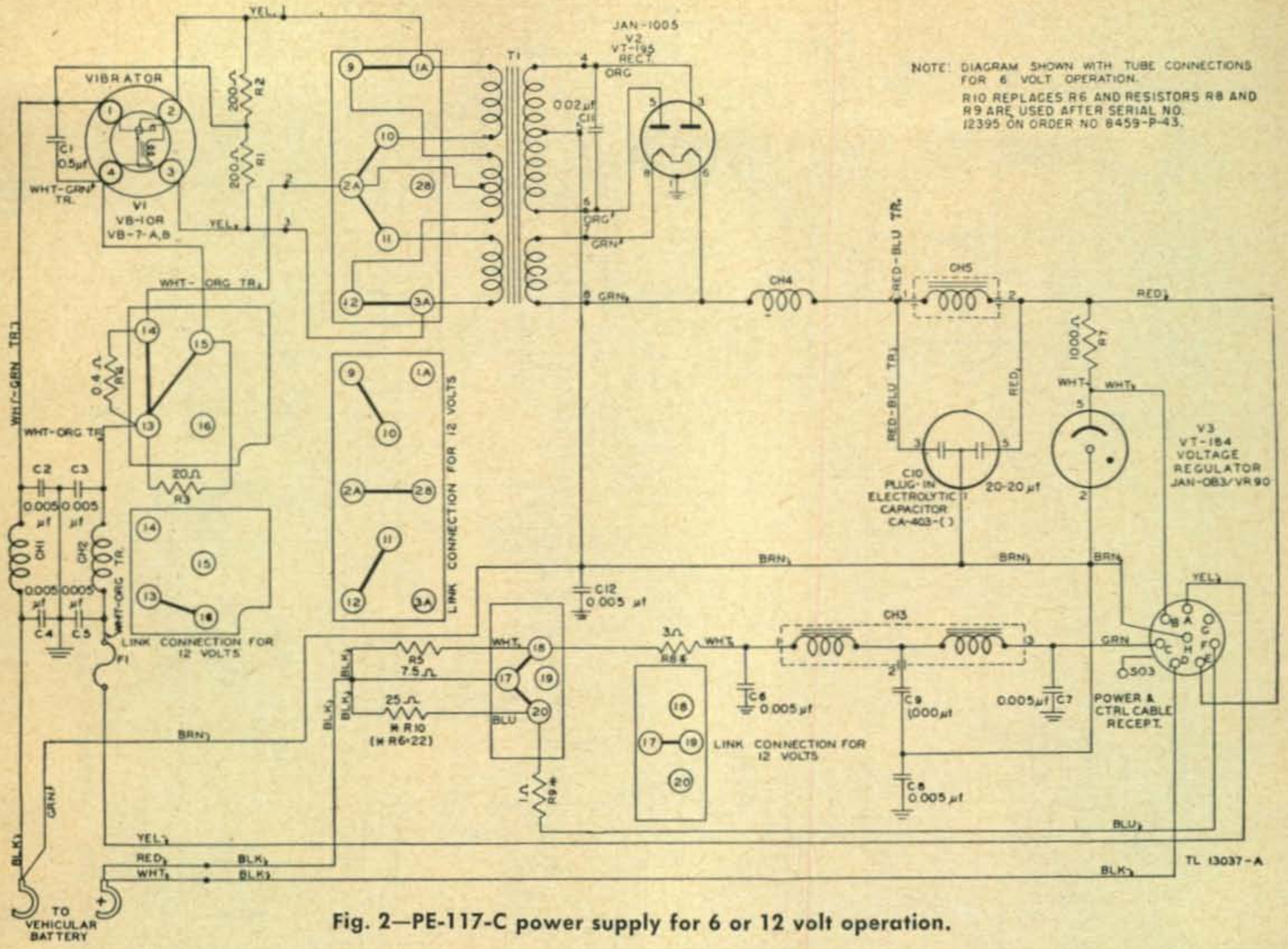


Fig. 2—PE-117-C power supply for 6 or 12 volt operation.

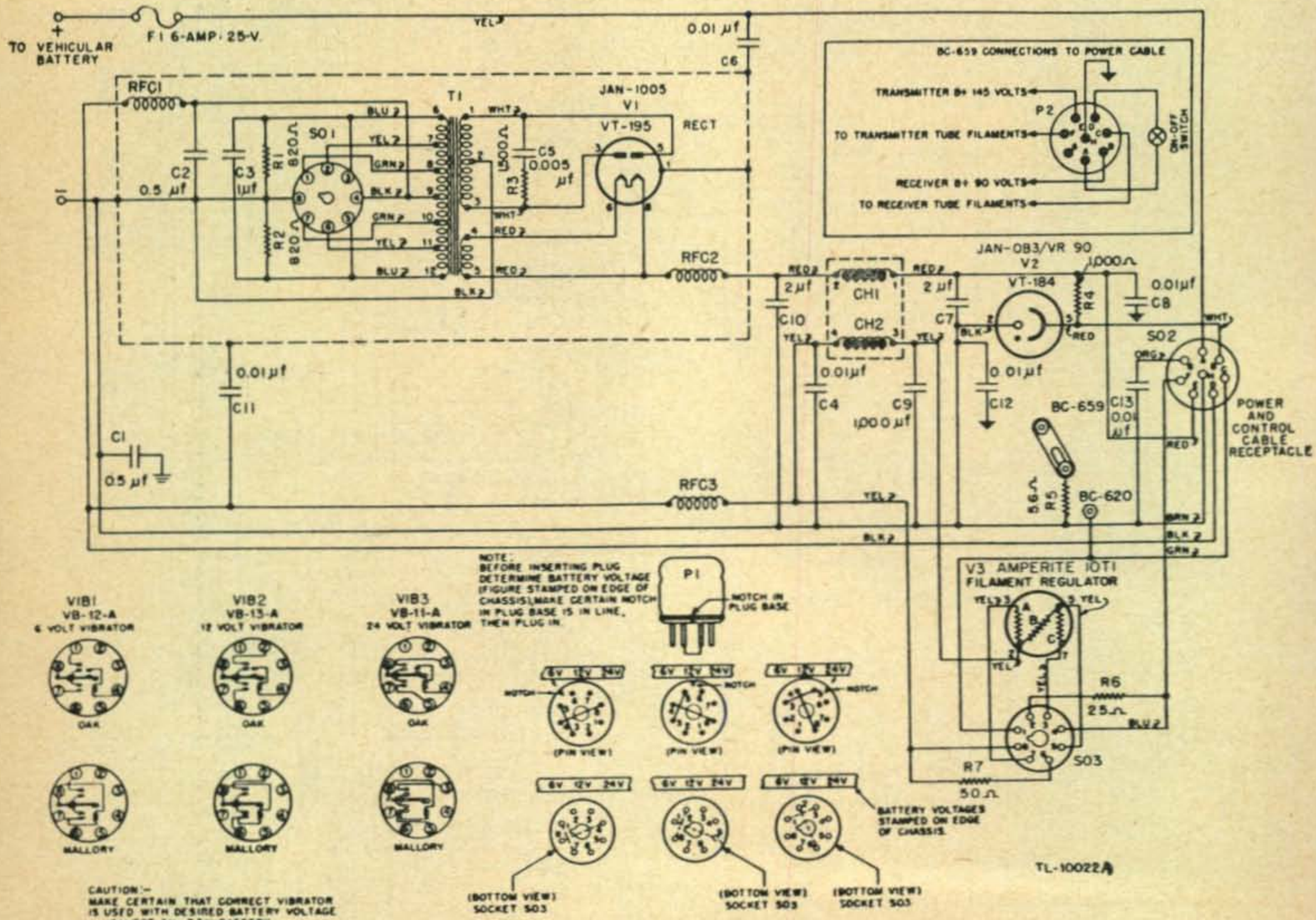


Fig. 3—PE-120-A power supply for 6, 12 or 24 volt operation.

For further information, check number 26 on page 142.

Letters ..... to the Editor

Protest

Dear Editor,

This is a protest. You have gone too far. Lately, when I start reading CQ I begin to wonder if I'm not in the middle of a science fiction magazine instead. Your technical department, if any, must be on permanent leave if the testimony of the increasing number of inexcusable technical absurdities is any witness. Take for example your recent article on the K4HWY antenna. The improvement in gain claimed over a regular full sized three element beam is startling, to say the least. And when the article goes on to say that this beam is better than a V-beam, rhombic or bi-square then you are ready to trade in your Kraus "Antennas" for "Superman" comics.

K2DZJ

We do try hard to keep obvious technical errors out of CQ, but from time to time we go out on a limb and let an author present some new ideas which may or may not prove out. The article to which you refer was, however, printed in QST.—Ed.

Reciprocal License

Dear Wayne:

I have read the letter (January '59) from T/Sgt. Alvin E. Pittman regarding his failure to get a license for Andorra, and also your editorial (February 1959) on Europe.

I do not think it is a question of "taking out their bitterness over U.S. non reciprocal licensing by refusing to license American amateurs".

Surely reciprocity means what it says, and looked at even from the very practical aspect, if all countries granted licenses to American amateurs, there would be no incentive for American amateurs to press Congress for appropriate legislation.

We in England are faced with exactly the same problem. Our Government does not grant reciprocal licensing facilities for foreign amateurs, so we too cannot get licenses for France, Switzerland, Spain, Andorra, etc. I have also tried to get a license for Andorra and failed.

But surely our complaint must not be against those countries who are prepared to grant facilities on a reciprocal basis, but rather with our own authorities, who by their red tape refuse to give the international cooperation to which they are always giving lip service. 73,

Edgar Wagner, G3BID

Ham Family

Dear Wayne,

I think the eight in the immediate family tops any ham family you've reported so far. We have a weekly sked for a family rag chew. W5JSS: brother; KØAZX: son; W5RRC: son; K5KLW: son-in-law; K5HCF: brother-in-law; W5QBY: nephew; W5TOH: nephew.

Gordon, W5SVR
Mangum, Oklahoma

Charity

Dear Sir:

It was several years ago now, that my eldest son came dashing into the house, with a copy of your admirable magazine clutched in his sticky little paws, and yelling, "Hey Pop, do you know anything about ham radio?" Well, that started things, and now, after having held a general class ticket for a year and a half, I pause briefly between QSOs, to reflect upon our hobby.

[Continued on page 139]

Only World Radio can offer the host of services guaranteeing your satisfaction. Fast turnover of large stocks insures latest serial numbers. Our reconditioning department and established amateur market allows us to make you the highest trade offers. We finance our own paper, for the easiest budget terms and only 10% down. Fast shipment from the center of the U.S. cuts your waiting to a minimum. And 25 experienced hams in our organization pride themselves on Personalized Service to You. Give us a try the next time you buy . . . at "the house the hams built!"

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The new Globe Champion 350 is bandswitching 10-160M, 350w CW, 275w AM, 450w SSB (PEP), with any 10w external exciter. Extensively TVI-suppressed, filtered and bypassed. High level class B modulation maintained without usual clipping distortion with commercial type compression circuit. Pi-Net output circuit 48-300 ohms, built-in VFO, push-to-talk, antenna changeover relay, and improved time sequence keying. Final tubes air-cooled. Single knob bandswitching. Cabinet 12x21⅜x17".

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- Manual balance control for compensation of line unbalance.
- Standby switch permits placing land-line, call without energizing transmitter.
- Separate gain controls for receiver and transmitter permit proper adjustment and balance.
- Completely shielded and RF by-passed to eliminate RF feedback.
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For further information, check number 28 on page 142.

SEMICOND. [*from page 71*]

a transistor system of generating 10 *mw* of power at 2,000 *mc* for satellite tracking. It consists of an oscillator and amplifier producing a signal on 250 *mc*. A diode operated in the capacitive mode is used as an eighth-harmonic generator. It provides 10 *mw* of power for a total *dc* power input of 423 *mw*, resulting in an overall efficiency of 2.3% (much higher than vacuum tubes).

RCA has just announced their new series of drift transistors for high speed computer switching. The 2N643, 644, and 645 are used in non-saturating circuits of computers such as inverters, flip-flops, and logic gates. They feature a high gain bandwidth product (20, 40, and 60 *mc* respectively).

The new Texas Instruments 2N1141 has an alpha cutoff rating at 750 *mc* and features 12 *db* gain at 100 *mc*. The device dissipation with an infinite heat sink is 750 *mw*. The 2N1142 and 1143 have the same power rating but feature alpha of 600 and 480 *mc* respectively.

Well, that is the bottom of the stack for this month. Don't forget to advise Dick of your QRP activities. 'Til next month.

73, DE, Don, W6TNS

ANNOUNC. [*from page 75*]

door prizes, and dinner. Ladies will be invited to tour the Corning Glass Center at Corning, New York, during the afternoon. Reservations at $3.50 per person includes everything. For more information, contact Penn-York Hamfest Assn., c/o CARA, P.O. Box 301, Corning, N.Y.

Charlotte, N. C.

"The Annual Charlotte Swapfest" will be held Sunday May 24, 1959 at the Army National Guard, Muncipal Airport, Charlotte, North Carolina.

Los Alamos

At the February 6th meeting of the Los Alamos Radio Club, the following people were elected to office: President, Les Hale, W5LYT; Vice-President, Glenn Todd, W5ZMN; Secretary-Treasurer, Bob Cowan, KN5QIN; Trustee, Ed Jurney, W5DWB; Delegate at Large, Wm. Baird, W5GXU; Delegate at Large, Donald Potter, W5BEW; Delegate at Large, Louis Burkhardt, W5YMA; Emergency Coordinator, Art Williams, K5EJW; Publicity Director, John Agee, K5ODN.

The Los Alamos Radio Club Mobile Units participated in the Radio March of Dimes Marathon, and spent the evening collecting donations for this worthy cause.

Armed Forces Day

All amateur radio operators are invited by the Army, Navy, and Air Force to participate in Armed Forces Day communication exercises on Saturday, 16 May 1959. The co-sponsors of the amateur radio activities are the Director, Naval Communications, and Military Affiliate Radio System (MARS) representing the Army Signal Corps and the Air Force Director of Communications and Electronics.

The amateur radio activities will be conducted in

[*Continued on page 110*]

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H311	2 5/16" x 3" x 6 1/8"	300 VDC. @ 100 MA.	300 VDC. @ 50 MA. 150 VDC. @ 100 MA.	49.95	42.95
H325	2 5/16" x 3" x 6 1/8"	325 VDC. @ 200 MA.	325 VDC. @ 75 MA. 162½ VDC. @ 150 MA.	55.95	47.95
H375	2 5/16" x 3" x 6 1/8"	375 VDC. @ 200 MA.	375 VDC. @ 100 MA. 187½ VDC. @ 200 MA.	62.95	53.95
H600	2 5/16" x 3" x 6 7/8"	600 VDC. @ 200 MA.	600 VDC. @ 100 MA. 300 VDC. @ 200 MA.	68.95	59.95

AIRCON CONVERTERS AND SQUELCH UNIT (TNS) (Shown on middle shelf.) For fixed or mobile use the Aircon Converters are easily installed in any car or home QTH. Use in conjunction with any receiver. FEATURES— • B plus required 150 to 250 VDC. 10 to 15 MA. • XTAL controlled oscillator • Completely shielded • Switch back to B.C. ANT. when turned off • Size 4 x 2⅝ x 3⅞ • 6 or 12 VDC. or A.C. filament.

Price: Wired and Tested—$29.95/Kit Form—$25.50

For mobile operation use the Transcon TNS for REDUCTION OF EXTERNAL NOISE and HASH and FOR THE ADDITIONAL FEATURE OF HAVING SQUELCH ACTION.

Price: Wired and Tested—$12.95/Kit Form—$10.95

TRANSMITTER-CONVERTER (Shown on bottom shelf)—Packaged in one compact unit, this Transcon MII Series comes in 6 and 10 meter models. They are so designed that they can be completely powered by your present auto radio. Each unit is so compact that it can be installed under the dashboard of most cars. In some cars its small size allows for glove compartment installation. If you are planning to go mobile there's nothing out to compare with this Transcon unit by Creative.

Price: 6 Meter—$99.50
10 Meter—$99.50

MAIL ORDERS SHIPPED SAME DAY AS RECEIVED
Include with your payment a generous allowance for shipping charges — the excess will be promptly refunded.

ESTABLISHED 1927
HARVEY RADIO CO., INC.
103 WEST 43rd STREET, NEW YORK 36, N. Y. • JUdson 2-1500

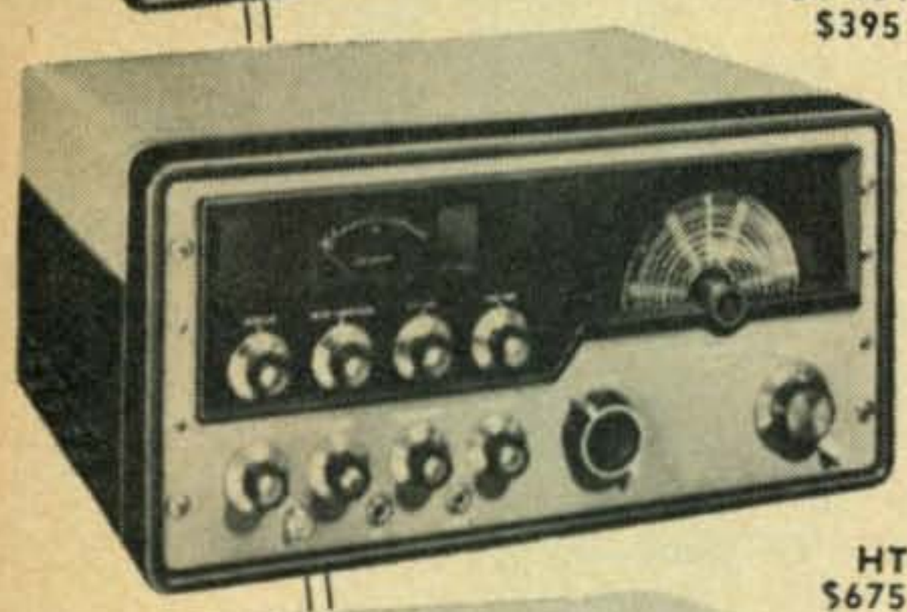
For further information, check number 30 on page 142.

