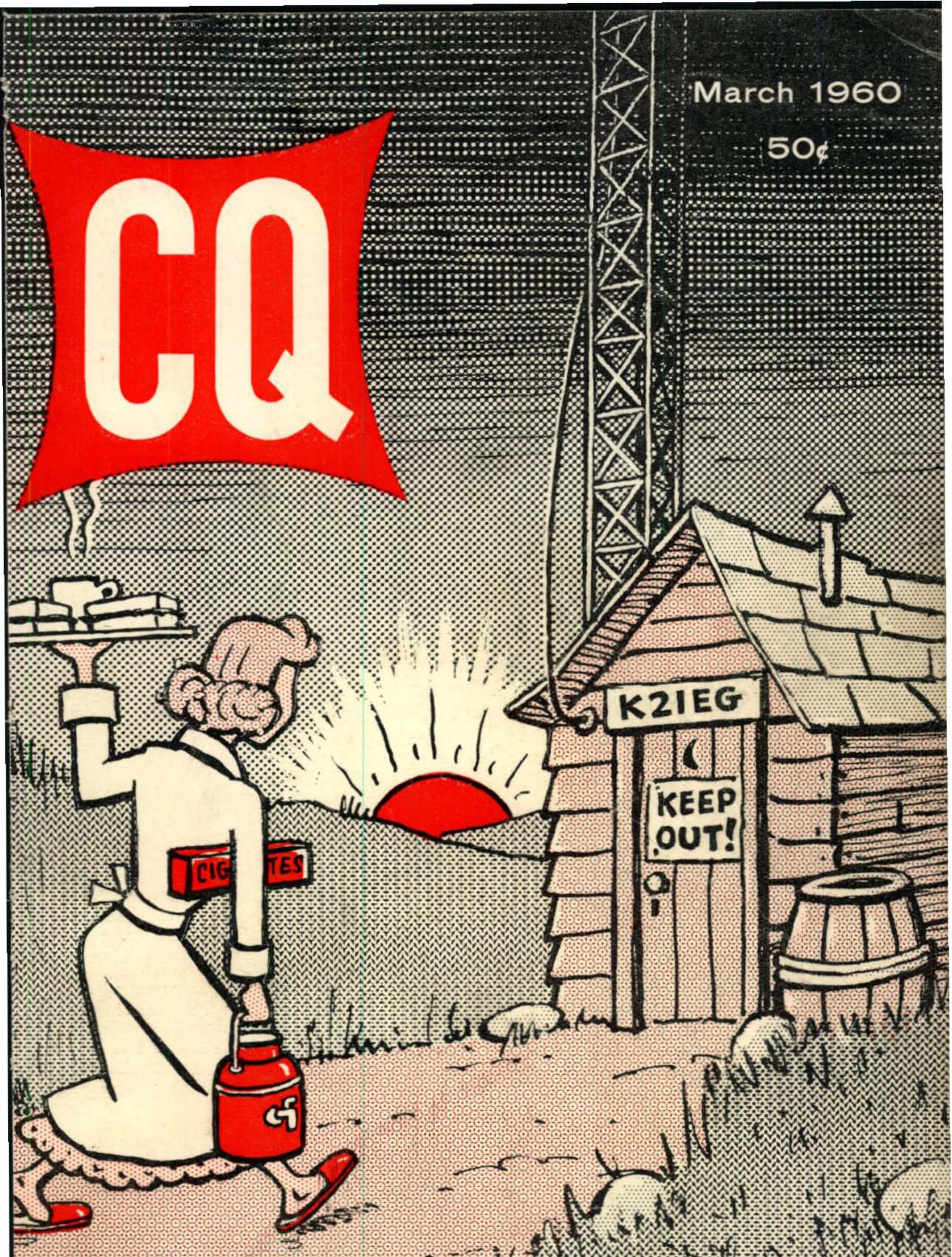
March 1960

50¢

CQ



Late Flash: 20 Meters Expanded 14.3 to 14.35 mc

The Radio Amateur's Journal

MORE PLEASURE THIS *Spring* WITH COLLINS KWM-2

Whether you're fishing, boating or taking a weekend drive through the country — you get more pleasure from vacation-time hamming with the Collins KWM-2 Single Sideband Mobile Transceiver.

The KWM-2 is easily moved between mobile and fixed station installations. It slips into mounting brackets beneath the instrument panel of your car or boat. It even mounts in the passenger compartment of an airplane. The KWM-2 instantly and automatically connects to the power supply, antenna, antenna selector and car radio speaker.

With 175 watts PEP input or 160 watts on CW the KWM-2 gives you outstanding frequency stability and over-all reliable communication on 14 200-kc bands from 3.4 to 30.0 mc.

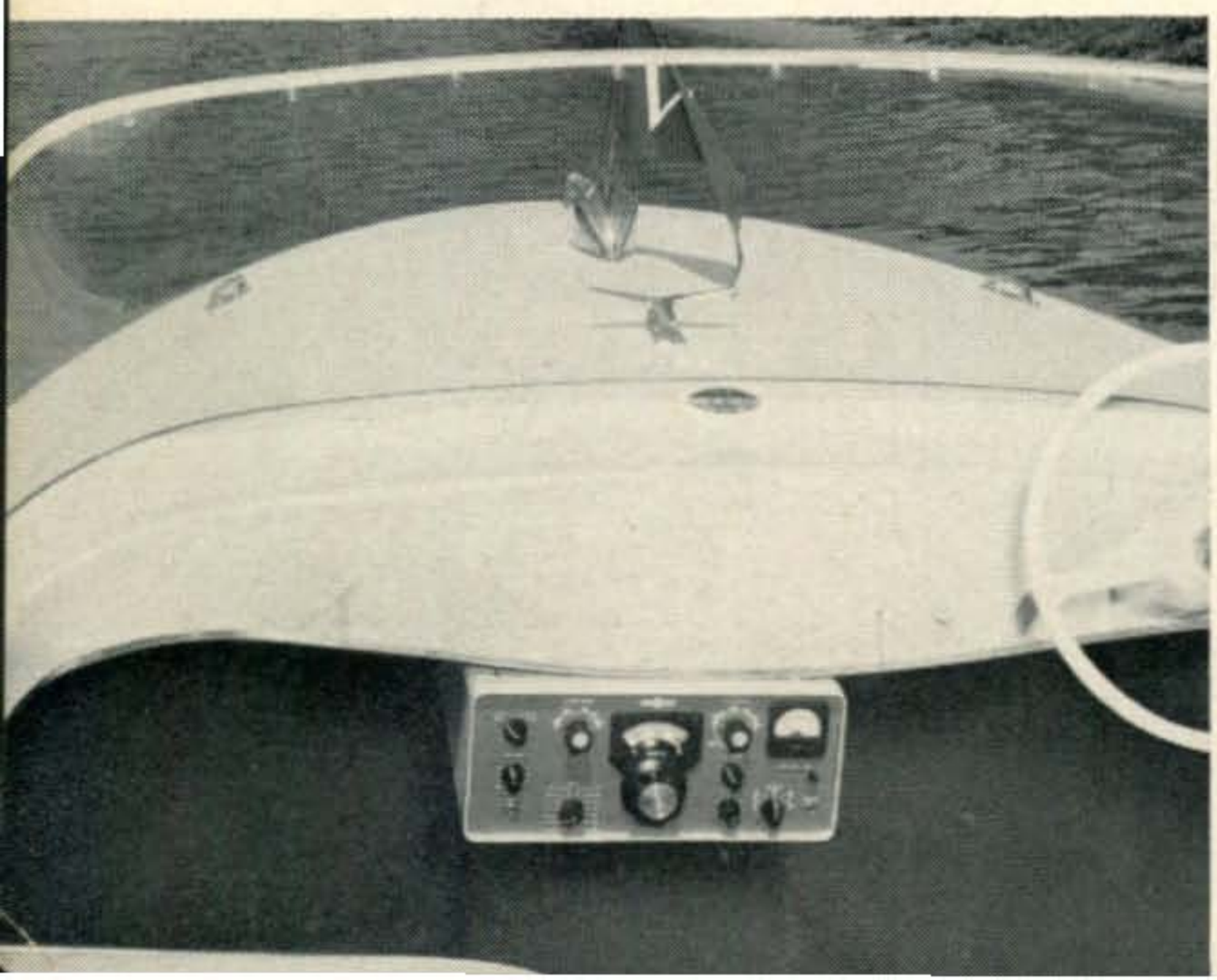
Because Collins ham equipment retains its value over the years, the KWM-2 Mobile Transceiver costs you only pennies a day to own.

Your Collins distributor will be pleased to give you a first hand demonstration of the KWM-2 . . and show you why Springtime — or anytime — is KWM-2 time for the ham on the move.

Visit the Collins exhibit at the annual Single Sideband Dinner, March 22, 1960, Hotel Statler Hilton, New York City.

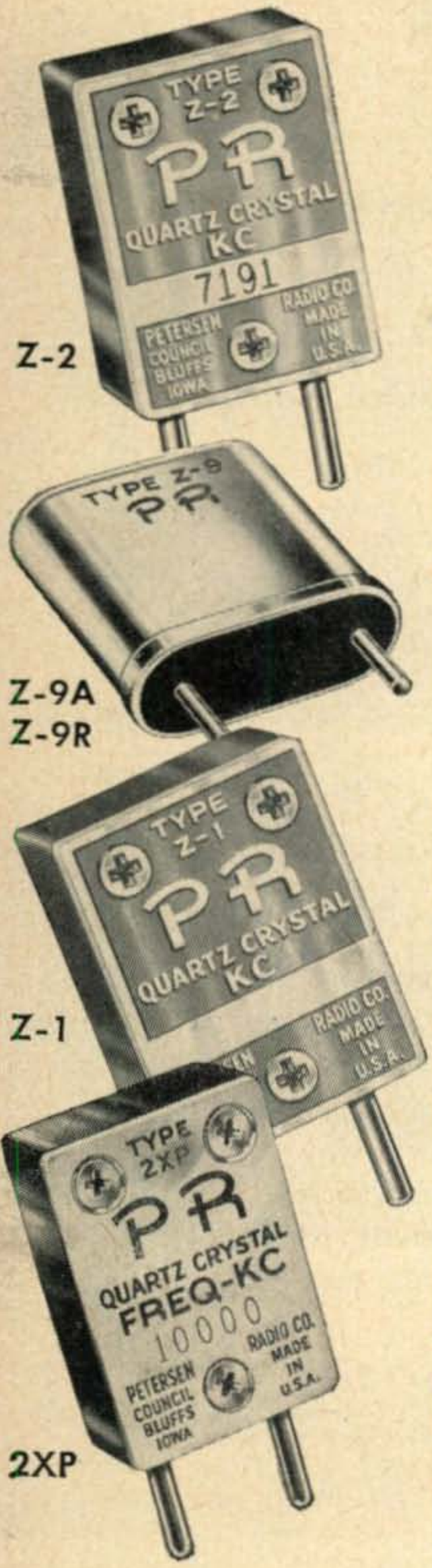
COLLINS

For further information, check number 1 on page 126.



It pays to insist on PR *crystals*

STANDARD OF EXCELLENCE SINCE 1934



Z-2

Z-9A
Z-9R

Z-1

2XP

AMATEUR TYPES

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

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

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

Third overtone; multiplies into either 2-meter or 6-meter band; hermetically sealed; calibrated 24 to 27 Mc., ±3 Kc.; .050" pins. **$4.95** Net

COMMERCIAL TYPES

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

SPECIAL TYPES

Type Z-1 Aircraft

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

VHF Type Z-9R, Aircraft

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

Type Z-1, MARS and CAP

Official assigned frequencies in the range. Calibrated to .005%.
1600 to 10000 Kc..... **$3.45** Net

Type Z 1, TV Marker

Channels 2 thru 13.... **$6.45** Net

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

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

10.7 Mc. FM, IF, .01%..... **$2.95** Net

Type 2XP

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

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

12001 to 25000 Kc. (3rd Overtone) ±10 Kc..... **$4.45** Net

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

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

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

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

Type Z-6A, Frequency Standard

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

Z-6A

PETERSEN RADIO CO., *Inc.* 2800 W. Broadway
COUNCIL BLUFFS, IOWA

EXPORT SALES: Royal National Corporation, 250 W. 57th Street, New York 19, N. Y., U. S. A.

For further information, check number 3 on page 126.

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The Stradivarius of electronic keyers

new HA-1 $79.95

T. O. Keyer

PLAN NOW TO ATTEND ANNUAL SSB DINNER STATLER-HILTON HOTEL NEW YORK CITY, MARCH 22

In every field of human endeavor, there is a group of strong-minded individuals whose goal is perfection. They settle for nothing less in the equipment with which they pursue their hobby or profession.

And inevitably, one manufacturer with similar goals produces a product so strikingly superior that overnight it becomes—like the Stradivarius—*not only the ultimate standard of performance but a symbol of perfection.*

Whatever your communications experience, if you are among that group who insist on the finest, you will recognize in the new T.O. Keyer a technological stride that will bring you greater personal satisfaction, and clearly advance the art of CW.

HA-1 ADVANCED FEATURES

- **Employs digital techniques. Advanced circuitry assures constant ratio of dot-to-space-to-dash over entire speed range.**
- **All timing circuits electronic—not affected by relay variations. Dots and dashes are self completing.**
- **Employs four dual-purpose triodes, two voltage regulators, two neons, three semi-conductor diodes. Transformer-operated.**
- **Plug-in, vacuum-sealed, mercury-wetted relay used only to key transmitter and sidetone signal. Capable of dot speeds up to 100 dots per sec. Life span over 10 billion operations.**
- **Monitor or sidetone may be heard via built-in speaker, or fed through receiver audio.**

FRONT PANEL: Function control: off; low speed, hold (key down), high speed. Speed control: calibrated in range 10-30 and 25-65 WPM. Keyjack; neon keying and balance indicator.

REAR CHASSIS: D.C. Balance (factory set); Weight (dot duration); Sidetone Level; Head Set Jack; Octal socket for transmitter connections; Aux. Paddle Input; Monitor Tone Output; extra contacts.

The new ideas in communications are born at . . .

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CQ, the Radio Amateurs' Journal is published for active hams by active hams. Not affiliated with any clubs or other political groups, CQ endeavors to be a true and honest reporter for those interested in the hobby. Suggestions for improvement are welcomed.

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

CQ CERTIFICATES:

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

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

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

TECHNICAL INFORMATION:

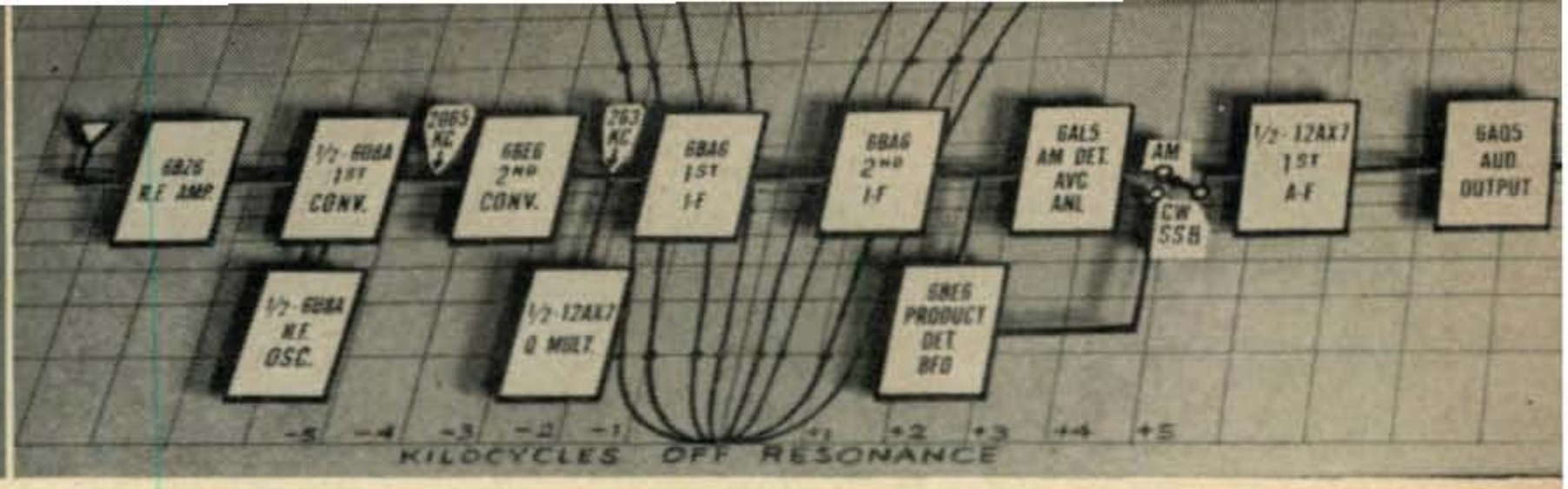
Please check the 11-year cumulative index which was published in the January 1956 CQ for information about articles in past issues of CQ. The December 1956 to 1958 CQ yearly indexes will bring you up to date. Most back issues are available at $1 from us. Check our "Back Issue" ad for details on those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

DISCLAIMER:

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

← **For further information, check number 5 on page 126.**

G-63



Greatest number of features for smallest number of dollars

GONSET G-63 COMMUNICATIONS RECEIVER

for outstanding SSB-AM-CW reception on 6 amateur bands . . . 80-40-20-15-10-6 meters.

Exceptional value. A modern communications receiver for the radio amateur with many, many features found usually only in receivers that are priced substantially higher. For example . . . sensitivity that is less than 1 microvolt for 6 db signal-plus-noise/noise ratio. *A real "live" top-performing receiver on 6 meters!*

Compare also the features included in G-63 for SSB reception against those of other receivers in the same price bracket:

Stable! HF and BF oscillators are stable, have low frequency drift.

Full vision drum dial spreads each amateur band fully for easy tuning —vernier tuning knob has flywheel for smooth operation.

Two second detectors. Product type for better SSB/CW reception and *Diode* type for AM.

Other features. Double conversion . . . Peaking-type "Q" multiplier gives adjustable band widths down to 100 cycles for CW. Bandpass I-F circuitry gives desirable steep-shoulder selectivity for AM and SSB reception . . . "S" meter . . . AVC . . . Automatic noise limiter . . . plug-in crystal calibrator as accessory.

239.50

AT YOUR GONSET DISTRIBUTOR

INTH ANNUAL
NGLE SIDEBAND DINNER
arch 22, 1960, Statler Hilton Hotel, New York City.

For further information, check number 6 on page 126.

GONSET **GONSET** *Division of Young Spring & Wire Corporation*
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BUILD YOUR OWN

HEATHKIT®

HAM GEAR

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

PROVEN, "ON THE AIR" PERFORMANCE

"SENECA" VHF HAM TRANSMITTER KIT

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

HEATHKIT VHF-1 **$159.95**

HEATHKIT DX-20 **$35.95**

DX-20 CW TRANSMITTER KIT

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

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

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

"CHEYENNE" MOBILE HAM TRANSMITTER KIT

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

HEATHKIT MT-1
$99.95

"COMANCHE" MOBILE HAM RECEIVER KIT

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

HEATHKIT MR-1
$119.95

MOBILE SPEAKER KIT

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

HEATHKIT AK-7
$5.95

HEATHKIT AK-6
$4.95

HEATHKIT MP-1
$44.95

MOBILE BASE MOUNT KIT

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

MOBILE POWER SUPPLY KIT

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

POWER METER KIT

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

HEATHKIT PM-2
$12.95

HEATHKIT®

COMPANION UNITS

HEATHKIT TX-1 **$234.95**

"APACHE" HAM TRANSMITTER KIT

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

HEATHKIT SB-10
$89.95

SINGLE SIDEBAND ADAPTER KIT

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

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

HEATHKIT AR-3
$29.95
(less cabinet)

ALL-BAND RECEIVER KIT

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

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

HEATHKIT QF-1
$9.95

"Q" MULTIPLIER KIT

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

OF DISTINCTIVE QUALITY

ACCESSORY SPEAKER KIT

Handsomely designed and color styled to match the "Mohawk" receiver this heavy duty 8" speaker with 4.7 ounce magnet provides excellent tone quality. Housed in attractive 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.

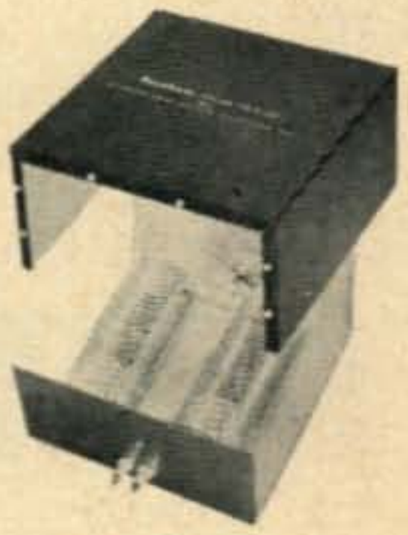
HEATHKIT AM-2
$15.95

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

HEATHKIT

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pioneer in do-it-yourself electronics

a subsidiary of Daystrom, Inc.

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NAME

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CITY ZONE STATE

QUANTITY	KIT NAME	MODEL NO.	PRICE

For further information, check number 7 on page 126.

In Our Opinion....

Flash 20M

The FCC has just announced that effective 10 March, 1960 at 0001 EST the 20 meter phone band will be expanded to include the segment 14.300 to 14.350 kc. Also note that F1 privileges in this segment have been deleted. This means that we have, at last, the much coveted additional 50 kc on twenty meters.

Change

This month's editorial will, among other things, be somewhat of an introduction. By this time it's probably no secret that Wayne, W2NSD was dismissed as Editor on January 14th and I was appointed Managing Editor. So, CQ has undergone a bit of a personnel change. This change does not portend any major upheaval in either the ideology or content of the magazine, but there are to be some minor variations in CQ's Columns Departments.

While some of you most likely recognize the call of your new editor as belonging to the assistant editor of the past year, there are most likely those who would appreciate some basic familiarization with the person. Unfortunately I can't draw upon a long historical record in the hobby as a biographical interlude, but since my background is "amateur" right down the line, I can capsule it.

My basic interest in Amateur Radio is long-standing. At the tender age of 13 I happened upon a copy of QST in the New York subway system and was able to glean out enough info from that copy to know that the challenge and depth of the subject were right for me. For several years my basic interest in amateur radio waxed and waned with the inconsistency of youth; demonstrating itself in Short Wave listening and occasional visits to ham shacks. In early 1954 I decided to make the move and get a ham ticket. I believe that it was W2FCM, Mark, that was most instrumental in solidifying this decision. Mark was kind enough to invite me to a meeting of The Amateur Radio Society of Queens one Friday evening, and there I met a medium sized cross section of the local ham populace. About two months after this meeting I was the proud owner of KN2IEG, and lost no time in getting going. I purchased an old National NC-100 ASD and a Stancor P-20 transmitter from W2EBC, strung up a 66' center fed long wire and, after brief periods of nervous band scanning called that first CQ on 40 meter CW. If I live to be 110, I don't think any situation can be as thrilling as that moment when I turned off the transmitter and heard K2GSE calling me.

Sitting here now, 6 years later and trying to recall the in-between years is a definite reminder that lots of water has gone over the dam since those early days. I have operated all bands 160 through 2 meters, graduated from CW to Phone, to SSB and have now settled on a bit of each mode. I really have no specific preference and operate each mode periodically.

I have always liked to build and I can say that I have gone through at least two sets of tools, several soldering guns and an untold amount of components in my attempts to unravel the complexities of these machines. I suppose that most amateurs settle into a specific niche of our hobby which to them is most interesting. I'm certainly no exception. In my case I find that I enjoy trying to get the most out of an antenna . . . trying to improve them and learning how to design my own. As of late an observer might see me busy in the shack armed with a tape measure and a copy of Kraus, attempting to enter the brave, new world of skywire design.

As far as actual "hamming" is concerned, I like DXing and contests. I enjoy a trip to a mountaintop for the vhf contest and above all I get a tremendous kick out of meeting the people I have talked with from all parts of the globe.

I have other interests too. In spite of the fact that I am the rankest of rank amateurs, I enjoy taking pictures. I also like to travel . . . particularly to observe fellow amateurs in their home territory, all the while recording major events on celluloid for posterity. It may be dangerous to start discussing my bug for guiling our finny friends from the deep so I'll pass on this one. Suffice to say if you happen to be an aspiring author who owns a fishing lodge in the mountains, you have a better than even chance to make the grade. So much for me Let's discuss

CQ . . . From Here Forward

As the Editor of one of amateur radio's two largest publications I have of course, several responsibilities. The primary responsibility is to you, the reader. Like most magazines, CQ is a medium of communication. It's my job to see that you are kept abreast of developments in and of concern to amateur radio; to report clearly and accurately on important matters and, in these pages, to express my opinions concerning these issues.

The second responsibility facing me is that of reading, evaluating and selecting articles which are timely and interesting. . . . You play a major part in this in-as-much as it is the reader who contributes the material. Bear in mind that I scan your contributions with a purely objective eye. I enjoy reading articles on all facets of our hobby and while an article is, naturally, even more desirable when professionally written, I read them primarily for content. Don't let inexperience prevent you from taking pen in hand (typewriter required in this modern age) and giving a try at authoring. If you feel you have something others would like to read about send it in. You haven't lost anything but a little time and a check can be a pleasant surprise for a first effort.

. . . Status Quo!

Occasionally during the past year I've heard rumblings about CQ being anti-ARRL. Let me go on record right here and now . . . as an amateur I both like and respect ARRL. Even if I tried, I would not be able to minimize ARRL's many contributions to our hobby over the years; nor can I discount the League's position in representing radio amateurs today. If, however, I should at some time disagree with ARRL on any issue I will certainly express *my personal* opinion in that regard. This will always be constructive criticism. It never hurt an issue to have a multitude of opinions and I like to think that mine are sophisticated, well-founded evaluations.

If at any time you, as a reader, should happen to disagree with me, I expect you to write to CQ and express your side of the story. This deal works both ways all the way across the board. P.S. If I should be seen lurking in the corridors of ARRL HQ's in the near future it means that I have come for a chat with Messrs. Budlong and Huntoon. . . . Something I feel is in order.

. . . Other Changes

In some ways you may notice changes in CQ. For example, we have dropped the Club Bulletin column from CQ, but Marvin Lipton is still making his monthly contributions in the CQ Club Bulletin which is mailed FREE monthly to any and all radio clubs that are interested. This bulletin goes to nearly 1000 clubs now and we want to expand this service.

We have a new editor for our SSB column. Taking over the chores that Bob Adams, W3SW has handled so well. Actually, we have two editors, Irv Strauber, K2HEA and his lovely wife Dorothy, K2MGE. Irv and Dotty are, of course, about as well known in sideband circles as anyone. So, please address all correspondence relating to sideband to Irv & Dotty.

Filling the slot formerly held by yours truly, we have Arnold Trossman, W2DTJ. Arnie has been an active amateur for quite a long time and is an excellent electronics technician. Don't be too surprised if you find that some of

[*Continued on page 24*]

GLOBE SCOUT DELUXE

A versatile 90w CW, 75w fone transmitter of smart modern design, packed with top performance features. Bandswitching 80-6 meters, straight through operation of final on ALL bands; high efficiency and output on ALL bands, panel adjustment of loading on ALL bands. Pi-net matches 50-300 ohms on 80-10, and 50-75 ohms link output on 6 meters. High level plate modulation using new husky 7027A modulator tube. Just plug in VFO or crystal. Dual Xmttr./VFO keying provisions for CW. More output on 6 meters than some exciter linear combinations. Extensively shielded and filtered with separate final RF shield and built-in power supply and many other features. **$149.95.**

NOISE SUPPRESSOR GNS-1

New Globe Noise Suppressor, Model GNS-1, is a capacitor tuned for maximum noise reduction in the 14-30mc range, for all 11 Meter Citizen Band, and 10, 15 & 20 Meter Amateur Bands when equipment is operated mobile . . . reduces generator noise and improves reception. Easily installed. **$4.95.**

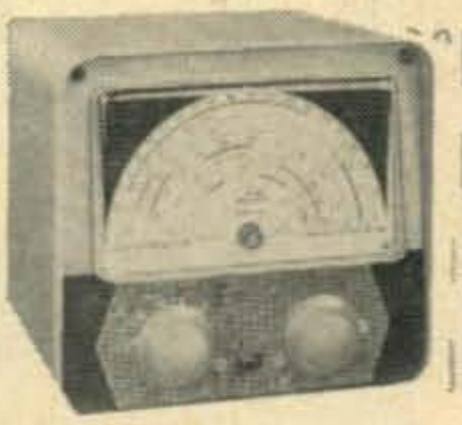
GLOBE PATCHER PH-1

The Globe Patcher PH-1 is a hybrid phone patch for operating VOX on sideband, push-to-talk on AM. Mounts almost anywhere; easy to install and operate. Balance control for landline call without energizing transmitter. Completely shielded. Wired: **$29.95.**

TOMORROW'S PRODUCTS TODAY

GLOBE VFO 755A

The 755A VFO combines simply with the Sidebander, the Scout or the Chief by simple plug-in. Covers 10-160M bands with output on 40 and 160M. New smooth non-slip cable drive, 13:1 tuning ratio. Self-contained, well-filtered power supply with voltage regulation. Approx. 50 RF volts output. Temperature compensated for utmost stability. Calibrate switch for zero beating. Wired, **$59.95.** Kit, **$49.95.**



GLOBE TENNA-METER

The Model TM-1 Tenna-Meter is designed specifically for metering antenna current, tuning Citizen Band transceivers and amateur transmitters for max. power radiation from antennas. Built-in tuning meter and sensitiviy control. Determines whether antenna is performing properly, is properly matched. Easy to use by technician or amateur, it is housed in rugged, compact (2¾" x 2½" x 5¾") steel case. Only **$15.95.**

GLOBE ELECTRONICS

A DIVISION OF TEXTRON ELECTRONICS, INC.

22-30 SOUTH 34TH ST. COUNCIL BLUFFS, IA.

ASK ABOUT GLOBE'S NEW 2-WAY RADIO CITIZENS BROADCASTER

For further information, check number 8 on page 126.

SCRATCHI

Feenix, Ariz.

Deer Hon. Ed:

Stop the Presses!! Don't printing next issue of your Hon. Mag. until Scratchi having chance to putting in advertisement. Every day that passing I losing money like sixty. I just coming up with gratest idea for making money since invenshun of printing press.

Please putting following ad in biggest type you having. Not even caring if you having to yewsing hole page for it. Taking to pages if needing them, on acct. money are no object. Here are the ad:

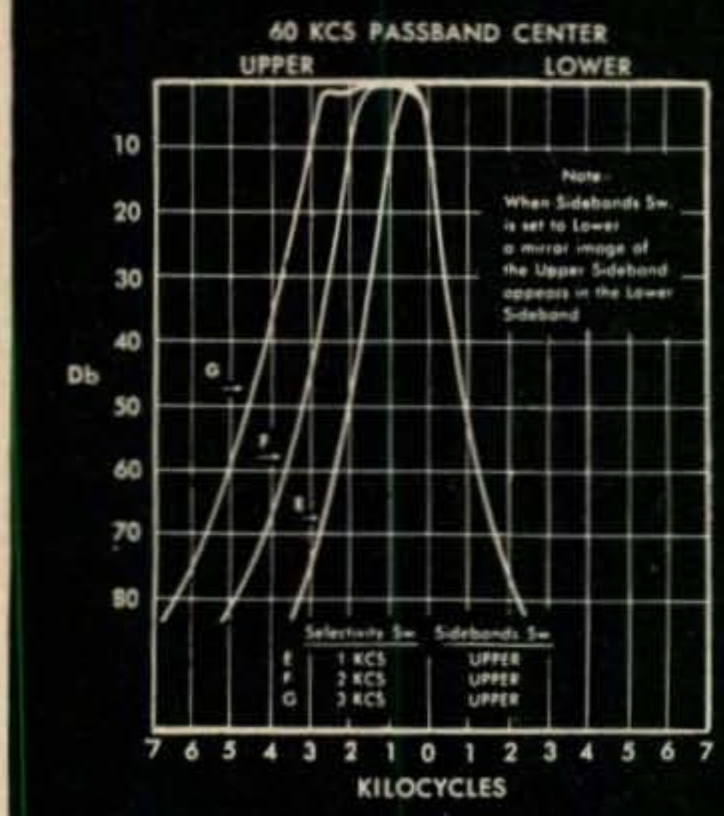
AMCHOORS!! KNOW THE THRILL OF OPENING UP BRAND NEW AMCHOOR BAND. HAVE YOUR NAME AND CALL ENGRAVED IN HISTORY. NO KIDDING!! F.C.C. APPROVED. COMPLETE TRANSMITTER AND RESEEVER INCLUDED. THIS IS NOT A KIT. LIMITED NUMBER OF NEW AMCHOOR BANDS AVALABLE. FIRST COME FIRST SERVED. SEND ONE HUNDRED DOLLARS CHECK OR MONEY ORDER (NO STAMPS PLEASE). SATISFACKSHUN GUARANTEED. CERTIFICATE FOR HANGING ON WALL TWENTY CENTS EXTRA.

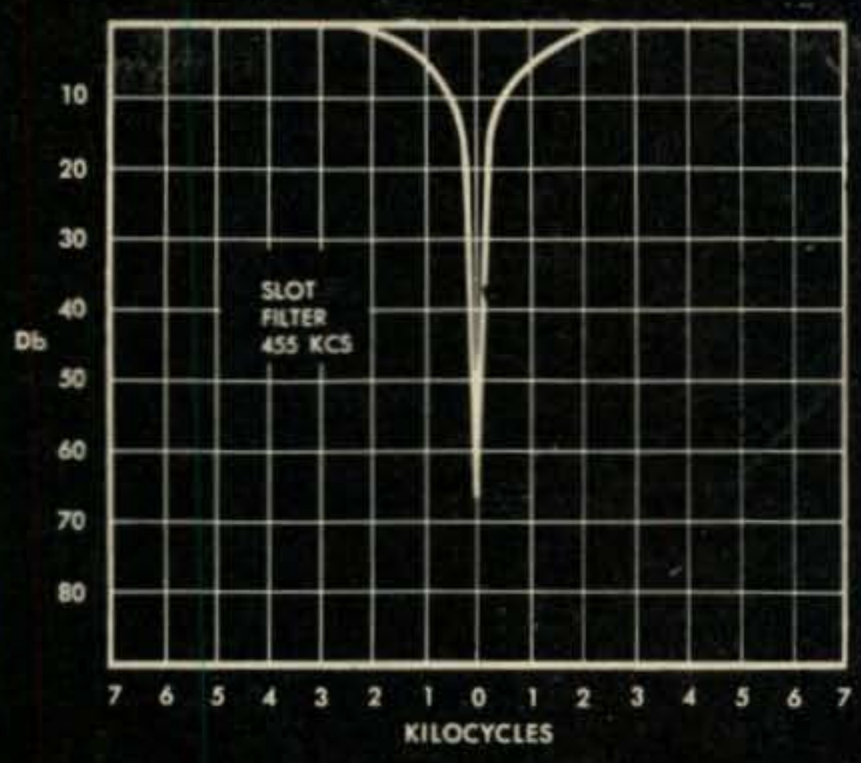
Hon. Ed., this are the reel thing. This are reely true. I could making big thing of this, but desiding to make fast cupple thousand bux and letting it go at that.

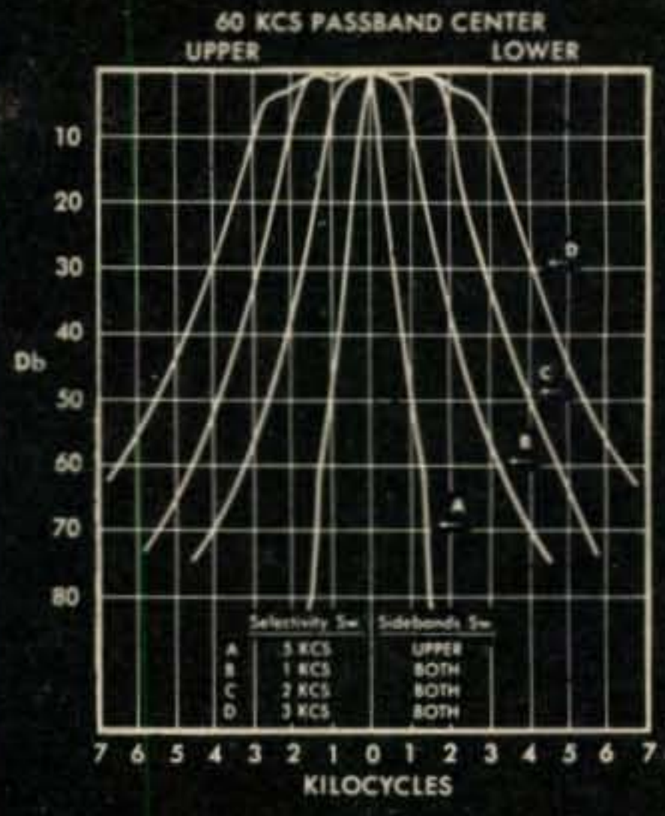
You notice I not enclosing any money to paying for ad. Natchyourally, not having any money until ad are running, so I'm surely you understanding my circumstances. Howsumever, I making deel with you. If you wanting to get in on grounded floor of this big-fat deel, and you wanting to be one of these amchoors who going down in history for opening up new amchoor band, then you giving me ad for free, and I sending you, post-hasty, complete hundred bux package. Even throwing in certificate suitable for framing for free.

And, if that not enuf, then I also sending you list of amchoors who ordering hundred-bux package. What good are that doing you?? Hon. Ed., you not paying attenshun. Amchoor what ordering hundred-bux deel are getting just one transmitter and reseever. He having to working somebuddy who also having same-like kind

[*Continued on page 26*]







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SSB at its best

Complete tuning versatility to meet any SSB reception problem—that's performance you can hear—and that's what you get in a Hammarlund HQ-180.

The general-coverage SSB HQ-180 offers true professional performance at an amateur price. It offers more features, more real quality and far more listening pleasure per dollar than any receiver in its class. Prove it to yourself—see and try the HQ-180 at your Hammarlund dealer.

HAMMARLUND HQ-180

- Triple conversion, 18-tube superheterodyne.
- Full dial coverage from 540 KCS to 30.0 MCS.
- Bandspread calibration for 80, 40, 20, 15 and 10 meter amateur bands.
- High frequency crystal filter for improved selectivity and shape factor of 1st IF amplifier.
- Razor-sharp, adjustable slot filter for up to 60 db attenuation.
- Separate linear detector for CW and SSB reception.
- Adjustable IF amplifier for maximum selectivity.
- Selectable sideband, upper, lower or both.
- Built-in crystal calibrator.
- Selectable AVC obtained from 60 KCS IF.

$429.00

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For further information, check number 10 on page 126.

QSL contest

Winner

Big Losers

For further information, check number 11 on page 126.

THE BROADBAND TWINS

THE REVOLUTIONARY 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.

AT YOUR DEALERS NOW.....PRICE $795.00

FAMOUS 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 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 20A

MODEL 10B

MODEL GC-1. Gated Compression Amplifier. Connects between receiver and speaker. Automatically brings all received signals to same level—no blasting. Compensates for receiver AVC deficiencies. Compresses a 40 db increase in level to less than 3 db. Magic Eye continuously monitors compression value. Keep peace with your family and neighbors — buy a GC-1.

KIT....$49.50 Wired....$59.50

MODEL MM-2. 3" RF analyzer scope for use on SSB—DSB—AM—PM and CW. MONITORS RECEIVED AND TRANSMITTED SIGNALS thru new electronic switching circuits. NO TUNING — BROADBAND response 1MC to 55MC at power levels of 5 watts to 5 KW. SIMPLE CONNECTIONS. Built-in 1KC oscillator for exciter alignment. Plug-in IF adapters available for 450-500 KC, 80 KC and 50 KC.

IF adapter RM-455 or RM-80 or RM-50 .....$9.95
MM-2 (less adapter) wired.$129.50
Kit $99.50

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MULTIPHASE THE OVERWHELMING CHOICE OF HAMS EVERYWHERE

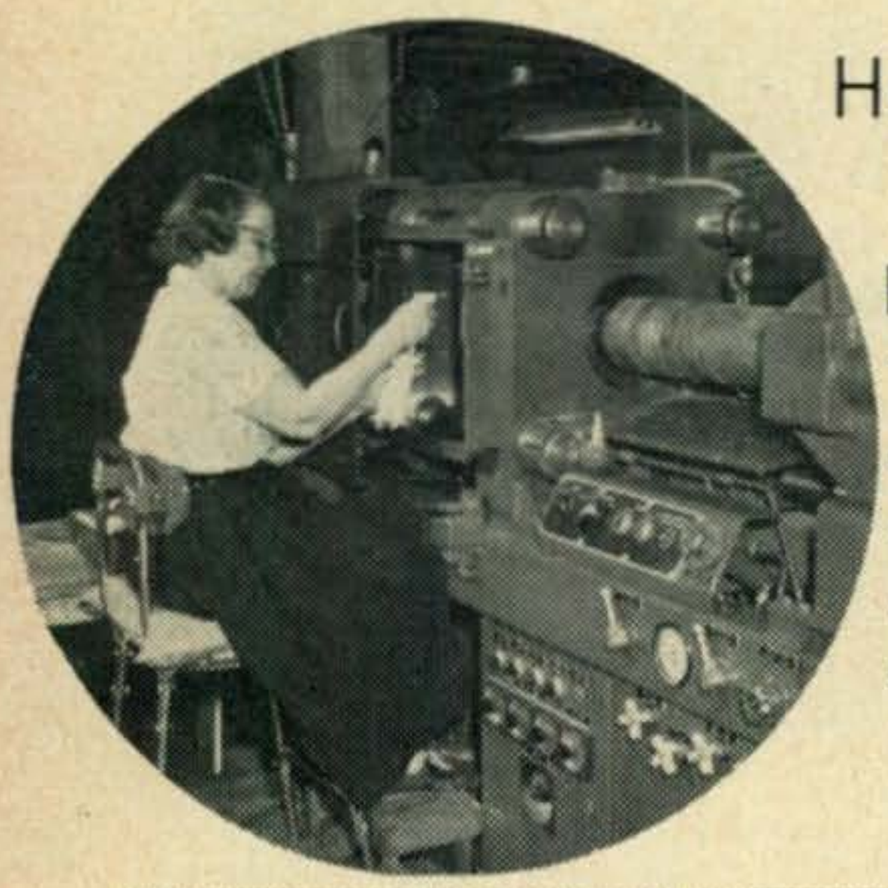
For further information, check number 12 on page 126.

A SIGN OF QUALITY

The tremendous acceptance of MOSLEY Antennas by tens of thousand of Amateurs around the world is amazing . . . but not to us! We kno the reason!

We know, for example, the type of engineering skill that conceives each MOSLEY Antenn engineering that is oriented not only to quality but to the needs of Amateur Radio as well.

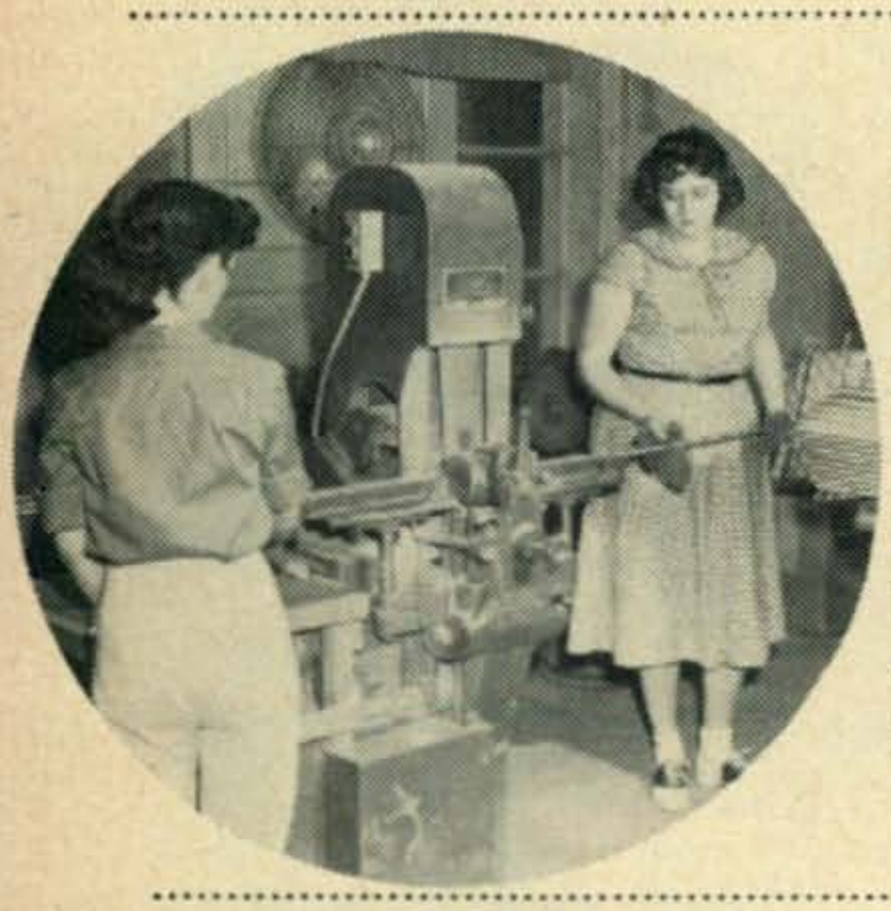
We know, too, of the many extras that go into the making of MOSLEY Antennas: The dilige search for ever-better materials; the constant striving to improve without creating obsolescenc the little extra production steps taken to assure that your MOSLEY Antenna will be a source pride for you as well as satisfaction and enjoyment.



Here are some of the Extra Steps to Qualit

Precision Molded "Trap" Coil Forms

TRAP MASTER coil forms are molded directly on the element sections. Coils thus made cannot change inductance - stay on frequency rain or shine, hot or cold. TRAP MASTER Antennas are doing their efficient work in steaming jungles and arid deserts; on polar ice and tropical islands.



Polishing of Element and Boom Tubing

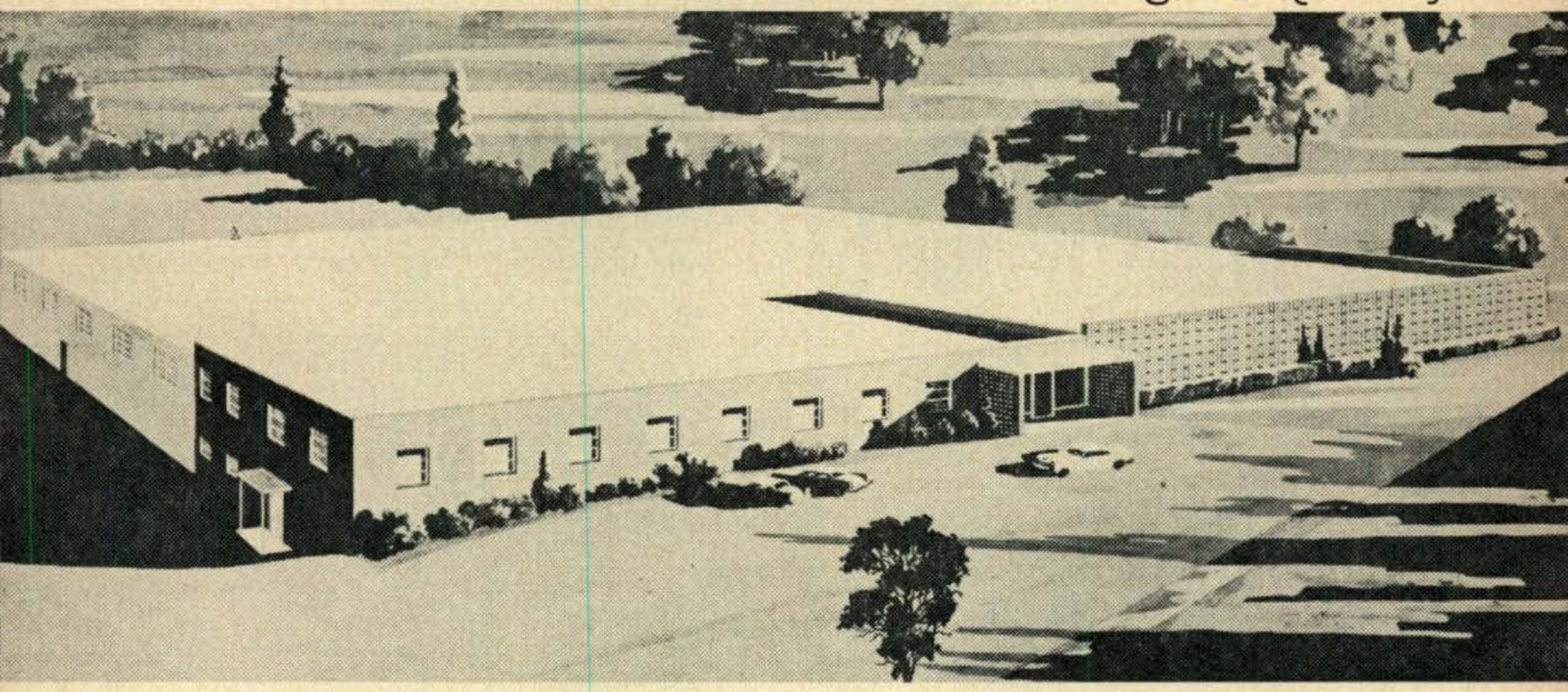
We wouldn't *have* to polish the aluminum tubing of MOSLEY Antennas, but we think you want a nice looking antenna as well as a good performer. We begin with the finest quality, heavy-wall, 6061T6 aluminum, clean and polish it on this machine and, finally, supply a package of MOSLEY Antenna Coat which will, when applied, keep your antenna in factory-fresh appearance for years.

"De-burring" Tube Ends

Here's another little finishing touch that takes extra time for us but will save you both time and temper.
When you unpack your MOSLEY Antenna you'll see that each end of every tube section has been machine "de-burred" to a degree of perfect smoothness. There's no frustration of telescoping sections that won't telescope - no hazard of sharp aluminum shavings.

For further information, check number 13 on page 126.

This is Where You'll Find the Sign of Quality



Here is the 70,000 square feet MOSLEY Engineering, Manufacturing and Administrative facility where dedicated engineers, technicians and craftsmen enjoy building the world's finest Amateur antennas. Nearly forty different antenna types are produced here for Amateur and Citizens Band services and antennas in many configurations are designed and manufactured for military, industrial and scientific applications.

The MOSLEY Building is strategically located on By-Pass U.S. 66, approximately one mile south of Lambert-St. Louis Airport in St. Louis County. Traveling Amateurs and Engineers are cordially invited to stop in for a visit, meet the Hams of MEI and see how Quality Is Built Into Every MOSLEY Antenna.

YOU'LL FIND THESE SIGNS OF QUALITY EVERYWHERE

Look for the black and yellow decals at the stores of nearly 250 Amateur Equipment Dealers located in every State of the Union and in many countries throughout the world. These signs indentify Dealers who carry in stock the MOSLEY Antenna for you.

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Ninth Annual Single Sideband Dinner
March 22, 1960
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Announcements

Correction

TRANSISTORIZED 6 METER TRANSMITTER, Feb. 1960, page 55. Despite all our efforts an occasional error still creeps in. This beaut is in fig. 1. The battery voltage is labeled as 50 volts. *Please* change that to 15 volts.

Virginia 6 M Net

A number of local amateur stations in this area have recently organized the Central Virginia Six Meter Net which meets each evening at 1900 hours on 50.100. Members listed as charter members are: W4AVO, W4CPB, K4PUD, W4LGS, W4SNH, K4MLY (ex-WA2CVS), W4DNK and K4DEA. Purpose of the Net is fraternal, although traffic will be passed as facilities allow. An additional purpose is to further good operation and construction practices.

We are offering a certificate to any licensed amateur station working five (5) of the eight (8) charter members anytime after 1 January 1960; said certificate will be issued by the secretary, K4MLY, upon submission of dates and times of contact of the five stations.

Paducah Hamfest

Paducah Hamfest, Sunday, July 10, 1960 at Noble Park Community House at Paducah, Kentucky. Lunch will be served on the grounds, Prizes Entertainment for the children and grownups that are not interested in the hamfest. Swimming Pool, Etc. No Registration Fee, just pay for food and drinks.

Saskatchewan Amateur Radio League

A lot of Saskatchewan residents will take a double look at some of the new license plates which will be issued this year in Saskatchewan. Over 200 license plates will be issued to Amateur Radio operators with their Station Call Letters displayed. The big difference between this plate and all the other Saskatchewan license plates will be that there is only one numeral and four letters, but in all cases the first two letters will be VE followed by the numeral 5, which is the prefix of all Saskatchewan Amateur Radio Station Licenses. Some forty States and five Provinces have already recognized their radio amateurs in this similar fashion. The Acting President of the Saskatchewan Amateur Radio League, Lionel O'Byrne, VE5LU, stated that everyone concerned is very happy about this salutation by the Government of Saskatchewan.

I would like to express the sincere thanks of all Saskatchewan Amateur Radio enthusiasts for the singular honour of the issuance of Call Letter License Plates by the Government of Saskatchewan. There are very few ways in which the active public-minded radio enthusiasts can be thanked for the many services he renders his fellow man and community, but I am sure that this particular honour would be appreciated by all Amateurs. Some 200 active radio amateurs will wear this badge of recognition on their motor vehicles with pride.

Lionel O'Byrne, VE5LU

Ted, W6TIJ

Saturday, June 13th, was a red letter night in the life of Ted Marilli, W6TIJ. The combined membership of the Marin Amateur Radio Club and the Tamalpais Radio Club, Inc., both Marin County Groups, staged a "This is Your Life" program for Teddy.

Ted came to Marin County in 1899, just 60 years ago, and as far as we can determine was the first enthusiast to puncture the ether from this North Bay county. He worked with Colin B. Kennedy and Dr. Kolster in the early days of radio, helping on the installation of the first broadcast station in the San Francisco Bay area. He was one of the first Amateurs who pioneered the *vhf* bands and has been continuously active since 1908.

Needless to say, Ted is the oldest active amateur in Marin County. During the course of the program, events that had occurred many years ago were dramatized and a number of the people Teddy knew in the past spoke to him from a concealed microphone and then came forward to recall their experiences. Some of these people Teddy had not seen or heard from in 40 years. Amateurs that Teddy

had started in the hobby of radio as early as 1925 came forward and recounted their problems and how Ted had helped them.

At the conclusion of the program, which took almost two hours, Ted was presented with a certificate of life membership in both radio clubs and was also given a Hammarlund HQ 110 receiver.

As in the best "This is Your Life!" tradition, Teddy was kept in the dark as to who was to be the honored guest of the program. This was no mean task, as Ted is very active in local nets and club activities and the program had been planned almost two months previously. When Karl Baron of Radio station KTIM, the master of ceremonies, walked out into the audience and told Ted that this program was for him, Ted was speechless and for Teddy that's something.

Over 200 amateurs and their wives attended the function. At the conclusion of the program they gave Ted a standing ovation and he was observed dabbing at his eyes with a handkerchief. The entire operation was a great success and it has been suggested that such a program be made an annual affair.

Altoona, Pa.

The Horseshoe Radio Club of Altoona, Pa. will hold a QSO party April 1 to 3 and April 8 to 10 from 1900 EST Friday to 1900 EST Sunday on both weekends. Anyone working 10 Altoona stations will receive a beautiful certificate. No QSL's will be required. Just send the calls, time and dates to George P. Conklin, W3KQD, 2117 Third Avenue, Altoona, Pa. All Altoona stations will announce they are operating the QSO party and looking for you. The Horseshoe Radio Club net frequency is 29510 kc and we will have someone on that frequency throughout the party, however all bands and all modes of operation will be used.

Disciple Fellowship

The Disciple Amateur Radio Fellowship met Saturday, August 29, 1959 at the Cosmopolitan Hotel in Denver, Colo.

The guest speaker was Garth H. Stonehocker, KØRYW, a scientist at the Bureau of Standards, Boulder, Colo.

Carl L. Smith, KØBWJ, introduced the speaker. C. R. Prichard, WØNYT, Highland, Kansas, was chairman of the meeting. The guest of honor was Dr. Robert Nelson, United Christian Missionary Society, Indianapolis, Ind. Wm. J. York, representing Radio Products Sales Company of Denver was also a guest. Radio equipment displays were through the courtesy of Radio Products Sales Company, Denver, and the World Radio Laboratories, Council Bluffs, Iowa. Claude Maer, Jr., WØIC, a prominent attorney, District Representative and member of the Denver Radio Club, helped to make the arrangements for a very successful meeting.

The elected officers for 1960 are:

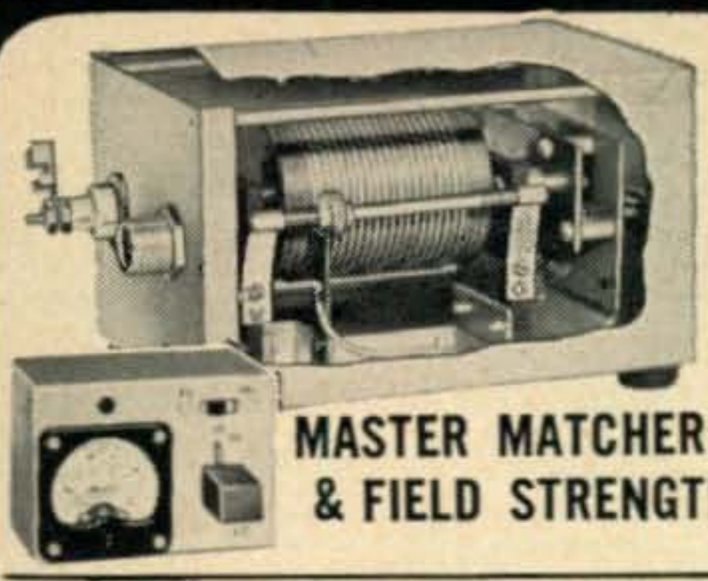
Chairman—John W. Campbell, W9AXK, Clinton, Iowa
Vice-Chairman—Ken W. Smith, W6NWJ, Santa Monica, California
Sec-Treasurer—John H. Stewart, W9RFU, Belleville, Illinois
World Representative—Hugh McCully, Ve3AYR, Toronto, Canada
Missionary Representative—James Sugioka, W9CKB, Indianapolis, Ind.

This is the first time Amateur Radio has been accorded a place on an International Convention Program, Disciples of Christ. The objective of the fellowship are twofold.

1. To assist in the selection, design and modification of radio equipment to be used to link together isolated mission stations.

2. To set up a worldwide net which can provide missionaries with the comfort and assurance of periodic contacts with their families at home.

Our first efforts will be focussed toward Clarence Williams, OQ5HN, Belgian Congo. Clarence has a regular schedule with OQ5VD, Andy, also of Belgian Congo each Tuesday, Thursday and Sunday at 0600 GMT. He also works 28.45 *mc* without a schedule. The schedule with OQ5VD is on 7070 kc. He also expects to be on 15 and 20 meters soon. If any amateur should contact OQ5HN, the following information relayed to James Sugioka, W9CKB, would be appreciated: frequency, time, signal strengths, length of contact and any pertinent information.



6 or 12 volt models

Complete **$24.95**

Automatically tunes entire band by remote control.

MASTER MATCHER & FIELD STRENGTH METER

ULTRA-HI-"Q" COILS FOR 80, 40, 20, & 15 METERS

Your Choice **$5.25 ea.**

The coil with the highest "Q" ever obtained. Tested and found to have a "Q" of well over 515. Use with 36" base sect. 60" whip. 3" Dia.

NEW!

SLIM-JIM ALL-BAND BASE LOADING ANTENNA COIL

96" WHIP

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

SIZE 1⅜" x 19"

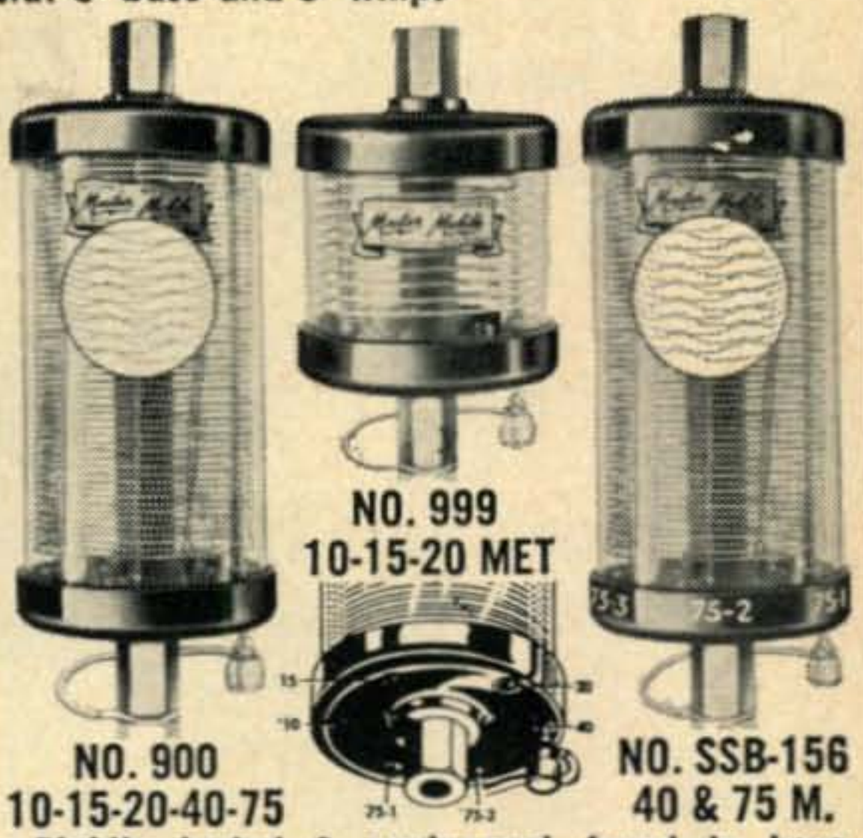
Positive action, just slide whip in or out to loading point and lock nut into position.

NO. B-1080

$17.95

MULTI-BAND ANTENNA COILS

New Plug-in type coils, designed to operate with std. 3' base and 5' whip.



NO. 900 10-15-20-40-75

NO. 999 10-15-20 MET

NO. SSB-156 40 & 75 M.

- 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.

YOUR CHOICE EA **$14.95**

FIBRE-GLAS WHIPS

The Feather-Weight Antenna with Spring-Steel Strength!

Completely weather proof, breakproof antenna with special flexibility that prevents accidental shorting-out against overhead obstructions which can cause loss of signal, serious damage to equipment.

FG-60	60" $4.95
FG-72	72" $4.95
FG-84	84" $5.15
FG-96	96" $5.25
FG-103	103" $6.95

Leaders in the Design and Manufacturing of

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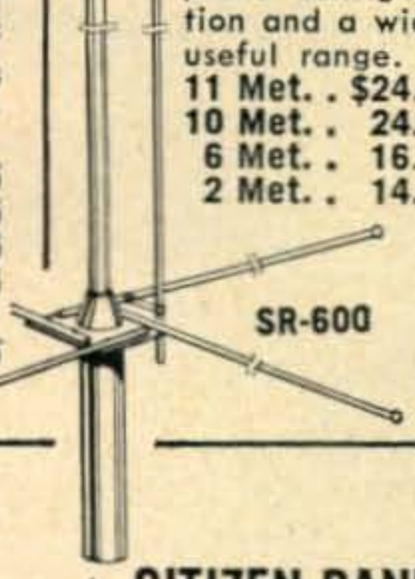
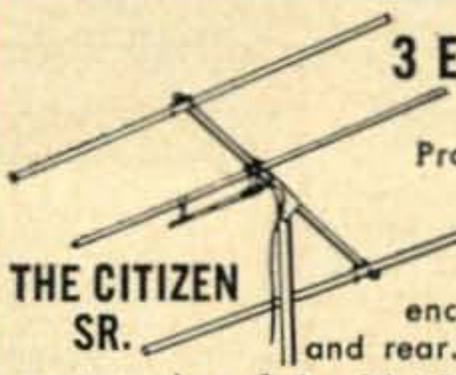
MONOPOLE ANTENNA

Folded radiating element for installation requiring a ground plane configuration and a wider useful range.

11 Met.	$24.50
10 Met.	24.50
6 Met.	16.95
2 Met.	14.95



SR-600

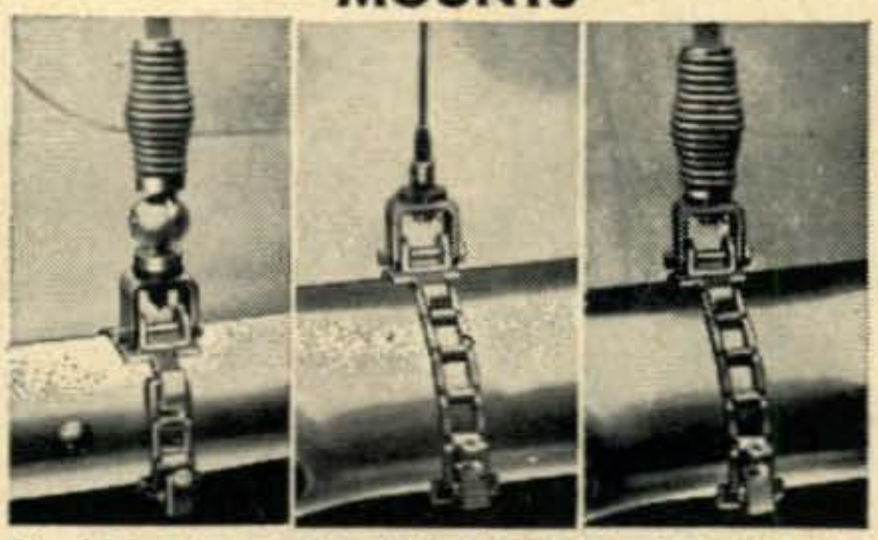


3 ELEMENT 11M. BEAM NO. SR-500

THE CITIZEN SR.

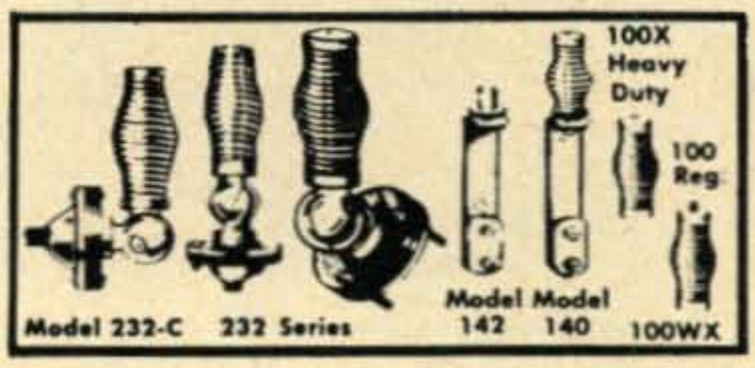
Provides a power gain of approx. 2½ (8DB) in forward direction. 10 to 1 interference reduction from sides and rear. VSNR-1. 1 to 1 at band center when fed with 52 OHM coax. . . **$36.00**

MOUNTS



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

Adjustable to any bumper. No holes to drill.



MASTER-MAGIC WAND

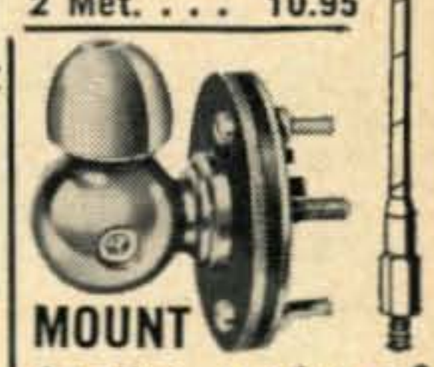
New easy-to-install, single band, top-loaded plastic covered fiber glass antenna provides maximum performance at the most useful radiation frequencies.

10 Met.- 5 Ft. L	$8.95
11 Met.- 5 Ft. L.	8.95
11 Met.-35 In. L.	8.95
11 Met.-45 In. L.	8.95
15 Met.- 5 Ft. L.	8.95
20 Met.- 5 Ft. L.	8.95
40 Met.- 6 Ft. L.	9.95
80 Met.- 6 Ft. L.	9.95

SKYMASTER COAX ANTENNA

Gets your signal through where others fail. Concentrates signals at the lowest angle, provides omni-directional pattern for best coverage. Matches RG 59/U Cable. SM-700

11 Met.	$17.95
10 Met.	17.95
6 Met.	15.95
2 Met.	10.95



MOUNT

Smaller version of Master Mobile Mounts, less spring. Swivels, mounts in all positions. ⅜"-24 thread for Magic Wand, and all Master Antennas.

No. J-11 **$2.95**

11M. CITIZEN BAND ANTENNA

40" base loaded S.S. whip antenna. Fitted with a ¼" dia. brass slug for all-purpose mounts. Low standing-wave ratio on most of band when fed with a 52 ohm coax.

8B-27 **$12.95**

CITIZEN BAND ANTENNA 26.960-27.225 MC

VSWR under 1.5:1 at resonance. Complete with 50' RG 58/U Cable. Swivel type antenna base for flat or peaked roof installation.

GP 27-11

$34.50

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AT LEADING RADIO JOBBERS EVERYWHERE

For further information, check number 17 on page 126.

MARS BULLETINS

First Army MARS SSB Technical Net

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

Mar. 2—"Transistorized Test Equipment for the Amateur Radio Station" by Robert W. Gunderson, Editor, Braille Technical Press, New York, New York.

Mar. 9—"Fundamental Requirements for Military SSB Receiver Design" by Dudley Kahn, Instructor, Fixed Station Equipment, U. S. Army Sig. Corp School, Ft. Monmouth, New Jersey.

