July 1958 50c

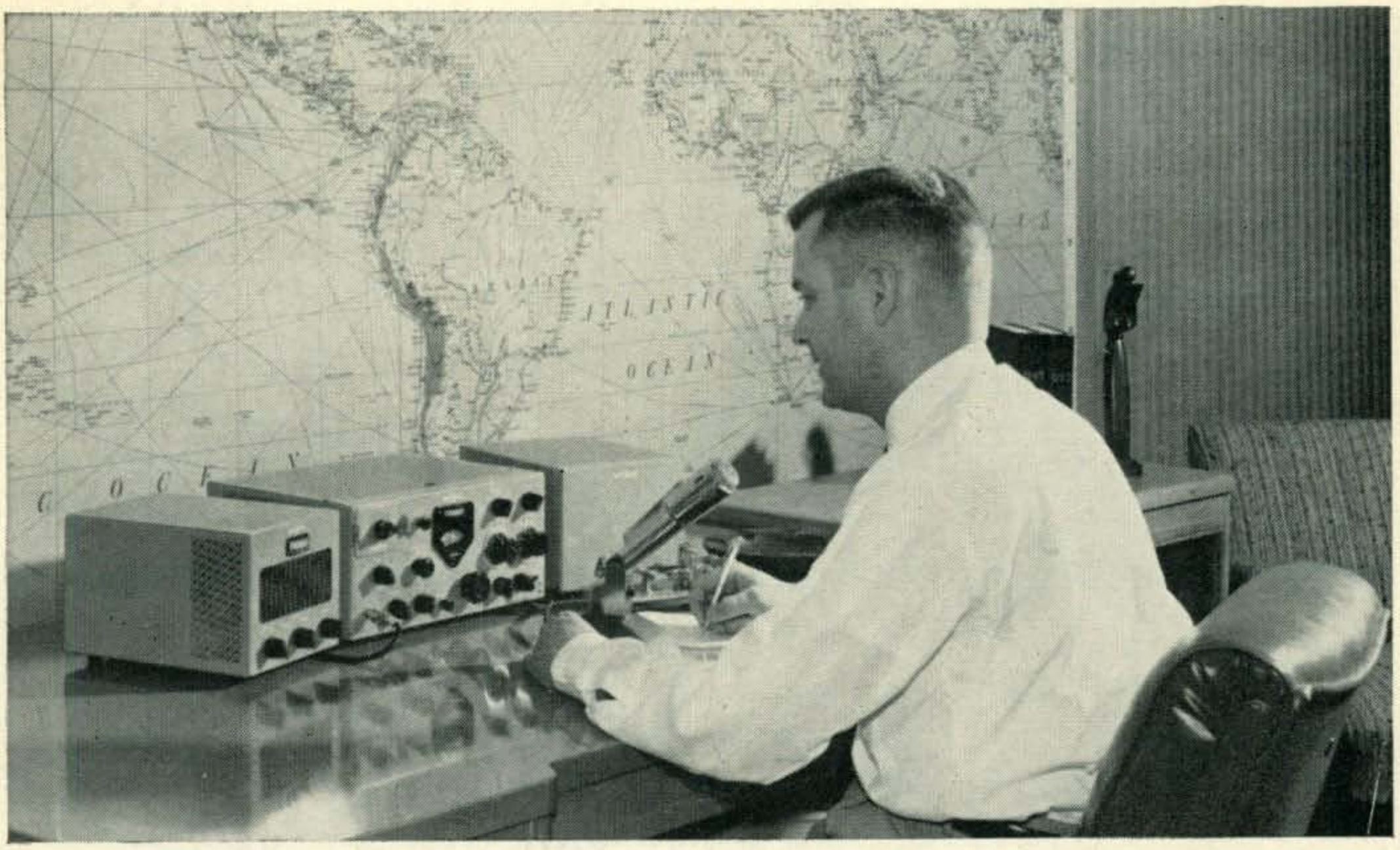
CQ

SPECIAL ANTENNA

The Radio Amateur's Journal

A HAM'S AT HOME

IN CAR



OR 'CASTLE'
WITH A **KWM-1**

COLLINS

For further information, check number 1 on page 126.

There's a PR for every Service!

AMATEUR

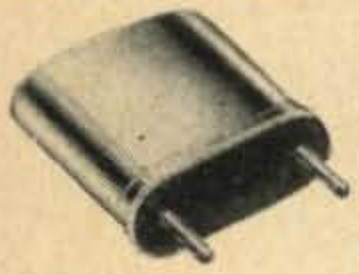
40, 80 and 160 Meters, PR Type Z-2

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

20 Meters, PR Type Z-3

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

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



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

$4.95 Net

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

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

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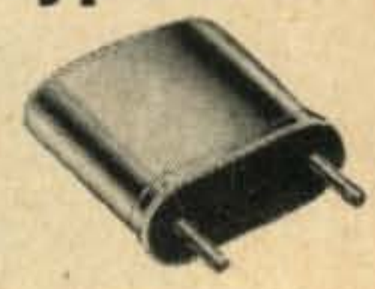

SPECIAL TYPES

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

Type Z-1, AIRCRAFT

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

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

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

100 Kc. . . . . **$6.95** Net

PR PRINTED OSCILLATOR KIT

Has many uses—

- As 100 Kc. Marker
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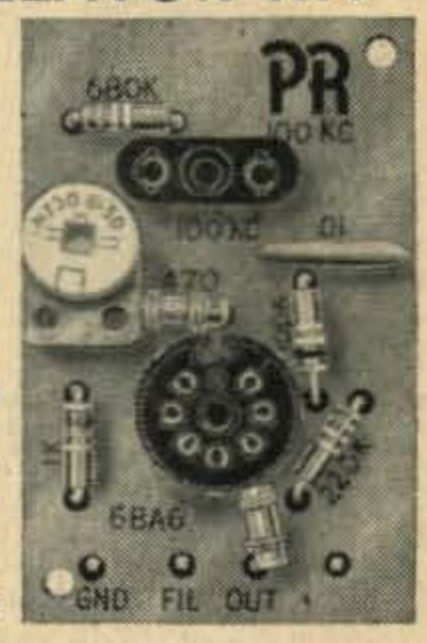
- As Foundation Circuit for Low Frequency SSB Crystals

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

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



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

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For Lear, Narco and similar equipment operating in the 121 Mc. region, requiring crystals in 30 Mc. range.

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For further information, check number 3 on page 126.

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

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

CQ CERTIFICATES:

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

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

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 and 1957 CQ yearly indexes will bring you up to date. Most back issues are available at 50c from us. Check our "Back Issue" ad for details on those not available. Reprints of the Cumulative Index are available free. For further information see the Ham Clinic column.

DISCLAIMER:

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

← For further information, check number 4 on page 126.

CQ—The Radio Amateur's Journal

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

July, 1958
vol. 14 no. 7

Departments

Branch Advertising Offices: James D. Summers, Suite 556, Pure Oil Building, 35 East Wacker Drive, Chicago 1, Ill. ANdover 3-1154.

Ted E. Schell, 2700 West 3rd Street, Los Angeles 57, Calif. DUnkirk 2-4889.

Charles W. Hoefer, 1664 Emerson Street, Palo Alto, Calif. DAvenport 4-2661.

publisher S. R. Cowan
production manager Bill Gardner, Jr.
circulation manager Harold Weisner
draftsman David Fish
advertising representative Jack Schneider
advertising representative Dick Cowan
classified advertising Phyllis Gelfand

CQ — (title registered U.S. Post Office) is published monthly by Cowan Publishing Corporation. Executive and editorial offices at 300 West 43rd Street, New York 36, N. Y. Telephone JUdson 2-4460. Second Class Mail privileges authorized at New York, N. Y.

SUBSCRIPTION RATES: U.S.A. and Possessions, APO, FPO, Canada and Mexico: one year $4.00; two years $7.00; three years $10.00. Pan-American and foreign: one year $6.00; two years $11.00; three years $16.00.

FOREIGN SUBSCRIPTIONS: Great Britain: RSGB, New Ruskin House, Little Russell St.; London WC 1, England. Australia: Technical Book Co., 297 Swanston St., Melbourne C 1, Victoria, Australia.

Postmaster: Send Form 3579 to CQ, 300 West 43rd Street, New York, N. Y.


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HEATH *hams work to bring you*

All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact. With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!


CHUCK K8CJI

ROGER MACE (W8MWZ)
SENIOR HAM ENGINEER
HEATH COMPANY

HEATHKIT 50-WATT CW TRANSMITTER KIT

MODEL DX-20

$35.95

If high efficiency at low cost in a CW transmitter interests you, you should be using a DX-20! It employs a single 6DQ6A tube in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single-knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedances between 50 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you! Shpg. Wt. 19 lbs.

HEATHKIT "APACHE" HAM TRANSMITTER KIT

- Newly Designed VFO—Provision For S.S.B. Adapter
- Modern Styling—Rotating Slide Rule Dial

MODEL TX-1 **$229.50**

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Fresh out of the Heath Company laboratories, the brand-new "Apache" model TX-1 Ham Transmitter features modern styling and is designed as a handsome companion to the also-new Heathkit "Mohawk" receiver. The "Apache" is a high quality transmitter operating with 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, the "Apache" features built-in switch selected circuitry providing for single-sideband transmission through the use of a plug-in external single-sideband adapter. These Heathkit adapters will be available in the near future. A compact, stable and completely redesigned VFO provides low drift frequency control necessary for single-sideband transmission. An easy-to-read slide rule type illuminated rotating VFO dial with vernier tuning provides ample bandspread and precise frequency setting. Simple band-switching control allows flip-of-the-wrist selection of the amateur bands on 80, 40, 20, 15 and 10 meters (11 M with crystal control). The "Apache" features adjustable low level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL-34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation.

The final amplifier is completely enclosed in a perforated aluminum shielding for greater TVI protection and transmitter stability. Cabinet comes completely preassembled with top hatch for convenient access without taking chassis out of cabinet. Die-cast aluminum knobs and front panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. Incorporates all the refinements necessary with many "plus" features for effective and dependable communications. Shpg. Wt. 115 lbs.

...top quality at lowest prices!

HEATHKIT "MOHAWK" HAM RECEIVER KIT

- All Critical Circuits Prewired and Aligned
- Crystal Controlled Oscillators for Drift-Free Reception

MODEL RX-1 **$274.95**

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Outstanding results can be expected with the new "Mohawk" receiver which is designed to combine all the necessary functions required in a high quality communications receiver. A perfect companion for the Heathkit "Apache" transmitter, the "Mohawk" features the same wide-band slide rule type vernier tuning and covers all of the amateur bands from 160 through 10 meters on seven bands with an extra band calibrated to cover 6 and 2 meters using a converter. External receiver powered, accommodations are available for these converters which will be available in Heathkits soon. The "Mohawk" is specially designed for single-sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled, wired and aligned front end assures ease of assembly. All critical wiring is done for you insuring top performance. This 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc. Five selectivity positions from 5 kc to 500 CPS. A bridged T-notch filter is employed for maximum heterodyne rejection. Complete accuracy is obtained with the use of a built-in 100 kc crystal calibrator and the set features 10 db signal-to-noise ratio at less than 1 microvolt input. S-meter and many other fine features built-in for top-notch signal reception. Shpg. Wt. 90 lbs.

HEATH COMPANY A Subsidiary of Daystrom, Inc. BENTON HARBOR 12, MICH.

HEATHKIT PHONE & CW TRANSMITTER KIT

MODEL DX-40 **$64.95**

The DX-40 incorporates the same high quality and stability as the DX-100, but is a lower powered rig for crystal operation, or for use with an external VFO. Plate power input is 75 watts on CW, permitting the novice to utilize maximum power. An efficient, control-carrier modulator for phone operation peaks up to 60-watts, so that the rig has tremendous appeal to the general class operator also. Single-knob switching covers 80, 40, 20, 15, 11 and 10 meters. Pi network output coupling makes for easy antenna loading, and pi network interstage coupling between the buffer and final amplifier improves stability and attenuates harmonics. A line filter is incorporated for power line isolation. The efficient oscillator and buffer circuits provide adequate drive to the 6146 final amplifier from 80 to 10 meters, even with an 80-meter crystal. A drive control adjustment is provided, and the function switch incorporates an extra "tune" position so that the buffer stage can be pretuned before the final is switched on. A switch selects any of three crystals, or a jack for external VFO. High quality D'Arsonval meter for tuning. Shpg. Wt. 26 lbs.

HEATHKIT DX-100 PHONE & CW TRANSMITTER KIT

MODEL DX-100 **$189.50**

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

You get more for your transmitter dollar when you decide on a DX-100 for your ham shack! Recognized as a leader in its power class, the DX-100 offers such features as a built-in VFO, built-in modulator, TVI suppression, pi network output coupling to match a variety of antenna impedances from 50 to 600 ohms, pi network interstage coupling, and high quality materials throughout. Copper plated 16-gauge steel chassis, ceramic switch contacts, etc., are typical of the kind of parts you get, in assembling this fine rig. The DX-100 covers 160, 80, 40, 20, 15, 11 and 10 meters with a single bandswitch, and with VFO or crystal operation on all bands. RF output is in excess of 100 watts on phone and 120 watts on CW, with a pair of 6146 tubes in parallel for the final amplifier, modulated by a pair of 1625 tubes in parallel. VFO tuning dial and panel meter are both illuminated for easy reading, even under subdued lighting conditions. Attractive front panel and case styling is completely functional, for operating convenience. Designed exclusively for easy step-by-step assembly. No other transmitter in this power class combines high quality and real economy so effectively. Here is a transmitter that you will be proud to own. Time payments are available! Shpg. Wt. 107 lbs.

more fine ham gear from the pioneer

HEATHKIT GRID DIP METER KIT

A Grid Dip Meter is basically an RF Oscillator used to determine the frequency of other Oscillators, or tuned circuits. Numerous other applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, designing new coils, etc. Features continuous frequency coverage from 2 MC to 250 MC, with a complete set of prewound coils, and a 500 ua panel meter. Has sensitivity control and a phone jack for listening to the "Zero-Beat". It will also double as an absorption-type wave meter. Shpg. Wt. 4 lbs.

MODEL GD-1B **$21.95**

Low frequency coil kit: two extra plug-in coils extend frequency coverage down to 350 KC.
Shpg. Wt. 1 lb. No. 341-A **$3.00**

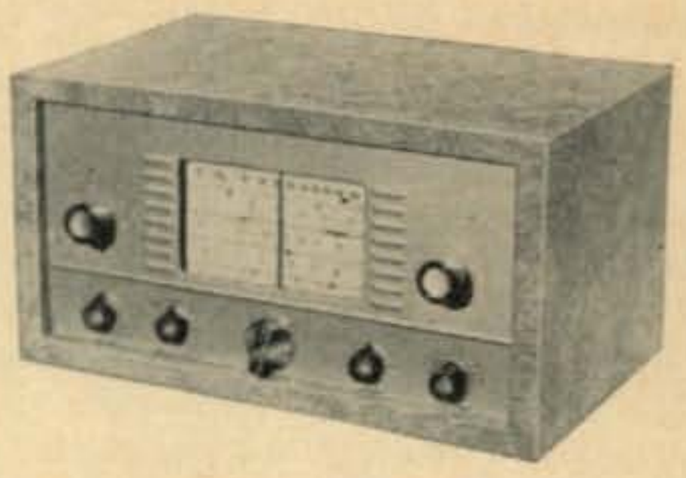
HEATH COMPANY A Subsidiary of Daystrom, Inc. BENTON HARBOR 12, MICH.

HEATHKIT ALL-BAND COMMUNICATIONS-TYPE RECEIVER KIT

Ideal for the short wave listener or beginning amateur, this Receiver covers 550 KC through 30 MC in four bands. It provides good sensitivity and selectivity, combined with fine image rejection. Amateur bands are clearly marked on the illuminated dial scale. Features transformer type—power supply—electrical band spread—antenna trimmer—separate RF and AF gain controls—noise limiter—internal 5½" speaker—head phone jack and AGC. Has built-in BFO for CW reception. An accessory power socket is also provided for connecting the Heathkit model QF-1 Q Multiplier. Will supply 250 VDC at 15 ma and 12.6 VAC at 300 ma. Shpg. Wt. 12 lbs.
Cabinet: Fabric covered cabinet with aluminum panel as shown part 91-15A. Shpg. Wt. 5 lbs. **$4.95**

MODEL AR-3

$29.95



ALL-BAND RECEIVER

HEATHKIT ELECTRONIC VOICE CONTROL KIT

Here is a new and exciting kit that will add greatly to your enjoyment in the ham shack. Allows you to switch from Receiver to Transmitter merely by talking into your microphone. Lets you operate "break-in" with an ordinary AM transmitter. A terminal strip is provided for Receiver and speaker connections and also for a 117 volt antenna relay. Unit is adjustable to all conditions by sensitivity and gain controls provided. Easy to build with complete instructions provided. Requires no transmitter or Receiver alterations to operate. Shpg. Wt. 5 lbs.

MODEL VX-1

$23.95

ELECTRONIC VOICE CONTROL

HEATHKIT "Q" MULTIPLIER KIT

This fine Q Multiplier is a worthwhile addition to any communications, or Broadcast Receiver. It provides additional selectivity for separating signals, or will reject one signal and eliminate a hetrodyne. Functions with any AM Receiver having an IF frequency between 450 and 460 KC that is not AC-DC type. Operates from your Receiver power supply, and requires only 6.3 VAC at 300 ma (or 12.6 VAC at 150 ma), and 150 to 250 VDC at 2 ma. Simple to connect with cable and plugs supplied. Effective Q of approximately 4000 for sharp "peak" or "null". A tremendous help on crowded phone or CW bands. Shpg. Wt. 3 lbs.

MODEL QF-1

$9.95

"Q" MULTIPLIER

NOTE: $10.65 WHEN ORDERED WITH AR-3 BECAUSE OF EXCISE TAX.

...in do-it-yourself electronics!

HEATHKIT "AUTOMATIC" CONELRAD ALARM KIT

Designed to give instant warning whenever a monitored station goes off the air, the CA-1 automatically cuts the AC power to your transmitter, and lights a red indicator. Works with any radio receiver; AC-DC—transformer operated—battery powered, so long as the receiver has AVC. A manual "reset" button is provided to reactivate the transmitter. Incorporates a heavy-duty 6-ampere relay, a thyratron tube, and its own built-in power supply. A neon lamp shows that the alarm is working. Simple to install and connect with complete instructions provided for assembly and operation. Shpg. Wt. 4 lbs.

MODEL CA-1

$13.95

"AUTOMATIC" CONELRAD ALARM

HEATHKIT VARIABLE FREQUENCY OSCILLATOR KIT

Enjoy the convenience and flexibility of VFO operation by obtaining this fine variable frequency oscillator. It covers 160-80-40-20-15-11 and 10 meters with three basic oscillator frequencies. Better than 10 volt average RF output on fundamentals. Requires 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a, available on most transmitters. It features voltage regulation for frequency stability, and has illuminated frequency dial. VFO operation allows you to move out from under interference and select the portion of the band you want to use without having to be tied down to only 2 or 3 frequencies through the use of crystals. "Zero in" on the other fellows signal and return his CQ on his own frequency! Shpg. Wt. 7 lbs.

MODEL VF-1

$19.50

HEATHKIT REFLECTED POWER METER KIT

A necessity in every well equipped ham shack, the model AM-2 lets you check the match of the antenna transmission system, by measuring the forward and reflected power or standing wave ratio. Handles up to one kilowatt of energy on all bands from 160 to 2 meters, and may be left in the antenna system feed line at all times. Input and output impedances for 50 or 75 ohm lines. No external power required for operation. Meter indicates percentage forward and reflected power, and standing wave ratio from 1:1 to 6:1. Shpg. Wt. 3 lbs.

MODEL AM-2

$15.95

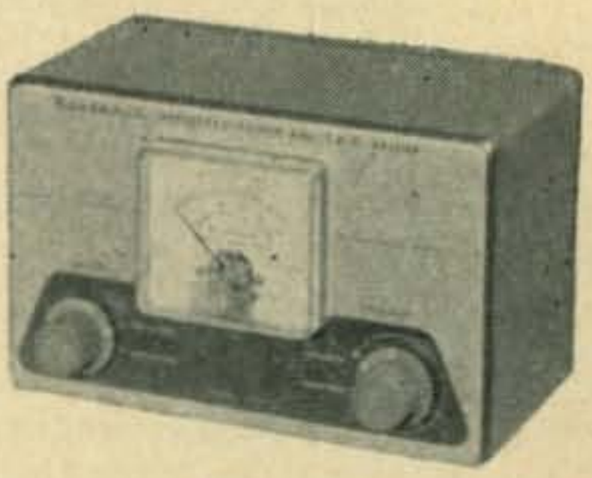
HEATHKIT BALUN COIL KIT

This convenient transmitter accessory has the capability of matching unbalanced coax lines, used on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance. Design of the bifilar wound Balun Coils will enable transmitters with unbalanced output to operate into balanced transmission line, such as used with dipoles, folded dipoles or any balanced antenna system. Can be used with transmitters and Receivers without adjustment over the frequency range of 80 through 10 meters. Will handle power inputs up to 200 watts. Shpg. Wt. 4 lbs.

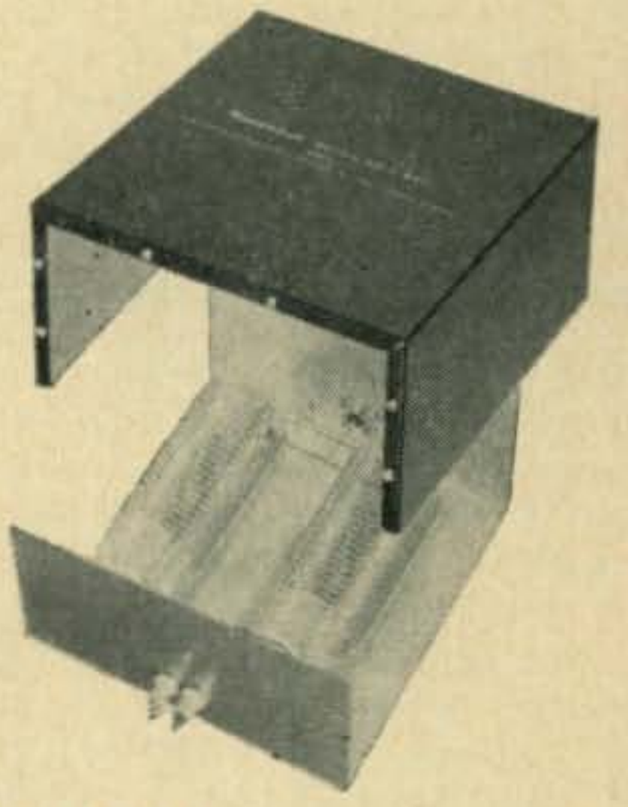
MODEL B-1

$8.95

VARIABLE FREQUENCY OSCILLATOR



REFLECTED POWER METER



BALUN COIL

save ½ or more . . . with HEATHKITS

FREE 1958 Catalog

Send for this Free informative catalog listing our entire line of kits, with complete schematics and specifications.

☐ Rush Free 1958 catalog.

HEATH COMPANY

BENTON HARBOR 12, MICH. a subsidiary of Daystrom, Inc.

name _____

address _____

city & state _____

QUAN.	ITEM	MODEL NO.	PRICE

$_____enclosed. Parcel post, include postage—express orders are sent shipping charges collect. All prices quoted are Net F.O.B. Benton Harbor, Mich. and apply to Continental U.S. and Possessions only. All prices and specifications subject to change without notice.

For further information, check number 5 on page 126.

editorial / WAYNE GREEN

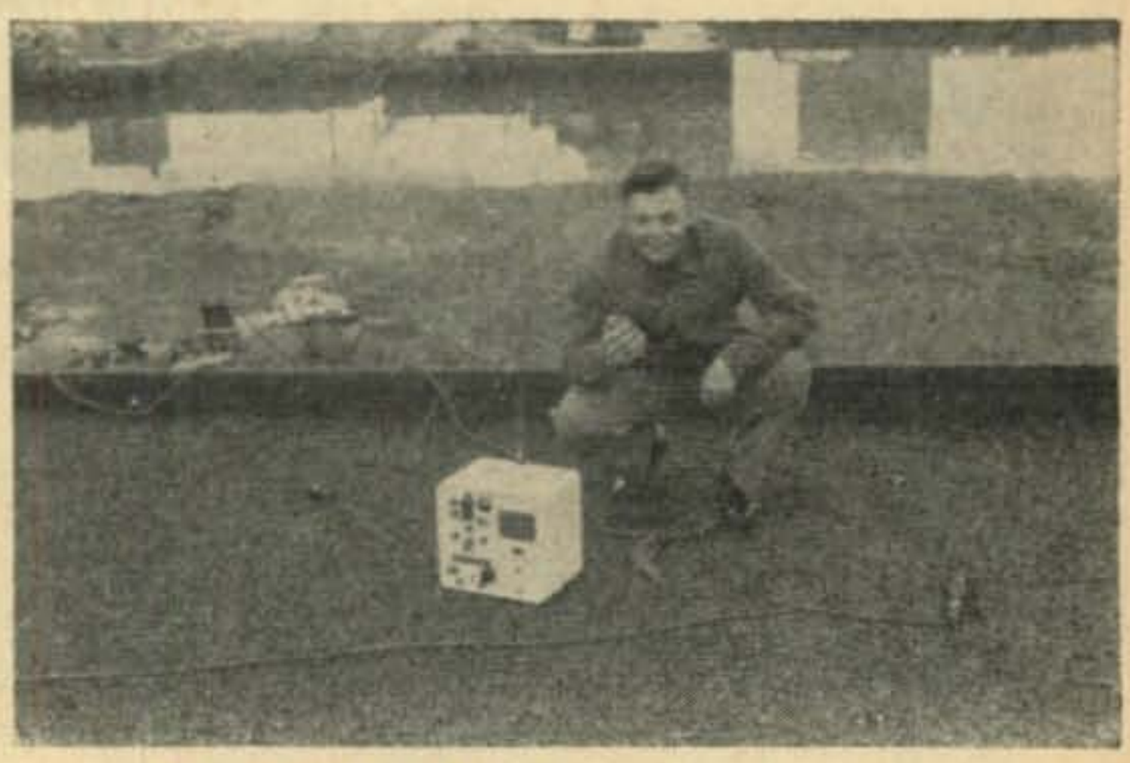
. . . de W2NSD

never say die

Ham Rally

Saturday, April 12th, dawned dull and chilly . . . complete with light rain to help bring out the transmitter hunters. The hunt, organized and directed by Tommy Aalund, K2VBI, got underway with a timed run over a twenty mile route. Once checked in at the end of this run the mobiles were pointed in the general direction of the hidden transmitters, and let loose. The transmitters, a two meter Gonset, a six meter converted ARC-5, and a ten meter Harvey Wells T-90 were set up on the roof of a broadcast station in an exceedingly difficult to locate spot. It took well over an hour before the first car came in and it was another hour before all of them had finally made it . . . all but one that is. One chap got a sudden inspiration as to the location of the hidden transmitter and made a quick U-turn on a boulevard only to be stopped immediately by two police cars. Putting it politely, let us say that he was not very tactful. They hauled him into the police station and wrote up tickets for Improper Turn, Not Signaling a Turn, Speeding, and Reckless Driving. And that was the end of his license.

The winner of the transmitter hunt was W2LID/W2ELK with only 14.1 miles traveled and 168 seconds off "standard" time. Next came K2HYS with six extra miles and 483 too many seconds traveled. Third was K2GKY with eleven extra miles traveled and 460 seconds overtime. Fourth was K2TAQ who ran twelve miles too far and 617 seconds overtime.



Bob, K2UFO talked them in on two meters.

Harold, K2TYY ran the six meter rig.

Walt, W2UG operating the 10 meter hidden transmitter.

Navassa Errata

Just to add another touch of pathos to the disastrous financial misadventures of the KC4AF DXpedition, we now find that not one cent of the $700 deposit made on the boat that was to take us to Socorro will be refunded. Just goes to show that you don't always get decent treatment when you do business with a ham. Fortunately, such incidents are few and far between. Since the expedition was cancelled in time to keep the boat from even having to leave San Diego we all felt that some of the deposit should have been returned. John W. Richardson, KN6YNI, the skipper, felt different. Bless you John.

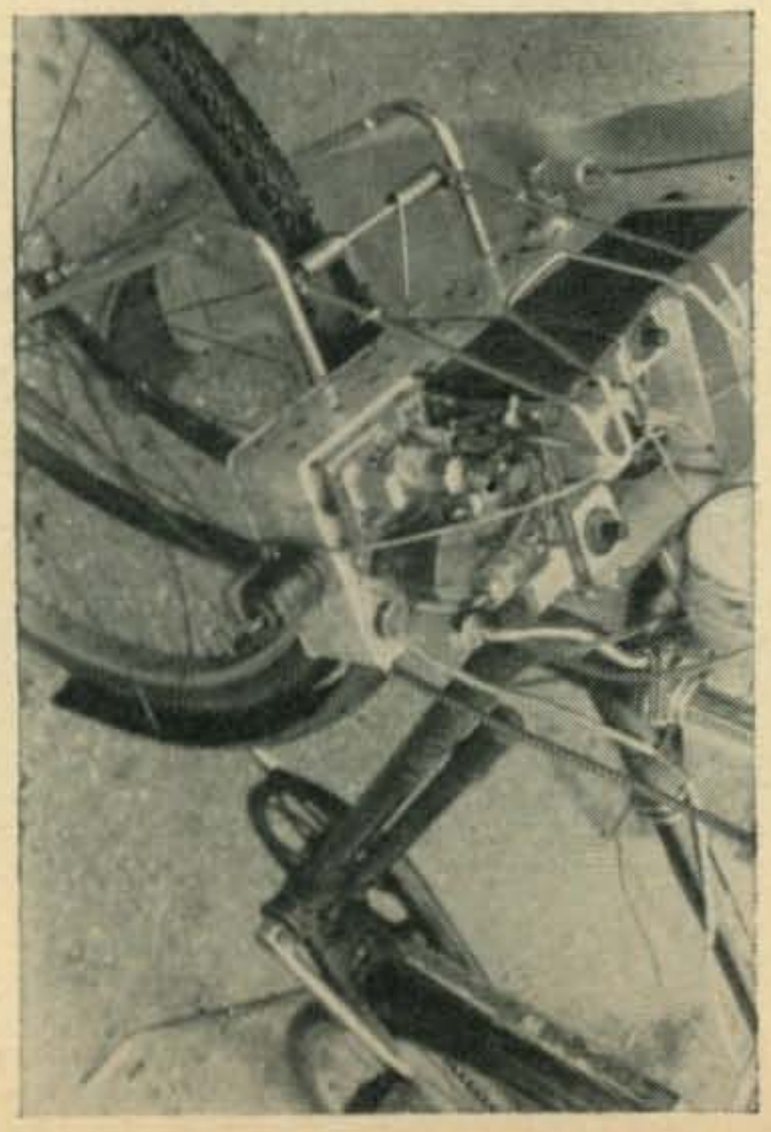
MORE 2NSD

Oops . . .

We did it again! Goofed, I mean—on page 10 of the May issue we said the lapel pin and tie bar made by Hewlett Sales Co., 1199 East Broadway, Hewlett, N. Y. were $4.95 each. We should have said each *set* of silver-plated tie bar and lapel pin.

6 Meter Bike-Mobile

The most unusual mobile to show up for the hunt was this one belonging to Harold, K2TYY. Up front is the CQ conversion of the ARC-5 receiver with the International Crystal units. The power supply is mounted under the seat. And back in the caboose is the gas driven generator! Can anyone beat this?



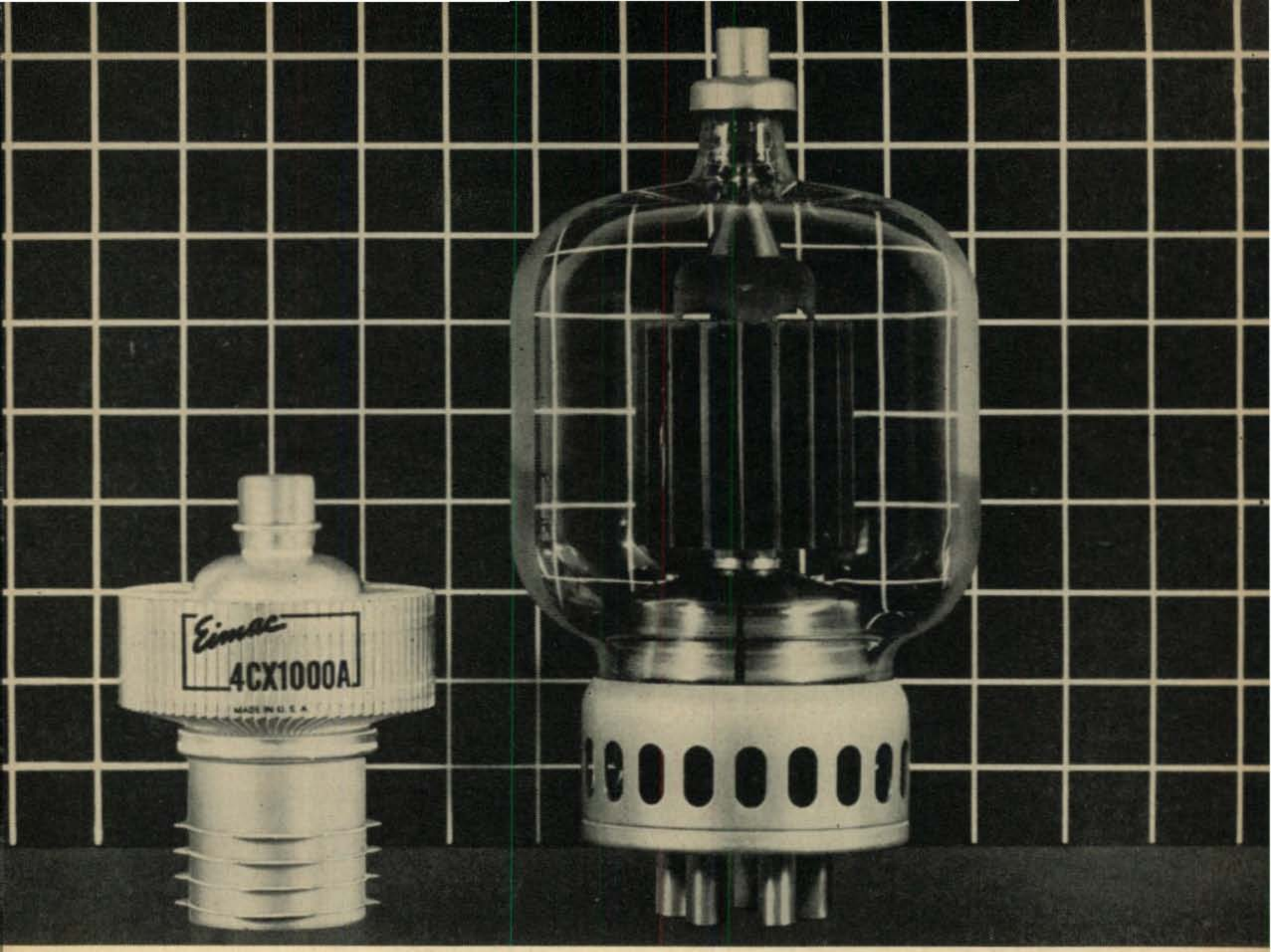
Thanks

The advertising department sends their thanks to the many readers who have been so cooperative in responding to our survey regarding reader-service coupon conversion into sales.

By the way, one reader enclosed a dollar with a reader service coupon to help defray our expense. This was a nice gesture, but entirely unexpected. The reader service coupon is a *free* service to our readers. It costs close to fifty cents to service a single coupon. If readers appreciate the service they can best reciprocate by mentioning CQ whenever contacting a manufacturer. If you buy gear through a distributor, mention CQ. By getting more advertising in CQ we can continue to improve the magazine so the reader benefits in the end.

P.S. The reader got his dollar back!

[*Continued on page 12*]



Fourth in a series describing the advantages of ceramics in electron tubes. Previously discussed: Impact, Heat, Vibration.

Smaller Size...

is an Eimac Ceramic Tube Extra

High power capability in a compact package has been made available to the radio amateur by Eimac ceramic tubes. For example, the stacked ceramic 4CX1000A shown above—conservatively rated at one thousand watts plate dissipation—is less than 5 inches high and 3½ inches in diameter. Compare it with the conventional glass tetrode of the same plate dissipation shown beside it.

Eimac's stacked-ceramic design now encompasses ⅓ of the Eimac vacuum power tube line. Advantages include: resistance to damage by impact, vibration, or high temperature. In addition, the ability of ceramic tubes to withstand rigorous high temperature processing techniques leads to high tube reliability, uniformity, and longevity.

For your next transmitter, choose a ceramic tube by Eimac. It's the answer for the amateur who desires a modern rig with the optimum in present-day electron tubes.

Write our Amateur Service Department for a copy of the booklet "Advantages of Ceramics in Electron Tubes."

EITEL-McCULLOUGH, INC.
SAN BRUNO · CALIFORNIA

Eimac First with ceramic tubes that can take it

Eimac®

For further information, check number 7 on page 126.

EIMAC CERAMIC TUBES FOR AMATEUR APPLICATIONS
CLASS AB, SSB OPERATION

	4CX250B	4CX300A	4CX1000A
Plate Voltage	2000 v	2500 v	3000 v
Driving Power	0 w	0 w	0 w
Peak Envelope Power Input	500 w	625 w	2700 w

de W2NSD [*from page 10*]

New Products

The ham manufacturers have been coming out with some real nice goodies lately. The prices on most things are astronomical, but underproduction makes the resale value stay fairly high so that the actual cost of using a piece of gear for a year or so doesn't run too high.

Perhaps the most exciting recent revelation is the new Central Electronics 100V exciter. This unit seems to have just about everything anyone could ask for, except adequate production quantities. Though this exciter will do a darned good job with the Central 600L broad-band linear amplifier I suspect that it won't be long before Wes comes out with one of those two KW linears as a companion piece.

The Johnson Thunderbolt 2 KW linear has made a profound impression in SSB circles and may well be undercutting their excellent Viking Kilowatt amplifier, which is sort of unfair for that is one of the best buys in high power rigs available. I had a chance to use one of these Viking Kilowatts while visiting Dick Spencely (KV4AA) . . . quite a rig. You can run close to 3 KW on CW and a good solid full KW on AM, which is pretty important if you want to run up a fast phone DX score. Good old class B modulation just cant be beat.

The Thunderbolt, at $590, and roughly $1000 cheaper than the Viking Kilowatt, will put out almost the same signal on CW and SSB (both rigs use a pair of 4-400A's) and represents a good investment if you aren't too interested in phone DX'ing. If you make up your own speech amplifier and modulator you can run 800 watts to the Thunderbolt. I've been using the Thunderbolt hooked onto my Lakeshore Phasemaster II exciter for the last few months and it puts out a crushing signal on all bands. The Central Electronics 600L amplifier sort of spoiled me for a while since no tuning was necessary with it, but once I had gone through the tuning process with the Thunderbolt and had all the dial settings logged for all bands it turned out not to be much trouble to jump around. One really important gadget for tuning your linear is a good scope or, even better, the Central Electronics MM-2 RF analyzer scope. Without a scope you can get into all sorts of miseries with your tuning.

Another newey is the Cosmophone "35". For $940 (with power supply) you have a complete SSB station which covers all bands, upper or lower sideband. Looks like they aimed just a bit below the Collins KWM-1 price of $956 (with power supply) plus adding the 40 and 80 meter bands and an interesting dual tuning gadget. Where physical size is a factor, such as in mobile installations, the KWM-1 still has the field. The KWM-1 outpowers

[*Continued on page 94*]

Incomparable Value!

Model SX-100
Amateur Net $295.00

SX-100 selectable sideband receiver *proved best in its field by far!*

• In all our quarter-century of manufacturing, no Hallicrafters design has received more enthusiastic approval than the SX-100 receiver.

How have we measured this approval? *First*, by the letters we receive—more favorable comment than ever before. *Second*, by the conversation we hear on the air from owners and observers alike. *Third*, by sales—the SX-100 is one of the *fastest selling communications receivers we've ever designed.*

Never before has there been available a receiver with all these quality features at such a reasonable price. Better look into it yourself, today. Your jobber has the details.

1. Selectable side band operation.

2. "Tee-Notch" Filter—This new development provides a stable non-regenerative system for the rejection of unwanted hetrodyne. The "Tee-Notch" also produces an effective steepening of the excellent 50 KC i.f. pass band (made famous in the SX-96) and further increases the effectiveness of the advanced exalted carrier type reception.

3. Notch depth control for maximum null adjustment.

4. Antenna trimmer.

5. Plug in laboratory type evacuated 100 KC Quartz crystal calibrator—included in price.

6. Logging dials for both tuning controls.

7. Full precision gear drive dial system.

8. Second conversion oscillator crystal controlled—greater stability through crystal control and additional temperature compensation of high frequency oscillator circuits.

9. Frequency range: 538-1580 kc. 1720 kc-34 mc.

CONTROLS

Pitch Control • Reception • Standby
Response control (upper/lower side band selector)
Antenna Trimmer • Notch depth
Notch Frequency • Calibrator on/off • Sensitivity • Volume
Band Selector • Tuning • AVC on/off
Noise limiter on/off
Bandspread • Selectivity.

hallicrafters ...*where the best ideas in communications are born*
Chicago 24, Ill.

Available with convenient terms from your Radio Parts Distributor.

EXPORT SALES:
International Operations
Raytheon Manufacturing Co.
Waltham, Massachusetts

For further information, check number 8 on page 126.

Feenix, Ariz.

Deer Hon. Ed:

Some things that are happening in this world are reely fritening, or at leestwise they making a person stopping and thinking. Some peeples buleeving in gosts, some peeple not. And Hon. Ed., how about African witch doctors—you bulveeing in them? Maybe Scratchi do. I not saying positively I do, but listening to what happening.

You remembering Mumbo Jumbo? He feller I riting you about in September 1953. He witch doctor, VS4 amchoor, who living in south of North Borneo—or are it north of South Borneo. Anyways, that are when Feenix having good old 1/c dry spell, and when I telling this to Mumbo Jumbo he giving out with cupple mistic spells over the air and it raining like furies. Surely you remembering.

Well, I talking to him again. Or rather I should be saying, he talking to me again. It happening cupple nites ago. I out in living room talking to Hon. Brother Itchi, when all suddenly getting idea maybe wanting to go on air. So, going to shack, turning on reseever, and without even tooning reseever, there are feller calling me.

He saying he Mumbo Jumbo there, and do I recalling working him. I saying surely I remembering, how could I forgetting. He saying fine busyness, would I taking message to Hon. Editor of Hon. Seek-You magazine. I saying it be my pleasure, so he going ahead.

Mumbo Jumbo saying first of all he speaking for all African witch doctors in his capacity as Hon. Chief Glorious Spell-Maker and Spell-Braker for the Secrut Cult of African Witch Doctors, Sorcerers and Apprentises, as evidenced by his posseshun of the Mistic Tiger Claw.

On acct. witch doctors resently coming across LP record from USA with song on it called Witch Doctor, Mumbo Jumbo wanting to making it public that the SCAWDSA are not only

[*Continued on page 119*]

DUAL and TRIPLE CONVERSION!
SINGLE SIDEBAND!

New

HAMMARLUND HQ-170

Another great new receiver from Hammarlund—an outstanding SSB amateur receiver offering the best features of the finest SSB converters and hottest amateur receivers—all wrapped up in a single, beautiful superheterodyne receiver.

Telechron Timer $10.00 extra

- 17-tube superheterodyne
- Dual and triple conversion
- 6, 10, 15, 20, 40, 80 and 160-meter amateur bands.
- 60 db adjustable notch filter
- Separate vernier tuning
- Selectable upper, lower or both sidebands
- 100 KCS crystal calibrator
- Fast attack selectable AVC

— and everything else to make it the most tremendous thing that ever happened to amateur SSB reception and at a price that beats them all!

only $359.00

Write For Complete Details . . .

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

For further information, check number 10 on page 126.

CLUB BULLETINS

by MARVIN D. LIPTON, VE3DQX

311 Rosemary Road, Toronto 10, Ontario, Canada

As I was thumbing through the pages of MIKE & KEY, the paper of the Greater Cincinnati A.R.Ass'n., I came upon an original item. The members of that association draw the name of a fully paid member at each meeting. If the member is present he receives $3.00, but if he is absent the money is placed in the pot to be added to the next week's draw. This trick appears to be the answer for those clubs attempting to encourage better attendance at meetings.

I was pleased to read a full page in The Pensacola News Journal about the folks connected with PARASITICS, the publication of the Pensacola A.R.C. Here is an instance in which a club periodical contributed to some excellent newspaper publicity. The number of other purposes that a club bulletin serves is far too great to tell about herein.

I have received requests from clubs without papers, asking if they could be placed on the CQ NEWS mailing list. In order to encourage these organizations to establish a news sheet, I complied with their wishes, If your club has no journal, and if you are interested in starting one, I shall send you a monthly copy of CQ NEWS to display on your bulletin board and assist prospective editors. You will then be an asociate member of the CQ Club Bulletin Dept., and News Service, and upon publishing a club bulletin you will become a full member.

Our 4 page news release, CQ NEWS, contains editorials, technical articles, the best selections from the Nation's amateur radio publications, plus "inside info" on future copies of CQ. The members of your club will enjoy reading these contents either in their club paper or on the club bulletin board. To become an associate member of the News Service, write me stating, the name, executive, size, and QTH of the club. Remember this is all free!

Here is a list of the most recent additions to our News Service. As usual, it's a pleasure to welcome these publications, who have increased our membership to 101: LINCOLN LOG, Lincoln A.R.C., ETERSVEP, Swedish Allround R.C., QRM, Tri-County A.R.Ass'n., Sylvania A.R.Ass'n., associated member, NANAIMO NEWS SHEET, Nanaimo A.R.A., BUCKS COUNTY R.C. NEWS, Bucks County R.C., SARA NEWS, Schenectady A.R.Ass'n. Inc., ROUNDTABLE, Denver R.C., REA NEWS, St. Paul Minn., ETHER WAVES, Ohio Valley A.R.A., HARMONICS, Beachwood A.R.C., ETHER ECHOES, B & F R.C., OMNIGRAPH, Fayette County R.C., and STATIC SHEET, Des Moines A.R.Ass'n.

As the bunny says, "That's all Folks".

73, Marv. VE3DQX.

COMCO

TWO-WAY RADIO

communications equipment

VHF-FM FOR:
MOBILE
AIRCRAFT
MARINE
MOTORCYCLE
PORTABLE
BASE

VHF-AM FOR:
AIRPORT VEHICLES
GROUND STATIONS
POINT-TO-POINT

VHF
ANTENNAS
REMOTE CONTROLS
ACCESSORIES

MODEL 278 SERIES

CONTROLLER

VHF-AM TWO-WAY RADIO

for airport vehicles and ground stations

The CONTROLLER mobile unit was specifically designed for airport vehicles requiring two-way communication with control towers and planes.
For use in ramp jeeps, electrician's trucks, crash trucks, tow tractors, snow plows, executive cars, police cars and at temporary locations such as construction sites.

FEATURES

- **FREQUENCY RANGE:** 118 to 400 MC. crystal controlled.
- **SINGLE OR DUAL CHANNEL:** maximum spread 500 Kc.
- **POWER OUTPUT:** 3 to 4 watts, more than enough for airport service.
- **LOW BATTERY DRAIN:** total standby 10 amps. at 6 volts, 5 amps. at 12 volts.
- **UNIVERSAL:** instantly changeable from 6 to 12 volt operation.
- **COMPACT:** under dash or trunk mounting, case 5½"x11"x13".
- **LOW COST MAINTENANCE:** thousands of CONTROLLERS have earned an excellent reputation for trouble-free operation.

NEW!

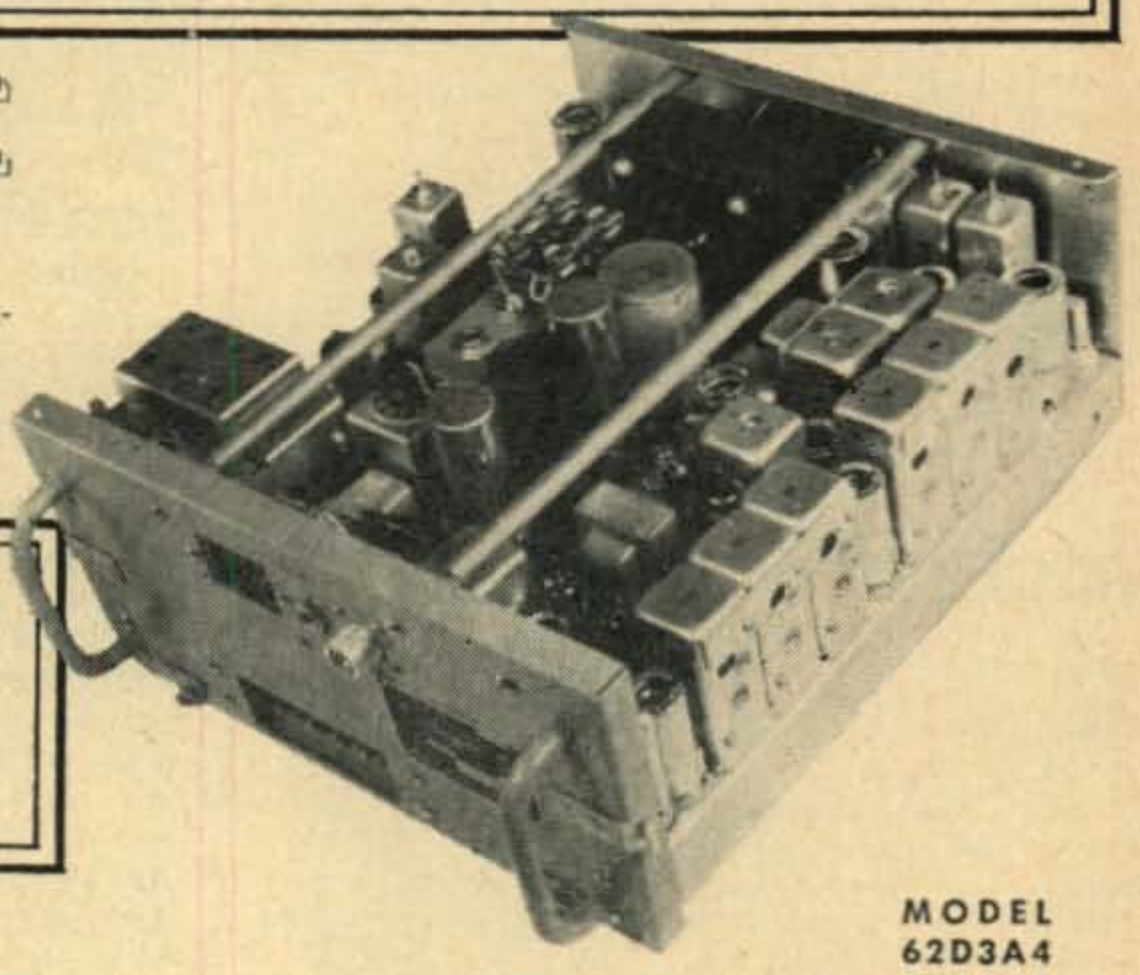
FLIGHTCOM

12/24 VOLT VHF-FM FOR AIRCRAFT

Provides communications between ground FM systems and executive, patroling and utility aircraft. Used by fishing fleets, petroleum producers, pipe line helicopters, State police, Conservation departments, crop dusters, power companies and departments of the U. S. government.

FEATURES

- **COMPACT** . . . case size 14" x11½"x6½".
- **LIGHT** . . . 22 lbs. (without antenna and speaker).
- **UNIVERSAL** . . . instantly changed from 12 volt to 24 volt operation.
- **POWERFUL** . . . 25 watts output.
- **EFFICIENT** . . . low battery drain.
- **LOUD** . . . 1 watt minimum.
- **PERFORMANCE** . . . meets all existing and proposed FCC and FCDA requirements.



MODEL
62D3A4
CHASSIS

Package consists of: Chassis, case, shock mounting rack, control box, cables, microphone.

ATTENTION DEALERS!
Write for available territories.

DESIGNERS AND MANUFACTURERS OF RADIO COMMUNICATIONS EQUIPMENT

COMMUNICATIONS COMPANY, Inc.

FOUNDED 1938 CORAL GABLES, MIAMI 34, FLORIDA

For further information, check number 12 on page 126.

Model 1A

$299.00 Amateur Net

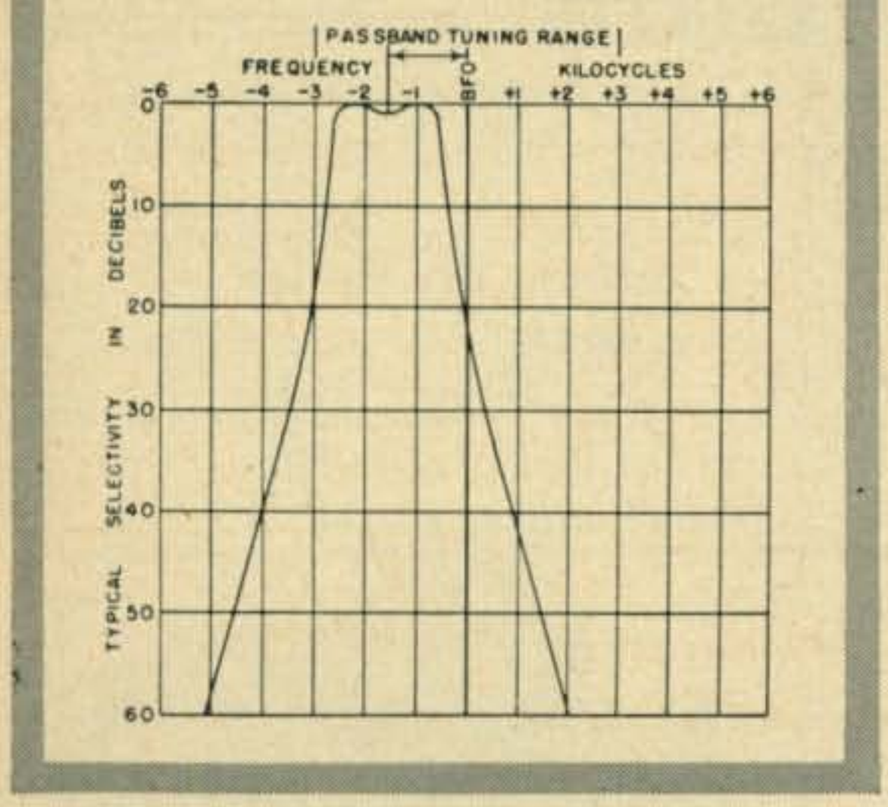
the improved

R. L. DRAKE

SIDEBAND RECEIVER

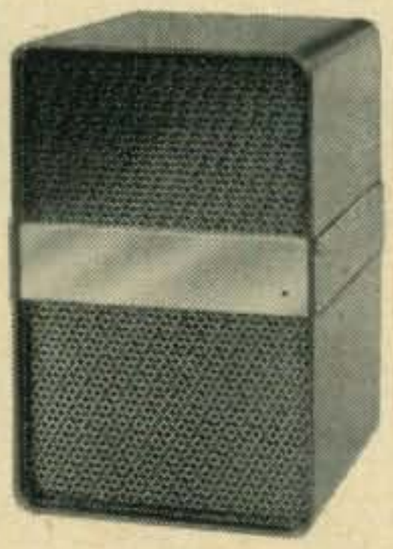
Late Engineering Changes

- **Crystal Calibrator with front panel control.**
- **Switch position for WWV for accuracy.**
- **AVC tube changed to 6BJ8 for improved TR switch operation.**

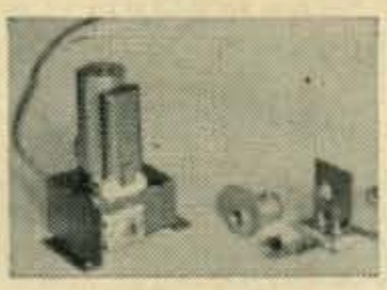


Dimensions 6¾" wide x 11" high x 15" deep
Weight 18 pounds
Power Consumption 50 watts at 115v, 60cps
Transformer Power Supply

ACCESSORIES



5" x 7" Oval Speaker
in matching cabinet, acoustically designed for voice communications. Speaker is submounted to permit installation of accessories on front panel. $15.00 Amateur Net



100 KC Crystal Calibrator
—with front panel control for earlier sets available at $20.00 Amateur Net

Features for best SSB and CW

STABILITY: High stability VFO has warm up drift of less than 300 cps after 15 minutes operation. Crystal-controlled, high frequency conversion establishes this same stability for all bands.

SELECTIVITY: 2.5 kc at 6 db—8.1 at 60 db. Sideband tuning control adjustable plus or minus 3 kc.

AVC: Amplified-delayed AVC. Integrating dual-action time constant circuit gives fast charge—slow discharge for modulation, but fast charge—fast discharge on short pulses. This provides some noise limiter action.

DETECTION: Product Detector for SSB, CW and AM by exalted carrier method.

PLUS

OPERATING RANGE: Seven 600 kc tuning ranges cover five "ham" bands: 80M(3.5-4.1 mc), 40M(7.0-7.6 mc), 20M(14.0-14.6 mc), 15M(21.0-21.6 mc), 10M(28.0-28.6 mc), 10M(28.5-29.1 mc), 10M-(29.1-29.7 mc) and WWV-10 mc.

MAIN DIAL: Scale length 8.3"—10 kc divisions—600 kc each band—tuned with 4½ turns fast knob or 30 turns of slow knob.

SENSITIVITY: Less than 1 uv for 20 db s/n.

ANTENNA ATTENUATOR: 30 db. Switch provided to switch pad in or out.

"S" METER: Meter calibrated in "S" units to S9 and 20, 40, 60 db over S9. S9 is approximately 100 uv. "S" units are at approximately 6 db intervals.

AF RESPONSE: 300 to 3000 cps.

AF OUTPUT: To internal speaker or 4 ohms to external speaker, headphones and transmitter anti-trip.

RF INPUT IMPEDANCE: to match 50-75 ohm coax line.

BUILT-IN SPEAKER FOR PORTABLE USE.

THIRTEEN TUBES

6BZ6—1st RF
6AB4—crystal oscillator
6BE6—1st mixer
6BQ7A—V.F. oscillator
6BE6—2nd mixer
6BY6—3rd converter
6BZ6—I.F.
6BJ8—AVC amplifier and rectifier
12AU7—product detector
12AU7—L.F. oscillator and 1st AF
12AQ5—A.F. output
12X4—Rectifier
12BA6—crystal calibrator

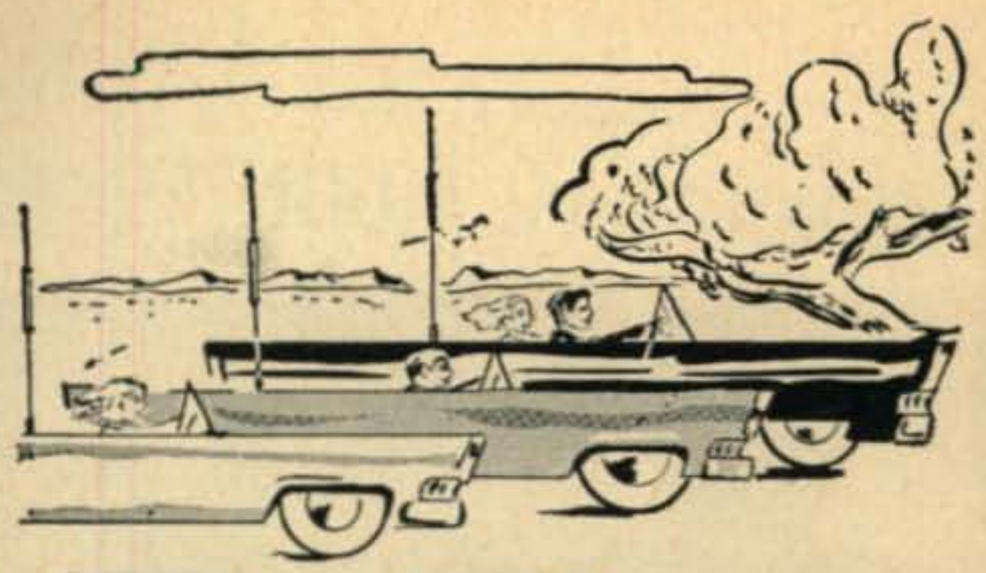
AVAILABLE FROM LEADING ELECTRONIC PARTS DISTRIBUTORS

R. L. DRAKE COMPANY, MIAMISBURG, OHIO

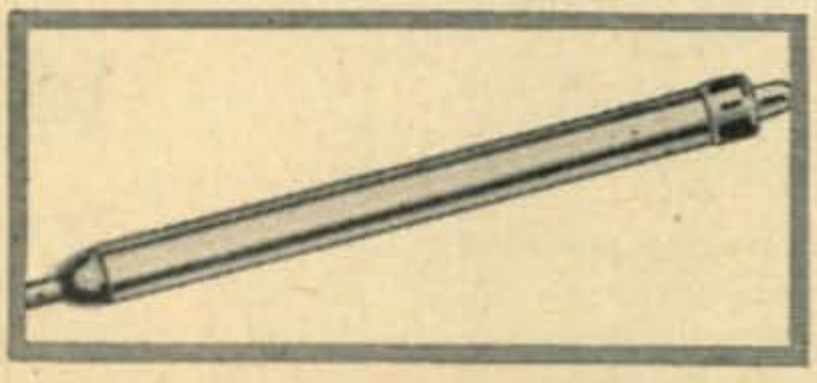
For further information, check number 13 on page 126.

MOBILEERS . . .

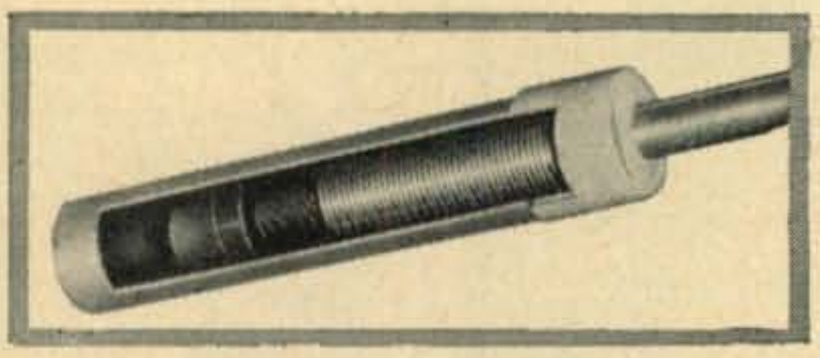
facts and features prove your best buy is-



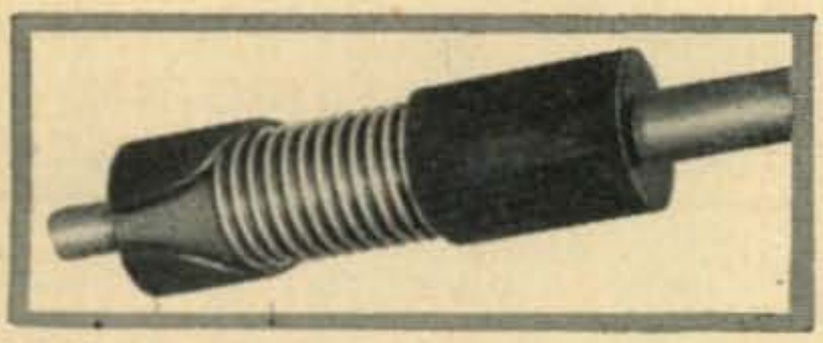
TRAP-MOBILE by Mosley



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



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



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

Overall Height Only 7' 8"

3/8" – 24 Threads

FACT: 3-Band Operating Convenience!

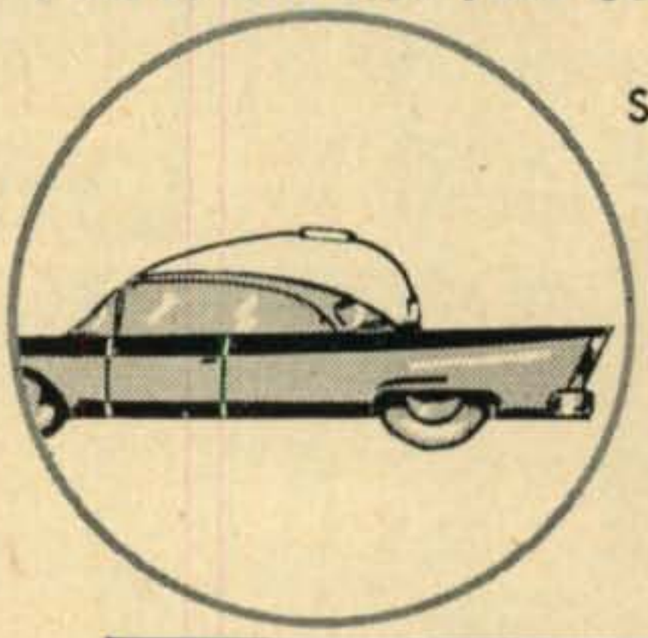
Real operating convenience is as close as your transmitter and receiver... *because thats where you change bands – for 10, 15 or 20 meters!*

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

FACT: Exclusive Trap Design!

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

FACT: Will Not Take Set Or Warp!



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

GUARANTEED!
Will Not Take Set!
Will Not Warp!

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

$19.95

Model MA-3

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

Mosley Electronics, Inc.

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

EXPORT DEPARTMENT
15 Moore Street
New York 4, New York

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

For further information, check number 14 on page 126.

HERE'S YOUR CHANCE

to get a B&W transmitter that:

- Covers All Bands from 80-10 Meters
- Permits VFO or Crystal Control on All Frequencies
- Provides Versatility for AM, CW and SSB with the 51SB-B
- Features Built-in TVI Suppression
- Has Components Conservatively Rated for Maximum Output
- And . . . All at the Lowest Cost for Comparative Value

B&W 5100-B TRANSMITTER
CERTIFIED BY FCDA
ITEM NO. T-32

5100-B $525

There isn't a transmitter on the market that gives you more versatility than the B&W 5100-B . . . regardless of price. In spite of superb performance, the 5100-B is as competitive in cost and often under many comparable units.

Designed for discriminating hams, the 5100-B is engineered to the highest degree by professionals. Layout and circuitry are skillfully designed to assure a minimum of harmonics and distortion.

As a basic for novice or oldtimer the 5100-B is perfect for future addition of SSB by plugging in a B&W 51SB-B. If you're ready for maximum power you can add the B&W L-1000-A Grounded Grid Linear Amplifier. This addition will give you 1000 watts peak envelope SSB-875 watts CW and 375 watts linear AM phone.

Here's your chance to get on the air with a top-quality signal. Buy a B&W Model 5100-B transmitter today. If you want additional information, before you buy, see your favorite "ham" dealer or write the factory direct.

Complete assembly 5100-B, 51SB-B and L-1000-A

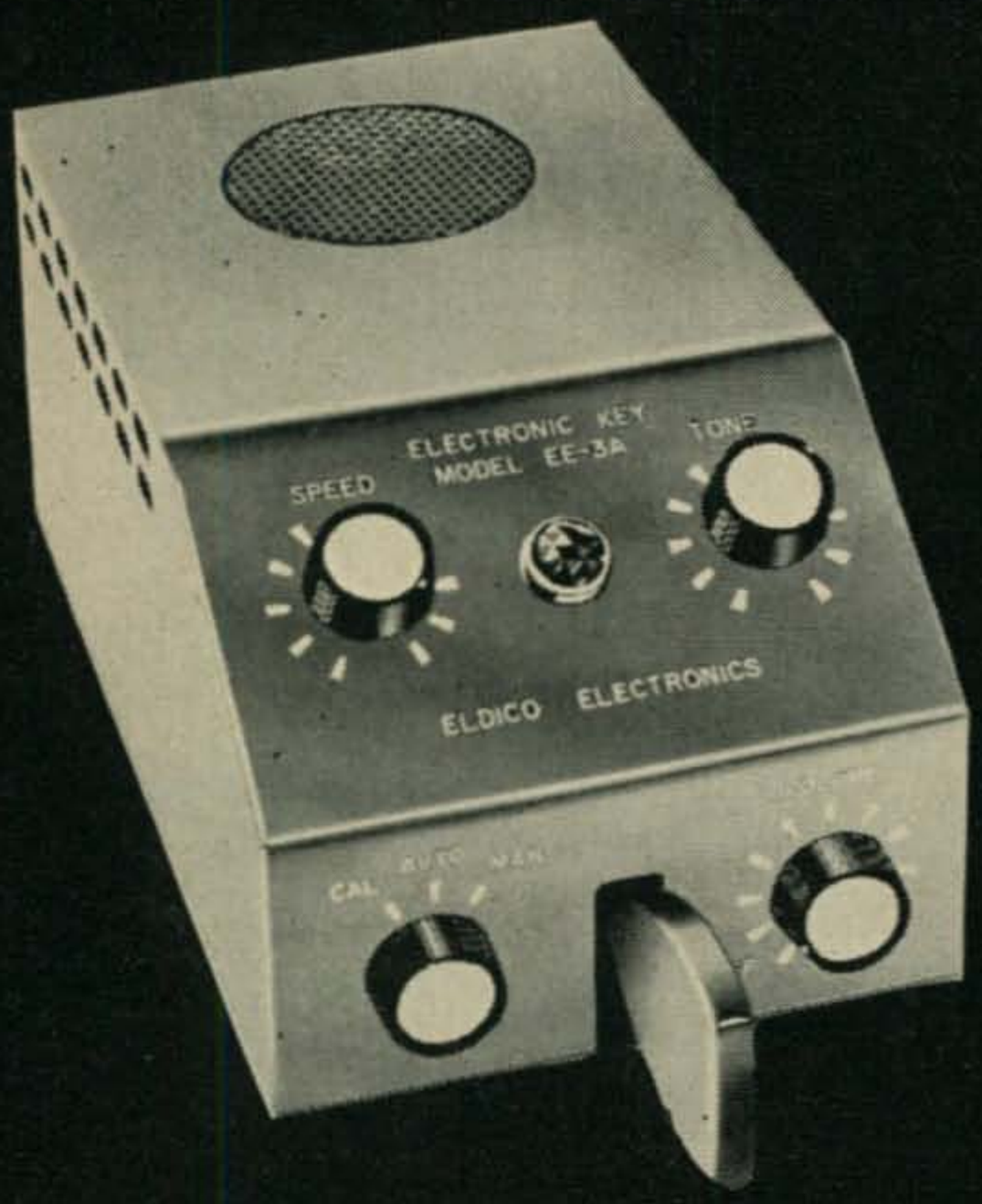
Barker & Williamson, Inc.

Canal Street and Beaver Dam Road • Bristol, Penna.

For further information, check number 16 on page 126.

OTHER B&W AMATEUR EQUIPMENT: Transmitters AM - CW - SSB • Single Sideband Generators • Single Sideband Receiving Adapters • Dip Meters • Match Masters • Frequency Multipliers • Low-Pass Filters • T-R Switches • R.F. Filament Chokes • Transmitting R.F. Plate Chokes • Audio Phase Shift Networks • Band Switching Pi-Networks • Cyclometer-type Counters • Antenna Co-axial Connectors • Baluns • Variable Capacitors • Fixed and Rotary Type Coils • Band Switching Turrets • Standard Inductor Materials • Miniductors • Complete line of Amateur Air-wound Plug-in Coils • Variable Plug-in Links • Faraday Shielded Links • Misc. Coil Mounting Assemblies • Misc. Frequency Marked Dial Plates • Misc. Knobs • Ceramic Jack and Plug Bars

For the C.W. man...

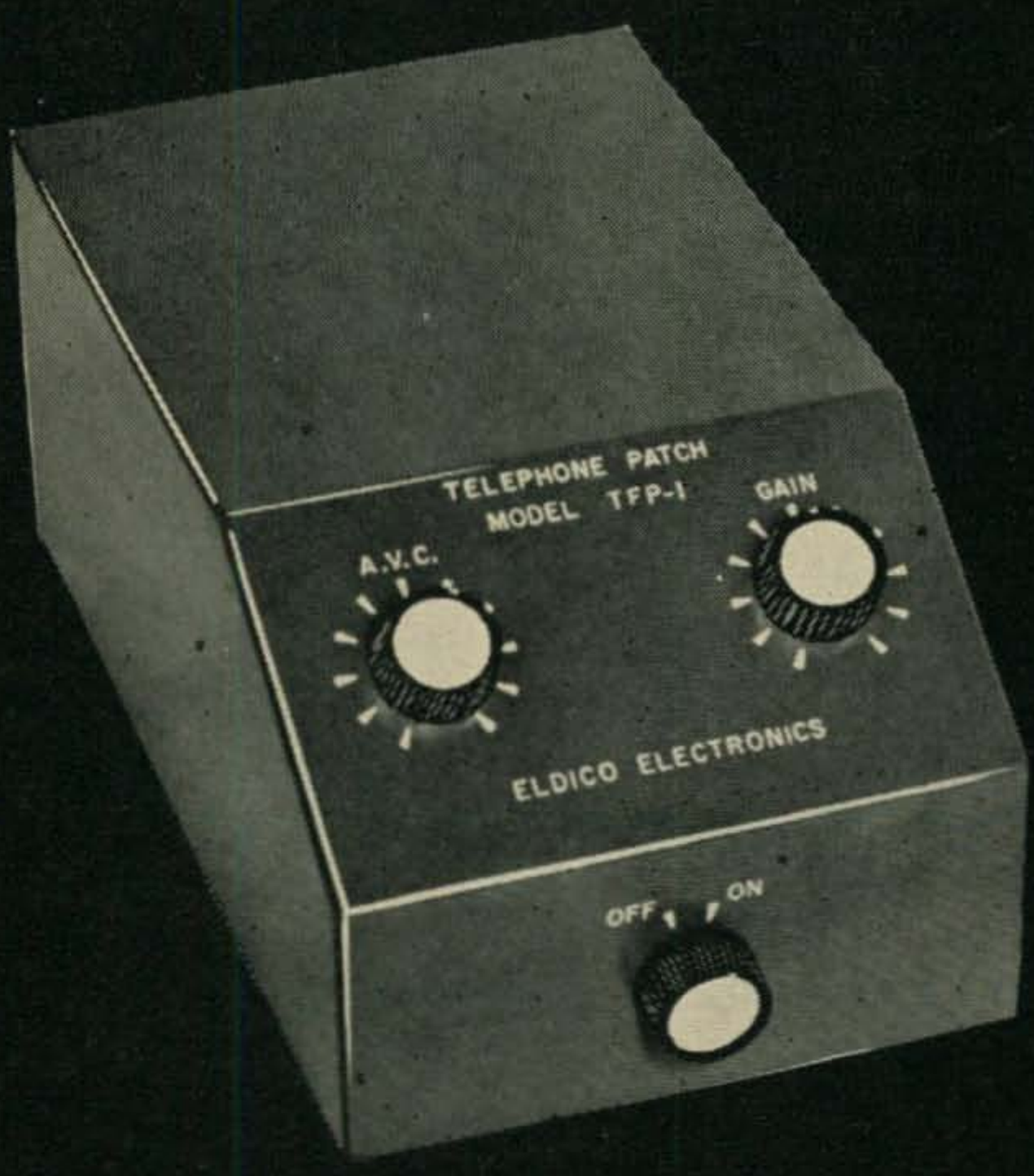


TWINS!

EE-3A

The newly improved model of the famous ELDICO electronic key — acclaimed by beginner and old-timer alike! Self-completing type: complete dot or dash plus space are perfectly formed once the character has been initiated and released . . . will make your CW keying sound like tape! ELDICO features include audio oscillator and speaker for monitoring, receiver audio muting circuit for break-in operation, volume and tone controls, and speed control for 5 to 50 WPM continuously variable. $79.95

For the phone man...



TFP-1

Transistorized, hybrid-type phone patch for automatic operation of transmitter by either local or remote telephone voice, with both telephone signals held at the same level by means of an AVC amplifier and limiter. Very low drain on the self-contained battery gives extra long life. Speaker and microphone switching is provided. RF filtering and complete shielding insure against RF feedback. $79.95

For further information
see your dealer,
or write
ELDICO direct.

ELDICO
ELECTRONICS

29-01 BORDEN AVENUE, LONG ISLAND CITY, NEW YORK

A Division of Radio Engineering Laboratories, Inc.

For Every Ham Requirement . . .
the complete WRL Electronics line
. . . More "Workable Watts" per Dollar!

540w Fone & CW; 540w SSB & DSB (PEP) Input

Globe King 500C

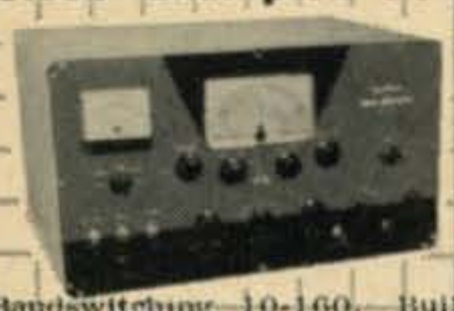
Completely Bandswitching 10-160M

W/T: $795.00

Relay-controlled; built-in antenna relay, VFO, commercial type compression circuit. Separate power supply for modulator. Time sequence.

350w CW, 275w AM, 300w SSB & DSB (PEP) Input

Globe Champion 300A



W/T: $495.00

Kit: $399.00

Bandswitching 10-160. Built-in VFO, Pi-Net output, 48-700 ohms, push-to-talk, antenna changeover relay, time sequence keying, compression circuit.

Plate Modulated . .

Globe Scout 680A

W/T: $119.95

Kit: $99.95

60w CW, 50w AM

Self-contained, bandswitching, 6-80M, with built-in power supply. Pi-Net 10-80M, link-coupled on 6M. High level modulation. Forward Look.

90w CW for 10-160M

Globe Chief 90A

W/T: $74.50

Kit: $59.95

Forward Look cabinet, bandswitching Xmttr. Built-in power supply. Pi-Net. Provisions for external VFO.

Bandswitching 6 & 2M Xmttr.

Globe Hi-Bander

6M: 70w CW, 60w AM

2M: 60w CW, 50w AM

W/T: $139.95 Kit: $119.95

Regulated screen supply. 3-stage RF section allowing straight through operation. Adequate harmonic and TVI suppression. RF Stages metered. Reserve power for accessories. Provisions for mobile use. 52-72 ohm coax output. Forward Look.

100w PEP DSB Input, Suppressed Carrier 40w AM, 50w CW

Sidebander DSB-100

W/T: $139.95

Kit: $119.95

Bandswitching 80-10M; adapt to your present AM eqpt. Min. 35 db carrier suppression all bands, 3-stage RF section, pi-net, *speech clipping, reserve power for accessories. Forward Look.

WRL's VOX Model 10

For voice operated control, with extra contacts for auxiliary circuits. Plug in socket at rear of DSB Xmttr. Adaptable for other Xmttrs.

W/T: $24.95 Kit: $19.95

VFO 755A

160-10 Meters

W/T: $59.95

Kit: $49.95

For 10-160M; output on 40 & 160M. Vernier drive with shock absorbing features. Self-contained, well-filtered power supply with voltage regulation.

VFO 666

For 6 Meters

W/T: $49.95

Perfect zero beat. Built-in power supply with voltage regulation. Lowest price, lowest drift (.003%) to drive 6M Xmttrs.

Power Attenuator PA-1

Use with Xmttrs. up to 70w input; for swamping drive to linear amplifiers. Three power reduction positions. Coax input and output. W/T: $10.95

Antenna Tuner with VSWR Bridge

Globe Matcher Sr.

W/T: $79.50

Kit: $69.50

Shielded Cabinet

For Xmttr. with final RF input up to 600w, 80-10M. Fixed link coupling in output. Coax input, 2-wire balanced output. Monitor SWR between Tuner and Xmttr.

Globe Matcher Jr., AT-3

For input to Xmttr. of 100w CW, 75w fone or less. Substantial harmonic attenuation. Unbalanced output. Self contained.

