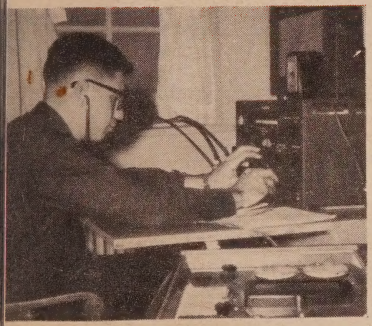
March 1959 50¢

CQ



Master-minding the entire six man crew of K2GL operators is DX-pert Bill Leonard, W2-SKE, at controls of the main No. 1 rig (a Collins KW-1).



Fred Capossela, W21WC, listens for some weak ones on 20 meters from operating position No. 3 (the Johnson Kilowatt).



Chief operator Buz Reeves, K2GL, knocks off some new multipliers from transmitter position No. 3 (A Johnson Kilowatt with its own 4-element 14 *mc* Telrex).

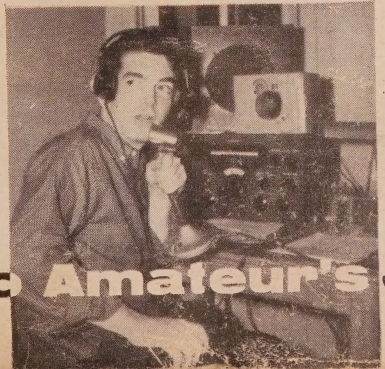


"Master control" of K2GL from which the activities of all four kw. phone rigs and an auxiliary KWM-1 were coordinated. Equipment included four 75A-4 receivers and choice of 12 different antennas.

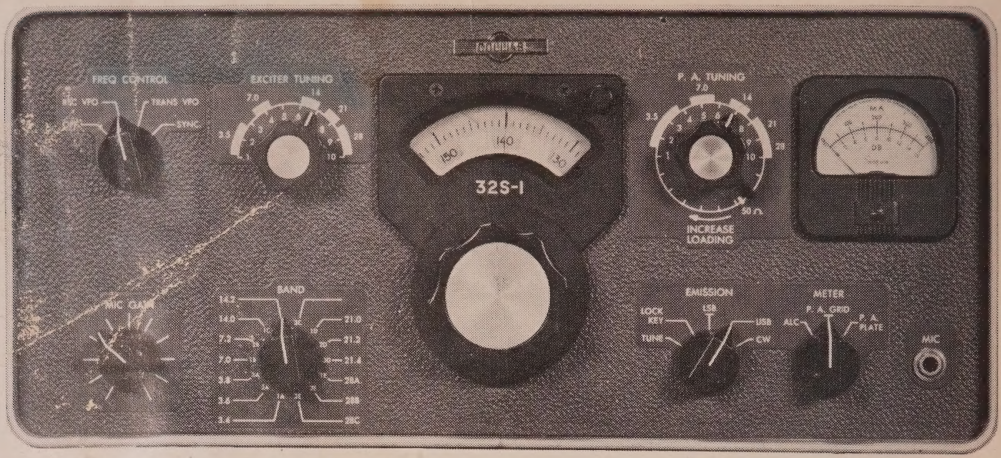


Covering SSB from transmitter position No. 2, Dick Darrance, W2LEJ-K2EAD, works 21 *mc* at the mike of a KWS-1.

Keeping the second of K2GL's two KW-1's busy is Dave Rosen, W2-GLM, operating from position No. 4.

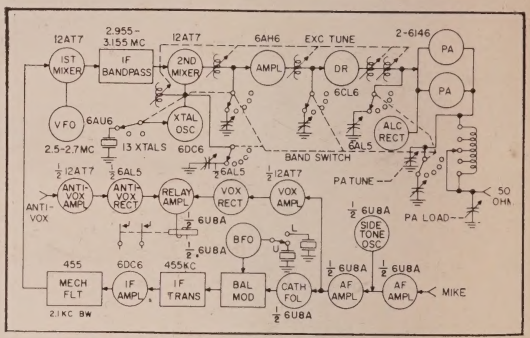


The Radio Amateur's Journal



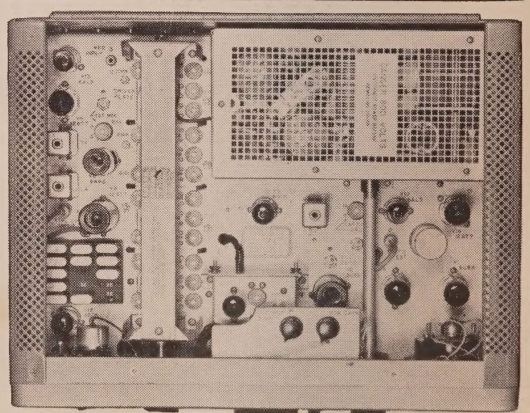
Straightforward design features permeability tuned VFO, crystal controlled HF oscillator, Mechanical Filter sideband generator, RF feedback, and automatic load control.

Compact circuit arrangement results in a basic transmitter package measuring only 14½" W, 11⅝" D and 6⅞" H. Operation is simplified with fewer front panel controls.



COLLINS 32S-1 TRANSMITTER

Compact Styling . . .
Advanced SSB Performance



The new 32S-1 SSB and CW Transmitter, handsomely packaged in a desk-top cabinet, provides nominal output of 100 watts — 175 watts PEP input on SSB, 160 watts input on CW.

It offers the amateur a refreshing simplicity of operation with its reduced number of controls; excellent stability; highly accurate, 1-kc calibrated dial. By a flick of a switch, transceiver operation may be selected, with the 75S-1 Receiver controlling the transmitter frequency.

The Mechanical Filter sideband generator assures clean voice signals without additional audio filters. Automatic load control prevents over modulation and provides 10 db compression for higher average talk power. Excellent linearity is obtained by RF feedback around the PA and driver.

The 32S-1 comes supplied with crystals for operation on all amateur bands between 3.5 and 29.7 mc. Frequencies between ham bands are available by substituting crystals. An ac power supply is housed in a separate, matching cabinet. The transmitter will also operate from accessory 12 or 28 v dc supplies — a useful feature for such activities as field days or mobile operation.

Visit your Collins distributor to examine the 32S-1, its associated 75S-1 Receiver and the 30S-1 Linear Amplifier, which may be driven by the 32S-1 to provide full legal input (1 kw average) on SSB and 1 kw input CW.

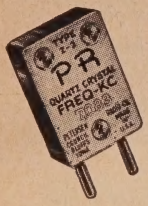
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COLLINS

Make your reservation for the *ANNUAL SINGLE SIDEBAND DINNER*, March 24, 1959.
Contact the SSB Amateur Radio Association, 1741 Andrews Avenue, New York 53, New York.

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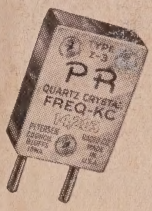


40, 80 and 160 Meters, PR Type Z-2

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

20 Meters, PR Type Z-3

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



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

$4.95 Net

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



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

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SPECIAL TYPES

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

Type Z-1, AIRCRAFT

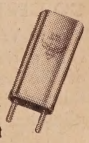
3023.5 Kc., .005%.....$3.45 Net

Type Z-1, MARS and CAP

Official assigned transmitter frequencies in the range.

Calibrated to .005%. 1600 to 10000 Kc. $3.45 Net

Type Z-6A FREQUENCY STANDARD



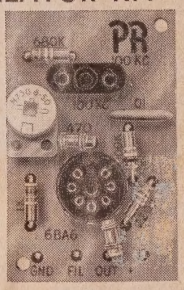
To determine band-edge. To keep the VFO and receiver properly calibrated.

100 Kc. . . . . $6.95 Net

PR PRINTED OSCILLATOR KIT

Has many uses—

- As 100 Kc. Marker
- As 1000 Kc. Marker for Check Points up to 54 Mc.
- As Foundation Circuit for Low Frequency SSB Crystals



Assembled in minutes. Kit contains everything but 6BA6 oscillator tube and crystal.

Each . . . . . $4.50 Net



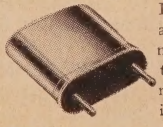
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Suitable for converters, experimental, etc. Same holder dimensions as Type Z-2.

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Designed for



Application



The No. 61455

ADJUSTABLE COUPLING—HIGH Q MINIATURE IF TRANSFORMER

Extremely high Q: Variable Coupling—(under, critical, and over) with all adjustments on top. Small size 1 1/16" x 1 9/16" x 1 7/8". Molded terminal base. Air capacitor tuned. Coils mounted in special powdered iron assemblies. Tapped primary and secondary. Rugged construction. High electrical stability. No. 61455, 455 kc. universal transformer. No. 61453, 455 kc. BFO. No. 61160, 1600 kc. transformer and No. 61163, 1600 kc. BFO.

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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 126.

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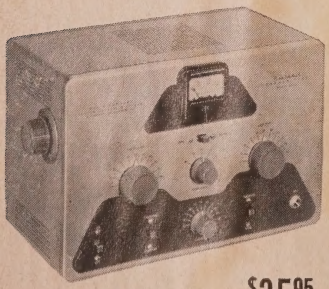


"SENECA" VHF HAM TRANSMITTER KIT

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



HEATHKIT VHF-1 **$159.95**



HEATHKIT DX-20 **$35.95**

DX-20 CW TRANSMITTER KIT

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

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

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

"CHEYENNE" MOBILE HAM TRANSMITTER KIT

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



HEATHKIT MT-1
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"COMANCHE" MOBILE HAM RECEIVER KIT

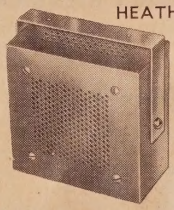
Everything you could ask for in modern design mobile gear is provided in the "Comanche" . . . handsome styling, rugged construction, top quality components . . . and, best of all, a price you can afford. The "Comanche" is an 8-tube superheterodyne ham band receiver operating AM, CW and SSB on the 80,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



HEATHKIT MR-1
$119.95

MOBILE SPEAKER KIT

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



HEATHKIT AK-7
$5.95

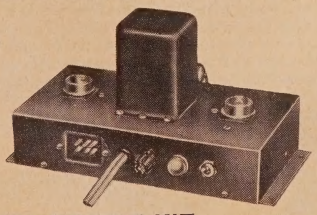


HEATHKIT AK-6
$4.95

MOBILE BASE MOUNT KIT

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

HEATHKIT MP-1
$44.95



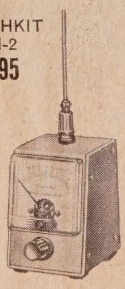
MOBILE POWER SUPPLY KIT

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

POWER METER KIT

HEATHKIT PM-2
$12.95

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.



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COMPANION UNITS



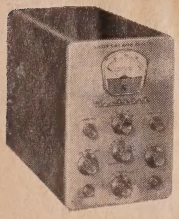


HEATHKIT TX-1 $234.95

"APACHE" HAM TRANSMITTER KIT

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

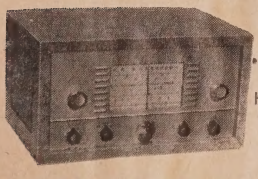
HEATHKIT SB-10 $89.95



SINGLE SIDEBAND ADAPTER KIT

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

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



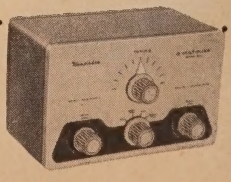
HEATHKIT AR-3 $29.95

(less cabinet)

ALL-BAND RECEIVER KIT

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

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



HEATHKIT QF-1 $9.95

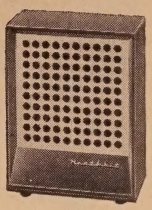
"Q" MULTIPLIER KIT

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

OF DISTINCTIVE QUALITY

ACCESSORY SPEAKER KIT

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



HEATHKIT AK-5
$9.95



HEATHKIT RX-1 $274.95

"MOHAWK" HAM RECEIVER KIT

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



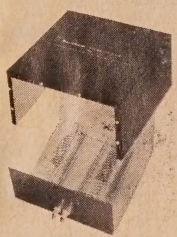
HEATHKIT AM-2
$15.95

REFLECTED POWER METER KIT

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

BALUN COIL KIT

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



HEATHKIT B-1
$8.95



HEATHKIT VX-1
$23.95

ELECTRONIC VOICE CONTROL KIT

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

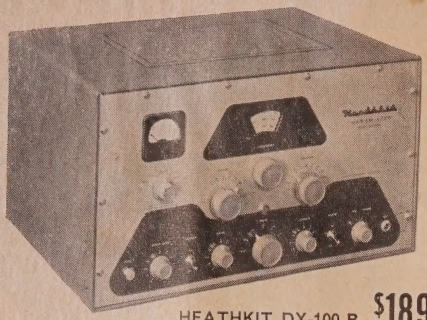


HEATHKIT VF-1
$19.50

VFO KIT

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

Save 1/2 or more...with Heathkits



HEATHKIT DX-100-B $189.50

DX-100-B PHONE AND CW TRANSMITTER KIT

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



HEATHKIT DX-40 $64.95

DX-40 PHONE AND CW TRANSMITTER KIT

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

Free *specification sheets are available on all Heathkits. Simply ask for spec sheet by model no. of kit in which you are interested, or write for latest catalog describing over 100 easy-to-build electronic kits in HI-FI— TEST—MARINE and HAM RADIO fields.*

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NAME

ADDRESS

CITY ZONE STATE

QUANTITY	KIT NAME	MODEL NO.	PRICE

For further information, check number 5 on page 126.



. . . de W2NSD

never say die

The CQ Poll has already been flooded with close to 1000 replies as I write this. Several points were brought up time after time and warrant elucidation . . . like what happened to the DX Column . . . like what happened to the Editorial . . . like how come the Poll was on the back of the VHF Column.

DX Column

Handling the DX department of CQ is an almost impossible job. Don, W4KVX, was trying to not only do that but also put out a weekly DX bulletin and run a TV service shop. It was the certificates that snowed him. Between the WAZ and WPX he was up to here most of the time. WAZ was under full blast from the hundreds of fellows who had 39 zones for a long time and then finally made the list with JT1AA. Topping that was the increased activity of our new WPX arrangement.

Frank Anzalone, W1WY, our Contest Editor called one day and suggested I get in touch with Urb LeJeune, W2DEC, president of the Northern New Jersey DX Club, one of the hottest DX Clubs in the country. I did and Urb agreed to give the DX department a try. Those of you who are waiting for DX certificates please hold tight for a few more weeks. By the way, for those that haven't heard, we require all QSL's be submitted for both WAZ and WPX awards.

Europe

With the completion of the December issue and enough articles set aside for January and February I decided to take a fast trip to Europe to see what was cooking over there for the coming frequency conference, meet as many hams as possible, and see Europe for the first time. All the travel books agreed that the cheapest way to see Europe is by car so I immediately got in touch with the Porsche people to see if I could arrange for one. It was not only my fond love of the Porsche that prompted the choice, but my fond love of money. Investigation showed that while I would save about $400 on most cars by buying them in Europe, I would save about $970 on the Porsche. Counting $350 for shipping it back plus customs still left enough money to pay the plane fare over and back ($550). A free trip to Europe, in essence.

A further surprise came when I went to buy the plane tickets and found that I could go by jet at no additional cost.

Getting the car turned out to be more of a problem than I had expected for the Porsche factory was back ordered on their new 1959 models and could only give delivery long after I would be back home. I made one more desperate try and sent a letter directly to the head man at the factory and explained that it was very important to me to get the car for my European trip and that they should be able to dig up one car somewhere for the president of the Porsche Club of America, Metropolitan Region, and vice president of the Eastern Conference of Sport Car Clubs; not to mention the editor of CQ, famous humor magazine.

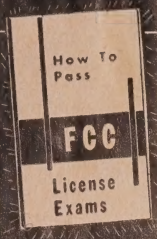
Strangely enough, this worked! They cabled that a red Convertible D would be ready for me in late November, a month away. The local Porsche factory rep assured me that the factory would have a car for me to use until my car was finished, so I set up an itinerary starting with Stuttgart, going down through Austria, Italy, France, Switzerland, back up to Stuttgart for the new car at the end of the month, then up to Holland, Denmark and ending at Hamburg in early December.

The jet trip was fast. We left New York at 8:30 pm and landed at Le Bourget at 9:30 the next morning. F7AF met me as I came through customs and drove me to a hotel in downtown Paris.

My high school French, exercised for the first time in Haiti earlier in the year during the Navassa DXpedition, got a chance to develop into a semi-communication medium. I set out on foot to see Paris. For three days I trudged through the rain and drizzle. Thank heaven for my French, limited as it was, for

[*Continued on page 54*]

How To Pass FCC COMMERCIAL RADIO OPERATOR License Exams



Free . . .

Tells where to apply and take FCC examinations, location of examining office, scope of knowledge required, approved way to prepare for FCC examinations, positive method of checking your knowledge before taking the examination.

GET YOUR FCC TICKET IN A MINIMUM OF TIME!

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Address .....

City ..... Zone..... State.....

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CQ-50



Feenix, Ariz.

Deer Hon. Ed:

Next time sumbuddy wanting yo to doing sumthing—saying no! No matter if it sumthing that sounding like fun for you to doing—saying NO! You knowing old Hon. Saying: He who hesitates is QRT. And, if having wimmin asking you to doing sumthing, be doubly surely you saying NO NO!!

Scratchi saying yes, and that when trubble starting. My XYL-to-be, Lil Watanabe, are asking me to helping with Seenyur Play at local hi-skool. Of course, you reelizing it not good to saying no to XYL-to-be very often, so that why Scratchi saying yes.

Also, Hon. Ed., it sounding like it might be fun. What Lil needing are sum help on prompting. It seems that almost hole cast are coming down with meesels, so Lil, who are in charge of Seenyur Play, having to get another bunch of peeples to playing parts, and they not having much time to lerning there parts.

So, Lil thinking maybe I can fixing it up so each person in cast having little reseever, like heering ade only reel reseever, so can brodcasting there lines to them from transmitter backstage. Scratchi knowing they doing things like this on Tee-V, so desiding can doing with no problums.

Are finding bunch war surplus heering ades in local surplus outlet (Hon. Ed., howcomes they having deff soljurs?). Are finding also other stuff around shack to fixing up heering ades. Putting diode detecktor in each one, so can picking up and deteckting the radio-freakwency wave from neerby transmitter.

First one I making working reel peechy, so going ahed and doing same thing with all of them. Are finishing just in time, on acct. Seenyur Play are skedyuled for only cupple days later when I finishing.

At dress rehersel devices are getting reel workout. The new members of cast trying reel

the Big Signal...

this one puts out "rocking chair copy" without half trying!



HT-33A
linear amplifier

There's more than one reason why the HT-33A was designed to be *rated conservatively at the maximum legal input. Talk-power* was part of it—enough to provide output to the antenna that guarantees you one of the really big signals on the band. But way beyond that was a need for *reserve-power* . . . to insure the effortless operation that means so much to efficiency and component life. Your distributor is ready to give you a convincing demonstration.

Available with convenient terms from your radio parts distributor.

Make reservations now for annual SSB dinner, New York City, March 24th.

FEATURES

- Maximum legal input.
- Certified for FCDA matching funds.
- Third and fifth order distortion products down in excess of 30 db.
- Passive grid circuit. 50 to 75 ohms input.
- Built-in r.f. output meter to simplify tune up.
- Complete coverage of 80 thru 10 meter amateur bands.
- Pi-network for maximum harmonic suppression.
- Variable output loading.
- All important circuits metered.
- Circuit breaker assures protection of power supply.
- Perfect match to HT-32 in size, appearance, and drive requirements.
- Tubes: (1) PL-172 high power pentode; (2) 3B28 rectifiers; (4) OA2 screen regulators.
- Front panel controls: Meter selector; Filament switch; High Voltage switch; Bias adjustment; Band switch; Plate tuning; Plate loading.

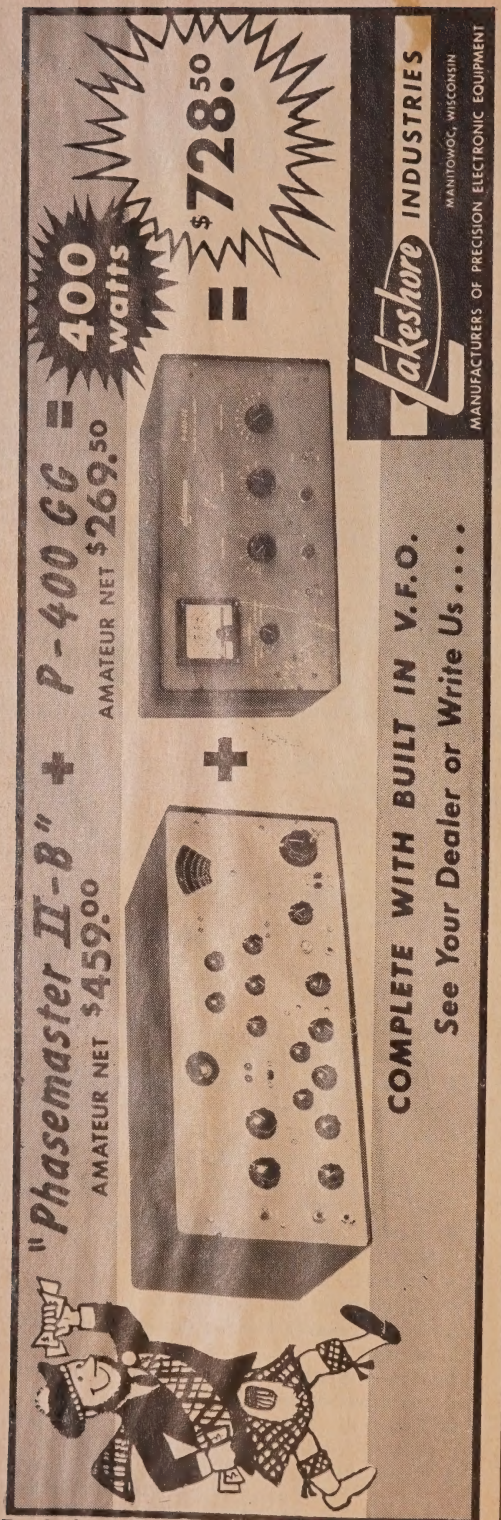
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For further information, check number 6 on page 126.



For further information, check number 7 on page 126.

hard to lerning all the lines, but just not having time to doing it, so Lil are doing lotsa talking into mike of transmitter back stage. Now and then cupple lines being remembered, but generally Lil are pretty busy talking—not that she not most always pretty busy talking.

Next nite are big nite. Nice crowd are being there. Everybuddy in cast all slicked up, and wearing there heering-ade prompters. Lil are at mike backstage, and Scratchi is standing by in case anything going wrong. First thing you knowing, first act are over, and everything still hunky-dunky. Prompters working like millyun bux, even though can heering local brodcast stayshun very weekly in background.

Everything staying hunky-dunky until middle of last act, when all of sudden I heering long hunks of silence on stage. Lil yelling into mike, but nobuddys heering there lines. One fellow in cast coming off stage, and he saying not heering Lil—all he can heering is Red Skeleten, program over local BC stayshun. At this point peeple in audience doing reel loud laffing. Discovering cast are repeeting jokes that Red Skeleten are telling.

Meenwhile I looking for and discovering trubble. Cupple metal chassis I have joined by connector are apart, but needing sumthing to holding them together. Untying peece of rope from seenary, tying to chassis, and transmitter working okey again. Just then fellow coming offstage and slamming door in set. Noyse are hardly dying down when hole hunk of seenary are slowly toppling forward and falling on stage.

When it falling audience are seeing Lil and Scratchi sitting at transmitter. Sumbuddy on stage ad-libbing that he having brother and sister who are amchoor radio operators, and I thinking might fooling audience until another hunk of seenary are slowly falling and flopping on stage. All this time audience are heering combination of lines from play, and jokes from Red Skeleten program, and hole audience are reeling laffing by now.

I desiding I rather being almost any other place except there, so trying to leeving stage. In hurry and not seeing rope which I tripping on. That rope are reel important one, on acct. it the one holding up rest of seenary. As last peece falling Scratchi are long gone.

Are back at the ranch packing my suitcases getting reddy to leeve for parts unknown, when Lil coming in. I getting braced for what she going to say—like she never speeking to me again, or she never wanting to see me again.

Howsumever, she not saying any of those things. No indeedy, it seeming like hole play such 1/c deel that Seenyur Class desiding to doing it again next nite. So, Scratchi not in doghouse after all. I just hoping there are another Red Skeleten program on tomorrow nite.

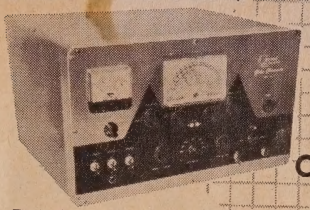
Respectively yours,
Hashafisti Scratchi

by test or testimonial . . .

THE WORLD'S MOST WANTED GEAR

SEE IT · TRY IT · BUY IT

More "Workable Watts" per Dollar!



350w CW, 275w AM
450w (PEP) SSB - DSB
(Suppressed Carrier)
Wired & Tested: $495

Globe Champion 300A

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

Sidebander DSB-100

100w PEP DSB, Suppressed Carrier



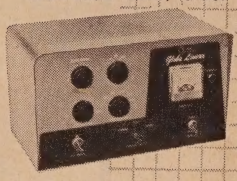
Wired & Tested: $139.95
In Kit Form: $119.95

Double Sideband, AM, CW at Low Cost

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

Globe Linear LA-1

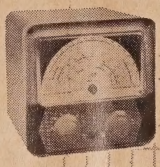
Grounded Grid, Class B or C



W/T: $124.50
Kit: $99.50

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

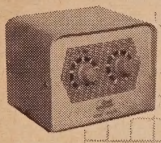
Globe VFO 755A



W/T: $59.95
Kit: $49.95

10-160M

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

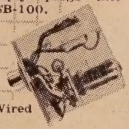


Vox, Model 10

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

QT-10

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



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

Globe Matcher Sr., AT-4



Wired: $79.50
Kit: $69.50

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

Globe Matcher Jr., AT-3



Wired: $15.95
Kit: $11.95

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

Globe Scout 680A

for 6-80 Meters

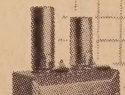


Wired: $119.95
Kit Form: $99.95

Plate Modulated — 65w CW, 50w AM

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

Power Booster PB-1



Wired: $21.95
Kit Form: $14.95

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

Globe Patcher



Wired & Tested: $29.95

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

Visit Your Favorite Distributor for Details!

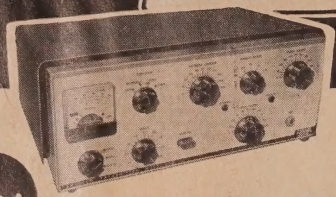
OTHER TOP FLIGHT GLOBE PRODUCTS

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

GLOBE electronics
3417 W. BROADWAY
COUNCIL BLUFFS, IOWA

For further information, check number 8 on page 126.

The specs are the proof . . . now your BEST BUY in ham gear is EICO®



New

90-WATT CW TRANSMITTER . . #720
KIT $79.95 WIRED $119.95

Conservative, highly efficient design plus stability, safety, and excellent parts quality. 80 thru 40, 20, 15, 11, 10 meters (popular operating bands) with one knob band-switching. 6146 final amplifier for full "clean" 90 W input, protected by clamper tube. 6CL6 Colpitts oscillator, 6AQ5 clamper, 6AQ5 buffer-multiplier, GZ34 rectifier. "Novice limit" calibration on meter keeps novice inside FCC-required 75W limit. No shock hazard at key. Wide range, hi-efficiency pi-network matches antennas 50-1000 ohms, minimizes harmonics. EXT plate mod. terminals for AM phone modulation with 65W input. Excellent as basic exciter to drive a power amplifier stage to max. allowable input of 1KW. Very effective TVI suppression. Ingenious new "low silhouette" design for complete shielding and "living room" attractiveness. Conservatively rated parts, copper-plated chassis, ceramic switch insulation. 5" H, 15" W, 9½" D.



NEW UNIVERSAL MODULATOR-DRIVER #730
KIT $49.95 WIRED $79.95 Cover E-5 $4.50

Superb, truly versatile modulator at low cost. Can deliver 50 W of undistorted audio signal for phone operation, more than sufficient to modulate 100% EICO 720 CW Transmitter or any xmitter whose RF amplifier has plate input power of up to 100W. Multi-match output xmfr matches most loads between 500-10,000 ohms. Unique over-modulation indicator permits easy monitoring, no need for plate meter. Lo-level speech clipping & filtering with peak speech freq. range circuitry. Low distortion feedback circuit, premium quality audio power pentodes, indirectly heated rectifier filament. Balance & bias adj. controls. Inputs for xtal or dynamic mikes, phone patch, etc. Excellent deluxe driver for high-power class B modulation. ECC83/12AX7 speech ampl., 6AL5 speech clipper, 6AN8 ampl. driver, 2-EL34/6CA7 power output, EM84 over-mod. indicator, GZ34 rect. Finest quality, conservatively rated parts, copper-plated chassis. 6" H, 14" W, 8" D.

NEW GRID DIP METER . . . . . #710
KIT $29.95 WIRED $49.95 including complete set of coils for full band coverage.



Exceptionally versatile. Basically a VFO with micro-ammeter in grid: determines freq. of other osc. or tuned circuits; sens. control & phone jack facilitate "zero beat" listening. Excellent absorption wave meter. Ham uses: pretuning & neutralizing xmitters, power indication, locating parasitic osc., antenna adj., correcting TVI, de-bugging with xmitter power off, determining C,L,Q. Servicing uses: alignment of filters, IF's; as sig. or marker gen. Easy to hold & thumb-tune with 1 hand. Continuous 400 kc—250 mc coverage in 7 ranges, pre-wound 0.5% accurate coils. 500 ua meter movement. 6AF4(A) or 6T4 Colpitts osc. Xmfr-operated sel. rect. 2¼" H, 2⅞" W, 6¼" L. Satin deep-etched aluminum panel; grey wrinkle steel case.

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L. I. C. 1, N. Y.
Show me HOW TO SAVE 50% on 60 models of top-quality equipment.

Name_____
Address_____
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For further information, check number 9 on page 126.

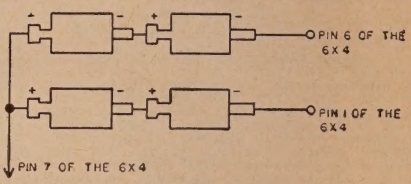
Letters . . . . . to the Editor

Gonset Modification

Hi Wayne:

Here is a rough drawing of a modification of the Gonset IIB Communicator which ups the plate voltage to around 300 volts and really helps when you are mobile. Thought you-all might like to run it in good old CQ so some of the other boys can run a little more punch from their Gonset. I use Sarkes Tarzien M-500's mounted on a little bakelite board and fasten it with the transformer top bolt. I don't show it, but a surge resistor in the transformer center tap is a good idea.

Wm. Kenneth Kern, K9BEH
Microwave Equipment Co.
Paoli, Indiana



Michigan Permit

Editor:

Please insert a notice in next issue of CQ to the effect that as of 1957, Act 242 of the Public Acts of 1957 law has been amended to the effect that a bona-fide amateur radio operator holding a conditional, general, advanced or extra class amateur license issued by the F.C.C. is exempt from the requirement of securing a permit from the Michigan State police before equipping a vehicle with a radio receiving set capable of receiving signals sent on frequencies assigned to police purposes.

This is as it should have been years ago in all states. A ham should never need a short wave permit. His license should suffice for all frequencies he desires to listen to. States cannot legally enforce laws that conflict with the Federal controlled services is my opinion.

This should be good news for Michigan hams that red tape has been cut as it should have been years ago. Hams should not be liable to such state enacted laws at all.

73,
Irving Davis, W8KJ

Boiling Blood

Dear Wayne,

In reference to Jim Kyle's (K5JKX) article "Twin Lead Traps" in the January, 1959 issue, one line really made my blood boil.

Jim says, "high-pass filters are fine for the low frequency laddies, but they simply won't do it right on 50 mc." Evidently, he has never tried an R. L. Drake TV-300-HP or equivalent. This filter has a cutoff frequency of 52 mc. If that won't work, I won't know what would.

My TV antenna is about 20 feet away from the 5 element six meter Yagi. Until recently, it has been only 5 feet away. With a power input of 35 watts AM (75 watts DSB) there is absolutely no trace of TVI! No grainy effect was noted, as K5JKX found true . . . with his twin lead trap.

I've tried his twin lead trap, and results were better than with no TVI preventive, but it certainly does not compare with a good high pass filter. I'm not trying to criticize his idea, only that one statement.

Another point, these filters ARE AVAILABLE for 4¢. That's right, 4¢. Most TV manufacturers furnish them

best by far!

HAMMARLUND

HQ-170

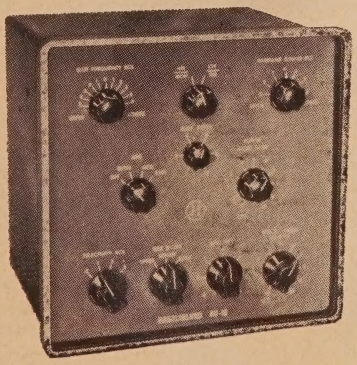


For once—everyone agrees, experts, amateurs, dealers—there is no amateur receiver that approaches the Hammarlund HQ-170 in performance and features. Even receivers costing much more, cannot offer everything the HQ-170 offers....

- ★ Dual and triple conversion—17-tube superheterodyne.
- ★ Full dial coverage of 6, 10, 15, 20, 40, 80 and 160 meter amateur bands.
- ★ Razor-sharp slot filter, adjustable ± 5 KCS over passband with up to 60 db attenuation.
- ★ Separate vernier tuning ± 3 KCS for easy SSB tuning.
- ★ Separate linear detector for CW and SSB reception.
- ★ Tuned IF amplifier with seven selectivity positions for skirt selectivity.
- ★ Selectable sideband, upper, lower or both.
- ★ 100 KCS crystal calibrator.

$359.00

Telechron clock-timer, $10 extra.



ADD SSB/CW AND AM/MCW TO YOUR PRESENT RECEIVER

HC-10

The biggest box of tuning tricks ever offered! Provides all modes of tuning for perfect SSB reception. Takes seconds to connect to any receiver having an IF from 450 kcs to 500 kcs. Has own audio system and power supply. You must try it to believe it... **$149.00**

Write for details...

Established 1910

HAMMARLUND

HAMMARLUND MANUFACTURING COMPANY, INC., 460 W. 34th ST., N. Y. 1, N. Y.

Export: Rocke International, 13 E. 40th St., N. Y. 16, N. Y.
Canada: White Radio, Ltd., 41 West Ave. N., Hamilton, Can.

For further information, check number 10 on page 126.

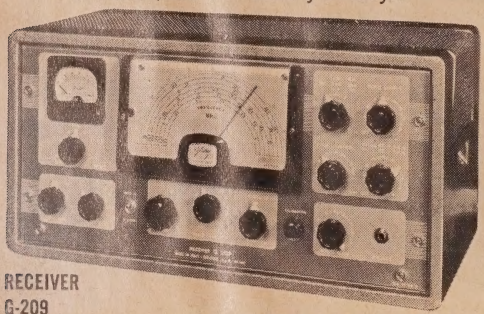
GELOSO
AMATEUR EQUIPMENT

DESIGNED

by John Geloso, a pioneer ham gear designer — now Europe's largest manufacturer of amateur equipment.

TESTED

yes, each custom-built instrument personally tested and approved by Geloso engineer Pippo Fontana, President of ARI, the ham society of Italy.



RECEIVER
G-209

ACCLAIMED

internationally for its rugged chassis design, superior quality construction, substantially lower cost.

- Double-conversion superhet
- 10 thru 80 meters
- Easy S. S. B. selection
- Accurate stable tuning
- Crystal filter
- Standard American tubes
- Fully guaranteed

— and only $299.50

SEE IT now at your ham distributor
WRITE for free illustrated brochure of complete Geloso ham line

Desk No. 73

AMERICAN GELOSO ELECTRONICS, INC.

312 SEVENTH AVE., N. Y. 1
LA 4-9936

For further information, check number 11 on page 126.

free, on request. Just specify that you want one with a cutoff frequency of at least 52 mc. You'll get it.

Bob Brown, K2ZSQ

Firing VRs

Dear OM:

I am offering the following VR tube suggestion for publication to be used by your readers in solving a problem I was recently confronted with.

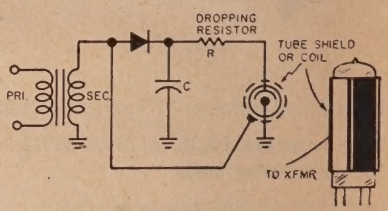
When VR tubes are used in parallel or where often the supply voltage for igniting them is marginal, this gimmick will invariably do the trick in getting the VR tubes to fire.

See enclosed sketch. A metal tube shield or a coil of insulated wire placed around the VR tubes envelope and then connected to one side of the hi potential winding of the power transformer, allows voltage peaks from the high voltage secondary to assist in firing the VR tube. It is no longer required to select matched VR tubes. Arrange equalizing shunt resistors across VR tubes to get parallel connected VR tubes to fire.

I trust the explanation was clear enough. If any questions remain as to operation, I would be happy to answer them. Have enjoyed CQ since its days under the "Radio" tag. Keep up the good work.

73,

Lee. L. Toman, W3BIM



FLASH!

Another DXpedition is brewing, possibly heading out in late March or early April. There is still room for one or two more fellows to put their foot on the running board. The license has already been issued by the FCC after getting permission from Colombia. The calls are KS4BA for Roncador Key and KS4BB for Serrana Bank. Look off the coast of Nicaragua on your maps for these islands. There has never been any amateur operation from these islands before and their political as well as physical location assured them of separate country status.

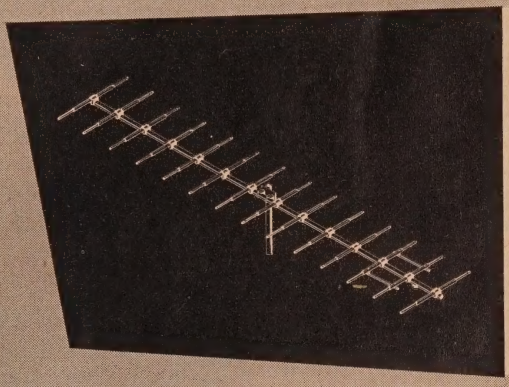
The DXpedition first started when W4CG (ex-KV4BB, see August 1957 CQ) gave me a call while I was KC4AF and suggested we get together as he had a good spot located. I'll go into all of the foot work necessary to get the license later. W9EVI took the ball and pushed through until it was achieved.

We will have more info next month on this. At any rate, be ready for a new one to pop up for a few days on all bands, CW, SSB, AM, etc. Don't write to join up unless you are a darned good operator, don't have to worry about the money it costs (around $600), can get time off when you need it, don't mind working (we need indians, not chiefs . . . we've already got the chiefs), and are in good robust health (no doctors, heat, misery, etc.).

de W2NSD

STRENGTH AND *PERFORMANCE !!*

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

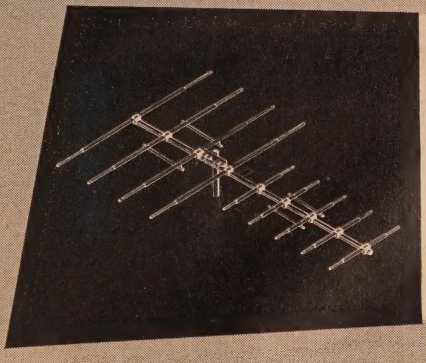


Model A-142
14 element, two meter beam.
Fwd. gain 13db. F/B 20db.
SWR 1.1 res. frequency

$48.75 net

Model SK-2
Stacking kit for A-142

$23.75 net



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

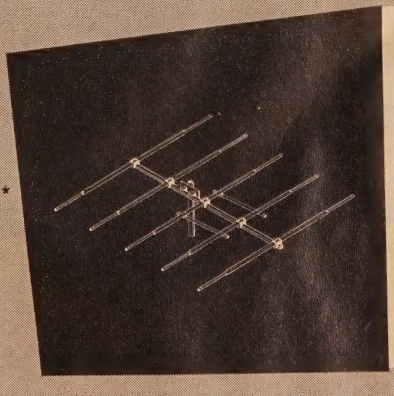
	2 meter	6 meter
Fwd. gain	11.4db	9.6db
F/B	11.5db	16.3db
SWR	1.1	1.1 res. freq.

$67.05 net

100%
RUST PROOF

100%
CORROSION PROOF *

5 YEAR
GUARANTEE



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

$41.95 net

Model SK-6
Stacking kit for A-56

$32.75 net

For further information, check number 12 on page 126.

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

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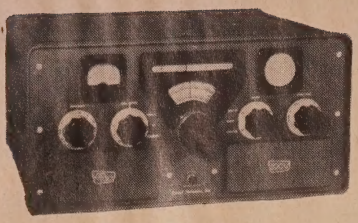
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*When Mosley Antenna Coat, supplied, is used as directed.

NEW for VHF by Mosley

SUPERIOR SSB GEAR

MULTIPHASE EQUIPMENT



NEW 100V EXCITER-TRANSMITTER

NO TUNING (except VFO), uses famous CE BROADBAND system. PRECISION LINEAR VFO—1KC Calibration. Single Knob Bandswitch 80 thru 10. SSB—DSB—AM—PM—CW and FSK. RF Output adjustable 10 to 100 Watts PEP. Meter reads Watts Input, Amps Output and Carrier Suppression. 2" RF Scope. Speech Level and Load Mismatch Indicators. Audio Filter — Inverse Feedback — 50 db Carrier and Sideband Suppression.

IN PRODUCTION NOW .....PRICE $595.00



MODEL 600L BROADBAND LINEAR

NO TUNING CONTROLS — CE BROADBAND Couplers in HIGH EFFECIENCY CLASS AB² using single 813. Easily driven to 600 Watts PEP Input 160 thru 10 by a 20A or 100V. Built-In HEAVY DUTY POWER SUPPLY — 45 MFD PAPER Capacitor. Meter reads WATTS INPUT, GRID DRIVE, RF AMPS, and SWR. Completely shielded — TVI suppressed — parasitic free. REMEMBER there is LESS than ONE S UNIT difference between the 600L and a 2 KW PEP job. .....PRICE $495.00

THESE MULTIPHASE EXCITERS PIONEERED AMATEUR SSB

MODEL 20A



MODEL 10B — 10 watts PEP. Plug-in coils 160 thru 10 meters. Perfect voice control on SSB—DSB—AM and PM — CW breakin. Carrier and calibrate level controls. 40 DB suppression.

Wired.....$179.50 Kit.....$139.50

MODEL 20A — 20 watts PEP. Bandswitched 160 thru 10 meters. SSB—DSB—AM—PM and CW. Magic eye monitors carrier null and peak modulation. Ideal for driving AB1, AB², and most Class B linears.

Wired.....$279.50 Kit.....$219.50

MODEL 10B

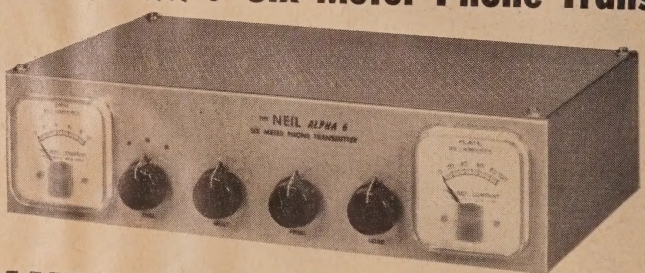


Central Electronics, Inc.

1247 W. Belmont Ave. Chicago 13, Illinois

For further information, check number 31 on page 126.

THE NEIL *ALPHA 6* Six Meter Phone Transmitter



NOW AVAILABLE IN KIT FORM . . . $58.50

MOST PARTS PRE-MOUNTED! *AVAILABLE FOR 6 OR 12 VOLTS!*

- Only 3 inches high, all enclosed, ideal for mobile or fixed station.
- All tuning is done from front panel.
- Two tuning meters eliminate meter switching, ideal when operating mobile, or to give rapid performance checks when you QSY.
- Built-in crystal switching for rapid QSY, socket for 3 crystals.
- Input to final approximately 20 watts.
- Uses 8mc crystals, no expensive high frequency crystals needed.
- Pi antenna coupler, coaxial output.
- No frequency multiplication in final amplifier for highest efficiency.
- Low distortion, push-pull modulator.

TRANSMITTER KIT - with all tubes, crystal, and step by step construction manual $58.50

TRANSMITTER - completely wired and tested 78.50

POWER SUPPLY FOR FIXED STATION (300v @ 200ma - 6.3v @ 3.65a) 39.95

This power supply is completely wired, with tube, connecting cable, separate ON-OFF switch and SEND-RECEIVE switch, 2 indicator lamps, and a switched 110 volt outlet for connection to antenna relay.

Order From: THE NEIL CO. · Box 5001 (River Campus Station) ROCHESTER 20, N. Y.

For further information, check number 13 on page 126.

INTERNATIONAL'S NEW

TRANSCEIVER

at home...work...or play here is



2-WAY RADIO for everyone!



MEETS ALL FCC REQUIREMENTS

for the Class "D"
CITIZENS BAND

The new class "D" citizens band is a new band of frequencies in the 27 megacycle range set aside by the FCC in Sept. 1958 for citizens radio service.

LICENSE WITHOUT EXAMINATION

Any U. S. citizen can be licensed to operate a class "D" radio station by applying to the FCC on FCC Form 505D.

3 MODELS

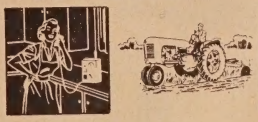
CUSTOM, 117V AC, all channel receiver **$94.95**
DELUXE, 117V AC or 6/12V DC **124.50**
COMMAND, 117V AC or 6/12V DC fixed channel receiver **149.95**

FOR BUSINESS



Ideal for office-to-field communication. Also for office to trucks operating within restricted area or for office and factory liaison.

FOR THE FARM



The solution to fast communication from the farm home to the field. Wonderful in an emergency.

FOR SPORTS



From ship-to-shore or from base camp to the scene of the hunt . . . an enjoyable accessory to any sport!

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From the kitchen to the den, workshop or sickroom . . . the Transceiver will save you many steps.

SEND FOR FREE BROCHURE

INTERNATIONAL
CRYSTAL MFG. CO., INC.

18 N. Lee
Oklahoma City, Okla.

Dept.CQ, International Crystal Mfg. Co., Inc.
18 N. Lee,
Oklahoma City, Okla.

GENTLEMEN:

Please send me my copy of your free brochure on the Transceiver. Also your new 1959 Catalog.

NAME _____

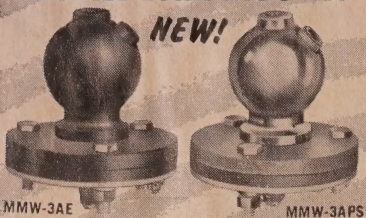
ADDRESS _____

CITY & STATE _____

For further information, check number 14 on page 126.

HEAVY DUTY
MOBILE BASE MOUNTS

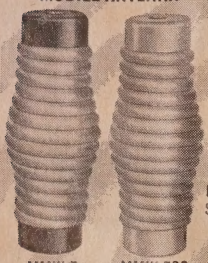
NEW!



MMW-3AE MMW-3APS

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

PROTECTS YOUR MOBILE ANTENNA



MMW-7 MMW-7SS

NEW HEAVY DUTY
MOBILE SPRINGS

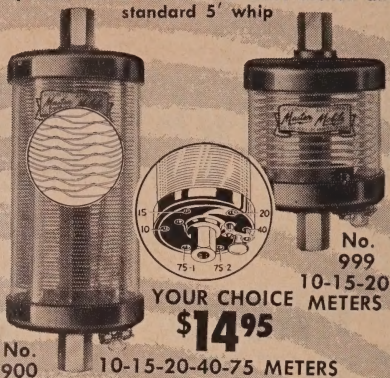
MMW-7 Cad. plated, black painted ends $4.50

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NEW MULTI-BAND ANTENNA COILS

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



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

No. 999 10-15-20 METERS

YOUR CHOICE $14.95

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

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

96″ WHIP

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

SIZE 1⅜″x 19″

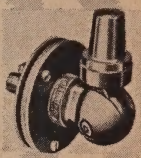
NO. B-1080

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

$17.95

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

No. 321 BODY MOUNT $7.95

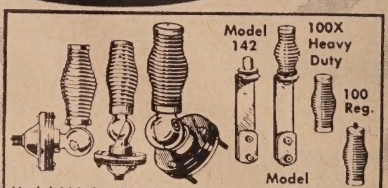




Automatically tunes the entire band from the drivers seat!

MASTER MATCHER & FIELD STRENGTH METER

6 or 12 volt models $24.95



MASTER-MAGIC WAND

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

10 Met–5 Ft. L. $12.95
15 Met-5 Ft. L. 12.95
20 Met-5 Ft. L. 12.95
40 Met-6 Ft. L. 14.95
80 Met-6 Ft. L. 14.95
NEW CITIZENS BAND 27.255 mc . . . $12.95

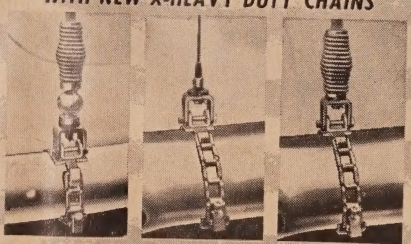
FIBRE-GLAS WHIPS

The Feather-Weight Antenna with Spring-Steel Strength!

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

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

BUMPER MOUNTS
WITH NEW X-HEAVY DUTY CHAINS



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

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

SUPER HY-GAIN CITIZEN BAND

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

EMERGENCY • COMMERCIAL • AMATEURS

EIA ELECTRONIC INDUSTRIES ASSOCIATION est. 1924

Master Mobile Mounts, Inc.
1306 BOND STREET • LOS ANGELES 15, CALIF.

AT LEADING RADIO JOBBERS EVERYWHERE

For further information, check number 15 on page 126.

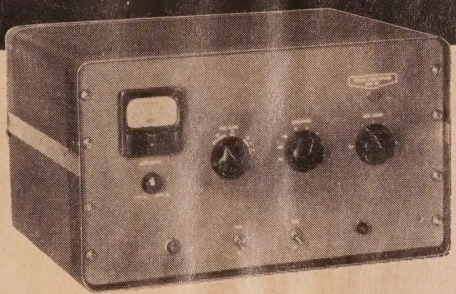
An Exceptional Dollar-for Dollar Value!

Powerful New Equipment With So Many Exclusive Features for an Outstanding SSB Signal!