Mar. 16—"Low Noise Preamplifiers" by Dr. James W. Meyer, Associate Director Division 4, MIT Lincoln Laboratory, Cambridge, Massachusetts.

Mar. 23—IRE Convention Recess.

Mar. 30—"Fundamentals of Single Sideband and Some Commercial Practice" by S. Edwin Piller, Group Supervisor, Eldico Electronics, Division, Radio Engineering Laboratories, Inc., New York, New York.

Air Force MARS Western Technical Net

Sunday 2-4 PM PST . . . 7832.5 kc, 3295 kcs and 143.460 mcs.

Mar. 6—"Frequency Control for the Amateur" by Mr. Hugh A. Young, AF6VYP, Western Engineering Representative, Military Products Div., Hallicrafters Co.

Mar. 13—"Infra Red Technology" by Dalmo Victor Corp., 1515 Industrial Way, Belmont, Calif.

Mar. 20—"Propagation with Problems Confronting Radio Transmission in the Arctic" by Mr. Bud Compton, Philco Systems Engineer, 4750th Radar Evaluation Squadron, Utah.

Mar. 27—"Technical Net Session, Conversion Discussion and Project Reports" by Net Members.

EDITORIAL [*from page 12*]

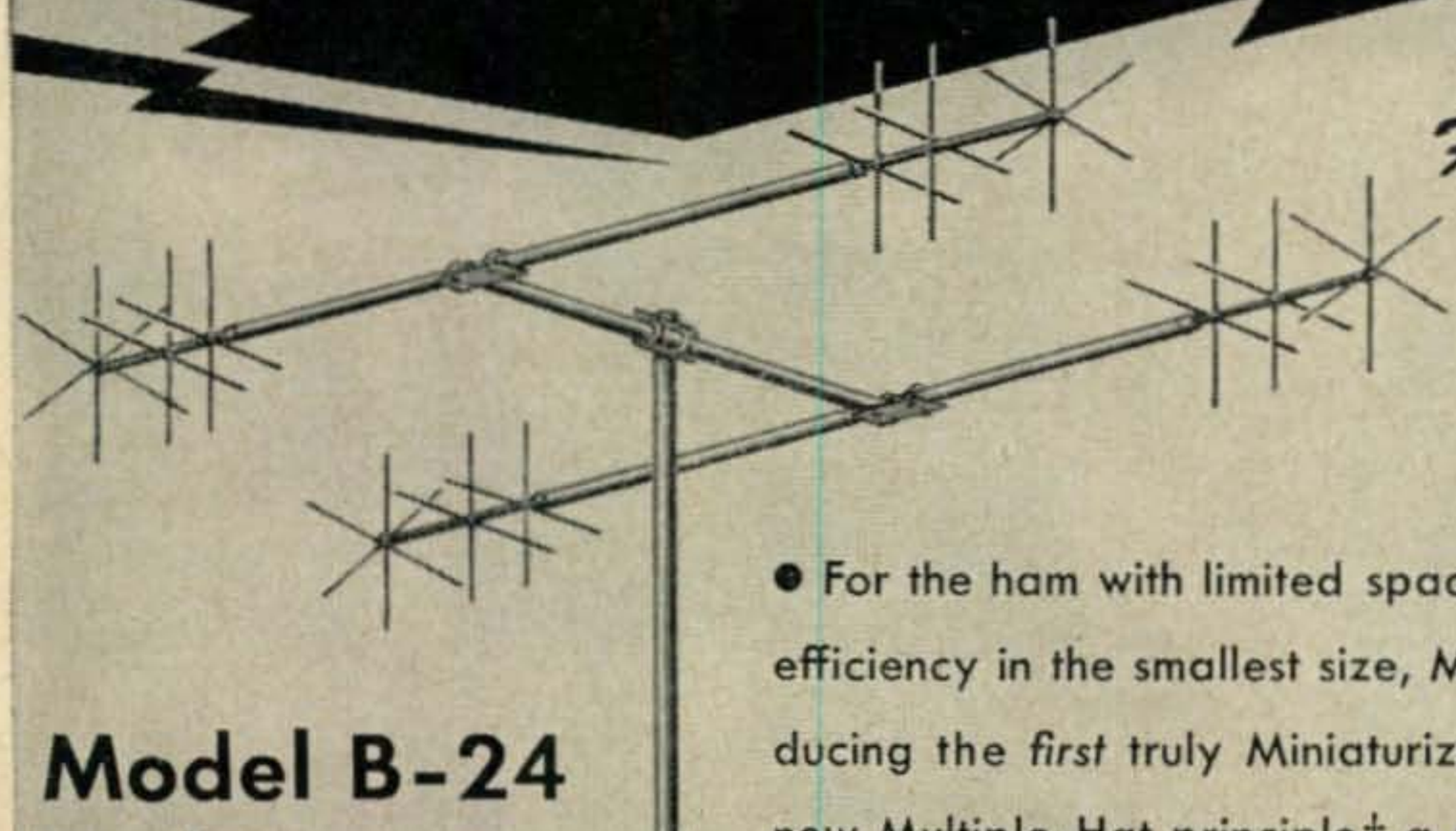
W2DTJ's amateur equipment articles become standards.

. . . Ingenuity

Some months ago I had a visit from Lenn, W7SMB. Lenn appeared at my home QTH in a new Ford pickup complete with KWM-1 and

6 10 15 20 meters

With the *Exclusive* MINI-PRODUCTS' 4-BANDER



Featuring --

4 BANDS ..... Small size . . . Light enough for any TV Rotor .....

● For the ham with limited space and those desiring maximum efficiency in the smallest size, Mini-Products takes pride in introducing the *first* truly Miniaturized multiband antenna, using the new Multiple-Hat principle† a new concept in Multiband antennas which provides coverage of any number of bands within a two octave range with a single antenna.

End loading employed on all bands—universally accepted by antenna designers as the most efficient method of miniaturizing and maintaining the high radiation resistance and radiator current necessary for *effective* radiation.

Model B-24
2 elements
Amateur Net
$54.95*

Features

- Four Bands—6, 10, 15, 20
- Maximum element length 11'-6", boom 6'-10"
- Turning radius 7'
- Weight—11 lbs.
- Gain—comparable to any antenna of equivalent size
- SWR—Less than 2:1 on all bands
- 6061-T6 aluminum elements and boom
- 1" diameter elements for maximum band width
- Can be assembled in smallest garage

†Patent Pending

Model M-4 MOBILE

Amateur Net $16.95*

Features

- Four Bands — 6, 10, 15, 20
- Overall height — 5'-8"
- Up to 5 db. gain over base loaded antenna's of equivalent height
- SWR — Less than 2:1 on all bands
- 1" diameter Radiator for maximum band width
- 3/8-24 base stud — Fits all standard mobile mounts

*NOTE—Pennsylvania residents add 4% Sales Tax

Mini-Products, Inc.

Ask for them at your favorite distributor or order direct from:

1001 WEST 18th ST., ERIE, PENNSYLVANIA

For further information, check number 19 on page 126.

lots of space to carry home the results of his shopping on New York's famous Radio Row. When Lenn and I finished shopping, he had a truck full of massive plate transformers, filter chokes, oil condensers and some 30 odd 304TH's. I admitted that the load looked impressive, but had my doubts as to its practical application. The photo below shows that Amateur ingenuity still thrives. You guessed it! Those attractive racks house the parts Lenn bought in New York. The lovely YL is Lenns XYL, W7DHV.

72-73-75, Barry, K2IEG

SCRATCHI [*from page 14*]

transmitter and reseever. If you getting list, that other amchoor are you. You going down in history so many times your Hon. Name will be legion. OK?

I still thinking maybe you not buleeving all this. So, alright, Mr. Hon. Know-It-All, here are the scoop. I referring you to F.C.C. Rules and Regulayshuns Volume Six, Part 12. Next looking up Secshun 12.111. Part (o) of this secshun are saying amchoors are permitted to working any freakwency above 30,000 megacycles.

Now getting reddy for the amazing news. I having available brand new freakwency bands from one million megacycles, on up to 750 million megacycles. That are medium fair hunk of amchoor spectrum, you not thinking?

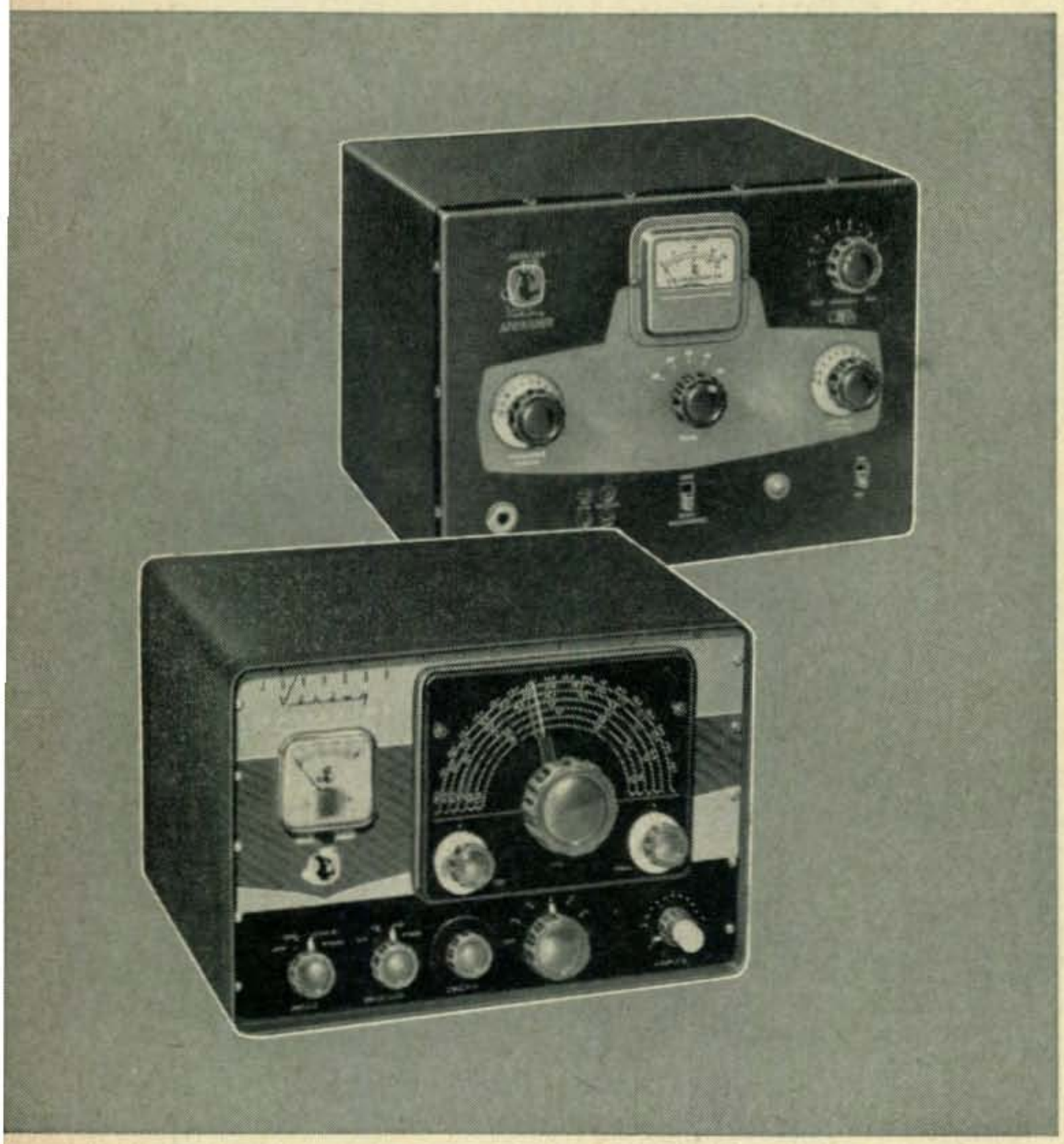
Let us say that I desiding to selling you complete transmitter and reseever for 600 million megacycles band. What you getting are reel slicky looking to-cell flashlite, complete with green filter over glass. Also getting pair green-tinted eyeglasses. Flashlight are transmitter. Pair of green-tinted eyeglasses are reseever. It so happening that green lite are on freakwency of 600 million megacycles.

Are able to supplying freakwencies between 400 and 750 million megacycles with no trubble, on acct. that visible lite spectrum. Are now working on infra-red spectrum, from one million to 300 million megacycles. Also, if needing more money, going other way and working on ultra-violet spectrum.

[*Continued on page 98*]

Whatever you expect from a transmitter ...you'll get <u>more</u> with a VIKING!

Excellent dollar value . . . high trade-in value . . . solid communication power . . . dozens of operating and convenience features – just a few of the **many** good reasons why you get much more with a Viking! From the popular, low-priced "Adventurer," which was used to earn the first novice WAC – to the brilliantly engineered "Kilowatt" – Viking transmitters are "first choice" among the nation's amateurs. Yes, dollar-for-dollar, Viking transmitters are your **best** buy. See them today at your authorized Johnson distributor.



"ADVENTURER" TRANSMITTER

More than just a novice transmitter, this power-packed, completely self-contained unit was used to earn the first novice WAC. Instant band-switching 80 through 10. Crystal or external VFO control – wide range pi-network output. 50 watts CW input. Effectively TVI suppressed. With tubes, less crystals.

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

"NAVIGATOR" TRANSMITTER/EXCITER

Perfect for novice or experienced amateur–serves as a flexible VFO Exciter with enough RF power to excite most high-powered amplifiers on CW and AM. 40 watts CW input–bandswitching 160 through 10. Built-in VFO or crystal control–wide range pi-network output. Timed sequence keying. TVI suppressed. With tubes, less crystals.

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

"CHALLENGER" TRANSMITTER

Ideal for fixed station or portable use! Fast, easy tuning and plenty of reserve drive. 70 watts phone input 80 through 6 meters; 120 watts CW input 80 through 10 – 85 watts CW input on 6 meters. Wide range pi-network output – effectively TVI suppressed–special "LC" keying circuit provides true "shaped" CW waveform. Crystal or external VFO control. With tubes.

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

The world at your finger tips!

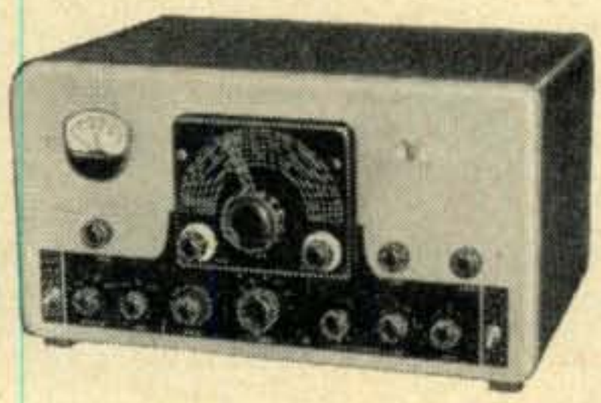
VIKING "KILOWATT" AMPLIFIER—The only power amplifier available which will deliver full 2000 watts SSB* input, and 1000 watts CW and plate modulated AM. Continuous coverage 3.5 to 30 mcs. Excitation requirements: 30 watts RF and 10 watts audio for AM; 10 watts peak for SSB.

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

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

"RANGER" – 75 watts CW and 65 watts phone input. Bandswitching 160 through 10 meters. Built-in VFO or crystal control. With tubes.

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



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

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

"FIVE HUNDRED" – 600 watts CW input; 500 watts phone and SSB (P.E.P. with aux. SSB exciter). Bandswitching 80 through 10. With tubes.

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

"THUNDERBOLT" AMPLIFIER—2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear. Continuous coverage 3.5 to 30 mcs. With tubes.

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

"6N2"—Instant bandswitching coverage of both 6 and 2 meters. Power input rated at 150 watts CW, and 100 watts AM phone. With tubes.

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

"6N2" THUNDERBOLT AMPLIFIER—Input rated 1200 watts P.E.P.* SSB and DSB, Class AB_1; 1000 watts CW, Class C; 700 watts AM linear, Class AB_1. Continuous coverage 6 and 2. With tubes.

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

"COURIER" AMPLIFIER – Class B linear rated 500 watts P.E.P. input with auxiliary SSB exciter; 500 watts CW; 200 watts AM. Continuous coverage 3.5 to 30 mcs. With tubes.

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

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FIRST CHOICE AMONG THE NATION'S AMATEURS

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E. F. JOHNSON COMPANY • WASECA, MINNESOTA

For further information, check number 27 on page 126.

VHF Receiver
Model 100B

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

Most of the VHF old timers that tinkered with Ham gear for good many years, at one time or another, have had visions of an ideal receiver—one to suit their particular fancy. One that would encompass the converters and the receiver with all necessary power supplies on one chassis, and one with unnecessary weight that could easily be moved around the shack. Yet such a receiver would have to have rigidity and stability to the utmost degree. Such a squawk box was never produced commercially and if it had been, the price tag would be out of reach for all but the big wheels. Not being wealthy, but having a gnawing desire to own such a receiver I decided to build one, and here is what I came up with.

The receiver shown is not the first attempt in receiver design and construction and it wasn't built over the week-end. It is the second one built of this particular design and all deficiencies of the first model were eliminated in the second called the 100B. In describing the details of such a receiver for duplicating purposes would require the entire CQ magazine, and of course that's out of the question, for it would only bore most of the readers. So only the general description of this project will be outlined.

The receiver shown is of a five band design. Double conversion type on 13 to 29.9 *mc* bands, and on 144 and 220 *mc* bands it operates as triple conversion, using xtal converters with a regulated power supply. Then can be seen at the far end of the chassis in the photos. The sensitivity of the receiver is better than 1 microvolt for 10 *db* signal to noise ratio on all bands as measured with "Measurements Corp" signal generator Model 80. The selectivity is a compromise between the *ssb* and *vhf* and is in order of 3 *kc* at 6 *db* down. More selectivity could be incorporated but was not necessary operating the *vhf* bands.

The rest of the items incorporated are standard proven circuits found only in the good receivers and are *rf* gain, *if* gain, Antenna trimmer, oscillator calibrator, product detector, *bfo*, upper and lower side band crystal oscillators, delayed *avc*, automatic noise limiter, signal strength meter and hand calibrated lucite dial which is illuminated.

Construction

With exception of small items that had to be machined, the mechanical parts are standard throughout. All tube numbers and part

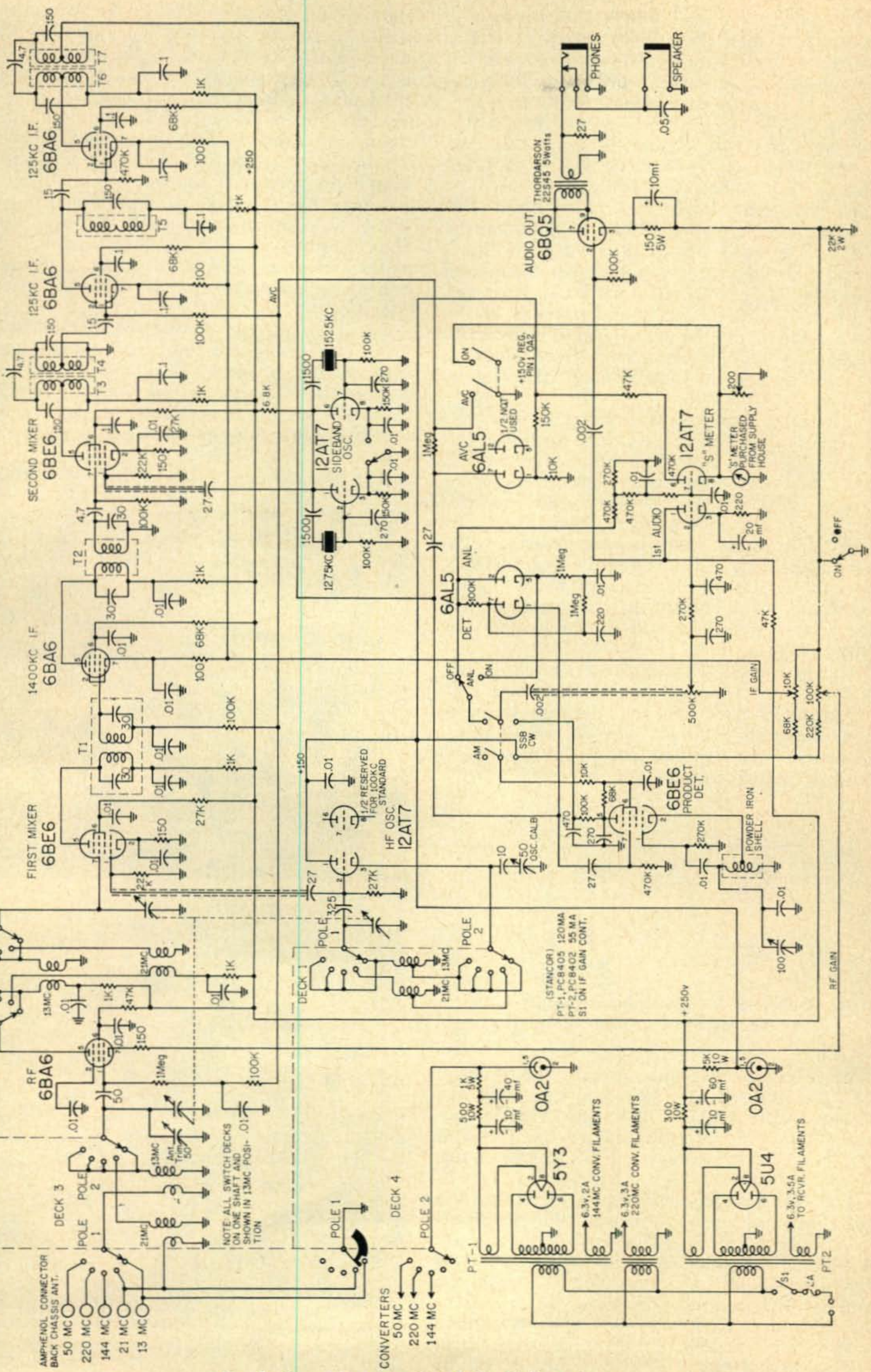


Fig. 1—Complete schematic of the VHF receiver.

numbers were stamped with steel stamps on all chassis and then the chassis were lye etched for neat appearance. The front panel is aluminum gray crackle, with all controls engraved to give it a professional look.

The first units built and tested with my BC-348 were the 144 *mc* and 220 *mc* xtal converters which employed a 417-A into 6AJ4 cascode *rf* amplifier. The circuit was borrowed from QST, Nov. 1956 issue. (Low Noise 108-144 MC Converter by Mason P. Southworth) and it is a good one with a very low noise figure. Several of these converters were built and they all performed very well. However, in order to mount the two converters in the space allotted on the chassis of this receiver, mechanical modifications had to be made to place both of them in the space taken up by the original design.

The next item was to arrange components for the rest of the receiver on what was left of the chassis to favor the best wiring layout. When this was done (after several tries) the *if* strip (which is a separate chassis mounted over a cut out in the main chassis) was designed. This system was used to alleviate difficulty in making cut-outs for the *if* transformers and to add further rigidity to the heavy aluminum main chassis. It also increased the ease of testing and aligning the completed strip before securing it in place.

The first *if* stage utilized the standard 1600 *kc* transformers made by J. W. Miller but padded with 30 mmf NPO Capacitors to bring them down to 1400 *kc*. The second *if* transformers are the standard 262 *kc* units modified to bring them down to 125 *kc*.

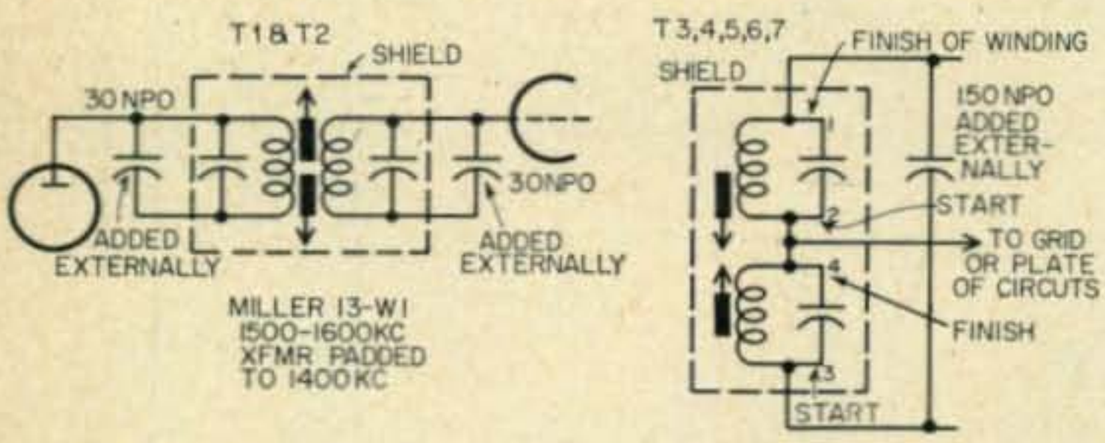


Fig. 2—Details of if transformer modifications. Further details are given in text.

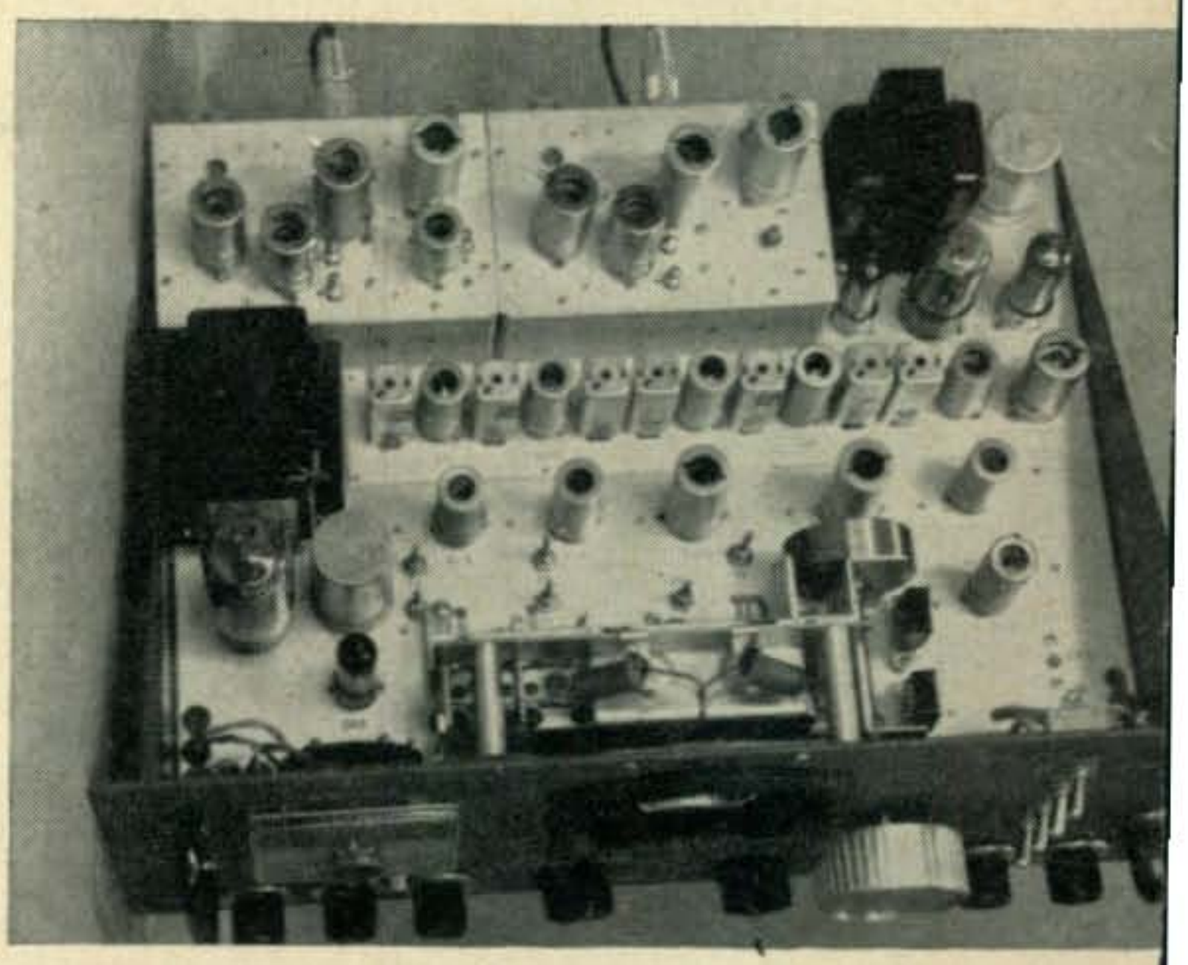
After completing and aligning the *if* strip, the *rf* section and its switching of bands was designed. The 6BA6 *rf* tube has cathode controlled bias and is engraved on the panel as *rf* gain. AVC is also applied to the grid of this tube.

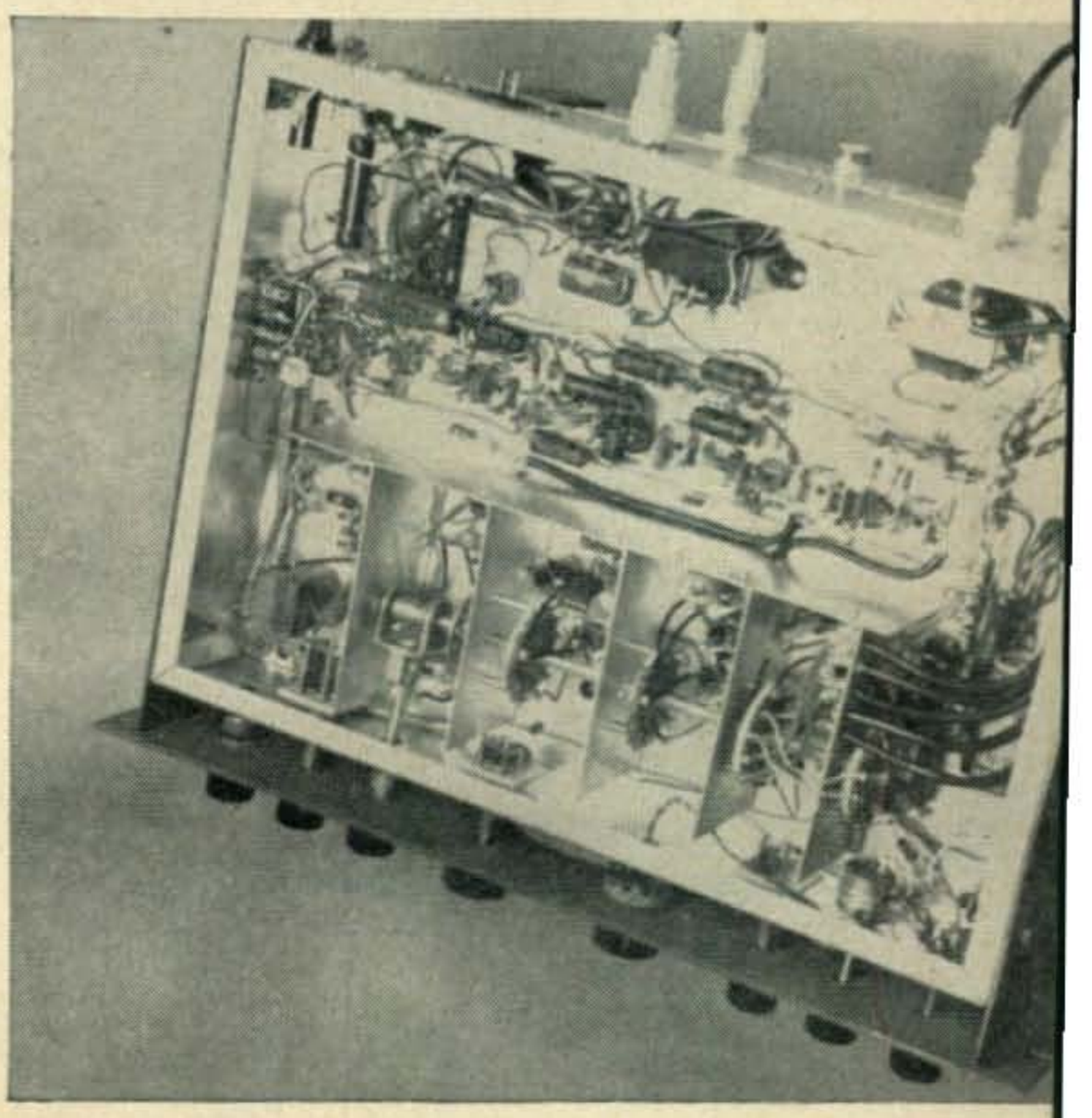
The 6BE6 which serves as a mixer has the usual mixer circuit. The *hf* oscillator is a Hartley and ½ of a 12AT7 is used in the circuit. A 50 mmf trimmer in series with a 10 mmf fixed condenser is connected between the cathode and ground, and serves as an oscillator calibrator. Regulated 150 volts is applied to it during stand-by periods to eliminate drift.

The second mixer is also a 6BE6 and its plate circuit is tied to the 125 *kc* second *if* of which there are 2 stages. The gain of these stages is also controlled by the same method as the *rf* stage and *avc* is also applied to the grids of the 6BA6 *if* tubes. The transformers used in this section are 262 *kc* modified by connecting the two coils in series and shunting the winding with 150 mmf NPO Capacitors. The bottom core is screwed all the way in, and only the top core is used for trimming. These transformers are used as single tuned units coupled by 4.7 mmf capacitors. The plates and grids are tapped down to the junction of these transformers to minimize loading effects.

Fixed frequency second oscillators use a 12AT7 tube and are Pierce crystal oscillators using a 1525 *kc* and 1275 *kc* crystals for upper or lower side band reception. They are switched by grounding of the cathode through a *spdt* switch on the front panel. (Engraved USB—LSB.)

The last 125 *kc if* is fed to the 6BE6 product



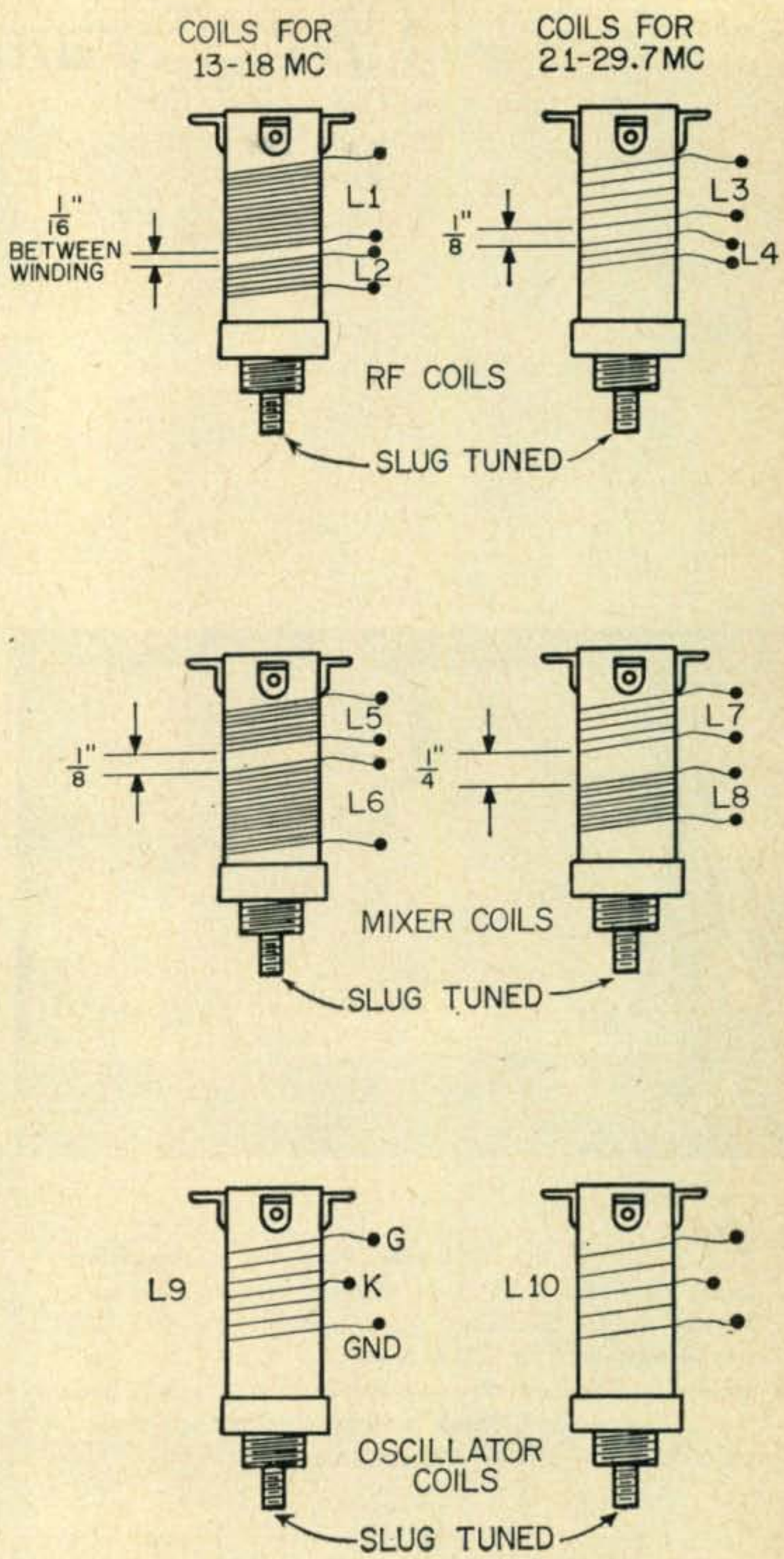


detector and the 6AL5 diodes which serve as a second detector and automatic noise limiter. Another half of a 6AL5 is used for delayed *avc*. A 12AT7 is used for the 1st audio and S meter. The power amplifier is a 6BQ5 and puts out 3 watts of audio. A 6BE6 used as a product detector and BFO operates from 150 volt regulated power supply for stability. Main power supply is the usual 5U4 operating full wave, well filtered and producing 250 volts at 120 *ma*. The power supply for the xtal converters is 150 volts regulated and is switched on only for the band in use. The heaters in both converters are on at all time.

The switching of bands and power to converters is accomplished through a right angle drive mechanism because the switch runs parallel to the front panel. The switch was assembled from standard parts and contains four decks of 2 pole 5 position each. During the switching of power to converters a system had to be worked out to short out the antenna on the 13 to 18 *mc* band to prevent feed through of commercial stations. This is the band that is used as an *if* for the converters.

The amphenol connectors on the back of the chassis and coax cables shown running to the switch, in the bottom view of the photo, are used for separate antennas. There is also an extra connector for an external converter in the 50-54 *mc* range for which the dial is calibrated. Due to lack of interest in this band it was never tried.

The project required about 4 months of midnite oil. However, considering the development time of the first receiver called the 100A, the combined time would look like about 18 months, but it was well spent and much enjoyed. Besides, where can you buy a receiver with all the trimmings?



Front End Construction Data

Tuning Capacitor Modification Data

RF 1	MIXER 2	OSCILLATOR 3

Original Capacitor Section 1 = 8 rotor and 8 stator plates.
Original Capacitor Section 2 = 8 rotor and 8 stator plates.
Original Capacitor Section 3 = 17 rotor and 16 stator plates double spaced.
Measured Capacities of Original Capacitor
Section 1 = 320uuf max. – 14uuf min.
Section 2 = 320uuf max. – 14uuf min.
Section 3 = 333uuf max. – 22uuf min.
Modified Capacitor – Stator plates intact, only removal of Rotor plates.
Section 1 (Only 2 rotor plates) Max C = 34uuf
Section 2 (Only 2 rotor plates) Max C = 34uuf
Section 3 (Only 3 rotor plates) Max C = 37uuf
Note: Section 3, in spite of bigger C max, is used in the oscillator section due to double spacing of plates the variable C is only 15uuf.

Coil Data

All coils wound on CTC ⅜" X 1½" low loss coil forms. All forms powder iron tuned.

L1-L5 10T #26 enamel wire close wound (= 3.5 uh to 4.5 uh).
These coils tune 13 to 18 *mc* with 20 uuf of variable C.
L2 – 3T #26 enamel wire close wound spaced 1/16" from L1. This coil is low impedance antenna coil.
L3-L7 = 5T #20 bare copper, turns spaced one wire diameter (L = 1 uh to 2 uh) These coils tune 21 to 29.7 *mc*. with 20 uuf of variable C.
L4 = 2T #26 enamel wire (untuned, spaced ⅛" from L3, low impedance Antenna coil).
L6 – 20T #30 enamel wire (untuned) spaced ⅛" from L5 (*rf* plate coil).
L8 – 10T #26 enamel wire (untuned) spaced ¼" from L7 (*rf* plate coil).
L9 – Oscillator – 8T #28 bare copper, space wound one wire diameter. Cathode tap 3½T from cold end. (L = 2.5 to 3.5 uh). This coil tunes 14.4 to 19.4 *mc* with 15 uuf of variable C.
L10 – Oscillator coil – 5T #20 bare copper, space wound two wire diameters. Cathode tap 2T from cold end (L = .9 to 1.5 uh). This coil tunes 22.4 to 31.1 *mc* with 15 uuf of variable C.

144 Mc Parametric Amplifier

Frank C. Jones, W6AJF
85 Donner Ave.
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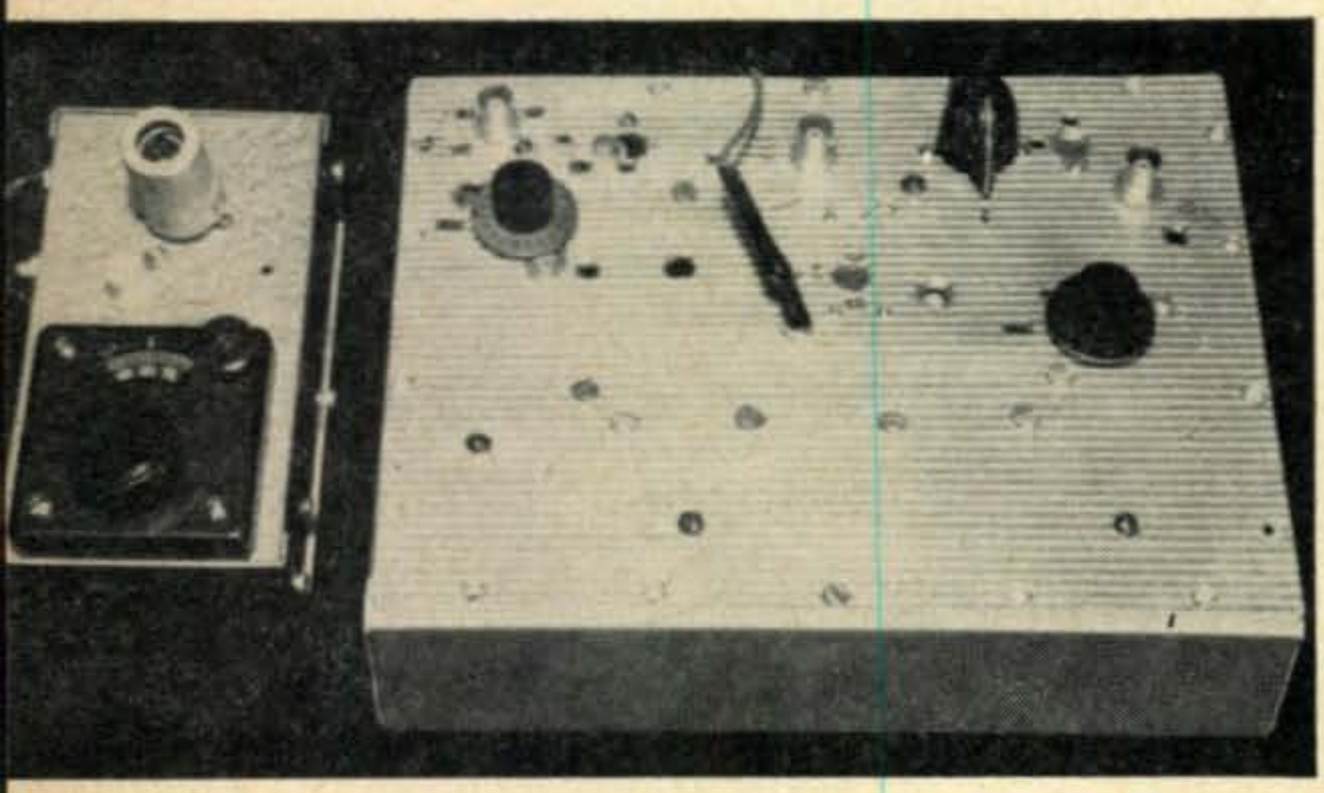
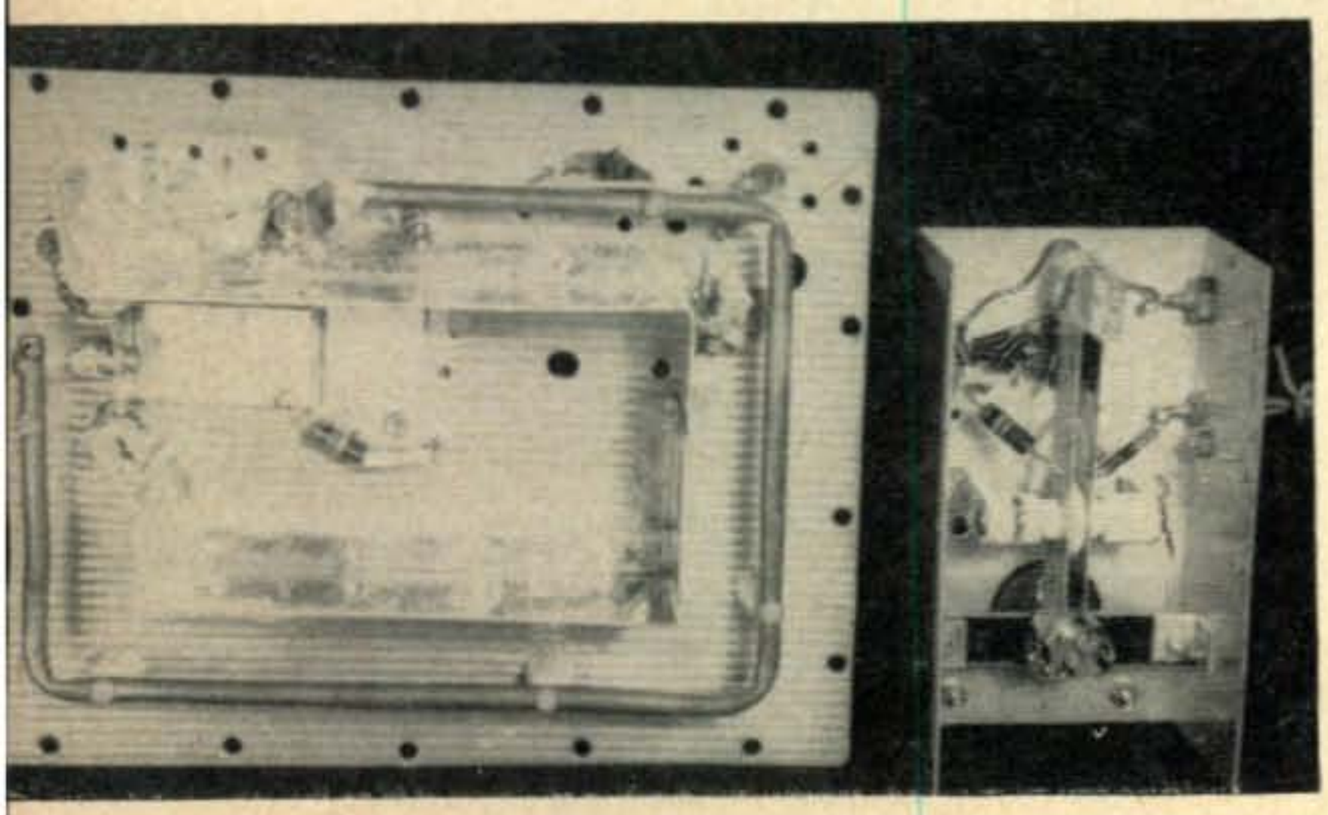


Top view of the 2 meter Parametric Amplifier built on a 7 x 9 x 2 inch chassis. The smaller unit is the Pump Oscillator that operates in the 800 mc range with a 6AF4 oscillator tube. The small dials on the amplifier are for idler and pump frequencies. Knob adjustment is for the 144 mc tuning.

Bottom view of the 144 mc parametric amplifier using a folded line and a flat plate pump oscillator line with the varactor diode connected between them. Input and output links are near the large tuning condensers on each side of the 144 mc line. The line is supported on ¾" ceramic standoffs. The 2" high partition, together with the chassis, forms a trough line for the bent copper tubing. Smaller unit is the parallel plate line 800 mc pump oscillator with a 5 plate butterfly tuning condenser at one end and tube and polystyrene "stiffening" block at the other end.



For ordinary 144 mc band operation, little is gained by using a parametric amplifier since the man made static or noise level can be reached at times by tube amplifiers. When that noise level is greater than the receiver noise level little is gained for ordinary AM fone operation. The usual 144 *mc* parametric amplifier has a noise figure in the vicinity of 1 *db* which is about ⅓ of a receiver "S" meter reading better than a good cascode or grounded grid *rf* amplifier using tubes. The signal gain over a few hundred *kc* in the 144 *mc* band is about the same as a grounded grid stage but the latter will cover 4 or 5 *mc* or the entire "2 meter" band.

The parametric amplifier on 144 *mc* has its virtues in that it is a very low noise device, adding gain without an equal amount of added noise. For 2 meter DX reception, it may become very popular, especially if the cost of parametric amplifier diodes is reduced. Where high angles of antenna direction such as for moon bounce tests and some meteor shower DX attempts, the man made noise levels are often much less than when an antenna is pointed along the horizon. This really gives a good advantage to the parametric amplifier as compared to 417A or 416B tube *rf* amplifiers. In some locations the noise level is quite low at times even with large antennas pointed along the horizon so 2 meter DX may be possible that would ordinarily be very difficult with tube amplifiers.

For ordinary fone operation over moderate distances, there are times when the parametric amplifier may be very useful. A small beam antenna or ground plane antenna will seldom provide enough pick up to be able to hear average man made noise levels as compared to the receiver noise from the first stage in the 144 *mc* band. In this case a parametric amplifier can be used to cover as much as 1 or 2 *mc* of the band without retuning its input circuit or the associated pump oscillator. If the regenerative amplification is reduced a little from the usual value, the amplifier will cover

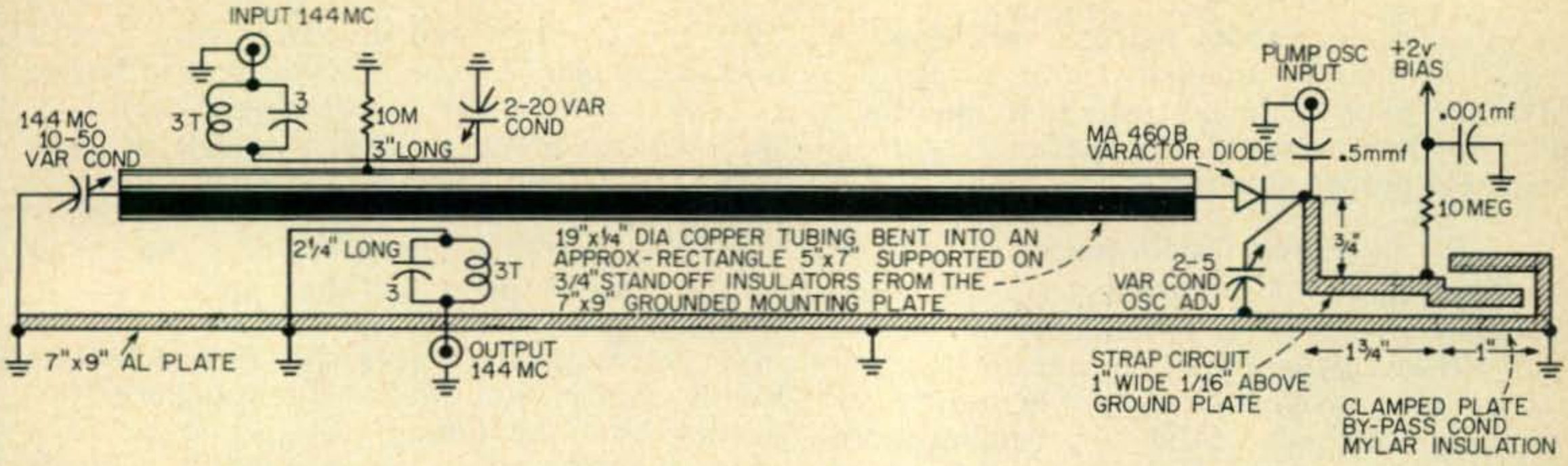


Fig. 1—Construction details for a folded line 144 mc parametric amplifier.

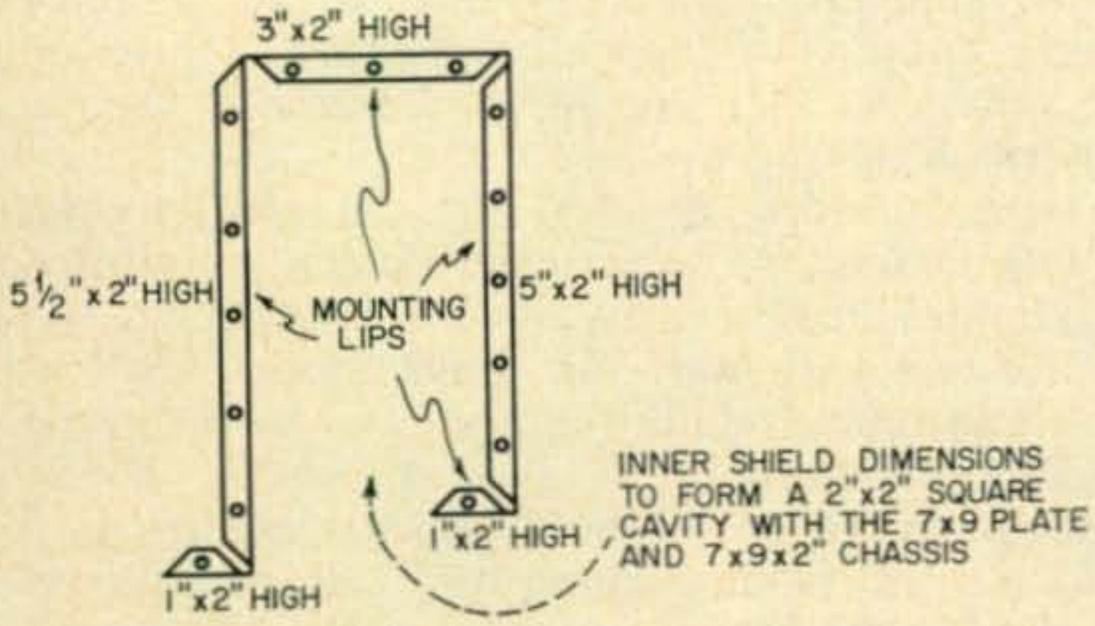
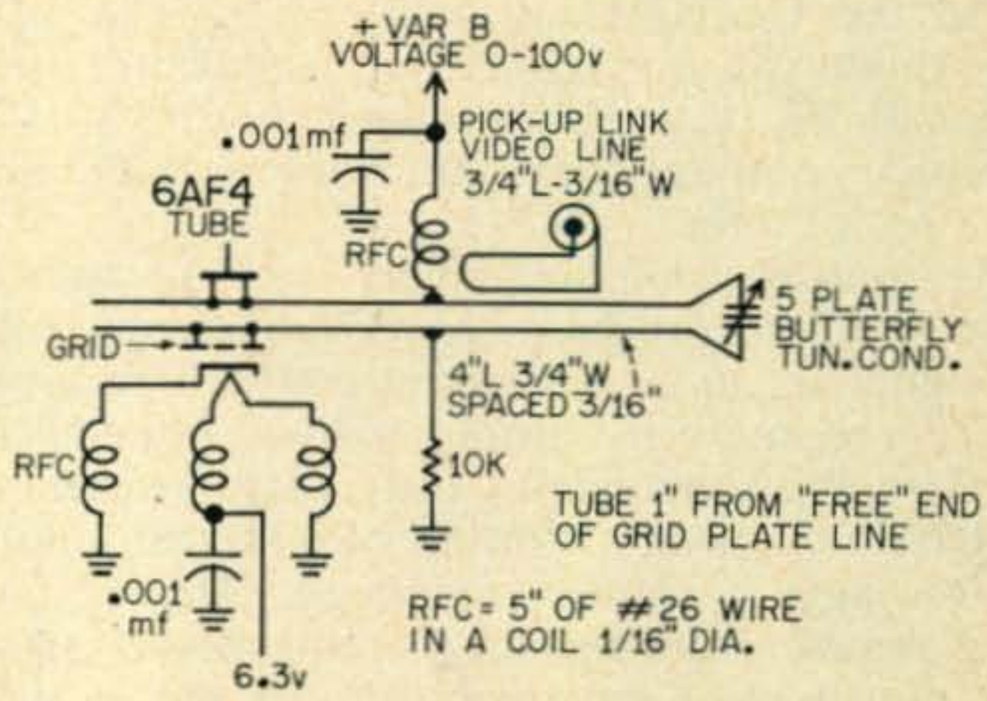


Fig. 2—Circuit of the pump oscillator that operates from 760 to 825 mc.



2 *mc* before losing more than about one S point of gain and around 2 *db* of *nf*. With this method of operation, a portion of the band can be covered and signals copied with only a small antenna. If a large antenna cannot be put up in the clear for some reason, the parametric amplifier can become a modest substitute. The writer is a firm believer in having a receiver that will "reach out" further than a transmitter and that becomes a problem as the transmitter power is increased from a few watts to a few hundred watts. The parametric amplifier with either a large or a small antenna system is a good step in this direction.

Another favorable point is in the added image rejection afforded by the regenerative diode amplifier and its high Q signal frequency circuit. The amplifier will not function without a low loss, high Q circuit properly adjusted and since it depends on regeneration for its amplifying properties, the device is of considerable help in overcoming 144 *mc* converter or receiver deficiencies. Unlike a regenerative tube amplifier, it does not add equal amounts of signal and noise gain or increase.

Construction

Like any other diode or reactance amplifier, the 144 *mc* system can be built in a number of different forms. The high Q circuit can be a cylindrical coaxial tank or it may be of a trough line design. The system shown in the photographs is a folded trough line which fits into a standard aluminum chassis, 7 x 9 x 2 inches in size. The ¼ inch diameter copper line was folded around so as to be one inch from the sides of the chassis box when the 7 x 9 inch mounting plate is in the box. In order to complete the 2 inch by 2 inch cavity, a 2 inch high piece of sheet aluminum was bent around to be spaced one inch from the copper line on the sides opposite to the chassis box walls. This line is 19 inches long with about a 1 inch flat copper strap lead to the series tuning condenser at the end opposite from the varactor diode. It is electrically more than a quarter wave long with the excess length tuned out with a large variable condenser of 5 to 50 mmf. The antenna and output connections can be tapped on the line or coupling can be inductive as shown here. Five small ceramic stand-off insulators were used to support the copper line on the 7 x 9 inch 14 gauge aluminum mounting plate. The microwave varactor diode, a MA 460A or B, connects from this long line circuit to a short low impedance flat plate line tuned to the pump frequency.

A wide range of pump oscillators can be used in this parametric amplifier by adding a small piston type of tuning condensers at strategic points a few inches from the large tuning condenser end in order to resonate it to the idler frequency. The circuit, as built, resonated in the 144 *mc* band and at a frequency near 650 *mc* so this was chosen as the difference idler frequency with a pump frequency of about 790 *mc*. This particular 144 *mc* circuit also resonates not far from the sum idler frequency of about 1080 *mc*. A pump oscillator in the 1000 to 1100 mc region should also be usable

but would require about twice as much power as with an 800 *mc* oscillator. It is always the difference idler frequency which is important and must have a resonant impedance to dissipate it for proper parametric operation.

Pump Oscillator

A high ratio of pump frequency to signal frequency gives a lower noise figure than a low ratio. However, there are compensating factors in a low ratio system. The upper or sum idler frequency may aid a little in providing more signal thru the amplifier. The second or third harmonic of the pump frequency and its difference idler frequency may have resonant impedances in the varactor diode circuits and so aid the fundamental frequencies. The varactor diode is a marvelous frequency multiplier as compared to ordinary mixer diodes, so the harmonic output from the pump oscillator could be a factor.

The pump oscillator power applied to the varactor diode produces new frequencies with the signal as in any superheterodyne receiver but in a regenerative amplifier these added frequencies, in particular the difference frequency, must be dissipated to obtain parametric amplification at the signal frequency. The system being regenerative means that the pump oscillator power must be carefully adjusted as well as the frequency in order to obtain amplification. Too much pump power will cause oscillation at the signal frequency and too little results in no improvement in *nf* and no amplification. The required pump oscillator power varies apparently as the square of the frequency so a pump oscillator at 1600 *mc* would have to supply four times as much *rf* power as one at 800 *mc* and would also radiate about four times as much into the antenna. A pump frequency of three times 800 or 2400 *mc* would have to furnish about nine times as much power. Up to about 900 *mc* pumping frequency, a 6AF4 oscillator will give good results with a 20 to 100 volt plate supply and 5 to 15 *ma* of plate current. For higher frequencies some other tubes should be used and this complication may offset the advantages of greater simplicity in the amplifier design and tune up procedure.

Pump Oscillator Construction

The pump oscillator shown in fig. 2 and in the photographs was built into a 5 x 3 x 2 inch aluminum box. It is a parallel line oscillator with the 6AF4 tube connected to the line about one inch from the open end and a little 5 plate butterfly condenser is used to adjust frequency at the other end. The oscillator tunes from about 760 to 825 *mc* with the 4 x ¾ inch plate and grid lines spaced 3/16 of an inch. The brass plate material used was somewhat flexible so the line was supported at each end and near the middle to improve frequency stability. The butterfly condenser is mounted on a strip of bakelite and is controlled by a small vernier dial insulated from it with a shaft coupler. The plate, cathode and heater *rf* chokes were made by winding 5 inches of #26 wire to produce a coil diameter of 1/16 inch. The output coupling link was made of #18 hook-up wire in a small hairpin loop ¾ inch long and 3/16 inch wide near the center of the parallel plate line but underneath it. Oscillator power output is adjusted by means of a potentiometer across the 100 volt plate supply. Since this affects the oscillator frequency also, the tuning dial has to be reset when adjusting pump power into the varactor diode circuit. In fact all adjustments interact on others so the tune up procedure is usually laborious, to say the least.

Other diodes besides the MA46OA and 46OB varactors were tested in this amplifier. A Hughes Products parametric amplifier diode performed very well but other diodes such as small computor units required too much pump oscillator power or a lower C circuit across the diode. Three different types were tried of which the Radio Receptor DR303 diodes seemed to work best, but only with less antenna coupling and more reverse bias and pump power. The *nf* was not much better than a 417A amplifier in this particular unit. Possibly an amplifier designed around the diode would produce better results. At the present time the writer feels that about $20 was wasted in order to test several of the computor diodes. Those manufactured for the particular job of parametric amplification are certainly worth the added cost.

The low impedance pump frequency circuit in fig. 1 was made of a piece of sheet brass about 3½ inches long and 1 inch wide. A ¾ inch lip was bent up as a mounting lip for the friction sleeve into which the large end of the diode fits. A ¼ inch length of ¼ inch inside diameter tubing was slotted with a saw for part of its length and the sleeve was then soldered into a hole in the top lip of the flat plate line. The remainder of the line has a 1¾ inch portion spaced 1/16 inch above the large 7 x 9 inch mounting plate. A one inch portion is clamped to this plate with the clamp and plate insulated with plastic sheet mylar to form a radio frequency by-pass condenser effective in the 800 *mc* region. By using a low impedance circuit at this point, the varactor diode literally has a solid footing to pump energy into the signal and idler frequency circuit, and oscillator adjustments have less detuning effects on these other circuits. The pump oscillator jack connects to the top of the vertical lip thru a ½ *mmf* condenser.

The copper line is floating unless a direct antenna tap is made to it. In this unit a 10 megohm resistor was used to ground it. The diodes tested here all seemed to function better with about 20 megohms total in series with the bias supply. The advantage of 2 or 3 volts of *dc* bias is in the fact that the diode

[*Continued on page 125*]

Matching The Modulator To The Class C Amplifier

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Impedance Matching is the common expression used to describe the process of properly relating the various circuit impedances so as to maximize power transfer and insure proper operating conditions. Practical examples have been used to illustrate the various points in making these calculations.

First determine the modulation capability of the audio amplifier. This is done by measuring the voltage swing across the modulator transformer secondary with resistance load for proper impedance match. Measure peak voltage; if an rms meter is used multiply reading by 1.414 to indicate peak voltage.

This result indicates the class C amplifier plate voltage that must be used. For these measurements a pure 400 cycle sine wave input signal must be used. Listen to the output of the modulator and advance the gain control to the point where the signal begins to sound like an octave. This indicates distortion and the gain should be reduced slightly below this point. If a scope is available it will show the exact point at which distortion begins.

The modulator power output equals the square of the modulator output voltage, divided by the load resistance. RMS value is used in this case. The class C power input equals twice the modulator output power and class C power input divided by class C voltage equals class C amperage that must be used.

A slide rule will quickly show these calculations to be true. For instance suppose a modulator is available that will supply 17 watts (this will modulate a 34 watt class C amplifier); and the modulation transformer has an output winding with an impedance of 6,000 ohms. The slide rule is set to give a quotient of 6,000 ohms. Inspection shows that there is only one set of values that will equal 34 watts, namely 450 volts at 75 millamperes.

Now if the slider of the rule is moved to indicate other values of voltage and current to produce 34 watts it will be found that the quotient has also moved to another value and the impedance match is lost.

Further suppose that either 410 volts or 490 volts is available for the class C amplifier. It would be better to use 490 volts at 70 mils which will equal 7,000 ohms impedance and the reflected impedance will be 17% high. If 410 volts at 82 mils is used the load impedance will be 5,000 ohms and the reflected load impedance will be 17% low. This shows that if there is much deviation from matched value there will be a comparatively high percentage deviation in the reflected load at the plate input of the modulator. It is recommended that a higher rather than a lower load impedance be used if a choice can be made.

Reflected impedance looking into the primary = Secondary load resistance X (primary impedance ÷ Secondary impedance); or Secondary load resistance X the square of turns ratio = reflected load impedance in primary.

To find turns ratio when primary and secondary impedance are known:

$$\text{Turns Ratio} = \sqrt{\frac{\text{Primary Z}}{\text{Secondary Z}}}$$

Suppose further that a pair of tubes used in the modulator have a recommended load resistance plate to plate of 10,000 ohms and the transformer has a 9,000 ohm input impedance. Then using the higher reflected load impedance of 17% results in a reflected load of 10,530 ohms; (17% of 9,000 ohms = 1,530 ohms.) This would give about as good a match as the original 6,000 ohm load.

A chart is shown which shows the relationship of voltage, impedance, and power in the ranges usually encountered in transmitters. Currents

[*Continued on page 124*]

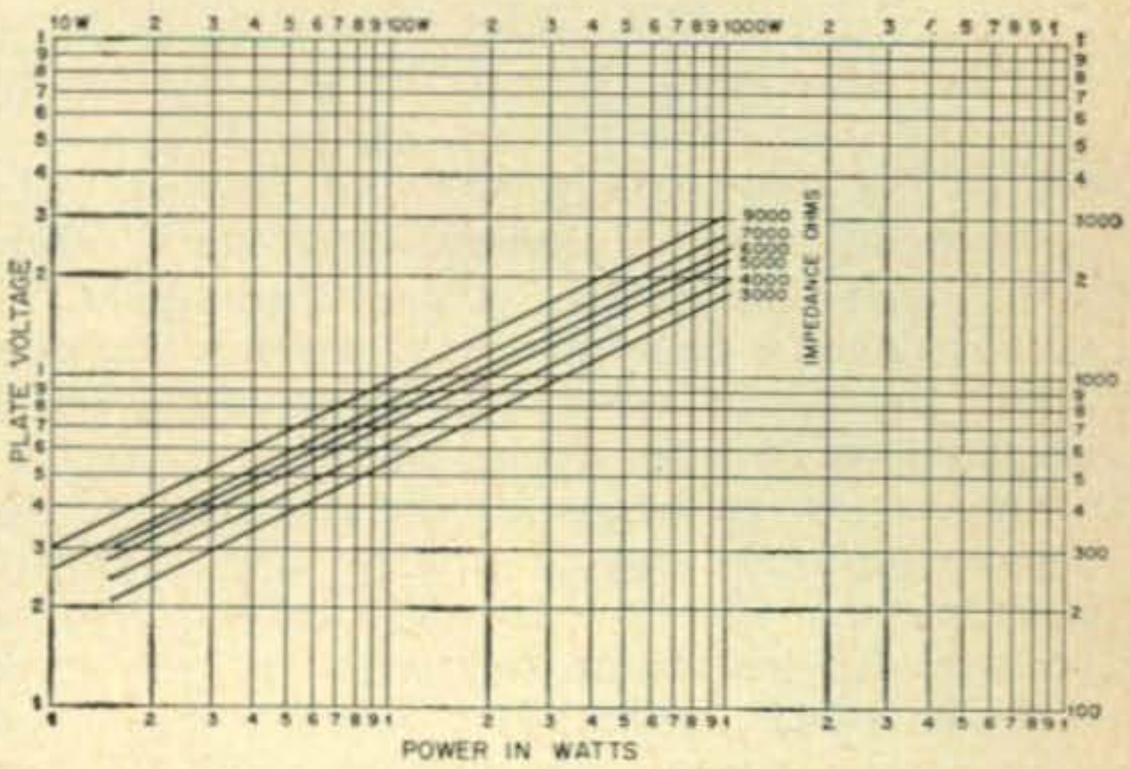

Chart showing the relationship between the voltage, power and impedance for modulators.

