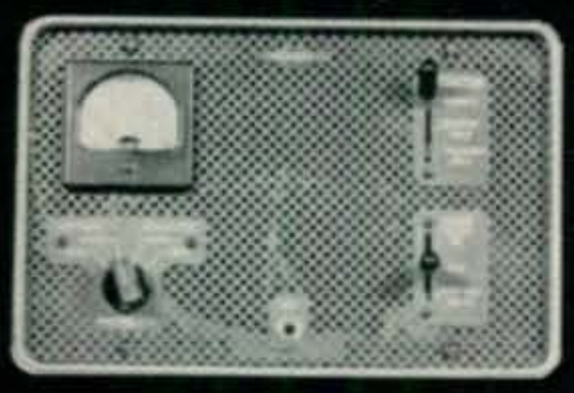
CQ

December 1959
50¢

The Radio Amateur's Journal

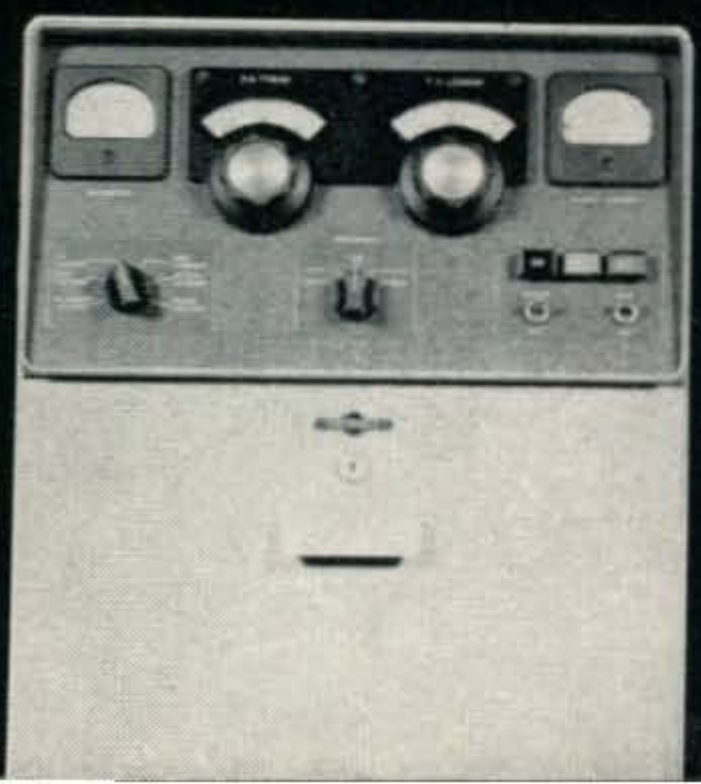
NO OTHER

GIFT



WILL GIVE

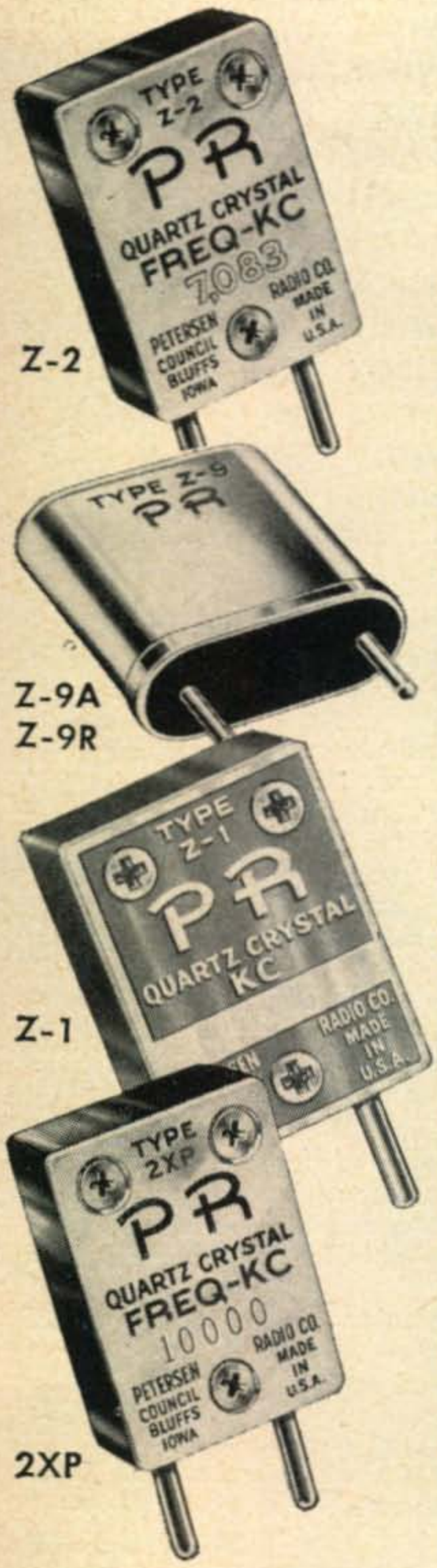
GREATER



PLEASURE

COLLINS

It pays to insist on PR *crystals*



STANDARD OF EXCELLENCE SINCE 1934

AMATEUR TYPES

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, hermetically sealed; ±500 cycles..... **$2.95 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. **$6.95 Net**

COMMERCIAL TYPES

Commercial Crystals available from 100 Kc. to 70 Mc. Prices on Request.

SPECIAL TYPES

Type Z-1 Aircraft

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

VHF Type Z-9R, Aircraft

For Lear, Narco and similar equipment operating in the 121 Mc. region, requiring crystals in 30 Mc. range. Each..... **$4.95 Net**

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Official assigned frequencies in the range. Calibrated to .005%.
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Channels 2 thru 13..... **$6.45 Net**

4.5 Mc. Intercarrier, .01%..... **$2.95 Net**

5.0 Mc. Signal Generator, .01%..... **$2.95 Net**

10.7 Mc. FM, IF, .01%..... **$2.95 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. (3rd Overtone) ±10 Kc..... **$4.45 Net**

ALL PR CRYSTALS ARE UNCONDITIONALLY GUARANTEED. ORDER FROM YOUR JOBBER.

TYPE Z-9R CITIZENS BAND CLASS "D"
FCC assigned frequencies in megacycles: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225; calibrated to .005%..... **$2.95 Net**

TYPE Z-9R RECEIVER CRYSTALS FOR CITIZENS BAND CLASS "D"—Specify I.F. frequency, also whether I.F. is above or below transmitter frequency. Calibrated to .005%. **$2.95 Net**

TYPE Z-9R RADIO CONTROL CLASS "C"
FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005%..... **$2.95 Net**

Type Z-6A, Frequency Standard

To determine band edge. To keep the VFO and receiver properly calibrated.
100 Kc. .. **$6.95 Net**

Z-6A

Silver Anniversary Year 1934-1959

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For further information, check number 3, on page 132

← For further information, check number 1, on page 132

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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 132**

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HEATHKIT®

HAM GEAR

"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**

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.

HEATHKIT DX-20 **$35.95**

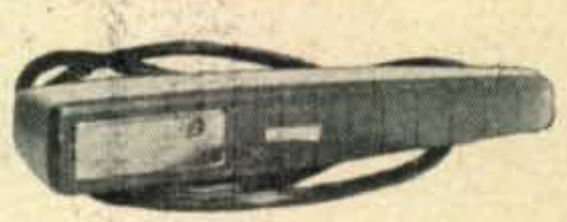
HEATH COMPANY Benton Harbor, Michigan a subsidiary of Daystrom, Inc.

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

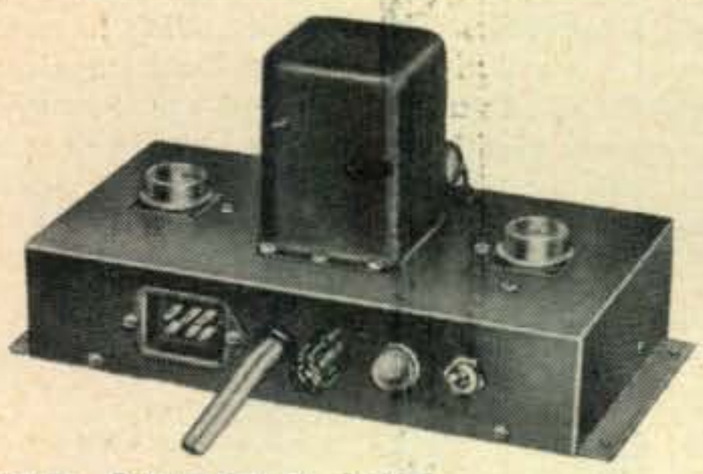
MOBILE SPEAKER KIT

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

HEATHKIT MP-1
$44.95



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.

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 3/8" 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.

Free Send now for latest Heathkit Catalog describing in detail over 100 easy-to-assemble kits for the Hi-Fi fan, radio ham, boat owner and technician.

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HEATH COMPANY BENTON HARBOR 12, MICH.

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NAME

ADDRESS

CITY ZONE STATE

QUANTITY	KIT NAME	MODEL NO.	PRICE

For further information, check number 5, on page 132

. . . de W2NSD

never say die

Geneva

The U. S. Delegates to the International Telecommunications Union conference at Geneva were faced with grim prospects with respect to most of our amateur bands and pessimism was the order of the day. They realized that ham radio is primarily a U. S. hobby and that, while there are amateurs in other countries, they are thinly spread and evidently do not carry much weight with their governments as a rule. Thus it seemed almost a foregone conclusion that other stronger and more organized interests would make mincemeat of us.

The pre-conference proposals pointed up the difficulty of the situation. The European countries were asking for 7100-7300 *kc* for broadcasting on a world-wide basis. India wanted to cut it down too. On Eighty we found that Argentina, in our own region, was requesting that the band be cut in half. Several countries went on record for cutting Ten Meters in half.

Though the final outcome of the conference won't be known until mid-December, we have about a 90% chance that the decisions made by the working committees of the conference will be upheld. And the decisions that have come out of the committees are indeed encouraging. With the exception of Forty Meters, we were able to hold our own right along the line. Before we start patting ourselves on the back for being recognized by the world as being valuable I would like to point out that in just about every case the amateur bands escaped plunder by either a fluke or by sheer luck.

One of the most important pressures that held things for us was the U. S. determination to keep the frequency allocations for *all* services unchanged. Though they appreciate ham radio there were far more (to them) important things at stake. If they had not been able to hold the line it would have been amateur radio frequencies that would have been the first to go.

It is interesting to observe the things that influence rather important decisions. The U. S. was able to win one important point by threatening to agree with the opposite side, thus winding up the work of a committee perhaps a month ahead of schedule. The opposing delegates protested over an Expresso about this and explained that if the U. S. delegates would only wait a week or so they would come around to their proposal, for after all the conference had two months yet to go.

Let's take a look at the bands, one by one. First comes 160 Meters. Pre-war ops will remember this as one of our most interesting and useful amateur bands. The wartime placement of Loran on 1850 and 1950 *kc* punched two 50 *kc* holes in the band. The eventual opening of two 25 *kc* segments for ham operation with reduced power did not provide enough frequency space for stations to populate the band. Loran is still grinding away on those channels and it looks like it will stay there for a long time to come. There are admittedly better radio-navigational systems, but we have so much tied up in Loran that we are apparently unable to change. 160 is unchanged.

One or two Region 2 countries (North and South America) threatened to upset the applecart for us on 80 meters by proposing world-wide cuts in the amateur frequencies. The U. S. position was that the world-wide allocations should remain unchanged and that we could come to an agreement within our region as to shared use of the band. The countries in question, possibly fearing what might come from allocation changes, which might easily get out of hand for them, agreed that the U. S. amateurs do not interfere with their fixed and mobile use of the top half of 80 and the battle was avoided. Countries in Region 2 can, among themselves, get together and establish sub bands in this frequency range, without making it a world-wide problem.

The major problem was 40 meters. The statesmanship of Al MacIntosh, head of the U.S. committee on frequency allocations and Prose Walker W4CXA had a lot to do with our retaining the entire 300 *kc* for Region 2. We knew that we would have to give in on changing the broadcast band to start at 7100 instead of 7150 for the rest of the world, so we were not really disturbed when we had to give in on this point. One probable factor in convincing the other countries to allow Region 2 amateur operation in the 7100-7300 *kc* band was the alternate prospect of competing with the high power VOA transmitters which would immediately move into the band. They no doubt felt it would be easier to live with an occasional ham kw than a lot of 100 kw transmitters. Obviously the other countries had not thought of this turn of events when they proposed the removal of the U.S. amateurs from the band.

One thing we can do is to monitor the 7000-

If it weren't for Amateur Radio 25 years ago, there'd be no Eimac tubes today..

Twenty-five years ago W6UF and W6CHE were unhappy with the way final amplifier tubes were per forming. They decided to do something about it. They founded a company and called their product Eimac tubes.

What has happened since is reviewed in part on these pages. At Eimac W6UF and W6CHE, and 12 other amateur radio operators are on-the-air getting just as much of a thrill out of their hobby toda as they did then and enjoying it much more.

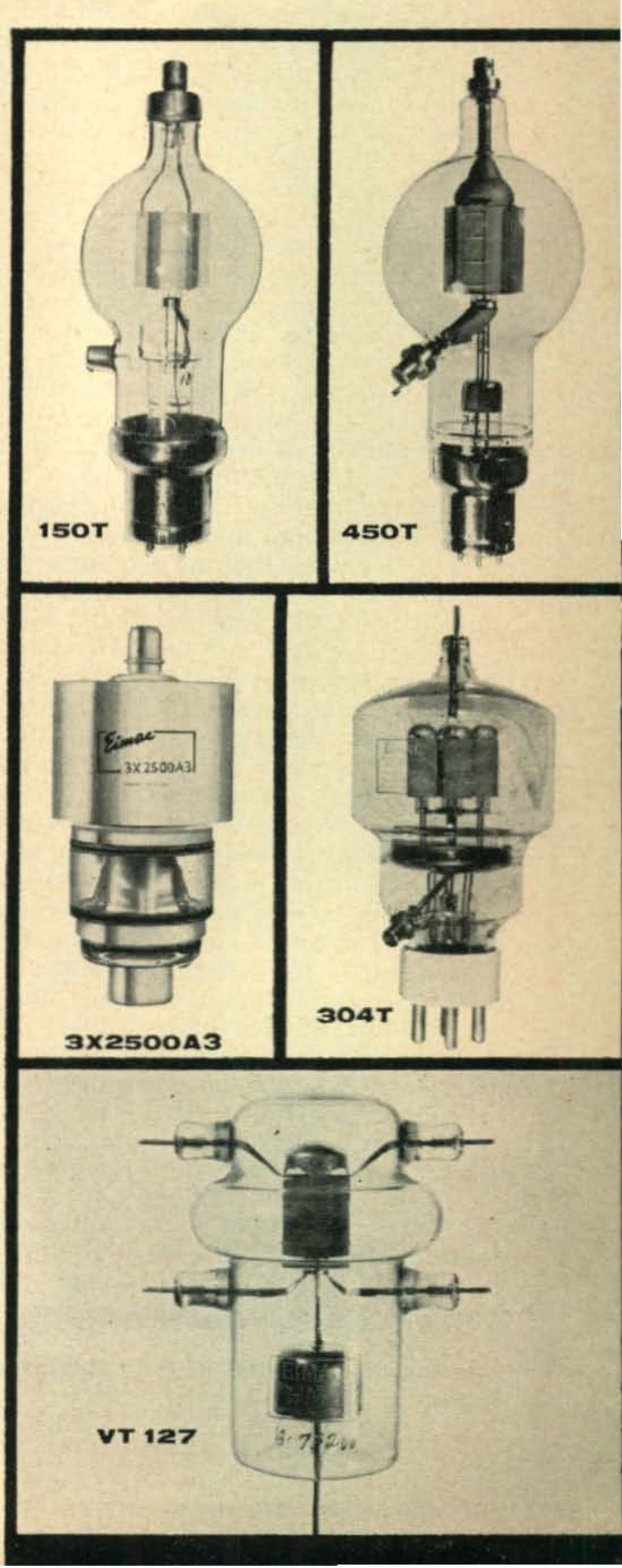
150T "The only tube the low power man can buy, yet still use effectively at higher power" was the case for the first Eimac tube, the 150T triode, in 1934. It was designed primarily for the amateur and established Eimac tube characteristics for the future—clean, hard vacuums, simplified design, lower driving power, high mutual conductance and superior overload capability.

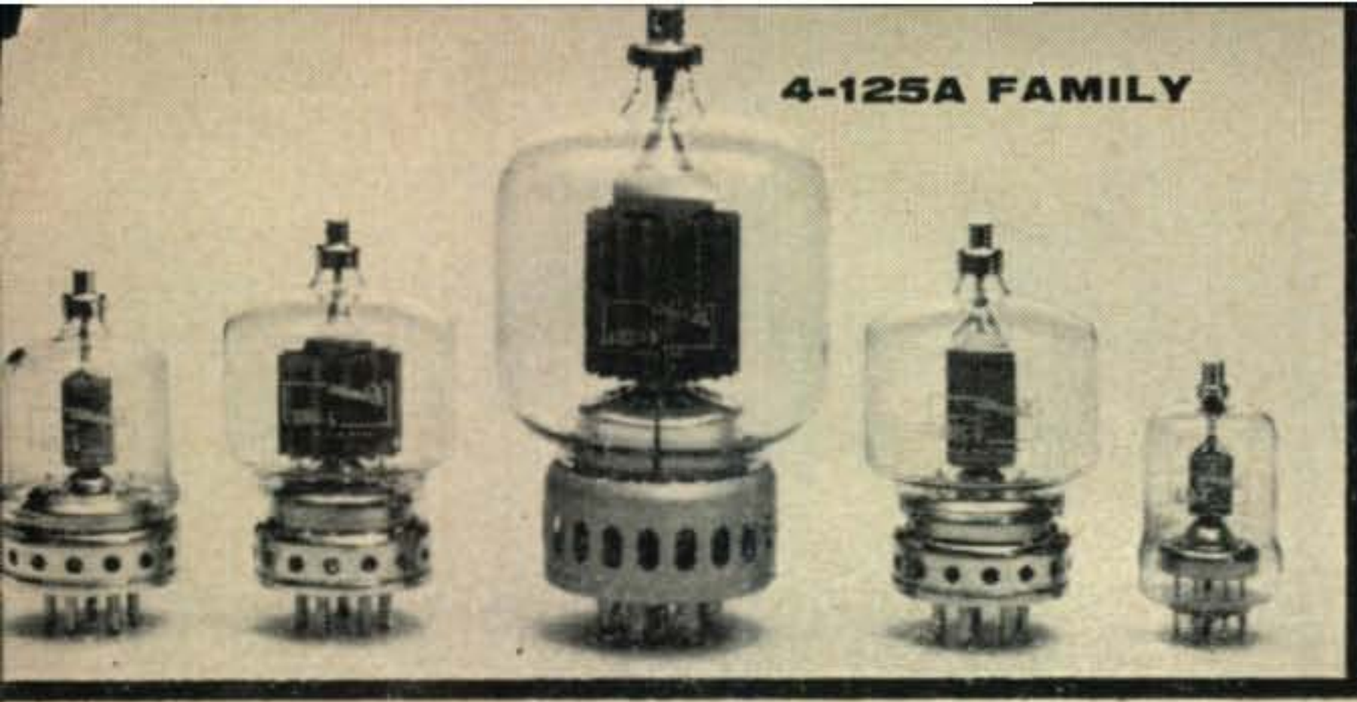
450T Only two years later in 1936, the statement could proudly be made that "practically every major airline uses Eimac tubes." The 450T triode had captured the imagination and fulfilled the critical desires of aviation and was first choice in ground-to-air communications. It featured a new type thoriated tungsten filament by Eimac ending premature emission failures and guaranteed never to fail because of gas released internally. Later, in 1938, Eimac tubes went into TV service at Station KTSL.

3X2500A3 FM and Eimac tubes were together from the start. By the time Major Armstrong had convinced the world that FM was a great advancement in broadcasting, Eimac tubes were in nearly every experimental FM broadcast station in the nation. The first tubes used were the internal anode triodes. In 1945 the external anode triode 3X2500A3 was introduced and subsequently used in the world's most powerful FM transmitter —50,000 watts.

304T In 1940 the Eimac multi-unit triodes made their debut to provide a high power, low voltage tube with uncommonly low internal resistance which would operate efficiently up to 200mc. In actual service the tubes operated with as much as 20,000 volts on the plate—10 times the rated voltage. The 304T, four triodes in one, was then and is now acclaimed as a top linear amplifier tube.

VT 127 The Navy held its first sea radar tests in 1939. Generating the power were Eimac 100T triodes. Two years later when World War II started, this equipment was the prototype of the first radar to see action in the Pacific. Airborne radar with its demands for smaller antenna meant higher frequency operation. The Eimac 15E met all requirements and made possible 26,000 radar sets used universally by the Navy. Said the Navy, "No other single type of airborne electronic equipment contributed as much." Many of the renowned VT series radar tubes were another Eimac contribution.





4X150A

4-125A FAMILY (5 TUBES) In 1945 Eimac led in power tetrode development with the introduction of the 4-125A as the first of its radial-beam family. These tubes set the standard for the tetrode art and are known for their low driving power requirements, low grid emission, low grid-plate capacitances, minimized neutralization requirements and dependable VHF performance.

4X150A Radial-beam power tetrode advantages in the rugged, compact external anode package was introduced by Eimac in 1946 with the 4X500A followed closely by the incomparable 4X150A. This unique approach enabled smaller, high power, high frequency equipment and coaxial cavity circuits. The Eimac 4X150A has since become the most copied of transmitting tubes and father of the modern 4CX250B and 4CX300A.

AMPLIFIER KLYSTRON Despite its reputation in leading tetrode development and manufacture, Eimac saw the shortcomings of grid tubes for UHF, in 1948, and started a development program in amplifier klystrons. The result — Eimac external-cavity ceramic klystrons — the most extensively used tubes in tropospheric communications. From the initial Pole Vault system to White Alice and NATO, these klystrons are unrivaled.

4CX300A, 4CX250B, 4CX1000A, 4CX5000A Ceramic is replacing glass in the Eimac tube line-up. Over 40 tube types now have the advantages of the ceramic envelope. Its ability to withstand thermal and physical shock has application benefits. Other extras are also built in, such as smaller size without power sacrifice, high temperature and precise tolerance processing.

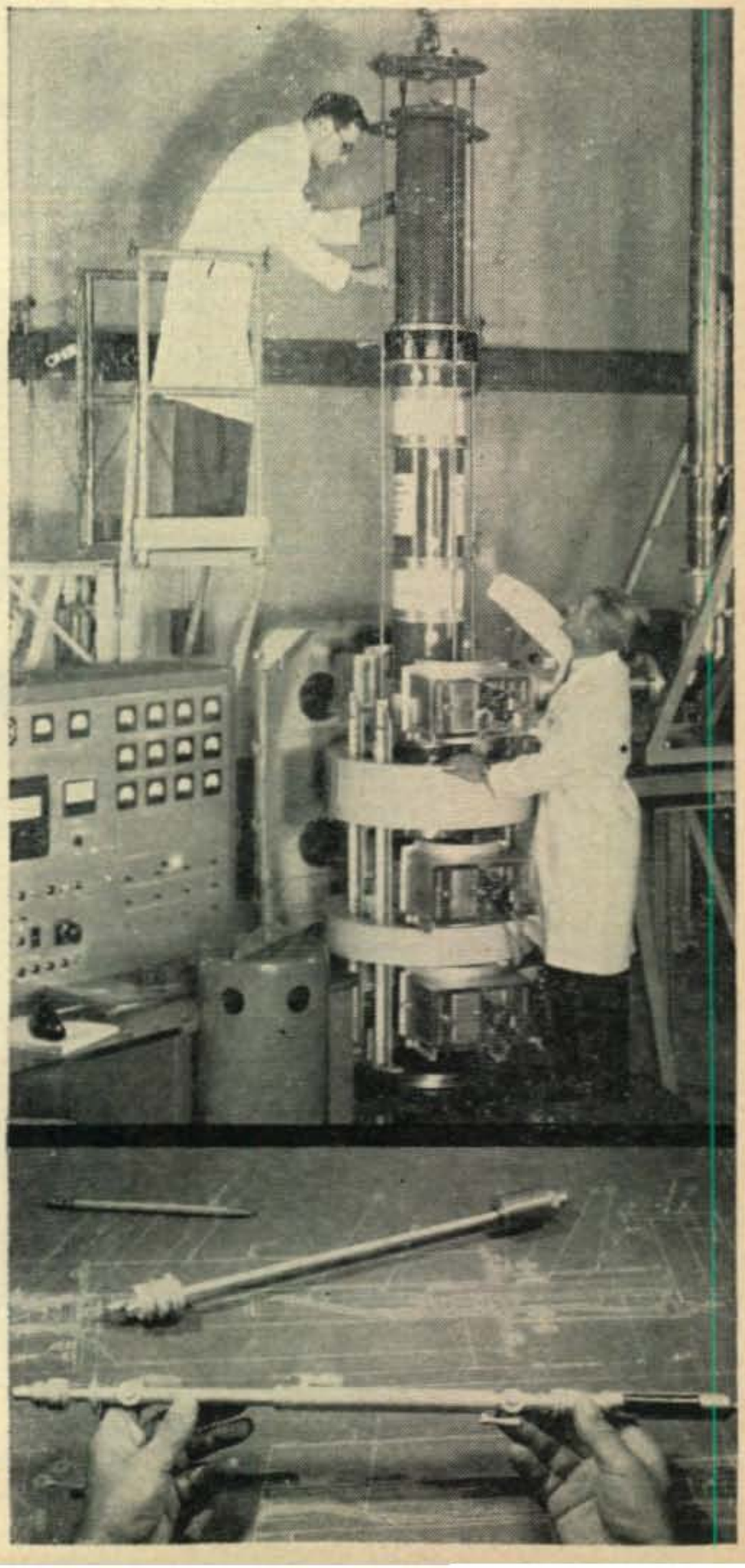
X626 Super power, 1.25 megawatts of long-pulse power, at UHF is now available with the Eimac X626. In Ballistic Missile detection and tracking, or interplanetary DX, (this tube holds the record to Venus and back — 56,000,000 miles), the X626 is now an important part of our space age.

TWT Now, microwave in the form of ceramic traveling wave tubes and reflex klystrons. Eimac is engaged in the development and manufacture of new electron devices to propagate the uncrowded spectrum at Super High Frequencies and above.

The dependable tubes of yesteryear have not been forgotten. They are constantly improved. Most of the oldtimers on review here are still available and many are replacements for originals that have finally given in after years and years of service.

EITEL-McCULLOUGH, INC.
San Carlos, California

X626



TWT

For further information, check number 6, on page 132

-7100 *kc* band and put in official protests to the State Department every time we spot a broadcast transmitter in that band. These official protests will be difficult for the offending governments to answer and may eventually do some good. There are several countries that are illegally broadcasting there. Also, we can watch the 7100-7300 *kc* band for any broadcasts directed at the U.S. This band is not to be used to transmit into Region 2 and any broadcasts directed into the region are in violation of the treaty and should be protested. Tape recordings of such violations would be helpful.

The main arguments about 20 meters were inspired by Australia and India. Australia proposed cutting the band down to 14,250 *kc* and India to 14,200 *kc*. The Australian delegates were not too well able to push their government position since they had had quite a hassel at home over it. The proposals were developed by the Post Office in secret and sent to Geneva without being announced at home. When the amateurs found out about it they raised Cain. They got in touch with their Parliament representatives and really shook things up. As a result the delegates were not ready to put up quite the fight for their position that they might have had they been backed at home. India had made a quite unpopular request for the 80 meter band to be cut down to a 10 *kc* width and thus did not get as much consideration as they might have for the 150 *kc* they wanted to allocate to fixed services out of the 20 meter band.

One important factor that greatly benefitted us was the agreeableness of the U.S.S.R. They were in favor of unchanged amateur bands and this made a tremendous difference. We were unable to know that this would be their position until the conference actually got going, since they are at times unpredictable. It is quite possible that the friendly atmosphere created by the Kruschev visit aided us somewhat.

On Ten Meters, when the chips were down, only Japan and France wanted to stick by their guns. This was resolved by their agreeing to run their other services in the band on a non-interference to the amateur service basis. The amateur band would stay the same world-wide.

On the whole then, we came through this conference, barring any last minute changes of heart, with hardly a scratch. Our laurels are already flat from long sitting and we should take the hint. We had the right men at the right spots and general world support to pull us through this time, but everyone can see the handwriting on the wall. If we are to pull through again it will be only because we have taken stock of ourselves and made some painful changes.

In discussing what changes would be in order many suggestions have been brought up. Some feel that a voluntary drop in our power limitation would make for better feelings abroad. Others suggest a stricter licensing system for

THOROUGHBRED

...New SX-111 Receiver...

$249.50

The team that designed the famous SX-101 now brings you an entirely new class of precision receiver at a moderate price.

Objective: bring the advantages of Single Sideband to thousands more *without sacrificing performance.*

Hallicrafters' answer: SX-111 . . . brilliant offspring of the incomparable SX-101—a receiver that *retains the essential performance characteristics of the acknowledged leader* but at a price that can put it in your shack tomorrow.

STUDY THESE FEATURES

- **CW • AM • SSB reception.**
- **Complete coverage of 80, 40, 20, 15 and 10 meters in 5 separate bands plus 6th band tunable to 10 Mc. for WWV.**
- **Hallicrafters' exclusive upper/lower sideband selection.**
- **Sensitivity: 1 microvolt on all bands. 5 steps of selectivity, 500 to 5000 cycles.**
- **Exceptionally high mechanical and electrical stability.**
- **Dual conversion. Crystal controlled 2nd converter.**
- **Famous Tee-Notch filter.**
- **Calibrated S-meter, series noise limiter.**
- **10 tubes plus voltage regulator and rectifier. Operates from 105-125 volts, 50-60 cycle A.C.**
- **Built-in crystal calibrator. 48:1 tuning ratio.**

For further information, check number 7, on page 132

The new ideas in communications are born at . . .

hallicrafters

Chicago 24, Ill.

Export Sales: International Division,
Raytheon Mfg. Co., Waltham, Mass.
Canada: Gould Sales Co., Montreal, P.Q.

our operators, more in line with the license exams in other countries. There is almost universal agreement that we should put more emphasis on being technicians and building our own equipment . . . the feeling being that we are becoming largely a group of people who have a hobby of sitting around talking to each other. Unfortunately this is a not too distorted picture of our hobby at present.

The F.C.C. has been aware of many of these arguments and has had the desire to do something about it, but has been cautious about doing anything which would create a storm. Our governmental system whereby storms can be very embarrassing to governmental employees results in extreme caution on their part, with a result of very little forward motion. If there is to be any change in our hobby I am afraid that it will be up to us as amateurs to initiate it. I feel that CQ, as a communication medium for the hobby, has a responsibility to help in whatever way it can, though, like the governmental employees, we have to be careful not to raise too many waves lest they drown us.

The public reaction to my editorial on the QCWA proposal for reallocation of sub bands is a case in point. Though I was merely reporting the thoughts of others I received many fierce and bitter letters attacking me for being anti-CW. None of the writers seem to have actually read the editorial, but apparently heard somewhere that I was proposing expansion of the phone bands and thought I should be lynched immediately before I stirred up any more trouble. My thought was that perhaps we should investigate the actual use of our bands and see if the present sub band allocations were adequate. In the light of that reaction I hesitate to think what would happen should I suggest that AM be abolished from 20 meters and only sideband be permitted. What would be the reaction should I suggest that clubs set up technical inspection committees which could visit amateur stations and check them for violations of the F.C.C. regulations (such as overpower) and report offenders to the ARRL and CQ for possible revocation of awards. No, I think I'll not suggest anything like that.

One of the most important moves toward intercountry solidarity would be the approval of the U.S. of reciprocal licensing. It is indeed unfortunate that we have let the present rules go this long without modification to permit the F.C.C. to license foreign hams for operation in the U.S. at their discretion. There seems to be a good possibility at this time that the Communications Act of 1934 will be changed during the next Congress to effect this. If any general support of a measure is called for we will try to let you know through the pages of CQ and the monthly Club Bulletin what steps to take. In the meantime, if you meet any Congressmen make good friends of them, we'll be needing their help.

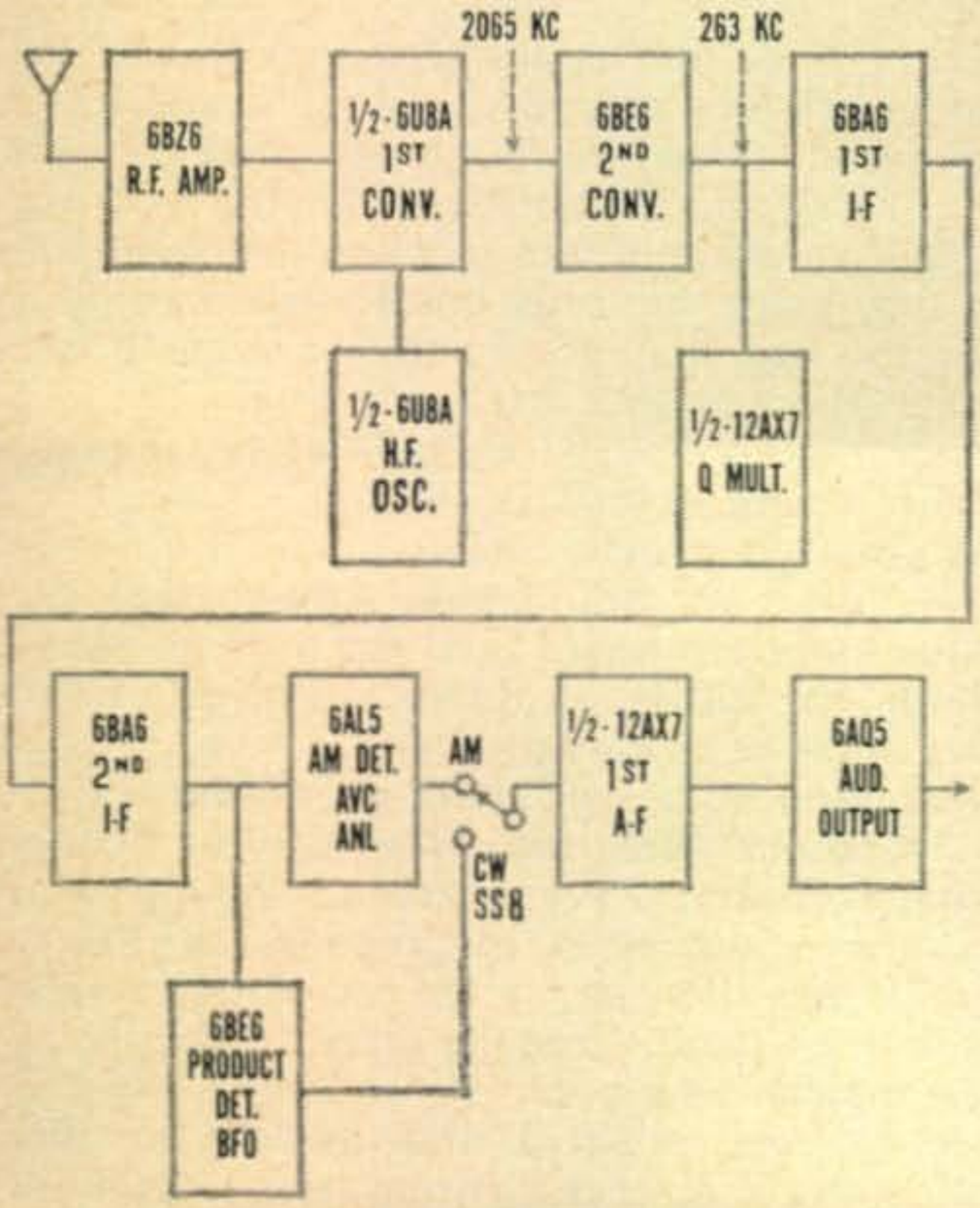
[Continued on page 102]

new

amateur communications receiver

GONSET G-63 RECEIVER

G-63 BLOCK DIAGRAM



Gonset presents . . .

G-63, designed to give you the greatest number of features obtainable in any amateur communications receiver within its two hundred dollar price bracket.

G-63 gives you six amateur bands, 80 through 6 meters . . . each separately viewable on calibrated drum dial scale . . . every band . . . *including 6 meters* . .has excellent sensitivity and signal-to-noise ratio!

The receiver features double conversion for high image rejection . . . multiple, band-pass tuned circuits in the second I-F for optimum shaping of I-F selectivity curve . . . a new peaking-type "Q" multiplier provides variable band width down to near 100 cycles. *Two* second detectors—*diode* for AM and a *product detector* for SSB and CW reception. Stability and drift-factor of both high frequency and beat frequency oscillators is excellent. Refer to the accompanying block diagram for further circuit details and tube lineup.

Available at your Gonset distributor during March, 1960.

For further information, check number 9, on page 132

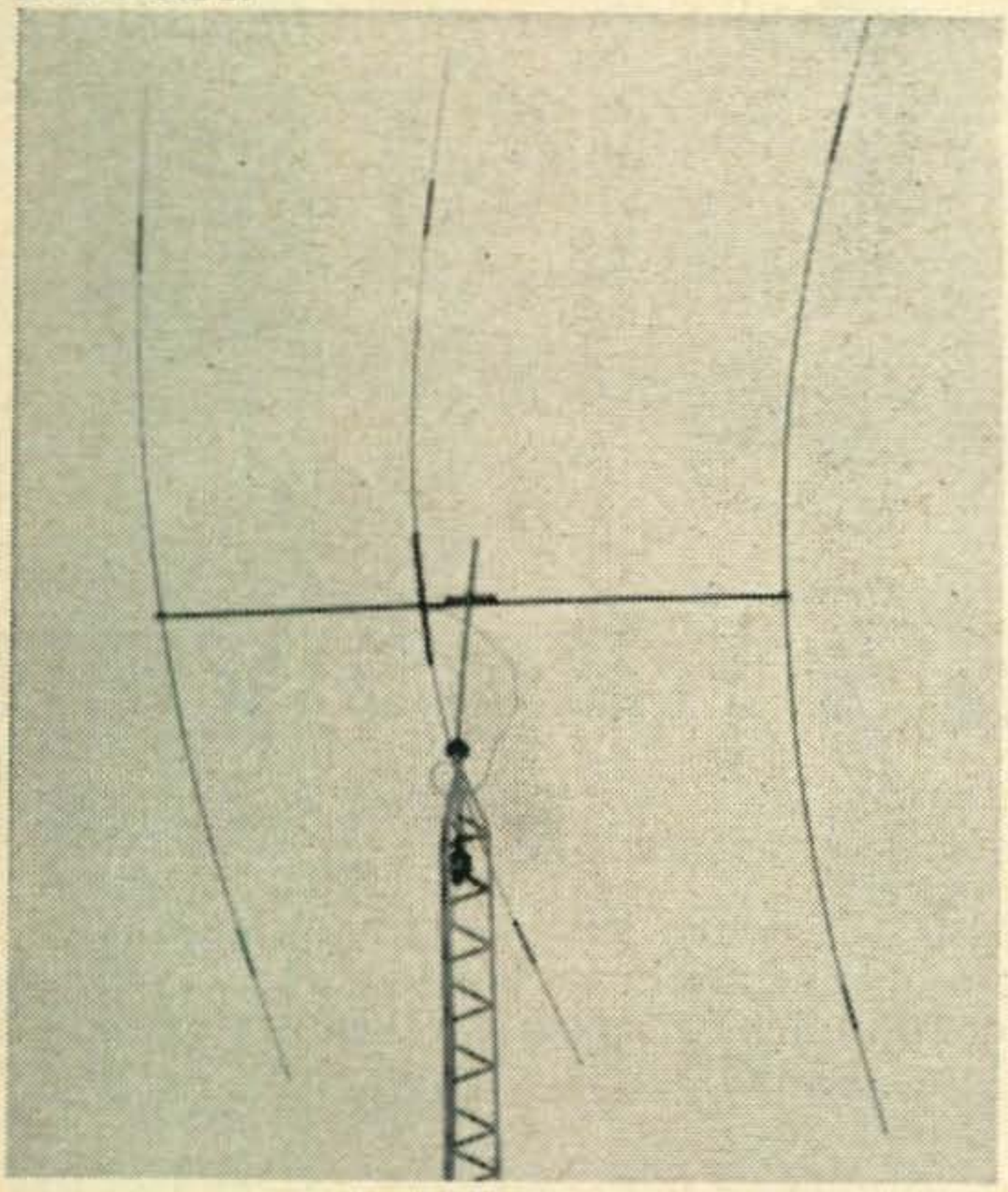
There's No Biz Like Ham Antenna Biz! . . .

Our apologies to Ethel Merman, Georgie Jessel, Tin Pan Alley, *et al*, but there is a striking similarity between their business and ours. We, too, get an occasional over-ripe cabbage tossed at us. (Like all good troupers, though, we don't duck because the produce thrower's aim is most always way off!)

But these gratuitous discourtesies are overwhelmed by the *kudos* that constantly come our way. Why they make working almost fun! Some days we go home positively glowing—and we haven't stopped off somewhere, either!

Like yesterday, for example . . .

Bob Hoffer, K9KKK, sent us a card and a snap-shot of his MOSLEY Trap Master Beam. Here's the snap and we quote *verbatim* from Bob's card:



Bob says, "*The picture was taken during a 50–60 mph wind hr. The beam suffered no damage. It works tremendously for me. The beam is at 70 feet. Make mine Mosley.*"

Since Bob—in addition to obviously being a fine fellow—is crowding DXCC, has WAC Phone, WAS Phone and goodness knows what all, we think his opinion of our Trap Master Beam means a great deal.

That picture isn't to be sneezed at, either.

Feenix, Ariz

Deer Hon. Ed:

Have you ever been in posishun of sitting on stick of dinamite, and not knowing if fuse being lit or not? That where Scratchi sitting right now. It same feeling you getting when you discovering you have been having QSO outside of band, then you sitting back for cupple weeks waiting for card from FCC monitoring stayshun, not knowing if they are heering you or not.

In fackly, it are eggactly that posishun Scratchi being in rite now. Are keeping eye on male and if getting wrong kind of letter from FCC, I are taking off for some remote southsea eyeland post-hasty. No, Hon. Ed., it not for operating off-freakwency. It for something much worse.

Let's starting at beginning. Cupple days ago a cupple of the local amchoors coming over to chewing Hon. Rag. We sitting around in shack, and first thing we discusting are all the trubbles we having with our rigs. Each one telling others how to fixing there rig, and others not agreeing, so natchyourally we soon having 1/c argewment.

About this time desiding we all thirsty, so Scratchi bringing out good old thirst quencher, slitely aged cacktus jooce. Shortly after this, we forgetting all about trubbles we having with our rigs, and we start to telling jokes. We telling at least fifty jokes, but only one I remembering is about the egg that asking the sawsage if the sawsage thought that everyone ought to be a sawsage, and sawsage saying that he thought everyone ought to link for himself.

As you can planely seeing, Hon. Ed., even at this point we should have known that the cacktus jooce are being aged for to long. Howsumever, we still being thirsty, so having more of the slitely aged cacktus jooce.

Next thing we talking about is Crismus. Lovely old Crismus. How nice Hon. City of Feenix looking at Crismus. Pretty green, swaying palm trees. Acres and acres of green grass. Pretty Crismus tree lites across the swimming pools, with pretty Crismus tree lite colors reflecting in water of swimming pool.

Feeling real poetical and mellow at this point. Getting in reel Crismus spirit. Making

[Continued on page 20]

Man's desire to communicate still offers our greatest opportunity to achieve peace on earth and good will toward all mankind

Merry Christmas and

Happy New Year

hallicrafters company

. . . and 73 from

W. J. Halligan W9AC Bud Halligan Jr.

For further information, check number 11, on page 132

CLUB BULLETINS

Marvin D. Lipton,

311 Rosemary Road, Toronto 10, Ontario, Canada.

DX Clubs Only

It never rains but it pours. Such was the case last August when we printed, in *CQ NEWS*, a request from overseas clubs for used ham call books. The response was so good that we now have a greater supply than demand. If your club would like a recent call book, send in your address. Overseas clubs only, please.

Taped Programs

Grant Jung, KØSFX, 800 Cedar St., Charles City, Iowa, answered our call in the October column for a librarian to keep a running catalogue of available tapes of club programs. If your club has a special meeting on tap, tape it and let Grant know about it. That way it will be reported in our *Tapes Available* column in *CQ NEWS* and other clubs might share your speaker, etc.

Tips

Club editors frequently ask me for suggestions regarding the improvement of their journals. Since each case demands individual attention, there are few general remarks that can be made here. However, I believe that an editor serves little purpose by reproducing contents and contest results as they appear in the 2 U.S. amateur radio magazines. Second hand news is seldom of interest to readers. On the other hand, a conscientious editor might subscribe to a foreign amateur radio publication, such as the *R.S.G.B. BULLETIN*, and discriminately, copy odd pieces of eminent news. May I caution you to carefully determine if the material is copyrighted before you set out to duplicate it. Unless the author and publisher consent, it is illegal to reprint copyrighted matter.

Newspaper Publicity

Another request constantly reaching me is one that concerns newspaper publicity. There is no special way to gain admission to the local press, but if you are considering submitting an article for publication, here are a few hints: Make a survey of the paper beforehand to learn on which week days the paper is smallest. On these days when international and local news is at an ebb, send your selection in. In any event, it is a good idea to put the city editor on your club paper's mailing list.

Membership Mounts

Wayne's plug in his September editorial gave

Well worth its wait!

Available to you February 1, 1960

GONSET MSB-1

MOBILE SIDEBAND COMMUNICATOR

Priced at 795.00 . . .
it's sure to be 1960's biggest value.

(Price includes 12V DC transistorized power supply)

Features . . 125 watts P.E.P. input . . . Upper and lower sideband and CW . . .

All-band operation — 10 through 80 meters . . . High stability VFO . . .

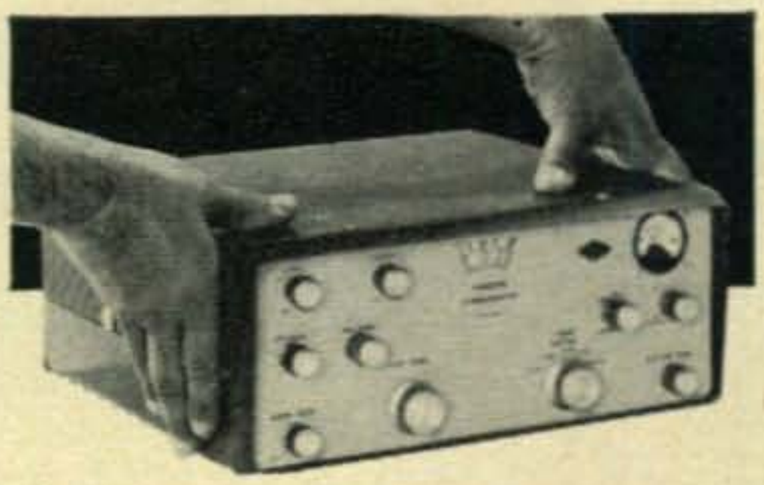
VOX and push-to-talk . . . Receiver sensitivity better than 1 microvolt . . .

9 mc band-pass crystal filters for transmitting and receiving selectivity . . .

100 kc crystal calibrator . . . Size of MSB-1 housing, 5" x 12" x 12" . . .

Weight 15 lbs. less power supply . . . Both AC and DC power supplies available

COMPACT



Highly compact, MSB-1 mobile transceiver is only 5" high, 12" wide and 12" deep. Fits conveniently under dash of car . . . makes a fine showing too on any well appointed operating desk.

Prices and specifications subject to slight revision.

For further information, check number 13, on page 132

GONSET **GONSET** *Division of Young Spring & Wire Corporation*
801 SOUTH MAIN ST., BURBANK, CALIFORNIA

EXPORT SALES: WESTREX CORP., 111 EIGHTH AVE., NEW YORK 11, N.Y.

our mailing list a shot in the arm, and we are happy to declare the following, new members: **Spartan Wireless Club,** Michigan State University, **The Groundwave,** Air Capital A. R. Ass'n., **Radio Amateur Mc. Soc., Newsletter,** Southgate Finchley Group R.S.G.B., **San Francisco A.R.C. Bulletin,** San Francisco A.R.C., **Nipper's Bark,** A.R.Soc. of Harrison, **Keyer,** Ventura County A.R.C., **Harmonic Splatters,** West Valley R.C. Inc., and **Androscoggin A.R.A.**

73, Marv, VE3DQX.

SCRATCHI *[from page 16]*

toasts to things. Toast to dee-x. Toast to Arizona Kilowhats. Toast to Callyfornia kilowhats (being low-power Arizona Kilowhats). Toast to toobs. Toast to transisters. Toast to tunnel diodes. Toast to man who knowing what is a tunnel diode.

Toast to cacktus. Toast to cacktus jooce. Toast to Crismus. Toast to Crismus cards. Right then, Hon. Ed., right then fun are beginning. You seeing, I are having my Crismus cards right in Hon. Shack, in plane view. Each card neetly folded and in envelope, and each envelope having reel nice return address on it. Everything there but address of person Crismus card going to.

So, we desiding to addressing Crismus cards. Thinking back on hole affair, I not at all surely that I desiding to addressing Crismus cards, but other fellers are going ahed and addressing Crismus cards. My Crismus cards. So, not wanting to looking silly and just sitting there, first thing you knowing Scratchi are sitting there addressing Crismus cards.

Now it are no easy task to addressing cupple hundred Crismus cards, espeshyoually when are just toasting so many things in cacktus jooce. So, by time all cupple hundred cards are addressed, party are braking up, and last thing I remembering are one feller leaving all cupple hundred Crismus cards, saying he maleing them for me.

Next morning, late, when getting up and remembering what happening, I not to worried, except about having to by cupple hundred more Crismus cards. No indeedy, what worrying me are fone call from feller what leeving with Crismus cards. He telling me he maleing them all okey, and he wanting to say he thinking that local FCC commishener are reely going to liking getting Crismus card from good old Scratchi.

Hon. Ed., that are the dinamite I talking about earlier. Local FCC feller will be reely happy to heering from Scratchi for one small reeson. Not having lisense and operating bootleg for past cupple months. All he needing is nice Crismus card with my address. Scratchi reely being QRT if he getting that card.

Only one ray of hope. Maybe Hon. Postoffice not being able to reeding address on

[Continued on page 102]

IT'S HAMMARLUND...
for SSB at its very best!

the
ALL-NEW HQ-180
for general coverage

An advanced design 18-tube superheterodyne receiver with full dial coverage from 540 KCS to 30.0 MCS. Bandspread on all amateur bands within frequency range of receiver.

$429.00 (Optional clock-timer, $10.00)

the
PROVED CHAMPION
*of amateur band receivers—***HQ-170**

No amateur receiver has ever gained as fine a reputation as the HQ-170. A 17-tube superheterodyne receiver tuning the 6, 10, 15, 20, 40, 80 and 160 meter amateur bands.

$359.00 (Optional clock-timer, $10.00)

Hammarlund shows the way to new standards of performance in SSB with the HQ-170 and HQ-180 receivers. These receivers incorporate the Hammarlund slot filter that allows attenuation up to 60 db for razor-sharp tuning, selectable sideband, selectable IF amplifier tuning, separate product detector, BFO control, crystal calibrator, selectable rates of AVC and other advanced features. Pick the one that suits you best. You can't buy better, or be more satisfied than with a Hammarlund SSB receiver ... they're tops!

HAMMARLUND
MANUFACTURING COMPANY, INC.
Established 1910
460 West 34th Street, New York 1, N. Y.
In Canada: White Radio, Ltd., 41 West Ave., N. Hamilton, Ont.

A HALF CENTURY OF QUALITY PRODUCTS — 50th Anniversary

For further information, check number 15, on page 132

QSL contest

Winner

We don't know just why, but K6TQR's colorful pictorial of San Frans' Telegraph Hill really caught our eye. Sooo, to you, Mr. Thompson praise and glory (not to mention loot in the form of a subscription to your favorite ham magazine).

Losers

Since this is the place where second best is good enough, we present more meritable entries from K2OLS, VU2EH and XE1CCP.

Keep those QSL's a-comin, lads. We've plenty more subs to give away. Keep your QSL editor busy. Help him earn his paycheck each month.

For further information, check number 17, on page 132

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.....

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. SORRY: INFORMATION AND DELIVERY DATES ON THESE NEW ITEMS NOT YET AVAILABLE. For further info, check No. 18, on page 132.

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A subsidiary of Zenith Radio Corp.

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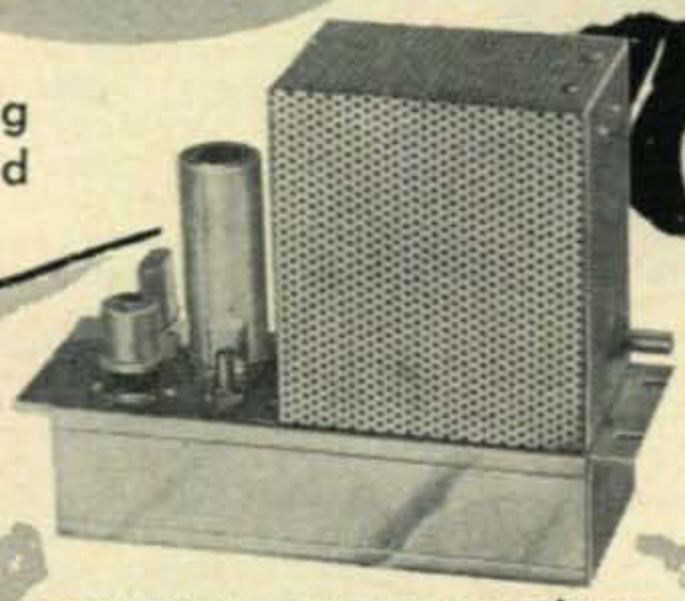
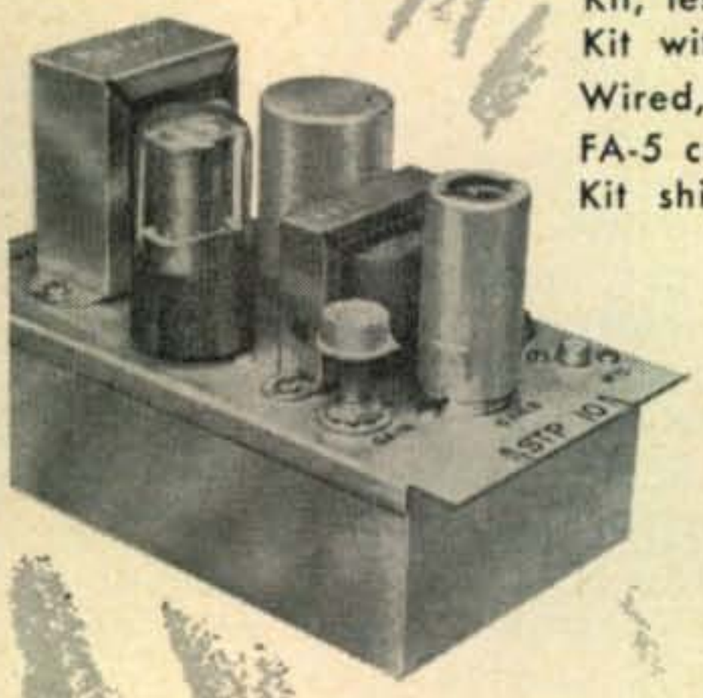


STP-50 6 meter transmitter

Kit, less tubes & crystal, $21.50
Kit with tubes, less crystal, $26.50
Wired, with tubes, less crystal, $32.50
FA-5 crystal, 12MC, $4.00
Kit shipping weight 5 lbs.

FCV-2 CONVERTER

Model 50, 6 meters. Model 144, 2 Meters. Kit with crystal, less tubes, $12.95. Wired and tested, with tubes and crystal, $17.95. Shipping weight, 2 lbs.



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10 WATT MODULATOR

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FOR AMATEUR USE ON 6 METERS OR 10 METERS. Tunes 300 KC portion of the band for which the unit is ordered. (Specify portion of band desired when ordering. Complete kit with 3-way power supply for operation on 6 volts DC, 12 volts DC or 115 volts AC, $98.00.
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For further information, check number 19, on page 132

The World's Most Popular Antenna . . .

The hy-gain VERTICAL

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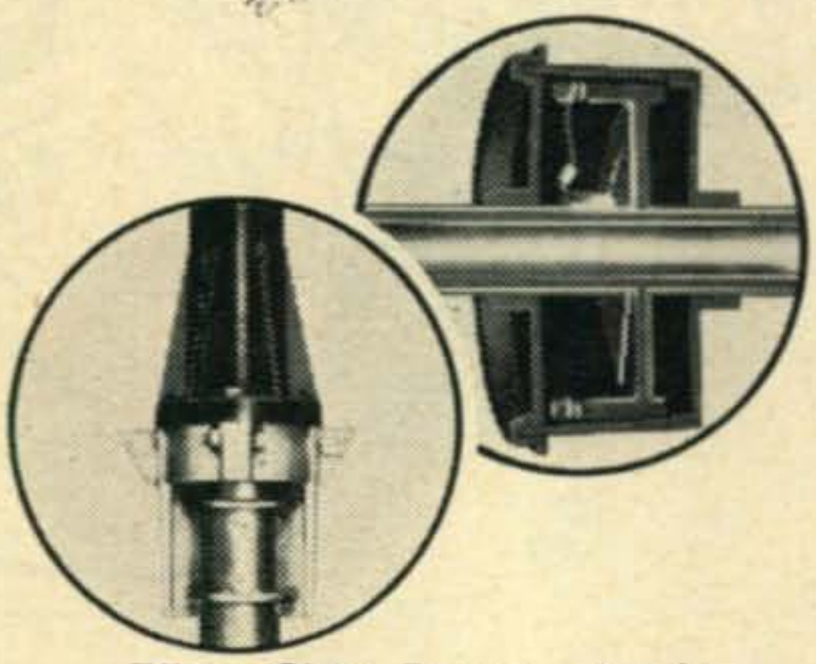
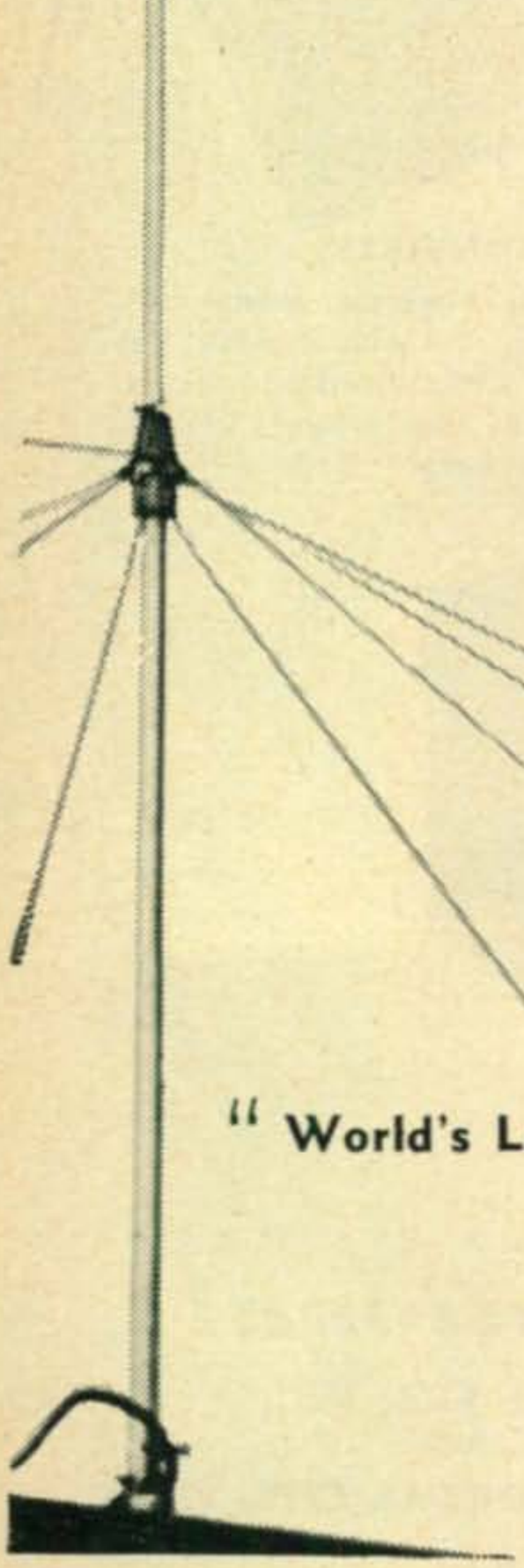


Fiber Glass Impregnated Nylon Base Assembly makes possible self support. Heavy cast aluminum mounting bracket is adjustable for various sizes of mast. Weatherproof internal coaxial fitting supplied.

The Hy-Gain Insu-Trap acts as an insulator at resonant frequencies, but allows radio energies of other frequencies to pass, making the Insu-Trap an automatic electronic switch which isolates various sections of the verticals to make them the proper length for each band. Exclusive adjustable capacitor plates are used, individually factory resonated for efficiency in high degree. Traps are completely weatherproof and airtight. Carbon activated polyethylene cover and cap. Traps rated to take full maximum legal input power. Just 2x3", trap's weight only 8 oz.