A RADIO SHACK EXCLUSIVE!

20% BONUS!

SX-100
$295 Net

SX-101 - III A
$395 Net



HT-32 A
$675 Net

HT-33A
$795 Net

SR-34
$395 Net

YESSIR! WE'RE ADDING AN EXTRA 20% BONUS TRADE-IN ALLOWANCE (Above Our Usual Liberal Allowance) TOWARDS ONE OF THESE 5 GREAT

hallicrafters

OF YOUR CHOICE!

PLEASE ACT NOW! We can't keep this offer open for long and remember this . . . Radio Shack has the largest stock of ham equipment READY FOR IMMEDIATE SHIPMENT THE DAY WE RECEIVE YOUR ORDER!

SEE RADIO SHACK'S EASY-PAY-PLAN ON NEXT PAGE

HALLICRAFTERS AVAILABLE ON THIS OFFER

SX-100: Broadcast 538-1580 kc, three S/W 1720 kc-34 Mc. Double conversion superhet over entire frequency range.

SX-101: 13 tubes, voltage regulator, rectifier. Power-line fuse. Covers 7 ham bands — 160, 80, 40, 20, 15, 11-10 meters.

SR-34: 2 & 6 Meter receiver/transmitter. Complete fixed, portable or mobile. AM or CW. 49-54 & 143.5-148.2 mc range.

HT-32: New amateur band transmitter. S.S.B. AM or CW output on 80, 40, 20, 15, 11 and 10 meter bands.

HT-33A: Linear amplifier. Complete coverage of amateur bands; 80, 40, 20, 15 and 10 meters.

NEW IDEAS are born at HALLICRAFTERS

In the limitless world of communications, new ideas are the real measure of leadership. In the past quarter-century, Hallicrafters engineers have brought to amateurs, novices and listeners more than 100 major communications designs. That is why Hallicrafters is a leader in this field . . . acknowledged by over a million satisfied users.

W1RVQ

Radio Shack's Al Coe Won't Say NO!

All we ask is that your present set, regardles of its age, be in operating and presentable condition. We will give you an additional 20% BONUS allowance on top of our usual liberal trade-in allowance.

Al Coe

Radio Shack Manager of Amateur Sales

USE RADIO SHACK'S EASY-PAY-PLAN

EXAMPLE: (No Down Payment Required)

If the price of the equipment you want is **$200.00**
And the trade-in allowance on your equipment is **80.00**
The balance would be..... **120.00**
Payments are only $10 Monthly

IF YOU DO NOT TRADE IN A RECEIVER.

If Equipment price is $200..... Down Payment $20..... Monthly $13

Small monthly payments while you're enjoying the superb performance of your HALLICRAFTERS that has ALL the newest electronic features!

TRADE BY MAIL AT RADIO SHACK!

There is no other concern that has a larger stock of ham equipment than Radio Shack. With our tremendous mail order facilities our store is near to you as your door. You can trade with utmost confidence at Radio Shack, a favorite source of equipment for hams since 1923. Everything sold with a MONEY-BACK GUARANTEE!

OUR LARGE AMATEUR DEPARTMENT HAS OPENINGS FOR HAMS THAT HAVE SALES ABILITY. WRITE IN.

RADIO SHACK CORPORATION

STORES
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NEW MAIL ORDER HDQTRS.

Radio Shack's new mail order headquarters and electronic shopping center covers 80,000 square feet. An entirely new system fills your order with the greatest speed in the industry!

FILL IN AND SEND TODAY!

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730 Commonwealth Ave., Boston 17, Mass.
Please quote me an allowance on my present equipment:

Model _____

I would like to trade for the following Hallicrafters

Model _____

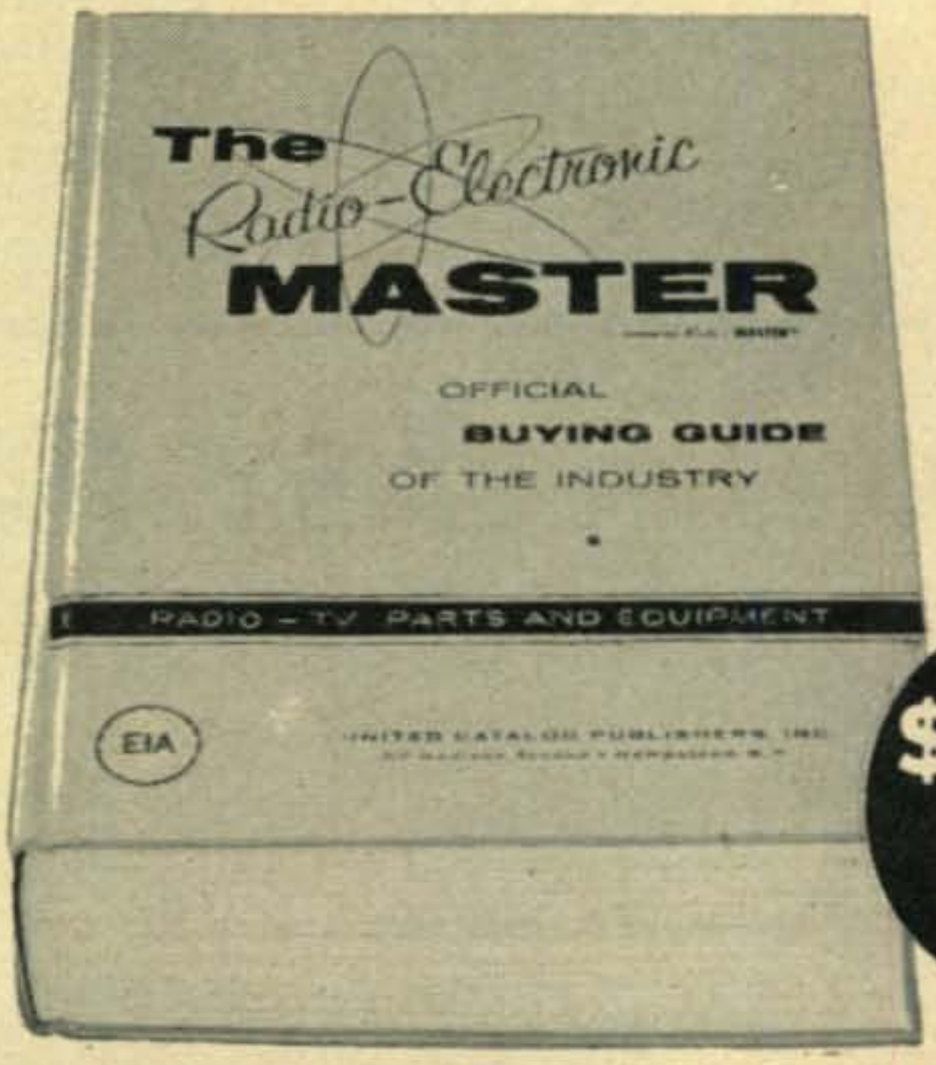
Name _____

Address _____

City _____ Zone _____ State _____

For further information, check number 36 on page 142.

NOW AVAILABLE
at your local distributor



1,536 pages

$3.50 At parts distributors
$4.50 in Canada

1959 RADIO-ELECTRONIC MASTER

WORLD'S LARGEST BUYING GUIDE OF TV-RADIO-ELECTRONIC-AUDIO PRODUCTS

1536 pages of complete descriptions, specs, illustrations, prices for **150,000** items including all latest products of **350** manufacturers systematically arranged in **18** product sections for easy reference

SAVES TIME AND MONEY FOR AMATEURS AND EXPERIMENTERS

When you buy, repair or assemble, you're sure to get the right products to do the job because you are shopping in the electronic supermarket – The MASTER. Shows complete descriptions, specs, illustrations and prices of receivers, transmitters, hi-fi components, cabinets, racks and many hard-to-locate items not usually found in smaller incomplete catalogs. All latest SSB and mobile ham gear included.

No matter what ham gear or component you require . . .

YOU'LL FIND IT FASTER IN THE '59 MASTER

At your local parts distributor, or write for list.

FREE...*Valuable 24-page panel lamp chart at your MASTER distributor, or write direct enclosing 10¢ for handling.*

The Radio-Electronic Master • 60B Madison Avenue, Hempstead, N. Y.

☐ *Here's my $3.50. Please rush me the 1959 MASTER, Official Buying Guide of the Electronic Parts and Equipment Industry*

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Name.....

Address.....

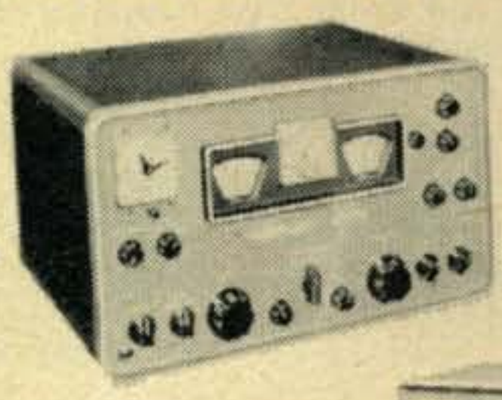
City.....**Zone**.....**State**.....

Have YOU tried out the new

HAMMARLUND

HQ-145?

...and their



HQ-170 ...and all of the other fine receivers they make?

HQ-100

HQ-110

HQ-160

If not, it will certainly pay you to come to "Ham Headquarters, USA" ...and see and hear for yourself all the newest and the best of Amateur equipment.

(Visiting Hams, DX and local, keep telling us it is by far the greatest show on earth — a veritable Ham Paradise!)

Come, see and get all the facts, first-hand, before investing. Learn the many good reasons why more hams everywhere prefer doing business with me. See why Harrison can give you a better deal than any mail-order or discount-house!

Bring along any old brand gear — for my highest allowance. I guarantee you'll return home a most happy Ham!

If you just can't visit us, you can still enjoy the personal attention of our experienced, helpful Hams, our easy terms, prompt delivery from our huge stock of latest models, and our "tops-'em-all" trade deals.

For quickest action, write to me, now, telling me all about what you would like to do. Thank you!

The world-famous HARRISON TRADE-IN CENTER

is the greatest! Come, pick **your** choice from the hundreds of like-new trade-ins, all money-saving bargain price tagged! Easy terms, trades.

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[LONG ISLAND—144-24 HILLSIDE, JAMAICA]

Coming! The new

HARRISON AMATEUR EQUIPMENT CATALOG

illustrating all the latest receivers, transmitters, antennas, towers, accessories, etc.

. . . everything for the Ham!

ASK FOR YOUR FREE COPY

For further information, check number 31 on page 142.

ANNOUNCEMENTS [*from page 104*]

three categories. Category one will consist of a CW receiving contest and is open to anyone who can copy International Morse Code at twenty-five words per minute. The Secretary of Defense will attest on a certificate of merit to the code copying proficiency of any listener who submits a perfect copy.

Category two consists of a radioteletypewriter (RATT) test of receiving proficiency, and is open to any amateur station capable of receiving radio teletypewriter transmissions. The message sent will be a special Armed Forces Day message and a certificate of merit signed by the Secretary of Defense will be awarded to participants who submit perfect copies. This is a new award and will be similar to the CW certificate award.

Messages copied in the contest should be submitted to: Armed Forces Day Contest, Room BE1000, the Pentagon, Washington 25, D. C.

Category three, is the highlight of the Armed Forces Day amateur radio activities, consisting of military-to-amateur transmitting and receiving contacts, for all holders of valid U.S. amateur radio licenses. Headquarters stations of the Army, Navy, and Air Force in Washington, D. C. will establish radio contact with amateur stations and will acknowledge these contacts with a new type vari-colored QSL card. Contact may be made with the Headquarters station of each of the three services providing an opportunity to qualify for the three different QSL cards.

The Night Amateur Radio Did Not Fail

It was February 1, 1959. It could have been any night of the year, but most especially this night. For over thirteen months the men stationed at Ellsworth Station, in the Antarctic have looked forward to the day the ship would arrive to take them home. At 3 am EST on February 1st the ship finally arrived. All amateurs who listen on 15 and 20 meters know the many delays. The 10 days stuck in the ice near Cape Norvegia and again for four days near the coast of Penck Glacier. The wind finally became favorable and the ice moved out enough to get to Ellsworth. The many tons of supplies were unloaded. The outgoing cargo loaded, and the attempt made to get away before the wind changed, and the ship would be captured by the ice for maybe several days or possibly another year. The men of the USS Edisto, want to send hamgrams home and try to run phone patches. KC4USW has operated for over one year and he knows who he has to operate with. There is no ceremony. The stations that move in too close and interfere are asked to move. There are many who would like to help but they patiently stand by and everyone cooperates beyond all expectations. Fifteen meters was used from 6 *pm*, EST to 1 *am*. The last phone patch on 15 meters was just before 1 *am*, and then K2KGJ took over on 20 meters for a few more patches and many hamgrams. When I looked over the 15 meter band after the last phone patch there was not one station beween 21400 and 21450, and yet there were many listening ready to help; W8GDB, WØCO, W4's and W5's and many, many more amateurs must be thanked for their help. When the sun came up February 2nd it was found that KC4USW had sent hamgrams for everyone and phone patches for all who wanted them. Almost two hundred hamgrams and a few more than fifty phone patches. This was the biggest traffic night for KC4USW. This was the best night for KC4USW. This was the last night for KC4USW.

Jack Rodebaugh, W8LIO
Dorset, Ohio

VHF [*from page 74*]

W7DVB, 3131 W. Bethany Home Rd., Phoenix, Arizona.

"I haven't been on the air since May '58 and plan on going back on again but this time on two meters. No more low frequencies for

NEW SURPLUS

4X150A TUBES

AMPEREX EIMAC & RCA

MFD. TO MEET JAN SPECS **$6.00** Each P. Pd.

H & C SALES CO.

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CITIZEN BAND CRYSTALS

Channels 1 to 22 inc. for Class D + or — .005%

UNCONDITIONAL GUARANTEE
FAST 24 HOUR SERVICE
SPECIAL $2.50 EACH WITH THIS AD

HC6/U or FT 243, Pins Optional, Hermetic Seals.
Write for quantity discounts

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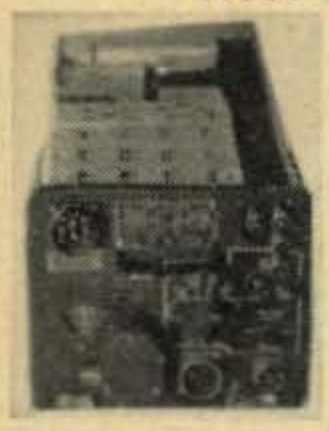
FOR AN EYE OPENING ANNOUNCEMENT SEE PAGE 138

NAVY ARB ALL BAND RECEIVER



NAVY ARB/CRV 46151—190 to 9050 KC—Four Band, 6 Tube Superhet—Local & remote tuning and band change; illuminated dial, sharp & broad tuning; AVC, CW, provisions for operation of DU-1 Loop. Complete with Tubes: 1/12SA7, 1/12A6, 4/12SF7, & 24 Volt Dynamotor. Size: 8 x 7 x 16". **$18.95**
Used: .....

ABOVE—Converted to 12 Volt, with Dynamotor (No electric band change) $24.95

Conversion for 115 V 60 cycle, with Spin Dial, Phone Jack, CW, Volume Control, On & Off Switch (All on front panel)—KIT of Parts with instructions $10.00

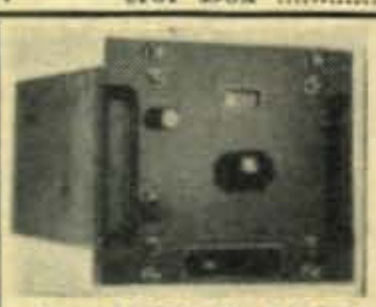
Conversion—as Above—for 12 Volt DC—KIT of Parts, with Dynamotor $10.00

Remote Control Box $2.00
Remote Control Head $2.00
Remote Control Shaft $1.50
Tuning Knob f/large splined shaft: $1

T-Shaft Adapter f/remote and local tuning $1.50
PLUGS only—for Receiver or Control Box ..... Each: $1.00

HIGH FREQUENCY RECEIVER

Used for Remote Control in the 65.9 to 92.8 MC Band. Variable Condenser for tuning 4 pre-set Channels. Complete with Tubes: 6/6AG5, 3/6J6, 1/6AL5; 24 VDC Dynamotor—output 250 VDC 60 MA. Relays, Band Filter, etc. Size: 10 x 12 x 6". Used: $6.95—Unused: $8.95.



UHF CONVERTER

Western Electric FM Converter — Plug in unit — covers Freq. 100 to 225 MC with 30 MC resultant freq.; & tunable dial, AFC + or — control, using 1/6J4 & 1/5670 tubes. Shielded in cast aluminum. Size: 7¼ x 6½ x 9½". AM-913/TRC ..... New: $34.95

CATALOG #F-59—Free copy will be sent you on request! Write today!

