CQ

June 1962
50¢

Special ham clinic *Feature*

Plus—

50 Mc Propagation Effects.
Calculating OSCAR's Orbit.
.....and more!

The Radio Amateur's Journal

in your ham shack, or

in action with the Marines . . .

Collins performance stands out!

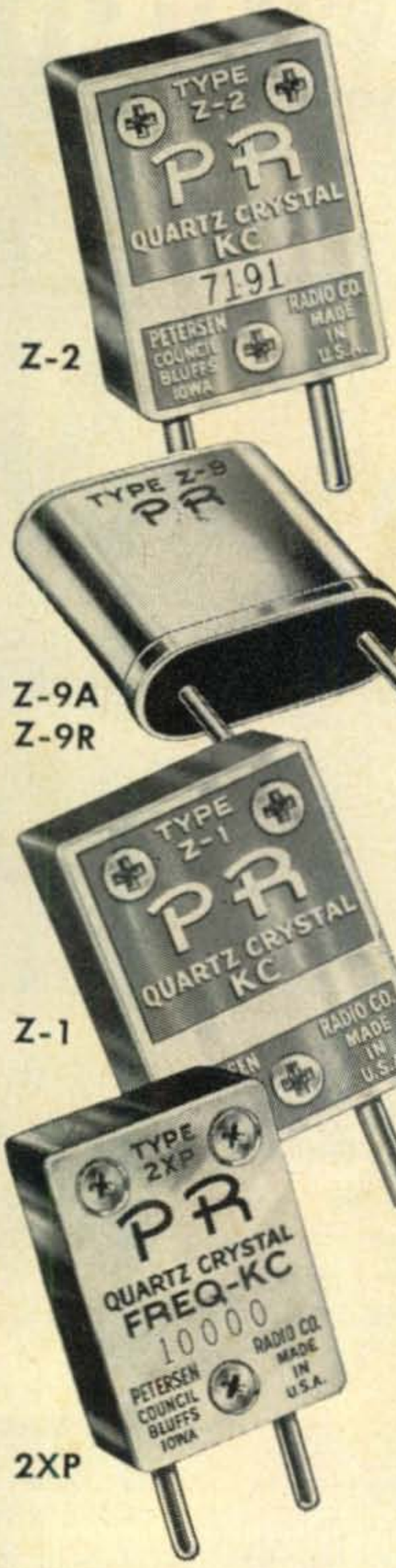
Collins is well known as the performance leader in amateur radio equipment with its system-designed S/Line. The reasons are many. Among them are the extensive design and development efforts invested by Collins in advancing the state of the art in single sideband communication systems for the military as well as the commercial user. ☐ One of the many versatile units of the Collins military line is the AN/MRC-87. This is a complete medium/long range HF and local UHF two-way communication facility installed in a jeep. Automatic tuning allows rapid frequency selection of 28,000 1 kc channels between 2.0 and 29.999 mc with crystal stability and accuracy. Dial in the frequency, press the microphone button, wait ten seconds, and the complete kilowatt transmitter and receiver is tuned and ready to go on the air with SSB, AM, CW, or RTTY. ☐ Collins products and Collins know-how have long been a part of the U. S. military team. Collins capabilities — and the men behind them — will continue to make Collins products your best ham investment.

COLLINS

For further information, check number 1, on page 128

It pays to insist on PR *crystals*

STANDARD OF EXCELLENCE SINCE 1934



Z-2

Z-9A
Z-9R

Z-1

2XP

AMATEUR TYPES

Fundamental, PR Type Z-2

Frequency Ranges in Kcs.: 3,500 to 4,000 (80M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M).

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

(All Z-2 Crystals calibrated with a load of 32 mmfd.)

Third Overtone, PR Type Z-9A

Hermetically sealed; calibrated 24,000 to 24,666 and 25,000 to 27,000 Kc., ±3 Kc.; .050" pins..... **$3.95 Net**

6 Meters, PR Type Z-9A

Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ±15 Kc.; .050" pins. **$4.95 Net**

CITIZENS BAND CLASS "D"

Type Z-9R, Transmitter

FCC assigned frequencies in megacycles: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225, 27.255, calibrated to .005%. (Be sure to specify manufacturer and model number of equipment) **$2.95 Net**

CITIZENS BAND CLASS "D"

Type Z-9R, Receiver

Specify I.F. frequency, also whether receiver oscillator is above or below transmitter frequency. Calibrated to .005%. (Be sure to specify manufacturer and model number of equipment.)..... **$2.95 Net**

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FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005%. (Be sure to specify manufacturer and model number of equipment.)..... **$2.95 Net**

Type 2XP

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

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

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

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

COMMERCIAL TYPES

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

Type Z-1, MARS and CAP

Official assigned frequencies in the range. Calibrated to .005%.

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Type Z 1, TV Marker

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

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

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

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

Type Z-6A, Frequency Standard

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

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

Z-6A

PETERSEN RADIO CO., *Inc.* 2800 W. Broadway

COUNCIL BLUFFS, IOWA

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

For further information, check number 2, on page 128

listen in on the world

.....on Your MOSLEY CM-1 Communications Receiver!

For the ultimate in a communications receiver, there is none finer than the Mosley CM-1. A precision engineered receiver, the Mosley CM-1 covers a complete range of all amateur bands. The Mosley CM-1 is the first low-priced receiver with double conversion and crystal controlled first oscillator. It is the first receiver with 5 dual-purpose tubes of one type and 4 semi-conductor diodes which perform all functions usually requiring 12 or more tube sections. All crystals furnished.

FEATURES AND PERFORMANCE

Diode detector for a.m. and product detector for s.s.b. and c.w. . . . Calibration every 5 k.c. . . . WWV reception at 15 Mc. . . . Sensitivity: ½ microvolt for 10 db. signal-to-noise ratio on ten meters. Selectivity: 2.5 kc. at -6 db. Automatic noise limiter. . . . Stability: Less than 500 cycles drift after one minute warm-up. . . . Less than 200 cycles change for 10% line voltage change. . . . Image and i.f. rejection: 35 db. minimum. . . . "S"-meter functions on a.m., c.w. or s.s.b. with or without b.f.o. . . . Rear chassis accessory facilities: Transmitter relay terminals, accessory power socket, external speaker/VOX terminals. . . . Power consumption: 33 watts. (115 v.a.c., 50 to 60 c.p.s.) See your dealer soon or write Mosley Electronics Inc., 4610 North Lindbergh Blvd., Bridgeton, Mo.

Mosley CM-1 Amateur Net $182.70

Matching Speaker – CMS-1 Amateur Net $16.95

Mosley Electronics Inc.

Prices subject to change without notice. All prices slightly higher west of the Rockies.

For further information, check number 3, on page 128

CQ The Radio Amateur's Journal

VOL. 18, NO. 6 JUNE 1962

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Postmaster: send Form 3579 to *CQ*, 300W. 43rd St., N. Y. 36, N. Y.

TABLE OF CONTENTS

DEPARTMENTS

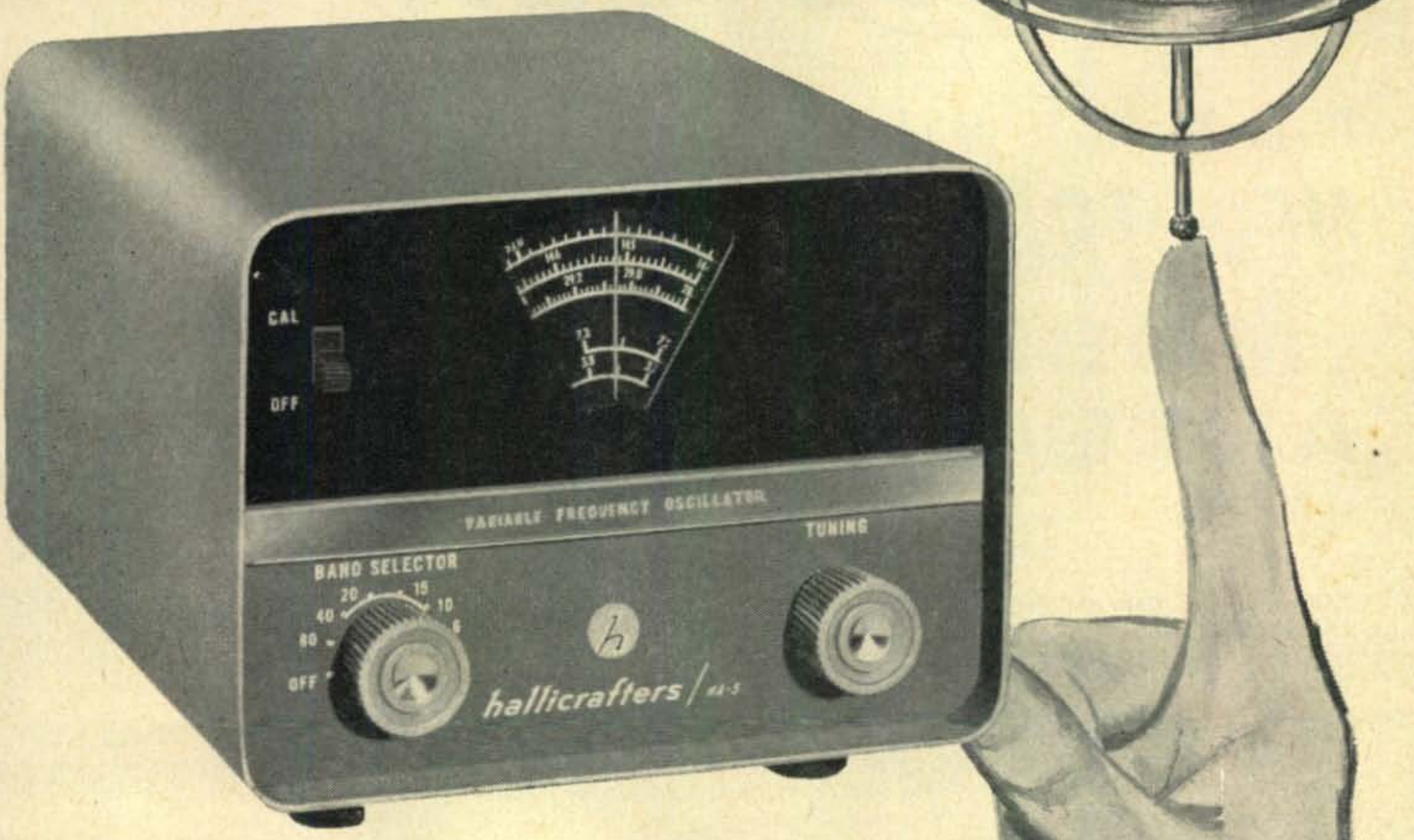
Serving all the needs of the amateur, all of the time, is one of the responsibilities of leadership in communications equipment. That is why there are 37 different Hallicrafters models available today...three more just around the corner...and seven more on the drafting board.

the new ideas in communications are born at...

hallicrafters

Chicago, Illinois

EXTREME STABILITY ON ALL FREQUENCIES INCLUDING VHF...



hallicrafters deluxe HA-5

self-powered, heterodyne-type VFO

FEATURES

- Variable oscillator 5.0 to 5.5 MC may be set directly against WWV.
- 30 to 1 tuning ratio.
- Illuminated dial calibrated for all amateur bands, 80-2 meters. (Crystals for 80-10 meters included.)
- Heterodyne system assures excellent keying accomplished in the mixer tube cathode.

SPECIFICATIONS

Output frequency range:
3.5 MC to 4.0 MC, 7.0 MC to 7.5 MC,
7.8 MC to 8.3 MC, and
8.333 MC to 8.833 MC

Power source:
105V AC to 125V AC, 60 cycles

Tube complement:
VFO and crystal oscillators, 1-6U8;
mixer, 1-6BA7; output,
1-6AQ5; voltage regulator, 1-0A2

Dimensions:
7″ wide by 5″ high by 8½″ deep

the new ideas in communications are born at... ***hallicrafters***

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5th and Kostner Aves. Chicago 24, Ill.

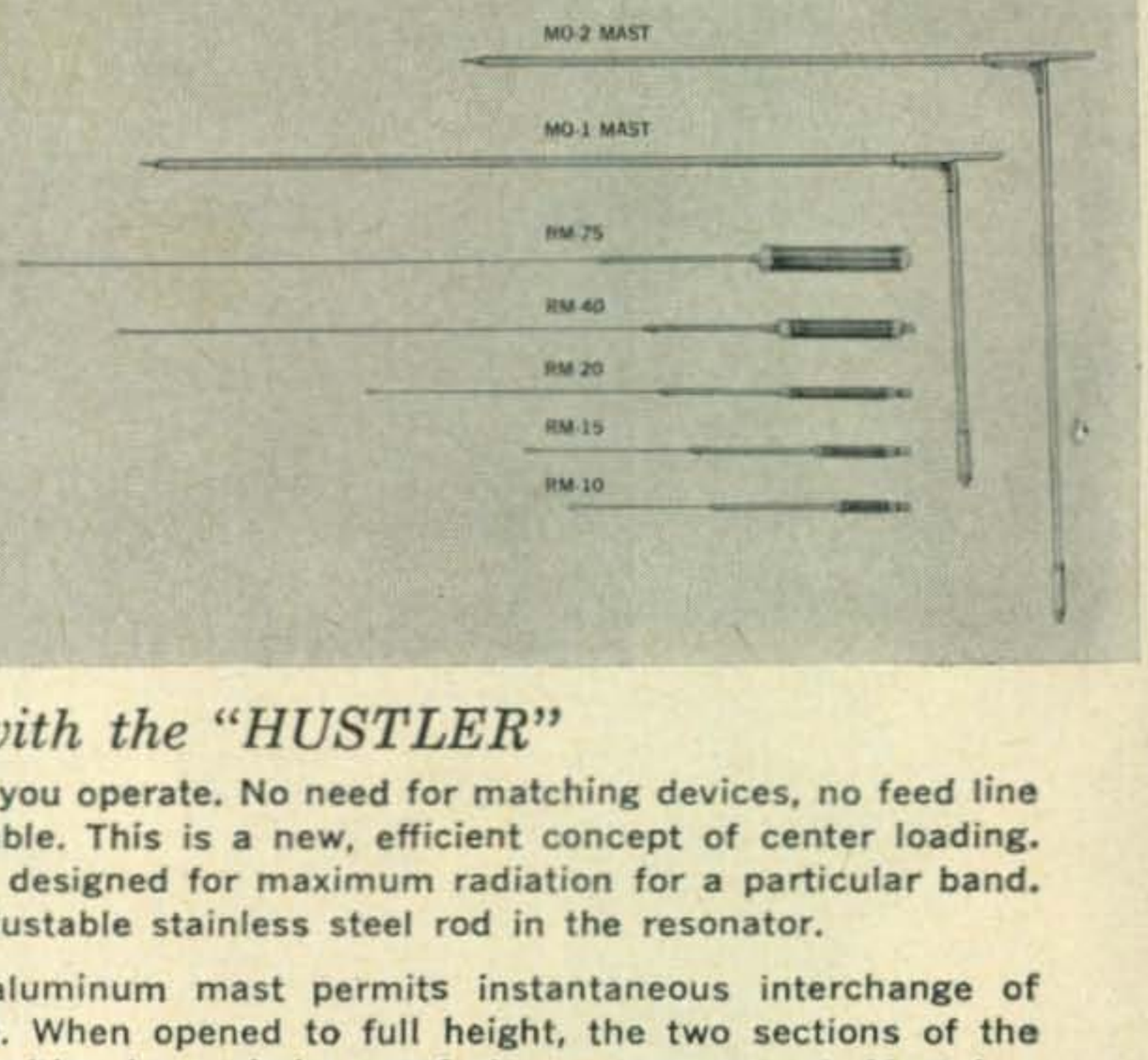
For further information, check number 4, on page 128

GOOD MOBILES GO...

HUSTLER

10-15-20-40-75 METERS

NEW-TRONICS MOBILE ANTENNA



● *Now, Get Fixed Station Reports with the "HUSTLER"*

Buy only the mast and resonators for the bands you operate. No need for matching devices, no feed line length problems. Use any length of 52 ohm cable. This is a new, efficient concept of center loading. Each of the five resonators has a coil specially designed for maximum radiation for a particular band. Center frequency tuning is by means of an adjustable stainless steel rod in the resonator.

The 54-inch fold-over, heat treated, ½-inch aluminum mast permits instantaneous interchange of resonators. Mast folds over for garage storage. When opened to full height, the two sections of the permanently hinged mast are held rigidly in position by a shake proof sleeve arrangement. Mast has ⅜-24 base stud to fit all standard mobile mounts. Power rating is 75 watts dc input A.M. — 250 watts PEP input for SSB.

ANTENNA ASSEMBLY CONSISTS OF 1 MAST and 1 RESONATOR

Part No.	Description	Total Height of Antenna	Amateur Net
MO-1	54" Mast folds at 15" from base	(For Rear Deck or Fender Mount)	$ 7.95
MO-2	54" Mast folds at 27" from base	(For Bumper Mount)	7.95
RM-10	10 Meter Resonator	Maximum 80" — Minimum 75"	5.95
RM-15	15 Meter Resonator	Maximum 81" — Minimum 76"	6.95
RM-20	20 Meter Resonator	Maximum 83" — Minimum 78"	7.95
RM-40	40 Meter Resonator	Maximum 92" — Minimum 87"	9.95
RM-75	75 Meter Resonator	Maximum 97" — Minimum 91"	11.95

ANY MAST OR RESONATOR MAY BE PURCHASED SEPARATELY

FITS MORE CARS THAN ANY OTHER BUMPER MOUNT!

MODEL BM-1 Flat alloy steel strap fits tightly against any shape bumper yet is inconspicuous. Length of strap permits its attachment to both large and small bumpers.

Assembly is held in place by two "J" bolts at the top of the bumper and strap clamp at the bottom. "J" bolts may be inserted between top of bumper and car body where clearance is as low as ¼".

Whip receptacle assembly consists of a heavily chrome plated 1½" die cast Zamak ball with ⅜-24 thread. Adjustable so as to maintain whip in true vertical position. Black phenolic base. All metal parts of the bumper mount are heavy cadmium plated. $6.95

See these outstanding NEW-TRONICS products at your electronics distributor. If he cannot supply you send check or money order for immediate delivery. Write for literature on the complete NEW-TRONICS line.

NEW-TRONICS CORP. 3455 VEGA AVENUE CLEVELAND 13, OHIO

For further information, check number 5, on page 128

ZERO BIAS

THERE'S no doubt about it, our monthly HAM CLINIC section continues to be one of the most attractive features found in *CQ* and, by far, leads all others in mail received each month. Charles J. (Chuck) Schauers, W4VZO, as you probably know has been editing this "Question & Answer" column for almost four years, and we might add, quite successfully too.

Not too many of the gang realize that Chuck, a native Californian, is now, and has for almost thirty years, been a member of our fine U.S. Army. He has held a great many calls during his service career the most recent of which was F7FE, during his last tour in France. We could take this entire page extolling the virtues and accomplishments Chuck has made as author, electronic expert and goodwill embassador. His column, however, speaks for itself.

What is not apparent from his regular chores of putting together often-asked questions in column form, is the fact that a great amount of correspondance is carried on during his "off" hours, helping both Novice and Old Timers with questions that are too singular in nature to warrant publishing in the regular monthly column.

With the end of *CQ*'s regular Surplus feature in the March, 1961 issue, Chuck took over the chore of answering queries regarding surplus conversions, and although he was not equipped to do so at the time, has done an outstanding job.

Since Chuck's work is carried on exclusively at home, a word of praise should also go to his XYL, Elfrieda, who herself is a writer, and not only has to live with her OM's haywire rigs, but substitutes as secretary, filing clerk and librarian as well.

We're pleased to offer an expanded HAM CLINIC section this month and hope that the extra effort expended by Chuck is appreciated by our readers.

World-Wide Contest

Results of the C.W. section of the *CQ* World-Wide DX contest are now in print (beginning on page 64 of this issue) and besides the regular note of congratulations extended to individual winners, we would like to voice our special salute to the boys of the Potomac Valley Radio Club, winners in the Club catagory, who are now looking for a clean sweep of all major contests this year.

Frank Anzalone, W1WY (the youngest amateur to hold a two-letter call), *CQ*'s Contest Committee Chairman and his "slave labor" group consisting of W1GYE, W2BO and W2JB are now breathing easier after tallying a record-breaking number of logs, certainly proving that the *CQ* DX gatherings are gaining steam every year. If the entries continue at the increasing pace set in the last two years, Frank tells us that the gang may have to wait an extra month to see the results. Anyway, congratulations again to the winners; certificates should be going out as this is being read.

One Down—Three to Go

One of the four major holdouts in the U.S.A. for Amateur Radio License Plates has agreed to begin issuing special plates. Governor Nelson A. Rockefeller, of New York is to be highly commended for his insight in seeing the validity of signing the Directive ordering plates be struck for 1963.

We're sorry that space does not permit listing all those who enthusiastically participated in having this measure accomplished. However, all New York amateurs should be indebted to the following: Howard Maguire, W2AAO; Graham Berry, K2SJN; Stan Zak, K2SJO; Walt Slack, W2EIC; Larry Laupheimer, K2CLI and Harry Dannals, W2TUK.

Kentucky, Massachusetts and New Jersey now remain the only three states not issuing call-letter license plates.

OUR COVER

"Little Doc," our scowling little HAM CLINIC surgeon is seen staring at some recent correspondance. He really isn't angry though—he just looks that way! We hope you'll enjoy this month's expanded "CLINIC" section, edited by Chuck Schauers, W4VZO. Remember, it's a regular feature during the entire year.

INTERNATIONAL **AMATEUR CRYSTALS**

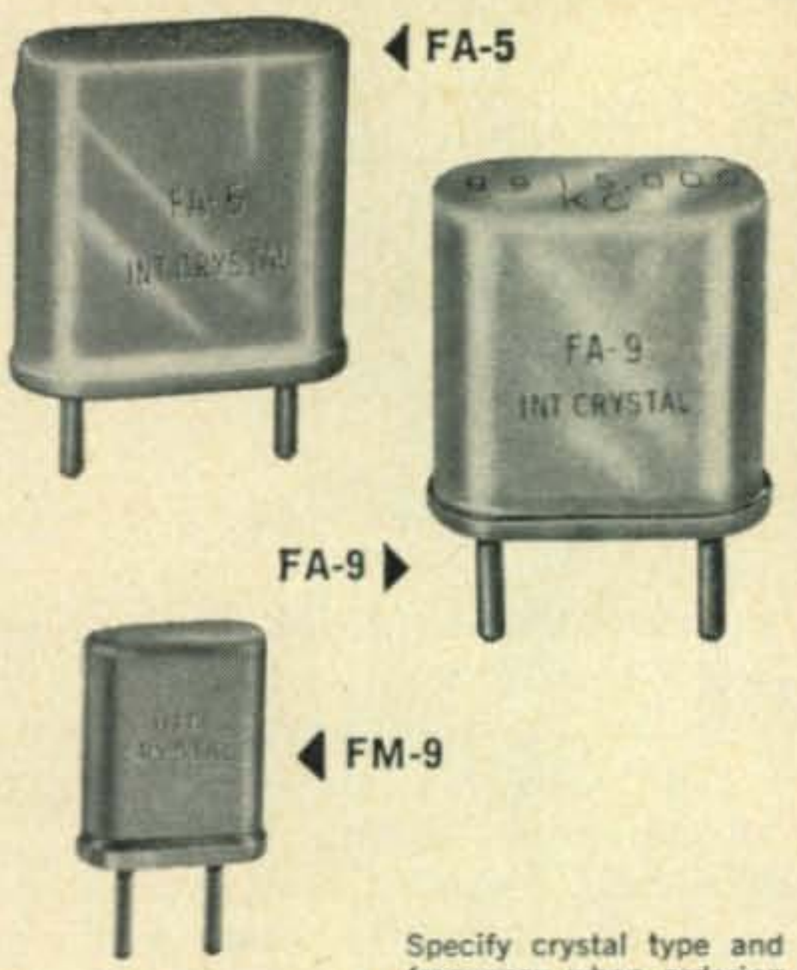
Amateurs throughout the world depend on International crystals for precision frequency control.

Manufactured by the same highly skilled craftsmen who produce International commercial crystals for the broadcast industry, two-way radio communication, and our space and missile program.

International Amateur Crystals
1000 kc to 137 mc — .01% tolerance

Wire mounted, plated and hermetically sealed in metal holders. FA-5 and FA-9 are HC/6U pin type. The FM-9 is an HC/18U pin type.

Priced from $3.30 to $10.00



Specify crystal type and frequency when ordering.

	FA-5 and FA-9	FM-9
Fundamental	* 1000 - 1499 kc	Not available
	* 1500 - 1799 kc	Not available
	* 1800 - 1999 kc	Not available
	2000 - 9999 kc	8000 - 9999.999 kc
	10000 - 14999 kc	10000 - 15000 kc
	15000 - 20000 kc	15001 - 19999.999 kc
Overtone (3rd)	10 - 14.99 mc	Not available
	15 - 29.99 mc	20 - 39.99 mc
	30 - 59.99 mc	40 - 59.99 mc
Overtone (5th)	60 - 75.99 mc	60 - 89.99 mc
	76 - 99.99 mc	90 - 100 mc
	Not available	101 - 109.99 mc
Overtone (7th)	100 - 137 mc	110 - 137 mc

* Allow three to four day processing.

the **PERFECT** combination

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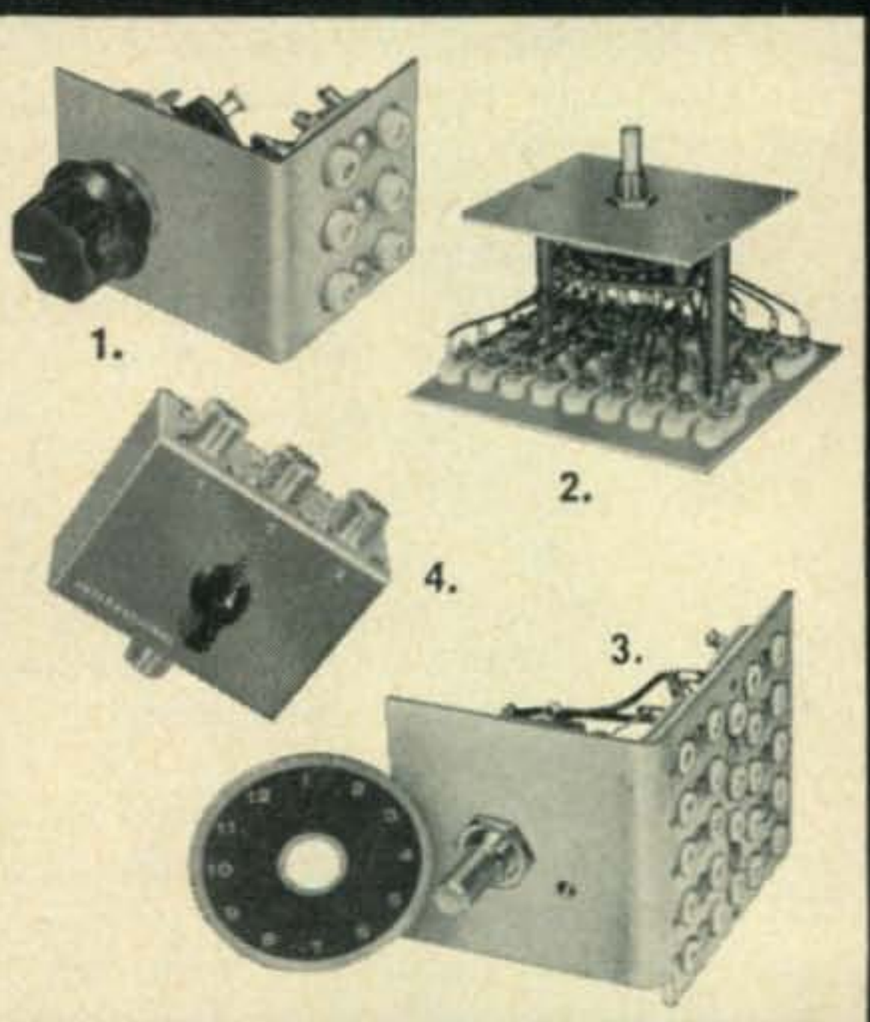

1. S-121 Triple Socket Crystal Switch. Cat. No. 150-126.
2. AC-44 Single Pole, 24-Position Crystal Switch. Cat. No. 150-131.
3. 12-Position Crystal Switch. Cat. No. 150-163.
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Write today for International's Free catalog of precision made crystals and equipment.

INTERNATIONAL CRYSTAL MFG. CO., INC.

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For further information, check number 6, on page 128

= 3 ¾ WATTS PEP

Get more watts per dollar with

GONSET GSB-201 LINEAR AMPLIFIER!

COMPARISON OF GONSET GSB-201 WITH 4 OTHER LEADING LINEAR AMPLIFIERS

PEP		Watts per $ of investment
1500 W.	GONSET GSB-201	3¾*
2000 W.	A	3¼
1000 W.	B	3
1000 W.	C	2½
2000 W.	D	1¼

*Even more watts per dollar in terms of output due to high efficiency. The Gonset Linear delivers a FULL GALLON of PEP output.

This little powerhouse is compact, finished in attractive blending colors. It's powerful in all transmission modes, versatile, with full band-switching with pi network output for five bands.

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GONSET®

DIVISION OF YOUNG SPRING & WIRE CORPORATION

801 SOUTH MAIN STREET, BURBANK, CALIFORNIA

BEST FOR YOU IN '62

For further information, check number 7, on page 128

THE HAMMARLUND *"Personal Touch"*
ELECTRONIC KEYER HK-1B

Hard to believe—but true . . . and backed up by the most distinguished name in Amateur radio——HAMMARLUND.

The new Hammarlund 'Personal Touch' keyer is an incredible value—packed with the performance and features found in "Big-Money" units—yet priced at just half the cost of comparable-quality keyers.

This compact, **fully-transistorized** code generator combines every desirable feature of electronic sending with distinctive dot/dash control to give messages your own distinctive "touch". Ideal for expert or novice alike, it provides a full range of speeds to match individual proficiency.

Study these "$ $ $ $" features and convince yourself that the HK-1B is the "Best Buy" in electronic keyer history!

VERSATILE **Automatic,** semi-automatic (bug) or straight key operation.
Volume adjustable sidetone signal for monitoring or code practice.
Speed Range with variable dot/dash ratio. (Approx. 8-50 WPM)
Battery operation and compact size for ideal field day exercise use.

SIMPLE **Transistorized** circuitry for extended service.

PROTECTED Keying relay contacts have greater current carrying capability than a transistor—removing limitation of transistor keying and eliminating possible transistor damage due to reversing polarity.

PORTABLE Low drain transistor circuitry results in indefinite life from standard 22½ volt battery.

Compact
Only 7" wide, 4½" deep, 2⅜" high.

Established 1910

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For further information, check number 8, on page 128

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***Completion of our Master Course prepares you for a First-Class Commercial Radio Telephone License with a Radar Endorsement. If you fail the FCC examination for this license after successfully completing the Master Course, you will receive a full refund of all tuition payments. This guarantee is valid for the entire duration of your enrollment period.**

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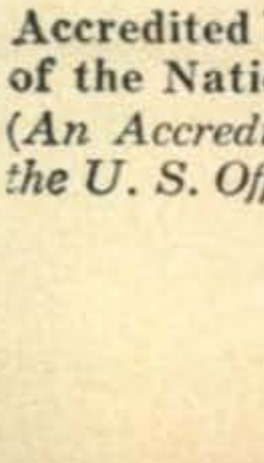

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I want to know about the following area of electronics_____

(please print)

Name_____ Age____

Address_____

City_____ Zone____ State____

CQ-89

Letters..... to the Editor

Signing/TV

Editor, *CQ:*

With reference to the television transmitter described in your April issue, I think you should advise your readers of the correct and legal way to identify their television transmissions. The pictures you include with the article are misleading: tacking a "/TV" to the end of an amateur callsign is improper identification and the use of an unissued callsign. The callsign on an F.C.C. license is the one assigned whether you use A1 or A5 emission.

Under the present regulations, Section 12.81 (*a*) (2), identification of a television transmission must be by *both* television transmission and either telegraphy or telephony. I hope this information is of some help to television experimenters.

Richard A. Freedman, K2DEM/1
P. O. Box 2617, Yale Station
New Haven, Connecticut

Zener Diode . . .

Editor, *CQ:*

Thanks for the fine article by Dr. Gitchagoome on "A Zener Diode Transmitter." I dug down in my junkbox and found I had all the necessary parts except an antenna connector, which I purchased for $0.35 (surplus). I used a phase-mixer circuit behind the oscillator and modulated the rig with a pair of 2N749s and two 1N2792s which I also found in my junk-box, and lo and behold I had a very fine sideband rig.

Digging deeper into my junkbox I found four 2N1662s with which I built a linear using a 29.4 volt power supply drawing 10 amps. This gives me a power output of about 1000 watts. I used a Barber's Clipping Circuit in the modulator and have a total bandwidth of 350 c.p.s. This rig can be heard daily at 1025 GMT on 3999.5 KC (upper-sideband).

Bob Froehling, KØAYU
1115 So. Minn. St.
New Ulm, Minn.

Editor, *CQ:*

The zener-diode transmitter article in the April issue was extremely interesting, however, the magic wand should have been included. With enough power to drive a 2N1908 to 18 watts, the zener just sits there and apparently couldn't care less. How about an actual construction article of this futuristic final? It should kick up a lot of build-it-yourself activity in the mobile phase of the hobby.

Ben Favrholdt, K6EKS
1234 S. Barrington Ave.
Los Angeles 25, Calif.

We just may have one in the very near future!—*Ed.*

Counties

Editor, *CQ:*

I just recently received my USA-CA *Record Book* and have just finished recording the last of hundreds of QSLs. It's been a lot of fun, but I do have one gripe. Looking up counties on old road maps is hard work. I'm sure that if all US hams put their county on their QSLs, the extra work of county hunters would be greatly simplified. It is not that hard to go to a little extra trouble to help out fellow hams that are interested in knowing your county, and it's sure appreciated on the other end of the line.

Ken Stewart, W8CLD
23727 Elm Rd.
North Olmstead, Ohio

◄ For further information, check number 10, on page 128

your choice of 2 GREAT EICO® TRANSMITTERS...

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to the highest Ham standards

90-WATT CW TRANSMITTER* #720
Kit **$79.95** Wired **$119.95**
*U.S. Pat. #D-184,776
"Top quality"—ELECTRONIC KITS GUIDE
Ideal for veteran or novice. "Clean" 90W CW, 65W AM-phone with EXT plate modulation. 80 through 10 meters.

60-WATT CW TRANSMITTER #723
Kit **$49.95** Wired **$79.95**
"Compact; well-planned lay-out. Clean-sounding, absolutely hum-free carrier; stable." — ELECTRONICS WORLD.
Perfect for novice or advanced ham needing low-power standby rig. "Clean" 60W CW, 50W AM-phone with EXT plate modulation. 80 through 10 meters.

TRANSISTOR CODE PRACTICE OSCILLATOR #706
Complete with battery Select variable tone, flashing light, or both together. Phone jack for private use. Efficient speaker: clean loud signals.
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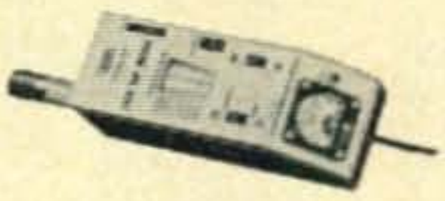
New! **CITIZENS BAND WALKIE-TALKIE #740**
Complete with rechargeable battery and charger. 9 transistors, 1 diode. Full superhet. U.S. made.
Kit **$54.95**
Wired **$79.95**

CITIZENS BAND TRANSCEIVERS
Superhet; prealigned xmitter osc; match different antennas by variable "pi" network. Single & multi-channel models.
From Kit **$59.95** Wired **$89.95**

HIGH-LEVEL UNIVERSAL MODULATOR-DRIVER #730
Kit **$49.95** Wired **$79.35**
Delivers 50W undistorted audio for phone operation. Can plate-modulate transmitters having RF inputs up to 100W. Unique over-modulation indicator. Cover E-5 $4.50.



GRID DIP METER #710
Kit **$29.95** Wired **$49.95**
Includes complete set of coils for full band coverage. Continuous coverage 400 kc to 250 mc. 500 ua meter.

PEAK-TO-PEAK VTVM #232
& exclusive ***UNI-PROBE®**
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Kit **$69.95** Wired **$109.95**
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RF SIGNAL GENERATOR #324 (150kc-435mc)
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For further information, check number 11, on page 128

Licensing

Editor, *CQ:*

. . . W5EHC tried to show that a higher class license made a ham a better national asset. (April '62).

The scale in his letter was an open denunciation of Novice, Technician and General class amateurs. W5EHC does not realize that tolerance of all is one of this country's greatest national assets. The amateur fraternity has had a tradition of the experienced helping the newcomers to our fine hobby. Some experienced amateurs try to add lustre to their Extra Class license by downgrading lower class licenses. Instead of standing on a soapbox and yelling "I have an Extra Class!", the experienced amateur might lend a helping hand to beginners.

Steven E. Summer, WA2KYF
80-58 250th Street
Bellerose, N. Y.

Editor, *CQ:*

. . . I do not believe that one can assign scholastic levels to amateur licenses. In the first place, the High School level expressed by W5EHC is no longer being issued. Secondly, the Technician Class has the same theory requirements as the higher General and Conditional Classes.

. . . It is true that the Extra Class requires more theory and a higher code speed, but it does *not* give any more privileges to the holder.

. . . How can one expect an amateur to put forth the effort to obtain an Extra Class ticket if there is no offer of extra dividends. I personally know many amateurs who are qualified Electronics Engineers who hold no higher ticket than a General. Every one of these is capable of an Extra Class but prefer to devote their time to more constructive things.

Glen E. Zook, K9STH
1006 W. 16th Street
La Porte, Ind.

Listeners

Editor, *CQ:*

I am in agreement with Roger Williams (Short Wave Listeners, Feb. '62) on an s.w.l. column in *CQ*.

The real reason for my writing is to let you, and many others know that there is a club for s.w.l.s—the Canadian DX Club. Of course, we welcome anyone who wishes to join. The *Bulletin* published each month covers the Broadcast Band to u.h.f. Anyone who is interested might contact either myself or Fred Woodley, 24 Briscoe St., West London, Ontario.

In my four years of listening I have logged 246 Countries in 40 zones and have 193/38 confirmed (all hams, naturally) and all 50 States.

By the way, our club offers a HAVE award to s.w.l.s. Thanks very much, and thanks for a teriffic magazine.

Alan Leith, VE1-7976
846 George Street
Sydney, N.S., Canada

Audio Selectivity

Editor, *CQ:*

Being a dyed-in-the-wool c.w. DX hound I find it is necessary for the serious DXer to use every possible means of selectivity available.

The use of an FL-8 audio filter in addition to the normally provided selectivity adjustments, many times will make the weak ones readable through QRM. As the FL-8 is used between the receiver output jack and the headphones it can be used without any internal changes in the receiver and it can be switched in and out of the circuit with the switch provided on the unit. I have used one for a long time and believe an audio filter should be part of every station's receiving accessories.

Glen Tillack, W6KZL
8307 Bardwell Ave.
Panorama City, Calif.

FL-8 Bibliography—Bane, C. F., "QRM Slicers! Reintroducing Audio Filters," *CQ*, June, '48, p. 15.
Talpey, R. G., "Low-Cost Audio Selectivity," *CQ*, Sept., '48, p. 27.
Countryman, G. L., "A QRM Eliminator," *CQ*, June, '49, p. 21.
Tyskewicz, J. P., "Variable Audio Selectivity With The Surplus FL-8 Filter," *CQ*, May, '50, p. 28.
Ford, G. C., "SAF-4—The C.W. Man's QRM Eliminator," *CQ*, Nov., '57, p. 60.

For further information, check number 13, on page 128

BARKER & WILLIAMSON MODEL 6100 TRANSMITTER

With the All New
CRYSTAL CONTROLLED
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SSB • CW • AM

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Establishing A New Standard of Frequency Stability!

The Barker & Williamson Model 6100 Transmitter has been engineered and built to give the discriminating operator the ultimate in SSB and CW operation.

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For further information, check number 15, on page 128

AT LAST there's a

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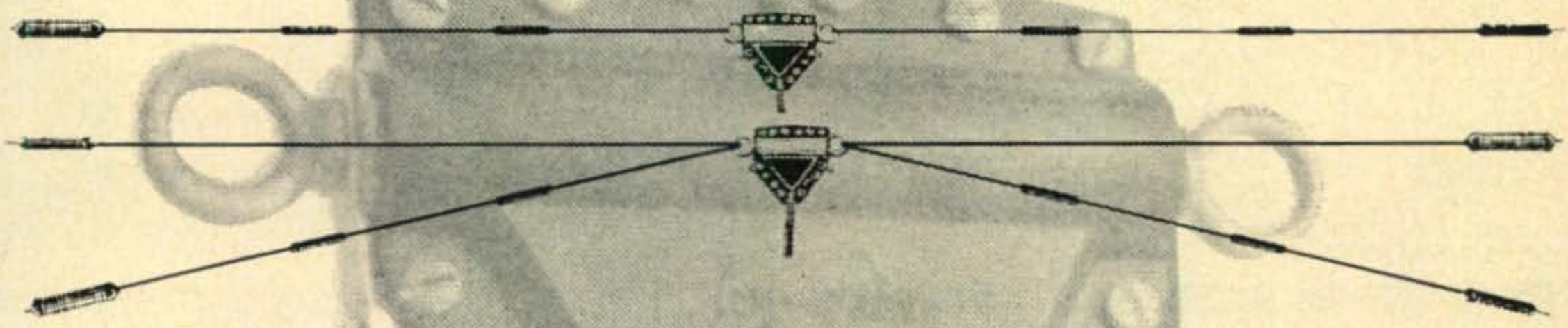
HY-GAIN TRAP DOUBLET TAKES UP TO 500 WATTS AM; 1 KW PEP

New high level of radiation efficiency is made possible for the first time by using a matched set of Slim Line traps for each band. This exclusive feature produces true half-wave resonance at every design frequency. Antennas can be adjusted for phone or CW. Will equal or surpass the performance of any other doublet system. SWR 2:1 or less at resonance on every band. Fed with 52 ohm coax (not supplied). Guaranteed to survive winds up to 100 mph. An ideal system for any ham with multi-band capability.

Trap Doublet for 10-15-20M, Model 3BDT **$17.50**



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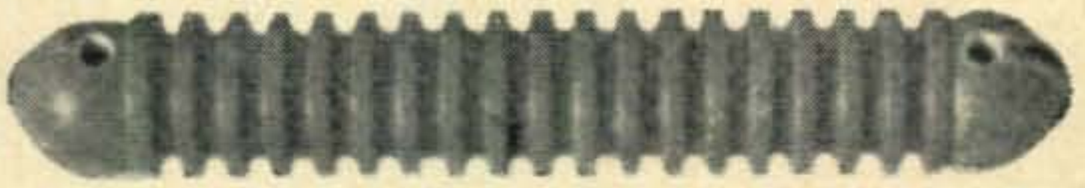
Complete antenna system, single 52 ohm coax fed, and constructed of copper clad steel stranded wire, cycolac insulators and coax center insulator assembly. Fan configuration increases bandwidth and is virtually impervious to all weather conditions. Takes unlimited power. SWR less than 1.5:1. Models 4BDT and 5BDT take 1 KW P.E.P., 500 watts AM.

Fan Doublet for 15-40-80M, Model 2BDP **$19.95**
Trap Fan Doublet for 10-15-20-40M, Model 4BDT **$24.50**
Trap Fan Doublet for 10-15-20-40M, Model 5BDT **$34.95**

Reliability of the Hy-Gain Slim Line traps has been proven by the more than 100,000 in daily use throughout the world operating under every conceivable condition and climate. This enviable record is made possible by the unique triple molding process which completely embeds the trap circuit in tough, ageless polypropylene. In addition to this high degree of weatherability, the Slim Traps are practically indestructable mechanically and will survive even greater strain than will the copper clad steel doublet wire. Fully guaranteed for one year.

Slim Line Trap Doublet



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DEPT. 126 LINCOLN, NEBR.

For further information, check number 30, on page 128

Northeast Ohio V.H.F.

The 7th Annual picnic sponsored by the Northeast Ohio V.H.F. Group will take place on Sunday, June 17th, at Sunset Park in Alliance Ohio. Entertainment and events for all the family. Contact K8BYR for registration and information.

Charlotte Hamfest

The National Guard Armory at the Municipal Airport in Charlotte, N. C. will host the 8th annual hamfest sponsored by the Mecklenburg A.R.S. (W4BX). July 1 is the date, and a fine program is planned for all, including a Barbecue lunch. Tickets are $3.50; $1.25 for children, or lunch only.

Paducah

The 1962 Mo-Ark-Ky Hamfest, sponsored by the Paducah A.R.C. will be held on Sunday, July 8th at the Nobel Park Community House, Paducah, Kentucky. A big noon meal is planned. No registration fee. For further information contact W4KCH at 3628 Gregory Ave., Paducah.

Penn-York

The Penn-York Hamfest Association will hold its 4th Annual hamfest at the Ingersoll-Rand Recreation Hall, Athens, Pa., on Sat. June 16th. Program will include speakers, contests, awards and dinner. Reservations $4.00 per person or $6.00 at the door. Plenty of parking. For more information contact Pen-York Hamfest, c/o CARA, P.O. Box 301, Corning, New York.

Call Book Again

Fr. Aquinas Cox, K1QVO is attempting to compile a fourth addition of his *Call Book* listing all clergy of the Roman Catholic Church. Contact him at the St. Anthony Friary, Lowell Road, Hudson, New Hampshire.

Amateur TV

K9GRH informs us that two meetings in June are scheduled for the amateur TV enthusiasts in the Chicago area. Jerry's QTH is 3901 W. 61st Place, Chicago 29, Ill. He'll fill you in on time and place.

Saskatoon

Western Canada's largest hamfest is scheduled for June 30-July 1, 2 at Saskatoon. Thousands of dollars in commercial gear is scheduled for prizes and if for nothing else, this should entice you to look into making the trip. Tickets and info can be obtained from the Saskatoon Amateur Radio Club, Box 801, Saskatoon, Saskatchewan, Canada.

Wyoming

Wayne Moore, W7CQL informs us that the Wyoming Hamfest will be held on June 30-July 1 at the Pines Lodge near Buffalo, Wyoming. Wayne's QTH is 2000 E. 1st Street, Casper, Wyo.

Biloxi

The Biloxi A.R.C. will hold its 5th Annual Hamfest on June 30-July 1 at the Community House, Biloxi, Mississippi. There will be club station activities and dance Saturday night and mobile contests, dinner and usual prizes Sunday. For details write: Biloxi A.R.C., 2307 Miller St., Biloxi, Mississippi.

Original Call Book

The Old Old Timers Club is now offering a reprint of the first issue Government Call Book dating back to 1913. The price to non-members is $3.00 and is certainly a nice thing to have around the shack. Earl Williams, W2EG is taking the orders via 507 Wayside Road, Neptune, N. J.

Stolen

W7GDV/6 at 1720-A Laurel Canyon Blvd., Los Angeles 46, California has had his Viking Navigator, serial #85803 stolen from his home. Amateurs and distributors in the Los Angeles area are asked to keep a sharp eye open for this item. The r.f. output connector has been replaced with an SO-239.

We're happy to say that K5REV recovered his stolen G-76 through the announcement in the April issue of *CQ*. Guess someone does read this stuff after all!

Central Kansas

Bob Neal, KØYEM, 343 Woodlawn, Salina, Kansas is handling all the information for the 15th Annual C.K.R.C. Hamfest on June 3rd. Registration is $1.00 and there will be prize drawings, hidden transmitter hunts, *etc*. You're asked to bring dishes and silver service for your own family.

Memphis

The Memphis Hamfest, co-sponsored by the Mid-South Amateur Radio Assoc., Mid-South V.H.F. Club and the Memphis DX club will be held during Field Day, June 24th from 10 A.M. to 4 P.M. at the Overton Park Pavillon in Memphis. Clay Elam, W4YZQ is handling the incidentals.

RSGB Handbook

Since we carried the note about their new edition of their *Handbook*, the RSGB has received many requests for the price and they would like us to tell everyone that the volume can be obtained for $5.25, which includes postage. See March *CQ* p. 16.

San Fernando

The San Fernando Valley Radio Clubs are once again sponsoring their hamfest to be held June 17 at Northridge Park, Northridge, California. Free coffee, donuts, ice cream and soda pop are included with the ticket. It is requested that you bring your own lunch. Transmitter hunts, code awards, swaps, tube guessing contests are some of the events that will take place. Larry Johnson, WA6KLQ, Publicity Chairman will fill you in.

Tape Recordings

Mike Caveney, VE3GG has a good gimmick intended to bring out your hiding club members. He has written a book covering his 45 years of amateur radio in the wild north and is willing to record 45 minutes of any part of the book if clubs will send him a five-inch reel of tape plus 10¢ for return of same. Mike's address is 29 Byng Ave., Willowdale, Ontario, Canada.

Winding up the very successful New England Convention, Chairman Ernie Coons, W1JLN, (right) presented Nat Hallenstein, W1JMA, engineer in charge of the Boston F.C.C. with a plaque "in appreciation of many years of unselfish devotion helping the radio amateur." Looking on is Eli Nannis, W1HKG, president of the Federation of Eastern Massachusetts Amateur Radio Association. *(Photo by W1VRK.)*

RADIO HAMS! FLEET OWNERS! CB OPERATORS!

(INBOARD BOAT OWNERS, TOO!)

The Sprague SUPPRESSIKIT—especially developed for Amateur, Citizens' Band, Industrial, or Public Service mobile equipment. Easily installed on any truck, car, or boat engine using a 2-pole 6-volt or 12-volt d-c generator.

SUPPRESS RADIO FREQUENCY INTERFERENCE in your MOBILE RADIO GEAR!

Deluxe Type SK-1 SUPPRESSIKIT has full 60 ampere voltage regulator and generator THRU-PASS® capacitors designed for heavy-duty, continuous operation in hot engine compartments. Shielded armature and field leads keep noise level to a minimum!

★ Every THRU-PASS capacitor, as well as the field R-C suppressor, in the Deluxe Suppressikit has been designed for quick, simple, effective installation. The generator capacitor is built for continuous heavy duty 257°F (125°C) operation. The combination of a full 60 ampere current rating and the high rated operating temperature gives you an extra factor of safety against expensive generator burnouts, unlike many suppression assemblies containing general-purpose capacitors. The lower noise level, plus the time saved in installation, are well worth the slight extra cost! And you won't suffer the aggravation of trying to figure how to mount ordinary general-purpose feed-thru capacitors when you install the SK-1 Deluxe Suppressikit according to the comprehensive step-by-step instructions in each neatly-packaged kit.

Just Look at the Advantages of the Type SK-1 SUPPRESSIKIT

- ★ **Provides effective R-F interference suppression at moderate cost.**
- ★ **Permits faster, more readable, less tiring communication at greater ranges.**
- ★ **Makes possible H-F interference control by means of new, extended range, THRU-PASS capacitors which are effective through 400 mc.**
- ★ **Heavy-duty capacitors avoid "short-outs", preventing generator failure.**
- ★ **Contains only 5 easy-to-install basic parts—a well-engineered kit.**
- ★ **Components neatly marked and packaged complete with easy-to-follow installation instructions.**

ORDER FROM YOUR SPRAGUE DISTRIBUTOR

He'll be glad to explain the SUPPRESSIKIT and answer any questions you may have. See him Today!

WORLD'S LARGEST

MANUFACTURER OF CAPACITORS

SPRAGUE®

THE MARK OF RELIABILITY

6S-339R3

For further information, check number 19, on page 128

STOLEN!

From time to time *CQ* gets requests for help in aiding amateurs who have had their gear stolen. The case below is of such unusual nature that we are taking this space to help OM Pierce.

Mexican amateurs are especially asked to be on the lookout for this equipment since the Sheriff's office in San Diego feels it may have gone over the border.

4 Each—Collins 32S-1 Receiver. Serial numbers available: 10345, 10443, 11932.

4 Each—Collins 75S-3 Transmitter. Serial numbers: 10118, 10221, 10354, 10648.

4 Each—Collins 516F-2 Power Supply. Serial numbers available: 10338, 12273.

4 Each—Collins 321B-4 Speaker Console. Serial numbers: 52027, 52532, 52905, 53269.

3 Each—Collins 30L-1 Power Amplifier. Serial numbers: 10302, 10326, 10927.

This equipment was only 5 weeks old and was stolen from Cameron G. Pierce, W6HJT, 1190 Oak Grove Ave., San Marino, California.

All leads that may aid in the recovery of this equipment should be referred to the San Diego Sheriff's Office, San Diego, California, or to W6HJT.

radio frequency interference suppression in mobile and marine radio installations. The kit contains newly designed capacitors which permit effective noise suppression up to and beyond 400 mc. See the photos showing how suppression is accomplished.

The kit does not interfere with engine performance.

A check on one installation disclosed that the kit does a good job at 2 meters and up. In rare instances you may need to install a tunable filter on the generator if the generator has not been carefully maintained.

Some day there may be a Federal law enacted making ignition noise suppression mandatory on *all* cars, just as France requires now. Car ignition not only interferes with ham radio but many other radio services. Let us hope a law can be passed soon.

KE-93—"How come the b.f.o. in my KE-93 receiver changes pitch from time to time on the same signal without touching the control?"

You have a defective 15K pot. Replace the old pot with a new wire-wound type. Your trouble will disappear.

NC-303—"How about my installing a Nuvistor tube front end in by NC-303 receiver? Think it will be worth the trouble?"

No. But you might explore the possibility of changing the r.f. tube in your converters (if they are National) with the 6DS4; you'll notice a big difference!

Scope-Aches—"I own a 7 inch scope and it worked okeh for over two years. Recently on warming up there are tiny flitting flashes on the screen. The sync is stable and the scope seems to work okeh. Are the flashes a sign that my c.r.t. is going out?"