The Self-supporting Hy-Gain Multiband Trap Verticals are completely factory pre-tuned with no further adjustment necessary, maintaining an SWR of 2:1 or less across the entirety of each band for which they are designed. 52 ohm coax feed line. True ¼-wave marconi resonance on each band makes possible low angle DX radiation pattern. All top-grade construction throughout. Model LC-80 Loading Coil **($4.95)** adds 80M operation to the 14-AV Vertical. Decoupling stub **($4.95)** adds 6M operation to both models 12 and 14 AV.

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12-AV Vertical

for 10, 15 and 20 meters; only 13.5' high, wt.: 12 lbs. Self suporting.

Combination mast & Radial roof mounting kit, complete, **$8.95.**

14-AV Vertical

for 10-40 meters; 21' high; wt.: 13 lbs. Includes exclusive Hy-Gain Capacity Hat.

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Combination mast & radial roof mounting kit, complete, **$9.95.**

" World's Largest Manufacturer of Amateur Communication Antennas! "

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For further information, check number 20, on page 132

the leader in the field of amateur radio equipment . . .

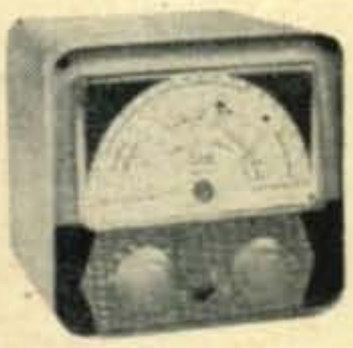
90w CW; 85w PHONE

Globe Scout Deluxe

$149.95

Smartly styled, compact, versatile transmitter with built-in power supply. Outstanding features include straight through operation of final amplifier, high level plate modulation, NEW WIDE RANGE pi-net on 10-80 meters — link coupled on 6 with front panel loading adjustment and many others.

Next Step Up — Add Globe's VFO-755A

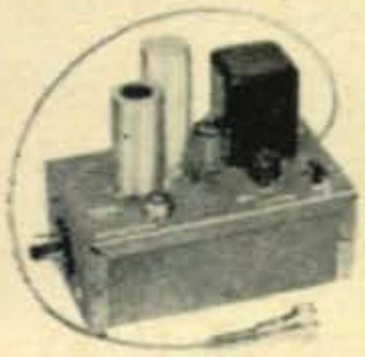


For 10-160M, complete with power supply with voltage regulation. Output: 40 and 160M. Vernier Drive. 13:1 tuning ratio. Approx. 50 RF volts output. Temperature compensated.

Wired: **$59.95**

Kit: **$49.95**

And the Speech Booster FCL-1



Peak limiting audio preamplifier for preset amplitudes. Increases modulation intensity. Includes audio harmonic suppression.

Wired: **$24.95**

Kit: **$15.95**

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For further information, check number 21, on page 132

Honoring 1958 Award winner Julius M. J. Madey, K2KGJ, spotlighted the public-service work of all radio amateurs. Here L. Berkley Davis, head of General Electric's Electronic Components Division, presents the young New Jersey ham with his Edison trophy, earned by handling over 12,000 messages to and from isolated American personnel overseas. Looking on is Captain Robert H. Weeks, Assistant Director of Communications for the U.S. Navy, which has publicly commended Madey.

JAN. 4 LAST DAY FOR EDISON AWARD NOMINATIONS

Letters naming candidates for the 1959 Edison Radio Amateur Award must be postmarked not later than Jan. 4, 1960, to receive consideration by the panel of judges.

Award nominations come only from letters written by you and others. In view of this, you will be rendering an important service to the entire amateur group by choosing a suitable candidate and sending in a letter describing what he has done. Do this now! Time is growing short.

In doubt about what qualifies an OM or YL for the Award? Read the list of representative activities at right. For rules of the Award, see the October issue of this magazine, or write to *Edison Award Committee, General Electric Company, Electronic Components Division, Owensboro, Kentucky.*

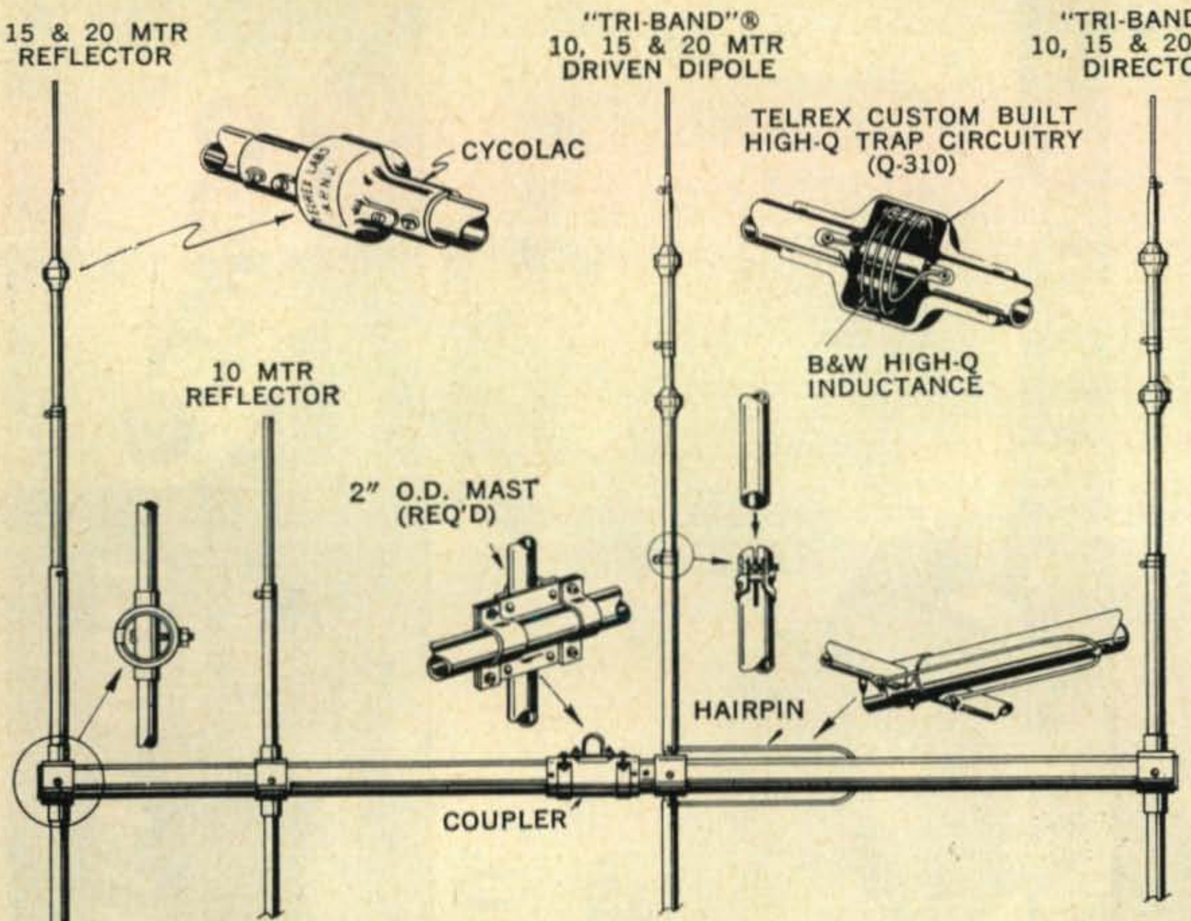
HERE ARE TYPICAL ACTIVITIES THAT CAN QUALIFY FOR THE AWARD:

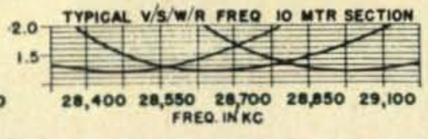
- Emergency communications work in a disaster, such as a flood, hurricane, tornado, or explosion.
- Helping amateurs and others with their specialized problems, through professional knowledge and experience.
- Community service in organizing mobile and fixed communications to promote the success of fund drives and other public events.
- Helping disabled or physically handicapped persons.
- Relaying messages from remote points for the benefit of isolated servicemen and civilians.
- Designing and constructing radio equipment for use by persons in remote parts of the world, who do not have access to regular commercial communication channels.
- Civil-defense organization work; weather reporting; radio assistance to state or local traffic and police authorities; cooperation in forest-fire prevention and control.
- Teaching basic electronics to young people.

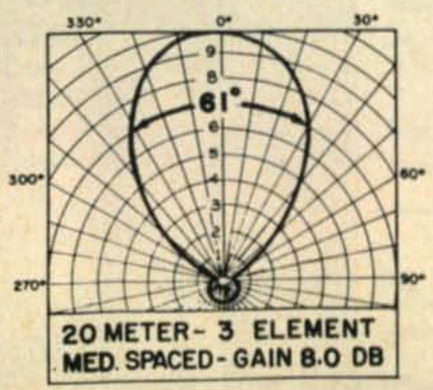
GENERAL ELECTRIC

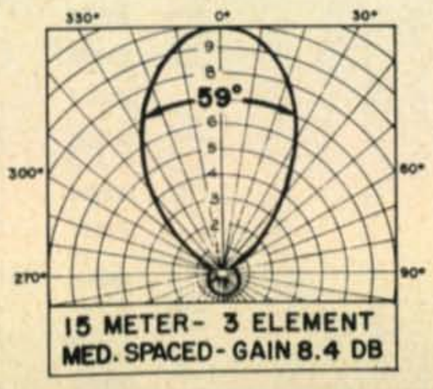
8-524-402

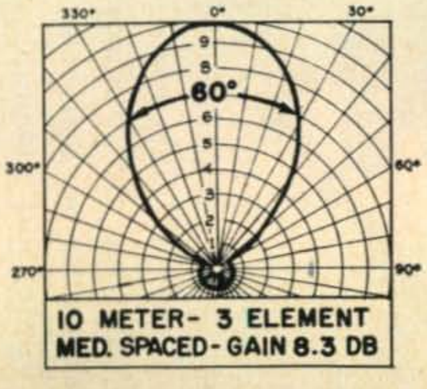
For further information, check number 22, on page 132











For the Perfectionist! Broad Band "Baluns" are available:
Model BBB 1/5 (1.5KW) $18.50 Model BBB 3/0 (3KW) $24.50

TELREX
CHALLENGER "TRI-BAND"®
Single-Transmission-Line Array
Model TBS-416 $159.50 F.O.B. Asbury Park, N. J.

Telrex Model TBS-416—tuned, matched and calibrated for easy assembly (to your favorite band sectors) and Telrex specified performance at your site — without tuning or adjustments of any kind, required, or recommended!

Model TBS-416 consists of 4 medium spaced elements (two of which are "Tri-Band"® elements) on a 16 ft. boom, providing optimum 3 element 10, 15 and 20 MTR performance.

Model TBS-416 is engineered to provide maximum performance and satisfaction per dollar, per element!

SPECIFICATIONS

V/S/W/R at resonant point (using 50 ohm coax).....1.2/1
Bandwidth within 2/1 V/S/W/R...1.5%
F/B ratio on 10, 15 and 20 meters.26DB
Max. power rating.....1.2 KW 100%AM
Boom length and diameter 16 ft. x 2" O.D.
Longest element length Approx. 30 ft.
Turning radius approx...17 ft.
Support mast required 2" O.D. Seamless .125 wall min.
Wind surface area.....5-29 sq. ft.
Wind load at 100 m.p.h.....164 lbs.
Recommended rotator— Telrex Model.....175 RIS
Design wind load rating with ½" radial ice load.....85 m.p.h.
Antenna net wt. 44 lbs.— Shipping wt. approx.....58 lbs.
Shipping container size approx.....11" x 6" x 10'

The following Single-Transmission-Line "Tri-Bands" available:

CHALLENGER TBS-308 ..... $ 99.75
3 Elements (8' x 2" O.D. Boom) gain 5 db.
Recommended Rotator—Telrex 175 ..... 198.50

MONARCH TBS-626 ..... 259.75
6 Elements (26' x 3" O.D. Boom) gain 10 db.
Recommended Rotator—Telrex 500..... 435.00

CHALLENGER DTB-30 ..... 38.50
Rotatable 10, 15, and 20 Meter "Tri-Band" Dipole, unity gain bi-directional pattern. Any good TV rotator may be used or Telrex 175-RIS rotator.

ANTENNAS SINCE 1921 — Communication and TV Antennas
telrex LABORATORIES
ASBURY PARK 42, NEW JERSEY, U.S.A.

For further information, check number 23, on page 132

For further information, check number 24, on page 132

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your best buy Johnson

NEW!

"6N2" THUNDERBOLT POWER AMPLIFIER—Rated at 1200 watts P.E.P.* input SSB and DSB, Class AB_1; 1000 watts CW input Class C; and 700 watts input AM linear, Class AB_1. Drive requirements approximately 5 watts in Class AB_1 linear or 6 watts Class C continuous wave. Continuous bandswitched coverage on 6 and 2 meters—effectively TVI suppressed and filtered—wide range pi network output. Outstanding efficiency—losses on 2 meters held to approximately 5%, instead of common 25% losses experienced in some other 2 meter circuitry! This is possible due to the unique silver-plated Hi-Q coaxial line; silver-plated anode and other external metal portions of the 7034 tubes; silver-plated inductors; capacitors; and switch! With tubes.

Cat. No.		Amateur Net
240-362-1	Kit	$524.50
240-362-2	Wired	589.50

"6N2" TRANSMITTER—This compact VHF transmitter offers instant bandswitching coverage of both 6 and 2 meters. Completely shielded and TVI suppressed, the "6N2" may be used with the Viking "Ranger," Viking I, "Valiant," or similar power supply-modulator combinations capable of at least 6.3 VAC at 3.5 amp., 300 VDC at 70 ma., 300 to 750 VDC at 200 ma. and 30 or more watts of audio. Power input is rated at 150 watts CW and 100 watts AM phone . . . shaped keying results in excellent waveform. With tubes.

Cat. No.		Amateur Net
240-201-1	Kit	$129.50
240-201-2	Wired	169.50

"6N2" CONVERTER—This compact Viking "6N2" Converter provides instant front panel switching from normal receiver operation to either 6 or 2 meters. Maximum sensitivity and low noise figure . . . excellent image and I.F. rejection. With tubes. Available kit or wired in either 26 to 30 mcs., 28 to 30 mcs., 14 to 18 mcs., or 30.5 to 24.5 mcs. ranges. Specify range desired.

Kits	Amateur Net $59.95
Wired Models	Amateur Net $89.95

"6N2" VFO—Exceptionally stable and compact—designed to replace 8 to 9 mc. crystals in frequency multiplying 6 and 2 meter transmitters, including types using overtone oscillators. Temperature compensated and voltage regulated for minimum drift and high stability. Plexiglas dial calibrated from 144 to 148 mc., 50 to 51.5 mc., 51.5 to 53 mc. With tubes and pre-calibrated dial.

Cat. No.		Amateur Net
240-133-1	Kit	$34.95
240-133-2	Wired	54.95

Other equipment for 6 and 2 meters!

"6N2" TRANSMITTER

"6N2" CONVERTER

"6N2" VFO

this or any other season... Amateur Equipment!

"CHALLENGER" — 70 watts AM input 80 through 6, 120 watts CW input 80 thru 10 —85 watts on 6. With tubes.

Cat. No.		Amateur Net
240-182-1	Kit	$114.75
240-182-2	Wired	$154.75

"RANGER"—75 watts CW and 65 watts phone input. Bandswitching 160 through 10. Built-in VFO. With tubes.

Cat. No.		Amateur Net
240-161-1	Kit	$229.50
240-161-2	Wired	$329.50

"VALIANT"—Instant bandswitching 160 through 10. 275 watts input CW and SSB (P.E.P. with aux. exciter) 200 watts phone. With tubes.

Cat. No.		Amateur Net
240-104-1	Kit	$349.50
240-104-2	Wired	$439.50

"KILOWATT" AMPLIFIER—This exciting unit is the only power amplifier available which will deliver full 2000 watts SSB* input and 1000 watts CW and AM! Continuous coverage 3.5 to 30 mcs. Excitation requirements: 30 watts RF and 10 watts audio for AM; 10 watts peak for SSB.

Cat. No.		Amateur Net
240-1000	Wired and tested	$1595.00
251-101-1	Matching desk top, back and 3 drawer pedestal..FOB Corry, Pa.	$132.00

**The FCC permits a maximum of one kilowatt average power input for the amateur service. In SSB operation under normal conditions this results in peak envelope power inputs of 2000 watts or more depending upon individual voice characteristics.*

3 feature-packed amplifiers!

"COURIER" AMPLIFIER—Class "B" linear rated 500 watts P.E.P. input with aux. SSB exciter—500 watts CW and 200 watts AM! Continuous coverage 3.5 to 30 mcs. Drive requirements: 5 to 35 watts. With tubes.

Cat. No.		Amateur Net
240-352-1	Kit	$244.50
240-352-2	Wired	$289.50

"THUNDERBOLT" AMPLIFIER—Rated 2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear! Continuous coverage 3.5 to 30 mcs. May be driven by "Ranger", or other unit of comparable output. With tubes.

Cat. No.		Amateur Net
240-353-1	Kit	$524.50
240-353-2	Wired	$589.50

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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!

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FIRST CHOICE AMONG THE NATION'S AMATEURS

For further information, check number 26, on page 132

A Simple Phasing-Type Exciter

Frederick W. Brown, W6HPH
37 Humphrey Rd.
Santa Barbara, Calif.

In recent years, the SSB exciters built by amateurs show a tendency to favor the filter type of exciter in preference to the phasing method. There are a number of considerations that should be kept in mind in choosing between the two systems. We might list the principal advantages of the filter method as being: (1) better sideband rejection at the higher audio frequencies; (2) ease of adjustment. On the other hand, the phasing method has the advantages of: (1) ease of sideband switching; (2) the signal may be generated directly at a high radio frequency. In addition, the phasing method has the advantage that no special or expensive components such as mechanical or crystal lattice filters are required.

Probably the main reason that phasing rigs are losing favor is because of the need for special measuring equipment to insure that the audio phase difference network is correctly adjusted. The circuit described here has the advantage that it can be aligned with nothing more pretentious than a communications receiver, a *vtvm*, and a tunable audio oscillator.

The design of an audio phase difference network can be an imposing problem to the circuit theorist. What is needed is a method of splitting the audio signal into two channels. The two channels must have a frequency independent phase difference, something other than 0° or 180°; and, in addition, must have a constant amplitude ratio.

Most of the networks currently used are patterned after the ones devised by Dome[1]. These networks are characterized by a constant amplitude response, and a slightly ripply phase response. As an alternative to the Dome network, we could construct a circuit with a constant phase shift and a ripply amplitude response. Since amplitude is easier to measure than phase shift, the latter type of circuit would seem more desirable from the amateur's viewpoint. To realize this type of circuit, we will combine a phasing network with a reactive network.

The Phase Shift Circuit

It has been shown[2] that if the output of a differentiator is subtracted from the output of an integrator, we will have a signal that is shifted 90° in phase and fairly constant in amplitude over an octave or so of bandwidth. A circuit for accomplishing this is shown in fig. 1. The first triode is an ordinary phase splitter, the plate driving an integrating network consisting of R_1C_1 and the cathode driving a differentiating circuit R_2C_2. The two signals are then added in the dual triode. This circuit can be made to give a phase shift as close to 90° as we like; the only limitation being how much attenuation we are willing to accept by making the time constant of R_1C_1 very large and that of R_2C_2 very small. The frequency response will be given by

$$A = \frac{k_1}{f} + k_2 f$$

where k_1 and k_2 are constants that depend upon the circuit parameters. The relative gain is plotted in fig. 2 as a function of normalized frequency. The first term of the above equation is the contribution from the integrator branch and the other term the differentiator branch. The minimum will occur where the contribution from the two branches are equal. For a sideband rejection of 20 *db*, we need the two audio channels to be constant in relative amplitude to within ± 20%. For speech, we would like at least a decade (300 to 3000 cycles) of

[1]R B. Dome, "Wideband phase shift networks," Electronics, December, 1946.

[2]M. A. Honnell "Single sideband generator," Electronics, November, 1945.

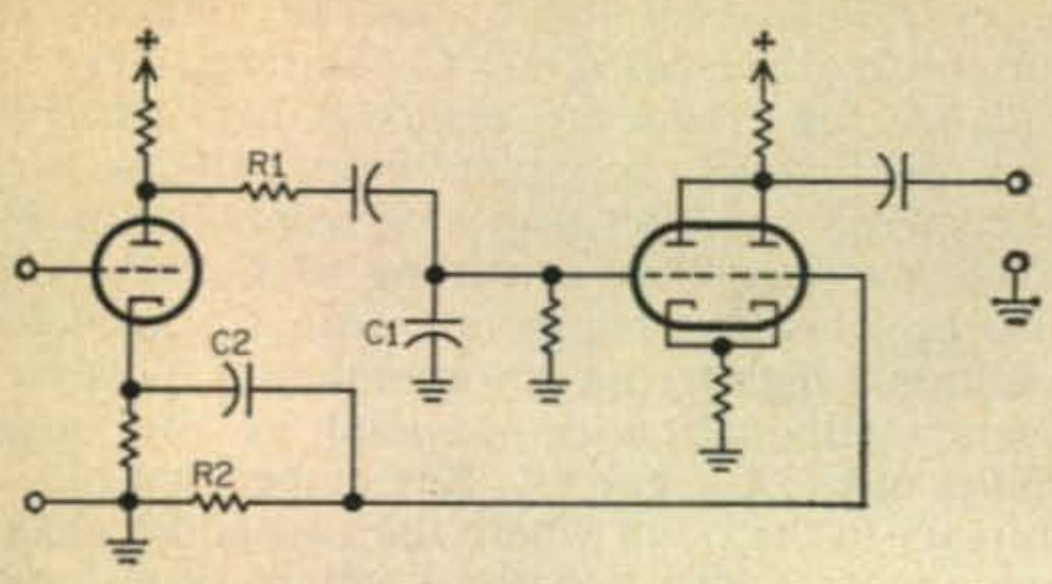


Fig. 1—The phase shift circuit.

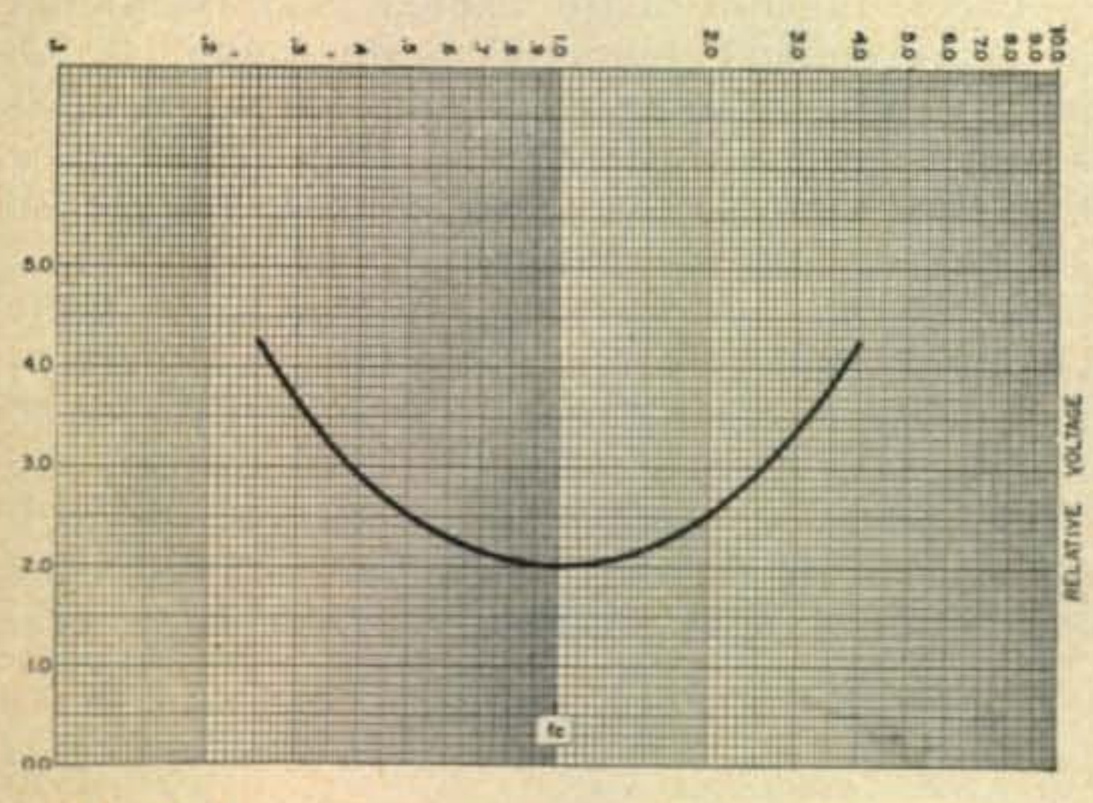


Fig. 2—Frequency response of the phase shift circuit.

bandwidth. If we use the original signal for the 0° channel, we see from fig. 2 that the phasing circuit alone will not give the required uniformity of gain over the required audio bandwidth.

The Reactive Network

What we have, then, is a circuit which gives the desired phase shift to any degree of precision that we like, but does not quite meet the amplitude requirements. It would be convenient if we could compensate for the poor amplitude response with some kind of network that would not introduce any addtiional phase shift. An interesting network theorem states that if we have a purely reactive network, the phase shift through it will always be either 0° or 180°. We might, then, look for a reactive network which, when cascaded with the phasing circuit described above, would compensate for its frequency dependent gain. Such a network is shown in fig. 3. The transfer function of this network is

$$\frac{E_o}{E_i} = \frac{(\alpha^2 k^2 - 1)\ (\frac{\alpha^2}{k^2} - 1)}{(\alpha^2 k^2 - 1)\ (\frac{\alpha^2}{k^2} - 1) - s^2 \alpha^2}$$

where

$$\alpha = \frac{\omega_c}{\omega} \quad \omega_c = \frac{K}{\sqrt{L_2 C_2}} = \frac{1}{k\sqrt{L_1 C_1}} = \frac{s}{\sqrt{L_1 C_2}}$$

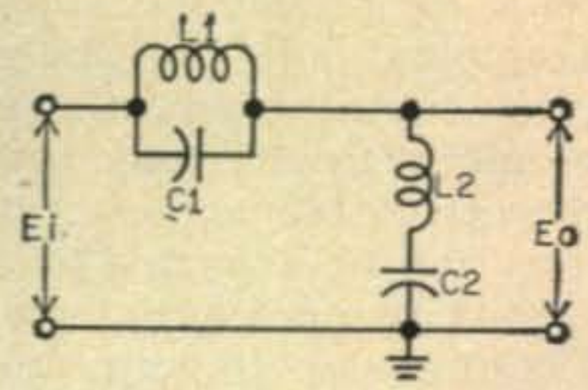


Fig. 3—The reactive network.

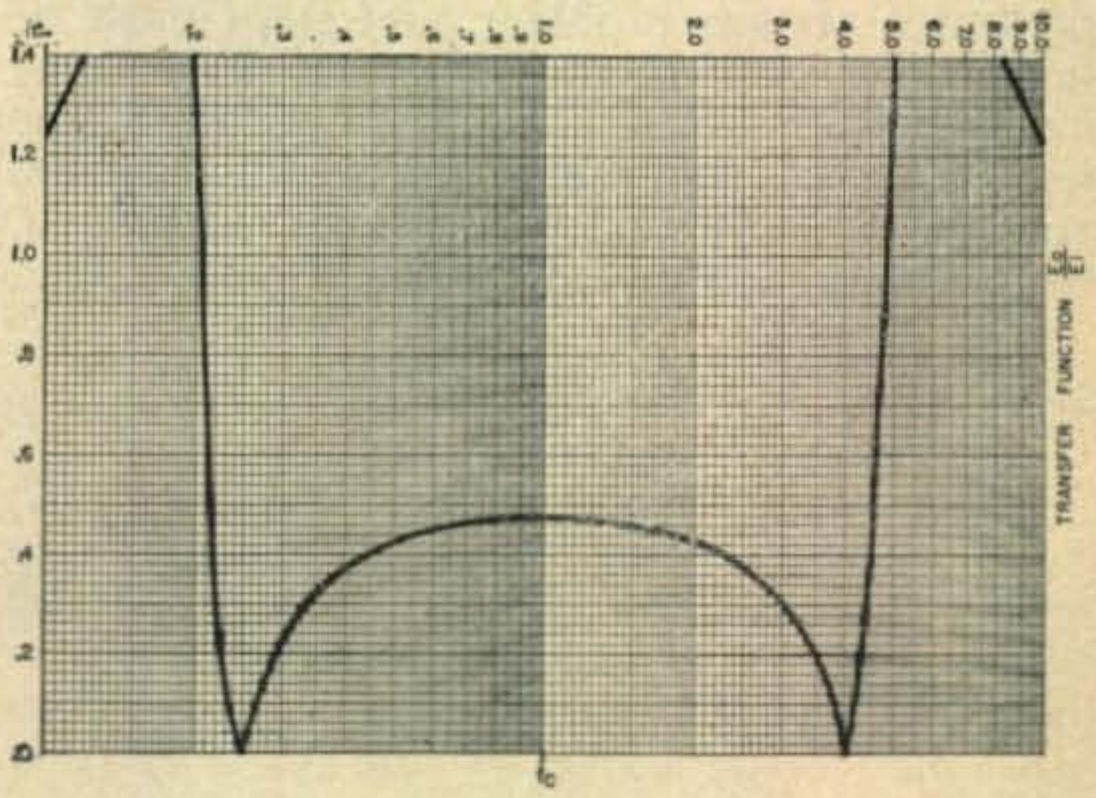


Fig. 4—Frequency response of the reactive network.

Taking $k = s = 4$ $(L_2 = L_1)$, we will have

$$\frac{E_o}{E_i} = \frac{(16\alpha^2 - 1)\ (\frac{\alpha^2}{16} - 1)}{(16\alpha^2 - 1)\ (\frac{\alpha^2}{16} - 1) - 16\alpha^2}$$

This function is plotted in fig. 4. When multiplied by the frequency response of the phasing circuit (fig. 2), we will have fig. 5. Here f_c is taken as the geometric mean of 300 and 3000 or 949 cycles. Notice that fig. 5 is flat to within about $\pm$ 0.8 *db* for a decade of bandwidth. If we assume no phase errors in our circuit, we can then expect a minimum sideband suppression of 26 *db* between 300 and 3000 cycles.

The reader may well point out that purely reactive circuits are not realizable in practice. Available reactances are never pure, and inductors are ordinarily much worse in this respect than are capacitors. It would be instructive, therefore, to find what effect a given coil Q has on the phase shift of the reactive network. Theoretical considerations indicate that the phase error θ will be given approximately by

$$\theta_L = -\frac{I}{Q\ (32\alpha^2 - 3 + \frac{1}{16\alpha^2})}$$

$$\theta_h = \frac{I}{Q\ (\frac{\alpha^2}{16} - 3 + \frac{32}{\alpha^2})}$$

θ_L applying below f_c and θ_h above.

This phase error is plotted in fig. 6 for a coil Q of only ten. Remember that a phase error of 5° corresponds to a sideband suppression of 27.2 *db*. Also plotted in fig. 6 is the phase error of the phasing circuit where the corner frequencie[3] are taken as .01 and 100 times fc. Note that the errors are opposite in sign, and to some extent can be expected to cancel out.

Figure 4 shows two poles that rise to infinity at 167 and 5380 cycles. In actual practice, the output voltage will be limited by the finite source impedance driving the reactive network, and by the finite coil Q. The poles do, however, present a serious problem, and steps must be taken to suppress them in the final design. One method is to restrict the bandwidth of the speech amplifier so that frequencies below 300 and above 3000 cycles are greatly attenuated. In fact, this should be done in any SSB exciter.

The Exciter

The complete schematic is shown in fig. 7. Tube V_4 is the microphone amplifier; V_5 is a speech amplifier and split-load phase inverter; V_6 the adder; V_3 is a cathode follower for driving the diode balanced modulators; V_1 is a conventional crystal oscillator and V_2 a class A stage for amplifying the output of the modulators.

For the reactive network, I used telephone loading coils. These are high Q toroids of 88 *mhy* inductance and are available at a very reasonable price. The low inductance, however, requires a relatively large value for C_{27} which may create a problem in procurement. Electrolytic condensers are ruled out here because of their low Q. Paper and oil filled types are available, but usually only in the bulky high-voltage category. I finally located some small 1 mfd., 100 v. capacitors made by Gudeman, which were paralleled to form C_{27}.

The purpose of L_7 and C_{25} is to provide a high source impedance for the reactive network at the pole frequencies. This combination is series resonant at 400 cycles. In addition to suppressing the poles, L_7, C_{25} and R_{23} serve to equalize the frequency response between 300 and 3000 cycles. The plate circuit of the second speech amplifier uses a conventional m-derived low-pass filter consisting of C_{22}, C_{23}, C_{24}, and L_6. This, in conjunction with C_{20} provides additional high frequency attenuation. Low frequency attenuation is provided by the small values of C_{18}, C_{19}, and C_{21}. Remember that phase shift up to the point where the two audio channels separate, (that is, the junction of C_{25} and C_{26}) is inconsequential.

The *rf* portion of the exciter is conventional in every respect. Generating the signal at 5.6 *mc* permits covering either 3.8-4.0 *mc* or 7.2-7.4 *mc* with a vfo that tunes 1.6 to 1.8 *mc*. The fifth harmonic of the same *vfo* will get you to 20 meters, and the ninth to 15 meters. Inductance L_4, R_2, and C_2, C_3, R_5 form the *rf* phase shift network. Absolute symmetry is important in L_2 for complete carrier rejection. I've found the position of the link to be quite critical and if off center, can not be compensated for with the balancing pots R_4, R_5. There should be a minimum of stray coupling between L_1 and L_3.

Adjustment

In order to align the exciter, you will need a tunable audio oscillator, a *vtvm*, and a communications receiver. First, check the response of the audio up to the grid of the phase inverter. The output should be zero near 237 and 3800 cycles, and should be well down at all frequencies below 300 and above 3000 cycles. You may have to juggle the values of C_{25} and R_{23} to get uniform response between 300 and 3000 cycles. Disconnect C_{25} and connect your audio oscillator across R_{23}. Adjust R_{25} so that the response as measured at the junction of C_{12} and rfc_1 is equal at 400 and 2300 cycles. Next, set the oscillator to 1600 cycles and adjust R_{11} so that the voltage at rfc_1 is the same with S_1 in either position. This completes the alignment of the audio section.

With an *rf* probe on your *vtvm*, adjust L_8

[Continued on page 131]

[3]i. e., the frequency where the reactance is equal to the resistance in the differentiator or integrator.

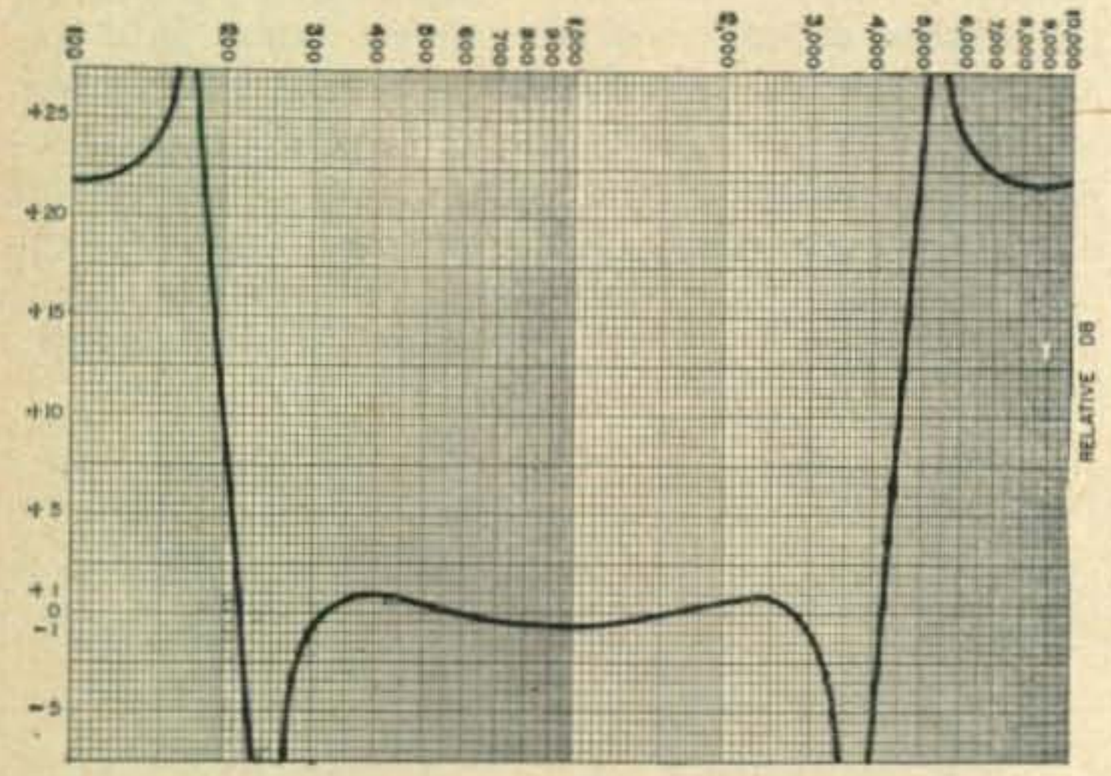


Fig. 5—Frequency response of the combined circuit.

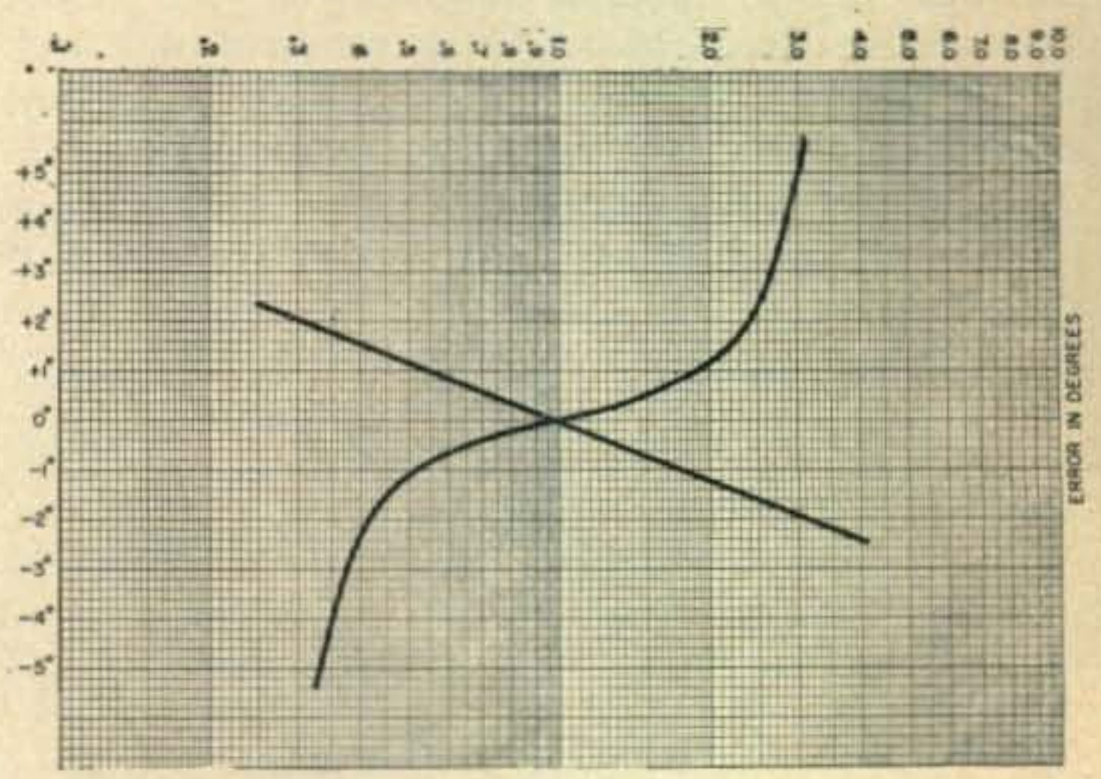
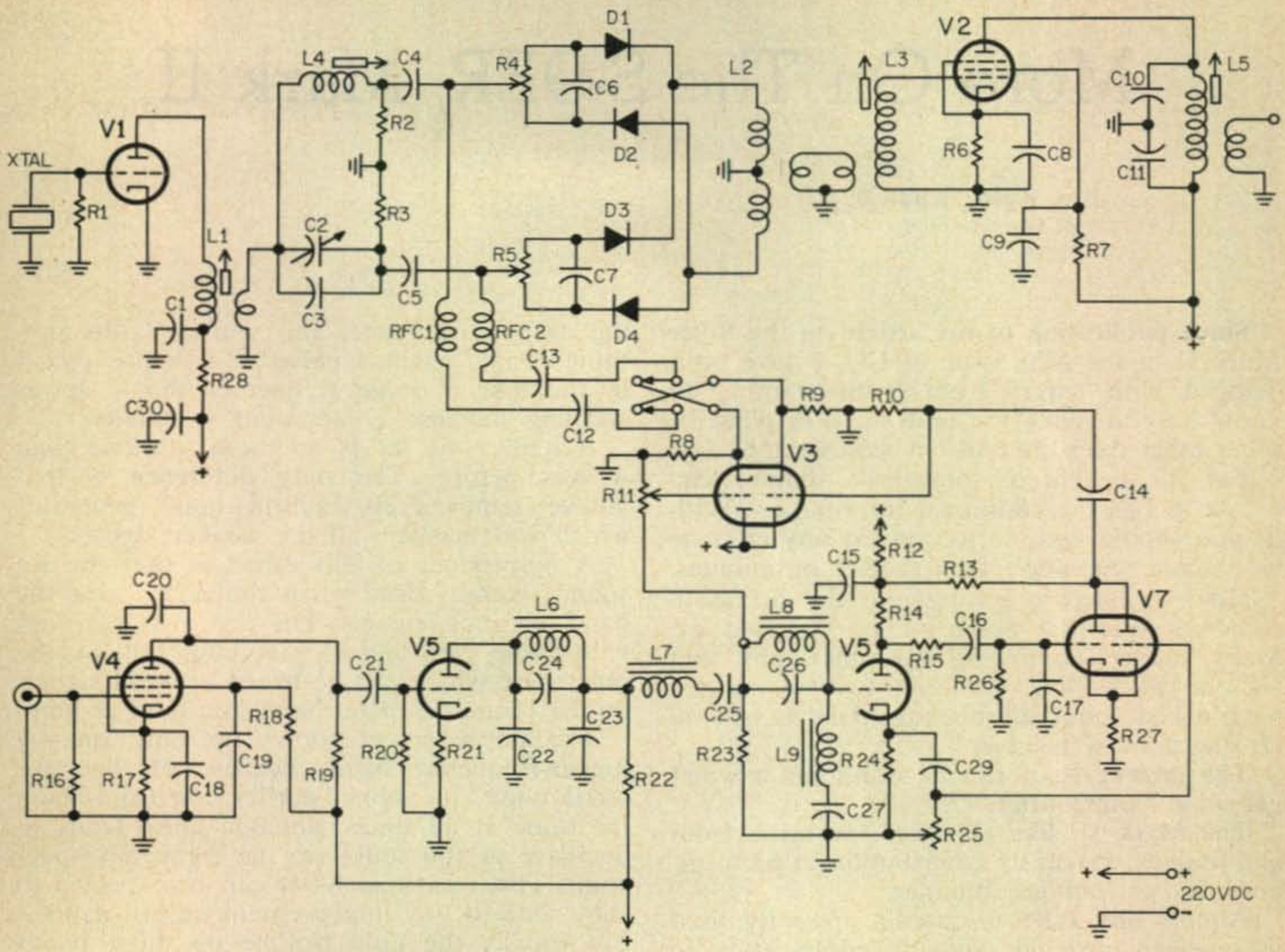


Fig. 6—Phase error of the reactive network and phasing circuit.

Fig. 7—Complete circuit diagram of the exciter.



Parts List

C_1, C_8, C_9, C_{11}, C_{30} .01 mfd. disc ceramic
C_2 10-110 mmf. ceramic trimmer
C_3 220 mmf. mica
C_4, C_5, C_{23} .0047 mfd. paper
C_6, C_7, .005 mfd. disc ceramic
C_{10} 50 mfd. ceramic
C_{12}, C_{13} 5 mfd. 200 VDC electrolytic
C_{14}, C_{17} .01 mfd. paper
C_{15} 30 mfd. 450 VDC electrolytic
C_{16} .1 mfd. 400 V paper
C_{18} 4 mfd. 50 VDC electrolytic
C_{19} .02 mfd. paper
C_{20} 300 mmfd mica
C_{21} 680 mmfd. mica
C_{22} .002 mfd. mica
C_{24}, $_{29}$ 1500 mmfd. mica
C_{25} .04 mfd. paper
C_{26} About .015 mfd. paper. Resonates with L_8 to 3800 cycles
C_{27} About 5 mfd. paper or oil-filled, *not* electrolytic resonates with L_9 to 237 cycles

L_1 80 turns #30 e. close wound on ½" slug tuned form. 3 turn link.
L_2 10 turns each side of center tap #28 e. close wound on ⅜" form. 1 turn link.
L_3 70 turns #30 e. close wound on ½" slug tuned form. 1 turn link.
L_4 11 turns #26 e. close wound on ½" slug tuned form.
L_5 28 turns #26 e. close wound on ½" slug tuned form.
L_6 .6 Hy. iron core audio choke.
L_7 About 3.8 Hy. choke, primary of small output transformer. Resonates with C_{25} to 400 cycles.
L_8, L_9 About .1 Hy. Q greater than 10 between 300 and 3000 cycles

D_1, D_2, D_3, D_4 Germanium diodes preferably matched as to forward resistance.
R_1, R_{28} 47 K, 1 watt.
R_2, R_3, R_6 100 ohms ½ watt.
R_4, R_5 600 ohms carbon pots.
R_7 43 K, 1 watt.
R_8, R_9, R_{12} 100 ohms, ½ watt.
R_{10}, R_{20} 680 K, ½ watt.
R_{11} 50 K, pot
R_{13} 4700 ohms, 2 watt.
R_{14} 180 K, 1 watt.
R_{15}, R_{24} 15 K, 1 watt.
R_{16} 470 K, ½ watt.
R_{17}, R_{26} 1 meg, ½ watt.
R_{18}, 470 ohms, ½ watt.
R_{19} 360 K, ½ watt.
R_{21} 120 K, ½ watt.
R_{22} 1500 ohms, ½ watt.
R_{23} 10 K, 1 watt.
R_{25} 3.9 K, 1 watt.
RFC_1, RFC_2 2.5 mh RFC.
XTAL 5.6 MC.
V_1 —6AB4.
V_2, V_4 —6AU6
V_5, V_3 —12AU7
V_6 —12AX7
S_1 —DPDT switch

More On The S-9ER, Mark II

Jim Kyle, K5JKX
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Since publication of my article on the S-9er Mark II in the May issue of CQ, I have been deluged with letters from hams wanting to know how to make the unit work in place of tubes other than the 6SK7 it was designed for.

For the benefit of those who didn't write to ask, here's the additional information. With it, you should be able to convert any *rf* stage to cascode operation in a matter of minutes.

However, before getting into the details, a recurrent question needs to be disposed of. Many readers, following the philosophy that "if one works fine, wouldn't two be better," have asked about substituting Mark II's in *all* *rf* stages of a receiver.

The answer is, it can be done but it won't get what you're after.

The Mark II, like all other low-noise front end designs, makes its contribution to performance in an oblique manner.

Almost any tube or circuit presently used in receivers provides enough amplification to receive signals of only a few millionths of a volt strength. Amplification, alone, is not the problem.

What creates trouble in older receivers on the higher-frequency bands is noise generated in the early stages of the set. A vacuum tube is not an intelligent device—so far as it's concerned, that DX signal you want to hear and the noise generated by a passing car, the antenna radiation resistance, or the first *rf* stage of the set are one and the same thing.

And once the noise is added to the signal, you can't do a thing about it in the way of separating them again. It's like trying to take apart two bits of solder after they have been melted together.

A good noise limiter will get rid of the passing car's interference, and you can't do anything about "antenna noise." But improvement in the first *rf* stage frequently shows up as startling increase in apparent sensitivity.

Actually, the set is no more sensitive than it was before. The only difference is that you've removed its built-in noise generator which was masking all the weaker signals.

A by-product of this effect is that the set sounds literally dead when you tune across the band between signals. On my own receiver, with audio gain and *rf* gain both full on, the only noise which can be heard between signals on the 15 and 10 meter bands is a faint *ac* hum.

The improvement shows up only on the higher-frequency bands because of the "antenna noise" mentioned earlier. Far from being the same at all times, antenna noise tends to decrease as you move up the frequency spectrum. This means an S-9er can be expected to show little if any improvement on 80 or 40—but usually the only trouble on those bands is to find a channel clear enough to operate on, anyhow.

Now, with the lecture out of the way, the question "Will two S-9ers in the front end instead of one help?" can be answered more thoroughly. It just takes one. By the time the signal emerges from the Mark II, it's so far above the tube noise of the second *rf* stage that the second one would be a wasted effort.

Of course, if you're looking for more gain, that's a horse of a significantly different hue. More about this subject later.

Now to the problem of making the Mark II replace tubes other than the popular 6SK7 series it was designed for.

The original article was simplified, with ex-

[Continued on page 129]

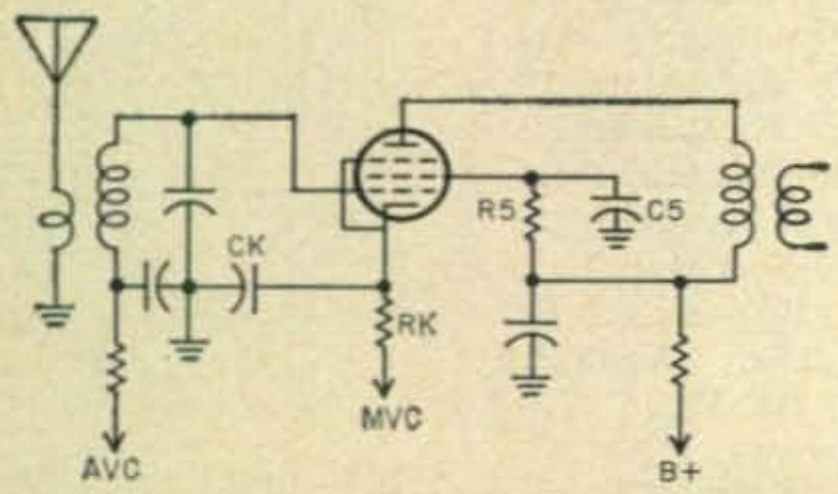


Fig. 1—Basic pentode rf amplifier with band-switching omitted for simplicity.

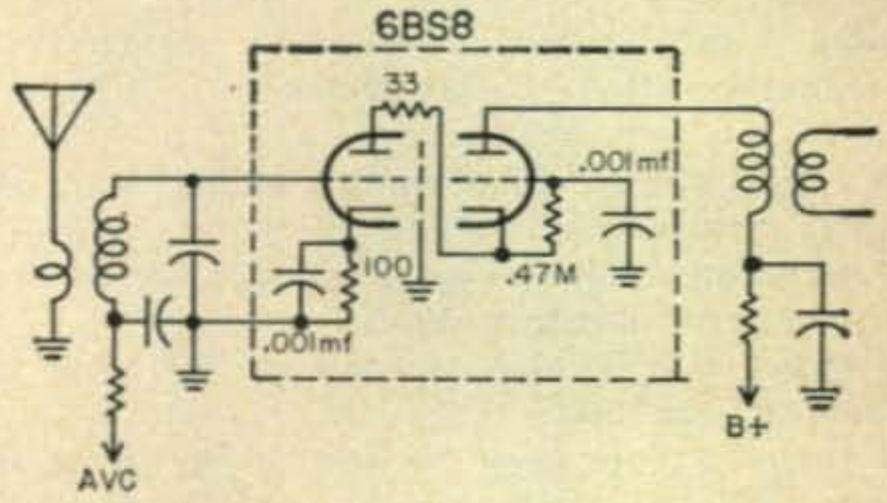
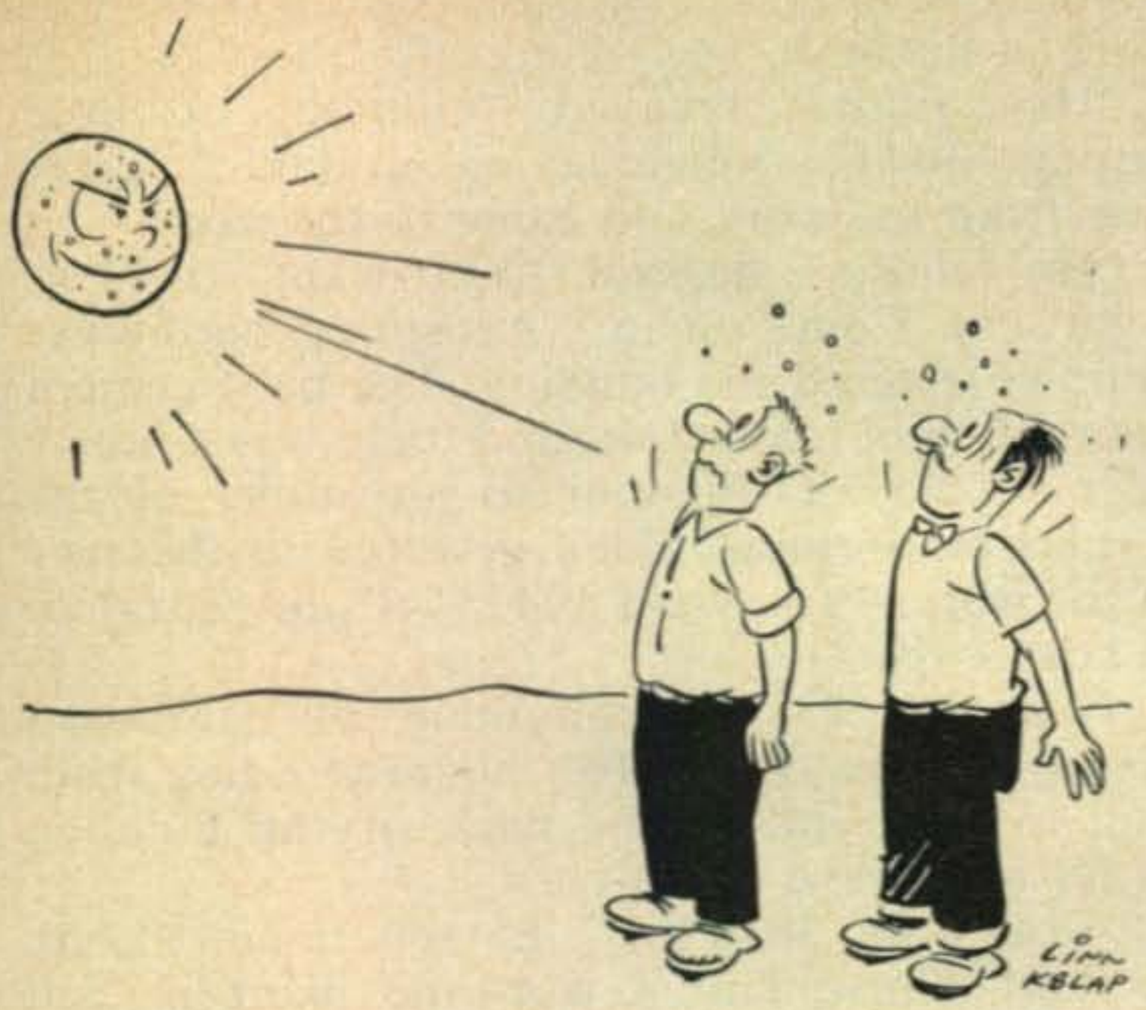


Fig. 2—Resultant circuit when the S-9ER is plugged into the circuit shown in fig. 1.



Bill Orr, W6SAI

Sunspot Madness

or,

The Day We Boiled the 304TL

The door of the shack opened and Pendergast walked in. "Hello, Sport," he said, dropping into his favorite chair. "What big hunk of DX are you working?" He picked up the latest copy of CQ and started leafing through it.

"Just working ZD3G in Gambia", I replied as I reached for the send-receive switch. "Make yourself at home. Just got a bunch of QSL's from the Bureau. They're in the brown envelope. Take a look and weep".

Pendergast opened the envelope and let the loose cards slide into his hand. He ruffled through them in an expert manner. Hm-m-m. A couple of UA3's, a UJ8, a VU2, ZC5, VKØ, two PY's, and a bunch of G's. What a collection of bilge. Don't you work anything good?" Pendergast turned back to the open copy of CQ. Presently he said in an angry tone,

"Hey, look at this ad! Some surplus outfit is selling 304TL tubes for thirty-five bucks apiece. Wow! Remember when those jugs were only a few cents apiece? Times have certainly changed!"

Times have certainly changed I thought, the signals of the ZD3 sliding to the back of my mind as I reminisced of the past. Remember when the sunspot cycle was at its lowest, 'way back in 1954? Remember the mad day of July 17th, when the sunspot cycle hit the all-time low count of 0.2? Things were really tough then. Ten meters was completely deserted except for a few lonely diathermies hunting back and forth across an empty band. Fifteen wasn't much better. A few South American signals and a lot of earsplitting QRN. And twenty meters! How that glorious band had shrunk into obscurity! As soon as the sun set below the horizon 14mc went completely dead. Around noon, it would come back to life in an insipid sort of way. If you were lucky you could sneak in a QSO with a G or maybe an LU. Now, things are different, and the bands are bursting with DX. It is so common to work exotic DX—like this fellow in Gambia—that the usual DX'er thinks nothing of it. Yes, DX had come a long way from that dismal day of July 17, 1954.

Come to think of it, the sunspot cycle must have some effect on the mental balance of the average ham. If my memory serves me correctly it was that day that Pendergast and I went slightly beserk—slightly crazy. It *must* have had a connection with the sunspot count, since we both seemed to be perfectly normal hams since then. . . .

I abruptly broke off my thoughts, pushed my earphones up on my forehead and turned to Pendergast.

"Yes, times have changed", I said. "Remember July 17th, the day of *Sunspot Madness*, when we boiled the 304TL's? That must have been a physical and mental reaction to the low sunspot count." Pendergast broke into a smile.

"Sure do!", he replied with a grin, picking up the copy of CQ. "I just thought of it when I saw that advertisement for the thirty-five buck 304TL's! The whole silly episode started right here when I came barging in the shack with that flyer I got in the mail from Surplus Eddy."

* * * *

It was a hot, muggy morning, quite unusual for July, 1954. The sun was rising, red and angry and I climbed out of bed about six in the morning after a sleepless night. "Going to be a hot day", I muttered to no one in particular. "Guess, I'll look over the band". I groped blindly to the shack and turned on the receiver. After an interminable time, a blast of QRN rocketed from the 'phones. I put the phones back on the table.

"A guy would go Asiatic on a day like this in the tropics. It's going to be a scorcher", I thought.

A steady rifle-shot of popping noises from the earphones announced that a car was pulling into the driveway. Glancing out the window I could see that the early morning arrival was

Pendergast, fully dressed and bouncing with excitement. He barged into the shack, waving a flimsy piece of paper in his hand.

"Awake, and greet the rosy dawn!" he cried. "Surplus Eddy has saved the day. Read this!" He thrust the paper under my nose. I drew back as if a dead fish had materialized under my nostrils.

"What is it?" I asked suspiciously. "What are you doing up at this hour of the morning? The heat must have gotten you!"

Pendergast wiped a thin bead of perspiration from his forehead. "Certainly not", he replied with dignity. "It is merely that Uncle Sam's postal service delivered this earth-shattering announcement from the surplus store. I found it in the mail box this morning when I couldn't sleep. Believe it or not, ol' Surplus Eddy is selling 304TL tubes at *four for three dollars!* That's *seventy five cents apiece!*".

My sixth sense of surplus values awoke me with a jolt. "Sa-a-a-y!", I blurted, grabbing the paper from his hand. "That sounds like a real good deal. One of those tubes will run a cool kilowatt! Gee, maybe we better run down there before they're all gone!"

"Sure, thing", said Pendergast. "Why don't we buy four? Then we can each have one for the rig, and one spare. That will be only a dollar-fifty apiece".

I thought rapidly to myself. This was the chance of a lifetime! A brand new 300-watt bottle for less than a dollar. Instinctively I opened my desk and rummaged through a pile of miscellaneous papers until I found the data sheet on the 304TL. "Look at this," I said. "The bottle will run a kilowatt input at 2000 volts! Boy, what a beauty! I'm going to pull out that pile of junk I call a final and put this tube in its place."

"Yeah," screeched Pendergast, his eyes aglow like a teen-ager who has just seen his first pin-up photo. "I'm going to put *two* of 'em in *my* rig and run three kilowatts! Three thousand volts at one amp! BOY! WILL I BE LOUD!"

"Easy, son", I rejoined. "Loosen your collar and breathe through your mouth for a few minutes and you'll be all right again. Calm down! Sit down and read CQ and I'll get dressed and have a cup of Java, and then we'll run down to Eddy's store and see if this fantastic deal is for real!"

Eddy's store was a wearysome hour's drive through heavy traffic. The sun had risen like a blistering iron disc in the sky, white-hot and angry. The air was oppressive and still and smelled of smoke and diesel oil. We turned into the little alley and approached the surplus store which had originally been a large garage. Much to our surprise there was no sign of activity about the place. The area was deserted. Pendergast swung the car in front of the yawning door and parked with a squeal of brakes. Through a dim window we could see Eddy at work at his desk.