Grounded Grid, Class B or C

Globe Linear LA-1

W/T: $124.50 Kit: $99.50

Complete with well-filtered power supply. 200w input AM Class B. 300w DC or 420 PEP input Class B linear SSB or DSB. 300w Class C for CW. Pi-Net 80-10M. 52 ohm Pi-Link coupled on 6M. Extensively TVI-protected.

Versatile Modulator

Plate Modulator UM-1

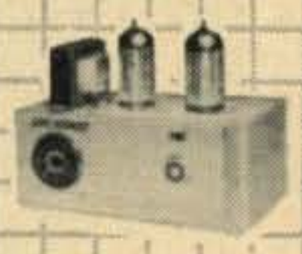
W/T: $49.95

Kit (less tubes): $37.50

Class A or AB_2 modulator, driver for higher power modulator, PA Amplifier. Matches output impedances 500-20,000 ohms. Carbon or crystal mike usable. Perforated steel cover, $3.00 extra. Supplies 10-45w audio output. Ideal for use with Chief.

Controlled Carrier Type

Screen Modulator Kit



Kit: $11.95

Ideal for use with Globe Chief. Permits radio-telephone operation at small cost. Self-contained. Connections, instructions, printed circuits, etc. supplied.

6 Meter Converter

Compact, stable, crystal converter for receivers tuning output frequencies 10-14mc. Cascode RF stage, bandpass coupling, shielded input and output, high sensitivity. Crystal for 10-14mc ouput supplied.

W/T: $27.50 Kit: $19.95

Code Oscillator Kit

Transistor and printed circuit assembly, Code Practice Oscillator. Screw terminal input for key; standard phone tip output jack. Complete with batteries. Kit: $4.95

Peak Limiting Pre-Amplifier

WRL Speech Booster

W/T: $24.95 Kit: $15.95

Perfect for Scout and Hi-Bander; clips and filters speech frequencies at pre-set amplitude. Response: 300-3500 cycles. Increases modulation intensity.

WRL Electronics

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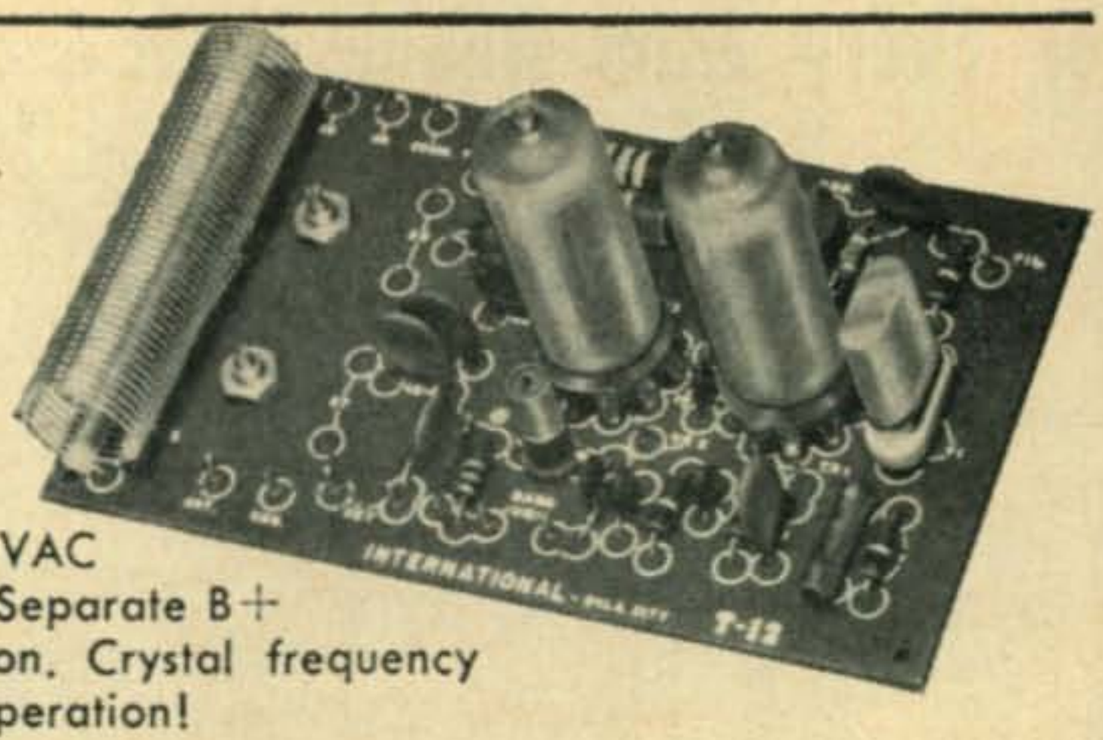
Broadway at 34th Council Bluffs, Iowa

For further information, check number 18 on page 126.

← For further information, check number 17 on page 126.

● T-12 TRANSMITTER 12-WATT

3500-4000 KC 7000-7300 KC



Pi-network output enables operator to couple into almost any type antenna. Low drive oscillator with International FA or F-6 crystals; may be used in close tolerance applications. 12BH7 Oscillator-buffer and 5763 final. Power requirements: Filaments 6.3 VAC @ 1.35 amp. Plate supply 350 volts dc @ 50 mils. Separate B+ input connection to final for addition of modulation. Crystal frequency same as output frequency; uses straight through operation!

T-12 Wired with tubes and one 80 or 40 meter crystal (Specify KC).....$15.95

(Kits for assembly also available)

● FCV-2 CONVERTER

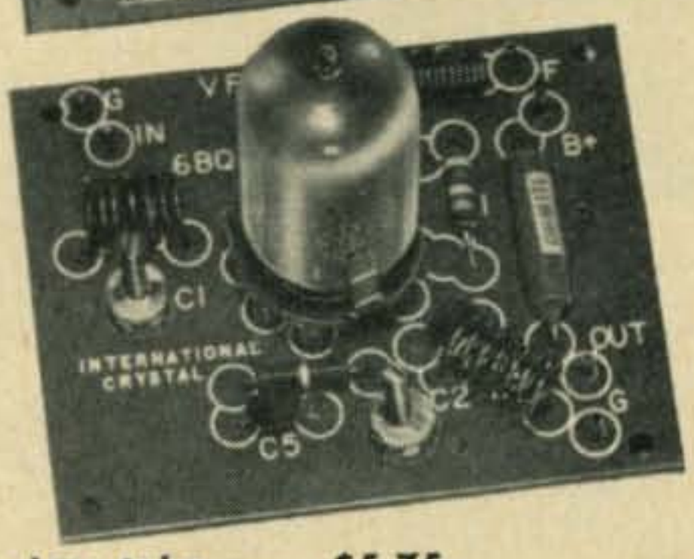
- **Model 50—6 Meters**
- **Model 144—2 Meters**

A 6U8 tube is used for oscillator-mixer. Cascode r-f amplifier using 6BQ7A. IF outputs available from broadcast band through 30 MC. Designed to mount in a standard 3" x 4" x 5" minibox.

Kit with crystal (less tubes).....$12.95

Wired with crystal and tubes.....$17.95

● VFA-1 CASCODE PREAMPLIFIER



For 2 Meters or 6 Meters, using the 6BQ7A in a low noise circuit. Designed to mount in a standard 3" x 4" x 5" minibox.

Kit, less tubes.....$4.75

Wired, with tubes..... 6.95

● IFA-10 IF AMPLIFIER

For use between converter and receiver. Uses 6AH6 type tube. Available for I-F ranges from broadcast band through 30 MC. Designed to mount in a standard 3" x 4" x 5" minibox.

Kit, less tube.....$5.75
Wire, with tube..... 8.50

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NEW MAIL ORDER POLICY (Revised January 1958)

Please supply sufficient information with order to facilitate accurate processing. Shipments are made on open account F. O. B. Oklahoma City when credit has been approved. On C. O. D. orders of $25.00 or over, 1/3 down payment with order is required.

Please include in check or money order sufficient postage and insurance for your Parcel Post Zone. Shipping weight of Printed Circuit Units, 2 lbs.

PARCEL POST RATES

Zone	Amount
1 and 2	(Up to 150 miles) .27c
3	(150-300 miles) .29c
4	(300-600 miles) .31c
5	(600-1000 miles) .36c
6	(1000-1400 miles) .40c
7	(1400-1800 miles) .46c
8	(Over 1800 miles) .51c

For Insurance, add:
10c up to $10.00 Value
20c up to $25.00 Value

International
CRYSTAL MFG. CO., INC.
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Orders for less than five crystals will be processed and shipped in one day. Orders received on Monday through Thursday will be shipped the day following. Oraers received on Friday will be shipped the following Monday.

For further information, check number 19 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.

IN PRODUCTION SOON.....PRICE $595.00

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

MODEL 20A

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 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

WRITE FOR INFORMATION ON THE COMPLETE MULTIPHASE LINE.

MULTIPHASE EQUIPMENT

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GONSET

At home . . . from your car in motion . . . on vacation . . . anywhere you go . . your GONSET Communicator just can't be equalled for real operating pleasure.

COMMUNICATOR

MODEL III

"Communicator" is a complete station. Transmitter, receiver, universal power supply completely integrated within a handsomely styled, conveniently carried "package." Models of this versatile equipment are available for either 2 or 6 meter amateur bands, for C-D, CAP and various commercial, industrial and ground-to-air applications.

Each model is a complete station, has transmitter, receiver and power supply. Latter is self-contained, operates on 6 and 12V DC and 115V AC (all three). Only one vibrator used. Simple interior strapping speeds change to DC voltage. Silicon diodes eliminate rectifier tubes in power supply, save current drain.

Models are available for either 2 or 6 meter amateur bands. Each has calibrated, tunable receiver, utilizes low-noise 6BZ8 RF tube in sensitive "Cascode" circuit. AVC is applied to avoid possibility of blocking by very strong locals. Special gang-tuned circuits give high image rejection. I-F selectivity is improved. All models have noise limiter, adjustable squelch, earphone provisions. Tuning dial is full-vision, slide rule type. Switchable panel meter replaces "green eye", indicates exciter or final output or receiver output level.

2E26 in transmitter delivers 6 to 8 watts output. New modulator uses 6L6GB tube, gives heavier modulation. All tunable circuits have adjustment knobs on panel. Gang-tuned circuits reduce spurious responses to negligible values. Transmitter has provision for 6-crystals, selectable by switch. Operation may optionally be with external VFO. (Illustrated.)

Cabinets are 10¾" wide, 10" high, 8¼" deep, are finished in Alpine White. Knobs are in Gunmetal Blue.

2 meters....#3211.
6 meters....#3212.
Either, 169.50

RF LINEAR AMPLIFIERS

Linear RF amplifiers available for either 2 or 6 meters to increase carrier output of associated Communicator to 50-60 watts. No alterations required on Communicator. Tune up is easy, fool proof without danger to tubes. Switching Communicator to transmit automatically activates amplifier, including internal antenna relay. Uses 2-826 VHF triodes with forced air cooling. Heavy-duty power supply uses 2-5U4GB rectifiers. Cabinet matches Communicator III models.

2 and 6 meter VFO.
#3226 Net . . 69.50

2 AND 6 METER VFO

Compact, highly stable VFO provides frequency control for both 2 and 6 meter Communicator III models. Both 2 and 6 meter bands are spread fully across slide-rule-type dial, either band being selectable by panel switch. Unit also has "spotting" switch. VFO is actuated automatically by associated Communicator. Power supply for 115V AC operation is self-contained. Tubes: 2-6BJ6, 1-OB2. Cabinet is finished in Alpine White to match Communicator III models.

Usable only with Communicator III models.

For further information, check number 44 on page 126.

2 meter Communicator III (6-12V DC, 115V AC)
#3133 .....Net . . 269.50

6 meter Communicator III (6-12V DC, 115V AC)
#3136 .....Net . . 269.50

GONSET

GONSET DIVISION OF YOUNG SPRING & WIRE CORPORATION
BURBANK, CALIFORNIA

Checkmate QRM with full communication power!

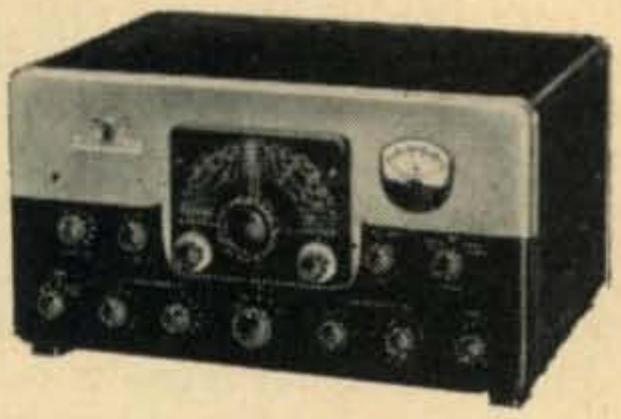
First choice among the nation's amateurs, Viking transmitters deliver solid communication power to punch your signal home every time! For effective practical design and honest dollar value, Viking transmitters stand ahead of all others. So, whether you choose the "Adventurer" as your first transmitter, or the power-packed Viking "Kilowatt" as the "last word," you know beyond a doubt that your transmitter dollar is soundly invested with Viking equipment.

VIKING "KILOWATT" AMPLIFIER—in a class by itself . . . the only transmitter available that provides full, maximum legal power in all modes SSB, CW and AM—more than 2000 watts SSB*. Class C final amplifier operation provides plate circuit efficiencies in excess of 70% with unequaled broadcast-type HIGH LEVEL AMPLITUDE MODULATION with more than three times the AM power obtained in KW class linear equipments! Continuous tuning 3.5 to 30 mcs. Excitation requirements: 30 watts RF and 10 watts audio for AM; 2-3 watts peak for SSB. Wired and tested, with tubes.

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

VIKING "PACEMAKER" TRANSMITTER/EXCITER—90 watts SSB P.E.P. and CW input . . . 35 watts AM. Instant bandswitching 80, 40, 20, 15 and 10 meters. Excellent stability and suppression. Temperature compensated VFO; VOX and anti-trip circuits; high efficiency pi-network output. More than enough power to drive the Viking "Kilowatt" or grounded-grid kilowatt amplifiers. With tubes and crystals, less key and microphone.

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



New desk-top linear amplifiers . . .

VIKING "COURIER" AMPLIFIER—Rated a solid 500 watts P.E.P. input with auxiliary SSB exciter as a Class B linear amplifier; 500 watts CW or 200 watts AM linear. Self-contained desk-top package—may be driven by the Viking "Navigator", "Ranger", "Pacemaker" or other unit of comparable output. Continuous coverage 3.5 to 30 mcs. Drive requirements: 5 to 35 watts depending on mode and frequency desired. Employs two 811A triodes in parallel. Pi-network output will match 40 to 600 ohm loads. TVI suppressed. With tubes and built-in power supply.

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

VIKING "THUNDERBOLT" AMPLIFIER—The hottest linear amplifier on the market—engineered to provide maximum "talk-power" to smash through QRM. 2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear; in a completely self-contained desk-top package. Delivers a dominant signal on all amateur bands—continuous coverage 3.5 to 30 mcs.—instant bandswitching. May be driven by the Viking "Navigator", "Ranger", "Pacemaker" or other unit of comparable output. Drive requirements: approx. 10 watts in Class AB_2 linear, 20 watts Class C continuous wave. Final amplifier employs two 4-400A tetrodes in parallel, bridge neutralized. Complete with tubes and built-in power supply.

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

***The F.C.C. permits a maximum 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.**

See your authorized Johnson distributor for easy terms.

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E. F. Johnson Company

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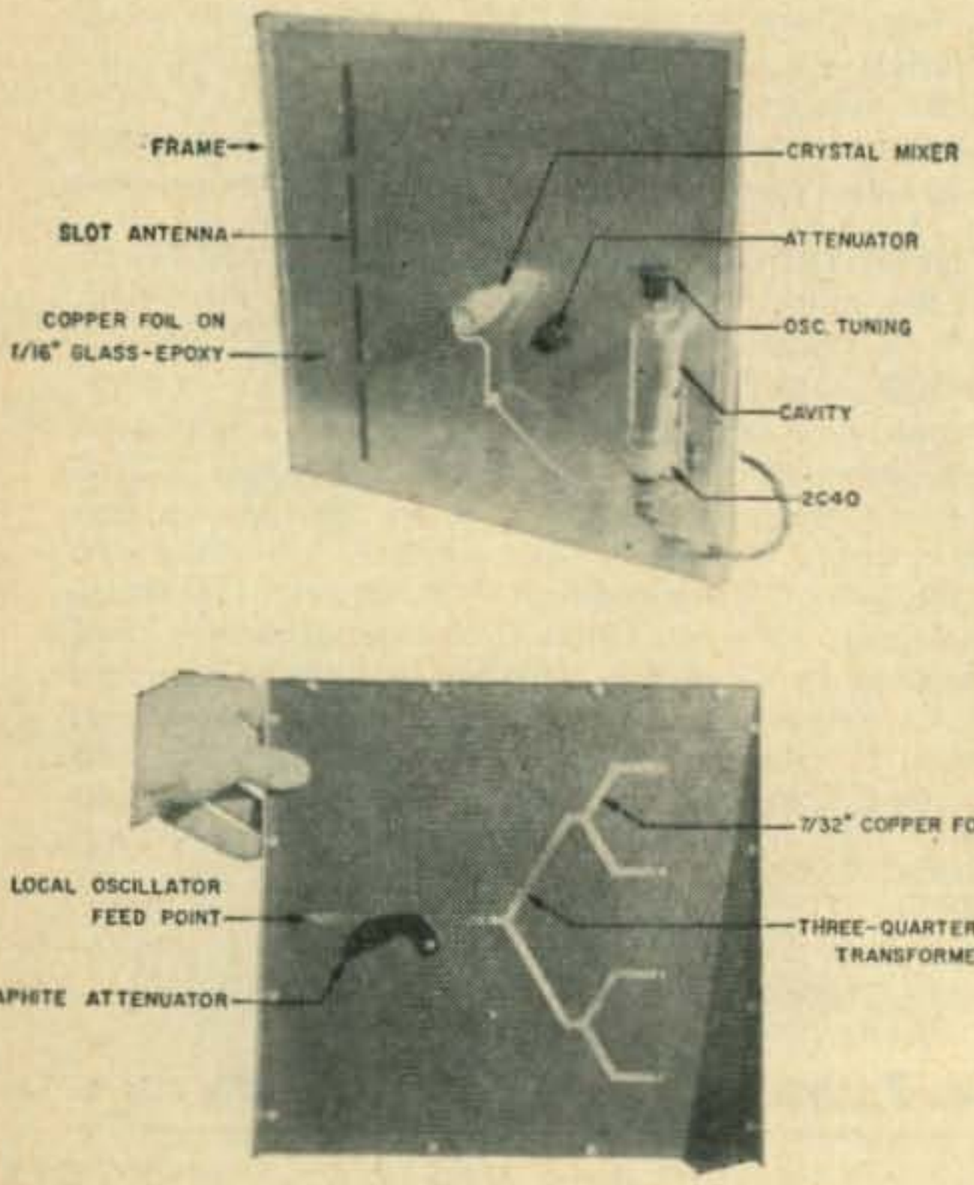
PRINTED CIRCUIT ANTENNAS

by E. L. KLEIN, W4UHN
5902 Brunswick St., Springfield, Va.

Antennas for the 2300-2450 mc frequency range suggest use of waveguide, horns, crystals and the other shf techniques which have come to be regarded as commonplace in radar and microwave-link work. Application of etched circuit board variety of printed circuits to the transmission and radiation of energy at these frequencies, on the other hand, is somewhat less common, and indeed stimulating to the experimenter's imagination. It has been found that the same advantages which make etched circuit application to conventional circuitry so profitable, also weigh heavily in promoting their application to microwave work. Additional advantages of reduced weight, as compared to waveguide, and ease with which dimensionally-critical designs may be converted from blueprint to production model make etched circuit techniques a strong contender in new shf antenna development.

Foremost among the applications in which etched circuit techniques may be exploited in microwave work are "microstrip" and "slot antennas". This article gives a straightforth introduction to etched circuit techniques in both applications by comparing them to other more familiar radio-frequency techniques and by describing their employment in a practical receiver front-end.

Fig. 1—Slot antenna and microstrip transmission line used to feed superhetrodyne receiver operating in the 2300-2450 mc band.



Microstrip

A cross-sectional view of a typical microstrip transmission line is shown in Fig 2. As may be seen, microstrip is simply a three-inch wide strip of dielectric material having copper foil on both sides. The 7/32 inch wide foil is frequently called the conductor, and the three-inch wide foil is called the ground. Only the highest grade dielectric material having a high dielectric constant, low loss-factor and low moisture absorption may be used.

Increasing the conductor width decreases the characteristic impedance of the microstrip as well as increases its dielectric losses. Approximate impedance for the dimensions given is 50 ohms. This value was chosen for compatibility with existing coaxial transmission lines and fittings. Theoretically, the ground foil should be several wavelengths wide. However, experiment has shown that a width of two to three inches results in minimum practical fringing effect and radiation losses.

A variation of this type of etched circuit transmission line is called "stripline". Essentially, stripline is two microstrips face-to-face with the 7/32" conductors sandwiched between the two ground plates similar to a flattened coaxial line. Higher transmission efficiencies are thus obtained at some sacrifice of mechanical simplicity. *Tri-plate*, a tradename of Sanders Associates is another term applied to such a system.

Construction and operation of microstrip may be better understood by reference to Fig 3. Here is shown a pictorial transition from the familiar open-wire type transmission line to three other microwave transmission devices. Of these, waveguide and coaxial line need no particular explanation other than to recognize that waveguide, due to its enclosed sides, is sensitive to frequency. As such, waveguide undergoes changes in characteristics impedance with changes in frequency, as well as being subject to a cut-off frequency below which it ceases to act as a microwave conductor.

Transmission of radio frequency energy requires two conductors between which the electric field is confined and upon whose surfaces electric currents flow. Inasmuch as higher frequency currents travel at or near the surface of the conductor, each of the individual wires of an open-wire transmission line may be considered as a tube or cylinder. These, if opened up and flattened out, would continue to act in much the same way as the wire in providing two surfaces between which an electric field may exist. It therefor follows that two conductors, such as the parallel foil strips in microstrip, will confine an electric field and permit propagation of energy along its length. Actually, approximately 75% of the energy is confined within the dielectric between the foil, and 25% constitutes the fringing field shown emanating from the top surface of the upper foil in the microstrip illustration, Fig 3. It is this fringing field that contributes to radiation losses from the microstrip. If it is desirable to attenuate the radio frequency energy traveling down the microstrip, a lossy material such as printed circuit resistive paint[1] or a piece of paper well-covered with soft pencil graphite may be placed flat upon the surface of the conducting strip and dielectric. Care should be taken to taper the leading and trailing ends of such an attenuating device so as to minimize physical discontinuities which would reflect energy causing deleterious standing waves on the line.

Microstrip is somewhat more lossy than coaxial line and waveguide. At 5 kmc, for instance, microstrip has an attenuation of 0.33 db per foot while RG-8/U and waveguide have attenuations of 0.25 db per foot and 0.021 db per foot respectively. For this reason, microstrip is usually not used for long runs such as feeding a remote antenna in a sensitive receiving system due to the losses which would be encountered. On the other hand, microstrip is most useful for relatively short runs and systems having the antenna and receiver together as an integral unit.

Wavelength In Microstrip

Prior to designing applications using microstrip, it is necessary to know the ratio of the electrical wavelength to actual wavelength in the microstrip. This is obtained by calculating or measuring the velocity factor for the microstrip. As in the case of coaxial transmission lines, radio frequency currents travel slower in microstrip and thus traverse a shorter distance in each cycle than they do in air or free space. The ratio of these speeds and thus the ratio of actual wavelength to electrical wavelength is called the velocity factor of the microstrip line.

Fig 4 shows a test set-up for measuring the velocity factor in microstrip having discrete cross-sectional dimensions and dielectric constant. The slotted line may be replaced with an open-wire line such as a Lecher wire system,

[1] Resistive paint type R-21 or R-31
[2] ARRL Handbook, 1953 issue.

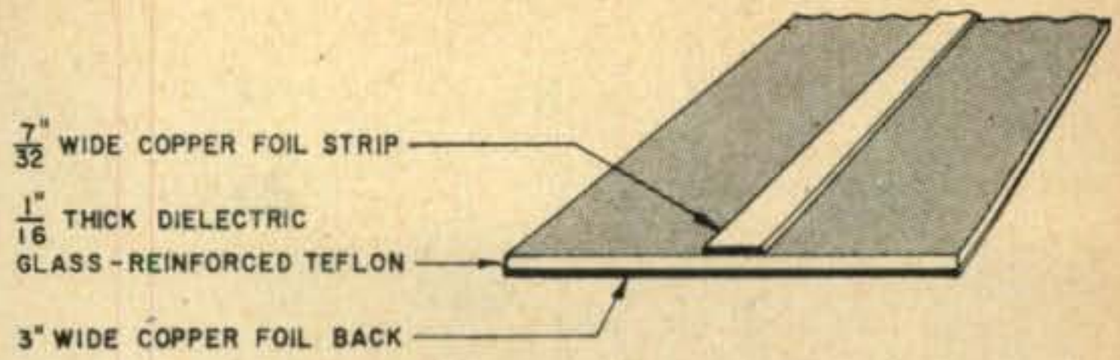


Fig. 2 — Basic construction of microstrip. Another variation, called stripline, has a second dielectric and 3" copper foil above the 7/32" strip in a sandwich arrangement. Sometimes an air dielectric is used.

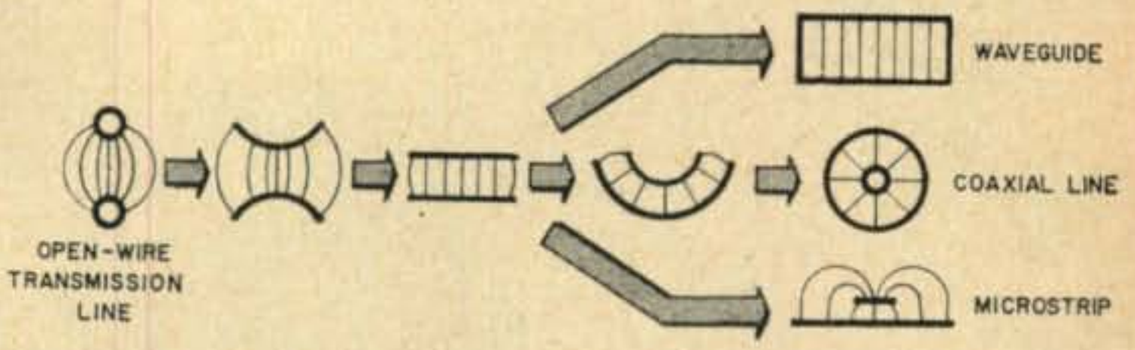
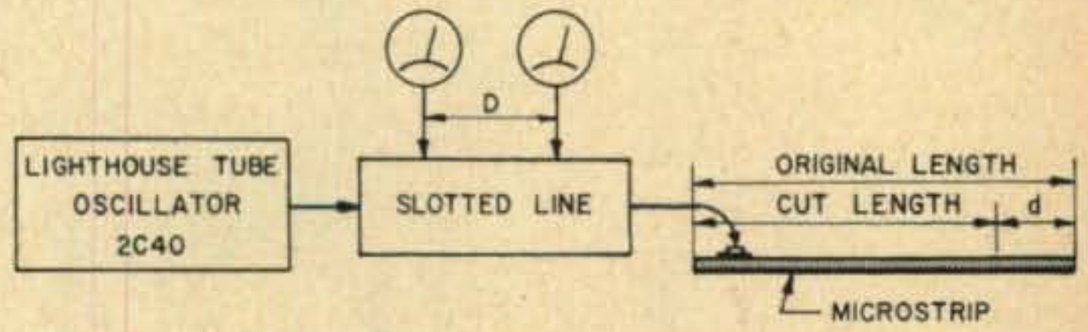


Fig. 3 — Geometric concept of evolution from "open-wire" transmission line to wageguide, coaxial line and microstrip. Light lines indicate the electric field between conductors.



$$\frac{d}{D} = V \qquad (1)$$

$$\lambda_\ell = \lambda V \qquad (2)$$

$$\frac{\lambda_\ell}{4} = \frac{7.5V}{f} \qquad (3)$$

where: d = length cut from sample microstrip (cm)
D = distance indicator moves after cutting (cm)
V = velocity factor
λ_ℓ = wavelength in line (cm)
λ = wavelength in free space (cm)
f = frequency (kilo-megacycles)

Fig. 4 — Test set-up for wavelength measurements. The length of one-quarter wavelengths in Microstrip is calculated using formula (3).

MATERIAL				DIELECTRIC CONSTANT			WATER ABSORBTION % IN 24 HRS.
BASE	BINDER	GRADE	MFG'R	1 MC	100 MC	1 KMC	
PAPER	PHENOLIC	XXXP-26	A	3.8	3.6	3.5	.038
FIBERGLAS	POLYESTER	ESTOGLAS	B	3.88	--	--	---
		GM-PE	A	4.3	4.25	4.25	.40
FIBERGLAS	EPOXY	EPOGLAS	B	5.26	--	--	.016
		FF-91	C	4.75	--	--	---
FIBERGLAS	TEFLON	GB-112T	A	2.8	2.8	2.8	.02
FIBERGLAS	STYRENE CO-POLYMER	REXOLITE 2200	D	2.77	2.77	2.77	<.05

A - CONTINENTAL DIAMOND FIBER
B - PLASTILITE, INC.
C - FORMICA, INC.
D - REX CORPORATION

Fig. 5 — Characteristics of copper-clad laminates. Inasmuch as the dielectric constant is different for different frequencies, especially at the higher frequencies, the appropriate value should be chosen.

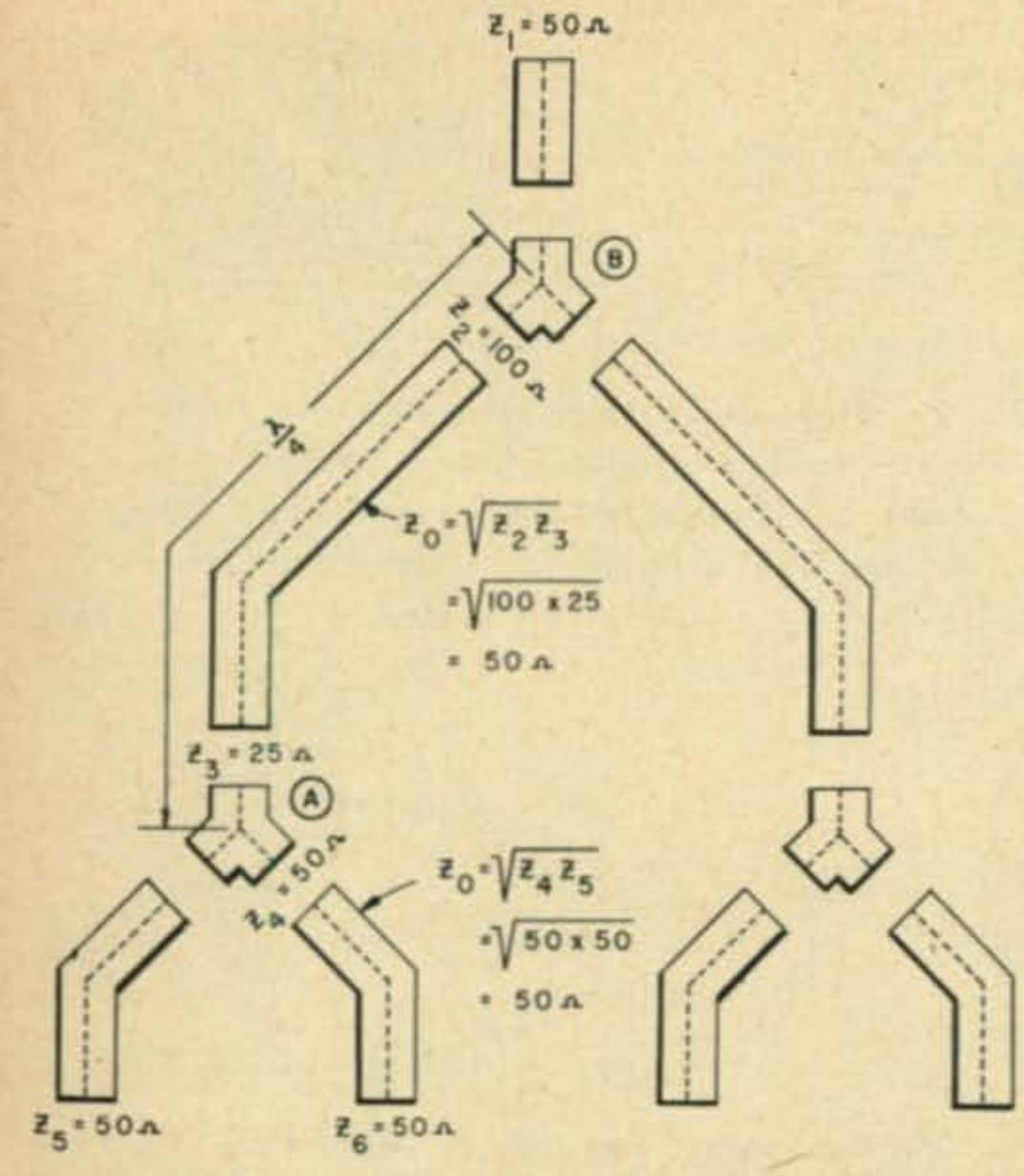


Fig. 6 — Four-way power splitter used to feed "beam" slot antenna. Minimum reflection of standing waves is maintained by use of quarter-wave transformer to match impedances at the several junctions.

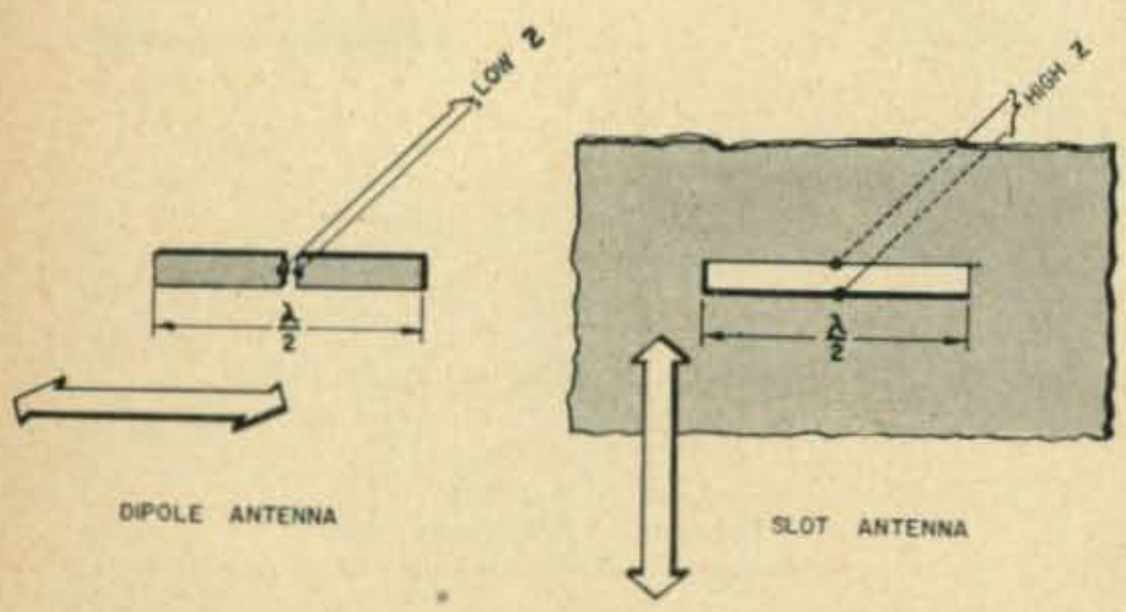


Fig. 7 — Relative polarization of energy radiated from dipole and slot antennas. Dimensions are identical, as if slot were formed by removal of dipole from an infinite plane.

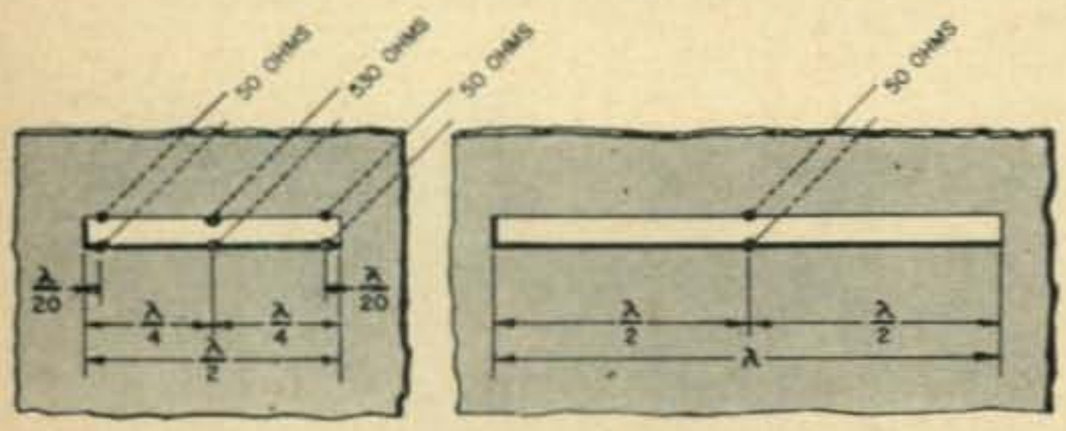


Fig. 8 — Impedances encountered at different possible feed-points on slot antennas. Slot width is a small fraction of wave-length.

using a voltage pick-up probe instead of the shorting bar normally employed. Source of 2450 mc energy may be from a 707B reflex-klystron or a type 2C40 lighthouse tube oscillator described by W2RMA.[2] The latter oscillator, incidentally, was used as the local oscillator in the superhetrodyne receiver designed to work in conjunction with the antenna system described here. Details of a suitable coaxial line-to-microstrip adapter are shown in Fig. 9.

Calculation of the velocity factor for microstrip can also be performed if the dielectric constant of the particular insulating material is accurately known at the particular frequency to be used. Fig 5 gives some values for more popular dielectric materials. An approximate figure for the velocity factor may be obtained from the following relationship:

$$\text{Velocity factor} = \frac{1}{\sqrt{\text{Dielectric constant}}}$$

Power Splitter

Having ascertained the velocity factor for the microstrip, it is then possible to lay out an actual quarter wavelength in the line. Such quarter-wave tranformers in the power splitter served to transform impedances to suitable values so that sections of microstrip may be paralleled or split, as the case may be, and still maintain proper impedance matching which is essential in minimizing standing waves.

Power splitters used in the microstrip line to a four element etched circuit antenna, are described in Fig 6. In this instance, the power is being combined instead of being split. If two 50 ohm lines from two of the antenna elements are joined together at point "A", the resultant parallel impedance will be 25 ohms. The quarter-wave transformer then transforms this impedance to 100 ohms at point "B" where the parallel impedance of the two 100 ohm ends is 50 ohms. Thus, power from four antenna elements is added in phase and the impedances of the microstrip line at the four sources and terminal end are the same.

Slot Antennas

Slot antennas are formed by cutting a narrow slot in a large metal surface. Such antennas are shown in Figs 7 and 8. Slot antennas may be compared to conventional half-wave dipoles consisting of two flat metal strips of size equal to the slot cut out of the large metal sheet. Radiation patterns produced by slot antennas cut into an infinitely large metal sheet and those of the complementary dipole antennas are the same.

An important difference between the slot antenna and its complementary antenna is of interest. Their electric and magnetic fields are interchanged. With the slot antenna, the magnetic lines are horizontal and the vertical electric lines are built up across the narrow dimension of the slot. This causes vertical polarization from the horizontal slot as shown in Fig 7.

The impedance at the center of a slot whose electrical length is a half wave is 530 ohms. This impedance is reduced to a lower value as the input connection is moved toward the end of the slot. At a point about one-twentieth of a wavelength from either end, the input impedance falls to about 50 ohms as indicated in Fig 8. The slot length may be increased to a full wave if it is desired to achieve a 50 ohm match at the center of the slot.

Receiving System

Microstrip transmission line and power splitters were used with a four-element slot antenna in the superhetrodyne receiver illustrated in Fig 1. Inasmuch as the center impedance of the half wave slot is relatively high (530 ohms), the four sections of line feeding the slots must each be an odd number of quarter wavelengths long to obtain the necessary transformation to a lower value of impedance at the first parallel junction. Likewise, the subsequent transformer sections feeding the last junction adjacent to the crystal mount must be odd multiples of a quarter wavelength long. Obviously, a one quarter wave section would be physically too short. Connection from the microstrip conductor to one edge of the slot antenna is made by drilling a small hole through the etched circuit board and soldering a short length of hook-up wire to the copper foil on both sides. This connection also serves as the dc return for the crystal.

Energy from the local oscillator is limited by a variable attenuator before being mixed with the incoming signal in the crystal mount. Fig 9 shows modifications which were made to a coaxial connector to accommodate a type 1N23 crystal. rf by-passing is accomplished through the thin-walled teflon sleeves.

Experimentation with and proving of the various parts of this receiving system prior to final assembly are desirable due to appreciable variations encountered in electrical characteristics with small changes in size or type of material used.

Construction and Operation

The complete receiving system including antenna is constructed on a 12 by 12 inch copper-clad glass-epoxy board. In lieu of making a master drawing and a photographic negative as is usually done when photo engraving etched circuit boards, strips of 7/32 inch wide draftsmans masking tape are applied directly to the copper surfaces of the board to resist the ferric chloride etchant. The half-wave slot antennas are formed by scoring the copper foil with a sharp knife and pealing it away from the four slot areas.

Care must be exercised when soldering the local oscillator fitting and crystal mount to the copper-clad board. Adequate caution and practice on sample pieces will insure good results. Make certain both pieces are well-tinned and that a minimum of solder remains. When sweating two pieces together, heat should be applied to the largest of the two masses of metal and then only long enough for the solder to flow.

A frequency check of the finished receiving system may be made by tuning slightly higher to the police radar band. By removing the attenuator and crystal mixer, this receiving system may be converted to a transmitter permitting two-way communication on the 2300-2450 mc amateur band. Who would guess it could be done with printed circuits? ■

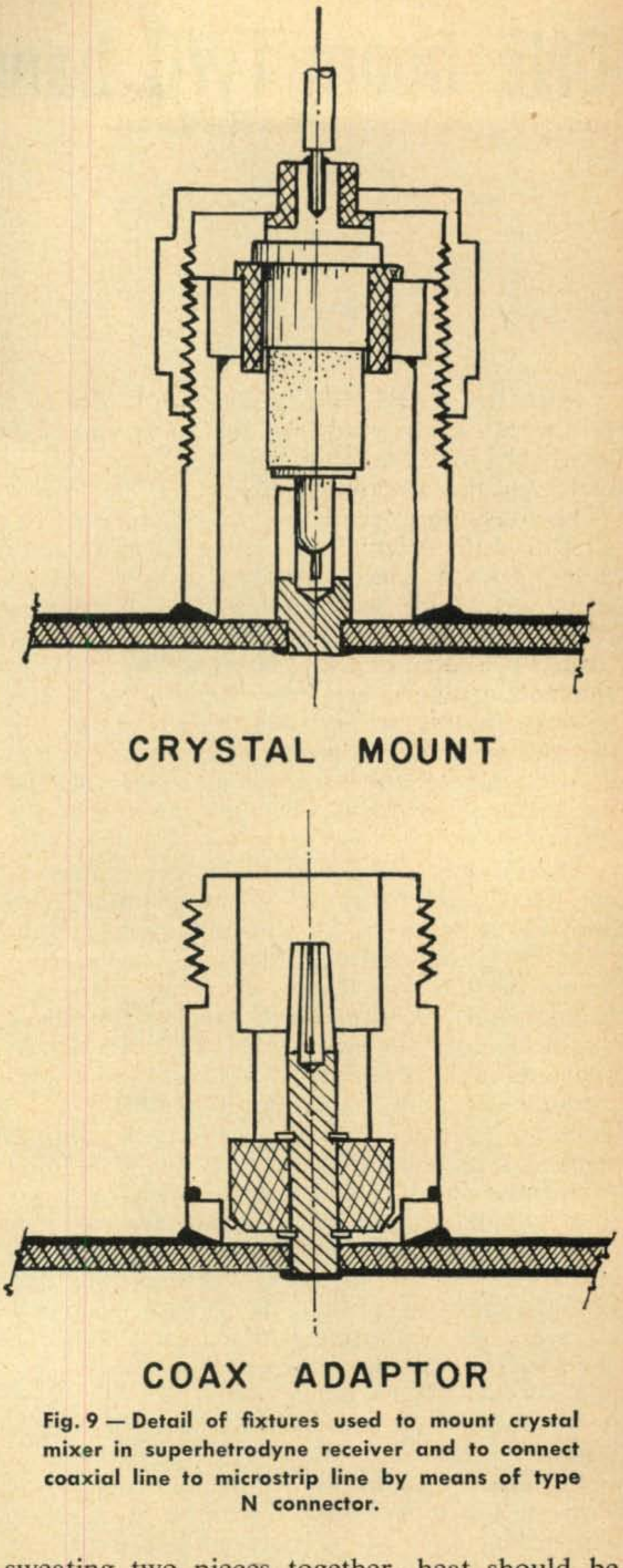


Fig. 9 — Detail of fixtures used to mount crystal mixer in superhetrodyne receiver and to connect coaxial line to microstrip line by means of type N connector.

ONE boom TWO band beam at W4KFC

by VIC CLARK, W4KFC
RFD 1, Clifton, Virginia

With the ARRL DX Tests looming only a few weeks away, the need for some short-cut approach to a combination ten and fifteen meter beam became apparent at W4KFC. Time-consuming structural requirements dictated that the original plan to stack "three over three" be set aside and some simpler design employed. With materials for a twenty-foot boom on hand, the compromise plan took the form of a dual ten-fifteen meter beam with elements arranged in a row. Reading from left to right in this arrangement (see Fig. 1) are the fifteen meter reflector, the fifteen meter driven element, the fifteen meter director, the ten meter driven element and the ten meter director.

The director for the fifteen meter beam was cut just a bit shorter than optimum and doubles in brass (if *aluminum* tubing can do this) as a ten meter reflector. The 20-foot boom permits one-tenth wavelength for reflectors and .15 wavelength spacing for directors in each of the two arrays. The two driven elements are fed separately with coaxial cables through Gamma matching assemblies.

Preliminary consideration of the horizontally stacked arrangement of the two beams seemed to promise that it would be less critical to adjust than a pair of interleaved three-element jobs on a common boom, in that detrimental interaction should be negligible between the two sets of elements—in fact, the shorter ten meter elements out in front could conceivably be expected to provide a measure of director action for the fifteen meter array.

In practice, the two beams exceeded expectations.

Presumed quantitative measurements of parasitic array performance can be misleading, depending upon whose decibels are used, the measuring set-up, antenna environment and so on. To establish the performance characteristics of this antenna, signals originating from W3GRF—approximately twenty miles away—were measured under dead-band conditions. W3GRF's 100-foot-high four-element antennas, aimed directly at my station, over a path approaching line-of-sight, provided an excellent low angle signal source for these checks. Correlation was good when my antenna was excited and the field strength measurements made at W3GRF under the same band conditions. The following data emerged from these measurements:

	10 meters	*11 meters*	*15 meters*
Front-to-back ratio	26 db	21 db	18 db
*Front-to-side ratio	35 db	39 db	31 db

*Average of front lobe to nulls on each side.

Minor lobes in the rear quadrants proved to be negligible on all three bands, averaging less than the back lobe in magnitude.

From this it can be seen that each of the two arrays performs as one would expect of a well-adjusted independent three-element Yagi. Surprisingly enough, the ten meter array exhibits very deep side nulls both on ten and eleven meters and it is superior in this respect to the fifteen meter array—and, for that matter, to my three-element twenty meter beam which has .16 wavelength spacing for each of the parasitic elements.

On the very first evening of fifteen meter operation with the new beam I exchanged RST 589 reports with VK9AJ (Cocos-Keeling) in what amounted almost to a "private line" QSO. The proof of an antenna's effectiveness, however, is its performance under competitive conditions. These are amply provided by a DX contest, wherein the radiating system not only shoulders the burden of projecting one's signal through the "W" barrier, but must inhale competitively, as well. The dual beam fulfilled expectations in this respect, netting 412 QSO's and 160 band-countries in the 1957 ARRL CW DX Tests, as follows:

	10 meters	*11 meters*	*15 meters*
QSO's	181	20	21
Countries	69	13	78

Element dimensions and spacing used; which depart only slightly from recommended handbook values, are as follows:

Element	*Length*	*Spacing between elements*
10 meter director	15′ 9″	5′ 1″
10 meter driven el.	16′ 11″	3′ 5″
15 meter director	21′ 0″	6′ 9″
15 meter driven el.	22′ 6″	4′ 6″
15 meter reflector	23′ 11″	

These dimensions favor the cw band segments.

The end-to-end placement of two antennas on a single boom certainly is not unique, but is infrequent enough in home-constructed

amateur antennas to warrant a boost on the basis of my experience with what started out to be a compromise temporary contrivance but which proved to be a treasure.

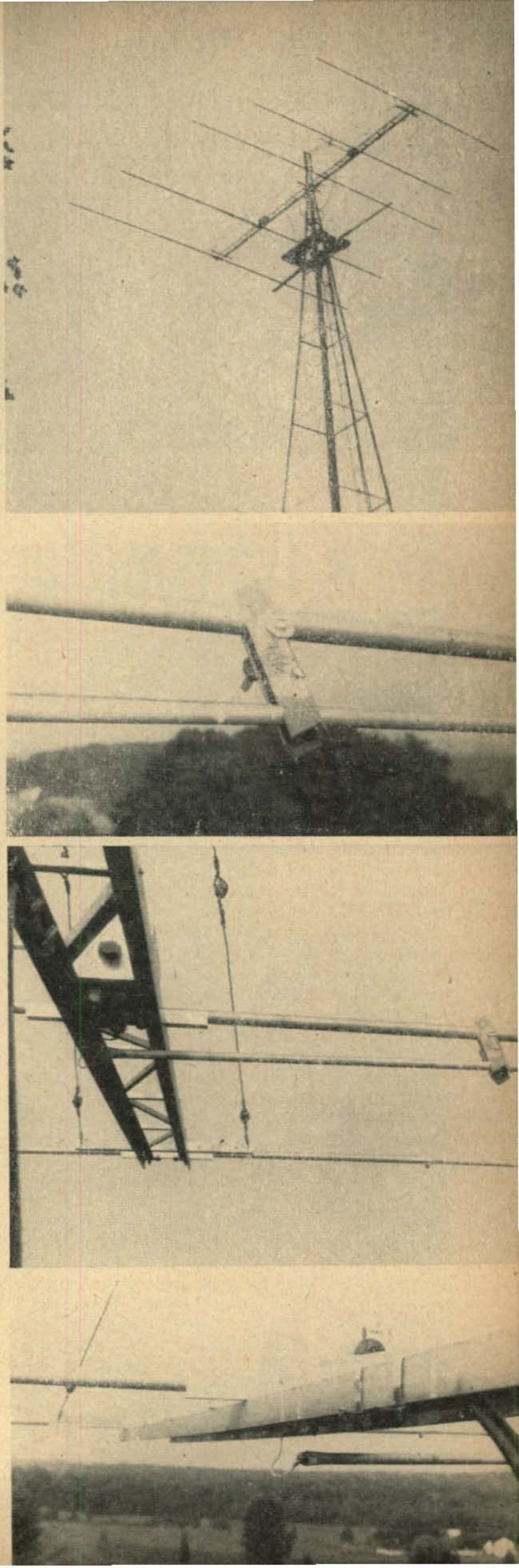
In summary, the advantages afforded by this arrangement over the more commonplace three-over-three design are (1) no destructive interaction exists between the two arrays, (2) one piece of tubing serves as an effective parasitic element in each of the two arrays (something for nothing!), (3) both driven elements and matching systems are at tower-top height and are accessible from the tower platform or by tipping the boom, (4) wind loading is less, and (5) considerable simplification in construction is afforded.

A note or two on the Gamma matching assembly: In each array this consists of a half-inch diameter piece of aluminum tubing rigidly secured to the driven element with a single clamp fashioned from two pieces of aluminum angle stock, notched to receive the element and Gamma rod (see Fig. 2). Two bolts pass through the angle stock. This is the only support for the Gamma rod, which is only about three feet long and therefore quite light in weight. The Gamma rod is connected to a feed-through insulator by means of a six-inch piece of tinned copper braid, lugged at each end (see Figs. 3 and 4). This permits the driven end of the Gamma rod to wave in the breeze; previous experience with Gamma rods revealed that waving in the breeze is the thing they do best, and that because of the potent leverage action resulting from element movement in the wind, the insulator has yet to be built that can successfully withstand the hammering it will receive from a Gamma rod that is rigidly clamped at *both* ends. The braid pigtail approach has endured nearly two years of use on my twenty meter beam without evidence of deterioration.

Variable capacitors removed from BC-375 tuning units seem ideally suited for tuning the Gamma match. They have ample plate spacing for a kilowatt, are sturdily constructed and of non-ferrous materials. One of the 100-mmfd type (27 plates) was used for the fifteen meter Gamma and a 70-mmfd type (19 plates) for the ten meter antenna. These are protected from precipitation by aluminum boxes as shown in the photograph. Covers of flexible vinyl plastic, such as mixing bowls or refrigeratorator boxes have proven to be equally suitable and seem to weather well.

Adjustment of the two Gamma matching assemblies to result in a VSWR close to unity proved to be a ten-minute job.

I should mention, in closing, that raising the beam to the top of a sixty-one foot Vesto tower was accomplished without a hitch, thanks to the capable assistance of K4OQR and junior op KN4OKZ—somewhat brisk weather conditions notwithstanding. ■



Top to bottom: Figures 1, 2, 3 and 4.

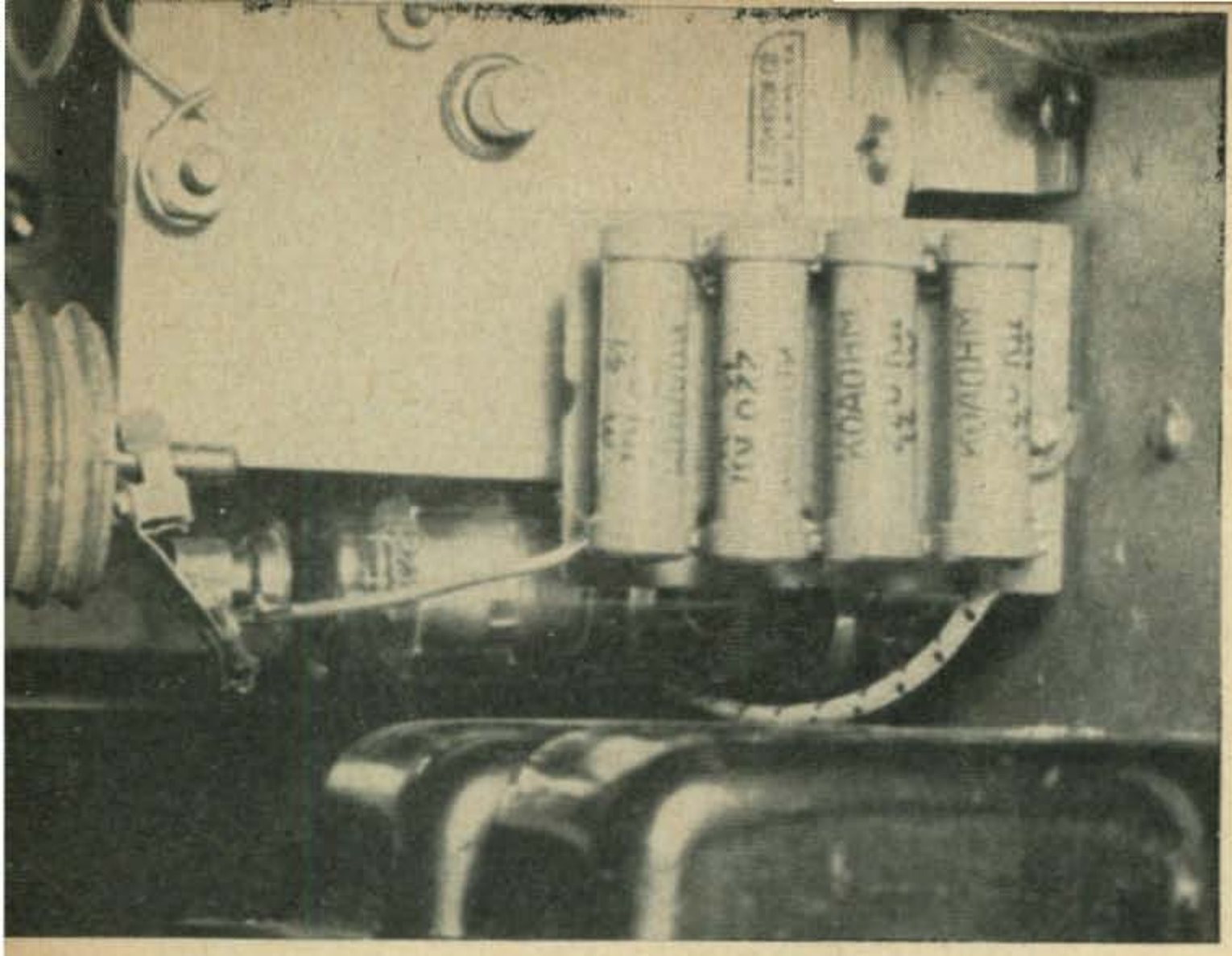


Fig. 2

by W. B. BERNARD, CDR, ED, USN, W4ELZ
3151 South Grebe Rd.,
Arlington 2, Va.

a transmitter tuning meter

Power pentodes and tetrodes are widely used as output amplifiers in amateur transmitters. The high power sensitivity of these tubes makes it possible to drive them with a low power driver system. This low power driver may be simple and therefore economical. Also because it is low powered it is less likely to cause TVI and other interferences than is a high power driver system. With all these advantages there are some disadvantages which must be accepted. The one of most importance is the ease with which such tubes may be damaged if they are not operated properly. Contributing to this difficulty is the small change in plate current which occurs between an overloaded condition which is likely to cause overheating of the screen and an overloaded condition which will cause overheating of the plate.

A glance at the characteristic curves in the tube handbook will show that the screen current of the output tube rises steeply if the plate voltage of the tube goes much below the screen voltage. This situation will occur once each cycle of the transmitted frequency if the voltage swing of the plate tank is too great. This high voltage swing results from too light a loading of the tank. If the screen grid is furnished its current from the plate supply through a high resistance the screen dissipation, which is limited to a maximum of $E^2/4R$ where E is the supply voltage and R is the value of the dropping resistor, may be less than the maximum permissible screen dissipation of the tube in which case we need not worry about burning up the screen. If instead of a high voltage supply with a high value dropping resistor we have a low voltage supply with little or no series resistance $E^2/4R$ can easily become great enough to melt down the screen leaving us with a poor grade triode which we really don't want.

Tuning up is a process that is very dangerous since during most of the process there is insufficient load on the plate tank. This danger can be minimized by tuning up and loading with reduced grid drive and/or screen voltage but we are left with the basic difficulty of recognizing correct loading as mentioned in the first paragraph. The number of amateurs complaining of the short life of certain type tubes attests to the difficulties of correct operation.

The answer to the problem is some type of an indicator which tells, with more accuracy than the plate current meter, the actual operating conditions in the plate circuit. A meter which measures the peak radio frequency voltage in the plate circuit will give us the information which we need. Such an instrument has been used in commercial transmitters for years but has rarely been adopted by the amateur fraternity.

Perhaps in the past the cost and the bulk of the necessary components acted as a deterrent to its wider adoption but the wide availability of high voltage components designed for television receiver service has removed these objections.

Fig. 1 shows the circuit of a plate voltmeter for use in amateur transmitters. The components which must be added to make this circuit are small enough that they may be installed in all but the smallest transmitters. Fig. 2 shows the coupling capacitor, rectifier tube and multiplier resistor for the plate voltmeter installed in the author's transmitter.

Returning to fig. 1 the 1x2A tube and the 20KV 500$\mu\mu$fd capacitor are easily secured inexpensive television receiver parts. The meter must give full scale deflection with 1 ma or less since the 1X2A is limited to 1 ma average current. If the transmitter already has a DC

meter other than the plate current meter a 1 ma meter may be substituted for this meter and a switch with suitable shunts can be connected to use the meter for the original function(s) and the plate voltmeter circuit.

The multiplier resistor string should consist of a number of resistors in order to limit the

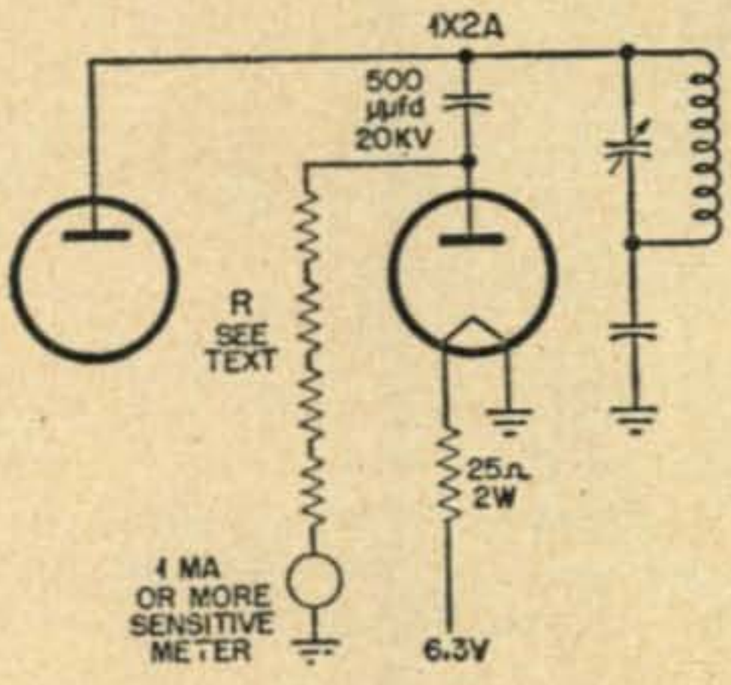


Fig. 1

voltage which is impressed across each individual resistor. At least the top two resistors should be of the deposited carbon type since some composition resistors have a very small resistance element inside a large phenolic case. When such resistors are subjected to high radio frequency voltages they tend to overheat and burst. The value of the total resistance string is equal to the full scale voltage reading desired divided by the current required for full scale deflection of the meter movement. For instance if the meter is to read 1000 volts and has a sensitivity of 1 ma (.001 A) the resistance needed is 1000/.001 or 1,000,000 ohms (1 megohm). It is convenient to have the meter read from 1.25 to 1.33 the DC plate supply voltage except in the case of a plate modulated amplifier in which case it should read about 2 times the plate supply voltage.

The author's transmitter has four 807's in the final amplifier designed to run at 750 volts and 400 ma for c.w. The curves shown were taken at reduced screen voltage to prevent damage to the tubes during the data taking, however if the voltages and current shown are multiplied by two they will be very close to those obtained under full power conditions. Fig. 3a shows the plate current and plate voltage as the final tank is turned through resonance with no load coupled into the circuit. It can be seen that at resonance the r-f plate voltage rises to a very high value. Had the screen voltage not been reduced the plate swing would have exceeded the plate supply voltage and the screen current and the screen dissipation would have been far in excess of the disallowable ratings. Fig. 3b shows the plate current and the plate voltage as the plate tank is tuned through resonance with the tank heavily loaded. The much greater sharpness of the plate voltage rise compared to the plate current dip is still evident although the transmitter is loaded more heavily than is desirable. Although there is not much plate current change between a plate tuning dial reading of 8 and 8.5 the plate voltage curve shows that the r-f plate voltage changes 25%, therefore the output power may be down by more than 40% with little indication by the plate current meter. Since the DC input has not changed much and the r-f output has dropped 40% there must be much more power being dissipated in the final amplifier plate(s).

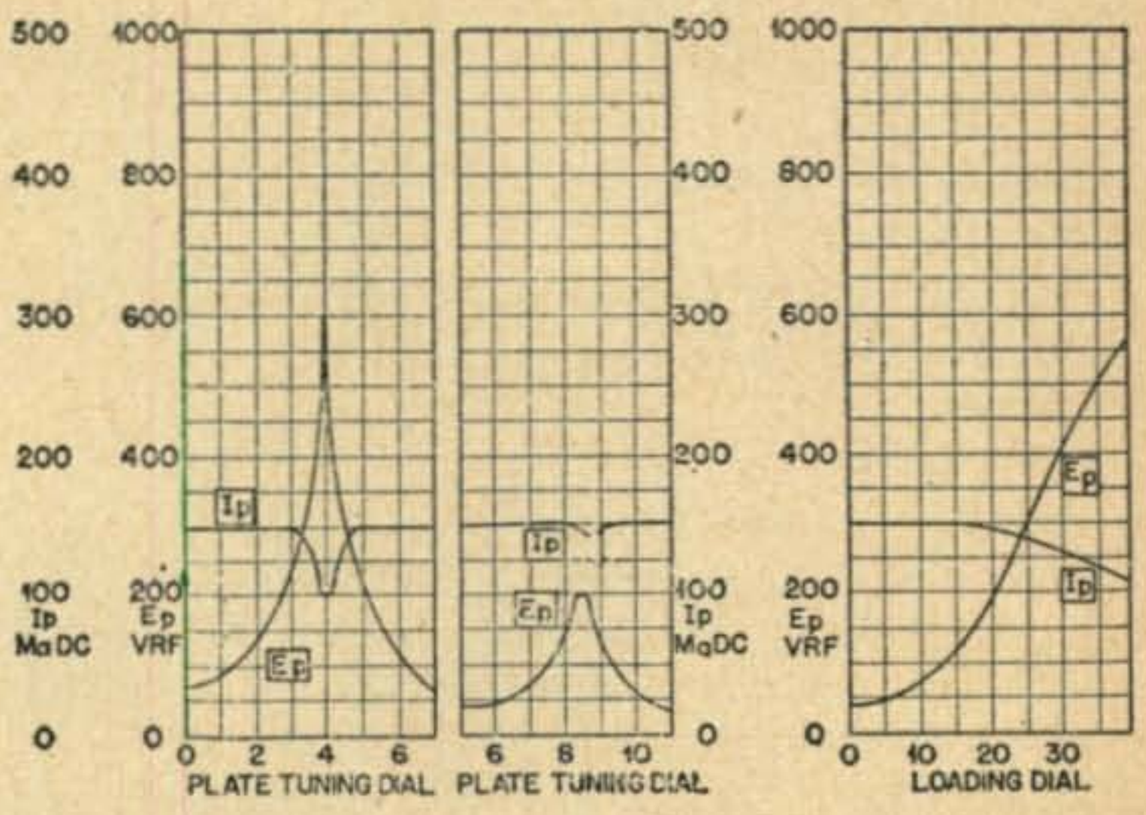


Fig. 3(a) (b)

Fig. 4

Fig. 4 is a plot of the plate current and the plate voltage as the loading on the plate tank is varied with the tank being maintained at resonance. As the loading dial numbers increase the loading on the tank is decreased. We may consider that under the reduced screen voltage condition a 250 volt peak plate swing indicates proper loading on this amplifier. A loading which gives 200 volts plate swing under these conditions will give excessive plate dissipation under full power operation while a loading which gives 300 volts plate swing under these conditions will result in excessive screen dissipation under full power operation. This 100 volts difference on the voltmeter results in the same needle movement as 50 ma difference in plate current, however the same change in loading which caused the 100 volts change in plate voltage caused only 5 ma change in plate current thus the plate voltage meter is 10 times as sensitive an indicator of operating conditions as is the plate current meter.

In addition to being almost essential for the determination of proper loading of final amplifiers the r-f plate voltage meter is also useful for the determination of linearity of linear amplifiers and the modulation capabilities of modulated amplifiers. To sum up, the radio frequency plate voltmeter is more than a convenience. Once you have become accustomed to using it you will wonder how you got along without it in the past. ■

The True Matcher

by GEORGE BONADIO, W2WLR
320 Winslow St., Watertown, N. Y.

What do you mean—"just can't work out on some bands!"?

Have you checked all your antennas with a True Matcher yet?

No!

No wonder!

Look!

The 1958 True Matcher is named for Mr. Virgil True who developed the original model for the military. It is a full-power-on, grouped, triple instrument to tell the operator when he has hit 52Ω, full output and resonance, all at once.

After more than 20 years of neon bulbs, carbon pencils, field strength meters, twin lamps, standing wave bridges, pi networks, low pass filters, and coax, I was driven to see just what does happen when the power is turned on. Now I know.

Without a True Matcher, proper tuning is a slow and cumbersome process at best. Not only that, but the best is seldom realized when a pi-tank feeds through coax, a low pass filter, more coax, a relay, more coax, a band switch, still more coax and a tuner to an antenna. Added to all this was a desire for a rapid band changes and rapid frequency shifting, and my problem was obvious.

I had to have an instrument to help me tune up fast. The True Matcher is it.

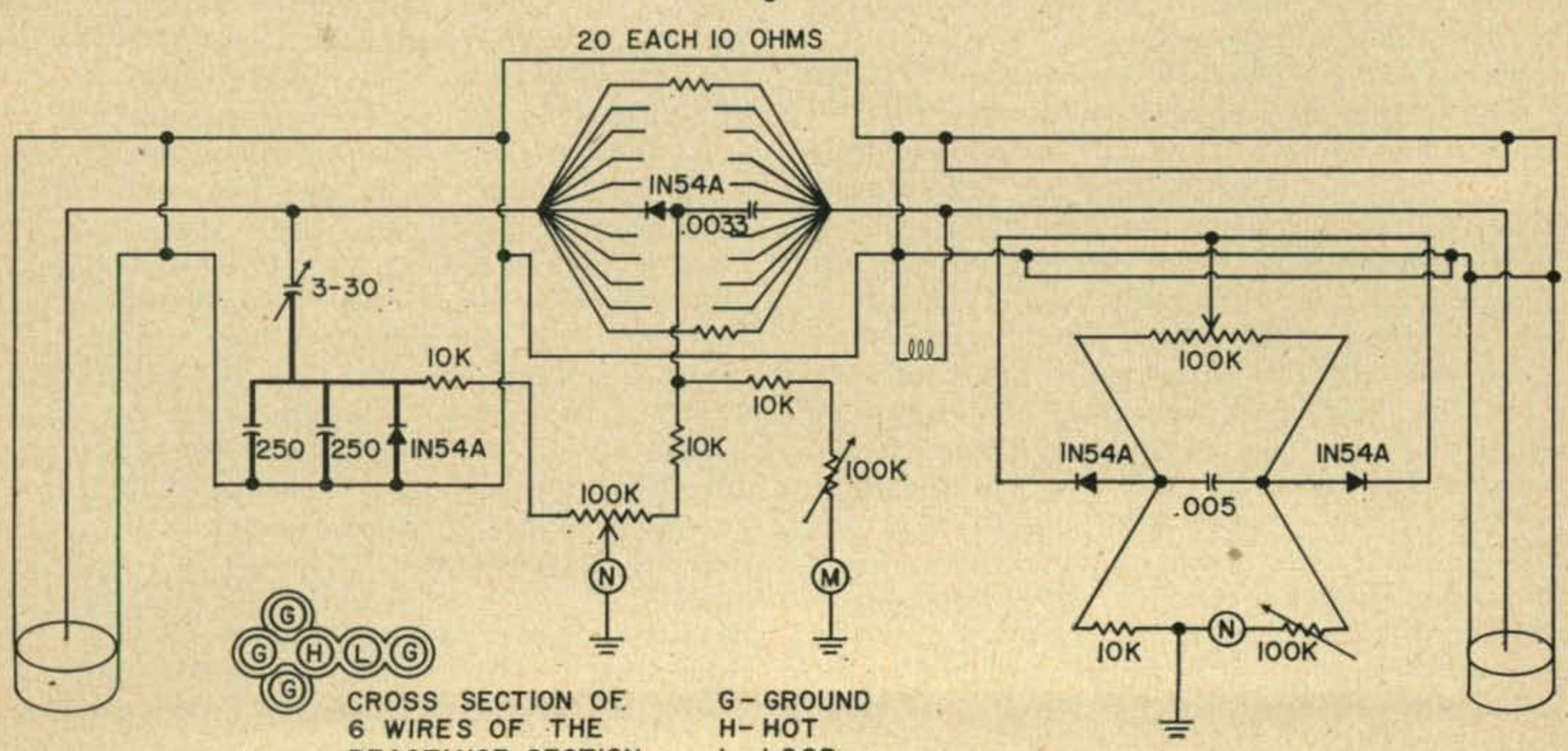
In experimenting I sunk over $75 into my model. However, using all new parts it may now be built for $25. Many of the parts may be found in the junk box. An advertiser in CQ has each of the 3 meters for $5.50, the burden of the cost.

The 3 circuits are: a null circuit to indicate centering at 52Ω, a second null circuit to indicate centering on resonance, and an intensity circuit to show that power is passing in spite of the other nulls.

The 52Ω circuit works a balance be- intensity developed from a current birdcage device as opposed to intensity developed from a voltage divider condenser assembly.

The resonant circuit works a balance between forward and backwards lead and lag of

Fig. 1



currents coupled out by equal but opposite loops.

The intensity unit shares power off the birdcage (or from its own condenser voltage divider, if desired.)

Precautions of construction must be observed or the device will be uselessly off balance at the higher frequencies. The present limit is manifest by the voltage dividing condensers. Mine have a self resonance at 110 mc. This limits the 52Ω circuit's full usefulness to about 10 meters and crude usefulness to 6 meters. Much time was spent in determining compromise limitations.

Condenser resonance is checked by soldering two together, in a series loop. The leads are soldered in a shape and length they will be used in. The loop is checked for resonance with a grid dip meter. The two in series resonate at the same frequency as each alone, or 3 in series. Then, two in parallel are used to give high capacity at low inductance. My condensers are small, .00025 mfd at 500 volts. The voltage is high enough for a modulated kilowatt. The lead lengths, before soldering were cut to ¼".

Rectifiers were resolved to 1N54A's for having high back resistances. In the voltage circuit the lead lengths were cut to ½". This required a wet rag over the crystal during soldering. Several rectifiers were changed greatly by heat before this was done. Resistance measurements demonstrated this cause of poor balancing.

The birdcage was constructed by laying out 20 resistors on the sticky side of tape, soldering in a cross wire to all of them, then rolling them up into a round cage. Pigtails clustered at each tip.

Bypassed, rf chokes, feed throughs, wire cloth and shielded wire were all used only to be found to be unrequired.

The reactance bridge was constructed of 4 wire TV rotator power lead. The two outside strands were ground continuity. One inside strand was made the hot lead. The other became the pickup loop. Two more ground continuity leads were taped around the mid-section to help maintain a low impedance look. These two leads also continued around the birdcage assembly. See fig 1.

The hot 52Ω lead must not get more than a diameter away from two surrounding ground continuity leads. This is because exposing the lead allows it to appear as a section of high impedance line, up to several hundreds of ohms. Such construction would defeat much of the purpose of the whole unit and make adjustment a severe problem on band changes. This is an important point as several articles on this style of instrument have illustrated great disregard for this factor. Such a unit, adjusted in one shack for one band might become a liability in emergency use on another band.