Contest Phonies I Have Known

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Wichita, Kansas

In working DX phone contests I have met some very interesting fellows. Probably you know these characters too. If you haven't let me introduce you to some of them. I have given them names. The names are fictitious to protect the guilty.

CAUTIOUS CALVIN: Wants to make each contact "100 per cent." Rogers everything, including rogers of previous rogers. This man further confounds by having to stop and replace relays burned out from over use of his push-to-talk switch during previous rogering contests.

ILLITERATE IAN: Evidently this guy cannot read because he never seems to know the rules. Rather than listen to someone on the band to find out what to say he usually does one of two things. He may turn it back to the DX station and ask for a complete list of the rules. Or he may try the broadside approach and repeat everything but the Ten Commandments in the hope that somehow all the pertinent facts will get through. He makes his point but you could rebuild your modulator while he is doing it.

PHRIENDLY PHIL: He starts out to make a simple report to the DX station but invariably ends up in a rag-chew. He simply does *not* know the meaning of haste. Phil doesn't stop the contest, of course, but he sure slows it down.

I KNOW MY RIGHTS, RICHARD: This character is highly incensed because the boys are using "his frequency." Knows he is entitled to it by FCC rules. Will not move to less crowded spot. Insists on making regular contacts in busiest portion of band. Spends a lot of his time calling "CQ no contest." Has patronizing attitude toward any station who is childish enough to "give out numbers." If his signal is a poor one he is merely trampled on in the confusion but he never gives up. If he happens to have a block-busting carrier his maneuvering manages to cheat many of the low-power boys out of a few new countries. Fortunately, like two-headed calves, Mother Nature did not make too many of this type.

SUREFIRE SAM: Has terrific signal but wants to be sure his report is received. Repeats, and repeats and repeats. Could double his score if he could be cured of his compulsion.

TRAFFIC TONY: Usually carries on a traffic sked in busy part of band. Feels that "traffic must go through." Politely with a dedicated tone of voice, asks all and sundry to "clear the channel" for him. The trouble is the "frequency" is being used by several hundred contesters. Trying to move his traffic he is as busy as the famous one-armed paper hanger. Evidently our friend has never heard of the upper reaches of the phone band or has a receiver that will not tune higher than the first 100 *kc* of the band.

PHONETIC PFRED: His mother was scared by a dictionary and he just cannot seem to hold back on the phonetics. Here is a typical call to a CO2 from a pfred-type KØ—the KØ having a 40 over 9 signal:

Charlie Oboe Two Cactus Basketball,
Creeping Octopus Dos Cornball Biscuit,
Crabapple Octahedron One-Two Calliope Blockhouse, this is,
Kangaroo Zero Zulu Sugarfoot Zodiac,
Kilimanjaro Zombie Zealous Stethoscope Zither,
Kilowatt Zephyr Zany Stalactite Zebra.

The CO2 sits with mouth open at such goings on and then calmly goes back to an S7 K2 who made a simple call.

SPECIFIC STEVE: This character insists that everybody call him on a certain frequency—invariably in the hottest spot in the band. Of course nobody can be heard unless they keep calling for about five minutes. Then the quitters give up and he answers the leather lung who is still holding out. This is a terrible way to make contacts but it is a surefire way to avoid the trouble of tuning the receiver.

ADVERTISING ADELBERT: Used to write soap commercials in an advertising agency. Knows the value of repetition. Loves the sound of his own call. Constantly repeats it. Attracts a great deal of notice on the band. Each standby is greeted by many calls—all clobbering each other. After a great struggle he finally gets his quota of rogers and is ready for next round. With half of hamdom standing by with bated breath he blasts forth with another long call complete with aforesaid repetition. And so forth ad nauseum. He is especially bad medicine if his call is slightly rare.

[*Continued on page 123*]

Converting The BC 442 Antenna Relay

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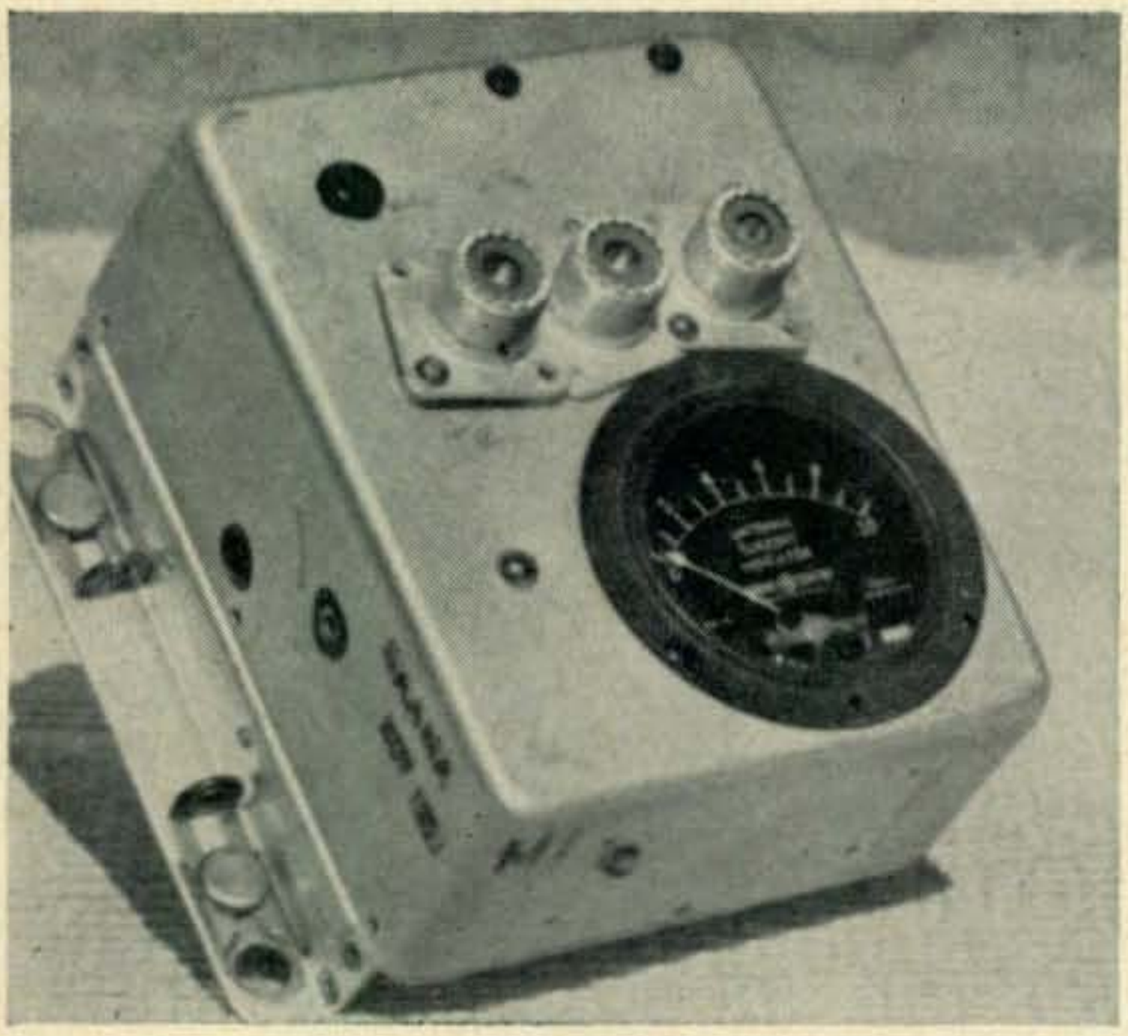
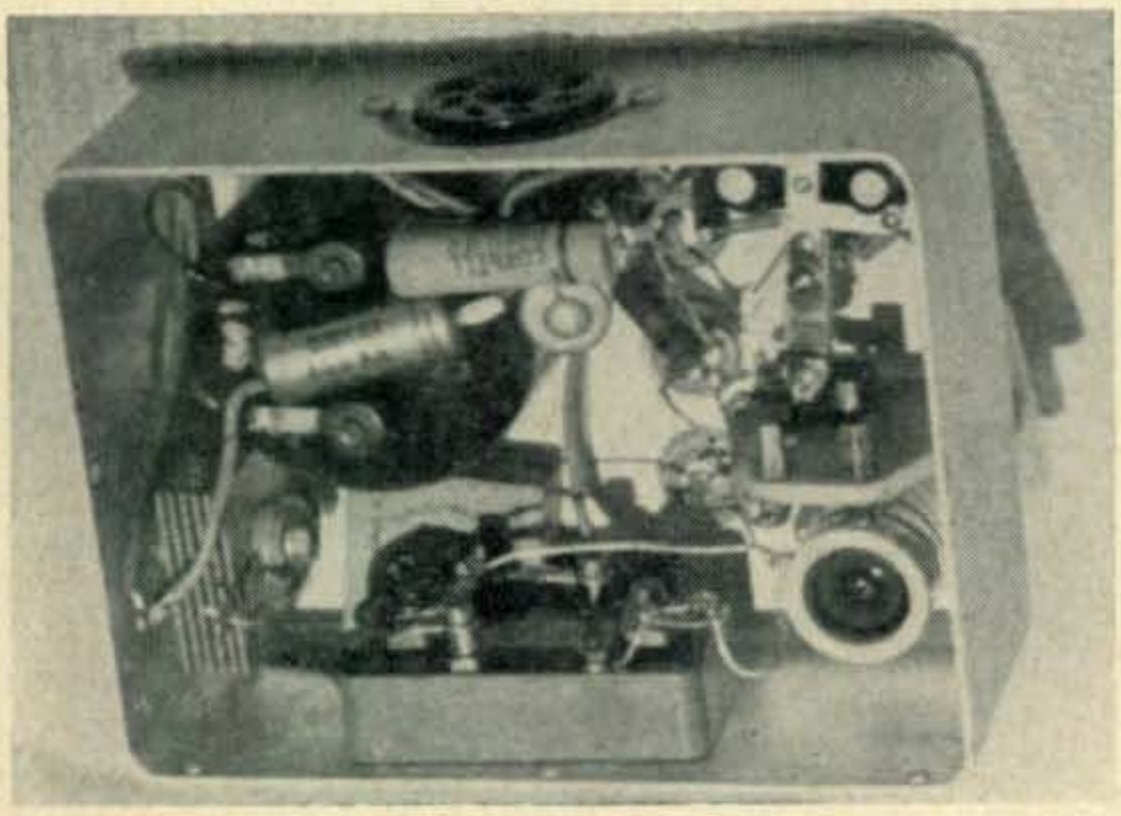
Huntington Woods, Mich.





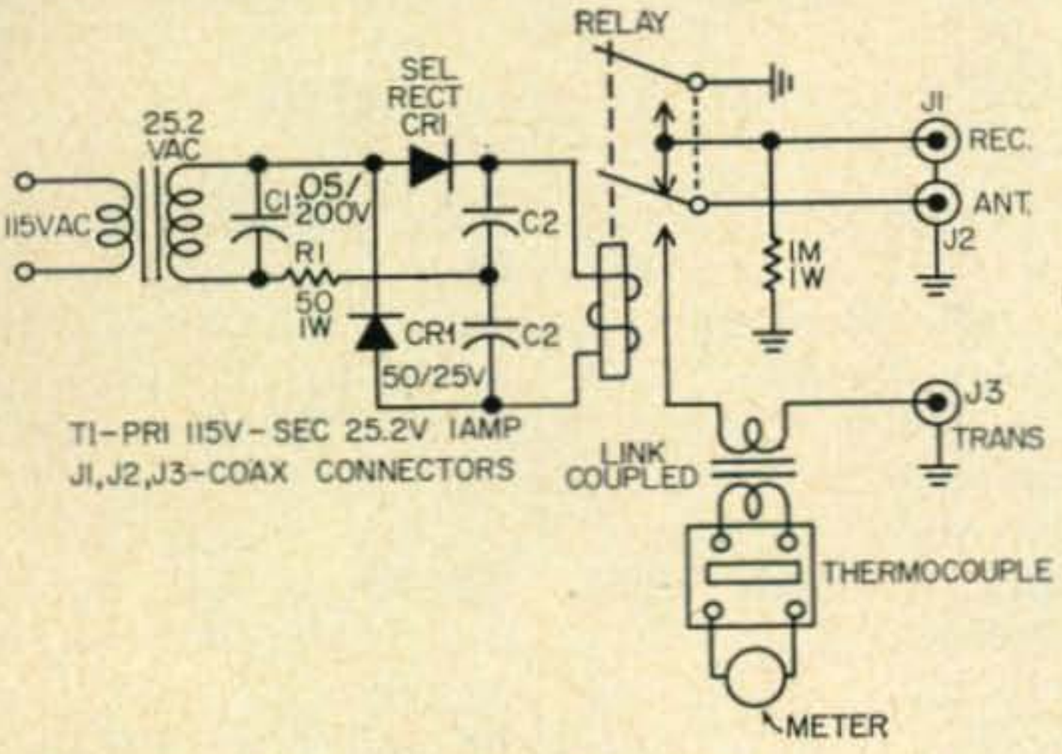


Fig. 1—Modification of the BC 442 Antenna Relay for ac operation.

The major reason for converting any government surplus equipment to amateur use is the savings in cost when that equipment is compared to equivalent commercial gear. Converting the BC 442 or equivalent antenna relay, offers a coaxial relay with a ¾ Amp *rf* antenna meter (0 to 10 scale) at a considerable saving in a neat package with minimum alteration.

Construction

The four prong connector is removed and replaced by an MIP (molded-in-plastic) socket which just fits the hole without any alteration. Unsolder the wire running to the tie post to ground. This is not used. The other two wires run to the relay. I used an octal socket for the tie points for the condensers and resistors. Remove the name plate and unfasten the thermocouple for the meter and mount the selinum rectifiers. I connected the wires to the rectifiers before inserting because of their awkward location. Remove the three tie posts and replace with coax fittings. In order to get the three fittings in without altering the meter positions it was necessary to remove one screw from the relay base and ream one of the outside coax holes just slightly larger than the original shape. This then allows you to mount the three sockets without difficulty. A nut was placed under the two end coax connectors so the three were in parallel planes.

Wiring

Wiring is relatively simple and by following the planning of parts shown in the photos, no trouble should be encountered. Notice that the receiver post is tied to ground through the relay contact points when in transmitting position. Any stray *rf* is sent direct to ground, protecting your receiver. However, even the short length of wire running from the tie post to the contact points is a pick up for *rf* and it is fed back to the receiver. You can turn the volume control down and use this feed back to monitor your CW signal or use a separate relay or a send-receive switch which is usually supplied with most receivers and cut off to the B plus to the receiver when transmitting.

I located the 25 volt *ac* Transformer on the back of my DX 100 along with the low pass

[*Continued on page 115*]

Shunting The Milliammeter

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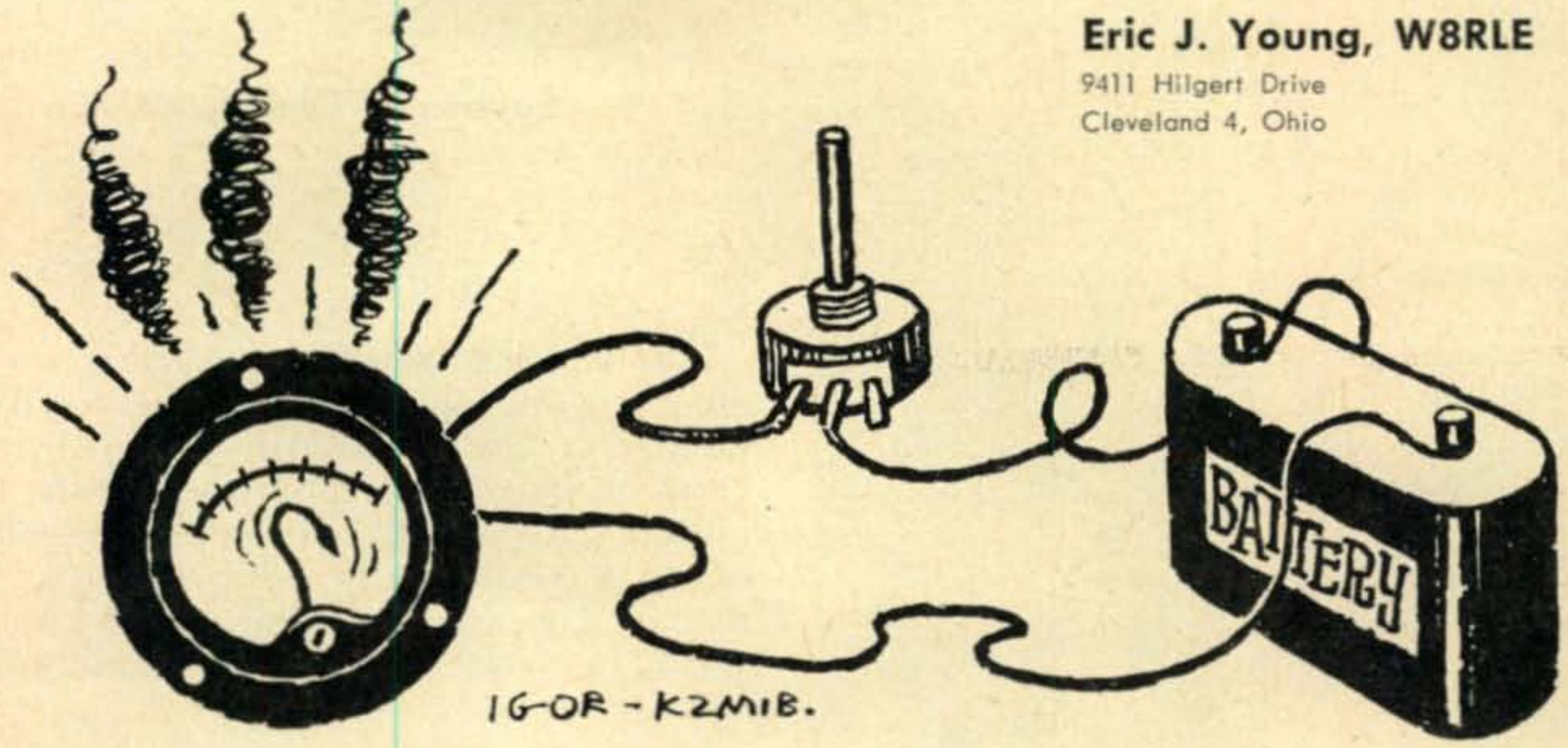

While a growing number of "hams" seem to be buying custom built KW rigs, there are still many who prefer home-built transmitters. Starting, as a rule, with comparatively low power, the ambitious amateur gradually acquires the needed parts for higher powered equipment.

"One problem that confronts many amateurs is that of utilizing a "surplus" meter that appears to be O.K. but which must be changed from its original range or service before it can be used."

In the first place, one must reduce the meter to its basic movement. An *rf* ammeter, for instance, would need to have its thermo-couple element removed and the leads from the moving coil soldered to the terminal studs. The series resistance in a voltmeter would have to be removed before a start could be made to change the nondescript meter into a useful milliampere indicating instrument. A shunt will be necessary if a higher range is desired than that provided by the meter.

There is a theoretical way to figure out the correct resistance of a shunt: the formula is simply $R = \frac{Rm}{n-1}$; where R is the shunt resistance, Rm the resistance of the meter, and n the scale multiplication factor. This formula assumes that the internal resistance of the meter and its range are known. If a regular meter is being considered, both these factors will be known, and the formula can be used. But what about the surplus instrument?

In the first place, one should never attempt to check the internal resistance of a meter by connecting an ohmmeter across it. This could result in a completely useless meter. Secondly, if one doesn't know what the range was originally, it is impossible to arrive at a scale multiplication factor. We thus arrive at a point of frustration—*if* we don't have the real ham spirit!

Shunt Materials

Trial and error can be time consuming and will not always result in the correct answer to the problem. One may well arrive at the correct shunt resistance, but when the meter is installed in the high powered rig it might rapidly burn out. The following table gives the resistance values and current carrying capacities of various copper wire sizes.

Wire Size	Resistance per ft at 68°F	Resistance per ft at 77°F	Current ma
26	0.04082	0.4162	1000
28	0.06490	0.06617	600
30	0.1030	0.1052	400
32	0.1641	0.1673	250
34	0.2609	0.2660	150
36	0.4148	0.4295	100
38	0.6596	0.6726	60

From the table, it will be seen that 6 inches of #38 enamelled copper wire will give a resistance of approximately 0.33 ohms, which might be all that is needed to change a 0-1 *ma* meter to read 0-100 *ma*. If the meter is unlikely to be used to indicate more than 50 *ma* the #38 wire will be fine, but if the current is much higher the shunt will become overheated and its resistance will increase appreciably. Increased resistance of the shunt will obviously change the multiplication factor of the meter, and the reading will be far from correct.

To obtain the 0.33 ohms shunt with #26 wire would require approximately 8 feet of wire. This could be wound on a ¼ inch diameter form about 1¼ inches long (72 turns at 58 turns to 1 inch). Such a size would provide more than ample safety, but might prove to be inconvenient, so that an intermediate size of wire may be selected.

Choice of wire size to carry the anticipated current is of prime importance. If the resistance for the shunt is known (based on the formula and known characteristics of the meter) using the correct length of wire will be all that is necessary to provide the proper multiplication factor. (You obviously won't be able to measure a resistance of less than one ohm with an ordinary V.O.M.) So what about the surplus meter with no known characteristics?

First of all it is necessary to establish what is the present range of the meter. If we assume that it is a standard 0-1 *ma* movement, this may be checked by connecting a 1½ volt flashlight battery in series with a 15,000 ohm resistor across the meter terminals. If the indicating needle moves fairly rapidly up to the maximum point on the dial, it is certainly a 0-100 microamp meter. If the needle barely moves it may be a 0-1 *ma* or higher meter, or the moving coil might be burnt out.

A single flashlight cell is not suitable for checking a 0-100 *ma* or higher ranges. Instead, use a 7½ volt A battery (or series-connect 5 flashlight cells) in series with a 75 ohm resistor. Full scale reading will establish that it is a 0-100 *ma* meter, and a 20% reading will indicate that it is a 0-500 *ma* meter, etc.

Let us assume that the surplus item has now been found to be a 0-1 *ma* meter. We wish to use it to measure between 50 and 100 *ma*, and therefore need a shunt to provide a multiplication factor of 100. The shunt will need to be approximately 0.33 ohms and must carry up to 100 *ma*, so we may use about 9½ inches of #36 wire. We could use two feet of #32, or eight feet of #26 as an alternative. With the selected shunt connected across the terminals, the milliammeter may be wired directly into the circuit to be measured and will give an approximately correct reading.

If a greater degree of accuracy is desired, the 7½ volt battery, in series with a variable resistor, may be connected across a VOM and the resistor adjusted to provide a reading of 75 *ma*. The battery and resistor should then be connected across the surplus meter (with shunt in place) and the reading compared. If the meter reads less than 75 *ma* the shunt resistance must be lowered by reducing the length of the wire. If #38 wire was used, only one half inch should be cut and then the meter rechecked. With #32 and #26 the length to be cut off would be 1 or 4 inches to make an appreciable difference in the resistance. If the meter reads higher than 75 *ma*, the shunt resistance must be increased, and this will require a new length of wire somewhat longer than that used previously. If a VOM is available for comparison purposes, the length of the shunt wire should be cut appreciably longer than the length suggested above. It may then be shortened until the correct resistance is obtained to exactly match the reading on the surplus meter with the VOM reading.

DO NOT keep the battery and resistor connected to either the VOM or the surplus meter for longer than is necessary to obtain a reading. If connected for more than a second or so, the resistor will heat up and an incorrect indication will be obtained. Also, the battery will not maintain it's voltage for very long on continuous discharge. ■

FORBIDDEN PLEASURE

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"This amateur radio stuff has got to go," Mr. Jones stated angrily, ignoring his breakfast coffee.

His wife looked up sheepishly from her own cup, "Yes, dear," she murmured.

Mr. Jones stood and started pacing the room with quick nervous footsteps. "I don't want the boy fooling around with that complicated equipment. He might get hurt. Besides, the neighbors are complaining about interference again."

Meekly, Mrs. Jones sipped her coffee. She didn't look up as she said, "Yes, dear."

"Very well then," Mr. Jones snapped. "Have him throw out those gadgets he's got in his room. All those dials and things—he'll get himself killed one of these days. You can't trust those complicated technical do-dads."

His wife agreed silently and he continued.

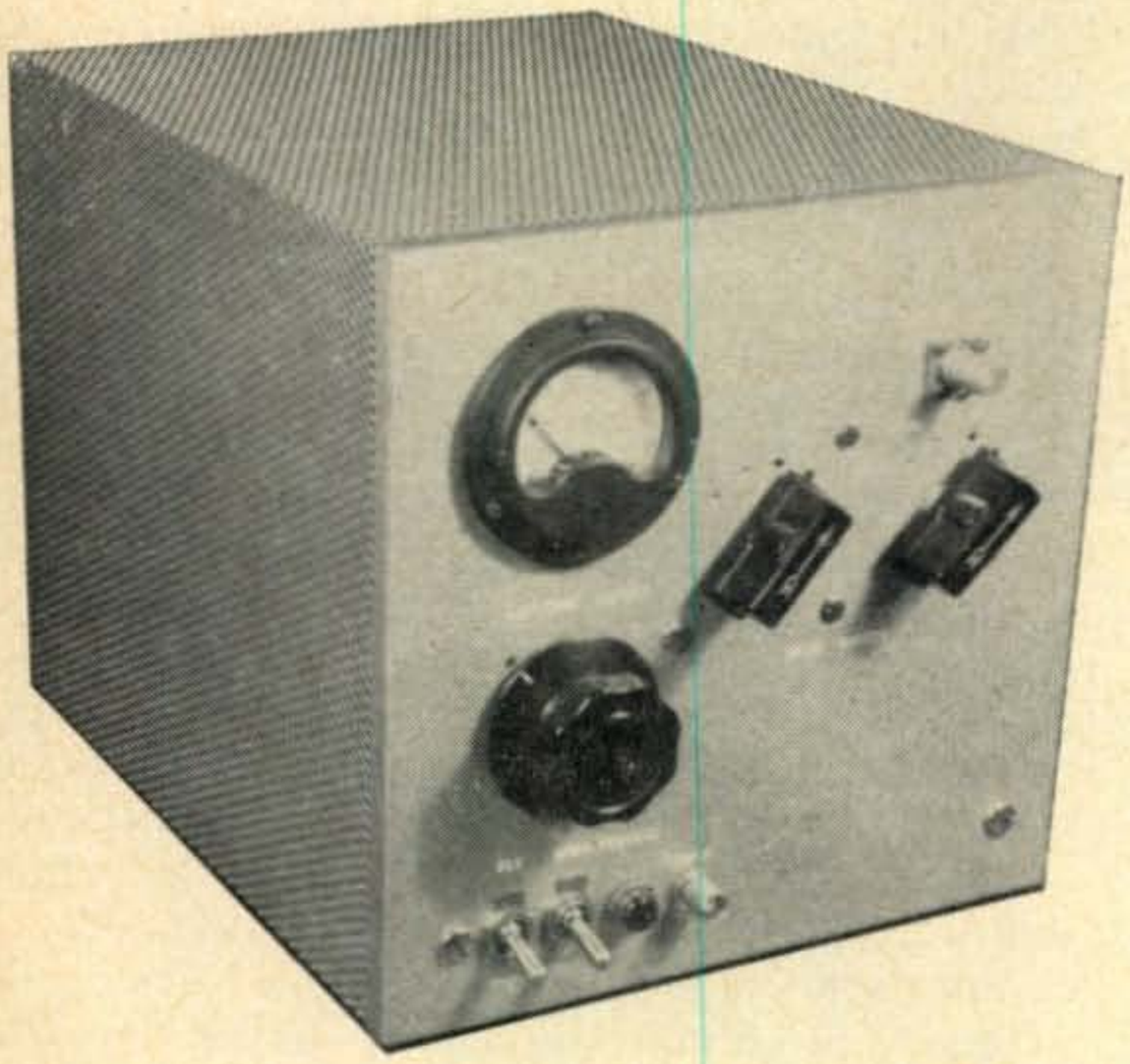
"I don't know what this younger generation is coming to. The boy should grow up to be a respectable salesman—like me."

Mrs. Jones emptied her coffee cup and nodded. "You're right, dear. What ever you say."

"Then have him get rid of that complicated maze of do-dads today. He put on his hat and started toward the door. "I'll be home for supper."

And, so saying, he tucked the paper for July 1, 2151, under his arm, stepped into his personal sub-matter transmitter where his body was broken down into atoms, transmitted to Mars, and there reformed. ■

Miniature GG Linear Using 811's



E. H. Marriner, W6BLZ
528 Colima Street
La Jolla, California

The future miniaturization of amateur equipment depends on the manufacturers' willingness to supply small components to the amateurs. Proper components will eliminate many parts now used and will bring the over all construction cost to approximately the same value as present design methods, but in a much smaller package. I would like to present this article to alert the manufacturers and stimulate thinking among the amateur fraternity. Actually no new circuits are used in this amplifier, only new components and wishful thinking.

For example, diode rectifiers may be very expensive, however, when they are used, the rectifier tubes and filament transformers are eliminated. A saving in cabinet size, plus the use of a smaller plate transformer in a bridge circuit will contribute to monetary savings. If a manufacturer would make a special transformer for bridge operation, with a heavy duty filament winding, the amplifier tube filament could come off of the same transformer. In this instance I needed a 6.3 volts at 8 amps.; no winding was available with that current and it was necessary to use an external transformer. The choke could have been replaced with a 70 ohm resistor if three 300 mf at 450 volts could have been put in a series. The price of these condensers prohibited this for amateur construction.

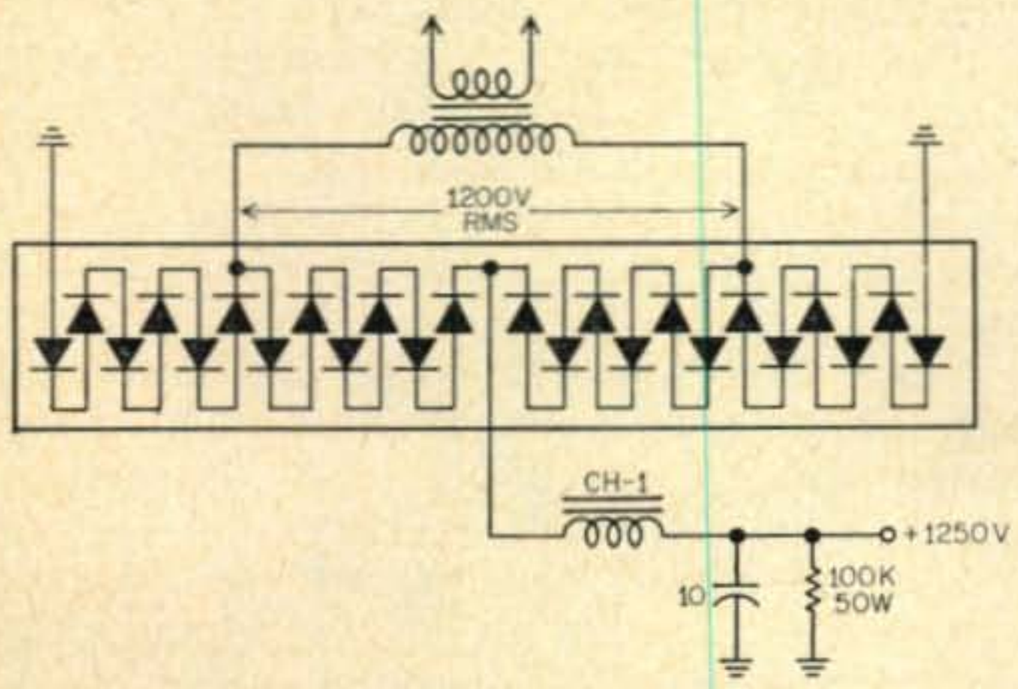
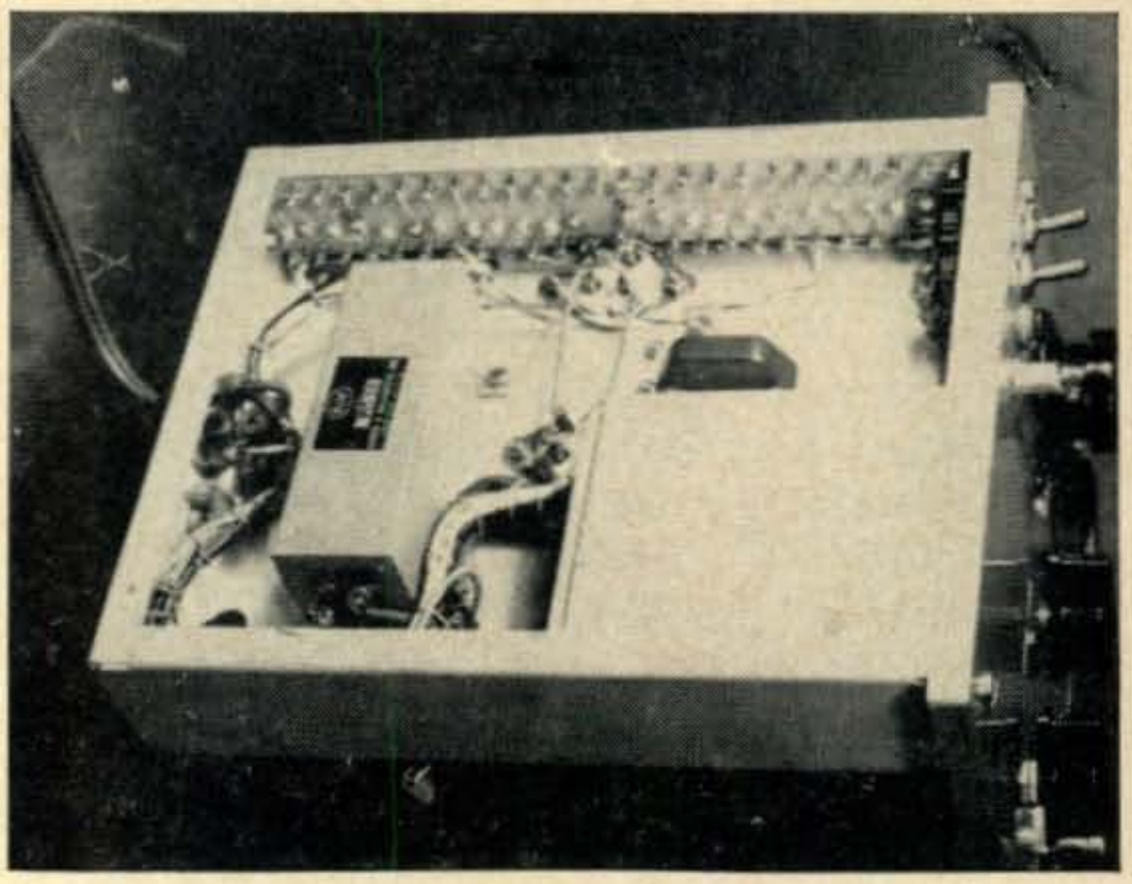


Fig. 1—Wiring arrangement for the Sarkes-Tarzian F-4 diodes.



Bottom view showing mounting location of the F-4 diodes on the silicone glass terminal board.

Thus, with only a partial supply of desired components, a linear amplifier was constructed using two 811's in grounded grid running a minimum of 300 watts PEP in a reasonably small package. No perforated metal cabinet was available, on the market, tall enough to squeeze transmitting tubes into*. A manufacturer co-operated with me, revising one of their standard economy line cabinets to my required dimensions.

The new F-4 Sarkes-Tarzian diode rectifiers enabled me to make a very small power supply of 1300 volts and 300 *ma* from a small 200 *ma*, 600-0-600 volt *rms* transformer in a bridge circuit. This would not have been possible without the new F-4 diode which is smaller in size and 10% lower in cost than the M-500 or 40K diodes.

Grid bandswitching was solved by using the B&W filament choke in place of a tuned grid circuit. The plate switching was more of a problem. The only switch the author could locate to handle 300 watts of *rf* came from a defunct BC375E tuning unit in a surplus store.

Thus construction was started in hopes that this article would point out the direction. Amateur equipment should be made—SMALLER!

Construction

The amplifier is crammed on a 8x11 inch chassis which came with the cabinet. There was room to make the chassis one inch longer, or the cabinet 1 inch shorter. We had to put two studs on the back to fasten the chassis tight.

One of the first projects is mounting the diodes on a silicone glass terminal strip. When soldering these diodes a heat sink of some sort should be used. Long nose pliers clamped between the diode and soldering iron on the pigtail should work. Keep from heating the diode itself. Note that the manufacturer has marked the F-4 Negative end, actually this is a case of symbolic terminology. I found out the hard way that the negative end is not the cathode when I turned the supply on and was amazed to find 1300 volts negative on the plates of my 811's. Mount the diode according to picture drawing fig. 1.

Condensers C1 and C6 can be of the disk ceramic type. However, no information is available on the *rf* current carrying capacity of these. The author chose to use the old fashioned mica type. Likewise a safety feature of the F-4 diode mounting was to put them on a silicone glass terminal board rather than on micarta to prevent hydroscopic pores sustaining an arc to ground. Otherwise the rest of the amplifier construction is straightforward and no further explanation should be needed if you have passed your license exam, hi! The absence of the 80 meter band can be explained by the author who is unable to use the 80 meter band

[*Continued on page 114*]

*Cabinets of this type are available from Knight Metal Products, 285 Eastern Pkwy., Brooklyn, N. Y.

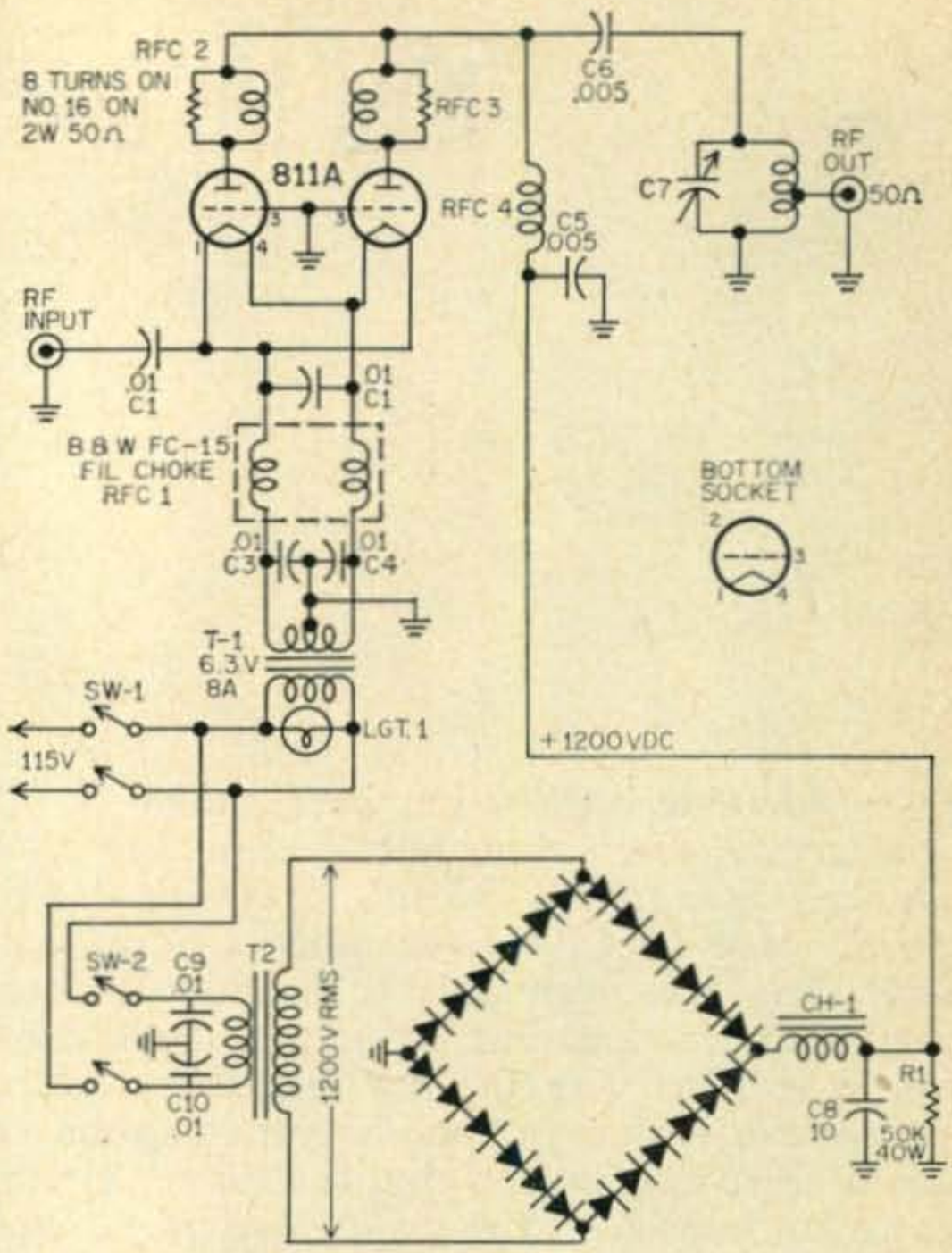


Fig. 2—Schematic of the GG linear.

Parts List

1	Silicone Glass terminal board 1½" x 10". Type #1250C-192-G.S. 1.5 Plastic Stamping, Inc., 932 Price St., Pomona, Calif.
26	F-4 Diodes rectifiers. If your local dealer doesn't have them write Sarkes-Tarzian, 415 N. College Ave., Bloomington, Ind.
T1	6.3 Volts at 8 amps. Type—Thordarson T-21-F-12.
T2	Plate transformers 200 *ma* 600-0-600 *v rms*. Thordarson T-22R36.
Choke	300 *ma dc* 7 *hys* Thordarson T-20-C-56.
C8	10 mf at 1000 volts working. Oil filled will stand 200 volts over load. Surplus GE Pyranol or equivalent.
C1	.01 mf mica, 5000 volt test.
C2, 3, 4	.01 mf disk ceramic 1200 volt.
C6	.005 mfd 5000 volt mica.
C7	0-1300 mmf from BC 375E tuning unit.
C9, 10	.1 mfd Sprague feedthrough or oil filled mica. 600 volt.
RFC-1	B and W FC-15 Filament Choke.
RFC-4	300 ma 2.5 mhy R-176A National or equivalent.
RFC-2, 3	8 turns #16 enamelled on a 2 watt 50 ohm resistor.
R-1	50K to 100K 50 to 100 watts resistor.
Tank Coils:	40 meters 11 turns #1408 Air-Dux tap 3 turns from ground end. 20 meters 9 turns #1008 Air-Dux tap 1½ turns from ground end. 15 meters 6 turns #1008 Air-Dux tap 1 turn from ground end. 10 meters 3 turns #1008 Air-Dux tap ¾ turn from ground end.
Lgt-1	115 volt 6 watt lamp or use 6.3 v and extra winding from transformer.
Chassis	8" wide 10" deep comes with cabinet.
Cabinet	9" high x 8¾" wide x 11" deep. Modified LTC 469 California Chassis Co. Attn Mr. H. P. Balderson, 5445 East Century Blvd., Lynwood, Calif.
	A 0-500 *ma dc* milliampmeter, would be better than the 0-300 used by the author.
	Input and output connectors BNC type for RG58U Coax.

Nine Mc Crystal Filter Exciter

Donald L. Stoner, W6TNS

Sideband Handbook Editor

Considerable interest has been shown in the 9 *mc* crystal filters first described in *The New Sideband Handbook*. Of the companies mentioned, only McCoy Electronics Co. of Mt. Holly, Pa., has been able to produce a filter acceptable for amateur equipment and compatible in price with the low frequency filters.

Although stated in the diagram caption, it should be re-emphasized that the exciter circuit shown on page 61 of the *Sideband Handbook* was "operational" only. It was shown only to illustrate how such a filter could be used. The circuit was not built and tested for the filters were not available at that time.

Since then, McCoy has started marketing their Model SSB-9 Amateur Filter for use in 9.0 *mc* single sideband exciters, receivers, and transceivers. The filter has an inherent nominal impedance of 560 ohms and must be terminated in (or look into) this impedance to retain its optimum filtering characteristic. Thus, the circuit on page 61 of the handbook is not satisfactory.

The SSB-9 filter contains four crystals and the matching network in a sealed can. In addition, the SSB-9 package includes two matched crystals for carrier insertion on either side of the symmetrical bandpass. The SSB-9 filter is adjusted internally at the factory while being terminated into a *resistive* 560 ohm load. If the terminating impedances looking into the filter are correct, the selectivity curve of the filter should correspond to fig. 1. Note that the 6 *db* points are 2.8 *kc* wide and the shape factor (6/60 *db*) is better than 2:1. Because of the extremely rapid 'drop-off", the carrier is positioned at the 10 *db* point rather than the customary spot, 20 *db* down. This, of course, can (and should) be set to suit the individual's own voice characteristic. A typical exciter is shown in block diagram form in fig. 2. Notice the use of a cathode follower as an impedance matching device. The circuitry is shown in fig. 5.

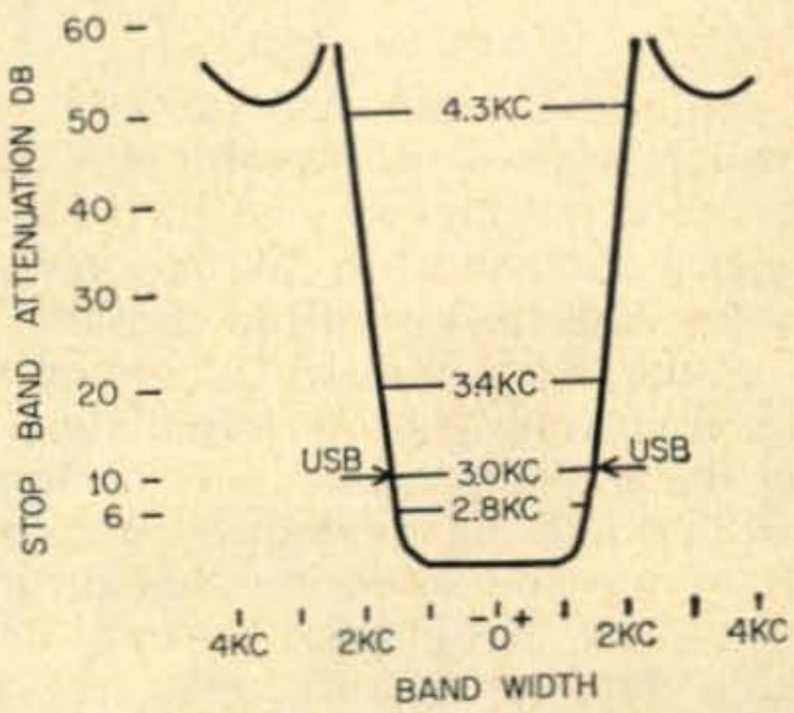
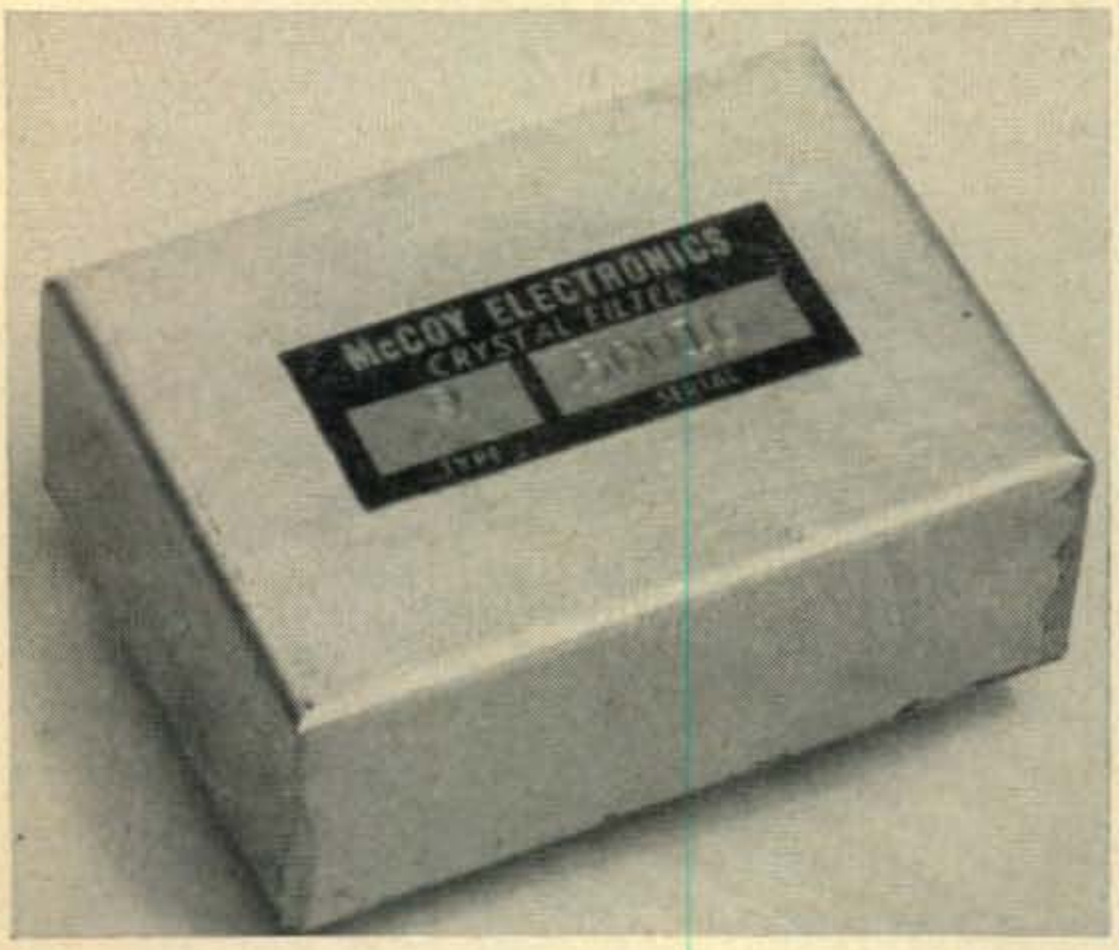


Fig. 1—Characteristic curve for the SSB-9 filter.



The McCoy Electronics Nine Mc crystal filter is smaller than a pack of matches, yet contains four crystals and the necessary impedance matching components.

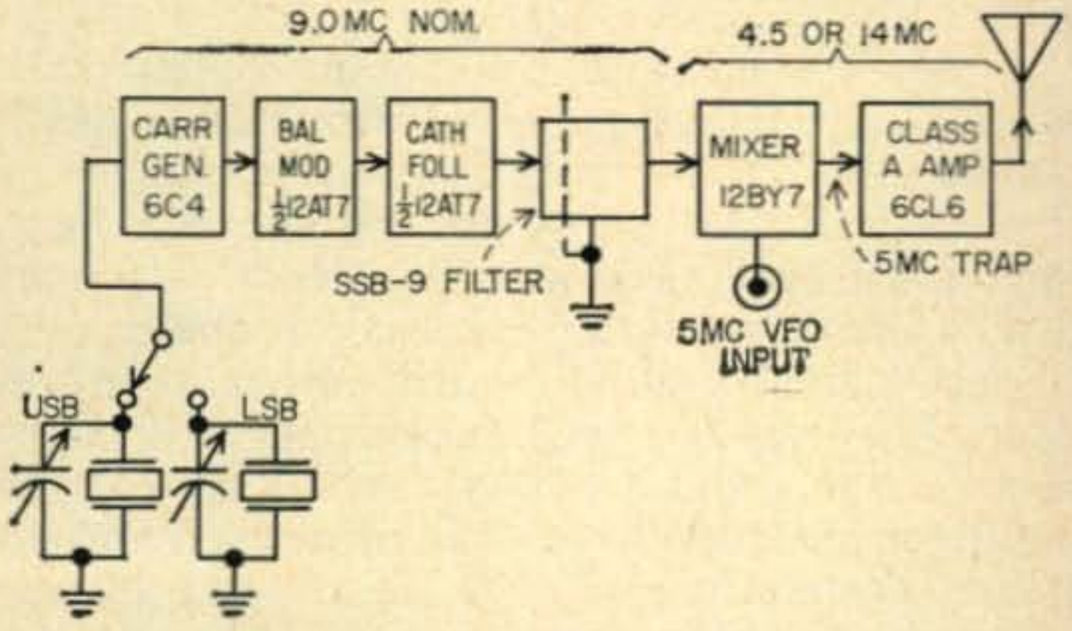


Fig 2—Typical SSB exciter using the SSB-9.

The two oscillator crystals included in the

[*Continued on page 113*]

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Hillsboro, Illinois

WOFQY–He's On The Beam

If you have a QSL card from WØFQY, chances are you remember a pleasant rag-chew with a St. Louisan named Carl who was running fairly low power to a Mosley antenna. He may have mentioned proudly that his son, Jack, is now a ham, KØTFL, and you might have learned that Carl owns some kind of factory; but unless someone tipped you off before, you didn't realize that the beam he used is one of thousands he has manufactured within the last five years.

Carl Mosley gets on the air every moment his busy schedule allows—not to discuss the performance of his antennas, but just to relax and enjoy himself like any other ham. A pioneer amateur, he hit the air waves in 1918 sending his initials, CEM, with a Ford spark coil. In 1922 while a college student at Ames, Iowa, he received his license as 9BOJ.

"My first contract back then was 9CK, Ray Palmer, who is now WØCK and still in Iowa," Carl recalls, "I finally met Ray in person at the 1958 National Convention in Washington, D. C., and we had a picnic discussing that first QSO."

A long-time manufacturer of television antenna accessories, Carl didn't make an amateur beam until 1954 when several hams including another well-known St. Louisan, Wyman Pigg, WØQFG, convinced him to branch out with what they called the "Vest Pocket" beam for hams with limited space. Those first antennas were made one by one as orders came in; but sales went well, and before long, the new venture was giving Carl's original business some competition. In 1958 alone, his amateur antenna sales jumped from 6 to 60 per cent of the total business.

A factory staff including eight hams supervised by his son, Jack, KØTFL, turns out thirty-one different beams, verticals, and mobile whips. Badly in need of more elbow room for antenna assembling, the Mosley factory is now being enlarged, and building blueprints include ample office space where their other son, Gene, does his share of the work. Visitors are always welcome, and Carl has rolled out his red carpet for hundreds of hams including many DX friends who stop by. In Norwich, Norfolk County, England, production at a second factory is handled by O. J. "Jack" Russell, G3BHJ.

While most Mosley antennas are for amateur use, military and commercial contracts are also accepted. Carl is especially proud of one such order that sent twelve of his beams to the scattered tracking stations of Project Vanguard where they are still in use.

Even with so many irons in the fire, WØFQY finds time to ham, and he tries to send a QSL card to everyone he works. Amateurs using one of his beams may be surprised to receive a certificate confirming their contact with "The Old Man Himself." DXing on CW at home and rag-chewing on AM, the family car is equipped with two mobile stations—one AM and one SSB, which get a workout as Carl travels about the country visiting hamfests and radio meetings. Believing strongly that every ham should try as many modes of communication as he has time, room, and money for, he recently rebuilt a 500 watt transmitter for his first radio-teletype station.

"Next I want to try amateur television," he laughed, "but first I've got to talk some of the local fellows into looking at me on a screen!"

[*Continued on page 110*]

A Versatile Control Unit For The Ham Station

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Mercer Island, Wash.

Imagine, if you can, the sheer pleasure of sitting at your ham rig engaged in a pleasant QSO and, when it's your turn to send, merely reaching for your key or mike and talking back! No switches to throw, no relays to 'clack' . . . to send work the key (or mike if you've got voice control); to receive, relax! Just quit sending or talking!

At the same time, you have perfect 'break-in' when transmitting . . . so instantaneous that you can hear the other fellow (or gal!) between *letters* . . . *not* just between *words!* No need for 'repeats' . . . you miss something, push your key or yak in the mike and 'break' him (*IF* he has as good a break-in as *yours* if you've built the control unit described here!). If he *hasn't*, he'll soon discover that such a thing *is* possible because he can break *you* at will and he'll want to know all about how you do it!

Noise Limiter

Add to that a greatly improved signal-to-noise ratio in your receiver through a noise limiter that really *works* and you're in "Ham Heaven." You ever see much difference between 'ON' and 'OFF' in the so-called noise limiters built into the average factory-built receiver? You *will* with the one incorporated in the control unit described herein!

That should be *enough* to expect from just one gadget. But, you're not through *yet* . . . more pleasant surprises are incorporated in the little box described here! It will place *all* of your equipment switching and fusing in *one* concentrated location conveniently positioned on your operating table. No more removal of dozens of screws in a mad effort to replace a blown fuse right in the middle of that DX contact you've been waiting *months* to make; no more flipping switches on half a dozen scattered panels when your day is done (you always forget one or more . . . remember?). Add to that, perfect aural monitoring of your emitted signal, be it CW or phone, a built-in electric clock right in front of you where it belongs, together with a stand-by speaker for calls when you're working around the shack and appropriate status indicating lights for your main gear . . . a veritable "Aladdin's Lamp" in a magic cabinet!

Best news of all . . . the cost is *small!* If you're a high school lad, mow a few more lawns or carry out a few more boxes at the 'Super-Market'; if you're a regular working stiff, cadge a few additional hours of overtime and you've got 'er made! Even if you were to buy all parts new (who does?), something under thirty dollars will see you through without a mortgage.

Construction

Sold? Then let's get on with the building. I am going to describe and illustrate my own unit in detail but you are by no means limited to duplication. Use the ingenuity for which the ham is justly famous and adapt this unit to best fit your own conditions. There is nothing critical in this control unit; make of parts and their placement is immaterial. Follow the basic schematic wiring shown, using care to see that the two crystal diodes (X1 and X2) are wired in *opposition* so that the negative of one and the positive of the other are tied together at each end and make sure that the 'tip' and 'sleeve' connections to P-1 and J-1 are as shown.

Physically, my unit is much larger than it need to be; my 'junk-box' produced a Bud No. C-995 black crackle finish cabinet 7″ high, 14″ wide and 8″ deep. Having this cabinet available, I picked up a BUD CB-1194 steel

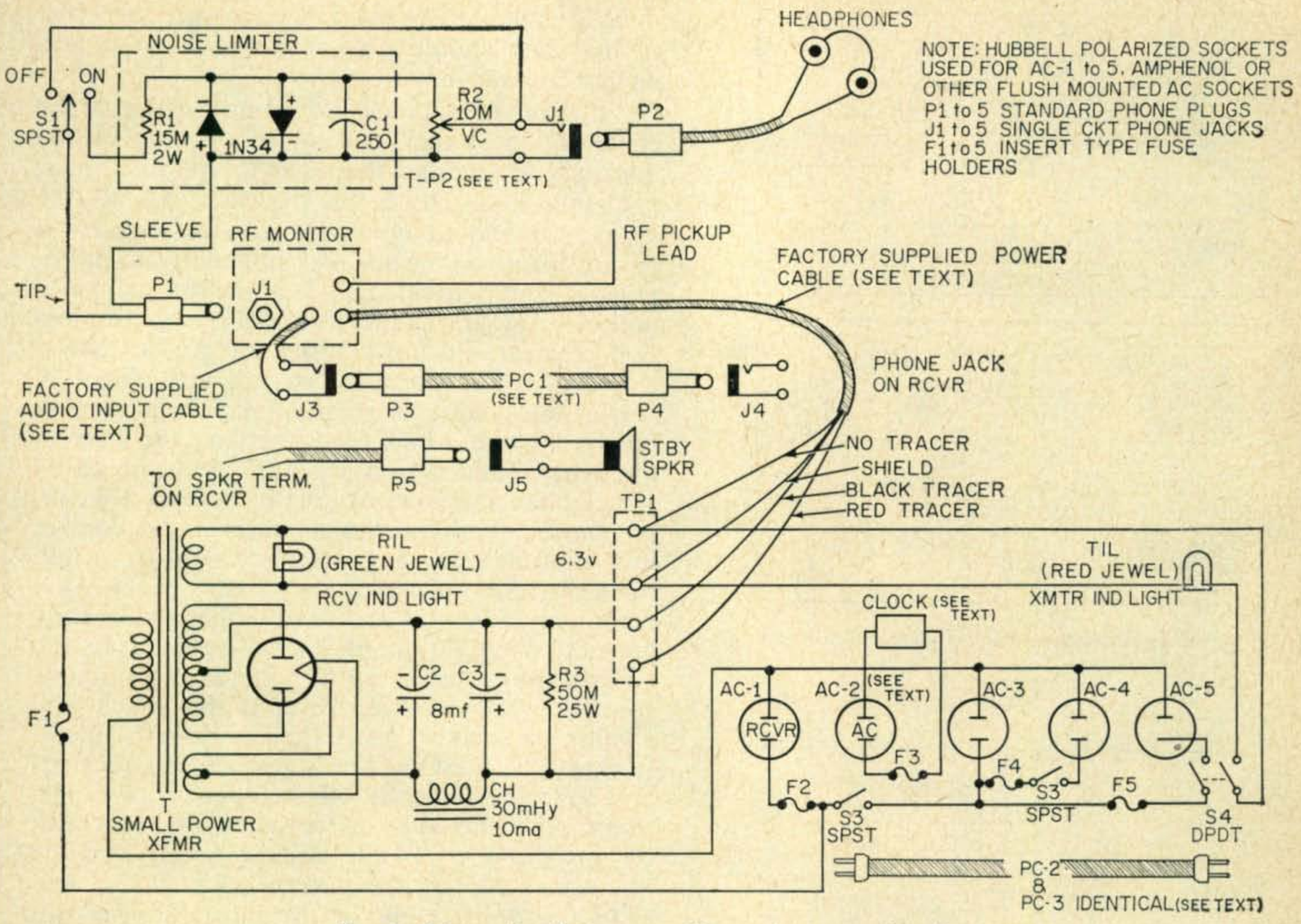


Fig. 1—Schematic of the versatile station control unit.

chassis 13″ long by 7″ deep and 2″ high.

On the basis of the cabinet and chassis which I acquired, the panel and chassis layout were as shown in an accompanying sketch, fig. 2. Remember now, this layout is based on the components which *I* used; if you change to use what you have, make your own allowances! I suggest however, that you follow the general placement and arrangement of parts for wiring convenience.

Inasmuch as the various *ac* cords and plugs from the external equipment must enter the cabinet, provide a generously sized hole in the back so that the plugs will pass through freely. I found that a two inch diameter hole, punched in the exact center of the back of the cabinet, was ample. Bush the sharp edge with a couple of layers of Scotch electrical tape to prevent chafing of the cords and resultant fireworks!

Before mounting the panel to the chassis, drill all of the panel holes *except* those for F-1, 3 and 4 and S-2, 3 and 4. These latter go through *both* the front panel and the front chassis lip and can most easily be aligned by drilling through both at once. Attach the panel to the chassis first with two 6-32 machine screws, as indicated at SC1 and SC2 in fig. 2, to hold it in place while drilling for fuse holders and switches. These screws can remain in place permanently.

Suppose we now discuss the components which we are going to mount on the panel itself. In the upper left is the *rf* monitor by means of which you can listen to your own keying or voice. I use a standard Johnson "Signal Sentry" which works very well. Undoubtedly similar devices of other manufacture, or even something 'home-brewed' will perform as well, if you already have one.

Directly below the *rf* monitor are a series of three insert type fuse holders. Manufacture is of no consequence although I used the panel mounting Buss type HKP which I happened to have on hand. These holders are mounted 1½″ above the bottom edge of the panel so that the body of the holder is on the *under*-side of the chassis.

Now to the clock. As this is a vital piece of station equipment (FCC logging makes it a *must!*), a *good* electric clock movement is most certainly warranted here. The 'jump' or 'executive desk' type rather than the more conventional circular design is dictated here by space requirements. These are relatively costly if purchased new. By browsing around among the stores of the salvage organizations I came up with a Telachron type in a Salvation Army store for $1.50! After removing the movement, I left it with a local watchmaker to clean, oil, check and adjust which he did for another $1.50. Result; a clock which has kept perfect time and never faltered for more than three years! I have since seen several similar clocks at comparable cost in various second hand stores and even in pawn shop windows! Many of the surplus mail order radio supply houses often catalog new

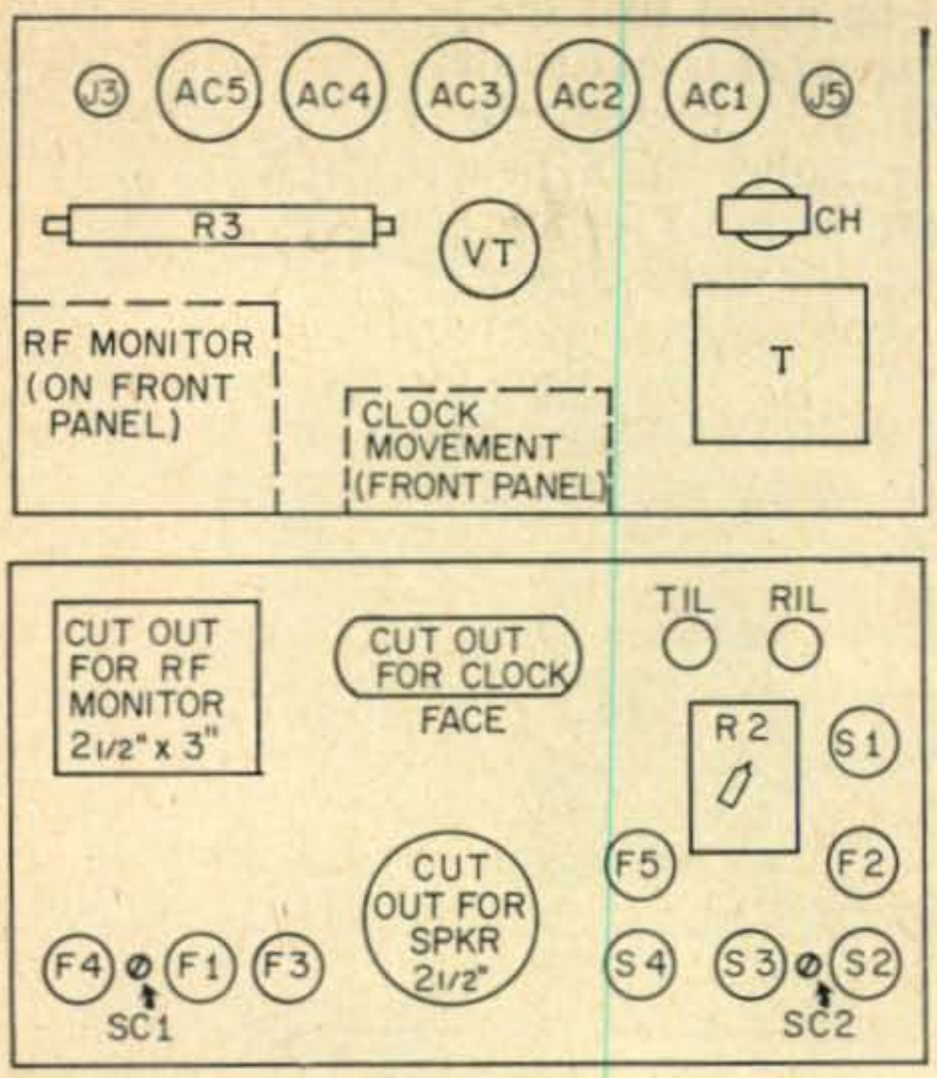


Fig. 2—Chassis and front panel layout.

