CQ

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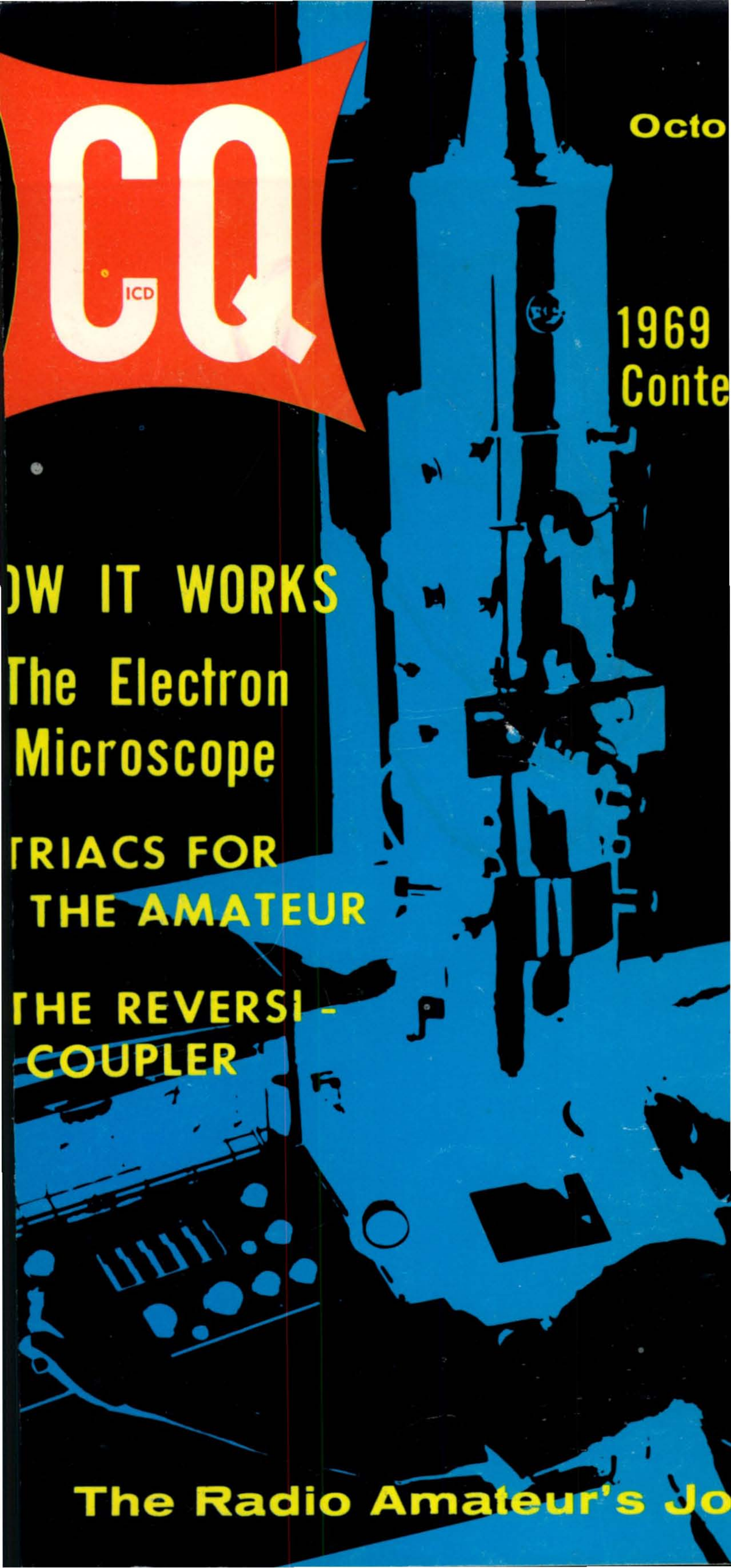

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The Radio Amateur's Jo

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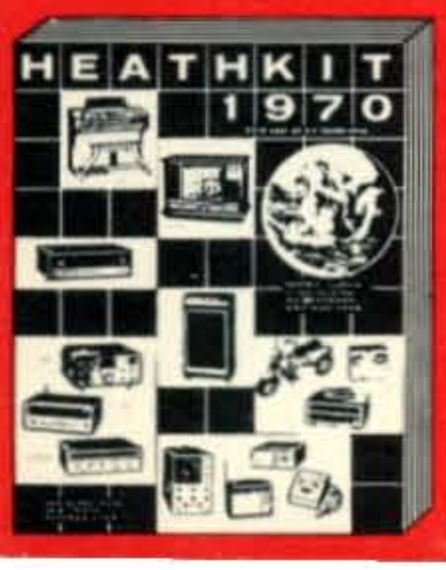
HP-13A, DC Power Supply, 7 lbs.....**$69.95***
SBA-301-2, 400 Hz CW Crystal Filter, 1 lb.....**$21.95***

SB-101 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Less than 1 microvolt for 15 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down — 2:1 nominal shape factor — 6:60 dB. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION: DC power input: SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation: SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 dB down from single-tone output. **Unwanted sideband suppression:** 55 dB from single-tone output at 1000 Hz reference. **Third order distortio** dB down from two-tone output. **Noise level:** At least 40 dB below s tone carrier. **RF compression (TALC):** 10 dB or greater at .1 ma fina current. **GENERAL: Frequency coverage:** 3.5 to 4.0; 7.0 to 7.3; 1 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (hertz). **Frequency stability:** Less than 100 Hz per hour after 20 m warm-up from normal ambient conditions. Less than 100 Hz for ±10% voltage variations. **Modes of operation:** Selectable upper or lower band (suppressed carrier) and CW. **Dial accuracy — "resettabil** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz calibration or nearest 100 kHz point. **Dial mechanism backlash** than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency resp** 350 to 2450 Hz ±3 dB. **Phone patch impedance:** 8 ohm or 600 oh ceiver output to phone patch; high impedance phone patch input to mitter. **Front panel controls:** Main (LMO) tuning dial; Driver tunin Preselector; Final tuning; Final loading; Mic and CW Level Control; switch; Band switch; Function switch; Freq. Control switch; Meter swit gain control; SSB-CW filter switch. Audio Gain control. **Internal con** VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capa Meter Zero control; CW Side-Tone Gain control; Relative Power Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutro **Rear Apron Connections:** CW Key jack; 8 ohm output; Spare A; Sp Phone patch input; ALC input; Power and accessory plug; RF outpu tenna switch; Receiver Antenna. **Power requirements:** 700 to 800 at 250 ma; 300 volts at 150 ma; —115 volts at 10 ma; 12 volts at 4.76 **Cabinet dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.



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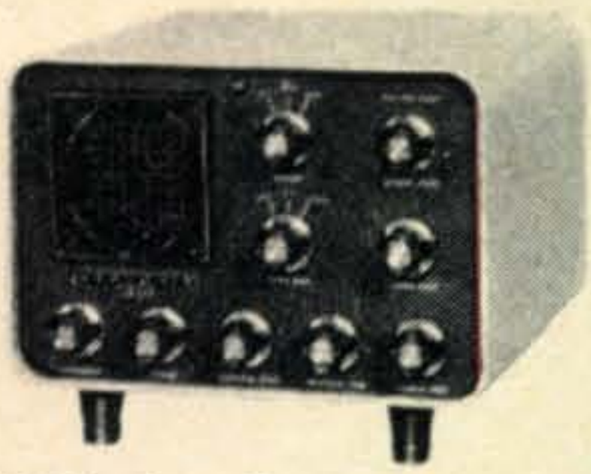

-610 Signal Monitor Scope . . . operates with trans-tters on 160 through 6 meters at power levels from 15 tts through 1 kw. Shows transmitted envelope. Operates h receiver IF's up to 6 MHz. Spots signal distortion, over-dulation, etc.
SB-610, 14 lbs. **$79.95***

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-620 Amateur Radio Spectrum Monitor . . . displays received signals up to 250 kHz either side of receiver ed frequency. New narrow sweep function shows 10 for single signal analysis.
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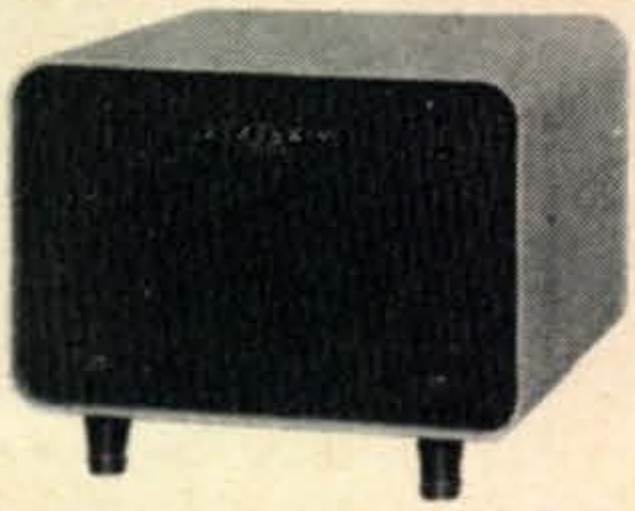

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OCTOBER, 1969 VOL. 25, No. 10

CQ The Radio Amateur's Journal

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DEPARTMENTS

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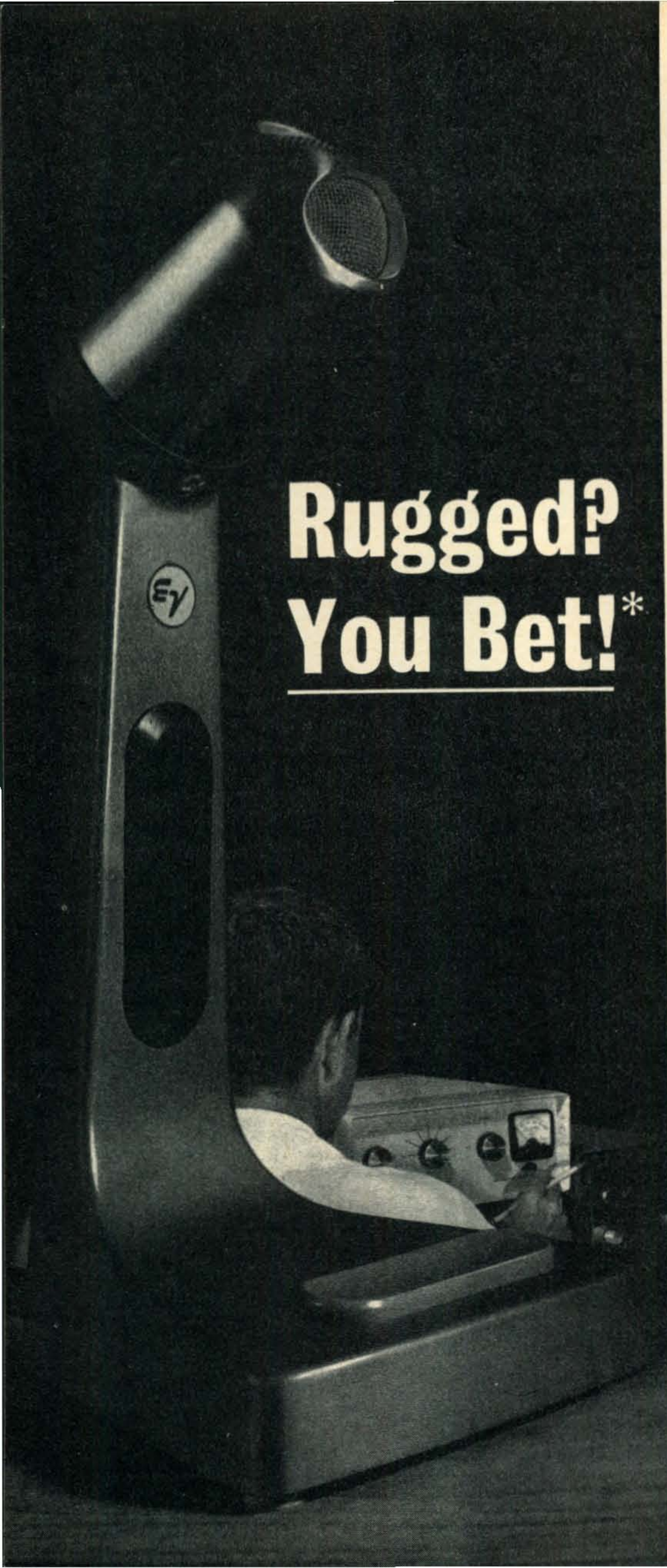

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ZERO BIAS

Equal Credit for Equal Effort

ALMOST traditionally, DX contests have been won handily by East Coast DXers who, with their better geographical situations have had a relatively easier shot into Europe, the Mid-East and Africa. For many years it was almost universally assumed that anyone outside the Atlantic coast states could have a lot of fun in a DX contest, but that fun was not likely to include a chance at a "Top US" award.

The geography of the US hasn't changed, but operating enthusiasm apparently has, and it looks as though a contest "tradition" must be laid to rest, for the skill and tenacity of the mid-western DXer is making inroads into what has been the hallowed ground of us easterners. All this is a fine situation for everyone except perhaps the eastern contest man.

However, the result has been that *CQ* has unintentionally been a party to a subtle form of discrimination. Being based in the New York area, it's quite natural that the *CQ* staff has gotten to know contesters up and down the east coast. It's also understandable that these relationships have led to better news and background coverage of east coast DXers in our contests. After all, when someone you know wins a contest you're more likely to get worked up over it than if a relative stranger does the same thing.

So what has happened is that to a small extent *CQ* has unintentionally neglected the fine efforts of some mid-western DX contest operators. To backtrack, and give post mortem coverage to contests a few years old would be silly, but what we intend to do is look at future contests through different eyes, and see to it that when a W9 or WØ or W8 nudges an easterner off his perch, the unbiased story will be told in *CQ*.

Next Month in CQ

In years past, the November issue of *CQ* has often been something special. This year the "special" will be Propagation. We intend to cut away as much of the mystery and confusion surrounding the subject as is practical in the space of a monthly magazine, with such notable authors as George Jacobs, W3ASK; Stanley Leinwoll and John Schultz, W2EEY. The issue will cover the ionosphere and its relation to short wave communications, ionospheric blackouts and what to do about them, v.h.f. propagation, sunspot cycle 20, and a propagation forecast for the next seven years.

The issue should be a veritable propogation text, but will be written in a non-textbook style. You'll probably find yourself referring back to the November 1969 *CQ* for some time to come. Look for it on the newsstands or better still subscribe using the envelope between pages 80 and 81 of this issue. and we'll guarantee you'll have a copy in your mailbox before they're all sold out.

On The Cover

The cover this month is a high contrast rendering of an RCA Electron Microscope. What's an electron microscope doing on the cover of an amateur radio magazine, and what's an article on the same doing inside? They're simply a case of an editorial liberty we've taken in the belief that the average amateur's interest go beyond the ordinary devices and systems he normally encounters in his hobby. We feel that to have become an amateur in the first place, a person had to have a more than average share of curiosity about things—technical things in particular. To think that his curiosity was sated upon receiving his amateur license is naive. So, about a year ago, *CQ* embarked on a test program of broadening its editorial view to include an occasional item unrelated to amateur radio, but still in the electronics or communications field. We've already touched on the Instrument Landing System used by airplanes, Lasers, visible light tuners, the Apollo Program, and others with favorable reader reaction. Our editorial excusion has thus proven to be quite acceptable, and unless we hear a lot of comments to the contrary, we'll continue on this course.

73, Dick, K2MGA

See page 110 for New Reader Service

OUR READERS SAY

Station Identification

Editor, *CQ:*

Since the fall amateur contest activity will soon be here, I believe you will be interested in a resumé of a recent explanation of what the Commission considers to be an acceptable station identification, as follows:

For compliance with rule Section 97.87(a), the last transmission of the exchange of transmissions with another station must include that "other" station's call sign. For example "BK 589 CAL TU DX1DX de W6XYZ K" would be in compliance with 97.87(a). When there is a need for identification of the "other" station in an exchange for the benefit of our monitoring facilities, it is most likely to be heard if it is in the last transmission or at the end of a long sngle transmission.

Where the transmissions of an exchange are very brief, such as the typical contest exchange, if it is less than 30 seconds duration, the entire last transmission is considered the "end of the exchange" for the purpose of compliance with 97.87(a). Provided there is no mistaking which is the transmitting station's call sign, the call signs may be anywhere in such last transmission. While the rule no longer gives examples, continuation of the traditional practice of placing the transmitting station's call sign last or preceeding it by "de" is acceptable for this purpose.

Examples of acceptable end-of-exchange transmissions of less than 30 seconds are:

"DX1DX de W6XYZ 589 CAL BK"
"DX1DX W7XYZ 589 CAL K"
"DX1DX 589 CAL de W6XYZ K"
"DX1DX 589 CAL W6XYZ K"
"589 CAL DX1DZ W6XYZ K"

For telephony, the voice equivalent of the foregoing examples may be used, substituting "this is" or "from" for "de", etc.

James E. Barr
Chief, Safety & Special
Radio Services Bureau, FCC

Our "ARRL Policy"

Editor, *CQ:*

Enclosed is my renewal for your fine magazine because of your excellent editorial policy toward ARRL. I was pleased to read that you will criticize them when they are wrong—and support them when they are right. Not a policy of being against them simply because they are ARRL!

I also agree that ARRL is the one who represents us nationally and internationally. Let us support them when they are right.

Sorry I can't go along with "hate" magazines.

Ned Culler, W3JW
Connellsville, Pa.

Free Ham Shop

Editor, *CQ:*

Why do you keep a good feature practically in the dark or shall I write "in fine print"? I am referring to your Ham Shop.

I have subscribed to *CQ* eight years, going on nine. The articles I read and enjoy, and often patronize your advertisers. (I also bought up back copies of some of your top notch articles on surplus equipment.)

Recently I acquired RCA, RBA, RBB and RBC receivers. Since they came without manuals I tried the Navy Publications' Department with partial success. Remembering Ham Shop I took advantage of this generous offer as a subscriber.

Talk about action:

Two days after my *CQ* copy with the request arrived here Phillip D. Greenway, W4LRR, of Atlanta, Ga., sent schematics. A few days later Phil DeSilva of East Meadow, N.Y. phones and offered me the use of his manual. It was not to end there since Mr. Treftz, K4UDP of Vero Beach, Fla. got in touch shortly thereafter. And last but certainly not least the West Coast was heard from: Lew Holt, W7AAI, wrote from North Bend, Ore.

So, please let more subscribers know about Ham Shop. My one insert was more than worth the year's subscription price.

Thanks to *CQ* and all that came to my aid.

Joseph I. Lisaius,
West Caldwell, N.J.

Transistor Interference (TXI)

Editor, *CQ:*

Read your article about TXI. Glad to see that, at last, someone is taking a stand concerning interference problems. I doubt very much that the manufacturers will take any steps to prevent such problems from arising unless forced to by Federal law.

Can anyone tell me why a ham, who is operating according to all rules and regulations, must tolerate complaints from owners of TV receivers, phonos, etc., when the problem is caused by poor design and design compromises of the TV receiver, phono, etc.? It is time that the manufacturers be made to assume their full responsibilities in these matters.

Dan Rasmussen, WA9UBI
Marengo, Illinois

160M. DX Window

Editor, *CQ:*

Having read W1BB's comments on page 67 of April 1969 *CQ* regarding "The DX-Window at 1825 kc to 1830 kc brought to mind my personal feelings about the 160 meters band. Now, I have operated licensed amateur radio for 21 years. These past two years I have finally managed to get onto the 160 meter band after 3 years of patiently preparing a suitable aerial system to fit into a limited backyard space. The 160 meter contacts came through but the DX operation to which I was ultimately headed simply did not

See page 110 for New Reader Service

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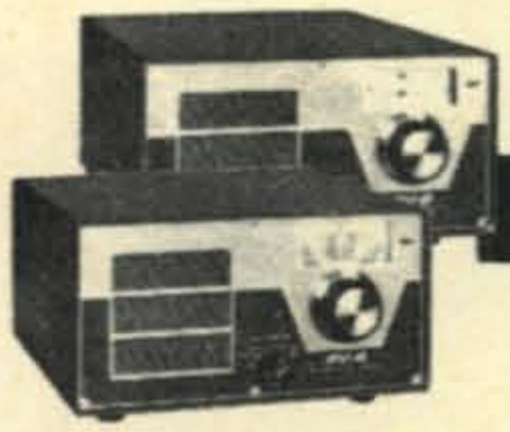

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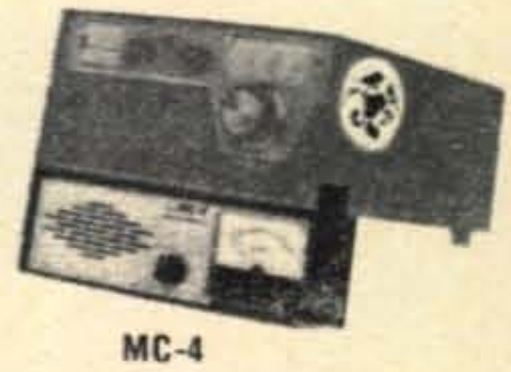
MC-4 Mobile Spkr/Wattmeter	**$ 69.00**
34-NB Noise Blanker Kit for TR-4	**$129.00**



MC-4

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MN-4 MN-2000

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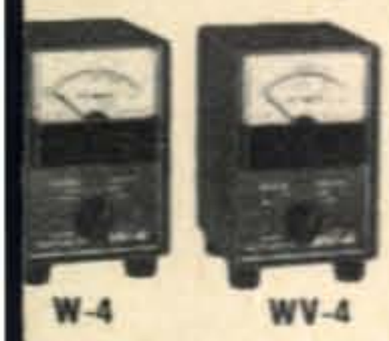
WV-4	20-200 MHz	100/1000W	$73.50



W-4 WV-4

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MS

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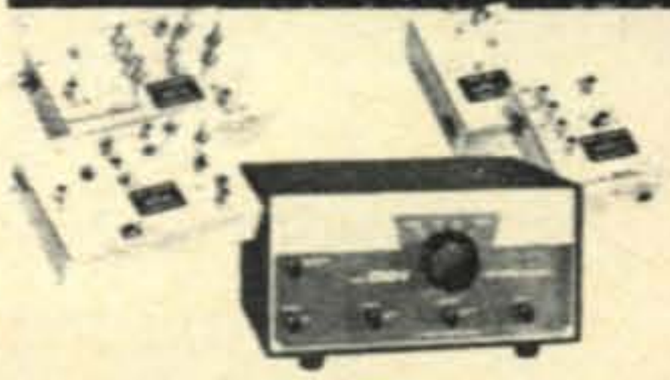

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materialize because of understandable amateur created QRM. In my years of amateur operating I have seen and still see amateur radio at its very best as well as having observed amateur radio operating at its very worst. Top Band has displayed much of this very best for me and because of this I am strongly in support of W1BB's suggestion of a DX-Window for 160 meters at 1825-1830 kc.

Top Band is in a favorable portion of the radio spectrum for study of radio propagation by amateurs via DX communication at the lower frequencies. One example of an ever present study problem is DX from East to Far West (The Orient) around or perhaps through the Auroral Oval. Creation of a DX Window is decidedly a necessary and preliminary step in clearing the air for 160 meters so that these amateurs can at least hear each other. Another direction that should be taken in relation to 160 meter DX is the making available of suggestions for construction of a "radio-meter-type" receiver to be used on 160 meters to enable the amateur to read S1, S2, S3, etc. signals in a Q5 manner. I believe that the time has come for the serious DX-experimenter to start developing for amateur radio the fruits of already proven scientific technique such as "radio-metry" for use on weak signals on Top Band that would not otherwise be copyable. A microwave radiometer has already described by K1KKP, Alan Parrish in his article, "Detecting V.H.F. Signals Too Weak to be Heard" published in *QST* for January 1968. A somewhat similar technique has been in well established use at low frequencies for many years and has been called a "phase-lock amplifier." For 160 meter design and construction, parts are easily available and the technique has a long and honorable amateur radio history. I, for one, would seriously look forward to assembling and using a 160 meter "radiometer" provided someone would come forth with a *CQ* article on the subject.

Angelo Lamendola, W2CMS
Rochester, N.Y.

See page 110 for New Reader Service

The world's best Ham Antenna

The Hy-Gain DX Long John high frequency beam is far and away the best amateur beam in the world.

It comes in 5 models from 10 to 40 meters. (See specs.) The DX Long Johns are optimum spaced parasitic arrays that are designed to deliver the maximum theoretical electrical performance and greatest mechanical strength and durability attainable on the amateur bands.

You won't find another like this the world over. That's because Long Johns are built like the commercial antennas Hy-Gain makes.

So, each is built to a very rigid commercial specification, using only the finest aluminum and stainless steel.

And, every Long John comes with Hy-Gain's exclusive Beta Match and a super-power balun to make sure you get the top electrical energy transfer with minimum SWR.

When you really start getting serious about DXing, you'll be ready for the Long John. Because with one, you'll have the whole world at your hands.

The DX Long John from Hy-Gain*

SPECIFICATIONS	Model 204B 4-Element 20 Meter	Model 403B 3-Element 40 Meter	Model 205B 5-Element 20 Meter	Model 106B 6-Element 10 Meter	Model 155B 5-Element 15 Meter
ELECTRICAL					
Forward Gain	10.33db	9.45db	13.45db	14.5db	13.45db
Front-to-Back Ratio (Average)	23db	25db	28db	22db	20db
Front-to-Side Ratio (Average)	40db	35db	40db	30db	30db
Maximum Power (RF)	5 KW	5 KW	5 KW	5 KW	5 KW
VSWR (at resonance)	1.2:1 Max.	1.2:1 Max.	1.2:1 Max.	1.2:1 Max	1.2:1 Max.
Feedpoint Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Half-Power Beam Width (E Plane)	53	59	48	42	47.5
Half-Power Beam Width (H Plane)	72	79.5	64	54	60
Frequency Range (Megacycles)	14 to 14.35	7 to 7.3	14 to 14.35	28.0 to 29.7	21.0 to 21.150
Approx. Bandwidth at Resonance (2:1 SWR)	325 KC	225 KC	370 KC	600 KC	600 KC
Polarization	Horiz.	Horiz.	Horiz.	Horiz.	Horiz.
MECHANICAL					
Longest Element	38 ft.	73.5 ft.	38 ft.	18 ft.	24'8"
Element Diameter (Largest)	1½ in.	2½ in.	1½ in.	1½ in.	1½ in.
Boom Length	31 ft.	46 ft.	46 ft.	32 ft.	31'10"
Boom Diameter (Largest)	4½ in.	4 in.	4 in.	3¼ in.	3½ in.
Turning Radius	24.1 ft.	42.2 ft.	29.7 ft.	17.6 ft.	20.3 ft.
Maximum Wind Survival (No ice)	125 MPH	125 MPH	125 MPH	125 MPH	125 MPH
Wind Load (100 MPH)	360 lbs.	720 lbs.	555 lbs.	224 lbs.	274 lbs.
Total Wind Surface Area (Square Feet)	12.8	23.6	18.1	5.6	6.9
Net Weight (Assembled)	116 lbs.	250 lbs.	185 lbs.	151 lbs.	151 lbs.
Total Number of Elements	4	3	5	6	5
Shipping Weight	160 lbs.	300 lbs.	250 lbs.	167 lbs.	167 lbs.
Shipping Volume (Packaged BCP)	8.9 cu. ft.	21.9 cu. ft.	12.5 cu. ft.	7.8 cu. ft.	7.8 cu. ft.
Shipping Cartons	3	4	3	2	2

For recommended rotators and supporting structures, see Hy-Gain Technical Data Reports on Model RP75 rotating steel pole and Model R-3501 rotators.

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See page 110 for New Reader Service

Announcements

Correction

In the "Slow Scan Television" article, Part 1, July, *CQ*, page 16, footnote 5 on page 18 should read *QST*, March 1964 and not 1969 as indicated.

FCC Public Notice

The International Telecommunication Union has recently been informed of the withdrawal of restrictions regarding radio communications between amateur stations in Thailand and those in other countries. Authorization will be granted for Thai nationals only. A reciprocal agreement is required for any foreign national. Negotiation of a reciprocal agreement for amateur operation between Thailand and the US has been initiated.

Apollo 11 "Special Event"

The Space Center Amateur Radio Society of Kennedy Space Center, Florida has their club station WB4ICJ in operation July 16th for the Apollo 11 special event. For details of such operations see pages 86, 87 and 102 of June *CQ*. During this 17 hour period of operation, 1,650 stations were contacted. Among these contacts were 235 foreign stations representing 50 countries.

Attn: 160 Meter Amateurs

The formation of the Northeastern States 160 Meter Amateur Radio Association has been announced, encompassing the states of New England, New York, New Jersey and Pennsylvania. For more information about the club and their election/banquet to be held in October, contact William K. Murphy, WA2QLT, 31 Furman Road, Fairport, N. Y. 14450.

Tampa, Florida

The Hillsborough Amateur Radio Society, Inc. Tampa Annual Hamfest will be held Sunday, October 12, in Lowry Park, Sligh Avenue & North Blvd. Large Sheltered Swap Table Section. Plenty of free parking. Fun for the whole family.

Oneida, N.Y.

The annual dinner/banquet of the Central New York Chapter of the Quarter Century Wireless Assoc. will be held at the Hotel Oneida in Oneida, N.Y. on Sat., Nov. 1. The Finger Lakes Chapter and the Mohawk Chapter will join them on this occassion. Tickets are $5 per person. All reservations should be in no later than Oct. 26th. Write to your chapter secretary for full details and tickets. Cocktail hour 5-7 P.M. Dinner at 7 P.M.

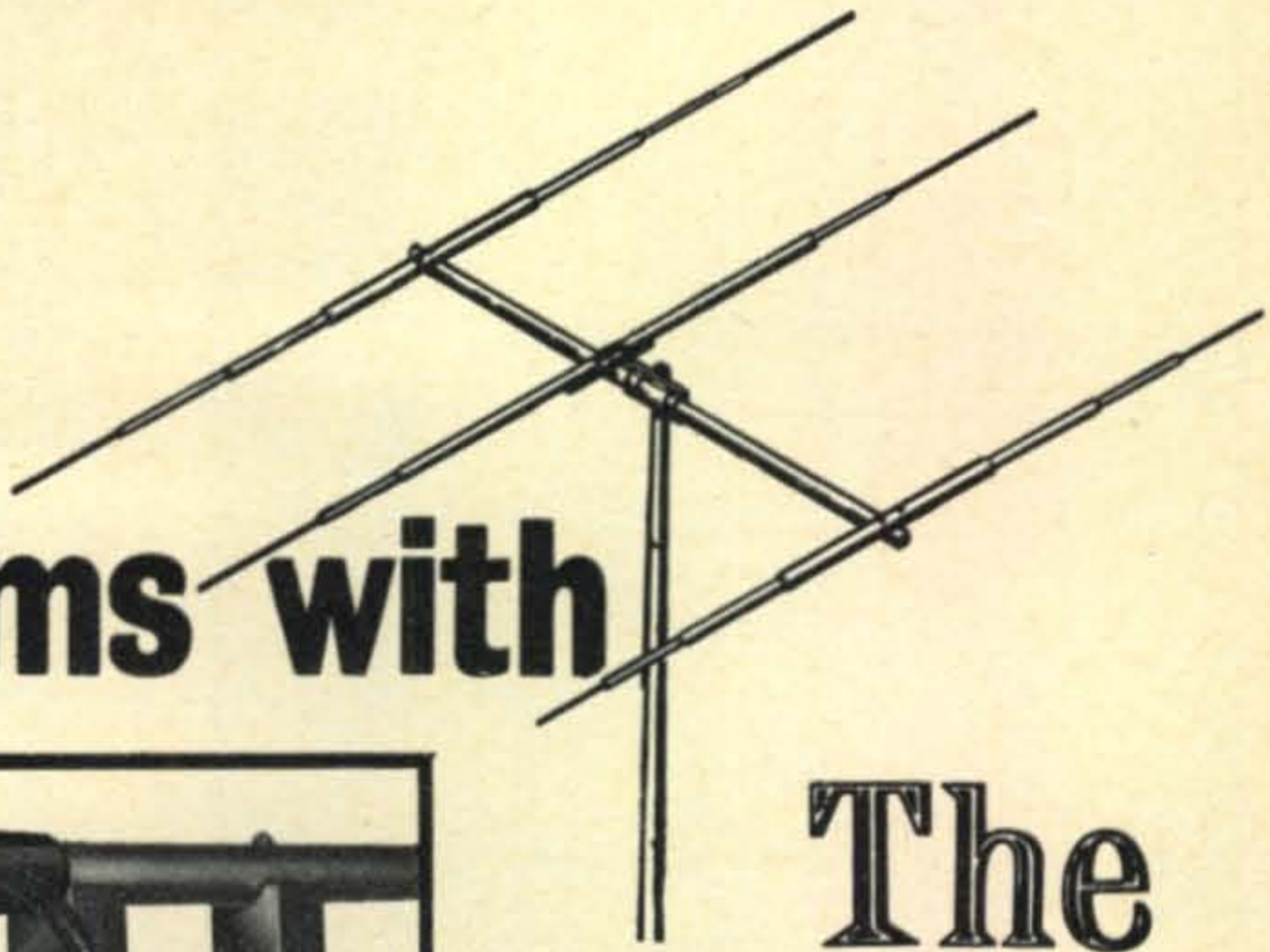
Bombay, India

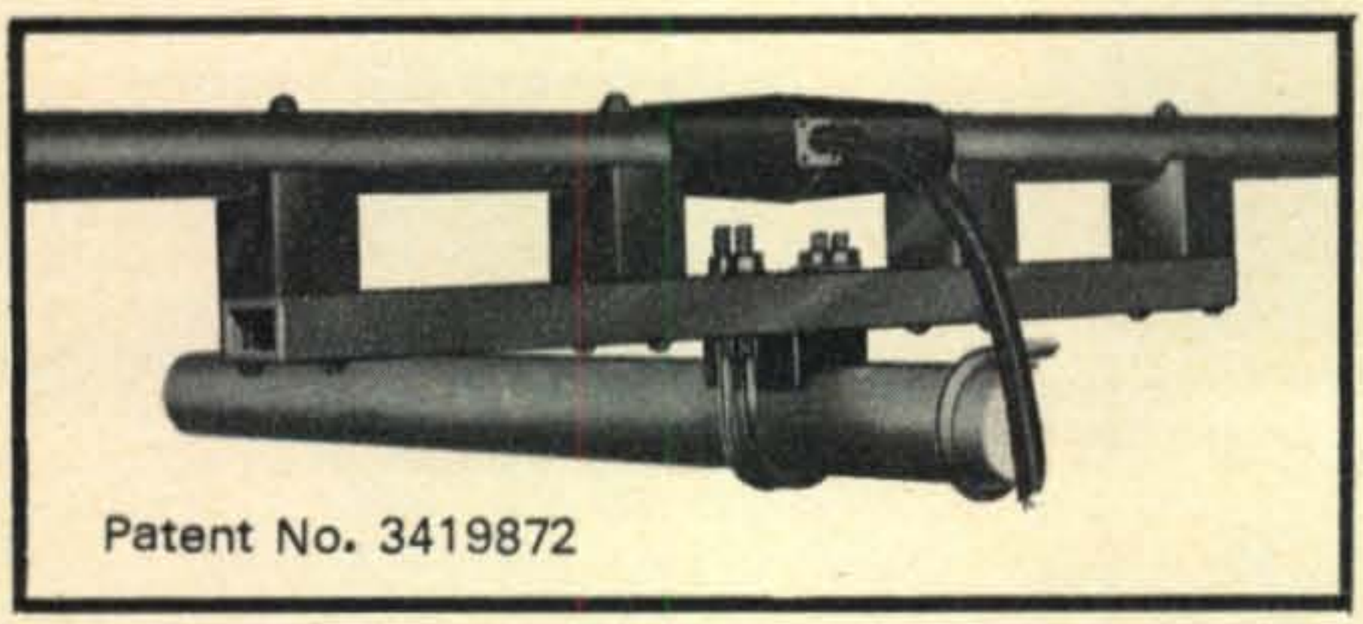
The first all India Amateur Radio Convention will be held in Bombay on December 27, 28, 29 & 30th. A simultaneous exhibition on the progress of the Indian electronic industry is being organized. For further information contact T. P.

See page 110 for New Reader Service

NEW! FROM MOSLEY

Two Single-Band Beams with





Patent No. 3419872

The Classic FEED

According to forecast, 1970 should be another great year for h. f. propagation conditions. Make the most of the DX openings on 10 and 15 meters with new Mosley single-band beams, the Classic 10 (Model CL-10) and the Classic 15 (Model CL-15). These beams offer the optimum spacing possible only on single-band arrays. But even more advantageous is their famous Classic Feed System (pat. no. 3419872) This "Balanced Capacitive Matching" provides maximum gain, increased bandwidth and more afficient performance because of its better electrical balance and weather proof design.

See these DX champions at your nearest Mosley dealer. For complete specifications and performance data, write factory direct for free brochure, Dept. 189.A

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ee page 110 for New Reader Service

Sheth, VU2TP, c/o Radio & Electronics Society of India, 4, Kurla Industrail Estate, Ghatkoper, Bombay-Agra Road, Bombay 77 AS.

Wichita, Kans.

The 5th Annual Tec-Ni-Chat Amateur Radio Club electronics garage sale will be held at the QTH of Ernie Welborn, 1911 Woodland on October 25 and 26, with designated leftovers to be auctioned at 2 P.M. on Sunday. Talk-in will be provided on 3.920 kc and through the Wichita Repeater on 146.34/94 mc to assist mobiles in reaching the scene. Those wishing to consign amateur radio equipment and items of electronic interest may leave them at the sale site beginning October 18th. All consignmens will be catalogued and protected until sold or reclaimed.

Spring Mill State Park, Ind.

The eigth annual hamfest held by the Hoosier Hills Ham Club will be held on October 12 at Spring Mill State Park near Mitchell, Indiana. Prizes will be awarded, swapshops available and the area includes facilities for camping, boating, refreshments, etc. For more information, advance registration, hotel or motel reservations write Hoosier Hills Ham Club, Inc. P.O. Box 375, Bedford, Ind. 47421.

Delaware QSO Party

The Delaware Amateur Radio Club of Wilmington, W3SL, announces its 14th Delaware QSO Party and invites all amateurs to participate. Time: 30-hour period from 2300 GMT Nov. 1 to 0500 GMT Nov. 3. No power restrictions. Scoring: Delaware stations: 1 point per contact and multiply total by the number of states, Canadian provinces and foreign countries worked during the contest period. Outside stations: 5 points for each Delaware station worked and multiply total by the number of counties in Delaware worked during the contest period. Credit will be given for contacts with the same station on more than one band, but not for contacts with the same station using two modes on the same band.

A certificate will be awarded to the highest scoring station in each state, Canadian Province and foreign country (with 3 or more contacts) and to the highest-scoring station in each Delaware county. In addition, a W-DEL certificate will be sent to any station working all 3 Delaware counties. Party logs showing required data will be accepted in lieu of QSL's.

Suggested frequencies: c.w.: 3560, 7060, 14060, 21060, 28060 kc; phone: 3975, 7275, 14325, 21425, 28650 kc; vhf: 50., 50.4, 144 mc. General call: "CQ DEL." Delaware c.w. stations should identify themselves by signing DE (call) DEL K. Phones say, "Delaware calling." Contact information required: Delaware stations send number of QSO, RS(T) and county (New Castle, Kent or Sussex). All others send number of QSO, RS(T) and state, province or country. Logs and scores must be postmarked not later than Dec. 1, 1969, and should be sent to the Delaware Amateur Radio Club, c/o Ross Hawkins, 125 Greenbank Road, Apt. B-4, Wilmington, Del. 19808. Applications for the W-DEL certificates should also be sent there.

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INTRODUCING THE

DELUXE SWAN *Cygnet*

MODEL 270 . . . 5 BANDS . . . 260 WATTS

he deluxe Cygnet is a complete amateur radio ation including AC and DC power supply and udspeaker, beautifully integrated into one pack-ge. It contains all the features required for home ation operation with enough power to work the orld. Yet the 270 is compact and light enough make an ideal 'traveling companion' on those usiness or vacation trips (second only to the YL, of course). Incidentally, a carrying case for e Cygnet will soon be available.

or temporary mobile installation, either in your wn or someone else's car, Swan will soon offer installation kit, including antenna, which will ut you on the air in 5 minutes (no holes). Thus, ou'll be able to operate mobile from a rental car! or permanent mobile installation, your Swan ealer has mounting kits and 5 band antennas stock.

or those who feel they need higher power to imb above the QRM level, Swan will soon an-ounce a matching 1 KW Cygnet Linear. It will so come with a handle just in case you decide take its 25 pounds along on a trip. With this uch power of course, it works only on AC.

SPECIFICATIONS: **Power Input:** 260 watts P.E.P. in SSB voice mode, and 180 watts in CW mode ● **Frequency Range:** 3.5-4.0 mc, 7.0-7.3 mc, 14.0-14.35 mc, 21.0-21.45 mc, 28.0-29.7 mc ● **C.F. Networks:** Crystal Lattice Filter. Same as used in the Swan 500 C. 2.7 kc band width at 6 db down. 4.6 kc wide at 60 db down. Ultimate rejection exceeds 100db ● **Unwanted** sideband suppressed. 50 db. **Carrier** suppressed 60 db. 3rd order distortion down approx. 30 db ● **Audio Response:** flat within 3 db from 300 to 3000 cycles in both transmit and receive modes ● **Pi Antenna coupler** for 52 or 75 ohm coaxial cable ● **Grid Block CW keying** with off-set transmit frequency ● **Solid state VFO circuit** temperature and voltage stabilized ● **Receiver sensitivity** better than ½ microvolt at 50 ohms for signal-plus-noise to noise ratio of 10 db ● **100 kc Crystal Calibrator** and dial-set control ● **S-meter** for receiver, P.A. Cathode meter for transmitter tuning ● **Improved** AGC and ALC circuit. Separate **R.F.** and **A.F.** gain controls ● **Sideband selector** ● Provision for **plug in of VOX** accessory, as well as headphones and/or Cygnet Linear ● **Tube complement:** 12BA6 VFO amp, 12BE6 trans. mixer, 6GK6 driver, 6LQ6 pwr. amp., 6BZ6 rec. R.F., 12BE6 rec. mixer, 12BA6 1st I.F. amp., 12BA6 2nd I.F. amp., 12AX7 prod. det. A.F. amp., 6AQ5 A.F. output, 12AX7 mic. amp., 6JH8 bal. mod., 12AV6 AGC-ALC amp. **Dimensions:** 5½ in. high, 13 in. wide, 11 in. deep. **Weight: 24 pounds.**

Amateur Net: **$525**

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ACCESSORIES

Mobile Mounting Kit		**$12**
VX-2 Plug-in VOX Unit		**35**
5 Band Mobile Antennas	Model 45	**65**
	Model 55	**95**

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Feenix, Ariz.

Deer Hon. Ed:

Most of time when riting you I having some kind of problem, but not this time. No indeedy, this time it's you who having the problem, and it a reel serious 1/c one.

So, Hon. Ed., taking feets off desk and paying attenshun. Putting away Hon. Girlie magazine. Uh, uh . . . closing centerfold—let's not leeving magazine open. Okey? Okey.

As editor of leeding amchoor journal, you having big responsibility. All over world amchoors are facing Hon. Dillemma. A big old problem are about to stare us rite in the face, and you got to do something about it post hasty.

I speeking about a dee-x problem. What are we going to do when some of us are working the moon? How we going to count it? Stop laffing, Hon. Ed., this are serious. You thinking it can't happening soon?

Hokendoke Hackensaki!! but you are a hard man to convince. Now just listen. Very shortly we going to have more manned Moon landings. One of the Hon. Astronnawts could very easily be an amchoor operator.

Now, you know amchoors. He'll sneek a ham rig on the spaceship without anybuddy knowing it. When they land he'll set up on the Moon, say a 2 GHz parabola and in one of his exersize periods he'll call seek-you Earth. Supposing sumbuddy working him? By the beard of my sacred Hon. Ant Fuji, then we having 1/c pandemonium!

Supposing this amchoor he working are getting QSL from Moon? How are you gonna figyour QSO with Hon. Moon? Is it all one country? Hon. Ed., it too big to being just one country. You gotta divide it up. I meen, if some measily little ten square mile island on Earth is called a country, then the Moon is certainly eleventeen different countries.

It not all that hard to doing. You can divide

See page 110 for New Reader Service

COMPARE IT?

...WITH WHAT?

The CX7 practically demands comparison. Question is . . . what to use for a standard? A transceiver? Or transmitter-receiver separates?

You'll really need one of each. Don't forget power supplies, speech processor, keyer, directional wattmeter. Pick the best. In fact, set up your "dream station" . . . at least on paper. NOW . . .

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COMPARE the CX7 with **any receiver** for sensitivity, selectivity options, dynamic range, AGC merit, VFO smoothness, interference rejection . . .

COMPARE the CX7 with **any transmitter** for continuous power output in **all** modes, P.A. ruggedness, crisp audio punch, low distortion, instant CW break-in and spotting, quick band-change . . .

COMPARE the CX7 with **any transceiver** for total size and weight . . . the extreme flexibility of its dual-channel system . . . the convenience of its completely self-contained design . . .

CONSIDER the CX7's **incomparable** frequency coverage and readout precision . . . aerospace-bred excellence in engineering and craftsmanship . . . built-in "extras" . . . overall versatility . . .

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it by the big areas what having names, like: Sea of Serenity, Sea of Tranquillity, Sea of Fertility, Bay of Billows, Ocean of Storms—things like that.

Then how about the back of the Moon? That could be a reel stumper. On acct. it never facing the Hon. Earth, you can't working it direct. You could working sumbuddy there if you having a satellite orbiting the Moon what can relaying the message to hidden side of the Moon. But will the Dee-X Committee count working back of Moon thru a satellite? You see all these questions that can coming up now any minute?

In fackly, talking about satellites are bringing up hole new subject. Are you going to counting manned satellites in dee-x list? Are they or aren't they counting as new countries when armchoor working them?

I suppose if they moving around the Earth you might not considering them fixed points. You might thinking of them same as likewise maritime/mobile stations you working.

On other hand, how abouts Hon. Synchronous Satellites? They always in same spot above your head. Supposing they are manned, and you having QSO with amchoor on one of them. That certainly are counting as new country, are it not? Or are it not not? You gotta making up your mind, Hon. Ed. on all these little problems.

Getting on your toes, Hon. Ed., and getting some decisions made. First thing you knowing we be having manned landing on Mars, then we having a reel Hon. To Do.

At the speed at which you dee-x experts are moving on this we liable to have a QSO with Mars before we amchoors even knowing if it or the Hon. Moon are counting as new countries in our dee-x total. Up, up and a w a y !

Respectively yours,
Hashafisti Scratchi

See page 110 for New Reader Service

a Great one from NRCI

New 500-Watt 5-Bander from NRCI

You can't buy a more potent package than the new NRCI NCX-500 transceiver. This versatile 5-bander is packed with the performance extras that give you the sharpest signal on the band, plus an enviable collection of QSL's. Check it out!

- 500-Watt PEP input on SSB, grid-block keying on CW and compatible AM operation.
- Receive vernier, with tuning range greater than ± 3kHz.
- Separate product and AM detection.
- Sidetone monitor, plus built-in code practice oscillator.
- Fast-attack slow-release AGC in all modes.
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- Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent-channel QRM on receive . . . plus solid-state balanced modulator for "set-and-forget" carrier suppression.
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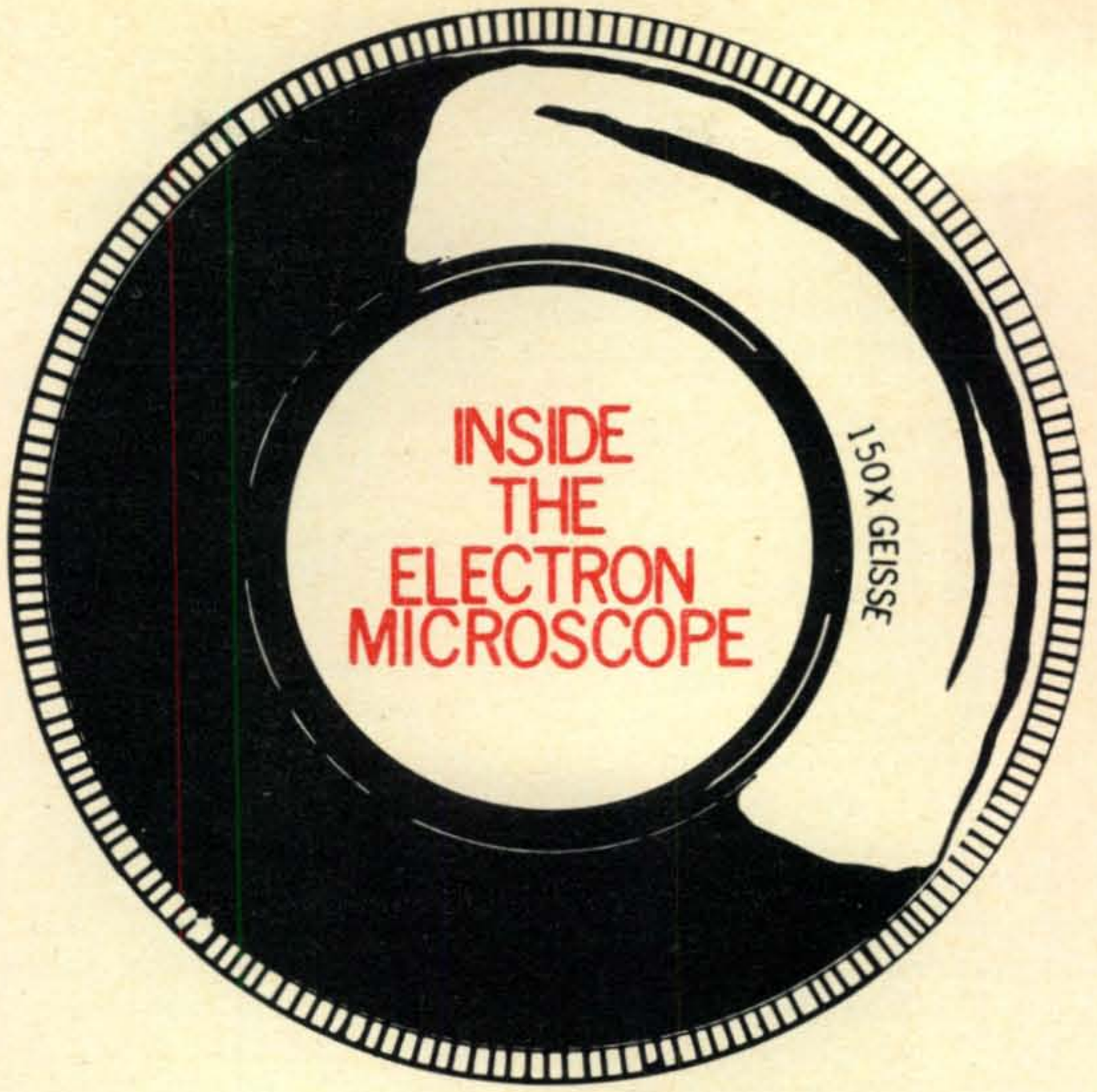

BY W. EDMUND HOOD,* W2FEZ

SINCE the introduction of the first commercially produced model, around 1945, the electron microscope has opened a window into an entirely new world of scientific exploration. Having a theoretical magnifying power as high as half a million, it enables the scientist to examine first-hand the minutest details of Nature, even revealing molecules and enzyme-chains which hold the keys to the innermost secrets of life itself.

The device itself stands about four feet high, and sets on a specially built desk console. The material being studied is placed on a tiny copper disk about one eighth of an inch wide. Actually, this disk is a superfine screen, with about two hundred holes per square millimeter. It is inserted into a metal plug about the size of a thimble, which has a hole through its axis. The sample disk is held across the hole by a threaded insert. The plug is inserted into the microscope. The microscope must be sealed shut, and a high vacuum drawn inside it before the power can be turned on. At the bottom of the four foot column, where it rests on the desk, there is a glass window, which enables the operator to look in. A special pair of binoculars points into the window, giving a magnified view of the image, which looks almost like a black-and-white movie on a glowing green background.

The reader, if he is familiar with elec-

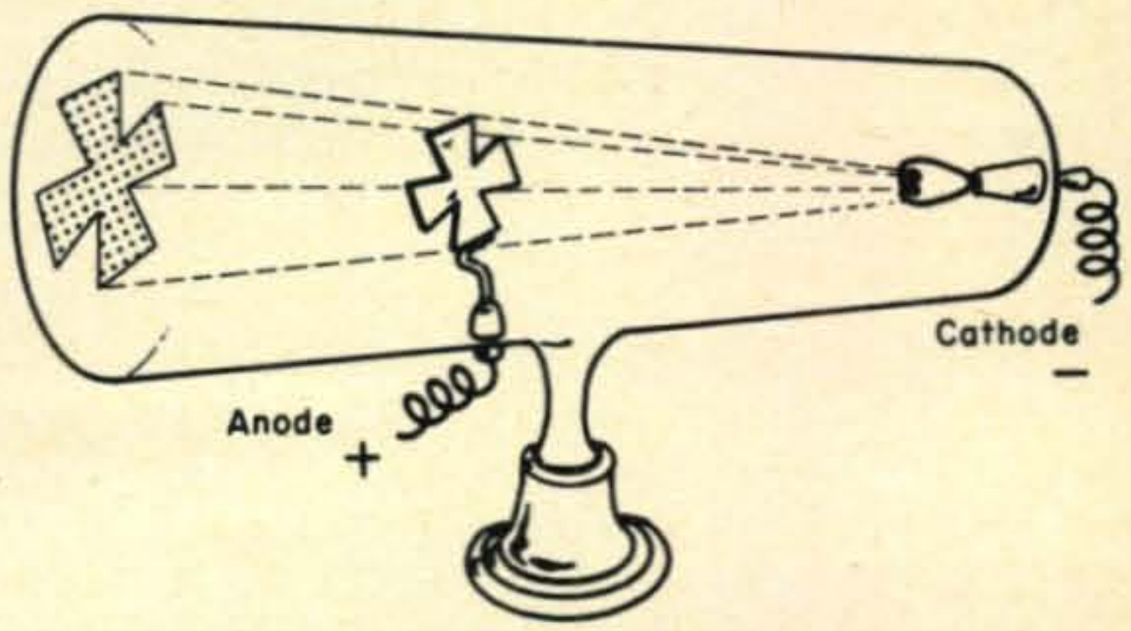

Fig. 1—An early experimental device used to show that "cathode rays travel in straight lines." The type of tube shown above did not use a coated screen as the glass produced a vivid fluorescence where the electrons hit, thus outlining the shape of the object in the path of the electron stream.

*223 Pullman Ave., Rochester N.Y. 14615.

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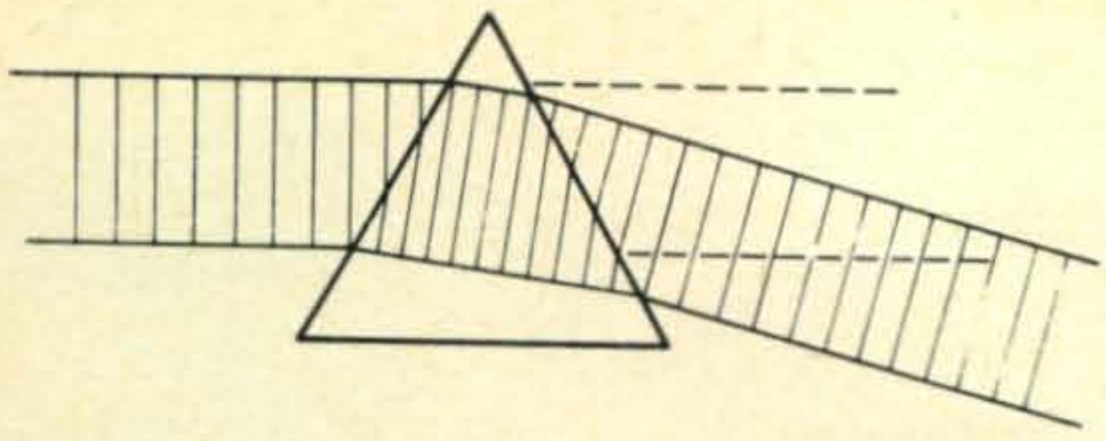

Fig. 2—The effect of passing a light beam through a prism is to bend the beam, refraction.

tronics, has probably guessed that the image appears on the screen of a cathode-ray tube. Well, you're almost right. The electron microscope itself is very much like a cathode-ray tube. The principles of the cathode-ray tube was discovered in 1897 when John Thompson constructed a device which revealed the presence of an electron beam. It looked something like the cathode-ray tube of today, with a filament at one end and an accelerating anode about midway. See fig. 1. The other end was coated with phosphor. An obstacle was placed between the anode and the phosphor screen. When the filament was lighted, and voltage applied to the anode, the phosphor screen glowed and showed a shadow of the obstacle. The whole idea was to prove that an invisible beam was coming from the cathode and striking the phosphor. Only if it were coming from the cathode could it strike the obstacle and cast a shadow on the phosphor. Quite appropriately, he called his gadget a cathode-ray tube.

As time went on, the invisible beam was proven to be a stream of electrons. It was found that this beam could be focused to a fine spot, and even modulated. This eventually evolved into the display tube of the oscilloscope, and the television picture tube, as technical advances realized during World War II were turned to civilian use.

Before tracing the evolution of the electron microscope any further, it will be necessary to discuss and become familiar with the optical microscope and its limitations.