SSB TRANSMITTER
GSB-100



GONSET SSB



GSB-101
SSB LINEAR AMPLIFIER

GSB-100 Transmitter

POWER INPUT...140 watts P.E.P. sufficient for use as a complete transmitter, more than enough as an exciter.

SSB WITH SELECTABLE SIDEBANDS: AM, PM or C.W. Keying characteristics are excellent.

TRANSMITS BOTH SIDEBANDS WHEN ON AM.

EXCLUSIVE FILTER PHASING SYSTEM ...contributes materially to SSB quality. Unwanted sideband suppression 45 db. Uses quartz crystal CARRIER - ELIMINATION filter to suppress carrier by more than 60 db, avoids need for adjustments on carrier balance and sideband suppression.

FREQUENCY CONTROL by fixed, quartz crystal and exceptionally stable VFO. Complete band coverage with 5 kc calibration and interpolation to better than 1 kc. Precision gear ratio dial drive.

EXCELLENT VOICE OPERATED CONTROL SYSTEM (VOX). Biasing voltage available for cutoff of external linear amplifier when receiving.

COVERS 80-40-20-15-10 METERS. Flexible pi network output, quick band change. All operating controls on front panel.

BUILT IN, HEAVY - DUTY AC POWER SUPPLY.

Model #3233... 479.50

GSB-101 Linear Amplifier

POWER INPUT: 1200 watts P.E.P.* Grounded grid principle is utilized, does not waste drive power by swamping exciter...drive appears in output of final.

DRIVING POWER REQUIRED: 70 to 80 watts, readily supplied by GSB-100 or similar SSB transmitter in 100 watt class.

COVERS 80-40-20-15-10 meters.

FULL BANDSWITCHING OPERATION.

PI NETWORK OUTPUT. Flexible, easily loaded.

COMPLETE: Built-in power and bias supplies. Built-in antenna relay, 4—811A tubes and 2—866A rectifiers. Ready to operate.

Same size cabinet and general appearance as GSB-100 transmitter.

Model #3262... 439.50

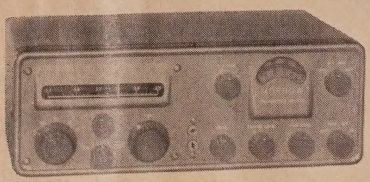
GONSET

GONSET DIVISION OF YOUNG SPRING & WIRE CORPORATION
801 SOUTH MAIN STREET, BURBANK, CALIF.

For further information, check number 16 on page 126.

SESCO SAVES YOU $ $ $ ON MORADCO GEAR

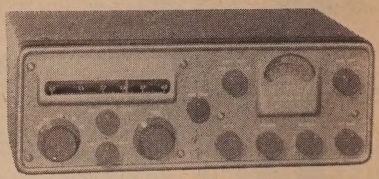
10% Down
2 Years to Pay



MORADCO MB-565 TRANSMITTER

Features turret-type, hooded, illuminated dial. Covers 80-40-20-15 and 10 meters, VFO or crystal controlled. 60 watts input. PI network final operates into 50 to 75 ohm antenna or antenna tuner. Size: 4⅛"x11⅞"x7¼". Ship. wt. 14 lbs.

SAVE $50.00 *Sale Price $199.50*



MORADCO MB-6 RECEIVER

Matches MB-565 Transmitter. 13 tubes – 20-tube performance. 100 kc calibrator, "S" meter that converts to an F. S. meter for transmitter tune-up. 1 microvolt sensitivity. Noise limiter and very sensitive noise-balanced squelch. Size: 4⅛"x11⅞"x7¼". Ship. wt. 12 lbs.

SAVE $55.00 *Sale Price $184.50*



SH 7 SPEAKER

5" x 7" size; metal case.

$8.85

MK-N1 MIKE



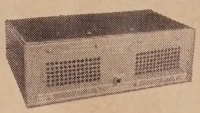
Push-to-talk carbon mike.

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FS-1 FIELD STRENGTH METER

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RAP 250S POWER SUPPLY

AC power supply: dual speakers.



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RVP 260 POWER SUPPLY

Vibrator power supply powers MB-6 Receiver and MB-565 Exciter.

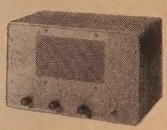
$34.95

RVP 260B POWER SUPPLY

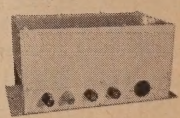
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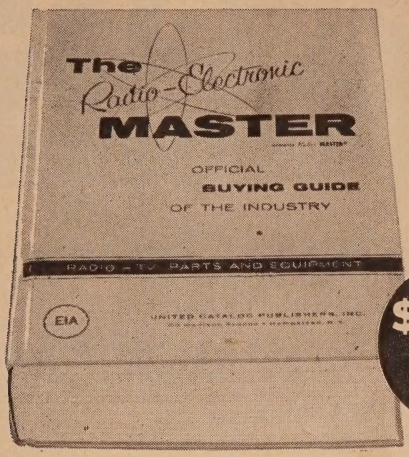
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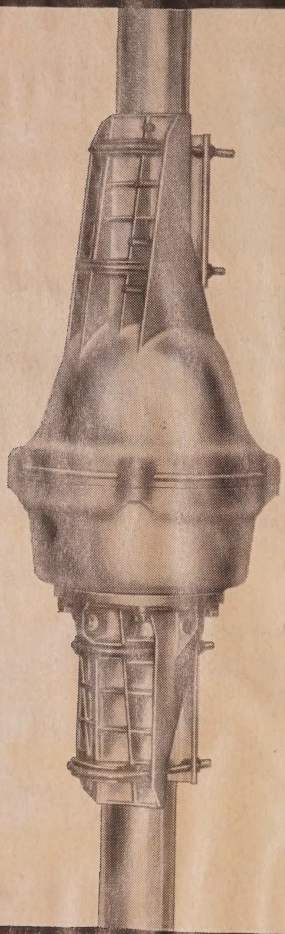
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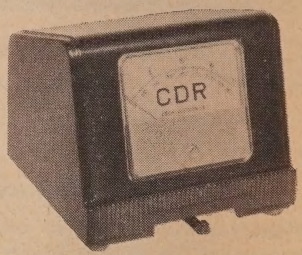
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For further information, check number 19 on page 126.

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Model 345
Price $279.95

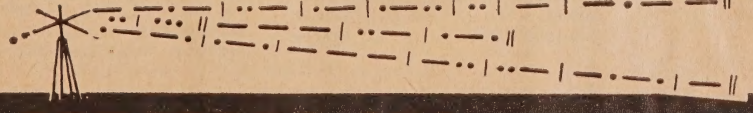
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  - ★ Band width at 6 db: 3.5 KC.
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We are specialists in frequency converters.
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For further information, check number 20 on page 126.

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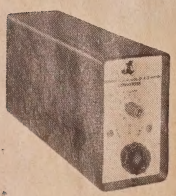
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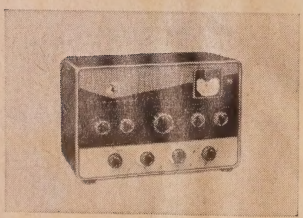
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250-43-1, or -2, or -3..Kit	$59.95
250-43-12, or -22, or -32..Wired, tested	$89.95

NOTE: Specify either Kit or Wired plus your choice of the following ranges: 26 to 30 mcs.; 28 to 30 mcs.; 14 to 18 mcs.



"6N2" TRANSMITTER

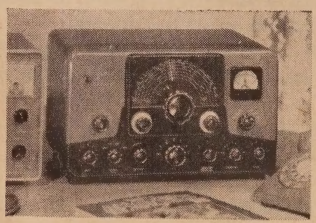
Instant bandswitching 6 and 2 meters. Rated 150 watts CW; 100 watts AM phone. Use with "Ranger", "Viking I", "Viking II", or similar power supply/modulator combinations. With tubes, less crystals.

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240-201-1..Kit	$129.50
240-201-2..Wired, tested	$169.50

"6N2" VFO

Compact—stable! Replaces 8 to 9 mc. crystals in frequency multiplying 6 and 2 meter transmitters. With tubes and pre-calibrated dial.

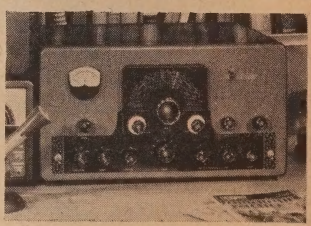
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240-133-1..Kit	$34.95
240-133-2..Wired, tested	$54.95



"RANGER" TRANSMITTER/EXCITER

This popular, superbly engineered transmitter also serves as an RF/audio exciter for high power equipment. 75 watts CW or 65 watts phone input. Built-in VFO or crystal control—instant bandswitching 160 through 10. 6146 final amplifier—wide range pi-network output. Timed sequence keying. TVI suppressed. With tubes, less crystals.

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



"VALIANT" TRANSMITTER

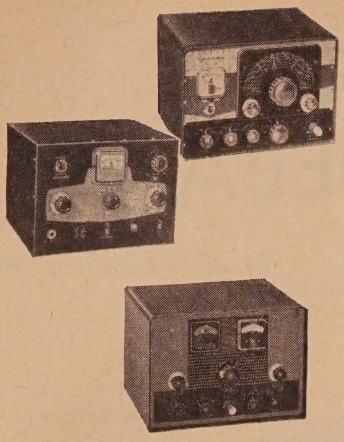
Here's effective power, wide flexibility, and many unique operating features combined in a compact desk-top transmitter! 275 watts input CW and SSB (P.E.P. with auxiliary SSB exciter) and 200 watts phone. Bandswitching 160 through 10. Built-in VFO or crystal control. Final amplifier utilizes three 6146 tubes in parallel—wide range pi-network output. With tubes, less crystals.

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

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Cat. No.		Amateur Net
240-126-1	Kit	$149.50
240-126-2	Wired and tested	$199.50

"ADVENTURER" TRANSMITTER

Perfect for novice or experienced amateur! 50 watts CW input—instant bandswitching 80 through 10 meters. Crystal or external VFO control. With tubes, less crystals.

Cat. No.		Amateur Net
240-181-1	Kit	$54.95

"CHALLENGER" TRANSMITTER

Ideal for fixed station or portable use! Fast, easy tuning—excellent stability and plenty of reserve drive. 70 watts phone input 80 through 6; 120 watts CW input 80 through 10 . . . 85 watts CW input on 6 meters. Wide-range pi-network output—effectively TVI suppressed—excellent keying system. For crystal or external VFO control. With tubes.

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

"KILOWATT" AMPLIFIER

Here's the most exciting unit you've ever seen . . . the unit that puts the whole world at your fingertips! Brilliantly designed and engineered, the Viking "Kilowatt" 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 mc. 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.

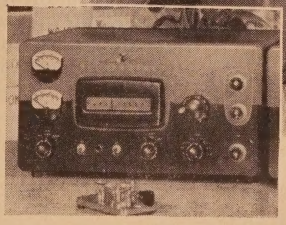




"FIVE HUNDRED" TRANSMITTER

More than one-half kilowatt of power and operating convenience! 600 watts CW input . . . 500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)—instant bandswitching 80 through 10 meters! All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Highly stable, built-in VFO or crystal control. Wide range pi-network output. Low level audio clipping—effectively TVI suppressed. With tubes, less crystals.

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



"THUNDERBOLT" AMPLIFIER

Here's real power and peak performance in a compact desk-top amplifier. Rated 2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear! Continuous coverage 3.5 to 30 mcs.—instant bandswitching. May be driven by the "Ranger", "Pacemaker" or other unit of comparable output. Two 4-400A tetrodes in parallel, bridge neutralized. Wide range pi-network output. With tubes.

Cat. No.		Amateur Net
240-353-1	Kit	$524.50
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"PACEMAKER" TRANSMITTER/EXCITER

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

Cat. No.		Amateur Net
240-301-2	Wired	$495.00

Watch for the new Hybrid Phone Patch... coming soon from Johnson!

Viking

FIRST CHOICE AMONG THE NATION'S AMATEURS

WASECA, MINNESOTA

For further information, check number 21 on page 126.

BETTER DOUBLE SIDEBAND

Dr. Bruce Cameron, K9BDO
Bradley University
Peoria Illinois

If you want a rig which sounds as good as the best single sideband but is far easier and cheaper to build, read on. If you are convinced that all double sideband signals sound distorted and bassy, meet me on the air. If you want to own a piece of gear that is so complicated and tricky to wire that only a good commercial manufacturer or a highly skilled amateur could assemble it, forget it, because the Novice next door could build this one and sound as good as you do.

We will assume that all readers of CQ are familiar with the arguments pro and con sideband and are at this point interested only in the techniques. Several alternatives are available at this point. The first question in designing any sideband rig is the power level at which to generate the signal. Generating at high powers (above 100 watts) is of course cheaper than AM, but still inefficient because of the relatively large audio requirements, unless we use some sort of efficiency modulation. Extremely low level generation, such as is the practice with most filter type SSB rigs requires extra tuned stages and high amplification, which leads to inconveniences and unwanted feedback. Somewhere in between, around the three to ten watt level, we can achieve both simplicity and low cost.

The next decision concerns the type of modulation to be employed. The reason many DSB rigs on the air today sound bad is that they are screen modulated. Either control, screen, or suppressor grid modulation can be designed to sound good *if* drive, bias, feedback, and loading requirements are all met. Unfortunately, a departure from design value of any of these can degrade the signal. This is also true of AM operation, but less obvious due to the low average percentage of modulation and the less critical receiving techniques employed. Make no mistake about this: there *are* good grid modulated rigs on the air, but designing and operating one of these properly is a job for an engineer and not the average dx hound or rag chewer. For simplicity, dependability, and good sound, nothing has ever surpassed a Class C triode, plate modulated. This is why the majority of AM men have always used plate modulation, and why we use it here, with suitable modifications.

The tubes we chose were the 6L6 and the 12BH7A, since we found this could produce ample rf to drive a class B stage to 40 watts output with modest speech and excitation requirements. In coupling the audio to the rf we used a circuit mentioned in some of the handbooks, but not reduced to practical values in any other rig we have heard on the air. (See fig. 1)

Circuit Operation

In this circuit the carrier is balanced out in the push-pull plate circuit, optimum balance being secured by means of a small trimmer from one plate to ground. (Which plate must be determined by experimentation after the rig is placed in operation.) We could achieve balanced operation by feeding the grids in push-pull and the plates in parallel, but this would increase second harmonic output, acting like a push-push doubler.

In this circuit the grids are driven into the Class C region and all "plate" power is supplied in the negative lead by T_1. Since we need no steady carrier, we need no steady plate supply, and the plates operate at dc ground potential. With no audio the tubes draw no current, and being balanced, pass on no rf. When we apply audio, each tube conducts half the time to produce sidebands which are the mix-

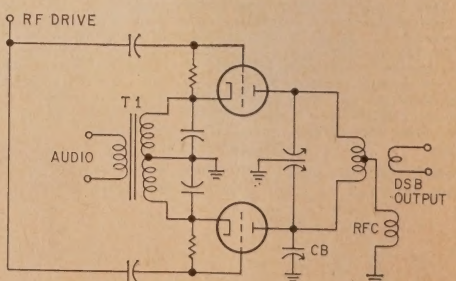


Fig. 1—Basic double sideband modulator.

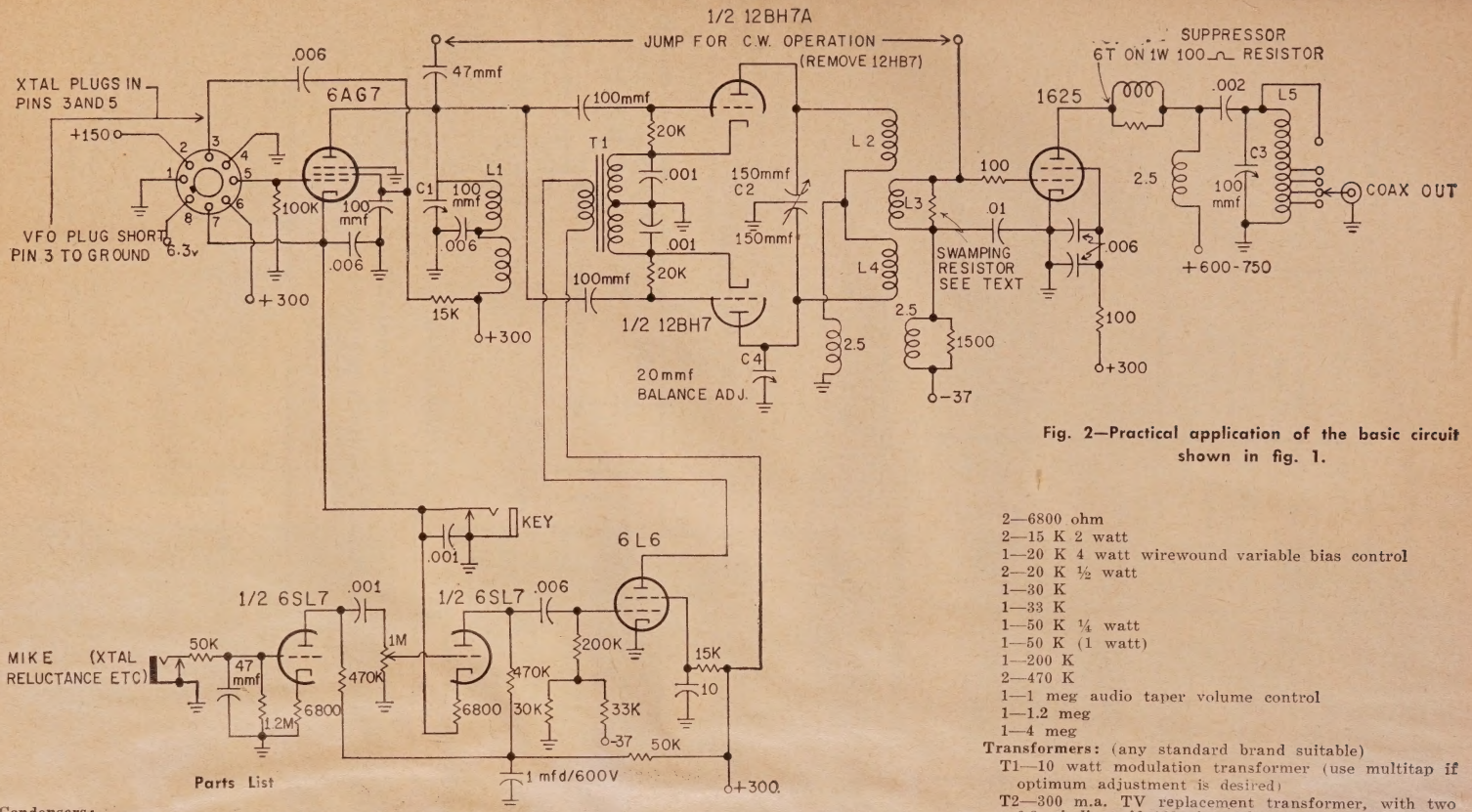


Fig. 2—Practical application of the basic circuit shown in fig. 1.

Parts List

Condensers:
C1-100 mmf variable, C2 150-150 split stator, C3 100 mmf transmitting variable (1000 v spacing), C4 20 mmf APC air padder.

6—.006 mfd mica or ceramic
1—.002 mfd 1600 v mica
4—.001 mfd mica or ceramic
3—100 mmfd mica
2—47 mmfd mica or ceramic
1—.01 mfd mica or ceramic
1—1 mfd 600 v oil filled (see text)
1—10 mfd 450 v electrolytic
1—70 mfd 450 v electrolytic
1—500 mfd 50 v electrolytic
5—6 mfd 1000 v oil filled (paralleled)

Resistors: (one watt adequate unless specified)

3—100 ohm
1—1500 ohm
1—2500 ohm 5 watt wirewound
2—6800 ohm
2—15 K 2 watt
1—20 K 4 watt wirewound variable bias control
2—20 K ½ watt
1—30 K
1—33 K
1—50 K ¼ watt
1—50 K (1 watt)
1—200 K
2—470 K
1—1 meg audio taper volume control
1—1.2 meg
1—4 meg

Transformers: (any standard brand suitable)

T1—10 watt modulation transformer (use multitap if optimum adjustment is desired)
T2—300 m.a. TV replacement transformer, with two 6.3 windings if 1625 is used, one 6.3 winding if 807 is used
T3—50 v 20 ma bias transformer
T4—5 v 3 a filament transformer 1600 v insulation
T5—1500 vac ct 100 ma plate transformer

Chokes:

PL1—10 henry 250 ma
PL2—5 henry 100 ma
3—2.5 mh 50 ma rf chokes (pigtail type)
1—2.5 mh 100 ma rf choke (standoff transmitting type)

Table I

Coil Winding Data

	75 mtrs	40 mtrs	20 mtrs	15 mtrs
L1 Oscillator 4 prong 1¼" forms	26 turns #24 enam. closewound	13 turns #18 enam. spaced to 1" long	10 turns #16 enam. spaced to 1" long	6 turns #16 enam. spaced to 1" long
L2, L3, L4 Mixer 5 prong 1¼" forms	L2-4 16 turns ca. #24 enam. with 25 mmf fixed mica padder	L2-4 14 turns ca. #24 enam. closewound	L2-4 4 turns ca. #16 enam. spaced wire diameter	L2-4 3 turns ca. #16 enam. spaced wire diameter
	L3 14 turns #24 enam. with 25 mmf fixed mica padder (condensers in coil form)	L3 10 turns #24 enam. closewound	L3 4 turns #16 enam. spaced wire diameter	L3 3 turns #16 enam. spaced wire diameter
L5 Output 6 prong 1½" forms	23 turns #16 enam. spaced to 1¾" tapped at 3, 4, 5, 7 turns	13 turns #14 enam. spaced to 1¾" tapped at 1, 2, 3, 4½ turns	Use same coil for both B&W coil material or 4 turns #14, 1¼" diameter, spaced to ⅝" long, mount by short leads to 6 prong tube base, tapped at ½, 1, 1¾, 2½ turns	

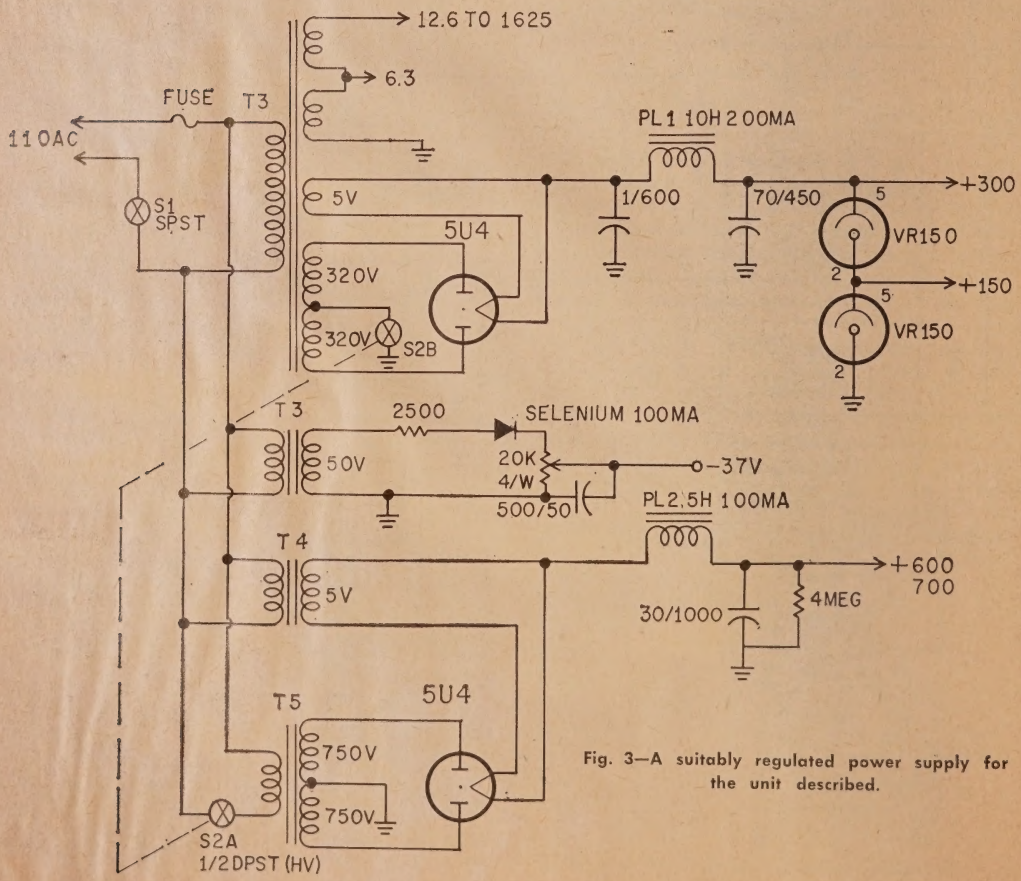


Fig. 3—A suitably regulated power supply for the unit described.

ture (sums and differences) of the rf and audio frequencies. The cathode bypass condensers serve two purposes simultaneously: (1) they put the cathodes at ground potential for rf and (2) they limit the high frequency response of the audio system and thus restrict the band width of the transmitted rf signal.

Since plate current flows only while audio is applied, even small receiving tubes can deliver a prodigious amount of rf without burning up. It is difficult to determine the optimum impedance values for the transformer, and the optimum grid resistances, but fortunately these values are not critical unless we are trying to achieve maximum output. This is not at all necessary, because a 6L6 and a 12BH7A or some similar combination can supply more than enough drive for a class B 1625 or 807 to produce a full forty watts output. This is an excellent level of output for an exciter, because it is enough to use by itself as a summer portable, or to drive a grounded grid linear up to three or four hundred watts.

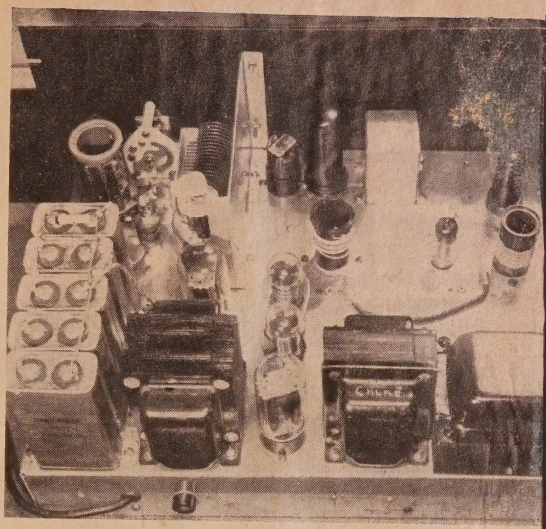
The only special mechanical consideration is in the balanced modulator, which will be easier to balance if the lead dress and parts placement are bi-symmetrical. Beyond this, point to point wiring, cabling, right angle buss-bar or almost anything can be used consistent with conventional practices. This is a very forgiving design.

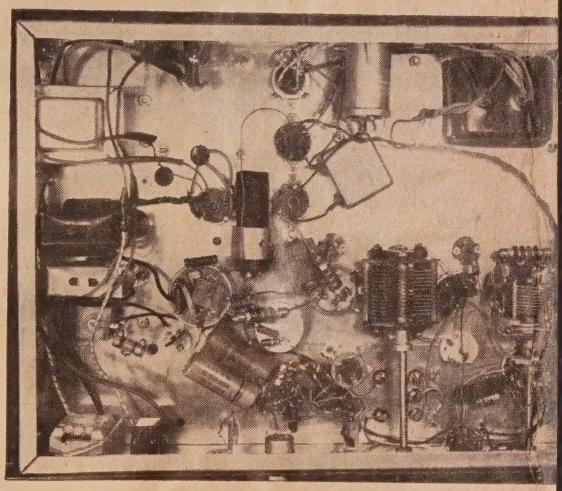
The dyed-in-the-wool experimenter can quit reading this article right now and go plan his own rig, but for those less experienced we will describe in some detail the exciter now in use at K9BDO. The photographs and circuit diagrams are largely self-explanatory, but a few further observations may simplify duplication, if that is desired.

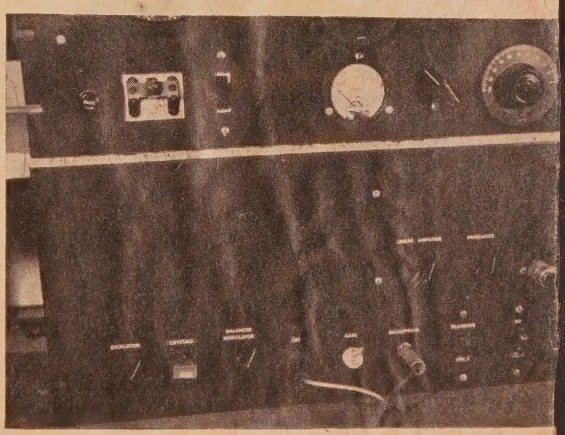
Power Supplies

Good signals require good power supplies. It will be seen that all B voltages are regulated except the supply for the 1625 plate. Since the 300 volt supply faces a varying load with modulation some initial experimenting is necessary to assure that the voltage available at the output of the filter falls within a range which can be regulated by the two VR tubes. In the rig described here this was accomplished by adding the 1 mfd input capacitor, experimentally selecting a value which would keep the VR tubes lit at all times. If the output from the filter were too high, a resistor would be added in series with the power supply ahead of the VR tubes, and the regulated output taken from the VR tubes themselves. It would even be feasible to correct low voltage by using a larger input condenser in series with a potentiometer to ground but such refinement is hardly worth while. Most TV replacement transformers will put out about the right voltage "as is" and correction by the addition of a condenser or resistor takes only about ten minutes of experimentation.

[*Continued on page 124*]

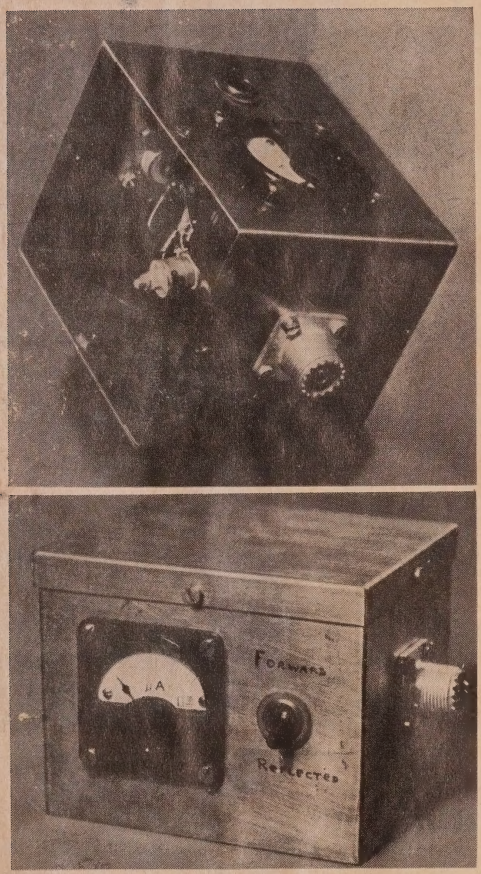






SWR Meter

M. van Schagen, PAØLZ
Kalverstraat 35
Eindhoven, Holland



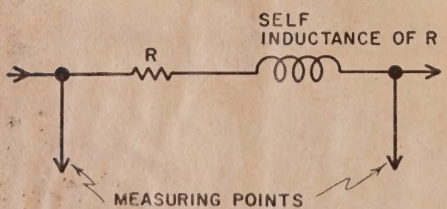


Fig. 1—Schematic of the coax inner conductor, the series resistor and the self inductance of the resistor. The influence of the self inductance becomes greater as R decreases. When R has a high value, excessive power is dissipated.

The neatest headache-saving device to appear in the ham shack in the last decade is the Standing-Wave Ratio (S.W.R.) Indicator.

By now many schemes have been tried and the "Ideal" is being approached. Or so we think. The requirements are as follows:

1. S.W.R. Indicator must be left in antenna line to continuously monitor outgoing power. It should not absorb more than 1% of the *rf* power in the line.

2. It should measure S.W.R. and Power with good accuracy.

3. Construction should be simple, without critical measurements or touchy components. It should be rugged. It should work forever.

PAØLZ has incorporated these features in a very small unit, a mere "bulge" in the transmission line, so to speak.

The principle is familiar[2, 3, 4]. However, this unit uses two bridges back-to-back, with no series resistor, utilizing instead a current transformer of unique design.

The advantage of this simple transformer-type unit is immediately apparent. The earlier resistor-type 50-ohm S.W.R. Indicator could not be left in the line. The 1 ohm Indicator could, but saps about 2% of the *rf* power (about 20 watts at 1 kw input).

The reflections caused by these units are rather great, so placement of components, particularly of the crystals, is very important.

In the 1 ohm unit, the fault due to the self-inductance of the resistor is large. See fig. 1. Here we should be measuring $I \times R$, actually we measure $I(R+jwL)$. The error increases as R decreases, and 1 ohm is about the lowest practical value for R. And the lower the resistance, the more sensitive the voltmeter must be.

In one stroke we eliminate these troubles by coupling thru a tiny ferroxcube core transformer. We now have something equal to the bridge described by Allan W. King[5] but with quite a few advantages:

1. The power absorption is 10 times less.

1—Helpful suggestions were given by Mr. A. v. d. Grijp, for which the author is grateful.
2—Recent Equipment, QST, March 1955.
3—Meet the SWR Bridge, QST, March 1955.
4—Theory and Design of the Reflectometer, Parson and Yalow, Electrical Communication, March 1947.

2. "Fasefault" is imperceptible as the series inductance has been eliminated. The parallel inductance introduced by this unit does not cause an appreciable fault.

3. Construction is made right on co-ax cable of desired impedance, and parts placement is not critical.

4. The primary voltage is transformed *n* times, so a less sensitive voltmeter will serve.

Design

The ferroxcube core chosen has a permeability of about 300 at 10 mc. This gives a primary impedance of about 5 ohms at any frequency. With 37 turns on the secondary of the transformer, and (effectively) *one turn* on the primary (the cable center conductor), the secondary resistor of 140 ohms effects a resistance of $\frac{Rsec}{T^2} = \frac{140}{37^2}$ — .1 ohm, which means a power loss of only .02% in a 50 ohm line (.2 watts at 1 kw).

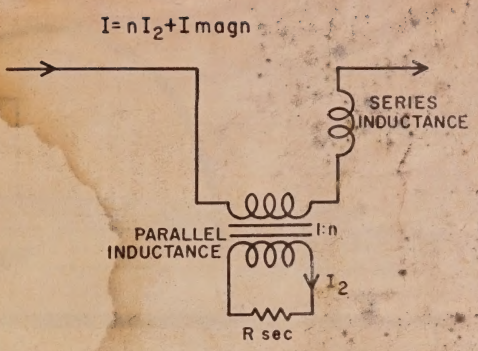


Fig. 2—Schematic presentation of the transformer method. The primary has one turn, the inner and outer conductor of the coax. The secondary has approximately 36 turns. The reflected impedance of the secondary appears in the primary but without the self-inductive effect.

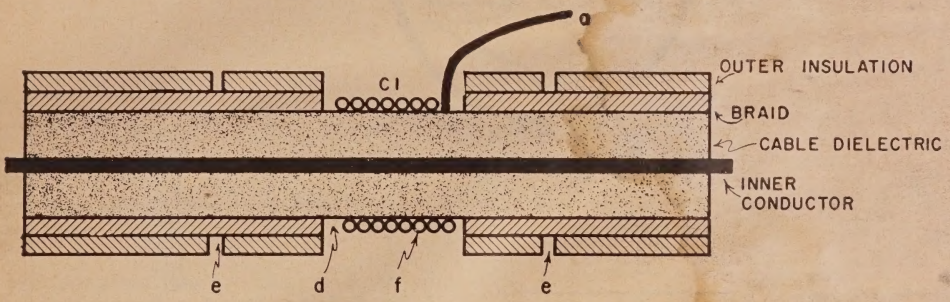


Fig. 3—Cross section of the coax to be inserted in series with the antenna. Note C1.

As the impedance of the primary is high with respect to the "transformed resistance" of the secondary (.1 ohm), the magnetization current is small. Power input in Holland is limited to 150 watts, so this transformation to .1 ohms was used. With a KW, one could go to smaller values. This bridge is very sensitive and can also be used for checking or adjusting interstage coupling.

Construction

First take a short piece of coaxial cable of the desired type (5 to 10 inches will be sufficient). Follow these instructions carefully and the cable will be prepared quickly and easily.

1—Cut through the outer insulation *and* the braid at point *"d"* of fig. 3, using a sharp knife. Do not cut inner dielectric.

2—Next, cut the outer insulation twice, at *e, e,* being careful *not* to cut thru the braid this time.

Pull the two halves of the braid apart, exposing a section of the inner dielectric. Around this dielectric wind a sleeve of copper wire (*f*)

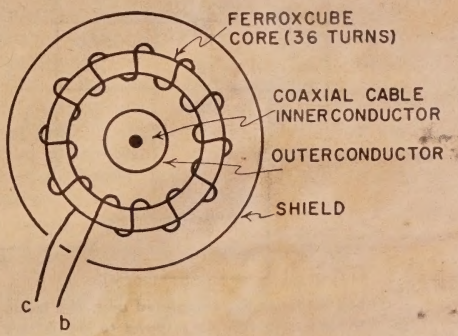


Fig. 4—Frontal view of Ferroxcube core showing position relative to coax.

—any size between #30 and #38 will do. This forms capacitor *C1* with the inner conductor, about 1 mmfd. With 50-ohm cable, the winding should be 3/8" in width, 5/8" with 72-ohm cable.

3—Insulated wire *a* is soldered firmly to this capacitor "sleeve" and at the same time a small amount of solder is caused to flow between adjacent turns of the sleeve to assure

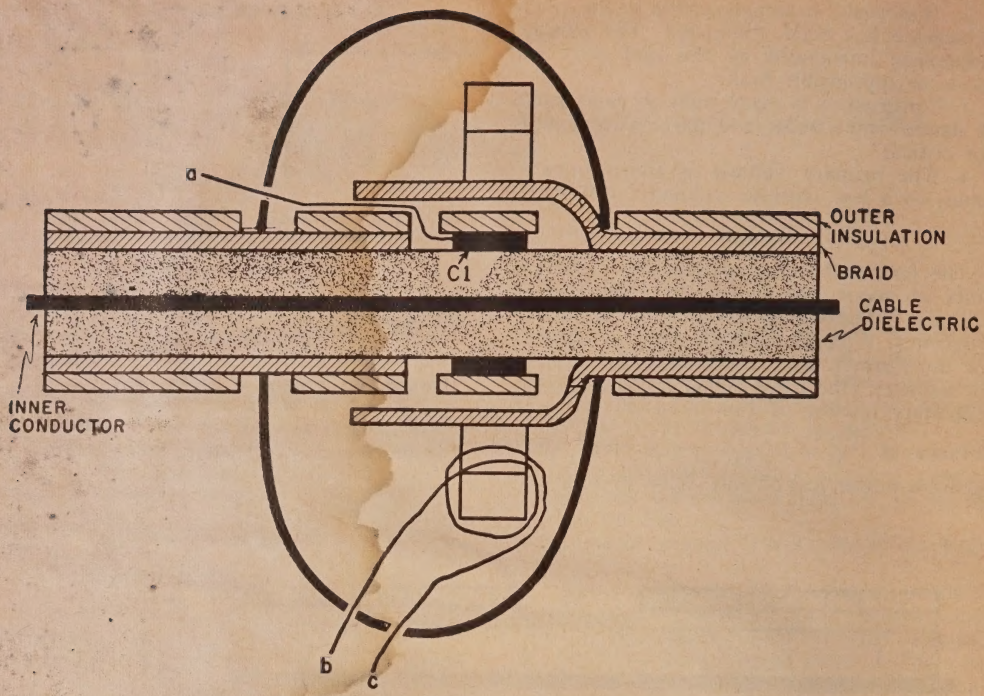


Fig. 5—Cross section of the complete coax assembly. The three connections leading from the coax assembly correspond to the letters in fig. 6.

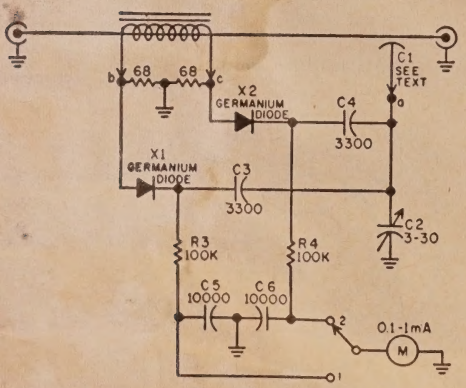


Fig. 6—Schematic of the completed unit. The leads from the coax assembly correspond to the letters in fig. 5.

that they are all shorted electrically.

4—The two loose sleeves of insulating material are now maneuvered so as to protect the capacitor sleeve from shorting to the outer braid when the braid slipped back over as a shield (see photos). Wire *c* is threaded thru this shield as shown.

The replaced outer braid forms a Faraday screen which assures that all coupling between the primary (inner conductor of the coax) and the secondary (windings on the ferroxcube core) is inductive and not capacitive.

If the Reflectometer is to be mounted inside the transmitter cabinet where strong *rf* fields are present, it will probably be necessary to enclose the entire circuit in another shield with the leads to an external meter by-passed to the shield by capacitors. If the unit is not shielded in the presence of a strong field, the diodes may rectify stray *rf* and send it along to the meter.

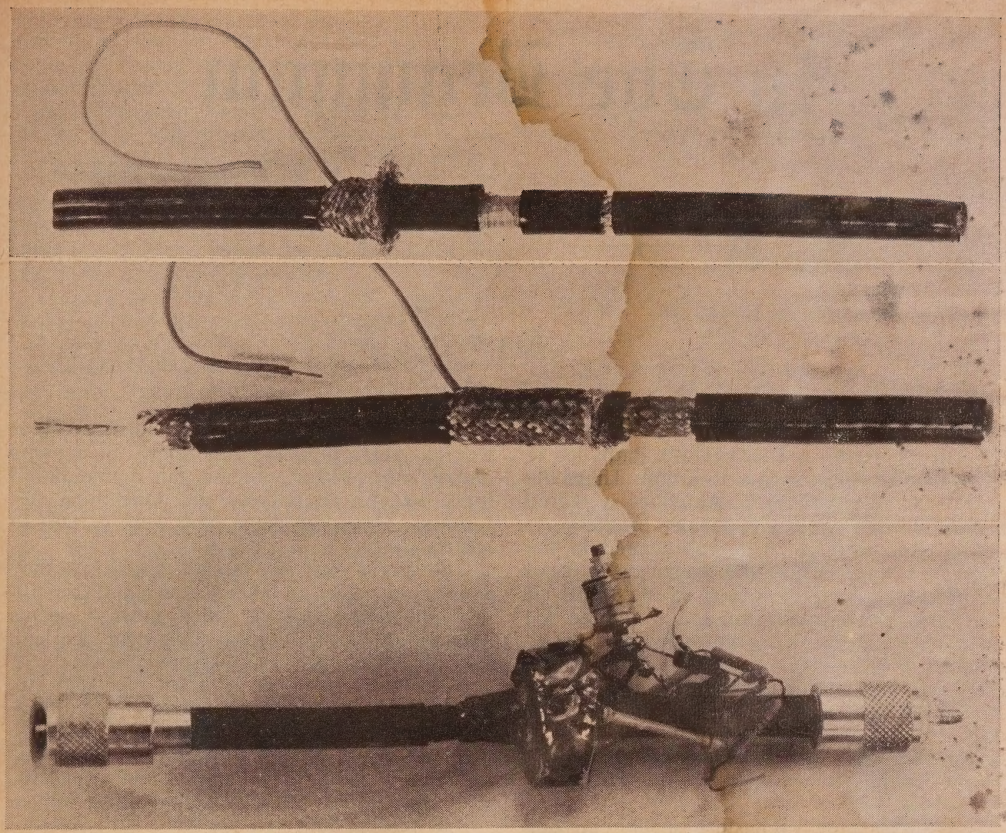
A shield was unnecessary in the PAØLZ installation as the Reflectometer was mounted outside the transmitter cabinet.

5—The ferroxcube ring[6] is wound with insulating tape (quality not too important).

6—Wind about 36 turns of insulated wire[7] on the ring as in fig. 4. Then wind insulating tape around the outside of this winding.

7—The ring is then placed on the cable in the location shown, and enclosed in a shield

5—The Z Match Antenna Coupler, QST, May 1956.
6—The ferroxcube can be obtained from:
Ferroxcube Corp. of America
35 East Bridge St.
Saugerties, New York
In Canada
Rogers Majestic Electronics Ltd.
11-19 Brentcliffe Road,
Leaside, Toronto
7—The number of turns on the secondary is not important. The more turns the less power dissipated in the secondary carbon resistors and the higher the measured voltage.
8—Dummy Load for Coax Line, CQ, July 1958.
9—Photos by PAØUSA.



formed of copper or a suitable braid material, so as to shield the transformer completely, and provide continuity of the outer braid of the coaxial cable. See fig. 5. Don't forget to feed thru the leads *a, b,* and *c.*

The remaining components to form the circuit of fig. 6 are then connected external to this neat little bulge in the cable, as shown.

Adjustment

Adjustment at this station was made using a "poor man's dummy load" consisting of 12, 150-ohm 1-watt carbon resistors in series-parallel, immersed in ordinary water providing a 50 ohm dummy capable of dissipating up to 300 watts[8]—until the water boils. This dummy is not quite free of standing waves at 30 mc (due to high capacity). Otherwise the quality is excellent—even better if you use transformer oil instead of water.

With the Reflectometer inserted bewteen transmitter and dummy load, adjust the transmitter to deliver power to the load, with the Reflectometer switch in position 1 ("forward power"). A power reading will be obtained on the meter.

Then put the switch in position 2 ("reflected power"). Adjust *C2* for minimum deflection.

Adjustment is best made at 21 mc or below. Adjustment need only be made at one frequency, after which no further adjustment is necessary.

The unit is now ready to operate. Remove the dummy and connect to your antenna tuner and/or feed system. You may be surprised when you find the correct adjustments for maximum power transfer to those antennas!

Using the Reflectometer

This has been covered in detail in earlier articles. But to round off this article we will offer a few suggestions.

First connect the dummy load and adjust the transmitter to the power level you plan to feed into the antenna.

Connect the antenna feedline or tuner, adjusting these for minimum reading of the Reflectometer on the "reflected power" position. Do not change transmitter control settings, which are already correct—nothing at all can be done at that end of the line to reduce standing waves.

You are now ready to contact me on any band, 80 thru 10. I hope to meet many of you there, and often. ■

In The Beginning

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223 W. Holly Ave.
Pitman, N. J.

Part II

To large and small boys in our town, wireless science originated at Sam's house. Paths led to this spot like wheel spokes to a hub. There the new science flourished. Activities centered around Sam's dad and two older brothers.

His dad, born in 1872, volunteered in the Spanish-American War and stayed on to serve an additional hitch. Exposed to the bustle of Navy wireless development, some of it rubbed off and he caught the fever badly. The "bug" quickly spread to his oldest son Walt. From there it gradually drifted down through Harold to the youngest boy, Sam. Boys were not the only group lured to Sam's house. Dad's old sea cronies often dropped in. Those occasions meant double treats—like adding ice cream to the pie.

Sea yarns kept youngsters spellbound and poised in their chairs. Rarely a muscle moved while the oldsters spun their sagas. Each tale swapped surpassed the previous. Soon even the oldsters got excited. You could tell because their vocabularies slipped. When things reached that stage, Sam's mother rushed in and shooed out the young audience. She gave the men a small "bawling-out," complaining about their lack of respect for children. Each incident dampened her wireless enthusiasm a little more. This never seemed to perturb Sam's dad though. He would smile at his visitors and comment that the disputed words were just a little *sea salt*—normal seasoning to authentic sea yarns.

Naturally, the language was never too spicy for the young ones. They believed each *piece of salt* was a hero word. Given half a chance, they would use them too. In fact, there were times when they did—to their sorrow. Listening to these sea tales left its mark on the boys. Their emotions ran from thrilled, to awed, to sometimes scared. Each tale strengthened the lure of the water. Never has the sea known better recruiting.

The Coherer

Sam's Daddy's robust good nature made young and old feel at home. I suspect half the visitors to their house enjoyed his magnetic personality equally as much as his mysterious wireless gear. Initially, you might have come out of curiosity for wireless; but if that didn't hook you, his friendliness did. One thing was for sure: Once you came, you were certain to return.

The assemblage of wireless apparatus they saw would puzzle all but a scattering of present-day amateurs. Looking back now, it seems amazing that such radio equipment worked. Probably strangest of all was the *coherer*.

Coherers formed the heart of receiving systems. Affection for these temperamental gadgets ran the full gamut of personal feelings: You pampered them, adored them, and cussed them. Constant association alone mastered their peculiarities and the regulating adjustments needed. Sam's Daddy had a cantankerous one. And he also had some *beautiful* sea language to breathe over it.

In their "shack" a home-made coherer plucked c-w signals from the air. In the beginning, all wireless was c-w. But had voice transmission existed too, you couldn't have received it—coherers responded only to code. Other detecting devices, with the added ability to receive voice, still awaited inventing.

With coherers you didn't hear the actual c-w signals. You only heard an internally created signal following the spurts of electromagnetic energy passing through the coherer. This always intrigued the visitors.

The secret of coherer operation rested in their resistance. Basically, coherers consisted of a glass tube filled with metal filings. Their static resistance depended upon the pressure applied by metal plugs inserted in each end of the glass tube. Proper adjustment consisted of just enough resistance to keep the internal signalling device from operating. Wires from these plugs connected the coherer between antenna and ground. Received signals cohered the metal filings thereby lowering the coherer resistance. With lower resistance, more battery current passed through the coherer causing the internal sound device to work.

To understand how a coherer works, imagine yourself back in a physics class. A sheet of

white paper covers a magnet. Someone sprinkles iron filings over the paper. Quickly the filings swing end-to-end outlining a pattern of the magnetic lines of force. Now, if we discharge a condenser near a second scattering of iron filings, they will change position. A radiated electromagnetic wave also causes metal filings to cohere end-to-end. When this happens, the resistance of the iron filings goes down. A Frenchman, Edouard Branly, discovered this effect and put the knowledge to work. He invented the first wireless detector.

The original coherer had one bad drawback. When an electromagnetic wave passed through and cohered the filings, they stayed that way for awhile. This made it impossible to receive any more signals until the metal particles decohered.