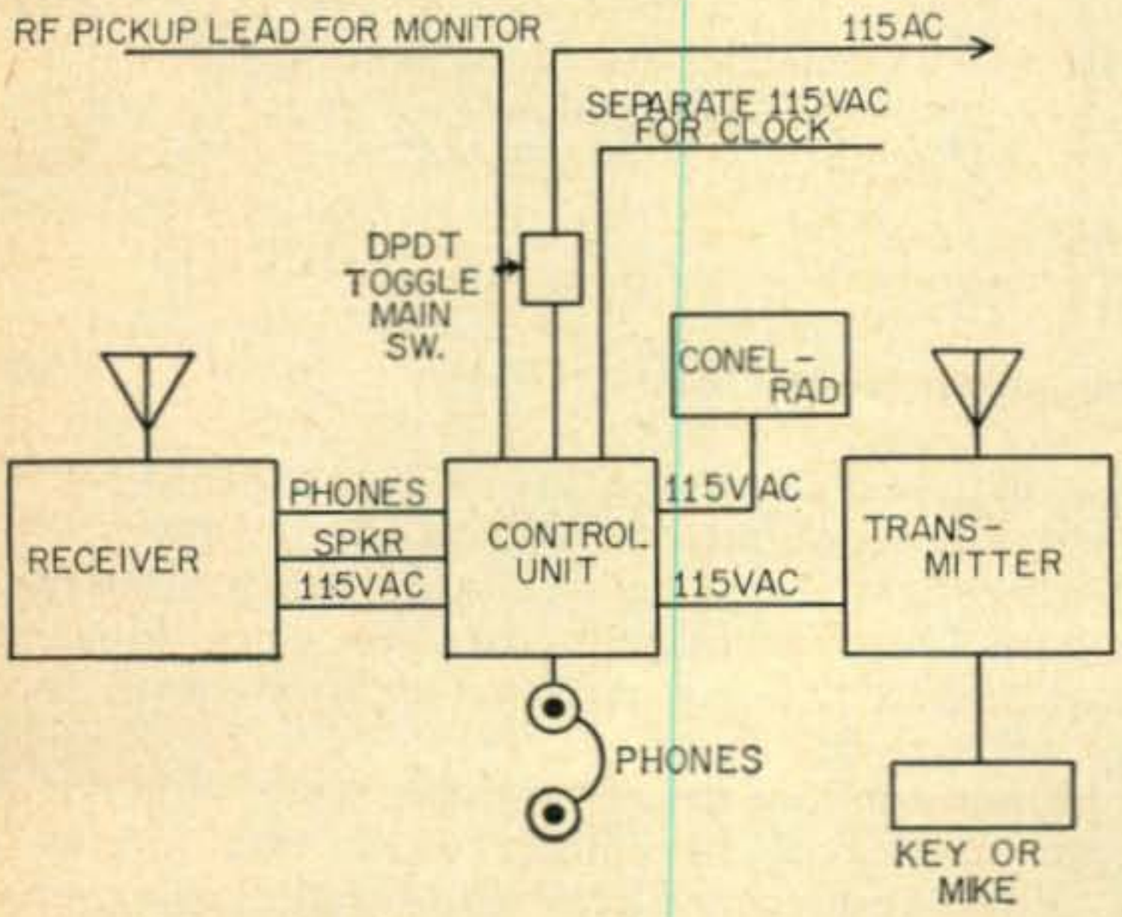
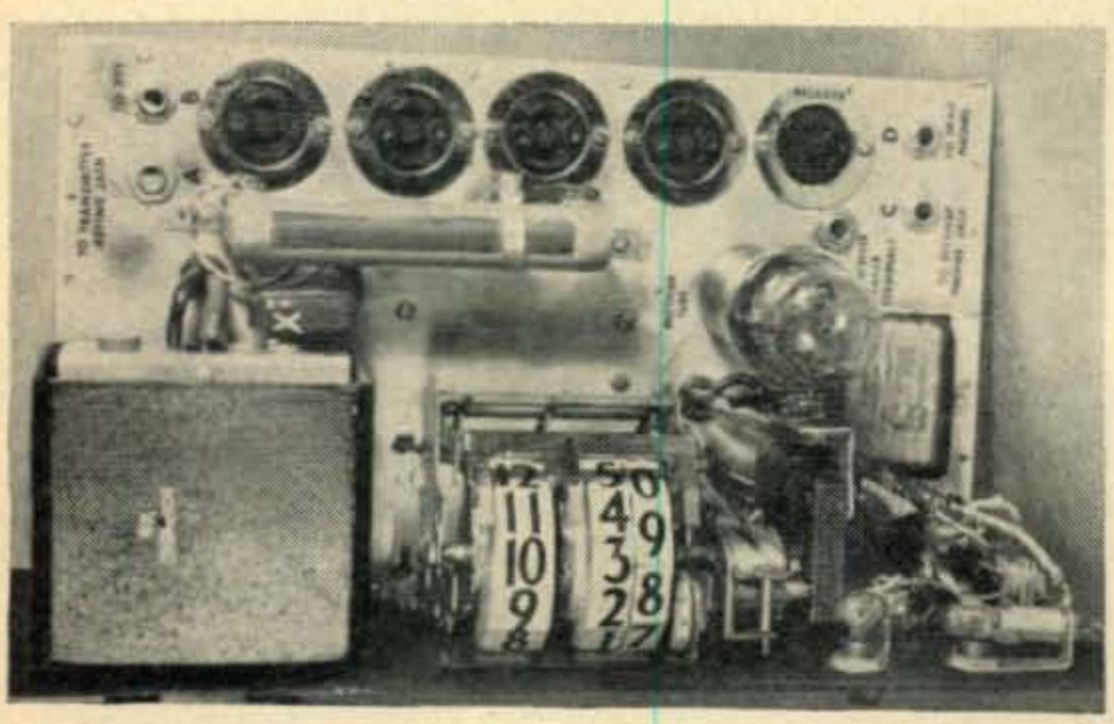


Fig. 3—Block diagram of complete station layout.



Looking down on control unit chassis. Note keying jacks (A and B) in upper left corner. These have been eliminated in the accompanying text and schematic wiring as irrelevant. They merely serve to loop the key leads through the control unit for centralization of wiring and may be omitted or added as shown.

ones at ridiculously low prices, so procurement of this item should present no problem if you do not already have one.

I mounted my clock movement in the upper center of the panel, cutting an opening of the appropriate size and shape, as the photo shows.

Centered directly below the clock is a 4" PM speaker. I had to notch the chassis slightly to permit lowering the speaker sufficently to maintain a symmetrical panel appearance. As a majority of the better amateur communication receivers do not contain integral speakers, this serves the purpose, particularly for CW work. The quality of such a small speaker may not be all that could be desired on the part of the discriminating phone ham who probably already has a speaker of greater fidelity. He can, of course, eliminate the speaker in the control unit entirely; perhaps even manage to install his Conelrad unit in the vacated space! As I work only CW and use headphones exclusively for actual operation, the small speaker in my control unit serves admirably as a 'standby' speaker while working around the shack and awaiting a scheduled call. When called, I merely push the 'PHONES' plug in on the receiver and I'm automatically off the speaker. I expect to simplify this even more when time permits, by installing a 'PHONES-SPEAKER' switch just above F-5 on the control unit.

In the upper right of the panel appear two pilot light jewels, one red for 'TRANSMITTER ON', the other green for 'RECEIVER ON'. Perhaps not necessary, but an added refinement. Any standard pilot light bracket can be used here; mine are Drake #10-G. Their wiring is obvious from the schematic of fig. 1.

Below and centered between the light jewels is the 10M ohm volume control for the noise limiter. Any make will serve; I used a Mallory #U-20. A Waldom nameplate #571 makes a convenient index for the Mallory pointer knob.

Below and on either side of the volume control knob are two more Buss type HKP insert fuse holders, one for the transmitter and the other for the receiver. Below these, and on a horizontal line with the three fuse-holders at the lower left, are three toggle switches, their purpose shown on the panel sketch and schematic. One additional toggle switch above the receiver fuse, for switching the noise limiter in or out, completes the panel layout. Note that the three toggle switches, S-2, S-3, S-4, like the fuse holders F-1, F-3 and F-4 are mounted 1½" above the bottom panel edge, placing the switch bodies beneath the chassis deck also.

With the drilling of holes and mounting of parts, mechanical assembly of the control unit is complete and we may now proceed with the wiring in accordance with the schematic. This is all straight-forward and easily interpreted from fig. 1. I want to mention here though that the two 'cables' from the *rf* monitor unit and which, on the schematic are labelled 'audio input cable' and 'power cable' are supplied by the manu-

facturer as an integral part of the Johnson 'Signal Sentry'. Likewise, the color code shown on the 'power cable' is applicable to the Johnson 'Signal Sentry'. If you use an *rf* monitor of different make, or one of your own design, check to see that connections are properly made as shown, regardless of color.

Operation

A few pointers now in placing the unit in service after completion. Note that the entire control unit is supplied with 115*v ac* through patch cord PC-3. This is simply a length of standard, flexible, rubber-covered, two-conductor lamp cord of a size not smaller than #14 B&S gauge. It should be long enough to reach from receptacle AC-3 in the control unit to the nearest *ac* source in the shack without strain or excess slack. Each end of this cord is fitted with a standard male *ac* plug cap, one to plug into the shack outlet and the other into AC-3 in the control unit. This is the main *ac* power source for the control unit and must carry the combined current of the transmitter, receiver, *rf* monitor power supply and Conelrad unit. If a transmitter drawing more than 500 watts from the *ac* line is used, PC-3 should be made up of #12 cord instead of #14. For added convenience of operation as well as increased safety factor, a *dpdt* toggle switch of the standard house wiring variety, rated at 15 amperes at 115 volts, should be inserted between PC-3 and the main source of *ac*. This will enable all items of equipment served through the control unit (except the clock) to be turned on and off without manipulating several individual switches. This is shown in the accompanying block diagram.

PC-2 is another *ac* patch cord made up identically with PC-3 but of sufficient length to reach between AC-2 in the control unit and a source of 115 volts *ac* in the shack that will *not* be affected by the main switch described in the preceding paragraph. This will assure a constant source of fused *ac* supply to the clock.

The AC cord for the receiver is plugged into AC-1 in the control unit and the transmitter cord into AC-5. AC-4 is used for the *ac* supply to the Conelrad unit. This outlet (AC-4) is provided with a switch (S-3) on the control unit so that when receiving or standing by only, the Conelrad need not be operative.

A word about the noise-limiter. Contrary to popular belief this operates extremely well *without* the conventional use of one or two volts of *dc* customarily supplied to this type of limiter from flashlight batteries. The limiter circuit shown here will reduce the audio volume in the headphones considerably when it is switched to the 'ON' position, by S1. This however presents no problem as the average modern receiver has an excess of audio output and if the loss in volume through the limiter appears too excessive, it can be built back to the desired level by increasing the receiver audio output control. It will be noted that the output of the receiver to the speaker is *not* routed through the limiter. Should you customarily operate with your speaker rather than headphones, merely plug P-5 into jack J-3 and use the patch cord PC-1 in jacks J-2 and J-5.

For convenience in mounting and wiring the small components of the limiter, use a Keystone Type 1204 four position mounting board or similar, which will accommodate the two crystal diodes, the 250 mmf fixed condenser and the resistor R1, rather than 'loose' as I did!

Appropriate marking of the front panel with the readily available small decals and insertion of a small piece of fly screen and suitable backing cloth between the speaker cone and the panel will give your control unit that much-to-be-desired 'professional' touch.

Proper fusing of the various items of equipment is of course, dependent on the current drain. In any event, the control unit fuses for equipment already supplied with integral fusing, should be *less* than the value of the fuses within the equipment. The best way to achieve this is to remove the fuse from the equipment and place it in the control unit. A fuse of *greater* capacity can then be placed within the equipment or a jumper wire soldered around the integral holder. For the clock, a 1/10 ampere fuse is adequate; these are available at most radio supply houses.

Factory built *rf* monitors like Johnson, Bud and others which function by sampling a small amount of *rf*, will require a pick-up lead from the monitor to a point where an *rf* field exists. Merely route a piece of insulated wire from the monitor through the cable entrance hole in the rear of the control unit and thence to the pick-up point.

To enjoy the completely automatic, switchless, relay-free operation which this control unit offers, separate antennas for receiving and transmitting are highly desirable. This presents no problem however as with the high gain of modern receivers, a short random wire or a mobile whip, tuned or untuned, proved very satisfactory.

"G" Hams Problem

What is an ohm to an English 'am?
It's the place where 'e 'angs 'is 'at;
And the guy who invented resistance
Never considered that
Those "G" 'ams sure 'ave their problems,
When it's 'onduras or 'aiti they seek;
A.M. is taboo, single side band, too
For they lose the four dots when they speak
With the bug or 'and key there's no trouble,
Be it 'awaii, New 'ampshire or the 'ague;
With code there's no guessing, an H is
four dots—
In London, Madrid or in Prague.

W2BOH

Typical Novice station.

The Art of Being a Novice

Barry Briskman, K2E1G

One of the most memorable periods in any amateur's career is that time which he spends as a Novice. Not only is the hobby fresh and new, but his mind is kept busy absorbing "very complicated" details concerning radio gear. There are many decisions to make. What station equipment shall I employ? What antenna will give me the best results for each given band I plan to operate? How can I meet more people and draw on their experiences to help me through the creeping stage?

He has these and many other issues to settle, and he must do it in a relatively short period of time, as the Novice ticket is of short duration. If he plans to make the grade, he must also find a good deal of time for code practice and studying the General theory. To we who have done it all, it is rather simple to pat him on the shoulder and say, "Don't worry! It's not as bad as you might think." This is a lot to learn in such a little time, and to get the most out of it it pays to do a little planning beforehand.

Since each individual has different amounts of time to devote, different degrees of tenacity and even different types of intellect, it is difficult if not impossible to generalize on what will be the best method of attacking the problem. We can, however, draw upon accumulated past experiences of those we know and come up with some hints which will make the job easier and more pleasant.

Let's imagine that we are Jake Jones, WV2XXX, a lucky young man who just found his Novice ticket in this morning's mail and after surviving the initial blow is now sitting in his easy chair pondering things to come.

Progressing Toward His 1st Station

Jake's biggest concern is getting on the air. If we assume that he has no equipment (if he was an SWL he probably has a receiver) he must decide what gear will give him the most within his budget. Few Jakes approach amateur radio with unlimited funds. At least I don't know of any. To logically evaluate the situation, Jake should first review his position. He knows that he must operate a crystal controlled transmitter with a maximum power input of 75 watts. He also knows that he may operate CW in the bands: 3.7-3.75 *mc*; 7.15-7.2 *mc*; 21.1-21.25 *mc*. He may also operate phone in the 145-147 *mc* 2 meter band. Naturally, every amateur would like to be able to use all the frequencies available to him. Unfortunately this is limited by factors such as antenna space, TVI etc. So, Jake must first decide what will be most practical from this point of view. If Jake lives on a multi-acre plot in the country there is *no* problem. If he's the average city slicker, he is probably on a typical 40 x 100′ plot or perhaps even an apartment dweller. He now has to evaluate his location in terms of being an antenna farmer. Let's say this "city Jake" has decided he would like to operate 80 and 40 CW, with a future possibility of 15 meter work for DX purposes. He naturally wants the

most for the least in the way of antennas. What he should strive for is maximum efficiency without building a wire mesh cage over his property. For the lower bands either straight half-wave dipoles or folded dipoles will do well for him. They both radiate the same power and pattern. The folded dipole will, however, give him an antenna which is broader in response. Sure there's a disadvantage. It's more difficult to match a 300 ohm feedline to a transmitter than a 50 or 72 ohm line. This, of course, is based on the assumption that Jake is a modern chap who will use a pi-net rather than a link coupled affair. Assuming that Mr. Jones does use a pi-net transmitter and still wants the broadband characteristics of the folded dipole, he must either use Balun Coils to transform the feedline impedence from 300 to 72 ohms, or employ an antenna tuner for matching a Pi-Net Xmtr to any balanced feedline.

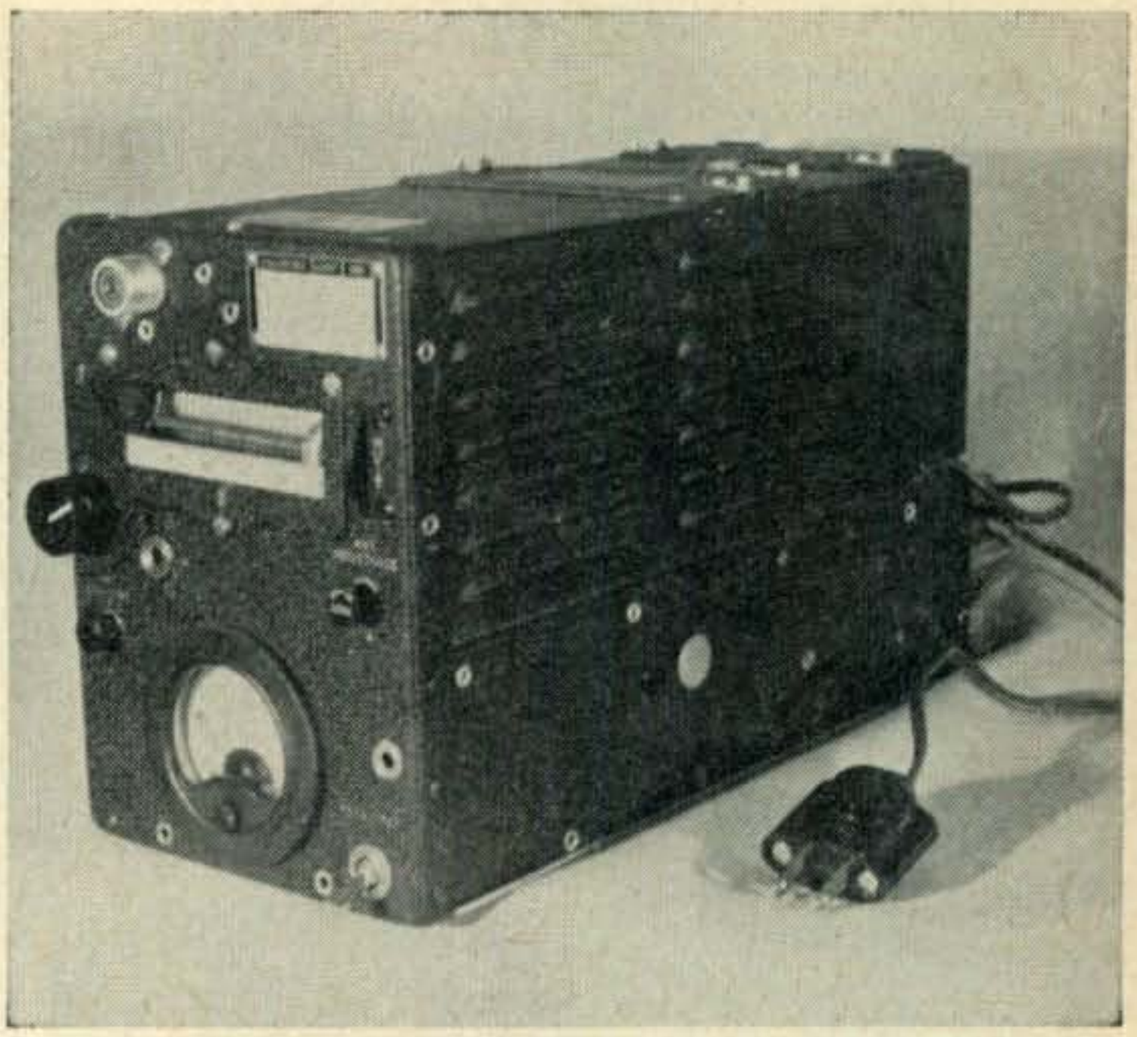
Multi-Band Trap

Jake Jones may not have room for separate dipoles, folded or otherwise. What to do? Why not use a multi-band trap antenna. This is only about 108′ long and will work on all bands 80-10 meters. Sure, it's a compromise on some bands, but it is a means to versatility. Now Jake has a skywire for 80, 40 and 15 and can use it when he gets his General on 20 and 10, too. He's saved so much room and expense, that he can probably even install a 15 meter vertical on the roof for netting those rare ones from across the pond. There are, of course, other ways to skin the cat. But each Jake will have to determine the best method for his particular cat.

Other Gear

Now, what about some gear. Jake needs a transmitter, receiver antenna relay, key (perhaps a microphone), speaker and maybe Balun Coils or a Tuner. It's the author's opinion that he should build his own. We may make an exception where the receiver is concerned, as a receiver to separate today's interference is perhaps a little beyond the beginner. A transmitter, however, is rather easy to build. Jake can convert any number of the surplus units that are available or he can take a design (there are literally thousands available in CQ, QST and various handbooks) which will suit his purpose, buy the parts and do the job. This latter solution is the one I endorse. By building his own, Jake will increase his understanding of circuitry, become more familiar with diagrams, and in the final analysis be more proud of the result. He will profit all the way down the line.

If Jake is an older fellow with very little time, he may feel that he should buy his transmitter. OK, Mr. Jones, you can do this and still learn something. There are KITS available. All the shopping for parts and mechanical work have been done for you, so you save time and still have to learn something. The Heath Co., Eico and E. F. Johnson & Co. make some ideal units for you. Others like Allied Radio in Chicago do too. These people will be most happy to send



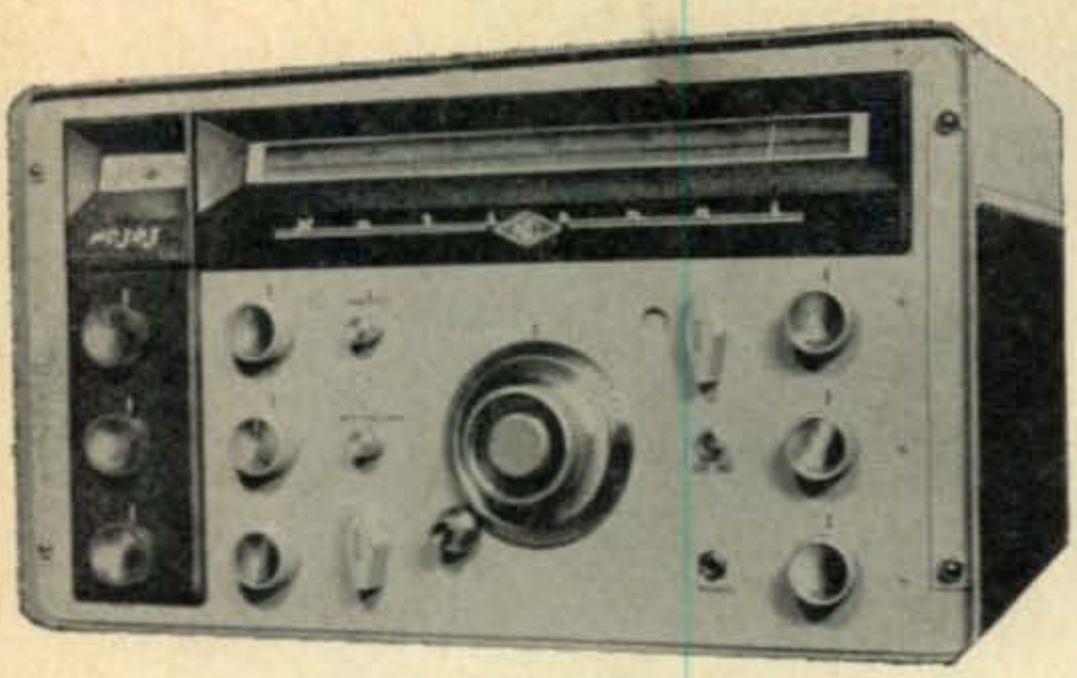
Converted ARC/5 surplus transmitter. They can be modified for use on any amateur band.

you their catalogues. If Jake wants to be difficult about learning things, and still be on the air, he can buy any number of transmitters and accesories that are ready to go. These are available in a wide variety of prices. There is certainly one that is ideal for Mr. Jones.

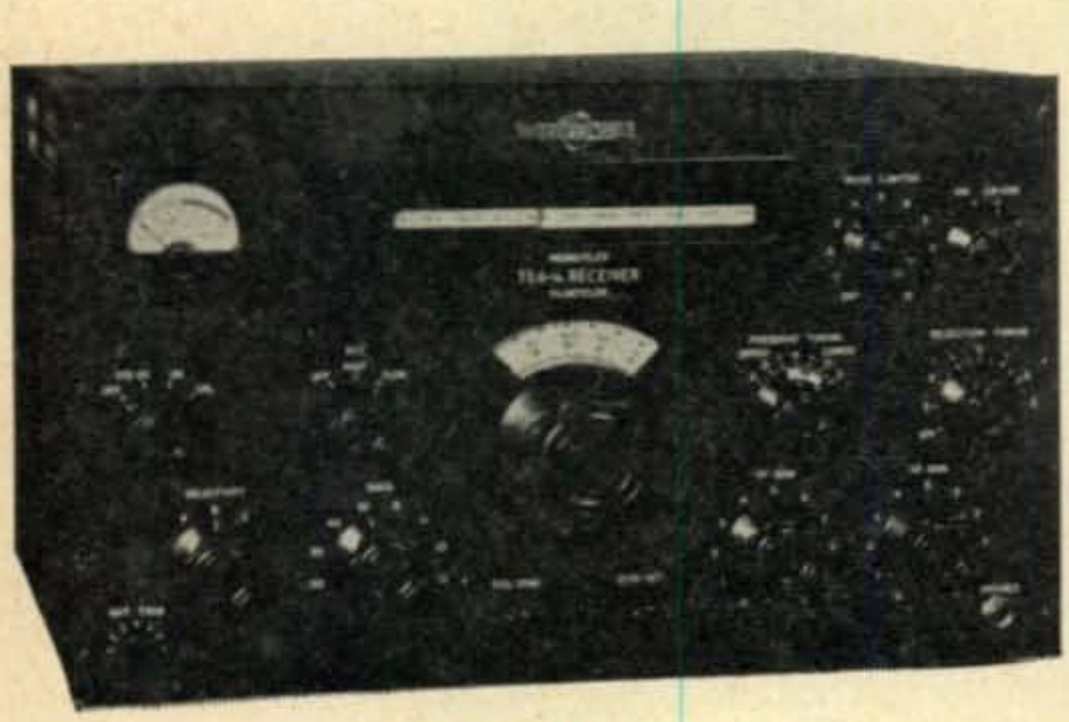
Receivers

A receiver is slightly more difficult to select. A good one is rather costly and will probably represent the majority of Jake's investment. Receivers are available from $50.00 to $1500.00 depending on the features they provide. I have always felt that it is wise for the newcomer to start saving for the receiver even before he has his ticket, as it is wise to buy a good one immediately. A good receiver will last a lifetime if properly cared for and having one as a Novice will make operating a much greater pleasure. If I had to list receivers in groups in order of preference I would do it something like this: Class A: Collins 75A-4, 75A-3, 75A-2, 75A-1, National HRO-60, Hammarlund HQ-170, HQ-160, SP-600JX, Hallicrafters SX-101, Mark IIIA. Class B: Hammarlund SP-400, National NC-183D, Hallicrafters SX-88, SX-99, Ham-

A Knight-Kit receiver.



National NC303.



Collins 75A-4.

Hammarlund HQ-100.

Hammarlund HQ-170.

marlund HQ-140, HQ-150, HQ-129, Hallicrafters SX-28A, Hammarlund HQ-110. Class C: Hammarlund HQ-100, Hallicrafters S-76, SX-71, National HRO-5, 7, etc., BC-348, BC-342, BC-312.

There are, of course, any number of others, but I feel that this represents a fair crossection of currently popular models. The one Jake selects will depend upon his budget. The Collins' are advantageous since they read frequency in 1 *kc* divisions and are extremely stable. They employ mechanical filters for any degree of selectivity. A Novice like Jake Jones couldn't do better than a receiver calibrated in 1 *kc* divisions with a 500 cycle bandpass for CW. It would, however, cost him anywhere from $450 to $800.00 to have this.

Miscellaneous

At this point, Jake has the major items required for his first Ham Shack. Miscellaneous gear such as a Microphone, Key and Antenna relay are available at any amateur equipment distributor and should be quite easy to select. Jake should, of course, have a straight key. The popular, war surplus J-38 will probably cost him about $2.00. Both Advance and Dow-Key make excellent antenna change over relays in just about any coil voltage. For a microphone, the Astatic D-104 is excellent although there are many mikes which are equally as good for Jake's purposes.

Reading

In order to facilitate his technical advancement and general familiarity with ham gear, Jake will do well to start a small library covering the subject. The American Radio Relay League in West Hartford has a line of books for chaps like Jake which cover this quite thoroughly. I suggest that Jake pick up a copy of their Radio Amateurs Handbook, as well as some of ARRL's publications on operating procedures. Cowan Publishing (publishers of CQ) also publish a line of books which will be valuable to Jake. Bill Orr, W6SAI has written books which are also particularly good. Mr. Jones will be smart to purchase Bill's Radio Handbook, Novice & Technician Handbook, and VHF Handbook. These are published by Radio Publications, Wilton, Connecticut.

Going "On The Air"

After setting up his station, Jake is faced with the BIG moment. Most Novices find that they are just a little apprehensive about throwing that switch for the first time. Their minds are full of questions like "Is my sending adequate?", "Will the other fellow send too fast to me?" etc. There are certain basic rules Jake can follow with regard to these. He should send slowly and accurately. Jake should have no worries about being "too slow". After all, he is a Novice and the Novice Bands are set aside for him and fellows like him. It is far better to be slow and accurate

than be a speed demon and make many mistakes. Also, most hams will answer you at a speed quite close to that which you are sending because they assume you won't be foolish enough to send faster than you are able to receive.

Calling CQ

Once Jake does call CQ, he should remember that *all* Novices are crystal controlled. After tuning his own frequency, Jake should carefully tune the entire Novice segment. It will be a memorable moment when Jake hears another signal and finds it is calling him. Don't get flustered, Jake. After the calling station signs, go back to him, give him a report, your name, QTH (address) and then sign it back to him. Don't repeat everything two or more times. If the other fellow misses something, let him ask for a repeat. It certainly sounds foolish to say: name is Jake, J-A-K-E, J-A-K-E etc. If you have been given a report which indicates that you are not being received Q-5, there may be some justification for being repetitious, but if you are Q-5, what's the point of repeating?

Another point to remember, that is often overlooked, is that of understanding just what signal reports mean and making them as accurate as you can. If a chap is RST 339, there's no sense in giving him 599. He *wants* to know what he is and there is no need to make him feel good by fooling him. Remember that 599 is about as strong as a CW signal can be. It is doubtful that you will run across many of these, unless your neighbors on either side are also amateurs.

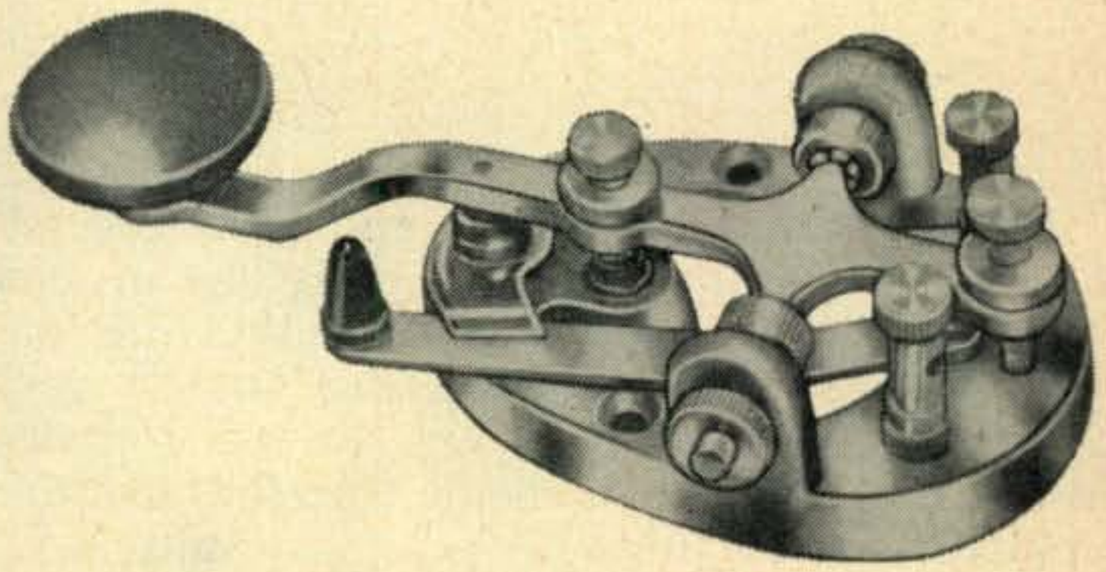
QSL

It is important that you send and answer QSL cards. Many fellows are working towards awards such as "Worked-All-States" and your card may give them a needed state. A QSL is the final courtesy of a QSO. Remember that.

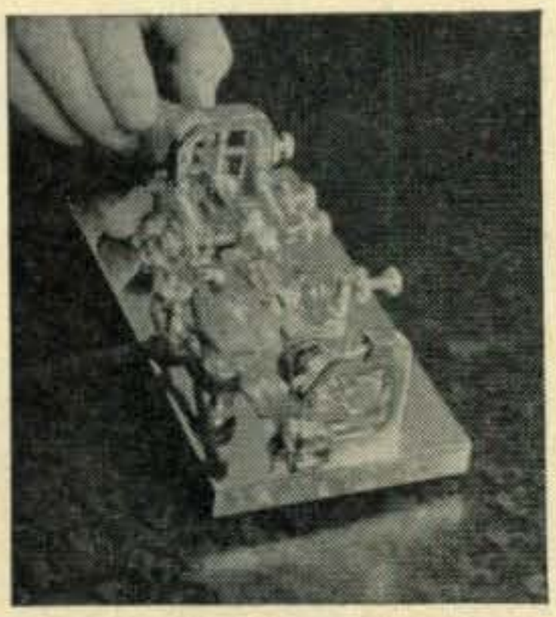
Logs

The law says that Jake should keep an accurate log. Aside from the legal aspect of this, you will find that a log is valuable to you as a record of past QSO's. I have some 60 log books and I still get a great deal of pleasure in looking back and remembering some of the fine contacts listed in them. Jake should keep his log accurately and neatly. Your log also makes a fine record of QSL's sent and received.

After Jake has been on the air for a while, he will undoubtedly meet other local amateurs. Getting together with these fellows will introduce Jake to a circle of people with interests which are parallel to his own. These relationships will be of great value to Jake, as Amateur Radio is a group hobby where one profits from another's experiences and vice-versa. A group of local amateurs often form a Radio Club where they get together at regular meetings and hold interesting discussions, watch films, hear timely lectures and participate in contests sponsored by both the ARRL and CQ magazine. Next month we will go into the basics of forming that club, the facts on contests and Jake's part in them. We will also discuss Traffic Nets, Jake's part in emergency communications and further hints on developing advanced "operating skills". For Now, 73 es gud DX.



Standard "straight key". This is the choice of most beginners.



A Vibroplex Bug. This type of key is excellent after you gain experience in sending through practice.

RME 4350A receiver

Inexpensive and Easy Amateur Reception

Lyle Parsons, W7HLU
2319 West 87th Street
Seattle 7, Washington

Articles about converters and receivers seldom draw reader response equal to articles about other phases of amateur radio. This unfortunate fact is, I believe, due to the very general feeling that receivers are too complex and critical of adjustment for the average amateur to obtain satisfactory results with home-brew or modified equipment. This article is written in the hope that it may help to spread the not-very-widely held theory that a particular receiving problem may not only be solved by the purchase of the latest commercially built apparatus, but may also be solved by building new apparatus or by modifying equipment which was originally intended for another purpose. The latter approach is one which has given many amateurs maximum satisfaction with minimum expense, and one which you may easily try for yourself. If you have the pioneer spirit, read on

This article describes a 40 meter mobile converter in terms precise enough to permit duplication. More pertinent, however, it describes the solving of a receiving problem. Relatively few hams need a 40 meter mobile converter, but many have receiving problems. Perhaps you could use an 80 meter mobile converter, or a 20 meter fixed converter, or just more bandspread on the DX portion of 15 meters. These possibilities have dictated the following description which is pointed at "method" more that at "construction."

The first step in any construction project is recognition that a problem exists. My problem was K6TYW. During the course of a two year stint operating as K6UEB, I was subjected repeatedly to K6TYW's pointed, often insulting, remarks about my fixed tuned, broad band, crystal controlled converter. He finally won his point, and I was forced to agree that more accurate tuning arrangements and greater selectivity would result from a change to a tunable converter.

The second step is formulating a tentative list of requirements based on results expected, balanced against the time and money required. This step leads naturally into step three, selection of a tentative solution. My requirements were simple: A 40 meter tuning range with adequate bandspread, a stable oscillator, good sensitivity, reasonable small size, and an *if* output in the broadcast range. Balancing these requirements against the high cost of living, the commuter's lack of time at home, and the necessity of building in an apartment kitchen, resulted in the tentative solution which was to adapt a piece of surplus gear. This, I felt, would be cheapest and easiest and, with proper care, could vastly simplify the major mechanical problems and provide passable cabinet work and stability.

With a tentative solution in mind, I was fortunate in being able to almost combine steps four, five, and six. Step four was selection of a unit which had usable mechanical features combined with as many usable electrical features as possible. Here the ARC-5 Command receiver seemed ideal. It had a fairly good receiver front end within a modest sized portion of the cabinet. Also, it was available in one model with 1415 *kc if* transformers. True, this was the 3-6 *mc* unit, but an ultimate tuning range of perhaps 6.9 to 7.4 *mc* was desired, so the front end would need modification anyway. This decision allowed me to proceed with steps five and six.

Step five is, of course, proper aging of the idea or of the parts. In this case I let the idea age while I searched for the ARC-5. From long experience, however, I have found that it is equally satisfactory to age the parts, and can state positively that either course is satisfactory.

Obtaining the ARC-5, step 6, was simplicity itself. I mentioned the project on a round table, specifying that I needed an 80 meter ARC-5 in $2.98 condition. K6CQV brought one to the house two days later.[1] It was in $0.98 condition, but he made it a gift because he was curious to see if it was actually salvageable.

The rest was easy. I rewired the *rf* and mixer filaments for 6 volt equivalent tubes, grounded the "sensitivity" lead (if you don't have an ARC-5 schematic, try the 'Mobile Handbook' or the 'Command Sets' booklet[2]) and ran the

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1. Two others also deserve more than honorable mention: Bob Rohner for excellent photographic assistance, and Juanita, patient XYL not only during this apartment drainboard project, but during many years of amateur wireless operation and countless other projects.
2. Cowan Publishing Corp.—Any ham supply store.

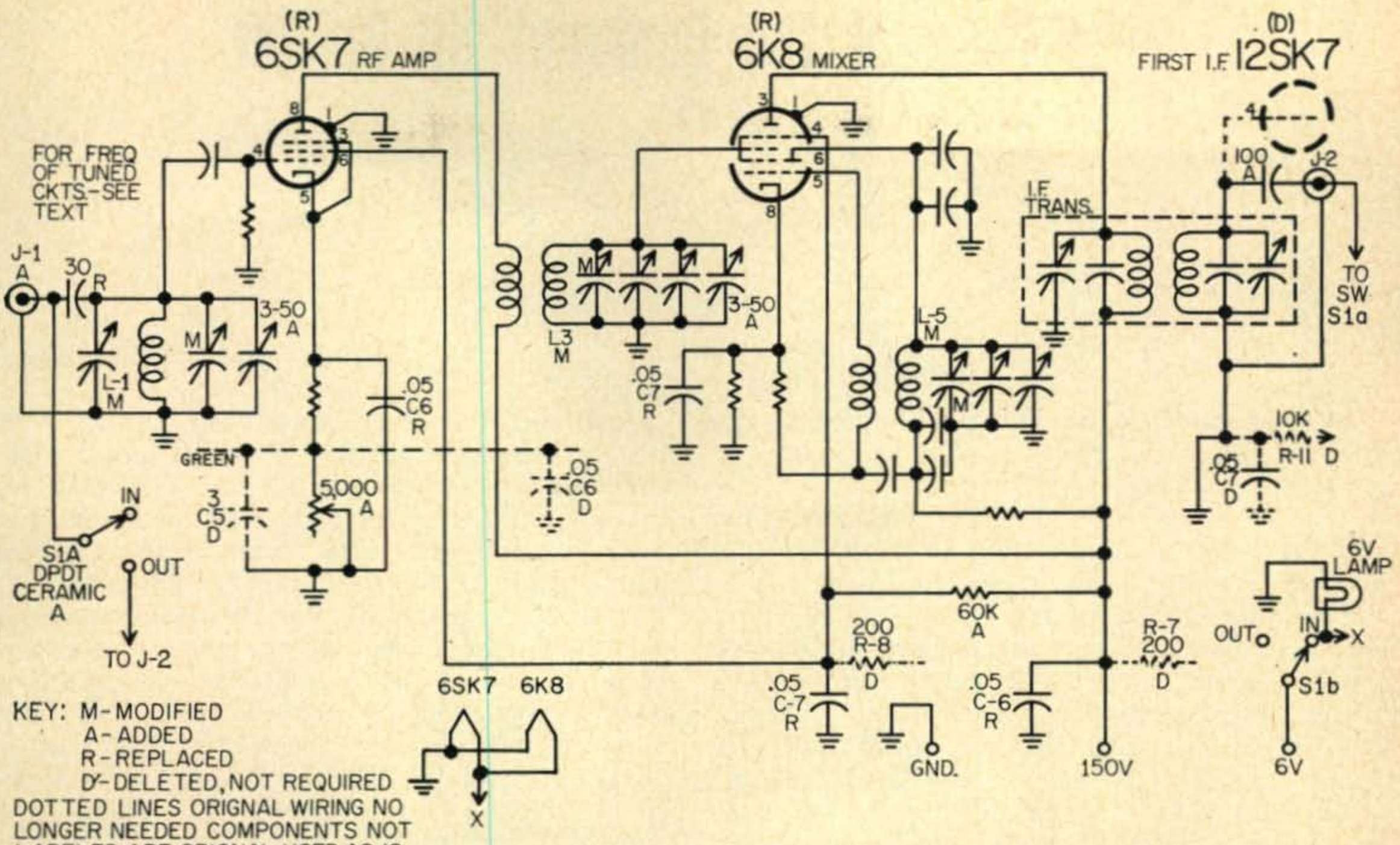


Fig. 1—Circuit and key for modifying the ARC-5. Jacks J1 and J2, used for input and output, are Motorola types.

secondary of the 1st *if* transformer to the antenna terminals of my receiver. Application of voltages showed the front end to be working in its 3-6 *mc* range. I then tuned in the oscillator on my communications receiver (range 4.415 to 7.415 *mc*) and began removing turns from the oscillator coil (L5) until the center of the range (dial about 4.5 *mc*) approximated 7 *mc* (oscillator frequency about 8415). It was not at all difficult to follow the oscillator signal in the communications receiver, and removal of 7 turns accomplished the objective. Seven turns were then removed from the other tuned windings (L1, L3). You will note that both the oscillator and mixer circuits each have one pie winding which is not tuned (L2, L4). These pie windings were not modified.

Assuming that these coil modifications would approximate the necessary frequency coverage, it was then necessary to expand the bandspreading. This was done by removing plates from the oscillator tuning rotor while following the signal in the receiver. The oscillator trimmer has plenty of capacity and the signal may be easily moved back to the desired range. It was found that removal of all but the single slotted plate left the oscillator covering a range of 8.365 to 8.745 *mc*. Subtracting the 1415 KC *if* frequency indicated a tuning range of 6.950 to 7.330 *mc*. This was judged satisfactory and no additional work was performed on the oscillator, although the range could have been further reduced by using tin snips on the single remaining plate.

The same number of plates were then removed from the *rf* and mixer tuning condensers. Trimmer range in these stages was

[*Continued on page 108*]

The converter measures 5 by 5½ by 5. Dial calibrations are from 6950 kc to 7330 kc with 10 kc spacing thru the fone band. A new dial pointer has been placed on the left side for under-dash mounting. Decals are from Tekni-labels set No. 2201. The special knob is a combination of 2 stock items from Offenbach-Remus, San Francisco; Total cost of knob about $7.65.

The Case of the Bankrupt Kit-Builder

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

So you can't go on living without that deluxe, easy-to-build converter, phone patch, or perhaps a super-duper receiver kit for the shack. But your kit-building booty is long gone, and the little woman is sure to cloud up and nix the idea of a new project as soon as you start edging toward an order blank. Well, don't despair, fellows; there's more than one way to cross a creek, and I happen to know of a bridge that can answer a low-budget kit-builder's prayer and give the gals some fun, too.

Do you secretly despise the fellow at the office who boasts about all the fishing trips he and his wife take? Well, stop despising and start imitating; he's got a good idea. This guy wouldn't spend half the time with minnow bucket if his wife didn't approve, let's face it; and my theory is that a bankrupt kit-builder's cupboard won't be bare if his wife is a Do-It-Yourselfer, too.

Converting your XYL from steam iron to soldering iron shouldn't be so difficult; she's already a veteran with tools. Haven't you seen her dice an onion with her eyes closed, hack a bony chicken with a butcher knife, or frost a fancy bed of roses on a cake with one hand while sifting flour with the other? Sure you have. And she won't have any trouble with pictorial wiring diagrams. They're down-right simple compared to knitting instructions for a pair of Argyles.

But don't reach for that order blank yet! Just because you see the advantage of a kit-building wife is no sign she does. You may have to do some persuading!

For the initial approach, get yourself in a mellow mood; stroll up to your lady fair and murmur something like this:

"Say, honey, haven't you been working *extra* hard lately?"

(Emphasize the word *extra* or you'll be implying that she doesn't work hard *all* the time. That would be disastrous.)

If she sighs in agreement but continues scouring the skillet, follow with this: "Dear, I think you need to relax—get away from all this work. (Explode with the next words as if the idea just hit you.) I KNOW! YOU NEED A HOBBY!

After the Well-what-are-you-up-to look, boldly suggest kit-building as an escape and flash a magazine advertisement showing a happy homemaker putting the final touches on a neat chassis surrounded by her smiling family. With this technique, and, yes, a bit of good luck, she'll sink that skillet in the suds and rush for the kit catalog. The gadget of your dreams, out of reach as a HIS item, is about to be painlessly financed from the HERS fund.

Unless you married a Paddle-My-Own Canoe gal, she'll accept some advice about the choice of a kit, so see that her first one is simple—even if you need an all-band communications receiver with crystal calibrator and built-in cocktail shaker in the worst way. And don't let her select a kit merely because it's small and cute and has pretty knobs. We girls have a definite weakness for little things like sports cars and diamond rings, but a thimble size case that looks perfectly adorable in the catalog is sure to lose its charm when it's time to crowd all the tubes, wires, and coils inside.

Don't let her enthusiasm die during the crucial days before the kit arrives; launch some kind of program to keep her interested. A series of soldering lessons will do the trick, and you'll have to admit it's important. I didn't buckle down to learn soldering until Dad caught me with a cold joint one day and said in a firm, fatherly tone: "You know, Carole, learning to heat a joint and solder it properly is like knowing when to turn a pancake or how much salt to put in the gravy. It takes practice, and it's just as important."

There's a song that says it's nice to have a man around the house, and this is especially true on the day the first kit arrives. The sight of all the odd-shaped bits of wire, glass, and metal is pretty baffling to a beginner unless someone is around to introduce the different parts. Don't be surprised if she talks about chocolate mints and licorice sticks instead of ceramic disc capacitors and spaghetti tubing; after all, they do look alike. Be prepared, too, for her to come up with some unconventional but practical ideas like using muffin tins and dainty dessert dishes for sorting screws and other small parts.

Now, when she picks up the soldering iron for the first step—take off. Force yourself to watch television or the girl next door sunbathing—anything to get you away. Your protegé will feel plenty awkward and nervous without you breathing down her neck with a let-me-show-you-how-it's-done look on your face.

[*Continued on page 108*]

Come To New York in 1960!

The International Amateur Radio Convention to be held in New York in August, 1960, will be the biggest ham show ever held. The convention will feature programs and technical sessions for all the facets of our hobby as well as a committee to help make your vacation even more interesting by supplying theatre tickets, arranging tours and recommending fine eating spots.

There will also be exhibits of nearly all of the commercial ham gear available as well as manufacturers representatives to answer your technical questions.

YL • Sideband • Antennas • Hotel Accommodations

DX • Novice • Traffic • Transportation

VHF • Technician • Civil Defense • Entertainment

We still have some room for additional people to serve on the committees listed below. If you would like to be a part of the world's biggest Amateur Radio show drop a note to:

IARC Convention Chairman
300 West 43rd Street
New York 36, N. Y.

Building the Heathkit

Cheyenne

James N. Brink, K5SVJ
1721 River Oaks Drive
New Orleans 14, Louisiana

"Only 90 Watts!!", "Into a vertical?!!", "Thought you had a quad for sure," "Sounds beautiful," and on 20 meters "Brother, I was sure you were running a full gallon into a beam, the audio is beautiful." These are actual comments from the receiving end of Heath's new mobile transmitter the "Cheyenne." Everyone on the air, from KJ6-land in the Pacific Ocean through VO land in Newfoundland are rendering Q5 S9 reports and from South America comes Q5 and 25/9 with "very, very good audio." The first 47 contacts all Q-5. The new little Cheyenne is dispelling some of the old fears and bad reputation of carrier controlled modulation. Most probably as a result of the real fine mating of the transmitter and the Electro-voice Model 727 ceramic microphone which is included in the kit.

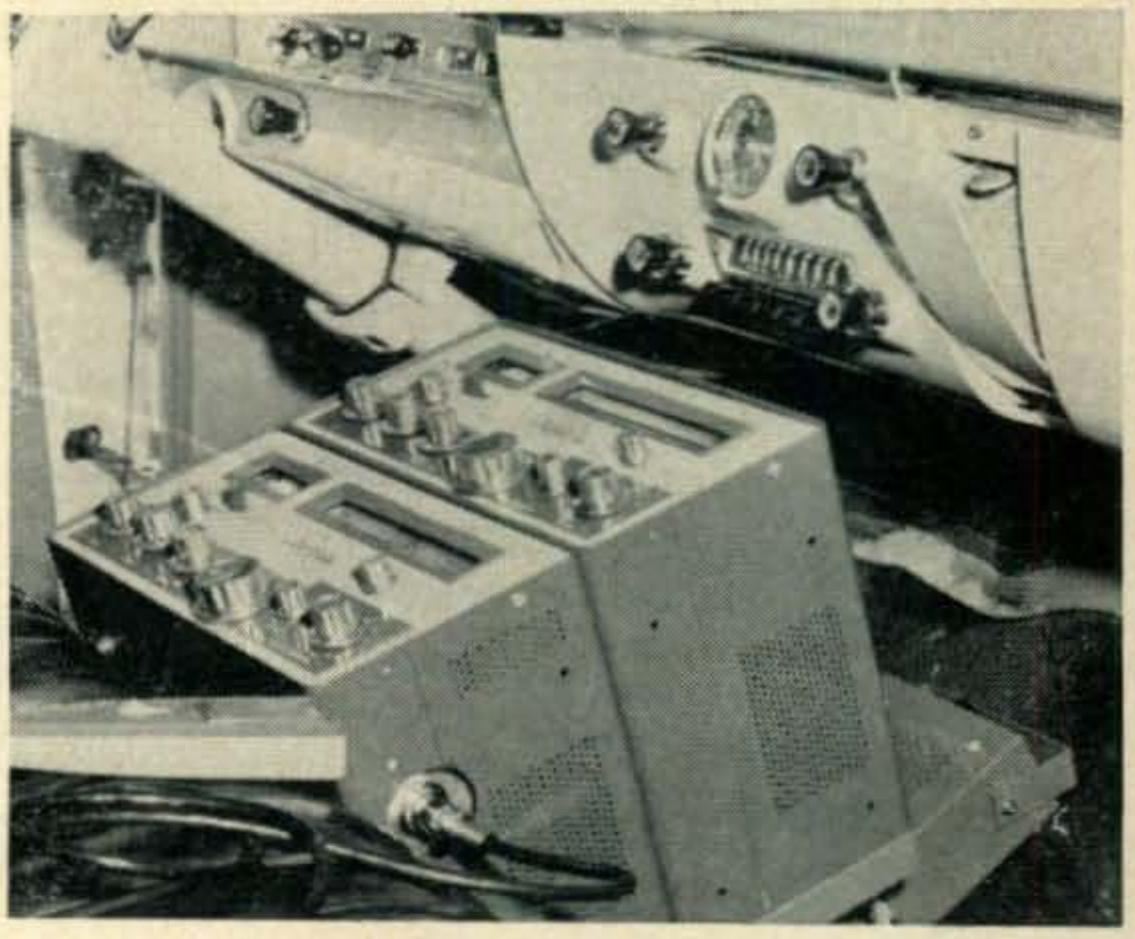
The Heath Company has maintained its exceptionally high quality of components and exacting mechanical tolerance again in its new mobile transmitter. The little gem is easily assembled and put on the air in about thirty hours of good honest work. However, the instruction manual for the Cheyenne was not as well edited as was the instruction manual for the "Comanche" receiver, there being several noticeable errors and confusing instructions.

Assembly

The first steps include assembly of the main dial mechanism. Inasmuch as this is probably the most handled part of the transmitter, a couple of construction details should be most strongly emphasized. Be absolutely sure that the tuning mechanism works flawlessly before you continue with construction. This can be aided by very careful mating of the "Pointer drive gear shaft assembly" #100-202 and the "pinion gear shaft assembly" #100-201 into their respective oilite bearings. A thorough polishing and buffing of the bearing surfaces will help insure smooth operation. This may be accomplished with a power buffer and/or crocus cloth (not sandpaper!!). Be extremely careful not to decrease the size of the shaft to the extent of causing a loose fit. The same smoothing treatment should also be accomplished on that portion of the pointer bracket (204-M215) on which the dial drum pointer (463-15) rides. This is very important because the pointer bracket is subject to receiving nicks and burrs during handling and the tiniest nick can snag the dial pointer and be a source of continual irritation. It should be noted here that although the tuning mechanism appears the same, and the Cheyenne instruction manual states the tuning mechanism for both the Cheyenne transmitter and the Comanche receiver is identical, it must be assembled differently for each. Basically, the spiral drum spring #258-10 and associated parts are located on opposite ends of the dial drum. This point is emphasized so that each builder will not have to trace all the way through the book to find out whether or not the assembly instructions are correct.

Reference figure 6b and 6c, page 14 and figure 7 page 15. Change the numbering of the lugs on the two 15 mmf variable capacitors Q and JJ in figure 7 to correspond to the numbers indicated in figure 6b and 6c.

Note on step #10 page 22 that the braid connection is the *eyelet*, not the lug.



Reference figure 19a page 27, and steps 9 and 10 page 28. The placement of the 10 and 15 meter drive coil and the 10 mmf N750 capacitor is rather difficult and may be made somewhat easier by preforming the leads of each, prior to making permanent connections on either.

Change Step 5, page 30 from "—pin 7 of tube V-6 (S-2)—" to read "—pin 7 of tube V-6 (N-S)—".

Change Step 7, page 30 from "—pin 7 of tube V-6 (NS)—" to read "—pin 7 of tube V-6 (S-2)—".

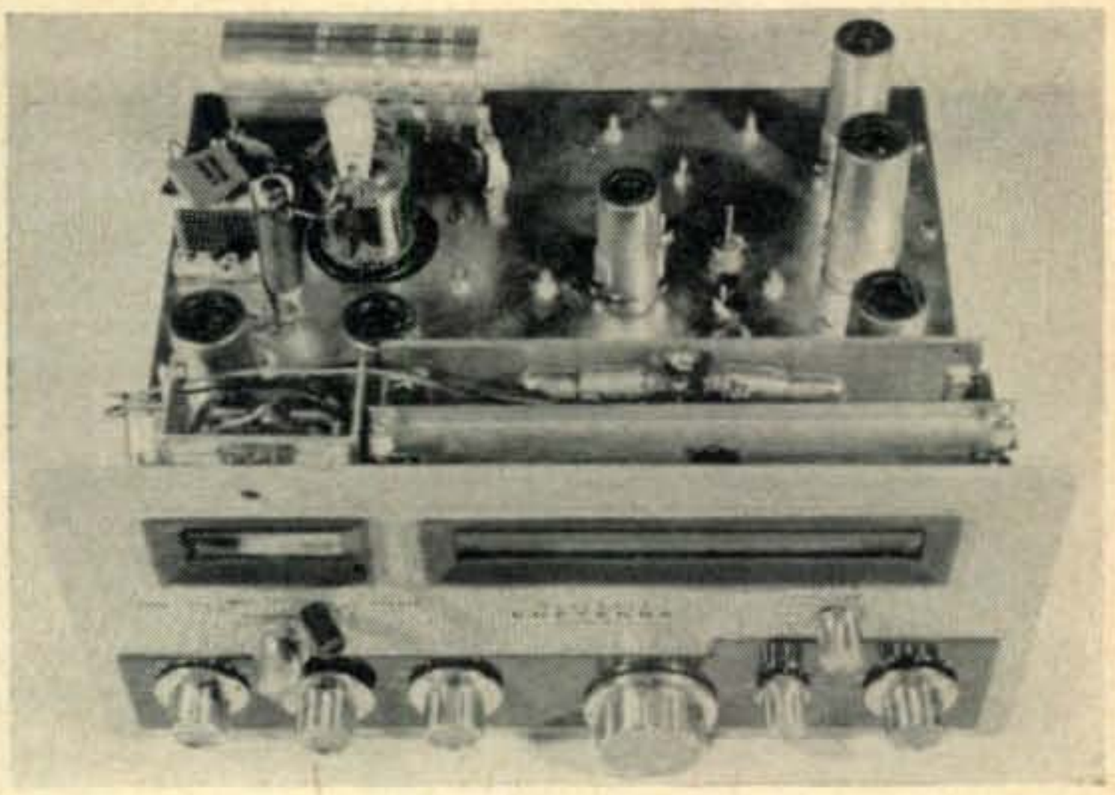
Reference Step 8, page 38 add—"refer to figure 31 for correct placement of switch."

Reference Step 1, page 42 change from "—terminal 1 on the spotting switch (S-2)" to read "—terminal 1 on the spotting switch (NS)."

Calibration

The calibration procedure is very well described in the manual and will not be elaborated on further other than to suggest the

procedure can be combined with alignment and bandspreading of the receiver. This should probably not be done during the initial calibration because of the possibility of inadvertently turning the wrong thing. It was done during a subsequent re-checking and touching up alignment and bandspreading of both the transmitter and receiver. First bring the *vfo* of the Cheyenne to zero beat with the standard and then zero beat the Comanche with both. Consequently, now both the Comanche and Cheyenne dials read the same for a given frequency. This procedure seems to instill more confidence in the dial readings and imparts a desire for a higher degree of accuracy than when each unit is calibrated separately. There is much less interaction between the trimmer capacitors R, Q and JJ, which set the frequency spread, and coil slugs A, B and C, which give a definite frequency point on the dial, than exists when bandspreading the Comanche. Consequently, *vfo* calibration is relatively quick



and easy, taking less than thirty minutes to accomplish. The Cheyenne *vfo* circuit consists of a 6AU6 tube operating as a Clapp or series tuned Colpitts oscillator with output frequency ranges of 1750-2000 *kc*, 7000-7175 *kc* and 7000-7425 *kc*. Both screen and plate voltages are stabilized by an OA2 regulator tube. The *vfo* switch uses an interrupted bandswitching mechanism in such a way that the *vfo* output is used on 80 meters (1750-2000 *kc*); 10 & 40 meters (7000-7425 *kc*) 15 & 20 meters (7000-7125 *kc*). Stability of frequency on all three outputs was within 3 *kc* during each of two test periods of four hours each. Several stations have voluntarily noted they did not have to retune their receiver at all during hour long QSO's.

The two position spotting switch makes possible zero beating without going on the air and additionally, by having it a two-position rather than a push-button, one can easily perform the zero beat operation while driving. Don't forget to turn it off, however. I had a report of a chirpy *cw* signal and discovered I'd inadvertently left the spotting switch on. Turning it off cured the chirp and all *cw* reports have been 5-7-9 or better. A test was made on fone and absolutely no difference in audio could be detected with the spotting switch on.

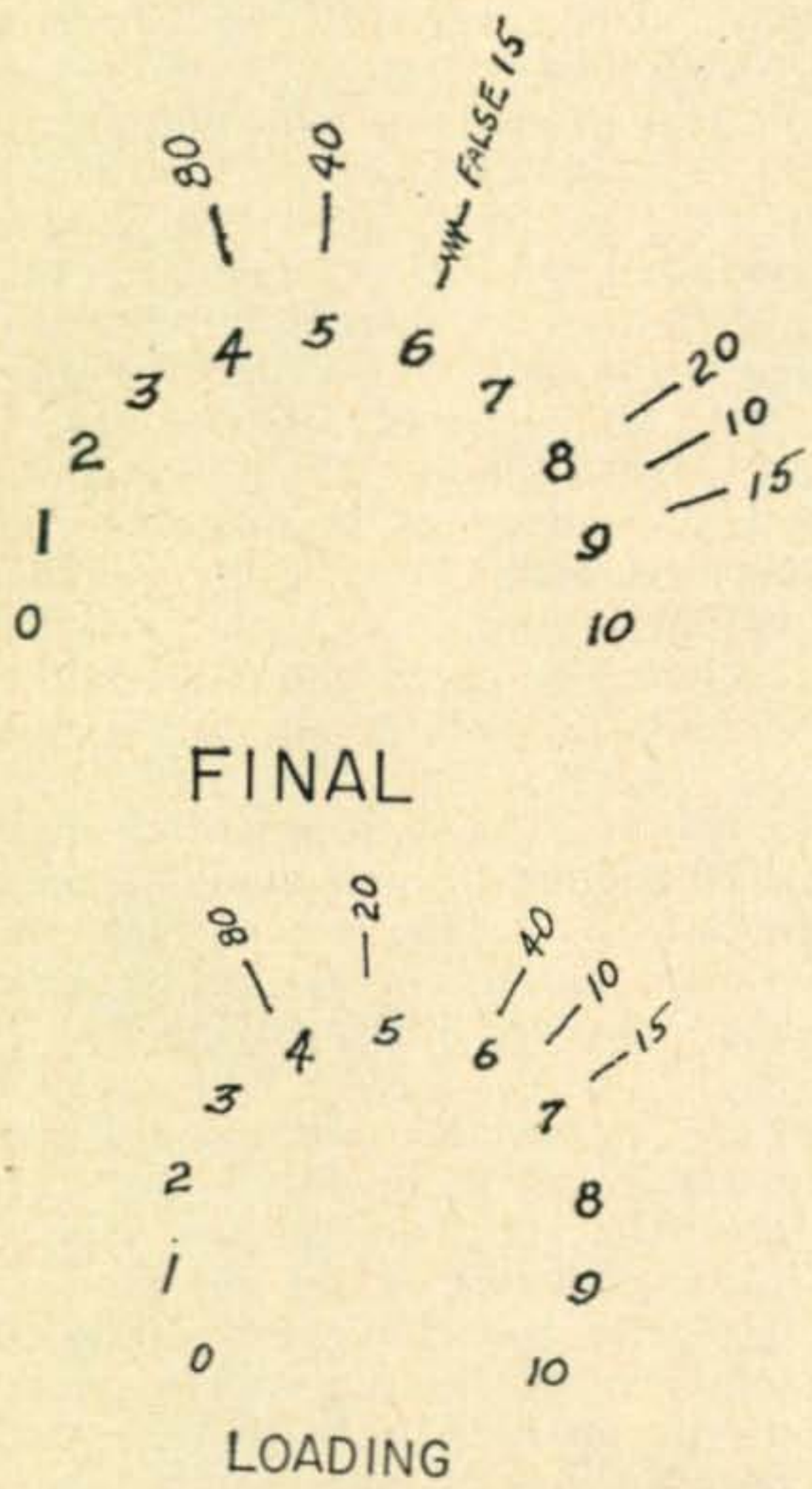
Many people have been apprehensive about the characteristics of carrier controlled modulation; however, I have requested a very "critical" report from each station and all reports have been very fine, and I'm beginning to believe that some of the older attempts at carrier controlled modulation were faulty due to not having the proper microphone balance and drive.

Yours truly had no desire to operate on 80 meters but had a requirement to operate on MARS frequency 4350 *kc*. The slug tuned *vfo* Coil C (#40-115) and the trimmer capacitor R (#26-44) were reset so that with a reading of 3950 on the dial of the Cheyenne the actual output was 4350 *kc*. This indicates a range outside the amateur band of at least 400 *kc* is available if needed. I'm sure the actual range would be considerably more because neither the coil nor the trimmer were close to their limits. This arrangement makes the entire 80

meter band useless for the 80 meter amateur band unless the *vfo* output is realigned. The same procedure could undoubtedly be used on the other *vfo* output frequencies. However such an arrangement would affect both the 10 meter and 40 meter band or the 15 meter and 20 meter band because they each use the same *vfo* output.

Tuning

No difficulty was encountered on any band except 15 meters. On fifteen I goofed again and spent some time transmitting out of the band. (I think). However, I haven't received a QSL from the FCC as yet so maybe I just



wasted my own time. What happened is this—when dipping the final on fifteen I tuned up on the first dip (counting clockwise) instead of the second dip, so I was probably doubling out at 14,000 *kc*-14350 *kc* somewhere instead of tripling out on the 15 meter band. This first dip occurred at number 6 on the final and the correct dip occurred at number 9.

It might be wise to use either a wavemeter or have a nearby ham listen for you to insure getting the final tuned properly. The following diagram gives the positions of the final and loading controls on the author's rig when adjusted to resonance on each band. Individual rigs may vary somewhat, but if resonance is indicated in a greatly different spot it might be wise to investigate or at least have your local friend confirm the location of your signal on the band.

It should be pointed out that the complete Heathkit mobile rig, i.e., Cheyenne transmitter, Comanche receiver, transistor power supply, speaker and mobile mounting bracket, contains several extras that usually must be purchased separately, eg ceramic microphone (Electro-voice model 727), antenna changeover relay, power supply relay, all power supply cabling and connecting gear including battery terminal studs and drill bit!! The only item not included is a 10″ piece of coax with two male connectors to connect the transmitter and receiver antenna together. The power supply manual contained complete information and suggestions on how to use the supply with both negative and positive grounded electrical systems as well as complete information on how to convert a single battery 6 volt system to a dual battery 12 volt system.

The author's rig was installed in a 1959 Kingswood station wagon in less than 4 hours which included mounting the power supply, speaker, installing mounting bracket on the floor of the front seat, installing antenna and running antenna leads. Subsequent removal and installation of the transmitter-receiver combination takes less than one (1) minute and only involves loosening two wing screws, unplugging power connector and speaker and disconnecting antenna lead. If a suitable 110 *vac* power supply and antenna is available in the shack, you end up with an extremely versatile piece of gear total weight about 30 pounds that will give many hours of pleasure both fixed and mobile with a minimum of cost and inconvenience in changing from fixed to mobile.

Antenna

The antenna in use on the mobile installation are entirely Master Mobile products starting with the model 232-C base mount located on the right rear fender 38½ inches above the road followed by a quick disconnect, then a 36-inch extension on which is mounted the All-Bander center loaded coil and on top of that the 5-foot whip. The RG58 AU coax lead from the transmitter is routed down through the floor, then through (inside of) the frame of the car and out a hole in the frame near the right rear wheel, then up through the drain plug hole of the spare tire compartment and terminating into the Micro-Z-Match which is on the base of the antenna. The ground lug of the Micro-Z-Match is permanently grounded at this point.

Although initial adjustment of this antenna installation is quite time consuming, it's well worth the efforts when you can see an almost perfect *swr* on all bands.

Power Supply

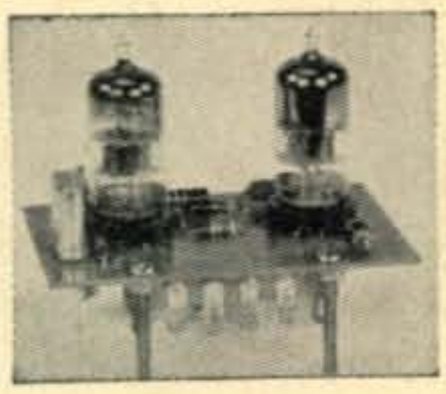
The transistor power supply MP-1 is 9-1/16″

[*Continued on page 98*]

New

Amateur Equipment

Nafco Converter



What! You're not on 6 meters yet? Well you can be and without necessitating a hunger strike for your wife and kiddies. The Nafco Model 5054 Six Meter Converter is available in kit form at only $7.95 less tubes and Xtal and $11.95 complete. The converter is a printed circuit type using a pair of 6BQ7's for the range 50-54 *mc.* It has a sensitivity of better than ½ microvolt and a S/N Ratio of better than 6 *db.* All popular tuning range *if*'s are available. For more data indicate your interest by circling A on page 126.

Mohican Receiver by Heath

The "Mohican" GC-1 general coverage receiver joins the ranks of Heathkit ham gear. Offering many advances in receiver design, it features complete portability through an all-transistor circuit powered by 8 long-life standard flashlight batteries. The Mohican uses ceramic *if* transfilters previously found only in expensive military equipment as well as a telescoping 34" Whip antenna, flywheel tuning, S-meter, etc. The receiver covers the frequency range 550 *kc* to 30 *mc* in five separate bands. Be daring! Circle the little B on page 126 and be surprised.

Knight-Kit 2-400 Transmitter

Here's an interesting tidbit from the Allied folks. Knights new T-400 Amateur transmitter kit makes an ideal unit for beginner or experienced operator. Just review the features: Modular add-in accessory kits for built in AM or SSB; Heterodyne *vfo* with large 14" slide rule dial; adjustable speech compression; coverage 80 thru 10 meters; completely TVI suppressed by liberal shielding and filtering; Silicon rectifier power supply for cooler operation, better regulation; built in AM and SSB modulation indicator. We can't begin to expose it all here, so for the entire scoop, we suggest that you circle C on page 126.

Webster 2D11 Power Converter

Webster Electric Company has a new DC-DC converter for you mobile fans. The 2D11 is basically an R-L transistor multivibrator with a secondary winding on the oscillator transformer for delivering power to a rectifier filter system. The frequency of operation under load is about 400 cycles per second. The unit is self-protecting as any short on the output side causes oscillations to cease resulting in loss of operation. The characteristics of the 2D11 are as follows: It delivers 500 volts *dc* at 150 *ma* and 250 volts at 80 *ma* simultaneously. For detailed details merely circle D on page 126 and all will be taken care of.

Spot Tuning Your Transmitter in 11 Seconds

Frank A. Mohler, W2IAZ
187 Broad St.
Eatontown, New Jersey
Training Officer
Fort Monmouth, N. J.

How quickly can you bandhop and QSY to any frequency from 3 to 30 mc? Would you like to do it within a few seconds? Although instantaneous QSY is just a little beyond the present state of the art, the author describes a dual antenna system which permits him to hop from band to band and spot tune his transmitter to a desired frequency in less than 11 seconds.

Maybe it isn't too important to have a transmitter that is as fast on the QSY as a western two-gun draw. But when you are armed with the quiet confidence that your rig can zero-in on any CQ being called on the 80, 40, 20, 15, or 10 meter bands, you can be sure that your pleasure in operating will increase fivefold. This is especially true when the CQ-caller happens to be an old friend you haven't talked to in a long "distance" or maybe an elusive station you need for WAS or WAC. Whatever the case may be, the technique described in this article will permit you to spot tune your transmitter and answer the CQ in about 10 seconds.