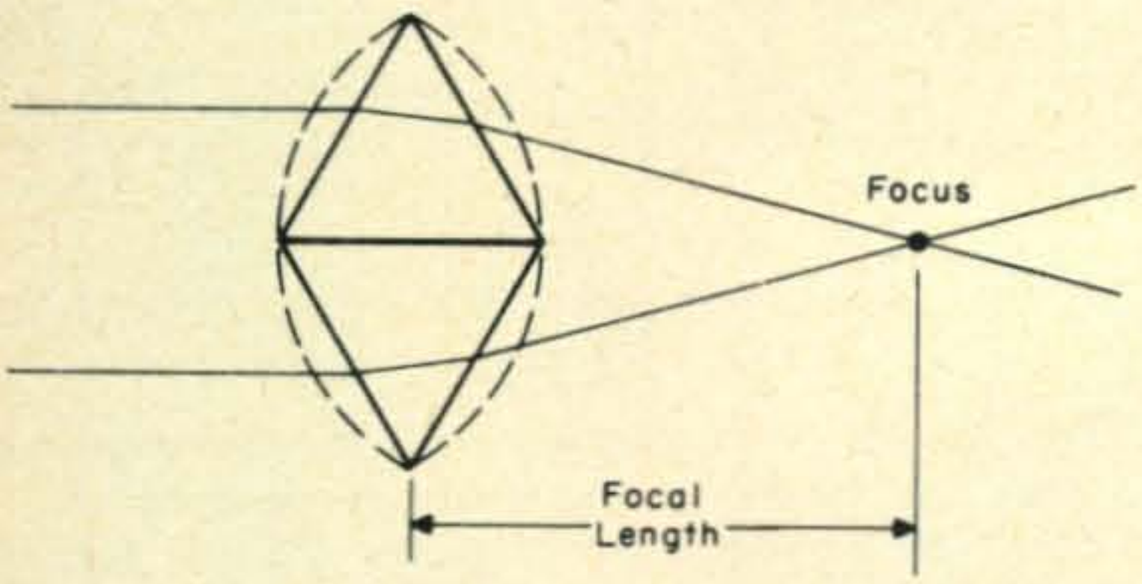

Fig. 3—Combining two prisms and modifying the shape slightly (dotted lines) produces a conventional lens.

Lenses And Refraction

The heart of a microscope is the lens. A lens is a simple application of a scientific law called *refraction*. Refraction means the bending of a beam of light due to the fact that light travels at different speeds in different materials. Suppose, for instance, we passed a beam of light through a piece of glass which was thicker at one end than at the other. Figure 2 shows what would happen. We see the waves of light traveling in a straight line through the air. One side of the beam enters the glass first, and slows down. The same result is realized when one side of the beam leaves the glass, speeds up, and pulls ahead of the other. The result of these two phenomena is that the beam is bent toward the thick portion of the glass.

A lens behaves as if it were two such pieces of glass placed back-to-back. Parallel beams of light, each passing through its own side of the lens, would bend toward each other and eventually cross. (Fig. 3) The point where the two beams cross would be called the *focus*, and the distance from the center of the lens to the focus, the *focal length*. Let us now imagine light coming from a point (fig. 4A). As the light left the point, *P*, it would spread in all directions. A lens would capture some of this light and bend it until it again came to a point, P^1. Now imagine two points, *A* and *B*, (fig. 4B). The lens would form a new point for each of them, A^1 and B^1. These new points would be positioned similarly to the positions of points *A* and *B*, except that their positions would be switched and, if the distance from the lens to the original points was shorter than the distance from the lens to the new points, they would be further apart. In fig. 4C, we see how an object can be treated as an infinite number of points of light and form an image which is reversed in direction and larger than the object. Now, as the light passes the position of this image, it spreads out again, since the beams have *crossed*, as if it were coming from a real object. We can place a second lens (fig. 5) which will cast a second and still larger image. This image will be opposite in direction to the first image, and therefore will be in the same direction as the object.

That is all there is to a microscope. It is just a series of lenses, carefully designed and

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RCA's model EMU-4 electron microscope has a resolving power of 8 angstroms and allows researches to observe particles as small as 1/30 millionth of an inch in diameter. The EMU-4 is being used at right with a TV image intensifier with the images being observed on the TV monitor screen.

placed so as to make a large image of a very small object. If an opaque screen were placed at the point of either the first or second image, the image could then be clearly seen. If you looked down through the second lens, the lens of your eye would create still another image, this time on the retina of your eye.

Theoretically, then, all one has to do is use more powerful lenses, and more of them, to make microscopes of unlimited power. Nothing would ever be too small to be magnified up to visual size. That's an excellent theory except that it has a couple of holes in it.

First of all, light is composed of many colors, and each color has a different index of refraction. That is, each color is bent differently by the same piece of glass. They don't all come to focus at the same point. Then, too, remember that light is a wave exactly the same as radio waves. Each color is a different frequency. It has a definite wave-length. For instance, one particular color which is used as a prominent landmark in the visible spectrum, has a wavelength of 6.5 ten thousanths of a millimeter. Any object smaller than that could not be seen with *any* lens simply because the light waves would go over and around it, being larger than the object. Some people try to get around the problem by using ultra-violet light. Since it has a much shorter wavelength, it will "see" much smaller objects. At best, however, this only doubles the possible magnification. In order to reach the infinitely small details, it was necessary to discover a light with infinitely small wavelength.

Cathode Ray Tubes

In the 1930's it was suggested to try using the electron beam of a cathode-ray tube. Since the electron is the smallest of particles, no object should be too small for an electron microscope. Several problems existed. First of all, since glass is an insulator, electrons

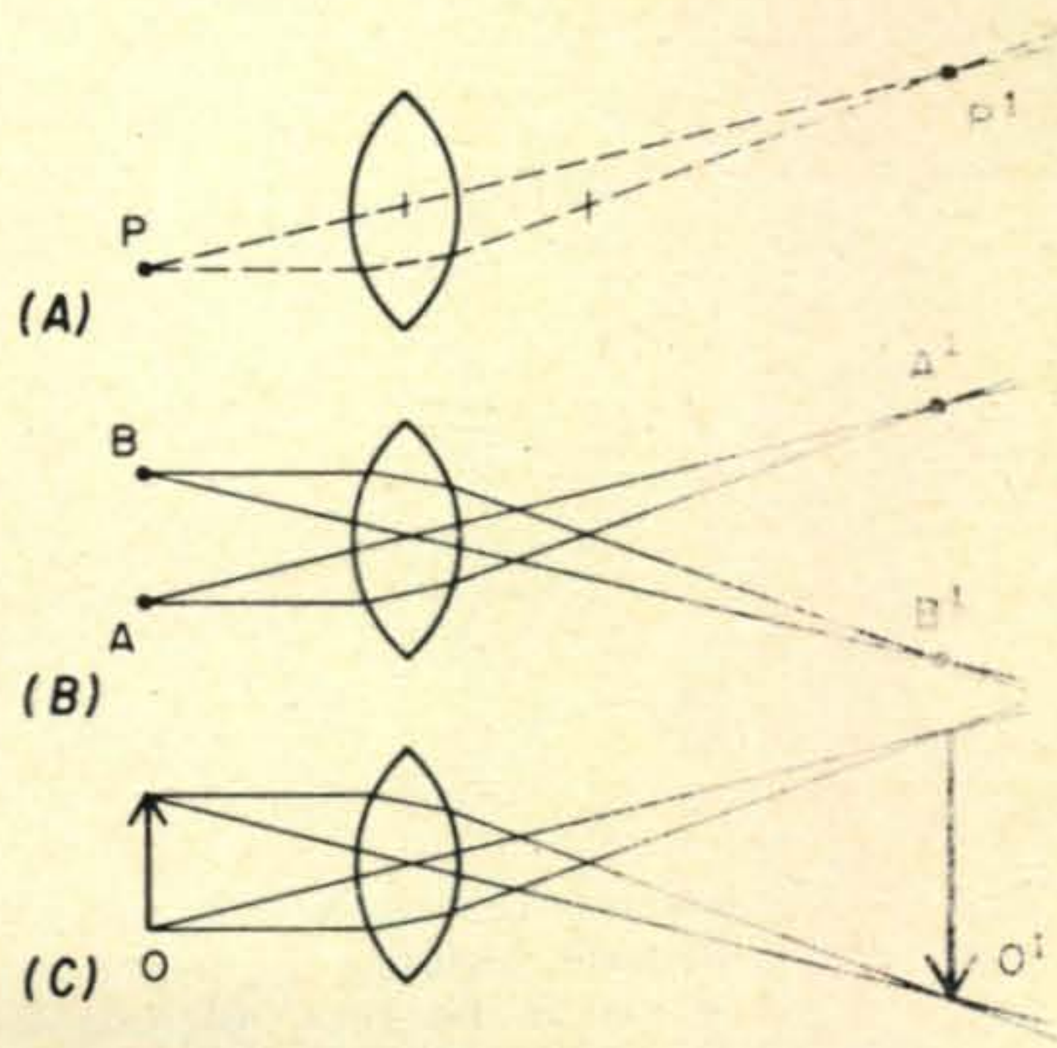

Fig. 4—Illustrations showing how an object is treated as an infinite number of light points and an inverted and enlarged image is produced.

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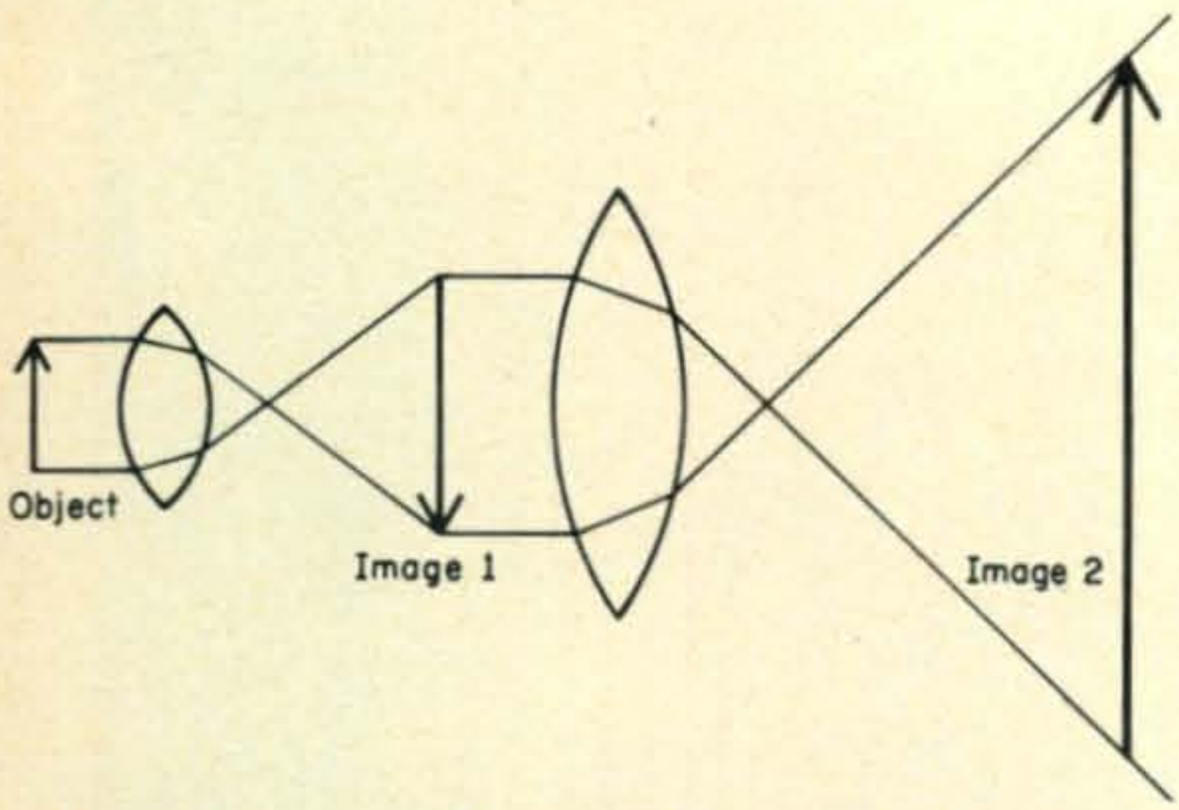

Fig. 5—The use of a second lens casts a second and enlarged image. The second lens also provides a second image reversal so that it is in the same direction as the object.

cannot travel through it. Therefore we cannot make a glass lens for an electron microscope. Another way had to be employed to focus electron beams. There are two possible methods: electrostatic and magnetic.

Suppose a stream of electrons were passing through a ring, and the ring given a powerful negative charge. As the electrons passed through, the ring would repel them and deflect their path toward the center. Even if the reflection were very slight, there would still be a point where they would all come together—in other words, a focus. So we see that an electron beam can be focused and made to behave exactly like a light beam. This is shown in fig. 6A.

An electrical current passing through a magnetic field produces motion. It is possible to orient a magnetic field around an electron beam so as to deflect the paths of the electrons to a focus. Electro-magnetic focusing seems to be the more desirable both in cathode-ray tubes and in electron microscopes.

Figure 6B gives a simplified idea of how electromagnetic focusing can work. The electrons are released from the cathode in the same way as in a vacuum tube, and accelerated by the positive charge on the anode. (Actually the anode takes the physical form of a ring.) Passing through the anode, the electrons then pass through a coil. This coil, which is, in fact, the lens, is encased in soft iron except for a gap around the inner circumference. The magnetic field from the coil, in trying to pass through the gap, spreads out into the center. The electron stream, upon passing through this magnetic flux, tends to move out of it. Therefore, it is deflected toward the center and eventlually comes to a focus. The power of the magnetic "lens" can be controlled simply by varying the current in the coil. This is a theoretical idea of how it might work. An actual electronic lens is much more complex, but works along the same general idea.

Electron Microscope

Credit for the invention of the electron microscope is given to Vladimir K. Zworykin in the United States in 1939, but the first commercially produced model came out of R.C.A. in the early 1940's. Figure 7 shows the arrangement of an electron microscope. At the top of the column the beam is generated and accelerated with 50 to 100 thousand volts. It passes first through one or two

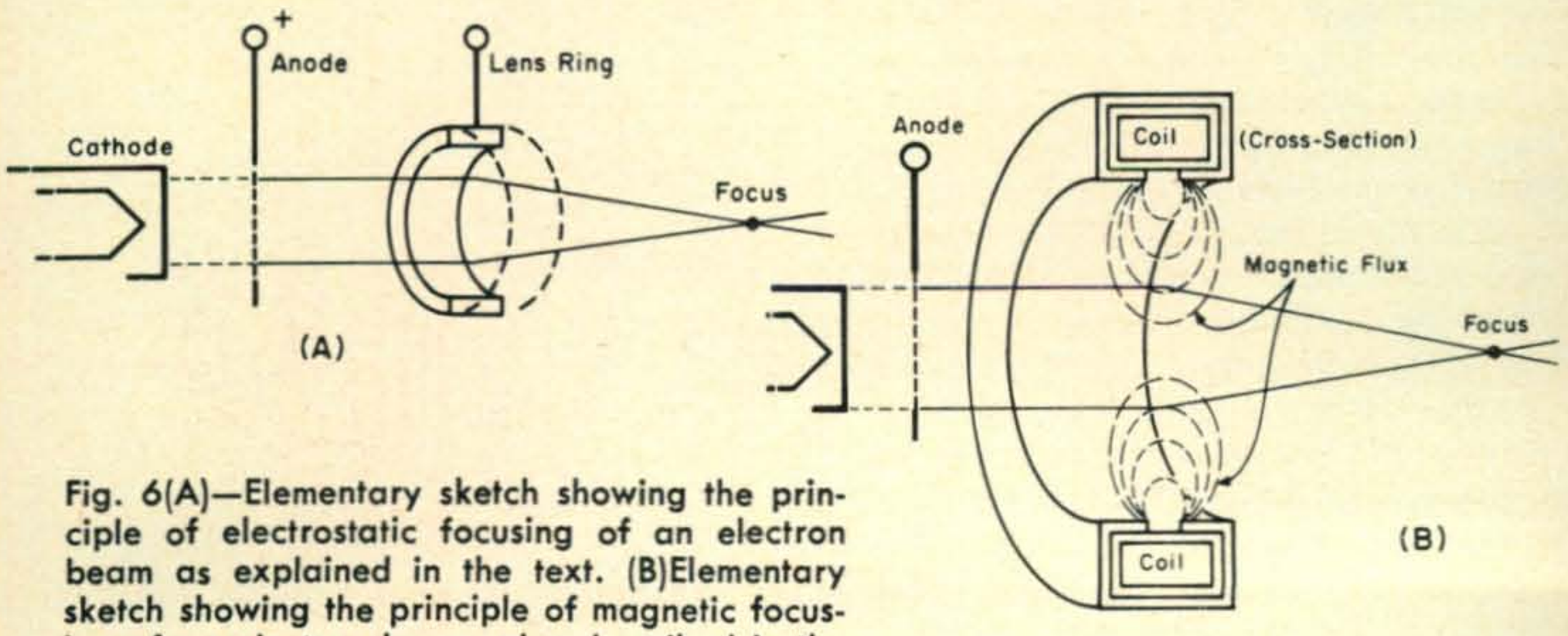

Fig. 6(A)—Elementary sketch showing the principle of electrostatic focusing of an electron beam as explained in the text. (B)Elementary sketch showing the principle of magnetic focusing of an electron beam, also described in the text.

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"condenser" lenses. The word condenser, as it is used here does *not* mean capacitor. It refers to the function of the lens, which is to concentrate the beam into a stream fine enough to pass through a very tiny object. The object being studied is a super-thin slice through which the electrons are capable of passing. (The beam will burn the subject after a while if it is too intense.) It then passes through the objective lens which focuses a first image. After passing through two more lenses, the beam, now focused into a tremendously magnified image, strikes a fluorescent screen similar to the face of a cathode-ray tube. This screen glows, showing the image visibly. The resolution of the image is so sharp that it can be examined with a binocular-like microscope, giving further magnification.

If it is desired to make a photographic record of the image, a sheet of film is inserted in place of the fluorescent screen. The electron beam affects the film exactly the same way as a light beam. This film can be projected onto a screen resulting in a total magnification of incredibly large amounts. I have seen electron photomicrographs which clearly showed molecules and enzyme-chains.

Shown here is a photograph and a diagram of R.C.A.'s latest electron microscope model, the EMU-4. Without additional equipment, this model can give direct magnification of up to 200,000×. Photographic enlargement can tremendously increase this amount.

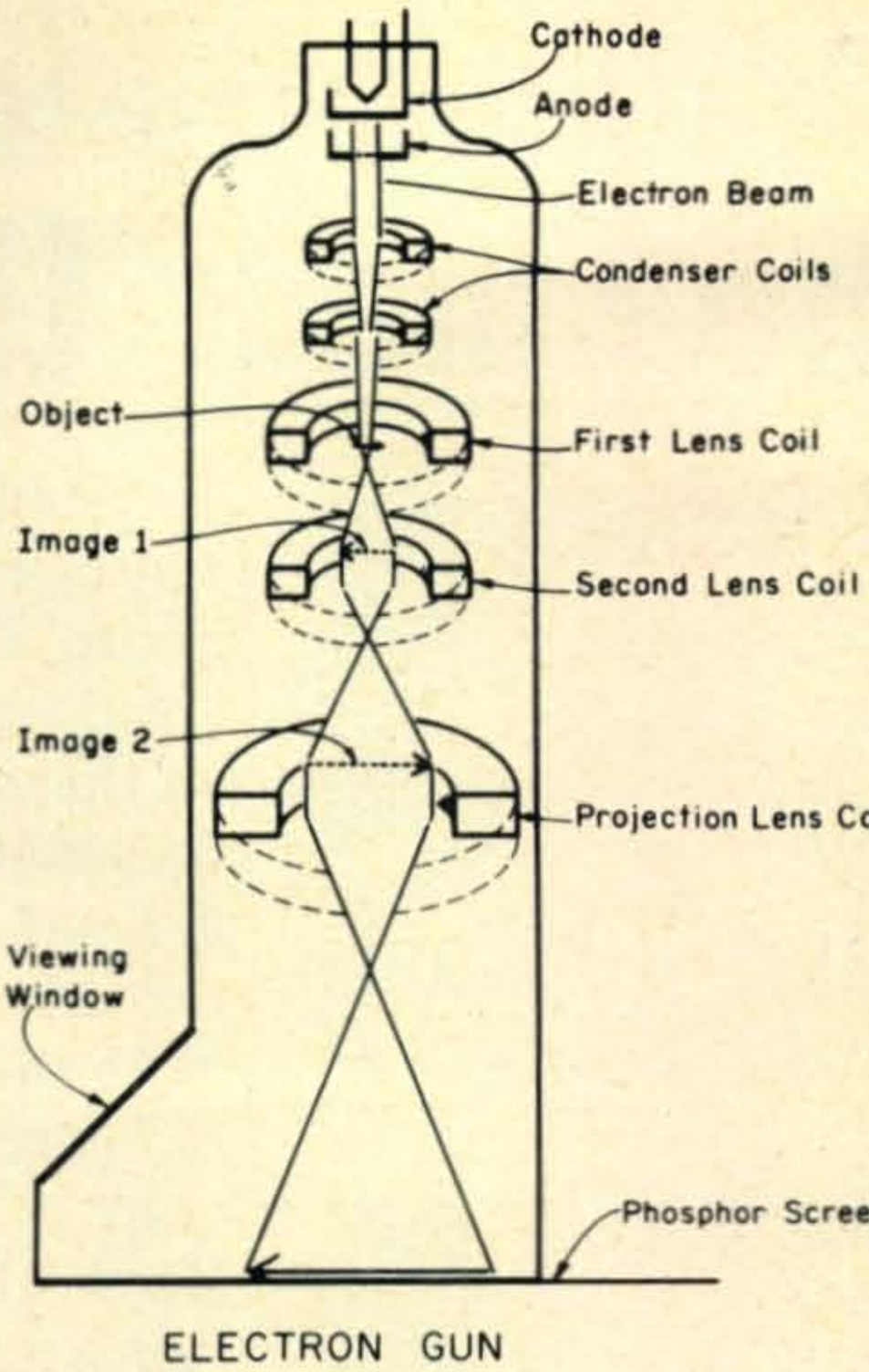

Fig. 7—Basic construction of an electron microscope.

Image Intensifier

Also worth mentioning, is a device now coming into widespread use as an additional to the electron microscope. This is the image intensifier, or light amplifier. (One version of light amplifier, in use in Vietnam, enables a soldier to see the enemy by starlight.) To use an image intensifier with an electron microscope, the phosphor screen is replaced with a screen coated with a far more powerful phosphor. The image from this new screen is focused through an optical lens onto a photo-emissive surface. This surface emits electrons proportionally to the amount of light striking it. In other words, it emits a complete electron image. Opposite the photo-emissive surface there is an anode plate, coated with phosphor. The anode plate is transparent. A high positive voltage is applied to this plate. The electron image, greatly accelerated, is attracted to the anode plate where it excites the phosphor and causes a brilliant image, greatly increased in brightness over the original image.

The new image is then fed, through a system of fiber optics, into a TV camera, and then reproduced on as many TV screens as desired. Except for the television system, which is only an accessory, and for the circuits which control and stabilize the lens currents, the electron microscope uses no electronics such as the average radio ham knows. We often get so smug and wrapped up in our hobby that we forget, or never become aware of the many other exotic ways in which the electron works for us. ■

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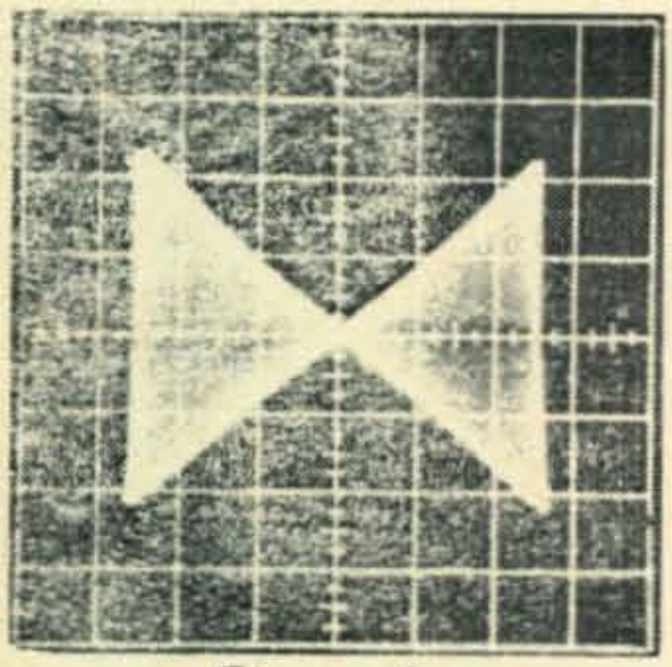

Figure A

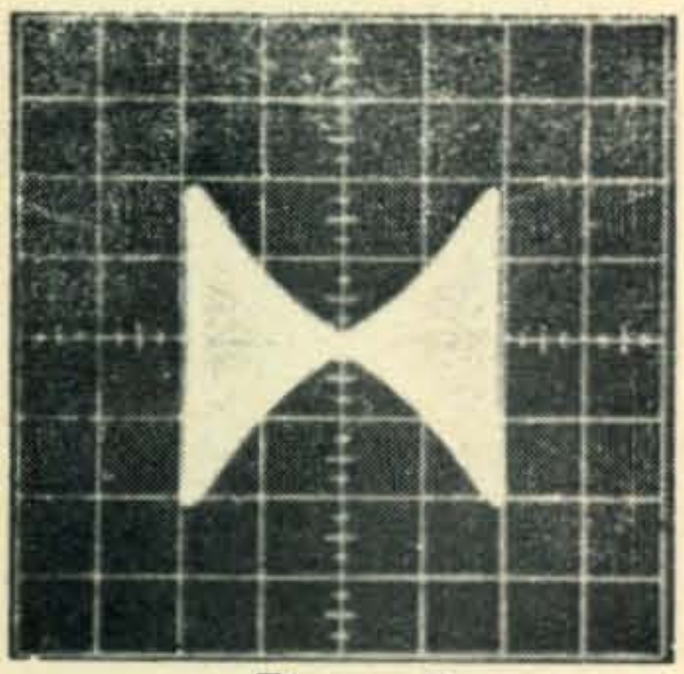

Figure B

All amplifiers for SSB operation are called linear amplifiers. Frankly most of them are "so-called" linear. One amplifier, the 2K-3, stands out as a linear linear. You've heard the clean, sharp signals on the air. They shout "LINEAR LINEAR".

As proof, study the oscilloscope displays published in a national amateur publication which reviewed the 2K in comparison with competitive amplifiers. Note the 2K's classic straight slope bow-tie pattern in figure A as compared with the non-linear curvature of the competitive amplifier in figure B. Remember...the curvature of figure B means "splatter" on the band. Remember...the straight lines in figure A are the sharp, clean signals of the 2K-3.

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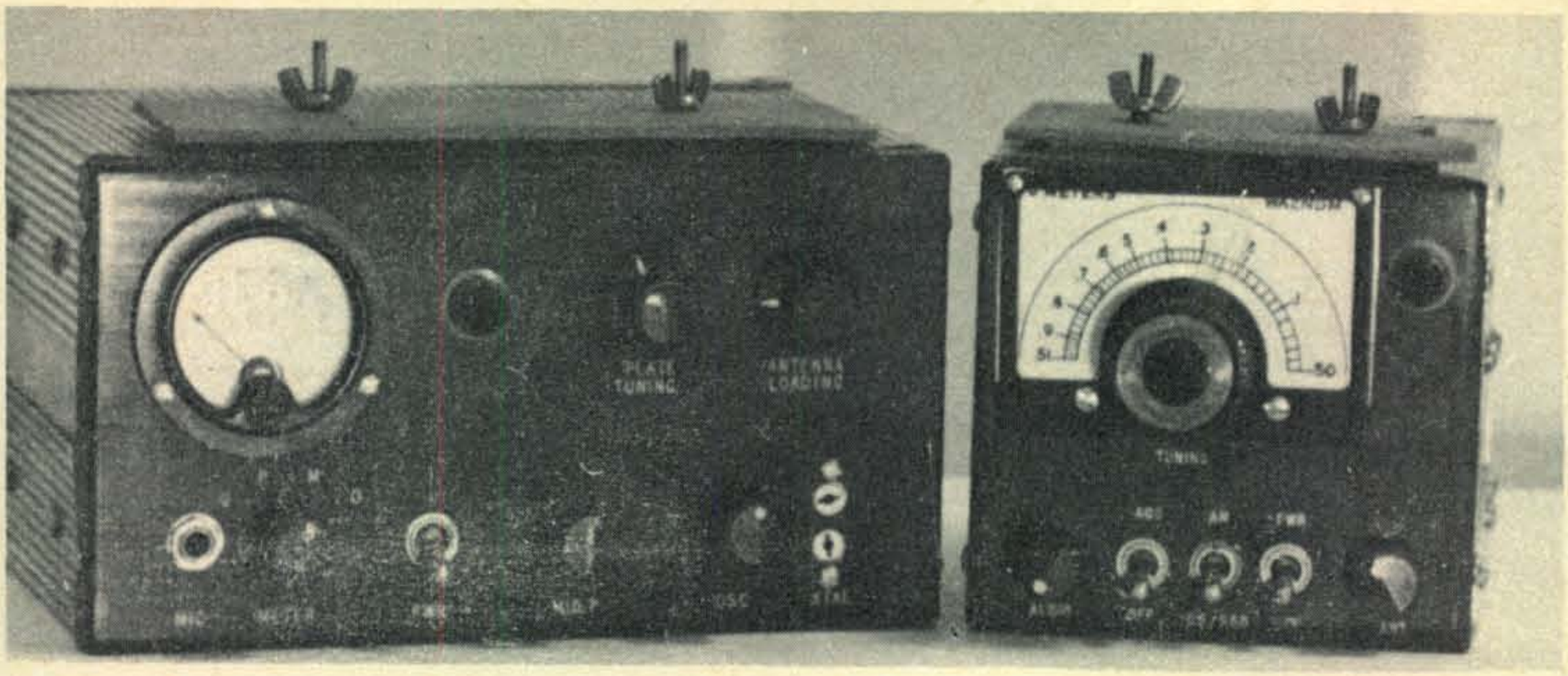

BUILD A COMPLETE 6 METER STATION

BY IRWIN MATH,* WA2NDM

Part II

IN THE first installment of this article on the construction of a six meter station, the power supply (for fixed or mobile operation) was built and tested after which the tunable i.f. portion of the receiver was constructed and tested. Part II, below, covers the alignment of the tunable i.f., construction and testing of the six meter converter and construction and testing of the transmitter.

Tunable I.F. Amp Alignment

All controls should first be set in the following positions: VOLUME CONTROL—maximum; AVC switch—OFF; AM/CW-SSB switch—AM; and the tuning dial in any position. Now the oscillator must be disabled. This is most easily accomplished by shorting the oscillator section of the variable capacitor with a clip lead.

At this point the signal generator should be set to a modulated output of 455 kc and connected through a 0.05 mf capacitor to pin 7 of V_3. Also connect the v.o.m., set on a high a.c. range, to pin 5 of V_7 (through a 0.1 mf 600 volt capacitor) and ground. Apply power and allow the signal generator and receiver to warm up for at least 15 minutes. Each i.f. transformer should then be adjusted for maximum response as heard from the speaker or read on the meter. As each section of the i.f. transformers is brought into tune, the output of the signal generator should be reduced so that a.c. readings on the meter do not exceed 25-30 v.a.c. When all of the transformers have been peaked, the i.f. alignment is completed.

Remove the short from the oscillator tuning capacitor and replace the 0.1 mf signal generator coupling capacitor with one of 100 mmf. Set the tuning dial to maximum capacity and the signal generator to 550 kc. Adjust the slug in the oscillator coil until the signal is received. Now turn the tuning capacitor to minimum capacity and adjust the signal generator to 1.5 mc. This time vary the oscillator trimmer capacitor on the side of the main tuning capacitor until the signal is again received. Repeat these two steps

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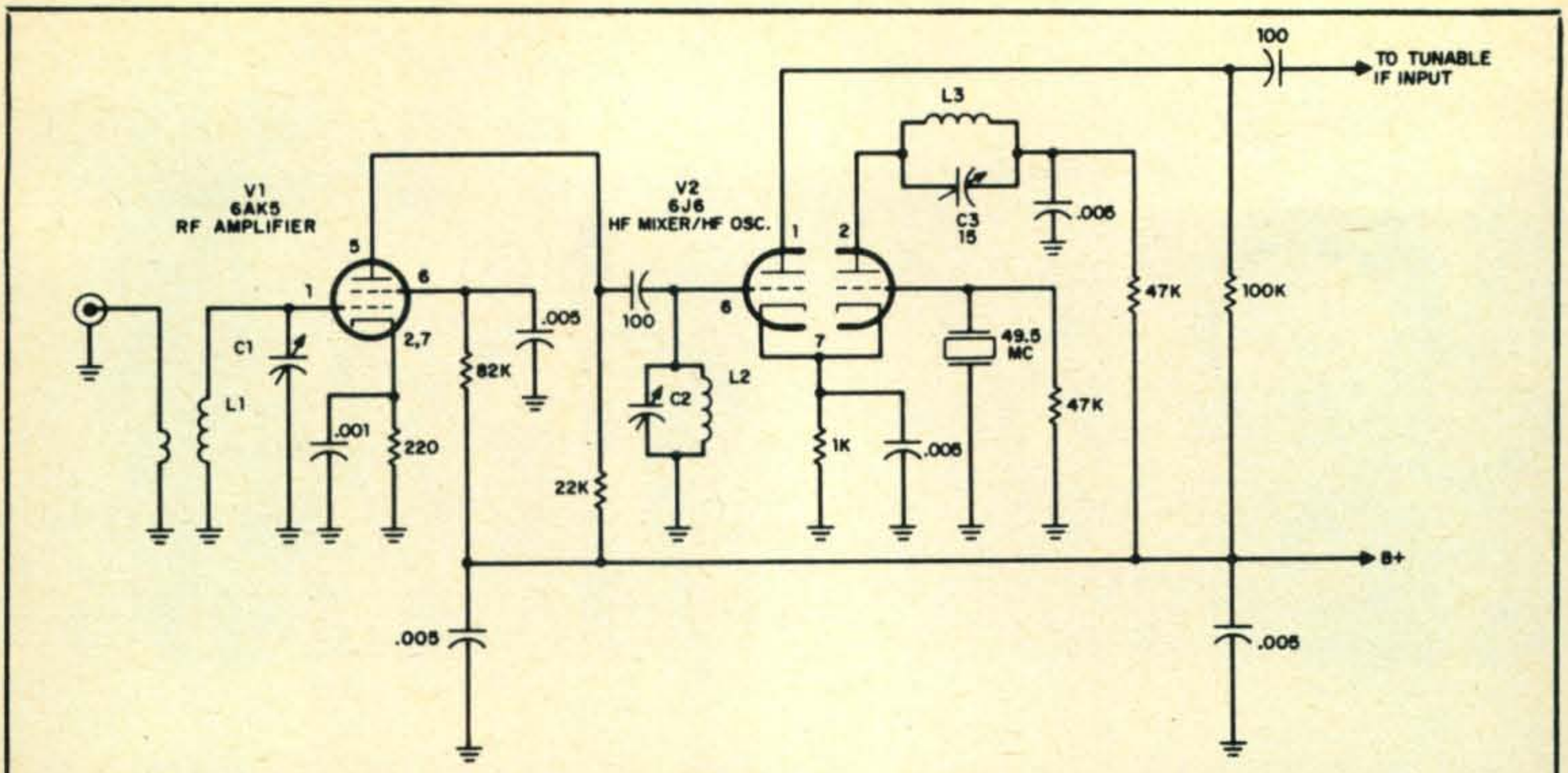

Fig. 9—Circuit of the front end of the 6 meter receiver. The layout of this unit was shown in fig. 7 of Part I. All resistors are 1/2 watt and all capacitors greater than one are in mmf while values less than one are in mf.

C_1—Antenna trimmer, 15 mmf APC type.
C_2, C_3—Trimmer, piston type, 3-15 mmf.
L_1—10t #30 e., 3/16" dia., close wound with a 2 turn primary link on the cold end.
L_2—12t. #30 e., 3/16" dia., close wound.
L_3—13t. #30 e., 3/16" dia., close wound.
Y_2—49.5 mc crystal.

until the signal generator can be received at both ends of the capacitor's range without adjusting either the trimmer or slug. The range does not have to be exactly 550 kc to 1.5 mc; a range of within ±10% of these values is satisfactory.

The same procedure should be followed with the mixer coil (L_4) and its capacitor section. Be sure to remember to adjust the coil at the low frequency end and the trimmer at the high frequency end. When this is all completed, 75% of the receiver is finished.

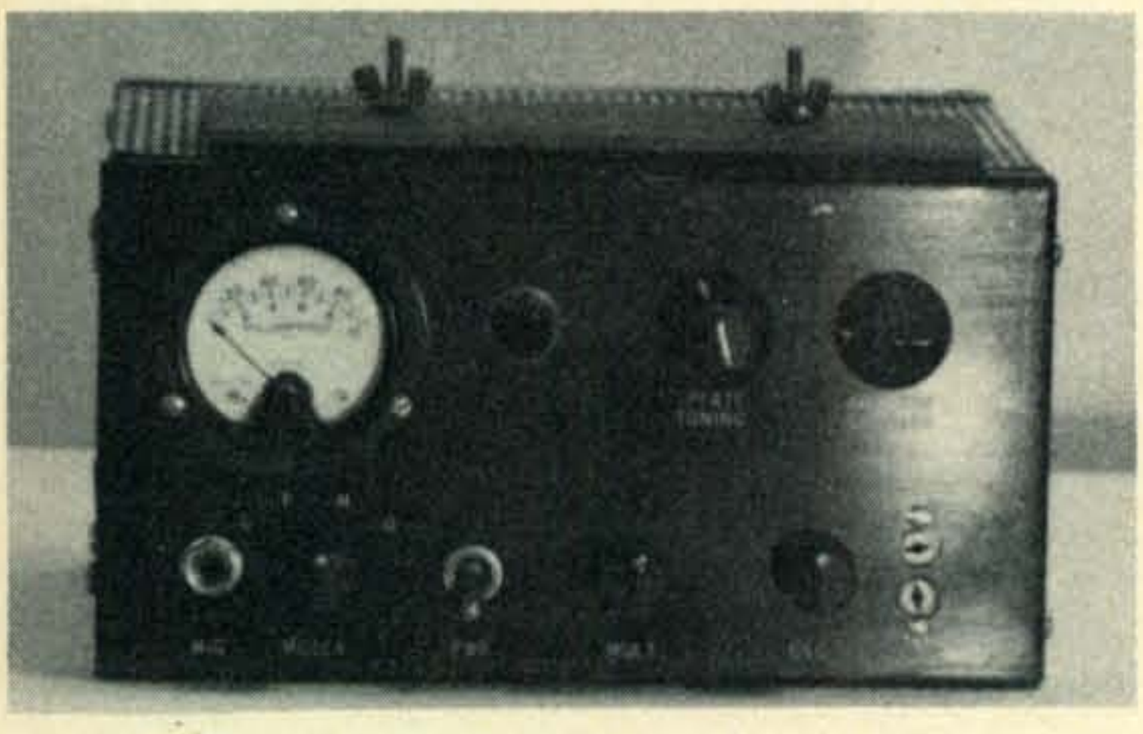

Fig. 10—Front view of the 6 meter transmitter capable of 20 watts input with a self contained modulator. The controls along the bottom row are, from left to right, Meter Switch, Power Switch, Multiplier Tuning, Oscillator Tuning. The two controls on top are Final Plate Tuning and Antenna Loading.

The second half of the 12AX7 (V_6B) can now be tested. Set the signal generator to 1 mc (or any other convenient frequency within the tuning range) and turn off the internal modulation. The carrier of the generator should be then tuned in and the variable capacitor rocked back and forth until peak response is obtained. Now switch the AM/CW-SSB switch to the CW-SSB position. A whistle should be heard from the speaker. Varying the 7-45 mmf trimmer associated with V_6B should cause this whistle to vary in pitch. If this is the case, all is OK. Later when S.S.B. signals are received this capacitor can be adjusted so that the oscillator output can be "inserted" as an artificial carrier and the S.S.B. signal easily received and understood. When receiving unmodulated C.W. signals, they will beat against the oscillator signal and produce a clear tone.

Front End

Now, the final stages of construction have arrived. Stages V_1 and V_2 should be wired, following the photograph and schematic (fig. 9) closely. (The filament circuit was wired

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earlier.) These two tubes are the ones that convert the incoming 6 meter signals to the 550 kc- 1.5 mc range. Tube V_1 is a low noise, tuned pentode, r.f. amplifier while V_2 is a triode mixer and V_2 , a crystal controlled oscillator.

Incoming signals are selected and amplified by V_1 and the tuned circuits formed by L_1, C_1, L_2 and C_2. The response of L_2, C_2 is such that 50-51 mc signals are equally amplified while L_1 C_1 offers some measure of selectivity. In the completed receiver when a signal is received, it will be peaked with C_1, the ANTENNA TRIMMER. Stage V_2 converts the 6 meter signal by mixing it with the 49.5 mc signal produced in its other half. While there is no actual connection between the two halves of the 6J6, the ocillator signal reaches the mixer section by coupling through the interelectrode capacitance of the tube. The difference frequency in the plate of the mixer is then selected by L_1 and C_1A in the tunable i.f. system shown in Part I.

After wiring this circuit, power should be applied. After a short warm up time, a loud hiss should issue from the speaker. If no hiss is heard from the speaker adjust C_3 until this occurs. Removing the crystal, Y_2, should immediately stop the hiss. Now a 6 meter antenna can be attached to the receiver and signals should be received quite easily. The dial is ready for calibration and this can be done either by signals received or the signal generator. The receiver is now complete. All that is left is to install it in its cabinet and begin to think about building the transmitter.

Transmitter

The transmitter, a front view of which is shown in fig. 10, is a conservatively designed unit capable of running up to 20 watts input to the final. Straightforward A.M. operation is employed and tune up is neither complicated or tricky. Figure 11 is a block diagram of the transmitter while fig. 13 and 14 are top and bottom views of the chassis.

A 5763 pentode is first employed as an 8.33 mc crystal oscillator while triples its oscillating frequency to 25 mc in its plate circuit. This 25 mc output drives another 5763 operating as a Class C doubler. The 50 mc energy thus produced is sufficient to drive a 2E26 Class C final to full output.

A 12AX7 amplifies the audio produced by the microphone to a sufficient level to drive a 6N7 dual triode modulator which in turn

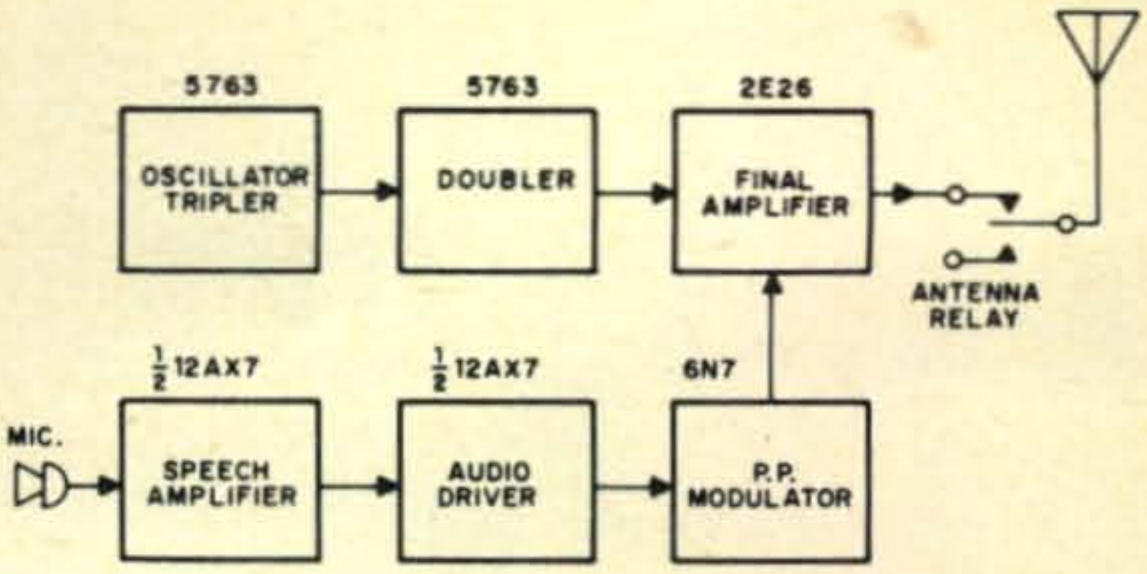

Fig. 11—Block diagram of the transmitter.

plate modulates the 2E26. The result, is a high quality 6 meter signal with a percentage of modulation capability of 90-100%.

Construction

As was done with the receiver, the construction procedure will be to work from the oscillator stage to the output stage, explaining and building as we go along. Also, exact mechanical details are omitted because of differences in size of components; however, it is again recommended that the photos and tube layout of figs 12 and 13 be followed closely.

With the chassis punched and major components such as tube sockets, switches, terminal strips and shields mounted, all of the heaters, pilot lamp, and power connectors should be wired first. Then, the antenna changeover relay should be mounted, and the B plus leads connected.

Actual wiring will start with the modulator. Referring to fig. 14, the transmitter's

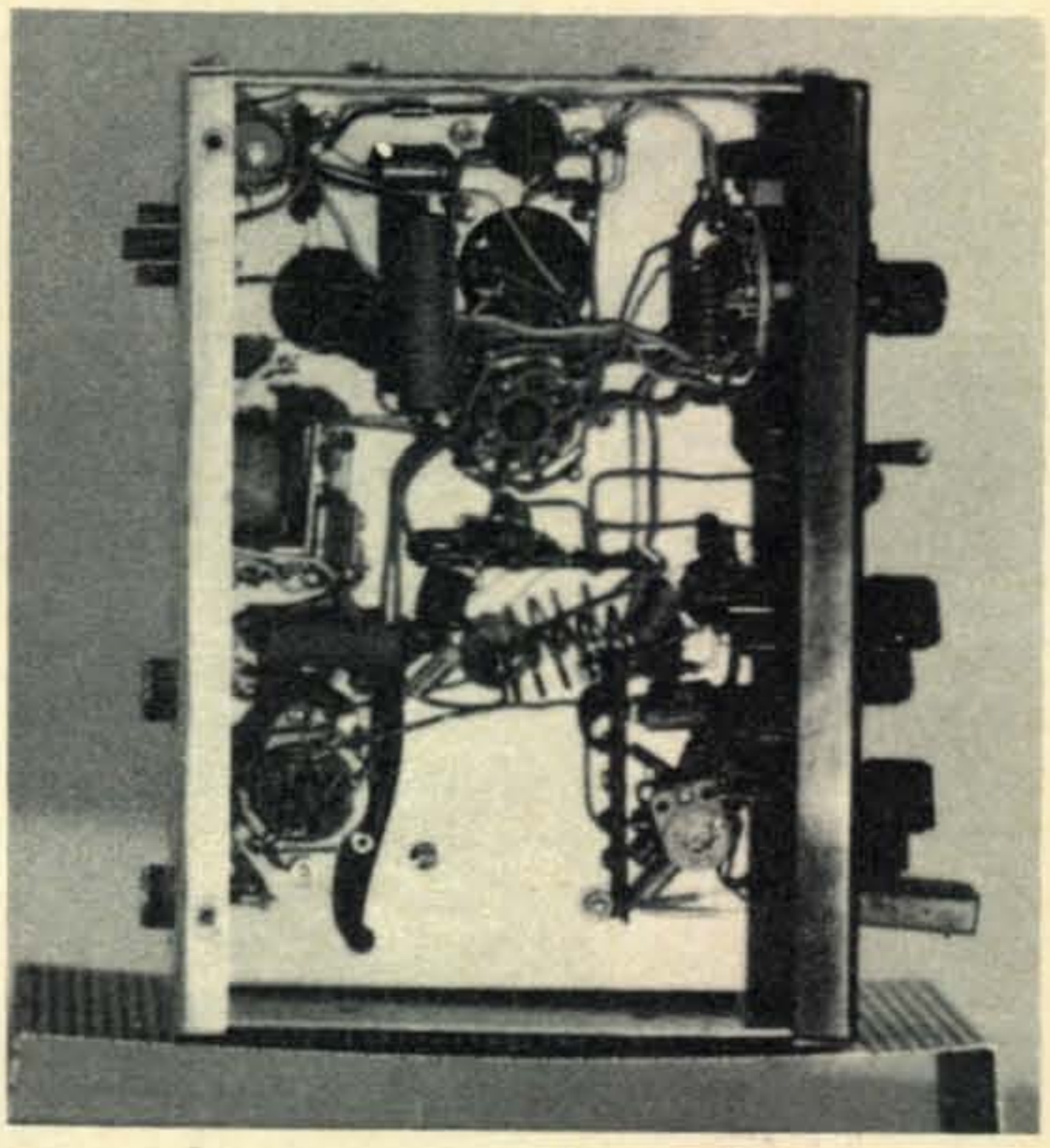

Fig. 12—Bottom view of the transmitter chassis.

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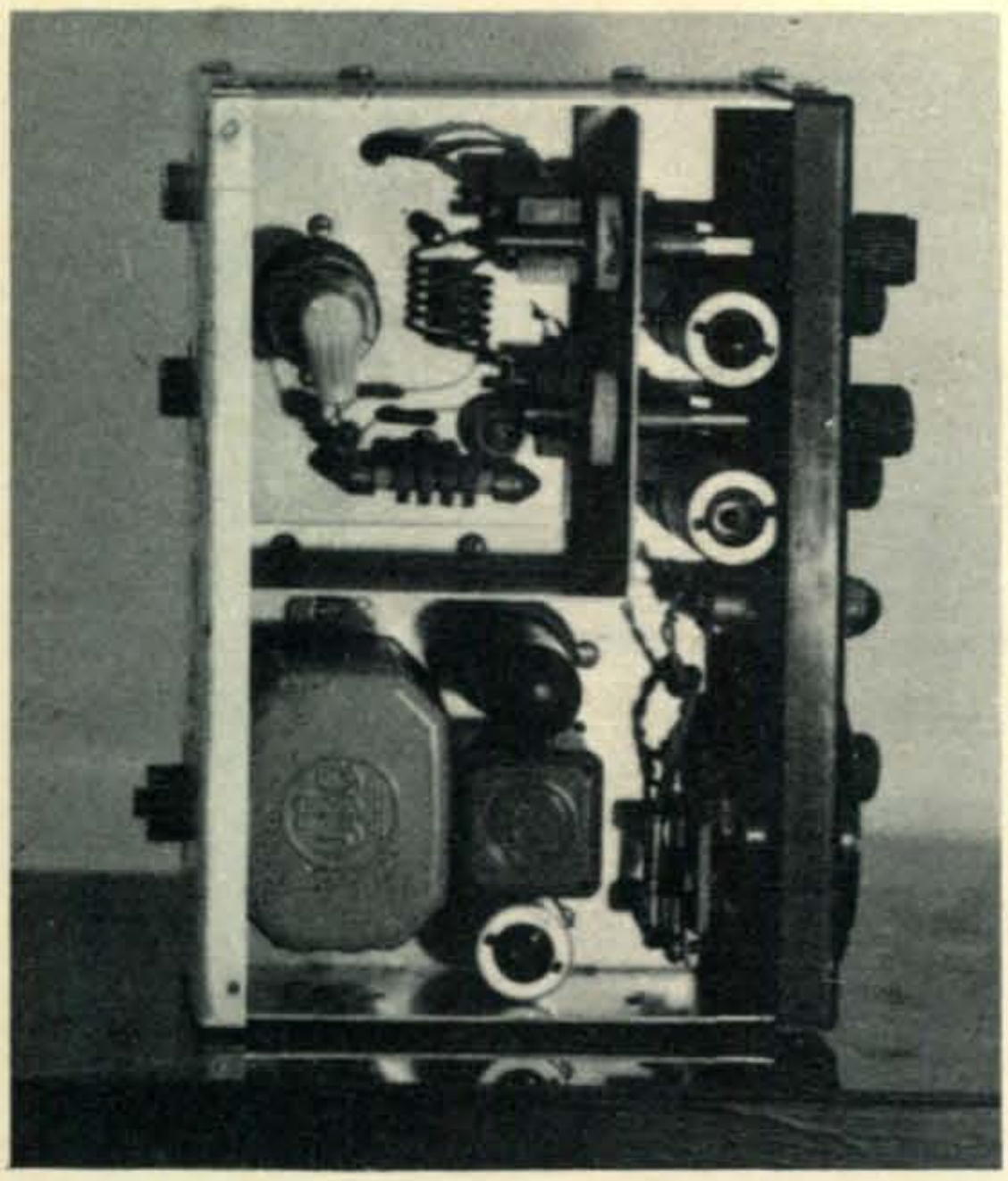

Fig. 13—Top view of the transmitter chassis. The final is enclosed by a shield while the oscillator and doubler, just in front of the enclosure, are shielded individually. The modulator and speech amplifier occupy the remaining space.

schematic, the entire 12AX7 stage should be wired and the driver transformer mounted. These two stages serve to amplify the output of the carbon microphone to a level adequate for driving the 6N7. The first half of the 12AX7 is a grounded grid amplifier with the microphone in the cathode circuit. Since a carbon microphone is basically a variable resistance device, as one speaks into the microphone, its resistance varies at an audio rate and in turn varies the bias of the tube.

The second stage simply amplifies the signal further. When the stage is wired, a microphone with a s.p.s.t. push to talk switch should be plugged into the microphone connector and the tube installed in its socket and power applied to the stage. This should light the 12AX7 filament and pilot lamp. Pressing the push-to-talk button should now activate the antenna relay. By connecting a pair of earphones across the full secondary of the driver transformer and speaking into the microphone, the operation of the driver can be checked. Once everything is working, the power can be removed and the 6N7 stage wired. This stage is a simple class B push-pull amplifier, the output of which varies the B plus of the r.f. output stage at an audio rate.

The meter shunt resistor used will vary in value with the meter used. It should be chosen to give a full scale sensitivity of 100 ma.

Testing of this stage will be put off until the final is wired.

We can now proceed to the wiring of the r.f. sections. The oscillator should be wired first. This stage is a conventional tuned grid-tuned plate oscillator. The grid is "tuned" by the crystal and the plate circuit is tuned to the third harmonic of the crystal. It will be noted that shunt feed is used in the plate circuit. This was done to allow the variable capacitor rotor to be grounded to the chassis. A 7-45 mmf variable capacitor is also included to control drive to the crystal. This oscillator will work most efficiently with crystals in the range of 8.33-9 mc giving an output frequency of 25-27 mc. Crystals in the range of 6.25-6.75mc can be used, but in that case the oscillator would have to quadruple the output and the results obtained may not be as good.

After the wiring is completed, the oscillator and multiplier 5763's should be installed in their respective sockets, and a crystal plugged in. A simple tune-up lamp, as shown in fig. 15, should be placed so that its coil meshes with the oscillator tank coil and power applied to the transmitter. Then the microphone button should be pressed and held in for the duration of the test. Tuning the oscillator tank capacitor should cause the tune-up lamp to light at some point in the capacitors range. The 45 mmf trimmer should now be adjusted so that minimum brightness occurs.

With the oscillator working properly, we can now proceed to the multiplier. This stage amplifies and converts the 25-27 mc signal of the oscillator to 50-54 mc and a level sufficient to drive the final. Pi-type coupling is used between this stage and the final to assure a good match while minimizing any tendency to self-oscillate. When wiring this stage, follow the photograph carefully as the frequencies involved are high and excessive lead lengths can cause trouble.

At this point it would be also wise to wire the input of the final. This will allow the use of the panel meter for adjustment of the multiplier stage. (In this position, the meter range will be about 0-10 ma). When everything is complete, apply power. Tuning the multiplier tuning capacitor should cause a reading on the panel meter. Adjust the capacitor for maximum current, and then re-

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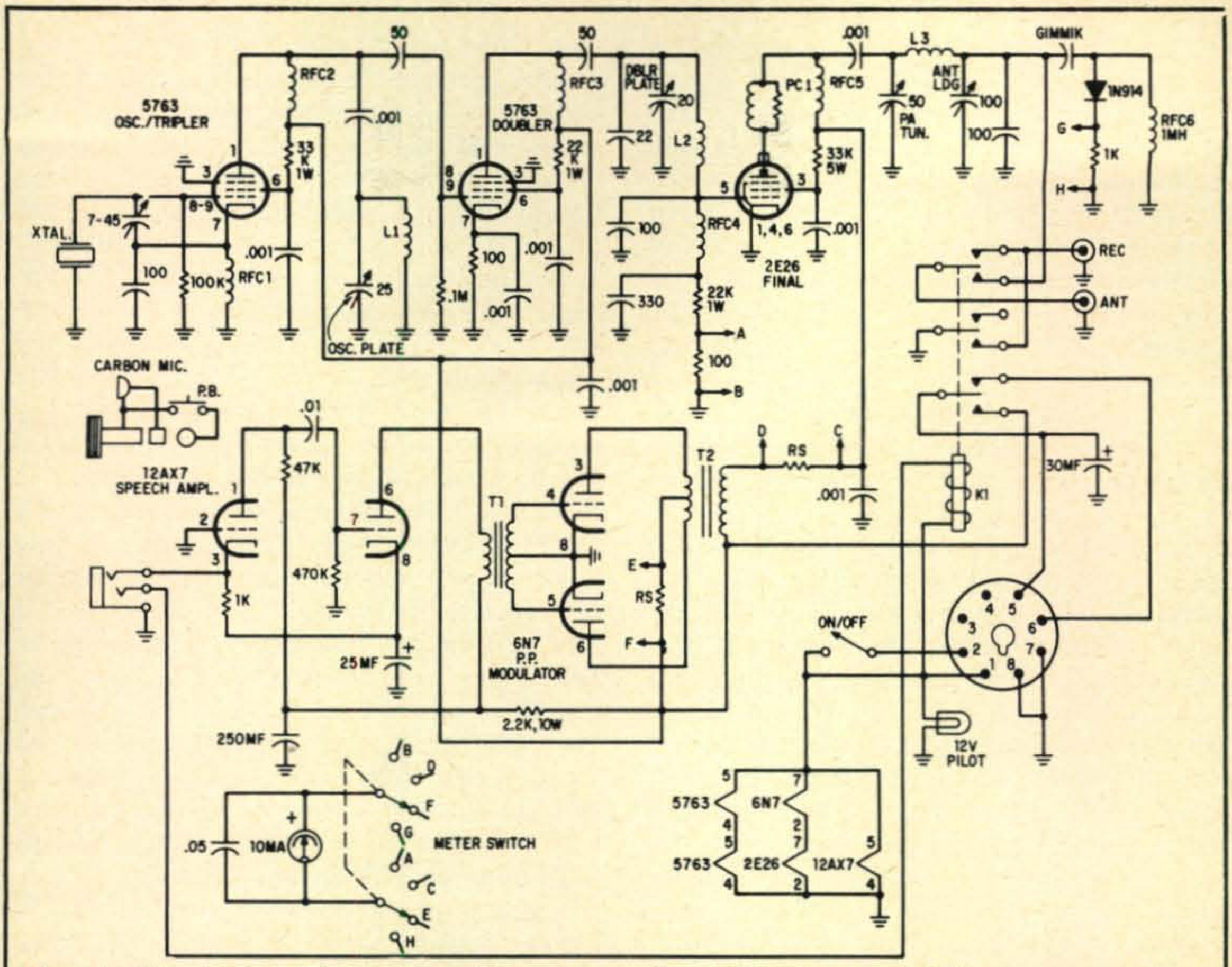

Fig. 14—Circuit of the 20 watt a.m. 6 meter transmitter. All resistors are 1/2 watt except where otherwise noted. Capacitor values one or greater are in mmf; values less than one are in mf except where otherwise noted. The gimmik capacitor is described in the text.