COLLINS ART-13 TRANSMITTER.. $49.50

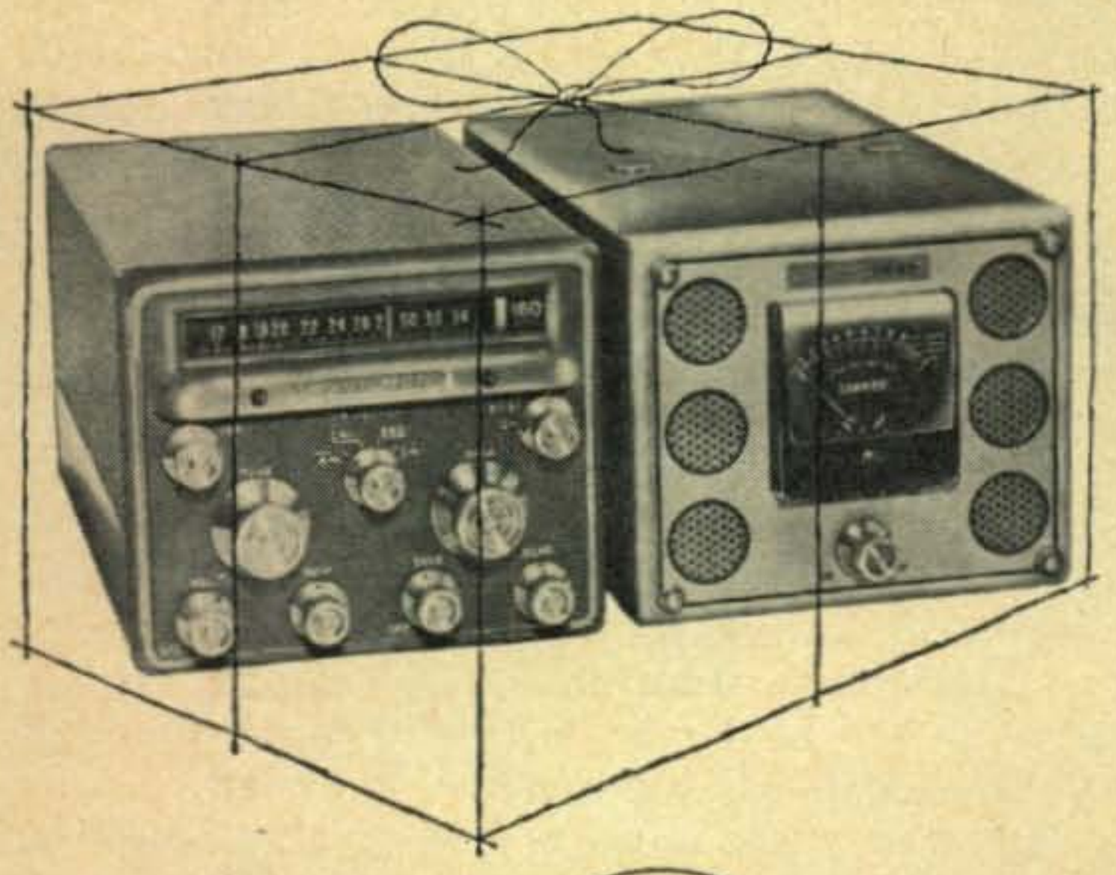
2 to 18.1 MC—100 WATT—PHONE—CW—MCW— The most desired Set on the surplus market—Easily converted to 10 Meters (See Surplus Conversion Manual No. 2: $2.50). Automatic Tuning for selection of 11 Channels in the Freq. Range. Tube Line-Up: 1/837, 1/813, 2/1625, 1/12SJ7, 2/6V6, 2/811, 2/12SL7, 1/12SA7, AC Power Supply requirements: 28 VDC/10 A, 400 VDC/225 MA & 1250 VDC/250 MA. Size: 23⅝"x16"x11¾" Wt.: 70 lbs. Price—Used $49.50
Price—Same as above—except, Less Tubes $30.00
DY-12/ART-13 24 V Dyn. w/filter & relays U:.... 12.95

RECEIVERS: BC-453 — BC-454 — BC-455 — BC-1206 — BC-229 — BC-312 — BC-348 — and many others in stock! Full selection in Catalog F-59!

ADDRESS DEPT. CQ • MINIMUM ORDER $5.00 • PRICES F.O.B. LIMA, OHIO • 25% ON C.O.D. ORDERS

FAIR RADIO SALES • • 132 SOUTH MAIN ST. LIMA, OHIO

For further information, check number 33 on page 142.



Packaged Precision!

...THE AMAZING KE-93

The KE-93 is a precision 12-tube all-band communications receiver for fixed station **or** mobile and portable use. A miracle of engineering and "packaging," the KE-93 features sensitivity and stability usually found only in large table-top receivers. AM, SSB and CW on all bands, 10 thru 160 meters, plus broadcast band!

Write today for brochure and complete specifications.

AUTOMATION ELECTRONICS, INC.

1500 WEST VERDUGO AVENUE • BURBANK, CALIFORNIA

For further information, check number 34 on page 142.

VHF [*from page 110*]

this boy. I will be in New Jersey this summer and from what I hear the activity is pretty good back there. I would like to hear from some of the boys in the Red Bank-Asbury Park area concerning the activity, nets etc. I would appreciate suggestions on a ten to twenty-five watt two meter transmitter. I plan on using a crystal converter in front of an SX-99 and a quad yagi." *Moving east, eh, Dave? Good luck and hope you get lots of answers to the plea.*

Long Island, New York Frank Carfano, contest winner, K2VIX has some interesting information: "Wanted to let you know that six meter side-band is growing fast. A new net called the 'Eastern Seaboard Side Band Net' meets on Sunday morning at 1100 on 50.287. As high as fifteen SSB stations have checked in from New York, New Jersey, Pennsylvania and Connecticut. W2SZE is net control. If anyone wants to work a sideband station, look around 50.287, always some activity in the evenings. I am running 900 watts PEP with a pair of 4X250B's." *Congratulations to the SSB gang on six and hope to join you in the not too distant future.*

Novelty, Ohio Paul (K8III) comes through with the dope about his rig, location etc.

"At present the rig here is a Gonset Communicator into a three element beam thirty-five feet high. My best ground wave is to Chicago, Illinois and my best skip DX is to K6ALI in Santa Rosa, California. The elevation here is about 1110 feet and we are in Geauga County (*Our own old stamping grounds*) which is line of sight with Cleveland about twenty miles away."

"In the three months I have been on six I have worked 168 stations with 91 confirmed. Reliable working range with the Gonset seems to be about 90 miles. I have a 65 foot tower to go up when the spring thaw comes and also a four element beam on a 13 foot boom. I'll be running 180 watts on cw and 125 watts on phone by the first of March."

"Receiving set up is a Filter-King converter into an S-85 receiver. I'd like skeds on any band, 40 through 2 with Oklahoma." *See you on six soon Paul, probably when you get that tower and beam up.*

Ft. Lauderdale, Florida Arch Adams (K4QQE), O.M. of Fran, K4PPX came through like a good O.M., with news and views of his XYL. "Just a line to let you know that K4PPX, Fran, is still alive and hamming on 50 *mc*. She even kept up her activity from her hospital bed shortly after the arrival of her new junior operator, Gregory, 8 pounds, 10 ounces, and fully modulated."

"Through the good offices of her doctor, W4CSV, she was permitted to have a Gonny Box and Halo at her bedside, allowing her to

keep in touch with her home station, thus not depriving her other son, Ricky, of his mother's 'good-night.' Fran was able to make many local and inter-county contacts, but was unable to make any to the west coast during the opening of January 10, 11th."

"So far Fran has confirmed 31 states, plus Canada, Puerto Rico, Norway and Sweden. She is also the proud possessor of Certificate #64 of the 50 mc 'Century Club'." *Thanks Arch for letting us know and congratulations to both you and Fran on the new junior operator. (What's his call?). Next letter let us know what you're doing too.*

73, Sam, W1FZJ

DX [*from page 83*]

G3IMV John Hunter
PAØLOU Louis Van De Nadort
PY3QX Elon Castro
OH3RS Paavo Taimela
W10TX Joseph A. Tedder
OE5JK Dr. H. Kerbler DM
PAØPN P. Neve
F9RS Charles Saniez
DL7CW Karl B. Schwarting
KL7PI Joe Paquette
WØFUH Leonard H. Guldman
W2HO Willibald Vollkommer
OH5RH Captain Erkki Kaskenpaa
W1AZY Frederic W. Ashworth
K6RWO W. E. Leeder
VE7SB Allen H. N. Koo
W7AUS John Belongia
W8QFB Bert M. Moroz
W2AEB Irving C. Grabe
K2OEA P. J. Danthony
WØMLY G. R. McKercher
W2KED Frederick W. Roden
K4BVQ Frank Dowd, Jr.
W2BOK Samuel Rubinstein
K2UPD Peter Kragh
CN8DJ Jean Bertrand
OD5LX T. S. Truszkowski
WØFNN William C. Lemons
W9RKP Russell E. Burss
W3LMM William J. Taylor
W2FBS Sam Johnson
W3RSR William Bell
W2FXN Robert Scully

WAZ PHONE:

W2BXA Benjamin H. Stevenson
W2DEC Urban A. LeJeune

W6CZQ with an AC4YN card and W2BXA with a C8YR card are the only two applications approved the past two months who did not have a JT1AA or JT1YL for Zone 23. They certainly make life difficult for me, hi.

Last Minute Items—W4KVX and Company arrived on KS4BB, Serrana Banks, almost on schedule and did a land office business. The Island didn't want to be found for awhile.—W6PHF has been licensed as FO8AW on Tahiti. QSL to his home QTH.—HB9FU and UQ2AN worked the very difficult WV2 prefix thanks to WV2BWC.—W8CED nominated DU7SV, BV1USB, ZC5AL, and CE3AG/CEØZA as the QSL'ers of the month.—LUØAAF/MM is K4GKN.—W4KAC, Jim, is heading for SVØ and hopes to be active from Crete.—KV4BO is ex W6NPO.—DL4MG is ex W5WW.—Thanks to W6KG for the last four items. Some good ones at W6KG during the DX contest; 3.5mc. KV4AA, UAØLC, FO8AC. 7mc. DU7SV, UAØLC, ZS6IF. 14mc. UN1AH, UG6AG, UL7GQ, 21mc. EA9AP, SM5WN/LA/P, BV1USB. 28mc. F9QV/FC, ZK1BS.—Many thanks, to all who sent in information for this month's column, and especially to my XYL Helen who puts up with this time consuming hobby and does my typing to boot. CU next month. 73 Urb.

Again in this issue a new section appears in CQ where distributors may advertise trade-in and reconditioned equipment. This section, called the TRADING POST, will be confined only to legitimate ham distributors as a means of announcing the many excellent used items available.

THE HAM SHOP

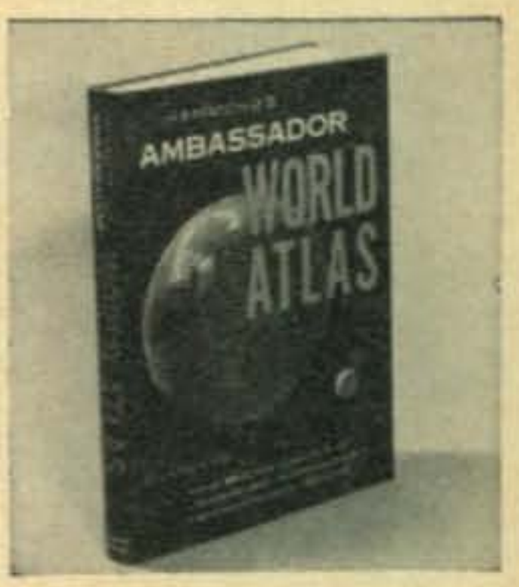
GLOBE

We can't see how you can get along without this beautiful 19-inch, 8 color World Globe. It can be yours, including a one-year subscription to CQ for: lighted model W/bulb $24.95; unlighted model $19.95.

ATLAS

Come on, get with it. Don't pull a blank when some one asks you for the capital of Honduras. For only $12.50 you can own 7 lbs. of full-color maps and a complete gazeteer. Send for this Hammond Atlas. PLUS a one year subscription to CQ.

only $12.50



COMMAND SETS

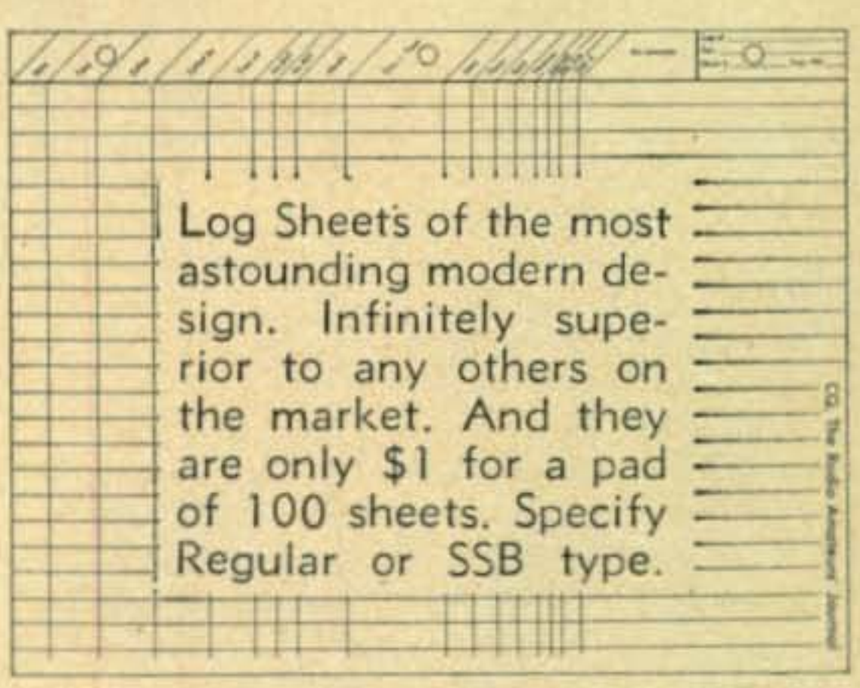
This IS a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous amazing terrific pages for only $1.50 PPD.

MOBILE HANDBOOK

This new Mobile Handbook by Bill Orr, W6SAI, has been getting raves from all of the experienced mobile operators. There is all sorts of information in here that cannot be found anywhere else. This is NOT a collection of reprints. $2.95 postpaid.

CODE RECORD

Learning code is a snap with this record. Speeds from 3 to 16 WPM, depending upon turntable speed. This 12" LP record has on it all you need to learn the code for both the Novice and General license. $3.50 each.

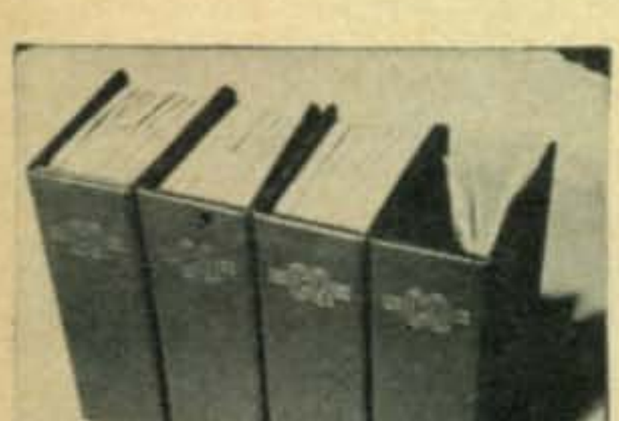


HAM'S INTERPRETER

Now you can talk in broken French, Spanish, Italian, German, Swedish and Finnish. This handy little book gives all the popular ham conversation in seven languages, including letters and numbers. Only $1.50 postpaid.

TVI HANDBOOK

WIDBM's newly written TVI book (no reprints) covers all aspects of curing TVI from both the Ham's viewpoint and that of the TV viewer or the TV serviceman. It includes 2 and 6 meter TVI as well as Industrial, Medical and Utility TVI. Profusely illustrated with diagrams, photos, charts, tables and FCC regulations pertaining to radio and television interference. Price: $1.75 postpaid, USA, $2.00 Foreign.



BINDER

There is no other good way to keep your back issues. Make 'em neat. We supply the binder, with the year embossed in gold, not merely a sticker which will come off later. Specify what year you want stamped on your binder. $3.50 each

BOUND VOLUME

By far the handiest way to keep your library. Why not go first class? This impressive volume is only $10.00. We only made a few of them this year, so don't expect to get one later. 1958 still available, released Jan. 1st.

CQ ANTHOLOGY

Down through the years CQ has had the honor of being there first with just about every major discovery in the amateur radio field. Unfortunately most amateurs do not have a good file of back issues of CQ to fall back on when they are interested in building up something or in improving their equipment. So we've looked back through the years 1945-1952 and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out and are unavailable. The price is a paltry $2.00.

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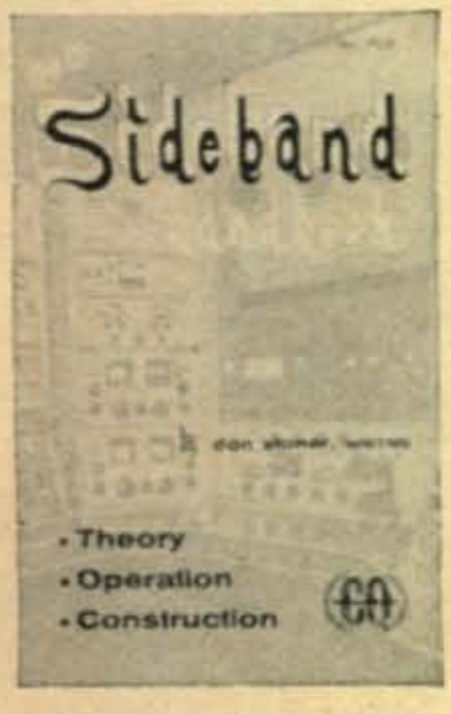

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SX 101 [*from page 55*]

its oscillator filament always on came into being. Now here was a perfect receiver—all of the qualities of the original SX101 with no warm up drift. One can just imagine the head scratching in the Hallicrafter laboratories when the order came through to "make it better." Where to improve? What can be better?