Could be—though I am inclined to think that some of the cathode material (oxide) has sloughed off (or is sloughing off). Apply a high voltage (momentarily) between cathode and grid to burn out the particles which have a tendency to short the elements out. If this is not the cause, check each component in your high voltage supply—especially your intensity pot. Incidentally, after losing over half of my manuscript on my *Ham Scope Book*, I have finally caught up again, and hope to have the book out this year. It will contain scope maintenance info of interest to the ham, how-to-use info, etc. not found in most scope books written for TV servicemen etc.

Zener Diode vs. VR Tube—"Would you use a zener diode or a v.r. tube for purposes of simple voltage regulation? If the zener diode is a better device than the v.r. tube what makes it so?"

If you will refer to pages 23 and 24 of Motorola's *Silicon Zener Diode Handbook* (1st Edition), you will read in effect that with a v.r. tube, the constant voltage plateau is rather narrowly limited between two current levels establishes by the internal tube geometry. Exceeding the maximum current limitation results in an increase of voltage drop, a loss of regulation and eventual tube destruction. The minimum voltage level with a v.r. tube is around 70 volts. Zener diodes are available over a continuous voltage spectrum. For example, Motorola has a series of diodes rated at 6.8 volts to 200 volts which have low to high current carrying capacity. Its dynamic regulation range and power handling capabilities are much higher than the v.r. tube's and it is not erratic in operation.

I am sure the zener diode will eventually replace most v.r. tubes due to its small size and reliability. Because it can be used in a wide range of application in electronic circuitry it has a bright future. Better get acquainted with it.

Open Wire Line Radiation—"I plan to use an open wire line to feed my 40 meter antenna which must of necessity be located over a wavelength away from my transmitter. How about the radiation from this long open wire line, will it be great?"

It can be. To reduce radiation from a long open wire transmission line, the line must be balanced, for radiation loss is directly proportional to the amount of unbalance. For open wire lines, the lines should be transposed (crossed) every few feet, using transposition insulators. A line a full wavelength long whose spacing is uniform will usually be balanced.

LASER—"A couple of times on the air I have heard the mention of the LASER. What is it anyway?"

The LASER is "light amplification by stimulated emission of radiation." The laser provides a coherent light output in much the same analogy that an r.f. oscillator exhibits definite time and phase relations in its output waveform. For full information on the laser, I urge you to obtain a copy of the Oct. 27, 1961 issue of *Electronics*. The first article, "LASERS: Devices and Systems, Part 1," covers the subject well.

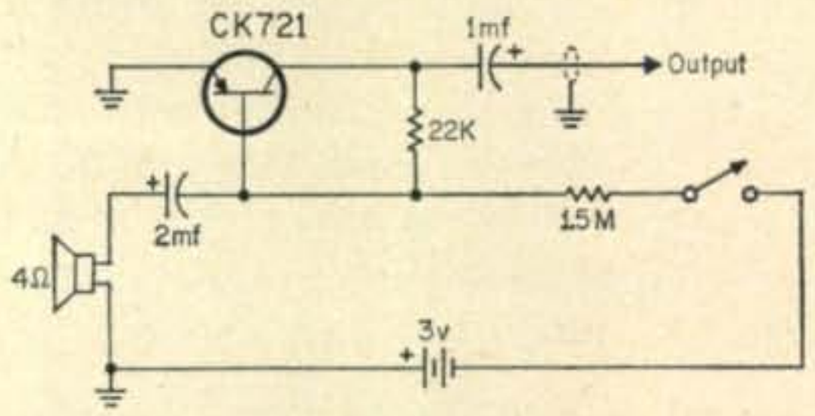


Fig. 8—Using a small dynamic speaker as a microphone is facilitated by the use of this simple transistorized preamp.

Mike Amplifier—"I own one of those little dynamic midget speakers which would make a fine microphone. It has a 4 ohm voice coil. Please give me a circuit using one transistor for high impedance output to make this speaker a mike."

See fig. 8. So little to it—you can build it right in the case.

2 Meter Spurious Sigs—"I live near a guy with a new commercial 2 and 6 meter transmitter.

[*Continued on page 100*]

If Hickok comes out with a *late* chart for the 546, plus socket modification information I, like many others, would surely buy one.

SB-10 and 50 mc S.S.B. Converter-Transmitter—KØSVT (M. L. Sproul) passes along this information: "The following is an adaptation for the 50 mc s.s.b. converter-transmitter which appeared in the July 1961 issue of *CQ*. This adaptation makes it possible to drive the unit with the Heath SB-10 s.s.b. adaptor.

"The changes described were either to simplify or improve operation.

"First detete RFC_1. Then change the 180 ohm resistor in the cathodes of the 5763s to 270 ohms. Change the 47K ohm resistor in the screen lead of the 6EA8 (or 6U8) to a 500K potentiometer. Adjust the pot to give approximately 4.5 volts at TP_2 and TP_3. Change the 14 mc s.s.b. input resistors to 33 ohm and 22 ohm resistors in series. Connect the .01 mf coupling capacitor to the junction between the 33 ohm and 22 ohm resistors. The cathode drive is 22 ohms above ground.

"These changes were found advisable to improve the linearity of the mixer-driver and prevent over-driving.

"The following changes were made to the final for simplicity. First delete C_4 and the 10 ohm resistors in series with L_4 and the grids. L_4 is now wound to be self-resonant with the input capacity of the final tubes. Change the .005 mf screen bypass capacitors to .001 mf. This improves the stability of the final and the parasitic suppressors PS_1 and PS_2 could be eliminated.

"A v.f.o. to drive the SB-10 was also included on the chassis of the converter-transmitter. Grid block keying was used on the v.f.o. and the grid of V_{1B} for standby. Plate voltage is left on all tubes including the final at all times.

"The results of the above changes for use with the Heath SB-10 have been worthwhile. Excellent reports and many favorable comments have been received during the past months. This, I believe, is a simple method of getting on 6 meter sideband. The SB-10 should not be overlooked as an exciter for 6 meters!"

Thank you, Maury. I'm sure many hams will appreciate the info you have so kindly passed along.

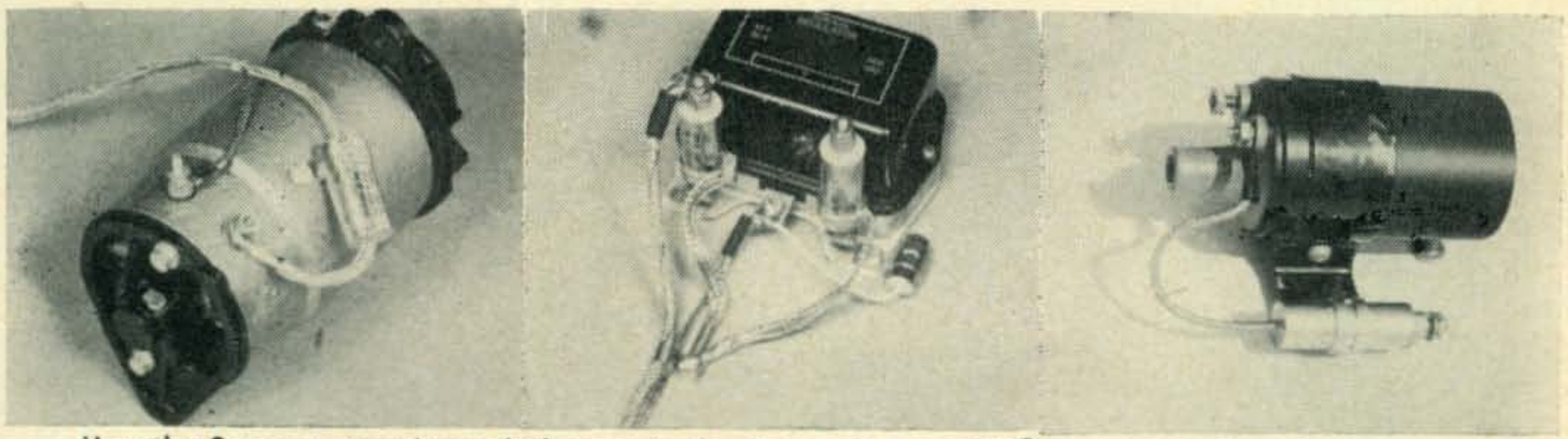
Case of "Boiling" Capacitors (Apache)—"Although my TX-1 (Apache) has been working well for about three years, I am experiencing trouble with the 20-20-20 mf electrolytic capacitors in the low voltage section. The can gets so hot that I can hardly touch it. I replaced the 6AL5 and the 5V4—and the set worked all right for about 3 months. After this time I have the same trouble. What cooks here besides the electrolytics which I have also replaced without success?"

Parts, especially electrolytic *do* age. When under full load they "work hard." Whenever a capacitor begins to sizzle, first check the voltage across it. Resistors change value much quicker than capacitors; a lowering of resistance will naturally allow more voltage to get through. In the case of the TX-1, check the 1 K resistor out of the 6AL5 and the 7 henry choke out of the 5V4 when hot and cold. Then check the selenium out of the 6AL5 and the resistors associated with it; next the socket connections at the 5V4 for arcing. If any black smudge is present, replace the socket with a ceramic unit; the same goes for the 5R4GYs. Last but not least, check your load on the low voltage supply. You may have a defective resistor feeding the 6CL6 or 5763 which intermittently opens up, thus having the effect of an open bleeder and consequent higher voltage. I also advise you to replace the 6AL5 with seleniums (the newer sets have them), and to place a 100 ohm 1 watt resistor in series with each of the 20 mf electrolytic sections. Good luck!

Please return!—Again I appeal to the hams whom I have loaned copies of *CQ, QST, WRA,* receiver and transmitter diagrams etc., to return them. Some of you have my *only* copies of the items mentioned. By keeping this material, you are depriving other hams of the same information. Please help me to help you! *Please* return my material!

Ignition Noise (Again)—"Like many other hams I am going mobile for the first time and would like to clear up my ignition noise in one session, not spread it over months as some fellow hams have done. Is there anything on the market (a kit preferably) which I can install and forget?"

Yes. The Sprague Electric Co., of North Adams, Mass. now has on the market their Type SK-1 Supresskit which provides effective



How the Sprague capacitors which come in the Sprage Suppressikit® are mounted on the generator, regulator and high voltage coil for the suppression of ignition noise. The kit contains basic components plus cable and ground straps.

Front view of the DX-40 showing the location of the new audio gain control and the new 6 meter switch position.

Next, switch in the 25 mc coil, put your main band-change switch on the new 6 meter position and tune your drive for proper grid current (2 to 3 ma) as read on the meter of the DX-40. With a 6 meter antenna connected, switch to phone position, dip your final (as indicated on the meter in plate position) and load as for the other bands.

Perhaps some DX-40 owners feel that the modifications require too much work. There is, of course, a simpler way to put the set on 6 meters, but it is quite inefficient and I am therefore against it. With the modifications presented here you will have close to maximum output on 6 meters—what more can be said?

Should your final oscillate, you may have to neutralize it. Do this by feeding a part of the r.f. from the pi-net side of the .001 mf final output coupling capacitor via a 0.5 mmf to 3 mmf ceramic trimmer to the cold end of the new 6 meter doubler coil. This accomplishes neutralization as for the Adapt-O-Citer final or any other.

Observation

Never in the history of amateur radio was there anything to match the publicity received from project OSCAR. From every corner of the globe, hams listened for OSCAR's "HI" and marveled at its coverage. The American hams who made project OSCAR possible and successful proved to the world not only that America is second to *no* nation in electronic-radio technology: they showed everyone what a group of private citizens can achieve in an open society, and only in an open society like ours, where freedom prevails. We are proud of them!

There will be more OSCARS. Perhaps by the time this is in print OSCAR II will be orbiting the earth and with each of its orbits emphasize the important role ham radio plays in scientific communications progress.

The hams who made OSCAR such a smashing success are now probably planning more sophisticated ham communications satellites. And we must remember—these experiments in space cost money. Lots of money! I am sure if they called on the American amateur radio fraternity for financial assistance we would all respond generously. The reward of international goodwill, greater scientific knowledge and higher technical achievement which the American ham fraternity shares unselfishly with fellow hams throughout the world—can it be measured in dollars and cents?

Questions

Doppler Shift Calculator—"I'm sure that many of us who are interested in projects such as OSCAR, etc., would appreciate your help in coming up with something to enable us to calculate doppler shift. The equation for doing this is a mite cumbersome. How about it?"

There are doppler shift nomograms available and we are planning to make up a few hundred for free distribution. However, the Sylvania Electric Products Co. Inc. (Sylvania Electronic Systems), 63 2nd Ave., Waltham, Mass. put out a terrific doppler shift circular slide calculator. This calculator covers 10 mc to 100 kmc, 50 ft/sec to 50,000 ft/sec, bearing angle of 0° to 85° and indicates shift from .01 kc to 1000 kc. It sells for 50¢ plus postage. This calculator is ideal for figuring shift on 145 mc (OSCAR's frequency). I hope they are still available. If not, perhaps you can obtain one from Graphic Calculator Co., Chicago 5, Ill.

Tube Tester Info—"I have an old, reliable Hickok tube tester. The tube roll chart on it is dated 1954. Inquiry to the company brought a reply that this was the last tube chart made for this particular tester. When I bought the tester I was assured by the dealer that it would never become obsolete. Without an up-to-date tube chart I'm lost. Can you suggest procedures to test the new tubes on this old checker?"

You no doubt have the same model I do, the 546. This is still a good tester. For tubes like the Nuvistor, Compactron etc., you can either make an adaptor or remove the loctal sockets (which are seldom used now) and replace them with the new sockets.

When I encounter a new tube, not covered by the tester roll chart, I either buy a similar tube or borrow one from a radio dealer friend. I then check the characteristics of the tube, pin connections, etc., using the charts in the ARRL *Handbook* or tube manual. I attempt to pick out a tube which has the same or nearly the same pin connections and characteristics. Next I set up my base connection switches, filament voltage, bias voltage, etc., as close as I can. Using the newly purchased or borrowed tube (which I assume is good) I then proceed to cautiously check my settings. In every case, I try to obtain the correct G_m (mutual conductance). I compare the new tube I want to check against the borrowed tube and make up a chart showing the settings as given on the tube roll chart. The same procedure can be followed with any tester (including surplus types), which utilize switches for proper tube element socket connection. The method just described is the practical way to do it.

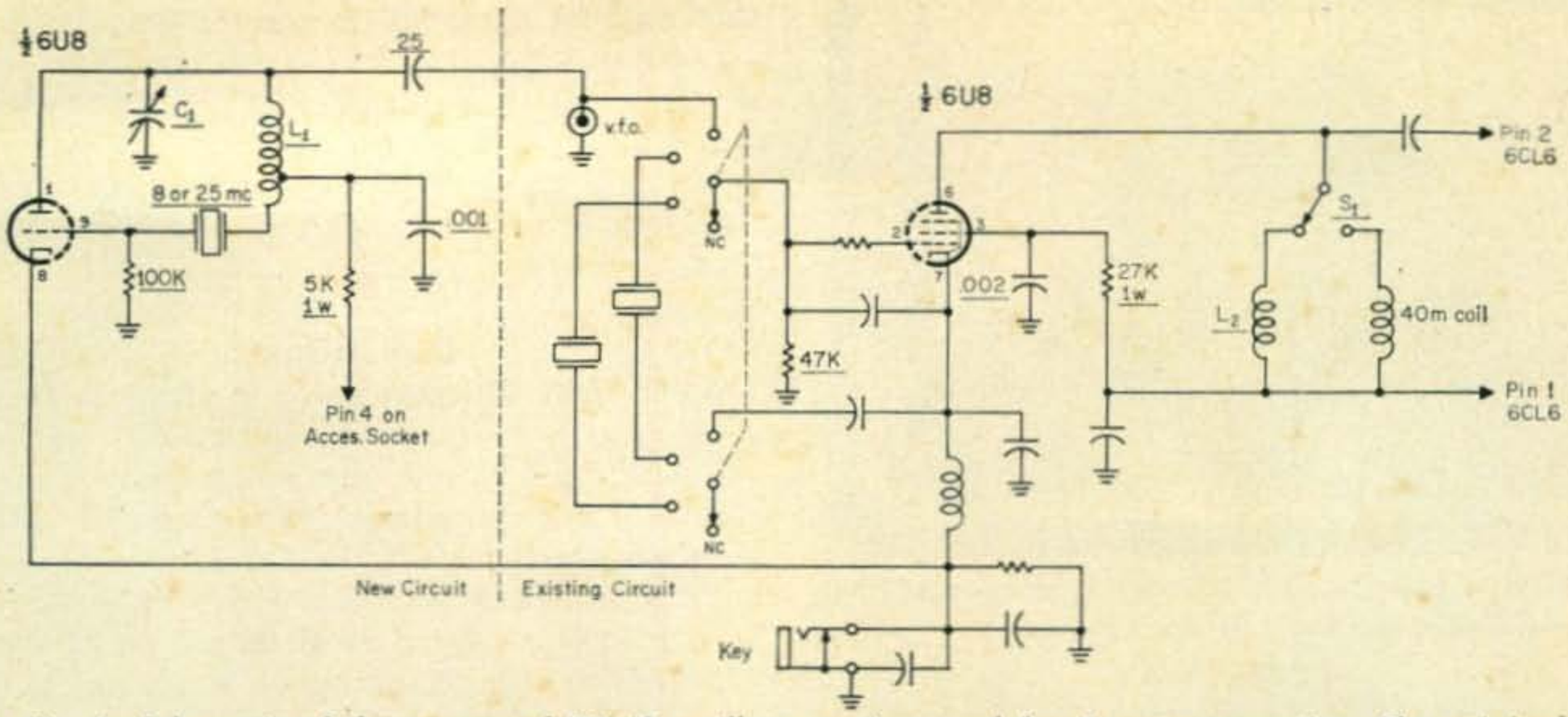


Fig. 6—Schematic of the revamped DX-40 oscillator section used for 6 meter operation. The original 6CL6 oscillator is removed and replaced with a 6U8 wired as shown. Unlabeled parts are original components requiring no changes. See text for complete conversion details.

C_1—50 mmf ceramic trimmer capacitor.
L_1—14 t. B&W 3003 tapped 4½ t. from xtal. end.
L_2—CTC LSM-30.
S_1—S.p.d.t. ceramic switch.

Note that the output of the oscillator section of the 6U8 goes to the DX-40 v.f.o. input. When you are on bands other than 6 meters, you can forget the triode section of the 6U8. Merely pull out the crystal and switch to either of the other two crystal positions.

Third overtone crystals are used. Either 8 mc or 25 mc crystals will operate satisfactorily in this circuit.

In the output of the 6U8 pentode section we have added a small ceramic switch, S_1, to select either the 40 meter coil or the 25 mc coil—it is mounted on the rear of the chassis in the old ground bolt position. The ground bolt was re-installed on the edge of the chassis. A coil for 50 mc was added to the output of the 6CL6 (L_3) which feeds the final stage, and another for 6 meters added to the final (L_4). (Fig. 7.)

Both sections of the bandswitch have been changed to 6 position types to accommodate the 6 meter coils. The switch sections used in the conversion shown in the photographs were obtained surplus and if difficulty is encountered in obtaining similar units commercially, another procedure must be used. Four standard Centralab Type XD (3) and FFD (1) switch sections must be obtained and fitted to the switch detent assembly and then wired as shown in figure 7.

Note that an Ohmite Z-50 choke was added in series with the r.f. choke feeding the final plate as well as one in the 6CL6 plate circuit.

Tune-up is simple. Close the key, and with a neon bulb (½ watt) touching the v.f.o. input connection, tune the 50 mmf compressor type trimmer condenser until the crystal takes off and r.f. is generated as indicated by the neon.

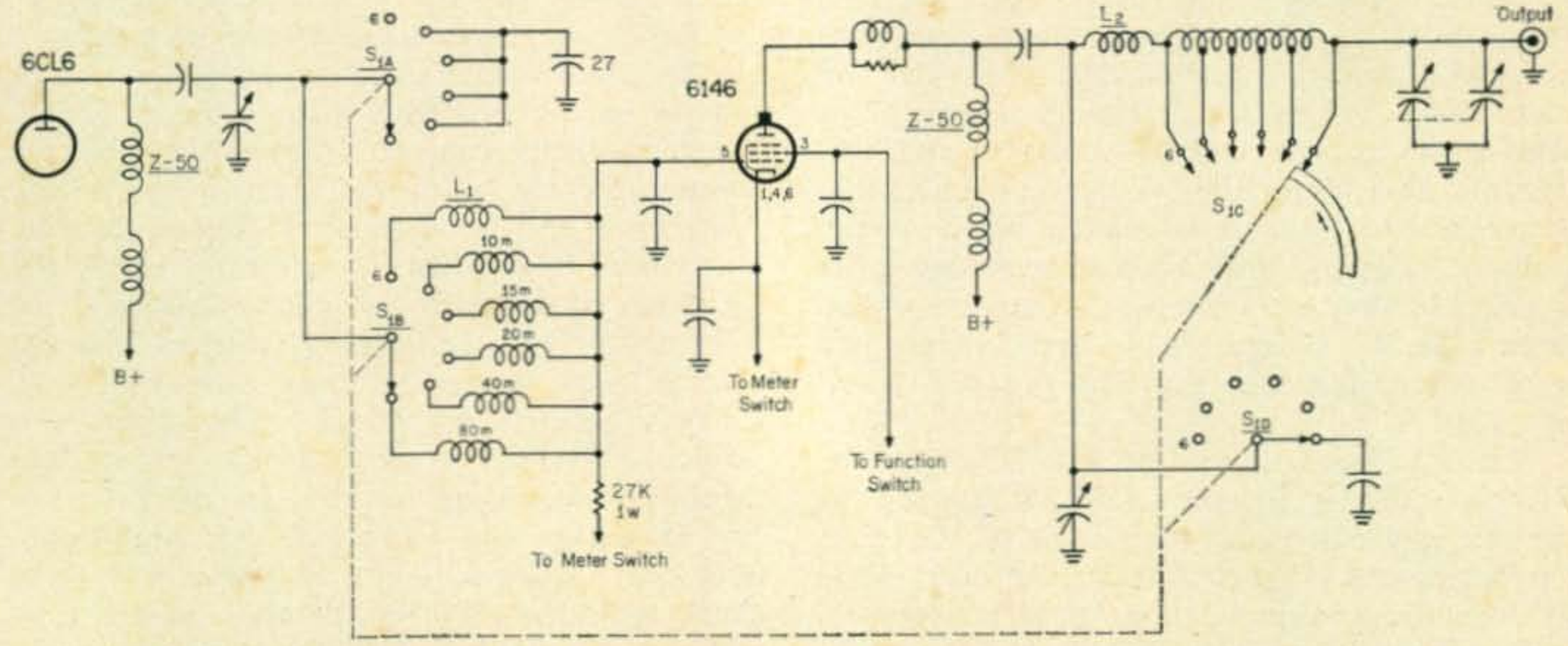


Fig. 7—Circuit changes to the DX-40 driver and amplifier section for six meter operation. Coils L_1 and L_2 must be added as well as RFC_1 and RFC_2. The original bandswitch sections must be replaced with a six position unit, S_1 as shown.

L_1—9t. #18 e. ¼" dia. ½" long.
L_2—3t. #18 1" dia. ⅜" long. Airdux 808T.
S_1—4 pole six position rotary switch. 3 pole non-shorting, 1 pole progressively shorting. See text.

Converting the DX-40 to 6 Meters

We had so many letters on the DX-40 requesting information how to modify it for 6 meter operation, etc., that we decided to buy one. First we added an antenna relay *internally*. The photo shows how this was done.

We used small coax for the installation, plus a phono connector and two binding posts. Binding posts are employed for receiver muting connections, and the phono connector (used before for the v.f.o. input) is now the receiver antenna connection. Connections are made as shown in fig. 5. If you have a v.f.o. and need the phono connector, you have enough space to install another phono connector between the crystal switch and the original phono connector on the back of the DX-40 chassis for the receiver antenna connection.

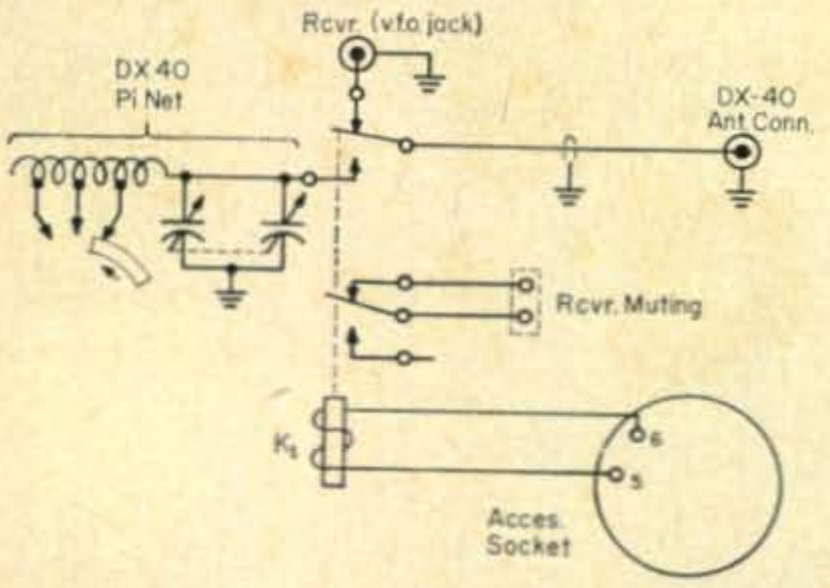
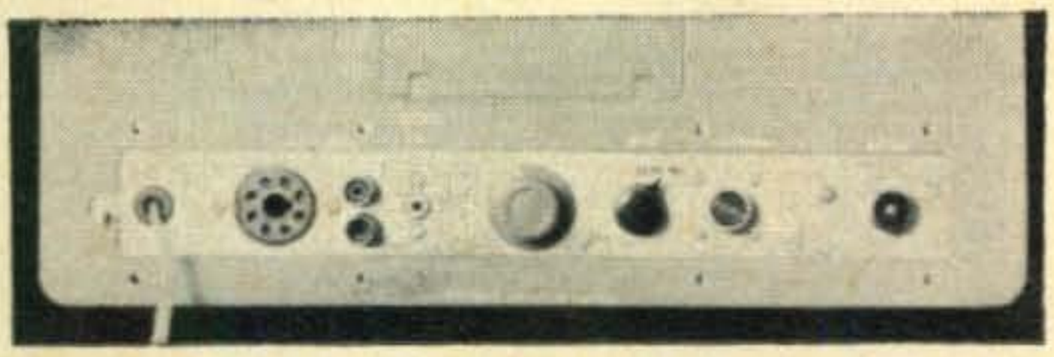


Fig. 5—Connections for internal antenna relay for DX-40. Relay K_1 is an Advance #1504.

Second, we added an audio gain control. We did this simply by replacing the 1 megohm resistor in the output of the 12AX7 with a 1 meg pot. The pot was installed between the key jack and the mode switch. This change permits the use of a good high output crystal mike without fear of overmodulation.

To improve the high frequency a.f. response and make for better modulation, we replaced the 500 mmf coupling capacitor from plate pin 6 of the first 12AX7 section to the grid pin 2 of the second 12AX7 section with a 250 mmf unit. It made the D-104 mike sound much better. (This change may not be necessary for other mikes.)

In modifying the DX-40 for 6 meter operation, the "contemporary" approach was not used, but rather one which enables us to operate the rig without doubling in the final. This involves more work, but the results justify the effort.



Rear panel of the modified DX-40. The control between the crystal selector switch and antenna connector selects either the regular 40 meter oscillator plate coil or the new 25 mc unit, L2. The two binding posts to the right of the accessory socket are for receiver muting.

The first step in modification is to change the 6CL6 oscillator tube to a 6U8 which is a triode-pentode. The socket need not be changed. The heater connections, pin 4 and pin 5 on the new tube, are the same as the 6CL6 and can be left as is. The grid, pin 2 is also the same, ditto the pentode plate, pin 6. The cathode of the pentode plate now becomes pin 7 instead of pin 1. The pentode screen is pin 3 (not connected through to pin 8 as on the 6CL6). Pin 8 is the triode cathode. Pin 9 becomes the triode grid (not connected through to pin 2 as on the 6CL6). Pin 1 becomes the triode plate. Be sure you make the proper connections. (See figure 6.)

Coil L_1 consists of 14 turns of #20 tinned wire, ½" diam., ⅞" long tapped at 4½ turns from the crystal end. (A B&W 3003 coil should work fine.) The coil is mounted near the tube socket.

The ceramic compression type trimmer condenser (50 mmf) can be mounted on the shield near the oscillator tube socket. It is only adjusted once (on preliminary tune-up); and as long as the *same* type of crystal is used for different frequencies, no trouble will be encountered.

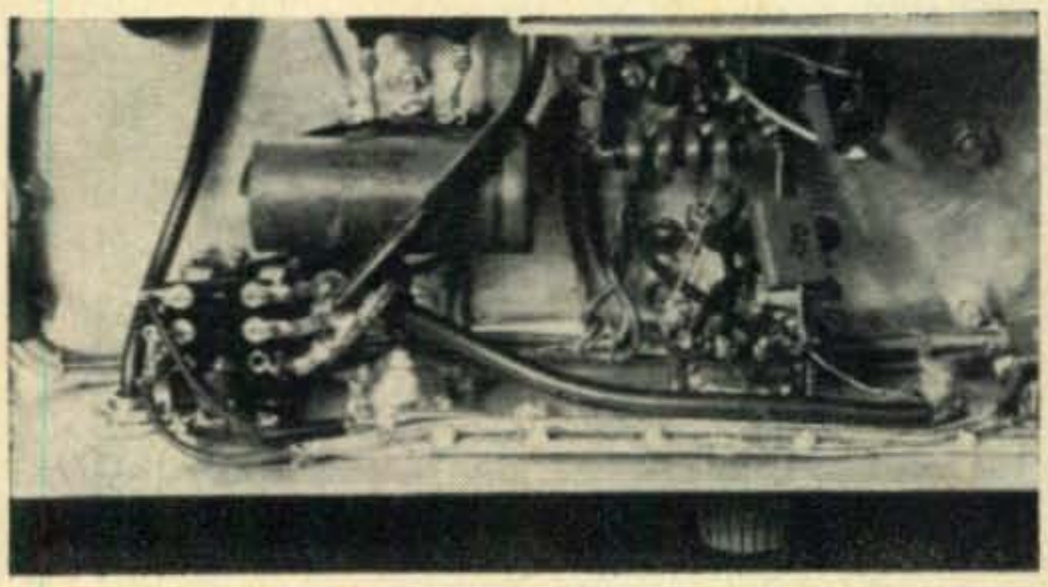
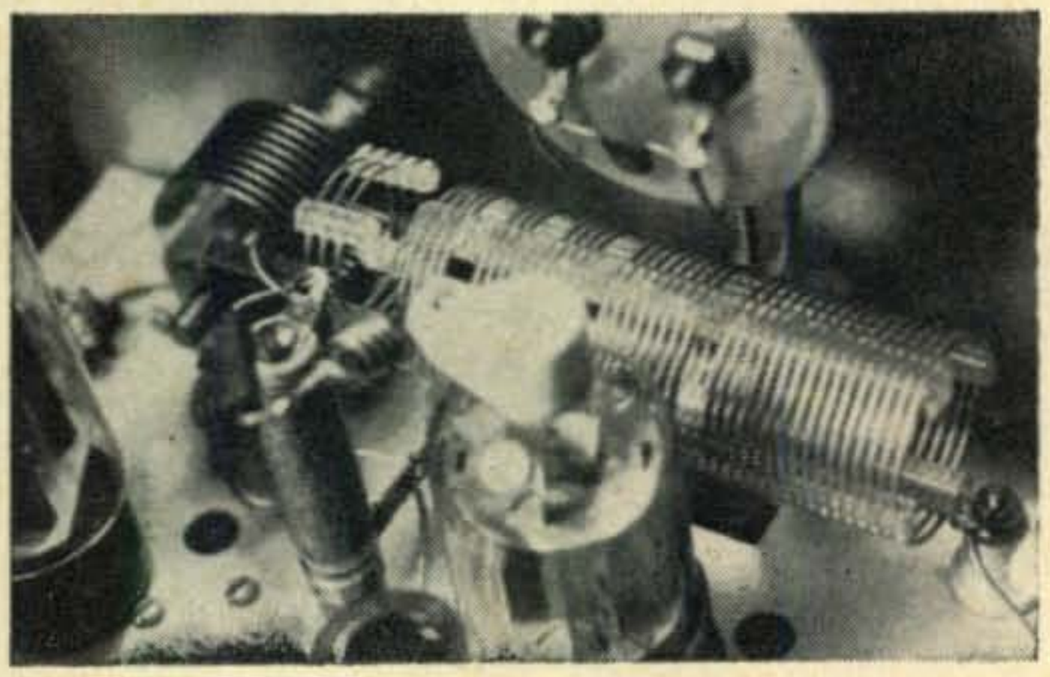


Photo showing antenna relay installation in DX-40. Oscillator circuit modifications were not completed at the time of the photo.



Top view of the DX-40 showing installation of the new six meter tank coil at the end of the 80-10 meter coil.

Sufficient output is available to drive the pants off a 6146 or similar tube.

Construction Hints

A Minibox was used in the original model—it measures 8 × 6 × 3½". Compartmental shielding between L_1, L_4 and L_5 was accomplished by using small L shaped shields.

The slug tuned forms used are XR-50 (National) types, though you may substiute them with any other good slug tuned form.

All speech amplifier "long haul" audio wiring is shielded.

Mount the r.f. phase shift network as close as possible to L_1. Coil L_2 should be at right angles to L_1.

Pots R_1 and R_2 are mounted on the Minibox front panel. These pots *must* be wire-wound units.

Output r.f. and a.f. are taken via coaxial plug to the transmitter, as is the r.f. input from the transmitter driving stage.

Transmitter such as the DX-40, Ranger, Heath HX-11, etc., have enough reserve c.w. power to handle the unit. But, as with the SB-10, a separate power supply *is* better.

Tune-up and Operation

Information for putting the Viking Ranger on s.s.b. is contained on page 41 of the Sep. 1959 issue of *CQ;* on the DX-40 (and similar sets) in the Mar. 1961 issue, page 67. This information shows how to convert the final for linear AB-1 operation and gives the diagram of a simple power supply to use with the SB-10 s.s.b. adaptor or the Adapt-O-Citer.

After the set is assembled and wiring checked out, bring in the r.f. power (from the crystal oscillator shown in fig. 3) or from the transmitter driver stage—this r.f. can be switched via a ceramic switch.

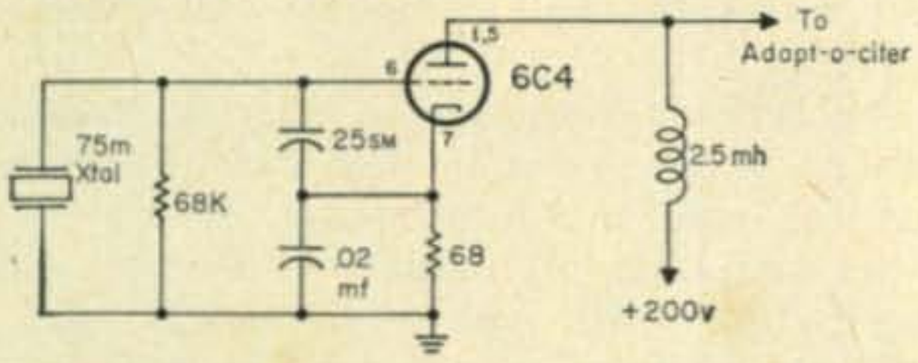


Fig. 3—Oscillator for the "Adapt-O-Citer" for use if a complete, small sideband exciter is desired or if a 3.5 mc c.w. transmitter is not available.

Unbalance pot R_1 or R_2. Insert a milliameter (see fig. 4) in series with the grid resistor and ground of the final tube. Adjust L_1, L_3 and L_4 in turn for maximum (2-3 ma) grid drive to the final. Make sure the final plate and screen voltages are off. With r.f. drive to the final, place a grid dip meter near L_5 and adjust C_N, the neutralizing "gimmick" wire near the final tank, for minimum r.f. feedthrough; remember that your g.d.o. should be on *diode* position. (Before installing the gimmick, try the set—the final may not need neutralizing.)

With the final neutralized, connect up an a.f. oscillator (output set for around 1000 cycles) or a microphone. Insert a milliameter in the final plate of the EL-84 between the r.f. choke and B+. The meter should be 0-1000 ma. Do not yet whistle into the mike or apply the a.f. oscillator signal.

Now apply power to the final tube—a 10 watt 110 volt bulb being used for the load on L_5. Adjust L_5 and the loading capacitor for maximum bulb brilliance. Check final grid current again and touch up L_1, L_3 and L_4 in order. Next, balance pots R_1 and R_2 for *no* brilliance on the output bulb; this indicates carrier suppression.

A 0-1 milliameter to read 0-100 ma (with the proper shunt) in conjunction with a two deck three position midget switch was added to the Adapt-O-Citer to measure relative output, final plate and grid currents. Figure 4 shows the circuit. For simplicity it was not included in the main diagram.

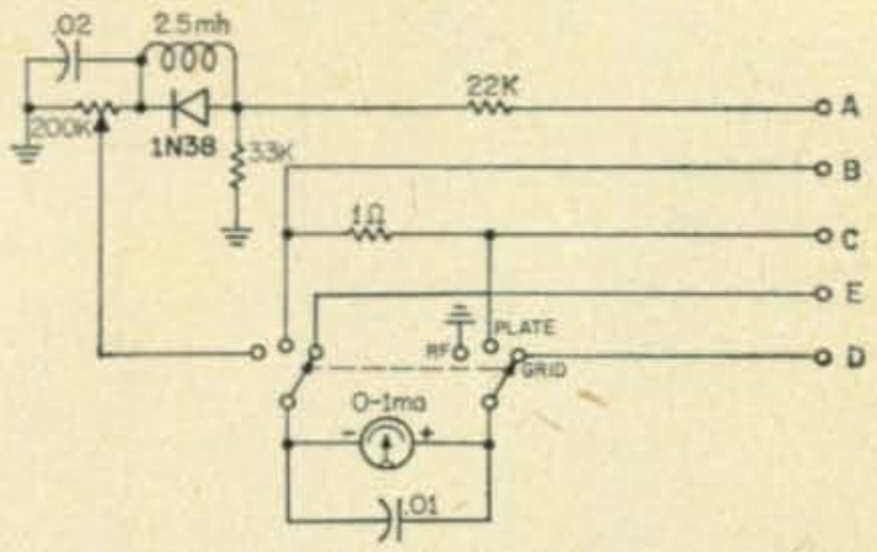


Fig. 4—Metering circuit for the "Adapt-O-Citer" for reading amplifier grid and plate currents and r.f. voltage output. Letter designations refer to connections in "Adapt-O-Citer" diagram in fig. 2.

Now apply the a.f. signal from an oscillator or whistle into the mike (Gradually increasing the gain); then carefully note the plate current peak reading (around 50 ma), the brilliance of the bulb or maximum indication on the relative output meter. You are ready to connect up the rig to the antenna or a small transmitter. Remember to put your transmitter on its c.w. position, unless you have provided an additional s.s.b. switch-over position.

A word at this point on converting transmitter finals to linear AB-1 operation: Remember that your screen voltage must be stabilized, and you must supply a good husky bias source. In the case of the 6146 this amounts to around 50 volts. For better dynamic stability of the power supply it is wise to add additional filter capacity. If you do not use the speech amplifier, modulator etc. of your transmitter frequently (because of s.s.b.), pull out the tubes.

Incidentally, transformer T_1 can be an output transformer from the ARC-5 surplus receiver.

Although this little rig will not surpass a crystal filter type rig or one using a phase shift network like B&W's 2Q4, it nevertheless works—and very well. Let us know how you make out. Good luck!

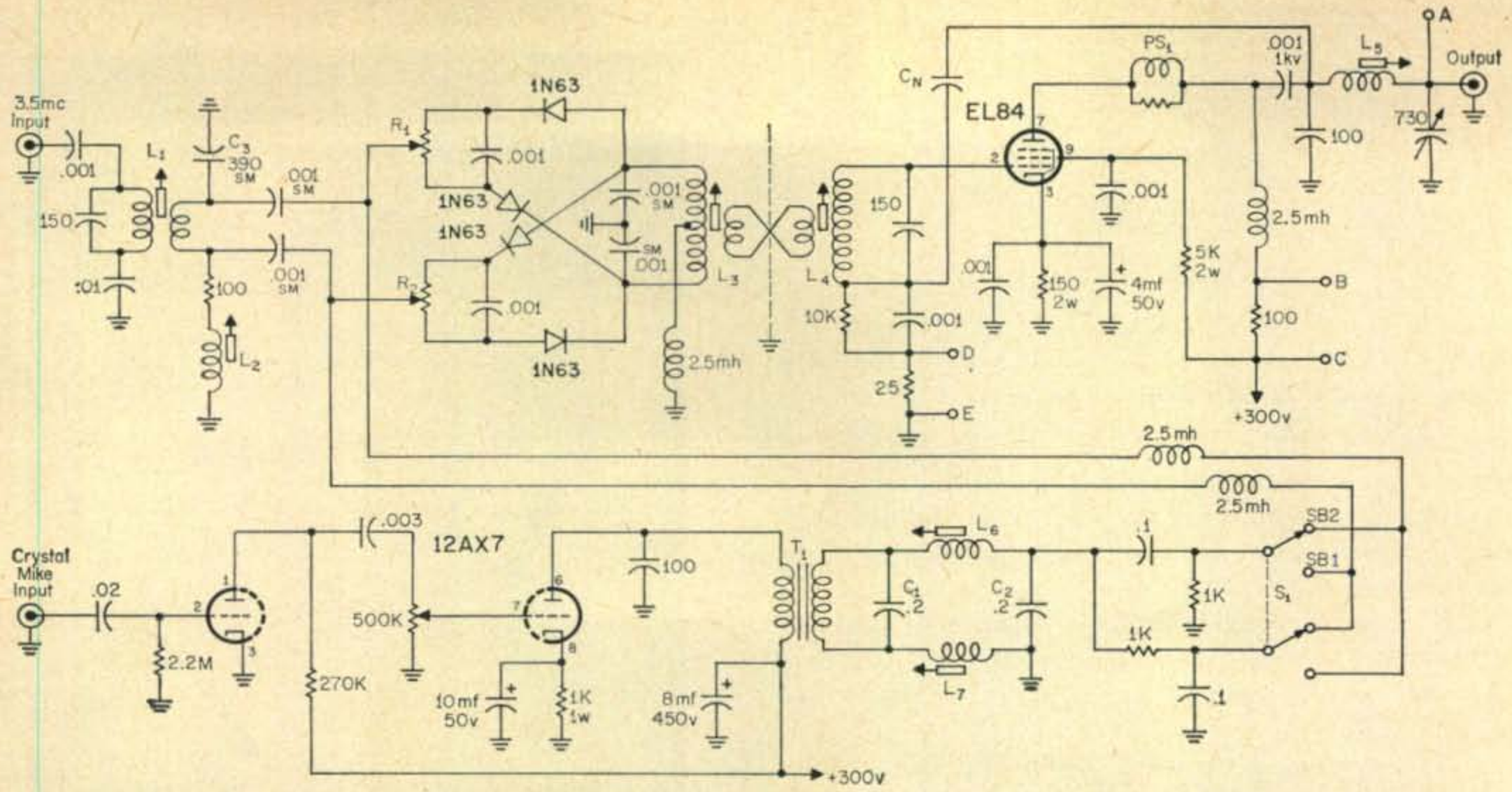


Fig. 2—Circuit of the "Adapt-O-Citer," a device suitable for use as a small, low power sideband exciter or an adapter enabling any small a.m. rig to be used for sideband in 75 meters. The lettered points are for connection to the metering circuit shown in fig. 4.

C_n—Neutralizing "gimmick." See text.

L_1, L_4, L_5—36 t. #30 e. with 7 turn #30 e. link at cold end of L_1 and L_4. Wound on XR-50 form. (No link on L_5).

L_2—15 t. #28 e. on XR-50.

L_3—18 t. #30 e. with 7 t. #30 e. link at cold end. Wound on XR-50 form.

L_6, L_7—26-35 mh TV width coil.

PS_1—Parasitic sup 25 t. #30 e. on 100 ohm 1 w. res.

R_1, R_2—1 K wirewound balance pots.

S_1—Sideband selection switch. D.p.d.t. toggle.

T_1—Plate to 500 ohm output transformer. See text.

barefooted the crystal oscillator circuit shown in figure 3 may be used and its output fed into L_3.

The balanced modulator uses high back resistance diodes; however, any good diode in the low price class can be used with success. Just make sure they are matched. Vacuum tube diodes like the 6AL5 may be substituted if desired.

Coupling between the modulator and the final is accomplished with link coupling, L_3 and L_4. Coil L_3 can be bifilar wound but this is not absolutely necessary. Make sure to shield coils L_1, L_3 and L_4. Final coil, L_5 can be shielded or not, but it should be placed so that minimum coupling exists between it and other coils in the rig.

A speech amplifier has been included in the little set, but actually the speech stages in any small transmitter may be used with a crystal mike as long as the speech filter composed of L_6, L_7 and C_1, C_2 is used. If the speech range is not restricted, suppression will be poor. The two simple s.s.b. rigs mentioned above use carbon mikes without a filter. This is ideal for mobile work, because a crystal mike can be damaged by excessive heat in a closed car during the summer.

The speech filter is adjusted to cut-off just below 2000 cycles, which will afford around 25 db suppression. You can go as low as 1300 cycles and still have somewhere near 30 db suppression with understandable voice quality.

To adjust the filter, obtain an a.f. oscillator and feed it into the mike amplifier (½ 12AX7). Connect a scope (vertical input) to the output of the filter. Merely adjust the slugs in L_6 and L_7 for minimum indication on the c.r.t. A pair of good headphones connected at the same junction and the coil slugs tuned for minimum signal is a rough way to do it, but it works. You can also connect a v.t.v.m. as an indicator of the minimum (cut-off) feed-through of 2000 cycles.

The r.f. phase shift network is very simple, but critical—unless you use a silver mica capacitor for C_3, and make L_2 resonate at the input frequency. The network in this rig is for 75 meter operation.

To put this rig on other bands, the values of C_3 and L_2 must be changed along with the other coil values. For more information on simple phase-shift systems, read the article by VE7QL (ex-ZL1AAX) in the Nov. 1959 issue of *CQ*, page 72.

The coil in the Adapt-O-Citer *R-L-C* phasing network is used to neutralize the effect of the load—the overall effect being a higher voltage across the network.

Sidebands are selected through switch S_1.

The final is operated in Class A utilizing a 6BQ5 or EL-84; a 6BQ6 can also be used.

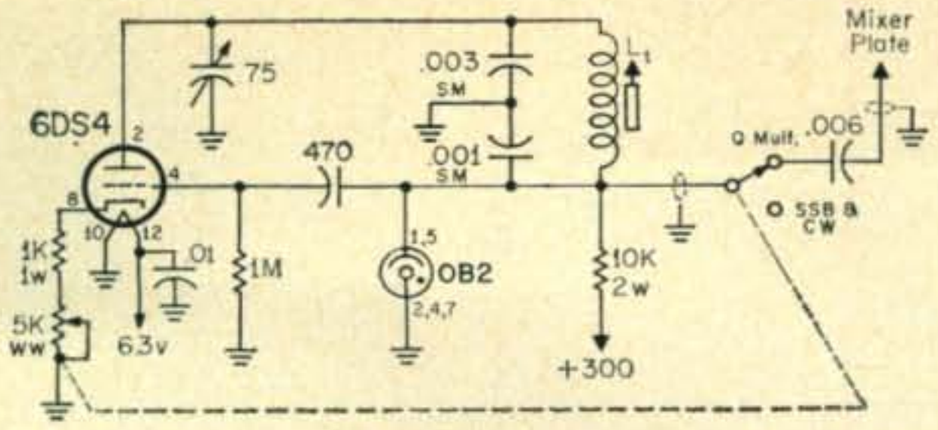


Fig. 1—Combination 455 kc b.f.o. and Q multiplier using a single 6DS4 Nuvistor. Inductor L_1 is an iron core coil, 140-160 μh.

mixer plate and enables c.w. or s.s.b. reception by b.f.o. action—the b.f.o. pitch being controlled by *C*, the variable tuning capacitor.

If enough stray coupling does not exist for b.f.o. action, (and this *can* happen), connect a small piece of wire (gimmick) to the top of the coil *L*, and place it near an i.f. stage grid.

To use this b.f.o.-QM on other frequencies the capacitors and/or coil may be changed as explained before.

After the installation of most QMs, the receiver i.f. will usually need a little "touch up" alignment. Your receiver instruction book gives the information on how to do this.

The Combo-B.F.O.-Q-Multiplier in use on a Peirson KE-93 receiver. the KE-93 has a 265 kc i.f., so the information in the preceding article was put to use for this installation.

The "Adapt-O-Citer"

JUDGING from the number of letters received asking for "a simple s.s.b. rig" or "an inexpensive s.s.b. adaptor," one is inclined to wonder if all a.m. hams would give s.s.b. a try if they could only do it easily and inexpensively. Getting a taste of this wonderful communications medium would probably convince them how effectively it works.

But to come up with something that will work and work well for less than $20.00 (as some of our readers expect us to do), is quite a task. You just can't even buy a worthwhile a.m. rig for that!

A real good s.s.b. rig must have effective carrier and sideband suppression, and getting this costs money. Yet try to make the average a.m. ham who is but mildly interested in s.s.b. realize it! Sure, he knows that most s.s.b. transmitters cost $400 or more, but he first wants something to convince him that the expense is warranted.

So—inspired by two articles on very simple s.s.b. rigs (*Western Radio Amateur*, Feb.-Mar. 1962, and *Sidebander*, Feb. 1962), I decided to cook up an exciter-adaptor with which the avid a.m.'er could at least find out what makes s.s.b. tick.

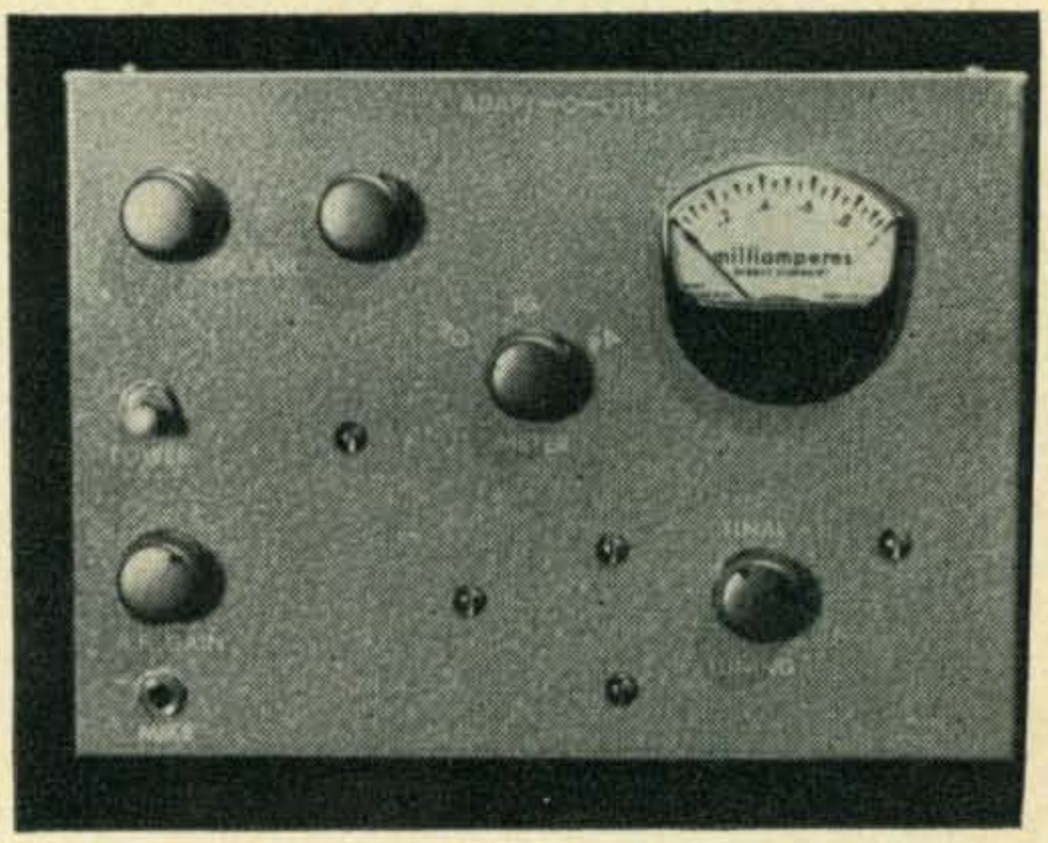
I came up with a rig which can be used barefooted for local 80 meter rag chews or as an adaptor for using small transmitters like the DX-40, Eico 720, Ranger, T-60, etc. The result is described here and I call it the "Adapt-O-Citer."

With the parts most hams have on hand, this little rig can be built for less than $20.00 and really puts out a respectable and clear signal.

Circuitry

The circuit of the Adapt-O-Citer shown in figure 2 is truly simple.

When used as an adaptor, r.f. excitation is furnished by the transmitter final driver stage and is fed into L_3. When the unit is used



Front view of the "Adapt-O-Citer" showing panel layout. Balance pots and R_1 and R_2 are at the upper left with sideband selector switch below. At the lower left are the audio gain control and mike connector. The final loading control can be seen below the meter.

Changing Q Multiplier Frequency

WHEN the *Q* multiplier (QM) was first mentioned in the Oct. 1953 issue of *CQ*, little did anyone think it would become as popular as it is today. Time and time again it has been added to an old receiver to better its selectivity with amazing results. However, those who tried to convert their 455 kc QMs to a lower or higher frequency often ran into trouble. They did not realize that in order for a QM to be effective the *overall* circuit must present a *Q* approaching 5000 when in regeneration.

The usual QM contains a slug tuned choke (or coil) of between 125 and 165 microhenries shunted by series capacitors—center grounded to minimize hand capacity. To change from 455 kc to a higher or lower frequency it is necessary to maintain coil *Q;* and this is sometimes hard to do.