If you have a modern bandswitching receiver, you know from experience that you can tune it to any spot frequency from 3 to 30 *mc* in about *five seconds*. But what about your transmitter? If you can spot tune and transmit on any frequency from 3 to 30 *mc* in less than 15 seconds, you can consider yourself to be a charter member of a very exclusive QSY fraternity (or sorority). The average operator, even when using a modern bandswitching transmitter, is not capable of even a *sixty second* QSY because he handicaps himself with an antenna system which is as old-fashioned as button shoes . . . and it is interesting to note that it takes just about as long before you can get going with either.

In my attempt to modernize the antenna system and make it as versatile as its associated bandswitching receiver and transmitter, I tried out a variety of antenna systems. A condensed report of my findings was based on the following criteria:

1. **All band operation.** If the receiver and

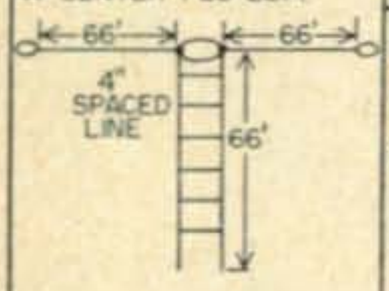
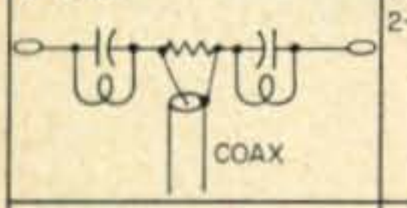
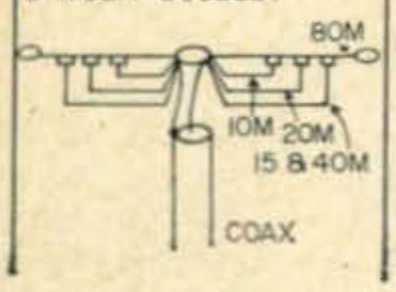
	ADVANTAGES	DISADVANTAGES
A- CENTER FED ZEPP 	1- ALL BAND 2- BROAD BAND 3- EFFICIENT	1- REQUIRES TUNING 2- SEPARATE COILS FOR EACH BAND 3- LARGE SIZED TUNING CAPACITOR 4- SLOW ON QSY
B- WINDOM 	1- ALL BAND 2- NEAT, COMPACT	1- NOT BROADBAND 2- INEFFICIENT ON 20, 15, 10 METERS
C- TRAP 	1- ALL BAND 2- NEAT, COMPACT	1- NOT BROADBAND 2- INEFFICIENT ON 20, 15, 10 METERS
D- MULTI- DOUBLET 	1- ALL BAND 2- USE ONE TRANSMISSION LINE	1- NOT BROADBAND 2- FREQUENCY CONSCIOUS 3- NOT TOO EFFICIENT

Fig. 1—Types of All Band Antennas and some of their characteristics.

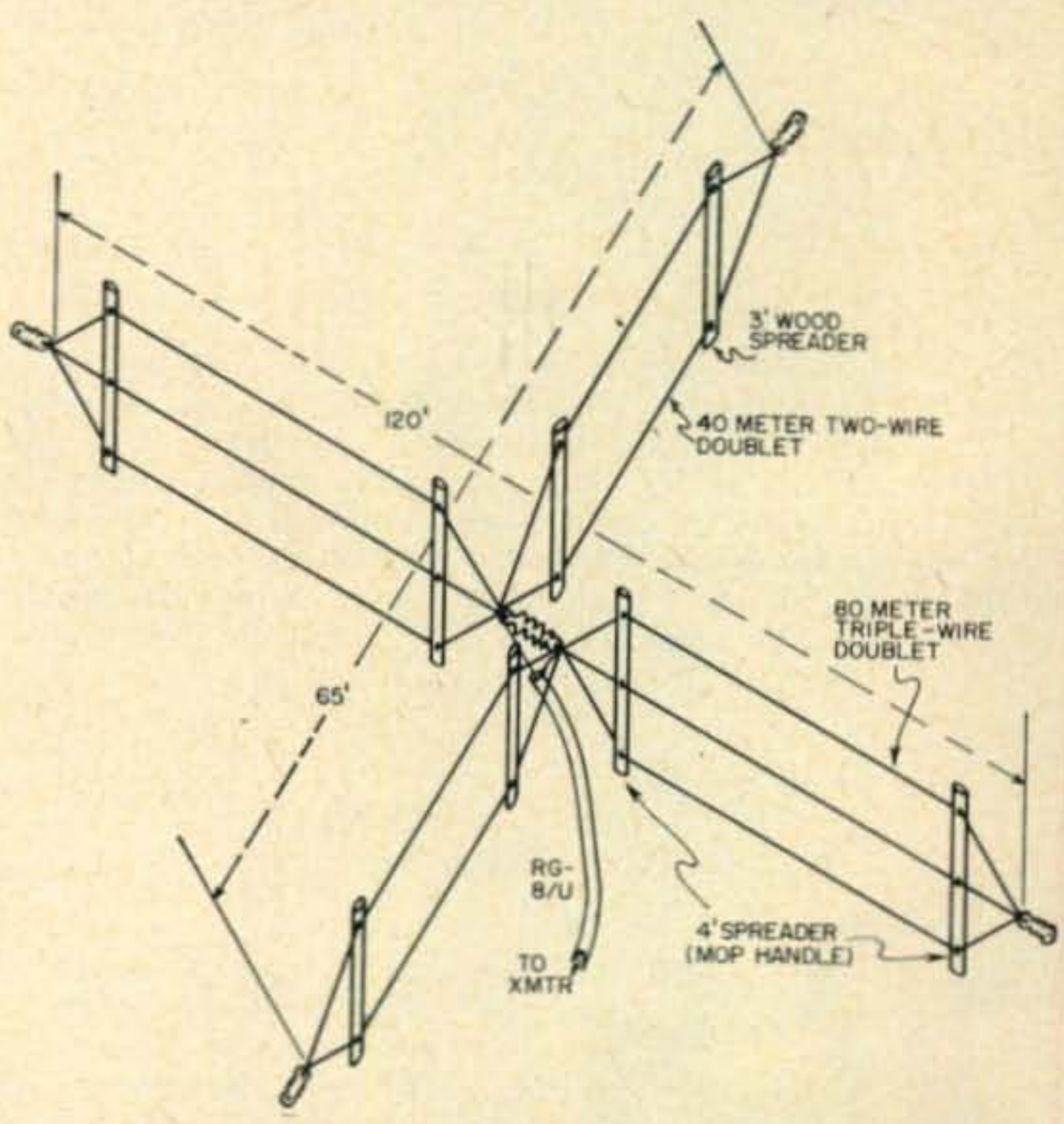


Fig. 2—The 80, 75 and 40 meter section of the dual tri-band antenna system.

transmitter cover all bands, the antenna system should be equally versatile.

2. **Broad-band operation.** The transmitter should be able to operate anywhere within each band, not just on restricted portions.
3. **Efficient.** The transmitter power should be in the radiating part of the antenna system and not wasted in loading coils or high SWR.
4. **Simple and inexpensive.** The operating station should not be cluttered up with balun coils, antenna tuning coils, antenna tuning capacitors, complicated matching adjustments on tapped coils, automatic tracking motors, or other expensive or time-consuming claptrap.

Center-Fed Zepp. Figure 1A shows the dimensions for an efficient, all band, broad-band antenna which provided excellent performance for a number of years at this station. However, proper operation required the use of an antenna tuner. Because separate coils were used for each band and different taps were used for efficient operation at different parts of each band, QSY and band-hopping was a time-consuming chore. For this reason, the old faithful Zepp was pulled down and some of the more modern all-banders were tried.

Windom All-Bander. Figure 1B illustrates the arrangement of this all band antenna which was used at this station for a few months. It is my unhappy conclusion that this antenna system offers simplicity and economy of construction but little else. If you don't believe me, try it and then join the chorus in, "I'm using an all-band Windom antenna, but frankly, it is miserable on the 20, 15, and 10 meter bands." Although I managed to make contacts on all bands with the Windom, the *swr* meter indicated that efficiency was pretty low. As a matter of fact, on some of the higher frequencies it took a nightclubber's experienced eye to tune the transmitter for minimum smoke!

Trap All Bander. This antenna (fig. 1C) provided all band operation with a single coaxial transmission line. However, the antenna is frequency conscious and satisfactory operation was limited to a narrow range of frequencies in each band. Since I was looking for efficient, *broad*-band operation, the narrow band response was as serious as being "rock bound" to a few crystal frequencies.

Multi-Doublet. The operating characteristics of the multi-doublet (figure 1D) were similar to the Trap All-Bander. The multi-doublet permitted all-band operation on about 20 to 50% of the total range in each band. Although this was a definite improvement over the Trap All-Bander, it still was not completely satisfactory. Subsequent tests, which involved variations in the design, disclosed that the bandwidth increased as the doublet wires were spaced farther apart. Optimum bandwidth was achieved when the doublets were arranged at right angles to each other. Since it was geometrically impossible to arrange five doublets (for 80, 40, 20, 15, and 10 meters) at mutual right angles to each other, I used the multi-doublet idea to obtain Tri-band operation on 20, 15, and 10 meters. A separate multi-doublet provided operation on 80, 75, and 40 meters (fig. 2).

Broadband Tri-Bander For 20, 15, and 10 Meters.

Figure 3 illustrates the arrangement of this efficient, broad-band antenna system which comprises a doublet on 15 meters, a doublet on 20 meters, and a drooping ground plane for 10 meters. Before connecting all three antennas to the line as shown, each radiator was first connected to the coax line by itself and tested for *swr*. The lengths of the 15 and 20 meter doublets were clipped to produce minimum *swr* at the midpoints of each band. On the extreme ends of these bands, the *swr* remains within 2 to 1. After adjusting the length of the 10 meter ground plane for minimum *swr* at the mid-range frequency of 29.1 *mc*, it was necessary to lower the angle of the ground plane radials about 30 degrees from the horizontal plane. The *swr* then was 1 to 1 and remained within 2 to 1 throughout the range 28.5 to 29.7 *mc*. After the separately adjusted antennas were connected together for tri-band operation with the same coax transmission line, an *swr* check indicated no noticeable changes. This is probably due to the fact that the radiating elements are at mutual right angles to each other and interaction is minimized.

[*Continued on page 98*]

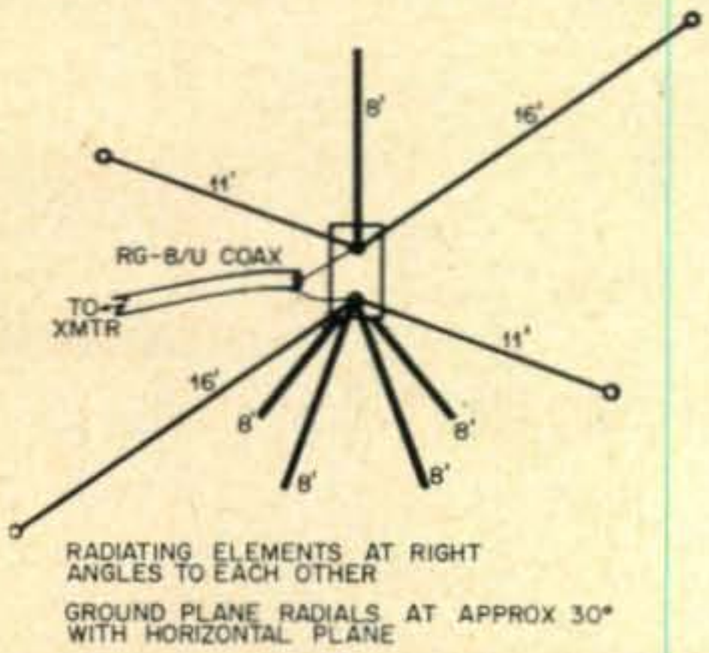


Fig. 3—The 20, 15 and 10 meter section of the dual tri-band antenna system.

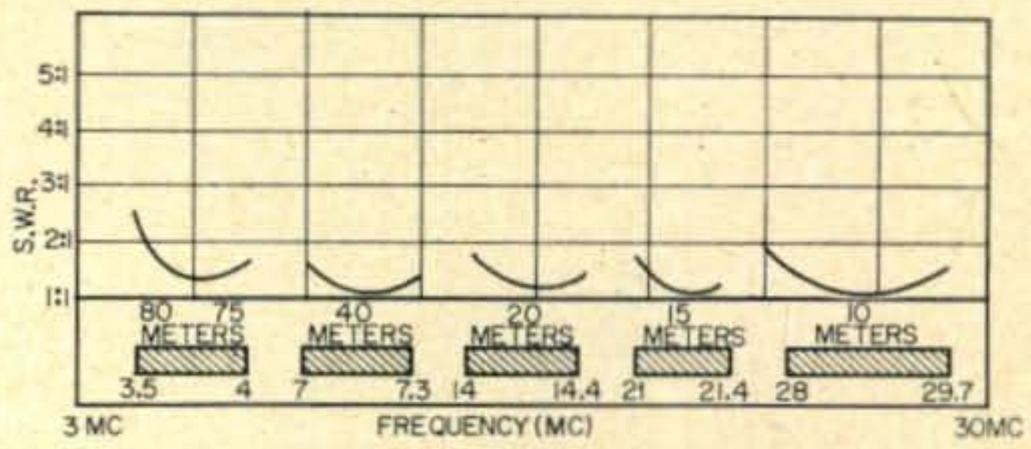
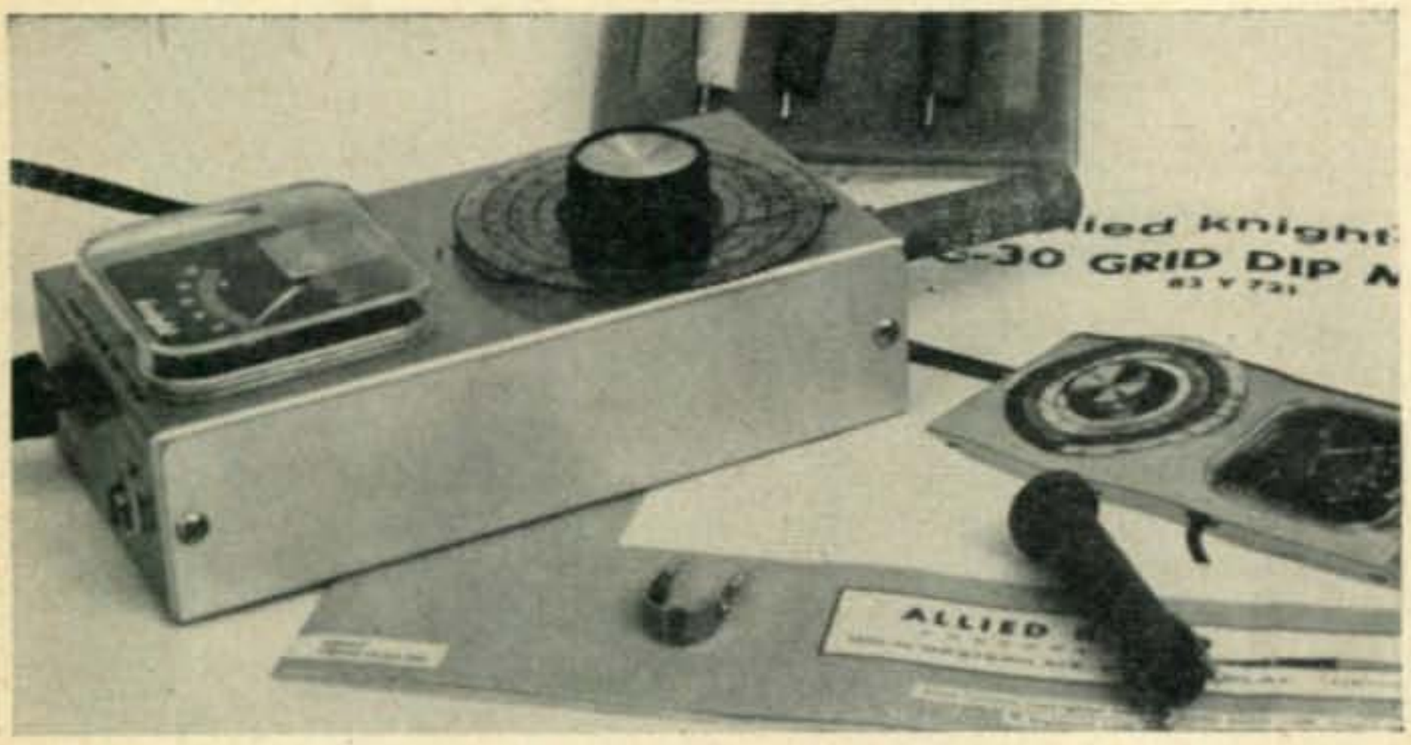


Fig. 4—SWR curves for the broadband antenna system shown in fig. 2.

CQ Tests The Knight—Kit Grid Dip Meter



The completed Knight-Kit G-30 grid dip meter. The coils are stored in a handy clear plastic case.

Donald L. Stoner, W6TNS
P. O. Box 137
Ontario, California

Grid dip meters are pretty much alike—they are used to indicate a resonant circuit. However, when a "dipper" with the features of the Allied Knight-Kit G-30 comes along (and for less than 23 dollars) that's news!

Anyone who already owns a "dipper" and who knows how to get the most out of it will heartily agree that they're mighty handy to have around. They save lots of time and take the guesswork out of such jobs as adjusting wave traps, winding transmitter and receiver coils, pruning antennas, tracking down parasitics, and even work out fine as *rf* signal generators.

The schematic of the Knight-Kit dipper is shown in fig. 1. A *uhf* triode, type 6AF4A, is

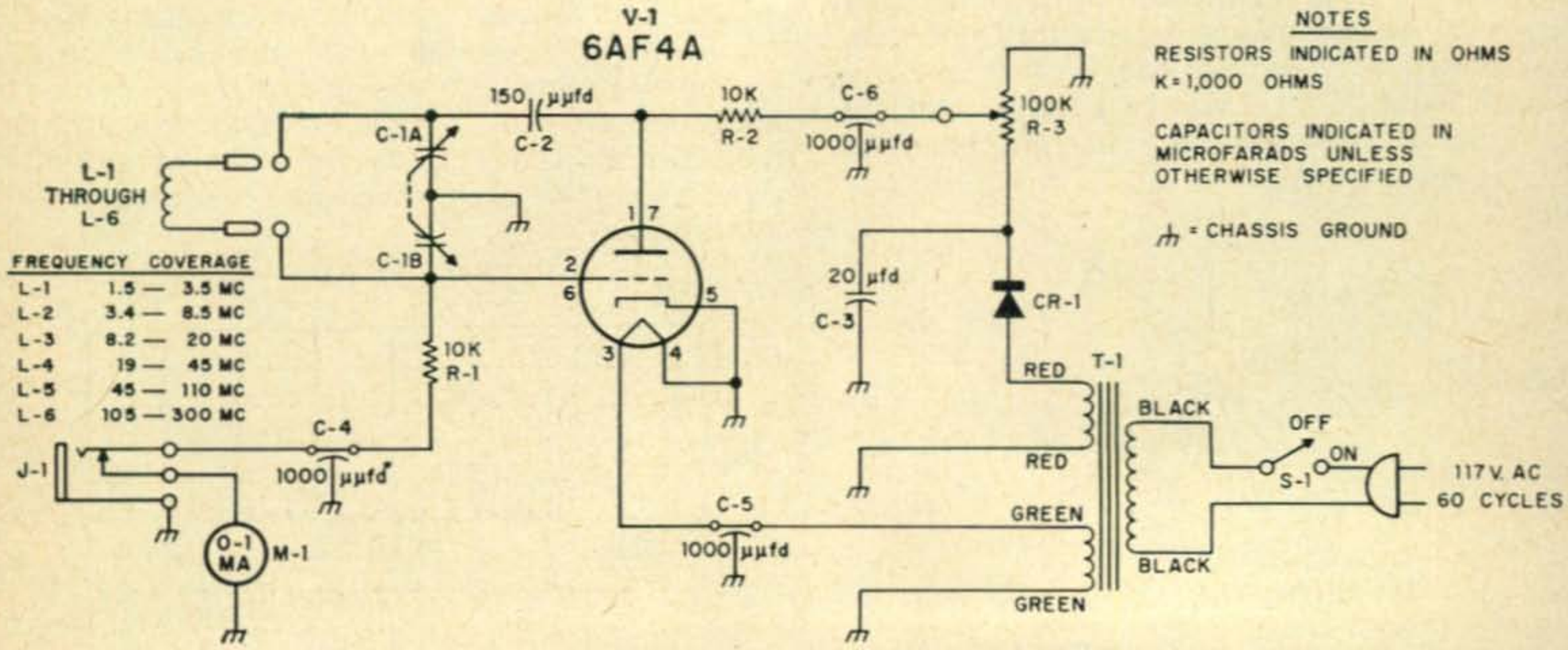


Fig. 1—Schematic diagram of the Knight-Kit G-30 grid dip meter.

used in an ultra-audion oscillator circuit. Each coil is *artificially* centertapped by using a split stator capacitor (C1) and the coil has opposite phases at each end. Energy appearing at the grid is amplified (and inverted in phase by 180°) in the tube and coupled to the tuned circuit. The phase of the *rf* is again inverted and presented to the grid for additional amplification. Connected in this manner the circuit oscillates and the tube draws grid current. The current which flows through R1, C4 and J1 is measured by M1, a O-1 *ma* meter. Power for the oscillator is supplied by T1 and a half-wave rectifier. Potentiometer R3 controls the strength of the oscillation and consequently the grid current reading. Resistors R1 and R2 act as "non-resonant" *rf* chokes, passing *dc* but blocking *rf*. Capacitor C2 prevents the high voltage from reaching the coil (eliminating the shock hazard) but allows the *rf* to pass. Feedthrough capacitors C4, C5 and C6 prevent any spurious resonances caused by circuits associated with the oscillator.

Operation

The grid dip meter works in the following manner: The correct coil is coupled to the resonant circuit and the dial is slowly rotated. When the oscillator frequency is the same as the resonant frequency of the tuned circuit, energy is removed from the oscillator. This causes the strength of the oscillator to drop and reduces the grid current reading. The meter, therefore, takes a pronounced "dip" when the oscillator is tuned past the coil resonant frequency.

Technically speaking, the Knight-Kit grid dip meter covers the range of 1.5 to 300 *mc* with six color coded coils. This dial is also color coded, making the selection of coils easy.

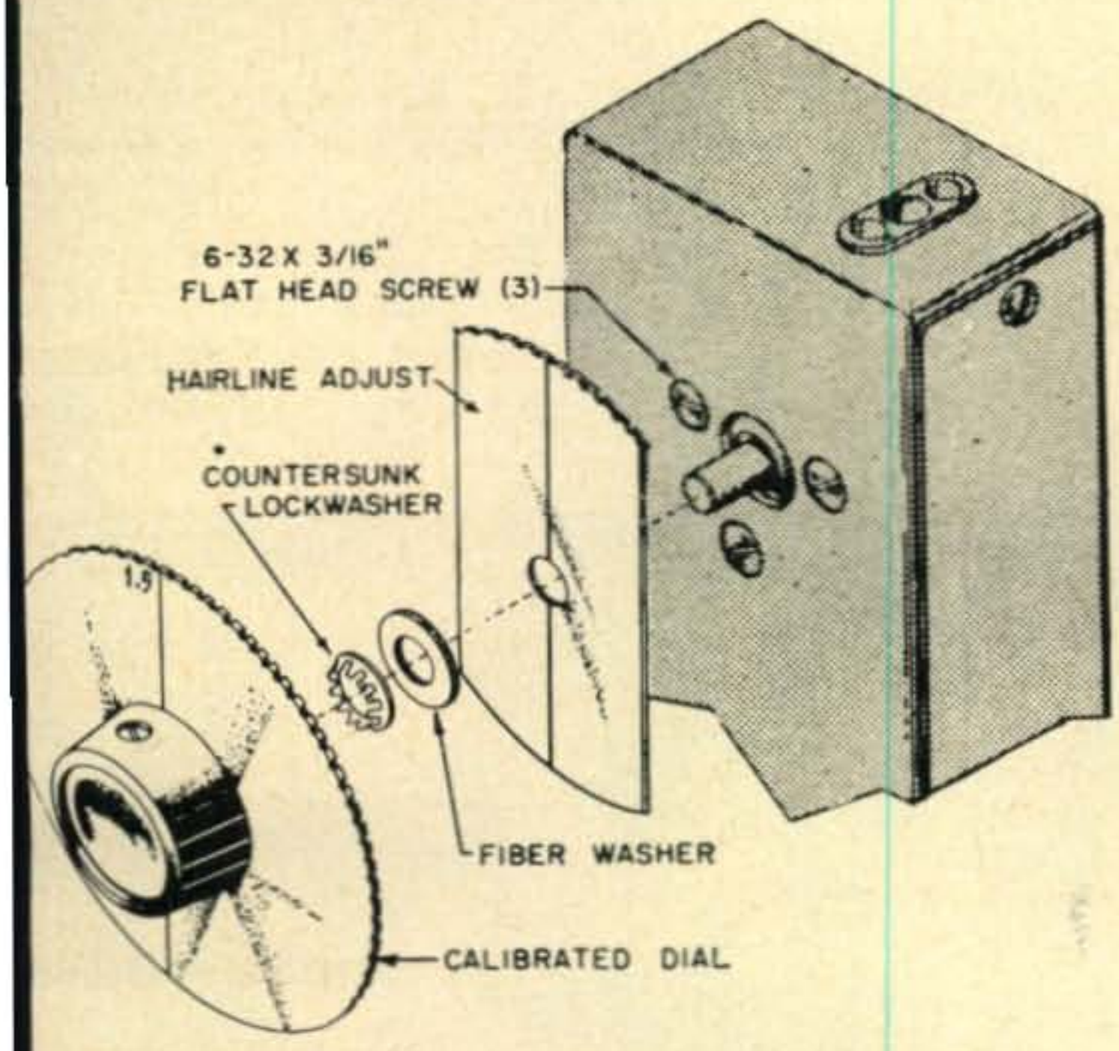


Fig. 2—An instruction manual drawing showing the dial assembly. The manual also shows a chart for using the dipper to determine the value of unknown coils and capacitors.

Particularly intriguing is the adjustable hairline below the knob. If you want to use the dipper as a signal generator (or extremely accurate frequency readings) beat the oscillator against a known frequency and correct the dial reading with the adjustable hairline. The dial calibration is quite accurate and this correction will hold over the entire range. The dipper (as a signal generator) can be modulated by plugging an audio oscillator into the phone jack.

Another impressive feature is the use of a crystal socket for the coils. This socket takes a great deal of punishment but the type used should last for a long time. The pins are readily available and can be easily replaced in the event of a failure. The dipper can also be used as a crystal oscillator simply by plugging a suitable crystal into the socket. War surplus FT-241 and 243 types work nicely and plated overtone crystals oscillate on their fundamental with ease.

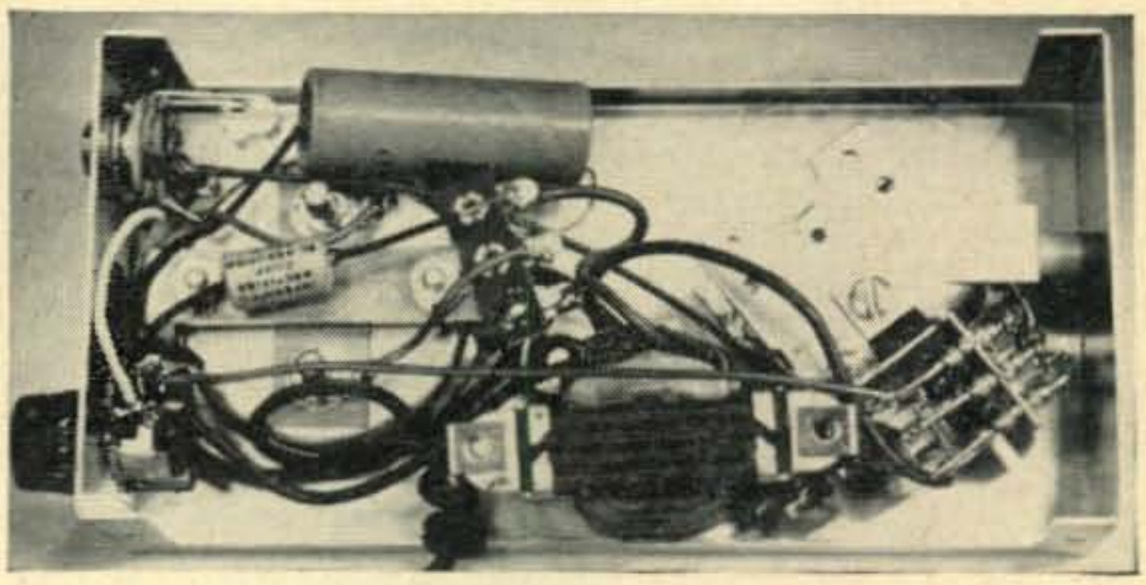
The Knight-Kit meter can be used as an absorption meter by turning the potentiometer *CCW* until the meter reads zero. Under these conditions the tube acts as a diode rectifier and the meter reads detected *rf*. By coupling a resonant antenna to the coil you can detect radiated *rf* for great distances. A headphone jack allows you to monitor the signal if it is amplitude modulated.

Construction

Construction is easy. The manual is clear, as always, and the use of precut wires brings the construction time down to less than 2 hours. If it doesn't work the first time you test it, then you weren't paying attention to the instructions!

The dipper fits nicely in the hand and the dial is constructed in such a manner so that it can be adjusted with the thumb, leaving the other hand free for circuit adjustment.

If you have been considering the purchase of a grid dip meter, we recommend you consider the Allied G-30 Knight-Kit. At $22.95 it is a top bargain! ■



Interior view of the Allied's Knight-Kit "dipper". The oscillator section is a subassembly, and is shown at the right side of the photograph. Note the three feedthrough capacitors. The transformer is secured to the bottom of the case (removed in this view).

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

DX DX DX DX DX DX DX DX

The following certificates were issued between December 15th and January 15th, 1959 and 1960 respectively.

WAZ

1255	VE5JV	Allan Chesworth
1256	GM3LYS	Duncan A. McCansh
1257	OZ4RT	J. Arnvig
1258	W9ERU	Eugene A. Hubbell
1259	G2CNW	F. Robathan
1260	OZ3GW	Hans Jungdal
1261	W6MUM	John Franklin
1262	DL6GP	Erich Marquardt
1263	HB9DB	Albert E. Guldimann
1264	SM6AMR	Lage Edebrink
1265	W2DOD	Elmer Grabb
1266	K6LGF	Arthur L. Friedman
1267	WØSMV	Dale E. Russell
1268	W9RQM	Reno W. Goetsch
1269	K7GIE	C. H. Dockhorn

ALL-PHONE WAZ

48	OK2AG	Antonin Hezucky
49	W4DQH	Claude W. Bass

CW WPX

84	Robert G. Wilson	W3GHD
85	Frank Koval	W8RSW
86	Harry D. Gray	VE3CIO
87	Raymond J. Bayer	W9QGR

PHONE WPX

11 Henny P. J. Bouwma PAØHBO

Unfortunately, the WPX box scores canno be listed each month due to limited space, how ever, we'll try to list is as soon as possible.

Letters

The following very interesting letter was re ceived from Mal, ZE3JO, describing his recen expedition to Nyasaland.

"Having already operated as VQ1, 3 an 4JO, plus a short spell as ZE3JO/VQ2, th writer decided on another trip this July t Nyasaland. Ivan Wood (ZE3JJ) and Well Buxton (ZE8JJ) were invited to join me, an thus arrangements were made to travel by ca from Salisbury, the home QTH, to Zomba Nyasaland, via Tete and over the Zambesi River in Portuguese East Africa, (CR7).

The following equipment was taken (whic was enough considering the three operators i a fairly small car)—a Panda Cub which cover 160 to 10 metres, either phone or CW wit about 30/40 watts, the B2 transceiver (o VQ1JO memories), and an Eddystone Triple receiver of 3JJ. Wells supplied the car, a Frenc Renault Dauphine.

We left Salisbury on the Saturday afternoo of 25th July, intending to make Zomba abou lunch time the following day, approximatel 425 miles away. We had not, however, cor

Victor on the left and Bob, a father and son team, jointly own and operate HH2V in Port-au-Prince. Victor is the General Secretary of the Radio Club of Haiti.

sidered the Customs and upon arrival close to the Rhodesian/Portuguese border, we found that they were closed until 6 am the next morning, which necessitated some considerable delay with a night stop at Mtoko in Rhodesia. At dawn on the Sunday, we left and without any major complications, arrived at our destination at the Zomba hotel, where accommodations had been reserved by ZD6NJ (who is, incidently, the Postmaster for that town and who assisted us to the extent of even putting up an antenna, and later loaned a ground plane), at 8 p.m.

About 11 pm that evening, the first calls under the prefix of ZD6 were sent out and several stations were contacted until the band closed up, when after a "noggin" or two, we went to bed. The next day the rigs were transferred to a garage at the back of the hotel, which caused some amazement to the local African population, who were not quite sure as to what was going on. Here we were able to operate two rigs at the same time on 14 *mc*. That evening one of the local hams invited Wells to operate from his own station which was fortunately situated well away from the Zomba plateau, and during the short visit, he knocked off about 600 contacts. Ivan and I continued at the hotel with the two low-power rigs and found that twenty metres was the best bet by working the W's over the long path, well away from the mountain. It was here that a pile up ensured especially when the three stations using the calls ZE3JJ/ZD6, ZE8JJ/ZD6 and ZE3JO/ZD6 were on the same band at the same time. In fact the similarity of calls was confusing at times when a fellow who had just worked 3JJ tuned around the band and heard either 8JJ or 3JO, and must have wondered whether his own CW was at fault!

Operation continued for four days and five nights with Wells with 600 contacts, and Ivan and I 300, mostly on CW but with the odd phone QSO with the locals and ZE gang on forty metres. On the following Friday, we were obliged to leave Zomba and return to Salisbury. Here we experienced the worst part of the whole trip. The roads seemed to have gotten more dusty, more corrugated, than our outward trip; then a puncture near Tete in subtropical heat; brakes failing except the hand brake, and to crown it all, the lights let us down completely unless we engaged in second gear, which kept them going with sufficient light to see what we really thought we might hit at any moment! The last 150 miles made us realize that perhaps we were trying to do too much in a short time, with bad roads, a small car, plus three reasonably heavy hams to cope with. Despite all these troubles we did creep into Salisbury at 4:30 am on the Saturday morning, where the writer had to be at work at 8 am and Wells at mid-day.

Another trip is contemplated early next year when more operating is looked forward to in either ZS7 or 8, and possibly a week on the return journey in ZS9. Whether or not SSB is

The overwriting speaks for itself. This picture was taken by ZE3JO without the benefit of telephoto lens. Bucking 20 meter pile ups sure makes one brave.

Jose, LU8CW/LU2ZY (S. Sandwich), Ernesto, LUØAV/MM, and Juan, EA2CA/PX1DE/EA9DE on board the yacht "Gaucho" in San Sebastian, Spain. (Tnx W1WY)

This impressive looking group is: Ruth and her OM, W2KUW, Dot and her spouse W2BXA, EA2CQ and EA2CA. Snapped during Juan's and Paula's visit to W2BXA's shack.

used remains to be seen, but it is certain that larger means of transport will be used, possibly of the "Safari" type.

Regarding conditions, they appear to be similar to those in Rhodesia, and despite low power it is still possible to have numerous contacts, with the added help, of course, of the stroke ZD6.

From what we saw of Nyasaland, it appears to be pleasant country, with little difference in landscape to that of parts of S. Rhodesia, with the exception of the beautiful Melanje Mountain area. Owing to the distances and the absence of time, we were unable to see the best part of the country around Lake Nyasa.

For those of your readers who might have contacted me on the three DXpeditions that I have made over the past three years, I would point out that I am a person with limited means, and the following gives some idea of what it has cost me in actual cash:—

VQ1JO (Zanzibar) — approximately 100 pounds for a five-week trip.

VQ2/3/4JO (East Africa)—75 pounds for a five-week trip.

ZE3JO/ZD6 (Nyasaland)—15 pounds for a one-week trip.

In conclusion full acknowledgment must be given to Norman Kloka (ZD6NJ), who made the trip possible."

In a letter from W6KUF, Joe advises he is operating /MM on board the aircraft carrier U.S.S. Yorktown with a KWM-2 with a trap traveller dipole mounted 115 feet above the waterline. Joe said the 41,000 ton ground plane helps a lot. The station will be operated 24 hours a day. QSL to Chief Warrant Officer, J. E. Serpa, U.S.N., U.S.S. Yorktown (CVS10), c/o F.P.O., San Francisco, California.

AC4 Tibet—AC4AX received the instruction book for his BC610 that was furnished by W6YY and now awaits permission to get on the air. (Tnx W6YY)

AC5 Bhutan—W6YY is awaiting a Bhutanese government transportation order to air freight a SSB transmitter and receiver, which is being furnished by Hallicrafters, to the King of Bhutan. (Tnx W6YY)

HL Korea—HL9KR has been very active on 20 meters using a KWS-1 around 1500 GMT. He is WØCQK. His mail QTH is: John Derrick, 1246 AACS, A.P.O. 970, c/o PM, San Francisco, California. (Tnx W2DOD)

LA/P Jan Mayen—Kjell, LA3SG/P, continues active on CW and SSB. VE7ZM is now his QSL manager for North and South America and LA6VC is his QSL manager for the rest of the world. (Tnx W6YY)

TA Turkey—A station signing TA1AD has been operating on 14318 *kc* SSB around 1900 GMT. (Tnx WVDXC)

VKØ MacQuarie Island—Clive, VKØCC is now QRT leaving without any activity. Ray, VK4FJ, will be able to help with any outstanding QSL's. (Tnx Adrain Fallert)

VR1 Gilbert Islands—Ted Henry is furnishing VR1B with a SSB rig; he should have it by now. Chas, who is ex VKØAB, would like to go to another rare spot but his new wife says, "NO". They expect to return to Australia in about one year. (Tnx W6KG and WGDXC)

VS4 Sarawak—Chang, VS4FC, is on 14010 *kc* each day about 1430 GMT calling CQ "W". The least we can do is help Chang out, hi. (Tnx W3FGB)

4S7 Ceylon—W6PHF advises that the 4S7NG QTH listed last month is incorrect. The word Gampaka should be deleted.

9N1 Nepal—Glenn, 9N1GW, who is ex W2CBD, continues active on 20 meter SSB. The first batch of his QSL's went out in the middle of January. Ralph, W1CJ/3 left for Nepal on January 14th. He should be on now as 9N1CJ using a 6 element beam. Send your cards for 9N1GW to P.O. Box 9136, Washington, D. C. (Tnx W6YY)

Expeditions

KS4AZ will be active during the period from about Feb. 16 through Feb. 23, 1960. Exact dates of operation may differ slightly as the result of uncertain transportation schedules.

Operators will be the following Potomac Valley Radio Club members:

Ralph Ladd, W3KA (orig. KS4AZ op.)
Dick Buchholz, W4JNE
Vic Clark, W4KFC

Objectives are (1) to activate a seldom heard prefix for the first weekend of the ARRL CW DX Test and (2) to provide those who have not worked Swan Island, particularly non-W/K hams, a chance to log a KS4 QSO.

Contacts will be limited to W/VE/KL7/KH6 stations during the ARRL DX test period on Feb. 20-21, while the balance of the time on the island will be devoted to DX work, insofar as possible.

Operation will be on all bands from 10 through 80 meters, phone (AM and SSB) and CW. DX stations should watch these frequencies:

CW	AM phone	SSB
3507 kc	——	——
7007	7250 kc	7205
14,040	14,240	14,295
21,040	21,325	21,410
28,040	28,750	28,650

All QSL's received with self-addressed stamped envelope (W) or IRC (DX) will be answered direct. List time in *GMT*.

QSL's go to: Ralph Ladd, W3KA, 1040 Insley Street, Silver Spring, Maryland.

160 Meters

DX Countries Worked Records W1BB is compiling a tabulated list of DX worked on 160 and requests all DXers—who do not consider the information confidential—to send i

their list for tabulation. Number of countries QSO'd and QSL'd—also continents worked/ QSL'd—and the call letters of the station worked.

Second Regularly Scheduled "TEST" Dec. 20th was puzzling!! Opened with low noise level, WWV sending N5 and indications of excellent DX. HOWEVER, and this is the puzzle, DX to the West was VERY good with W6s, LN, KIP, K6ZH, HXT and W5SOT rolling through for over two hours as QSB/RST 339-597X peaks. Never before have the 6s come through so loud for so long, W9PNE confirms these conditions/W2EQS also, but Europeans did not come through so well. Nevertheless, congratulations go again to Shely, W3RGO, for snagging G5JU on a short but difficult contact. Charlie, W2EQS, heard G5JU and DL1FF/ Armin—G5JU worked W3RGQ and heard W8 ANO. W1BB was heard regularly at Gibraltar all periods 229/339. G5JU/DL1FF averaged 229. One plausible explanation why DX was so excellent 3000 miles to the West, and so much poorer 3000 miles to the East may be the big difference in power between W6s and Europeans, at any rate, it is encouraged that the band IS showing signs of a good opening to come. Many W6 QSOs were had. W1BB was real thrilled to make two new ones, with K6HXT/RO, who came home from dance and found band "HOT." W1BB was loudly calling CQ and K6ZH, Herbert Hoover Jr. was another surprise with fine signal and A-1 operator behind the key. Also QSO with another staunch 160 meter man, W5SOT. The happiest part of this test was the lift it gave all hands to know that "THE GOOD OLD DAYS," when every now and then, 160 would crack wide open for DX have NOT gone forever—the day will come when Europeans and other DX will be there in numbers too . . . Incidentally, "Marker" stations, 1827 *kc* WICK Radio/North Scotland & Folkstone—1834 *kc*, NITON and Thyboroem, ship shores stations, with considerable power were not coming through too well—while as I say W6s were extra FB—explanation???? (Tnx W1BB)

QSL Managers I have had several letters from QSL managers saying that fellows asking for cards quite frequently are not enclosing SASE. These fellows are giving a lot of their time to help you out; the least you can do is furnish them with the postage to return the card.

While on the subject of QSL managers, I have had offers from quite a few persons who would like to help DX stations with their QSL problem. Any DX station who could use help with QSL's please let me know, and I will have the interested parties get in touch with you.

Certificates

Worked United Nations Award

Award certificates are issued in four classes:

Class 1 70 countries
Class 2 55 countries
Class 3 40 countries

Countries contacted must be nations having membership in the United Nations at the time the QSO was made. The countries that now have membership in the UN are listed below. Nations not on this list will automatically become eligible on becoming members of the UN.

An alphabetical list of countries and calls is required with application. Keep a duplicate list for yourself so that the issuance of further awards will be simplified. QSLs are required and will be returned when submitted. While the applicant must possess confirmation for each QSO, said QSLs do not have to be sent. A statement signed by two members of DXCC that the applicant has the necessary confirmations in hand will be accepted in lieu of sending the cards themselves.

Each certificate is printed on different tinted paper. The certificates are printed in three colors. The size is 8½ by 11 (212mm x 274 mm).

The following countries may be worked for this award. The date indicates the beginning date for which credit will be allowed. This date is the year that country joined the United Nations.

Afghanistan	1946	Italy	1955
Albania	1955	Japan	1956
Argentina	1945	Jordan	1955
Australia	1945	Laos	1955
Austria	1955	Lebanon	1945
Belgium	1945	Liberia	1945
Bolivia	1945	Libya	1955
Brazil	1945	Luxemburg	1945
Bulgaria	1955	Malaya	1957
Burma	1948	Mexico	1945
Byloerussia (UC2)	1945	Morocco	1956
Cambodia	1955	Nepal	1955
Canada	1945	Netherlands	1945
Ceylon	1955	New Zealand	1945
Chile	1945	Nicaragua	1945
China (nationalist)	1945	Norway	1945
Columbia	1945	Pakistan	1947
Costa Rica	1945	Panama	1945
Cuba	1945	Paraguay	1945
Czechoslovakia	1945	Peru	1945
Denmark	1945	Philippines	1945
Dom. Repub.	1945	Poland	1945
Ecuador	1945	Portugal	1955
Egypt	1945	Romania	1955
El Salvador	1945	Saudi Arabia	1945
Ethiopia	1945	Spain	1955
Finland	1955	Sudan	1956
France	1945	Sweden	1946
Ghana	1956	Syria	1945
Greece	1945	Thailand	1946
Guatemala	1945	Tunisia	1946
Haiti	1945	Turkey	1945
Honduras	1945	Ukrainia	1945
Hungary	1955	Un. So. Africa	1945
Iceland	1946	USSR	1945
India	1945	United King.	1945
Indonesia	1950	USA	1945
Iran	1945	Uruguay	1945
Iraq	1945	Venezuela	1945
Ireland	1955	Yemen	1947
Israel	1949	Yugoslavia	1945

Fee for each certificate $1.00 or 7 IRC.

Send cards or list to Tom Harmon, WØIUB, 5019 Gramar, Wichita 18, Kansas.

[*Continued on page 100*]

Novice

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

I wonder how many Novices, after erecting a new antenna, bother to check its performance with instruments. The usual procedure is to go on the air right away. If the ratio of answers to CQ's is high, the antenna is judged satisfactory. If Neal Novice has to thump away for hours before contacting a ham in the next subdivision, then the antenna is a failure.

Not very scientific, to say the least! And yet with a simple, inexpensive device called an

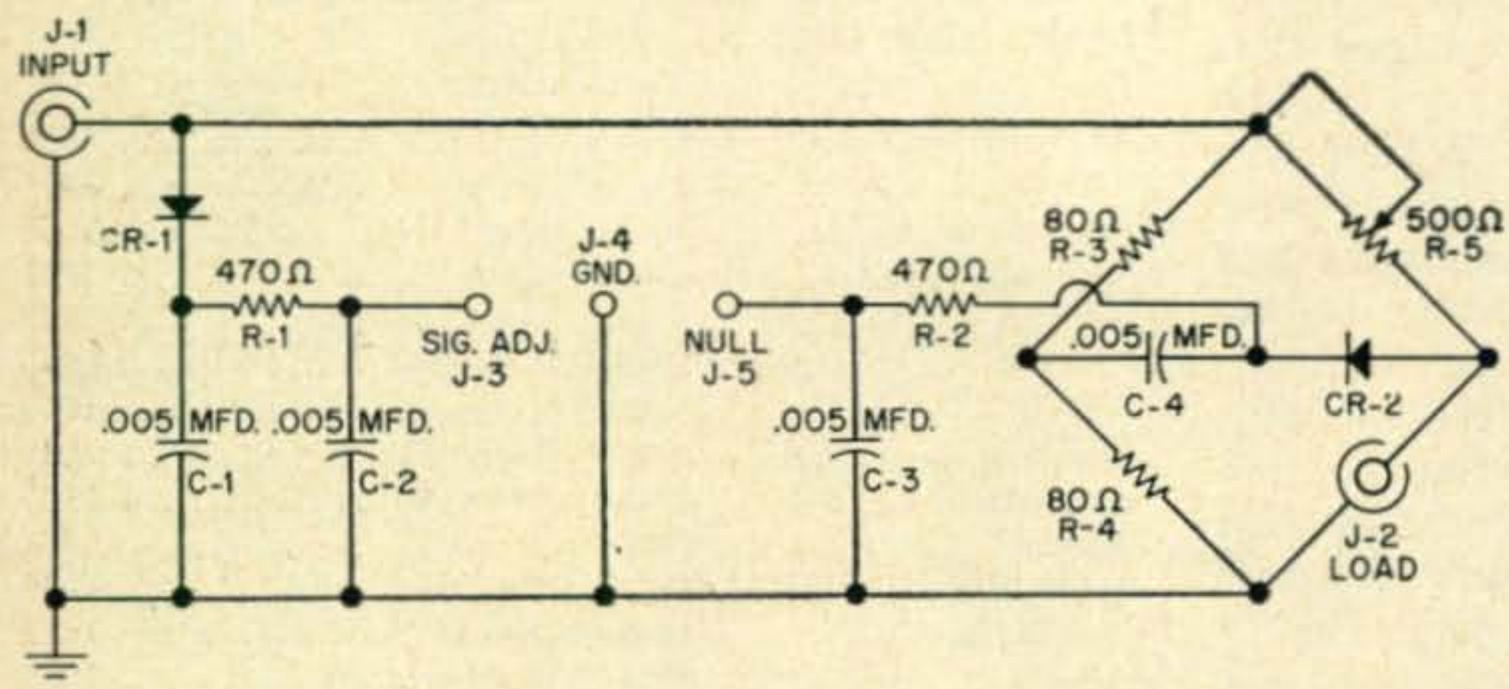


Fig. 1—Schematic of the Allied Knight-Kit RF Z-Bridge.

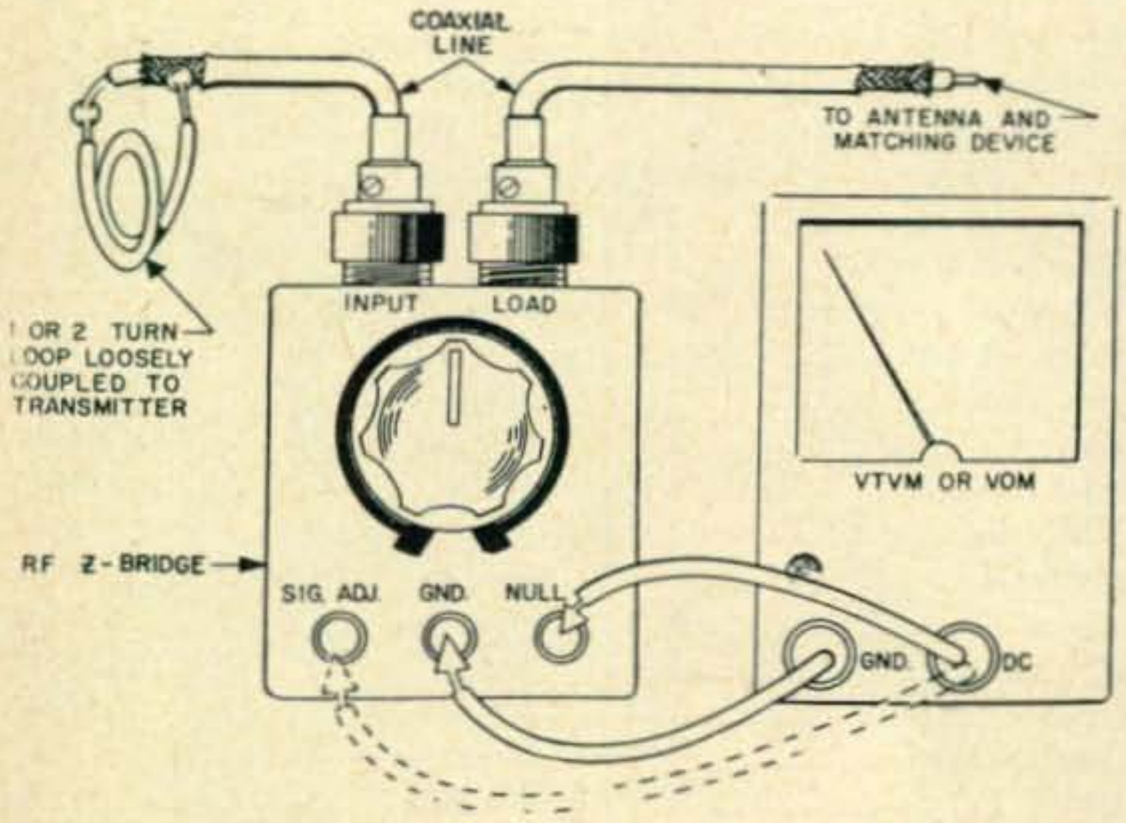


Fig. 2—Typical connections for testing antennas and couplers.

The Knight R.F. Z-Bridge may be used to check antenna performance or tune antennas and couplers. →

impedance bridge it is possible to evaluate antenna performance accurately.

The text books tell us several important things about antennas. First, we know that for best performance, the power sent up the transmission line should be radiated by the antenna and not reflected back to the transmitter. When these reflections occur *standing waves* appear on the transmission line. We also know that if the antenna is resonant at the operating frequency, and matches the transmission line, a minimum amount of power will be reflected to the transmitter. The RF Z-Bridge will tell when these conditions do, or do not, exist.

Let's examine a typical RF Z-Bridge, such as the Allied Knight-Kit, to see how it works and how it is used. The *rf* circuit (fig. 1) consists of a simple resistance bridge and a diode detector. The resistors R3, R4, R5, and the load make up the bridge circuit. R3 and R4 are equal in value. If you assume a voltage at the junction of R3 and R5, Ohms Law will show you that if the load (the antenna and transmission line) is equal to the setting of R5, there will be no voltage applied to CR2, and no output voltage at jack J5. By the same token, if you vary potentiometer R5 until the meter (connected to J5) reads zero, then the circuit impedance of the line can be read on the R5 dial. If the meter dips to a minimum reading, but does not go to zero, it indicates standing waves are on the line. A chart, which accompanies the bridge, may be used to determine the *standing wave ratio* from the meter reading.

The *rf* rectifier circuit composed of CR-1, R1, C1, and C2 is used for calibration purposes.

To illustrate how to use the Z-Bridge, let's check a 40 meter dipole which is fed with 52 ohm coax. First, connect a dummy load to the transmitter and connect the Z-Bridge as shown in fig. 2 Also connect a 2.5 to 5 volt meter (*vom* or *vtvm*) to the *SIG. ADJ.* jack and adjust the link until the meter reads full scale. This calibrates the Z-Bridge. Then connect the transmission line and rotate the potentiometer until the meter reads minimum. The transmission line impedance (as "seen" by the transmitter) may be read directly from the dial on the Z-Bridge.

If your antenna is "cut" for the operating frequency the meter will drop to almost zero. If not, you can figure the standing wave ratio as explained earlier.

You can also use this handy instrument to determine where your antenna works the best. Check the *swr* at each end of the band. If it is better at the high end, the antenna is too short and vice versa. If convenient, you can modify the antenna length by 6 inches or so and check it again.

The Z-Bridge is also a useful device for adjusting the antenna tuner in a multi-band installation. In this instance, the antenna tuner is adjusted for a minimum standing wave ratio, while maintaining a maximum reading in the forward direction.

Tony Bodo, 4725 Penn. Ave., Gary, Indiana is KN9UEN. According to his letter he operates late late at night and I am inclined to believe him—hi. The transmitter, practically hidden by a flannel curtain, is a Globe Chief 90A. If we can wake him up, you'll find Tony on 40 meters.

Steve Fowler, KN3KLM, 2349 E. Sergeranole, Philadelphia 25, Penn. share the station with his father, KN3KLN. Outside the "shack" is a 15 meter beam Steve is working on, which should increase his WAS of 18/7 and bring up the DX record. Steve would like to work some W6 stations.

Dennis Cox, KNØSHU, North Loup, Nebraska, has added an NC-125 since this shot was taken. The gear is set up exclusively on 15 meters where he searches for that elusive DX. His best contact so far is Scotland.

Certificate for Novices

The Kansas Radio Club, 5019 Gramar, Wichita, Kansas, is awarding certificates for working stations in this state. To earn the award shown, you must work 10 Novices, 2 DX stations, 15 Kansas stations, and 7 stations in other U.S. areas. A fee of 50 cents (or four IRC's) is required, along with the necessary QSL cards.

For more information on the other Kansas awards drop a SASE to the above address. P.S. Only three Novice certificates have been awarded so far!

Converter

A snappy looking little six meter converter is sold by NAFCO Electronics, 1125 Highridge Ave., Dayton 20, Ohio. The printed circuit kit (less tube and xtal) is only $7.95. Drop 'em a line for their brochure. (See New Products. Ed.)

Who's DX?

Mike Gervin, K5KOR, 3407 Rusk, Amarillo, Texas, advises the readers he has heard HL9KT (Korea) calling CQ KN/WN on about 21.015 mc. and no one has been returning his call. This station comes in about 0200 GMT at RST 579. GO GO GO!

Signals were not too good into Europe during December, but Tima Propovic, YU1-RS-357, Banat Novo Selo, Yugoslavia, reports hearing the following stations: Dec. 6, between 1554 and 1726 GMT: KN1GPK, JNU, KPS, KTZ, KYR, LNT, LPA, LWS, MBS, MJD, MJI, WV2DPB, DWB, FCB, FJW, GQI, GQX, GRE, GWT, GWV, HGE, HZO, IUP, IVJ, TLP, KN3IWV, JTU, JZV, KN4DPR, FOP, ISV, JPI, JWM/4, NAO, PLR, KN8PCW, PJE, PZX, KN9UFO, KNØTPV. Dec. 13, between 1428 and 1738 GMT: KN1JJU, KDR, LPF, MBH, MJD, WV2DST, DYI, FCR, HJP, HZQ, JCF, NCR, KN3HPG, KN4GNM, HNR, INB, KBZ, LDF, MDB, MPE, PQH, QDR, WV6GXQ, KN7INQ, KN8NHC, OHG, OKD, PMG, PYV, RBB, RNM, KNØJER, TZW, UIC. Dec. 15, 1622 to 1701 GMT: KN1MCL, WV2FBM, FNK, FUB, IPB, KN4JSU, ONT, PVD, KN5WGT (?), KN8RLQ. Dec. 18, 1614 to 1655 GMT: WV2ELP, GWX, HAT, WP4ARX, KN4FUD, JYS, KN5?GT (in QSO with KN4JYS), KN8PMY, KN9TOK. Thanks for the fb list of calls heard in YU land, Tima.

A new correspondent, Gerry Smillie, Officers Mess, RAF, Wynton, Hunts, England, reports reception of the following stations in G-land: Dec. 30, 1350-1637 GMT: KN1MCF, MPM, WV2FJE. Dec. 31, 1807-1849 GMT: KN1MVT, KN3JMP, KN4JPI, QDF, KN8QZT. Jan. 1, 1737 to 1834 GMT: WV2EJS, JAZ, KN4ISV, KN8RMK, KN9QXY, ROL. Jan. 3, 1503 to 1832 GMT: KN1LEY, MJP, MKF, WV2FHU, KEJ, KN4FPA, INB, ORY, QBM, KN8OHG.

A note from Don Kirkman, WA6ENG (SWL-JA1) advises the following Novices their signals penetrated the land of the rising sun. He writes: "What little SWLing I've done here has turned up the following KN-WN's: Oct. 25, 0725 GMT, WV6GOG calling CQ on 7.175, RST 339, at 0756 GMT, the same station working KN5WWC. At 0753 KN7JHB called a long, long, long, loooong CQ on 7.175, RST. On Nov. 28 at 1037 GMT, Don heard WV6FTX calling CQ on 7155, RST 449 . . ." Don uses a 20′ wire inside a steel building and feels the stations he heard are *really* getting out.

Proof of this is from Tom Jones, KR6ZT, OARC, APO 331, c/oPM, San Francisco. He has a good location on Okinawa and rakes in the stations like chips in Las Vegas. Here's his list; stations are RST 569 or better and on 15 meters unless noted otherwise: Nov. 30, 2220 GMT: KN5NQX, WV6GFE, KN7BHN, KN8IGW, PYV. Dec. 1, 2200 GMT: WV2FBY, KN5VTI, WV6BWM, HAO, JCI, KN7GUO, KNØUXM. Dec. 2, 2200 GMT: KN5MJT, TOY, WV6JCI, JGB. Dec. 3, 2200 GMT: WV6GOL, KN7KHN, KN8PRG, KN9RKO, TZS/9. Dec. 5, 0800 GMT on 40 meters: WH6DJE, WV6FZB, IRB, WL7DCC. Dec. 6, 0100 GMT: WV6GMO, IJY, on 15 meters and WV6IEA and GZK on 40 meters. Also on Dec. 6 at 2200 GMT: KN5TOY, WV6ECG, IVM, KN7IZJ. Dec. 7, 2200 GMT: WV6FYR, JFB, HBZ, KNØTCZ. Dec. 8, 2200 GMT: KN5URC, WV6HUA, IVP, JFS, KN7JTO. Dec. 13, 0001-0400 GMT: WV6DUG, EOK, GDH, GJO, GMO, GTI, HVH, ICG, IEO/KL7, IGY, IVM, IVO, *KN7INE, INQ*, JOY, KHQ, HOF. Dec. 13, 0700 to 0830 on 40 meters: WH6DJZ, DKV, WH6DLK, WV6DUR, ENY, FKC, FXK, GZK, HHJ, HVO, ICN, IEO/KL7, JJD. Dec. 23, 0000-0400 GMT: WV2GKI, KN3JGW, KN5VBO, YDO, WV6DYG, FHB, GJO, GOK, GNC, HBZ, HDY, IQY, IVP, *KN7INE, JBS*, JOY, HIG. Dec. 25, 0000 to 0400 GMT: KN1JTL, WV2EKM, GAM(H?), JEN, WV6ECG, KN7IOG, KN8*OGH*, OLL, QEX, QFA, KN5YIT, WH6DIT/5, DJV, DKN, WL7DHU KNØTWE. Dec. 27, 0030 to 0500: KN4FWD, (C?), WV6FVN, IEO/KL7, KN7IQI KAH, KCH. Dec. 29, 0100 to 0230 GMT. KN4MPE, KN5YEU, YPY, WV6FCN, GNC, GVE,

HTO, JFS, *KN7HOF*, IGW, JGP, JRE, JYU, KCS/7, KDJ, KNØUVE. Dec. 30, 0000 to 0200 GMT: WV2GKI, KN4FOM, KN7IAQ, JYU, KN8PFE, KN9UFO, UJN. Tom says that KN7INE has the strongest signal on Okinawa and his quad is sure working. How about some dope on that antenna and location OM?

Help Wanted

The following people would appreciate receiving help with their Novice licenses. Could you take the time to give them a helping hand?

W1 —Craig Saverine, 31 Edgewood Rd., Darien, Conn. (OL 5-2274)
Robert Landry, 15 Olney St., Lowell, Mass.

W3 —Bo Keally, 5713 Kentucky Ave., Altoona, Pa. (WI 3-8819)
John Butler, 4009 35th St., Mt. Ranier, Md. (UN 4-0506)
Greg Weiler, 1229 Allegheny Ave., Reading, Pa. (FR 4-6080)

W6 —Bob Danneman, 601 Callen St., Apt. #4, Vacaville, Calif.

W7 —Rodney Babcock, 319 Oak St., Dallas, Ore. (MA 3-4402)

WØ—Thomas Loock, 160-10th St., So., Wisconsin Rapids, Wis. (HA 3-5542)

W8 —Jimmy D. Smith, 224 Third St., Yorkville, Ohio (UL 9-6236)

Letters

Steve Lauck, KN5YNA, 3109 Cypress, North Little Rock, Ark., leads things off this month. He writes to say the rig is a NC-125, a Knight 50 watter and he has worked 25 states plus KG4 and VE3. Steve would like skeds with WV6's and KN7's.

George Glass, K3IPQ, 4742 Loring St., Phila. 36, Pa., has just shed the Novice license and would like skeds on any band but 15 (wonder why?). George worked 44 states in 6 months as a Novice, with his DX-100.

Bob Burr, KNØTPK, 1009 N. 4th St., Fargo, North Dakota, would like to make skeds but isn't on the air much due to college, but found time to work 48/47 WAS, VE's, KZ, OA, KH and KL. Bob would like skeds with Nev. and Ida. so he can make WAS.

Ex-Novice Tex Birnholz, K2VAB, 634 High St., Newark 2, N. J. would like to locate R. W. Javins, ex-KN3AIC, who last lived in Patuxent River, Md. He might be in the Jacksonville, Fla. area now.

Mike Eilers, KN8OOK, 2533 Leahy St., Muskegon Heights, Mich., has rocks for 40 and 15, and would like skeds with KL7, Utah, Nev., Mont., and Del. Write soon—his ticket will expire on Apr. 14!

Neil Mishalof, WV2HVR, 1294 Diane Dr., Seaford, L. I., N. Y., whacks away with a DX-40 and SX-99 and has a WAS of 37/36 plus KC4, OK1, ON4, VE5, VO2, KP4 and G3. However, he has never worked a W7 and would like skeds with S. Dakota, S. Carolina, New Mexico and other W7's.

Sott Nainis, KN9UIT, 9344 S. Hamilton, Chicago 20, Ill., piled up a 32/30 WAS total in three months with his SX-100 and Knight 50 Watt rig. Scott uses a 15 meter beam and 65′ wire and would also like to work 7's.

John Kreiger, 1565 Vulgcimore Pl., Reno, Nev. holds call letters KN7JUW and of all things is looking for skeds! Look for him on 15 running a Viking Ranger and HQ-100 to a 100′ wire and Gotham V-80. John would like to get into the rag chewers club. Here's your chance to work the rare state of Nevada fellows—Go.

Mike Sanders, KNØTPW, 1521A Hebert St., St. Louis, Mo., nails 'em with a Knight 50 watter and HQ-100 on 40 and 15. So far the combination has produced 45/40 plus VE's, VK, and G2. Mike needs KL7, KH6, Ida., Nev. (don't we all?) and N. H. to complete WAS. He will sked anyone.

Joel Thurtell, KN8PSV, RFD #3, Box 291, Lowell, Mich., has picked up 20 states in two months with his NC-173 and Globe Chief 90 powerhouse. He would like to hear from hams in his area who are on 6 or 2 meters.

Neal White, 22844 Lull St., Canoga Park, Calif., is WV6GPQ and he would like skeds on 40 meters during the afternoon or on holidays.

Steve Russell, KN8NHC, 715 Dwillard Dr., Kalamazoo, Mich., is a real DX Gun with an impressive list of 38 countries in 21 zones and 5 continents so far. WAS resides at 46/43 after more than 900 contacts with a DX-40 and SX-16 into a 15 meter dipole. At 15 years, Steve has a CP for 25 wpm and RCC, and believes he won Sweepstakes for Novice section in 1959 with 19,444 pts! Sorry the pix was too little Steve.

Dick Schataza, 3608 2nd Ave., N., Great Falls, Mont. was in the Help Wanted section a few months back and now proudly displays call letters KN7KCR. Dick is warming up with a DX-40, BS-342 into an all band doublet and has WAS of 21/30. Oh yes, Dick would like dope on starting a net.

Tom Jacobson, K9PLU, 5230 N. Olcott Ave., Chicago 31, Ill. earned his General ticket at the ripe old age of 11. Not only that, but he constructed the DX-100 shown in the photo. Just shows you what you can do when you set your mind to it!

Tom Wells, KN5YSH, 2204 DeVerne St., Austin 4, Texas, would like to start a net also. On the statistics side of things, Tom has 23 worked with his long wire, doublet and 15 meter Quad.

Mark Rowland, KN5TST, finally took pen-in-hand and wrote to tell us about the DX-35

[*Continued on page 100*]

ham clinic

CHARLES J. SCHAUERS, F7FE/W6QLV

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

Thank You!

I wish to thank all those (including manufacturers and distributors of ham radio equipment) for their fine comments relative to the lead-off piece in this column which appeared in December and titled "Complaints to Distributors and Manufacturers." It evidently was very well received.

A number of readers however, brought to my attention the fact that when equipment is bought directly from a manufacturer and is damaged in shipment, it takes forever and a day to receive proper claim settlement . . . from the carrier (transportation). My advice to hams: if it is at all possible, open up your packing carton in full view of an employee of the carrier company and inspect for *visual* damage. If the damage seems to be slight, file a claim right then and there, and make a statement to the effect that should internal damage be evident, you reserve the right to file still another claim.

If the set is badly damaged, have the carrier hold the shipment and contact the manufacturer. Describe in detail the damage and ask for instructions. In most cases, the manufacturer will tell you to ship the set back (after careful re-packing). They also may tell you to file a claim in their behalf—which you should do.

I *still say,* the only way to pack a radio receiver, transmitter etc., is in rubberized horsehair in a wooden crate enclosed in a good sturdy cardboard carton.

Repairing Commercial Gear

It is amazing that so many hams cannot repair their own commercial radio receivers, transmitters, recorders etc.; especially some of the new SSB equipment—but in a way, this may be good.

Many hams after glancing at the circuit diagram (when trouble strikes), calmly pull the *ac* plug and prepare the set for shipment to the factory or authorized service agency.

"Me tear into that mess? Are you nuts? Why I'm lost even before I start!" is a very usual reply to the often asked question, "are you going to try to fix it yourself?"

Certainly the guy who owns a set has taken the time out to find out "what makes it tick"—or has he? My guess is that very many do not.

Of course, a little knowledge is sometimes dangerous and trouble shooting modern ham gear is not easy for the inexperienced. Oh sure, you can replace tubes, fuses etc., but how about knowing how to "fish" out a tiny ceramic condenser that has gone bad (after it is found) without making a mess of a neat cable job? This info is seldom found in the average instruction book, nor is it likely to be.

If you're brave, you learn by "cutting and trying," otherwise, back to the manufacturer or service agency she goes.

"I think this set needs alignment," are some other famous "last words."

You can tinker to learn, but alignment of the more complicated gear requires precision equipment—not owned by the average ham. The days of the "screwdriver alignment by ear technician" are over.

But we still have with us the "electronic hypochondriac." He is the guy who feels any set can be made better by just a little touch here, a little screwing there, a new tube here, a new resistor there . . . he is forever looking for the slightest deviation in circuit performance. After checking everything he is working with, he rechecks again and usually won't believe on-the-air reports given him by fellow hams. A *db* to him is a "big deal." He is the "worry wart" who is continually trying to figure out whether or not he has been "stung" because he bought a so-and-so set.

Unless a set has been doused with water, dropped from a speeding truck or hammered with a sledge, those original factory adjustments seldom shift—at least not very much.