Tapping the glass tube with a pencil would restore the filings to their original state. But this was too slow for communication work. Marconi eventually solved this situation by adding an automatic tapping device. In addition, he reduced the size and improved the sensitivity. His coherer was about two inches long, contained nickel filings with silver plugs hermetically sealed in a glass tube. The tube was automatically tapped after each dot or dash. The foreign and American Marconi companies used these coherers for many years. They were sturdy and sensitive and not easily knocked out of order.

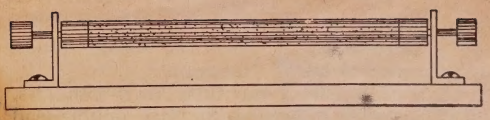


Fig. 3—Branly coherer.



Fig. 4A—Marconi coherer.

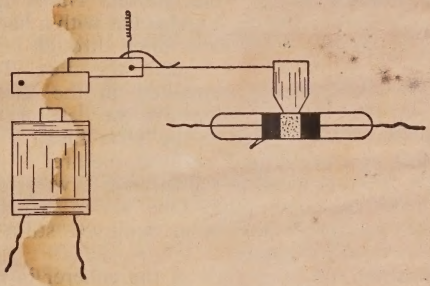


Fig. 4B—Marconi coherer with decoherer tapper.

Detection

Detection with a coherer required three circuits; 1) The radio frequency circuit, 2) the sensitive relay circuit, and 3) the signalling circuit. The antenna, ground and coherer made up the radio frequency circuit. Wireless signals picked up by the antenna passed through the coherer to ground. As they travelled through the coherer, they reduced its resistance from high to low.

A small battery, sensitive relay and the coherer formed the sensitivity circuit. The end plugs in the glass tube holding the metal filings controlled the resistance of the coherer. Pushing them in decreased the resistance; pulling them outward increased it. The trick was to make the resistance just enough that the feeble battery current passing through wouldn't quite work the relay. This relay controlled the audio signalling device and the decoherer. The relay contacts, a bell or other sounding device and a battery comprised the signalling circuit.

Signals picked up by the antenna flowed through the coherer causing the metal filings to cohere. This lowered the coherer resistance allowing enough current from a battery to flow and actuate the sensitive relay. Closing of the relay contacts enabled current from a second battery to pass through the signalling device. This started the bell ringing. Besides striking the bell, the clapper struck the coherer

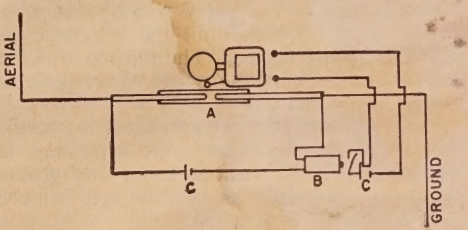


Fig. 5—Receiving set coherer circuit; A-coherer, B-relay; C-batteries.

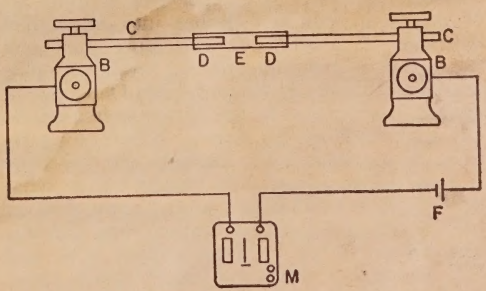


Fig. 6—Amateur homemade coherer; B-double binding post; C-brass rods; D-ends of brass rods inserted in glass tube; E-area in glass tube for compressed metal filings; F-battery; M-relay.

on the return stroke. This jar decohered the filings. Reception of dots and dashes relied upon continuation of this cycle.

Many amateurs built their own coherers. Their coherers consisted of two double-lead binding posts, two brass sliver-plated rods about two inches long, large enough to fit snugly in the binding posts, a small glass tube, and some filings. The two binding posts mounted on a piece of half inch board held the two silver-plated brass rods. The top screws of the binding posts secured the rods. These rods went into the glass tube from each end, compacting the filings between them into a one-sixteenth inch space. The side screws of the binding posts held the circuit wiring.

Preferable filings were nickel. Hams obtained them by sawing a nickel bar with a hacksaw. Sifting the homemade filings through thin-meshed cheesecloth extracted the dust. The larger metal filings remained in the cloth. These, after heating to remove the detrimental moisture, were placed in the glass tube.

Just as a newly built receiver requires aligning, coherers needed adjustment. Two steps covered this operation: One varied the coherer resistance; the other removed stiffness from the relay spring.

Pushing the brass rods of the coherer in decreased resistance of the filings. Continuing this movement until the relay worked and then backing off until the bell barely stopped ringing, completed the first adjustment.

Adjustment of the relay tension comprised unwinding the spring until the armature just closed and rang the bell. The tension was then slightly increased to the point where the relay barely stayed open.

Finer adjustments were possible if the sending and receiving apparatus were separated ten feet and operated without aerial and ground. Adjusting continued as the distance widened until the limit was reached.

Interference & Regulation

Confusion and problems ride hand in hand with growth. Like many enterprises before it, wireless too failed to escape. The thrilling art of decoding dots and dashes into intelligible language attracted more and more men and boys. But as the atmospheric mysteries sputtered nightly into Sam's home, his Dad's pencil paused more often. As the pauses increased, so did the depth of his frown. Before long no trace of his usual smile existed.

Two things caused this change: One, what he copied; two, what he couldn't copy. Putting both together he sensed forthcoming trouble. The nature of the problem eluded Walt and Hal. Mastery of code still wasn't theirs. However, though they didn't recognize its nature, it definitely affected their work. They found it harder and harder to hear good copy.

Mostly the new crop of operators had no previous experience. They were just public enthusiasts with a flair for scientific adventure. The remainder though were extremely important people held in great esteem by the inexperienced. This hero group comprised the commercial operators having a yen for their own equipment. One thing in common united both groups—they liked to ragchew.

Originally, American commercial operators obtained sea experience one of two ways: Either they wireless-operated in the United States Navy, or they saw service with the American Marconi Company. The Marconi Company trained operators to run equipment in their land stations and to operate the rented Marconi gear installed aboard ships. The U.S. Navy, faced with a shortage of wireless operators to man their increased installations, opened a special training school for wireless operators at the New York Navy Yard in 1903.

One of the employees hired by the American Marconi Company in these early years later became one of today's outstanding names in radio. The Marconi Company hired this fifteen year old youngster for office boy (they thought). But if they didn't know what they were doing, it sure wasn't true of him. He wanted an education in wireless.

Vigorously he pursued a routine of wireless study. Practical experience he secured by hanging around Marconi's experimental shops. Nights found him buried among the technical books his scant salary provided.

Before long his initiative brought reward. The Company promoted him to operator at the Marconi station on Nantucket Island off the south coast of Massachusetts. During his two years at this lonely station he continued to study and practice. Today, as Chairman of the Board of the Radio Corporation of America, Brigadier General David Sarnoff guides a billion dollar a year business. His uncanny insight into electronic futures earned him the enviable title of "Mr. Radio" in the communications industry.

All wireless enthusiasts were not of course possessed with Sarnoff's mania for learning. Unfortunately, a number confined their activities to making nusiances of themselves.

Sam's Dad heard the QRM swelling and, though unconsciously, so did his two oldest boys. His code proficiency however enabled him to know the nature of the QRM. With the increased QRM arose numerous unscrupulous habits. Other listening stations noticed them too. Sam's father was right to frown; for eventually the bedlam and confusion forced regulation and licensing upon wireless communication.

At first, commercial operators only acted like overgrown children with a new toy. But it was such as fascinating toy: They snared unseen messages out of thin air; they received messages from unexpected sources; they often "hooked up" with an operator friend aboard another ship. How entertaining sailor life be-

came for the wireless operator. He was really living. Unfortunately, wireless operators aboard naval and merchant ships got cocky. Their ideas of themselves swelled into importance out of all proportions to their duties. To themselves they were an exclusive class; to others, they were just a big pain.

Soon they wouldn't send official traffic until it suited them. Knowing no laws controlled them, they became arrogant. Ragchewing between operators even blocked out life and death messages from distressed ships. To break up the gossiping, operators held their keys down with weights. While this broke up the chatter, the spark signal also blocked the whole band and then some. What an atmosperic *fuss* they kicked up! Such action failed to cure the situation. But it did provoke some *beautiful* feuds.

American ships weren't lone offenders in this wireless bedlam. Operators in all parts of the world practiced it. The same trouble even prevailed on land. By now Sam's brothers began to understand the picture. Together with their Dad they listened and waited for the inevitable. It wasn't long coming.

The first attempt to find relief occurred in 1903. The first International Wireless Conference met in Berlin to form *regulations* for wireless telegraphy. But their squabbling and bickering produced no concrete results. Only one thing emerged—the international distress signal CQD.

This first wireless distress signal merely added "D" to the British railroad distress call CQ. Germany, however, would have no part of this. The Germans continued to use their own distress signal, SOE.

The distress call CQD stood for many years. Officially, it was changed in 1906. At that time the second International Wireless Conference agreed on SOS. However, even by 1912 when the British queen of the seas, the Titanic, struck an iceberg and sank, uncertainty still existed and both distress calls flashed from this tragic scene.

In 1904 Sam's brothers and their Dad saw the regulations noose woven. When the first Wireless Conference failed to achieve its purpose, the British proceeded to do something about it. To control their fifty wireless stations then in operation, they created a governing body. The British Parliament passed the Wireless Telegraph Act of Great Britain in 1904. This Act placed all British wireless activities under control of the Post Office. From then on, the Postal authorities issued licenses for construction of new wireless stations. Licenses required operation of stations on definite assigned wave lengths.

Now the boys, Walt and Hal, realized too what was happening, and they watched the woven noose tighten a little more. America also was on the warpath. President Theodore Roosevelt's committee was studying the need for regulation of American wireless activities. Sure enough; their report submitted in August 1904 recommended the War Department have charge of interior stations; the Navy, coastal stations; and the Department of Commerce and Labor, commercial stations.

Fortunately or unfortunately, the Committee's recommendation never became law. The Navy, however, applying long range perspective, basically adopted the recommendations. From then on the Navy spent millions of dollars to develop wireless. The Navy became the best customer for early American wireless equipment manufacturers. Whenever new apparatus appeared, the Navy tried it out.

In the meantime, wireless conditions continued to go from bad to worse. Amateur activity by 1904 was alive! While they varied in degree of efficiency, in one thing they had a common ability: They all were capable of cluttering up the ether with man-made static.

When President Theodore Roosevelt visited the fleet maneuvering off Cape Cod in 1906, Amateur interference made communication with the nearby Newport Naval station impossible. Unable to get wireless messages through, destroyers had to ply back and forth delivering them.

All signs pointed toward Amateur interference increasing. Wireless magazines multiplied. The marvel of wireless filled pages of popular science periodicals. Instruction articles galore, splashed with ample diagrams, detailed with great clarity how to build the pieces of apparatus yourself.

Together with daily reports of wireless thrills, these articles set young America afire. Manufacturers soon joined in and supplied various parts which made Amateur tinkering easier. Soon mechanical monsters rising above tree tops distorted the landscape. These various shapes of homebrew ingenuity held aerials in the clear.

From worse, conditions went to serious. Mischievous pranksters among the Amateur clan transmitted false messages causing severe distress and confusion. Naval vessels received fake orders presumably from an Admiral. False distress calls sent ships scurrying to the rescue. Both the Coast Guard and merchant marine ships dashed wildly about seeking these imaginary distressed ships. Similar pranks happened in other parts of the world. A message received in Japan said the American liner, Siberia, was aground and sinking off Formosa. Vessels rushed to her aid. Meanwhile, she steamed peacefully into Manila the next day having been nowhere near Formosa.

No laws covered these Amateur tricks. Without them, few or no police searches could be made. Therefore, the names and locations of the worst offenders remained unknown. Any attempts to remonstrate with them over the air generally drew their curses mingled with

[*Continued on page 123*]

How to Catch a "Rabbit" with 89c Worth of Copper

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50 Parcot Avenue
New Rochelle, N. Y.

Among the many activities of the Communications Club of New Rochelle, N.Y. (K2YCJ), one of the most popular is the monthly hidden transmitter hunt. Club members also serve the local Civil Defense Organization as its radio communications section, and this activity is sponsored by the CD along with the club. Members are issued CD equipment on loan, and our monthly "rabbit hunts" usually find as many as seven or eight mobile units combing the more remote parts of New Rochelle.

During these hunts, the most unusual collection of "secret weapons" appears, limited only by the abilities and inventiveness of our members. Antennas which have been used range from three-element beams, vertically polarized in the two meter band where our CD gear operates, to home-brewed arrangements of coat-hanger wire, and back again. One of the more successful rigs was the "dish reflector antenna" used by one team of four members at the last hunt. It ran a total cost of exactly 89¢ and some scrap lumber. Starting from "scratch", this unit led the team straight to the hidden transmitter in less than 20 minutes of "rabbit hunting"—and was the only successful rig in the two-hour hunt.

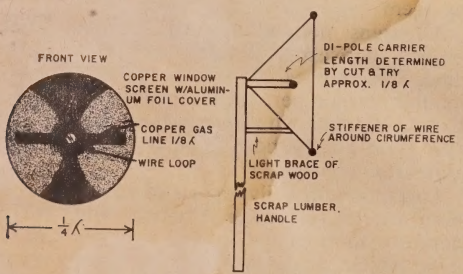


Fig. 1—Structural details for the antenna.

Basically, the unit is as simple as possible. It consists of two lengths of copper automobile gas line mounted atop a block of wood. Each length is cut to 4¾″ and the two are center fed by a length of 72 ohm co-ax bridged to the two pieces of copper. By a process of cut-and-try, the di-pole was mounted at the focussing point of the dish reflector whose construction will be described later. The CD-owned equipment used by the Club—Gonset and Kaar Imp units—are fix-frequency operated at 145.38 mc. It can thus be seen that the total wavelength of the twin pieces of copper tube is ⅛ wave of the frequency in use. The focal point of the particular unit in question turned out to be about 4″ from the back of the reflector, but anyone attempting to duplicate the rig would be well advised to begin by making the support for the di-pole quite a bit longer, and following the same cut-and-test method that we did to arrive at the proper distance.

The reflector or dish is simplicity itself in construction. A circle with a diameter of 20″ —just over a quarter-wave— was cut from a piece of common copper window screening. It was then formed into a concave shape by removing a wedge-shaped segment—another case of cut-and-try—from its area and forming the edge around a piece of heavy wire. We used a scrap of copper-clad antenna wire left over from the installation of the 40-meter vertical ground plane associated with the shack. This dish-shaped reflector was then fastened to the handle of the antenna with ordinary heavy-duty staples—the sort that are applied with a hand-gun.

The insulation on the co-ax lead was cut

[*Continued on page 122*]



After the hunt. At the wheel, KN2JQB (Al Mason) VP es Activities Chairman of Communications Club of New Rochelle; at Mike, K2ZDJ (Jerry Hacker) and holding parabola antenna, KN2RRZ (Pete Berry). Car belongs to KN2SJN, member of club and father of RRZ.

A Frequency Standard for the Heathkit SG-8

H. H. Gloster, VE3IT
London Aeradio Station,
Box 156, London, Ont., Canada

The Heathkit Signal Generator has been in use at the authors station for some time. It is an excellent piece of apparatus, but like most signal generators it is not a precision instrument. This does not matter for such work as preliminary alignment of receivers, but for calibrating a VFO or frequency meter, or for the precise alignment of a receiver a frequency standard is required.

While frequency standards are not difficult to build they do cost money, and since they are not in constant use quite a number of amateurs are reluctant to make the necessary expenditure. If it is made up in a separate unit an additional power supply is needed, or power must be borrowed from some other source, an arkward arrangement. If such a unit is placed in the receiver itself its use is limited to that receiver only.

The logical place for it is in the signal generator, and most high grade instruments have a frequency standard incorporated. With such an arrangement it can be used on any receiver or other piece of apparatus for calibration purposes.

Consideration was given to the possibility of adding a frequency standard to the Heathkit SG-8. It was quite obvious, however, that any attempt to place it in the rf section would upset the calibration of the instrument, especially on high bands, since this would necessitate a switching arrangement from crystal to manual. An examination of the Heathkit Assembly Manual 595-73, page 2, shows that a crystal placed between the plate and grid of the 6C4 audio tube would make the audio section a Pierce oscillator, which would not interfere with the audio oscillator section if the modulation switch was placed in the "Ext" position, nor would it interfere with the normal modulation function if the crystal was removed.

Therefore, at a cost of approximately 75 cents, excluding the cost of the crystal, and less than one hours work, a frequency standard may be added to the SG-8. Any crystal may be used, either on its fundamental frekc crystal since it serves to mark the high end of the 75 meter band, and the low ends of the 7, 14, 21, 27 and 28 mc bands. Strong harmonics up to at least the 30th are obtained, the output being controlled by the A-F in-Out control on the front panel. On the fundamental frequency an output of approximately 4 volts is obtained, measured with the rf probe. With a 100 kc crystal usable harmonics up to the 70th are given. The modulation switch must be in the "Ext" position when using the frequency standard. Removing the crystal restores normal functioning to the audio section.

Fig. 1 shows the addition components and wiring required, the type of crystal socket depending on the type of crystal used. The method of mounting the items is shown in fig 2, the wiring from the crystal socket and output connector being passed through the rubber grommet in the chassis to the plate and grid prongs of the 6C4 socket. The grommet is labeled "A" in Pictorial 4 of the Heathkit assembly manual. If one is hesitant about putting the plate voltage directly to the crystal a .005 mica condenser may be inserted as shown by the dotted lines in Fig. 1 but it is not necessary.

In addition to the use of the fundamental crystal frequency and its harmonics, by heterodyning the crystal frequency with the correct

[*Continued on page 122*]

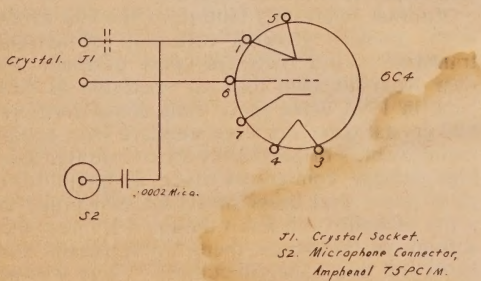


Fig. 1—Conversion of audio oscillator to a Pierce.

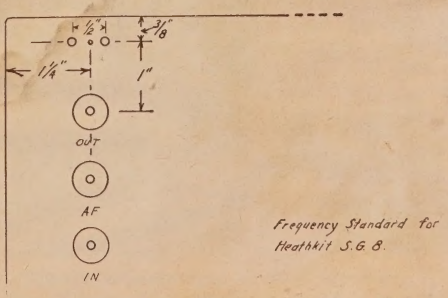
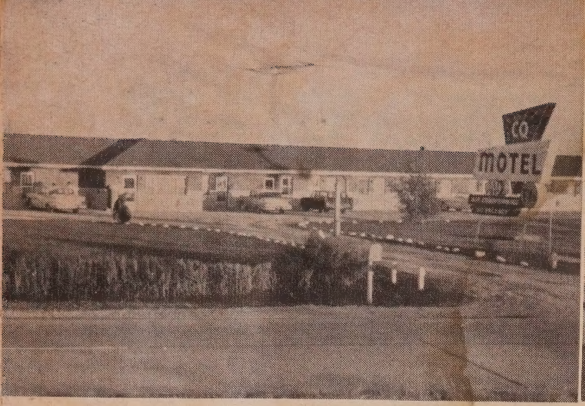
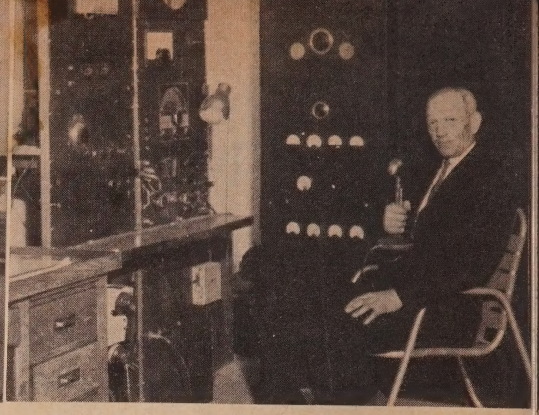


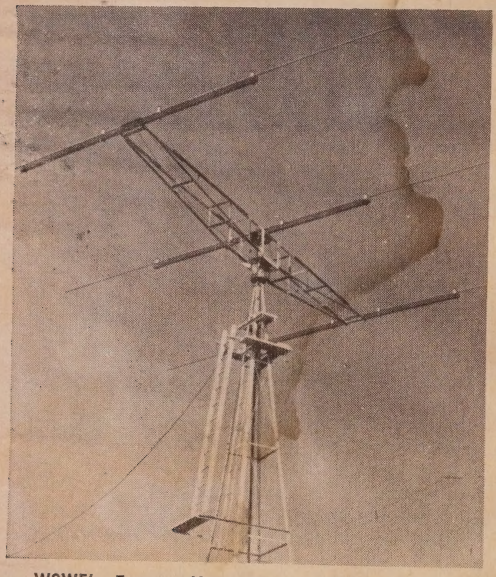
Fig. 2—Dimensions for crystal socket placement.



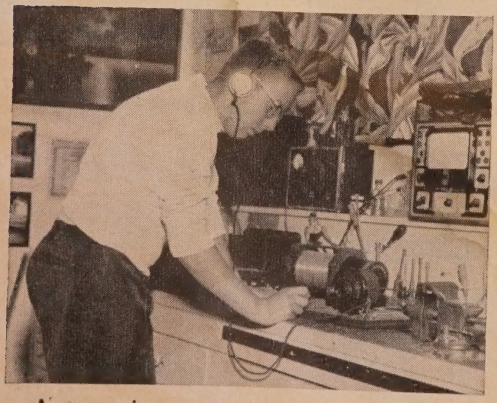
The "CQ" Motel at Kokomo, Indiana. A real Ham Haven.



Noble Watson, W9WE, himself at his self-designed kilowatt transmitter located at the CQ Motel.



W9WE's Twenty Meter Beam weighing about 400 lbs. Boom is 26 feet long.



A new novice amateur radio operator, KN9PDC, Samuel L. Breeden, examining a 1913 radio receiver owned by Noble Watson, W9WE.

Ham Haven

Carole F. Hoover, K9AMD
401 East Wood Street
Hillsboro, Illinois

At the south end of the Highway 31 Bypass at Kokomo, Indiana, there's a motel that will stop a traveling ham in his treads whether he's ready for a night's rest or not. What's more, Noble Watson, W9WE, planned it that way when he put up his bright neon sign reading "CQ" Motel and raised an enormous beam and tower behind the neat row of units.

Along with the key to one of his spic-and-span rooms, a guest at the CQ, and especially a ham, will get an invitation to drop around to the shack to contact relatives back home, look over Noble's self-designed kilowatt transmitter, or enjoy a ragchew with the tall, tanned Hoosier. Although often heard on forty and eighty meters, Noble spends most of his time on the DX twenty meter band where with the aid of a tremendous four hundred pound rotary beam that took a dozen helping hams from the Kokomo area to get it to the top of his tower, Noble has worked over 122 countries under his two calls, W9WE and W9RUC.

Another interesting feature of the CQ Motel is the owner's growing collection of antique transmitters and receivers—part of them left over from his own days of operation as 9JA back in 1914 when spark coils, loose couplers, and crystal detectors were standard ham equipment. Noble's original kilowatt transmitter used high voltage condensers made at home from glass plates and brass sheets he submerged in a tub of boiled oil. Even though television was a thing of the future then, Noble recalls that hams still had their difficulties: "There was no TVI," he told me, "but blinking the neighbor's lights did not make the amateur very popular."

Before building his first motel in 1932, Noble tried out his sea-legs as a ship's radio operator for the Marconi Company at a fabulous salary of $30 per month. He sailed the Atlantic to Europe and down to South America and the Caribbean before returning to the States where in 1922 he pioneered broadcast station WBBZ in Indianapolis. Noble used the same station during free time on the ham bands under the call 9WS. In 1926, with studios in the front room of his home, Noble founded WKBF which later became WIRE, still in operation in Indianapolis.

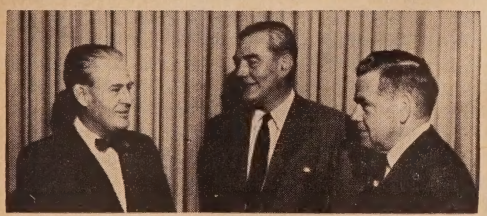
As you might expect, running a motel and a kilowatt transmitter simultaneously presents some unique problems. Noble laughs about the days he hammed with a blanket draped over his head something like an Indian chief in his teepee in order to keep his voice from carrying through the air ducts to disturb sleeping guests. Of course, that was before construction of his sound-proof shack was complete. And more than once he has had to explain to non-ham tourists that the voice heard on the television set in their room is only his end of a chat with an engineer in Africa, a G.I. in Greenland, or a sheep rancher in New Zealand.

Noble is always anxious to extend his special brand of overnight hospitality to traveling hams and their families, but he still likes to hear from those who go by but can't spend the night. The gay neon CQ by the road takes the place of the "If-You-Can't-Stop—Smile" sign, and W9WE says it's a rare day when at least one or two passing cars with whip antennas waving don't toot out a *CQ* or *HI* in code.

"Frankly," Noble told me, "I'd probably starve to death if I depended entirely on ham travelers for business, but I sure like for them to stop."

With a welcoming sign to a motel like his, a kilowatt transmitter, twenty meter beam, and a shack full of antique gear and DX cards, who's to say Noble Watson, W9WE, of Kokomo, Indiana, doesn't have himself a real Ham Haven? ■

Radio Amateurs to Assist State Department Sponsored Ninth Plenary CCIR Session



W6AEE W6ZH W6MLZ
(Photo by Collins Radio)

Radio amateurs of Southern California and Arizona, under the direction of Ray Meyers (W6MLZ), S.W. Director ARRL and Chairman of the Amateur Committee, will install and operate a completely equipped amateur radio station at the Biltmore Hotel, Los Angeles, California, for the Ninth Plenary Session of the Consultative Committee International Radio (CCIR). This conference of approximately six weeks will start Wednesday, April 1, 1959.

According to the General Publicity Chairman, Phineas J. Icenbice, Jr. (K6VZJ), Engineering Division, Collins Radio Company, Burbank, California, amateurs from industrial and governmental agencies are combining forces to assure a successful demonstration of amateur radio capabilities in this official State Department affair. The purpose of the fourteen study groups of this conference is to study technical and operational problems of international interest and recommend solutions for those problems. Impressions acquired by the delegates as a result of this conference are of importance to all citizens, and more especially those of the amateur radio fraternity. Radio facilities will be available to foreign delegates who comply with U.S. regulations. It is anticipated that thousands of messages will be exchanged with many of the 97 participating countries.

Participating in the arrangements with Ray Meyers, Radio Operations Manager, Lockheed Aircraft Corp., will be Herbert Hoover, Jr. (W6ZH), Special Consultant for the State Department and Honorary Chairman of the Committee. William Grenfell (W4GF), FCC, Washington, D.C., Merrill Swan (W6AEE), Cannon Electric, and Howard Shepherd, Jr. (W6QJW), of the Shepherd and Shepherd Law firm are Vice Chairmen of this Committee.

The Federal Communications Commission and the State Department have assigned and approved the special call letters K6USA for this event. The operation of K6USA will provide an opportunity for our foreign delegates to become acquainted with amateur radio in Southern California. World-wide understanding will be furthered by the many contacts with amateurs throughout the world on all bands. QSL cards will be exchanged to verify radio contacts conducted via AM, SSB, CW and RTTY. ■

John K. Wilkinson, K8GWZ
627 Madison Place
Ann Arbor, Mich.

TU Engineering

Many a ham, in search of new and more challenging ways to enjoy his hobby, has invested in a Teletype page printer of one sort or another, thrown together the simplest TU which he could find in the literature, and experienced a thrill like that of a novice at his first QSO as he watched the darn thing printing an occasional decipherable phrase or sentence. When the first glow wears off, however, our hero realizes that RST 299 is not satisfactory communication in F2 emission any more than it is in A1 or A3. Then follows much frantic breadboarding as new circuits and modifications are tried in endless procession. (RTTY'ers build, *and rebuild!*) At last, if they have good test instruments and are clever circuit men, most hams who try RTTY will finally get one of the standard TU's working in a fairly satisfactory manner, and will add RTTY to their hobby as a more-or-less taken for granted means of communication.

After suffering through the routine described above, the author decided to take a critical look at the problems involved in TU engineering to see what was going wrong. The results of his investigation are presented here in the hope that they will help others to design their own TU's. Incidentally, several of the classical ham TU's fail to meet one or more of the basic engineering requirements, and can be gotten to work only because FSK is inherently a very reliable means of communication.

Let's start with the printer, whose characteristics we are stuck with, and then work backwards until we reach something compatible with the output of a conventional communications receiver. The TT-26 printer will be used to provide numerical examples in the following discussion, on the theory that it is the most commonly used printer in ham circles, and anyway, what is good for a TT-26 is also good for a model 12 or 15, since they were all originally designed to work together.

TU Output Circuitry

With the coils connected in series, the selector magnet of a TT-26 requires about 10 *ma* to barely pick up its armature. The standard line current for much modern printing equipment is 20 *ma*, providing a good margin of safety. As others have pointed out before, but perhaps not with sufficient emphasis, a *voltage* source capable of pushing 20 *ma* through a selector magnet under *static* conditions *will not work for printing*. Instead of normal character selection taking place, the printer will appear to run open for a second or so each time a key is pressed. This is easy to understand when we recall that a magnet is basically an inductive device and thus exerts a force on its armature in proportion to the applied *current*, not voltage. The equivalent circuit for a TT-26 operating from a voltage source is shown in fig. 1. Also shown is the equation for the current in the selector magnet as a function of time after closure of the distributor con-

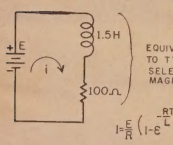


Fig. 1—Equivalent circuit of TT-26 operating from a constant-voltage source.

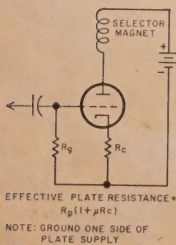


Fig. 2—Current regulator for driving selector magnet.

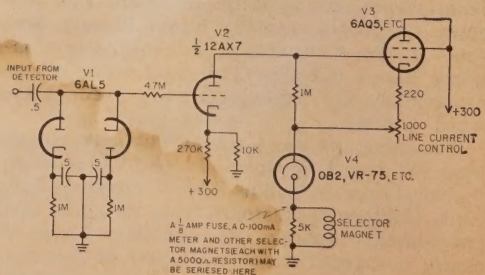


Fig. 3—Suggestion for a practical TU circuit.

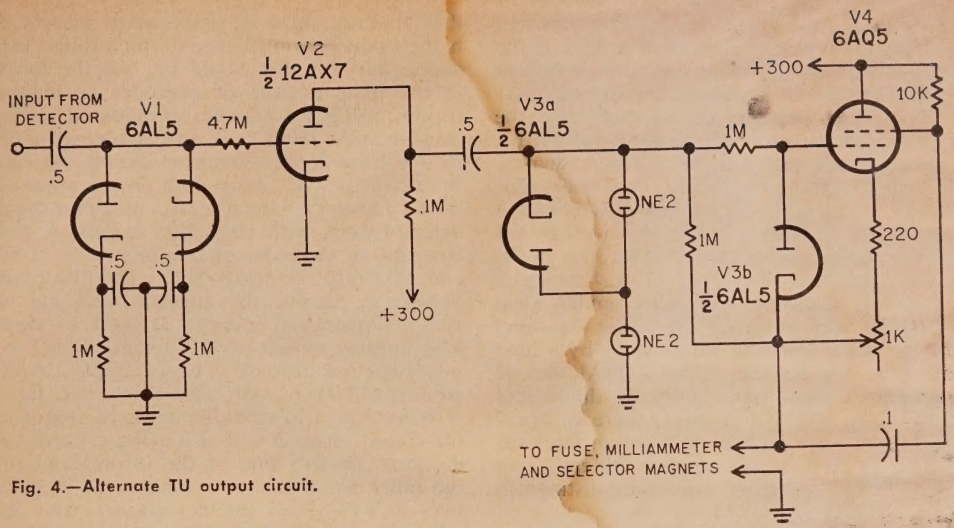


Fig. 4.—Alternate TU output circuit.

tacts. Putting in the numbers and turning the crank, we find that the current, having been interrupted by a *space* signal, will have risen to only 6.4 *ma* by the end of a 22 millisecond *mark* pulse: not even enough to pick up the armature at the end of the mark pulse, much less enough to have any effect in the middle portion of the pulse when the transfer lever is set up for the next character! Now a high-impedance *current* source is the equine of alternate hue. With a 110-volt "battery" and a 5,500 ohm current-limiting resistor in series (the circuit used by the professionals for 20 *ma* loops) the current in a TT-26 selector magnet will have reached 90% of its static value half a millisecond after the distributor contacts close. This may explain why many an elaborately-designed TU with a nice low-impedance, cathode-follower output has utterly failed to print until the static current was cranked up dangerously high.

How then to get a current source? A fast (and expensive) relay will help, though it too is really current-operated, but the contact arcing in this service will give you noise problems that will cause many a gray hair. At the very least you will have to shield everything, choose your ground points with great care, and make habitual use of the noise clipper in your receiver. Probably the best way to provide an "elastic" source for line current is to use a vacuum tube current regulator, as shown in fig. 2. If this looks like a cathode-biased amplifier, don't let it worry you; that's what it is. The effective source-impedance of a tube in this circuit is raised by a factor of $1 + \mu$ Rc, and that's why cathode bypasses were invented. In voltage-amplifier service, the very high plate resistance produced by the negative current feedback would require an enormously high load resistance and plate voltage supply to obtain decent voltage gain. Here, however, the high Rp is just what we want. Virtually the whole plate-supply voltage is available to get that 20 *ma* started through the selector magnet in a hurry. The trouble with the circuit of fig. 2 is that we must either operate the printer at +250 volts or provide a 20 or 60 *ma* negative power supply, and neither choice is very attractive. The two best current regulator circuits which the author has been able to work out are shown in fig. 3 and fig. 4. The extra complications arise from the need for clipping, clamping, and normal-current-when-no-signal circuits. Take your choice, they both work. Or better yet, work out your own circuit, now that you know what is needed. Incidentally, with any of these circuits the switching transients can rise to extremely high voltages, as high as B+ on "make" and as high as a thousand volts on "break," so don't forget to strap in the 5000-ohm resistor provided for this purpose inside the TT-26. Since 5000 ohms times 20 *ma* equals 100 volts, the switching transients will be limited to that value in both directions. A resistor of 2000 ohms or so would be better for 60 ma.

The double-diode dc-restorer circuit shown at the input in figs. 3 and 4, automatically adjusts the bias level of the clipper so that switching of the printer line current is done at a point about midway between the positive and negative peaks of the input signal. This permits use of the cleanest portion of the available signal when printing from mark only, space only, or any mixture of the two signals.

Discriminator Circuits

Probably more TU projects have been aborted because of the time and effort required to obtain toroids than for any other single cause. Let's examine the merits of toroids, TV width controls, and laminated core coils.

First of all, what are the requirements imposed on the resonant circuits of a TU? If the bandwidth of the resonant circuit is sufficient to pass the seventh harmonic (or thereabouts) of the 22 cps Teletype keying rate, then the output of the detector will be good enough for a selector magnet without further shaping (through a current regulator, of course). For a center frequency of 2500 cps this means a Q of about 4. This is about the average for the filter chokes and output transformers in the author's junk box. From this we may conclude that almost anything will work under ideal conditions, and in fact, just about anything will! But that is not the whole story by a long shot. After the detector circuit, QRM can be distinguished from signal only by differences in amplitude, and with a low Q there is a proportionately wide range of frequencies over which there will be too small a difference in amplitude for a clipper circuit to distinguish between signal and QRM.

The next step up is the TV width control with a Q in the vicinity of 12. The ringing of these coils will prevent the detector from responding to components of the signal much beyond the fifth harmonic of the keying rate, and hence some signal-shaping will be required between the detector and the current regulator. The shaping required, however, is in the nature of limiting, which, unless we are very careful, will limit the signal and QRM to the same amplitude, thus defeating the very purpose for which we sought a higher Q. Good results can be gotten from these coils if the associated circuitry is designed and adjusted to provide only the minimum necessary limiting between the detector and the selector magnet. As with all TU circuits, but particularly so in this case, a simple dc-coupled 'scope is needed to make the final adjustments for good performance under marginal conditions.

Finally, the evasive toroids. When tuned in the 2 to 3 kc range, any toroid from perhaps 50 to 500 millihenries will have a Q well above 100, *when unloaded*. With such selectivity there is little to fear from QRM near the mark and space frequencies. (But watch out for sub-harmonic QRM described in the next section.) Toroids, however, bring their own problems. First, the desired signal must be tuned *very* precisely to the resonant frequency of the detector and *kept there*. AFC (see the *RTTY Handbook*) will take care of drift in the other fellow's VFO, as well as drift in the local oscillator and bfo of your receiver, but AFC will not compensate for incorrect frequency shift or chirp in the other fellow's transmitter, nor for relative drift among the tuned circuits in your TU. The only solution is to tune the toroids with the best condensers you can find, and check both your FSK oscillators and TU frequently with a tuning-fork standard.

If the high inherent Q of the toroids is not to be ruined by the associated circuitry, then that circuitry must be designed to present the highest possible impedance to the toroids. Some suggestions for this would be: put the toroids in the plate circuits of pentodes or high-mu triodes, using a 5000-ohm unbypassed cathode resistor in the latter case, and condenser-couple to a voltage-doubler detector circuit (to avoid the need for a *dc* return path on the input side of the detector). Use at least a megohm for the detector load, with very little bypass. A time-constant on the order of 2 milliseconds (1 meg and .002 mfd) is plenty here, since the limiter needed to remove the effects of ringing will also remove even a large amount of ripple. The limiting action of V2 in figs. 3 and 4 is just right for toroids. The complete detector circuit will then look something like fig. 5.

When tuned to straddle the mark frequency, the circuit of fig. 5 will also make a good AFC detector. Disable one of the toroids and tune the other for maximum response at 2125 cps (use a VTVM on the dc output), and then *add* capacity until the output voltage drops to about one-half of its maximum value. Then disable the first toroid while repeating with the second toroid, but this time *remove* capacity for one-half response. This procedure will yield a detector with a good steep, linear FM detector characteristic.

Input Circuits

A couple of stages of effective limiters preceding the detector in a TU will go a long way toward eliminating misprints due to fading, QRM by stronger signals, and shock-excitation of the detector by QRN. The best limiter for this application which the author has run across is shown in fig. 6. This circuit is immune to bias-shifts resulting from grid rectification of strong signals, and thus preserves the portion of the input signal which is most likely to be clean, the zero-crossover.

The introduction of limiter circuits ahead of the selective circuits in a TU introduces another difficulty which is all too often overlooked: a good over-driven limiter, drawing grid current is about as good a frequency multiplier as can be designed. Hence any *af* signals on ½, 1/3, ¼, etc., of the mark or space frequencies will be multiplied and limited until they fight for control of the detector on an equal footing with the real mark and space signals, precisely negating the effect which we try to achieve with high-Q toroids. The only solution to this is to provide a very effective high-pass filter ahead of any non-linear circuitry. If the filter is band-pass, so much the better. Fig. 6 includes the circuit for a band-pass filter which will do a fair job without undue complexity. Nothing less than good toroids will do in ths circuit, unfortunately. The last time the author spoke with W8DLT, Ralph said that he still had quite a few of these 2.1 *h* toroids, which were going to waste because no one

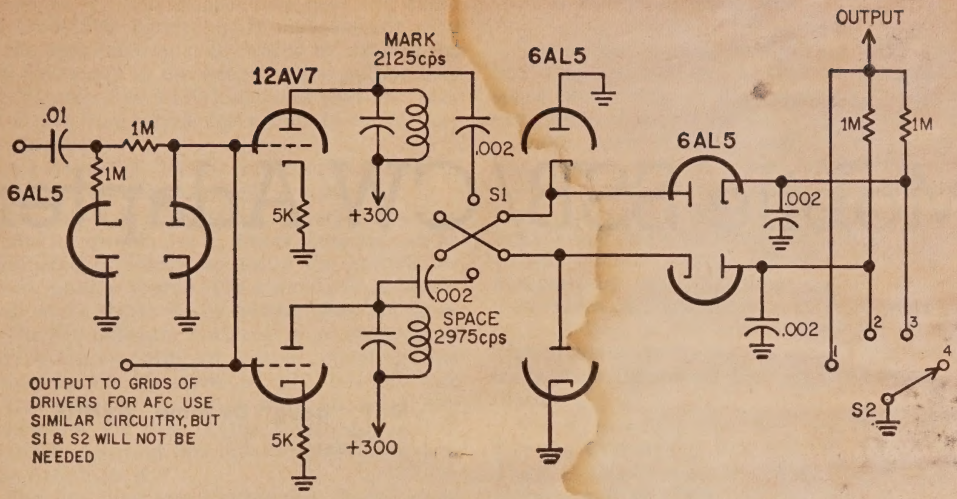


Fig. 5—A suitable detector circuit for AFSK signals, or for FSK signals received with the bfo on. Switch S1 is to provide for receiving inverted signals, and switch S2 provides for no copy, print from space only, print from mark only, and print from mark and space in the four positions, respectively.

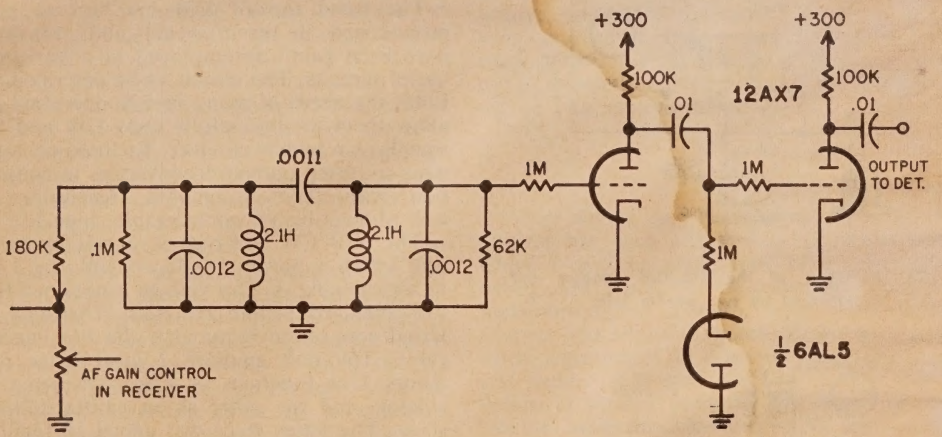


Fig. 6—Filter and limiter suitable for RTTY TU.

could figure out a use for them. It seems that these coils came from a surplus loading coil set which contained some more-useful 64 *mh* toroids, so they are no doubt available elsewhere as well.

Miscellany

Now that we have reached a point in our backwards design of the TU where all we need is something between 1 and 100 volts of audio, we can close with a few remarks which just wouldn't seem to fit in anywhere above:

The author has no quarrel with any of the published circuits he has seen for FSK oscillators, either audo or *rf*. The usual diode-keyed L-C or crystal oscillator seems to be the best part of most TU's.

Don't try to substitute semiconductor diodes for the vacuum diodes in the circuits accompanying this article unless you know exactly what you are doing. Some of the inverse transients get rather high.

For that dream TU you hope to build some day, look up the article on the Bell Systems model 143A regenerative repeater in the AIEE Transactions, Vol. 69. With one of those gadgets in your TU, you can get solid copy from a guy whose distributor contacts are so dirty, bouncy, and maladjusted that even his own printer won't follow in a dc loop! ■

Mobile SSB/CW Adapter

M. F. "Doug" De Maw, W8HHS
Box 164
Luther, Mich.

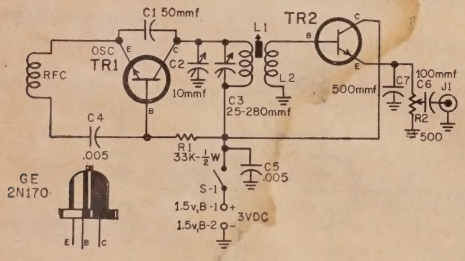


Fig. 1—Circuit of the SSB/CW adapter self powered by two penlite cells.

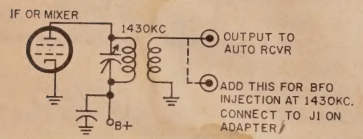


Fig. 2—Method of connecting the adapter to the converter output.

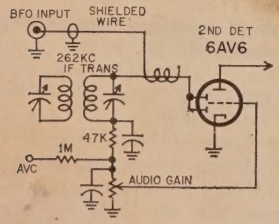


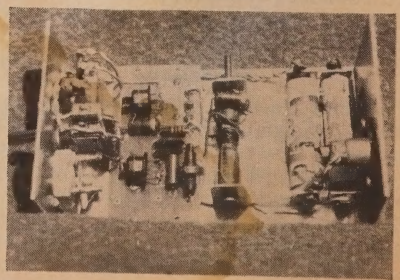
Fig. 3—If the adapter is operated at the car radio if, the bfo signal may be injected into the second detector.

The trend toward SSB has become more pronounced in recent years and transistors have been gainfully employed in a variety of useful circuits. The circuit to be described will fulfill the needs of many mobile operators and allow them to successfully copy CW and SSB signals on a mobile receiver. To those operators who are using outboard converters in conjunction with their automobile receivers, this unit should be of considerable appeal.

The SSB/CW Adapter is a self contained unit which is powered independently by 3 *vdc* as shown in fig. 1. This voltage is obtained from two standard penlite batteries. The only external connection required is the *bfo* injection cable. The unit employs 2 inexpensive transistors. One functions as a beat frequency oscillator and the other as an emitter-follower stage. The latter stage was added to facilitate a means of variable injection control and to help reduce pulling on the oscillator as the output level was varied.

Circuit Description

The SSB/CW Adapter may be used at the



converter *if*. This is generally near the range of 1300-1500 kilocycles. It may also be used at the auto receiver *if* if desired by altering the *bfo* frequency in the adapter. The author uses a converter *if* of 1430 kilocycles with his Gonset Super-6 and finds the results to be entirely satisfactory.

A pair of GE 2N170 transistors are used in the circuit and function well at either *if*.

The two 1.5 volt penlite cells are series connected to provide 3 *vdc*. These batteries can be eliminated if desired by using the automobile 6 volt ignition source. The circuit will be somewhat more stable if the penlite cells are used.

The *bfo* collector tank coil is an inexpensive ferri-loopstick with an output coupling link consisting of 30 turns of #32 enamel wire wound over the cold end of it. The input impedance at the base of the emitter-follower is relatively low and this link will provide a suitable match to it.

The *bfo* injection control was incorporated to eliminate the need for an *rf* gain control on the mobile receiver. The proper ratio between the incoming signal and the *bfo* can be achieved by varying the level control, R2.

The injection to the converter or receiver is made by connecting a short length of RG58-U coax cable from the adapter output jack to the converter output circuit as shown in fig. 2. The author mounted a small coax connector on the back apron of the mobile converter and wired it in parallel with the converter output jack. If it is desired to operate the adapter at the *if* of the car radio, a jack can be mounted on the base of the receiver and the *bfo* signal injected into the input of the second detector (see fig. 3).

In using the *if* of the auto receiver for *bfo* injection, it will become necessary to substitute a miniature replacement type *if* transformer for the ferri-loopstick in the converter. Most automobile receivers operate at an *if* of 262 kilocycles. The 262 kc transformer must be modified by removing either of its windings and replacing the removed winding with a base coupling link comprised of 40 turns of #32 enamel wire. This link should be wound directly under the remaining *if* winding and as close to it as possible. The two lugs at the bottom of the *if* can which were connected to the removed winding may now be used to bring out the leads from the newly added link. The same procedure should be satisfactory for 455 kc *if*'s also.

The *bfo* pitch control (C-2) will allow the operator to select either the upper or lower sideband by placing the *bfo* injection frequency on either side of the receiver *if* passband as is done in conventional receivers.

The stability of the adapter has proven to be excellent. Re-adjustment of the *bfo* padder condenser (C-3) may become necessary if the batteries, which supply the unit, should become low in output after prolonged use.

Construction

The author housed the unit in a small minibox. The size used will be dependent upon the space availability in the constructor's mobile installation. I used a chassis made from 1/16" phenolic board which is available on the current surplus market. Any similar non-conductive circuit board material can be used. Small holes were drilled through the chassis to facilitate bringing leads through to the required circuit points. The transistors were mounted by inserting their pigtails through these holes and placing a small bead of solder on each lead on the underside of the chassis. This prevents the transistors from being broken loose from the circuit through mechanical vibration.

When installing the batteries, be certain that the **CORRECT POLARITY** is observed. The GE-2N170 is an NPN type transistor and requires a **POSITIVE** collector voltage.

To realize maximum stability from the adapter, it is suggested that the builder use short, direct leads when wiring the unit. Exercise caution when soldering the transistors into the circuit. They are easily damaged by excessive heating in the same manner as other semi-conductors. Direct the heat away from them by holding their leads between the point to be soldered and the body of the transistor, with a pair of long nosed pliers.

Operation

After wiring has been completed and the adapter has been attached to the circuit with which it will be used, tune in a moderately strong AM signal on the converter. Tune for maximum signal strength. Next, turn on the adapter and adjust the pitch control to a point where capacitor (C2) is at mid-range. Next, adjust padder (C3) until the beat note is heard. Adjust it further until the *bfo* signal is zero beating with the incoming AM signal. The unit is now ready for operation.

The *bfo* is operated in the same manner as other *bfo*'s. Tune in a SSB or CW signal for maximum amplitude. Turn the *bfo* on and adjust the pitch control to whichever side of the *if* passband you wish to receive. Increase the setting of the injection pot until the audio of the SSB signal no longer sounds distorted. In copying CW, the same procedure is used: adjust the injection level to a point where the sound of the beat note suits the operator.

The benefits received from the addition of this unit to the mobile set-up in the author's car cannot be adequately described. If you enjoy SSB or CW and desire to operate either mode while mobile, this will be a welcome addition to the receiving equipment. It is also a pleasure to be able to 'Read the Mail' on SSB or CW while in the car. ■

Ralph Haburton, W4ZVX
1617 Flamingo Dr.
Orlando, Florida

VOK—Voice or Key Automatic Control

Why use two when one will do? You don't need a break-in unit for cw in addition to a separate VOX unit for phone. One will do the work of two! A simple addition to any VOX unit will convert it to a VOK—voice or key—control that will give you superior BK or semi-break cw operation, without affecting normal voice action. It is inexpensive, easy to construct and adjust.