"Hey, Eddy!" I called. "Got any of those surplus 304TL tubes laying around?" Eddy rose from his work and came to the door.

"Hi, fellows", he said. "You want 304TL's? I got 'em. Come on in". Accepting his invitation, we entered the building. The hard cement floor felt cool to our feet, and there was a musty odor in the air, familiar to an addict of the surplus emporiums. Eddy gestured to the rear of the store. "You want 304TL's?", he repeated. "Look at *that!*"

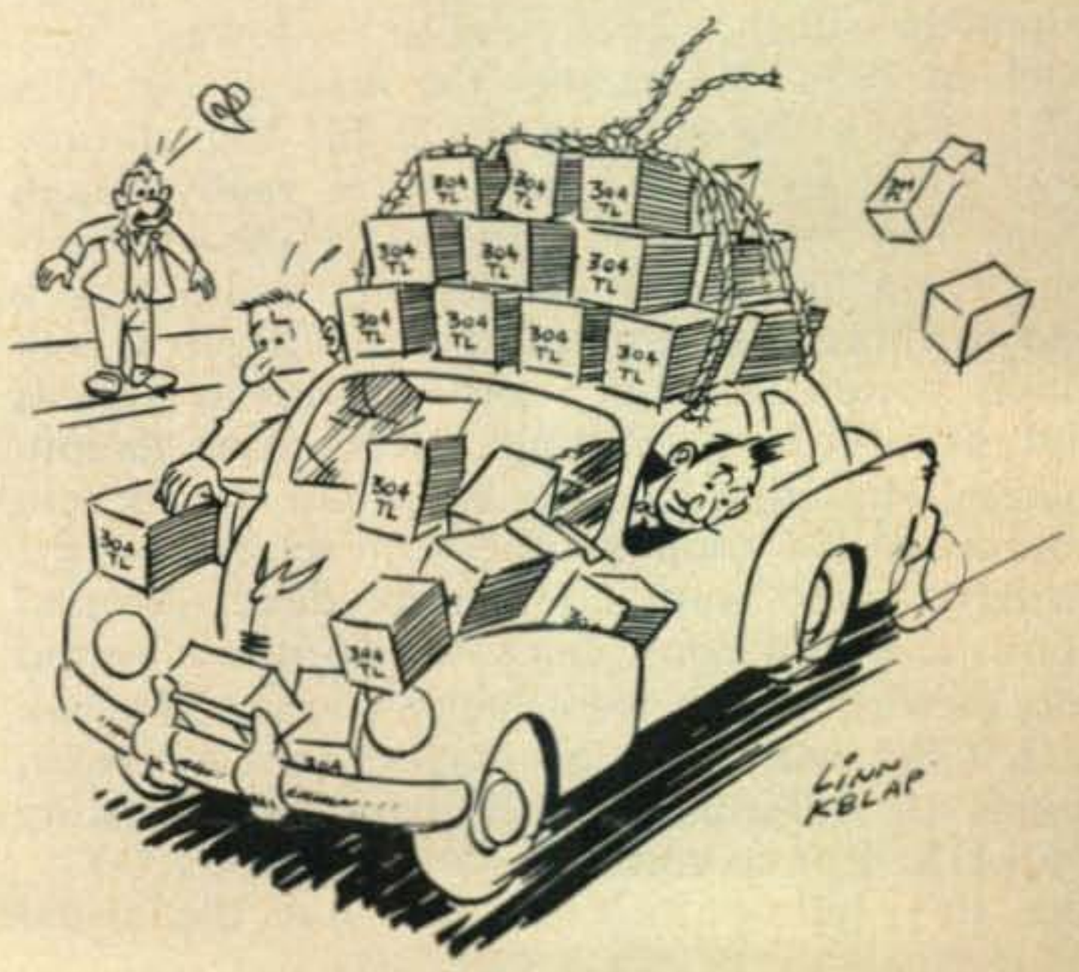
That was a huge mountain of cardboard boxes, perhaps twenty feet high extending from wall to wall and to the back of the building as far as the eye could see.

"You want 304TL's?" he reiterated. "Look at that! *Eimac* had a war-time plant in Salt Lake City grinding 304TL's out by the thousands, twenty four hours a day! Remember the old SCR-268 radar? That used eight 304TL's, and each set had sixteen spares! By the end of the war, the U. S. Government had 304TL's coming out its ears!" He grabbed a carton and expertly slit open the paper tape. The box opened up like a flower, disclosing an intricate cardboard suspension system holding a second box. Eddie dropped the larger box on the floor and opened the inner box. Nestled in the cleverly folded segments of the box reposed a glistening, new 304TL. The glass shone with an unholy glow and the ceramic base was as white as snow. Eddy heard us gasp simultaneously and he knew he had made a sale. At this point the *Sunspot Madness* hit us. We were doomed.

It isn't easy to drive a car loaded with fifty 304TL's, each in its cumbersome carton. The rear seat of the car, Pendergast's lap, and the floor of the front seat were crowded with boxes. An extra dozen tubes were roped to the roof of the car. More tubes were crowded in the turtleback.

"Boy, what a deal", crowed Pendergast. "We really put it over on old Eddy. Imagine *fifty* 304TL's at that price! Wow!"

Looking back on it now, I can clearly see



that we were both slightly mad. Unknown to us, the sunspot cycle was at that instant at its very lowest point, and deadly rays from the sun were plunging through the weakened ionosphere, addling our senses and turning our brains to putty.

"Yeah", I said with suppressed excitement, turning the car into my driveway. "Let's unload our treasure and gloat over it."

Surrounded by the quiet of the shack we feverishly broke open one box after another, exposing in each carton a spotlessly new 304TL. I picked up one and read the label, etched for all eternity on the side of the glass envelope.

"EIMAC, Registered U. S. Patent Office. VT129/304TL. Made in U.S.A." I placed the tube on the edge of the desk with a hand that trembled slightly. My aim was poor and the tube rolled neatly to the floor and hit with a jangle of ruptured internal elements.

"What the heck!", said I. "We still have forty-nine left." I heaved the defunct bottle into the wastepaper basket.

Surrounded by gutted boxes and 304TL tubes Pendergast and I learned all there was to know about the species. There was a beautiful, slim new-type 304TL having four separate tubes within the envelope, closely bonded together. A single grid and plate lead protruding from the envelope gave a feeling of unison to the tube. It has *electronic sex appeal!* There was also a second type, obviously an earlier design that had *four* separate grid leads protruding from the glass. The leads were bonded into one by a metal ring encircling the outside of the tube envelope. Finally, there was an ugly brute of a design, having a bulging glass envelope and a crude grid ring outside the mis-shapen bulb.

"That baby must have been made on a subcontract," I said. "*Eimac* would better be caught dead than to turn out a junker like *that*!"

"Look at this," cried Pendergast, waving a tube over his head. "Here's a 304TL with a *Sylvania* label. Bet this is a collector's item." He pushed the debris of the cardboard containers into the corner of the room and started to fondly stack the tubes in a pyramid in front of him. I gazed at the 304TL in my hand, and slowly *THE IDEA* came to me. *This was a turning point in our life! The implications staggered the imagination!*

"P-Pendergast", I stuttered. "I've just had an inspiration that comes only once in a lifetime! Do you see what I see?"

My lifelong buddy spun around, questioningly. "What do you mean," he gasped. "What is this idea of yours? Can we make money at it?"

"Look at this 304TL", I replied. "It is actually *four* separate 75-watt tubes in one envelope. They have a common plate lead, as you see. They also have common filament leads. But some models of this tube have *four separate grid leads* coming out the envelope—like this one, and others have *one common grid lead*—like that one," I gestured to a 304TL laying on the floor.

"So what," he replied." Just a diffierent manufacturing process. The bottle with four grid leads has all the leads strapped together on the outside of the tube. Why get excited about that?"

"Don't you see?", I exclaimed, grabbing his shirt in my excitement. "If we can take off this external grid ring, we can separate the grid leads! Look at this!" I grabbed a pencil and a piece of paper and drew a rapid sketch. *All we have to do is to separate the grid leads!* Then we can use one-half the tube as a neutralizing capacitor for the other half! Think of the economy! Just turn off the filaments of half the tube and you have a built-in neutralizing capacitor! This will revolutionize ham radio! A self-neutralized kilowatt amplifier, using two 304TL tubes! Each tube serves as the neutralizing capacitor for the other!"

Pendergast's mind operated as quickly as a computing machine.

"Let's rush back to Eddy's place and buy up all his 304TL's that have the external grid ring," he exclaimed. "We'll corner the market and make a killing! This is great! I hope nobody else thinks of this!"

"Before we do that, let's see if we can disconnect the grids from the grid ring", I examined the 304TL minutely as if it were a fine jewel. "Each grid terminal is welded to the grid ring by a thin strip of metal," I announced. "Hand me those wire cutters, and I'll try to clip one of the strips. That will disconnect the grid terminal of one section of the tube." I seized the cutters and placed the jaws over the grid strip. I squeezed gently. A sharp click announced the parting of the wire. A simultaneous "pop" told that the glass seal of the grid lead had parted, ruining the tube. I cast the useless bottle aside.

"Hand me another 304TL", I commanded. "My hand must have slipped on that one". Five tubes later I had to admit defeat. "I just can't cut the seal without breaking the glass of the tube," I said. "Maybe we can cut the lead with a jeweler's saw."

"Nonsense', said Pendergast whose visions of a fortune made from de-gridded 304TL's still swam before his eyes. "The grid ring is only stuck to the envelope with some sort of glue. Put the tube in hot water and the ring will loosen up. The glue will soften, *then* we can cut the connecting straps between the ring and the grid leads!"

No sooner said than done! Scooping up an armful of 304TL's we ran for the kitchen. A frantic search brought forth a large galvanized iron tub, big enough to hold five or six tubes.

"Fill it full of water and place it on the stove," I cried. "Turn on all the burners, and let's start cooking with gas!"

Slowly the temperature of the kitchen rose. It was late afternoon, and still extremely hot

outside, and the kitchen rapidly approached oven-like temperatures. Pendergast and I were dripping perspiration from head to foot as we gently dropped five 304TL tubes in the boiling water.

"Hope they don't crack," I muttered to myself.

The kitchen door suddenly swung open and my wife appeared through the rising steam.

"What are you two madmen doing with the stove on a hot day like this?", she demanded. She advanced through the hot haze and looked into the tub. "What in the world are you cooking?", she cried. "A couple of baby walruses?"

"No honey", I answered, "Just boiling a couple of radio tubes".

"Boiling radio tubes? Well, you don't have to be crazy to be a ham, but it certainly helps!", and with that tart remark she left the kitchen. "Don't forget to clean up that mess when you are finished", she called.

Pendergast was right. The glue was loosened in the boiling water, and the metal grid ring became loose and pliable when the scorching hot tubes were removed from the iron tub. It was but the work of a second to clip the offending leads with a pliers without damage to the tube.

"Tell you what," I said. "It's only four-thirty. I'll drive back to Surplus Eddy's and make a deal with him on the rest of the 304TL tubes that have the external ring. Meanwhile, you boil the remainder of the tubes. Then you hotfoot it out to the shack and start working on a final amplifier so we can try out this wonderful idea! I'll be back as soon as I can." I departed, soggy and dripping and headed once again back to the city, mentally totalling the profits as we sold de-gridded 304TL tubes to the amateurs for $4.95 apiece, after buying them for less than two bits each, and boiling them in hot water for a spell. "Nice work if you can get it", I said sagely to myself.

It was long after midnight when I returned home, tired and dusty. I walked painfully into the shack where Pendergast was putting the final touches on a new amplifier designed to operate with the "new-design" 304TL tubes.

"Boy, am I bushed", I groaned. "I climbed all over that dirty pile of boxes, and opened every darn one! Eddy has 13,593 tubes that have external grid rings, and I made a quick deal for them all. He's sending them out by truck. They'll be here tomorrow."

"Sure took a lot of money," said Pendergast looking at the sales slip in my lifeless fingers. 'I'll give you a check for my half of the cost tomorrow. While you were gone, I de-gridded fifteen tubes. Your wife has stopped speaking to me, incidentally. I dropped six 304TL's on the kitchen floor. What a mess that was". He sighed. "Oh, well, this amplifier is all ready to go. Hand me a tube, and we'll try the famous self-neutralized amplifier that will revolutionize amateur radio."

Pendergast took one of the reworked 304TL tubes and tenderly placed in the amplifier socket. The filament of the tube glowed as he closed the primary switch. I dragged myself out of the easy chair and looked at the amplifier, sitting askew on one corner of the operating bench.

"I'm using your *Viking I* to drive it", said Pendergast. "That will give us plenty of excitation. Let's tune up the grid circuit before we apply any plate voltage to the 304TL. Slow and steady is my motto."

I flicked the plate switch on the *Viking* transmitter and it sprang into life. "Tune the grid circuit of the 304TL amplifier", I said in an excited voice. "Watch the grid current!" Pendergast spun the knobs on his creation with shaking hands.

"In five minutes we'll be famous", he smiled as he watched the meters. "Sure wish I was home so's I could be your first QSO."

"How-come you're not getting grid current," I demanded "Didn't you check things with the grid-dipper?"

"No," he admitted. "Too excited, I guess." I brushed past him.

"Here, let me try it," I said. But try as I would, I could get no more grid current than Pendergast. Zero. "It acts like the grid circuit is out of resonance," I stated. "Let me take a close look at the wiring. Probably some of your famous hay-wire is fouling us up!"

I examined the would-be million dollar circuit with a close eye. All seemed to be in order. It was wired exactly as we had agreed upon. Two sections of each tube acted as the neutralization capacitors for the other sections. The amplifier was poetically symmetrical in its simplicity. I was looking at a potential fortune be-

[Continued on page 128]

Transistorized Two-Tone Oscillator with Pulser

A Simple Device to Help Tune the Sideband Rig

D. W. Richards, W7UPF
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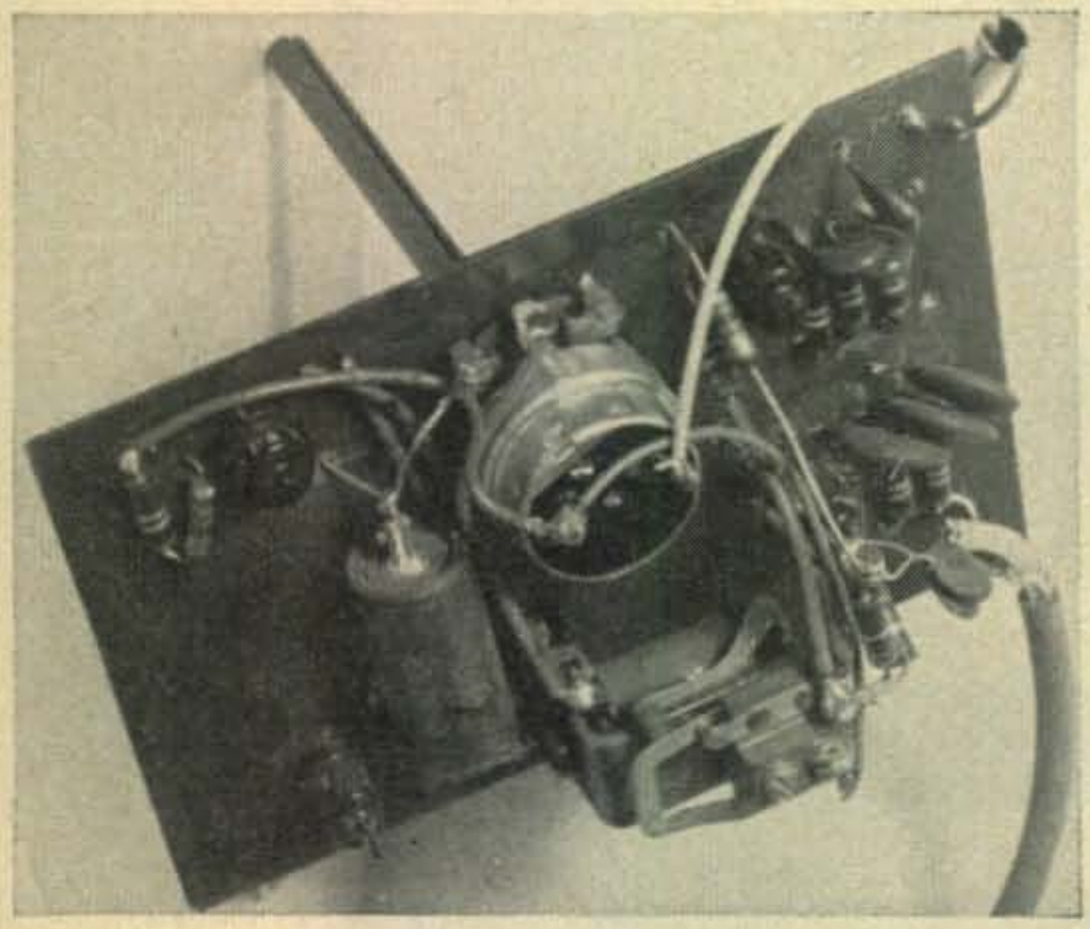


A reader is often uncertain what an article is about even after going through it completely. Let's therefore list at the beginning of this one an outline of the "whys and wherefores."

The unit to be described in this article is a transistorized two-tone audio oscillator with pulser. The function of the unit is to supply two audio tones simultaneously at approximately 2500 and 1000 cycles, pulsed at a selective rate.

The purpose of the unit is to serve as an aid in the tuning of a sideband rig, using the two-tone method of alignment for linearity.

Many books and articles have been written and many circuits produced, dealing with transistors in almost every conceivable application. Since it is much easier to make use of another's effort in the design field, this unit is borrowed in sections from data already in print but which has been combined to serve a practical purpose in the ham shack.

Audio Section

It would be best to consider the audio portion of the device first and cover some of the key parts; but before we dive into this, please note that although the accompanying photos indicate printed circuit construction, it isn't really necessary to follow this suggestion. I wanted to try this rather new and wonderful scheme of building and it was fun; but now let's get along with the problem at hand. If you will refer to fig. 1 and consider the audio section, you can see it is simply two separate "Phase Shift Audio Oscillators" which are tied together in a single output connection.

Now, in the simple "together" method used here, the output coupling of one oscillator will affect the action of the other; therefore, the setting of R5 and R10 or equivalents will need to be checked to assure equal output voltage from each of the oscillators. You are in need of this balance in order that the 2500 and 1000 cycle output will be of the same amplitude prior to inserting into the audio section of the sideband exciter. Not to be forgotten in this basic description is the identification of frequency controlling factors in each of the oscillator circuits. C1, C2, C3 combined with R1, R2 and R3 provide the key to the desired frequency. This same portion of the second oscillator circuit is the heart of its frequency determining network. If it is necessary to change frequencies, an increase in the capacity of C1, C2 and C3, each in a like amount, will lower the resultant frequency. A decrease in the same capacitors will give a higher resultant frequency. This once again applies to the same portion of the network in the second audio oscillator; namely, C5, C6 and C7. If you desire to hear the audio while working on this unit and prior to piping it into the side-

[Continued on page 118]

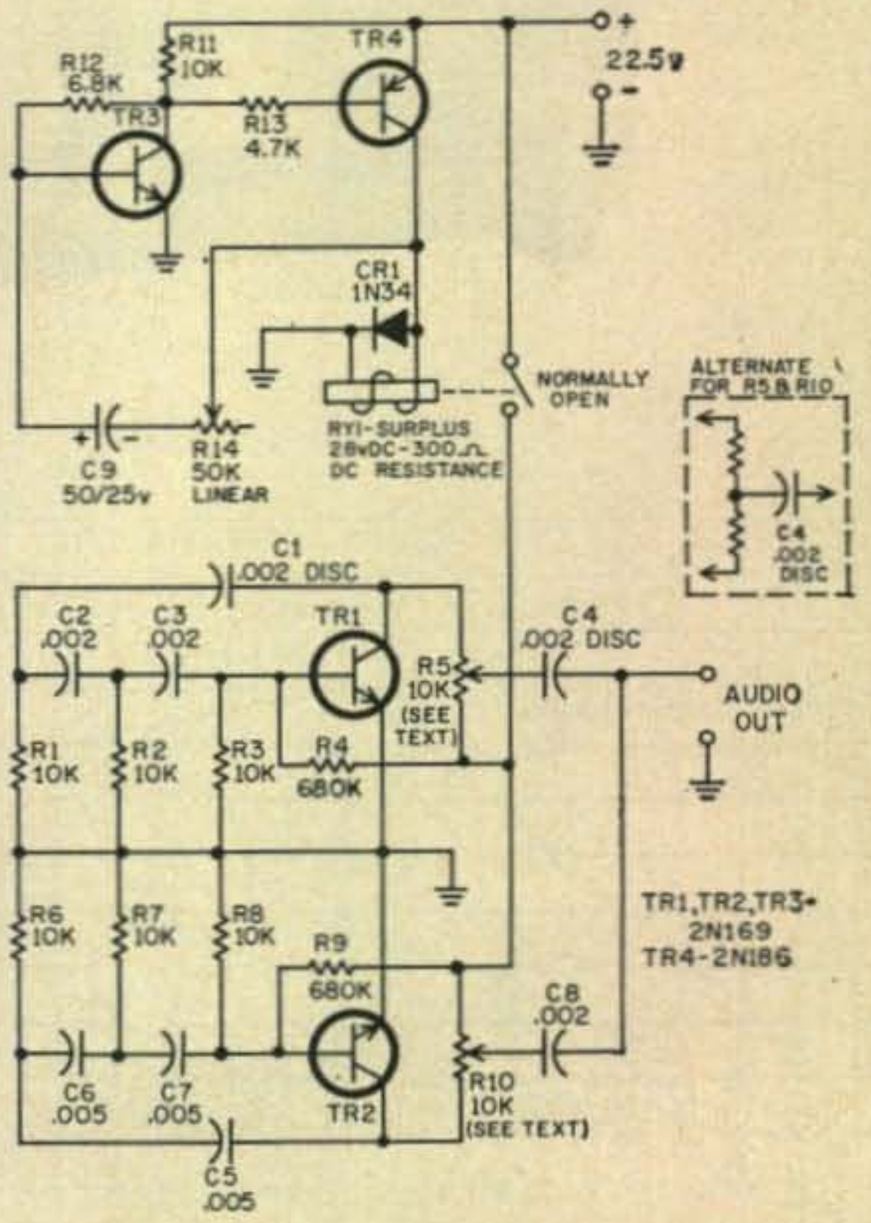
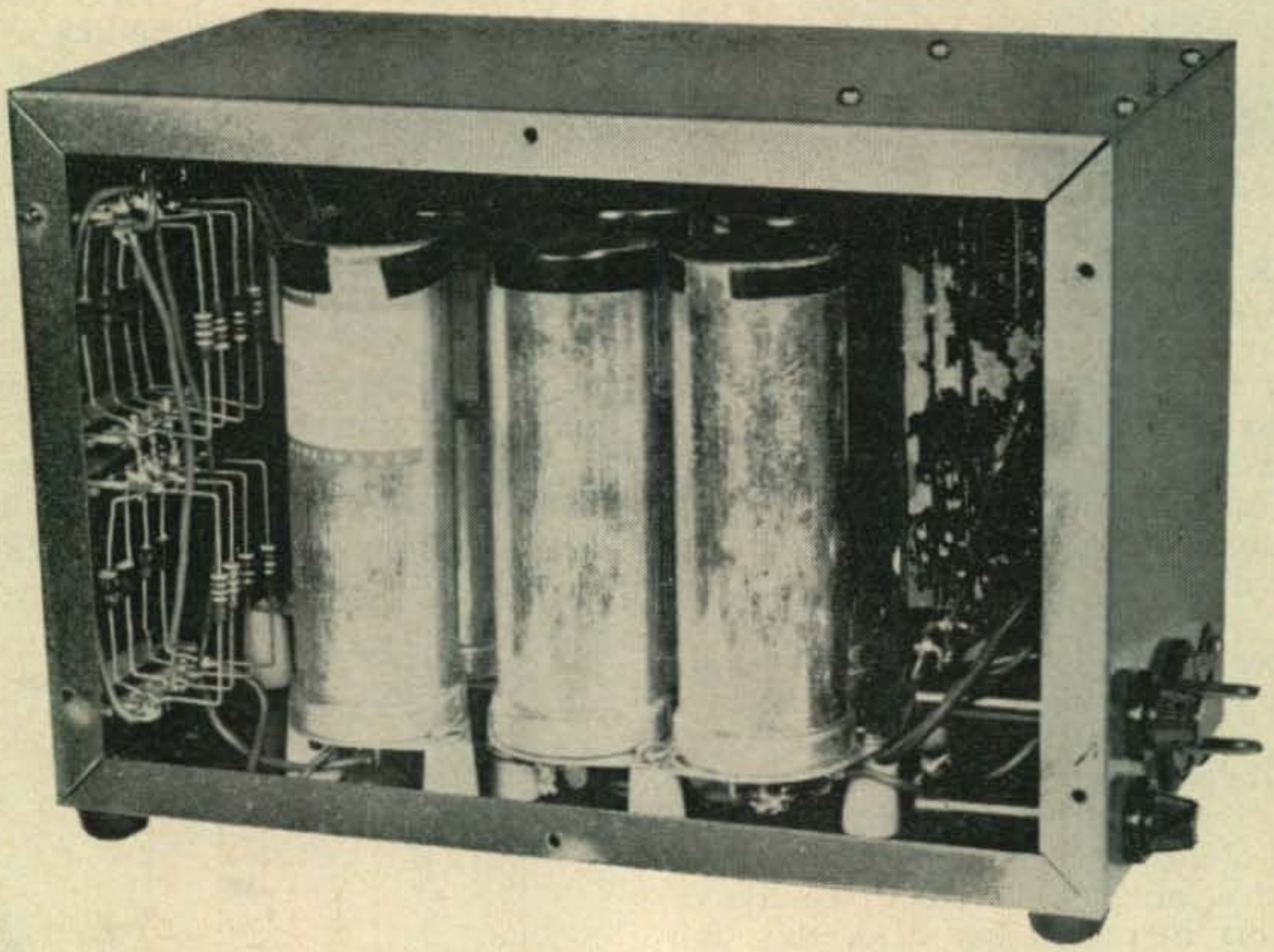


Fig. 1—Circuit of a dual audio oscillator working at about 1000 and 2500 cycles pulsed at a variable rate.

A Medium Power Voltage Quadrupler

Glen W. Deen, W5TAD/5
4516 Avenue D
Austin 5, Texas



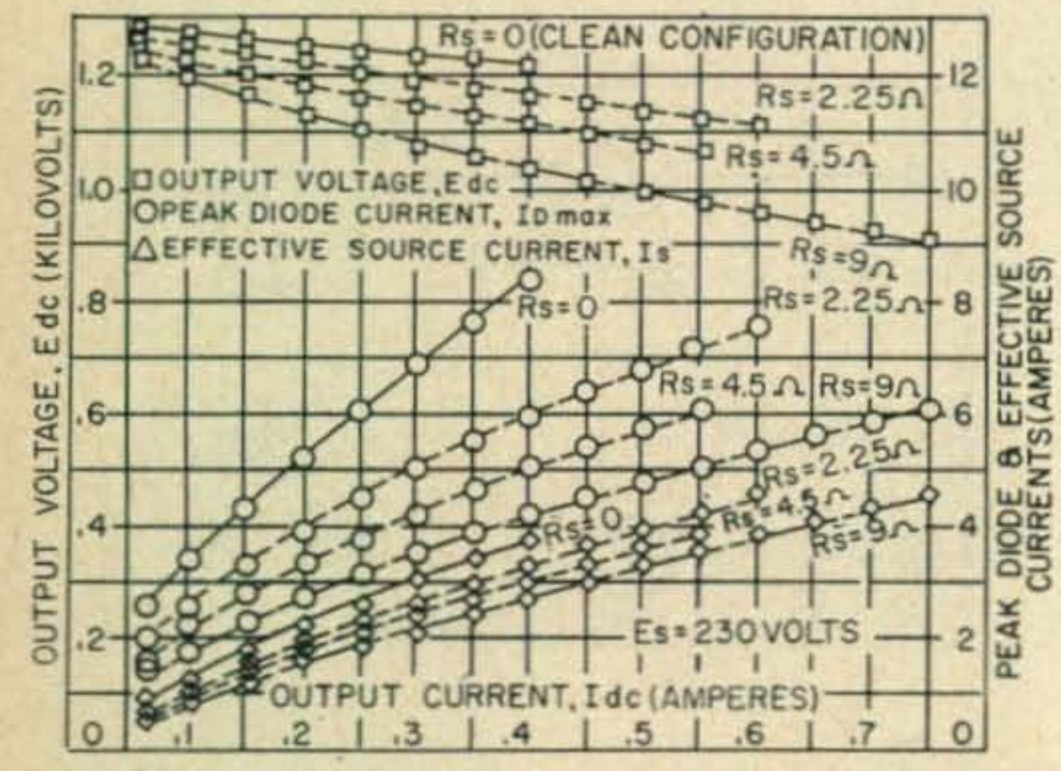


Fig. 1—DC output voltage, peak rectifier current, and power factor.

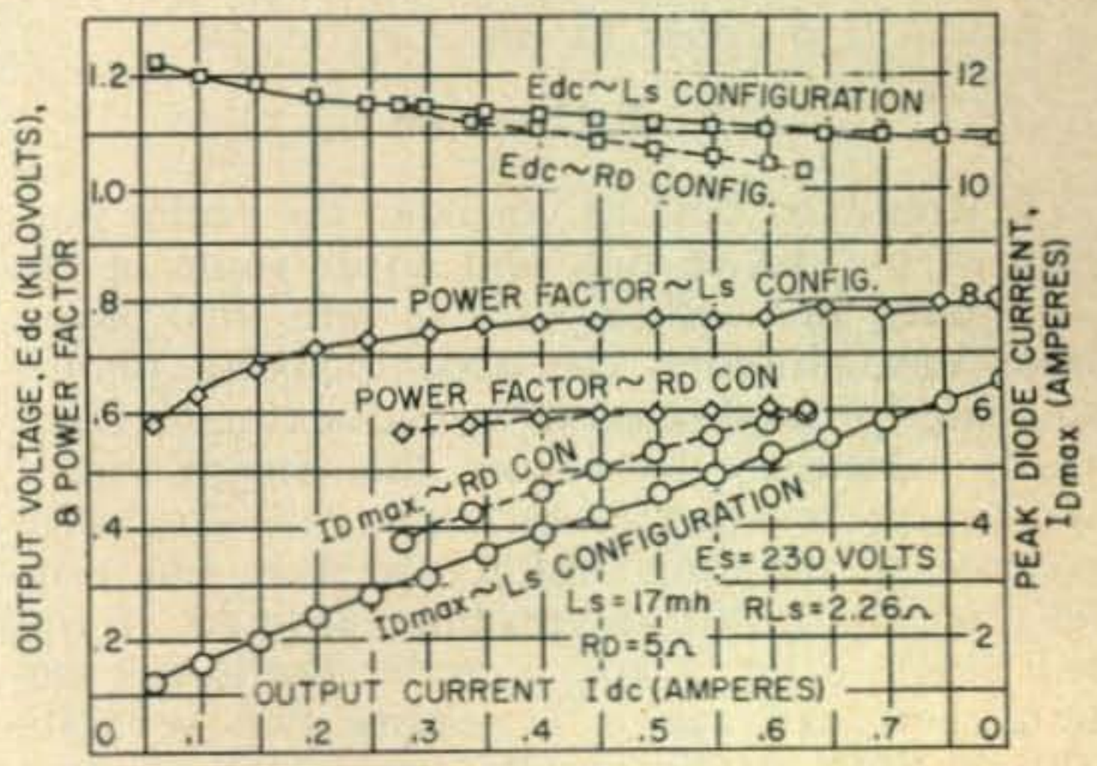


Fig. 2—Performance of the clean and series resistance configuration.

Voltage multiplying circuits have been in use for more than twenty years. For the most part, however, their use has been limited to low-power applications. The purpose of this article is to demonstrate the feasibility of constructing a medium-powered, full-wave, voltage-quadrupling power supply.

A prototype was constructed with readily available, low-cost components. This lightweight (10.25 lbs), compact (5x6x9 inches) unit delivers three-quarters of an ampere of smooth direct current at 1080 volts when it is connected to a 230 volt, alternating current source. The rectifier conduction angles were increased by inserting an inductor in series with one of the input leads so that the rectifiers could be operated at their maximum average current ratings without exceeding their recurrent peak current ratings. Series current-limiting resistors accomplish the same effect, but the series inductor also provides better voltage regulation, higher power factor, and it dissipates less heat. The Texas Instruments type 1N2070 silicon rectifiers used in this power supply are rated at 0.75 amperes average, 6 amperes recurrent peak, 32 amperes surge, and 400 peak inverse volts at 25°C ambient. The average current for all rectifiers in a voltage multiplier circuit is the same as the *dc* load current.

Experimental Results

Four distinct configurations for the voltage quadrupler were tested. The clean configuration in which no resistors or inductors were inserted corresponds to the theoretical case. The series inductor configuration contains an iron-core inductor inserted in series with the voltage source. The inductance was adjusted to that value which permitted the rectifiers to reach their maximum average and peak current ratings simultaneously. The diode-resistor configuration has a five ohm resistor in series with each of the four rectifiers. The power rating of each resistor is 20 watts. The series-resistor configuration contains a resistance which was given three different values (2.25, 4.5, and 9 ohms) in series with the voltage source.

Figure 1 shows the *dc* output voltage, the peak rectifier current, and the power factor (which is defined here as the ratio of *dc* output power to *ac* input volt-amperes) plotted against *dc* load current for the series-inductor and the diode-resistor configurations. The superior performance of the series-inductor configuration is obvious.

The five ohm resistors almost limit the peak current adequately for the diode-resistor configuration, but the surge current can be as high as 65 amperes for each rectifier. The surge current for the series inductor configuration is difficult to calculate because of core saturation. A rough estimate, ignoring exponential decay, and assuming a step function of 325 volts (ESmax) shows the surge current to be about 30 amperes for each diode. The maximum surge current observed with a long persistance oscilloscope for the series inductor configuration was 25 amperes for each rectifier.

The ripple factor was not plotted because for load currents above about 200 milliamperes, it can be closely approximated by the following linear relation:

$$\text{Ripple percentage} = 0.10 + 0.86\text{Idc}$$

Where Idc is the load current in amperes. Thus at full load, the ripple is about 0.75%. The presence of the inductor or the resistors has little effect on the ripple factor.

Figure 2 shows the performance of the clean and the series-resistance configurations. The rectifiers in the clean configuration reach their maximum recurrent peak current ratings at one-third of full load. Nine ohms of series resistance was required to hold the peak current to six amperes at full load. Referring to the effective input current at that point, it is seen that this represents a power loss in the series resistor of 178 watts. The *dc* output voltage of 900 volts at full load is far below that for either of the other two workable configurations.

A comparison of the three configurations in regard to I^2R loss can be made by estimating the series resistance that will give the same peak current versus load curve that the diode-resistor configuration gives. This value for Rs is roughly the geometric mean between 4.5 ohms and 9.0 ohms or 6.36 ohms. The effective source current at this common load point (0.625 amperes average and 6.0 amperes peak) for the series-resistor configuration is about 4.0 amperes, and the power dissipated by the 6.36 ohm resistor is therefore 102 watts. The effective diode current for the diode-resistor configuration at this load was measured to be 1.85 amperes. Since there are four of these five ohm resistors, the total power dissipated in the diode-resistor configuration is 68.5 watts. The effective source current for the series-inductor configuration at this same *dc* load current is 3.85 amperes. Since the resistance of the inductor is 2.26 ohms, the power dissipated by the inductor is only 33.5 watts.

Figure 3 shows source and rectifier current and ripple voltage waveforms for the clean and the series inductor configurations. In both cases the peak source current is about 9 amperes and the peak rectifier currents are about 6 amperes. The *dc* load current for the clean configuration is only 250 milliamperes, however, while the *dc* load current for the series-inductor configuration is 750 milliamperes. The differences in the shape of the current waveforms for the two diode pairs is of interest. Diode one starts conducting slightly before diode three, and diode four starts conducting slightly before diode two. The effect of increasing the series inductance is to increase the rectifier conduction angles (the energy stored while the current increases is released as the current decreases) which, in turn, provides a greater

ratio of average current to peak current. Increasing the inductance also reduces the output voltage, however, so that the inductance which was used was that value just sufficient to give 0.75 amperes load current at 6 amperes peak rectifier current. It just happened that this required inductance was the maximum inductance of the particular variable inductor used in the laboratory tests. It did not occur to the author at the time these tests were made to check the performance of the supply with the inductance increased to that value necessary for series resonance at 60 cycles. Quite probably, the input current would approximate a sine wave, and the power factor would approach unity.

The fundamental ripple frequency is 120 cycles since this is a full-wave circuit. As can be seen from the ripple waveforms, however, a small 60 cycle component is present because the capacitors are not perfectly matched. Because the ripple voltage is proportional to the load current, the load on the series-inductor configuration was reduced to the same value as that for the clean configuration (250 milliamperes) for comparing ripple voltage waveforms.

The peak rectifier currents were measured with the oscilloscope connected across a 50-millivolt, 5-ampere meter shunt which was placed in series with one of the rectifiers. The resistance thus introduced in the rectifier circuit is negligible.

Circuit Details

Figure 4 shows the complete circuit diagram for the series-inductor configuration along with a list of parts. Because the peak inverse voltage across each rectifier at no load is 650 volts, it was decided that 600 *piv* diodes would be inadequate. Since there are no 700 or 800 *piv* diodes on the market at this time, each rectifier was made up of two 400 *piv* diodes in series. The half-megohm resistors equalize the inverse voltage drop across each diode. The tenth-megohm resistors equalize the voltage drop across the electrolytic capacitors and act as safety bleeders. The capacitors need at least five minutes to discharge adequately.

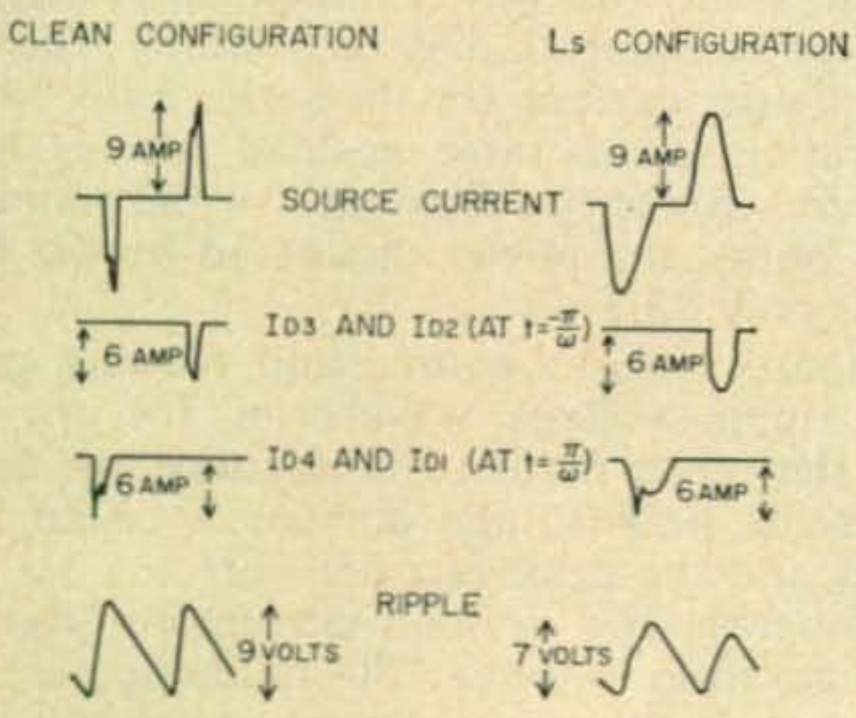
Danger

This circuit is potentially lethal, and extreme caution is necessary at all times. When the author was testing a preliminary breadboard hook-up with 115 volts input, he accidentally got between the shield and the tip of the voltmeter probe and landed on the floor with a tangle of wires, components, and broken load lamps in his lap. Fortunately, the plug came out of the wall, and the capacitors discharged through the lamps before they shattered. Nevertheless several painful burns were sustained on the hands.

Ventilation

The heat dissipated by this unit is not large, and normal ventilation practices should suffice. The prototype has no ventilation holes in its case. It was run at full load with the side covers attached for two hours. There was no percep-

[Continued on page 116]



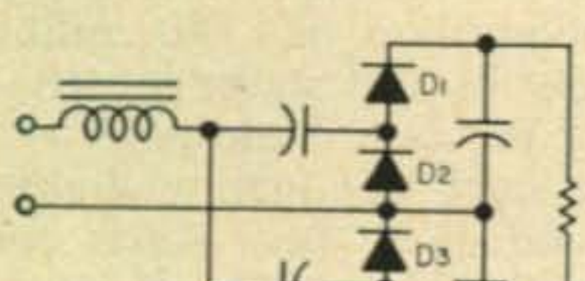
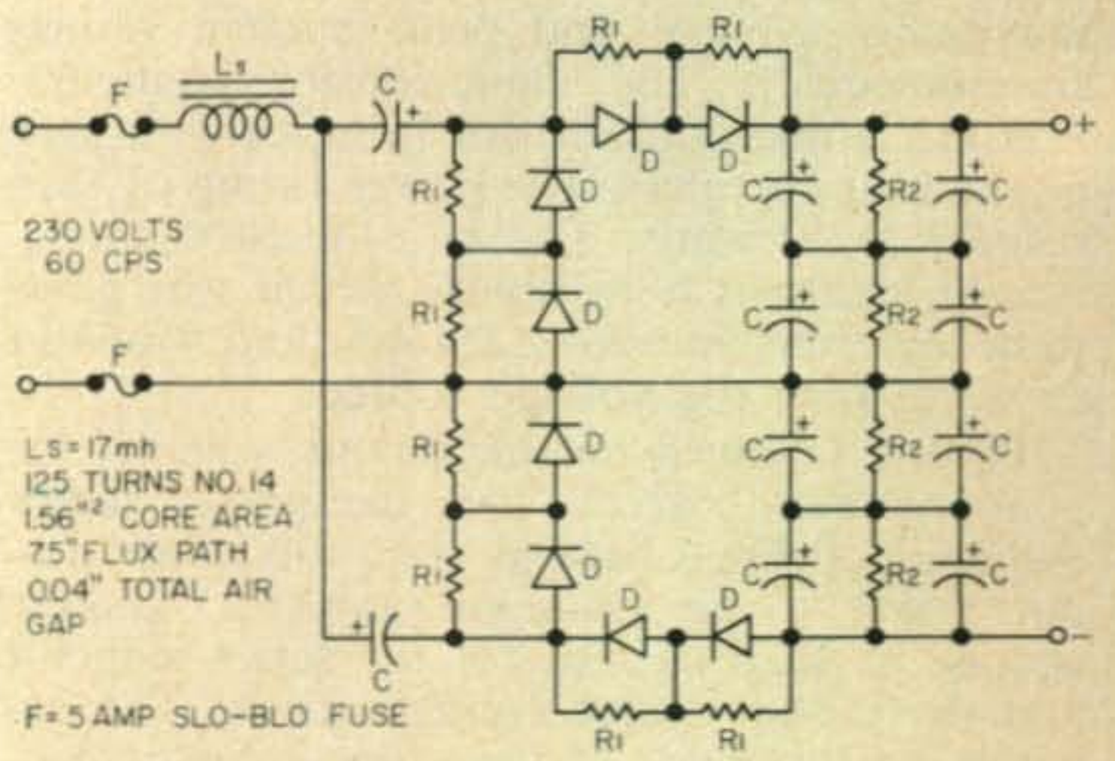


Fig. 3—Source and rectifier current and ripple waveforms for the clean and series inductor.



C—Sprague TVL1642 150 rf @ 350 WVDC (10 REQD)
D—Texas Instruments IN2070 (8REQD)
R_1—500 K ~ ½ Watt Carbon Resistor (8REQD)
R_2—100 K ~ 2 Watt Carbon Resistor (4 REQD)
L_s—17 mhy Home-made Inductor (1 REQD)
Bud CU-1099-HG Utility Cabinet (1 REQD)
National GS-10 Standoff Insulator (16 REQD)

Fig. 4—Complete diagram and parts list for the series inductor quadrupler circuit.

K6EVR IN BERMUDA

Bermuda welcome for Ron Camp (center), K6EVR, Bermuda's 350th Anniversary Contest winner. He is greeted by Reggie Pitman, VP9AX. At left is Dennis Dinga, W6UED who accompanied Ron.

Ron and Dennis receive cycle operating tips from VP9AX, president of the Radio Society of Bermuda. The visitors from California were guests at Inverurie Hotel on the Paget waterfront.

View of the head table guests at annual dinner of Radio Society of Bermuda. On extreme right is Ron Camp. Others are (l to r) Reggie, VP9AX; Hon. J. E. Pearman, M.C.P., Bill Jones, VP9BN; Mrs. Jones

Ron shown with other guests during the annual dinner at which he was the guest of honor. At left is Walt Bauer, VP9WB and XYL Thelma, while next to Ron is Mary, XYL of Tom Lynch, VP9EN.

In The Beginning

F. D. Whitmore, W2AAA
223 W. Holly Ave.
Pitman, N. J.

Conclusion

Rapid Advancement of Amateur Radio

Sam arrived home with plenty of salt behind his ears, and master of the sailor's bent-knee walk. Though enjoying sea life and foreign ports, he too got that feeling experienced by so many other operators. It's the feeling that excellent opportunities are popping up at home and you aren't there to get them. That's what really cured Sam from continuing a career at sea. Shortly afterward, he joined a broadcast station as an operator.

Back at home again, Sam plunged into amateur radio, picking up where he had left off. He experimented with numerous master-oscillator-power-amplifier (MOPA) transmitting circuits keeping them in the band through checks with WWV's signals. WWV first began sending signals for ham check purposes in 1923.

When crystal control circuits appeared in 1925, Sam and the neighborhood hams were among the first to give them a try. This just about shelved the old peanut can monitors the hams used to keep constant check on their frequency.

Playing with crystal circuits got Sam acquainted all over again with the advantages of low power. From then on, to keep alive with the fast changing radio art, Sam made experimentation easy by switching to low power rigs.

Frequency doubling also came to light in 1925. Its bandhopping economies captured immediate attention and is popular to this day.

One of the biggest boons to amateur radio hit amateur circles in January 1927. The QST editorial for that month mentioned the first ARRL handbook. What originated perhaps as a timid trial soon became a bible to the amateur fraternity. Contained in one thin volume was instruction in the essentials of ham radio together with circuit information to get started.

Its timing was perfect. Because from then on, radio developments moved rapidly. Concentration on radiation featured the popular "Zepp" antenna for the amateur in 1928. Starting with the UV-224, screen grid tube, in 1929, tube types mushroomed each year. That little workhorse, the UV-245 power amplifier, came out at the same time.

A whole series of 2.5 volt tube types hit the market quickly giving way to the new series having 6.3 volt filaments. Then metal replaced glass. Still the tube evolution moves rapidly on. Today we are back to glass.

By 1930 numerous fone rigs hit the pages of QST. All band operation set the style. Fone jobs showed several choices of modulation; but the Heising plate modulation method gained the greatest popularity. This sufficed for a few years until Class B came to light.

One of the cutest simple rigs Sam built came out in QST shortly after the UV-245 tube became available. Sam built this transmitter when he had an unexpected day off from work at the broadcast station.

Sam had very little to say about having this day off. At the broadcast station, they weren't talking at all. A big cloud of mystery shrouded the whole affair. However, bit by bit over a period of time, the story got out. It went like this:

The commercial broadcast station had a 500 watt homebrew transmitter. In its final form, this transmitter represented the handiwork of several individuals. However, it was not the product of mass labor; it was rather an accumulation of tinkering by several self-styled experts. Salesmen on this station even sold "time" to prospects with the argument that this station had more kilocycles than the other stations in town. Viewing it head-on, the panel presented a sleek well-balanced layout. But looking obliquely from either side or straight into the rear, showed a different story. Compared to modern standards, it was a rats-nest deluxe. A maze of wiring ran in all directions. Only the *rf* tank circuits contained short, direct wiring. Filament and grid leads drooped to the floor to connect to transformers and "C" batteries. Personnel had to step over numerous power leads snaking about the room.

Still, the old haywire rig had good quality and performed nobly day after day. It per-

formed well that is until the day after the *accident*. The accident put them off the air twenty-four hours. It affected the equipment only slightly; the big damage was to the personnel's pride. The Federal Radio Commission required a full report when a station left the air during broadcasting hours. Writing that report was a humiliating chore.

After several starts, scrapping sheets of paper, and starting anew; an apologetic story began to take shape. True, the room had been flooded. But no water main had broken; no surface water from a hill had swept in; no heavy rain had caused a leak. All that had happened was: A stopped up toilet drain caused water to overflow all over the floor. It saturated the haywire wiring and put them off the air.

Eventually the room got cleaned up and the wiring dried. Shortly afterward, however, a new transmitter appeared on the scene; with it came a new chief engineer too.

An efficient design and compact construction removed all traces of former growing pains. Served by hidden feed lines, this 1 KW water-cooled rig stood majestically alone with all circuitry confined.

The rig Sam built that immemorial day consisted of a pair of UV-245 tubes in a push-pull tuned-plate tuned-grid circuit using a fixed resonant grid coil.

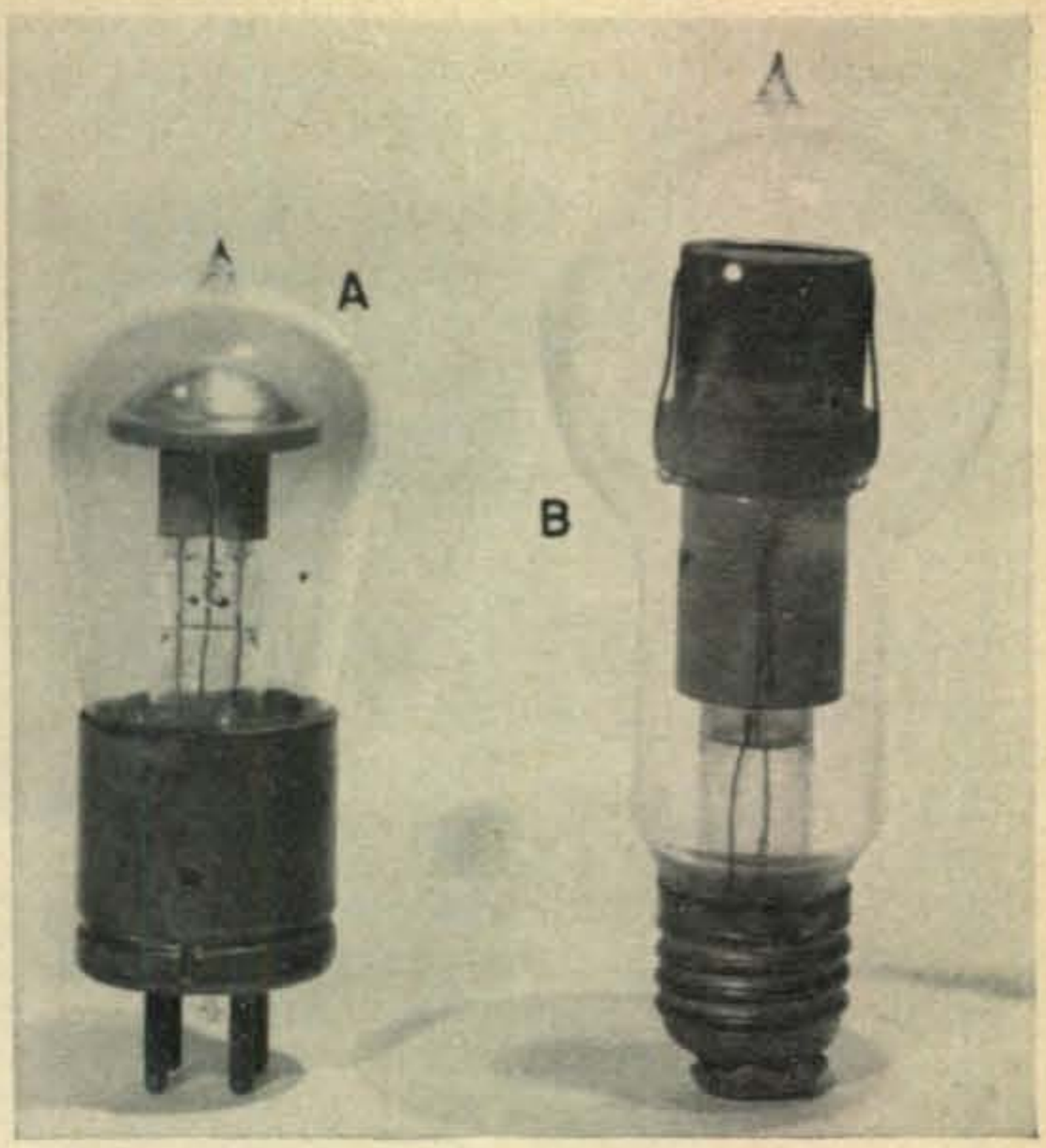
The push-pull 245s with 350 volts on the plates packed as much wallop as a single UV-210 with 600 plate volts. In addition, the 245 rig with its 280 rectifier was considerably cheaper than a 210 transmitter and type 281 rectifiers. The saving was due to mass production of the former tubes for broadcast receivers.

Now a bombshell hit amateur radio. The November 1931 issue of QST announced class B modulation to hamdom. Loy E. Barton of RCA wrote the article. It familiarized the amateur via a technical discussion with a class B audio amplifier to replace the Heising constant current plate modulator.

The minimum number of tubes for a given power output and the large reduction in average plate current consumed, sent class B modulation sweeping through amateur circles. It was the big subject of the day. Shortly thereafter commercial class B driver and output transformers reached the market. Among the numerous fone articles covered by QST, a nifty forty watt class B job, using dual grid tubes, came out in the July and August issues of 1932.

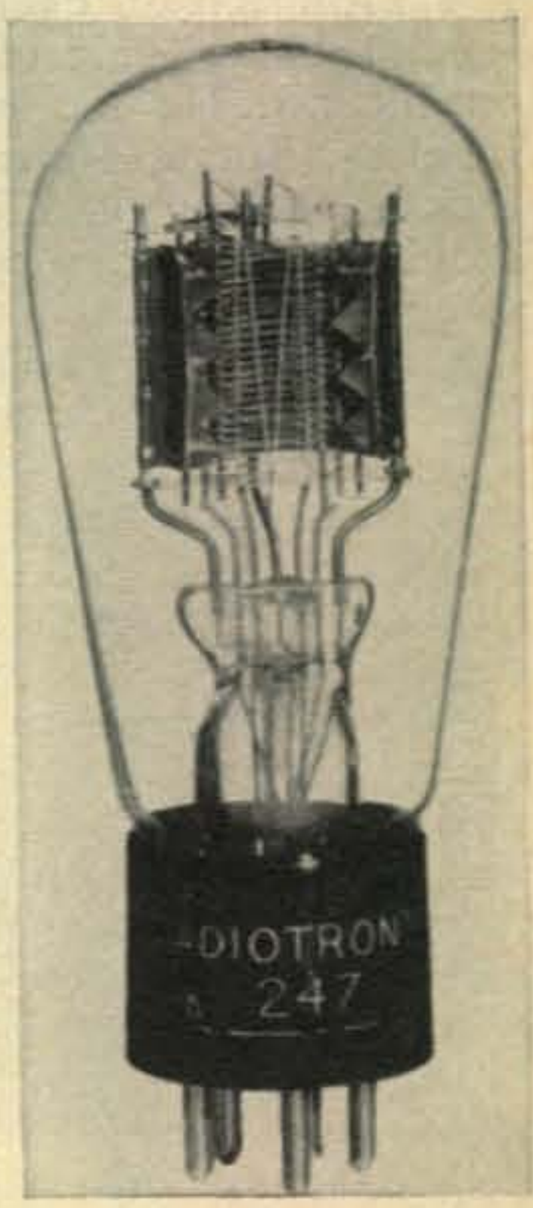
This little fone transmitter appealed greatly to the eye and pocketbook. A small wooden chassis held the compact speech amplifier and modulator. A three panel wooden rack contained the 246 crystal oscillator, 246 buffer and the pair of 246s in the final. Separate 400 volt power supplies fed the *rf* chassis and the modulators. The driver and modulators were also 246 tubes.

A lot of hams had a lot of fun with these low-power class B fone rigs. They took their



Rectifier Tubes
A—One of the hot types
B—Cold cathode type

Screen grid tube brought out in 1927. Screen grid tubes promptly caused great changes in receiver performance.



In 1931 the 247 power pentode became available.

own part very well amid the average QRM. In the amateur nets they were superb. Their fine performance kept them popular for quite a while.

One night Sam rushed to the operating table to call in to the state net with one of these rigs. He slammed into the swivel chair and hit the "warm-up" switch. As the receiver reached operating temperature, he heard his call being repeated with provoked impatience.

At the "break", he flipped the "on" switch and started to answer. Muroul-l-ll!!, and a bundle of fur flashed past him. With the enraged yell he was off the air. In the sudden silence, a mixture of ozone and burnt hair enveloped the room.

A look at the power pack and Sam knew he would keep no net schedule that night. Some of the wiring was broken loose, and a couple of wires still smouldered. It meant removal from the rack and a complete overhaul.

Why cats, and especially kittens, do what they do no one will ever figure out. They can pick the most impossible places to curl up for their naps. This one selected the open power pack on the bottom shelf of the transmitter rack. The transformers and chokes were Thordarson manufacture having exposed windings and side terminals. Inverted oil capacitors put the connections at the top for easy hookup to the rest of the components. Amid this exposed wiring "kitty" found it ideal for a comfortable bed.

The kitten was amateur shy for several days. Seen from a distance, it looked badly moth-eaten in places. Sam spent part of two days removing cat hair, shorts and damaged wiring from the power supply. He had only one answer for the cat still being alive: It had used up only one of its nine lives.

Either the kitten decided to let bygones be bygones or else he had a very short memory. For soon it was again wandering about the shack rubbing against Sam's legs. Sam was back on the air. He too had about forgotten the incident. But that pussy-cat just had no radio luck at all. Sam used a two-button carbon microphone suspended by eight strings from four symmetrical points in a ring stand. One day in the midst of a fone contact, Sam raised up from the chair to reach across the operating table for a log book. As he sat back again, his elbow struck the mike stand and knocked it off the table.

Some might say the kitten wanted to be helpful and save the mike. Others would say the kitty just happened to be in the way. Anyway at one instant the kitten's tail was between the mike stand and the floor. The next instant there was nothing between the mike stand and the floor. On one side of the mike was the kitten's tail. On the other side—nothing! And the "unbalanced" kitten was nowhere to be seen. They soon found the kitten hiding under the kitchen table, and doctored its "shortcoming". Upon inspection they discovered that it had really had a "close shave".

Sam claimed the kitten lost another one of its lives in this skirmish with the mike. According to the audit then, kitty still had seven to go. But radio continued to be a threat to its well-being. At last count the kitten had only three more lives to go.

Throughout the latter half of the 1930s and until the World War II, three themes permeated amateur radio. These themes were: 1—All-band transmitters, 2—variable frequency oscillators, 3—beam antennas.

All-band rigs featured various schemes for band changing. Some started with a standard oscillator cutting in or out a series of doubler stages to drive the final. Finals varied from shorting taps to changing coils.

Availability of multi-grid tubes gave flexibility right in the oscillator stage. One type circuit used an electron coupled oscillator. With this, a tank circuit connecting to the screen grid tuned to the fundamental while a second tank circuit connecting to the plate tuned to a harmonic. A variant of this was the Tri-tet in which the screen was the grounded "plate" of a tuned-grid-tuned-plate triode oscillator.

From all band designs, the urge among amateurs developed for means to locate anywhere within a band on a moment's notice. Gradually all band exciters appeared containing variable frequency oscillators as well as crystal circuits. These attempts were the forerunner of our present fine, stable *vfo's*.

Antennas came in for their share of experimenting too. First, various designs of fixed skywires, both horizontal and vertical, were offered. These ranged from long wires center fed to pitchfork verticals.

Then a gradual trend developed as more and more hams joined the higher frequency gang. High gain radiation caught the ham's eye. This led immediately to multi-element beams.

Articles on beam antennas and means for rotating them appeared more and more as the "thirties" moved on. They represented the ultimate in signal gain once you reached the limit of transmitter power. Today, this ability to send the most signal to a certain spot on the globe rages in full force.

Staying Alive in Radio

Old-timers exist in everything. No special privileges go with the title. Nor does it indicate one's ability or character. It means only one thing—*you are getting old!*

What really counts is: Are you happy to have been an old-timer; and, are others happy that you were.

In the beginning, amateur radio was all work with some fun. A little later, it became more and more fun with less work. Today, it can be all fun and no work if you insist upon buying every piece of gear you use.

[Continued on page 114]

Twin Noise Squelch Unit Utilizing Printed Circuit Techniques

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Albuquerque, New Mexico

The popularity of the Twin Noise Squelcher (TNS) (Ref. 1, 2, 3, 4) cannot be over emphasized since it has proven itself to be a necessity to mobile operation. The TNS will also enhance fixed station operation.

The TNS unit herein described utilizes the advantages of printed circuit techniques while using standard commercial components for assembly.

Ham clubs are missing a good bet if they fail to utilize these techniques for mass construction of TNS units.