Now it is true that parts and tubes do age, and with age, realignment is a maintenance item that should not be neglected. But I believe it should be the last thing to check when working over a set.

To the ham on his toes, the symptoms of the need for realignment present themselves gradually. A faulty tube, resistor or fixed condenser may cause misalignment symptoms. But before you pick up an alignment tool, check your tubes and for the *simplest causes of trouble first!*

One factory service manager told me recently via letter, that many sets sent to the factory for realignment (if not touched by the owner)

seldom need much attention. He said the majority of troubles can be traced to defective tubes or a part that has changed value.

Now if you are the owner of the real fine (and expensive) ham gear now commercially available, I advise you to do two things after you have purchased it. First, read that instruction book carefully—*twice*—what you do not understand should be the subject of a letter to the manufacturer. Second, set your rig up, get it operating properly, then with your own test equipment make up a voltage, current and resistance chart (using the manufacturer's charts and test points as guides). Should trouble develop, a few minutes with your test prods will enable you to locate it. (I use color coding paint on or near test points, i.e., red for plate voltages, green for grid circuits, yellow for screen grid voltages, black for resistance points —etc.) Ground is taken as common.

By noting my meters and the action of various controls (in the case of receivers), I can within a few minutes locate nearly any trouble that might develop. But I *ALWAYS* suspect *TUBES* first.

Another thing: if your set uses a lot of dial cord, note how it is strung—draw your own cording diagram. Some of the sets now on the market are "lu-lus" when it comes time to re-string a dial cord. Gosh, I hate to think of the hours I've spent trying to figure some of them out!

Before you ship your set to the manufacturer (after querying him), do try to locate another ham who owns the same set. He may be willing to help you locate your trouble by making voltage, current and resistance comparisons between the two sets.

Shipping your set away can be expensive. For example, a ham located in a small Midwestern town decided to send his receiver back to the factory. To replace one 56,000 ohm resistor, one tube and an alignment check cost him a total of $32.00! Today, he uses my color marking system with test charts he has prepared. (He would not have this had he not written me complaining about the charges . . . which were reasonable!) Transportation is not cheap nor is the time of trained technicians.

Do not be afraid to take the time to carefully go into a commercial set to find trouble—but first, learn what makes it "tick." Take your time and do not "dig into carefully placed wiring—LOOK FOR THE SIMPLEST CAUSES OF TROUBLE FIRST and you can't lose.

Observation

With Spring just around the corner, many hams' thoughts turn to getting ready for the mobile season—as well as the more esthetic things in life.

Whether you are a 10 or 80 meter enthusiast, you can have a lot of fun participating in QSOs when on the move, but here are a few unwritten operating rules, which if followed, will make mobile operation more fun.

Don't do as some do, get into the car, flip on the rig and start calling CQ. First, listen in for a few minutes and do not try to "crash" an already going round table. Note (with pencil or lipstick on the dashboard) who is operating on the frequency in which you are interested. Break in when the QSO is thrown open to newcomers.

Stop your car to tune up. Make your transmissions short and *you too* listen for break-in stations. Don't monopolize a net established frequency to talk to a "long lost" friend—move off to carry on your private QSO.

Do use a chest-microphone so as to have both hands free for driving. Watch the road and not your final plate or modulation meters.

Observed: in the many, many miles I have operated mobile, I met few fellow hams who bogged down either the road or the air. The mobileer is a "special breed" who likes to move as well as communicate and he seems to be a little more friendly than the "stay-at-home type" ham.

Mobile operation is a lot of fun indeed, but it requires some discipline; otherwise it can be a dangerous hobby as well as unpleasant, especially when one cannot break into a roundtable to request emergency assistance.

Questions To Ham Clinic

Quad-helix Antenna

"Whom do I contact for information relative to the quad-helix antenna?"

Try the *Andrew Corp.*, 363 East 75th St., Chicago, Illinois.

Tunnel Diode

"I've beer. hearing so much lately concerning the tunnel diode (all good) that I would like to learn if it has any major drawbacks. Surely there must be some!"

The main one I have read about is the difficulty of isolating input and output. The TD cannot be staged for uni-directional operation —not yet anyway.

Ham-Stereo

"Have you perchance heard of any hams performing experiments with stereo sound using two ham frequencies and two complete receiving and sending outfits?"

No. (Any reader supply this information?)

Club Beam

"My radio club has about $150.00 and needs a good beam antenna for 10, 15 and 20 meters. In this price range what do you suggest?"

For the money you have, I suggest you consider a Tri-Band TBG416 array by Telrex. They claim it provides 1.1:1 VSWR on the three bands. Gains of 8 *db* on 20, 8.4 *db* on 15 and 8.3 *db* on 10 meters are claimed. The price of the beam is $159.50. Believe me, it is a sturdy well-designed beam and worthy of consideration. I used one in San Francisco and was very happy with it. I am now trying out a Moseley *which I purchased* sometime ago; it works fine so far. I hope *to buy* and test most three band beams during the next 18 months.

Watts vs. Heat

"Just how hot can a resistor really get before one needs to consider replacing it with a larger wattage value?"

Most resistors in *power circuits* do get very hot. When I discover a resistor that it too hot to touch (after the power is turned off), I begin to look for ways and means of splitting the load. Heat means wasted power anyway. To keep the heat down, I suggest designing a circuit which does not depend solely on one resistor for voltage reduction or swamping. If one resistor is necessary, then I over-design by at least 50% to keep the heat down. In other words, a circuit requiring 25 watts gets a 50 watt resistor . . . (there are no 37 watt resistors).

SB10 Taking Off

"I just got an SB10 and seem to have some instability in the 6BQ5 (output) stage. I tried loading it down with more capacity as you suggested and this helped a little. Is there any way to neutralize this stage?"

I did not encounter that trouble with my SB10 but Bill Hodgson (K3ICK/K5YWM) did and sent me his information on how he neutralized the SB10 output stage. Thanks Bill and 75 to you! I wish more hams would realize how they can help others by sending in their tips to HAM CLINIC.

Here's how he did it: First remove the .01 mfd disc ceramic capacitor connected between the ground lug GL1 and the common wire connected to #1 lug of all the driver coils. Replace this capacitor with a 220 mmfd mica one. Drill a hole adjacent to coil L5. Connect a stiff, insulated wire to lug 1 of L5, through the hole along the chassis; and bend it so that the final 2½ inches of the wire is parallel with and approximately ¼ inch from the 6BQ5 envelope. Remove the plate and screen voltages from the 6BQ5, apply excitation, and with a grid-dip meter (on diode position), (its coil near the 10 meter coil in the output stage—with 10 meter excitation on—) bend the wire near the 6BQ5 for MINIMUM *rf* indication. That's all there is to it. Incidentally, I tested Bill's method out and it is fine. This about wraps up the SB10 for the time being. The one I *bought*, works very, very well with the TX-1.

NC 109 SSB Improvement

"How can I improve SSB operation with my NC 109 receiver?"

Thanks to the *National Radio Co.* here is the information to improve the SSB operation of your NC 109. This change is *not* absolutely necessary but it does help to eliminate retuning the receiver at varying *rf* gain control levels.

1. Remove C16, .01 mfd from plate return of V2 and reposition it across two used terminals of *rf* gain control R5. 2. Change R11 from 150K to 82K ohms. 3. Remove R14, 470 ohms and bring the red lead from it, (plate return of V2) back to B plus 105 volts regulated (orange wire near rear of chassis). 4. Add 20 mmfd of fixed ceramic capacitance in parallel with C58 (47 mmfd). 5. Change R4 from 68 ohms to 120 ohms. 6. Change C28 from .047 mfd to .22 mfd.

Incidentally, I wish *some other* manufacturers were as cooperative and helpful in supplying such information to HAM CLINIC. They would save a lot of correspondence and time. Service notes as well as modification information is always appreciated—no matter the source. And if there is a charge, I personally PAY so that the readers of CQ, (over 90,000 now) can benefit from it.

Please remember again, that when information relative to equipment troubles appears in this column, this does not indicate that every set of a particular manufacturer will sooner or later encounter the same troubles. As pointed out before, there are too many isolated instances of trouble to generalize a condition IN ANY SET.

VR Tubes

"Is it possible to use two VR150s in parallel to give me 300 volts regulation?"

No. They go in series. Don's forget the limiting resistor in series with the combination. See page 231 ARRL Handbook, 36th Ed.

12.6-2E26

"I removed the little 75 meter transmitter from my old car wired for 6 volts. My new car has 12 volts. I can find equivalent tubes for the other 6 volt tubes but not the 2E26. Is there a 12.5 volt equivalent for the 2E26?"

Yes. Try RCA's 6893, it's a 12.5 volt "2E26."

Power Supply Capacitor Size

"I'm building up a 500 watt AM rig. The final will run 2000 volts at around 250 mils. What should be the final condenser size in my power supply?"

$$C = 25 \frac{I \text{ (Final amp current)}}{E \text{ (Final amp voltage)}}$$

In this case, about 3.5 mfd.

Now Organ "I"

"That guy with hearing aid "I" has nothing on me. While playing my organ with headphones on, I heard a station in the background. It sounded for all the world like an SSB station before the *bfo* was adjusted. This, by the way was on a Hammond Organ (Chord). I'd be most appreciative if you could offer any suggestions."

Anyone for jacks? (Just kidding) Well, Al, if you could find out the frequency on which the station is operating, a trap tuned to its frequency and inserted in the power line near the organ may eliminate the interference. The *rf* could also be coming through your headphone cord. I'm no organ expert I can tell you. Suggest that you contact the company that makes the instrument and ask for help. I'm sure they can clear it up in no time flat.

28Mc Complaints on Russian Signals

A number of letters have been received relative to the very bad signals that are being emitted on FM by some Russian amateurs. Ac-

cording to one old-timer (Russian ham), the stations using *broadband* high distortion FM transmitters are new-comers. I guess there is little that can be done about the situation. Of course, this is no way to cement International relations (by occupying 25 *kc* of an already crowded band). Those of you who are interested get the same reply I gave to those who have already complained—write to the Central Radio Club Secretary, PO Box 88, Moscow, Russia and do your complaining. Why these hams (those who use FM) cannot screen modulate their rigs *cheaply* is not understood. Maybe they have surplus over there too. So 72 to you "Ivan" *(Peace and Friendship in Freedom!)*, but how about eliminating those awful sounding FM stations? Surely, if you can hit the moon you can build transmitters for 10 meters!!!

On the whole however, I must say in all honesty and fairness, the old-timer hams in Russia put out real good signals on all modes including SSB and I enjoy talking to them; especially when they help me learn a little of their language.

100 KC Oscillator

"Anyone making a 100 *kc* oscillator kit now? If so, who is it?"

Try *Irving Electronics Co.*, PO Box 9222, San Antonio 4, Tex|

SX24

"What is the approximate antenna input impedance of the SX24?"

About 400 ohms.

HQ140X

"On position 4 of the crystal selectivity switch in my HQ140X, I seem to get no action. Any tips?"

Check contacts of the switch first and clean with a good contact cleaner. Second, check R14 (300 ohms) for an open.

Knight Intercom "I."

"I own a Knight Intercom with which I am very happy, except when it is on the monitor position (front door speaker) and I'm operating on 20 meters AM, then it really feeds back. What's the cure?"

As explained before, an isolation transformer for about $1.00 (110v *ac* to 110v). Incidentally I have one of these intercoms in operation too, and had the same trouble—a small isolation transformer fixed it. This can and does happen to the best intercom sets.

Tech Tip

Find out what the prevailing wind direction is in your locality when you put up your beam. Just below the beam proper tie a 1" wide plastic streamer. When the wind shifts, you can readily see in what direction the wind is blowing and turn your rotator so that your element ends are facing into it. This saves a beam if high winds come up.

On Writing to HAM CLINIC

Letters received at the CQ Offices are forwarded to me via airmail. Those containing self-addressed stamped envelopes receive handling priority. In many instances, loose change for return postage is often enclosed in some letters —this is ALWAYS returned to the writer. Do not enclose money for postage, and please do not send your letter to my QTHs as printed in the Callbook as so many are doing.

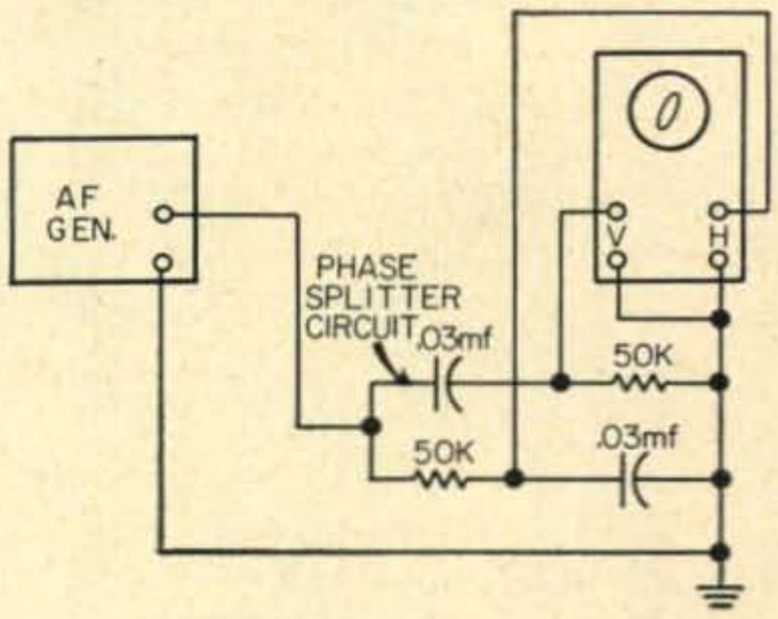
One question to a letter or card—PLEASE! Do not ask for a new *complete* set design—time does not permit it. You will however be referred to back issues of CQ and other mags for *complete* design information on a particular unit.

Before writing HAM CLINIC, refer to back issues containing the column, your answer might have already been published. Also, direct your letters on specific subjects covered by other columns to the able editors of these.

Always write the author of an article for particular information before writing HAM CLINIC; you will save time, because we must query them (in most instances) anyway.

Correction Dept.

Below is corrected diagram for a phase splitter originally shown in January 1960, page 70.



Thirty

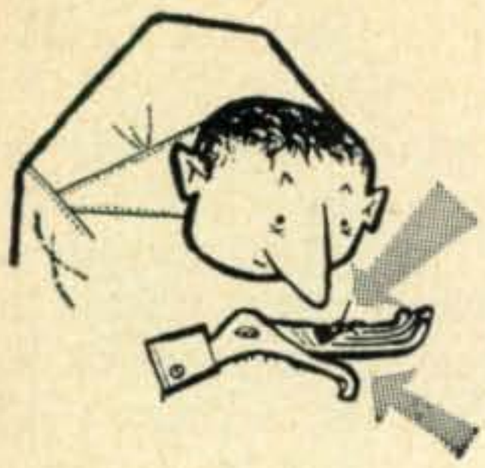
Again, thank you fellow-hams for your support and assistance. I enjoy devoting my spare-time to this very worthwhile activity. As long as you need help, HAM CLINIC will do all it can for you.

The opinions and statements expressed herein are my own and do not reflect passive or active indorsement by the publisher, any governmental or civilian agency or organization; thus it is possible to write what sometimes cannot be written.

Equipment tested by me *is purchased by me* or returned *after* test when it is found unsatisfactory. No "engineering samples" or equipment is accepted from any manufacturer on a *free basis* so that mention of such products would be naturally expected. HAM CLINIC (me!) *buys* and *tries*.

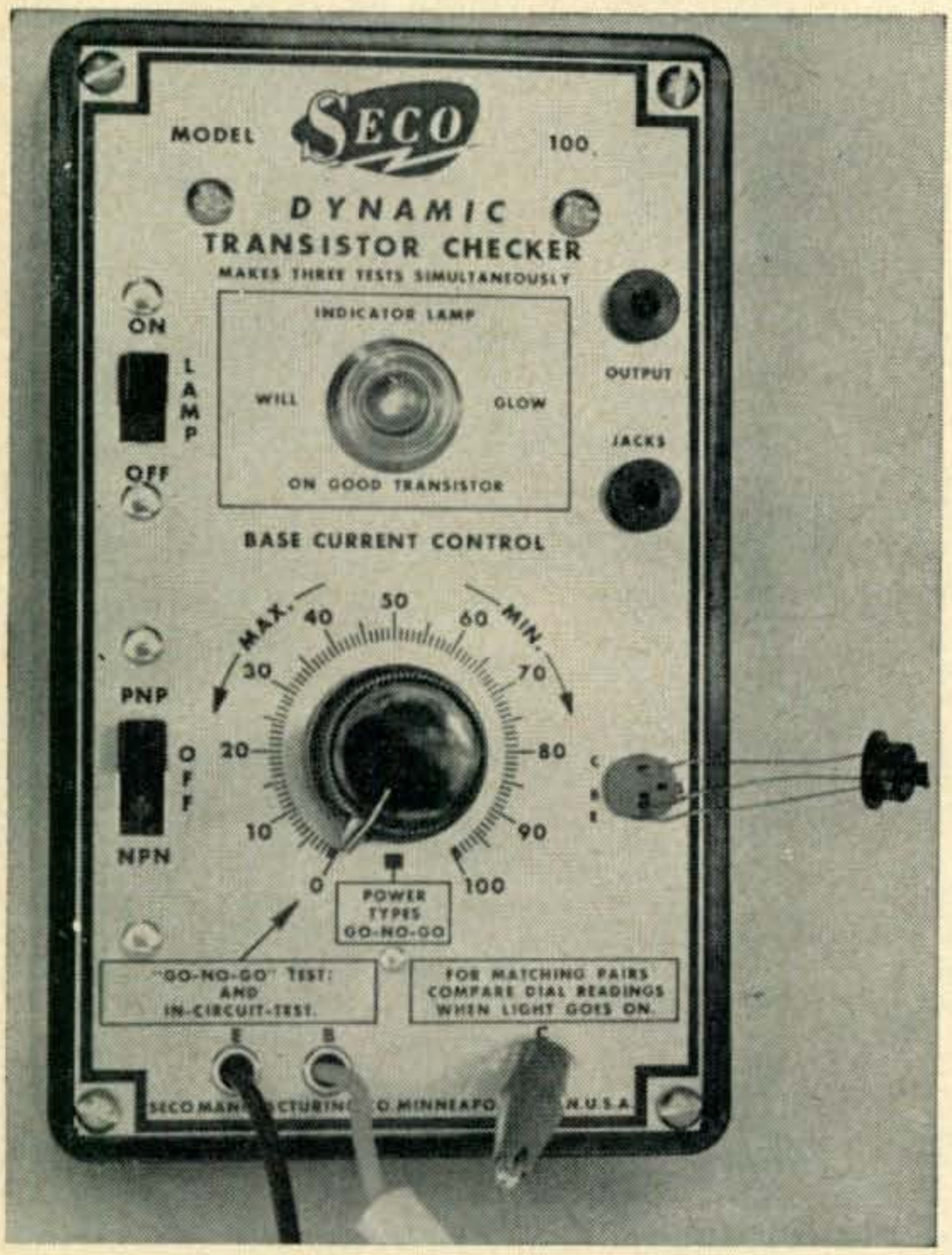
For this month then, 72, 73 and 75 to all you wonderful hams who read what I write————

Chuck, W6QLV/F7FE ex-W6RQQ,
W7QLV & DL4SC



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

semiconductors



The new *Seco Model 100* transistor tester makes dynamic checks by operating the transistor in a blocking oscillator circuit and measures the ease with which it oscillates.

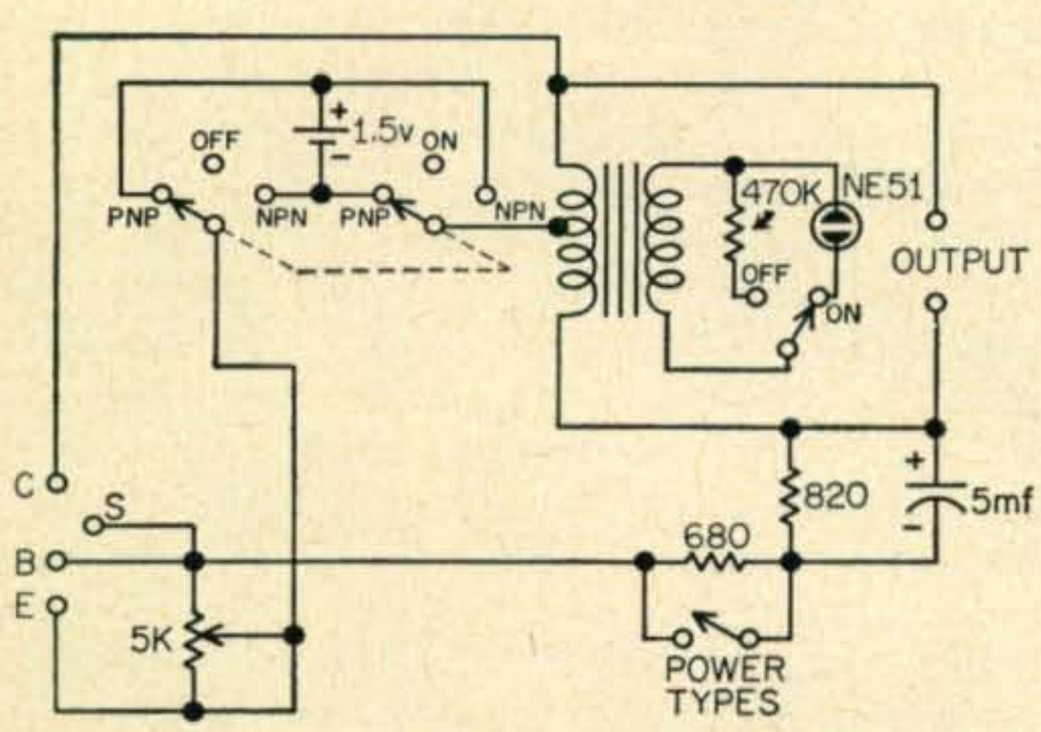


Fig. 1—Dynamic test circuit used in the *Seco Model 100* transistor checker.

The feature item this month concerns a very impressive piece of transistor test equipment. The *Seco Model 100*, shown in the accompanying photograph, is a simple, low-cost device for testing transistors dynamically. Most testers in this price range simply apply a small amount of bias to the base and check the increase in collector current. The *Seco Model 100*, on the other hand, actually energizes the transistor allowing it to function in a blocking oscillator circuit, as shown in fig 1. The oscillator voltage is stepped up from 1.5 volts to about 100 volts in a transformer. This voltage, in turn, fires a neon bulb connected across the output of the step-up and feedback transformer.

The novel part of this circuit is the calibrated base bias potentiometer. It allows the user to vary the forward bias to check the current sensitivity of the transistor being tested.

Transistors are tested in the following manner: Turn lamp and power switch on and set selector to type being tested (PNP or NPN). Set knob to zero and insert transistor. If the lamp does not glow, the transistor is defective or the opposite type. To test relative current sensitivity, advance the knob until the lamp just extinguishes and note dial reading. Transistors can be matched or compared using these relative readings. For production testing, the knob is set in the "GO-NO GO" position for the particular type. A defective transistor will not illuminate the bulb.

So far, your conductor has found the *Seco Model 100* foolproof! Weak, shorted, or open transistors show up immediately with this simple dynamic tester. This unit has all but replaced the bias tester and elaborate Beta meter in the workshop. At $19.95 (only slightly more than the cheapest bias testers) the Seco Model 100 is an excellent buy in test equipment, particularly when you consider it is wired and tested.

Compensator Diode

As mentioned in the last column, RCA has developed a compensator diode for use in Class B transistor amplifiers, as shown in fig 2. As an examination of the circuit will show, the diode replaces the usual resistor in the bias divider

network. This system will lower the "end-point" battery voltage, before audio distortion becomes objectionable. When used in the circuit shown in fig. 2, the 1N2326 will maintain the bias voltage applied to the output stage within ±0.015 volts for supply variations up to 40%. In addition, it compensates for ambient temperature variations over the range from −20°C to +71°C. A data sheet is available.

Tunnel Diodes

The amazing tunnel diode is now available to labs and experimenters. A GE device, the ZJ-56, is available in limited quantities for $60.00, and has a 5 to 1 ratio. This 1000 *mc* device is shown in the accompanying photo and may be obtained from Mr. James H. Sweeney, Marketing Manager, GE Semiconductor Products Dept., Syracuse, N. Y. For an excellent article on how this fantastic device operates, look up the article by K2IEG, in the November '59 issue of CQ.

Bargains!

A new company has been formed to supply hams and experimenters with low cost transistors and associated components. As an example Texas Instruments audio transistors are available for $1.00 each post paid, and schematics are included. Matched driver and output transformers are available for $2.50 a pair. Also, many of the projects featured in CQ and other publications have been put on printed circuit boards. To be released soon is a transistorized communications receiver and two meter receiver kit, not to mention a transistor course complete with components for use in the experiments. If you want on the mailing list, drop a card to Semiconductors 'N' Stuff, Box 288, Alta Loma, Calif.

New Products

Bendix Semiconductors, Long Branch, New Jersey—New Products this month include a 25 ampere transistor, type 2N1031, a military type 2N1120 rated to 10 amperes and designed for switching applications. A new type capable of switching 1,000 watts is the 2N1029 and 2N677 with V_{CE} ratings to 80 volts. The new military-type 2N1011 has a current gain range of 30 to 75 at 3 amps and maximum V_{CB} of 80 volts.

CBS Electronics and Philco have signed a cross-license agreement to exchange types and equipment. This merger is good news for standardization and mass production means lower cost.

Columbus Electronics Corp., 1010 Saw Mill River Rd., Yonkers, N. Y.—just introduced a new line of silicon rectifiers with impressive low prices.

General Electric, Semiconductor Div., Syracuse, N. Y.—New 15 *mc* silicon transistors, types 2N1276, 77, 78 ,and 79 have 40 volt V_{CE} ratings. Silicon controlled rectifier prices have been reduced by 20 to 40%, bringing the lowest priced unit down to $18.50.

Hughes Semiconductors, Newport Beach, Calif.—An impressive group of silicon transistors have just been announced. In addition to computer types, a double diffused mesa and high frequency silicon ¼ watt types are included.

International Rectifier Corporation, El Segundo, Calif.—Among the many new releases this month is a 10 zener diode series, priced for budget conscious lads at approximately $5.40. Bulletin SR-257 describes these. New diffused silicon 6 and 12 amp rectifiers, types 1N1341 through 47 and 1N1199 through 205, have PIV's between 50 and 500 volts. Bulletin SR-311 tells all. Zener diodes—152 standard and 1584 special tolerance types are described in free bulletin SR-260. Silicon controlled rectifiers, for load currents up to 16 amperes, have been added to the "Thyrode" line and are described in XSR-351. Building a battery charger?

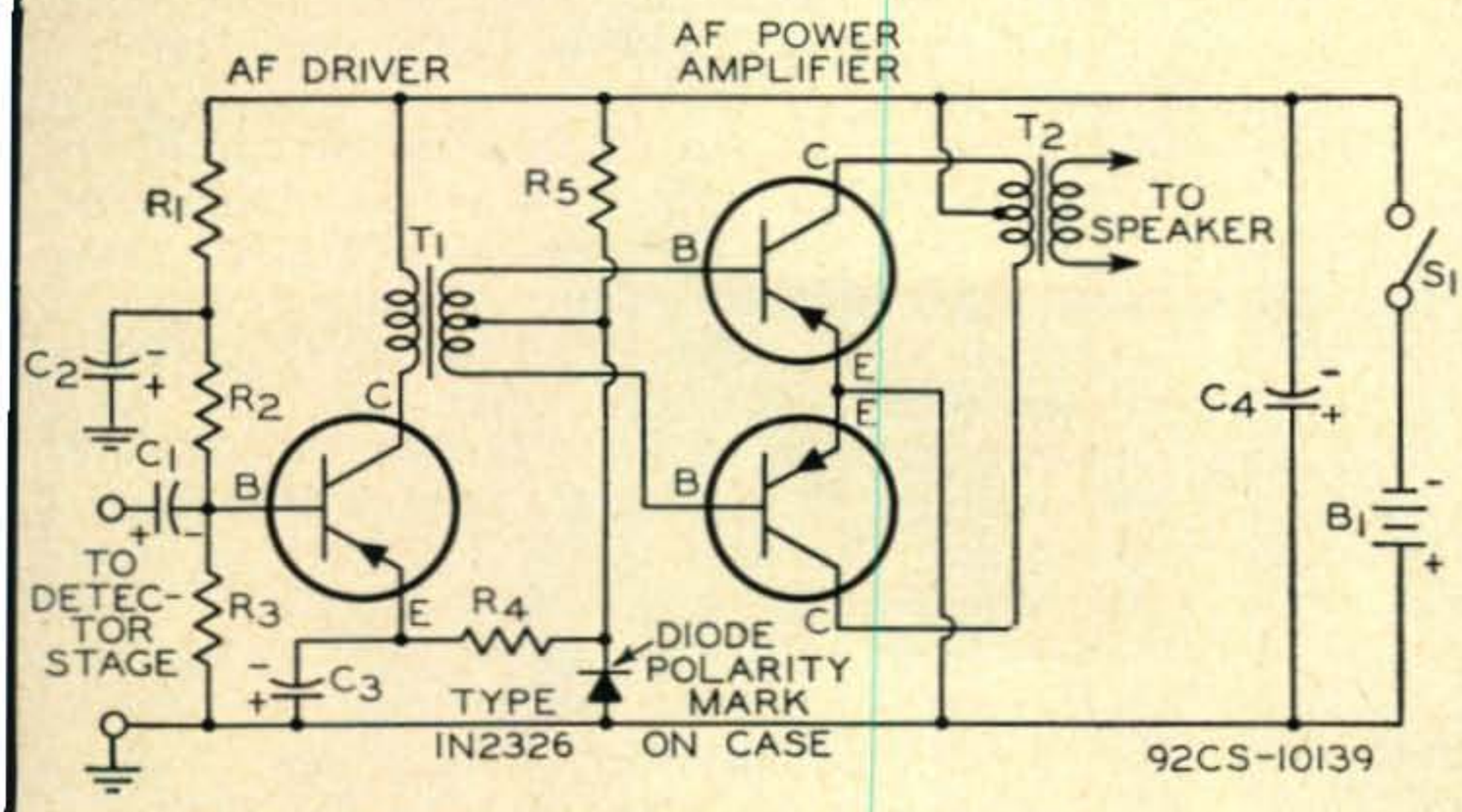
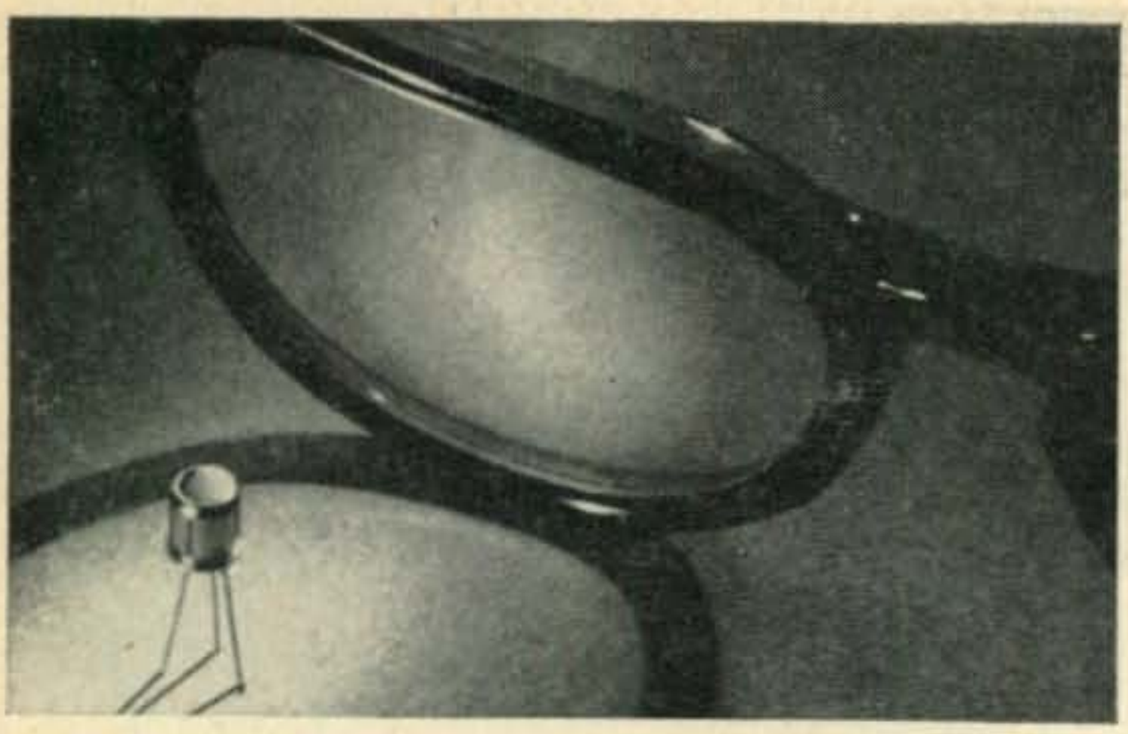


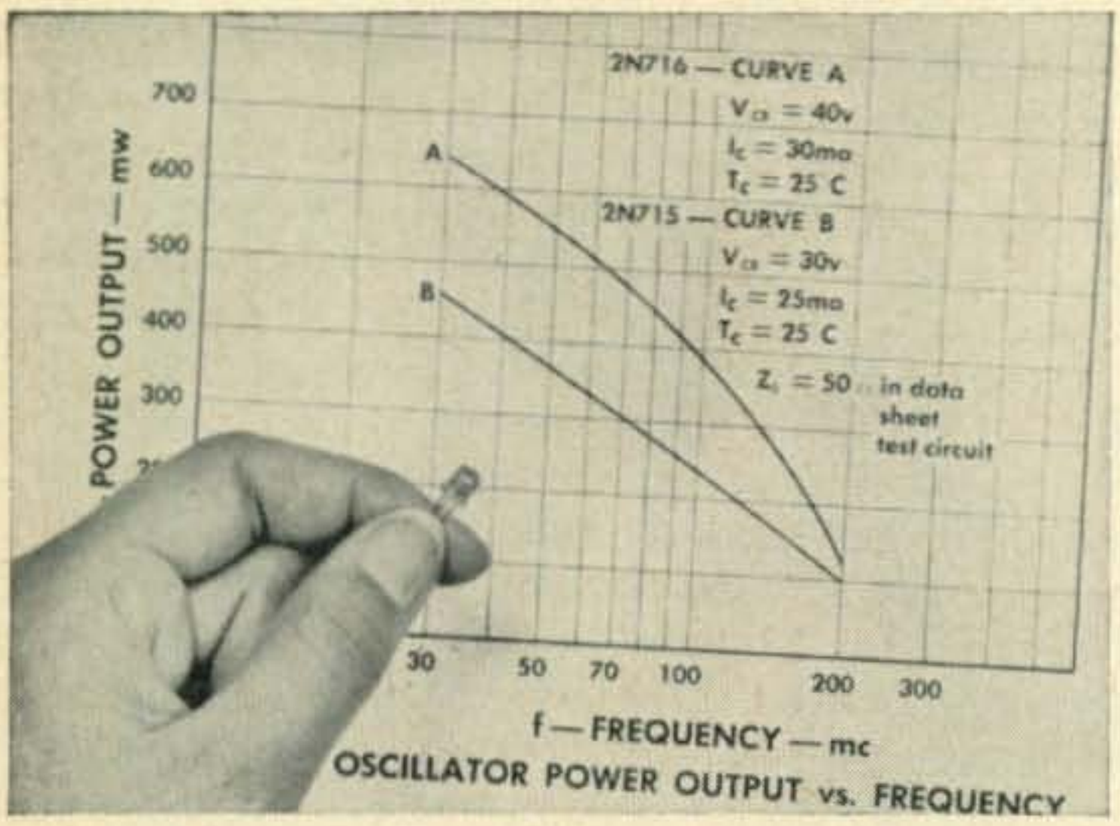
Fig. 2—Push-Pull Class B audio amplifier circuit utilizing the 1N2326 compensating diode (Courtesy of RCA).

B_1 = 9 volts
C_1 = 5 μf, electrolytic, 3 v.
C_2 = 1 μf, electrolytic, 6 v.
C_3 = 50 μf, electrolytic, 3 v.
C_4 = 100 μf, electrolytic, 10 v.
R_1 = 27,000 ohms, 0.5 watt
R_2 = 10,000 ohms, 0.5 watt
R_3 = 10,000 ohms, 0.5 watt
R_4 = 2,200 ohms, 0.5 watt
R_5 = 10,000 ohms, 0.5 watt
S_1 = Switch
T_1 = AF driver transformer, primary impedance (with a current of 1 milliampere flowing) = 10,000 ohms, secondary impedance (with transformer center-tapped) = 400 ohms.
T_2 = AF output transformer, primary impedance (with transformer center-tapped) = 500 ohms, secondary impedance matched to speaker.

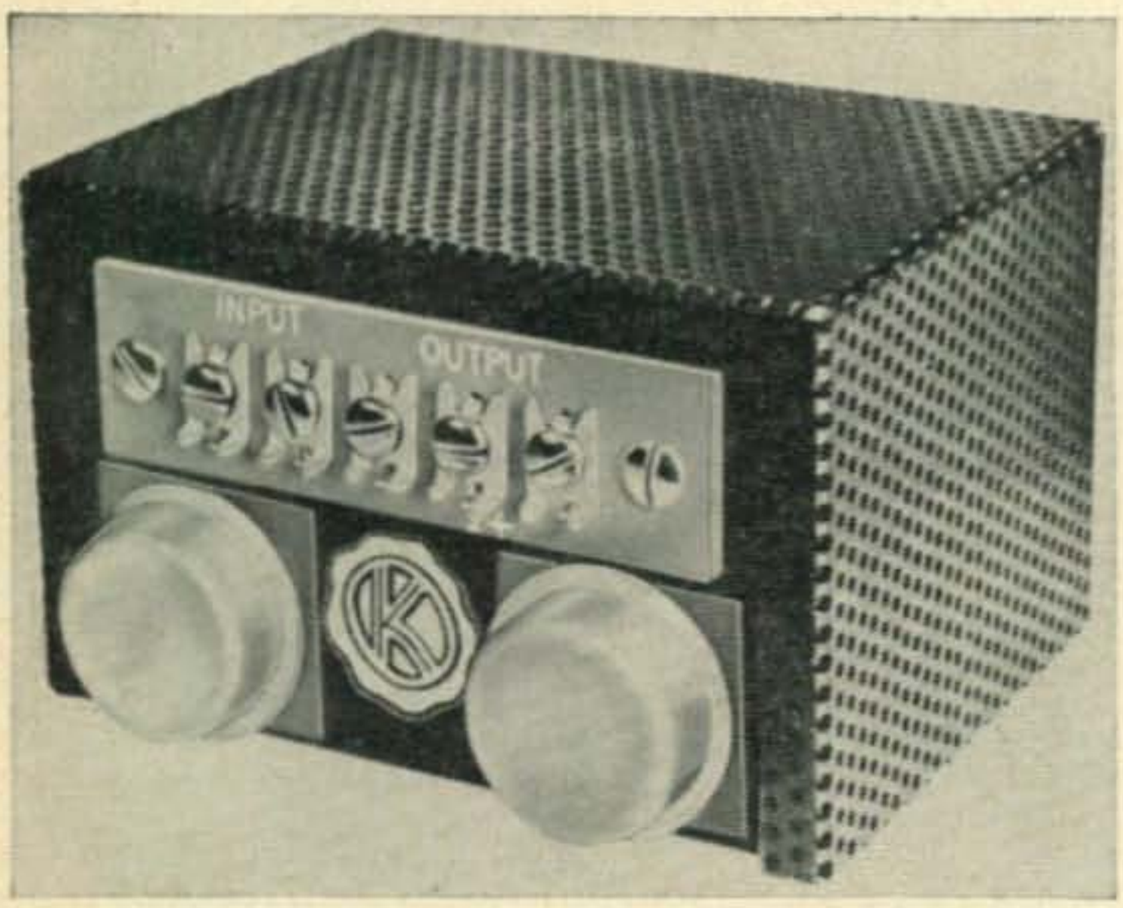
Note 1: For af driver stage transistor, use 2N407, 2N408, or similar type.
Note 2: For af power-amplifier stage transistors use a pair of 2N109, 2N217, 2N270, 2N407, 2N408 or similar type.
Note 3: Input signal voltage = 3 millivolts rms, input resistance = 2,000 ohms, power output = 250 milliwatts with a maximum distortion of 10%.



Meet the new General Electric Tunnel Diode, rated to 1,000 mc. This new electronic tool is available in sample quantities, priced at $60.00.



The TI 2N716 is superimposed on the power output curve for these two new types. It would appear that the 2N716 is capable of more than ¼ watt output at 144 mc.



The Kupfrian transistor power converter is extremely compact and yet is capable of delivering 120 watts of output power.

New low cost 100 ampere rectifiers, silicon of course, are now being marketed. Consult bulletin SR-210. Do you receive the "Rectifier News" regularly? If not, request addition to the mailing list on your company letterhead.

Kupfrian Mfg. Corp., 395 State St., Binghamton, N. Y., have their transistor power converters in most jobbers stores these days. Their CA-1263-12 delivers 300 or 600 volts at 400 and 200 *ma* respectively. For high power applications the CA-12105-10 suppliers 1000 and 500 volts at 100 and 200 *ma*.

Motorola Semiconductors, 5005 E. McDowell, Phoenix, Arizona, have added several new switching power transistors to their line. The 2N1162 through 67 are rated at 50 watts dissipation and go to 100 volts V_{CB}.

Manadnock Mills, 1977 First Ave., San Leandro, Calif.—Having trouble locating anodized aluminum washers for power transistors? This company has a very extensive line at attractive prices.

Pacific Semiconductors, 1045 W. Jefferson Blvd., Culver City, Calif.—A recent addition to the line is a series of very fast recovery silicon computer diodes, types 1N925 through 28. The capacity of these units is extremely low.

Lansdale Tube Company (Philco), Lansdale, Pa.—New products this month include the 2N1270 through 72, silicon NPN surface Alloy Diffused-base (SADT), the 2N1267 through 69, lower frequency SADT's, and the 2N1199. This new group is intended for *rf* oscillator/amplifier and high speed switching applications. Also of interest is their new low-noise 70 *kmc* mixer diode. The noise figure is an amazing 13 *db* at this frequency!

Raytheon Corp., 215 First Ave., Needham Heights, Mass.—Recent introduction of a low-cost industrial silicon transistor, type CK942. The device dissipation is ¼ watt.

Radio Corporation of America, Semiconductor Div., Somerville, N. J.—A series of 12 tunnel diodes are now available on a sample basis. Their device has a p-n junction only 1/1000 of an inch in diameter and 80 angstroms in width (about 1/150 the wavelength of visible light)! The new 2N1300 and 1301 are mesa switching transistors featuring gain-bandwidth products of 40 and 60 *mc* respectively. RCA is in the ferrite core business in a big way, with the introduction of their 226M1 and 228M1. These memory devices are only 0.08 inches in diameter! The drift family has been enlarged to include the 2N1023, 1066, 1224, 1225, 1226, 1395, 1396, 1397 for applications up to 250 *mc*. Additional literature is available: H. S. Sommers, Jr. reprint of "Proceedings" Tunnel Diode article, available from David Sarnoff Research Center, Princeton, N. J. when requested on your company letterhead. "RCA Batteries for Transistor Applications" is available at your RCA distributor for 25¢.

Sarkes Tarzian, Inc., 415 N. College, Bloomington, Ind., have introduced a silicon replace-

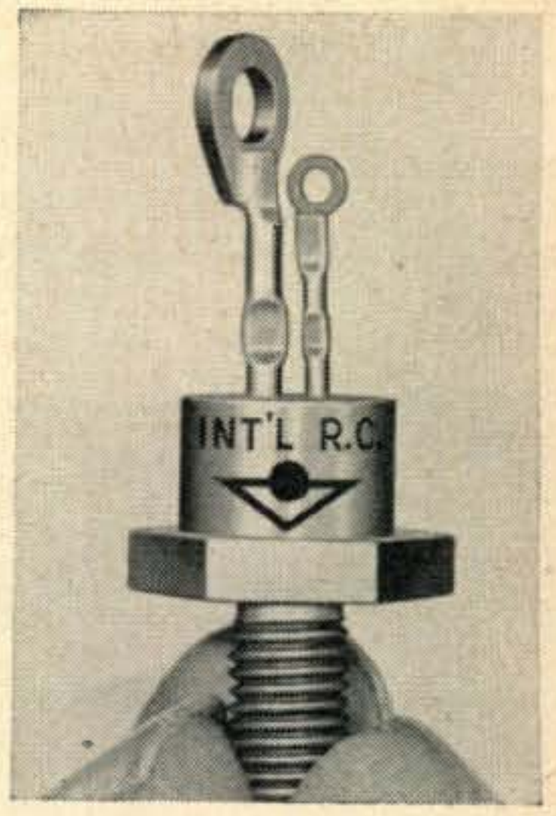
ment for the 866 tube, price $29.50.

Sylvania Semiconductor Div., 730 Third Ave., New York 17, N. Y.—Introduction of a new L-Band mixer diode with a 5.5 *db* conversion loss. Also available is a microwave diode characteristic and replacement guide.

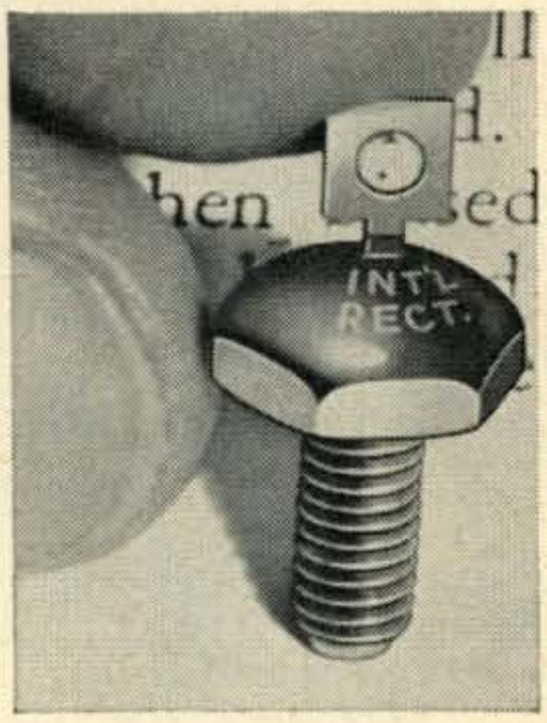
Texas Instrument, Box 312, Dallas, Texas. The big news this month is their introduction of silicon solar cells, their TI N2009 series.

Also of interest is new line of silicon mesa computer diodes, types 1N914 and 1N916, which feature a switching time of four milli-microseconds. If you use tantalum electrolytic capacitors, a new information-packed bulletin is available. The recently introduced 2N715 and 2N716 are silicon mesa transistors in the high-power, vhf league. They are guaranteed to produce ½ watt as 70 *mc*, diminishing to 50 *mw* at 200 *mc*. How about a pair of these in a two meter rig? The October '59 issue of TI's "Application Notes" presents an excellent discussion of transistors in switch applications.

Transitron Electronic Corp., Wakefield, Mass. —An impressive new line of silicon regulators ranging between ¼ watt and 10 watts, in addition to several stable reference types.



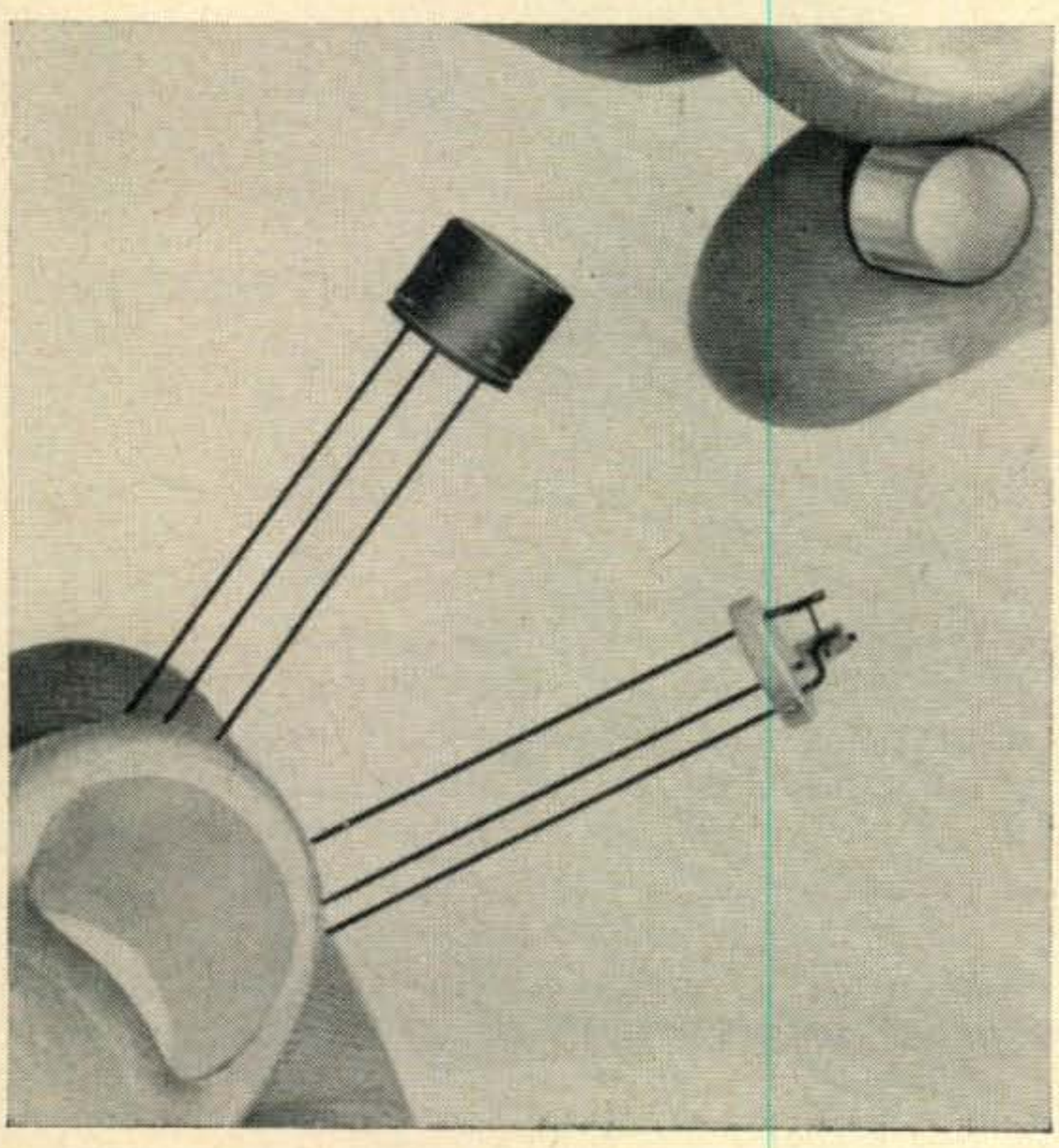
The International Rectifier Corporation 16 ampere "Thyrode" is a silicon controlled rectifier. Normally the device does not conduct between the base and large terminal. However, the application of a signal to the gate (small terminal) initiates conduction and "fires" the rectifier much the same as a thyratron.



Economy silicon zener diodes for budget-conscious experimenters are available at less than $6.00 for the 10-watt package.

The 50¢ Transistor

One of the highlights at the 1959 WESCON show was a production breakthrough by Texas Instruments, Inc. This progressive company has conjured up a unique system for automatic assembly and testing of germanium transistors. Using this new system, they have developed a series of germanium alloy junction transistors for the industrial and entertainment fields. Included in the series is a MESA high frequency *rf* transistor that the average amateur can afford. The net result is of interest to experimenters inasmuch as the new family of transistors is priced from .50 to $1.25!

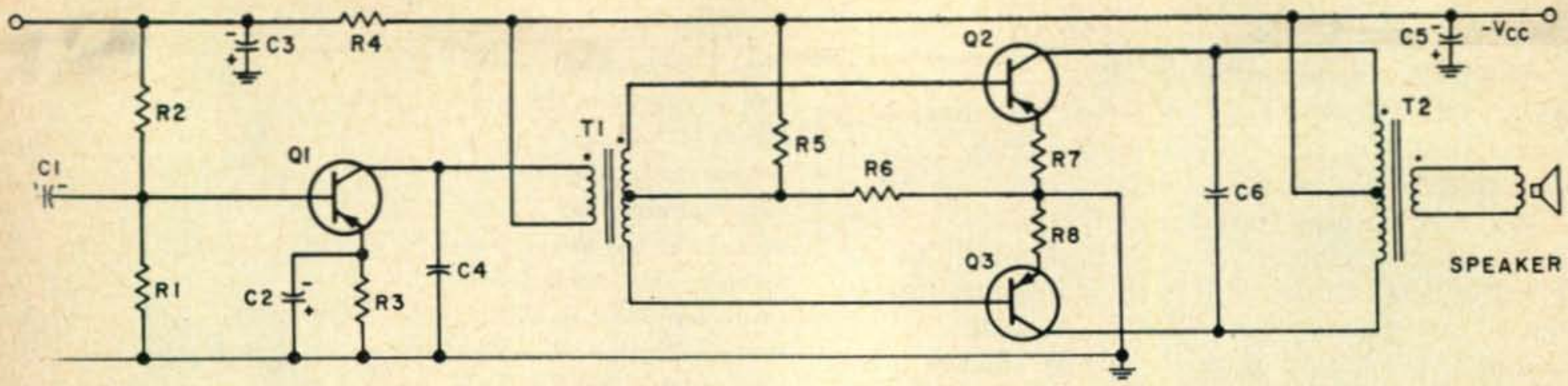


The production breakthrough was made possible by the perfection of an all-glass header which has been under development by Texas Instruments for more than two and one-half years. This new method allows a direct glass-to-metal seal between the metal case and glass header and enables almost complete use of mechanized production techniques.

From the glass header to the finished transistor, these devices are produced by machines and Continuous Automatic Testing (CAT) equipment. Each machine is capable of testing as many as 1800 transistors an hour without the possibility of human error.

There are ten types in the industrial series, numers 2N1372 through 2N1381. These units have 250 *mw* dissipation rating, 200 *ma* maximum collector current, and are temperature rated to 100°C. The 2N1380 is the "50¢ transistor" and, along with the 2N1381, has a typical *dc* beta of 100. Beta is 30 to 300 in 3-to-1 spread brackets for the remainder of the series, and the collector to base voltage range is between 12 and 45 volts. These transistors will be useful in medium frequency switching, servo, and audio amplifier applications.

Six transistor types are featured in the entertainment series. The 2N1273 and 2N1274 are intended as small signal class A or B amplifiers and can dissipate 150 *mw*. The 25 volt 2N1370 and 45 volt 2N1371 can also be used in class A or B circuits requiring higher gain. The 2N1382 and 2N1383 are medium power types and feature a collector dissipation of 200 *ma*. All entertainment types have a maximum junction temperature rating of 85°C.



Parts List 12V Push-Pull Amplifier

Vcc = 12 v	C_1	5 uf/3v
R_1 = 4.7 K	C_2	100 uf/
R_2 = 27 K	C_3	50 uf/12v
R_3 = 1 K	C_4	0.001 uf
R_4 = 330 ohms	C_5	50 uf/12v
R_5 = 3.9 K	C_6	0 068 uf
R_6 = 47 ohms	Speaker 3. 2 ohms	
R_7 = 4.7 ohms	Q_1; Q_2; Q_3 2N1383 per table	
R_8 = 4.7 ohms	T_1 7.5 K to 1.48 K center tapped	
	T_2 288 ohms C.T. to 3.2 ohms	

Fig. 3—Class B push pull audio amp using the low cost transistors.

Amplifier Performance Data

	Push-Push	Pull-Pull
Supply Voltage	12 v	12 v
Rated Power Out	500 mw	500 mw
Power at 10% Distortion	620 mw	620 mw
Distortion at Rated Power	6%	7%
Distortion at 100 mw Power	3%	3%
Input Impedance	1.0 K	1 K
Input Voltage for 100 mw Power Out	4 mv	5 mv
Power Gain	67 db	65 db
Response Down 3 db at	120 cps 5.0 kc	120 cps 5 kc
Battery Drain Zero Out	9.0 ma	8 ma
Rated Out	57 ma	69 ma

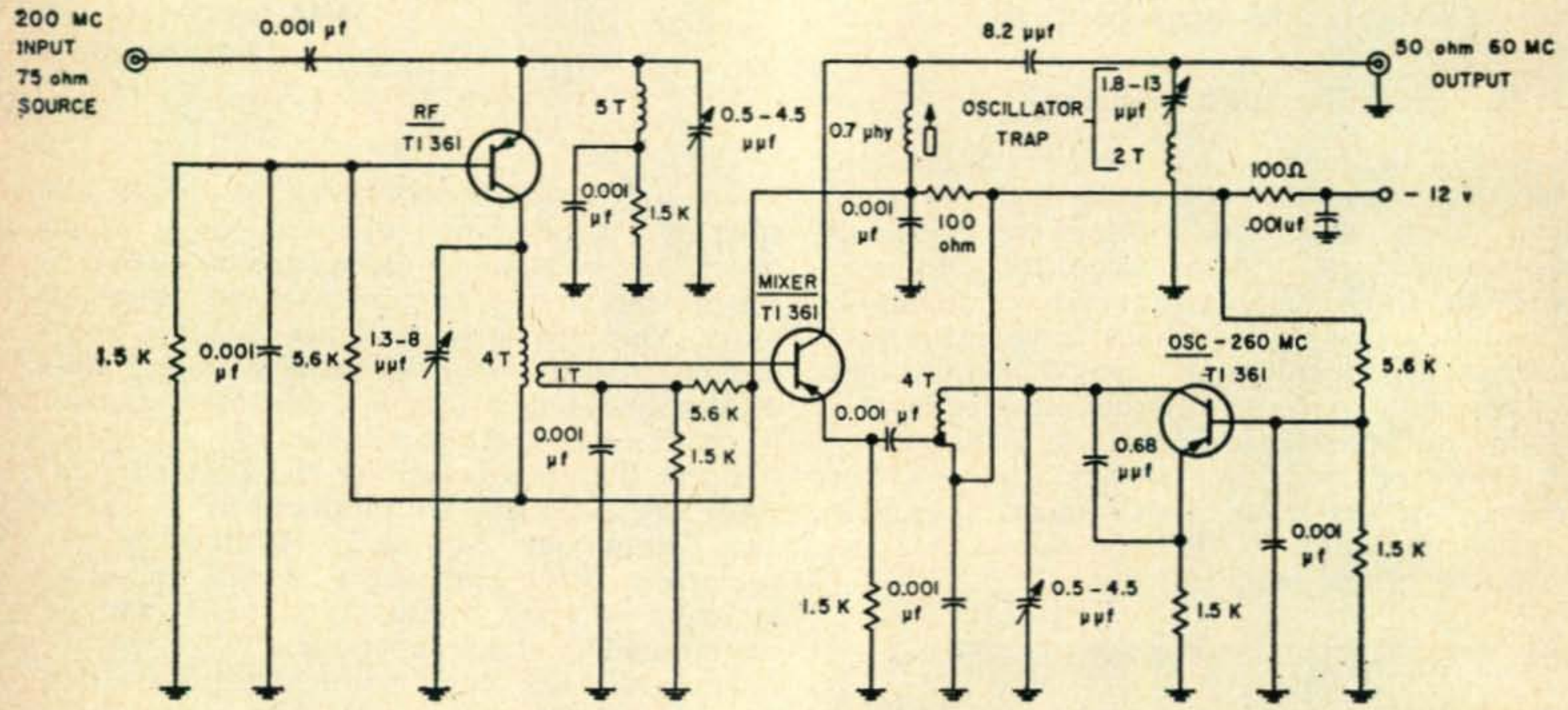


Fig. 4—A 220 mc self-excited converter.

A recommended class B audio amplifier using these low cost entertainment transistors is shown in fig. 3. A triad TY-56X can be used for T1 and a TY-57X will work nicely for T2. The parts list and performance data is also shown in fig. 1.

Of special interest to vhf experimenters are two new glass header PNP germanium MESA transistors, known as TI-360 and TI-361. Both transistors are packaged in a TO-9 case and have a fourth lead grounded to the can to minimize circuit radiation. To insure reliability over an operating range of −55 to +85°C, all units are heat cycled from −55 and room humidity to +85 and 95% relative humidity for four complete cycles over an eight hour period. A typical circuit gain of 15 *db* in 100 *mc rf* amplifier applications and a low 5.5 *db* noise figure can be obtained with the TI-360. The TI-361 will be a real performer on 144 and 220 *mc*, for it has a noise figure of 6.5 *db* at 200 mc. The price of these MESA transistors is less than $10.00.

A 220 *mc* self-excited converter is shown in fig. 4, and uses three of the TI-361's. It could be easily modified for two meters by adding about two turns to the high frequency coils. The *rf* amplifier is a common base circuit which is link coupled to the mixer. The oscillator is injected into the mixer emitter circuit and the *if* signals appear in the collector circuit. The trap in the output circuit should be made series resonant at the oscillator frequency. All

[*Continued on page 102*]

VHF

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

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

It seems like no matter how hard you try to get a message across, you can't always make the grade with everybody. Maybe it isn't surprising but sometimes it is discouraging. For instance; the last time I was at a ham get-together I was buttonholed by a serious feller who began his pitch with "I know you don't like long john beams, but—." Now I can't honestly say that I like long john beams any more than I like any other type of antenna. The point I have been trying to get across is that the type of antenna that you use should be dictated by the results you desire, rather than by what happens to be the fad of the moment. It isn't the proper ham spirit to believe what someone else tells you about how something works. Ham tradition dictates (and Predates) a Marlboro-like attitude. Any self respecting ham thinks for himself. As a matter of fact, he is more or less inclined to lean over backward in his efforts to prove that the established theory is demonstrably wrong. Without this attitude ham radio might as well fold up and convert to a citizen band type of operation. I feel that the biggest trouble with hams today is that they believe that Ohm's law can't be broken. The attitude that you can't build a better receiver than you can buy is most deplorable. The vhf fraternity is indeed the last bastion of the old line ham. Even though the manufacturers are starting to invade the vhf field, they are in fact selling Ham designed and proven equipment. And no matter how hard they try they still can't equal the performance of a Ham built piece of gear. If you are willing to be satisfied with "run of the mill" performance, you buy your gear. If you want top notch performance, you get out the soldering iron and fix it. To put it bluntly; "You can't buy yourself into being a ham. You have to work at it."

Project Moon

The 1296 moon bounce project mentioned in last month's column is progressing toward the operating stage. At present we are intending to operate on a frequency of 1296.0 megacycles. It would be of considerable help if anyone who has gear operating on this band would let us know how the interference problem looks.

In the New England area the 1296 frequency is as clear of crud as you can expect in these days of high power radars, etc. If you have any suggestions as the best "clear frequency" in your area we would like to know *now*. Our transmitter is not *vfo* and we need some lead time in order to get suitable crystals. Furthermore, if you want to listen for the Moon echo please send a stamped, self-addressed envelope to the Rhododendron Swamp V.H.F. Society. P.O. Box 334, Medfield, Mass. As soon as we are operational, we will send out our transmission schedule to all who request. We also will be transmitting liaison information on 3695 *kc* CW or 3830 *kc* SSB.

Ham-Fest

"The East Coast VHF Society Inc." is holding its 2nd Annual Dinner and Ham-Fest on February 21, 1960, at the Hotel Alexander Hamilton in Paterson, New Jersey. Tickets or information available from Nick Franetovich, 100 Surrey Lane, River Edge, New Jersey. I understand that the 1st annual was quite a "do", so it's your own fault if you miss the "2nd Annual."

Awards

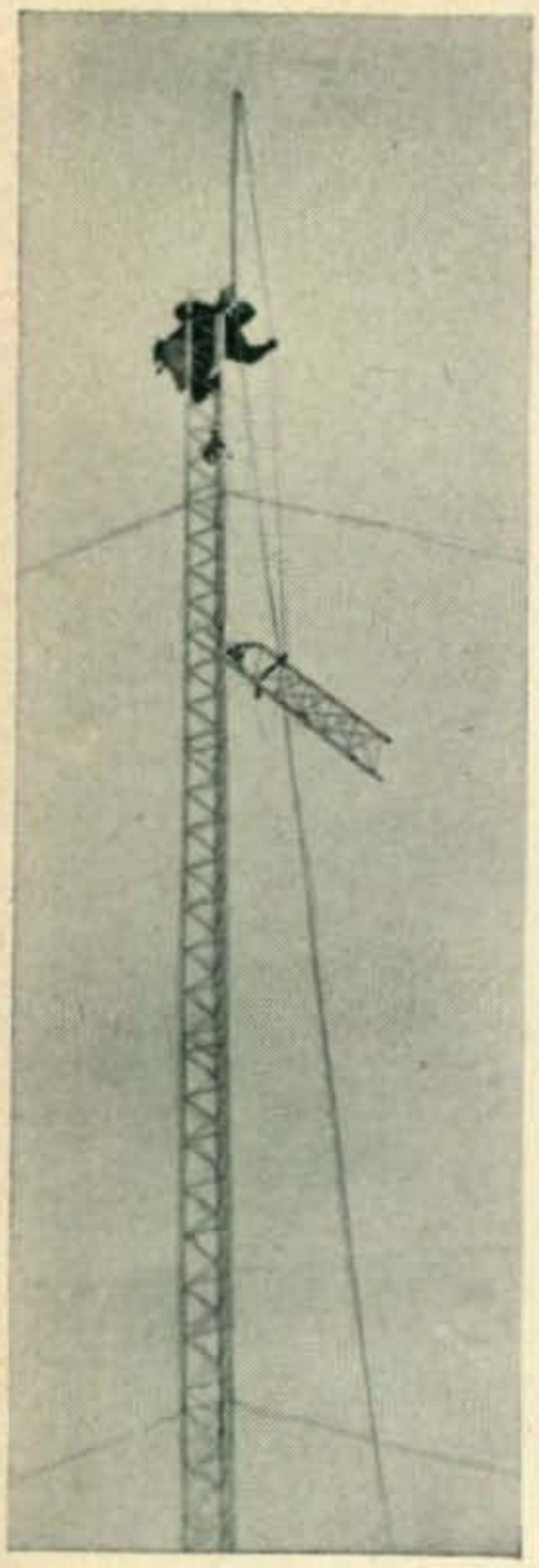
The "Kansas Radio Club" has issued a VHF award for VHFers. Contacts must have been made since January 1, 1947, and QSLs must be sent along with fifty cents to obtain certificates to: Kansas Radio Club—5019 Gramar, Wichita, Kansas. Novice stations must work 5 Kansas stations; DX stations must work 2 Kansas stations; Kansas stations must work 20


The Kansas Radio Club

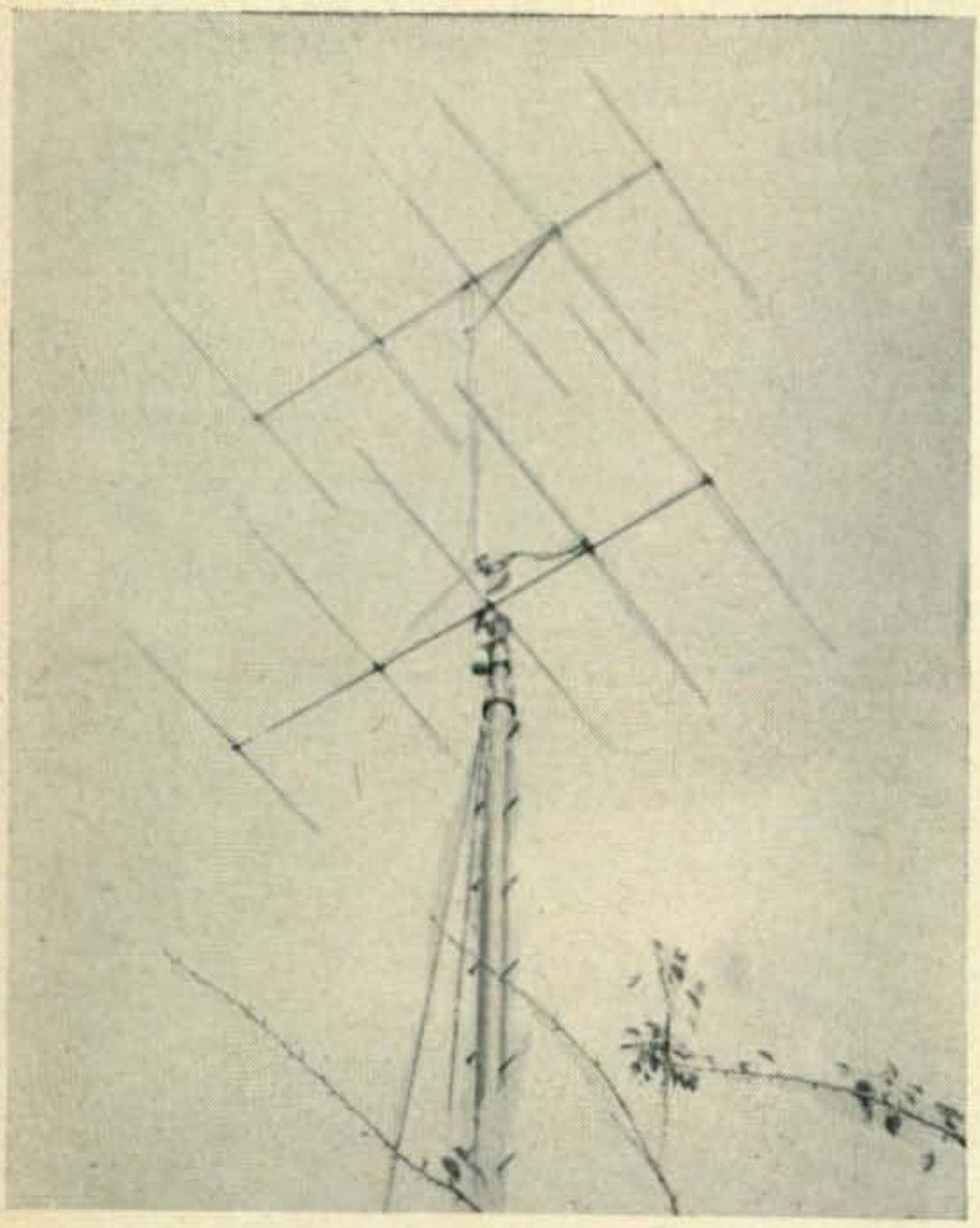
Presents the

Worked Kansas Award

NOVICE CERTIFICATE



UP She Goes! Pat (W1HIV) guides the top section of W1FRR's new 110' Rhone tower into place. Total erection time for the tower: 3 hours working, 3 hours talking. Not shown is the elevating power on the other end of the rope (W1FRR and W1PYM).