Now, let's take a look at a block diagram of a typical VOX unit (fig. 1.) The audio amplifier bridges the microphone output to the transmitter, producing sufficient voltage for the control section. The control section usually consists of a level control, a diode, a variable R-C circuit which adjusts the "hold" time, and a power tube. The last tube usually controls a relay which performs the desired functions of muting the receiver, activating the antenna relay (if used) and energizing the transmitter. In lieu of a relay, some VOX units apply appropriate bias voltage to electronically accomplish the transfer from receive to transmit. Talk into the mike—and you're on the air; stop talking and the rig reverts to receive.

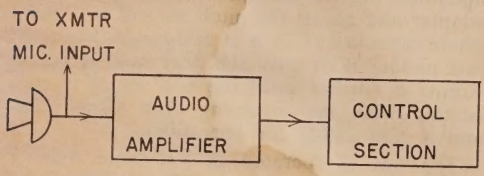


Fig. 1—Block diagram of typical VOX unit.

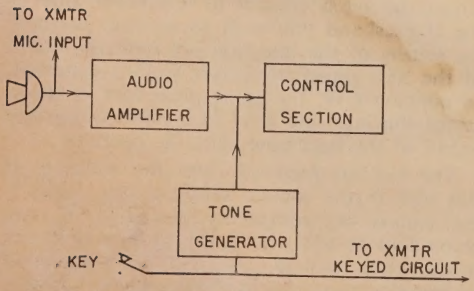


Fig. 2—Insertion of an audio tone will enable the key to control the VOX.

To use the same VOX for cw operation all we have to do is to insert an audio tone, controlled by the key, at the input to the control section. Fig. 2 shows how this is done. An audio tone generator supplies this tone. The key controls both the tone and the usual transmitter-keyed circuit. The control section reacts to this tone just as it did to the amplified voice output of the audio amplifier. The control section just can't tell the difference between the two tones and goes into its act when prompted by either the keyed tone or the amplified voice frequency voltage.

The tone generator can be simple. The 60-cycle output of a 6.3 volt filament transformer has been used, but a neon relaxation oscillator was finally selected at W4ZVX, as being less expensive and taking less room.

The basic relaxation oscillator circuit is shown in fig. 3. When voltage is applied, condenser C1 is charged through resistor R1. When this charge rises to the firing voltage of the neon lamp, the lamp fires, rapidly discharging condenser C1. The cycle repeats with the charge of C1 at a slower rate than the discharge. The result is a saw tooth voltage at the junction of R1 and C1.

To use this as a practical circuit there must be a means of keying, a means of taking off a portion of the signal, and frequently a means of reducing the voltage to a suitable value.

[*Continued on page 113*]

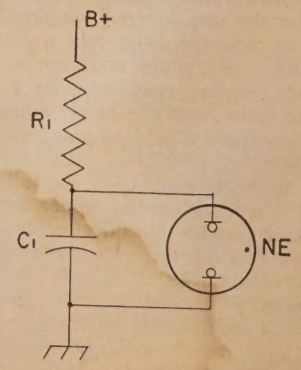


Fig. 3—A basic relaxation oscillator circuit.

Meter Protection

Conway L. Wilson, W4WQT/4
2000 N. Gulf Blvd.
Indian Rocks Beach, Florida

Those meters in our transmitters are expensive little items. All it takes is a short arc somewhere in the rig and blip, out goes the meter . . . then the fuse. Most commercial transmitters use special meters which take a lot of time and money to replace. All in all, it is probably worth a little extra trouble to install a safety bypass for your meter so you won't have to go through all that letter writing to find a new one.

Sure, you can buy special meter fuses. But did you ever look up the price on 'em? Since, in all probability, you are using either a 0-1 ma. or a 0-500 μa. basic movement meter you will have to pay around 75¢ for each fuse.

Enter fig. 1 and the silicon rectifier. This little gizmo just sits there not bothering you (less than 1% effect on the meter reading) until sparks start flying, then it takes over everything beyond the capabilities of the meter. It should hold anything your power supply can put out even until slo-blo fuses have time to figure out that things are not going well and commit suicide for the cause.

The *Sarkes Tarzian M-500* silicon rectifier seemed like a good choice for this situation since it was readily available and not too expensive ($2.12). You can try others, if you so desire, but for the purposes of this discussion let's stick to the M-500.

Calculations

It is a little frustrating to see an unmarked value in a circuit diagram. Fig. 1A has resistor "R" and, sorry, but you'll have to use Ohms Law to get the value since it will vary with different meters and circuits. If your meter isn't marked with some of the data we need you may even have to use a test meter to get it for the calculations.

We first want to know the voltage necessary to make the meter read full scale (even if it is an ammeter). This is a little difficult to set up to measure directly so it is easier to multiply the full scale meter current times the internal resistance of the meter movement. Most transmitter meters have their shunt resistors external to the meter and you can determine the resistance of the meter separately with an ohmmeter. Regular commercial meters usually have the shunt inside the case and it is a bit more difficult to open up the meter and measure the meter movement alone. 0-1 ma. movements will usually run around 100 ohms.

Once we have the current that flows through the meter and the resistance of the meter we (via Ohms Law) have the voltage across the meter. $E = I \times R$. With the 0-1 ma. meter which measures 100 ohms we find $E = .001$ amperes $\times$ 100 ohms $= 0.1$ volts.

The silicon rectifier should not introduce any appreciable error in the meter reading if it is to be of value to us. Let's take 1% introduced error as our limit. This means that when .001 amperes are flowing through the meter we will have 1% of that going through the rectifier, which is .00001 ampere.

Next, checking a curve of the voltage/current characteristics of the rectifier as supplied by the manufacturer (fig. 1B), we find that 0.46 volts across the M-500 will result in a current of .00001 amperes. We can now calculate the value of "R" which will be needed. Ohms' Law again. $R = E/I$. E is the .46 volts minus the .1 volts across the meter and I is the .001 amperes flowing through the resistor and the meter. That is .36 volts divided by .001 amperes or 360 ohms.

This new circuit, with the rectifier and resistor, should replace the old circuit, and any shunts that were being used should be outside of this, connected from the plus to minus on the diagram.

Just because you have your meters protected doesn't mean that you can bypass the supply fuses. Prolonged load on the meter circuit will burn out the meter shunt and, if the current is high enough, fry the silicon rectifier. Fortunately, when fried, it develops almost zero resistance and your meter will still be OK. ■

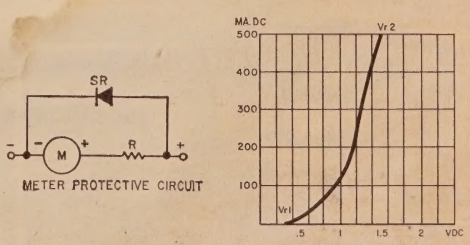


Fig. 1A—Basic meter protective circuit. Fig. 1B—Voltage current characteristic of the rectifier.

CQ Tests The

Hammarlund HQ160

Frank Anzalone W1WY

A Hammarlund receiver has occupied the operating position at W1WY (and ex-W2WC) for more than 25 years, beginning with a Comet Pro back in the early '30s, an HQ-120 in the late '30s and a HQ-129 post war. All were excellent receivers in their day, but there have been some important improvements in receiver design of late and a new receiver was deemed a good investment. A general coverage receiver, with selectivity to meet the challenge of today's crowded bands and stability to make single sideband reception possible, is needed.

The gang down at Hammarlund invited us to try out the latest addition to their line, the HQ-160. In outward appearance the 160 follows the familiar HQ design; two directly calibrated dials that cover 0.54 to 31 mc, physically separated by an S meter. Of course the whole package has been dressed up with a cast panel, perforated gray metal case and two healthy knurled knobs for tuning. But here the similiarity ends.

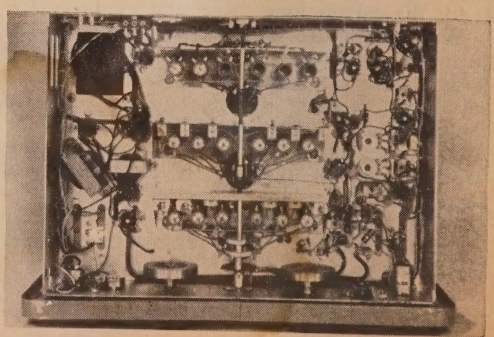
The HQ-160 is a 13 tube double conversion receiver. The crystal filter in the earlier HQ models has been replaced with a variable Q Multiplier and adjustable slot filter. The Q Multiplier has two panel controls, one to set the frequency and the other to adjust the band width. Two panel controls are also used to adjust the slot filter for suppression of unwanted signals and the suppression of the unwanted sideband in cw and SSB reception. Selectivity is provided by fourteen tuned circuits in the IF strip.

The *bfo* is adjusted by the cw Pitch control which not only varies the audio beat on cw but is also used as a vernier adjustment on SSB. It is also tied in with the function switch which gives the operator a choice of cw/SSB reception (no S meter or *avc*), Manual (diode detector, no S meter or *avc*) and *avc* (S meter and *avc*).

A separate linear detector and crystal controlled converter assures the high degree of stability required for single sideband reception.

Two separate avc lines are provided for maximum efficiency. One line controls the *if* gain and the other the *rf* gain.





A highly stable 100*kc* crystal controlled oscillator provides markers at 100 *kc* intervals throughout the range of the receiver. A ceramic trimmer provides means of adjusting the oscillator against WWV.

A special feature of the audio system provides variable feedback in such a manner that it is maximum at low settings of the audio gain control and minimum at high settings. This gives better fidelity on strong signals and a narrow bandpass on weak signals, reducing distortion and giving additional noise suppression.

The S meter is factory calibrated so that a signal of 50 microvolts will give a S9 reading with each S unit representing a 6 *db* signal change. However a chassis adjustment permits changing the sensitivity to other values if desired.

In addition to the panel controls already mentioned, there is a limiter switch, a send-receive switch and an antenna trimmer control. Also a new gimmick called the "calibrate set control." A small knob adjacent to each dial permits the adjustment of the hair-line to zero beat with the 100 *kc* calibrator.

So much for the descriptive analysis. Now, how does the 160 stack up under actual operating conditions?

We were amazed at the fine signal to noise ratio. Those "long-path" Far East signals that were buried in the mud with the old receiver, were now up in the clear.

It took me some time to master the operation of the Q Multipler and Slot controls but once mastered there is no doubt about the selectivity. And this without the objectionable ring of the old crystal filter in the HQ-129.

The frequency stability is a revelation. The drift from a cold start is within audible range, and after a minute it can be counted off in cycles.

The 100 *kc* crystal calibrator was exceptionally accurate when beat against WWV. However the marker signal was found a bit weak on the higher frequency bands.

Its a pleasure to operate the nice big knobs on the tuning controls. The size of the knurl fits the finger perfectly and when operating over a long period of time like a contest, it makes for comfortable operation.

On extremely strong local signals and when using a TR switch that gave a signal gain, it was found that there was some overloading of the *rf* stage. Under these conditions it was necessary to lower the sensitivity control below the normal setting. The loss of signal strength however is not objectionable. To overcome this would probably result in a loss of sensitivity, so it has to be a compromise between having a sensitive receiver or one that will not overload on an occasional strong signal. Personally we would rather have a "hot" receiver.

We like the HQ-160 and have a feeling the Hammarlund name and tradition will still occupy a permanent spot at W1WY. ■

QSL contest

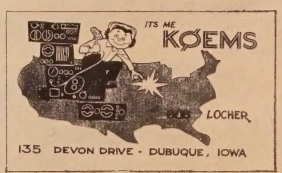
WINNER



LOSERS







Winner this month with a beautifully printed card is K2QWO. Prize is an extra year of CQ. Runners up are K6REB with a card which carries a message which most 6M ops will appreciate, KØEMS with a clever cartoon card, and KN5QJB who has a horse on his card, thereby almost winning the contest since the editor is nuts about horses. Runners up get one whole complete extra free copy of the magazine at no additional cost. The contest is world-wide and is judged by your honest editor who plays no favorites. (Congratulations on winning this month Ed, and I'll see you for that dinner you mentioned.)

the taxi drivers seemed to have a negative understanding of English and the only one in the hotel that knew English was the concierge. In defense I took to the metro (subway) and soon found that all I had to fear was fear itself. It takes a lot of guts to walk into a restaurant and sit down without being able to read the menu or speak with the waitress. The best you can do without creating a scene is to stride in as if you know what you are about, sit down, point to something on the menu and hope for the best. Unfortunately the French eat a lot of things that are unusual for us and some of the meals were more traumatic than nourishing.

The high point of my Paris visit was a ham-fest set up by Charlie at Jim Pringle's apartment (F7DO). I was due there at 7 pm, to be driven out by Warren Miles, the Collins rep for Europe. I met Warren and Andy Andrews, W4TB, at about 6:30, but had forgotten the slides of the Navassa trip which I had promised to bring. We headed for my hotel to pick them up . . . and got lost. Paris streets go every which way. We got within four blocks of the hotel at one time so I got out of the car to walk to the hotel. Warren said he would make another try and meet me in front of the hotel. If he wasn't there then I should look for him back at the spot we had parted. Within 10 minutes I was back at the corner, but no Warren. Forty minutes later he found me again, but had never been able to find the hotel! Pretty confusing place for we had both a map and the address of the hotel.

We finally made our entry at 8:30 and plunged right into the buffet supper which was wonderful. Present were most of the active hams of the area, both military and civilian. Admiral Bruton, W4IH, and waiting for his French call, was the C.O. and we had a fine eyeball QSO. F9AA, president of the REF, headed the French group, which also included such well known hams as F8RQ and F9HF. K2AOS was there from New York, plus W4CDM and F7AA. Very enjoyable.

They keep the Eifel Tower off to one side of the city and I almost ended up the first American in history to visit Paris without even seeing it. Curiosity finally won over the pride of such a unique accomplishment and I took a taxi to see it. Sent postcards from the top, like we are supposed to.

Just as I was beginning to get enough nerve to use my limited French it was time to head for Stuttgart. Had a quick glimpse of the sun as we made the short hop to Germany by Austrian Airlines. Took the autobus downtown and a taxi to the Porsche factory. Some difference! Most of the people understand English.

I arrived at the factory at lunch time and they took me into the cafeteria for a free lunch. Then we got down to business about the car. They had rushed it for me and it would be ready Tuesday (this was Friday). I made out a list of all the accessories I could think of . . . fender mirrors, adjustable seats, special high capacity battery, auxiliary generator system for the ham rig, driving lights, special headlamps, etc. They then drove me downtown and arranged for me to rent a VW for the weekend and reserved a hotel room for me. Very accommodating, I would say.

John Moran, DL4JU, the G.E. rep, had made arrangements for me to have dinner and show slides in Wiesbaden the next day. After getting lost for over an hour trying to get out of Stuttgart (yes, I had a map), I finally found the Autobahn . . . only I went the wrong way and ended up in Heilbron. My map didn't go that far so I was at a loss until I picked up a cute girl hitchhiker and found out that I had to drive back to Stuttgart and then take the other road on up to Frankfort. She spoke no English or French, only Swedish and a little German, so it took a long time to get ideas across. Even so I made it to Wiesbaden in time to get to the PX before 6 pm and buy a portable typewriter and some camera accessories. On the Autobahn you put your foot on the floor and let the VW go flat out until you get where you are going . . . about 70 mph. There are no speed limits, in general, outside of towns, where you are limited to 30 mph.

About 30 of the local gang turned out for the dinner in Wiesbaden, both military and civilian, and we had a wonderful time. There really is no way that I can thank John and the rest of the fellows enough for the reception they gave me.

The next noon, Sunday, I was due to meet DL3FM, Dr. Karl Lickfeld, the VHF manager of DARC, and DL4WW in Weinheim for lunch. We met without difficulty and had an all afternoon and evening QSO. It was very interesting to get all the inside VHF news on two meter work on the continent. They work from country to country the way we work from state to state. We have them beat all hollow on antennas and power though, and get much better results. They were surprised to hear that I have both a 24 element and 32 element beam, and still consider myself one of the lesser signals on the band, even with 500 watts.

One thing that I got to realize is that most of the European hams do not speak English. Having been brought up on working English-speaking DX stations, I just naturally thought that all DX hams knew English. Most of them run fairly low power and talk among themselves. The Germans can, for the most part, understand English if you speak slowly, but are reluctant to try to use it on the air. I found this same feeling in all of the other countries too.

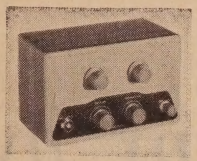
If the reaction to this travelogue isn't too strong we'll continue next month.

Soixante-treize
Wayne

New Amateur Equipment

IRE Show

Flash—The IRE Show this March will be a whopper. If you want more info as to time and place check A on reader service coupon.

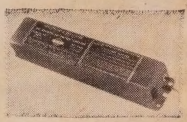


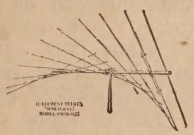
V-O-X by Heath

Heath Company has been really working in their sideband department lately. So now they have a transmitter, sideband modulator, and voice control unit. This voice control unit allows you to . . . oh, shucks, you know what a VOX unit does already. This one costs $23.95 in kit form and has, in addition to provisions for turning your receiver off and transmitter on, ac output for an antenna relay. It will also turn the transmitter off and receiver on when you run out of breath. Ziggle B on page 126 for Heath data.

Line Voltage

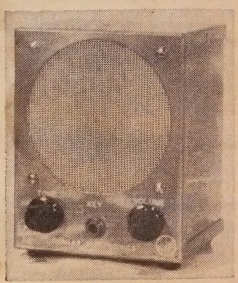
Electromatic Industries has a new line of Self-Adjusting Line Voltage Correctors which might be of interest to you chaps living at the end of a long rural power line. Like you get 118 volts out with an input varying between 75 and 135 volts . . . and all automatically, by George! Expensive? Well, if $19.95 is expensive for a 200 watter, then you'll call 'em expensive. Look into it, eh? Like you should gnash out C on page 126 for literature. No salesman will call.





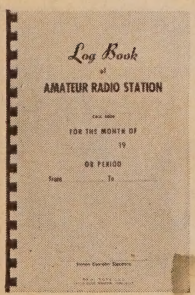
Telrex "Spiralray"

This six meter eleven element Yagi array is designed to be particularly good on scatter waves. The skewing of the elements on the 27 foot boom effect circular polarization, making the antenna work equally well on both horizontally and vertically transmitted signals. Scatter waves arrive all mixed up in polarization, just the ticket for this gadget to unscramble. You'll be amazed at the gain! Cribble D on page 126 for facts and figures.



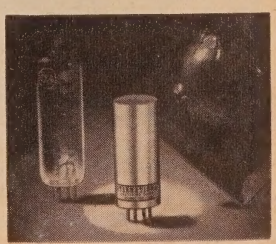
Code Oscillator

Attention phone men, learn the code, become a real amateur. Dunlap Electronics has a battery operated transitor code oscillator, complete with tone control and loud speaker. What amateur has not had a need for a code practice oscillator to give instruction? What amateur will not want to punch out F on page 126 and look at the convincing literature from Dunlap?



New Log Book

Frank Bette, W6CWS has come up with a new idea for a log: separate pages for each contact. This gives plenty of room for you to keep lots of notes on the contact. Each log book contains 60 pages (costs 50¢) so you have room for quite a few days operation in each and will end up with a really valuable reference book for future QSO's. Available at most ham distributors or gouge G on page 126.



Silicon Rectifier

International Rectifier had a brainstorm when they mounted a silicon replacement for the 6X4 in a gadget with tube prongs so that it is interchangeable. The 6X4 will handle 85 ma. dc at an input voltage of 400 rms, peak inverse is 1250 volts. Voltage drop is only 6 volts at 70 ma. For info on this and other direct silicon replacements circle E on page 126.

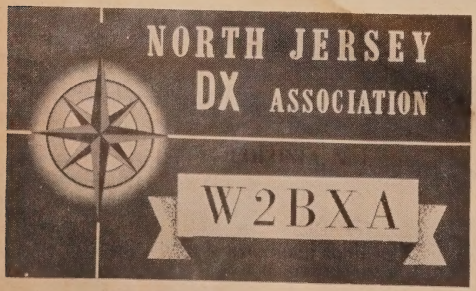
URBAN LeJUNE Jr., W2DEC
416 North 15 St., Kenilworth, N.J.

DX DX DX DX DX DX DX DX

Hi fellows: In case you haven't noticed, there's a new name at the top of the page. I can hear the cry going up now, "Who is this guy?" So, I guess a short description is in order. I'm a young squirt to a lot of you old timers, since I've been licensed for only eight years. I've been chasing DX since 1953, with two years out for Uncle. While in the Army, spent a year in Japan with tours at KA8SD and KA2USA. The present rig is a pair of grounded grid RK65's running a gallon on CW and about 600 watts on AM fone (I'm old fashioned). The final is used as a linear amplifier on AM and modulation is furnished by a de'TVI'ed 32V1 which drives this contraption. The receiver is a 75A1 but have been looking for an A4. The present totals are WAZ and 258 worked on CW and 195 on fone. (40 zones worked but one card missing.) I'm a member in good standing (my dues are paid) in the North Jersey DX Association, current President and past Vice-President. Well, that's enough about me.

Now I'd like to say that I'll do my best with this column and I hope all you fellows will bear with me while I struggle along temporarily. Please remember this is really your column and anything you want I'll be only too glad to do. Just let me know. Remember, I will rely on you for information, so anything you can pass along will be most appreciated. Please submit your information, pictures, etc. to me by the 15th of the month. Some of the local gang have commented that in the past they had always enjoyed reading what the competition was doing, not just that Charlie Mellen had gone from 299 to 300, but that he had worked VQ7AA to get there. Would you like to see something like that come back again? I don't necessaarily mean a box score, but a monthly report on what you have worked, cards received, rig finished, etc. Let me know your feelings in this respect. As I said, this is your column, so let me know what you want. Now, down to business.

W8NBK. We were very sorry to hear that our good friend Arkie had given up DX and had his rig up for sale. Arkie assures us that everyone in his family is in good health and that is not his reason for hanging up the key. He just got tired of the poor operating one hears on the bands today and the addition of the VP2's to the country list was the straw that broke the camel's back. He said he hadn't had a good time in amateur radio since the Dayton Convention. (We'll be looking for you this



The new NJDXA club QSL card. It helps if one of your member's wife is a commercial artist. (Mrs. W2HTI)



Pfan, XW8AL during a recent visit to the states. From the look on his face he must be listening to a good one on W2JT's rig. (TNX W2HTI)

year Arkie.) Here's an operator that didn't have to take a back seat to anyone. His machine-like fist was something to behold. As for patience and perseverance, he had more than enough. Last year at the Dayton Convention we were talking about FW8AA and Arkie asked, "How do you work this guy?" Several of the W2 boys present told him it was almost a lost cause since he gets on very early, about 0200 local time, on 14330, and then, more often than not, will not work any W's. That's about all there was to it until, about a month later, I happened to get on one morning about 2:00 AM and, while looking across the band, found Arkie working an FO8 on the high end. When I asked him what he was doing, he told me that he had been on between 0200 and 0400 for 27 straight days and was staying there until he worked FW8AA. About a month later, I got a card from Arkie saying he had worked FW8AA after 45 straight days of listening. We hate to see Arkie give up because here was an operator whose habits were always so clean that any newcomer who molded himself after Arkie couldn't help but turn out to be a good operator. He said he may put a low-powered rig on twenty to work his many friends. We'll be looking for you Arkie.

AC4 TIBET—This very rare spot has been showing up at very irregular intervals in the person of AC4AX. (ex FN8AD es VU2AX) He seems to prefer fone, either on 14098 or 14160, but will work CW stations when he is on fone. He recently worked K2GFQ and W2JVU in this fashion. He is very weak in the states but VK6MK reports him an S9.

BYIKP CHINA—As you probably know, BY1KP was operating on the Chinese mainland during an international telegraph competition. The station with a very strong signal on 14010 would work only U's, OK, SP, LZ, etc. W2AYJ relates a very amusing story about his efforts to work this one. One day when they were very strong, they were calling CQ LZ so Bob went down the band and found LZ1AF. Dima came back to work 1KP and asked him to listen for his old friend, W2AYJ. The operator replied that he was very sorry but he would be unable to do it since the United States was at war with China. So, it looks like anyone needing C will have to wait for the boys at BV1US to make an expedition.

CR5 SAO THOME—CR5AR has been putting this rare spot on fairly regularly on 14 and 21 *mc* CW. In the past, this one was almost impossible to work on CW as both CR5UP and CR5SP were fone men. Look for Ramalho on about 14050, however, call slowly (5 to 10 WPM) as he is just a beginner.

CR8 PORTUGUESE INDIA—In a letter received from Raul, CR8AC, he stated that he is still there but very inactive because he's not using the commercial transmitter anymore. He is working on a transmitter of his own and expects to have it on the air very shortly. Sends his thanks to everyone who sent parts to help in this project.

CR1Ø PORTUGUESE TIMOR—Bob Wilson, W3GHD, tells us that the gas generator he shipped to Rui CR1Ø AA has arrived. It was delivered personally by CR9A1 when he and his XYL were on their way home to CTI. Here's a ham who must work under the most adverse conditions; has no *ac* power, his only power coming from a battery which he had no way of charging before except to carry it all the way to town and back to have a few more QSOs before it ran down again. There was some talk about Rui emigrating to VK but let's hope he leaves with a great flourish of activity. MNI tnx to Bob, 3GHD, for the effort he put into this one.

FD8 FRENCH TOGOLAND—Hugh 9G1-CF and Paul 9G1CX (ex VQ4EO) activated a very rare spot for three days, January 9th, 10th and 11th. They could get operating permission for a 72-hour period only, so they alternated and operated FD8DZ around the clock. A KWM-1 was loaned to them by W2KUW. They did a bang-up job even though they were hampered by not having the DX adapter for the KWM-1. They might go to ZD2 and FF8 Guinea. QSL to W2KUW, c/o North Jersey DX Association, Box 55, Arlington, N. J. Include a SASE. Contributions are not necessary, however, would be greatly appreciated to help Ted defray his shipping expenses. Any excess will be used in shipping



L to R—Ian, MP4BBW; Ben, W2BXA; and Kurt Carlsen, W2ZXM/MM at a recent meeting of the NJDXA. (Tnx W2TWC)



Bob, W3GHD and his fabulous QSL collection. (TNX W2HTI)

the rig to its next destination. Ted is in the process of arranging for the rig to appear at several other places.

FF8 FRENCH WEST AFRICA—FF8AJ QRTed FF8 on January 28th. Yves was probably the most active FF8 and will be missed on the bands. Bob, W2AYJ, has the complete logs for his three-year stay and will be glad to oblige anyone needing a car. Just send a stamped, self-addressed envelope.

MP4B BAHRAIN ISLAND—While visiting the states, Ian, MP4BBW, attended one of our club meetings (NJDXA, see pic.). He has purchased a KWM-1 and is going on several DXpeditions. Some destinations are Trucial Oman, the Sultanate of Oman, Oatar and possibly the Neutral zone between Saudi Arabia and Kuwait, if separate country status can be obtained. He will go to each of these places when he receives long holidays. Get your mikes ready men. Ian does not operate CW.

Lee Grant ex ST2NG, ZD3G, VS9AG and ET2NG, after a long holiday in England, is now on his new assignment in Bahrain. His call is MP4BCN, and he should be active on all bands by now. W2ZGB will more than likely take care of Lee's QSL chores, as in the past.

MP4D TRUCIAL OMAN—In a letter to Aug, W2HMJ, Andy mentioned that he is an avid stamp collector and likes to receive U.S. commemorative issues. He is with an oil company that is drilling for oil 20 miles off shore. Das Island itself is 80 miles from the mainland. Andy's been fairly active, especially week ends on 14048 (T8 with a slight drift) around 1300 to 1600 GMT. Since there are no dependent quarters, he visits home once every four months, which explains his periodic absences.

T19 COCOS ISLAND—Humberto T12HP of SSB fame will be in Cocos Island around the first week in April for a one-week stand. The calls T19SB and T19CW will be appropriately used on SSB and CW. QSL via T12HP.

VK2 LORD HOW ISLAND—By the time you read this article, VK2FR will be on 14 *mc* SSB.

VP2 DANNY—After stops at VP2S and VP2G, Danny will return to KV4AA, replenish his supplies and head out into the Pacific. The first stops will be HC8, CEØ, and VR6.

VP6 BARBADOS—A letter from Eric, VP6LT, relates that he is the only VP6 on SSB with a 10B driving a homebrew linear on 15 and 20 meters. Eric expects to be in the New York area this summer.

VQI ZANZIBAR—This place has never seen so much activity. VQ3PBD put it on 10 meter fone, as VQ1PBD. No sooner had he gone when Robbie, VQ4ERR, made his promised return trip as VQ1ERR, operating 14 *mc* fone and CW with a KWM-1. When Robbie left, there was VQ1PBD with his homebrew SSB rig holding down the fort. QSL for VQ1PBD via VQ3PBD, for VQ1ERR via W41YC and VQ1SSB via VQ3GX.

VQ9 SEYCHELLES—Robbie VQ4ERR has purchased a KWM-1 and is definitely going to the Seychelles in August of this year. Robbie needs no introduction to the DX gang and is one of the world's finest operators. He has sent several letters to the DX clubs in the U. S. trying to raise funds so that one or two more VQ4's might be able to go on the expedition and keep the station activated 24 hours a day. They would rather have contributions on a club basis than a personal basis. Details and a copy of the letter may be obtained from W4IYC.

VS5 BRUNEI—Both VS5BY and VS5AT have been somewhat active. 5BY on 14308 SSB and 5AT on 14030 CW. Both at about 1200 to 1300 GMT.

UA1 FRANZ JOSEPH LAND—PAØLOU reports that UA1KEC on Franz Joseph Land is active on 14 *mc* CW. Ernst RAEM, however, said there is now no activity from this spot. Take your choice.

UAØ TANA TUVA—Mike, UAØOM informs us that he will be operating from here for one day. March 19 on 14 *mc*. Be on the look out for this one if you need Zone 23. No fone operation is planned.

160 METERS—Stew, W1BB, sent a copy of his interesting 160 meter DX Bulletin and I'll quote one paragraph. "DXpeditions—It is noted with regret that most DXpeditions forget to include operation on 160 in their schedule. It is a pity since it would be productive of some rare first QSO's. DXpedition planners are requested to write W1BB and arrangements will be made for schedules and publicity, also suggestions how to get on the band easiest, it isn't as hard as some think." So, what say, fellows. . . .

PHONE CREDITS: There is quite a bit of misunderstanding regarding fone credit for WAZ and DXCC. The rules for DXCC state that the station submitting credit must have been on fone, a two-way fone QSO is not required. If you work a station on CW and have him listen for your fone and the if QSL received has a fone report on it, this is all that is required for fone DXCC credit. For WAZ, however, all QSO's *must* be for two-way fone. Any QSL's received that have both CW and fone reports must be rejected unless there is some indication that the station sending the card was also on fone. This probably makes fone WAZ the most difficult of all awards. The Russian zones have always been the hardest, especially zone 19. UAØLA is the only station I know who is active in that zone. I understand UAØKQB has fone but I was never able to induce any of its operators to go to fone. In zone 18, your best bets are UA9VB, UA9OI and just recently UAØKAR. Zone 17 is a little easier with UA9AA, UA9CM, among

[*Continued on page 82*]

Announcements

F.C.C. Actions

Docket 12728 proposes that Technician Class licensees be permitted to operate in the 144-148 *mc* band in addition to the present frequency allocations. The petition was entered by Robert K. Wallace, K8BYQ. In the Commission's comments they point out that this allocation was considered at the time that the 50-54 *mc* allocation for Technicians was made, but that the A.R.R.L. was opposed. The deadline for filing comments on this proposed rule making is March 31, 1959, so if you are interested, pro or con, send the F.C.C. an original and fourteen copies. Docket 12728, F.C.C., Washington 25, D.C.

CW on Two and Six

The A.R.R.L. has asked for a delay in the opening of the new CW segments on two and six meters which they requested and were granted by the F.C.C. The Commission has therefore postponed the new bands indefinitely. A.R.R.L., without, to my knowledge, asking the members their feelings, petitioned the F.C.C. to set aside the lower 100 kc of the six and two meter bands for CW only. This move met favor, naturally, with the few fellows who are active in CW DXing on those bands, but was overwhelmingly scuttled by the rank and file operators on those bands who appealed directly to the F.C.C. not to push them up in the bands. The F.C.C., believing that the A.R.R.L. was sincere in their request for exclusive CW frequencies in these bands, allocated segments of the bands that would not interfere with the great majority of the regular operators on those bands. Interested parties have until March 10, 1959 to file petitions for reopening or reconsideration in this matter.

Maritime Operation

Despite objections by the A.R.R.L., the F.C.C. has amended the amateur rules to permit maritime mobile operation outside the jurisdiction of foreign governments within Region 2 on any amateur band from 40 thru 2 meters. When not in Region 2 they are still restricted to 10 to 15 meters. This proposal was made over a year ago by the Maritime-Mobile Amateur Radio Club, but has been delayed by League opposition. It is quite remarkable that the mere handful of amateurs making up the MMARC were able to win out.

Goose Bay

The annual GBARC QSO PARTY will commence 0 400 GMT 4th April and end 0 400 GMT 11th April 1959.

All band phone and cw will be used. Exchanges will consist of RS or RST name and QTH.

A WAG, Worked All Goose certificate, will be awarded to all USA and Canadian stations reporting working four members of the GBARC during the contest period. A WAG certificate will also be awarded to all other stations reporting three GBARC members during contest period and also to all SWLs reporting hearing five GBARC members in actual contact during contest period.

Send all your reports giving date, time, RS or RST and Stn QSOd to awards manager, Ted Harvey VO2AB AERADIO, Dept. of Transport, Goose Bay Labrador. No QSLs are required for these awards as the logs can be checked locally.

Railway Amateur Club

A new organization, the Santa Fe Railway Amateur Radio Club, was recently organized in San Bernardino, Calif., by a group of Santa Fe employees who are ham radio operators.

Dale Conners, K6COK, 835 South "j" Street, San Bernardino, Calif., is President, and W. E. Courtney, WA6BGI, 1169 Crestview Ave., San Bernardino, Calif., will serve as Secretary-Treasurer. Membership fee in the club is one dollar per year and members will be furnished with free QSL cards.

It is planned to organize both telephone and CW nets in every state served by the Santa Fe and, when this is done, these nets will be available for handling traffic in the event of public emergencies such as floods, fires and earthquakes. Santa Fe employees, their dependents and retired employees who are amateur radio operators and who desire to join the club should write either Mr. Conners or Mr. Courtney.

K4BV

Emery H. I. Lee, 62, K4BV, died at Ormond Beach, Florida on January 4th, after retiring there in 1957. He had served in many capacities in a long radio career which began when he sailed at the age of 16, later studying at the University of Washington, and working with the FCC in most of the years of his public service. He was Regional Manager in the New York office of the FCC from 1954-57, and served in Detroit in the same office and capacity from 1934-54. He also worked in the FCC offices in Seattle, New York, and Washington. He was a Director of the IRE, a consultant in interference problems, a member of the Quarter Century Wireless Club, and recently president of the Daytona Beach Amateur Radio Assn. A man of high integrity, he was a true amateur to the end, and his CW and SSB signal was heard from K4BV up to the onset of his fatal illness which stretched over about four months. He held a number of calls, among them W8SBY, W8LK, K2BZ, and the latest, K4BV. His many friends throughout the country will regret to learn of his passing. ■



ham clinic

by CHARLES J. SCHAUERS, F7FE
CQ Magazine, 300 West 43rd St., New York 36, N. Y.

In every batch of mail received by HAM CLINIC there is usually one request relative to "souping up" and modifying an old receiver. As we have said before, we are not reluctant to indicate *some* changes on a circuit diagram sent to us but we cannot endeavor to *redesign* whole receivers.

Preselectors provide a reasonable answer to the sensitivity problem encountered in older receivers containing only one or no *rf* stage. Even with receivers containing two *rf* stages there is a vast improvement when a well designed preselector is used.

Converters incorporating preselection circuitry are much better (often as much as 50%) than those employing none. However, various problems are encountered in the design and construction of the preselection-converter which are not easily solved by the average amateur.

Essentially, a preselector is nothing more than an *rf* amplifier which boosts the received signal before it is processed by the receiver itself. Selectors have been and are designed for one or multi-band operation. Broad, medium or narrow selectivity can be designed into the preselector by choosing a circuit with the proper Q.

With a multi-*rf* staged receiver, improved signal-to-noise and image ratios will be realized if a preselector is utilized. Another advantage too, is of course being able to design input circuits for proper impedance match.

Most preselectors described in the various radio handbooks and in articles appearing in CQ and other technical journals are of the one stage variety. Some are fix-tuned while others are manually adjustable.

The fix-tuned preselector is usually broad-band and may have two or more stages. An example of such a very fine instrument is RME's DB-23 which utilizes three 6J6s and has an average gain of 25 *db* throughout most of the ham spectrum.

With the advent of new high mu low-noise tubes there is little reason for the average ham with a real old receiver to suffer along with poor sensitivity. The 6CB6, 6AK5, 6J4, 6J6 and the old 6AC7 tubes have been and are being used in various preselectors with a great deal of success.

Improvement in the *rf* transistor resulting in lower noise opens up a new avenue of approach to preselector design. However, it is hard to beat the new high gain vacuum tube which has been designed for specific *rf* amplifier applications.

A two-stage preselector may present tracking problems, but if broad-band fix-tuned circuitry is utilized these are obviated.

Oscillation and feed-back are also problems which must be solved by the ham doing his own design. Input and output shielding, careful bypassing and proper tuned circuit design will eliminate these. Sometimes as little as 47 ohms resistance in series with grid and plate leads will do much toward doing away with instability. On the other hand, it may be necessary to incorporate small parasitic chokes and broaden some circuits (by the addition of resistance) for proper operation.

Preselectors designed for the higher frequencies require the use of low-loss coil forms (ceramic etc.), silver mica condensers (for stability), very short (and heavy) connecting leads and so on. With the addition of a preselector and a Q multiplier many old receivers take on "new" life.

In response to numerous requests for a tested preselector for 10 meters, a circuit diagram of one is printed herewith this month. Referring to fig. 1, it can be seen that a 6CB6 is used. Both input and output are tuned by a dual 50 mmf midget variable condenser. If your receiver does not have an antenna trimmer, one may be connected between the bottom of the input link and ground (a midget 5 or 6 plate condenser will work). Input and output circuits are separately shielded. This circuit works fine and has been tried (while in San Francisco) with a number of receivers, including the SX-28-A; KE-93; BC-348 (with 20 meter coils); AR-3; HQ 129X; NC-57 and NC-88.

Observation

There are few radio amateurs who do not have at least one piece of equipment on hand that they do not use. It may be an old receiver, transmitter, or even a conglomeration of parts. As time passes on its merry way, the equipment depreciates to the point where it may have little resale value. Realizing this, the average ham just lets it continue to gather dust in the garage, attic or shack; thus depriving someone else of its use.

Any ham part, regardless of how old it is (as long as it is operational) is worth doing something about. If you cannot afford to give your excess to some young ham just starting out, surely you can trade it for something you can use.

If you have something to swap or sell, the HAM SHOP in CQ is the place to advertise it. For only 10¢ per word your ad covers the *world!*

On the other hand, if you have something to give away (free), send HAM CLINIC a list. Those of you (especially Novices) who have specific wants, send us your name and address and we'll try to get you together with those desiring to get rid of some of their old equipment and parts. Of course, those receiving the various ham items must pay for its transportation.

To start off, the writer has a box of parts (some new) which he will send to the FIRST ham who writes him after reading this. I will pay the postage too. Those of you who are too late will have their names added to the "want list" anyway. (Be sure to let us know what you need and would like to have)

So much good can be done by so many hams by giving away parts and gear (especially to those just starting out). How about it fellows and gals? Release that old receiver, transmitter, tube and parts to someone who will really appreciate whatever they can get. After we place you in contact you're on your own. Be generous and good luck!!

Questions

Fluorescent Danger!

"I use a fluorescent lamp (40 watts) in my shack to show my friends that my transmitter really puts out the *rf*. Any danger of it exploding in my hand if it gets too much *rf* when I touch my transmitter output terminals?"

What you are doing is *dangerous* no matter how you look at it. Of course the lamp can explode. Too, most fluorescent lamps contain mercury, phosphorus and beryllium which are very *POISONOUS!* If you happen to break one of the lamps *DO NOT* breathe the expelled vapor or touch the broken glass with your bare hands. Get out of the area for at least 30 minutes, then "mop" up the parts and glass with a large rag. *All* broken particles should then be buried.

Sensitivity

"How does the *Hammarlund* HQ 140X compare in sensitivity with the HQ 100?"

The HQ 140XA has a sensitivity of 1 microvolt per meter (uv/m) for a 10 *db* signal to noise ratio; the HQ 100 a little less than 2 uv/m for a 10 to 1 signal to noise ratio.

Parabolic Gain

"What's the antenna gain using a parbolic reflector 24 inches in diameter operating on 3000 *mc?*"

With an efficiency factor of .55, the gain will be around 23 *db*.

WE 708A

Who has information on the WE 708A tube?

GG Swamping

"Is swamping of a grounded grid amplifier ever recommended?"

No. Excitation power appears in output.

PC

"What can I use for a parasitic choke in the plate of a 2E26 operating on 50 mcs?"

Try 4 or 5 turns on #18 enamel wire wound on a 47 or 100 ohm 1 watt resistor.

BC-348 Receiver

"Any articles on the BC 348 receiver in past issues of CQ?"

Yes. November 50—triple conversion; April 49—gain and selectivity; April 48—conversion and December 48—bandspreading.

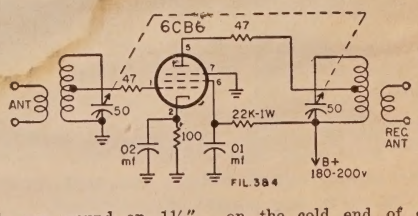
GG Input Impedance

"Can you give me the approximate input impedance for an 813, 6146, and 6AG7 in grounded grid?"

Yes. The 813 about 270 ohms; 6146 about 150 ohms and the 6AG7 about 90 ohms.

Hallicrafters SX88

"I have an SX88 whose antenna coil was cooked when a changeover relay stuck (apparently). Digging into the set I find a neon bulb (which looks cooked too) in the input of the 1st *rf* stage. Wasn't this supposed to protect the antenna coil?"



Coils are wound on 1⅛" ceramic forms. 9 turns #20 DCC spaced 1" and center tapped. Input and output links are 2 to 2½ turns on the cold end of each coil. A 10 k pot may be inserted in series with the cathode resistor for gain control.

Fig. 1—Simple preselector that will add life to the old receiver.

Yes, but your set had more than a 50 *rf* volt flashover.

813 Zero Bias

"What driving power is recommended for full input to an 813 in grounded-grid (zero bias)?"

With 2500 volts on the plate, about 450 watts for an efficiency of about 65% (SSB *only*).

V.R.

"I have a 300 volt *dc* supply and would like 150 volts at around 25 mils regulated. How?"

Use an OA2 VR tube in series with a 5000 ohm 5 watt resistor across the B plus to ground.

Tone Control

"What is an easy way to add a tone control (more bass) to a small receiver?"

Merely connect about a .05 mf condenser in series with a 25,000 ohm pot from *af* plate to ground. Try lower or higher values of capacity to suit.

Fading in SSB

"Why is SSB so much better than AM when fading is taken into consideration?"

In AM, signal components received out of phase from two or more propagation paths of different lengths will cause selective or multi-path fading. Intermodulation and other types of distortion occur when an AM carrier (2 sidebands) or its components are cancelled by fading.

In SSB, there being only one sideband, phase changes do not occur and there is no great distortion generated in the detection or demodulation processes. Distortion in SSB due to "atmospheric fading" is of the AM-frequency type which in itself does not prevent understanding SSB voice transmissions. This phenomena only makes the transmitted signal sound more "Donald Duckish."

Crystal

"My second hobby is building radio control equipment for model aircraft. I need a small crystal having wire leads instead of pin connections. Who makes such units?"

Try the *Bliley Elect. Co.*, Erie, Penn. They make a unit called the BH6W. It is 25/32" long × ¾" wide × 11/32" thick. Ask for their bulletin #493.

42 Oldtimer

"I have a set with a type 42 power pentode tube in its output. What's the replacement?"

The 6F6. It's electrically identical.

Novice Antenna

"What antenna do you recommend for a novice just starting out on the 40 meter band?"

A good half-wave doublet.

4H4C

"What is the recommended replacement for the 4H4C current regulator tube in the HRO 60 and NC 300 when it must be replaced frequently?"

In *National* Bulletin Nr. FSN-41, it is recommended that the 4H4C be replaced altogether with a 6V6GT. The additional drift caused by this substitution will not exceed 250-300 cycles at 29 megacycles which is really negligible.

Heathkit Apache

"I'm planning the purchase of the *Heathkit* Apache, do you really think that this transmitter is worth the money and will do what Heath says it will?"

We have 52 letters asking the same question. If you tried to buy parts separately to make up a similar rig you couldn't come close to the asking price. When the SSB adaptor kit (SB 10) is considered, one can readily see that such a setup (which will give you CW, AM and SSB) is quite ideal. Preliminary reports indicate that the Apache puts out a very fine stable signal. This is one rig that I hope to add to my "collection."

Phone Patch

"Why do most phone patches sound very noisey and often are full of hum?"

I would not say that *most* patches are noisey or full of hum. Most of those I have heard seem to work very well. Occasionally one is heard where the gain does not seem adequate but on the whole most hams who use phone patches are not content with mediocre operation. Poor impedance matching to phone lines from receiver output and to transmitter input (speech stages) is the biggest cause of poor operation. Hum is due to poor input and output lead shielding and poor transformer orienation. Inadequate grounds often contribute to hum too.

Thirty

Ham radio is a fine hobby; through it one cultivates many fine friendships and there are many enjoyable hours spent talking to the world. However, there are many hams that take the hobby itself for granted. They are usually the very first ones who scream about a reallocation of frequencies or the elimination of a band. Some do not even subscribe to CQ and care less if they keep up with what is *actually* going on in the ham world—other than what they themselves talk about when operating their rigs.

As pointed out by our Editor some time ago, CQ has no quarrel with ARRL and believes that it should have strong support. If you don't belong consider it and make your voice heard.

Personally, I have belonged to the ARRL for years. Now I am a member of the British and French radio amateur societies too. I believe in supporting amateur radio anyway that I can. Not the least of my efforts being devoted

[*Continued on page 100*]

MARS BULLETINS

Mars Station

The recent reactivation of the Fort Monmouth Radio Club and the modernization of the equipment in the seven studios and antenna field of K2USA/AA2USA has resulted in greatly increased activity on both MARS and amateur frequencies.

One studio is used exclusively for MARS operation—equipped with a BC-610, Viking Ranger, and an SSB transmitter. The receiving equipment consists of an SX-100 and a military R-390.

Each of the six studios devoted to operation on the amateur frequencies is used primarily for a single band with the exception of the Novice/Technician studio. This studio is equipped with both 2 and 6 meter equipment.

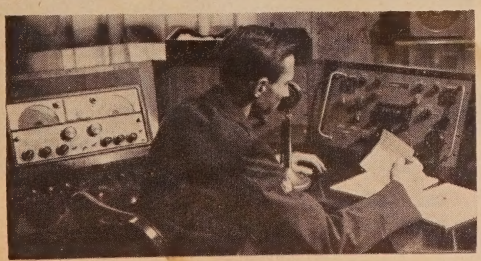
Each of the other studios are equipped for CW, AM, and SSB operation and include a complete RTTY installation. Phone patch facilities are available in each studio.

Flexibility in the use of the equipment is obtained through the use of an antenna patch panel. Through this panel any studio may be connected to any of the beam or wire antennas.

Besides the studios, the station also has a code practice room for the Novice operators, plus a workshop for maintenance chores. Even an emergency generator has been installed so as to operate in the event of power failure.

Adding to this "ham" activity is the newly organized Fort Monmouth Radio Club. They meet every first and third Thursday, at which time the Club features prominent guest speakers on radio operations, films, lectures and demonstrations.

The radio club president is Master-Sgt. Ralph Faist (W2IYE), native of Monsey, New York. Lt. Col. H. M. Russell (K2ABH) is vice-president, and Pfc Herbert Walgate (K2AIK) the secretary. Ed Asay (K2GTX), a civilian employee at the Post, is operations officer. ■



SP3 Raymond Maier is seated at the microphone at the MARS Radio Station, Fort Monmouth, N. J.

First Army MARS SSB Technical Net

Wednesday evening, 9 PM EST on 4030 kc upper sideband.

March 4—"Frequency Measurements" by Herbert B. Tanzman, Project Engineer, Frequency Control Division, U.S. Army Signal Research & Development Laboratory, Fort Monmouth, N.J.

March 11—"Principles of Radio Direction Finding" by Paul G. Hansel, Engineer-in-Charge, Radio Engineering Dept., Servo Corp. of America.

March 18—"Some Aspects of Grounded Grid Amplifiers" by George Grammer, Technical Director, American Radio Relay League.

March 25—"Antennas" by Michael D. Ercolino, President and Chief Engineer, Telrex, Inc.

Air Force MARS Western Technical Net

Sundays 2-4 PM PST—7832.5 kc, 3295 kc, 143.46 mc.

March 1, 1959—"Environmental Testing of Electronics Equipment and Components" by Eric Edberg, Chief Test Engineer, Varien Associates.

March 8, 1959—"Microwave Radiometers" by Don Harris, G. E. Microwave Laboratories.

March 15, 1959—"Navcom 100 VHF Aircraft Navigation and Communication Radio System" by Kenneth M. Miller, K6BNJ, Chief Engineer, LearCal, Division of Lear Inc.

March 22, 1959—"Miniaturization of Amateur Equipment" by W. R. Barstow, Lockheed Aircraft Corp.

March 29, 1959—"Equipment Utilization, Conversion Information and Project Reports" by USAF MARS Western Technical Net Members.



Military tribute to amateur radio luncheon—Sheraton-Park Hotel, 16 August 1958

(Left to Right: Mr. J. Stan Surber, W9NZZ; Mrs. Surber; CWO Luke Rogers, USAF, W3ZHL; Mr. James H. Symington, K4KCV; Mrs. Symington; Mr. J. Harvey McCoy, W2IYX; Captain Eugene J. McElroy, USAF, W1AEO; Mr. Morton B. Kahn, W2KR.)