Belonging to an active Mobile Group (the Amateur Radio Caravan Club of New Mexico, Inc. which is comprised of about forty active amateurs) has presented the opportunity to operate during many local activities such as parades, flash floods, lost-children-hunts, hidden-transmitter hunts and RACES drills.

During these activities many mobile installations have been co-manned by two operators. One of these operators is thus given an opportunity to evaluate mobile receiving equipment differing from his own and to make qualitative comparisons between one equipment and another.

It can be truthfully stated that, in our opinion, there is no single circuit which enhances communication to a greater degree than a high performance noise limiting and squelch system. Furthermore, no other simple system of squelch and noise limiting has been found to be more effective and versatile than the TNS.

Installation of TNS circuits have been made in a variety of local hams' mobile and fixed station setups and to date, no case has been found where the TNS could not be made to perform properly.

After a few hand-wired installations were made, a printed-circuit configuration seemed to be a "natural" and one was designed and constructed.

Operation of the unit from either a 6-volt or 12-volt filament supply is provided. A plate supply from 75 volts to 250 volts (at 1 *ma* maximum) will power the TNS. Mounting arrangements can be adapted to suit the individual application. In some installations, the unit can be tucked into a corner of the existing radio receiver. A 2¼ x 2¼ x 4" Minibox also makes a convenient case which can be mounted outboard.

With the techniques described, one can merely use the printed circuit layout (fig. 4) and exactly duplicate the original layout as the printed card is depicted in full scale.

For information on procurement of printed circuit materials and techniques, reference is made to the excellent series of articles by W4UHN in CQ during 1956, (Ref. 5) plus an article in August 1954 QST by W5CA and W5RFF (Ref. 6).

[Continued on page 52]

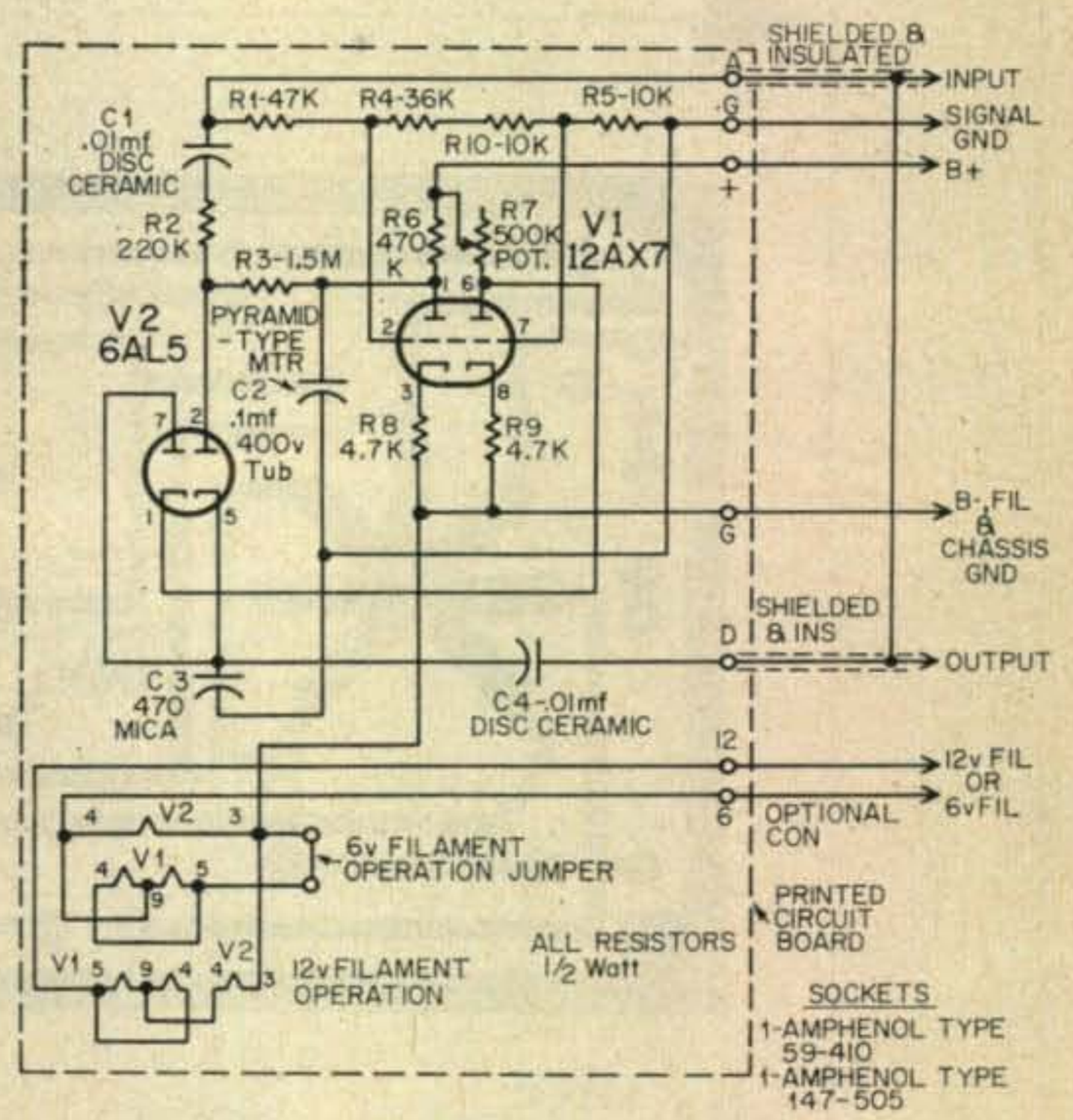


Fig. 1—Schematic—TNS

1. Mobile Corner, CQ, January, 1952, Page 51.
2. Scherer, W2AEF, "The TNS Twin Noise Squelcher" CQ, May, 1953.
3. Radio Amateurs' Mobile Handbook (CQ) First Edition, Page 71.
4. Scherer, W2AEF, "More on the TNS" CQ, May, 1954.
5. CQ—February, March, April, September, November, 1956.
6. Middelton, W5CA and Marshall, W5RFF, "Etched Circuitry for the Ham—Now!" QST, August, 1954.

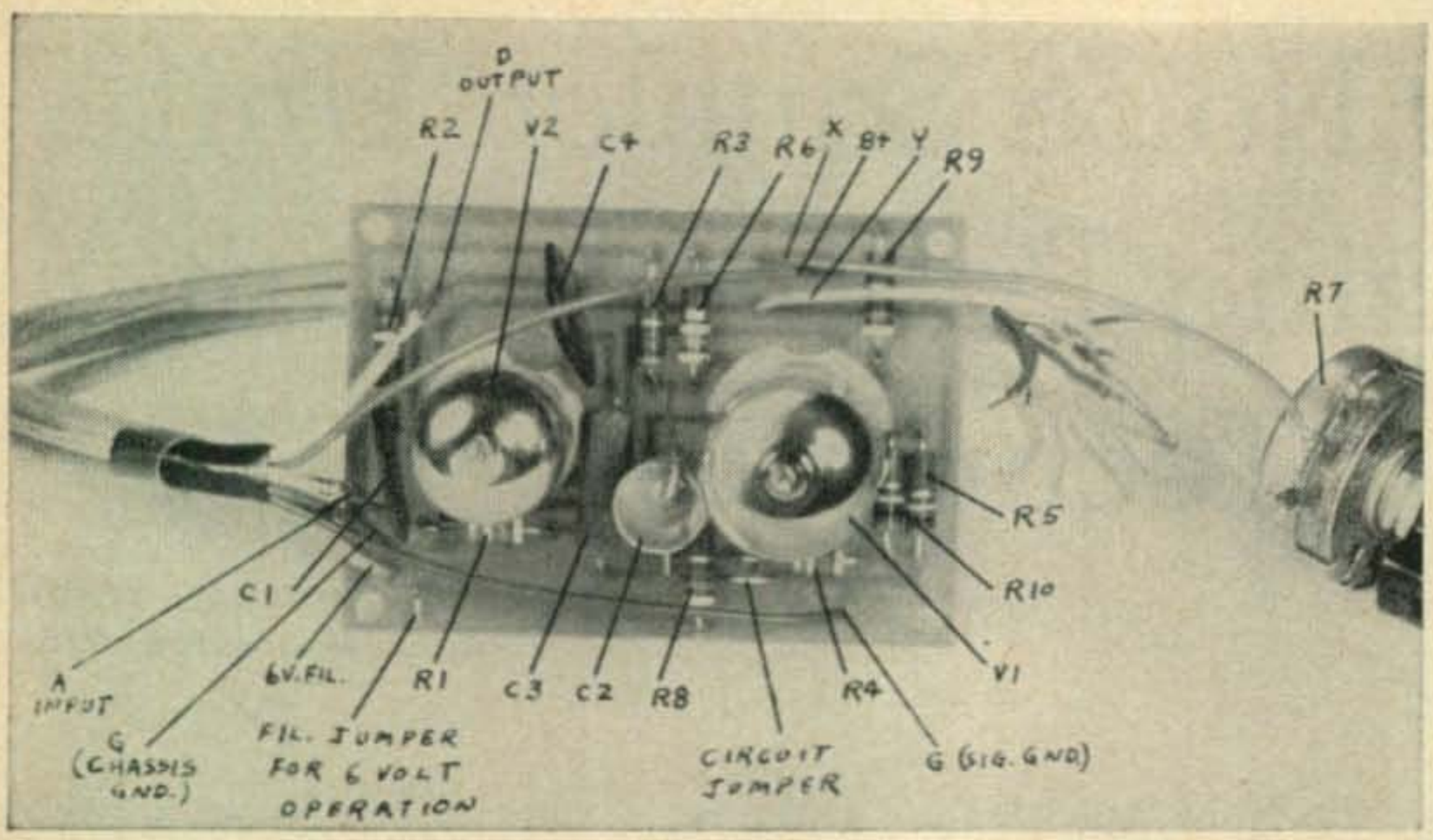


Fig. 2—Top view of TNS showing parts location.

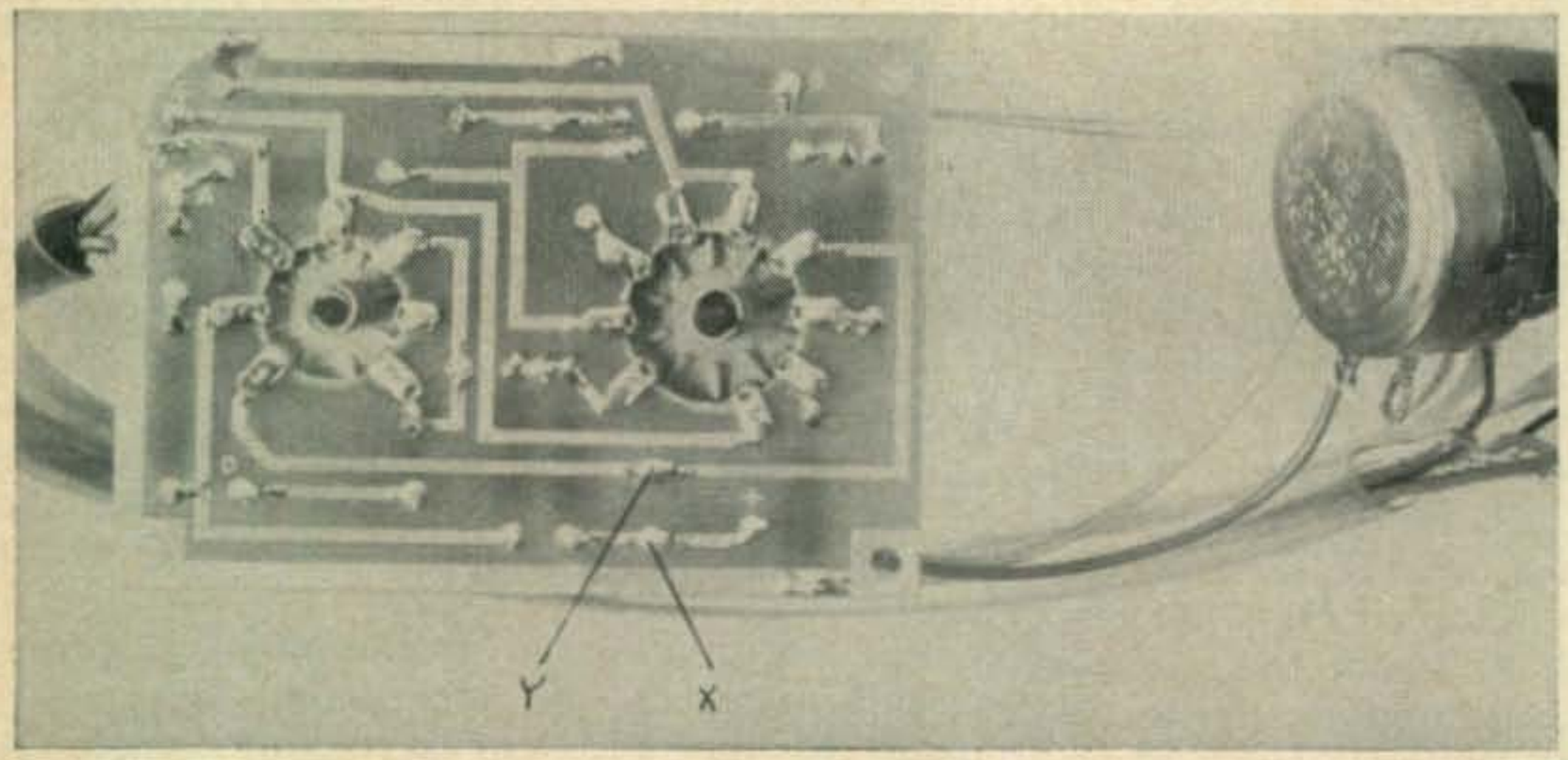
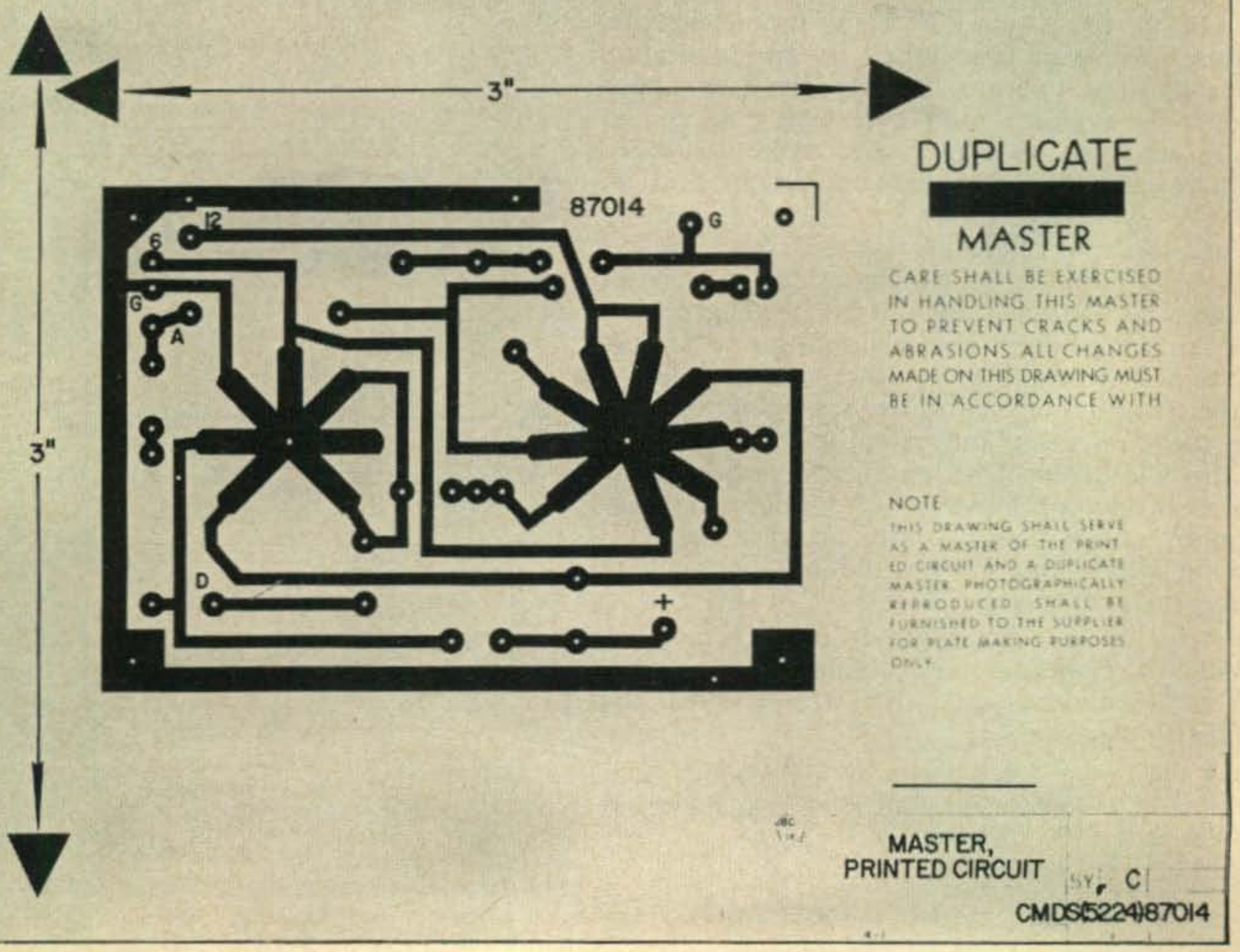


Fig. 3—Bottom view. Points X and Y are the connection points for pot R7.

Fig. 4—Full scale cut of printed circuit board.



Modify Your Balun Coils

Wendell E. Spies, K6TWI
245 Santa Maria Ave.
San Bruno, Calif.

As most every ham knows, antenna matching balun coils can be connected in one of two ways: First, they can be connected in a series arrangement for matching 75 ohm unbalanced line to 300 ohm balanced line, and second, they can be connected in a parallel arrangement for matching 75 ohm unbalanced line to 75 ohm balanced line. Because of this, if one has an antenna which uses 75 ohm transmission line, such as a doublet, and also has an antenna which uses 300 ohm transmission line, such as a folded dipole, he will be able to match only one of the antennas. Therefore, if one wants to match both antennas, he must buy two sets of balun coils.

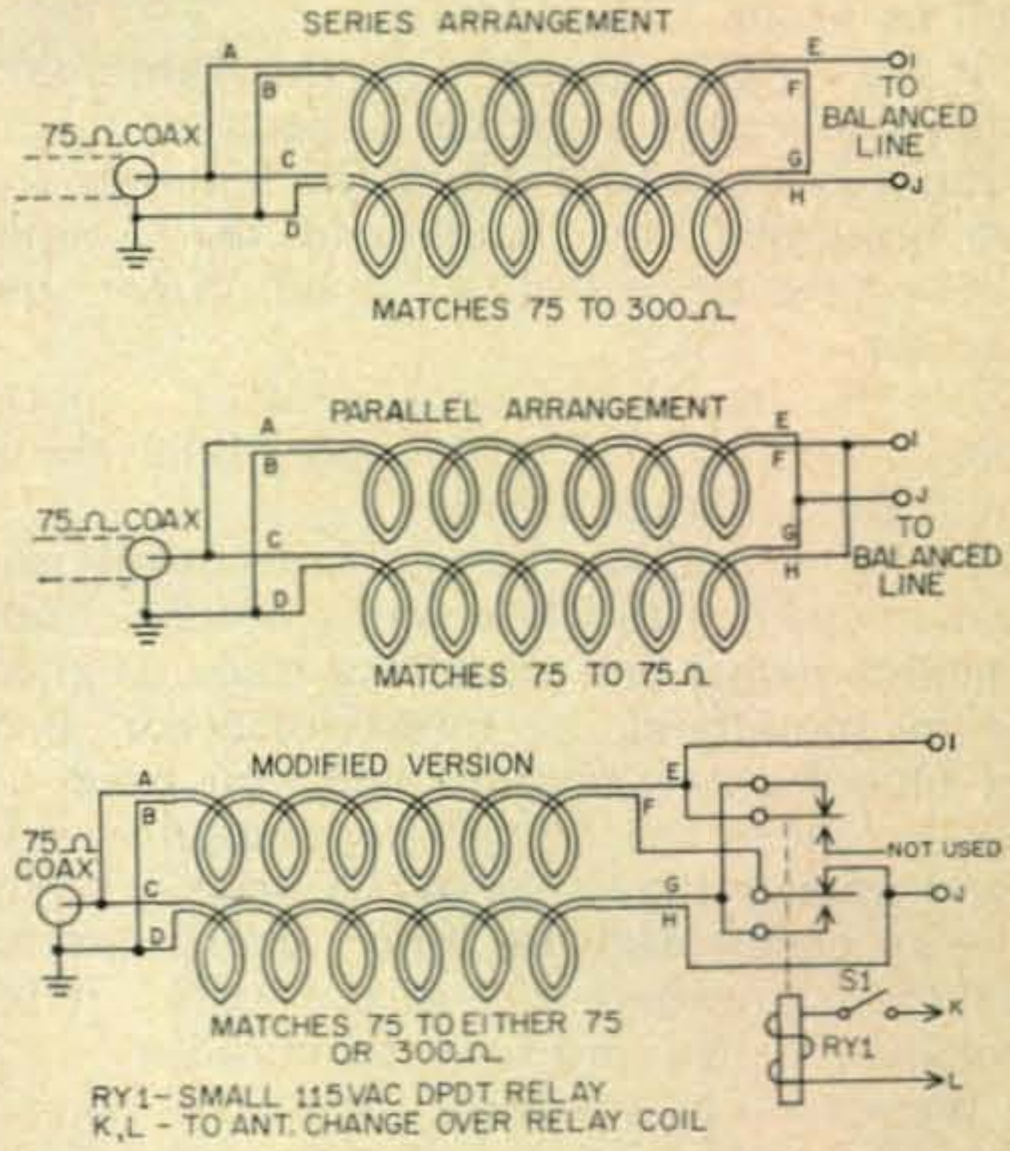
When I received my Heathkit balun coil set, I was faced with this problem. However, after studying the schematic of the balun coils, I thought of a solution—a relay to switch the balun coil circuitry itself.

I wired a small 115 volt *ac dpdt* relay into the balun coil circuit in such a way that when the relay is inactive, the balun coils would be connected to match 75 ohm unbalanced line to 75 ohm balanced line (refer to schematic). When the relay is energized, the balun coils would be connected to match 75 ohm unbalanced line to 300 ohm balanced line.*

I wired the relay coil in parallel with my antenna change over relay's coil, and I placed a *spst* toggle switch in series with the line going to the balun coil relay. When this switch (S1) is open, the balun coils match 75 ohms to 75 ohms. However, when S1 is closed, every time the antenna change over relay is energized, the balun coil relay is energized also, thus matching 75 ohms to 300 ohms. Therefore, one can have a proper match for either doublet or folded dipole by just switching S1 in the proper position.

I have had excellent results with this balun coil switching arrangement. Using a folded dipole, I have an *swr* of 1.1 to 1, and using a doublet, 1.4 to 1. I am very pleased with the results, and I am sure you will be equally pleased. ■

*Mount the relay as close to the balun coils as possible so that the extra wiring can be kept short.



Card Preparation And Fabrication

The card is fabricated utilizing materials contained in any of the available "printed circuit" kits. Either the "hand-inked" or "tape resist" method may be employed.

Step 1. Place a piece of carbon paper face down on the copper side of the 1/16″ laminate.
Note: *Do not permit the layout to shift location during steps 2, 3,* and *4.*

Step 2. Place the layout over the carbon paper and laminate. Carefully prick center locating holes in all "eyes" using a sharp center punch.

Step 3. Check to determine that all holes have been pricked.

Step 4. With a sharp pencil draw in the *center line* of *all* the patterns. It is not necessary to pencil in the full width of the lines. Draw in *outline* of the heavy ground bus and the socket terminals.

Step 5. Carefully remove layout and carbon to prevent smudging.

Step 6. Drill all holes with a #60 or #61 drill. De-burr all holes with a slightly larger drill.

Step 7. Remove all drill chips by carefully brushing the copper surface with a fine hair brush. This will eliminate trouble while inking.

Step 8. Ink in all lines, using resist ink. Lines should be at least 1/16″ wide. Fill in socket terminals and "ground bus." If the "tape resist" method is used, place lines and "eyes" in place.

Step 9. Etch the card and remove resist ink or tape from lines.

Step 10. Drill 4 corner mounting holes with #32 drill (4-40) screw. Drill, ream or punch-*one* ⅝-inch and *one* ½-inch diameter socket holes. The ⅝ inch

[Continued on page 114]

"One Thousand Miles From Anywhere"

VQ9ERR
Box 30077
Nairobi

Mahe is the chief Island andis roughly 1000 miles from Mombasa, the Port of Kenya. Half way between lies Aldabra VQ7, unfortunately however not "en route".

To get to Aldabra you must chance it from Mombasa by private charter direct or do it by trading diesel schooner from Mahe and either way would be difficult and probably expensive to arrange. There are several large main groups of Islands, notably Amirante and Farquhar as well as Mahe and Aldabra.

If the ARRL agreed to list the additional two groups I believe a second expedition might be arranged. Except for Mahe the landings are by flat bottomed surf boats and the equipment would have to be well wrapped up for squally weather.

All the groups are dependent on exports of copra, vanilla, and turtle and Mahe enjoys a small tourist trade besides.

Mahe is one of the most beautiful islands in the world, with white sandy beaches and tall graceful palms and casuarina trees. Higher up on the mountains are forests of cedar. Beautiful blue lagoons abound and you need never feel lonely as the female population is several times greater than that of the male! The living is very cheap and the hotels charge probably less than anywhere else in the world. It really is a fisherman's and tourist's paradise.

We stayed at a private guest hotel owned by Tony Schwarz who turned out to be a wonderful host. Tony runs his beautiful luxurious home as a hobby and likes congenial company —if you can get an introduction.

He is an expert at most things and his gardens are a riot of tropical colour. A retired metallurgical chemist—engineer, he has a private workshop and entered into the spirit of the adventure wholeheartedly—he knocked us up a rotary mast for the Mosley Triband Beam and topped a cedar for a ground plane—85 feet in the air!

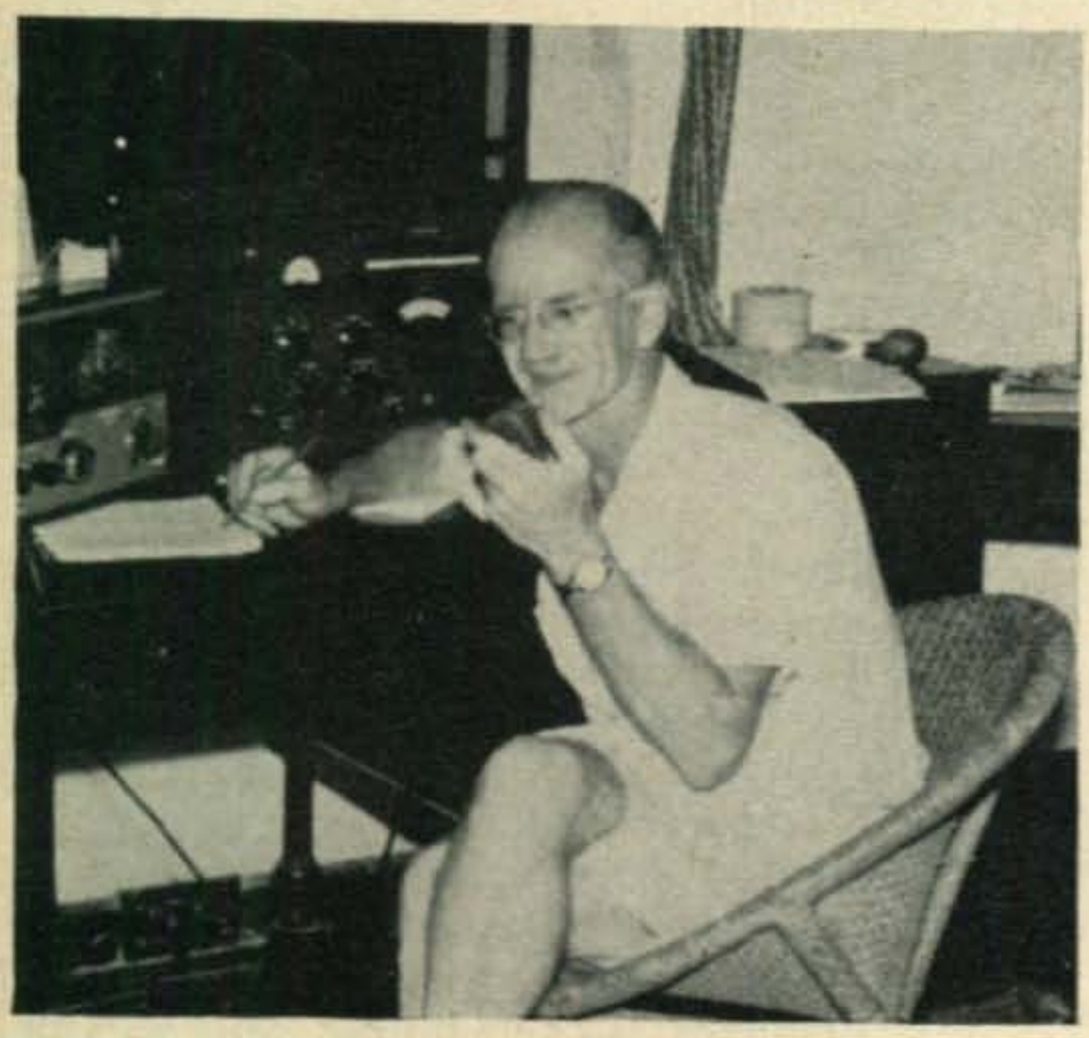
Extremely well educated, Tony could lecture on just about any subject in the world and I am sure he will now become a radio amateur.

We had lots of space but these two antennas were so good, especially the Mosley, that there was no need to erect the VEE beams, etc., which we had planned. The reports averaged out between 5/8 and 5/9 when the bands were open.

Lee, WØAIW arrived in Nairobi on August 15th and we sailed from Mombasa on the 17th, but without his KWM-1 which didn't arrive from Rome in time.

This set, used in the San Marino Expedition, was sent on in good time via Rome but got stuck in the Belgian Congo, of all places. Lee was furious about it and at the last minute we packed up my HT-32 and 75A2 as well as my KWM-1.

What with the Mosley beam and the G.E.S. Generator we began to get bulky, but it all turned out very well indeed as we were able to have the two stations operating simultaneously.



VQ9ERR

VQ9AIW

Lee won the toss for the beam and the KWM-1 and I used the HT-32 and a ground plane.

Please note chaps—these make good non-interfering units with the horizontal and vertical polarizations, especially when the CW and SSB are at different ends of the band. Lee and I were able to work simultaneously on any one band.

We found the 700 watt G.E.S. Genny handled both stations together with ease and gave us 115 volts, nonstop performance. It started off first pull and never gave a moment of trouble.

This was arranged for us by W3SW and Wayne of C.Q. magazine and Myron W4IYC who is also doing the VQ9ERR QSL's—thank goodness!

Don, W6TOT, persuaded Carl Mosley to donate a Triband Beam via London agents who broke down the boom with a sleeve joint to a six foot total carton only 4 inches square—a very light compact portable unit and easily assembled and highly recommended as a tri-bander which really works!

So many expeditions flop because of poor antennas, generator troubles or inexperienced operators.

The latter trouble was ironed out by having Lee, WØAIW with me who gave a tip top CW performance of 1950 contacts in the ten days. I added on 1050 SSB calls and Ted, VQ9TED, a brand new novice gave us an extra bonus of 50 QSO's gathered in off-peak periods! A total of over 3,050 VQ9 QSO's. A former SWL, Ted was very happy and excited with his first operating and made some original remarks!

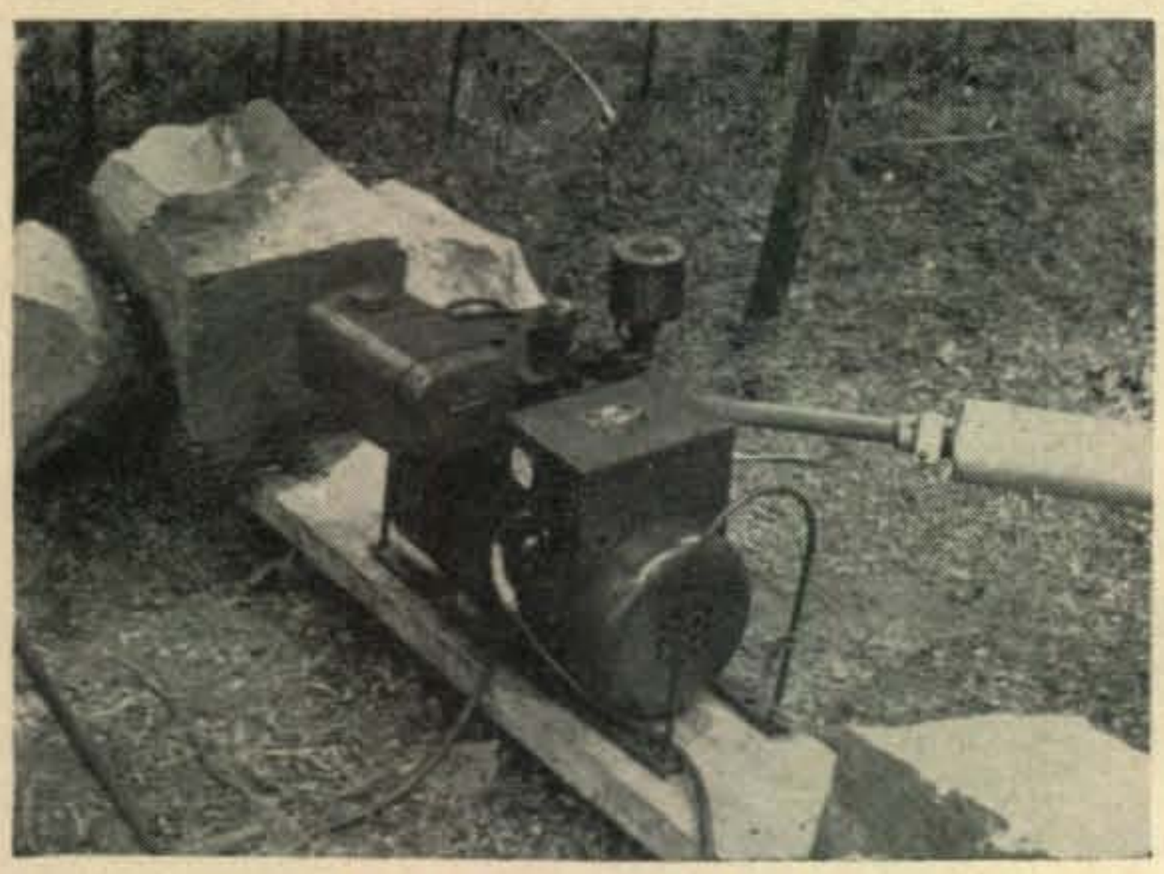
"They *will* all call at once".

"There really isn't enough room for them all, is there?" Ted was nettled by our very unkind laughter and capped it by saying

"Well you must admit it would make it easier if they would only call one at a time".

Lee was quite helpless by this time and I admit choking a bit too when Ted said,

"What a really desperate lot these amateurs are—I say, just listen to them calling me!"



The 50 pound, 700 watt GES highly recommended by the expedition and arranged by CQ.

When you come to think of it, what could you have done in Ted's place—first time on the air and from VQ9!! A really terrifying experience which ripened Ted into an old hand at the game in ten days!

The first U.S.A. contacts were—on SSB, W2ZX (who was also the last Island contact) W2SUC, W3ECR, W3DHM, K8EWK, and W4TM and on CW W9HUZ, K5LIA, K2DCA, W5UKK, W4FVR, W3AOH.

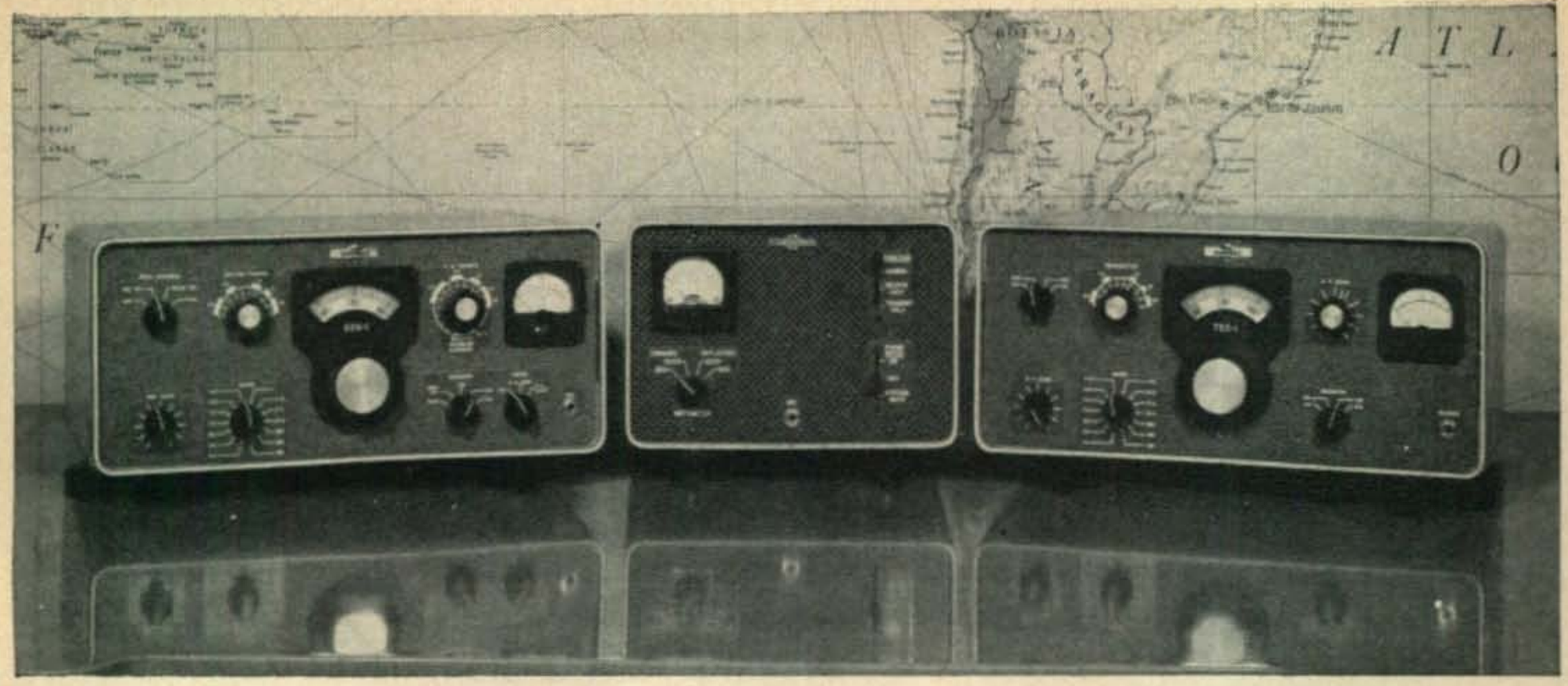
With much previous correspondence the Seychelles government was well prepared for our deadly electronic assault and gave us our licences within 30 minutes of landing, thanks to the Minister of Tourism's assistance who rushed us up to the Governor's secretary at once—the papers were all ready in fact and only needed signing by ourselves and the Chief Secretary.

Reverting to the lighter side again, on the way out we made firm friends with the ship's chief Radio Officer. Now this character had never handled a bug-key and was very keen on trying one out. After dinner one night, "sparks" was off duty and we had quite a party trying some cocktail innovations and I shall never forget Lee's dead pan face persuading "Sparks" to operate lying on his back with the key above him. You see Lee is a "Southpaw" and forgot to tell "Sparks" this. A few rounds of Vodka based cocktails makes anything strange seem quite commonplace. Even an L.H. bug key!

We all had coffee only for breakfast! The United States nearly lost one of its leading operators when Lee went swimming with me off our private beach. We decided to swim out to a little yacht nearby. The little yacht turned out out to be a big yacht and a longish way out. Lee made it—just—the yacht was deserted—no assistance—and Lee flatly refused to swim back—I realized I had to get him back somehow as the bug key was a left-handed one and no one else could operate it. Lee realized this important point and only for your sakes tried the return trip. At half way back he was "bushed and pooped" and I draw a veil over the agonizing return to shore, but can still hear him saying "can you touch the bottom yet" and with fifty yards to go he said, "You'll have to tow me again—I'm pooped out" when a ten foot Indian Ocean roller lifted us and in a few seconds dumped us on the beach with quite unnecessary energy. Surviving the backtow we crawled out and Lee staggered up the beach, battered, bent and bushed! He had a quick dry and lit a cigar but was sound asleep before he had had a couple of puffs. He slept solid for a couple of hours and woke up in "good shape but a little stiff".

Tony took us across the island by car—up 3,000 feet to the top from where you can see the entire island and the extreme range of sea blue from the lightest of blues to the deepest indigo with translucent water—clear down to

[Continued on page 114]



Review of

The Collins "S"-Line

E. F. Huberman, W2JIL

As the design of commercial SSB equipment advances, we can expect to see complete "system engineered" amateur stations dominate the field. The Collins "S" Line represents one of the first efforts to this end. In the "S" Line, we have three light, compact, units which integrate into a complete amateur station consisting of a receiver (75S-1), transmitter (32S-1) and a station control which includes a speaker, directional wattmeter VSWR bridge, and a phone patch (312B-4).

Aside from the usual features found in any well designed SSB setup, The "S" Line gives you quite a few features which are rather unique. For example: By merely selecting the type of operation desired, with a switch on the 32S-1, the operator may use the station as a transceiver or a separate transmitter and receiver. If you desire smooth CW operation, full break in is available. No external antenna relay is required as the units are fully integrated from the mike or key right up to the feedline.

75S-1 Receiver

The 75S-1 receiver is designed for SSB, AM and CW operation on all frequencies between 3 and 30 *mc*. Tuning is accomplished with a PTO which is calibrated in 1 *kc* divisions between 1 and 200. As supplied, the receiver has crystals for the following ranges: 3.4-3.6, 3.6-3.8, 3.8-4.0, 7.0-7.2, 7.2-7.4, 14.0-14.2, 14.2-14.4, 14.8-15.0 (For WWV at 15.0 *mc*), 21.0-21.2, 21.4-21.6, and 28.5-28.7 *mc*. There are sockets to plug in two additional crystals should you desire to have an additional 400 *kc* of coverage on the ten meter band. The ranges are selected by a band switch which is marked to coincide with the above frequency bands. Both the stability and resettability of the permeability tuned oscillator are excellent.

Stage tuning of the 75S-1 is accomplished in a rather novel way. The critical stages of the receiver are tracked and slug tuned by means of a slug table. Rather than switching coils in the various stages of the receiver, capacitors are switched by the action of the bandswitch, and the coils are tuned by moving the slugs in the coil forms in or out of the coils. This slug table control is marked "Preselector" and is calibrated in general frequency bands on the front panel.

The action of the EMISSION switch determines the selectivity of the *if* in the 75S-1. When the switch is in either the upper or lower SB position, a 2.1 *kc* mechanical filter is switched into the *if*. When AM is selected, the filter is bypassed and replaced with standard *if* transformers for a normal 4.5 *kc* bandwidth. CW is generally copied with the switch in either the upper or lower SB position (2.1 *kc* bandwidth), but for the amateur that desires the utmost in selectivity for CW, a 500 cycle filter (not supplied) may be installed in the unit and selected by setting the EMISSION switch to the CW position. In all cases, the *bfo* is crystal controlled for maximum stability.

Separate detectors are available for AM and CW/SSB operation. Output from the second *if* amplifier, V5, is coupled from transformer T2 (See fig. 1.) to the grid of the product detector V6A and to the diodes of V7. The *bfo* injection signal is coupled to the cathode of the product detector. The output of the product detector is filtered and connected to the EMISSION switch where it is selected and fed to the grid of the triode section of V7. The AM audio signal from one of the diode plates of V7 is coupled to the audio output tube V8, from which it may be fed to phones, speaker or phone patch by plugging into J6, J8 or J12, respectively.

The 75S-1 requires 110 volts, 60 cycles *ac*, and consumes about 90 watts of power from the line. It may be operated mobile from a *dc* power source by using the proper connector. In this service, the receiver requires 150 volts *dc* at 125 *ma*, —70 volts *dc* at 5 *ma* and either 6.0 volts at 5.5 amps or 12.0-14.0 volts at 2.75 amps. It can also be used with 24.0-28.0 volts at 1.375 amps. The 75S-1 can be connected to any speaker with a 4 ohm voice coil or any type of headphones.

Specifications

Sensitivity: 1 microvolt for a 15 *db* signal to noise ratio for SSB operation.

Selectivity: **SSB:** 2.1 *kc* at 6 *db* down, **CW:** 0.5 *kc* at 6 *db* down, 1.0 *kc* at 60 *db* down. (with accessory filter), **AM:** 4.5 *kc* at 6 *db* down, 25 *kc* at 60 *db* down.

Spurious Response: Image rejection to better than 50 *db* down. Internal spurious signals (beats) below 1 microvolt equivalent antenna input.

Frequency Stability: After warmup, stable to within 100 *cps*.

Dial Accuracy: Better than 1 *kc* on any band (After Mid-band calibration).

Dial Backlash: Less than 50 cycles.

Output level: 0.25 watt at *avc* threshold; 1.8 watts maximum.

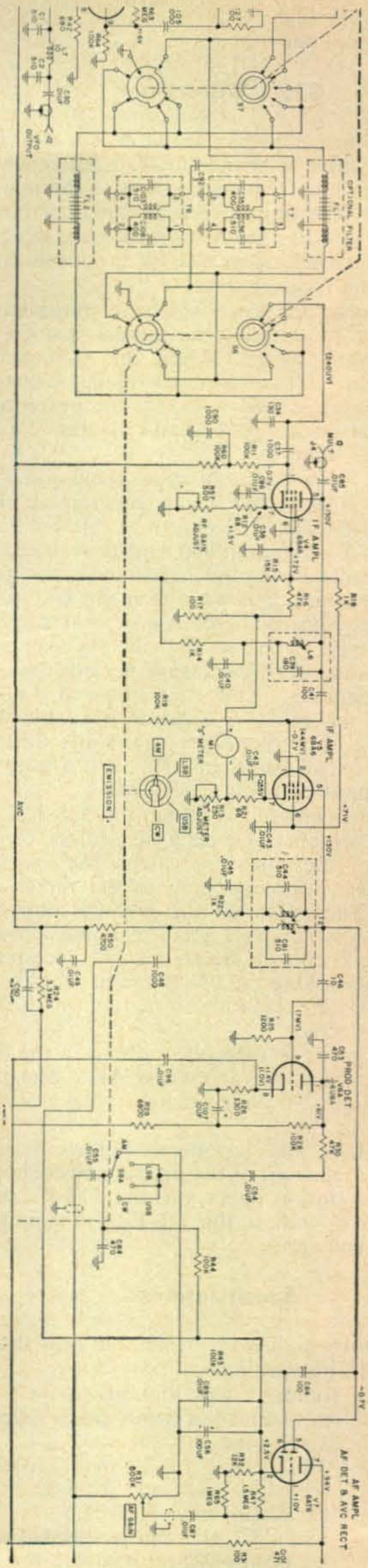


Fig. 1—Mechanial filter, if amplifier and Product Detector of 75S-1.

Size: 6 9/16" high, 14¾" wide, 11½" deep.
Weight: 20 pounds.

32S-1 Transmitter

The Collins 32S-1 Transmitter is a compact 175 watt single sideband/cw transmitter which covers the same frequency ranges as the matching 75S-1. The unit covers the amateur bands in two hundred *kc* segments which are selected by crystal switching in exactly the same manner that the receiver does.

Both upper and lower sideband transmission is available by selecting the correct position on the EMISSION switch. When the sideband is selected, one of two crystals is made operative. The sideband is determined by the position of the crystal in the pass band of the 2.1 *kc* mechanical filter.

In the CW position, an audio oscillator (CW sidetone) is activated which generates a tone at about 1350 cps. The output of this oscillator is fed to an audio-amplifier and is switched by the *bfo* signal in the balanced modulator grids to provide continuous wave *rf* at the grid of the first mixer. This oscillator is also used to monitor the keyed signal, so that the receiver may remain muted during transmit periods and still afford monitoring. This contributes to the efficiency of the full CW break-in available with the S-Line. Approximately 160 watts input is available on all bands in CW, with a nominal power output of about 100 watts.

It is worthwhile to note that the 32S-1 maintains a constant frequency regardless of the position of the emission switch. The *vfo* is a Colpitts oscillator operating in the range 2.5-2.7 *mc*. The value of the cathode choke is selected so switching a small trimmer across it shifts the oscillator frequency. This compensates for switching the *bfo* frequency and keeps dial calibration accurate no matter which sideband is selected.

A pair of 6146 tubes are utilized in the final amplifier which operates Class AB1. The final will load only 50 ohm antennas with a VSWR of less than 2.0:1.

The S-Line may be operated either fixed or mobile by selection of the proper power supply. For home station operation, the 516-F2 used. For 12*vdc* operation, the 516-E2 will supply all required voltages.

Specifications:

Size: 6 9/16 high, 14¾ wide and 11½ deep.
Weight: 16 pounds.
Frequency Range: 3.4 to 30.0 mcs. With Crystals furnished, bands are as follows: 3.4-3.6 *mc*, 3.6-3.8 *mc*, 3.8-4.0 *mc*, 7.0-7.2 *mc*, 7.2-7.4 *mc*, 14.0-14.2 *mc*, 14.2-14.4 *mc*, 21.0-21.2 *mc*, 21.2-21.4 *mc*, 21.4-21.6 *mc* and 28.5-28.7 *mc*. Two additional crystal positions are available for any 200 *kc* bands 3-30 *mc*. These are generally used to extend the range on the ten meter band.
Mode: Upper or Lower Sideband, CW.
Type Service: SSB Continuous; CW 50% Duty Cycle.
Plate Input: SSB 175 watts *pep*, 160 watts CW.
Plate Output: 100 watts nominal into a 50 ohm load.
Mike Input: High Impedance (Crystal or Dynamic).
Frequency Stability: Total variation after warm-up not more than 100 *cps*.
Calibration Accuracy: 1 *kc*.
Keying: Break-In.
Audio Response: 300-2400 *cps* plus or minus 6 *db*.
Carrier Suppression: 50 *db* down on output signal.
Oscillator Feedthrough or
Mixer products (unwanted) better than 50 *db* down.
Second Harmonic Output: 50 *db* down.
Third Order Distortion: 30 *db* down.

312-B4 Station Console and Control

The 312-B4 Console is a small package which also matches the S-Line. It contains a speaker, telephone patch and directional wattmeter/VSWR bridge. It also provides a lever switch which determines the operating parameters of the equipment. This switch enables the operator to select Transmit Only (Manual), Receive Only or Normal (Sequential operation). There is also a microphone connector on the 312-B4 in the event that it is more convenient to plug the mike into the control unit rather than the 32S-1. It may also be used as a second mike input.

The wattmeter is extremely accurate. I borrowed a 50 ohm Bird Termaline Unit (Lab Standard) and calibrated the Collins against it. When the Bird showed an *rf* output of 500 watts, the Collins showed about 465 watts. The Collins wattmeter has two scales in both the forward and reflected power positions. These are calibrated in 0-200 and 0-2000 watts. Type N Connectors are used on both the input and output of the bridge

I can truthfully say that the Phone Patch is a marvel. Here at W2JIL I have used many different patches over the years, and this particular patch tops the lot. It does a good job of following VOX input signals, and make phone patching a pleasure. It is advisable, however, to closely follow the instructions in initial setting up of the patch unit as the Null Balancing is rather critical.

The entire S-Line is interconnected with a series of cables (shielded) which plug into RCA connectors on the rear of the units. The entire line sets up in about ten minutes, and operates nicely as a fully integrated amateur station. ■

ham clinic

CHARLES J. SCHAUERS, F7FE/W6QLV

CQ Magazine, 300 West 43rd St., New York 36, N. Y.

Complaints to Distributors and Manufacturers

When a ham purchases a piece of radio gear he expects it to operate just as the manufacturer said it would—*under normal circumstances.* But sometimes something happens between final testing and a few hours operation after delivery.

Now, what is this "something"?

To begin with, every effort is made by every reputable manufacturer to insure that the parts supplied from outside factory sources are good and comply with engineering specifications. However, we all know that any electronic part can fail at any time. The premature failure of component parts in electronic equipment is the big headache of nearly everyone—including our missile makers. *No one*, I repeat NO ONE can predict failure of any man-made system or component 100%. This is impossible!

Very strict quality control procedures, rigid inspections and careful testing are the order of the day in any reputable manufacturing plant. Other than long *field testing* of a specific item, little else can be done to insure customer satisfaction.

When the finished product is packed and readied for shipment every possible precaution is taken. You can bet that when it leaves the factory it IS operable. However, the manufacturer has no control over what happens to the equipment on its way to the distributor. The equipment can be dropped a distance that is just "too much" for its packing.

After the equipment arrives at the distributor's or dealer's warehouse, the equipment stays in its packing until it is displayed or demonstrated to a customer. This is not a bad practice because if it is correctly packed by the factory it cannot be damaged by *normal* handling.

The distributor who sells a piece of equipment in the original packing without testing it prior to delivery to the customer, is making a mistake. Better that he should open the case in front of his customer and check out the set on a well equipped service bench. At the same time he can inspect for damage and possible mis-alignment.

Carefully checking into the overall "complaint situation" I have come up with some very interesting things.

First of all, the average ham *does not* know how to go about obtaining an adjustment on faulty merchandise! His first inclination is to write a nasty letter to the manufacturer—when in reality, he should be contacting the people from whom he purchased the set. Then to make adjustment more difficult for the factory people, he forgets to include essential information in his letter.

Writing either too much or too little, his anger clouds the real purpose of his communication, Admitted, describing symptoms (even to a doctor) is difficult, but it must be done and done properly. In the process of description however, one does not insult those who are ready, willing and able to help.

Getting a "lemon" out of a large barrel of "oranges" can and does happen! But before you lose your temper and threaten the manufacturer with everything under the sun, THINK! Remember, hundreds or even thousands of that same piece of equipment are operating properly in other ham shacks. To say on the basis of *your* one complaint that a particular receiver, transmitter etc., is no good—is first-rank childishness and shows a lack of intelligence.

Believe me, *some* of the letters received by Factory Service Managers (FSM) are not only insulting but downright mean!

Usually, manufacturers are ready to make reasonable adjustments *through* their distributors and dealers. But sometimes those who deal directly with the customer do not "carry the ball" and the factory gets blamed.

It is up to the dealer or distributor who sold the set to a customer to make certain that the equipment is operating properly prior to release.

Your first complaint then, should be directed to the man who actually placed the set in your hands . . . not the manufacturer. Why? Because he's handy—he has direct liaison with the manufacturer—he has service notes—and he has assumed the responsibility for the transaction and *your* satisfaction.

The time to contact the manufacturer is *after* your own dealer (distributor) has *not* intervened for you or given you the satisfaction you deserve.

Then the little matter of "over-expectation" comes into the picture. For example, one "Mr. Ham" buys a receiver in the $150 class and it seems terrific until he operates a $595 model in

another shack. Then he starts to wonder. His reasoning (which, incidentally is wrong) goes like this: "maybe my receiver only cost me $150, but why should there be *so much* difference?" A few days later, a FSM gets a letter berating the product and suggesting improvements!

Here are a few excerpts (edited) from letters to FSMs.

"Dear Sir: I bought your XYZ Model (under $200) and find that the *avc* action is not half as good as that on a friend's 'Superwhooper' ($450). Seems to me, this feature should operate the same either in a low or high-priced set. Am I correct?"

Another: "Dear Sir: I'm #"%&() sick and tired of writing letters relative to my Model ZZZ transmitter. I've done all that you suggested and my signals are still weak. I'm telling you right here and now there is something really wrong. If I don't get satisfaction I'm going to spread the word that your equipment stinks!"

"Dear Sir: your poor engineered sets should be sold to the enema (sic)."

"Dear Sir: my distributor told me to tell you that if you don't replace my receiver he is going to take his business elsewhere. As far as I am concerned, you are a bunch of crooks. Furthermore, how come this dern set won't stay on frequency?"

"Dear Sir: that TR switch I bought of yours is ill-designed because the rf leaks through no matter what I do—even with my transmitter OFF. Tell me, how come? Better send my money back."

"Dear Sir: reference your letter received yesterday. Listen, don't tell me I don't know if my set is operating properly or not. I happen to be a TV serviceman and know a heck of a lot more than some of your engineers. I shall send the scope back to your factory as you suggest tomorrow." (Note: this was a tough one for the factory too. Intermittent short in high voltage transformer caused by heat. When cold, meter readings were normal.)

Finally: "Dear Sir: I put that kit together *exactly* like the instructions called for, but no matter what I do, the set won't work. I've checked and re-checked my wiring. Now what do I do?"

Fellow hams—do complain if there is justification, but do be courteous—be sensible—be descriptive and not insulting or childish. Think of the guy "on the other end" trying to do his job to help you—he's only human too.

Your distributor/dealer and manufacturer are your friends. They *do* want you to be completely satisfied. Remember, they make it possible for you, the American ham to have the best equipped ham shack in the world!

One well prepared letter to the manufacturer or distributor giving the following facts will do more good than 20 others merely complaining or threatening to do bodily harm to an overworked FSM!

First, give the model of the set; serial number; date of purchase; name of dealer or distributor; approximate number of hours of operation; type of antenna and ground system (or other auxiliary apparatus used with receiver, transmitter etc.); what you have done in an attempt to correct the malfunctioning (Note! Be careful here—if the set is still in warantee—*do not touch it*—other than replacing tubes!); what you would like to do—symptoms in detail (what it does or does not do)——and please, say, "thank you!" (Note: also follow this outline when submitting questions to HAM CLINIC)

Always make a copy of your correspondence. If you do not receive a reply from a manufacturer, send the copy along with your letter to HAM CLINIC—we'll see what we can do.

Never send equipment back to a manufacturer without first getting his permission. Also, contact your distributor/dealer and tell him what you are going to do—he may suggest another attack at the problem.

Remember: Factory Service Managers are in existence to help you with your problems; they are human, courteous and will "bend over backwards" to give you satisfaction. They cannot help you unless you are factual and do not let your anger outweigh common sense.

HAM CLINIC cannot be "brainwashed" by any manufacturer regarding ham products. We call the shots as we see them; and our one main aim is to tell our readers what we know and/or think . . . to help them in the hobby. *No one* dictates our copy.

One final bit of advice: before you buy equipment, ask the man who owns some. Then try out the gear before you buy, either at the store, at home or in someone else's shack. Be satisfied!

All electronic equipment must go through a "settling down" period; you may or may not have trouble. Just remember that the warantee period backed by the manufacturer is your protection—and his—do take advantage of it, if necessary.

"75 and 72" Thank You!

Introducing the two new signals, "72 and 75" was not a "lark." Their purpose is CLEAR! (Read October CQ for details) Now I wish to *thank* those of you who have written in telling me that you think the idea is fine and that you intend to use them. Good! Let us hope that *every* ham will use them and really mean what they stand for!!

Observation of the Month

When the old 11 meter band (now the Citizens Band) was open and available for ham use I worked hundreds of stations using only 3 watts! If 10 meters seemed a mite crowded, I scooted down to 11 and had a "field day."

Now I'm wondering what will happen interference-wise when propagation conditions are good on 27 *mc!*

Those who bought CB equipment with the idea that they would have a lot of fun contacting distant stations and generally operating as hams DO, are in for a big surprise PLUS FCC citations which could result in loss of license!

Our Canadian ham friends can still use 27 *mc* and have been warned via the pages of The *Canadian Amateur* (a new and very fine Canadian ham publication) that they *cannot* contact U. S. CB stations!

Long-winded contacts on 27 *mc* are forbidden and so are DX contacts. We hope Lee will straighten out CQ's readers via his CB column on what CB stations can or cannot do—quickly.

For preliminary information, CQ readers are encouraged to read the article which appeared in *Electronics World*, Sept. 1959.

Observed: the way the 27 *mc* band is being used *now* there *is* a possibility that it could revert back to the ham for his intelligent use. To hasten the day, report violations. This may be a little drastic, but those who are using it now *and* violating regulations should remember that this band did belong to the hams. If the hams do get it back, I hope they USE it—I know I will!

Questions

Universal Radio Time

"I understand that someone is advocating the use of a 'universal time' for radio operation throughout the world. Who is it and where can I obtain more information?"

The man is Harry R. Habig, K8ANV of 1700 Shoryer Road, Dayton 19, Ohio. He can supply you with full information. I agree with him that GMT (Greenwich Mean Time) should be (but isn't) used by *all* radio stations. Messages, log information QSL data, etc., all seem to be based on *different* times. Let us hope that his campaign succeeds. "When you press your key, your signal is in space," says Harry—and I agree.

Test for Mag Requests

Phil Carter W1CRA of Hospital Radio Inc., Sharon, Mass., suggests that we run a little piece in HAM CLINIC to find out from foreign hams *how badly* they want to receive CQ. Also, to find out if there are enough generous American hams to supply the demand. So you *foreign* hams in France, England, Germany, Russia, Belgium and any other country, let ME know if you would like to receive CQ on a regular basis—maybe we can arrange it. Pass the word around—the more requests received, the more hasty the action. Thanks Phil and 75 to you!