K_1—3 p.d.t. 12 v.d.c. relay. Potter Brumfield KA14DY or equiv.

L_1—12t #20 1" dia., 1" to 1½" long varied to center the capacitor tuning range.

L_2—6t #18 1/2" dia., 1½" to 2" long varied to center the capacitor tuning range.

L_3—6t #12, 1/2" dia., 1½" to 2" long varied to center the p.a. tuning capacitor range.

PC_1—See text.

R_S—Handwound nichrome shunt; 0.3 ohms for a 10 ma 3 ohm movement.

RCF_1—2.5 mh.

RFC_2—680 microh. Miller 684A1 or equiv. (1 mh will also do.)

RFC_3—10 microh. Miller 9310-36 or equiv.

RCF_4, RFC_5, RFC_6—1 mh National R50 or equiv.

T_1—P.p. input transformer UTC 311 or equiv.

T_2 — Modulation transformer UTC 318 or equiv.

adjust the oscillator capacitor for maximum current and good stability. (Be sure the crystal kicks over when keyed). When both capacitors are peaked, the final can be wired.

The final amplifier is a class C power amplifier with a wire-range pi-network type output circuit allowing it to be used with a wide range of antennas. Design and operation are straightforward and, with the exception of a simple parasitic supressor in the plate, no measures are necessary to prevent self ocillation or spurious signal generation. As in the multiplier section, wiring should follow the photographs closely. Also be sure that all grounds are well made and properly soldered.

The shunt for the meter in this circuit is one which will give a full scale sensitvity of

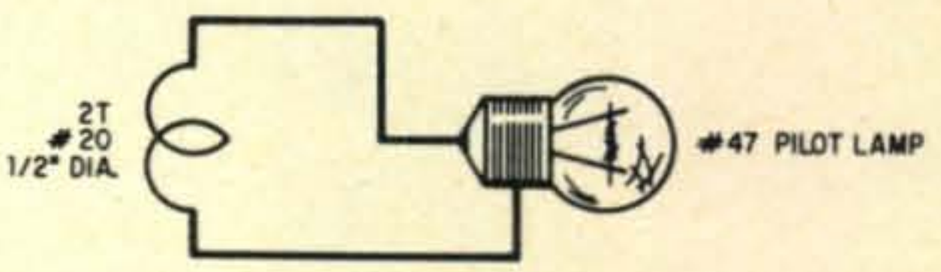

Fig. 15 — Tune-up lamp used for transmitter alignment.

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100 ma. It is the same value as the one in the modulator.

The gimmick capacitor for output indicator consists of a few turns of wire wound around the r.f. lead from the loading capacitor to the antenna relay. The exact number of turns will be determined by how much of a meter indication is desired. Also, the parasitic supressor consists of 3 turns of #20 enamelled wound on a 100 ohm 1 watt resistor.

At this point, the entire transmitter should be completed. Plug in all tubes, an 8.33-9 mc crystal, the microphone, connect a dummy load (a 25 watt lamp may be used) to the antenna connector and apply power. Switch the meter to read grid current of the final, press the microphone button, and tune the oscillator and multiplier stages to get at least 3 ma of grid current. Now switch to final plate current and adjust the 50 mmf plate tuning capacitor for a dip in plate current. At this point the lamp should glow dimly. By alternately adjusting the tuning and loading capacitors, a point should be reached where about 50 ma is being drawn by the final and the lamp is somewhere near its brightest point. Now whistle into the microphone. The lamp should increase in brightness. Switch the meter to read modulator plate current and speak into the microphone. The current should vary with each word and the lamp should flicker noticeably. Meter "kicks" of 60 to 80 ma indicate proper modulation. When this occurs, the transmitter is completed. All that now remains is to recheck all wiring and solder joints and mount the chassis in its case.

Any six meter antenna from a simple 1/4 wave whip to an elaborate multi-element beam can be used with this station. Of course, the more elaborate the antenna, the greater the communication range. With a three ring halo however, in a mobile installation the author can consistently work 25-35 miles in the N.Y.C. area and 30-60 miles in the suburbs. When the band opens however, anything goes. The best DX from the mobile has been New Orleans, La. from a suburban N.Y. City location and from a fixed location with a 3 element beam, Los Angeles has been worked with no difficulty. Best of all however, is the realization that when any stations are contacted, it is all on "home brew" equipment. ■

THE PROP(P)ER THING TO DO

DURING her whirl-wind tour of the U.S. in July, Sylvia Margolis, *CQ*'s proper British lady writer was a house-guest at a proper U.S. family, the Proppers of Oceanside, Long Island. The bottom view shows Sylvia at the rig of David Propper, WB2PMP, and the view to the right has Sylvia autographing David's cast. He broke his leg participating in this year's Field Day exercises. ■

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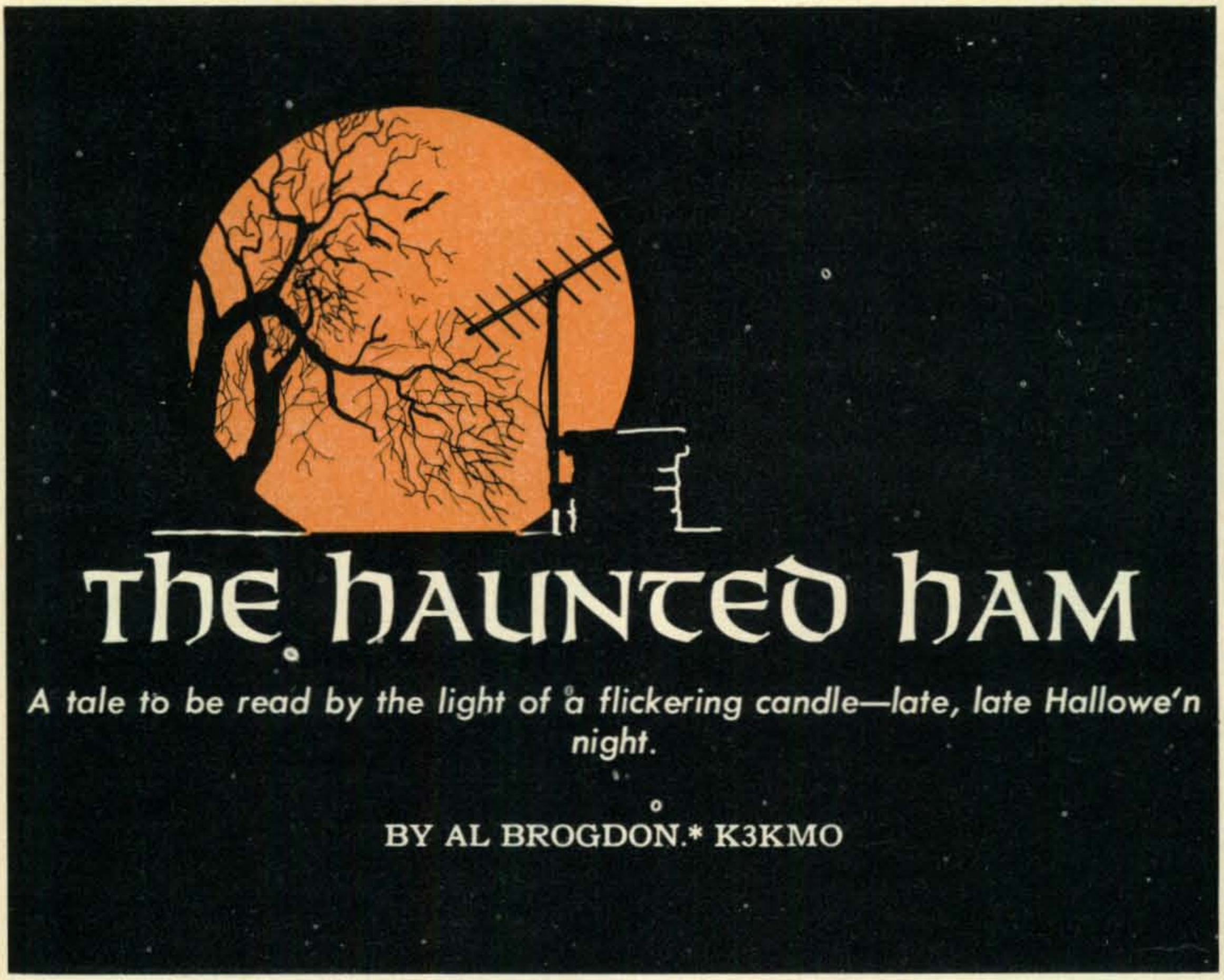

THE HAUNTED HAM

A tale to be read by the light of a flickering candle—late, late Hallowe'n night.

BY AL BROGDON.* K3KMO

You may find this story to be quite strange; but then again, hams are acustomed to strange goings-on. Fitting the different parts of the story together has been difficult, and it isn't quite complete yet. But a large number of hams (especially the DX'ers) have heard about certain strange goings-on on our amateur bands in the recent past, and have been curious to learn the details. Therefore, it is felt that the story should be presented, incomplete as it is.

It all started out in Missouri with well-known DX'er, WØDU. Ray is reluctant to talk about it, and it took quite a bit of questioning to draw him out and get him to tell the way it first came about. It seems that a little old lady moved in next door to him. She was a strange sort who kept in her house most of the time, with the curtains closed night and day. She apparently didn't want to socialize with the neighbors, keeping to herself and her cats (she had at least a dozen, all coal black).

After being there a few days, she came storming over to Ray's house one evening and complained that he was causing TVI, really giving him the devil for it. Well, Ray started in his usual TVI pitch very courteously and patiently, and explained how his transmitter was of good engineering design, and that he didn't cause TVI to any of his own TV sets, *etc.*

The old lady wouldn't accept his explanations, so finally Ray asked if he could see the lady's TV set. She agreed, and they went to her house. When Ray saw her set, it was quite apparent to him that the fault must be in her TV. It looked (as Ray put it) as if it had been built in the middle ages. So Ray again explained that it would be best for the lady to call in a TV repairman to confirm what he was telling her and to install a good high-pass filter to try for a quick cure.

At this point in telling the story, Ray began to act a little ill at ease and seems even yet to be a little confused about exactly what happened. To the best of his recollection, the lady really lost her temper at this time and told Ray she would "fix" his transmitter so it wouldn't cause any more interference, and showed him unceremoniously to the door.

*RD 1 Box 390A, State College, Pa. 16801.

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By this time, Ray was certain she was a little on the balmy side. After all, she wore those strange, old-fashioned looking long black dresses all the time and her house smelled funny, with incense and all kinds of strange cooking odors. He had never seen an uglier woman in his life. But he didn't think too much more about it as he went home. By this time it was pretty late, and the bands were closing down anyway, so Ray gave up on hamming for the evening and pulled the big switch.

The next evening, he had just about finished his preparations for the *CQ* World Wide DX Contest which would be coming up the following weekend, and decided to get on the air and see what was cooking. One of the first signals he ran across was Gus in a new location. Anxious to both work a new country and see that the flame-belcher was still a big gun from the midwest, he flipped the plate switch on and started a quick call.

As soon as the key was closed, the high voltage fuse blew. Taking only a quick minute to scramble in a replacement, Ray lined up behind the guy Gus was 589'ing and tried again. This time, he got halfway through Gus's call before the keying relay in his TO keyer welded closed. Ray dug into the desk drawer and got the old faithful straight key plugged in and immediately called again. Just as he got to the "de"—every light in the house went out!

Ray stumbled to the window (after suitably crushing one shin against the desk corner and uttering a few thank-yous) and looked out. The whole neighborhood had blacked out with a power failure. Except.

Except that the little old lady still had her TV on. Ray could hear the audio floating over from next-door, and could see the glow of a TV screen falling on her closed curtains. Strange.

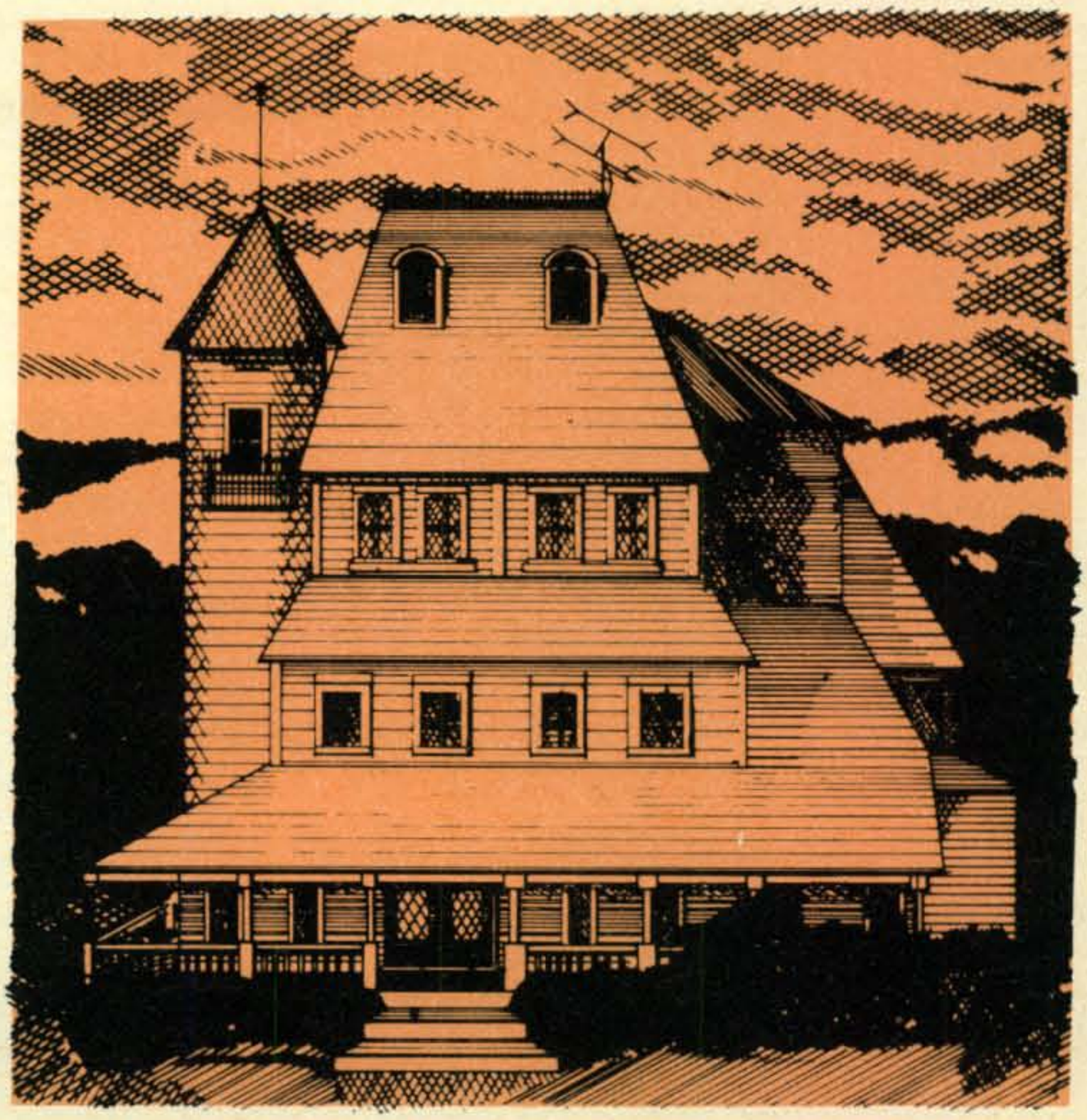
After staring a few minutes, his curiousity got the best of him, and he went next door to find out how SHE had power when no one else did. Just as he started to knock, the door was flung open in his face. Just about scared him to death to have that ugly face so suddenly and unexpectedly right in front of his, and with that black cat perched up on her shoulder, watching him in that evil way that only a cat can.

Here again, Ray fumbles for words as he tells the story. But the gist of the scene which followed was that the little old lady told Ray she had put a "hex" on his station, and he might as well never try to use it again.

For the next few days, Ray found that his run of "bad luck" continued, and he went for four days without working a single soul—even though he would get on the air every evening and try. With the Big Contest starting the next day, Ray was desperate. Of course he didn't believe in witchcraft malarky, but finally willing to try anything in such desperate circumstances, went next door one more time to see the little old lady.

He offered profuse apologies (this time ignoring whose equipment was at fault), offered to install a high-pass filter, suggested he could even observe quiet hours if everything else failed, or even pay part of the cost of a new TV set. At this, the little old lady became a little more civil toward Ray, and finally even thanked him for his offers.

Then Ray brought up the matter of the "hex" and asked if she had been serious. She said she was. Ray asked her (after pointing



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out again that he would be sure to get rid of the TVI problem) if it could be lifted. The little old lady went into a long, detailed technical explanation that Ray couldn't quite follow, but boiled down to the fact that the hex couldn't be entirely lifted, but it could be "modified."

So finally Ray talked her into "modifying" the hex. She told him that she would modify the hex so that it would be transferred to another station. Since Ray's call was WØDU, she would allow it to be passed to the first station Ray worked whose call started with "DU"–but that the hex would hold until he worked a "DU." In other words, he would have to work a "DU" before he could work anyone else. And so the hex could be passed from that station to another in a similar manner, but would never be entirely dispelled.

After thanking her and taking his leave, Ray wandered home–a little on the shaky side–and sat down at the rig. Just to test the hex and see if it was still there, he called the first station he heard (a G5) and melted the screen out of his driver tube.

Finally convinced that the little old lady must be, in fact, an Extra Class Witch, he aimed his beam at the Philippines just as the DX test got under way. After waiting for the path to open, not daring to call any of the other juicy tidbits of exotic callsigns popping in and out, there came DU7SV fading in through the other racket. A quick one-by-one call raised him with a 599 to WØDU. After completing the exchange, Ray then heard DU7SV's signal sputter and go into a raspy note before it ended rather abruptly.

Feeling just a little ashamed of himself, Ray went on and worked 50 stations in 32 zones in the next hour. As he was scanning across the band one time, he heard DU7SV calling a long CQ with no reply. One-way skip? Ray knew better! He sat and listened in morbid fascination as no one came back to DU7SV for the third CQ. Then SV1SP came on frequency calling CQ Test. DU7SV called him and made immediate contact! After a quick TNX FOR NEW MULT, SV1SP started a QRZ? and his v.f.o. started yooping across a 4 kc wide chirp. Before it went away entirely.

Then Ray lost track of the chain for the moment. He later pieced together a little more of it. It seems that SV1SP had worked SP9-UH, and then it went out of sight for a while. By this time, Ray had clued in a few other hams, being careful not to tell anybody who might think he was nuts, and we started scanning the bands looking for the tell-tale marks of the hex. The next time the chain was found, VP9CP was working CP3CN. Then it went to CN8DJ, D7CX, CX4CR, CR7OK and OK1ZL.

At this point, OK1ZL had a heck of a time before he raised ZL3OX. From there is went to OX3DL, DL8DL (who easily passed it to DL4KW on two meters after his h.f. rig went up in smoke), KW6CO, CO2FP, FP8EI, EI9F, F3OX, OX3KM, KM6CR, CR6EA and EA4CE. Then Ray lost track of the series while he was out of town for a week.

One of the PVRC'ers who had heard of the strange happenings found OK3EA with it next. Then it passed to EA9AP, who had one heck of a time before he finally worked AP5-JA. From there, it went to JA6PY, PY7VK, VK7SM, SM5XE, XE1OK, OK1VK, VK9-ZS, ZS7M and DX-peditioner M1VU.

M1VU managed to work VU2JA just before he was due to return to his home in Germany (luckily for him). From VU2JA to JA1CO, CO5CN, and CN8HB. For several nights I listened to CN8HB on his usual frequency, but he had no immediate luck. Conditions were pretty spotty at the time–expecially for the short skip he needed without knowing it.

But last night I got home from work later than usual. When I turned the rig on, the band was beginning to fade a little, but with the better signals still pushing through. This time, the affected station was on the air with a rock-crusher signal, with a gaggle of US hams calling him, and all no doubt wondering what was wrong with this guy's receiver. Little did they (or he) know. To the ones of us who knew about this hex that had been passed around the world so many times, it was obvious that the thing had taken a strange twist.

Because the one European signal that was head and shoulders above the other fluttering signals was still calling–and beginning to sound a little desperate at it–"CQ DX CQ DX CQ DX DE HBØDX HBØDX PSE PSE K..." ■

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HAVE YOU TRIED TRIACS?

BY C. A. WEST,* W2IYG

Most amateurs are familiar with the gas-filled thyratron tube used for controlling load voltages. A triac is a solid-state counterpart of the thyratron which provides circuit designers with the same features and advantages that transistors provide to those substituting transistors for tubes. Equipment can be made more compact, lighter in weight, instant starting, more reliable, and less costly.

This article describes several circuits designed around triacs which can be useful in the shack and point up the advantages of the triac in such applications. In many instances the triac circuitry can be an advantage over the more costly and bulkier Variac.

A triac, as shown in fig. 1, is basically a switch with the two terminals, *X* and *Y*, connected in series with the a.c. supply voltage and the load. The *XY* switch is closed by the gate. Voltage for the gate is obtained from a resistor-capacitor network connected to the a.c. supply voltage through the load. The value of R_1 determines the rate of rise of voltage across C_1 and, therefore, the time required for the trigger device to pass current and trigger the triac into conduction. Because the triac is a bidirectional device, switching occurs for both the negative and positive portions of the a.c. supply voltage. The R_1 phase control determines when, during any half cycle, the triac will start conduction. Figure 2 shows the relationships between a.c. supply voltage, a.c. load voltage, and voltage across the triac. In this case, R_1 has been adjusted to trigger the triac at 90° and 270°. Because of the chopped sine wave, a "true" r.m.s. type voltmeter is required to measure voltages at the load when the power in the load is being determined.

General Purpose Variable A.C. Supply

Figure 3 shows a general purpose experimental supply which utilizes the circuit board shown in fig. 4. The board is mounted on the meter terminals of an RCA WV-120A Line Monitor and supplies variable a.c. volt-

*130 Warren Avenue, Somerville, New Jersey.

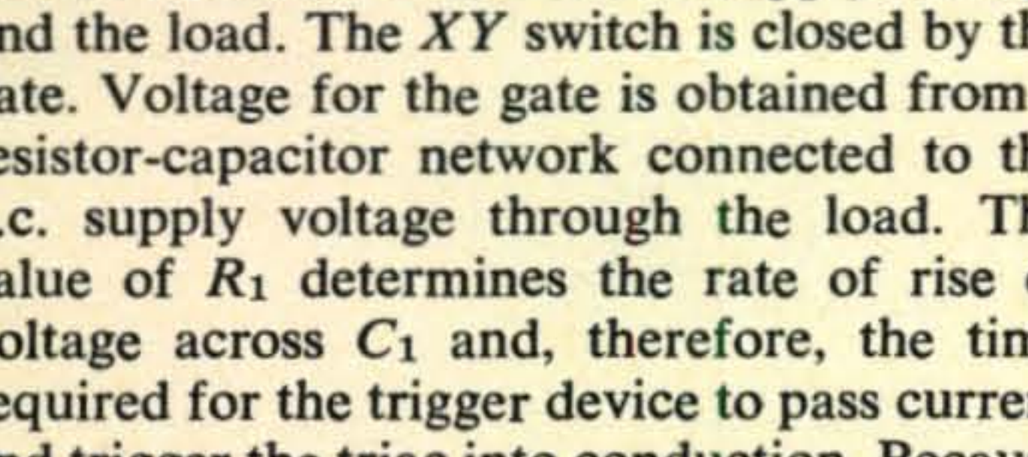

Fig. 1—Basic triac circuit used to control the a.c. voltage across the load.

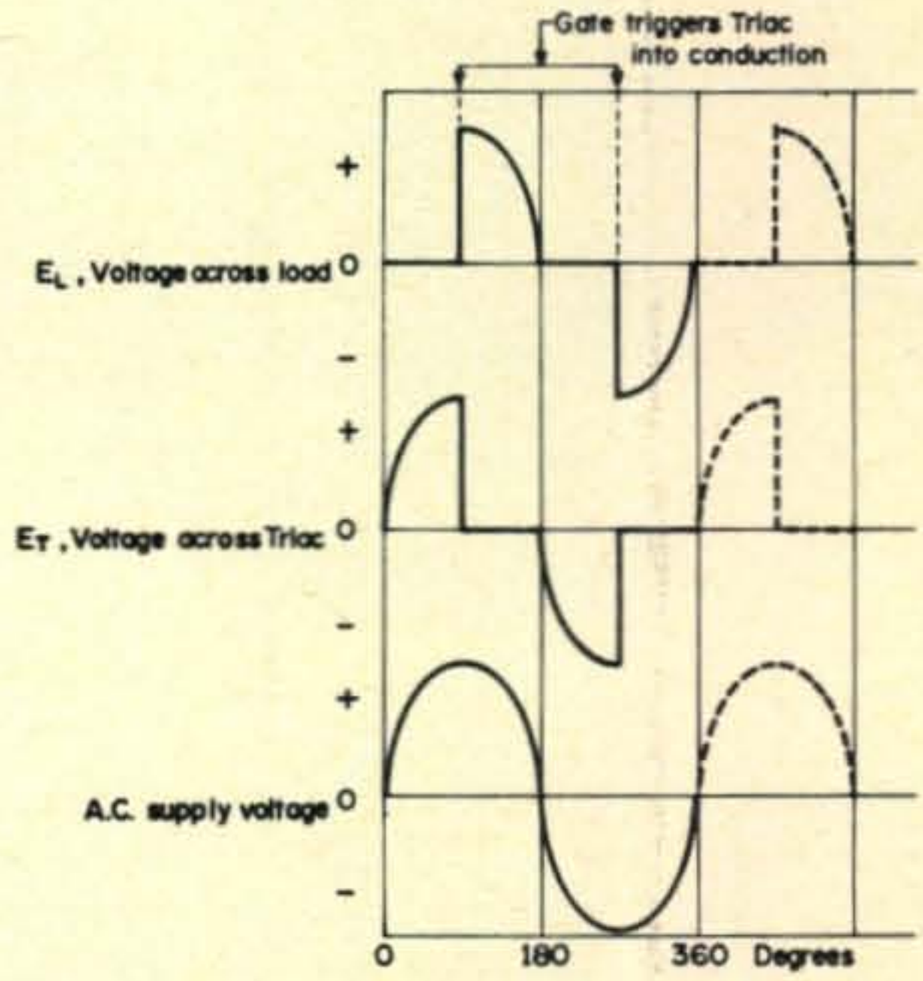

Fig. 2—Typical waveforms for the voltages in fig. 1, when R_1 is set for triggering at 90° and 270°.

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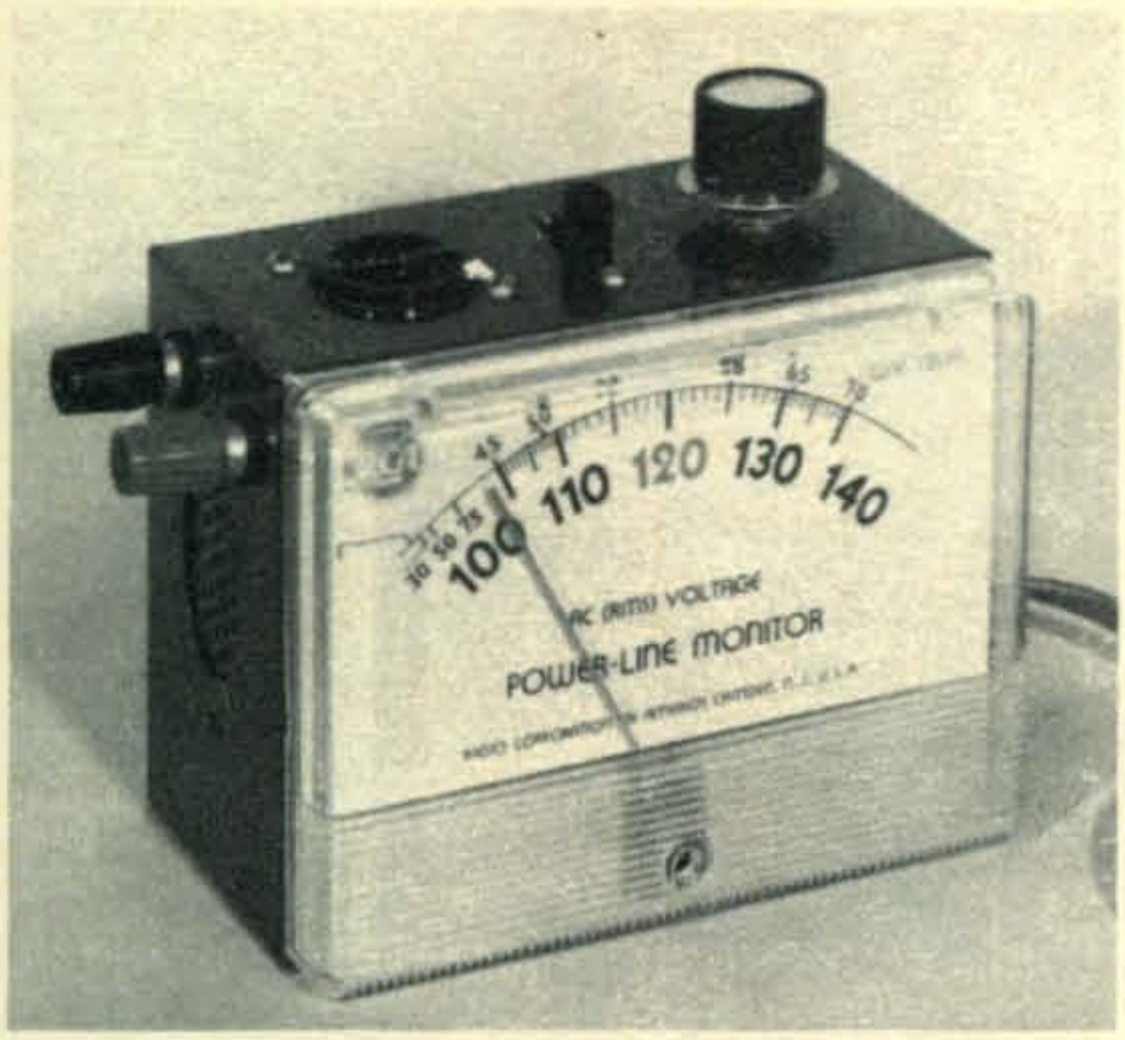

Fig. 3—A general purpose variable a.c. supply housed in an RCA WV-120A power line voltmeter. The scale is hand calibrated below 100 volts. The terminals on the side and the socket on the top provide the variable a.c. output as measured by the meter. The slide switch atop the case selects fixed or variable output. The knob is the phase control or output level.

ages down to a few volts through a line receptacle or binding posts. The meter scale was calibrated at several points below 100 volts. Some experimenting was done to lower the range of the meter but was not satisfactory. A vernier type of load-voltage control

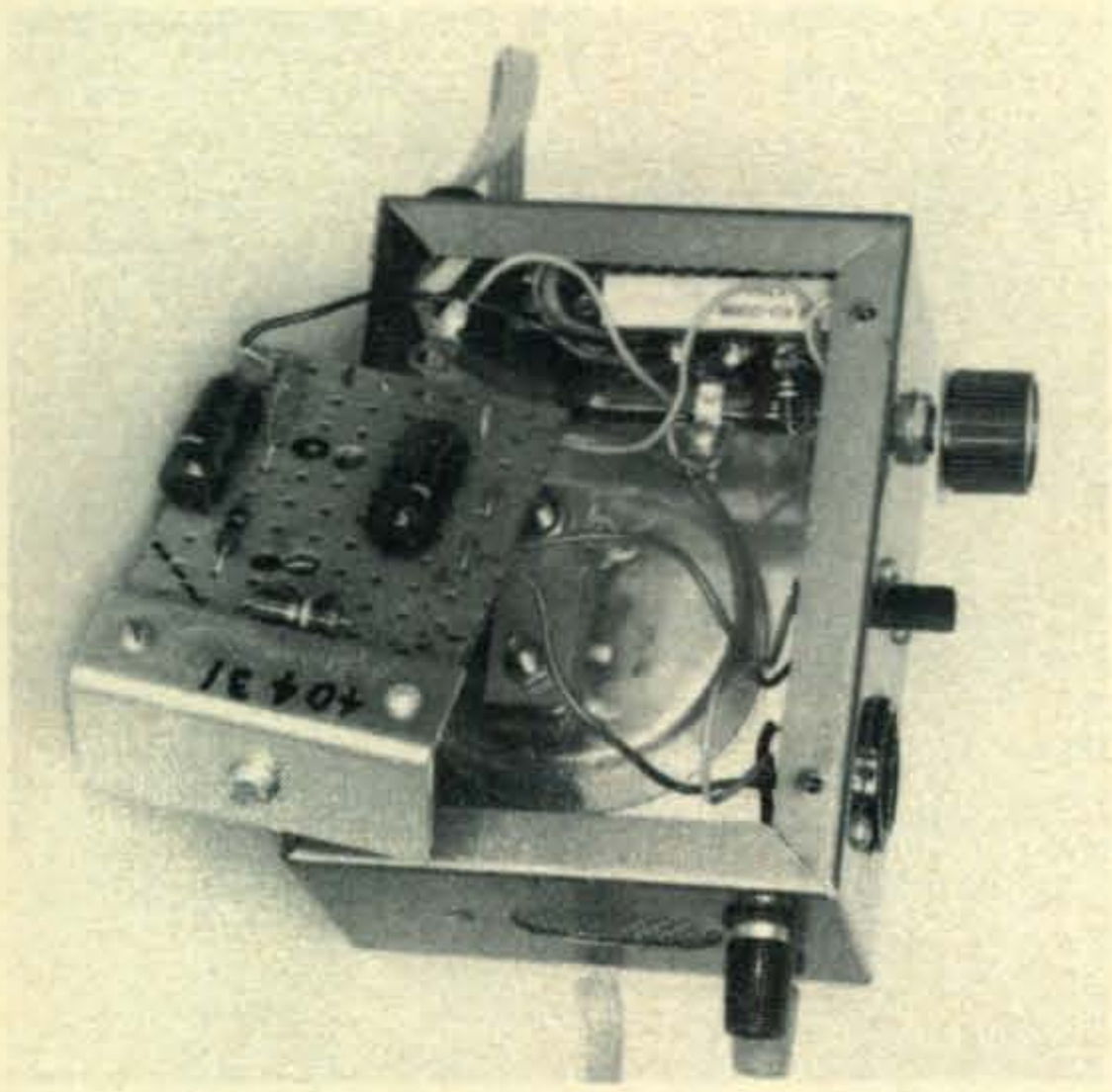

Fig. 4—Rear view of the triac operated general purpose variable a.c. supply. The triac is clamped in the heat sink and the triac circuit components are mounted on the board. The large resistors in the case were used when attempting to lower the meter range to 70 volts full scale. The arrangement was not satisfactory and the circuitry was removed.

potentiometer such as the CTS 45 series may be used to control output voltage more precisely.

Figure 5 shows two typical circuits. The circuit in fig. 5(A) uses a neon lamp for triggering, and the one in fig. 5(B) uses an integral-trigger RCA triac that contains a built-in back-to-back diode. Either basic circuit is suitable for the application. The integral-trigger triac offers the advantage of providing control of load voltage down to a few volts; the neon trigger provides control of load voltage down to about 30 volts r.m.s. The circuit of fig. 5(A) has the advantage of using the neon lamp as an indicator that the supply is on; it is also less expensive. The lamp should be mounted in a conspicuous location because light output is low.

Because there is a small voltage drop across the triac, a switch may be provided to enable the user to short out the triac circuit and apply the full line voltage across the load. The addition of a fuse and switch or circuit breaker in the line is a useful safety feature. Figure 6 shows the complete circuit arrangement of the supply shown in figs. 3 and 4, including an r.f. filter for the load and a filter for inductive loads. Figure 7 shows a suitable heat sink for the triac used in any of the circuits.

Because of the nature of the chopped waveform shown in fig. 2, noise is radiated from the line and is noticeable on an a.m. type receiver. Noise on the line decreases as the triac voltage control is set to supply higher

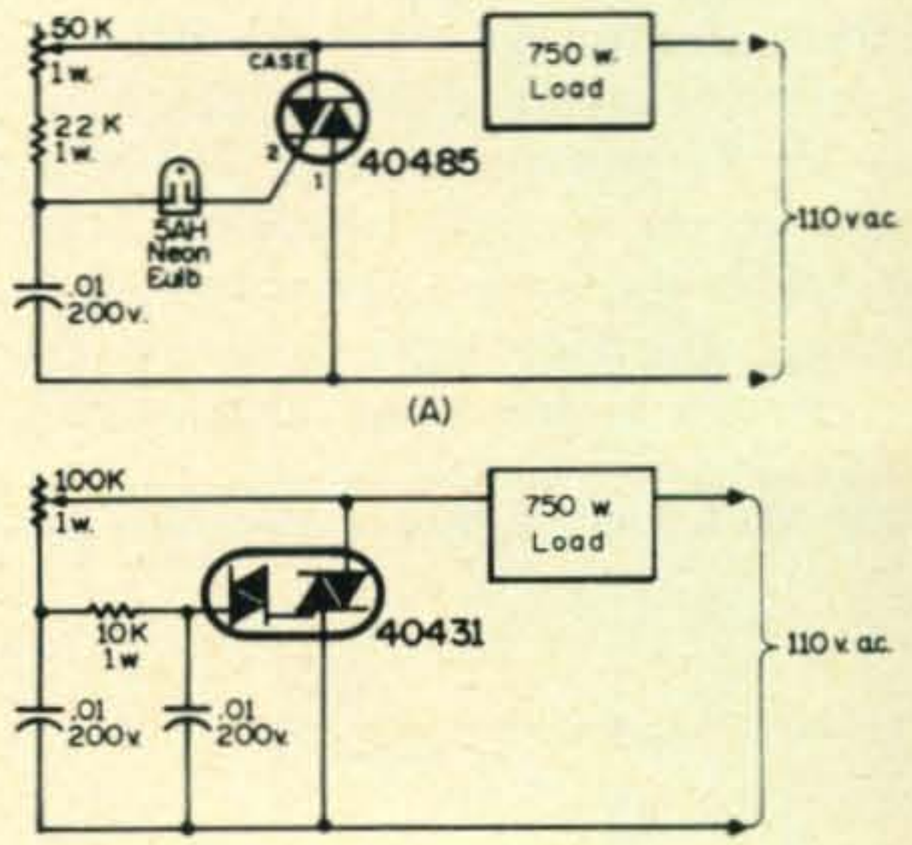

Fig. 5(A)—Basic circuit of a triac variable voltage supply using a neon bulb for the trigger device. (B) uses a triac that contains an additional back to back diode for the triggering device. This allows control of the output voltage down to a few volts.

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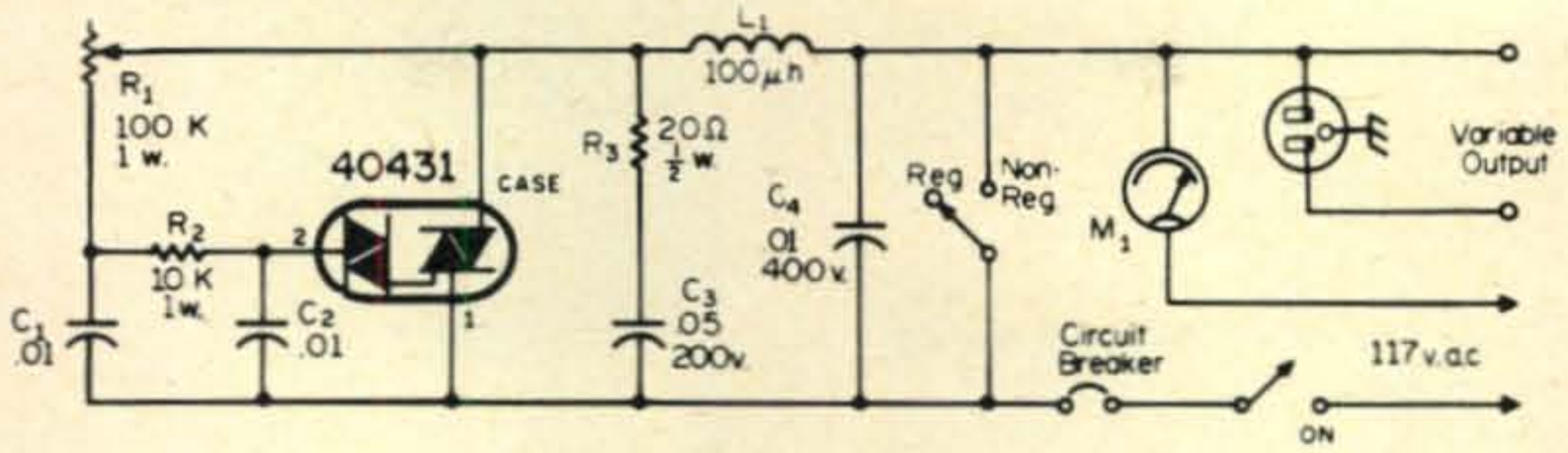

Fig. 6—Circuit for the variable voltage supply shown in figs. 3 and 4. The R_3-C_3 network forms a filter necessary for inductive loads and L_1-C_4 forms an r.f. hash filter. The circuit breaker can be between 5 and 6 amperes or a fuse may be used instead.

load voltages. There is no effect on an f.m. or TV receiver. This type of interference can be reduced in the equipment being controlled by the triac by use of a filter such as that shown in fig. 6.

Tool Speed Control

A tool speed control can be a handy item in the shop. Figure 8 shows a typical model using a triac. The components are mounted on a metal panel and housed in a standard bakelite or plastic box. The model shown is mounted on the ceiling at a convenient location over the work bench and uses a coiled-type line cord to which is attached a 3 way receptacle. A circuit breaker such as the type used in a color TV receiver protects the motor of an electric drill or saw in the event of stalling. There have been no burned out armatures since this device was installed. The heat of a soldering iron can also be controlled to increase the life of the heating element and tip. The circuit used can be that of fig. 5(A) or (B).

Light Dimmer

Want to please the XYL? Here's your chance to apply some of the techniques of your hobby and perhaps make a slight payment for those times when construction of a rotary beam antenna system was more important than redecorating a room. The control can be housed in a small metal box with an outlet at one end. Paint or spray the box an

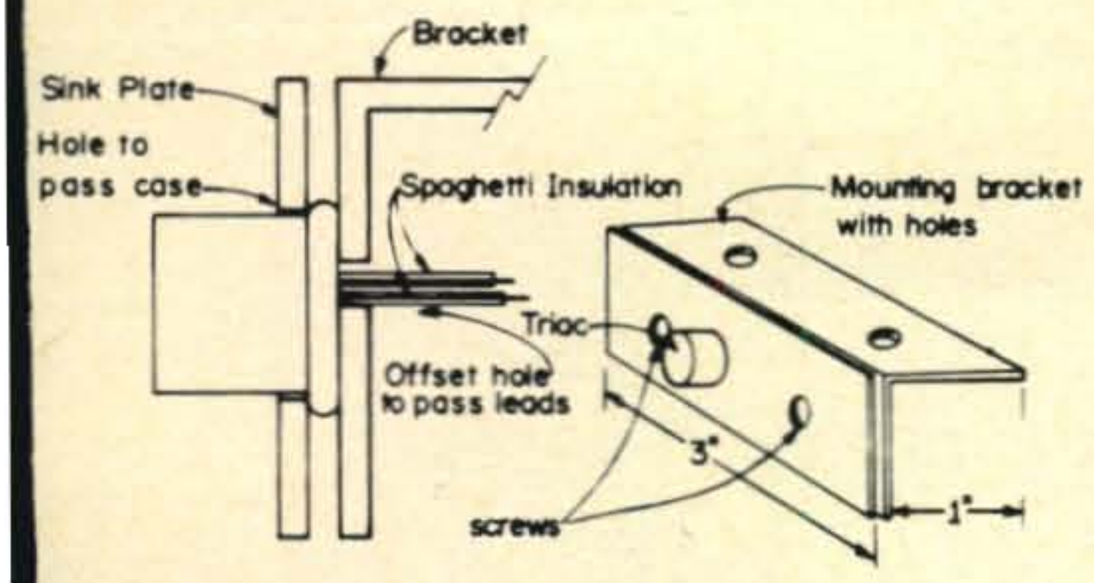

Fig. 7—Suggested heat sink for the triac used in the circuits of figs. 5 and 6. Aluminum, 1/16" thick, of the dimensions shown above, may be used. The case connects directly to the sink so the sink must be insulated from the chassis or meter case.

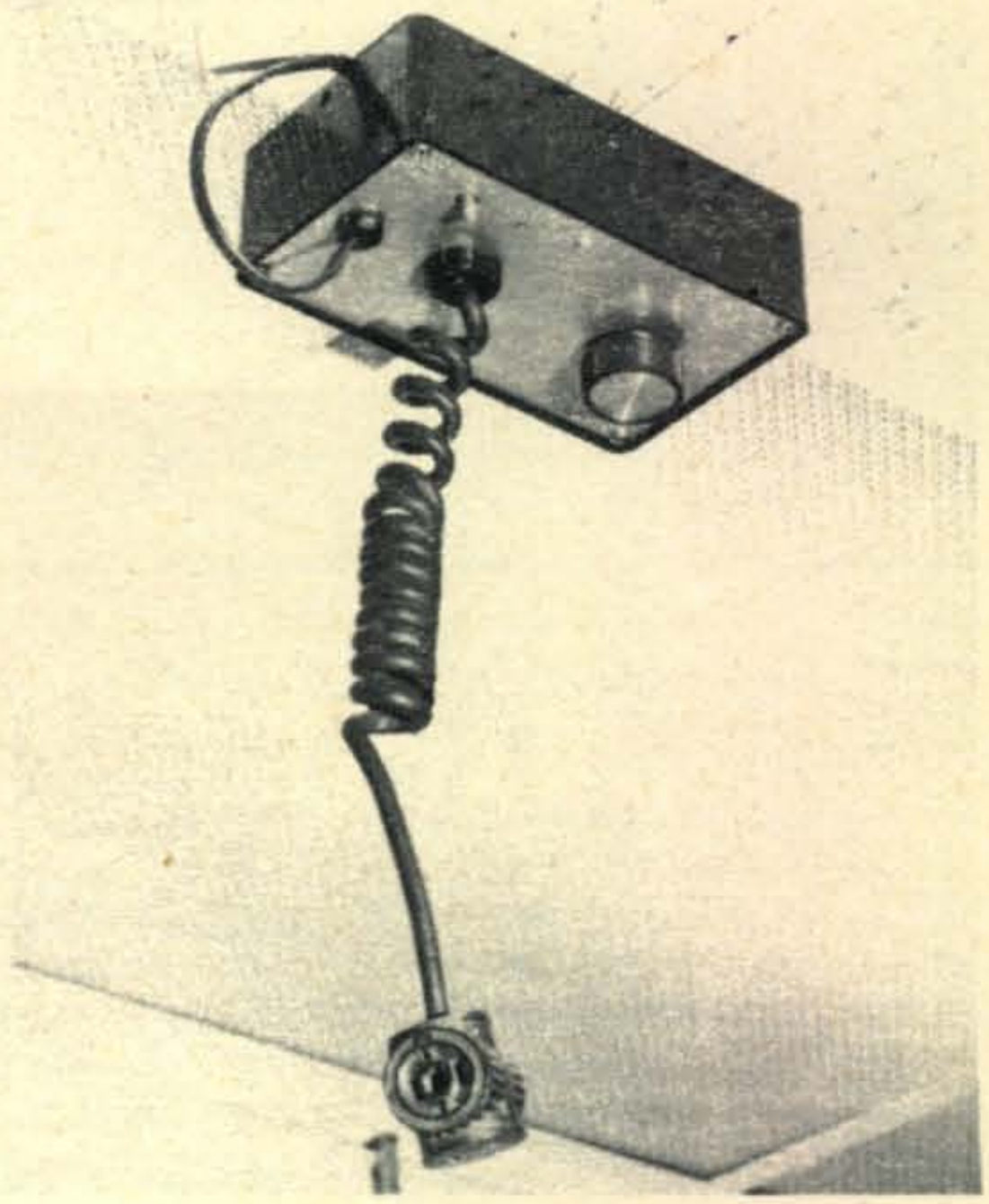

Fig. 8—A triac drill speed control mounted on the ceiling over the work bench can also be used to control the heat of a soldering iron.

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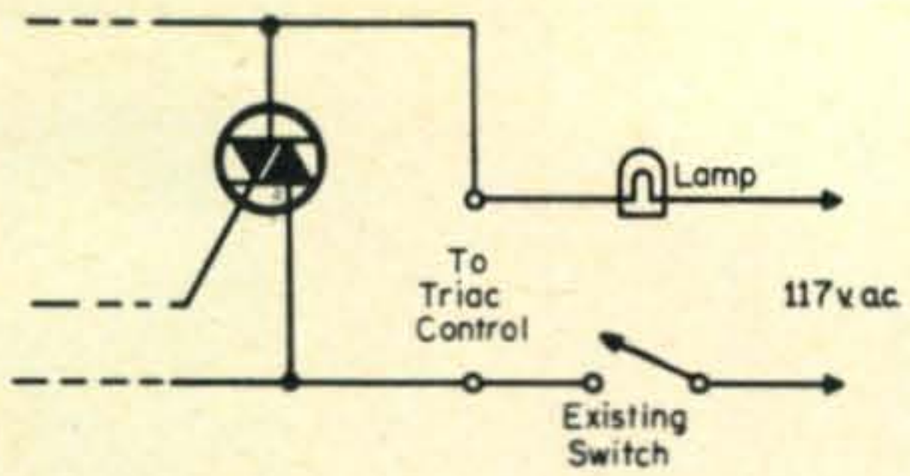


Fig. 9—Use of the triac control circuit to act as a lamp dimmer.

appropriate color and attach a control knob which blends with the surroundings.

In this application the lamp and dimmer serve several uses. With a 200 watt lamp, plenty of light is available to illuminate a desk in a writing area. The lamp may be dimmed for a pleasing lighting effect, and dimmed still further for use as a night light.

The compactness of the triac circuit coupled with a little ingenuity should enable the designer to build the control on a wall switch plate to control lighting from a chandelier. Figure 9 shows a circuit diagram capable of handling up to at least 500 watts of lighting with the heat sink shown in fig. 7.

Photocell Control

Photocells can be used in conjunction with the circuits of figs. 5 and 6 to control the load according to the ambient light level. The methods of connection are shown in fig. 10(A) and (B) for a type 4453 photo cell. If a 4403 type cell is available the connections are the same except that a 1.2K resistor is placed in series with the photocell.

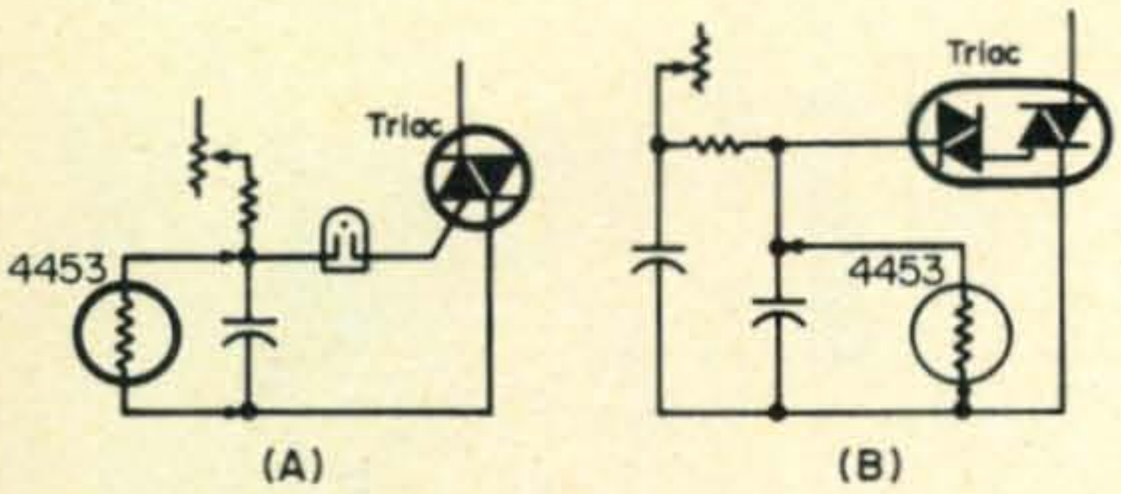


Fig. 10—Connection points for photocells that can control the triac circuit.