Novice

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

From time to time I have been prodding my readers about their harmonic radiation. Believe me it is not just idle chatter, or something to fill up space in a column. The situation has become very serious. Evidence of this can be found in the fact that the FCC is sending a note regarding the emission of harmonic signals, along with each new Novice ticket that it issues.

First of all, what is harmonic radiation? (You should know, it's a test question.) Stripped of all the fancy words, harmonic radiation is emitting or transmitting signals that mathematically relate to the frequency you are supposed to be operating on. As an example, the most common case occurs on 40 meters. Joe Novice fires up on 7180 *kc* for a rag chew. Unfortunately, he did not tune his transmitter properly and he is also sending out a carrier on two times his 40 meter frequency, or 14.360 *mc* which is just outside the 20 meter ham band. Another common case is the Novice who unleaches his rock crusher on 15 meters. If he does not tune up properly he may also transmit another beautiful signal on 20 meters on 14.1 *mc*. If things are really out of whack, the transmitter might even be audible on 7050 *kc*. Obviously both these harmonics are in the general class cw band and your "N" or "V" would really cause a commotion! In all fairness, it should be also pointed out that some transmitters will pour out harmonics, even when properly tuned up.

You might think to yourself "So I get a citation (pink ticket) for harmonics—they can't hang me!" Well by golly, they almost can! Here are some points you should consider. If you receive a ticket for harmonics, it is not the same as paying the dollar fine for a parking ticket. You have to write a letter of explanation, and your answer must be to their satisfaction. You don't just say "I am sorry, it won't happen again," rather, you must tell what steps have been taken to prevent this from happening again.

For a moment, let's return to our friend Joe Novice, and his harmonic on 14.360. On this frequency there is a radio teletype circuit between Okinawa and Washington, which I assume carries military traffic. Joe's harmonic can really play havoc with this circuit. When the 20 meter band starts to fade out, the signals get pretty marginal and copy is difficult. If you don't believe that Joe's little "peanut whistle" (even the second harmonic) can wipe out a marginal signal, you are just kidding yourself. If this should happen, a pretty good explanation would have to be forthcoming!

In most cases the harmonics are radiated because of improper transmitter tuning. Right from the key to the antenna a transmitter will do your bidding. If you tell it to send a dot, it sends one, and so on. And if you tell the oscillator to generate a signal on 7180 (by proper tuning) it will do this too. But if you mis-tune the final (say half way between 20 and 40



Utah is represented this month by John R. Shupe, KN7DJO, 3584 Harrison Blvd., of Ogden. He has picked off 44 for WAS and has had over 600 QSO's since July. John will be glad to sked anyone needing Utah.



Dick Paschall, P. O. Box 1075, Jacksonville, N. C. holds the call K4QZG, is 15 years old and a soph in high school. Dick would like skeds with Nevada, Idaho, and R.I. for 15 meter WAS.

meters), it will become confused and amplify the two frequencies at the same time. If you really "goof" and dip (or resonate) the final on 20 meters the transmitter following your instructions to the letter and churns up a storm on twice the crystal frequency or 14.360 *mc.*

Unfortunately, some transmitters are not smart enough to figure out your instructions, and generate strong harmonics, even when properly tuned. The solution is an antenna tuner (or coupler). This device is connected between the transmitter and the antenna and has the ability to separate the wheat from the chaff. Such a unit is a good idea for any transmitter, for that matter. It will usually improve your loading, put more power into the antenna, and increase efficiency.

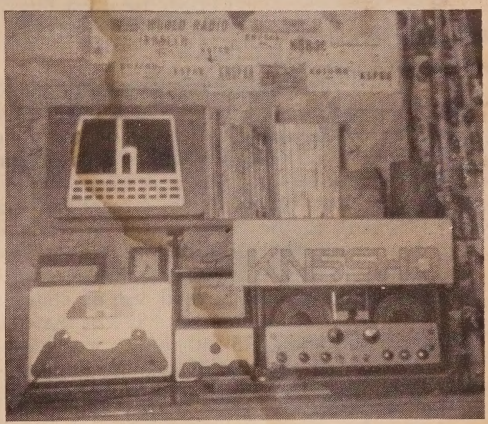
Some antennas are better than others in regard to harmonic radiation. For example, the simple dipole almost cancels the second harmonic, but will radiate the third with the greatest of ease. Multiband antennas, such as the long wire or Windom, will radiate harmonics with much gusto.

So these are some of the causes, but what about the cure. As I mentioned, the antenna coupler will go a long way towards eliminating the harmonics. It will usually knock them down to such a low level that they cannot be detected. An excellent article on the subject appeared last fall in QST (McCoy, 80 Meter Loading Without Harmonics, Aug. QST, p. 24) and is recommended reading. Such an antenna coupler is not difficult to construct, not expensive and should improve your signal strength too. This same coupler may be used on other bands also simply by removing turns from the coil.

Another recommended item for your ham shack is a wave meter. This consists of nothing more than a coil, a variable capacitor, and an indicating device. The dial of the wavemeter is calibrated in frequency but it is not accurate enough to tell you the exact frequency you are on. However, it will indicate what band you



Nick Lash, 4360 Mass. St., Gary, Indiana is K9KLR and has a WAS of 48/47 and a DXCC score of 15/11. Nick offers to help any prospective Novices.



Ron Radican, KN5SHQ, sent this picture of his shack, but forgot to include his QTH. Ron is also looking for an Idaho sked on 40 or 15 meters and QSL'S 100%.



Stephen Dinkel, KNØRUH, 601 N. 12 St., Oskaloosa, Iowa tells us about the new KNØ that couldn't give him an RST report because he did not have an RST meter (cheap receiver-hi). Stephen QSL's on cards received and to new states.



Dick Southern, KN5QKK, 813 Mulberry, Ardmore, Oklahoma, is smiling because he only needs Idaho to complete his WAS. Dick must do a lot of listening for he has 48 out of the 49 with 291 total contacts, plus 18 countries for DXCC. Nice going, Dick.

are on, and the presence of harmonics. A wavemeter tailored for Novice use was described in the July 1958 issue of QST, on page 19 (A Novice Band Checker, McCoy).

If you have a grid-dip meter, such as the Eico, or Heath, you can use it as a wave meter and harmonic indicator simply by switching it to the "Diode" function. The calibration of these units are usually close enough so that you can read your frequency within .25 *mc.*

I realize, as well as you, that the whole situation is akin to the guy who discovers he has a cavity in a tooth. It doesn't hurt, so he avoids the trip to the dentist. Only when it starts throbbing and the dentist starts to "drill for oil" in his mouth does he realize that he should have taken care of it when the cavity was first discovered. As a favor to both of us, please look up these articles. Let's make the phrase "Help stamp out harmonics" as popular as the Volkswagen sign "Don't crush me, I eat bugs."

DX News

Heard JA1VX calling KN1RGO, but didn't hear the conclusion. Did you work him? Also heard KN6RUH and JA1VX kicking the gong around. John, in Roseville, was 579 and Mitu, in Tokyo, was 569.

Bud Lafferty, up in Thule, Greenland, has shipped back to the States but I understand that Jose (ex-KP4ANT), KG1AN will still be dishing out the KG1 contacts from there. Before Bud left, he sent a final list of stations heard at Thule for December 58: On the 6th, between 0000 and 0225, 40 meters was jumping, the following stations were logged—KN1IYP, JAR, WV2AXI, CLW, KN3ETG, GHV, GQV, GZR, HAJ, JBQ, KN4ZQE, KN7JWC, KSG, KVY, LZH, KN9LYR, OOQ, KNØPAT, PWX, RTX. On Dec. 7, 1958, the 15 meter band was really hopping about 1600 to 1945 GMT. These stations were received: KN1IVT, WV2BDV, BJC, BUJ, CBB, KN3CNS/3, EAJ, GAC, GIT, UBZ, KN4AQA, CKS, YMN, YYG, YZR, KN5QLJ, KN8KTZ, LAU, LIF, LRD, LVA, MLS, PPX, PXU, KN9LIX, OCX, PEI, KNØMST, PKW, PFX, RUM. On Dec. 26, 1958, between 0000 and 0140 GMT the 15 meter band was wide open to the West Coast and the following stations were logged: KN1RGO, WV2CHE, KN4UZH, KN5LRC, RZW, SIC, KN6ROU, RUH, TFW, TVI, YDE, WV6AHK, CGB, KN7CKN, ELB, ERN, EZP, GDV, MQB, KN8BCG(?), KKC, KUR, LDD, LVA, MEF(?), NCH, NDV(?), KN9OYD, KNØOYB, RRW. Bud's final report included signal strengths and frequencies, and times. If you are interested in your report, drop me a self-addressed postal card and I will confirm his reception of your station. Also, if you have worked KG1CK and not received a confirmation QSL card, send in a self-addressed stamped envelope to me and I will rush one out to you post-haste.

Ever faithful Tima Popovic, YU1-RS-357, Banat Novo Selo, Yugoslavia, sends us his monthly list of calls heard in his country on the 15 meter band. November 28, between 1645 and 1940 GMT: KN1GRJ, HRE, HSN, HYC, HYZ, IMA, JAH, WV2AFT, AQC, BLY, KN2IVS, KWY, LPU, MHX, MMP, PKD, RYB, TCW, UCJ, KN3EKD, ELD, EVR, EXM, GIT, GRL, GUB/3, ISA, IXM, LOX, KN4BVO, BWS, THC, VAD, VFU, VUU, VWI, ZRT, ZSY, ZUU, KN5OUR, RMV, KN7GLB/Ø, KN8JVY, KBJ, KUW, KYN, LIJ, MIR, KN9LAU, MAT, MAU, OJI, OYD, PPX, KNØGTM, PNN, QXH, RFL. On Dec. 6, between 1800 and 1845 GMT, Tima brought in the following stations: KN1YDO, HMH, HMS, IKB, WV2AED, AWR, AYM, BQO, BUJ, CJO, KN2DYH, PRM, REG, KN3ECF, EPH, EPM, GCR, GFM, KN4CCC, YHM, YIM, ZDJ, KN9PEW, POP. On Dec. 7, between 1645 and 1700 GMT, only a few stations were logged: KN2SQT, UQS, KN3GEO, KN8LSG, KN9LRS, OIU, OUY. December 13, between 1600 and 1700 GMT, the following stations came through: KN1GCV, IFJ, WV2ALI, CPA, KN2UWC, KN3EAJ, CSR, CWU, GCQ, KN4BOD, CKB, YMB, KN8JUD, KQW, KN9LXW, MAE. Dec. 14, between 1550 and 1810 GMT, was a good day and Tima heard many stations: KN1GKS, GRU, HHN, HVV, IBX, IKF, IWV, WV2AKK, BDV, BPY, BPZ, BRL/2, CII, CIO, KN2JKK, JKM, LOK, OQM, OWJ, QEQ, QPQ, SMC, SSC, TEB, TZF, UWQ, KN3DMG, DPQ, ECQ, EVK, GHI, GJH, GNK, GVG, HCD, RJH, KN4TPB, UOD, VRT, VUO, YHK, YMU, YSK, YSU, UWX, KN8LAU, LCJ, LCL, LEI, LIB, LOU, MFB, KN9KUI, ORC, KNØRJO. The following stations were heard on Dec. 15, between 1615 and 1800 GMT: KN1EKP, GJN, GWG, KN2TQB, UVU, KN3DEG, EAE, GCS, KN4BOE, VIQ, VWS, YWD, KN8IQB, KJN, KKC, LHF, LKC, OBI, KN9OBI, PEI, KNØOHI, RMO, ROW. Tima also mentions that on Dec. 14 he heard G3JVU, calling KN3EVR, and on Nov. 28, ON4HW was heard calling KN3EVR.

Net News

KN4CML, 835 19th Place, and KN4CPK, 924 21st St. in Newport News, Va., would like to start a net on 40 or 15 meters for Novice hams with 30 watts or less. Write these fellows if interested. Your ideas are welcome.

Arnold Berland, KN2RBH, 223-22 65 Ave., Bayside 64, N. Y. is interested in starting a 15 meter Novice cw net. Interested Novices can contact him at the above QTH.

Help Wanted

Mr. Paul Kunz, W3IWJ, Secretary for the Greenbelt Amateur Radio Association, Green-

[*Continued on page 100*]

SURPLUS

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

Last month we covered the power supply for the BC-312 and a set of converters (with their own power supply) for ten, six and two meters. This month we will continue the conversion, with specific reference to the BC-348. Actually any circuits shown are equally applicable to the BC-312 and just about any other surplus receiver of similar types.

These receivers offer a lot for the money, especially when you consider the quality of the components, the receiver stability and workmanship. Although the receiver range is limited, the use of converters similar to those shown last month should take care of any problems along these lines. However, one complaint heard from CW operators is that the selectivity, even with the crystal filter in, leaves something to be desired. Well, W2HHZ came up with one simple solution to increase the selectivity, and at no additional expense. Assuming the *if's* to be completely aligned (as we later describe), try adjusting the neutralizing capacitor for best results. This is only a couple of turns of wire around a coil and the value is extremely small (about two micromicrofarads). A distinct narrow band effect will be noticed with the neutralization adjusted properly. W2HHZ has found that the crystal is actually imbedded in a small plastic mount. This plastic acts like a capacitor dielectric and increases the stray crystal capacity. Carefully remove some of the plastic, leaving just enough to hold the crystal assembly together. The selectivity, after making this modification and re-neutralizing, dropped 800 cycles, which isn't bad at all. It may seem like a lot of work, but if you are a CW man, it is going to prove worthwhile.

Much of the correspondence about the BC-348 is in reference to a suitable noise limiter. Having tried just about every type, from the simple diode to the Lamb noise silencer, I'm convinced that the TNS offers more than any of them. Of course you may say that you don't need a noise limiter. If so, don't use one. But, just in case, the circuit and the correct connections are shown in fig. 2. The TNS and an additional stage of audio were mounted on a small strip type chassis in the space under the *if* wiring. The original volume control was ganged to the *rf* gain control and is not used in our conversion. Instead, a half-meg potentiometer with a SPST switch was mounted on the front panel access plate for audio volume control, while a second half-meg pot was mounted along-side for the TNS control. The switch is used for a power control since

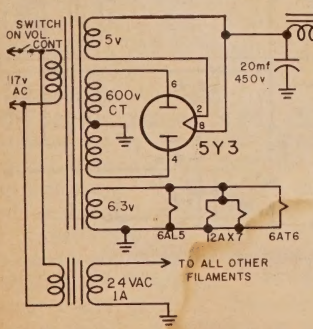


Fig. 1—Power supply for the BC-348.

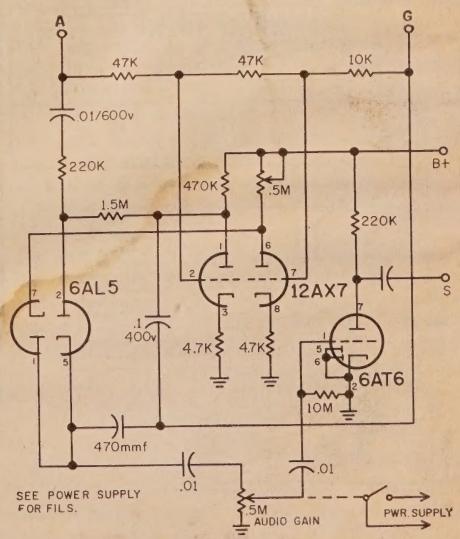


Fig. 2—TNS and audio amplifier.

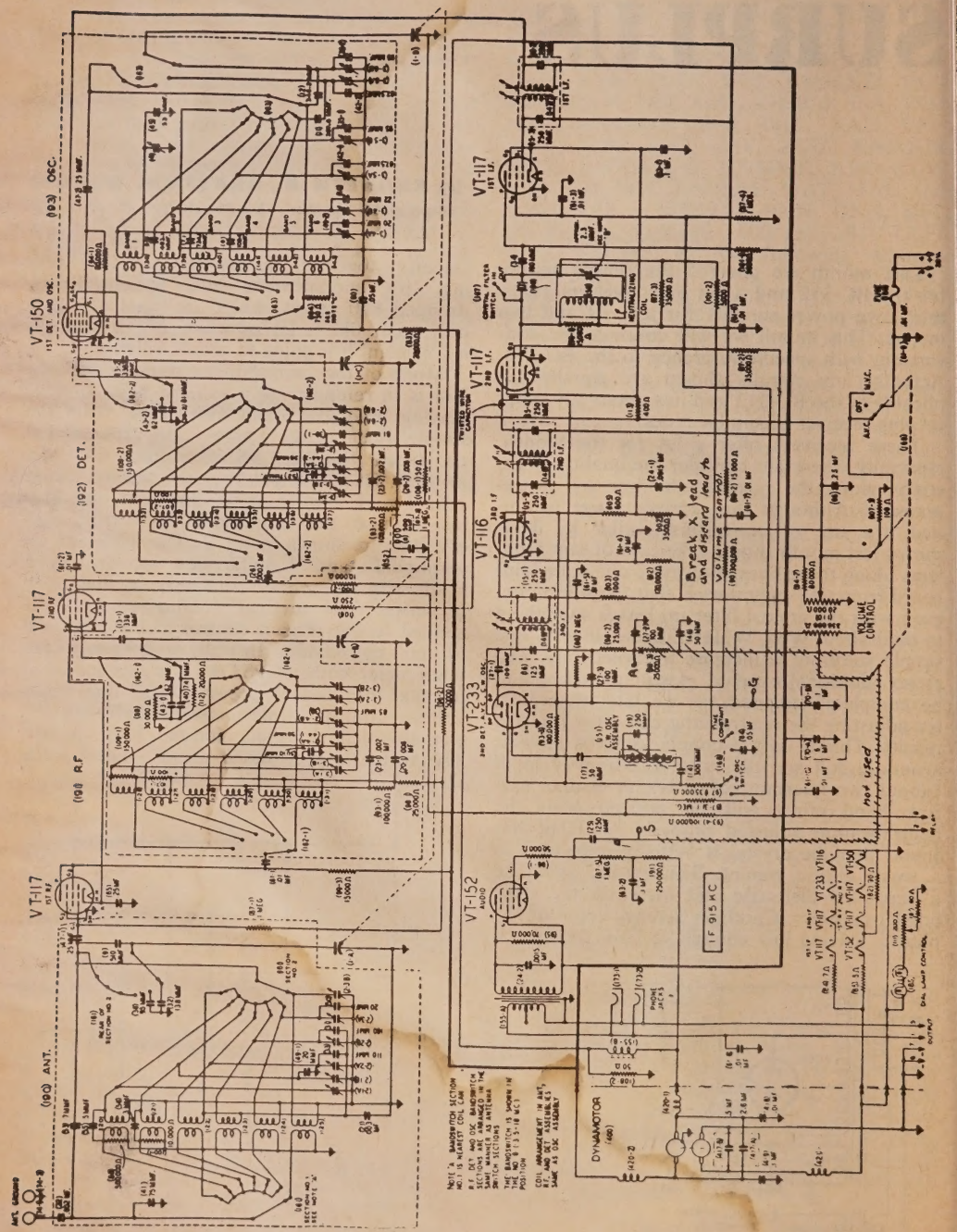


Fig. 3—Schematic of the BC-348.

we didn't trust the original power switch at 117 volts ac.

While you still have your soldering iron out, make sure that the output tap is set at 4000 ohms on the output transformer-filter choke combination. This will allow you to connect a loudspeaker directly to the set by means of a standard four or five thousand ohm to voice coil transformer. Table I gives you the correct pin connections for the power plug and the output connection (pins 1 and 5) can be made by means of these pins or by means of the earphone jacks which are in parallel with these pins.

Table I

1 Output
2 Relay (short to 6 for receive)
3. Plus 24V DC
4 Plus 24V DC
5 Output (may be grounded)
6 Relay (short to 2 for receive)
7 Ground—24V DC
8 Ground—24V DC

Several "S" meter circuits were tried, but with the lack of a calibrated meter and the effort needed in properly calibrating such a meter, we decided against putting one in. Actually, unless you have such a meter, it would prove only to be a rather expensive tuning meter, and probably useless. If you feel that it is worth it, you can refer to the handbooks that are available for suitable circuits.

The original BC-348 that we had used a set of binding post type of terminals for the antenna input. We found that the use of a coaxial connector was more compatible with our equipment and we removed the one marked "Antenna" and enlarged the hole to 5/8 inch for a standard coaxial connector. The results were surprising, especially the reduction in noise pick up from the fluorescent desk lamp.

Alignment

Now comes the alignment job. Set the receiver to *mvc* reception, with the *bfo* off. Beg, borrow or even buy a signal generator and connect the hot lead to pin 1 of VT-116 (6SJ7) and the ground lead to ground. Set the signal generator to 915 *kc* modulated AM, and make sure the receiver crystal filter is off. Connect a *vtvm* type *dc* meter (or a 20,000 ohm per volt unit) across R-86 (2 megohm) or connect an *ac* voltmeter across the receiver output (phone jack). Turn the signal generator up and adjust the range of the meter until a mid-scale reading is obtained. Adjust the 3rd *if* transformer for maximum reading on the meter by adjusting the top and bottom threaded adjustments. When you have reached the maximum meter reading, disconnect the hot lead and reconnect it to pin 1 of VT-117 (6SK7), the second *if* amplifier.

Adjust the second *if* transformer the same way that you did the third, but decrease the output from the signal generator in order to keep the meter on scale. When you have reached a maximum as before, disconnect the signal generator and connect it to the signal grid of the converter tube, pin 8, 6SA7. Make sure that the crystal switch is in the OUT position. Adjust the first *if* transformer for maximum output as before, again readjusting the output of the signal generator so as not to overload the meter. Note that we by-passed the adjustment of the crystal filter. This is a rather tedious job involving the realignment of the *if* amplifiers, but with the crystal in the circuit and the signal generator carefully adjusted to the exact frequency of the crystal. We will be going over receiver alignment techniques soon in another article and will completely discuss this technique then.

The next thing to align is the *rf* and oscillator stages. The oscillator should always tune to a frequency 915 *kc* above the incoming signal, meaning that the variable capacitor should cause the oscillator to tune this difference regardless of where the dial is set. Minor variations will not permit this to occur exactly, but with the aid of trimmers and padder type variable capacitors we can make the error very slight. The technique of receiver alignment is to first adjust the oscillator. Set the receiver to the high end of one band, say 18 *mc* on the high frequency band. Adjust the trimmer for maximum output from the signal as read by the meter. The signal generator supplying the test signal should be set at 18 *mc* and should be connected to the signal grid of the converter tube (6SA7). Since there are no other adjustments for the oscillator on this band, check and see if the calibration is correct at the low end of the band (13.5 *mc*). It should be OK, but if it is off a little find out how much. You can check the calibration by merely setting the signal generator at the frequency you wish to check. If it is practically on, you may merely have a signal generator that is not calibrated very well. You may have to use a frequency meter and check both the sig-gen and the receiver to see which is off if there is a big error. Notice that the trimmer is adjusted at the high end of the band in all cases, so when you adjust the other bands follow the same procedure.

On the low frequency bands, in the case of these receivers, you will find that we also have a padder. This is used to further correct the *rf* alignment, and is adjusted after the trimmer. The padder capacitor has most of an effect with the tuning capacitor fully meshed and therefore must be adjusted at the low end of the band. The procedure is simple enough. Just feed in a signal to the converter grid from the sig-gen at the high end of the band, adjust the trimmer for maximum output on the meter. Then turn the sig-gen to the low end of the band and set the receiver dial to the same frequency. Adjust the padder for maximum output

[*Continued on page 100*]

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

sideband
sideband
sideband

SIDEBAND

The year 1958 will long be remembered for its many d/xpeditions which were either exclusively conducted for the sideband fraternity or which used sideband gear most of the time. Countless "new" countries were made available to SSB operators, and in several instances, the d/xpeditions using SSB provided a first for all types of communication. Have you noticed that most of the leading DXCC boys have obtained sideband exciters in order to maintain their positions in the countries worked race? Did you notice the many USA stations calling VQ9GU, XW8AM, XZ2SY, HC8LUX, CEØZG, PYØNE, VQ1SSB, FD8DZ, etc., on CW because they did not have SB? While on the subject of CW one cannot help but wonder why so many of the key brethren are starting to call CQ and carry on QSOs between 14,300 and 14,350 especially while the band is wide open for DX. Of course they are licensed to operate CW in this section of the twenty meter band, but ethics dictates differently. Do you detect as I do some pent up frustration?

Nineteen fifty-eight witnessed a tremendous number of Sideband converts from the ranks of the useless and selfish carrier operators. While it is difficult to be too accurate it is believed that, based upon statistics now available from manufacturers, and on surveys recently made that there are more than twenty-five thousand side band stations operating on all of the amateur bands. On the past three Saturdays and Sundays it seemed as though the entire 25,000 were operating in the top half of twenty meters.

Although severe interference was experienced by these Sidebanders, there were actually ten times as many solid or satisfactory QSOs being conducted from 14,250 to 14,300 than there were below 14,250 because of the hetrodynes from the carriers and the double sidebands in use. Wonder when the FCC will send out its long expected announcement to hams as it has to the commercial stations (two-way operations) to prepare to change over to SB or else?

Leo, Chief operator of UB5KAB wrote to say that SSB is now in use with a pair of 813's and that they are on daily from 0500-0800 and again from 1300-1700 GMT looking for W/K sideband contacts. Leo has permission to QSL direct by AirMail and receive cards through his P.O. Box 27, Stalino, Ukraine, USSR. Please remember to send IRCs for direct mailing of your card. Thanks to Bob, W4INL we are able to show a picture of Serge who is one of the operators of UB5KAB. Serge holds a "Master Amateur Radio Sport" certificate, is 22 years of age, unmarried and in charge of the technical aspects of the station. He is interested in languages, music and international relations. By the way Leo the chief op writes beautiful English.

Jack, W7IAA has now worked 118 countries. He contacted George, UA1DZ on January 6th and learned that UC2AA will be on SSB in one month.

Mickey, W8YIN the "low power proponent" reports that Martin, OY7ML will return the KWM-1 early in January and will QRT. We will sure hate to see him go off the air. Mickey also advised that as of January 10th, George, OK1HZ was still operating SSB with his KWM-1 and a long-wire antenna from his hospital bed. George who hopes to begin his five-year d/xpedition through sixty countries is recovering from a broken leg. Beda, OK1MB is also active on ten, fifteen and twenty meters on SSB.

Danny Weil, last worked from St. Lucia as VP2LW worked over 2000 stations from that island. Two weeks ago when signing VP2DW on Dominica he worked over 2500 stations. Danny uses an HT-32 and an HT-33A with an SX-101 receiver furnished by Hallicrafters. He has used a three element beam from the last few islands and has a tremendous signal. The next ports of call will be St. Vincent and Grenada, and then after a short stay in the Virgin Islands for a complete overhaul and provisioning, Danny will begin his long voyage through the Panama Canal and then across the broad Pacific Ocean to some remote places for the Sidebanders to work him from.

George, W8YBZ sent in 130 choice cards for two-way SSB. He has worked 160. Jack, K2JFV who was the first to contact OY7ML, reports that ZS5JM, John is now on SSB. John promises to put some "shoes" on his 10B after his coming marriage this month.

On January 2, 1959 the First Army MARS SSB Technical Net celebrated its first anniversary. Many well known specialists in the Electronic field gave interesting talks on this network, and the audiences all over the East Coast enjoyed and benefited by these discussions. Tune in on the net each Wednesday evening

on 4030 Kc at 2100 EST on upper sideband and enjoy a very interesting evening.

Roberto, TG9AD qualified for and received "Worked 100" certificate number 37. Stan, W3NKM received number 38. Congrats!

George, PJ2AA writes in to say that he has now worked 95 countries on SSB, but that he is having difficulty obtaining QSLs. (I thought only W/K stations had that trouble.) George says that there are now three SSB stations in Aruba, PJ3AE, PJ2AV, (with a 20A and an 813 linear with a G4ZU beam), and himself. He has sent QSLs to all who have worked PJ2AA.

Dave, W6VX advises that Harry, JA1ANG was heard on 21 megs using an "all JA" transistor rig. The transistors were made by SONY who makes many of the transistorized portable radios sold in the USA. Harry will soon be operating from his new QTH in Tokyo.

K8AEC reports that the Inter-State SSB Net held 31 sessions on 75 meters this month with 1922 check-ins, and handled 2131 messages. The average time per session was slightly over two hours. On twenty meters there were 17 sessions with 296 check-ins with 641 messages handled.

The Third CQ World Wide Side-Band Contest will be held over the week-end of April 18th, 1959. It will begin at 1800 GMT on April 18, and end at 1800 GMT on April 19th. This contest will be open to all sideband operators in all parts of the World, and all authorized frequencies will be utilized. In order to make this contest more interesting and with equal opportunities to all amateurs no matter where they live we have adopted new rules and regulations. There will be no multipliers allowed for contacts with different countries, zones or continents, nor will there be multipliers allowed for multiple band operation. The object will be to work as many stations as possible and with as many different prefixes. For example, should you have worked 609 stations and you find there are 123 different prefixes in the total then you will multiply the 609 contacts by the 123 prefixes and your total score will be 74,907.

In this contest W/K stations may work other W/K stations to increase the number of possible contacts. It is suggested that you work all of the DX stations you can when the bands are open. You may only work a station one time regardless of the number of bands you use. We will all use the standard exchange of five digits. The first two will be the Q and S report with the last three numbers indicating the number of that particular QSO. An example is 59001 indicating the first contact. 59886 would be for QSO number 886 with Readability 5, and strength 9 of the station contacted.

Logs must be received at CQ offices by June 10th, 1959 to qualify.

Another W3SW, Silver Cup will be presented

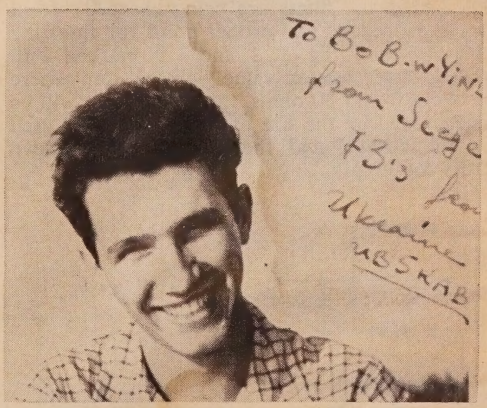
[*Continued on page 103*]



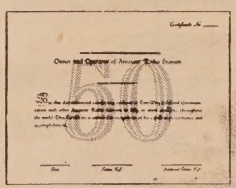
Ken, 4S7KD. Courtesy VS1FJ.



GW5TJ Courtesy W1BDF.



"To Bob, W4INL from Serge, op at UB5KAB." Station of K9EBA, Gus.



CQ issues special certificates for amateurs who can provide proof of contact with amateur stations, using two way sideband, in 50, 75 and 100 different countries. Send your cards and application to the Sideband Department directly.



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

semiconductors

Last month, we discussed the characteristics of the new silicon rectifiers, their manufacture, and operating conditions. One mis-impression should be corrected at this point however, absolutely no more than 130 volts (*rms*) should be applied to a silicon rectifier with a peak inverse voltage of 400. This 130 equals 400 ratio and can be scaled up or down to suit the rectifiers you have on hand. In some cases where 130 volts is applied to the rectifier, the peak current rating can be exceeded. To check for this condition (when you are pushing the rectifiers to maximum piv), connect a known value wire-wound resistor in series with the rectifier and measure the peak voltage with an oscilloscope. This peak voltage divided by the resistance will reveal the peak current. Another point, very worthy of your consideration, is the surge current involved. A properly engineered circuit will have surge protection resistors connected in series with the rectifier current path. This resistor will prevent the surge current rating (when the filters are being charged) from being exceeded. The proper point for inserting this resistor in fig. 1, 2, and 3 is marked with an X. The resistor value will be somewhere between 5 and 30 ohms, the exact value will be determined by the size of filter capacitors used in the circuit, and the current being drawn from the supply.

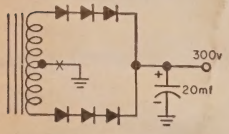


Fig. 1—Full wave.

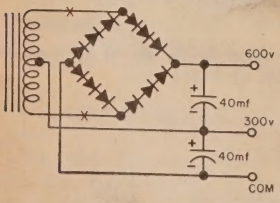


Fig. 2—Bridge.

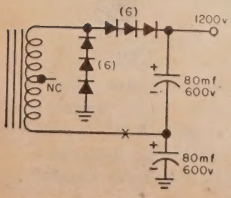
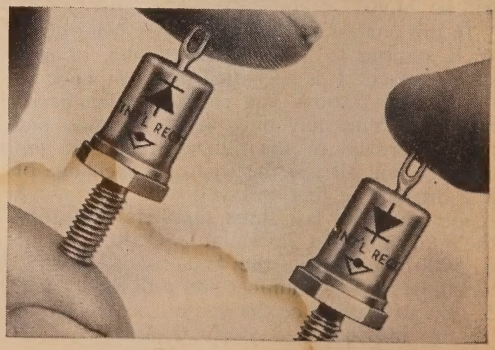


Fig. 3—Doubler.

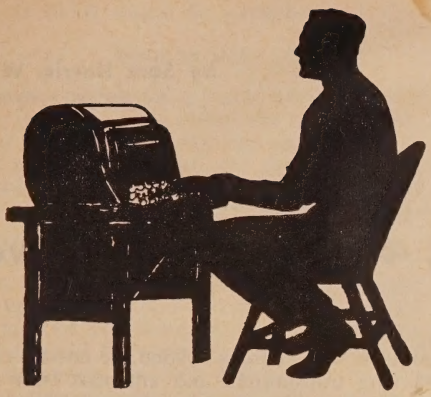
Figure 1 shows the application of silicon rectifiers in a full wave circuit. Note that several rectifiers must be connected in series to avoid going above the peak inverse voltage. Assuming that the rectifiers in fig. 1 have a peak inverse voltage rating of 400 volts (130 v *rms*), then we can apply 390 volts *rms* to each rectifier string. Thus, the transformer might well be a replacement type rated at 780 volts center-tapped. A resistor of approximately 10 ohms in the center-tap leg would keep the peak current within reason. A 20 mf filter will nip off quite a bit of the ripple, but for most applications a choke and output filter capacitor will be required to produce near pure *dc*. A choke input filter system could also be used in this circuit and would result in the same advantages as with vacuum tubes.

Figure 2 shows an interesting variation, and is known as the bridge rectifier. This configuration will produce two times the output voltage of fig. 1, but only half as much current on a continuous basis. However, it is a "dandy" circuit for using receiver type transformers to supply power for small transmitters. In SSB applications, this circuit would provide the same peak current (on voice peaks) as the continuous current of fig. 1. However, there is "no free lunch." Since the transformer end-to-end voltage is 780 volts, it will require three rectifiers in each leg, or 12 rectifiers total. If the transformer has a center-tap, you may obtain half voltage (for driver stages, and so on) as shown in fig. 2. The total wattage of the two outputs must not exceed the wattage of fig. 1,

[*Continued on page 103*]



These new 300 ma., 1500 volt piv diodes are available with the stud connected to the anode or cathode. See text for more information.



FLASH—FCC Oks proposal that unlicensed personnel be permitted to operate Amateur Radio Teleprinters.

RTTY

Byron H. Kretzman, W2JTP
2260 Matilda St.,
St. Paul 18, Minn.

An RTTY converter, or TU, does *not* have to be large, as Phil Catona, W2JAV, pointed out in the June 1958 RTTY column in CQ, by his development of a TU built into a polar relay case. That TU was of the "neutral" type; in other words, designed to directly key the selector magnets of a Model 26 machine. Now, some fellows, such as W2JAV, prefer to take advantage of the excellent low-pass filter action of a polar relay and its inherent push-pull circuitry. Besides, the "floating" contacts permit a large degree of flexibility when it comes to designing your own "local loop" system.

Figure 1 is the schematic diagram of Phil's transistorized TU redesigned to use a *Western Electric* 255-A polar relay. The result: a full eighty-point range and an increase in sensitivity. With no signal input, the current drain is only 1.7 *ma!* (With signal, each side of the polar relay is hit with a 40 *ma* pulse.) This suggests a wonderful deal for autostart. Just leave the thing on. The small 7½-volt "C" battery used will last a long time with this kind of no-signal drain. Does anyone have a suggestion for a circuit to turn on the machine motor upon reception of a standard 5-second autostart start signal? (See page 58 in the RTTY Handbook.)

Radioteletype Channels

Caution! The FCC, effective January 10, 1959, granted exclusive cw segments in the 6-meter and in the 2-meter bands. These are, 50.9 to 51.0 *mc* and 147.9 to 148.0 *mc*. The "national" 6 meter RTTY frequency (52.6 *mc*) is not affected, but the 2-meter frequency of 147.96 *mc* can no longer be used for AFSK. No doubt, by this time you have been thinking of a possible substitute. Look down the list

[*Continued on page 105*]

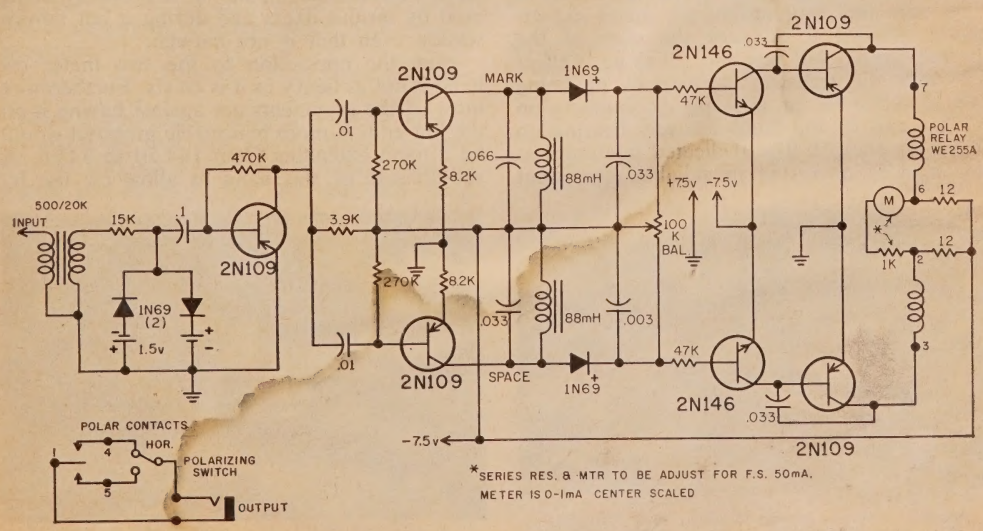


Fig. 1—W2JAV Transistorized Polar Converter.

VHF

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

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

CW and the VHF

Just as it looked like we could forget the non-ending and bitter arguments about cw sub-bands on two and six, it's back again. Officials of our national organization (ARRL) acting without authorization from or consultation with the membership, have requested the F.C.C. to hold up the cw sub-band allocations. The object of course is to allow time to bring more pressure to bear in favor of the Leagues' original proposal. The fact that the majority of the mail received is against the cw sub-bands has apparently no effect on our duly elected representatives.

Lest there be any misunderstanding, I wish to go on record as being 100% in favor of the cw bands.

F.C.C. Six meter Proposal

I feel that the F.C.C. suggested 50.9 to 51.0 *mc* cw band is ideal. It allows maximum usage for the primary purpose (scatter, etc.) and minimum interference with the great majority of six meter operators who do not want it. I am sure that any serious six meter experimenter, seeking to advance the state of the art will agree. No sensible, thinking VHFer feels that the transient advantages of being able to make hit or miss F2 dx contacts on the low end of the band has any bearing on improving the art. The dedicated communication man is interested in reliable, consistent contacts with stations beyond the normal range. Moving transmitters and antennas from 50.0 to 50.9 doesn't present a big rebuilding program. The larger arrays and more sophisticated receivers used by the dx man are much less subject to interference from Channel 2. Moreover the more experienced dxer is better able to cope with the somewhat increased TVI problems encountered on this higher frequency. The only change I would propose is to enlarge the sub-band to include 50.8 to 51.3 with a novice sub-band from 51.0 to 51.3.

F.C.C. Two meter Proposal

It is immediately apparent to anyone who has ever operated two meters that the proposed 147.9 to 148.0 *mc* cw band is non-operable. (RTTYers excepted.) The two meter dx man would have to undertake a complete rebuilding job to use this allocation. Rather than do this it is obvious that even the most confirmed cw operator will take his chances in the phone band. Furthermore the allocation of only 100 *kc* is not consistent with present usage on the band. A minimum of 300 *kc* is presently being used by serious dxers and during a hot aurora session even that is not enough.

Now the opposition to the two meter cw band is not as heavy as it is on six. Furthermore most of the arguments are against having it on the low end. A more reasonable proposal would be a band extending from 144.50 to 145.0. A sub-division of this band to allow cw use by



Another veteran contest worker, Will Whitaker (K2AXQ) relaxing for a moment.



Operating position at Dave's (W1LMZ).

the two meter novice of the frequencies from 144.8 to 145.0 would be advisable.

Time to Act

The proposals and opinions above are not wholly my own. They reflect the written opinions of six and two meter operators from the whole country. They are not the opinions of the rabid cw or anti-cw men. The majority of the amateur fraternity is composed of mature individuals who realize that politics, religion and cw sub-bands are "non-arguable to a conclusion" subjects. You can't win the argument; you can only make an enemy. I am afraid that some of our more zealous VHFers have passed beyond the stage of reason. In view of their temporary insanity it behooves us, the less rabid more reasonable majority to make a firm decision about our bands. The leagues' request to delay the proposed cw sub-bands until March tenth has been granted. By the time you read this you will have just enough time to write the F.C.C. regarding your proposal. Don't be misled about the F.C.C. You *do not* have to submit a formal proposal with 14 copies. Even a post card with your opinions will be considered. You might say for instance:

F.C.C. Commissioners
Dear Sirs:

I would like to go on record as favoring a six meter cw sub-band extending from 50.9 to 51.3 *mc* with a novice cw band from 51.0 to 51.3 *mc*.

I would further recommend a two meter cw sub-band including the frequencies from 144.5 to 145.0 *mc* with a novice cw sub-band from 144.8 to 145.0.

In my opinion this would provide maximum utilization of our six and two meter cw bands with a minumum of interference with present operations.

Signed: Your name and call.

Now if you are a rabid anti cw or an unreasonable cw man and are not willing to consider the feelings and desires of others you can change the letter to say any silly old thing you want. Just remember that your decision affects the pleasure and happiness of thousands of other amateurs who deserve at least the courtesy of a little thought on your part. Don't let anything deter you from sending your honestly thought out recommendations to the F.C.C. *NOW ! ! ! !*

April VHF Contest

What: A *vhf* Contest primarily designed to give the *vhf* operators a chance to compete on an even basis, and have fun doing it.
When: 8:00 P.M. Local Standard Time, April 25th 1959, to 8:00 P.M. Local Standard Time April 26th 1959.
Who: All amateurs throughout the world.

Winners certificates will be awarded to the top scorers on each *vhf* band for each state or province in the United States and Canada and for each country.

Separate certificates for the top scoring Novice in each state or province and for top scoring equivalents in other countries will also be awarded.

How: Just fire up on your favorite *vhf* band and exchange contest information with as many stations in as many different (a) Counties in the U.S. and Canada, (b) Provinces, states or other similar political subdivisions in countries other than the US and Canada. Contacts must be made on the band for which the log is submitted.

Separate entries may be made for more than one band but the score for each band must consist of contacts made on that band only.

Crossband contacts are permissible for extra contact points but sections must be worked on the band the transmitter is on and for which the log is submitted.

Only one contact per station is allowed, whether it be crossband or direct.

Scoring: For each complete exchange of information consisting of message number, county (or political subdivision) and state (or country), and handle, two points are accrued.

The total number of contact points is then multiplied by the total number of different counties (or political subdivisions in foreign countries).

[*Continued on page 106*]



A good six meter man from South Carolina is LeRoy Lawhorn (W4VIW).



Veteran contest winner, George Gadbois (W3 FEY) at two meter operating position.

PROPAGATION

by GEORGE JACOBS, W3ASK
607 Beacon Road, Silver Spring, Md.

March Highlights

The *spring equinoctial* period occurs during late March and early April. A similar period, the fall equinoctial, occurs during late September. During these periods the sun crosses the equator on its apparent travels in the sky. During the equinoctial periods, day and night are of almost equal duration everywhere. Significant shortwave propagation variations generally observed during March and early April are closely related to this celestial phenomenon.

In the northern hemisphere, daytime maximum usable frequencies will be considerably lower during the spring and summer months than were observed during the winter months. East-west DX openings are not likely to occur on 6 meters, and on some days the MUF's on long east-west paths (from the USA to Europe for example) may not even exceed 28 megacycles. On the other hand, with the increasing hours of daylight, both the 15 and 20 meter bands can be expected to remain open for a greater number of hours as summer nears.

Ionospheric absorption, and atmospheric noise (static) increase steadily during March and the spring and summer months, resulting in somewhat poorer propagation conditions on 40, 80 and 160 meters.

The spring equinox in the northern hemisphere actually marks the beginning of fall in the southern hemisphere. During this period relatively similar propagation conditions exist in both hemispheres (as compared to the extreme conditions that exist when it is summer in one hemisphere and winter in the other). Consequently, propagation conditions between both hemispheres *are at their best* during the equinoctial periods. Openings should be at their best a few hours each side of the sunrise and sunset periods (in the United States). Many good openings are forecast for all bands between 10 and 40 meters, and some openings should also be possible on 6, 80 and even 160 meters!

Band Conditions

6 Meters

Few, if any, east-west DX openings are expected until next fall. Some long f-2 north-south openings are likely to occur from most areas of the USA to South America, Australiasia, and perhaps South Africa. There is a good possibility that transequatorial scatter will increase during the equinoctial period, resulting in several early evening openings to South America. Several auroral type short-skip openings are expected to occur during March and early April. Meteor-type openings are most likely to occur on March 10-12 and March 20th, when minor meteor showers are expected.

10 Meters

Good world-wide DX conditions are forecast to continue on 10 meters from shortly after dawn until late afternoon, and into the early evening on most days of the month. Good f-2 short-skip openings are expected during the daylight hours, as well as several auroral and possibly meteor-type openings as forecast for 6 meters.

15 Meters

Excellent propagation conditions are forecast for this band from early morning through the early evening hours, and continuing past midnight to some areas of the world.



The great aurora of July 9/10, 1958 as photographed by volunteer Cornell Project auroral observer A. W. Starkweather, Brownsville, N. Y.

Last Minute Forecast

Radio storms are forecast for March 6-8 and 20-22. These storms are very likely to be accompanied by wide spread auroral displays. The remainder of the month is expected to be seasonably normal.

20 Meters

World-wide reception should be best during the late afternoon, evening, and early morning hours. The band will remain open during the hours of darkness more frequently than during the winter months. Asiatic reception is expected to peak on this band an hour or two each side of local sunrise.

MARCH, 1959

All Times in C. S. T. (cont'd)

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
South America	9A-1P (2)* 4P-10P (1)* 5A-2P (3) 2P-6P (4) 6P-10P (3) 10P-12M (2)	5A-9A (3) 9A-2P (2) 2P-4P (3) 4P-10P (4) 10P-1A (3) 1A-5A (2)	12M-8A (3) 8A-2P (2) 2P-5P (3) 5P-12M (4)	7P-10P (2) 10P-4A (3) 4A-7A (2) 8P-3A (2)**
Japan & Far East	2P-4P (2) 4P-7P (3) 7P-9P (2)	7A-11A (2) 11A-1P (1) 1P-4P (2) 4P-9P (3) 9P-12M (2)	6A-10A (3) 10A-1P (2) 1P-9P (1) 9P-1A (2) 1A-6A (1)	12M-7A (1)
Central & South Asia	8A-11A (2) 11A-2P (1) 2P-4P (2) 4P-6P (3) 6P-9P (1)	7A-12N (2) 12N-3P (1) 3P-9P (3) 9P-12M (1)	3P-10P (2) 10P-5A (1) 5A-8A (2)	8P-10P (1) 5A-7A (1)
Hawaii	2P-5P (2)* 9A-11A (2) 11A-8P (4) 8P-10P (3) 10P-12M (2)	9A-3P (3) 3P-11P (4) 11P-3A (3) 3A-5A (2)	9A-3P (2) 3P-6P (3) 6P-4A (4) 4A-9A (3)	8P-10P (2) 10P-6A (4) 6A-8A (2) 11P-6A (3)**
Australasia	4P-7P (1)* 8A-11A (3) 11A-4P (2) 4P-8P (4) 8P-10P (2)	7A-9A (3) 9A-3P (2) 3P-7P (3) 7P-11P (4) 11P-3A (2)	5P-8P (1) 8P-12M (2) 12M-8A (4) 8A-11A (2) 11A-5P (1)	1A-8A (3) 2A-7A (2)**
Antarctica	12N-2P (1) 2P-8P (3) 8P-11P (2)	10A-6P (2) 6P-12M (3) 12M-10A (1)	3P-6P (1) 6P-9P (2) 9P-4A (3) 4A-9A (2)	12M-7A (2) 1A-6A (1)**

All Times in P. S. T.

WESTERN USA TO:

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

MONTH: March, 1959

All Times In E. S. T.

EASTERN USA TO:

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

All Times In C. S. T.