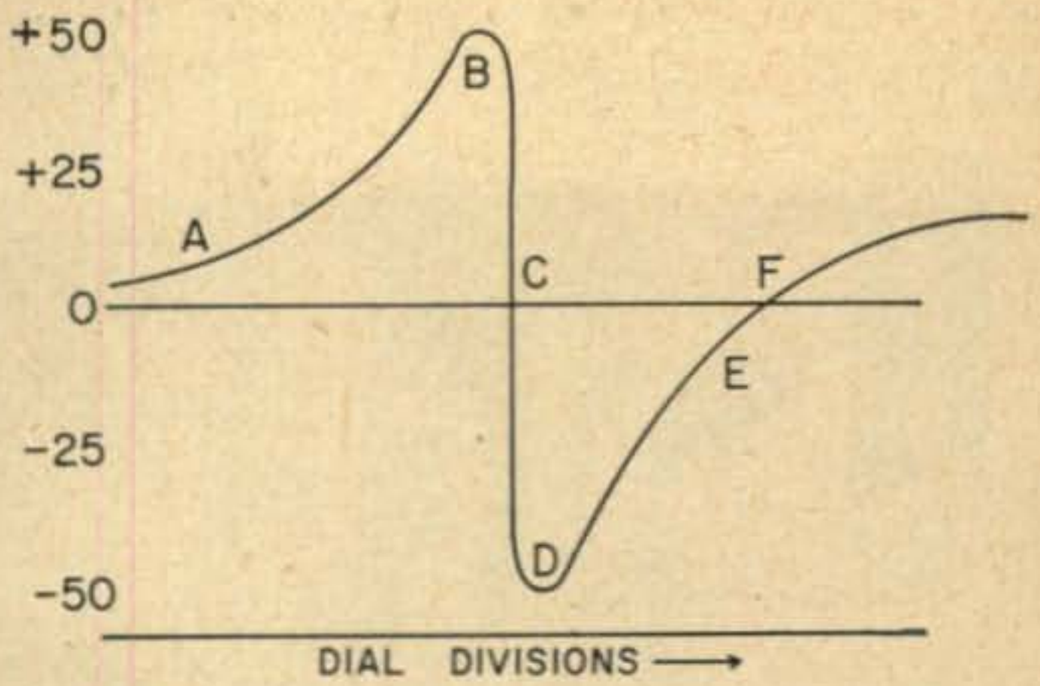


Fig. 2

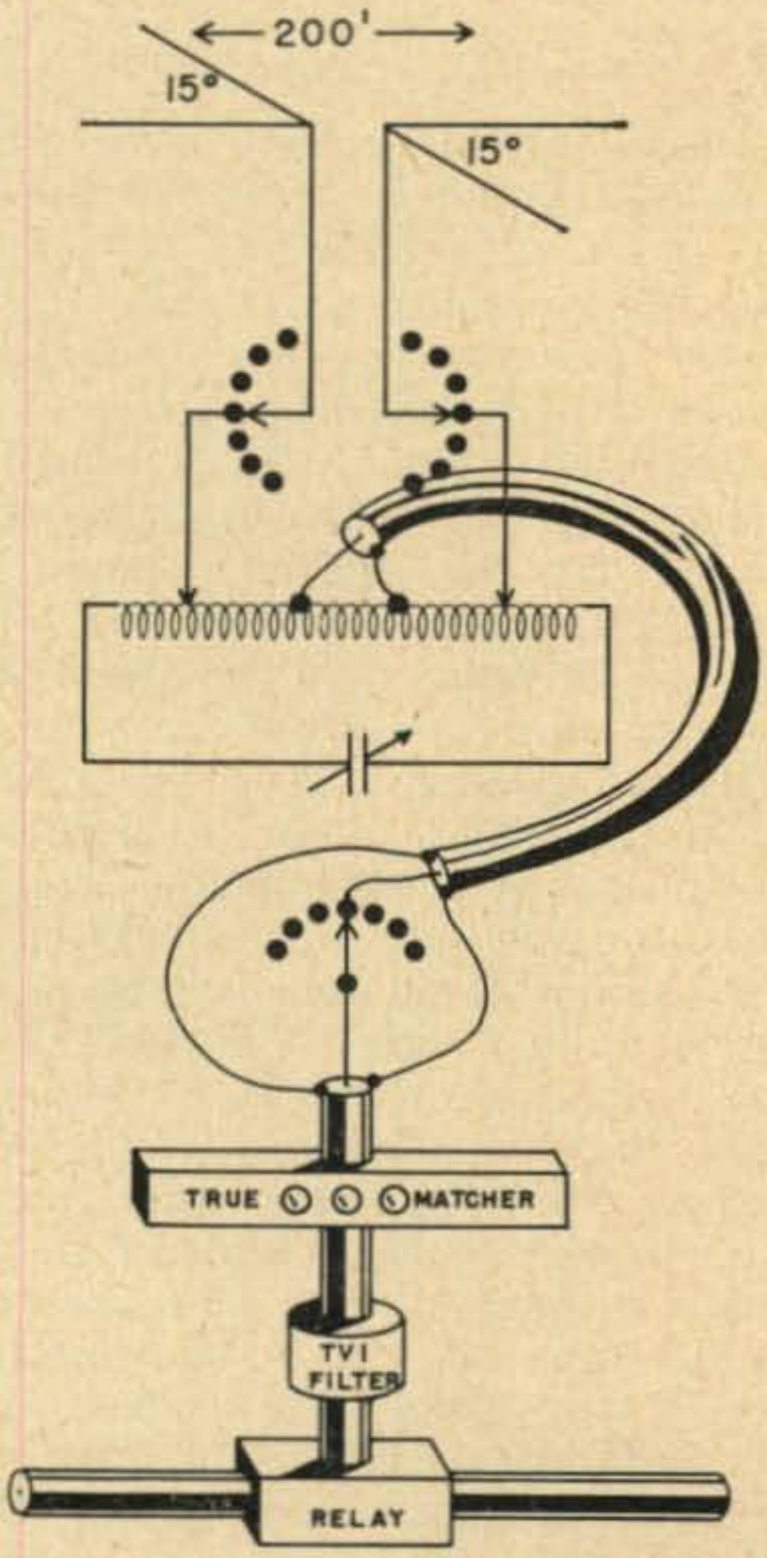


Fig. 3

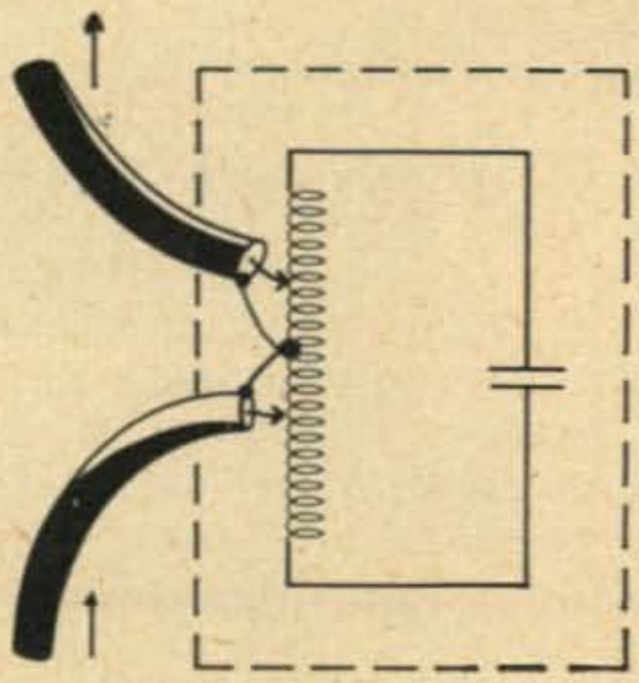


Fig. 4

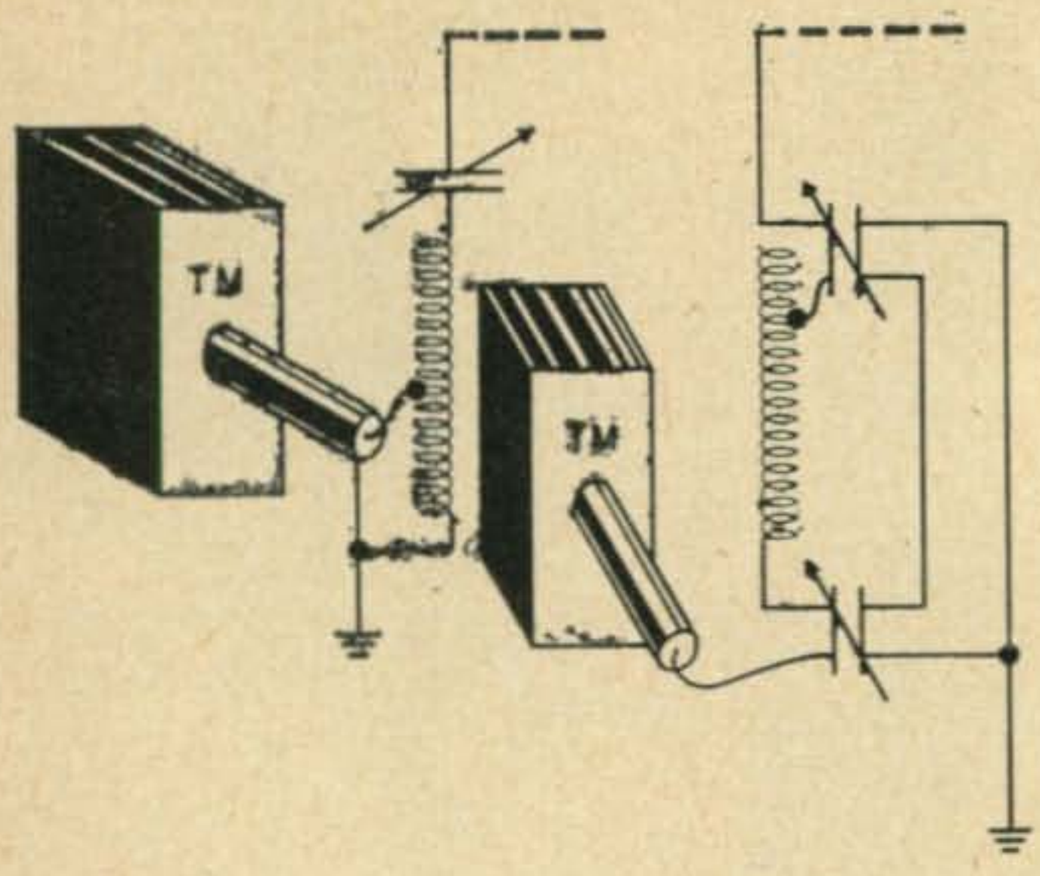


Fig. 5

The values of all components are satisfactory to our limits of power, yet allow a 10 watt set to be adjusted easily with only the sensitivity adjustments advanced. The sensitivity of the units may be controlled in step switch positions, if desired, after experimental measurements have established settings.

The sensitivity of deviation on the 52Ω balance and of the intensity should be the same from 160 through 10 meters. However, the reactance deviations will be about 16 times greater on 10 than on 160. I have not experimented with Z50 chokes in series with the reactance loops. They might hold down the gain in sensitivity at the higher frequencies to more reasonable values. The .005 condenser is a filter storage condenser and has no effect on the sensitivity. When I set my maximum reactance deviation on 160 to 10 dial divisions out of 50, then on 10 meters I go off scale. A rotary switch with band markings could control this easily, as the ratios are linear.

My pickup loop is just 12" long. Higher power, more than my 100 watts output, or the exclusion of the lower frequencies could reduce this length to as little as 1", but physical balance would be more critical. The reactance unit may be built separately for wavelengths as short as ¾ meter without great precautions. If the voltage sensing unit condensers are reduced in capacity by 25:1 and lead lengths are kept smaller than ¼", then the 52Ω unit may be used on 2 meters and 6, but not much further.

The quality of the material insulating the small condenser should be the best and the amount the least. On 2 it should not even exist.

The birdcage resistors must not have the first color band of double width, as this designates wire wound. Many manufacturers' low values of resistors are made in only wire wound style, so this may produce a search. Be sure to specify carbon resistors and check that their first color band width is equal to and not double the other color bands.

The rfc is to guarantee a dc return path for the meters.

The most practical meter placement is a close spacing from left to right of the impedance, intensity and reactance meters. Wide spacing is not recommended in spite of decorum.

To prove out the instrument obtain a commercial dummy load resistance of 52Ω (or 72Ω if you prefer) and connect to either end of the instrument by the shortest possible means using coax. In the absence of a commercial dummy load, two 60 watt 120 volt lamps tied in parallel with close to 25 watts input will appear to be non-reactive and 52Ω on 80 meters. The orange glow of the filaments will seem to be about half of the diameter of the lamps at this power. At higher powers the reactance stays at the null but the resistance goes way up to over 100Ω at normal powers of the lamps. Set the balance rheostats in the exact mid-ranges. Disconnect the rheostat arm from the voltage side. Apply low power at the lowest frequency. Increase power to 25 watts, impedance null meter should read a significantly high number on the scale. Record this reading. Reconnect that arm. Open the opposite arm. Adjust the small condenser to give an equal reading, but at opposite scale. Reconnect the arm.

With lamps, apply a resonant 25 watts incantly high number on the scale. Record this reading. Reconnect that arm. Open the opposite arm. Adjust the small condenser to give an equal reading, but at opposite scale. Reconnect the arm.

With lamps, apply a resonant 25 watts input, or with a commercial dummy load, apply full power. Adjust the nulls. With full power adjust the intensity to ½ scale when using a 52Ω load.

Switch to higher bands. Apply power. Notice that the impedance holds quite close to null. The dummy load isn't perfect. The reactance meter may be so sensitive now that the small reactances of the unit lines and the dummy load, with its connections and mismatch reflections shows severely. DON'T rezero the balances! Control the sensitivity by the variable resistor, if need be. Cut power, encase. Rebalance on the lowest frequency.

Connect the antenna and tuner. Prepare for a shock. Many antenna tuners operate under such poor "Q" as to not allow tuning through resonance against the antenna reactances. In other words, line ABCDEF from fig 2 would all appear on one side of the scale from zero, all plus or all minus. Avoid point F for operation. It is a falsie. Point C is perfect. Actually most of the range between B and D is usable, but this is a very small range on the tuning condenser.

The common practice antenna tuning procedure which results in the final plate current falling when the antenna is tuned *either* way

is found at B or D. This is not optimum. Tuning the antenna either way from point C will make great excursions in plate current, in opposite directions. Some bands will not have a falsie point F. Others, due to mismatched lines, may have two. Point C is recognized easily by the sudden excursion of the needle from B region to D region as the tuning knob is slowly rotated. The crossover is much slower at F. No one should become confused.

The receiver is particularly hot with this system. If one is in doubt between points C & F, he need only check with the receiver. C will steal the show.

The readings on the impedance meter varies greatly as the reactances are tuned. The reactances should be tuned out first. When reactance is zero, then the impedance may be accurately read. If this is too high or too low, the tuner load control should be adjusted, the reactance retuned to zero and the impedance read again. When the impedance is zeroed, indicating 52Ω, then the intensity will give true readings. Only then may the final be adjusted to give its maximum output. If it is then switched into a dummy load, the final setting will likewise be found optimum.

A pi-network designed for 52Ω output will give maximum output only into such a load. If the pi-tank must reduce reactances, it operates at a reduced efficiency not delivering all the possible power to the radiation resistance.

I have used my True Matcher for over a year with great satisfaction from 160 to 10. I used the same antenna I had used for 3 previous years with a two year old tuner. The tuner was a help over plain balun coils. The True Matcher has been at least as much advantage again, this time on all frequencies.

In practice, on 75 meters, a shift in frequency of only 10 kc will suggest a trimming up of the tuning of the antenna. The heating of the antenna tank through a long transmission or the swaying of the antenna in the wind will show up in reactance. Rain or snow on open wire or plastic feeders will indicate on the impedance swing as well as reactance. Because of its low s.w.r., my RG-58U carries my 100 watts output easily with no warming detectable by hand. In developing antenna tuners, improper constants can be avoided on first trial, rather than after 20 calls.

My antenna consists of a center fed fan for 160 through 10 meters, 150′ open wire feeders, with 6 tuned circuits, a balun, lightning grounds and a dummy load on a rotary switch. I get out satisfactorily on every band. See fig 3.

The link coupled antenna system shows shortcomings when observed by a True Matcher. When the link is less than about 2/3 coupled in, it appears that the coupling is so loose that the reactances of the link are not able to be taken care of by the tuned circuit. Thus a link circuit should be roughly series resonant in the band used, if the link is to be varied in coupling. The series condenser must be capable of handling large amounts of current. This generally means using an air spaced condenser. However, a tightly coupled fixed link may be used if another means is available for varying the load impedance to the coax. Such a system is found in the Matchbox fed by a pi-tank. The Matchbox does not include the 160 meter band, and it may need some tap changes to switch from 80 to 10, but it is otherwise very satisfactory.

Trap antennas in doublet or vertical ground plane versions show up crazy like. Because of mismatches, the coax length is related to the resonant positions found. Merely grabbing by hand the outside of the coax will change resonant frequencies significantly. Adding a 5′ coax extension moves resonances widely.

The circuit of fig 4 is useful in a number of these cases. It is inserted in the path of any coax which does not have any other associated tuner. The taps, away from center, are approximately equally spaced, unless an impedance change is desired. This tank needs to be as husky as the final tank. If TVL harmonics are to be suppressed, this unit will help, up to 40 db, when a metal box encloses the tuned circuit. Both sides of the condenser are hot.

Best of all, this circuit allows hard-to-couple trap antennas to take their normal loads over extended frequencies, by allowing the transmitter to look into a non-reactive load. Hence the name, Unity Coupler. The True Matcher is a great help here. It simplifies the adjustments remarkably. If one of the coax taps, or both, are clips, a quick setting can be found in the middle of the band for the impedance null. These need not be touched again. The condenser is adjusted for resonance throughout the band. A turret switch, with 4 bays will facilitate band changes here.

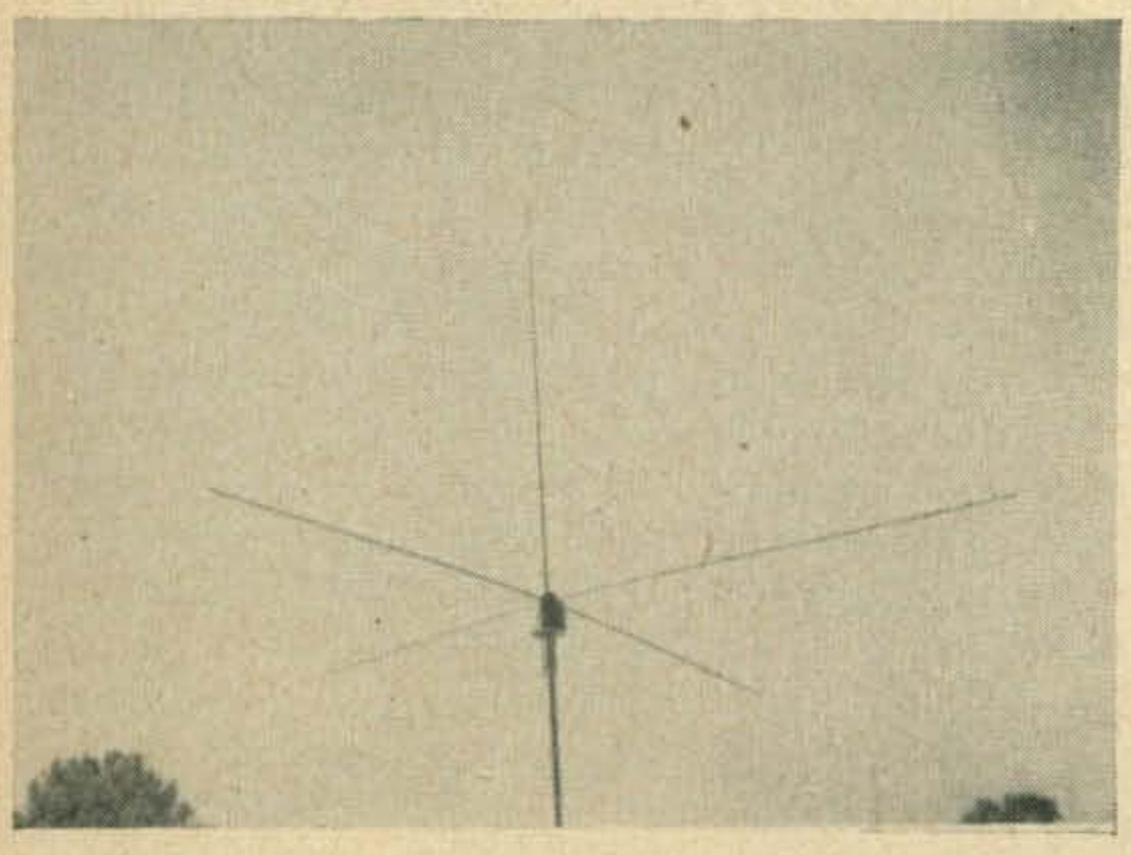
Th coax to coax Unity Coupler of fig 4 should be useful on a beam antenna coax. I would be very interested to hear from any reader who uses a True Matcher and a Unity Coupler on a multi-band beam.

Fig 5 illustrates other antenna systems we have used with good results, the first time, via the True Matcher. It is mighty handy to know immediately that one has or has not conquered the antenna problem at hand. The True Matcher does just that. It should be ideal in cases of emergency work and field day or portable operations.

Results have been such that I have a standing wave bridge for sale, and I no longer monopolize the club's antenna impedance bridge. Four blocks away K2JDD built A True Matcher and claims more for his sucesses than I do for mine. Two blocks away K2YNK has just finished his. Be careful, a single True Matcher in the neighborhood may be very contagious. ■

surplus 6 meter ground plane vertical

by ROBERT K. WALLACE, K8BYQ,
Rte 1, box 7, Belbrook, Ohio
and WILLIAM B. RANDOLPH, W8VFT,
Rte 5, Xenia, Ohio



Since the advent of the six-meter mobile the problem of a fixed station using the usual horizontal beam trying to work a mobile station using a whip antenna has been greatly increased. While this problem has been whipped by some hardy souls who have installed the halo type of antenna, there nevertheless remain many hams who can't persuade the XYL to let them attach any type of mobile antenna to the car, much less the halo.

Then of course the only alternative is to use the existing broadcast antenna. The broadcast antenna is usually of sufficient length to perform satisfactorily at 50 mc and the authors have used it to a great degree of success.

With the old problem of having great difficulty working vertically polarized mobiles with a horizontal beam in mind, we set about the task of adding to our antenna arrays a vertical ground plane.

The first and foremost consideration in building this antenna, and probably first and foremost in the minds of most hams, was low cost. In order to meet this specification this unit uses almost entirely surplus materials.

The antenna base is a surplus antenna base can labeled (AS-89) and contains the necessary 52 ohm coax for an impedance matching stub. The can also has a female coax connector mounted in the bottom and this connector is recessed to make the connection semi-waterproof. The actual radiating element or spike is also surplus and a companion unit to the (AS-89) antenna can. The ground plane forming radials are ⅜" aluminum rod 56" long.

The spike as purchased is too long and must be cut to the required 53.57" length. Since the spike is made of extremely hard material the best procedure to follow for cutting is to grind or file a notch around the circumference and break off the unwanted part.

The RG8/U, 52 Ohm coaxial feed line is still available on the surplus market so even the feedline falls into the low cost category.

The dimensions were derived from calculations using formulas in the *ARRL Antenna Book* and the *Radio Amateurs Handbook* and were based on a frequency of 50.5 megacycles.

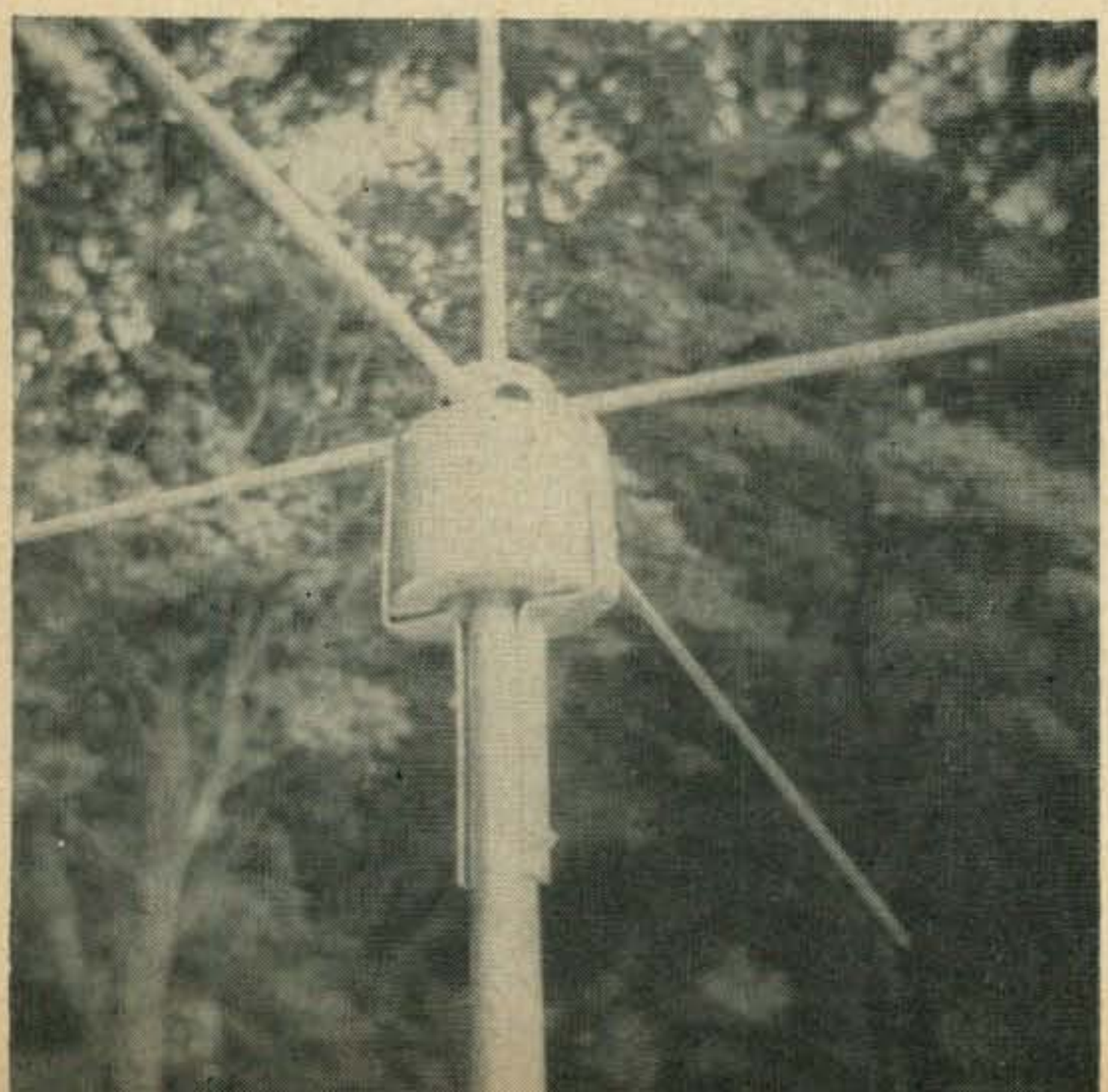
The impedance matching stub is merely a piece of RG8/U cut to a length of 23.2" with one end shorted. The opposite end has the center conductor connected to the vertical radiating element and the shield connected to the ground plan. All of the dimensions given thus far have been for 52 ohm coax, however, should the builder desire to use 72 ohm coaxial feed the following dimensions should be used. The length of the spike should be 50.3" and the matching stub should be a piece of 72 ohm coax, 16.8" long and connected exactly the same as for the 52 ohm stub. Since the length of the ground plane forming radials is not critical the 56" length remains the same as for the 52 ohm model.

The authors have constructed both the 52 ohm model and the 72 and found them to perform equally well. As a matter of fact the 52 ohm model is in use at K8BYQ and the 72 ohm antenna is in use at W8VFT.

The construction of this antenna is rather simple compared to other types of antennae. The radials are threaded ⅜"-16 at 90 degree intervals around the top of the antenna base can. (See photographs.) Eight ⅜"-16 hex nuts are needed to lock the radials securely in place.

[*Continued on page* 117]

. . . and here it is close up.



WHAT HAS HAPPENED TO THE RF AMMETER?

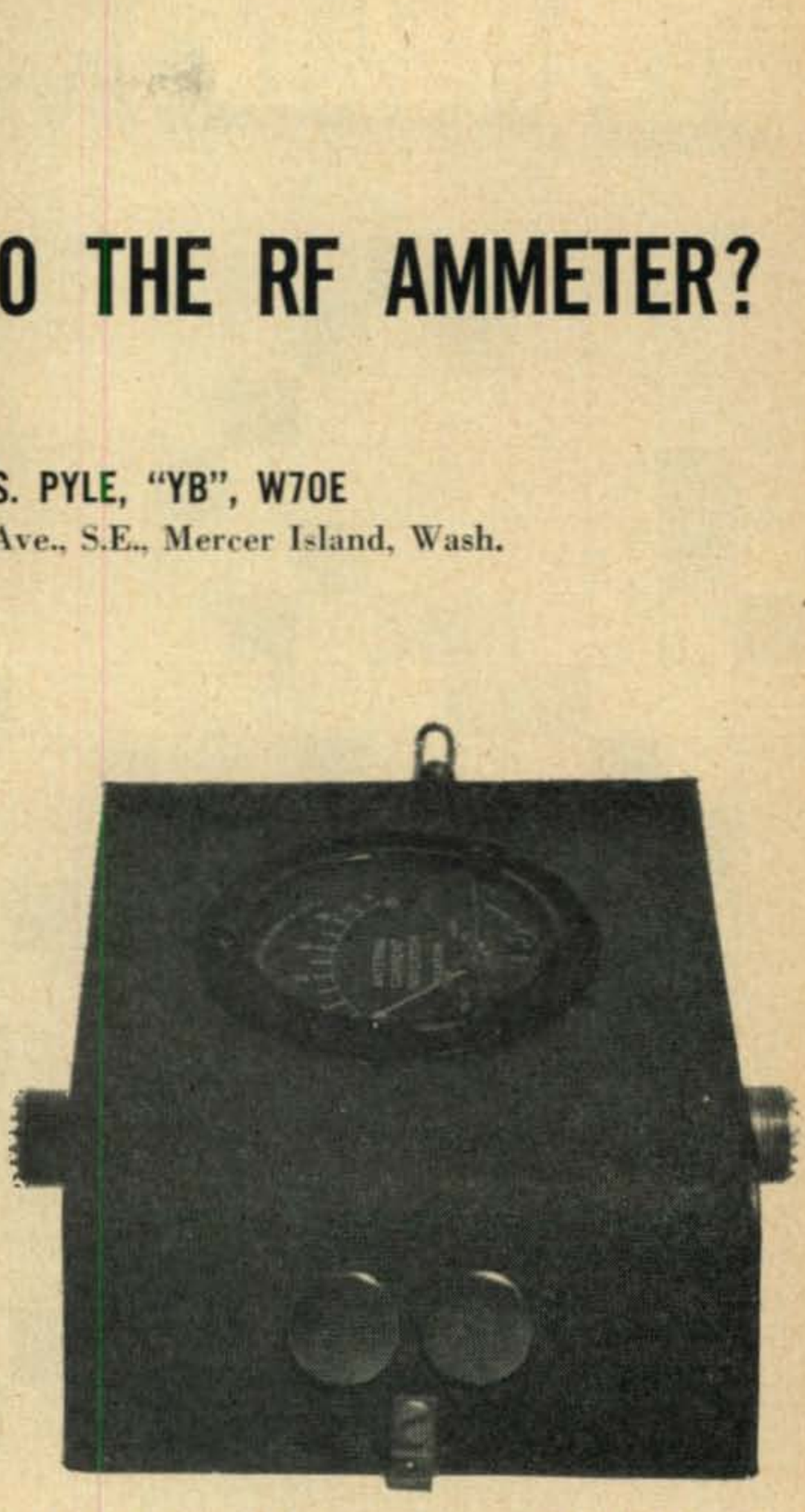
by HOWARD S. PYLE, "YB", W7OE
3434 74th Ave., S.E., Mercer Island, Wash.

That's a good question! Back in the dim, dark ages of amateur 'spark' stations, and early 200 meter CW, the Radio Frequency Ammeter was a 'must' in any ham station. Starting many years back with what was commonly known as a 'hot wire ammeter' which shimmied and shivered it's way toward a peak every time the key was pressed, we progressed to the 'thermo-coupled ammeter' . . . a vast improvement. The needle was highly damped, the readings quick and clear and it told a story. Sure, a transmitter will *work* just as efficiently and effectively *without* an antenna current indicator, and rf ammeters cannot be purchased with peanuts! This probably explains it's fall to oblivion throughout the years.

I've gone back to one . . . I don't know why I ever did without it! Sure, in these days of co-ax lines, SWR, antenna tuning units and other gadgets inserted in the antenna feed line, small wonder we have hesitated to add an item which does nothing to increase the efficiency and effectiveness of the radiated signal.

Just like always, the good old rf ammeter isn't worth a thin dime if you expect it to tell you how much actual current is being *radiated* by the antenna. Likewise, it won't tell you how much actual current you are putting IN to the antenna (or the line). But . . . it *will* tell you in terms of amperes, when you are taking the most *out* of the *transmitter* output circuit! And, you'll be surprised frequently, to discover that not always does the greatest output from the transmitter appear at the exact 'dip point' of the final plate meter! It may vary a few degrees on the tuning dial . . . may actually read a bit *less* plate current for a bit *higher* output current!

Another most convenient advantage I've found; transmitter comparison. Like all hams, one transmitter just doesn't sit in place on my operating console, year after year. I get a 'building spree' now and then; maybe some Novice drags in a home-brew deal or for some other reason I want to put another transmitter on the air. Knowing my rf output reading on



Surplus type 0-10 RF ammeter, as installed and used at W7OE.

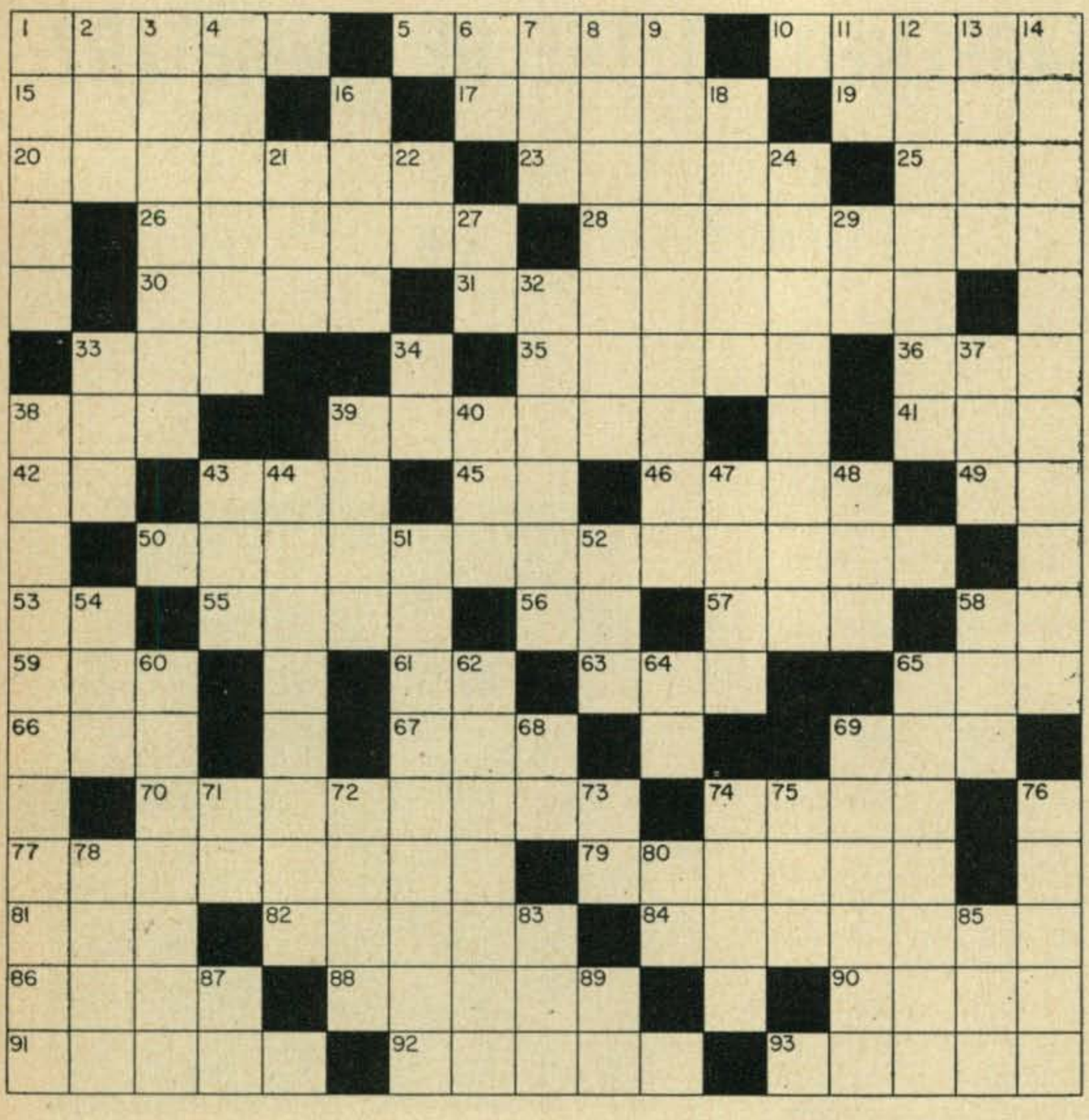
the rf ammeter, I only have to compare the reading of the 'test' transmitter with that of my old stand-by, (assuming the same plate input or making 'allowances') to know which is most effectively delivering rf output! I've proven this time and again, and you would be surprised, like I've been, to find that some of these somewhat 'tinny' and questionable little jobs, sometimes show an *in*creased rf output over a high-quality, standard factory built job of the same power input!

RF ammeters still *do* cost many sheckels if you buy them new from standard stocks. You don't need to do that. Shop around in your favorite surplus store; very likely you'll come up with a pretty neat little rf ammeter, complete with thermo-couple (be *sure* you get the thermo-couple!) I bought a 2" job, with a ten ampere reading (max), mounted in an aluminum case, with a little antenna relay, a couple of stand-offs and some odds and ends . . . one

[*Continued on page 118*]

PUZZLER

by FREDERICK L. ESSEX, K1ABI
Loren Lane, Westport, Conn.



HORIZONTAL

1. Voltage times current
5. Used to modulate rig
10. Units of e.m.f.
15. Animal in ZS land
17. Hours some daytime nets meet
19. F3 playboy
20. Set to go
23. Bares
25. Massachusetts cape
26. CD tests
28. Tube types
30. Leer at
31. Identical
33. Section in W2 district
35. Put off
36. Danger to wooden masts
38. Observe
39. Will occur to license not renewed
41. Regrets in CW
42. "Easy Dog" handle
43. Hat for a GM
45. "And" ala a F8
46. Inductor
49. Some have a 21 Mc. i.f.
50. Of little interest
53. Word of inquiry
55. Name in DL country
56. AW1 state
57. Guatemalans
58. A CW double dash
59. Corn residue
61. Intermediate frequency
63. Needed for Field Day generator
65. Put
66. Golfer's mound
67. Position for contest weekend
69. Hole
70. Negative-resistance oscillator
74. Ardor
77. Type of condenser
79. Rich man's antenna farm
81. Half of Philippine city Iloilo
82. Looks
84. First step when new receiver arrives
86. Rig maker's necessity
88. Early rulers of UA's
90. Vocal
91. 4W1 country
92. Fry
93. Too (pl.)

VERTICAL

1. Tube element
2. Lubricate
3. First word in the text (2 wds.)
4. Power
6. Operating
7. Electron
8. Device between rig and transmission lines
9. Caused by supporting antenna insulators (2 wds.)
11. Either
12. Antenna couplers
13. Dip the final
14. Indication of good receiver design
16. Not operating
18. Meaning
21. Suffer
22. Licensed female operators
24. Type voltage required for gaseous tubes
27. Sweepstakes
29. Licensed male operator
32. W2NSD de CQ
33. Marry
34. Chopping tool
37. Worthless bit
38. Receiver requirement
39. Transmit
40. Vigor
43. In addition
44. Rotary beams
47. Grains
48. Tank circuits
51. Without dampness
52. Transmitter
54. Garden tool
58. Flying mammal
60. Where many apartment dwellers keep rig
62. Civic servant
64. Like
65. Amplifiers for SSB
68. Until
69. Scout
71. Iraq call
72. Help
73. Area of first call district
74. Oven
75. Varnish ingredient
76. Recording tape holders
78. Fragrant wood
80. Egyptian call sign
83. Theater sign
85. Chinese road
87. Football position (abbr.)
89. Therefore

Answer on page 119

SPACED VERTICAL PAIR

by R. J. ANDERSON, W8BIE, Col., USAR
17 Lexington Ct., Midland, Mich.

An antenna covering the amateur bands from 3.5 to 28 mc with low cost, low maintenance, moderate space requirement, low SWR at any frequency in the ham bands, interesting directivity patterns.

Today's antennas were developed before the end of the 1930's. Post-war efforts have resulted in feed systems to give multi-band properties and low SWR. Some of the single-band types, while effective, were hard to feed and have not been revived.

An example of the above is: two vertical half-waves, spaced one-half wave (see Fig. 1). It was fed with a 600 ohm line with a quarter-wave stub. Connection at B resulted in in-phase operation with a bi-directional pattern broadside to the array (Fig. 2). Gain over a vertical half-wave is 4 db. Connection at "A" gave out-of phase operation and a bi-directional pattern in line of the two radiators (see Fig. 3). While gain was only 2 db (Fig. 4) it was supposed to give a lower vertical angle.

Such an array should be good for 7 and 3.5 mc but physical dimensions rule it out (66 ft. high for 7 mc).

Let's see if we can't get similar results with smaller physical size. Let's see if we can get a vertical with the radiating (high current) portion at the top instead of at the bottom, as in the case of a vertical ground plane.

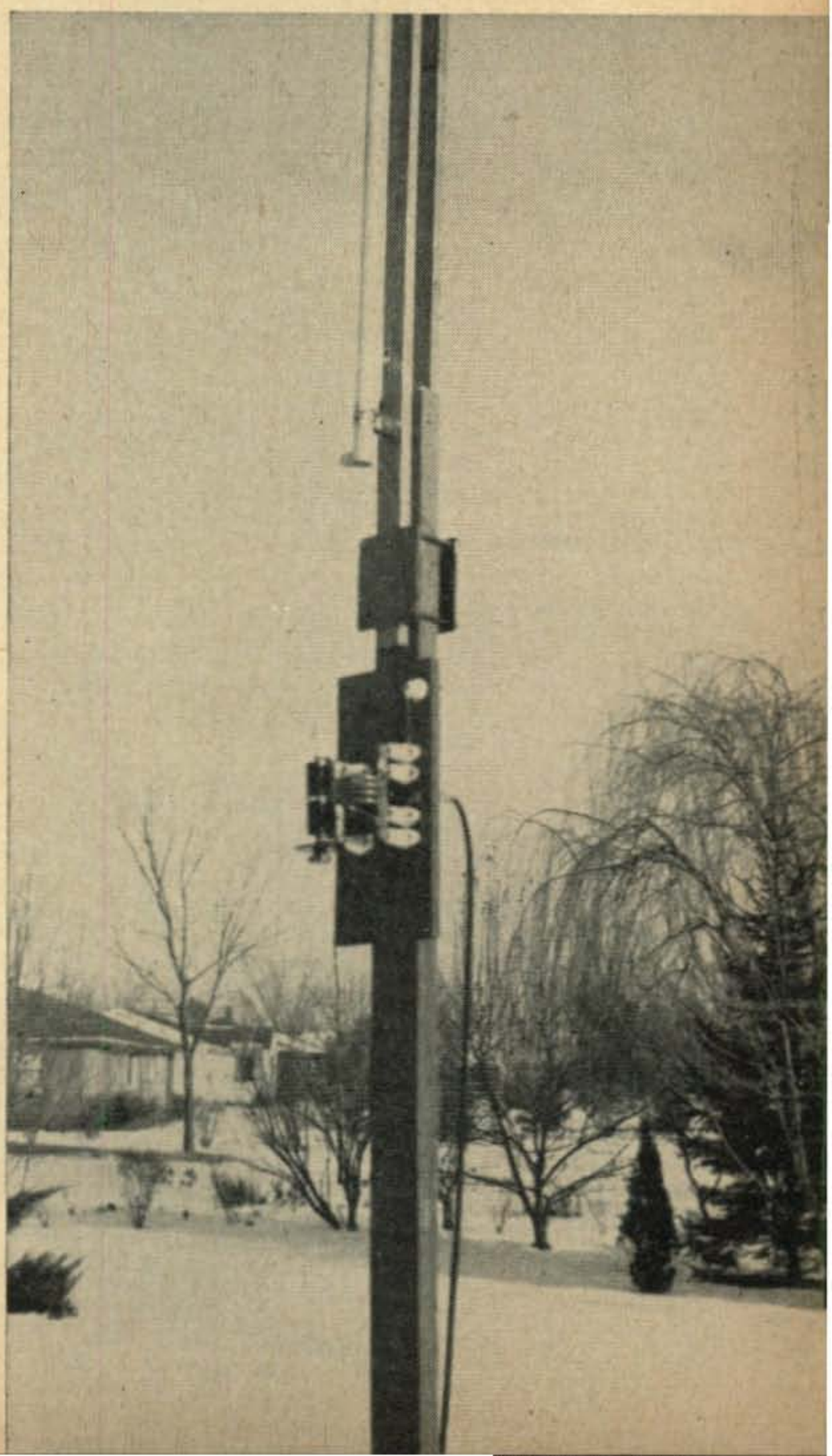
Consider the vertical lazy-H configuration (Fig. 5) with gain of 6 db. As reported by Hawkins (1) when the outside quarter-waves were bent in (Fig. 6) it was found that a loss of 0.2 db was all that was incurred by cutting the overall height of the array in half. This is still too high for the frequency range considered. By eliminating the bottom half, the height is again halved with the loss of co-linear gain of 1.8 db, leaving the basic element (Fig. 7). Note that it is a full-wave around.

Since there is no radiation from the hozizontal phasing portion (I found none on 420 mc model tests) it is essentially two vertical half-waves, in phase, spaced one-half wave. The gain should be 4 db.

The radiating portions are at the top of the array and the radiation is all low-angle (vertically polarized). For multi-band operation it must be fed at the base of one of the verticals.

An array proposed by W. Smith (2) contains two of these elements in line (rather long for the average location, but effective). Smith emphasized that the high current portions were at the top of the structure.

A quad has a full-wave reflector. It was interesting to see if this antenna would give a similar gain with a full-wave reflector. With a reflector, this antenna could also be considered a quad that has been 'opened up'.



(1) J.N.A. Hawkins, RADIO, p. 33, Dec. 1936
(2) W. Smith, CQ, p. 21, March 1948

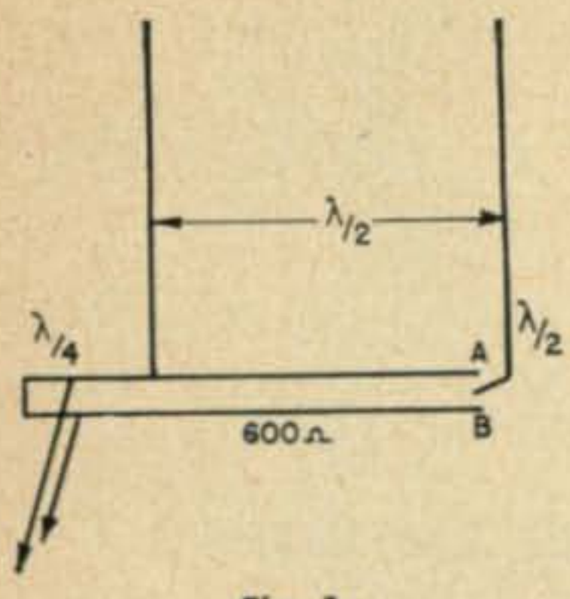


Fig. 1

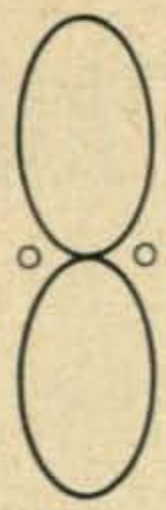


Fig. 2 — Horizontal pattern for in phase verticals spaced 0.5λ.

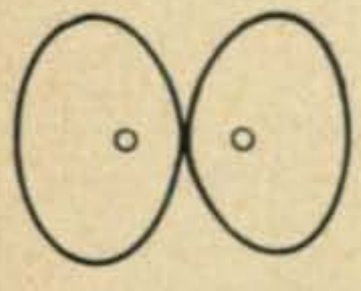
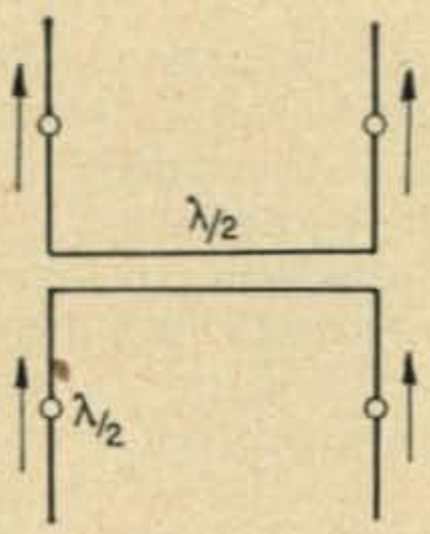


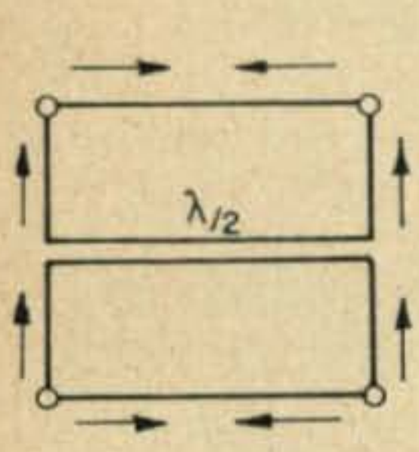
Fig. 3 — Horizontal pattern for out of phase verticals spaced 0.5λ.



VERTICAL LAZY-H

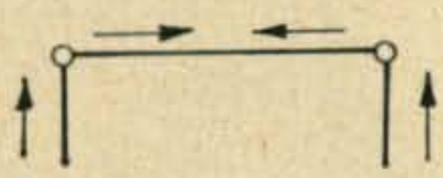
○HIGH CURRENT PORTIONS

Fig. 5



○HIGH CURRENT PORTIONS

Fig. 6



○HIGH CURRENT PORTIONS

Fig. 7

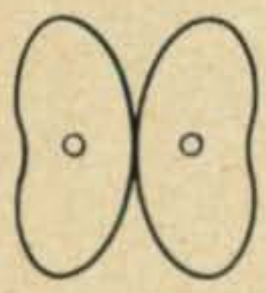


Fig. 8 — Horizontal pattern for out of phase verticals spaced 0.75λ.

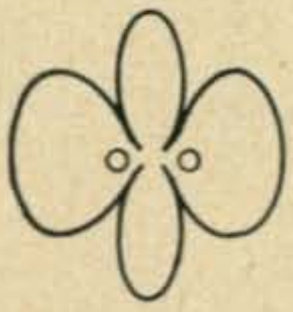
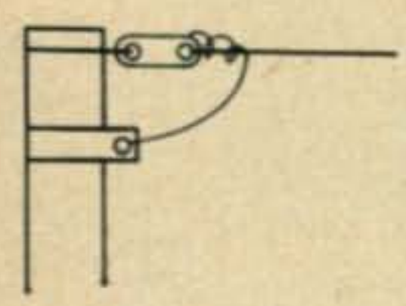


Fig. 9 — Horizontal pattern for in phase verticals spaced 1.0λ.



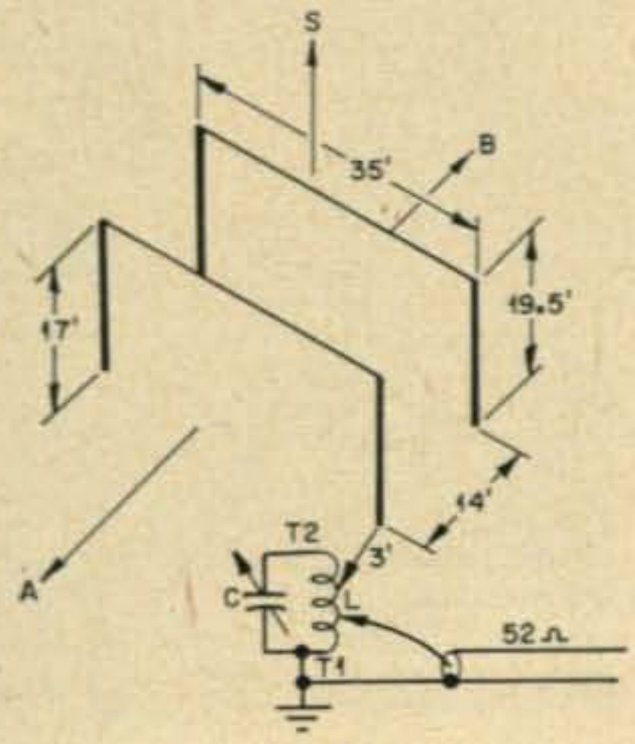


Fig. 11

420 mc model tests (3) indicated:

	db
Power gain of basic element over a vertical half-wave:	4
With duplicate reflector at 0.2 wave spacing: (spacing for maximum gain on models)	6

Multi-band Features: Let's take a basic element (without reflector) built for resonant frequency of 14050 kc (17′ vertical aluminum tubing joined at the top by 35′ of No. 14 copper wire). On 14 mc the pattern is Fig. 2.

21 mc: here we have approximately two vertical half-waves separated 0.75 wave and fed out of phase. Pattern will resemble Fig. 8.

28 mc: two vertical half-waves, spaced one wave, in phase. Polarization is both vertical and horizontal. Theoretical pattern for the spaced verticals is Fig. 9.

7 mc: while this is a half-wave around, resonant frequency of antenna alone is 5865 kc and radiation is predominantly vertically polarlized.

3.5 mc: approximately a quarter-wave around and feed point is at a high-current position.

For you fellows using long wires, Windoms, Zepps, folded dipoles and long wire traps here are some advantages of the driven element alone:

1. A multi-band antenna with a tuned circuit for each band (going outside to change coils keeps you from becoming deskbound).

2. Less space required than for long wire types. Easier to erect and keep up in storms than beams.

3. The radiating portion is at the maximum height.

4. Low SWR's are possible on each band with coax feed.

Construction of a 14 mc array with reflector (Fig. 11): Verticals are telescoped 1.125″ and 1″ o.d. aluminum tubing mounted on stand-off insulators equipped with 1⅝″ long wood screws. Fasten tubing to the insulators with two separate pieces of No. 12 copper wire (in case one breaks). No. 14 copper wire connects the

(3) E. P. Tilton, QST, p. 13, Nov. 1947

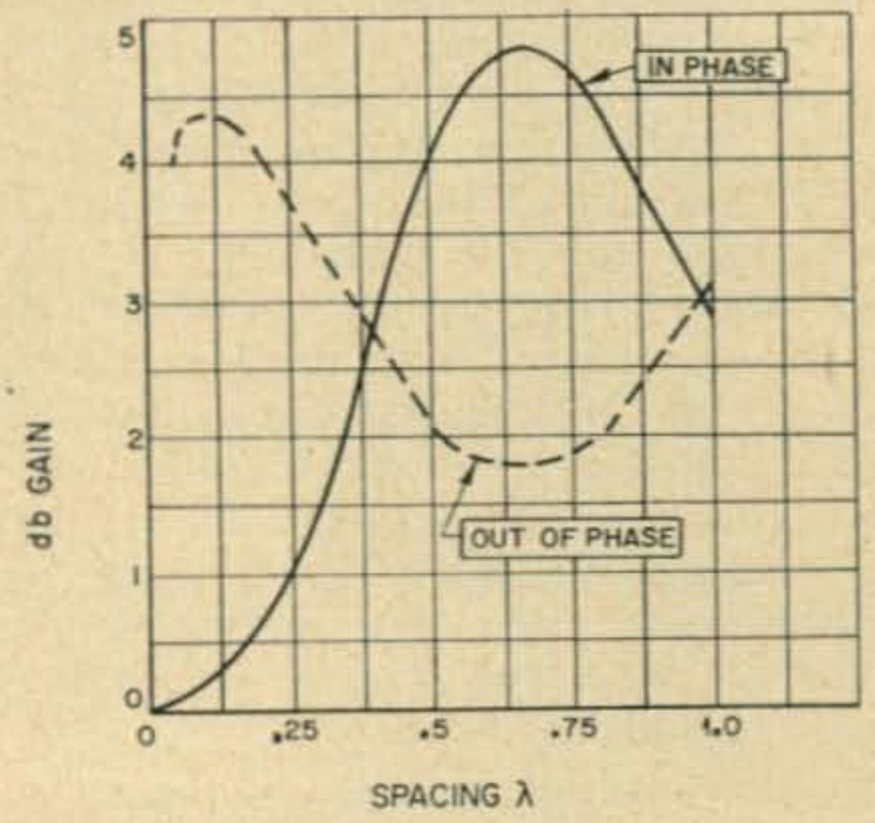


Fig. 4 — Gain curve for two spaced half-wave radiators.

tops of the verticals. Use a small insulator (see Fig. 10) to relieve the loading, due to winds, on the copper-aluminum connection. Otherwise the joint will snap in about a month.

A 3′ tail of No. 12 copper wire connects the tubing base to the tuned circuit (an attempt to get away from the critical reactance flip-flop condition at the base of an exact half-wave). I have used up to 10′ of wire here, but the tank constants in this case are somewhat different than given in the table. Tubing base is 9.5′ above ground. Note: 'best' height above actual ground for a vertical half-wave remains an unknown to me.

For uprights, I used 12′ 2x4's. If placed 2′ in the ground no guy wires are necessary. Use a 4″ dia. rotary post-hole digger.

Spray all connections with *Krylon* antenna spray coating. Check continuity about four times a year by connecting a temporary jumper and an ohm-meter at the base of the verticals. You might try the new *Sal-Met* flux for soldering aluminum-aluminum and aluminum-copper joints.

Verticals can also be made up of MS52 or 53 mast sections. To maintain continuity apply a stick of *Door-Ease* to the threaded ends before assembly.

Spaced Vertical Pair

Antenna tank constants, using reflector and dimensions of Fig. 11:

Band	Turns	Diam.	L over —inches	wire size	Cmmfd	T1	T2	Res. fq. of ant. tank alone △ mc
3.5	34	2½	4⅜	14	63	6	23	3.21
7	14	2½	3¾	12	21	3	0	11.6
14	12	2½	4	12	24	2	2	14.0
21	6	2¾	2⅝	14	23	1	2	19.9
28	4	2½	2	¼″ o.d. Cu tubing	32	1	0	−25.2 ¼″ o.d. Cu

△ Antenna, ground and coax disconnected.
L, Fixed link removed from old B & W TL series. Modern T series with added banana plugs should be satisfactory.
C Hammarlund, double spaced, handles unmodulated output of a Viking II.

Tuning

An SWR indicator is necessary. Approximate capacitor setting can be found quickly with a

[*Continued on page 112*]

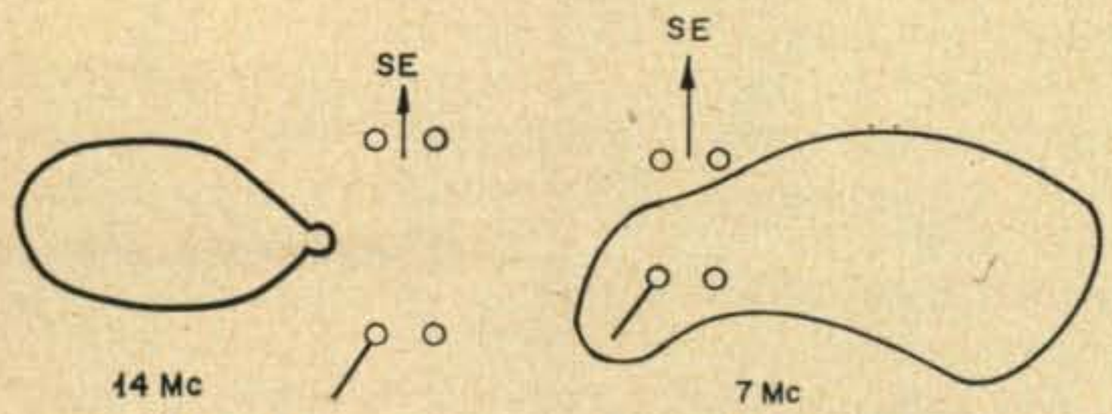


Fig. 14 Fig. 15

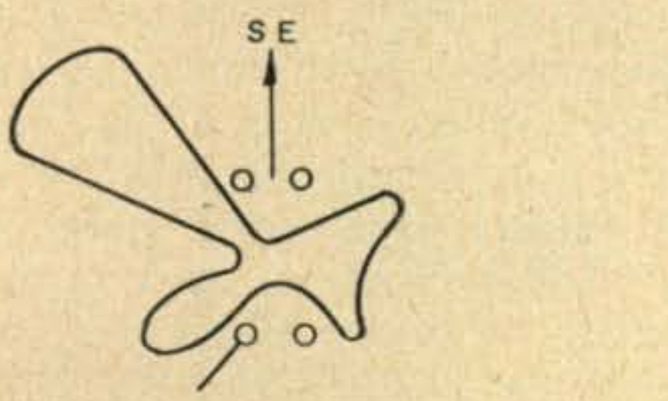
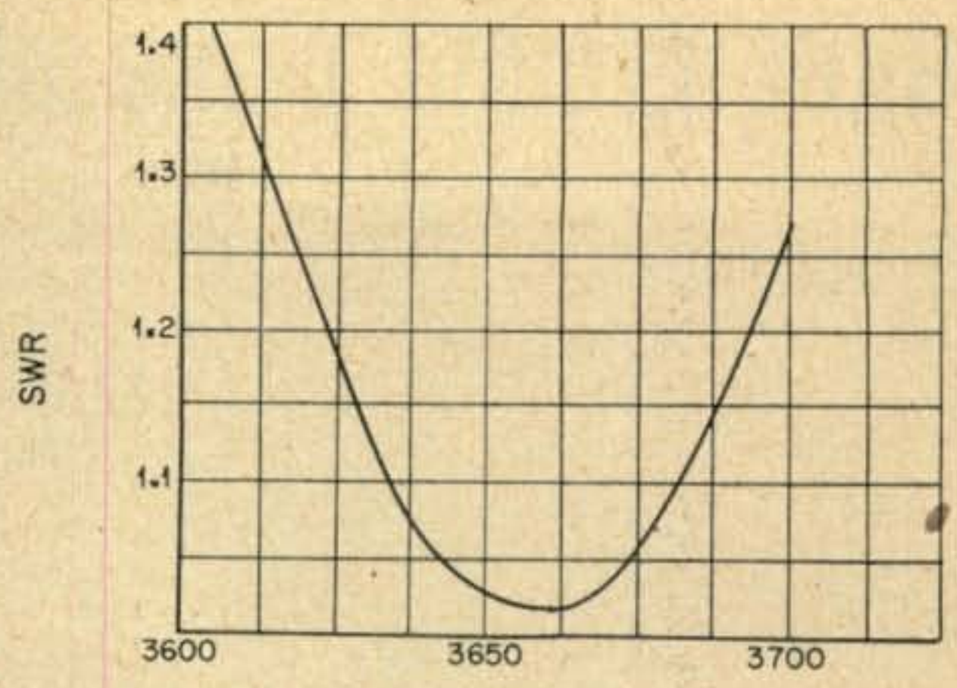
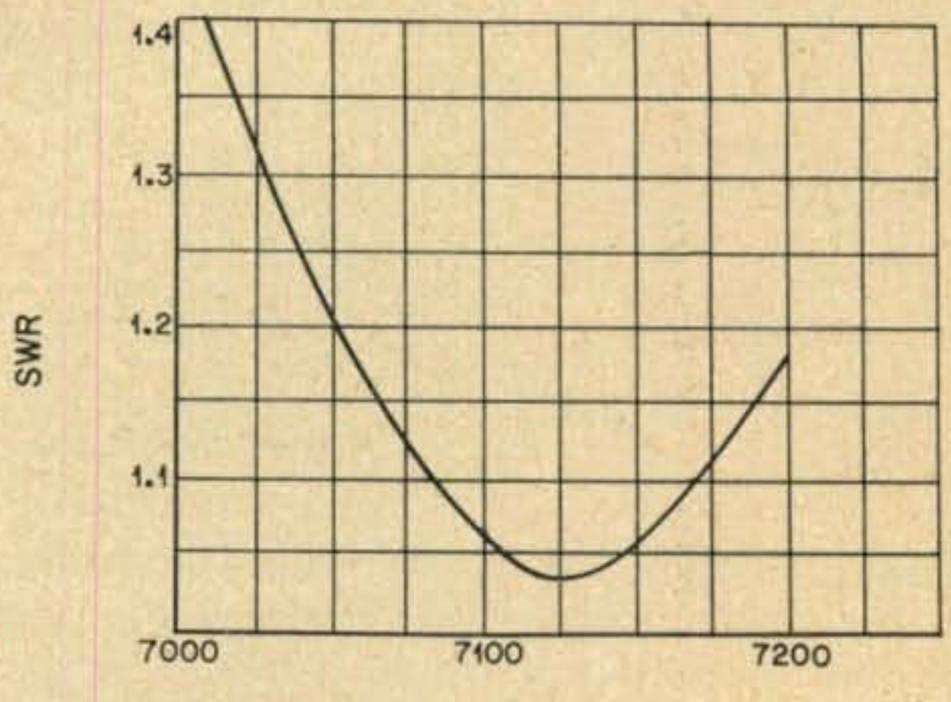
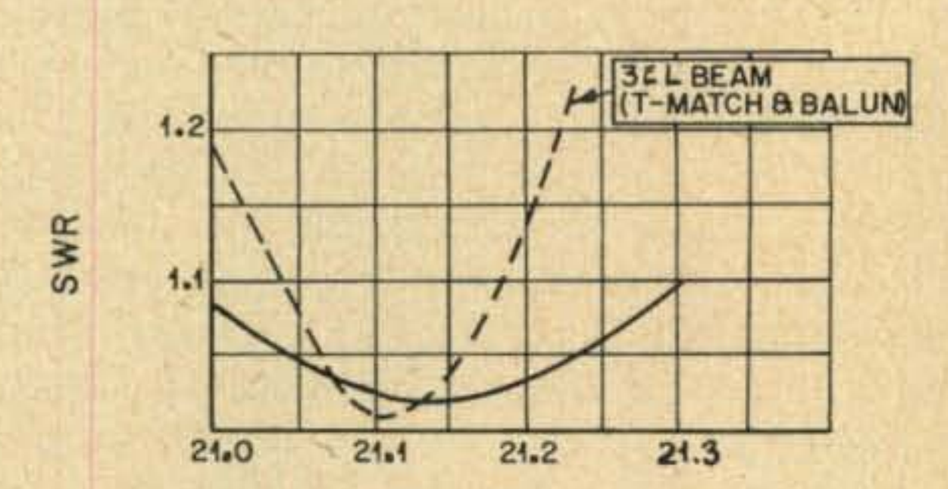
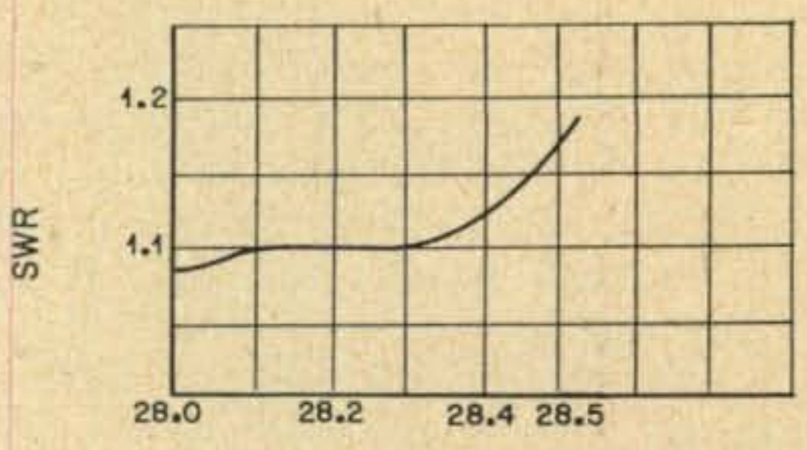


Fig. 16









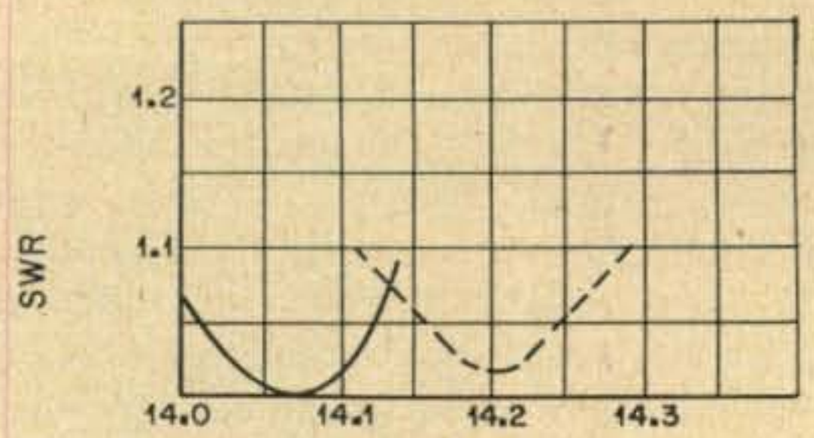


Fig. 12

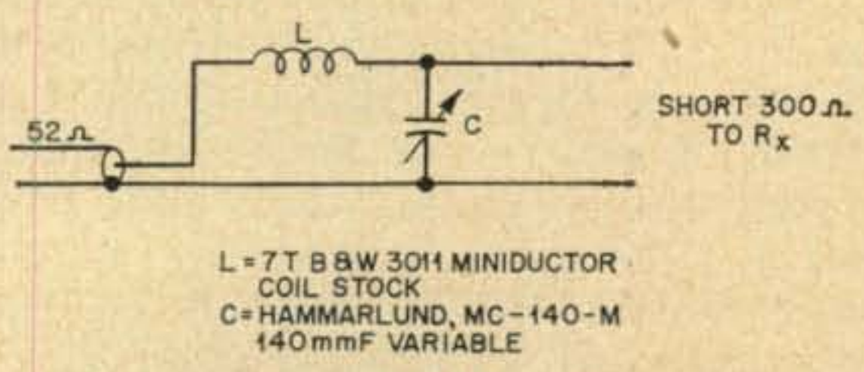
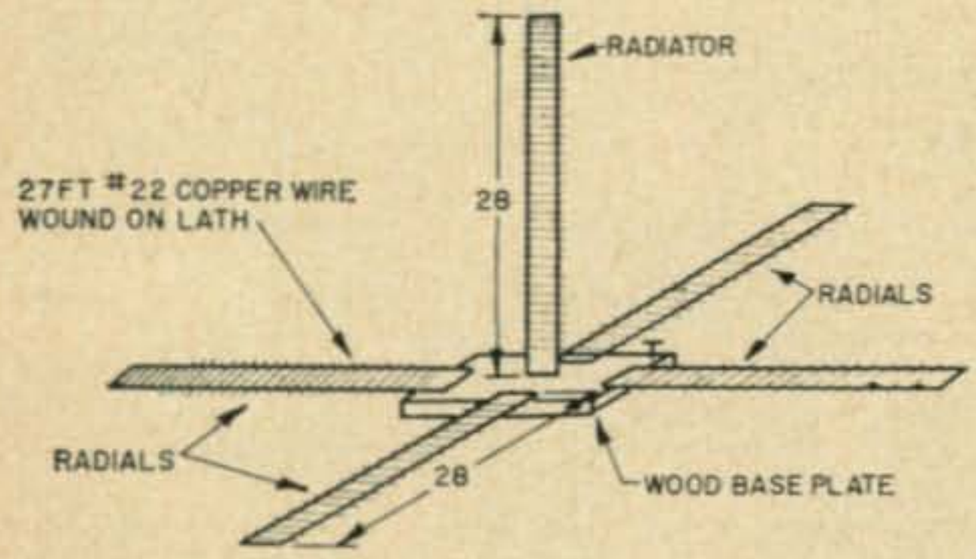


Fig. 13

midget ground plane on 15

by WILLIAM J. ABBOTT, W6VIV
173 E. Del Mar Ave., Costa Mesa, Calif.



It was probably the combination of midnight oil, a still-warm copy of CQ Magazine and a low-power bankbook which inspired this antenna. The most important ingredient, however, was W8MTI's article "Fishpole on 160" in the November CQ issue. Yet no small part was played by the aforementioned bankbook and a small real estate lot surrounded by neighbors already dubious of certain sprouting poles and strung wires. All these factors advised against getting out on 15 meters by means of a long wire, beam and tower, or (!) rhombic array. Even a normal quarter-wave ground plane was too large.

Computing the dimensions of my fishpole-offspring was in large part a matter of converting W8MTI's figures to those suitable for the 15 meter band, which was chosen for experimentation because it was felt that if the antenna performed well there it would very likely also do so on 10 and 20 meters, with certain modifications. My own contribution was the use of ground plane radials, as described below and as illustrated.

Fishpoles were not actually used for the radiator and four radials, as the smaller sizes involved permitted use of almost any non-metallic rods or struts available. I selected five builder's laths which I had on hand, though more durable supports would probably be a wise investment. The laths measured 48 inches long by 1½ inches wide by ¼ inch thick. I shortened each one to a 28 inch length.

My only purchase was then made necessary: 150 feet of #22 copper wire, from which I cut five 27 foot lengths, reserving the balance for lead-in. One 27 foot length of wire was then wound firmly around each lath, knotting the wire at both ends, but leaving about two inches of wood bare at the bottom end of the laths, and also several inches of wire free beyond the knots.

A square block of wood served for the base plate. To the center of this I fastened one lath (the radiator) upright with two "L" supports. The four remaining laths (the radials) were then nailed to the wood block, perpendicularly to the radiator, one running outward from each side of the block. A screw tightened halfway into the block became a common terminal for the free wire ends from the five laths. I soldered these wire ends and also the separate piece of lead-in to this terminal, and the construction of the antenna was completed.

The amount of time consumed was approximately an hour and one-half, and the task required so little room that the antenna was assembled entirely inside the ham shack while I optimistically monitored the 15 meter band.

After running tests on the antenna with a grid dip meter and standing wave bridge, it was determined that 21.200 mc was the point of resonance — a fair compromise between cw and phone operation, and perfect for Novice use. Removal of a few inches of wire from each lath would, of course, shift the resonant frequency into the phone band, if so desired. With the use of a Z-Match Antenna Coupler in the line, the antenna was loaded up to 180 watts (the maximum power available) and the SWR was found to be 1.3 to 1 at resonance, but loading at the far ends of the band did not seem to increase the SWR alarmingly at any point, though there was a definite increase.

With the antenna still balanced precariously on a chair in the shack, I sent out my first "CQ," immediately answered by a ham in Olympia, Washington, who offered a five-and-nine signal report, though he later reported some signal fading. A few minutes later, in the backyard, the antenna was mounted on a twelve foot pole, raising it one quarter-wave above ground.

My next call was answered by a Ft. Lauderdale, Florida, station, who gave a five-and-nine-plus report and indicated that the signal remained strong throughout a fifty-minute QSO. Further contacts brought in equally gratifying reports, convincing me that the midget ground plane vertical was worth much more than the $1.22 it had cost in cash outlay, and it has proven a far more efficient 15 meter antenna than the 40 meter vertical I had previously been using, as well as being portable, compact and inconspicuous. ■

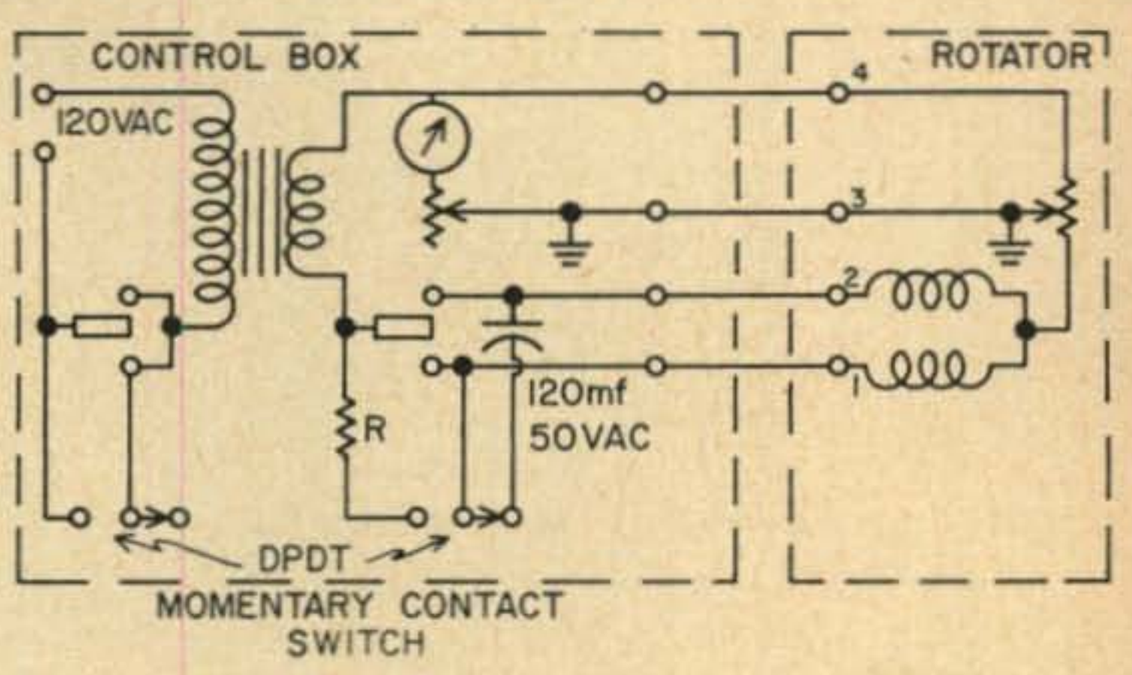
Easy Modification of the CDR TR-4 Rotator

by WILLIAM E. ROSE, Jr., W9KLR
Rte 5, Rensselaer, Indiana

The article *"TR-4 ROTATOR IMPROVEMENTS"* by WØUPT in July '57 CQ impressed upon me that it was about time that W9KLR did something similar. A 64 element beam on 2 meters is sharp enough that exact aiming is necessary for meteor-scatter, or other skeds where working with marginal signals. The indicator on the TR-4 only indicates while the beam rotates, and makes for difficulty in aiming—especially as the reading will change from the correct reading by several degrees as the unit warms up with frequent use. (This condition might be aggravated in my case since the beam weighs about 130 pounds, the rotator is installed about 6 feet down in the 60 foot windmill and the rotator must overcome the friction of the mast turning in the pipe sleeve at the top of the windmill.) At any rate, the rotator handles the beam easily, and the unit is entirely satisfactory except for the indicator.

A study of the article by WØUPT looked like there was too much work involved. I have no desire to climb the tower, take out the rotator, bring it down to install another lead, put it back up, then install another lead to the shack for the indicator!

Examining the diagram for the rotator and control box shows that the motor utilizes two sets of windings: the first winding getting its power directly from the transformer secondary, and the second winding getting its power through a condenser from the transformer secondary. This condenser provides a leading current for the second winding, and this allows the motor to turn due to the out-of-phase currents. Operating the control switch on the control box in the other direction interchanges the connections so that the first winding gets the leading current, and the motor turns in the opposite direction. Now here's the solution to our problem: if we open the circuit through the condenser, the motor cannot move at all. However; when we close the operate-switch, we have power applied to the rotator, and the indicating meter will give a reading. Unfortunately this reading will be too high. (You might have known it wouldn't be quite *that* simple!) The reading will be too high because the motor will not be turning, and thus there will be no back-e.m.f. and the current will be higher than



operating current. (You'll note that when the rotator hits the stop at end of travel, the meter will jump to a higher current.)

In our case we simply use one pole of a double-pole, double-throw, momentary-contact switch to apply power to the transformer, and the other pole to open the condenser circuit and put enough resistance in the lead from the transformer secondary to make the meter read correctly. This turned out to be 2½ ohms in my case. (Two 5 ohm 5 watt resistors in parallel.)

It is not necessary to use a momentary-contact switch, although the transformer would probably overheat if the unit were left on all the time. A three ohm, 10 watt adjustable resistor lists at 47¢ so that would be the easiest way to get exact meter readings if you don't prefer to scrounge through your junk-box for resistors.

As mentioned before, there are heating effects that cause the indicator to be off by as much as 20 degrees after the rotator has been turned around by 90 degrees or so. This is partly due to heating effects of the motor windings and the reostat in the rotator, but seems to be even more a function of heating of the condenser in the control box. This is an electrolytic and I assume that this unit is like many a.c. electrolytics, in that it has a "duty cycle". This means that it should not have voltage applied more than a certain percent of the time. (Some are rated for usage of no more than 2 minutes "on" time in any 5 minute period.) At any rate, the condenser does get warm with a few moments use. If the capacity

[*Continued on page 125*]

flat eighty antenna

by R. F. "FRANK" BILOON, K2ECY, 60 Elizabeth Drive, Bethpage, N. Y.

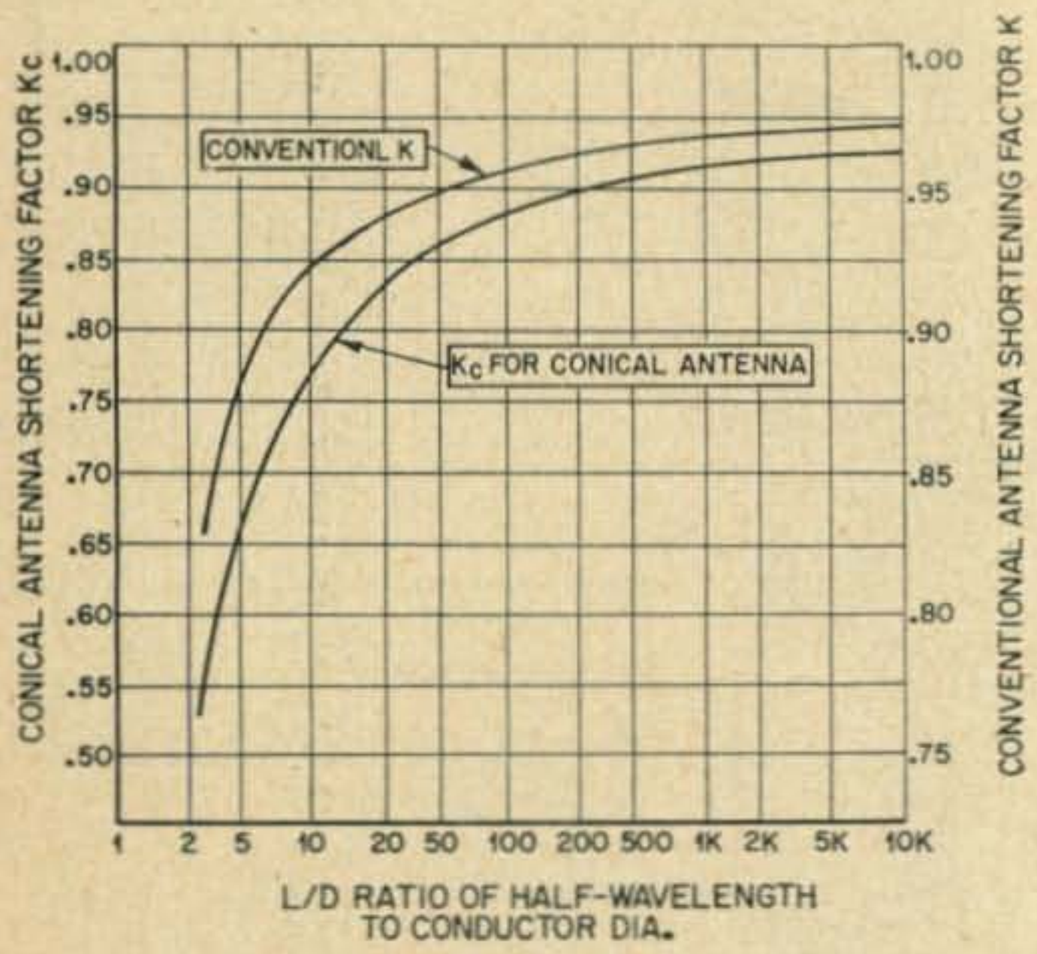


Fig. 1

Are you an 80 meter "op" who can't work 75, or a 75 meter "op" who similarly can't get on 80 simply because your antenna won't load up on both ends of the band? I was one of the many in just this unhappy circumstance and it bothered me no end. Though I'd read in the amateur journals about the wonders of antenna broadbanding I just couldn't see myself running up and down a ladder numerous times pruning a skywire to the correct frequency. With one quick snip of the diagonals it would be just my luck to cut the blamed thing too short! By golly, I thought, it's just about time "someone" figured out the general principles of a conical so that any one of us could put up the correct length of antenna at any time to suit our own particular needs. That's why I finally took it upon myself to dope it out and the results have been more than gratifying.