5D21 Tube

Goodness! From the number of requests received, looks like the 5D21 is flooding the surplus market. Try as we may, we cannot find the spec info on this particular tube. Anyone help? SOS!

P-1000 ALCO Meter

I needed a real small meter for a *very* small FS indicator I'm building and ALCO Electronics Mfg. Co. of 3 Wolcott Ave., Lawrence, Mass., came to my rescue. Only as large as a quarter (of a dollar—that is) it requires only a 1-1/32" mounting hole. It is available from 50 microamps to 500 milliamps and 0-500 volts. Just the thing to squeeze into little space for measurement of voltage, current or used as an S meter. $4.95 gets you one—and these rugged little "giants" are worth every penny! I also obtained a miniature toggle switch from the same company; so small you can put a dozen of them in a small tube shield.

Transistor Book

I managed to get an advance copy of GE's new transistor manual (4th Edition)—it is terrific. 227 pages of good solid readable information, it also contains a number of projects of interest to hams. Let me say, for a dollar you should add it to your library. Send to the *General Electric Co.*, Semiconductor Products Dept. Charles Bldg., Liverpool, N. Y. for your copy.

Surplus Manuals

"I have need for a number of technical manuals on surplus equipment, not merely the diagrams. Where can I obtain these?"

Try *Lee Industrial Surplus*, 28180 Van Born Rd., Inkster, Michigan.

TX-1 Relay Cut-out

"Sometime ago you said that the relay should be disconnected in the Heath TX-1 when it is used on SSB. Any idea how this can be done without having to take the set out of the cabinet when AM operation is desired (to connect the relay back up)?"

Yes. I used a SPST toggle switch and mounted it on the rear directly underneath the two coax connectors (SSB). There is space for it there. I then merely lifted one wire going to the relay and tied it to one side of the switch. Another wire was tied to the other side of the switch to the terminal on the relay from which the feeder wire was removed.

DX 40 Conversion to 6 Meters

"What's the status of the 6 meter conversion on the DX40?"

What, with writing up the scope book; working on the miniscope (Ham-T-Scope—I call it) and two other scope projects; writing the column and answering letters, I'm just about done with the 6 meter conversion on the DX 40. You can bet it will work when I'm through. So far, I have not had too many troubles. Please be patient . . . the waiting will be worthwhile.

Folded Dipole Matching

"Any way to feed a folded dipole (300 ohms) with 52 ohm coax?"

Only way is with a transformer matching

section, otherwise the losses due to mismatch would be too high.

SSB Alignment

"How come Heath tells you to adjust the SB10 on 80 meters instead of say, 15?"

If you're using a scope—so that you can get the pattern called for in the alignment instructions. Few scopes go up to 14 *mc*, most "hit" about 5 *mc*. This will be covered in my new scope manual for hams.

Transistor Power Supply

"I'm building up a transistor power supply to supply 800 volts at less than a mil for a project of mine. Can you suggest something to stabilize the 800 volts?"

Suggest you use some NE2 neon bulbs in series across the load. Figure around 65 volts per neon bulb.

Cross-over

"I need 50 microfarads of capacity for a cross-over network I'm building. How can one obtain *unpolarized* capacity of this amount?"

Connect two 100 mfd electrolytic condensers in series, plus to plus. The resulting terminals will be negative-negative, and 50 mfd capacitance will result.

SX 101 Mark III NL

"What type of noise limiter is used in the *Hallicrafters* SX 101 Mark III radio receiver? Is it good?"

It is a direct coupled series noise limiter. You bet it *is* good!

Transistor Tester

"What should I look for when buying a transistor tester: Also, can you recommend a real good one?"

The tester should have its own stabilized power supply (variable available voltages); test for Icbo, gain, leakage, shorts and so on, on low medium and high power transistors of both the p-n-p and n-p-n types. I recommend *Precision's* Model 960. This is truly a wonderful instrument and worth $87.00!

Tube Equivalents

"Please give me the American tube equivalents for: EF95; ECC82; ECC81; EF93; EL-84; EL90 and ECC91."

In order: 6AK5; 12AU7; 12AT7; 6BA6; 6BQ5; 6AQ5 and 6J6.

Relay Hum

"I'm new in this ham business. I have an antenna relay (110v *ac*) that hums terribly. What's the cause and cure?"

Cause: low voltage and/or mal-adjustment. Cure, make *sure* it is an *ac* relay and check adjustment (usually a spring—screw adjusted). For further hum reduction re-mount relay on non-resonant medium, i.e., rubber "feet."

Wuerth Surgistor

"Sometime ago you suggested that a *Wuerth* surgistor be used in series with the 110 *vac* line on receivers, transmitters, TV sets etc., to help preserve tubes from starting voltage surges. Well, I installed one on my NC 303, and it seems to work okeh. But occasionally, I notice that the set will go from a full voltage condition to a 'starting' condition. This is annoying. Any way to keep that gadget from opening up in the middle of a QSO?"

I installed one in my NC 303 also, I found the same thing. So here is what I did. After adjusting it to limit the current for about 25 seconds, I installed a small 5 watt bulb *right at the device* (connected so it would come on when I flipped the power switch). The *heat* provided by this little light bulb keeps the temperature sensitive contacts closed. This should be done on any appliance requiring *less* than the full wattage of the rated Surgistor. Another way is to bridge the Surgistor with a switch (SPST). Cut this in after the warm up period. It works and I'm very happy with it. (I wish Wuerth (GC) would come out with one for 750 watts!)

On Tube Shields

Those of you interested in obtaining heat dissipating tube shields, write to *Allied Radio* or *Harvey Radio*.

BC 611 Conversion

"Where can I get some info on the conversion of the BC-611 ('Walki-talki') for ham use?"

See July issue of *Western Radio Amateur* 10517 Haverly St., El Monte, Calif. (25¢ plus postage).

Audio Selectivity: Filters

"Did CQ ever publish any info on Audio Selectivity—Filters?"

Yes. The 1948 June Issue. Two articles in there on *af* filters.

Low Pass Filter

You can forget all the changes to the SB10 to improve audio response IF you use a low pass filter sold by *Harvey Radio* at 103 West 43rd St., N. Y. 36, N. Y.

Out-board mounted on the rear of the SB10, the filter when connected between T4 and the phase shift network (merely insert it between the secondary of T4—green and black wires and points 1-5 and 3-7 of the PS network) really works FB. It will pass 300 to 2500 CPS —or—3 *db* and will reject 3200 CPS and above at −40 *db* or better. Be sure and make your connections using shielded wire. This is a $9.95 investment that was well made. You can also use this filter in DSB rigs. The insertion loss is so small you more than likely will not notice it. If you do, bypass the cathode resistor in the 12AT7 half feeding the phase shift network with a 2 mfd condenser.

Transformer Connection

"Can I use two 6.3 volt *ac* transformers in series to give me 12.6 volts at maximum current?"

You can use two in series but at ½ the current rating of both transformers.

THIRTY

A very merry Xmas and a very happy and peaceful New Year to all of HAM CLINIC's readers!

72—73—75, Chuck, W6QLV/F7FE

C. K. Brewer, K5OVR, president of the Tulsa Electron Benders, is shown presenting awards to the winners of their Novice contest. Receiving trophies, from left to right, are Darrell Munsey KN5TUH (1st), Houston Goodwin, KN5SLE (2nd), and accepting trophy for Joe Fallin, KN5TXK, (3rd) is Kathy Seibert, KN5TOG. Thanks to Julia Young, K5JFJ, Corresponding secretary for the Electron Benders for the photograph.

Novice

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

There are as many methods of tuning a transmitter, as there are transmitters themselves. It is difficult, if not impossible, to set down rules for tuning a transmitter because of these differences. In general, however, the following technique should be useful.

Think of the transmitter as having two main sections, the driver(s) and the final amplifier. The tuning procedure for these sections is different. If an external antenna coupling system is used it must be tuned with a third technique.

The only purpose of the driver is to supply excitation to the final amplifier. For the most efficient operation, these stages must be peaked up for maximum signal output. In most cases, this represents maximum *rf* drive to the final amplifier. Some transmitting tubes can be damaged by overdrive and the transmitters using these tubes should incorporate a drive level control. In addition, excess drive almost invariably causes harmonics that create havoc in television receivers.

Start the tune-up procedure by setting the bandswitch in the appropriate position. Adjust the crystal oscillator for the most output *consistent with stable operation*. Tune the buffer and/or frequency multiplier for maximum output as indicated by maximum grid current of the driven stage or for a dip in the plate current of the buffer multiplier. Be sure that the output of the driver stage is on the proper frequency, for the tank circuits in most amateur transmitters are capable of selecting more than one harmonic. When the driver appears to be operating properly, check the grid current to the final amplifier. If it is low, recheck the

How about this for a nice installation? It belongs to Chas. W. Maxwell, Jr. KN5VCP, 5820-S½, Galveston, Texas. Chuck built the table which also houses the equipment. Up on the roof is a Gotham V-80 vertical. He can be found on 80 and 40 and will sked anyone, particularly 1, 2, and 3 call areas.

driver tuning. If it is high, reduce the drive by turning down the excitation control.

Tuning the Final—When the final amplifier plate tank is correctly resonated, the final plate current will be *minimum*. Start the tune-up by setting the *tune* and *load* capacitors (and *coarse load* switch, if any) to *maximum* capacity. Apply grid drive and plate voltage to the final amplifier. *Rapidly* rotate the tune capacitor until you note a dip in the final plate current. Set the tune capacitor for minimum current. Next, slowly advance the load capacitor and note the plate current rises. When the current is up 50% or so from the "no-load" setting, readjust the tune capacitor for minimum plate current. Once again, reduce the capacity of the load capacitor (increase loading) until the current rises 50% and "re-dip" the final. Continue that process by jockeying between the tune and load controls until you reach the correct operating plate current for the transmitter. If the transmitter uses link coupling, start the tune-up with the link at minimum coupling, and proceed as above.

Coupling to the Antenna—With the pi-network type of transmitter, using low impedance coaxial transmission line, antenna loading is correct when the above steps have been completed. With some antenna systems, an antenna coupler may be used. The antenna coupler is an impedance matching device and can be tuned in the following manner. First, remove the antenna coupler connection from the transmitter. Dip the final for minimum plate current as outlined above. Then reconnect the cable to the antenna coupler and adjust the coupler controls for maximum plate current. If the transmitter load control is at minimum you will probably note only a small rise in current.

The neat station of Dave Mason, KZ5WXN. The sign in front of Dave should be in every ham-shack (can you read it?). It says simply "Use your Head."

Leave the antenna coupler set at this point and proceed with the loading instructions outlined above.

A more precise adjustment can be made if an *swr* (standing wave ratio) bridge is connected between the transmitter and the antenna coupler. The coupler should be adjusted for maximum forward power and minimum reflected signal.

Tip of the Month

Many Novices would like to purchase the higher power phone/cw transmitters so that they will not have to purchase new equipment when they shuck the "N."

From Ted Wilds, KZ5SW, comes this tip for "QRP'ing" the medium power table top transmitters such as the DX-100, Apache, B & W 5100, Valiant, etc. It can be used with any transmitter that uses a separate plate transformer to supply high voltage for the final amplifier.

As shown in fig. 1, Ted breaks the primary lead to the transformer and inserts two parallel connected 150 watt light bulbs. Connected in this manner, the primary does not receive the full 117 volts, and the transmitter will only run about 75 watts input. A single 200 watt bulb

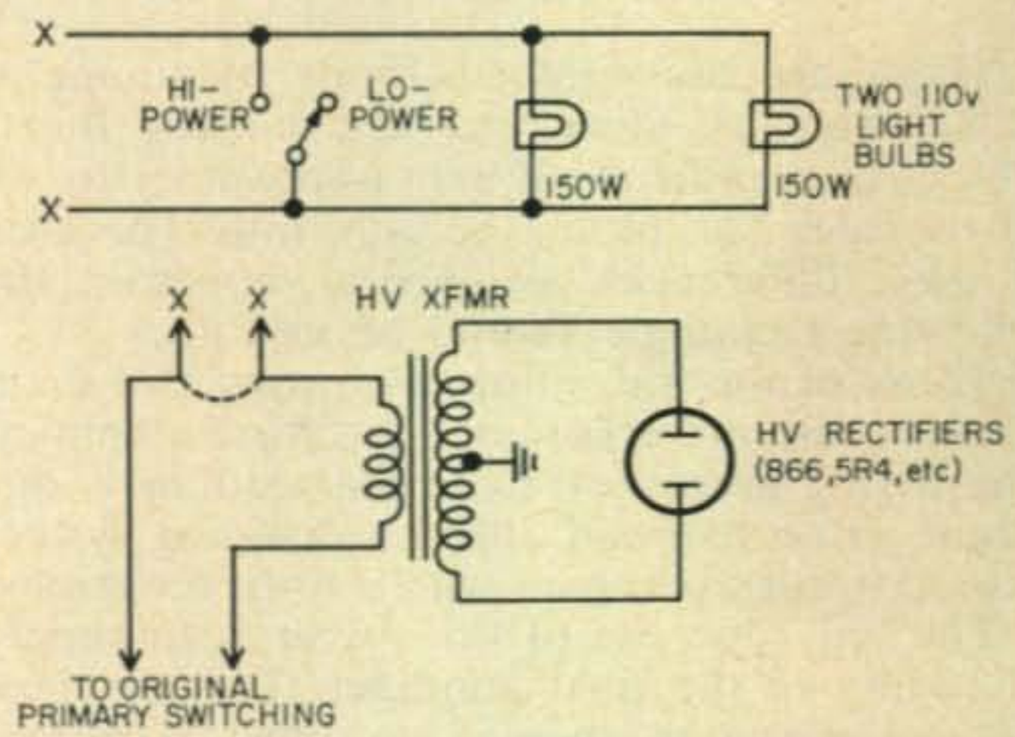


Fig. 1—Ted Wild's (KZ5SW) clever method of reducing the power input for the popular table top transmitters (DX-100 ect.)

drops the input power to about 40 watts. Remember, when using this trick, that the plate voltage as well as the plate current drops. To establish your power input it will be necessary to measure the high voltage with the lamps in the primary.

Net News

Don Daves, KN8OYQ, 827 Chalker St., Akron 10, Ohio, writes to say that the old Ohio Novice Net is being revived. It meets on Sunday at 1600 *est* on 3710 *kc*. Traffic is handled and the net operates about 8 *wpm*. All hams and SWL's are urged to contact Don, if interested in joining.

Who's DX?

Our only DX report this month comes from faithful Tima Popovic, YU1-RS-357, Banat Novo Selo, Yugoslavia. He reports hearing the following Novice stations in YU-land:

August 27, 1920-1945: KN1IVT, WV2HOZ, KN4ERR, KN5MSJ, KN8NWS, KN9TLW. Sept. 14, 1940-2054 GMT: KN1JPQ, PJUV, LWH, LXB, W WV2FBF, FCV, KN2FHP, WV2 IGW, IVF, K..3HEG, KWV, KN4GLU, JNS, LNP, KN5UKN, UZC/2, KN7HOF, KN8NQO/8, NWK, POU. Sept. 15, 1840-1930 GMT: KN1JGY, JPA, JUV, LPA, WV2FBM, GHD, KN3OBJ, KN4JWQ, LPN, MVI, KN5UKR, UQT. Sept. 18, 1850-2105 GMT: KN1KBX, KDF, KOT KSH, KTH, LKP, LPP, MBH, PPJ, WV2DLM, DQT, DYK, FJL, GDV, GPS, KN3GJB, GTK, HEF, HYQ, IGF, IIA, JIZ, JLM, JTU, KN4BDF, FUD, FVA, IID, KN5FMH, SSH, USE, KN8PCU, KN9QFB. Sept. 19, 2000-2058 GMT: KN1JJJ, KAV, LCX, LKV, LSO, WV2ELP, FBI, FJY, GFZ, HFR, KN3HEO, HEU, KN4HUR, KOK, MOK, SPU, KN5UMC, VRS, WMP, KN8OSH, OSS, QSF, QRP, QWW, KN9PMW, POG, PRR, PYL, SMA/4, SNO, TPQ, KNØSTJ.

Help Wanted

This is the first month I can recall not receiving several cards for help. If anyone reading this is interested in earning an amateur license, simply drop me a postal card with your name and address (telephone, if any) and it will be posted in this column. Remember, it takes about three months from the time received to appear in print.

George, K6CCZ, 8811 Tangelo, Fontana, California, is broadcasting code practice sessions on 7090 *kc* each day between 6 and 8 pm *pst*. The first hour the speed is 3 to 10 *wpm*, and the second hour between 15 and 20 *wpm*. George will transmit on 2 meters simultaneously if there is enough demand for it. There may also be a relay from Los Angeles on the 6 meter band.

Letters

A/1C Dave Mason, KZ5WXN, Box 429, Albrook AFB, Canal Zone, has been on the air since July and has piled up over 300 QSO's. Dave operates with a DX-40 and an NC-300 into a 67″ Windom 25′ off the ground. Look for him on 21.116 and 21.150.

Mark Ryan, KN1MGC, 249 Waverly St., Belmont 78, Mass., is about the youngest contributor to the Novice Column so far. Mark is 8 years old. He has had his ticket for a week and worked three states with a Globe Chief 90 and an NC-109. He would like to sked anyone on 40.

Glenn William, WV6ENH, Rt. 2, Box 56, Manteca, Calif., is winding up his Novice career about now. Glenn used a 60 watt homebrew rig on 7170, along with a BC-348 and Windom antenna.

Butch Behler, K9PFL, P. O. Box 109, Carmi, Illinois, is 14 and runs a homebrew 50 watter and SX-100. So far he has 35 states, with KG4, KZ5, CE3, KP4, and XE3 for DX. Butch would like info on the WAVE certificate and will sked anyone on any band and would like to help any newcomers.

Ted Schmitz, WV6GPH, 842 N. Orange St., Orange, Calif., is having a ball on 80 and 40 with his DX-20 and BC-348. He says K6GPG of Santa Ana was a great help in getting him started and wishes all hams would take a Novice under their wings.

Phil Coley, KN4MPE, 2006 Twain Rd., Greensboro, writes to represent N. C. In a month of "pounding" he has a WAS of 24/15 es DX includes PJ2MC (I'm still chasing him!) VE4GS, WP4ARX, LU5AQ, and LU6DI. Phil would like skeds with 1's, 7's, Ø's and 5's on 15 or 40 meters.

Joe Lester, KN7JAL, 5415 Penrith Rd., Seattle, Washington, plinks away with a Globe Scout, S-85, and a Hy-Gain vertical. "No DX" says Joe, but he has 10 WAS confirmed and would like 15 and 40 meter skeds with anyone and QSL's 100%.

John Garcia, K6VLC, HQ. Bat. 1st How. Bn., 19th Arty., Fort Ord, Calif., finally cracked the General exam and operates with a Challenger, SX-99, and all band doublet. John thanks K6LCX and K6SUW for their help.

Keith Lamonica, WA6CYT/G (England), 7500 ABRON, APO 125, New York, N. Y., is with his father in G-land. Unfortunately he cannot get a license in that country but does a lot of listening and reports hearing some whopping Novice signals in the high end of 20 (gasp). Keith would very much like to have some amateur pen pals. By the way, Keith, how about sending some reports of the Novices heard in England?

Bob Kling, WV2FGP, 415 Hazel Ave., Linden, N. J., knocks 'em dead with a Globe Scout 65A, a Navy ARB, and a dipole for 80, his favorite band. He will sked anyone for any reason.

So much for the news and letters this month. As always, let me be the first to wish you a Merry Xmas and a loot-filled New Year.

73 de Don, W6TNS

Urban Le Jeune, Jr., W2DEC
416 North 15th St., Kenilworth, N. J.

DX DX DX DX DX DX DX DX

The following certificates were issued between September 15th and October 15th, 1959:

WAZ

1163	G8JO	James Orr
1164	G6BS	B. M. Scudamore
1165	G3FUR	Fred K. Parker
1166	OH9RD	Matti K. Vuorela
1167	W3RPG	William T. Clark
1168	W9MUJ	Rollin Tremont
1169	W6UNP	Daniel E. Earhart
1170	W6AFI	Philip E. Frazier
1171	W1GYE	Andrew Malashuk
1172	VE2AIO	G. M. Kennedy
1173	W3LUD	Royal M. Gibson
1174	G2AJB	J. W. Booth
1175	EI3R	Tim Hurley
1176	F3DM	Mercader Antoine
1177	ON4LB	Fd. Delbrouck
1178	G3GGS	W. E. Waring
1179	W2VND	Ozzie Jaeger
1180	KØDQI	Scotty Redd
1181	K4IIC	J. Clark Mitchell
1182	W2FXA	Eugene W. Nadolny
1183	W3KA	Ralph B. Ladd
1184	W2PTD	C. W. Floring
1185	K4QIJ	John M. Yount
1186	W9KMN	Bruce E. Steinke
1187	W8UMR	John M. Sulak
1188	W8MCC	Harold I. Swart
1189	K9CJK	James E. Buth
1190	VE6AO	George E. Sargenia
1191	W8SZS	Dr. Julian Stern

CW WPX

70	K6CQM	Bob Murphy
71	SM5AJU	Leif Lundin
72	SM5WI	Harry Akesson
73	W4AZK	David S. Traer
74	K9AGB	Steven Tuma

SSB WPX

13	W2OTZ	Theodore H. Perlowski
14	W5DA	J. L. Young, Jr.
15	W5RHW	Sidney E. Stout, M.D.

PHONE WPX

8	PY1NC	Luiz M. Freitas
9	F8PI	Paul Mandeville

WPX Honor Roll
CW WPX

W2HMJ	531	G3EYN	318
W6KG	473	VK6WT	316
W8KPL	453	F9MS	315
W5KC	433	PAØVO	315
OK1MB	428	SM5WI	312
K6CQM	409	SM5AHK	311
W5AFX	407	W8RO	311
W1NLM	400	PAØLY	310
W1EQ	377	W9BPW	310
W2PTD	374	DJ3BB	308
W2EQS	373	SM5BCE	308
W9YSX	368	WØDMA	308
W3BQA	367	DL1QT	306
W9DYG	367	K5LIA	306
W4AZK	365	OK3DG	306
W9UXO	362	UA9DN	306
VE3DIF	357	K4HXF	305
DL7CS	356	K6SXA	305
W5OLG	356	VE3BWY	305
W6WO	356	W1BFT	304
W8LY	354	W6RLP	304
WØPGI	353	OK1AEH	304
W5DA	351	SM5CCE	304
W2MUM	350	W1FZ	304
W8JIN	350	W5AWT	303
W1IJB	349	W9VIN	303
W9IU	344	VK3KB	302
W6YY	330	W3DBX	302
K2PFC	325	W5LGG	302
W4OPM	323	JA2JW	301
K9EAB	319	K9AGB	301

VU2CQ owned and operated by Micky Mozoomder in Bombay. Micky operates on 3.5, 7, 14, 21, 28, 50, 144, and 420 mcs. Also SSB on 14, 21, 28 mc. Receiving equipment includes a SP400SX, AR88D, HRO, S22R, for 50 mc a command receiver plus tuneable converters, for 144 mc, two xtal controlled converters, 420 mc receiver is a R-89 AR8-5A surplus army receiver. (Tnx VU2CQ)

LU5AQ	301	W3BCY	300
PY4OD	301	W3LMA	300
SM5AJU	301	W4GXB	300
W2DGW	301	EA4CR	299
W4HYW	301	W1HWH	299
WØQYE	301	WØGUV	299
K4JVE	300	W3UXX	280
K4KOY	300	OK1BY	207
KL7MF	300	W4OMW	207
W2FXA	300		

Phone WPX

W8WT	455	ZP5CF	306
G3DO	395	F8PI	302
PY2CK	354	PY1NC	302
CT1PK	350	W9UZC	302
W5ERY	315	VE1ADE	25¢

SSB WPX

TI2HP	231	W2OTZ	153
K2MGE	203	W2TP	153
W1GR	183	W5RHW	152
K9EAB	180	W8YBZ	152
W6BAF	170	WØFUH	151
VE3MR	164	W5DA	150
TG9AD	160	W6TNS	150
WØCVU	155	K2HEA	149

Certificates

WOSA and HOSA Award—OSA the Antwerp section of the U.B.A. The Antwerp section of the UBA has decided to issue two diplomas known as the WOSA and the HOSA awards (Worked or Heard Antwerp stations) with the idea to foster international friendship and good will, and also to draw your attention to their beloved city.

May we herewith remind you, that Antwerp is the third largest port in the world, the trading and cultural capital of Flanders and was, in the Middle Ages, the world's center of arts and learning. The diploma depicts a view of the harbour at the beginning of the sixteenth century. It has been printed on old handscooped paper, with an original block belonging to the world's oldest printing shop (1560), our actual Plantin—Moretus Museum.

Rules and conditions in order to obtain the diplomas:

1. Only contacts made after the 31 December 1953 enter into consideration. All contacts prior to this date are non valid.

2. The minimum report during the QSO must be RST 448 in CW or RS 45 in phone, from both stations.

3. It is unnecessary to send your correspondant's QSL cards for confirmation. Send instead, an extract from your log showing date, time, reports, etc., to allow us to check your claim. We require that you have sent your QSL cards, and they must be in our possession at the moment you make your application.

Some of the team of the Radio Society of East Africa's "Coronation Safari" Headquarters in Nairobi. Standing in the usual order VQ4ET, SWL Robertson, R. H. Munro, Vice President R.S.E.A. with beard, VQ4FB. Seated VQ4CW, VQ4GO, VQ4HE (VQ1, 3, 4, 5, HE). (Tnx VQ4HE)

FB8CD needs no introduction to the DX fraternity. Andre is quite active on 21 mc phone. (Tnx W2HTI)

FR7ZD who has given many a "new one" this year. Guy is justifiably proud of his home made rig. He can be found on 14 mc either CW or phone most days around 0300 GMT and weekends around 1200 GMT. (Tnx W2HTI)

4. To obtain a diploma it is necessary that you contact in CW or phone:

(a) For any country outside of Europe, a total of 5 stations;
(b) For any European country, a total of 6 Antwerp stations;
(c) For the Benelux countries a total of 8 Antwerp stations;
(d) MM stations, only 4 Antwerp stations;
(e) For all short wave listeners a total of 10 Antwerp stations heard and confirmed.

5. Your log should be accompanied with 5 International reply coupons to cover the expenses of handling and postage.

6. Your application together with an extract of your log (no QSL cards please!) should be forwarded to:

WOSA
P. O. Box 331
Antwerp

OSA is the call sign of the coastal radio station, well known to all Radio Operators on board any ship entering the Antwerp docks. (Tnx ON4QX)

Worked All Scandinavia—Vaestmanland County Radio Society in Vasteras, Sweden, issues the Scandinavia award to licensed radio-amateurs everywhere in the world.

"Heard All Scandinavia" is available to all shortwave-listeners. Rules are the same as below but heard instead of worked.

1. All contacts must be after January 1, 1957.
2. EUROPE:

European stations have to work the following on any or all bands:

50 several stations in Denmark.
50 several stations in Finland.
50 several stations in Norway.
50 SM5 stations in Sweden
+ all SM districts 1-7 (2 06 contacts)

3. FOREIGN:

DX stations have to work the following on any or all bands:

20 several stations in Denmark.
20 several stations in Finland.
20 several stations in Norway.
50 SM5—stations in Sweden,
+ all SM-districts 1-7 (116 contacts)

4. SL-contacts are also valid for WA-Scandinavia.

Do not send any QSL cards. Send a list on all your contacts with call, date and type of emission (A1 or A3).

Your application must be checked and signed by any club or amateur. You can get WA-Scandinavia either on CW or on Fone.

The cost is 1 US-dollar or 13 IRC's.

Send your application to: Radio SM5WI, Vitmaragatan 2, Vasteras, Sweden. Vaestmanland County Radio Society.

The first 12 winners of the 5th of May Diploma (September CQ) were:

1. K6SED, Jay Dratler
2. EA8CM, J. M. De La Vega
3. CE1BT, Orlando Escudero
4. XE1AE, Fernando
5. OA4AV, Gustavo Reusens
6. PY3AFO, Dr. Nelson Rocket
7. XE2SD, Eduardo Sais
8. TI8AA, Adolfo Alvarez
9. K5QDF, Richard Levor
10. XE2VE, Carlos Velasco
11. W6CHY, Gan Baker
12. KH6BXU, Bob Thornton

The CN8 Certificate as described last month has been changed to include all CN8 stations not only CN8 nationals.

Hamilton Beach, Bermuda—Stan, VK9AD, on Norfolk Island, has become the first rare DX station to qualify for the elusive "Worked All Bermuda" Award.

The Bermuda certificate, a handsome reproduction of an early map of the Islands, is given to those amateurs who succeed in working all nine parishes in the mid-Atlantic resort.

Stan turned the trick on the 15 meter phone band by establishing contact with the following Bermuda stations: Reggie, VP9AX (Sandys); VP9EN, Tom (Southampton); VP9L, Cy (Warwick); VP9WB, Walt (Pembroke); VP9-DC, Al (Smith's); VP9BN, Bill (Paget); VP9CY, Vern (Devonshire); VP9G, Bill (Hamilton); and VP9DU, Neville (St. George).

Although the Worked All Bermuda award has been in existence for about five years, only five certificates have been issued to date—and all of them to W/K stations.

As of this writing, VP9G is the only station in Hamilton Parish and VP9EN is the only one active in Southampton Parish. The other seven Parishes have two or more stations.

It is felt that many W/K and VE stations qualified for the award as a result of contacts made during Bermuda's recent 350th Anniversary Contest. All operators making such a claim should mail their confirmation cards to VP9DC, secretary of the Radio Society of Bermuda, Box 275, Hamilton, Bermuda.

I1 Italy—The following letter was received from Dave, W4YCY, concerning American operated stations in Italy:

"Last year for the first time, the Italian Government licensed five stations to be supervised and operated by American Military personnel. So far these are the only US club stations operating in Italy. I1DFA, I1DFB, I1DFC, I1DFD, I1DFE. In Italy it is necessary to pay a 6,000 Lire tax each year in order to renew your third class license.

Here at the NATO Headquarters in Naples, we have two Amateur stations, I1DFA and I1AFS. I1DFA is the US station and I1AFS is the NATO station. I1AFS is for use of all Radio Amateurs assigned to Allied Forces Southern Europe. The custodian is Mllo. Gaetano Almonti, Italian Air Force, I1AGS. This

is our most active station. The custodian of I1DFA is Col. Leonard N. Palmer, USAF K2GFU, who is Chief of Staff for Communications AIRSOUTH. The direct supervisor of the station is M/Sgt. Dave Gillmann, USAF, W4YCY and formerly F7CE.

The addresses furnished for these stations are the official ones but a little awkward for use on QSL cards. The following is a simplified address: I1AFS, AFSOUTH Box 110 FPO, 510 New York, N. Y. For International Use: I1AFS, AFSOUTH Box 110, Bagnoli Post, Napoli, Italia. From the US: I1DFA, AIRSOUTH Box 110, FPO 510, New York, N. Y. For International Use: I1DFA, AIRSOUTH Box 110, Bagnoli Post, Napoli, Italia.

Our operating schedule for I1AFS is: 07:15 to 0745 GMT; 13:00 to 1400 GMT; 2100 to 2300 GMT.

We normally work on 20 meters around 14.350 mc *and quite often on 10 and 15. Our equipment is a Globe Scout with Linear amplifier working into a Telerex Beam or Windom antenna. Our receiver is a National 193 or Super Pro. We are hoping we can get on SSB soon with an RCA SSB-1 rock bound on 14.2 or 14.3* mc.

If anyone would like information about operating in Italy, just drop us a line."

CR8 Goa—HB9QP operated from here for ten days in the beginning of October using a KWM 1. Another ten-day stand as HB9QP/CR8 will take place in about three to four months when he returns.

TG Guatemala—Brother Pat of YN4CB fame is now operating as TG5HC. A Ranger and Windom is doing a good job of putting Pat's familiar voice into the states.

VQ8 ST. Brandon Island—(Cargados Carajos Shoals) a new country? This island is about 400-500 miles Northeast of Mauritius. Rodriguez is about 600 miles East of VQ8. Rev. Father Louis Nicolas VQ8AP was on from there as VQ8APB for a few days, a couple of weeks ago, but has now returned to VQ8. Paul, VQ8AD has now completed a new 7 and 14 *mc* rig (sounds vy FB in W6 land) which he is sending via ship leaving in 5 days (from 9/23) to Herve Figon on St. Brandon, who will be on the air as VQ8BBB in about 10 days (10/2). QSL via VQ8AD (The VQ8QSL Manager), P. O. Box 467, Port Louis, Mauritius. (Tnx W6YY)

LZ Bulgaria—Radio Sofia presents a monthly DX Programme for Hams and S.E.L.'s all over the world in English, French and German in cooperation with the Sofia DX Radio Club, LZ1KBA.

This programme includes DX information, ham topics and news about the activities of the Bulgarian radio amateurs and is prepared by radio amateurs for radio amateurs.

Radio Sofia's DX programme is broadcast in English as follows:

To Great Britain—the first Friday of each month—from 19.35 to 20.05 h. GMT on short waves in 30.93 m. or 9.7 *mc.* and is repeated from 21.40 to 22.10 h. GMT in the same wavelengths.

To North America—the first Friday of each month—from 20.00 to 20.30 h. EST on short waves in 30.93 m or 9.7 *mc* and is repeated from 23.00 to 23.30 h. EST in the same wavelengths.

Your comments and suggestions will be highly appreciated. Questions about the life and activities of Bulgarian radio amateurs will be answered in the DX programmes or by post.

For friendly contacts or additional information please write to: Sofia DX Radio Club LZ1KBA, 13, September 6 Street, Sofia, Bulgaria. The address of the Bulgarian QSL Bureau is: P. O. Box 830, Sofia, Bulgaria. (Tnx LZ1AF)

U. S. S. R.—Russian *uhf* hams have been given permission to operate 28 *mc.* They use the prefix RA1, RB5, RC2, etc. This corresponds to UA1, UB5, UC2, etc. This should prove to be a big boom for WPX. (Tnx GC6-FQ)

15 Italian Somaliland—Pat and Jere, who jointly operate I5GN, were so impressed with SSB, after using Ted Henry's "Argonant" for a period, that they ordered a SSB adapter for their DX100. If you haven't already worked 15GN, you are missing out on a really beautiful QSL card. They are all hand water colored pictures of African wild life.

YA Afghanistan—YA1AO is DL1AO and may be reached at Post Office Box 4044, Frankfurt, Germany. (Tnx W2HMJ)

About the time you are reading this, YA1PB and YA1IW will be pulling the big switch.

ZC3 Christmas Island—With the change of administration on Christmas Island, the prefix used has been changed to VK9 and ZC3AC has become VK9MV.

FW8 Wallis—A yet unidentified FK8 is due to operate from Wallis Island in January using KWM-1.

FB8 Comoro Islands—Andre FB8CD, has been active on 21 *mc* phone. He is on almost daily around 1800 GMT. Frequently, VQ4AQ acts as master of ceremonies.

AC4 Tibet—AC4AX is the proud papa of a son born in Lhasa last June. He is fixing up his BC610 and will be on the air again very shortly. If anyone can help with any of the following, it would be greatly appreciated by AC4AX: Books on TV Engineering; TV handbook; RCA tube manuals; transistor receiver manual and circuit diagrams; and assorted tools. W6YY and W8GZ have been trying to help round up these items so it might be well to check with John or Windy if you can help with any of the above.

ET2 Eritrea—ET2US is now on RTTY and looking for contacts on 14080 and 21015 *kc.* The FL8 trip by these boys had to be cancelled because the request for a license was denied.

W4BPD is leaving on a king size expedition, starting on March 1st, when he flies to New York City. From there, Gus will travel to CT1, EA2, 7G1, EL2, OG1, CR5 (Sao Thome) OQ5, VQ5, VQ4 for one or two weeks, then with VQ4AQ and VQ4GT to VQ3, where FB8BC and FB8CD will go with them to VQ1, VQ7 (Aldabras), Cosmoledo Islands, Providence, Farquhar Islands, Isles Glorieuses, if a landing looks possible to Tromelins, then back to VQ3 for the return leg. After good byes to all, Guy heads for ET3, VQ6, FL8, VS9, HZ1, 4W1, HZ1, two neutral zones each side of Kuwait, SU1, OD5, YK1, OK1, DL6, G6, G3, GW3, and home.

The entire trip will take three months and one to three days of operation will take place where licensing is possible. If anyone can give Gus information on getting operating permission in 4W1, it would be greatly appreciated. (Tnx DX magazine)

YASME—Rumors not withstanding Danny has procured the Yasme III and will be starting his new trip sometime in January, first stop being HC8. (Tnx KV4AA)

VS9 Oman—VS9OC is a new station operating from the Sultanate of Oman around 1300 GMT on 14 *mc*. QSL via RSGB.

9N1 Nepal—W4IFN forwarded a letter from friends of his in Kathmandu in which they stated that the fellows from Cook Electric have not been assigned sites for their ham rigs, let alone permission for operating. The local officials have promised to have matters taken care of in 30 "American" days, but everyone is pessimistic, to say the least. Warren promised to keep us informed on the developments there.

VR6 Pitcairn Island—Warren, W4IFN, is sending VR6TC a DSB rig and a converter, BC453 combo. He would appreciate it if anyone could help with spare parts, shipping costs, etc. Tom, VR6TC, will be back on in January or February.

EL Liberia—EL4A advises that he will accept cards for any EL station because his job as a pilot takes him all over the country. EL4M is a 12 year old YL. EL4A is preparing a *dsb* rig for all bands and also plans to operate 160 meters this season. His present operating hours are 7006 *kc* CW every Saturday at 0400 GMT. 14012 *kc* CW all other mornings at 0400 GMT. 21030 *kc* CW on even days of the month and 28040 on odd days of the month. He will get into regular 80 and 160 meter CW skeds sometime in November.

Many thanks to the Northern California DX Club Bulletin, Southern California DX Club Bulletin, Ether Waves, The Sidebander, and DX magazine for submitting their bulletins which were a great help in preparing this month's column. It is really appreciated.

At this time, I'd like to wish everyone a Merry Christmas and do hope that Santa Claus

[Continued on page 106]

Preview

1959 CQ World Wide DX Contest, Phone Section

The phone section of CQ's 1959 World Wide DX Contest was bigger and better than ever. Single Sideband is becoming a most popular adjunct as each year goes by. Such notables as HI8SKE (W2SKE), HZ1AB, ET2US, DL4-AAA, CN8JX and others were working them fast and furious above 14.3. A change to SSB can be like a breath of fresh air after battling the QRM below 14.2 on AM. Signals were many times easier to read in spite of heavy QRM. Some good showings should be made via SSB this year.

Activity appeared to be at an all time high. 20 meters was excellent on Friday and Saturday evenings, with 10 and 15 taking the burden of heavy contest activity during the sunup hours. Ten made a very good showing of rarer prefixes and zone multipliers such as VQ2, VQ3, VQ4, VQ5, CR4, CR5, CR6, CR7 and ZD2. Our neighbors from ZL, VK, JA and KA were available in quantity, with outstanding signals on this band. Point building G's, DL's and assorted Europeans were also plentiful.

We tuned the lower bands, too. 40 meters showed numerous europeans, africans and even a 4X4 calling CQ contest well below 7.2 *mc* apparently without too much success. You chaps ought to tune well below the low end for these lovely low band contacts. 80 didn't seem too lively from the 2nd district this year, but we did log nearly ten West Indies and Central American stations giving this band a go.

Two well known contesters were conspicuously absent. Our good friend Katashi Nose, KH6IJ was missing due to the fact that he is at Harvard taking some courses. Buzz Reeves, K2GL and his bodacious multi-op signal was also out due to last minute complications. When the logs are totaled, keep your eye on W2HTI, CN8IG, ZS2HI, W6VSS, UR2BU, K2IEG, K6EVR, W8JIN, LU8CW, CX1AK, UQ2AN, KA2AA, CO2ZS and W6AM. These boys should make a good showing from what we heard.

The logs are filtering in to our contest department and the tallies will soon commence. In the meantime, repair your antennas and oil the key in preparation for the CW section which should be a bang up contest too. See you November 28th and 30th. ■

Amateur Radio Legal Notes

Maurice J. Hindin, W6EUV
6505 Wilshire Boulevard
Los Angeles 48, Calif.

Another lawsuit which had an important effect in establishing the law of radio and which further points up the continuing struggle between the Federal Government and the States and political subdivisions of the States is the case of *Station WBT vs. Poulnot*. This case arose in 1930. Station WBT was a commercial broadcasting station, located at Charlotte, North Carolina. In 1930, the legislature of the State of South Carolina enacted a state law requiring an annual license tax to be placed upon all radio receiving sets operated in the State of South Carolina.

The radio station filed a suit to enjoin the collection of the tax on radio receiving sets and to prevent the enforcement of the law of South Carolina. In defense of the law, the State of South Carolina urged the court to sustain its right to tax any property within its state. In support of its position, however, WBT urged the court that the State of South Carolina law was invalid in that it was a tax on an instrumentality of interstate commerce and was an unlawful interference with interstate commerce. The general rule of law is that interstate commerce is exempt from State regulation. Two questions were, therefore, presented to the court in this case. They were: (1) whether or not the reception of radio signals is an act in interstate commerce; and (2) is a tax on radio receivers an unlawful interference with interstate commerce by a state?

The Federal court, after hearing the arguments of the radio station and the State of South Carolina, ruled in favor of the radio station. The court made the following interesting observation: "The plaintiff (WBT) contends that all radio communication is necessarily interstate, and in the present state of the art, this appears to be correct; however, it is not inconceivable that radio communication may in the future be so perfected that it may be confined strictly in intrastate." With reference to the second contention of the parties, the court said, "The plaintiff (WBT), through its broadcasting plant, is engaged in interstate commerce. The receiving sets in South Carolina are essential to the reception of the communications by the South Carolina audience. The receiving sets are absolutely essential instrumentalities in the interstate commerce in which the plaintiff is engaged. Under the numerous decisions of the Supreme Court, a state has no power to lay any burden in any form by taxation, or otherwise, upon interstate commerce or its instrumentalities."

Thus, it will be seen that another important attempt by the state to gain a regulatory foothold in the field of radio was defeated by the courts. It does not take any great imagination to realize the effect on amateur radio, had the ruling in the WBT case been different. If South Carolina was successful in imposing a license tax on all radio receiving sets, another state, such as California, could levy a prohibitive tax on all amateur radio receiving equipment. In that way, actual control of amateur radio would be possible by the states. This, of course, is true because the power to tax is the power to destroy.

Although no state can tax a person for the privilege of engaging in interstate commerce, this immunity does not prevent a state from imposing ordinary general property taxes upon property located within its jurisdiction. This is true even though such property be employed in interstate commerce. It is the discriminatory type of tax which was stricken down in the WBT case. California permits the collection of personal property taxes on radio equipment, but it is taxed on the same basis as any other property in the state and is taxed at the same rate and at the valuation as other property.

Although the WBT case is an important precedent (it is reported officially at 46 Fed. 2d 671), as will be seen in discussion of other cases, this case did not end the continuing attempts on the part of states and their political subdivisions to enact restrictive radio legislation. How the courts have dealt with these other cases will be the subject of other articles from time to time. ■

VHF

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

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

Two Meters—SSB—Etc.

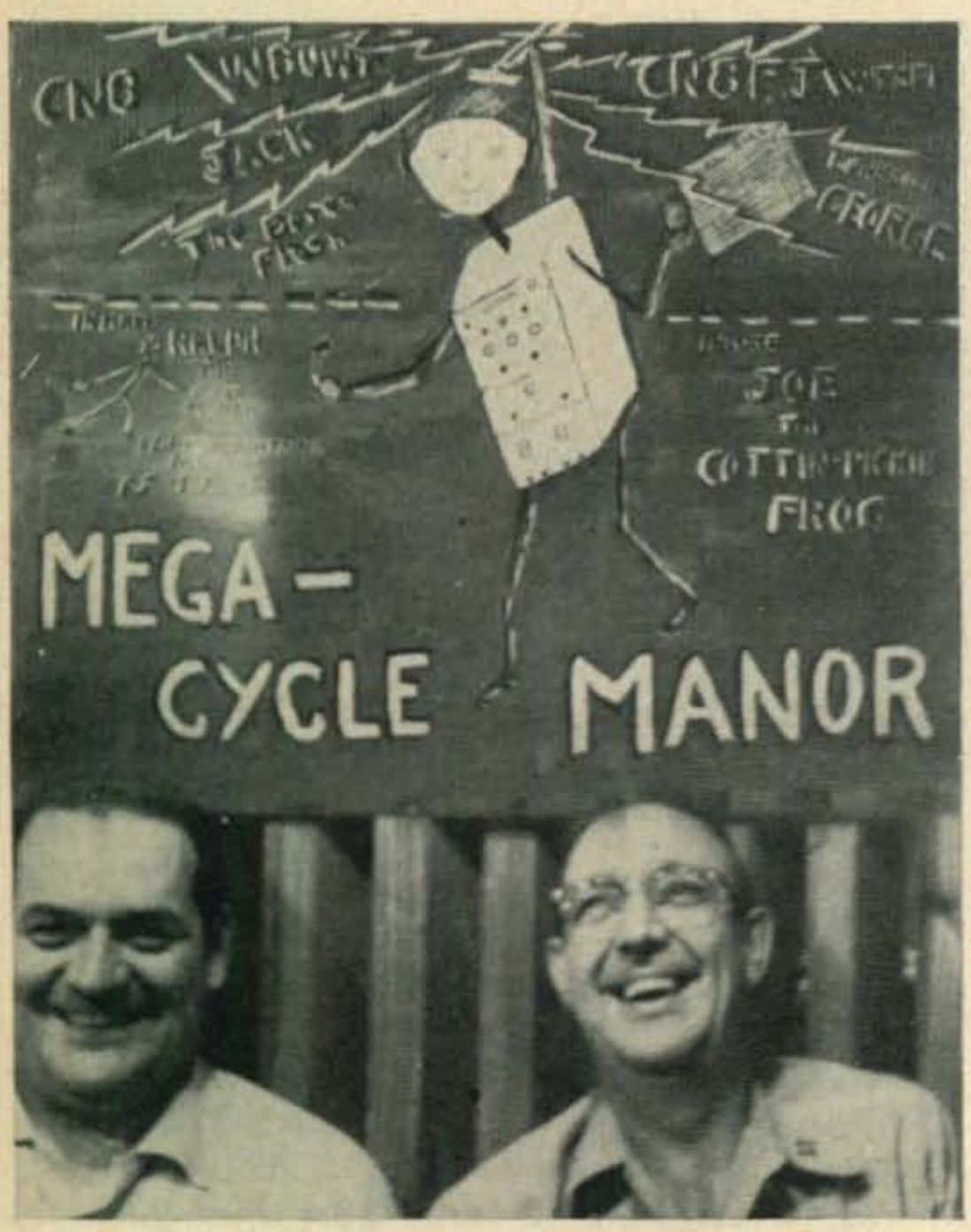
Listening in on two meters on the east coast gives you a feeling of confidence. It's true that the top two megacycles are not in great use. As a matter of fact, it is rare to find more than one or two stations operating in this part of the spectrum. The rest of the band, however, is well occupied with a highly diversified clientele. The lower 100 *kc* of the band is occupied to a large extent by a group of people known as the "scheduleers" (not to be confused with "mobileer"). Scheduleers in general should not be classified with the usual amateur. They have in fact lost sight of the usual uses for amateur radio and with their high speed tapes and their precisely timed transmissions are hoping for that one contact in a lifetime which will land them in the Hall of Fame. Their low frequency counterpart is found at the top of the DXCC list. Their contribution to the art of *vhf* propagation and communication, while perhaps not immediately apparent to the casual amateur, comprises almost the entire contribution to the state of the art made by amateurs. Their determination to find a way to do the heretofore impossible cannot be praised too highly.

As we tune higher in the band, we run into the ragchewers, disseminators of information and general mainstays of the band. The majority of these operators are interested primarily in talking with someone. They are perfectly willing to maintain schedules provided the fellow on the other end can be heard each time they maintain the schedule. It's all right if he's weak, but he must be there and readable, or the schedule is of no value. It is these people who are there when the band is open, who are around and ready to be worked when there is a contest on and who make use of the majority

Ethel Robison, K4HPX, one of the active YL's on six meters. Equipment: DX100 to 829B final, about 160 watts to 8 element HyGain Beam.

of the innovations discovered by the scheduleers.

Having tuned through the usual TV birdies and gotten up to 145, we run into a new type of station. Here of course, we find primarily technicians and novices. Neither class have had occupancy of this portion of the band for a long enough period to have obtained a foothold. However, since the technicians have obtained permission to operate in this portion of the band, the occupancy has more than tripled. This should not be construed to mean that there exists, even on the east coast, a QRM condition



W8UWT (now CN8JF) on the left; W5SFI (now CN8FS) on the right. Didn't say they'd work us on six or two meters but it's a nice picture anyway

on two meters, or that two meter occupancy even begins to approach that presently in existence on six meters. It is encouraging, however, to be able to tune the band at almost anytime of the day or night and find at least one station to talk to. During the peak evening hour, as many as twenty or thirty stations are operating simultaneously. This, of course, is in direct opposition to the information obtained from Old George, W8KDJ, of Orwell, Ohio, who when last heard from had just converted his two meter transmitter to ten meters. After a period of almost six years of operating with a hundred

W1NBN Club members and steadfast VHF enthusiasts on location at contest time.

watt transmitter feeding a 32 element beam up a hundred feet, George feels that the activity on the two meter band, in the northeastern corner of Ohio at least, has fallen down to such a degree to make the band of no value whatsoever. In view of the close proximity of Orwell, Ohio, to such towns as Youngstown, Akron, Cleveland and Hubbard, Ohio (home, I might point out of some of our best midwest *vhf* amateurs) it seems like an amazing piece of information. I might be inclined to ask what happened to W8SFG, W8SRW, W8KAY, W8IJG, W8LIO, W8AIN, W8UKS, W8WJC, and a host of other two meter operators who used to run W8BFQ's score into the thousands on any *vhf* contest you wish to mention. If any of you guys are hereabouts and happen to read this, drop me a line and let me know what happened. You can't all be on six meters.

I would not care to suggest that SSB is something new on six meters. The fact that Arnie, W2JJC, has been operating on the single side band for longer than I can remember would certainly make a liar of me. Arnie's long and strenuous efforts to interest the *vhf* fraternity in the use of single side band as a method of communication has not met however, with any great success. Much of this, I'm sure, is due to the fact that single side band has not made too great a foothold in the normal amateur bands. There are, for instance, less SSB operators on the low frequencies than there are technicians on six meters. And whether you like it or not, the production of a single side band

"WORKED EARLY BIRD" (W.E.B.N.) Certificate, one of best looking we've seen.

signals on the *vhf* requires a single side band generator. You can talk about single side band mixers, high level or low level, but you can't talk about it unless you have the generator to start with. Furthermore, while the production of double side bands plus suppressed carrier signals is relatively easy, the tuning of them is not, and they are about as popular on the *vhf* as a phone station in the cw band. Furthermore, on the east coast at least, the stations who are running side band are not the stations who have the strongest signal. While even an idiot could understand that location, and power input and antenna have a large effect on the strength of the signal two or three hundred miles away, the fact remains that the loudest signals are on AM. While it is true that there is a definite improvement in signal to noise ratio when using single side band transmissions and the proper receivers for single side band reception, it is also true that even more improvement can be obtained by using CW. Up to now at least, the majority of the weak signal workers on *vhf* are using CW.

Despite the slow foothold side band is on the *vhf* despite the complexity involved in assembling a side band rig for the higher frequencies. There is still a crying need for side band techniques on the *vhf*, and as Helen says, "if the side band isn't any good, how come I hear W7MAH in Nevada after everyone else has faded out."

Having recently become the proud (even though temporary) owner of a Collins 32S1 side band transmitter, I must admit to having done a little dabbling with the production of single side band signals on the *vhf*. Several new facts were discovered (rediscovered?). The first and primary discovery was that it really is easy to get on side band if you have a side band generator. And on two, two-twenty or six, the ease of getting on is greatly simplified if you happen to have in your possession an ARC-5-T23 transmitter. As an example, in order to put the Arc 5 on two meter side band it is only necessary to tune the exciter stages up with a 6833 crystal, insert a coax connector in the grid

leak ground return of the final 832A, and insert into this coax connector the 21 *mc* output from your SSB exciter. All the driver stages in the Arc 5 are tuned as though you were intending the transmitter to operate on 123 *mc*. The output tuning circuit of the final 832A is tuned to two meters, the mixing of the 123 *mc* good excitation with the 21 *mc* SSB excitation produces an upper side band of 144 *mc*. Oddly enough the prime advantage of converting the exciter of your transmitter is not the fact that you can now operate on single side band. Rather it lies in the fact that you now have a stable *vfo*. Assuming the use of a stable crystal in the ARC 5, the *vfo* drift will not have been multiplied but will rather have the same stability on two meters that it originally had on 21 *mc*. In the case of the 32S1, this good stability is considerably better than the average crystal presently being used in two meter transmitters. The output coupling circuits of the Arc 5 are sufficiently high Q to knock the 123 *mc* signal down more than 60 *db* below the two meter signal. In my case, I am driving through three more circuits, all tuned to two meters, and the net output at 124 *mc* is too low to be measured. Obviously the same system can be used with the Arc 5 on either six meters or 220 *mc* by using the appropriate crystals.

My 220 *mc* SSB exciter is a piece of equipment built with my own hot little hands primarily in an effort to prove that I can still build something if I have to. The circuit consists of 6U8 oscillator multiplier driving a 5763 which drives the grids of an RCA 6524 tripler to 199 *mc*. The output of this stage drives another RCA 6524, the plate of which is tuned to 220 *mc*. 21 *mc* SSB excitation is fed to the grid returns of the final output stage. The result of this combination is about 10 watts of SSB on 220 *mc* and 1 watt of CW on 199 *mc*. Certainly not the type of signal to hook directly to an antenna. However, entirely adequate for driving the grids of a pair of push-pull 4X250B's. If 10 watts of side band is all you're looking for, of course, an added tuned circuit at 220 *mc* will adequately filter the output so that the 199 *mc* CW signal will be well below the point of interference. If anyone is interested in the hard way to make a 220 *mc* single side band signal, we will be glad to publish the pertinent details upon request. Meanwhile, believe me, the easy way to do it is to use the T23.

Six Meters, Here or There

By the time you receive this issue, six meters should already have demonstrated its ability to provide long distance communication by way of F2 and Es. As a matter of fact, predictions indicate that the north south pass should be extremely good this fall and the fact that HC1FS and HC1JW were coming into Massachusetts on the 18th of October and that the BBC TV stations were heard on the morning of October 15th over the North Atlantic path auger well for the coming season. Although the diehard predictionists have originally forecast no F2 openings for this fall season, the likelihood of their being right is no greater than normal. As usual the Norwegian and Swedish amateurs will have permission again this year for 50 *mc* work. Cross band contacts with many other European countries will very likely be possible. Openings to Hawaii and Alaska from many parts of the country are expected. If you haven't heard them yet, don't blame me, fix your antenna and your receiver.

As a matter of interest the proper way to work DX stations on six meters is to emulate the actions of the DX workers on the lower frequency. This, in the case of a band where there are no CW sub-divisions for the DX stations to hide in, consists of the *vfo*ing to the frequency of the DX station and calling loud and lustily at all times when they are not audible. It is not necessary to hear the DX station in order to join the fray, nor even to know his exact call letters. It is however, not considered sporting to call blindly without even knowing the country in which the DX station resides. Now there may be many diehards who will decry this type of operation (me for instance), however, the mores of DX operating are long founded and deeply entrenched. Certainly it would be unseemly for a six meter operator to try to improve on these tried and proven practices. If, however, you have other views on the proper way to operate we would be more than glad to publish them for the benefit of others who obviously do not have them. We do feel however, that an affidavit attesting to the fact that you not only subscribe to these practices but actually practice them should be included. Meanwhile, we'll stick to our old crystal and just hope the DX doesn't get on our frequency so that we have to move.

Syracuse VHF Round-Up

Well, if you missed the latest Syracuse *vhf* production and I did, then I assume that you are feeling as badly as I am. Information filtering back to the Rhododendron Swamps indicate that the food was great, the entertainment terrific, the talks extremely interesting and informative, and the clientele above par. It must be admitted that the presence of such notables as KH6UK, W1HDQ, W2CXY, K2TKN, W1OUN, W1OOP, W1AZK, W2AMJ, K2GQI, and the host of about 500 others equally avid *vhf* workers, is an attraction not to be missed by anyone seriously interested in *vhf* work. Unfortunately, neither Helen nor I could attend, but this was strictly a matter of ill health and not to be construed as indicating that we didn't feel the trip was worthwhile. As a matter of fact, the two really large *vhf* gatherings of the year are the "Syracuse VHF Round-Up" and of course the "Dayton Hamvention". Neither one should be missed by anyone who can pos-

sibly make it. It was at the Syracuse Round-Up last year where the first demonstration of an operating parametric amplifier was made. This year plans for the use of the parametric amplifier on all out effort to produce amateur moon-bounce communication were outlined by Henry Cross, W1OOP. Furthermore, these get-togethers provide an opporunity for the exchange of ideas particularly by those scheduleers who are reticent to have their plans published until they have been proven, but who are perfectly willing to discuss them person to person. It has always been my personal opinion that anyone engaged in a "Will of the Wisp" endeavor should not be ashamed to have the rest of the world know he is making an effort. It is true however, that almost all scheduleers prefer to have their schedules kept secret. Letters received from these serious hard working experimenter type amateurs are usually filled with exciting news and facts of interest to everyone and are, sadly enough, almost always ended by "Please do not print this."

Parametric Amplifiers, etc.

Speaking, as we were, on parametric amplifiers, I note that something over a year has passed since the first varactors became available to the average amateur or experimenter. During that period much work has been accomplished and much data has been empirically determined by experimenters and amateurs the world over. Most of this information has reached the publications stage and has appeared in either "QST" or "CQ". Varactors capable of working in the *vhf* and *uhf* frequencies are now available for a relatively modest sum. If you are operaitng on six meters or possibly even two meters, there is some excuse for you not having a varactor in use at your home station. However, if you are operating at 220 *mc* or higher there is *no* excuse. Improvements in signals and noise ratio on the order of 5 or 6 *db* can be expected on frequencies of 220 *mc* up to 1296. This is equivalent to quadrupling the size of your antenna for instance. If you expect to do any serious work on these bands the use of a parametric amplifier is as mandatory as the use of a rotary beam or crystal control. You may not be able to add a state as the advertisement says, but you certainly will be able to hear people who were just not there before.

Club News

One year ago the "Microwave Group of San Diego" was formed. The objective of every member was to engage in the utlization of the higher frequencies of the amateur bands. The Group meets once a month to discuss any problems, technical or mechanical as well as news of happenings in the bands from 144 *mc* to 10 *kmc*. Many of the more than twenty members are engaged in getting on 220 and 432 *mc* with a few members on 1296 *mc* and three members are "setting up" on 10 *kmc*.

Since the Group is interested in the technical end of amateur operation in the higher frequencies, you will find that the equipment used follows the true amateur form, they build everything they can.

Certificate

The "Kansas City V.H.F. Club" is now offering a certificate. To qualify for same you must work five members of the Club after July 1, 1959. Required proof of such contact is either excerpts from the log or QSL's which should be sent to K.C.V.H.F.C., P.O. Box 973, Kansas City 41, Missouri.

Hampton Roads Six Meter Club has elected the following new officers: Lawrence Salvemini (K4TKP), President; Nathan Berent (K4-UKT) Vice President; Herschel Matthews (K4DTP), Secretary-Treasurer. The Club was founded a year ago by amateurs interested in the six meter band, and membership has doubled since that time. Included in the group are amateurs from the entire Hampton Roads area.

The club meets in person once a month, the first Friday at 9:00 PM. An on-the-air meeting is held at 8:00 PM on the third Friday of each month. Club members also participate in the Hampton Roads Six Meter Net every Monday, Wednesday and Saturday at 8:00 PM on 50.46.

Mail

Townsville, Queensland, Australia

Bill O'Donnell (VK4ZBE) gives us the low-down from his country: "We in Townsville are well situated for DX openings to JA, KR6, VS6, KH6 and during Sporadic 'E' season to ZL1, 2, 3, 4, and it seems all VK areas except VK6 and VKØ". *Here we go again! Should we change our QTH or not? KR6!! VS6!!*

"So far this year I have contacted 1300 JA's on six meters, from February 8th to July 2nd. The next season is due to open about August." *Listen closely for W1's, Bill, Puh-lease!*

"VK's to the south in Brisbane, VK2, and VK3 have not had much luck with the JA's

or KH6's, although as you know VK2ADE contacted VE7AQQ, and VK3ALZ contacted XE1FU on six."

"The equipment used in VK is nearly without exception home-made as far as the transmitter, modulator, etc. is concerned. Most receivers are generally war surplus being the Australian AR7, AR8, AR88, and of course the old U.S. standby, the BC348 series."

"Our Sporadic 'E' season normally begins in November and continues until March. The 'F2' usually is from February to June (inc.) and mid-August to mid-November."

"Those contacted in the past five months were KR6AK (happily going back to his home in the U.S., his place on six being taken by KR6MD); VS6CJ; W6RUY somewhere in the China Sea. The KH6's were KH6UK, CTC, BTV, CVA, CAU, CNI, CHI, BCF, W3BJG/KH6, K6HGP/KH6, and also KA7AX."