A complete overview of the situation showed that the 160 meter band had fallen into disuse because of the QRM from Loran. In fact, after the cut in this band of frequencies by the FCC about eight months ago, the situation became even worse and one had to search for signals on 160. Why not use this band position to tune a band of frequencies that would accommodate the vhf boys? No sooner said than done and what was formerly the 160 meter band was changed to tune from 30.5 to 34.5 to be used with many of the Xtal converters which as a tunable *if* with calibrations covering the 6 and 2 meter bands. The Mark III A makes an excellent *vhf* receiver. It is difficult to imagine any further improvement to this versatile Mark IIIA which now has everything. Imagine the delight of those rugged individuals who have been on SSB on six and two meters! We can look forward to seeing more of this type activity with such a fine receiver now available.

In case you haven't been able to get around to see an SX101 Mark IIIA or any of the SX101's for that matter, a quick rundown may explain why this receiver has become so popular. Stability wise, three factors contribute to its fine performance in this area. First one has only to try to lift the receiver to realize that its heavy construction—like the proverbial battleship—is not fiction. Second, a look into the oscillator compartment with its heavy ceramic coil forms and temperature compensating capacitors proves that good engineering practice has been used here. Third, the crystal oscillator in the second conversion holds any instability to an absolute minimum. Yes, the fifty pound lead weight test was tried on the table. No amount of banging on the table could budge this receiver even on 28 *mc*.

The block diagram (fig. 1) reveals several important features. The SX101 Mark IIIA is a dual conversion receiver on *all* bands. The 1650 *kc if* stage, V4, contributes to the image rejection while the 50 *kc*, *if*, V5, V13 and V6 gives that "razor-sharp" selectivity so necessary in today's hambands. This selectivity is controllable in five steps from 5 *kc* to 500 cycles from the front panel and the selectivity curves shown in fig. 2 could not have been more accurate had they been drawn individually and by hand.

The notch filter, so necessary in eliminating heterodynes, is prominent in its performance in the SX101 Mark IIIA. A minimum of 50 *db* is available as a notch which can be moved across the pass band of the *if*; and it really works just as the curves say it should!

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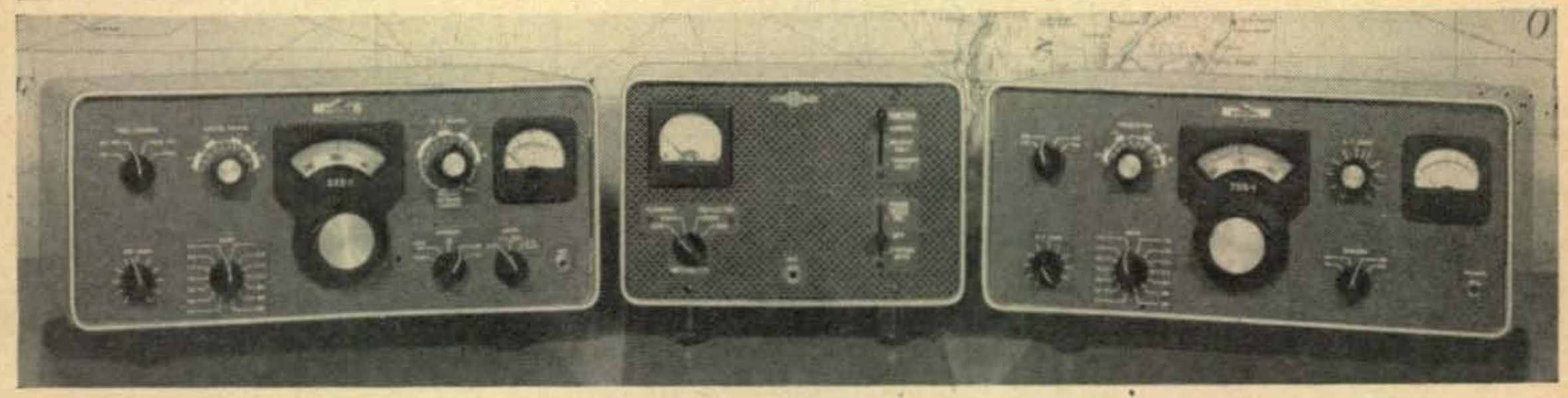

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SX101 [*from page 100*]

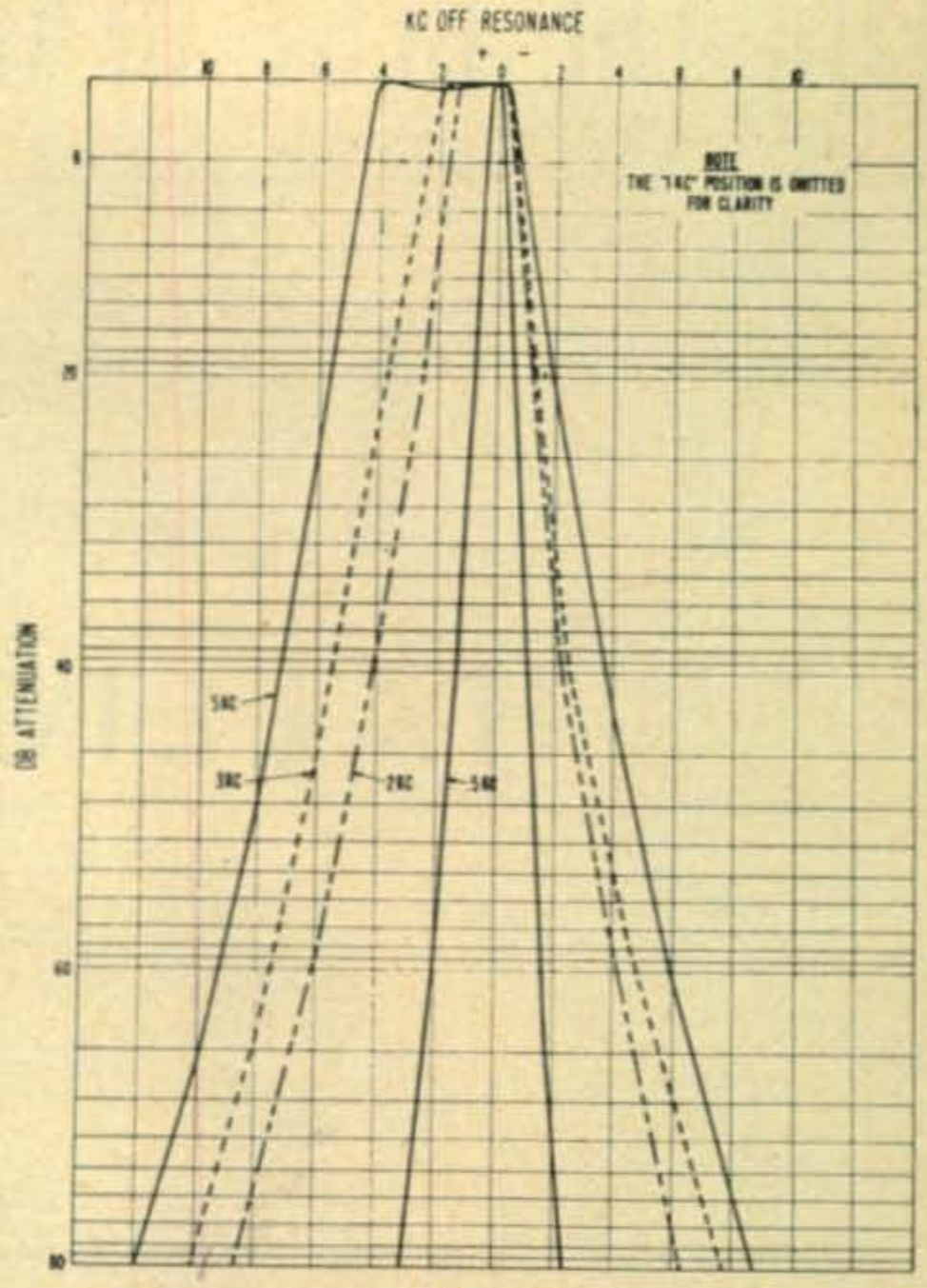

Fig. 2—IF curves available by front panel switch.

Here is a superb receiver with outstanding performance. SSB tunes like AM, sideband rejection is excellent and one can listen to DSB and understand it. The Mark IIIA is a fine CW receiver also. Listening around the CW bands proved to be a relaxation rather than a a chorus of alleycats vying in competition as to who could squawk the loudest. For the AM'er, such selectivity and stability is a rare treat afforded by very few receivers previous to the Mark IIIA. Now, with *vhf* added—need we go further?

Adolph F. Suchy W2KHE

PROP. [*from page 91*]

of 154 centered on May, 1959.

ZL—W 160-Meter Openings

In the February forecast, mention was made that beginning in late February, and lasting through March and April, propagation conditions between the U. S. A. and Australasia would improve considerably.

In the March column this subject was discussed further, and it was pointed out that during the *equinoctial* period propagation conditions between the northern and southern hemisphere were at their best. Good openings were forecast for these paths on most bands, *including 160-meters.*

Word has just been received from the Dean of the *160- meter* band, Stewart Perry, W1BB,

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For further information, check number 42 on page 142.

that the predicted openings for 160-*meters* have in fact taken place. Here is the story directly from W1BB:

> It started in April, 1958 when after a QSO on 20 meters, both Alex, W6KIP and Mick, ZL3RB, just for a "look-see" decided to give it a try on 160-meters. The 1995 *kc* signal from W6KIP in Los Angeles was heard clearly nearly 7,000 miles away at the Canterbury, New Zealand, QTH of ZL3RB, but not vice-versa. Thus began a weekly 160 meter schedule, held faithfully every Tuesday morning at 0800 GMT through the summer of 1958, and continuing through this year. Necessary coordination for the schedules were conducted on 20-meters. All during this time (with but one exception) W6KIP's 160 meter signals were always heard by Mick ranging between 229 and 579, but ZL3RB's 1899 *kc* signals were never heard in Los Angeles. The fact that Mick's signals were not heard in Los Angeles is probably explained by the high noise level at W6KIP, which averages S6 to S7. "On the morning of January 13th 1959, W6KIP managed a solid 90 minute cross-band QSO with Mick." W6KIP was on 160-meter cw while ZL3RB was on 20-meter phone. Not a single word was missed, in fact Mick rebroadcast W6KIP's signals back to him on 20-meters with absolute clarity. Amazed on the remarkable consistency of the path from W6 to ZL3, both Mick and Alex decided to continue the schedules with the hope that sooner or later the path would open in both directions.
>
> On the morning of February 16th, 1959, almost a year of patient scheduling was rewarded when *two-way* 160 meter cw contact was established for nearly 20 minutes. W6KIP's report was 559 at Canterbury, while ZL3RB was between a 239 and 339 at Los Angeles. Mick also reported hearing several other W6 phone stations, including W6QUV. With the ice finally broken, more, and further distant openings have since followed. At 0900 GMT on March 1st, ZL3RB QSO'd W8ANO at Grafton, Ohio, nearly 8,500 miles distant. At 0900 GMT on March 3rd, W1BB at Winthrop, Mass. pulled ZL3RB out of the noise for a two way QSO over a path almost 9,500 miles long.
>
> Accounting no small part of these remarkable results is Mick himself, his QTH, and his rig. Located in the country on a farming ranch, miles from any man-made interference, the location is superbly quiet. Added to this, his 5 element Vee antenna, 560 feet on a leg is really something! The beam combination is selected from within the shack by switching

between the five-wire feed lines, giving almost any desired directional characteristics. He often brings in American broadcast stations, or WWV on 2,500 *kc* like locals. The receiver at ZL3RB is a BC-342 with a Q 5'er. The transmitter is a VFO/6146/813, with four 1625's in PP parallel being used as modulators (see photo).

W6KIP, of 'Death-Valley' 160-meter fame, now living in Los Angeles, uses a half-wave sloping antenna 50 feet above ground at the high end, and 40 feet above ground at the low end. The antenna slopes towards the south, with considerable directivity towards New Zealand. Alex's receiver is a BC-348. His transmitter is a Viking I running about 150 watts."

W1BB further informs us that both Alex and Mick plan to continue their 160 meter schedules in order to obtain additional data concerning 160 meter propagation conditions throughout the sunspot cycle. We are certainly indebted to both of them for their patience over the past year. Our congratulations go out to W6KIP and ZL3RB for a job well done in the true scientific spirit that has made amateur radio famous.

Daylight Saving Time

Many communities throughout the United States returned to Daylight Saving Time during late April. Since the *CQ Propagation Charts* are based on Standard Time, make sure to *add* one hour to them if you live in an area now on Daylight Saving Time.

73, George, W3ASK

YL [*from page 93*]

when she was 11. Her father is W8PFL, her mother is ex-WN8WUE (now preparing for General); her older brother is W8PGA and her twin sister, Carolyn, is ex-KN8CHX. A younger brother and sister are preparing for Novice exams. But this isn't all! Marolyn's grandfather is WØFXV and an uncle is WØKCP, both in Minn., and Marolyn keeps daily skeds with them on 20. W8WUB uses a homebuilt all-band 500-watt rig her brother W8PGA built for her. She has an SX-100, with a cubical quad on 20 and dipole antennas on the other bands. W8WUB holds WAS, YLCC, Worked West Va., and has 60 countries toward DXCC. Her other hobby is corresponding with boys all over the world whom she has met via Ham radio.

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"CQ YL" contains 169 pages, over 500 photos, covering all phases of YL participation in Ham radio. It has been brought up to date with a 2-page addendum. (If you already have the book, send a couple of 4c stamps for the additional pages.) To celebrate the first anniversary of its publication, "CQ YL" is now priced at only $3 per copy. Order from W5RZJ (QTH at head of column). Postage free, and the book will be autographed if you wish.

33, Louisa, W5RZJ

HAM CLINIC [*from page 97*]

it in the '30s. It isn't *ordinarily* used in transmission work. However, modified DDs (with sharper frequency characteristics) can be made to work as transmitting antennas. Those of you interested in this old reliable for SW listening are invited to request more information from HAM CLINIC. Be sure to state the "general" frequency coverage desired.

NC-183D

"What causes S meter readings in my NC 183D to vary as much as 10 to 15 *db* on an unvarying signal for long periods of time?"

First check the 6BE6 converter tube; bet a new tube helps. I hope you mean by an "unvarying signal", the signal from a well monitored stable signal generator. I once owned a 183 which did the same thing; a new tube cured the trouble.

Refrigerator Noise

"I'm stumped. I'm nearly nuts from trying to eliminate a crackling and popping noise coming from my refrigerator. This noise is picked up on all bands of my receiver (an SX 71). I tried a brute force filter and it helped a little but didn't take out all of the noise. Any ideas?"

Yes. Sounds like belt static, a bad relay or electrical thermostat connection. First, ground the refrigerator well. This means the motor shell too. Second, try some graphite powder on the belt. If these two measures don't work then call a refrigerator serviceman to check the starting relay and other electrical controls. One case of this sort was solved by attaching a soft brass brush to the frame (grounded) so that it would touch the belt; accumulated charges were drained off to ground. However, the brute force filter will not (usually) take out friction caused static. You may have a bad relay contact which is sometimes hard to track down be-

cause most units are sealed. Let us know how you make out.

HF Oscillator

"I'm building a little superhet (all bands). What's your recommendation for a good *hf* oscillator tube in spite of all we hear?"

A 6C4.

Ham Spirit

Colonel Edward H. Barr of 216 Seford Drive, San Antonio 9, Texas is a retired Army Officer and one of the finest hams I know. He has the call, W5GUR. He happens to be a guy who likes to construct electronic equipment. So far he has built and is using 13 pieces of kit equipment. Now he comes along and offers to build *one* piece of electronic equipment *per month* for some disabled person. This is what I call the REAL HAM SPIRIT! If you are disabled or know of someone else who is and interested in having a kit constructed get in touch with Ed at his home address. HAM CLINIC says a great BIG thank you Ed!

Boo-Boo

Writers for CQ cannot control the expert touch of the printer or draftsman. Mistakes do pop up. For example, the attenuation for RG59U coax was given for a "foot" instead of 100 feet in the February issue of CQ. A guy would have a heck of a time getting out with that much attenuation!

Old Stuff

We *still* receive letters inquiring about *real* old equipment. Fellows and gals, even though we know we more than likely will not come up with the info you seek, we still try. For example: who has a circuit diagram of a Pierson KP 81 receiver? Anyone help out with a diagram on an FB7? How about a diagram for a Meissner receiver? These are just a few! Please let us know whom you have contacted in an attempt to get the information—there's little use of duplicating effort.

Thirty

Since operating in Europe, I have been very much impressed by the enthusiasm and helpfulness often exhibited especially by British, French and German hams. Truly, it is wonderful to find hams 6000 miles away from home who speak the same "language."

I would like to make a plea at this time to you hams in the United States who have extra copies of CQ or do not maintain a CQ file of old issues. Foreign hams would like to have those copies (especially the British who gave us the English language).

Look in the call book and pick out a "G," "F," or "DL" call and send a copy. If by a long chance your recipient subscribes to CQ we know he'll pass on the extra copy.

Let's do a little "cementing" of International

relations on our own—we hams. For a few cents postage and a discarded issue of CQ we can do just that.

Now back home for a second. If any of you who read this live near Merlyn Kresge, W6QXJ, Box 465 Chester, Calif. and have extra copies of any of your radio mags, how about sending them to him. Merlyn is an amputee; I am sure he would appreciate the gesture very much. Remember: we hams regardless of who we are MUST stick together! What we do for one another is NEVER, NEVER charity—it is the REAL HAM SPIRIT!