The "end-effect" of a half-wave antenna is one of capacitance. With single wire antennas it is essentially that of the wire ends attached to the end insulators and the shortening factor curve in the ARRL Antenna Handbook will apply. This also accounts for the rather significant difference between the "average" shortening value of 5% and the curve shown value of 2% as stated in the subject text, since wrapping the wire ends about the insulators produces a greater capacitor surface area than the wire ends alone.

However, when making a conical dipole the capacitive effect becomes much more pronounced and the "average" value no longer is true. In fact we find the actual length of the antenna elements for resonance at a particular frequency to be considerably shorter than we might expect from reading the shortening factor curve. This is because the quantity of capacitance varies both as the surface area of the capacitor plates and the square root of the separating distance between them. We may also consider that a conical antenna of end-spread D presents an average spread of D/2 with these theoretical points located half way out from center on each quarter wave section of the dipole.

Well, with these thoughts in mind I summarily ceased all of my DX, traffic and rag-chewing for about six weeks and retired to my test bench to make like an "egg-head". Experimentation in the 80 meter band was obviously out of the question due to the large antenna sizes involved. Besides I figured the cost of the wire alone would soon eat up my ham gear budget! Consequently I scaled everything up to VHF frequencies and took it from there. All of my early constructions and measurements were carefully carried out in the band of frequencies from 175 to 200 mc and numerous controlled experiments soon led to the startling discovery that by raising the ARRL Shortening Factor to the power 3.333 *any* conical antenna might be correctly computed the *first* time thus freeing us all from the bother of cut and try in the development of such a radiating system! For a primary design aid I have worked up the complete Conical Antenna Shortening Factor (Kc) curve and plotted it beside the conventional Antenna Shortening Factor (K) curve for comparison. See Figure 1. In using this chart all that it is necessary to know is the ratio of L/D which is the ratio of the Half-Wave Antenna Length divided by half the Conical Antenna end spread.

Now, getting down to practicalities, the problem of the suburban amateur who desires to install an antenna with a good match and consequently a low standing-wave ratio both for 80 and 75 meters. He finds he has to keep his antenna height down to just above roof-top level or about 28 feet. He is aware that the antenna radiation resistance for a half-wave dipole drops sharply when less than a quarter wave above ground and wishes to compensate for this phenomena. As a solution he conceives the notion that he might construct two folded-dipoles, one resonant at the low and one resonant at the high end of the 80 meter band, feeding them both in parallel at the center point and thus halve his effective resistance, and also spread the ends as much as he is able to reduce the overall length while broadbanding. Consulting the Antenna Handbook at several points as well as his electronic

parts catalogue and the antenna shortening factor curves, he comes up with the following calculations:

Antenna height=28 ft

Operating band=3.5 to 4.0 mc

Antenna to be resonant at 3.6 and 3.9 mc

300/3.6=83.4 meters 300/3.9=77.0 meters

28 ft x .3048=8.53 meters

(antenna height above ground)

8.53/83.4=.102 wavelength

8.53/77.0=.111 wavelength

From the Antenna Handbook curve his average antenna resistance will be close to 30 ohms.

The radiation resistance of a folded dipole antenna is the effective resistance of the half wave dipole multiplied by the number of elements squared. Therefore the effective resistance of one two-wire folded dipole in this case will be 4 x 30=120 ohms, and for two such antennas fed in parallel 120/2=60 ohms. The installed shorting capacitors at the folded dipole ends, to remove the transmission line effect, work out to the closest commercial value of 560 mmfd and four of these will be needed. The lengths of his two half waves in *free space* is found to be:

492/3.6=136.9 ft and 492/3.9=126.2 ft

Commercially available open-line copper antenna transmission line comes in number 18 AWG with 1 inch spacing (Saxton CF-250-6 or equivalent). This will be very handy wire for the purpose but since it will have a shortening factor of its own in addition to the conical we find its own K directly from the conventional shortening factor curve thus:

L/D=137 x 12/1=1642

L/D=126 x 12/1=1512

and K for each antenna individually=.976

The average length for both folded dipoles is:

$$\frac{1642 - 1512}{2} + 1512 = 1577 \text{ inches}$$

Arbitrarily we choose a conical maximum end spread of 2 feet. The average spread is 1 ft. Using our conical antenna shortening factor curve we find a value of K_c=.885 for the conical alone. The shortening factor for our folded dipole conical is then product of both K factors, or:

.976 x .885 = .864

The *actual length* of our two folded dipoles center fed in parallel and spread 2 ft at the ends is then found to be:

Low end (3.6 mc)

L = 492 x .864/3.6 = 118.08 ft

= 118 ft 1 in

High end (3.9 mc)

L = 492 x 864/3.9 = 108.99 ft

= 109 ft

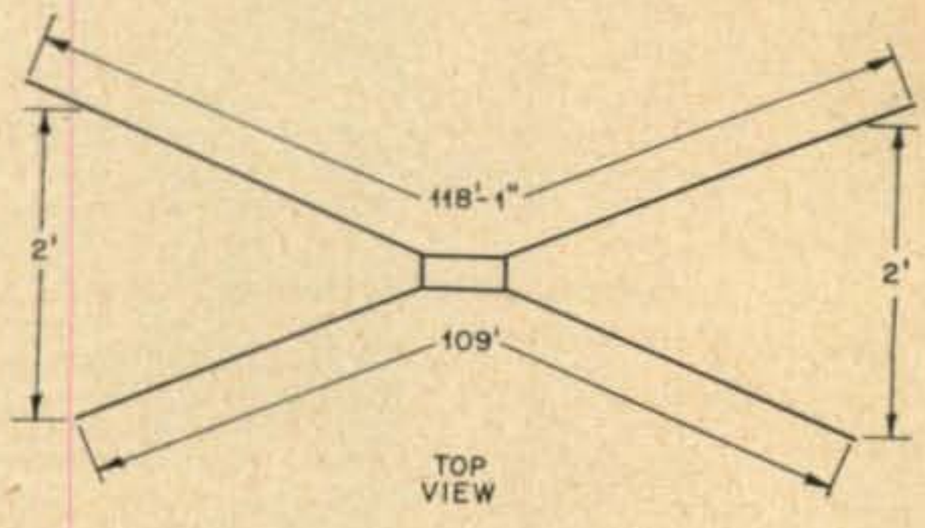
The essential details of this antenna appear in Figure 2.

This version of the Flat Eighty was constructed and installed at my home and was found to be exactly correct according to the above development. Testing with a Heathkit Grid-Dip meter showed it to be broadly resonant throughout the 75/80 meter band with slightly greater resonant indications at 3.6 and 3.9 mc. Probing the antenna with an rf impedance bridge every 50 kc from 3500 to 4000 kcs proved its input impedance to be linear from 48 to 72 ohms with average input impedance of 60 ohms at mid-band.

In use on the air only very minor resettings of the antenna tuner, a Johnson Matchbox, were required to bring about a 1:1 SWR every 50 kc from 3500 to 4000 kc. Best of all an immediate signal increase of from one to two "S" units was realized both for transmission and reception over a half wave dipole cut for 3.7 mc.

Based on the above it is interesting to investigate the maximum end spread configuration for the Flat Eighty antenna because it is the one with the shortest length in each element. The following work shows how the Flat Eighty

[*Continued on page 108*]



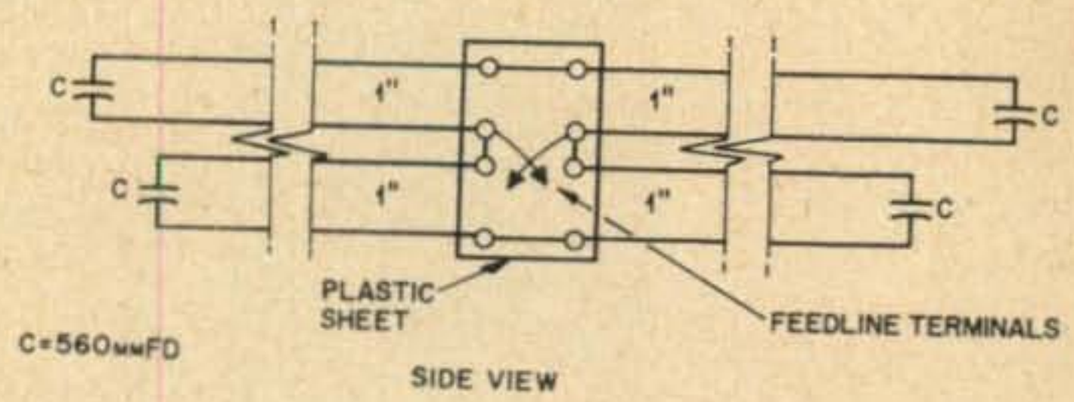


Fig. 2

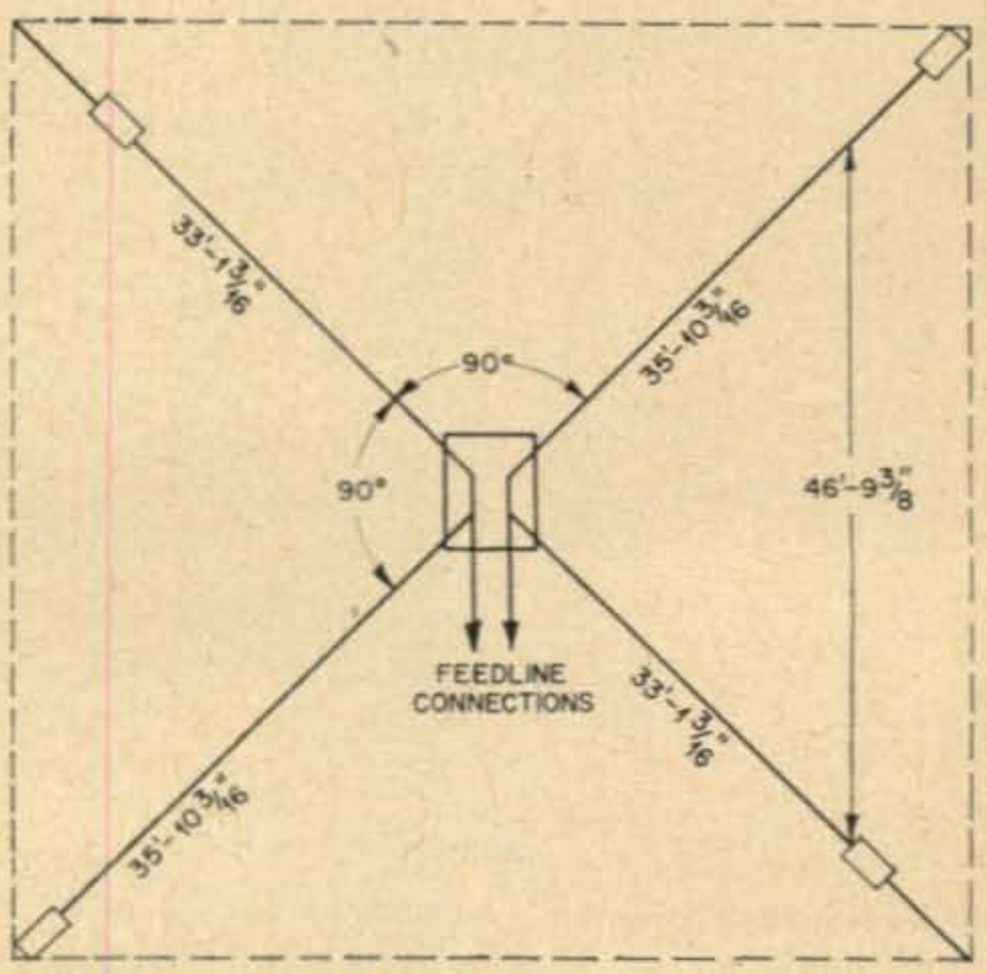
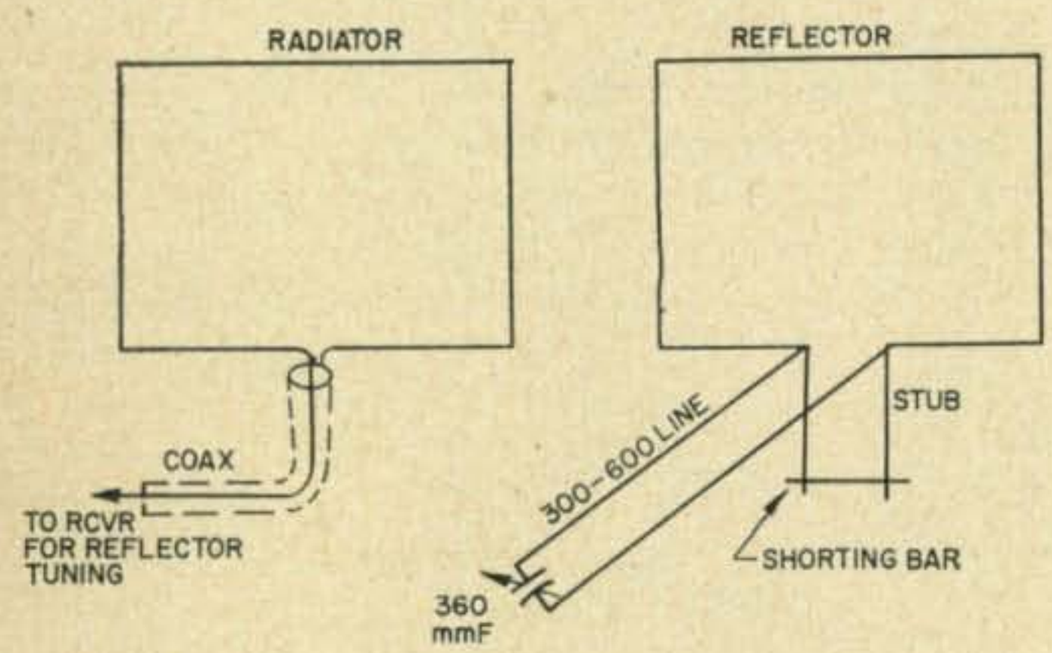


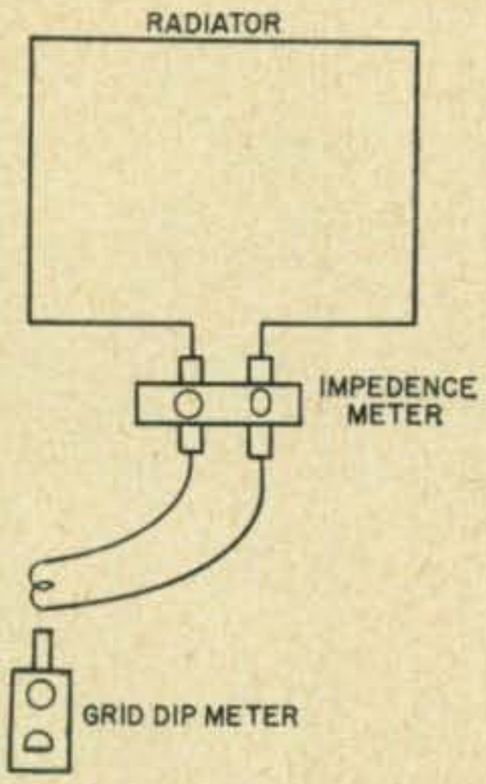
Fig. 3

Make Your Quad Tunable

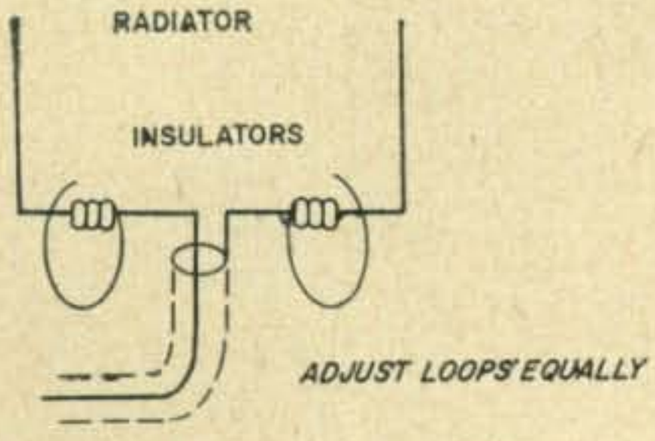
by JAMES R. HAGEN, KZ5UJ
Box 15, Fort Bulick, C.Z.



Remote reflector tuning.



Set up for tuning radiator.



Simple method of lowering resonant frequency of radiator.

Described is a way to greatly increase the band-width of the cubical quad and control the elusive point of maximum front to back. I was never quite sure that the point at which I finally left the reflector tuning stub was actually the point of maximum front to back, and I was quite sure that detuning occurred upon raising the array to its operating height. I contemplated a mechanical tuning arrangement before hitting on this simple method of tuning the reflector at my operating position. I have not included construction details or dimensions for the quad since that has been covered in previous articles.

Remote tuning is accomplished by placing a 360 mmfd broadcast type variable condenser across the reflector tuning stub. This condenser is at the end of a random length of open wire line up to 80 feet long. The effect of the open wire line is capacitive so the spacing between conductors is important. 300 ohm receiving type twin-lead may be used up to 40 feet but moisture affects tuning. 400 to 600 ohm line may be used over greater lengths and is not affected by moisture. 300 ohm line may be used from the reflector to a point just past the rotator then into the wide spaced line to permit rotation.

This system will work effectively if the quad is tuned and to tune a quad proper equipment and procedure is essential. The procedure I use is to disconnect the transmission line and connect an impedence meter or bridge to the radiator. Drive it either with a grid dip meter or the low power stage of a transmitter and tune the radiator for maximum dip on the impedence meter, the meter having been set to the impedence of the line and the rf source to the middle of the band. Tuning may be accomplished by adding a loop of wire on either side of the feed point of the radiator to lower the resonant frequency or if the resonant frequency is already too low remove wire from the radiator. The reflector is tuned by setting the 360 mmfd condenser at half value and then sliding the tuning stub shorting bar to the point of minimum signal on the S-meter of your receiver with the back of the quad on a station at least a mile away. After the reflector is tuned recheck and if necessary readjust the radiator. Tuning may be done with the quad about 10 feet above ground. Any detuning which occurs

[*Continued on page 114*]

SIMPLE AUDIO OSCILLATOR

by L. H. McMAHON, VK2AC
22 Pitt St., Randwick, Australia

The inclusion of an inbuilt audio oscillator in radio telephony transmitters is a most useful adjunct passed up in all but the most rare case. In an AM transmitter it supplies a modulation pattern which can be made stationary and so allow of a definite check. In a DSB transmitter it provides a two tone test and in a SSB one—it together with some carrier unbalance will provide this same test. It is a luxury simple to provide and as with so many simple things its addition is well worth the little extra cost and work involved. It's incorporation in all radio telephony transmitters would increase the convenience of their adjustment greatly in excess of the extra expense involved. It could also be used as a selling point. The time honored whistle method is in no way satisfactory. Nobody has the respiratory capacity and the laryingeal control to do the job properly.

The audio oscillator must be:—

(a) Simple
(b) Supply good wave form
(c) Surefire
(d) Satisfy local availability of parts.

The audio oscillator to be described is claimed to be simple and to provide a wave form as close to Sine wave as can be judged by the eye. If the thing is not surefire it is not worth continuing with. It is most dispiriting to construct an article and find it does not provide the results promised. How often has it been found to be deficient in one or more respects? A common example is to find oneself short of grid drive. It takes more power input to the driver than was indicated to provide the requisite grid current. Maybe the milliamperes are of a smaller species, as it seems to take more of them to do the job. However, in the case of the final input the species of milliampere used in W land must be the same as elsewhere or even smaller as it takes a lot of them to get to a kilowatt—all very puzzling.

As to availability locally of parts, there is nothing more frustrating than to be told that the inductance used is P6⅞s. In many cases a gram of Plutonium would be easier to come by.

This oscillator uses two triodes coupled through their cathodes. The types of tube used in the experiments were 6 S L 7 or 6 S N 7, their 12 volt equivalents, 12 A H 7, a pair of 6 A C 7 as triodes and a pair of 6 S H 7 as triodes. Otherwise the tubes used are any two triodes available. No doubt the modern tubes would also work. The other parts used in the circuit are available everywhere.

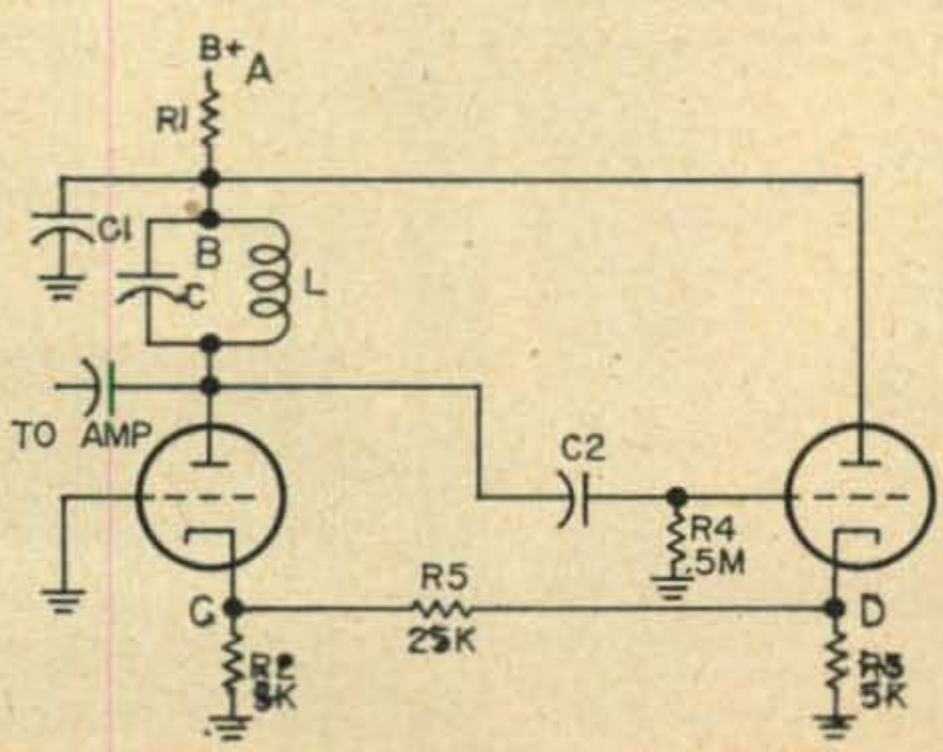
R1 is a dropping resistor which allows the use of the normal power supply. This also limits the audio voltage obtained from the oscillator. R1 and the cathode coupling resistor R5 show a degree of interaction but this presents no great difficulty. The dropping resistor R1 is bypassed at its junction with the LC circuit (for the audio frequency involved). From this point also is taken the dc voltage for the cathode follower V2.

The circuit LC decides the frequency. In the model the inductance L used was the primary of a nondescript speaker transformer. It really is nondescript as even the markings have been rubbed off. Odd chokes have also been used in other models.

The "C" used is that required to get the frequency desired. This is simply a matter of experimentation with the inductance available. The frequency from the oscillator can be checked sufficiently by comparing it with the notes of a piano, if no other standard is available. Middle C is 262 cycles and each octave doubles the frequency of the one lower than it. From experience judging an audio frequency generally places it much higher than it is and it is most advisable to give the frequency some degree of checking against a standard, the piano being quite satisfactory.

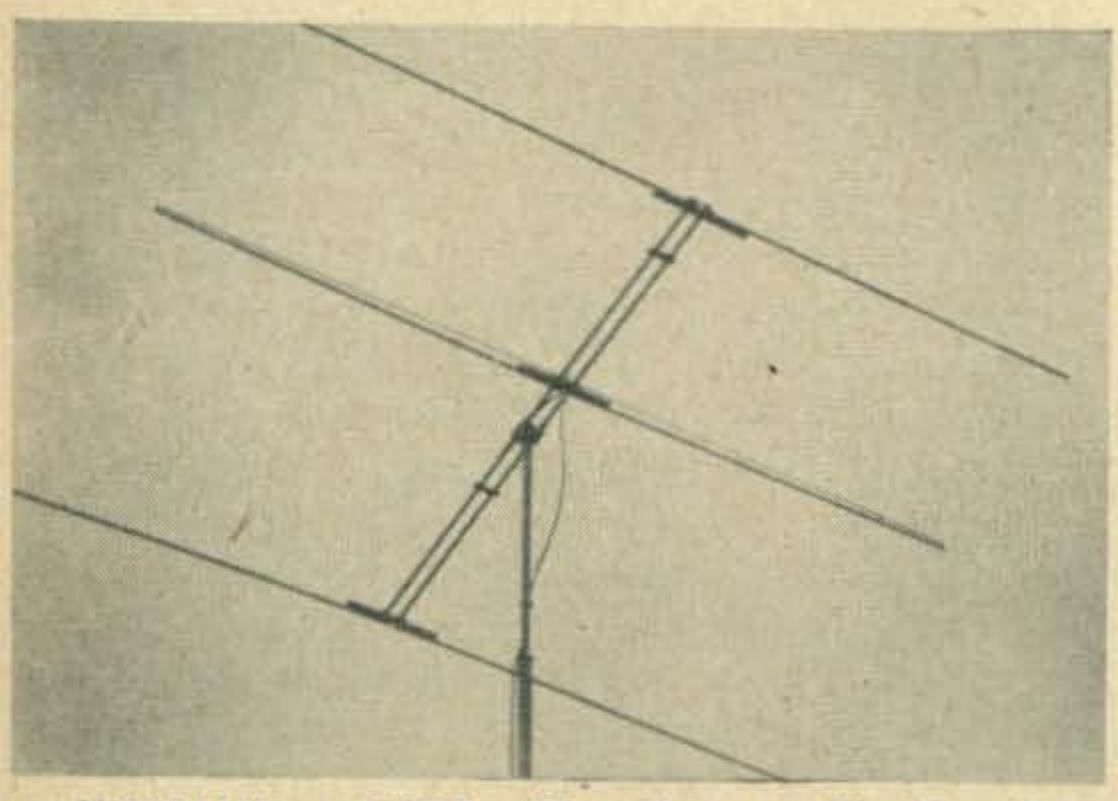
[*Continued on page 106*]

[*NOTE: The value of R1 is 150 K.*]



more about the "MINIBEAM" – part I

by Capt. G. A. "DICK" BIRD, G4ZU
94 Shirley Way, Croydon, Surrey, England



MINIBEAM at G3HLS with radiator at Fig. 7 and two band director as Fig. 3.

During the past couple of years, there has been a remarkable increase in the use of multi-band beams. It seems difficult to believe that five years ago, an effective tri-band beam was still waiting to be born. It took the release of the 21 mc amateur band in 1952, and the promise of outstanding conditions during the sun-spot maximum, to get anyone thinking seriously about the problem. Several experimental designs were produced by amateurs on both sides of the Atlantic, but nothing appears to have reached the stage of commercial production until 1955, when the G4ZU Minibeam made its first public appearance at a three day exhibition in London. This antenna was based upon an earlier experimental design, but had been developed to a stage where tuned traps and loading coils were successfully eliminated.

The interest aroused by this new design was really phenomenal, and it was not long before amateurs all over the world could be heard on the H.F bands, using either home constructed or manufactured versions of the 'G4ZU Beam.'

American manufacturers were quick to sense this new trend in amateur communications, and the following year, a number of tri-band beams appeared, mostly based upon the trap-loaded design of W3DZZ, and by now there must be many thousands of happy amateurs using them in various parts of the States. Not many of these beams seem to have found their way to foreign countries. This is probably due to their somewhat large physical size, which entails shipping difficulties, and of course, the dollar shortage, which debars so many overseas amateurs from acquiring the latest American products. There is also the point that many amateurs prefer to use entirely home built equipment, and the construction of a full size trap loaded beam poses too many mechanical and electrical problems.

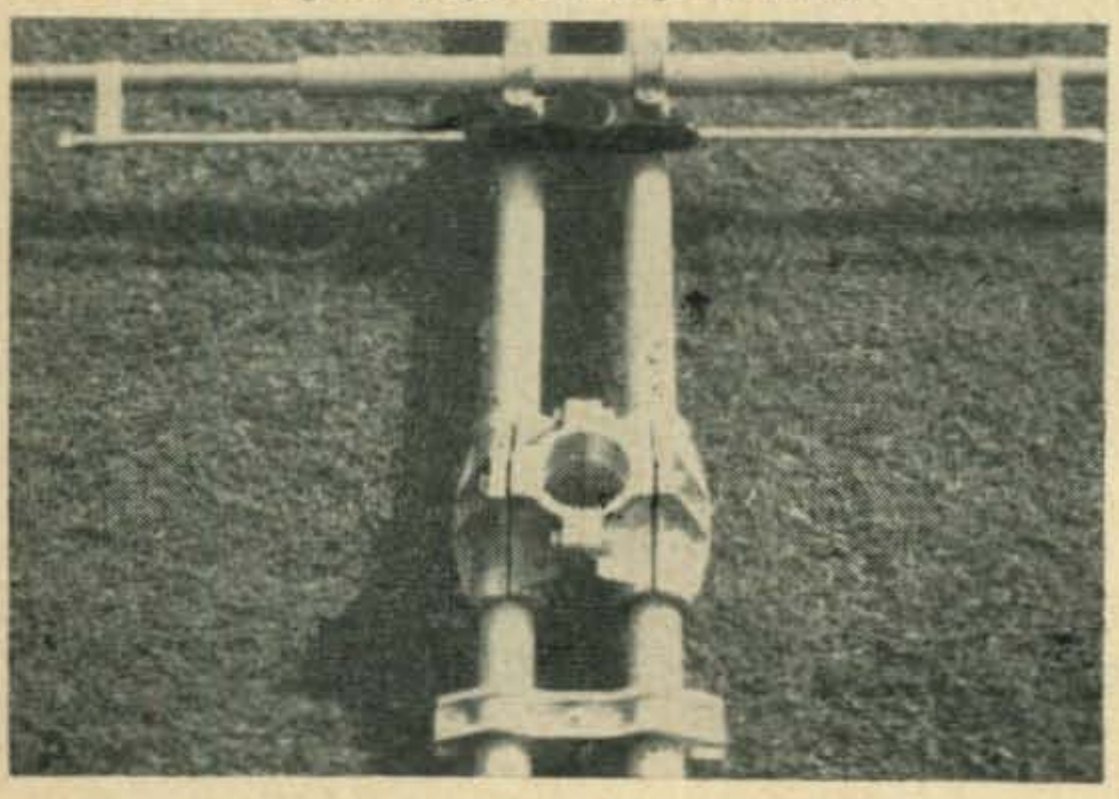
The majority of amateurs seem to be short of money, short of time, and short of space, and when it comes to a home constructed three band beam, the Minibeam design has proved to be by far the most popular, due to its smaller size and simpler construction. However, an analysis of correspondence received during the past year indicates that quite a number of amateurs would like it smaller and simpler still! Many have asked whether it could be redesigned for 10 and 15 meters only, and some seem rather hazy about the tuning adjustments.

For their benefit, I have developed a simplified version of the beam which demands very little in the way of 'know how' or measuring equipment, and yet retains many of the virtues of the original design, such as unusually high gain, and a good F/B ratio. The basic design is shown in fig 1.

Note that there are no stubs, no loading coils, no special castings, no tuning required. — So simple that even a child could build it. — The only tools required are a screwdriver and a hacksaw. If the local hardware store will cut the tube to length you don't even need a hacksaw!

Don't worry too much if your transmitter is a bit of a lash up. Here and there, tri-band beams are getting a bad name for putting out a 9+ signal on ten when you fire up the rig on twenty. This of course is the fault of the TX, not the beam, but the difficulty should not

Fig. 8. Shape of things to come.



arise with this particular design because the two bands it covers are not harmonically related. Getting interested? Here goes . . .

Materials Required

9-10 ft of dural tube or electricians conduit for the boom. Diameter 1-1¼ ins.

Two conduit 'T' junction boxes to fit ends of boom.

Four 12 ft lengths of 1 inch tubing, plus two more 12 ft. lengths which will telescope inside. Locking rings & U bolts.

Four feet of U section channel. (or a piece of wood)

Four insulators for mounting the driven element.

Assembly

Assemble as per fig. 1. A 12 ft length of tube is used for each half of the driven element. These are mounted by means of insulators on the 4 ft piece of channel or even on a piece of hardwood. The assembly can then be attached to the boom by means of a couple of 'U' bolts, as in fig 2.

12 ft lengths of tube are then mounted centrally at each end of the boom by means of the 'T' junction boxes.

Finally the two 12 ft lengths of smaller diameter are cut at four feet from one end to provide two pieces 4 ft long and two pieces 8 ft long. The 4 ft pieces are slipped into either end of the director, and the 8 ft pieces into either end of the reflector. Adjust the director length to 16 ft and the reflector to 23 ft 6 ins and lock in position. No tuning should normally be required, but you can, if you wish, adjust the element lengths slightly for max. F/B ratio.

Feeding

The most efficient way of feeding this beam is with 300 to 400 ohm open wire feeder. You won't have to worry about standing waves and feeder losses will be practically non-existent. 300 ohm ribbon makes quite a fair second choice for low to medium power transmitters. Don't be put off by the bogey of feeder radiation. The very sharp null you get off the ends of the beam will soon convince you that the radiation from the feeder is infinitesimal. In general, coax feed to an ordinary dipole will produce as much, and probably greater feeder radiation. (About ½ watt generally gets lost in feeder radiation with a 1 kw transmitter.)

If your rig uses the old fashioned but well tried swinging link type of coupling, just couple the feeder to the link. It may sometimes help to alter the feeder length by a few feet to get the best loading, but feeder length should not be particularly critical, so there is no need to specify any special fancy lengths.

If your final tank is Pi-coupled, with coax output, it is best to go through a tuning unit to provide balanced feed. Quite a good scheme would be to use the automatic tuning unit (Fig 12 page 13 March '57 CQ). It will then be unnecessary to retune when changing bands,

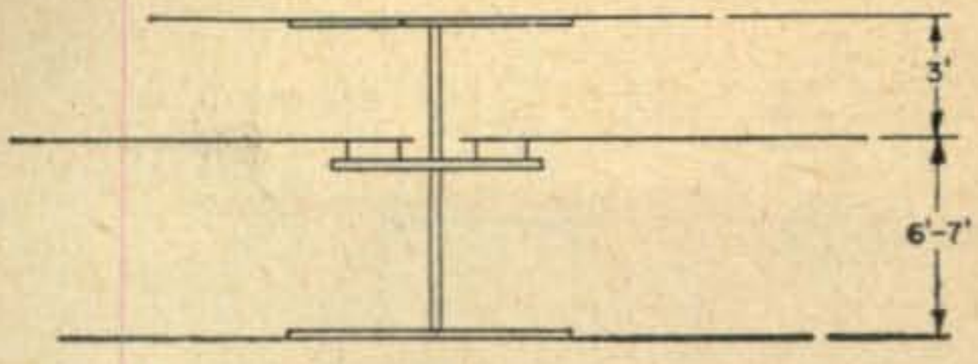


Fig. 1

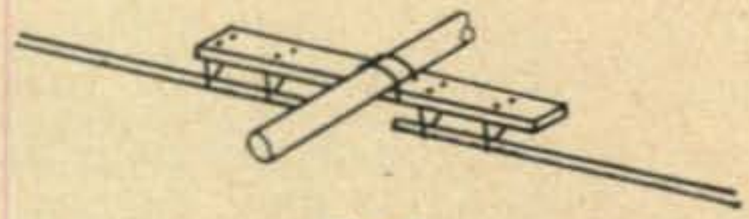


Fig. 2

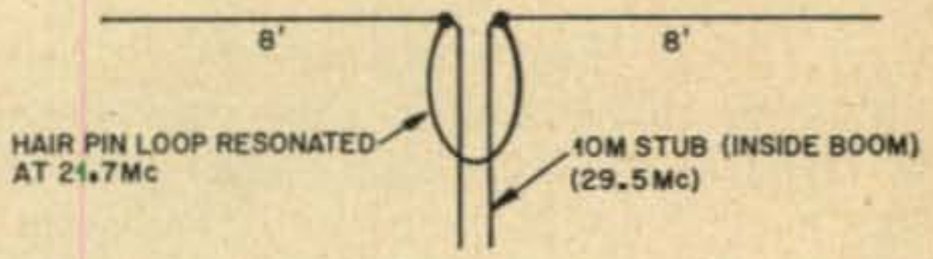


Fig. 3

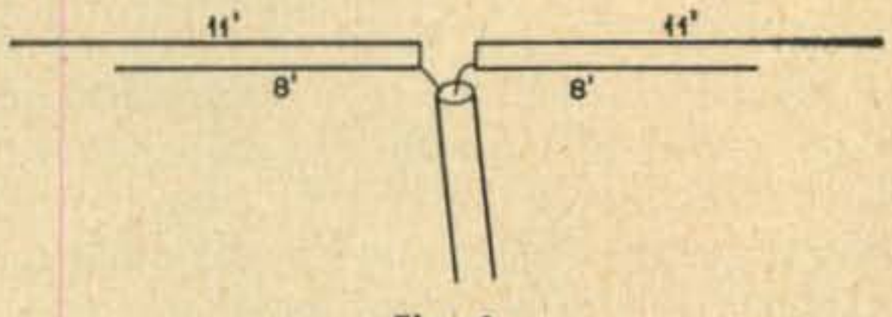


Fig. 4

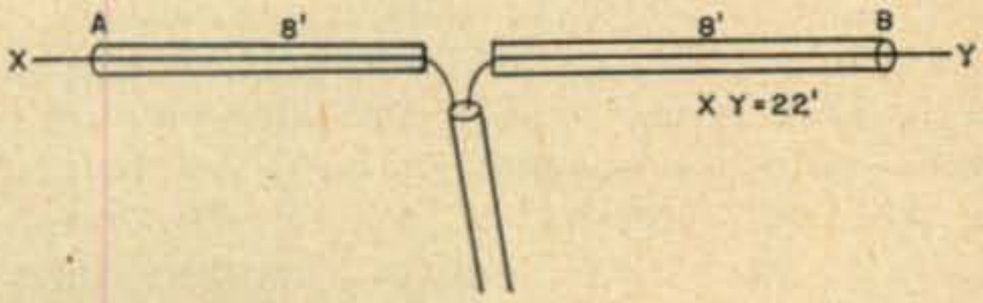


Fig. 5

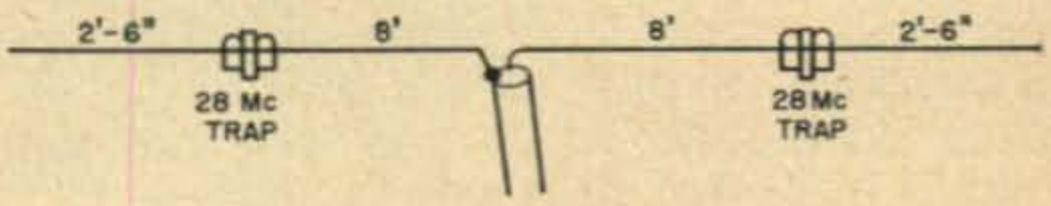


Fig. 6

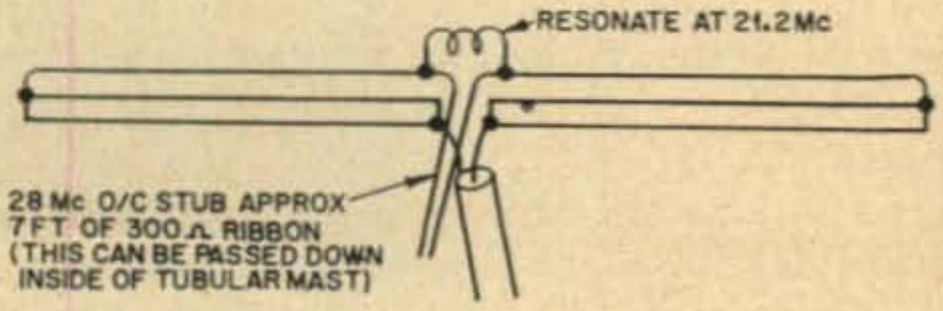


Fig. 7

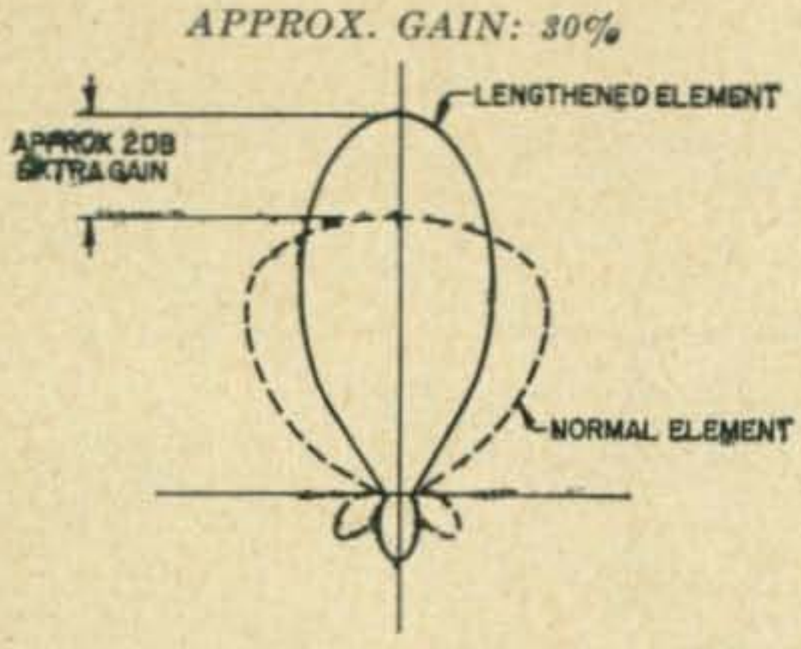


Fig. 9

and it will enable you to resonate the set up as a rotary dipole on 20 metres if you feel like using this band just occasionally.

With the help of a slide rule it is quite easy to scale this beam up for fifteen plus twenty, if you prefer those two bands.

Performance

Although this beam is relatively simple, it gives remarkably high gain. The gain on ten metres is at least as good as a full size four element beam. (see March '57 CQ Magazine for the proof of this statement).

The gain on fifteen is also well up, due to the use of a lengthened driven element. If you want to boost the 15 metre gain even higher you could use a two band director as in the original minibeam (fig 3) but beginners are advised to avoid this additional complication, as it requires accurate measuring gear for adjusting the resonant frequency of the stub and the inductance of the hairpin loop.

Coaxial Feed

It is well known that as the impedance of a feeder is reduced, the current, for a given power level, has to increase very considerably, and feeder loss becomes quite a serious consideration. This is the reason the majority of high power commercial installations are forced to use open wire feeder of 300 to 600 ohms impedance. However, many amateurs like to make use of the surplus coax cable which is available at quite low cost, and it is not particularly difficult to modify this beam for coax feed. It must be stressed that even when perfectly matched, losses with coax tend to be high, and particular attention should be given to checking the S.W.R. and also the qualities of the cable itself, which may well have deteriorated with time. It is not uncommon to find steam blowing out of the ends of a piece of surplus coax when it is used on a high power TX for the first time!

Only the radiator will need changing for coax feed. It will not be necessary to alter the parasitic elements in any way, except possibly to provide a fine adjustment of the radiator impedance.

One approach would be to use two dipoles fed in parallel as in Fig 4. This works reasonably well, and has the virtue of simplicity. There will be quite a lot of interaction between the two dipoles, and a certain amount of juggling with their relative lengths may be required. The impedance will also tend to be rather low for a correct match to 50 ohm coax.

Fig 5 looks rather more attractive, but suffers from the disadvantage that the outer tube must be at least four times the diameter of the inner for correct operation. The theory of this set up is as follows. The outer tube with the smaller one inside forms a quarter wave coaxial stub at 28 mc. As this stub is shorted at the centre, a very high impedance appears at the points A and B. This effectively isolates the portions AX and AY, as far as ten metres is concerned. On fifteen metres, the whole thing behaves like a half wave dipole. This treatment can also be used for multi-band parasitic elements, but as it only works efficiently with large diameter tubes, it tends to look rather untidy and the wind resistance becomes excessive.

Fig 6 is a trap loaded type of element which is so well known that it requires little description. The bandwidth tends to be limited and troubles may be experienced with electrical breakdown of the trap insulation on high power installations unless the whole thing is very carefully engineered. There may also be a certain amount of detuning in wet weather, but this is not too important with a driven element. It will merely produce a temporary increase in SWR. De-tuning of a trap loaded director or reflector is naturally a much more serious matter, and can easily lead to a complete loss of both gain and front to back ratio!

Another alternative, which gives a better control over impedance matching is the folded element of fig 7. This operates as a folded dipole on ten, and a loaded folded dipole on fifteen. It is however a little more complicated because you have to get the stub and loading loop adjusted properly. A detailed analysis of this type of element was given in the December 1956 and October 1957 issues of the R.S.G.B. Bulletin.

There is one last method which is a real *joy* from the point of view of appearance and electrical performance. This has been developed mainly for commercial production and forms the subject of a recent patent application. Unfortunately it involves some rather complex engineering which is beyond the scope of the ordinary amateur. It is possible that I may later find some way of simplifying it for home construction. The photography may help to satisfy your curiousity! (Secretly I hope it will make you want to buy the thing if it ever gets into production, but don't tell the Ed., he may send me a bill for advertising.)

As things stand at the moment it is probable that fig 4 is your safest bet. It is not perfect, but it is simple to construct, and not much to go wrong. I notice, incidentally that *Telrex*

[*continued on page 104*]

another use for the antennascope

by FRANK S. COLLIGAN, W3RYX
6322 32nd St., Washington, D. C.

One night at WCHV in Virginia, we decided to trim up the phases and current ratios in our three element BC array. This involved adjustments on the antenna coupling system and naturally we began to wonder what impedance the transmitter was now working into. In broadcast work, this impedance is very important because the operating power of the station is determined by multiplying the current squared times the resistive component at this point which is commonly known as the "common point" of the antenna coupling system. We borrowed a General Radio type 1606 impedance bridge which is expressly designed for this type of work and is the equivalent of the Antenna-scope. After we finished measuring the Common Point, I suddenly thought it would be nice to know the impedance looking back in to the transmitter final amplifier plate tank network which typically consists of a cascaded pi-L network. To do this means that the network has to be terminated at the point where it connects to the plate of the final amplifier tube. We of course, cannot measure it with the final amplifier on and dumping five kilowatts into the bridge. The network *is* properly terminated only when the tube is operating. Our normal plate DC power was 5100 volts at 1.4 amperes. This represents a resistance of 3650 ohms. We lug up the proper resistors to give us this value, clipped this value from plate to ground on the tube (with the B plus off) and looked back in to the output end of the net-work with the bridge. Our common point earlier measured 72 ohms at zero reactance and this is what we wanted to see looking back into the output end of the final tank circuit. We found our null on the bridge and then adjusted the "loading" control until the bridge would null at 72 ohms. After that, it was merely a matter of connecting the transmitter output terminal back up to the common point, firing up the final and dipping the plate to resonance and then tuning it off slightly on the "efficiency side of the resonance point" until we read 8.3 amps. at the common point terminal which is the proper current at 72 ohms for 5 kilowatts. The use of the Antennascope for this purpose is the perfect double check on the match between your output terminal and the antenna load. First measure your feed line at the transmitter end. This is assuming of course, that the line is matched to the antenna itself. Note the reading and the connect the antennascope to your transmitter output terminal. Figure out what your normal operating plate voltage and current should be on the final amplifier tube. Divide the voltage by the current and connect the resulting value of resistance between the plate and ground making sure that the B plus is off before, during and after the test. Before measuring the transmitter tank circuit, turn on and drive the final to see where the dip point is when tuning the plate tank capacitor and leave it there throughout the test. Then turn it completely o$^{\Omega}$ and connect the resistor between the plate and ground. Connect the antennascope to the output terminal and tune the bridge for a null. If the null doesn't read the value the feed line showed, set the antennascope dial to that value and then adjust the output loading control to the point where you do get a null at the value you found at your feed line terminals. Then, remove the resistor and the bridge and connect the feed line back to the output terminal of the final. Turn the final on and dip the plate. Don't touch the loading control but put an r-f ammeter in the line and tune the plate for maximum indication. Don't worry if this does not occur right at the plate dip point. This is quite normal. I have seen some broadcast transmitters run considerably off the dip point to get the required value of current to operate at their rated power. Dipping the plate would always bring the r-f line current down considerably. At this point, some words about the pi network are in order. The pi network is an excellent tank circuit but it is quite complex if you stop to analyze it. There is only one way to operate a pi network. For a multiband transmitter, a logging scale on the tuning dials is a must. The settings should be carefully noted for each band for each type

[*Continued on page 102*]

SIMPLE RECEIVER EXPERIMENTS

by A. D. MAYO, W5DF, 209 Conti St., Jackson, Miss.

Note: 100 Ω cathode resistor should go to ground, not grid, in the diagram. 6U8 plate slug adjust: uncouple link, grid dip to 1750 kc, replace link. Bring wire from 6C4 plate near Det grid, if too close det won't oscillate, if too far you won't get a good beat note from rig. To adjust slug in 50T coil turn BFO off, advance regen until det oscillates. Set freq of oscillation to 1750 kc. Coupling between coils is correct when det oscillates at 30-40 volts on the plate.

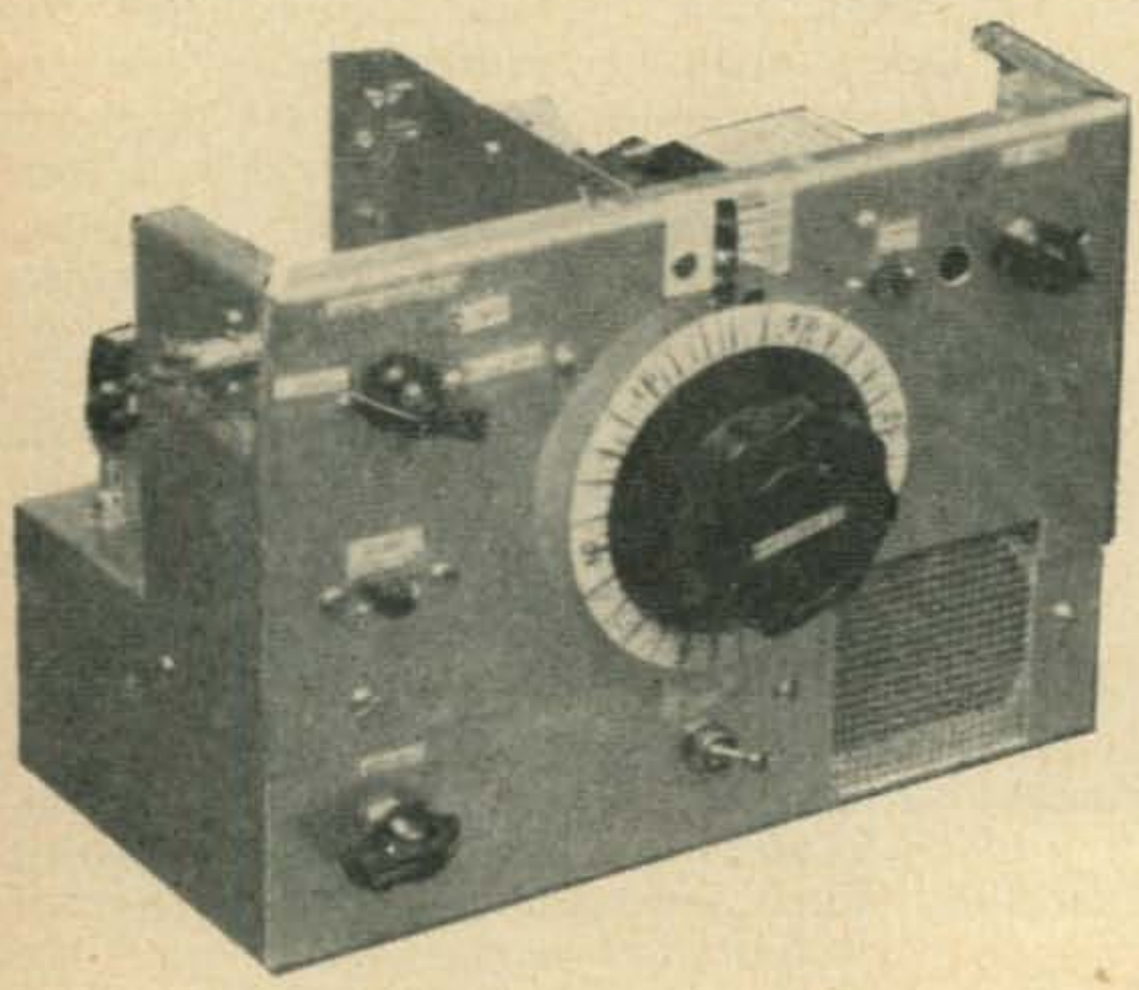
The small set in the photos was built to see how good performance could be obtained without getting complicated. It is an improvement over previous designs because it covers 3 bands without switching coils and it has a crystal controlled regenerative detector that is extremely selective plus being stable. It also incorporates a "poor man's PTO" tuner with good bandspread and ½ kc divisions.

The meat of this material has to do with the i-f system and the crystal in the detector, but before this lets say that at some point in time there is going to be a distinction made in phone and CW receivers. We are moving toward entirely different characteristics in receivers for the reception of these two types of signals and it is no longer possible to have a good receiver for both, unless we are going to have duplication in i-f channels, detectors, and AF response at the minimum, and assuming that we want high performance for both types of reception.

The four tube set shown here was designed for CW reception.

Design Objectives

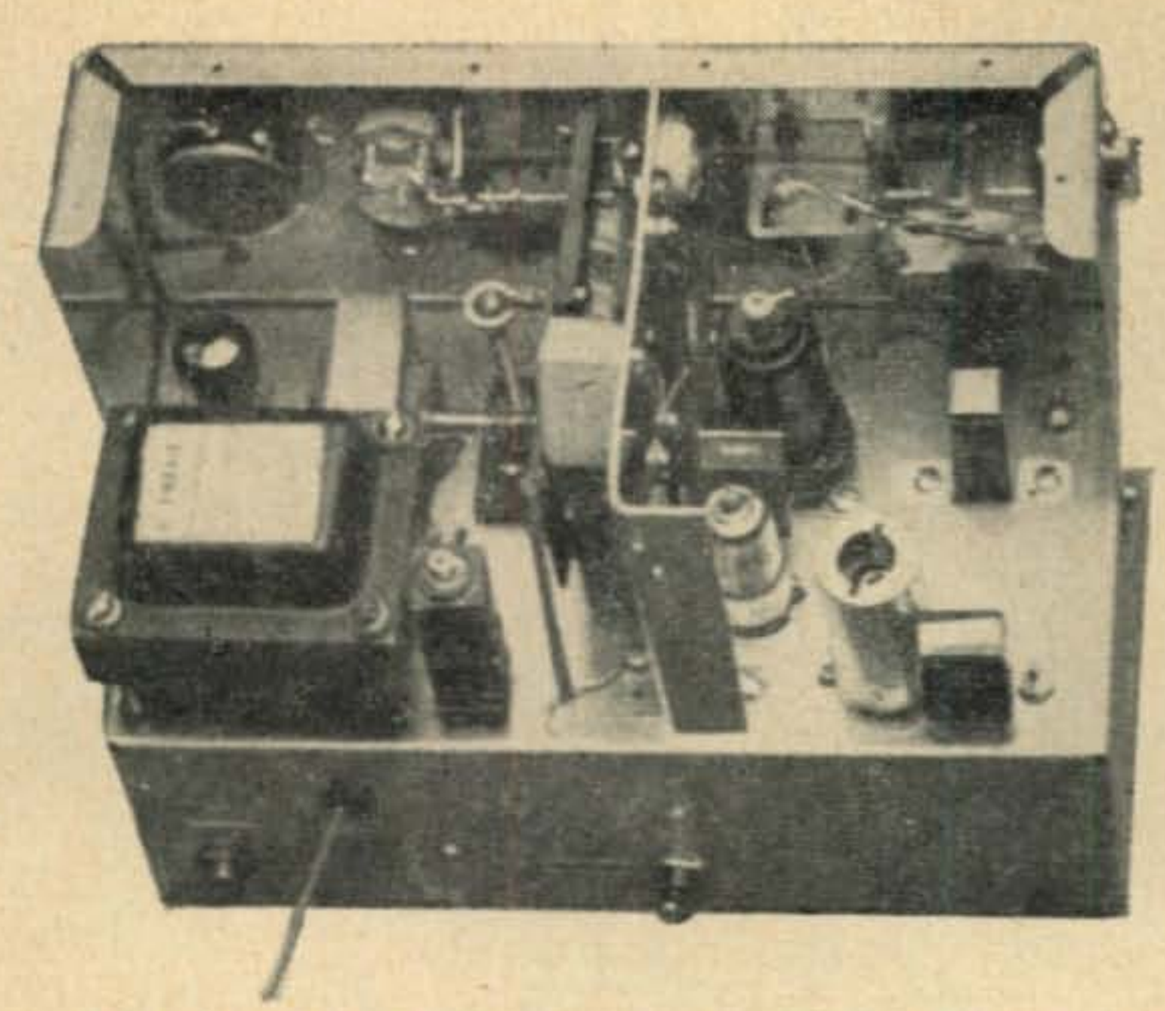
Let us say a desirable receiver for CW should have three necessary features: bandspread, selectivity and stability. In a few words we should have a dial marked off in dial divisions covering no more than 1 kc per division. We should be able to tune in a signal and read him solid, even though another signal of similar strength exists within that same dial division, and we should be able to select either one (while rejecting the other almost completely) merely by moving the dial to the desired signal. When the dial is tuned away from a signal, it should return to the same spot to retune that signal (no backlash; no jumping of frequency). In practice it is better to hear the adjacent signal weakly so one knows where the QRM is, and for this reason some skirt response is preferable to straight sided mechanical filter type rejection, and crystal filter response is preferable. With sloping response, the experienced operator can touch the dial slightly either direction and sense the direction and distance away from the desired signal that the QRM is located. A distracting factor is the audio image (other side of zero beat) which always gives the wrong answer in regard to the direction of the QRM and this image is better eliminated. Check your receiver against these specifications.



Regenerative Detector

One of the oldest tricks is the use of regeneration to increase gain and selectivity. Without regeneration the selectivity is limited only to the selectivity of the associated tuned circuit. In theory the parallel tuned circuit may have nearly infinite resistance at resonance and may drop rapidly in impedance as the frequency moves away from resonance. However the circuit loaded by the grid of the tube (and other practical losses) so the impedance at resonance never gets extremely high in comparison to the impedance off resonance. Effectively, a positive resistance shunts this circuit, limiting its on-resonance impedance. If a negative resistance could be introduced just large enough to cancel out the shunting resistance, the selectivity would be greatly improved.

The triode tube is an amplifier. What goes in the grid, comes out the plates and it comes out bigger. What we do is tap off some of the amplified plate energy and feed back to the grid just enough to balance out the positive resistance shunting the tuned circuit. The most desirable point is just at the point where the resistance is removed from the tuned circuit. The point is rather critical and is determined by several factors, coupling to the tuned circuit, gain of the triode, tuning of the tuned circuit, strength of received signal etc.



Obviously the setting for regeneration is critical. It is especially critical when the detector is used in the slightly oscillating condition for autodyne reception of CW signals. This type detector develops its own grid bias in a high resistance grid leak which charges a condenser at an audio rate, and it is easily upset from critical conditions by additional bias developed from a strong signal. This is a serious practical drawback in the use of this detector. The station transmitter will block the detector when the transmitter is keyed. Increasing the regeneration control to bring back oscillation will usually result in a change of frequency of oscillation so one can never be sure he can check the frequency of his transmitter or put it on a received signal.

It would be better to crystal control the detector so its frequency would not shift, then take steps to stabilize the oscillation. The mere addition of a crystal in the circuit in place of the usual grid coupling condenser will accomplish wonders. The detector becomes very stable, much more selective, and lends itself to a reduction in the value of the grid leak. It is acceptably stable in autodyne reception with the detector oscillating, but so much improvement is had by the use of a separate beat oscillator that it justifies the addition of another tube for a beat oscillator.

Consider the detector with crystal, regeneration and separate beat oscillator as shown in the diagram. The i-f pass frequency was 1750.0 kc. The crystal was gradually ground to bring the pass frequency on the nose, then the frequency of the crystal checked at 1751.5 kc in a standard pierce oscillator. From this it appears that the anti-resonant frequency is 1½ kc lower than the resonant frequency of this (and other crystals checked). Also, the detector will oscillate right on the anti-resonant frequency when the regeneration control is advanced to the point of oscillation, and when the tuned grid circuit is aligned at the IF pass frequency.

There are two frequency sensitive components, the crystal and the tuned circuit. The circuit must be tuned right on crystal frequency for maximum selectivity of the stage (on the anti-resonant frequency). The response of the stage can be pulled to a lower frequency by mis-alignment of the tuned circuit, but the selectivity will not be high. It can be pulled several kc lower without losing crystal control. From this it can be seen that autodyne reception with this detector will sacrifice selectivity, since the frequency of maximum response is the same as the frequency of oscillation of the detector. For utmost simplicity it works out OK as an oscillating detector, but is more selective and more stable with external BFO.

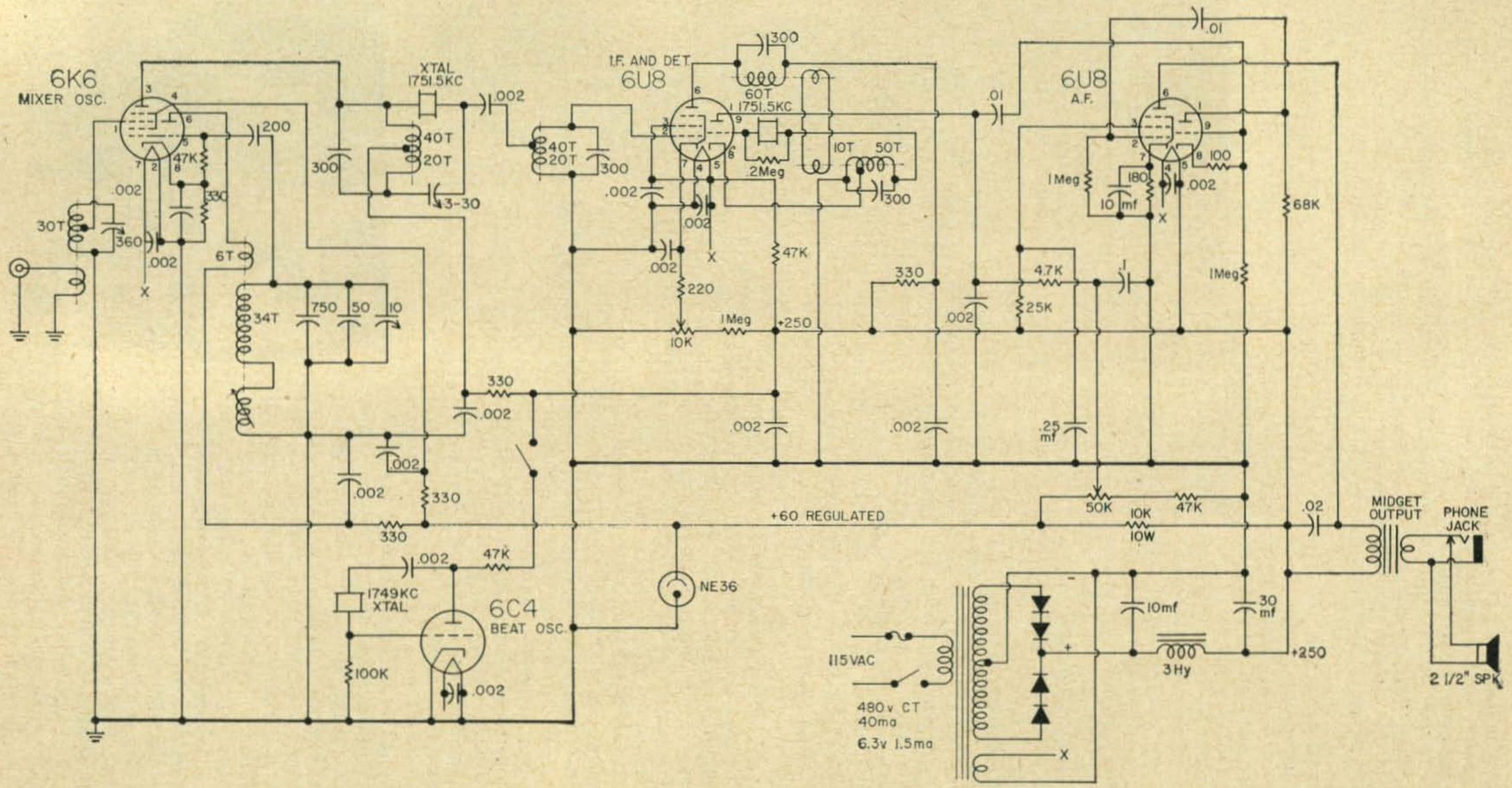
The response curve of this regenerative stage, with crystal, shows a marked rejection frequency about 40 db down right at the resonant frequency of the crystal, 1751.5 kc, or 1.5 kc above the i-f response frequency. When we put our BFO on the low frequency side of 1750 kc, say 1749 kc. a very selective response results. This response curve is essentially 1/10 or 2/10 kc wide at 10X down and dropping off sharply to zero beat on the low side, while on the high side it drops to about 40 db down at 1.5 kc high. There is some variation with the setting of the regeneration control, but the operator has no difficulty in adjusting this stable stage right up to its most selective point in QRM. At other times the regeneration is backed off for broader response. Unfortunately the audio image (other side of zero beat) is only about 25 db down, and its presence is a nuisance.

I-F Stage & Crystal Filter

To eliminate response to the audio image a crystal was put in the IF stage. This crystal filter is roughly 4 times as broad as a conventional 455 kc filter and it offers no problem of frequency alignment with the detector crystal which is much sharper. The i-f crystal filter has a rounded top on its response curve about 1½ kc wide at 10X down, and an adjustable rejection notch.

The rejection notch is adjustable from +2 to −3 kc with the phasing condenser. The curve can be skewed to the side away from the rejection notch. Actually the entire filter was designed to be not-too-sharp so the rejection notch would be broad and take out the audio image. The rejection notch is put on approximately 1748 kc and the audio image is almost eliminated. The phasing control is not on the front panel and is left fixed. However a switch is provided to cut the i-f crystal in or out. When it is in there is additional rejection of 10 to 30 db for signals more than 2 kc to either side.

Actually the inclusion of the crystal in the i-f strip throws practically the entire job of i-f selectivity on the crystal itself. The i-f transformers are absurdly simple devices and don't have much selectivity. One could have a chassis full of large and expensive i-f transformers to do the job that a 75 cent surplus crystal does


6K6
MIXER OSC.
XTAL
1751.5KC
.002
40T
20T
3-30
300
200
47K
330
.002
30T
360
.002
X
6T
34T
750
50
10
330
.002
.002
.002
330
330
.002
47K
1749KC
XTAL
6C4
BEAT OSC.
100K
.002
NE36
I.F. AND DET.
6U8
300
60T
1751.5KC
.2Meg
10T
50T
300
.002
.002
X
47K
220
10K
1Meg
+250
.002
.002
.25
mf
330
+60 REGULATED
.01
6U8
A.F.
.01
1Meg
180
10 mf
100
.002
X
68K
4.7K
25K
.1
1Meg
50K
10K
10W
47K
.02
MIDGET
OUTPUT
PHONE
JACK
2 1/2" SPK
115VAC
480v CT
40ma
6.3v 1.5ma
X
10mf
30
mf
3Hy
+250

with ease and takes little space. The i-f coils are wound on slug tuned coil forms available as Morrow part No. ST-4, only ¼" diameter, 1 inch long, and come four in a plastic bag for 98 cents. They just push in and lock in a 5/16" dia hole. They are wound with 60 turns #32 DCC and tune 1600 kc to 2500 kc with 300 mmfd. Shielding is not necessary with a few inches separation.

Crystal Controlled Beat Frequency Oscillator

Come to think of it, one of the silliest of the conventional devices is an adjustable BFO. You have a certain alignment of various response and rejection circuits throughout the i-f strip and there is a certain BFO frequency that fits, and aids this response curve. An adjustable BFO is just something that constantly needs to be realigned to the best frequency to aid your total response. Yes, they drift on the cheap and on the expensive sets too. To avoid these headaches, and to aid in simplicity, a crystal oscillator was used here for a BFO. Just a tube, crystal and couple of resistors.

An important secondary use of the BFO developed. Since it is on a frequency of 1749 kc, it furnishes harmonics that can be used for calibration check. These harmonics come 2 kc below 3500 kc, and 4 kc below 7000 kc, and 8 kc below 14,000 kc.

HF Oscillator & PTO

One purpose of this construction was to find out if one oscillator could be used to receive 3 bands. The oscillator tunes upward from 5250 kc. When 5250 kc is combined with 1750 kc i-f the sum is 7000 and the difference is 3500 kc. Also the third harmonic of the oscillator is 15,750 kc. The difference between this and 1750 is 14,000 kc.

There is no difficulty at all. All three bands tune upward. The 14 mc band tunes three times as fast as the other two and a dial division which is 1 kc at 3.5 and 7 mc will equal 3 kc at 14 mc. Too high a "C" in the oscillator reduces the harmonic output, but a total C of 75 mmfd seems about right. Obviously this oscillator must be well built if it is going to be stable.

Several PTO units were built. These used a ¼ —20 drive screw, and moved a 3/16" dia slug into a ½" coil form. Most of the winding was on the end of the form away from the slug with a few turns on the slug end. These turns were spaced to produce the same number of kc change each revolution. There was no difficulty in accomplishing this over a range of 5 turns or more of the lead screw. 30 kc per turn seems ideal, and permits ½ kc dial divisions about ¼" apart on a 4 inch dial. A turn counter was rigged up to indicate in steps of .000, .030, .060 etc.

The lead screw must be spring loaded to keep the threads tight one way or the other. Even then there is a little backlash. The threads must be well lubricated.

3 Band Mixer

The grid circuit of the mixer tunes 3 bands with one sweep of a 360 mmfd midget condenser, and this constitutes the entire band change mechanism.

Images exist. When tuned to 3.5 or 7 mc, the other band is the image. Suppression of the image band is about 30 to 40 db. when a tuned antenna is used. This is acceptable in a simple set and even if very strong signals can be heard faintly on another band it is a price we pay for simplicity. On 14 mc the other ham bands are not the worst spurious signal offender, but signals around 12,250 kc are received by the combination of them with the 10,500 kc second harmonic of the hf oscillator to produce 1750 kc i-f. If 14 mc reception is a primary use, steps should be taken to eliminate these. It can be done with addition of an rf stage, but it seems that if an additional stage is to be undertaken it would be better to figure on a crystal controlled converter. Since the first tuned circuit is loaded by the mixer grid there does not seem to be a lot of difference in good and bad coils for this spot since the selectivity is limited by the loading. Tapping down on the coil helps.

A gain control in the mixer seems out of the question as changes in this stage severely affect oscillator frequency. The mixer screen is regulated. The gain control in the i-f stage varies the total plate supply voltage since it varies the total ma from 32 to 42 ma., however the effect on the received frequency is negligible, perhaps a change of 1/10 kc in dial setting total variation.

There is no change in the detector frequency (using crystal) with i-f gain control variation, but without crystal the detector frequency changes ½ to 1 kc with this control.

The mixer input tuning has little effect on received frequency as long as it is touched up near where a band position is. There seems to be a point about half way between the various bands where a severe change of 2 or 3 kc takes place as this point is passed, then it is stable. Some 6K8 tubes are microphonic and an audio oscillation will occur with the speaker mounted under the chassis. It would be better above the chassis.

Audio Section

What could be simpler than one 6U8 tube and a 2½ inch speaker for the total audio? Yet this seems quite adequate. There is plenty of volume for all over house reception, yet at the set it does not blast. Both stages are overdriven and there is limiting of both halves of the audio cycle. The response is very peaked around 500 to 2000 cycles because small coupling condensers are used and the output is bypassed. This is an aid to selectivity and it cuts out noise. For example shunting a .01 coupling condenser with .1 will increase noise without increasing strength of CW signal. ■

Designs for Two and Three Band Trap Antennas for the CW Man

by PHILLIPS SMITH, W2OTC, 70 Woodside Ave., Northport, N. Y.

Several excellent articles have been written on trap antennas, among them are (a) W3DZZ, QST March 1955, (b) W9YJH, QST December 1955, and (c) W2CYK, QST December 1956. The writer noticed that these presented designs with the phone man in mind. The 1956 Field Day with the Huntington Long Island Radio Club, W2DPQ/2, pointed up the need for a good multi-band CW antenna fed with coax and requiring no antenna tuner.

Before work was started on this antenna, opinions were sought from many users of trap antennas employing commercially available traps. The general reaction was as follows:

Frequency (Meters)	*Performance of Trap Antenna vs. Dipole*
75 Phone	Same
80 cw	Slightly poorer
40 Phone	Same
40 cw	Poorer
20, 15 and 10	Much poorer

From the data below (Fig 1), it can be seen why the conventional trap antenna employing a single pair of 40 meter traps is poor on 20 meters and above. At this point don't get me wrong—I am only trying to analyze and improve on a good design with the accent on cw frequencies.

Some eight different antennas were erected and measured. To spare the reader, only the two believed of interest will be presented here. All antennas were measured with a simple rf bridge, the Antennascope described in CQ June 1954. All measurements were taken at the station end of the coax feed line (RG-59/u, 75 ohms). This coax was cut to a length of 91 feet, an electrical half wave at 3550 kc, in order to reflect at the station end exactly what the antenna looks like at its center or feed point. This is also true on 40, 20 and 10 meters, but not on 15. If this is too confusing, dig into your Handbook to brush up on transmission line theory.

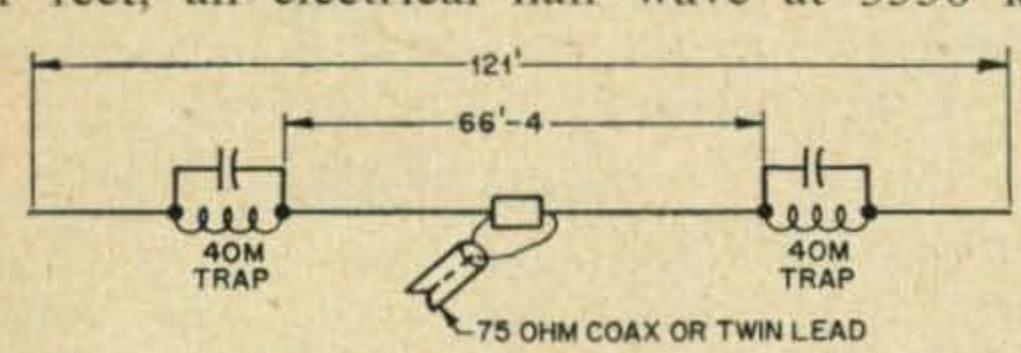


Fig. 1—Two band antenna.

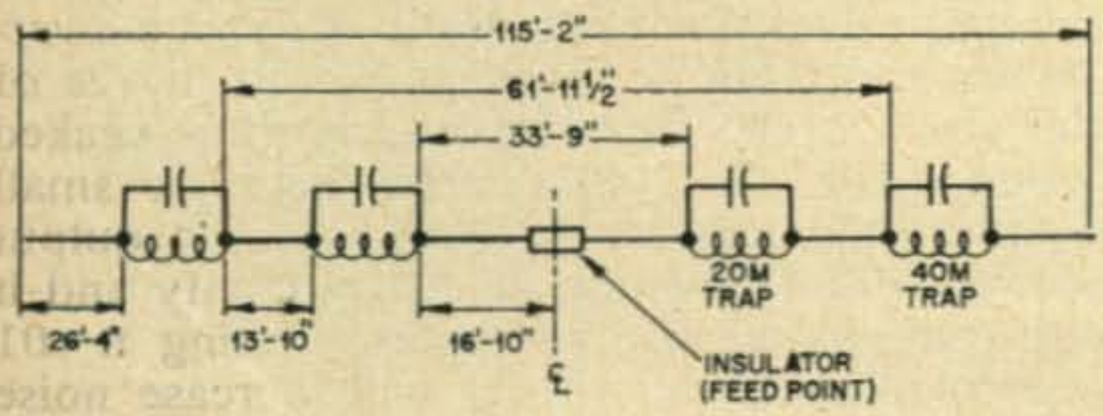


Fig. 2—Three band antenna.

The *two band antenna,* Fig 1, was designed for optimum performance on 3550 and 7050 kc. The single pair of traps is similar to those described by W2CYK, QST December 1956 except that they are tuned to 7050 kc which requires a 50 mmfd cond. and 9½ turns instead of the 9 described in his article.