"In March on two nights I heard an unidentified WØ working a KØ also heard W6NLZ calling 'CQ' but he was too weak to work." *Maddening isn't it? We've given Bill more space then we normally do, but boy! it surely was worth it.*

Hawaii And now from the Blue Pacific we hear from G. David Germeyer, W3BJG/KH6: "The ball is still rolling out here in Hawaii as far as *vhf* activity is concerned. Just got on 144 *mc* with the Seneca transmitter, S-37 receiver, and a homemade 4 element beam. No big openings lately on 50 *mc*, but did work Russ, VK9XK on the evenings of July 3rd and 5th; the first since the 30th of May." *Can't hold out on us O.M., we know you worked Bill, VK4ZBE too.*

Boise, Idaho Here's ole George (W7CJM) with good news concerning 144 *mc*: "First of all, Mel Baer, W6WSQ and I worked each other this morning (August 13th) via meteor skip this morning during our third schedule on two meters. His frequency, 144.006 and I on 144.010 *mc*. Guess this breaks the barrier between Idaho and the outside world, may it never exist again." *We're with you!*

"The fun begins when I tell you that Mel was horizontal while I was vertical (OH NO!) with a Mosley A-142 stacked Yagi array. The rig here is a 6n2 driving the PP HK-54's running 600 watts input, 400 watts out (don't hold the key down at this level), feed line is inch and five eighth copper coax, converter is Tapetone into modified BC312 with 100 *kc if*. QTH is 7150 feet above MSL. This is the first decent contact for this station; previous DX was W7AIB in Ogden, Utah, mobile in Oregon."

"There were two very good bursts of thirty seconds here, one 25 second and one fifteen second. The two way was accomplished in the last five minutes of the schedule from 0030 to 0130 MST." *It always works that way. Sometimes I think skeds should be kept only the last five minutes of the schedule period.*

"The path as I make it is about 665 miles from my QTH. Possibly this information might get a little more activity in this area which is sadly needed. Only one station in each of the NW states doesn't give the outside world much of a break." *You're doing a grand job. CONTINUED GOOD DX TO YOU.*

Pharr, Texas First report of DX this season from Walt Piper (K5GPR) who sez: "Worked HC1FS and HC1JW September 27, 1959 at 1912 CST on 50 *mc* AM. We had a three way QCO with S9 signals both ways. Some LU's were heard but was not able to make contact." *Thanks, Walt, hope it keeps coming your way.*

Madison, Wisconsin Some good aurora news from Fred Laun (W9SZR): "The aurora of September 3rd enabled many of us in this area to hook up with KG1FN on Fletcher's Ice Island, located North of Alaska. Contact was apparently by some sort of direct auroral skip. His signal was well over 9 most of the time, with a typical skip-type signal; no flutter. Bob said it was the best opening he had seen since he has been up there. Seems to me that if someone north of the Arctic Circle in Alaska gets on 6, we won't have to depend on F2 to get this state." *Hope you're right Fred, maybe some of the gang will then be doing it often.*

Chattanooga, Tennessee A little bit about two meters, and again a little bit about six meters from Charles Curle (W4TDZ). "On the area scene, the biggest thing of note is the moving of W4IKK *(not again!)* from Signal Mountain, Tennessee, to the Tullahoma, Tennessee area. Gone is that tremendous signal that caused all the birdies in my receiver. But then, whoever heard of him?" *Careful, now.*

"The two meter activity is picking up. Seems like the Atlanta boys are getting real active. Of course, here in Chattanooga no one is on two. Several of the area chaps are getting on 220 *mc*. W4LNB can arrange to receive on 220 if anyone is interested. But then, he is going to move to another section of town shortly."

"As far as this station is concerned, I have been using a Telrex 11 element Spiral-Ray. *Fine piece of equipment.* This seems to push my 6n2 out a little farther. Now I have a KW final for six under construction. It will use a pair of 4-250's using the "copper tubing final" from Virginia." *Sounds like you really mean it, Charlie. Keep with it.*

Penhook, Virginia From beautiful Virginia and Dave Sutherland (K4RTG) we hear: "I have been on six meters only five months and have thirty-four states confirmed and thirty-seven worked. Skip conditions lengthened out June 17th near 1500 when I worked K7AAD and K7BCX in Oregon and K7CAV in Washington. Longest ground wave worked was about 250 miles to W3MFW and W3RUE in Pennsylvania the night of June 27th. Power

here is 20 watts to a 4 element Yagi."

"There seems to be quite a bit of two meter activity in this area especially down in North Carolina."

"The 'Windbag Net' of which I am a member meets on 50.75 each Saturday night at 2035. Anyone having worked three members of the net since January 1, 1959, can earn a WBN Certificate by sending a written request and submitting complete information on contacts to: Windbag Net Secretary, Box 2002, Roanoke, Virginia." *Thanks Dave, always appreciate the news from your vicinity, also certificate news.*

Southbridge, Mass. From the home state and Kent (K1JPH) we submit a few words: "Never having seen my name or call in print, I decided that I would write and see if I had anything to add to your VHF column." *Now you've seen it Kent. Should we just quit here?*

"I got my tech ticket on St. Patrick's Day. Had my novice for a while but urge people to go for their general rather than technician. So . . . my equipment included a TBS 50-C and a Super-Pro with FCV-2 converter and a five element hy-gain. I now have a Seneca with loads of *tvi*, Anyone have any ideas? I have a poor location for *vhf* inasmuch as my elevation is 650 feet and the hills on all sides range from 740-850 feet. However, I have managed to work 17 states and get 13 confirmed."

"I would like to get on 220 *mc* and would be interested to hear from anyone in this area concerning same. As of now, I have no 220 gear but am planning to get a transmitter built." *Hope you get all the help and advice you'd like, Kent. Luck!*

Canfield, Ohio From the old home state and Jack Graft (W8OWT) we hear: "50 *mc* was really hot in Ohio on July 12th. I hit my shack about 0830 and K5SWL from Oklahoma was coming with S9 and then some signals. Activity from the west was low, due to time difference, but when those western boys got up, oh boy! 80 meters would sound as empty as a grave yard."

"All call areas were heard at my QTH; I even picked up State No. 40, Arizona. Now I'll get to the point. Double hop was real good so I was working W6ABN from Long Beach when to my surprise we were joined by Chuck, KØCHK, from Omaha, Nebraska. Signals were Q5 at each end. Chuck was a mere 20 over 9, and Stan was Q5 S7-9. We were in QSO for 14 minutes with little QRM. *(THAT is a record!)* This is my first single and double hop 3 way and I was wondering if it has ever been reported to you before." *Has been done, but not frequently. Had just about the same conditions in New England on that date. States coming through were Mississippi, Illinois, Arizona, Nevada, California, Louisiana, Iowa, Virginia, Alabama and Ohio. Should get more letters from you Jack, all you seem to have is good news. Let us hear from you more often.*

Phoenix, Arizona A new technician from Arizona, Paul Prato (K7CKZ) sez: "I have just received my technician license and plan to get on six as soon as I can convert my DX-20. Would like to hear from anyone who has successfully converted the DX-20 to six. I am building a transistorized receiver for six now." *Good luck, Paul, hope you get lots of letters.*

Montreal, Quebec Our transplanted K2VTX/VE2 Dave, comes through once more with: "We've been blessed with a couple of 'E' openings on six meters but that's all. Why in the world don't any of the W2's and W1's point their beams up this way once in a while?" *We do!*

"At present I am running about 20 watts to a 9903. The receiving set-up is an SX99 with a homebrew converter. I've worked numerous 9's, 4's, 3's, 8's and Ø's. Have just one complaint. It would be much better for all concerned if stations calling would give me a chance to transmit. The QRM can get higher than the noise level." *Ain't it the truth!*

"Recently VE2NI has been working very good aurora with distances up to 600 miles. According to the grapevine, W4RMU has been heard on meteor pings wits signals of 4-6." *Keep that dope coming, Dave. We get little news from VE land.*

Whitehorse, Yukon Another letter from Canada; this time from Smitty, VE2ACH/VE8.

"Since I've just moved back to VE8 land for another tour of a few years, I thought this would be a good a time as any to get started on *vhf*."

"As USA equipment is just about too much for me to handle, my equipment is going to have to be all home-brew. Any suggestions regarding six meter equipment would certainly be welcomed; and it would almost have to be in the 10-50 watt range for several reasons."

"The six meter band should do OK up here, for just using a small converter and a single dipole I've heard one VE3, two W1's and the odd W6, W7, and KL7 to date." *WHO!!!*

"As far as I know or can find out there are no other Yukon VE8's active on six, so I have hopes of being able to supply the necessary VE8 contact for the new WVE award being sponsored by the Ontario VHF Association in Toronto." *Anyone with suggestions, ideas or schematics, get busy and send them to Earle W. Smith, R.C.A.F. Station, Whitehorse, Yukon, Canada. Good luck Smittty. Sure hope we see you on six.*

W.E.B.N. 50 mc Certificate — Rules

1. Contact must be made with two of the four

[Continued on page 108]

PROPAGATION

George Jacobs, W3ASK
607 Beacon Road, Silver Springs, Md.

Last Minute Forecast

Generally good shortwave radio propagation conditions are forecast for most of the month of December. The period December 1-6 may be exceptionally good, while radio storms are most likely to occur December 10-11 and 24-26.

The following is an over-all picture of band conditions forecast for December, 1959. For specific times of band openings for a particular DX circuit, refer to the *CQ Propagation Charts* on the opposite page.

6 Meters: DX openings to several areas of the world should be possible during the month of December.

10 Meters: Excellent world-wide DX propagation conditions are forecast for this band from early morning through the early evening hours. Almost daily openings to most areas of the world are expected, with strong signals and little fading.

15 Meters: While closing somewhat earlier in the day than during the fall months, excellent world-wide propagation conditions are forecast for 15 meters. The band is expected to open shortly after dawn, and remain open through the early evening hours. Short-skip propagation, between distances of approximately 600 and 2400 miles, should be possible on most days from a few hours after sunrise until well after sunset.

20 Meters: Twenty-meters is expected to open to most areas of the world shortly after sunrise, with conditions peaking during the late afternoon and early evening hours, and remain open to some areas of the world around-the-clock. During the early afternoon the 20 meter skip will extend from as short a distance as several dozen miles, out to several thousand miles, resulting in strong interference between local and DX stations.

40 Meters: Static levels are generally very low during December, and fairly good propagation conditions are forecast for 40 meters. From a few hours before sunset until shortly after sunrise the band is expected to open to many areas of the world. Short-skip openings are expected around-the-clock, with the skip as short as a few miles during the early afternoon, extending out to large distances as evening approaches.

80 Meters: Propagation conditions on this band are usually at their best during December. Static levels are low, and signals strong. DX openings to some areas of the world are forecast for several nights during the month. During the daylight hours, normal ionospheric absorption limits skip to about 250 miles, with range increasing as darkness nears.

160 Meters: During the daylight hours intense ionospheric absorption prevents skywave reflection, and transmissions are limited to groundwave distances of several miles, or so. During December, in the late afternoon hours, as ionospheric absorption decreases, 160 meter signals begin to be reflected by the ionosphere. During the evening hours the range may extend out to several hundred miles. When the static level is low, DX openings to some areas of the world may also be possible.

Solar Cycle

The solar cycle continues to decrease, but at a very slow rate. The Zurich Federal Solar Observatory reports monthly sunspot numbers of 149 for July, 198 for August, and 142 for September, 1959. This results in smoothed sunspot numbers of 177 centered on January, 1959, 175 centered on February, and 173 centered on March. The smoothed number forecast for December, 1959 is 149.

Season's Greetings

The Editor of this column would like to extend season's greetings to everyone, everywhere. Merry Christmas, and a very Happy 1960.

73, George, W3ASK/HB9

DECEMBER, 1959

ALL TIMES IN EST

EASTERN USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western Europe	8A-12M (2)* 6A-8A (3) 8A-1P (4) 1P-4P (2)	6A-1P (3) 1P-3P (4) 3P-5P (3) 5P-8P (2)	8A-12N (3) 12N-5P (4) 5P-11P (3) 11P-5A (2)	3P-5P (2) 5P-2A (3) 2A-4A (2) 6P-2A (2)**
Central Europe	8A-10A (1)* 6A-8A (2) 8A-11A (3) 11A-2P (2)	5A-7A (2) 7A-9A (3) 9A-12N (2) 12N-2P (3) 2P-4P (2)	4A-11A (2) 11A-3P (3) 3P-8P (2) 8P-12M (1)	4P-6P (2) 6P-10P (3) 10P-2A (2) 8P-1A (1)**
Eastern Mediterranean	8A-10A (1)* 6A-11A (3) 11A-1P (2) 1P-3P (1)	6A-11A (2) 11A-1P (3) 1P-3P (2) 3P-6P (1)	12M-3A (1) 3A-7A (2) 7A-11A (1) 11A-4P (2) 4P-12M (3)	5P-12M (2) 8P-10P (1)**
North & Central Africa	8A-12N (2)* 6A-8A (3) 8A-1P (4) 1P-4P (3) 4P-6P (2)	6A-11A (2) 11A-3P (4) 3P-6P (3) 6P-8P (2)	12M-5A (1) 5A-1P (2) 1P-8P (4) 8P-12M (2)	5P-7P (2) 7P-2A (3) 9P-1A (2)**
South America	8A-11A (2)* 5P-8P (1)* 7A-1P (2) 1P-5P (4) 5P-11P (2)	5A-10A (3) 10A-2P (2) 2P-5P (4) 5P-8P (3) 8P-10P (2) 10P-2A (1)	5A-8A (3) 8A-2P (1) 2P-5P (2) 5P-11P (4) 11P-5A (2)	7P-4A (3) 4A-6A (2) 9P-3A (2)**
South East Asia	10A-3P (2) 5P-8P (1)	7A-9A (2) 9A-4P (1) 4P-7P (2) 7P-9P (1)	5A-9A (2) 9A-2P (1) 2P-4P (2) 4P-6P (1) 6P-11P (2)	NIL
Australasia	9A-11A (1) 3P-5P (1) 5P-8P (2) 8P-10P (1)	9A-11A (2) 11A-4P (1) 4P-10P (2) 10P-12M (1)	12N-10P (1) 10P-6A (2) 6A-9A (3) 9A-12N (2)	4A-8A (2) 5A-7A (1)**
Guam & Pacific	4P-6P (1)* 10A-12N (1) 3P-7P (3) 7P-9P (1)	8A-10A (2) 3P-5P (2) 5P-8P (3) 8P-10P (2)	11P-2A (1) 2A-7A (2) 7A-9A (3) 9A-12N (2)	4A-8A (1)
Japan & Far East	5P-6P (1) 6P-7P (2) 7P-8P (1)	5P-6P (2) 6P-8P (3) 8P-10P (2)	4P-11P (2) 11P-2A (3) 2A-5A (2) 5A-7A (3) 7A-9A (1)	1A-7A (1)

ALL TIMES IN CST

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western & Central Europe	8A-11A (2)* 6A-8A (3) 8A-10A (4) 10A-12N (3) 12N-2P (2) 2P-4P (1)	6A-8A (3) 8A-12N (4) 12N-2P (3) 2P-6P (2) 6P-8P (1)	12M-6A (2) 6A-11A (1) 11A-3P (3) 3P-7P (2) 7P-12M (1)	4P-3A (2) 6P-1A (1)**
Southern Europe & North Africa	8A-11A (2)* 5A-7A (2) 7A-12N (4) 12N-2P (3) 2P-4P (2)	5A-8A (3) 8A-10A (2) 10A-2P (4) 2P-6P (3) 6P-8P (2)	6A-12N (1) 12N-3P (4) 3P-10P (3) 10P-6A (2)	5P-1A (2) 7P-12M (1)**
Central & South Africa	9A-12N (1)* 6A-9A (2) 9A-2P (4) 2P-4P (3) 4P-7P (2)	5A-10A (1) 10A-12N (2) 12N-4P (4) 4P-7P (3) 7P-9P (2)	11A-1P (2) 1P-8P (3) 8P-12M (2)	6P-9P (1)
South America	8A-10A (1)* 5P-8P (1)* 6A-1P (3) 1P-4P (4) 4P-7P (3) 7P-10P (2)	5A-9A (3) 9A-2P (2) 2P-6P (4) 6P-9P (3) 9P-1A (2)	3A-8A (3) 8A-3P (2) 3P-5P (2) 5P-11P (5) 11P-3A (4)	6P-4A (3) 4A-7A (2) 7P-3A (2)**
Japan & Far East	4P-6P (1)* 2P-4P (2) 4P-6P (4) 6P-7P (3) 7P-9P (2)	9A-1P (1) 1P-4P (2) 4P-8P (3) 8P-10P (2)	1P-7P (2) 7P-11P (3) 11P-5A (2) 5A-7A (3) 7A-9A (2)	1A-7A (1)
South East Asia	10A-1P (3) 1P-4P (1) 4P-7P (3) 7P-9P (1)	7A-9A (2) 9A-3P (1) 3P-8P (2)	7A-9A (3) 9A-12N (2) 12N-5P (1) 5P-11P (2)	NIL

ALL TIMES IN CST (cont'd)

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Hawaii	11A-1P (1)* 10A-2P (3) 2P-7P (4) 7P-10P (2) 10P-11P (1)	9A-3P (3) 3P-9P (4) 9P-11P (3) 11P-1A (2)	10A-4P (2) 4P-6P (3) 6P-2A (4) 2A-5A (3) 5A-10A (1)	8P-10P (3) 10P-7A (4) 7A-9A (3) 9P-7A (3)**
Australasia	8A-11A (3) 11A-2P (2) 2P-7P (4) 7P-9P (2)	7A-10A (3) 10A-3P (2) 3P-9P (4) 9P-12M (3) 12M-2A (2)	8P-12M (2) 12M-4A (4) 4A-9A (3) 9A-12N (2) 12N-8P (1)	2A-8A (2) 4A-7A (1)**
Antarctica	7A-9A (1) 6P-10P (1)	7A-9A (2) 9A-5P (1) 5P-8P (2) 8P-11P (3) 11P-1A (2)	4P-7P (1) 7P-10P (2) 10P-3A (3) 3A-9A (2) 9A-11A (1)	12M-4A (1)

ALL TIMES IN PST

WESTERN USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Europe & North Africa	8A-12N (1)* 7A-9A (2) 9A-12N (3) 12N-2P (1)	1A-3A (1) 6A-8A (2) 8A-11A (3) 11A-2P (2) 2P-4P (1)	1A-4A (2) 4A-10A (1) 10A-4P (3) 4P-8P (2) 8P-1A (1)	5P-2A (2) 8P-1A (1)**
Central & South Africa	6A-11A (2) 11A-4P (4) 4P-6P (2)	6A-11A (2) 11A-5P (4) 5P-9P (2)	10A-1P (1) 1P-3P (2) 3P-9P (3) 9P-12M (1)	5P-10P (1)
South America	8A-10A (1)* 5P-8P (1)* 6A-12N (3) 12N-3P (4) 3P-6P (3) 6P-8P (2) 8P-10P (1)	5A-8A (3) 8A-12N (2) 12N-6P (4) 6P-8P (3) 8P-10P (2) 10P-5A (1)	3P-10P (4) 10P-2A (3) 2A-3P (2)	6P-8P (2) 8P-11P (3) 11P-6A (2) 9P-1A (2)**
Guam & Pacific Islands	12N-3P (1)* 11A-1P (2) 1P-6P (4) 6P-8P (2)	10A-3P (3) 3P-10P (2) 10P-1A (1)	8P-12M (3) 12M-6A (2) 6A-9A (3) 9A-12N (1)	2A-7A (3) 4A-6A (2)**
Australasia	4P-7P (1)* 8A-4P (3) 4P-8P (4) 8P-10P (2)	7A-11A (3) 11A-6P (1) 6P-8P (2) 8P-11P (4) 11P-2A (2)	6A-10A (3) 10A-12N (1) 7P-9P (1) 9P-1A (4) 1A-6A (2)	12M-7A (3) 1A-7A (1)**
Japan, Okinawa & Far East	2P-6P (1)* 1P-3P (3) 3P-5P (4) 5P-8P (3)	12N-4P (3) 4P-7P (4) 7P-10P (3)	5P-8P (2) 8P-12M (4) 12M-4A (3) 4A-10A (2)	12M-8A (3) 1A-6A (2)**
Philippine Is. & East Indies	3P-6P (1)* 9A-11A (2) 11A-1P (1) 1P-6P (3) 6P-8P (2)	9A-11A (3) 11A-2P (2) 2P-8P (1) 8P-10P (2)	4A-10A (2) 10A-12N (1)	2A-8A (1)
Malaya & South East Asia	4P-6P (1)* 9A-11A (1) 3P-8P (3)	9A-12N (3) 12N-2P (1) 2P-7P (3) 7P-10P (2)	12M-4A (1) 4A-8A (3) 8A-12N (2)	6A-9A (1)
Siberia	3P-6P (1)* 2P-4P (2) 3P-6P (3) 6P-8P (2)	1P-5P (2) 5P-7P (4) 7P-10P (2)	5P-7P (2) 7P-9P (4) 9P-12M (3) 12M-8A (2)	10P-6A (3) 12M-5A (2)**

SYMBOLS INDICATING NUMBER OF DAYS CIRCUIT IS FORECAST TO OPEN DURING DECEMBER, 1959

(1) 1-4 days (2) 5-11 days (3) 12-18 days (4) 19-26 days (5) more than 26 days

* Indicates probable times for six-meter openings.
** Indicates probable times for eighty-meter openings.

The 160-meter band is likely to open approximately 10-20% of the nights during December during those times for which 80-meter openings are shown in the Charts with a symbol of (2) or better.

Time Symbols A means A.M. N means noon
P means P.M. M means Midnight

The CQ Propagation Charts are based upon a CW power of 150 watts at radiation angles less than thirty degrees, and are centered on the Eastern, Central and Western areas of the USA. This month's forecast is valid through January 15, 1960. All information appearing in the Charts is based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

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

semiconductors

One of the handiest devices that I have seen is the Eico Model 1020 transistorized power supply. It can be used for servicing transistorized equipment or to provide power for transistor experiments.

The output, monitored by a dual range voltmeter (0-6 volts and 0-30 volts) is continuously variable from 0 to 30 volts. The maximum ripple under any possible voltage or current condition is only 1/200 of 1%. Two type 2N256 (CBS) power transistors and a rugged power transformer are used to permit safe and reliable operation. A fuse, which is located on the front panel, protects the unit from shorts and overload. It is housed in a grey wrinkle steel case measuring 5" x 4" x 5½" and weighs 4½ lbs.

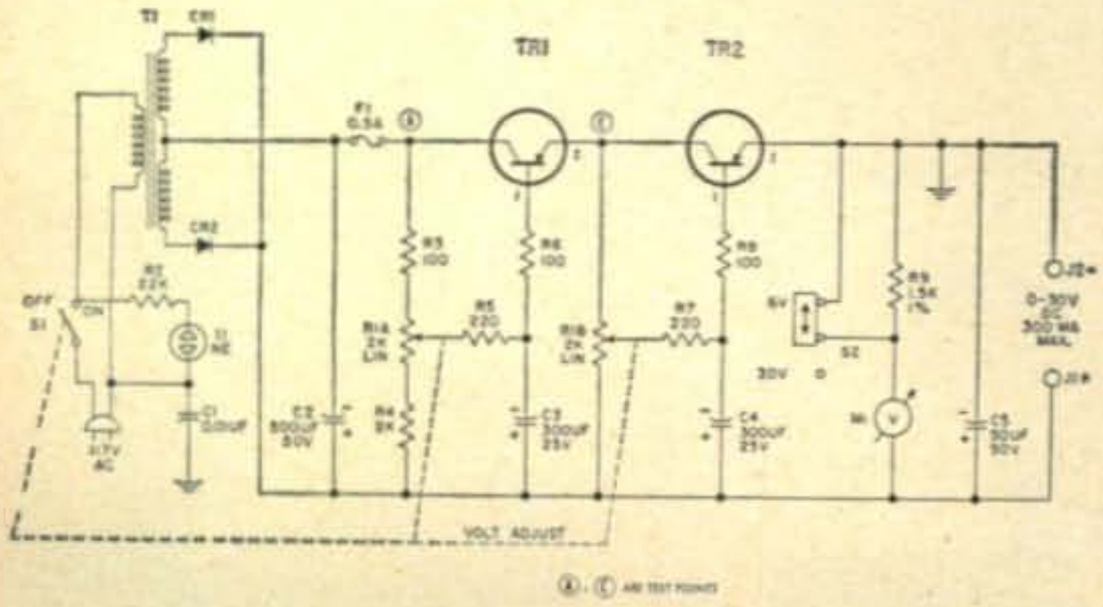
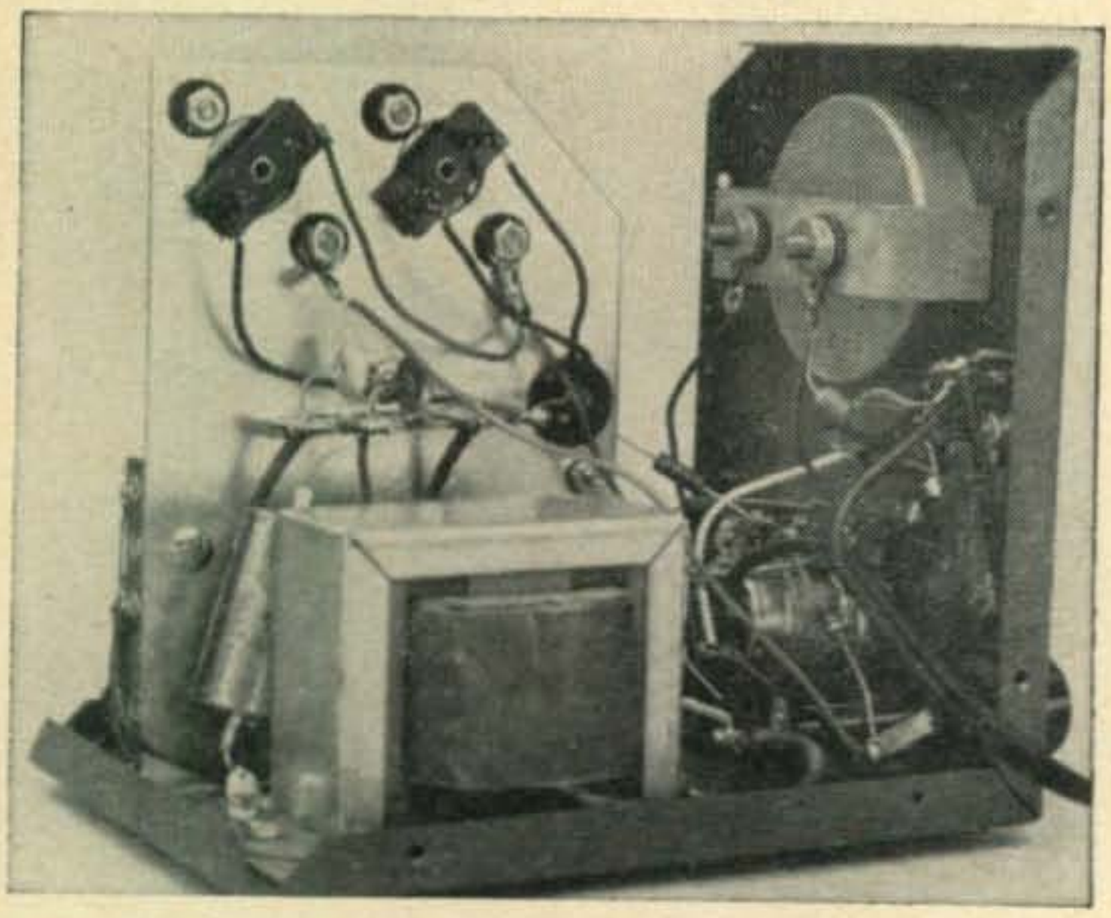


Fig. 1—Schematic diagram of the Eico Model 1020 transistor power supply.



The Eico Model 1020 transistor power supply is ideal for testing and experimenting with transistor circuits.

The schematic diagram is shown in fig. 1. The power supply section is essentially a full wave rectifier. Two transistors in series, connected in a grounded collector circuit, reduce the ripple to a negligible level. The collector to base voltage for each transistor is controlled by the dual potentiometer. This voltage will affect the emitter current, which will in turn determine the output voltage. The transistors are operated at the saturation region of the curve so that small voltage variations in the collector circuit will not result in current variations in the emitter circuit. These small variations may be ripple voltages at the transistor input, which are not transformed into ripple current at the transistor or power supply output. Any ripple that may get through is further reduced by the 50 mf capacitor across the output terminals of the Eico Model 1020. By the way, do not add more capacity here (or elsewhere) as optimum values have been selected. A meter monitors the output voltage. When the 1.5 K resistor, in series with the meter movement, is shorted out, the meter reads 6 volts full scale. When the resistor is in the circuit, the reading is 30 volts full scale. The fuse (½ ampere) located in the center tap of the transformer provides complete protection for the transistors in case of overload. Note that the lamp (a neon bulb) will remain *illuminated, even though the fuse* may have blown.

All-in-all, the Eico 1020 is a worthwhile investment for the experimenter. My Eico has paid for itself in time saved wiring batteries together. The feature of continuously variable output voltage makes it indispensible for transistor experimenters. The kit is priced at $19.95 or slightly more wired and tested.

JETEC Designations

Occasionally I mention the Jetec TO-9 outline and JETEC E3-51 base in the Semiconductor Column. Several readers have written to ask what this means. It is simply a standard size that has been adopted for transistor cases and bases and was necessitated by mechanical

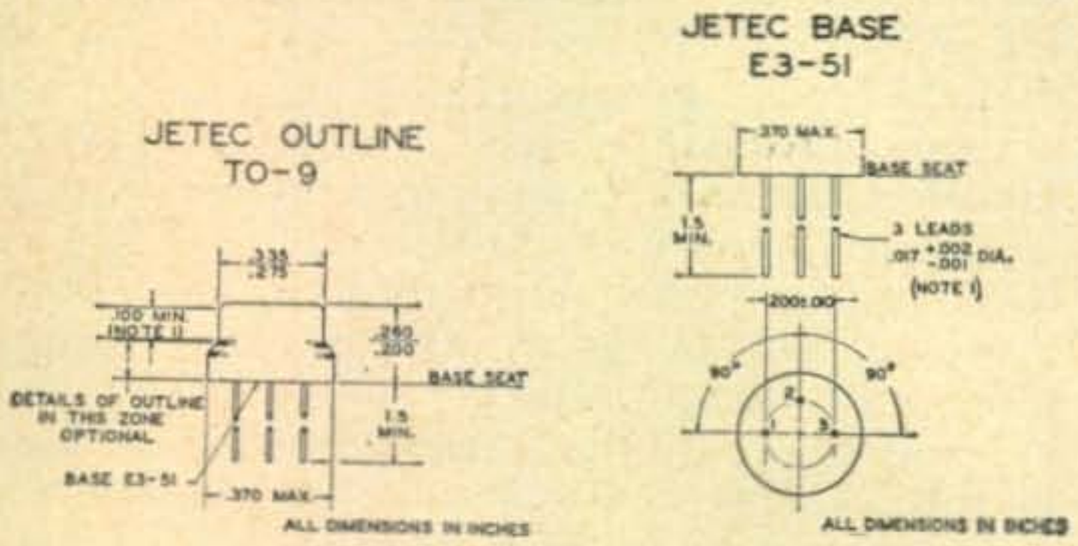


Fig. 2—Outline dimensions for the JETEC TO-9 and E3-51 transistor packages.

circuit board assembly techniques. The TO-9 and E3-51 outlines are shown in fig. 2.

Circuit of the Month

One of the slickest circuits shown in this column was sent in by Vincent San, USS Pioneer, Box 128, FPO, San Francisco, Calif. It is a variation of the old loop-modulator but uses modern techniques. The circuit is shown in fig. 3. A crystal oscillator (it could also be the final amplifier) running about 100 watts is coupled to the antenna system with a link. However, inserted in the bottom end of the link coil is a transistor impedance modulator. A carbon microphone drives the modulator transistor, changing the bias, thereby raising and lowering the internal resistance of the transistor. Thus, the variable resistance in series with the link causes the *rf* to be amplitude modulated. The *rf* choke, of course, blocks *rf* from the microphone circuit. Vincent says "Our technicians have been using it in the ham phone bands, each with his own pet version of the circuit." I think this would be a neat addition for cw only transmitters like the Heath DX-20, etc. It should make a nifty kit, too. If you doubt that it works, get an RCA 2N301 and connect it to your DX-20, Viking Navigator, etc. You'll be as amazed as I was!

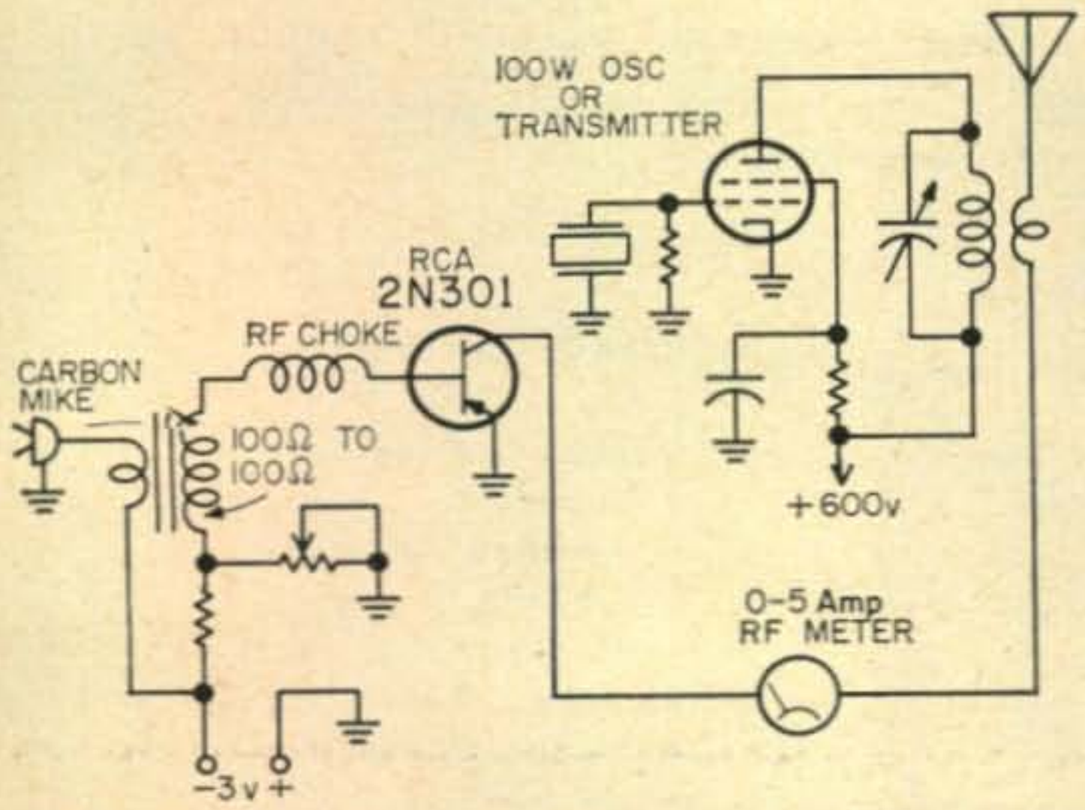


Fig. 3—The transistor impedance modulator circuit contributed by Vincent San, USN. The resistor bias divider should be set so that the antenna current is approximately 20% less when the transistor is connected in series with the link coil.

Semiconductor News

Bendix Semiconductor Products has announced a new military-type transistor, the 2N297A. It is intended for audio, motor or servo, switching, and oscillator applications. The device has a 60 volt collector rating and the current is 5 amperes. The 2N297A will readily dissipate 35 watts. Also available from Bendix is a transistor interchangability chart. Drop a line to Bendix Red Bank, Long Branch, N. J.

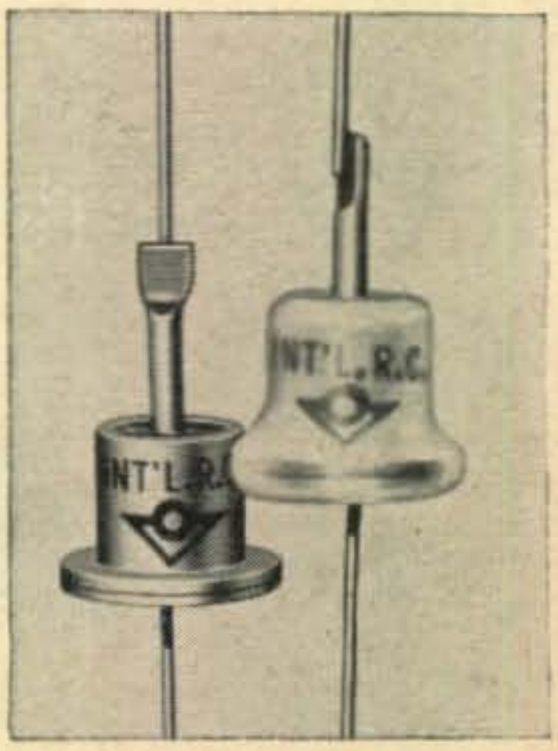
CBS Electronics, Lowell, Mass., has developed a new line of NPN high speed switching transistors. The line comprises 25 computer types suited for logic-circuit, core-driver, and other switching applications. Data sheets are available. Ask for Bulletin E-353.

The latest CBS "Tech-Tips" describes *How to Test Transistors* and is written by Bud Tomer. The bulletin is available from CBS distributors or by writing CBS Electronics, 100 Endicott St., Danvers, Mass.

If you have an application for the Silicon Controlled Rectifier, don't miss General Electric's latest data package on this product. It is comprised of Bulletins ECG-418, ECG-417, ECG-371A, and ECG-416.

Hughes Semiconductors, Newport Beach, Calif., has just announced a new high voltage silicon rectifier series. The devices have a tiny package and are *piv* rated from 50 to 1000

[Continued on page 108]



Teflon insulating jackets are available for International Rectifier "top-hat" diodes. The cost is about 10 cents each.

RTTY

Byron H. Kretzman, KØWMR
108 W. Teresa Drive
West St. Paul, Minn.

Minn. Dept. of Highways Photo

"10-4!" Kretzman of the Highway Patrol in action.

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RYRY   WØMDL  MINNEAPOLIS, MINN.  TNX FOR RTTY QSO 8/18/59       RYRY
RYRY       2143 CST.  73, CUL, ES GOOD LUCK,  VIC.                RYRY
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RTTY QSL for 2-meter AFSK QSO. Between Minneapolis and Milwaukee

Surplus, in particular war surplus, was a great boon to amateur activity in the decade following WWII. RTTYers made great use of the SCR-522 on 2 meters, taking advantage of its crystal controlled receiver to monitor an AFSK autostart channel, usually 147.96 *mc*, without worrying about drift. Of course, the 522 receiver was as broad as a barn door, and not too sensitive; and, being an AM receiver, ignition noise was often a problem.

Now we are on the threshold of a new boom in surplus, this time commercial FM two-way radio surplus. New FCC regulations will soon (August 1960) require that most stations reduce their deviation from ±15 *kc* to ±5 *kc* in order to make more channels available for mobile use. By November 1, 1963 all sets must meet the new FCC regulations in respect to reduced deviation, modulation limiting and filtering, and stability. This will make the majority of sets in use today obsolete. Already the older sets are being replaced by police and other agencies. Some of these are being snatched up by opportunists for resale to garages for accident chasing, illegal use without permission of the monitored station, we might add. There should be enough eventually, though, for all.

Equipment Characteristics

The "low-band" sets will usually hit the 6

Official Air Force Photo

KZ5KQ, Albrook AFB, Canal Zone
Operator: Augie Gironda
Transmitter: Johnson kilowatt, Viking Ranger
Receiver: 75A-4
Antennas: 40-meter single wire, 10, 15, and 20 beams.
Machine: Model 15
Converter: Commercial

meter band and the "high-band" sets the 2 meter band without modification, except for plugging in the correct crystal. The balance of the sets can be easily modified to hit the desired frequency. Their single-channel crystal control feature is ideal for monitoring RTTY autostart nets. (No receiver drift to worry about.) Their tremendous sensitivity, as compared to the SCR-522, greatly extends the range of communication; and, of course, the squelch circuits used keep the speaker silent in the absence of carrier, *and*, in the presence of noise only.

The "low-band" transmitters invariably end up in one or two 807's in the final. The transmitters are rated at approximately 25 and 50 watts *output*, enough power to cover most cities, and enough to drive a triode kilowatt amplifier if desired. Frequency multiplication might be 12, 16, 18, or 24 times. If you can't figure out what is going on, beg, borrow, or look at an instruction book at a two-way mobile radio service station. (Look in your 'phone book under "Mobile Radio Service.")

Two-meter RTTY/fone nets using this kind of surplus FM mobile equipment have been in use now for several years in Chicago and in Detroit. Use of bandpass input filters ahead of the TU's has permitted the channel to also be used with voice for rag chewing and mobile operation without starting up any machines. Antenna polarization has been vertical; most logical for this kind of operation. Autostart circuits can be found in the *RTTY Handbook* beginning on page 58. An improved clock-control circuit was described in your RTTY column on page 78 of the January '59 issue.

Questions and Answers

The mail bag always brings a host of questions, some of them obviously from hams who have just picked up a copy of *CQ* for the first time and discovered that it has an RTTY column. *CQ*, by the way, is the only radio magazine that has ever carried an RTTY column as a regular feature. Wayne, W2NSD, present ye Ed. hisself, edited the "Amateur Teletype" column in *CQ* during 1952 and 1953. This column has appeared since 1955. So the questions begin:

1—**Where can I find basic information about RTTY?** Well, besides subscribing to CQ, we suggest the info-hungry ham get a copy of the *RTTY Handbook*, written by W2NSD and W2JTP, from W2JTP/Ø, 108 W. Teresa Drive, West St. Paul 18, Minn. (Make out check or money order for $3 payable to "RTTY Handbook.") Secondly, we suggest you get the RTTY Bulletin of the RTTY Society of So. Calif., Inc. This is only $2.75 a year via W6AEE, 372 West Warren Way, Arcadia, California.

2—**Where can I get a machine?** The answer is first a loud, **"Cavaet Emptor!"** Both Wayne and I have repeatedly warned, via the pages of *CQ*, of that one-man "national" society with "headquarters" in the New York area. (Wayne, himself, got nicked for both TTY and mobile FM gear such as just described.) Beware of "package deals" and "windfalls." To be sure, make certain that you obtain equipment made by the *Teletype Corporation* (only manufacturer of Models 14, 15, 26, and 28) and through a legitimate source via W2ZKV, W3CRO, W4EHU, W6AEE, W7HRC, W9GRW, WØATM, and/or WØNOY. Required reading is, "RTTY the easy way, or a word to the wise on . . . ," page 38, November 1957 *CQ*.

3—**What is the best RTTY converter or TU?** For amateur RTTY, all things considered, the W2JAV unit described on page 42 of the April 1958 issue of *CQ* is the best—when used as recommended.

4—**Where can I get those 88-mhy toroids?** These can be obtained for $1 each, postpaid, from W6CQK, 710 Madison Avenue, Redwood City, California.

5—**What frequencies are used for RTTY?** Look *around* these frequencies: 3620 *kc*, 7140 *kc*, 14,340 *kc*, 21,090 *kc*, 52.6 *mc*, 147.96 *mc*, 146.7 *mc* in Chicago, 147.3 *mc* in Detroit, and 147.85 *mc* in California.

6—**What frequencies can be copied for press?** Most commercial stations use multiplex, *not* single channel FSK with 850-cycle shift. Look for military and/or weather stations using standard FSK around 3100 *kc*, 6-7 *mc*, and just above the 20 meter band.

7—**How can RTTY weather reports be copied?** Look up the RTTY columns in the October 1956 and in the February 1957 issues.

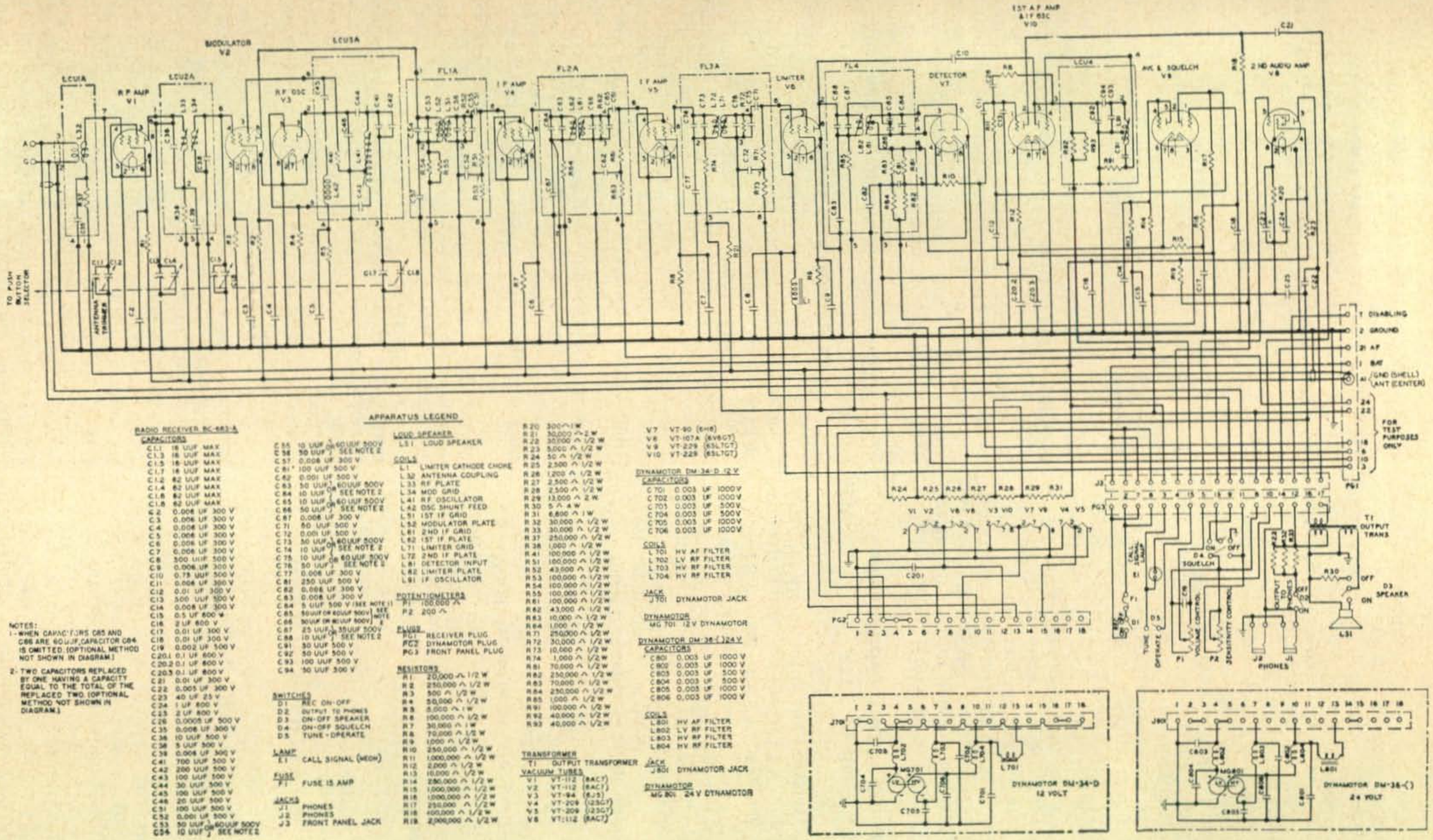
RTTY At the Central-Midwest ARRL Convention

Baity Bartel KØDFR, ex-W5IJC, reports on the RTTY Forum held on Saturday afternoon August 22nd at the combined Central-Midwest ARRL Convention held in St. Louis.

Larry Amelung W9NOY and Mel Hart WØIBZ ramrodded the program which consisted of a demonstration by two telephone company TTY repairmen using a Model 15 machine, a 164C1 Transmission Measuring Set, and a 1A sender. Spacing and marking bias were demonstrated as was the use of a wave shaper for land-line extensions. Converter types and the theory of telegraph signals was discussed, aided by large visual-aid drawings prepared by KØDFR. Ray Morrison, W9GRW, provided everyone with a free ribbon for their machine. Forty-five RTTYers registered, and about 9 or 10 attended the Sunday morning breakfast.

Baity points out that Larry, W9NOY, is the "Ray Morrison" of the St. Louis area as he gets most of the junked equipment and reconditions it for the local gang. Always ready for a bit of

[Continued on page 94]



APPARATUS LEGEND

LOUD SPEAKER
LS1 LOUD SPEAKER

COILS
L1 LIMITER CATHODE CHOKE
L32 ANTENNA COUPLING
L33 R.F. PLATE
L34 MOD GRID
L41 R.F. OSCILLATOR
L42 OSC SHUNT FEED
L51 1ST I.F. GRID
L52 MODULATOR PLATE
L61 2ND I.F. GRID
L62 1ST I.F. PLATE
L71 LIMITER GRID
L72 2ND I.F. PLATE
L81 DETECTOR INPUT
L82 LIMITER PLATE
L91 I.F. OSCILLATOR

POTENTIOMETERS
P1 100,000 Ω
P2 200 Ω

PLUGS
PG1 RECEIVER PLUG
PG2 DYNAMOTOR PLUG
PG3 FRONT PANEL PLUG

RESISTORS
R1 20,000 Ω 1/2 W
R2 250,000 Ω 1/2 W
R3 500 Ω 1/2 W
R4 50,000 Ω 1/2 W
R5 5,000 Ω 1 W
R6 100,000 Ω 1/2 W
R7 30,000 Ω 1 W
R8 70,000 Ω 1/2 W
R9 1,000 Ω 1/2 W
R10 250,000 Ω 1/2 W
R11 1,000,000 Ω 1/2 W
R12 2,000 Ω 1/2 W
R13 10,000 Ω 1/2 W
R14 250,000 Ω 1/2 W
R15 1,000,000 Ω 1/2 W
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R19 2,000,000 Ω 1/2 W
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R21 30,000 Ω 2 W
R22 30,000 Ω 1/2 W
R23 5,000 Ω 1/2 W
R24 50 Ω 1/2 W
R25 2,500 Ω 1/2 W
R26 1,200 Ω 1/2 W
R27 2,500 Ω 1/2 W
R28 2,500 Ω 1/2 W
R29 13,000 Ω 2 W
R30 5 Ω 4 W
R31 6,800 Ω 1 W
R32 30,000 Ω 1/2 W
R33 30,000 Ω 1/2 W
R37 250,000 Ω 1/2 W
R38 1,000 Ω 1/2 W
R41 100,000 Ω 1/2 W
R51 100,000 Ω 1/2 W
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R61 100,000 Ω 1/2 W
R62 43,000 Ω 1/2 W
R63 10,000 Ω 1/2 W
R64 1,000 Ω 1/2 W
R71 250,000 Ω 1/2 W
R72 30,000 Ω 1/2 W
R73 10,000 Ω 1/2 W
R74 1,000 Ω 1/2 W
R81 70,000 Ω 1/2 W
R82 250,000 Ω 1/2 W
R83 70,000 Ω 1/2 W
R84 250,000 Ω 1/2 W
R85 1,000 Ω 1/2 W
R91 100,000 Ω 1/2 W
R92 40,000 Ω 1/2 W
R93 40,000 Ω 1/2 W

TRANSFORMER
T1 OUTPUT TRANSFORMER

VACUUM TUBES
V1 VT-112 (6AC7)
V2 VT-112 (6AC7)
V3 VT-94 (6J5)
V4 VT-209 (12SG7)
V5 VT-209 (12SG7)
V6 VT-112 (6AC7)
V7 VT-90 (6H6)
V8 VT-107A (6V6GT)
V9 VT-229 (6SL7GT)
V10 VT-229 (6SL7GT)

DYNAMOTOR DM-34-D 12 V
CAPACITORS
C 701 0.003 UF 1000 V
C 702 0.003 UF 1000 V
C 703 0.003 UF 500 V
C 704 0.003 UF 500 V
C 705 0.003 UF 1000 V
C 706 0.003 UF 1000 V

COILS
L 701 HV AF FILTER
L 702 LV RF FILTER
L 703 HV RF FILTER
L 704 HV RF FILTER

JACK
J 701 DYNAMOTOR JACK

DYNAMOTOR
MG 701 12 V DYNAMOTOR

DYNAMOTOR DM-38-( )24 V
CAPACITORS
C 801 0.003 UF 1000 V
C 802 0.003 UF 1000 V
C 803 0.003 UF 500 V
C 804 0.003 UF 500 V
C 805 0.003 UF 1000 V
C 806 0.003 UF 1000 V

COILS
L 801 HV AF FILTER
L 802 LV RF FILTER
L 803 HV RF FILTER
L 804 HV RF FILTER

JACK
J 801 DYNAMOTOR JACK

DYNAMOTOR
MG 801 24 V DYNAMOTOR

RADIO RECEIVER BC-683-A

CAPACITORS
C 1.1 18 UUF MAX
C 1.3 18 UUF MAX
C 1.5 18 UUF MAX
C 1.7 18 UUF MAX
C 1.2 82 UUF MAX
C 1.4 82 UUF MAX
C 1.6 82 UUF MAX
C 1.8 82 UUF MAX
C 2 0.006 UF 300 V
C 3 0.006 UF 300 V
C 4 0.006 UF 300 V
C 5 0.006 UF 300 V
C 6 0.006 UF 300 V
C 7 0.006 UF 300 V
C 8 500 UUF 500 V
C 9 0.006 UF 300 V
C 10 0.75 UUF 500 V
C 11 0.006 UF 300 V
C 12 0.01 UF 300 V
C 13 500 UUF 500 V
C 14 0.008 UF 300 V
C 15 0.5 UF 600 V
C 16 2 UF 600 V
C 17 0.01 UF 300 V
C 18 0.01 UF 300 V
C 19 0.002 UF 500 V
C 20.1 0.1 UF 600 V
C 20.2 0.1 UF 600 V
C 20.3 0.1 UF 600 V
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C 24 1 UF 600 V
C 25 2 UF 600 V
C 26 0.0005 UF 500 V
C 35 0.008 UF 300 V
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C 39 0.008 UF 300 V
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C 42 200 UUF 500 V
C 43 100 UUF 500 V
C 44 30 UUF 500 V
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C 48 20 UUF 500 V
C 51 100 UUF 500 V
C 52 0.001 UF 500 V
C 53 50 UUF, 60UUF 500V
C 54 10 UUF, SEE NOTE 2
C 55 10 UUF, 60UUF 500V
C 56 50 UUF, SEE NOTE 2
C 57 0.008 UF 300 V
C 61 100 UUF 500 V
C 62 0.001 UF 500 V
C 63 50 UUF, 60UUF 500V
C 64 10 UUF, SEE NOTE 2
C 65 10 UUF, 60 UUF 500V
C 66 50 UUF, SEE NOTE 2
C 67 0.008 UF 300 V
C 71 60 UUF 500 V
C 72 0.001 UF 500 V
C 73 50 UUF, 60UUF 500V
C 74 10 UUF, SEE NOTE 2
C 75 10 UUF, 60 UUF 500V
C 76 50 UUF, SEE NOTE 2
C 77 0.008 UF 300 V
C 81 250 UUF 500 V
C 82 0.008 UF 300 V
C 83 0.008 UF 300 V
C 84 5 UUF 500 V (SEE NOTE 1)
C 85 50UUF OR 60UUF 500V, SEE NOTE 1
C 86 50UUF OR 60UUF 500V, SEE NOTE 1
C 87 25 UUF, 35UUF 500V
C 88 10 UUF, SEE NOTE 2
C 91 50 UUF 500 V
C 92 50 UUF 500 V
C 93 100 UUF 500 V
C 94 50 UUF 500 V

SWITCHES
D1 REC ON-OFF
D2 OUTPUT TO PHONES
D3 ON-OFF SPEAKER
D4 ON-OFF SQUELCH
D5 TUNE-OPERATE

LAMP
E1 CALL SIGNAL (MEON)

FUSE
F1 FUSE 15 AMP

JACKS
J1 PHONES
J2 PHONES
J3 FRONT PANEL JACK

NOTES:
1- WHEN CAPACITORS C85 AND C86 ARE 60 UUF, CAPACITOR C84 IS OMITTED. (OPTIONAL METHOD NOT SHOWN IN DIAGRAM.)

2- TWO CAPACITORS REPLACED BY ONE HAVING A CAPACITY EQUAL TO THE TOTAL OF THE REPLACED TWO. (OPTIONAL METHOD NOT SHOWN IN DIAGRAM.)

Fig. 1—Schematic of the BC-683 receiver. The BC-603 was published Sept., '58, page 75. (In CQ of course.)

SURPLUS

by **KENNETH B. GRAYSON, W2HDM**
Care of CQ 300 West 43rd Street, N. Y. C. 36, N. Y.

Many requests have been received from people, other than hams, for a conversion of the BC-603 (and BC-683) to a monitor receiver for the 30 to 50 *mc* band. While this is primarily used by fire and police services, many other services find assignments in this band. Among these other assignments are the forestry, taxi and trucking services. The main concern of most of the mail was for a cheap conversion for use by volunteer firemen in mobile installations and at home. Before beginning with the conversion which should satisfy even the most frugal of folk, a very important word to the wise is necessary. This is aimed at the person who, although most competent in his knowledge and ability, still feels that laws were made to be broken. In this service band, as with any band of frequencies, other than amateur, a commercial operator's license is necessary to maintain any transmitting equipment. This means that when the local firehouse has a transmitter failure due to a bad tube or a stuck relay, you cannot make the repair, unless you are licensed. Getting a license is simple enough if you know your stuff; doesn't cost anything but the time to take the exam, and will certainly up your local prestige if you can show that you have such a license. As a study guide there are several good books listed in the Radio Bookshop ad in this magazine.

OK, so we want to convert the receiver. No license ss necessary for receivers so we can go ahead. Our first problem is to decide which receiver to buy. Actually they are very similar, except for frequency. If the frequency that you need to monitor is below 38.9 *mc* then get the BC-683 as it goes this high without any conversion. If the frequency is higher than 38.9 *mc* you can get either receiver and proceed with the conversion. Let's look at the 603 since that is the one we converted. Our final frequency range turned out to be about 36 to 50 *mc*. We could have stretched it a little bit it seemed, but we thought that a little overlap for safety would be necessary. It also seemed that to sweat out a big conversion and try to hit the 30 to 50 *mc* range might work well on one receiver, but not on another. Besides, this gives some overlap so that the 683 together with the 603 (converted) will cover the range of 30 to 50 *mc*.

Now, having decided which receiver to get and what our frequency range should be, let's get on with the conversion proper. This usually starts by going to the local surplus shop or by going to the advertisers in CQ and placing an order. If possible, you can simplify your work a little by looking for one particular detail. Many of the receivers have a simple can, much like the other shield cans, over the oscillator. This is labeled LCU-3. However there is one model that seems to have a bottle-cap type of can which is actually sealed with a solder-on type base. This latter type will require a little effort in order to get the base off so we can alter the coil, so try and get one that has a shield can like the others. Incidentally, if you are planning to use the receiver mobile and you have a twelve volt system, get a DM-34 type dynamotor as this plugs into the receiver and supplies all high voltages. If you don't plan to use the receiver mobile, it doesn't matter whether

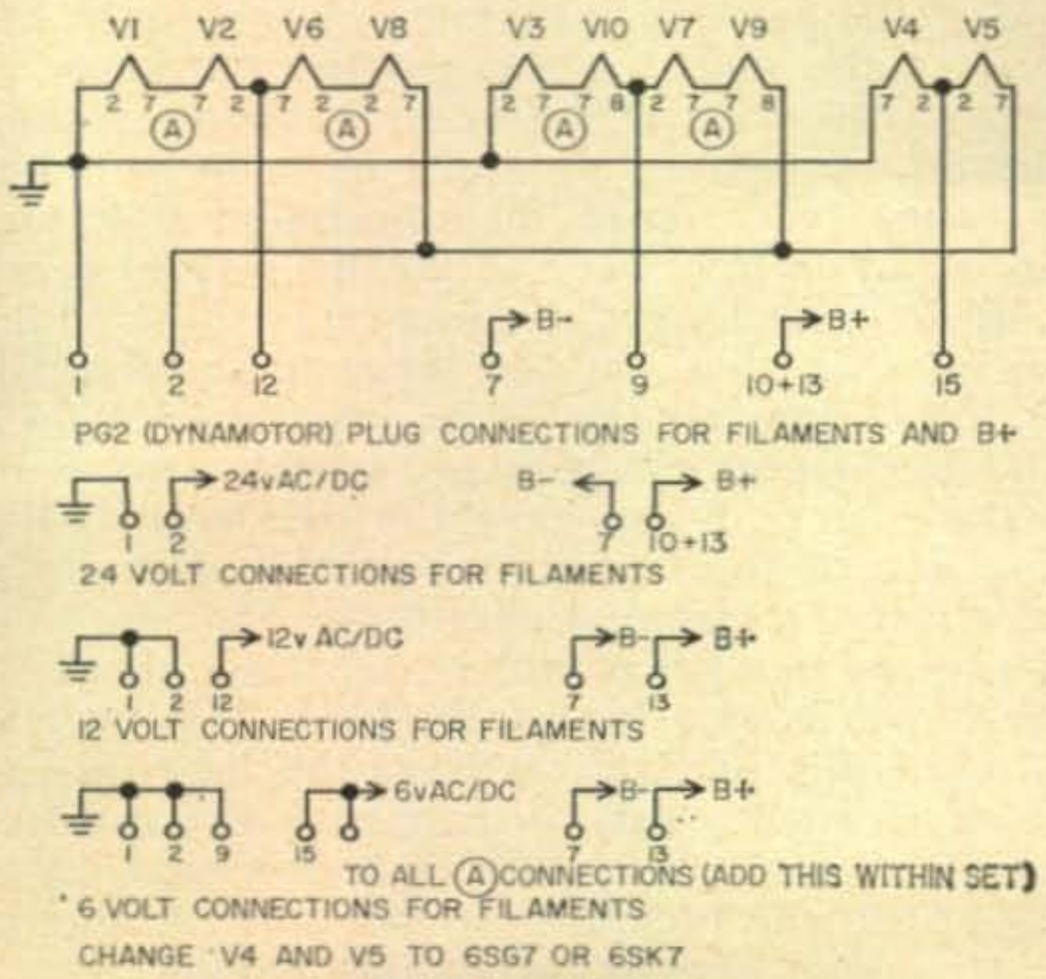


Fig. 2—Filament connections.