73, Chuck, F7FE/W6QLV.

SURPLUS [*from page 98*]

stock clip normally holds the test probe when not in use. The receiver is aligned by inserting a crystal in the proper socket and with the volume control fully clockwise the meter should read zero with the probe in pin 1. A reading of five divisions or more means a bad crystal or tube (V-8). Now insert the plug into pin 2 and tune A-1 (B-1) for minimum. Now insert the probe into pin 8 and tune the receiver mixer A-2 (B-2) for maximum headset noise. The meter should dip slightly at this setting. Now tune A-3 (B-3) for maximum noise and a meter dip, and the same for A-7 (B-7). You may have to tune up the stages slightly again for best results.

Transmitter

To set up the transmitter it is necessary to calibrate the meter. You'll have to have a good battery (BA-41). Ground the probe and note the meter reading. Now, with the probe held free again note the meter reading. Reduce the volume control settings until the difference between the two readings is exactly 4½ divisions and then keep the setting fixed for the remainder of the alignment.

Remove V-5 (first *rf* amplifier). Insert the probe in pin 3 and slowly tune A-4 (B-4). More than one dip will be found, but the correct one gives the biggest meter deflection but remains close to the original setting. This adjustment is critical. When completed replace the tube (V-5).

Press the mike switch and note the reading with the probe hold free. Now insert the probe into pin 4 of the metering socket and carefully and slowly make a slight readjustment of A-4 (B-4) in the direction that brings the meter exactly one division less than it was when the probe was free. Listening in the headset will allow you to hear a rushing noise if the adjustment A-4 (B-4) has been moved too far. If so go back and remove V-5 and adjust A-4 (B-4) again since you got on the wrong dip. If your voice can be heard in the headset when speaking in the mike you know you are right. Now

insert the probe in pin 5, press the mike switch and tune A-5 (B-5) for minimum. Replace the probe in the Fahnstock clip, and set the OFF-ALIGN switch to OFF. Set SW-1 to on. Tune A-6 (B-6) to maximum on the panel meter. For this adjustment don't press the mike button

Table I

Approximate Trimmer Settings

Channel	A1-B1 Receiver oscillator	A2-B2 Mixer	A3-B3 R-f grid	A4-B4 Transmitter oscillator	A5-B5 Buffer	A6-B6 Power amplifier	A7-B7 P-a plate
270	0.0	1.0	0.8	0.2	0.4	0.0	1.0
280	0.6	1.0	1.4	1.1	1.2	0.7	1.8
290	1.4	2.4	2.0	1.7	1.7	1.3	2.4
300	2.2	3.0	2.4	2.3	2.2	1.8	2.8
310	2.9	3.6	3.1	2.8	2.7	2.3	3.1
320	3.6	4.1	3.8	3.5	3.3	3.0	3.8
330	4.0	4.2	4.2	3.9	3.7	3.4	3.9
340	4.1	4.6	4.5	4.2	3.9	3.7	4.0
350	4.6	5.0	4.7	4.5	4.0	3.9	4.1
360	4.9	5.2	4.8	4.8	4.5	4.2	4.2
370	5.4	5.5	5.2	5.2	4.9	4.6	4.7
380	5.6	5.6	5.3	5.5	5.0	4.8	4.8
389	5.8	5.8	5.4	5.9	5.1	5.0	5.0

Note. A red dot on each trimmer shaft indicates the side of the slot that should be toward the dial card. The width of the slot is about one-tenth division. In case the red dot has worn off, its proper location can be found by meshing the capacitor fully. The end of the slot near the 0 of the 0-to-6 scale is the end that should carry the red dot.

Table II

Readings on Panel Meter
(Transmit position)

Switch position	Correct reading	Circuit checked
Fil.	2 or more	Rec fil voltage
Plate	2 or more	Trans B voltage
Check	1.5 or more	P-a grid current
Oper.	Less than 1[1]	P-a plate current
Oper.	1.8 to 3[2]	P-a plate current

[1] Antenna disconnected.
[2] Antenna connected.

Table III

Pin No.	Voltage
1	Receiver oscillator grid.
2	Receiver converter injection grid.
3	Receiver limiter grid.
4	Reactance modulator grid (d-c amplifier output).
5	Transmitter buffer grid.
6	Transmitter oscillator grid.
7	Receiver discriminator output.
8	Output of one discriminator diode (Tube JAN-1LH4, VT-177).

until you are ready to make the adjustment fast . . . so as to prevent damage to the final tubes.

Set SW-2 to ON, turn the panel meter switch to operate and when ready to adjust A-7 (B-7) for minimum quickly press the button and make this adjustment. This should be practically on if set according to Table I.

This completes the overall adjustments. The

MARS BULLETINS

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May 6—"American Antarctic Communications Adventures" by Amory H. Waite Jr., Project Engineer, Exploratory Research Division, Communications Dept., U.S. Army Research & Development Laboratory, Fort Monmouth.

May 13—"Telemetering For Guided Missiles" by J. R. Popkin-Clurman, W2LNP, Pres. & Director of Research, Telechrome Mfg. Corp.

May 20—"The Megacoder" by Harry Kihn, Member of Technical Staff, RCA Laboratories.

May 27—"Novel Tuning Methods At UHF & Lower Micro-Wave Frequencies" by Bernard D. Nadler, Electronics Engineer, Lewyt Mfg. Corp.
Upon completion of the May schedule, this technical net will recess until September.

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Sundays 2-4 PM EDT—3295, 7540, 15,715 kc

May 3rd—"RF & X-Ray Measurement In The Field". Anthony T. DeMinco and Robert L. Dondero, Project Leaders, Directorate of Technical Services, Rome Air Development Center.

May 10th—"Microwave Communications Systems". John F. Longley, Bell Telephone System.

May 17th—"Basic Transformer Theory". Robert W. Gunderson, Braille Technical Press.

May 24th—"Basic AC Systems". Robert W. Gunderson, Braille Technical Press.

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May 3—"Organization Facilities & Operation of a Modern Communication System". Mr. P. C. Christensen, Chief Engineer, Mackay Radio, San Francisco.

May 10—"Wide Band Micro-Wave Telemetry". Mr. Fred Barry, Manager, Equipment Development Div., Philco Corp.

May 17—"High Impedance Modulation Systems for Klystrons". Mr. Gene Tallmadge, senior project Engineer, Levinthal Electronics Products Inc., Palo Alto, Calif.

May 24—"Electronics in Medicine". Dr. J. Phillips Sampson, USC Medical School Teaching Staff.

May 31—"Equipment Utilization and Conversion". USAF MARS Western Technical Net Members.

equipment is now ready for use and either earphones or the loudspeaker may be used. The mike is a T-17 although any good carbon mike may be used.

Many questions have been asked as to the possibility of converting this equipment as well as the BC-1335 to Citizens Band Class D. Unfortunately we were not fully convinced of this at the beginning, but we have worked out a solution which is satisfactory. Citizens Band, Class D requires crystal control on the transmitter. This is not fully true of these FM equipments. We have worked out such circuit changes as are necessary and next month will convert the BC-659 to AM for citizens band (as well as other bands) and this should satisfy many readers. Likewise July will see the BC-1335 so converted for the same purpose. ■

73, Ken, W2HDM

SUPERPOWER [*from page 46*]

tion of station W6BXL were sent to the laboratories of UCLA where they were calibrated against a known standard. The results of this follow:

	LOW POSITION		
	Volts	*Amperes*	*Power*
FCC Inst's. as read	2650	.175	463 watts
FCC Inst's. as calibrated	2850	.177	504 watts

	HIGH POSITION		
	Volts	*Amperes*	*Power*
FCC Inst's. as read	3800	.330	1254 watts
FCC Inst's. as calibrated	4150	.348	1444 watts

On the basis of the facts evidenced in the commission's inspection, the amateur license of Mr. Bailey, W6BXL was suspended for a period of six months effective June 16th, 1958. Turn down those Variacs Men! ■

BC 348 [*from page 47*]

be installed as close to the crystal can as possible. It was installed above the MVC control and BFO. The original knobs of the 348 are too big and have to be replaced by pointer knobs, which should also be used for the phase control. After it is installed mark the sharpest point for the phase control.

To get at the phase control we must first remove the crystal can as follows:

( ) Remove S1 shown in fig. 2
( ) Remove crystal knob KN1 by loosening Allen screw.
( ) Remove the S2 screw that appears when the knob KN1 is removed.
( ) Remove the two wires on top of the can and label them so you can put them back in their proper places.

( ) Turn the set over and remove the sub chassis SC1 or the shield over the bottom of the crystal can (should be one screw holding it).

( ) After removing the sub-chassis (SC1) remove the two wires underneath that are connected to the crystal can and label them.

( ) Next remove the two remaining nuts (N2) and slide the can out (in some sets you will have to do a little jiggling to get it out).

( ) Next lay the can down and remove the screw below the switch shaft, #S3, and slide the crystal structure out. (It may be varnished and thus difficult to remove.) The appearance of the assembly is shown in fig. 3A. *Do not move the coil or damage it in any way.* At the bottom of the crystal can you will see a condenser, #K1.

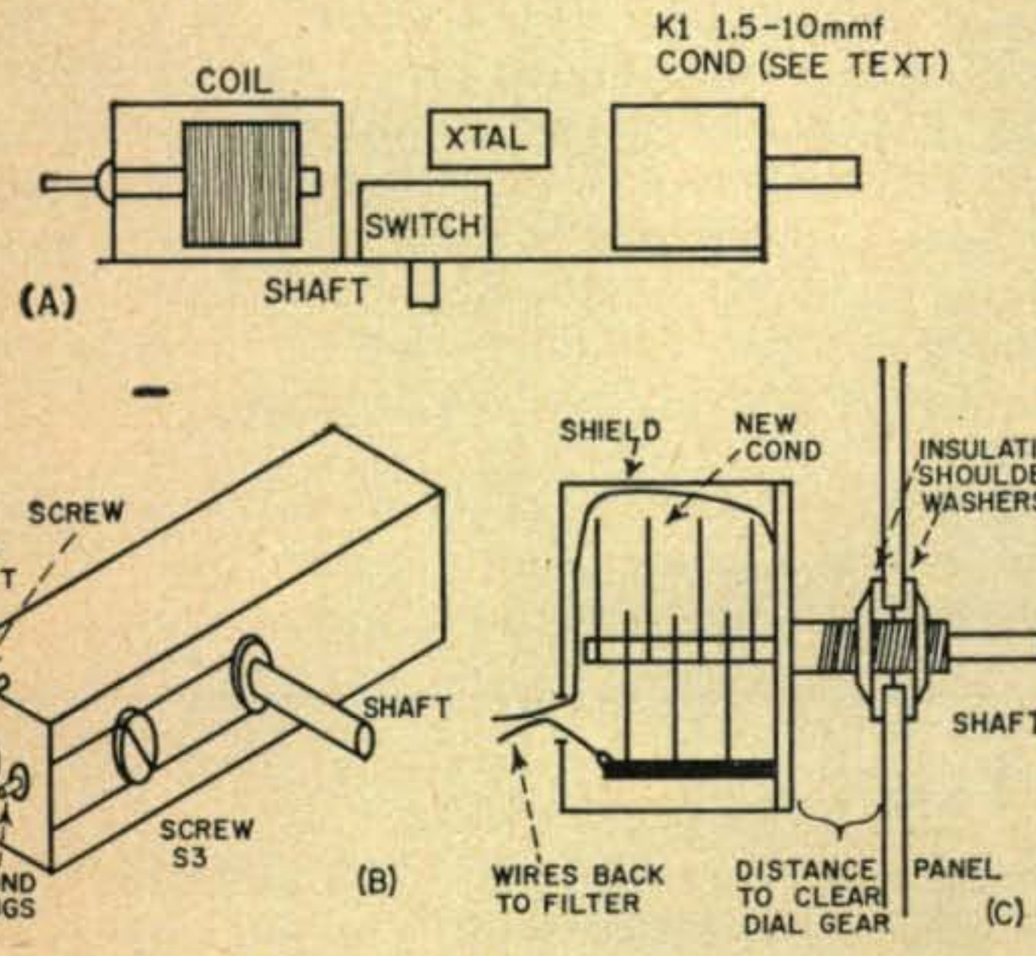

Fig. 3—Modification of the crystal filter to provide an external phasing control. View A-Crystal Filter removed from shield can. View B-Crystal Filter can be removed from the 348. View C-Details for mounting the phasing control on the front panel. Note use of shoulder washers.

( ) Remove this condenser and remove the two wires that are connected to it and label the one connected to the rotor and the other connected to the stator.

( ) Now drill a hole in the cabinet to mount a new condenser, such as the #PL-6000 or equivalent, that has a longer shaft. The hole should be drilled so it is far enough over to clear the dial gear as in fig. 3C.

( ) Install two shoulder washers in this hole so the condenser will be insulated from the chassis.

( ) Next make a shield to cover the condenser, making sure that it does not touch the stator or rotary plates of the condenser. **Be sure! !**

( ) Mount the condenser and shield making sure the condenser is *not* grounded and the shield *is* grounded.

( ) Now extend the leads that went to the

For further information, check number 52 on page 142

old condenser in the can and run these leads through the hole in the bottom of the crystal structure where the shaft of the old condenser went through.

( ) Put the structure back into the can and replace the can making sure the two wires on top and bottom of the can are put in their proper places and soldered.

( ) Screw the can in with the two (N2) nuts and one (S1) screw.

( ) Connect the two leads that went to the original condenser to the new PL-6000 making sure you put the stator and rotor leads back correctly.

( ) Replace the sub-chassis SC1 and put a knob on the new PL-6000 shaft. The knob's set screw should be filled with wood filler or some other substance to keep your fingers from adding capacity to it.

In place of the original condenser I substituted the Cardwell PL-6000 which is 1.5-10 mmfd. The only drawback to the PL-6000 is that it is a large condenser and the smaller you can get the better as there is a limited amount of space. There is a 9 plate midget condenser of the same rating and about one half the size whose number is Underwood CV-140-A. Any condenser can be used as long as it is 1.5-10 mmf.

I have had very good performance from the 348 and cannot find any areas to improve on since it was converted. ■

HQ 129X [*from page 40*]

Diode type delayed AVC[3]. Modifications also improved "S" meter sensitivity and first audio stage operation. All parts associated with the noise limiter and second detector tube (V6) are removed as indicated in the diagram fig. 4. The space previously occupied by the 6H6 tube (V6) will now provide room for the TNS circuitry and associated tubes above the chassis. They may be mounted in any convenient way, such as in a 2½ x 2½ x 4" Minibox or on a Vector shielded can assembly arrangement. In this particular case, the TNS circuitry was made as a subassembly in the Minibox, terminating leads brought out the end of the box and wired to the proper points after removing the 6H6 socket, which leaves a large convenient hole. The Minibox was mounted to the chassis using the old 6H6 tube socket mounting holes.

Using the existing terminal strips from which old parts are removed, the new parts are wired as per fig. 5. The 500 *k* TNS squelch control is mounted where the ANL switch was removed. The 50 *k* delayed AVC control is mounted on the back chassis apron near the antenna and ground terminals of the receiver. This requires drilling a ⅜" hole. The 50 *k* control may be adjusted to give a desired range. A complete analysis of the Sinking Diode delayed AVC circuit is given in the Radiotron Designer's Handbook[3]. Its principle is to hold the AVC

voltage to zero until a signal comes along strong enough to overcome the delay thereby making the receiver more sensitive to weak signals yet allowing good AVC operation on strong signals.

"S" Meter

The "S" meter circuit changes consist merely of reducing the values of R38, R39, and R40 from 470K to 270K. This changes the sensitivity of the bridge circuit and in this case gives double the "S" meter reading per given input as was available with the original circuit. Good control is still afforded with the meter adjust control R37.

First Audio Stage

The changes of the first audio stage (V7A) consist of increasing the cathode bias reisistor R36 from 1 *k* to 2.2 *k* and the plate resistor R45 from 24 *k* to 51 *k*. This makes the audio stage conform more closely to design center values contained in the tube manual.

All the changes herein described need not be made to improve the receiver. The front end changes alone will improve the receiver tremendously and take very little time to accomplish. However, for those who want to make a clean sweep, all the changes are highly recommended.

Talk to any ham who has ever used the TNS system of noise limiting and squelch, and he will tell you that it is incomparable for voice communications, especially on the higher frequency bands where ignition noise and high residual band noise is the general rule.

Other additions to the receiver may be made in the future (such as a product detector) but at the present time, these changes are not advantageous to the type of operation engaged in by the authors.

Reference is made to an excellent article written about adding the product detector to the Super Pro[4] and also may be applicable for the HQ129X.

In this case, the receiver, running "barefoot" on the 10 meter band, is more sensitive and achieves better over-all operation than could be attained by the authors using a 6J6 preamp stage and S-9'er circuit[5, 6].

Ten meter DX has been heard and worked several evenings, since the modifications were made.

Comparisons with the Morrow 5BR mobile receiver have been made by listening over a given band on the mobile rig while the car is parked in the driveway, then running into the shack and scanning the same band with the HQ129X. All I can say fellows is now I can hear them on both receivers with about equal strength. ■

4 Commander Paul H. Lee, USNR, W3JHR "Save Your Super Pro for SSB" CQ September 1958
5 Carter, W6TSQ "The S-9'er" CQ May 1956
6 Ives, "Improving the S-9'er" CQ August 1956

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FOR SALE (Cont'd.)

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MOTOROLA FM transmitters 35 to 45 MC. ideal for conversion to 6. Has 6 volt in 600 volt 180 mill dynamotor. Clean. Cables but no control heads. $15 FOB. Warren Arnett, 723 North Horton St., Marion, Ind.