As we know, we can change the resonance of any tuned circuit by merely changing either the values of capacitance or inductance in the proper ratio. We know that changes in frequency upward require fewer coil turns (less inductance) and/or less capacitance. The obverse is true here. If we wish to lower our frequency we must have more inductance and more capacity in the proper ratio if we are to maintain a respectable circuit Q.

Now what is *Q* anyway? It is simply the factor of merit applied to either a capacitance or inductance. This factor is expressed as the ratio of the reactance to the total resistance. When we have a high *Q* we generally have a condition of very sharp resonance. The formula for *Q* is:

$$Q = \frac{2\,f\,L}{R}$$

f being frequency, *L* inductance and *R* the total resistance.

The tuned circuit used in an average QM without regeneration has a *Q* of around 200 at 455 kc; but with regeneration the *Q* can go over 4000.

Some hams have changed the operating frequencies of their QMs merely by putting in another coil of proper inductance and leaving the parallel capacity as is. Others have modified the coil (by taking off turns) and changing the capacitance. But no matter how it is done, the capacity ratio (usually three to one) must be maintained.

In every *Q* multiplier there is stray capacity which amounts to as much as 40 mmf, and this must be taken into consideration when changing capacitance to affect a frequency change.

The parallel capacitance (across the coil) must resonate the coil at the receiver i.f.—this resonance being obtained with the variable tuning capacitor meshed at 50%.

So when figuring the amount of capacity needed for resonance at the receiver i.f., use the following formula:

$$C \text{ (Circuit capacitance)} = \frac{C_1 \times C_2}{C_1 + C_2}$$

For example, referring to the circuit of the Combo-BFO-QM in figure 1 (which will be described later), we would have:

$$C = \frac{(1000 + 37.5) \times 3000}{(1000 + 37.5) + 3000} + 40$$

Note that we have taken ½ of 75 mmf = 37.5 mmf and we have added the stray capacity of 40 mmf. For 455 kc, we can figure that around 145 microhenries will resonate with about 800 mmf or so. As long as the capacitance ratio is maintained at 3 to 1 you will encounter little trouble.

For those of you with receivers having 1600 kc i.f.s and owning 455 kc Heath QMs, you can try replacing the 1100 mmf and 3300 mmf capacitors with around 250 mmf and 850 mmf respectively. But it is even better to change the coil to one which will resonate with around 350 and 900 mmfs to get the *Q* needed.

The Combo-B.F.O.-Q-Multiplier

FIGURE 1 shows the diagram of a very good combination beat frequency oscillator (b.f.o.) and *Q* multiplier. It is very simple and uses one of the new Nuvistor series tubes, the 6DS4.

The voltage for the b.f.o.-QM can be taken from nearly any h.v. point in any receiver. Although an 0B2 regulator is included (for better stability in receiving s.s.b.), the unit works very well without the regulated voltage.

The output capacitor (.006 mf) should be connected directly to the receiver mixer plate. There is enough stray capacity for oscillator coupling at the i.f.

Make sure that the unit is housed in a metal cabinet or box and that the *unit ground* is also *receiver ground*

In operation, for QM action, merely flip the switch on the pot to the closed position, thus connecting the output to the mixer plate. Variable capacitor *C* enables one to tune through the receiver band-pass. Selectivity is controlled by turning *R* the 5K ohm pot which controls the gain of the 6DS4. In the S.S.B.-C.W. position, the switch disconnects the unit from the

a *confidential* manner and no names or calls are used in the column except to give the credit you deserve for helping other fellow hams.

Popular Articles

Following is a list of some of the most popular articles on which we receive the greatest amount of mail. Consult the "back issues for sale" ad in this issue to see if the copy you are seeking is still available.

ANTENNAS, TOWERS, TRANSMISSION LINES

Prop Pitch Rotator ..... Apr. 50, p. 11
TR-4 Rotator Improved ..... Jul. 57, p. 60
Modifying Baluns ..... Dec. 59, p. 53
Prop Pitch Rotor ..... Jul. 59, p. 46
Multi-Band Trap Dipole ..... Jan. 58, p. 40
G4ZU Beam ..... Nov. 59, p. 66
Multi-Band Vertical ..... Sep. 59, p. 45

AUDIO AMPLIFIERS, MODULATION

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All questions pertaining to these and other articles (space precludes listing them all) which have appeared in past issues of *CQ* will be given prompt attention. Write first to the author, he may have some late information.

This month we feature Ham Clinic, written by Chuck Schauers, W4VZO. For 4 years, Chuck has brought to the pages of CQ *a lot of enjoyable and informative reading. But more, he has answered thousands of letters from readers seeking technical and non-technical help. His success in this endeavor is apparent by the large amount of mail he continues to receive each week.*

The service he renders is now known throughout the entire ham radio world. Manufacturers refer many letters from hams to him and have even adopted some of his technical innovations.

Although Chuck never professes to know all there is to know about ham radio, he does manage to come up with most of the answers. Because he must do a lot of digging for information his research is a continuing education, his efforts being reflected by his monthly writing.

Since 1930 he has been "up to his ears" in radio and possesses, along with his Extra Class ham license, commercial phone and telegraph tickets with radar endorsement and a CB license. His writing has appeared in nearly every ham and radio-electronics magazine, including the IRE transactions. He is a member of the ARRL, REF, RSGB, SARA, IRE, AFCEA, SMPTE and other technical societies.

He has received an ARRL Public Service Award and the French R.E.F.'s Bronze Medal of Merit.

Chuck's aim is to interest more young people in ham radio. To this end, he encourages all hams-to-be to bring their problems to him.

CHARLES J. SCHAUERS, W4VZO
c/o CQ, 300 WEST 43rd ST.,
NEW YORK 36, N. Y.

ham clinic

For more than 4 years now, HAM CLINIC has helped thousands of radio amateurs with their technical and nontechnical problems. Mail pours in daily—and includes letters from virtually every country in the world which permits ham radio operation.

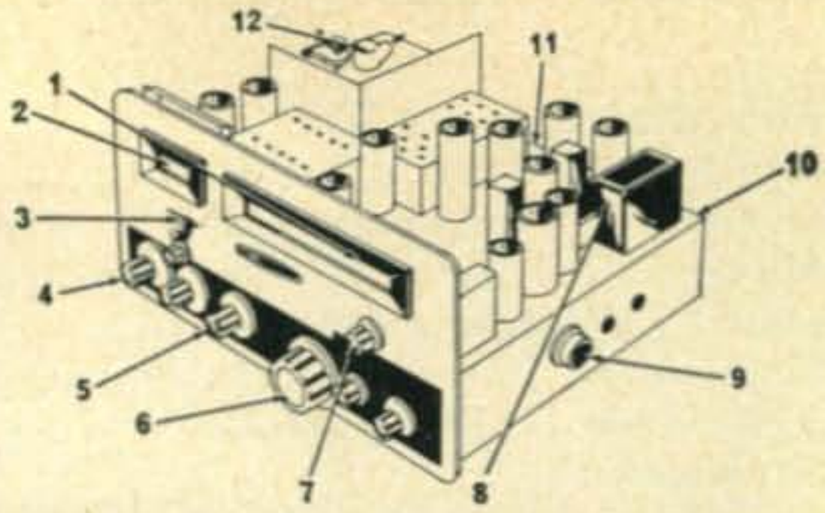
We are quite proud of our record in answering all communications directed to us. However, we have received questions which we could not answer. We are, after all, only human and cannot *always* have the answer to every question. If we did, we'd certainly charge a big consulting fee! But the advice and service provided by HAM CLINIC have always been free—and will remain free.

Some of the letters received have been real "beauts!" I remember one containing 21 questions—and with the narrative it ran to fourteen pages! Then there was the irate lady(?) who wrote—lambasting *CQ* for keeping her OM so interested in ham radio. (Yes, there have been a few "unprintables" too!)

Generally, though, the ham who writes to HAM CLINIC is the sincere chap who needs help. Since the demise of the SURPLUS column we receive increasing amounts of mail on surplus—especially conversions. We admit that our surplus files are not yet as complete as we would like to have them, but we do our best to help people still interested in utilizing surplus gear.

In quite a large number of letters we are asked to dig up information on articles which have appeared in past issues of *CQ*. Some of the issues involved go back beyond 1950 and are not available from the *CQ* office. These require some library research. The best way to get an old issue of *CQ* is to advertise for it in the *CQ* HAM SHOP (Classified Ad section) at 5¢ per word. Offering $1.50 will usually get you the old copy you want.

For those of you who have never written to HAM CLINIC for information or are newcomers, please remember the following points: confine your letter or card to one question—this will enable us to give speedy service. Letters containing self-addressed stamped envelopes receive *first* consideration. Do not expect us to design *whole* circuits to your order—time does not permit this. If you write again about a previous question, DO restate the background on it *briefly*—we simply do not have enough file space for correspondence. *Do not* send *CQ* subscriptions nor ads to HAM CLINIC; this flatters us, but detracts from our available time. Your question can be anything on ham radio—we do no *commercial* consulting! If you send us a technical tip or hint let us know that it is *exclusively* for HAM CLINIC publication. Finally, if you have a legitimate gripe, send it *directly* to HAM CLINIC—we'll try to help or pacify you. All correspondence is treated in



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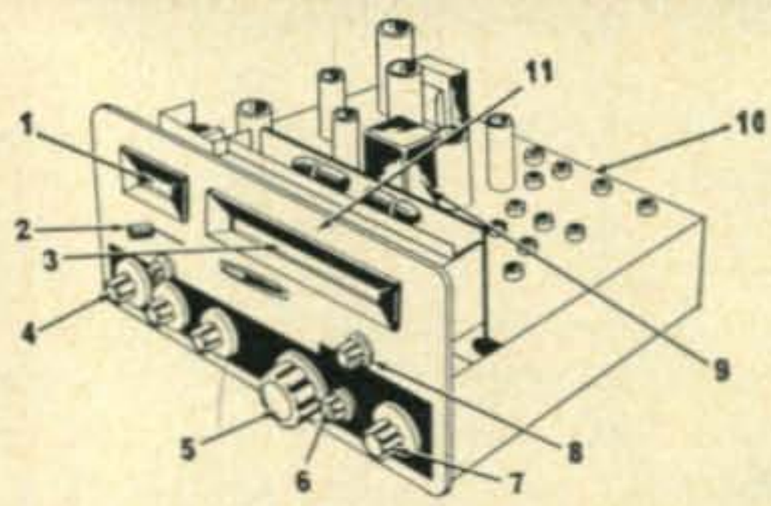

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For further information, check number 21, on page 128


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For further information, check number 20, on page 128

50 Mc Propagation Effects; Mid-Point Report On A Six-Year DX Study

BY MORGAN MONROE*, K7ALE and DOROTHY MONROE*, K7ALF

The following report, based on 6 meter observations made almost continuously during the past three years, identifies daily, seasonal and sunspot cycle trends in DX propagation on this band. Aside from its practical importance to radio amateurs, especially during the present period of low sunspot activity, the report has considerable scientific value. Reporting on the progress of one of the most comprehensive, long-term propagation studies ever undertaken on 6 meters, it sheds new light on the propagation of v.h.f. signals over considerable distances by means of ionospheric reflection, a subject which fascinates, and often baffles, scientists and communication engineers. Undertaken entirely by radio amateurs (in this case a husband-wife team), using regular amateur radio equipment, the study and accompanying report is another example of the important role amateur radio plays in the field of scientific experimentation and research.

THE tremendous growth of v.h.f. activity in recent years is perhaps the most striking demonstration of widespread interest in the history of amateur radio. This expansion has brought thousands of new enthusiasts into the hobby; but that's not the only gain. The lure of exploring formerly unknown regions of the amateur spectrum has even encouraged a number of jaded oldtimers to return to the air on v.h.f. bands.

Despite this great interest, few v.h.f. operators, new or old, appear to recognize a significant challenge which could make their activities even more absorbing and worthwhile. The challenge is this:

Much research remains to be done on all v.h.f. bands before our knowledge of their use and potentialities begins to compare with amateur understanding of frequencies below 30 mc. In no area of v.h.f. activity is this more apparent and seemingly less recognized than in the puzzling, often frustrating, but never dull riddle of v.h.f. propagation and its effects on amateur communication.

At present, for example, neither sporadic-*E* nor tropospheric propagation phenomena are satisfactorily explained by any existing scientific theory. Yet these two propagation forms produce most of the v.h.f. "band openings" in years between sunspot-cycle peaks.

Challenges associated with such unknowns attracted us originally to the v.h.f. region of amateur radio and particularly to the 50-54 mc band. At one time or another six meters offers every condition found on the jammed-up lower frequencies plus some fascinating anomalies peculiarly identified with 50 mc operation.

*Route 6, Box 273-A, Tucson, Arizona.

Purpose Of Study

This report is a summary of findings recorded during the initial 37 months of a 74-month investigation of 50 mc propagation effects. The study is being conducted under what might be termed average amateur operating conditions. It represents an effort to gain accurate, long-term information that may aid us and other v.h.f. operators in better understanding and exploiting propagation phenomena about which comparatively little is known at present.

Considerations that have shaped the course of our study are:

1. Desire to learn how the 50 mc band is generally affected by the decline in solar activity from the record-breaking maximum of 1958, including determination of the percentage relationships of "open" time and days-to-total and monitored-time and days during the decline.

2. An effort to determine and record accurately the number, duration, and path direction of 50 mc band openings via both F_2 and "short skip" types of propagation from a fixed location during declining years of the present cycle.

3. Desire to determine the geographical distribution of 50 mc DX opportunities by season, number, time of day, path direction, and duration, *using only low-powered transmitters and types of receiving and antenna equipment available to all v.h.f. enthusiasts.*

4. An attempt to determine what, if any, relationship exists between declining solar activity and the number, duration, and geographical distribution of 50 mc sporadic *E* (E_s)

TABLE A

COMPARATIVE SUMMARY
(Nov. 1, 1958 — Jan. 1, 1962)

	1958 (2 Mos.)	*1959* (11 Mos.)	*1960* (12 Mos.)	*1961* (12 Mos.)	*Period* Totals
No. Monitored days	61	335	366	365	1,127
No. Days band opened	45	99	126	101	371
No. Band openings	70	121	169	140	500
Total minutes band open	6,167	14,797	16,326	21,316	58,606
Avg. duration of openings (minutes)	88.1	122.3	96.6	152.3	117.2
% Open to monitored time	11.23	4.90	4.96	6.49	5.78
% Open to total time	7.02	3.07	3.08	4.06	3.61
% Open to monitored days	73.77	29.55	34.43	27.67	32.92
No. States heard/worked	19	42	30	46	50
No. Foreign prefixes heard/worked	18	11	15	7	36

band openings.

Our study began November 1, 1958 and will continue until early 1965, when the present sunspot cycle is expected to reach its lowest point. The initial phase of investigation was completed January 1, 1962 (the intervening one-month gap is explained elsewhere).

The first five months of study took place from Phoenix, Arizona. Since May 1, 1959 the investigation has been continued from a location near Tucson, Arizona, at latitude 32° 20′ 34″ N, longitude 110° 59′ 21″ W. This station site, at an elevation above mean sea level of 2,485 feet (757.42 meters), is 100 statute miles (160.9 kilometers) southeast of the original study site and 70 miles (112.7 kilometers) north of the Arizona-Mexico boundary.

Major Findings

During the initial phase of study we have observed many interesting and some puzzling things about 50 mc propagation effects under amateur operating conditions. Perhaps the most significant fact established to date is that the six meter band opened between south-central Arizona and regions *outside* the continental United States during 27 of the 37 months. This represents available *foreign* DX opportunities in 73 per cent of the total study months (Table C).

Our records indicate that the band was open at some time within a 15 hour daily monitoring period 371 of the 1,127 monitored days. This represents available 50 mc DX in 32.92 per cent of the total study days (Table A and fig. 1).

These figures are considerably higher than some propagation authorities appear to believe possible in 37 declining sunspot-cycle months. Our findings suggest that a substantial discrepancy may exist between presently postulated v.h.f. propagation theory and recorded 50 mc operational results. There appears reason to believe that this discrepancy may be greater than some of us have long suspected.

A total of 500 band openings was recorded during the 371 days in which openings were observed, an average of 1.35 openings per day of opening (Table A and fig. 2). The band was open a total of 58,606 minutes (976.7 hours) during the initial phase of study. Thus the average duration of openings was 117.2 minutes (Table A and fig. 4).

E_s Uptrend

A finding of particular interest, because very little is known about what causes E_s propagation, indicates that in the early years of the present sunspot cycle decline the number of summer E_s band openings *increased* substantially while F_2 openings continued to decrease each year at approximately the anticipated rate. A marked *increasing* trend also is apparent in the number of days the band opened, in number of openings, in percentage of open-to-total days, in percentage of open-to-total time, and in average duration of summer E_s openings (Table D and figs. 1 through 4).

It appears significant that the 447.2 minute peak in average duration of openings (fig. 4) was recorded in May, 1961, more than three years after the March, 1958 sunspot peak. Equally significant is the fact that more states were heard and worked during the 1961 summer E_s season than in any comparable period of time (Tables B and D). Also, the number of foreign prefixes heard/worked during the same season was twice the 1959 summer E_s total and three times greater than in the comparable 1960 season (Tables C and D).

Experienced 50 mc operators in the United States generally agree that the 1961 summer E_s season topped anything observed previously in an equal period of time. At the study site, 89 band openings were worked in the 73 day period between May 20 and August 1. Reports from others indicate that conditions were even better in some areas of the nation.

Thus it appears, at least in terms of the present sunspot cycle, that either there is no relationship or else an *inverse* one between sunspot peaks and 50 mc E_s propagation peaks. The no-relationship possibility has been pointed out by a number of propagation authorities. The inverse relationship suggested by Table D, figs. 1 through 4, and by the experience of many other v.h.f. operators, raises a challenging question that warrants long-term study by all interested amateurs.

A puzzling anomaly in the opposite direc-

[1]No data recorded in April, 1959 (See Text).

State	1958		1959												1960												1961									
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Ala.									1																						2	1				1		
Alaska			1	1																																	
Ark.	3							4	2					1																	2	2	2			1		
Cal.	2			2			2	4	7	5			2	2	2	1			3	5	9	6		1	3	6	1			3	4	8	12	3		1		3
Colo.								3	1	1			2					1	2	2	5	1				1	2				3	7	6	2				
Conn.	11																															1						
Del.																																3	5					
Fla.								5	4					2						1		1				1						4	5					
Ga.									1												1											2	1					
Haw.													2		1																							
Idaho								2	1	1								1	2	1	1				1		1					3	2	1				
*Ill.	2								1				1																									
*Ind.								1	1																						1	1	2					
Iowa			1				1	2	2	2				1					1	1		1					1				2	5	2					
Kas.	3		1				1	2	2				1	2						4							1				4	8	2	1		1		
Ky.									1																						1	1	2					
La.	2	1			1		2	2	6					1	1	1		1	2	6	1			1			1				2	6	8			1	1	1
Me.	20	6	1																													1						
Md.																																2	2					
Mass.	19	6	2	1									1																		1	5	1					
Mich.									1											1												3						
Minn.								5	2		1							1		1	2										2	6	4					
Miss.								1	2					1																		2						
Mo.	3		1				1	2	3					3						2						1	2				3	7	6	2				
Mont.								6	2	1	1				1				4	2	3				1	1	1		1		2	5						
Neb.			1					4	5	3			1	1				1	6	7	5	1				1	2				2	10	12	3	1	1		
Nev.								3	2	2					1				1	1	3	1									1	2	4					1
N.H.	13	2	1																													2					
N.J.	5	1	1																												2	5	4					
*N.M.																																	1					
N.Y.	5	2																													1	5						
N.C.	1	1							2						1																	2	1					
N.D.			1					1	3	1	1										5										1	5			1		
Ohio				2					1	1										1											2	2	5					
Okla.	2	1	3				1	2	5	3			2	2					3	6	3	2				1					4	9	9	3		1		
Ore.				2			1	7	7	4					1				4	12	8	5		2	1	1	2				2	9	9	3				
Pa.	3	1							1	1										2											1	3	3					
R.I.	13	2																														1						
*S.C.			1							1																						2						
S.D.								4	1	1	1								4	2	1	1							1		2	7	5	1		1		
*Tenn.									2	1				1					1	1	2										1	3						
Texas	7	5	5	2	2		2	8	10	5		2	3	3	2	2	2	7	12	18	13	8	1	4	8	10	6		2	1	8	20	16	2	2	7	5	3
Utah								1	1	1								1														1	1					
Vt.	7.	1																														1						
Va.		1	1	1					1										1	1												2	6					
Wash.				2			1	7	7	4					1				3	11	8	5		2	1		2				2	5	7	3				3
W.Va.									2											1											1	4						
*Wisc.			1					1	2	1									2												1	2						
Wyo.								2	3	2	1				1			1	1	3	5	1						1		1		2	5	6	1				
Total States Heard/ Worked	18	13	15	8	2	0	7	23	36	22	5	1	9	12	10	3	1	8	17	25	18	12	1	5	6	10	13	0	4	2	29	45	31	12	2	10	2	5

Table B—A listing of states heard or worked. The figures indicate the number of times the state was heard or worked for a given month. The states marked by asterisks were heard but not worked.

tion was failure of the 50 mc band to open at the study site during the entire month of February, 1961. This is the only month since the study began in which no opening was recorded (figs. 1 and 2).

Productive Paths

The geographical distribution of recorded openings has extended from Southern Rhodesia westward to Australia and from Alaska to Southern Argentina (Table C). The most productive paths have been those between 50 and 90 degrees (true) and between 300 and 340 degrees (fig. 6).

These bearings, centered on the station site a few miles northwest of Tucson, Arizona, encompass large areas of the U. S. eastern seaboard, midwest, southern and southwestern states, California, and the Pacific northwest. More domestic band openings have been recorded between the study site and Texas than for any other state. California, Oregon, and Washington, in that order, were runners-up (Table B). Canada topped all out-of-the-U. S. regions, with Argentina second (Table C).

As fig. 6 indicates, a large area of the world south and west of the study site is non-productive on six meters. This is a 90 degree quadrant of the southern Pacific Ocean extending approximately from the southwestern coast of South America to New Zealand.

There is little if any 50 mc activity in this large region although in spring and fall months it is frequently the apparent location of ionized layers which reflect six meter signals from several areas of the United States. Under such conditions we have worked phone stations in the midwest, Texas, and California on backscatter with the beam at 200 degrees. Signal strengths are almost invariably higher than would be expected under backscatter conditions.

The "Pacific gap" eliminates 25 per cent of the total possible DX-producing beam bearings at the study site. Therefore the station location

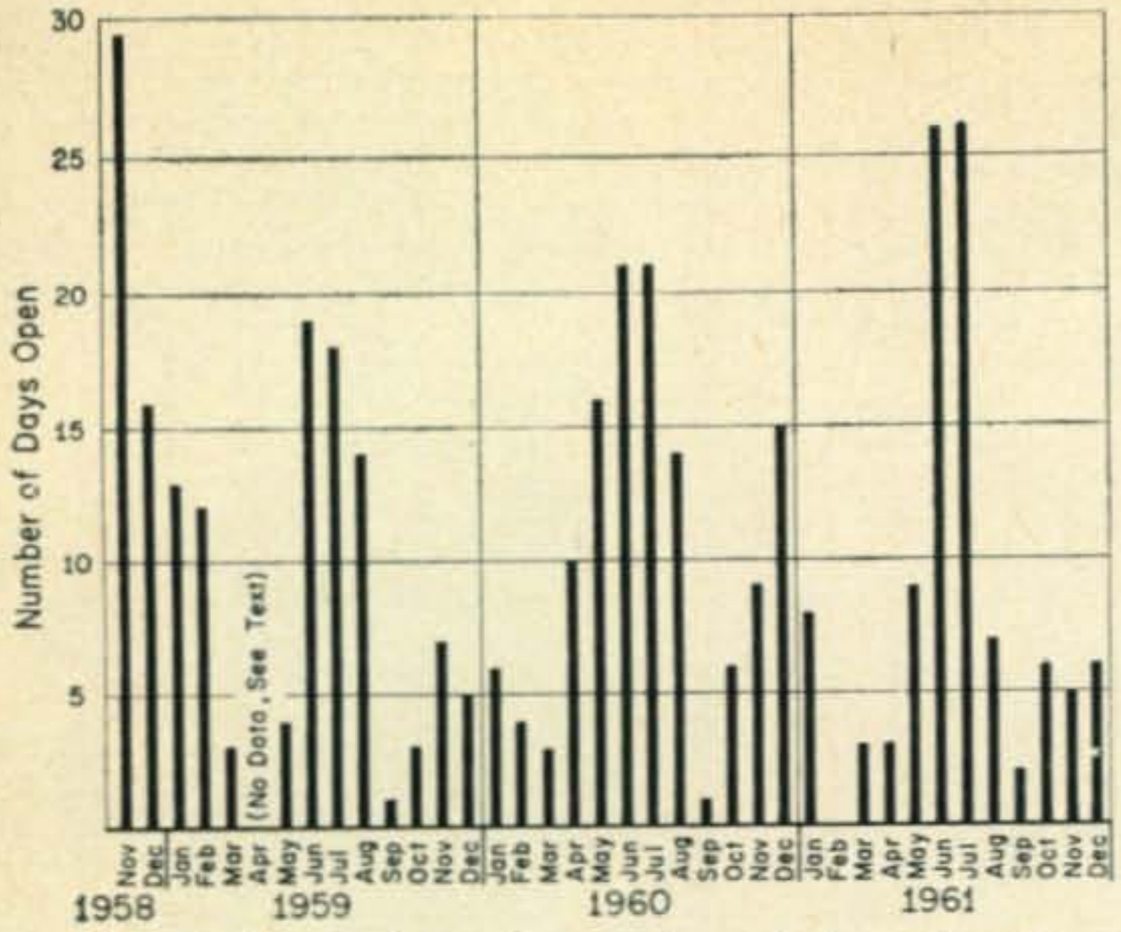

Fig. 1—Chart shows the number of days the 50 mc band was open from 1958 to 1961.

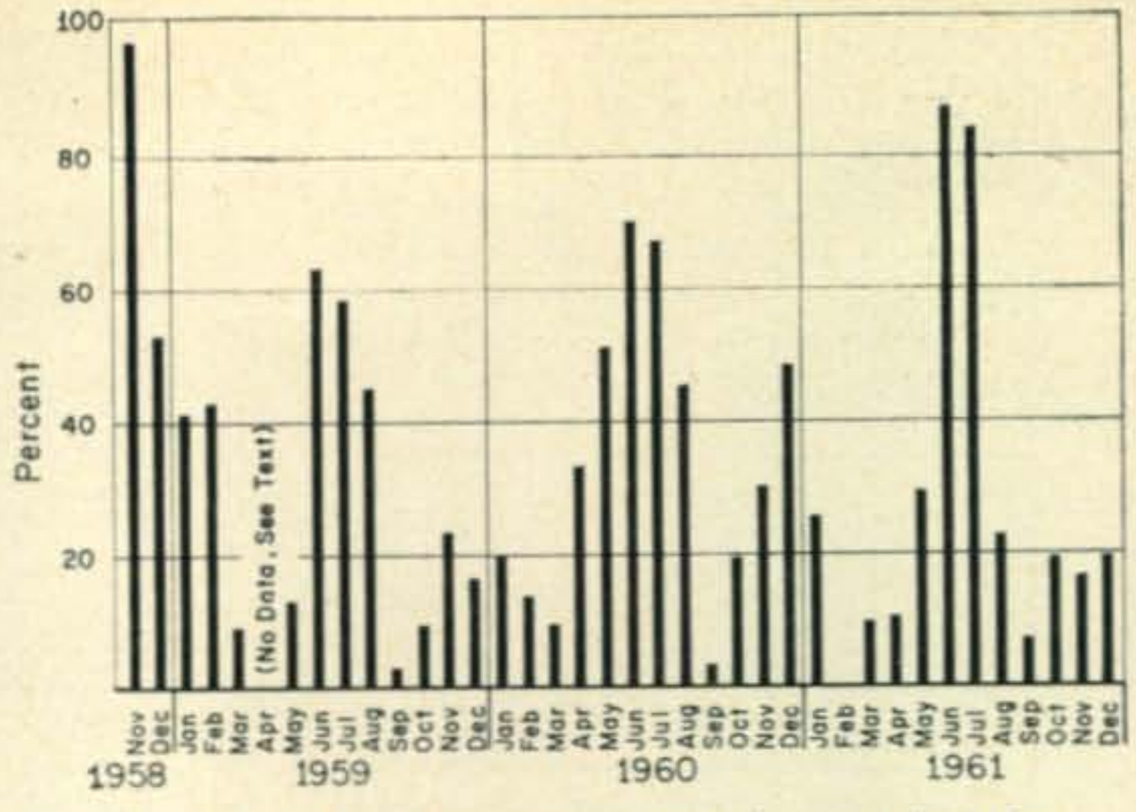

Fig. 3—Chart shows the percentage of open days for a 37-month period from 1958 to 1961.

may be considered below par in terms of directional potentiality.

In connection with lack of six meter activity in the South Pacific, we believe that a 50 mc DXpedition to Pitcairn Island at the right time of year might produce amazing results. Michael Czysch, LU3DCA of Buenos Aires, advises us that from his location certain areas in the West Indies in which there are no active six meter stations at present appear to be in the same "needs-trying" category.

When To Tune?

V.h.f. enthusiasts whose operating is limited largely to evening hours have been known to charge that others "catch all the DX while I'm at work!" This is not a very good argument at the study site.

Our initial phase of investigation indicates that more band openings begin between 0100 and 0400 GMT than in any other three-hour period of the day. These are evening hours throughout the United States.

The most productive daylight hour has been 1600 GMT. The least promising daily periods to tune for 50 mc DX have been 1400 and 2000 to 0000 GMT (fig. 5).

Percentage breakdown of openings by beginning times shows that 41.2 per cent of the total recorded began after 6 P.M. local time. Again,

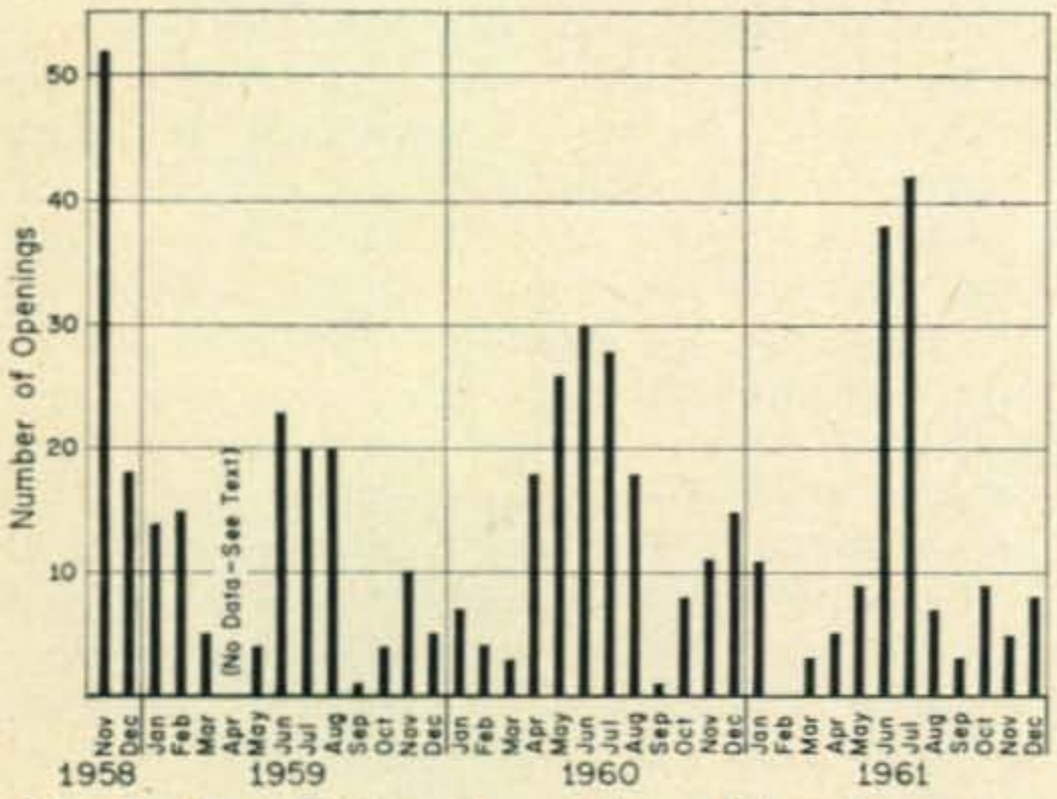

Fig. 2—Chart listing the number of band openings over a 37 month period, from 1958 to 1961.

here are 50 mc operational results which appear to disagree with propagation theory.

A great many of the openings recorded since the spring of 1959 have been via E_s propagation. As more than 41 per cent of all recorded openings, and the totals include the abundant morning F_2 openings of late 1958 and early 1959, *occurred during evening hours* at the study site, these findings are not in good agreement with propagation theory. As presently postulated, this states that E_s propagation may occur at any time but that it is essentially a daylight phenomenon peaking at or near midday. Clearly, there is considerably more 50 mc E_s DX available in evening hours, and less around midday, than theory suggests.

Equipment Used

The accompanying tables and charts contain most of the information we have recorded. They do not, however, indicate the equipment with which these data were acquired or the criteria controlling our investigation.

The antenna used throughout the study to date is a rotating commercially manufactured, 18 foot, eight element, Yagi-type beam, mounted 50 feet (15.24 meters) above ground in a suburban area. Transmission line, which is replaced at two-year intervals, is RG-8/U. Standing wave ratios do not exceed 1.4:1 and are in the range of unity to 1.2:1 most of the time. Computed antenna gain after line-loss deduction is 10.6 db at resonant frequency.

During the first five months of the study an unmodified Communicator III with a transmitter power of 7 watts was used for tranmitting and receiving. In times of heavy QRM the i.f. output of the Communicator was fed to a conventional communications receiver for greater selectivity.

Since May 1, 1959 an unmodified G-50 transceiver has been used exclusively for transmitting and receiving. With exception of a variable a.c. line voltage transformer, which controls all station equipment, and a standing wave ratio indicator of the reflectometer type, no accessory or special equipment is used in the study.

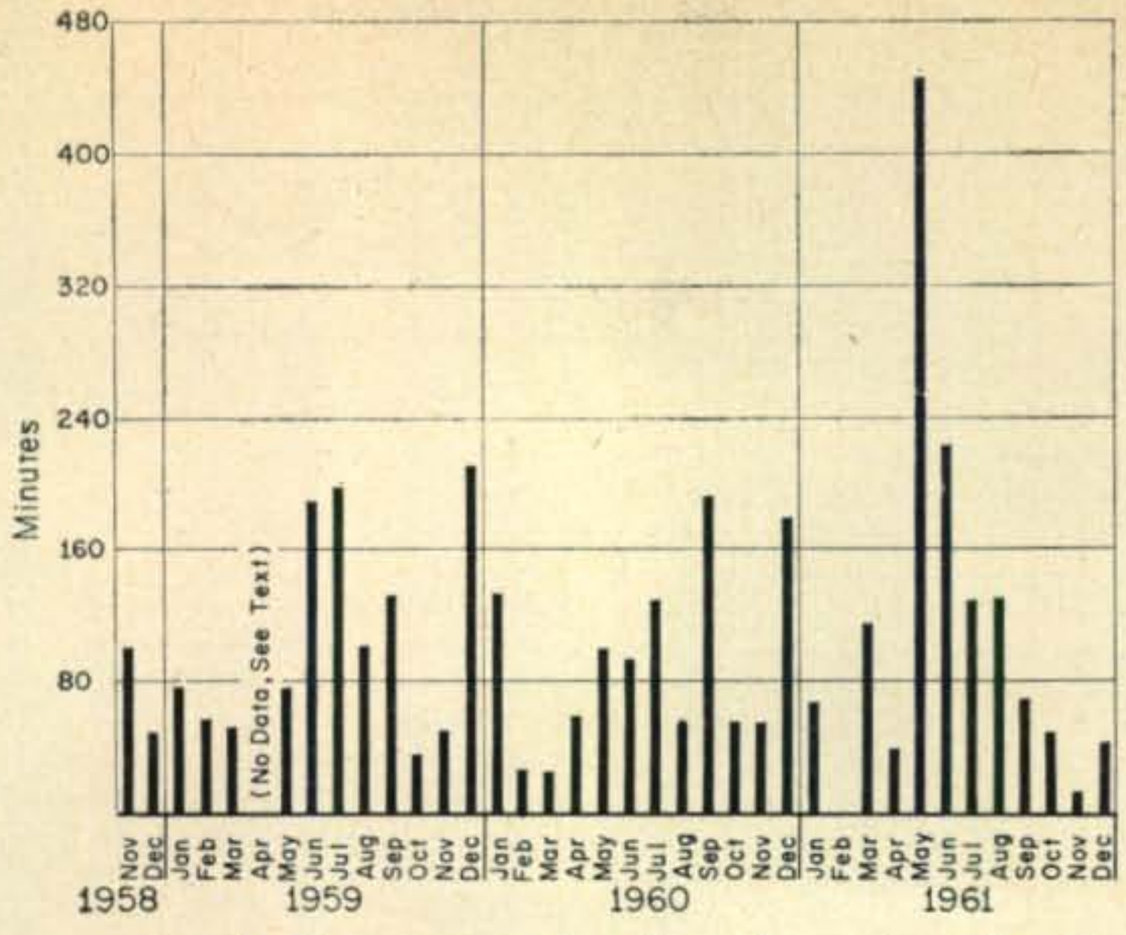

Fig. 4—The average duration of openings for the same period is shown in this chart.

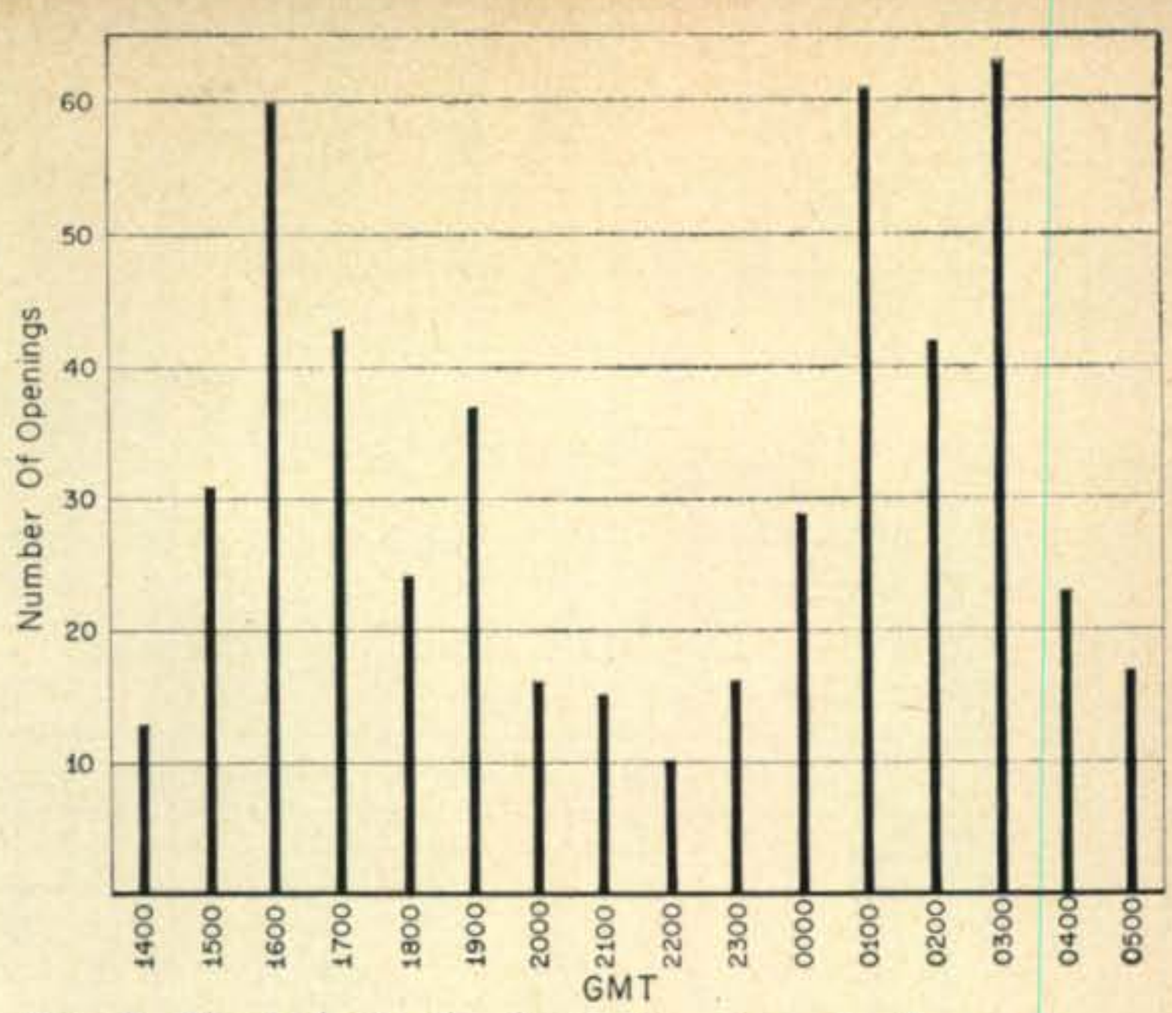

Fig. 5—Chart shows the beginning time, to the nearest hour, of the openings on the 50 mc band.

The purpose of employing such over-the-counter gear is to assure that study conditions simulate as closely as possible those found in the stations of many v.h.f. enthusiasts. "Amateur" investigations conducted with costly laboratory-type equipment do not offer the average v.h.f. operator a fair basis for comparison or evaluation of results. Nor does such out-of-reach gear encourage the amateur on a budget to conduct similar studies with simple, less costly equipment.

Study Criteria

Our investigation is conducted on the basis of 15 hours of 50 mc band monitoring and operation daily between the hours of 1400 and 0500 GMT. At times when the band remains open at 0500, monitoring and operation are continued until it closes.

For purposes of definition, an opening is considered to be any interval of five minutes or more in which identified 50 mc DX signals are received at the study site via any form of propagation except groundwave or meteor scatter. DX is defined as any identified six meter signal originating outside the 113,909-square-mile area of Arizona, which is considerably larger than the combined land areas of the five New England states and New York.

Duration of band openings is determined by the total elapsed time from reception of first to last identified DX signals. Timing is by synchronous electric clocks which are calibrated daily with WWV or WWVH.

A 30 day "hole" appears in the accompanying data during the month of April, 1959. This is due to moving the station from Phoenix to the Tucson area where, during that month, only a temporary antenna was in use while the regular tower and beam were being installed at the new location. To avoid the possibility of misleading findings, no study data were recorded in that month although several 50 mc openings were observed during the period.

Changing Conditions

A total of 500 six meter openings during 1,127 days of sunspot cycle decline may seem high to those who rarely tune 50 mc. Twenty-four-hour-per-day monitoring would, of course, produce an even higher total as the band does open before 1400 and after 0500 GMT, though infrequently. As monitoring is not regularly scheduled before and after these hours, some openings undoubtedly are missed in intervening hours. A round-the-clock total, plus those openings not recorded in April, 1959, would be greater than our findings indicate.

This should not be interpreted to mean that 50 mc propagation conditions will remain equally promising throughout the remainder of the sunspot cycle decline; they probably will not. The long range F_2 openings associated with the sunspot peak of 1958 continued to some extent into 1960. This F_2 "bonus" will not be present in the remaining period of decline, years in which only E_s and tropospheric forms of propagation are likely to offer 50 mc DX opportunities.

When our study is completed we shall prepare and publish a final report. This should indicate propagation-effects variation between the first and last periods of cycle decline at the study site.

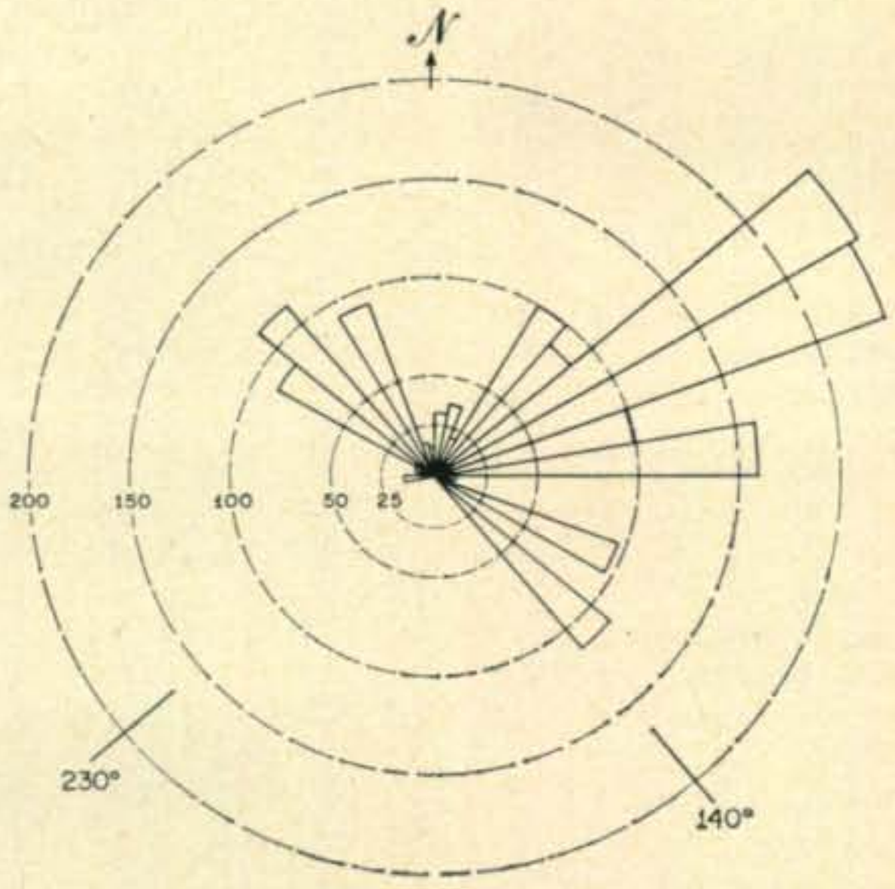

Fig. 6—Chart illustrating number of times states and/or prefixes heard/worked by path direction from Nov. 1, 1958 to Jan. 1 1962. See text.

Prefix	1958		1959												1960												1961											
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
V02	7																																					
*CT1	3																																					
*EI2	3	1																																				
KL7	7	3	(Alaska Became 49th. State Jan 3,1959– See Table B Thereafter)																																			
KH6	6	2		4	(Hawaii Became 50th. State Aug 21,1959– See Table B Thereafter)																																			
KP4	1			2	2																											2	2			1		
JA1	1																																					
JA3	1																																					
JA4	1			1																																		
JA5	2	1																																				
JA6	1																																					
JA7	1																																					
JA8	2																																					
*ZE2	1																																					
*KM6	1																																					
VE1	27	6	3	2																																		
VE2	3	1																																				
VE3	1																															1						
VE4								1																									1					
VE6																					2								1		1	2				1		
VE7								2													1																	
LU1																		1					2															
LU2																		2																				
LU3					1							1	1			1		3					2						1									
LU4					1								1					3	1			1	1	1													
LU5																1	2																					
LU7																		1																				
LU8					1																																	
LU9																		2																				
HC1					1							1	1				1												1									
XE1								2	2	1		1				1		2						1	4	4				1	4	1	1					
*VK3															1																							
*VK5															1																							
CX8																		1																				
*CE3																		1																				
*CO2																																						
Total Prefixes H/W	18	6	1	4	5	0	0	3	1	1	0	3	3	0	2	3	2	9	1	0	2	0	1	4	2	1	1	0	2	0	2	4	4	1	0	2	0	0

Table C—A listing of foreign prefixes heard or worked. The figures indicate the number of times the prefix was heard or worked. Those prefixes marked by asterisks were heard but not worked.

No "S-timates"

We have avoided any attempt to evaluate the quality of 50 mc DX in our findings despite the fact that quality varies widely, both by and within openings. There is no wholly objective method of measuring signal quality against a reliable standard under amateur operating conditions and within the limiting criteria of our investigation. For example, what would be considered a good double hop E_s signal by an experienced v.h.f. operator may be interpreted as a poor quality signal by one of less experience. The error factor introduced by S-meter readings is so great that such records are useless where objective information is sought.

TABLE D
COMPARATIVE SUMMER E_S SEASONS
May 16-Aug. 15

	1959	*1960*	*1961*	*3-Season Totals*
No. Monitored days	91	91	91	273
No. Days band opened	51	62	66	179
No. Band openings	63	89	94	246
Total minutes band open	10,157	9,556	18,785	38,498
Avg. duration of openings (minutes)	161.2	107.4	199.8	156.5
% Open to monitored time	12.40	11.67	22.94	15.67
% Open to total time	7.75	7.29	14.34	9.79
% Open to monitored days	56.04	68.13	72.53	65.57
No. States heard/worked	36	28	46	47
No. Foreign prefixes heard/worked	3	2	6	7

More Study Needed

We do not seek to "prove" anything with our study. We do, however, feel strongly that the need for better understanding of v.h.f. propagation and its effects on amateur operation demands the attention of all who refuse to confine their activity to local contacts. Of equal importance is the concurrent need for cooperative exchange of accurate amateur propagation-effects findings as they become available. That is the purpose of this report.

Findings summarized here make it apparent that there is an international need for cooperative, long-term study of v.h.f. propagation effects *under average amateur operating conditions.* A few v.h.f. operators who work DX consistently are aware of this need and are attempting to do something about it. But they are a very small percentage of the total required to create and maintain a continuing "pool" of accurate international data.

We hope this report may encourage v.h.f. enthusiasts elsewhere to undertake similar studies in their respective regions. If a repre-

[*Continued on page 118*]

A 20 Meter Tower-Mounted "Bird Cage"

BY FRED A. FARINET, JR.*, W8PYL

After closely examining the mechanical problems of the "Bird Cage" antenna, the author has come up with an excellent arrangement whereby he uses his tower for the main support. The rotor that drives the ten meter beam also drives the "Bird Cage".

THE death of 10 meters has caused some wrinkled brows at my QTH. When 10 died last time, I took a leave of absence from ham radio and became a more or less normal member of the household. This was rather enjoyed by the XYL who hadn't seen much of me for about four years. Wrinkled brows predominated this time since the XYL decided several years ago to "join 'em rather than fight' em" and consequently became K8ITF. An avid enthusiast, she had no intention of either of us taking a leave of absence from ham radio.

To meet the situation, I decided that something had to be done to put the station on 20 meters. G4ZU's article on the "Bird Cage"[1] was timely for me since I had been trying to determine how to manage a good antenna for 20, utilizing my present tower, with a minimum of constructional changes.

The tower at W8PYL is 40 feet high and consists of five triangular shaped 8 foot sections. The bottom cross section is approximately 18 inches and the top section approximately 6 inches (feels more like ½ inch when you're hanging up there). A dural mast 1½ inches in diameter extends 4 feet above the tower and supports a 10 meter three-element beam. The other end of the dural mast passes down through the tower and mates with the antenna rotator, within the tower, at about the 10 foot level.

To use the G4ZU method of "Bird Cage" support (¼ wave length of pipe), a section of dural would have had to been added to the existing dural mast and would have raised the 10 meter beam to approximately 21 feet above the tower and the "Bird Cage" completely above the tower. This method of supporting the "Bird Cage" and beam would undoubtedly have resulted in the loss of the entire system with the first high wind.

With this in mind, and the desire to utilize the tower for the principal support, it was decided to devise some form of construction that would permit rotation of the "Bird Cage" around the tower, require no guys, and leave the 10 meter beam intact at its present height.

Approximately one month was spent sketching, scrounging and scrutinizing before a reasonable design evolved. Two more weeks were spent in "making like a monkey" to complete the system.

This article was prepared to aid others in determining methods of "Bird Cage" construction and to indicate the results that can be ex-

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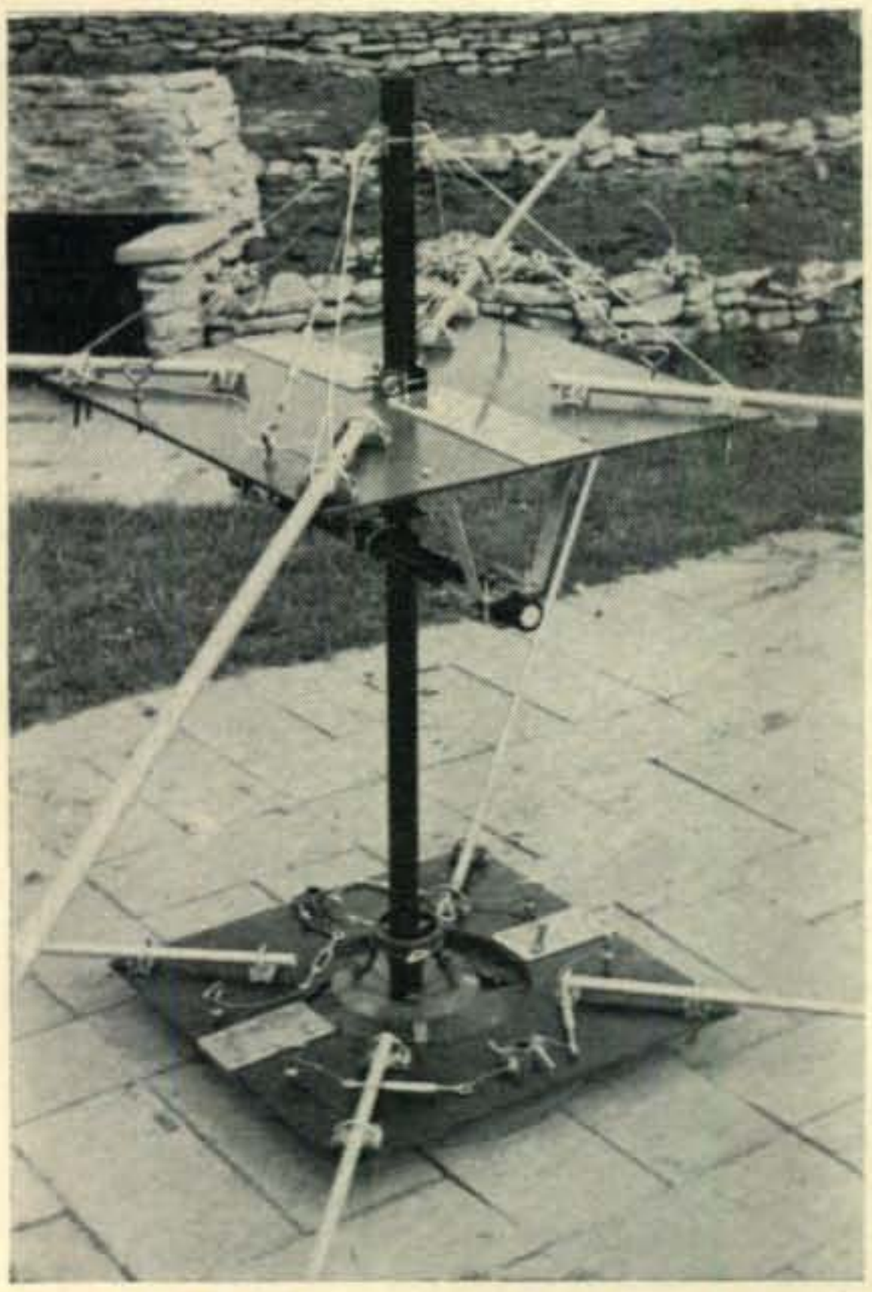


View of the Bird Cage mounted on the mast. The 10 meter antenna still rests above the new unit and both are driven by the rotor.