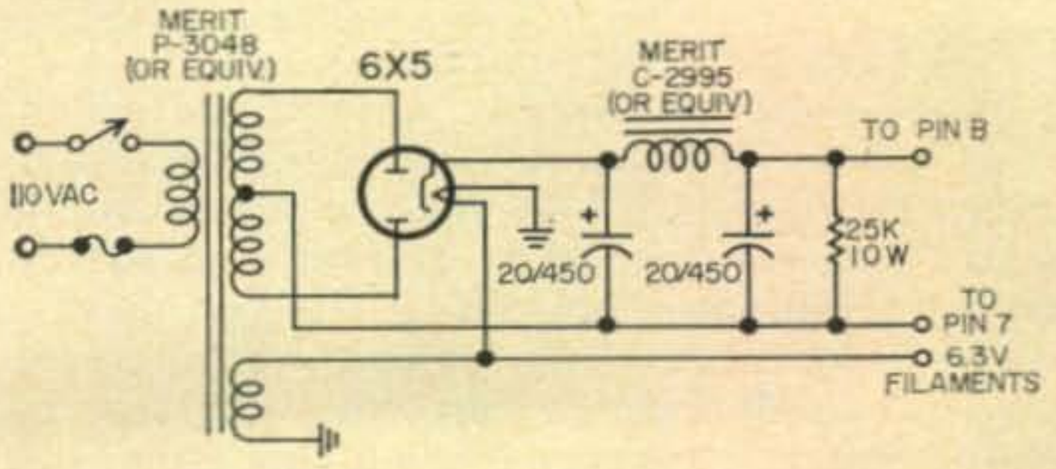


Fig. 3—Suitable ac power supply.

you get a dynamotor or not.

Once you get the receiver take off the cover by turning the head of that "bolt" at the back one-half turn. Slide the cover off and lay the set on its side with the wiring side down. There should be a circuit diagram on the bottom of the cabinet just in case you need one. Locate the *rf* and oscillator coils. They are LCU-1, 2 and 3. These are the only coils that will need any work. DON'T TOUCH ANY OTHER COILS. These receivers are usually aligned perfectly and will not need any adjustments to the *if* circuits. You will find an LCU-4 coil. This is part of the *bfo* and should not be touched either.

It is necessary to remove the shields from the three coils and this is accomplished by removing the nuts holding the shield. There are two per shield and they are located at the bottom of the chassis. In the case of the oscillator coil within a can, it will be necessary to remove the entire coil assembly and to use a heavy soldering iron to open the can. Mark each lead and part going to the pins of the coil base and then unsolder. A simple sketch may help in this. Remove all but three turns on the oscillator coil, and unsolder the 20 mmf ceramic capacitor across the oscillator coil. Short out the two capacitors, C-41 and 42. These are used at the lower frequency to make the oscillator track and aren't necessary here. Replace the oscillator coil, and its shield. Reconnect all of the wires that were unsoldered.

Now go to LCU-1, the *rf* input coil. Remove four turns from the top end of the coil. This is the end away from the chassis. Resolder the coil end to the lug and replace its shield. Now go to the *rf coil* marked LCU-2. This is the *rf* interstage coil and is actually made up of two separate coils close to each other. These should each have two turns removed. Make sure that when you remove these turns they are on the ends of the coil away from the center. By this we mean that the upper coil should have its turns removed at the top end of the coil and the lower coil should have its two turns removed at the bottom end of the coil. This leaves the spacing between coils the same as before. Remove the small capacitor across each coil, but leave the mica by-pass capacitor that is mounted within the coil assembly. Replace the shield and you are ready to start aligning.

Power Supplies

Applying power is simple if you have a dynamotor mounted. Merely connect the ground of a battery eliminator to ground of the receiver through pin 2 of the connector on the back. Connect the other end of the 12 volt battery eliminator to pin 1. If you have a twenty four volt dynamotor you will, of course, have to supply twenty four volts. (A rear coaxial input is also available on this connector, should you decide to feed your antenna from this point.) Turn power on by means of the switch on the front panel.

For 110 volt operation it will be necessary to construct a power supply, and make connections through the dynamotor power plug on the top surface of the dynamotor section. A typical power supply and proper pin connections are shown in fig. 3. Using an *ac* power supply will not allow the power to be controlled by the front panel power switch unless this switch is rewired and the wires originally going to it insulated to prevent improper connections or sneak circuits.

Osc. Alignment

We now have our power connected and are ready to tune up. Begin by checking the grid bias voltage on the oscillator. This should be measured with a *vtvm* and should be about 12 to 15 volts minimum (negative with respect to ground). You can measure this from pin 5 of the 6J5 to ground.

Now connect a signal generator from pin 4 of the 6AC7 mixer to ground. A signal generator going to at least 50 *mc* is preferred, but one of lower frequency range can be used if you use the second harmonic. Set the generator to 50 *mc* (25 *mc* if you use the second harmonic) and turn the tuning dial till it reads 28. You should have the Tune-Operate switch in the Tune position. The sensitivity control should be at maximum, and the squelch control should be off. Adjust the trimmer capacitor for the oscillator and the slug of the coil, until you can hear the beat note in the loud speaker. In case you haven't found the trimmers they are under the access strip on the wiring side of the chassis, on the capacitor structure between the small and large bathtub condensers. The exposed one is the *rf* trimmer and at the other end is the oscillator trimmer. Once you have managed to get the oscillator beat (and you don't need a modulated signal either) turn the dial to 20 and the signal generator to 36 *mc* (18 *mc* if the second harmonic). Using only the slug in the coil, try and get the output beat. When you have it, again go back to 28 and the 50 *mc* signal and adjust *only* the trimmer this time. Now, repeat the adjustment at 20 and 36 *mc*. You may have to do this several times until it is no longer necessary to adjust either trimmer or slug. Set the receiver at 28 again and this time set the signal generator to 44.7 and see if you can pick up a beat. This is to make sure that you have the oscillator at the low side of the signal. If you can't pick up a beat, set the signal generator to 55.3 *mc* and see if you can get a beat *there*. If so, check to see if you have a beat at 41.3 *mc*. It is preferable, in this receiver, to have the beat on the lower frequency side of the signal. If you don't have it there you run the risk of signal interference at the high end of the band. A simple re-alignment, starting as we did, would correct this. Using a grid dipper or other signal meas-

uring device such as a frequency meter would certainly help.

RF Alignment

Having set our oscillator to cover a band of 33.35 to 47.35 *mc* it is now necessary to adjust our *rf* coils to cover 36 to 50 *mc*. A grid dipper would certainly be helpful in getting the coils pre-aligned with the shields off, but the coils will fall pretty much into line the way they are set. Begin, after the oscillator is adjusted, by reconnecting the signal generator to 50 *mc* and the dial of the receiver to 28. Adjust the trimmer to produce a maximum beat intensity, with the output of the receiver signal generator at a minimum. If this output shows no change, it will be necessary to go to the back connector and use an *ac vtvm* from ground to pin 3. The signal generator should be modulated. At pin 24 you will find a *dc* voltage also proportional to signal strength that can be used for tuning up. There are two coils in LCU-2 and both the coils and their trimmers must be adjusted.

After getting the receiver set at 50 *mc* reset the signal generator to 36 *mc* and the receiver dial to 20. Adjust the slugs of the LCU-2 coil for maximum signal output as mentioned before. Again go back to 50 *mc* and set the receiver at 28 on the dial. Readjust the trimmer. Again, set the signal generator to 36 *mc* and the receiver to 20 on the dial. At this point readjust the coil slugs. By now the receiver should be pretty well aligned, except for the input stages.

Disconnect the signal generator from the grid and reconnect it to the antenna and ground input connectors on the front panel. Adjust LCU-1 just as you did the LCU-2 coil and the set should be aligned.

All of the information given here was based on the BC-603 receiver. Because the BC-683 has a different range of frequency, the coils will naturally be different. They will probably differ only in the number of turns. At this time no data is available as to the number of turns to remove from the various coils for same frequency coverage. Essentially the technique is to remove the shield of one coil at a time, and using a grid dipper set to 50 *mc*, remove one turn from the coil at a time with the main tuning capacitor at the high end of the band. Each time you remove a turn check with the dipper as to what frequency the coil resonates at until you approach the 50 *mc* point. If the coil is close and it is obvious that the next turn will put you over 50 *mc*, try adjusting the slugs to get to 50 *mc*. After you reach this point, turn the tuning dial to the low end of the band and adjust the coil to hit 36 *mc*. Then go back and use the trimmer to get 50 *mc*. This should produce the desired results. Remember that the oscillator is 2.65 *mc* below the received signal and that this must be true *over the entire band*. Repeat this procedure for each coil.

Dial Calibration

Once aligned, calibrating the dial is very simple. Set the signal generator to 36 *mc*, or if possible, use a 1 *mc* crystal oscillator as a check point at each one megacycle step. Note where the 36 *mc* point occurs on the logging scale and proceed to the 37 *mc* point again making note of the log setting. Keep this up for the entire band and then remove the dial strip by removing the screws that hold it on the dial drum. Paste a new strip over the frequency part of the strip and mark the correct frequencies next to the logging scales from the calibration data you just took. Replace the dial and again check to see if you have the dial calibrated properly.

To align the push buttons turn the dial to the LOCK position and with a long screwdriver, loosen the screw which will be accessible through the hole at the top of the push button panel. Now tune in a station to which you want the first push-button set to. Press the push button all the way in. Now press another button part way . . . to release the first button. Tune in a second station for the second button and press this button. Again release the button. Keep this up until all of the buttons are set as you want them. When finished, again turn the dial to the LOCK position and tighten the screw. That is it.

Squelch

The squelch setting depends upon the sensitivity control setting and the operation of the squelch siwtch. The *bfo* is operated by the Tune-Operate switch.

Sources

Prices for this equipment will vary as to condition and locality. We managed to get our 603 at Rex Electronics, 88 Cortlandt Street, NYC. The price was about fourteen dollars, but can vary depending upon availability and model. PAM Electronics at 2129-A East Holt Avenue, Milwaukee 7, Wisc. has some of the FT-384s left at $3.95 postpaid for making full alignments of the 603 and 683. He can occasionally supply 603s as well. Might try Meshna Enterprises, 580 N. Lynn, Malden 48, Mass. and Crown Supply Co., P.O. Box 1283, Cedar Rapids, Iowa for the 384s as well.

Special Notes On Surplus In Class D Citizens Band

A new FCC ruling makes it imperative that manufacturers of Class D equipment make the oscillator a pre-wired device to prevent spurious radiation. This also reflects itself on the surplus

Be Appreciated!

YOU probably have several very near and dear friends who are also Hams . . .

for whom expensive and elaborate Christmas gifts this year are out of the question.

IF SO, you're not alone! Thousands of Christmas shoppers face the problem of what to get these friends . . . while holding expenses within their budgets.

A SUBSCRIPTION to CQ will be appreciated by anyone who receives it and each month will be a reminder of your thoughtfulness.

SAVE MONEY on your subscription as well as your gifts.

CHECK our Subscription envelope and rates on the opposite page.

equipment. Your transmitter MUST be adjusted by a licensed radio operator. This is a commercial band and an amateur license is not good enough. Don't risk a revocation (at the minimum) of your license by operating with faulty equipment. Get it checked *properly*.

The BC-659 conversion may not require the use of the BA-41 battery, but in case you do need a fresh BA-41, Eveready makes it under the number X-398. The Burgess number is K-60-P1. We got this choice tidbit from W7OQY. Incidentally, the correct choke in the BC-659 conversion is the Z-28 Ohmite, NOT the Z-30, and we may add that some crystals seem to work better in the circuit we used if they are connected from plate to grid and not grid to ground as we had it.

Mail

This month's mail is actually an accumulation of two months. As you probably know, anyone desiring information or a handbook on some piece of surplus equipment merely has to drop a postcard to this column at CQ's office and we will enter a request on your behalf at no charge. It takes about three months from the time we receive the request to get it into the column, and if you write, please use your call as this greatly simplifies things.

K4BVQ is looking for the ARC-1 manual as is KØBWH, W8MO, W5FPB, and yours truly. K8JTT needs a conversion of the APN-4 indicator ID 6/B. WA6AHF needs a manual on the R44/ARR5 and will gladly pass on a TS-34 manual to one who may need it. K1AED needs a manual for the RDP panoramic receiver adapter and will give, on loan, a few of his manuals on the GRC-3, VRC-13 and UIC-1. He also has a manual on the URA-8, FMQ-1 and GRC-27 plus some others like the SCR 609,610 and the BC-312-314-344 series. Bob Rea of the F. Hood Craddock Memorial Clinic, 308-14 W. Hickory St., Sylacauga, Alabama needs manuals on the AM-19/APA-14, BC-659K, PE-120, SN-7A/APQ-13 and the ARR-2. Arnold Davidson, North Kenova, Ohio needs a conversion manual for the ATD Navy transmitter.

George Vance, P.O. Box 1742, San Diego 12, California needs manuals for DBM-1, RDP, RDJ and TS-182-UP. K2DFP needs manuals for the MAR equipment which includes the RDR receiver as well as power supplies. WA6BPE writes asking for information on the RT-34/APS-13 equipment. Charles C. Logan, Box 505, Sudan Texas needs a maintenance manual for the BC-653-A. A-2/c George Harrop, KN9QEY of the 791st AC&W SQD. Hanna City, Illinois wants a manual or conversion information for the RCA AVT-15A. K6RXU needs a manual for the RDJ and APR-1. K50GP wants a book on the ASB-7 indicator so he can convert this to a scope. A/1c Norman Talley, Jr., W4ARH/6 needs a manual on the R-45/ARR-7 and the R-332/ARR-1 and can help a few hams with some schematics of surplus if they contact him. Johnny Cooper K5DMD still is looking for the BC-797-B manual and diagram. John Vomacka, 2059 Hyde Park Street, Sarasota, Florida is looking for a manual on the Navy RBF-3. K4GXV is looking for a BC-797-B transmitter manual, while WW7ZJB wants an APN-4 indicator manual or conversion. V. L. Walker of 836 Moss Hill Drive, Ashland, Ohio is in need of the ID-93/APG-13A. E. N. Field of 1303 Carter Road, Decatur, Georgia is in need of any conversion manuals on the BC-348. W8PTG wants ART-13 info so he can convert his. K8HUK has a Coast Guard TRC-127 and wants a diagram or a manual for it. SM5BND wants a TCS manual and an RT-7/APN-1 manual and conversions. His address is Karl-Einar Lundberg, Dobelnsg 28A, Upsala, Sweden. Alsco from Sweden is SM5PY, N. O. Theve, Lidgaten 18, Solna, Sweden who asks for conversion data to modify the ART-13 to 15 and 10 meters. From France comes a letter from B. Cical, 8 Rue A. Fournier, Chaville (Seto) France who asks for BC-470D radio direction finder equipment manuals.

K2JEZ needs a handbook for the ATJ and BC-1335 equipments. W3YDF needs a handbook on the BC-684A. Bill O'Brien needs info on the RBM as well as the BC-611 handy-talkie, especially a conversion to citizens band. From Texas, O. Guiberteau of 6418 Flamingo, Houston 17, needs the BC-603 and AKB-5 books. W8MIB wants information on the T-9/APQ-2. W4HHK needs information on the availability and radio control uses of the ARW-2. K4KWE wants information on the T-23/ARC-5 and the R-28/ARC-5.

Another ham needing 15 and 10 meter data for the ART-13 is K6CBQ. Richard Dege of 16167 Regina, Allen Park, Michigan wants information on the BC-348. W8COW wants information about the rectifiers used in the PE-125-AX power supplies. He would also appreciate getting a manual on this set. Another conversion of the APN-4 indicator is needed by W. R. White, c/o The Bay Petroleum Corp., P.O. Box 957, Denver 1, Colorado. A. M. Nohe, 246 W. 6th Ave., Huntington, W. Va wants a conversion of the RDZ receiver. We hope to get this on the air shortly ourselves and run it in CQ sometime early in 1960. Another ARC-1 book is needed by the Bellevue Amateur Radio Club out in Nebraska. Drop it care of Clyde V. Taylor, 3 Bairchild Circle, Offutt Air Force Base, Omaha 13, Nebraska.

We have a few offers from amateurs to loan or swap handbooks. Major E. G. Berger, F7FF/W7YIF, PANDPD, SHAPE, APO 55, NYC, NY has the TM-11-5500/AFM 101-10, the TS-297/U multimeter, the BC-787 receiver and would like to get a TS-239 manual for his scope.

73, Ken, W2HDM

sideband sideband sideband

SIDEBAND

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

Worked 100 Countries

Two-Way SSB
(In order of award)

W6UOU	W2VZV	W6QFE	K2HEA	HB9IE
W2JXH	W6IAL	W8MG	W7VEU	W6ZBN
F7AF	K2JFV	PY4TK	W4CDY	W5KFT
K6GMA	W1ADM	K9EAB	W6TOT	KØKWY/4
W3SW	TI2RC	W7IAA	W9HP	YV5FK
W4IYC	W2CFT	VQ4ERR	W5DA	TI2EV
TI2HP	KØABH	W8MPW	W7GIE	W8DMD
WLQNF	ZL3IA	W3MAC	W1LHZ	K2FW
W6ITH	W6BAF	W1GR	W2MA	W1WDD
VE3MR	W2TP	W8JXM	W6BAY	K6LGF
W8GCN	W6RKP	W1EQ	W5RHW	W3VSU
W8EAP	PY2JU	W5FDZ	W4HXF	W1OOS
W8YBZ	W6UPP	W8JXY	K2EWB	YV5ABD
WØQVZ	W6PXH	W2OTZ	K2HUK	4X4DK
WØFUH	WØCVU	W5BGP	VE3ES	
ZL3PJ	W4INL	W6WNE	MP4BBW	
K2MGE	TG9AD	W4HIM	W1DCE	
W2OQO	W3NKM	HB9TL	KZ5WZ	

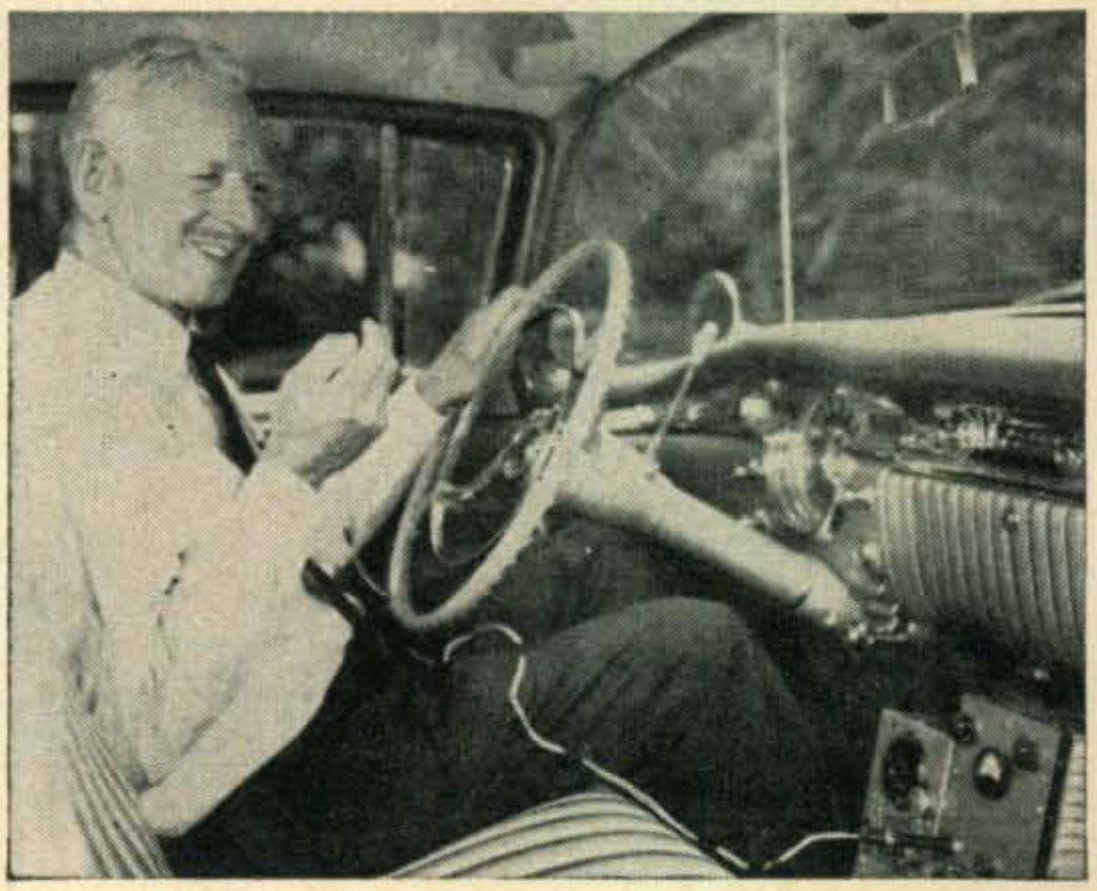
A warm welcome to the "Worked 100 Club" is extended this month to W1WDD, K6LGF, W3VSU, W1OOS, YV5ABD and 4X4DK. Well done fellows! Ami, 4X4DK who made number 90, claims to have worked 160 countries with only 102 confirmations. I thought this could only happen to a W/K station.

This column rounds out three full years of reporting sideband news, and, as we reach the end of 1959, I cannot but be amazed in the rapid growth of this mode of communication. This year has witnessed numerous happenings and events which testify to sideband's rapidly increasing popularity. Look above to the ninety stations who have worked over 100 countries. Many of them have passed the 150 mark and quite a few have worked 175 countries. Listen in some evening and log the calls of fellows who only several years ago were cussing SSB and swore by "all that was holy" they would never be heard using it themselves. The earlier description of "donald ducks" hasn't been used on the airways for several years. Why? Because everyone now knows how to properly tune their receivers so as to receive single side-band as clearly as they can AM, and without the hetrodynes and squeals so prevalent in the frequencies inhabited by users of "ancient modulation", (as I like to call AM). Proof that sideband is here to stay is evident in the fact that the largest manufacturers of amateur equipment, namely Collins and Hallicrafters discontinued last year producing anything but SSB and CW transmitters and receivers.

By far the largest percentage of recent dx/peditions utilized SSB or CW and in fact there are now several new countries with *only* SSB activity.

Ted Henry's tiny "Argonaut" which has been loaned to many stations previously using AM in many remote spots in the Far East and Africa has been responsible for providing more new SSB countries than any other single piece of gear. A strange paradox is that in most cases the operators of these stations were so amazed at the results accomplished with several watts of SSB that they quickly ordered or built their own sideband transmitter. Pat and Jere Hoyt of I5GN in Somalia are the latest examples. They

LU3DCA, Michael.



W3SW on SSB Mobile, Courtesy of W8JDV.

will soon be on with a new SSB exciter.

Possibly the best example of SSB is in mobile operation where there can be no question of its superiority. Your Editor should know as I believe I held the record of over 100 countries worked on twenty meter AM Mobile when operating ten years ago as W9SM. Believe me, there is no comparison to the results now obtained and the percentage of QSOs to calls made.

Every time I get carried away in my enthusiasm for SSB and write about it I receive large volumes of mail from the die-hards. You would almost think that I was selling Communism the way they have reacted. I have been accused of beating the drums for the *capitalistic* manufacturers of SSB equipment; of being unrealistic; of being inexperienced in the other methods of communication, etc.

To attempt to cut-off another flooding of the Silver Spring Post Office with cries of anguish, may I first say a few words in self-defense? First, I do not represent any "producer of SSB gear". Secondly, I am sorry to have talked so much about sideband's superiority in the past nine years. Many others have "seen the light". Segments of the various bands are now getting too crowded.

Thirdly, I am not a newcomer to Ham radio! I started with a spark coil in 1915. After the First World War, when we went through the same sort of conflict we are now experiencing between CW and Spark, I was one of the last to admit that Spark was doomed. I also operated AM phone for twenty-five years on twenty meters, and was just about to "hang up my gloves" and quit radio because of the "hetrodyne bedlam", when I experienced the thrill of sideband operation. In the past nine years sideband has given me such tremendous pleasure that I cannot but help passing the news along. Please note that I do not talk against CW operation. How can I when I still spend many hours on the key? Having been a traffic man and a former Section Communication Manager for ARRL's Southern New Jersey Section, I believe I have presented sufficient proof of my qualifications. If that is still not enough then I will add my experiences as a Commercial Ship Operator in the "twenties". (Sure wish I had SSB on some of the times I tried to work WSE or WSC while plying the Carribean.)

PAØBW advises in a recent letter that there are now more than twenty-five sidebanders active in Holland. I am sure this is a fairly good percentage of the active PAØs.

Harry, KH6JEM took an HT-32 and an SX-101 to Johnston Island in September, and worked 460 SB stations in spite of very poor conditions. There is no regular amateur operation from KJ6 as there are no licensed hams there now. QSLs for KH6JEM/KJ6 have all been mailed so if you haven't received yours, then I suggest sending Harry another card.

More than 250 sidebanders attended the three-day convention of the Western Single-Band Association in the Miramar Hotel at Santa Barbara, California. Everyone thoroughly enjoyed themselves according to Ted, K6FH who sent us this information. Plans are made to hold a similar affair each year. Many prizes were awarded the lucky winners. Side-band operators are cordially invited to join this organization which is dedicated to the furtherance of good SSB operation and techniques. Al, W6ZHH is the President. Apply to Box 568, San Pedro, California.

Fifty-five attended the SSB-DX meeting during the Roanoke Division Convention held in Richmond, Virginia in October. Myron, W4IYC acted as moderator in place of this Editor, who had been scheduled. My California trip prevented me from returning East in time. Myron described the activities of VQ4EO, ZS6AQQ/ZS9 and the VQ4ERR-WØAIW trip to VQ9ERR. Rumors emanated from the meeting that W3KA and W4KFC were considering a six-day dx/pedition to Swan Island in February. W4IMP exhibited a small experimental model of an "expendable" three tube, variable crystal frequency SSB rig designed for shipment to various rare dx stations.

Cliff, W8GCN just one hour before leaving for Saudi Arabia, mailed me his confirmations for a "Worked 175" sticker endorsement. It's too bad that Cliff could not have delayed his departure until he could qualify for one of the first "Worked 200" certificates. Now he has to start all over again. Cliff hopes to sell Bob White at ARRL DXCC, new country status

[Continued on page 112]

G3LB, Arthur—Courtesy of W1BDF.

G2MA, David

CONTEST CALENDAR

by Frank Anzalone, W1WY
14 Sherwood Road, Stamford, Conn.

November 28-30 CQ WW DX CW
January 9-10 DARC WAEDC CW
January 23-24 DARC WAEDC CW
January 30-31 CQ WW SSB

CQ WW DX

CW GMT 02:00 Saturday, November 28th to 02:00 Monday, November 30th.
EST 9:00PM Friday, November 27th to 9:00PM Sunday, November 29th.
PST 6:00PM Friday, November 27th to 6:00PM Sunday, November 29th.

It's quite possible that most of you in the US will receive this issue before the CW week-end. Therefore a last minute reminder is not out of order. Note the starting and ending times.

If the requests for log sheets mean anything, we should have quite a "brawl", conditions permitting of course.

A reminder to those entering the Multi-operator classification. Keep in mind that, this year, it has been broken down to two divisions, Single Transmitter and Multi-Transmitter. Meaning of course that in the Single Transmitter category, only one transmitter can be on the air at a given time. In the Multi-Transmitter division there is no limit to the number of transmitters going simultaneously. It's important that you specify your classification when you submit your log. Don't expect us to go thru your log to determine if you had more than one signal on the air at the same time.

There have been some fine openings on 10 of late so don't sell it short. And for you multiplier seekers, give 160 a try and see what's cooking around 12 or 1 o'clock EST. VE2WW and W7ZVY have both promised to activate the band. And I wouldn't be surprised if W1BB and W6KIP also make an appearance. With any luck there should be some activity from the Caribbean area. And wouldn't it be something if some of the Europeans got across?

And finally and most important. **Send in your log.**

DARC WAEDC

Starts: 11:00 GMT Saturday, January 9th.
Ends: 23:00 GMT Sunday, January 10th.
Starts: 11:00 GMT Saturday, January 23rd.
Ends: 23:00 GMT Sunday, January 24th.

This is the 5th annual WAE contest sponsored by the DARC. The format still remains the same, only this year it has been split up over two week-ends. It's still a CW contest only and the object is for non-European stations to contact as many stations on the European continent as possible.

Rules:

1. All bands 3.5 thru 28 *mc* CW.
2. The usual six digit serial number, RST report plus a progressive three digit QSO number starting with 001, and which will also continue into the 2nd week-end.
3. ONE point per QSO except on 3.5 *mc* where it will count TWO points. (Same is in the WAE certificate rules.) Tone reports less than a T7 will not be credited.
4. A station can only be worked once on each band, per week-end. (We are a bit confused on this point. However it would seem that you can work the same station again on the second week-end.)
5. The multiplier for non-European stations is determined by the number of European countries worked on each band. Using the WAE country list as of January 1, 1959.
6. European stations will use the ARRL country list. In addition, each call area in the following countries will also count ONE point in the multiplier. CE, JA, PY, VE/VO, VK, ZL and ZS. Also UA9 and UAØ.
7. The final score will be the QSO points, plus the QTC points, multiplied by the sum of the country points on all bands.

QTC Traffic.

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

1. A QTC contains the time, call and QSO number. ie: 1200/DL7AA/123. This means you worked DL7AA at 1200 GMT and received his number 123.
2. A QSO can be reported only once, and not back to the same station, even though the contact was on another band.
3. No more than a maximum of 10 QTC's can be sent to the same station.
4. Keep a uniform list of QTC's sent. ie: QTC 3/5. This means that this is the third series

[Continued on page 110]

horse trading, Larry can be contacted at 3409 St. William Lane, St. Ann 14, Mo.

Here, There, and Everywhere

W1LWV Millinocket, Maine, would like to combine his hobby of weather and RTTY by printing out his instruments on a page printer. W2PBG sold all gear and is headed for California. (*Please drop me a line, Bob*) W2JTP/Ø is looking for an I-193 Relay test set.

W3PYW, Silver Spring, Md., visited XE1BI in Mexico City in August. Erosa gave Frank the bottle of Tequila which BeeP had while operating XEØBP. Frank proposes that it become a trophy for the annual Spring RTTY Sweepstakes.

W4EHU is now studying in California. W4TLV, Demopolis, Alabama, is building a W2JTP fork standard. K5UJD, Tularosa, N.M., is also building one. W6SJS, Fresno, Calif., is looking for 2.1 *hy* toroids. W6ATO and K6KNP were visited by ZK1BS of Raratonga, Cook Islands, who is taking back a Model 26 with him. September 16th, NCARTS, Inc. met in Millbrae, California. Guests were W3CRO, W9VSU, W5VKE (of W5YM), and W4EHU. Fifty-six members and guests were present.

W9ZPV and K9LFK both have gotten Model 15's. W9WFN, 6312 Wolf Road, LaGrange, Illinois, has two Model 15's for sale, one with weather symbols. W9UQR, 31 Alta Lane, Kokomo, Indiana, will trade a Model 19 for a 2-meter *Gonset* III or a G-50. He will also trade a Model 15 for a 6-meter *Gonset* Linear Amplifier.

WØIQW has a Model 15 and a W2JAV TU. KØDFR is building one. WØAEB, Waterloo, Iowa, building a W2JTP fork standard, finds that the coils from a pair of $1.85 *Sawafuji* S.F.-24 headphones, from Radio Trade & Supply Co. Des Moines, work fine. WØAEB is also looking for an FL-8A filter. WØAGP is deserting SSB for RTTY.

VE7KX reports that British RTTYers, having been stymied by the RSGB, have formed their own society, known as the British Amateur Radio Teletype Group, BARTG, with over thirty members. They have published a news letter for the past two months and have just latched on to some twenty-one *Creed* strip printers which are being distributed by the group. Their Secretary is Dr. A. C. Gee, G2UK, Oulton Broad, Lowestoft, Suffolk, England.

P. Harris, Organford, Dorset, sends us a very interesting list of available surplus telegraph equipment, including Models 14 and 15 as well as *Creed* Models 8 and 10 equipment. Even the the AN/FGC-1 appears on the list! Englishmen, take note.

For general information, the Standard international teleprinter code is 50 bauds, or about 66 *wpm*. The start and the 5 unit pulses are 20 milliseconds, and the stop pulse is 30 *ms*, making a total of 150 *ms* per character, as compared to the *Teletype* code of 161 *ms* per character that is used in this country. With good signal strength a foreign RTTY signal can generally be copied by adjusting the range for the best copy.

Chi—RTTY Meeting

October 11th, the 5th annual RITTY Meeting was staged in Chicago by the CATS. Unfortunately your RTTY Editor could not get there, but Minneapolis-St. Paul was well represented by a contingent headed by Bob Fincke, KØAKG, to whom we are indebted for these details.

Of course the vacant chair of WØBP was keenly felt by all, as 'Ole BeeP had keynoted the four previous Meetings; however, the program this time was handled very capably by George Boyd, W9SPT, who introduced the opening speaker, Bert Jaffe, K9BRL, of *Electrocom Industries*. Bert described the new TU being marketed for CD and amateur use by *EI*. This is an audio-type of TU, and we note with great interest that it has *autostart* built in. We hope to have the details on this unit in a future issue.

George, W9SPT, discussed briefly the automatic carriage return and line feed systems of WØHZR and W9UE. By the way, W9UE is almost out of parts for his famous *Auto-Mate 26*. (See the RTTY column in the October *CQ*.) Word to the wise, etc.

Dave Chapman, W9DPY, told how to make the most out of surplus equipment, and Jim Aagard, K9OJV, showed and described his transistorized TU, keyers, autostart unit, and his AFSK oscillator. George, W9SPT, talked some more about filters.

All in all, the meeting was termed the usual success, as was the dinner which followed. Dave Chapman, W9DPY, won the single-channel AN/FGC-7, and Ed Green, K9DAS, won the Model 28 (*yes, I said 28!*) at the dinner.

Comments Personal

At the head of this column you will note that we are at a new QTH in St. Paul. This time it is our very own. Activity, naturally, was a bit limited at the other location since it was temporary. By the time this appears in print we should even have a shiny new set of call letters. It is hoped that very soon we will be occupying those holes punched in the ether for us by 'Ole BeeP, WØBP. Look for a strange new call on 3620 *kc*, 14,340 *kc*, and on 52.6 *mc* (FM).

73, Byron, KØWMR

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Grounded Grid, Class B linear for 6-80M, complete with power supply. 200w input AM Class B, 300w DC or 420w PEP Class B. 300w Class C for CW. Pi-Net, 80-10M; 52 ohm Pi-Link coupled on 6M. TVI-protected. Monitoring meter indicates approximate RF output for tuning at maximum efficiency and output.

the Globe Patcher PH-1

Hybrid fone patch operates VOX on SB, push-to-talk on AM. Easy to install, operate. Balance control. Standby switch for landline call without energizing Xmttr. Completely shielded. Mounts anywhere.

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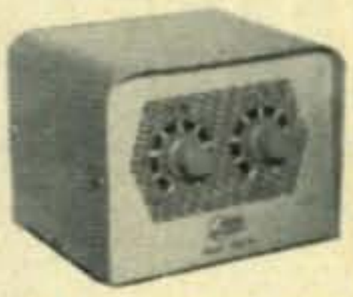

Vox, Model 10

For voice operated control of the DSB-100 and similar Xmttrs. Plugs into rear of DSB; extra contacts for aux. circuits.

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QT-10, an anti-trip accessory for the VOX, Model 10, in wired form only: **$9.95.**

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An 11M transmitter/receiver for mobile or fixed station: for use anywhere and by anyone over 18 years of age. 115VAC and 12VDC or 6VDC mobile. Exclusive 3-channel selection switch and buttonlight indicators. Squelch control for muting background noise. 10-tubes. AM-modulated. Meets FCC specs. 3½x13x10½". 19 lbs. Complete with Xtals for one channel and mike. FCC form 505 included.

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MARS BULLETINS

First Army MARS SSB Technical Net

Wednesday evening, 9 PM N. Y. time on 4030 kc uper sideband.

Dec. 2—"Technical Aspects of Satellite Communications," by Lowell Smilen, Research Associate Microwave Research Institute, Brooklyn, Polytechnical Institute.

Dec. 9—"The Trans-Atlantic Submarine Telephone Cable," by Harold West, Plant Design Engineer, Long Lines Dept., American Telephone & Telegraph Company.

Dec. 16—"Determination of Percent Success Expectable in High Frequency Radio Transmission," by George Krause, Project Engineer, Analysis Engineering Division, U. S. Army Signal Radio Propagation Agency, Fort Monmouth.

Dec. 23—"FM Forward Scatter Tropospheric Communications Systems," by Joseph Lesmez, Project Engineer, Radio Engineering Laboratories, Inc.

Dec. 30—"Coaxial Cable," by Michael Ferber, Sales Engineer, Times Wire & Cable Company.

Air Force MARS Eastern Technical Net

Sundays 2-4 PM EST—3295, 7540, 15715 kc

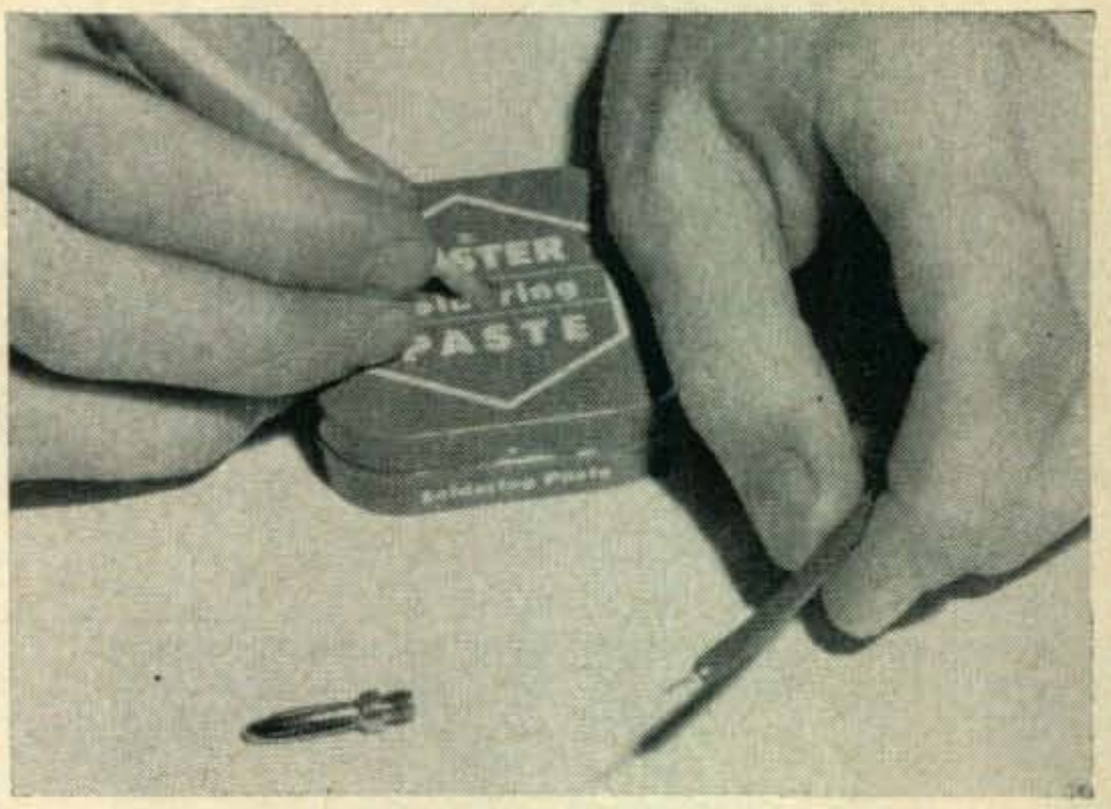
Dec. 6—"UHF Air-Sea Rescue Communications," Thomas C. Nehrbas, Chief Eng. and John E. Richter, Project Eng., Telephonics, Inc.

Dec. 13—"Underwater Sound Detection," George D. Cummings and Warren Lane, Project Engineers, Telephonics, Inc.

Dec. 20—"Reinforced Plastics," Walter H. Greenberg, Chief Engineer, Riverside Plastics Corp.

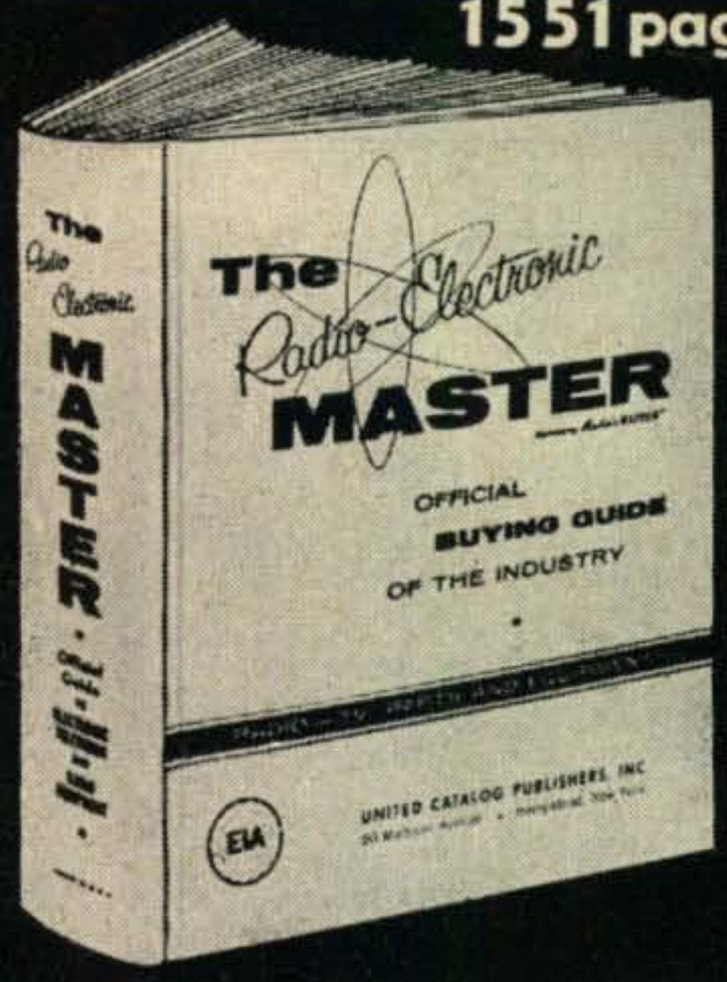
Dec. 27—Recess day.

January 3—Recess day.



Paste Dispenser

An opened can of soldering paste kept on the bench soon collects drops of solder, dust, and the paste usually gets all over tools. Prevent this by punching a hole in the lid and using an ordinary pipe cleaner as a brush applicator.



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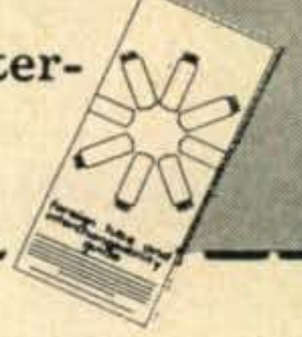

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TCS-9(to 14) Transmitter, as above, but has minor modifications which make these models more desirable. **Each $59.95**

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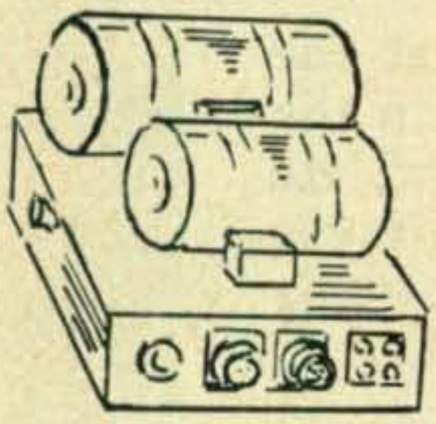

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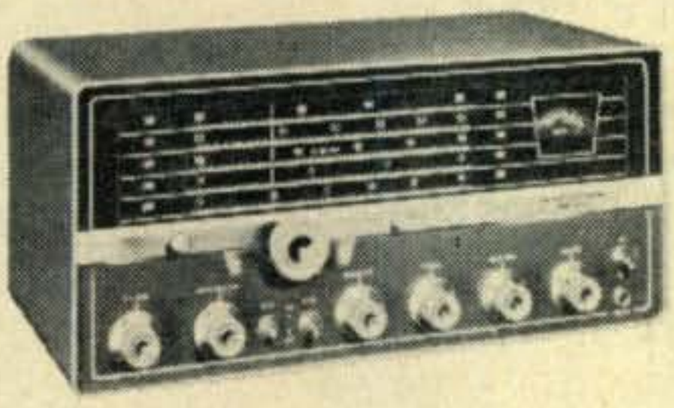

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- 22 amateurs at your service
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A GREAT RECEIVER S-108

Net: $129.95

540-1600kc broadcast band plus three S/W bands 1550kc-34mc. Slide rule dial bandspread calibrated on 10, 15, 20, 40 & 80M. One rf, two if and separate bandspread tuning condensor. Built-in speaker. Temperature compensated oscillator, AVC, noise limiter, rear terminals for single or double antenna. External antenna provided. Grey steel cabinet with brushed chrome trim.

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C-12

Leo: Please rush ☐ Free Catalog ☐ Latest Reconditioned Eqpt. Lists, and complete information on Hallicrafters ☐ SX-100 ☐ SX-111 ☐ HT-37 and S-108.

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For further information, check number 28, on page 132

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Johnson Challenger (Kit)	114.75	**90.00**
Cosmophone "35" (1 Only—New)	795.00	**595.00**
B & W—51SBB	279.00	**210.00**
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Collins—Used—32V3 (2 Only)	——	**395.00**
Sonar—D120p. Depth Indicator	198.50	**129.50**

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All Equipment and Kits Fully Guaranteed
SORRY—NO TRADES ON THIS SALE!

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Big savings on used Globe gear, Globe Scouts (AM/CW) from $59.95 to $89.95. Globe Chiefs (CW) $44.95 and $49.95. DSB-100 sidebander, $99.95. LA-1 linear amplifier, $99.95. 666 6-meter VFO, $34.95. 6- 2-meter VFO, $44.95. A big buy on Elmac PMR6A mobile receivers. 6-volt and 12-volt models, $69.95. Elmac 6-volt power pack with receiver, only $10.00, otherwise $19.95. Elmac AC power pack for PMR6A, $19.95. Elmac A-54 and A-54H, $69.95 and $79.95. Send for list.

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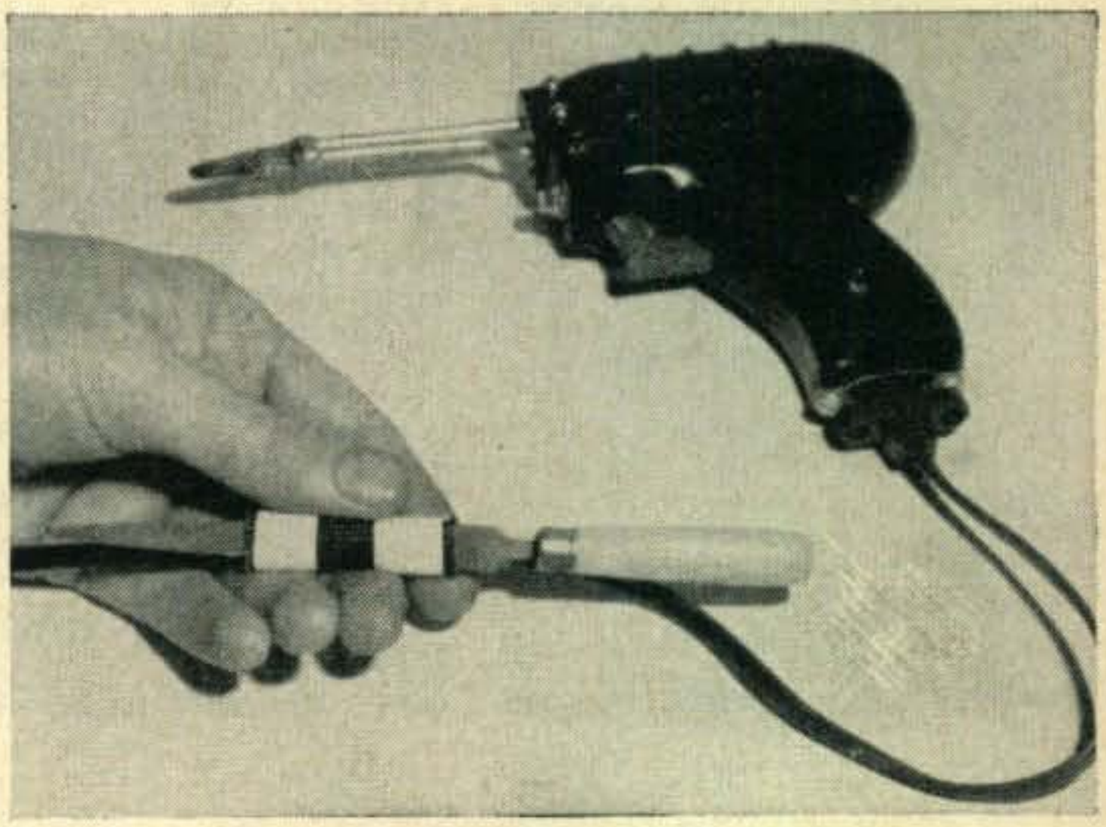
Ham Hint



File Holster

A small file often comes in handy for cleaning your gun or iron tip, brightening small parts, and tip tinning operations. To keep a small file close at hand, make a "holster" for it from a piece of large diameter spaghetti taped to your gun or iron's cord. This way you will not have to hunt for this often misplaced tool when you are busy soldering.

For further information, check number 29, on page 132

SCRATCHI *[from page 20]*

cards, and they returning to sender. You ever try addressing cards after eleventeen shots of slitely aged cacktus jooce?

Merry Crismus,
Hashafisti Scratchi

W2NSD *[from page 14]*

International Amateur Radio Convention

When: August 11-12-13-14, 1960
Where: The Statler-Hilton Hotel in New York City

Plan your 1960 vacation and bring your family with you for the first International Amateur Radio Convention ever held anywhere. Make your plans well ahead of time so the Hotel Accommodations Committee will have space reserved for you . . . or, if you are coming from a foreign country, the Ham Hospitality Committee will be able to find a ham you can stay with in the New York area to conserve your dollars.

The convention will be the most lavish ever held anywhere, with special programs for every phase of the hobby, prizes to make your eyes pop, exhibits by just about every manufacturer in the field, DX personalities from all over the world, special contests of every imaginable type, tours of famous New York spots, tickets to Broadway shows, TV programs and concerts.

August was chosen for the convention since New York normally is reasonably cool at that time and hotels have plenty of space available. It is the ideal time to tour the city too. You can swim at Coney Island, visit the Statue of Liberty, see the U.N. and other famous landmarks. See a Shakespearean show in the Park (free), or any of the hundred other delights that New York and vicinity holds for out-of-towners.

Plan to come to New York next August for the International Amateur Radio Convention and really have a ball.

More details next month.

Citizens Band

Several letters have come to me asking how come the Citizens Band Column in CQ. Since this is not an amateur radio band, nor even, for that matter, a hobby band, how come we are taking the space to write about it. Let me explain.

1) Many a ham has wished that he could have a small rig in the car to talk home to his wife or to the office, but has been prevented by the ham regs. The Citizens Band offers us a medium of personal and business communi-

"HAM HEADQUARTERS, USA®"

is COLLINS HEADQUARTERS, USA for several mighty good reasons!

Where else in the whole wide world can you . . .

- ✓ See so much of the latest Collins gear on live display!
- ✓ Buy it on such easy, most flexible terms!
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- ✓ Be given such sincere, friendly interest and help!
- ✓ Receive so favorable a deal!
- ✓ Select from such a large, fresh inventory, and take it right home with you!

COME ON IN AND BE PLEASURABLY CONVINCED!

(Bring along your old gear, for the deal of your lifetime.)

73,

Bil Harrison

W2AVA

HARRISON HAS 75A-4's!

Collins 75A-4 receiver, complete with 3.1 Kc Mechanical Filter, tubes, and instruction manual. **$785.00**

Additional plug-in mechanical filters:
500 cycle . . . **$77.50** 1.5, 2.1 or 6 Kc . . . **$57.50**

Whenever any good equipment is scarce—with slow delivery, or virtually unobtainable—"Ham Headquarters, USA" takes a special pleasure in bringing it to you, immediately!

Right now we have a limited supply of the more-popular-than-ever 75A-4 receivers. Collins made them in their Canadian factory to the very highest standards, then brought them in to sell at $840.00.

We bought all they had, and, to pass the savings along to you, we have just been authorized to reduce the price!

Every one is brand new, with all the latest production improvements. In factory sealed cartons. Fully guaranteed by Collins and by us.

51J-4 For any **precise** frequency—

.54 THRU 30.5 MC

The finest general coverage commercial receiver, with frequency standard accuracy. Ideal for Laboratories, Communications, and the discriminating Short Wave Listener!

Complete with one mechanical filter, Cabinet style: **$1208.**
Rack style: **$1168.**

Additional mechanical filters ..... **$80.** each

(Ask for 51J-4 Brochure)

COME TRY THE NEW KWM-2

"Ham Headquarters, USA" has it on display!

NEW! KWM-2

We are booking firm orders for this new, compact SSB MOBILE/PORTABLE extended frequency range Transceiver. A $25 deposit gives you preferred earliest delivery position ..... **$1095.**

(Ask for KWM—2 Brochure and Price List)

LONG ISLANDERS!

Our Jamaica Branch is centrally located to serve you well, to bring you Collins and other ham gear, and all the advantages of dealing with **"HAM HEADQUARTERS, USA"!**

Both great stores open all day, Saturday, Dec. 26 and Jan. 2

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[LONG ISLAND—144-24 HILLSIDE, JAMAICA]

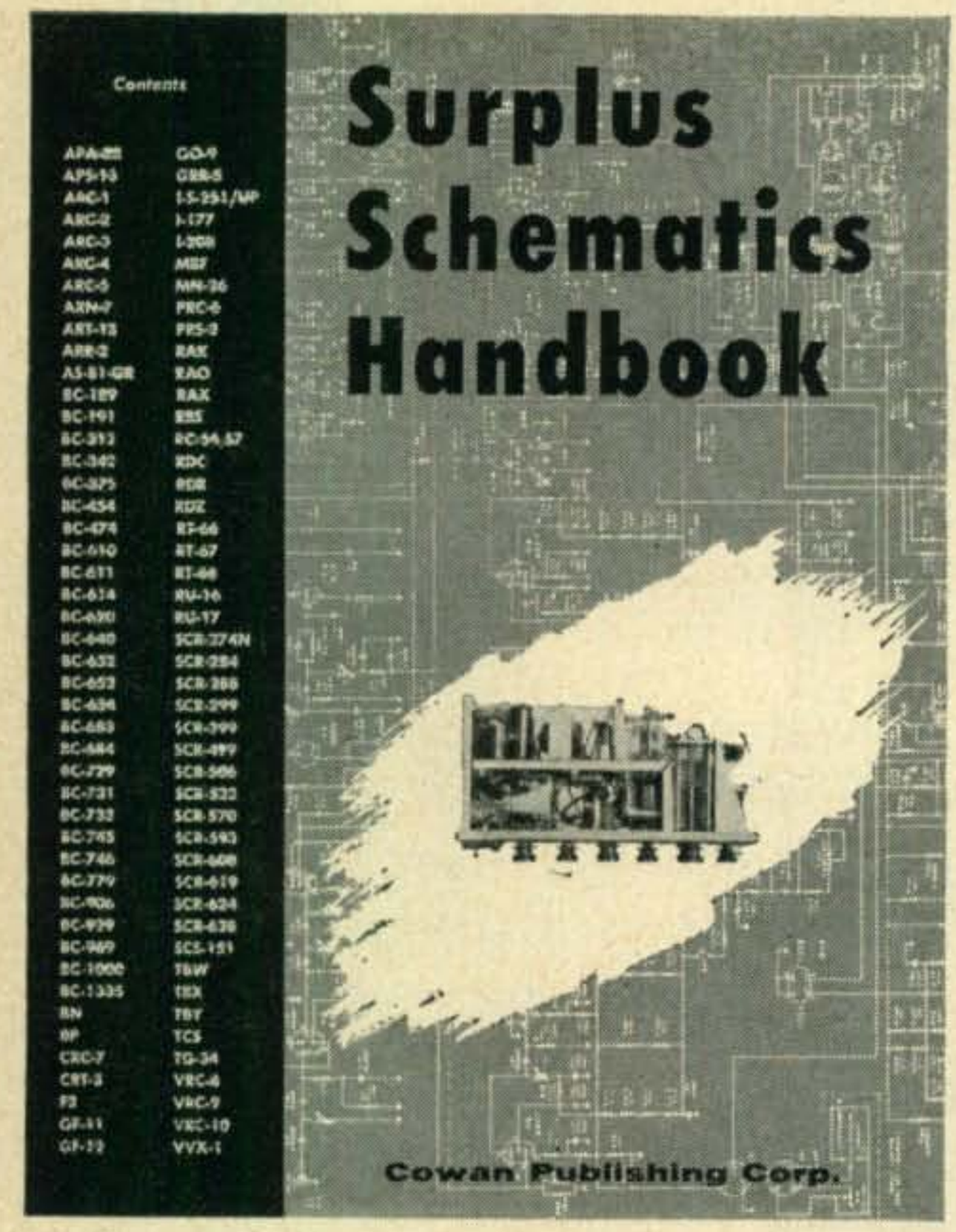
NOISE BLANKERS

Sensational Collins device uses noise peak pulses to mute receiver. Gives amazingly quiet reception. Dramatically effective on SSB, AM, and CW! Mounts inside receiver, easily connected, no critical adjustments.

For 75S1, KWM-1, KWM-2—$120.
For 75A4—$165.
(Ask for special brochure)

For further information, check number 32, on page 132

COMING SOON!



This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry cold turkey can be many times more difficult than the most involved puzzle, and purchasing a single instruction book can run as high as $3.50. Why knock yourself out when you can have a book with complete coverage on hand in your library? All this for only $2.50.

Including . . .

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RAX
RBS
RC 56
RC 57A
RDC
RDZ
SCR 274
SCR 284
SCR 506
SCR 608A
SPR 2
TBW

Use coupon on opposite page →

cations that may be of great advantage.

2) Ham radio offers terrific emergency service during disasters. However there are a lot of times when we are called upon to provide communications for activities or events sponsored by outside groups which could just as easily be solved by using the Citizens Band. It is important for us to be aware of the availability of the new 11 meter band, the equipment available, its limitations, uses, etc., so we can advise when we are called upon for a service that should not really be done by ham radio. Many a ham belongs to some other club or organization that has a communications problem that is solvable by CB and it is important for him to know the answers.