This device may turn lights on or off according to the outside light. Two typical uses are to turn on interior lights automatically when no one is home. It is hoped this will discourage burgulars. The second is to turn outside lights on automatically to light up the driveway, house entrance and other critical points. A homebrew unit is shown in fig. 11. ■

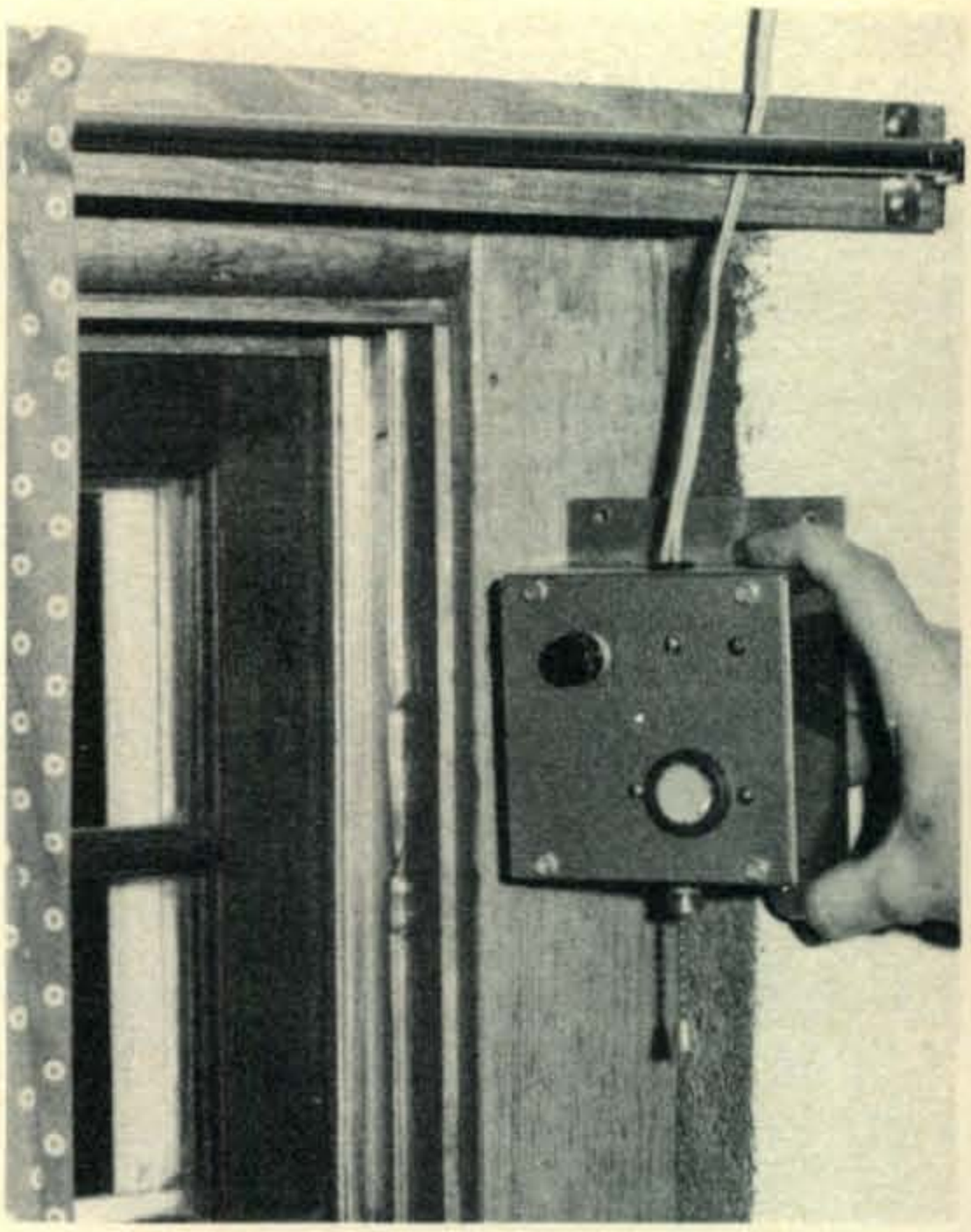
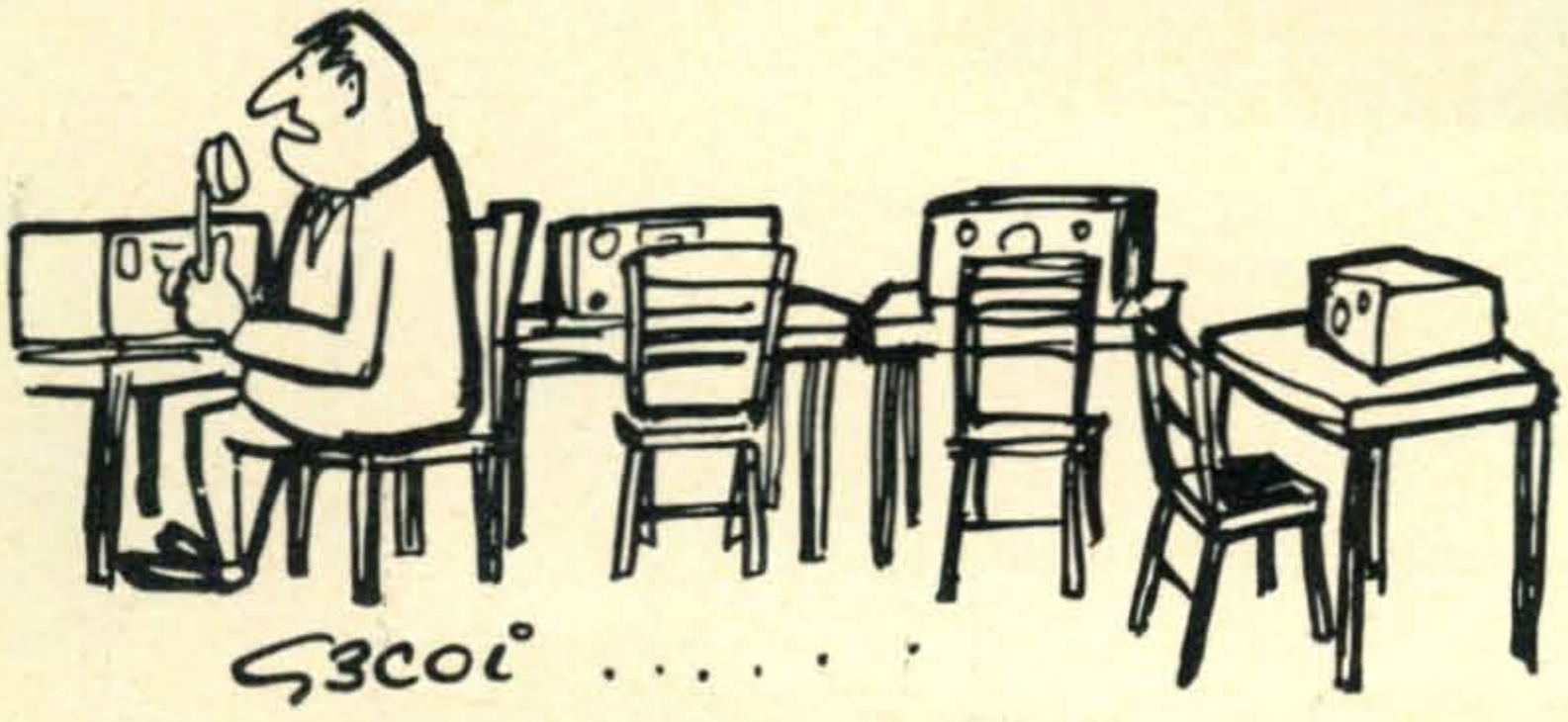


Fig. 11—Photocell controlled triac unit placed in the garage window senses outside light to control driveway and other exterior lights.



"Bandswitching system here is unusual . . ."

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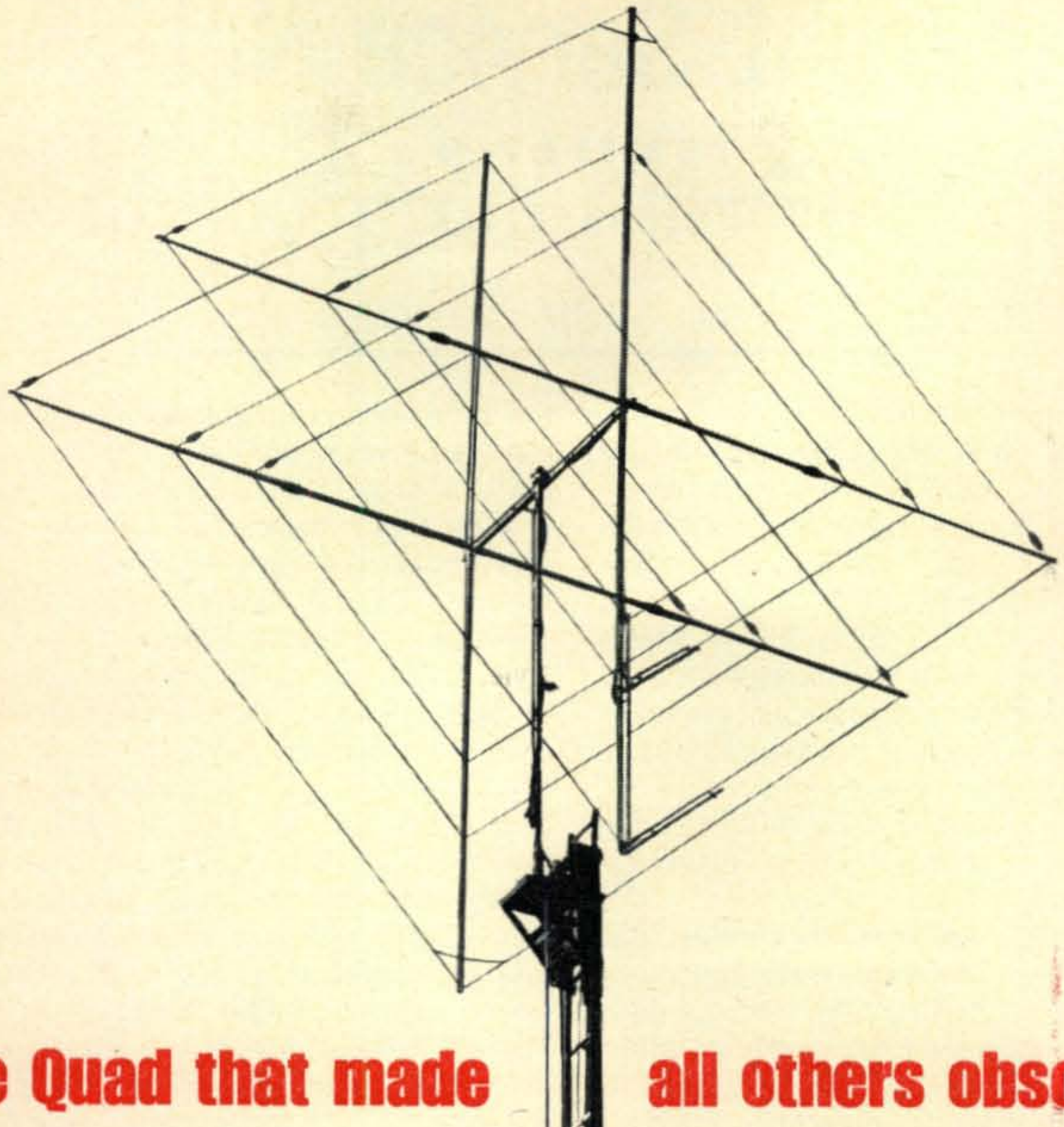

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Instant Service Nets
WCARS—MWARS—ECARS

BY ED GRIBI,* WB6IZF

WITH this column *CQ* recognizes the importance to all amateurs of the growth and expansion of WCARS, West Coast Amateur Radio Service[1], and more recently MWARS (or MIDCARS) and ECARS (or EASTCARS). As an opener I'd like to quote Dick Ross, *CQ* Editor: "The inception of MIDCARS and EASTCARS, I think, signalled the beginning of eventual nationwide coverage by amateurs of nearly a! highways and waterways, bringing the grass-roots value of amateur radio to public view in a way it's been missing for too many years." I wish I'd said that myself!

What are these alphabet soup groups and why are they any different from any other amateur groups? Taking the last question first, they are different from nearly all other amateur nets, services, or similiar groups in that they are devoted to monitoring one frequency for the purpose of providing immediate service to the public and to other amateurs by assisting in emergencies, facilitating contacts, and arranging to handle traffic. These 'instant service" frequencies are 7255 for the east coast and the west coast and 7258 for the midwest. The channels are monitored every day in the respective areas by dedicated operators who keep the services going so long as there are operators and participants and a need for service. The concept is similar to the now-abandoned ARRL National Calling and Emergency Frequencies, with one vital difference: The NCEF's were passive frequencies except in time of emergency. 7255 and 7258 are *active* frequencies at all times with a control station and relays picking up all breakers and performing services, large and small, continually. Naturally, in order to accomplish these services effectively and efficiently operation has to be fast-break and snappy with no time for long-winded amenities. However, courtesy and good humor are vital ingredients of the best aspects of these procedures.

West Coast Amateur Radio Service, Inc., was organized in early 1963 with a very small group including Wayne Nail, WB6CBW, 1969-1970 WCARS President, and George Lyle, K7ZAU, Past President and now Editor of the WCARS Sentinel. There are now more than 600 members from Canada to Mexico and hundreds more stations who make use of the Service every day. Mid-West Amateur Radio Service was launched by Marv Cook, W9WWE, and Nick Geer, K9DDT, in January, 1968, and has grown steadily to its present membership of 250. The baby, East Coast Amateur Radio Service, was born in January, 1969, and already shows signs of becoming a giant. Apparently the east coast was ripe for such a concept judging from the heavy usage of the frequency I hear when the long skip is in and from the size of their roster exceeding 500 after several months operation. Bernie Howe, K1LTO, and Jean Strickland, WA3GAL, are the sparkplugs of the daily operation while Dave Flinn, W2CFP handles public relations. There is no direct organizational connection between the three groups—the main bond is a common interest in providing similar public services.

Whatever Turns You On

Anybody who's ever tried to stimulate amateurs to participate in AREC, NTS, CD Red Cross, or other similar public service knows the frustration of trying to maintain interest in such groups through meetings and drills with little or no opportunity to utilize their skills in the real thing. Some pessimists have concluded, therefore, that most amateurs are not really interested in public service activities. I submit that amateurs are human beings (mostly) who like to appreciate the immediate results of their labors, even if laboring only for a hobby. The WCARS con

*229 Vivian St., King City, Cal. 93930.

[1]"The All Day Every Day Net—WCARS", *CQ*, Jan. 1968, p. 4.

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cept with its instant service and instant satisfaction fulfill this basic human need in daily fashion for a wide variety of amateur operators. Whether acting as a control station, picking up a piece of traffic, mobiling the freeways, or just monitoring in the off chance that somebody may want East Podunk, the growth of participation indicates that a large number of amateurs are "turned on" by the opportunity to serve the public and other amateurs. You may think DX or contests or v.h.f. or building are your bag, but you too might find that you'll be turned on by one of these all day every day operations where the action is.

This Column

These lines will appear every other month in *CQ* as long as they serve a purpose. They will be particularly pointed toward developments within the three Services in the hope that some of you may be stimulated to participation or to adaptation of some of the ideas to your own needs. I intend to cover suggestions for operating procedures, observations based on my own and other's experiences, and news of daily operations. I intend to take occasional wider views of any and all related public service activities by amateur operators. I do not intend to trod the same footsteps as George Hart, W1NJM, ARRL Communications Manager in "Amateur Radio Public Service" but rather to complement (and compliment) the continuing dedicated efforts of this great gang. I am Vice President of WCARS and a member of MWARS and ECARS, but the views expressed in this column are my own and do not necessarily reflect official views of any of the three organizations. In my profession as a geologist I travel quite a bit and pack a rig with me, so catch me on my favorite frequency or drop me a line if you have a gripe, a suggestion, or something you think is newsworthy.

Brief Calling Procedures For 7255 and 7258

I think I'll repeat these often because I believe it is vital that they be disseminated widely and continually.

BREAK-BREAK-BREAK – *Emergency Only* – used for messages having a life and death urgency–such as highway accidents–all stations stand by while control determines method of handling.

BREAK-BREAK – Priority or urgent traffic having a specific time limit. Traffic hazards and obstructions are priority.

CONTACT–Notifies control that you wish to contact a station just heard.

INFORMATION – Notifies control that you have information that may explain or expedite traffic at hand or for any other contingencies.

Your call letters only – The only proper way to break for routine matters–never say "break."

Never transmit more than one brief sentence without dropping your vox or mike button.

Always move all routine messages and contacts at least 4 kc off Service frequency.

ECARS News

Dave W2CFB, says discussions are going on regarding organizational setups and the matter of dues. Regardless of organization, 7255 in the East rolls on with its daily monitoring service and an increasing number of impressive "Services Rendered."

W8ERB/M8 called in to report a car veering all over the road. When Bob reached the car the driver was slumped over the wheel. WA1KRN called the Ohio State Police with relay help from WA4BOQ.

WA2CFA/M2 called in two accidents involving five cars in New Jersey. WB2DRG called the New Jersey State Police.

EL$\emptyset$B MM on a tanker utilized ECARS services to locate their mess boy missing when they left port. W3RSC traced him down and arrangements were made for him to join the ship 12 days later.

A number of assists to mobiles and motorists have been made with the air of W2PXU, W3RSC, WA3FWI, W4ZNH, W4RNN, W2WSP, W1RUS, K3LBP, W2BHK, WA1-KRN, and many others. Two items deserve more attention. W3RAZ monitors ECARS with a pair of Walkie-talkies – one in his pocket while he's outside and the other in transmit position in front of his speaker in the shack. One day he heard a weak mobile requesting assistance with nobody responding. He dashed in the house, got the details on the mobile's disablement, and set the wheels in motion so that a tow truck was on the scene within 20 minutes.

WA3FXQ mobiling through the backwoods of Virginia lost a water hose and all his coolant. W4CCJ phoned a friend of his in a nearby town who brought out water. The friend informed him that he was in the

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"Shootin' Creek" moonshine area where a vertical antenna means "revenooer." Low garages and gas stations aren't the only hazard to mobiles—apparently we have to worry about squirrel guns too!

For information on joining ECARS send an S.A.S.E. to Jim Lightfoot, WA1KRN, c/o Radio Station WBZ, Boston, Massachusetts 02134.

MWARS News

Best wishes to Ron Mann, W8NXD, new editor of MWARS *Radio Watch*. Other MWARS officials are K9DDT, Service Control Manager; W9WWE, Secretary; W9YJN, Publicity Manager; WA9OIN, W9GET, WA8FYA, W8UX, W8FPZ, Coordinators; and W0WYJ, Coordinator and Chairman for Liaison with the other Services.

Thirty members attended the MWARS picnic at Springfield, Illinois, on July 5th. K9KTB arranged the affair which had participants from as far as Wisconsin and California.

W4IAN/MØ called in on 7258 to report a serious accident south of St. Louis. KØUPT called the St. Louis Police.

A Ki mobile in Georgia collided with hogs spewed from a livestock truck that had overturned. He called in on 7258 and with the aid of K9DDT, several relays, and ECARS the accident was reported and presumably the sausage was cleared.

To join MWARS—send a QSL or postcard and twelve 6 cent stamps to: Secretary, Midwest Amateur Radio Service, Box 82, Seaton, Illinois 61476.

WCARS News

By the time you read this three big summer holiday weekends will have passed with resulting highway death tolls. The Automobile Club of Southern California has been trying to hold down these figures with their "Bring 'Em Back Alive!" program. Essentially the project involves dissemination of traffic, resort, and weather conditions to a maximum number of broadcast radio stations so that motorists will be alerted to potential hazards and trouble spots. WCARS has been participating in these by contributing information from mobiles and others in spots not covered by the regular sources. John Annis, WA6PCY, a member of the California Highway Patrol, has sparked amateur involvement with the backing of his commander by setting up a portable station at Auto Club headquarters to relay reports.

Here's a few of the "Services Rendered" by WCARS on 7255 in the late spring and early summer:

WA6TKE mobile called in on 7255 at 2350 Pacific Daylight Time reporting a highway accident with injuries near Salinas, California. The band was in long skip so WA9UWV, WB2RQP, and K4LD helped relay the information back to K6OAM, Palo Alto, California, who called the CHP. The mobile reported Patrol arrival at 0010.

At least 15 highway emergencies were known to have been handled through WCARS in this period by a number of stations. 21 accidents without injuries, freeway obstructions and hazards, motorists requiring assistance, and other priority situations were known to have been handled.

For information regarding WCARS membership send a card to Wayne Nail, WB6CBW, President, 4924 Omar, Fremont, California 94538.

Other Services

WB6OTB and WB6FEH mobile near Yosemite called in on 3952, monitored frequency of Western Public Service System, to report an accident on a mountain highway. W6ULC, NCS, designated WA6HCJ to call the CHP. This group operates in the evening hours in a manner similar to WCARS. It should—the President is Theda Nail, W6BSW, xyl of the WCARS Prexy. It's a real good alternate to 7255 when 40 goes out.

I was listening on 7255 here in Wyoming the other day when I heard the following: WAØNKS reported a car had spun off the freeway near Topeka, Kansas, and requested assistance. K5QBM and WAØRCY relayed the information to authorities. This was the Kansas Post Office Net which holds a roll call and traffic session on 7255 at 1230 local time.

I also heard this incident on 7255: a station requested asistance in handling some urgent traffic during late evening long skip conditions. WA7HHY, WCARS control, asked for a clear frequency because of evening skip conditions. K5USO of "The Rare Ones of New Orleans" and a number of other stations in QSO in the midwest and south immediately ceased transmissions. With K6OAM and WB6IZF relaying, information was provided advising how the station could get traffic into the area. The cooperation of the "long skip" stations was noteworthy.

[*Continued on page 102*]

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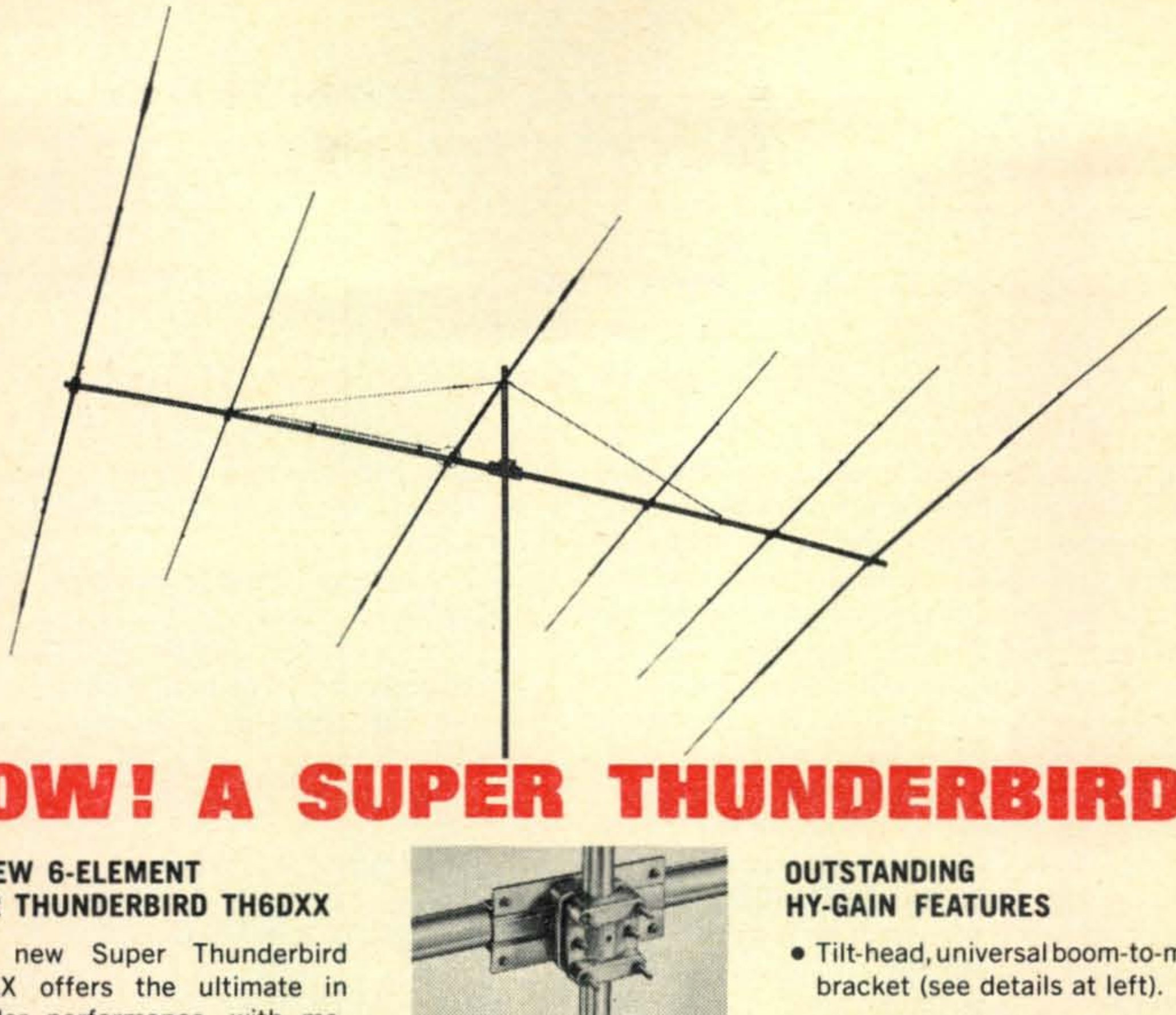

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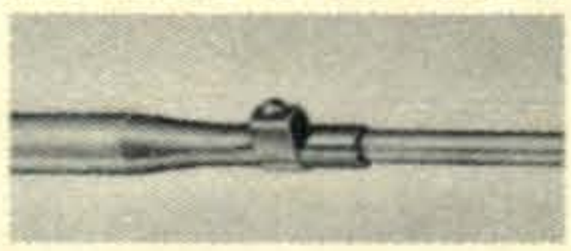
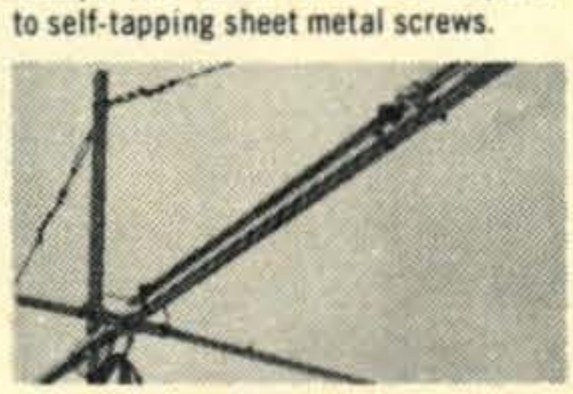


Taper swaged, slotted tubing – new tubing on all elements allows easy adjustment and re-adjustment. Taper swaged to permit larger diameter tubing where it counts! And, less wind loading. Full circumference compression clamps are mech. and elec. superior to self-tapping sheet metal screws.



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THE REVERSI-COUPLER

An Antenna Tuner that Covers 160 Meters

BY RICHARD R. HAY,* W1LE

THE ideal antenna coupler has smooth, continuous variable control of impedance in both magnitude and phase. While there are several commercial antenna couplers on the market that meet this requirement, there are none (as of this writing) that cover the 160 meter band and the Disaster Communication Service band of 1750-1800 kc. The latter service appears to have been given little attention because of a lack of readily available transmitting equipment to cover the 1750-1800 kc band. There has been renewed interest in the 160 meter band with the advent of a single band transceiver in kit form.

The specifications for an antenna coupler at W1LE were determined to be:

1. Bandswitching (to prevent tuning up on the wrong band.)

2. Maximum efficiency on the 160, 80 and 40 meter bands with additional coverage of the Disaster Communications Service band 1750-1800 kc.

3. 20, 15 and 10 meter coverage, with reduced efficiency acceptable.

4. Continuously variable, self reversing (*i.e.* no stops at end of tuning range), adjustment of impedance in both magnitude and phase.

5. Adaptable to automatic and/or remote control.

6. Constructed from readily available components.

7. Capable of handling about 200 watts of r.f. power.

8. Capable of being used primarily with end fed antennas, but with a limited capability of feeding a balanced line.

Because of excellent results previously obtained with automatic tuning of a Johnson

*Mu-Tronics Corp., Box 223, S. Dartmouth, Mass. 02748.

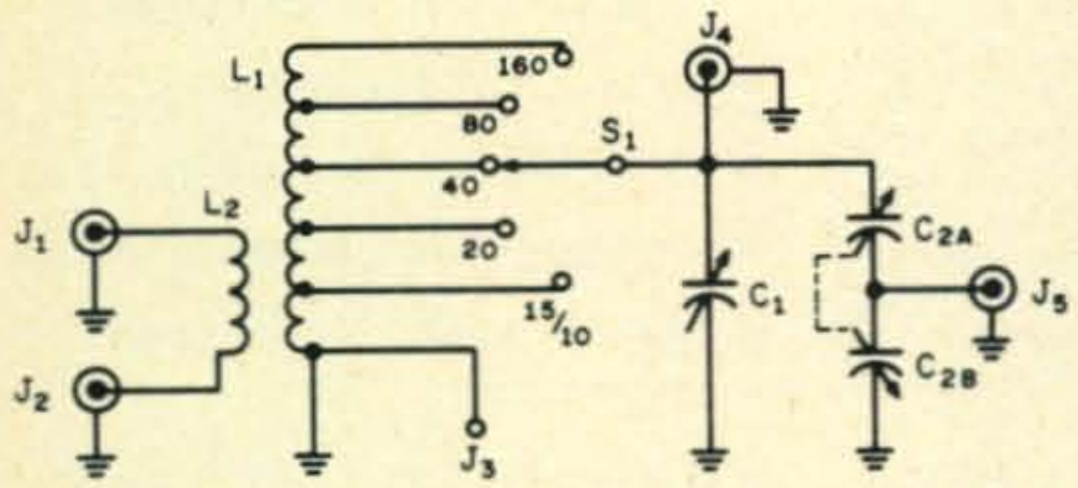

Fig. 1—Circuit of an antenna tuner that covers from 160 to 10 meters.
C_1—250 mmf variable capacitor, 0.075" spacing.
C^{2A}, C^{2B}—Two 200 mmf variable capacitors, 0.75" spacing.
J_1, J_2, J_4, J_5—SO-239 connectors.
J_3—Bannana jack.
L_1—30t #16, 3" long 2" dia. (Air-Dux 1610T), tapped at 1/2, 1¼, 6 and 12 turns from the cold end.
L^2—6t #14, 3/4" long 2½" dia. (Air-Dux 2008T) mounted over the cold end of L_1.
S_1—5 position ceramic switch.

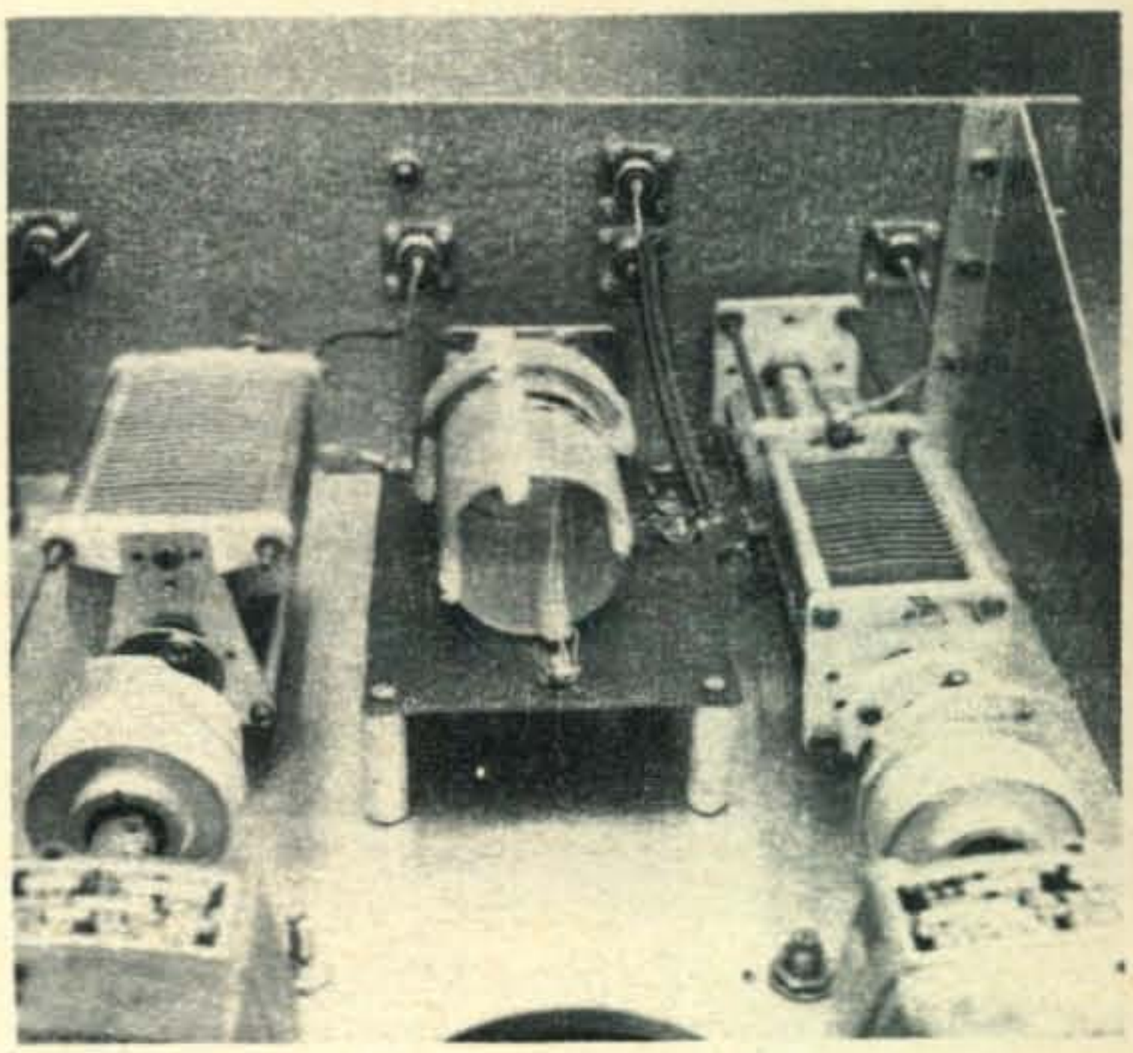

Fig. 2—Physical arrangements of the components for an all band version of the Reversi-Coupler an all band antenna coupler. Seen in the foreground are two drive motors used for automatic control. They are not discussed in this article but were covered earlier.[1] The right hand tuning capacitor is C_2 ganged 180° apart.

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Matchbox[1], it was decided to use the same principles, but modified for simpler construction and to reduce the size of the coils and variable capacitors to manageable values for 160 meter operation. The name "Reversi-Coupler" stems from the fact that this coupler can be fed in either direction.

The schematic diagram of the multi-band version is shown in fig. 1. Variable capacitor C_1 provides the phase control (tunes the circuit to reasonance). Capacitor C_2 adjusts the magnitude of the impedance as seen at J_5. Since C^{2A} decreases as C^{2B} increases (and vice versa) the change in total capacitance is minimized. There will, however, be some reaction between the adjustments of C_1 and C_2.

The photograph, fig. 2, shows the physical arrangement of the components for one version of the Reversi-Coupler. This particular version was adapted to automatic tuning (not described in this article). Capacitor C_2 was formed from a dual capacitor by displacing one set of stator plates 180° so that one set of rotor and stator plates was completely meshed while the other set was completely disengaged. Since it may be difficult to find a dual capacitor which is capable of being so modified, it is recommended that two separate capacitors be ganged with the rotors set 180° apart. These capacitors must be mounted so that the rotors are insulated from ground, since J_5 must connect to their junction. The jacks are mounted in the front panel for convenience in changing connection arrangements.

Because of the numerous combinations of transmitter and antenna connections, a table has been prepared, as indicated in fig. 3. Single wires are plugged into the jacks by using banana plugs which fit the SO-239 connectors nicely. It also is possible to obtain u.h.f.-to-binding-post adapters for this purpose. In case of high impedance balanced lines, it probably would be advisable to use combination *C* or *D* with a step-up balun of 4:1 ratio.

Preliminary tests with an antenna bridge and grid-dip meter will indicate the best set-up for any particular antenna and frequency. The most desirable connections are those which will produce an impedance match with the least critical adjustment of controls.

For best results, the Reversi-Coupler should be used with an s.w.r. indicator that

[1]Hay, R.R., "The Automatic Match Box," *CQ*, June 1954, p. 13.

Application	Connections				
	J_1	J_2	J_3	J_4	J_5
A. Single wire 1/2 wave or multiple of 1/2 wave.			Gnd	Ant	Xmtr
B. Single wire 1/2 wave or multiple of 1/2 wave.	Xmtr	Gnd	Gnd		Ant
C. Single wire, length other than 1/2 wave, or antenna fed by coax.	Xmtr	Gnd	Gnd		Ant
D. Single wire, length other than 1/2 wave, or antenna fed by coax.	Ant	Gnd	Gnd		Xmtr
E. Antenna fed by balanced 2 wire line.	Ant	Ant	Gnd		Xmtr

Fig. 3—Chart showing the connection points for the transmitter and various types of antennas.

can be left in the line at full power. [2]Figure 4 shows the recommended operational set-up. The operational procedure is as follows:

1. Connect the transmitter to a dummy load with an impedance equal to the nominal impedance of the connecting coax line.

2. Tune the transmitter for designed or desired loading and/or r.f. output and check the s.w.r. indicator for 1:1 reading.

3. Switch from the dummy load to the Reversi-Coupler and adjust, first the PHASE CONTROL and then the MAGNITUDE CONTROL for minimum reading on the s.w.r. indicator. Repeat until the optimum s.w.r. reading is

[2]Jones, M.C., Sontheima, C., "The Micromatch," *QST*, April 1947, p. 15.
Construction of a Coaxial SWR Indicator, Radio Handbook, 14th Edition, *Editors and Engineers.*
A Varimatcher SWR Indicator, *1969 ARRL Handbook*, p. 557-559.
DeMaw, D., "The Varimatcher," *QST*, May 1966, p. 11.
King, A., "The 'Z-Match' Antenna Coupler," *QST*, May 1955, p. 11.

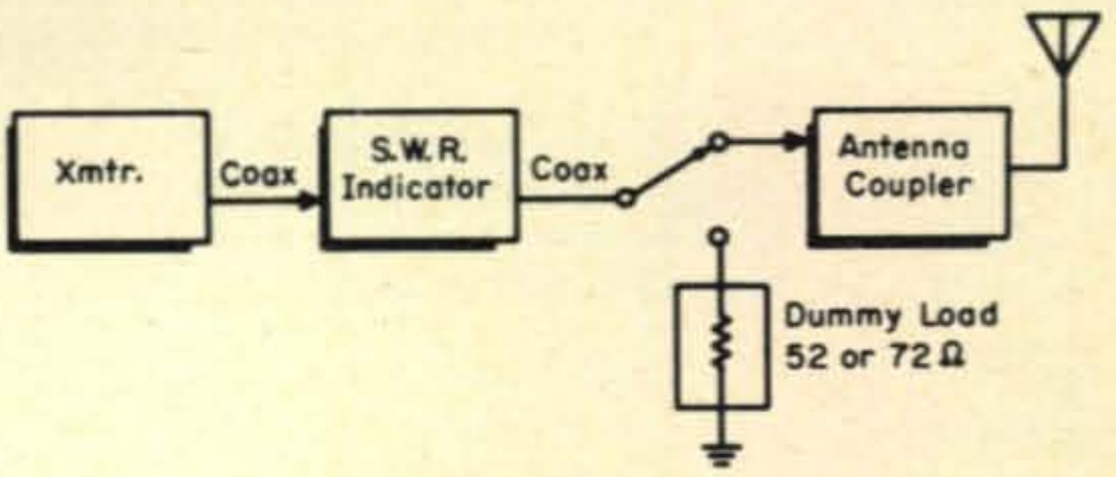

Fig. 4—Recommended operational set-up for the antenna coupler.

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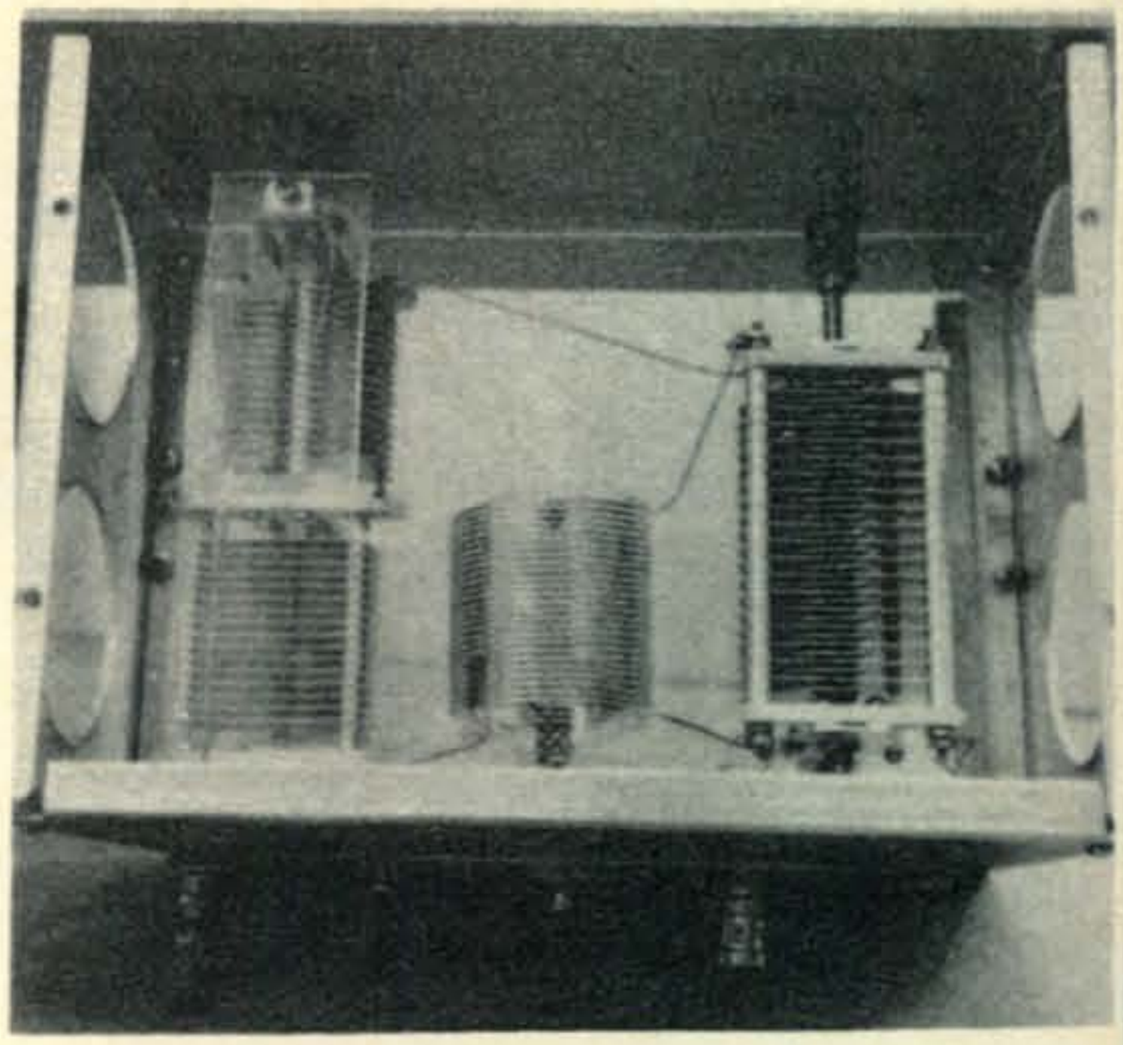

Fig. 5—Top view of the 160 meter single band Reversi-Coupler.

obtained. *Do not change the settings of transmitter tuning controls.*

It will be found that the phase and magnitude affect each other to some extent. If initial tuning of the Reversi-Coupler is done near of the center of an amateur band, further adjustments of the MAGNITUDE control usually is unnecessary for changes of frequency; it is only necessary to reset the PHASE control. Vernier dials on both controls will be found advantageous for precise adjustments. They were not used on the coupler shown in fig. 2 because they would have interfered with the automatic tuning.

The multi-band version of the Reversi-Coupler is admittedly inefficient on the 10, 15 and 20 meter bands. In case the coupler is intended for use only on the lower frequency bands, the taps for 10, 15 and 20 meters may be eliminated. At W1LE we carried this idea to its ultimate by building one version for 1750-2000 kc coverage only, and eliminated the band switch altogether.

Single Band Coupler

The single band version of the coupler is shown in fig. 5 and is wired the same as fig. 1, except that the band switch is omitted. Inductor L_1 is made from a 2½" length of Air-dux 2010T (2½" dia. 10 t.p.i. to produce approximately 28 microhenries). Winding L_2 is a 6 turn length of Air Dux 1610T, 2" in diameter and 10 t.p.i., centered in the cold end of L_1.

The jacks are mounted at the rear of the unit (instead of on the front as in the multi-band unit) since, once set up, no changes in

[*Continued on page 100*]

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A JUNK BOX PHONE PATCH

BY GARY L. ERLAND,* KØGBT

This article describes a phone patch which can be built with a minimum cash outlay. All parts are common and liberal values are given for substitution to fit the builder's junk box. Modification of the basic circuit is included for those desiring a more elaborate phone patch.

AFTER using many patches, both commercial and home built, I have finally settled on the manual type. Hybrid patches are extremely useful with parties experienced in phone patching. The average person, however, tends to get excited and trip the transmitter vox at the wrong time. This results in doubling and repeats are invariably necessary. Confusion is thus added and the patch ends up far from gratifying. I have always found the manual method results in a smooth running patch and therefore have gone completely to the manual type phone patches. Not only are they easy to build at home but are considerably less expensive as well.

Impedance Matching

First thoughts in building a phone patch are matching the impedance from the telephone line to the transmitter and receiver. Finding a transformer to do the job is not always a simple matter. Using a power transformer is crude in more ways than one and buying a specially designed transformer is rather expensive. The solution is to use more readily available transformers and combine them for a proper impedance transformation.

The phone patch shown in fig. 1 is quite basic and unique only in the transformer hook-up. This particular method uses the center-tapped impedance which is one quarter the total secondary impedance. (See fig. 2.) This fact is often overlooked and relagates many suitable transformers to an unused life on the shelf. Remembering this will turn up transformers which can be mated to provide many different impedance values.

Transformer T_1 is a very common 600 ohm primary to 20,000 ohm center-tapped secondary. A check of surplus audio equipment around the shack may turn one up. If not, it may be purchased from many of the surplus distributors advertising in this magazine. Transformer T_2 is a 5,000 ohm primary to 3.2 ohm secondary. This one can be obtained from many of the old tube type broadcast radios.

*656 Malone Avenue, Albany, Georgia 31701.

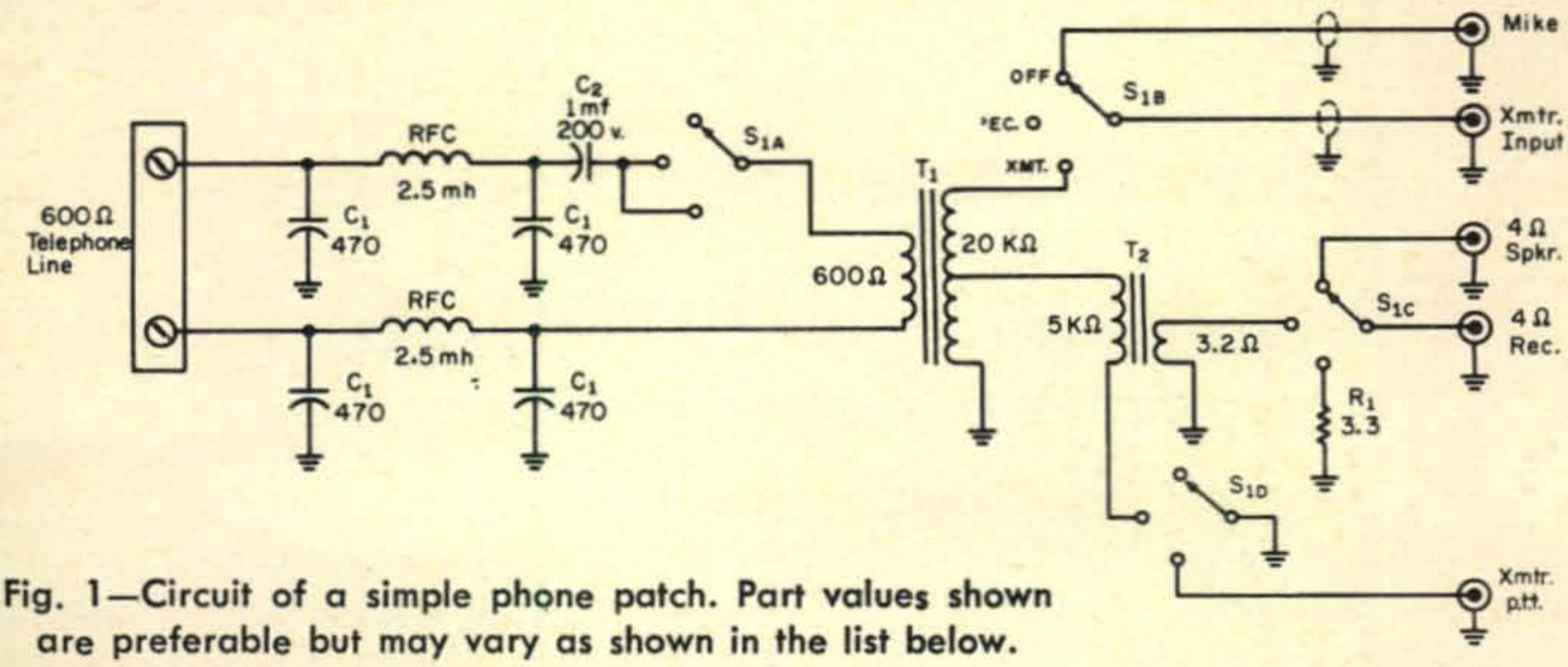

Fig. 1—Circuit of a simple phone patch. Part values shown are preferable but may vary as shown in the list below.

C_1—470 mmf to 0.005 mf disc ceramic, 200 v. min.
C_2—1 mf to 4 mf, paper or oil filled, 200 v. min.
R_1—3.3 to 50 ohms, 1 watt carbon.
R.f.c.—1 to 2.5 mhy.
S_1—4 pole 3 pos. rotary switch.
T_1, T_2—See text.

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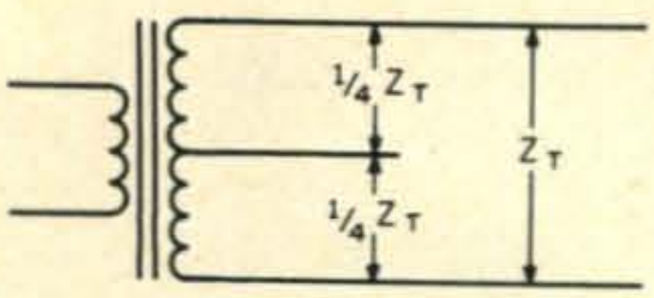

Fig. 2—Impedance distribution across a center tapped winding.

Construction

In construction, the parts may be arranged to suit the builder's preference. Wiring is not critical, however, the line filter should be located close to the terminal where the telephone line connects to the patch. Several values are listed for the low pass line filter to make maximum use of the junk box parts. It should be noted here that the filter is used mainly to keep r.f. out of the patch. Modern s.s.b. receivers exhibit audio roll-off characteristics capable of conforming to telephone regulations regarding frequency response.

One lead of the primary winding (5K) of T_2 is connected directly to the center tap of T_1. The other lead is switched to ground by S_{1D}. This arrangement precludes the use of an extra switch section which would otherwise be needed if the entire transformer were switched in and out of the circuit.

Resistor R_1 should be used if the receiver audio output is an open circuit with the speaker disconnected. This can be checked by locating the output transformer on the schematic and observing whether or not a resistor is shunted across the secondary winding.

Modifications

A VU meter may be incorporated as shown in fig. 3. The meter will allow monitoring the output to the telephone line and give the operator an indication of proper operating

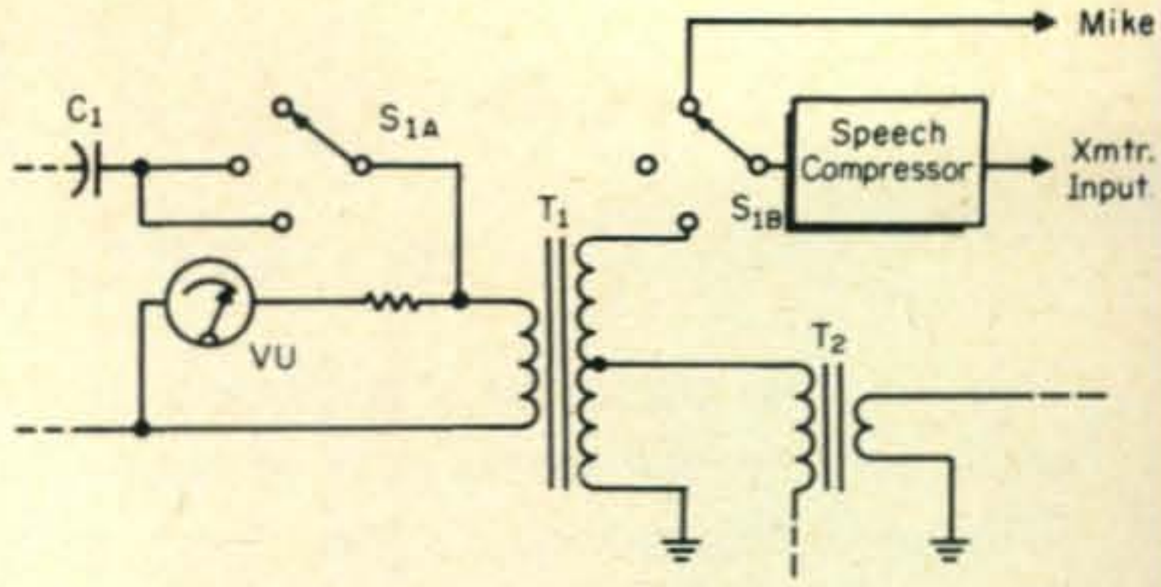

Fig. 3—A VU meter is added across the primary of T_1 while the speech compressor is placed in the microphone line.

volumes. It should be adjusted to read zero VU with 1.228 volts across the input terminals (600 ohms) and that level *never* exceeded during patch operations. Excessive line voltages will cause crosstalk and possible trouble with the telephone company.

To aid in keeping the transmitter input at a constant level, a speech compressor is highly desirable in phone patch operations. Most parties being patched tend to speak softly at times and shout when excited. A considerable range in volume is therefore present and the operator usually ends up riding the gain control. The majority of this gain riding is taken care of by the compressor, resulting in better intelligibility at the receiving end. A compressor circuit is not illustrated as many articles have appeared in this and other magazines which can be used. The speech compressor can be included as shown in fig. 3.

In conclusion, the patch described is very basic but extremely effective. Its operation is as simple as the positions of its one and only switch; OFF, RECEIVE and TRANSMIT. Good luck and happy homebrewing. ■

Restoring Sensitivity To Carbon Microphones

BY IRWIN KANODE,* WA9CKP

RECENTLY I picked up several telephone units which had been exposed to the weather, because of this the carbon microphones were inactive. To remove the moisture which had seeped into the carbon granules, I placed the microphone unit in the kitchen oven at 100 degrees for approximately 3 hours, then turning off the oven I still left them in the heated oven overnight. When I replaced them in the telephone, they worked perfectly, and have done so ever since. A word of caution, the carbon granules are a fine grade of coal carbon and at a high temperature are liable to burn. ■

*158 W. Ind. Ave., Nappanee, Indiana 46550.

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Australis-OSCAR 5 Progress

BY GEORGE JACOBS,* W3ASK

WHILE the green light has *not* yet been given for the launching of the AUSTRALIS-OSCAR 5 radio amateur satellite at the time this issue of *CQ* goes to press (early September), there is a possibility that it might be launched shortly after October 15. *Be prepared for the launch, but don't be disappointed if it doesn't take place.*

The best way to be prepared is to carefully reread:

"AUSTRALIS-OSCAR, Amateur Radio's Next Satellite In Space," *CQ*, Aug. 1969, p. 63.

"AUSTRALIS-OSCAR Telemetry Calibration Data And Reporting Instructions," *CQ*, Sept. 1969, p. 22.

"The Oscalator," *CQ*, Aug. 1965, p. 54.

"Predicting OSCAR's Orbit With Ease," *CQ*, June, 1962 p. 58.

Also check W1AW transmissions as often as possible since launch information will be contained on regular and special bulletins.

The following are salient points to remember about the AUSTRALIS-OSCAR 5 satellite:

1. It will transmit continuous telemetry data on 144.050 mc.

2. It will transmit telemetry data on 29.450 mc from 0700 GMT on Fridays to 0700 GMT on Mondays.

3. Eight telemetry channels operate on the following time sequence:

CHANNEL 0—1.6 seconds of tone followed by a 1.6 second afsk burst of HI in Morse Code (.... ..), repeated for 6.5 seconds.

CHANNEL 1—6.5 seconds of tone measuring battery current drain.

CHANNEL 2—6.5 seconds of tone measuring X-axis stabilization.

CHANNEL 3—6.5 seconds of tone measuring battery voltage.

CHANNEL 4—6.5 seconds of tone measuring Y-axis stabilization.

CHANNEL 5—6.5 seconds of tone measuring internal temperature.

CHANNEL 6—6.5 seconds of tone measuring Z-axis stabilization.

CHANNEL 7—6.5 seconds of tone measuring skin temperature of package.

While AUSTRALIS-OSCAR 5 may ride piggyback into space with one of several different satellite series, AMSAT suggests that the TOS (TIROS Operational Weather Satellites) orbit is a practical one to consider as a possible orbit for the radio amateur satellite. Many radio amateurs are already tracking TOS satellites to obtain local cloud cover pictures (APT). W1AW also transmits TOS orbital data on a regular basis. A typical TOS orbit has the following parameters:

INCLINATION: 102 degrees (a polar orbit)
ALTITUDE: 900 statute miles
PERIOD: 114 minutes (sun synchronous)
LIFT OFF Window: Centered on 1100 GMT
LAUNCH SITE: Western Test Range, California
LAUNCH DIRECTION: East-to-west
TIMES of NEAREST OVERHEAD PASSES: 3 P.M. (ascending node, south-to-north). 3 A.M. (decending node, north-to-south).
NUMBER of PASSES WITHIN RADIO RANGE: At equator—4; Mid USA—6 to 8; Polar regions—All.

Once the satellite is in orbit, W1AW bulletins wil give times of expected equatorial crossings of ascending nodes, in GMT. The longitude of an equatorial crossing will be given in degrees west of the 0 meridian. Values from 0 to 180 degrees correspond with geographical values of west longitude, but values between 180 and 360 degrees correspond to values of east longitude. Subtract the value given from 360 degrees to obtain the correct geographical meridian for map plotting. For example, if W1AW gives an equatorial crossing of 220 degrees, this corresponds to 360-220, or 140 degrees *east* longitude.

Transmission schedules for W1AW can be obtained from the American Radio Relay League, 225 Main St. Newington, Conn. 06111. They are published monthly in *QST*.

After October 15, keep tuned to W1AW, to 144.050 mc, and on weekends to 29.450 mc, to hear amateur radio history in the making when the AUSTRALIS-OSCAR 5 satellite is launched into space. ■

*11307 Clara Street, Silver Spring, Md. 20902.

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CQ Reviews: The Drake 2-NT C.W. Transmitter

BY WILFRED M. SCHERER,* W2AEF

THE Drake 2-NT C.W. Transmitter has been around for some time and thus may be familiar to many operators either through usage or from earlier descriptions presented elsewhere. However, there are newcomers to the amateur ranks, particularly Novices, who have expressed a desire to know something about this rig. For these readers and others who may find some points of interest involved with this job, we shall now take a look at it.

The 2-NT is strictly a c.w. transmitter for operation in the c.w. portions of the 80-, 40-, 20-, 15-, and 10-meter amateur bands with a power input adjustable to 75 watts for Novice operation or to 100 watts for use by higher-class licensees. It is a crystal-controlled unit, but an external v.f.o. may be used with it when legally permissible. A frequency-spotting position is included.

The output tank is a Pi-type with fixed loading for operation into 50-ohm impedances and the low-power stages employ fix-tuned broadband circuits, leaving only one tuning control to be manipulated; namely, that for resonating the p.a. plate as determined by a cathode-current meter and by the r.f.-output level indicated by a panel lamp.

*Technical Director, *CQ*.

The Drake 2-NT C.W. Transmitter.

The Pi-network itself provides a degree of harmonic attenuation, but to further minimize the possibility of TVI due to harmonics, a built-in lowpass filter is provided in the antenna output line.

A unique keying system provides a choice of complete break-in, semi break-in or manual c.w. operation. Included is an antenna-changeover relay and a sidetone oscillator with a level control. Provisions also are incorporated for receiver muting and for keying a v.f.o.

The power supply is a built-in job for operation from 120 v.a.c., 50/60 c.p.s.