[1] Bird, D., "The G4ZU 'Bird Cage' Aerial", *CQ* 1960.

pected from such a system (for this service the writer expects only S9 reports from interested readers).

Preliminary Planning

Preliminary planning indicated that some type of platform for the top and approximately mid-point of the tower would be required. These platforms would support the top four elements and bottom four elements, respectively. The top platform could be placed around the dural mast above the tower and below the 10 meter beam. This platform would be secured to the dural mast in a manner which would allow it to rotate with the mast. The bottom platform could be placed around the tower, receive its support from the top platform supporting system and be free to rotate concentrically around the tower.

A clearance hole could be cut in the center of both platforms and both platforms slid down from the top of the tower after the ten meter beam was removed. Since I did not want to remove the 10 meter beam, each platform would have to be split and the two pieces of each platform rejoined on the tower.

The vertical wires of the "Bird Cage" were to be cut slightly longer than calculated and fastened to the top element ends. The bottom of these vertical wires would be fastened to the bottom elements and, by rotating the system so that each element end, in turn, would be within reach from the roof of the house. Tuning could be accomplished by changing the bottom platform's distance from the top platform and refastening the vertical antenna wires accordingly. A 52 ohm transmission line would be used to feed the driven element at the bottom platform and a 300 ohm ribbon stub used to tune the reflector.

Construction

This general plan was followed in constructing the "Bird Cage". Since few readers will have exactly the same set of problems and since commercially available hardware varies from one area to another, no attempt will be made to give the complete constructional details. However, enough detail is included to materially aid interested readers in constructing their own antenna.

Platforms

Tempered masonite ⅜ inch by 2 foot square is used for the platforms (the material most desired was plexiglass or its equivalent but the price of this material was found to be prohibitive). A circular hole to clear the dural mast is cut in the center of the top platform and a 12 inch hole is cut in the center of the bottom platform for tower clearance.

Eight strips of plastic approximately 3 inches wide and ⅜ inch thick join the platform halves. A series of holes were drilled in the plastic strips and matching holes drilled in the platforms. The platforms were split and then the

View of the upper and lower platforms supported by a Christmas tree stand. The large opening in the lower platform permits it to rotate around the mast. The bottom platform is split and secured with two pieces of plastic. The vertical supports are set into the two clamps on the bottom platform. Top view of the upper platform shows the elements mounted 90° apart and secured with U clamps. The two halves of the platform are also coupled with two strips of plastic.

plastic sheets were used, in "splint" fashion, to rejoin the platform halves.

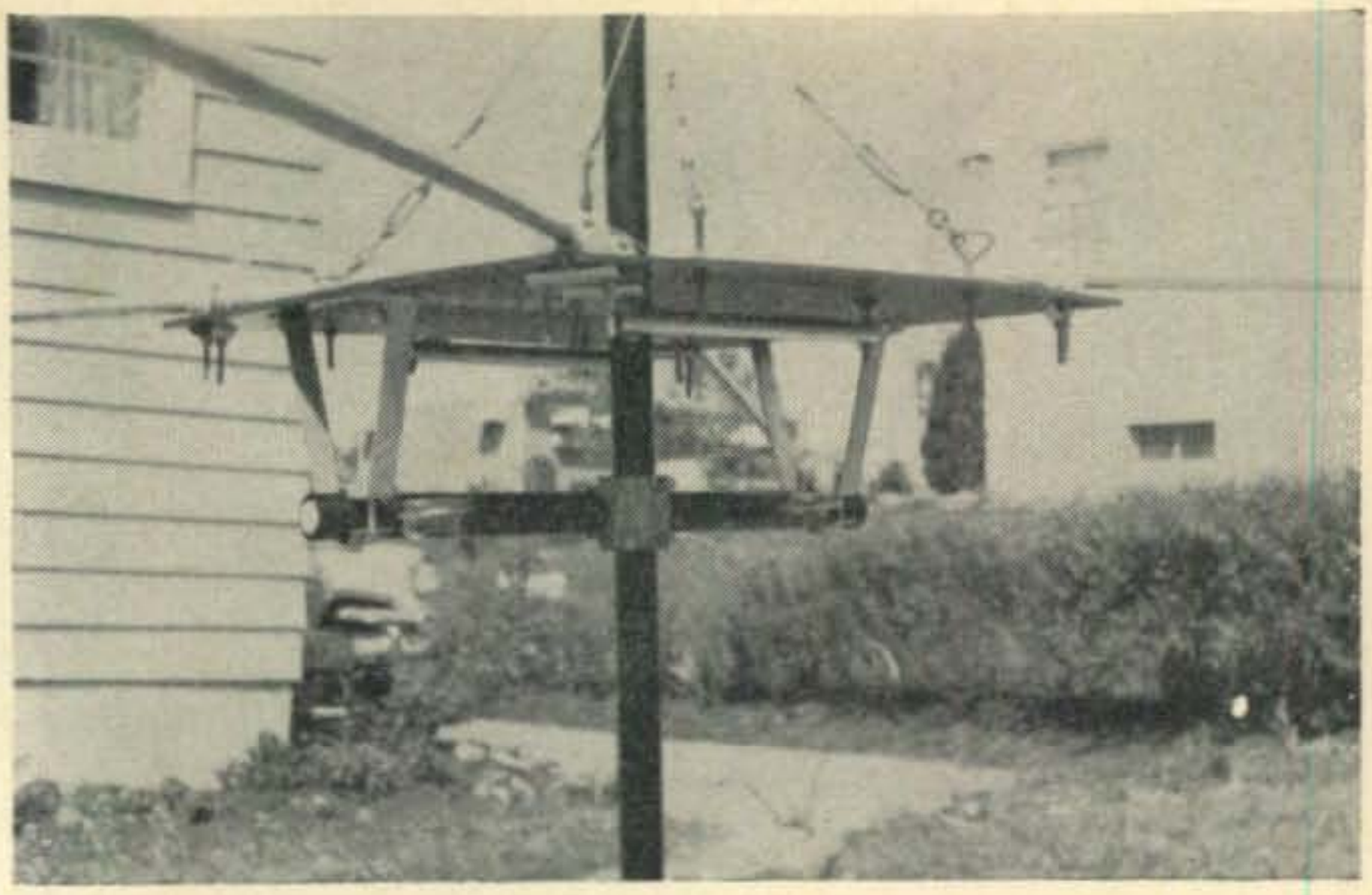
Elements

Dural tubing elements ¾ inch by 8.73 feet (length in accordance with G4ZU's formula for 14.1 mc) are mounted at each platform corner, 90 degrees apart. Two "U" clamps fasten each element to its proper platform. To maintain symmetry, the ends of opposing elements are separated by a distance greater than the 12" diameter hole of the bottom platform. A 16 inch separation was used to allow greater tower clearance.

Two pieces of ¾ inch tubing approximately 8 inches long, with holes drilled in each end and mounted on the underside of the top platform, strap the driven elements and the reflector elements together, respectively. Holes in the ends of each of these pieces of tubing are secured by the bolts of the "U" clamps. This same type of strapping is used on the bottom platform elements except for a break of about 1 inch at the center of the ¾ inch tubing to permit connection of the stub to the reflector elements, and the coaxial feedline to the driven elements. Copper ground straps are fastened to the ends of each element to be used as solder connections for the vertical wires.

Guying The Platforms

The top platform is supported from the mast



View of the underside of the upper platform. The platform is secured to the crossbar by a pair of TV stand-off mounts. Guys and turnbuckles supporting the top platform may be seen on top. The two U clamps on the crossbar are to clamp the vertical supports for the lower platform.

by 4 umbrella-type guys (approximately 18 inches long) and suported from beneath, by two "V" shaped 12 inch brackets (the type used to support TV masts alongside of a house). Eye bolts are used on the platform to secure the platform ends of the guys. Turnbuckles are used for each of the quys and a "Slip on" bracket attaches to the dural mast and terminates the opposite end of the umbrella type guys.

A 1½ inch by 2 foot piece of pipe, fastened at right angles to the dural mast beneath the top platform, serves the dual function of supporting the lower ends of the "V" brackets and the vertical "pendulum like" members which drop down to support the lower platform.

The lower platform is equipped with turnbuckles and guys in the same manner as the top platform. The guys are secured at their upper ends by attaching each pair to a "slip around" type guy-ring bracket placed on each of the two vertical "pendulum like." members.

A tour of the local junk yards turned-up 20′ × 2″ × ¾″ rectangular shaped aluminum tubing. Two of these were purchased and used for the "pendulum like" members of the platform support.

Clearance holes are cut in the lower platform to accommodate the lower ends of these "pendulum like" members. "U" prackets on the 2 foot pipe beneath the upper platform secure the "pendulum like" members to the top platform. Bolts should be placed through the "pendulum like" members on the ends to be clamped to insure that they will not slip from their "U" bolts at some later time.

All open ended tubing is plugged with corks to prevent water from entering and also to assure that the "Bird Cage" won't "whistle like a bird" during high winds.

During "mock up" of this system the XYL suggested the use of a piece of pipe supported by a Christmas tree stand to hold things in position. This suggestion proved to be a good one and is highly recommended for builders of "Bird Cages".

This description has hardly been exhaustive but the pictures show enough detail to allow the reader a good idea of the construction.

Assembly

The "mock up" is partially disassembled and the parts placed near the foot of the tower. One half of each of the platforms is removed from it's complimentary half. The plastic "splint" pieces were left in place on the other half of each platform and the underside support of the top platform was left intact. All elements are left in place. At the top of the tower, the "slip around" type guy-ring bracket is put into position on the dural mast. The half of the top platform with most of the hardware on it is hauled up first and set in place. The second half follows. The plastic "splint" pieces and umbrella type guys aid in the positioning of the platform until all bolts are secured.

The assembly of the remaining portions of the antenna are routine in nature and consequently will not be described. When everything is assembled, the rotator may be used to turn the antennas to check that their system rotates freely. The bottom platform should show no tendency to bind on the tower.

Environmental Tests

Nature voluntarily took over the task of environmentally testing the antenna almost as soon as the last bolt was secured. For over a week it rained! The temperature went up and down and the wind produced gusts of up to 60 m.p.h. The antenna withstood this beating despite one neighbor's prophesy that the whole thing would come down through the roof during the first high wind.

Tuning and Troubles

During short periods when the weather was changing tempo, a "grid dip" reading was obtained. Much to my dismay, this reading was 17 mc. Calculation indicated that approximately 15 feet (7.5 feet per vertical wire) of additional length was required to bring the antenna to resonance at 14.1 mc. Between the rain storms, 300 ohm ribbon stubs were added to the reflector and driven elements. The 52 ohm transmission line was connected directly across the

[*Continued on page 112*]

How to Receive QSL Confirmations

BY JOHN H. GRADY*, K4TUA

The techniques enumerated in this article have proven successful at K4TUA to secure QSL confirmations expeditiously and may assist other amateurs to earn WAS, WAZ, DXCC, WPX or any of the hundreds of available foreign awards.

THE 1958-1962 objective established by K4TUA in January 1958 was to be the first amateur station to work all prefixes in the world—whether it be WPX-700, 800, or 900 (depending on the future conversion or sub-division of presently known prefixes of DX countries) on 20 meters c.w.

The only officially recognized test of a successful QSO with any amateur station, whether DX or state-side, is a confirming QSL; therefore, every possible technique must be used to coax a QSL from the contacted station.

The procedure of forwarding a QSL after a QSO and expecting one in return, while successful during the 1920's, does not always hold true today. There is no panacea for the problem of timely deliveries of QSL confirmations. Often times, after employing all known techniques to secure QSLs and without success, you must subject the question of "How to get QSL confirmations" to the process of creative thinking in your attempt to arrive at a brand-new method of getting QSLs from badly needed, stubborn DX stations.

It must be realized that some DX stations work hundreds, and sometimes thousands, of W/K stations and are not thrilled to receive one of our QSLs, unless he happens to need your state for the WAS Award, so since the 1920's, W/K operators have devoted considerable time and expense to find the best method to secure QSL confirmations.

Generally speaking, many DX stations will not forward a QSL, either via their QSL Bureau or direct, until after receiving your QSL and sometimes not even then. The only known case when they positively will QSL, direct or through the QSL Bureau, after a QSO with you is when they need your state for the WAS Award.

During the past four years the trend in QSL confirmations has been changing, in some cases, in that certain USA and DX stations have become QSL managers for some of the DX stations and have assumed the responsibility for the distribution of the DX station QSLs. This greatly alleviates the difficulty and greatly reduces the time to secure QSLs and this procedure should be exploited to the fullest extent. Listings of QSL managers regularly appear under the DX sections of *CQ* and *QST*, as well as in DX club publications such as: *The DX Bulletin* published by the West Gulf DX Club, P. O. Box 450, Odessa, Texas; and the famous *DX Magazine* from Don Chesser, W4KVX, Burlington, Kentucky.

...NOT THRILLED...

Keeping a listing of the worldwide QSL managers current is of prime importance for quick returns of QSLs. The compilation currently maintained at K4TUA lists over 1200 QSL managers. Clif Evans, K6BX, Box 385, Bonita, California has recently published a listing of nearly 1000 QSL managers, now available at $1.25, and should be in every DX station.

The successful techniques used by the author to secure QSLs from DX stations are as follows:

1. The regular procedure of filling out a QSL is to affix a five cents U.S. postage stamp and forward to the DX station as soon as possible after the QSO.

2. Place a self-addressed envelope (s.a.e.), sufficient IRCs (International Reply Coupons,

*404 North Briarcliff Road, Warner Robins, Georgia

which can be purchased at your local Post Office at 15¢ each and are exchangeable in any country of the Universal Postal Union for a postage stamp or stamps representing the amount of postage for an ordinary single rate letter destined for a foreign country for return postage) whether for air or surface mail, and a filled in QSL in an oversize stamped envelope addressed to the DX station. Fill out the self-addressed envelope completely, with your QTH as well as that of the DX station, so the least amount of work will be required by the DX operator. Place a piece of waxed paper under the gummed flap of the self-addressed envelope to prevent the flap from adhering to the envelope under humid atmospheric conditions.

3. Place a self-addressed oversize envelope, $1.00 in cash, and a filled in QSL in an envelope addressed to the DX station.

4. Place a self-addressed oversize envelope, a blank special QSL (order from your QSL printer), sufficient IRCs for return postage, and your filled in QSL in an envelope addressed to the DX station. The blank special QSL will be used in case the DX station has no QSLs available. The DX operator will fill in his QTH, type of QSO, date, time, band used, your RST, sign it and forward to you in the self-addressed envelope after converting the IRCs for stamps of his country.

5. Place a self-addressed oversize envelope with sufficient IRCs, for return postage, accompanied by a small picture of your rig and yourself along with your filled in QSL in an envelope addressed to the DX station. This little personal touch has resulted in many QSL confirmations.

6. Mail a special printed International Reply Paid (IRP) double postal card to the DX station. Use of the IRP is provided under Section 2, Article 52 of the Universal Postal Convention. Using the IRPs, the W/K station fills in one-half of the card with the following information: DX station call, date, time, band used, type of QSO, RST, transmitter, receiver and antenna used; name and address of the W/K station and QTH of the DX station. Both (attached) postal cards are stamped with a 5¢ U.S. postage stamp and is forwarded to the DX station. Upon receipt, the DX station, in turn, fills in the W/K call, date, time, band used, type of QSO and RST of the W/K station. He, also, will list his transmitter, receiver and antenna used, sign his name, call letters and his QTH. He then separates the two postal cards and mails the Reply-Paid QSL portion to the W/K station. Preprinted IRPs are available from the Hart Industries, 467 Park, Birmingham, Michigan at a cost of $3.00 per 100. (*Note*: In the past, the use of IRPs have not proven 100% successful because some DX administrations are without knowledge of these cards and refuse to forward the Reply Paid portion without additional postage).

7. Have special QSL cards printed in the language of the DX station, fill in cards and either forward via 5¢ postage or include in a self-addressed envelope as noted above. QSL cards printed in the Russian language with your call letters may be purchased from the Polar Bear Radio Club (SWL SM3-3104), Solgardsgatan 15, Ornskoldsvik, Sweden at the rate of 60 cards for $2.00 (U.S. currency) or 120 cards for $4.00. These cards have been successfully used to get QSL confirmations from rare Russian stations within six weeks via the USSR QSL Bureau.

8. Place a self-addressed oversize envelope with sufficient IRCs, for return postage, along with a filled in QSL and a special letter requesting a QSL. Many types of letters appealing for a QSL can be composed. The following typewritten note is being currently used by K4TUA and is forwarded in all sincerity: "All W/K prefix amateurs consider a QSO with you to be the *Acme of Perfection* so your QSL is looked upon with much pride and a sense of great achievement. I, too, will greatly appreciate the early delivery of your QSL and am inclosing a self-addressed envelope and sufficient IRCs for Air Mail return to help reduce your high monthly postage stamp expense. Best DX es Vy 73."

9. In cases where a USA QSL manager exists, a self-addressed stamped envelope (s.a.s.e.) *must* be forwarded along with your filled in QSL card.

10. In the case of a DXpedition, place a self-addressed stamped envelope for USA QSL managers, or a self-addressed envelope for DX QSL managers, your filled in QSL and a $1.00 (if you care to assist the DXpedition) in an envelope and forward to the DXpedition QSL manager. Many DXpeditions are being made to rare countries by adventurous, enterprising amateurs from many countries with an objective of QSOing as many worldwide countries/prefixes as possible. Generally speaking, the present practice of most DXpeditions is to solicit voluntary contributions to help finance the cost of traveling to and from a rare DX location. Contributor's QSLs are generally answered first and the others are answered in due time, either direct or via the applicable W/K bureau. It has been emphatically stated by members of some DXpeditions that while contributions are solicited and appreciated they are not a prerequisite to your receiving a QSL. The author fully accepts and gratefully participates financially in the DXpedition practices in sharing the opportunity of adding new countries and prefixes to his confirmed list. Working station after station for long periods of time through terrific pile-ups with contest-type QSOs is not fun and W/K amateurs owe a debt of gratitude to operators who make DXpeditions or live in rare countries and put up with this practice.

11. When the QTH of the DX station is unknown or when the DX station requests your QSL via the bureau, it is necessary to forward your QSL through the appropriate DX QSL bureau, as listed in the *Radio Amateur Call Book*. This procedure will greatly extend the time required to receive a confirming QSL, *e.g.*, the QSL bureau for a QSL routed to the Society Islands (FO8), about midway between the United States and Australia, is located in Ver-

sailles, France. In cases of this kind, it must be realized that foreign mail service is not as dependable as the U.S. Postal Service and mail sometimes has a habit of getting permanently lost. The author always forwards a second QSL to another DX station located in the same town or island, if possible, and a request is made to forward the QSL to the designated station. In every case, QSLs sent to all Iron Curtain Countries should be routed through the QSL Bureau, e.g., all USSR QSL should be routed care of Central Radio Club, P.O. Box N-88, Moscow, USSR; QSLs to OK stations routed care of CAV, P.O. Box 69, Praha, Czechoslovakia; while QSLs to LZ stations should be routed care of P.O. Box 830, Sofia, Bulgaria. When no QSL bureau is listed for a DX country, forward your QSL to ARRL, Hartford, Connecticut for forwarding. Do not use elaborate QSLs, with a picture of your rig, etc., going to the Iron Curtain countries.

12. Another method, and a very successful one, is to place a self-addressed stamped envelope (using uncancelled stamps of the proper value of the DX country) along with your filled out QSL and mail it to the DX station. You will find the cost of securing uncancelled foreign stamps of the proper denomination are much cheaper than the use of IRCs and requires less effort on the part of the DX operator. The following table shows the cost of foreign postage stamps compared to the cost of IRCs for postage from certain prefixes:

Prefix	*Country*	*Cost of Foreign Stamps (Air Mail)*	*No. of IRCs Required (Air Mail)*	*Savings Per QSL*
EA	Spain	$0.23	3	0.22
5R8	Madagascar	0.42	4	0.18
HC	Ecuador ...	0.20	3	0.25
HH	Haiti	0.21	5	0.39
HK	Colombia ..	0.23	5	0.37
MP4	Qatar	0.32	4	0.28
ZD3	Gambia ...	0.38	6	0.52

Uncancelled foreign stamps may be purchased from philatelic dealers; however, the DX Stamp Service, 466 Weaver Road, Webster, New York directed by A. N. (Sax) Ringler, W2SAW, has developed a special service in furnishing foreign postage stamps to W/K DXers.

13. The optimum method of securing a DX QSL is a combination of the above techniques. This procedure has been service-tested and has resulted in 100% QSL returns. It consists of the following: Place a self-addressed oversize stamped envelope (using uncancelled stamps of the DX country), a photo of yourself and station, a special note requesting a QSL and written in the language of the DX country, a blank or special QSL along with your filled in QSL and forwarded to DX station.

14. Even after carefully following all of the outlined techniques to secure a QSL and the DX station still does not forward his QSL, what can you do then to get a QSL? Perhaps another personal letter or cablegram might do the trick. Make use of creative thinking and try to devise an improved method which will result in 100% QSL confirmations.

15. Every DXer must keep an ample supply of self-addressed stamped envelopes on hand at his W/K QSL bureau as well as at the DX QSL Co-op., P.O. Box 5938, Westport Station, Kansas City, Missouri for delivery of QSL received by these bureaus.

Generally speaking, the cost of securing expeditious delivery of DX QSLs is expensive when the following is considered:

Air Mail postage to DX station	$0.25
Cost of envelopes (2 at $0.01 each)	0.02
Cost of QSL card	0.03
Cost of 5 IRCs for Air Mail return at $0.15 each	0.75
Total cost of one QSL from aforementioned QTHs	$1.05

However, if one's goal is to earn WPX-700 Award, on a timely basis, such a requirement exists regardless of how expensive it may be. A careful record was maintained of the monetary expenditure to secure K4TUA's first 300 QSLs direct from DX stations. The total cost amounted to $225.15 or an average cost of $0.75 per QSL received.

...DON'T GIVE UP HOPE...

The aforementioned 300 DX stations were, later, checked against the K4TUA recently compiled *QSL Manager* listing and it was found that 69 percent of them had USA QSL managers. When the cost of securing a QSL from a QSL manager is compared to securing one direct from the DX station, the savings are very substantial, e.g.:

1st Class postage to USA QSL manager	$0.04
Cost of envelopes (2 at $0.01 each)	0.02
Cost of QSL card	0.3
Cost of 1st class return postage	0.04
Total cost of one QSL from USA QSL manager	$0.13

The average difference in cost between the aforementioned direct foreign QSLs and those from USA QSL managers amounted to $0.75—

$0.13 or $0.62 per card. For 300 QSLs, the savings amounted to $186.00 or enough to purchase a 20-15-10 meter beam and a RME DB-23 preselector, or some other needed piece of equipment.

W/K amateurs should also give consideration to the use of CRPs (Commonwealth Reply Coupons which can be purchased from the Financial Branch, Post Office Department, Ottawa, Canada for $0.06 each), as a substitute for IRCs, for defrayal of postage only to overseas Commonwealth points.

The number of IRCs required for first class and Air Mail postage is shown on the "Second Operator," which may be purchased from the Radio Manufacturing Engineers, Inc., Division of Electro Voice, Inc., Buchanan, Michigan for $1.00, or from the *Radio Amateur Call Book*.

In the past, references have been made in *CQ* that certain DX countries will not accept IRCs in exchange for local postage stamps, so other means will have to be employed in these countries—whether it be cash, money order, etc.

U.S. amateurs, making use of IRCs, should definitely see that the Post Office employee, stamps the date in the circle on the right side of the IRCs. Those IRCs stamped in the circle on the left side or those not stamped at all will not be accepted by the Post Office in the DX country.

Careful consideration should be given to the RST information shown on your QSL resulting from a QSO with a DX station. For example, a recent engineered work sampling study whereby the author completed 12,000 random observations of DX and local (W/K prefixes) stations to determine at what frequency DX stations were operating, showed that accurate RSTs of DX stations varied from 333 to 589. As the input of the majority of DX stations is below 100 watts, the S symbol (signal strength)

..EVERY POSSIBLE TECHNIQUE...

rarely exceeds an honest S6. Also, from a T symbol (tone) standpoint they vary from T3 (rough, low pitched a.c. note, slightly musical) to T9 (purest d.c. note). Many of the Iron Country stations have poor tones and range from T3 to T5 (musically modulated note).

If you will listen and copy a W/K station working an Iron Curtain station you will note, in the majority of cases, that a T9 report is given with a "tongue in the cheek" attitude in order to flatter (by committing mild perjury) the DX station with the hope of securing a much needed QSL. Many articles and comments have been written discussing and condemning such a practice. However, it is questionable that if an RST 457 was placed on your QSL and forwarded to the DX station it would generate a confirming QSL. Then, again, perhaps if you did give the DX station an honest report he might be so surprised that he would forward you a confirming QSL You alone must decide whether you wish to be truthful in your appraisals and receive few QSLs or commit mild perjury and secure the required QSLs.

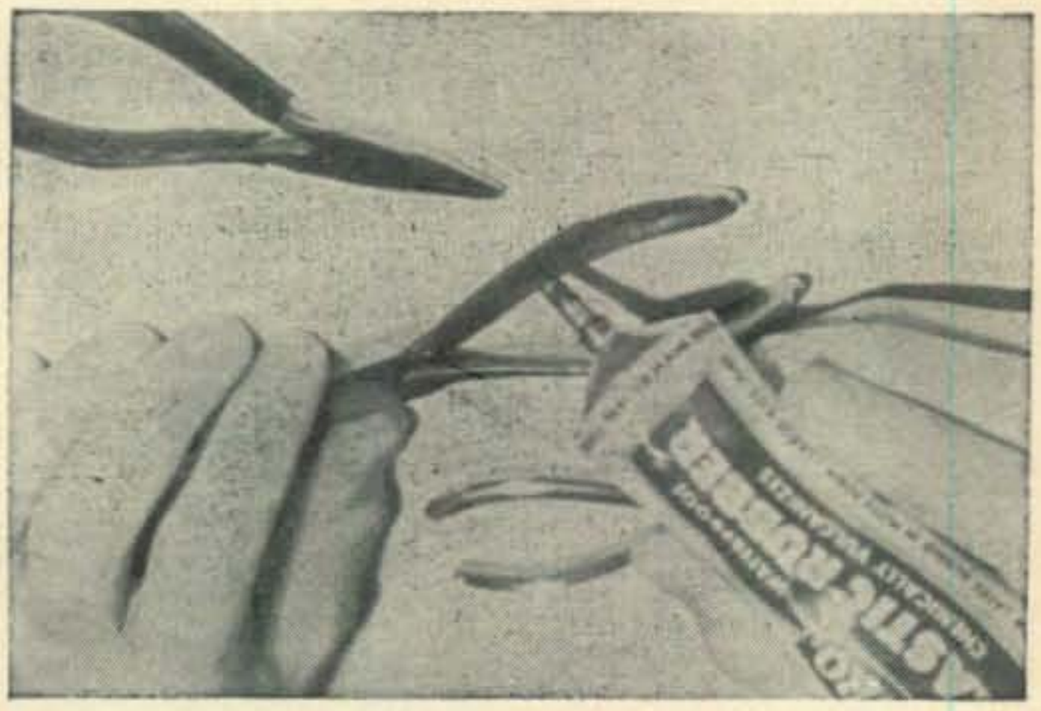
In order for the DX station to forward you a confirming QSL he must know the exact time of the QSO in order to check his log book. If you use your local time on your QSL the DX operator will have to convert it to his time and this requires a great deal of unnecessary work. This difficulty can be eliminated through the use of Greenwich Meridian Time (GMT) by worldwide amateurs and it is mandatory that all DX operators use GMT in reporting QSO times on their QSLs.

If a confirming QSL has not been received in a reasonable length of time (depending upon the degree of urgency), follow-up with another QSL using a different approach and strong appeal for a QSL. Some DX stations are notorious for their failure to QSL and you must be very persistent, in these cases, and continue to forward QSLs until a confirming QSL is received. Don't give up hope of receiving a confirming QSL as some DXers have finally received QSLs after an effort extending over three or four years.

Accomplishments to date at K4TUA toward WPX-700: 502 prefixes worked on 20 meters c.w.

These techniques have been proven successful by K4TUA for getting QSL confirmations from planet EARTH DX stations but how successful they will be in getting inter-planetary QSOs, at a later date, cannot be determined at this time. ■

Ham Hints



Tool Handle Insulation

It is mighty hazardous to use uninsulated tools around hot circuits. If your tool handles are not insulated, two or three coats of plastic rubber will do the job. Allow sufficient drying time between coats. The liquid rubber will not unravel and have to be renewed like tape.

TOWER CONSTRUCTION

BY E. H. MARRINER*, W6BLZ

Erecting antenna masts frequently poses problems both for the beginner and old timer. Here is a detailed account of how a pair of simple and inexpensive wooden masts can be fabricated and installed in a safe manner. Also discussed is the construction of simple dipole antennas.

MANY beginners whether they are young or old, seem to be perplexed by the problems encountered in constructing supports for antennas.

There are many decisions to be made before getting started. Should the antenna support be mounted on the roof or set on the ground? Would a bamboo pole be satisfactory? Should the support be guyed? What materials should be used? Height and anchoring methods must also be decided. These are just a few of the problems for which answers must be found before construction is started.

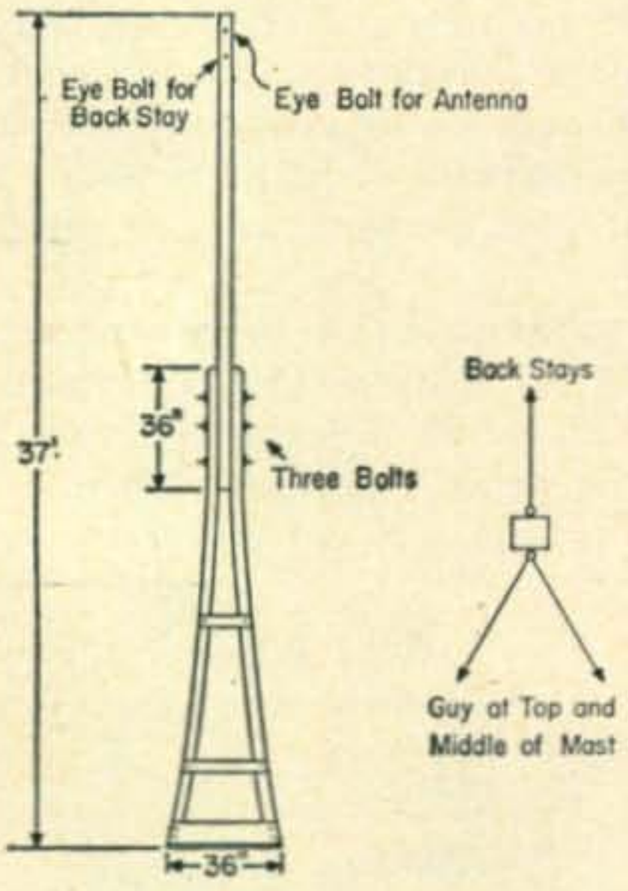


Fig. 1—Mast construction details. Galvanized nails must be used for securing the wood braces.

Decide what the requirements are for your antenna; is it to be for receiving or will it eventually be used as a transmitting antenna? If it will be used for transmitting, a major factor is its height. It should be at least forty feet high since this is the minimum height that would effectively reflect signals off the ionosphere. In this case then, bamboo poles would not do since they are too flexible. A heavier, more substantial guyed pole is needed.

Certainly, expense and durability are factors to be considered. The least expensive material from which to construct the antenna support is wood. However, proper finishing is necessary to prevent rotting. How about hardware? If the antenna is erected in a damp climate area, brass or galvanized hardware should be used. Electroplated hardware is suitable in a dry climate but will rust badly in a damp area. In extreme cases it might rust enough to cause the entire structure to come tumbling down on a neighbor's property.

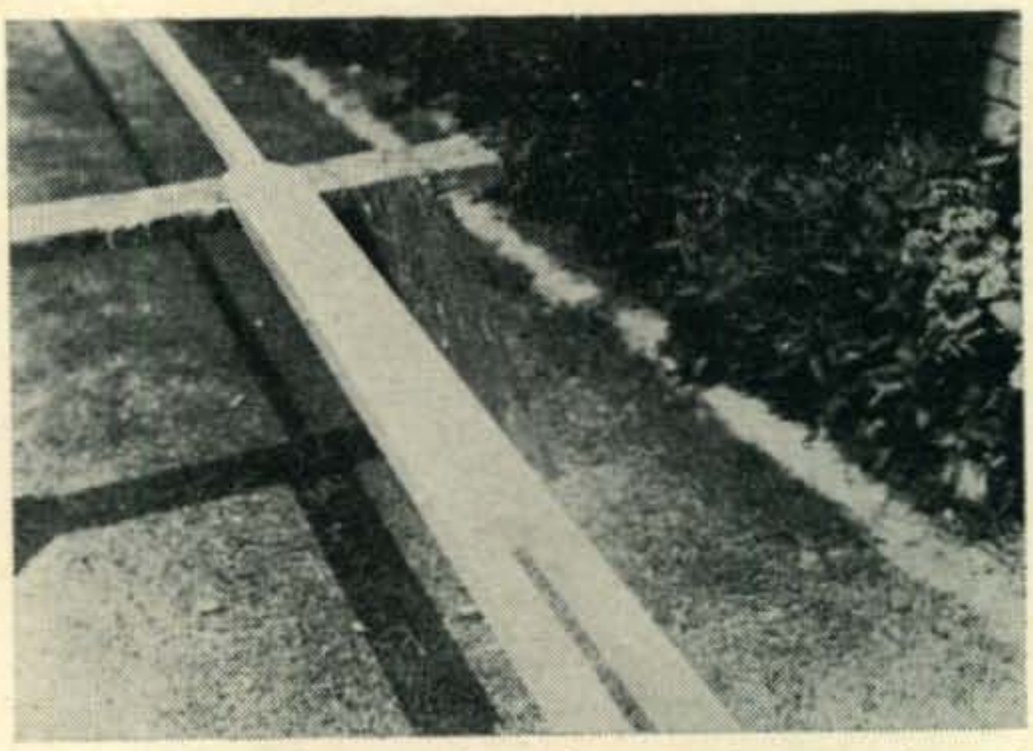


Fig. 2—View showing how the wood is overlapped and bolted.

Getting Started

Once a decision has been made as to the type of hardware necessary, begin accumulating it. Galvanized and brass fittings can be obtained from a marine hardware store sometimes called a Ship's Chandler. It can frequently be ordered through your local hardware dealer.

Construction details for a wooden antenna support are shown in fig. 1. It is made from 3 twenty foot lengths of 2 × 2. The cost of the wood runs about $3.50 at most lumber yards. It is essential that you select straight grained lengths that are knot free.

To begin construction string out the 2×2's on 3 saw horses with the bottom two overlapping the top section by 36 inches as shown in fig. 2. Next drill three ¼ inch holes, about a foot apart, through all three 2×2's. Bolt the

*528 Colima Street, La Jolla, California

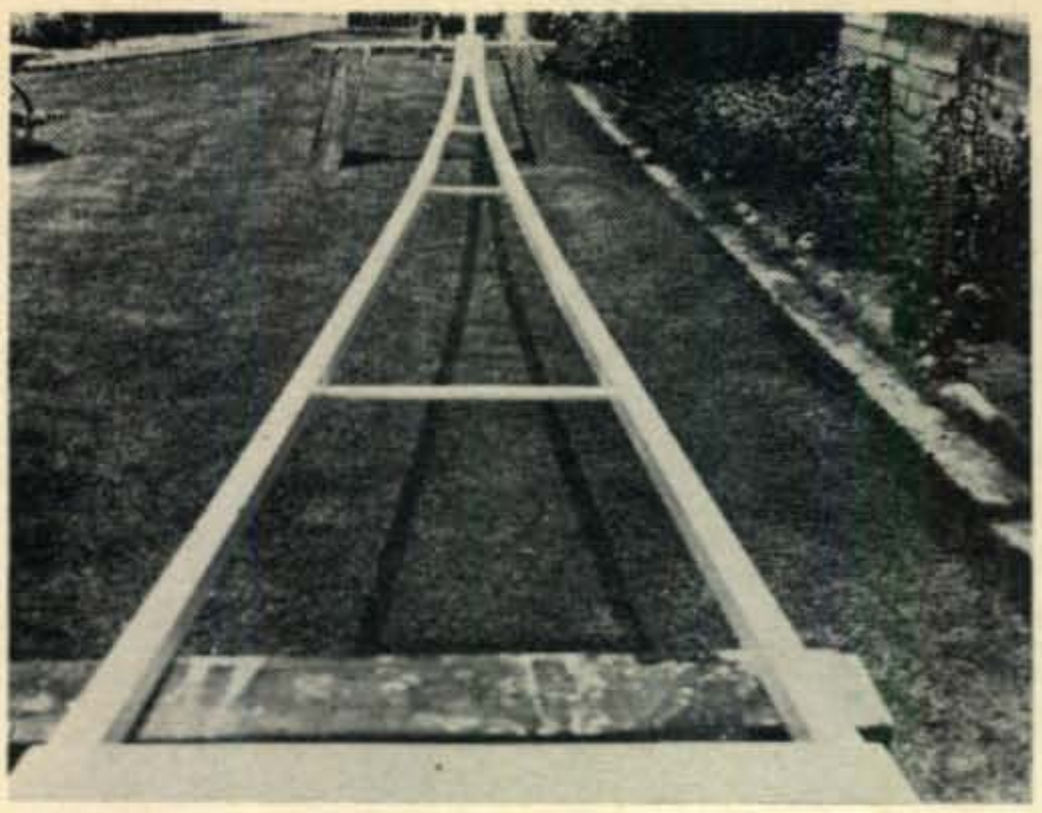


Fig. 3—View showing how the mast legs are spread and braces attached.

three lengths together with ¼-20 threaded brass rod or galvanized carriage bolts 5½" long. Avoid the use of electroplated hardware.

After the wood has been bolted together, spread the bottom ends of the legs apart 36 inches and nail on a 1×4 inch support on each side as shown in figs. 3 and 4. Be sure to use galvanized nails. Trim off the surplus wood edges and nail another 1×4 inch length on the bottom to form a solid base. A few pieces of wood can be tacked across the legs at various heights to give added support and stability.

Drill a hole about 3 inches down from the top for the antenna supporting eye bolt (fig. 5). Six inches below this, drill another hole for the back-stay eye bolt. Each bolt should face in the opposite direction. It is a good idea to use cast bolts, obtainable in any marine supply house, as these will never open under strain.

Now give the mast three coats of a good grade white boat paint which will outlast house paint many years. It will also stay bright and not flake.

Locating and Erecting The Mast

The positions of the masts are determined by several factors. The length of the antenna will determine the separation of the masts and

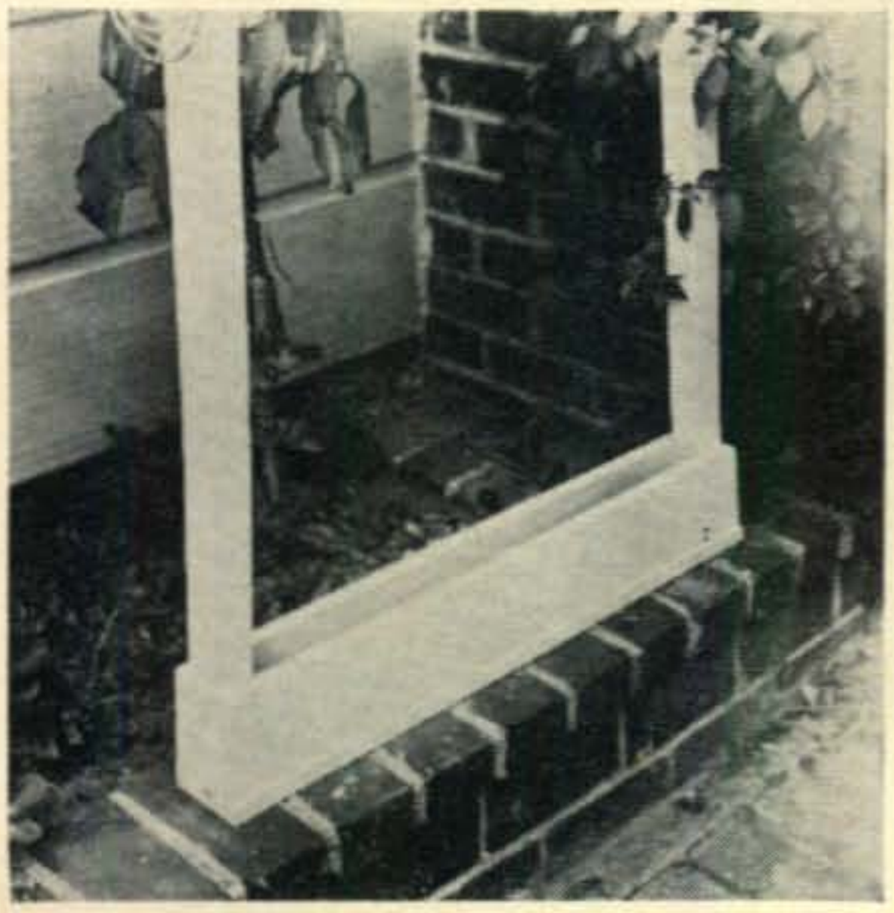


Fig. 4—Completely assembled mast base.

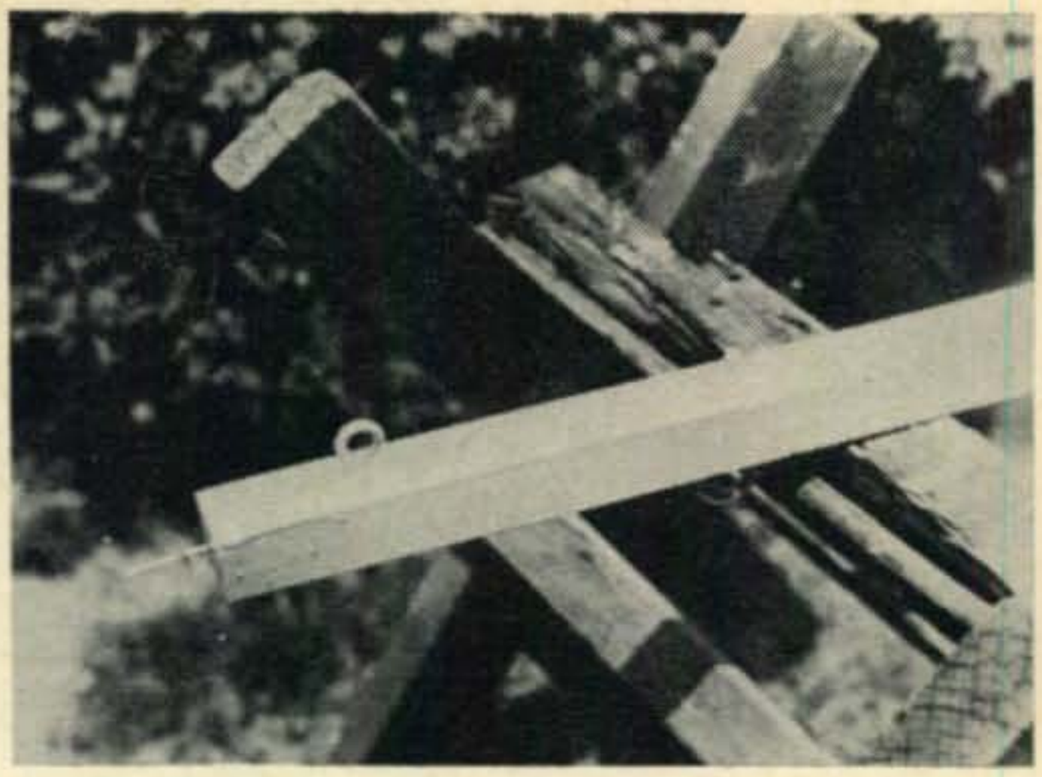


Fig. 5—The antenna eyebolt is secured about three inches down from the top of the mast. Six inches below it, facing the opposite direction, is the back stay eye-bolt. The nail is needed for handling the mast when painting.

this is discussed more fully later. The masts should, if possible, be situated where there are convenient tie points for the guy wires. The selected positions should be such that the wire does not cross a neighbors property as this could be considered a violation of "air rights" and possibly lead to litigation. If the choice is available, select the compass direction that will permit you to operate in the desired direction.

The antenna, guy wires and anchors must be prepared before the masts are "walked" into position. Galvanized wire can be used for the stays if they are broken every 12 feet with egg insulators. If the climate is damp it would be advisable to acquire some stainless steel aircraft control cable. While this is rust proof it is more difficult to handle. The ends of the aircraft cable can be fastened with #6 Burndy electrical clamps. It is also possible to use Stacon lugs, but this requires the use of a spe-

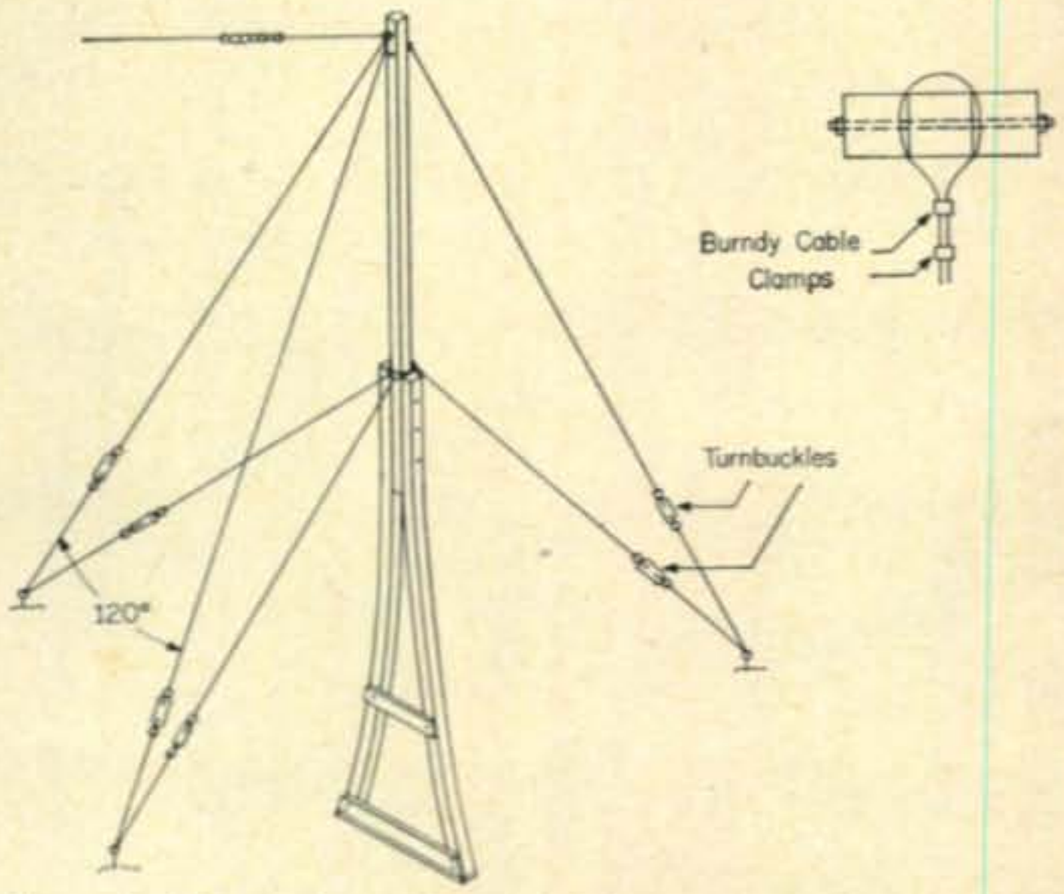


Fig. 6—Illustration of a satisfactory guying system. The top backstay is secured to its eye-bolt while the two forward stays are tied to the antenna eye-bolt. The lower stays are secured by loops over the top mast section as snown in the insert. Each set of forward stays should maintain an angle of 120° for maximum strength.

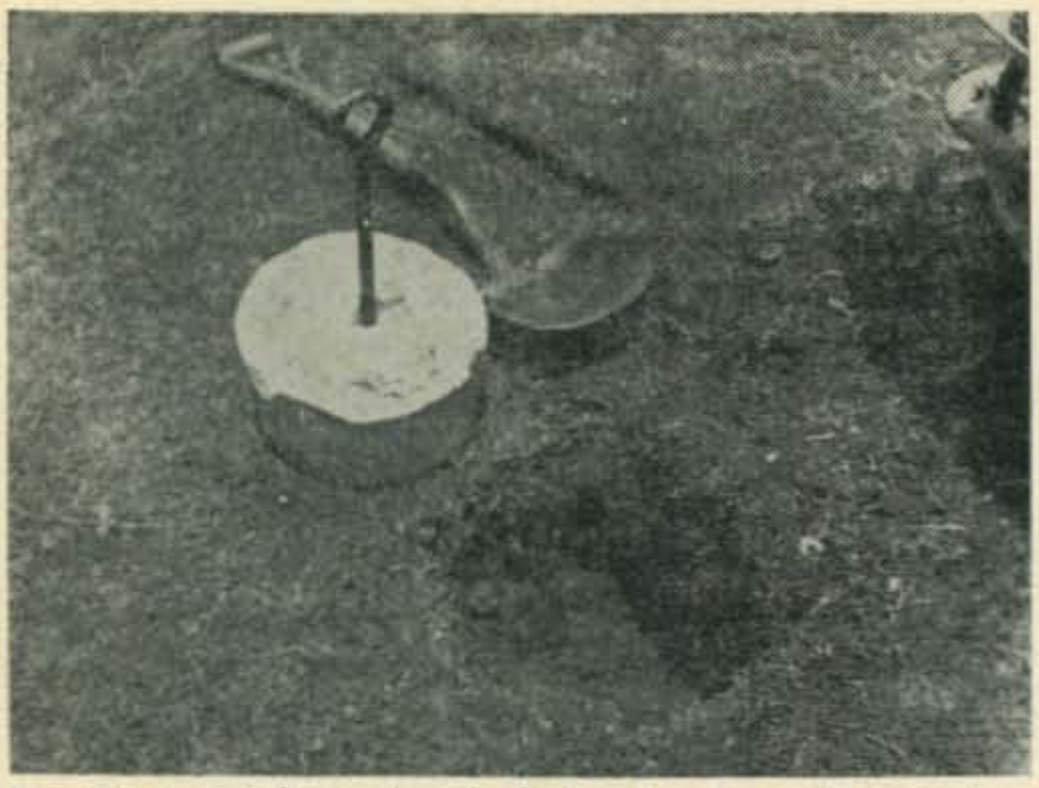


Fig. 7—A simple anchor bolt for the stays. The anchor, laced with wire mesh, can be formed in a bucket or the hole in the ground can be used, as explained in the text.

cial crimping tool. The number and location of guys to be used are shown in fig. 6.

Turnbuckles placed in the guy lines will enable you to adjust the mast to a perfect vertical position. If care is taken in adjusting the side stays then the turnbuckles can be confined to the back stays only.