CENTRAL USA TO:

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

All Times in P. S. T. (cont'd)

WESTERN USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Malaya & South Asia	8A-12N (3) 12N-2P (1) 2P-7P (2) 7P-9P (3) 9P-11P (1)	7A-1P (3) 1P-4P (2) 4P-9P (1) 9P-2A (2)	12M-3A (1) 3A-6A (2) 6A-8A (3) 8A-11A (2)	4A-7A (1)
Hong Kong, Macao, & Formosa	3P-6P (1)* 12N-8P (3) 8P-10P (2)	7A-9A (3) 9A-7P (2) 7P-12M (3) 12M-4A (2)	12M-4A (4) 4A-9A (3) 9A-11A (2) 11A-7P (1) 7P-12M (3)	3A-6A (2) 4A-6A (1)

CQ PROPAGATION CHART (SHORT-SKIP)

BAND(METERS)	DISTANCE (MILES)			
	50-250	250-750	750-1300	1300-2400
10	-	-	9A-12N (1-3) 12N-3P (2-4) 3P-8P (1-3)	12N-4P (1)* 7A-10A (2) 10A-5P (4) 5P-9P (2-3)
15	-	11A-4P (0-2)	7A-10A (2-3) 10A-4P (4-5) 4P-9P (2-3)	7A-1P (3) 1P-8P (4) 8P-11P (2-3) 11P-1A (1-2)
20	9A-11A (1-2) 11A-3P (2-3) 3P-5P (1-2)	7A-10A (1-3) 10A-4P (4) 4P-8P (2-3) 8P-10P (0-1)	5A-7A (2-3) 7A-4P (4) 4P-8P (5) 8P-3A (2-3)	4P-11P (5) 11P-1A (3-4) 1A-7A (2-3) 7A-9A (4) 9A-4P (3-2)
40	2A-6A (1-2) 6A-8A (3) 8A-10P (5) 10P-2A (2-3)	6A-10A (5-3) 10A-4P (3-2) 4P-12M (5-4) 12M-6A (2-3)	6P-8P (4-3) 8P-6A (5) 6A-9A (4-3) 9A-4P (2-1) 4P-6P (3-2)	3P-7P (2-1) 7P-6A (4-3) 6A-9A (2)
80	8A-11P (4-3) 11P-4P (3-2) 4P-7P (4-3) 7P-8A (5)	8A-5P (2-1) 5P-7P (3-2) 7P-5A (5) 5A-8A (4-3)	6P-8P (2-1) 8P-6A (4) 6A-8A (2-1)	5P-8P (2-1) 8P-4A (4-3) 4A-8A (2)
160	5P-7P (2) 7P-7A (5) 7A-9A (2)	6P-8P (2) 8P-5A (5-4) 5A-7A (4-2)	6P-8P (2-1) 8P-4A (3) 4A-6A (2)	9P-5A (2-1)

SYMBOLS FOR NUMBER OF DAYS CIRCUIT FORECAST TO OPEN:

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

The CQ DX Propagation Charts are based upon a CW radiated power of 150 watts at radiation angles less than thirty degrees. They are centered on the Eastern, Central and Western areas of the USA. The DX forecasts are valid through April 15, 1959. The CQ Short-Skip Propagation Chart is based upon a radiated CW power of 75 watts, using a dipole antenna a half-wave length above the ground. This Chart is valid through April 30, 1959. All forecasts are based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau Of Standards, Boulder, Colorado.

* Indicates time of possible six-meter openings.
**Indicates time of possible eighty-meter openings.

40 Meters

Good daytime short-skip conditions are forecast for 40 meters, with the skip ranging from a few miles at noon to several hundred miles. The band will open for DX later in the day than during the winter months, with long-distance propagation conditions fairly good to many areas of the world from shortly after sundown until sunrise.

80 Meters

Daytime skip is not likely to exceed 300 miles during March and early April. As the hours of darkness approach the skip will lengthen considerably. On some nights DX openings to several areas of the world should be possible, although signals are expected to be weak, and noise levels relatively high.

160 Meters

Fairly good propagation conditions are forecast during the hours of darkness for distances up to about 1300 miles. Some openings over greater distances should be possible on a few nights during the month, especially just before sunrise.

Sunspot Cycle

The sunspot cycle continues its slow decline from peak intensity. The Swiss Federal Solar Observatory reports a monthly average sunspot number of 185 for December, 1958. This results in a *smoothed sunspot number* of 184 centered on June, 1958. This month's *CQ* propagation forecasts are based on a predicted smoothed sunspot number of 155 centered on March, 1959.

Aurora Research

The aurora, while one of nature's most beautiful and spectacular phenomenon (see fig. 1), plays havoc with shortwave radio communication. Acting like an electronic curtain, auroral displays prevent the propagation of high frequency radio waves to many parts of the world. Radio circuits that pass near to, or over, the polar regions are particularly affected. On the other hand, this same aurora which causes blackouts in the high frequency range, is responsible for unusual propagation in the *vhf* range. Quite often *vhf* circuits limited to more or less line of sight range suddenly can be heard several hundred, and at times more than a thousand miles away, because of the unusual ionization associated with auroral displays.

As part of the International Geophysical Year (which ended December 31, 1958), Cornell University undertook a widespread visual study of the aurora. From volunteer observers in the United States (many of whom are radio amateurs), much valuable information was collected during the 18 months of the IGY which has led to a better understanding of where auroras occur, the frequency of occurrence, and the relationship between the aurora and geomagnetic and radio propagation conditions. Because of the great number of auroras expected during 1959 (auroras occur more often during the years immediately following the peak of the solar cycle), this research program will continue during the IGC (International Geophysical Cooperation Year—1959). Dr. C. W. Gartlein, who directs this project, has again asked for more volunteer observers. Participants in this project must be able to devote the time necessary for scanning the northern sky. Radio amateurs are particularly asked to volunteer since many times they are aware of auroral activity from radio signal behavior. Observers are especially needed from the northern and central states west of the Mississippi, and from New England and the state of Alaska. Observ-

[*Continued on page 109*]

CONTEST CALENDAR

by Frank Anzalone, W1WY
14 Sherwood Road, Stamford, Conn.

Feb.	28-Mar. 1	YL/OM Phone
Feb.	28-Mar. 1	R E F CW
March	6-8	ARRL DX Phone
March	13-15	QCWA QSO Party
March	14-15	YL/OM CW
March	20-22	ARRL DX CW
April	11-12	R E F Phone
April	18-19	CQ WW SSB



They start 'em young over in Roumania too. That's George Pataky, chief operator of YO2KAC with a class of embryo hams.



David Delson, K4UIV, age 11, claims to be the youngest operator on our 1958 World Wide DX contest.

YL/OM

Phone

Starts: Saturday, February 28th at 1:00 PM EST.
Ends: Sunday, March 1st at 12:00 Midnight.

CW

Starts: Saturday, March 14th at 1:00 PM.
Ends: Sunday, March 15th at 12:00 Midnight.

The 10th annual YL/OM contest was fully covered in Louisa's YL column in last month's CQ, so no need of going into more details. However it would seem to me that a closer coordination with other organizations would result in a better selection of dates. Maybe the gals want to be alone.

R E F

CW

Starts: Saturday, February 28th at 1400 GMT.
Ends: Sunday, March 1st at 2200 GMT.

Phone

Starts: Saturday, April 11th at 1400 GMT.
Ends: Sunday, April 12th at 2200 GMT.

Rules for the REF contest have always been a bit confusing to use but a direct translation from Radio REF by our good friend Bernard Malandrain, F9MH, came up with the following:

1. Calls will be transmitted as follows:
   CQ Test de F9RS/21. 21 being the Cote d'or Department.
   CQ Test de FA9XX/OR. Algeria has three districts, AL, OR and CO. (Algiers, Oran and Constantine.)
   CQ Test de FQ8YY/MC. Middle Congo.
   CQ Test de W1WY. No suffix necessary.
2. Serial numbers will consist of the usual RS or RST report plus a progressive three digit number starting with 001.
3. East QSO counts one point.
4. Refer to chart below for your multiplier.

Europe and FA, CN, 3V.	10 pts.
Africa (less FA, CN, 3V)	
No. and So. America	10 pts.
Asia and Oceania	20 pts.

[*Continued on page 108*]

YL

by LOUISA B. SANDO, W5RZJ
212 Sombrio Drive, Santa Fe, N. M.

10th Annual YL-OM Contest

Remember the dates: Phone—Feb. 28, Mar. 1; CW—Mar. 14-15. Check Feb. CQ for rules.

9th Mid-west YL Convention

W9RUJ, Mary, chairman of the 9th Mid-west YL Convention has announced that this meeting will be held at the Polly Valley Motel on Hy. 16, 18, 30 at Milwaukee, Wis. on May 22-24. There will be an interesting tour, YL luncheon, and a banquet at which the OMs are welcome. Registration is $2, and please get reservations to Mary by May 10.

Corcoran Award

YLRL has received from W8TPZ, Marie Corcoran, and her OM, donors of an earlier Corcoran Cup, a handsome copper plaque which will be an added incentive to YLRL members in future Anniversary Parties. The plaque is designed in relief, the YL seated on the globe as the central idea with YLRL above and across the bottom four panels for the names and calls of YLRL members who win the award. The legend "Corcoran Contest Honor Award" is between the globe and the name panels. The award will be made to the YLRL member making the highest *combined score* in the phone and cw sections of future A.P.'s. If any member wins possession of the plaque three times she will retain it permanently.

DX-YL Award

W4BLR, Kay, has supplied this list of all the YLs who achieved the DX-YL award in 1958. The figure in parentheses indicates the number of stickers earned so far (these are given for each 10 additional confirmed DX YL contacts).

ZE1JE	K6EXQ	W4KYI
CR7LU	KH6BTX (2)	W8HWX
W5DRI (1)	OE2YL (1)	KP4APX (3)
W4VCB/3 (2)	VP1OLY	G8LY
G2YL	W3GEN	W4SGD
W5JCY (1)	K2JYZ	W6GGX
OH5SM	KA2HA (3)	ZS5OB (2)
KH6AUJ		

Maxine Willis, W6UHA is now custodian of the DX-YL award. After becoming a state, Alaska will not be considered DX for US girls. QSOs made before that date will still count for this award.

With the Clubs

Crowded out of recent issues, we now bring you news of the YL clubs.

At their fall meeting in Oct. HAWK of Indiana elected these officers: Pres., W9RTH, Ada; V.P., K9IXD, Doris; secy, K9ILK, Fran; treas., W9LYU, Betty. The HAWK certificate, for working 10 members of the club, is now available. Contacts on or after Jan. 1, 1958, on any band, are valid. Send list showing date, band, call and name (no QSLs) to certificate custodian, W9RTH, Adah Elliott. Other members to look for: W9's AQB, JYO, IMT, LYU, OAU, PEX, PFO, RTH, RUJ, YWH; K9's CIH, CZQ, EUQ, GPG, ILK, KKG, IVG, PPP, JJC; KN9's MAL, MPN, MWC; KØATT; W7's GXI, NJS, DVH, ZUJ.

The HAWKs were very sorry to lose member K9BZU, Lulu Perrine, who joined the Silent Keys on Dec. 19. Lulu became licensed in 1955 at the age of 73 and since then had been active on 40 meters . . . HAWK's Eye View editor and club V.P., K9IXD, has received a 50 *mc.* Century Club certificate from CQ; "Butch" also made BPL in December.

At their fall get-together Nov. 1, members of WRONE chose these YLs to serve on their

[*Continued on page 109*]

ROTATING POWER

BRAKING POWER

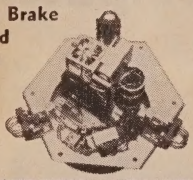
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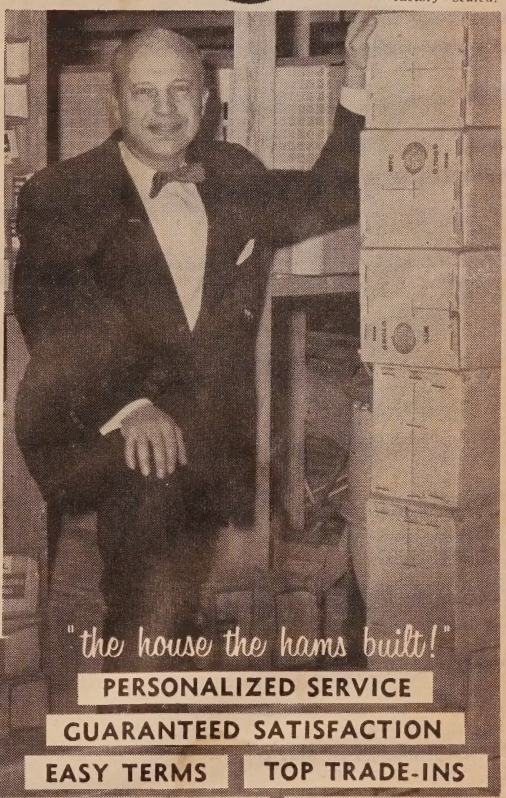
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PPS: Lucky NYC types can add 3% for you know who.

DX *[from page 58]*

others. So, if you're lucky enough to have zone 23 sewed up (I've been waiting one year for JT1AA to send my card to complete my fone WAZ) check this list and go to work. Good luck.

CERTIFICATES — The following new certificates have been announced.

"Worked all Kwajalein Island" for working (5) KX6 stations on Kwajalein in the Marshall Islands after 1st of July, 1958. Send QSO information (QSL's not required as logs will be checked) to: The Secretary, Kwajalein Amateur Radio Club, c/o KX6AF, Box 11, Navy 824, Fleet Post Office, San Francisco, California. (Tnx KX6CM)

"Worked all Netherlands Antilles Award" for working 17 PJ's with at least ten from Aruba (PJ2A) five from Curacao (PJ2C) one from Bonaire (PJ2B) and one from the Windward Islands (PJ2M). All QSO must be after 1st of January, 1959. Send confirmations to President, John Hassill, PJ2AZ, 20 Verrielstraat, San Nicolas, Aruba, Netherlands, Antilles. (Tnx PJ2AZ)

DC-25—(Double Call 25) for working 25 double or triple call sign stations (JA1AA, FB8ZZ, K2AAA, etc.) containing four or more JA's. Either phone or CW may be used and all QSOs must be after 30th of July, 1952. Send QSL's a check list and 10 IRC's to DCC (Double Call Club) JA1CC Akira Asano, 257 Eifuku, Suginami, Tokyo, Japan. Cards will be returned by registered mail. (Tnx K6DLV)

LAST MINUTE ITEMS—YK1AT is back on 14305, 0800 GMT—FB8CD is returning to Comoros in February — DL4UX is now K6CKD—XZ2AD now has KWM-1—VKL9E Cocos leaves for VK land in February—W6RLP will be operating 5 at White Sands, N. M. for one year—New officers of the NJDXA are Yours Truly, Pres., W2GUM, VP., K2GMO, Sec'y., and W2KUW, Treas.—Bob, W3GHD, visited our club recently and had us drooling with a VU7AF Nepal QSL—FK8AS plans another invasion of FW8 in the near future—Windy, W8GZ, has been appointed Ohio State Adjutant General—Danny has been working some of the boys on 80 meters at 0100 GMT Saturdays on 3510—ZD1GM has been active on 14050—Crete now boasts two active stations, SVØWN and SVØWT—LA2JE/P Svalbard ranks have been swelled by LA4CG/P and SM5WN/LA/P—XW8AH is now QRT—KX6BT is Frankfort's W3CHH. KV4AA reports 9V4AA in Nepal on 7.005 *mc!!*—VKØCC, 14080, is new on Macquarie. Sorry no WPX or WAZ listings this month but have not received the records yet. Will try and have both listings next month.

73 es DX, W2DEC

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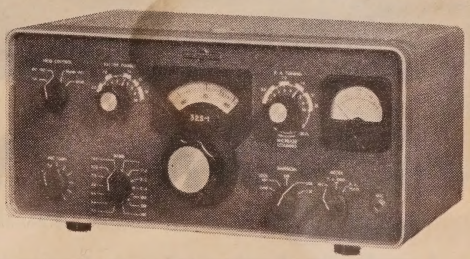
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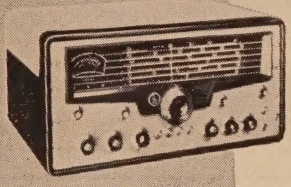
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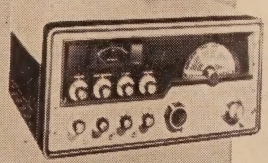
HALLICRAFTERS SX-101 mark IIIA Receiver



This receiver is setting new standards for dependability and ruggedness throughout the amateur world. Provides full frequency coverage of five ham bands plus a 2 and 6 meter converter band — 80, 40, 20, 15, 10 meters. Every technical advantage and feature needed for years to come.

$395.00

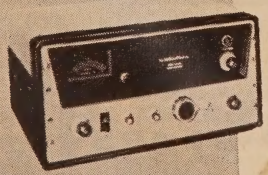
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Completely engineered with extra-heavy duty components, the HT-33A is conservatively rated at the maximum legal limit. It guarantees you one of the big signals on the band and effortless performance. Complete efficient coverage of amateur bands: 80, 40, 20, 15, 10 meters. Third and fifth order distortion products down in excess of 30 db. Built-in rf output meter simplifies tune-up.

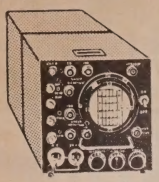
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For further information, check number 24 on page 126.



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Originally used for IFF and Radar Navigation. Can be easily converted for general bench service work. Tubes included: 2-6SN7, 2-6H6, 1-6X5, 1-6G6, 1-2X2 and 3BP1 Cathode Ray Tube. A TERRIFIC BUY at our low price! **$12.95**

Excellent used ....

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Conversion instructions for AC operation 65

BC-603 FM RECEIVER.

10-channel push button tuning or continuous tuning, 20-28 Mc. Complete with speaker tubes, squelch. **$14.95**

BRAND NEW .....

12 or 24 V Dynamotor for above. Excellent. Used $4.25. BRAND NEW..... **$5.50**

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for BC603, 683. Interchangeable, replaces dynamotor. No revr change needed. On-off switch on power supply. Provides 220V DC @ 80 Ma, 24 V AC @ 2 Amps. **$8.45**

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BRAND NEW, including all tubes, together with 5BP1 Scope Tube. Originally used in Navy Aircraft RADAR equipment. Easily converted for AC operation.

VALUE $250.00!

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SCR-274 COMMAND EQUIPMENT

ALL COMPLETE WITH TUBES

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BC-454	Receiver 3-6 Mc	9.95	12.95
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110 VOLT AC POWER SUPPLY KIT

For All 274-N and ARC-5 Receivers **$7.95**

Complete with metal case, instructions.....

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BC-451 Transmitter Control Box ..... 1.25 NEW 1.49

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Wonderful Value! Consists of ¾ amp 2" RF Ammeter (antenna current indicator). 0-10 scale. Transmitter-Receiver Switching relay, in aluminum case with associated components. BRAND NEW..... **$2.49**



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1—2V. 20 Amp. Hr. Willard Storage Battery....$2.79

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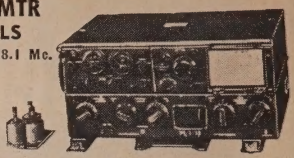
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11 CHANNELS

200-1500 Kc. — 2 to 18.1 Mc.



OUR PRICE

$48.50

Complete With Tubes

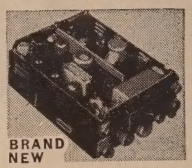
Navy Model Collins Autotune Aircraft Transmitter—one of the very finest! Original cost $1800. Up to 90 watts output on CW, MCW or Voice. Easily preset frequencies. Simple operation. Subassembly construction for quick repair. This is a sensational smash value at our low price. Exc. used. Limited Quantity.

Antenna Cond. for above..... $1.95

0-16 Low Freq. Coil for ART-13..... $ 7.95

24V Dynamotor for ART-13 ..... $11.95

BC-645 XMTR RECEIVER



BRAND NEW

15 Tubes 435 To 500 MC

Can be modified for 2-way communication, voice or code, on ham band 420-450 mc. citizens radio 460-470 mc. fixed and mobile 450-460 mc. television experimental 470-500 mc. 15 tubes (tubes alone worth more than sale price!): 4—7F7, 4—7H7, 2—7E6, 2—6F6, 2—955 and 1—WE316A. Now covers 460 to 490 mc. Brand new BC-645 with tubes, less power supply in factory carton.

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Complete set of 10 Plugs for BC-645..... **$5.50**

CONTROL BOX for above $2.25

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CONVERSION BOOKLET. Instructions for most useful surplus rigs..... **$2.50**

BC-906 FREQ. METER-SPECIAL

Cavity type, 145 to 235 Mc. BRAND NEW, complete with antenna. Manual incl.



OUR LOW PRICE..... $9.99

AN/APA-38 PANORAMIC ADAPTER

And Wave Analyzer. 30 MC Center Frequency, 2MC Band Width. Total scan 10 Mc at one clip. Regular saw-tooth sweep. Variable sweep freq. control 1600 cycles. Use it as regular service scope! Including 11 tubes and 3" scope tube type 3DP1, **BRAND NEW**..... **$19.50**

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Model AN-PR6N is for 14V DC operation.

These receivers are supplied complete with built-in dynamotor, 11 tubes. Weston output meter on front panel, as well as coax antenna and output connection, phono jack, on-off switch.

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For further information, check number 64 on page 126.

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SAYS LEO I. MEYERSON, WØGFQ



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You pay only ten percent down, and up to 18 months to pay. Financing our own paper offers greater savings while you're operating your rig.

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25 hams here at World Radio are at your service. We do business on a personalized basis . . . not with a list of names in a ledger.

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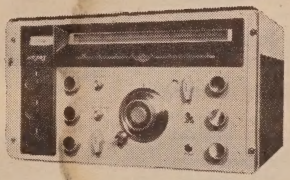
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National NC-303



$44.90 down

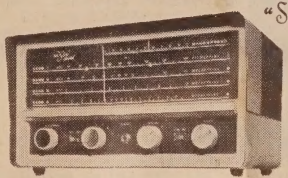
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or $449 Amateur Net

Here's the time proven features of the fine NC-300 plus the following features. Front panel selector provides instant sideband choice. Retuning or detuning eliminated. "Q" Multiplier. 5-position IF selector (.5kc, SSB-1, SSB-2, 4kc, 8kc). Separate ANL for AM. Separate manually adjusted limiter for CW, DSB and SSB. WWV converter position. Hi-speed 40-1 ratio tuning dial. Fine tuning vernier dial on CW, SSB and DSB. Antenna trimmer. 15 tubes. Sensitivity: 1.5mv. Image rejection 50-80db. Black & grey enamel finish. Shp. wt.: 64 lbs.

and the first, all new, low-priced shortwave receiver

National NC-60 "Special"



$6.00 down

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The NC-60 Special Receiver offers continuous coverage of AM broadcast, Amateur and world-wide shortwave bands. Full electrical bandspread. General coverage 540kc to 31mc in 4 bands. Bandspread knob can be used as vernier on all frequencies. 5 tubes. Built-in speaker. Two-tone grey and black enamel. Shp. wt.: 15 lbs.

We stock the complete National Line: Send for full information today . . . to "the World's Largest Distributor of Amateur Radio Equipment!"

Dear Leo: Please send your free 1959 Catalog, information on the National line, and quote your best trade offer on my present c/2

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You'll want to own this brand new

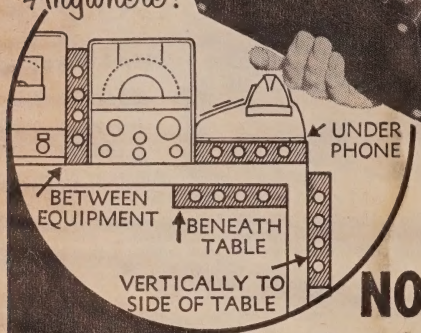


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Size:
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5 3/8 x 1 5/8 x 9

Cost:
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Phone-Patch for Fun with these Exclusive Features

- ★ Extremely easy to install and operate; switchtable selection of 500-8 or 3.2 ohm speaker terminal connection. No additional or external transformer necessary.
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- ★ Separate gain controls for receiver and transmitter permit proper adjustment and balance.
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- ★ Steel cabinet of "book shelf" design needs only minimum space. All necessary connectors supplied for either SB or AM.

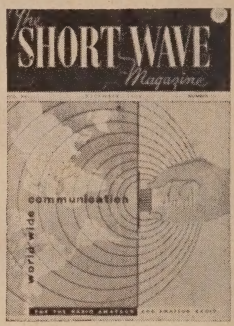
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OVERSEAS ECHOES

Thomas K. Aalund, K2VBI
Box 13
Roslyn, L. I., N. Y.



First of all we wish to correct an error. The *ECC84* tube referred to in last month's column *does* have an American equivalent. The equivalent tube is the 6CW7. In addition to this the ECC84 tube should be available through Philips in Toronto or Amperex in this country.

Last month we started with the idea of highlighting certain magazines each month and this time we are introducing you to *The Short Wave Magazine*. One could almost compare this magazine to our *CQ* in as much as it is not connected with any specific club. The managing editor is G6FO and their address is 55 Victoria Street, London, S.W. 1. The US subscription rate is $5.00. This latter item we mention in as much as we frequently receive inquiries concerning same.

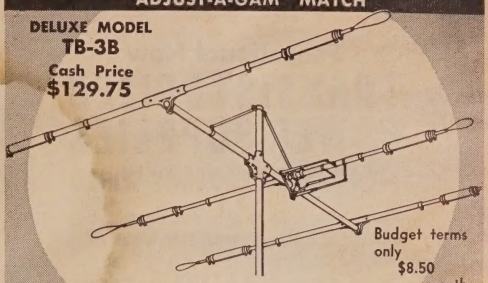
Their December issue runs a Christmas message in place of the usual editorial by G6FO. Very interesting articles are the standard for them and one almost comes to take them for granted. G2TA describes a very simple and efficient standing wave indicator; useful if you are running 300 Ω line. This is followed by an article entitled "NBFM Applied to the Geloso VFO," by G3KQH. While Geloso equipment may not be known too well in this country, all Geloso items enjoy great popularity and the most popular items are their *vfo* units, of which there are several. It is therefore quite normal to see suggestions for modifications or additions to that line of equipment. The DX-pedition to Zanzibar under the call VQ1PBD is described by VQ3PBD of Dar-es-Salaam (same man). He also mentions that two further expeditions to Zanzibar are planned by different parties. "Getting the Best Out of an El-Bug," by G3IEF, is another interesting article. Methods

for varying the range of the speed control are mentioned and one nice feature of the article certainly is worth mentioning here: The bug circuit contains a meter, with calibrated marks for dots and dashes, as well as a calibration reference mark. G3IEF says in part that you can ". . . always check your dot/dash ratio . . . it is most valuable for the initial setting up of the key, since if your dots and dashes coincide with the marks after having calibrated the meter first, then you have theoretically perfect Morse." "Key-Controlled Break-In" is the next article, by G2NS. He discusses a completely silent, full break-in arrangement requiring only a modified key, a capacitor, and a couple of resistors. Most types of keys can be modified for the purpose, and all pertinent details and sketches are given in the article which runs five pages.

While the above rounds out the articles in the December issue of The Short Wave Magazine, this only constitutes one third of the pages! The DX Commentary, conducted by G6QB, follows next and takes up over six pages. It being a British magazine and most of the Empire being DX regardless what part you live in this is only natural. In the DX column there is also a picture of KR6HP and his station, in the Pacific. In civilian life he is K2LEQ of White Plains, N.Y. As mentioned at an earlier date, the "SSB Topics" editor is Jim, *DL4SV/W9NTV*. In five pages he covers such topics as "improving Carrier Suppression, Monitoring Carrier Level, Circuit for Vox," just to mention a few at random. A two-page write-up of the Radio Hobbies Exhibition of London contains interesting notes on new equipment and also mentions the price of the Racal R.A. 17. At £400 it certainly is in a class of its own in more ways than one. We noted with interest that the Heath line was also shown, "and their stand was the focus of continuous interest," quoting the article. "VHF Bands," by A. J. Devon, fills another four pages and makes one jealous. The European countries being close together are easier to catch (if you are there). G5YV has 18 countries on two meters, ON4BZ has 17, and four British stations have worked 16 countries each. And so it goes down the line. We collect states here, and it is not much easier at times, but collecting countries sounds so much more exotic. "VHF Propagation by Meteoric Ionization" is written by G3HQI, and he has been connected with the subject on a professional level. The balance of the magazine is rounded out by such items as new QTH's, "The Other Man's Station" (this month it is G2BCX), and "The Month with the Clubs." The latter is a very interesting combination of what corresponds to our "Club Bulletins" and local happenings of the various amateur radio clubs in Great Britain. There are also ads of items for sale and surplus ads. Of the latter one caught our attention and we have at present on order

DESIGNED FOR THE AMATEUR WHO DEMANDS THE FINEST . . . DELUXE MODEL TB-3B WITH ADJUST-A-GAM* MATCH

DELUXE MODEL TB-3B
Cash Price $129.75

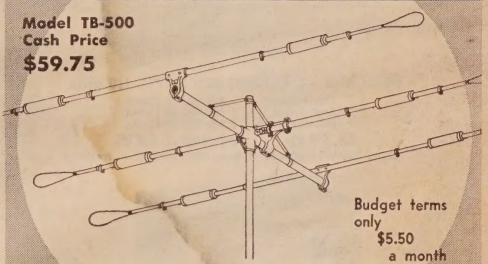


Budget terms only $8.50 a month

3 Bands—10—15—20. 52 ohm coax fed. Perfect unity SWR Gain: 8 db Average. F/B: 25 db avg. Streamlined, Extra-heavy duty Cast Aluminum Fittings used throughout. Write for complete specifications.

THE NEW, THE IMPROVED, THE NOW "BETTER-THAN-EVER" MODEL TB-500 FOR '59

Model TB-500
Cash Price $59.75



Budget terms only $5.50 a month

3 Bands—10—15—20 52 ohm coax fed. Wt.: 35 lbs. Turning radius: 14' 11". Handles 500 W. Elements: 6061-T6 Aluminum tubing.

Cast Aluminum Fittings used throughout. Pretuned and easy to install. Heavy-duty Electro-zinc plated steel boom. Uses Hornet's exclusive weather-sealed trap design*.

Resonance	Forward Gain	SWR at resonance	Front to back
10m—28.750	10m—8.2 db	10m—1.01	10m)
15m—21.350	15m—7.5 db	15m—Unity	15m) 15-18 db
20m—14.250	20m—7.0 db	20m—1.1	20m)

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TRY THE TB-500 BEFORE YOU BUY IT—

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Please rush the new Model TB-500 HORNET TRIBANDER for a 10-day free trial period. If fully satisfied, I agree to pay $5.50 within ten days and $5.50 per month for 11 months.

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WRITE FOR FREE ILLUSTRATED CATALOG

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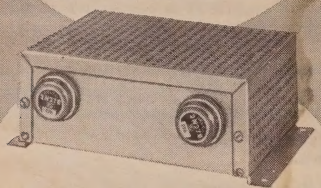
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Sensational New

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KIT FORM OR FACTORY-WIRED

Choose from a line-up of models supplying from 16¼ to 120 Watts **continuous duty output.** All units are designed for **12-14** VDC **BUT** can be changed in moments to **6-7** VDC* by substituting two resistors which are supplied with each unit. Complete with mounting brackets.

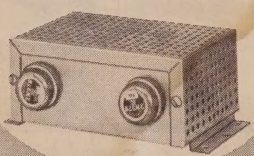


MODEL H600 — CONTINUOUS DUTY OUTPUT: 120 Watts

Single Output 600 VDC @ 200MA
Dual Output { 600 VDC @ 100MA
(Simultaneous) { 300 VDC @ 200MA

Kit, $59.95 **Factory-wired, $68.95**

Size: 2-5/16" High x 5" Wide x 6⅞" Long (Over Brackets)



MODEL H-250 — CONTINUOUS DUTY OUTPUT: 16¼ Watts

Single Output 250VDC @ 65 MA
Dual Output { 250VDC @ 32½MA
(Simultaneous) { 125VDC @ 65 MA

Kit, $33.95 **Factory-wired, $39.95**

MODEL H311 — CONTINUOUS DUTY OUTPUT: 30 Watts

Single Output 300VDC @ 100MA
Dual Output { 300VDC @ 50MA
(Simultaneous) { 150VDC @ 100MA

Kit, $42.95 **Factory-wired, $49.95**

MODEL H325 — CONTINUOUS DUTY OUTPUT: 48¾ Watts

Single Output 325 VDC @ 150MA
Dual Output { 325 VDC @ 75MA
(Simultaneous) { 162½ VDC @ 150MA

Kit, $47.95 **Factory-wired, $55.95**

MODEL H375 — CONTINUOUS DUTY OUTPUT: 75 Watts

Single Output 375 VDC @ 200MA
Dual Output { 375 VDC @ 100MA
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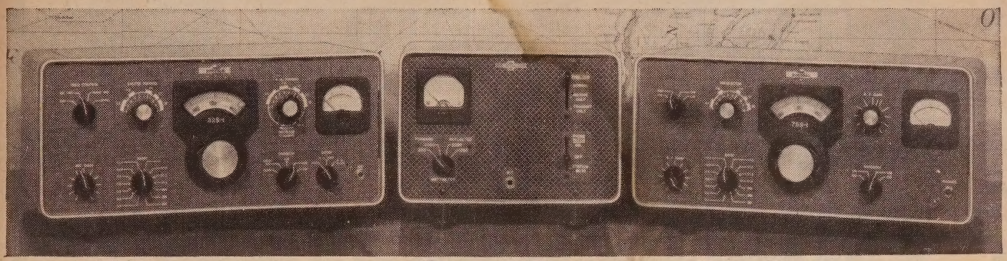
For further information, check number 28 on page 126.

an "RF Unit, Type 26." It has slow motion tuning from 50 to 65 *mc* and includes three tubes. Price, complete with schematic, is less than £2.

Other Publications this Month: Several of our other contemporaries have magnificent articles in recent issues and it is frequently hard to pick out the items which are of the greatest interest. We received a copy (the first one in many a moon) of *Raadioamatoori,* the club magazine of the Finnish hams. In a very interesting article they have collected the better pieces of information on antenna design from various other magazines as well as designs of their own. It is amazing how difficult a language appears if you have not had contact with it for years. . . . After a lapse of two issues which were not published *The Malayan Radio Amateur* is back again and contains a 100 watt modulator by VS2UW, also a SSB phasing transmitter by G2HQ among other articles. We also noted with pleasure that they devoted four pages to the rules for the 1958 CQ World Wide DX Contest. The December issue of *Das DL-QTC,* DL, carries a few gems, just to mention a few: Details of the two-meter SSB transmitter of DL4WW, by DL3FM; an article on transmission line applications and impedance calculation, and an article on parametric amplifiers by DL3FM. The November issue of *REF,* F, reached us too late to be covered last month, but as is frequently the case, it contained some nice items. An article which covers twelve pages is the tenth one in a series on antenna design problems by ex-CN8MH. This series of artices deserves the attention of all French-speaking hams. The December issue contains an article of the same quality, by F9ND and covering the reception of NBFM in theory and practice. Another article describes the stations currently operating in the Arctic and Antarctic. It is written by F3NB who has made it his hobby to maintain contact with all possible polar expeditions. This he has done for years. The December issue of *OEM,* OE, devotes a full page to our editor's visit to Europe in general and his meeting with Frank, OE1FF in particular. *Amatirski Radio,* OK, in their November issue carries a design article for a twelve-tube (plus power supply) two-meter receiver by OK2EC. All circuit details, coil data, as well as chassis lay-out are given. Judging by the amount of *uhf* work being done in that part of Europe this should be a very hot design. The prototype of this receiver must have had something to do with the first place OK2KBR gained in the two meter section of the 1957 Polni Den contest. We also received a copy of *Electron,* PA, published by VERON. One of the articles contains design ideas, principles, and two practical circuits for transmitters on the 70 *cm* band. An operating radius of 100-130 miles is claimed. The material for this

[*Continued on page 112*]

KEN-ELS RADIO SUPPLY FOR THE FINEST

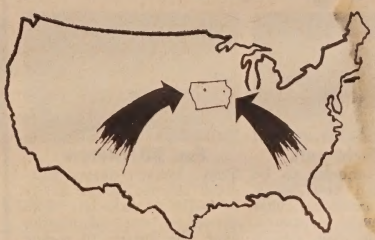


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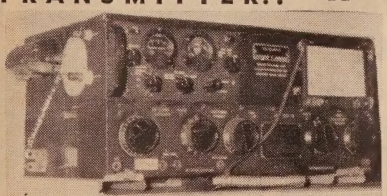
428 Central Ave., Fort Dodge, Iowa
Phone: 5-2451

KØABO—Rog **Cedar Rapids**

67 16th Ave., S. W., Cedar Rapids, Iowa
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For further information, check number 29 on page 126.

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2 to 18.1 MC—100 WATT—PHONE—CW—MCW—The most desired Set on the surplus market—Easily converted to 10 Meters (See Surplus Conversion Manual No. 2: $2.50). Automatic Tuning for selection of 11 Channels in the Freq. Range. Tube Line-Up: 1/837, 1/813, 2/1625, 1/12SJ7, 2/6V6, 2/811, 2/12SL7, 1/12SA7, AC Power Supply requirements: 28 VDC/10 A, 400 VDC/225 MA & 1250 VDC/250 MA. Size: 23⅝"x16"x11⅜" Wt.: 70 lbs. Price—Used Excellent.....$49.50
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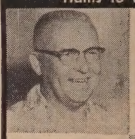
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Lorin Lee W6NOO
Manager Amateur Division

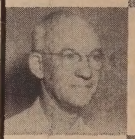
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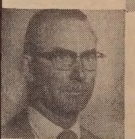




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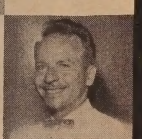
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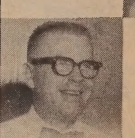




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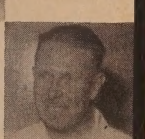
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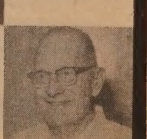
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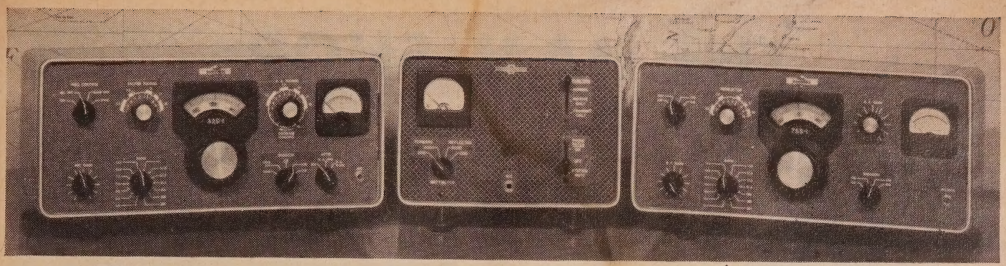


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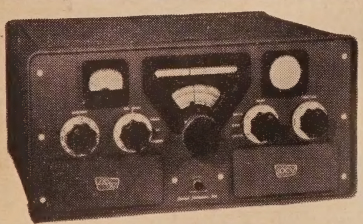
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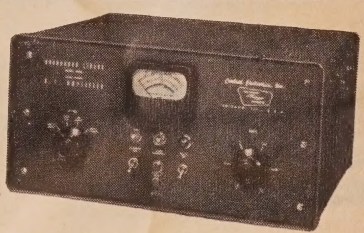
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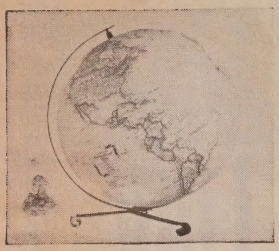
MODEL 10B



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1247 W. Belmont Ave. Chicago 13, Illinois

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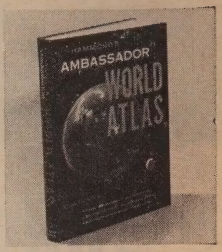
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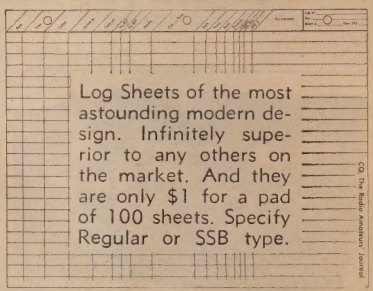
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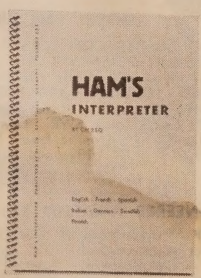
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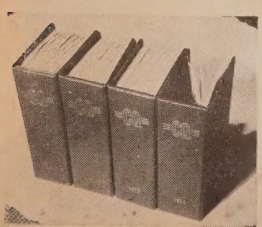
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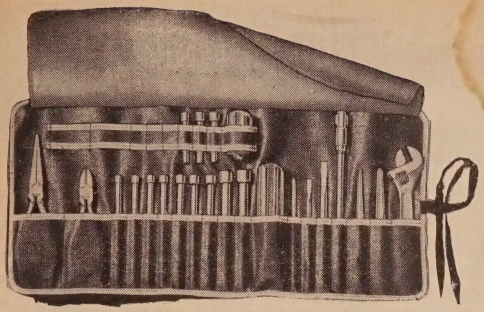
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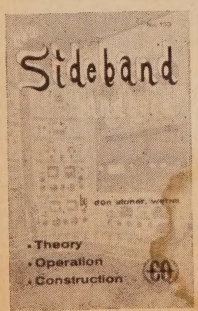
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SIDEBAND HANDBOOK

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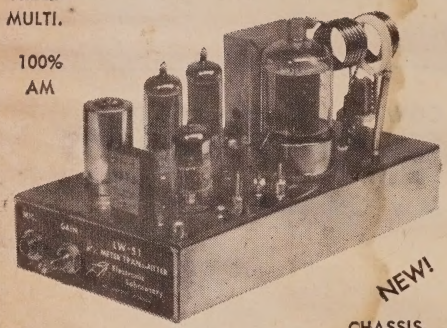
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For further information, check number 32 on page 126.

CLUB BULLETINS

Marvin D. Lipton, VE3DQX
311 Rosemary Road, Toronto 10, Ontario, Canada

The pile of club journals that forms on my desk each month usually requires six hours to read thoroughly. The editors of these papers invariably are a part of the active nucleus of their respective radio clubs, and the periodicals reaching me always prove to be interesting and enlightening. Nevertheless, I feel that with the exception of a few publications, most club news sheets have one common shortcoming; the lack of sufficient news reporting and comment.

Because of advertisers and other commercial interests, editors of large radio magazines find themselves restricted in their remarks regarding various amateur developments. To be totally unbiased, the presentation of the news should not be sponsored. It's in this capacity of news reporting, that many amateur radio club papers could easily fill the gap created by the large magazines.

Unfortunately, one seldom reads any editorial statements in club journals, other than those dealing with new harmonics, DX records, traffic results, banquets, ham biographies, and obituaries. One editor, whose work is widely read, told me in a letter, that his main endeavor is to include as many names and calls in his publication as possible. I wonder, is he, like so many others, maintaining a paper or a social register?

Whether you are a reader or an editor, it is your duty as a ham to pick up your pen and express your opinions as correctly and discreetly as you can. Why not expose those individuals who are guilty of poor operating procedure, those who bring disgrace to the hobby, and those whose actions warrant our general attention?

I can recall only two papers in which I have read real controversy; the DARA QMN BULLETIN of Detroit and AUTO-CALL of Washington. Whereas, I do not necessarily agree with the opinions expounded by the editors concerned, I must commend both gentlemen for saying what they said the way they said it.

NOTES: We were happy to welcome five new members into our news service in the last month. CQ NEWS, our monthly release, was enriched by these five new members: WATTS NEW, Levittown, A.R.C. Inc., GREENBELT A.R.A. NEWS, Greenbelt A.R.A., QRM, Ulster County Mike & Key C. Inc., MIKE SHY, Soc. Radio Operators, and SPLATTER, Minneapolis R.C.

73, Marv. VE3DQX.

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STAN WØBJV

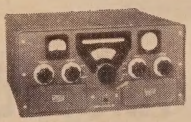
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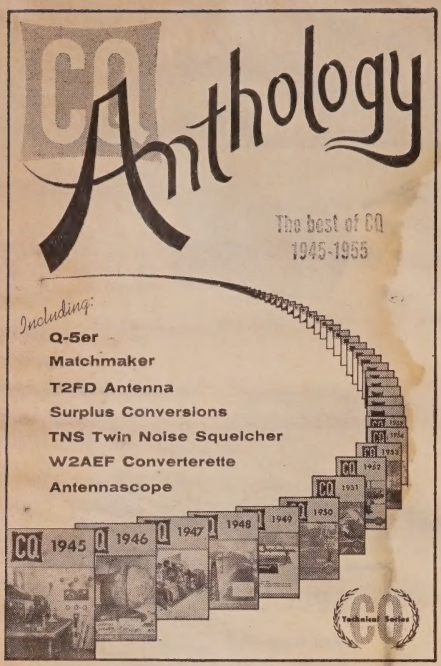
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Again in this issue a new section appears in CQ where distributors may advertise trade-in and reconditioned equipment. This section, called the TRADING POST, will be confined only to legitimate ham distributors as a means of announcing the many excellent used items available. $15 per column inch.

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HAM CLINIC [*from page 62*]

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73, Chuck, W6QLV/F7FE

NOVICE [*from page 66*]

belt, Maryland, advises us prospective Amateurs in the Washington D.C. area can obtain help from that association.

Greg Schneider (W9IEI), 4860748, USS Prichett, DD561, c/o FPO, San Francisco, is stationed in Japan, but offers to help anyone by mail.

The following persons would like help with their tickets:

W1—James Littlejohn, Christian Rd., Middlebury, Conn.
Gerry Bedard, 250 S. Whitney St., Hartford, Conn., phone AD-39924.
W7—Ken Wesche, 2927 1st Ave. N., Seattle 9, Washington
WØ—Fred Wolfe, Waterville, Minnesota

Letters

Through some quirk I received scads of photographs from my Novice friends, this month. They were all so good, that I hated to make a selection, and I talked ye olde Editor into printing them all. It is quite probable that we will not have room for the letters this way, but the increased number of photos makes an interesting variation. So, all the very best until next month.

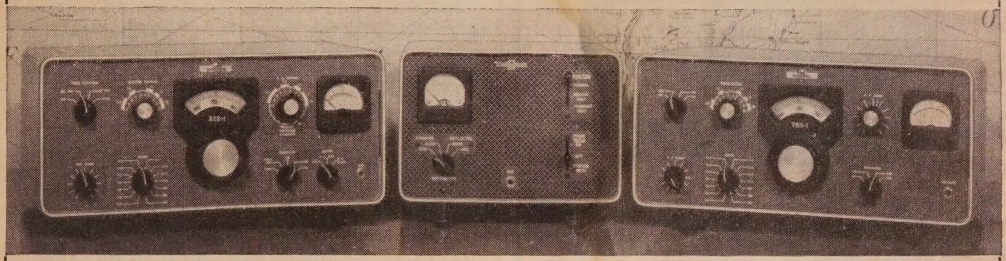
73, Don, W6TNS

SURPLUS [*from page 69*]

and you have the oscillator adjusted.

The *rf* stages are a little simpler, since they only have trimmers. Reconnect the sig-gen to the signal grid of the second *rf* amplifier (pin 1, 6SK7) and tune the high end of the dial. Adjust the appropriate trimmer for the band you are on, by getting maximum on the meter. Now, go to the next band and do the same, but don't forget to set the sig-gen to the correct frequency. Again, go to the next band and do the same, until all bands are fully adjusted. Now, reconnect the sig-gen to pin 1, 6SK7, of the first *rf* amplifier and repeat this all over for each band, adjusting the *rf* coils. Once more,

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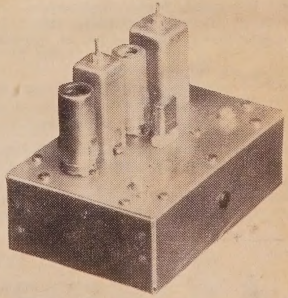
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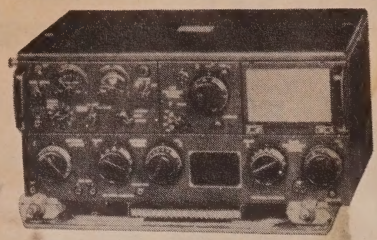
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For further information, check number 52 on page 126.

reconnect the sig-gen to the antenna connector and adjust the antenna coils on all bands.

You may find it necessary to go over each band now and just make sure all of the antenna, *rf* and detector coils are adjusted properly by feeding a signal in at the antenna input, but don't touch the oscillator tuning at all. If it checks out OK you will find that your receiver is properly aligned.

Mail

We've received a lot of mail about our handbook service, telling us that the Library of Congress has a photostat service where copies of handbooks may be purchased. It may be possible to get a copy of that "hard to get" manual from this source if all else fails. This month we have requests from Ernest G. Berger, W7YIF, c/o PANDPD SHAPE, APO 55, NY, NY who is looking for the manual on the BC-787-C (TM-11-867). Mr. A. Carter McIntosh of 10019 S. Charles, Chicago 43, Ill. wants a copy of the BC-604 manual. K4MQB is looking for an AN/ARC-1 (RT-18) manual or conversion. K4TWK needs the handbook for the AN/VRC-2 so he can convert it to six meters. This manual goes by the number TM-11-607. He also is looking for someone who converted the TU-6B and TU-49 to transmitters. Craig Murphy, 4873 James Avenue, Castro Valley, California is in need of any and all data on the R-56/CPN-8. Ray Speckman, W6VEW is one of the chaps who pointed out the Library of Congress as a source of manuals. He is looking for the TBS-6 book as a complete book though and would like to hear from any one having a copy. Incidentally the correct address is Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D.C.

That seems to be about all the mail that we have received asking for handbooks, but we have received a lot of mail about the TCS. As a matter of fact, a word of explanation may be in order, so here it is. We promised to have the TCS article in as soon as possible, and that was originally planned for last *Summer*. Since we didn't do the conversion we merely attempted to check it out. It was set in type and later pulled back from publication because of the discovery of a few errors, just serious enough to flood the office with mail asking why doesn't it operate. Any way, we have not been able to get the thing rechecked and following our usual policy of making sure it works, we won't get it in until the thing works the way it should. If you don't understand that perhaps we could say that we would rather not let you have fifty pounds of junk and a case of frustration over a fine piece of gear that just won't work right. Thus we feel fully justified in letting you wait just a little longer . . . but it will be right when we get through with it.

73, Ken, W2HDM

SIDEBAND [*from page 71*]



to the world-wide winner and certificates will be awarded sectional and continent winners. It appears as though Eva and Alex of CN8MM who won the first and second contests will not compete this time. (They are now in Brazil arranging to move their business and home to that country.)

Please talk this one up on the different bands as some of the countries are very late in receiving CQ magazine. Let's make this contest the biggest and best one so far.

73, Bob W3SW.

SEMI CONDUCTORS [*from page 72*]

on a continuous basis. This circuit is also handy for using "pole pigs" that do not have center taps. Your conductor is currently looking for a 3,000 volt, 500 *ma* transformer that will be used in conjunction with 54 silicon rectifiers in a 1,500 watt power supply.

The favorite circuit is shown in fig. 3. This is a voltage doubler configuration, and can be used to supply twice the *rms* end-to-end voltage of the transformer. If the original transformer in fig. 1 were used in this circuit it could supply 1200 volts at a peak current of half fig. 1. Just the ticket for a compact SSB power supply! I currently use this circuit in my mobile installation to supply power to a pair of 6146's operating class AB1 (SSB, of course). The transformer is a Triad Transistor type, number TY-71S. This unit is designed to deliver 375 volts of square wave power. When connected as shown in fig. 3, it will deliver 825 volts at 50 *ma* (idling current) or 775 volts at a voice peak current of 200 *ma*.