There is no need to purchase additional accessories for providing all the above features. The job is a complete package in itself.

The 2-NT is designed as a companion unit to the Drake 2-C receiver for which it is styled to match; however, it may be used with other Drake receivers as well as many other types. Its size is 6 9/32" × 9 7/8" × 9 9/32" and it weighs 12½ pounds.

Details

The r.f. circuitry is quite conventional using the setup shown at the block diagram fig. 1. It consists of three stages, a crystal-controlled oscillator, a driver and the p.a. The first stage is the pentode section of a 6EA8 with which the crystal operates in a modified-Pierce grounded-plate (in this case the screen grid) setup along with the grid and cathode of a tube. 80-meter crystals are used for that band, 40-meter ones are used for all the other bands. There are two parallel-connected crystal sockets on the panel, one of which accepts crystal holders with pin diameters of .050 inches; while the other is for those with .093-inch pin diameters.

On 80 and 40 the plate of the tube is untuned simply using an r.f. choke as the load. The output is the same as that of the crystal frequency. For operation on the 20- and 10

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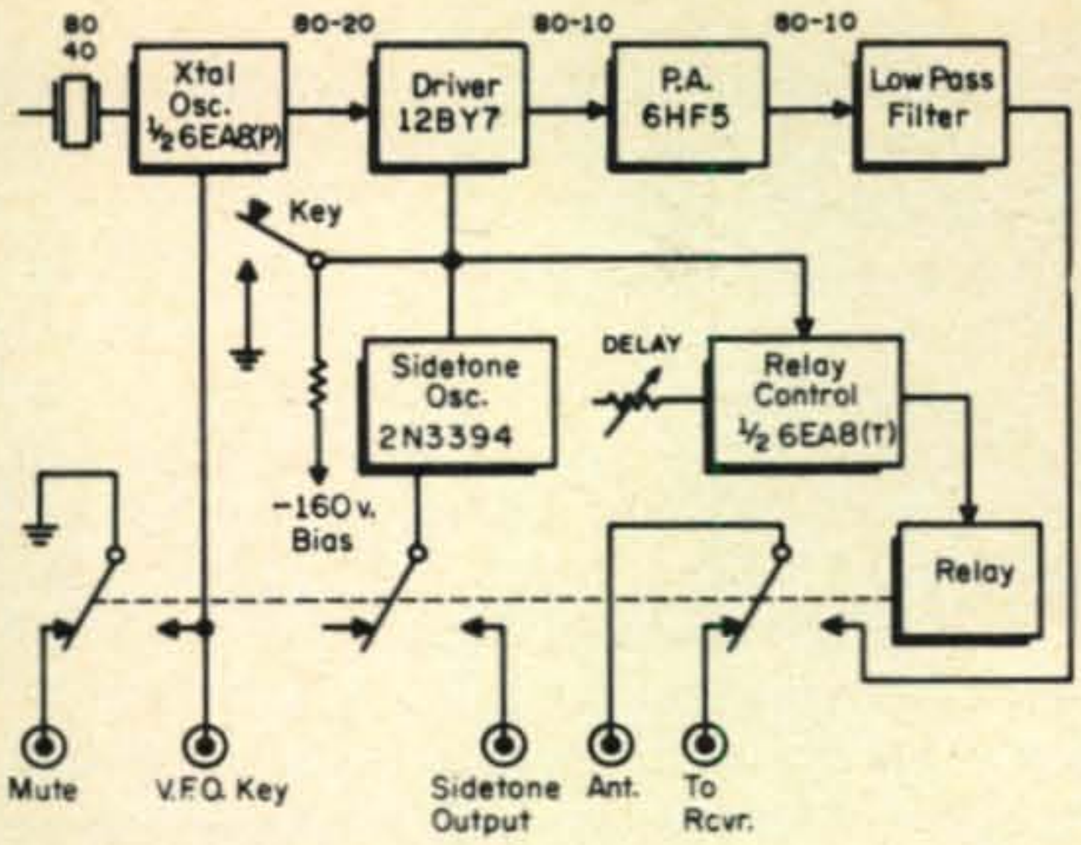

Fig. 1—Block diagram for the 2-NT setup. Also shown is the arrangement for the changeover-relay contacts.

meter bands, the 40-meter crystal frequency is doubled to 20 meters with a tuned circuit at the plate. For 15 meters, the crystal frequency is similarly tripled to 15.

The driver functions as a straight-through amplifier, except for 10-meter operation in which case it works as a doubler to 10. Separate fix-tuned circuits are switched in for each appropriately loaded with a resistor where needed for broadbanding.

The p.a. operates as a class-C amplifier with fixed bias. The plate is resonated by a variable capacitor at the input to the Pi-network at the output of which fixed mica capacitors are switched in to provide the correct loading on each band when approximately 50-ohm impedances are presented by an unbalanced transmission line. For balanced feedlines or a higher impedance such as with 300-ohm twin lead, a balun or a suitable antenna-matching coupler would have to be used.

Neutralization

Both the driver and the p.a. are each independently neutralized. There apparently are some differences in the interelectrode capacitances between the 6HF5 tubes of different manufacture, inasmuch as a 10 mmf fixed neutralizing capacitor is specified on the schematic for use with a G.E. tube; while a 6 mmf one is indicated for a Sylvania tube.

Low-Pass Filter

The low-pass TVI filter consists of series M-derived end sections and a constant-K midsection. Its characteristics are given later. The r.f.-output indicator lamp is a neon bulb which is connected to the plate side of the Pi-network through a 2 mmf capacitor. Although no adverse effects have been experienced with this arrangement in the 2-NT, other experiences with r.f.-excited neon bulbs have indicated their being prone to introducing harmonics and causing TVI.

Keying

As shown at fig. 2, grid-block keying is used at the driver with the blocking bias keyed directly. At the same time, the keyed bias operates a relay-control tube which actuates the antenna-changeover relay, auxiliary contacts of which key the cathode of the oscillator. Additional contacts also key the muting circuits for the receiver.

A panel control makes it possible to obtain a relay-release delay of from zero up to about 5 seconds. With the control set for no delay, both the driver and the changeover relay are keyed simultaneously on and off, providing complete break-in operation as the relay fol-

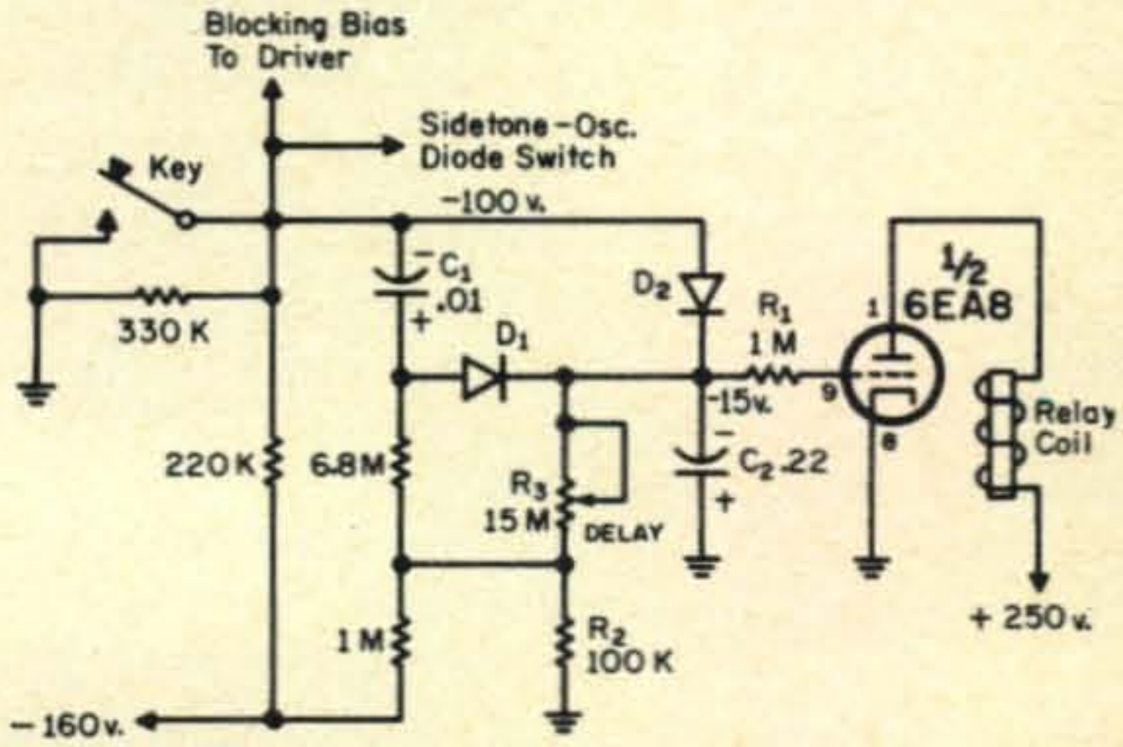

Fig. 2—Relay-control setup for keying the 2-NT. The negative voltage is higher on D_2 anode than at D_1 anode, so the polarity of the charge on C_1 is as shown. C_2 is negatively charged with about −15 v. which also is applied to R_1, supplying a bias which cuts off the tube. Closing the key grounds D_2 anode and C_1 discharges through D_1, thus applying a large positive pulse at the grid which makes the tube conduct and energize the relay faster than if the grid were simply grounded. Instantaneous action is thus better ensured. At the same time, the negative charge on C_2 charges through D_2 and the tube remains at ground potential as long as the key is down, thus maintaining tube conduction and energization of the relay. When the key is released, C_2 charges through R_2 and R_3 at a rate determined by the delay setting of R_3. During the discharge, a point is reached where the net voltage then cuts off the tube, deenergizing the relay. Also, at the same time the charge on C_1 reverts to the original state required for activating the tube with a positive pulse when the key is closed.

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lows the keying. For semi break-in (break-in between pauses), advancing the delay control holds the relay in for the duration of the delay time related to the control setting. Consequently, the oscillator continues to run during the delay period and the overall effect is somewhat similar to that which takes place with differential keying, thus ensuring chirpless keying.

"Manual" type of c.w. operation is obtained by actuating the transmitter with an external switch, such as a footswitch or a send-receive switch on a receiver, in which case the changeover relay holds in continuously, keeping the antenna transferred, the receiver muted and the crystal oscillator running during transmitting. Only the driver and the sidetone oscillator are keyed.

Where an external v.f.o. is used that has provisions for cathode keying, this can be accomplished with the 2-NT keying facilities through a rear-apron jack that is bridged across the relay contacts that key the crystal-oscillator cathode. The v.f.o. output plugs into one of the crystal sockets.

Sidetone Oscillator

The sidetone oscillator is a phase-shift type using a transistor as the active element. The a.f. output is obtained from the collector through a gain control which feeds it through the changeover relay to a phono jack on the rear of the set. The setup is shown at fig. 3.

When the Drake 2-C receiver is used in conjunction with the 2-NT, the sidetone output is then connected directly to the sidetone-input jack on the receiver which is already arranged for producing the sidetone signal at the receiver a.f. output for monitoring the keying. For use with other receivers, a receiver modification must be made which allows the sidetone output to be applied to the arm of the a.f. gain control or the grid of the a.f. amplifier.

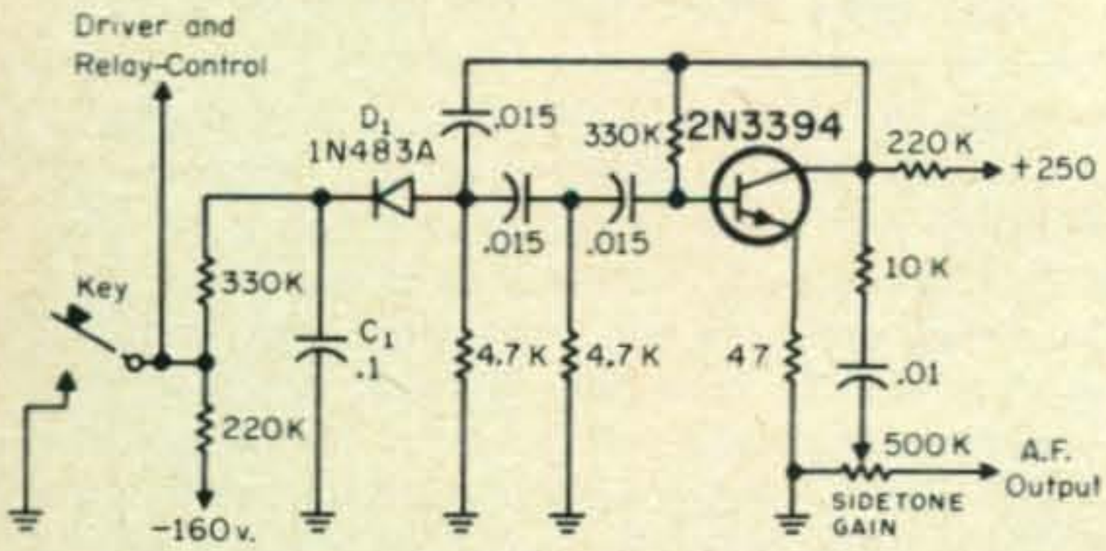

Fig. 3—Setup of the phase-shift sidetone-oscillator for the 2-NT. When the key is up, a negative voltage at D_1 cathode causes the diode to conduct, grounding the feedback circuit (through C_1) and thus disabling the oscillator. With key-down, D_1 cathode is grounded, the diode does not conduct, thus permitting the needed feedback for oscillation.

When this is done with receivers that do not have a muting system employing bias[1], the above connections will effectively mute the receiver a.f. amplifier by automatically shunting a 1000-ohm resistor across the amplifier input whenever the key is down. This is accomplished through contacts on the relay when the function switch is at the XMT position. This places a low enough load on the amplifier input to effectively cut off the signal from the receiver detector, but it is not a heavy enough load to prevent the higher level from the sidetone oscillator from passing on to the amplifier.

Power Supply

There are three secondary windings on the power transformer. One supplies heater voltage for the tubes and another supplies operating potentials of 250 v.d.c. for the low-power stages and 500 v.d.c. for the p.a. plate. It employs a voltage-doubling setup with silicon rectifiers. The third winding supplies screen voltage for the p.a. using a half-wave silicon rectifier. A variable control on the panel enables the screen voltage to be ad-adjusted for reducing the p.a. input to 75 watts with Novice use, or upping it to 100 watts for other operation. An additional half-wave rectifier at the third winding provides —160 v.d.c. for bias needs.

Operation and Performance

Tuning up the 2-NT is just about as simple as could be, requiring only that with the function set at XMT, you hold down the key (or remove it from the key jack which is located on the front panel) and adjust the *one* TUNE control for minimum cathode current indicated on the meter or for maximum brilliance of the r.f. indicator lamp.

For Novice operation the meter has a red dot on it at 150 ma. marked 75 watts, to which the meter reading must then be adjusted by the POWER-SET control on the panel. For other class operation the power-set control is fully advanced for 100-watts input which occurs near 200 ma. You're then ready to go just by keying the rig and adjusting the

[1]The 2-NT muting facility will also handle other muting systems in receivers that require a grounded normally-closed relay contact on receive with the ground lifted on transmit.

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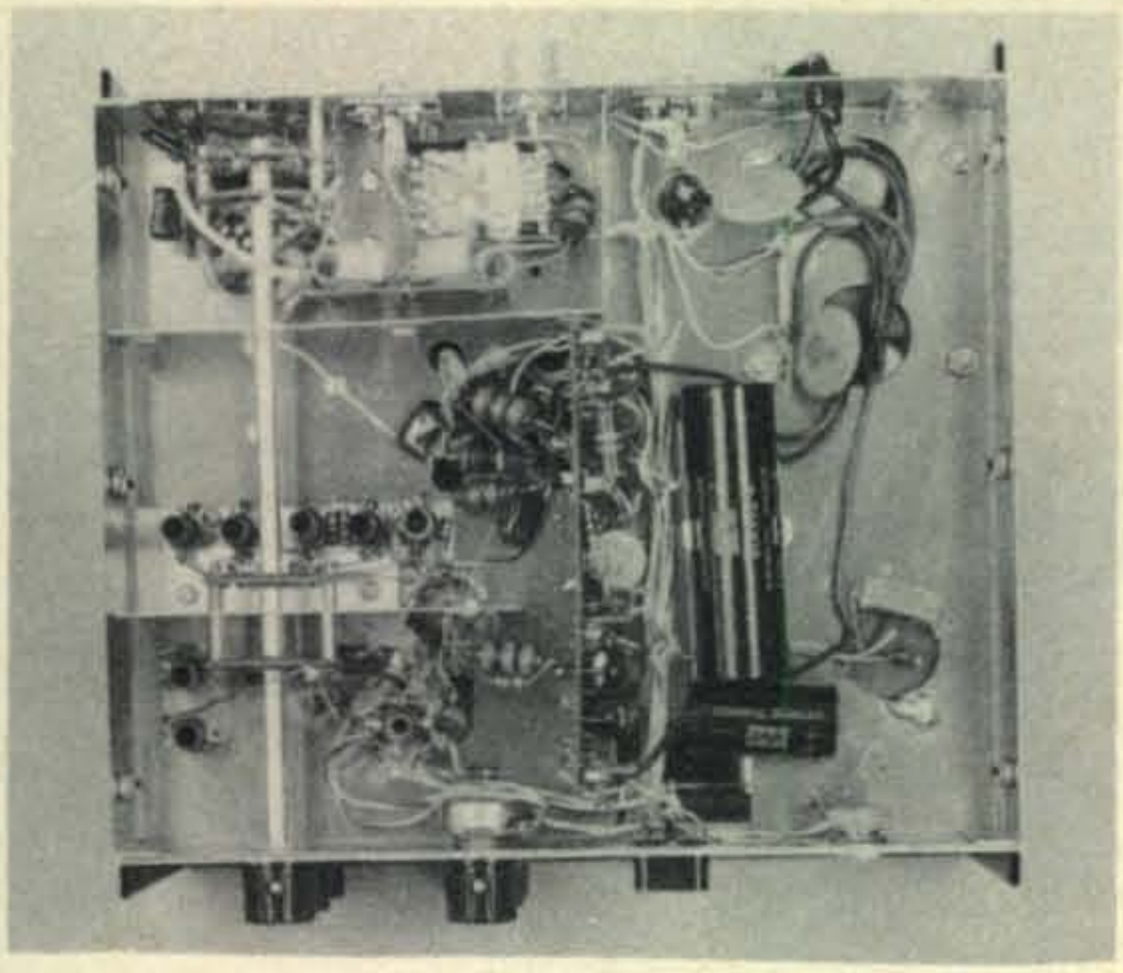

Below—Chassis view of the 2-NT. The oscillator is in the lower left compartment with the driver plate and the p.a. grid circuits in the left-center section. The changeover relay is in the upper-left section which is shielded on all sides. The low-pass filter (with the white inductors) is below the relay and next to the long side of the shield. Some of the power-supply components are on an edgewise mounted board at the center which also includes the keying-system components.

delay control (on the panel) as desired.

The above power levels were obtainable on our unit with a line potential of 117 v.a.c., in which case the plate potential is 500 v. With higher line voltages the latter runs accordingly higher as then does the input power. With 75 watts input, the r.f. output on all bands was 38 watts, with 100 watts input it was 60 watts.

The keying and the break-in setup were found to be a real delight. Observations by ear and visual displays on an oscilloscope indicated clean and crisp keying with no shortening of dots or dashes or changes in the dot-dash and space ratios at even high code speeds and with the changeover relay set either for complete break-in with no delay or for delayed semi break-in (as a matter of fact, there was no difference in the character formations using either method as is often otherwise experienced with v.o.x. type break-in keying systems to which this setup bears a similarity).

The keyed impulses are somewhat shaped at both edges for minimizing key clicks, but a slight click was noted on the break only within a few kc of the operating frequency and thus might be considered inconsequential.

The sidetone oscillator is exceptionally pleasant and clean sounding with a pure sine-wave measured close to a frequency of 800 c.p.s. A handy feature here is that besides monitoring your keying during c.w. transmissions, the oscillator may be used for code practice without actuating the transmitter. This is done by placing the function switch at STBY and plugging high-impedance headphones into the sidetone-oscillator output jack.

Also, if you do not wish to make the additional internal connections in receivers other than the Drake 2-C for monitoring the sidetone, you can use "split" headphones (or stereo ones) with one connected to the receiver and the other to the sidetone-output jack. On the other hand, phones may be used at the sidetone jack and a loudspeaker at the receiver or you can parallel the sidetone output with the receiver phones if the headphone jack is connected at a high-impedance point in the receiver.

With the transmitter placed next to a TV set and operating on any amateur band into a dummy load, no TVI due to stray radiation from the transmitter was experienced on any TV channel in spite of the fact that no extensive TVI preventitive measures in this regard are incorporated in the 2-NT, except for a shielded enclosure around the p.a. and simple bypassing for external leads, plus a perforated metal cabinet the back of which is open.

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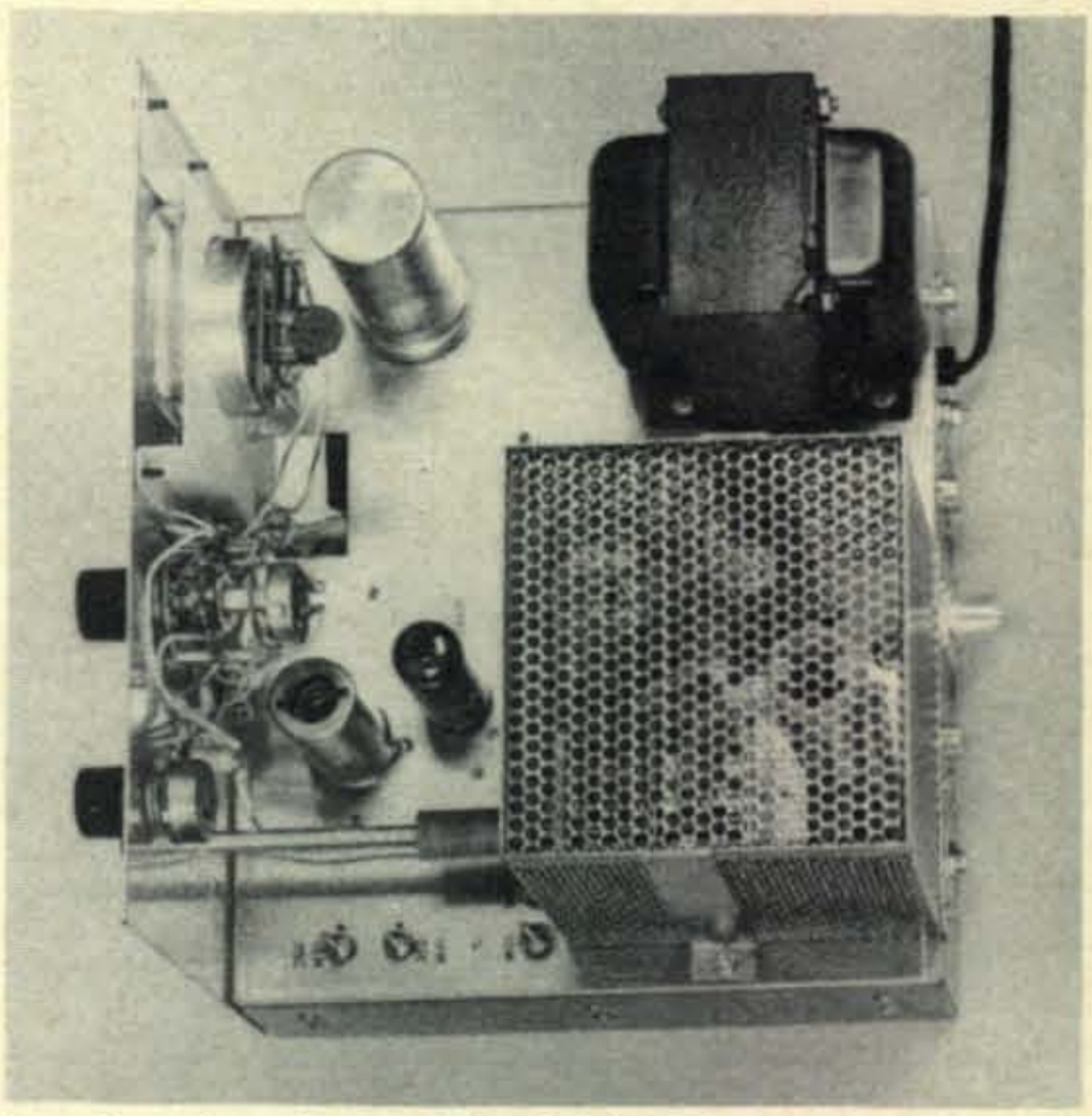

Top interior view of the 2-NT. The p.a. is located in the perforated-metal enclosure at the lower right. The unshielded tube at the left of it is the 12BY7 driver. The 6EA8 oscillator has a tube shield on it.

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A TRI-BAND QUAD AND 2 METER BEAM ON THE SAME MAST

BY WILLIAM R. SCHOPPE, JR.,* WB2FWS

UNLESS I missed it somehow, I couldn't find any articles describing an installation of a tri-band quad and a 2 meter beam on the same mast. The reason this type of arrangement was considered at all was due to the way this QTH is graded. The resulting combination of beams prompted me to describe some of the problems I ran into after the decision was made.

While I recognize that no two situations or installations are the same, it struck me that maybe there might be a few angles worth thinking about. With my particular limited plot size and severe terrain change, the problem more or less solved itself as I went along. I hope you will be as fortunate.

My property, (fig. 1), is fairly standard size for most suburban areas and runs kind of deep at the rear of the house. A rather severe terrain change in the last 50 feet or so plus some clustered and high oak trees added to challenge I faced in putting up a beam of any kind.

One of the original major concerns was a limited turning radius for anything I could put up unless I went to 70 or 80 feet to clear the trees. As it was, I had to negotiate with the XYL for several weeks to chop down one key oak tree in the spot where I thought the new tower should be located. After the tree was gone, the available space for turning a beam was about 10 to 12 feet. This narrowed the choice to a two element, tri-band quad with a turning radius of 9 feet, 6 inches. If you compare this with the average 2 or 3 element yagi, I was way ahead already.

*31 Penny Dr., Huntington Station, N.Y. 11746.

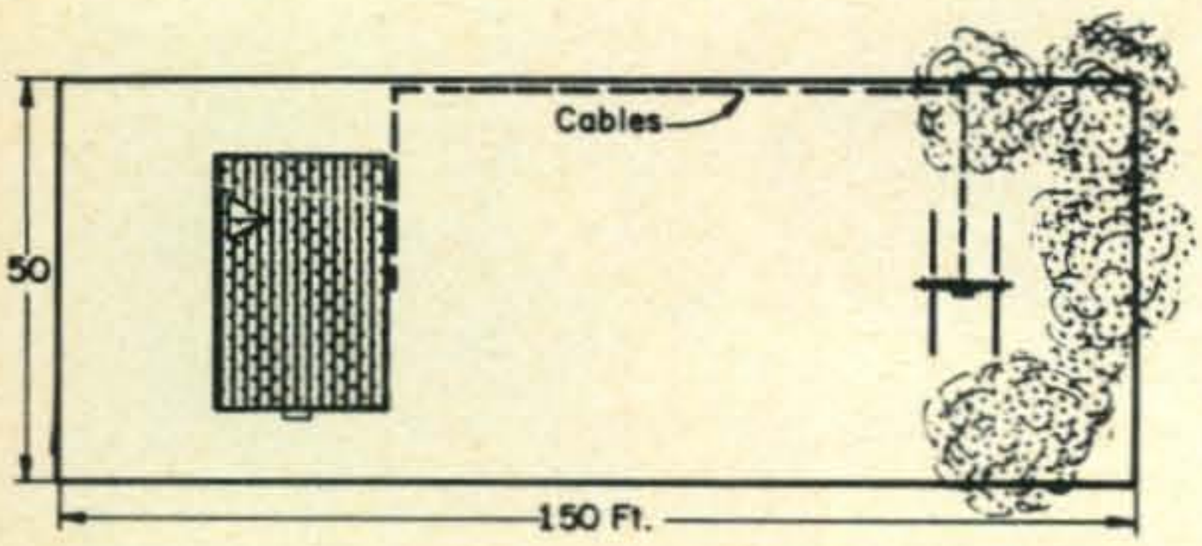

Fig. 1 — Layout of the property on which the tower is located. One oak tree had to be removed to make room for the assembly.

The Tower

As far as a tower was concerned, there was no choice left open in that situation. It boiled down to simple economics; an equivalent 50 foot (which was the size I had in mind) crank-up, tilt-over tower was far more expensive than I was prepared to consider. The most logical solution seemed to be the type of tower which comes in 10 foot sections which, when assembled, can be bolted to a hinged base plate and raised from the horizontal position. Also, the tilt-over tower would have only done me some good if it cleared the trees and that, coupled with a good tri-bander and the heavy-duty rotator needed to turn it would have necessitated a win in the N.Y. State lottery to pay for it.

The subsequent choice was a tower consisting of four 10 foot sections and one 10 foot mast and rotor section making up the 50 feet, overall. This was assembled on the ground with two sets of glass-line and one of stranded aluminum guys pre-fastened and ready to hook up when the tower was vertical. With the aid of a few strong backs, it was raised and the guys were secured to anchors placed into the ground previously. None of the antenna work or assembly was done at this time; that was done later and hauled up to the top in two sections.

The antenna finally chosen was one of the types using fiberglass spreaders and weighing

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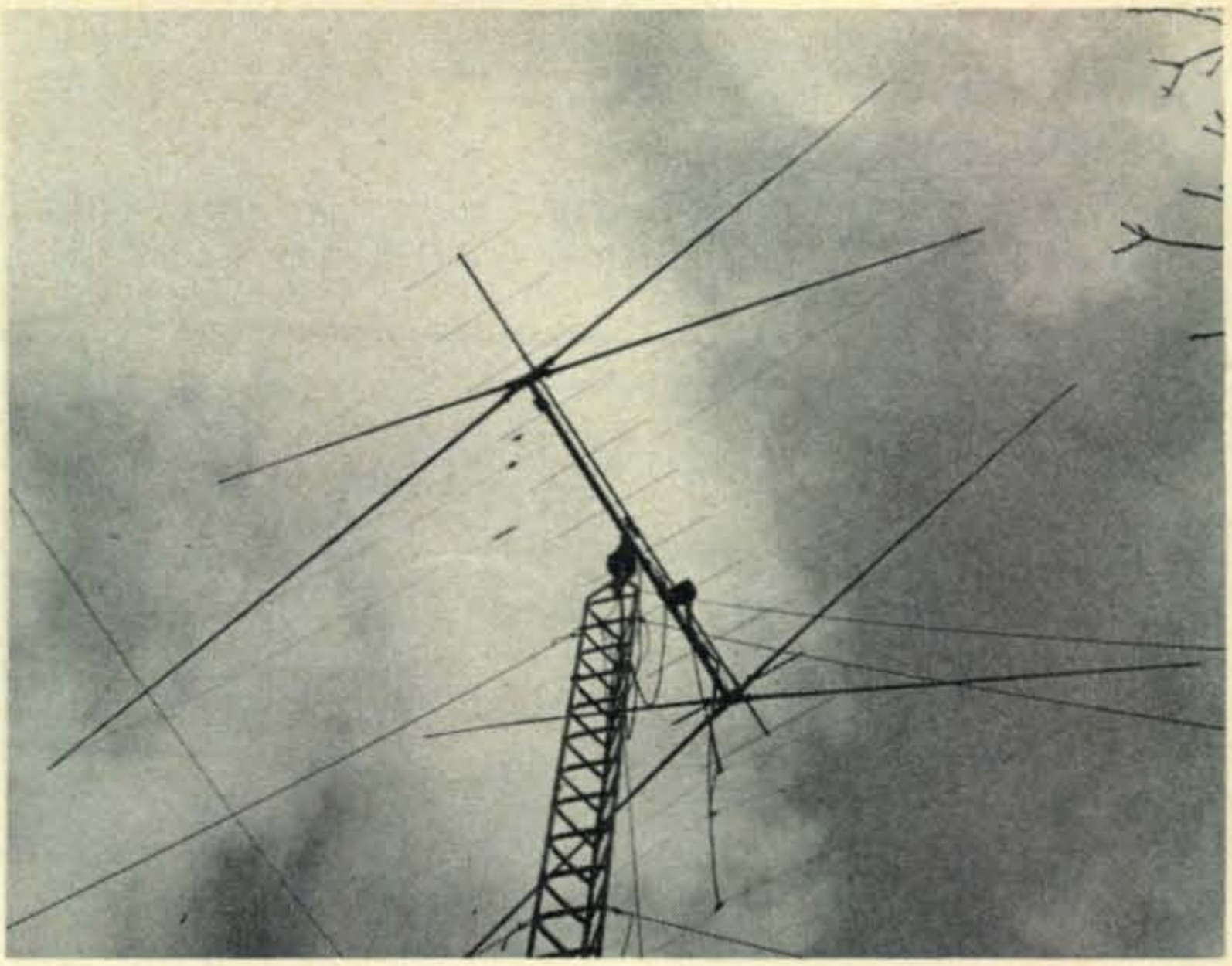

A worm's eye view of the 2 meter beam as seen through the tri-band quad antenna.

27 pounds. That took care of 20, 15 and 10 meters very nicely but since my interests also included 2 meters as well as 80 meters. I still had a lot of work ahead of me.

2 Meters

The 11 element 2 meter beam was at that time mounted just above the house on the roof and because of the rising terrain, (fig. 2), in the most-used direction, faced right smack into the side of the hill. It became obvious that a change was necessary and the first thought was to put it on the new tower. With the conventional type of yagi, I could have just extended the mast a few feet and put it above but with a quad up there, it was quite another matter.

One problem made others and in this case, the initial problem became three-fold. First, would placing the 2 meter beam inside the quad cause any change in the lobes or operation of the quad? Second, would the extra losses introduced by the now excessive feed line necessary to reach from the tower to the shack make it prohibitive to operate 2 meters? Third, since the direction I wished to cover was generally in two different directions, could I utilize the same rotator?

Since I do not consider myself an antenna expert, I tried to reason out some of the answers. It seemed to me that because the 2 meter beam boom would be run parallel and just above the quad boom and the nearest wire elements were a couple of feet away, there would probably be no discernible interaction. As far as I can tell, this later proved to be the case.

The second phase, concerning losses due to the longer transmission line, sent me to the reference books. The handbooks indicated that for a distance of 100 miles, the difference of starting at a 0 to 10 foot height and thence to 50 feet was a difference in gain of from −4 db to +2 db, respectively.

Referring to fig. 2, it will be seen that even though I would be picking up 50 feet by going to the tower plus about 20 feet from the rising terrain, I would be incurring a loss in the transmission line of about 2.5 db per 100 feet or about 5 db in all. (I suppose I could have used RG-17/U instead of RG-8/AU but the price of 200 feet plus the associated fittings was rather expensive). Anyhow, since this was not the ultimate in installations, I decided to take my losses and mount the beam anyway.

The third problem, that of a turning device, was somewhat simpler to solve. The rotator I was using to turn the quad was of

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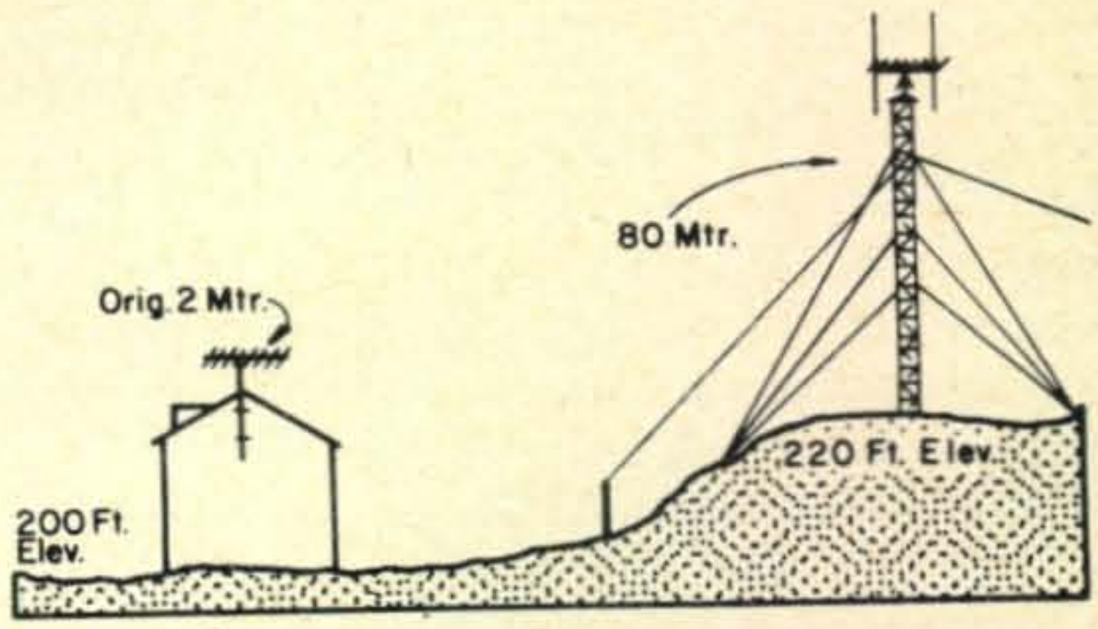

Fig. 2—Lot elevation showns gain in height obtained by moving the two meter beam and the location of the 80 meter inverted vee.

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The Results of the 10th Annual CQ 160 Meter Contest

BY CHARLES M. O'BRIEN,* W2EQS

UNFORTUNATELY, for most of us, the Ionosphere was not its usual well behaved self this year, but, although we reached the poorest conditions possible for the lower frequency bands, we were not as bad off as we might have been as there were many DX QSOs made and countries worked. And, the spirits of the 1,151 hams who participated apparently weren't dampened particularly when one realizes we had more stations on this year than last. However, the consensus of opinion from all sectors of the country, as noted from comments in various logs, indicated that conditions were fair to poor or good to fair... all according to how one looked upon them.

Last year we struck the very finest conditions of the entire season over this weekend. This year we missed the peak by one to two weeks. However, considering the peak of the sunspot cycle, again, we cannot complain too bitterly because if one were to check his logs for the previous peak he would find nary a DX QSO or, at best, only an occasional one. We can look upon this in three ways: 1) The sunspot cycle did not hit the all time peak of the previous one. 2) Better antennas have been put to use by the 160 gang: 3) there were more DX stations participating thereby giving us the opportunity of working them when band conditions did open.

It has been noted on the East Coast that when commercial station KPH on 2045 kc in San Francisco is rolling in, there have been no openings to Europe. On the other hand, when KPH is weak, European signals have broken through and, at times, with strong signals. For conditions to South America might we suggest you check WNU in New Orleans on 2048 kc. For the western and Pacific areas check WCC on 2036 kc and located in Massachusetts.

Although activity didn't "seem" as great as the past two or three years, look at the total QSOs, the multipliers and the different countries worked by many of the boys. The greatest number of QSOs ever amassed by a single operator was that of DL9KRA who had 266 to his credit. A really outstanding performance. Look at these figures, too...

Top 10 Scores

KV4FZ	78,750	W9YB	28,726
DL9KRA	45,942	W9EWC	27,216
W3IN	33,770	W9UCW	26,316
W3DPJ	32,340	W9YYG	26,214
K1PBW/4	28,728	W8TJQ	25,092

	1968	*1969*
Highest number of QSOs	256	266
Highest multiplier	56	55
Highest number of countries worked	18	18

Again, as last year, we had activity from 47 States with Alabama, Wyoming and Alaska being the only ones missing. Last year the missing three-some was Nebraska, Utah and Alaska. Wouldn't it be wonderful if we could get all 50 on? Logs were received from all of the participating States. To the north of us we again had stations participating from all of the Provinces with the exception of New

This is Jan, DL9KRA on CE3CZ's porch, admiring VFB permannent 160 antenna.

*48 Prospect Ave., Westwood, N.J. 07675

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The first column indicates the number of contacts, second is the multiplier, third is the number of different countries worked and the last column is the final score.

CONNECTICUT

K1KSH	190	42	8	17,976
W2WY	164	38	7	14,516
K1LMO	140	35	6	11,200
WA1FDV	115	27	3	6,426
W1TX	20	13	2	624
W1AW	14	6	1	168

MAINE

W1UOT	82	26	2	4,264
K1OYB	45	19	4	2,014

MASSACHUSETTS

W1BB/1	85	45	12	16,290
WA1FHU	126	34	3	8,908
W1AX	60	27	4	3,672

NEW HAMPSHIRE

W1FZ	81	28	4	4,984

RHODE ISLAND

W1HLY	50	17	2	1,700

VERMONT

W1TH	87	28	2	4,972

NEW JERSEY

W2FJ	184	45	10	19,800
W2FQS	192	41	8	17,712
W2IU	157	42	8	15,540
W2TA	176	36	4	13,248
WB2OZW	136	33	4	9,504
W2HUG	123	34	4	8,908
W2KHT	104	31	5	7,192
W2BP	71	31	6	5,642
W2CVW	54	20	3	2,320
W2DEN	49	16	3	1,696
W2EM	45	16	2	1,440
W2AZO	41	15	2	1,230
W2MNK	34	10	2	680
WB2FUO	16	4	1	128

NEW YORK

W2GNC	191	44	8	19,624
W2UWD	180	39	6	15,600
WA2FDF	103	29	2	5,974
W2SN	82	24	4	4,320
W2HXI	61	22	3	2,860
WA2JZX	19	10	2	280
W2BXS	15	6	1	180
W2IP	17	5	1	170
WB2SIH	5	4	1	40
WA2HIQ	1	1	1	2

DELAWARE

W3MK	64	19	2	2,432
W3EJU	49	22	2	2,156
W3NYG	48	18	2	1,728

MARYLAND

W3IN	255	55	10	33,770
W3DPJ	258	55	10	32,340
W3AXW	85	30	3	5,340
W3GN	74	24	2	3,552

PENNSYLVANIA

W4WUY/3	204	49	9	23,128
W3TV	182	41	4	15,581
W3BUR	177	40	5	15,120
W3WGH	165	37	4	13,172
W3AJS	132	25	2	6,600
WA3BGN	66	26	4	3,848

FLORIDA

W4BGO	163	48	8	17,952
WA4SGF	113	36	6	9,360
W4BRG	53	24	5	3,312
WB4JSV	54	23	3	2,806

GEORGIA

W4YWX	103	35	4	7,770

KENTUCKY

W1PBW/4	242	54	8	28,728

NORTH CAROLINA

W4OMW	102	29	3	6,148
W4CDZ	44	21	2	1,848

SOUTH CAROLINA

WA4LDM	144	40	5	12,480
WA4YZC	48	20	3	2,080

TENNESSEE

W4HYY	116	37	3	8,880
K4NBV	85	28	4	5,208
W4ZZ	30	17	1	1,020
W4UD	14	8	1	224

VIRGINIA

K4GSP	119	34	3	8,364
WA4RGH	57	19	1	2,166

ARKANSAS

WA5KUD	57	24	2	2,736

LOUISIANA

WA5OID	1	1	1	2

MISSISSIPPI

K4RIN/5	69	30	3	4,380
K5MZU	49	22	2	2,156

NEW MEXICO

W5DO	121	40	4	10,320
W0VEH/5	92	32	3	6,144
W5SOT	43	24	3	2,256

OKLAHOMA

W5EHY	47	21	1	1,974
K8CGM/5	25	15	1	750

TEXAS

W5HAI/5	182	48	5	18,624
W5FIX	78	35	5	6,300

CALIFORNIA

W6JTB	123	33	6	9,174
W6GEN	96	34	6	7,616
W6ERS	96	28	7	6,496
W6GWQ	47	20	3	2,040
W6BHZ	46	15	3	1,500
W6YC	36	13	3	1,200
W6JEK	31	11	2	770
WB6JSY	35	11	1	770

ARIZONA

WA7BOA	44	16	3	1,536
W7GLL	6	2	1	24

IDAHO

W7DY	51	24	2	2,448
W7IWU	30	18	2	1,080

MONTANA

W7GBL	40	22	2	1,760

NEVADA

K7ICW	46	17	3	1,734
K7ZQV	32	16	2	1,024

OREGON

W7AVV	59	21	5	2,940
K7YXS	13	7	2	182

UTAH

W7ZC	75	30	4	4,980

WASHINGTON

W7DL/7	100	37	7	9,768
W7JLF	13	7	2	182
W7HTL	11	4	2	88

MICHIGAN

W8TJQ	230	51	6	25,092
K8HKM	196	45	3	18,360
K8BYI	190	38	2	14,440
WA8EMJ	157	42	5	14,196
K8VQP	150	42	5	13,608
WB8AAJ	130	31	2	8,060
W8MAI	108	31	2	6,696
WA8OLN	54	18	2	1,944
W8CC	7	6	1	84
WA8ZGF/8	4	2	2	32

OHIO

K8EEG	184	47	2	19,834
WA9AJZ	138	36	4	10,512
K8RYU	113	32	2	7,232
W8EX	64	25	4	3,600
W8WEG	4	2	1	8

WEST VIRGINIA

W8VVE/8	149	36	4	11,376
K8UZX	126	33	2	8,316
W8HZA	100	29	2	2,900

ILLINOIS

W9UCW	242	51	6	26,316
W9YYG	233	51	7	26,214
W9PNE	204	50	5	21,500
W9DY/9	158	42	4	13,944

INDIANA

W9YB	246	53	6	28,726
K9YWO	220	53	7	25,440
WA8ADB/9	183	42	4	16,044
W9DPL	33	17	2	1,122

WISCONSIN

W9EWC	228	54	8	27,216
W9KOG	199	50	4	20,600
K9GZK	158	45	4	14,940
K9DJB	96	32	2	6,144

COLORADO

WAØCVS/Ø	128	39	4	9,984
KØQIX	101	34	2	6,868
WAØLRW	42	24	2	1,968
WØQPO	26	12	3	720

IOWA

WØNFL	192	46	3	17,848
WØII	101	36	3	7,650
WØRFT	103	31	2	6,286

KANSAS

WØGDH	183	47	4	17,954

MINNESOTA

WØAIH	212	49	5	21,952
WØRHI	59	25	2	5,950

MISSOURI

WØAV	95	32	3	6,336
WØBV	92	34	2	6,265

NEBRASKA

WØVEA	37	21	2	1,554

NORTH DAKOTA

WØSDN	117	38	2	8,816

SOUTH DAKOTA

WØIT	115	37	2	8,510
KØLXD/Ø	79	33	2	5,214

NEWFOUNDLAND

VO1FB	33	19	10	3,439
VO1HN	11	9	2	198

NOVA SCOTIA

VE1ZZ	101	34	12	12,952

QUEBEC

VE2IL	52	20	3	2,240
VE2SD	47	18	2	1,692

ONTARIO

VE3BWY	150	35	3	12,780
VE3QU	125	35	5	9,590
VE3DU	109	33	2	7,194

MANITOBA

VE4JB	71	24	2	3,408

SASKATCHEWAN

VE5UJ	46	22	2	2,024
VE5JI	41	21	2	1,722
VE5DT	29	17	2	1,020
VE5QB	7	5	2	60

AUSTRALIA

VK5KO	3	3	3	51

AUSTRIA

OE1KU	68	6	6	2,004
OE5CD	44	5	5	1,085

BAHAMA ISLANDS

VP7NY	22	16	2	3,440

BERMUDA

VP9BO	73	23	4	16,491

BRAZIL

PY2BJH	13	11	7	946

CZECHOSLOVAKIA

OK1ATP	178	18	17	12,546
OK2BOB	157	16	16	9,312
OK3BU	142	15	15	7,185
OK1KYS	126	16	16	7,184
OL1AKG	129	13	13	5,915
OK1STU	122	14	14	5,894
OL6AKO	108	13	13	4,927
OK2HZ	112	12	12	4,716
OK2ZU	114	12	12	4,608
OK1KRS	11	12	12	4,584
OK1MGW	107	12	12	4,020
OK2HI	103	10	10	3,530
OK1AHZ	89	12	12	3,480
OK1WC	114	9	9	3,471
OK1AES	96	9	9	3,087
OK2BOL	107	9	9	3,042
OK1FAB	96	9	9	2,808
OL6AKP	87	8	8	2,048
OK1AJY	67	9	9	1,827
OK2BEC	77	8	8	1,720
OK1AIJ	70	6	6	1,696
OK2PAE	59	6	6	1,050
OK3TBC/P	56	6	6	942
OK1FAR	61	6	6	930
OK2BJJ	53	6	6	924
OK2LN	52	7	7	896
OK1ZW	51	6	6	846
OK1MSS	50	6	6	750
OK3CDE	44	6	6	636
OK2BHD	39	5	5	555
OK2BNZ	35	6	6	528
OK1AVN/P	27	5	5	465
OK1XG	46	4	4	428
OK2BOT	41	3	3	264
OK1AUI	35	2	2	146
OK1MAA	28	2	2	90
OK1IAG	6	1	1	12

EIRE

EI9J	96	13	12	6,370

ENGLAND

G3SED	238	23	15	19,665
G3IGW	209	16	15	11,072
G3KAC	189	17	15	10,744
G5RP	206	15	14	9,870
G3SVW/A	145	14	14	6,636
G2DC	145	13	13	6,331
G3VIP	128	13	13	5,785
G3PVA	140	11	11	5,324
G3UXB	117	11	11	3,674
G3TR	111	11	11	3,586
G3SXW	92	11	11	3,531
G3JVJ	47	12	12	2,244
G4RS	46	10	10	1,720
G3PKS	22	8	8	592

FINLAND

OH2VO	1	1	1	5

GERMANY

DL9KRA	266	31	18	45,942

GUERNSEY

GC3UJE	257	21	17	28,518

HAWAII

KH6GLU	15	7	3	875

ISLE OF MAN

GD3TNS	36	8	8	1,440

JAPAN

JA2CLI	21	7	5	896
JA3AA	7	3	2	90
JA1PIG	3	1	1	6

NETHERLANDS

PAØPN	47	10	10	3,210

NORTH IRELAND

GI3WSS	49	7	7	1,631

PARAGUAY

ZP9AY	3	2	2	30

SCOTLAND

GM3KMR/A	213	16	15	16,224

SWITZERLAND

HB9CM	41	14	12	3,066
HB9QA	59	9	9	2,502
HB9NL	43	9	9	1,494
HB9UD	33	7	7	1,113

TURKEY

TA2E	18	4	4	360

VENEZUELA

YV10B	43	17	3	6,290

VIRGIN ISLANDS

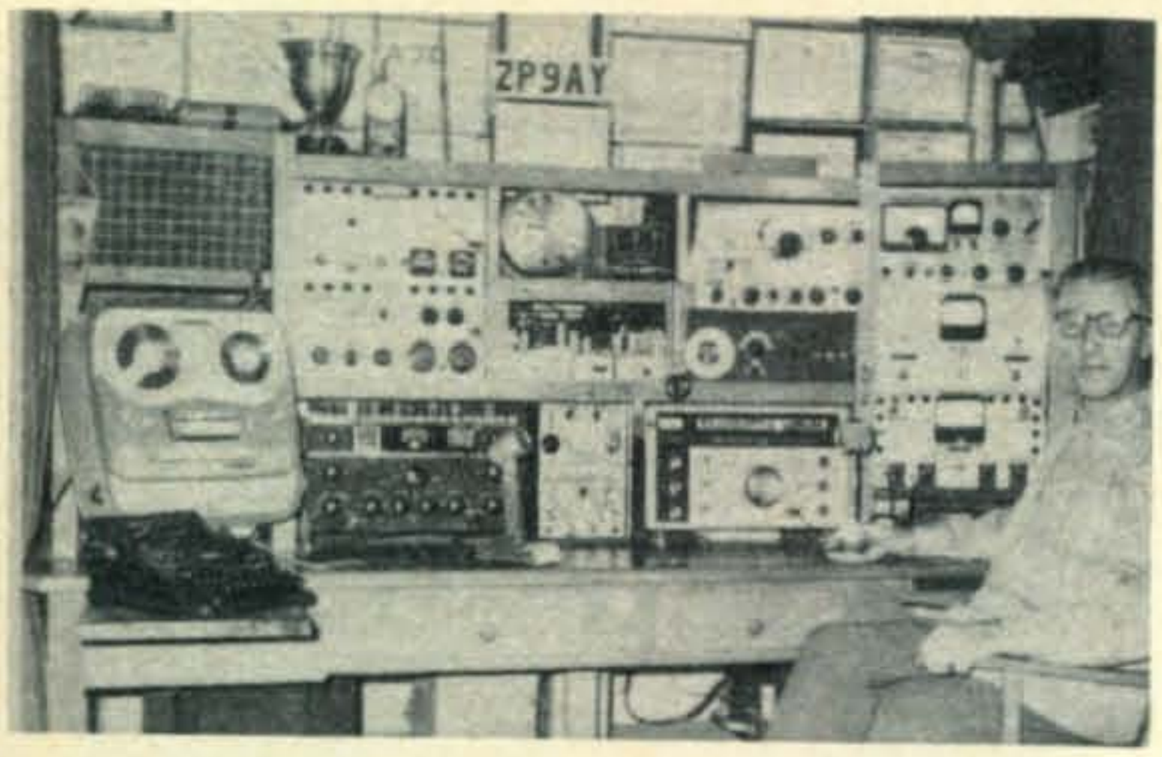
KV4FZ	170	50	14	78,750

WALES

GW3XSQ/A	107	14	11	7,672

Check logs are gratefully acknowledged from OK1KWP and OL5-ALY.

See page 110 for New Reader Service



This is ZP9AY. How do you like that for a set-up, boys?

Brunswick, Prince Edward Island and North West Territory—the same as last year.

Most amateurs aren't aware of the extent of 160 meter DX activity. Here's what was on: CO, DL, EI, G, GC, GD, GI, GM, GW, HB, JA, KH, KV, OE, OH, OHØ, OK, PA, PY, SP, TA, VE, VK, VP7, VP9, W, XE, YU, YV and ZP.

I want to express appreciation to the phone boys for their courtesies. Only a few operated in "DX Alley" which is 1825/1835 kc. But, many of our own c.w. operators, some of whom should have known better, ignored this fact. Therefore, may we request that this 10 kc be kept open? For those of you who are unaware, DX looks for our signals between 1800/1807 kc. Regarding you fellows out in the West, DX has been requested to make more use of 1995/2000 kc. in view of the fact that Loran in your areas kills their signals in the 1825/1835 portion of the spectrum.

May we once again make this request? Please be sure to sign your call letters to your logs. Every year we run up against a few very neatly recorded logs but no indication of the call. It takes a very time consuming process of checking before we are finally able to determine whose log it actually is. An important point for the DX boys to note. A QSO to each separate State and Canadian Province (including VO) gives you an extra multiplier plus the 10 points for such a contact. But, on top of this you cannot count the United States and Canada/Newfoundland as separate country multipliers, too. In the past Contest some DX credited themselves with 10 points for their QSO with KV4FZ. The Virgin Islands is a territory—not a State—and, therefore is a 5 point contact. Contacts by W/K, VE/O to KV4 *count as 10* pointers, though, as it is a DX country.

For all of you to make note of . . . this is a CW to CW Contest only; CW to phone QSOs are not permitted nor are any cross-band contacts allowed. This Contest is a yearly event that is scheduled to run the last full week-end of January. A most attractive certificate shall be sent the winners in each State, Province and DX country. In cases where scores are close a certificate shall also be sent to second and third place contestants. All logs should be submitted directly to W2EQS.

Comments? Often this makes the most interesting part of the story. What contest would be complete without them! Well, here they are . . .

1st District

W1BB/1: Band for western DX between 1975/200 kc was really fouled up. It would be almost impossible KH6 and even W6s/W7s in this segment during a Contest with so much additional QRM there. It put quite an effective blanket over the weaker DX stations. *K1KSH:* The Contest was enjoyable as ever—QRN and poor conditions notwithstanding. Each succeeding year is more enjoyable than the previous one. *W1TX:* Convalescence from open heart surgery limited my operating time. Conditions seemed quite good while on. (Understand your coming along in great shape, Roy. Fellows, W1TX was the Team Captain at PJØCC who put that country on 160 during the *CQ* WW Contest in November—*ed.*). *WA1FHU:* I had to work much harder this year for fewer QSOs than last year for more. Oh well, it was just very fine.

2nd District

W2TA: This was a fun Contest!! (John is the other big wheel behind that PJØCC operation. He, himself, put up a full wave, 520 feet, which ran 200 feet above a salt water inlet and pointed on the U.S. Many of you may remember him as ex-W2ADE). *W2HUG:* I just wasn't getting out this year. Guess it's the sunspots. That got me disgusted so I didn't put in as much time as usual. *K2KHT:* Know I did poorly but still enjoyed meeting old friends even in that horrible QRN. Tough Contest on evening shift worker. Going to play hookey next year. *W2BP:* The Contest certainly was a din! On what other band can you find such heavy QRM because there is no skip, QRN when you least need it, c.w. and phone Clobbering DX Alley and, frankly, real politeness on the part of all contestants. Got back on 160 in July of 1968 being absent since 1937. (You're doing a great job, Al—*ed.*).

3rd District

W3MK: Heard three other Delaware stations during the Contest so we had a bit better repre-

[*Continued on page 96*]

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DX

BY JOHN A. ATTAWAY,* K4IIF

"Adventure was his coronal, and all his wealth was wandering."
—HENRY HERBERT KNIBBS

This month we honor a new member of the DX Hall of Fame, Danny Weil, VP2VB, pioneer of the great worldwide DXpedition. For almost eight years, from August, 1955 to March, 1963, Danny made DX history around the Caribbean and across the Pacific. He had more narrow escapes from death than 100 average men would expect while pursuing peaceful occupations. His exploits will live on as long as little groups of amateurs gather to reminisce about the "good-ole days" of DXing.