Five over five on a hydraulicly raised tower at W1TQZ. Frank designed and built the tower. (Rumor has it that a wind storm cleaned the antennas off, but left the tower intact.)

Kansas stations. Any others outside of Kansas in the U.S. must work ten Kansas stations.

Clubs

A new group has been formed called "Sunday Morning Radiators". This group meets on Sunday mornings from 0700 until 0930 on 50.31 *mc*. Everyone welcome to check in, and a certificate will be sent out. I've received no details on what is necessary to obtain this certificate, but when you check into the "Radiators" you can inquire. Information was sent from Canton, Ohio by Bill Croston, K8ECK.

The "No'West Club" has run into a problem with its certificate concerning effective date of contacts. Because of the "problem" the effective date has been deleted from the rules and those who have made the necessary contacts will receive the certificate regardless of date.

Contact Daniel J. Marx, W7CYQ, 11140 Luther Ave., South, Seattle 88, Washington, for information etc., concerning certificate.

Letters

Camarillo, California. From the sunny state we hear from Fred Brown, W6HPH, that:

"I am planning an effective station for 1296 *mc*. My converter is patterned after the one in January '58 'CQ', and the performance is very gratifying. I've heard W6BLK in San Diego, 153 miles over 2000 ft. mountains, using only a 19 element yagi. The mixer is an MA421B. I intend to build a parametric amplifier for my 432 converter, and then graduate to 1296. I have a 2C39 rig under construction, but hope eventually to run 1 kw." *Congratulations, Fred. Glad to hear that you've been working with the paramps and that you're happy with the outcome.*

Tucson, Arizona. Proof of 220 *mc* activity in Arizona comes from Dick Mills, W7AMH:

"K7HID-Jim, K7HJD-Darel, and W7AMH-Dick, are all on 220 *mc*. Would like anyone else in this area who is on 220 *mc* to get in touch with me at Ma 4-1043." *Interesting Dick, but how about letting the vhf gang know what you three are doing or are intending to do.*

Nedrow, New York. Jim O'Hern (W2WZR) sez:

"Just a line to let you know that myself and W2CTJ are on 2 meter SSB. We are running relatively low power at present, but both will run 1 KW very soon."

"In the 6360 driver class at present. All gear is 100% homebrew of course, and the ball shall soon start rolling on 2 SSB."

"Soon to get on — K2ATD, K2GGA, W2RHQ, W2TVO, VE3NW and VE3BHW."

"Of course I'm still on 2 CW for aurora, but soon as I get the shoes on this thing I would like to try SSB on aurora. Any takers?" *Sounds very good to me Jim, and bet you'll get a number of "takers". Good luck.*

Peoria, Illinos. A hint coming from Stan

Kujawa (K9JSB) at Bradley University, ought to be a good one. "Are you having trouble with the dial slipping on your Communicator III? Here is one solution. Insert through the U-frame of the tuning mechanism a number 4-40 screw with a nut 1¼ inches long, or enlarge the two holes with a number 27 drill and insert a 6-32 screw with a nut; ¼ inch long. Tighten the nut just enough to keep the dial from slipping." *Thanks Stan. Get busy fellas.*

Johnson City, Tennessee. A few timely comments concerning two meters from Bill, W4UVP. "There is little or no real two meter activity here, althought I am working my brother, W4VSN, almost nightly on skeds at 2130 on 144.08. This is 100 miles between Johnson City and Oak Ridge."

"Haven't heard W4ZXI in three months, did hear W8KAY last week for the first time in months. I'm running a Tecraft, Seneca, and ten element Hy-gain here. Ed, W4VSN, is running Tecraft, 4CS250B for about a half gallon, to seven element beam. He is also running same 4CS250B to ten elements on 220 *mc*, and has been scanning 220 *mc* every time aurora warning from WWV appears, or conditions on 144 appear to be good. He has been doing this for the past 2½ years and has heard W4WUX/4 on White Top Mountain, Va., no stations worked. *Discouraging isn't it?* He has heard of, or seen in print, numerous stories of 220 *mc* plans but not one station has he found to be on within a reasonable working range, i.e. 250-300 miles. He can be on 420 *mc* within a very short time should someone get on that band."

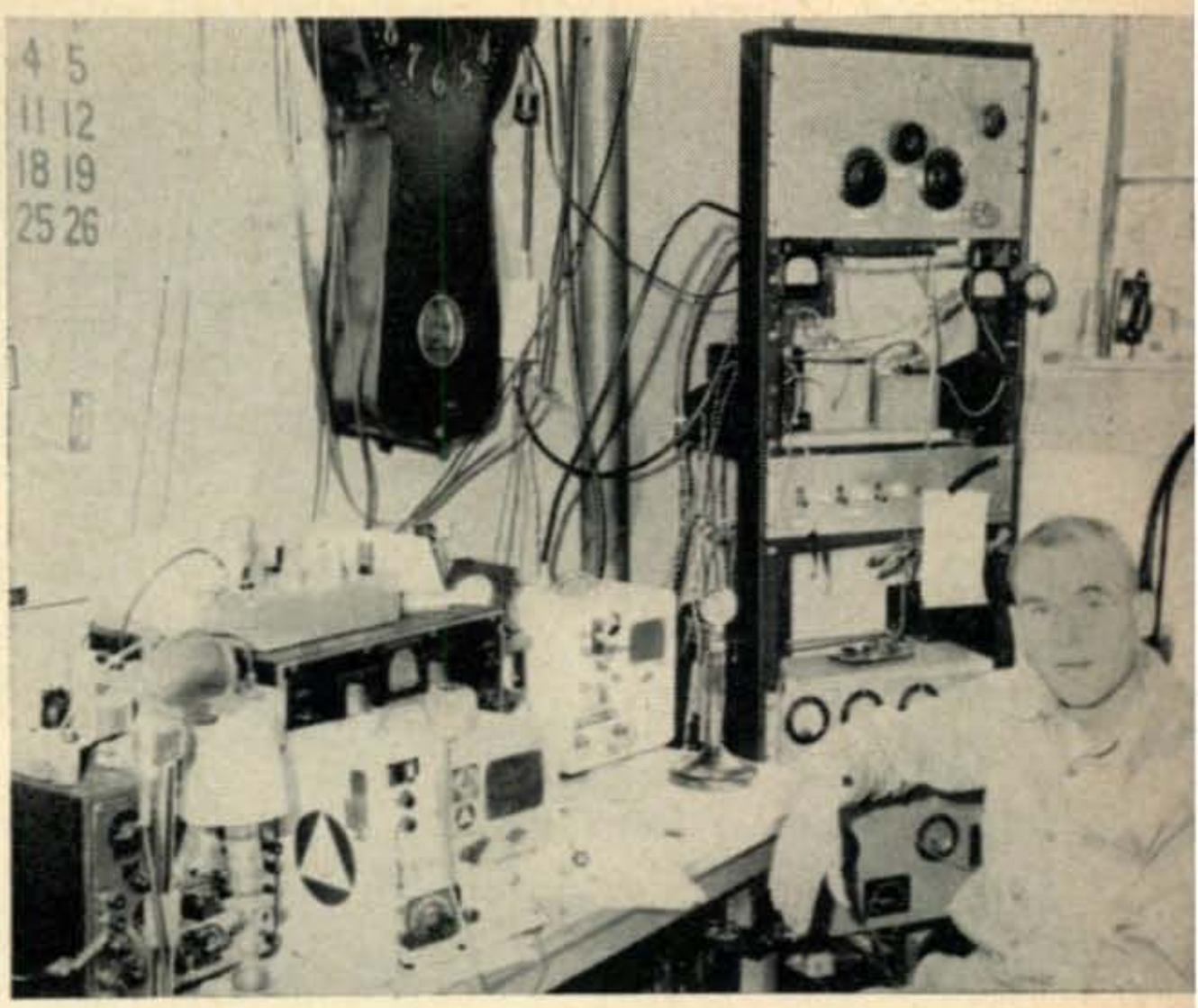
"Would like to try some 144 *mc* skeds in late evenings. Tropo work is nearly impossible here as 3000-5000 ft mountains to N.W., north, east, south and southwest, and from 3-25 miles away effectively block any but the strongest fronts. *Hey, you're down in a hole, aren't you?* Results here after ten months, 14 stations and seven states, most of the states on one aurora, for 144 *mc* trying." *Well at least no one can say that you're not trying Bill. Keep it up, maybe some of those skeds will come through and you'll 'make hay'.*

Bellingham, Washington. Donald Smith (KN7HNI) has this to say for two meters:

"Where all of the active hams on two meters have gone in the last few months is a mystery to what is left of the gang." *Ever try listening on 75, Don? That's where I found 'em.*

"There are a couple of VE7 stations going on SSB at the present time and one that I know of is there already. Two meters is gaining quite a bit of interest in the area around Vancouver at the present time and it's a shame that the fellows that are building rigs won't find as much activity as there was in the past. Almost all of the operating in this area is between 145 and 147.4 *mc* with at present about fifteen stations on the air. I received notice of passing my tech-

[*Continued on page 102*]



Frank LeBaron (W1TQZ) doesn't believe everything you tell him. That big rack has RK65's in a six meter final.

W8TTU (W. L. Wettel) of Piqua, Ohio, sports one of the new Tapetone receivers. This station has 46 states and 5 continents on six meters so far.

Gar Tomlin (K1DR) and Fred Collins (W1FRR) at the operating position of the R.S.V.H.F.S. (Too much talk. Not enough work. Ed.)

PROPAGATION

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

Last Minute Forecast

Radio storms of at least moderate intensity are most likely to occur during March 6-8 and March 20-25. These storms are likely to be accompanied by auroral displays. The period March 13-18 is expected to be somewhat better than normal, with relatively good shortwave propagation conditions.

General Conditions

March and the spring months in the Northern Hemisphere correspond to the fall season in the Southern Hemisphere. During these seasons relatively similar propagation conditions exist in the temperate regions of both hemispheres as compared to the extreme conditions that exist when it is summer in one and winter in the other. As a result of this "equalization effect," radio propagation conditions on paths between both hemispheres are at their best during the spring (or fall) months. Maximum usable frequencies are at their highest values, signal intensities at their strongest levels. Openings on these inter-hemisphere circuits, for example to Australasia and South Africa, are expected on all bands between 10 and 80 meters, with the possibility that some openings may also occur on 160 meters.

For other areas of the world, typical springtime propagation conditions begin to occur during March. Fewer openings are forecast for 10 meters, but with increased hours of daylight

Auroral displays are known to occur more often during March than during any other time of the year, and coincident with these displays there is a greater tendency for severe and prolonged ionspheric disturbances, or radio storms, to occur. An increase in aurora type ionospheric openings in the vhf amateur bands also usually occurs during March.

Sunspot Cycle

Sunspot cycle 19, the most intense solar cycle ever recorded, is now on its way down. Reaching an unprecedented maximum in March, 1958 with a smoothed sunspot number of 201, the cycle had declined to a number of 158 by June, 1959. A smoothed sunspot number of 125 is forecast for March, 1960. The progress of cycle 19 since it began during 1954, as well as a prediction for the next year, is shown in figure 1. The smoothed sunspot numbers for the present cycle, and those predicted for the coming year, are also tabulated in Table 1.

The new year, 1960, began with a predicted

MARCH, 1960

ALL TIMES IN E. S. T.

EASTERN USA TO:

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

ALL TIMES IN C. S. T. (Cont'd.)

CENTRAL USA TO:

	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Central & South Asia	9A-11A (1) 11A-2P (2) 2P-4P (1) 4P-6P (3) 6P-8P (1)	8A-11A (3) 11A-3P (2) 3P-7P (1) 7P-9P (2)	10P-12M (1) 12M-3A (2) 3A-6A (1) 6A-9A (2) 9A-12N (1)	NIL
Australasia	8A-11A (2) 11A-3P (1) 3P-8P (4) 8P-10P (2)	8A-11A (3) 11A-2P (1) 2P-9P (2) 9P-12M (3) 12M-2A (2)	11P-1A (1) 1A-5A (4) 5A-7A (2) 7A-9A (3) 9A-11A (2) 11A-4P (1)	3A-8A (3) 4A-7A (2)**
Antarctica	12N-2P (1) 2P-8P (3) 8P-10P (2)	12N-6P (2) 6P-10P (3) 10P-1A (2)	3P-6P (1) 6P-9P (2) 9P-2A (3) 2A-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-8A (1) 8A-1P (2) 1P-3P (1)	6A-10A (1) 10A-12N (2) 12N-3P (3) 3P-5P (2) 5P-9P (1)	11A-1P (1) 1P-3P (2) 3P-6P (3) 6P-9P (2) 9P-3A (1)	7P-11P (1) 8P-10P (1)**
Central & South Africa	6A-8A (1) 8A-1P (3) 1P-4P (2) 4P-6P (1)	7A-9A (1) 9A-1P (2) 1P-4P (3) 4P-9P (1) 9P-11P (2)	12N-2P (1) 2P-6P (2) 6P-10P (3) 10P-12M (2)	7P-10P (1)
South America	10A-1P (2)* 4P-7P (1)* 6A-12N (3) 12N-4P (4) 4P-6P (3) 6P-9P (2)	5A-1P (2) 1P-3P (3) 3P-6P (4) 6P-9P (3) 9P-12M (2) 12M-2A (1)	8A-2P (1) 2P-4P (2) 4P-6P (3) 6P-10P (5) 10P-4A (4) 4A-8A (3)	6P-10P (2) 10P-2A (3) 2A-6A (2) 8P-1A (2)**
Guam & Pacific Islands	9A-12N (1) 12N-4P (2) 4P-6P (4) 6P-8P (2) 8P-10P (1)	8A-11A (1) 11A-1P (2) 1P-6P (1) 6P-10P (3) 10P-3A (1)	8P-10P (2) 10P-3A (3) 3A-6A (2) 6A-9A (3) 9A-11A (1)	2A-7A (3) 3A-6A (2)**
Australasia	8A-12N (2) 12N-4P (1) 4P-6P (2) 6P-8P (4) 8P-10P (2)	7A-12N (2) 12N-5P (1) 5P-7P (2) 7P-11P (4) 11P-2A (2)	4A-9A (3) 9A-11A (2) 11A-7P (1) 7P-9P (2) 9P-12M (4) 12M-4A (2)	1A-4A (2) 4A-7A (3) 4A-6A (2)**
Japan, Okinawa & Far East	1P-3P (2) 3P-6P (3) 6P-8P (2) 8P-10P (1)	11A-1P (2) 1P-5P (3) 5P-7P (4) 7P-11P (2) 11P-2A (1)	5P-8P (2) 8P-10P (3) 10P-3A (4) 3A-8A (3) 8A-12N (2) 12N-5P (1)	1A-4A (2) 4A-6A (3) 1A-5A (1)**
Philippine Islands & East Indies	9A-1P (1) 1P-3P (2) 3P-5P (3) 5P-7P (2) 7P-9P (1)	8A-12N (2) 12N-6P (1) 6P-10P (3) 10P-2A (1)	10P-12M (1) 12M-2A (2) 2A-4A (3) 4A-10A (2) 10A-2P (1)	3A-6A (1)
Malaya & Southeast Asia	9A-11A (2) 11A-2P (1) 2P-4P (2) 4P-6P (3) 6P-8P (2) 8P-10P (1)	8A-12N (2) 12N-6P (1) 6P-9P (3) 9P-2A (1)	12M-3A (1) 3A-6A (2) 6A-8A (3) 8A-11A (2) 11A-1P (1)	4A-7A (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 United States and are valid through April 15, 1960. These forecasts are based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

* Indicates six-meter opening forecasts
** Indicates eighty-meter opening forecasts.

A means A. M. N means Noon
P means P. M. M means Midnight

SURPLUS

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

BC 603 Conversion—September and October 1958

Due to the great interest in this data, our back issues have been depleted. The Surplus Column for these two months has been reprinted in booklet form and is available from the circulation department for 50¢.

Considering the amount of mail we have received here in recent months regarding the ART-13 transmitter, we are more or less forced to discuss this equipment. Not having converted the ART-13 leaves us with a bit of a problem, but we have seen a lot of conversions on this equipment and we did manage to use it in service. The ART-13, or as it is known among the older Navy men, the ATC, is an autotune transmitter designed by Collins, operating in the 2.0 to 18.1 *mc* range. The power into the final is about 200 watts and it was capable of CW, MCW or Phone operation. Keying rates up to 25 *wmp* are possible and a low frequency adapter is available for the 200 to 1500 *kc* band. Ten preset channels are provided and any channel can be set and later selected automatically. The *vfo* is typical Collins quality and the ART-13 includes a crystal calibrator to further check to calibration of the *vfo*. The final stage is a single 813, modulated by a pair of 811 tubes.

The original equipment included a remote control box, an antenna matching network, etc. However, it is not necessary to have these accessories in order to operate the basic transmitter. The addition of a suitable power supply is all that is really necessary. Several arrangements can be worked out to simplify the power supply according to what surplus transformers are available, or whether you can supply the necessary *dc* voltages. The simplest solution would be to supply 28 volts *dc* at well over 40 amperes for the basic input. Power supplies like this are hard to come by, and then you may not have the original dynamotor available. The second solution is to supply 28 volts at ten amperes for the filament, blower motor and autotune motors, as well as all relays. You would then have to supply an additional 400 volts at 225 *ma* for the low level stages and 1250 volts at 300 *ma* for the modulators and *rf* final. In most cases a power supply would have to be built, but don't overlook the possibility of using existing supplies if you happen to have one similar in ratings.

To our knowledge, only a couple of conversions have appeared in print. CQ ran a conversion in the November 1946 and February 1947 issues, with some additional data on the speech system in the December 1947 issue. The Radio Handbook, Eleventh Edition, now out of print, devotes several pages to the conversion, including a modification to ten meters, and a very well designed power supply. The special note regarding the ART-13 antenna circuit is worthwhile reading, and will be discussed further on in the column you are now reading. Another fine conversion appeared in the Surplus Radio Conversion Manual, Volume 2, available from the Radio Bookshop for $2.50.

When the ART-13 first became available after the war (WW-II) the going price was well over two hundred in good condition. The airlines gobbled them up and they are still in use by them for communications purposes. About a year ago they again started appearing on the surplus market, at give-away prices, usually well under fifty dollars. Adding a power supply to the unit may bring the cost up to about ninety, but where could you buy a (conservatively rated) 200 watt transmitter for under a hundred dollars complete?

Reducing TVI

The main complaint we hear most about the ART-13 is that it is a great generator of TVI. Probably the complaint is justified. The driver (frequency multiplier) is a 1625 (a 12 volt 807) and is probably the offending circuit. The solution is the same as it would be for any transmitter . . . good shielding and filtering and using just enough power to do the job. Obviously using a 70 watt buffer stage to drive an 813 is not going to help. However, a redesigning is not necessary, for the ART-13 is in a fine metal cabinet and shielding and filtering can work wonders. Much has been written about shielding for TVI, but sometimes the materials are not available for a good job. The individual compartments of the ART-13 can be shielded, where necessary, but good contact between shields and the main chassis is an absolute must. Considering that this is military equipment, the possibility exists that either moisture proof paint or corrosion has gotten onto the chassis. For best results sand the chassis so each shield flange will make good contact. In modern military equipment, a woven braid is used between such shields to provide a continuous contact. While this material is expensive, it can be duplicated fairly cheaply by means of steel-wool pulled into a strand about a quarter inch thick and twisted slightly so as to sort of lock the strands. Make sure that no strands work free or a short may occur. Force this between the chassis and the shield and tighten the screws holding the shield. Of course if you solder a shield to a chassis it isn't necessary to use the steel wool.

The shielding of meters and leads as shown

in the ARRL handbook should eliminate most of the radiation escaping from the cabinet.

The harmonic radiation getting to the antenna has to be eliminated for a perfectly clean signal. The use of filters in the antenna line is highly recommended, but unless they are matched as far as the input and output impedances are concerned they will be of little value. The antenna tuning circuit of the ART-13 will act as a filter as well as matching impedances. The filter should be used only if it can be used in a transmission line of the same impedance. The ability of the antenna tuning system to match almost any antenna should make this a relatively simple matter.

Output Network

The output network is designed to be a pi-network on all frequencies above 5 *mc*, and an inverted "L" network below that frequency. Each circuit has the properties of impedance matching within certain impedances (See CQ November 1953 and September 1950). For amateur use in the 80 meter band it is desirable to convert the "L" network into a pi-network. This is easily done by connecting a variable capacitor between the "COND" terminal and ground. Find the value which gives the best match and then substitute a fixed air or ceramic capacitor in its place. The Radio Handbook mentioned that a value about 200 mmf was sufficient for the match to a 300 ohm line. The capacitor is not needed above 80 meters.

The local surplus people in New York City and thereabouts have made some arrangements to put together a package of components necessary for the power supply of the ART-13. Algerradio in Hempstead, N.Y., will match his supply of components to your needs. Drop your dealer a line and you will probably find that you will get a better deal than you would ordinarily. When ordering the parts, as well as the ART-13 don't forget that the weight of solid metal is quite a lot, and ordering local will eventually save money overall as compared to the bargain far away.

Mail

Glenn Whittaker, 537 West Hunt Rd., Alcoa, Tennessee, is looking for manuals and handbooks on radar including such indicators as the APN-12 and the BC-929. Ray Lunsford, 423 Hembree Street, Knoxville, Tennessee, needs conversion info on the BC-604 transmitter. Don Halford, W9VJD, 5632 South Maryland, Chicago 37, Illinois needs a manual for the Hickok 540 tube tester. From the Rager Ranger Station, LaRay Armstrong asks for manuals on the T-4/FRC, TS-34 and the BC-779, write him care of Paulina, Oregon. Walter Wilkenson, K8LUR needs a manual for the ART-13 and the TDG-1 transmitter. K3EGK needs a handbook on the BC-1033.

From John Armstrong, 32 Hillfield Place, Cardigan, W. Wales comes a request for the conversion and handbook for the RT3A/APS-13. In return he can offer a BC-611 manual. WV6HXM needs a manual on the URC-4 and other handi-talkies. Edwin Lake, 1930 Ottawa Beach Road, Holland, Michigan needs conversion information on the BC-1066. Clint Sprott, K4BOM, 607 Center Drive, Memphis, Tennessee wants the APN-1 handbook, Niel Friend, RFD, Manlius, N.Y. is looking for a handbook and something worthwhile to convert the BC-771 to.

CN8HO needs cabling information for the AN/VRC-4 and can be reached care of W6-NCP. Tommy Preston writes for the APQ-7, APG-5, APG-3 and APX-6 books. His address is 326 W. Virginia, Sebring, Ohio. Bob Bisha, 21 Pine Ridge Circle, No. Syracuse, N.Y. wants info on the RDZ and the R-430/ARN-5. K7EYT would like to locate the ESB-1, CR-10 and the CRC-11 manuals. George Kersh, 176 Tara Street, San Francisco 12, Calif. will trade the manuals on the BC-603/604 and the I-177 for a manual on the AN/URC-4. Rod Hogg, KØEOH, 715 N. Sheridan St., Minneapolis, Kansas wants the handbook for the Navy version of the HRO, the TCS and the BC-746. Bob Nelms, KØVTT, 1102 E. Columbia, Colorado Springs, Colorado needs the LAK (Navy) signal generator handbook and can supply schematics for much aircraft equipment such as the APT, APR, ARR, ALT, ALA, etc.

Norman McCourt, KØIPD, 6014 Dowling Avenue, Berkeley 34, Missouri requests the tech manuals on the BC-221-L, the BC-669 and the SCR-522. Lloyd Olsen, 540 Blvd. Drive, Prince Albert, Sask., Canada will trade a BC-348 manual for a BC-224 manual. Fred J. Dering, K6LYU, 10211 Dixon Ave., Inglewood 4, California needs a manual on the TDZ. Bob Draycott is looking for a conversion for the ID-6B/APN-4 to a bench scope. His address is 28 Spring Street, Red Bank, N.J. Bob Schwarer, 303 Bangs Street, Wauconda, Illinois is looking for the manual on the SCR-522. Frisco Roberts, W5APT, 807 South Carancahua Street, Corpus Christi, Texas wants a conversion for the ID-80 radar indicator. Fallington Graf, 228 N. Mary Street, Lancaster, Pa. will swap a BC-610 manual for a BC-779G manual. K1GCX, R. W. Randall, 43A University Heights, Burlington, Vermont, wants info on the BC-1158. E. V. Manchester, W8ZWL, 289 W. Broadway, Muskegon Heights, Michigan needs the manual on the APS-15.

Re The I-177

We have been literally swamped with info on the I-177 and can pass the following information on for what it's worth. K8KTM tells us that the Hickok Company made the I-177 in a civilian package as their AC-51. The handbook is available for $1.00 from Hickok Electric Instrument Co., 10514 Dupont Avenue, Cleveland 8, Ohio.

73, Ken, W2HDM

YL

by Louisa B. Sando, W5RZJ
212 Sombrio Drive, Santa Fe, N.M.

YLRL 20th A.P. Scores

Phone

W1ZEN	8450*	KH6DLD	10,118*	K1IJV	1680*
K1IZT	6038*	W7TGG	7128	W1YPH	1334
W1ICV	3784	W7DIC	5850*	K1ADY	165*
W1SCS	3772	K7GEB	5555*	K2JYZ	2828*
K1DWH	2498*	W7FDE	5536*	K2ZQG	1920*
W1YPT	1983*	W7HXE	5250	K2CUQ	180*
K1ADY	553	K7CHA	4848	W3TSC	2125*
K2JYZ	11,025*	K7EBY	3998*	W3URU	1398*
K2CUQ	974*	K7IVK	3705*	K5SPD/3	1283*
W2OWL	659*	W7CSQ	2975*	W4HLF	2395*
W2EEO	24	K7GQL	2275	K4HXB	2295*
W3URU	8414*	W7DIF	2170*	W4BIL	1899*
W3MDJ	5336	W7HWV	1885*	K4SAF	1511*
W3JST	4750*	W7GGV	1789*	K4LSI	1031
K5SPD/3	3369*	K7ADI	1495*	K4TFL	825*
W4CWV		W7NJS	236*	W4UF	782
(W4LMK)	12,658	KL7ALZ	6688*	K4DNL	440*
W4SGD	10,850*	KL7BLL	1958*	K4BKT	CFM
K4TGA	9686	W8HUX	6956*	K4LVE	CFM
W4HLF	8775*	W8ITF	2356*	K5PFF	2700*
K4DNL	6250*	W8RIR	1856*	K5YIB	2683*
K4RNS	5612	W8WUT	1755*	K5TXQ	2520*
W4KZT	5003*	W8VRH	1560*	K5BJU	2205
W4WPD	4950*	W8OTK	1313*	K5BNQ	2021*
K4CZP	4488	K8MQB	CFM	K6OWQ	2109
W4BIL	3848*	K9CQF	8188*	K6BUS	1550*
W4UF	3569	K9QGR	4920*	W6UHA	1519
K4LSI	3373*	K9JVL	3105*	W6PCA	1295*
W4HYV	158*	K9JDE	2890*	K6VUE	400*
K4BKT	CFM	K9ILK	2868*	W6CEE	261*
K5BNQ	15,031*	W9VNG	2593*	W6QGX	240
K5YIB	11,948*	W9GME	1238*	WA6CCR	88*
K5BJU	11,844	K9TUD	935*	WA6AOE	CFM
W5DRI	10,325*	WØSZH	7685	W6DXI	CFM
K5OPT	10.004	KØGIC	6105*	W7PUV	2253*
W5JCY	7865	KØHEU	5885*	W7GUQ	1980
W5WXT	7595*	KØIKL	5198*	W7HXE	1953*
W5ZPD	5400*	WØVTX	2774	K7EQM	990*
K5IMD	3753*	KØEVG	1908	W7FDE	949*
K5RUI	3025*	WØWDM	1400*	W7WHV	625*
K5PFF	3015*	WØZWL	1400*	W7DIF	31*
K5RJJ	2635*	KØKLQ	1290*	KL7ALZ	906*
W5LGY	1890*	KØBMS	1170*	KL7BLL	31*
K5JGC	1849*	KØMMR	960*	W8WQE	1522*
K5MIZ	1375*	CR7LU	180*	W8NAL	575*
K5TXQ	1183*	DL6VM	350*	W8OTK	473*
W5RZJ	553*	JA1YL	2414	W8SJF	238
K5MXO	219*	KA2HA	1788*	K8MQB	CFM
W5DRA	CFM	KG6AIA	1026	W8WUT	CFM
W6QGX	11,100	KP4APX	4235*	W9MLE	2432
K6KCI	8680*	K6QPG/KW6	3423*	K9AVK	1538*
W6GGX	7155*			K9TUD	1463*
K6OQD	6580*	LU4DMG	1452	K9DXK	1392*
W6CEE	5344*	OA4HK	260	K9IWR	CFM
K6EXQ	5220	OH5SL	740	W9USR	CFM
W6WDL	4818*	VE3AJR	800*	KØ1KL	3885*
W6UHA	4738	VE3DDA	240*	CR7LU	5*
W6WBH	3981*	VE6YW	1380*	JA1YL	108
K6UHI	3612	VE7NW	5681	KA2HA	45*
WA6AOE	3400*	VE7ADR	4600	K6QPG/KW6	53*
WA6CCR	3285*	SP5JP	1121*	OA4HK	90*
K6ANG	3250*	ZS5OB	1400*	VE3AJR	2809*
W6JMS	2646*	ZS6APG	179*	VE3DKY	2204
W6PCN	1150*	ZS6AEU	49	VE5DZ	945
K6VUE	750*			VE7ADR	1426
W6DXI	CFM	**CW**		VK3KS	6
W6JZA	CFM	W1ICV	1848	JA9NB	CFM

Results YLRL 20th A.P.

Congratulations to the top scorers in YLRL's 20th Anniversary Party! We can't all be winners—but all had a wonderful time. In the Phone Section, Nov. 11-12, 1959, top place and the gold cup went to K5BNQ, Doris Anderson. Doris had 185 contacts in 65 sections with a score of 15,031 (low power multiplier). W4LKM, Annette Thompson, using OM's call W4CWV, placed 2nd with 12,658 points. Third high was earned by K5YIB, Barbara Houston, with score of 11,948.

In the CW Section, Nov. 18-19, KØIKL, Joyce Polley, won the gold cup with 3,885 points earned for 74 contacts in 42 sections (using low power). Joy placed 2nd on CW in the 19th A.P. a year ago. K2JYZ, Lillian Byrne, came in 2nd with 2,828 points, having worked up from 3rd place in the 19th A.P. (see photo and write-up in CQ Feb. '59, p. 61). K5PFF, Audrey Beyer, came in third with 2,700. (For her photo and write-up see CQ Oct. '59, p. 108.)

Special congratulations to K5BNQ, Doris, for also winning the Corcoran Award, presented for the first time in the 20th A.P., to the YLRL member earning the highest combined phone and cw score. To her 15,031 points on phone she added 2,021 on CW for a total of 17,052. The 2nd high combined score was earned by K5YIB, Barbie, with 14,631, followed closely by K5BJU, Harriett, with 14,049 points.

The YLs with the highest phone and CW scores in each section, U.S. possession, VE district and country will receive a certificate. W6DXI, Gladys, expresses special thanks to W6QGX, W6CEE, W6WBH and K6OQD who assisted in checking logs. Contest scores appear below. Asterisk indicates low power multiplier.

Coming YL Conventions

Last call for the **2nd Annual California YL Convention,** to be held March 4-6 at Sacramento. Check Feb. CQ for details.

Big YL gathering next on the calendar is the **10th Annual Midwest YL Convention** May 20-

21 at the Mohawk Manor Motorist Hotel at Indianapolis. The HAWKs are sponsoring it with W9RTH, Ada, as chairman. Registration fee is $2 and should be sent to Ada. Highlights will include luncheon, tour of Western Electric Co.'s plant, buffet supper and PJ party on the 20th. Saturday will offer a shopping tour, YL luncheon and Forum and evening banquet. In addition to the W.E. tour and banquet, OMs are invited to a Swap, Shop and Auction on Fri. with IRC as host and on Sat. to attend the Time Trails.

Plans are rolling ahead for the **3rd International YLRL Convention** to be held June 17-19, 1960, at Cambridge, Mass., sponsored by WRONE. Among the first reservations received were 4 from California YLs—come on, gals, let's join 'em! The convention souvenir bedspread, made of embroidered squares representing the YL club certificates, is going together nicely. You can get tickets for the spread, and the hairpin lace afghan, from Chata, W1RLQ, at 25¢ each or 5 for $1.

Certificates Available

Two new certificates: The Chicago YLRL now offers one called the "Dark-Eyed-Queen." Lil, K9JVL, is custodian and all you have to do is work five members of the Chicago YLRL club.

From K6OQD, Jean Kincheloe, who will be it's custodian, comes word of the "Seldom Heard OM Certificate" offered by *Western Radio Amateur* magazine. This is to honor the patient and long-suffering OMs who keep us gals on the air. To earn it, work 25 OMs whose XYLs are licensed amateurs at the time of the contact. You must contact the OM himself, not his XYL using his call, and all contacts must date on or after Jan. 1, 1960. At least 5 States or countries must be represented. Submit list to K6OQD ararnged in alphabetical order by OM's call with his XYL's alongside and showing the date and band of contact. No QSLs required. Stickers will be given for each additional 25 contacts.

With the Clubs

The Camellia Capital Chirps want you to know their Cook Book, with the Ham (radio) flavor, is completed and ready to sell. We hear it has some "terrific" recipes; in fact, 100 pages of recipes and illustrations, plus a heavy stock cover in green with a red camellia. The price is $1.75 per copy, postpaid. Order from K6-ENK, Wanda Gluck, 7317 Walnut Rd., Fair Oaks, Calif.

Officers for the Chirps for 1960: Pres., WA-6DGH, Velma; V.P., K6HHD, Jan; sec'y, K6-PBG, Linda; treas., K6RHH, Norma.

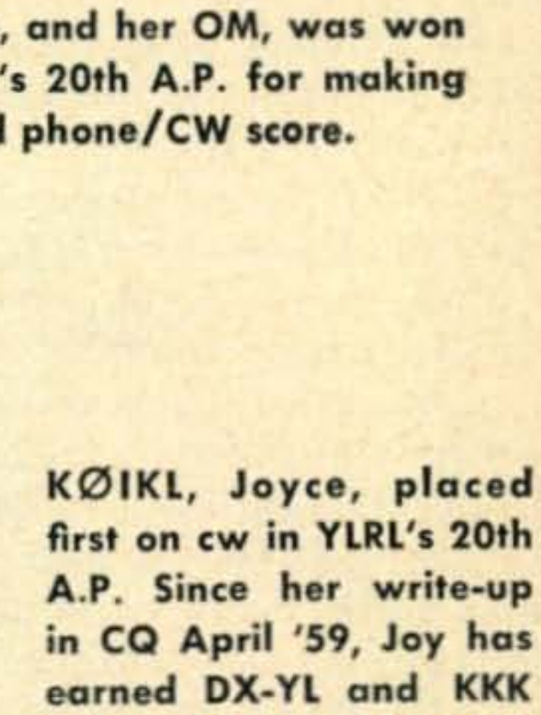
New officers for HAWK of Indiana are: Pres., K9IXD, Doris; V.P., K9ILK, Fran; sec'y, K9QJR, Norma; treas., K9SUT, Ann; directors, W9RTH, Ada, and W9LYU, Betty.

Officers of WHO for 1960: Pres., K5MTS, Dorothy; V.P., K5LQK, Dottie; sec'y, W5IHB,

[*Continued on page 103*]

The Corcoran Award, a handsome copper plaque, donated by W8TPZ, Marie, and her OM, was won by K5BNQ, Doris, in YLRL's 20th A.P. for making the highest combined phone/CW score.

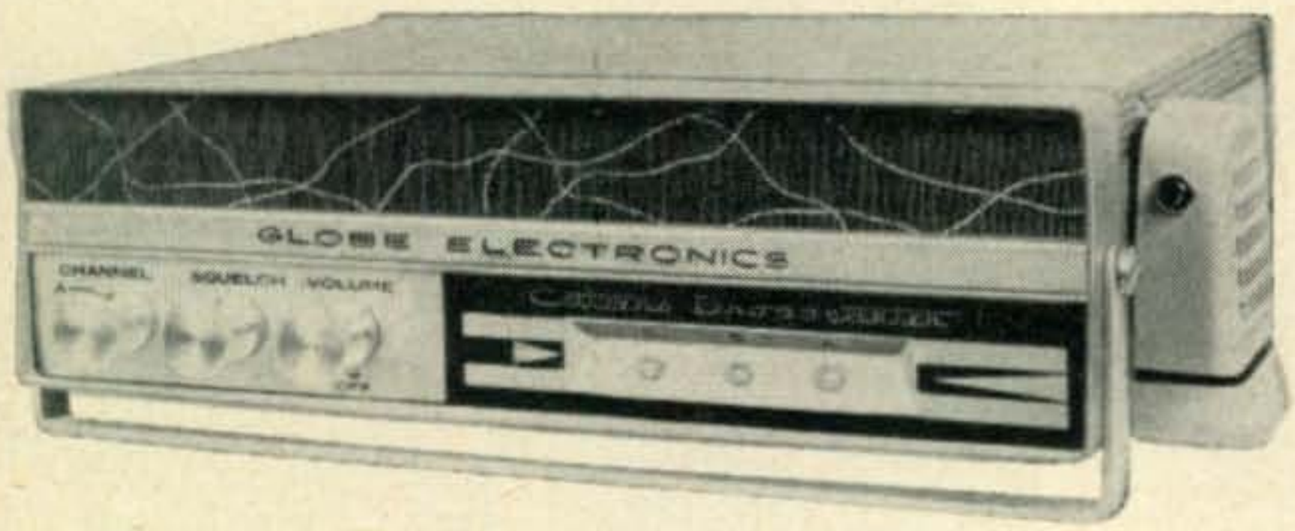
KØIKL, Joyce, placed first on cw in YLRL's 20th A.P. Since her write-up in CQ April '59, Joy has earned DX-YL and KKK (offered by the ZS YLs), the first W/K to receive



K5BNQ, Doris, won the phone section and the Corcoran Award in YLRL's 20th A.P. Licensed in '55, she is active on 10 through 75 phone and cw plus 6-m CD work. She holds WAS/YL, YLCC, has been YLRL D/C, NCS of TYLRUN, and a top scorer in YL-OM contests.

Citizens Radio

Lee Aurick, W2QEX



Several readers have written to inquire about the review on the Globe Citizens Broadcaster which your conductor planned to have in the December issue. Briefly, there was a delay in receiving the equipment.

The Globe transceiver has now been in use at 2W2870 for several weeks. For all who have expressed interest in this rig, you're not going to be disappointed any longer. We think the long wait to review this unit was worth every minute.

In general appearance, the CB-100 Citizens Broadcaster, manufactured by Globe Electronics, Council Bluffs, Iowa presents a very business-like and clean-cut impression. The handle, shown in the photograph, has several functional uses. It may be used, as indicated, to hold the unit in a convenient operating position; as a handle, when moving the station location; or in the raised position, to fasten to hooks under the dashboard of a motor vehicle.

The CB-100 is extremely simple to operate, and both units provided by the manufacturer functioned immediately when unpacked and connected to an AC source.

Operation is simplified by three front panel controls and a push-to-talk switch on the microphone.

Any of three pre-set crystal-controlled channels may be selected by the control on the left.

The center control operates the squelch which may be adjusted to a level at which the background noise just disappears. This squelch circuit really does a fine job.

The control on the right incorporates the ON-OFF switch with the volume control, in the usual manner.

The CB-100 has three plastic "buttons" on the front panel which are individually lighted, each by a distinctive color, to indicate the channel in use.

Transmission and reception are on the same frequency so that you can't find yourself in the somewhat awkward position of working "cross-channel" without intending too. This can't happen with this rig.

A coaxial antenna connector is mounted on the rear of the cabinet, adjacent to the power connector.

Two small holes on the right side of the cabinet provide access to the antenna and final amplifier adjustments of the transmitter.

Circuit Description

The CB-100 consists of three units attractively packaged in one cabinet. The power supply operates both transmitter and receiver and is located in the center of the unit where it nicely distributes the weight of its heavier components.

As delivered, the CB-100 comes equipped for either 6 volt *dc* and 115 volt *ac* or 12 volt *dc* and 115 volt *ac* operation. When ordering, you should be certain to specify the primary voltage supply source. If you intend to operate from either 6 volts or 12 volts it will also be necessary to order the proper power cable for the voltage to be used. No internal changes are required. The necessary conversion is wired into the cable plug. In this way you change from your mobile installation to 115 volt operation by just changing power cables. The 115 volt cable is included with the unit. Both mobile cables are fitted with a device that plugs directly into a dashboard cigarette lighter.

One set of crystals for receiver and transmitter to operate on channel 11 is also included with the CB-100. Additional crystals may be purchased for other channels.

The transmitter section consists of four tubes: a 6C4 crystal oscillator; 12AQ5 *rf* power amplifier; 12AU7 speech amplifier; and a 12AQ5 modulator.

The receiver section is as follows: a 12BA6 *rf* amplifier; 6U8 crystal oscillator mixer; 12-BA6 first *if* amp.; 12BA6 second *if* amp.; and a 6BJ7 detector/avc/noise limiter/squelch.

The 12AU7 and the 12AQ5 in the trans-

Another vote for Reciprocal Licensing

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

Having a license but not being able to use it is a ham's nightmare, but one that Bill Allen, K9AKF, lives eleven months of the year. Like many unfortunate Americans who can't operate an amateur radio station on foreign soil, he is a geologist with an oil company at Lagunillas, Venezuela, South America.

"Only citizens of the country can ham," Bill said; "That means everybody else is out."

An enthusiastic amateur since 1954, he got his license after spending hundreds of hours on the air from K2USA at Fort Monmouth, New Jersey. Later, on the campus of the University of Missouri at Columbia, Bill operated K9AKF/Ø while studying for his master's degree in geology.

"My job in Venezuela was just what I wanted after graduating in '57," Bill commented, "but I didn't realize I'd have to turn into an SWL!"

At Langunillas, Bill tunes every band almost every evening on a Hallicrafters SX-101 and tries to remember that he'll have one month's vacation to make up for a year without a QSO. With a fixed station at Raymond, Illinois, as well as a mobile rig, Bill filled two or three log books, came close to working WAS again, and added some new calls to his DXCC list—all while home thirty days last summer.

Bill Allen, K9AKF, is now in Venezuela wishing he could get back on the air.

"We have good food, entertainment, modern stores, and fine living conditions in Venezuela," he stated, "but nothing takes the place of a rag-chew. Besides that, conditions for DX and stateside contacts couldn't be better."

After writing stacks of letters to government agencies and embassies in both the United States and Venezuela, Bill Allen, K9AKF, is still a ham in call letters only eleven months of each year.

"The answer for me is reciprocal licensing," he states, "but where do I go from here to get it?" ■

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mitter are also used in the receiver as audio amplifier and audio output tubes, respectively.

In the 6 volt unit, the 6 volt counterparts of the above tubes are used.

Globe makes a very good point in the accompanying instruction manual that was discussed at some length in this column in January. They will guarantee the frequency of operation of the CB-100 *only* when Globe crystals are used.

Both transceivers have been used for several weeks, and signal reports have been extremely gratifying. Particular emphasis has been paid, by several stations that gave reports, to the fine quality of the modulation.

Your conductor found the Globe CB-100 to be a well designed and effective C/B station.

Two New Antennas For C/Bs

The last few weeks also provided an opportunity to examine two new HY-GAIN base loaded, telescoping antennas.

The CW model is intended for portable use or wherever distances not in excess of 1½ miles are to be covered, such as in plants, warehouses, and parking lots. It has an interesting feature in that the coaxial connector at the base of the coil may be fitted "in-line" with the antenna, or at a right angle, depending on the location of the antenna connector on your equipment. This antenna has been used extensively at 2W-2870 and the 1½ mile range suggested by the manufacturer is conservative, particularly when working with other fixed-stations. It telescopes to 13½ inches and extends to 36½ inches. It must be operated fully extended. Measurements are from the top of the loading coil.

The CM model is designed for auto-cowl installations. This antenna was not operated on-the-air, as the family car couldn't accommodate one more antenna. In construction, it is identical with the CW model, except for the familiar 8-ball cowl-mounting arrangement. It telescopes to 33½ inches and extends to 6 feet. It must also be operated in the fully extended position.

The loading coils on both models are designed to withstand rough use, and the telescoping sections appear to be rugged enough to give reliable operation under a variety of portable and mobile conditions.

There's a real interesting review in store for next month, too; for hams as well as C/Bs. C U.

73, Lee, W2QEX/2W2870

CONTEST CALENDAR

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

February 27-28—YL/OM Phone
February 27-28—R E F CW
March 4- 6—ARRL DX Phone
March 11-13—CQ 160 CW
March 12-13—YL/OM CW
March 18-20—ARRL DX CW
April 2- 3—Helvetia 22
April 9-10—REF Phone
Apr. 30-May 1—PACC CW
May 7- 8—PACC Phone
May 7- 8—USSR DX

YL/OM

Phone Starts: 1.00 PM EST Saturday, February 27th.
Ends: 12.00 M. EST Sunday, February 28th.

CW Starts: 1.00 PM EST Saturday, March 12th.
Ends: 12.00 M. EST Sunday, March 13th.

Louisa Sando, W5RZJ gave you all the details in her column last month.

REF

CW Starts: 13.00 GMT Saturday, February 27th.
Ends: 21.00 GMT Sunday, February 28th.

Phone Starts: 13.00 GMT Saturday, April 9th.
Ends: 21.00 GMT Sunday, April 10th.

The rules have been greatly simplified for this year's contest. Your log will be accepted for any of the French awards. The rules are:

1. The usual five and six digit serial number, RS/RST plus a progressive QSO number.

2. Each contact earns you 3 points.

3. No multiplier. (This is hard to understand.)

The object of the contest is to work as many French stations as possible on all bands. That of course includes stations in France, the French Union and possessions.

This offers a fine opportunity to build up your total for the DUF, DPF, and DDFM awards.

The French stations will use an identification code or number after their call but we are told that is of no interest to foreign stations.

They also neglected to elaborate on the rules, but it is assumed that you can work all bands and that a station can be worked once on each band. Also that the usual awards will be made.

Send your logs to the REF Contest Committee, B.P. 42-01, Paris R.P., France.

Results of 1959 R E F Contest
Top Ten—In Each Category

U.S.—CW		Foreign—CW		Phone	
W1AQE	7,920	OK1MG	18,525	EA3LA	14,364
W1WY	4,080	ON4AU	15,176	OQØPD	10,640
W3AYD	2,592	PAØLV	8,436	OD5AP	10,455
W3MFW	1,673	YU1SF	6,588	EA1GG	9,030
W4WSF	1,170	YU1YE	5,985	PY1BIM	6,928
W1RAN	960	SM5AHJ	5,508	DL3NO	5,880
K4PHY	450	PAØVB	5,439	SM5MN	3,078
W3VRJ	360	PAØVO	3,861	VQ4GT	2,952
W1MD	144	PAØTA	3,420	DJ2UU	2,178
W8SYC	108	IT1AGA	3,360	PAØPAT	1,836

ARRL DX

Phone Starts: 24.00 GMT Friday, March 4th.
Ends: 24.00 GMT Sunday, March 6th.

CW Starts: 24.00 GMT Friday, March 18th.
Ends: 24.00 GMT Sunday, March 20th.

This is the 2nd section of the ARRL DX marathon and the 26th year it has been offered. It's too late to go into any details, anyway you should know the rules by this time.

CQ 160 CW

Starts: 9.00 PM EST Friday, March 11th.
Ends: 9.00 AM EST Sunday, March 13th.

This one was organized to promote some CW activity on the Top Band. Of primary interest to the United States and Canada, it is also open to foreign stations, conditions permitting of course, and it looks like this is the year. We filled you in on the rules last month.

Yours logs should go to: CQ Magazine, att: 160 Contest, 300 West 43rd St., New York 36, N.Y.

Helvetia 22

Starts: 15.00 GMT Saturday, April 2nd.
Ends: 17.00 GMT Sunday, April 3rd.

The object of the contest is for stations outside Switzerland to work as many stations as

Amateur Radio Legal Notes

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

Another important case in the judicial development of Amateur Radio Law was the case of Wright vs. Vogt. This case originated with the difficulties which an amateur encountered with the city fathers of the Borough of Haworth, New Jersey.

The amateur in question desired to erect a 60 foot tower for his antenna. He filed an application for a building permit. The tower was to be erected next to his home; the zone in which his home was situated was zoned for residential use.

The Borough of Haworth had a 35 foot building and structure height limitation, but the ordinance exempted from the 35 foot height limit church steeples, chimneys and flag poles.

The application for a building permit for the proposed tower was denied on two grounds. The first ground of denial was that the purpose for which the tower was to be used i.e. an Amateur Radio Station Antenna was not an appropriate or accessory use of residential property. The second ground for denial of the building permit was that the proposed tower exceeded the 35 foot building and structure height limitation of the ordinance.

After the building inspectors denied the building permit, an appeal was taken to the Board of Adjustment. The Board of Adjustment upheld the building inspectors and again denied the building permit.

The amateur then filed a suit against the appropriate city officials. In his suit he sought an Order of the court directing the city to issue to him his permit for the tower. After a trial the court granted the petition of the amateur and directed that the city issue to him his building permit for the proposed tower. The city then appealed the case and the case eventually was argued before the Supreme Court of New Jersey.

The Supreme Court of New Jersey, after considering the arguments of both the amateur and the city, held that the erection of a tower in a residential zone was a proper incidental or accessory use of residential property and that it did not violate the zoning restriction. The Supreme Court also found that the 35 foot height limitation was an unreasonable restriction since the proposed tower was adequately engineered and was safe and would not adversely affect the neighbors in light of the other exemptions.

The Supreme Court of New Jersey, by its ruling, again established an important judicial precedent. Had the argument of the city been upheld by the court, namely that the erection of the tower for amateur radio use was not a proper use of the property in a residential zone, an effective method of restricting amateur radio activity in residential zones would have been provided cities and counties throughout the country. Fortunately for amateur radio, the court did not follow the argument of the city. The case is a legal precedent for the legal proposition that amateur radio activity is a valid and permitted use of property zoned as residential use.

Left open and unanswered by the Supreme Court was the question of the conflicting right of the government to regulate interstate commerce as against the right of a city to control the use of residential property. Although this question was argued in the New Jersey Supreme Court, the court was not required to pass on this question since the court already decided the case in favor of the amateur on other grounds.

For anyone interested in reading the opinion of the court, the case is officially cited as *Wright vs. Vogt, 7 N J 1, 80 A 2d 108.*

73, Maurice, W6EUV

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possible in each of the 22 Swiss Cantons.

1. All bands, 3.5 to 29.7 *mc* may be used, CW/CW or Phone/Phone.

2. Serial numbers will be the usual five or six digit variety, signal report plus a progressive 3 figure contact report.

3. Each contact counts 3 points and the same station can be worked twice on each band, once on CW and once on phone.

4. The multiplier will be the sum of Swiss Cantons worked on each band, CW plus Phone, making a possible multiplier of 44.

5. Your final score therefore will be the sum of QSO points on all bands, multiplied by the sum of Cantons worked on each band.

6. Use a separate log sheet for each band and only one side of the paper.

7. No mention was made of awards but based on last year's rules, awards were made to the two highest scores from each country. Each district in the United States and Canada is being considered as a separate country.

8. Sign the following declaration: I certify that my station was operated in accordance with the rules and spirit of the contest, and I agree that the decision of the council of the USKA will be final.

9. Your logs must be postmarked no later than April 18th, 1960. Send them to: The USKA Contest Committee, Knutwil/LU, Switzerland.

[*Continued on page 104*]

sideband sideband sideband

SIDEBAND

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

John, W2FGV.

Bill, DL4WH.

The Worked 100 Club continues to grow in membership and VE3RE became number 110. We welcome these seven new qualifiers: K6ZXW, W7ZAS, W8BKO, W2GNQ, W3PGB, W5AFX and VE3RE. Incidently, Bob, W8BKO who was OD5BZ for several years made his 100 confirmations in less than a year. Congrats!

Possibly the top news this month is that W4IYC, Myron, and Humberto, TI2HP has advised us that they have both worked 202 countries on two-way SSB. A message from TI2RC indicates that he has also contacted 202. Both Humberto and Myron are awaiting several additional cards to become the first "Worked 200" stations officially. Remember when *one hundred* looked impossible? No wonder we hear of so many of the DX boys getting sideband rigs. Sideband activity in Russia has grown rapidly and we now have UA1, UB5, U18, UF6, UAØ, UD6 and UL7 operating on 15 and 20 meters.

Other new ones on sideband are CP1CJ, ZB2N, TA1AD, VQ2ERR, EA8BO, CR6BW, VP6WT, VK9NT, ZD7SA (St. Helena), OE9IM, VP5AB, ZM7DA, VU2MD, OE3ME, FM7WT, LA1NG/P, OQ5AG, HI8GA, UJ8OJ, HO1LO, HC8JU, SU1MS, PAØBW, VU2-

Worked 100 Countries Club

(Two-Way SSB)
In order of award

W6UOU	W1ADM	W8MPW	W6BAY	W9QNO
W2JXH	TI2RC	W3MAC	W5RHW	ON4DM
F7AF	W2CFT	W1GR	K4HXF	W2MAF
K6GMA	KØABH	W8JXM	K2EWB	YV5ABD
W3SW	ZL3IA	W1EQ	K2HUK	4X4DK
W4IYC	W6BAF	W5FDZ	VE3ES	VK3AHO
TI2HP	W2TP	W8JXY	MP4BBW	DL1VR
W8QNF	W6RKP	W2OTZ	W1DCE	K8EWK
W6ITH	PY2JU	W5BGP	W2ATJ	KØCTL
VE3MR	W6UPP	W6WNE	KZ5WZ	W4OPM
W8GCN	W6PXH	W6TNS	HB9IE	W8DJP
W8EAP	WØCVU	W4HIM	W6ZEN	W8MXS
W8YBZ	W4INL	HB9TL	W5KFT	W9CYL
WØQVZ	W8YIN	K2HEA	KØKWY/4	W1TYQ
WØFUH	TG9AD	W7VEU	YV5FK	W2HMJ
W8PQQ	W3NKM	W4CDY	TI2EV	K6ZXW
ZL3PJ	W6QFE	W6TOT	W8DMD	W7ZAS
K2MGE	W8MG	W9HP	K2FW	W8BKO
W2OQO	PY4TK	W5DA	W1WDD	W2GNQ
W2VZV	K9EAB	K7GHE	K6LGF	W3PGB
W6IAL	W7IAA	W1LHZ	W3VSU	W5AFX
K2JFV	VQ4ERR	W2MA	W1OOS	VE3RE

ANI/5, LX1RK, HB9QR, and Mike, W2BDS. This last one rates mention with the DX, hi.

VR6CC on Pitcairn Island should have made his appearance by the time this is in print, as well as VR1B, (W6UOU's second little Argonaut). Argonaut number one has reached Madagascar and will soon be heard on SSB as FB8. W9EVI, with HK3LX and HK7AB should also have caused a big pile-up from Malpello Island, off the Columbian coast. (This has new country status.)

As reported last month, Ralph, W1CJ departed for Nepal on January 8th, and will soon be signing 9N1CJ. This should help considerably to reduce the tremendous bedlam heard each time that Glen, 9N1GW comes on the twenty meter band.

Stan Green, who is fondly remembered for his operating in Hong Kong as VS6DA, and on Cyprus as ZC4DA, is arriving for a four day stay in New York enroute to Bermuda. He wrote to me asking that some of the SSB gang try to meet him during his short stop-over. The NYC gang were alerted and should help Stan and his wife "see the sights." As soon as I finish typing this column I am going up myself to see him.

Wally, KZ5WZ asks that we advise everyone not to affix US stamps to their self addressed envelopes as they are no good in Panama. Use IRC's and not stamps. KZ5WZ who has been among the top scorers in the previous Contests is all ready to win this one. Good Luck, Wally!

A new certificate is announced by the Kansas Radio Club for Two-Way SSB contacts with Kansas stations. DX stations need only work four sidebanders in Kansas, while USA operators must contact ten other SSBs in Kansas. Send verifications with 50 cents to Kansas Radio Club, 5019 Gramar, Wichita, Kansas.

John, W2FGV, who needs no introduction on SSB sent in the fine picture of himself, standing between two of his *home-made* transmitters. John who has made all of his sideband generators and finals, and been active on SSB for ten years, wonders if any one else has been using home built equipment for such a long time. John says, "anyone can buy commercial gear and plug it in and start talking. How about more dope on fellows like himself and Bob, W4INL"? (See photo of W4INL's deluxe station in February CQ.)

We have just received word from Bill, DL4-WH, who is a General in the US Signal Corps, that he is closing down his station preparatory to returning to the States for assignment to Fort Monmouth. Thanks, Bill for the fine photo.

A letter from Bruce, who was CE7AY, advises of his transfer from Chile to Puerto Rico. He is awaiting assignment of a KP4 call. Bruce is working on a project to increase activity on SSB in Curacao, Grand Cayman, Merida, San Andres, and Bogata. If anyone has some old "beat up" exciters to donate, Bruce will patch them up and get them on the air from some existing licensed ham-stations in these countries. Write him, Bruce Hosmer, Weather Bureau Airport Station, San Juan.

We reproduced a complaint just to show that everything is not "rosy" from Dick, W6OZ, as follows: "I run code practice sessions on 7199.5 many hours per week. I have had many complaints of splatter from SSB stations. We would appreciate your making some appropriate comment on this matter in your column. We have appealed to these offenders without effect. If they don't stop clobbering our frequency I may have to move up to above 7200 and run a kilowatt. I have tried to call them on CW but most of them cannot read even 10 words per." Looks like we have a problem out there in California. Have your boys in the code practice classes been told to reduce their *rf* gain controls Dick? Well we have printed your letter and we sincerely hope that it will help.

As reported several times during the past three years, your Editor has made many serious efforts to interest Mike Ercolina, W2BDS, of Telrex in SSB. Mike always had some excuse, the best one to his way of thinking was: "I am a DX man and in order to work foreign countries I must use AM because most of the DX cannot tune in SSB." Evidently W2BDS has observed the number of SSB countries now active, or else he saw the "light" as have many of the other DX men have. Anyway W2BDS can now be found nightly on 14,295 using SSB. Welcome to the fold Mike. We could fill this entire column with a list of others like him. Maybe we had better leave things as they are, hi.

Ed, W2KPQ, President of the S.S.B. Amateur Radio Association, asked us to again remind everyone to of the Ninth Annual SSB Dinner, to be held in New York City at the Hotel Statler-Hilton, 33rd Street and Seventh Avenue. This affair held annually, during the I.R.E. Convention, attracts many outstanding amateurs from all parts of the World. This year it will be held on Tuesday, March 22. The dinner starts at 7.30 PM and the equipment displays will open at 10 AM. W2SKE, Bill Leonard will be master of ceremonies. Tickets purchased in advance are $8.50 each. At the door they will be $9.50. As usual there will be many wonderful prizes awarded. Send for reservations to SSBARA, care of Mike, WA2BLH, 33 Allen Road, Rockville Center, N.Y. See you there gang! It is estimated that more than twelve hundred will attend.

Thirty-two "Worked 75" certificates were mailed this month, along with fourteen endorsements for "Worked 150."

Editorial Change

This will be my last column and I wish to thank everyone for the wonderful way you have received my efforts. I sincerely hope that you will continue your support to Dorothy, K2MGE who takes over next month.

73, Bob, W3SW.

SCRATCHI [*from page 26*]

Hon. Ed., don't just sitting there. Getting my ad printed reel quick-like. Also post-hasty letting me know if you wanting free hundred-bux deel, and what color you prefering, or are you going to being 1/c stinker and wanting me to paying for ad?

Respectively yours,
Hashafisti Scratchi

SPOT TUNING [*from page 63*]

Broadband 80, 75, and 40 Meters

For operation over the 40 meter band, an ordinary single wire doublet was first installed. This antenna proved to be adequate for covering the band from 7000 to 7300 *kc*. Since this band is only 300 *kc* wide, the antenna is required to work only 150 *kc* either side of the mid-range frequency of 7200 *kc*. This represents 150/7200, or 1/48th, deviation from the resonant frequency. Although this frequency excursion is easily accommodated by the single-wire doublet, subsequent tests indicated the superiority of multi-wire doublets. For this reason, the two-wire doublet (fig. 2) is used for 40 meter operation and comparison checks (with single-wire doublet) indicate gains of two S-units for both reception as well as transmission.

The 3500 through 4000 *kc* (80 and 75 meter) band was not as cooperative as the 40 meter doublet. Various antenna tests have indicated that the average single-wire doublet (coax fed) can accommodate a frequency variation of approximately 1/50th of the resonant frequency. The 500 *kc* band (3500 to 4000 *kc*) required a maximum deviation or QSY of 250/3750, or 1/15th, from the mid-range resonant frequency of 3750 *kc*. Since a single-wire doublet could not accommodate the desired range, I first tried three separate doublets with overall lengths of 130, 125, and 120 feet all connected to the same coax transmission line. An *swr* check produced a roller coaster response across the band. The *swr* was over 4 to 1 on some portions of the band and below 2 to 1 on alternate portions. To achieve a flatter response throughout the band, a triplet or Bowtie array (figure 2B) was tried and proved to be surprisingly successful. For most of the band, the *swr* is below 2 to 1 and the *swr* meter keeps its smile all the way down from 4000 *kc* to about 3550 *kc*. Below that, the *swr* meter's smile gets a little strained when the meter climbs up to 2½ to 1.

Because of the practically flat *swr* response offered by the dual antenna system, it is a real comfort to QSY from band to band and watch the slop jar grin on my *swr* monitor. Using this dual antenna system makes bandhopping with your transmitter almost as easy as with your bandswitching receiver. Without fooling around with time consuming antenna tuning and impedance matching adjustments, changing bands becomes a matter of seconds. Just for my own amusement, I timed myself recently when I bandhopped from 75 meters to 10 meters to answer a Wyoming CQ. Without previous practice in rapid bandhopping, it took me 11 seconds . . . and I got the station.

There is no doubt in my mind that the state of the art will continue to improve and future amateurs will think no more of instantaneous QSY than they will of working the dark side of the moon during Interstellar Space DX Contests. In the meantime, (to get back to earth), some pioneering work is still needed to bring the QSY time down to 5 SECONDS. How about it? ■

HEATH CHEYENNE [*from page 60*]

x 4-3/4" x 5-1/16" and weighs 5½ pounds. It requires 12-14 volts *dc* at 4.5 to 15 amps, depending on load. Total output power is 120 watts CCS or 150 watts ICAS. The load imposed by the MR-1 and MT-1 is 600 Volts at approximately 150 *ma* and 300 Volts at 100 *ma*. The dual output voltage is of course available from the MP-1.

Selection of the best location for mounting the power supply narrowed down to two locations. Under the hood on the firewall and just forward of the right front door above the floor over the fresh air vent. The under hood location was first selected, but after learning a rather expensive lesson, the power supply was relocated over the fresh air vent out of the engine compartment. Everything worked fine, the first call as a mobile in motion was a contact and several hour long QSO's were enjoyed. I dropped by a fellow mobile ham's house to show off the rig and we sat parked for about 1 hour making various antenna adjustments when all of a sudden pph-h-h-t—no high voltage. The fuse was blown on the power supply. Being late at night and no spare fuse available, I went on home, storming at myself for such stupidity There I was with the car parked, engine running for an hour blowing air off the radiator at about 170° F (Thermostat setting) right over the power supply. The Heath manual clearly states the maximum ambient operating temperature should not exceed 122°F. So work and earn and live and learn I did. The two 2N442 transistors on the power supply were replaced along with a new 6146 and 6AU6 tube in the Cheyenne—the power supply was relocated over the fresh air vent by the front seat and everything is fine now and I'm sure we'll encounter no further trouble from overheating the power supply. I should probably add that at that time of failure, several other boners were pulled namely, the transmitter was pulling the full 90 watts on CW (continuously, not keyed)

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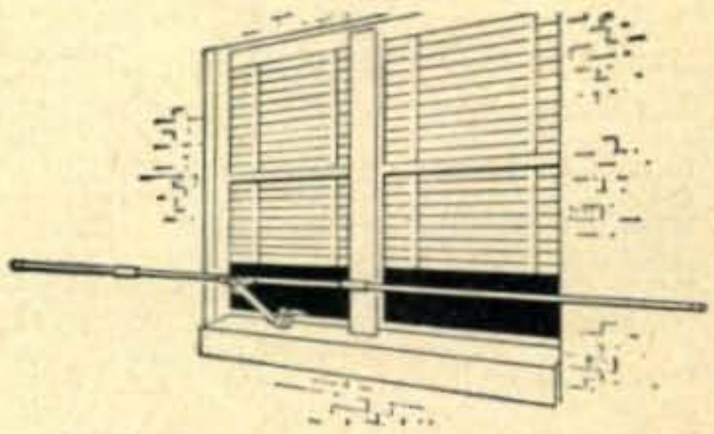

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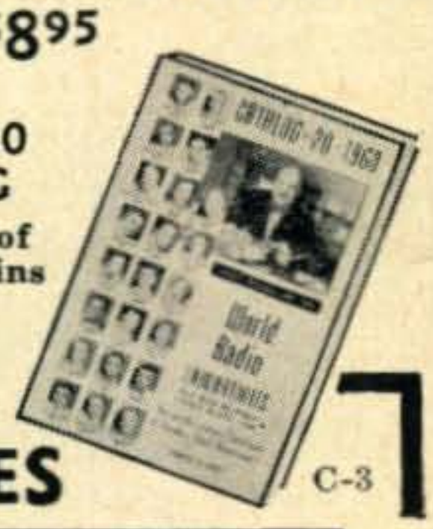

C-3

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ADDRESS: _____ CITY & STATE: _____

For further information, check number 21 on page 126.

and at the same time the antenna had become disconnected inadvertently. So all the trouble was caused by boners and not equipment failure. ■

NOVICE [*from page 73*]

and S-85 gear feeding and dipoles on 15 and 40. Mark has a CP also, for 15WPM. DX-wise, it includes 48 states plus KR, KZ, KG, CN8, and PY2.

Wendell Boyden, KN1LWI, 195 Presidents Land, Quincy 69, Mass., would like skeds with K7 are, Colo., N. Dak. and N. Mexico and will sked with anyone needing Mass. Wendell also mentions his 37 states worked on 40 and 80 with the Viking Challenger and HQ-160, plus G5, DL1, OX3, VE, and WP4.

Ted Drake, 1422 Grandview Dr., Tempe, Arizona, received call KN7JOX and went on the air with a DX-40 and SX-99 along with a dipole and Quad for 15 meters. Tom has worked 30/29 for his WAS in 4 months of operation, plus a KR6. He is RCC members and will sked for this or any other reason.

WV6IBX, IFE, and HXM, has formed a joint Novice station at 1201 Tower Grove Drive, Beverly Hills, Calif., and have a DX-40, DX-20, an SX-28 and numerous other pieces of equipment. The boys will be active on 80, 40, 15, and 2 meters and will make skeds for any reason.

Jack Ray, KN4MZW, 412 W. 4th St., Tompkinsville, Ky., writes to say he operates with a DX-20, S-38E, and Q Multiplier with a multiband dipole. In less than 3 months Jack has a WAS 22/18.

Well, as happens every month, that cleans out the Novice file. Don't forget to keep those letters and pictures coming this way. And if you would like help with your license, drop a postal card to the address at the head of the column. Within 90 days your name will appear in the help wanted section. For now—

73, De Don, W6TNS

DX [*from page 69*]

100-SM5

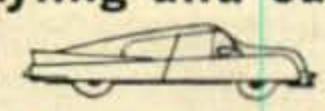
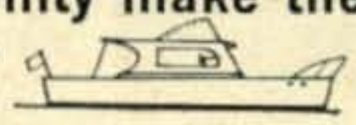
V. C. R. S. in Vasteras issues also the award 100-SM5. For this award you have to work 100 SM5-or-SL5 stations on any or all bands after the War. Send a list (NO QSL) with the call, date and type (CW or FONE). Your list must be checked and signed by any club or amateur. You can get 100- SM5-award on CW or FONE. Send your application to SM5WI, Harry Akeson, Vitmaragatan 2, Vasteras, Sweden. The cost is 1 U.S. dollar or 13 IRC.