The stays can be secured to the house or a large tree if they are conveniently located. If not, a concrete anchor, such as shown in fig. 7, must be poured. This is done by placing a 20 inch long eye bolt (half inch diameter) in the concrete form (an old waste basket or bucket). Secure a foundation washer to the bolt so that it won't pull out of the concrete later. Position the bolt in the form and add some chicken wire for reinforcement. Stir up a batch of Redi-Mix concrete and pour it into the form. Poke at the mixture with a trowel or a scrap of wood to work out all the air bubbles. When hardened, remove the anchor and pour the rest of them. If you form the anchor in the hole on the site, be sure the sides of the hole are vertical and damp. Wet the concrete down occasionally to prevent it from setting too fast. A complete anchor is shown in fig. 8. Secure the antenna to the masts as

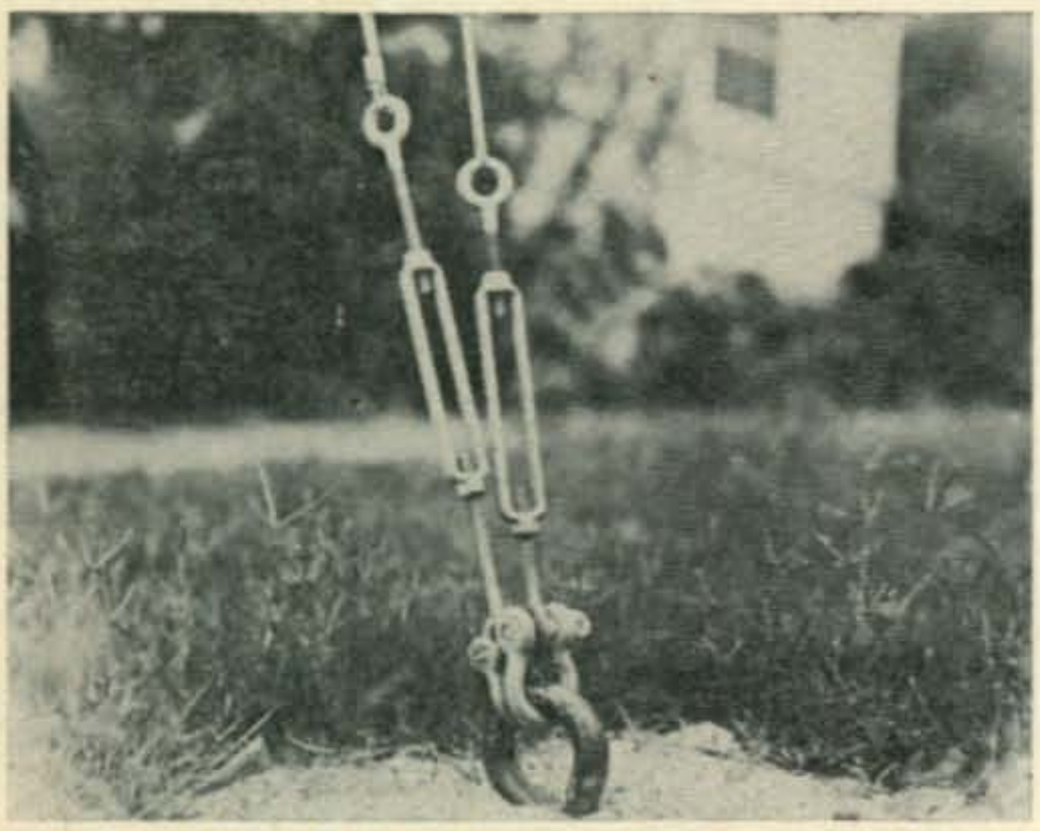


Fig. 8—View of the upper and lower back stays secured to the anchor bolt with shackles. Number 6 Burndy electrical clamps are used to secure the wire.

explained in the section on antennas and proceed to erect the mast.

Walk the mast into position, hold it in place, and secure the stays. Using a carpenters level to insure a true vertical position, align the base. Then adjust the turnbuckles until the mast is straight.

Preparing The Antenna

As previously indicated, the distance between the masts will be determined primarily by the length of the antenna. The following table indicates the antenna lengths for the various amateur frequencies. For transmitting purposes the antenna will be effective for about 100 kc on each side of the cut frequency. It is most practical to cut the antenna for the center of the desired band. The table is based on the formula:

$$L(\text{in feet}) = \frac{468}{f(\text{mc})}$$

Freq kc	Feet	Inches	Freq kc	Feet	Inches
3500	133	8	14,000	33	5
3600	130	—	14,100	33	3
3700	126	6	14,200	32	11
3800	122	—	14,250	32	10
3900	120	—	14,300	32	9
4000	117	—	14,350	32	7
7000	66	10	21,000	22	—
7100	65	4	21,100	22	3
7200	65	—	21,200	22	1
7300	64	5	21,450	21	9

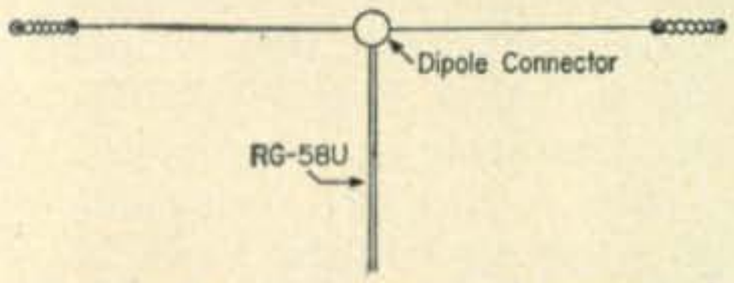


Fig. 9—Simple dipole antenna that may be strung between the masts. The lengths versus frequencies are listed in the text. The center dipole connectors to be used are shown in fig. 10. If one is not used, a center insulator should be substituted and the coax feedline properly waterproofed.

The most practical method of erecting the antenna is by pulley since it would be quite a feat to climb this type of mast. A galvanized pulley whose diameter is determined by the size of the hoisting line used, is hooked into the top eyebolt. The hoisting line may be sisal rope or Glass Line. Glass Line is preferable since its length does not vary with moisture as does sisal rope.

The antenna itself should be made from steel core copper wire, gauge #12 or 14. This type of wire will not stretch and the operating frequency of the antenna will be maintained. The end insulators should be large enough to handle the required power if the antenna is used for transmitting.

The simple antenna configuration, a dipole, is shown in fig. 9. A special connector manufactured by Cesco, Hy-Gain and other firms, is recommended as shown in the illustration. Use of one of these provides a proper impedance

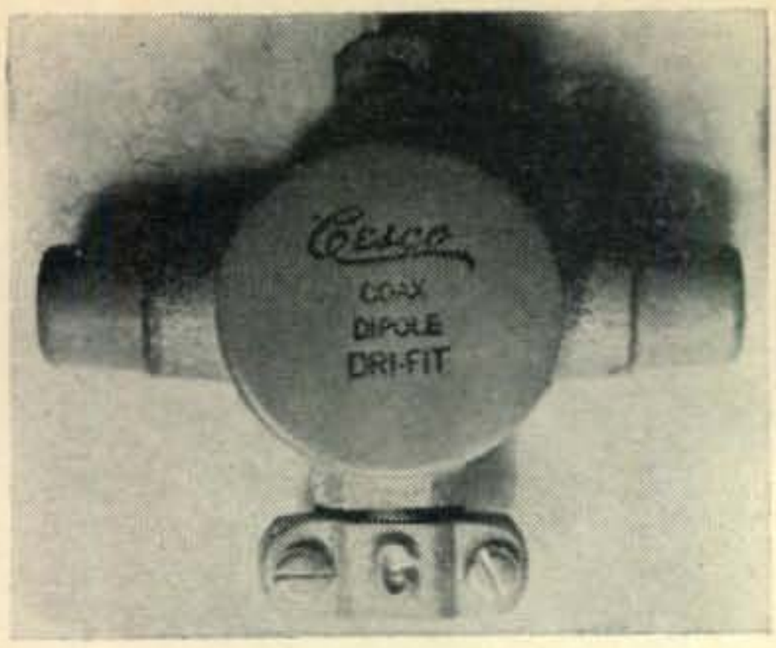


Fig. 10—Two types of dipole connectors are shown above. The top unit is manufactured by Continental Electronics and Sound Co. and the lower by Hy Gain Antenna Products.

match, a water tight connection and support for the RG-58/U coaxial line. The center of this dipole has an impedance ranging from 75 to 52 ohms depending upon the height above ground. In most installations it is nearer to 52 ohms and RG-58/U cable would be best. A good length for the feedline is about 60 feet and it should come away from the antenna at a right angle for as long a distance as possible but a minimum of one third the antenna length.

Before using the antenna with a transmitter, check the standing wave ratio and prune the antenna length (or increase it if necessary) so that the lowest v.s.w.r. exists at the desired operating frequency.

A good straight antenna mast, painted white, is a magnificent sight to behold, even for the neighbors! Why not give it a try? ■

Parts List (For Two Masts)

1—Galvanized hot dip pulley. Size according to type rope or line used.

12—Stub and forged steel turn-buckles. Stub length 5½ inches, eye-inside diameter ½ inch, stub diameter ½ inch. Total length with eyes unscrewed, 9 inches. (It is possible to only use four turn-buckles if front guy wires are fastened correctly.)

4—Nut type eye bolts, galvanized weldless drop forged steel with closed eye, ¼" shank and large eye shoulder.

40"—Brass threaded rod, ¼"-20 threads per inch with twelve each brass nuts and washers.

12—Screw Pin Anchor Shackles. Width between eyes ⅝" with ⅜ inch diameter pin. Inside length 1½ inches.

6—Nut Lock Malleable Iron Washers or Cast Iron Washers. 2⅜ diameter.

6—Anchor Eye Bolts, ½ inch diameter bolts with 1½ inch diameter eye, drop forged construction bolt. Place malleable washer between two nuts and tighten before pushing in cement.

24—Egg Insulators.

200'—Guy wires, #16 galvanized or stainless steel wire.

1 Qt.—Z-Spar boat paint, white.

200'—Glas-Line rope, 500 pound test.

1—Dipole center connector.

A TVI Filter for the 6 Meter Man

BY FREDERICK W. BROWN*, W6HPH

Although most six meter TVI is caused by 50 mc r.f., this easily constructed filter will insure that no other frequencies are getting into the antenna.

THE first step in eliminating TVI is to clean up your own rig. It's usually a pretty convincing demonstration to show your own TV set to be free from interference. Of course, nothing can be done at the transmitter to cure TVI that is the fault of the TV set, but it's hard to know just where to point the finger of blame if the transmitter is not well shielded and filtered.

Described here is a filter for 50 mc transmitters designed to suppress frequencies other than 50 mc that may be getting to the antenna. It will do absolutely nothing for harmonics being radiated by the transmitter power leads, key lead, mike lead, etc. Before you worry about a transmission line filter, make sure the tranmitter is completely shielded and all entering wires are adequately filtered. This can be checked by disconnecting the six meter antenna and firing up the rig. If you still have TVI, it's a pretty good indication you need to do some more shielding and bypassing.

If disconnecting the transmitting antenna eliminates the interference, it means the TVI is either the fault of the TV set or your transmitter is putting something into the antenna it should not. This filter is designed to eliminate

*Star Route, Idyllwild, Calif.

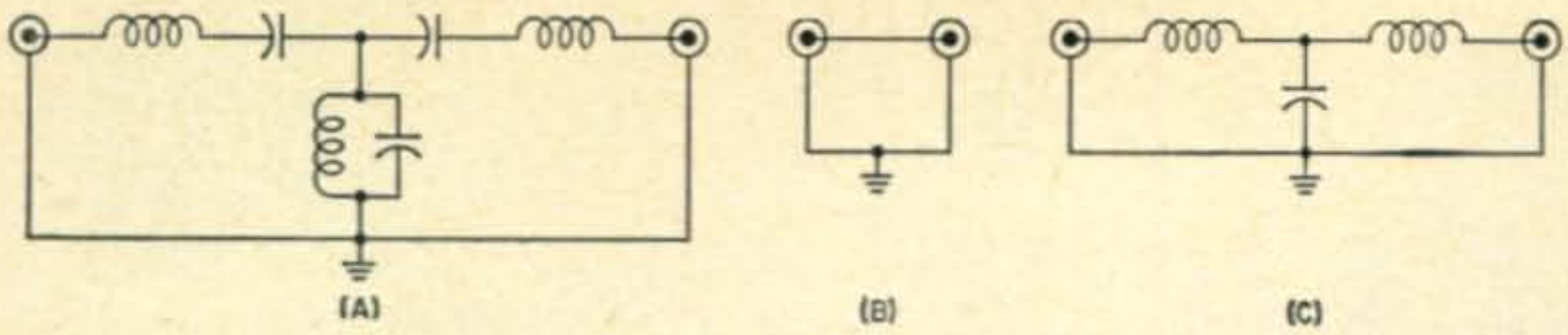


Fig. 1(A)—The prototype T section. (B)—equivalent of (A) at resonance. (C)—Equivalent of (A) above resonance.

the latter possibility.

Most six meter TVI filters described in the past have been low-pass types with a sharp cut off at about 52 mc. This filter is a band-pass type which will suppress frequencies both above *and* below 50 mc. Although there are no TV channels below 54 mc, the TV set intermediate frequency, usually either about 21 or 45 mc, is also susceptible to interference (ask anyone who operates 15 meters). If your rig starts out with an oscillator frequency below 50 mc, as most six meter transmitters do, it is a potential source of interference to TV intermediate frequencies. A low-pass six meter filter will, of course, do nothing for this type of interference.

Another advantage of the band-pass type filter is the ease of adjustment–everything is simply peaked for maximum six meter output. About the only shortcomings of the band-pass filter are the restriction to operation on one band and the necessity of retuning whenever a large change in transmitter frequency is made.

Circuit

Figure 1A shows the T-section prototype of which the filter is composed. Since, ideally, series resonant circuits are zero impedance and parallel resonant circuits are infinite impedance, the filter should show no attenuation (insertion loss) at the operating frequency (fig. 1B). Any insertion loss is the result of finite coil Q; assuming, of course, that everything is tuned to resonance. Attenuation of frequencies other than 50 mc is considerable because of the use of a high L to C ratio for the series tuned circuits and a low L to C ratio for the parallel tuned circuit. Unfortunately, these conditions also increase the 50 mc insertion loss if any finite value of Q is assumed. The off-frequency rejection may be increased without unduly increasing the insertion loss, however, by increasing the number of sections. This particular filter employs two sections, but a larger or smaller number may be used depending on the severity of the TVI.

Figure 2 is the complete schematic and fig. 3 shows the measured attenuation characteristics of the filter. The attenuation is high everywhere except in the lower TV channels. Since not more than one spurious transmitter output is likely in this region, it can be eliminated with a series tuned trap. That's the job of C_5 and L_5. The effect of this trap is shown by the dotted line in fig. 3. The rejection notch can be tuned to any frequency from 54 to 120 mc. The reactance introduced by the trap at 50 mc is tuned out simply by readjusting C_4.

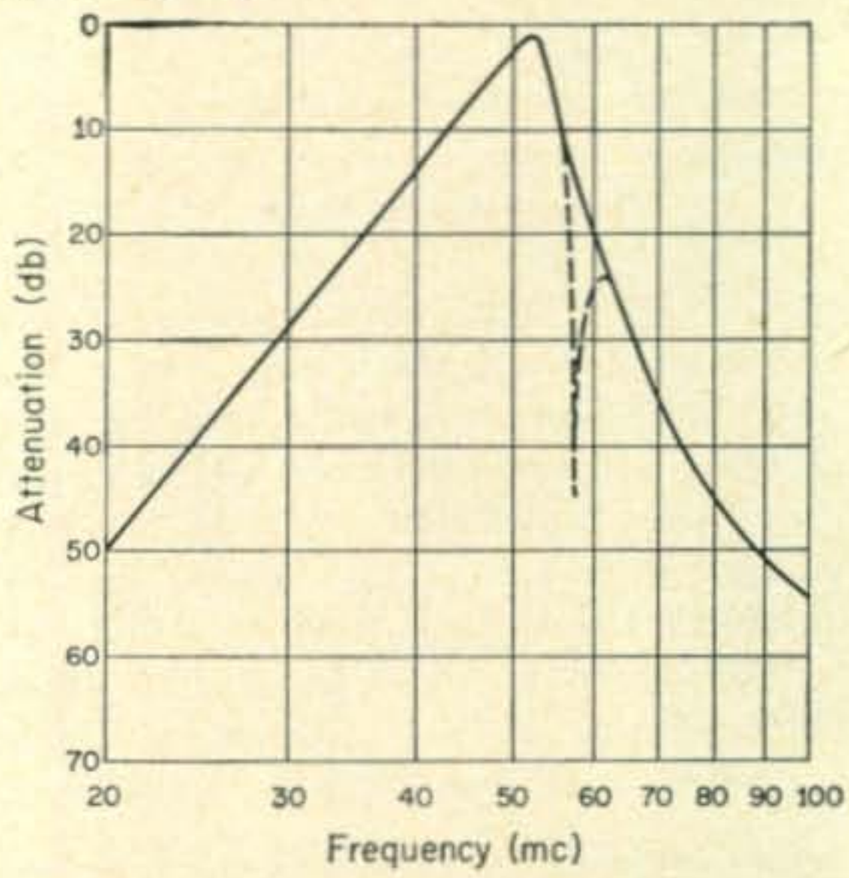


Fig. 3—Measured attenuation characteristic of the filter. The effect of the trap (L_5, C_5) when tuned to 58 mc is shown by the dotted line.

Component I_1 is a dial light across the output which is used for tuning up. The current through the bulb is limited by the reactance of C_7. The value given is about right for transmitters in the 100 watt class—the dial light gives a red glow which is easy on the eyes. For higher or lower power operation, the value of C_7

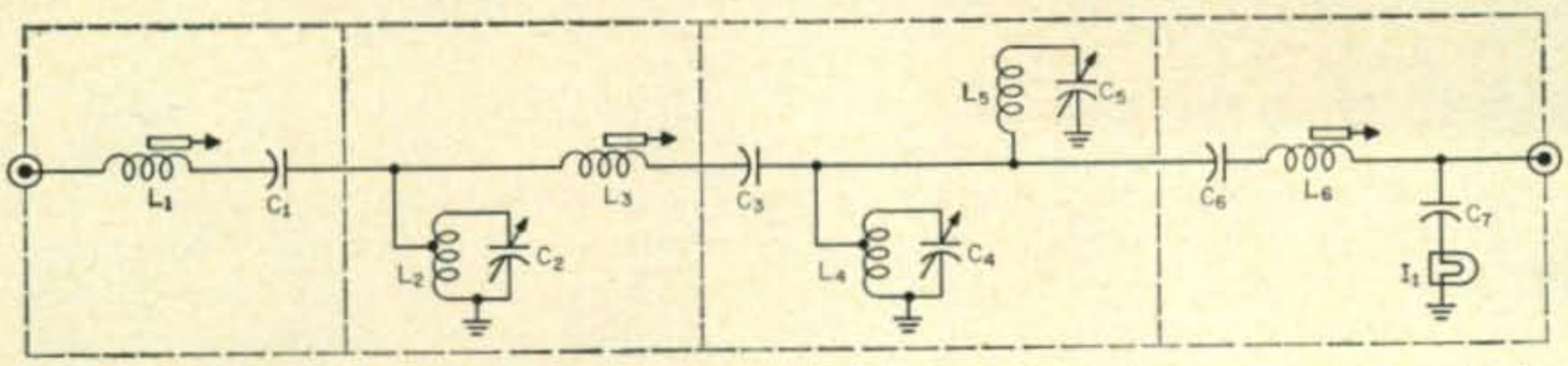


Fig. 2—Schematic of the 6 meter filter. The dial light I_1 is used as an output indicator.

C_1, C_3, C_6—25 mmf, mica.
C_2, C_4—100 mmf variable.
C_5—10 mmf variable.
C_7—5 mmf.
L_1, L_3, L_6—6½ t. #16 e. wound on ½" diameter brass slug tuned coil form, spaced the wire diameter.
L_2—2½ t #16 e., ½" diameter, ½" long air wound. Tap ½ turn from top.
L_4—Same as L_2 but tapped 1 turn from top
L_5—13 turns #20 e. 5/16" diameter, ⅝" long, air wound.
I_1—#47 dial light.

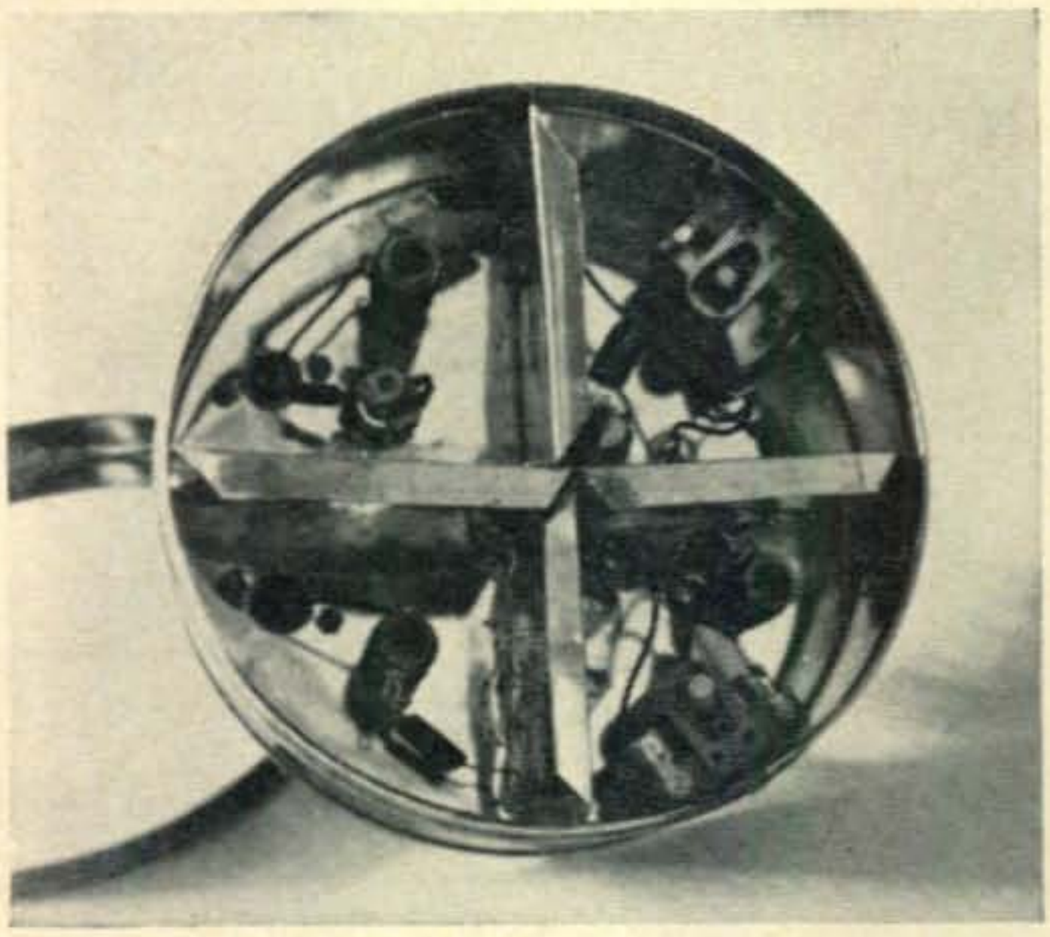
should be adjusted accordingly. A thermocouple type meter could have been used for the output indicator, but under *no* circumstances use a rectifier type meter. Diode rectifiers generate harmonics which is just what we are trying to eliminate.

Inductors L_2 and L_4 are tapped down slightly to effectively increase the L to C ratio and thereby improve the off-frequency rejection.

Construction

This particular unit was built in a 2 pound fruit cake tin (7" diameter and 2½" deep) left over from Christmas. Any metal container that provides complete shielding and enough space for the components should be suitable. The partitions are also made of tin can metal. Be sure everything is tin plated on both sides; unplated steel is extremely lossy at radio frequencies. Although, ideally, each coil should have its own compartment, only four compartments were used here in the interest of accessibility and ease of construction. Where it is necessary to place two coils in one compartment, care is taken to minimize coupling by orienting the coils perpendicular to each other.

The three tuning capacitors C_2, C_4 and C_5 should be shaft mounting units to insure that no rf is radiated from the protruding shafts. For the same reason the series tuned circuits are inductively tuned, since both sides of the capacitors C_1, C_3, and C_6 must be above ground. The three tunable coils (L_1, L_3, and L_6) should have slugs that are inherently grounded by the mounting arrangement to prevent radiation from the adjustment screws. The coil forms used came from a BC-604 transmitter and are tuned with silver plated brass slugs. The Q is probably higher than could be achieved at 50 mc with powdered iron slugs. If iron slug tuned coils are used, however, the number of turns on L_1, L_3, and L_6 will be considerably less.



Underside view of the filter with cover removed. The signal enters at the lower left and travels around counter-clockwise, leaving the upper left hand compartment. Notice that the shielding is bent over at the top to provide a spring contact with the cover.

The six meter transmission line filter is built in a 7" diameter cake tin. The input connector is at the lower center, and the output connector is to the right. Just behind the output connector is the dial light tuning indicator. The three variable inductors are adjusted through the upright tubes. The two knobs control C_2 anl C_4. Capacitor C_5 is just in front of the right hand knob.

The 5 tuned circuits should be adjusted to resonate at 50 mc before being placed in the shielded container. The three series tuned circuits (L_1-C_1, L_3-C_3 and L_6-C_6) are temporarily soldered in parallel for checking with the grid dip meter. The two parallel tuned circuits (L_2-C_2 and L_4-C_4) should be adjusted to resonate at 50 mc near the *maximum* setting of the tuning capacitors. Inductor L_5 should resonate in parallel with C_5 (fully meshed) to 54 mc.

All interconnecting wires should be short, heavy, and as direct as possible in order to minimize lead inductance and losses.

Operation

The filter may be inserted in the coaxial transmission line between the transmitter and change-over relay, or between the antenna and change-over relay. In the latter case it will also filter received signals—a desirable condition if the receiver has trouble with images, spurious responses or i.f. leak-through. Overall insertion loss at 50 mc is only about 0.4 db, an amount too small to notice on either transmit or receive.

First step in tuning up is to adjust your transmitter normally without the filter in the line. Then insert the filter and set all the filter adjustments for maximum output as indicated by the dial light. If you have a field strength meter, standing wave meter, or line sampler connected to the antenna side of the filter, you can use it for peaking up, but be sure to remove it afterward, since these devices can generate harmonics. Every adjustment should be repeaked at least twice since there is some inter-action among the controls. When everything is correctly adjusted, your transmitter

[*Continued on page 106*]

The Rebirth of the Negative Peak Modulation Indicator

BY E. J. WANAMAKER*, WA2EJJ

Overmodulation, one of the ills of our overcrowded bands, can be reduced by the use of this simple modulation monitor. It is designed for use with a.m. transmitters and is extremely simple, foolproof and inexpensive.

HERE is an old device[1] brought up to date, an inexpensive modulation monitor which will tell the operator if he is getting the percentage of modulation permissible, and yet be sure he is complying with the law.[2] Intended for plate modulated a.m. transmitters with B+ voltages of less than 1000 volts, the monitor can be built for less than $10.00; much less if one has a good junk box.

Why Needed

The common method of determining where to set the audio gain is how high the plate meter kicks on modulator current. This is intended, in manufacturer's instructions, as a guide to where approximately 100% modulation is to be found. However, with aging of components and differences in individual voices, it can be very misleading. A brief listening session on 40 or 75 meters will show how much needless splattering is present on our crowded bands. A scope, of course, is the best method of checking modulation, but, let's face it, few of us can afford them.

Theory of Operation

At the final amplifier side of a modulation transformer secondary, the B plus voltage is driven from the unmodulated carrier level up to twice the B plus on positive audio peaks, and down to 0 volts on negative audio peaks, assuming 100% modulation. When overmodulation occurs, both the positive and negative peaks exceed those of 100% modulation with the negative peaks being driven down below 0 volts or below chassis ground potential.

At this instant, the cathode of the 1B3, shown in fig. 1, is below ground potential as it is tied to the top of the modulation transformer secondary. The plate of the 1B3 is at ground potential since it is connected through the meter to ground. With these conditions, the plate of the 1B3 is positive in respect to the cathode, and current will flow from cathode to plate through meter to ground giving an indication of overmodulation. It is when this occurs that splatter is generated. (Heaven forbid!!!)

Construction

The 1B3 was chosen as it is available in almost all junked TV sets, is cheap if you have to buy it, and it has a peak inverse voltage rating of 33,000 volts. It will conduct when plate is only 1.5 volts positive with respect to the cathode, and never when cathode is positive with respect to the plate (up to the p.i.v. rating). As the filament of the 1B3 requires 1.25 volts, a #51 pilot lamp is connected in series across a 6.3 volt filament transformer. This brings the heater voltage of the 1B3 right out on the button. The pilot lamp serves to indicate when the device is on and also shows

Front view of the trim looking modulation monitor. The pilot light serves as a ballast for the 1B3 filament as well as an indicator.

*147 Oxford Road, New Hartford, N.Y.
[1]1936 ARRL *Handbook*, Credited to W8AGW
[2]FCC reg. 12.133.

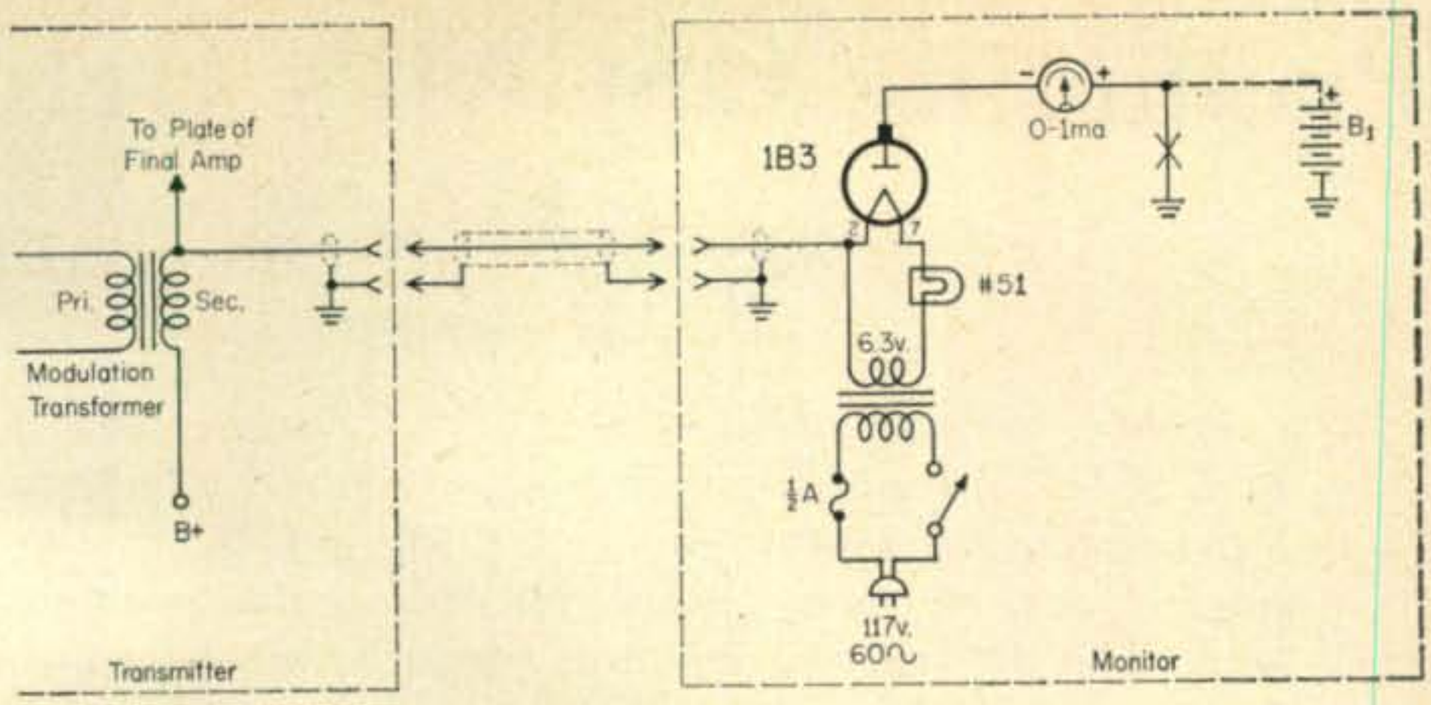


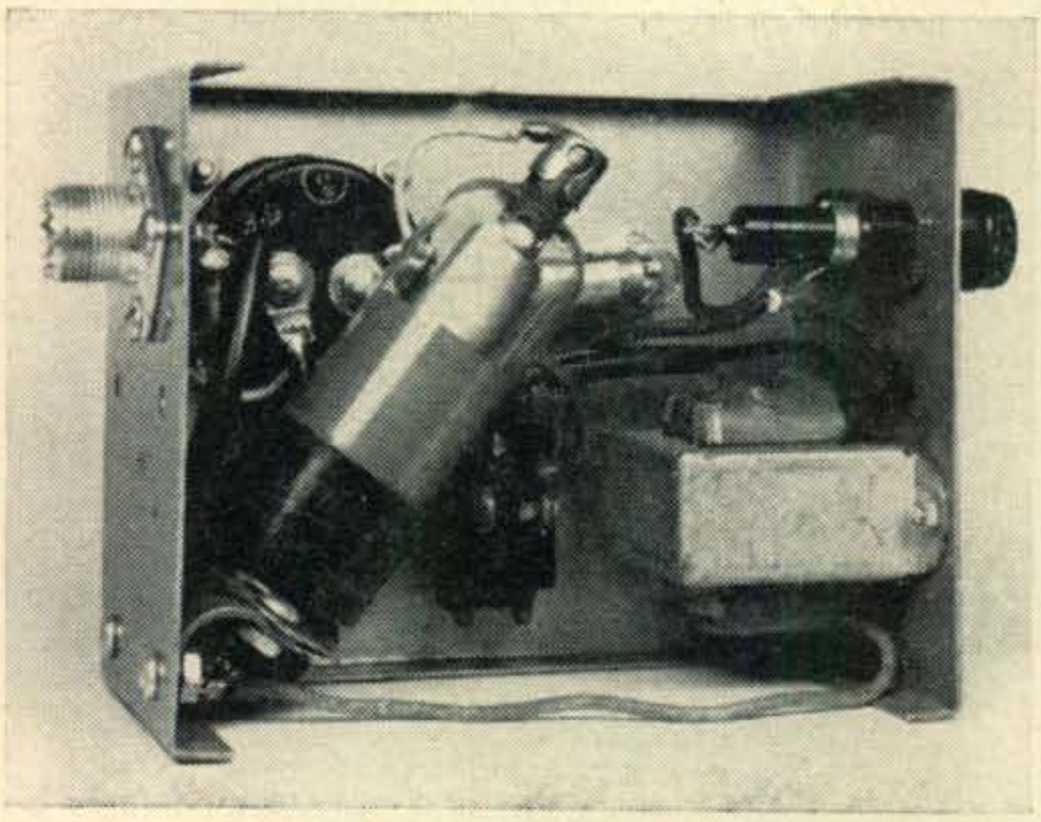
Fig. 1—Circuit of a simple modulation monitor. Without B_1 (approximately 9 volts) the meter will "kick" only on over-modulation. When B_1 is inserted in series with the meter, the "kick" will appear at some level just below 100%. The filament transformer is a Stancor P6143 or equivalent.

if 1B3 filament is good. It is very difficult to see when the filament of a 1B3 is lit.

The filament transformer was chosen to have 3000 volt insulation as the 1B3 is directly heated and the transformer provides the isolation required. As the peak modulated voltages are in the 1400 to 1800 volt area, in the class of transmitter this was designed for, 3000 volt insulation should be adequate

The monitor was built using a coax line to connect monitor to transmitter, the center conductor for the modulated B plus and the braid for the ground return. However, this could be wired through the accessory socket available on most transmitters providing adequately insulated wire is used. Remember, this line has 1400 to 1800 volts on it.

Some crowding is necessary to get all components into a 5 × 4 × 3 inch box, but it can be accomplished by mounting the tube at an angle as shown in the photograph.



Inside view of the modulation monitor. The 1B3 is mounted at an angle in order to fit within the confines of the box.

Testing

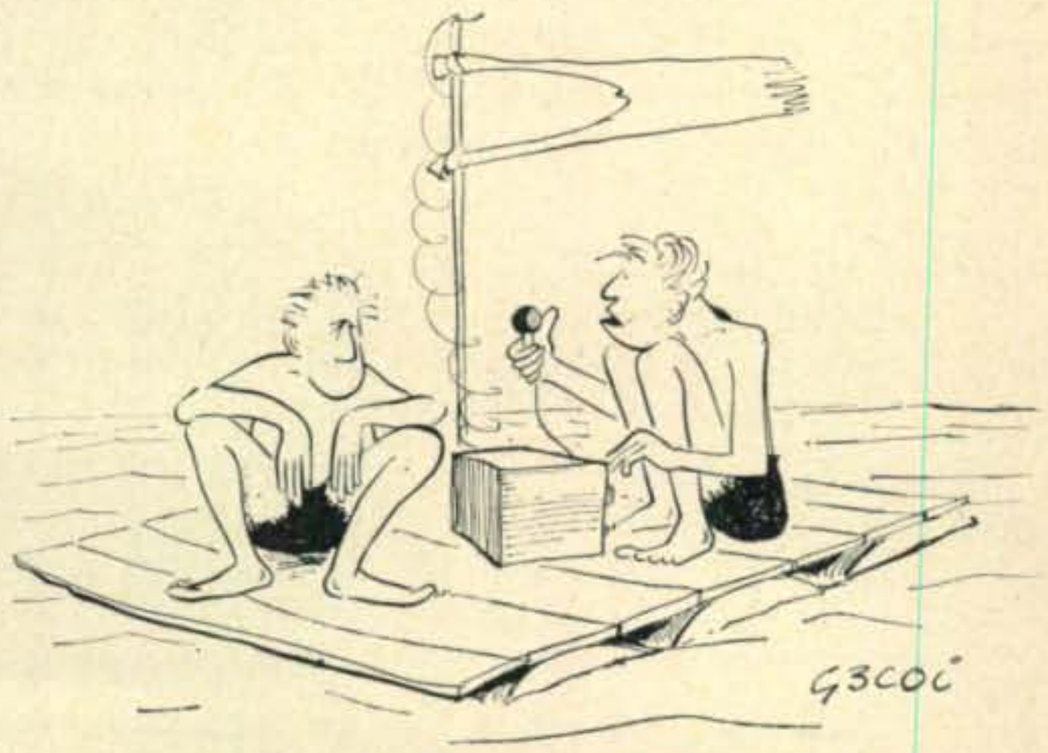
The monitor can be tested, before connecting it to the transmitter, with any small battery, 1.5 volts on up. Connect the positive terminal of the battery to ground, and the negative terminal of the battery to the cathode of the 1B3, and the meter will indicate a current flow. Reverse the connection and there will be no indication. This shows that the monitor will give an indication just barely below the 0 volt level.

Operation

In actual operation, with the monitor connected to the transmitter, speak into the microphone in a normal manner, and advance the audio gain until the monitor meter needle just starts to wiggle. Then back off audio gain until the wiggle just stops. At this point you are operating as close to 100% modulation as it is possible to get without overmodulation. It will be interesting now, to check your transmitter modulator current kicking, and see how it compares to the monitor indication. A big surprise could be in store for you.

For those who "just gotta" see a meter needle move all the time, try this. Connect a small battery, such as a 9 volt transistor radio type, in the monitor meter to ground circuit. Connect the positive terminal of the battery to the positive side of meter and the negative terminal of the battery to ground. This will pedestal the plate of the 1B3 9 volts above ground, and the meter will indicate just before overmodulation occurs. For example, if the transmitter has a B plus voltage of 600 volts and a 9 volt battery is in the meter circuit, the meter will start to "wiggle" at 98.5% modulation.

It would be possible to expand on this unit indefinitely. The current flow through the meter, with the proper circuitry, could be made to ring bells, blow whistles and even, upon overmodulating, give the operator "a hit in the head." Say! That's not a bad idea!!! ■



"He wants us to QSL direct . . ."

Predicting OSCAR's Orbit With Ease*

BY GIORGIO GIRO†, I1BMV

I1BMV, located on the shores of the Adriatic Sea in historic Trieste, was one of OSCAR I's most ardent observers. Giorgio managed to receive OSCAR's 145 mc beacon transmitter on nearly 60 orbits, as the radio amateur satellite passed over or near Trieste. He solved the problem of knowing where and when OSCAR was within radio range by working out a few fairly simple rules for predicting the satellite's orbit with good accuracy. On the eve of OSCAR II's launching, I1BMV discusses his orbit prediction method, since it will be extremely useful for predicting the times when amateur radio's second satellite should be heard over your QTH.

THE first step in predicting when OSCAR I would be heard in Trieste was to start from a known point. This was established by catching at least one overhead pass, and noting the time when reception was strongest. We knew roughly when to tune for the first pass from information that had been broadcast over the amateur bands concerning the time of OSCAR I's launch. With this starting point, and the assumption that it took OSCAR 92 minutes (1.533 hours) to complete an orbit, and the fact that the earth rotates about the sun in 24 hours, it was possible to devise a few simple rules for predicting when OSCAR would be heard next over Trieste.

Orbit-to-Orbit Prediction

When OSCAR passes overhead during one of its orbits, it will not pass directly overhead on its next orbit, since the earth will have rotated on its axis during the 92 minutes that has elapsed. From the following equation it can be seen that on each successive orbit OSCAR will cross the equator further *west* by a distance equal to 23 degress of longitude.

$$\frac{360\ degrees}{24\ hours} \times 1.533\ hours = 23\ degrees \quad \ldots\ldots (1)$$

OSCAR I was heard almost directly overhead at I1BMV at 1029 GMT, December 13, 1961. Since it took 92 minutes for OSCAR to complete an orbit, predicting the next pass amounts to simply adding 92 minutes to the time the previous pass was heard.

$$t = t' + 92\ minutes \quad \ldots\ldots (2)$$

where: t is time that signal is predicted to be maximum on next successive pass, and
t' is time that signal was observed to be maximum on previous pass.

Using (2) we were able to predict the next pass for 1201 GMT. We also knew that it would pass to the *west* of Trieste. At 1203 GMT OSCAR reached a peak on its next orbit, within two minutes of the predicted time. We predicted the next pass for 1335 GMT, but realized that the satellite would pass too far to the west to be within range (OSCAR's maximum tracking range was about 1400 miles). We were right, OSCAR was not heard at 1335, and its position at that time was over the middle of the Atlantic Ocean, more than 2500 miles from Trieste.

Day-to-Night Predictions

We next wanted to know when OSCAR would again be within range of our QTH. Picturing OSCAR's orbit as remaining relatively stationary in space while the earth revolves inside of it, we knew that in about 12 hours (from 1029 GMT), when the earth had rotated 180°, we would again be within OSCAR's orbit (see fig. 1). In addition, we knew that OSCAR I was launched in a north-south direction near noontime. This meant that all passes during the daylight hours were traveling

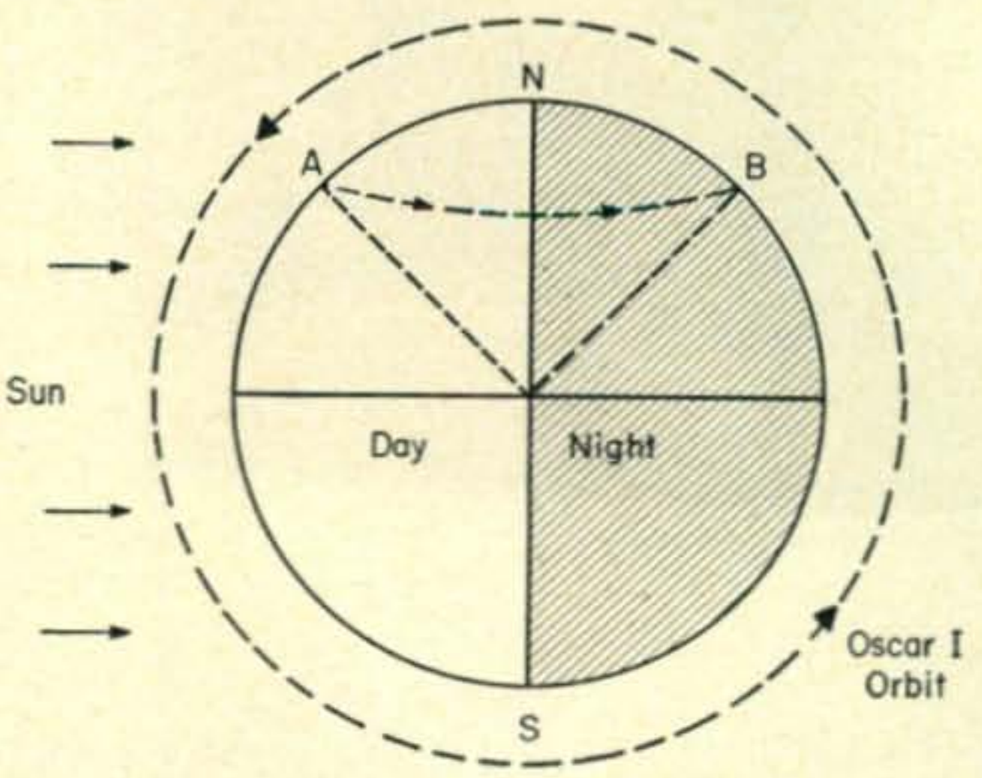


Fig. 1—OSCAR's orbit remains relatively fixed in space while the earth revolves inside of it. With a daytime launch from Vandenberg, California, every north-to-south pass is in sunlight and every south-to-north pass occurs at night. Observers passing from *A* to *B* as earth rotates, "sees" a different portion of orbit overhead.

*Translated from the Italian by Rolly Hassum, Hewlett-Packard Co., Paolo Alto, Calif., and edited by the Projects OSCAR Association. Edited exclusively for *CQ* by W3ASK, SPACE COMMUNICATIONS Editor, *CQ*.

†Box 372, Trieste, Italy.

in a north-south direction, while all orbits during the hours of darkness were in a south-north direction. While on our first observation of OSCAR (at 1029 GMT) we observed the satellite "rise" in the sky from the north and "set" in the south (observer at point *A* of fig. 1), we would observe it approximately 12 hours later "rising" in the south and traveling in a northerly direction, since we had moved to point *B* (of fig. 1) as the earth rotated on its axis.

In our first attempt to predict the evening orbit which corresponded to the 1029 pass, we deduced that OSCAR would make 8 complete revolutions in 12 hours and 16 minutes, since its period was 92 minutes. We were tempted to believe that it was as simple as this, but there was another important factor that still had to be considered.

As the earth rotated, we "moved" eastward along the path *A-B* of fig. 1. We first observed the satellite from point *A*, then later from point *B*. It can be seen that the satellite does not complete one revolution as it passes from *A*, across the south pole, to *B*. It is short by the distance *B* to *A*. This distance, and the time it takes for the satellite to traverse it, can be calculated by spherical trigonometry. Don't let this frighten you, we've already worked it out, and present the results as a correction factor:

$$k = 2\ (90\ degrees - L) \times \frac{p}{360\ degrees} \quad \text{.....(3)}$$

where: k is correction factor in minutes
L is latitude of your QTH in degrees
p is period of satellite 92 minutes for OSCAR I.

For I1BMV's QTH at 45° north latitude, the correction factor becomes 23 minutes. For a QTH at 30° north latitude, the correction factor is 31 minutes, etc. For QTH's in the northern hemisphere this correction factor must be *subtracted* when predicting a nighttime orbit corresponding to a daytime pass. For southern hemisphere locations it must be added. Combining this correction factor with the time required (12 hours and 16 minutes) to complete 8 orbits, the following fairly simple expression can be used for predicting evening passages over your QTH:

$$t = t' + 12{:}16 - k \quad \text{.....(4)}$$

where: t is predicted time for nighttime pass
t' is observed time of corresponding daytime pass
k is the correction factor from (3). For QTH's in southern latitudes, k is added.

EXAMPLE: OSCAR was observed to pass overhead at Trieste at 1203 GMT. From (4), its nighttime passing is predicted for:

$t = 12{:}03 + 12{:}16 - 00{:}23$
$t = 23{:}56$ GMT

Reception from OSCAR actually peaked on this pass at 2352 GMT. Not bad for a start! (OSCAR I's period was later calculated more exactly as 91.7 minutes, resulting in a time of 12 hours 13½ minutes for 8 revolutions. This would have reduced the error in the above example from 4 to 1½ minutes.)

Night-to-Day Predictions

In the part of the world in darkness, OSCAR appears to travel from the south to the north (see fig. 1). To predict a daytime pass from an observed nighttime orbit, we use the same approach as we did for the reverse situation. Equation (4) is still valid, except the correction factor (k) is added for QTH's in northern latitudes and *subtracted* for southern latitudes, as follows:

$$t = t' + 1216 + k \quad \text{.....(5)}$$

where: t is predicted time for daytime pass
t' is observed time of corresponding nighttime pass
k is correction factor from (3). For QTH's in southern latitudes, k is subtracted.

EXAMPLE: OSCAR's signals peaked over Trieste at 2352 GMT. From (5), the corresponding daytime pass is predicted as follows:

$t = 23{:}52 + 12{:}16 + 00{:}23$
$t = 12{:}31$ GMT

OSCAR's signal actually peaked at I1BMV's QTH at 1230 GMT!

Long Range Predictions

Next, we thought it would be nice if we could predict OSCAR's orbits over or near Trieste for several days in advance. To predict from one day to another, or from one night to another requires the addition of both equations (4) and (5). This results in the following:

$$t = t' + 32 \text{ minutes} \quad \text{.....(6)}$$

where: t is predicted time one day (or night), or more in advance
t' is observed time for corresponding day (or night) pass

For example, OSCAR's signal peaked at 1023 GMT on December 16, 1961. Using equation (6), the following corresponding passes were predicted. Also shown are the times that OSCAR was actually heard, and the errors between the predicted and observed times.

Date (December)	*Predicted Time* (GMT)	*Observed* (GMT)	*Time Error* (Min.)
17	1055	1049	6
18	1127	1116	11
19	1159	1142	17
20	1231	1209	22

At first hand, the results don't look too good. In actual practice, however, as soon as we found that we missed the first prediction by 6 minutes, we know that the period was somewhat shorter than 92 minutes. We re-calculated it as 91.7 minutes, and using this value for deriving equation (6), we came out with revised predictions for December 18, 19 and 20 which were within two minutes of the observed

[*Continued on page 104*]

Notes On Sporadic-*E* Propagation

BY GEORGE JACOBS*, W3ASK

During June, July and August there is usually a sharp increase in the formation of sporadic areas of ionization in the earth's atmosphere. This is of considerable importance to radio amateurs since it often results in skywave propagation on frequencies as high as 60 mc, and occasionally in excess of 100 mc, when propagation on these frequencies is not possible by means of the regular layers of the ionosphere.

Recent studies indicate that sporadic ionization may occur more often during periods of low sunspot activity, as at present, than during periods of high sunspot activity. If this is the case, propagation openings due to sporadic ionization should be even more numerous this summer than the record-breaking number of openings reported last year.

The following is a general discussion of sporadic ionization, and a hint for predicting when it can be useful for 6 and 10 meter openings.

THERE frequently forms within the normal *E*-layer region of the ionosphere, "clouds" or "patches" of abnormally intense ionization, which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E* or *F* layers. These clouds usually take the form of thinly ionized areas covering a rather small geographical region, approximately 50 to 100 miles in diameter. They occur more or less at random and are relatively short lived, usually dissipating within a few hours. This sporadic ionization usually occurs about 60 miles above the earth's surface, at about the same height as the regular *E* layer. For this reason it is called Sporadic-*E*, or E_s.

Short-Skip Propagation

The height at which sporadic-*E* ionization usually occurs limits one-hop propagation to a maximum distance of about 1400 miles. Propagation beyond this distance does not occur often by way of sporadic-*E* because of the remote possibility of clouds being present over such a large area necessary for multi-hop propagation. For this reason, band openings due to sporadic-*E* propagation are often referred to as *short-skip* openings.

Reflection from sporadic-*E* clouds takes place with very little signal loss since ionization is generally so intense (see fig. 1). This results in exceptionally strong signal levels during most short-skip openings, even when very low power is used. Quite often it is possible to maintain communications considerably off the great circle path between two stations by means of back and side scatter from areas of intense sporadic-*E* ionization. For example, stations in eastern and western New York State working each other on 10 meters by pointing their antennas toward a common E_s cloud over North Carolina.

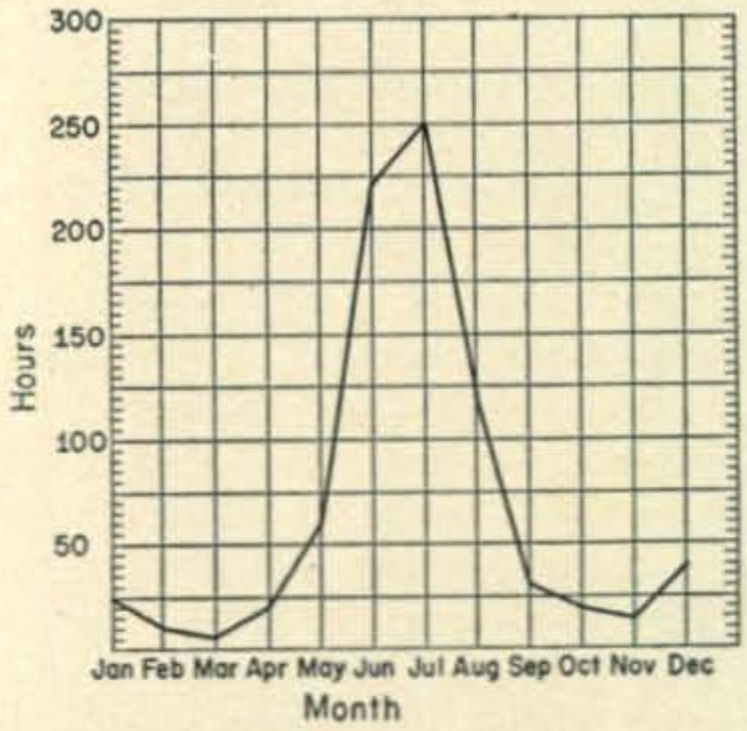


Fig. 2—Total number of hours sporadic-*E* openings occurred on 10 meters each month during a typical year of moderate sunspot activity in the U.S.A.

What Is Sporadic-*E*?

Although E_s ionization has been under study by scientists and engineers for more than thirty years, its nature and origin still remain largely a mystery. However, some general characteristics about E_s behavior are known.

Sporadic-*E* ionization varies geographically.

*PROPAGATION Editor, *CQ*.