Danny started with a goal, to be the first Englishman to circumnavigate the globe single-handedly. He left England in August, 1954 on the original *Yasme*, a 40 ft., 21 ton "Bermudian" sloop which he had purchased as salvage in 1949, and painstakingly rebuilt by his own hand in what time he could spare from his occupation as a watchmaker. The *Yasme* had ham gear consisting of a 30 watt final (1625 tube) and a BC-348 receiver powered by 24 volt storage batteries. His callsign, unofficial, was G7DW/MM.

Danny hopped from island to island, finaly arriving in St. Thomas (KV4) in the spring of 1955. On St. Thomas he met Dick Spenceley, KV4AA, then DX Editor of *CQ*. Dick called Danny's attention to the common interests he shared with DXers, and arranged to convert the *Yasme's* voyage into the longest DXpedition of all time. As the first step Dick taught Danny the code and helped him obtain the official call VP2VB from the British authorities on the neighboring island of Tortola. The *Yasme* was outfitted with two Elmac AF-67 transmitters, and Elmac PMR-6A and Hammarlund HQ-129X receivers, and Danny departed for the Pacific via the Panama Canal.

In the Canal Zone Danny acquired his second ham call, KZ5DW, and the *Yasme* was thoroughly fitted out for the long Pacific voyage, where his first official stop was Tahiti. He opened up on Dec. 18, 1955 as FO8AN, the initial DX operation of the great venture. After Tahiti he set sail for Canton Island where he used the call in making 4800 QSO's, followed by Nauru Island, VK9TW, in July, 1956 with 2500 contacts, and Guadalcanal, VR4AA, with 1650 contacts. Enroute from Guadalcanal to Port Moresby, Papua he encountered hurricane force winds which resulted in considerable damage to *Yasme*. It was necessary for him to be towed into port by a rescue vessel. This was one of his many close brushes with death.

From Port Moresby Danny set sail for Australia, with plans to proceed to Timor, the Laccadives, Maldives, and Aldabra. However, on Oct. 24, 1956, one day out on the next leg of his trip, the *Yasme* struck an uncharted reef and sank with the complete loss of all gear. Danny survived thanks to a rubber dinghy dropped from a rescue plane.

This loss, completely uninsured because of prohibitively high premiums, might have stopped lesser men. However, Weil, Spenceley, and the other *Yasme* backers started to work immediately to obtain *Yasme* II. Danny arrived in San Francisco on Dec. 2, 1956 and began a speaking tour of radio clubs all across the U.S. It soon expanded into a general interest tour including talks to laymen (non-DXers) and radio appearances. In April he appeared on the Groucho Marx TV show.

Danny Weil, VP2VB, as he appeared in February, 1959 on the occasion of the loss of the *Yasme* on the rocks of the Grenadines. This was one of the many occasions where Danny almost lost his life during his great 8 year DXpedition of a decade ago.

*P.O. Box 205, Winter Haven, Florida 33880

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DX Hall of Fame

Gus M. Browning, W4BPD
Nov. 1, 1967

John M. Cummings, W2CTN
March 23, 1968

Stewart S. Perry, W1BB
August 16, 1968

Richard C. Spenceley, KV4AA
March 1, 1969

Danny Weil, VP2VB
September 15, 1969

By August 6, 1957 Danny had succeeded in raising enough money to buy *Yasme* II. He then adjourned to the British Virgin Island to make over 2000 contacts as VP2VB before leaving for England on Aug. 18, 1957. On Sept. 10 he purchased a new vessel in Scotland, and embarked for his home port in the south of England. However, the boat blew up enroute, and Danny was again lucky to escape the grim reaper, this time by clinging to a buoy until rescue arrived. Fortunately there was insurance and Danny was able to resume his search for a new *Yasme II* without delay.

In November, 1957 he acquired a solid teak 50 foot yawl, built in 1912, and began to prepare her for a DX cruise. However, trouble struck again when the new craft broke it's moorings during a storm and was badly damaged. Repairs and modifications were finally completed and a new rig, Hallicrafters HT-32 and SX-101, was installed and ready for action. On May 13, 1958 he passed through the Madeiras, and in July he opened up from Aves Island with the call YVØAB. Following this successful operation he again activated VP2VB as part of a Caribbean swing including VP2KF, VP2AY, VP2MX, VP2KFA, VP2DW, VP2LW, VP2SW, VP2GDW, VP4DW, VP7VB, VP5VB, and HKØAA. But unfortunately, disaster struck again during this stretch when, you guessed it, *Yasme* piled into a jagged rock off the lightly populated Grenadines. Danny was rescued by the native populance of an adjacent island.

Surely this would have stopped most anyone cold, but not Danny Weil. Thanks to the replacement of the gear by Hallicrafters, and donations from all over the amateur world, Danny fitted out *Yasme III* in the spring of 1960, complete even with gear for 160 Meters. It was this last vessel that he used in activating FO8 (Clipperton), HC8VB, FW8-DW, and VR2-land before his retirement from DXing in the spring of 1963.

At present Danny resides on a 5 acre farm in Seguin, Texas, near San Antonio, where he is employed by General Dynamics. The great adventurer has settled far from the sea, but the sound of the crashing breakers must still be in his ears.

De Extra

In Geoff Watts DX News-Sheet, issues No. 382 and 383 dated July 22 and July 29, respectively, mention is made of an "operator" who allegedly collected $200.00 in donations for a DXpedition to CR8-land, although he apparently never intended to go there. This same "operator" was also alleged to have received a substantial plane fare for a DXpedition last year which never came off.

Even though Geoff's excellent bulletin is usually too concise for lengthy editorial comment, he took the time to propose a solution to this donations dilemma. He suggests that DXpeditions which cannot be financed without donations should take place only with the help and approval of the national radio club or society of the operators concerned, or some other responsible organization such as the International Amateur Radio Club. Geoff feels that this would eliminate the question of donating stations getting QSO preference over others, or of buying a QSL, and would make it possible to conduct DXCC matters on a more trusting basis than at present. As an instance of the continuing policy of fomenting distrust he cites the case of Andre, 5Z4KL, who has cancelled his upcoming trip to Uganda and returned all donations because of the attitude of ARRL in refusing to recognize his April DXpedition.

In announcing his September trip to Iwo Jima, KA9RC (WA4FLR), states that "no

SSB DX Honor Roll

K8ONV 293	SM5SB 305	K1IXG 288	MP4BBW 267
F2MO 292	W2ZX 305	W2LV 286	W8BVF 266
W2FXN 292	K6CYG 305	W6EUF 286	G2PL 265
WA2RAU 319	W6YMV 303	K8RTW 286	G2BVN 264
W2TP 318	WØQVZ 303	W9EXY 284	W2FXE 264
W9ILW 316	XE1AE 302	SM6CAS 281	W2MJ 261
VK3AHO 315	W2BXA 302	W3KT 281	W9OLD 261
W3NKM 315	G3AWZ 301	W1LLF 280	W6PTS 260
TI2HP 314	G3DO 301	W6UOU 280	W6WNE 259
W2RGV 314	G6TA 301	WA2EOQ 279	PJ2AA 258
DL9OH 313	G3HDA 300	W3FWD 279	K1SHN 257
WA2IZS 312	W4IC 300	W4RLS 279	PAØEEM 256
K6LGF 312	W9JT 300	K4OEI 279	W6BAF 254
W8DE 312	W4SSU 299	DL3RK 278	K6CAZ 254
G3FKM 310	5Z4ERR 298	DL1IN 276	HP1JC 252
KP4CL 310	VE3ACD 297	K4HYL 276	PAØSNG 252
W4NJF 310	K2DX 297	W7DLR 276	K4GXO 252
WA8AJI 310	W4OCW 297	PZ1AX 274	WA6GLD 252
W4OPM 309	W8BT 297	K9EAB 274	VE6TP 251
K6YRA 309	K8IKB 296	K9LUI 274	W1AOL 251
I1AMU 308	W4PAA 294	W6RKP 272	
G8KS 307	W8EVZ 293	G3NUG 270	
W5KUC 307	KØUKN 292	G3WW 269	

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The WAZ Program

Record 54 new certificates authorized. (Old record: 50 in August, 1968.)

C.W.—Phone WAZ

2720.....WA6LBP
2721.....W8MJG
2722.....W2ATJ
2723.....W9HHX
2724.....W9RER
2725.....ZL3GQ
2726.....K6JAJ
2727.....K3JLI
2728.....OH6NH
2729.....SP6BZ
2730.....OK1AII
2731.....DJ5EY
2732.....DJ1IJ
2733.....K1EIN
2734.....YO3RF
2735.....W6EUV
2736.....W3TVB
2737.....JA5LI
2738.....W2ZZ
2739.....I1FGP
2740.....W1DTY
2741.....W7BJ
2742.....WØLXQ
2743.....K3MNJ
2744.....K6OQF
2745.....ZS4AK
2746.....WA9IBT
2747.....WB2JYN
2748.....W8GMX
2749.....W2PPG

S.S.B.—WAZ

695.....K6CWS
696.....6W8DY
697.....WB2NXL
698.....I1WT
699.....DL6KG
700.....W1FXD
701.....W2CNQ
702.....HA5AM
703.....PAØXPQ
704.....W8VHY
705.....K6HXF/ZL3QN
706.....K8GQG
707.....VK4DO
708.....W6ZWK
709.....W7EZW
710.....ZS5LB
711.....ZS6DP
712.....G3UML
713.....JA1OCA
714.....JA1AG

Phone WAZ

414.....TG9UZ
415.....CR6GQ
416.....VK4DO
417.....YA1HD

donations are solicited, expected, wanted, nor will they be accepted." De Extra heartily

HC4 area which has 22 calls. Chimborazo, Canar, and Azuay, in south central Equador make up the HC5 area with 36 licenses, Cotopaxi, Tungurahua, and Bolivar constitute the 6th call area with 14 licenses, Napo Pastaza and Santiago Zamora with 8 licenses make up the 7th district, while the 5 HC8 stations are in the Galapogos Islands.

A.R.E. awards the certificate W.A.H.C. (Worked All HC) to amateurs who furnish proof of contact with 7 of the HC districts on c.w. or phone since November, 1945. To apply for this certificate write to A.R.E. at P.O. Box 289, Quito.

Amateurs licensed in Ecuador prior to 1953 hold permanent tickets. However, anyone licensed since that time must renew his license in person every year, unless he is incapacitated and unable to appear. The power limit is 1000 watts.

All HC amateurs are required to have an antenna and equipment for 40 meters for

The WPX Program

C.W.

955.....OE5CA
956.....OK3BT
957.....OK1ACF
958.....W2ZZ
959.....K6JAJ

S.S.B.

439.....CE6EW
440.....DJ1XU
441.....DL6UH/M
442.....OK2DB
443.....K1KNQ
444.....KR6TAB

Mixed

FLASH!

Due to a sudden upsurge in applications for the *CQ* SSB DX Award, the deadline for applications has been extended for one full year to Oct. 1, 1970. This action has been taken to permit further study of the award program to determine if the large number of new applicants was due to the impending Oct. 1, 1969 deadline or due to renewed interest in the award as has been suggested by some readers. The Honor Roll will also be continued until the December 1970. *CQ*.

national emergency use. Failure to have such equipment will prevent the renewal of a license. A license can also be cancelled by the Minister of Communication for violating the rules or not properly notifying his office that the station is no longer in use.

A.R.E. recommends that HC amateurs QSO non-USA stations outside the U.S. phone bands using the following sub-bands.

Band	C.W.	A.M.	S.S.B.
80	3.50-3.80	3.80-4.00	3.80-4.00
40	7.00-7.05	7.05-7.30	7.20-7.30
20	14.00-14.10	14.15-14.20	14.10-14.15
15	21.00-21.10	21.10-21.20	21.20-21.25
10	28.00-28.50	28.00-28.50	28.00-28.50

About RM-1393

The May, 1969 issue of the Monthly Bulletin of the Wireless Institute of Australia, page 5, commented favorably on RM-1393. This is the bulletin of the Council of New South Wales Division published at Wireless Institute Centre, Crows Nest, New South Wales. It pointed out that unless the recommendations of this petition are followed, almost all of the U.S. 40 meter c.w. operators will be concentrated between 7050 and 7100 kc. This is the phone band in Australia, New Zealand, and many other countries. As a consequence of the high power and 7 mc beams used by stateside hams they feel that their phone band will be a shambles.

Favorable action on RM-1393 would do much to preserve the faith of our oversea's friends in the U.S. system.

160 News

It is with deep sorrow that we report the death of Alice S. Perry, W1DQF, the XYL of Stewart Perry, W1BB. Stew writes that she passed away quietly in her sleep the night of June 18 at their country home "Villa Mon Repos" in Harrington, Maine. We will all miss this great lady.

S.S.B. DX Award

200 Countries

177.....VE3UR
178.....K8IKB
179.....VE6QD

100 Countries

574.....CT1IA
575.....K3JLK
576.....G2NH

Here and There

Your letters indicate that our new system of publishing activity from rare zones and prefixes is filling a definite need so we are continuing it. Callsigns and frequencies will be listed, but not times because so many of our readers live in widely divergent time zones. You should listen at the times appropriate for the part of the world in question, and consult your local DX bulletin for further information.

Rare Zone Activity:

Zone 18: UV9PP, Alex in Novosibirsk, 14206 kc s.s.b.

Zone 19: UAØKIP, 14085 kc c.w.

Zone 21: AP5HQ, 14037 kc c.w.; AP2MR, 21355 & 21385 kc s.s.b., QSL to VE3ACD; MP4TCM, 21318 kc s.s.b.; 7Z3AB, 14203 kc s.s.b.; and 9K2BU, 21252 kc s.s.b.

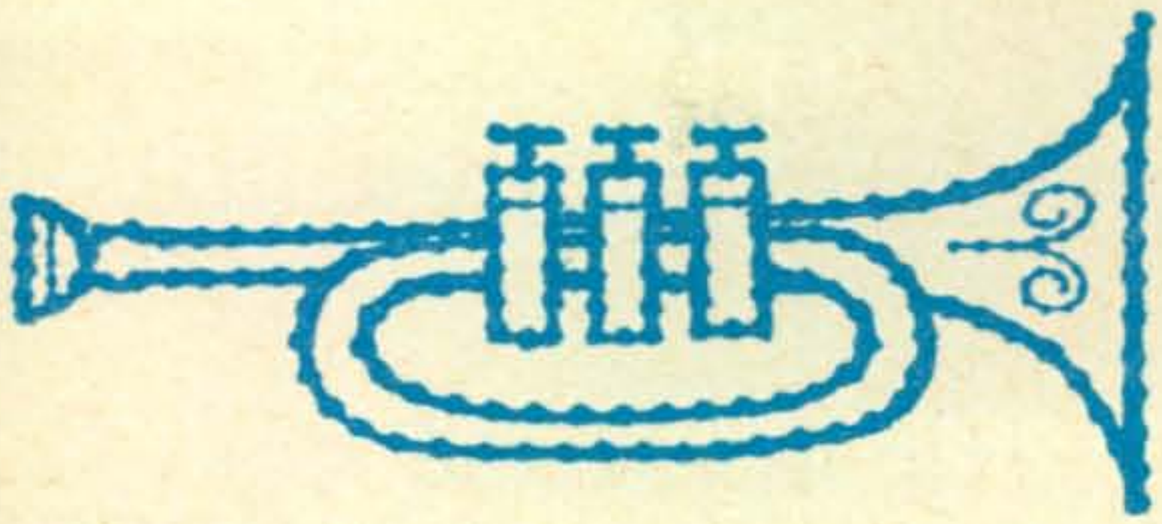
Zone 22: VU2QQ, 14027 kc c.w.; 4S7PB, 14201 kc s.s.b.; and 9N1MM, 21309 kc s.s.b.

Zone 23: JT1AH, 14043 kc c.w.; and JT4-KAB, 14017 kc c.w. Other stations reported

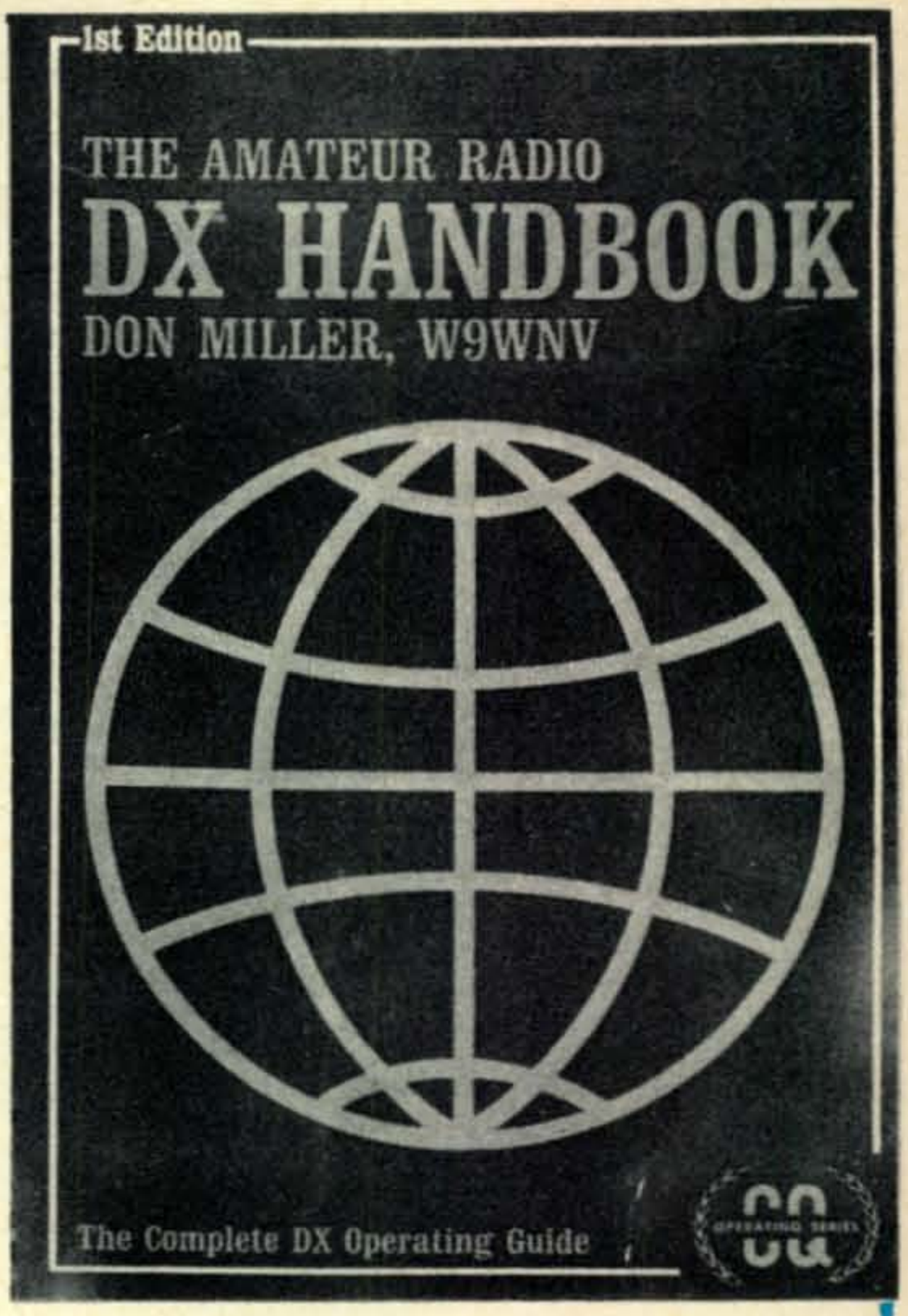
[*Continued on page 92*]

Stew Perry, W1BB, DX Hall of Fame and XYL Alice, W1DQF, visiting Japanese 160 meter enthusiasts during their 1968 excursion. Mrs. Perry joined the ranks of the Silent Keys on June 18.

See page 110 for New Reader Service



Rather than "Toot Our Own Horn" we decided to present what the Radio Society of Great Britain (RSGB) had to say in their April issue of *Radio Communications* about *The Amateur Radio DX Handbook*. See their review below.



DX-ing starts here

A big gap in amateur radio publishing is filled by a new book from *CQ Magazine*, the *Amateur Radio DX Handbook*, By Don Miller, W9WNV.

Everything DX-wise concerning the radio amateur or SWL is included in the DX Handbook. It runs to 200 pages of concise text plus a mass of drawings, tables, graphs and pictures. The amount of factual content is quite staggering.

W9WNV starts with an admirably straightforward survey of propagation, one of the best short treatments of the subject seen. He surveys the various bands from the DX point of view and then covers the many small factors that make for efficient operation. Following this are sensible suggestions for the station with the merits of various aerials thoroughly covered.

The best chapter in the book has the explanatory title of "Working DX from the Home Station." Especially useful here are language conversion tables for radio terms. Another chapter on contest working is one of the best analysis of contest work yet written while the piece on DX'ing from the rare location should be compulsory reading for all DX stations!

Sundry other topics such as award chasing and mobile DX'ing are adequately covered. There is even a section on vhf uhf DX!

Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

THE AMATEUR RADIO DX HANDBOOK, $5.00 each, Postpaid

Name.....Call.....

Street..... Enclosed is $_____

City.....State.....Zip..... for_____copy(ies)

New York City and State residents add applicable sales tax.

See page 110 for New Reader Service

"There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey."

JOHN RUSKIN

See page 110 for New Reader Service

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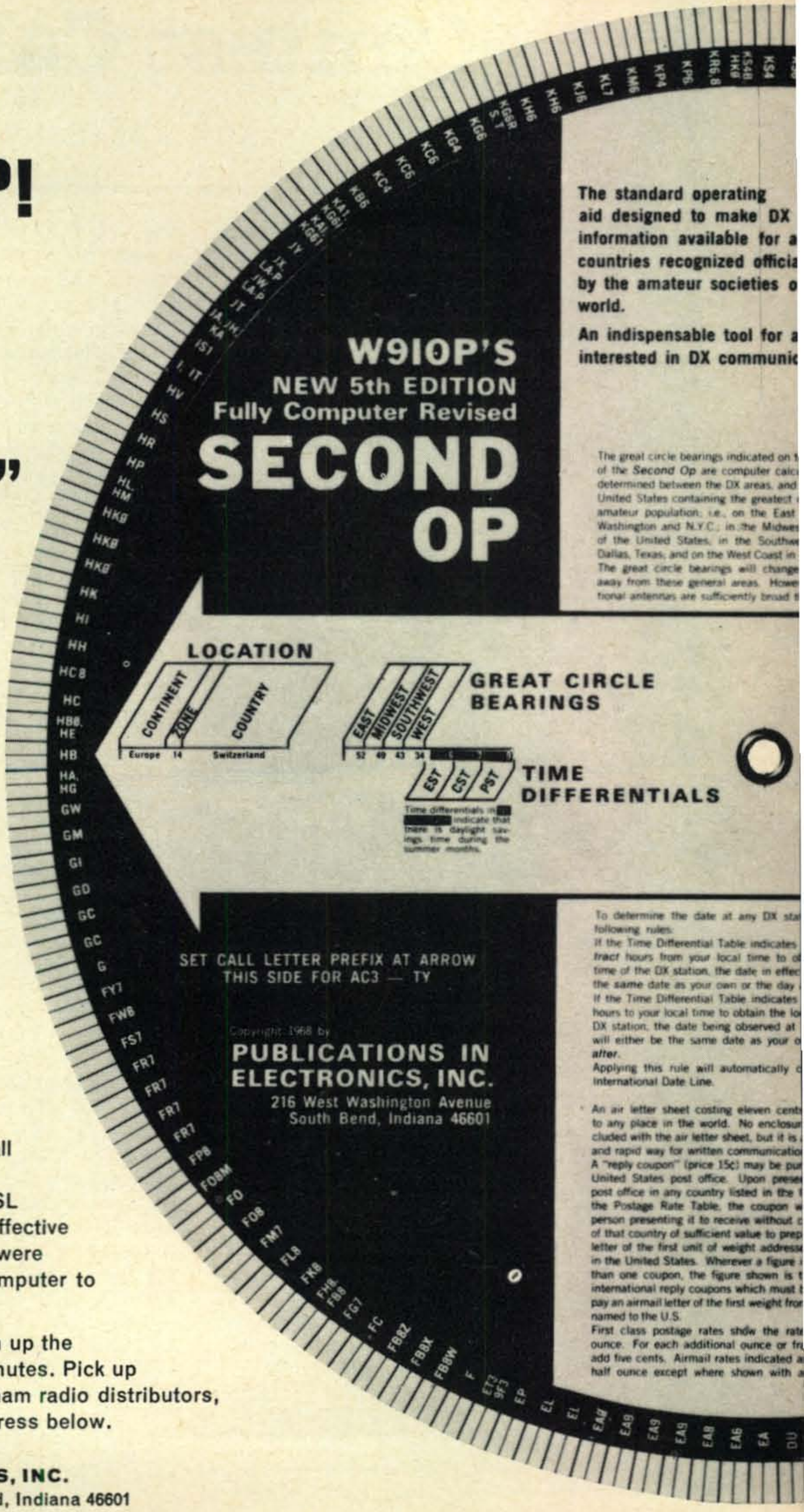

ee page 110 for New Reader Service

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Oct.	4-6	California QSO Party
Oct.	4-6	CARTG WW RTTY Contest
Oct.	4-5	VK/ZL Oceania Phone
Oct.	4-11	Lebanese DX Contest
Oct.	11-12	VK/ZL/Oceania C.W.
Oct.	11-12	Floridora QSO Party
Oct.	11-12	RSGB 28 mc Phone Contest
Oct.	11-12	IARU Region II Contest
Oct.	15-16	YLAP C.W. Contest
Oct.	18-19	Boy Scouts Jamboree
Oct.	18-19	Okinawa (KR6) Contest
Oct.	18-19	WADM C.W. Contest
Oct.	**25-26**	**CQ WW DX Phone Contest**
Oct.	25-26	RSGB 7 mc C.W. Contest
Nov.	1-3	ZERO District, QSO Party
Nov.	5-6	YLAP Phone Contest
Nov.	8-9	OK DX C.W. Contest
Nov.	8-9	RSGB 7 mc Phone Contest
Nov.	8-9	ARRL SS Phone Contest
Nov.	15-16	ARRL SS C.W. Contest
Nov.	22-24	Trilliums' Memorial Week
Nov.	29-30	**CQ WW C.W. Contest**

Floridora Party

The Floridora's (a YL organization) will be on in full force between 0000 GMT Saturday, October 11th and 2300 GMT Sunday, Sunday, October 12th.

There are special certificates for the stateside YL and OM, and worldwide YL working the most members.

Use all bands and modes, and exchange your signal report, county, state or country.

Send your logs to: Dorothea Seaver, W4QBY, 254 Oceanic Avenue, Lauderdale by the Sea, Florida 33308.

(A list of frequencies where the Floridoras will be found have been desirable.)

RSGB 28 mc Phone Contest

Starts: 0700 GMT Saturday, October 11
Ends: 1900 GMT Sunday, October 12

It's the world working the British Isles on 28 mc only. Contacts may be made on a.m. or s.s.b. and single operator entries only are acceptable.

Following rules are for overseas stations.

Exchange: Five figures, RS report plus a progressive contact number starting with 001.

Scoring: Each complete QSO with a G, GC, GD, GI, GM, GW counts 5 points. In addition, a bonus of 50 points may be claimed for the first contact with each British Isles country/ numeral prefix, i.e. G2, GC3, GD4 and etc. (max. of 36) Contacts with GB stations score 5 points only. There is no multiplier.

Final Score: Total QSO and bonus points.

Awards: 1st, 2nd and 3rd place certificates to the leading overseas stations.

There is also a s.w.l. section. Only British Isles stations are to be logged, and scoring is same as above.

A summary sheet with the scoring, a signed declaration and your name and adress in BLOCK LETTERS is also requested.

This year entries go to: RSGB HF Contest Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England.

IARU Region II Contest

Starts: 1200 GMT Saturday, October 11
Ends: 2359 GMT Sunday, October 12

This years contest was organized by the Radio Club of Argentina. It is open only to stations located in Regional II. (North and South America)

The same station may be worked only once on each band for QSO points. Contacts are permitted between stations in the same country, but for a multiplier only.

There are two catagories, single and multi-operator.

Exchange: RS/RST report plus a progressive QSO number starting with 001.

Scoring: One point per QSO multiplied by the number of countries worked. A country may be counted only once, not once per band.

Awards: The highest scorer in each country will receive a certificate and medal. There are also special awards for the highest over-all scorers on phone, c.w. and r.t.t.y. and the top multi-operator station.

Include a summary sheet with your log showing the scoring and your name and address in BLOCK LETTERS.

Logs must be in the hands of the committee by December 31st. They go to: Gustavo Reusens OA4AV, IARU Region 11 Secretary, P.O. Box 4087, Lima, Peru.

Boys Scouts Jamboree

Starts: 0001 GMT Saturday, October 18
Ends: 2359 GMT Sunday, October 19

*14 Sherwood Road, Stamford, Conn. 06905.

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This is the 12th Jamboree-on-the-Air for the Scouts, and will be held on the 3rd full week-end of October each year.

The activity has been fully covered in many languages in Scout magazines around the world. Therefore it will not be necessary to go into details.

All authorized frequencies and modes may be used. This is not a contest but participating certificates will be issued to all those sending in a report.

They may be sent to the individual National organizations or directly to: Boy Scouts World Bereau, Att: L. J. Jarrett, P.O. Box 280, 1211 Geneva 11, Switzerland.

Okinawa (KR6) Contest

Starts: 0000 GMT Saturday, October 18
Ends: 2400 GMT Sunday, October 19

This activity was organized to provide an opportunity to work Okinawa.

Use all bands and modes, single or multi-operator. Only one contact per band and mode with the same station.

Exchange: RS/RST report plus a progressive contact number starting with 001.

Scoring: Each QSO will have a point value as follows: On 80M–25; 40M–20; 20M–5; 15M–10; 10M–15. Final score, total number of QSO points from all bands.

Awards: Certificates to the top scorer in each country and W/K district. Distance will be the deciding factor in case of a tie.

A detailed and accurate log and a summary sheet with all pertinent information is requested. And the usual signed declaration and your name and address in BLOCK LETTERS.

Logs go to: Okinawa A.R.C. Contest, APO San Francisco, Calif. 96331. Mailing deadline November 1st.

WADM C.W. Contest

Starts: 1500 GMT Saturday, October 18
Ends: 1500 GMT Sunday, October 19

This is a c.w. contest only and all bands 3.5 thru 28 mc may be used. The same station may be worked once per band. There are three classifications, single operator, multi-operator and s.w.l.

Exchange: The usual six figures, RST plus a QSO number starting with 001.

Scoring: Three points for each DM contact, multiplied by the number of DM districts worked on each band. (A district is identified *not* by the number in the call but by the last letter in the call. (A thru O)

Awards: A WADM contest flag (or plaquette) to the top scorer in each country. All contestants will receive an award.

Applications for the WADM and RADM awards may be made from contacts in your contest log. (Plus QSL cards if they accompany your log) Check W2GT's column for details.

Logs go to: Radio Club of the DDR, Attn: DM2ATL, P.O. Box 30, Berlin 1055, German Democratic Republic.

The PJØMM Contest Expedition to St. Maarten for the 1968 Phone Contest was a major project that the boys had been working on for over a year. Their 6406 contacts were the highest ever made in a DX contest. The operating crew: Top to Bottom: Bob Hines K4MZU, Frank Derfler K9KIC/7, Dave Zeph W9ZRX/PJ5MN, Jim Walsh K9RHN/5, Les Bannon W9ZTD/PJ0MM and Walt Key W9POK.

RSGB 7 mc Contest

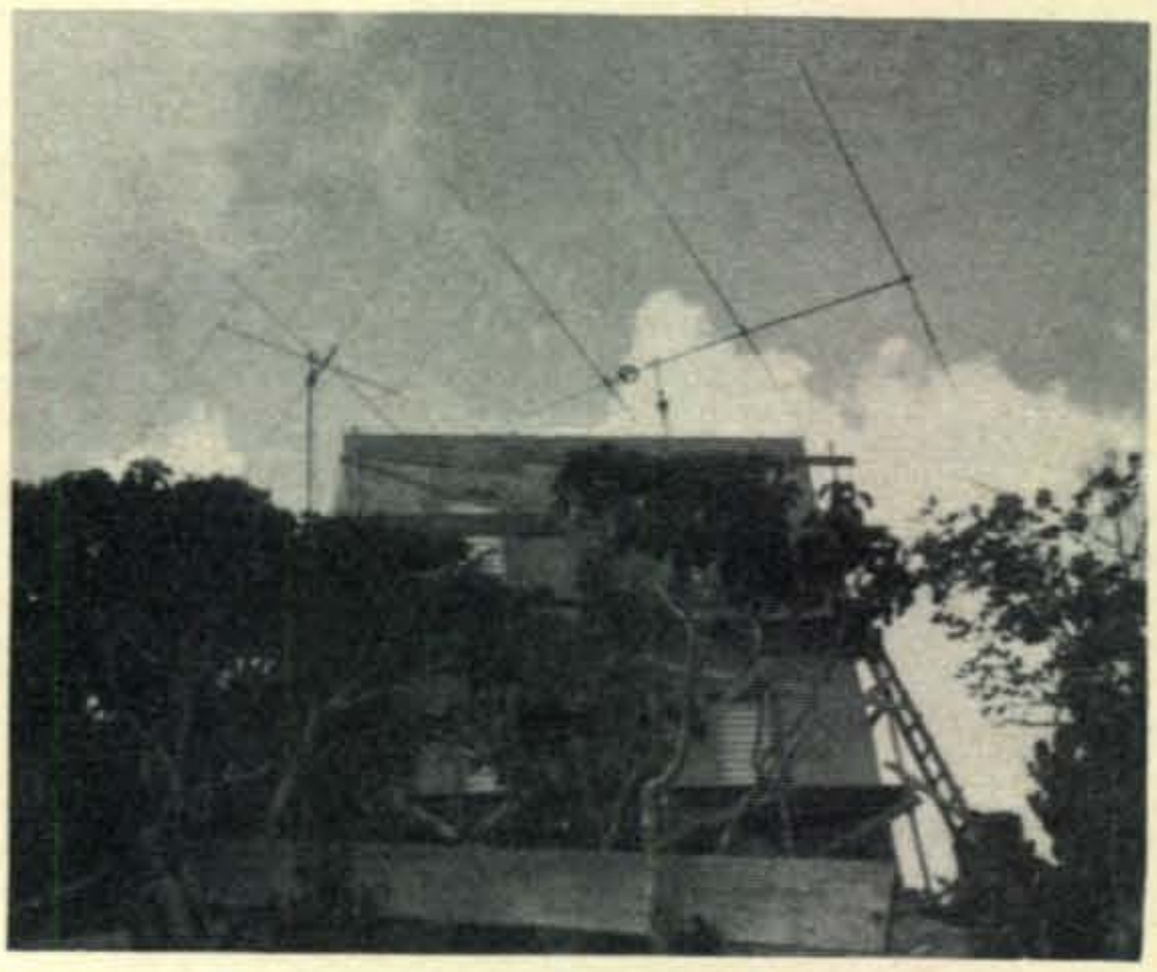
C.W.–Oct. 25-26 Phone–Nov. 8-9
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

Its the world working the British Isles on 7 mc. (G, GC, GD, GI, GM, GW) C.W. and Phone are separate contests, and only single operator entries are acceptable.

Following rules are for overseas stations.

Exchange: RS/RST report plus a progressive QSO number starting with 001.

Scoring: Contacts with British Isles station vary in point value according to the location of



PJØMM's 15 and 20 meter beams located on a mountain top 1071 ft. above sea level, which gave them a good shot in all directions.

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the DX station. If in Europe, 5 points; North America. 15 points; Africa, Asia and South America, 25 points; Oceania, 50 points.

In addition, a bonus of 50 points may be claimed for the first contact with each B.I. country/number prefix. (i.e. G2, GC3, GD4 and etc. max. of 36 possible) Contacts with GB stations score no bonus points.

Awards: 1st, 2nd and 3rd place certificates to the three leading overseas stations.

There is also a s.w.l. section. Only British Isles stations may be logged, and scoring is same as above.

Transmitter logs go to: RSGB HF Contest Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex, England.

S.w.l. logs to: RSGB HF Contest Committee, 35 Doughty Street, London WC1, England.

CQ World Wide DX Contest

Phone

Starts: 0000 GMT Saturday, October 25
7 P.M. EST Friday, October 24
4 P.M. PST Friday, October 24
Ends: 2400 GMT Sunday, October 26
7 P.M. EST Sunday, October 26
4 P.M. PST Sunday, October 26

C.W.

Starts: 0000 GMT Saturday, November 29
7 P.M. EST Friday, November 28
4 P.M. PST Friday, November 28
Ends: 2400 GMT Sunday, November 30
7 P.M. EST Sunday, November 30
4 P.M. PST Sunday, November 30

Complete rules in last month's issue, with a brief run-down in the August CALENDAR.

Remember we use the ARRL country list and the WAE country list for Europe. The WAE list was in the DARC contest rules in the July CALENDAR.

You are expected to score your log and check it for duplicate contacts and correct multipliers. Re-copied logs must be in their original form with duplicates included but crossed out and scoring corrections made. Also indicate total QSOs made, less duplicates.

Official log and summary sheets and Zone maps are available. (s.a.s.e. to *CQ*) You can make up your own log sheets, 40 contacts to the page. Use a separate sheet for each band, and enter the Zone/Country multiplier only the first time it is worked.

Be sure to check W3ASK's PROPAGATION Column. George's correct average runs pretty high.

OK DX C.W. Contest

Starts: 0000 GMT Sunday, November 9
Ends: 2400 GMT Sunday, November 9

This is an international contest so don't confine your operation to working OK's only.

Use all bands, 1.8 thru 28 mc, c.w. only. Single operator stations may compete on a single band or all bands, multi-operator sttations on all bands only. (Club stations are considered as multi-operator)

Exchange: Five figures, RST plus two figures indicating number of years the operator has been active in amateur radio. (*i.e.:* active since 1949, 57920. Multi-stations will give year station has been licensed)

Scoring: One point for each QSO, 3 points if it's with a Czech station. The multiplier is determined by the number of prefixes worked on each band. (WPX list) Final score, total QSO points multiplied by the sum of prefixes worked on each band.

Awards: Certificates to the top scorers in each country and each category.

Use a separate log sheet for each band and show in this order: Date/time GMT, station worked, number sent/received, QSO points and prefix. (First time worked only)

Include a summary sheet showing the scoring and other information. Your name and address in BLOCK LETTERS and a signed declaration that all rules have been observed.

Contest contacts may be applied for the "100 OK Award" (worked 100 Czech stations) and the "S6S Award" (worked all continents) with endorsements for individual bands. Written application must accompany log.

Logs go to: The Central Radio Club, P.O. Box 69, Prague 1, Czechoslovakia, postmarked no later than December 31st.

ZERO District QSO Party

Two periods (GMT)
0000-0400 Saturday, Nov. 1
0000 Sun. Nov. 2, to 0400 Mon. Nov. 3

Complete rules next month. Received too late for this issue.

Editor's Notes

The Ohio A.R.A. has challenged the Florida DX Club in this years phone and c.w. *CQ* contest. To make it more interesting, our DX Editor K4IIF, is donating a trophy to be retired by the club winning it three times.

The Laurentian DX Club (Montreal, Canada) was erroneously listed in the U.S. Club Scores on page 28, Aug. *CQ*. Actually, the Laurentian Club (3,146,446) took top honors in Canada nosing out the Northwest DX Association (3,023,769) by over 123,000 points!

In the c.w. section, for the 9th call area, W9AQW was listed as Single Op winner with 765,919 points, with K9KDI shown second with 501,900 points. As both operators tell it, W9AQW's score is a phone score, making him the winner in the phone section for the 9th call area and K9KDI winner in the c.w. section.

73 for now, Frank, *W1WY*

Continued on page

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THE awards PROGRAM

BY ED HOPPER,* W2GT

THE October "Story of the Month"—The County Hunters Convention, July 4th weekend, after these commercials.

Bob Bosbach, W1BHV/K1CXP qualified for a USA-CA-3000 award. Geo Wallace, W7ENA did a lot of paper work and obtained a USA-CA-2500 mixed award, and All 14 mc Mobile SSB 2000, 1500 and 1000 awards. M. A. "Ukie" Urquiza, W4SWW was awarded a USA-CA-1500 certificate. Ed McAuslan, W7VJI, qualified for Mixed USA-CA 1500 and 1000 awards. Tom O'Brien, WA6UZG was issued mixed USA-CA-1000 and 500 awards. Mixed USA-CA-500 awards went to: Gloria McDaniel. W9GHO; Stokley Benson, WAØFRM; Jim "Kib" Ramsey, WA4ULL; and Ambross Barry, W4GHV. USA-CA-500 awards endorsed All A-1 were issued to Harry Incho, WB2CBK and John Hotchkiss, W7CNL.

USA-CA HONOR ROLL

3000		1500		500	
W1BHV/K1CXP	22	W4SWW	99	WA6UZG	724
		W7ENA	100	W9GHO	725
2500		W7VJI	101	WB2CBK	726
W7ENA	51	1000		WAØFRM	727
		WA6UZG	162	W7CNL	728
2000		W7ENA	163	WA4ULL	729
W7ENA	7	W7VJI	164	W4GHV	730

103 Whittman St., Rochelle Park, N.J. 07662.

The County Hunters Convention

The gathering of the COUNTY HUNTERS at Mountain Home, Arkansas over the July 4th weekend was a huge success. The final count revealed approximately 100 county hunters, XYLs and harmonics present. Notable among those attending were

COUNTY HUNTERS at Mountain Home, Ark. Back Row: K2PFC, W5ULN, WØYLN, WAØKQQ, KØAYO; W5HDK, WAØJRZ, W5ROP, K9CSL, K5PWG, K5VTA. Center Row: W5POH, WA5OCG, W4YWX, KØIFL, W9CNG, K4ISE, WAØPJX, WAØDCQ, K8VSL, W4RMT, WAØKGD. Front Row: W5EHY, K8DCR, K9KKX, WAØSHE, K5KDG, WA5AEB, WAØWOB, WØBL, WØSJE. Not Pictured: WAØEVO, W5WWW, WA5OCT, W5MAJ, K5JEW.

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TVI Award

Charlie, WØBL; Leo, WA5AEB; Phil, WAØEVO and Eddie, K4LSP (not yet applied), all of whom have reached the pinnacle of 3079 counties. Included among the other confirmed hunters, both old and new, were: Duane, K2PFC; Bill, K4ISE; Doc, W4RMT; Paul, W4YWX; John W5EHY; Ben, W5HDK; Steve, K5KDG; Al, K5JEW; Howard, W5MAJ; Roy, WA5OCG; Seymour, WA5OCT; Dave, W5PWG; Pat, W5POH; Doc, W5ROP; Hank; W5ULN; John, K5VTA; Jules, K7ZJP/5; Dan, K8DCR; George, W8VSL; Jack, W9CNG; George, K9CSL; Ray, K9KKX; Bob, KØAYO; Dick, WAØDCQ; John, KØIFL; Don, WAØJRZ; Mike, WAØKGD; Mike, WAØKQQ; Joe, WAØPJX; Cleo, WAØSHE; Jack, WØSJE; Skip, WAØWOB and Clyde, WØYLN.

Headquarters was established at the Holiday Inn, where an excellent buffet dinner was served on the evening of July 4th. When our illustrious Net controller, Marv, WB2SJQ, realized that the center of activity was room 303 of the Inn, he decreed that for the remainder of the convention, all 3 x 3 reports would be 303.

As with all conventions there were some speeches, but they were kept short, and some recognizations. Although unable to be present, Marv, WB2SJQ was honored as the Net Control Station of the year for the County Hunters. He has done much during the past year to contribute to the success of county hunting. Recognized as the county hunter with the greatest spirit and determination was Lee, WAØOFF. His willingness to take over as Net Control should be an inspiration to the many who are so reluctant.

Paul, W4YWX, together with his committee of Phil, WAØEVO and Roy, WA5OCG, announced that generous minded county hunters had contributed $500.00 to help defray the medical expenses of Ben, K5DRF, created by his recent hospitalization.

Numerous donations made by the merchants of Mountain Home helped to make the "door prize" portion of the activities more enjoyable for the ladies present. The county hunters were more interested in those offered by World Radio Labs., Radio Amateur Callbook, Hy-Gain Electronics, and Mosley Electronics. Perhaps that which created the most interest was the three day all expense stay at the Carousel Motel, Lakeview, Arkansas—won by Cleo, WAØSHE, and a similar stay offered by the Crow-Barnes Resort, Bull Shoales, Arkansas—won by Bob, KØAYO.

A BIG vote of thanks go to Steve, K5KDG and Pat, W5POH for all the outstanding arrangements and for the manner in which they managed the convention to make it such a big success.

Preliminary planning for the next event is already under way and when more definite information is available, I hope it can be announced here, in plenty of time for you all to make plans to attend and enjoy it.

W-10-U Award

Letters

Cliff Davidson, WAØKXJ, writes: "Jay, WAØPKE and I just returned from the biggest trip yet; a two-count, two-country set up on the U.S.-Canadian border. We used the calls WAØKXJ/Ø/VE3 and WAØPKE/Ø-/VE3. Operation was from rare Cook county, Minnesota and Thunder Bay county, Ontario, Canada. Believe it or not, The Minnesota and Ontario QSO Parties were both on the same weekend, so we operated in both contests simultaneously. Some fun swimming across the Pigeon River to string up our international long wire antenna. As usual, we will have special QSLs printed to cover our 530 QSO's."

Jim McKay, VE4GV, writes: "Here is my application for the USA-CA-500 award. These have all been worked on 14 mc s.s.b. on 14336.

These have been collected in a 14 month period of limited operations. I am a school teacher and during the school term only work on the band a half hour each day, with the exception of Saturday and Sunday. I make up for this during the summer months.

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You might be interested to know that I am also in a wheelchair due to muscular dystrophy.

The part of the activity I enjoyed is the regular contacts with stations like: W4HA, WA4LMR, W4YWX, W4DAU, WA7IRD and WØYLN, just to name a few of the regulars. It is a wonderful way to make new friends and to learn about different areas through county hunters. In my opinion, the best operators are found on the Independent County Hunters Net".

Mary Carlson, WAØCSL, writes: "I was active on the Net in 1964 and 1965, but have been in Japan since then.

Please give my best to all on the Net and I hope to be checking in again from our new base (?)".

Awards

Tennessee Valley Indian (TVI) Award: Stations other than W, K or VE may qualify for the TVI Certificate by working any two of the member stations listed below. Working any seven (7) members during any calendar year entitles applicant to a year subscription to *CQ* Magazine, The Radio Amateur's Journal. W, K, and VE stations may qualify for the certificate by working any seven (7) members. Claims should be sent to Mike Campbell, WA4HJK, TVI Manager, 2209 Mecca Drive, Nashville, Tennessee 37214. The QSLs not required, but QSLs must be sent to stations worked. Member stations are: W4AOU, W4AY, W4CSY, W4DDF, W4-MSZ*, W4SRT*, W4WHM, W4WHN, W4-ZCB, W4ZMC, K4EHA, K4EJO, K4OKW, K4RTA, K4TFI, WA4HJK, WA4JJY, WA4-LXX. (Those marked * are deceased). On verification that claims are geniune and that QSLs have been received by the members; subscriptions and/or certificate will be sent by return mail.

Confederate Signal Corps Colonel's Award: Sponsored by Confederate Signal Corps, Inc., and awarded in 3 Classes: A-Mixed; B-C.W.; C-Phone. 4th Call area stations must contact 20 members; rest of continental U.S. contact 10 members; DX must contact 5 members: QSL cards must be exchanged. Send GCR list of members contacted, showing mode, date, and class of award desired. All contacts must be made after January 1, 1962. Apply to: Gen. Ron Bacon, K4NTS, P.O. Box 90267, East Point, Georgia 30344. Cost to U.S. stations is 50¢, no charge to DX.

Jim McKay, VE4GV.

W-10-U Award: This new award is sponsored by the Georgia Southern Area Amateur Radio Club. The club is made up of faculty, student's, and others in the Georgia Southern College area. The Award is issued for working ten (10) college or university club stations. W/K and VE/VO applicants send their ten cards and $1.00 (U.S. or Canadian funds) to the club secretary: Larry E. Price, W4DQD, P.O. Box 2067, Georgia Southern Branch, Statesboro, Georgia 30458. Other DX applicants may send a list of claimed certified by an official of their local radio club along with ten (10) IRCs. No charge is made to handicapped amateurs. Each applicant should list the name of the college/university/school if that name is not already clearly shown on the printed QSL card. There are no time or mode restrictions, all valid contacts may be claimed for the award. It is not necessary, for example, that any W/K stations be included in your application.

Notes

Happy to note that James E. Hoffman, K1ZFQ, 42 Gresham St., Milford, Conn. 06460, has taken over the Editor job of the *CW County Hunter News Sheet;* the CW CH NET 1600Z Sundays on 7055 as well as the CW CH NET on 14070 at 1400 and 2000Z Saturdays. Also Tuesdays 1800Z on 7055 and Wednesdays 1900 on 14070.

Also happy to report, although too late

[*Continued on page 102*]

Colonel's Award

See page 110 for New Reader Service

Q AND A

BY WILFRED M. SCHERER,*
W2AEF

Panadapter Operation with Heath SB-620

QUSETION: In attempting to use the Heath SB-620 Panadapter in conjunction with the SB-300/301 receivers, there apparently is a lack of gain in the SB-620, especially on the upper bands. It takes an S-9+40 db signal to show a pip of one-half inch at the center of the c.r.t. screen. When tuning the receiver away from the signal, the pip then increases in height to above full scale. What can be done to correct this?

ANSWER: As explained in the SB-620 manual, the point at which the unit is connected to the SB-series of receivers drops to a very low-impedance value when the receiver is tuned to the signal and the pip is centered. This is due to the low impedance at the resonant frequency of the crystal filter. The signal level therefore decreases at this time. The impedance off resonance rises to a high value and off-tune signals then increase in amplitude.

If the on-signal pip is too low for making the desired observations on it, the received signal will have to be tuned off frequency to raise the pip level, which will appear at one side of center on the c.r.t. screen; however, the signal will not be heard at this time.

An additional reason for the level drop is that when the signal is tuned in for an audible output on the receiver, the a.g.c. comes into play and decreases the receiver gain. You therefore have two things working against you—the a.g.c. and the low impedance of the filter. This would be the case with any panadapter and is not the fault of the SB-620. Such also could be the case with any other receiver where a.g.c. is used when the panadapter connection is involved with the input circuit of a filter. On the other hand, the filter impedance would not be a problem when the panadapter is connected to a mixer where the v.f.o.-injected signal is ahead of a subsequent mixer that is followed by a filter.

The situation can be partially alleviated by reducing the r.f. gain to where there is little a.g.c. action or by switching off the a.g.c. and reducing the r.f. gain below the receiver-overload point.

A way to avoid the loss of pip level due to the filter impedance and an expedient we have found works well, is to use an outboard mixer bridged across the input of the second mixer, with the v.f.o. signal simultaneously injected to the outboard mixer from the v.f.o. (l.m.o.) output jack.

A block diagram of the setup is shown at fig. 1. The mixer circuit is shown at fig. 2. The panadapter is connected to the plate circuit of the new mixer which is a simple resonant one tuned to 3395 kc. The SB-620 is connected to this circuit which is a rather broad high-impedance one at resonance thus having little effect on the signal level (actually the signal level should increase slightly at the center frequency).

The outboard mixer should be mounted right at the rear of the receiver and may be connected to the second-mixer grid through one of the spare phono jacks using as short a piece of low-capacitance coaxcable as possible with a 5-10 mmf coupling capacitor at the second-mixer grid-end. C_{13} in the SB-300 theoretically should be disconnected, but we have not found this really necessary.

This arrangement avoids the loss of level due to the filter, but it does not alter the a.g.c. situation which must be handled as suggested earlier. An alternate solution in this regard

*Technical Director, *CQ*.

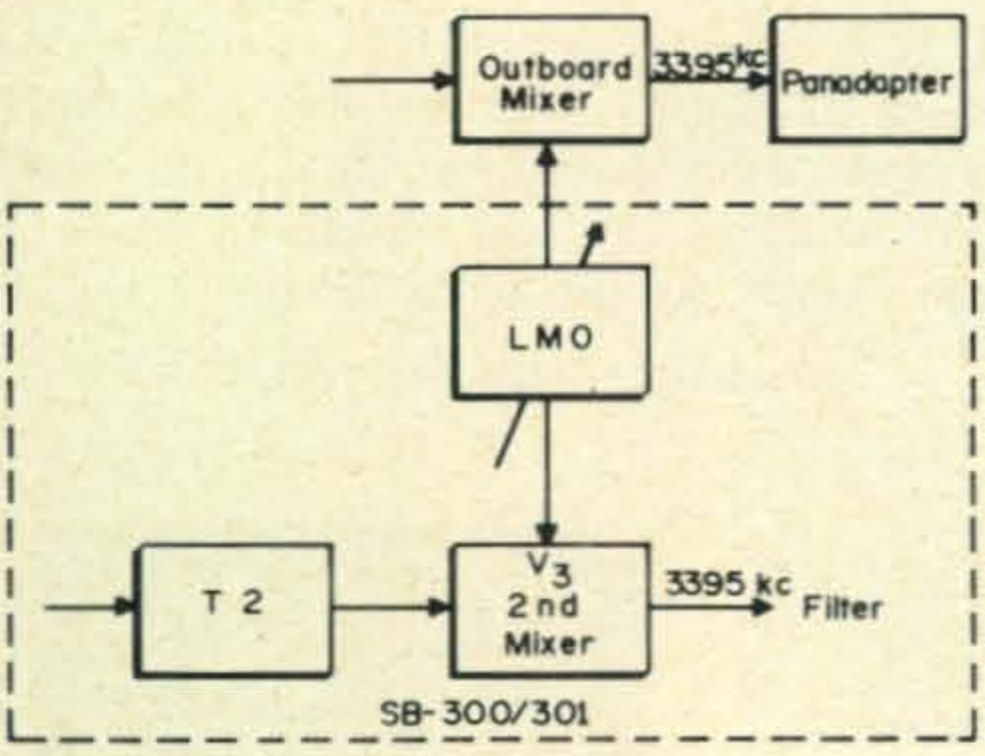

Fig. 1—Block diagram of an outboard mixer set-up for use with a Panadapter and Heathkit SB-300 receiver.

See page 110 for New Reader Servic

would be to remove the a.g.c. from the r.f. amplifier only. This can be done by disconnecting the a.g.c. line from the bottom of R_1 (470K at V_1 grid). This also removes the r.f. gain from the r.f. amplifier, so if the signal must be reduced to prevent front-end overload with strong signals, an attenuator at the antenna input will have to be used, or a separate gain control provided at the cathode of V_1.

Extensive Modification or Design Requests

We have been receiving an increasing number of inquiries regarding extensive modifications to or a re-design of existing gear, as well as requests for new designs. Unless such procedures have already been worked out or have been described in past published articles known to us, compliance with such requests simply cannot be undertaken. Such a task is too time consuming and unless the related changes were actually tried out, they would not be proven procedures.

We can, however, give some ideas on how the desired job might be done and as to what specific changes might be required, leaving the details up to the reader to work out for himself, basing these on the suggested requirements. The following are typical examples:

Heath Apache on Six Meters

QUESTION: Have you any information on putting the Heath Apache transmitter on 6 meters?

ANSWER: We have no specific or proven data on modifying the Apache for 6-meter use. Basically, such a modification would require shifting the v.f.o. to 6.35 mc and quadrupling in V_3 plate (the present 1st multiplier) to 25 mc or shifting the v.f.o. to 8.35 mc and tripling at V_3 plate to 25 mc. An 8.35 mc crystal also may be used instead of the v.f.o. V_2 plate (present multiplier/divider) would have to double to 50 mc in either case.

Besides changes in the v.f.o. (no changes required in crystal-oscillator circuit), L_6 would have to be tapped or altered for resonance at 25 mc and the 10-meter section of L_{11} would have to be tapped for 50 mc, as also would the 10-meter section of the p.a. inductor L_{17} (or a new 50 mc section incorporated with a reworked L_{17}).

In order to obtain sufficient *working* inductance for the 50 mc tank, a turn or two may have to be removed from the p.a.-plate parasitic suppressors.

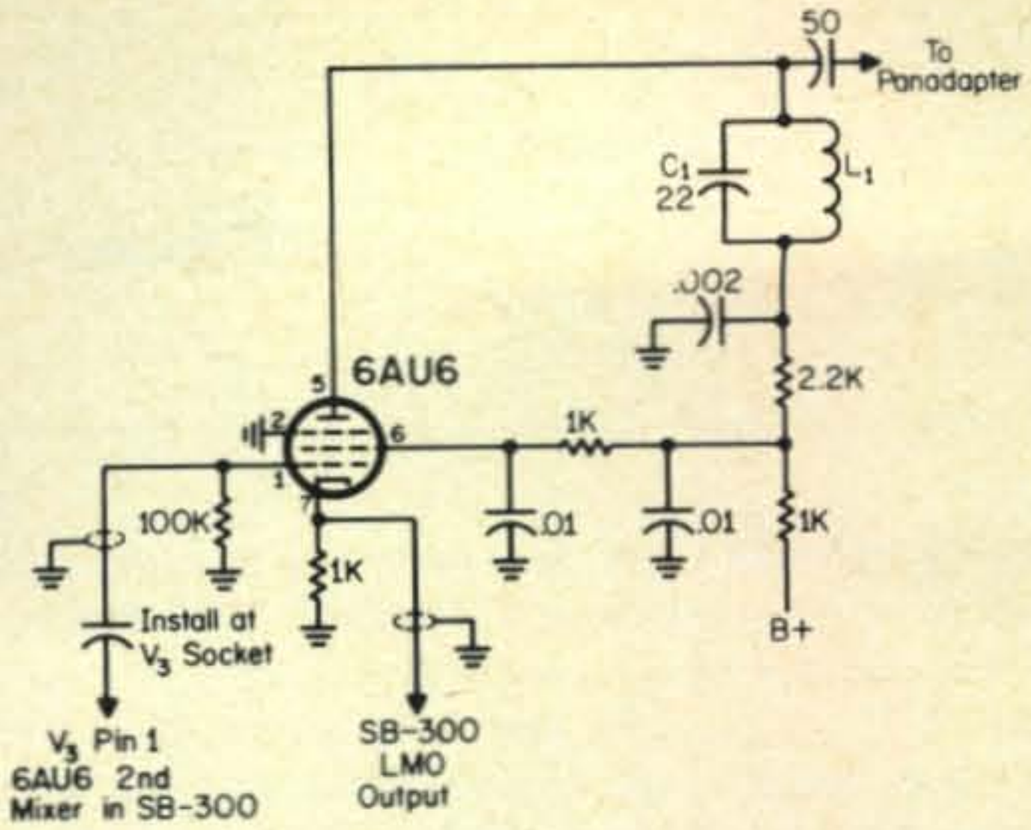

Fig. 2—Circuit of an outboard mixer for use with a Panadapter and Heathkit SB-300 receiver. L_1 should be selected and adjusted to resonate with C_1 at 3395 kc. Install mixer in shielded box.