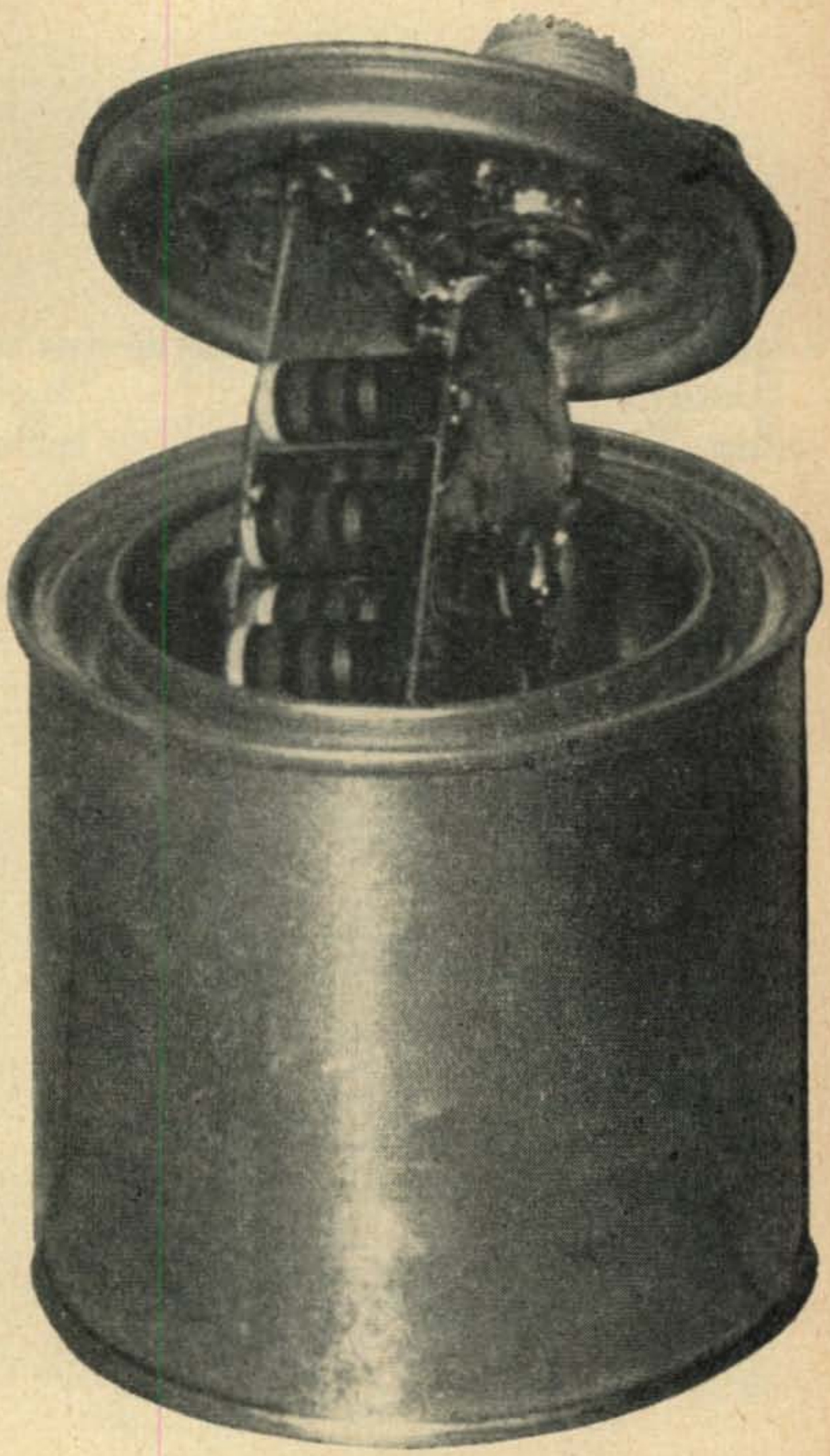
Frequency (kc)	Impedance (ohms)	VSWR (Calculated)	Reactance	Comments
3500	47	1.56	Trace	Good
3550	58	1.3	None	Excellent
3600	75	1	"	"
3650	90	1.2	"	"
3700	120	1.6	"	"
7000	35	2.15	Some	Fair
7050	43	1.75	Trace	Good
7100	55	1.36	"	"
7150	65	1.16	Some	Fair
14000	19	3.9	None	Unsatisfactory
14050	18	4.1	"	"
14100	19	3.9	Some	"
21050	63	1.2	Very large	"
28075	110	1.46	Large	"

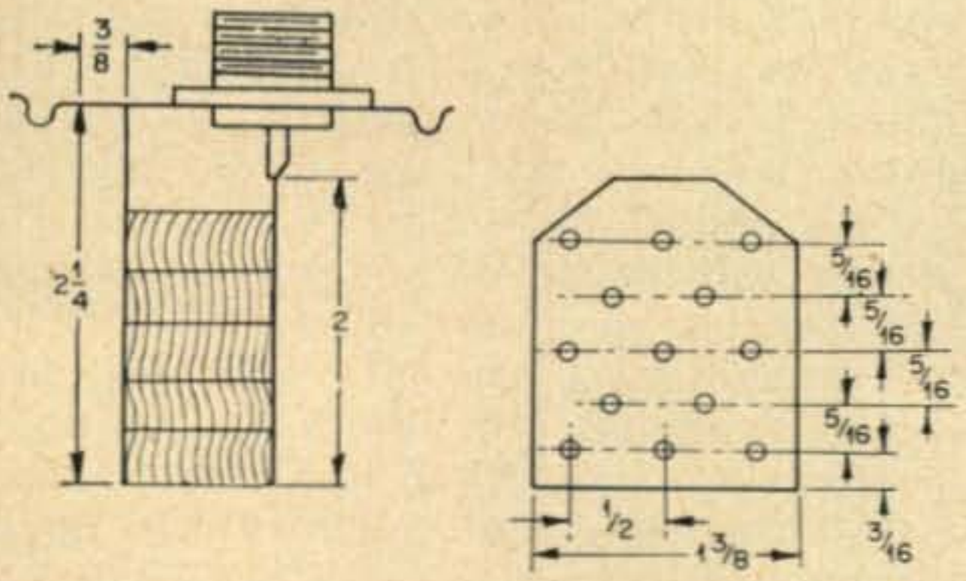
The *three band antenna,* fig 2, was made for peak performance on 3550, 7050 and 14050 kc. Two pairs of traps are employed; one pair tuned to 7050 kc and the other pair to 14050. One length of Air Dux 2006 or Barker Williamson coil type 3905-1 (2½" dia., 6T per inch) costing $1.50 is more than sufficient for all four traps. The 7050 kc traps are as described above for the two band antenna; the 14050 kc pair each uses 5½ turns of the same coil form tuned with a 50 mmfd fixed capacitor of the same type used by W2CYK (Centralab 850 SL.) The traps with no wires attached are adjusted on the workbench to the correct frequency with a grid dip oscillator. It will be found the tuning of the 20 meter traps is quite critical.

Frequency (kc)	Impedance (ohms)	VSWR (Calculated)	Reactance	Comments
3500	53	1.41	Trace	Good
3550	70	1	None	Excellent
3600	100	1.32	"	"
3650	120	1.6	"	"

A Compact Dummy Load For Coax Line

by CLARK ANDERSON, K6NKZ
3537 Huntington Blvd.
Fresno, Calif.





Having discovered that the old reliable light bulb left a great deal to be desired as a dummy load to match coaxial line, I came upon an inexpensive compact substitute.

Twelve surplus 910 ohm two watt carbon resistors were connected in parallel and placed in a half pint paint can filled with #10 motor oil. Although this arrangement gives a resistance of 75.8 ohms and a rating of 24 watts, it was found that the oil dissipates the heat. This load was more than adequate for a home brew 75 watt transmitter, and for all practical purposes matched a 75 ohm line.

Thin brass or copper sheet may be used in the construction of this unit. Two pieces were cut and drilled as shown. The resistors were sandwiched in and soldered in place. A mica filled coax connector was carefully soldered in the can lid to avoid oil leaks and the resistor assembly soldered in place. After all soldering was completed a drop of Duco cement was placed on the center of the connection to prevent leaks around the center terminal.

This idea submitted as a general suggestion subject to variation to use other values of resistors. Another unit was constructed using 48 of these resistors in series parallel in a quart can and was satisfactory dummy load for 600 watts.

Incidentally, paint cans are usually available from Automotive paint dealers that mix lacquers to match automotive colors. ■

by **BYRON H. KRETZMAN, W2JTP**
16 Ridge Drive, High Hills, Huntington Station, N.Y.

RTTY

Amateur Radioteletype Channels

National, FSK 3620, 7140, 27,200, 29,160, 52,600 kc.
National AFSK 27.2, 147.96, 144.138 mc.
Area Nets:

California	147.85	Mc.	AFSK on AM
Chicago, Ill.	147.70	Mc.	AFSK on FM
Detroit, Mich.	147.30	Mc.	AFSK on FM
Washington, D.C.	147.96	Mc.	AFSK on AM
	147.495	Mc.	AFSK on AM
New York City	147.96	Mc.	AFSK on AM
Livingston, N.J.	146.30	Mc.	AFSK on AM
Buffalo/Niagara	147.50	Mc.	AFK on AM
Boston, Mass.	147.96	Mc.	AFSK on AM
Seattle, Wash.	147.00	Mc.	AFSK on AM
Spokane, Wash.	147.15	Mc.	AFSK on AM
Minneapolis, Minn.	144.90	Mc.	AFSK on AM

A new tuning indicator for RTTY signals has been developed by Elwin J. O'Brien, W6LDG of Whittier, California. Here is another interesting as well as practical device developed by an active RTTYer in this last frontier of amateur radio, where hams still *build*.

The tuning indicator from the *RTTY Handbook*, shown in basic form in Fig. 1, has not proved too satisfactory for use with the Audio Frequency Discriminator Converter described in *RTTY* for November, 1956.

The converter, for best results, requires the incoming signal to have equal plus and minus voltages at the discriminator for the two RTTY tones. Center tuning is impossible when only one tone is being received and is still difficult with both tones present, especially if one of the tones is fading.

The new double-tuned indicator shown in Fig. 2 was therefore developed to correct the deficiencies of the single tuned indicator.

The new circuit, when receiving a single tone of 2125-cycles, produces a zero voltage (assuming zero coil resistance) across the 2125-cycle series tuned circuit with all the signal voltage across the common resistor. This results in no voltage at the vertical plates of the oscilloscope with only a horizontal line appearing on the 'scope. When the 2975-cycle tone is received, the situation is reversed and a vertical line only appears on the 'scope. Intermediate tones between 2125 and 2975 cycles produce diagonal lines. Proper tuning when either 2125 or 2975 cycle tone is received is the corresponding vertical or horizontal line, thereby indicating proper tune for the balanced center voltage condition. If the shift is less than the normal 850-cycles, then the pattern will shift from the right-angle cross to an oblique-angle cross, making the indicator also useful for narrow shift without change of tuning elements.

A further advantage of the circuit is the ability to indicate direction of signal drift of the tones. Assuming a full 850-cycle shift for the fsk RTTY signals with the best oscillator set to product tones of 2000 and 2850 cycles, the cross is no longer oriented vertical and horizontal lines, but is rotated counter-clockwise on the face of the 'scope. A drift in the opposite direction gives a clockwise rotation. For either of these conditions the beat oscillator is adjusted to give the proper vertical-horizontal cross pattern.

The experimental unit built at W6LDG used small 300-mhy high-Q toroids tuned to approximately 2125 and to 2975 cycles. Accurate tuning is not necessary. A 5000-ohm resistor, *R*, is used to prevent loading of the signal from the 500-ohm line of the receiver.

First WAS on RTTY

The first RTTY-endorsed "Worked-all-States" certificate of the ARRL has been presented to Boyd Phelps, WØBP, the "Will Rogers of the old *QST* Strays column." The final contact was with Delaware.

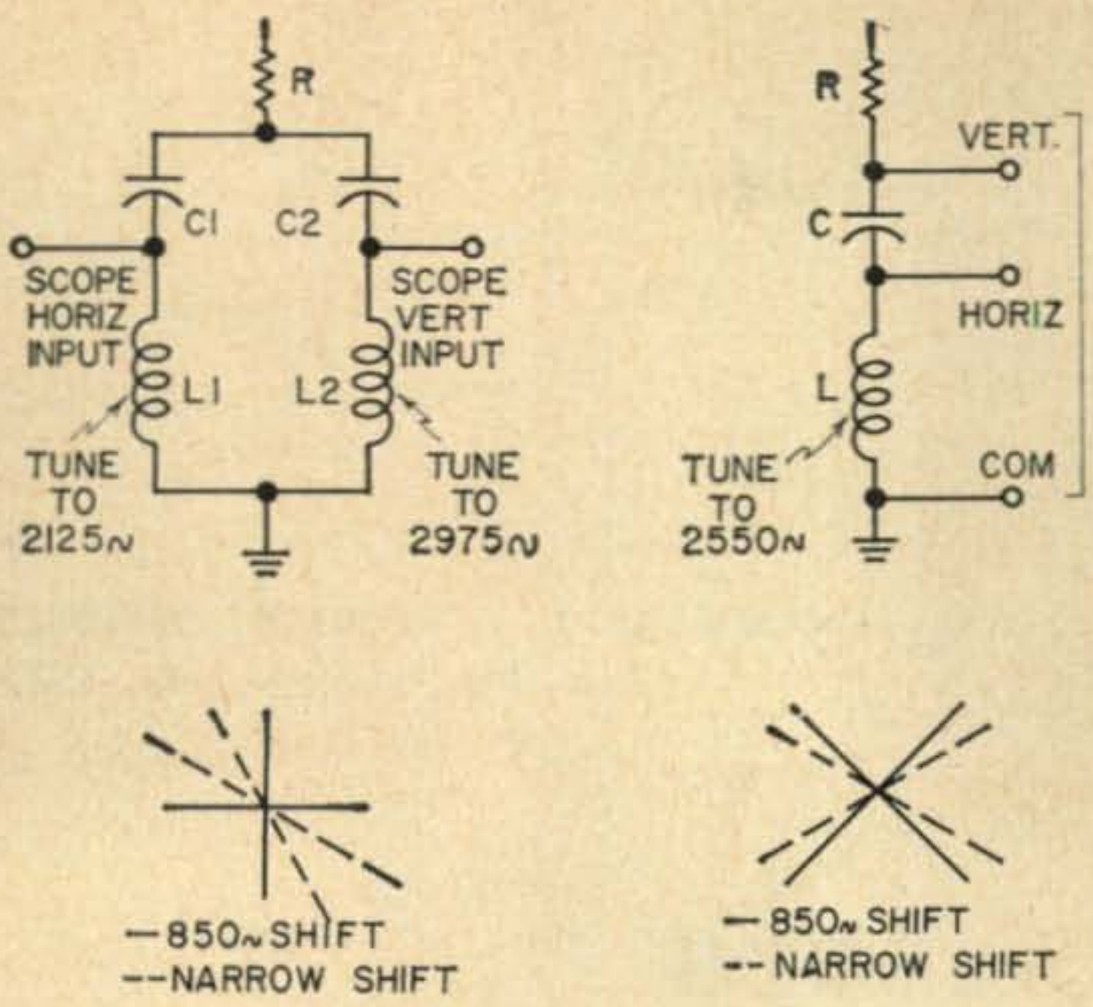


Fig. 1 and Fig. 2.
Basic Circuits of Old and New Tuning Indicators.

While the last "first" earned by Beep was back in 1931 (FMT), we suspect that it will not be too long before he makes the first WAC. (Congratulations, you old buzzard! Ed.)

Hospitality

Back in the early part of May, your RTTY Editor had occasion to visit California. In the Los Angeles area, Merrill Swan, W6AEE, the guiding light of the RTTY Society of Southern California (Inc.) drove many miles one evening to bring W2JTP out to his "shack" (with swimming pool) in Arcadia. To say the least, his was a beautiful set-up, with Model 28, remote control of the usual kilowatt and the TU, which was the AN/FGC-1X, a seven-foot rack full of *WE* gear for dual diversity reception of RTTY.

Bud Schultz, W6CG, and his XYL K60WQ, in nearby Temple City were also visited. Bud was on 15-meters, so I had a wonderful three-way QSO with KR6AK in Okinawa and W6KUY/MM just out of Yokohama, Cas, by the way, will soon be returning to the U.S.A., so you had better get going on 21,090-kc pretty soon.

Up in San Francisco, I was met at the airport on a Friday night by Jack Pitts, W6CQK, and immediately whisked off to a meeting of the Oakland Radio Club where I spent an enjoyable evening, meeting the well-known RTTY-OBS pair, Buck W6VPC, and Charlie W6ASJ, as well as old friend Roger Wixson, W6FDJ, former SCM of the East Bay Section. Saturday, lengthy and interesting visits were made to the remote control stations of W6CQK. This ingenious set-up was briefly described in the Feb. '58 issue of *RTTY*, and the remotely tuned VFO is detailed on page 77 of the *RTTY Handbook*. At the transmitting station the usual kilowatt is completely controlled over a leased telephone line from the receiving station, two miles away.

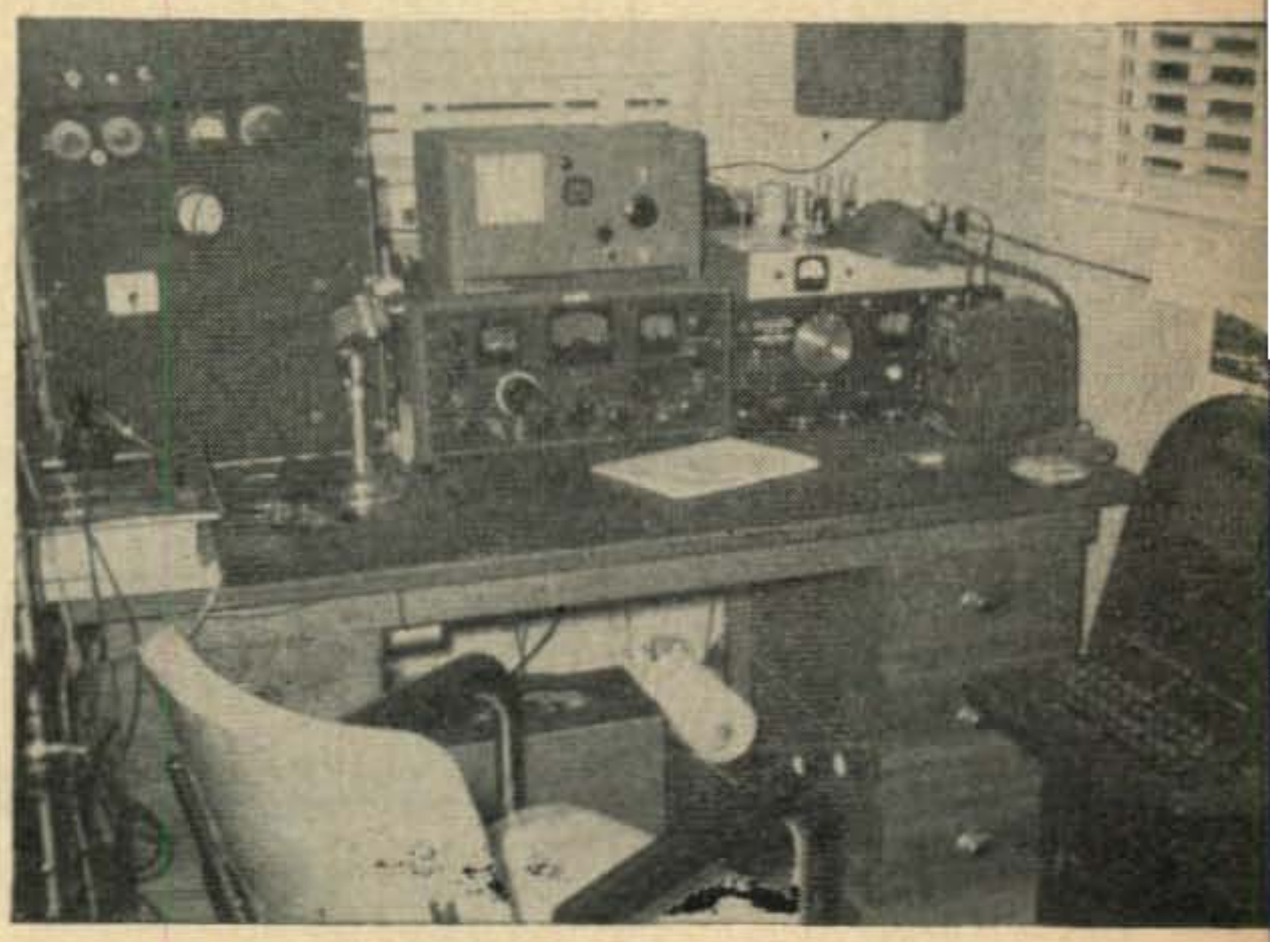
Visits were also made to DX-man W6RBO, Tommy Lott, VE2AGF/W6, Bob Weitbrecht W6NRM ex-W9TCJ, and to Bart, W6OWP ex-KA1ABH, designer of the several "single-toroid" converters that have been described in past issues of *RTTY*. Bart then took us out to visit some real California kilowatts, those on fsk at the Belmont transmitting station of *Press Wireless*. Sunday night the NCARTS, Inc. gang gave an RTTY dinner, amazingly quickly organized by W6CQK and W6FDJ, where I was able to meet those *really* active RTTYers whose signals have been making my polar relay jump. They were W6FDJ, W6NRM, W6CQK, VE2AGF/W6, W7GHW/6, W6NKP, W6CQI, W6FYM, W6MZO, W6WIS, K6GZ, K6KVZ, W6ASJ, W6CBF, W6VPC, and W6EFT.

RTTY Societies

Last month we reported the beginning of the nation-wide organization of a Federation of organized, legally incorporated, RTTY societies. The Federation, itself, would not procure and distribute teleprinter machines like that so-called "national" society so often warned about in the pages of *CQ* (pg 9, April '58), but would properly leave that function to the regional member societies. More and more of these regional societies are being organized and being incorporated, following the successful pattern laid down by the RTTY Society of Southern California, Inc. The latest is the legally incorporated RTTY society formed in North Carolina, sparked by B. Riley Fowler, W4RRH, the SCM. In the south east, Don Wiggins W4EHU (1415 NE 8th St., Gainesville, Florida) reports local interest in forming and incorporating a Southwestern RTTY society in order to tap a new source of gear. Don would like anyone in the southeast interested in this to drop him a line.

[*Continued on page 98*]

W4TLA, Rocky Mount, North Carolina. Warren runs 300-watts mostly on 80-meters, checking into the East Coast RTTY Net. Note the polar relays used for controlling the machine, a Model 26, and for keying the VFO.



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

semiconductors

Many of the letters directed to this column are from readers interested in high frequency circuits for transistors. Two meters holds a particular fascination for experimenters. A discussion of the basic problems and several working circuits are presented here to aid the constructor.

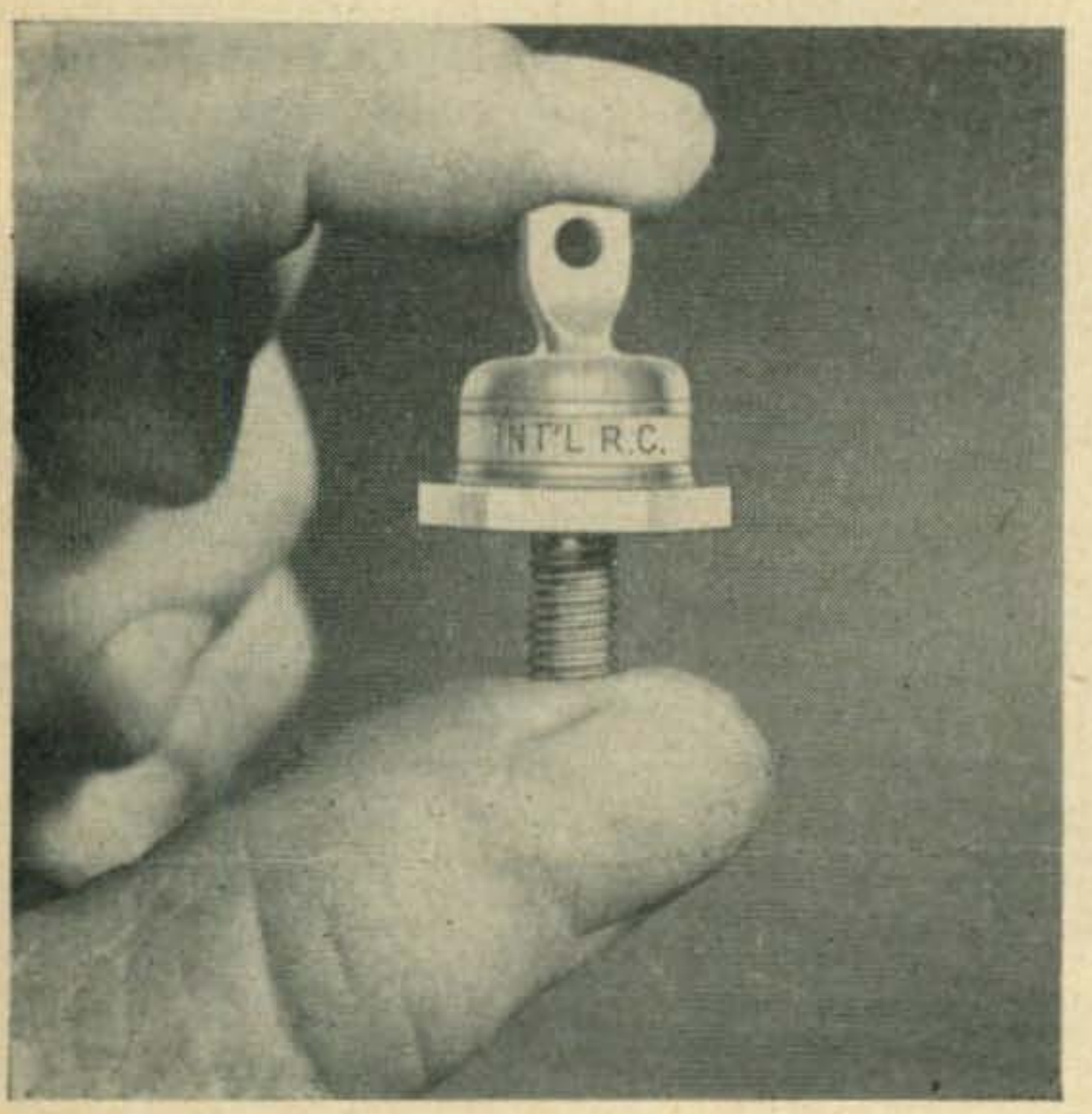
The alpha and unity frequency rating of a transistor are the basic tools of the high frequency experimenter. *Alpha cut-off* is the high frequency at which the power output of the transistor is down 3 db from what it would be at some low frequency (usually 1 kc). The ability of the transistor does not quit abruptly at alpha but continues to decrease with increasing frequency. At some frequency much higher than alpha, the output power will be no greater than the input power (in other words, no amplification) and this frequency is called the *unity gain cut-off* frequency. Since it is impossible for the transistor to amplify at this frequency, and higher, it cannot oscillate.

The superregenerative detector is particularly useful for amateur applications. This detector usually has one tube (or transistor) and is so sensitive that it can receive signals from thousands of miles away. Although the transistor will continue to oscillate very near the unity frequency, it will not usually super-regen that high. It is quite possible that the use of a separate quench oscillator would push the detector operation up near unity. The author has never tried this however.

When operating transistors in the region beyond alpha cut-off, the maximum frequency of oscillation (and superregeneration) will depend entirely on the circuit efficiency and the experimenters ability and patience. Your conductor has been able to "push" the Philco SB-100 to 45 mc as a detector and 60 mc as an oscillator. The RCA 2N247 will oscillate to 50 mc but superregen circuits usually quit about 38 mc. The T-1324 (more about this one later in the column) superregenerates like a "bomb" on six meters. RCA's new low cost VHF transistor, the 2N384, detects very nicely on the two meter band and will oscillate to well over 200 mc. It should be kept in mind that the alpha will vary from transistor to transistor. Published ratings are only *averages* so don't sue the manufacturer if your transistor has poor high frequency performance.

Several circuits are included this month for VHF transistor operation. They are not in the form of a construction project so don't write for layout details. I constructed each one of them on a breadboard chassis. They are in-

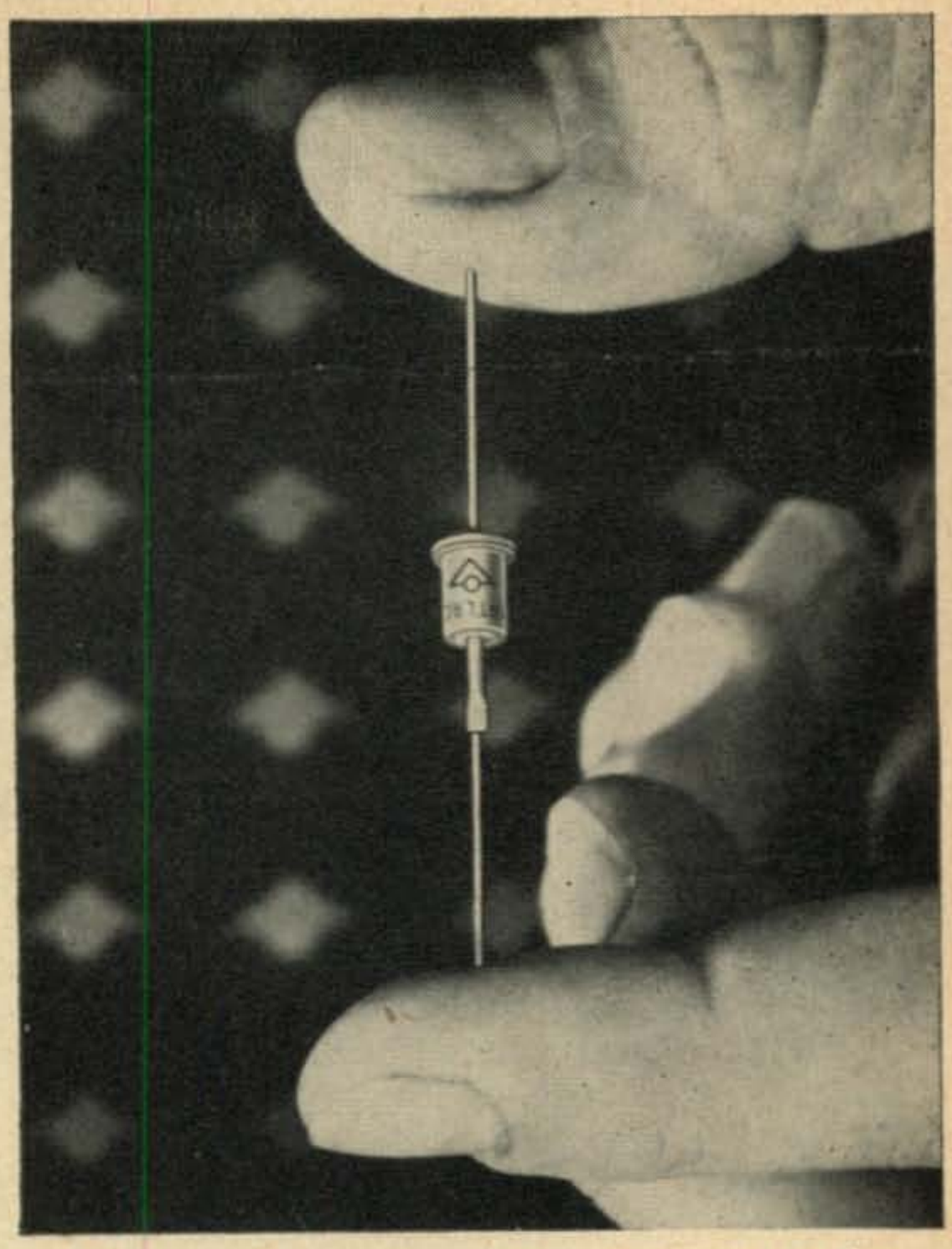
Miniature type silicon diodes mentioned in the text.



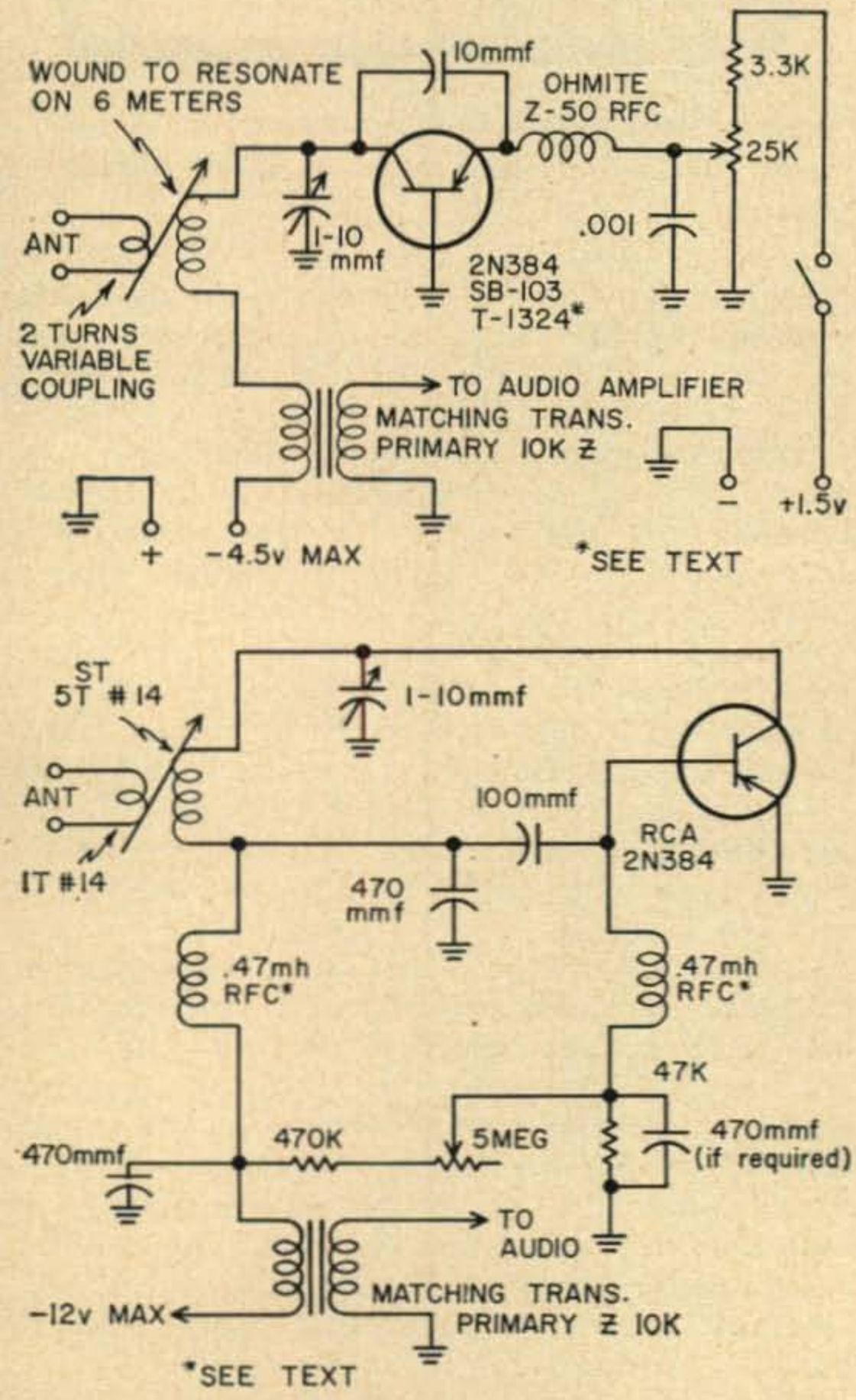
tended only to get you into the ball park. You will have to experiment to optimize the circuit with individual transistors. Keep in mind the transistor needs feedback to sustain the oscillation at a high frequency. The higher the Q of the tuned circuit, the greater the feedback voltage. In initial experiments, don't try to use teeny-weeny coils in small spaces. Use large coils wound from #14 wire and keep the diameter at least ⅜ inch. Also, don't use slug tuned coils. Variable capacitors are still best.

Transistor Kit

Featured this month is the Allied Knight kit Transistor and Diode Checker, catalog number 83 Y 149. As the accompanying photographs show, it is packaged in a plastic case measuring 6¼ x 3¾ x 2⅝ inches. The instrument is very eye catching because of the beautiful silk screen lettering job. The most important use of this tester is the checking of leakage-to-gain ratios in transistors. It will test any junction and point contact transistor. To check surface barrier types it is necessary to substitute a 4.5 volt battery for the 22.5 volt battery supplied with the kit. Matched pairs of transistors, whether similar or dissimilar types, can be selected with the tester. Germanium and silicon diodes, or any rectifier, can be checked



Miniature silicon power diodes mentioned in the text.



High frequency transistor circuits for six meters.

for excessive reverse current conduction, and for front-to-back ratio. Another important feature of the Knight Transistor and Diode Tester is that it enables the user to listen to the noise generated by the transistor. It is possible, in this manner, to select low noise transistors for use in low level stages. Here's how easy it is to use this device; first, determine from the manufacturers specifications whether the transistor is an NPN or a PNP, and insert the transistor into the appropriate socket. Move the switch to gain and set the meter (a 0-1 ma meter, incidentally) to full scale. Then release the switch and read the leakage current. If the leakage current is less than the gain current, the transistor will amplify. Generally, the greater the difference between the two readings, the better the transistor.

The instruction manual is well written and the kit can be constructed and used by anyone. Actually, the book has as much application information as it has construction data. Application notes includes selecting transistors, for matching characteristics and for low noise, how to check rectifiers, how to interpret readings and even some basic transistor theory! The kit sells for $8.50 and this includes everything you need except the hand tools. Even solder is in the kit!

News

O. W. Penny, K2AEQ, RFD #5, Huntington, L. I., N. Y. worked DJ2HC on 3503 kc with a transistor rig running 1.5 watts input. Signal report was 449 and a later contact produced a 559. Because of the "high power"

and low frequency it does not produce very many points when applied in the formula (See CQ, Feb. 58, transistors).

Error-Error-Error. . . . Page 61, Jan. CQ the mobile modulator shows the collector and emitter reversed on T5 and T6. Better correct your copy before you build it and blow the transistors! Gad!

New Literature

Triad Transformer Corporation, 4055 Redwood Avenue, Venice, California are distributing, through their dealers, an application bulletin on the TY-68 to TY-74 series of transistor power supply transformers. It gives complete circuits and part lists for each transformer. If your dealer does not have it, write direct.

In addition to Lafayette Radio's free transistor catalog (T4-56) they have several other interesting application bulletins. Titled What They Are . . . How They Work, is a theory data sheet on transistors and includes physical and electrical characteristics. Also new from Lafayette is an application bulletin, complete with circuits and wiring diagrams for a four and six transistor receiver, microphone, phone preamplifiers and power amplifiers, plus a sun battery receiver and a wireless microphone. A new reference sheet describes Lafayette's complete line of Texas Instruments transistors and diode rectifiers. In case you don't have their #305 catalog, ask for that. It's free too! Lafayette Radio, 165-08 Liberty Avenue, Jamaica 33, N. Y.

This months issue of Rectifier News, from International Rectifier Corporation, El Segundo, California contains a discussion of the reliability of military rectifiers.

Philco Technological Center, 22nd and Lehigh Avenue, Philadelphia 22, Pa. have introduced an extensive transistor course. It includes 20 lessons, and experiment kit, textbook etc. It is strictly engineering level material. Total fees and charges come to $159.00. If you are interested, and can meet the prerequisites for enrollment, drop them a line.

Some terrific data is contained inside the jacket used to ship technical data from Tung-Sol Electric, Semiconductor Division, 95 Eighth Avenue, Newark 4, N. J. It includes power rating charts, symbols and conversion charts. Almost missed it! If you are interested in getting on the air with a transistor transmitter for the 10, 11, and 15 meter bands, look up the forthcoming articles in Popular Electronics and Radio and Television News on this subject.

The March issue of Western Radio Amateur, 10517 Haverly St., El Monte, Calif. has a slick little transistorized field strength meter designed by Chuck Caringella, W6NJV. I bet they would give you a free copy with your $2.00 subscription!

New Products

United Aircraft Products, Inc., 1116 Bolander Avenue, Dayton, Ohio are marketing

Tester set to show the leakage of a 2N109 transistor. The leakage/gain switch is spring loaded.

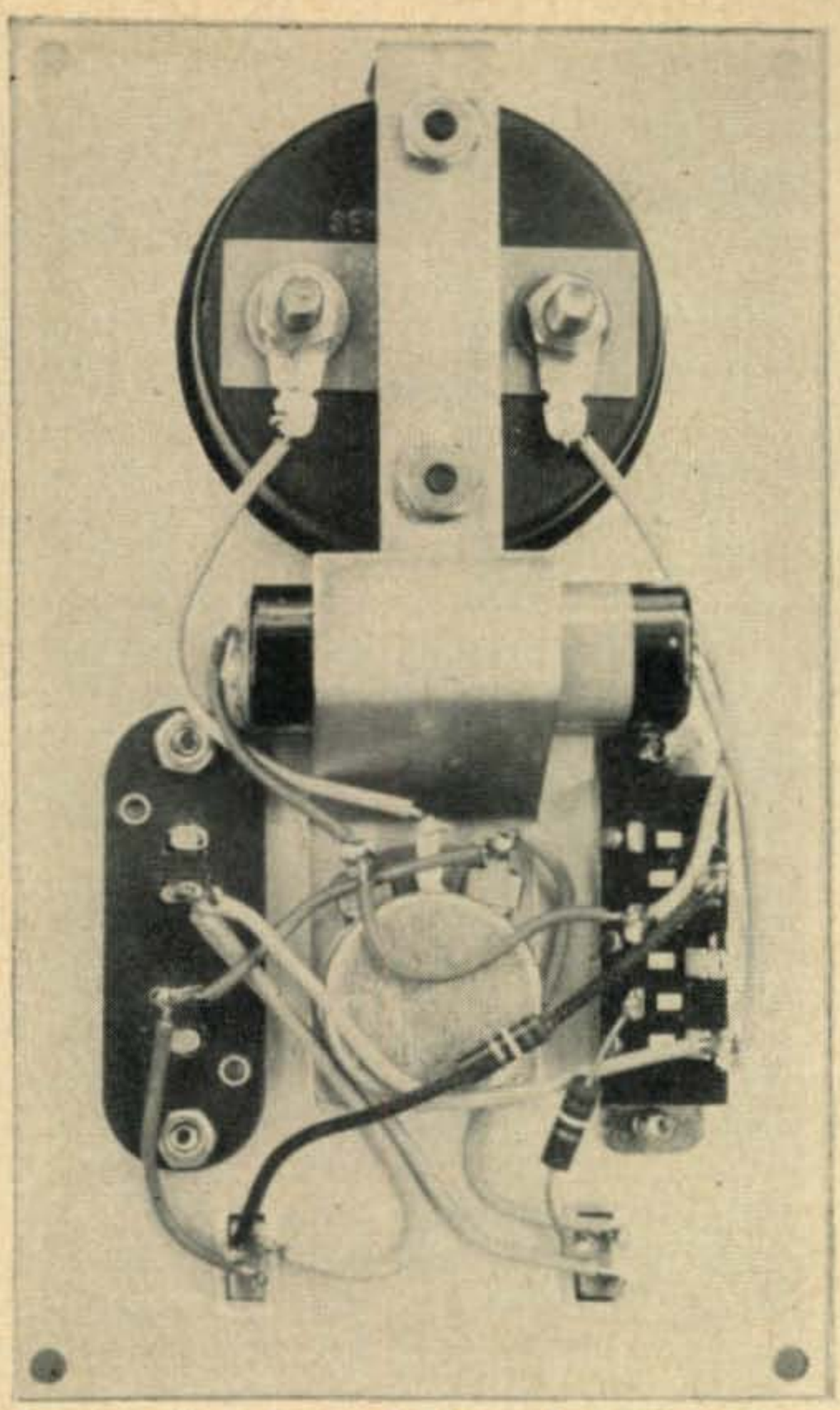
"Cold Plates". These devices are air or refrigeration cooled heat sinks for transistors such as the Delco 2N174, and that series. Terrific idea!

Sylvania announces a new broadband mixer diode, dubbed the 1N1132. It is of tripolar construction and covers the frequency range from 3 kmc to 12.4 kmc in a single coaxial holder.

Chicago Standard Transformer Corporation have added three new transistors to their Stancor line. The TA-15 is an input transformer for matching low Z mikes to a 2N156 or equivalent device. The TA-16 and TA-17 are Class B driver and modulation transformers respectively, and can be used to match 2N278's to Class C loads.

International Rectifier Corporation has introduced two new miniature silicon rectifiers. The stud rectifier shown in the photo is available for forward currents up to 45 amperes with a maximum piv of 500 volts. The miniature all welded pig tail lead rectifier will handle 500 ma and is available in a piv range of 100-600 volts. Bulletins SR-304 and SR-203, respectively, describe these rectifiers. If unavailable locally, write to International Rectifier Corporation, El Segundo, Calif.

RCA has again reduced the price of the 2N384 VHF transistor. This is the transistor



Inside view of the Allied Knight Kit Transistor and Diode Checker.

used this month in the two meter receiver. It's available at RCA distributors for $6.11 net. If unavailable locally, write Lafayette. They stock it. Other price reductions from RCA include the 2N109, 2N139, 2N140, 2N217, 2N218, 2N219 and 2N270.

Clevite Transistor Products, 241 Crescent St., Waltham 54, Mass. have introduced another powerhouse. The CTP-1133 dissipates 14 watts at 70°C and 40 watts at 250°C. It is characterized by high power ratings, low thermal resistance and excellent audio frequency response.

If you are in the electronic brain business (computers) drop a card to RCA for data on their new line of switching transistors, numbers 2N578 through 2N584. They cover almost every high speed or high current application.

Sylvania Electric Products Inc., 100 Sylvan Road, Woburn, Mass. are now manufacturing the famous "Drift" transistor, types 2N247, 2N370, 2N371 and 2N372. These four units are hermetically sealed, in a JETEC group 30 metal case and utilize four-in-line flexible leads which can be soldered or welded into the circuit. Shielding is employed to reduce interlead capacitance and minimize coupling to adjacent circuit components.

Seven new computer transistors have been added to the Sylvania transistor line. The 2N312, 2N356, 2N357, 2N358, 2N377, 2N385 and 2N388 are of germanium alloy junction style and hermetically sealed in a case conforming to JETEC group 30.

Also of interest from Sylvania is a new high voltage power transistor added to the renewal line. The 2N296 is ideal for power amplifier and switch applications which must operate from supplies between 25 and 60 volts.

Another new low cost transistor is now available to experimenters. The 2N234A is manufactured by Bendix Aviation Corporation, makers of world famous aircraft equipment. Its ratings are much higher than other low cost units (collector dis. is 10 watts!) and yet the price is still only $1.50. It is available from Avnet, 36 N. Moore St., New York, N. Y. or from Lafayette Radio.

Finally I have been able to locate a source of anodized aluminum insulators for mounting power transistors. They are also made by Bendix but will fit any of the current types of power transistors (2N301, 2N307, 2N255, 2N256, etc.). They may be obtained from Avnet (see above) and they are listed on page 64 of catalog #305 from Lafayette. Amateur net price, 55 cents. Believe me, it is well worth $1.10 a pair to save fiddling around with super thin mica washers and silicone grease.

SCOOP-SCOOP. I have been saving the best news for last, to see how many get this far back in the column. A new catalog from Arrow Sales, P. O. Box 3007, North Hollywood, California (Cat. #117) lists five transistor bargains that are fantastic! Here's a run-down on the pertinent data. All are Philco transistors. *T-1316*, similar to 2N352, stiff leads, PNP, Class A rating—5 watts, matched pair in Class B delivers 20 watts or will switch 200 watts in a transistor power supply, alpha 1 mc. price —$2.78, amateur net each or $5.56 for a matched pair! *T-1017* same typical ratings as the 2N352 and similar to T-1316 except for flexible leads and slightly less power capability-price—$1.87. *T-0037* said to be the worlds smallest low noise type transistor, measures only .115 wide and .18 inches tall! PNP, typical ratings same as 2N207. Beta-100, noise figure 5 db, price 75 cents. *T-1324* same typical ratings as the SB-103/2N346! PNP, germanium surface barrier, guaranteed to oscillate at 50 mc, 20 mw collector dis. Price—$1.65 (I bought four of these and everyone worked in the 6 meter superregenerative detector illustrated in the text). *2N226* medium power, 250 mw of audio, PNP, V_{cb} max — 30 volts, typical beta 60, price $1.65. All these transistors are brand new, and not surplus. I have checked and they certainly seem to be as advertised. I still find it hard to believe, but there it is! I also note that Arrow is handling the Audio Devices A750 silicon rectifier that I have used in previous articles. Amateur net—$1.57. ■

73, Don, W6TNS

by **BOB ADAMS, W3SW**
919 McCeney Road, Silver Springs, Md.

sideband sideband sideband

SIDEBAND

This month we wish to pay tribute to Lt. Colonel "Bob" Mitchell, USMC, W4RQR, for his efforts during the past several months in flying SSB gear into various Caribbean QTH's in order to make additional countries available to the DX-chasers. Bob's activity has created much interest in the places where he has worked and we understand there will be permanent side-band activity as a result. During the first week-end in May he operated from FG7XE and FM7WT using an HT-32 loaned by Hallicrafters and a Hi-Gain 10-40 meter vertical antenna. W4DCQ and W4NZG accompanied W4RQR on the trip. Previous countries visited were VP5, VP4 and VP6. Bob expects to operate from Cayman and Bermuda soon.

Mobile SSB operation is becoming very popular, due to the ease of installation and the efficiency exhibited by the Collins KWM-1. Several new Mobile tri-band antennas have appeared on the market including Bassett, Mosley and Heliwhip, so that band changing may be accomplished without delay while in motion. Eldico have announced their new SSB Mobile transmitter and Hallicrafters will have a complete mobile station, with most of the units transistorized, available soon.

The SSB Committee with Sam, W3HN as Chairman is working on plans to make the Single Side-Band Dinner to be held during the ARRL Tenth National Convention in Washington, D.C., on Saturday, August 16th the largest and best one held so far. Several well known speakers have been scheduled and there will be many valuable door prizes donated. Make your reservations early.

Frank, W6IAL advises that he will handle all W/K QSL's for HL9KR. His QTH is OK in any call book.

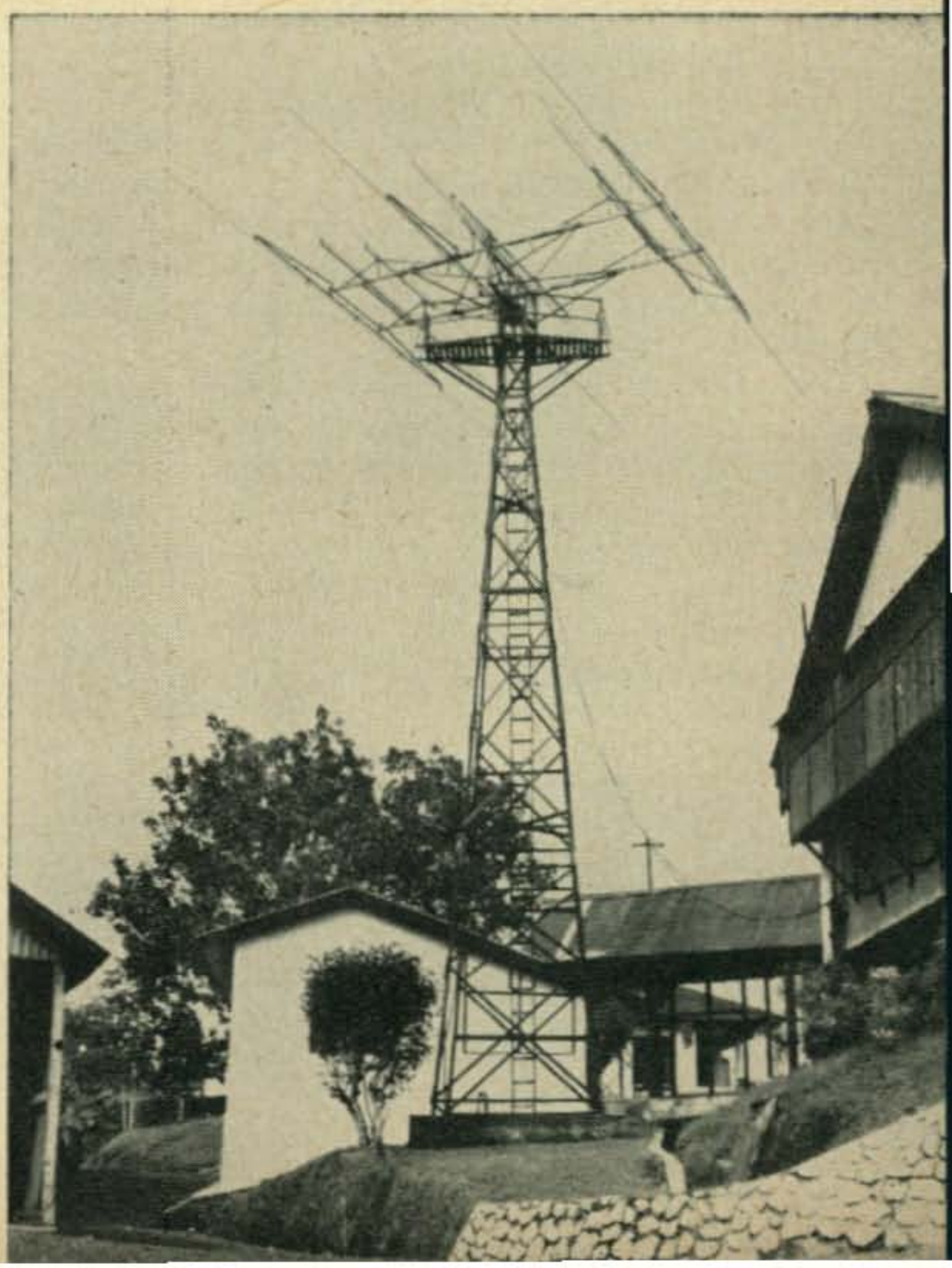
Martin, VE3MR who operated from HKØAI with TI2HP, continued on and to Nicaragua where he fired up his KWM-1 as YN1AP, on April 18th. On April 25 Martin operated as VE3MR/VP1 in British Guiana.

George, PJ2AA came on SSB on May 1st for the first time and is very active using a 20A a 300L into a G4ZU beam. He is now rock bound on 14, 294 but expects to receive additional xtals.

We are still in the process of checking and evaluating the hundreds of logs sent in from the last World Wide DX Contest and it has turned into a gigantic task. Many did not understand the rules for compiling their total

VQ4EO, Paul at Joe's QTH, 9G1BF.

Antenna at 9G1BF.



count and it has been necessary to figure the correct totals for them. We will publish the correct scoring rules for the next Contest so as to avoid all of the confusion now existing.

As of the moment, and be assured that it is strictly unofficial, it appears that Eva, CN8MM has done it again. Her score was a whopping 236,780. Looks like the second silver cup will find its resting place in Casa Blanca.

Peter, HB9IE operating on four bands made 516 contacts, with 55 Zone multipliers, 89 Country Multipliers with 1408 points gave Eva tough competition and placed second.

F7AF, Charlie made 532 contacts on three bands to place third with 181,480.

Bob, OD5BZ in Lebanon burned the midnight oil to score 177,974 for a close fourth place.

TI2HP, Humberto made 601 QSO's on five bands, 10, 11, 15, 20 and 40 meters for a score of 128,949. Only the point scoring rules of counting 1 for QSO's with USA and Canada prevented Humberto from being the winner.

Sixth place was won by ZS6KD with 108,-100. Empty used four bands and was only active for a few hours due to illness in the family.

ON4DM placed seventh with 100,674, resulting from 299 contacts on three bands.

Other scores are:

TG9AD—	63,956	VK6RU—	48,806
W9EWC—	59,249	KZ5WZ—	45,320
W3SW—	58,456	SM6SA—	44,978
KG4AQ—	52,002	W4JUR—	43,344
VK3AEE—	49,335	W4TO—	46,050

The 1 point for contacting stations in the same continent certainly hurt Del, KG4AQ who operated the entire twenty-four hours of the contest and made 551 QSO's.

Every one seems to have enjoyed themselves and there are many requests for another Contest before the end of this year. Your suggestions are welcomed for rules and point scoring etc.

Walt, K6GMA is now the proud possessor of a "Worked 100" certificate, and among his QSL's forwarded for verification were some beauties. Congratulations Walt!

Mac, K2QXG advises that Cyril, VK3AEE is now up to 123 countries worked.

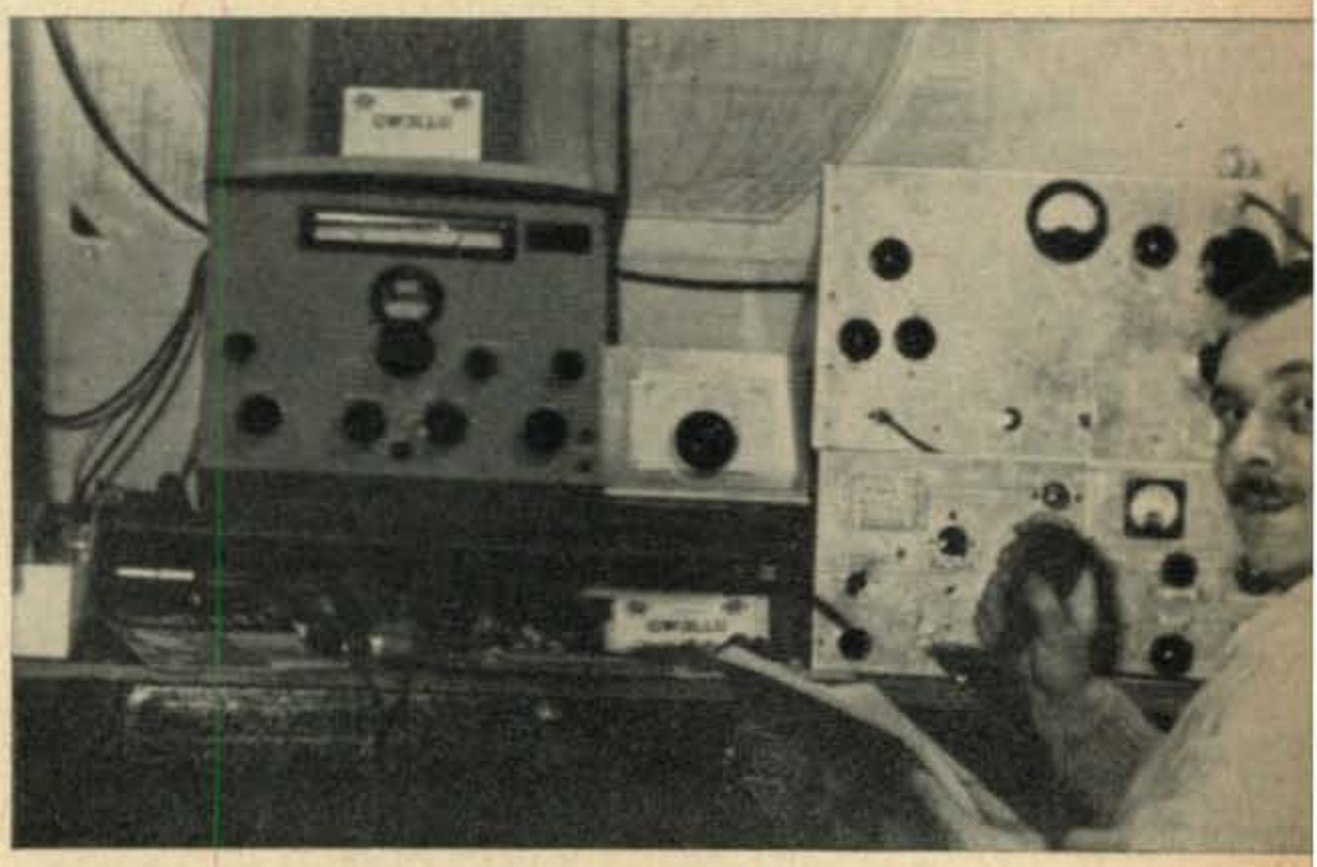
We understand that the SSB Dinner held in Dayton during the Annual Hamfesters Convention was a wonderful success. Sorry that I could not attend.

Todate the majority of suggestions resulting from our request for opinions as to whether we should move on up to 28,800 from around 28,650 are in favor of remaining where we are for the time being.

We welcome news of SSB Hamfests and Dinners held in various parts of the World. Group photos are particularly interesting to the readers of this column.

73, Bob, W3SW.

CX5AF, Deluxe.



Maurice, GW3LLU.

Don and Mick at 5A2TP

VHF

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

by **SAM HARRIS, W1FZJ**
P.O. Box 2502, Medfield, Mass.

The most "commented about" issue facing the VHF enthusiast today is "CW on six meters." The two most vociferous groups, naturally, on opposite sides. Group one consists mainly of the fellows (and gals) that make six meters a going concern today. They are the mainstay of activity on the band. Their efforts provide the majority of PICON, the bulk of your contest contacts, the QRM during openings, the QSO's during the non-open periods and the complaints when your signal is not up to snuff. It may be true that the majority of this group are technician class. It may also be true that they all use Gonsets or some such. Possibly they don't have the biggest antennas either. *But* they most certainly are the majority on six meters. And they most certainly do not want the bottom portion of the band set aside for cw use.

Group two comprises the so called "serious" dx worker. This group (and now I generalize) is interested in advancing the state of the art as concerns working dx. Their prime object is to work something new and difficult. They do not like CD nets, fire drills or local rag-chewing. They do like to work band openings, contests, meteor scatter and anything else that requires slightly more than the average amount of effort. Their pursuit of this hobby is greatly hampered by the presence of loud local signals. Particularly on the *low* end of the band. They feel (and rightly from *their* point of view) that a weak cw contact with someone in South Africa is more in the public interest than regular attendance on the CD net.

Now I could devote this whole column to a long dissertation concerning the "facts" involved in this argument. There are however, no *unbiased* "facts" to enumerate. There is only one person who can solve this problem. *YOU*. If you belong to either Group One or Group Two, *YOU* must write to your ARRL director and advise him. Form letters are available for both groups. More consideration will be given your letters if you state your feelings in your own words. If you do get, do not get, (underline the proper phrase) a cw band let it be because you wanted it that way.

Contests

The April contests netted the usual early season activity. No six meter openings in the New England area but lots of portable stations. Helen tied her last contest score with 217 contacts but was down in multipliers to a measly 39. This column goes to press before the deadline for logs so look for the final results next month.

Hamvention

Helen and I and most everybody else went to the Dayton Hamvention. As usual we were bolled over by the enthusiastic VHF group in Dayton. The affair (VHF wise) started Friday evening with a VHF Banquet held at the Avondale Club and attended by ninety some odd VHFers. In addition to being served one of the best banquet dinners I ever had, we were present when old Walt (W8ZCV) received the annual VHF man of the year award (and justly awarded too). Helen and I were presented with honorary memberships in the Miami Valley V.H.F. Club. (I showed some pictures and muttered away about something.)

The Miami Valley VHF Club maintained

Two meter contingent at the Dayton Hamvention. Not as numerous but real *potent*. There are at least five, thirty state men in that group.

open house in a suite at the Convention headquarters. I hesitate to mention any specific names like Ev Taylor (W8NAF) or Larry Brandenburg (W8TEK) for fear of slighting someone else who also worked hard to make the VHF section of the Dayton Hamvention a real success. If you missed it, you made a mistake. Make your plans now for next year.

Six Meter Century Club

Among other things at Dayton, we received in person the Number 1 YL application from Kay Brandenburg (K8IYW). Kay worked like a slave to get her 100 cards in time for the Hamvention. We didn't have our certificates with us but Kay still gets the "Microwave Associates VHF Achievement Plaque" for the very commendable efforts she made. I might point out that the number one all time YL C.C.C. was awarded to Elaine Busson (W8WRH) of Akron, Ohio. All told we collected about 20 applications for the Six Meter C.C.C. while at Dayton.

Meanwhile back at the ranch we have been getting about 10 applications a day and boy are we busy. First KL7 application came in from Jack Reich (KL7AUV). He almost had WAS to boot.

Two Meter Century Club

Finally got a certificate holder on the two meter band. Be it known by all here present that Stuart W. Banks (K1CRQ) is the first two meter operator to send in the necessary information for eligibility in the Two Meter Century Club. In addition to receiving the Number 1 Certificate for 1958, Stu wins the "Microwave Associates VHF Achievement Plaque". (There are a few Two Meter C.C. Certificates left. Hurry with your application.)

220 MC AND UP

Latest addition to the 220 mc C.C.C. listing is K2CBA. Old Judd lost a few antennas during the winter but he is still going strong. Judd lists 9 stations in four states. Best DX—200 miles to W3KKN. (Complete, up to date listing next month.)

Turkey Run VHF Picnic

On July 27, 1958, the Turkey Run VHF Picnic will be held at Turkey Run State Park, Indiana. This is a must for any VHFer within striking distance. See you there?

The San Bernardino Microwave Society

The San Bernardino Microwave Society, Inc., will hold a "Symposium on Amateur Microwave Communications Techniques" in place of the regular June meeting. The symposium will consist of a two hour session covering past and present progress in Amateur microwave work. The speakers will discuss general microwave theory and constructional details of equipment now in use. The talk will include slides and demonstrations. All interested Amateurs and others are welcome—If you can make it, remember the date—June 5, 1958, at 7:30 P.M., and the place, Chaffey College Annex (A-15), Euclid Avenue, Ontario, California.

Dayton Hamvention VHF Forum speakers. Me (W1FZJ), Frank (W1JVG), Ev (W8NAF), Tom (W8PBU) and old Bolide Horace (W8HAA). You could afford to miss me but you shouldn't have missed those other guys.

D-EXPEDITION

Received the following information from Art Rogerson (W1UXK), Leominster, Massachusetts:

"I thought you might be interested to know that Mac Maurer (W1QMS) and myself are taking a trip to Prince Edward Island during the first two weeks of July, 1958, for the express purpose of giving out with as many QSO's as we can on the bands 80 through 6 meters."

"Two rigs will be used on six meters. W1QMS will use a Gonset Communicator and W1UXK will use a TBS 50-C, receiving with a homebrew converter ahead of an HQ129-X. Antennas used will be Lunenburg 5 element beams."

"We have no idea what the propagation conditions will be like, but we are going to try to get through on six."

"Hours of operation at this time are undetermined, but we will be active between the 5th and 12th of July." *Good luck boys, hope this notice will alert the boys to your location in July and that you'll be loaded with six meter contacts.*

Muskegon, Michigan – From the area around Lake Michigan we get a report from Herb, (K8CIC).

Six meter land slide at the Dayton Hamvention VHF forum.

"Beam is now a ten element up 70 feet, will no doubt hear some signals coming through since the converter is very hot. I call out toward the east around 10:00 EST mornings, hoping that some of the gang can hear us."

"Long time no hear from the Eastern gang, things are very quiet here in Michigan. Did hear K2TYW yesterday for a moment, that is the first we have heard from that direction for quite a while. This past winter has been very good to us, left us with a lot of cards from KL7's, a JA8BU, ZE2, VQ2, HC1, PJ2, ZS3, ZS9, G3, plus we worked Oregon again and OUR QSL CAME this time. Three times we had to work them for one QSL. Thanks Ken, W7INX. We made his 46th confirmed, and he made our 46th confirmed."

"The six meter band is very poor QSL-wise, we are short over 150 cards ourself. So far it has been about 57% return. What is going to happen to the new fellows that are trying for WAS? They'll probably get about one out of three cards. I'll send a card for every new contact, and if you guys and gals need a card from Michigan toward WAS, call me during the summer openings, let me know that you need a QSL and you shall have one AT ONCE." *It's getting to be almost as big a problem on six meters as it is on the low frequencies, Herb. But knowing the VHF gang, I'm sure they'll respond better in the future.*

Meriden, Connecticut – Got a real good one this month from Doug (W1KLK) down Connecticut way.

"The Connecticut VHF Club has its first contest under its belt. The conditions were nothing better than average but it was lots of fun. The large antennas stayed on the ground for this one because of high winds. The equipment consisted of a Viking 2, powering a 6n2, crystal converter into an HQ140, and a 6 element beam on six meters. Two was taken care of by a 300 watt 4-125 rig, with W1QAK's latest effort in low noise converters (don't know what it had in the front end because I didn't have time to look) into an HQ150 with a 20 foot yagi for antenna. 220 was a 4-65 trans., te-craft, and 13 element yagi. The final score hasn't been totaled yet but enough was made on 6 and 2 to qualify for the VHF CC's. The use of cw on two got us on down to W4 land but when I put a key on the 6 meter rig I got the impression the boys didn't copy the no sideband mode."

"W1KAC has a 3E29 rig but no modulator. He is using an 8 element beam until he gets up his big beam which is supposed to contain 32 elements. His wife, K1BOI, is also active."

"Lee, W1OLG, the old man of two meters in Meriden has at last gone high power. He can be found trying to get more grid drive out of a 522 to his 826's around 147.34 mc. (Did someone say there was no activity above 146?)"

"W1EYF, W1ERE, W1OLG and myself passed the cold winter with some duplex trys. I found in working W1OLG that frequencies up to 15 kc apart would work. The work from W1EYF to W1ERE at Northford, over a much longer path needed a separation of 1 mc."

"W1ECI, John in Wallingford, is now on 220 and six, and has a new rig for 2 also."

"W1RJA, Milford, is now using SB on 2 but don't know how he generates it because I can't catch up with him."

"W1HDQ, Canton, is still without anything but a small six meter beam on the house. He is planning a drive on 220 because of the increased activity."

"W1REZ, Fairfield, is back in business and the A DE W1REZ is again being transmitted. You can't miss it."

"W2ONV has come back on from his new QTH with his kw and 32 elements."

"I received the VHF Institute Award for working the 25 stations above 146. It was no. 43 so there must be something going on up there."

KN1DWL, Jim, and KN1DWM, Lou are the latest additions to two in Meriden. They run a 522 with 6252 in the final, crystal conv. and 16 elements, not to mention 600 feet of hill under them."

"W1FHP, Bob, has had great success with his Connecticut VHF Net. Look for it on Monday, Wednesday and Friday nights at 2030 on 145. 9mc. If you cannot get on that frequency then Net Control tunes from 144 to 146 for stations. Everyone is welcome, just no cw, I tried once." *A very fine busines letter Doug, we'll be looking for more of them.*

San Antonio, Texas – From Gary (K5JWK) we get some mighty interesting information:

"I have just passed my Technician exam and plan to get on six meters very soon. The receiver here is a Hallicrafters S-53A with a pre-amplifier and a QF-1. The transmitter is a homebrew running about 20 watts. The final is an 832. I don't have any ideas on what kind of antenna to use, and I was wondering if you could give me some information on some good 6 meter antennas."

"There are about three 6 meter clubs here in San Antonio, and all of them offer certificates for working ten of their members."

"Here's the news! I will be working portable in New Mexico, Colorado, Utah, Wyoming, Idaho, Montana, Washington, Alaska, and Canada this summer." *Hope there are some good openings to the east for you Gary, while you're portable. Will you be a busy boy, if there is! ! Come on you San Antone boys, give Gary some antenna information.*

Milwaukee, Wisconsin – Vic Weissbrodt, W9JFP, emits on a transmitter hunt:

"On Sunday, March 16, 1958, The Milwaukee 6 Meter Emergency Corps, Civil Defense Net had a 6 meter transmitter hunt. The hunt started at 1330, from 60th and Capitol Drive in Milwaukee."

"The hidden transmitter was a Gonset Communicator planted in the Civil Defense room of the Milwaukee Police station at 47th and Vliet St. The antenna used was a 6 meter vertical on the Police tower 300 feet up. Now for the operator of the hidden transmitter we imported K9ESB and her husband from Evanston, Illinois. By having a girl operator the boys were really caught off their guard. The hunt was started at 1330 by W9ZBO about six miles north of the transmitter. Dottie, K9ESB, answered all calls and gave them S reports. The first car to find it was a group of Milwaukee boys, K9KCU, this was after an hour and 20 minutes; second place was W9ROS, Roselle, Illinois and third was K9IUA, Lombard, Illinois. About 23 cars started the hunt and at three thirty the hunt was called off, all cars congregated and the prizes were given out. A good time was had by all." *Sure sounds like it was fun, Vic. Let us know about the other fun your gang has.*

Austin, Texas – Marv Bloomquist (K5ABV) sez:

"Six has been open to ZL here. W5FXN worked ZL2 and ZL3 the 18th (April). W5VV and K5EBZ worked 'em on the 19th (April)."

"ZK1BS is on six now, 50.080 mc. Bill told me he would be on six every week-end he could. He has a tape cut and transmits the second 5 minutes of each half hour, listens the first five minutes. He made his first QSO's on the 19th with ZL3AQ and three other ZL's. Heard a W6 call him on the 19th, but guess no QSO."

"I'm not on six now but maybe will be on soon (by the time the DX is gone)." *Glad to hear that the DX is still holding out for you W5's. It's been long-gone here on the east coast.*

Montreal, Quebec – From our good neighbor, Canada, we hear the following from Dave McFall (VE2AUD):

"How about asking some of the boys in W1 and W2 land to shoot their beams northward once in a while. There are about a dozen of us active on two meters, around 144.300, most evenings and week-end mornings."

"I'm just waiting to get the ten element Yagi up and hook the 522 on it; I talked Tony, VE3DIR, out of one of his converters, so will be very active soon. Incidently Tony has his 4X150 on now—I wonder did he burn out his picture tube? I have a 4X250 to build around so I may be able to do something worthwhile with that. I hope to run it linear so would like to see some more on VHF SSB. Six meters is pretty well out up here as Channel 6 is a local."

"Right now I'm trying to get a 5894 ready for Field Day and will be operating around 144.300 and would appreciate the boys to look for the South Shore Amateur Radio Club Station, VE2ADX—we have a couple of prospective VHF mento work on over there." *Very nice to hear from you Dave, and to find out that there are*

[Continued on page 117]

by **THOMAS K. AALUND, K2VBI**
Box 13, Roslyn, L. I., New York

overseas echoes

Response to early issues of this column has been very gratifying, and comments have been received even from overseas, so we shall keep right on going. Recently we have received several requests for copies of articles we refer to in our column. We are of course not in a position to send reprints of articles, but upon request you may receive the mailing address of any of the magazines we mention in this column. While in most cases it should be possible to obtain copies of magazines, it is our assumption that some magazines can only be had in conjunction with a club membership of the club publishing the magazine. You may also borrow copies of foreign magazines from the writer of this column, who maintains a fairly complete collection. All that is required is a deposit of $2.00—no cash in the mail please—and we will send the desired copy if it is not out on loan at the time. Upon return of the magazine the deposit is refunded less cost of mailing and 10 cents handling charge (banks want money for printing checks, you know). **Please note new mailing address above.**

We received word from Bill, K1CLD, that the Radio Society of Great Britain, who publish the *RSGB Bulletin,* accept overseas memberships at the cost of $3.00 annually. This includes the *RSGB Bulletin* and certainly seems well worth the money, we think. Contact him for application blanks, or write directly to the RSGB.

If anyone would like to do a favor to a blind fellow amateur, this information may be of use: *RSGB Bulletin,* April 58, G, covers the design of an aural tuning indication unit which permits tuning the final for resonance as well as the exciter for maximum drive. The sound given off by this unit serves as an accurate indication and if you build a rig like this for an amateur who has lost the use of his eyes you'd make him very happy with only a little effort. The unit is far from complicated.

Interesting modulator ideas seem to be in fashion in foreign publications these days, and the 150 watt class B unit in the same issue is certainly no exception. The output is obtained from a pair of *KT88* with 750 v on the plates, in zero-bias operation, and if only 600 v are available, the output is 100 watts. An interesting feature is the power supply, which has *two rectifier circuits on the same transformer winding.* The bridge-connected rectifier supplies the plates of the output tubes, and a full-wave rectifier across the same taps delivers the lower voltage required for the driver screens as well as the input stages.

"Technical Topics" is a new regular feature of the *RSGB Bulletin,* starting in the April issue. This represents a survey of recent ham developments, and covers ideas suggested by individual hams as well as items noted in other publications, sort of an "Overseas Echoes" in reverse.

Last month this writer stuck his nose out with reference to 50 mc long distance echoes—I should now hide my head in shame. G4LX has received a letter from W7RT stating contact between W7RT and ZL1MQ on 50 mc. Then ZS3G works 4X4IX and F9BG on the same day—and most of us are still looking for states, never mind continents. From now on this writer will stick more closely to what belongs in this column.

REF, May 1958, F, carries the most comprehensive article covering SSB seen in quite some time. In over 16 pages principles are covered in detail, as well as the design of a complete station, with schematics even for the power supply. All in all—an excellent article which deserves the attention of every ham who understands French but somehow did not yet get started with SSB. The same magazine also carries a column for the beginner and in this issue the design of an all-band converter is the subject. Such items as physical lay-out etc. are fully covered making it useful to the newcomer to our hobby.

Coincidence—*REF,* May 1958, F, mentions that FA8RJ, who is trying to get himself a DXCC-YL diploma, and has already worked yl-s of 61 countries, recently got an award—or is it a reward in this case? He received his WAC-YL diploma, serial number 88 . . . . . .

If there is not too much variety in this month's column, this is due to the fact that some of the magazines do not reach us by our deadline each month, but we are sure that a flood of magazines will be received just after we go to press. So watch your mailbox (or are you not yet a subscriber???), as we think the August issue may have a surprise or two. Meanwhile—

best of luck and 73, Tom, K2VBI

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

PROPAGATION

Last minute forecast: Seasonably normal shortwave radio propagation condtions are forecast for the entire month of July except July 9-11 which may be somewhat disturbed.

July's Highlights

During July ionospheric disturbances tend to occur less frequently than during other months of the year, resulting in a comparatively stable ionosphere.

Because the sun remains high in the northern skies during July, night time usable frequencies are at their *highest* values of the year, with *20-meters*, and to a lesser extent *15-meters*, open to almost all areas of the world from shortly after sundown until after sunrise. On the other hand, during the daylight hours maximum usable frequencies are at their *lowest* level for the year. On many paths that supported *6-meter* openings almost daily during the winter months, the daytime MUF during July is expected to barely reach *10-meters*. The *10-meter* band is forecast to open fairly regularly to South America during the afternoon and early evening hours, and occasionally to other areas of the world. *Fifteen-meters* is expected to be the best band for daytime DX, opening to almost all areas of the world on many days of the month.

During July and the summer months there is a considerable increase in atmospheric noise levels in the United States. While the origin of static is not yet completely understood, it is generally known that most atmospheric noise is due to electrical discharges taking place in thunder storms. The static level at a particular location can be caused by both local and far distant storms, with the noise impulses from distant thunder propagated to the location by the ionosphere, similar to the propagation of actual radio waves. Most of the world's thunder storms occur in what is referred to as the equatorial weather front. In this area, thunder storms are present for more than half the time. During the summer months, this weather front moves northward from the equator, bringing a sharp increase in the number of thunder storms, and associated static, to the United States and the Northern Hemisphere in general. On the average, atmospheric noise increases by about 6 DB during the summer months. This means that signal levels must be at least twice as strong as they were during the winter months to maintain a fixed signal to atmospheric noise ratio. The increase in the static level is most noticeable on the *80 and 160-meter* bands, and generally poor propagation conditions are forecast for these bands during July. High static levels are also expected on *40-meters* during the daytime, but some DX openings should be possible during the night hours.

Sporadic-E propagation continues to increase during July with almost daily short-skip openings expected on *15 and 10-meters*. An occasional short-skip opening is forecast for *6-meters* as well as the possibility of some meteor type openings on this band during the last week of the month as a result of the Perseids and Aquarids meteor showers. These, as well as short-skip openings due to regular F-layer propagation, are shown in the *Short-Skip Propagation Chart* on the following page. The first digit shown in the parenthesis following the time of opening on this *Chart* applies to the shorter distance range for which the forecast is made, while the second digit applies to the longer distance.

Sunspot Cycle

The Zurich Solar Observatory reports a monthly sunspot number of 195 for April, 1958. This results in a *smoothed* sunspot number of 198 centered on October, 1957. As of last October the present cycle was continuing its unprecedented rise. This month's CQ forecasts are based on a predicted smoothed sunspot number of 163. Next month this column will contain an up to date graph of the present sunspot cycle, and a forecast of solar activity for the next 12 months.

73, George, W3ASK

ALL TIMES IN E. S. T.

EASTERN USA TO:	10/11 Meters	15 Meters	20 Meters	40/80** Meters
WESTERN EUROPE	8A - 1P (1) 1P - 7P (2) 7P - 9P (1)	7A - 1P (2) 1P - 3 P (3) 3P - 7 P (4) 7P - 11P (2) 11P - 7A (1)	10P - 4A (3) 4A - 6A (2) 6A - 1P (1) 1P - 3 P (3) 3P - 10P (4)	7P - 9P (2) 9P - 11P (3) 11P - 2A (2) 9P - 12M (2)**
CENTRAL EUROPE	1P - 6P (1)	7A - 1P (1) 1P - 4P (2) 4P - 7 P (3) 7P - 9P (1)	1P - 3P (1) 3P - 6P (2) 6P - 10P (3) 10P - 5A (2)	8P - 1A (2) 9P - 11P (1)**
EASTERN MEDITERRANEAN	12N - 3P (1) 3P - 5P (2) 5P - 7P (1)	7A - 11A (1) 11A - 1P (2) 1P - 5P (3) 5P - 10P (2) 10P - 1A (1)	12N - 4P (1) 4P - 11P (3) 11P - 6A (2)	8P - 11P (2) 9P - 10P (1)**
NORTH & CENTRAL AFRICA	9A - 12N (1) 12N - 5P (2) 5P - 7P (1)	5A - 11A (1) 11A - 2P (2) 2P - 8P (4) 8P - 11P (3) 11P - 5A (2)	1P - 5P (2) 5P - 1A (4) 1A - 7A (2)	7P - 2 A (1) 9P - 11P (1)**
SOUTH AFRICA	7A - 11A (1) 11A - 3P (2) 3P - 7P (1)	12N - 2P (1) 2P - 4P (2) 4P - 7P (3) 7P - 10P (2)	2P - 4P (2) 4P - 9P (3) 9P - 1A (2) 1A - 5A (3)	8P - 1A (1)
SOUTH AMERICA	12N - 7P (1)* 7A - 2P (2) 2P - 6P (3) 6P - 9P (2) 9P - 1A (1)	6A - 9A (3) 9A - 3P (2) 3P - 5P (3) 5P - 10P (4) 10P - 6A (2)	1A - 7A (3) 7A - 3P (2) 3P - 6P (3) 6P - 1A (4)	7P - 1A (2) 1A - 6A (3) 11P - 5A (1)**
AUSTRALASIA	7P - 10P (1)	5P - 7P (1) 7P - 9P (2) 9P - 11P (3) 11P - 3A (2) 3A - 9A (1)	3A - 6A (2) 6A - 8A (3) 8A - 10A (2) 9P - 11P (2) 11P - 3A (3)	1A - 6A (2) 2A - 5A (1)**
MALAYA & SOUTH EAST ASIA	NIL	6A - 11A (1) 3P - 5P (1) 5P - 8P (2) 8P - 10P (1)	6A - 8A (1) 8P - 12M (2)	NIL
GUAM & PACIFIC	NIL	5P - 7P (1) 7P - 11P (2) 11P - 1A (1)	7P - 10P (1) 10P - 3A (2) 3A - 6A (1) 6A - 10A (2)	NIL
JAPAN & FAR EAST	NIL	6A - 9A (2) 5P - 7P (1) 7P - 10P (2) 10P - 12M (1)	7P - 9P (1) 9P - 2A (2) 2A - 6A (1) 6A - 9A (2) 9A - 12N (1)	NIL
PHILIPPINE IS. & EAST INDIES	NIL	2P - 5P (1) 5P - 10P (2) 10P - 1A (1)	6A - 9A (1) 6P - 12M (1)	NIL

ALL TIMES IN C. S. T.