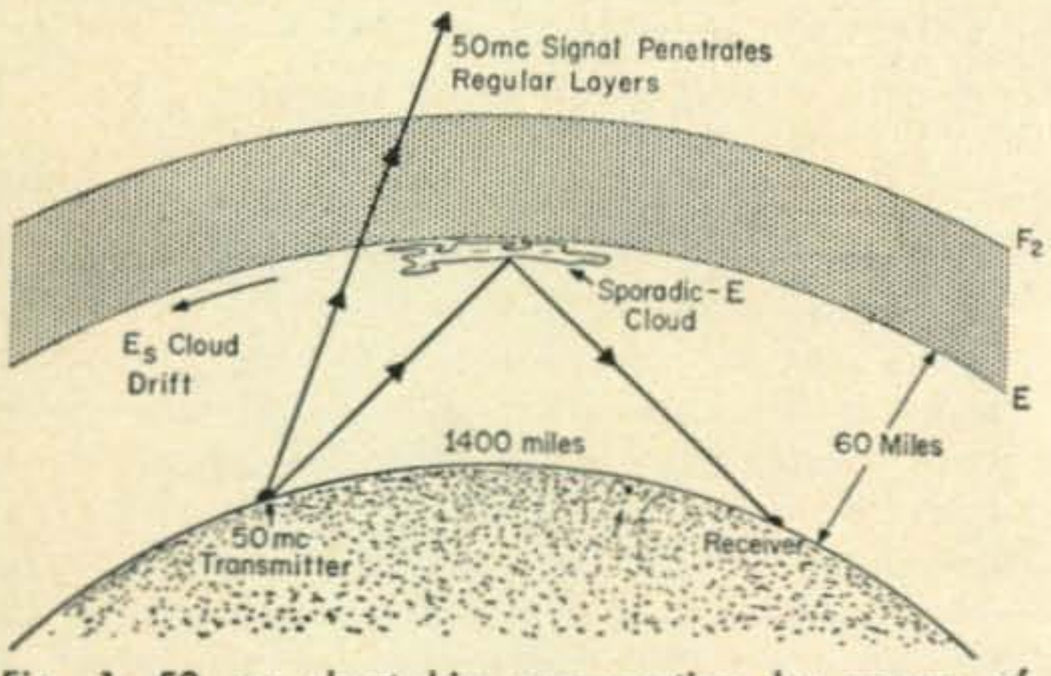


Fig. 1—50 mc short-skip propagation by means of sporadic-*E* reflection. (Not drawn to scale.)

It occurs most frequently, and with greatest intensity, in extreme latitudes in the vicinity of the earth's auroral zones, and in equatorial regions. In mid-latitudes, for example in the United States and Europe, it occurs most often during the late spring and summer months and during December, but hardly at all during other periods (see fig. 2). In mid-latitudes, sporadic-*E* has a tendency to peak during the late morning hours and again around sunset (see fig. 3).

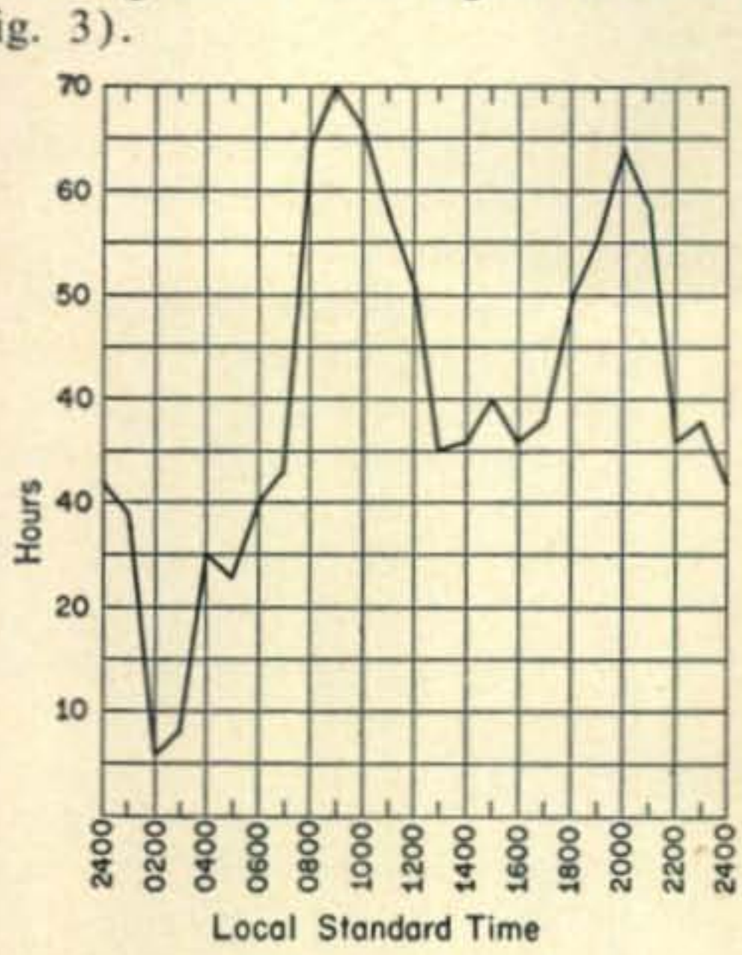


Fig. 3—Number of hours per-year sporadic-*E* occurred on 10 meters during typical period of moderate sunspot activity in the U.S.A.

Sporadic-*E* ionization is subject to erratic and often rapid variation. The ionized clouds are known to drift, generally in a westerly or northwesterly direction, at rates of approximately 150 to 250 miles per hour. The drift appears to be due to winds believed to exist in the ionsphere. Radio amateurs were responsible for first detecting this curious behavior of sporadic-*E* clouds during a research program (Project RASO) conducted by *CQ* for the U.S. Air Force during 1949 and 1950. Because of drift, reception areas can change within a relatively short period of time, and it is not uncommon for a sporadic-*E* opening to fade out completely from an S-9 plus level in a matter of a few minutes.

There have been surprisingly few long-term scientific studies of sporadic-*E* propagation, and the relationship between it and the sunspot cycle is not yet completely known. Based on recent studies, however, it appears that sporadic-*E* at mid-latitudes in the northern hemisphere occurs more frequently as the sunspot cycle declines [1,2]. If this be the case, sporadic-*E* ionization is likely to be more prevalent this summer, and for the next three summers, as the present sunspot cycle declines steadily towards a minimum.

[1]Morgan & Morgan, "50 Mc Propagation Effects; Mid-Point Report On A Six-Year DX Study." *CQ*, June, 1962, p. 37.

[2]Chadwick, W. B., *Variations In Frequency of Occurrence of Sporadic*-E; *1949-1959*. Technical Note No. 117, CRPL, National Bureau of Standards, Bouider, Colorado, 1962.

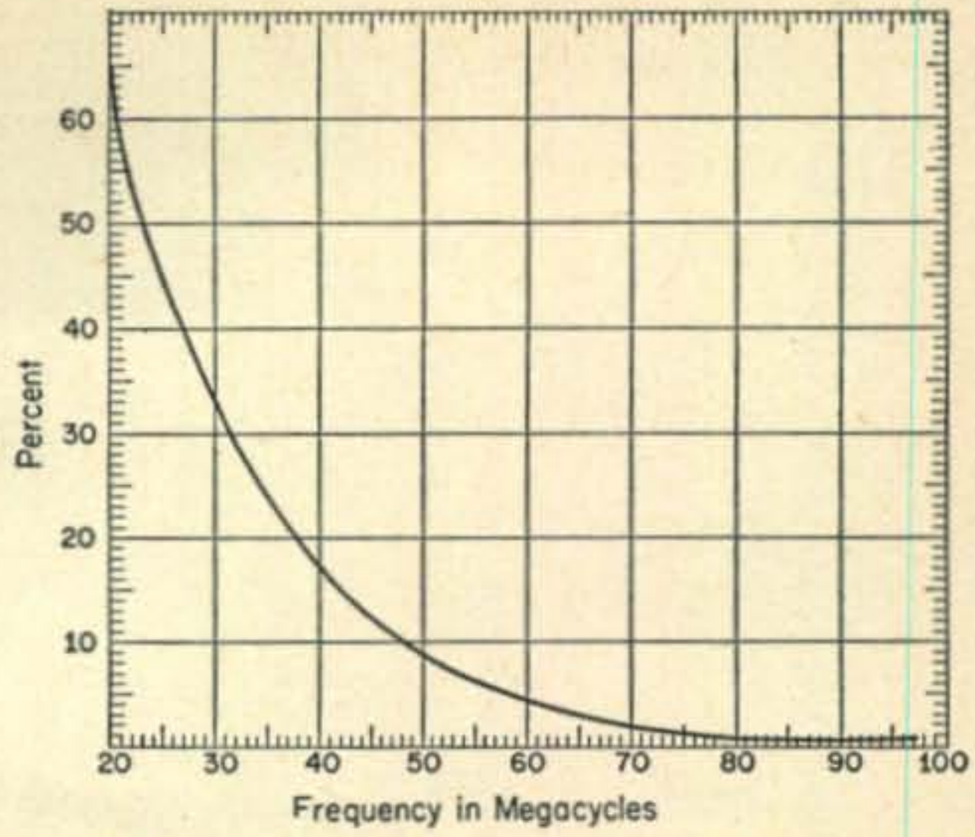


Fig. 4—Percentage of time sporadic-*E* propagation occurs during summer months during moderate sunspot activity in the U.S.A.

What Causes Sporadic-*E*?

Scientists and communication engineers have been baffled by sporadic-*E* propagation ever since it was first observed more than thirty years ago. While it has been studied for some time, its cause is still unknown. Since it occurs more often during the hours of daylight, it appears that ultra-violet radiation might play a part in its formation. Its general behavior, however, does not coincide closely with the known pattern of ultra-violet radiation from the sun. Since sporadic-*E* also occurs quite often at night, especially in polar regions, some other source of ionization must also be responsible for its formation. Recent suggestions point towards ionization from meteor trails and from auroral displays as other possible sources. Another school of thought attributes sporadic-*E* formation to thunderstorms, changes in barometric pressure and movements of air masses.

Predicting Sporadic-*E* Openings

Since little is known about the source of energy responsible for producing sporadic-*E* ionization, its behavior cannot be predicted by positive means at the present time. Statistical studies show, however, that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During the next two or three months, short-skip propagation over distances up to about 1400 miles should be possible in the northern hemisphere for nearly 65% of the time on 15 meters, 35% of the time on 10 meters, and about 10% of the time on 6 meters (see fig. 4). Although very remote, there is a possibility that 2 meter openings may also occur during periods of intense E_s ionization. The most likely times for short-skip openings are between 8 and 11 A.M. and 6 and 8 P.M., Local Standard Time.

Here's a tip that's worked very well during past years for determining when 10 and 6 meters would open for shortskip E_s propaga-

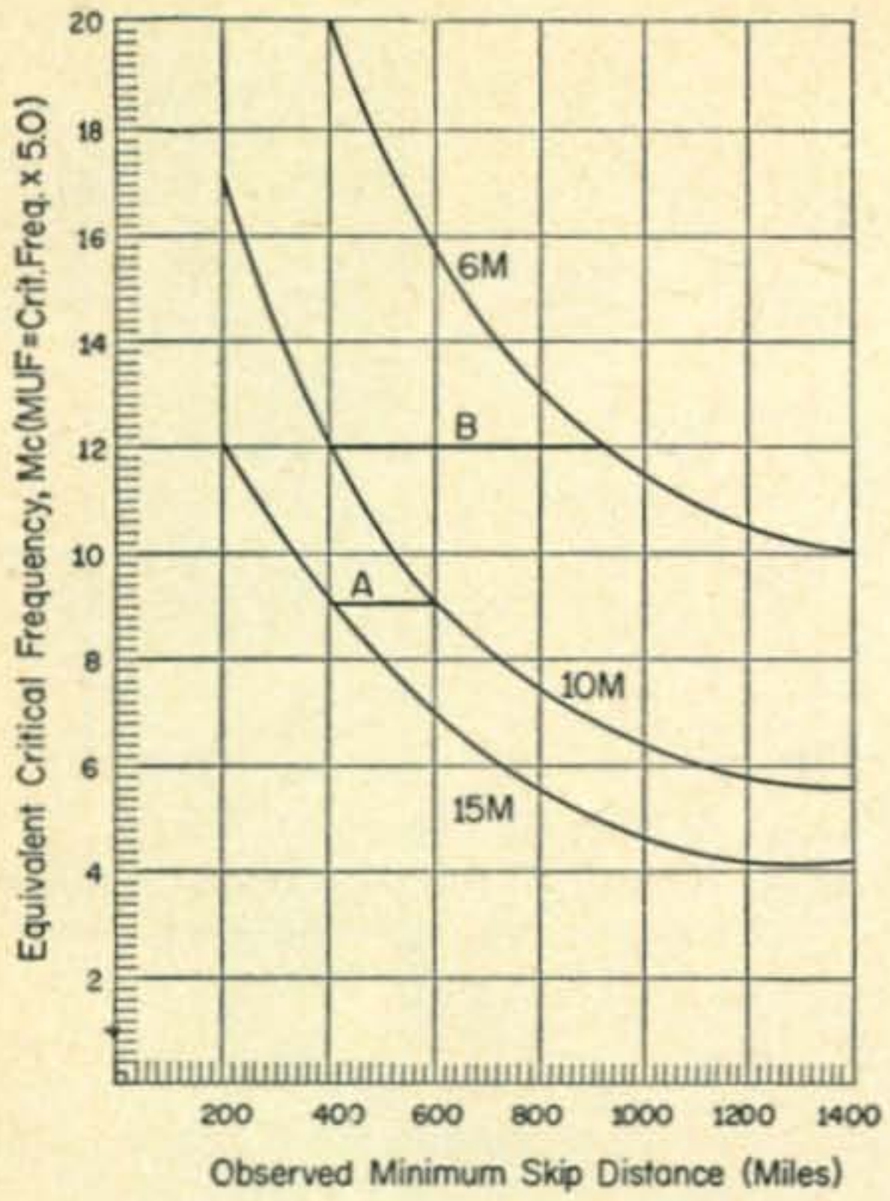


Fig. 5—Critical Frequency in mc, compared to observed minimum skip distance in miles. See text for examples.

tion. The geometry of skywave propagation is such that as the skip distance *decreases* on 15 (or 10) meters, the highest frequency (m.u.f.) that will be reflected by the sporadic-*E* cloud is *increasing*. By observing the minimum skip distance on 15 (or 10) meters, the m.u.f. in the direction of the skip can be determined from fig. 5 with fairly good accuracy, as well as whether or not 10 (or 6) meters is open, and what the minimum skip distances are on these bands.

As an example (B in fig. 5), the minimum skip observed on 10 meters in a certain direction is 400 miles (it's the distance to the *nearest* skip station heard that counts in this case, not the furthest station heard). The intersection between 400 miles observed minimum skip distance and the 10 meter curve corresponds to a critical frequency of 12 mc, or an m.u.f. of 60 mc, since the m.u.f. is approximately equal to the critical frequency multiplied by a factor of 5. This means that the m.u.f. is high enough for 6 meter (50 mc) short-skip openings in the same direction. The minimum skip distance on 6 meters can be found from fig. 5 by locating the intersection between the 12 mc critical frequency and the 6 meter curve. The resulting value of minimum skip distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than *500 miles* away on 10 meters, or less than *350 miles* on 15 meters, the chances are very good that 6 meters will open in the same general direction.

From most locations in the continental United States, 1400 mile openings should extend into both Canada and Mexico. From the southern third of the country it should also be possible to work a rather large number of countries in Central America and the West Indies during 15, 10 and 6 meter sporadic-*E* openings. DX television reception also increases considerably as a result of sporadic-*E* ionization during the summer months. Signals from low band v.h.f. TV stations (channels 2-5), which normally can not be received more than 75 or 100 miles away, suddenly are propagated up to 1400 miles, often at very strong levels. While freak DX television reception via E_s may prove interesting, it will often cause interference to local stations on the same channels.

According to observations made during 1961, sporadic-*E* propagation on 15, 10 and 6 meters appeared to occur more often last summer than ever before. It is very possible that an even greater number of openings will occur during the summer of 1962. ■

A Speedy QSO File

BY HARTLAND B. SMITH*, W8VVD

ONCE you've had a QSO with a particular ham, it is always nice to be able to call him by name when you run across him again on the airways. Nothing inflates a person's ego more than to think that he's important enough to be remembered, even after the passage of a year or more. Unfortunately, when you've worked two or three thousand different stations, the calls, names, QTH's and other pertinent information concerning a specific QSO have a tendency to become lost in the far corners of one's brain.

We've all heard the frustrated op who frantically shuffles through the pages of his log in a vain attempt to learn why the call of the station he's talking to seems so familiar. This is the guy who's absolutely certain he's worked the station before, but he just can't recall when it was. Rather than be caught in a similar situation, a number of fellows have bravely attempted to aid their failing memories by means of a file system containing 3 × 5 file cards. Unfortunately, the usual arrangement of this kind is subject to several pitfalls.

Most important of these is the danger of falling behind whenever you run out of cards. A lapse of only a few days will often result in a fatal accumulation of unrecorded QSO's. On

*467 Park Avenue, Birmingham, Michigan

Fig. 1—When properly arranged, a single card file no larger than the one shown here can provide a convenient source of information concerning QSO's with more than 14,000 different hams.

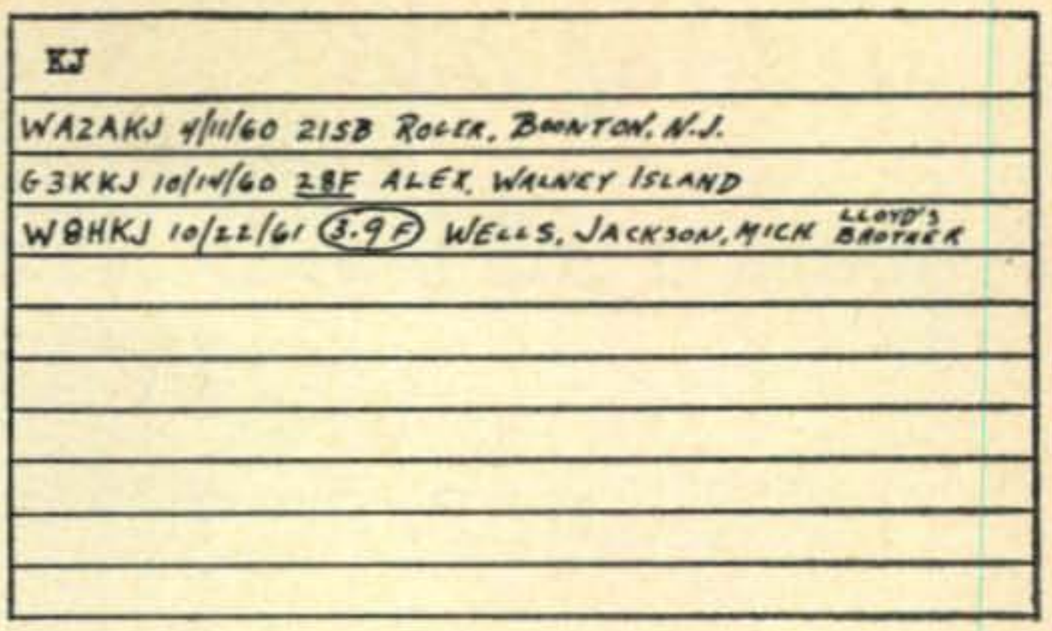


Fig. 2—A typical 3 × 5 file card from the author's file system. Note that all calls ending with the same two letter combination are recorded without regard to prefix, on a single card.

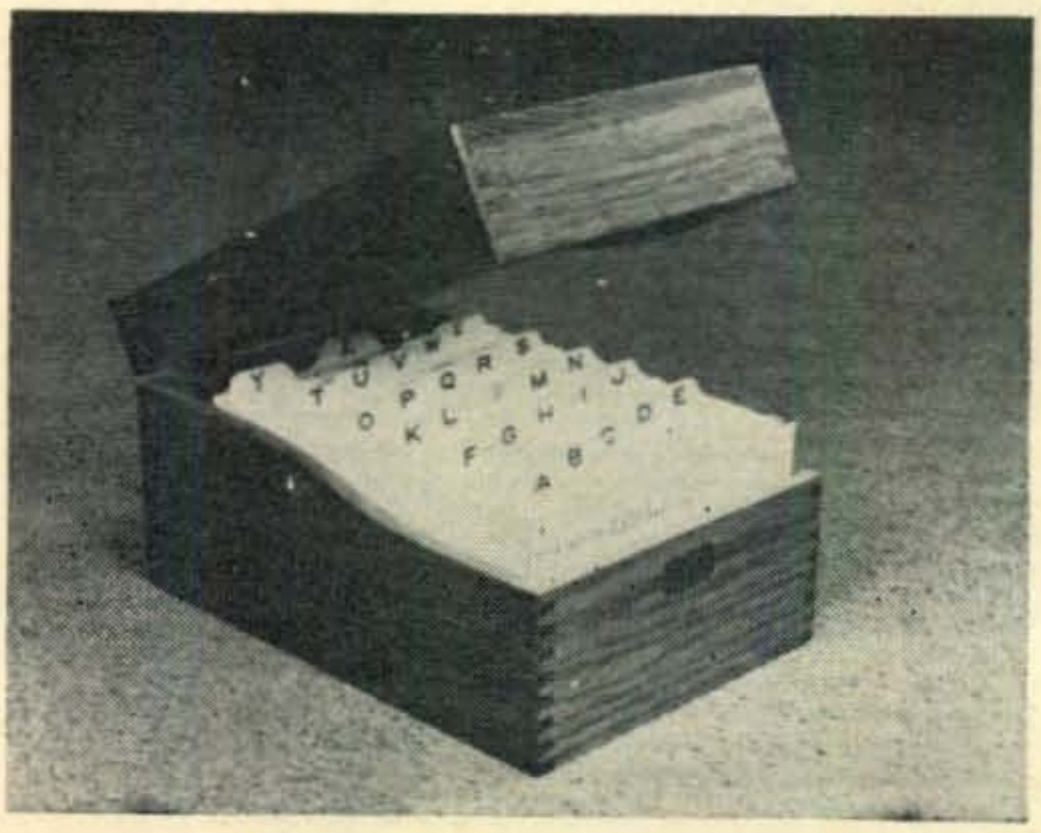
the other hand, if you conscientiously fill out a separate card for each station you work, it won't be long until the filing system takes up almost as much space as the rig. Furthermore, unless you index the cards properly, you'll often spend lots of precious QSO time searching for data concerning previous contacts.

Last Letter Indexing

The filing system I use overcomes these drawbacks. Its most important feature is the indexing method. Information is filed according to the last two letters of a station's call. Thus, W9HKA appears under KA, while HZ1AB will be found under AB. This form of indexing prevents file card bunching, a disease which plagues most "by prefix" setups.

The average operator works only a few CE's or VU's, but the chances are he has chatted with hundreds of W6's. Consequently, if he indexes by prefix he won't encounter much difficulty locating facts about a QSO with Chile or India, but he'll have a really tough time pawing through his huge W6 stack trying to find info on a specific west coast ham.

Last letter indexing results in a compact system from which wanted information can be rapidly located. As a matter of fact, with this arrangement only 702 file cards are needed to provide enough space for recording vital facts concerning QSO's with more than 14,000 different stations. Best of all, you can find material pertaining to any one of these 14,000 stations in 10 seconds or less!



To organize a file system of this type, you'll need a box large enough to accommodate 702 3 × 5 file cards plus 25 A-through-Z index cards. Each of the 702 3 × 5 cards must be marked in the upper left hand corner with either one or two letters of the alphabet. Unless you're a superb printer, you'll be wise to type these letters, because the more nearly uniform their appearance is, the easier it will be to search through the file. On the first card type the letter "A." On the next card put "AA." The card after that gets "AB." Continue in this manned until you have typed 27 cards, the last one bearing "AZ."

The 28th card will require "B," the 29th "BA," the 30th "BB" and so on, until you reach the 702nd card on which goes "ZZ." Each group of 27 cards may now be placed in the file, separated by the appropriate index cards as shown in fig. 1.

Using the System

At the moment you begin a QSO, reach for the proper card and fill it in. I prefer to put down the call first, followed by the date, band, mode (C, F, SB), operator's name and QTH. In the remaining space I often add a short comment that will help me to remember either the particular QSO or something special about the operator. If I send a QSL, I draw a line under the band and mode. When I receive a QSL, I continue the line until it forms a circle. Then, I can thank the fellow for his card the next time I work him.

The arrangement of fig. 2, which allows a G3 to be sandwiched between a WA2 and a W8 may, at first glance, appear rather unsystematic. However, in actual practice even if a 3 × 5 card is almost filled on both sides, it takes but a moment to glance over it to learn if a specific station has been worked. In fact, it takes much less time to scan a single random filled card than to search through a carefully sorted stack of cards made out separately for each station worked.

No claim of originality is made for the system which has been described. It is an adaptation of one used by an amateur in the southwestern part of the U.S. whom I once contacted. Unfortunately, I can't pass along his call. You see, I didn't have a filing system of my own at the time of our QSO. ■

Results of the

1961 CQ World-Wide DX (C.W.) Contest

BY FRANK ANZALONE*, W1WY

THAT was quite a week-end of DXing we had back in November. The turnout in this country was probably held down by the anticipated poor conditions, but the dyed-in-the-wool contest addicts were handsomely rewarded by one of the best contest week-ends we have ever had.

On an average, scores are higher than they ever were and in most cases the Trophy winners made new highs in their respective divisions.

In his third try, Josef Plzak, 7G1A came up with another million-plus score on all bands to make him King for 1961. However having won the Trophy in 1959, Josef is not elegible for this year's award and the Larry LeKashman, W9IOP Cup goes to CX2CO next in line in the all band category. This makes Ricardo Sierra, Jr. a double winner for the second straight year. With no more worlds to conquer, maybe Jr. and Sr. will team up and make a go of it as multi-operators next year.

It was a close one with KW6DG, but Layne lacked those few extra points in his multiplier, although his contact total was much higher. Maybe he lost out during that short period when he had to shut down because of a typhoon that just skirted Wake Island. Too bad, since Layne will be back in the States as KØSLD for the next contest.

In the fourth spot, is our old friend KH6IJ, with a score lower than his normal average. Had "Nosey" equaled his last year's output the Trophy would have finally gone to Hawaii.

The call 5N2LKZ seems to be a new one in our contest listing. Making fifth in the Top Ten, on his first try, is indeed commendable. Hope Owen will again take advantage of his choice location next year. With the exception of UB5WF who always comes through with a good score, the rest of the spots in the Top Ten are occupied by stations in the USA. This is the best showing ever made by our boys in world competition. A fine tribute to W4KFC, W3GRF, W4YHD and W4DHZ, all tried and true contest veterans.

Over in the Single-Band division the competition was keen and the scores were high. Once again it was 14 mc where the high scores were made and this year's winner is none other than Vladimir Semenov, UA9DN last year's all band winner. So make room for the John Ryan, W7KVU Cup and put it alongside the W9IOP Trophy you won last year. Congratulations Vladimir, perhaps we'll see you in the Phone section next year.

Both ZS2HI and KH6DLF also have fine scores on 20. Ken can give it another try next year but Ed has returned to the States and is now in W1-land, so his golden opportunity from KH6 is no more.

Over here on our side, W1BIH was high man on 14 mc. Evidently John decided to take it easy after plans for a Multi-Operator entry did not materialize.

Both 7 mc and 21 mc received equal attention and the activity was divided according to one's sleeping habits. Those with normal habits decided that 15 would fit their requirements and found the band hopping with Europeans from daybreak to early afternoon. After that, it was slim pickings to other areas of the world. Here on the east coast openings to the Pacific and Asia were almost non-existant, although other areas of the country were getting through.

PY4GA took advantage of the north-south opening and is high scorer on that band. And W2WZ, once again, is at the top of the list for our boys. Who is going to be the first one to dethrone Al?

The DJ3JZ Gang preparing for the c.w. week-end. That's a tri-bander going up, adding to the extensive antenna farm needed for multi-transmitter operation. P.S. They made good use of it.

*Contest Committee Chairman, *CQ*.

Openings in the Pacific and Asia were of short duration as shown by the lower scores.

The "night owls" who stuck to 7 mc found it very rewarding. Glowing comments of "never heard or worked so much DX on 40" were found only on logs of those blessed with beams or other high-gain arrays. And those that came up with six figures scores had that, plus power to boot. Of course a little savvy on the workings of 40 helped a bit too.

Top man on the totem pole is Don Miller, W9WNV perched on top of a 250 foot hotel building facing Lake Michigan. With an assortment of four arrays and antennas covering all directions, he was able to come up with a big enough multiplier to overcome the point advantage of his nearest competitor, Bob Martinez, K2DGT on the east coast. So to Don goes the new 40 Meter Trophy donated by the Israel Amateur Radio Club.

A member of that club, 4X4DH is third on the list. Followed by W3KFQ. Clarence has won the 3rd district award on each band, 10 through 40, the past 4 years. If he maintains that schedule he should be showing up on 80 next year. Very close and with an identical multiplier is W8FGX, Jake, the 40 meter perennial. With these conditions and a Trophy to shoot for you are going to see more and more stations taking a crack at the 40 meter band.

The 80 meter activity was mostly confined to Europe, with OK3DG at the top of the list. Followed by DJ3WE, PAØLV and SP5IA.

On our side of the pond the surprising high scorer is K6EIV with W1BU and VE3AGX next in line. Out in the mid-west W9PNE and W9PWU got involved in a very close one.

As for 160, well what can I tell you? Only one log was received from our boys. Except for a few multiplier seekers over here all the top band activity was confined to Europe, especially among the Czechoslovakian group.

The 28 mc band was very spotty. Some of the all-banders kept pecking at it for an occasional multiplier but very few stuck it out for single-band awards. Those that did, had very little to show for their efforts, the openings were very few and of short duration. With 21 mc wide open to Europe it was hard to realize that the m.u.f. didn't reach 28 mc.

The JAs who usually occupy 10 in droves, avoided it like the plague and went to 21 mc. Our K2HWL is to be commended for sticking it out the way he did. We know that the band was open for short periods but those that gave it a try went to more productive fields after they had cleaned up the few stations that were on the band.

Once again it was the Europeans that dominated the activity in the Multi-Operator Single-Transmitter division. But it was the only entry from Australia, VK5NQ that tops the heap and wins the Tony Susen, W3AOH Trophy. Jeff and Tubby Vale really poured on the coal and

The Gang at W6RW—Standing: K6ERT, Gregg; K6PJY, Dan and W6PZH, John; sitting: W6BXL Chuck and W6RW, Rog himself.

lead the field with plenty to spare. Nice going fellows, The "Mug" is on its way to you.

The c.w. portion of the HV1CN story was adequately covered in the April issue so little more can be added here.[1] Altho Al and Larry came up with the highest QSO total ever made by a single transmitter station in this division, it was impossible to break through the European barrier and run up a good multiplier. But they sure made a lot of the boys happy with a new one.

A new club group in Bulgaria takes the third spot with LZ1KSV of the Sofia City Radio Club, beating out LZ1KBA who usually takes top honors for Bulgaria.

VQ4RF, the Trophy winner, in the Phone contest, gave it a go on c.w., but evidently brass pounding requires a different technique and the best Frank and Henning could do was 4th. Even though they took on Jock, VQ4DW as a third hand.

The final honor goes to another new club group, UJ8KAA, reflecting the added activity from Asia.

The Multi-Transmitter division had a better representation than during the Phone contest and the "Big Boys" ran up some eye-opening scores. With the exception of W3AOH, last year's winner who did not put in an appearance this year, it is essentially the same group that has been battling it out for the past 3 or 4 years.

The 1959 winner, DJ3JZ, again leads the field. Hardi Ludwig and his boys planned this one for months and their hard work paid off. Congratulations fellows, we are sending you a suitably engraved plate for the base of the Trophy you won in 1959.

The Buzz Reeves, K2GL Trophy therefore goes to the Potomac Valley group at W3MSK who were right on DJ3JZ's heels with a much bigger multiplier but lacking in contact points.

The Ukrainian power house of the Kharkov Radio Club, UB5KBB, for the third straight year ends up in third position, but with a much higher score than in previous years. They have

[1]LeKashman, L., "DXpedition to HV1CN," *CQ*, April, 1962, p. 37.

7G1A—Josef Plzak meditating just before he got down to the serious business of contesting. Now that he is back home in Czechoslovakia he will have plenty of time to think about the good old days.

a good multiplier and a record number of contacts but unfortunately to many of them were Europeans and good for only one point. Watch out in 1962 is their slogan.

Roger Mace and his west-coast gang are still in there pitching to put W6RW back in the lime light but with present day propogation conditions it's pretty tough from the west coast. Even so they always manage to make the Top Five, although not the lofty heights they reached back in the lush days of 1957. "But there will come a day," sez Rog.

And a new one in the big time, W2JT did surprisingly well with only a two-man crew and limited multi-transmitter operation. Maybe this will give the North Jersey gang ideas for next year.

There is no question as to where the *CQ* Plaque goes this year. Once again the Potomac Valley Radio Club heads the list. With three members in the Top Ten and their "Big Gun" a Trophy winner in the Multi-group, how could they miss? The North Jersey DX Association made their usual fine team effort but still lack that big clincher. A few new clubs, among these the Virginia Century Club, show very nice totals. However its disappointing to see the fall-off on the west coast and the small representation of potential powerhouses here in the east. These club members are sure missing a lot of fun.

The score of the German DX Team cannot be considered for an award since once again their secretary failed to make an official entry.

Since there are so many foreign clubs, we found it necessary to cut the listing down to only the large ones and those who sent in a summary sheet of their participating members.

The 1145 logs received this year is a substancial increase of 144 over last year. However the 103 in the country total is a drop of 4 over the countries represented last year.

It was the same hard working crew of Andy Malashuk, W1GYE; Mac McIntire, W2BO; and Ben Lazarus, W2JB, that made this detailed report possible. Wonder if you fellows realize the work involved in a project of this size. Man! you just don't have any idea.

That's it for this one, 73 for now. Frank, W1WY.

U.S.A. Club Scores

Potomac Valley Radio Club	**4,883,473**
North Jersey DX Assn.	2,721,685
Southern California DX Club	1,268,174
Virginia Century Club	855,441
Northeast DX Association	658,402
West Gulf DX Club	532,164
El Ray Radio Club (Mass.)	337,208
Badger Amateur Radio Society (Wis.)	228,902
Ohio Valley Amateur Radio Assn.	228,842
Nashua Mike and Key Club (N.H.)	175,048
Hamfesters (Ill.)	171,152
Northern California DX Club	128,514
Detroit Amateur Radio Association	119,725
Southeastern DX Club	117,088
Frankfort Radio Club	105,930
QCWA DX Club of New York	66,721
Indian Hills Radio Club (Ohio)	49,406
Genesse County Radio Club (Mich.)	28,012
Greater St. Louis DX Club	15,976
Florida DX Club	12,816
Hampden County Radio Assn. (Mass.)	5,672
St. Mary's High School Radio Club	4,720
Niagara DX Association (N.Y.)	2,680
Order of Boiled Owls (N. Mex.)	2,520
Blackstone Valley Radio Club (R.I.)	1,674

Foreign Club Scores

German DX Team	3,064,252
Uruguay DX Club	2,008,892
Central Radio Club (Czechoslovakia)	1,600,847
Sofia City Radio Club (Bulgaria)	1,360,066
Kharkov Radio Club (Ukraine)	1,283,407
Swiss DX Radio Club	906,776
Far East DX-Ploiters (Japan)	822,290
Turun Radio Amateur Club (Finland)	370,237
Zagora Radio Club (Bulgaria)	358,581
Japan DX Radio Club	356,069
Amateur Radio Society of Iran	348,877
Okinawa Amateur Radio Club	308,982
SP DX Club (Poland)	269,437
Radio Club of Tallinn (Estonia)	135,843
Shizuoka Amateur Radio Club (Japan)	125,140
Warsaw Amateur Radio Club	112,480
Bremerhaven Radio Club	67,320
Taiwan-American Radio Club	62,532
Doso Amateur Radio Club (Bulgaria)	50,882
South Birmingham Radio Society (England)	48,500
R.A.F. Little Rissington Amateur R.C.	46,200
Kanazowa Amateur Radio Club (Japan)	16,856

Top Ten

ALL BAND—SINGLE OPERATOR

7G1A	**1,177,893**		
CX2CO	**856,416**	W4KFC	645,663
KW6DG	841,334	W3GRF	622,506
KH6IJ	791,840	W4YHD	544,504
5N2LKZ	777,155	UB5WF	514,022
		W4DHZ	464,002

Top Five

MULTI-OPERATOR SINGLE TRANSMITTER

VK5NQ	**709,000**		
HV1CN	529,356	VQ4RF	431,538
LZ1KSV	452,782	UJ8KAA	239,940

Top Five

MULTI-OPERATOR MULTI-TRANSMITTER

DJ3JZ	1,451,437		
W3MSK	**1,405,767**	W6RW	538,486
UB5KBB	1,203,350	W2JT	521,554

Continental Leaders

SINGLE BAND

28 Mc

K2HWL	7,130
CX9HJ	4,470
G5RP	3,360

21 Mc

PY4GA	105,616
W2WZ	77,910
ZS6APQ	74,808
ZB1HC	65,807
ZL2GS	22,607
JA3IW	22,385

14 Mc

UA9DN	**274,412**
ZS2HI	219,034
KH6DLF	205,816
PY4OD	188,374
W1BIH	142,374
G4CP	131,145

7 Mc

W9WNV	**146,510**
4X4DH	117,810
VK3ADB	78,588
OK2KOJ	69,048
PY4AP	12,204

3.5 Mc

OK3DG	18,300
4X4WF	8,019
K6EIV	7,410

1.8 Mc

OK1ADX	740
K7EKD	24

U. S. A.

Leaders and Runners-up

21 Mc	W5LGG	66,444
14 Mc	K2IEG	134,928
7 Mc	K2DGT	134,820
3.5 Mc	W1BU	5,104

Number groups after call letters denote the following; Band (A-all), final score, number of QSO's, Zones and Countries. Certificate winners are listed in **bold face.**

SINGLE OPERATOR
North America

United States

K1JTC	**A**	**337,208**	**484**	**84**	**160**
K1RTB	"	144,690	283	68	127
W1JYH	"	113,524	226	69	133
W1WAI	"	97,811	227	58	99
W1FZ	"	48,831	142	41	82
W1EZD	"	13,800	68	27	65
W1PLJ	"	598	12	11	12
W1WY	**21**	**60,734**	**228**	**27**	**70**
K1MOD	"	36,408	172	22	52
W1OJR	"	33,915	144	26	59
W1UUK	"	7350	58	19	31
K1JYN	"	3535	37	14	21
W1BIH	**14**	**142,374**	**414**	**36**	**86**
W1GYE	"	87,840	256	34	86
K1MLI	"	52,788	177	35	71
K1PNN	"	13,668	72	21	47
K1NHR	"	7700	55	19	36
W6KFV/1	**7**	**14,617**	**108**	**15**	**32**
K1DIR	"	11,139	85	15	32
W1NJL	"	6533	51	18	29
W1BU	**3.5**	**5104**	**45**	**17**	**27**
W2BXA	**A**	**362,799**	**533**	**81**	**162**
K2DCA	**A**	**277,632**	**403**	**83**	**158**
W2AGW	**A**	**250,632**	**390**	**80**	**156**
W2EQS	"	174,000	284	97	153
W2GUM	"	123,648	269	52	109
W2CYS	"	118,650	239	57	118
W2JAE	"	117,279	274	61	96
WA2OJD	"	108,996	223	68	118
W2LV	"	106,704	226	63	108
W2DEW	"	96,264	218	66	102
W2OBX	"	82,764	181	63	108
K2GHM	"	71,916	175	59	97
W2YTH	"	54,800	148	46	91
W2OKM	"	31,512	108	40	61
WA2IEK	"	26,992	94	45	67
W2FXN	"	26,775	93	39	66
W2BHM	"	23,230	90	40	61
K2BSM	"	17,216	90	23	46
W2GKZ	"	13,515	62	36	49
WA2IKL	"	10,488	71	19	47
K2TQC	"	7808	48	26	35
W2GT	"	7345	44	27	38
W2BO	"	4664	38	17	27
W2TP	"	920	16	10	10
K2HWL	**28**	**7130**	**62**	**17**	**29**
WA2WDH	"	1010	17	10	13
K2YFE	"	200	16	5	5
W2WZ	**21**	**77,910**	**286**	**28**	**70**
W2LAX	"	45,504	171	28	68
W2GZZ	"	14,874	79	22	45
W2DJT	"	12,705	77	18	37
WV2QHE	"	1311	23	5	14
K2IEG	**14**	**134,928**	**340**	**36**	**108**
K2UVU	"	95,634	270	36	90
W2LPE	"	78,430	247	32	78
W2PCJ	"	48,970	139	33	85
K2EAC	"	38,896	161	28	60
K2ECL	"	31,428	135	22	59
K2QHL	"	30,874	127	29	57
K2AAC	"	9858	60	19	43
W2JB	"	1323	21	12	15
K2DGT	**7**	**134,820**	**445**	**32**	**73**
W2AQT	"	4960	45	14	26
K2KFP	**3.5**	**3485**	**37**	**18**	**23**
W3GRF	**A**	**622,506**	**620**	**118**	**241**
W3EIV	**A**	**221,343**	**314**	**96**	**171**
W3MSR	"	190,244	306	93	146
W3TMZ	"	154,037	256	78	143
W3VKD	"	19,500	90	25	50
W3AEL	"	15,192	81	29	43
K3MZY	"	11,154	71	30	37
W3FDH	"	10,295	61	24	47
W3AYD	"	7688	46	25	37
W3JO	"	7552	47	22	37
K3NZV	"	5841	35	25	34
W3UHN	"	2541	27	12	21
W3BKE	"	1340	32	14	23
K3OWE	"	650	15	12	13
W3LSG	**21**	**59,925**	**248**	**26**	**59**
W3QQL	"	25,662	118	24	54
W3JTC	**14**	**117,652**	**306**	**35**	**99**
W3DAO	"	55,438	196	34	72
W3ZQ	"	19,116	87	27	34
K3AIG	"	12,834	77	24	38
W3WV	"	3320	32	20	20
W3KQD	"	210	10	7	7
W3YHR	"	24	2	2	2
W3KFQ	**7**	**105,930**	**344**	**32**	**75**
W3MCG	7	546	13	5	9
W4KFC	**A**	**645,663**	**635**	**121**	**252**
W4YHD	**A**	**544,504**	**584**	**121**	**225**
W4DHZ	**A**	**464,002**	**545**	**103**	**219**
W4YWX	"	126,519	247	66	115
W4OM	"	96,693	201	53	114
W4OPM	"	85,330	193	57	104
W4BJ	"	80,235	160	54	81
K4BAI	"	75,852	188	56	91
W4CKD	"	73,698	177	65	108
W4LRV	"	42,090	165	48	74
W4ZM	"	35,750	104	43	67
K4MXF	"	27,450	94	53	69
W4GF	"	19,364	82	39	55
K4ORQ	"	17,316	88	31	47
W4QCL	"	12,495	56	34	51
W4JJL	"	8584	57	22	36
W4QVJ	"	6804	46	21	33
W4OMW	"	4958	43	31	36
WA4DQM	"	3760	28	21	26
K4WUY	"	3698	35	16	27
W4HOS/4	"	1200	15	15	15
W4JAT	**21**	**42,688**	**168**	**28**	**64**
W4VZB	"	25,228	129	21	47
W4EEO	"	6612	40	21	37
W4SNU	"	5264	44	17	30
W4ZYQ	"	1932	23	18	69
W4NYF	**14**	**6800**	**61**	**19**	**31**
K4SXT	"	4512	45	20	27
W4SSU	**7**	**9450**	**62**	**21**	**42**
W4ZYS	"	1485	21	13	14
W4ZOK	"	1150	21	9	14
K4LGI	**3.5**	**3700**	**43**	**17**	**20**
W4SHJ	"	1650	30	14	16
W4WHK	"	1500	25	13	17
W5WZQ	**A**	**226,500**	**329**	**95**	**155**
W5BUK	"	46,665	124	63	90
W8RMF/5	"	10,101	57	44	47
K5VTA	"	2632	25	22	25
K5BAJ	"	54	6	5	4
W5LGG	**21**	**66,444**	**211**	**35**	**78**

W5EHY	....	"	3456	35	13	23
K5YNA	....	"	3358	32	20	26
K5UYF	....	"	1140	20	8	11
W5KC	.....	**14**	**32,643**	**137**	**31**	**62**
W5BOS	....	14	25,398	125	28	55
W5PM	....	"	15,504	79	27	41
W5EJT	....	3.5	416	15	7	9
W6IRD	....	**A**	**247,520**	**388**	**98**	**140**
W6TZD	....	**A**	**147,947**	**295**	**81**	**116**
W6GRX	....	"	88,357	213	57	92
K6BWX	....	"	76,580	199	55	85
W6ERS	....	"	50,336	166	54	67
W6CBE	....	"	48,720	152	49	67
K6IEC	....	"	37,065	127	43	62
W6QDE	....	"	23,205	105	38	47
W6FKZ	....	"	10,200	62	25	35
W6ISQ	....	"	8840	63	25	27
W6DCC	....	"	7524	51	34	32
W6NEX	....	"	7095	47	24	31
W6BIL	....	"	6519	46	24	29
W6ID	.....	"	5250	43	24	29
W6CLZ	....	"	4181	43	17	20
K6PJT	....	"	3960	39	15	21
WA6KZI	..	"	2156	34	9	13
W6BSY	....	**21**	**25,416**	**127**	**24**	**48**
W6TMX	..	"	23,595	142	25	40
WV6SBO	..	"	3168	40	15	18
W6EPZ	....	**14**	**85,910**	**249**	**34**	**87**
W6GHM	..	"	80,704	269	33	71
W6AFI	....	"	47,005	197	29	56
K6LEB	....	"	45,299	167	30	67
W6CYI	....	"	33,418	146	24	53
K6PDA	....	"	27,643	144	22	55
WA6AYF	..	"	1260	18	14	16
K6VTQ	....	**7**	**65,136**	**256**	**32**	**60**
W6UED	....	"	15,400	108	22	28
K5TER/6		"	9248	104	14	18
WA6DNM		"	609	13	11	10
K6EIV	....	**3.5**	**7410**	**106**	**17**	**22**
W6BYB	....	"	6253	70	16	21
W6FOZ	....	"	4716	53	17	19
K6BPR	....	"	3193	45	13	18
W6NKR	....	"	2370	34	14	16
W7PQE	....	**A**	**115,596**	**262**	**72**	**97**
W7POU	..	"	11,940	67	27	33
W7BAJ	....	"	3626	34	24	25
W7VY	.....	**14**	**85,284**	**288**	**33**	**70**
W7PGS	....	"	59,073	203	29	68
K7MVR	....	"	16,200	117	20	34
W7CAB	....	"	7680	69	16	24
W7BTH	....	"	5400	49	20	25
K7JCI	....	"	3584	45	10	18
W7DLR	....	"	3534	38	15	16
K7CAD	....	3.5	544	17	8	9
K7EKD	....	**1.8**	**24**	**13**	**3**	**3**
W8JIN	....	**A**	**103,125**	**297**	**41**	**84**
K8RMK	....	"	46,368	156	47	77
W8KSR	....	"	33,109	111	47	66
W8IQS	....	"	28,012	104	34	60
K8LJR	....	"	25,452	99	39	62
K8VIX	....	"	17,460	113	37	53
W8KC	.....	"	12,444	75	26	35
K8HTM	....	28	15	4	3	2
W8TTN	....	**21**	**23,857**	**117**	**23**	**48**
W8UMR	..	"	20,860	106	21	49
W8RTF	....	"	12,139	74	23	38
K8NMG	..	"	5880	54	16	26
W8SA	.....	**14**	**36,860**	**167**	**30**	**65**
W8FGX	....	**7**	**102,399**	**332**	**32**	**75**
W8VSK	....	"	8512	60	21	35
W8KIA	....	**3.5**	**1150**	**20**	**12**	**13**
W9RQM	..	**A**	**115,520**	**225**	**65**	**125**
W9CLH	....	"	5590	45	23	27
W9GMS	..	"	2451	24	21	22
W9DYG	....	"	1419	22	16	17
W9YYG/9		"	240	8	5	7
W9GIL	....	**21**	**31,950**	**142**	**24**	**51**
WØVXO/9		"	28,314	131	25	53
K9LIO	....	"	17,152	99	22	42
K9YOE	....	"	15,309	88	23	40
W9DWQ	..	"	13,769	99	16	33
K9TZH	....	"	11,307	72	22	39
W9LKI	....	"	4588	42	14	23
W9IU	.....	**14**	**71,390**	**240**	**30**	**80**
W9IRH	....	"	57,873	226	30	71
W9ZTD	....	"	40,388	176	28	64
K9UHH	....	"	22,436	105	26	53
W9EGQ	....	"	5922	49	19	28
W9WNV	..	**7**	**146,510**	**399**	**35**	**95**
W9AIW	....	"	30,324	139	31	53
W9HUZ	....	"	24,948	108	31	53
K9WTS	....	"	2205	31	15	20
K9MMS	..	"	1014	19	12	14
W9PNE	..	**3.5**	**3040**	**47**	**17**	**21**
W9PWU	..	"	3026	56	16	18
WØDAE	..	**A**	**75,843**	**187**	**66**	**93**
WØBTD	....	"	43,566	125	60	77
WØGUV	..	"	21,854	88	42	56
KØJPL	....	"	817	48	16	19
WØMCX	..	**21**	**18,005**	**101**	**24**	**41**
KØLFY	....	"	13,701	78	25	46
KØDQI	....	**14**	**38,456**	**162**	**28**	**60**
WØUAF	....	"	5123	40	15	32
KØTHN	....	"	3344	46	17	21
Alaska						
KL7JDO	..	**A**	**96,590**	**357**	**56**	**74**
K2BBY/KL7		"	92,004	344	42	60
KØBYC/KL7		"	13,860	102	21	24
W1EJT/KL7		**14**	**24,832**	**137**	**20**	**44**
Canada						
VE1AE	....	**14**	**4386**	**50**	**9**	**25**
VE2YU	....	**A**	**117,320**	**258**	**78**	**120**
VE2AFC	..	**21**	**2,652**	**47**	**9**	**17**
VE2NV	....	**14**	**57,120**	**209**	**31**	**71**
VE2BV	....	"	16,354	91	26	48
VE3BOG	..	**A**	**60,060**	**223**	**64**	**76**
VE3BES	..	"	30,740	116	39	67
VE3PV	....	"	3034	28	15	22
VE3BMB	..	**21**	**7889**	**62**	**18**	**31**
VE3AGX	..	**3.5**	**4636**	**82**	**17**	**21**
VE4XO	....	**A**	**28,906**	**114**	**34**	**63**
VE4KZ	....	"	1530	60	15	11
VE5KY	....	**14**	**1848**	**51**	**12**	**10**
VE6HG	....	**A**	**14,508**	**121**	**32**	**30**
VE6TP	....	**14**	**5130**	**50**	**15**	**23**
VE7BFN	..	**A**	**1408**	**44**	**13**	**14**
VE8RX	....	**A**	**50,456**	**258**	**42**	**64**
VE8DM	....	**14**	**13,497**	**312**	**14**	**19**
Canal Zone						
KZ5TD	....	**A**	**54,864**	**213**	**65**	**79**
KZ5LC	....	**14**	**54,038**	**420**	**25**	**57**
Costa Rica						
TI2WA	....	**21**	**20,520**	**232**	**20**	**34**
Cuba						
CO2CT	....	A	650	63	7	3
Greenland						
KG1FD	....	**A**	**133,215**	**778**	**43**	**64**
KG1AA	....	"	67,252	575	35	51
OX3UD	....	**14**	**3880**	**173**	**9**	**11**
Puerto Rico						
KP4AAO	..	**A**	**85,995**	**528**	**50**	**85**
KP4CC	....	"	12,636	210	23	39

Africa

Algeria						
FA8RJ	....	**A**	**110,894**	**218**	**63**	**115**
Angola						
CR6DA	....	**A**	**7560**	**76**	**17**	**19**
Congo, Rep. of						
9Q5AAA	..	**A**	**95,230**	**392**	**46**	**43**
SM5ARQ/ 9Q5	....	**14**	**20,374**	**125**	**23**	**38**
Guinea, Rep. of						
7G1A	.....	**A**	**1,177,893**	**1536**	**79**	**182**
Liberia						
EL4A	.....	A	5313	77	8	15
Libya						
5A1TW	....	**A**	**353,007**	**654**	**76**	**107**
Madagascar						
5R8AD	....	**14**	**18,786**	**114**	**24**	**38**
Morocco						
CN8EU	....	**21**	**60,146**	**332**	**19**	**42**
Mozambique						
CR7IZ	.....	**A**	**62,910**	**281**	**39**	**51**
CR7CI	....	"	432	17	5	3
Nigeria						
5N2LKZ	..	**A**	**777,155**	**1282**	**63**	**142**
5N2JKO	..	"	437,338	733	66	140
5N2RDG	..	**14**	**32,793**	**238**	**19**	**32**
Rhodesia, No.						
VQ2W	.....	**A**	**200,200**	**457**	**58**	**96**
VQ2JG	....	"	15,249	89	29	40
Rhodesia, So.						
ZE7JV	....	**A**	**210,446**	**515**	**48**	**91**
ZE3JO	....	"	21,225	106	27	48
ZE4JS	.....	**14**	**27,850**	**208**	**21**	**29**
South Africa						
ZS6IW	....	**A**	**110,556**	**352**	**37**	**74**
ZS1ACD	..	"	3094	92	7	7
ZS1O	.....	"	986	22	8	9
ZS2U	.....	"	798	22	10	11
ZS6APQ	..	**21**	**74,808**	**354**	**25**	**47**
ZS6DZ	....	"	18,825	255	8	17
ZS2HI	.....	**14**	**219,034**	**642**	**35**	**83**
ZS6IF	.....	"	122,944	379	33	80
ZS5AM	....	"	27,142	119	29	53
ZS5UP	....	"	8736	65	19	37
Spanish Guinia						
EAØAB	....	14	260	13	5	8
Swaziland						
ZS7M	.....	**14**	**33,040**	**172**	**25**	**45**
Tanganyika						
5H3HZ	....	**A**	**53,010**	**206**	**37**	**56**