If operation is to be retained on *all* other bands, a new bandswitch with an added position for 50 mc would be needed.

Problems that could arise would be a matter of obtaining sufficient grid drive for the p.a. and stabilized operation.

Heath CB-1 Transceiver on Ten Meters

QUESTION: Have you published any information on modifying a Heath CB-1 CB transceiver for 10-meter operation? It uses a super-regenerative receiver and a crystal-controlled transmitter.

ANSWER: *CQ* has not published any data on the requested conversion. We suggest that you refer to *QST*, February 1967, page 20, where there is an article on converting CB sets. The article does not include anything on the CB-1, but from it you may obtain some ideas on how to go about the job.

Data is not given on super-regenerative type of receivers, but this should only involve retuning or pruning of the r.f. circuits (at L_{101} and L_{102}). If backing out the cores on the inductors will not tune the circuits to the 10-meter band, remove one turn at a time from L_{101} or L_{102}, until the inductor can be tuned to the desired frequency.

A similar procedure may be followed for the transmitter at L_{201} and L_{202}. Also, use 10-meter band crystals. If you're apprehensive about removing turns from the inductors (if needed), try 8 or 10 mmf in place of the 12 mmf parallel-resonating capacitors now used.

If you should desire to add a squelch to this set, refer to "Converting The Heath CB-1 to Six Meters," *CQ*, August 1969, page 53.

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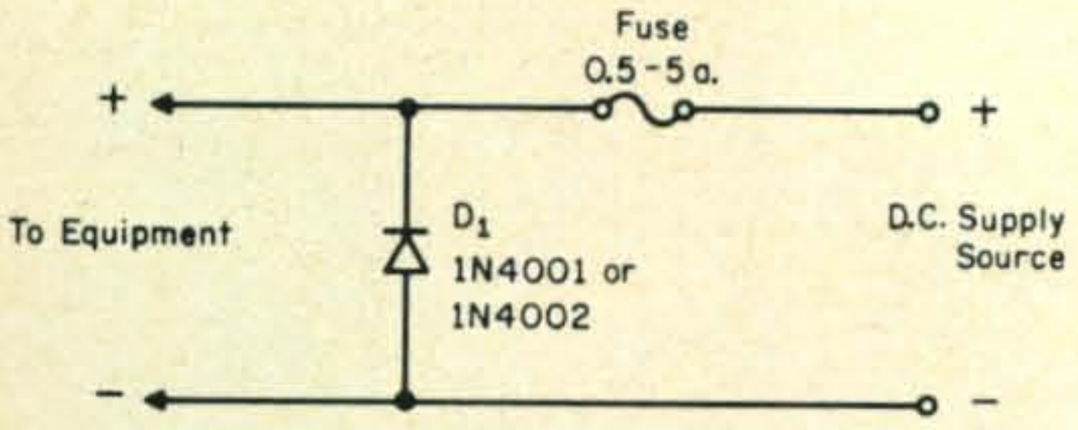

Fig. 3—Circuit used for reversed-polarity protection of transistorized equipment. With the correct d.c.-supply polarity as shown here, the cathode of D_1 is positive with respect to the anode and the diode is thus biased into non-conduction, making it essentially appear as an open circuit. If the d.c.-supply polarity is reversed, D_1 cathode will be negative with respect to the anode and the diode will conduct heavily, placing a virtual short across the line which will cause the fuse to blow and open the circuit. The fuse should have a current rating slightly above the maximum normal-current drain of the equipment, usually 0.5 -5 a.

Reverse-Polarity Protection for Transistors

QUESTION: In a recent equipment review you described how to provide reverse-polarity protection for a transistorized receiver by using a high-current silicon diode. What particular diode do you recommend and where can one be obtained?

ANSWER: Motorola, Sylvania or Texas Instruments type 1N4001 or 1N4002 diodes are recommended for the reverse-polarity protective setup which is shown at fig. 3 for the benefit of new readers or those who may have missed the suggestion. These diodes are rated at 1-ampere but will take a one-cycle surge of 30 a. which amply meets the requirements for this application and are used commercially for similar purposes. They may be obtained from Transistors Unlimited, 462 Jericho Turnpike, Mineola, New York 11501. The 1N4001 is priced at 40¢, the 1N4002 at 45¢—plus 12¢ postage.

Help

A schematic or manual for the Navy Model OBL-3 Oscilloscope (Triumph Model 841) is desired by L. L. Turner, W7BKQ, 2213 Sunland Ave., Las Vegas, Nevada 89106. Help in this respect that any reader can provide will be appreciated. Thanks.

500-Ohm Output with A-2515 Receiver

Here is some additional useful data, received from C. E. Price W8HPR, concerning the Allied A-2515 Solid-State General-Coverage Receiver review in the July 1969 issue of *CQ*.

"One important feature you did not mention is the availability of 500-ohm output for RTTY and phones on an unused tap on the output transformers, labeled *23* on the schematic. It takes but a moment to shift the lead from tap *21* (4 ohms) over to *23* and thus make this 500-ohm winding available on the output block on the rear of the receiver.

"It took Lloyd Grow, WØAJ, to find this winding and phone me the story. We've both purchased these remarkable receivers and are having the proverbial ball with all their fine features."

Many thanks, Fred, for your interest in helping others.

Modulating a Transistorized Transmitter

QUESTION: I have built a transistorized a.m. transmitter and have had trouble with distortion when the transmitter is modulated. This problem seems to be a general situation as several of my friends have had similar difficulty.

ANSWER: With an a.m. transistorized transmitter, modulation usually must be applied to *both* the driver and p.a. collectors. There also must be adequate drive for the p.a. and both stages must be properly biased. Usually the p.a. must be tuned up for maximum modulation, rather than for maximum carrier output. This should be done while using an oscilloscope. In addition, the modulator must be capable of delivering adequate audio power; otherwise you'll have low modulation or heavy clipping with distortion.

Heath SB-610 Monitorscope with SX-101A

QUESTION: I suspect something is wrong with the vertical amplifier in my Heath SB-610 Monitorscope, as I cannot obtain a display on the c.r.t. when the unit is connected to either the 1650 or 50.75 kc i.f. of my SX-101A receiver. What do you think is wrong?

ANSWER: In respect to the above problem, the cause of the difficulty may be incorrect connections to the SX-101A receiver or a defect in the vertical amplifier or the switching involved therewith.

First of all, the SB-610 vertical amplifier is designed to operate at frequencies below 500 kc. This rules out its use with a 1650 kc i.f.

[*Continued on page 98*]

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Propagation

BY GEORGE JACOBS,* W3ASK

THE 1969 *CQ* World Wide DX Contest will be held on the following dates[1]:

Phone Section: 0000 GMT October 25—2400 GMT October 26

C.w. Section: 0000 GMT November 29—2400 GMT November 30

Continuing the practice of the past nineteen years, this month's PROPAGATION column will be devoted to a special forecast for use during the 1969 contest periods.

Propagation conditions during this year's contest periods are expected to be much the same as they were during the contest periods of 1967 and 1968, barring the development of any sudden radio storms.

According to Frank Anzalone, *CQ's* Contest Editor, last year's propagation forecasts were "perfect" for the phone section, and "pretty much on the nose" for the c.w. section. Crediting *CQ* with one highly and one fairly accurate forecast for 1968, this brings the eighteen year record to 27 highly accurate forecasts; 6 fairly accurate, with only 3 missing the mark completely.

Sunspot Cycle

It seems almost certain now that peak solar activity of the present cycle occurred during the 1968 contest periods. The smoothed sunspot number for October was recorded as 110, while a peak number of 111 was recorded during November. Solar activity is now declining, but at a very slow rate. A smoothed sunspot number of 99 is predicted for October and 98 for November. This is the same level of solar activity that occurred during the 1967 contest periods, and about 10% below last year's level.

*11307 Clark Street, Silver Spring, Md. 20902.

[1]See page 56 of *CQ*, September, 1969 for Contest rules and information.

LAST MINUTE FORECAST

Oct. 1, through Nov. 15, 1969

	Forecast Rating & Quality			
Days	(4)	(3)	(2)	(1)
Above Normal: Oct. 5, 7, 9, 21-22, 25; Nov. 5, 9			B-C	C
Normal: Oct. 1, 3-4, 6, 8, 10-12, 14, 16, 18-20, 23-24, 26-27, 29; Nov. 3-4, 6-8, 10-12, 15	A-B	B-C	C-D	D-E
Below Normal: Oct. 2, 13, 15, 17, 28, 30; Nov. 1-2, 13	C	D	D	E
Disturbed: Oct. 31; Nov. 14	D	E	E	E

How To Use These Charts

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 8 and 13 days; (1) less than 7 days.

On the "Short-Skip" Chart where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

3—With the forecast rating noted above, start with the numbers in parenthese at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating higher than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meaning: (A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4—This month's DX Propogation Charts are based upon a transmitter power of 250 watts c.w.; 500 watts s.s.b., or 100 watts d.s.b., into a dipole antenna a quarter-wave above ground on 160 and 80 meters a half-wave above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss, reception will become poorer by one level.

5—Local Standard Time for these predictions is based on the 24-hour system.

6—The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 amateur call areas; The Central USA Chart in the 5, 9, and 0 areas, and the Western USA Chart in the 6 and 7 areas. The Charts are valid from October 15, 1969 through December 15, 1969, and are prepared from basic propagation data published monthly by the Institute For Telecommunication Sciences And Aeronomy of the U.S. Dept. of Commerce, Boulder, Colorado.

General Forecast

Barring any sudden radio storms developing during the contest periods (check the "Last Minute Forecast" appearing at the beginning of this column), conditions during the 1969 Contest are expected to be about the same as there were during the Contests of 1967 and 1968. The following is a band-by-

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band summary of general propagation conditions that can be expected during the 1969 contest periods.

10 Meters: Good-to-excellent openings are expected to almost every area of the world during the daylight and early evening hours. Openings to Europe and those in a generally easterly direction should peak an hour or two before noon, while those to South America and Africa are expected to peak during the early afternoon hours. Optimum conditions to the Far East, Australasia, Southeast Asia, *etc.*, are forecast for the late afternoon and early evening hours. During many of the daylight hours it will probably be a toss-up between 10 and 15 meters for best DX band honors.

15 Meters: Excellent DX propagation conditions are predicted from shortly after sunrise through the early evening hours. For each geographical area of the world, conditions on 15 meters are expected to peak about an hour or two after they have peacked on 10 meters. Openings are expected to take place to all areas of the world, and exceptionally strong signal levels may occur on many of them. During the late afternoon and early evening hours, 15 meters is likely to be the optimum band for DX propagation conditions.

20 Meters: Generally good-to-excellent DX openings are forecast to one area of the world or another on this band, almost around-the-clock. Optimum conditions should take place an hour or two following sunrise, and again during the late afternoon and early evening hours. Excellent openings are predicted to many southern and tropical areas during the late evening and early morning hours as well.

40 Meters: DX openings from Europe and the east should begin during the late afternoon and early evening hours. Openings should become more numerous during the hours of darkness, with signal levels increasing considerably, especially on signals from a southerly direction. Signals from a westerly direction are expected to peak shortly after sunrise, just before the band closes for DX. During most of the hours of darkness, it will be a toss-up between 20 and 40 meters for optimum DX conditions to many areas of the world.

80 Meters: Some fairly good openings are forecast to several areas of the world during the hours of darkness and the sunrise period. Peak conditions are expected around midnight on signals arriving from the east, shortly before sunrise for signals arriving from the south, and shortly after sunrise for signals from a westerly diection.

160 Meters: DX openings to some of the world should be possible during the hours of darkness and the sunrise period. Signals tend to peak at local sunrise at the *more easterly* terminal of a path. Because of relatively high signal absorption and the low power levels used on this band, openings at best are expected to be weak and noisy.

For a more detailed circuit-by-circuit forecast refer to the *DX Propagation Charts* appearing on the following pages. Instructions for the proper use of these *Charts* are given in the box following the "Last Minute Forecast" at the beginning of this column.

Contest Work Plans

The *Charts* on the following pages show the times that each amateur band 10 through 160 meters is expected to open for DX from the United States to the major areas of the world. This information can be easily reorganized into operational work plans, or schedules, to serve as propagation guides during the contest periods. Experience during previous contests has shown that such plans can be extremely useful in piling up a large number of contacts with a minimum of wasted time. The following is an example of one of the many type of plans that can be devised. It shows, for each three hour period throughout the day, the areas of the world for which 20 meter propagation conditions are expected to be optimum (a rating of 3 or higher in the *Charts*)[2]. An Eastern USA QTH has been chosen for this example, but similar plans can be devised for other QTHs and for other bands.

Sample 20 Meter Optimum Operating Schedule For Eastern USA

Time (EST)	Areas To Which Openings Should Be Optimum
00-03	Pacific Islands, Australia, New Zealand and South America.
03-06	Openings to many areas of the world, but none optimum. A good time to catch some sleep.
06-09	Most of Europe, Pacific Islands, Australia, New Zealand, Far East, Southeast Asia, most of South America.
09-12	Some Europeans, some north and central Americans, but nothing optimum.
12-15	Most of Europe, North Africa, Eastern Mediterranean, Middle East.
15-18	Western and central Europe, Eastern Mediterranean, Middle East, most of Africa, most of South America, and long path openings from Australasia.
18-21	Western Europe, Eastern Mediterranean and Middle East during early period, most of Africa and South America during entire period.
21-00	Far East, Southeast Asia, Pacific Islands, Australia, New Zealand, all of South America, Antarctica, and parts of Africa.

The following is a typical *multi-band* operational work plan devised from the *Charts* for a Western USA QTH. The plan shows the

[2]In some cases a rating of (2) was selected as optimum when no higher rating was expected on a particular path.

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times and bands when propagation conditions are expected to be optimum to various areas of the world, for each two hour period throughout the day.

Sample Multi-Band Work Plan For Western USA QTH

Time (PST)	*Optimum Band*	Areas To Which Band Expected To Be Open
00-02	20	Pacific Islands, New Zealand, Australia, South America and Antarctica.
02-04	40	Southeast Asia, Far East, Pacific Islands, New Zealand, Australia, Northern and Central South America.
04-06	40	Pacific Islands, New Zealand and Australia. This may be a good time for some sleep.
06-08	20	Europe, Eastern Mediterranean, Middle East, Asia, Far East, Pacific Islands, New Zealand, Australia, Antarctica and most of South America.
08-10	15	Most of Europe, Eastern Mediterranean, Middle East, S. E. Asia, Pacific Islands, New Zealand, Australia, North and Central South America.
10-12	15	Most of Europe, S. Africa, Pacific Islands, New Zealand and Australia.
12-14	10	Most of Africa, Far East, Pacific Islands, New Zealand, Australia, and most of South America.
14-16	10	Most of Africa, S. E. Asia, Far East, Pacific Islands, New Zealand, Australia, and most of South America.
16-18	15	Some Africans, S. E. Asia, Far East, all of South America, Pacific Islands, New Zealand, and Australia.
18-20	20	Eastern Mediterranean and possibly southern Europe, most of Africa, all of South America, Far East, Pacific Islands, New Zealand, Australia, Central and South Asia and Antarctica.
20-22	20	Pacific Islands, New Zealand, South America and Antarctica.
22-00	40	Pacific Islands, New Zealand, most of South America, some Europeans.

Radio Storms

The forecasts in this column are based on *normal* propagation conditions expected with a sunspot level of 98 to 99. If actual conditions during the Contest turn out to be *above normal*, DX openings on 10, 15 and 20 meters are likely to be somewhat better than shown in the *Charts*. On the other hand, if radio storms should develop during the contest periods, with *below normal* or *disturbed* conditions, fewer openings will take place on these bands. During radio storms, propagation conditions on 40, 80 and 160 meters may also become erratic, with poorer openings during certain type storms and improved openings during other types.

If a radio storm should develop during the Contest, circuits passing through or near polar regions will probably become weak, fade considerably, or may even black out entirely, depending upon the severity of the storm. During certain storms, while east-west propagation may become poorer, north-south openings improve.

If a storm should occur, concentrate on working east-west openings during the daylight hours and north-south openings during the evening and early morning hours. A "Last Minute Forecast" for the Phone section of the contest, made at press time (early September), appears at the beginning of this article. A similar forecast for the C.w. section will appear in next month's column.

WWV Contest Forecasts

Be sure to check WWV for the latest propagation information *during* the Contest. WWV broadcasts general propagation information on 2.5, 5, 10, 20 and 25 mc twelve times every hour. The data is transmitted at 4½ minutes past the hour, and is repeated every five minutes thereafter. Given in slow Morse Code, the transmissions consist of the letters N. W or U, followed by a number between 1 and 9. The letters designate propagation conditions *at the time* of broadcast, as follows:

N-Normal propagation conditions
U-Conditions unstable or erratic, signals subject to increased fading and noise
W-Radio storm in progress, condition normal or disturbed

The numbers designate propagation conditions forecast for the *following six-hour* period, as follows:

1. Useless; 2. Very Poor; 3. Poor; 4. Poor-to-Fair; 5. Fair; 6. Fair-to-Good; 7. Good; 8. Very Good; 9. Excellent

If, for example, propagation conditions are unstable at the present time, and are expected to be Poor-to-Fair during the next six hours, WWV would transmit U4 in Morse Code (..— ....—).

V.h.f. Ionospheric Openings

While the v.h.f. bands are not included in

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the Contest, there is a slight possibility of some 6 meter F-layer and trans-equatorial scatter DX openings during October. The most likely paths are between the USA and Central and South America. The best time to check for F-layer openings is from about an hour before to about an hour after noon. The optimum times for TE openings are between 8 and 11 p.m., local time at the path midpoint. Propagation favors the southern tier states for these 6 meter DX openings, but some may extend into more northerly regions of the country.

Meteor-scatter openings are likely to occur on the v.h.f. bands during the two-day *Orionids* meteor shower, which is expected to peak during the late evening hours of October 20 and the early morning of the 21st.

During October, auroral-scatter propagation on the v.h.f. bands is most likely to occur when h.f. radio conditions are disturbed or below normal. Check the "Last Minute Forecast" appearing at the beginning of this column for the days that are expected to be in these categories during the month.

Post Mortem

More radio amateur DX activity takes place in more parts of the world during the *CQ* World Wide DX Contest than at any other time. For this reason, the Contest offers an excellent opportunity to check the accuracy of the *CQ* predictions. Reports received from previous contests have contributed considerably in improving these forecasts over the years. Any comments or observations concerning this year's Contest forecast would be appreciated. Comments may be sent directly to W3ASK, the Editor of this column.

C.W. Contest Forecast

The forecast appearing in this month's article is valid for *both* the Phone and C.w. periods of the Contest. *Be sure to retain the Charts for use during next month's C.w. period.* The *Charts* appearing in next month's column will contain Short-Skip forecasts. Short-Skip propagation data for October appeared in last month's column. Good luck in the Contest!

73, George, W3ASK

October 15-December 15, 1969

TIME ZONE: EST (24-Hour Time)

EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	04-06 (2) 06-08 (4) 08-09 (3) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (3) 17-21 (2) 21-00 (1) 00-02 (2) 02-04 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-13 (1)	03-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-14 (2) 14-20 (1) 20-22 (2) 22-00 (1)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-19 (3) 19-21 (2) 21-23 (1) 23-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
West & Central Africa	07-10 (1) 10-12 (2) 12-14 (4) 14-15 (3) 15-16 (2) 16-17(1)	07-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	04-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-23 (3) 23-00 (2) 00-02 (1)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
East Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	07-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-01 (2) 01-03 (1)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
South Africa	08-09 (1) 09-10 (2) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-23 (3) 23-01 (2) 01-02 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-10 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-12 (1) 18-20 (1) 20-23 (2) 23-02 (1)	18-21 (1) 06-08 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-13 (1) 17-20 (1)	09-10 (1) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-13 (1) 18-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 17-18 (1) 18-19 (2) 19-20 (1)	08-10 (1) 17-18 (1) 18-20 (3) 20-21 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	04-08 (1) 05-07 (1)*

*Predicted times of 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a forecast rating of (2), or higher.

See page 110 for New Reader Service

South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-22 (2) 22-00 (4) 00-02 (3) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (4) 09-11 (2) 11-13 (1)	00-03 (1) 03-05 (3) 05-07 (2) 07-09 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-18 (2) 18-19 (1)	08-10 (1) 10-13 (2) 13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (2) 07-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-23 (2) 23-03 (2) 03-06 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Northern & Central South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-21 (4) 21-01 (3) 01-03 (2) 03-05 (1) 05-07 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-06 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Brazil, Argentina, Chile & Uruguay	07-08 (1) 08-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-14 (2) 14-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-09 (2) 09-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	17-19 (1)	06-09 (1) 15-17 (1) 17-20 (2) 20-21 (1)	16-18 (1) 18-21 (2) 21-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

TIME ZONES: CST & MST (24-Hour Time)

CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (3) 08-12 (2) 12-15 (3) 15-19 (2) 19-22 (1) 00-02 (1)	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 19-20 (1)* 20-22 (2)* 22-00 (1)*
Northern & Central Europe & European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 06-07 (1) 07-09 (2) 09-11 (3) 11-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-22 (1)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-10 (2) 08-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-08 (1) 08-11 (2) 08-11 (2) 11-13 (3) 13-15 (2) 15-17 (1) 17-19 (2) 19-22 (1) 22-01 (2) 01-03 (1)	17-19 (1) 19-22 (2) 19-22 (2) 22-23 (1) 20-22 (1)*
West & Central Africa	07-09 (1) 09-12 (2) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-04 (1) 04-06 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
East Africa	09-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	06-14 (1) 14-17 (2) 17-20 (3) 20-21 (2) 21-22 (1)	20-00 (1) 21-23 (1)*
South Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (2) 14-15 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-10 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-21 (2) 21-23 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-12 (2) 12-13 (1) 15-16 (1) 16-18 (2) 18-19 (1)	08-09 (1) 09-12 (2) 12-16 (1) 16-18 (2) 18-20 (1)	06-08 (1) 08-11 (2) 11-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1)
Far East	16-17 (1) 17-19 (3) 19-20 (1)	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-09 (1) 02-04 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-23 (4) 23-02 (3) 02-04 (2) 04-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2)	23-01 (1) 01-06 (3) 06-07 (2) 07-08 (1) 00-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	07-08 (2) 08-10 (3) 10-12 (2) 12-14 (1) 21-23 (1) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	06-07 (1) 07-08 (2) 08-10 (3) 10-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-23 (3) 23-02 (2) 02-06 (1)	18-19 (1) 19-21 (2) 21-02 (3) 02-04 (1) 04-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Brazil, Argentina, Chile & Uruguay	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	02-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-22 (4) 22-00 (3) 00-02 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	07-09 (1) 16-19 (1)	07-10 (1) 15-17 (1) 17-19 (2) 19-21 (1)	06-08 (2) 08-10 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

[*Continued on page 91*]

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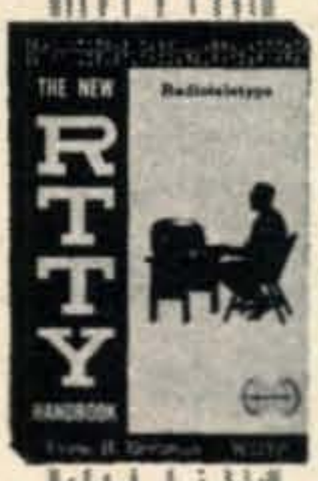

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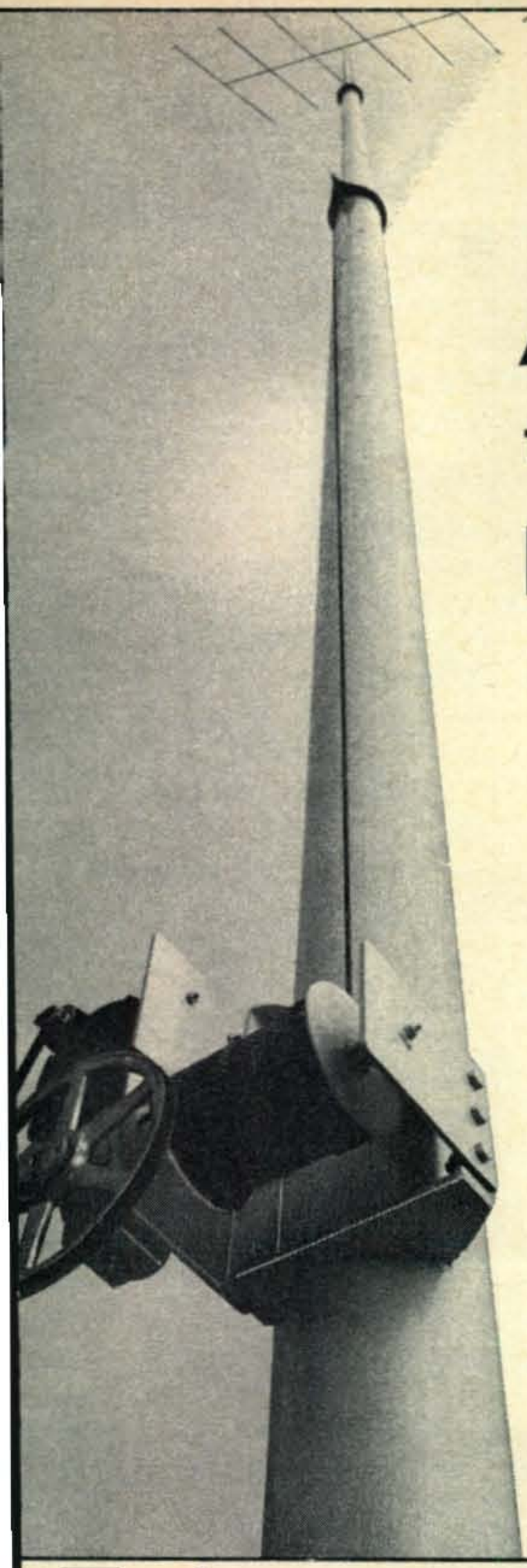

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VHF TODAY

BY ALLEN KATZ,* K2UYH

WHAT constitutes an amateur QSO? The answer to this question is of great importance to v.h.f. today. One can naively define a QSO as a two-way exchange of information. The inadequacy of such a limited definition became obvious long ago. The fading and interference on the h.f. bands made it necessary to establish a minimum on the amount of information which must be exchanged between two stations for a valid QSO. This minimum consists of the exchange of call signs, signal strength, and the confirmation of reception of the required information (*rogers*) in both directions. The above guidelines seemed sufficient until the application of meteor scatter propagation by v.h.f. amateurs for the purposes of communication.

Meteor Scatter propagation employs the short periods of high ionization caused by the passing of meteors through the upper atmosphere to reflect v.h.f. signals back to earth. These short periods of ionization are usually separated by relatively long periods of time. Several short periods or bursts are normally needed to pass the minimum amount of information required for a QSO.

The question thus arises as to what is the maximum period time over over which the information which constitutes a QSO may be transmitted? For instance, could calls be exchanged during a burst one hour and the signal reports and rogers be exchanged during the next hour, week, or even year? Ed Tilton, acting for the ARRL, when this question first arose, made what might be considered by some a landmark decision.[1] He decided not to restrict the maximum length of time (and hence the rate of information transmission) for a valid QSO, but instead set conditions on the procedure used to achieve a contact. What Ed did was to rule that a valid QSO must be made totally in one sitting.

The above condition is best illustrated with an example. In the case of meteor scatter, part of the information may be exchanged during a burst the first hour and the rest of the information exchanged several hours later. This QSO would be valid provided the stations involved continuously tried to achieve a QSO during this period of time. If, however they quit trying to communicate after the first hour and then began again after a period of several hours, the exchange of information would have to start all over. A valid QSO could therefore be made (in theory) over a period of many hours or even days, provided the operators concerned have the perseverance to keep at it continuously over this period of time.

Another aspect of Ed's expansion of the definition of a QSO deals with how the signal is detected, and is still a subject of controversy. What Ed said was that if one had to listen to a tape recording of the received signal to tell whether one had a QSO or not, one did not have a QSO. We do not interpret this statement to mean that one cannot use a tape recorder or other recording device (a pen recorder for example) as an aid in making a QSO. Rather, we believe that what Ed was getting at here was the need for continuity in a QSO. This point again is most easily illustrated by a specific example. Consider stations X and Y. X hears a burst of signal from Y, during which he copys Y's call, his own call, and a signal report, but is not sure of the signal report. He has, however, tape recorded the received signals and immediately replays the previous sequence to assure himself of the signal report. He then replays to Y with the appropriate signal report and roger, and in return receives a roger from Y. This situation (to me) is a valid QSO since it consists of a continuous two-way exchange. It would not be a valid QSO if some hours later X discovers while listening to his tapes, that Y's signals are on them. And consequently he calls Y on the phone to say that they had a QSO. This case is not a QSO since the important sequence of two-way exchange of information has been lost.

Ed's expanded guidelines of a QSO are, however, still not adequate in light of the rapid advances in communications technology and an example of this are problems of determining the validity of the communication

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*66 Skytop Road, Cedar Grove, N.J. 07009.

[1]World Above 50 MC, *QST*, March, 1967, p. 55.

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between W6IOM and G3LTF on 1296 mc.[2,3] This example will not be the last.

As amateurs involved in what I like to refer to as the "states worked game", we are not interested in the transmission of "absolute" information as the postal service or telephone company are. If anything, our operation might be compared to a golfer or other sportsman trying to display a specific skill. When we sked a station, we usually know his call, handle, and QTH. If the propagation by which we are trying to work him is marginal, we also know with a high probability, the signal strength: weak! These items represent a great deal of "absolute" information. To transmit them from one station to another (when they are *known* at both ends of the path) takes very little "mutual" or "real" information transmission. For example, station X could say to Y: when you receive a series of dahs during our sked this will stand for my call, your call, my QTH, my handle, and my reception of your signal at an S-1 signal strength, etc. The above technique is known as block incoding and is not new to amateur radio. The ARRL number code (73,88,etc.) is a form of block encoding.

Obviously, any definition of a QSO should be based on the "real" information transmitted not "absolute" information. It is possible to define a measure of "mutual" information, but this quantity is abstract and would be difficult to implement in practice. A more fruitfull approach might be to establish limitations on the coding techniques used to transmit information. Valid QSO's could be limited to information exchanges employing Morse code (or voice) only. Such a resriction however, we believe to be much too harsh since it would eliminate the use of many new communication techniques upon whose application much of the future of v.h.f. depends. A far better rule would be one which limited the amount of allowable block incoding or the minimum number of code symbols. Perhaps the best compromise rule would be one which allowed any coding technique to be used which had the ability to transmit every word in the English language.

In any case, the sooner agreement is reached on what constitutes a QSO, the sooner real progress will be made on the v.h.f. bands.

73, Allen Katz–K2UYH

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[2]World Above 50 MC, *QST*, Feb., 1969, p. 74.
[3]VHF Today, *CQ*, March, 1969, p. 75.

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SURPLUS sidelights

BY GORDON ELIOT WHITE*

ONE of the World War II surplus "Classics" was the v.h.f. Command Set, the SCR-522, which served so many amateurs so well as their first v.h.f. sets, and has endured to this day, with factory-new units still being unearthed in obscure government storage depots. I thought it worth a last, fond treatment in its thirtieth year before the memory fades away.

A Classic Revisited

The literature on the SCR-522 is more extensive than for any surplus unit other than the h.f. command sets, SCR-274N and AN/ARC-5. The *CQ Surplus Conversion Handbook* ($3) covers the set and construction articles on it dot the back issues of *CQ* (October '48, July '47, February and October '65 to name a few) as well as *QST*, *73*, *Radio News*, and other publications. The BC-625 transmitter section can be used for 2 meters in its original form (100-156 mc coverage) or doubled to 220 mc (see *CQ*, October 1962). The BC-624 receiver is simple to use for 144 mc work, and can be adapted to the 136 mc weather satellite band as well, through its sensitivity and noise figures are not as good as more modern equipment.

The v.h.f. command sets were brought to the attention of the Army Air Corps in August 1940, by the famous British technical mission led by Sir Henry Tizard, an advisor to the Ministry of Aircraft Production. Tizard and his small group of technical experts had already developed the cavity magnetron, which was the key to modern radar, but needed American mass production of it. V.h.f. voice, using crystal control, had proven itself in the early air battles over Europe, and the British TR-1143 was given to the U.S. by Tizard. It was eventually farmed out to Bendix, and Colonial Radio, who made exact copies by the tens of thousands. Almost all bore the British Signal Corps seal, a red crown which may still be seen on the surplus units.

Conversions of the SCR-522 can be as simple as the construction of a power supply to replace the 24 volt dynamotor, (fig. 1), with the addition of rudimentary controls to replace the motor-driven setup, or one can go into bandspreading the receiver to broaden its tuning, addition of a carbon mike input, and transmitter modulation improvements.

The first thing usually done is to convert the receiver portion from crystal control to tuneable operation. This was described first by W2JBM in *CQ* 22 years ago: the crystal sockets are removed from the r.f. oscillator circuit (a 12AH7GT) and a 25 mmf variable capacitor wired between pin 5 and ground, together with one of the iron-core inductors used to trim the original crystal circuit. Fig. 2(A) shows the original configuration and (B) shows the converted oscillator.

The receiver uses a 12 megacycle intermediate frequency, and crystals used originally had fundamental frequencies between 8 and 8.72 mc, selected according to the following formula:

$$C = \frac{F-12}{M} \times 1000$$

where C is the crystal fundamental in kilocycles, F is the desired operating frequency, and M is the harmonic to be used. The harmonic is taken from the following table:

Incoming r.f. frequency	Receiver harmonic
100-108 mc	11th
108-116 mc	12th
116-124 mc	13th
124-132 mc	14th
132-140 mc	15th
140-148 mc	16th
148-156 mc	17th

*5716 N. King's Highway, Alexandria, Virginia 22303.

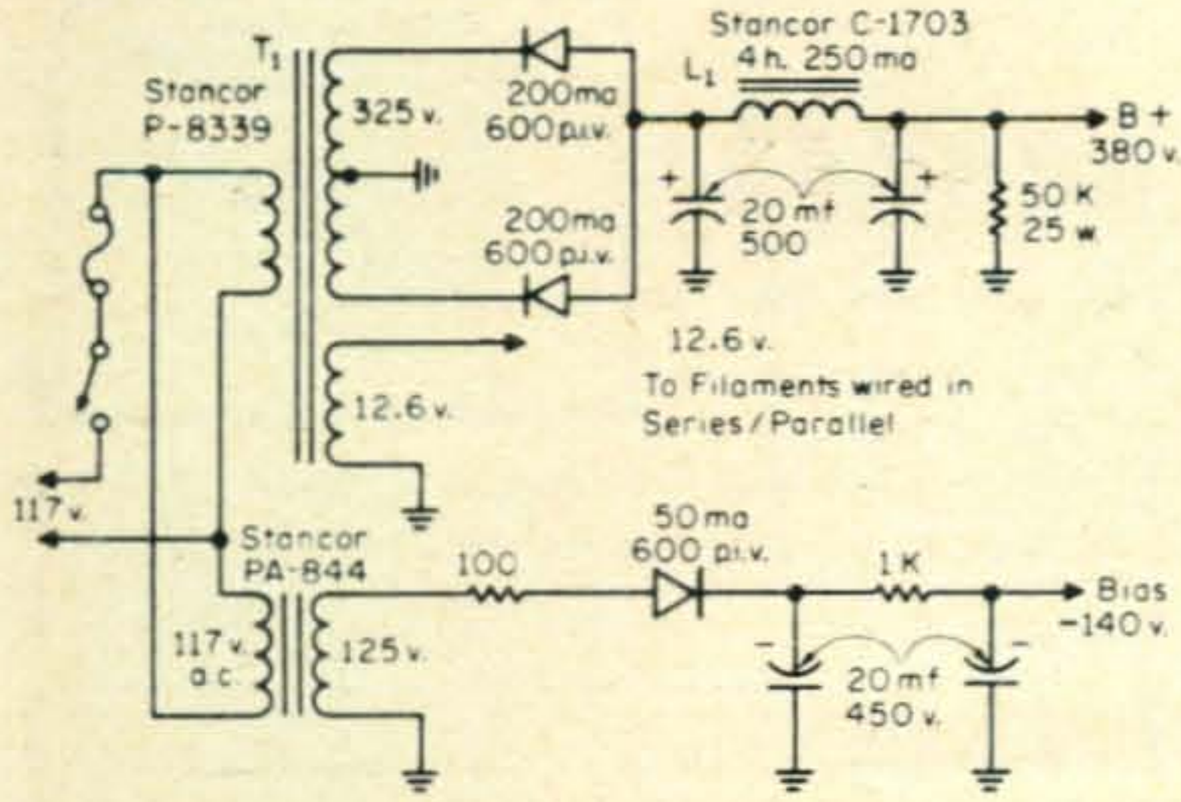

Fig. 1—A power supply that will replace the 24 volt dynamotor.

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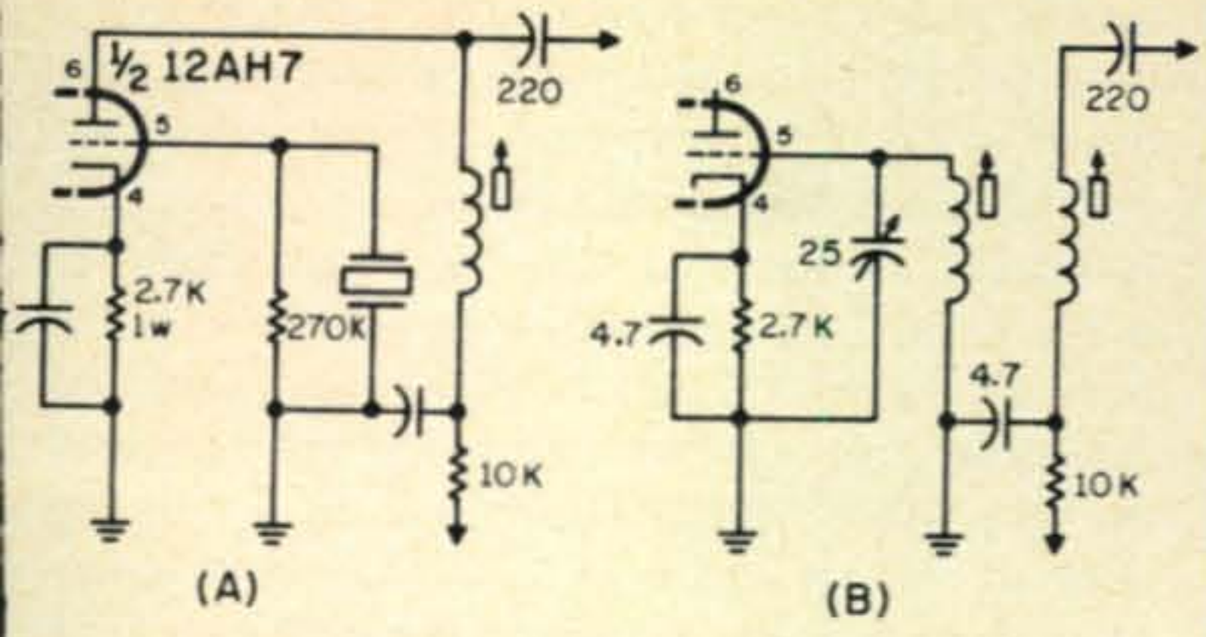

Fig. 2—(A) Original oscillator circuit, (B) converted circuit.

The transmitting crystals range from 5.560 mc to 8.660 mc, and are chosen by dividing the desired output channel by 18.

The output power of the original dynamotor-powered SCR-522 was rated at 8-9 watts. With a stiff power supply, and minor improvements, the a.m. output can easily be increased, though without surgery the SCR-522 will never be a rock crusher. Simple expedients include replacement of the braid plate leads to the 832A output tubes with copper straps, and use of 12V6GT tubes in place of the 12A6 audio amplifiers. (the braid was used when strap leads broke under vibration conditions in aircraft)

To decrease prevalent TVI problems, it is desireable to heavily bypass the transmitting tube filament leads with .001 mf ceramic disc capacitors. Do the same on meter leads and shield the transmitter case as well as possible.

Six meter operation of the SCR-522 is also possible, as well as the simpler 144 mc conversion, or the 220 mc mode. The former requires new coils in the first tripler circuit, which becomes the output tube (832A), and the latter involves putting in a 6.120 mc crystal to get 110 mc on the final, which is then driven as a doubler to get 220 mc output. This lets a lot of 110 mc energy get to the output, so a high-pass filter is de rigueur, lest you find the sky overhead filled suddenly with air liners, their instrument approach systems homing frantically in on your QTH. This might become embarrassing, and should be avoided. A quarter-wave stub cut for 110 mc was suggested as a solution to the problem, but I suggest some care be exercised in such a lash-up.

Original voltages for the SCR-522 were: B plus 310 v. d.c. at 230 ma; bias—150 v. d.c., 8 ma filaments 12.6 v. (a.c. or d.c.) at 3.5 amps, and 13 v. d.c. at 500 ma to operate the

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relays and tuning meter. I have seen the B plus boosted to 350 volts or more without harm, with accompanying current increase.

The sensitivity of the BC-624 receiver was rated at 3-4 microvolts for a 10 db signal to noise ratio and 10 milliwatt output. This is nothing much. The R-28/ARC-5 and the rare tuneable ARC-5 sets have better than 1 uv sensitivity figures, but then, in 1939, the state of the art was fairly poor, and the range of the Spitfire was not very great either.

The tuneable ARC-5 receivers for v.h.f. used an additional stage of radio frequency amplification, and generally far cleaner design, though the tubes (9003 and 9002) were the same. That circuit survived intact until quite recently in the R-13 and R-19 receivers in the A.R.C. type 12 series.

In sum then, the SCR-522 set is a relic of a bygone war and of an era when surplus *was* amateur radio. Obsolete for such exotic projects as moonbounce or even v.h.f. DX, these sets have long served as useful short-to-medium range transceivers, including good service as bootleg *unicom* sets in many small airports on 122.1 mc. Still to be seen in surplus stores, they can provide good, cheap practice for the Novice, and offer a good bargain in reliable local v.h.f. communications. ■

Tri-band Quad [*from page 55*]

the medium-duty type with the same control box as its big brother, *i.e.*, a meter indicates direction. The stop for this rotor is in the south direction, which for this N.Y. area, is just right for most all the DX, but for my purposes on 2 meters was a headache.

On 2 meters, I wanted to be able to swing from north and around in a clock-wise direction through south. This necessitated mounting the 2 meter beam 180 degrees reversed from the quad. That meant either interpolation of headings or decals would be needed on the control box. After some practice, the interpolation method was found to be easier.

So finally, the three problems seemed to be solved or at least worked out to my satisfaction and the 2 meter installation was made. Evidently the height increases overshadowed any line losses because after some contacts with South Jersey and Philadelphia, a distance of over 100 miles, the reports I got were most gratifying, to say the least.

80 Meters

The only other band in which I was interested was 80 meters and since I had no room

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to swing a beam, the choice boiled down to some combination of a dipole and inverted vee. Because of the clearance necessary for the quad spreaders and loops, the apex of the antenna could not be much higher than about 40 feet. One leg of the antenna was stretched out and secured to a fence and the other went to a tree limb in a wooded area adjoining my property. This antenna was pre-cut for a middle portion of the band and checked for s.w.r. with good results. The first few contacts on this band were a G2 and a KP4. Their reports were not tremendous but since I only run barefoot, I was more than satisfied.

Conclusions

1. There seemed to be no obvious interaction between the quad and the 2 meter beams.

2. Even with the high transmission line loss there was excellent reception and improved signal reports.

3. The light-weight beams were not too much for the rotor I used.

4. All antennae, control lines and transmission lines were away from the house and clear of the main part of the yard. (They ran around the fence; an XYL mandate).

5. The price tag for the whole installation, if everything is new, runs about $400. This will vary but it's reasonable if you consider the going price for a crank-up, tilt-over tower, a good tri-band beam and a heavy-duty rotator.

6. I now have the 5 bands I prefer to work, at one location.

7. The 80 meter antenna could probably be modified with a 40 meter leg at some future date.

Disadvantages

1. A crank-up, tilt-over tower would definitely be easier to work with to tune up and install the antenna.

2. The quad has somewhat less gain than its yagi equivalent.

3. A tower mounted nearer the shack would require a good deal less transmission line.

Some Additional Comments

My quad was fed with a single transmission line to a 4 position switch controlled from the shack and selling for about $15. This provides for switching feeders *at* the tower for the three sections of the quad and had I installed the 2 meter beam at the same

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time as the quad, I would have utilized the fourth position. Unfortunately, it is rather difficult to work on the switch from 50 feet but I would recommend the switch very highly.

The three transmission lines, (one from each separate antenna), come into the shack to a 6 position coax switch and the only thing necessary to do to go from h.f. to v.h.f. is to move the cable to the appropriate transmitter.

Maybe this article will not be applicable to your unique situation but at least it will give you some idea of what can be done. ■

Propagation [*from page 79*]

TIME ZONE: PST (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-20 (1) 00-02 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-09 (1)	06-07 (1) 07-09 (2) 09-11 (1)	06-07 (1) 07-09 (2) 09-11 (3) 11-12 (2) 12-14 (1) 14-19 (2) 19-23 (1) 23-02 (2) 02-04 (1)	21-00 (1)
Eastern Mediter-ranean & Middle East	07-10 (1)	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
West & Central Africa	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	06-10 (1) 10-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-23 (1)
South Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	06-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (2) 15-17 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-21 (2) 21-22 (1) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
East Africa	08-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	08-12 (1) 12-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	08-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	18-21 (1) 06-08 (1)
Central & South Asia	17-18 (1) 18-19 (2) 19-20 (1) 06-09 (1)	16-17 (1) 17-19 (2) 19-21 (1) 06-09 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	04-09 (1) 17-19 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-15 (1) 15-18 (2) 18-20 (2)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 18-20 (1)	02-03 (1) 03-05 (2) 05-08 (1) 03-05 (1)*

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Far East	13-14 (1) 14-15 (3) 15-17 (3) 17-18 (2) 18-19 (1)	08-13 (1) 13-15 (2) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 14-16 (3) 16-18 (2) 18-20 (4) 20-21 (2) 21-23 (1) 02-04 (1)	23-02 (1) 02-05 (2) 05-08 (1) 03-05 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-14 (3) 14-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-23 (4) 23-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (4) 09-11 (2)	21-22 (1) 22-05 (3) 05-07 (2) 07-08 (1) 22-00 (1)* 00-05 (2)* 05-06 (1)*
Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-17 (1) 17-19 (2) 19-22 (1)	18-20 (1) 20-00 (2) 00-04 (3) 04-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-10 (3) 10-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-09 (4) 09-13 (2) 13-15 (3) 15-18 (4) 18-00 (3) 00-01 (2) 01-03 (1) 03-06 (2) 06-07 (3)	18-19 (1) 19-01 (3) 01-04 (2) 04-05 (1) 19-22 (1)* 22-01 (2)* 01-04 (1)*
Brazil, Argentina, Chile & Uruguay	06-07 (1) 07-11 (2) 11-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-00 (3) 00-02 (2) 02-04 (1) 04-07 (2) 07-09 (1)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
McMurdo Sound, Antarctica	07-09 (1) 16-20 (1)	07-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

DX [*from page 62*]

to be active from this zone are JT1AG on s.s.b. and JT1AJ, JT1AK, JT1KAA, JT2-KAA, JT2KAB, and JT2AB on c.w.

Zone 24: BV2A, 14028 kc c.w.; VS6AA, 21382 kc s.s.b.; VS6AL, 14250 kc s.s.b.; VS6DR, 21357 kc s.s.b.; and VS6BS, 14215 kc s.s.b.

Zone 26: HS3AL, 14220–225 kc s.s.b.; HS1-TA, 21290 kc s.s.b.; XW8BS, 14218 kc s.s.b.; XW8BZ, 14240 kc s.s.b.; XW8CR, 21044 kc c.w.; and XW8CS, 21028 kc c.w.

Zone 34: ST2SA, 21040 *kc* c.w.; SU1IM, 14017 and 21059 kc c.w.; 5A1TL, 14213 kc s.s.b.; 5A1TN, 21333 kc s.s.b.; and 5A3TX, 14200 kc s.s.b.

Rare Prefix Activity:

A2–A2CAU frequents the low end of 14 mc c.w. QSL only to PO Box 120, Lobatsi, Botswana.

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AX-AX1—AXØ may be used instead of VK by Australian amateurs during 1970. This is to commemorate the Bi-Centenial of the discovery of Australia by Captain Cook in 1770. Arrangements were made by VK2QL.

JD1—A DXpedition to the Ogasawara Islands formerly Bonin and Volcano Islands, was scheduled for the All Asian DX Contest on Aug. 29-31. QSL to JARL QSL Bureau, P.O. Box 377, Central Tokyo, Japan.

JW1—JW1CI prefers 14 mc c.w. and s.s.b. QSL to LA3T.

JW9—JW9DL is very active on 20 meter s.s.b. Frequencies reported include 14175, 14229, and 14235 kc. QSL to LA1SL.

PZØ—The special call PZØAA will be used from Sept. 25 to Oct. 8 by the Surinam Radio Amateur League (URAS) station at the Surinam Trade Fair.

XT2—Try 15 meters for XT2AA around 21270-275 or 21300. QSL to WA5REU.

3V8—3V8NC has been active around 14025. QSL to G3TXF.

9L2—9L2SL was a DXpedition by the Freetown, Sierra Leone radio club, to Banana Island. QSL to K4MQG.

9VØ—From Aug. 9 to Sept. 9, 1969 the 9V1 stations in Singapore were authorized to use the 9VØ prefix to commemorate the 150th anniversary of the city of Singapore.

QSL Information

CN8GE—Via W2GHK, P.O. Box 7388, Newark, N.J. 07107.
CN8HD—To W2GHK.
CR5SP—c/o W2GHK.
CX2CO—Via W2GHK.
FM7WD—QSL July 1969 5-band operation to WA5LES.
FM7WQ—To W4OPM, 2208 Dinwiddie Road, Bayside, Virginia Beach, Va. 23455.
G3AWZ—c/o W2GHK.
GD6UW—Via W2GHK.
HB9AHJ—North American stations QSL to W3HUU, 284 Union St., Uniontown, Pa. 15401.
HKØAI—To W9WHM, 438 Hamilton St., Fortville, Indiana 46040.
HS2JR—Via DK1RR.
JA1IVV—c/o W3HNK, Box 14, Norwood, Pa. 19074.
KA1C—To WA8NZH.
W4PHY/YV5—c/o K4ZCP, Box 626, Hickory, N.C. 28601.
LA1H—Via W2GHK.
OK4CM—To OK3UL.
PJØMM—c/o W2GHK, Box 7388, Newark, N.J. 07107.
PY2PA—Via W2GHK.
PY2PE—To W2GHK.

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A 5 BAND 260 WATT SSB TRANSCEIVER WITH BUILT-IN AC AND DC SUPPLY AND LOUDSPEAKER $435

The new Swan Cygnet is a complete SSB transceiver, with self contained AC and DC power supply, microphone and loudspeaker in one portable package. The Cygnet features full frequency coverage of the 10, 15, 20, 40 and 80 meter bands with a power input rating of 260 watts P.E.P. in single sideband mode, and 180 watts CW input. A crystal lattice filter at 5500 Kc is used in both transmit and receive mode, and provides excellent selectivity with a 2.7 Kc bandwidth at 6 db down. Superior receiver sensitivity of better than ½ microvolt makes it easy to pull in those DX signals, and with the Cygnet, if you can hear them, you can work them. Audio fidelity is in the well known Swan tradition of being second to none; providing smooth, natural sounding voice quality. The Cygnet is temperature compensated on all bands, featuring solid state oscillator circuitry with zener regulation which permits wide variation in supply line voltage without frequency shift.

Unwanted sideband suppression is 45 db, carrier suppression 60 db, and distortion products are down approximately 30 db.

The new Cygnet is designed to provide efficient, high quality communications in the 5 most commonly used amateur bands. Its low cost is a tribute to Swan's well known techniques in value analysis, and simple, direct circuit design. Above all, these techniques lead to a high degree of reliability and foolproof performance. Dimensions are: 13" wide, 5½" high, and 11" deep. Weight is 24 lbs.

The transceiver comes complete with AC and DC input cords, and carrying handle; thus making it the most versatile and portable set on the market, and certainly the best possible value.

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P.S. Yes, for our customers who require some of the extra features, there will be a deluxe version of the Cygnet coming soon, which will sell for approximately $495

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Phone: 617-944-4000

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SVØWMM–Via K6JAJ.
TA1AM–To K4EPI.
TA1AV–c/o SMØKV.
TA1KT–Via K4IEX.
TA1NC–To DJØUJ.
TA1RT–c/o K4EPI.
TA1SK–Via DL2OE.
TA2EM–To WØDAK.
TA2FM–c/o DJ2PJ.
TA2SC–Via K4EPI.
VE2DHF/YV1–c/o P.O. Box 92, Maracaibo, Venezuela.
VK9DR–To W2GHK, Box 7388, Newark, N.J. 07107.
VK9XI–c/o W2GHK.
VP2AZ–QSL July 1969 5-band operation to WA5LES.
VP7BG–Via W2GHK.
VP2GTL–Via WA5LES.
VP2LD–QSL July 1969 5-band operation to WA5LES.
VP7NY–To W2GHK.
VQ9G–c/o W2GHK.
WA5YRG/VE8–To WA9VBG, 6675 East 19th. St., Indianapolis, Ind. 46219.
YU3EY–c/o W3AVJ, 157 Chestnut St., Sunbury, Pa. 17801.
ZD9BE–Via W2GHK.
5R8AM–To K2KTK.
7G1CG–WA3HUP reports that no logs were ever received & station apparently not legally licensed. QSLs will be returned.
9J2BK–c/o W2GHK.
9X5GG–Via W2GHK.
9Y4VT–To W3DJZ.

73, John, K4IIF

160 M. Results [*from page 58*]

sentation from our State this year. Strung up a long wire Friday evening and got it tuned up just 10 minutes before the rat-race started. Last year my call was WA3DDW. As usual, a couple of anti-contest s.s.b. a.m. boys were QRMing the DX portion. However, the CW boys were very courteous and respected the DX portion quite well. *W3IN:* Condx were mostly excellent with lots of activity. Thought W3DPJ had me but was saved by the Gs with their 10 pointers. *W3GN:* Forgot that Contest started Friday, not Saturday!

4th District

W4BGO: A good show in spite of S-9 static levels. Signals from mid-west were normal but both coasts way down. Let's pick a better weekend next year! (Ben, I've thrown the old crystal ball out and replaced it with a new one for 1970–*ed.*). *WA4SGF:* QRT 0610 Sunday. Have bad cold and terrific headache. (That QRN was enough to give anyone a headache, Ed–*ed.*). QRN was lil ruff this year but was still great fun. *K1PBW/4:* The antenna is really worth mentioning. It was the 325 foot vertical or radio station WGOH with 120 half wave radials and a 50 × 50 copper ground screen at the base. We

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also had a long wire 1,400 feet in length and at a height of between 150 and 200 feet. In addition we also put up a 2,500 foot Beverage antenna running east/west and about 6 feet above ground. *W40MY:* At least once a year I get on Top Band. This is the one Contest I look forward to, to get to "see" some of my old buddies I don't QSO on other bands. I now have a 24 foot trailer parked in the backyard near the tower just for a ham shack. Getting it all ready and some of the fellows are calling it the Dog House.

5th District

WA5KUD: Luckily the Contest fell on a weekend that I was home from school. The University of Arkansas doesn't have a 160 meter rig YET! Hope this Contest keeps growing like it is. It's one of the best as far as I'm concerned and my favorite! *K5MZU:* Didn't stay up late because conditions were so poor. Had some competition this year. K4RIN/5 was working in Mississippi also. Hope he did better than I. *WØVEH/5:* Condx were lousy here both nights—cloudy and rainy and lots of static. I now have a high scorer certificate from 3 areas: Bermuda, Virginia and New Mexico. I wonder if anyone can top that? *W5SOT:* Unable to participate both dates. Sending log anyway to help fellows with their score. Am proud to report that the 160 meter gang were courteous throughout the Contest.

6th District

W6JTB: Condx very poor. QRN extremely bad. Not one East Coast station did we hear at 1.8 mc end of band. We did manage to work two new countries. Should have a second go at Test! *W6GEN:* I was able to operate only Friday night as I went to the Fresno DX Convention on Saturday. Band Condx were not nearly as good this year but evidently there were many more stations on the air because, without even trying, I did almost as good as I did during the first night last year. I'll be on from W7CFJ next year in Arizona. Maybe I can work the East Coast a lot easier from there. Didn't hear any W1 or W2 this year. (Dale worked as XEØGEN during the ARRL D X Contest on 160. How's about giving that some thought, too, for our Contest next year?—*ed.*).