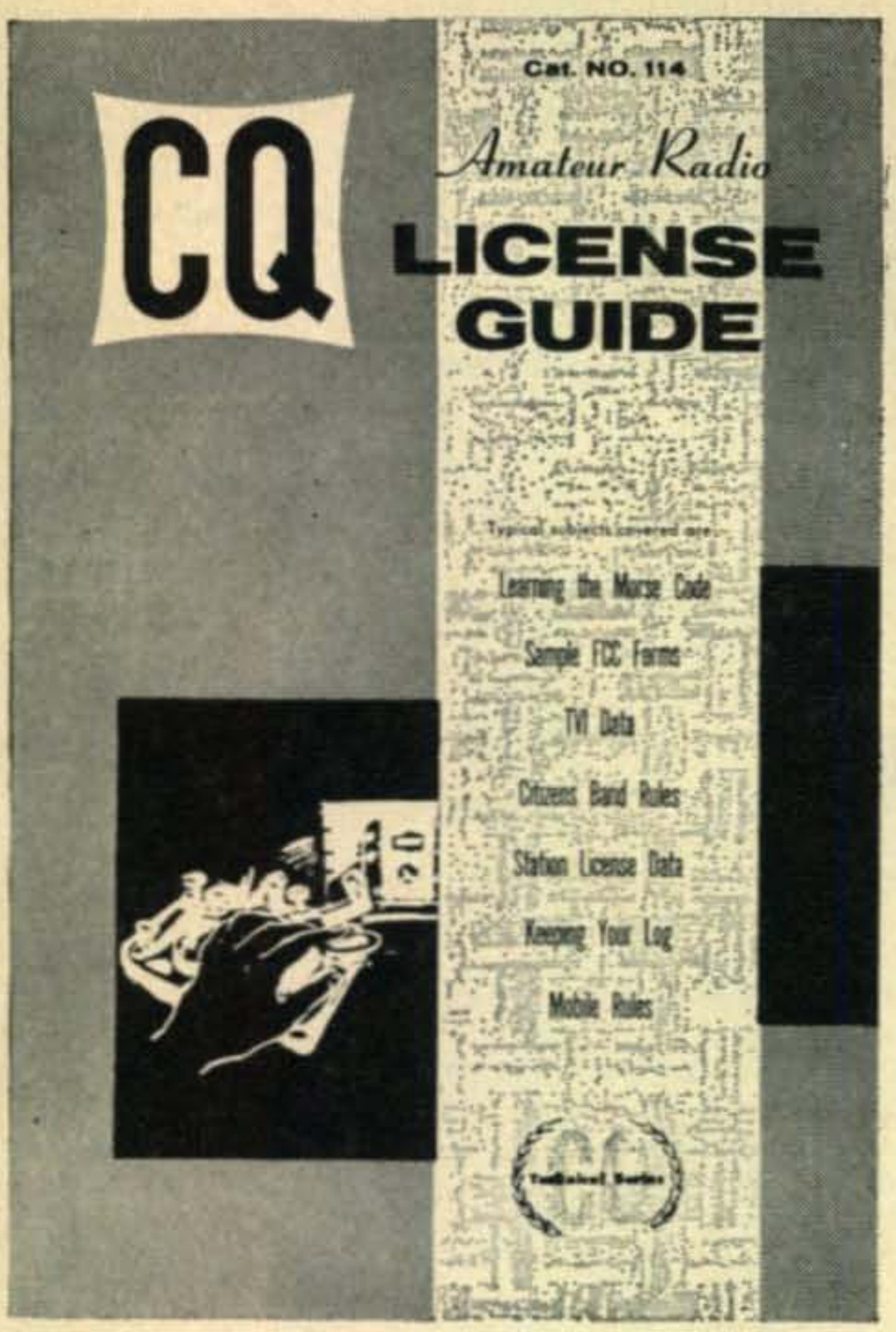
3) The tremendous popularity that we see ahead for CB already has made equipment available at a very reasonable cost. Much of this gear is easily converted for the ham bands.

4) The FCC has every intention of preventing ham type contacts on CB and has already initiated legislation to back this up so we have no need to fear that we are nurturing anything at all competitive with ham radio. The CB will not long satisfy the lazy radio enthusiast that might get a ham ticket. As the CB becomes more intensely occupied we will find that the use of the band will rarely be for other than explicit communications between related units. Few QSO's will be heard.

L-R: Takeo, JA1CR; Harry, JA1ANG; W2NSD; Hisao, JA1AA; Bill, W2SKE; Yuri (means Lily) and Harry's XYL, JA1CLJ. This was quite a DX gabfest and was an evening that will not be forgotten by any of us.

DX *[from page 70]*

brings nice goodies, such as 32S1's and 4-1000A's, to everyone. If any of you feel like playing Santa Claus to some of your less fortunate fellow hams, might I suggest a year's subscription to Bob Gunderson's braille technical press which is now available on records for $10.00 a year. The 16 *rpm* records, which come out once a month, will keep your blind friend abreast of all the latest technical developments and help him along the road to self sufficiency. If you would like to help, but



COMING SOON!

Over 192 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator.

ONLY **$2.50**

RESERVE YOUR BOOKS TODAY!

CONTENTS . . .

Learning the code

Study material for the Novice class license, for technician and general class licenses

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Charts showing FCC examining points and schedules

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Sample log sheets

Section on TVI, What it is and how to cure it

Section on QSL's and QSLing

Charts showing great circle bearings from LA, Chicago and NYC

Complete list of amateur "Q" Signals

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SIRS:

I enclose $_____. Please send me _____ copies of the CQ LICENSE GUIDE.

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I enclose $_____. Please send me _____ copies of the SURPLUS SCHEMATICS HANDBOOK.

NAME_____

ADDRESS_____

CITY_____ STATE_____

SIGNATURE_____

New York City residents add 3% sales tax.

don't know of any one in particular, contact me as I see Bob almost every week and I'm sure he will know of some deserving ham. You can send a check directly to Bob Gunderson, W2J10 at 999 Pelham Parkway, New York 69, New York.

Well, that's about it . . . Again, have a very enjoyable Holiday and may God bless you and yours.

CU next month.
73es DX, Urb, W2DEC

QTH's

Tnx to W6KG, EL4B, W3KVQ, W1JGY and the above mentioned bulletins for the following:

VK9VM, Rabaul, Territory of New Guinea via K2QXG.
KG6AIF, Box 445, Agana, Guam.
HRØAB, QSL via HR1AB.
ZS1UM, QSL to 89 Hill Side Road, Fish Hook, Capetown, Union of South Africa.
VP8EG, QSL via G8KS.
LA8FG/P, Spitsbergen—will QSL on returning to LA next year.
LU1ZC, Isla Deception, Antartida, Argentina; Habana 424 Valentin Alsina, Buenos Aires, Argentina.
ZD1AW, via W3KVQ.
CR9AH via W1DWH.
VEØNM, H. M. C. S. Cape Scott, c/o of F. M. O. Halifax, Nova Scotia, Canada.
FM7WQ, via K1DRN.
EL's all via Ken Bale, EL4A, Le Towmeau of Siberia, Ltd., Robertsfie'd, Siberia, West Africa.
VU2JA, QSL via W4YWX.
YA1AO, P. O. Box 4044, Frankfurt, Germany.
ZD8JP, John E. Packer, High Knoll, Furze Close, High Salvington, Worthing, Sussex, England.
AP2BH, QSL via W4ANE.
HB9QP/CR8 QSL via W4IYC, 1236 Westminster Richmond 27, Va.
ZD1PB, Army Post Office, Freetown, Sierra Leone.
VS1BB, c/o G3KXN, 51 Virginia Rd., Newport Road, Albrighton, Wolverhampton, Staffordshire, England.

VHF *[from page 77]*

charter members in one morning's QSO. Then to QSL two of the four, requesting membership in the net.

Fee of 1/10th of a dollar to cover cost of mailing the certificate is also a requirement.

Charter members are K2VUU, K2UFY, K2CMG and K2VQR; and they must be worked during the period from 0530 to 0700 weekdays, and 0730 Saturday, Sunday and Holidays.

SEMI COND. *[from page 81]*

volts at currents between 50 and 200 *ma.*

International Rectifier Corporation's line of pigtail diodes is now available with Teflon jackets for use in bank-mounting or other compact arrangements. The jacket maintains its mechanical and electrical properties from −67° to +250°C.

Motorolo Inc., Phoenix, Arizona, has announced a new line of reference diodes. The 1N2620 through 1N2624 have temperature

1 Electronics & Radio Eng. by Terman

1078 pages. One of the most complete radio textbooks ever printed. All theory but not too heavy on math. $14.50

5 Antennas by Kraus (W8JK)

The most complete book on antennas in print, but largely design and theory complete with the math. $10.50

8 Radio, TV, Basic Electronics

Provides a firm basic theory foundation for the newcomer to electronics. Well written, simple..... $4.95

20 RTTY Handbook by W2JTP

A-Z of ham teletype, supply low, very popular....$3.00

21 VHF Handbook by W6QKI

Covers just about every aspect of VHF.....$2.95

22 Beam Antenna Handbook by W6SAI

Practical, includes both theory and construction. $2.70

23 Novice Handbook by W6TNS

Receiver, transmitter and antenna theory and construction for the Novice and Technician. Terrific.....$2.85

24 Better Shortwave Reception by W6SAI

Fine handbook for SWL'ing, long needed.....$2.85

26 Surplus Radio Conversion Manual I

BC-221, 342, 312, 348, 412, 645, 946, 1068A, SCR-274, 522, TBY, PE-103, etc. $2.50

27 Surplus Radio Conversion Manual II

BC-454-459 Xmtr-Rcvrs; APS-13; ARC-5 VHF Xmtr-Rcvrs; BC-357; 946B; 375; TA-12B; ART-13; AVT-112A; GO-9; LM; etc. $2.50

32 RCA Radiotron Designers Handbook

1500 pages of design notes on every possible type of circuit. Fabulous. Every design engineer needs it. $7.50

40 15th Edition (NEW) Radio Handbook by W6SAI

This is the BEST amateur radio handbook ever published, over 800 pages and all completely NEW. $7.50

47 Practical Electronics

Lavishly illustrated introduction to just about every phase of electronics. Interesting to all, instructive to beginners. Great to have around the shack for visitors. $2.50

48 Basic Electronics

Same deal as #8, only this was written by an instructor at RCA Institute for use with their electronics course. It covers more ground too. $9.25

49 Electronic Communication by Shrader

Same deal as #48 only written by instructor at Oakland Junior College. Biggest book of 'em all and aimed at giving all info necessary for FCC commercial and amateur licenses. $15.00

50 Microminiaturization

The first book on the subject. Don't see how a lab or manufacturer can be without this book. Everything is going to have to be built smaller, you know. $11.00

51 Surplus Handbook

APN, APS, ARB, ARC4-5, ARN, ARR, ASB, BC-222, 312, 314, 342, 344, 348, 603, 611, 624, 652, 654, 659, 669, 683, 728, 745, 764, 779, 794, 923, 1000, 1004, 1066, 1206, 1306, 1335, AR-231, CRC7, DAK3, GF11, MARK II, MN26, RAK, RAL, RAX, TBY, TCS, VT/JAN tube index. Schematics & photos. $3.00

52 How to Read Schematic Diagrams

Recommended by Ham Clinic May '59, page 95. $3.50

53 Basic Electronic Test Procedures

Test equipment: how it works, how to use it.....$6.50

54 Ham Radio Handbook by W2DJJ

Picture introduction to ham radio and rather complete guide to commercially available ham equipment. $2.50

55 Transistor Circuit Handbook

Simple, easy to understand explanations of transistor circuits. Dozens of interesting applications. Recommended by Ham Clinic, p. 84, Aug. '59 CQ. $4.95

N. Y. C.'ers add 3% Sales Tax.

Radio Bookshop

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BIGGEST VALUE FOR YOUR DOLLAR!

GSB 100

SSB 100W P.E.P. input. Transmitter/Exciter.

SSB transmitter/exciter, bandswitches 80-40-20-15-10 meters. Rated 100 watts P.E.P. Operates on SSB with selectable sidebands, also PM, AM and CW. Has pi network output. Uses quartz crystal notching filter to suppress carrier. Has stable, calibrated VFO, excellent VOX system, heavy-duty AC power supply.

499.50

GSB 101

SSB 1000W P.E.P. input RF Linear Amplifier

1000 watts P.E.P. input linear uses stable, efficient grounded-grid circuitry. Has pi network output, bandswitches 80-40-20-15-10 meter bands. Supplies for power and bias and antenna relay are built in. Linear drives by GSB-100 or other equipment supplying 60-70 watts of driving power.

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For further information, check number 34, on page 132

coefficients between .01 and .0005% per degree C.

Also new from Motorola are three military type power transistors in 3 and 10 ampere ratings. The 2N297A, 2N1011, and 2N1120 are useful in audio, servo, and switching applications.

North American Electronics, Inc., Lynn, Mass., is an upcoming producer of silicon diode rectifiers. If you use these devices in your business be sure to get their catalog.

The hit of the WESCON show was the new five watt, 30 *mc* silicon transistor made by Pacific Semiconductors, Culver City, California. Technically, not too much information is available at this time, but it is expected to find wide application in air-sea rescue equipment and in portable Class "D" Citizens Band transceivers.

Radio Receptor Co., Inc., Brooklyn 11, New York, has a new line of selenium diodes that are priced between 15 and 35 cents. Radio Receptor also handles the Siemens of Germany rectifier line.

The August issue of Texas Instruments *Application Notes* provides a complete roundup of the various transistor manufacturing techniques. The September issue of the same publication describes the design techniques of two high frequency oscillators for 400 and 200 *mc*.

Tung-Sol Electric, Inc., Newark 4, N. J., is marketing the new 2N1313 high current, high speed switching transistor, for computor applications. It uses the thermal bond construction technique which provides high dissipation while maintaining electrode-to-case isolation.

73, de Don, W6TNS

CONTEST CAL. *[from page 93]*

of QTC's sent and that 5 QSO's are now being reported.

5. QTC's not reported the first week-end can be held over and reported during the second week-end.

Classifications:

There are two classifications, Single operator and Multi-operator.

Awards:

Awards are made on the basis of all band operation. Certificates will be awarded to the highest scorer in each country or country/district. There will be additional awards to the top man in each continental area. In case of sufficient participation, second and third place awards will also be made.

It is strongly recommended that contestants write to the DARC for official log forms and rules. Send a large self-addresed envelope and include 2 IRC's for regular mail and 5 IRC's for air mail. More if you require a large supply of logs.

Send your logs to: The DARC DX Bureau,

Fuchsienweg 51, Berlin-Rudow, Germany.

CQ WW SSB

Starts: 18:00 GMT Saturday, January 30th.
Ends: 18:00 GMT Sunday, January 31st.

The "sidebanders" have come up with an earlier date for their annual DX party this year. It's the only phone activity we know about for the month of January so the change should prove popular. If it meets the approval of the gang, Bob Adams will probably retain this as a permanent date. See his column for the details.

That's all for this month. Good luck in the contest.

73, Frank, W1WY

SIDEBAND *[from page 91]*

for the two neutral zones bordering Kuwait. If he is successful then he will make a trip there with W1TYQ, Vic who is a pilot for Arabian American Oil Company.

The Fourth Annual CQ World-Wide Sideband Contest will be held starting at 1800 GMT on January 30, 1960 and continue until 1800 GMT on January 31, 1960.

All amateur authorized bands will be utilized although there will be no multipliers allowed for multiband operation. Only one contact with a station is counted.

The scoring rules will be identical with the last Contest and the final score will be the number of contacts made, multiplied by the number of different prefixes worked.

Stations may work other stations in the same country for additional points.

Each station will exchange the usual Q and S report followed by the number of their own contact number starting with 001. For example 59001.

Logs may be obtained from CQ Headquarters in New York, or you may improvise your own. To be eligible for mention, your log must be received at P.O. Box 625, Silver Spring, Maryland by March 15, 1960.

First prize will be the W3SW Cup and certificates will be issued to the top 25 high worldwide scorers.

Lets make this contest even more successful than the last one. Talk it up on the bands so that everyone will know the details. Last year Peter, HB9IE was the winner. Eva and Alex, CN8MM won the first and second contests. Who will win this time?

May I take this opportunity to wish each and everyone a VERY MERRY CHRISTMAS and A HAPPY AND HEALTHFUL NEW YEAR? Also thank you for the wonderful letters from my many readers expressing your interest in the SB Column.

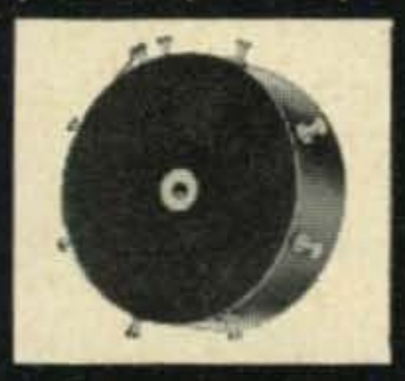
73, Bob, W3SW

TRANSISTORIZED D. C. POWER CONVERTERS & INVERTERS

These small lightweight units, feature low current drain, high conversion efficiency, ruggedness and no moving parts. They provide trouble free, economical operation of communications equipment and other related devices. Ideal for use in mobile, marine, aircraft, Citizen's Band and amateur equipment.

TRANSISTORIZED CONVERTERS AND INVERTERS 12 TO 14 VDC INPUT				
MODEL	TPC-25W	TPC-60W	TPC-120W	TPI-25W
RATING	25W	60W	120W	25W
PRICE	$32.50	$48.50	$57.50	$32.50
OUTPUT Voltage Current	250V 100ma	300/150V 200ma total	500/250/—60V 200/100/10ma	115/26V 25W—400cy
INPUT No Load Full Load	0.5 amp 3 amp	1 amp 7 amp	1.5 amp 12 amp	0.5 amp 3 amp
REGULATION Full Load/No Load Full Load/½ Load	86% 92%	88% 93%	85% 91%	70% 85%
OVERALL DIMENSIONS Width Length Height	2¼ in. 3¼ in. 2⅜ in.	3 in. 4¾ in. 3⅛ in.	4¼ in. 5¼ in. 3¼ in.	3⅜ in. 5 in. 3¼ in.

Precision wound Toroidal Transformers. For use in construction of Transistorized Power Converters and Inverters or as a replacement part. Encapsulated for ruggedness and long life. Easy to install and wire. Designed for operation in ambient temperatures from —55° to 130° C.



TOROIDAL TRANSFORMERS FOR 12 TO 14 VDC INPUT				
MODEL	TT-25W	TT-60W	TT-120W	TIC-25W
RATING	25W	60W	120W	25W
PRICE	$8.10	$11.25	$15.25	$14.75
TRANSISTOR POWER RATING	3 amp	6 or 12 amp	12 amp	3 amp
OUTPUT Voltage Current	250V 100ma	300/150V 200ma	500/250/60V 200ma	26 & 115 VAC sq. Wave

B&W

Barker & Williamson, Inc.

Bristol, Pa.

For further information, check number 40, on page 132

JELECTRO HAM EQUIPMENT

QRP-60 Phone and CW Transmitter

(Ideal for the Novice or OM)

- Built-in modulator for phone operation.
- Completely assembled. Ready to operate.
- 50 watts CW, 40 watts peak on phone.
- Pi Network output coupling 50 to 1,000 ohms impedance.
- Designed for crystal or external VFO.
- Bandswitching on 80, 40, 20, 15 and 10 meters.

The Jelectro model QRP-60 provides phone or CW operation on 80, 40, 20, 15 and 10 meters. Plate input power is up to 50 watts on CW and carrier controlled modulation peaks to 40 watts on phone. Excellent TVI suppression is provided by adequate RF bypassing, pi-network output tuning. Inductive-capacitive TVI filters at the AC input and key leads. Tube line-up consists of a 6cL6 oscillator, 6DQ6A final amplifier, 12ax7 speech amplifier, 12au7 modulator and 5U4GB rectifier. Large easy-to-read panel meter indicates final grid or plate current, by panel switch. Standard coaxial antenna connector. Microphone jack, AM-CW selector switch and accessory socket are located on the rear of transmitter. The QRP-60 power supply is conservatively rated for 600 volts DC at 150 milliamperes. Compact: 12¼x6½x6½". Shipping weight: 22 lbs.

$59.95 Model QRP-60 Assembled complete

Jelectro DeLuxe Key Model HK-1. Solid polished brass base, solid silver contacts, ball bearings, circuit closing switch. Both spacing and spring tension fully adjustable. Ship. wt. 1½ lbs. Price **$1.95**

Jelectro Semi-Automatic Key Model BK-100. Fully adjustable for smooth operation at any speed. Lead weighted base and suction cups keep key from sliding. Moving parts are protected by plastic covers. Chrome plated. Ship. Wt. 5 lbs. Price **$9.95**

Coming Soon: Transistor Code Oscillator • All-Wave 5-tube Receiver with S meter, etc.

Order direct from:

JELECTRO ELECTRONIC COMPANY

200 La Paloma Avenue, Alhambra, California

All prices F.O.B. Alhambra. California residents add 4%

Jelectro Overseas Agencies Available, Write.

For further information, check number 41, on page 132

1000 MILES *[from page 55]*

the dozens of beautiful beaches and lagoons.

The last inhabitant we saw was Tony waving goodbye from the jetty steps and we recognized our beach and Tony's lovely home on the extreme north tip as we sailed past, Africa bound. Back in VQ4 land we took Lee for a goggling expedition and found a nice lot of tropical shells on the reefs—a fine collection for his shack and Lee's last two days were spent with me on a super expedition hunting elephant, hippo, rhinoceros and lion with colour film. As he said, "I have now seen and done all things". We gave him a party send off of Radio Society Members and we were all very sorry to lose Lee, a wonderful pal. ■

TNS *[from page 53]*

hole is for the V 1 socket and the ½ inch hole is for the V 2 socket (Fig. 3)

Mounting Of Components

Sockets—Insert socket in the card so that terminals protrude *through* hole and touch the copper wiring. Orient socket to proper position. Hold socket in place and bend over socket terminals. Solder in place. Center ground stem is not used. See fig. 3.

Resistors—Bend resistor leads, insert in proper holes, bend over on *wiring* side. Clip off excess lead. Solder in place. See fig. 3.

Disc Capacitors—C_1 C_4—Mount same as Resistors.

Potentiometer R7—Connect leads from potentiometer lugs X and Y to points X and Y on printed circuit card (fig. 2).

Filament Connections—

For 6-volt operation

Connect two wires to Points 6 and G, respectively.

Connect jumper between Point G and Point 12.

For 12-volt operation

Connect two wires to Points 12 and G, respectively.

Power Input +75 to 250 DC at 1.0 *ma.* 6 volts at 0.6A or 12 volts at 0.3A.

Input Lead (A) and Output Lead (D) are shielded leads and the shield is not connected to ground except at the *receiver* end of the wire. ■

BEGINNING *[from page 50]*

Amateur radio lives today because it early took on a purpose. Goals were set for it. Thanks to the American Radio Relay League, amateurs organized to accomplish something—relaying messages across the country.

To get the most from amateur radio, *be active*. The more active, the greater the pleasure.

We can't take away from those real old-tim-

ers the thrills of that era when messages first flashed through space to distant destinations. But since then, many other radio thrills occurred. Active amateurs enjoyed each one that happened following their entry into the amateur ranks.

And the more active the amateur, the greater the chance that he will discover something that contributes to the advancement of radio. Ham radio never was just a plaything. It was sold to our government as having a useful purpose. Today, if we want to keep it, we must do things that constantly sell it.

As speakers, old-timers can be terrible bores or delightful stimulants. Nothing is more tiresome than, "We did this and we did that in the old days." It sounds so boastful and smug. The old-timer most admired is the one who lets you know how active he is today. Whether at an old-timer's wingding or just during a social visit, he brings up the past only to strengthen the present. You learn that condenser impulses in the early days were the heart of spark transmission; while condenser impulses today form the basis for television and radar. Listening to this type of old-timer impresses one that amateur radio is alive and as full of fun today as yesterday.

Sure it was fun to grow up with radio. But remember, others lived equally full lives growing up with automobiles and airplanes during the same period. And before then, still others thrilled to the settling of the West with its attendant cowboys and Indians.

To have been lucky enough to grow up with something is not much in itself. Participation in its growth is the main thing. And as long as it continues to grow, you must continue with it. Otherwise, it's like holding a lion by the tail—once you let go, you're a "has-been".

Keeping up with today's amateur radio keeps the old-timer "young". As each year thins his ranks a little more, his associates automatically include more and more of the younger hams. This is a healthy situation because he never will run out of companions. And too, he has a front-line seat for watching the growth of future engineers and discoverers.

This kind of old-timer always makes you feel he is a part of the present and you are a part of the past. He is the kind of person you can expect to cross the threshold from this life into the next still sending a CQ.

The End

QUADRUPLER *[from page 46]*

tible temperature rise in the diodes, but the capacitor cans and the inductor core were quite warm to the touch.

Inductor Construction

The inductor used in the prototype was

wound on the core of an old filter choke. The air-gap was built up with paper strips between the "I" and the "E" laminations. The scheme used by the choke manufacturer to clamp the laminations together across the air-gap is inadequate in this application. The core buzz is annoying when the load is applied, and an audible "thump" occurs each time the supply is connected to the source voltage as a result of the large surge current. An air-core inductor would require a little more space and considerably more wire (about 500 feet), but it would be silent and much more efficient than an iron-core inductor.

The performance of the quadrupler with 115 volts input was checked by the author at home without the benefit of laboratory instruments. The output voltage with a 375 watt load (five 75-watt lamps) was about 540 volts. If 115 volt operation is intended, only four diodes and four capacitors are needed. Also, the voltage rating for the two input capacitors can be as low as 175 volts. No half-megohm resistors are needed, and only two tenth-megohm resistors need be used.

Conclusions

The chief disadvantages of this type of power supply are that the output voltage is relatively low, and the output terminals are not isolated from the power source so that neither terminal can be grounded. The problem of low voltage can be overcome by choosing the proper tubes. The 811A, for instance, operates quite efficiently with 1200 volts or so on the plate, and four of them would utilize this power supply's capabilities nicely. If grounded-grid operation were used, the lack of isolation would present no problem at all, since the cathode is already above ground for *rf*. When the quadrupler is connected to a 230-volt, three-wire, grounded-neutral source, the positive terminal is a maximum of $(650+115\sqrt{2})=813$ volts above ground potential, and the negative terminal is a maximum of 813 volts below ground potential. One-kilovolt ceramic bypass capacitors should be adequate for both plate and cathode *rf* ground-return paths.

Costs

The prototype quadrupler cost a few cents under $50 (including all hardware). A 115-volt version (540 volts, 400 watts) should cost about $25. This works out to be 16 watts per dollar, which is a bargain any way you look at it. The considerable reduction in size and weight over a conventional power supply are additional bonuses. The no-load to full-load voltage regulation of the prototype is about 17%. With 75 microfarads across the output terminals, however, the dynamic regulation should be quite good. ■

OSCILLATOR *[from page 43]*

band rig, then couple a high impedance set of headphones to the output. There is sufficient audio to operate the phones if you have the controls R5 and R10 set for a maximum output. It's possible to have approximately 3.5 volts out and this will probably be far too much for the mike input circuit on your sideband rig. About 0.5 volts output seems to be a good compromise and the correct setting of R5 and R10 will insure this factor. Fixed resistor values may be substituted for R5 and R10 once the correct values are known, by removing the potentiometers and making accurate measurements of their setting. Refer to fig. 1 for alternate methods. It may be noted this was the choice in the pictured unit.

The data as presented to this point should suffice for the audio section of the project. Now let's see what part the pulser will play. It should be obvious to sidebanders that you normally can't handle a sustained tone into the linear final, hence the need for an intermittent tone source; and if it's automatic in operation you will have both hands free to adjust the scope, make adjustments to the sideband rig and so forth. If we have lost anyone at this point, I suggest a review of the subject of "two-tone" test which is covered very well in such publications as the new Sideband Handbook by W6TNS. For those of you still with us, please refer to fig. 1 and the pulser circuit portion of the project. There are many ways of switching a circuit on and off at various rates but by this time a look at some of the "flasher" circuits featuring transistors would be logical in order to go along with the transistorized audio section of this unit. Now a switching circuit with a simple on-off function would be fine, but I decided that in this particular application, more variety was needed. The following modes were of interest.

1. A short on cycle with a long off period.
2. A medium on and a medium off cycle.
3. A long on cycle with a short off period.
4. A continuing on-off with speed enough to keep the scope trace in view.

This multiplicity is obtained satisfactorily by changing the setting of R14. There are two possible control factors in the pulser circuit and the "purists" could make both R14 and R12 variable. Increasing the resistance of R14 will tend to increase the amount of "on" time, and decreasing the resistance of R12 will tend to lower the pulse rate. Beware, because the battery voltage, as it lowers due to use, will also control these factors—probably not to your liking. The relay as you see from fig. 1, is used to control the voltage applied to the audio section of the unit and thus the pulsing of the audio is achieved. A surplus 28 volt *dc* relay

[Continued on page 128]

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FOR SALE (Cont'd.)

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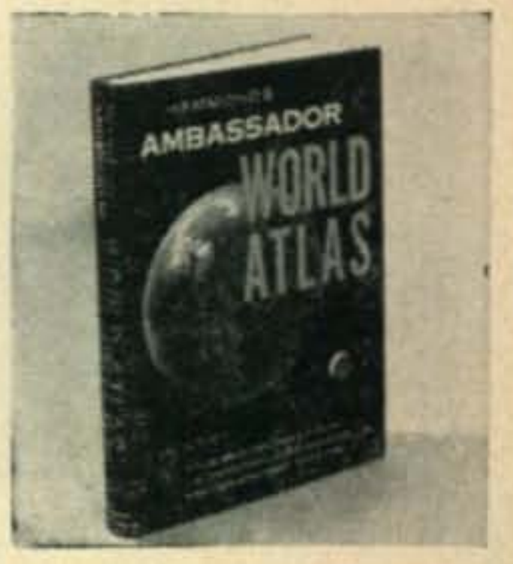

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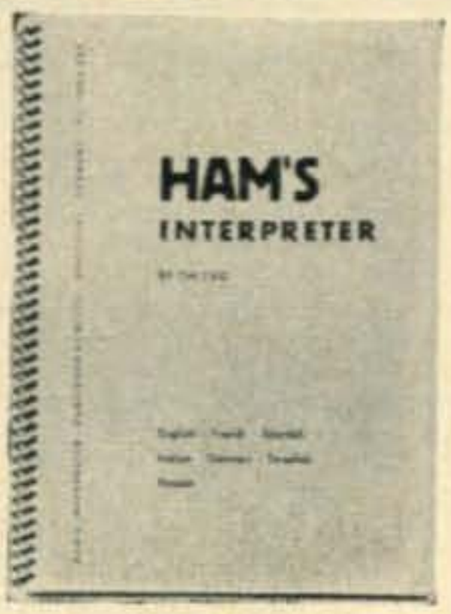

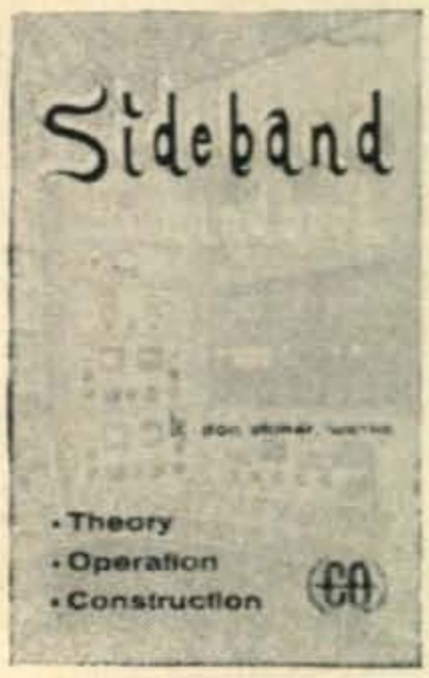

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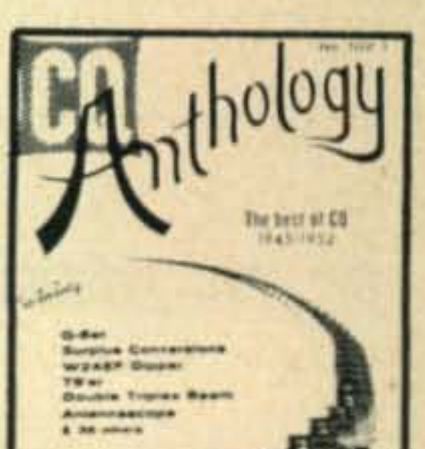

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ATTENTION CATHOLIC HAMS. The Franciscan Brothers who run Morris School for Boys in Searcy, Arkansas are looking for usable Ham gear. All donations welcomed. Ad donated by K5CHV.

HAM Licenses, resident courses, Novice and General. Classes 3 evenings weekly. Delehanty Institute, 117 East 11th Street, New York City 3, N. Y. Tel. GR 3-6900.

FUN in the SUN at the Greatest of all Florida Hamfest, the TROPICAL HAMboree, January 30 & 31. Write Box 104, Miami 1, Florida for details and hotel reservations.

MERRY XMAS and A HAPPY NEW YEAR from WØCVU. Thanks for making these awards possible on Two-Way SSB: DXCC, CQ 100, WPX, WAC, BERTA, 101, TPA, WAA, DRD, 150 countries confirmed on Two-Way SSB. Using Collins KWS-1, 75A-4, and Telrex Beams.

"YOUR BEST CONTACT" (spiritual side of ham's life). Free on request. Sackers, W8DED, Holland, Michigan.

OSCILLATOR *[from page 118]*

is used, but any similar relay having a *dc* coil resistance of 300 ohms will fill the bill. This portion of the circuit will draw a fair amount of current on an intermittent basis, but don't blame the transistors since they are only controlling the relay. The relay coil is the reason for drain on the battery. Since the unit is not in continuous use, being normally a piece of test equipment, a total drain of about 60 *ma* from the 22½ volt battery is not a problem.

How It Works

If you are wondering at this point why the switcher and the audio oscillator work the way they do, then go buy a book and read the story of the transistor. I, for one, am a little tired of pouring through various construction articles filled with formulas, graphs and other gobs of data when all I wanted in the first place was to build a simple little gadget and start using it. If one of your projects doesn't work just right, you can then start the process of either cursing the fool who wrote the article or looking for that book I mentioned. Of course we sometimes find wiring errors of our own, but we never admit these.

If you are now ready to hook up this unit and give it a try, fine! First, however, I would recommend that you put it into one of those little metal boxes that most chassis manufacturers seem to be selling. This will then provide housing space for the battery and supply the shielding that might be desirable. In any event, have at it, and good luck. I think you will be surprised at the improvement in the linearity of your *rf* final, due to you, your scope and the little two-tone oscillator-pulser. ■

SUNSPOT *[from page 42]*

fore me. All we needed was a little bit of grid current. . . . . .

"What's wrong?", asked Pendergast. "All of a sudden you look white. Are you going to faint?"

In one horrible blast of truth the whole idea of the self-neutralized 304TL tubes crashed about my head. Through a haze I noticed something that Pendergast and I had seen a thousand times but had never recognized. The four grid terminals of the 304TL tubes were connected together *internally*, in addition to having the removable grid ring on the outside of the envelope! This realization hit me in the pit of the stomach like a blow from a fist. Our whole money-making scheme dissolved into nothing. Pendergast's features looked old and drawn in the harsh, granular light of the 304TL filament. I felt tired and foolish. Obviously the whole idea was worthless. There would never be a self-neutralized 304TL amplifier because

the *Eimac* company had thoughtfully welded the grids of the 304TL tube together within the envelope, a union complete and final until the day the tube turned to dust. I then thought of the truckload of 13,593 tubes, on their happy way to my home.

"Let's go to bed," I said. "I've had enough excitement for one day!"

* * * *

Pendergast carefully placed the copy of CQ atop the receiver and turned to me.

"I know what you've been thinking about," he said calmly. I nodded dumbly, still unnerved from thoughts of the four year old experience. "Old Eddy was pretty nice about taking all those tubes back. Actually, we didn't lose much money. It just hurt our pride."

"Yes," I replied. "Too bad we didn't hang onto all those tubes. They were a gold mine, and we didn't know it. Look what they are worth now! We wanted to resell them for four bucks or so. They're worth ten times that now!"

"You know," replied Pendergast. "The day we bought those tubes was July 17th. That day was the absolute low spot on the sunspot cycle. I wonder if all hams go slightly crazy on that day? Maybe its like a werewolf or zombie situation, where a fellow goes crazy at the full of the moon after he's been bitten by an enchanted wolf. Well, the ham goes nutty from the solar radiations that are extremely heavy on that particular day. I'd call it *Sunspot Madness.*"

"I'd call it hog-wash," I shot back. "You have been seeing too many horror movies on television." I pondered for a moment. "Even so, in a few years we'll have the same situation again when we reach the unhappy date at the exact bottom of the sunspot cycle. Who knows, maybe we'll have another nutty idea when the day arrives." I got out of my chair and snapped off the receiver." "I think I'll stay in bed that day. It'll be a lot safer! We'd better not take any chances next time!" ■

S9ER *[from page 38]*

planation of what the Mark II does limited to the simple statement that it converts the original pentode stage to a cascode circuit.

This is the place to look at figures 1 and 2. Figure 1 shows a typical pentode first *rf* stage, with all bandswitching omitted for simplicity.

Figure 2 shows what happens to this circuit when the S-9er Mark II is plugged in. Note that Rk, Ck, Rs and Cs are effectively out of the circuit. The dotted line merely encloses S-9er circuitry, and does not indicate shielding.

Notice that the only leads from the original circuit which matter are the grid connection which must feed to pin 7 of the 6BS8, the plate lead carrying output which is pin 1 of the 6BS8 and must go to the same place as did the

original plate lead and the filament wiring, which connects to pins 4 and 5 of the 6BS8.

All other wiring is self-contained in the unit. A separate schematic is shown in fig. 3.

To adapt it to any other series of pentode tubes, just be sure the grid, plate and heater leads run to the right places, and provide a ground return for the bypass condensers. Your original screen-grid leads and cathode connection can be ignored and left floating, or completely disconnected, as you choose.

Now back to that matter of boosting the receiver's gain. Several tubes have been de-

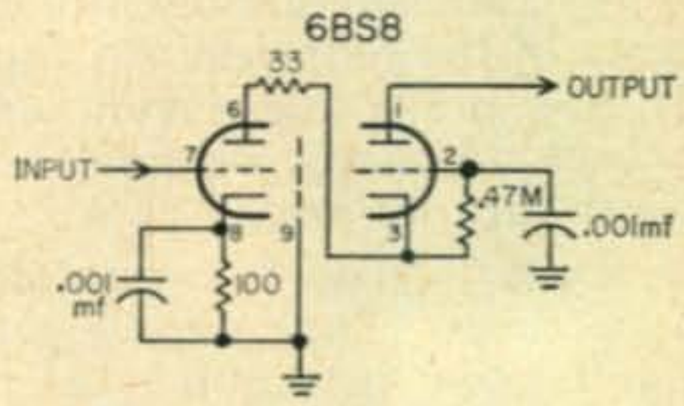

Fig. 3—Basic circuit of the S9ER. See text for installation instructions.

veloped in the past few years which exceed the wildest dreams of early-day designers—and let's face it, most of us own sets designed for the older tubes.

The only problem with tube substitution is that most newer tubes have characteristics so far from those of the tubes in the set that they are incompatible. Far from being a simple plug-in matter, it often requires a complete redesign of the set.

However, and luckily for us, that's not *always* so. Without going into the technical details of how to tell whether a newer tube will work, I'll pass along a few tried and proven replacements which are doing yeoman service in this part of the country to pep up tired stages.

Starting with the 6SK7, which I still think can be found in more ham receivers than any other one tube type, I have found the 6SG7 to be a perfect substitute with almost double the gain. Some that won't work properly for one reason or another include the 6AC7 and the WE 717-A. If you're willing to raise the screen voltage to 200, the 6AB7 works well, but no better than the 6 Sugar George.

In the miniature class, W5DRE tells me the 6BZ6 is one of the hottest *rf* amplifiers he has found. It is a plug-in substitute for the 6AH6, and usually will also sub for the 6BA6, 6AU6 and 6AH6. The latter three may require switching leads between pin 2 and 7 and vice versa, but not always since 2 and 7 are cathode and suppressor-grid connections and usually are strapped together.

So that's it—the theory and operation of the S-9er Mark II, with a bonus in the way of gain improvement. Any more questions? Just write and I'll try to help—but S.A.S.E. would be appreciated when you write. ■

EXCITER *[from page 37]*

and C_{10} so that the voltage at R_{14} and R_{15} respectively is just .707 of the voltage at the link of L_7. Now, couple your communications receiver loosely to the link of L_5. Tune in the carrier and adjust the link on L_2 and the pots R_4, R_5 for minimum s meter reading. Tune L_3 and L_5 for maximum signal. Be sure that the receiver is not getting a signal directly from L_1. Now, insert a weak 1600 cycle audio signal at the grid of V_4 and put the receivers crystal filter in the sharpest position. You should be able to tune in both sidebands 1.6 *kc* either side of the carrier. One of the side bands should be considerably weaker. Adjust R_{11}, L_4, and C_2 to make this sideband as weak as possible. You should have no trouble in getting it at least 30 *db* below the desired sideband.

Results

Figure 7 is by no means an optimum design, but is presented to show the general form that this circuit may take. The audio response of the 90° channel as measured from the grid of V_4 to the junction of C_{12} and rfc_1 is shown in fig. 8. The 0° channel, similarly measured, is

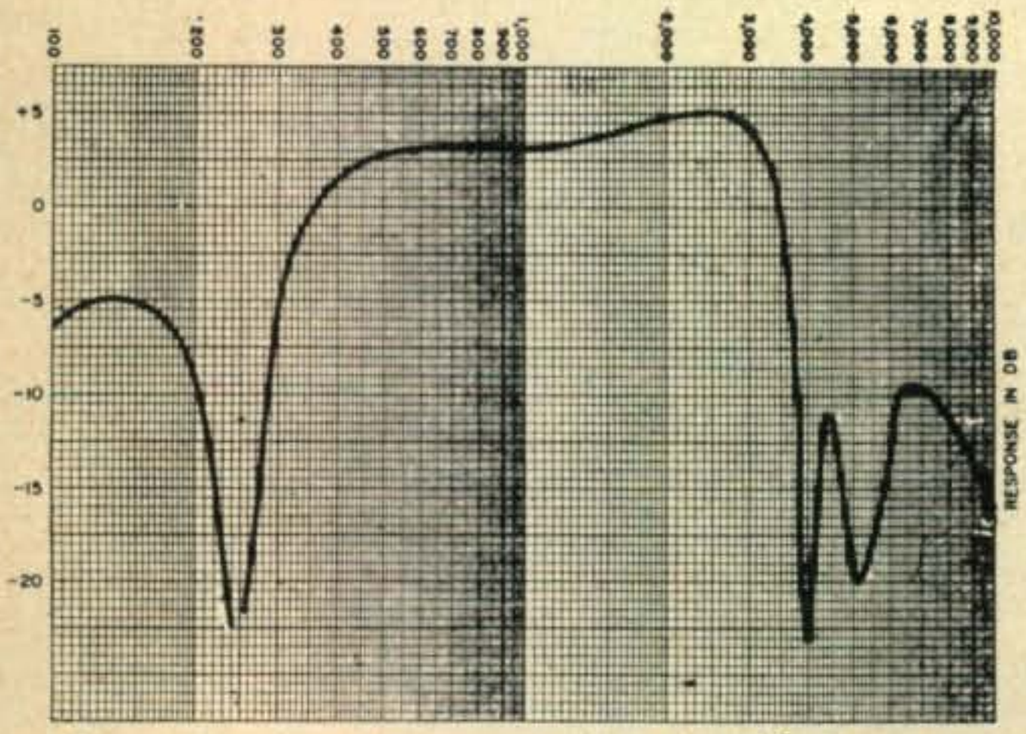

Fig. 8—Frequency response of the 90° channel.

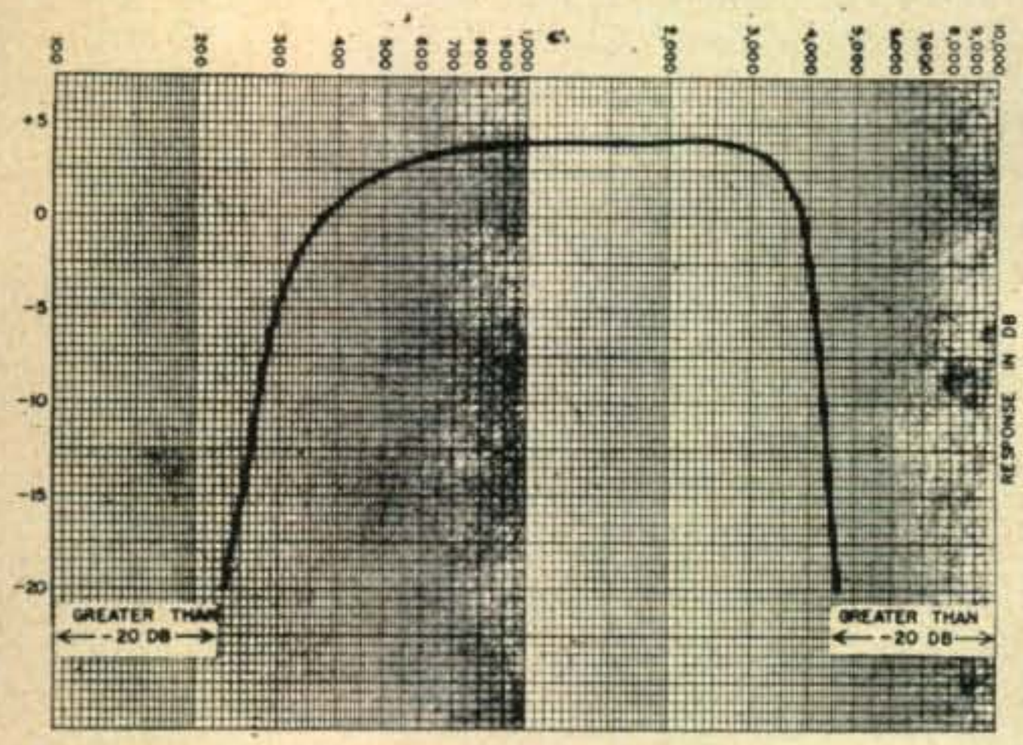

Fig. 9—Frequency response of the 0° channel.

shown in fig. 9. Checking the output of the exciter on a scope showed the sideband suppression to be about 23 *db* at the worst point between 300 and 3000 cycles. Speech quality was excellent ■

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Output 450 & TAP 250VDC at up to 150 MA/Up to **70 Watts** 80% efficiency: 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.**

Wanted 304TL Tubes & ALL TYPES!!!

***"TAB" for NEW TRANSISTORS!**

2N38	$.98	2N442	$5.00	2N441	$3.00
2N155	3.25	2N256	1.45	2N234A	1.36
2N156	4.45	2N277	4.50	2N422	5.00
2N174	12.00	2N278	5.50	CK722	.95

**Postpaid 48 States Orders $10*

W.E. 416B Microwave Triode up to 4000 Mcs. **High Transconductance 25 to 50000 mhos** use as pre-amp. mixer or oscillator HiMu—Low Noise, (Gvt Cost $58) Tubes removed from Equipment & Tested! SPECIAL **$4 ea.**
Closing out below cost!

EIMAC SK400/403 SOCKET & CHIMNEY for 4-250, 5D22, 5D24, 4-400A (Reg. $18) **SPECIAL $9.95.**
SK500/506 SOCKET ONLY for 4-1000, 4X1000 **SPECIAL $9.**
JOHNSON 122-275 SOCKET for 4-125A/250A/400 RK48 **SPECIAL $1.60.**

***"TAB" GUARANTEED XTALS!**

HAM BAND 80 or 40Mtrs ..... $1@
NOVICE BAND ..... $1@
CITIZENS BAND ..... $3@
Include 1st, 2nd, 3rd & 4th choice!
Buy Qtys Deduct 20% on $10 Orders XTALS!
**Postpaid 48 States on $10 orders*

"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 Instld Tuning Tools

Kit 6 AN Plugs & cnnctrs
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 5 FT243 Xtal Holders
Kit 5 Microswitches
Kit 10 Wheat Lamps
Kit 3 Transistor Xtmrs
Kit 8 Xtal Osc-Blanks
Kit 4 Asstd Rectifiers
Kit 12 Alligator Clips Astd
Kit 5 UG/Connectors
Kit 100 Self/Tap Screws

Kit Adj Wire Striper & Cut
Kit 2 Bakelite Panels 6x12"
Kit 5 pcs Wrench Set
Kit 8 pcs Nut Driver Set
Kit Hi Gain Xtal Mike
Kit 6 ea Phonoplugs & Jacks
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!

"TAB" Tubes Tested, Inspected, Boxed
Six Months Guaranteed!! No Rejects!
GOVT & MFGRS Surplus! New & Used

0A2	.70	6BZ7	1.25	*We Buy & Sell*	
0A3	.80	6C4	.45	43	.75
0B2	.65	6C5	.69	45	.49
0C3	.70	6C6	1.08	50L6	.69
0D3	.50	6C8	1.08	RK59	1.39
0Z4	.60	*We Trade!*		RK60	1.17
1A7	.90	6CB6	.89	HY69	2.20
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	6CB6	.89	4PR60A	37.50
1S4	.78	6CG8	1.12	4-125A	27.50
1S5	.68	6CM6	.79	4X150A	2/$9
1T4	.85	6CS6	.70	4X250B	41.00
1T5	.95	6CU6	1.29	4-400A	41.75
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	6.50	6F7	.99	388A	3/$1
2C51	2.00	6F8	1.39	350A	2.45
2D21	.65	6H6	.59	350B	1.75
2E22	1.75	6J4	1.72	371B	.95
2E24	1.90	6J5	.59	6146	3.90
2E25	2.50	6J6	.59	416B	16.00
2E26	2.75	6J7	.99	450TH	43.00
2E30	1.70	6J8	1.39	450TL	43.00
2E35	1.60	6K6	.59	460	11.50
2K25	9.75	6K7	.79		
Wanted Receivers and XMTRS					
2K26	34.00	6K8	.99	703A	2.00
2K28	30.00	6L6	1.19	707B	3.50
2V3	2/$1	6SN7	.72	715C	10.90
2X2	.48	6T8	.98	717A	5/$1
3A4	.70	6V6GT	.90	723AB	5.00
3A5	1.00	6X5	.49	725A	2.75
3API	5.95	12AT6	.59	803	3.50
3BPI	3.99	12AT7	.89	804	8.85
3C24	3.50	12AU6	.63	805	6.00
3D23	3.95	12AU7	.69	*We Trade.*	
We Buy!		*We Sell!*			
3E29	6.00	12AX7	.79	807	1.10
3Q4	.68	12AY7	1.29	5/$5, 10/$12	
3Q5	.86	12B4	.95	811	3.45
4-65A	13.50	12BA6	.65	811A	4.41
4-125A	27.50	12BA7	.99	812	3.30
4-250A	34.00	12BD6	.59	813	8.00
4X150A	7.00	12BE6	.59	815	3.15
4X250	36.00	12BH6	.79	826	.59
4X500	37.00	12BH7	.99		
5API	2.95	12BY7	1.00		
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	6.00
5CP7	9.00	12J7	.69	833A	36.00
5R4	1.00	12J8	1.35	837	2/$2
5T4	.90	12K8	.89	866A	2.45
5U4	.75	12SA7	.69	954	10/$1
5V4	.89	12SC7	.89	955	3/$1
5Y3	.60	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	2.75
6A8	.99	12SK7	.75	1619	5/$1
6AB4	.59	12SL7	.79	1620	2.00
6AC7	.72	12SN7	.69	1625	5/$1
6AG5	.65	12SQ7	.69	1626	5/$1
6AG7	.75	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 $$$ Paid for 304TL tubes					
6AR6	1.95	19T8	1.16	5618	3.25
6AS7	3.49	24G	3.50	5651	1.35
6AT6	2/$1	25A6	1.19	5654	1.20
6AU6	.79	25A7	2.19	5656	4.25
6B8	1.35	25C5	.81	5663	1.15
6BA6	.59	25L6	.72	5670	.90
6BE6	.59	25T	4.00	5686	1.75
6BG6	1.49	25Z5	.72	5687	1.15
6BH6	.79	25Z6	.75	5691	4.70
6BJ6	.72	26A7	3.69	5725	1.95
Top $$$ Paid for XMTTR Tubes!					
6BK7	.99	FG27	8.28	5732	2.00
6BL7	1.35	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.

111CY Liberty St., N. Y. 6, N. Y. RE 2-6245

"TAB"—THAT'S A BUY!—BARGAINS!!

IRISH/MYLAR Tape 2400 ft .... 3/$12
CONDSR Oil/W.E. 2mfd@600WVDC 6/$1
SNOOPERSCOPE TUBE 2" $5@ 2/$9
MINI-FAN 6 or 12VAC/60Cys $2@, 3/$5
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
Blower 24VDC/100CFM $3.98
Blower AC/Miniature 6&12VAC $1.00
Xmitting Mica's .006 @ 2500V, 5 for $1.00
Miller 2.5MH/2.5&5Mtr Chokes ....8/$1.00
Vibrators 6 or 12VDC $1.49@; 4/ $5.00
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/TC... $4@, 2/$6
DC MTR 100Ma/2½" ..... $3@, 2/$5
BC696/3 to 4 mc's good condition $5.95
AN-ARR2/RCVR less tubes A-1 endtn $1.95
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
G.E./YRS-1 Side Band Selector $45
829B Socket 85¢, 2/$1.50. 813 Socket $1
4x150 Ceramic/LOKTAL.....2 for $1.00

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
TF30/10VCT@10A, 680VCT@40MA $4.95
TF31/10VCT@10A, Pri 105/15/25V $4.00
TF35/2x5V@10A each or 10VCT/10A $4.50
TFM35/6.3VCT@15.5A&6.3VCT@2A $3.50

H.V. Silicon 866A Tube Replacement Rectifier Rated 250 Ma at 4500V-RMS or 6400PIV. Operates —65 to + 165°C. Max 12.5 VDC Drop 150Ma "VACDAC" ST866. **Each $16.**

New Silicon 500Ma Rectifiers, *Working Range RMS-ACV Input!

rms/piv	*rms/piv*	*rms/piv*	*rms/piv*
35/50	70/100	140/200	210/300
30¢	45¢	50¢	65¢
rms/piv	*rms/piv*	*rms/piv*	*rms/piv*
280/400	350/500	420/600	490/700
78¢	$1.00	$1.26	$1.50
rms/piv	*rms/piv*	*rms/piv*	*rms/piv*
$1.59	$1.89	$2.58	$3.12

Use in Bridge or C.T. up to 750ma dc
**Postpaid 48 States order $10*

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.

SELENIUM F.W. BRIDGE RECTIFIERS

DC AMP		18VAC 14VDC	36VAC 28VDC	72VAC 54VDC	130VAC 100VDC
One Year Guar.	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

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.
Write for Rectifier Catalog

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

*Silicon 360P. I. V. at 250 Ma Rectifiers H-Temp 106°C at 252V/RMS. Special 2 for $1; 25 for $10.
**Postpaid 48 States*

Send 25¢ for Catalog

1959 Cumulative Index

Holiday Greetings

to all our Ham Friends the world over

from the **ALLIED**

Ham Shack—and the rest

of the gang

at Allied

W8CZE
Jack Schneider

W9WHF
Jim Sommerville

W9BHD
Joe Huffman

W9HLA
Joe Gizzi

W9BUD Larry Blostein
K9BYD M. Fleischman
W9CCW Rudy Ackermann
K9CDJ Joel Bolker
W9DCB Milt Fojtik
W9DPO Alvin Singer
W9ECC Bob Gumm
K9EIL Don Saxon
W9EXQ Chuck Stone
K9GSB Norman Eastman
K9GXK Jack Wolfson
K9HLV R. Archambeault
K9HOB Don Wisniewski
K9ICY Rodney Strom
KN9IJO Mike Heinrich
K9KEF Leon Hearn
K9KVQ Rodger Nordlund
KN9KWT Bob Oatley
K9KWY Sherwin Berger
K9MDF Jack Marcus
W9MHB Goodwin Mills
K90DD Bob King
W9QBB Tasker Day
KN9RID Lloyd Mast
W9RND Jack Matin
KN9RUQ Michael Griffin
W9SFW Lou Dezettel
W9SIA Franklin Swan
W9THG Leo Borek
W9UVB Bob Knowles
W9UWM Clifford Ratliff
W9VHI Don Kobiljak
W9VHS Tony Marcello
W9WOV George Bercos
W9YLS George Miller
W9ZJU "Doc" Towler

serving the Amateur since 1921

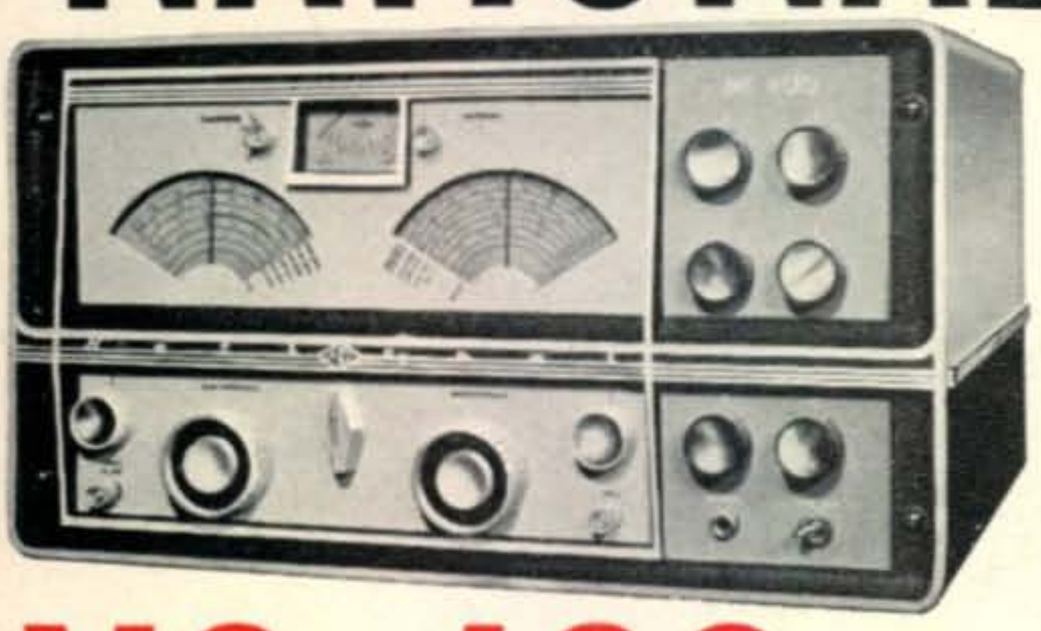
ALLIED RADIO

100 N. WESTERN AVE., CHICAGO 80, ILL.

For further information, check number 59, on page 132

BURTON BROWNE/New York

NEW FROM NATIONAL



NC-400

The Most Versatile Communications Receiver Ever Designed

National

NATIONAL RADIO CO., INC.

MELROSE 76, MASS.

A wholly owned subsidiary of National Company, Inc.

For further information, check number 2, on page 132

The NC-400 is a modern, multiple purpose, general coverage receiver. Tuning range is 540 kc to 31 mc in 7 bands, with dual conversion on all frequencies above 7 mc. Its unique design provides maximum flexibility of operation to satisfy a wide variety of communications requirements.

The NC-400 may be used as a self-contained unit, either manually tuned or crystal controlled on pre-selected frequencies. In addition, external master oscillator provisions make possible use of modern synthesizer techniques for applications where extreme frequency stability is required. It may be operated in space or frequency diversity applications. Provisions are made for interconnection of any required outputs or for feed to external loads or combiners. All frequency determining circuits may be internally or externally controlled. The NC-400 also provides optimum versatility of bandwidth, either through the use of internal IF circuits or the use of optional mechanical filters.

FREQUENCY RANGE:	GENERAL COVERAGE
Band 1	.54– 1.1 MC
Band 2	1.1 – 2.1 MC
Band 3	2.1 – 4.1 MC
Band 4	4.1 – 7.0 MC
Band 5	6.9 –12.2 MC
Band 6	11.8 –20.4 MC
Band 7	19.6 –31.0 MC

NOTE: Bandspread dial provided with 0-100 logging scale and calibrated for 80, 40, 20, 15 and 10 meter amateur bands.

FREQUENCY STABILITY: Long term stability after warm-up –.002%

SENSITIVITY: 1 microvolt for 10 db signal/noise ratio

SELECTIVITY: 4, 8 and 16 kc positions provided with 6 tuned circuits. 3.5 kc wide upper and lower sideband positions provided with 14 tuned circuits. 3.5 kc sharp position activates plug-in crystal filter providing 5 additional degrees of selectivity below 3 kc plus phasing notch. Plug-in accessory available which will provide front panel selection of three mechanical filters without modification of receiver. Proper choice of filters will enable selection of bandwidths from 500 cycles to 16 kc, or will enable filter type of sideband selection from front panel.

SSB PROVISIONS: Separate SSB heterodyne detector uses pentagrid converter and separate beat oscillator. Beat oscillator may be crystal controlled. Special "fast-attack-slow release" AGC circuit. Sideband selection accomplished by exclusive, new National passband switching techniques. In the event of commercial-type SSB reception, single sideband mechanical filters may be installed and switched from front panel.

FIXED CHANNEL OPERATION: HF oscillator has 5 crystal sockets for use in fixed channel operation. Channels may be selected by front panel switch. In addition, HF oscillator may be controlled from external master oscillator selected by front panel switch. "S" meter "Tune" position permits rapid tuning of receiver to crystal controlled channel.

DIVERSITY PROVISIONS: Basic receiver may be operated from master oscillator as noted above. An accessory Diversity Modification Kit (NC-400 DMK) allows choice of internal or external control of all oscillators. Rear panel selector provisions make possible use of any receiver either as master control, or slave fed from other oscillator sources. IF, detector and AGC outputs available for feed to external loads or combiners.

POWER REQUIREMENTS: 110-220 volts, 50-60 cycles AC

MANUFACTURER'S SUGGESTED LIST PRICE: $895.

OPTIONAL ACCESSORIES:

1. XCU-400 crystal calibrator. Output frequencies of 100 kc. and 1 mc.
2. NTS-2 matching speaker
3. NC-400 DMK diversity modification kit
4. NC-400 FH mechanical filter housing

*Manufacturer's suggested list price. Sold only by National Co. Franchised Distributors

In Canada by Canadian Marconi Inc., 830 Bayview Ave., Toronto, Ontario

Export by Ad Auriema, Inc., 80 Broad St., New York City.

BEAM

More power to you in '60

from your RCA Industrial Tube Distributor

RADIO CORPORATION OF AMERICA

Electron Tube Division — *Harrison, N.J.*