Asia

Aden						
VS9AAC	..	**A**	**272,049**	**545**	**56**	**121**
Burma						
XZ2TH	....	**14**	**31,491**	**174**	**29**	**54**
Hong Kong						
VS6DS	....	**14**	**8464**	**98**	**19**	**27**
India						
VU2NR	....	**14**	**76,400**	**290**	**31**	**69**
VU2AJ	....	"	63,984	309	31	55
VU2CK	....	"	35,113	203	26	47
VU2GG	....	"	4465	47	18	27
VU2TH	....	"	960	16	13	12
Iran						
EP2BB	....	**A**	**235,220**	**452**	**60**	**130**
EP2AE	....	**14**	**40,584**	**195**	**26**	**50**
Israel						
4X4FV	....	**A**	**36,784**	**143**	**26**	**62**
4X4MJ	....	**21**	**8888**	**69**	**13**	**31**
4X4FA	....	**14**	**173,855**	**567**	**29**	**80**
4X4DH	....	**7**	**117,810**	**533**	**20**	**57**
4X4WF	....	**3.5**	**8019**	**84**	**7**	**26**
Japan						
JA1BK	....	**A**	**310,453**	**680**	**71**	**98**
JA1VX	.....	**A**	**272,799**	**637**	**64**	**89**
JA1YL	.....	**A**	**185,300**	**478**	**73**	**97**
JA2AEY	..	"	103,621	317	56	75
JA7AD	....	"	85,239	309	41	58
JA3CKI	....	"	60,390	253	43	56
JA1BTG	..	"	54,705	208	45	60
JA7KY	....	"	42,408	217	36	40
JA3BEA	..	"	19,926	105	39	42
JA9TS	.....	"	12,455	117	21	28
JA6CY	....	"	10,824	63	31	35
JA1DFQ	..	"	9945	85	24	27
JA2CA	....	"	7350	60	25	25
JA1FHK	..	"	6868	74	16	18
JA2TH	....	"	6273	63	19	22
JA1AS	....	"	6248	69	21	23
JA1ACA	....	"	5891	52	23	20
JA9NB	....	"	3861	39	20	19
JA2WB	....	"	3535	41	18	17
JA1HP	....	"	3348	36	19	19
JA4AXO/3		"	2660	32	18	20
JA2AIT	....	"	2520	33	17	19
JA5KM	....	"	2486	49	13	9
JA1BYM	..	"	2132	32	13	13
JA7KX	....	"	2106	36	13	14
JA4AQR	..	"	2077	33	15	16
JA1AKH	..	"	1863	33	13	14
JA4DZ	....	"	1200	24	12	12
JA3CED	..	"	660	30	16	15
JA9FB	.....	"	540	11	10	10
JA1BCP	..	"	504	18	6	8
JA3IW	....	**21**	**22,385**	**151**	**24**	**31**
JA6PY	....	**21**	**17,220**	**116**	**22**	**38**
JA1CIB	....	"	14,360	123	19	21
JA8AAA	..	"	13,090	139	17	17
JA7RH	....	"	9850	120	13	12
JA1EM	....	"	7056	63	19	23
JA1DFN	..	"	6560	68	16	24
JA1ISA	....	"	6068	64	20	21
JA1BUN	..	"	5624	57	16	22
JA1ISB	....	"	3300	44	15	18
JA8AAC	..	"	2928	50	13	11

JA1FTL	"	1640	31	10	10
JAØHC	"	297	11	4	5
JA2JW	**14**	**92,988**	**401**	**30**	**54**
JA1BLC	**14**	**54,600**	**270**	**31**	**47**
JA1AA	**14**	**29,450**	**220**	**20**	**30**
JA5FQ	"	26,448	173	25	32
JA2DN	"	23,312	141	25	37
JA5AI	"	20,915	159	20	27
JA3CUK	"	17,621	115	28	39
JA1MJ	"	15,561	141	18	21
JA8GR	"	13,200	116	19	25
JA8BGF	"	10,535	90	21	28
JA1CG	"	10,527	127	15	14
JA2AIR	"	9881	96	21	20
JA2XW	"	8733	52	27	44
JA6ZV	"	6084	72	16	20
JA7WB	"	6045	69	19	20
JA6PA	"	5586	41	25	32
JA3ASF	"	5481	86	12	17
JA2ANX	"	5096	45	22	30
JA1DDH	"	3990	56	15	20
JA7EZ	"	3510	50	19	20
JA6ACZ	"	3404	50	19	18
JA7JW	"	2156	48	12	10
JA3AZ	"	1260	22	12	16
JA1WM	"	1219	35	10	13
JA1EL	"	1134	28	10	11
JA8JC	"	572	18	6	7
JA1DUH	"	330	11	7	8
JA1AJA	"	144	15	4	4
JA8LN	**7**	**27,966**	**188**	**25**	**34**
JA8FC	**7**	**26,164**	**173**	**25**	**37**
JA8AJS	**7**	**13,348**	**122**	**20**	**27**
JA1BRK	"	12,656	96	25	31
JA8AEP	"	11,139	98	20	27
JA1GIV	"	9028	97	13	24
JA1NI	"	8520	76	21	19
JA1DRC	"	4896	65	15	17
JA1CZG	"	4640	65	15	17
JA7AKQ	"	4470	69	14	16
JA1CVV	"	2208	41	12	12
JA1BOK	"	2088	40	12	12
JA2CG	"	2000	46	10	10
JA3CAF	"	1755	36	12	15
JA1CXC	"	1311	34	10	9
JA2BDY	"	1040	27	8	8
JA1CUM	"	825	32	7	8
JA6BCV	"	714	20	8	9
JA3UM	"	420	19	7	7
JAØOP	"	416	12	8	8
JA1AIU	"	275	13	6	5
JA9NA/1	"	161	12	4	3
JA6AK	**3.5**	**3948**	**53**	**12**	**16**
JA1ON	"	1386	37	6	8
KA2JL	**14**	**194,098**	**639**	**36**	**71**
Korea					
HM1AP	**A**	**1428**	**62**	**7**	**10**
HM4AQ	**14**	**20,645**	**225**	**17**	**20**
Ryukyu Is.					
KR6LJ	**A**	**280,368**	**559**	**81**	**127**
Singapore					
VS1KF	**21**	**3276**	**54**	**16**	**20**
VS1JY	**14**	**8848**	**93**	**18**	**38**
Thailand					
HS1R	**A**	**52,295**	**229**	**43**	**61**
U.S.S.R.					
Asiatic					
UA9WL	**A**	**95,142**	**359**	**26**	**77**
UAØAG	"	92,127	317	40	83
UAØJU	"	24,420	249	20	24
UAØTN	"	10,458	145	16	26
UAØLH	"	8625	175	10	15
UAØUU	"	7955	106	20	23
UAØSL	**21**	**13,452**	**105**	**18**	**41**
UAØGF	"	2739	35	16	17
UA9DN	**14**	**274,412**	**815**	**34**	**90**
UAØSB	"	28,594	217	18	40
UA9OB	"	15,680	121	17	39
UAØCE	"	1863	57	12	11
UA9XG	"	1134	23	11	16
UA9BZ	**7**	**14,063**	**131**	**9**	**32**
Armenia					
UG6AW	**A**	**72,297**	**284**	**19**	**68**
Azerbaijan					
UD6AM	**A**	**28,875**	**143**	**24**	**53**
Georgia					
UF6FB	**A**	**426,974**	**627**	**73**	**181**
UF6KAE	**7**	**16,946**	**156**	**7**	**30**
UF6AP	"	4255	69	6	17

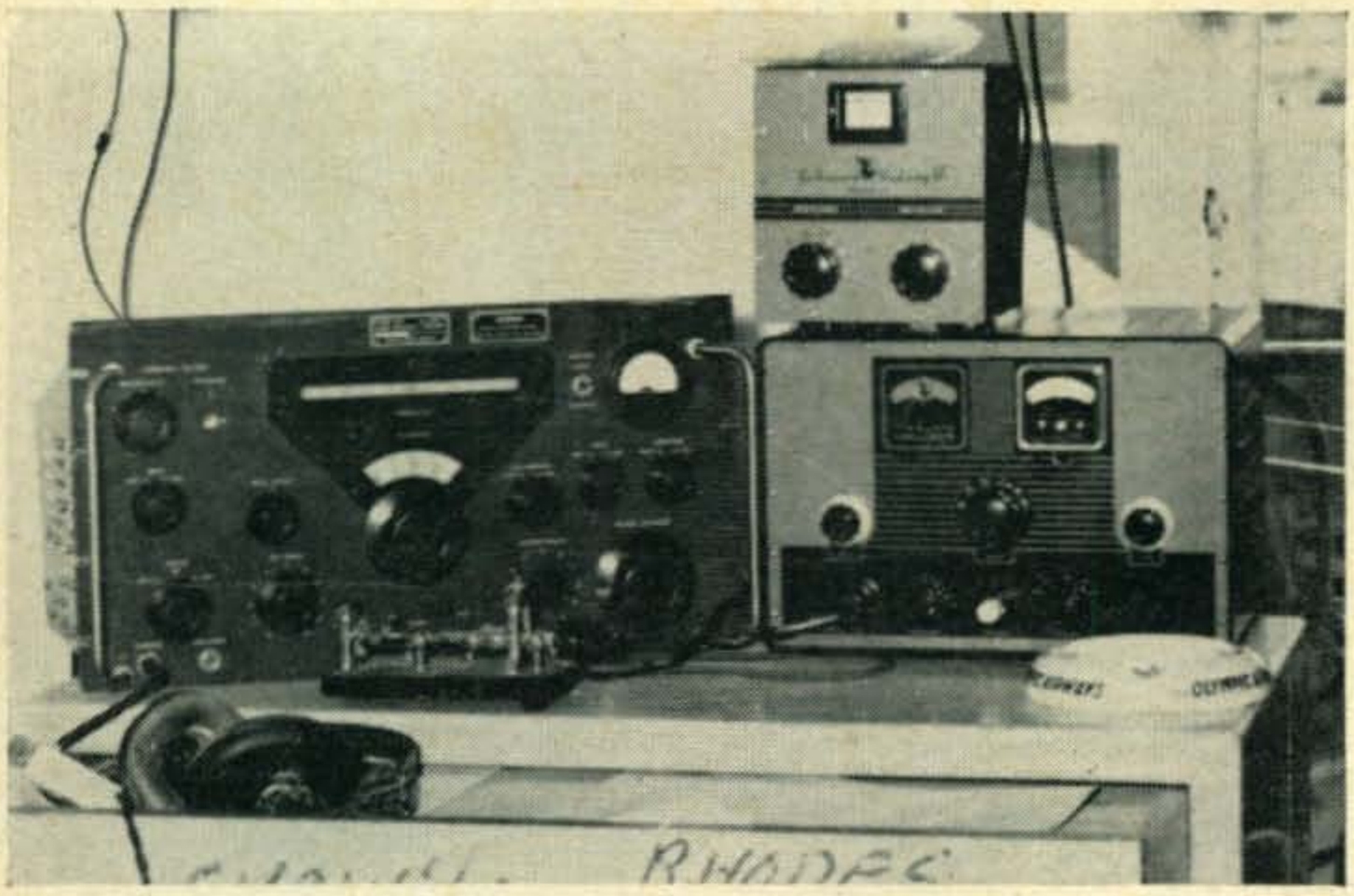
EP2BB—After a poor Phone week-end Bill ran up a respectable score in the C.W. section. This in spite of a broken rotator and a temporary illness during the contest.

Kazakh					
UL7FA	**A**	**121,950**	**325**	**51**	**99**
UL7HB	"	38,852	172	32	56
UL7CH	"	17,955	121	20	37
UL7HV	14	232	13	4	4
Kirghiz					
UM8AT	**14**	**4270**	**57**	**14**	**21**
Tadzhik					
UJ8AK	14	752	19	7	9

Europe

Austria					
OE1RZ	**A**	**141,882**	**277**	**66**	**148**
OE3WB	**14**	**7224**	**137**	**11**	**32**
OE1WO	**7**	**4448**	**116**	**7**	**25**
Belgium					
ON5AG	**A**	**15,939**	**122**	**29**	**40**
ON4AD	"	8,265	112	16	41
ON4CE	21	720	26	7	9
Bulgaria					
LZ1CW	**21**	**18,915**	**166**	**21**	**44**
Crete					
SVØWZ	**A**	**36,378**	**321**	**24**	**70**
Czechoslovakia					
OK1ZL	**A**	**236,210**	**606**	**72**	**158**
OK2QR	**A**	**92,798**	**379**	**47**	**116**
OK3AL	"	83,433	515	29	108
OK2YL	"	79,790	313	44	110
OK2OP	"	58,776	205	47	111
OK1JX	"	44,354	199	40	94
OK2LN	"	39,160	363	25	85
OK1RX	"	27,930	194	28	67
OK2KFK	"	16,880	165	24	67
OK2KMB	"	10,836	158	15	48
OK1EV	"	4928	77	16	40
OK1LM	**21**	**56,595**	**275**	**27**	**50**
OK3EA	"	36,360	167	28	62
OK1EJ	"	26,163	173	21	36
OK1VB	"	18,090	119	24	43
OK1BMW	**14**	**29,896**	**211**	**22**	**52**
OK3IR	**14**	**27,805**	**211**	**27**	**56**
OK1AVT	"	12,392	163	15	36
OK2KGZ	"	11,913	128	18	39
OK2LE	"	10,965	129	14	37
OK2BCC	"	4292	132	11	26
OK2ABU	"	3456	98	7	25
OK1AVD	"	1805	34	10	9
OK1NH	"	660	23	6	13
OK2KOJ	**7**	**69,048**	**553**	**19**	**53**
OK1IK	**7**	**51,282**	**462**	**19**	**58**
OK1GA	"	37,765	370	24	59
OK3SL	"	15,390	231	14	43
OK1FV	"	15,128	206	16	45
OK1AMS	"	9050	137	12	38
OK3CBN	"	9018	189	10	34
OK2KMR	"	6952	134	10	35
OK2BBI	"	6474	173	4	32
OK1OO	"	2000	59	9	16
OK2QU	"	814	39	6	16
OK3DG	**3.5**	**18,300**	**341**	**10**	**40**
OK1ZA	"	7749	212	8	33
OK1PG	"	6498	177	8	32
OK1KKJ	"	3684	128	4	28
OK3CAF	"	760	52	4	15
OK1BV	"	448	49	4	12
OK1ADX	**1.8**	**740**	**90**	**3**	**7**
OK1AEZ	"	464	71	3	5
OK1WT	"	450	63	3	6
OK2KEA	"	234	40	3	6
OK1AAZ	"	40	13	2	3
Denmark					
OZ2NU	**A**	**38,505**	**220**	**27**	**58**
OZ5MF	"	15,714	125	30	67
OZ3CF	"	14,170	147	17	48
OZ3LI	"	2158	77	10	16
OZ6HS	"	1218	28	12	17
OZ7G	**21**	**8398**	**82**	**15**	**23**
OZ3Y	"	4158	49	15	27
OZ5DX	**14**	**9786**	**114**	**15**	**27**
OZ9N	"	7473	89	14	33
OZ3LR	"	1770	61	7	23
OZ7KV	"	1705	34	10	21
OZ5WJ	"	1007	36	6	15
OZ1GW	7	12	3	2	2
England					
G2DC	**A**	**267,189**	**552**	**60**	**161**
G3FTQ	"	42,570	241	32	78
G3KHT	"	38,065	179	46	69
G3HZL	"	23,214	155	31	75
G3JKY	"	11,356	101	24	44
G3MWZ	"	768	22	10	14
G5RP	**28**	**3360**	**51**	**12**	**18**
G3PEU	**21**	**22,656**	**168**	**22**	**42**
G3OIZ	"	8010	87	15	30
G4CP	**14**	**131,145**	**502**	**33**	**72**
G2AJB	"	18,304	202	13	39
G3POG	"	9660	183	9	26
G3ISX	"	4403	93	10	27
G2HDR	"	1848	38	10	12
G3WP	"	1140	35	8	22
G3EYN	**7**	**19,604**	**257**	**14**	**44**
G3ESF	"	15,848	200	13	45
G8DI	"	3193	95	6	25
G3JVJ	**3.5**	**3128**	**91**	**6**	**28**
G3ATU	**1.8**	**525**	**26**	**3**	**7**
Finland					
OH2FS	**A**	**92,368**	**323**	**47**	**137**
OH2BZ	**A**	**61,502**	**274**	**44**	**117**
OH7OU	"	42,826	173	41	92
OH9NV	"	31,312	168	31	72
OH1VA	"	26,500	203	24	82
OH2SF	"	19,749	163	24	63
OH7NW	"	18,139	133	31	66
OH3PF	"	6669	67	20	37
OH9QF	"	5508	92	15	36
OH2BC	"	3850	49	14	36
OH2A	"	2832	35	18	30
OH2YL	"	1851	41	11	20

OH2CD	....	"	930	29	10	21	DL3OJ	....	"	13,041	130	18	51						
OH5TM	....	"	440	25	6	14	DL1FL	....	"	12,726	94	23	78						
OH1VR	....	"	192	12	6	10	DL1ES	....	"	11,178	107	23	58						
OH3PC	....	"	188	12	5	9	DL3SZ	.....	"	8418	72	23	38						
OH2OW	....	28	360	12	5	7	DJ6OG	....	"	6254	66	21	32						
OH2BH	....	**21**	**19,240**	**143**	**22**	**52**	DJ6SI	....	"	3822	59	12	30						
OH5RZ	....	"	5500	72	14	36	DJ5IO	....	"	2496	47	16	23						
OH2BF	....	"	2480	48	10	21	DM3JBM		"	960	22	10	14						
OH2BK	....	"	1058	25	4	16	DL6KG	....	"	629	15	8	9						
OH3TQ	....	**14**	**20,952**	**158**	**22**	**50**	DM3RBM		"	544	24	6	10						
OH2PO	....	"	16,848	203	17	37	DL1YA	....	28	160	9	3	5						
OH2IZ	....	"	10,672	131	13	45	**DJ1ZG**	....	**21**	**42,886**	**190**	**31**	**51**						
OH3SH	....	"	9400	154	12	38	DJ2YA	....	"	22,127	127	26	51						
OH3TH	....	"	7225	73	17	42	DL7EN	....	"	17,751	111	21	40						
OH3NY	....	"	3745	84	8	27	DJ5FZ	....	"	16,704	110	20	38						
OH4AA	....	"	1034	37	5	7	DJ4OP	....	"	15,105	116	20	37						
OH3PJ	....	"	893	44	5	14	DJ2DG	....	"	4480	51	15	17						
OH5PG	....	"	25	5	2	3	DL6DF	....	"	1491	45	10	11						
OH7NF	....	**7**	**24,339**	**280**	**16**	**45**	**DJ2RE**	....	**14**	**30,900**	**236**	**23**	**52**						
OH2BQ	....	"	10,863	179	9	42	DM3XPN	..	"	25,792	296	17	47						
OH2BAI	..	"	2020	73	5	23	DL1GL	....	"	23,229	112	28	61						
OH9RC	....	"	338	27	3	10	DL7DF	....	"	22,140	137	24	58						
OH5TJ	....	"	266	19	4	10	DL6KC	....	"	10,746	119	15	39						
OH2MA	....	**3.5**	**5148**	**130**	**6**	**33**	DJ2SR	....	"	7728	75	12	30						
OH2KA	....	"	1700	72	4	21	DJ6EV	....	"	7380	130	11	30						
							DJ7JV	....	"	874	38	4	19						
			France				DL9YC	....	"	774	25	5	13						
F8TM	.....	**A**	**115,128**	**377**	**54**	**110**	**DL1JW**	....	**7**	**48,516**	**365**	**19**	**59**						
F9OQ	.....	"	37,620	196	30	60	DJ2AA	....	"	42,300	334	18	57						
F2PO	.....	"	29,029	184	22	69	DJ5JH	....	"	7050	99	11	36						
F3PK	.....	"	24,492	148	28	50	DL8DF	....	"	1800	45	8	17						
F2QH	.....	"	7955	83	17	26	DM3KBM		"	576	36	4	12						
F8VO	.....	"	3876	37	15	19	DM3XL	....	"	295	19	4	11						
F2AS	.....	"	3300	60	10	23	DM2BDN		"	140	12	4	6						
F9BB	.....	"	1980	52	9	24	**DJ3WE**	....	**3.5**	**17,028**	**366**	**8**	**36**						
F2SQ	.....	21	1632	36	8	16	DJ2SX	....	"	3910	114	5	29						
F8HO	.....	"	126	14	2	1													
							DL5HI	....	**A**	**304,644**	**639**	**67**	**145**						
			Germany				DL5DU	....	"	40,250	165	39	76						
DJ3KR	....	**A**	**229,830**	**440**	**77**	**158**	**DL4DZ**	....	**14**	**67,680**	**373**	**26**	**54**						
DJ1PN	.....	**A**	**167,904**	**417**	**55**	**143**	DL4DO	....	"	627	27	6	13						
DJ2HH	....	**A**	**113,826**	**358**	**55**	**128**	DL5DJ	....	3.5	720	40	3	15						
DJ2IB	....	"	112,726	323	50	107													
DL1JF	....	"	108,150	282	58	117													
DJ4DN	....	"	102,758	311	59	132				Gibraltar									
DJ6LV	....	"	71,980	354	38	80	**ZB2AD**	....	**7**	**43,193**	**395**	**12**	**35**						
DL7BQ	....	"	66,232	292	41	95													
DL9KP	....	"	62,752	216	45	103				Greece									
DL7BK	....	"	61,056	189	49	110	**SVØWB**	....	**14**	**4590**	**59**	**13**	**32**						
DJ5BVA	..	"	58,362	324	33	104													
DM3VED	..	"	51,975	340	30	75				Hungary									
DL7CW	....	"	47,012	176	45	101	**HA8CF**	....	**A**	**23,465**	**200**	**29**	**66**						
DJ5VQ	....	"	34,902	166	37	89	HA9OS	....	"	22,016	222	20	66						
DM2ATL	..	"	34,650	195	31	79	HA4KYB		"	12,580	133	18	50						
DL8BS	....	"	33,855	196	32	79	HA5AW	....	"	8967	135	15	46						
DJ2JI	.....	"	26,980	175	23	53	HA6NF	....	"	8136	106	22	50						
DJ2BO	....	"	24,570	194	19	46	HA5FQ	....	"	5974	81	20	38						
DJ4VO	....	"	24,115	166	20	71	HA8UD	....	"	5537	107	15	34						
DM3EL	....	"	23,940	267	19	65	HA7PM	....	"	5400	104	14	40						
DM2BCN		"	23,290	207	27	58	HA2MJ	....	"	63	6	3	5						
DJ5GG	....	"	17,514	140	21	42	**HA6NI**	....	**14**	**3900**	**71**	**11**	**29**						
DL8CM	....	"	17,324	130	25	46	HA5DY	....	7	893	47	5	14						
DJ1UE	....	"	14,453	108	30	67	**HA9KOV**	..	**3.5**	**2068**	**96**	**4**	**18**						



SVØWI/R—The rig that was used for a limited period on 14 & 7 mc during the first day of the contest.

										Iceland									
TF3AB	....	**A**	**40,734**	**234**	**19**	**54**													
TF2WGA		**14**	**13,631**	**152**	**12**	**31**													
										Ireland									
EI5AJ	.....	**14**	**59,708**	**430**	**17**	**42**													
										Italy									
I1TEB	....	**A**	**24,360**	**149**	**34**	**71**													
I1ZCN	....	**3.5**	**5,449**	**180**	**5**	**26**													
										Malta									
ZB1HC	....	**21**	**65,807**	**418**	**23**	**56**													
										Netherlands									
PAØTAU	..	**A**	**176,800**	**386**	**61**	**147**													
PAØPN	....	"	83,390	263	54	101													
PAØVB	....	"	35,568	222	32	72													
PAØVDV	..	"	35,160	200	34	86													
PAØYN	...	"	13,056	115	20	44													
PAØWAC	..	"	7446	73	16	18													
PAØPAN	..	"	4181	43	14	23													
PAØSNG	..	**21**	**10,992**	**101**	**18**	**30**													
PAØNIR	..	"	5434	77	13	25													
PAØLOU	..	**14**	**47,090**	**243**	**20**	**57**													
PAØATY	..	"	12,558	160	12	34													
PAØBEA	..	"	6556	99	11	33													
PAØLV	....	**3.5**	**12,005**	**339**	**5**	**30**													
										Northern Ireland									
GI3IVJ	....	**A**	**127,980**	**437**	**50**	**130**													
										Norway									
LA1EE	....	**A**	**31,920**	**212**	**27**	**43**													
LA6U	.....	"	17,226	112	25	62													
LA8PH	....	"	10,797	139	17	44													
LA4LG	....	"	4539	60	17	34													
LA2B	.....	"	3218	29	22	20													
LA9KF	....	"	240	20	3	9													
LA6VC	....	**14**	**42,750**	**361**	**17**	**33**													
LA7JF	....	"	21,750	212	15	34													
LA2Q	.....	"	3060	106	8	22													
LA4ZB	....	**7**	**1207**	**75**	**4**	**13**													
LA4KC	....	**3.5**	**1316**	**47**	**5**	**23**													
										Poland									
SP6FZ	....	**A**	**149,145**	**409**	**57**	**126**													
SP6AAT	....	**A**	**112,578**	**354**	**50**	**124**													
SP5ADZ	..	"	52,625	320	29	96													
SP2WT	....	"	41,886	252	31	86													
SP8YA	....	"	23,621	200	23	56													
SP9ADU	..	"	20,099	149	29	72													
SP3KKJ	..	"	17,524	243	12	40													
SP6WM	..	"	11,480	84	28	42													
SP5GX	....	"	9880	81	20	45													
SP2GS	....	"	7535	106	16	39													
SP9DN	....	"	7424	104	19	45													
SP9RJ	....	"	3400	100	9	25													
SP2KDS	..	"	2178	56	11	22													
SP2TG	....	"	1440	40	8	22													
SP3PK	....	"	1152	18	11	13													
SP5AIB	..	"	20	4	2	3													
SP8JA	....	**21**	**41,100**	**226**	**25**	**50**													
SP8CK	....	"	17,405	121	22	37													
SP9RF	....	"	13,082	86	22	40													
SP5BR	....	"	11,703	94	15	32													
SP6LB	....	"	990	23	9	9													
SP4JF	....	**14**	**38,786**	**305**	**27**	**59**													
SP8HT	....	"	33,288	263	24	49													
SP9CS	....	"	25,840	200	24	56													
SP1XB	....	"	5555	78	17	38													
SP9UH	....	"	4200	101	8	35													
SP5HY	....	"	1848	74	6	18													
SP6AEG	..	"	760	36	7	12													
SP4AEQ	..	"	512	31	5	11													
SP8HU	....	**7**	**41,440**	**405**	**19**	**55**													
SP5ZA	....	**7**	**25,004**	**238**	**20**	**56**													
SP7JX	....	"	20,605	236	14	51													
SP8MJ	....	"	20,414	282	13	46													
SP2CO	....	"	19,776	255	14	50													
SP1ADM	..	"	11,074	202	10	39													
SP3HC	....	"	7840	117	11	38													
SP2RS	....	"	6320	144	8	32													
SP9KJ	....	"	5650	57	16	34													
SP7AAK	..	"	5544	108	9	35													
SP5ALI	..	"	3600	70	9	27													
SP8AJK	..	"	3503	112	5	26													
SP9ALG	..	"	3264	93	7	25													
SP5AHW	..	"	2528	71	7	25													
SP3AKA	..	"	2424	100	4	20													
SP7QO	....	"	2108	51	7	24													
SP5AHZ	..	"	192	16	4	8													
SP5IA	....	**3.5**	**11,825**	**253**	**9**	**34**													
SP6UK	....	"	5088	151	5	27													
SP6TQ	....	"	1976	76	4	22													
SP8HR	....	"	846	47	4	14													
SP9AMA		"	697	41	4	13													

Rhodes

SVØWI/R	**A**	**3960**	**87**	**12**	**28**

Roumania

YO2BU	**A**	**119,572**	**423**	**57**	**122**
YO2BB	**A**	**70,140**	**347**	**40**	**100**
YO6XI	"	42,895	329	29	86
YO2KAB ..	"	37,595	227	27	76
YO6AW	"	34,272	222	30	82
YO4KCA ..	"	16,660	167	22	48
YO2KAC ..	"	15,280	200	18	54
YO9WL ..	"	15,150	137	27	48
YO8ME	"	2880	90	7	25
YO2CD	"	2730	35	16	26
YO9IA	**14**	**14,160**	**164**	**15**	**45**
YO3FN	"	12,644	147	16	42
YO8CF	"	3636	69	8	28
YO2CJ	"	874	44	4	15
YO3LM ..	**7**	**40,300**	**472**	**15**	**50**
YO2FU	**7**	**10,580**	**186**	**10**	**36**
YO9CN	"	9936	157	13	33
YO8DD	"	9503	168	8	35
YO8MG ..	"	9030	192	7	36
YO7FZ	"	4828	121	7	27
YO3AC	"	4428	77	12	29
YO2CY	"	2790	134	7	24
YO3RR	"	2430	63	6	24
YO9HH	"	2158	63	6	20
YO5LP	"	1250	42	7	18
YO9HE	"	1100	44	7	18
YO6AY	"	624	23	7	17
YO4CT	"	390	26	4	11
YO5AF	"	323	15	5	12
YO9IG	"	48	6	3	5

Scotland

GM3FJP ..	**A**	**11,700**	**127**	**18**	**32**
GM3JDR ..	**14**	**37,737**	**364**	**19**	**44**

Sicily

IT1TAI ..	**A**	**85,008**	**298**	**46**	**115**
IT1AGA ..	**7**	**12,716**	**206**	**22**	**67**

Spain

EA3IH	**21**	**26,208**	**232**	**18**	**45**
EA2CR	"	2496	62	7	17

Sweden

SM5BPJ ..	**A**	**374,949**	**911**	**67**	**176**
SM5CCE	**A**	**80,542**	**315**	**50**	**104**
SM7ID	"	56,700	240	41	109
SM3VE	"	47,064	243	41	107
SM6CMU	"	15,984	214	16	56
SM6SV	"	11,584	140	18	46
SM6ARH ..	"	11,304	120	22	50
SM5CZK ..	"	11,242	131	21	56
SM5BIM	"	9159	99	21	50
SM5UQ	"	8856	143	16	38
SM6CWP ..	"	7920	72	19	29
SM5ACM	"	7336	73	15	41
SM6JY	"	5088	104	10	38
SM6VY	"	3375	33	19	26
SM5ACQ ..	"	1410	50	7	23
SM6CAW	"	1000	38	9	16
SM5BHW	"	651	15	10	11
SM5US	"	588	31	5	16
SM3BBA	"	360	20	7	11
SM5KV	**21**	**28,512**	**172**	**25**	**56**
SM5AIO ..	"	13,328	113	19	37
SM5BFJ ..	"	1624	22	12	17
SM5CZQ ..	**14**	**17,304**	**239**	**14**	**42**
SM5CAK ..	"	11,990	183	14	41
SM3TW	"	11,200	138	17	39
SM7AVD ..	"	9516	131	18	43
SM5AHL ..	"	8580	118	16	39
SM4ASJ ..	"	306	14	4	5
SM5BIC ..	**7**	**21,514**	**253**	**15**	**47**
SM5CEU ..	"	7910	147	9	37
SM4AZQ ..	"	6405	185	4	31
SM3CNN ..	"	6248	142	10	34
SM3ATG	"	2190	68	7	23
SM7CZP ..	"	1058	44	5	18
SM3BEI ..	"	960	31	7	17
SM6CVX ..	"	814	37	5	17
SM3CGR ..	"	777	34	5	16
SM3CUS ..	"	576	34	4	14
SM3CFW	"	180	17	3	9
SM6CMR	"	144	13	3	9
SM3CUN ..	**3.5**	**8738**	**191**	**8**	**34**
SM5BGB ..	"	493	30	4	13
SM5MX	"	322	24	3	11

Switzerland

HB9NL	**A**	**253,736**	**519**	**62**	**135**
HB9EU	"	179,450	439	55	139
HB9ZY	"	166,057	394	64	147
HB9MO	"	127,957	342	59	140
HB9UD	"	53,064	279	39	93
HB9QA	"	32,640	221	31	89
HB9MQ	"	22,616	162	26	62
HB9TT	"	13,685	133	28	57
HB9QO	"	3375	38	8	37
HB9DX	**21**	**14,344**	**129**	**14**	**30**
HB9J	"	4300	67	11	14
HB9JG	**14**	**2142**	**41**	**9**	**25**
HB9ABB ..	**7**	**3567**	**89**	**9**	**20**

Wales

GW3JI	**A**	**171,384**	**609**	**36**	**112**

Yugoslavia

YU1AG	**A**	**60,330**	**300**	**40**	**89**
YU3ABC	"	34,965	285	28	77
YU3WP	"	8379	130	15	42
YU1AHI ..	**7**	**25,056**	**285**	**14**	**44**
YU1SF	"	2064	103	4	20

U.S.S.R. European

UA1DH	**A**	**69,905**	**301**	**48**	**107**
UA1CE	**A**	**69,201**	**386**	**29**	**70**
UA4QA	"	52,668	270	36	97
UA3LI	"	51,414	341	30	84
UA1CC	"	49,300	276	31	85
UW3ME ..	"	39,015	265	29	56
UA1CI	"	22,841	163	27	64
UA3RX	"	6670	112	13	33
UA1FJ	"	6106	110	13	30
UA6BU	"	4655	77	12	37
UA3SC	"	3822	48	15	34
UA3YI	**21**	**23,716**	**170**	**22**	**55**
UA1MA	"	1352	40	8	18
UA4PA	**14**	**52,224**	**258**	**26**	**70**
UA3TZ	"	29,250	252	21	54
UA1NA	"	15,235	151	15	40
UA6FK	"	8404	120	10	34
UA1DF	"	6625	72	15	38
UA3GH	"	3354	40	12	27
UA1DZ	**7**	**68,400**	**512**	**25**	**65**
UA6FL	"	9360	147	9	36
UA3XN	"	6512	138	9	28
UA6BE	"	840	36	6	15
UA3OI	"	234	22	5	8
UA4PW ..	**3.5**	**4576**	**127**	**5**	**27**

Estonia

UR2AT	**A**	**76,881**	**340**	**40**	**107**
UR2BU	**21**	**6116**	**62**	**16**	**28**
UR2AO	**14**	**39,692**	**299**	**19**	**49**

Latvia

UQ2AS	**A**	**119,540**	**460**	**46**	**126**
UQ2KBA	"	48,888	424	24	73
UQ2BP	"	18,722	179	26	48
UQ2BA	"	14,112	168	17	55
UQ2CO	**14**	**5016**	**123**	**9**	**24**

Lithuania

UP2NV	**A**	**18,800**	**198**	**19**	**61**

Moldavia

UO5AA	**A**	**8190**	**61**	**30**	**40**

Ukraine

UB5WF ..	**A**	**514,022**	**901**	**79**	**199**
UB5FJ	"	315,060	751	68	199
UB5PG	"	41,810	295	28	85
UB5ZE	"	15,477	161	16	67
UB5NS	"	3486	65	11	31
UB5MZ	**14**	**37,410**	**290**	**22**	**65**
UB5NQ	**7**	**2856**	**103**	**7**	**21**

White Russia

UC2AR	**A**	**8496**	**89**	**17**	**47**
UC20M	**21**	**32,800**	**204**	**25**	**57**
UC2AA	**14**	**107,448**	**521**	**36**	**85**
UC2WP	"	13,334	138	17	42
UC2CS	**7**	**3000**	**115**	**6**	**18**

Oceania

Australia

VK2GW	**A**	**237,276**	**497**	**67**	**102**
VK2ADE ..	"	5520	40	18	28
VK2APK ..	**14**	**27,805**	**137**	**27**	**56**
VK3RJ	**A**	**19,964**	**92**	**38**	**54**
VK3AHI ..	**14**	**97,152**	**368**	**31**	**57**
VK3ADB ..	**7**	**78,588**	**448**	**24**	**35**
VK4FH	**A**	**6336**	**76**	**11**	**21**
VK4SD	14	2590	32	12	23
VK4XW	**7**	**3652**	**63**	**9**	**13**
VK5JT	**A**	**3834**	**60**	**14**	**13**
VK5JS	**14**	**19,380**	**123**	**21**	**39**
VK5RX	"	10,166	77	17	29
VK6RU	**A**	**69,250**	**201**	**48**	**77**
VK6SM	"	64,372	200	52	69
VK7SM	**A**	**104,500**	**317**	**51**	**74**

Cook Islands

ZK1AR	**A**	**106,151**	**396**	**44**	**57**

Fiji Islands

VR2DK	**A**	**44,733**	**213**	**40**	**53**

Hawaii

KH6IJ	**A**	**791,840**	**1326**	**82**	**114**
KH6DMW	"	29,744	182	29	28
KH6DLF	**14**	**205,816**	**728**	**35**	**69**
KH6BCX ..	"	39,123	264	24	39

Netherlands New Guinea

JZØML	**14**	**7296**	**54**	**14**	**24**

New Zealand

ZL1NG	**A**	**125,646**	**348**	**59**	**70**
ZL4BO	"	91,866	293	52	70
ZL2GS	**21**	**22,607**	**177**	**19**	**28**
ZL2AWJ	**14**	**52,560**	**225**	**31**	**59**
ZL4LB	"	44,400	223	23	51

Norfolk Island

VK5XK/VK9	**A**	**7052**	**94**	**20**	**21**

Wake Island

KW6DG	**A**	**841,334**	**1381**	**93**	**125**

KL7JDO—At the top of the list for Alaska. Tony had that big smile before he knew about his success.

KW6DG—The big signal from out in the Pacific. Layne came mighty close to winning the All-Band Trophy. In the future he will be signing KØSLD.

South America

Argentina

LU5AQ	....	**A**	**74,200**	**274**	**43**	**63**
LU5ABL	..	**14**	**8008**	**54**	**23**	**33**

Brazil

PY1ADA	..	**A**	**398,936**	**724**	**66**	**122**
PY4GA	....	**21**	**105,616**	**444**	**25**	**57**
PY4OD	....	**14**	**188,468**	**512**	**36**	**91**
PY2VB	....	"	7366	46	24	34
PY4AP	....	**7**	**12,204**	**129**	**13**	**23**

Chile

CE1AD	....	**A**	**262,950**	**611**	**64**	**86**
CE2OF	....	"	22,264	170	23	23

Colombia

HK7BE	....	**A**	**46,276**	**333**	**24**	**22**
HK7ZT	....	"	43,125	214	35	34
HK3AH	....	"	19,872	161	21	25
HK7YC	....	"	1296	30	9	7
HK1AAF	..	**14**	**150,728**	**610**	**30**	**53**

Ecuador

HC1AGI	..	**A**	**460,782**	**988**	**65**	**94**

Netherlands Antilles

PJ2AE	....	**A**	**33,766**	**196**	**28**	**31**

Paraguay

ZP9AY	....	**A**	**27,880**	**232**	**21**	**20**

Uruguay

CX2CO	....	**A**	**856,416**	**1112**	**94**	**170**
CX1RY	....	"	136,160	417	48	67
CX7CO	....	"	51,192	228	38	43
CX2BT	....	"	38,428	250	16	36
CX1FB	....	"	19,971	113	35	28
CX1OP	....	"	434	19	7	7
CX9AJ	.....	**28**	**4470**	**55**	**14**	**16**
CX1BZ	....	14	1848	30	11	11

Venezuela

YV5DE	....	**A**	**246,648**	**647**	**51**	**78**
YV5AGD	..	"	139,248	337	60	84
YV5AK	....	**14**	**21,525**	**178**	**16**	**25**

MULTI-OPERATOR
Single Transmitter
North America

United States

W5AZB	.....	**87,500**	**187**	**68**	**107**
		(W5AZB, OSJ, OSW)			
K7ADL	.....	**57,132**	**201**	**46**	**62**
		(K7ADL, W7TML)			
W8NGO	.....	**76,960**	**235**	**43**	**87**
		(W8NGO, K8YEI)			
W9YT	.....	**208,302**	**341**	**90**	**143**
		(K9ELT, W9SZR)			

Alaska

KL7BCW	.....	**90,727**	**659**	**35**	**56**
		(KL7BCW, BJW)			

Canada

VE3BWY	.....	**30,192**	**112**	**49**	**62**
		(VE3BWY, EWY)			
VE4JB	.....	**23,460**	**171**	**23**	**28**
		(VE4JB, 4MF)			

Africa

Kenya

VQ4RF	.....	**431,538**	**711**	**68**	**145**
		(VQ4RF, DT, DW)			

Asia

Japan

JA2YAB	.....	**42,316**	**220**	**34**	**37**
		(Club Station)			
KA2MA	.....	**77,988**	**417**	**26**	**41**
		(K2JOZ, K3PAG)			

Saudi Arabia

HZ1AB	.....	**73,710**	**242**	**36**	**69**
		(W1TYQ, W8GCN)			

U.S.S.R.
Club Stations

Asiatic

UA0KZA	.....	**148,887**	**812**	**26**	**45**
UA9KQA	....	**143,412**	**375**	**43**	**105**
UA0KJA	.....	69,290	495	26	39
UA9KOA	.....	67,304	423	44	50
UA9KAG	.....	51,378	375	37	92
UA0KDA	.....	13,452	224	19	19
UA0KYA	.....	12,720	139	17	31
UA0KCA	.....	9310	141	20	18
UA0KKM	....	7480	122	16	24
UA0KUA	.....	7330	107	22	27
UA0KSB	.....	3861	65	10	17

Armenia

UG6KAA	.....	**96,733**	**381**	**23**	**67**

Azerbaijan

UD6KAB	.....	**70,788**	**266**	**30**	**72**

Georgia

UF6KAE	.....	**64,824**	**326**	**17**	**56**

Kazakh

UL7KAA	.....	**38,036**	**216**	**26**	**48**
UL7KBA	.....	21,600	170	15	33

Kirghiz

UM8KAA	.....	**230,202**	**645**	**45**	**102**
UM8KAB	.....	35,510	293	21	46

Tadzhik

UJ8KAA	.....	**239,940**	**536**	**55**	**125**

Turkoman

UH8KAA	.....	**70,408**	**445**	**31**	**73**

Uzbek

UI8KAD	.....	**169,974**	**398**	**55**	**116**
UI8KAA	.....	71,040	308	30	66

Europe

Bulgaria
Club Stations

LZ1KSV	.....	**452,782**	**960**	**81**	**161**
LZ1KBA	.....	407,130	848	69	177
LZ1KSZ	.....	358,581	817	75	192
LZ1KNB	.....	260,538	846	55	118
LZ1KBD	.....	140,361	568	47	136
LZ1KDP	.....	75,255	389	41	104
LZ2KWR	.....	50,882	429	26	77
LZ2KRS	.....	10,332	217	8	34

Czechoslovakia
Club Stations

OK2KJU	.....	**265,306**	**650**	**61**	**157**
OK3KAB	.....	175,392	617	65	159
OK2KOO	.....	80,660	363	48	100
OK2KGV	.....	71,724	472	31	108
OK1KPR	.....	48,762	310	39	90
OK3KAS	.....	46,964	303	33	85
OK1KFG	.....	12,986	291	7	36
OK2KAJ	.....	4554	139	5	28
OK1KSL	.....	3478	68	11	28
OK2KVI	.....	1872	88	5	22
OK3KHE	.....	1775	95	4	21
OK2KEZ	.....	1235	89	5	14

Denmark

OZ7OF	.....	**26,010**	**271**	**20**	**70**
		(OZ7OF, EX, YH)			

Finland

OH5AC	.....	**100,082**	**423**	**46**	**117**
		(OH5SN, QN)			
OH2AA	.....	96,960	334	52	140
		(OH2LP, KH, KK, SB)			
OH6AA	.....	57,912	290	43	84
		(OH6OP, OY, PJ, SU)			

Germany

DJ2XP	.....	**267,264**	**587**	**74**	**182**
		(DJ2XP, DJ7IK)			
DL0FT	.....	127,887	384	50	91
		(DL1GW, HA, HH, 3XZ, DJ2YY, DJ5HL)			
DJ2JE	.....	88,404	302	48	91
		(DJ2JE, 5LE, DL3YQ, 9VN)			
DJ4FZ	.....	59,875	272	36	89
		(DJ4FZ, SO, 5AW, 6TK)			
DL0LL	.....	52,576	272	39	85
		(DJ1TT, 3IW, 5AV)			
DL0IB	.....	31,680	162	40	70
		(DL3ZH, 6FG, TQ, 9JJ)			
DL9YP	.....	30,900	238	28	72
		(DL9YP, DJ1TY, 4AN)			
DL5BR	.....	**115,580**	**416**	**47**	**101**
		(DL4AA, AN, IG, LU, DL5BH, DQ)			

Hungary
Club Stations

HA1KSA	.....	**143,934**	**649**	**48**	**101**
HA5KFR	.....	40,560	489	17	43
HA3KMF	.....	8165	130	23	48
HA6KVB	.....	5883	103	14	39

Netherlands

PI1PT	.....	**50,882**	**292**	**28**	**75**
		(Club Station)			

Norway
Club Stations

LA1H	.....	**90,965**	**468**	**34**	**79**
LA1K	.....	18,486	192	20	58
LA9K	.....	11,505	183	14	45

[Continued on page 104]

DX DX DX DX DX DX DX DX

URBAN LE JEUNE, JR., W2DEC

BOX 35, HAZLET, NEW JERSEY

The following certificates were issued between the period from March 4th, 1962 to and including April 6th, 1962:

CW/PHONE WAZ

1658	OK1ZL	Ing. Zdenek Mensik
1659	G4FN	C. T. Wakeman
1660	SM6APH	Bengt Olov Wiech
1661	W6VNJ	G. R. Schneider
1662	DL6QW	Siegfried Reinhold
1663	G3ASG	R. F. Fautley
1664	I1ZL	Livio Zenti
1665	W7BPS	Jim Oliver
1666	UA2AO	Anatoly M. Moskalenko
1667	DJ4TZ	Franz Linke

PHONE WAZ

136	PAØFX	H. Van Breen
137	VE7IT	L. C. Parkhurst
138	HB9ET	Kurt Ruesch
139	KH6DLF	Edward W. Goodhue, Jr.
140	WØAIW	Lee Bergren
141	W7BPS	Jim Oliver
142	XZ2SY	Zaw Yee Soc Ya

SSB WAZ

70	WØNFA	Chester B. Franz
71	W1YDO	Edward W. Bunnell
72	W2DGW	John Lubinski
73	W3WGH	Robert W. King
74	KH6DLF	Edward W. Goodhue, Jr.
75	K4PUS	Jim M. Hoots, Jr.
76	W7BPS	Jim Oliver
77	W8EWS	G. W. Fuller
78	W2BXA	B. H. Stevenson

CW WPX

292	W6BIL	George S. Maxey
293	W1BGA	Leonard M. Luther
294	DL3ZA	Klaus Weimann
295	SM3AGD	Arild Sjolund
296	IS1FIC	Ferdinando DiPaola
297	W1RCQ	Wm. G. Baird, Sr.
298	G8DI	Herbert William Simpson
299	PY5FO	Rui Antonio Santana
300	ZL1AV	Dave Tremayne
301	K2QHL	Robert B. Tuttle
302	SP2AP	Alfons S. Strzelecki
303	W8BQV	Ike Price
304	G2BUL	Len Butler
305	ZL2PM	J. N. M. Norman

PHONE WPX

63	K2CJN	Stephen A. Mann
64	EA2FE	Julio Sastre

SSB WPX

95	VK4RQ	H. C. "Chas" Noble
96	W6YMV	Paul E. Friebertshauser
97	EP2AG	Geo. H. Buchanan
98	K2CJN	Stephen A. Mann

MIXED WPX

25	SM5BPJ	Sune "Doc" Ericsson

WPX ENDORSEMENTS

	Mode	*Total*	*Continent*	*Band*
W1DGT	CW	366		
WA2CBB	CW		E	
W2HXG	SSB	263		
K2PFC	CW	401		
K2ZRO	CW	355		
W4YWX	CW	404		
W6YY	SSB	261		
W8IBX	CW	416	E	20
DL1PM	CW		E	
DL1YA	CW	450		
	Mixed		E	20
G8KS	SSB	302		
OK3EA	CW	419		
PZ1AX	SSB	345		
	Phone			20
SM3AGD	CW	384		
SM5BDY	CW		E	
SM5BPJ	Mixed		E	20
SM7MS	CW			20
ZL2GS	CW	350		

WPX HONOR ROLL

CW WPX

W2HMJ	651	W1EQ	500	W8JIN	449	JA2JW	403
W5KC	556	W2MUM	495	W8RQ	445	VE6VK	403
W8KPL	553	K2CPR	489	W3BQA	437	PY4OD	402
W2EQS	547	SM5CCE	488	K5LIA	428	K2PFC	401
W9YSX	544	YU1AG	482	OK1MB	428	IT1TAI	401
K6CQM	538	W8PQQ	481	W3CGS	426	W2RA	400
W4OPM	531	W4HYW	478	W1EIO	425	W9SFR	400
K6KG	528	W9GFF	471	WØPGI	420	VK3KB	400
W2HO	526	W3OCU	466	OK3EA	419		
W1IJB	513	K6SXA	464	W8IBX	416		
W6WO	511	G2GM	462	W5AWT	412		
W2GT	510	K2ZKU	461	W5DA	412		
SM7MS	510	W3BCY	457	K5LZO	411		
W8LY	506	W4BYU	456	W2PTD	411		
K2UKQ	505	K9EAB	454	W4DKP	410		
G3EYN	503	W9UXO	453	K4JVE	407		
W2NUT	502	K9EAB	451	W5AFX	407		
W5LGG	502	PAØLOU	451	W2KIR	405		
W6YY	502	W3PGB	450	W4YWX	404		
		DL1YA	450	DL3RK	403		

PHONE WPX

W8WT	545	PZ1AX	413	TI2HP	356		
W9WHM	510	TG9AD	381	K9EAB	350		
G3DO	487	DL6VM	376	PZ1AX	345		
CT1PK	479	G8KS	372	W8PQQ	315		
W9YSQ	471	PAØSNG	369	HB9TL	315		
MP4BBW	454	W1UOP	368	W2VCZ	310		
PAØHBO	453	K9EAB	366	W3MAC	307		
W6YY	448	SM3EP	361	G8KS	302		
VK6RU	421	W5ERY	358	G3DO	296		
		W8JIN	356	K2MGE	273		
		W9UZC	356	WØCVU	271		
		DL3TJ	354	K2TDI	264		
		PY2CK	354	W2HXG	263		
		5A5TO	353	W6YMV	261		
		LA5HE	351	W2YBO	257		
				W3VSU	256		
				UR2AR	255		
				TG9AD	252		

SSB WPX

W4OPM	417	W1ORV	250				
MP4BBW	392	G3NUG	250				

EA7JZ is probably one of the most active EA hams. Julio is a great all band enthusiast and you will find him whenever the band is open.

Stan, VS1FZ, passes along the activity status of the Malayan area: "There is plenty of activity in VS1, 9M2 and VS4, however, there is little or no activity in VS5 and none at all in ZC5. Two VS1s may be going to ZC5 for short periods soon and may be active for a few days. No definite details can be given as yet.

"Further investigations will be made into the possibility of a DXpedition to Christmas Island VK9 (ex-ZC3) but there are many obstacles to be overcome."

AC4 Tibet: AC4NC has been heard and QSOd by several stations. Two frequencies are mentioned 14048 kc at 1600Z and 14004 kc at 2200Z. Beam headings seem to be correct, however, so far we have no knowledge whether this station is OK and whether they QSL.

CE9: "During the 1961-62 austral summer, I had the opportunity to operate the following stations: CE9AF, Base O'Higgins, Antarctic Peninsula; CE9AS, Base PAC, Deception Island, South Shetlands; CE9AW, 'Piloto Pardo,' maritime mobile; CE9AY, 'Lientur,' maritime mobile.

There has been a great deal of confusion among the 'gang' as to QSL cards and I wonder if you might set the record straight. I will QSL only to stations I worked myself, *i.e.*, those told to 'QSL via W9VZL.' I cannot help those stations who worked the above-mentioned stations before or after I operated them, as I don't have the necessary log books.

The QSL cards for the Chilean Antarctic stations will be in my hands shortly, and those wishing confirmations should include a s.a.s.e. with their card. The cards should be sent to my Milwaukee QTH which is OK in the *Callbook*." The above is from Ted, W9VZL, who is now home in Wisconsin.

EIØ Ireland: The following letter is from EI6X: "A group of us is traveling to the Aran Islands about fifty miles off the Coast of Galway on the western seaboard of Ireland. The name of the Island is Inishmore and the name of the Village is Kilronan. The call sign is the same as last year, EIØAB. QSL cards should be sent to EI6X, either via the Bureau or direct with IRC. Cards will only be sent out for cards received. This policy was used last year and it is interesting to note that only about 50 per cent of the QSOs sent cards.

The gear is a DX-100, Globe Scout, K. W. Viceroy, three HROs rebuilt and modified by EI6X. Antenna; Mosely TR-33 jr. and several dipoles. Power is obtained from a 1.5 kw generator we are toting along. Will have a station on 144 mc but that will hardly interest you fellows stateside. We will work all bands a.m., s.s.b. and c.w. We will start on June 9th at 1600 and run continuously until 1200 on June 11th.

The leader of the trip is Sean, EI3B, and so far we have the following making the trip, acceptances open until May 15th: 4R, 4AI, 6AH, 5AJ, 9AD, 7BD, 2X, 4BC, 6X and s.w.l.s Tom Corry, official photographer, Tom Donnellan, Morgan and Paddy.

The call will be new for WPX and we are sure we will have a lot of fun on the trip."

FB8W Crozet Island: You may as well forget about FB8WW. According to Lambert, ZS6IF, the technicians who were busy installing a commercial station on the island, have left and they never showed any interest at all for ham QSOs. They just contented themselves in keeping up schedules with 5R8AA and 5R8BC. So, it looks as if we will have to wait until 1963, when a fixed crew is expected to man a weather station on the Island. (*Tnx VERON* DX Press)

FC Corsica: DL9PF said he will operate from Corsica for two weeks in June.

FW8 Wallis Island: VK3AHO has permission to go to FW8 during May or June, but he does not have a license as yet. (*Tnx VERON* DX Press).