7th District

W7DY: Condx less than the best. East Coast stations conspicuously absent. But KV4FZ was heard well—and for long periods—yet he could no more be raised than he ever can. *W7GBL:* Very sorry so few contacts from Montana. 35 the first night in 2½ hours; 5 the second night in 4½ hours. Guess you can't expect a power crew to work on an S9 plus power leak in 2½ feet of snow, temperatures of zero and below, and winds of 30 to 40 mph. *K7YXS:* Thoroughly enjoyed Contest. During Saturday morning I put up new 160 antenna but didn't help. So I guess I worked the "Lucky 13." As you have heard before, I'll be back with a better score next year. Age 17 . . . licensed 6 years. *W7ZC:* Antenna 1000′ long wire. Condx bad—rain and snow. No 1.8 mc QSOs possible—couldn't break through there. This is my fourth 160 Contest and enjoyed it very much.

8th District

W8TJQ: Enjoy this Contest more than any other. Hope to have K8MFO back from Viet Nam to help out next year. *K8HKM:* This was my first all out effort. Roger, WA8LWK, and I really enjoyed it. Will be looking forward to next year and a better antenna. *K8BYI:* Condx weren't very good this year but we had a nice time even though we didn't get as many States in the west as we could have liked. They were on out there, nevertheless. *WA8EMJ:* My ever present line noise haunted me again. It's a wonder I heard anybody. See you next year. K8VQP: It's quite a thrill to hear Europeans like DL9KRA 579 on "The Top Band." Next year a vertical and a better ground system are in order. *W8MAI:* This is a good club activity and a real test prior to Field Day. All operators had lots of fun and look forward to next year. (I'm sorry to tell you fellows that you did not work Alaska. KL7FRY was signing KL7FRY/5 and was in Texas. At least you worked the 2nd largest State in the Union—*ed.*).

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9th District

W9UCW: Hopes were certainly high but the noise discouraged a great number of stations. We listened to DL9KRA for almost an hour but could never read calls of stations he was calling. My ears almost fell off listening through that racket! (You weren't alone, Barry—*ed.*). *W9PNE:* The biggest surprise was the spring-like thunderstorms on Friday which really plastered the band with QRN!! It was so bad that the only Eu DX heard was DL9KRA and I couldn't tell whom he returned to. Some W/VE QSOs required 15 minutes to complete the exchange. Even so, I believe I enjoyed this Contest more than any for several years.

10th District

KØQIX: First time on 160. Poor antenna set-up hindered a better score. *WAØLRW:* Last year a hastily modified AT-1 got me on 160 and I vowed to do better this year. So this time I put a T-4X and R4-A on but got almost nowhere because of antenna problems. Spent the second day (up until midnight) building a tuner. It worked but it was too late and I was too tired. Next year: Watch out for me with the new antenna! *WØNFL:* We did get a few more contacts this year but only worked one DX. QRN bad and signals weak. Still very enjoyable. (Where was that telephone call this year, Jim?—*ed.*). *WØII:* First time in a 160 Contest. Last previous 160 work back in 1934. I really didn't think I would give it too much push but decided to see what it was all about. The Friday night stint almost did me in as I sure tired out. Guess age is catching up with me. (Nope, it's only the kids who are getting older, Bob—*ed.*).

Canada

VO1FB: Condx were good considering that the peak of the sunspot cycle was so close. It's good to be able to say hello to all the regular contest entrants again. *VO1HN:* Being off the air for so long I almost forgot how to work c.w. Heard many, many stations on the band but wasn't able to work them in the pile up. Scuba diving is my #1 hobby at present but will try to be more active in the winter here is too cold for this time of year. *VE2SD:* I am too far from you chaps for QSO. (Come on, Arnie. You're local when you consider the distances of a great many of the boys—*ed.*). *VE3QU:* Condx poor to fair. DX signals weak. DX QRMd by stateside c.w. Phone QRM very light. 2 mc badly QRMd by stations in East. Contest very lacking in VEs. (You can say that again, Mel. Where are all you VE boys? —*ed.*). *VE3DU:* Another 160 Contest has come and gone and judging by the amount of QRMs was quite successful. On the whole, condx could have been much better as the band wasn't too stable with changing skip condx and lots of QRN. Not good to the west from here at all. Now I suppose about 50% of the stations worked won't be on 160 for another year—hi!

DX DX DX DX DX DX

(And, there was quite a bit of it). *VK5KO:* Not much of a score but I finally broke through. You can't visualize how frustrating it is sitting at your rig for hours and hearing signals but having the devil's own time getting through to three. *PY2BJH:* Sure wish I could get those 3 other PYs I QSOd to be more active on Top Band. *OK3BU:* My QTH is far from all stations in the Contest. Heard KV4FZ 589 but sorry no QSO. *EI9J:* Thought that this test we were due to hit a shell of good condx after poor or mediocre condx in last few tests. Last year we just missed it by a day. Due to my limited time on during the affair I didn't happen to be in on the best of what was going. Went crazy calling PY2BJH. *G3SED:* It's almost impossible for a G station to do well in this Contest because of the scoring system. If I had been in Wales or Scotland which are all on the same island or even in the Channel Isles I could have claimed a much higher score. (Remember, Mike, you're in competition only with other G stations and no other country—*ed.*). *G3IGW:* Heard many East Coast Ws but wasn't too successful in working them. However, TA2E was a real bonus! Condx up to 1000 miles were quite superb and continental Europe was workable at high noon. *G3KAC:* Had a 1/2 wave vertical supported by a balloon filled with hydrogen and anchored to the top of a 150′ tower. In a wind storm the balloon broke its mooring and ascended carring all the wire and string with it never to be seen again. If anyone should find it we would like it back, please—hi! For next year can you please pick a day without any gales? *G3PVA:* Thoroughly enjoyed the Contest as always. My observation was that activity was down this year on this side of the pond. The standard of operating was excellent and in the spirit intended. Heard KV4FZ peaking S9 just before sunrise. *DL9KRA:* Just returned from CE3CZ in time to sleep and be ready for the Contest. How did you ever, ever have the nerve to pick those incredible, fantastic condx during the Contest? Very interesting was the observation that the band showed two definite peak periods, namely 0200-0300 and 0600-0720 GMT ... the second being much better. Worked 32 W/VE plus KV4FZ, TA2E, PY2BJH and heard YV1OB. *KH6GLU:* Very sorry for the poor score but condx must have been strictly one-sided. Heard all call areas, Central America, Canada and Caribbean but no go. Heard, actually, hundreds of signals, but managed only 15 QSOs. All in all, it was a very disappointing Contest. I make an appeal for W/VE to keep 1995/2000 open for the weak DX signals. I just can't fight through the W/VE QRM with 100 watts and 3000 miles separation to the nearest station. *JA1PIG:* I couldn't work any overseas stations yet heard some. Condx were poor. *GI3WSS:* This is my first attempt at your Contest. ■

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CQ Reviews Drake 2-NT [*from page 53*]

At the test location, which is in a good TV-signal area, no TVI was experienced with on-the-air operation thanks to the low-pass output filter which was measured as having a cutoff near 36 mc with an attenuation of at least 50 db above 50 mc. It should prove to be as effective in most other areas where reasonable TV-signal levels are found.

Whether you're just a newcomer or an old-timer, you'll find the Drake 2-NT a simple job but yet one that has just about everything for convenient and excellent c.w. operation. It is priced at $149, less crystals. The manufacturer is R. L. Drake Company, 540 Richard Street, Miamisburg, Ohio 45342.

—W2AEF

Q & A [*from page 74*]

Connections should be made through a small coupling capacitor (22-47 mmf) to the receiver's 50.75 kc i.f. amplifier. This may be done at pin 5, or pin 9, V_7.

At 50 kc the Monitorscope requires 0.5 volts for a 1-inch deflection on the c.r.t. This should be easily obtainable from the above connections to the SX-101A. Therefore, if satisfactory operation is not realized, a possible foulup in the vertical-amplifier section should be checked.

To do this, connect a 560 and a 56-ohm resistor in series. Connect this combination across a 6.3 v.a.c. source with the SB-610 vertical input connected across the 56-ohm resistor. This will apply about 0.5 v.a.c. to the scope amplifier, in which case the c.r.t. deflection should be an inch or more when the vertical gain is set at maximum. For the test, you can, of course, use any other a.c. source that will give you 0.5 v.a.c.

If the unit does not meet the test, check the component values used, the 6EW6 vertical-amplifier tube and your wiring (including the switching). The wiring also should be checked for continuity using an ohmeter. Also check the voltages on the amplifier and the c.r.t.

Antennascope Modifications

QUESTION: Regarding the Antennascope '54 described in the June and July 1954 issues of *CQ*, have there been any more recent versions? Too bad there isn't a kit or a commercial version of this instrument.

ANSWER: No new versions of the Antennascope have been made since that shown in the above issues. As for commercial units, several of these are available under the name of An-

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tenna Bridge (by Heath), Z-Bridge (by Knight), etc. Since we have not checked any of these models, we cannot say how they will perform compared with the original Antennascope, particularly in respect to the accuracy of readings up to 200 mc. ■

Contest Calendar [*from page 68*]

Addendum

The following are scores from phone logs that were inadvertently left out of the results in the July issue, some due to the mail snafu last winter, a few due to our error. Those in bold type will receive certificates.

K1KDP	21	187,397	490	31	102
K4EZ	A	115,430	251	57	113
W4TXE	**21**	**153,387**	**464**	**35**	**82**
		(Operator W4YDD)			
W7KSA	14	32,004	133	34	50
W9AQW	A	765,919	800	102	241
CE3OE	**21**	**117,432**	**488**	**26**	**58**
CP1HW	**A**	**424,830**	**980**	**57**	**113**
F2SI	**A**	**1,116,560**	**1610**	**84**	**188**
F3KW	A	873,937	1355	77	146
OH6VR	A	59,658	254	42	121
SP9ANI	14	46,472	484	21	54
TG9UZ	**14**	**192,065**	**747**	**26**	**81**
UV9PP	**28**	**102,414**	**471**	**28**	**73**
VR1P	**A**	**128,619**	**439**	**42**	**51**

Check Logs: DJØPN, DJØTA, K5MDX, LZ2-KRO, OZ5JR, SP9BZM, UW4HW, VE3CEA, VE7NH, VK7NC, W2WZ, W6CFG.

You may be wondering why you did not see W9LKJ's c.w. score in the August results issue, although it appeared in the high claimed scores in the February CALENDAR.

An investigation under way at the time of the publication of the results, has now been completed. We find W9LKJ's log in violation of Section XIII of the Rules and has therefore been disqualified. ■

Reversi-Coupler [*from page 46*]

patching are anticipated.

The obvious merit of accurate impedance matching, between the transmitter and antenna, lies in the maximum transfer of power. Less obvious, but perhaps more important are the following:

1. Reduction of radiation through the power lines.
2. Discrimination against radiation of unwanted frequencies (the antenna coupler is a good TVI filter).
3. Operation of r.f. power amplifiers under designed conditions.

The latter item is particularly important in

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the case of tetrode or pentode tubes. A meter in the screen grid circuit of the r.f. power amplifier will disclose some radical changes when there is a mismatch in the antenna coupler. In this respect, screen current is a more sensitive tuning indication than plate current.

It is hoped that the Reversi-Coupler will be useful to amateurs and, in particular, that it will facilitate operation on the 160 meter band. ■

Service Nets [*from page 42*]

One of my favorite avocations when I'm home is scouting. Therefore I'm a booster for the World Scout Net, 21.360 mc, 1800 GMT, every Saturday, with Bob Hallock, WA7-GOO, Boise Eagle Scout, as Net Control. Also "Jamboree on the Air" comes up this year on October 18 and 19. See elsewhere in *CQ* for details. These are both fine media for Scouts and Scouters to communicate.

I'll see you on 7255 or 7258.

73, Ed, WB6IZF

USA-CA [*from page 71*]

for alerting you, that James, K1ZFQ with the help of LB, W4RNL and Jeff, KØWNV, will sponsor the yearly CW CH QSO PARTY Sept. 27 & 28–logs should be sent to L. B. Cebik, W4RNL, 245 Morning View Drive, Athens, Georgia 30601.

MANY THANKS to Bill Todd, K4ISE for sending along all that interesting information on the County Hunters Convention and the fine photograph that he received from Joe Bidnick, WAØPJX.

Tragedy again struck the North Jersey DX Association, sad to report the death of Walt Knoop, W2LA, exW2PXR, President; the death of Russ Schilling, W2LAX, ex-secretary; and the loss of Ellen Marie Cowan, Daughter of Joe Gehegan, Sr., W2ODO. Ed Chinnock, W2FZY is still taking it easy after his heart attack.

Also sad to report the death of the famous son of a famous father–Herbert Hoover, Jr., W6ZH. Many ole timers will remember that Herbert Hoover, Sr., was Secretary of Commerce and that department used to issue all radio licenses. My first amateur license issued in January 1922 was issued by Herbert Hoover.

Try to find time between getting all those new awards, sending out your QSLs, and entering all those contest to write and tell m –How was your month? 73, Ed., W2GT.

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A GREAT BUY FROM ARROW —

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VHF ROUNDUP Syracuse VHF ROUNDUP Oct. 11, 69. Three Rivers Inn, 10 miles north Syracuse. Tickets W2RHQ, 902 First North Street, Syracuse, N.Y.

FIRST NEVADA QSO party scheduled, December 06001Z to 072400Z De WA7BEU.

SAROC fun-convention January 7-11, 1970 in Las Vegas Nevada. QSP QSL for details to Southern Nevada, ARC, Box 73, Boulder City, Nevada 89005 de W7PBV.

PITTSBURGH AREA 20 meter 3-el yagi, vy rugged, 20 ft twinbooms, stainless hdwr, $50, no shipping. W3AEV. (412) 835-9548.

2nd ANNUAL YANKEE VHF SSB Dinner October 15th Framingham Motor Inn, Framingham, Mass. Info contact K1BXC or WA1GET.

WANTED: RBL Rcvr 15-600 kc, R. Bell, 20146 Beachcliff Blvd., Rocky River, Ohio 44116.

WANTED: FM-receiver, Low band 30-50 M.C. A.C.-117 volts, used, at a reasonable price. Edward Webb, KBD4580, 306 Walker Street, North Adams, Mass. 01247.

JOHNSON VIKING SSB Adaptor with power supply. Cat. No. 240-305-2 like new & Johnson modification kit #250-0048.001 new. H. Richards, Argyle, N. Y. 12809.

FOR SALE: "COMPLETE RIG" $375.00. Collins 75A2 receiver with matching speaker B & W Transmitter model 5100 both with instruction manuals, and schematics. New Pair of 614B RCA, also have BC221 freq. meter (not included in above price) $50.00. with original calibration book. All in excellent condition. Glenn Poor, W9ZFG, 203 N. Coler, Urbana, Ill. 61801.

CLEANING HOUSE: Swan 250-Ac 117xc PS $250.00. Heathkit Pawnee 2 mtr Transceiver like new $125.00. Like new kw Johnson Matchbox $125.00. Motorola T51GGV 60 watt with all accessories tuned for 50.5 A-1, $115.00. 2 Meter narrow band Base station, $40.00. WA5QYR, Ben R. Tomlinson, RFD 2, Lonoke, Ark. 72086.

WILL PAY CASH for Ancient Broadcast Mikes—Carbon, condenser, ribbon, or Dynamic: H. F. Gray, 122 Woodland Terrace, W. Lafayette, Indiana. 47906.

LARRY: Whatever happened on two meters. Otto.

QSLS. Second to none. Same day service. Samples Airmailed. 25¢. Ray, K7HLR, 25 South Terrace Drive, Clearfield, Utah. 84015.

75A4, extra-mint, No. 2598, used 10 hrs., all modifica., manual, first $390 takes. S. A. Tucker, 51-10 Little Neck Pkwy., Little Neck, N.Y. 11362.

WANTED: Model 28KSR in good operating condition for $250.00. K. Schwieker, K4KQR, 1124 Opelika Road, Auburn, Ala. 36830.

B&W 5100 and 51SB, Heath twoer, Lafayette HE45B, write WA5CMC, 2309 Bullington, Wichita Falls, Tx. 76301.

WANTED: Heathkit SB200, HP23, and Collins 30LI, any condition. Bud Massa, W5VSR. 704 N. Cumberland, Metairie, La. 70003.

SELL Parks Nuvistor 2-meter converter. Like new. Output 27 to 31 MHz. Make offer. W5AQN, Box 1316, Rockport, Tex. 78382

FOR SALE: Johnson Invader 2,000 perfect condx. P.S. tubes to Solid State. 2 spare 4-400's meter, and extras. $550. John Schaefer, W2GZI, Box 59-A Epson Course, Brookhaven, New York. 11719.

05-FR RTTY Exciter $25.00. F.O.B.; TCS Trans-rcvr complete with access. and ac supply $125 u-pick up; Pair BC611 Handitalkies with 2 spare chassis $25.00 FOB; L. Basham, Cave Junction, Ore. 97523.

WANTED: Drake-RV4. V.F.O.; like new with manual—J. Gysan, 53 Lothrop Street, Beverly, Mass. 01915.

WANTED: Radio Reminiscences: A Half Century by Dr. A. Hoyt Taylor. K6ICS, 9418 Florence Ave., Downey, Calif. 90241.

FIRST NEVADA QSO Party December 060001Z to 072400Z. All Radio Amateurs invited to participate. Details in November issue amateur magazines. de W7PBV.

WANTED: Selsyns by Bendix or Diehl # C 78248 115 VAC. Collins 75S3. Johnson 70 & 99 mmf 9 KV variable capacitors. W0AIH, 814 4th Street, Virginia, Minn. 55792.

KNIGHT T-60 mint condition, no scratches, works perfectly, guaranteed, sell $35. WN6EYN, 363-10th Ave., San Francisco, Calif. 94118.

R4A-$280. Mobile power SY for KWM-2. by Adcom $85.00. new. F. Baker, Box 546, Mc Comb, Ohio.

FOR SALE: HR10 receiver w/cal. xtal. Also VR reg on BFO. $60. W6TTS, 1016 Masonic Avenue, Albany Calif. 94706.

WANTED: Pwr trans: 110-220 v. pri. 900v. 400-500 mil. sec. Not over 4½" x 4½" x 5½", for linear W6TTS, 1016 Masonic Avenue, Albany, Calif. 94706

FOR SALE: Collins S line 75S3B, 32S3 pwr supply and station control, High Ser number Ex. Con. WA0 GUN, 231 So. Jasmine Street, Denver, Colo. 80222

FB 6-80, VFO $25, tape recorder Stereo Solid State $40. Will trade on. NC 155 or 270 rcvr. W9DI, 22 S Clay Street, Hinsdale, Ill. 60521.

RCVR WANTED: Comparable to Drake 2B, C: Ps state cond. and price. WN2JJF, Gary Whitehead, Reynolds Rd., Glen Cove, N.Y.

NEW BOXED 811-A's $4 each plus postage. Pent PL-172 $50. Collins 516E-1 12 volt DC supply, mint $95. Don Burns, 4410 Reading Road, Dayton, Ohio 45420.

DRAKE 2C-$170. In excellent condition, need mone for school. WA0VFY, Dave, 1414-16th Street, Bismarck, N.D. 58501.

ANTENNA FARM-204 ft. lot, large bedroom house $24,000 take Collins equip. or boat in trade. W. Davis 4434 Josie Ave., Lakewood, Calif. 90713.

FOR SALE: TRI-X-500 SSB CW xmtr-500 watts PEP $170. Local Deal, Paul Wiegert, 625 Van Duzer Street Staten Island, N.Y. 10304.

SELL Almost new Swan 500-C-$475.00. Hallicrafter HT-37—$195.00. Have too much stuff. A. Vern Roberts, 5520 Porter, Wichita, Kansas 67204. W0GM

I'd Like to Modernize (!) my 807 rog by substitutin the 807W. These are unobtainable here. Can anyon help me? A. Herridge, G3IDG, 96 George Stree Basingstoke, Hants, England.

WANTED: Antique radio tubes made prior to 192 S.M. La Dage, 431 Oakland, Maple Shade, N.J. 0805

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3-4tl, (24) 250th, (4) 872A, (41) 5D21, (6) 211, (12) Unused surplus; make offer. W60FD, Geo. Sue 619 14th Street, Modesto, Calif. 95354.

SCHOOL COSTS FOR SALE: Hallicrafters SR-160 transceiver; Swan-500 with AC power supply. Any reasonable offer considered. Tom Frenaye, 4534 Hawthorne, Montclair, Calif. 91763.

HV mica cap. 1KV-5KV 0.00005-0.02 uF X band FR Q meters TS-33, TS-35 and many others. Send for list. M. Bae, Box 9, Kingston, N.J. 08528.

SWAP: Mint Cawon ft. Q1 1.4 w/accessories and F2.5 135 mm and F2.5 35mm lens. Want Swan 260 R.H. Odom, Jr. W4CRL, 1410 Converse Ave., Fayetteville, N.C. 28303.

SELL: Galaxy V Remote VFO Deluxe Accessory Console Rejector CW Monitor AC and DC supply all like new, WA0KLC, 315 E. 20 Grand Island, Neb.

FT&T 220 MHz Xmtr pair 7034/4X150 $75; Collins 51J rcvr, VHF Gear Excess needs SASE. W4API, Box 4095, Arlington, Va. 22204.

FOR SALE: 7-80M and 13-40M crystals, $1.25 each pp., all for $20 pp. None in Novice Bands or Phone Bands. Box 895, Greeley, Colo. 80631.

COLLINS 75A4 rcvr. Late serial No. 5276, Vernier Knob, vy clean, $415. WA8ONP, Al Schnorrenberg, 612 Jennings Ave., Salem, Ohio. 44460.

4000 POUNDS Radio & Photo gear priced for quick sale. List free. Art Beahr, 8719 Oxwell Lane, Laurel, Md. 20810.

FOR SALE: National SW3 complete with coils and Power supply. Also National 5 meter transceiver. Erv Rasmussen, W6YPM, 164 Lowell Street, Redwood City, California. 94062.

SELL: Immaculate HQ-170A, Ameco 6M-preamp, $210; SB-301 AM-filter $14; SX-99 $55. W1ZPB, Mount Hermon, Mass. 01354.

XFMR: 3KV/2KVCT, 110VPRI, 450 WCCS-$35 (26 lb) Mod. 14 Rtty KBD, Tape Prntr (55 lb). $25. More, SASE. WA1JYU, 27 Blue Ribbon, Westport, Conn. 06880.

RTTY PRINTER WANTED: Prefer lower cost model such as 15, etc. 150 mile radius. State price. R. Hendrickson, 118 E. Columbine Rd., Wildwood, N.J.

WANTED: Swan SW240 transceiver and KW Matchbox. S. Burke, 116 Flanders Rd., Niantic, Conn. 06357.

WON ONE, HAVE ONE: Sell Sencore FE-14, Field Effect Voltmeter, $50.00; Ameco Bridge Indicator Unit, $13.50; FOB. R. Wendel, WB2YYX, 160-20 Grand Central Pkwy, Jamaica, L.I., N.Y. 11432.

VARIACS, Constant voltage transformers, S.A.S.E. for list, Dale R. Lee, W3JRM, 1228 Shelbourne Dr., Bethlehem, Pa. 18018.

FOR SALE: A1 Galv 1/4" Guy Cable complete with insulators, Turnbuckles, Etc. Surplus top quality. 18¢ per foot. Write F. Ronson, Rd 1, W. Redding, Conn. 06896.

RTTY INFORMATION for the Amateur interested in RTTY. F. DeMotte, P.O. Box 6047, Daytona Beach, Florida. 32022.

SELL: ART-13 transmitter with maintenance manual, plugs, spare 813, 811's $40. RME, 4350A Rx $60. K9KRW, Box 436, Highland Park, Illinois. 60035.

3500V, 2A, 120V, PRI. Swinging, fixed chokes. Jennings, 750 Pf, Vac, Var. Cash or swap. K4EPI, 750 Lily Flagg Rd., Huntsville, Ala. 35802.

WANTED MODEL 28KSR in good operating condition for $325.00. K. Schwieker K4KQR, 1124 Opelika, Auburn, Ala. 36830.

FOR SALE: Power xformers 3750, 3120, 2500 VCT. each, 300 Mills Chokes: 500, 400 and 300 Mills each, Meters, 100 watt resistors etc. Casey, 33 Grove Ave., Woodbridge, N.J.

FOR SALE: National NC-125 receiver .5 to 32 Mhz. Very good condition. $55.00. S. N. Silbert, 2066 Creston Ave., Bronx, N.Y. 10453.

REPEAT COILS, QST Fone Patch 2/$5. 88 mh toroids 5/$1.75. W9FTE, 8800 W. Clovernook Ct., Milwaukeem Wisconsin. 53224.

V20 20 amp Variac $25. Blue racer Chromed Vibroplex $18. APS-13 Complete $8.50. Heinemann circuit breakers ASK. W0KPZ, Box 1038, Boulder, Colo.

WANTED TO BUY: Antique edgewise—wound copper helix for 1925 Hartley oscillator, W6AKM, 1289 Glen Eyrie Ave., San Jose, Calif. 95125.

SELL: 2 Motorola FPTR Handie Talkies 30-50 Mc. $50; Measurements 78B Sig. Gen. 25-50 Mc. and 120-240 Mc. $50; Monitoradio DR200 $90. J. Wasiewicz, 229 Sarles Lane, Pleasantville, N.Y. 10570.

SELL: Heath Monitor Scope. Used only 2 hours—$42.00. FOB. J. Ferrara, 146 William Street, West Haven, Conn. 06516.

FOR SALE: Hallicrafters SX 146 won at the Saroc convention. Two hundred dollars. Never used. Erv Rasmussen, W6YPM, 164 Lowell Street, Redwood City, Calif. 94062.

COMPLETE HEATH STATION, HW-100 & accessories. Write for list. All mint cond. WB6ZQQ, 3592 Valencia Hill Dr., Riverside, Calif. 92507.

SB33 xcvr & vox-20 hrs on air, last series, beautiful. SB1LA-1KW; 50 hrs; excellent also. Make offer. K5-RSG, 1323 Nashville, New Orleans, La. 70115.

"Hope to see you on SOWP" QSO-party Nov 29/30 & Dec. 6/7 K6EA/0 Lake Bemidji, Minn.

STUDENT SELLS Globe V-10 VFO, HR-10, R-100, Cheyenne MT-1 W/AC, Mon-Ley. Excellent cheap. Ed Winkle, WA8RQQ, Sardinia, Ohio 45171.

FREQ. METER TS-174?u, 20-250 Mc., Regulated power supply, with modulation. Like new, $125.00. Glen Richie, 643 Diamond Road, Salem, Va. 24153.

EICO 753, S.S. VFO, F.B. Stability, perf. oper. condx., $120. Also Homebrew AC p.s. for 753. WA0UDJ, Box 156. Artas, So. Dak. 57423.

DESIRE OLD QSLs, and information on operations of stations 1XM, 1MX, W1MX, 1909-1969. M.I.T. Radio Society. W1MX, Box 558, 3 Ames Street, Cambridge, Mass 02139.

WANTED: Novice crystals. State frequency and price in first letter. R. Gunden, 7893 Geiger Road, Pigeon, Mich. 48755.

TOWER 40 ft. self-support—$50, 20 m 3 el beam—$25, new Cushcraft 16 el 2 m colinear—$8. K6QGE, 675 S. 10th Street, San Jose, Calif. 95112.

SELL OR TRADE: B&K Picture tube testor/rejuvenator $35.00. 75A2 clean. T-150 mint. Gerald Manning, K4WWL, Rt. 2, Box 191, Rocky Face, Ga. 30740.

NC300 w/cal, spkr, 6 & 2 cnvtr. Best offer Viking II w/VFO also ART-13 make offers EICO 753/751 $170.00 K5ZUV, 911 S. Liberty Okmulgee, Okla. 74447.

WANTED ANTIQUE TUBES—Sodium—Robert Dollar Detector—Dietzen Midget—Margo Detector. W2EZM, 431 Oakland, Maple Shade, N.J. 08052.

SELL: DX-20 $19, Globe Chief Deluxe $27, HQ-110 $97. Also many surplus xtals, 15¢ ea. SASE for xtal. List. WA3JBN, 316 Donnell Road, Lower Burrell, Pa. 15068.

WANTED: 75A4 vernier tuning knob, cabinet 75A/32V series. Send letter-price & condition to W6OAU, 22034 Independencia Street, Woodland Hills, Calif. 91364.

FOR SALE: Complete Galaxy (5MK3) station. Also Drake Station and misc. SASE for list and prices. WA5TYB, Box 19522, Dallas, Texas. 75219.

See page 110 for New Reader Service

WANTED: TX and RX covering 160 to 190 kcs. State price and condition. C. M. O'Brien, 48 Prospect Ave., Westwood, N.J. 07675.

SELL: Swan 350 and 117XC power supply. Good condition. Make offer. W10ER, 135 Barbara Rd., Waltham, Mass. 02154.

WANTED: 432 MC Converter-output on 10 or 6 mtr band desired. State price wanted and condition of unit first letter. K8LJQ, 351 Mower Rd., Pinckney, MI 4-8169.

WANTED: 50 mc, 144 mc, 220 mc, and 432 mc converters and/or transverters; 20m or 6m. SSB Transceiver. WA3BGN, 6117 Smithfield Street, Harrisburg, Pa. 17112.

WILL SWAP Heath Sixer for DX-40 or another small transmitter. C. E. Garrison, 1448 Hannaford Rd., Winston-Salem, N.C. 27103.

FOR SALE: Hallicrafters SR-160 & Knight T-60. Both in very good condition. Best offers! WA9WVJ, 7527 So. Morgan, Chicago, Ill. 60620.

COLLINS KWM2, PM2, MM1, CC1. Allin mint condition only year & half old. All in original cartons $1200.00. Veish, P.O. Box 418, Sackville, N.B. Canada.

HALLICRAFTERS SR-150, mint cond., with A/C, D/C and mount. Best acceptable offer. T. Appler, K3UEJ, 2981 Normandy Drive, Ellicott City, Maryland, 21043.

VFO, Heath HG-10 in exc. condx., $30, with manual, 80-2 meters, R. Beatie, 1904 114 Ave., Tampa, Fla. 33612.

SELL: Mosley 3 el Trisand beam, $40; Dumont model 553 5" scope, $40; ten foot triangular toner, $10; Homebrew 813 KW, $50. WZRUZ, 33-45 172 Street, Flushing, N. Y. 11358.

FOR SALE: Elec. Soldering Irons. New. Amer. Beauty 550w, $7.25; Hexicon 100w, $3.50 plus shipping. Ken Maas, W9AZA, Burlington, Wis. 53105.

WEBCOR Taper-Recorder, plays stereo and 4 channels $55 and also am-fm amplifier 35 watts $30. Rafael M. Estevez, WA4ZZG, P.O. Box 2442, Hialeah, Fla. 33012.

FOR SALE: HQ180 C Receiver, mint, original carton and manual. $215.00. K5ENL, Ed Block, Grandview, Texas.

WANTED: 4-250AS or 4-400AS, building 6 meter linear. Also TV1000LP filter. Philip D. Greenway, 234 Elden Drive, N. E., Atlanta, Ga. 30305.

HW-16 WANTED. Will pay reasonably. Will trade, also. Ed Baznik, 20931 Tract Ave., Euclid, Ohio. 44123.

WANTED: 80 Meter SSB transceiver or whatelse & accessories. Name price & what in first letter. Also will sell Viking Challanger and HT41, what bid? K1JAR, L. Covey, 238 Jenness Street, Lynn, Mass. 01904.

SWAN VFO (TCU) has calibrator, VOX, WWV, Manual, guaranteed, never used. First check $35 takes it. 212 MI 1 2559 Colella 105-131 Street, Richmond Hill, L.I., N.Y. 11419.

STEREO FM TUNER, Paco ST25, new, less cabinet, $25. 230 V 9A Variac, $25. W2FZE, 1269 Chestnut Street, Roselle, N.J. 07203.

WANTED: CE200V with factory 160 meter coils—W2CVW, 13 Robert Circle, S. Amboy, N.J. 08879.

WANTED: Old battery operated Radios of the early 1920's. Need not be working condition. Also want CQ and QST binders. D. T. McKenzie, 1200 W. Euclid, Indianola, Iowa. 50125.

FOR SALE: SB-301 mint condition $245. DX-100 $55. DK-60G2C Relay $5. Want SB-200 and SB-610. WA3-EIP, Dennis Quinn, 88 Woodrow Court, Sharon, Pa. 16146.

ANTIQUE SPEAKER such as RCA 100A to go with RCA Radiola 17. Must work. R. Mendelson, W2OKO, 27 Somerset Place, Murray Hill, N.J. 07971.

FOR SALE: HW-16 mint condition. $95.00. plus shipping. R. Buchess, 1207 Sundown Street, Streator, Ill. 61364.

FOR SALE: Home Brew KW Xmitter, 10-8M. Many spare parts. T-Type, Mod 14 Dist, Mod 15 Perf-Typ unit, URA-8 Freq Shift Conv. pick up only. G. Ireland, 1073D Circle Dr., Dover, De.

FOR SALE: HyGain 6 mtr 6 element beam with AR22 rotor-75' wire—$39.95. Good condition. Geffner—48 Park Avenue, East Merrick, L.I., N.Y.

FOR SALE: HX-50 in excellent condition. $150.00. Will ship in original container. You pay shipping. Les Turner, W7BKQ, 2213 Sunland Ave., Las Vegas, Neveda. 89106.

HEATH B-1 Balun $4.50 Ultimatic built on Al Kanda's circuit board as is $5. Collins VFO/dial 70E8A $40. ZN441 80¢ ea. 60C Mercury thermostat $3.50 W0KPZ, Box 1038, Boulder, Colo.

CLEGG ZEUS Xmtr, Interceptor Rec. mint condx. Complete $450.00. G. Kennedy, WA6MRX, 1103 W. Glenoaks, Glendale, Calif. 91202.

WANTED: F455-J-05 filter for 75A4. Sell or trade Freq. counter, RTTY, VHF SASE W6YKM, 12 Sellings Ct., Walnut Creek, Calif.

RTTY FOR SALE: ASR 28 and Electron Converter, Morris Cohen, W3JZR.

SYLVANIA 5T4 U-V Lamps, 4 watt, 115v., starter and shield, 50 for $40. Radio Recepter Impedance measure set type 470-ZB, $42. A. Klinger, 6287 Elm Valley, San Antonio, Tex. 78242.

SALE: SB-101, SB-200, SB-630, HP-23, HP-13, Cantenna, Webster Band Spanner, HD Mount, Shure 404. Exclt condx. $500.00, or best offer. D. Bryant, Box 1063, Merritt Island, Fla. 32952.

SBE-34 with xtal calibrator xclnt condt $285. Codaptor $25. K6MWM, P. Buyaki, 927 Beryl Street, San Diego, Calif. 92109.

FREE Eico 730 modulator when you buy my Eico 720 xmtr for $60. Also VHF with Heath Twoer $40, Lafayette HE-45A $50, whip & beams. Misc. xtals, mags, etc. R. Hajdak, WA3JDT, 4 Homer Street, Greenville, Pa. 16125.

SELL Pair Heath Twoers and one mobile power supply, all for $45.00, plus shipping. R. G. Bosc, P.O. Box 203, Warroad, Minn. 56763.

SWAN 350, Late model 117xc, D.C. Module 14C, very clean condx. $375.00. W2RHE, 2609 Finlaw Ave., Pennsauken, N.J. 08109.

ONTARIO—FOR SALE—Heath DX 40 transmitter—Heath VFO HG10, ant, Relay, $80.00. A1 condx. A. N. Liley, 212 Pearce Street, North Bay, Ontario.

OLDIES—Make offer. 1-Flewing tube checker-1930. 1-Radio News Mag. March-1931. 1-Radio World mag. April 19, 1930. 1-Radio World Mag. Jan. 4, 1930. R. Fiser K8KRK, 466 S. Sandusky, Tiffin, Ohio 44883.

WANTED TO BUY: One complete copy in good condition. TM11-666. Training manuleon antennas. Joe Turrentine, K4YHI, 8708 Hamner Ave., Tampa, Fla. 33604.

DRAKE TR4 and AC supply. Excellent condition. $500. Also Nikormat Ft SLR camera for sale. Wilcox, 2605 Wards Rd., Lynchburg, Va. 24502.

FOR SALE: 6 volt-110 volt 85 watt rotary converter. Best offer takes H. B. Smith, W8VVD, P.O. Box 452, Birmingham, Mich. 48012.

WANT: Roll later than 1951 for Superior Instrument Mod. TV-11 tube tester Wm. B. Duck Co. catalog. Anderson, W8BIE, 17 Lexington Ct., Midland, Mich. 48640.

See page 110 for New Reader Service

GET YOUR "FIRST!" Memorize, study—Command's "1969 Tests-Answers" for FCC First Class License. —plus—Command's "Self-Study Ability Test." Proven. $5.00. Command Productions, Box 26348-H, San Francisco. 94126.

FOR SALE: Hallicrafter HT 32 B $300. Heathkit-Magnecord Tape Deck $150. Both like new. K6JYA, E. Wyland, 501 No. Sunset, Apt. 3404, Banning, Calif. 92220. Tel: (714) 849-8433 after 6 p.m. or weekends.

FOR SALE: Heathkit HW-12 transceiver in mint condition. $95.00. L. M. Johnson, K0AER, 2400 James Street, Topeka, Kansas 66614.

WANT: Hallicrafters S-36 or S-37 rcvr., Instructograph tapes, Crystals (any Freq.) VHF, and UHF Equip. Ken Johnson, 701 Carolyn, Austin, Texas. 78705.

POLAROID Color Pak 2. Received two for birthday and will sell one new and unused. $20.00 postpaid Len Malone, 4305 Windsor Drive, Garland, Texas. 75040.

DRAKE 2B $150. Lakeshore Timemaster $8.50. Johnson Signal Sentry $14. New B&W 550A coax switch $9.00. R. Barnett, 1310 Navajo, Florissant, Mo. 63033.

SELL: Sams vol., AR-1 thru 18 $10; Crystal controlled 88-108 MHz. FM receiver $14; H-P 453A voltage divider $17; Robert Ireland, Pleasant Valley, N.Y. 12569.

STABLE EICO 753 Transceiver $120 or with 751 AC power supply $160. R. A. Gilson, W3NQA, 10 Kenmore Street, Warren, Pa. 16365.

SILVER PLATED KW Tank coils for 10-15-20 meter amplifiers 5/16" tubing-3" Dia. 6" long. W4GD, 3087 Carnes Ave., Memphis, Tenn. 38111.

FOR SALE: Drake TR3/AC pwr supply/Matching Spkr. Ser. ±3532. Used 9 hours, Mint cond. $425.00. Will ship collect REA. All inquires answered. Bill, WB4LPT, 713 Fechet Street, Goldsboro, North Carolina. 27530.

EXCELLENT—Heath HX-10 Marauder with Johnson ±250-39 T-R switch and Astatic D104 MIC with PTT stand. Make offer. Grady Dean, K4HJZ, 2219 Tift Ave., Tifton, Ga. 31794.

HAM TRANSFORMERS REWOUND. Using Hi temperature wire and insulation. Jess Price, W4CLJ, 411 Gunby Ave., Orlando, Fla. 32801.

Regulated Power Supply, 250V, 200 ma. West Coast Electronics, in 15x 22 Cabinet Rack, New, $20.00. Joe Brand, 1250 Val Vista, Pomona, Calif. 91766.

WANTED: Antique radio tubes and wireless equipment made prior to 1919, need not work. W9LGH, 610 Monroe Ave., River Forest, Ill. 60305.

COLLINS: 75S-3B Revr. 32S-3 xmtr. with 516F2 supply $985. W2HU, 37 Rodney Lane, Westbury, L.I., N.Y.

FOR SALE: Zenith shortwave radio 1947 $40 or trade also BC-348 Q $55 or trade. Will ship. R. Lucas, 46-066 Heeia Street, Kaneohe, Hawaii 96744.

FOR SALE: SB-300, SB-400—$225.00 each TB1000-4, TR-44, 40 ft. Tower $150.00 All FOB P. E. Bennett, K4YYT, P.O. Box 7308, Jacksonville, Florida. 32210.

COLLECTORS ITEMS FOR SALE: Radiola III not in working condition, National FB7, looks ok, condition unknown—Make offer—Ed Block, K5ENL, Grandview, Texas. 76050.

FOR SALE: Teletype model 26 with table, sync motor. $55 fob Costa Mesa. WB6WBC, 257 Ogle Street, Costa Mesa, Calif. 92627.

WANTED: Model 425 Weston RF Ammeter, 7-10 amp full scale; 73 magazines for Sept. 61, May 62, Jun.62, and Jan. 67. Al, K3KMO, Rd 1, Box 390A, State College, Pa. 16801.

MAYBE I HAVE The Back Copy of QST or CQ that you need. Write for price. W3IND, 914 Claire, Hunt. Valley, 19006.

REPAIRS—Modifications on all types of equipment. For details write: Interstate Electronic Service, P.O. Box 71, Park Ridge, New Jersey 07656.

NOICES: Needs help for general ticket? Complete recorded Audio-Visual Theory Instruction. Easy, no Electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Virginia 23508.

WRL's used gear has trial-terms-guarantee! KWM1—$249.95; KWM2—$695.00; SR150—$299.95; HW12—$89.95; Swan 250—$249.95; WRL Duo-Bander 84—$119.95; TR3 — $369.95; NCX3 — $169.95; NC200 — $249.95; SB34 — $299.95; Galaxy VMK2 — $279.95; Ranger—$99.95, many more. Free "blud-book" list from: WRL, Box 919, Council Bluffs, Iowa. 51501.

MUST SELL: Factory aligned 2 meter TR-108, Hallicrafters SX101, 500 watt 80 thru 10 AM-CW Viking 500. WA9BYR, 627 Dundee Ave., Barrington, Illinois. 60010.

POLICE-FIRE-AIRCRAFT-AMATEUR-CB CALLS on your Broadcast radio with TUNAVERTER! Tunable-Crystal controlled! Guaranteed! Free catalog. Salch Company, Woodsboro 9, Texas 78393.

RTTY gear for sale. List issued monthly. 88 or 44 Mhy toroids, uncased, five for $2.50. postpaid. Elliott Buchanan and Associates, Inc., 1067 Mandana Blvd., Oakland, Calif. 94610.

See page 110 for New Reader Service

SELL: TRADE: NCX-5MKII with NCX-A supply and calibrator—latest serial number—excellent—$500.00. Ranger $70.00. List available—Want SR-160, CE 100V, J. Shank, 21 Terrace Lane, Elizabethtown, Pa. 17022.

SELL: My Viking 2 & VFO $80. SX140 ham rcvr 6 to 80 M $45 Royal typewriter, $30. Simpson VOM, #260 —$30. SASE for list parts & Tubesa Trans. 10¢ up. 1129 N. Knight Ave., Pk. Ridge, Ill.

SALE OR TRADE: Riders Manuals Vol 1 thru 15—SX-28 as is operating—$30.00. HQ120X Hammarlund Rec. $50.00. Heath SG-8 Signal Generator $15.00. ART-13 Unmodified $30.00. CQ mags—1947 thru 1960 $35.00. QST Mags 1947 thru 1960 $35.00. Want Pawnee, SR34, SR42, Clegg 22 or What have you? B. Morrow, WA6BLN, Box 136, Golo Run, Ca. 95717.

MANUALS—TS-323/UR, TS-173/UR, R-274/FRR, $5.00 each. Hundreds of others. List 20¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

SELL: Lafayette HA-350, speaker, $85; Gonset GSB-100, $150; 600L Linear, $115. Ship except linear. Thurber, W7DZW, 8556 Elm, Fairchild AFB, Wash. 99011.

FCC Commercial operator license preparation by correspondence. Grantham, 1507 N. Western, Hollywood, Calif. 90027.

QSLs—BROWNIE—W3CJI—3111 Lehigh, Allentown, Pa. 18103. Samples 10¢ with catalog. 25¢.

TELETYPE MODEL 31-KSR portable. Very tiny, weighs under 20 pounds. Like new, extra nice. $4.95. K1VTW, Box 103, Sherborn, Mass. 01770.

HALLICRAFTERS SR400 xcvr & P500 spk/pwr $695, SX117 rcvr $229, vy excl cond & ppd. WA6BWB, 13241 Eton Place, Santa Ana, Cal. 92705.

REI can train you for the First Class Radio Telephone License in only five (5) weeks. Approved for Veterans training. REI has schools in Sarasota, Florida; Glendale, California; Fredericksburg, Virginia; and Kansas City, Missouri. For free brochure write REI, 1336 Main Street, Sarasota, Florida 33577 or call 813-955-6922.

POSITION WANTED: Electronics Technician with Supervisory, VHF, UHF, 1SB, SSB, microwave Micro-Tel, Autovon, 250 KW Trans, with Rhombic and curtain antenna. Interested in Tropo, ISB, systems in the Far East, Philippines, Thailand, open for offers. D. R. Combs, 321 West Center Street, P.O. Box 1, Kaysville, Utah. 84037. Telephone 801-376-4729.

FOR SALE: HT32-A (immaculate) $275, 75S3 #10, 679, $375. SW-350, 117-XC, 14-117 $400. James Craig, 29 Sherburne Ave., Portsmouth, N.H. 03801.

CANADIANS: Complete equipment service, fully equipped, gov't lic'd technician, VE6TW, Bob Fransen, Box 197, Sherwood Park, Alberta.

MILLIAMPERE Meters, center reading, used A-1 condition $3.50 ppd. C. B. Goodman, 5826 S. Western Avenue, Chicago, Illinois 60636.

See page 110 for New Reader Service

FRXD—Climbing Head Reperforator and TD. With cover and sync. motor. 60 WPM.
PRICE: .....$60.00 ea.

MODEL 14 TD—RECONDITIONED, 60 WPM WITH sync. motor.
PRICE: .....$35.00 ea.

MODEL 15 RECEIVE ONLY 60 WPM, Sync. motor with case .....PRICE: $50.00 ea.
No case .....PRICE: $45.00 ea.

WESTERN UNION MODEL 2B STRIP PRINTER with keyboard. 60 WPM, Sync Motor.
PRICE: .....$30.00 ea.

WESTERN UNION MODEL 100 PAGE PRINTER in console cabinet with keyboard 60 WPM, Snyc. motor.
PRICE: .....$75.00 ea.

FACSIMILE—WESTERN UNION INTRA FAX with stand and power supply.
PRICE: .....$35.00 ea.

OIL FILLED CAPACITORS 4 mfd at 10 KV. Perfect for that ultimate linear.
PRICE: .....$24.95 ea. or 5 for $100.00

WATERMAN MODEL S 17 OSCILLOSCOPE. A real Beauty—Fits in your hand.
Horiz. .01 to 1000milliseconds/division
Vert. .01 to 500 Volts/division DC-200 KHZ.
Uses a 1½ x 3 inch rectangular tube. LIKE NEW with MANUAL.
PRICE: .....$74.95 ea.

SPERRY MODEL FE HIGH BAND
4 channel crystal controlled with 115V AC Power Supply. Uses a pair of #6146's in transmitter. Consists of three units: TRANSMITTER, RECEIVER, and POWER SUPPLY. WITH SCHEMATICS.
NO CABLES AVAILABLE.
PRICE: .....$60.00 ea.

SPEAKER & CONTROL BOX FOR ABOVE (LIMITED QUANTITIES).
PRICE: .....$10.00 ea.

RECEIVER DECODER
This is a modern unit utilizing transistors and miniature tubes and operates in the 400-500 mhz range crystal controlled. Measures 6 x 8 x 10" and weighs 10 pounds.
NO SCHEMATIC AVAILABLE.
PRICE: $24.95

COMPUTER GRADE COMPACITORS
2500 mfd at 200 VDC
10000 mfd at 35 VDC
PRICE: ..... $1.00 ea. or 6 for $5.00

WINTRONIX MODEL 850 INDUCED WAVE FORM ANALYZER

This unit, in conjunction with your present oscilloscope, permits you to view wave forms in the range from audio thru MHZ without any direct connection. The probe is simply placed over the tube in question and the wave form is displayed on the oscilloscope. It may also be used as a high gain amplifier to increase 'scope sensitivity. Excellent for T.V., Radio, Amplifier, and Transmitter repair and maintenance. BRAND NEW, WITH PROBE.
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DUMONT 304 A OSCILLOSCOPES

We have a few left—These are all checked and ready to go at a very SPECIAL PRICE.
PRICE: .....$74.95 ea.

VARIACS 2 amp. at 115 Volt.
PRICE: .....$2.95 ea.

PIATE TRANSFORMERS
STANCOR PC 8303
665-0-665 Volts at 250 ma.
PRICE: .....$2.95 ea.

ALL PRICES ARE F.O.B. OUR WAREHOUSE, PHILADELPHIA, PA. ALL MERCHANDISE DESCRIBED ACCURATELY TO THE BEST OF OUR KNOWLEDGE. YOUR PURCHASE MONEY REFUNDED IF NOT SATISFIED. TERMS ARE CASH AND MINIMUM ORDER $5.00. ALL MERCHANDISE SUBJECT TO PRIOR SALE.

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all correspondence ★

ALL BAND TRAP ANTENNA !

Reduces Interference and Noise on All Makes Short Wave Receivers. Makes World-Wide Reception Stronger. Complete with 96 ft. 72 ohm feedline. Sealed resonant traps. For novice and all class radio amateurs! Eliminates 5 separate antennas with better performance guaranteed. 80-40-20-15-10 meter bands. Complete 102 ft. $19.95. 40-20-15-10 meter bands, 54 ft. (best for world-wide short wave reception) $18.95. Send only $3.00 (cash, ck., mo) and pay postman balance COD plus postage on arrival or send full price for postpaid delivery. Complete instructions included!

For ALL Amateur Transmitters. Guaranteed for 1000 Watts Power. Light, Neat, Weatherproof.

Midway Antenna • Dept. C-10 • Kearney, Nebr. 68847

OPPORTUNITY !

TV BROADCAST TECHNICIANS

All color VHF TV Station needs maintenance technician/operators. This is an opportunity to learn and work with the latest solid state TV broadcast equipment. Experience desired, but will consider training ambitious beginner. First Class license required. Contact Chief Engineer, WJRT-TV, P.O. Box 12, Flint, Mi. 48503 or call collect (313) 239-6611.

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October, 1969

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Please send me information on the products and services which I have checked above.

Name.....Call.....

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Advertiser's Index

FM

nhancing the ham world is the recently de-ped art of FM repeater operation for 2 meters 6 meters which is now sweeping our country. e seems to be no limit to the usefulness of e small FM mobile and fixed devices. Their ication defies the conventional thinker.

ere, in the North-East, a little tiny transceiver, ile operated, can communicate by means of ntain top repeaters, with stations literally lreds of miles away and, I am told, that such t up exists in California and in many other s of our country.

ne of the cleverest and best thought out com-cial products made to top this market is the tronics Inoue FDFM-2S, illustrated herewith. all solid state device comes complete with ophone, speaker, mounting bracket, power es, plugs and three crystals.

annel 1 receives 146.94 and transmits on 34. Channel 2 is simplex on 146.94. Four tional crystal positions are provided and can switched in at will. Complete squelch and ring is likewise furnished. Only 6½" wide high x 7½" deep and weighing but 4 pounds unces, the FDFM-2S is small and compact enough to even fit a Porsche or other small compact foreign cars. Tiny rooftop antennas are available. Providing efficiency of up to 50% and operating with 10 watts input, these little gems make it entirely feasible to maintain reliable communications on a true FM noise free basis.

The receiving section is really hot with a sensitivity better than half a micro volt for 20 DB signal to noise. Spurious responses are downed at least 60 DB, and both units draw only 225 mils. When transmitting the FDFM-2S draws 1.5 amps, while for receiving, the FDFM-2S draws only 0.7 amps.

We stock both the 10 watt unit, described at $310.00, and the 2 watt unit, which sells for only $250.00. Both units are sold post-paid to United States and Canadian points and are 100% guaranteed for six months from date of purchase.

We endorse this fine product 100% and carry it in depth for immediate delivery. If you are thinking of something interesting this summer and want something different, yet a definite part of the ham radio picture, consider FM. It is exciting to those who own it and practical to those who use it and much more reliable than CB.

HERBERT W. GORDON COMPANY

Harvard, Massachusetts 01451 • Telephone 617 — 456 — 3548

"Helping Hams to Help Themselves"

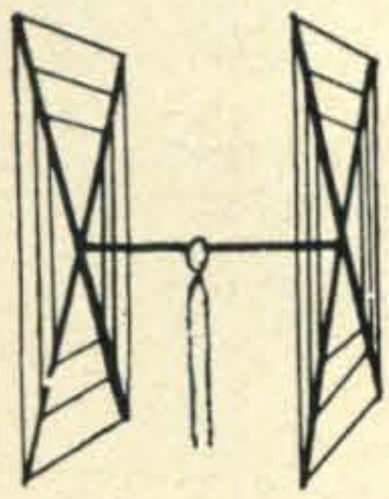
See page 110 for New Reader Service

AHA! YOU THOUGHT GOTHAM

had a 47 story factory with 16 beautiful receptionists and 87 research technicians. No! No! No! Gotham is just two brothers making thousands of antennas in a 15' x 35' store, at prices that reflect the low, low, low overhead.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount: uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.; 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished); 52 ohm coaxial cable

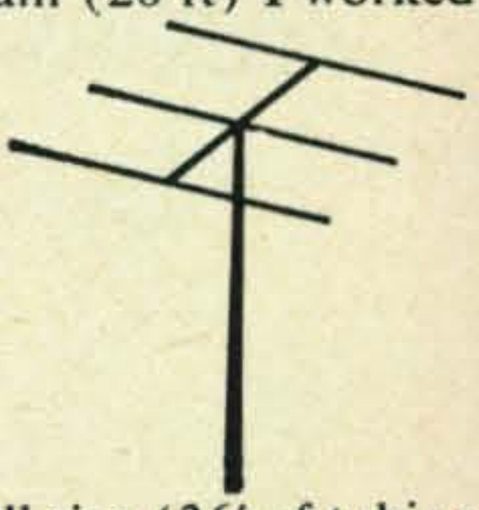
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$19	4 EL 10	$18
3 EL 20	25	7 EL 10	32*
4 EL 20	32*	4 EL 6	18
2 EL 15	15	8 EL 6	28*
3 EL 15	19	12 EL 2	25*
4 EL 15	25*		
5 EL 15	28*		

*20' boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

HOW TO ORDER: Send money order. We ship immediately by REA Express, charges collect. Gotham ham and CB antennas are available for pick-up in: Rockford, Ill.; Orange, Calif.; Cleveland, Ohio; Daytona Beach, Fla.; Calgary, Canada; Hannibal, Mo.; Indianapolis, Ind.; South Bend, Ind.; *Oklahoma City, Okla.*; and in the Benelux Countries and Australia. Write for name and address of franchised distributor. Other cities open.

GOTHAM
1805 Purdy, Dept. CQ, Miami Beach, Fla. 33139

See page 110 for New Reader Service

NOW AT YOUR DEALERS!

FROM THE MAKERS OF THE FAMOUS GALAXY TRANSCEIVERS

The Galaxy FM-210 2 Meter FM Transceiver

● Now every Amateur can buy Galaxy's well-known quality and performance in a 2-Meter FM Transceiver! This American-made, solid-state, FET front end transceiver offers no compromise performance for direct or repeater communications...a full 5 watts of Power (or 10 watts with the optional AC-DC Power Booster!) Check these specs and you'll agree it's a lot of Transceiver for only $199.95! *See one...try one!*

SPECIFICATIONS

Frequency range: 143-149 MHz. Antenna Impedance: 50 Ohms Nominal Power Req'mts: 12-14 VDC (or optional power booster)

Transmitter: Power Input: 5 watts (10 W. with pow. booster) • Freq. Control: 3 Chan. crystal controlled • Microphone: High Impedance req'd. • Deviation: Adj. narrow or wideband with clipper filter also adj. for optimum clipping level.

Receiver: Sensitivity: SINAD .5uv for 12db, 1uv provides 20 db quieting. • Adjustable squelch • Modulation Acceptance: FM wideband (narrow band available) • Type: Dual Conversion, FET front end for minimum cross modulation and overload • IF Frequencies: 10.7MHz and 455 KHz • Freq. Control: 3 chan. crystal controlled • Audio Output: 3 watts (intr'nl 3.2 spkr.)

Power Booster: Provides high power operation from either 12-14VDC or 117 VAC. Makes an ideal fixed station accessory. ($39.95).

galaxy electronics

"Pacesetter in Amateur/Commercial Equipment Design"

10 South 34th Street • Dept. CQ-FF-46 • Council Bluffs, Iowa 51501

Novice or extra...

Here are many exciting solid-state hobby projects

For you, in this manual from RCA, are 35 construction projects to satisfy your hobby interests for the coming months.

This addition to the expanding RCA technical library, the RCA Solid-State HOBBY CIRCUITS MANUAL, HM-90, has "something for everyone"—from beginner to expert The 35 circuits are of interest to electronic experimenters including hams, motorists, photographers, home owners, and music and hi-fi buffs. Circuits are described in detail with circuit schematics, layouts, templates, parts list and photographs. In addition, there are sections on theory and practical applications of solid-state devices—including integrated circuits and MOSFET units as well as a section on trouble shooting and testing.

Typical circuits include: electronic slot machine • electronic dice • metal detector • single-voice organ • electronic metronome • code-practice oscillator • automatic keyer • enlarger exposure meter • lamp dimmer • electronic "fuzz" box • audio amplifier • automobile tachometer • motor speed control • electronic flasher • light minder for automobiles, and twenty other interesting circuits.

See your RCA Distributor today for your copy of HM-90, published by RCA Electronic Components, Harrison, N.J. 07029