FOR SALE: Hallicrafters S-40B stroboscope, McElroy code oscillator, tape puller, tape. Best offers. Anthony Anderson, 57 Elmhurst Rd., Newton Mass.

CLEANING OUT all odds and ends SCR522 Complete Used $30.00. BC-645 new $30.00—General Electric YRS-1 new $50.00—Collins 32RA transmitter used $75.00. Many other items transformers, National parts, odds and ends. Send for list, W2EUZ, 721 Carroll, Teaneck, N. J.

AN/APA-38 PANORAMIC ADAPTER

And Wave Analyzer. 30 Mc Center Frequency. 2 Mc Band Width. Total scan 10 Mc at one clip. Regular saw-tooth sweep. Variable sweep freq. control 1600 cycles. Use it as regular service scope! Including 11 tubes and 3" scope tube type 3DF1. **BRAND NEW** **$19.50**

BC-929 3" SCOPE INDICATOR COMPLETE

Originally used for IFF and Radar Navigation. Can be easily converted for general bench service work. Tubes included: 2-6SN7, 2-6H6, 1-6X5, 1-6G6, 1-2X2 and 3BP1 Cathode Ray Tube. A TERRIFIC BUY at our low price!
Excellent used **$9.95**
As Above, BRAND NEW $12.95
Conversion instructions for AC operation ..... .65

LORAN APN/4 'SCOPE

Easily converted for use on radio-TV service bench.

Completely Assembled

Supplied with 5" Scope, type 5CP1 only.
LIKE NEW! **$14.95**
Brand New **$19.50**

SCR-274 COMMAND EQUIPMENT

ALL COMPLETE WITH TUBES

Type	Description	Used	LIKE NEW
BC-453	Receiver 190-550 KC	$14.50	$16.50
BC-454	Receiver 3-6 MC	9.45	12.45
BC-455	Receiver 6-9 MC	10.45	12.45
BC-450	3-Receiver Control Box	1.49	1.95

110 VOLT AC POWER SUPPLY KIT

For All 274-N and ARC-5 Receivers **$7.95**
Complete with metal case, instructions $11.50
Factory wired, tested, ready to operate .....

SPLINED TUNING KNOB for 274-N and ARC-5 RECEIVERS. Fits BC-453, BC-454 and others. Only ..... **49¢**

BC-457 TRANSMITTER—4-5.3 Mc. complete with all tubes and crystal. BRAND NEW **$7.85**
BC-458 TRANSMITTER—5.3 to 7 Mc. complete with all tubes and crystal. BRAND NEW **$7.85**
BC-459 TRANSMITTER—7-9.1 Mc. complete with all tubes and crystal. BRAND NEW **$12.75**
ARC-5/T-19 TRANSMITTER—3 to 4 Mc. BRAND NEW complete with all tubes & crystal **$8.85**
BC-456 Modulator ..... USED 3.45 NEW 5.95
BC-451 Transmitter Control Box ..... 1.25 NEW 1.49
POWER SUPPLY KIT for All Command Sets, input 110 V 60 cy. AC. Top Quality $29.50

ASB-5 SCOPE INDICATOR

BRAND NEW, including all tubes, together with 5BP1 'Scope Tube. Originally used in Navy Aircraft RADAR equipment. Easily converted for AC operation.

VALUE $250.00!

OUR LOW PRICE **$15.95**

WILLARD 6-V MIDGET STORAGE BATTERY

3 Amp. Hour. **BRAND NEW.** 3⅝" x 1-13/16" x 2⅜". Uses Standard Electrolyte ..... Only $2.69

2 VOLT BATTERY "PACKAGE"

1—2V. 20 Amp. Hr. Willard Storage Battery $2.79
1—2V, 7 prong Synchronous Plug-in Vibrator 1.49
1—Quart Bottle Electrolyte (for 2 cells) 1.45
ALL BRAND NEW!
Combination Price **$5.45**

AIRBORNE RADAR INDICATOR ID-93/APG-13

Frequency range 2780 to 2820 Mc. Input power required: 265 Watts from AC supply 120V at 380 to 1600 cycles. Easily converted for 60 cycles. Controls: Horizontal, Vertical, Intensity, Focus, Slope, Marker Amp. Receiver Gain, Yards Range. Tubes used: 6-6SN7GT, 504G, VR105, 2-6H6GT, 2X2, 5V3GT and 3-inch scope tube type 3BP1. Made by G.E. Supplied complete with all tubes, scope tube, and visor. **BRAND NEW. OUR LOW PRICE** **$22.50**

AN/ART-13 XMTR

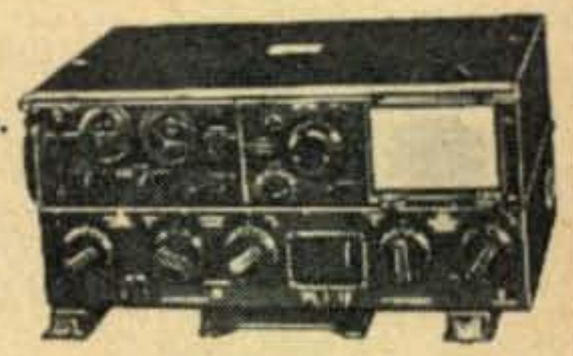
11 CHANNELS

200-1500 Kc. — 2 to 18.1 Mc.

OUR PRICE

$48.50

Complete With Tubes



Navy Model Collins Autotune Aircraft Transmitter—one of the very finest! Original cost $1800. Up to 90 watts output on CW, MCW or Voice. Easily preset frequencies. Simple operation. Subassembly construction for quick repair. This is a sensational smash value at our low price. Exc. used. Limited Quantity.
0-16 Low Freq. Coil for ART-13 ..... $ 7.95
24V Dynamotor for ART-13 ..... $11.95

234-258 MC RECEIVER

AN/ARR-2. BRAND NEW 11-tube UHF Tunable Receiver with schematic. Complete with tubes. Hurry — it's a buy! ..... Only **$8.88**

AC POWER SUPPLY

for BC603, 683. Interchangeable, replaces dynamotor. No revr change needed. On-off switch on power supply. Provides 220V DC @ 80 Ma, 24 V AC @ 2 Amps. **$8.45**
Complete kit with easy instructions $10.40
Wired, ready for operation .....
Complete 240-page technical manual for BC-603, 604 ..... $2.95

BC-906 FREQ. METER-SPECIAL

Cavity type, 145 to 235 Mc. BRAND NEW, complete with antenna. Manual incl.

OUR LOW PRICE **$9.88**

STANDARD TUBES

Removed From Brand New Government Equipment

1S5	.35	6AJ5	.45	6X5	.35	807	.95
3Q4	.35	6AK5	.35	6E5	.35	813	6.95
6AG5	.35	6C4	.25	6AC7	.55	826	.44
12AT7	.45	6X4	.32	6J6	.32	5670	.75
12X4	.35	6AL5	.33	6BA6	.35	1625	.29
12AX5	.45	6J4	.59	6AS6	.55	1629	.29

MINIMUM TUBE ORDER: 6 TUBES (6 of a number or 6 assorted).

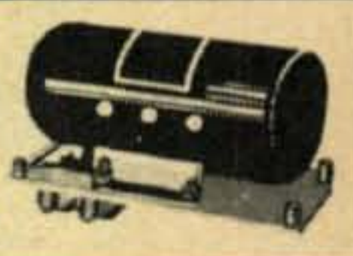
PANEL METER BARGAINS

2" Weston, GE, Panel Meter, 1 mil full scale, 0-100 scale reading **$1.99**
2" 150V AC Westinghouse Panel Meter, Black face with luminous scale, Brand New **$2.25**
3" 150V DC Hoyt panel meter Brand New **$2.45**

MOBILE-MARINE DYNAMOTOR

Input 12V DC. Output: 625 V DC @ 225 Ma. for press-to-talk intermittent operation. Shipping weight 14 lbs.

OUR LOW PRICE **$6.45**



Please include 25% Deposit with order—Balance C.O.D. 50c HANDLING CHARGE on Orders under $5.00 MINIMUM. All Shipments F.O.B. Our Warehouse N.Y.C. All merchandise subject to prior sale and price change.

G & G Radio Supply Co.

Telephone: CO 7-4605

53 Vesey St., New York 7, N. Y.

FREE! NEW CATALOG

MANY ADDITIONAL "HOT" HAM VALUES — SEND TODAY FOR YOUR FREE COPY!

For further information, check number 58 on page 142.

WANTED

WANTED: TELETYPE TG-7 and Model 15 and parts, printers and reperforators, etc.; COMM'NS REC'V'RS AND XMTRS, e.g. BC-610-E, -I, BC-939A, Collins 51J, 17L3, -4; R-388 and R-390/URR; 18S-2, -3; ARN-14 and -30; APR-9, -10, ARC-21, 27, etc.; APS-31, -33; and TEST EQP'T, with TS- or I- prefix. We pay freight. AMBER INDUSTRIAL CORP., 75 Varick St., N. Y. 13, N. Y.

WANTED: All types of communications receivers, transmitters, test equipment, teletype equipment, factory built amateur gear. Cash or trade for NEW HT-32, Valiant, Thunderbolt, SX-101, NC-303, Fisher HI-FI, etc. Write Tom. W1AFN. Alltronics-Howard Co., Box 19, Boston 1, Mass. (RIchmond 2-0048) Store: 60 Spring St. Newport, R. I. (VIking 7-3435, Fred, W1JFF)

304TL tubes needed. Write Ted Dames, W2KUW, 308 Hickory, Arlington, N. J.

WANTED: One used flying spot scanner 525 lines 60 fields 30 frames with or without FM modulation tuneable one TV channel 2 to 6. C. Engbarth, 462 Claiborne Street, Biloxi, Mississippi.

CAP Squadron will buy first five Gonset or Aerotron communicators, 2 meter. State price and condition. Box 307, Condon, Oregon.

SOS-HEY OLE Jim, K6HQ needs some 304TL or TH's for new final and spares. Send one or a dozen and name your price (don't rob me) 73 CU-SSB. K6HQ, 5208 Baltimore St., Los Angeles 42, Calif.

WANTED: MIM's Rotator and Indicator. R. Divis, 1613 So. Ruble St., Chicago 16, Ill.

WANTED: Mechanical filters, 500N, 800N, 3.1 kc (not high insertion loss models) 304TH/TL, 250th, 2000T, 866AX, 3 or 4el W. S. 20m beam (Telrex), Millen 1" Scope, converted small prop pitch motor, Selsyns & xfmr. 60' crankup tower, Tri-ex or E-Z-Way—Will pick up within 150 miles NYC. K2IEG, 521 Ocean Pkwy, Brooklyn 18, N. Y.

WANTED: Power Transformers, 3000 to 5000 VDC at 750 ma to 1 amp. 4-1000A$_{1s}$ 750TL$_{1s}$ 1000Ts$_1$ 1500Ts$_1$ 450THs, 4-400A's. Air sockets and chimneys for 4-400A^1 and 4-400A vacuum variables, Rotary Inductors, B & W 850A or 852 Band switch coils, filament xfmrs, 8.2v ct @ 35A, 5vct @ 30A, 7.5vct @ 25 amps, 10 vct @ 20A. Variacs, 0-130v @ 15A, 20A. 6000v oil condensers, Collins 70E8PTO or Equiv. Collins 310B exciter, 4" square meters 0-1 amp DC, 0-6000VDC, 0-59 umadc 0-10VAC. K2IEG, 521 Ocean Pkwy., Brooklyn 18, N. Y.

WANTED: Prop Pitch motor, large or small. W8QFR, 9226 W. Lafayette, Detroit 9, Michigan.

WANTED: W2EWL SSB Transmitter. Harry Stark, W3CGS, 7761 Parkview, Upper Darby, Penna.

WANTED: KWM1 using 12 volts. Have Elmac A54H to trade. W5SVP, Bill Bowers, 4 Ibis St., New Orleans 22, La.

WANTED: All types amateur & commercial receivers, transmitters, test equipment in trade for NEW Johnson, Hallicrafters, Hammarlund, National Fisher Hi-Fi etc. Also Teletype equipment. Write for used equipment list and information on teletype. See our advt. in Trading Post section. Tom W1AFN Alltronics-Howard Co. Box 19, Boston 1, Mass. (RIchmond 2-0048)

QSL

QSL's, SWL's, VHF's, XYL-OM's. (Sample assortment approx. 9¾¢.) Covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fatabulous. DX-attracting, prototypal, snazzy, unparagoned, cards. Rogers KØAAB 737 Lincoln Ave., St. Paul 5, Minn. Also glamorous, pulsating, super-passionate. (Wow!)

QSL's-SWL's: That are different, colored, embossed card stock, and "Kromekote." Samples 10¢. K8AIA, Box 953, Hamilton, Ohio.

GLOSSY 3 color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, New Brunswick, N.J.

QSL's—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pa. Samples, 10¢, with catalogue, 25¢.

QSL (Cont'd.)

QSL's—SWL's: Samples 10¢. Bolles, 7701 Tisdale, Austin 5, Texas.

QSL's: Samples, dime. Print Shop, Corwith, Iowa.

QSL's, Glossy samples 10¢. W1TBB Press, 807 Main Street, Winchester, Mass.

QSL's-SWL's; $2.75 per 100, QSO file cards $1.00 per 100, Samples 10¢. Rusprint, Box 7507, Kansas City 16, Missouri.

QSL's??? LARGEST variety samples 25¢ (refundable). CALLBOOKS (latest) $5.00. "Rus" Sakkers, W8DED, Holland, Michigan. (Religious QSL samples 25¢.)

Rubber Stamps for hams, sample impressions, W9UNY, C. W. Hamm, 542 N. 93, Milwaukee, Wisconsin.

QSL SAMPLES, Dime, refundable. Roy Gale, Waterford, Conn.

QSL's-SWL's, 50 card bonus on 500. Samples .05. Nicholas & Son Printery, P.O. Box 1184, Phoenix, Arizona.

QSLs. Samples Free. Phillips, W7HRG, 1708 Bridge Street, The Dallas, Oregon.

QSL SPECIAL—Free sample. Nat Stinnette, W4AYV, Umatilla, Fla.

QSL's, SWL's. Samples 10¢. Onondaga Press, Onondaga, Michigan.

QSLs—Outstanding—Original—Fast Service—Reasonable prices. Samples 10¢. Super Quantity 25¢. Refundable. VYS QSLs 1704C Hale, Ft. Wayne, Indiana.

CREATIVE QSL AND SWL CARDS. Are you proud of your card? If not, let us print your next order. Write for free booklet and samples. Personal attention given to all requests. Bob Wilkins, Jr. Creative Printing, KN6ZMT, P.O. Box 1064C, Atascadero, California.

SWAP OR SELL

RADIO MAGAZINES. Buy, sell, trade. Bob Farmer, Plainview, Texas.

SELL OR TRADE: Warner plastic laminating press for transmitter. A. D. Tudor, KN8OAT, 121 E. Warren St., Lebanon, Ohio.

SWAP—Have SX-42, HiFi, new color TV, will trade all or one. Want Heath "Mohawk" and "Apachie", kit or assembled, or cash to buy same. K4ZXC, Forrest McNabb, 402 Woodlawn Ave., Newport, Tennessee.

ATTENTION: FOREIGN SWL CARD SWAPPERS—Also KH6-, KL7-, KP4-and W7-SWL/Idaho. Send me one of your cards direct and receive in return my card plus mimeo list of SWL QRA-QTHs in 10 different countries. Joe Morris, W86913, P.O. Box 3962, Cleveland 20, Ohio.

SWAP OR SELL: 15 foot 1956 Trojan Custom Queen with 30 horse Evinrude Elec Starter big twin motor; for KWM-1 with AC power supply of Photo equipment. Alfred Kruhm, 7016 171st St., Flushing 65, N. Y.

MISCELLANEOUS

KITS ASSEMBLED. Trendtronics 1715 Forrest St., Mobile, Alabama.

TREASURE: Privateer Jean LaFitte buried his treasure on Galveston Island south of the Republic of Texas. Treasure hunters will gather on June 19. Data and information available Box 73, Route 1, Galveston.

FIFTH ANNUAL Syracuse VHF Roundup, October 10, 1959.

DECORATE YOUR CAR WINDSHIELD WITH YOUR CALL LETTERS. Attractive 1" letters and numbers available in gold or black. Complete single set 75¢, two sets for $1.25. Include name, call, address and color preference. Money refunded upon return of unused decals if not satisfied. All orders must be prepaid. Send to Box RJ, c/o CQ Magazine, 300 West 43rd St., N. Y. 36, N. Y.

MISC. [*cont'd*]

LETTERS [*from page 102*]

I read with interest, Ol' Joe's pungent comments, in your January edition. While I do believe, that each amatuer, owes it to himself, to endeavour to bring his morse ability etc., up to as high a standard as possible, we should not overlook the fact that ham radio is a hobby. As a commercial and press telegrapher for many years, I am not particularly impressed with speed alone. In these days of electronic keyers, it is no great accomplishment to bang out 35 WPM. To put it down on a mill, however, is something else again.

What does impress me very much, is the willingness of American Hams, to answer my CQ, and to carry on a pleasant QSO with a Canadian they have never heard before. I am grateful to work with any W or K, also novices, whether their ability is 4 WPM or 40. There has been a great deal said in the Canadian press, lately, about ways and means to improve Canadian-American relations. If the statesmen would turn the problem, if any, over to we hams, they would have nothing to worry about.

So, in closing, just a word to Ol' Joe. Let's have less disparity, and more charity. 73,

Wilf Keen, VE3CFB

TVI

Dear Wayne,

We would be glad to furnish information as we receive it to any TVI committee that will contact us and offer their addresses for our mailing lists of TVI committees. I'm sure we could be of assistance to the fellows still faced with TVI.