CENTRAL USA TO:	10/11 Meters	15 Meters	20 Meters	40/80** Meters
WESTERN & CENTRAL EUROPE	12N - 2P (1) 2P - 4P (2) 4P - 6P (1)	7A - 2P (2) 2P - 6P (3) 6P - 9P (2) 9P - 7A (1)	5A - 2P (1) 2P - 6P (2) 6P - 11P (4) 11P - 5A (2)	8P - 11P (2) 11P - 1A (1) 9P - 11P (1)**
SOUTHERN EUROPE & NORTH AFRICA	9A - 1P (1) 1P - 3P (2) 3P - 5P (1)	6A - 12N (1) 12N - 6P (3) 6P - 10P (2) 10P - 6A (1)	2A - 3P (1) 3P - 5P (2) 5P - 8P (4) 8P - 12M (3) 12M - 2A (2)	8P - 11P (2) 11P - 1A (1) 9P - 11P (1)**
CENTRAL & SOUTH AFRICA	7A - 9A (2) 9A - 1P (1) 1P - 6P (2) 6P - 7P (1)	3A - 12N (1) 12N - 2P (2) 2P - 7P (3) 7P - 9P (2) 9P - 12M (1)	12N - 4P (2) 4P - 9P (3) 9P - 2A (2)	7P - 11P (1)
SOUTH AMERICA	12N - 7P (1)* 6A - 12N (2) 12N - 3P (3) 3P - 6P (4) 6P - 11P (2)	6A - 9A (3) 9A - 2P (2) 2P - 4P (3) 4P - 11P (4) 11P - 6A (2)	2A - 8A (3) 8A - 2P (2) 2P - 4P (3) 4P - 2A (4)	7P - 4A (3) 4A - 7A (2) 10P - 4A (1)**
McMURDO SOUND ANTARCTICA	1P - 4P (2) 4P - 6P (1)	12N - 2P (1) 2P - 4P (2) 4P - 6P (3) 6P - 8P (2) 8P - 10P (1)	4P - 6P (1) 6P - 11P (3) 11P - 6A (2) 6A - 8A (1)	10P - 4A (2) 12M - 3A (1)**
JAPAN & FAR EAST	7P - 10P (1)	6A - 9A (1) 4P - 8P (2) 8P - 11P (3) 11P - 1A (1)	5P - 7P (2) 7P - 2A (3) 2A - 6A (1) 6A - 8A (2) 8A - 12N (1)	2A - 6A (1)
MALAYA & SOUTH EAST ASIA	NIL	6A - 9A (1) 1P - 4P (1) 4P - 9P (2) 9P - 11P (1)	6A - 9A (1) 6P - 11P (2) 11P - 1A (1)	NIL
HAWAII	4P - 6P (1) 6P - 10P (2)	7A - 2P (2) 2P - 5P (3) 5P - 10P (4) 10P - 4A (2)	2A - 4A (3) 4A - 7A (2) 7A - 9A (3) 9A - 5P (2) 5P - 2A (4)	10P - 7A (3) 11P - 6A (2)**
AUSTRALASIA	5P - 10P (2)	4P - 6P (2) 6P - 10P (3) 10P - 1A (2) 1A - 6A (1) 6A - 9A (2)	8P - 10P (2) 10P - 3A (4) 3A - 6A (2) 6A - 8A (3) 8A - 10A (2)	1A - 6A (3) 2A - 5A (1)**

ALL TIMES IN P. S. T.

WESTERN USA TO:	10/11 Meters	15 Meters	20 Meters	40/80** Meters
EUROPE & NORTH AFRICA	NIL	6A - 8A (2) 8A - 10A (1) 10A - 2P (2) 2P - 6P (3) 6P - 8P (2) 8P - 12M (1)	1P - 3P (1) 3P - 5P (2) 5P - 10P (3) 10P - 1A (2) 1A - 4A (1)	7P - 11P (1)
CENTRAL & SOUTH AFRICA	3P - 6P (2)	11A - 1P (1) 1P - 3P (2) 3P - 6P (3) 6P - 12M (2)	6A - 8A (1) 2P - 4P (2) 4P - 7P (3) 7P - 12M (2)	7P - 11P (2)
SOUTH AMERICA	12N - 7P (1)* 6A - 10A (2) 10A - 12N (3) 12N - 6P (4) 6P - 8P (2) 8P - 11P (1)	5A - 7A (3) 7A - 12A (2) 12N - 3P (3) 3P - 8P (4) 8P - 5A (3)	2P - 4P (2) 4P - 12M (4) 12M - 4A (3) 4A - 8A (2) 8A - 2P (1)	6P - 8P (2) 8P - 11P (3) 11P - 3A (2) 9P - 12M (1)**
GUAM & PACIFIC ISLANDS	12N - 2P (2) 2P - 7P (1) 7P - 10P (2) 10P - 12M (1)	12N - 7P (1) 7P - 10P (2) 10P - 4A (3) 4A - 12N (2)	8P - 12M (2) 12M - 6A (4) 6A - 10A (3) 10A - 12N (2)	1A - 6A (2) 2A - 4A (1)**
AUSTRALASIA	1P - 5P (2) 5P - 10P (4) 10P - 12M (2)	12N - 2P (2) 6P - 8P (2) 8P - 11P (4) 11P - 3A (2)	8P - 10P (2) 10P - 2A (4) 2A - 8A (2) 8A - 10A (1)	10P - 12M (1) 12M - 4A (2) 4A - 6A (1) 12M - 3A (1)**
JAPAN, OKINAWA & FAR EAST	12N - 6P (1) 6P - 11P (2)	7A - 12N (3) 12N - 7P (2) 7P - 12M (4) 12M - 7A (2)	9P - 12M (3) 12M - 4A (4) 4A - 9A (3) 9A - 12N (2) 12N - 9P (1)	1A - 5A (2) 2A - 4A (1)**
PHILIPPINE IS. & EAST INDIES	2P - 8P (1) 8P - 10P (2)	7A - 12N (3) 12N - 3P (2) 3P - 9P (1) 9P - 2A (2) 2A - 7A (1)	10P - 2A (1) 2A - 6A (2) 6A - 8A (3) 8A - 11A (2)	3A - 6A (1)
MALAYA & SOUTH EAST ASIA	11A - 2P (2) 2P - 6P (1) 6P - 8P (2) 8P - 10P (1)	7A - 12N (3) 12N - 3P (2) 12M - 2A (1)	12M - 6A (1) 6A - 9A (3) 9A - 12N (2) 12N - 2P (1)	4A - 7A (1)
HONG KONG, MACAO & FORMOSA	12N - 6P (1) 6P - 10P (2)	7A - 12N (3) 12N - 4P (2) 4P - 9P (1) 9P - 7A (2)	10P - 2A (2) 2A - 7A (3) 7A - 9A (2) 9A - 12N (1)	2A - 6A (1) 3A - 5A (1)**
NEW ZEALAND	12N - 4P (2) 4P - 8P (3) 8P - 10P (2)	11A - 1P (2) 1P - 5P (1) 5P - 9P (3) 9P - 12M (2)	7P - 9P (2) 9P - 12M (3) 12M - 8A (1)	11P - 2A (3) 2A - 6A (2) 11P - 4A (1)**

CQ PROPAGATION CHART (SHORT-SKIP)

BAND (METERS)	DISTANCE (MILES) 50-250	250-600	600-1200	1200-2200
10	NIL	NIL	8A - 2P (1-3) 2P - 8P (2-3) 8P - 12M (1-2) 12M - 8A (1)	8A -2P (3-1) 2P - 8P (3-2) 8P - 12M (2-1) 12M - 8A (1)
15	NIL	8A - 12N (0-1) 12N - 4P (0-2) 4P - 8P (0-1)	8A - 4P (2-3) 4P - 7P (3-4) 7P - 12M (2) 12M - 7A (1)	8A - 4P (3-4) 4P - 7P (4) 7P - 12M (2-3) 12M - 7A (1-2)
20	NIL	6A - 11A (1-3) 11A - 3P (1-4) 3P - 8P (1-3) 8P - 6A (0-2)	6A - 10A (3-4) 10A - 4P (4) 4P - 9P (4-5) 9P - 6A (2-3)	6A - 10A (4) 10A - 4P (4-3) 4P - 9P (5) 9P - 6A (3-4)
40	6A - 10A (2-3) 10A - 8P (5) 8P - 10P (3-4) 10P - 6A (2-3)	6A - 9A (5-4) 9A - 5P (4-2) 5P - 12M (5) 12M - 6A (2-4)	7P - 2A (5) 2A - 5A (4) 5A - 8A (3-2) 8A - 5P (2-1) 5P - 7P (4-3)	5P - 8P (3-2) 8P - 5A (5-4) 5A - 7A (2-1) 7A - 5P (1-0)
80	8A - 11A (5-3) 11A - 6P (4-2) 6P - 5A (5)	8A - 7P (2-1) 7P - 9P (3-2) 9P - 5A (5) 5A - 8A (3-2)	8P - 10P (2-1) 10P - 4A (4) 4A - 7A (3-1)	8P - 10P (1) 10P - 4A (4-3) 4A - 6A (2-1)
160	6P - 8P (3-2) 8P - 5A (5) 5A - 8A (3-2)	7P - 9P (2-1) 9P - 4A (5-3) 4A - 6A (4-2) 6A - 8A (2-0)	9P - 4A (3-2) 4A - 6A (2-0)	9P - 4A (2-1)

SYMBOLS FOR NUMBER OF DAYS CIRCUIT FORECAST TO OPEN

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

* Indicates possible six-meter openings
**Indicates possible eighty-meter openings

Time Symbols: A - A. M. N - Noon
P - P. M. M - Midnight

The CQ DX Propagation Charts are based upon a radiated CW power of 150 watts at radiation angles less than thirty degrees and are centered on the Eastern, Central and Western areas of the USA. They are valid through August 15, 1958. The CQ Short-Skip Propagation Chart is based upon a radiated CW power of 75 watts, using a dipole antenna a half-wave length above ground. It is valid through August 31, 1958. All forecasts are based upon ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

YL

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

AWTAR

About the time you read this, women pilots from all over the U.S. will be converging on San Diego, Calif. for the 12th Annual All-Woman Transcontinental Air Race. As they have every year since 1952, the amateurs will again provide a communications net to handle messages for the pilots and co-pilots, their families, and race officials. Race chairman, Betty Gillies, W6QPI, and the race participants, feel that the radio net is an essential part of the Powder Puff Derby and are grateful for the assistance of the many Hams.

Chairman for the 1958 AWTAR radio net is W3GTC, Carolyn Currens. She lists these frequencies to be used during the race:

July 4 through 9, AWTAR net
40 meters–72.10
75 meters–39.53

Chairmen so far lined up for the stop-over cities are:

San Diego, Calif. . . . . W6GGX, Pat
El Paso, Tex. . . . . W5KOK, Erv
Midland, Tex. . . . . K5ODH, George
Abilene, Tex. . . . . K5CEN, Judith
Tyler, Tex. . . . . K5IMD, Betty
Charleston, S. C. . . . . Charleston Amateur Radio Club

Many other amateurs besides those mentioned will be helping to relay the traffic. Some of the stations will be using SSB; some will be set up with equipment supplied by Hallicrafters.

W3GTC, Carolyn Currens, AWTAR radio net chairman for 1958.

More Young YLs

Two young YLs at Glouster, Ohio, are Reta Bryan Dougherty, W8HPP, and Karla Hambel, KN8HDO.

Reta is 18 and has had her General class licensed since 1953. She started with a Novice when in the 8th grade. Graduating from high school in 1956, she now is working for the State of Ohio, Dept. of Natural Resources, as a radio dispatcher. Reta's dad is W8LGR. He learned the code and became interested by listening to her as a Novice, receiving his license a year after she did. They run a Viking 500 and SX-101 and operate 10 through 80, but prefer 75 phone and 80 cw. W8HPP is NCS of the Doghouse Net and the Ohio Phone Net. She enjoys the Ohio QSO Parties and in '56 she won 3rd place trophy in the state and in '57 won first place trophy on 75 phone. Reta was married in Aug. '57; now her OM has his Novice license.

Karla Hambel is a 15-year old high school student who will be entering her junior year in the fall. Karla received her Novice license in July, '57 and by the time this is in print will probably have her General. She became interested when station WATH announced the local radio club was going to give code practice. At present Karla uses a Viking Adventurer 50-watt transmitter and an SX-96 receiver, with an SX-43 on the way. She works 80 meters and with the General she plans to work 80 and 75, with maybe a little DX. Thanks to W8CRS who gave her code instruction, she especially enjoys cw operation.

If you work Karla on the air you'd never know she was born without arms; her hands are at her shoulders. In addition, she has been walking for only four years and does so now

15-year old Karla Hambel, KN8HDO, will be a high school junior this fall.

with a brace. She has had ten operations starting when she was three years old. This past year was Karla's third year in public school, her first seven years being home instruction.

Her handicaps have proved little obstruction to Karla. She made the school Honor Roll her first and second years of High School. She plays the bell lyre in the school band, and attends all the school football games. Active in her church, she also was a Girl Scout for two years. Besides Ham radio, Karla likes to read, and figures she has read about 550 books in the last five years. At one time she had pen pals in 43 states and a few foreign countries, but gave them up due to school work. Another hobby is making and selling shell jewelry.

With the Clubs

On April 26 members of WAYLARC and the Penn-Jersey YL Club met in Philadelphia for their annual get-together. After dinner at the Original Bookbinder's Restaurant in Old Philadelphia, they enjoyed a visit to the QTH of P-J club president W3BIW in Bryn Mawr. Those attending: W3's AKB, CDQ, RXJ, TSC, UXU, AAU, APT, BIW, GTC, JST, SBE, SLF, TNP, UQE, VNN and YLRL VPW4BLR.

The Floridora YLs met for their first anniversary celebration during the Orlando Hamfest April 12-13. New officers elected: President, W4BWR, Ruth; VP, W4KOH, Ernie; S-T, K4LCD, Margaret, P/C, K4LPV, Irene.

SPARCYLS of St. Petersburg also have new officers for 1958: President, W4WPD, Shirley, VP, W4TDK, Naomi; S-T, W4BIL, Fran.

The 3C's of Sacramento have a new secretary—W6VHT, Evie; K6UZA, Dorie, resigned because of moving to Paradise (Calif.).

The Los Angeles YLRC has elected new officers for the 1958-59 season, to be installed at special ceremonies at their June meeting. President, W6JZA, Elsa; VP, K6BUS, Midge; recording sec., K6PFY, Pat; corresponding sec., W6AVF, Mary; treas. K6OQD, Jean. The L.A. YLs are sorry to lose one of their members—W6QWC, Gracie Woodhouse, joined the Silent Keys.

1958 officers for the South African W.R.C. are: President, ZS6YL, Toni; VP, ZS6AIL, Marlene; S-T, ZS6GH, Diana.

"CQ YL"

Do you have your copy yet? "CQ YL" is the first, the only, book recording the part YLs have played in Ham radio. 165 pages, 18 chapters, 500 photographs—it covers every phase of YL Ham radio from 1913 to 1958.

In Chapter 11, "Wartime Service," for instance, is gathered together for the first time a full account of the YLs' important contribution to their country during WW II. Ten pages in length, it includes many photos of the YLs, some in uniform of the armed forces. It includes YLRL member K6TCW's on-the-spot description of "Pearl Harbor," W2JZX's "swan song" transmission for the duration, after all other stations were cleared from the air, together with individual listings by call of nearly 200 YLs and their wartime work—in the serv-

[*Continued on page 116*]

18-year old Reta Dougherty started as a Novice when in the 8th grade.

by **FRANK ANZALONE, W1WY**
14 Sherwood Road, Stamford, Conn.

CONTEST CALENDAR

September	**6– 7**	**LABRE CW**
September	**13–14**	**LABRE Phone**
October	**4– 5**	**VK/ZL Phone**
October	**11–12**	**VK/ZL CW**
October	**11–12**	**Peruano Phone**
October	**18–19**	**Peruano CW**
October	**25–26**	**CQ WW DX Phone**
November	**29–30**	**CQ WW DX CW**

LABRE

As usual, the PY boys start the contest season rolling with their annual party the first two week-ends in September.

DATES–CW, 0001 GMT Sat., Sept. 6th to 2400 GMT Sun., Sept. 7th.
Phone, -0001 GMT Sat., Sept. 13th to 2400 GMT Sun., Sept. 14th.

SERIAL NRS.–The usual five and six figures. Signal report plus a progressive three digit number starting with 001.

POINTS—(a) Between stations in the same country, 0 points; but allowed for purpose of obtaining multiplier. (b) Between stations of different countries, outside the American area, 1 point. (c) Between stations of different countries, in the American area, 2 points. (d) Between stations in the American area and all other countries of the world, 3 points.

MULTIPLIER—Two types will be used. (a) 1 for each American area country worked on each band. (b) 1 for each Brazilian call area (PYL to PY9) worked on each band.

SCORING—Single Band score is the sum of both multipliers, multiplied by the contact points on that band. Multi-Band score is the sum of the total multipliers on all bands, multiplied by the total of contact points on all bands.

Entries who send in a log for one band are eligible for a Single Band award only. Those who submit logs for three or more bands are eligible for the Multi-Band award, as well as the Single Band award.

AWARDS—1st and 2nd place certificates will be awarded to each country and to each Brazilian call area. (a) To the highest scorer on each Single Band, Phone and CW. (b) To the highest multi-band scorer (minimum of three bands) Phone and CW.

All bands may be used, 3.5 thru 50 mc.

Be sure your summary sheet contains your address and that you sign a pledge that all rules have been observed.

Mail logs to—LABRE Contest Commission, Caixa Postal 2353, Rio de Janeiro, Brazil.

VK/ZL

This popular contest from "Down Under" is sponsored by the NZART this year. Rules therefore revert back to the pattern used in 1956.

DATES–Phone, 1000 GMT Sat., Oct. 4th to 1000 GMT Sun., Oct. 5th.
CW, 1000 GMT Sat., Oct. 11th to 1000 GMT Sun., Oct. 12th.

SERIAL NRS.—The usual five and six figures. Signal report plus a progressive three digit number starting with 001.

SCORING—One point per contact, multiplied by the total number of VK and ZL districts worked on all bands. There are 5 ZL and 9 VK districts.

AWARDS — Attractive certificate to highest scorer in each country and USA call area. *(Ed. note: They are attractive, I've seen one.)* There are also awards for SWLs.

LOGS—(a) Must show in this order: Date, time in GMT, station worked, serial numbers sent and received and each new district worked. (b) Use a separate sheet for each band. (c) Summary sheets to show call, name and address (use block letters) and summary of the total score. A signed declaration that all rules have been observed is also requested.

Your logs must reach the N.Z.A.R.T. Contest Committee, Box 489, Wellington, New Zealand, not later than January 23, 1959.

PERUANO

The Radio Club Peruano is again sponsoring this Panamerican contest. Last year the operation was confined mostly to Phone but more CW activity is promised for this year's affair.

DATES–Phone, 1200 EST Sat., Oct. 11th to 2400 EST Sun., Oct. 12th.
CW, 1200 EST Sat., Oct. 18th to 2400 EST Sun., Oct. 19th.

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ham clinic

by **CHARLES J. SCHAUERS, W6QLV**

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

Troubleshooting electronic equipment is not difficult unless one makes it so. Every circuit in every transmitter, receiver, recorder etc. possesses inherent operational parameters and when there is deviation from them one has trouble.

The wise ham, after he has purchased a piece of ham gear, carefully reads his instruction book and *immediately* checks all recommended operational voltages and currents as detailed usually under the book's trouble-shooting section. He notes the slight variations and makes up his own chart for his own particular piece of gear.

If he constructs his own equipment, he will also carefully note operating characteristics and be well prepared to shoot trouble should it arise.

The best troubleshooting ham is the one who looks for the simplest causes of trouble *first*. Too many amateurs however, are prone to "dig" into the "innards" before they have looked at the "patient's tongue".

For years I have used the following sequence for troubleshooting ham radio equipment with success; maybe it will pay off for you too—someday.

1. Check fuses; if blown, look for shorts or overloads. 2. Check tubes; replace if necessary. 3. Use ohmmeter and check B plus and filament circuits for shorts before making voltage and current tests. (Note: be careful in transistor circuits when using an ohmmeter—be sure you have the correct polarity and that the meter voltage is below maximum operating level of condensers (electrolytics) *and* transistors). 4. Reduce power input to the equipment before making voltage and current tests. 5. Check voltages and currents of each stage and compare them with those on your "trace chart", *after* you have brought input voltage slowly up to normal. 6. Low voltage readings may be caused by: resistors which have changed value ("gone high"); partially shorted condensers; shorted transformer windings; open coils (no voltage); shorted tubes; partially open chokes etc. 7. High voltage readings may be caused by: shorted resistors; shorted coupling condensers; defective transformers and/or filters, chokes or regulator tubes. 8. On receivers, signal trace each stage until defective stage is located. In transmitters, begin with the oscillator and check for operation through to buffer-doublers etc. to final; note grid current and plate current in each stage.

If you look for the simplest causes of trouble first, nine out of ten times you'll find it!

Observations

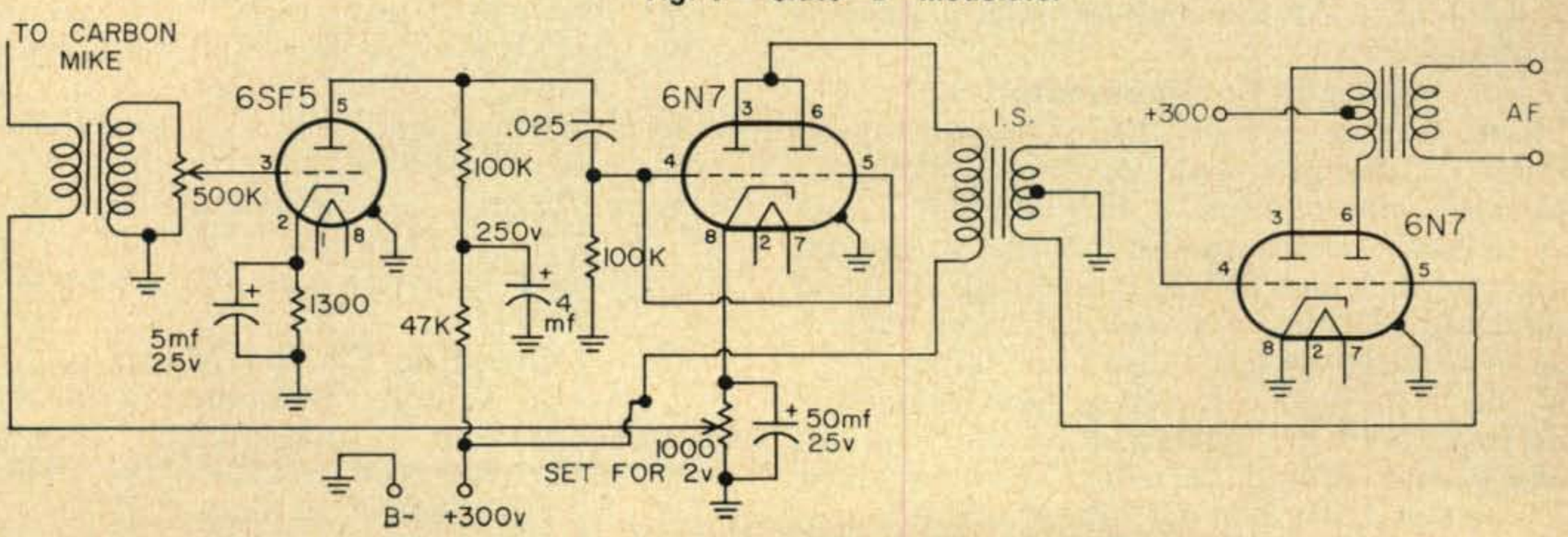
Electricity in the United States is very inexpensive compared to Europe. This may be one of the reasons that there are not more hams on the air over here (Europe).

I was amazed to find that just for the ordinary appliances, electricity bills of up to $40.00 per month are not uncommon!!

In France, three electricity rates prevail depending upon the number of appliances one has in his home. Most American Service families can qualify for the lowest or commercial rate—but it is still expensive compared to W-land. Too, most houses are fused for only 15 amps and one must be careful that he does not exceed this amount. Re-wiring is of course the answer, but this is expensive too.

Maximum amateur radio transmitter power

Fig. 1 — Class "B" modulator



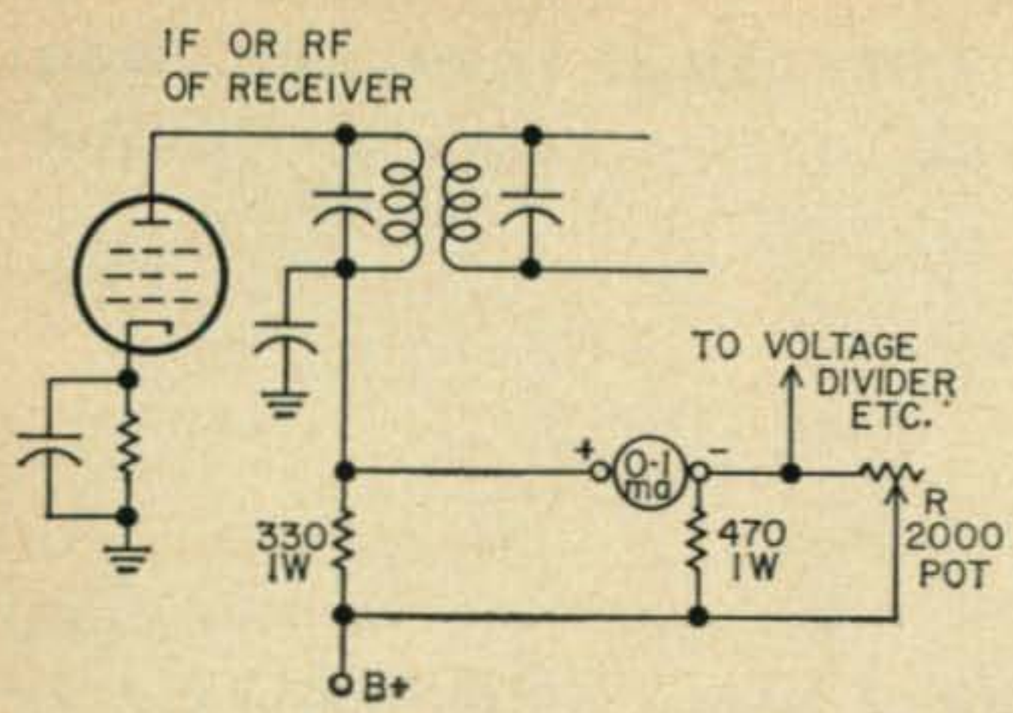


Fig. 2 — Simple tuning indicator.

in France is 100 watts. The Ministry of P.T.T. (like our FCC) *actually* inspects *every* station to see that it complies with regulations. The French inspectors are well qualified technically, courteous and extremely helpful.

It is amazing what some French radio amateurs can do with little equipment! I have no doubt that many amateurs in the United States could take lessons from most of them in squeezing out highest efficiency for the least money.

The accent over here (throughout Europe) is on antenna efficiency. Working the world with 10 watts is not at all uncommon.

So from here on in, I'm a *low* power man—I am sure there are a few French amateurs within a radius of 200 miles who will lend me a hand in putting up a tall pole. When the time comes, I'll furnish the sausage and wine!

Questions

V. R. San Diego writes: "I have a power transformer which at times sounds like a "buzz saw." Any way to stop the terrible hum short of throwing it out?"

Yes Vance. First off, make sure it is *not* overloaded. Replace retaining bolts (usually four) with one size larger (for greater torque), then tighten core laminations using either a vice or "C" clamps. Make sure you use good solid lockwashers. Casing the transformer may help too. Be certain core windings are straight and properly fitted. Hum can be caused by either winding or core movement.

Viking II

"My Viking II's final suddenly takes off and fuses go. The 6146s were boiled. Any ideas as to trouble?" asks B. J. Los Angeles.

Yes. K2HXA says he had the same trouble —and found it. An intermittent open in ground end of bleeder.

Gonset Communicator

M. A. Chicago writes: "What is your *frank* opinion of the new Gonset Communicator?"

My personal opinion is this: TOPS! Those boys at Gonset certainly did improve it. Besides better audio, it has a better receiving dial and other good features. For a single band set it is hard to beat. However, I also like Hallicrafter's new SR-34 (2 and 6 meter combination) too. This is a small but powerful communications package and should be considered by those interested in both 2 and 6 meter operation.

Transistor Power Transformer

L. A. Oakland, California writes: "I need a transformer to work with transistors in a mobile power supply which will give me 600 volts at about 180 mils with 12 or 14 volts input. Know where I can get one?"

Yes. Ask your distributor (Elmar's) for Triad's new TY74S transformer.

Viking Adventurer

F. D. Kansas City wants to know the cheapest way to modulate a Viking Adventurer transmitter.

Screen modulate it. Johnson makes just such a device which sells for only $12.25. It can be used on other transmitters too using an 807 or 6146 final.

Defective Transformer

N. A. Cleveland writes: "I built up an amplifier using surplus parts. When I first turned it on it seemed to work ok. Later on it became intermittent. I noticed a smell but could not pinpoint it. All parts seem to check okeh. I did notice though that on voltage check that my meter needle would sometimes not stay put. Please tell me what to look for."

I'll bet it's your power transformer or choke with an intermittent open. Check both when hot and cold. If you can, substitute.

Mobile Modulator

H. R. San Antonio asks: "Can you supply a diagram for a 10 watt class "B" amplifier for mobile use, using the old reliable 6N7 in its output and requiring only one driver (plus speech)?"

Usually, when a question like this comes in we refer the writer to a handbook. But this time we will publish a circuit (tested). See Figure 1.

Chirp

J. A. New Jersey asks: "What's the *main* (sic) cause of chirp?"

Presume you mean CW chirp. Well, it is usually due to poor voltage regulation, overloading or both. However, it can be caused by a bad crystal or poor oscillator isolation.

BC Interference

G. G. Washington, D.C. writes: "My table model broadcast set picks up some ham in the neighborhood regularly and spoils my programs. What do I do?"

We receive a lot of letters of this type. Our advice is always: obtain the services of a good radio repairman and ask him to bypass the input grid of the first audio with a 2 to 10 megohm resistor and a 500 mmf ceramic condenser. A small choke or a resistor of about 50,000 ohms in series with the grid will help too.

Question Of The Month

L. W. of Temple, Oklahoma writes: "My problem concerns locating rockets after firing them. My science club of which I am President

[*Continued on page 114*]

Novice

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

The desk is loaded with news and views, lots of DX reports, and requests for help with the FCC test. The weather is hot and the sky is clear. So stretch out under the nearest shade tree and let's review the Novice news for this month.

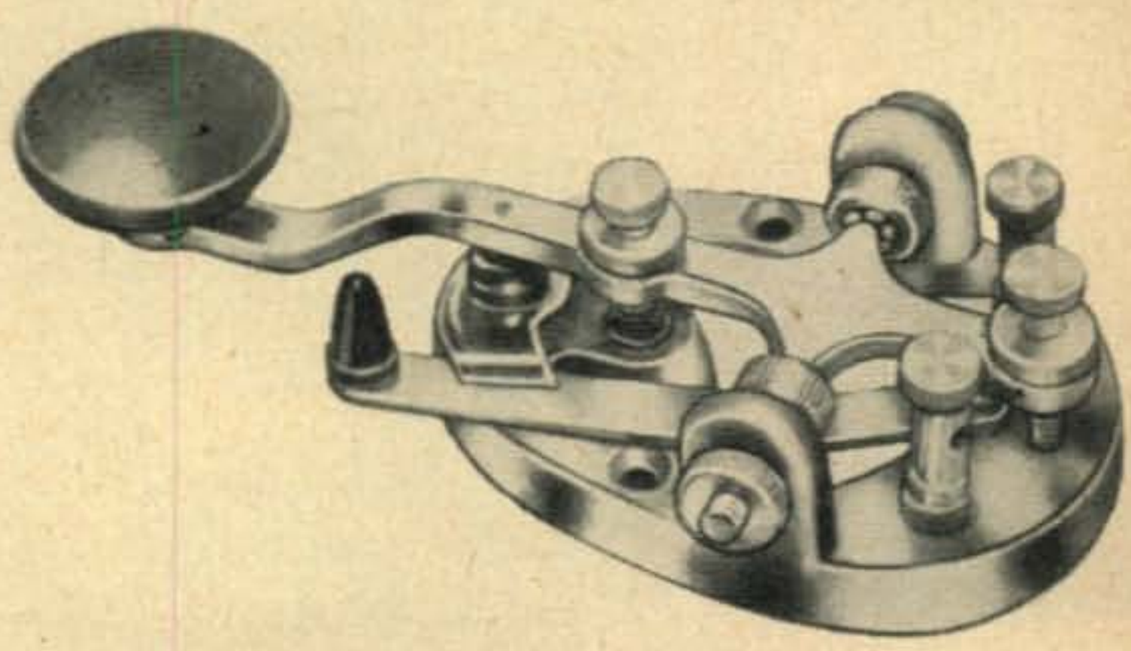
First on the agenda is space. Yep, we need more space in CQ Magazine to write up more construction articles. All the columns will be reduced in size slightly to make room for the soldering iron boys and the Novice column is feeling the pinch. Next time you write about your station and activities, add a paragraph about what you would like to see in the Novice column. Also, what would you like to see dropped. Three pages is not much space and I want to make it as valuable to you as possible. So let's hear from you.

Who will get the first *New* call? The amateur ranks have swelled to 160,000 members. 21,242 are Novices and 5,264 are Technicians! This rapid growth has necessitated the issuing of new prefixes in certain areas. When the area runs out of K and W prefixes the WA prefix will be assigned to all amateur stations, except the Novices. The WN prefix will be assigned to Novices whenever possible, otherwise, the WV prefix will be used. This will be changed from WV to WA when the Novice obtains General Class status. The expired Novice calls, formerly held for at least a year, will be reassigned immediately. A brand new 807 tube to the first WV who writes to the Novice column.

There as been a lot of discussion about restricting the Novice to CW only. This means cw or mcw on two meters, no voice operation! A proposal will probably be scheduled for the ARRL national conference in Washington next fall. I hope to attend the meeting and put in my two cents worth. At the moment I am behind the resolution 100%! I have seen a lot of my friends fritter away their 12 months on two meter phone, and lose their license or wind up on six meters. The Novice Class is intended as an interesting and educational way to practice code. It is a stepping stone to full amateur privileges afforded by the General Class license. Don't forget, I shall be speaking for the majority of my readers. If you think I am all wet, let me know.

Dave L. Jewer, 719½ S. Glenoaks Blvd., Burbank, California is a natural born Canadian. He, like many others, would like to get a Novice license and wonders if there is anyway to do it. Sorry, Dave, but because of our unfortunate reciprocal licensing agreement (or lack of it) there is no way that I know of,

Lafayette Radio, 165-08 Liberty Avenue, Jamaica 33, N. Y. announces a new group of telegraph keys, bugs, and a buzzer for code practice. The new "brass-pounder's key" is shown here; note that it has adjustable spacing, tension, and a circuit closing switch. The key pivots are adjustable ball-bearings. Price? Wow—$1.95.



other than waiting five years for your citizenship papers. It's really too bad, but you'll have lots of time for hamming after that.

Our DX expert, Tony, KNØLTB, reports that both he and KN4RID have made DXCC. Tony just made his 105th DX country with a VR2 contact. Nice going fellows.

DX tip . . . As part of British Columbia's Centennial celebration, two mountaineering clubs are climbing Mount Fairweather in the panhandle between the southern border of Alaska and B. C. The expedition leaves Vancouver by air for Lituya Bay, Alaska, June 14th and returns July 13. George Kitson, VE7ALE will handle communications using the call VE7BCC. George will spend some time each day in working the Novice frequencies to give the fellows added interest and impetus to their hobby. During these periods only Novice calls will be answered.

From Laurie C. Parkhurst, VE7IT, 1418 Gordon Avenue, West Vancouver B. C. a request to the Novices to stay below 21.2 mc to avoid QRM'ing the weak DX stations. Laurie is right fellows, I have had the same thing happen to me. Don't forget that the strong DX stations can clobber your signals too. It is easier to copy a station with code interference than it is with phone interference.

Novice harmonics are still a problem as reported by Robert A. Findlay, W6NZX. Bob is able to copy Novices around 7040 to 7050 when the stations are transmitting on 15 meters. This is another case of radiation of the crystal fundamental frequency. About the only thing that I can suggest is that Novices have a local ham tune through the short wave bands checking for spurious radiation.

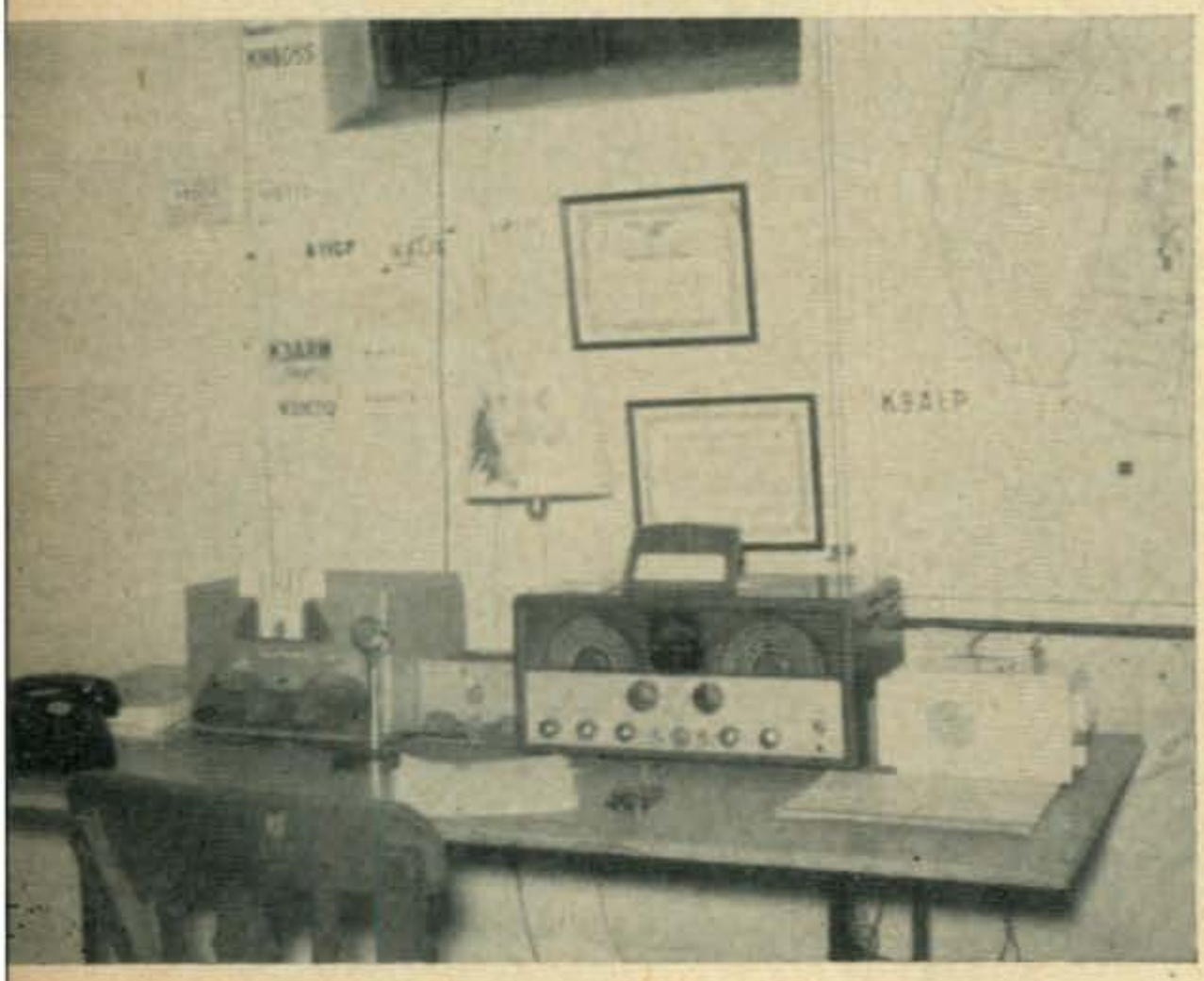
Net News

A Novice net has been formed in the Central section of the country. The Regional Novice Net meets daily on 7152 at 1730 CST. NCS is KN9JLD. Members are needed and plans for a session at 0700 CST are being considered.

Roy Weinedel KN5OEW, Box 52, Columbia, Mississippi would like to start a net but would like advice and suggestions from "going nets".

All Novices are invited to check into the Palmetto State Novice Net (PNN) of South Carolina. It meets Monday-Friday on 3745 kc at 2000EST. Net control monitors plus/minus five kc. For further information, write John Fuller, K4HQK, Box 257, Barnwell, S. C.

Don Plagman, KN8IAS, 3142 W. 160 St., Cleveland 11, Ohio has a very neat station complete with a telephone, Conelrad and (gasp!) a microphone.



Who's DX?

Our far east friend, Shinji Hasegawa, JA3-1050, #1815-15 Higashi, Maiko-cho, Tarumi-ku, Kobe, Japan, sent along another of his beautifully written listening reports. Is your call on it?

ON 15 METER BAND

CALL SIGN	DATE '58	G.M.T.	CLG/WKG	RST	DISTURBANCE
KN4RNG	4 Apr	01:51	CLG KN7AZK	569	QSB
KN4RNU	8 Apr	03:15	WKG WH6CIQ	559	QSB
KN4TPX	5 Apr	01:52	WKG W7HEO	569	QSB
KN5KYR	4 Apr	03:23	CLG CQ DX	579	QSB
KN5MHF	9 Apr	04:03	WKG WH6CIQ	559	QRM
KN5MYS	9 Apr	02:35	WKG K7ANK	579	QSB
KN5OOK	4 Apr	03:22	CQ	559	QRM
KN5OOJ	7 Apr	01:41	WKG KN6LJU	579	QRN
KN5OTV	4 Apr	01:36	CLG CQ	549	QSB
KN5PNT	5 Apr	01:43		569	QRN
KN6ATH	7 Apr	01:56	WKG K5 GIC	579	QSB
KN6BFX	9 Apr	04:14	CLG CQ	589	QSB
KN6CCB	9 Apr	02:30	CLG KN7AFO	579	QSB
KN6JCP	9 Apr	02:37	CLG CQ	579	QSB
KN6DBX	7 Apr	01:48	CLG CQ	559	QSB
KN6EPR	7 Apr	01:43	CLG CQ	579	QSB
KN6GUH	7 Apr	01:46	WKG KN8???	579	QRN
KN6IVY	4 Apr	03:06	CLG CQ KH6	579	QSB
KN6IWA	4 Apr	03:38	WKG KN2MHX	579	QSB
KN6JCR	4 Apr	01:46	CLG CQ	589	
KN6JMM	7 Apr	01:53	CLG CQ	579	QSB
KN6JKS	4 Apr	23:56	CLD KNØOQA	569	QSB
KN6KCV	8 Apr	03:34	CLG KN3?–P	569	QSB
KN6KJX	5 Apr	01:29	CLG CQ	559	QSB
KN6KMI	4 Apr	03:33	CLG CQ DX	589	QSB
KN6KMM	4 Apr	01:45	CLG CQ	569	QSB
KN6KOI	4 Apr	03:04	CLG CQ DX	589	QSB
KN6KPF	4 Apr	23:48	CLG CQ St. Louis	589	QSB
KN6LJA	9 Apr	03:50	WKG KN8JBK	569	QSB
KN6LJU	7 Apr	01:41	WKG KN5OOJ	569	QRN
KN6LRV	8 Apr	03:11	CLD KN6ONB	579	QSB
KN6LRZ	4 Apr	02:22	CLG CQ DX	579	QSB
KN6LSJ	4 Apr	03:00	WKG KN9LTY	589	QSB
KN6LWR	4 Apr	01:49	CLG CQ	579	QSB
KN6MHO	8 Apr	03:32	CLD WN2DND	569	QSB
KN6MPY	4 Apr	02:20	CLG CQ Ø	589	QSB
KN6ONB	4 Apr	02:21	CLG KN9LAV	579	QSB
KN6OQB	4 Apr	01:33	CLG CQ	569	QSB
KN6ZLJ	8 Apr	03:27	CLG KN2ILJ	589	QSB
KN6ZRX	9 Apr	03:20	CLG CQ	589	QSB
WN6NGB	4 Apr	03:44	WRG KN4SWZ	579	QSB
WN6NOJ	7 Apr	03:06	CLG CQ	579	QSB
WN6OLH	9 Apr	04:16	CLG CQ	579	QSB
WN6OLX	9 Apr	03:47	WKG KN1GNV	579	QSB
WN6SHU	4 Apr	01:53	CLG CQ	579	QSB
WN6SNR	5 Apr	01:55	CLG CQ	569	QRN
WN6UKP	4 Apr	01:26	CLG CQ	579	QSB
WN6UKT	9 Apr	03:29	CLG CQ	479	QSB
WN6WFC	4 Apr	01:38	CLG KN5PCE	569	QSB
WN5YJP	4 Apr	01:55	CLG KN8HAL	589	QSB
WN6YOM	7 Apr	02:11	WKG KN8GUW?	579	QSB
KN7AFO	9 Apr	02:29	VVV	569	QSB

KN7AIQ	9 Apr	03:22	CLG CQ	579	QRM
KN7AIT	4 Apr	03:36	CLG CQ DX	589	QSB
KN7APK	7 Apr	02:09	CLG CQ	579	QSB
KN7AQK	4 Apr	03:46	CLG KN4SNZ	569	QSB
KN7ASV/7	9 Apr	03:16	CLG CQ	579	QSB
KN7AUG	5 Apr	01:20	WKG KN8IDZ	569	QSB
KN7AYC	9 Apr	02:50	CLG CQ	559	QRM
KN7AYZ	9 Apr	02:39	WKG KN9IAT	579	QSB
KN7AZK	4 Apr	03:27	WKG KN4TSM	579	QSB
KN7BKY	5 Apr	01:56	CLG CQ	569	QSB
KN7BRE	4 Apr	03:39		579	QSB
KN7BRQ	7 Apr	02:56	CLG CQ	599	QSB
KN7BVT	5 Apr	01:30	CLG KN5MDG	579	QSB
KN7CAZ	4 Apr	23:22	CLG CQ	599	QSB
KN7CDU	7 Apr	02:07	WKG KN8HVG?	579	QSB
KN7CHT	5 Apr	01:25	CLD KN5MES	569	QRN
KN7CLU	7 Apr	02:02	CLG CQ	579	QSB
KN7CVL	9 Apr	02:48	CLG CQ	569	QSB
KN7CYQ	8 Apr	03:46	CLG CQ	569	QSB
KN7DDQ	9 Apr	03:28	CLG KNØLKR	579	QSB
KNØLJL	9 Apr	04:04	CLG CQ DX	579	QSB
KNØLZH	4 Apr	03:28	CLG CQ	549	QRN
KNØOXD	4 Apr	02:08	CLG CQ	579	QSB
WH6CIQ	8 Apr	03:15	WKG KN4RNU	589	QSB
WH6COV	7 Apr	02:27	TEST	589	QSB
WH6CQG	7 Apr	02:35		579	QSB
WH6CRN	5 Apr	08:21	WKG WN6NTJ	599	QSB
WL7CNJ	4 Apr	01:25	CLG CQ	579	QSB
WN7JIG	9 Apr	03:55	WKG KN9LAV	589	QSB

RCVR: DOUBLE SUPER (HOME MADE)
ANT: λ/2 FOLDED DIPOLE
OP: JA3-1050 SHINJI HASEGAWA
QTH: 1815-15 HIGASHI MAIKO-CHO TARUMI-KU KOBE

Ulf Ericsson, Sandelhielmsgaten 3, Vanersborg Sweden (SM6BMB) sends the following list of stations heard on 21 mc in his country: Feb. 24, 2200 GMT: KN4QHQ, KN8EZN. Feb. 26, 1530 GMT: KN1EHD, KN2JOV, KN4SWO, TII, KN9HKF. March 8, 2000 GMT: KN4RSY. April 6, 1630 GMT: WN2ISD. April 12, 2100 GMT KN1GUX, KN2KSQ, KQD, KMS, MPU, OJJ, WN2CGA, HLI, KN-8HFB. April 13, 1500 GMT: KN1CNZ. April 14, 1845 GMT: KN1GMI.

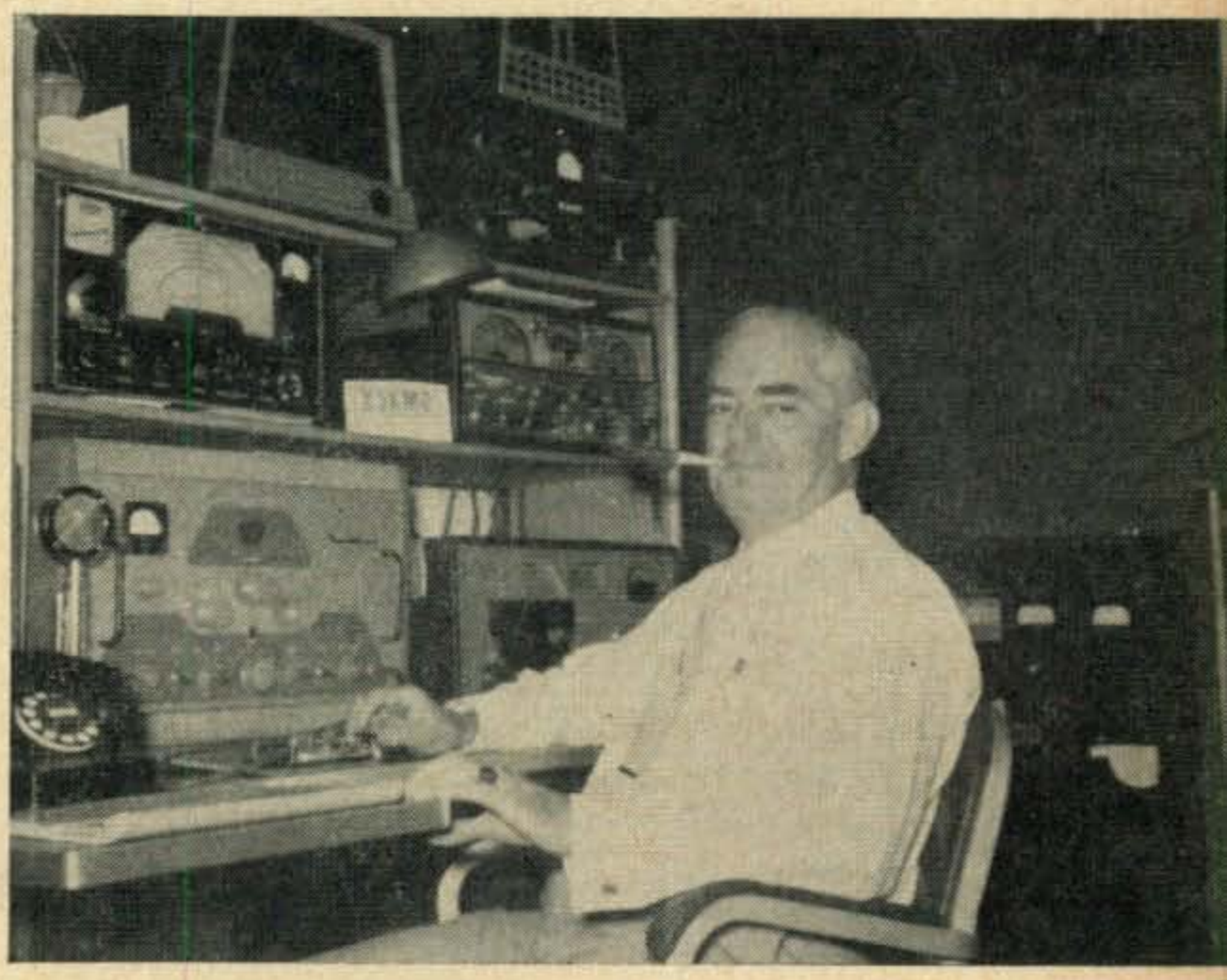
Hot Dog! A new European reporter: Mike Broga, K1DEQ/DL4, 586 C and E Sqdr. APO 109, N. Y., N. Y. goes to school in Germany and was able to hear the following stations during his Easter vacation. As soon as Mike receives his DL4 call, he will be operating on the 21 mc Novice band regularly. Listen for him. All times GMT, frequency, 21 mc Novice band: April 4, 1900-1930 KN1CDH, DFC, DFT, DIR, EJA, GBF, WN2RES, SIB, KN-3BDQ, KN5LMJ, OKY, KN8HFB, IFF. April 6, 1945—2100 KN1DFM, DKF, DSX, DXA, EGD, GCH, GDX, GFT, GMH, KN2IMK, MPU, OJJ, KN3AHK, CSL, KN4RID, SSE, KN5KMO, WN6GJA, KN9JDK, JFB, KNØ-OBX. April 9. 1900-2200 KN1GQV, GSX, GUX, KN2IMK, KSQ, MPU, WN2SSB, KN3ARF, DCQ, KN4FAE, RJO, TDS, KN-6BFT, TED, KN8EQA, HJC, IBW, IPQ, IRU, KN9LJV, KNØLRH, WP4AKH/WP4, WP4-AMA. April 10. 1330-1430 KN1DMT/1, KN2CPF, JWD, MPU, MXE, ZPC, WN2-CUG, REH, SSX, KN8HWW, KN9JSU. I had a little trouble reading Mike's G's and E's, hope I didn't make any mistakes. Many thanks for the report, Mike, and hope to hear from you next month.

Tima Popovic, YU1RS-357, Banat Novo Selo, Yugoslavia reports the following reception in his country on 21 mc. All times GMT: Feb. 16, 1640-2200 KN1AZJ, BEM, BTE, BUR, CAK, CBH, CEC, CQX, DAI, DCS, DIN, DPM, DSX, EJO, EKN, GBU, GDZ, KN2AOV, BHY, ETF, WN2EUJ, KN2EXY, HGR, HJH, IQK, IVT, JIW, JJE, JNJ, JOV, JPB, MKR, MUX, WN2PDT, PXP, TDQ, KN2TKM, WN2TQK, KN3AOV, AWZ, BCW, CDF, CFZ, CHI, CRD, CRG, DAO, WP4ALU, KN4OKZ, OTQ, PNO, PQF, PXY, QIY, QMO, QOO, RHN, SLO, SSQ, STA, STP, TBK, TQG, KN8ESO, GJM, HMF, HRI, HTX, IKM, IKZ, KN9KWK, KNØLQD, JVP, MGA, LNR. April 5 1950-2100 N1BSL, DQQ, EDW, GMW, GRJ, KN2KSQ, WN2PUC, KN2QRI, WN2REH, TQP, KN2ZXM, WN3AUT, KN3CMV, KN4-PXY/M, SDR, KN8IBD, IHZ, JBK. Thank you again, Tima, for your excellent report.

Bud Lafferty, KG1CK, has been working Novices on 21.12 and 21.15 mc. He advises us that the best time seems to be the late afternoon. Also, Bud says that he has called many Novices but the percentage of answers has been very small. Seems they prefer to work strong stations. He has heard Novice signals on the 40 meter band also. The following stations were worked between March 30 and April 14: KN1BZE, EFN, KN2HTI, KN3BSY, DCY, KN4SWO, UNH, KN5MHF, LZO, KN8JPM, KNØLNL. Thank you for your report Bud, we'll also be interested in knowing of the stations that you hear in Greenland.

Great news! Another new reporter this month. Ivor Stafford, VK3XB, 16 Bryon Street, Box Hill South, E. 11. Victoria Australia has been working stations on the 7 mc Novice

Here's a switch! Dad (shown here) is KN5KMG and son Jim is K5CRE. The Nelson's QTH is Box 68, DeRidder, La. Look for them on 40 and 15 meters, usually on the weekends.



band. ILvor operates between 7146 and 7150 and listens on the entire Novice band (7150-7200). Heard: KN4QLN, KN5KOD/5, MOF, WH6CJC, WN6LAK, KN7CDX, KN8ILC, and N9KLR. These stations were called, but they apparently were not listening outside the band. On March 25, Ivor called, but couldn't raise: WP4ANH, WH6CLG, KN9LSC, KNØ-KXW, ODO. On March 26 the following stations were heard and called: WN2HCR, KN5OND, WH6CJG, CNK, KN6OLB, ZHT, WN6VBC/KH6, KNØOXN. Finally Ivor snagged KN6OAP. Between March 25 and April 30 Ivor worked the following stations: KN2KVM, WN2HGR, KN3BSY, KN5MHF, OEA, KN6ABD, AOP, AUN, JKC, JXV, KER, KFR, LIU, LRZ, ZQO, WN6JZH, KN7BFI, CLO, WN7JII, KN8IAS. In addition, the following stations were heard and called with no results: KN1EDW, KN2MZF, WN2LLJ, KN4SWJ, TSB, TYZ, UQV, KN6-KCV, KMB, LPK, QQZ, WH6CRP, CRL, WN6HJX, WP4AKB, KN7CEO, COS, DIQ, BDX, KN8HJG, KNØOOU. The best time to work Ivor in Australia is between 3 AM and 6 AM *EST*. He sums up very nicely the best way to work him, or other DX stations; "If only these Novices would listen out!" Thanks for the report and advice, Ivor. Hope to hear frøm you again soon.

Help Offered

Novices in the various call areas can contact the following individuals or clubs and be assured of a helping hand.

W1—Maurice L. Finer, 379 Central Avenue, Milton, 87, Mass. (KN1GGP).

W2—George Hodgkinson, K2VHT, 5828 Meadowview Avenue, North Bergen, New Jersey.

W6—Lester Sade, 652 Second, San Bruno, Calif. is in the San Fran area but will help others by mail.
K6SIR, The Ramona Radio Club, Inc., 605 South Del Mar St., San Gabriel, Calif. has a code class on Tuesday nite and a theory class on Wednesday nite. Classes start at 7 PM and run to about 9 PM. Anyone interested is welcome to attend. For more information, write Orlo E. Brown III, K6SUJ, the theory instructor. Thanks Orlo.

Help Wanted

W1 —Fos Naw, 10 Doyle Street, Cranston, R. I.

W2 —Harry Scribner, Rd #3, Ithaca, N. Y. (4-5245) would like to work cw on 6 meters, 8 wpm or less.
Jack Schneider, 2662 Hewlett Lane, Bellmore, L. I., N. Y.
Louis Berkowitz, 1906 E. 1st Street, Brooklyn 23, N. Y.

W3 —David J. King, 56 Brunside Avenue, Norristown, Pa.

W6 —Earle S. Post, General Delivery, Boron, California

W7 —Ed Karl, 1011 So. Winifred, Tacoma, Washington
Steve Turner, 1349 W. W. Upland Drive, Portland 1, Oregon

W8 —David Starr, P. O. Box 22, Primrose Avenue, Spencerville, Ohio
Dale W. Messerschmidt, 3243 Henry St. Muskegon, Michigan (312322)
Don C. Foster, 733 S. Magnolia, Lansing, Michigan (IV-56174)

W9 —Dave Dunkelberger, Box 275, Kouts, Indiana

WØ —Glenn Delano, 2730 Portland Avenue, Minneapolis 7, Minnesota
Jerry D. Canady, 909 South Second Avenue, Washington, Iowa

KL7—Amos B. Rinehold, SP3, RA19477891, Headquarters and Headquarters Company US Army Garrison, Fort Greely, Alaska, APO 733, Seattle, Washington

KG6—Michael Currton, US Naval Hospital US Navy #926 c/o FPO San Francisco, Calif. (for direct contact — Quarters "7", US Naval Hospital Guam, M. I. phone 42-3130)

Letters

Doug, KNØLGZ, P. O. Box 296, Dixon, Missouri has been on the air for eight months and racked up 46 states plus VE and KP using a Globe Chief and an HQ-100. Needless to say, Doug would like skeds with North Dakota and Montana.

Jim Higgins, KN4TSM, Rt. #3, Taylors, S. C. uses a Globe Chief 90 and an Nc-98 and has logged 33 states. Jim would like skeds with sevens and zeros to complete it. He will sked for any reason.

Lou Braun, KN8IQB, 202 Howard St., Bellevue, Ohio is trying to get some gear going on 15 meters and could use some local help.

Don Wagner, W2JRT, 120 MacArthur Dr., Fords, New York sure had a slug of trouble with his equipment as a Novice. He finally gave up repairing it and got busy and went for the General ticket—hi.

Tony Goodman, K6VAW, 10515 Camarillo St., North Hollywood, Calif. has designed a "small space vertical" antenna and has worked an impressive list of stations. It works on 15 meters and can be mounted on the roof of the house.

Carl Haywood, Box 314, Claypool, Arizona wonders how to connect the Heath QF-1 to his S-38E, which does not have a type 12SA7 tube. The installation instructions are the same, Carl, only connect it to the plate of the new mixer, a 12BE6.

Walt Bogle, 1238 Dubarry Lane, Houston 18, Texas is an almost Novice and would like suggestions for limited space antennas (see above letter). He would also like tips on learning the General Class theory.

[*Continued on page 96*]

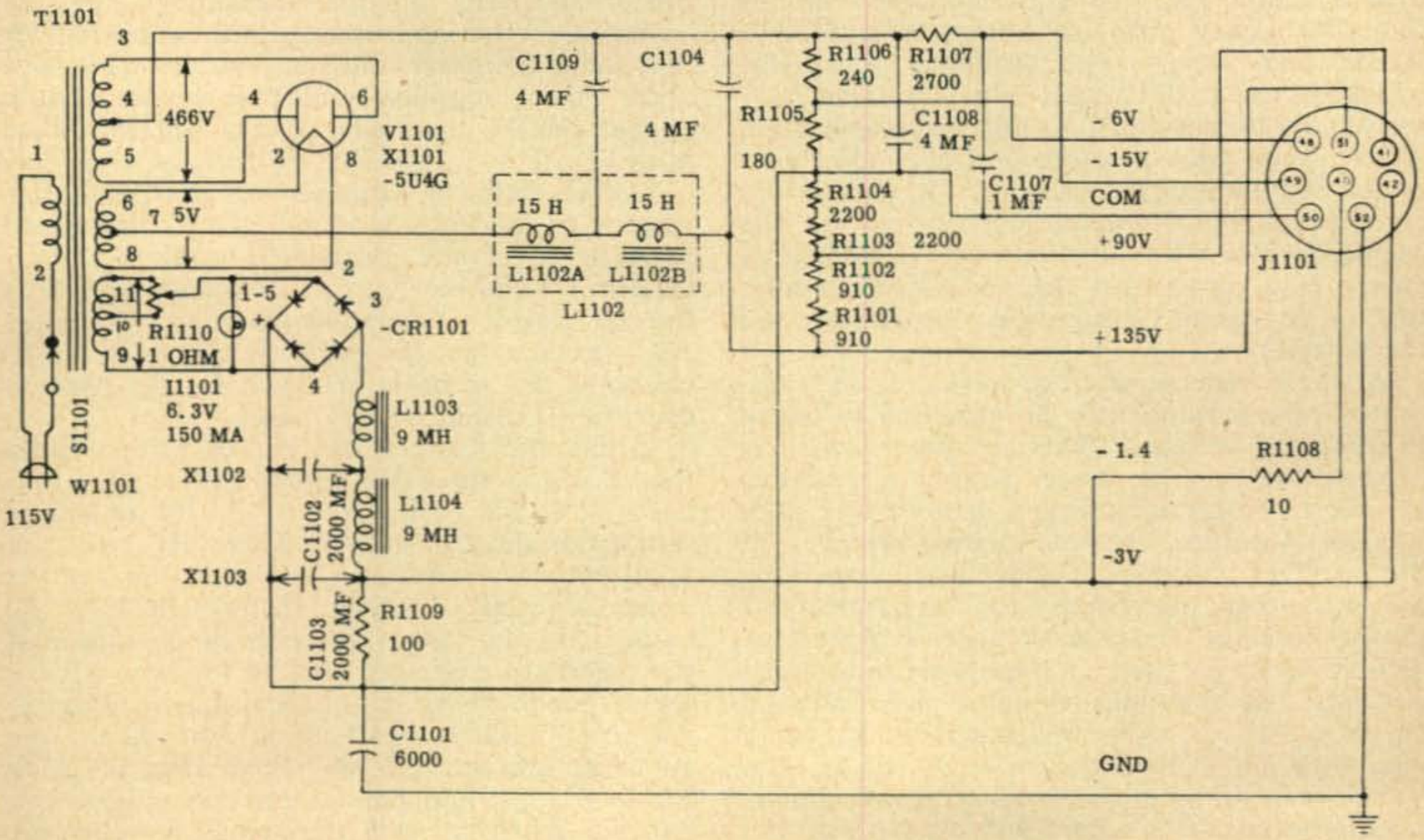
by KENNETH B. GRAYSON, W2HDM
110-20 71st Ave., Forest Hills 75, N. Y.

SURPLUS

At long last we got our TBX-8 working and we are passing the data along. We decided to to put it on the air without changing the frequency range so that a basically sound working unit could be presented to CQ readers. Later on we will change it to other bands.

Primarily designed for shore and small boat uses, the TBX-8 differs from previous TBX models by having instant heating tubes and break-in and push-to-talk features. A sidetone is available for CW monitoring as well. Early models of the TBX required special crystal holders which looked like a bulky ceramic pill box. The TBX-8 takes these crystals as well as the standard FT-243 type holder. Of course the one-half inch spacing pin sockets can be installed in the previous models if it is desired to use up those crystals from the shack. Another change existing on this model is that separate antennas may be used for the receiver and transmitter or they may be run off the same one depending upon the position of a link on a terminal board.

Schematic — TBX-8.



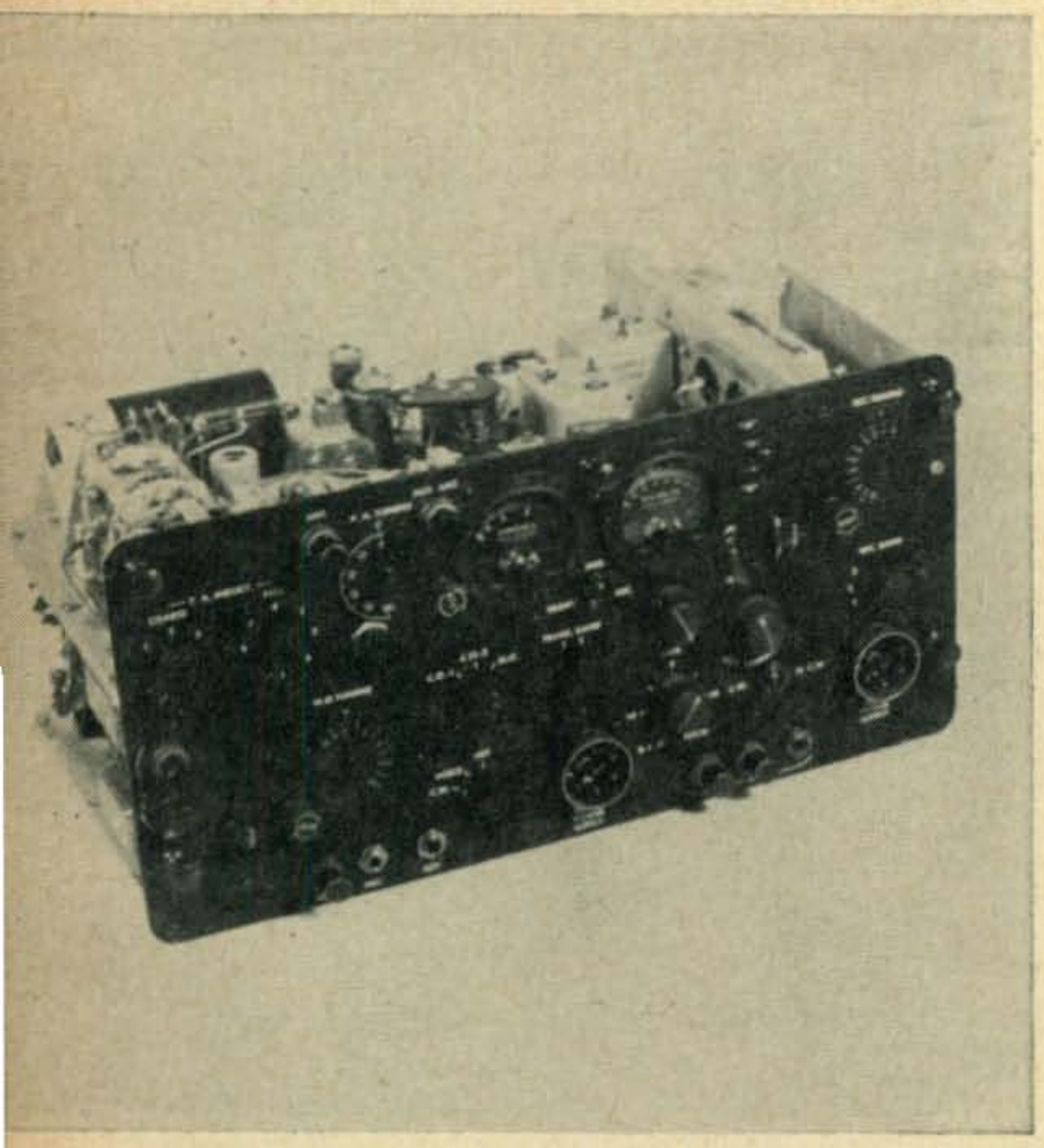


Fig. 1—Front view of TBX-8 without case.

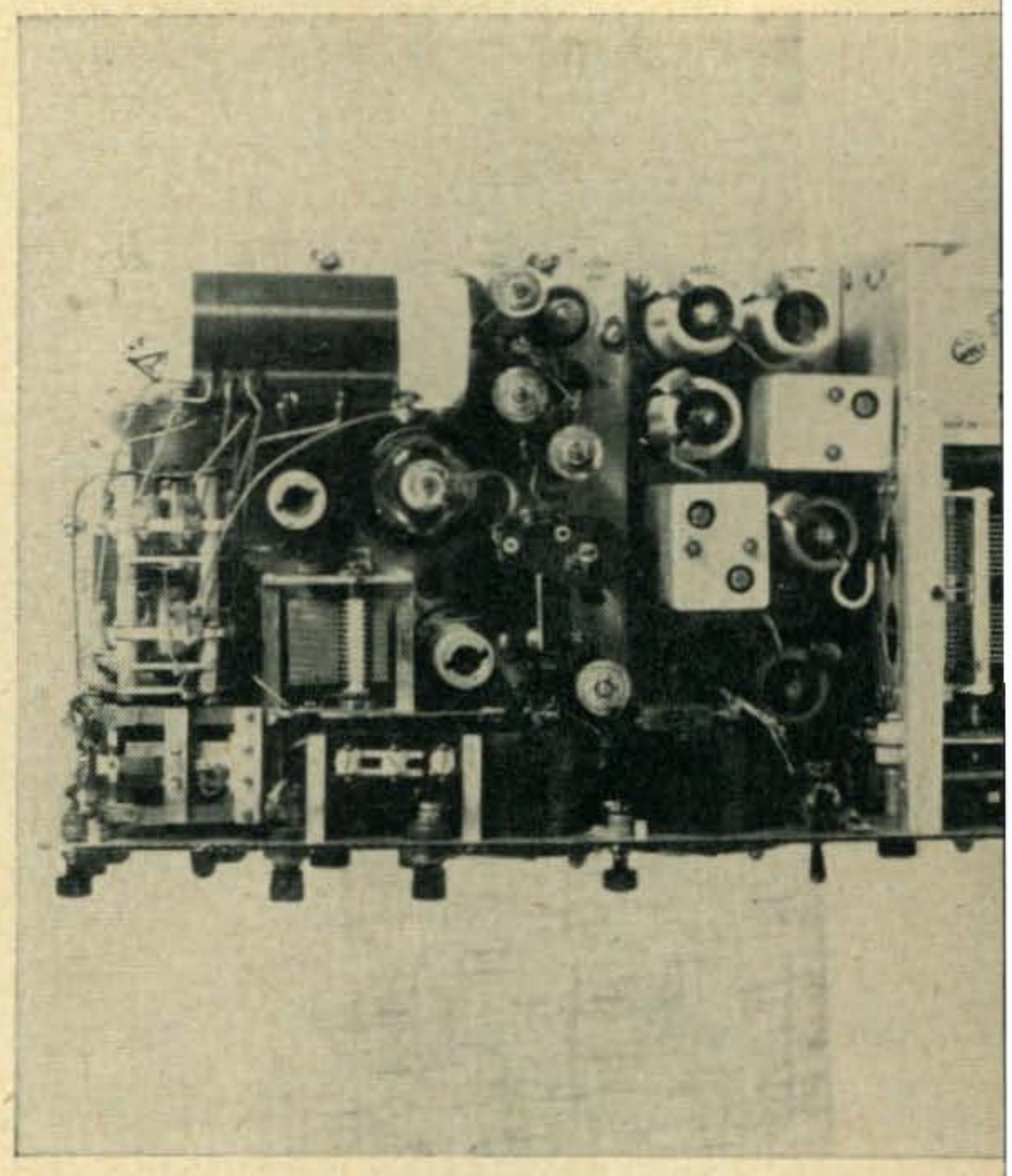


Fig. 2—Top view.

The TBX-8 covers a range of 2000 kc on the transmitter section and as high as 8000 kc on the receiver. The transmitter does this in two bands. Band II is of most interest to us as it covers 80 meters directly. Actually the spread is from 3200 kc to 5800 kc. Apparently the crystal oscillator will function only up to 4000 kc according to the instruction book, but I can see no reason for this and assume that this is the highest frequency that crystals were then available for. The crystal operates on the same frequency you are transmitting (NOVICES: take note). The oscillator is a 3A4 which drives a 2E22 final which is suppressor modulated by another 3A4 for voice operation. A 991 neon tube is used as a side tone generator for monitoring. Keying for CW is accomplished by breaking the B-plus of the oscillator. The NET position of the EMISSION switch is used to turn the transmitter oscillator on for zero beating the transmitter and the receiver.

A single meter is used to measure the transmitter currents and may be switched to check to receiver voltages. This is done primarily because the receiver power supply is available in several forms including a battery box with suitable batteries. The low current required of the receiver batteries should give very long life in the field. See Table I for the connections to the receiver and the voltages required. A second meter is used to measure the antenna current. The antennas supplied are normally either a 24 foot whip designated as (S) or a long wire and counterpoise designated as (L).

The transmitter power supply is not shown, mainly because every ham will use his own pet type. We used one that was available and found that the voltages were not critical, except for the low voltages, and even there they didn't effect the operation if they were kept close to the required value. In the field several types of power supplies were used, such as the hand driven generator, gasolene driven generator, vibrator supply and ac system. As long as the voltages were OK the system did work. Table II shows the proper voltages and the pin connections on the transmitter for the voltages. When connecting power remember that the transmitter and the receiver have separate power supplies, and that no ac should appear on the filaments as this will introduce hum.

Unlike ham or commercial gear, the frequency of the circuits is not given directly. In practice a crystal controlled calibrator was used to set the receiver on frequency and then the net feature set the transmitter on frequency. As a result, some provision should be made to calibrate the settings for ham use to prevent operation outside of the bands.

While the calibration curves are usually found inside the covers, not every TBX has a cover at the time you buy it. As an aid in setting up the transmitter, Table III gives the approximate settings of the transmitter for the antennas used. Receiver calibration may be made with the aid of a batch of crystals and the net feature of the TBX or by means of a signal generator or frequency meter. The receiver is a three band affair with band one covering 2.0 to 3.25 mc, band two covering 3.1 to 5.1 mc and band three covering 4.9 to 8.0 mc. Sensitivity is better than 14 microvolts

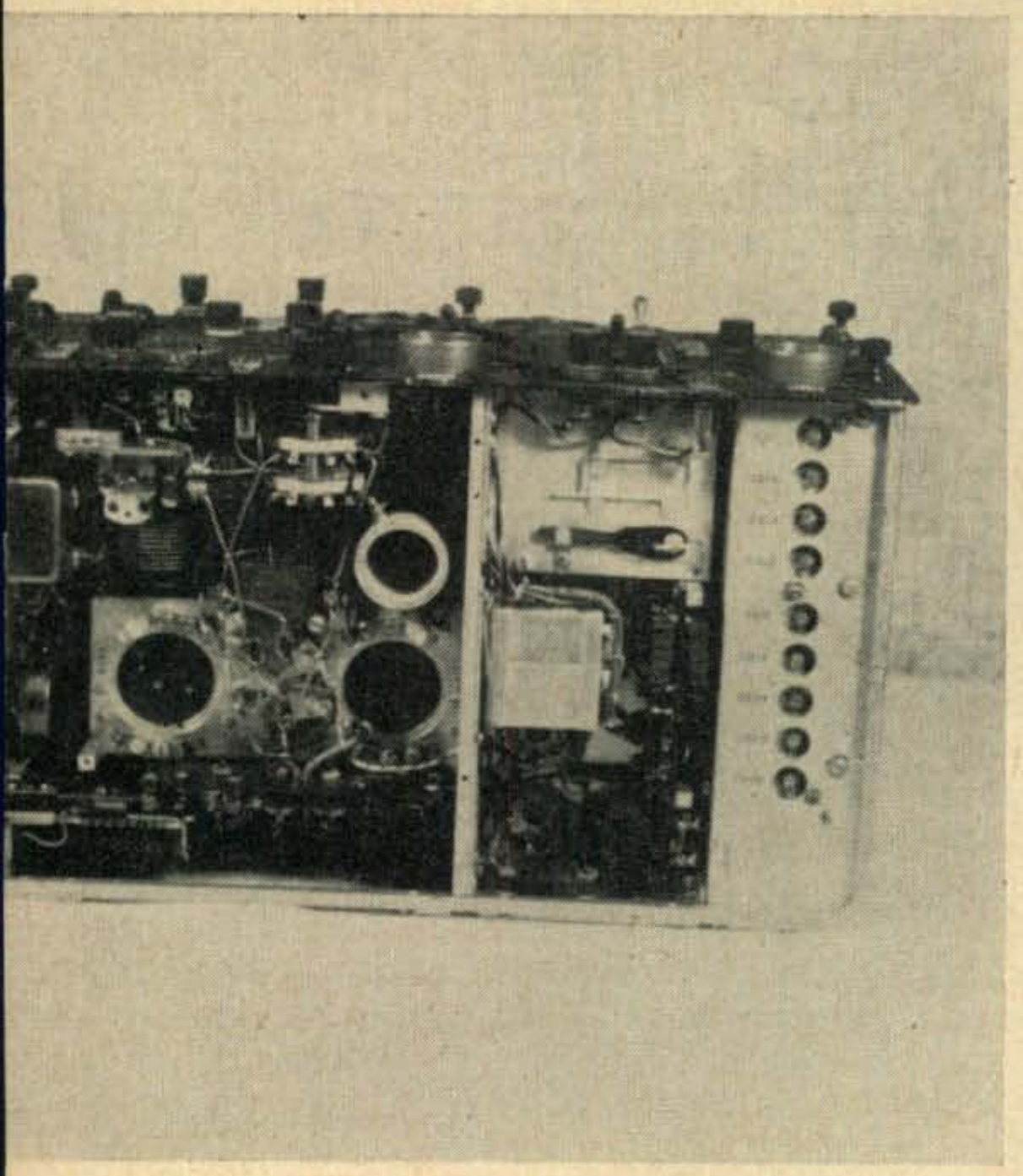


Fig. 3 — Bottom view of TBX-8 showing crystal sockets.

on band three and better than 10 microvolts on the other bands. As you can see the TBX lends itself to modification to 40 meters by changing the transmitter band one. The receiver is a superheterodyne with one stage of i-f at 1515 kc. The output is 6 milliwatts to a pair of earphones.