100-SM

V. C. R. S. issues the award 100-SM. For this award you have to work 100 SM-stations on any or all bands after the War. Send a list (NO QSL) with the call, date, and type (CW or

HERE IT IS AT HARVEY

THE NEW COLLINS KWM-2 TRANSCEIVER

Distinctive modern styling and easy mobility make the lightweight KWM-2 an attractive unit for the CAR  **BOAT**  **AIRPLANE**  **or fixed station.**

Featuring operation on all bands between 3.4 mc and 30 mc on either voice or CW, the KWM-2 has the quality and performance of the time-proven KWM-1 and famous Collins S/Line.

Filter type SSB generation and crystal-controlled double conversion also are features of the KWM-2, in addition to VOX and speaker anti-trip circuits. ALC keeps the signal adjusted to its rated PEP resulting in an increased average talk power.

The KWM-2 is easily moved between mobile and fixed station installations. For mobile use, the transceiver slides into the mount and the power, antenna, selector and car radio speaker plugs connect automatically. These same four connectors are used in a fixed station installation.

The KWM-2 mobile transceiver transmits on SSB or CW with a nominal output of 100 watts for complete coverage on all amateur bands. Any of fourteen 200 kc segments of the 3.4-30.0 mc frequency range may be utilized except the 5.0-6.5 mc range on transmitting. Other frequencies (such as MARS) outside the amateur bands may be obtained by inserting the proper crystals.

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516E-1	DC Power Supply	$262.00
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516F-2	AC Power Supply	$105.00
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312-B5	Speaker Console	$333.00
30S-1	Linear Amplifier	$1470.00
136B-2	Noise Blanker	$120.00

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FONE). The list must be checked and signed by any club or amateur. You can get the 100 SM-award on CW or FONE. The cost is 1 U.S. dollar or 13 IRC. The application to SM5WI, Harry Akeson, Vitmaragatan 2, Vasteras, Sweden. (Tnx W2GVZ).

The SP DX Club will award an attractive certificate attesting honorary membership, to any licensed amateur/other than SP/, having two-way communication with fifteen/for European ops/or ten/for DX/or more regular SPDXC members. No QSL's need be submitted but listed contacts shall have been confirmed by QSL and verified by SP DXC, and shall have been made after Oct. 1, 1959. Applicants for this certificate should submit their lists and ten IRCs to the SP DX Club/PZK/ P. O. Box 424, Lodz 1, Poland.

Some SP DXC members are: SP2AP, SP2BE, any club or amateur. You can get the 100-SM-SP8AG, SP8CK, SP8HR, SP9DT, SP9RF. (Tnx W2JWK)

Bud, W9GFF, advises of an amendment to the rules of the W 100 U certificate. Paragraph E should also contain a statement to the effect that if a list only is sent, it must be accompanied by a letter from a radio club that the QSL's have been inspected and corresponds to the list. UA1DZ advised Bud of this change.

73, Urb, W2DEC

SEMI CONDUCTOR [*from page 82*]

0.001 mf capacitors should be high frequency button standoff's, with the exception of the −12 volt bypass. This is a chassis feedthrough capacitor.

These new glass header transistors, by virtue of their high performance and low cost, will find their way into many hamshacks. If you are interested in incorporating these transistors into your next project, drop a line to Texas Instruments, Inc., Box 312, Dallas, Texas. Data sheets are available on all types.

In all cases literature on these new products is available by requesting it from the addresses given. 73 for this month.

DE, Don W6TNS

VHF [*from page 85*]

nician exam today and will be running about 500 watts on 145.8 as soon as possible."

"I will be QRT for six months of military service but would like to plan on seeing some of the old and some of the new when I return." *Never fear, Don. A few of the old faithfuls will still be on 144 mc when you return and probably a lot of new faithfuls. Good luck in the service.*

Williamsport, Pennsylvania. Hank (W3JMY)

comes through with our only six meter news:

"Am quite active on six meters here. Have worked forty-four states now with the usual amounts of DX stations. *But there isn't any 'usual amount' anymore.* I think I've worked all of the ones that have been heard on the Eastern U.S.A. Have worked E12, VQ2, ZE2, VE1, 2, 3, 4, 7, KL7, KP4, CT1, G-Crossband, HC1, SM7 and XE."

"Have 800 watts RM and CW, 300 watts DSB, and 120 watts AM. All homebrew here." *Nice to hear those familiar calls again, Hank. See if you can't dig them out once again, eh! On the air that is.*

73, Sam, W1FZJ

PROP. [*from page 87*]

Table 1.

Observed and Predicted Smoothed Sunspot Numbers 1954-1961

	1954	1955	1956	1957	1958	1959	1960	1961
Jan.	6	14	89	170	199	177	130*	97*
Feb.	5	16	99	172	201	175	127*	94*
Mar.	4	20	109	174	201	173	125*	91*
Apr.	3	23	119	181	197	167	122*	88*
May	4	29	127	186	191	162	120*	84*
June	4	35	137	188	187	158	117*	80*
July	5	40	146	191	185	157*	114*	74*
Aug.	7	47	150	194	184	153*	111*	69*
Sep.	8	56	152	197	183	147*	108*	65*
Oct.	8	64	156	200	181	143*	105*	62*
Nov.	10	73	160	201	179	136*	102*	60*
Dec.	12	81	164	200	179	133*	100*	59*

*Predicted Values

General propagation conditions for 1960 and 1961, as a result of declining solar activity, are expected to be somewhat different than during the past years of intense solar activity. The most significant changes are expected to be lower maximum usable frequencies and lower levels of ionospheric absorption. Fewer daytime openings are expected on 10 and 15 meters during the summer months. During the winter months MUF's to most parts of the world are not expected to exceed 35 *mc* (compared to MUF's in excess of 50 *mc* during the peak of the cycle). This means that few 6 meter DX openings are forecast for the coming year, or for that matter until solar activity rises again (which may be another six or seven years away). During the hours of darkness fewer 20 meter openings will occur, but an improvement is expected on 40, 80 and even 160 meters as a result of the decrease in ionospheric absorption which should result in stronger signal levels on these bands. To sum it up, as the solar cycle continues to decrease, propagation conditions

[*Continued on page 105*]

YL [*from page 91*]

Dell; treas., K5PIO, Marge.

K5MIZ, Alverta, is the new president of GAYLARK. V.P. is W5DRA, Teev; sec'y-treas., K5YTT, Grace, and W5CXM, Phyllis, is historian.

Floridora YLs are proud of member Betty, W4GGQ, and her OM W4IYT, who had twin girls born Dec. 6. They are named Ann Marie and Mary Ann but have been adopted by the Floridoras as their "mascots" and nicknamed "Flora" and "Dora."

BAYLARC members Esther, W6BDE, and Joyce, K6QCL, spent three days in December at Squaw Valley in tryouts with the communications squad for the Olympics. Joyce, who came from China, was subject of an FB United Nations Day write-up in the *S. San Francisco Enterprise-Journal.*

L.A. YLRC is justly proud of its Year Book which was conveniently made up in purse size for easy carrying. They will be glad to swap copies with other clubs who have a similar project; contact WA6AOE, Maxine.

Congrats to fellow New Mexican, K5BGT, Chic Tilley, on earning the WAZ award, and to OE2YL, Inge Ehrman, for making all-phone WAZ.

Do You Have . . .

Your copy of "CQ YL?" The one and only book devoted to the YLs, 169 pages, over 500 photos. Order from W5RZJ (address at head of column), $3, postpaid.

33, Louisa, W5RZJ

CONT. CAL. [*from page 95*]

Names and abbreviations of cantons:

Zurich	ZH	Scaffhouse	SH
Berne	BE	Appencell	AR
Lucerne	LU	St. Gall	SG
Uri	UR	Argovie	AG
Schwyz	SZ	Thurgovie	TG
Unterwald	NW	Tessin	TI
Glaris	GL	Vaud	VD
Zoug	ZG	Valais	VS
Fribourg	FR	Neuchatel	NE
Soleure	SO	Geneva	GE
Basle	BS	Girsson	GR

PACC

CW Starts: 12.00 GMT Saturday, April 30th.
Ends: 20.00 GMT Sunday, May 1st.

Phone Starts: 12.00 GMT Saturday, May 7th.
Ends: 20.00 GMT Sunday, May 8th.

Rules are the same as last year but we will repeat them in detail in next month's Calendar.

USSR CW DX

Starts: 21.00 GMT Saturday, May 7th.
Ends: 21.00 GMT Sunday, May 8th.

We finally got the rules for this one and will cover them for you in next month's Calendar. If we can decipher them, that is.

Ed Note

I'll have a preliminary report on our 1959 World Wide Contest next month.

73 for now, Frank, W1WY

PROP. [*from page 103*]

are expected to become increasingly poorer on the higher frequency bands (6, 10, 15 and 20 meters) and somewhat improved on the lower frequency bands (40, 80 and 160 meters).

Book Review

Although several excellent texts on the subject of radio propagation have been published during the past few years there still seemed to exist a need for a basic primer on the subject, a text for the very beginner, written as simply as possible. This need now appears to have been filled by a soft covered book recently published by the John F. Rider Publishing Co. of NYC entitled *Shortwave Propagation*. Written by Stanley Leinwoll, Radio Frequency and Propagation expert for *Radio Free Europe*, the book presents in a very straightforward manner, the basic principles of shortwave radio propagation and how they are used to help solve some of the everyday problems of long-distance shortwave radio communications. The author discusses important theoretical, as well as the practical, aspects and applications of shortwave radio propagation in a simple and concise manner. He cleverly uses simple analogies to help clarify complex principles, thus avoiding the use of mathematics as much as possible. Of special interest to amateur radio are chapters dealing with *Circuit Analysis, MUF Curves,* and *Forecasting Ionospheric Conditions*. Of great practical importance to amateurs and shortwave listeners is a well written and interesting discussion of propagation characteristics for each of the amateur bands from 6 through 160 meters appearing in a chapter entitled *The Amateur Bands Around the Cycle*. Although especially written for those with a beginning interest in shortwave propagation, this book, containing 147 pages of easy to read text material, should be of value to all those interested in shortwave radio communication. *Shortwave Propagation* by Stanley Leinwoll can be obtained from your favorite book dealer for $3.90. Copies can also be obtained, postpaid, from the Propagation Editor, W3ASK, 607 Beacon Road, Silver Spring, Maryland.

For those readers interested in *scatter communications,* the *January, 1960* issue of the *Proceedings of the IRE* contains an excellent comprehensive review of both ionospheric and tropospheric scatter communications. The review, prepared by the Joint Technical Advisory Committee of the IRE is entitled "*Radio Transmission by Ionospheric and Tropospheric Scatter*". It reviews the theories involved, experimental observations from existing circuits, system design, and fields of application for these relatively new methods of radio transmission.

73, George, W3ASK

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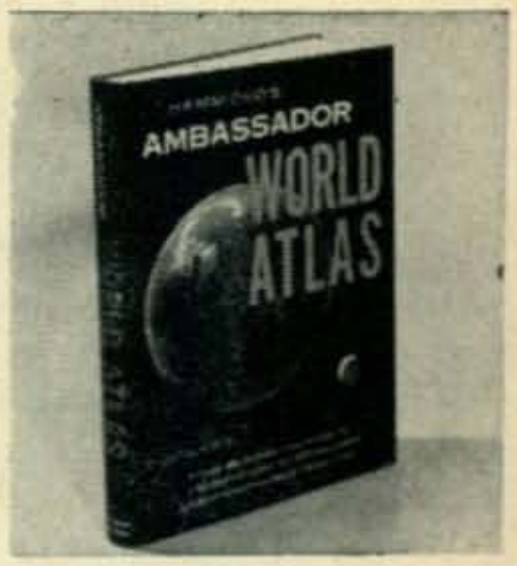

COMMAND SETS

This IS a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous, amazing terrific pages for only $1.50 postpaid.

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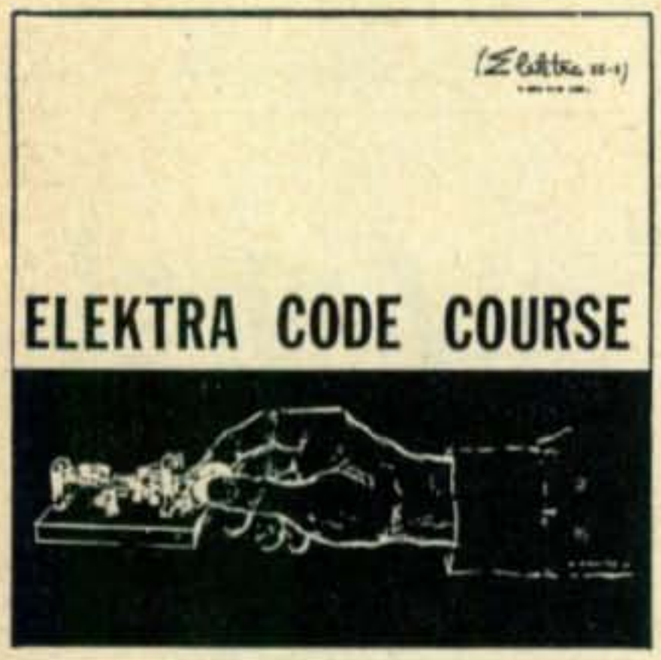

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Learning code is a snap with this record. Speeds from 3 to 16 WPM, depending upon turntable speed. This 12" LP record has on it all you need to learn the code for both the Novice and General License. $3.50 each.

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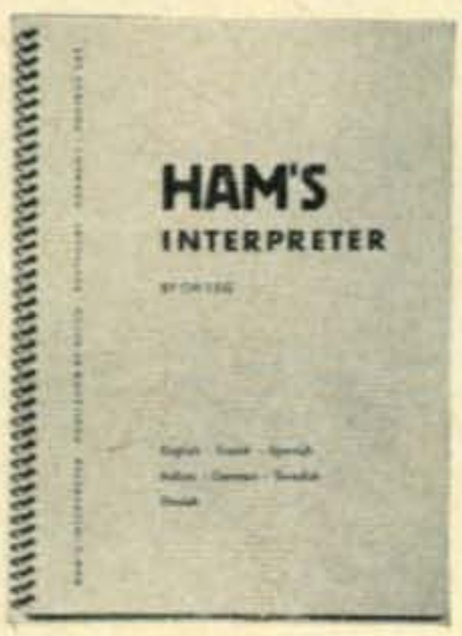

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Most amateurs do not have a good file of back issues of CQ. So we've looked back through the years 1945-52 and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a paltry $2.00.

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Here's a book, written in down-to-earth language, which answers questions on missile maintenance, fire control, flight control tracking, testing, fuels, payload and many other achievements in rocketry and space for both scientific and military applications. Also, featuring the most up-to-date "Directory of 38 Most Popular Missiles and Their Photos," (supplied by Department of Defense) as well as a "Glossary of Missile Terms." $1.50 per copy.

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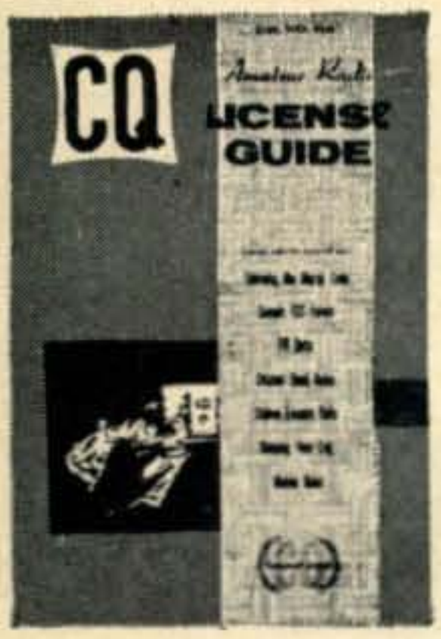
This nifty volume contains the latest dope on amplifiers, preamplifiers and equalizers plus a buyer's quide of component manufacturers! Over 150 — 5½" x 8½" pages of heavily illustrated descriptions covering Hi Fi Audio Components—the greatest publication value in its field today. Only $2.50 per copy.

SIDEBAND HANDBOOK

Written by Don Stoner, W6TNS, was almost one full year in the preparation of this terrific volume. This is not a *technical* book. It explains sideband, showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots of how to build-it stuff, gadgets, receiving adaptors, exciters, amplifiers. Price, only $3.00.



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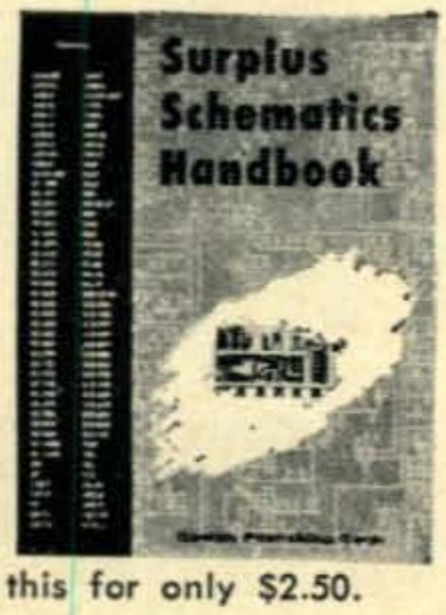
This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry cold turkey can be many times more difficult than the most involved puzzle, and purchasing a single instruction book can run as high as $3.50. Why knock yourself out when you can have a book with complete coverage on hand in your library? All this for only $2.50.



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KIT BUILDER [*from page 56*]

This is no time for an extra cook in her "kitchen." Besides, you may not approve of some of her techniques, and this is no time to nag. I sent my Dad into a frenzy by tightening a screw with my fingernail file instead of with a screwdriver. We girls are at home with make-shift tools, and we've had lots of practice improvising. After all, when Junior's toy train is derailed or the dishwasher won't shut off, there isn't time to run to the workshop for a special tool. It's a man-size chore to learn the names of each cutter, stripper, twister, and turner, not to mention knowing their uses.

After your XYL proves her prowess with the soldering iron, you'll probably be able to relieve her at the workbench now and then, but when the instruction manual starts calling for transformers and parts big enough to see with the naked eye, move over. Chances are she'll develop a good case of homestretch fever. Your place then should be at her side with coffee pot in hand and soothing words of encouragement. And you'd better cross your fingers and hope that the thing works when she plugs it in the outlet. If it does, you can waltz around the room together in a victory polka; if it doesn't you may have to dodge a barrage of screwdrivers. But, even if your wife swears off any more wiring projects, your future should take a turn for the better. She'll regard you as a sensitive, skilled craftsman (which you are, of course) who must wire constantly to keep in practice; and you'll get no more so-what shrugs when you tell her about the tricky tube socket you just polished off. She'll understand now.

I must add one word of warning for the fellow whose wife really gets the kit-building bug and starts ordering them by the dozen. Should you come home from work some evening to find her happily wiring her fingers to the bone with breakfast dishes sitting in the sink, laundry stacked in the corner, children running wild, and not so much as a potato peeled for supper, just remember—you may not be able to have your kits and eat, too. ■

CHEAP RECEPTION [*from page 55*]

insufficient for proper tracking, so 3-50 mmf trimmers were added across the condensers. The original antenna and mixer trimmers were set at the mid-point, and the new trimmers adjusted until a 7250 *kc* signal peaked at all points. This left sufficient range in the original trimmers to adjust for frequency changes caused by installation of covers.

Nothing remains but refinements. A rotary switch with good insulation should be used to by-pass the converter for broadcast reception. It can also cut the filament voltage in the

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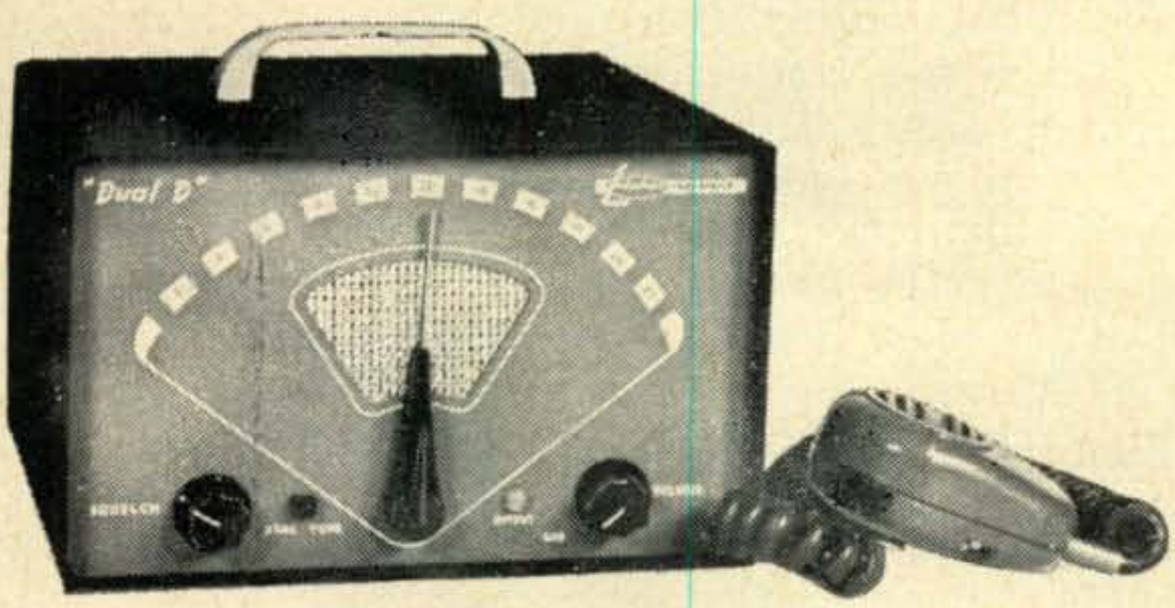

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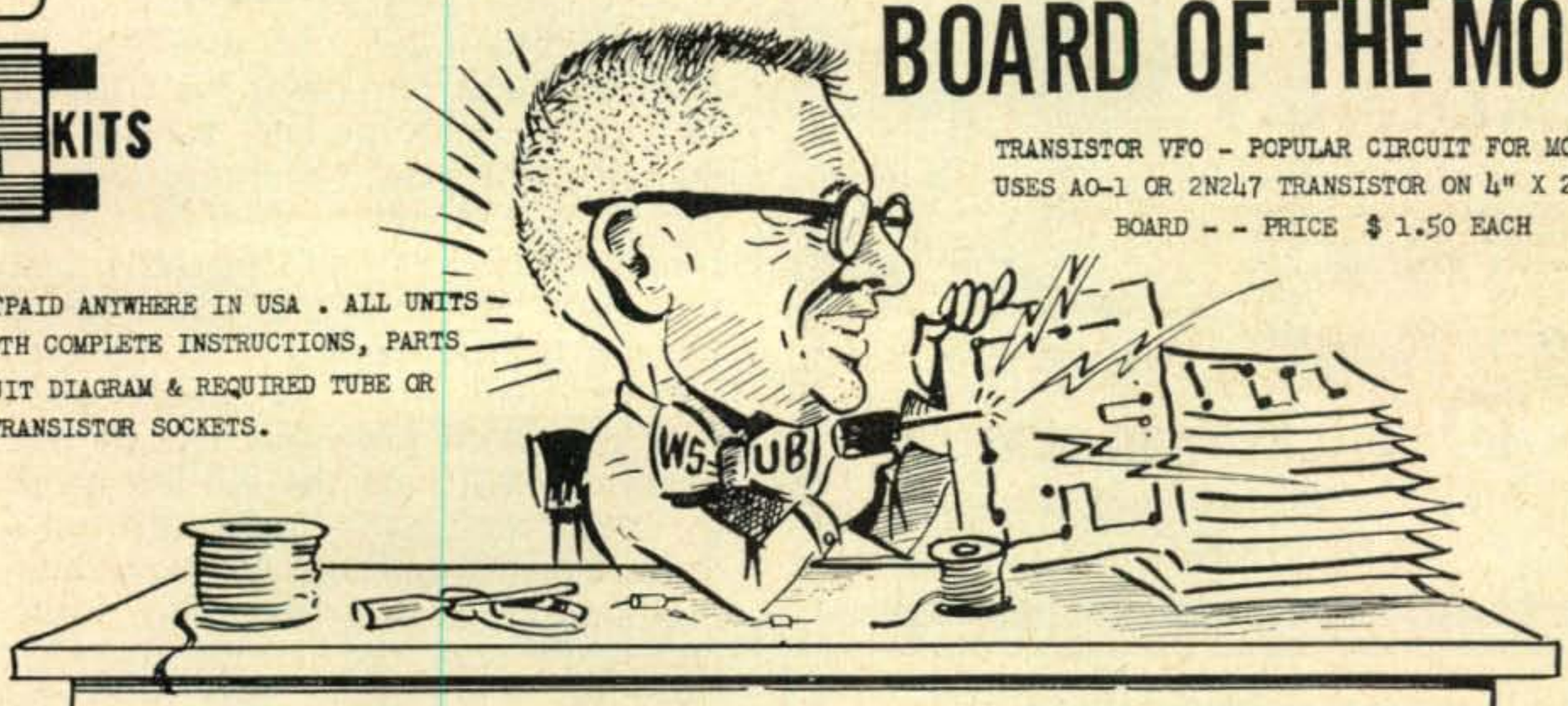

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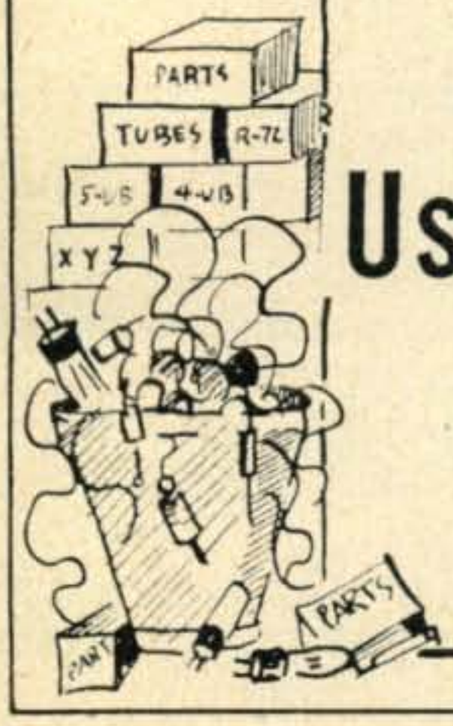

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off position. An *rf* gain control is also useful. A 4000 or 5000 ohm potentiometer in series with the 620 ohm original *rf* cathode resistor will do the trick. The original by-pass condensers will hamper sawing off the chassis. Use .01 or .05 disc ceramics as replacements. When input and output jacks are installed, isolate both with condensers. Use 100 mmf to isolate the output cable (use low capacity auto antenna leads for cables) so that the *if* transformer secondary will peak, and 30 mmf in place of the original antenna coupling condenser.

The original cabinet may be cut down, and a new bottom plate formed from scrap aluminum. A little spray paint will work wonders here. Be sure to re-peak the auto radio antenna trimmer with the converter in the circuit, and at that time, re-peak the converter *if* transformer and mixer condenser. Use a phone signal near the top of the band and adjust the oscillator trimmer until the top of the band is near the high end of the dial. The antenna trimmer is adjustable from the front panel and presents no problem.

Calibration

Calibration should take about 20 minutes. Drive to the home of the closest friend with a frequency meter and ask for a modulated signal moved in 10 *kc* steps across the band. This method, coupled with the excellent ARC-5 oscillator stability, will give you calibration equal to most mobile converters in use.

Results

Results will surprise you. The front end will be extremely hot on 7 *mc*, although conversion to a more modern tube would be worth the effort if you are interested in higher frequencies. Selectivity is fair because the two tuned circuits at 1415 *kc* (*if* transformer) are high quality, and your car receiver probably has an *if* frequency below 300 *kc*. The bandspread is adequate to allow comfortable tuning, and, with judicious use of decals, the appearance will pass the XYL's inspection.

The preceding information and a close look at the illustrations should be sufficient to permit duplication of the converter. But why be a copy-cat? Why not try one for 20 meters and see how it compares with the other receiving apparatus you have in your shack? ■

WØFQY [*from page 45*]

His wife, who is vice-president and secretary of the business, gave up a long time ago, and she doesn't even object to her OM hamming as KØAXS on their houseboat in Southern Missouri where they sneak away for weekends.

"I decided radio was here to stay soon after I met Carl," Oma Mosley said. "Why, even when we took our trip to Europe a couple of years

ago, if I lost track of him, I just looked up the nearest ham shack, and there he was."

Since 1918, Carl has noticed many changes in his favorite hobby including the mass swing from home-brew rigs to commercial equipment.

"Hams miss a great deal now because they don't get know-how from building their own gear," he said, "but, frankly, radio has developed with such leaps and bounds that I find it is almost too technical to build some things."

WØFQY feels that a new ham who wants to enjoy operating and isn't interested in building has a wide selection of well-built and reasonably priced commercial receivers, transmitters, and, of course, antennas, to choose from.

His only suggestion for improving radio is something of a personal conviction which involves manufacturers like himself, distributors, and other professional electronics men.

"Too many people are trying to commercialize the hobby," Carl states. "Sure, it's illegal to get on the air and talk about the product you make or sell, but I'm afraid there's a lot of it going on. For the good of amateur radio, I'm against it, and I try to handle all matters that pertain to business by mail rather than on the air."

Someone once said that the secret of success is enjoying your work, so it's no wonder Carl Mosley is doing all right for himself. What ham wouldn't have fun making his living visiting hamfests and conventions, planning and talking antennas, and meeting amateurs in every part of the world? Besides, he manages to sandwich in plenty of just-for-fun hamming from his car, home, and houseboat.

Whether you hear WØFQY or KØAXS operating AM, CW, SSB, or RTTY, or perhaps catch a glimpse of him on amateur TV, give

him a call and sit back to enjoy a real rag-chew. Trying hard to separate work from play, he probably won't say a word about his beam business in St. Louis, but I don't think Carl Mosley would mind at all if you just happened to comment, "Nice signal here, OM; Wonder what kind of beam you have there." ■

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9 MC FILTER [*from page 44*]

SSB-9 filter package are stamped 9.0015 *mc* and 8.9985 *mc*. These crystals are designed to work into a 35 mmf *capacitive* load with a maximum drive level of 10 *mw*. A recommended circuit is shown in fig. 3. The two small ceramic

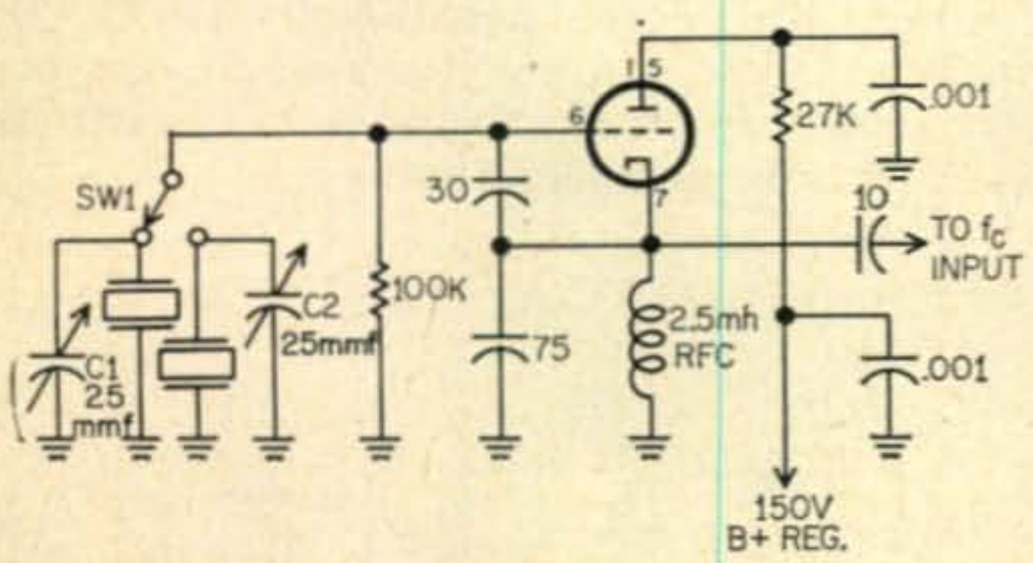

Fig. 3-A 9 mc carrier oscillator.

variable trimmer capacitors, C1 and C2, are for the purpose of trimming the crystal frequency to compensate for stray wiring capicitance. Once the oscillator crystals are adjusted for their nominal frequency, upper and lower sideband operation may be selected by switching the appropriate crystal into the oscillator circuit.

As you can see in fig. 1, the oscillator crystals provide carrier injection at the points marked USB and LSB. For example, if LSB transmission is desired, the 9.0015 *mc* crystal is selected. The carrier, which is suppressed by the balanced modulator preceding the filter, is positioned a +1500 cycles on the filter slope. When modulation is applied to the system, the lower sideband will pass through the filter, while the upper sideband (above 9.0015 *mc*) will be rejected. Conversely, if USB transmission is desired, the 8.9985 *mc* carrier crystal is used and only the upper sideband will be passed.

Due to the 3.0 kc bandwidth (at 10 *db*) of the SSB-9 filter, the bandwidth of the sideband energy will be limited to 3.0 *kc* at 10 *db* down

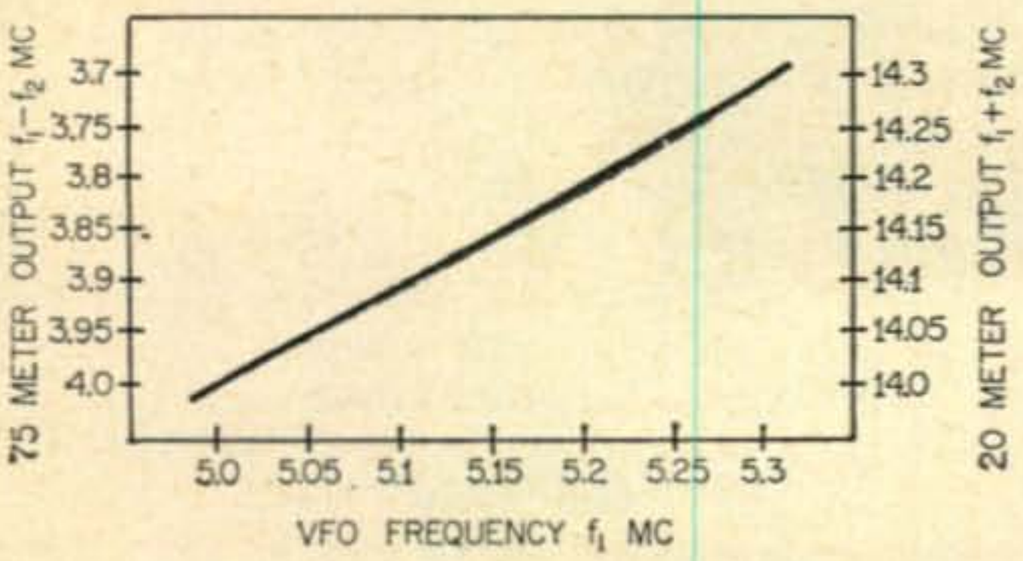

Fig. 4—Graphical analysis of 5 and 9 mc mixing.

by the filter. Minimum attenuation will occur at audio frequencies between 300 and 2700 cycles, no matter which sideband is transmitted.

Figure 4 is a graphical presentation of 75 meter and 20 meter operation when utilizing a nominal *vfo* frequency of 5.0 *mc*. By adding the *vfo* frequency (f_1) to the 9.0 *mc* SSB signal (f_2), you will obtain 20 meter (14 *mc*) output. If the 5.0 *mc vfo* frequency is subtracted from the 9.0 *mc* SSB signal, the output will be on 75 meters (4.0 *mc*). This can easily be accomplished by switching the appropriate coils into the 12BY7 and 6CL6 stages.

Stores catering to amateurs should stock the SSB-9 by the time you read this. The amateur net price is about $35.00. When you consider the simplicity of the associated circuits, the number of crystals in the package, and the cost of "competitive" units, the SSB-9 is a bargain worthy of your consideration.

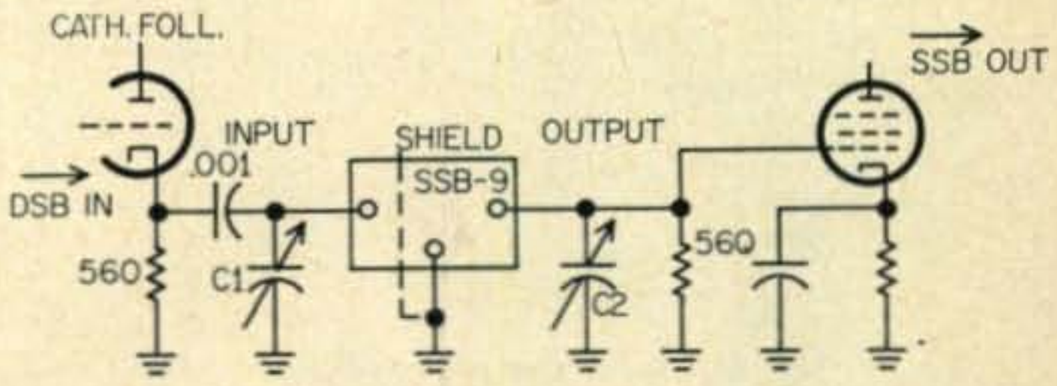

Fig. 5—Circuit to provide a correct impedance match for the input and output of the SSB-9. C1 and C2 are APC 50 Variable Capacitors. Tune C1 and C2 for maximum carrier output with carrier unbalanced and 9.001500 mc carrier frequency. Signal voltage at Filter input should be 2.0 volts.

If you would like more information on the filter package, it may be obtained by writing Mr. Frederick M. Clepper, McCoy Electronics Co., Mt. Holly Springs, Pa. ■

GG LINEAR [*from page 42*]

because of TV set 15 *kc* oscillator radiations in the neighborhood. Should the constructor desire 80 meters, there is room for a coil and a larger tuning capacitor of 250 mmf or a mica padder can be added, with a switch, across the existing 130 mmf variable.

Tuning Procedure

It takes about 40 to 70 watts to fully drive the 811's 300 *ma* or over. The output of the 20A is not really enough drive. I use a 10B, followed by four 6AG7's in grounded grid to drive the 811 linear.

For trouble free operation, and tube economy it is a hard little amplifier to beat and best of all there are no bias supplies, screen supplies or blowers to worry about.

A philosophical comparative list follows: Approximate —

Old Way

2	816 Rectifier tubes	4.30
1	Fil transformer	4.66

1	Plate transformer, 1200v 200 ma type P-17AL	28.05
2	Tube sockets	.60
1	10B cabinets	25.00
		$62.61

New Way

26 F-4 Diode	30.00
None	
600-0-600 200 ma	10.36
Glass Strip	2.00
Cabinet	8.00
	$50.36

Of course you realize statistics can be juggled either way, depending on how bad you want to build an amplifier. ■

RELAY [*from page 39*]

filter. This arrangement allowed me to obtain the line voltage direct from the transmitter and also use the high power on/off switch to acticate the antenna relay. Also the wires running from the transmitter to the antenna are low power lines, an added safety feature. If necessary the transformer can be mounted directly on the BC 442 case and controlled from some remote point.

As outlined by W70E in the July, 1958 issue of CQ, the location of the meter in the antenna line has a direct bearing on the reading obtained, that is, if you are at a current peak you have a maximum reading and if you are on a current node your reading is negligible. If you have an estimated output power of 50 watts or more it would be wise to shunt the meter with a #10 wire and then place the meter in the circuit. By trial, you can then determine the proper size wire needed to give filter. This arrangement allowed me to obtain you a reading of 5-7 when your rig is properly loaded. Because this output current decreases as you go on the higher frequencies, it is advisable to do your initial work on the 80 meter band. ■

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MUST SELL: HQ-145, matching speaker, crystal calibrator, like new. $245; Apache TX-I, brand new, wired, excelcent condition, $215. Both, $435. Father Michael Faraon, St. Michael's College, Santa Fe, New Mexico.

RECONDITIONED! TERMS! TRIALS! FULL GUARANTEE! Scout 40's $59.00; 65 $65.00; 65A $67.50; 65B $75.00; 66 $89.50; 680 $79.50; 680A $89.50; Chief 90A $49.95; LA-1 $89.95; DSB-100 $104.50; 755 VFO $44.50; VOX-10 $17.50; Champ 150's $149.00; 300-A's $389.00; Kings 400B $275.00; 400C $299.00; 500 $415.00; 500-A $449.00; 300-A's $389.00; Kings 400B $275.00; 400C $299.00; 500 $415.00; 500-A $449.00; 500-B $599.00; AT-3 $11.00; 6MConverter $19.95; FCL-1 $14.95; CB-100 $89.95; Johnson Rangers $219.00; Viking II $219.00; 122 VFO $29.95; 500 $725.00; 6N2 $129.00; Navigator $149.00; Challenger $119.00; Pacemaker $375.00; Receivers-S53A $69.95; SX-96 $189.00; SX-101 $319.00; SX-88 $419.00; NC-98 $114.00; NC-125 $139.00; NC-183D $299.50; NC-300 $269.00. Leo, WØGFQ, Box 811, Council Bluffs, Iowa, World Radio Laboratories.

CRYSTALS AIRMAILED: SSB, Net, MARS, Novice, Commercial, etc. FT-243 .01% any frequency 3500 to 8600, $1.49 (10 or more 99¢), any quantity novice 99¢. 1700 to 3,000 FT-243 $1.95. All frequencies 60¢ additional for HC-6/U hermetic holders. Construction article crystal packages: November QST "Phasing Sidebander" $9.95, June 1958 QST and SSB ARRL Handbook SSB "Package" five mixer crystals, Ft-243 $9.95, HC6/U $12.95, matched filter $6.90, also CQ "Crystal Synthesizer", "Transistorized Receiver" also Collins crystals, etc. If you don't see it be specific, ask. Airmailing 9¢ per crystal. Crystals since 1933. C-W Crystals, Box 2065C, El Monte, Calif.

CANADIANS Collins equipment excellent condition KWS-1, Directional Wattmeter, Phone Patch, Low Pass Filter, 75A4, Three Filters, Noise Blanker, Speaker, also Panoramic PR-1 Panadaptor, would like to sell complete but, would consider selling separately. For details, write, Martin Rosenthal, VE3MR, Post Office Box 508, Station "F", Toronto 5, Ontario.

CRYSTALS: FT-243, .01% any frequency from 3500 to 8700 Kilocycles—99¢. Filter crystals, tested FT-241-A 370 to 540 Kilocycles as available 50¢. Matched pairs to 15 cycles or better $1.95. Special 500 Kilocycle FT-241-A standards with oscillator circuit $1.00. Add 5¢ per crystal for postage. All types of crystals available. Old 455 Kc. I. F. HRO receiver wanted. Bob Woods, 2164, Parkway El Monte, Calif. Gilbert 8-3139.

75A4 Serial 2300 $525.00, 75A2 Full AVC on SSB unmatched for $300, 7551 brand new still crated $470 bought KWM2 above is surplus. WØBNF, Box 105, Kearney, Nebr.

Used T. V. Sweep Gen. built by Measurements Corp. U. H. F., $24.50; V. H. F. $18.50. V. H. F. Crystal Marker Gen., 2 thru 6 and 7 thru 13, $15.00 each. Ferris model 18B Signal Gen, 18 thru 100 MC., $29.50. All F.O.B. L. N. Chambers, 3019 Jefferson, Davenport, Iowa.

DWS-1 perfect. Serial 1326. Latest revisions at Collins factory, Original crates. $1195 cash f.o.b. Colorado Springs. James D. Russell WØAVP.

FREE 1960 SURPLUS FLYER, COMMAND SETS, HANDIE TALKIES, RECEIVERS, TRANSMITTERS, TEST SETS, TECH MANUALS, CODE MACHINES, RECEIVERS, TRANSMITTERS, TRANSFORMERS, CAPACITORS, RECEIVING AND TRANSMITTER TUBES, METERS, VHF-UHF SETS, PLUGS, PARTS. WRITE TODAY, BILL SLEP COMPANY, DRAWER 178, ELLENTON, FLORIDA.

MONTREALERS. NO SPACE, SELLING COLLINS 75A3, LATE SERIAL NUMBER, COLLINS 32V TVI MODIFIED TO 32V3 STANDARD, COLLINS LOW PASS FILTER. BEST OFFER TAKES THE LOT. IMMACULATE CONDITION. C. L. SKELDING, 37 SWALLOW AVENUE, DORVAL, QUEBEC.

KWS-1 #981, 75A4 #4895 Speaker and micro match. Guaranteed new condition in every respect. $1950 firm. Frank Lindsay, Holdrege, Nebraska.

ANTENNA TROUBLES? Watch Laurel & Hardy erect a roof antenna amid hilarious antics Kraus and Yagi never dreamed of. Low front to back ratio, but loads of laffs for all ages . . . especially the Jr. Ops. 200 ft, 8mm film. $5.5[illegible] postpaid: send check or M.O. (no cash or COD) to JAGFILMS, 1738 - 201 St., Bayside 60, N. Y.

HAMMARLUND SP-400—Good condx $129.50. GELOSO TWINS—Perfect—Complete Station—75 watts—SSB rcvr.—$229.50—W6QR, Hemet, Calif.

COLLINS 75A-1 $249., 75A-4 $545., 51J-2 $4.95., 51J-3 $575., R390A/URR, 32B-1, AC Supply, Spkr. 75S-1, $975., 32B-1 $525., 516F-2 $89., KWS-1 $1095. Filters, $49., Eldico #100F $495., SX-99, $109., SX-101 $225., SX-101A $295., NC-183-D $239., HT-32A $519., Gonset 111 6 meters $219., GSB-100 $399., Technical Material PMO Oscillator, counter dial $245., Teletype Printers #14, #15, #19, #26, #28, T-D #14, #14 Reperf., Converters. Write Tom, W1AFN, Alltronics-Howard Co. Box 19, Boston 1, Mass. (RIchmond 2-0048).

WANTED

WANTED: Military and Commercial laboratory test and measuring equipment. Electronicraft, Box 399, Mount Kisco, N. Y.

WANTED TRADES NEW AND USED: KWS-1 $1250.00, 32S-1 $590.00, 75S1 $495.00, 32V2 $350.00, HQ100 $149.50, HQ110 $209.00, HQ129 $129.00, HQ145 $269.00, HQ160, $379.00, HQ170 $359.00, Johnson Mobile $75.00, Thunderbolt $589.50, Valiant $439.50, Johnson Citizen Messenter $139.75, Courier $289.50, Hallicrafters 101 Mark III $395.00, HT33 new $495.00, SX99 $119.00, SX100 $295.00, HT32A $695.00, S107 $94.95, NC125 $139.00, NC183D $319.50, NC173 $139.50, NC57 $69.00, SW54 $35.00, CB100 Citizen $125.95, Globe King 500A $425.90, Chief $49.50, 90A $54.95, 680 $95.95, 680A $97.95, DSB100 $129.95, VGO755 $42.95, NC300 $299.95, NC2400 $169.50, CE20A $195.00, 10B $139.50, CE Slicer $37.50, WQ Multiplier $59.95, Heath DX35 $54.95, AT-1 $23.50, DX20 $34.50. Easy terms, Ken-Els Radio Supply, 4208 Central Avenue, Fort Dodge, Iowa, or 128 31st Street NE, Cedar Rapids, Iowa.

ARE YOU MOVING?

If you expect to move, and IF you know your new address now, and IF you don't want to miss any issue of CQ here are three things you can do right now!

1. Tear your name and address label off the wrapper of this issue and paste it in this box right over these words, or make a complete and accurate copy of your old address label.
2. Print your name and NEW post office address in the lines below:

(Name)

(Number and street—or Route)

(City) (Zone) (State)

3. Cut out this whole box and mail it to: CQ Magazine, 300 W. 43 St., New York 36, N. Y.

WANTED (Contd)

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-399A, 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 1— prefix. We pay freight. AMBER INDUSTRIAL CORP., 75 Varick St., N. Y. 13, N. Y.

WANTED: All types of receivers transmitters, test equipment & teletype, in trade for NEW Hallicrafters, Hammarlund, Johnson, National, Central Electronics, etc. Collins 51J2 $495., 75A-1 $239., 75A-4 $595., Hallicrafters SX-101 $225., SX-101 Mk 111A $295., SX-99, $109. SX-71 $169. National NC-60 $45. NC-188 $109. NC-109 $139., Eldico SSB 100F $495. Teletype converters, printers, etc. Write Tom W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (RIchmond 2-0048). Store: 60 Spring St., Newport, R. I.

WANTED: Wollensak recorder or $300. In trade for complete Elmac fixed/mobile rig, perfect condition. K4DJK/4, Baylor School, Chattanooga, Tenn.

Man wanted to take charge of FM Two-way Radio Service Department, first or second class Phone License. plus experience. Salary $000.00 per yr. Send complete resume to: Communications Associates, Inc., P.O. Box 8, Grove Hall Station, Boston 21, Mass.

Wanted: Tubes—Special purpose and receiving. Top prices for Klystrons, Power Tubes, Thyratrons, T. V. and Receiving Tubes. Tubes must be unused. Also Communication equipment Aircraft and Ground, Omnireceivers, Loran, VHF, Marker Beacon, Transceivers, Lab-grade Test Equipment, Signal Generators, Oscillographs, Recorders, or what have you. Bob Sanett, W5REX, V & H RADIO & ELECTRONICS, 2053 Venice Blvd., Los Angeles 6, Calif.

QSL

QSL's, SWL's, XYL-OM's. (Sample assortment approximately 9¾¢.) Covering designing, planning, printing, arranging, mailing, eye-catching, comic sedate, fantabulous, DX-attracting, prototypal, snazzy, unparagoned cards, (Wow!) Rogers KØAAB, 737 Lincoln Avenue, St. Paul 5, Minnesota.

QSL's-SWL's: That are different colored, embossed card stock, and "Kromekote." Samples 10¢. K8AIA, Box 953, Hamilton, Ohio.

QSL's-SWL's. Sample free. W4BKT Press, McKenzie, Tennessee.

GLOSSY 3-color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, New Brunswick, N. J.

QSL's—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pa. Samples, 10¢, with catalogue, 25¢.

QSL-SWL. Samples free. Bolles. W5OWC, 7701 Tisdale, Austin, Texas.

QSL's-SWL's, samples 10¢. Malgo Press, 1937 Glendale Avenue, Toledo 14, Ohio.

QSL's. Samples 15¢. Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSL-SWL: $1.00 per 100. Samples dime. Riesland, W6HTN, Del Mar, Calif.

CHEAPY's. "Fill 'em in yourself." 100-$1.00, 200-$1.75, 500-$4.00, 1000-$7.75 Postpaid. Free sample. QSL Coop, Box 5938, Kansas City 11, Missouri.

QSLs. Samples Free. Phillips, W7HRG, 1708 Bridge Street, The Dalles, Oregon.

QSL's: Samples, dime. Print Shop, Corwith, Iowa.

QSLS-SWLS: 100 two color glossy $3.00; QSO file cards $1.00 per 100; Samples 10¢. Rusprint, Box 7507, Kansas City 16, Missouri.

QSL's? Samples 25¢ (refundable). W6CMN, 6707 Beck Ave., North Hollywood, Calif.

QSL's, SWL's: Nicholas & Son Printery, Postoffice Box 11184, Proenix, Arizona.

QSLs'??? Largest variety samples 25¢ (refundable). CALLBOOKS (Spring): American calls $3.00. Sackers, W9DED, Holland, Michigan.

Gay . . . Rollicking QSL's . . . 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

SWAP OR SELL

For Sale or Trade: Complete mobile outfit, Emac AF-67, Gonset Super Cix, Palio 6 Volt power pack, mike, straight whip & whip with center loaded 40 meter Master Mobile Coil. All practically new. $200 or will trade for tape recorder, receiver, tower, or what have you? Lewis J. Francisco Jr., W3YQP, Route 1, Box 11, Clarksburg, Penna.

Editorial & Columns Content Survey

In order to determine just what material in CQ is most popular as well as which types of articles you like to read, we are including the following questionnaire. Please fill it out as plainly indicated and return it to:

CQ Editorial Survey Dept.
300 West 43rd Street
New York 36, N. Y.

The results of this survey will enable our Editorial Staff to determine the scope and content of future issues.

Indicate preference by progressive number system as follows:

1—Thoroughly enjoyable and informative
2—Enjoyable but takes second choice
3—I can take it or leave it
4—Grim
5—Grimmer
6—Grimmest
7—Please Omit it in future issues of CQ

COLUMNS

Editorial	_____
Scratchi	_____
Ham Clinic	_____
Teletype (RTTY)	_____
Novice	_____
Semiconductors	_____
Surplus	_____
VHF	_____
YL	_____
Sideband	_____
Propagation	_____
Citizens Band	_____
DX	_____
Contest Calendar	_____

ARTICLES

Theory and Design	_____
Travel & DXpeditions	_____
Construction	_____
MARS & CD News	_____
Club Data	_____
Antenna Design	_____
Receiver Dope	_____
Xmtr Dope	_____
Equipment Reviews	_____
Cartoons	_____
Humor & Satire	_____
Historical	_____
Operating Ethics	_____
For Beginners	_____
VHF & UHF Pioneering	_____
New Component Features	_____
Biographies of Leading Hams	_____
New Amateur Products	_____

Which Columns would you like to see expanded _____

Do You read our Classified Ad Department? Yes_____ or NO_____.

What areas of our Hobby would you like to see in CQ that are not in the book now? _____

_____

GENERAL COMMENTS _____

_____

_____

MISC

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., New York 36, N. Y.

TWO-COLOR CERTIFICATE. Attests to tongue-in-cheek ownership of one acre of the moon. Ideal gift or for wall of club, shack, bar or room. Name and call inscribed free. $1.00 each, 6 for $5.00. Box G, 1738, 201 St., Bayside 60, N. Y. Check or M. O. only.

HAMS: Learn Calculus or algebra. Powerful modern mathematics. Easy practical lessons, first four $1. Mathco, 4256-5 Minmor, Cincinnati 17, Ohio.

"WYOMING SUMMER JOB for man with General Ticket. . . . Teacher, graduate student or college upper classman. Single man. Assist with radio club at Teton Valley Ranch. Good technician. Keep contact between ranches and pack trips. Contact: W. S. Wilson, 2619 Oak Knoll Ave., San Marino, California."

A HIGHLY EFFECTIVE REVIEW THAT CAN PLACE YOU IN POSITION TO PASS FCC COMMERCIAL PHONE EXAMS. VERY INEXPENSIVE. FREE LITERATURE. WRITE, COOK'S SCHOOL, BOX 10634, JACKSON 9, MISS.

World's largest Ham Convention—New England Division ARRL to be held at the New Ocean House Hotel right on the beautiful Atlantic Ocean. Swampscott, Mass. on Sunday, May 1st. See exhibits of the latest equipment by the manufacturers themselves and their distributors. Talk over your problems with their representatives! Hear about the latest in ham radio from the country's most outstanding speakers. Ask the fellow who attended Swampscott last year about our prizes! Early Bird registration by mail $3. Banquet $5. Make check or money order payable to FEMARA and mail to Box 88, Swampscott, Mass., before April 20th.

HAM Licenses, resident courses. Novice and General classes, 3 evenings weekly. Delehanty Institute, 117 East 11 St., N. Y. 3. GR 3-6900.

HAMS! In central Illinois it's KNOX ELECTRONIC SUPPLY, INC., where your trade-in is always worth more. 67 North Cherry St., Galesburg, Illinois.

CONTEST PHONIES [*from page 38*]

TUNING TEDDY: Of all the phonies I have met this one takes the prize. Scientific tests by five New York doctors prove that he has the highest MUPH rating of any ham.* He is a first cousin of Advertising Adelbert. He is usually found around 28.3 *mc.* After a long, long call he announces to the world that he is "tuning the entire band." As he stands by consternation reigns. Some call here, some call there. Some call long, some call short. The band is full of calls from one end to the other. When a contact is finally made the USA station quite often will suggest in polite tones that he tell where he will listen. But QRM always seems to interfere because he never seems to get the message.

There is a report that some of the desperate ones are making calling wheels which run for two minutes and then stop for a short break for listening. This way the caller can eat an occasional sandwich or clean up the shack during calls. There is also the additional rumor that one of the Teddies got so enamored with his tuning that he started at 29.7 and tuned

*MUPH—Micro Ulcers Per Hour.

the wrong way—toward *vhf*-land. Finally he reached the Russian 38 *mc* band where he almost went mad trying to work what he thought were a bunch of SSB boys. After a great deal of wasted effort he finally decided it was the fault of his receiver and is now off the air working on it. However, he has announced that he will be back for the next "test" and druggists are laying in extra aspirin supplies.

There has been a great deal of research into the cause of *Tuning Teddyitus*. The experts have come up with several theories. One explanation is that he has had an accident and has suffered damage to his tuning arm. After a trip to the Mayo clinic he was advised to exercise his arm to make it well. Another idea is that he has just oiled his tuning mechanism and is trying to make it run smooth. The third theory is that he is making a stress analysis on some new exotic metal and is trying to wear out his gears. A fourth explanation by a renowned psychiatrist is that he has already stripped his gears.

EFFICIENT EDWARD: This fellow simply does it the simple, efficient way. Thank goodness there are quite a few of these.

In various contests the entrants must sign a statement saying they have observed all the rules and regulations. I suggest that each phone operator be instructed to sign the following form and send it in with his log:

> *"I certify that I have listened to KH61J operate during a phone contest for 30 minutes and that I have operated my station as nearly as I can using his procedure and technique."*

I have poked a little fun at the fraternity but I hope nobody gets mad. After all I wasn't talking about you—or was I?

It's quite a tube; it's very different characteristic curve system takes some getting used to—but it offers possibilities that nothing else does. In is own way, its as different from a standard vacuum tube as a PNP transistor is from an NPN—and, in a somewhat similar way, can be used as an inverse-complement of an ordinary tube. ■

MODULATOR MATCH [*from page 37*]

may be calculated by dividing watts, shown on chart, by plate voltage at any impedance shown.

Also it is useful to know the voltage corresponding to the desired electrical power in a particular load impedance. This voltage can be measured by a rectifier type meter and will serve to indicate proper amplifier output level.

In addition there are occasions when it is necessary to determine operating voltages in

order to lay out the transmitter. It is hard to find concise information all in one package on this subject and it is hoped that this material will prove useful to many. ■

144 MC AMP [*from page 36*]

capacity is reduced to a value not greatly different than when it is working as a parametric amplifier. The 144 *mc* circuit and coupling circuits can then be adjusted to near optimum values before turning on the pump oscillator.

The small trap circuits in series with the input and output jacks were put in to prevent these circuits from affecting the idler system impedance. These consist of 3 turns of #20 wire wrapped around a 3/16 inch diameter, 3 *mmf* ceramic condenser. If other pump frequencies are used, these traps should be changed to resonate as near as possible to the difference idler frequency (640 or 650 *mc* in this unit).

The small end of the varactor diode fits an octal socket pin clip so one of these was soldered to the end of the long line in a position to align with the sleeve fitting on the pump oscillator circuit.

Tune Up Suggestions

Connect a signal generator or crystal noise generator to the input jack after getting preliminary readings directly into the 144 *mc* receiver. With the pump oscillator power off, tune up the 144 *mc* line circuit with the large tuning condenser and about 2 volts of *dc* reverse bias on the varactor diode. Adjust the antenna link and series condenser and output link coupling for best signal or *nf* thru the line circuit into the 144 *mc* receiver. It should be around 60 to 80% as good as the preliminary measurement made directly into the receiver.

Turn up the pump oscillator power (after you are certain that it is oscillating), and vary the oscillator frequency. When the correct adjustments have been made (and remade) the parametric amplifier will come to life and show from 1 to 3 S points of gain. Then readjust all controls for optimum *nf*, or signal to noise ratio with a fractional microvolt input. Changing over to the antenna will alter the input loading in most cases and require a different degree of pump power and frequency adjustment.

Be sure the reverse bias voltage is with the positive side towards the large end of the varactor diode. Reversal does no damage due to the high series resistors but increases the diode loading on the 144 *mc* circuit with a large loss of signal.

The Microwave Associates varactor diodes work slightly better with a few volts of reverse bias only if this is applied thru at least 10 or 20 megohms. A mercury battery cell could be left in this circuit permanently for several years of operation before renewal. ■

Advertising Index

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Mar. 25, 1960

Please send me information on your ads in the March 1960 CQ keyed as follows:

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10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50				

A B
C D

NAME _____
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Type of work (specify) _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____

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Kit 500 Lugs & Eyelets
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Kit 5 lbs. Surprise Package
Kit 10 Transmit Mica Cond's
Kit Glyntal & Cement
Kit 3 Phone/Patch Xfmrs
Kit 3 Searchlights
Kit 4 AN/Reflector Lites
Kit 6 Instld Tuning Tools

Kit 8 AN Plugs & cnnctrs
Kit 5 Sub-Min Tubes
Kit 40 Standoff Insulators
Kit 35 Power Resistors
Kit 75 Mica Condensers
Kit 5 Crystal Diodes
Kit 200ft Hook Up Wire, 4 Rolls, 50ft/ea. Asstd. Colors
Kit 100 Ceramic Condensers
Kit 5 FT243 Xtal Holders
Kit 5 Microswitches
Kit 10 Wheat Lamps
Kit 3 Transistor Xtmrs
Kit 8 Xtal Osc-Blanks
Kit 4 Asstd Rectifiers
Kit 12 Alligator Clips Asstd
Kit 5 UG/Connectors
Kit 100 Self/Tap Screws

Kit Adj Wire Striper & Cut
Kit 2 Bakelite Panels 6x12"
Kit 5 pcs Wrench Set
Kit 8 pcs Nut Driver Set
Kit Hi Gain Xtal Mike
Kit 6 ea Phonoplugs & Jacks
Kit 25 ft Lo-Cap Mike Cable
Kit 18' Lo-Cap 2 Cond M-Cable
Kit 20 ft RG59U Coax Cable
Kit 15 ft RG11U Coax Cable
Kit 2 pair SO239 & PL59
Kit 12 Binding Posts Asstd
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Kit 3 Phone Plugs Asstd
Kit Long Nose Plier
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Kit 2 Xmttr Variables
Kit 5 of 2mfd @ 600wvdc/oil

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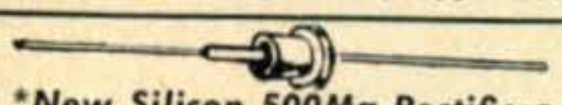

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Use in Bridge or C.T. up to 750ma dc

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Silicon 866A Tube Replacement Rectifier Rated 3000 Ma at 4500V-RMS or 6400PIV. Operates —65 to + 165°C. Max 12.5 VDC Drop 300Ma "VACDAC" ST866.
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5u4 or Equiv. 1600PIV/1100 Rms at 750Ma. ST5u4 ..... **$9**

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75Ma 49c, 5 for $2; 100Ma 59c, 6 for $3
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300Ma 88c, 5 for $4; 350Ma $1.00, 8 for $7
400Ma $1.10, 5 for $5; 500Ma $1.35, 5 for $5
This Item P.Pd. 48 states orders $10.

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0B2	.65	6C5	.69	45	.49
0C3	.70	6C6	1.08	50L6	.69
0D3	.50	6C8	1.08	RK59	1.39
0Z4	.60	*We Trade!*		RK60	1.17
1A7	.90	6CB6	.89	HY69	2.20
1B3	.78	6CD6	1.49	75	.81
1L4	.82	6CF6	.85	HY75	5.00
1R4	5/$1	6CL6	1.40	83	.95

We Swap Tubes! What Do/U Have?

1R5	.78	6CB6	.89	4PR60A	37.50
1S4	.78	6CG8	1.12	4-125A	27.50
1S5	.68	6CM6	.79	4X150G	15.00
1T4	.85	6CS6	.70	4X250B	41.00
1T5	.95	6CU6	1.29	4-400A	41.75
1U4	6/$1	6D6	.99	4E27A	39.00
1U5	.75	6E5	.79	250TL	19.45
1X2	.99	6F4	2.49	307A	2/$1
2C39A	9.00	6F5	.63	316A	5/$1
2C40	5.50	6F6	.99	VR92	5/$1

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2C43	6.50	6F7	.99	388A	3/$1
2C51	2.00	6F8	1.39	350A	2.45
2D21	.65	6H6	.59	350B	1.75
2E22	1.75	6J4	1.72	371B	.95
2E24	1.90	6J5	.59	5146	3.90
2E25	2.50	6J6	.59	416B	16.00
2E26	2.75	6J7	.99	450TH	43.00
2E30	1.70	6J8	1.39	450TL	43.00
2E35	1.60	6K6	.59	460	11.50
2K25	9.75	6K7	.79		

All Tubes Stocked at Low Prices!

2K26	34.00	6K8	.99	703A	2.00
2K28	30.00	6L6	1.19	707B	3.50
2V3	2/$1	6SN7	.72	715C	10.90
2X2	.48	6T8	.98	717A	5/$1
3A4	.70	6V6GT	.90	723AB	5.00
3A5	1.00	6X5	.49	725A	2.75
3API	5.95	12AT6	.59	803	3.50
3BPI	3.99	12AT7	.89	804	8.85
3C24	3.50	12AU6	.63	805	6.00
3D23	3.95	12AU7	.69	*We Trade!*	
We Buy!		*We Sell!*		807 1.10	
3E29	6.00	12AX7	.79	5/$5, 10/$12	
3Q4	.68	12AY7	1.29	811	3.45
3Q5	.86	12B4	.95	811A	4.41
4-65A	13.50	12BA6	.65	812	3.30
4-125A	27.50	12BA7	.99	813	8.00
4-250A	34.00	12BD6	.59	815	3.15
4X150A	7.00	12BE6	.59	826	.59
4X250	36.00	12BH6	.79		
4X500	37.00	12BH7	.99		
5API	2.95	12BY7	1.00		

Wanted Test Sets and Equipment

5BPI	5.02	12BZ7	.99	828	9.00
5BP4	5.00	12H6	.75	829B	8.00
5CPI	4.99	12J5	.69	832A	6.00
5CP7	9.00	12J7	.69	833A	36.00
5R4	1.00	12J8	1.35	837	2/$2
5T4	.90	12K8	.89	866A	2.45
5U4	.75	12SA7	.69	954	10/$1
5V4	.89	12SC7	.89	955	3/$1
5Y3	.60	12SF5	.69	957	3/$1
5Z3	.89	12SG7	.89	958A	2/$1

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15GP22	89.00	12SH7	.89	991	5/$1
6A7	1.00	12SJ7	.75	1614	2.75
6A8	.99	12SK7	.75	1619	5/$1
6AB4	.59	12SL7	.79	1620	2.00
6AC7	.72	12SN7	.69	1625	5/$1
6AG5	.65	12SQ7	.69	1626	5/$1
6AG7	.75	12SR7	.69	1629	4/$1
6AK5	.69	15E	1.19	2050	1.25
6AL5	.59	15R	4/$1	5517	1.25
6AQ5	.66	FG17	3.49	5608	3.95

Top $$$ Paid for 304TL tubes

6AR6	1.95	19T8	1.16	5618	3.25
6AS7	3.49	24G	3.50	5651	1.35
6AT6	2/$1	25A6	1.19	5654	1.20
6AU6	.79	25A7	2.19	5656	4.25
6B8	1.35	25C5	.81	5663	1.15
6BA6	.59	25L6	.72	5670	.90
6BE6	.59	25T	4.00	5686	1.75
6BG6	1.49	25Z5	.72	5687	1.15
6BH6	.79	25Z6	.75	5691	4.70
6BJ6	.72	26A7	3.69	5725	1.95

Top $$$ Paid for XMTTR Tubes!

6BK7	.99	FG27	8.28	5732	2.00
6BL7	1.35	HV27	19.39	5736	85.00
6BN4	.69	28D7	.89	5749	1.95
6BN6	1.08	FG33	15.00	5750	2.75
6BN7	1.99	EL34	3.49	5751	1.25
6BQ6	1.19	35A5	.69	5814	1.20
6BQ7	.99	35L6	.59	5879	1.20
6BX7	1.11	35T	4.49	5894	$12.00
6BY5	1.19	35Z5	.89		
6BZ6	.91	RK39	2.99	No Sre—Write!	

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NEW PRINT CKT-PANEL, 11x12x.062" $2
IRISH TAPE 1200' HiQlty, ...3 for $5
BANDPASS 60 or 90 or 150 Cys each $2
1N34A 45¢@, 15/$5; 1N35 $1; IN38 70¢@;
XTAL OVEN—115V&Thermostat $2
Blower 24VDC/100CFM $3.98
Blower AC/Miniature 6&12VAC $1.00

Xmitting Mica's .006 @ 2500V, 5 for $1.00
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Vibrators 6 or 12VDC $1.49@; 4/ $5.00
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New Variacs/or equiv 0-135V/3 Amp $10.65
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DC-METER Dejur 800 Ma/3½" $3@, 2/$5
DC-METER One Ma/4" Rd. $5@, 2/$8
RF-MTR Weston 750Ma/TC....$4@, 2/$6
DC MTR 100Ma/2½".....$3@, 2/$5

BC696/3 to 4 mc's good condition.... $5.95
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G.E./YRS-1 Side Band Selector..... $45
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4x150 Ceramic/LOKTAL.....2 for $1.00
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	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		
	24	15.00	29.45		

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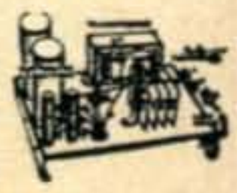

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Typical RCA High-Perveance Beam Powe

RCA Type No.	Max. DC Plate Input (watts)	Max. DC Plate Volts	Ma at R
2E26	40	600	
807	75	750	
813	500	2250	
829-B	120†	750	
5763	17	350	
6146	90	750	
7034/ 4X150A	500	2000	
7094	500	1500	

* Maximum Amateur Ratings, Class C
†Twin-Unit Tube. Total for tube

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