Jim Taylor, K2VOS/8
R. L. DRAKE COMPANY

Batteries

Gentlemen:

I haven't seen any mention made of a battery which might be the answer for transistorized equipment requiring a little more power than small flashlight cells provide.

I'd like to suggest the 2-volt "Magna" battery used in electric cigarette lighters. It holds up for months in these lighters where momentary current requiremens are high.

These batteries are cased in a yellow plastic and have convenient tabs which, however, are not marked for polarity. In size they are ⅜ x 1 1/16 x 1⅜ and probably weigh as much as two penlight cells. Date of manufacture is perforated into the label.

They can be obtained at 75c each from Magna-Lux Corp., 222 Fourth Ave., New York 3, N. Y. However, any shop handling the Magna electric lighters will stock them. There are American-made batteries for these lighters but they won't stand up under use as will the Swiss-made batteries.

The terminal tabs are 3/16 x ⅜, both out at the top of the battery, making them convenient to solder into whatever voltage pack is needed. Plan to try them myself in the heterodyne free meter in Feb., 1957 CQ.

A. C. Mitchell, ex-W5AIA
Chesterton, Indiana

Anybody else tried these? Let's hear more, if they're any good for us . . . ed.

TRANSIS. RCVR [*from page 37*]

tubes, the more capacitors, and the greater chance of failure.

The failure rate of transistors is extremely low. If operated within their ratings, their life may be considered indefinite. The applied potentials are low, allowing adequate safety margins for capacitors. There is no heat to cause deterioration of other components. The final result is startling—a receiver of this type may

be expected to operate for years with no failure or maintenance of any kind!! The most likely projected maintenance would be the need to replace gain controls as they wear out from constant use!

Recognizing these advantages, as many transistors were used as were required to do the job. Their small size left plenty of room, so it was not necessary to skimp on components. If the addition of a component helped, it was put in.

How Does It Work?

The performance of the receiver has exceeded our fondest expectations. Several experienced amateurs have dropped in to hear it, and have been (to coin a phrase) amazed. They had expected a compromise, but found a receiver that they fell in love with. All of them considered it a better receiver than their own commercial products, but none of them owned the highest priced receiver of any manufacturer. After recovering from the surprise at what transistors can do, they tuned it on the various bands simply as another receiver to be evaluated. As just another receiver, they liked these features best: 1-Rocklike stability on all bands, 2-The same easy tuning rate on all bands, 3-LARGE 1 *kc* dial calibration on all bands.

Disregarding the testimonials, the receiver shapes up about like this. The sensitivity is adequate on all bands. Even on 10 meters, nearly all the noise output of the set is antenna noise, even in a quiet location with a coax-fed beam. The stability is the same on all bands, being set by the low-frequency oscillator. Its dynamic stability is such that cw signals and phone carriers are clean and steady. Due to lack of heat in the receiver, drift is caused primarily by the heating of the tuned oscillator transistor junctions. This results in a drift of about 1 *kc* in the first three minutes of operation, with a further slow drift of about 750 cycles in the next 10 minutes. After 15 minutes, there is no perceptible drift. The dial calibration was accomplished by using a semi-circular plate variable capacitor with fixed paralleled capacity approximately four times the maximum capacity of the variable. This will give essentially straight-line frequency tuning. The tuning error is within 2 *kc* from 0 to 450, rising to about 4 *kc* in the vicinity of 475 to 480. It is necessary to slow down the capacity change at the high frequency end of the dial. This was done by soldering a single plate to the stator terminal in such a way that the rotor engaged it at about 400 on the dial, increasing the capacity between the rotor and this gimmick as the main capacitor section decreased its capacity. Trimming of this plate and adjusting its distance from the rotor should produce better results. A little work on this section should result in dial readings close to 1 *kc* in accuracy.

The third mode crystals in the converter section can be moved somewhat by the coil slugs.

Inexpensive .01% crystals were purchased. They turned out surprisingly well; all bands are within 1 *kc* of the fundamental calibration.

Selectivity is variable from about .5 *kc* to 6 *kc*. The skirt selectivity of the five tuned circuits is good, but not as good as a mechanical filter. The variable selectivity feature of the *if* system is a great advantage on 10 meters, where "Zeroing the frequency" is not the precise operation it is on 75 SSB. AVC action is good, but not so good as on a well-designed tube receiver. The AVC system adequately protects against overload on a strong signal, but does allow some variation in the audio output between weak and strong signals. The variation is not sufficient to require any riding of the AF gain control, but is not "flat" as in some of the more expensive commercial receivers. Sideband stations begin to sound rough if the "S" meter goes past S9, but sufficient AVC can be used to bring most nets in comfortably without riding the gain.

Image and spurious rejection is good. Mode crystals are used in the converter section to reduce spurious oscillator responses. The use of two tuned circuits in conjunction with a high *if* frequency brings the image response down to a satisfactory level. Due to the low level at which they operate, transistors are more subject to intermodulation and desensitizing than vacuum tubes. This was minimized by loading the tuned circuits as little as possible, in order to maintain their selectivity and reduce the gain to only the amount felt necessary to protect the noise figure. In addition, an *rf* gain control is used to reduce the front end gain. This is accepted *uhf* technique. Measurement of intermodulation effects is difficult, especially when a comparison with other receivers is desired. After some extended listening, it would appear that this receiver is no more subject to intermodulation than the average tube receiver.

Actual use of a piece of gear such as this will often show up unexpected defects. Such a defect led to the installation of the trap in the input to the 3.5 *mc* amplifier, On 7 *mc*, the oscillator was set to 3400 *kc*, to tune the band from 100 to 400 on the dial. The oscillator fed through its mixer to the *if* amplifier, where a harmonic of the oscillator was generated in the 3.5 *mc* mixer. This resulted in a spurious response in the middle of the 7 *mc* phone band which was very annoying. The installation of the trap, tuned to 3400 *kc*, effectively cured this difficulty.

Regular use showed other undesirabe characteristics, such as insufficient BFO injection, poor AVC action on SSB etc., which were in turn corrected.

The present design has been in regular use on all the bands for several months with complete satisfaction. It sits beside the exciter, as a regular piece of gear, and there is no question but what it will "hear anything the rig will work." ■

Advertising Index

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"TAB" Tubes Tested, Inspected, Boxed

Six Months Guaranteed!! No Rejects!

NEW & Used Gov't & Mfgrs. Surplus!

0A2	.70	6BZ7	1.25	*We Buy & Sell*	
0A3	.85	6C4	.49	43	.75
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1B3	.78	6CD6	1.49	75	.81
1L4	.82	6CF6	.85	HY75	5.00
1R4	5/$1	6CL6	1.40	83	.95
We Swap Tubes! What Do/U Have?					
1R5	.78	6CG7	.89	4PR60A	37.50
1S4	.78	6CG8	1.12	4-125A	27.50
1S5	.68	6CM6	.79	4X150A	2/$14
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1U4	6/$1	6D6	.99	4E27A	39.00
1U5	.75	6E5	.79	250TL	19.45
1X2	.99	6F4	2.49	307A	2/$1
2C39A	9.00	6F5	.63	316A	5/$1
2C40	5.50	6F6	.99	VR92	5/$1
Send 25¢ for Catalog!					
2C43	7.00	6F7	.99	388A	2/$1
2C51	2.00	6F8	1.39	350A	2.45
2D21	.68	6H6	.59	350B	1.75
2E22	1.75	6J4	1.72	371B	.95
2E24	2.00	6J5	.59	5146	3.90
2E25	3.25	6J6	.59	416B	16.00
2E26	2.75	6J7	.99	450TH	43.50
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2E35	1.60	6K6	.59	460	11.50
2K25	15.00	6K7	.79	701A	3.95
Wanted Receivers and XMTRS					
2K26	39.00	6K8	.99	703A	2.00
2K28	30.00	6L6	1.19	707B	3.50
2V3	2/$1	6SN7	.72	715C	10.00
2X2	.48	6T8	.98	717A	5/$1
3A4	.70	6V6GT	.90	723AB	8.00
3A5	1.00	6X5	.49	725A	2.75
3API	5.95	12AT6	.59	801A	5/$1
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3C24	3.75	12AU6	.63	804	8.85
3D23	4.50	12AU7	.69	805	6.00
We Buy!		*We Sell!*		*We Trade!*	
3E29	7.00	12AX7	.79	807	1.50
3Q4	.68	12AY7	1.29	808	.85
3Q5	.86	12B4	.95	810	12.75
4-65A	17.50	12BA6	.65	811	3.00
4-125	30.00	12BA7	.99	811A	3.95
4-250	34.00	12BD6	.59	812	3.30
4X150A	7.50	12BE6	.59	813	8.00
4X250	36.00	12BH6	.79	814	2.35
4X500	37.00	12BH7	.99	815	3.15
5API	2.95	12BY7	1.00	826	.95
Wanted Test Sets and Equipment					
5BPI	5.02	12BZ7	.99	828	9.00
5BP4	5.00	12H6	.75	829B	8.00
5CPI	4.99	12J5	.69	832A	7.00
5CP7	9.00	12J7	.69	833A	36.00
5R4	1.00	12J8	1.35	837	2/$2
5T4	1.25	12K8	.89	866A	1.50
5U4	.59	12SA7	.69	954	10/$1
5V4	.89	12SC7	.89	955	3/$1
5Y3	.65	12SF5	.69	957	3/$1
5Z3	.89	12SG7	.89	958A	2/$1
Send 25¢ for Catalog!					
15GP22	89.00	12SH7	.89	991	5/$1
6A7	1.00	12SJ7	.75	1614	2.00
6A8	.99	12SK7	.75	1619	5/$1
6AB4	.59	12SL7	.79	1620	2.00
6AC7	.79	12SN7	.69	1625	4/$1
6AG5	.69	12SQ7	.69	1626	5/$1
6AG7	.97	12SR7	.69	1629	4/$1
6AK5	.69	15E	1.19	2050	1.25
6AL5	.59	15R	4/$1	5517	1.25
6AQ5	.66	FG17	3.49	5608	3.95
Top $$$ Paid for 304TL tubes					
6AR6	1.95	19T8	1.16	5618	3.25
6AS7	3.49	24G	3.75	5651	1.35
6AT6	2/$1	25A6	1.19	5654	1.20
6AU6	.79	25A7	2.19	5656	4.25
6B8	1.35	25C5	.81	5663	1.15
6BA6	.59	25L6	.72	5670	1.00
6BE6	.59	25T	4.00	5686	1.75
6BG6	1.49	25Z5	.72	5687	2.25
6BH6	.79	25Z6	.75	5691	4.70
6BJ6	.72	26A7	3.69	5725	1.95
Top $$$ Paid for XMTTR Tubes!					
6BK7	.99	FG27	8.28	5732	2.00
6BL7	1.95	HV27	19.39	5736	85.00
6BN4	.69	28D7	.89	5749	1.95
6BN6	1.08	FG33	15.00	5750	2.75
6BN7	1.99	EL34	3.49	5751	1.25
6BQ6	1.19	35A5	.69	5814	1.20
6BQ7	.99	35L6	.59	5879	1.20
6BX7	1.11	35T	4.49	5894	$12.00
6BY5	1.19	35Z5	.89		
6BZ6	.91	RK39	2.99	No See—Write!	

"TAB" TERMS: Min Order $3—25% with order F.O.B. New York. Ten day guarantee, price of mdse. only. Our 14th year.

Prices shown are subject to change.

111CG Liberty St., N.Y. 6, N.Y., RE 2-6245

Wanted 304TL Tubes & ALL TYPES!!!

"TAB"—THAT'S A BUY!—BARGAINS!!

New Variacs/or equiv 0-135V/7.5A $15.30
New Variacs/or equiv 0-135V/3 Amp $10.65
New Variacs/or equiv 0-132V/1.25A $7.25
RF-MTR GE/475 Ma & 5 Amp $4@, 2/$7
DC-METER Dejur 800 Ma/3½" $3@, 2/$5
DC-METER One Ma/4" Rd. $5@, 2/$8
RF-MTR Weston 750Ma ..... $4@, 2/$6
DC MTR 100Ma/2½" ..... $3@, 2/$5
BATTY CHGR 6&12V/up to 4 Amps $7.90
IRISH/MYLAR Tape 2400 ft ..... 3/$12
CONDSR Oil/W.E. 2mfd@600WVDC 6/$1
SNOOPERSCOPE TUBE 2" ..... $5@ 2/$9
DIAM'D PHONO-NEEDLES P.Pd. $4.50
MILLEN 1007/KNOB 1⅝" Chrome 3/$1
RF LINE FILTER 10A $1.50, 50A/$10
MINI-FAN 6-12VAC/60Cys $2@, 3/$5

TRANSFORMERS all 115V/60cy/1Ø

6V @ 8A, 5V @ 3A & 1200VCT@200ma $5
TPF/540VCT @ 30ma/6.3V @ 2A $2
TPF61/500VCT @ 70ma & 6.3V @ 4A $3
TPF62/550VCT @ 250ma & 6.3VCT @ 2.5A & 12.6V @ 3.5A, & 5V @ 2A $5
TF02/2.5VCT @ 10A/5KV $4
TR400R/2x16V @ 1A ea. $3.45
TF05/7.5VCT/12A/15KV KENYON $9
TF27 Is 10VCT/5A or 220V Pri 20V @ 5A Kenyon H'sld ..... Special $4.95, 2 for $9
TPX Is 4760 VCT @ 300 ma $16.95

FILTER & SWINGING CHOKES

CH1029 CHOKE 8 Hy @ 750ma $12
CH1030 CHOKE 6 Hy @ 1.25A $18
CH1031 CHOKE 0.6 Hy @ 3.2A $10
CH1034 CHOKE 5 Hy @ 500ma $6
CHOKE 8 Hy @ 150ma $2
UTC/CG40/10 Hy @ 200ma $3 @ 2/$5
CTC/RS8150/8 Hy @ 150ma/80Ω $3
CTC/RS8250/8 Hy @ 250ma/90Ω $5
CTC/RS8105/8 Hy @ 105ma/100Ω $2
STAN/C2700/2-12 Hy @ 200ma/80Ω $6
STAN/C2701/3-12 Hy @ 350ma/80Ω $10
KEN/T509/7-22 Hy @ 200ma/140Ω $8
KEN/T510/6-19 Hy @ 300ma/125Ω $9
CH1011 RCA/10 Hy @ 150ma $2 @, 3/$5
CH1003 UTC/10 Hy @ 125ma ..... @ $2

"TAB" for NEW TRANSISTORS!

2N38	$.98	2N255	$1.30	2N441	$3.00
2N155	3.25	2N256	1.45	2N234A	1.36
2N156	4.45	2N277	4.50	CK721	2.35
2N174	12.00	2N278	5.50	CK722	.95

Postpaid 48 States Orders $10

New "TABTRAN" Rectifier Xfmrs

Sec'd Volts (DUAL†) 0-9-15-18-&-0-9-15-18. Series Sec'ds 0-3-6-9-12-15-18-21-24-27-30-33-36 Volts.

TR4001 @ 1 Amp† ea/sec/winding $5.15
TR4002 @ 2 Amp† ea/sec/winding $7.15
TR4003 @ 5 Amp† ea/sec/winding $9.90
†Wndgs in Series at Ratings shown: Parallel 2X Current. Voltage output. 0-9-15-18

LO-PRICED GTD DC to DC TRANSISTORIZED CONVERTER "TABSTAT" KIT OR BUILT!
HI-EFFICIENCY DC TO DC 12VDC TO 450 VDC ALSO 6VDC INPT.

Output 450&TAP 250VDC at up to 150MA/Up to 70 Watts 80% effieiency; ripple 0.2%; low idle current one amp silicon rectifiers, oil condensers, toroid transf, fused & short circuit proof. Regulation 5% at 20 to 100% load!! **Small in size! Quiet! Light wgt! Lo-priced gtd** "TABSTAT" TR1245CB built $35, **Pre-Assembled U-Build** kit TR1245CK **Only $30.** Six V Inpt TR645CB **$35 or Kit** TR645CK **$30.** "TABSTAT" 250VDC @ 100MA/12V in TR1225CB **$27, Kit** TR1225CK **$24.** 6V inpt TR625CB **$27, Kit** TR625CK **$24.**

SELENIUM F.W. BRIDGE RECTIFIERS

One Year Gtd!	DC AMP	18VAC 14VDC	36VAC 28VDC	72VAC 54VDC	130VAC 100VDC
	½	$1.00	$1.90	$3.85	$5.00
	1	1.30	2.00	4.90	8.15
	2	2.15	3.00	6.25	11.10
	3	2.90	4.00	8.60	13.45
	6	4.15	8.00	18.75	31.90
	10	6.10	12.15	26.30	41.60
	12	7.75	14.90	30.95	43.45
	20	12.85	24.60	49.90	76.75
	24	15.00	29.45	57.50	81.15

RECTIFIERS 130V/RMS HALF-WAVE

75Ma 49c, 5 for $2; 100Ma 59c, 6 for $3
150Ma 70c, 8 for $5; 250Ma 79c, 6 for $4
300Ma 88c, 5 for $4; 350Ma $1.00, 8 for $7
400Ma $1.10, 5 for $5; 500Ma $1.35, 5 for $5
Postpaid 48 states orders $10.

New Silicon 500ma./ 280V RMS/400 P.I.V. 100°C
Hmt Sealed $1.50 @, 4/$5, 24/$25, 100/$90
Postpaid 48 states orders $10

"TAB" FOR THE BEST KITS!