Figure 2 shows the universal receiver power supply used by the Navy for the TBX-series receivers. This is known as the EAO equipment. It can be duplicated with ease by using commercial parts.

Some interest has been displayed in the use of this equipment in a mobile installation. While it can be used as such, it does have very low power as mobiles go, and not quite what is most desirable as a receiver. For portable, it does put out about 8 watts of CW and 2.5 on phone. For the beach or a picnic it is a lot of fun to take along, and for emergencies well worth having. As a Novice rig it should be fine for a beginner and inexpensive enough for a second rig for anyone.

Mail

Much of the mail received here at CQ-SURPLUS is of course for information on equipments not yet converted. Of course we answer all inquiries to the best of our abilities, but we thought that it would be of mutual benefit and interest to know what is on the bench right now undergoing conversion. First, the BC-1335 to six meters. This proved to be a little more difficult than we had hoped it would be. It isn't going to be a hard conversion, but difficult from our point of view as to what is the best application of conversion techniques. We have been asked to put squelch and a vfo in as well and we are working on them too . . . but when you look at the rig you ask . . . where? The present six-meter conversion can be put on both or on only one channel as desired, keeping the unit as a complete 6 meter station or a combination six and ten.

The BC-659 has become very available and we're getting one soon. It seems that it too will convert like a BC-1335. The BC-603 is dirt cheap and should make good 6 meter gear with a little effort. We have tried them on ten and they seem OK . . . just as the 15 meter model is great too . . . one drawback is that they are FM, but that should be easy to change. They have push buttons so that you can preset ten channels which should be good for net operation. The companion transmitter looks a little too large for the job that it does and therefore has a lower priority as far as we are concerned.

Mention had been made in a previous column about some aircraft tower equipment that we have seen. Well, we now have one and they are getting more available every day. Specifically it is the RV-1B and is crystal controlled single frequency receiver. Adding a local oscillator as we did to the TBS receiver and changing a few small coils is about all that we can see as required to make a good rack mounted receiver. It is only 5 inches tall including 110 volt ac power supply and it has a 6AK5 input, output to a speaker and squelch all built in. Sorry we don't know the price, but they will be out in quantity when we get to publishing the conversion.

Recent meanderings around the surplus market has turned up a few items that are not normally advertised. The Radio Ham Shack in New York has a gadget known as a phase inverter to the Signal Corps, but it looks like an rf amplifier for a receiver with a very broad band characteristics. Two models exist, one with one tube and the other with two tubes . . . for a couple of bucks you can't go far wrong. Another place worth knowing about is Airborne Electronics, Inc. of 155 First Street, Mineola, N. Y. They have a great assortment of parts for aircraft equipment—all new and certified for aircraft. They don't sell surplus, but if you need a special plug for an aircraft piece of equipment, well here is the place.

We recently completed our annual two weeks on active duty with the Navy, which will explain why some mail wasn't answered as promptly as it usually is. This year I spent my time at the Naval Radio Station, Cheltenham, Maryland which forms a part of the Navy Station NSS. We can't be too enthusiastic about the training received. Captain Grange, USN (W4HZ) and his staff, including LCDR Herbig (W6MCS) and W. O. Ray Barrington USN, (K5IHC/3) made it worthwhile and interesting. Even the supply officer of the base, LTJG Clay Rose, USN, is a ham

TABLE I

TBX-8 RECEIVER VOLTAGES AND PIN CONNECTIONS

VOLTAGE	CURRENT	USE	J-401 PIN C'NECTION	
			Positive	Negative
1.5	0.25 Amp	Fils	40	50
90	10 Ma.	Plates	50	41
6.0	3 Ma.	Bias	48	50

NOTE: The power switch connects pin 50 to pin 52 (ground) to operate the receiver.

TABLE II

TBX-8 TRANSMITTER VOLTAGES AND PIN CONNECTIONS

VOLTAGE	CURRENT	PIN C'NECTION ON J-303	
		Negative	Positive
550	85 Ma.	63	65
12.6	2.0 Amps	63	64
9.5	0.1 Amps	63	66

NOTE: Ground is connected to pin 63.

with the call W3GCX. The training is so great that I really recommend that any east coast Naval Reservist of RM and CT ratings to check and see if they can't find a two week billet for you. What a way to learn about surplus before it's released. Incidentally if you are eligible and really want to learn radio you can learn and have fun doing it in any of the reserve programs.

This month we have a few requests for handbooks. Apparently the results are good as I have a lot of mail thanking us for this service. Well, all we can say is thank you, and you are welcome to make use of this feature any time. K5MBB is still looking for the BC-329-H, and W5YOU wants the BC-319 manuals. W5CIN is in need of the BC-1335 and ARB handbooks while R. M. Utterberg, 7104 Harriet, in Minneapolis, Minn. wants the RAL handbook or schematic. W6NHT has a need for the Scott SLR-F receiver and the Panoramic model SA1 type T200 Radio Spectroscope. If you have a BC-223-AX handbook send it to KN7DFW. The Rev. Bonifas (WØUBG/8) at the St. Charles Seminary of Carthegena, Ohio has a need for the SCR-508 manual. If anyone has a BC-1147A and BC-452 handbook drop it off at K6UTT who is in dire need of same. Jim Cooper, W2BVE, 834 Palmer Avenue in Maywood, New Jersey needs the BC-1335 and BC-611 books. And here is a very special request. WØBTV is a deaf ham who likes CW. Anyone knowing the where-a-bouts of an RD-60 ink tape recorder please contact him. His address is Claude Sweger, WØBTV, 616 S. Ash St., Yuma, Colorado.

73, Ken, W2HDM

TABLE III

TBX APPROXIMATE SETTINGS — TRANSMITTER

FREQ KCS	OPERATION	ANT	MO DIAL	BAND	PA INDUCT		PA DIAL	TRANS CURR MA	ANT CURR AMPS
					Fine	Coarse			
3500	CW	L	238	2	2	3	42	57	0.46
3500	VOICE	L	238	2	2	3	42	45	0.30
3500	CW	S	238	2	2	3	23	55	0.77
3500	VOICE	S	238	2	2	3	23	45	0.53
4000	CW	L	382	2	2	3	58	57	0.36
4000	VOICE	L	382	2	2	3	58	46	0.25
4000	CW	S	382	2	2	3	40	56	0.63
4000	VOICE	S	382	2	2	3	40	44	0.46

by **DON CHESSER, W4KVX**
R.F.D. 1, Burlington, Ky.

DX DX DX DX DX DX DX DX

Congratulations and an earnest "Well Done!" are due these hard-working DXers who achieved WAZ this month:

#529	OK2AG	Antonin Hezucky	(2nd K2)
#530	W6CGP	Chester P. Rosa	(150th W6)
#531	W7DJY	Loyd E. Street	(29th W7)
#532	W7BGH	Del Avery	(30th W7)
#533	PAØVB	Peter v.d. Berg	(1st PAØ)
#534	ON4FQ	Albert LeGrand	(4th ON4)
#535	OZ7BG	Erik Storner	(1st OZ)
#536	SM5CO	Alex Alexandersson	(6th SM5)
#537	DLIKB	Hans Pazem	(9th DLI)
#538	W8OYP	Nicholas Grasso	(28th W8)
#539	W5LP	Melvin E. Chun	(22nd W5)
#540	G3FKM	John Allaway	(10th G3)
#541	W4TM	L. K. Rush	(17th W4)
#542	OH3NY	Matti Paivio	(1st OH3)
#543	W9ROU	John E. Raynoha	(22nd W9)
#544	W6KEK	Frank W. Torchia	(151st W6)
#545	OKIJX	Jan Sima	(10th OKI)
#546	W4EPA	C. H. Merrell	(18th W4)
#547	W6NHA	Wilfred C. Dodds	(152nd W6)
#548	W2DEC	Urban A. Le Jeune	(22nd W2)
#549	KL7BHE	Sheila F. Goodhue	(4th KL7)
#550	KL7PIV	Edward W. Goodhue	(5th KL7)
#551	W8TMA	John L. Alline	(29th W8)
#552	DL7AB	Dr. Gerhard Daez	(2nd DL7)
#553	G8GP	Eric Neal	(5th G8)
#554	W3WGH	Robert W. King	(26th W3)
#555	W5AWT	Mel Boatman	(23rd W5)
#556	VE3QD	R. D. Carter	(4th VE3)
#557	WØQGI	Lloyd D. Harvey	(20th WØ)
#558	W4AIX	Francis Z. Smitz	(19th W4)
#559	W2LAX	R. C. Schilling	(23rd W2)
#560	W2TWC	John L. Wenger	(24th W2)
#561	W6EYC	Raymond O. Umbraco	(153rd W6)
#562	W7AJS	Wallace H. Hewitt	(31st W7)
#563	W8KPL	William W. Simpson	(30th W8)
#564	WØVBK	L. M. Divinia	(21st WØ)
#565	W2AYJ	Robert L. Poucel	(25th W2)

Despite the current flood of applications, earning a WAZ certificate to grace your station is no snap. "There are many years of hard work in this envelope! Even after JT1AA I was still lacking a VK6 card," notes W2AYJ in his application. . . . "My last card finally came in for WAZ," writes WØVBK, "and believe it or not it wasn't from Ludvik but from ST2AR." . . . "I've been waiting since 1950 for zone 23," is the common sigh of relief voiced by W7AJS. . . . "I completed WAZ in 1949 but couldn't squeeze a card out of C8YR, who was worked with only 40 watts here. It was sure a long wait, but I held up under it all," writes W6EYC. . . . "I finally made it, after three times around," sighs W6KEK. . . . "I sure enjoyed the many hours working for this first class award—the first from Libya, I think," reports 5A5TH. . . . "JT1AA is pulling the plug out for a lot of us," quips W6UJ.

Ludvik is pulling the plug, as can be certified by your hard-pressed DX editor, who is still far in arrears in the processing of WAZ cards. This is caused largely by the thoroughness with which each application is examined, and by the volume of correspondence necessary when errors or omissions are discovered. This is the only right way to discharge our duty, we believe, for it results in a consistently valuable and desirable award down through the years. Pride of ownership will remain high, for all certificates authorized by this department will continue deserved and well-earned. In order to retain this high standard we hope you will be patient.

The JT1AA/JT1YL team continues happily to hand out zone #23 contacts, but now the attention is centering on the distaff side of the family, Mila, who protested vigorously at our recent comment in these pages that she's 24 years old. She's only 23, she says—so there! And she's a very attractive woman, says OK-1JX, who promises a picture of her in the near future.

"I made a two-way phone QSO with Mila, JT1YL, at 0215 GMT, April 27th, for one of my biggest thrills in ham radio," writes Bill, W6YK. "Is this the first two-way A3 W6 to JT1 QSO? I convinced her on CW that although she didn't speak English and I no Russian we could still make a go of it on phone with Q-signals. She was Q4 ST, and gave me Q5 S9—she on 21030 kc and I on 21255. I'll make that WAZ yet!"

JT1AA/JT1YL's 21 mc frequencies may be changed by the time you read this, for their usual channels have been jammed with teleprinters recently and OK1JX is sending them different crystals. At this writing Mila can be usually found on 21030 kc and Ludvik on 14094 kc, often active at the same time, for they have separate stations—one at their flat and one in Ludvik's office. There's no hope of getting them on 3.5 or 7 mc, says OKJ1JX, and Ludvik claims 28 mc is a waste of time.

It's only remained for this historical operation to be immortalized in epic poetry, and Jim Paist, WØRBA, has done it; to wit:

WAZ Eulogy

Listen to the saga
of our hero, Willie Jones,
who spent his time with one design:
to work all forty zones.

From crack of dawn 'til late at eve,
he combed the DX bands,
working rare ones by the score,
the poles and desert sands.

QSL's were to him mailed
from countries small and great;
his wife walked out, his business failed;
his zones? Just thirty-eight!

He scanned the magazines for tips
on new DX-peditions;
his eyes, red-rimmed from lack of sleep,
just checking band conditions.

Years rolled away, his hair turned gray,
his zones now thirty-nine.
No card had he from twenty-three,
nor any hope or sign.

Then like a bolt from out the blue
came JT 1 A A.
Our hero frail camped on his trail
all hours of the day.

His fingers scarce could press the key,
his beard caught in the 'phones.
No food, no rest; he gave his best,
with feeble gasps and moans.

But as his strength ebbed fast away
his signal struggled thru,
and Ludvik gave him five-five-nine;
then said "Be seeing you."

Willie's will and testament,
Lord rest his weary bones,
was "Just inscribe upon my grave:
'He worked all forty zones.'"

Perhaps coincidentally, it might be added, the writer of the above masterpiece still needs a card from zone 23 to complete his WAZ!

DX-peditions

By the time you read this VS1BB's trek to the Maldives will be a happy memory, but there's a delicious postscript. Ted Henry, W6-UOU, whose roaming KWM-1 has provided many a fine SSB contact from remote and rare parts of the southwest Pacific, was instrumental in making the VS1BB/VS9 operation possible by having a DX-35 shipped down from Hong Kong to Singapore in time for Barry to take it along. The RAF Commandant of the Maldives was so impressed with Barry's results that he tapped the mess fund and purchased the DX-35. It will remain in the Maldives permanently, presumably to be used by hams stationed in the area or occasionally by "visiting firemen", which should result in considerably more frequent VS9/Maldives activity.

Those DXers needing the island of Gotland to complete their WASM awards should be pleased to know SM1BVQ will spend his summer vacation on the island, from June 10 to August 20, and will be active nearly every day from 2300 GMT on about 14050 kc.

Bob, W4RQR, continues his flying trips to various parts of the West Indies, serving as an excellent SSB ambassador of good will. May 2 to 4 he operated from FM7WT, and May 4 and 5 from FG7XE, working about 500 contacts from each place. Considerable CW was accomplished this trip, aided by W4DCQ, W4NZG, and K4UYM, with operation on 40 through 10 meters from FM7 and 80 through 10 from FG7. "Conditions were good on the low bands, but no one seemed to be looking for DX," reported Bob. Equipment consists of an HT-32 loaned to him by Hallicrafters for the purpose, a 75A4, and a Hy-Gain 14AV antenna. As this is written they are planning their next trip to Jamaica for a day at VP5RS, and then to Grand Cayman and VP5BH, as arranged through the cooperation of Bob, W4MW, and the OVARA.

"We'll probably make one more trip after this one before we quit," concludes W4RQR. "All spots in the Caribbean that we can reach have been covered. CT2 is out of the question, apparently, so we don't know where we'll repeat." All QSLs go to W4RQR.

VR2AP continues his tour of remote southwest Pacific islands aboard the governor's yacht. He was recently heard testing his rig on 14303 kc at 1335 GMT from CR1ØAC but couldn't make any contacts because of a defective receiver.

Noel Eaton, VE3CJ, operated as VP5BP on Grand Cayman last March at the same time our group was on Navassa. Using a Ranger and ground planes, Noel scored 351 contacts mostly on 10 and 15 phone, with a few minor excursions to 20 and 40. QSL to VE3CJ.

A most interesting 'round-the-world flight is scheduled this summer by Paul Heim and several hams in a twin-engine Beechcraft. They hope to do considerable hamming enroute, using 100 watts phone and CW, a BC348, and trailing-wire antenna. Their itinerary is as follows: Sunday July 13 to Sunday July 20, Baltimore — Boston — Newfoundland — Greenland — Iceland — Scotland — London; July 21 to July 27, London—France—Naples; July 28 to August 3, Naples—Crete—Lebanon — Iraq — Bahrein Island — Pakistan — India; August 4 to August 10, Delhi — Calcutta — Burma — Viet Nam — Saigon — Hong Kong; August 11 to August 17, Hong Kong — Okinawa—Tokyo; August 19 to August 24, Tokyo —Okinawa—Manila—British North Borneo—Singapore; August 25 to August 31, Singapore — Thailand — Burma — India — Ceylon; the balance of the itinerary, ending at Baltimore October 11th, will be published in a later issue. Flight times, and presumably radio operating times, will be between 1000 and 1600 local time daily. No calls or frequencies have yet been specified.

VK2QL's assistant in the VK2 QSL bureau, KV2AIR, is planning a trip to Lord Howe Island about the first of July. If it goes through

as planned he will operate for one week, probably as VK2AIR, on unspecified crystal frequencies 80 through 10 meters CW only, using 55 watts to a long wire. His resolved technique of operating from Lord Howe, incidentally, reads like a ten commandments for DX men that other remote operators might heed, and warrants space here: (1) He will not work stations within 20 kc of his frequency. (2) He will black-list any stations busting-in on a QSO. (3) He will work break-in. (4) If things get too lively on any frequency he will change to another crystal. (5) If the behavior of the boys on 14 mc is uncontrollable he will leave that band. (6) No schedules will be accepted. (7) No listening for "a friend" will be indulged. (8) No listening for "my phone" will be tolerated; he will leave the station that makes that request. (9) He will not take part in cross-band contacts. (10) All QSLs will be sent via bureaus, except those requests of direct QSLs accompanied by the requisite number of IRC's.

ZS6IF is planning a camping-vacation trip to ZS7, and possibly ZS8 and ZS9, during July. He hopes to do plenty of DXing during the trip, if he can secure light, portable radio equipment, for CW only. The necessary licenses for those countries have been obtained.

Martin, VE3MR, plans to work SSB from Andorra in the next month or so. Exact dates had not been set at this writing. And Bob, OD5BZ, is trying to work out a trip to Jordan for a few days of concentrated operating if he can surmount all the obstacles, reports WØQVZ. There's not much chance of any operating from Yemen right now, he says.

Locally, W1QMS, on phone, and W1UXK, on CW, will operate from VE1/Prince Edward Islands from July 6 through the 13th on 6 through 160 meters, with concentration on 15 and 20 meters, for the express purpose of providing contacts and cards from this relatively rare island for all WAVE certificate seekers.

And two individual excursions are planned to FP8/St. Pierre, K2JGG during the first week of July for 3 to 5 days, using phone and CW on all bands, and W3HGP, some time in July for an unspecified period, if he can find someone to accompany him.

DX Notes

Undoubtedly sparked by the W4RQR SSB enthusiasm, VP4TI is getting his own SB exciter and should be permanently active soon, reports W8YIN. PJ2AA, Aruba, fired up on SSB May 1 for the first permanent PJ2 activity, continues Mickey, using 20A, 300L, and G4ZU beam, usually active 0000 GMT and 2000 GMT Sundays, rockbound on 14294 kc but awaiting new crystals. VS1HS has been fairly active on 14310 kc at 1300 GMT, but with rather weak signals.

In order to set up CR1ØAA in business so he can be more active with better signals, W3GHD is shipping him a 6-volt DC gasoline driven generator to charge his batteries. It is expected the generator will be used by CR1ØAA for about six months, then shipped to another rare spot in that area that hasn't been very active. A little aid in this remarkably good cause, for the shipping expenses only, would be very welcome, and should result in some first rate DX activity. Encouragement, financial or other wise, may be sent W3GHD. Any excesses will be forwarded CR1ØAA for gasoline.

Lasse, SM8BYG, operated as SM8BYG/MP4T (Trucial Oman) May 1 and 2, but unfortunately the QSOs can't count for DXCC because he was aboard ship one mile off Debai. He didn't realize this wouldn't count! He returns to Trucial Oman in about two months, but believes operation ashore will be almost impossible.

Danny Weil, VP2VB et al, arrived in the Madeira Islands May 13th, enroute KV4AA, where he hopes to terminate June 15th. He plans to operate from PYØ, YVØ, and the other new countries in that area. He says he could use some operators to help with these new countries. The Yasme sleeps four comfortably. He expects it will require about four months to cover all the new countries.

VS5AT and VS5BY are testing their home made rigs and expect to be active very soon, probably on 21 mc. W1TYQ informs us HV-1CN is taking a 90-day course in English at the Vatican. FP8BB, who worked a lot of stations in the REF contest, is a pirate. FP-8AP avers he's the only ham on the island at present. OM5KT is a weirdy, too, in North Africa.

VP5CB is a new station on Grand Turk, set up by the SeaBees, with limited permission to handle third party traffic between the men of that base and their wives and families in the States, reports Ed Ray of K1NAP, the SeaBees Atlantic base in Davisville, R. I. A detachment of the same outfit will shortly be licensed and active from San Salvador. Equipment includes HT-32, SX-101, and a tri-band beam, with operation mostly on 10 and 15 meters.

ZD3G has returned to England, and ZD3E is leaving the latter part of May, which reduces ZD3 activity to zero. If they can persuade their relief to go on the air they may provide him with equipment, but nothing is certain. After England Lee is anticipating a spell at 5A2, MP4B, or YI, followed by VQ6 next year.

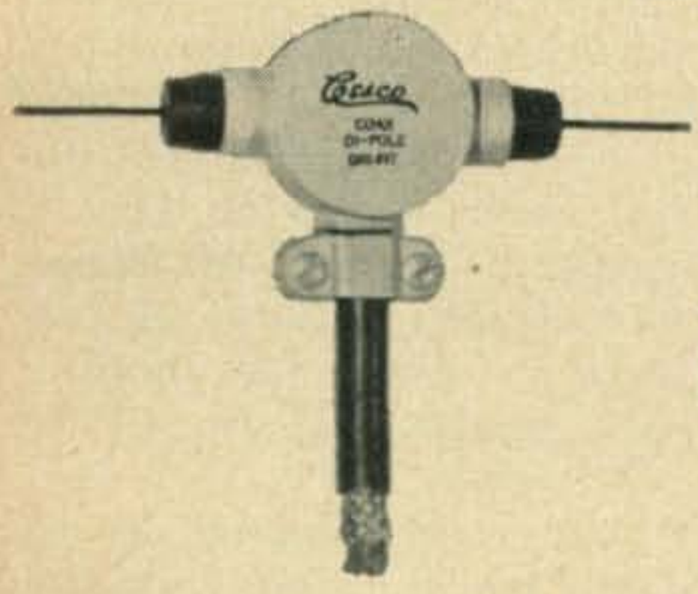
John, KR6JR, has taken over W5DKK's gear, 10-B, pp 813's, SSB and CW, on Okinawa, and is presently active and looking for DX. Dick, W3PZW, is now KB6BJ, on Canton Island, using BW 5100, 75A2, and Mosley tri-band beam. He's active on all bands, and schedules his father, W3WV, at 0300 GMT on 14080 kc. QSL via the W3 bureau.

The RSGB advises the third letter of Mauritius Dependencies call letters will be added at

[*Continued on page 95*]

New Amateur Equipment:

More news on new equipment from such manufacturers as Hy-Gain, Mosley, Telrex, Cushcraft, Skylane, Gonset and many others in the August issue of CQ.

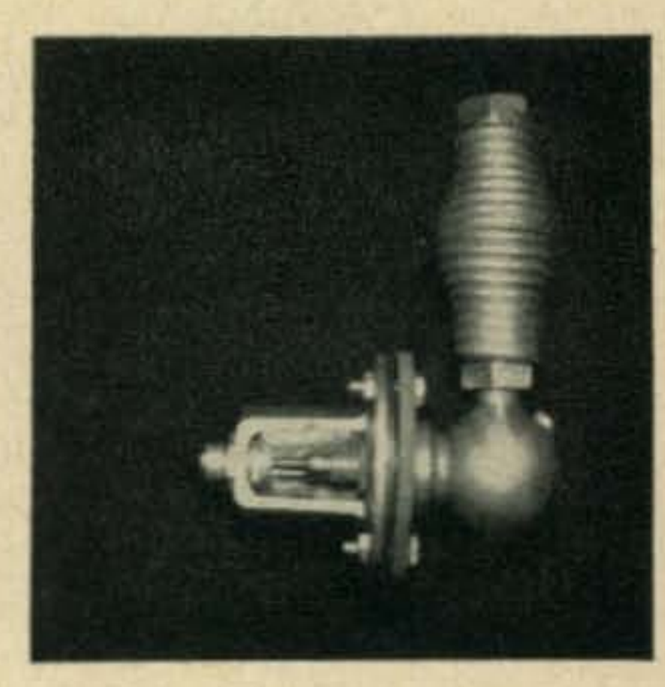


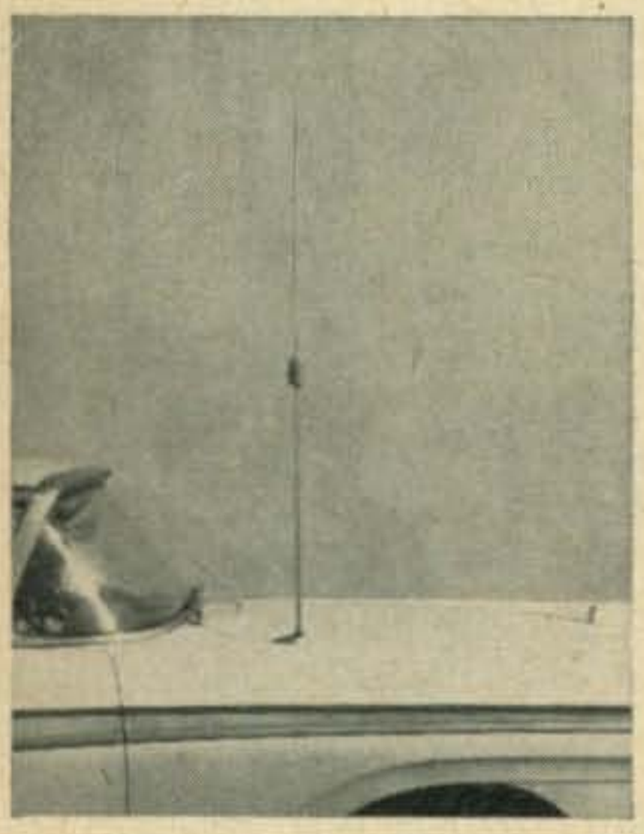
Dipole Hangers

Hey all you dipole hangers, harken unto this new Cesco dipole hanging gizmo. Like you hook the dipole wires into it and the coax is clamped into place. The connection is all wx proofed so it'll stay around for years giving no trouble. And you know what it costs? $2.95. Wanna read more about it? Circle or otherwise mark A on page 126.

Coax Mobile Fitting

Will's Electronics has come up with a little gadget that should help mobileers and their antenna installations. They have a kit which converts the regular mobile body mounts into a shielded coaxial connector, thereby simplifying your connection problems, reducing stray noise pickup and eliminating the possibility of your coax breaking loose from the antenna due to car vibration. Interested? They cost $3.95 to $5.95 and will fit most body mounts. Circle B on page 126 for more.





Attention Mobileers

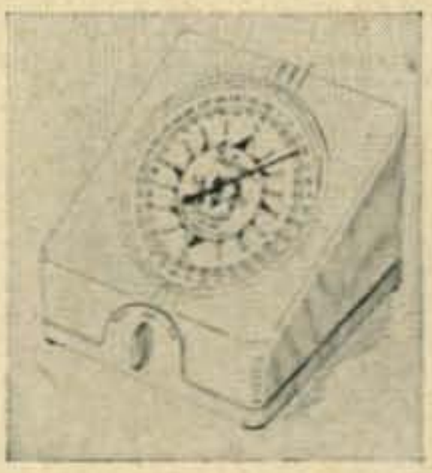
Rex Bassett has done it again. The Bassett mobile antenna system (September 1955 CQ, p. 19) has been pretty much the standard of comparison ever since it was first announced. About the only difficulty with the system was that it was a bit more expensive than other available units. Now Rex has just announced a completely new system which should be a real show stopper.

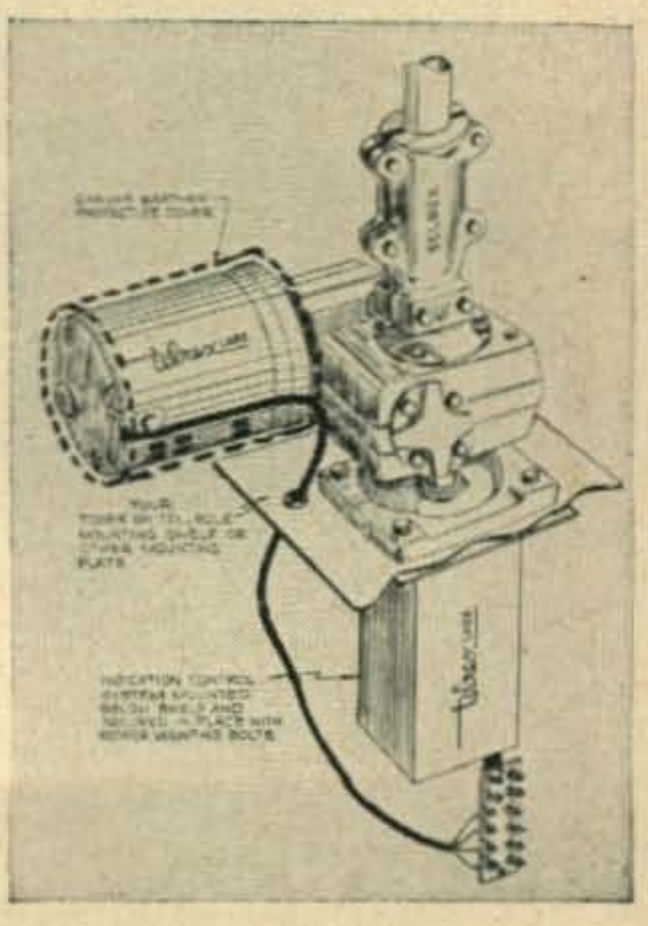
This antenna consists of a completely sealed vacuum coil sitting on a 24" base section. The top section telescopes down to 23" for 15 meters and 72" for 10-11-20 meters. SWR on all bands is less than 1.5:1 over the entire band. It will handle the power of the KWM-1, Elmac, Gonset, Morrow, etc.

Installation is a two second affair. You just slip the base section over your existing BC car antenna. Or it can be screwed into a regular base mount with the furnished accessories.

Since the top section is adjustable you can mount the antenna anywhere on the car and achieve precise resonance. The efficiency of the system is very high.

So much for all the features, now about the cost . . . and this is the most amazing part. It will cost $15.95 amateur net. Circle C on page 126 for more info.





Heavy Duty Beam Rotator

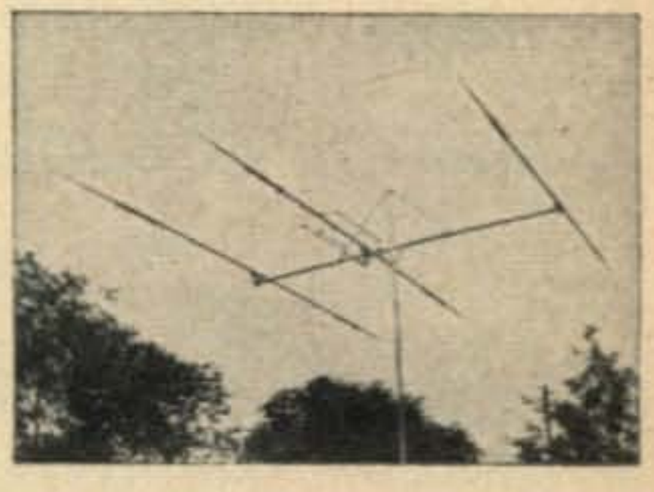
Telrex has a new beam rotator for use with large arrays. This model will handle a full sized four element twenty meter beam plus a four element fifteen and a four element ten meter beam stacked five feet apart in winds of over 100 mph. Rotation speed is 1½ rpm. The indicator unit is selsyn driven. Limit switches are built into the rotator to keep you from wrenching off your feeders. Only eight wires are needed for all controlling of the rotator and the indicating system. Price of the system is $360. For more info on the model 200RS circle D on page 126.

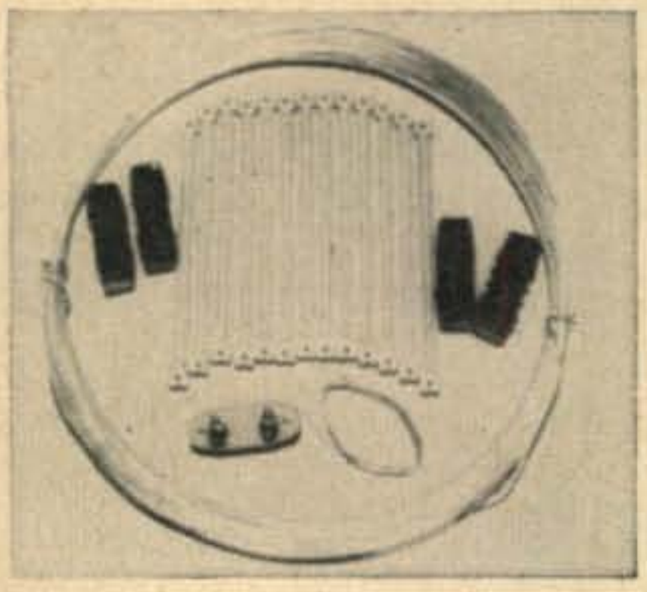
SWR Meter

Cesco, in addition to their excellent line of antenna hardware, has a rather complete set of SWR Meters available. One model has the whole works in one single unit ($29.95), then another has the control panel and meter separate for desk top use remote from the phase unit ($34.95), and the third type has the control panel designed for built-in installations such as the Collins Speaker Grill ($34.95). All units are designed to work from 3 to 200 mc and from 25 to 1000 watts (even lower powers needed to give full indication above 7 mc). Line loss less than 1 db at 30 mc. Marking H on page 126 will get you full data.

Tri-Band Antenna

Hornet has come out with a three band beam for $79.95. Delux edition with fancy gamma match contraption is $99.75, still quite a bargain. We could tell you all sorts of interesting things about these beams, but you'll do a lot better if you circle F on page 126 and read the interesting booklet that is available.





Folded Diapers

We all know how good the old folded dipoles work. Apparently the Hornet Antenna Products Company does too for they have come out with a complete line of 'em for all bands. Prices are pretty reasonable too . . . $4.95 for the 15 meter kit. These dipoles are wide spaced for minimum weather reaction and good efficiency. The kits include wire, spacers, end insulators, and center feed insulator. Feed with regular 300 ohm twin-lead. More info? Circle J on page 126.

Three Band Mobile

Mark Mobile has introduced a three band mobile whip for 10-15-20 meters, mitoudt der traps. This clever gadget consists of a basic bottom whip unit and three helical wound fiberglass top sections. The overall height is 6 feet. The top sections load up for each of the bands giving a quite satisfactory SWR on all three bands. Dunno the price yet, but we'll get all the info to you if you circle E on page 126.

QSL contest

WINNER

LOSERS

Winner of this month's years subscription to a well-known radio mag is Henry W. Peters, KN9LMN. Runners-up entitled to an extra free copy to impress visitors are Douglas Whillans, ZL1AFW and The Quart & ½ Club, KA2QT.

de W2-EN-ESS-DEE

[*From page 12*]

Washington Convention

A letter from the Convention reminds us that the National Convention this year will be held in D.C. on August 15-16-17. They have so many events, tours, breakfasts, luncheons, dinners, buffets, dances, cocktail parties, coffee-klatches, seminars, discussions, lectures, and all like that that you'll have to send for the official list to tell the performers from the spectators. Hint: everything is a lot cheaper if you order early. So send a card or letter to ARRL Convention HQ, P.O. Box 3726, Washington 7, D. C. for a program, brochure and the cost of all events. Advance registration closes August 1st. the "35" by 175 to 50 watts PEP, but either will run most linears so it will not make too much difference for home installations.

Navassa & QST

Somehow I got left out of the two microscopic mentions of the DXpedition that appeared in the June QST. See last paragraph page 87 for one and I dare you find the other.

73 Wayne, W2 NEVER SAY DIE

---

hamfests

Frederick, Md.

The Maryland Emergency Phone Net invites all amateurs and their families to join in its Annual Hamfest and Picnic, to be held on Sunday, July 13th, 1958, at Braddock Heights Park, 5 miles west of Frederick, Maryland on Route 40A. Advance registration at 75¢ per person (children under 12 free) can be made with W3PSP, Kenneth S. Teeple, 718 E. 33rd Street, Baltimore 18, Maryland.

Santa Fe Park, Ill.

Illinois—Hamfesters Radio Club is holding their 24th annual picnic at Santa Fe Park, 9100 So. Wolf Road, on Sunday, August 10, 1958. Site may be reached from the east by taking Route 4A (Archer Ave.) to 87th Street in Willow Springs, and heading west to the grove. From the west, take Route 66 to 79th Street, and head east to the park. Our picnic grove has modern facilities, convenient parking at one of the many tables, and plenty of shade. There will be radio displays and lectures, food and refreshments, events for children and adults, and a host of valuable prizes. Bring your gear for sale or trade at our swap tables. Come one, come all to the largest and liveliest gathering in the Midwest. Advance donation $1.00, $1.50 at the gate. Write W9PBM, 8213 Kingston, Chicago, Ill. for tickets or information.

Lafayette, Ind.

The Indiana Radio Club Council Picnic and Family Outing for 1958 will be held at the Tippecanoe County Fair Grounds, Lafayette, Indiana on July 20, 1958.

DX [*from page 91*]

the end of the suffix, rather than the beginning, with A representing Agalera, B for the St. Bradon Group, C for Chagos, and R for Rodriguez. Thus VQ8AS becomes VQ8ASR, and VQ8AJ, Diego Garcia, Chagos, becomes VQ8-AJC. All would drop the third letter and revert to the original call if they happened to return and operate from the home island of Mauritius. VQ8AQ has left Rodriguez for the Seychelles, and should be a VQ9 by now.

Canton Island is suffering a QRM problem, writes Chuck, KB6BH, because there are now seven hams on the island, and two or three more in the making. Ten and 15 meters are the popular bands, with 20 useless because of interference to a nearby airport frequency. Chuck is very anxious to work Maine, Vermont, Rhode Island, and South Dakota to complete his WAS. He hangs out on 21260-290 kc with a Valiant, NC-300, and two-element beam, and promises to QSL 100%. He's active most days between 0100 and 1030 GMT.

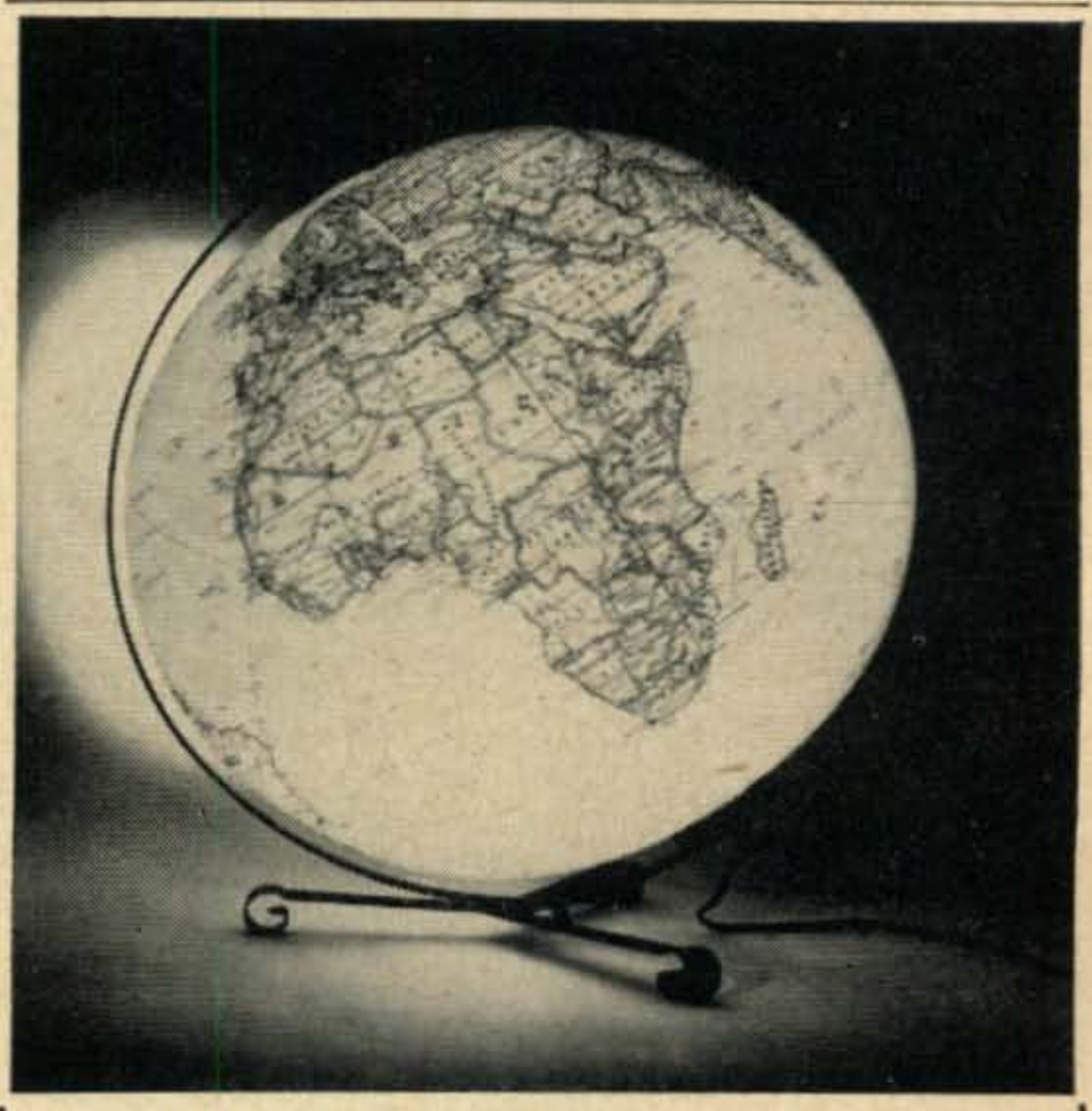
VKØAT is active from Davis base on 28 mc, advises VK2QL, and FB8XX is now on 21 mc CW. HL9KR went on SSB May 7 for the first time, reports W8YIN. He uses 14130 kc, beginning operation at 0900 GMT, and cannot use any other frequency because of government regulations. He tunes for American and foreign SB stations starting around 14260 kc. ZS2HX is considering a SB DX-pedition to ZS9 in the early fall.

See you next month. ■

73, Don, W4KVX

Addresses

DL4 QSL bureau – 604th COMM, APO 12, New York, N. Y.
G5RV – 184 Galleywood Road, Chelmsford, Essex, England
ex-HR2WC–QSL to Wayne W. Cooper, W6-EWC, P. O. Box 2170, Ojus, Fla.
KP4ANU–CWO Lee Galloway, Box 21, Ramey AFB, Puerto Rico.
KR6JR–John R. Hunt, 1962nd AACS Sq, Box 231, APO 239, San Francisco, Calif.
KX6CH–QSL viaW6GMQ
PI1LS – Vblommestein, 56 Driebergenstraat, The Hague, Netherlands
PJ3AB–Steele 160, Lagoville, Aruba, Netherlands West Indies
PJ5CB–QSL to G3EIX, Barrowdale, Baydon, Marlborough, England
VS1HS–Harry Goodwill, 11 Maida Vale, c/o RAF, Seletar, Singapore 28
ex-XW8AG–Rene Maspimby, 9 rue Ornaud-Bernard, Toulouse (Haute-Garonne), France
ZD3G – 13 Tedder Avenue, Wayfields, Nr Chatham, Kent, England
ZD7SA–Bob Freese, Napolean St, Jamestown, St. Helena
ZD7SB–Peter Billing, c/o Post Office, Jamestown, St. Helena



NOVICE [*from page 84*]

Dr. J. Louis Bouchard, Northwestern State College, Alva, Oklahoma is an almost Novice too, and has a similar problem. He would like to hear about the relative merits of the HI-Gain multi-band vertical and the various dipoles.

Dave Lufey, KN3BFH/Ø, 989 W. Washington St., Kennett, Mo. reports that he obtains better signal reports when running his Globe Chief at the 40-50 watt level. Wonder why?

Jim Morris, K5KSI, 6143 Howard Avenue, Dallas 27, Texas just passed his General but still operates on the Novice bands. He will sked anyone for any reason and would like to get in the Rag Chewers Club.

Alan Kaplan, KN2RIN, 75-15 35 Ave., Jackson Heights 72, N. Y. doubles as a photographer and sent along some "spiffy" home made QSL cards printed on Kodak photographic post cards. The rig is homebrew. Work Alan and receive one.

Riley Sundstrom, Headquarters R.D. #1, Stockton, New Jersey is an SWL and sends a question regarding the Q Multiplier. Yes, Riley, The QF-1 has two cables and any binding posts will work.

Don Simmonds, K5BDX, Box 1149—312 South 2nd St., Brownfield, Texas has been a General for two years, but never left the Novice bands. He wishes to advise you that he has a bunch of Novice crystals for sale. Write him for details.

Larry Fuller, KN7CRM, Mesa, Arizona runs a Globe Chief 90 and a Hammarlund HQ110. He would like skeds with Idaho, Mont., Conn., Mass., La., Ark., Wyo., and N. Carolina. Look for him on 40 and 15 meters.

Bob Simkins, KN40OZC, 202 Pleasant Ridge Avenue, Greenville, S. Carolina has worked lots of dx with his DX-40 and S-38. He would like to make skeds with Nev., Idaho, Okla., Neb., Ver., and N. Hampshire.

Bob Harrell, K40LQ, 128 Northern Avenue, Decatur, Ga. just received his General. He wants the readers to know that he will sked for any reason and will be glad to help anyone with the license.

Terry Griffin, KN5POP (wadda call — hi) Rt. #2, Mt. Enterprise, Texas operates with a Heath DX-40 and a Hallicrafters S-85 and has made 80 contacts in 14 states. Terry will QSL 100% and is glad to sked anyone needing Texas for any reason.

That does it fellows. Remember, when you write be sure to include what you would like to see in the Novice column. We only have three pages. How can I make them the most valuable to you. And don't forget to tell me your opinion of Novice phone operation on two meters. And while I'm twanging your memory, let's not forget those pictures of you and your shack. As large and as clear as possible. Didn't have many this month. ■

73, Don, W6TNS

Leo Says:

World Radio's Reconditioning Department

Leo I. Meyerson, WØGFQ, says, "Here's a part of our reconditioning department where five trained technicians are continually repairing and perfecting used equipment. As many as 500 new items go through here each month. But we need more. Over the years we have built such a tremendous market for used equipment, that sometimes we even have a waiting list for certain items. Because of this guaranteed market, we can offer you a better price on your trade-ins. We want them! We need them! We'll allow more for them! Let us give you our top quotation for your present gear when you buy your new NC-300."

Guarantees YOU THE BEST, HONEST TRADE-IN OFFER

on National's exciting new

NC-300

DREAM RECEIVER

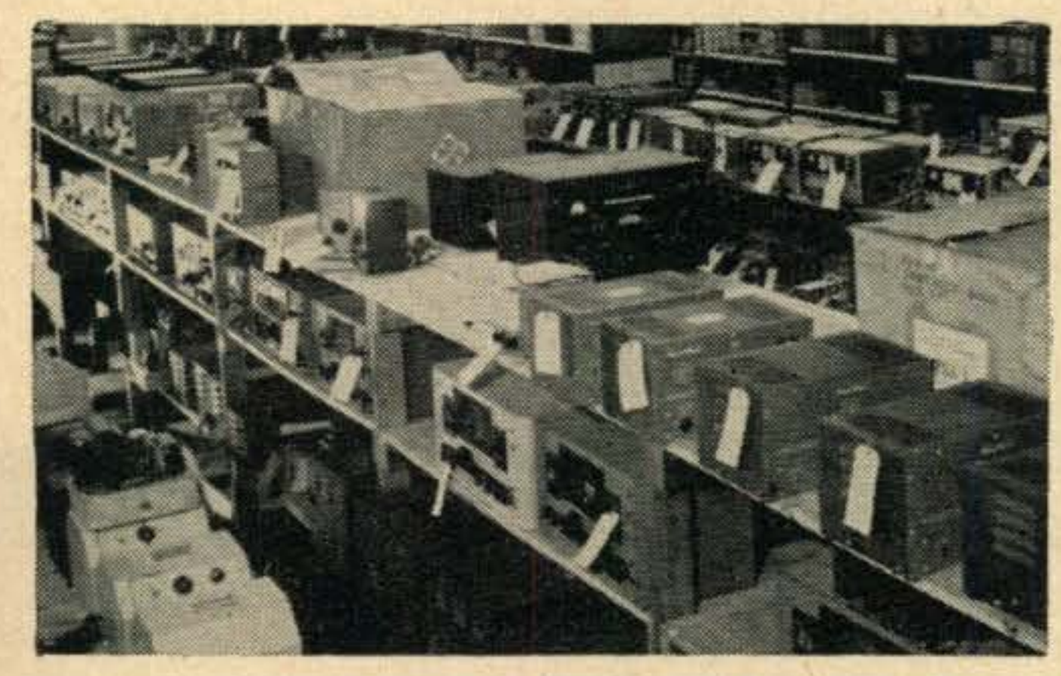
Stable! Sensitive! Features 10 dial scales for coverage of 160 to 1¼ meters with National's exclusive new converter provision with receiver scales calibrated for 6, 2 and ¼M, using a special 30-35 tunable IF band. Longest slide rule dial ever; more than 1 ft. Three position IF selector - .5kc, 3.5kc, 8kc - provides super selectivity. Separate linear detector for single sideband. Calibration reset adjustable from front panel to provide exact frequency setting. Dual conversion.

Amateur Net: $399.00

Only **$22.95 per mo.**

your present equipment may be enough for down payment.

XCU 300 Plug-In Crystal Calibrater: $23.95



FREE — Limited Time Only!

2400 Hour Clock with NC-300 Purchase

$15.00 VALUE

Gives 2400-hour time every hour of the day in every time zone all over the world. Key cities shown clearly. Direct reading, no computing or calculation necessary. Order your NC-300 now while this offer lasts. Clock will be mailed to you and guaranteed by clock manufacturer.

Dear Leo: Please send your free 1958 Catalog, information on the National line, and quote your best trade offer on my present

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for a new NC-300.

NAME: _____

ADDRESS: _____

CITY & STATE: _____

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World Radio LABORATORIES

ELECTRONIC HEADQUARTERS

3415 W. BROADWAY, CO. BLUFFS, IA., Phone 2-0277

For further information, check number 22 on page 126.

RTTY [*from page 63*]

Here and There

K2AAA, Bayside, N.Y., schedules Capt. Kurt Carlson, W2ZXM/MM, on the *Flying Enterprise II* every afternoon around 21,240-kc. W2GWL, Ronkonkoma, N.Y., effectively uses a silenced Model 12 on 20 and 40. W3YWO is attending the Indiana Technical College and hopes to get their radio club on RTTY this fall.

North Carolina reports in with W4CVU in Mars Hill, K4RRG and W4HKB in Winston Salem, W4RRH in Morganton, W4T1A in Rocky Mount, and W4EKB in Greensboro. Coming up are W4GHX, W4OFV, W4RVH, and W4HUL.

K4HJK in Rock Hill, S.C., is city-county CD director, and is also in MARS. K4DAU in Tampa, Fla., is on 80 with an MRC2 i-f converter. W4KKZ, Fort Pierce, Fla., has his Models 26 and 15 hooked to a KWS-1 and a 30K. W4AYT in Umatilla, Fla., is a newcomer.

K6GOS of Redondo Beach, Cal., just horse-traded for a Model 26 and is on 2 and 6 meters. K6HMS in Costa Mesa, Cal., is building his TU. W6AEE, Merrill Swan, 372 West Warren Way, Arcadia, Cal., is trying to locate his "loaner" TU (pg 63, *RTTY Handbook*). Last info is that Tom Howard, W1AFN, shipped it down south. If anyone knows where it is, please drop Merrill a line.

W7WJ in Portland, Oregon, is building the W2JAV TU from the April '58 issue of *CQ*. W7KYO of Bend, Oregon, is on 80 with a Model 26 and his improved version of the PAT converter.

W9GLR reports activity on the upswing in the Champaign-Urbana Illinois area. Jim has given several talks on RTTY before various Illinois radio clubs. KN9IBZ in West Lafayette, Ind., is looking for a printer with weather symbols. (So is W2PEE) W9DDG, Madison, Wis., with 350 watts, a Model 15 printer, and a 14 TD, is on 40.

KR6AK and KR6AY in Okinawa are now on 14,040-kc. WØANY/VO1 is on from Newfoundland. KZ5KJ is on from Balboa, Canal Zone. VK3KF in Australia has been worked by W6CG.

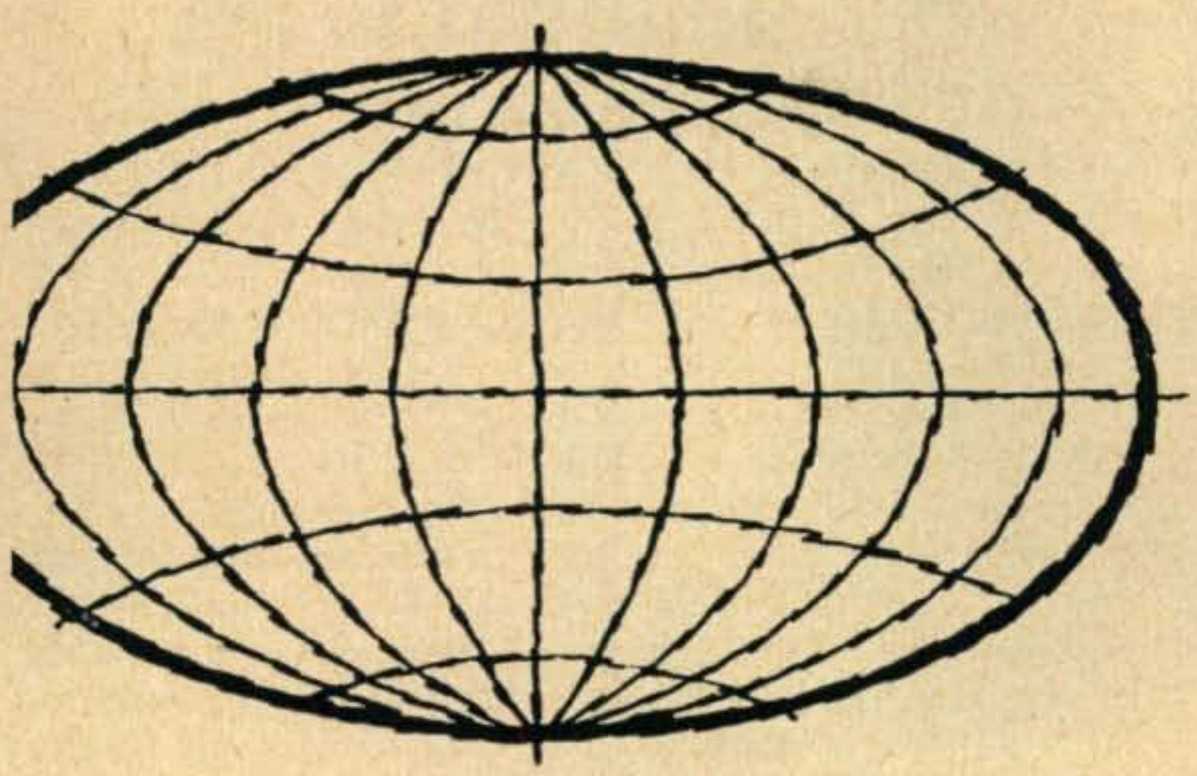
By the way, W6LDG still has some solenoids left for his automatic carriage return and line feed conversion for the Model 26. (See pg 73, Jan. '58 *CQ*.)

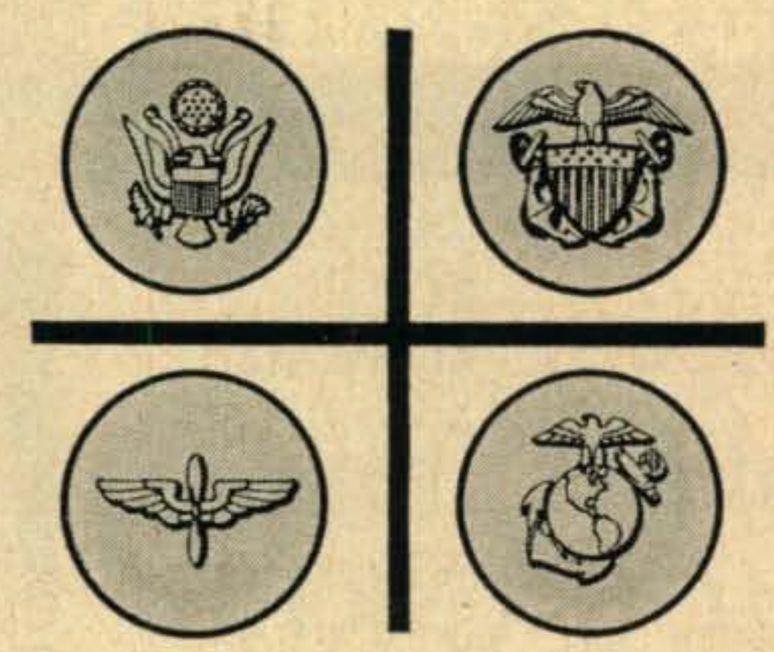
Commerce

Your RTTY column is gradually being reduced in size due to space limitations.

Don't forget, you newcomers: The *RTTY Handbook* is only $3, postpaid, via W2JTP. This is the *first* publication of this type devoted entirely to radioteletype, and it covers machine info as well as constructional data on exciters and terminal units or converters.

73, Byron, W2JTP





Harvey Service 'round the World for Servicemen 'round the World . . .

Wherever you are, if you're a ham, you are either practicing the hobby you love or wishing you could. Just because you added a uniform, you don't have to subtract a hobby. And, if 'Hamming' to you is a 'way of life', you're probably on the air every night—cutting down the distance between you and home.

If you are on the air, Harvey Radio aims to keep you there. If you're not, Harvey wants to help you get on. Whatever your equipment requirement may be, it is always in stock at Harvey's. Most important, you can be sure you will receive *exactly* what you *ordered.* Your order receives the personalized W2DIO treatment.

The processing of an order is not a conveyor-belt operation at Harvey's. It is personally handled from beginning to end, by W2DIO or one of his 'Ham' associates. Immediately upon receipt, your order is acted upon . . . often shipped the same day it is received. The manufacturer's carton is carefully bolstered for shipment so that it's safe upon arrival. Should the equipment be overweight or oversized for APO or FPO shipment, it is disassembled, each section is individually and carefully repacked and tagged. If you desire, Harvey's will open the carton to have the equipment inspected and checked out at no charge to you.

Harvey Radio is at your service—ready to take care of your every ham need. A complete stock of equipment provides for immediate delivery. For 31 years Harvey has served hams the world over —with satisfaction *always guaranteed.* Should you require any particular product information or literature, just ask W2DIO. He will be happy to take care of you.

HARVEY specializes in Single Side Band Equipment • BARKER & WILLIAMSON CENTRAL ELECTRONICS • CESCO • COLLINS RADIO • ELDICO • HALLICRAFTERS HAMMARLUND • E. F. JOHNSON

OUR 31st YEAR

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For further information, check number 24 on page 126.

hamfests

Terre Haute, Ind.

The Committee for the V.H.F. Picnic held annually by The Wabash Valley Amateur Radio Association has been appointed with our old standby Charles Hoffman, W9ZHL again serving as Chairman.

The Date has been set as of Sunday, July 27th, 1958 and the place as usual, Turkey Run State Park. Plans are under way to make this one day outing the best ever, plenty of nice prizes, Games for the Ladies, Fun for everyone, Swap Tables, Tall Tales, and no limit on the Eye Ball QSOs with old Friends of the Air Waves. No pre-registration required as each person is expected to bring their own Picnic Lunch. But Dinner may be had at the Park Hotel or Lunch Room.

Augusta, Ga.

"The Amateur Radio Club of Augusta, Inc., Augusta, Georgia, will sponsor its annual Savannah River Hamfest on July 13, 1958 at Julian Smith Park in Augusta. (That's Sunday) There'll be a Saturday night party and dutch supper, July 12. Lotz of prizes, fun, and eyeball QSO's. Dispatchers will be on 3807 kc to direct mobiles into town. Printed programs will be mailed to all Georgia and South Carolina hams. Anyone else wanting one together with a registration blank can write Bill, K4KAR, 359 Heath Drive, Augusta, Ga. Price, $3.50 including Sunday noon meal (Southern Bar-B-Que) and chances on prizes."

Sheridan, Wyoming

The Sheridan Radio Amateur League is again sponsoring the ANNUAL WYOMING HAMFEST. A banquet, contests, transmitter hunts and valuable prizes will be part of the program to be held in the South Fork Recreational Area of the Big Horn Mountains, 18 miles west of Buffalo, Wyoming, on July 12-13. Registration, including banquet, $4.50. Tourist mobiles will receive a friendly smile and a hearty handshake, western style. Register with W7QPP, 362 E. Loucks St., Sheridan, Wyoming, or contact any Wyoming ham for further details.

Shreveport, La.

The Caravan Club of Louisiana is sponsoring a hamfest in Shereveport, Louisiana on July 13, starting at 9:00 o'clock A.M. at the American Legion Club. Registration at gate only, fee 50¢ for adults and 25¢ for children. W5DSZ will be operating on 3825 kc for directions. Registration fee covers soft drinks. Bring picnic lunch. Drawings for prizes will be held at 2:30 o'clock P.M.

West Frankfort, Ill.

"The Second Annual Hamfest of the Shawnee Amateur Radio Association (SARA) will be held July 20 at the Community Park in West Frankfort, Illinois.

Lots of prizes, displays, and fun. Bring the family. Swimming for the kids.

For details, write Wayne Wright, Secretary; 219 West Lindell St., West Frankfort, Ill.

Conconully, Wash.

The Okanogan Valley International Hamfest will be held July 26-27, 1958 at Conconully, State Park, Conconully, Wash. There will be prizes, games, xmtr hunt, auction, contests and other entertainment. Fee is $1.00, XYLs .50, harmonics free.

HARRISON

'Ham Headquarters, USA'

has the NEW WRL "SIDE BANDER"

Join the swing to Side Band operation! Why clutter up the bands with a whistle-producing, power-wasting carrier, when for only $139.95 Harrison can give you this complete 100 watt PEP Double Sideband transmitter with guaranteed 35 db or more carrier suppression! Also operates as conventional 40 watt AM phone, and 50 watt CW. Will drive any of the popular linear amplifiers.

Full band switching 10 thru 80 meters, also covers all special frequencies 3 to 9 and 12 to 30 Mc. Uses regular crystals or any stable VFO. Simple to tune and use. Speech clipping and filtering gives greater talk punch per watt, and narrows band width.

Power supply section is heavy enough to handle external accessories. Pi network output matches any 52 to 1000 ohm RF load. Housed in attractive cabinet 8"x14"x9". Weight 29 lbs.

COMPLETE, EASY TO BUILD KIT, WITH FULL, CLEAR INSTRUCTIONS $119.95

FACTORY WIRED AND TESTED, READY TO OPERATE $139.95

VOX-10 Plug-in voice operated control. Has auxiliary contacts. Wired — **$24.95.** Complete kit — **$19.95**

● ASK FOR COMPLETE WRL CATALOG ●

RECOMMENDED ACCESSORIES

FB for use with the SIDEBANDER, or any transmitter, the

WRL 755 VFO

gives plenty of rock-steady output on all bands 10 thru 160. Large, accurately calibrated dial. Internal power supply.

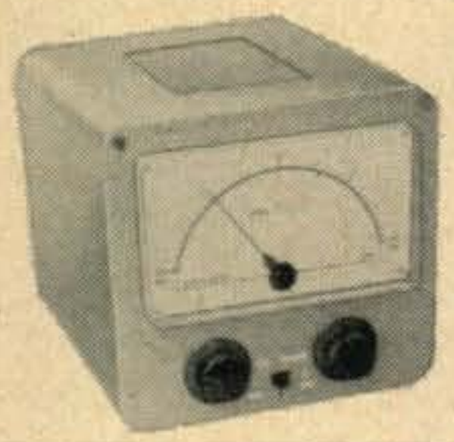
Wired and tested **$59.95**
Complete Kit **49.95**

WRL AT-4
Antenna Tuner and VSWR Bridge.

Enables perfect match of any antenna system to transmitter of up to 600 watts power. 10 thru 80 meter bands.

Wired and tested **$79.50**
Complete Kit **69.50**

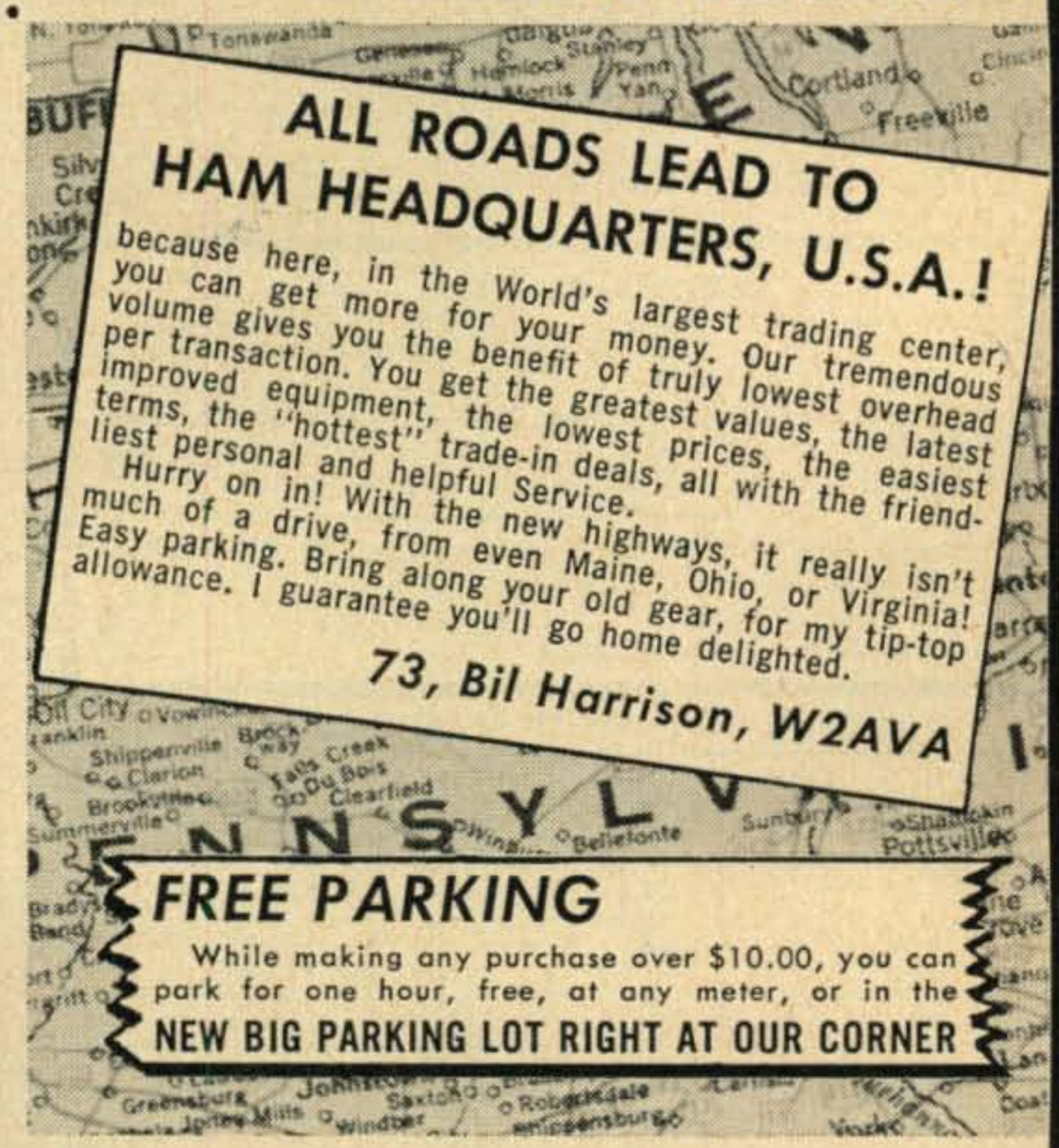
$10.00 CAN BRING YOU any Chief, Scout, Antenna Tuner, etc., etc. Put the balance on Automatic Revolving Credit with your Harrison Charge Account, and you can pay it off with as little as 1/10 of each monthly statement. You can add on more charge purchases any time you want. It's the greatest shopping convenience, ever! Send your order, today! Give employment and credit references, and include deposit.



6 METER VFO

Large, accurate dial with smooth vernier drive. Crystal-steady, 50 volt RF output, enough to drive any rig. Feeds right into crystal socket. Voltage regulated power supply, temperature compensated circuit, and sturdy construction give excellent frequency stability. Model 666. Factory wired and tested—**$49.95**

A PERFECT PAIR FOR 6 METERS



TECHNICIANS!
Here's an FB phone xmitter for the

SIX METER BAND

(also covers 10, 11, 15, 20, 40, and 80!) Full 55 watts talk power (high level plate modulated) phone, 65 watts CW. Completely band-switching, with built-in AC power supply, in compact TVI-shielded cabinet 8"x14"x8" Top value for your money! Factory wired and tested. **Model 680A $119.95**
Complete Kit **680AK $99.95**
For 10 thru 160 meter bands order **Model 66**
Factory wired only **$109.95**

New Model 680A

Globe Scout

The world-famous HARRISON TRADE-IN CENTER
is the greatest! Come in, pick your choice from the hundreds of like-new trade-ins, or write for Price List. All are money-saving bargain price tagged! Easy terms.

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VISIT NEW YORK OVER FOURTH OF JULY WEEKEND
Always plenty to see and do. (Bring along your old gear and let Harrison save you enough on a trade to pay for a good part of your trip!)
OPEN ALL DAY SATURDAY
July 5th

For further information, check number 26 on page 126.

ANTENNA SCOPE [*from page 55*]

of antenna used on a given band. This is particularly true where the inductor used has many taps on it rather than one tap for each band. A further absolute necessity is an r-f ammeter to measure the output current. A plate meter is only a very approximate indication of proper operating conditions of a pi network. The r-f ammeter will tell you precisely where your best settings are for maximum output. Always re-dip the plate but then tune it to which ever side of the dip point that gives the maximum reading on the r-f ammeter. Don't worry if the absolute reading of the r-f ammeter is as great as you would like it to be. R-f ammeters are notoriously inaccurate and are greatly subject to temperature changes. Also, make sure you take that terminating resistor off the plate of the tube before you fire up. The above mentioned hints on pi network operation are definitely worthwhile particularly when the guy down the street with a peanut whistle is working more and faster DX than you are with your gallon. A little care will spare your hair. ■

TWO AND THREE BAND TRAPS

[*from page 60*]

3700	150	2	Trace	Good
7000	35	2.15	None	Excellent
7050	65	1.16	"	"
7100	100	1.32	Trace	"
7150	100	1.32	Some	Good
14000	65	1.16	Some	Good
14050	70	1	None	Excellent
14100	70	1	"	"
14150	65	1.16	Trace	"
21050	90	1.2	Very large	Unsatisfactory
28075	230	3.05	None	Usable but high VSWR

The three band antenna was used with a Viking Ranger during two weekends in the 1957 Sweepstakes while operating as a fixed-portable station in Vermont. Thirty-eight states in all districts were contacted during over 400 QSO's on five bands. Performance on 10 meters was poor as expected; however that on 15 meters surprised me, being fair. Several Europeans were also worked on 15 and 20 meters.

The three band antenna developed above is a good one for the cw man who wants to work 80, 40 and 20 meters. With heavier coax (RG-11/U) there is no reason why either antenna cannot be used with inputs up to the legal limit. The length of the coax feed is not critical.

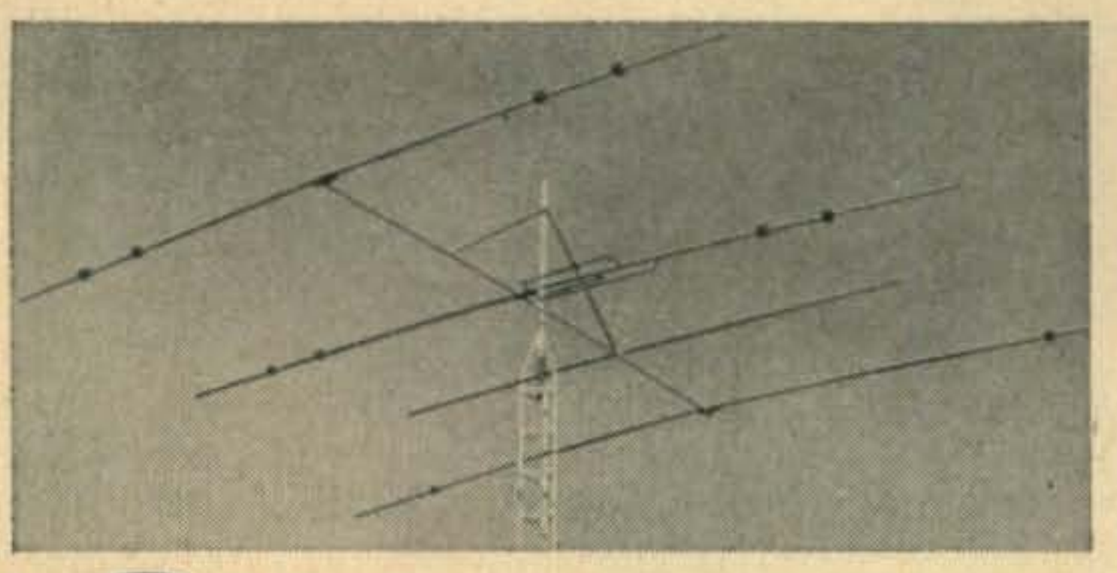
All we need now is a good inexpensive trap antenna for 10 and 15 meters. We have some ideas, and if they work out we'll let you know. For now, after eight antennas, I am weary! ■

for the final proof of operating excellence . . . compare on the air!

THESE GREAT SERIES OF

hy-gain trap tribanders

the FULL-SIZE trap tribanders



99.75

the 3-element trap tribander

The 3-Element Tribander shown above is now considered as the standard of performance in the field of amateur communications. F/B Ratio: approx. 25 db. Forward gain: 8 db. average.

69.50

the 2-element trap tribander

For use in limited space when top quality transmission is desired on 10, 15 & 20M. Single transmission line. F/B Ratio: approx. 18 db. Forward gain: 5.8 db. average.

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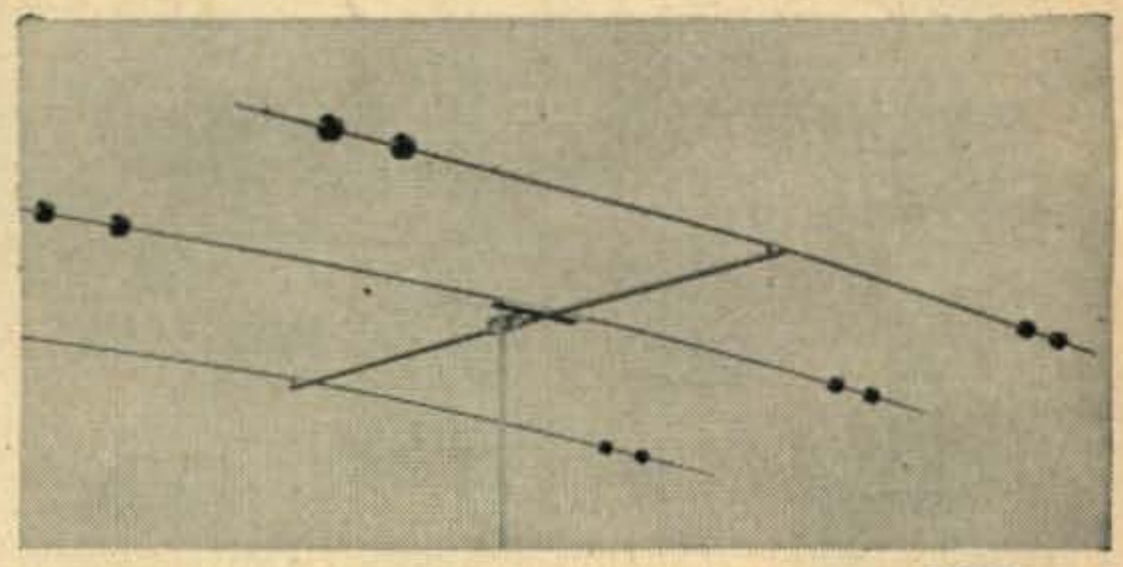
the 5-element trap tribander

The finest, highest gain, rotatable array available. Heavy duty construction. Uses 36', 2x31" rectangular aluminum boom. F/B Ratio: approx. 25 db. Forward gain: 12 db. average.

the NEW mini-tribanders



the 3-element mini-tribander

Extremely lightweight, only 39.8 lbs. Turning radius: 13'10", installable almost anywhere, yet boasting many features of the full-size line. Hy-gain top quality performance guaranteed.

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the 2-element mini-tribander

Practically a featherweight: — only 33.8 lbs., easily one-man installed in the shortest possible time and nearly anywhere. Turning radius: 12'11". Top features at minimum cost.

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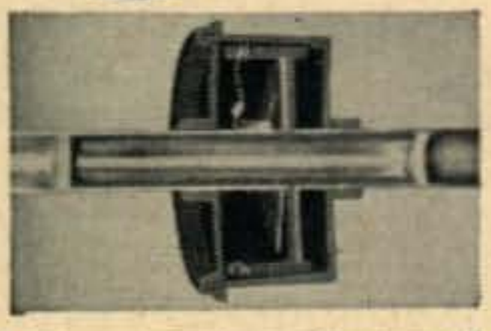
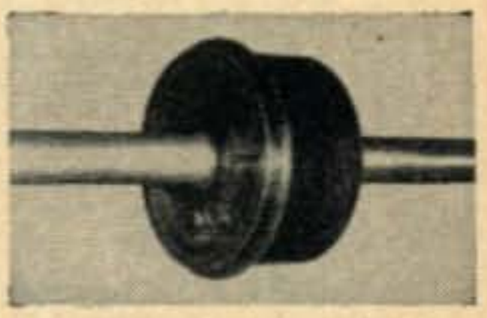
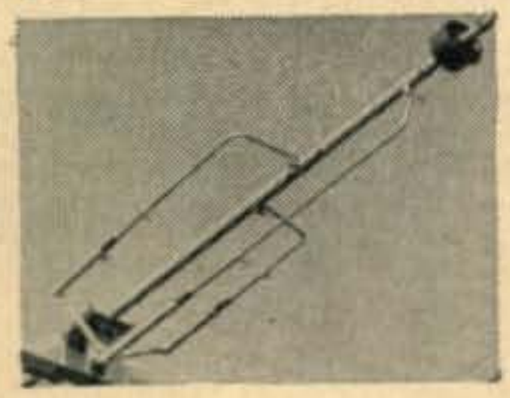
Here's the smallest practical size consistant with efficient operation, to which the trap tribanders may be reduced. Install in the smallest city lots. Light weight & rotatable by most TV rotators. Factory pre-tuned, with dimensions given for quick, easy assembly in a matter of minutes.