If you would like more information on silicon rectifiers, here is a list of manufacturers that market a very popular line of rectifiers. They will be very eager to supply you with information on their silicon power rectifiers.

Audio Devices, 620 East Dyer Rd., Santa Ana, California
Bendix Aviation, Red Band Division, Long Branch, N. J.
CBS-Hytron, Danvers, Mass.
Clevite, 241 Crescent St., Waltham 54, Mass.
General Electric, Electronics Park, Syracuse, N. Y.

RADIO BOOKSHOP

When are you actually going to start learning something about radio? We've left out all the unnecessary stuff and concentrated on those books that are really top notch for hams. Beginners should have #11-13-23-24. The next step is #21-22-28-32. #16 will help make QSO's a lot more interesting. #1-2-5-25 are important for developing your technical education and giving you a good reference library.

1 Electronics & Radio Eng. by Terman . . . $14.50
1078 pages. One of the most complete radio textbooks ever printed. All theory but not too heavy on math

2 E. E. Handbook by McIlwain
1618 pages. Mostly formulas, tables and circuits. With this, #13 & #32 you will have a complete source of data $10.00

5 Antennas by Kraus (W8JK) $10.50
The most complete book on antennas in print, but largely design and theory complete with the math

11 Old 14th Edition of Radio Handbook by W6SAI
We have the only remaining copies of this excellent edition, completely different from 15th edition. . $6.50

13 Reference Data, 4th Edition
The IT&T handbook, 1152 pages. Data, data . . $6.00

16 Ham Register by W3VKD
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27 Surplus Radio Conversion Manual II
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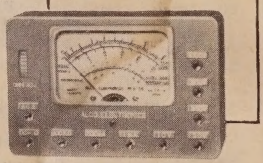
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Hoffman Electronics, 930 Pitner Avenue, Evanston, Ill.
International Rectifier Corp., 1521 E. Grand, El Segundo, California
Mallory Co., Indianapolis 6, Indiana
Motorola Semiconductors, 5005 East McDowell, Phoenix, Arizona
Pacific Semiconductors, 10451 W. Jefferson Blvd., Culver City, California
Radio Corp. of America, Somerville, N. J.
Raytheon Mfg. Co., Newton 58, Mass.
Sarkes Tarzian, 415 N. College Avenue, Bloomington, Indiana
Texas Instruments, P. O. Box 312, Dallas, Texas
Transitron, Inc., Wakefield, Mass.
*Be sure to include "Semiconductor Division" on above addresses.

Semiconductor News

Having trouble finding Clevite transistors? Try Wesco Electronics, 1244 E. Colorado St., Pasadena, Calif., Wesco Sales, 2837 Wilshire Blvd., Santa Monica, Calif., or Westates Electronics Corp., 11334 Playa St., Culver City, Calif.

General Electric Company has materially improved the 2N123 and 2N450 by increasing the Beta at the high current end. Application sheets ECG-364 and ECG-373 describe these two computer transistors. Same address as for rectifiers (see above).

Interested in Zener diodes? International Rectifier (also see addresses) Corp. has a short form catalog number SFC 11 & 12 which describes their ¾, 1, 3.5 and 10 watt zener diodes. Also of interest from International is their new line of high voltage silicon rectifiers. Although no JETEC number has been assigned to these units, they are described in bulletin #SR-226.

Three dimensional selenium photovoltaic "contour photocells" are a new product of International Rectifier Corp. These cells may be produced to any requirement (curved, cylindrical, or other configurations) in three-dimensional shapes with as little as one inch radius of curvature.

Zener Diodes, and silicon solar batteries are described in this month's copy of International Rectifier Corp. News. If you would like to receive this bi-monthly publication, write to them in El Segundo, Calif. (no street address required) and request that your name be added to the mailing list.

No doubt you have been reading about the new Varactor Diodes in Sam Harris's VHF column. These amazing devices are now available in production quantities from Microwave Associates, Inc., Burlington, Mass. In case you are not familiar with them, they are used in reactance or parametric amplifiers for low noise *rf* applications up to 60 *kmc*.

Intended for hi-fi pre-amplifiers, tape recorders, and microphone amplifiers is the RCA 2N1010 npn junction alloy transistor. This transistor is characterized by very low noise output and complete freedom from microphonics and hum.

News of the *uhf* transistors is coming in all

the time. Texas Instruments, Dallas, Texas is marketing a new series of germanium diffused-base MESA transistors featuring alpha cutoff frequencies up to 750 *mc* and power ratings up to 750 *mw*. If interested in these little beauties, inquire about the 2N1141, 2N1142, and the 2N1143. Also newsworthy is the new addition currently being constructed to the world's biggest semiconductor device plant. Texas Instruments is adding about 192,000 sq. ft. to their existing 310,000 sq. ft. plant. They sure do things big in Texas!

And so, that's all that's new in the field of semiconductors. 'Til next month.

73, Don, W6TNS

RTTY [*from page 73*]

(page 101, Dec. '58 CQ) and see if you have any good reasons for choosing a particular frequency, then drop us a line and we will see that your reasons get published.

"Unofficial" frequencies, or actually segments, that have come into very general use are centered around 14,335 *kc* on twenty and around 21,085 *kc* on fifteen. W6VPC has sent us an impressive list of the scheduled bulletin transmissions from the west coast. Frequencies used are 3620, 7140, 14,340, 21,080, 29,670, 51,000, and 147,290 kilocycles. In the midwest, WØBP sends his bulletins on 7140, 21,090, 51,000, and 145,000 kilocycles.

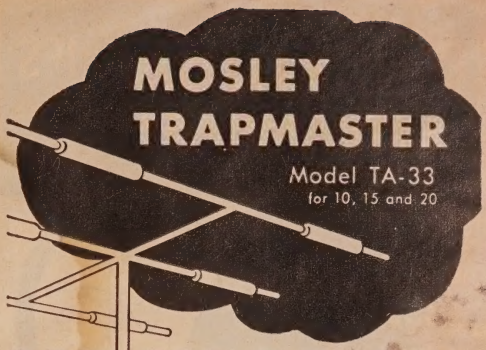
Dual Identification

Much has been said in these RTTY columns about the shackles of the dual identification rules that bind us so. (See last month's column.) Most of us identify with cw, or make-breaking of the carrier. Naturally, this makes the machines of other stations listening jump like 'elvis.

Why don't more RTTYers use narrow-shift, say 40 or 50 cycles, to identify with the hand-key? W2JTP uses this system on twenty, and, of course, all machines on the frequency stand still while W2JTP makes with the Morse. This is mentioned on the machine, but many fellows still ask, 'What do you mean by QRX for narrow shift code identification?" Technically, this is not hard to do. We don't even have to show a schematic. All you do is put another potentiometer, say 1000 ohms, in series with your regular shift—adjust pot and connect a hand key across it. Adjust the 1000-ohm pot to give you about 40 or 50 cycles shift as you hand key. That is all there is to it. Give the RTTYer a break; and, incidentally, confuse the jammer!

Hits and Bits

W1BGW, the NCS of the East Coast RT Net, which meets Wednesday nights at 7 pm, reports a great increase in check-ins during the



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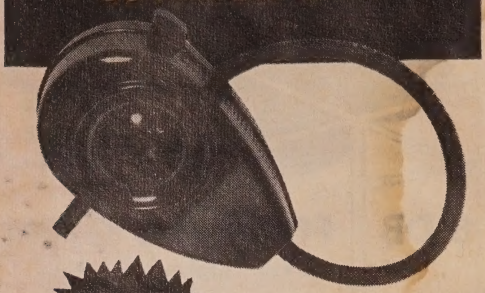
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For further information, check number 40 on page 126.

winter, with even WØBP making 99 and 44/100 percent perfect copy at most stations, including W2JTP.

W4EHU was awarded a National Science Foundation Faculty Fellowship and will do a year's graduate work at Stanford, starting in September. NCARTS, take note!

W6VBU reports a hotbed of activity around the Sacramento, California, area, with W6GDO as the spark-plug, assisting all interested neighbor hams with technical and procurement matters. W6VBU has a PAT TU, a Model 26, and a Model 15 on the air himself.

W5GUU has a Model 15 and converter problems. W7HTJ is active with the CAP. W9HJV has a Model 15 and a *B & W* 5100-B transmitter. WØRCV in Bushton, Kansas, is about to put Kansas on the RTTY map.

KH6NT has a *Press Wireless* 0-5/FR exciter and a Model 14 strip printer. VE8FO, Jim, sadly reports that his RTTY days are over in the far north; as, ". . . machines are no longer available."

Comments

Caveat Emptor! When about to part with some of your hard-earned money for a "teleprinter machine," be sure you know, *well*, with whom you are dealing. One of the best ways to get a machine is through an established and legally incorporated society. (Beware of a "national unincorporated society or league.)

The newest legally incorporated RTTY society is the "DARTS." This is the Dixie Amateur Radioteletypers Society, Inc., and Fred Demotte, W4RWM of Daytona Beach, Florida is the secretary. Don Wiggins, W4EHU, was instrumental in forming this helping hand to RTTYers and information will be supplied to all interested parties in the southeast.

RTTY Callbooks are available from W6AEE, 372 West Warren Way, Arcadia, California, for $1 postpaid. The RTTY Handbook can be obtained from W2JTP/Ø, 2260 Matilda St., St. Paul 18, Minnesota; and those 88-mh "loading coil" toroids can be had from W6CQK, 710 Madison Avenue, Redwood City, California, for $1 each, postpaid.

73, Byron, W2JTP/Ø

VHF [*from page 75*]

For instance: Total number of contacts 100×2=200. Total number of counties 50. Contest score 50×200=10,000.

Countries or other political subdivisions in different states, provinces, or countries having the same name are obviously separate counties and count as such in the totalling of the multiplier.

The exchange of reports, while not required by the contest rules, is suggested as good operating procedure.



Jay Thornhill (K4KLD) submits one of the neatest looking rigs we've seen in a long time. Wonder if it's always that neat.

Time: As mentioned in previous contest issues, it is desirable to end the contest with a round table discussion and exchange of scores. In this manner preliminary contest reports can be gathered and published in an earlier issue.

Contest logs must be post-marked by the 16th of May in order to be eligible for certificate.

Address contest logs to Log Department, Microwave Associates, Burlington, Massachusetts, U.S.A. Have fun, and mail in those logs!

Now is the time for all good VHFers to be working for their "CQ Century Club" certificates for 1959.

Two Meter Century Club

Any amateur station who submits proof of contacts with one hundred different two meter stations since January first, 1959, will be awarded the *"CQ Two Meter Century Club"* certificate for 1959.

Two Twenty Century Club

Any amateur station who submits proof of two way contacts with one hundred different 220 *mc* stations since January first, 1959 will be awarded the *"CQ Two Twenty Century Club"* certificate for 1959.

Four Twenty and Up Century Club

Any amateur station who submits proof of two way contacts with one hundred different stations on amateur assigned frequencies above 420 *mc* will be awarded the *"CQ Four Twenty Century Club"* certificate for 1959.

Six Meter Century Club

Any amateur station who submits proof of two way contacts with one hundred different stations on six meters since January first, 1959, will be awarded the *"CQ Six Meter Century Club"* certificate.

Microwave Associates VHF Achievement Plaque

As an additional incentive, the first station on each band to qualify for the century club certificate will receive "The Microwave Associates V.H.F. Achievement Plaque." Hand-



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For further information, check number 41 on page 126.

Cut Warm-up Drift on SSB—
End Dampness Failures with
DAMPP-CHASER
CHASSIS DEHUMIDIFYING HEATER ®

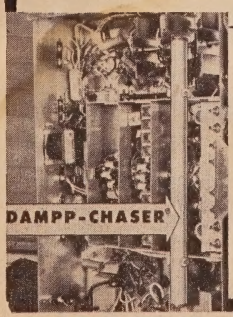
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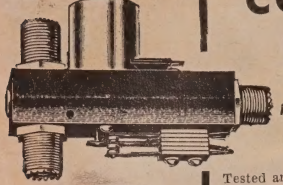
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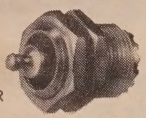
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Power consumption, AC models Approx. 4 watts, DC models 3 watts. V. S.W.R. at 150 mc 1.1 and 1.2 at 300 mc. Coil voltages: AC 6, 12, 24, 115, 220; DC 6, 12, 24, 48, 110, 220. Special coil voltages available.

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Needs only one ⅝" hole, no screws. Precision made, durable. Each .....70¢

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See your electronics dealer, or write for specifications.

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For further information, check number 43 on page 126.

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METERS—0-50 microamp, 2½" Burlington model 921 1# $4.95
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ATTENUATORS—
600/600 T-pad, 30 steps, Tech Lab.....1#...$2.89 2/$4.95
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TRANSFORMERS . . . All have 115 volt, 60 cycle AC primaries
Filament, 6.3/22,6.3 ct/2.4,6.3/2.25,6.3 ct/0.6..... 9# $3.29
Scope, 6.3/1.85, 6.3/0.6, 700 ct/30, 525/5, 2.5/1.75, 6.3/0.6, 2 and # KV insulation, upright shielded ..5# $3.45
Scope, 2500/3 and 2.5/1.75, oil filled and HS.....5# $1.95

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3AP1 .....$1.45 3BP1 .....$1.75 3FP7 .....$1.00 ppd
5FP7 .....$1.29 ppd 5GP1 .....$2.45 5JP1 .....$2.45 ppd
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BC-1268-A radar scope with all tubes .....100# $16.95
10 hy/500 mil choke, 100 ohms, 2 KV RMS.....30# $6.95
Delco selsyn, type 11-4, C56701, 115 v, 60 cyc .....15# 2/$17.95
Lo-pass filt, 300-2500 cyc, —40 db at 3200, HS..... 4# $1.95
BC-684 xmtr, 27-39 MC, recond Yokahama Sig Depot 50# $7.95
BC-604 xmtr, 20-28 MC, very good used condition ..50# $4.95
Full wave xfmr-rect combo for 24 volt DC/800 mils.... 5# $2.59
Dynamotor, 6 volt input, 600 v/150 mils, Elcor..... 12# $6.95
BC-610 tuning units . . complete set $24.95 . . each 4# $3.45
Bleeder resistor, 25K ohms at 160 watts.....1# 69¢

VACUUM TUBES—
2X2 35¢, $2.95/doz. 3B24 ....55¢, $4.95/doz. 3C24 ... $2.95
6AC7W... 85¢ 6SL7GT.... 65¢ 6SN7GT ....55¢ 6V6GTY... 65¢
80Y.....15¢, $1.49/doz. 221-A .....55¢ 305-A ... $1.95
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somely engraved with the number one Century Club Certificate information.

Microwave Associates VHF Achievement Cup

To the first club which makes a grand sweep of the century club certificates for all bands will be awarded the "Microwave Associates V.H.F. Achievement Trophy." Certificates submitted for this award must belong to certified club members who were members in good standing at the time that the certificate was achieved.

The following is required as "proof of contact": A list of the 100 QSLs together with dates of contacts. This list must be signed by another licensed amateur to the effect that he has seen and checked the QSLs. Then send in the list.

Big "Do"

And it is a big one too! Just around the corner is spring, with a small "s," but better than that, along with spring comes the "DAYTON HAMVENTION." Capitals all the way!

Each year the Dayton Hamvention gets bigger and better although at each convention we're sure that they can't possibly do any better next year. They always do.

Now is the time to write to Ev Taylor, W8NAF, 1125 Highridge Avenue, Dayton 10, Ohio, for details, particulars, and particularly for reservations.

73, Sam, W1FZJ

CONTEST [*from page 79*]

Therefore each French Department, French Union country, Belgian Congo and other provinces and Swiss Cantons worked on each band make up of your multiplier. Multiply this total by three.

5. To compute your final score, multiply the total number of QSO points by the multiplier as explained above.

6. The same station of course can be worked only once on each band.

7. Send your logs to the Reseau des Emetteurs Francais, B. P. 42-01, Paris RP, France, not later than 3 weeks after each section of the contest. The Secretary of the REF, F8JQ, will also honor your request for free report forms. Include an IRC of course.

ARRL

Dates, boxed above, are for the 2nd half of the ARRL marathon. If the OW had other plans for you during the 1st half maybe you can talk yourself into the 2nd half.

QCWA

Starts: Friday, March 13th at 1400 PST.
Ends: Sunday, March 15th at 1400 PST.

This is the 2nd annual QSO party for the Quarter Century Wireless Association. Full details in last month's calendar. Return your

logs to Dr. F. Clifford J. Spike, W7OS, 1412 Medical Arts Bldg., Tacoma 2, Washington.

CQ WW SSB

Starts: Saturday, April 18th at 1800 GMT.
Ends: Sunday, April 19th at 1800 GMT.

This is the 3rd annual SSB DX contest organized by Bob Adams and his crew of "sidewinders." There have been some changes in the rules this year, the main one being the change to WPX for a multiplier. Bob has covered it thoroughly in his SSB column for this month.

Ed. Note

If I can dig myself out from under the hundreds of logs still rolling in from our World Wide DX contest, I will try to have a preliminary report for you next month.

73, Frank, W1WY

PROPAGATION [*from page 78*]

ers selected for this project receive a comprehensive manual for identifying the various types and visual characteristics of the aurora, filters to distinguish the aurora from other night light, an alidade for measuring the elevation of the aurora, report forms and stamped return envelopes, and the satisfaction of contributing to the advancement of scientific knowledge.

If you have the time to devote to scanning the northern sky and are interested in participating in this IGC project, registration forms and additional information can be obtained from:

Dr. C. W. Gartlein
Aurora Data Center
Rockefeller Hall
Ithaca, New York

Bennington's Book

I have been informed by the *Radio Bookshop*, 1379 East 15th Street, Brooklyn 30, N.Y. that "Shortwave Radio and the Ionosphere" by T. W. Bennington (see review in December, 1958 column) is available for $2.85 a copy, postpaid.

Anniversary

This month begins my ninth year as Propagation Editor for *CQ*. During this time I have found conducting this column a stimulating and interesting experience. With sincere gratitude I want to thank all of you who, during these eight years have helped in making this one of the most popualr columns in Amateur Radio publications.

73, George, W3ASK

YL [*from page 80*]

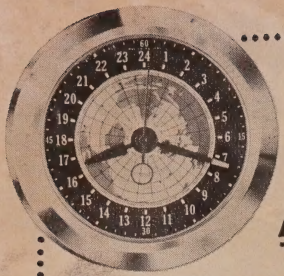
Executive Committee: W1ZEN, Leonice; W1RLQ, Chata; W1SCS, Ruthe; W1HOY, Helen; K1ADY, Mary. W1ZEN is chairman and W1RLQ is S-T. WRONE has offered to spon-



For further information, check number 45 on page 126.



For further information, check number 46 on page 126.



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* Inner dial with south polar projection shows time around world at a glance.
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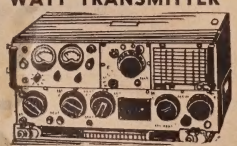
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For further information, check number 47 on page 126.

AN/ART-13 100 WATT TRANSMITTER



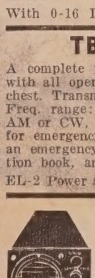
Designed to provide radio communication by voice, (MCW) or CW telegraphy. Class "B" audio modulator system capable of modulating the carrier at least 90% on voice or MCW. Incorporates automatic tuning mechanism which may be used to select any one of 11 frequencies, range 2000 KC to 18,100 KC. Frequencies 200 KC to 1500 KC range is provided by addition of oscillator 0-16/ART-13A. Excellent **$45.00**

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For further information, check number 48 on page 126.

sor a YLRL International Convention in the summer of 1960 if YLRL members would like to have it.

New officers of the R.I. YLs, elected in Nov., are: Pres., W1OTI, Louise; V.P., W1CFT, Mary; secy, W1ZOK, Norma; treas., W1WED, Ruth.

GAYLARK of Houston elected these officers at their Nov. meeting: Pres., W5EGD, Lillian; V.P., K5PFF, Audrey; S-T, KN5SPD, Mary; historian, K5HTO, Robbie. In Dec. the club catered a dinner and presented the program for the Houston Amateur Radio Club's Christmas party. On Jan. 28 GAYLARK celebrated its first anniversary and membership growth from 14 to 24 members . . . GAYLARK certificate custodian is now included in the jobs of the V.P. Rules have been changed as follows: 6 QSOs with members required for Stateside applicants; 5 QSOs required for all DX stations. Send no QSLs, only log sheet information and 10c for handling, to: K5PFF, Audrey Beyer, 7339 Guadalcanal St., Houston 21. . . . Feb. CQ announced GAYLARK founding-president, K5BJU, as the 3rd place winner in YLRL's' membership campaign. Harriett wishes to correct this to be a GAYLARK club score rather than a personal one.

WHO of Ft. Worth have this slate of officers for 1959: Pres., W5PFU, Johnny; V.P., W5GXG, Maudine; secy, K5CRH, Marie; treas., W5ETH, Betty. WHO will be sponsoring the TYLRUN anniversary party in the Fall.

New officers of the Penn-Jersey YL Club are: Pres., W3AAU, Edie; V.P., W3SLF, Sylvia; secy, W3JST, Inez; treas., W3IKI, Clare.

The 3C's Club has these new officers: Pres., K6PWH, Colleen; V.P., K6TYJ, Betty; secy, K6KCK, Roberta; treas., K6GKR, Gerry. They were installed at the "Chirps" second anniversary dinner party on Jan. 23. . . . Each member of the Camellia Capital Chirps will be on the air as much as she can during the 24 hours of Mar. 6 making as many contacts as possible. Each person contacting one of the members during that period will receive a special certificate commemorating the opening day of Sacramento's 1959 Camellia Festival. . . . 3C's founder and past president, K6ENK (also YLRL's Editor), K6ENK, has a new jr. YL, Lois Ann, born Jan. 2.

Condolences to K9JVL, Lil, president of Chicago YLRL, whose OM, W9NBY, joined the Silent Keys.

The YL club in Hawaii is offering a certificate to anyone who works five KH6 YLs (DX stations need only 3). Contacts must be made on other than net time and only those made after June 1, 1958, are valid. Mail QSLs, together with a self-addressed stamped envelope for their return, to KH6CBT, Elsie Wright, 773 Murray Dr., Honolulu 18, T.H. YLs to look for on the bands: KH6's CKD, AUJ, AFC, AFL, CIB, CBT, BGE, BTX.

A group of VHF minded YLs in the Pittsburgh area have formed the "Petticoat Operators of Six." They meet Tues. at 2100 on 50.4 *mc*. Objective of the club is to have operators available in case of a daytime emergency. They also offer a certificate to any amateur having confirmed contacts with 7 of their members. Officers are: Pres., K3AZZ, Fran; treas., K3DYW; secy, W3UTU, Joanna; net mgr., W3ERK, Dot.

The Loaded Clothes Line YL Net, which meets each Mon. at 0900 MST, 7235, offers a certificate to YL or OM who QSOs 10 of their members in off net contacts after Jan. 1, 1959. To apply send list showing calls, date, time and frequency to net president and NCS, K5GYZ, Lucille Miller, 215 E. Frazier, Roswell, N.M. Current members include: KØ's ADB, BCQ, BTV, DHA, EDH, EPE, EVG, GAS, GIC, HEU, HFB, KFX, LGS, MNI; WØ's MMT, TYB, ZWL; W5's BZB, DZB, FFH, HCE, RZJ, YSJ; K5's DAB, ECP, GYZ, KOK, KVJ, MBH, MIM, MSE; W7's DRU, BFE, INN, GCX/5; WA6AVP, W6QGX.



These members of HAWK met last June at the QTH of K9BZU during amateur radio week in Indiana. L. to r., K9BZU, Lulu (now a Silent Key); W9OAU, Betty; K9IXD, Doris; W9IMT, Red; W9RTH, Adah; K9ILK, Fran.

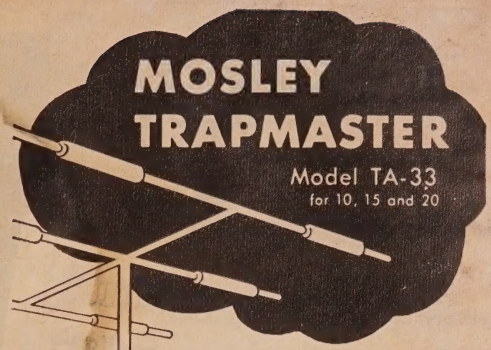


K4SAF, Carol Jean Fraley, also age 17.→

K2TSR, Nancy Lewis, ←17 years old.



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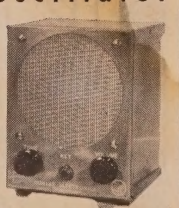
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More Young YLs

K2TSR, Nancy Lewis, of Middleport, N.Y. is 17 years old and a senior in H.S. She is president of the school radio club. Starting with a Novice two years ago, she was winner in Western N.Y. in the Novice Round-up. A year later she got her General. Nancy shares a Viking Ranger and an NC-300 with her Dad, W2FEB. She enjoys QSOing other teenagers and likes cw as well as phone, with 80 the favorite. Other interests are bowling, ice and roller skating, swimming and watching basketball games.

K4SAF, Carol Fraley, of Nickelsville, Va. is another 17-year old YL. Carol's brother, W4CHK, got her interested and she and her Dad received their Novice licenses in Sept. '57. Both now hold General and her Dad is K4SAB. They share a 60-watt home-made transmitter and an HQ-110 receiver. Her favorite band is 75 where K4SAF is active in the Tenn. Teenage Net. She also likes 40 and 15 and has worked 44 States and some DX. A junior in H.S. Carol has kept a "straight A" average. She is a member of the Beta Club, 4-H Club, and Library Club. Her favorite is FHA of which she has served as chapter president. Other interests are playing the piano and singing.

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33, Louisa, W5RZJ

ECHOES [*from page 90*]

article was prepared by DL3FM, who is quite prominent in *uhf* work in Europe. In another article PAØKT writes about two-meter SSB work. It seems that SSB is gaining a strong foothold in two-meter work in Europe.

Yours truly also has been involved in somewhat of an overseas echo. The Voice of America recently carried an interview of yours truly and xyl W2SLA during their Ham Show. Bill, W2SKE, who "runs the show," and we attempted to give a brief description of the scope and purpose of this column. We hope you had occasion to hear it and if you have any suggestions concerning this column as well as any items you would like to see covered in more detail, please let us know. We can only serve you best if we know what interests you most.

73, Tom, K2VBI

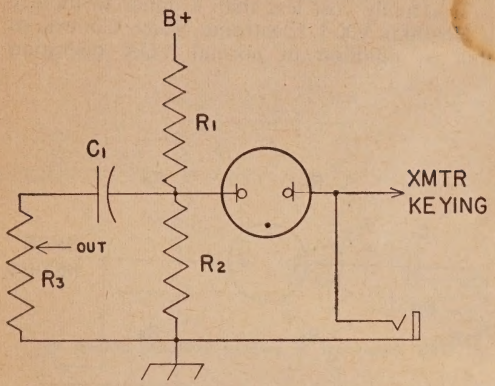


Fig. 4—A practical relaxation oscillator circuit with means for keying and output takeoff.

These features are found in fig. 4. R2 has been added so that the voltage at the junction of R1 and R2 is only slightly higher than the firing voltage. Resistance R3 is the existing level or volume control at the input of the VOX control section. Condenser C1 charges and discharges through this volume control, thereby acting as both the coupling condenser and the oscillator condenser. The ground return of the neon lamp is keyed along with the cathode circuit of the transmitter. If grid block keying is to be used, the unit would have to be fed from a negative voltage source instead of from B+.

The actual circuit employed (fig. 5) differs in only one respect, a positive voltage has been introduced at the junction of the key and the lamp. The key is shown as it is usually drawn, but seldom found. In practical applications it is frequently shunted by a large value of capacitance, the combination of key-click and key-shaping filters; it is shunted by a high resistance in the megohm range, the leakage resistance; it may be shunted by a much lower resistance used to limit the voltage across the key. Any of these may contribute to erratic operation of the neon lamp, causing it to hold in too long, or to fire mysteriously in the key-up position.

The voltage taken for the R4-R5 combination stabilizes the "lower" side of NE-2 at a value that will quickly extinguish the lamp in the key-up position, and keep it from firing until the key is depressed. The voltage is about the same as that required to cathode bias the transmitter to cut-off; its value can be determined by measuring the voltage across the key in the send position with key-up. The R4-R5 voltage divider need draw only one or two milliamperes. Its resistance will still be low

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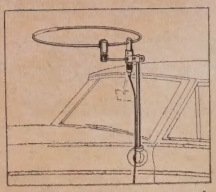
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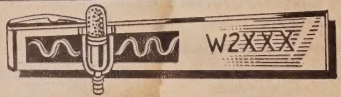
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enough so that the other circuit elements will have little effect on operation.

It actually cost less than a dollar to modify a Heathkit VX-1 Electronic Voice Control so that in addition to normal VOX operation

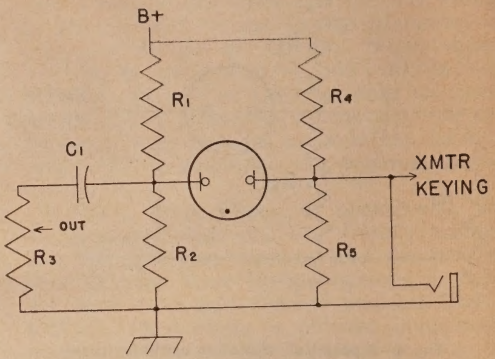


Fig. 5—Actual circuit employed introduces a positive voltage at the junction of the key and bulb.

it would also work on cw. The modified portion of the VX-1 circuit is shown in fig. 6.

Fig. 7 shows the location of all added parts, except the key jack, on the VX-1. I installed the key jack in place of the On-Off switch, since I use a master switch for power to a Viking transmitter and all transmitter accessories including the vfo. The function switch position shown avoids existing interference with the power transformer; the improved position is not required by this VOK modification.

Here's how you do it: Mount a three-terminal lug, center terminal grounded, above the chassis. This is held in place by the same screw securing the power transformer. Added components are mounted as shown. A small terminal lug is mounted on the function switch FS, in the vacant hole between terminals 4 and 5. The lead from this, the center one in the illustration, runs to TC-3, the "top" of the 100k transmitter sensitivity control.

If the key jack is panel mounted, replacing switch LS, replace DD with a two-terminal strip (neither grounded.) Solder the three wires from DD to one terminal; remove all three wires from LS and solder them to the other terminal. Mount the key jack in place of LS. The ungrounded side of the key jack runs to terminal 3 of the function switch. (See fig. 7.) The third lead, passing through grommet G-2 from terminal 6 of FS, is as originally wired. The jumper between FS2 and FS6 is removed; terminals 2, 4, and 5 go to the control ground lug. The lead between terminal 1 of FS and Pin 1 of the 12BY7 is removed. The 33k resistor is mounted between FS1 and FS2. Positive voltage for the oscillator is obtained from RY12. The ground is removed from terminal RY5 of the relay and re-connected to GL2 on the rear terminal. The vacated

terminal RY5 is connected to the key jack, ungrounded side. Modification is complete.

The function switch, in the manual position,

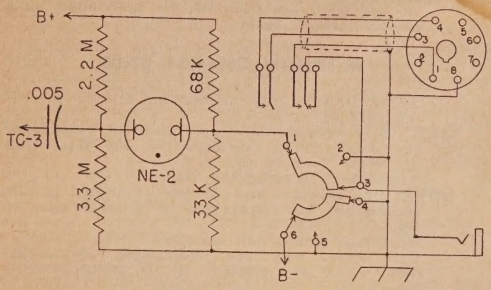


Fig. 6—The modified portion of the Heath VX-1.

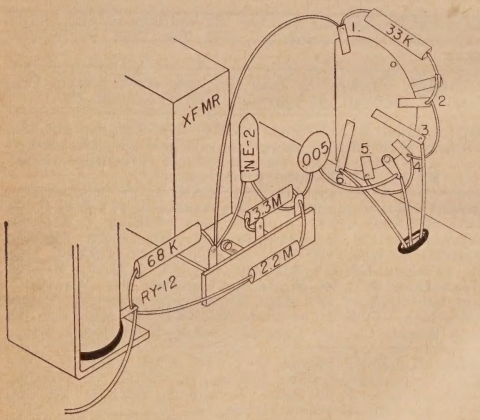
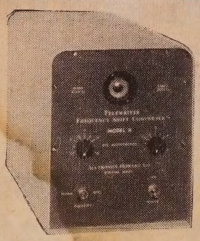


Fig. 7—Pictorial presentation of the modification.

connects the keying line FS3 to the neon oscillator FS1. The manual position becomes the cw position, and manual operation is achieved by closing the key. In the VOX position, FS3 and FS2 are connected, grounding RY5 as in the original circuit and operation is normal. The neon oscillator remains connected to the transmitter sensitivity control. The effect is negligible, equivalent to shunting the 100k control by 1.32 megohms through the .005 capacitor. The other section of the function switch opens the plate supply in the standby position.

Only minor revisions, probably those resulting from different supply voltages, should be needed for use with VOX units other than the VX-1. With many transmitters, having to switch from voice to cw at both the transmitter and the VOK can be avoided. The original VX-1 function switch wiring can be retained. The transmitter voice-cw switch is then used to power either the VOK pre-amplifier for phone, or the neon oscillator for cw, thereby determining the mode of VOK operation. ■



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- **SHIELDED TEST LEADS.** 44" long, 2 alligator clips at one end, 2 tip jacks at other end. Braided metal outer conductor. Useful for sig. gen., output testing etc. Stock #3F35-74C/L1. .....ONLY: 51¢
- **LATCHING RELAY.** Price Elec. Corp. Type 8507-1. 7½ ohm coil. Up to 15 position on rear deck unit contains 3 decks. Net weight one lb. .....PRICE: $3.50
- **RCA FILAMENT XFMR.** Pri: 117V 50/60 cps. Sec: 15/7.5 V @ 30 amps. Net weight 17½ lbs. Specify RCA type #901349-502. .....PRICE: $9.95
- **DPDT ANTENNA RELAY.** Standard 115 V AC @ 50/60 cps. Ceramic insulation throughout. (10 amps. contact @ 115 volts). Contact spacing 2½". Advance Electric type #400. ONLY: $3.95
- **RUSSELL ELECTRIC.** 3/16 HP Motor. 3450 RPM. 1.8 Amps. Continuous Duty. Operates on 115 Volts DC. (Also will operate on 115 AC). 20½ lbs. New, in original CARTONS. .....ONLY: $4.95
- **AIRCRAFT LABS! SELENIUM RECTIFIER.** Full-wave Bridge Type Input; 450 VAC (RMS) @ 400 CPS Output; 350 VDC @ 340 Ma. Encapsulated Hermetically Sealed, Oil Filled. Size: 3" Square x 3¾" High. (Original Cost $42.00). Int'l Rectifier #D1332A. BRAND NEW! .....ONLY: $15.00
- **JENNINGS VACUUM-VARIABLE CAPACITORS:** Type UCSX—Range approx. 20 to 700 MMFD at 10 KV. Complete w/MTG Brkts and Gear Drive and Motor. ($200 Value). ONLY: $36.95 (2 For $70.00)
- **Herm. Sealed FILAMENT XMFR** Pri. 115 or 230 SEC. 5 V at 10 A. 6300 Work. Volts. Exc. for 872-A's PRICE: $3.75
- **Herm. Sealed FILAMENT XMFR** Pri. 115 VAC TAPPED. SEC. 5 V at 10 A. 6300 Work. Volts Cat. #F90132. Exc. for 872-A's. .....PRICE: $3.00

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FOR SALE: Schematics for all military-surplus units $1.00 each. Dave Rumph Co., P.O. Box 7167, Ft. Worth, Texas.

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LOOK! $9.95 buys a high quality CW transmitter kit, complete with built-in power supply, and all parts except tubes and xtal. Send for literature. Greenray Industries, M. R., Mechanicsburg, Penna.

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CALL PLATES: Deluxe 8" x 1¾" black phenolic laminate with engraved white letters. Only $1.00 pp. Polished plexiglass base $1.00 extra. L. and J. PRODUCTS Co., P. O. Box 122, Downers Grove, Ill.

THIS HALO ANTENNA makes VHF mobile operation worthwhile. Folded dipole elements. 2 meter Model H-144 comes with fitting for standard mounts and 20 feet of coax. Portable Model H-144P mounts directly on your Gonset. Either model only $13—$13.50 west of Denver L. and J. Products Co., Box 122, Downers Grove, Illinois.

CRYSTALS GUARANTEED: 2 to 80 meters FT-243. Holders, 3 for $1.00. SSB crystals FT-241A, 10¢ each. Lists available. Quaker Electronics, 1040 West Main Street, Plymouth, Penna.

V-37, 10-75m antenna deluxe with accessories to highest bidder. Reynolds, 35 Elm Tree Lane, Pelham Manor, N. Y. PE 8-2165.

SELL: Collins 32V3 serial #1328. Excellent $400.00. Deluxe home brew KW. Conservative components make offer: Olivetti page teleprinter and tape printing reperforator in excellent condition with manuals $240. Call Don, Kellogg 1-1579, Deal, New Jersey, after 6:00 p.m.

ATTENTION MOBILEERS!! Leece Neville 6 volt 100 amp. system alternator, regulator and rectifier, $45.00. Also Leece Neville 12 volt 100 amp. system, alternator, regulator & rectifier $85.00. Perfect condition. Herbert A. Zimmerman, Jr., 115 Willow St., Brooklyn 1, N.Y. K2PAT, ULster 2-3472.

BINOCULARS, 7x50 prism type. Made by expert optical craftsmen in Japan. Prisms and coated lens are the utmost in precision. Genuine pigskin carrying case with straps included. Indiv. focus, $19.25. Center focus, $22.75. Add 10% F.E. Tax and 50¢ postage. Ramson, 9905 63rd Road, Rego Park, New York.

HARVEY WELLS T-90 Transmitter, complete with matching power supply. Cost $259.00. All band VFO phone-cw rig. Getting married and she hates ham radio. First $150. Box 23, CQ, 300 West 43rd Street, N. Y. 36.

FOR SALE (cont.)

TECRAFT CC-144 Deluxe two meter converter. Cost $44.95 new. It's still new, but I've had it for a while . . . never used. $30 buys it. Box 27, CQ, 300 West 43rd Street, N. Y. 36.

LAKESHORE Signal Splitter, still brand new, unused. $74.50 it cost me, $35 it cost you. Gives you really great SSB reception (455 kc *if*). Printed circuit construction. Box 29, CQ, 300 West 43rd Street, N. Y. 36.

TELETYPE Equipment. Model 12 printer in excellent working order, complete with table, power connectors, typing unit, keyboard, top, $50. Auto-start control unit and converter, the most elaborate type, with audio generator, polar relays, etc., $100. Typing perforator for tape punching, $60. Tape sending unit with distributor and power supply, $80. Test generator with synchronous motor and distributor, $35. Box 19, CQ, 300 West 43rd Street, N. Y. 36.

PANADAPTOR PR-1, cost $199.50 a couple years ago. Was used only a few months. In very good condition. $100. Box 37, CQ, 300 West 43rd Street, N. Y. 36.

GENERAL ELECTRIC YRS-1 in good operating condition. $45. The original, and still one of the best, sideband selectors. Box 22, CQ, 300 West 43rd Street, N. Y. 36.

BRAND NEW National SW-3 receiver with S-9er front end, Q-Multiplier, and mechanical filter. Best offer over $200. Box 265, CQ Magazine, 300 W. 43rd St., N. Y. 36.

SEVEN-ROOM house complete with 50 foot Vesto tower, Moseley Tri-Band beam, CDR Ham Rotator. Best offer, CQ Magazine Box 57, 300 W. 43rd St., N. Y. 36.

PRESERVE YOUR HAM TICKET, Social Security Card, small photo, passes and anything else of value that is wallet size. We will laminate it in clear plastic, guaranteed for life. Lamination will prevent it from getting torn, soiled or frayed. Send your ticket or anything of value with $1. in stamps or cash for each item that you want preserved. 24 hour service. Send to Dept. HW, CQ Magazine, 300 West 43rd St., N.Y. 36, N.Y.

HOUSE FOR SALE: Huntington, Long Island. Split Level, 4 bedrooms, 2 baths, 2-car garage on one acre close to highest spot on L.I. Built-in intercom system, remote control wiring and antennas. $33,500. Call Byron, W2JPP, HA 7-9533.

RUBBER STAMPS for hams, sample impressions, W9-UNY, C. W. Hamm, 542 North 93, Milwaukee, Wisconsin.

SIX METER Crystal Converter printed circuit Kit. RF stage, variable noise limiter, mobile or fixed. Write "PRINTED CIRCUITS," Trucksville, Penna.

FOR SALE: One pair vocaline transceivers model 400 in good condition with microphone, antennas, cables. $100.00. Ron Jones, 714 Wisconsin, Holton, Kansas.

ALUMINUM for every ham need. Write to Dick's, Cherry Avenue, Route 1, Tiffin, Ohio for list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits.

FOR SALE: Complete SCR-522 VHF station, fully converted transmitter and receiver with power supply, 20 watts. Ideal rig for VHF, novices and C.A.P. Price $95.00. Send for picture. BA-37, BA-38, new batteries for BC-611 $1.75 pair. BC-611 manuals $2.75. ARC-5 receivers, BC-454, BC-455 $8.00 each. Transmitters, BC-457, BC-458, $6.50 each. ARC-5 dual transmitter mounts $2.50, triple receiver $2.50. BC-456/ARC-5 modulators $3.50. Also parts. Send for list. See back issues. COD's OK. Bill Slep, W4FHY, Box 178A, Ellenton, Florida.

FOR SALE: 275 watt CW-AM transmitter. Bandswitching, VFO, 813 final. $175.00. No TVI. Cannot be shipped. U.P. and northern Wisconsin inquiries invited. W8HMX, Don Baker, 613 Copper, Houghton, Michigan.

CRYSTALS for 2, 6, and 40 meters. 25¢ each. Send for frequency list. Power transformer stancor PC-8414. $4.75 each. W6IMC, 210 Alden Road, Hayward, Calif.

TELETYPE WU1OA Reperforators, require external distributors. Uses standard tape. Very few left. All in good condition. $4.98 Plus postage on 13 lbs. No CODs. Victor Lome, 745 Brummel Street, Evanston, Illinois.

MORE UNUSED BUYS!

- **GLAS-LINE Non-Metallic Guy Line.** (ELIMINATES NEED FOR GLASS "BREAK-UP" INSULATORS) Weather resistant, plastic coated spun glass fibers. High tensile strength guy cable ideally suited for the heaviest antennas. Guaranteed not to rot, rust, or deteriorate for five years or more. Packed in 600 ft. reels, but sold in any multiple of 100 ft. Glas-Line (Green Only). .....Per 100 Ft. **$2.89.** 600 Ft. Reel **$17.34**

- **MOBILE ANTENNA CONNECTOR.** Perfect for use in all mobile installations, Gonset and other types of auto equipment. Standard size. Catalog #MAC20. PRICE: each **$.20**

- **DUAL REACTOR.** 2 complete reactors in one complete hermetically sealed unit. Each reactor has an inductance of 5 Hys. at 250 ma (D.C.). The center terminal is common to both of the chokes. Used in series (that is the 2 outside terminals), gives an inductance of 10 Hys. at 250 ma. (very conservatively) Mfd. by Airdesign Inc. Circuit clearly stencilled on each of these dual chokes. New, unused. Size: 7½" x 4" x 3⅜" deep. Wt. 12 lbs.-6 oz. Stock #C-50143. PRICE: **$3.50**

- **10 KV G.E. OIL TRANSFORMERS.** Husky Industrial Transformers filled with 61 gallons of oil. PRIMARY: 220 VAC, 60 Cy, in 3 phase. Delta winding. SECONDARY: 9850 volts at 3.2 amps. BRAND NEW. Crated and delivered FOB 1600 lbs. Fleming, N.J. WORTH $4200. .....ONLY **$350.00**

- **MARION ROUND METER.** Expanded scale reads from 18 to 36 Volts. Size: 2-3'4" diameter x 1¼" deep. Weighs 7 oz. Out of equipment. Catalog No. HS2-18-36. PRICE: each **$3.50**

- **SSB LOW CAPACITY FILAMENT TRANSFORMER.** PRIMARY: 110 VAC 60 Cy. SECONDARY: 10 Volts at 10 maps or 5 VCT at 20 amps. For use with 803's, etc. Brand New, current production. Designed for SSB, but may be used in ANY filament circuit at above ratings. Measures 5¾" High x 5¾" Wide x 3¾" Deep..... SPECIAL: **$13.95**

- **RACK PANELS.** 8¾" High, 19" W., for Standard Racks. Made of Steel by INSULINE Corp. Gray. Catalog No. 3616. Shipping Weight. 6¼ lbs. .....PRICE: each **$1.00**

- **PA SYSTEMS.** This system built for U.S. Navy by WESTERN ELECTRIC CO. Input: 115 V., 60 cyc. 1 Ph., 3 amps. Output: 40 Watts. Switches are provided to connect one or more or all of four groups of reproducers, with a fifth group switch as a spare. Originally designed for complete coverage LST ship. Instrument provided with percentage meter (not shown in photo). Condition good, never used. Size: Stock #PA-WE. Shipping Weight 165 lbs. .....PRICE: **$75.00**

- **RAYTHEON POWER SUPPLY.** Input: 6 VDC. Output: 117 VDC at 60 cycles (50 Watts conservative). This unit uses the nest of components and was made to sell for over $100.00 each. These units are unused, in original manufacturer's cartons. They will put out 117 VAC under load at ½ to ¾ amps. AC. They will run 50 Watt appliances, such as small radios, tape recorders, etc. in the field. A best buy. PRICE: **$16.95**

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0A2	.70	6AF4	1.45	6V6GT	.75	403A	.90
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0D3	.60	6AH6	1.40	6X5GT	.70	408A	1.75
0Z4	.65	6AK4	1.50	6X8	1.10	417A	8.00
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1B3GT	1.00	6AL5	.65	7BP7	5.00	434A	4.00
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1S4	.80	6AN5	2.00	8CM7	.90	450-TL	43.00
1S5	.70	6AN8	1.20	12A6	.40	673	11.50
1U4	.15	6AQ5	.65	12AE6	.65	703A	.75
1U5	.75	6AR6	1.00	12AD6	.75	717A	.20
1V2	.65	6AS7G	3.25	12AT6	.70	723A/B	5.00
1X2B	1.10	6AS8	1.15	12AT7	.85	803	1.50
1Z2	1.30	6AT6	.50	12AU6	.75	805	3.50
2C39A	9.00	6AT8	1.15	12AU7	.85	806	7.00
2C40	5.50	6AU4GT	1.15	12AV7	1.10	807	1.15
2C43	6.50	6AU5GT	1.50	12AX4GT	.95	807W	1.25
2C51	2.00	6AU6	.75	12AX7	.85	809	3.00
2D21	.65	6AU8	1.20	12AY7	1.25	811	3.50
2E22	1.75	6AV6	.60	12B4A	.90	811A	4.95
2E24	1.90	6AW8	1.25	12BA6	.70	812A	4.95
2E25	2.50	6AX4GT	.90	12BE6	.75	813	8.50
2E26	3.40	6AX5GT	1.05	12BH7A	1.05	814	2.00
2E30	4.70	6B4G	3.50	12BK5	1.20	815	3.00
2E35	1.50	6B8G	.70	12BQ6GTB	1.55	816	2.25
2K25	9.95	6BC4	1.80	12BY7A	1.00	826	.50
2K26	34.00	6BC5	.80	12BZ7	1.05	829-B	8.00
2K28	30.00	6BC8	1.40	12CU5	.85	830-B	.25
2X2	.25	6BE6	.75	12CU6	1.55	832	3.75
3A3	1.10	6BG6G	2.25	12DQ6	1.55	832-A	7.00
3A4	.70	6BH6	.75	12SA7GT	.95	837	1.00
3A5	.75	6BJ6	.70	12SC7	.85	838	1.00
3AP1	3.50	6BJ7	1.00	12SK7GT	.95	866A	1.50
3AL5	.65	6BK4	2.50	12SL7	.75	872-A	1.25
3AU6	.75	6BK5	1.10	12SN7GT	.90	879/2X2	.25
3AV6	.60	6BK7A	1.15	12SQ7GT	.85	884	.70
3B4	2.25	6BL7GT	1.35	12SR7	.65	885	1.00
3B28	3.50	6BN4	.85	12V6GT	.75	889RA	75.00
3BE6	.85	6BN6	1.00	12W6GT	1.00	918	.85
3BC5	.85	6BQ6GT	1.50	12X4	.60	954	.10
3BN6	1.00	6BQ7A	1.35	15R	.20	955	.20
3BP1	1.50	6BS8	1.45	FG17	5.00	957	.20
3BU8	.95	6BU8	1.00	19AU4	1.20	958-A	.25
3BY6	.85	6BX7GT	1.35	19BG6G	2.25	991/NE16	.15
3BZ6	.85	6BY5G	1.15	KY21A	22.50	1613	1.50
3C24	3.50	6BY6	.80	RX21A	21.00	1614	2.75
3CB6	.85	6BY8	.90	24G/3C24	3.50	1616	.60
3CF6	.90	6BZ6	.80	25AX4GT	1.05	1619	.17
3CS6	.85	6BZ7	1.40	25BK5	1.25	1625	.20
3D23	3.95	6BZ8	1.60	25BQ6GT	1.55	1626	.15
3DT6	.80	6C4	.45	25CD6GA	2.00	1629	.30
3E29	6.00	6C6	.75	25CU6	1.60	1635	2.00
3S4	.85	6CB5	2.75	25L6GT	.70	1654	1.70
3V4	.85	6CB6	.80	25W4GT	.95	1852	.75
4-65A	13.50	6CD6G	2.25	25Z5	.65	2013	.50
4-125A	27.50	6CF6	.90	FG27A	7.50	2014	.50
4-250A	34.00	6CG7	.85	FG32	4.50	2050	1.25
4X150A	7.00	6CG8	1.10	35A5	1.00	Z0-3200	45.00
4BC8	1.40	6CL6	1.30	35B5	.90	5516	7.00
4BQ7A	1.40	6CM6	.90	35C5	.75	5517	.70
4BS8	1.35	6CN7	.85	35L6	.85	5528	4.00
4BU8	1.20	6CS6	.85	35TG	1.75	5557	5.00
4BZ7	1.40	6CU5	.90	35W4	.50	5558	4.00
4C35	13.50	6CU6	1.50	35Y4	.80	5559	5.00
4PR60A	35.00	6D6	.75	35Z5	.65	5588	35.00
5ADP7	17.00	6DE6	.85	50A5	1.10	5636	2.25
5AM8	1.15	6DT6	.85	50B5	.90	5637	2.50
5AN8	1.25	6DQ6	1.55	50C5	.75	5638	2.50
5AQ5	.75	6F4	2.25	50L6GT	.85	5639	2.95
5AS8	1.20	6F6	.90	RKR-72	.25	5642	1.50
5AT8	1.15	6F7	.95	80	.85	5651	1.00
5AW4	1.25	6F8	1.25	81	1.75	5654	1.50
5BK7	1.20	6H6	.45	83	1.35	5656	3.00
5BP4	3.00	6J4	1.00	100-TH	9.50	5667	75.00
5BQ7	1.40	6J5GT	.55	1IZ23	.85	5670	1.00
5C22	18.00	6J6	.50	VXR130	1.00	5687	1.50
5CG8	1.15	6K6GT	.80	4X150A	7.00	5691	4.50
5JP1	4.00	6K7	.75	274B	.40	5692	4.95
5J6	1.00	6K8	1.00	GL-299	1.00	5693	4.50
5LP1	7.00	6L6	1.15	307A	.50	5703	1.00
5R4GY	1.00	6S4	.75	311A	3.50	5704	1.00
5T4	1.10	6SA7GT	1.05	316A	.20	5718	1.00
5T8	1.20	6SC7	1.05	339A	5.95	5719	1.00
5U4GB	.75	6SJ7	.75	350A	2.00	5725	1.00
5U8	1.15	6SK7GT	.90	350B	1.50	5726	.70
5W4GT	.90	6SL7GT	.90	355A	7.00	5727	1.50
5Y3GT	.60	6SN7GT	.70	357A	15.00	5736	85.00
5Z4	1.25	6SN7GTB	.90	371B	1.00	5744	.80
6A7	1.00	6SQ7GT	.85	394A	3.00	5749	.85
6AB4	.60	6T4	1.30	396A	2.00	5750	1.75
6AC7	.75	6T8	1.15	401A	1.50	5751	1.35

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See **TERMS** on other BARRY AD on Page 117 of this issue.