KITS! *Each "TAB" Kit Contains The Finest Selection!!!!*

Kit 5 Mycalex Glass/HF Strips
Kit 35 Precision Resistors
Kit 10 Switches
Kit 75 Resistors ½/1/2W
Kit 150 Carbon Resistors
Kit 25 Panel Lamps
Kit 12 Electrolytic Cond's
Kit 15 Volume Controls
Kit 56 Tube Sockets
Kit 65 Tubular Condensers
Kit 500 Lugs & Eyelets
Kit 10 Bathtub Oil Cond's
Kit 5 lbs. Surprise Package
Kit 10 Transmit Mica Cond's
Kit Glyptal & Cement
Kit 3 Phone/Patch Xfmrs
Kit 3 Searchlights
Kit 4 AN/Reflector Lites
Kit 6 Insltd Tuning Tools
Kit 6 AN Plugs & cnnctrs
Kit 5 Asstd Screw Drivers

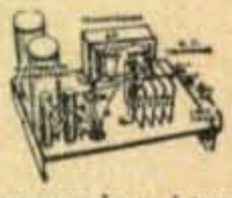
Kit 5 Sub-Min Tubes
Kit 40 Standoff Insulators
Kit 35 Power Resistors
Kit 75 Mica Condensers
Kit 5 Crystal Diodes
Kit 200ft Hook Up Wire, 4 Rolls, 50ft/ea. Asstd. Color
Kit 100 Fuses, assorted types
Kit 100 Ceramic Condensers
Kit 50 Coil Forms
Kit 5 FT243 Xtal Holders
Kit 65 Inductors & Coils
Kit 5 Microswitches
Kit 10 Wheat Lamps
Kit 3 Transistor Xtmrs
Kit 8 Xtal Osc-Blanks
Kit 4 Asstd Rectifiers
Kit 12 Alligator Clips
Kit 5 UG/Connectors
Kit 100 Self/Tap Screws
Kit Adj Wirt Striper & Cut

Kit 2 Bakelite Panels 6x12"
Kit 5 pcs Wrench Set
Kit 8 pcs Nut Driver Set
Kit Hi Gain Xtal Mike
Kit 5 Jeweler Screwdrivers
Kit 6 ea Phonoplugs & Jacks
Kit Silver Conduct Paint
Kit 6 Multi-Color Ball Pens
Kit 25 ft Lo-Cap Mike Cable
Kit 18' Lo-Cap 2 Cond M-Cable
Kit 20 ft RG59U Coax Cable
Kit 15 ft RG11U Coax Cable
Kit 2 pair SO239 & PL59
Kit 12 Binding Posts Asstd
Kit 5 Phone Jacks Asstd
Kit 3 Phone Plugs Asstd
Kit Long Nose Plier
Kit Side Cutter Plier
Kit 2 Xmttr Variables
Kit 5 of 2mfd @ 600wvdc/oil

Order Ten Kits We Ship Eleven!!!

ONE EACH ABOVE KIT ONLY **99c**

WE BUY! SELL & TRADE
Send 25¢ for Bonus Catalog!



NEW DC POWER FOR TRANSISTORS!!

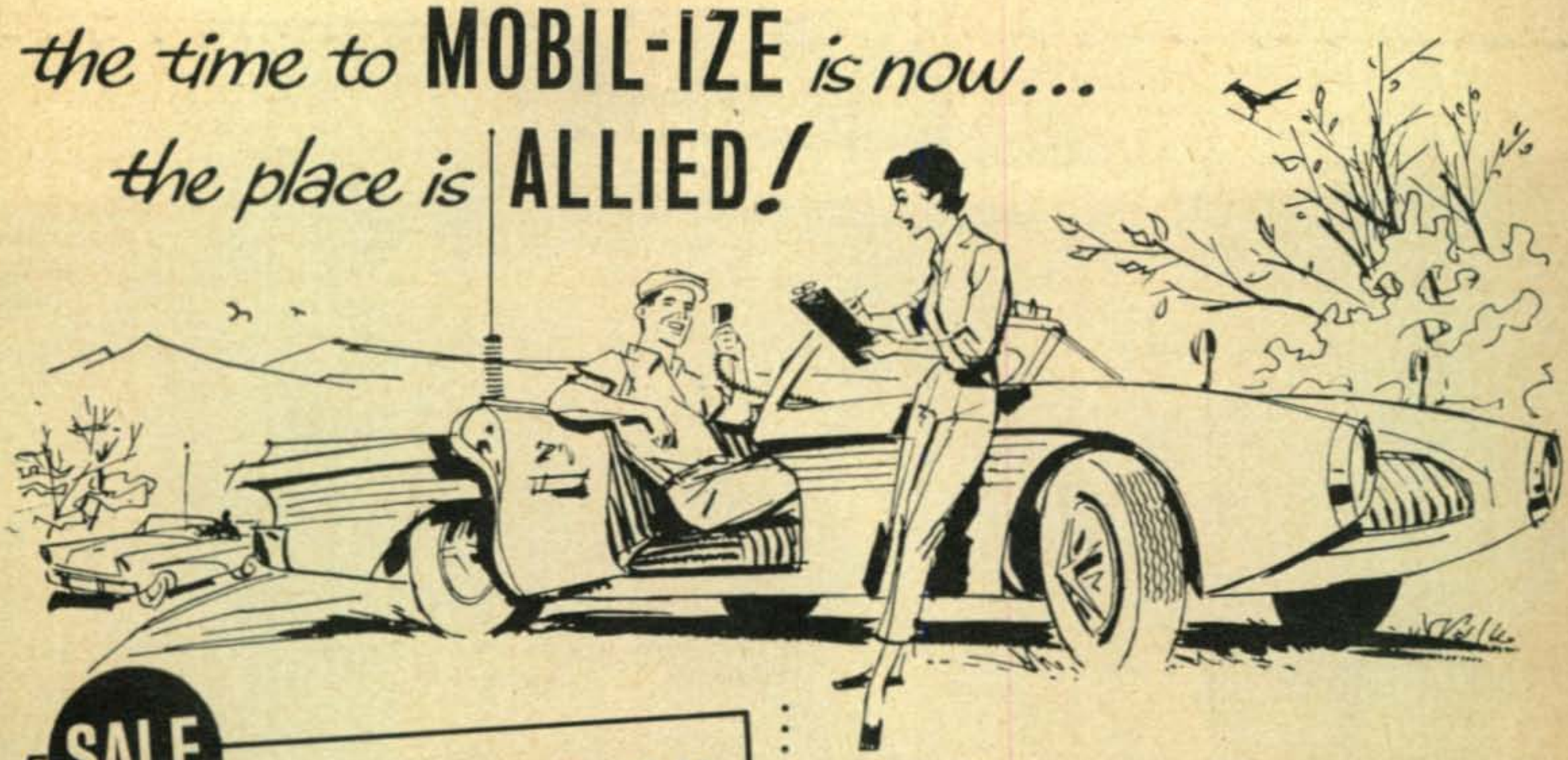
New low-cost 25 volt one amp filtered 1% ripple power supply. Same as specified CBS, G.E., RCA. Ideal for powering transistor circuits. Pre-assembled kit U-build B25V1ACK **$10,** or assembled B25V1AC **$12.**

"TAB"—That's A Buy!—BARGAINS!!

W.E. 416B Microwave Amplifier, mixer, OSC Hi-Mu low noise. Special! **$16@; 2 for $30. Reg. $58.00**

BC696/3 to 4 mc's good condition $5.95
AN-ARR2/RCVR as is/good parts $1.59
RDZ/USN 200-400 Mcs Rcvrs As Is $25
RAX/MPN rcvr covers 4 bands 1.5 to 9 mc's 8 tubes has BFO Vernier $24.00
60Mc's/IF-Strip $5.00
866A/2 Combo & Fil XFMR/7.5KV Ins 5.98
LM-7 Navy Freq-Mtr to 20 mcs $72
BC221 Freq Mtr—gd cndtn $90
ART13—Used Good Cond $59
TS34AP—W.E. scope used G/etdn $69
G.E./YRS-1 Side Band Selector $45
829B Socket 85¢, 2/$1.50. 813 Socket $1
4x150 Ceramic/LOKTAL ..... 2 for $1.00
Blower 24VDC/100CFM $3.98
Blower AC/Miniature 6&12VAC $1.00
AN Voltmeter 0-30VDC $2.49@, 3 for $6.00
Xmitting Mica's .006 @ 2500V, 5 for $1.00
Relay 4PDT/3Acts/12 to 24VDC $1@, 6/$5
Hvy Dty 115V/60Cy Selsyns, 2 for $9.00
Miller 2.5MH/2.5&5Mtr Chokes ..... 8/$1.00
Vibrators 6 or 12VDC $1.49@; 4/ $5.00
5" USN-MUMETAL Scope Shield $ 4.00
NEW PRINT CKT-PANEL, 11x12x.062" $2
IRISH TAPE 1200' HiQlty, ... 3 for $5
BANDPASS 60 or 90 or 150 Cys each $2
1N34A 45¢@, 15/$5; 1N35 $1; IN38 70¢@;
XTAL OVEN—115V&Thermostat $2
Dumont 208B/5" Scope Tested $65
Precision E200C Sig-Gen 88KC to 240Mc $69
Precision E400 sweep-gen 3 to 900MC $115
Simpson 303VTM tested gtd $45
RCA-WV98A voltohmst Sr/VTVM $50
Millen 90651 "GDO" 1.7 to 300 MC $30
Millen 90903/3" modulation scope $23
I-177 Mil-T-Copy Hickok Mu-Cond $25
W.E. 388A HiFreq Doorknob Tube up to 700Mc's Special ..... 2 for $1
12 for $5 Regularly $19

the time to MOBIL-IZE is now...
the place is ALLIED!



SALE

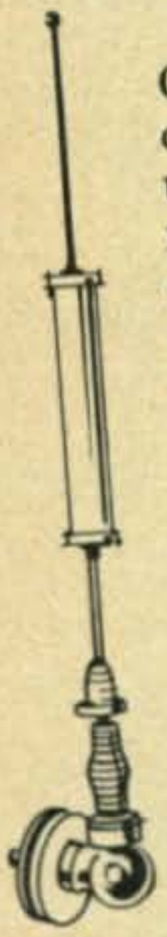
Allied's Mobile Special!

COMPLETE *Master* MOBILE
ALL-BAND ANTENNA PACKAGE

Regular Price $34.00

SALE PRICE $24.99

YOU SAVE $9.00



Consists of: 666 "All-Bander" coil for 10 through 75 meter use; heavy-duty swivel base mount with double taper spring and coax fitting; 96" stainless steel whip in two sections for use with "All-Bander" coil.

	Reg. Price
All-Bander Coil	$14.65
88-60 Whip	9.70
232XC Mount	9.65
Regularly	$34.00

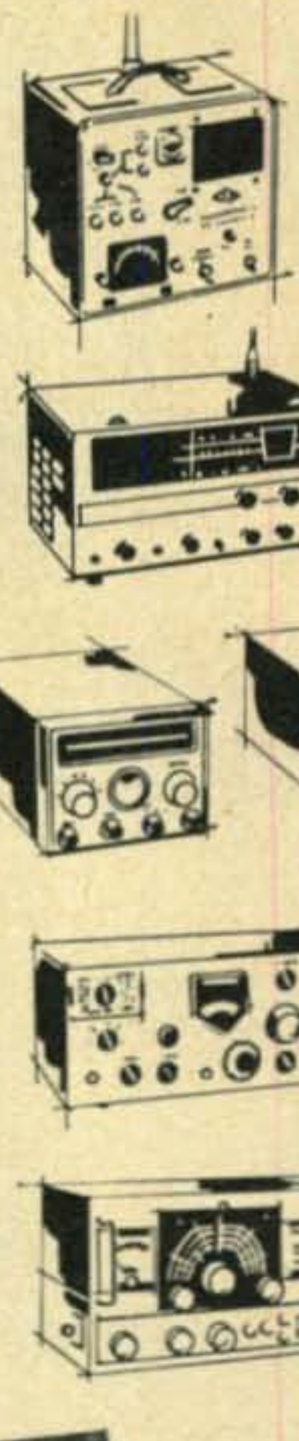
No. 92SX520
Complete Package,
SALE PRICE ONLY..... $24.99

ORDER NOW AT SALE PRICE!

KING-SIZE TRADES: We're trading highest—just try us. What have you got—what do you want? Write to us today for the sweetest deal anywhere.

EASIEST TERMS: Only 10% down (your trade-in will probably cover the down payment) and the remainder in convenient monthly payments to fit your budget.

ALLIED has the largest stocks—
everything in mobile equipment—
ready for immediate delivery!



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SEE YOUR ALLIED CATALOG
For everything in mobile gear, refer to pages 369-391 of your 452-page 1959 Allied Catalog. If you haven't a copy of this leading Amateur supply guide, write for it today.

ALLIED RADIO

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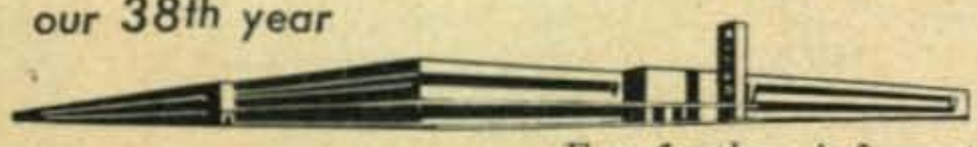
our 38th year



For further information, check number 69 on page 142.

National News Dial

Published periodically by the **NATIONAL CO. INC., MALDEN 48, MASS.**

NEW NATIONAL NC-303 OVERNIGHT SUCCESS!

Hams Throughout America Enthusiastic in Praise of New DeLuxe Receiver

Hams around-the-world have demonstrated their acceptance of the NC-303 since its recent introduction. Exceptional sales volume is being reported by National Company distributors. And as hams get on the air with their new NC-303's, interest continues to mount.

The NC-303 is a super-deluxe "ham band" receiver offering several exciting new features: Front panel SSB selector with exclusive, new "IF SHIFT" for instant choice of sideband . . . eliminates retuning or detuning. 5-position IF selector offers choice of sharp, SSB-1, SSB-2, medium and broad selectivity. New tone switch provides attenuation of highs, lows, or both for maximum readability.

New dual noise limiters . . . separate automatic noise limiter for AM, separate double-ended manual limiter for CW and SSB. New "Q" Multiplier with 60 db deep rejection notch, may be tuned continuously across the entire passband, has separate notch frequency and notch depth controls. New 40-1 tuning dial with logging scale, plus new fine tuning vernier dial drive for super precision CW and SSB tuning.

Exclusive new WWV converter provision . . . no interference with dial calibration or frequency coverage . . . accessory calibrator provides one microvolt sensitivity on 10 mc WWV. New "fast attack—slow release" AGC. Crystal controlled 2nd converter oscillator provides excellent inherent stability from cold start. Sensitivity less than 1.0 microvolts. 10 dial scales cover all amateur bands . . . exclusive converter provision for 6, 2, and 1¼ meters.

These are only a few of the many features. See your National Co. Distributor, or write for full specifications. Suggested list price $449.00.

NATIONAL CO. DISTRIBUTORS OFFER FREE $17.50 SPEAKER WITH NC-109 OR NC-188 RECEIVER!

For a limited time only, most National Co. distributors offer an opportunity to buy now and save $17.50 on the purchase of either the NC-109 or NC-188 receivers. You get the receiver PLUS speaker . . . BOTH FOR THE PRICE OF THE RECEIVER ALONE! See your National Co. distributor now and save.

NC-109 covers 540 kc to 40 mc in 4 bands. Calibrated bandspread for 10-80 meter amateur bands. Exclusive "MICRODIAL" filter provides 5 degrees of super-sharp selectivity. Sensitivity: 1-2 microvolts with 10 db signal/noise ratio. Separate high frequency oscillator with temperature compensated ceramic coil forms reduces drift to .01% or less. Separate product detector for SSB makes the NC-109 America's lowest priced SSB receiver.

NC-188 covers 540 kc to 40 mc. Directly calibrated for 4 general coverage ranges and 5 bandspread ranges for 10-80 meter bands. Has RF amplifier stage, two IF stages and two audio stages. Has tone control, antenna trimmer, S-meter, separate RF and AF gain controls, automatic noise limiter. Has temperature compensated and ventilated high frequency oscillator for increased stability.

For further information, check number 2 on page 142.

NC-109 PLUS NTS-1 SPEAKER Regularly $217.45
NOW ONLY $19.95 DOWN full suggested cash price $199.95

NC-188 PLUS NTS-1 SPEAKER Regularly $177.45
NOW ONLY $15.95 DOWN full suggested cash price $159.95

Typical RCA High-Perveance Power Triodes
(Max. Amateur Ratings, Class C Telegraphy)

RCA No.	DC Plate Input (Watts)	DC Plate Volts	Max. Freq. (Mc)	Amplification Factor
810	750	2500	30	36
811A	260	1500	30	16
812A	260	1500	30	2
833A	1000	3300	30	
8000	750	2500	30	
8005	300	1500	60	

RCA
High-Perveance
Power Triodes

...for high power with low plate voltage

For the man who prefers power triodes, RCA offers a choice of world-famous and time-proved types to meet every amateur power-input requirement, up to the legal limit.

Known for conservative ratings and great reserve of filament emission, these RCA high-perveance power triodes deliver high power output at low plate voltages. Benefits: You can (1) use more reasonable values of pi-network components, (2) design with lower voltage-rated plate transformers and filter capacitors, (3) use lower voltage-rated tank circuits.

RCA High-Perveance Power Triodes are available at all RCA Industrial Tube Distributors.

For technical bulletin on any of these six RCA Power Triode types listed in the chart, write RCA Commercial Engineering, Section E-15-M, Harrison, N. J.

RADIO CORPORATION OF AMERICA
Electron Tube Division — **Harrison, N. J.**

For the name of your nearest RCA Industrial Tube Distributor, call Western Union by 'phone number and ask for me, Operator 25.