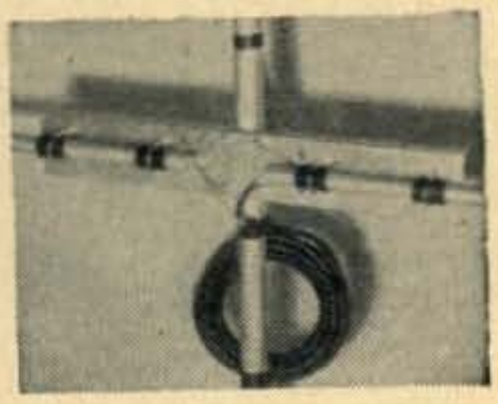
The automatic switch action of the Insu-Traps is employed in both series of tribanders. They act as insulators at their resonating frequencies, but allow radio energies of other frequencies to pass, isolating various sections of the antennas. Mechanically and electrically stable, the traps are hermetically sealed at the factory in polyethylene cover and cap, completely weatherproof. Hi-Q coils wound on styron form. Guaranteed for the life of the beam. The Mini-Tribander Traps are specially weight-designed for wind loading efficiency.





Perfect 1:1 SWR is made possible by the new, pre-calibrated Triaxial Gamma Match System with co-axially formed reactance cancelling capacitor built in. Exceptional band width maintains low SWR over entire band. Coax connector for 52 ohm feed line included. Gamma rod and capacitor section calibrated for exact setting over each band. No external baluns, antenna tuners or matching networks needed.

Split insulated dipole feed with co-axial choke results in SWR of less than 2:1 on all bands. No adjustments needed; simply attach 52 ohm feedline to dipole terminals. Heavy 12 ga. hot dipped galvanized steel channel and polyethylene insulated U-bolts support Hy-gain's driven element. Compare this construction with the flimsy supports using self-tapping metal screws.



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For further information, check number 28 on page 126.

MINIBEAM [*from page 54*]

have now gone over to a radiator of this pattern in place of the trap loaded element originally used on their tri-bander. *Gonset* appear to be using something like fig 5. If you want to study the principles of coaxial detuning sleeves, I suggest you read Transmission Lines, Antennas and Wave Guides by King, Mimno & Wing, page 133 onwards. (First published in 1945.)

All of these coax fed methods result in a loss of gain as compared with the system of Fig 1. This is because you lose the colinear effect of the lengthened driven element and the main lobe becomes broader and less well defined, more like a normal single band beam. Fig 9 gives a clear indication of what to expect.

I am often asked whether there are any secret plans afoot at G4ZU for something to surpass the Minibeam. I should like to make it clear that every known device was employed in the original design to extract the highest possible gain consistent with small physical dimensions, and it is most unlikely that any significant improvement could be made without increasing the overall size. It must also be remembered that adding more elements tends to follow the law of diminishing returns. For example, adding two additional directors to a five element beam to make seven elements in all, will produce a gain increase of 1 to 1½ db at the most.

However, the shortened elements undoubtedly make the performance on 20m somewhat less potent than on the two higher frequency bands, where results are generally described as exceeding the most optimistic expectations. A number of experiments have therefore been conducted during the past year with a view to obtaining improved 20m performance for the benefit of those who can accommodate a somewhat larger structure. It is proposed to call this new venture the 'Super Minibeam,' and it will be described in Part 2 of this article. Brief details of the 'Super Minibeam' were given in the October issue of the R.S.G.B. Bulletin, but although they printed extra copies, the demand was so great that they were sold out in a couple of weeks and it is now out of print. If you can lay your hands on a copy of this article you will find several other Minibeam designs, one with elements restricted to 17 feet overall length. ■

Note. *The designs in this article have been published for the benefit of the bona fide amateur. Publication does not imply any right to manufacture. The designs are protected against commercial exploitation by the following patents and patent applications.*

British Patent. 790576. *33589/55. 31012/57 (Patent applications) U.S.A. 611018. Canada 718163. Australia 23225*
S. African Patent 3671. *Germany B4259.*

Others pending.

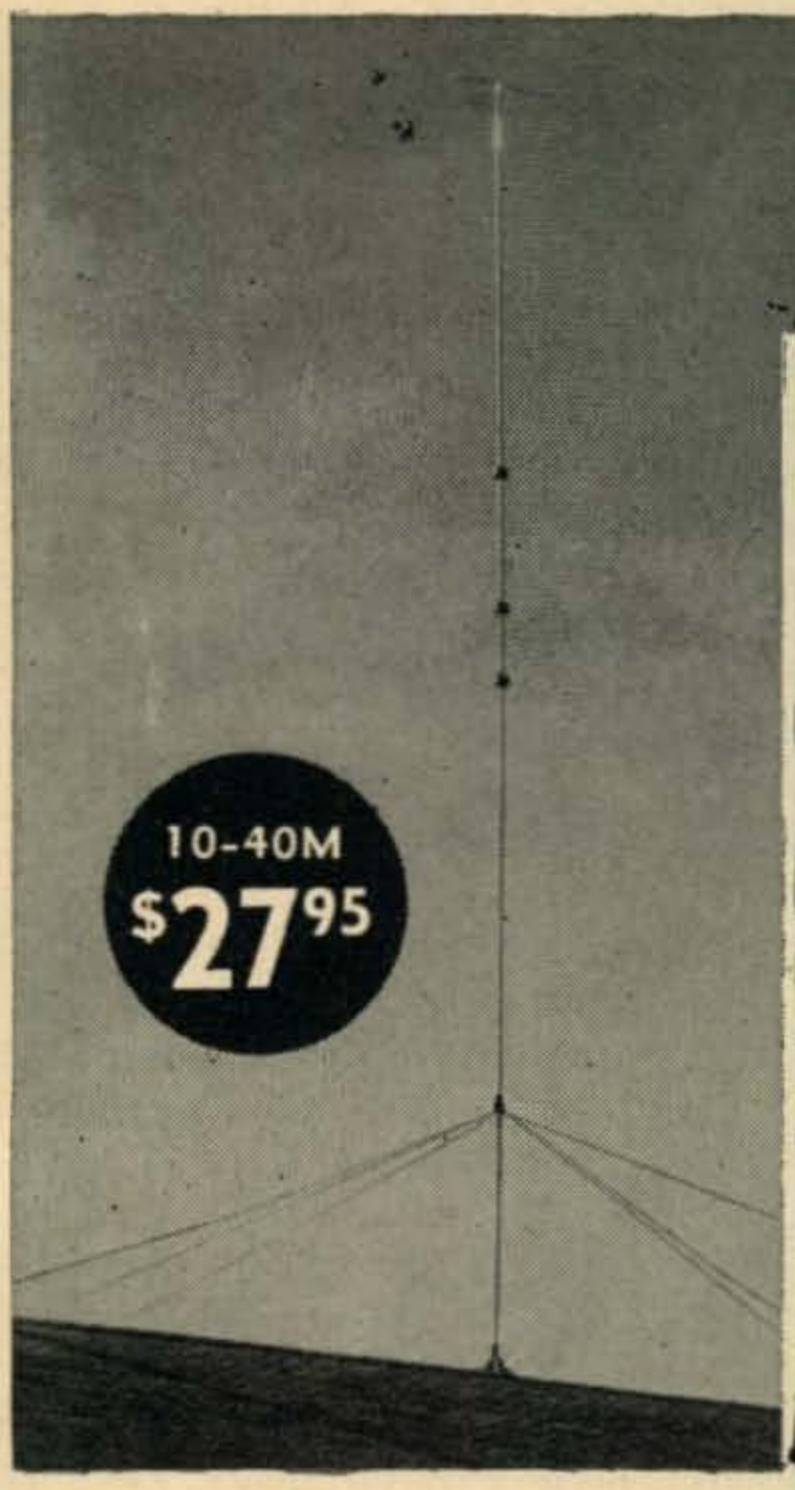
The Author has granted manufacturing rights under the above patents to (1) The PandaRadio Co. Ltd. Rochdale. England.

(2) Ing. Hannes Bauer. Bamberg. Germany.

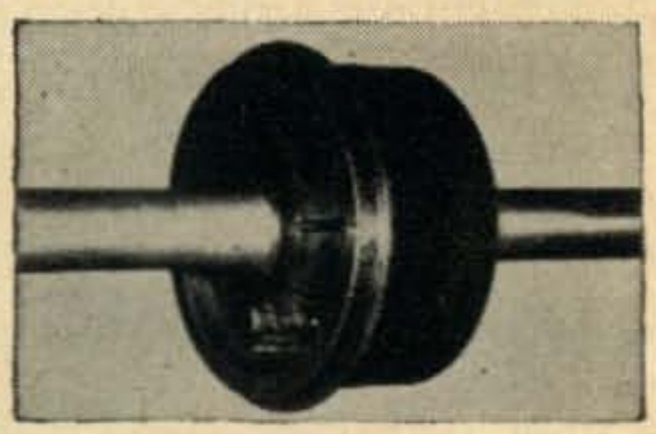
From Carton to Contact in 47 Minutes!

WITH hy-gain's

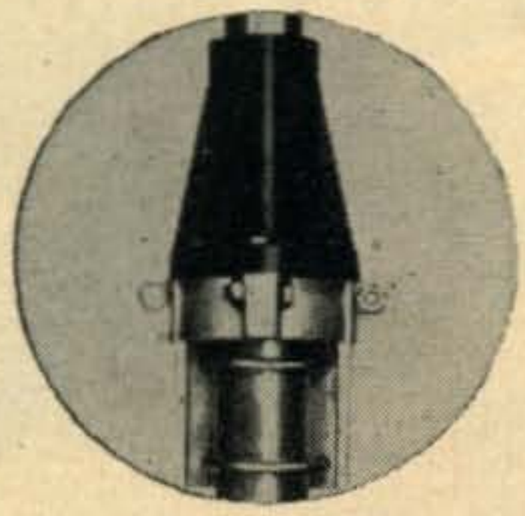
MULTI-BAND TRAP VERTICALS



Shown here are two of the great new hy-gain trap verticals, the 14-AV (for 10-40M), roof mounted, and the 18-AV (for 10-80M), side mounted, each using the sensational Insu-Traps to isolate the various sections of the verticals. 14-AV develops ¼-wave resonance. 18-AV develops ¼-wave resonance on 40-80M; ¾-wave resonance on the 10, 15 & 20 M bands. Each uses new Capacity Hat principle to increase radiating efficiency, and new nylon base insulator for self-support. Less than 2:1 SWR on all bands, single 52 ohm feed line. Combination Guy Wire and Radial Mount Kit available for 14-AV for rooftop mounting. 18-AV comes complete with side-mount bracket fixtures and nylon guring kit, all parts completely weather-treated.



Heart of the hy-gain trap antennas, the Insu-Trap makes possible for the first time a really efficient multi-band antenna system. It acts as an insulator at its resonant frequencies, but allows radio energies of other frequencies to pass freely. This automatic switch action isolates various sections of the verticals to make them the proper length for each band. Completely mechanically and electrically stable, the entire trap circuit is enclosed in a carbon activated polyethylene cover and cap. Traps are effective over the entire band. Completely weather-proof and air tight. Guaranteed for the life of the antenna.



Nylon base assembly makes possible the self-support of the Trap Verticals. Cast aluminum mounting bracket is adjustable for various sizes of masts, with weather protected internal coaxial fitting. All electrical connections are factory sealed. Entire unit completely weather-sealed.

Also available (not shown), is the model 26-AV vertical for the 2 and 6 meter bands, complete with new decoupling sleeve and ground plane. Overall height and length of ground plane: 5 ft. . . . and the model 12-AV Trap Vertical (for 10, 15 & 20M), using the Insu-Trap principle to isolate sections and develop ¼-wave resonance. Combination Guy Wire and Radial Mounting Kit available for rooftop mounting the 12-AV.

Model 26-AV (2-6M) —	$16.95
Model 12-AV (10, 15 20M) —	$19.95
Model 14-AV (10-40M) —	$27.95
Model 18-AV (10-80M) —	$69.50
12-AV Mounting Kit —	$8.95
14-AV Mounting Kit —	$9.95

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For further information, check number 30 on page 126.

AUDIO OSCILLATOR [*from page 51*]

C2 is simply a coupling condenser and R4 a grid resistor. The cathode resistors R2 and R3 are normal cathode resistors of about 5000 ohms.

The coupling resistor R5 is the secret of the unit. This should be as large as practical. By this means the degree of coupling is kept to the minimum needed to maintain oscillation. With the minimum of coupling the best in wave form is obtained as stated before R1 and R5 show some degree of interaction, but this is easily handled.

The voltage output should be somewhat less than that normally obtained from the microphone and the first voltage amplifier. In this way when the oscillator is turned on there is no need to make a grab for the volume control to save things from blowing up, and one can go about organizing things more calmly. By observing this point it is possible to build and set up the oscillator without any measuring equipment. The oscillator can be built and resistor R1 changed until it is found that the volume control has to be turned up to get normal operating conditions when the audio oscillator is substituted for the microphone and voltage amplifier. Next the coupling resistor R5 is increased until the maximum usable here is obtained.

The voltages as measured in the model using a 12 AH7 were using VTVM.

A	245	Volts
B	25	"
C	1.6	"
D	1.5	"

The audio output measured on VTVM was 1.2.v. RMS.

Measurements of A C — D can be made with a standard multimeter and the voltage at B calculated from these. However, no measurements are necessary if R1 — R5 are adjusted as explained earlier.

A thermister was tried in place of R5 both on its own and with a series resistor, but the results were no different from the use of a resistor alone. The same was the case with a lamp. The oscillator is switched in after the first voltage amplifier with a D.P.D.T. switch which also switches the high tension.

The circuit LC can be transferred from the plate circuit of V1 to the grid circuit of V2 if desired.

This cathode coupled oscillator can be used in many forms and a very handy one is as a crystal oscillator in which case the crystal replaces the connecting resistor R5. LC then turns to the xtal frequency. It is most useful when using the low frequency crystals of the FT 241 A type and with these crystals LC can be one half of an intermediate frequency transformer. If a crystal will not oscillate in this circuit it is just no good. The crystal osciilates on its series resonance in this circuit. ■

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PLUS: Band in use individually illuminated . . . antenna trimmer . . . dual conversion . . . full gear features. **Available with convenient terms from KEN-ELS. See me today!**

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- 5.0 mc. quartz crystal filter cuts unwanted sideband 50 db. or more.
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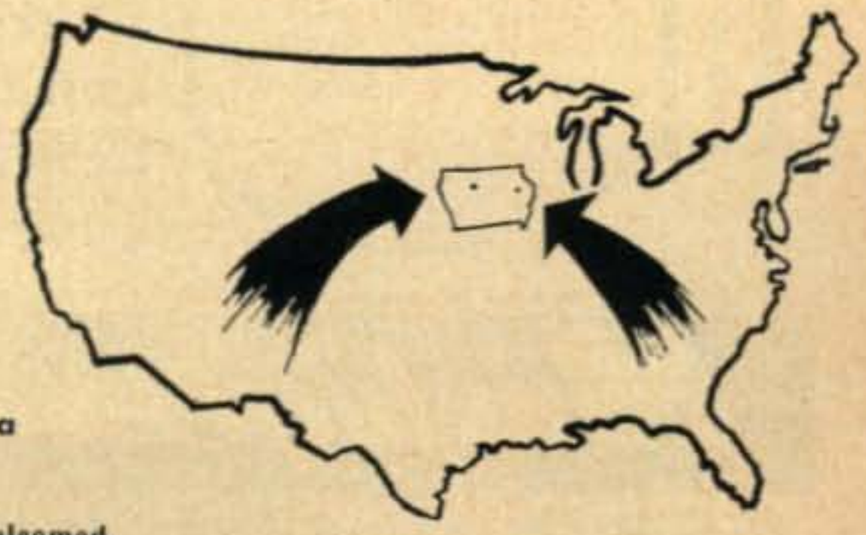

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For further information, check number 33 on page 126.

FLAT EIGHTY [*from page 49*]

may be installed over a plot of ground only 47 ft square. See Fig. 3.

Maximum end spacing occurs when the antenna elements cross each other at 90°. In this case the end spread = .707 x ½ wavelength shortened by conical antenna shortening factor.

Note: The sine of 90° = .707

Free Space half wavelengths

3.6 mc	*3.9 mc*
92/3.6 = 136.8 ft	492/3.9 = 126.2 ft

For the L/D ratio of the conical:

The Half-wave = L = 1
L/D = 1/.707 x ½ = 2/.707 = 2.828

since the effective diameter=½ the end spread.

Folded dipoles resonant at each end of the band are to be constructed. Open-line copper antenna transmission line 18 AWG with 1 inch spacing is to be used. As previously computed the K for these antennas taken separateley at 3.6 and 3.9 mcs = .976

The Flat Eighty shortening factor is then the product of these two.

K flat eighty = K x K_c
K flat eighty = .976 x .537 = .524

Low End

L = 136.8 x .524 = 71.7 ft
L = 71 ft 8⅜ in.

High end

L = 126.2 x .524 = 66.2 ft
L = 66 ft 2⅜ in.
Average L = 69.95 ft
End Spacing = 66.2 x .707 = 46.8 ft
= 46 ft 9⅜ inches

When installed about 28 to 30 ft above ground, the Flat Eighty shows an average input impedance of 60 ohms and can be fed with any feed line exhibiting approximately this impedance value. At my installation it was convenient for me to use ordinary plastic covered lamp wire of the type known as "zip" cord although twisted pair could also have been used. With the inclusion of balun coils in the system, coaxial feed may be employed.

The only components not found available commercially are the end spacers and the center insulator. These are not critical in material so long as they can withstand the weather and the weight of the antenna. At K2ECY it was found convenient to use two 2 inch strips of formica for the end spacers although two strips of bamboo would do the job just as well and be lighter besides. For the center insulator a rectangular piece of polystyrene material ⅜" thick was used as shown in Fig. 3. Due to antenna droop I support this piece from the center of my roof with a 3 ft pole. Kindly neighbors on either side of me have allowed me to tie the Flat Eighty ends to their respective chimneys. ■

For further information, check number 35 on page 126.

hamfest

Pittsburgh, Pa.

The South Hills Brass Pounders & Modulators will hold its 21st Annual Hamfest on August 3rd, 1958 at Pittsburgh's South Park Lodge. Complete details can be gotten by writing: Sil Zolinas, W3QWW, Program Chairman, 4949 Roberta Drive, Pittsburgh 36, Pa.

Big Springs, Idaho

The 26th Annual W.I.M.U. (Wyoming-Idaho-Montana-Utah) Hamfest will be held on August 1-3, 1958 in Big Springs, Idaho. For further information write to Ray Hunnicutt, W7YHC and XYL, W7YHB, Box 555, Harlowton, Montana.

Glacier National Park Hamfest

The 24th Annual Glacier National Park Hamfest will be held July 19-20, 1958, Glacier National Park. This is one of the biggest ham events of the year. For all the details write: Frank Anderson, Hamfest Committee, Box 367, Great Falls, Montana.

NEW CQ RATES

Postal Rate Increases require us to raise the subscription price of CQ. All subscription orders received on or after Nov. 1, 1958 will cost:

1 year $ 5.00
2 years $ 9.00
3 years $13.00

For further information, check number 49 on page 126.

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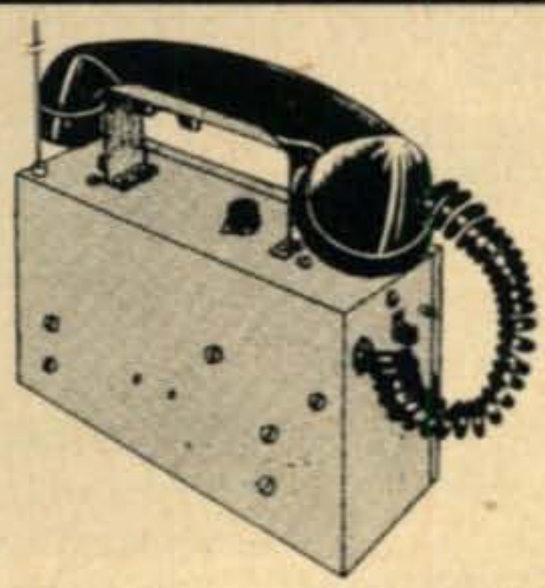

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General specifications applying to all models:

Highest quality workmanship and materials, silver plated coils, ceramic capacitors and advanced design assures maximum performance with the longest battery life. Sensitive receivers can detect signals as small as one microvolt and feature automatic volume control and noise clipping. Transmitters use high level amplitude modulation, have a power input of one watt to the R.F. stage and will radiate a signal for 1 to 5 miles (depending on obstructions) using antennas supplied. Up to 40 miles have been reported by some of our customers when communicating with stations having directional beam antennas. Radiophones can be used singularly to communicate with fixed stations or two or more to communicate with each other providing they are for the same frequency band. Fully portable, no external connections needed. Uses standard radio and flashlight batteries available at your local store. Total weight of completed unit including all accessories is less than 5½ lbs.

Model TC-144. Meets F C C requirements for general class amateur license. No minimum age requirement. Variable frequency transceiver circuit. Tunes from 144 to 148 mc. Wired, tested and guaranteed electronic chassis complete with two high frequency triodes (3A5)..... $7.98

Model TR-144. Similar to above but with independently tuned receiver and transmitter circuits, using 4 high frequency triodes (2-3A5's). Permits receiving frequency to be changed without affecting transmitting frequency.....$11.98

Model TRX-50. Crystal controlled transmitter and variable frequency receiver with R.F. stage. Tunable from 50 to 54 mc. Meets F C C requirements for general and technician class amateur licenses as well as for civil defense and other special services. Wired, tested and guaranteed electronic chassis complete with six high frequency triodes. (3-3A5's) $16.98

Model TRX-50-A. Similar to above but with transistorized audio booster stage for extra loud reception..... $18.98

The following accessories are required to complete the walkie-talkie as illustrated: Strong 16 gauge 8" x 5" x 3" aluminum case satin etched and anodized with all holes punched for quick assembly. Heavy duty battery holders with phosphor-bronze contacts, battery switch, telephone handset cradle, retractable coiled cord, adjustable shoulder strap, 18" or 24" antenna with loading coil (depending on frequency) and necessary hardware. All for only $9.98

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Handset similar to above but used surplus..... $3.98

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CORRELATION CHART

Mod.	Par., Anti-Res., or Series	%	Difference Frequency
SR1	Series		.09% difference frequency
AR50	50mmf	+.030%	
AR40	40mmf	+.008%	
AR32	32mmf	+.008%	
AR20	20mmf	+.018%	
AR12	12mmf	+.025%	
PAR3	Par-allel	Equiv. Shunt	To 30mc only—Pierce or Miller

NOTE: Recommended crystal drive level—10mw or less for fundamentals; 5mw or less for 3rd mode.

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Frequency Range		Calibration Tolerance	Temp. Range Tol. −55°C to 90°C	Price	Temp. Range Tol. −40°C to 70°C	Price
1000KC		.0025%	.005%	$6.50	.01%	$5.50
2000KC	2500KC	.0025%	.005%	4.50	.01%	4.00
2501KC	9999KC	.0025%	.005%	3.50	.01%	3.00
10000KC	15000KC	.0025%	.005%	4.50	.01%	4.00
Third Mode Operation—at Parallel or Series						
15001KC	30mc	.0025%	.005%	$3.50	.01%	$3.00
At Series						
30.1mc	45mc	.0025%	.005%	$4.50	.01%	$4.00

VALUABLE COUPON

Good for $1.00 off on each crystal purchased up to six units. Mail this coupon with your order. Offer good until August 15, 1958.

See correlation chart to order. Quickly correlate frequency to requirements of your equipment. Repeat order by same model number.
When check accompanies order, we will prepay air mail postage. All other orders under 10 crystals will be mailed C.O.D. Quantity discounts available on request. Satisfaction guaranteed.

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Phone VIctor 2-5571

For further information, check number 39 on page 126.

VERTICAL PAIR [*from page 45*]

neon bulb at the antenna end of the antenna tank, but the bulb will light up over a wide range of SWR values.

SWR curves were determined with a *Universal Service CoAx-Ratiometer*. Note that the bottom of the SWR curve can be placed anywhere in the band by changing C. Tuning charts facilitate band changes.

Incidently, the simple receiver antenna tuner shown in Fig. 13 gives 6 db better match on the S-meter of an SX-100 on 10, 15, and 20. No difference was noted on 40 or 80

Results, using reflector and dimensions as per Fig. 11: Gain was determined with a linear field strength meter using a 1F6 (4). It is not known how much the accompanying power gain curves were influenced by metal eave troughs, house wiring, power lines, TV antennas, towers, other antennas, and a 250-tree woods locally known as Anderson's Folly.

14 mc: Gain: 7 db in direction A, over a vertical half-wave. F/B: 15.4 db. F/S: 13.4 db. Polarization: vertical. Resonant frequency: 14,050 kc. Compares favorably with a 3 el beam in direction A, altho I have written off 20 as a DX band—1 W per kc calling 'CQ DX' (c'mon gang wise up). Pattern: Fig. 14.

7 mc: 6 db F/B ratio favoring direction B (happened to be favorable for VK, ZL contacts here). S7 signals into Europe in direction A. Polarization: mostly vertical. Resonant frequency: 5865 kc. See Fig. 15.

21 mc: Works S. Pacific, S. America and all of Africa but not as well as a 3 el. beam. See Fig. 16.

28 mc: WAC. High percentages of calls completed. Comparison has not been made with other antennas. Pattern resembles Fig. 9, except nulls are narrower.

3.5 mc: Works all directions, but particularly strong in SE direction (off the unfed end).

If you want a real antenna for 40, double the dimensions of Fig. 11 and put up the driven element alone. Remember this one when the sunspot cycle gets at the bottom again. On nightly skeds with W1ZF—since 1930—this beat everything, including two ground planes, spaced one-half wave and fed in phase. Pattern on 40 is Fig. 2. With the same dimensions you can work 20, 80 and 160.

A final word about vertical polarization. If power lines are reducing your results in a favorite direction, try it.

I have not noticed the increase in noise pickup attributed to it. There are times when DX contacts are possible one-half hour earlier than with horizontal polarization. There are other times, at night on 20, when many DX signals can be heard, but they seem to be going overboard. But as the guy on the record says, 'Never give up, never give up!'

As 30: thanks to W1ZF for a quarter century of tests. ■

(4) ARRL Handbook, Edns. 1937-45.

Good News

At last we've done it! Despite stubborn resistance from several wrong-thinkers on the CQ General Staff we have been able to sneak through a small increase in the subscription rates, effective November 1, 1958. The coming postage rate increase left the opponents completely without arguments.

On the surface you, as the subscriber, might at first be inclined to look at this as not being entirely to your advantage. But if you think over all the pro's and con's you will see it in its true perspective. For instance:

1) With postage rates going up some 80% this increase in revenue will keep CQ from going broke.

2) The higher investment will give you increased pride of ownership.

3) Spending more money helps our country. Be patriotic.

4) The resale value of your back issues will go up, making your estate more valuable.

5) Having a higher investment in each copy of CQ will tend to make you read it more carefully and you will get much more enjoyment out of your hobby.

Impatient types, who cannot wait for the rate increase, may fill out the form below.

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

One year, $4 Two years, $7 Three years, $10 C-7
in U.S. Possessions, APO & FPO, Canada & Mexico

Enclosed is $ ..... for a ..... year ☐ new ☐ renewal subscription to *CQ*, to be sent to:

Name ..... Call .....

Address .....

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

Pan-America and all other foreign: 1 yr. $6; 2 yrs. $11; 3 yrs. $16.

QUAD [*from page 50*]
after raising will be compensated for by the condenser.

After raising the array to its operating height the condenser may be calibrated by turning the back of the quad on a local station with VFO. As he steps the band every 25 or 50 kc adjust for maximum front to back and leave a mark. An interesting thing occurs when an SWR meter is inserted in the line; minimum SWR coincides with these calibration marks. Apparently interaction between the radiator and reflector is sufficient to vary the resonant frequency of the radiator.

My 15 meter quad is tunable from 21.15 mc to 21.45 mc. The 10 meter quad from 28.3 mc to 28.9 mc. Since the maximum forward gain of the quad is broad compared to the point of maximum front to back, the quad may be made bi-directional by slight detuning. Also, when receiving on a frequency other than the transmitting frequency an interfering station to the back may be nulled without but slight loss of forward gain.

The front to back ratio while transmitting is satisfactory. That while receiving is outstanding. The condenser appears to move a null such that rejection of an interfering station may be accomplished anywhere on the back 180° with the greatest rejection directly off the back. The SWR and forward gain will suffer when off calibration for rejection to the side, however, the condenser can be returned to calibration when transmitting or temporarily left off calibration providing the final is re-dipped. ■

HAM CLINIC [*from page 80*]
is interested in obtaining information on a cheap transistorized citizens band transmitter for this purpose. Also, would like information on converters too. . . ."

You do have a problem! So we are appealing to hamdom to give us a lift on this one. Right now, we do not know of a small "indestructible" transistorized transmitter which you could use for locating expended rockets. However, we do have some ideas as to how it could be done. Cost is a factor I am sure; and there are very few hf transistors (outside of the laboratory) which can generate sufficient power for location purposes. Our satellite now flying around contains a minified sun-powered transistorized transmitter which is very effective . . . but then it doesn't have to "worry" about man-made obstacles, mountains etc. either.

So if any of you have any information which will help out our young scientist friend let us know. If you have any equipment to donate too, let us have full information on it and we will forward you L.W.'s mailing address.

Anyway, we are sending him some information which he may be able to use.

Information Wanted

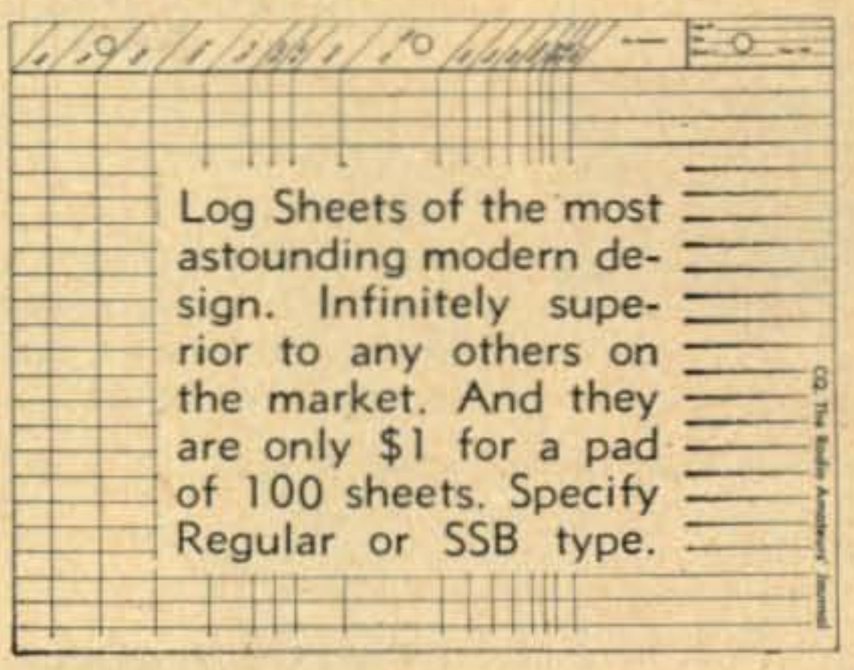
W1KFG (Morries) wants info on an indicator (tuning) CDI 55180.

[*Continued on page 116*]

THE HAM SHOP

GLOBE

Here it's Wednesday already . . . what better time to give the XYL this globe for your shack . . . and *you're getting a FREE year of CQ to boot.* Costs $25.00 in the stores . . . only $19.95 on this CQ deal.



Log Sheets of the most astounding modern design. Infinitely superior to any others on the market. And they are only $1 for a pad of 100 sheets. Specify Regular or SSB type.

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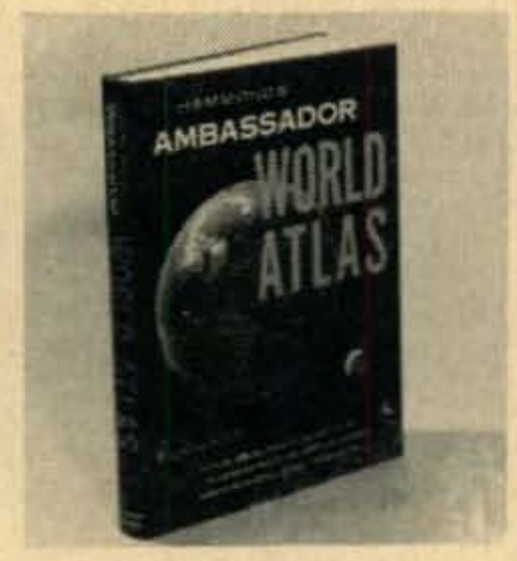
There is no other good way to keep your back issues. Make 'em neat. We supply the binder, with the year embossed in gold, not merely a sticker which will come off later. Specify what year you want stamped on your binder.
$3.50 each



ATLAS

Come on, get with it. Don't pull a blank when some one asks you for the capital of Honduras. For only $12.50 you can own 7 lbs. of full-color maps and a complete gazeteer. Send for this Hammond Atlas. PLUS a one year subscription to CQ.
only $12.50

MOBILE HANDBOOK

This new Mobile Handbook by Bill Orr, W6SAI, has been getting raves from all of the experienced mobile operators. There is all sorts of information in here that cannot be found anywhere else. This is NOT a collection of reprints. $2.95 postpaid.

COMMAND SETS

This IS a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous amazing terrific pages for only $1.50 PPD

HAM'S INTERPRETER

Now you can talk in broken French, Spanish, Italian, German, Swedish and Finnish. This handy little book gives all the popular ham conversation in seven languages, including letters and numbers. Only $1.50 postpaid.

CODE RECORD

Learning code is a snap with this record. Speeds from 3 to 16 WPM, depending upon turntable speed. This 12" LP record has on it all you need to learn the code for both the Novice and General license. $3.50 each.

C-7

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

SIRS: My check (money order) for $..... is enclosed. Please send the following items to: ☐ Globe ☐ Atlas ☐ Binder—Year Wanted ☐ Log Sheets ☐ Mobile Handbook ☐ Command Sets ☐ Ham's Interpreter ☐ Code Record

NAME .....

ADDRESS .....

CITY .....ZONE ..... STATE .....

New York City residents add 3% Sales Tax

HAM CLINIC [*from page 114*]

M. L. Gibson, 10235 SE 95th Place, Renton, Washington wants information on a type CKB 50142 noise peak limiter used with a Navy RAS receiver.

O. L. Besette, 31 Main St. Danielson, Conn. wants the dope on a Harvey-Wells Model MR-1 radio-transmitter. (Manufacturer cannot supply information due to flood damage).

Norman W. Perrin, 4818½ South Ivy St., Montebello, Calif. wants a schematic on the old McMurdo Silver 701 transmitter.

Doc Eaton, 4340 Raleigh-Millington Rd., Memphis, Tenn. still needs a diagram on the Sonar MR-3 receiver. Anyone help him and the others mentioned?

Technical Tip

Those of you who have old receivers (including the BC-348 etc.) may want to add a tuning indicator. See Figure 2 for this simple gadget which is easy to connect to nearly any receiver. R is adjusted for zero meter reading with manual gain on receiver set wide open.

Grounded Grid Linears

We have received a large number of requests for information relative to obtaining diagrams for grounded grid linear rf amplifiers in which the reader has specified the tubes he wishes to use. Most of these requests evidently want us to *design* complete finals for their specific requirements. Although we are not reluctant to do this after regular questions have been answered, we want you to know that we *cannot* guarantee performance. In nearly every case we always include a pi-final using available commercial coils and we *do not* include substitute information—this would take entirely too much of our time. If you do build up one of the finals which we have tried to design well and it works—let us know—will you? Perhaps we can get you to write a small article for the Editor's consideration.

Thirty

We have received oodles of letters containing technical information which we have passed on to those needing it. It is surprising the wealth of information obtainable from the ordinary ham who through experience has acquired a solid background in radio communication and electronic trouble shooting, design etc.

If you happen to have trouble with a piece of commercial gear and find it, how about letting us know so we can pass the information on to a brother-ham? HAM CLINIC's greatest number of letters are relative to troubleshooting and design information.

Again, thank you for being a swell bunch of discriminating readers. Your letters are always appreciated. If you have not received a reply it is because you forgot to include your address. Remember—send your communications VIA AIRMAIL.

73, Chuck, W6QLV

6 METER VERICAL

[*from page 40*]

The radials are attached to the antenna base can as follows. First screw one of the hex nuts on the radial as far as it will go. Second screw the radial into the tapped hole in the base can. Third place another nut on the portion of the radial screwed through the base and tighten. While this radial attachment is somewhat elaborate, the added strength has proven worthwhile as the antenna has survived some very bad windstorms with no ill effects.

The extreme flutter conditions experienced when using the beam to work vertical mobiles is all but eliminated with the ground plane vertical. In an actual test the signal strength of a vertical mobile was S-3 on the beam and S-9 plus 15 db on the vertical.

The primary purpose of constructing this antenna was mentioned previously but since it has been put into service other uses have been found. The ground plane vertical has outperformed the beam many times on band openings.

If provision is made for switching from the vertical to the beam, the vertical is very useful for scanning the band without the bother of turning the beam. The ground plane vertical should by no means be the first antenna at a six-meter station but it has definitely proven to the authors to be a worthwhile investment in both time and money. ■

VHF [*from page 72*]

VE2's active on 144 mc. Hope we hear more from your gang.

Collierville, Tennessee – A flash from old friend Paul (W4HHK) regarding two meters and himself:

"A bit of 144 mc news in the nature of a new contact made—North Dakota, WØYSJ, for state number 34. Contact was made during our meteor scatter sked at 0630-0700 CST today, April 22nd. It was pretty satisfying in that it took only twenty minutes or less to complete the whole thing. Believe this is the first Tennessee—North Dakota on 144mc. By the way, per my 75A3 setup, his frequency is 144.277½ mc. Don, W1AZK, comes in at 144.095 as advertised, but got very little from him on our skeds." So-oo-o, ya dood it agin, did ya Paul? *Congratulations! Keep up the good work and you'll make a few more yet this year.*

Loma Linda, California – Don Hilliard (W6LIT) gives us some dope on portable operating he'll be doing.

"I'll be operating from both Idaho and Wyoming during Perseids Shower, August 9th to 14th. Frequency will be approximately 144.180. Rig—4X250B, 500 watts. 13 element long yagi, 417 cc conv.-75A2."

"Will set up near the village of Border, Wyoming, and then change to Idaho after two or three days. There will probably be many that want skeds as there is little two meter activity there. So want to get skeds made as soon as possible. Thirty second transmissions will be used with us transmitting the first 30 seconds of each minute. Prefer 25-40 wpm (or even higher). Will sked anytime, A.M. OR P.M. Will try to stick by W4LTU dope as reference though." *Very interesting Don. Hope you have lots of takers and have even more success than you could wish for.*

73, Sam, W1FZJ

RF AMMETER [*from page 41*]

buck! Not particularly liking the case, after removing the surplus pieces, I re-mounted the ammeter in a standard *Bud* two-inch sloping front meter cabinet, turned on it's side to permit wall mounting in a corner behind my transmitter and above it. The two holes in the base lip of the meter cabinet were plugged with the standard nickel-plated hole closures and two small nickeled mounting brackets were added with which to secure it to the wall. A co-ax socket connector was mounted on what then became the top of the cabinet and likewise one was mounted on the bottom, to provide for transmitter input and antenna output lines. This should all be clear from the accompanying photo.

One tip; you have no idea how much current will appear initially and even though you're *sure* your not putting *ten* amperes into the antenna, the actual reading will depend on where the meter is inserted in the transmission line. You might be right square on a current peak and get an extremely high reading (depending on SWR); if at a voltage loop or current node, maybe way down. Play safe before turning the transmitter loose on it! I first shorted the meter terminals with a piece of #10 wire . . . the thing read 3 amperes! The shunt had saved the meter! Use a heavy wire to start with and keep reducing (or increasing) the wire size until you get about a half-scale reading. Try this on all bands and then strike an average and you'll be safe all around unless you put a higher powered transmitter on the line . . . in that case, repeat the shunt experiments. I finally came up with a #12 wire shunt on my ten ampere meter and, with a Johnson *Ranger*, get a current reading of 7 amps on 160 meters, down to 4 amps on ten. As I seldom work any but the 80 meter CW band, and get approximately five amperes there, it's ideal. With a Johnson *Adventurer*, I got from 5½ amps down to 2 in about the same proportion, with slightly over 4 on 80. With a *Globe Chief*, the readings slightly exceed (about ½ amp all bands) the *Ranger* readings.

True, those comparatively few hams using two wire open line in a "Zepp" feeder arrangement, generally manage at least one rf ammeter, switchable from one side of the line to the other, or should they be fortunate, one in each leg. It is almost the *only* practical method of determining current balance in the two lines . . . perhaps that's why use of the 'Zepp' type feed-line has declined in the past few years . . . it's still a *good* feed-line however, *properly* balanced!

I *like* my old rf meter! It tells me many stories. I'm not concerned with how *much* current I get . . . only that I get the *peak*. That I do is more than confirmed by the signal reports I get. Spend a buck in your surplus store . . . try it; I'm sure that you *too*, will like it!

try it; I'm sure that you *too*, will like it! ■

SCRATCHI [*from page 14*]

not sponsoring said LP record and song but witch doctors up in arms on acct. magic spell in song not reel magic spell.

At this point he explaneing what wrong with spell, but Scratchi not catching it all. It something about the third time you saying ooh ee ooh tang ting you should be saying ooh ooh ee ting, or something like that.

Howsumever, Mumbo Jumbo going on to saying that if you saying spell rite—don't do it —all your hair are falling out. He feeling it dooty to informing public and asking Hon. Seek-You magazine to doing same.

Just as he about to sineing off, I asking him to send QSL card and he saying I getting one shortly and he surely I liking it as it most unyoushewal.

Just then Hon. Brother Itchi coming in shack and handing me something and asking where I getting it—he finding it on hall table and it having my call letters on it. Hon. Ed., you can running all the QSL contests you wanting, but you'll never, no surely never, be getting a QSL card that are a shrunken hed with your call letters cut neetly into the forehed. No time, no signal report, no date—just call letters cut neetly into the forehed.

Not beleeving in witch doctors? Howcomes Mumbo Jumbo calling me and my reseever tooned rite there? Howcomes I even going in shack to turning on reseever? Howcomes I asking for QSL card and there it is—or maybe you thinking that coming from first QSO five years ago?

I'll say one thing. You not finding Scratchi going around changing the words in that Witch Doctor song. No indeedy. Not wanting anybuddys calling me Baldy.

Respectively yours,
Hashafisti Scratchi

PUZZLER [*puzzle on page 42*]

P	O	W	E	R	■	V	O	I	C	E	■	V	O	L	T	S
L	I	O	N	■	I	■	N	O	O	N	S	■	R	O	U	E
A	L	R	E	A	D	Y	■	N	U	D	E	S	■	A	N	N
T	■	D	R	I	L	L	S	■	P	E	N	T	O	D	E	S
E	■	O	G	L	E	■	S	E	L	F	S	A	M	E	■	I
■	W	N	Y	■	■	A	■	D	E	F	E	R	■	R	O	T
S	E	E	■	■	E	X	P	I	R	E	■	T	■	S	R	I
E	D	■	T	A	M	■	E	T	■	C	O	I	L	■	T	V
L	■	N	O	N	I	M	P	O	R	T	A	N	C	E	■	I
E	H	■	O	T	T	O	■	R	I	■	T	G	S	■	B	T
C	O	B	■	E	■	I	F	■	G	A	S	■	■	L	A	Y
T	E	E	■	N	■	S	I	T	■	S	■	■	P	I	T	■
I	■	D	Y	N	A	T	R	O	N	■	E	L	A	N	■	R
V	A	R	I	A	B	L	E	■	E	S	T	A	T	E	■	E
I	L	O	■	S	E	E	M	S	■	U	N	C	R	A	T	E
T	O	O	L	■	T	S	A	R	S	■	A	■	O	R	A	L
Y	E	M	E	N	■	S	N	O	O	P	■	A	L	S	O	S

The Ham Shop

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MINIMUM CHARGE: $..00

CLOSING DATE: 20th of the 2nd month preceding date of issue.

MAIL: Your typewritten copy with full remittance should be sent to CQ Magazine, 300 West 43rd St., New York 36, N. Y.
Attention: Classified Ad Dept.

NOTE: The products and services advertised in this section are not guaranteed by the publisher of CQ.
Telephone orders not accepted.
Call letters only are undesirable. Please include name and address in all advertisements submitted.

FOR SALE

RECONDITIONED: Shipped on approval with easy terms. Hallicrafters S40B, $79; SX99, $119; SX71, $149; SX96, $189; SX100, $229; SX101, $299; HQ129X, $129; HQ100, $139; HQ140X, $189; HQ150; National NC98, $99; HRO50T, $199; NC183D, $279; NC300, $279; Viking I $129; Viking II $199; Ranger $179; Valiant; Pacemaker; PMR6A; PMR7A; AF-67; Collins 75A1; 75A2; 75A3; 75A4; KWS1. Many other items. Write for list. Henry Radio, Butler, Mo.

BARGAINS: WITH NEW GUARANTEE: KWS-1, $1,399; Collins 30K-1, $575; S-72, $49.50; Hallicrafters HT-30, $349; HT-31, $299; NC-98, $119; NC183D, $329; Lysco 600, $69; Eldico SSB-100, $395; Eldico TR-75TV, $25; Johnson Pacemaker, $385; Ranger $199.50; Phasemaster II, $239; Gonset Linears (2M) $99—(6M) $119; Morrow MAH-B, $460 (DEMO); Globe King 500A, $455; Globe King 500, $435; Globe King 500B, $599; Scout 65A, $69; New Gonset Communicator II, #3077B or #3025B, $199.50; Communicator II, 6 meter, $179; Sonar SRT-120P, $199; Johnson Rotomatic, $125. Free trial, terms, write Leo, WØGFQ for best deals. World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

BARGAINS: Send for list of reconditioned receivers and transmitters with new guarantee. 10% down with up to 24 months to pay. In stock new Collins, Johnson, Hallicrafters, WRL, National, Hammarlund, Gonset, Elmac, Drake, Central Electronics, B&W H-Gain, Mosley, Gotham beams. Shipped on approval. Write Ken WØZCN, or Glen, WØZKD for your best deal. Ken-Els Radio Supply Co., 428 Central Ave., Fort Dodge, Iowa.

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ATTENTION MOBILEERS! Leece Neville 6 volt 100 amp. system alternator, regulator and rectifier, $45. Also Leece Neville 12 volt 100 amp. system, alternator, regulator & rectifier, $85. Hastings Hi Fi FM car tuner 88-108 mc, $60. Gonset Communicator 3058-B, 6 meter 12 volt and 110. $170. Perfect condition. Herbert Zimmerman, Jr., 115 Willow St., Brooklyn 1, N.Y., K2PAT, ULster 2-3472.

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GONSET 2-meter converter $20. ARC-5 schematics 25¢. S. Consalvo W3IHD 4905 Roanne Dr., Wash. 21, D. C.

TORIODS: Uncased 88 mhy like new. Dollar each. Five, $44 PP. Depaul Co., 101 Starview, San Francisco, Calif.

FOR SALE: Brand new dynamotors. 12V input 440-200 MIL. output, $9 FOB, Guy E. Pigford, W4EC, 611 Murchison Bldg., Wilmington, N. C.

DX-100 WITH COZX RELAY for sale: Outstanding signal reports whiled used less than 1 year. Perfect condition. $175; will deliver to 100 miles. Merle McBlain, W6AAZ, 7622 Highway 128, Healdsburg, California.

SCHEMATICS-BC453-454, 24" x 40" size. 50¢ each. Write Joe Jameson, 102 Carlysle, Abingdon, Illinois.

LEECE NEVILLE 12 v. alternator system with rectifier regulator, ammeter, wiring harness. $59. William Hudson, 179 Steinmetz Homes, Schenectady, N. Y.

BANDHOPPER "6" (February CQ) templates, parts list, coil table, schematic corrections, chassis photograph. $2. Bandhoppers Radio Club, 30 Dames Ct., Ferguson, Mo.

HAM TRADER: Radio Amateur Classified Newspaper. Published every 10 days. Send $1 and free 10 word ad for years subscription. Box 1095, Gardena, California.

FOR SALE: BARGAINS – GOING OVERSEAS, MUST SELL – NEW YORK AREA. (1) 6 ft. par metal enclosed cabinet containing 4–250 A kw amplifier, variable vacuum, pi output, National all-band tuner input; 2500 volt 500 ma power supply, 100 mfd 4000 volt filter; Jones micro match SWR; Solar low pass filter; Dow-key coax relay; RF patch panel (14 jacks and 5 hairpins)–all for $250. (2) 10A (20 and 80 coils) and BC-458A VFO, $100. (3) Drake 1A SSB receiver, 10 hrs. use, $250. Will ship Drake receiver only. W2BFT, IVanhoe 9-0760.

KWS-1 SSB EXCITER AND POWER SUPPLY: Late model manual ALC, Co-ax Relay, $1,395. W. E. Gipson, Jr., W5HAN, 3526 Princeton Drive, Irving, Texas.

COLLINS KWS1 and 75A4: Both like new. Best offer over $1800. BOB, Irv Fishelberg, W2ZLD, 2606 Atlantic Ave., Longport, N. J.

HEATH DX-40: Perfect condition, $60 prepaid. John Ditmar, 2233 Cypress, Wantagh, N. Y.

ALUMINUM FROM DICK'S: Plus your ingenuity, will make you the best beam for less. Write today for list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits. Dick's, W8IJL, Cherry Ave., Route 1, Tiffin, Ohio.

VIKING 500: Factory wired like new, $699, Azim, KØJEJ, 522 S. Minnesota, Wichita, Kansas.

FOR SALE: 75A2, calibrator, speaker, excellent $325. Lakeshore 400GG linear with 2-811As excellent on 15-10, $135 or trade on 75 A1. Byars, WØBNF, P.O. Box 105, Kearney, Nebr.

COLLINS 75A-3: Vernier knob, gooney filter, like new, $325. WRL triple tribander, rotator, 40' tower, cable, $115. Clean RME69 with speaker, $45. BC221 converted for VFO, $20. Don, K4DHG, 1032 Terry Ave., Lakeland, Florida. MU 8-9525.

FOR SALE: KW-1, KW tuner, 500 watt modulation transformer with screen winding, 2½ kw Collins modulation transformer, several chokes, condensers, transformers. Self addressed stamped envelope for list. Bill Tully, W6VPO, 10815 Rose Ave., Ontario, Calif. LY 8-2292.

GLOBE CHIEF–$45; S-38D, $35; Heath VFO, $15; home-built AB-1 PP 6L6 Modulator, $20; all A-1 and FOB. Paul Sturpe, RFD #1, Dalton, Ohio.

FOR SALE: New never used pair REYCO all band Antenna Traps. First $10 takes it. I'll ship. Reeve O. Strock, K4AW, 132 Rutledge, Hendersonville, N. C.

GONSET G66B RECEIVER: With power supply, 12 volts DC and 110 volts AC, $150. Harold Bullion, K2JCZ, 439 Ave. P, Brooklyn, N. Y.

FOR SALE: SX-99 excellent condition, best offer over $90. Mullins, K2YQI, 166 Beach 113th St., Rockaway Park 94, New York.

YOU ASKED FOR IT: A broad band I.F. coupler tuned to 455 Kc for double sideband am reception. This unit will plug directly into the mechanical filter socket of A 75A-4, only $12.95, postage prepaid. Busacker's, 1216 West Clay, Houston 19, Texas.

FOR SALE: One 3 element Mosely 2 om. Minibeam; One Hy-Gain trap vertical 80 av antenna with base for pipe mount. Best offer. P. B. Summers, 410 Maple St., Delphos, Ohio.

SSB STATION FOR SALE: Going mobile. HT-32, NC-300, 10M5796 Telrex, AR-22, Ten foot tower, Monikey, Vibroplex, D104, and many extras. $1,050 with free delivery within 50 miles. Special if you pickup. Smith, K2RSP, AS 4-7154, 3180 36th St., Long Island City 6, N. Y.

FOR SALE: Fourteen coin operated broadcast radios, six tube superhet, excellent coin rejector (25¢), all metal case, good operating condition, $17 each F.O.B., W. R. Roy, 353 Dunnwood Drive, Ft. Wayne, Indiana.

SELLING OUT: Complete Collins KW-1 station, receivers, etc. Lewis, W3LXE, 37 S. Sixth St., Indiana, Pa.

For further information, check number 46 on page 126.

FOR SALE (Cont'd)

FOR SALE: Custom deluxe 4-400A power amplifier and 4X250B modulator mounted steel cabinet all power supplies. Super 4CX1000A Linear amplifier. Wolfe, W6HHN, 3467 Rambow, Palo Alto, California.

SELL: NC300, calibrator, 6M, 2M, and 1¼M converters, converter cabinet, complete $390; DX100, $150; 10A, $75; 458 VFO with cabinet, $25; 250W linear $95; B&W LP, $13; 250W matchbox $30; BC453, $5; 6V dynamotor 400V, .150A $6. George Weiner, 2857 Faber Terrace, Far Rockaway, New York.

FOR SALE: Viking Adventurer built by commercial operator. First $40 or best offer. Bruce Reed, 1803 Walnut, Rolla, Missouri.

CRYSTALS GUARANTEED: 2 to 80 meters PT-243, 30¢ ea. SSB filter crystals FT-241A, 10¢ ea. List available. Quaker Electronics, 1040 West Main St., Plymouth, Pa.

FOR SALE: Prop pitch motor converted with¼" 12 by 12 plate and transformer, $30. J. Pyryt, W2ODH, 192 Norman Way, Paramus, N. J.

FOR SALE: Dyna Labs Gaussmeter Model D-79 with instruction book, carrying case, two probes. New condition, not adaptable our special research problem. $225, prepaid for cash. Lampkin Laboratories, Inc., RFD #1, Bradenton, Fla.

FOR SALE: BC779 Super Pro $70; E200 signal generator, $20, Dumont 241 scope, $75; RME-84 receiver 550 kc-44 mc, $50; world map, $1; surplus schematics, 25¢; Gonset 3008, 2 meter converter, $20. S. Consalvo, 4905 Roanne Drive, Wash. 21, D. C.

DX-20: All bands FB, not a scratch, reasonable, Larry Holden, 628 East 4th Street, Delphos, Ohio.

SURPLUS DYNAMOTORS: 12 volt dc to 400 volts 200 ma. New. $11; two for $20; express collect. Ross, RD2, Box 880, Orlando, Florida.

GOING OVERSEAS: Cleaning out. Eldico Model AT1 Antennascope, new condition, $12; Millen 90651 Grid Dip Meter 1.7 to 300 MC. new condition, $32; both for $40; SX-28, very good appearance but needs alignment and dial cord work, with instruction book, $65. Speaker $5 extra. Ekotape 3.5 ips tape recorder, six years old but good condition, with six reels 7" tape, $35. Brand new ATR Inverter type 6T-HSH, 6V DC input, 125-150 watts out at 110V AC, with spare vibrators, worth $130, going for $45. Whole works for $175. Box P.E., CQ Magazine, 300 W. 43rd St., N. Y. 36, N. Y.

TOWERS: All steel triangular 15" face, up to 80 ft. high complete with guy strands, base plate and hardware, easily assembled in 10 ft. sections 130 lbs. per section. Ideal supports for all types of antenna. Complete price $2.90 per ft. F.O.B. our plant. Bergen Wire Rope Co., Lodi, N. J.

WANTED

WANTED: All types of communications receivers, transmitters, test equipment, Teletype printers, URA-8, 75A, 32V, 51J, BC-348, BC-342, BC-221, etc. Cash or trade for NEW Ranger, Valiant, Thunderbolt, HT-32, HQ-160, Gonset Fisher Hi-Fi, Bell, etc. Write Tom, W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (Richmond 2-0048, Stores: 278 Friend St., Boston, near North Station; 60 Spring St., Newport, R.I.)

CASH PAID FOR TG-7 and Model 15 teletype and parts. Also BC-312, BC-342, BC-610E, BC-614, BC-939, BC-221, RA-63, JB-70, JB-60 and APR-4, APR-9, ARN-6, 7 and 14, ARC-3, 21, 27 and TEST EQPT. We pay freight.

AMBER INDUSTRIAL CORP., 75 Varick St., New York 13, N. Y. CAnal 6-7455.

WANTED: Need second receiver, cash for clean 75A1 or 75A2. Byars, WØBNF, P.O. Box 105, Kearney, Nebr.

NEED THE FOLLOWING BACK ISSUES OF CQ: November 1955, July 1956, February 1957. Will swap a brand new first MOBILE HANDBOOK, or copy of COMMAND SETS, or $1 in cash for the above three issues. Must be in good condition. Offer limited to first 100 copies. Send to CQ Magazine, 300 W. 43rd St., N. Y. 36, N. Y.

WANTED: BC-610, BC-614, BC-939, BC-221, TS-175, TS-323, TS-186, all types URM, USM, GRC, PRC, VRC, URD, we buy all types of military and commercial electronic material. RADALAB, Inc., 87-17 124th St., Richmond Hill, N. Y.

WANTED: Receivers, transmitters, testsets, teletype, all types Military and Commercial Surplus. Aviation-Ground-51R3, 51R2, 17L3-4, ART13, ARN14, BC610, BC312-342, ARN30, ARN6, 51V1-2, others advise condition price. We pay COD, RITCO, Box 156 Annandale, Va. Jefferson 2-5805.

WANTED: Viking Killowatt. Quote price and condition. McKinnon, P.O. Box 5032, Memphis, Tenn.

DX STATIONS—Please QSL. All my contacts sent airmail 5½ x 7 color QSL's. Help me get that 100 Country Two Way SSB. Boegel, WØCVU, 1500 Center Point Road, NE, Cedar Rapids, Iowa, USA.

WANTED: Progressive manufacturer of amateur radio equipment has opening for the right, practical amateur with ideas and a flair for engineering and design of new products. Interested? Send background, salary requirements, etc., to Electronics, Box 1082, Omaha, Nebraska. Chance for opportunity and advancement.

WANTED: Receiver and TVI suppressed transmitter. Prefer NC-300, DX-100, or equivalents. Give complete details, condition, age, etc. George Laine, W2NXP, 222 E. 7th St., Brooklyn 18, N. Y.

WANTED: Super Pro panel with dial escutcheons complete, or escutcheons only. E. L. Holman, 5908 Alhambra Ave., Oakland, Calif.

WANTED: Instruction Manual TCS-13 for cash or rental for photocopy. Queeney, 5518 Childs, Hinsdale, Ill.

QSL

QSLs ? ? ? LARGEST variety, samples 25¢. (refunded) CALLBOOKS (summer) $5. Sackers W8DED, Holland, Michigan.

QSL's, SWL's, VHF's, XYL-OM's. (Sample assortment approx. 9¾¢.) Covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fatabulous. DX-attracting, prototypal, snazzy, unparagoned, cards. Rogers KØAAB 737 Lincoln Ave., St. Paul 5, Minn. Also glamorous, pulsating, super-passionate. (Wow!)

QSL's—"Brownie" W3CJI, 3110 Lehigh, Allentown, Pa. Samples. 10¢ with catalogue, 25¢.

FREE FLYER. DX QSL, Radio Coop., Box 5938, Kansas City 11, Mo.

QUALITY QSL's. Samples, 10¢. Lee, W5CZA, Box 7171, Oklahoma City, Oklahoma.

QSL's: Samples, dime. Print Shop, Corwith, Iowa.

QSL's—Glossy. Samples 10¢, W10OLU Press, 30 Magoun, Medford, Mass.

QSL's: We've printed a million. Samples 10¢. VYS QSLs, 1704 Hale, Ft. Wayne, Indiana.

QSL's-SWL's. 100—$2.50. Samples, 10¢. QSO file cards, $1.00 per 100. Rusprint. Box 7507, Kansas City 16, Mo.

QSL's for economy-minded hams. $4.65 for 500. Free brochure. K9EUF Print, 1839 46th Street, Rock Island, Illinois.

QSL's-SWL's samples 10¢. Malgo Press, 1937 Glendale Ave., Toledo 14, Ohio.

DELUXE QSLS: Wm. Petty, W2HAZ, Box 27, Trenton, N. J. Samples, 10¢.

MISC.

HAMS! In central Illinois it's Knox Electronic Supply, 67 North Cherry, Galesbury, Illinois.

PRESERVE YOUR HAM TICKET, Social Security Card, small photo, passes and anything else of value that is wallet size. We will laminate it in clear plastic, guaranteed for life. Lamination will prevent it from getting torn, soiled or frayed. Send your ticket or anything of value with $1 in stamps or cash for each item that you want preserved. 24 hour service. Send to Dept. HW, CQ Magazine, 300 West 43rd St., N. Y. 36, N. Y.

NEED THE FOLLOWING BACK ISSUES OF CQ: November 1955, July 1956, February 1957. Will swap a brand new first MOBILE HANDBOOK or copy of COMMAND SETS, or $1 in cash for the above three issues. Must be in good condition. Offer limited to first 100 copies. Send to CQ Magazine, 300 W. 43rd St., N. Y. 36, N. Y.

BOB GRAHAM, W1KTJ (Graham Co.) has moved to new and larger quarters at 505 Main St., Reading, Mass., telephone REading 2-4000. We are still catering ONLY to the Radio Amateur with the best of new and used gear including Gonset, Elmac, National, Hammarlund, Hallicrafter, Johnson, Central Electronics, Astatic, C-D, etc. We buy-sell-trade-rent-install-service ham equipment. See us for the best deal.

WYOMING HAMFEST: July 12-13. Program, banquet, prizes. Tourist mobiles invited. See "Hamfest" section this issue, and watch for mobiles on U.S. 16 west of Buffalo, Wyoming.

HAMFESTERS RADIO CLUB announces its 24th annual picnic, to be held Sunday, August 10, 1958 at Santa Fe Park, near Chicago. See July Hamfest Calendar or write Mongeau, W9TJP, 245 E. 136 St., Chicago, Ill.

MISC. (Cont'd)

TELEVISION PERSONNEL: Available Sept. 1, a young, married, sober, educated, imaginative, producer-director. Would like to be associated with a live-wire TV operation. Need another ham on your staff? I'll go anywhere. Kines of my work available. References. David L. Bell, W8GUE, 128 Haven Road, Syracuse 10, N. Y.

CODE-PRACTICE OSCILLATOR: Operates up to one year on two flashlite batteries. Audio feed-back principle. Shipped postpaid. $7.95. E. M. Golde Enterprizes, P.O. Box 548, Oakland 4, California.

SWAP OR SELL

SWAP OR SELL: Combination tube multimeter tester RCP-804A with adapter for late tubes. For RME DB-22A Preselector or short wave receiver same value. Also SAMS No. 1 to 201 in excellent condition. Best offer over $125. Joseph Milla, 320 East 42nd St., New York 17, N. Y.

RADIO MAGAZINES. Buy, sell, trade. Bob Farmer, Plainview, Texas.

SWAP OR SELL: One pair BC11 walkie talkies. Would like pair of Vocaline Transceiver citizen Band. Ron Jones, 714 Wisconsin, Holton, Kansas.

SALE OR TRADE: Johnson matchbox, $40. Millen R-9er $17. Want Collins Mech. filter and/or good BC-453 with or without power supply. Make offer. Guaranteed reply. Lee Boschen, 403 W. Tilden Drive, Brownsburg, Indiana.

SWAP OR SELL: Homebrew KW station for small SSB transceiver or station. Brochure from Johnson, W3BJI, 1804 Maltravers, Glen Burnie, Maryland.

SWAP OR SELL: Large private gun collection for Ham Gear. 22's, 32's, 38's, 12 Ga, 30-30 Wheellocks, Flintlock's, Percussion Caps, Dueling Pistols, Oddities. Over 120 pieces, some new 400 Yrs. old. Will sell or trade even money basis for SSB equipment or fixed hi-power AM rig. Write full particulars, describing equipment and price for complete list of weapons to Arthur Gardner, K4VQP, 2115 So. Ferncreek, Orlando, Florida.

YL [*from page 77*]

ices, in industry, as instructors, operators, in WERS, Red Cross, AWVS, etc. For other chapter subjects, look up the write-up in April CQ.

Order your copy from this column editor, Louisa Sando, W5RZJ, 212 Sombrio Dr., Santa Fe, N. Mex.—$3.50, postpaid. Please indicate if you wish to have it autographed.

Operation "Snowdrift"

No doubt many East Coast Hams have exciting episodes to recount as a result of the blizzards this past winter. W2NAI, Marge, with her family at Sloansville, N. Y. was snowed in from Feb. 8 for over two weeks. Though only three miles from the Post Office, they could not get there, nor even for food, which was flown in to them by helicopter. Marge's daughter is staying with her while her OM is in Korea, along with two grandsons. One was born when the storm hit on Feb. 8. The other, age 11 months, became ill during the storm and it was 30 hours before they could get a doctor in.

Despite these difficulties, Marge has received a commendation from Hq. SAC for traffic and/or phone patches to which she devotes most of her operating time, using a kw on SSB and AM. Marge is interested in organizing a Capitol area YL club; anyone interested contact her on the air, or at RFD #1, Sloansville, N. Y.

33, Louisa, W5RZJ.

CONTEST CALENDAR [*from page 78*]

SERIAL NRS.—The usual five and six figures. Signal report plus a progressive three digit number starting with 001.

SCORING—One point per contact. Multiplier, one for each country worked on each band. Panama and Canal Zone count as one country. One's own country may be worked once per band for multiplier purposes. All logs must contain at least one OA contact.

AWARDS—There is a Trophy for the High Man on Phone. In addition, the high scorer in each country and each W/K and VE district, will receive a medal and a certificate. The runner-up will also get a second place certificate.

Remember this is a contest limited only to countries in North and South America. Include a summary sheet with your log giving your name, address and final score. Mail within 20 days to: Radio Club Peruano, Att: Pres. Comision Concursos, Casilla 538, Lima, Peru.

CQ WW DX

Full details of our own World Wide DX Contest will appear in our next issue. Little or no changes are anticipated, but you had better check.

73, Frank, W1WY

CDR MODIFICATION [*from page 47*]

should be reduced, or the leakage increased for any reason, in this unit, the current will not be leading in phase by as much as designed for in the one motor winding, and the rotator will not have as much torque as it should, and will take more current which will make the indicating meter read high. Incidentally, if you have a rotator which seems to be losing its ability to handle a beam, it would be a very good idea to try a new condenser in the control box before doing anything drastic like taking a rotator down from a tower!

In areas where rotators are commonly used for TV antennas, some TV servicemen will install a complete new unit when trouble develops. (After all, they make more profit on the deal, and they don't have to worry about a repaired unit going bad soon from another cause.) Therefore; the ham who is short of cash (what ham isn't?) can often obtain these units for little or nothing. Less than a buck will usually buy a new condenser or gear to put them back in good condition.

Now we only need push the button on the top of the control box to read beam direction without starting the beam moving. This was accomplished without having to go outside of the hamshack, or make any changes in the rotator housing, or install any extra wire up the tower. This is the easiest solution unless you want to buy a new model rotator! ■

Note: After installing this modification in my TR-4 control box, it now seems feasible to calibrate the meter scale accurately in degrees rather than just having the 90 degree points marked. Not quite as good as selsyns, perhaps, but certainly cheaper!

Advertising Index

Reader Service

CQ Magazine
300 West 43rd Street
New York 36, New York

Reader Service Coupon G
Void after July 25, 1958

Please send me information on your ads in the July 1958 CQ keyed as follows:

1	2	3	4	5	6	7	8	9	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
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Name _____ Call _____
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City _____ Zone _____ State _____

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SELENIUM & SILICON RECTIFIERS

all types & sizes mfrd. by

TECHNICAL APPARATUS BUILDERS

• *DATED ONE YEAR GTD.*

Single Phase Full Wave Bridge

DC AMP	18VAC 14VDC	36VAC 28VDC	72VAC 54VDC	130VAC 100VDC
½	$1.00	$1.90	$3.85	$5.00
1	1.30	2.00	4.90	8.15
2	2.15	3.00	6.25	11.10
3	2.90	4.00	8.60	13.45
6	4.15	8.00	18.75	31.90
10	6.10	12.15	26.30	41.60
12	7.75	14.90	30.95	43.45
20	12.85	24.60	49.90	76.75
24	15.00	29.45	57.50	81.15
36	23.15	46.00	89.90	142.90
50	31.45	60.90	128.00	183.15

"TABTRAN" Rectifier Xfmrs

Sec'd Volts (DUAL†) 0-9-15-18-&-0-9-15-18. Series Sec'ds 0-3-6-9-12-15-18-21-24-27-30-33-36 Volts

TR4001 @ 1 Amp† ea/sec/w $4.50
TR4002 @ 2 Amp† ea/sec/w 6.90
TR4003 @ 5 Amp† ea/sec/w 8.65
TR4005 @ 12 Amp† ea/sec/wnds 16.70
TR4006 @ 24 Amp† ea/sec/wnds 35.30
TR4007 @ 50 Amp†* ea/sec/wnds 57.45

†Wndgs in Series at Ratings shown: Parallel 2X Current. Voltage output. 0-9-15-18

NEW 28VDC RELAY SUPPLIES

Cased Filtered Ready to Work

B24VAR 24VDC at 1 amp Filtered ..... $ 6
B24VER 24VDC at 2 amp Filtered 11

NEW GTD. RADIO & T.V. RECTIFIERS

Postpaid 48 states orders $10.

75Ma 49c, 5 for $2; 100Ma 59c, 6 for $3
150Ma 70c, 8 for $5; 250Ma 79c, 6 for $4
300Ma 88c, 5 for $4; 350Ma $1.00, 8 for $7
400Ma $1.10, 5 for $5; 500Ma $1.35, 4 for $5
65Ma/260V $1.10@, 5 for $5; 100 Ma/260V $1.25@ *Doublers & H.V. to order*

New Silicon 500ma./280VRMS/400 P.I.V.
Hmt Sealed $1.50 @ 5 for $6.50, 40 for $46

orders $10, Postpaid 48 states

650 to 850VDC up to 450 mils POWER SUPPLY PARTS KIT includes TRANSF, RECTIFICERS, CAPACITORS & DATA 6 & 12 Volt Fil Taps. Delivers 850 VDC (no fil) SPECIAL $16 OR WE BUILD $24

NEW 5933 JAN/SYLVANIA RUGGEDIZED 807W. $1.25 @ 10 for $10

"TAB"—*THAT'S A BUY*—BARGAINS!

BC457/4 to 5.3mcs as is/good parts $1.49
AN-ARR2/RCVR as is/good parts $1.89
RF-MTR GE/475 Ma & 5 Amp $5@, 2/$9
RF-METER Weston 120Ma $12@; 2/$22
DC-METER Dejur 800 Ma/3½" $4@; 2/$6
DC-METER One Ma/4" Rect $6@; 2/$10

MODULATION TRANSFORMERS
Inpt Kenyon 6AQ5s P.P. to G of 807s/811s $2
Outpt Kenyon 250/500W—12K to 3300Ω 807s to 813s $12
Inpt 95A71 Driver 1.78 to 1/32K to 10KΩ $2
STANCOR 95A70 Output 65 to 125W/1.63 to 1/15K to 5700Ω, 807s to 813s $6
PYRANOL CONDSRS 15mfd @ 1000 VDC /330 VAC $2@, ... 6/$9
VITAMIN Q 4 mfd @ 3000VDC $5@. 2/$9
TUBULAR 4mfd/600V OIL 89c@, ... 3/$2
TUBULAR 2mfd/600V OIL 59c@, ... 5/$2
PYRANOL 1mfd/500V, 15c@, ... 10/$1
RM29 PORTABLE FIELD TEL. $5 @, 2/$8
WILLARD 6V/6AMP Plastic Battery $3.00
WILLARD 2V/20A. Plastic Battery $2.50
"ORSA" Swedish Wood Saws $3
CH SWITCH 3PDT/10Amps Hvy dty 2/$1
BANDPASS FILTERS 60 or 90 or 150 Cys ..... $1.95@

Slim Jim Dynamic Mike Hand or Std $3.98
Neck Mike Carbon New ..... $ .98
Telescoping 9 to 38" Antenna ..... $1.69, 2/$3
60Mc's/IF-Strip $5; 30Mc's/As is $3.00
866A/2 Combo & Fil XFMR/7.5KV Ins 5.98
Xmtting Mica's .006 @ 2500V. 5 for $1.00
Relay 4PDT/3Acts/12 to 24VDC $1@, 6/$5
Hvy Dty 115V/60Cy Selsyns. 2 for $9.00
Miller 2.5MH/2.5&5Mtr Chokes ..... 8/$1.00
Vibrators 6 or 12VDC $1.49@; 4/ $5.00
Blower 24VDC/100CFM $2.98
Blower AC/Miniature 6&12VAC $1.00
Co-Ax Cnnctrs PL259A/SO239/40c ea. 6/$2
Battery Charger 6 or 12Volt/4A $9.95
AN Voltmeter 0-30VDC $2.49@, 3 for $6.00
RDZ/USN 200-400Mcs Rcvrs As Is $39.00

AS89 MOUNTING & ANT. $3.95

Wanted—Regulated Power Supplies.
Wanted—Tubes Sperry, Eimac! W.E.
Wanted—New or Used Test Equipment.

"TAB"

THAT'S A BUY

WRITE FOR COMPLETE TUBE LIST

Tubes Wanted — **INSPECTED "TAB" TESTED GUARANTEED**

0A2	.70	6BZ7	1.25	*We Trade!*	
0A3	.85	6C4	.49	43	.75
0B2	.65	6C5	.69	45	.49
0C3	.70	6C6	1.08	50L6	.69
0D3	.70	6C8	1.08	RK59	1.39
0Z4	.60	*We Buy & Sell*		RK60	1.17
1A7	.90	6CB6	.80	HY69	2.20
1B3	.78	6CD6	1.49	75	.81
1L4	.82	6CF6	.85	HY75	5.00
1R4	.88	6CL6	1.40	83	.95
1R5	.78	6CG7	.89	4-65A	19.00
1S4	.78	6CG8	1.12	4-125A	29.00
1S5	.68	6CM6	.79	4X150A	38.00
1T4	.85	6CS6	.70	4X250B	41.00
1T5	.95	6CU6	1.29	4-400A	45.00
1U4	6/$1	6D6	.99	4E27A	39.00
1U5	.75	6E5	.79	250TL	19.45
1X2	.75	6F4	2.49	307A	.49
2C39A	9.00	6F5	.63	316A	5/$1
2C40	6.00	6F6	.99	VR92	5/$1
2C43	7.00	6F7	.99	350A	2.45
2C51	2.00	6F8	1.39	350B	1.75
2D21	.68	6H6	.59	368A	4.59
2E22	1.75	6J4	1.72	371B	.95
2E24	2.00	6J5	.59	434A	1.95
2E25	3.25	6J6	.59	446A	.69
2E26	2.75	6J7	.99	450TH	43.50
2E30	1.70	6J8	1.39	450TL	43.50
2E35	1.60	6K6	.59	460	11.50
2K25	13.00	6K7	.79	701A	3.95
2K26	39.00	6K8	.99	703A	1.00
2K28	30.00	6L6	1.19	707B	3.50
2V3	.50	6SN7	.72	715C	10.90
2X2	.48	6T8	.98	717A	5/$1
3A4	.70	6V6GT	.90	723AB	8.00
3A5	.55	6X5	.49	725A	2.75
3API	1.95	12AT6	.59	801A	5/$1
3BPI	1.90	12AT7	.89	803	2.00
3C24	2.50	12AU6	.63	804	8.85
3D23	4.00	12AU7	.69	805	4.75
3E29	7.00	12AX7	.79	807	1.19
3Q4	.68	12AY7	1.29	808	.85
3Q5	.86	12B4	.95	809	2.40
4-65	15.00	12BA6	.65	837	1.08
4-125	30.00	12BA7	.99	811	2.70
4-250	34.00	12BD6	.59	812	3.30
4X150	18.00	12BE6	.59	813	8.69
4X250	36.00	12BH6	.79	814	2.35
4X500	37.00	12BH7	.99	815	1.85
5API	2.95	12BY7	1.00	826	.50
5BPI	3.95	12BZ7	.99	828	7.50
5BP4	3.25	12H6	.75	829B	8.00
5CPI	1.95	12J5	.69	832A	6.00
5CP7	5.00	12J7	.69	833A	36.00
5R4	1.00	12J8	1.35	837	2/$2
5T4	1.25	12K8	.89	866A	1.50
5U4	.59	12SA7	.69	954	10/$1
5V4	.89	12SC7	.89	955	3/$1
5Y3	.65	12SF5	.69	957	3/$1
5Z3	.89	12SG7	.89	958A	.50
5Z4	1.00	12SH7	.89	991	5/$1
6A7	1.00	12SJ7	.75	1614	2.00
6A8	.99	12SK7	.75	1619	5/$1
6AB4	.59	12SL7	.79	1620	2.00
6AC7	.79	12SN7	.69	1625	4/$1
6AG5	.69	12SQ7	.69	1626	5/$1
6AG7	.97	12SR7	.69	1629	4/$1
6AK5	.69	15E	1.19	2050	1.25
6AL5	.59	15R	4/$1	5517	1.25
6AQ5	.66	FG17	3.49	5608	3.95
6AR6	1.95	19T8	1.16	5618	3.25
6AS7	3.49	24G	2.00	5651	1.35
6AT6	.49	25A6	1.19	5654	1.20
6AU6	.79	25A7	2.19	5656	4.25
6B8	1.35	25C5	.81	5663	1.15
6BA6	.59	25L6	.72	5670	1.00
6BE6	.59	25T	4.00	5686	1.75
6BG6	1.49	25Z5	.72	5687	2.25
6BH6	.79	25Z6	.75	5691	4.70
6BJ6	.72	26A7	3.69	5725	1.95
6BK7	.99	FG27	8.28	5732	2.00
6BL7	1.95	HV27	19.39	5736	85.00
6BN4	.69	28D7	.89	5749	1.95
6BN6	1.08	FG33	15.00	5750	2.75
6BN7	1.99	EL34	3.49	5751	1.25
6BQ6	1.19	35A5	.69	5814	1.20
6BQ7	.99	35L6	.59	5879	1.20
6BX7	1.11	35T	4.49	5894	$14.00
6BY5	1.19	35Z5	.89		
6BZ6	.91	RK39	2.99	No See—Write!	

"TAB" TERMS: Money Back Gtd. $2 min. order F.O.B. N.Y.C. Add Shpg. charges or for C.O.D. 25% Dep. Tubes Gtd. via R-Exp. only. *Prices shown are subject to change.*

111KC Liberty St., N.Y. 6, N.Y., REctor 2-6245

"TAB" FOR THE BEST KITS!

KITS! *Each "TAB" Kit Contains The Finest Selection*

Kit 35 Precision Resistors	Kit 40 Insulators
Kit 10 Switches	Kit 35 Power Resistors
Kit 75 Resistors ½/1/2W	Kit 75 Mica Condensers
Kit 150 Carbon Resistors	Kit 5 Crystal Diodes
Kit 25 Panel Lamps	Kit 200ft Hook Up Wire.
Kit 12 Electrolytic Cond's	4 Rolls, 50ft/ea. Asstd.
Kit 15 Volume Controls	Kit 100 Fuses, asst'd all types
Kit 56 Tube Sockets	Kit 100 Ceramic Condensers
Kit 65 Tubular Condensers	Kit 110 Coil Forms
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CH1034 CHOKE 5 Hy @ 500ma $6
CHOKE 8 Hy @ 150ma $2
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CTC/RS8150/8 Hy @ 150ma/80Ω $3
CTC/RS8250/8 Hy @ 250ma/90Ω $5
CTC/RS8105/8 Hy @ 105ma/100Ω $2
STAN/C2700/2-12 Hy @ 200ma/80Ω $6
STAN/C2701/3-12 Hy @ 350ma/80Ω $10
KEN/T509/7-22 Hy @ 200ma/140Ω $8
KEN/T510/6-19 Hy @ 300ma/125Ω $9
CH1011 RCA/10 Hy @ 150ma ..... $2 @, 3/$5
CH1012 WSTGHSE/200 Hy @ 10ma ..... @ $1
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