BARRY ELECTRONICS CORP.

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Phone: WAlker 5-7000

For further information, check number 54 on page 126.

FOR SALE (cont.)

BARGAINS-NEW GUARANTEE: SX-88 $449.00; Roto-brake $49.50; Leece-Neville 6 volt $35.00; Gonset 30-40 mc FM tuner $39.50; P-H LA400 linear $99.50; P400GG linear $159.00; BC610 with tuner $425.00; Gonset 500W linear $199.50; Elenco 77 SSB $375.00; Elenco PA400 linear $99.00; KWM-1 $650.00; BC-221 $49.50; James C1450 $49.50; DX-35 $55.00; Scout 680 $84.50; LA-1 linear $89.95; NC183D $319.00; NC300 $299.00; Globe Chief 90 $44.50; Globe Champ 300A $399.00; King 500 $425.00; HT33 linear new Demo $595.00; HT-30 SSB $339.00; HT-31 linear $289.00; test and audio equipment, inquire. Trial, terms, write Leo, WØGFQ Box 811, World Radio Laboratories, Council Bluffs, Iowa.

MERCURY TURNSTILE: a horizontally polarized omni-directional mobile or fixed antenna. "The most for two meter mobile." $3.95. Mercury Enterprises, Box 273C, Granby, Connecticut.

ELMAC MOBILE STATION: PMR 6A, AF67, power supplies, Master Mobile all band antenna, relays and cables ready to operate push-to-talk. $225 or trade for fixed station receiver. Also Heath Q-multiplier $7. David Dennis, K8ATS, 221 E. Beecher St. Adrian, Michigan.

ATTENTION: Don't miss the opportunity of a life time. As result of job relocation and moving, must sell beautiful RCA type Commercial Broadcast 1KW transmitter, operates all bands. Will sacrifice for best offer over $500.00 plus shipping or will consider even trade for 32V3, Viking Valiant or 500 or what have you. Need something more portable. Write for picture and details. Also have Dumont oscilloscope 208-B $50. Ferris signal generator $125. PE 103 new $18. Gasoline generator like new 550V 250ma and 6.6V 4 amps DC. $70. Griffeth, W3FSW, 1042 Pine Heights Ave. Baltimore 29, Md.

FOR SALE: New 1959 World's Largest Electronic Catalog, 1536 pages. Weighs 7 lbs. $3.50—We refund your $3.50 on purchases of $25.00 or more. Spera Electronics, 37-10 33rd Street, Long Island City, New York.

DUMONT 208 oscilloscope $45, RX R23/ARC-5 receiver $10, RME-84 receiver 550kc-44mc $40 RBM-4 Navy receiver 200kc-2mc $30, surplus tech manuals $1.00. W3IHD, 4905 Roanne Drive, Wash. 21, DC.

FOR SALE: Pacemaker, latest model, mint condition $335. Collins 32V3 (factory converted 32V2) built in NBFM coax relay & low pass filter. Excellent cond. $350. Want measurement's Corp. Sig. Gen. Model 82 or 65B or GDO. W2FUR, Sidney Gogel 1096 Laux Place, No. Bellmore, L. I. N. Y. SUnset 5-6876.

SELL: A complete Heathkit rig containing a DX-35, VF-1, AR-3, QF-1. Will take bids starting at $80. W3LZU, David Broadt, 23 N. 15 St. Lewisburg, Penna.

FOR SALE: Transformers, tubes, chokes, command transmitters, variable inductors, 4D32, 813 milien GDO. Send stamp for list. W5SZB, Box 330, Edinburg, Texas.

FOR SALE: Gardiner, Type-S, code machine, ten tapes—$20.00. W7WTG, 16726 North Park Avenue, Seattle 33, Washington.

HALLICRAFTERS S-76, very good condition, less speaker, $78. Canadian made RCA AC-DC, portable SW receiver, Model 36 QP. Tunes $550 to 22,000 KC Good condition except for slightly chipped bakelite casing. $22. Brand new Gonset 3-30 SW converter. Never used. Wired for 12V. but also good on 6V. $30. P.E. C/o CQ Box 73, 300 W. 43 Street.

AT LAST! Custom frame to fit ham license. $1.50 includes mailing. Two-week delivery. Choose black, green, red, gold. Money order or check to Farmil Crafts Co., Box 461, Warner Robins, Ga. (W4UZS).

ATR INVERTER: Brand new. 12vdc to 110vac. 125 watts intermittent, 100 watts continuous, $25. Harold Bullion, 439 Ave. "P," Brooklyn, N.Y., ES 5-2264.

DELUX CALL LETTERS: Engraved, polished black phenolic laminate 2½" white letters on 3½" x 14" x 1⅛" blank, $1.75. P. P. J. Mudry, W8LWW, 3701 Germaine, Cleveland 9, Ohio.

ELDICO SSB100A 150 Exciter/Transmitter. Most versatile equipment on the air. A complete all band AM SSB transmitter, only $425.00 FOB New York. In perfect condition K2MQO, 130 East End Avenue, New York 28, N.Y.

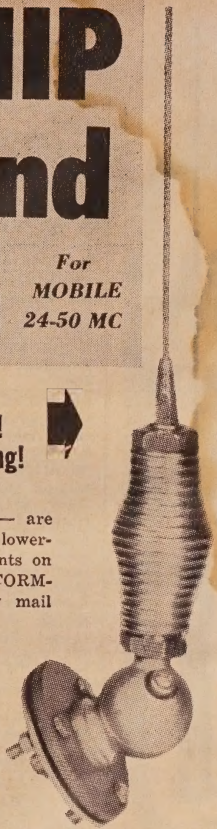
Now for the FIRST TIME!

WHIP BASE and SPRING

For MOBILE 24-50 MC

- 96" Stainless Steel Whip!
- Cast Aluminum Swivel Base!
- Heavy-Duty, 100° Turn Spring!

ALL THREE — whip, base and spring — are completely packaged at Radio Shack's lower-than-amateur-net price! Fits all cars! Mounts on any body surface! Gives BETTER PERFORMANCE . . . at LESS COST! Order by mail (#29D065), shpg. wt. 6 lbs.



$8.75
REGULAR LIST $14.95

New! Get all 3 Bands

Automatically Without Adjustment



TRIPLE BAND LOADING COIL FOR 25-15-10 METERS

Sensationally new High-Q Center Loading Coil is completely AUTOMATIC, requires NO TUNING! High impact plastic case is sealed to prevent water shorts and humidity effects. Rugged construction, precision made. Order by mail (#29D826), shpg. wt. 1 lb.

Amateur Net
$14.95

THE ANTENNA SPECIALISTS CO.

New Auto Bumper Mount



- No holes to drill!
- Fits any width bumper!

For 1953-1959 auto bumpers! Double-chain, Z-shape links are easy to fit, adjustable. Cadmium plated, alloy steel. Phenolic insulators.

Amateur Net **$7.95**

Order by mail (#29D073), shpg. wt. 2½ lbs.

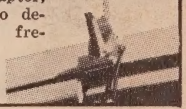
Auto UHF Whip

108-176 Mc. 450-470 Mc.

- Jiffy mobile mounting!
- Clamps to rain gutter!

Amateur Net **$6.90**

Mounts in seconds! Has 12-ft. RG-58/U cable and PL-259 adaptor, plus whip cut to desired length for frequency specified.



Order by mail (#29D084), wt. 1½ lbs.

YOURS FREE!

24-page Bargain Circular

- Ham Gear
- Parts
- Electronics
- Lower Prices
- Hi-Fi Equipment
- Records, Tapes
- Hundreds of Wonderful Values!

RADIO SHACK CORPORATION



- 730 Commonwealth Ave, Boston 17, Mass.
- 167 Washington Street, Boston 8, Mass.
- 230 Crown Street, New Haven 10, Conn.

ORDER BY MAIL

Radio Shack Corp. Dept 3C
730 Commonwealth Ave., Boston 17, Mass.
Please send me:

- ☐ Whip, base, spring set (#29D065), $8.75
- ☐ 3-band tuning coil (#29D826), $14.95
- ☐ Auto bumper mount (#29D073). $7.95
- ☐ Auto UHF whip (#29D084), $6.90
- ☐ Free 24-page Bargain Circular

I enclose ☐ Check ☐ Money-Order ☐ C.O.D.

Name _____

Address _____

City _____ Zone ____ State ____

For further information, check number 55 on page 126.

transmit

TO DOUBLE the distance!

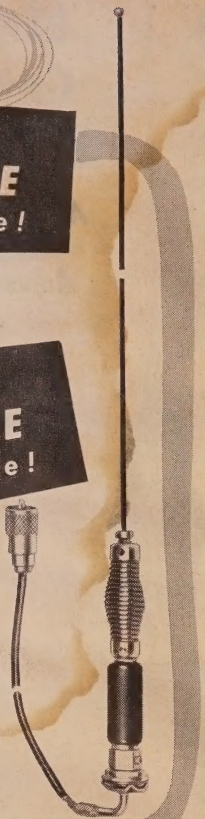
receive

FROM DOUBLE the distance!

with

ASP-177

½ WAVE LENGTH
HIGH GAIN
Roof-Top
Antenna



...here's why

- 3 DB gain doubles effective transmitter power. Eliminates dead spots.
- Receiver is 1.56 times more sensitive (4 DB) . . . increasing range. Audio quality is improved.
- Tamper-proof and weather-proof impedance matched transformer.
- Solderless weather tight mounting unit fits ¾" roof top hole.

With this ASP-177 (130-174 Mc) Roof-Top Antenna you can *hear* the mobile you couldn't hear before and *talk* to any mobile you can hear. Why pay $300.00 for a more porwerful transmitter when the ASP-177 will do the same job. See this new antenna at your distributor or write us for literature.

ASP-177 . . . . . *Only* $24.00
includes 12 ft. R. G. 58/U Cable and PL-259 connector

Another Fine Product From

the antenna specialists company

12437 Euclid Avenue · Cleveland 6, Ohio · Sweetbriar 1-7878

For further information, check number 56 on page 126.

FOR SALE (Cont.)

SELL: 25-44 mc double conversion FM receivers with 13 tubes $1600 each. Hard to get 12 volt low voltage input brushes for DM34 DM35 DY35 DY88 12 volt dynamotors. Ralph Villers, P.O. Box 1, Steubenville, Ohio.

SOMETHING NEW AND USEFUL for $1.00. Flexible holster for soldering gun; fits all types; facilitates work bench storage; easily mounted and no more burned fingers or tabletops. Postpaid, money back guarantee. Box SK, c/o CQ, 300 W. 43.

SELL: National NC125w/spkr.—$100; Heath DX-35—$50; Heath AR-2 good condtn. $20. Jon Wood, WØUHL, 613 Central, Humboldt, Kansas.

RECEIVERS: All Hallicrafters, Hammarlund, National. Big trade allowance. Jim Stout, W3VGZ. J. V. Stout Co. 4640 York Road, Baltimore 12, Maryland.

SELL: HRO-5 matching speaker. 4 coils. Central Electronics Model A slicer with AP-1. $200.00. Will not ship. Excellent condition. Tel. EV 6-9426 after 6 P.M. K2RAI, Joe.

SIX METER GONSET COMMUNICATOR III with Gonset VHF power amp for six meters and D-104 mike for sale. Asking $400. 2 months old, excellent condx. Jay Sewell, 3001 East 14 St., Belton, Texas.

MOBILE: New AF67, G66B/w AC/DC power supply. Master Mobile all band antenna. Transistor power for AF67. $315 prepaid. Deliver 200 miles. J. O'Brien, 33 Highland Drive, Iowa City, Iowa.

FOR SALE . . . Collins 32VI; Hammarlund 110C with speaker; coax relay; Bud-low pass filter; Mosley tri-band ground plane; Turner mike. Exc. cond. This complete station $450.00. All mail answered. K2IFL, Sam Lieberman, 130/29 228 Street, Jamaica 13, N.Y.

NC300 with three UHF converters in cabinet; Viking ranger. First check for $425 takes outfit. Victor Komow, 335 Spencer Place, Paramus, New Jersey.

SELL: Lakeshore Phasemaster 11 with VFO, $235; SX-96, $165. Both perfect. Hall, 733 Fillmore St., Gary, Ind.

GLOBE KING 500B transmitter. Extra 4-250A. Excellent condition. $450.00. W9TQX, Les Galloway, 249-173rd Place, Hammond, Indiana.

CRYSTALS AIRMAILED: New crystals. Novice, Net, Converter, CAP, MARS, General. FT-243. Custom finished to .01%. Any kilocycle, 3500 to 8700 99¢. Small hermetic holders, .050" or .093" pins $1.95. Airmailing 9¢ per crystal. SSB crystals in sets or singles including KWM-1 conversion. Write and let us know your crystal needs, we have them all. Crystals since 1933. C-W Crystals, Box 2065-C, El Monte, Cal.

W8JS moving, spring house cleaning, Write Rich, 3425 Middleton Ave., Cincinnati, Ohio.

HQ-129X, spkr. $129. NC-300, $269. SP-400 .5-40MC $175. SP600 $495. NC-183D $279. SX-101, $295. R-9 $85. 51J-3 $575. New parts for 4-250As in KW final $99. 310C $89. T47A/ART-'3 $75. LM $55. Boehme Keyer $95. Teletype printers, perforators, tape transmitters. 12000 ohm relays, $2. All types transmitters, receivers, test equipment purchased or taken in trade for NEW Johnson, Hallicrafters, Hammarlund, National, Mosely, Fisher HI-Fi, etc. Write Tom, W1AFN. Alltronics-Howard Co., Box 19, Boston 1, Mass. RIchmond 2-0048. (Store: 60 Spring, Newport, R. I. Fred, W1JFF.

FOR SALE: Complete mobile station, Gonset G66; Gonset Universal power supply with built in speaker/6VDC: 12VDC . . . 115VAC. Gonset-G77 and 6, 12V, power supply and modulator. Master matcher and field strength meter. 6V, micro-Z-match. Master mobile 20, 40, etc. coils. Center mounting 4 high pass condensers. $375.00. K2HAM, Swedgal 258 Broadway, New York 7, New York.

WANTED

WANTED: TELETYPE TG-7 and Model 15 and parts, printers and reperforators, etc.; COMM'NS REC'V'RS AND XMTRS, e.g. BC-610-E, -I, BC-939A, Collins 51J, 17L3, -4; R-388 and R-390/URR; 18S-2, -3; ARN-14 and -30; APR-9, -10, ARC-21, 27, etc.; APS-31, -33; and TEST EQP'T, with TS- or I- prefix. We pay freight. AMBER INDUSTRIAL CORP., 75 Varick St., N. Y. 13, N. Y.

WANTED: All types of communications receivers, transmitters, test equipment, teletype equipment, factory built amateur gear. Cash or trade for NEW HT-32, Valiant, Thunderbolt, SX-101, NC-303, Fisher HI-FI, etc. Write Tom, W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (RIchmond 2-0048) Store: 60 Spring St. Newport, R. I. (VIking 7-3435, Fred, W1JFF)

WANTED (cont.)

WANTED: Skyrider Diversity receiver in new condition. Box 48, CQ Magazine, 300 W. 43rd St., N. Y. 36.

WANTED: Coil set "A" for HRO-50T. E. V. Fortmiller, W7MMC, 575 Superior S. Salem, Oregon.

WANTED: Receivers, Transmitters, Test sets, Teletype, all types military or commercial surplus, aviation, ground, 51R3, 51R2, 17L3-4, 51V-1-2-3, ARN-14, BC348, ARN30, ARN18, 18S4, others advise condition price WE pay COD. RITCO, Box 156 Annandale, Virginia JEfferson 2-5805.

WANTED: TELETYPE parts for personal use. John Riley, 914 N. Cordova, Burbank, California.

QSL

QUALITY QSL's Samples. 10¢. Lee, W5CZA, Box 7171, Oklahoma City, Oklahoma.

YOUR BEST CONTACT (spiritual side of ham's life) Folder free. "Rus" Sakkers, W8DED, Holland, Michigan.

QSL's??? LARGEST variety samples 25¢ (refunded), CALLBOOKS (spring) $5.00. "Rus" Sakkers, W8DED, Holland, Michigan. (Religious QSL samples 25¢.)

QSL's-SWL's: High quality, reasonable prices. Samples. Bob Teachout, W1FSV, 204 Adams Street, Rutland, Vermont.

QSL's, OM-YL, AM-FM-SSB-CW, VHF-UHF, MARS. Special offer samples 10¢. Onondaga Press, Onondaga, Michigan.

QSL's-SWL's: That are different, colored, embossed card stock, and "Kromekote." Samples 10¢. K8AIA, Box 953, Hamilton, Ohio.

SAVE TIME, SAVE MONEY, DX QSL's forwarded 2¢ each after membership. Free flyer, "DX QSL COOP," Box 5938, Kansas City 11, Missouri.

QSL's—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pa. Samples, 10¢, with catalogue, 25¢.

CREATIVE QSL AND SWL CARDS. Are you proud of your card? If not, let us print your next order. Write for free booklet and samples. Personal attention given to all requests. Bob Wilkins, Jr., Creative Printing, P.O. Box 1064B, Atascadero, Calif.

QSL's-SWL's; $2.75 per 100, QSO file cards $1.00 per 100, Samples 10¢. Rusprint, Box 7507, Kansas City 16, Missouri.

QSL's: Samples, dime. Print Shop, Corwith, Iowa.

QSL's, Glossy samples 10¢. W1TBB Press, 807 Main Street, Winchester, Mass.

QSL's, SWL's, VHF's, XYL-OM's. (Sample assortment approx. 9¾¢.) Covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fatabulous. DX-attracting, prototypal, snazzy, unparagoned, cards. Rogers KØAAB 737 Lincoln Ave., St. Paul 5, Minn. Also glamorous, pulsating, super-passionate. (Wow!)

QSLs — Outstanding — original — fast service — reasonable prices. Samples 10¢. Larger quantity 25c Refundable. VYS QSLs, 1704C Hale, Ft. Wayne, Indiana.

QSL's—SWL's: Samples 10¢. Bolles, 7701 Tisdale, Austin 5, Texas.

GLOSSY 3 color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, New Brunswick, N.J.

QSL SPECIAL—Free sample. Nat Stinnette, W4AYV, Umatilla, Florida.

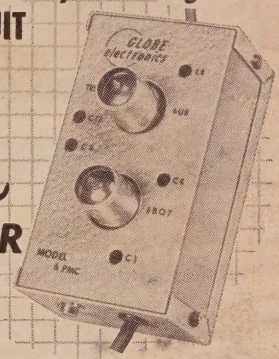
NEW FOR FIXED STATION OR MOBILE USE

Globe's Completely Re-Designed PRINTED CIRCUIT 6 Meter CONVERTER

MODEL 6-PMC

WIRED & TESTED: $29.95

IN KIT FORM: $21.95



HIGHER GAIN GREATER SENSITIVITY

This new and improved model of the popular Globe 6-Meter Converter now offers better signal-to-noise ratio through improved circuitry. Has highly stable, crystal converter with Cascode RF Stage and band pass coupling, made with two output frequencies, enabling converter to be used with many types of communications receivers plus 6 or 12V auto radios for mobile use. Kit extremely simple to assemble with printed circuit. Complete with 6U8 and 6BQ7 tubes, crystal, receiver input cable and power cable. Size: 3x5½x4½.

Before You Buy . . .

LOOK AT THESE TOP FEATURES!

★ New improved circuit provides higher gain, better signal-to-noise ratio.
★ Completely shielded to minimize feed-through of unwanted signals.
★ Printed circuit for simplifying kit assembly.
★ Works with most receivers on the market today, including home broadcast receivers and car radios using proper converter.
★ Highly stable, crystal controlled oscillator.
★ Measures only 3x5½x4½"; complete with tubes, crystal and connecting cables.
★ B plus requirements 150-250V at 15-18 Ma. Provisions for changing filaments for 6 or 12V operation.
★ Available—Model 6PMC1: 10-14 Mc. output. Model 6PMC2: 600-1600 Kc. output.

VIRGINIA'S LARGEST HAM SUPPLIER

Key ELECTRONICS

124-126 S. Wayne Street Arlington 4, Virginia

JA 8-4575 JA 4-5422

For further information, check number 57 on page 126.

KEEP CANDEE HANDEE!

TWO TRANSFORMER BARGAINS!

PLATE TRANSFORMER: Pri. 115 V or 230 V @ 50/60 cycles. 280 V @ ½ amp. and 120 V. bias winding. Hermetically sealed. Good condition. **$7.95**
A. J. J. Candee Special!

12 V. VIBRATOR TRANSFORMER: 135 VDC output @ 118 mils. Also may be used as 6 or 12 V. filament transformer when wired backwards. Hermetically sealed. New. Ea. **$1.95**

SAVE BY BUYING THREE FOR $5.00!

HICKOK MODEL 547 TUBE CHECKER
Mutual conductance. Includes chart. Also tests special purpose tubes. Excellent condition. Excellent buy! Only **$69.95**

R-435/VRC-2X FM RECEIVER
Crystal controlled, single channel, covers fire, police freqs. Double conversion superhet. 455 kc & 4.3 inc. IF's. Noise squelch, double limiter stages, loud speaker output. Complete with 24 VDC vibrator supply, tubes, less crystal. Special **$14.95**

RAX-1 RECEIVER
4-band, 4½" dial, AVC, MCW, CW, phone jack and volume control. Voltage required 24VDC and 200V @ 80 ma. Complete with 7 tubes. All excellent. Unit No. 1: 200-1500 kc.; Unit No. 3: 7,000-27,000 kc. Each **$17.95**

G.E. PYRANAL OIL-FILLED CONDENSERS
Cat. No. 18F209. 120 MFD @ 3,000 VDC. F.B. for hams. Makes good component for arc welder. Excellent cond. Sold at fraction of original cost. ONLY **$69.95**

Gudeman Oil-filled Cond. 60 mfd @ 4,000 VDC. Excel. $49.95

AC POWER SUPPLY
Made for BC-603 & BC-683 Recvrs. Just plug in. No mod. Wired. New. **$11.95**

ARC-5 COMMAND EQUIPMENT

T-19 TRANSMITTER: 3-4 MC. Excel. cond.	$5.95
T-20 TRANSMITTER: 4.5-3 MC. Excel. cond.	3.95
T-21 TRANSMITTER: 5.3-7 MC. Excel. cond.	3.95
FAMOUS Q-5'ER RECVR. 190-550 KC	12.95
MD-7 PLATE MODULATOR: Excel.	6.95
BC-442 ARC-5 ANTENNA RELAY. Excel.	1.95

T85/APT-5 TRANSMITTER
Has lighthouse tube 3C22 oscillator in tunable cavity modulated by two type 829B tubes powered by 931 noise generating photocell. Output approx. 30 W. CW @ 115 V, 400 cycles. Excellent cond. **$49.95**

All items FOB, Burbank, Calif., subject to prior sale. In Calif. add 4%. Min. order $3.95.

J. J. CANDEE CO. Dept. C.Q.
509 No. Victory Blvd., Burbank, Calif.
Phone: VIctoria 9-3053

For further information, check number 58 on page 126.

GENE VAN SICKLE W9KJF

Features Ham Gear at low prices in New Electronic Shopping Center

IN STOCK —
- HALLICRAFTER
- NATIONAL
- HAMMARLUND
- GONSET
- WRL GLOBE
- HY-GAIN ANTENNAS

Long Trades, E-Z terms



VAN SICKLE RADIO SUPPLY CO.
4131 KEYSTONE AVE., INDIANAPOLIS 5, IND.
EZ to find on the NE side — One acre of parking space.

AMATEUR SPECIALS

RCA Jr. voltohmyst WV-77A. New, factory sealed box. W/ Probes, cables and inst. book. Limited supply $34.95
Soldering Iron TL-601, 6/12 VDC 10 ft. cable, battery clips and sw. Quick-heat, heavy duty thru-out $3.95
Global non-ind res 600 ohms 118 W. Use 12 in parallel to make 50 ohm 1.4 KW dummy load $1.25 ea. or 12 for $12.00
Plug in trigger amp. p/o AN/PDR-27C radiac set. Contains 3. CK502AX tubes plus precision parts ..... ea. $ .99
RCA 931A photomultiplier tube $2.65 ea. or 2 for $5.00
All Orders Postpaid. Satisfaction Guaranteed.

MIL-E SUPPLY CO.
FORMERLY ARKAY ELECTRONICS
P.O. Box 23 Ft. Geo. Sta. N.Y.C. 40, N.Y.

SWAP OR SELL

RADIO MAGAZINES. Buy, sell, trade. Bob Farmer, Plainview, Texas.

Will trade large model railroad in vy gud condition, worth $330, new, for SX-28 or equivalent rcvr. K9PQG, 225 Lorraine Rd., Glen Ellyn, Ill.

TRADE OR SELL for RTTY printer: RDO receiver covers 38 to 1000 mc. Tuning units included W5KQJ, Lilburn Smith, 3004 Second Place, Lubbock, Texas.

SWAP OR SELL: LM-13 Freq. meter with book, $35. 0-1 ma meters, $4. 0-50 micro amp multi scale, $5. 829B, $6. 832A, $4. GL592, $20. 4E27, $10. National air tuned IFs, $2. Xtal filter, $5, etc. Stamp for complete list. Want mint F-VF stamps—prefer U.S., Vatican, Switzerland, Ireland. Make offer. W4DWF, 911 26th Place, So., Arlington 2, Virginia.

BOAT WANTED: I have like new NC-300 with xtal calibrator and 2nd Gonset Communicator II 12 volt model for 2 meters. Also Elmac A54H mobile Xmtr, W2ZEW, Ronald Schwendt, 5 Brook Lane, Bordentown, N.J.

MISCELLANEOUS

FIFTH ANNUAL Syracuse VHF Roundup, October 10, 1959.

HAM Licenses, resident courses, 3 evenings weekly. Prepare for Novice Class in 4 weeks. General class in 2 months. Delehanty Institute, 117 East 11th St., New York 3, N. Y. GR 3-6900.

DECORATE YOUR CAR WINDSHIELD WITH YOUR CALL LETTERS. Attractive 1" letters and numbers available in gold or black. Complete single set 75¢, two sets for $1.25. Include name, call, address and color preference. Money refunded upon return of unused decals if not satisfied. All orders must be prepaid. Send to Box RJ, c/o CQ Magazine, 300 West 43rd St., N. Y. 36, N. Y.

HUMOROUS BOOK JACKETS: "Three Band Interlace for the Well Dressed Ham", "Propagation Without Sex". 6 titles on each jacket 50¢. 5 sets available for $2.00. Fun Art, 676 8th Avenue, NYC.

HEATH SG8 [*from page 41*]

signal generator frequency from the "RF Out" connector it is possible to secure other usable signals and their harmonics, the frequencies depending on the sum or difference of the two fundamentals. This is similar to the method shown in the December 1955 issue of CQ.

By feeding both the crystal output and the rf output into a receiver a check point is obtained, and the signal generator dial may be set correctly by zero-beating the two frequencies and adjusting the signal generator dial accordingly. It will also be found useful for checking crystal activity.

With a weak crystal it is better to connect the center conductor only of the output cable to the receiver, otherwise the crystal may stop oscillating, but with other crystals better output may sometimes be obtained by connecting the conductor shield to ground also. ■

RABBIT [*from page 40*]

back at a convenient point, and a length of hook-up wire attached from the braided shield to the wire making up the body of the dish. After this was done, a raid on the kitchen produced enough aluminum foil to cover the entire

shield, and the unit was ready to go into action. Complete bill of parts was as follows:

1 length scrap lumber 4′ more or less for handle
2 wood screws to attach di-pole support
1 random length scrap lumber for dipole support
9½″ of copper automobile gas tubing
20″ circle of common copper window screening
enough alumium foil to cover screen
lead in of 72 ohm co-ax

After completion, a check with a Grid Dip Oscillator indicated that the antenna was most efficient at about 144-145 megs—and, as it turned out, nearly perfect in performance at the frequency for which it was intended. It did offer two problems in use—one mechanical and the other electronic in nature. Mechanically, the antenna dish has a tendency to turn inside out like an umbrella in a wind-storm when it is put in action while the car is in motion on the hunt, but a flip of the wrist turns it back to normal. More seriously, it is electronically almost too directional; if the antenna is not aimed directly at the hidden transmitter's source of *rf*, it fails to produce any reaction in the associated receiver. We quickly learned to make long, slow sweeps in a circular pattern with the antenna, raising its path after each pass to allow for an antenna located above ground by any appreciable height. In this way, an indication of position is received both by ear and by the closing of the "eye" of the "magic eye" tube in the Gonset.

After the hunt was over, the operators of the hidden "rabbit" transmitter reported that the "eye" in their Gonset closed tight every time the dish reflector antenna crossed their position with its radiated lobe of *rf* when we were broadcasting. Apparently the unit functions much like a standard flashlight, throwing out a long, narrow beam of energy which is highly directional in nature, and possesses considerable *rf* gain along the lobe.

We're looking forward to the next "rabbit hunt" to see if the dish reflector is equally efficient on its second trip into action. At least one other group of members of the Communications Club of New Rochelle plans to make a similar unit before next month's hunt. ■

IN THE BEGINNING [*from page 39*]

obscenity. This flaunting disrespect and orneriness couldn't survive. Each new incident spurred control a little nearer. The inevitable happened in 1912.

On August 13, 1912 Congress passed a bill for regulation of wireless. It amended interstate commerce laws extending their range to include transmission of intelligence by wire and wireless. This included regulation of radio-telegraphic communication. Congress placed juris-

EMERGENCY PORTABLE POWER PLANTS

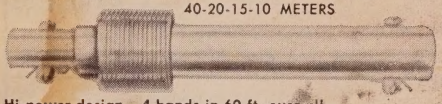


Push Button Start — 115 V AC (and 12 V DC). Always available. Only unit at these low factory prices fully shielded and filtered for radio, and individually checked by scope. Brand new 4 cycle easy starting engines, fiber glass insulated generators, and control boxes with voltmeter. Conservatively rated. Just the generator for CD, Field Day, Camping and Boats.

700 watt (A712) Shpg. wt. 77 lbs.....$143.50
1000 watt (A1012) Shpg. wt. 90 lbs..... 195.50
2500 watt (A2512) Shpg. wt. 225 lbs..... 325.50
Sizes to 3500 watts. F.O.B. factory
Dual voltage models, automatic controls, etc., available.

GENERAL ELECTRONIC SERVICE CO.
372-C Wilmot Ave., Burlington, Wisconsin

NEW 60-FT. 4-BAND ANTENNA
40-20-15-10 METERS



Hi-power design. 4 bands in 60 ft. over all.
Will handle 2 KW of well over-modulated AM carrier.

40M-C 4 band KW coils.....$14.95
40M-A 4 band KW antenna..... 24.50

FIVE-BAND ANTENNAS

HC-F 5 band KW coils.....$19.95
HA-F 5 band KW antenna..... 33.95
5BC-F phone coils; 5BC-C CW coils..... 12.50
5BA-F phone; 5BA-C CW antennas..... 27.50
All antennas have
88 ft. KW twinlead, heavy-duty insulators, copperweld wire.

GENERAL CRYSTAL COMPANY, INC.
372-C Wilmot Ave., Burlington, Wisconsin

PRECISION QUARTZ CRYSTALS



For precision frequency control, you can depend on the General Crystal line of high and low frequency quartz crystals. They are available to meet your most exacting and specific requirements. Filter crystals, delay lines, diffraction materials and other special applications designed and produced to your specs. Close tolerance quartz crystal blanks and plates. Transducers for Ultrasonics. Crystal Ovens to give precise frequency control to 1 degree C. Write for engineering assistance and catalog.

POSTPAID IN U.S.A.
MONEY BACK GUARANTEE

Hams — for crystals of high activity, made of strictly new materials with consistent quality control, order General.

GENERAL CRYSTAL COMPANY, INC.
372-C Wilmot Ave., Burlington, Wisconsin

For further information, check number 59 on page 126.

ALL BAND TRAP ANTENNA!



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diction of this law under the Department of Commerce.

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To be continued

DOUBLE SIDEBAND [*from page 3*]

Bias Supply

The bias supply could just as well be replaced by batteries, if preferred. We used the variable circuit shown here because it lent itself to experimentation, but nothing was actually gained by this except some nasty reports on the air when we ran the bias too high or too low. In any event 37 volts is about optimum. If you use this kind of supply don't think you can omit the large filter condenser. This is not to reduce hum but to provide stability. The bias wants to soar under modulation otherwise. The 6L6 could be operated with cathode resistor bias at slightly reduced output, but one bias supply can well serve both tubes, so we used fixed bias on both.

Oscillator

The crystal oscillator is an old friend, the modified Pierce, and is readily converted to a multiplier or driver when the vfo is plugged in. The plug needs only to include a jumper to shunt the .006 screen condenser to ground instead of to the crystal, thereby making it an rf bypass condenser instead of a dc blocking condenser as it is when the crystal is in use. The octal socket on the front panel provides plenty of extra terminals for supplying power and keying circuits to the vfo. K9BDO uses a heterodyne vfo but you can use whatever you prefer, or else stick to crystals.

Speech Amp

There is nothing very special about the speech amplifier, and if you have one you prefer, by all means use it. Note only that this one includes rf filtering, and that one of the cathodes is keyed to prevent any audio feedback when the mike is close to the loudspeaker. (Even low level leakage signals can be annoying.)

No provision has been made for voice control for two reasons: (1) push to talk is simpler to build, and (2) we don't like voice control because unintended transmissions occur through its use. Most hams prefer it, of course, and there is ample room on the chassis to include this feature if desired. Suitable circuits are

readily available elsewhere.

Coils

Plug-in coils are used throughout this rig mainly for simplicity, but also in anticipation of possible changes in band allocations soon. A plug-in coil rig does not go out of date; you simply rewind the coils! An unusual feature is seen in the 1625 output coil. This is wound on a six prong form, the extra pins going to taps to permit impedance matching. A 5 position rotary switch selects from four low impedance and one high impedance point, which permits us to match the cathodes of a grounded grid final, a coaxial line to an antenna, an antenna tuner, or what-have-you. Since there is no dc on the coil, and it is returned to ground, this makes about the most flexible output system you can have for the effort and cost involved.

The oscillator and mixer coils are wound on four and five prong forms respectively. The grid swamping resistor for the 1625 is selected experimentally for each band and mounted in the bottom of the coil form. Its value is not critical, nor is the resistor even absolutely necessary, but swamping helps stabilize the load on the balanced mixer, and just as with power supply circuits, the more stable the better where sideband is concerned. Use the smallest value of resistance consistent with adequate drive to the 1625. A resistance of 5000 ohms is typical.

Operation

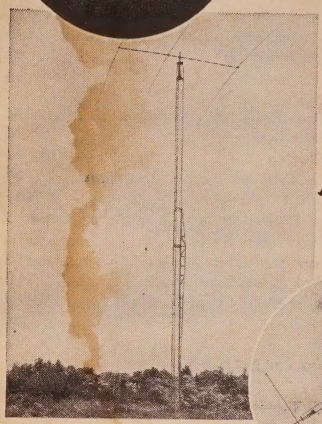
AM people may be surprised that no meters are included in this exciter. The reason is that they are entirely unnecessary. Initial tune up is best done with a single turn loop soldered to a blue bead dial light bulb coupled to each coil in turn. Once the dial settings for oscillator and mixer are determined and recorded, they need only slight touching up later on. The output from the 1625 can be fed to a 40 watt light bulb. If all is well, when you whistle into the mike it should light to full brilliance and then some. Once the exciter is actually on the air, the best way to adjust all the tuned circuits is with a field strength meter. Any other measurement is too indirect for real significance.

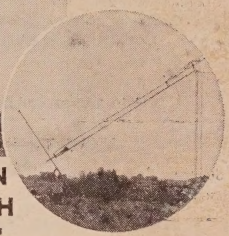
Except in the few instances noted, no special parts are required, which means that many hams can build this rig right out of their present junk box. Anything which improves the power supplies improves the signal, so if you are blessed with lots of fine filter condensers, pile them on. We used what we had, and would have used more if they had been handy.

That's about all there is to it. If you can build a decent CW or AM rig, you can build this one, and most of the sideband gang will not even notice that it is double sideband unless you tell them. I'll leave it to you and to the xyl to figure up all the money you can save.

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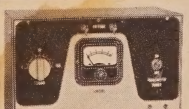
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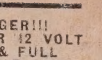
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1	1.30	2.00	4.90	8.15
2	2.15	3.00	6.25	11.10
3	2.90	4.00	8.60	13.45
6	4.15	8.00	18.75	31.90
10	6.10	12.15	26.30	41.60
12	7.75	14.90	30.95	43.45
20	12.85	24.60	49.90	76.75
24	15.00	29.45	57.50	81.15

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.

TR4001 @ 1 Amp† ea/sec/winding ... $4.50
TR4002 @ 2 Amp† ea/sec/winding 6.90
TR4003 @ 5 Amp† ea/sec/winding..... 8.65
TR4005 @ 12 Amp† ea/sec/wnds.... 16.70
TR4006 @ 24 Amp† ea/sec/wnds.... 35.30
TR4007 @ 50 Amp†* ea/sec/wnds 57.45

†Wndgs in Series at Ratings shown: Parallel 2X Current. Voltage output. 0-9-15-18

RECTIFIERS 130V/RMS HALF-WAVE

75Ma 49¢, 5 for $2; 100Ma 59¢, 6 for $3
150Ma 70¢, 8 for $5; 250Ma 79¢, 6 for $4
300Ma 88¢, 5 for $4; 350Ma $1.00, 8 for $7
400Ma $1.10, 5 for $5; 500Ma $1.35, 5 for $5
Postpaid 48 states orders $10.

New Silicon 500ma./ 260V RMS/400 P.I.V. 100°C Hmt Sealed $1.50@, 4 for $5.40, 20 for $25 New Meter Diode overload protection 90¢@, 2/$1.50



"TAB"—THAT'S A BUY!—BARGAINS!!

BC696/3 to 4 mc's good condition $5.95
AN-ARR2/RCVR as is/good parts $1.50
RDZ/USN 200-400 Mcs Revrs As Is $25
RAX/MPN revr covers 4 bands 1.5 to 9 mc's 8 tubes has BFO superhet, Vernier Band Spread $24.00
60Mc's/IF-Strip $5.00
366A/2 Combo & Fil XFMR/7.5KV Ins 5.98
LM-7 Navy Freq-Mtr 195KC to 20mc s .01% Gd cndtn.....$72
BC221 Frek Mtr—gd cndtn.....$90
BC312 used good cndt $70
BC779 Super-Pro—used less cabinet... $75
ART13—Used Good Cond $59
TS34AP—W.E. scope used G/ctdn $69
G.E./YRS-1 Side Band Selector $45
829B Socket 85¢, 2/$1.50. 813 Socket $1
4x150 Socket 120-109 Johnson Air $3.75
4ff150 Ceramic/LOKTAL 2 for $1.00
CARDWELL Dual 110 or 220mfd/¼" $5
CARD Dual 50 or 100mmfd/171 gap $4
Blower 24VDC/100CFM $3.98
Blower AC/Miniature 6&12VAC $1.00
AN Voltmeter 0-30VDC $2.49@, 3 for $6.00
Xmitting Mica's .006 @ 2500V, 5 for $1.00
Relay 4PDT/3Acts/12 to 24VDC $1@, 6/$5
Hvy Dty 115V/60Cy Selsyns, 2 for $9.00
Miller 2.5MH/2.5&5Mtr Chokes ... 8/$1.00
Vibrators 6 or 12VDC $1.49@; 4/ $5.00
5" USN-MUMETAL Scope Shield $ 4.00
New Variacs/or equiv 0-135V/7.5A $15.30
New Variacs/or equiv 0-135V/3 Amp $10.65
New Variacs/or equiv 0-132V/1.25A $7.25
RF-MTR GE/475 Ma & 5 Amp $4@, 2/$7
DC-METER Dejur 800 Ma/3½" $3@, 2/$5
DC-METER One Ma/4" Rd. $5@, 2/$8
RF-MTR Weston 750Ma .....$4@, 2/$6
DC MTR 100Ma/2½" .....$3@, 2/$5

"IRISH" HI-FI RECORDING TAPE!

1200 Ft.—7" Reel **$1.45 @** *Lots of 12*
Money Back Gtd!
7" REEL, 1200 FOOT Highest Quality Precision Coated & slit. **FERRO-SHEEN** processed constant output, Noise Free. **Freq. 7½ IPS 40-15 KC Oxide Wnd. In. @ $1.69 ea. 3 for $5, postage 15¢ each.**

"TAB" for NEW TRANSISTORS!

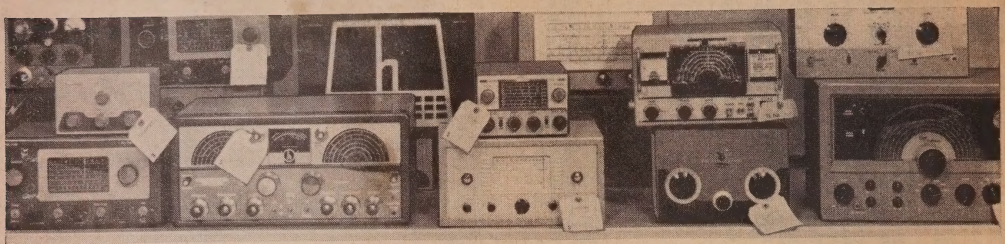
2N38	$.98	2N255	$1.30	2N441	$3.00
2N155	3.25	2N256	1.45	2N234A	1.36
2N156	4.45	2N277	4.50	CK721	2.35
2N180	3.65	2N362	1.31	CK722	.95
2N554	1.28	2N363	1.15	CK768	1.49

Postpaid 48 States Orders $10

Wanted 304TL Tubes & ALL TYPES!!!

For further information, check number 62 on page 126.

Allied's big clearance sale of reconditioned equipment...



Biggest trading in Allied history brings you top values like these...

ALL WITH 90-DAY NEW EQUIPMENT WARRANTY!

Hallicrafters

S-20R Receiver	$ 36.00
SX-25 Receiver	59.00
SX-28 Receiver	99.00
SX-28A Receiver	125.00
HT-31 Transmitter	279.00
S-40A Receiver	64.50
S-38 Receiver	29.50
SX-42 Receiver	139.00
SX-43 Receiver	99.00
S-53 Receiver	57.50
S-53A Receiver	65.00
R-44 Speaker	10.00
S-72L Receiver	39.50
S-77 Receiver	65.00
S-81 Receiver	27.50
SX-99 Receiver	114.00
S-94 Receiver	34.50
S-102 Receiver	36.50
HT-19 Transmitter	129.00
SX-62 Receiver	169.00

RME

RME-55 Receiver	39.50
RME-45 Receiver	85.00
RME-84 Receiver	59.50

Barker & Williamson

5100 Transmitter	299.00
51SB Transmitter	189.00

Hammarlund

4-11 Modulator	$ 24.95
HQ-100 Receiver	139.00
HQ-129X Receiver	149.00
HQ-150 Receiver	219.00

Collins

75 A1 Receiver	265.00
75 A3 Receiver	375.00
32 V2 Transmitter	325.00
32 V3 Transmitter	475.00
KWM-1 Transceiver	650.00

Eldico

VFO-2	19.95
TR-75-TV3 Transmitter	25.00
SSB-100	279.00

Elmac

PMR-6A Receiver	75.00
PSR-6V Power Supply	9.50

Heath

AR-3 Receiver	22.50
QF-1 Q Multiplier	7.95
VFO	17.00

Lettine

2 Meter 50-W Transmitter	59.50

Knight

Ocean Hopper & Cabinet	8.95
Space-Spanner	9.95

National

SW-54 Receiver	$ 33.00
NC-66 Receiver	85.00
NC-109 Receiver	142.00
NC-188 Receiver	115.00
NC-98 Receiver	110.00

Gonset

"Super 6" Converter	34.50
G66-B Receiver	144.50
Tri-Band Converter	22.50
Super-Ceiver	46.50
1.6—6 mc. Converter with Noise Clipper	24.95
3-30 Converter (6V.)	28.00
2 Meter VFO	22.00
50 Watt Linear Amplifier	149.00
Communicator II 2M 6V	129.00

Johnson

Matchbox (275 Watt)	39.00
Mobile Transmitter	69.50
6N2 Transmitter	89.95
Pacemaker Transmitter	350.00
Viking I Transmitter	129.00

Harvey-Wells

APS-50 Power Supply	24.50

Central Electronics

10-A Exciter	79.50

15-DAY FREE TRIAL. Try any of this equipment under your own conditions; if in 15 days you're not completely satisfied, return it for full refund, less only transportation costs.

90-DAY WARRANTY. Allied reconditioned equipment is covered by the same 90-day warranty against defects in material or workmanship which covers brand-new equipment.

100% FULL RETURN VALUE on your purchase of any Allied used equipment, if traded in on a piece of new equipment within ninety days. Take advantage of our "highest trades".

EASY TERMS AVAILABLE—ONLY 10% DOWN!

IMPORTANT: Some items above are one of a kind...all items are subject to prior sale...send 10% deposit to hold any item.

Mail, phone or wire your order to Jim Sommerville, W9WHF, Allied Ham Shack

HIGHEST TRADES ANYWHERE

ALLIED RADIO

100 N. Western Ave., Chicago 80, Ill.

For further information, check number 63 on page 126.

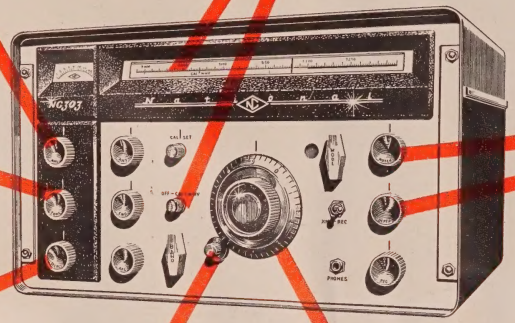
National's New Ham Band Receiver···NC-303

NEW
dual noise limiters. Separate automatic noise limiters for AM. Separate double-ended manual limiter for CW and SSB.

NEW
exclusive WWV converter provision. No interference with dial calibration or frequency coverage. Accessory calibrator provides one microvolt sensitivity on 10 mc WWV frequency.

NEW
front panel SSB selector with exclusive, new "IF SHIFT" for instant sideband choice . . . eliminates retuning or detuning.

NEW
tone switch provides for attenuation of highs, lows, or both for maximum readability.



NEW
"Q" Multiplier provides razor-sharp rejection notch (more than 60 db deep). May be tuned continuously across entire receiver passband. Separate notch frequency and notch depth controls.

NEW
5-position IF selector provides sharp, SSB-1, SSB-2, medium and broad selectivity. .5 Kc, 2 Kc, 4 Kc and 8 Kc bandwidths provide optimum selectivity for SSB, CW, phone, phone net and VHF plus sideband selection.

NEW
fine tuning vernier dial drive provides super-precision for CW and SSB tuning.

NEW
hi-speed, 40-1 tuning dial with logging scale.

ONLY
$44.99*
DOWN!
UP TO 24 MONTHS TO PAY.

Suggested cash price $449.00. (slightly higher west of the Rockies and outside U. S. A.)

*Most National Distributors Offer Budget Terms and Trade-In Allowances.

AT YOUR NATIONAL DISTRIBUTOR'S

TUNED TO TOMORROW

NATIONAL COMPANY, INC., Malden 48, Mass.

BURTON BROWNE/New York

For further information, check number 2 on page 126.



Type 813 is an original RCA beam power tube design

W6MDI's

High-Power Modulator in QST

...uses RCA-813 Beam Power Tubes

...ibed in detail in *QST* November 1958, W6MDI's Modu-...lator offers a practical way to get high audio power at reason-...able cost. W6MDI uses popular priced RCA-813's to do the job. ...s W6MDI:

"... If a comparison is made of available tubes for a modulator to deliver from 300 to 600 watts of audio power, it will be found that triodes will require from 5 to 10 watts of driving power while pentodes will require 1 watt at most. This results in a considerable saving in speech amplifier output power requirements, and consequently the speech amplifier can be reduced from something in the class of push-pull pentodes or tetrodes (6V6s or 6L6s), and associated power supplies, to something like a single 6AQ5."

Here is how *QST* summarizes it: "813s can supply all the audio power needed for modulating a kilowatt—or they can be operated in a variety of ways at lower power for transmitters in the several-hundred-watts-input class."

RCA-813 beam power tubes are available at all RCA Industrial Tube Distributors. For a technical bulletin covering modulator and rf amplifier operating conditions, write RCA Commercial Engineering, Section C-15-M, Harrison, N. J.

RADIO CORPORATION OF AMERICA

Electron Tube Division — **Harrison, N. J.**