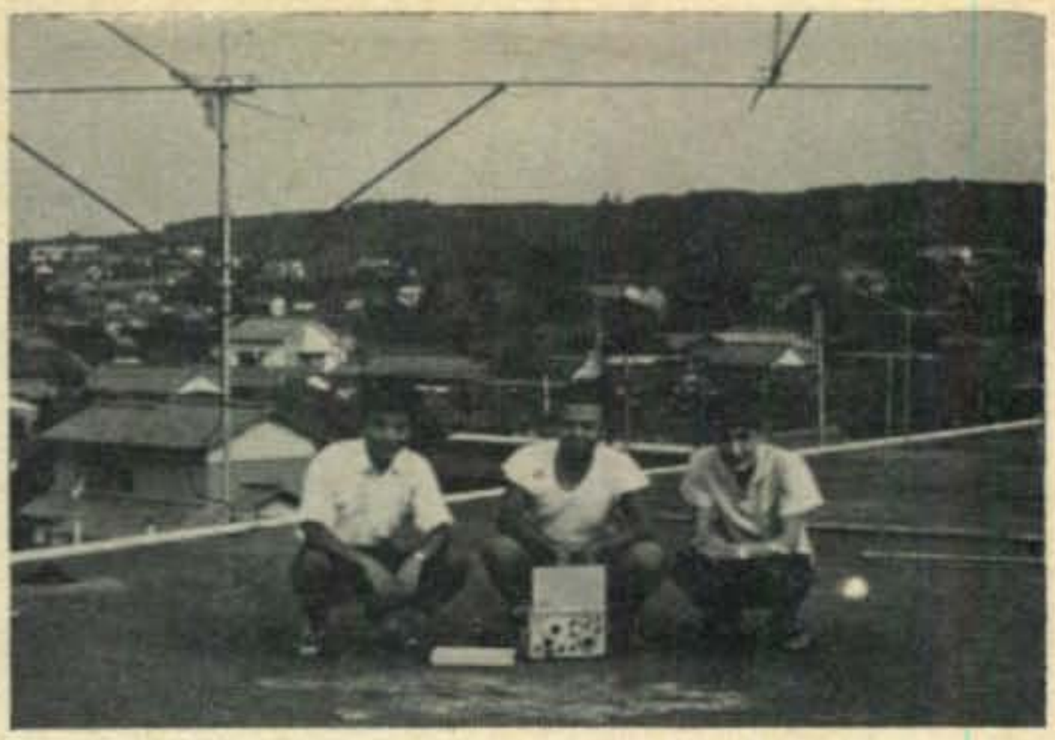
GB3 England: G3HCM sent along this item which should be of interest to WPX hunters. On May 25th, Her Majesty the Queen will be attending the consecration of the new Cathedral of St. Michael in Coventry. In connection with this, there will be a period of festivity lasting from May 25th until June 16th covering a wide range of sporting and cultural activities. The combined forces of the amateur radio clubs and groups in Coventry will be operating a special Festival Station signing GB3COV, which will be open to the public.

It is hoped to work all modes, on 160 through

BANNED LIST

Thailand has been added to the list of "banned" countries (Cambodia, Indonesia, Viet Nam) which have filed objections to amateur radio communications. Thailand has been off and on the list in recent years during diplomatic negotiations, and the current status is that contacts with HS-stations are now strictly prohibited.

Louis, CE3AG, addressing a meeting of the JARL during his recent trip to Tokyo. (Tnx JA2JW)



From l. to r., JA2JZ, JA2WB and JA2JW after they just put the finishing touches on JA2WB's beam. (Tnx JA2JW)

10 and a special QSL card will be issued to confirm all contacts. Incoming cards should go via the RSGB QSL Bureau.

KG6I Iwo Jima: Operator W4YQS of KG6IF has left and this station will be QRT until another operator is found. KWS-1 and all equipment remain. Arrangements have been made for all QSLs to be answered after departure of W4YQS. (*Tnx WGDXC*).

LA/P Spitzbergen: From July 1959 to July, 1961, I had my QTH at Spitzbergen (LA/P) I have QSLd 100% but again I get urgent requests from OMs asking for my card. I certainly want you to have it! I find only one explanation: My cards must become lost on the way. I am writing this because I want you to know it is not my fault if you wait for the card, since perhaps the /P is a new country for you. Bjarne Skillingshad, LA8FG/P. (*Tnx W2DEO*).

MP4 Abu Dhabi (Trucial Oman): Wynn, MP4TAO received the KWM-2 and now is very active on sideband around 1300Z on 21 mc where he has been worked by PAØWWP on 21215 kc. He is mostly on the air between 1100-1600Z and you may find him on the high end of 14 mc s.s.b. But, if conditions allow, he also operates the higher bands. QSL via DJ1BZ or direct (see QTH's). Also on 21 mc a.m., you may find MP4TAC active. (*Tnx VERON* DX Press).

PZ1 Surinam: ex-PZ1AY is now PAØJDS. If it has happened that because of his departure, some QSLs were not answered, he will be very glad to send them on request. You may reach him on the address mentioned in the QTH list.

TA Turkey: Wil, PAØWWP, was supposed to act as QSL manager for Erim, TA2AR, for QSOs made after Sept. 21, 1961. This was agreed after receipt of QSL by ØWWP from TA2AR and some correspondence between them. However, up until now, PAØWWP has not received Erim's logs nor did he receive a reply to 3 air mail letters with prepaid reply. According to incoming QSLs, TA2AR was on the air until Oct. 10, 1961 after which date he disappeared completely and nobody heard of him anymore. PAØWWP will keep the QSLs and IRCs some time longer and if he still will be unable to answer them, he will return all cards and IRCs received. (*Tnx VERON* DX Press).

TA2BK is QRX building a new rig and he will be active again in October of 1962. His QSL manager, DJ2PJ, hopes to do some operating from there when TA2BK is back on the air again. DJ2PJ is a good c.w. operator, so c.w. operation can be expected. (*Tnx WGDXC*).

TZ8 Mali Republic: Up until now, no 7G1A/TZ QSLs have been sent via the bureau. Josef, 7G1A, who now is in Czechoslovakia, has turned over the 7G1A/TZ logs to his QSL manager and it is expected that all answers to QSLs sent to the OK-QSL Bureau will be in the mail by now. (*Tnx VERON* DX Press).

VK9 Cocos-Keeling: VK9LA, has been very active using 20 watts and a dipole. QSL to VK6 Bureau. (*Tnx WGDXC*).

VP4 Trinidad: Larry, VP4NC, passes along the following VP4 news items: "Recent visitors to VP4 land included Nel, G2YL; Austin, YV6BC; and Stan, VP2SX. A barbeque at VP4NC's QTH was held in their honor with 36 OMs and XYLs present.

"Tek, VP4LP, was presented with a letter of commendation and a ship's plaque by the Captain of H.M.S. *Lynx* in appreciation for his combined home station and mobile operation which netted a stray seaman lost 'somewhere on shore.' With the *Lynx*, one of the hurricane guardships in the Caribbean area, waiting with steam up to pull out of Pointe-a-Pierre harbor, 4LP's quick work avoided what could have been a difficult situation for the ship's crew in general and a certain member of H.M. Navy in particular.

"Plans for the S.T.A R.S. exhibition are nearly completed under the leadership of Ken, VP4KR. The Honorable Gerard Montano, Trinidad's Minister of Works, has agreed to open the exhibit which takes place on May 5th, 1962.

"Trinidad's newest op, Keither, VP4KE, will

Here's Walt, W9JJF, the world's greatest DX operator. If you don't believe it, ask him!

be looking for DX with his Heathkit 90 watts and vertical antenna.

"The Antilles Emergency Weather Net, now more than 15 years in operation in the Caribbean area greatly misses former NCS Bob, KP4AEB. VP4NC is holding the gang together with the cooperation of Ed, PJ3AF and Dominica's two famous Bills. VP2DA and VP2DJ have made 40 meters a very busy band because of the 20 meter band conditions, especially at net time 1045 GMT."

VQ1 Zanzibar: There are at least four VQ1s now very active on s.s.b. The increased activity is due to several Americans recently stationed there manning the Zanzibar Project *Mercury* tracking station. Some of the stations are; VQ1DR, VQ1CJ, VQ1WW and the XYL of one of them. (*Tnx NEDXC*).

VR6 Pitcairn Island: "There has been some misunderstanding concerning the skeding of stations by VR6TC. A word of explanation is perhaps in order concerning these schedules. Every station who is scheduled, has contributed to the purchasing of equipment for VR6TC. We have sent him a receiver, a new Triband beam, plus many other items, without which he would not even be on the air.

"Tom is quite free to QSO anyone he wishes, at any time he wishes. The only time skeds are arranged is once per week for a period of about an hour and a half.

"So, to recap the above, the skeds are for those who have contributed to the purchase of equipment for VR6TC, without which we would not have been able to keep him on the air. Tom is free to work when and whom he pleases and can come on the air at his own discretion."

Thanks to John, W4TAJ, for the above information. John mentions that they are trying to get a transmitter for Tom in the event that some of you might care to help the cause.

VS4 Sarawak: Ron, VS4RS, now has his 21 mc beam on the air. He prefers this band and will be on it often. (*Tnx WGDXC*).

ZC6 Palestine: Several of the (NEDXA) members are reporting QSOing SM5ZS/ZC6, and it seems a good time to republish old data on this. There is no ZC6 prefix and no ham could be using it legally. Gaza Strip QSOs count only for Egypt and not Palestine. *The only* place that still counts as Palestine under the ARRL rules is a no-man's land situated in the

Two active Russian amateurs; Vlad, UL7FA, left, and Leo, UB5DP. (Tnx UC2AA)

City of Jerusalem and another no-man's land about 15 miles Northwest of Jerusalem. Recently, a tourist was shot through the head when she entered this area, so you can see it would be a little difficult to operate from there. A DXpedition is not possible as I believe the ruling stipulates that the station must be operated by a member of the UN force stationed in the area. (*Tnx NEDXA*).

ZC6UNJ is the call assigned to a new station in Palestine, operated by the former ZD2KHK/NC.

ZS2 Marion Island: ZS2MI is back to his regular Sunday morning operating around 1400 GMT. Usually operates around 14060, 14065, or 14030. (*Tnx NEDXC*).

Certificates

Musen to Jikken (Japanese leading radio experimenter's magazine) issues a new certificate "WA-AS." (Worked all Asia) in commemoration of its 50th anniversary.

Rules as Follows:

1. QSOs of 20 Asian countries required (except JA) and all Japanese call areas (JA1-JAØ). *2*. Any band and emission may be used. *3*. 30 QSLs and a list of stations will be submitted with all applications. *4*. Countries list will be the same as ARRL countries list. *5*. 10 IRC are requested. *6*. Send all mail to: DX Corner, *Musen to Jikken,* Seibundo, Ltd., 5-1 home, Kanda Nishiki-cho, Chiyodaku, Tokyo, Japan. (*Tnx JA1BWA*)

FEDXP

The FEDXP will award an attractive certificate attesting honorary membership to any licensed amateur, having two way communication with three or more regular FEDXP members. Applicants for this certificate should submit their QSL and ten IRC to FEDXP Award Manager, JA1BYM, Junzo, Yokokawa, 1-862 Asagaya, Suginami, Tokyo, Japan.

Some FEDXP members are: *JA1*BK, EL, GV, YL, BDF, BLC, BWA, BYM, *2*JW, XW, AEY, EK, *3*RQ, TC, *4*AS, *5*FQ, *6*CY, ACZ, *8*BY, ØCE, 1AEQ/Ø.

QTHs and QSL Managers

CN2BK via W2CTN.
CP1BH Box 1295, La Paz, Bolivia.
EP2BE Box 1472, Teheran, Iran.
ex-EP2BK, Robert Snyder, P.O. Box 502, Springfield, Mo.
FG7XE Box 387, Pointe-a-Pitre, Guadeloupe, FWI.
FK8AZ ex-FU8AE, Box 40, Noumea, New Caledonia.
FP8BX via W1RAN.
GW2DUR via KØRDP.
HH2CE via K8TBR.
HH2P via KØRDP.
KHØAB via W4DQS.
HL9KT via KARL, Central Box 162, Seoul, Korea, or B Company 304th SIG BN, APO 301, c/o PM, San Francisco, Calif.
ex-HS1C, Major Hal Christensen, W4RIM, 605 La Marre Dr., Fairfax, Va.
HS1W, APO 146, c/o PM, San Francisco, Calif.
HS1X, Carl Anderson, U.S. Embassy, Bangkok, Thailand or 5½ Hamilton Ave., Corinth, N. Y.
I1DFG, W. Simpson, AT-1P1, Nav #566 Div 80, c/o FPO, N.Y., N.Y. or Navy Air Facility, Aeroporto Capodichino, Napoli, Italia.
KC4AAD via WØBAT.
KC4USV via K1NAP.
KJ6CA via KH6DOX.
KN7OWH/WP4, Dale Barnes, P. O. Box 25, Castaner, Puerto Rico.
KS4BF via W4DQS.
KV4CM via WØGEK.
M1SVZ via I1SVZ.
MP4TAO via DJ1BZ or Decca Navigator Co. Ltd., Abu Dhabi, c/o A.D.M.A. Ltd., Das Island, Via Bahrain, Persian Gulf.
OH2BAH, John Rouhiarnen, Laurinkatu 32A 17, Lohja, Finland.
ex-PZ1AY now **PAØJDS,** J.D.S. Guilonard, Bachlaan 14, Enschede, Netherlands.
PZ1BH via WV6SBO.
PX1HX via F8HX.
SL6BH FSS/F 14, Halmstad, Sweden.
TN8AX ex-FQ8AX, Jean Rozier, Aeronautique Civile, B. P. 218, Brazzaville, Republic du Congo.
TN8BA, A Noger, B.P. 2012, Brazzaville, Republic du Congo.
TT8AL, Box 235, Fort Lamy, Tchad Republic.
UAØOM, Michael Tihonov, 2 Profsouznaja St. 3, Gorodok, Buryat, A.S.S.R., U.S.S.R.
V8EMZ via KØRDP.
VP1WS via K8ONV.
VP2AB, Box 229, Antigua.
VP2AF, W. Martin, Market St., John, Antigua.
VP2DA via W3AYD.
VP2GAA via W4OPM.
VP5AH via K4UFF.
VP8BW, Jack Hill, 32 Mariman Dr., Manchester 8, England.
VP8GB via W5QK.
VP8GN, Carol Greaves, Box 80, Port Stanley, Falkland Is.
VQ1CJ, Chuck, Box 1283, Zanzibar.
VQ1WW, Box 1283, Zanzibar.
VR1B via VK3IB.
VS4RM, R.M.G. Maule, Tandjong Loban School, Miri, Sarawak.
VS4RS, R.L. Skelton, (ex-G3HIP/ZD1IHP) c/o ACT, Post & Telegraph, Sibu, Sarawak.
VS9APH via W3HQO.
VU2US/AC5 via VU2BK.
W6YCW/KJ6, Box 100, APO 105, San Francisco, Calif.
WA6NPW/AM, W. Simpson AT-1P1 3000 El Sobrante, Santa Clara, Calif. or Navy #566, Div 80, R5D, Crew, c/o FPO, NY., NY.
YA1AN via DL3AR.
YV1CE, Box 1019, Maracaibo, Venezuela.
ZA2BAK, Box 28, Tirana, Albania.
ZD9AD, P. O. Box 3449, Johannesburg, S.A.
ZS6PC, Box 9321, Johannesburg, S.A.
6W8AN Box 971, St. Louis, Rep. du Senegal.
6W8CY, Box 3020, Dakar, Senegal.
6W8DF, Juif Fredo, Box 3033, Dakar, Senegal.
9G1CY via K1EJO.
9G1GN via VE4IM.
9K2AM via W3KVQ.
9M2GV via W7EMU.

PROPAGATION

George Jacobs, W3ASK
11307 Clara St., Silver Spring, Md.

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during June, 1962. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Charts are most likely to open with "good" quality (B) when conditions are above normal (June 8 and 14-16), and with "fair to poor" quality (C-D) on days when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be "disturbed," etc.

PROPAGATION CONDITIONS and CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days* June 8, 14-16	*Normal Days* June 1-2, 7, 9-13, 17-26	*Below Normal* June 3, 6, 29-30	*Disturbed Days* June 4-5, 27-28
(1)	C	D-E	E	E
(2)	B	C-D	D	E
(3)	A	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—An excellent opening with strong steady signals.
B—Good opening, moderately strong signals, with some fading and noise.
C—Fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.
D—Poor opening, signals generally weak, with considerable fading and high noise level.
E—Very poor opening, or none at all.

VERY few 10 and 15 meter DX openings are forecast for June and July. The relatively few openings expected on these bands should take place during the daytime hours. Twenty meters is forecast to open to most areas of the world sometime between dawn and several hours after sunset. DX conditions should be optimum a few hours after daybreak, and again during the late afternoon and early evening hours.

The highest static levels of the season usually occur during June and July, and this is expected to result in somewhat poorer DX propagation conditions on 40, 80 and 160 meters. Forty meters is forecast to open to many areas of the world from shortly before sunset, through the hours of darkness, until shortly after sunrise. This may be the best DX band to many areas of the world during the hours of darkness despite higher static levels. Some 80 meter DX openings are forecast for June during the hours of darkness, but signals are expected to be relatively weak and noisy. Very few 160 meter DX openings are expected, but some may take place during the hours of darkness and at sunrise.

Record-breaking short-skip propagation conditions are expected on all bands including 6, and possibly 2, meters during June and July. A Short-Skip Propagation Chart for June appeared in last month's column, and comprehensive information concerning sporadic-*E* short-skip propagation is contained in two special articles appearing in this month's issue of *CQ* —"50 Mc. Propagation Effects; Mid-Point Report On a Six-Year DX Story," by Morgan and Dorothy Monroe, and "Some Notes On Sporadic-*E* Propagation," by George Jacobs.

V.h.f. openings as a result of meteor ionization are generally at a minimum during June, since no major meteor showers are expected to occur. June is also a month of relatively little auroral activity, although there is a likelihood that some may occur when propagation conditions are below normal or disturbed (see "Last Minute Forecast").

Sunspot Cycle

The monthly Zurich sunspot number for March was 42. This results in a smoothed sunspot number of 52 centered on September, 1961. The sunspot cycle is now declining at a considerably slower rate than during the past three years. A smoothed sunspot number of 35 is forecast for June, 1962.

SURPRISE, surprise, throw away those magnifying glasses, this month's PROPAGATION CHARTS are appearing in clearer, easier to read type. Since it is very difficult to mix letters and numbers in type-setting Charts of this type, the A,P,N and M which were used previously for denoting time have been replaced by the 24-hour time system which uses only numbers. Don't let this confuse you, 24-hour time is simple to use. It begins with "00" for midnight, "01" for 1 A.M., etc. until "11" for 11 A.M. The figure 12 is used for noon, "13" for 1 P.M., "14" for 2 P.M., etc. until "23" for 11 P.M. An easy way to convert for the P.M. hours is simply subtract 12 from any number greater than 12. For example, if an opening is shown for 14-18, it means 2 to 6 P.M., Local Standard Time. Give it a try, it isn't as difficult as it may seem at first glance, and this change permits the Charts to be presented in more readable form. Let's have your comments please.—*W3ASK*

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of band opening indicate the *total* number of days during each month of the forecast period that the opening is expected to occur, as follows:

(1) Less than 7 days
(2) Between 8 and 13 days
(3) Between 14 and 22 days
(4) More than 22 days

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

The *CQ* DX PROPAGATION Charts are based upon a c.w. effective radiated power of 150 watts at radiation angles lower than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4 and 8 call districts; the Central USA Chart in the 5, 9 and Ø districts, and the Western USA Chart in the 6 and 7 districts. The Charts are valid through July 31, 1962. Propagation forecasts contained in these Charts are derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

June & July, 1962

EASTERN USA To:

TIME ZONE: EST (24-Hour Time)

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	15-18 (1)	05-08 (2) 08-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	19-20 (1) 20-23 (2) 23-01 (1)	21-22 (1) 22-23 (2) 23-00 (1) 22-00 (1)†
Eastern Europe & European USSR	13-16 (1)	05-09 (1) 14-22 (1)	20-00 (1)	21-23 (1)
Southern Europe & North Africa	14-18 (1)	04-05 (1) 05-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-21 (2) 21-23 (1)	19-20 (1) 20-23 (2) 23-01 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)†
South Africa	08-13 (1)	00-02 (1) 05-07 (1) 14-18 (1)	19-21 (1) 21-23 (1) 23-01 (1)	21-23 (1)
Eastern Mediterranean	13-16 (1)	05-07 (1) 14-17 (1) 17-19 (2) 19-22 (1)	19-23 (1)	*Nil*
Central Asia	*Nil*	05-08 (1) 13-21 (1)	*Nil*	*Nil*
Southeast Asia	*Nil*	06-08 (1) 12-17 (1)	*Nil*	*Nil*
Far East	*Nil*	07-12 (1) 21-00 (1)	*Nil*	*Nil*
Samoa, Pacific Area & New Zealand	19-21 (1)* 15-18 (1) 18-21 (2) 21-22 (1)	20-22 (1) 22-01 (2) 01-07 (1) 07-09 (2) 09-10 (1)	23-01 (1) 01-05 (2) 05-06 (1)	02-05 (1) 02-04 (1)†
Australia	19-22 (1)	06-07 (1) 07-08 (2) 08-11 (1) 22-00 (1) 00-02 (2) 02-03 (1)	02-06 (1)	03-05 (1)

*Indicates predicted 10 meter openings
†Indicates predicted 160 meter openings

South America	14-18 (1) 06-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	05-08 (3) 08-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-01 (3) 01-03 (2) 03-05 (1)	19-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-06 (1)	22-01 (1) 01-04 (2) 04-05 (1) 01-04 (1)†
McMurdo Sound, Antarctica	14-17 (1)	14-16 (1) 16-18 (2) 18-20 (1)	03-07 (1)	*Nil*

CENTRAL USA To:

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

	10/15 Meters	*20 Meters*	*40 Meters*	*80/160 Meters*
Western & Central Europe	14-17 (1)	05-07 (1) 14-16 (1) 16-19 (2) 19-21 (1)	20-23 (1)	21-23 (1)
Eastern Europe & European USSR	13-15 (1)	05-07 (1) 15-22 (1)	20-23 (1)	*Nil*
Southern Europe & North Africa	14-17 (1)	05-07 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-20 (2) 20-23 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Central Africa	14-18 (1)	12-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1)	21-22 (1)
Eastern Mediterranean	13-15 (1)	05-07 (1) 14-22 (1)	19-21 (1)	*Nil*
Central Asia	18-20 (1)	05-08 (1) 14-19 (1)	*Nil*	*Nil*
Southeast Asia	21-00 (1)	06-11 (1) 00-02 (1)	*Nil*	*Nil*
Far East	21-00 (1)	06-07 (1) 07-09 (2) 09-15 (1) 21-23 (1) 23-02 (2) 02-03 (1)	04-06 (1)	*Nil*
Samoa, Pacific Area & New Zealand	18-21 (1)* 11-12 (1) 12-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-04 (2) 04-07 (1) 07-09 (2) 09-13 (1)	00-02 (1) 02-05 (3) 05-06 (2) 06-07 (1)	01-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)†
Australia	16-20 (1) 20-22 (2) 22-23 (1)	14-22 (1) 22-00 (2) 00-03 (3) 03-07 (2) 07-08 (3) 08-10 (2) 10-12 (1)	00-03 (1) 03-06 (2) 06-07 (1)	02-06 (1)
Northern & Central South America	10-19 (1)* 06-08 (1) 08-12 (2) 12-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	06-09 (2) 09-14 (1) 14-16 (2) 16-20 (4) 20-22 (3) 22-00 (2 00-06 (1)	19-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-06 (1)	21-23 (1) 23-03 (2) 03-05 (1) 23-03 (1)†
Argentina, Chile & Uruguay	14-18 (1)* 06-08 (1) 08-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	14-16 (1) 16-18 (2) 18-22 (4) 22-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-02 (2) 02-05 (1)	22-03 (1) 22-02 (1)†
McMurdo Sound, Antarctica	13-15 (1)	13-16 (1) 16-18 (2) 18-20 (1)	04-07 (1)	*Nil*

[*Continued on page 168*]

Space Communications

GEORGE JACOBS, W3ASK
11307 CLARA STREET,
SILVER SPRING, MARYLAND

It's official—the U.S. Government has approved the launching of OSCAR II, amateur radio's second space satellite. It's due to be launched aboard a regularly scheduled space vehicle sometime during late May or early June. Chances are good that by the time this appears in print, the countdown for OSCAR II may already be in process. So, get your two-meter gear in shape, and join the parade as ham radio marches further into the space age.

OSCAR II's Purpose

OSCAR II will contain a 100 milliwatt beacon transmitter operating on 145 mc and will be almost identical to OSCAR I. The main purpose of launching another beacon transmitter is to attract a great many more observers to the OSCAR scientific program. As Bill Orr, W6SAI, recently put it, "many radio amateurs were caught with their antennas down when OSCAR I went up, and missed it entirely." OSCAR II presents another opportunity for radio amateurs to get into the space age—an opportunity to gain valuable experience in tracking procedures and equipment design in preparation for a radio amateur repeater satellite planned for a later launch in the OSCAR program. OSCAR II's beacon transmitter is expected to remain on the air for approximately three weeks, and the payload will remain in orbit for about a month.

Reporting OSCAR II Reception

OSCAR II's signal, like that of its predecessor, will consist of a continuous series of HIs transmitted in morse (.... ..). The HI rate will be controlled by the temperature within the payload. It will transmit on 145 mc in the internationally allocated 2 meter radio amateur band. Three types of reports are requested for OSCAR II.

The first, and simplest report is merely a QSL card mailed to the Project OSCAR Association, Box 183, Sunnyvale, California. Note the time OSCAR's signal was first heard, the time it peaked in strength, and the time it faded out. If possible, try to give the time to the nearest second. If you have a stop watch, or a watch with a sweep second hand, also count the number of seconds it takes the satellite to send 10 HIs. Jot the data on a QSL card, or a postcard or piece of notepaper, and mail it in. If possible, give your location in latitude and longitude as closely as you can. If not, your town location will do. The important thing is, *get the report in*. The information will be valuable in determining OSCAR's orbit and other scientific data, and you will receive an OSCAR II QSL card in return. Even if you hear OSCAR II only once, get that report in, and be counted among the radio amateurs who are pioneering the space age. You are urged to send in as many reports as you can.

The second, more advanced type of report makes use of the OSCAR I report form printed in October 1961's SPACE COMMUNICATIONS column. This report should be used when equipment is available for determining elevation and azimuth, HI counts, signal strength measurements and Doppler shift. Re-read October's column for full particulars.

Finally, a special tracking report form has been printed (see fig. 1) for the amateur with advanced equipment and experience. This form enables an observer to compute his own orbital data from satellite S-curves obtained by Doppler measurements. For more information on the use of this form see previous articles.[1, 2]

Remember—this is your satellite! It will prove its worth only if you listen to it, and

[*Continued on page 106*]

[1]Hilton, E. A., "Making Your Own Orbital Predictions From Doppler Measurements," *QST*, March, 1962, p. 23.
[2]Norgaard, D. E., "Eyeball and Eardrum Doppler Tracking," *QST*, April, 1962, p. 44.

OSCAR II TRACKING REPORT
Send to: P.O. BOX 183
Sunnyvale, Calif.

1) Call: _____
2) Name: _____
3) Street: _____
4) City: _____
5) County: _____
6) State: _____
7) Country: _____
8) Report No.: _____
DO NOT WRITE IN THIS SPACE.

9) Orbit No: _____
10) G.M.T. Observation Date: ___/___/___ (day mo year)
11) (decimals) Latitude: _____ (deg)
12) (decimals) West Longitude: _____ (deg)
13) First Heard: _____
14) Last Heard: _____
15) Estimated T.C.A.: _____
16) Signal Strength above Noise: _____ (db) (average for best two minutes of pass)
17) (1 = HI rate) Telemetry Chan 1: _____ °C
18) Telemetry Chan 2: _____
19) Telemetry Chan 3: _____
20) Frequency at T.C.A.: _____ mc
21) T.C.A. from Doppler Meas'mt: _____
22) Slant Range: _____ km (to west _____ / to east _____)
23) Satellite Position at T.C.A. (decimals) Lat: _____ W. Long: _____
24) Satellite Height: _____ km
25) Comments: _____

INSTRUCTIONS

Item 8) This is the number of this report for OSCAR II. Please keep a log of your reports and their dates so this will be accurate.
9) Fill in orbit number. Refer to WIAW broadcasts.
10) This date may be a day later or earlier than your local date. Remember it is the date in Greenwich (London), England.
11-12) Always use decimal degrees to nearest 0.01 degree.
12) Use West Longitude only (0° - 359°). See March, 1962 QST.
13-15) Use G.M.T. only. T.C.A. = Time of Closest Approach.
18-19) These channels may not be present--watch for last minute news reports.
21-24) See March 1962 QST for method of computing.
23-24) Requires joint reading with another station--state call under "Comments". Use back for worksheet.

Oscar form #5 Rev. 1-23-62

Fig. 1—Sample of special OSCAR II reporting form that should be used by radio amateurs and observers with equipment capable of measuring Doppler shifts with a high degree of accuracy.

RTTY

BYRON H. KRETZMAN, W2JTP
431 WOODBURY ROAD,
HUNTINGTON, NEW YORK

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.6 mc

SURPLUS converters for receiving radioteletype fall into two general classes, the i.f. type and the audio type. The i.f. type, as the name implies, is fed from the i.f. amplifier of the radio receiver with which it is used. Naturally, it must be capable of being tuned to the particular intermediate frequency of the receiver. The audio type of converter is fed from the audio output of the receiver with the two audio tones, usually 2125 and 2975 cycles, produced when an f.s.k. signal is tuned in. Of course the b.f.o. in the receiver is on. (See Chapter 3 of the *New RTTY Handbook* for a detailed explanation.)

The AN/URA Series

The most interesting RTTY converters to hit the surplus market lately were designed and built *after* World War II and are part of a dual diversity "Frequency Shift Converter-Comparator Group." There are actually three groups in this series, two of which have converters of the i.f. type and the third of which has converters of the audio type. All three groups, the AN/URA-6A, AN/URA-7A, and the AN/URA-8A, look somewhat similar, each with three "file-drawer" units which may be withdrawn on extension slides. Each group has two converters and a combining unit, called the Compartor. The Comparator is mounted between the two identical converters, each of which may be operated by itself in non-diversity. Space diversity operation of any of these groups, by the way, requires two receivers (with common or locked oscillators) connected to two widely separated antennas. The three units of a group mount in a table-top rack cabinet, but as originally supplied each unit came with adapter brackets for relay rack mounting and a set of shock or vibration-isolation mounts for table-top mounting of the individual units.

The AN/URA-6A and AN/URA-7A

The -6A and -7A groups have converters of the i.f. type. The CV-57/URR converters of the -6A group operate from any i.f. between 395 and 470 kc. The CV-71/URR converters of the -7A group operate from any i.f. between 47.5 and 52.5 kc. Input impedance at i.f. is 70 ohms unbalanced, and an i.f. input level between 2500 microvolts and 0.5 volts will operate the unit. The electronic keyer or switch tubes in the output circuit (to the teleprinter) get their plate voltage from an external 115 volt d.c. loop supply rectifier, which is a required accessory.

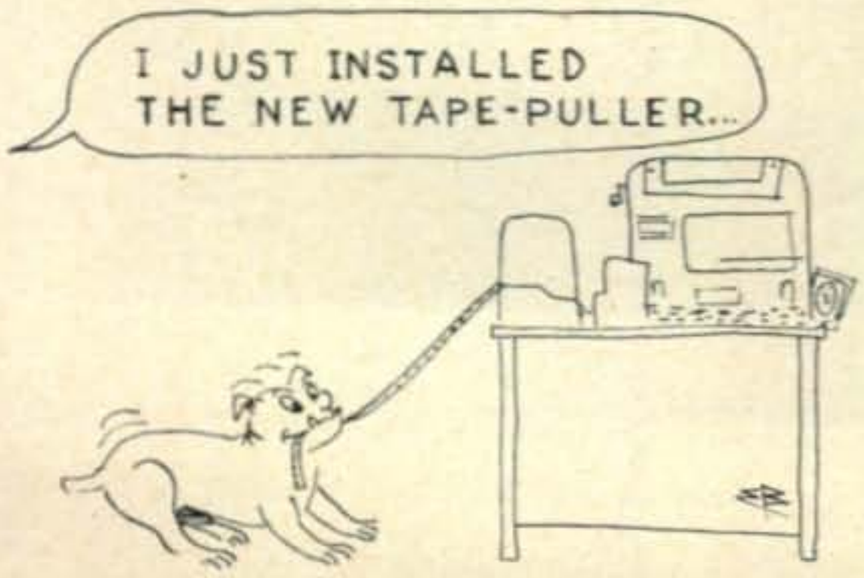
The CM-14/URR Comparator is used with both the -6A and the -7A groups. It has a make-break audio oscillator that is keyed by the combined received signal. A switch allows the selection of any of the standard tones of 595, 765, 1105, 1445, 1615, or 1785 cycles. An external position also makes possible the use of a different frequency when supplied from an external audio oscillator.

The purpose of this keyed audio oscillator arrangement was to send tone over a telephone line or v.h.f. link from the remote receiving station, where these units and their receivers are customarily located, to a signal center where the teleprinter machines are installed. Of course, make-break tone converters are then required at the signal center location.

The AN/URA-8A

Of the three groups, the AN/URA-8A probably is the most easily used by the amateur RTTYer since it is an audio type of converter requiring connection only to the

RTTY The Hard Way . . . No. 11.



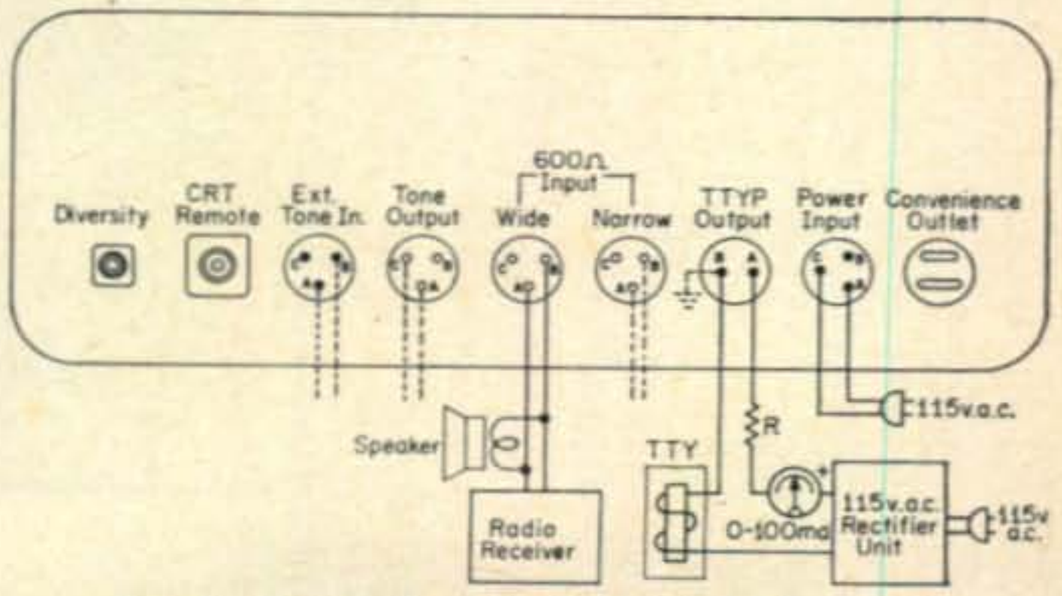


Fig. 1—Connections to CV-89/URA for RTTY.

Surplus CV-89/URA-8A audio discriminator converter.

output audio circuit of the receiver. Utilization of the -6A and the -7A groups require connection to the i.f. amplifier of the receiver.

In appearance, the -8A group is somewhat different from the -6A and the -7A groups in that the tuning scope is located in the center of each of the CV-89/URA converters, and that there is no level meter on the panel of the CM-22/URA Comparator unit. Also, each of the two CV-89/URA converters has its own make-break tone oscillator as well as its d.c. output circuit. The CM-22/URA, like the CM-14/URR of the other two groups, has its own tone oscillator, too, which may be switched to either of the diversity channels or to the combined output. All tone oscillators in all three groups have the same facilities as previously described.

Electically, the CV-89/URA is an audio type of converter with a linear discriminator instead of the slot-filters normally found in an amateur RTTY converter. Like its i.f. counterparts, the CV-89/URA has a two position selectivity or filter switch that enables the operator to set up for any narrow shift from 10 to 200 cycles or any wide shift from 200 to 1000 cycles. The mean or center frequency for narrow shift is 1000 cycles, and for wide shift it is 2550 cycles. The d.c. output circuit is the same as described above for the other two groups. Two separate audio inputs are provided, one for narrow shift and one for wide shift. Each has an input impedance of 600 ohms, balanced, and the converter will operate with an input of 60 microwatts to 60 milliwatts, or about –14 to plus 18 dbm. The output tone levels of the audio oscillators is adjustable up to 12 milliwatts (about 11 dbm) in 600 ohms. If required, a solder-connection to the center tap terminal on the output transformer can be made.

Connections

Connecting up a CV-89/URA for RTTY is not difficult if you have the cable connectors ordinarily supplied. Figure 1 shows the connections made to the rear of one of these converters. Note that each connector is clearly labeled on the unit. If you have to purchase the mating connectors, the following list identifies the types needed for each circuit. (These military AN connectors are made by Amphenol, Cannon, and by other companies.)

DIVERSITY	UG-85/U
CRT REMOTE	PL-259
EXT. TONE IN	AN3106-14S-12S
TONE OUTPUT	AN3106-14S-12P
WIDE (600 ohm input)	AN3106-14S-7P

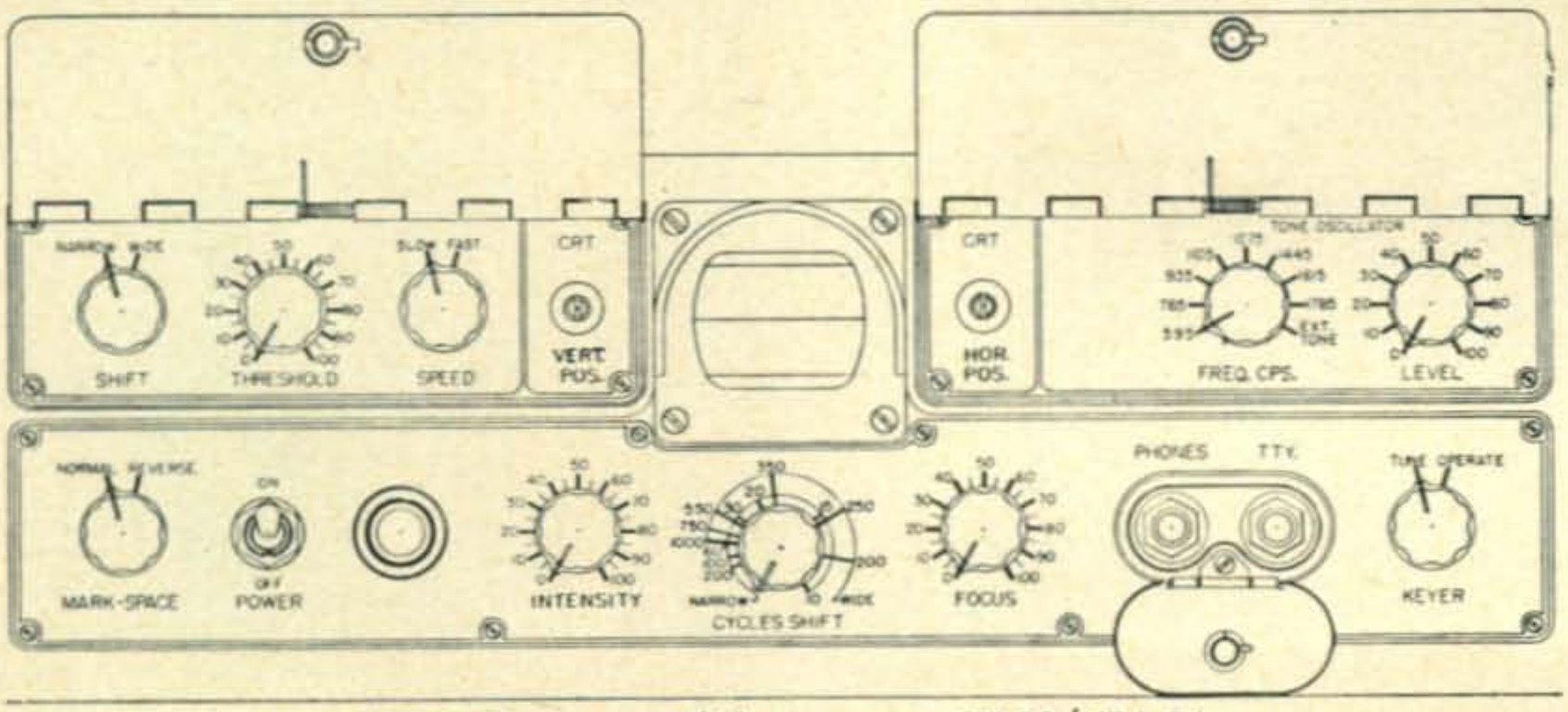


Fig. 2—Frequency shift converter CV-89/URA-8A.

NARROW (600 OHM INPUT)	AN3106-14S-7P
TTYP OUTPUT	AN3106-14S-9S
PWR. INPUT	AN3106-14S-7S

Since the audio input is 600 ohms with good sensitivity, satisfactory operation may be obtained simply by bridging the voice coil speaker circuit of the radio receiver with which the unit is to be used. It should be noted that inside the converter, on terminal board E_{102}, there are jumper links that allow the parallel connection of the wide and narrow inputs so that both may be fed from the same source without having to change connector position. These links are marked PARALLEL and OPEN.

The TTYP OUTPUT connections must be correctly polarized otherwise the unit will not operate. Pin *B* of the connector is ground (chassis) and pin *A* must be positive. Figure 1 also shows the connections that must be made between the selector magnets of the TTY machine, the d.c. loop supply, and the converter. Resistance *R* is adjusted to about 2000 ohms (use a 20 watt slider-type) to obtain 60 ma or about 6000 ohms to obtain 20 ma; whichever your TTY machine requires. The front panel jack, next to the TUNE-OPERATE switch is marked TTY, and is in the hot side of the d.c. loop. A loop current meter can be plugged in here if you don't have one permanently in the loop as in the diagram.

For normal amateur RTTY operation the internal tone oscillator, keyed by the incoming signal when the KEYER switch is in the OPERATE position, is not used. Its output may be monitored by plugging a set of headphones into the PHONES jack on the front panel. Likewise, the DIVERSITY and the CRT REMOTE connections on the rear would not be used.

Operation

Figure 2 is a drawing of the front panel of the CV-89/URA Converter with the doors swung open. Assuming that the correct connections have been made, the receiver with which the converter is used should be set up so that its b.f.o. is 2550 cycles from the i.f. center for the more common WIDE or 850 cycle shift. For NARROW shift operation the b.f.o. is set 1000 cycles from center. (See Chapter 6 of the *New RTTY Handbook*.)

To set up for 850 cycle shift, begin by setting the KEYER switch to TUNE, the THRESHOLD control to 0, and the SHIFT switch to WIDE. The CYCLES SHIFT (scope vertical gain) is set to about 800 and the SPEED is set to SLOW. With no audio signal input a straight line should appear across the center of the scope. Its position can be set, if necessary, by adjusting the CRT controls next to the scope face. With the audio input (receiver audio gain) turned up to about 60 mw or about 18 dbm, tune in an f.s.k. signal until you have a pattern on the scope that looks something like fig. 3A. If you know that the shift of the station being received is correct at 850, adjust the CYCLES SHIFT control until the height is such that the *mark* lands on the upper line and the *space* on the lower.

Set the KEYER switch to OPERATE and slowly turn up the THRESHOLD control until the machine starts to print. Try the MARK-SPACE switch in both NORMAL and REVERSE positions, and leave it in the position that gives correct copy. Now adjust the THRESHOLD control to the highest scale reading which does not allow noise pulses to cause errors in the copy. A practical way to find this setting is to detune the receiver slightly off the signal to where noise alone is received. Turn the THRESHOLD control clockwise to allow the noise to key the machine, and then back it off to where the threshold bias just prevents the noise from keying the local loop.

Additional Notes

Unfortunately, planned space for this RTTY COLUMN, a regular monthly feature of *CQ*, does not permit running the schematic diagram of this group. The instruction book, which of course contains the schematic, carries the Navy Department number, NAVSHIPS 91278. It might be obtained from one of the surplus publications dealers listed in Chapter 8 of the *New RTTY Handbook*.

Printed Circuit Boards

Last month we said that it looked like we would be able to supply the printed circuit

[*Continued on page 112*]

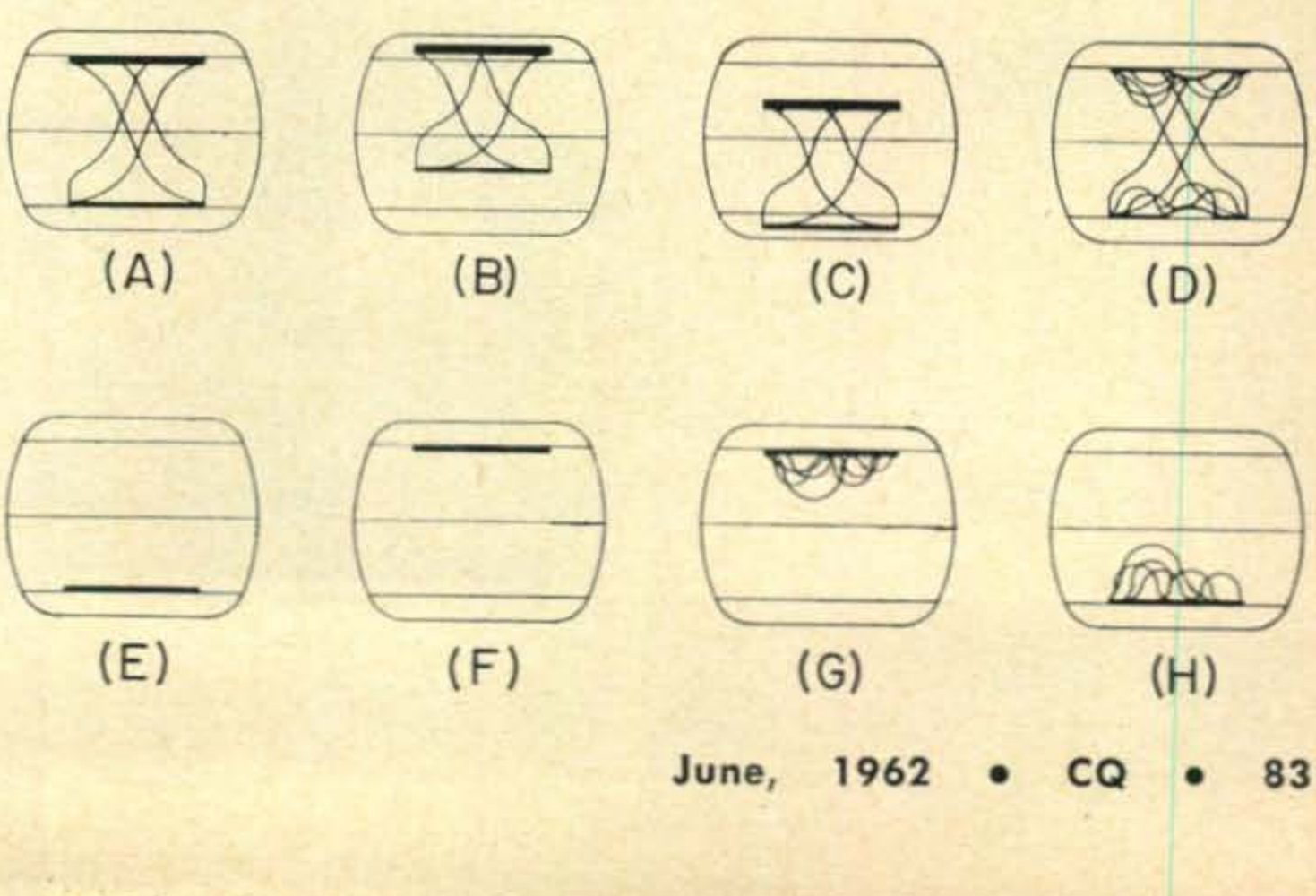


Fig. 3—Oscilloscope tuning indicator patterns (A) Correct tuning, (B&C) Incorrect tuning, (D) Noise, (E) Continuous space, (F) Continuous mark, (G) Continuous mark with noise, (H) Continuous space with noise.

Novice

BY WALTER G. BURDINE, W8ZCV
R.F.D. 3, WAYNESVILLE, OHIO

You will note from the column that someone took the time to write, did you? Those letters and pictures that you send make this column more interesting to read and remember, a picture (8" × 10") tells more than a thousand words. I will shortly start a count of states to see how long it takes before I get a letter from each state. Last time I wrote the column I heard from both Alaska and Hawaii before receiving letters from several of the Western States. Idaho was my last state and I received it after the last column was written.

I am surprised to find the number of people that know little of the ham, his activities and the licensing procedures. I am very happy to hear of the young folks getting their general licenses and working a large number of states and a fair amount of DX. They will undoubtedly form the backbone of our future generation of hams and they seem to be doing very well for their part. I am just a little fearful that if the FCC starts charging a fee for a license it might dampen the enthusiasm of some of the future generation of hams since they include many school children. They may have trouble getting the necessary money to pay for their license *and* their station equipment. This prevents some of them from getting on the air even *now*. I will try to keep the column full of simple, effective and easily constructed projects. We can work together on this.

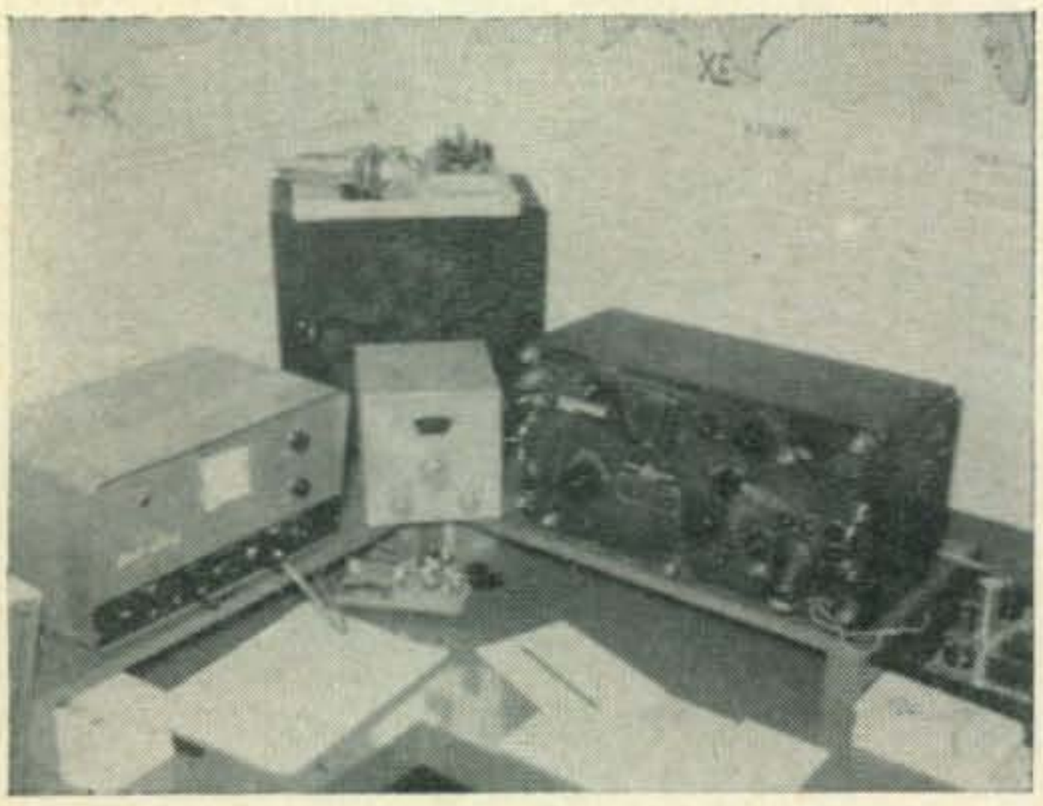
This month the column begins to look like a DX column. I surely welcome letters and pictures from other countries. We would like to know some of the facts of licensing and of equipment in your country, I'm sure that would make interesting reading. Thanks to all of you who have taken the time to write.

Rules and Regulations

A number of questions are asked in the FCC examinations on the rules and regulations and many aspirants for the amateur license have failed to study them sufficiently well to be able to pass that part of the written test. To be a good ham one must keep up with the latest rules and regulations. To help us get the latest information, the Government has a subscription method of getting this important information to us. To subscribe send one dollar and twenty-five cents to the following address and ask for *The Federal Communications Commission Rules and Regulations,* Volume VI, Parts 12, 19 and 20. The $1.25 is for the Revised 1962 Edition with supplementary material for an indefinite period. This will keep your copy up to date. Mail the letter and money to: The Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Nets and Net Information

If you have a net for Novices and Technicians and you will get the information to me along with the times and frequencies I will announce it in this space and try to help improve the attendance. Those nets announced this month are listed below.



This is how "Rich" corners all of that DX. This neat station belongs to Richard A. Klobucker, K7QWC, 402 Crestview, Moses Lake, Washington. Rich is located in Grant County.

This active ham's paradise belongs to "Mike," WN/WA4BMC and her OM, WN/WA4AZZ of Lake Worth, Florida. I'll be looking for you on two meters, Mike.

The Northwest Slow Speed Net (NSN meets at 0500 GMT on 3700 kc every day except Sunday. They welcome Novices and ex-Novices to check in and they tune the entire novice band for rock-bound novices (I thought *all* novices were rock-bound). Write, Jim Cassidy, K7IWD, 4224 S.E. View Acres Road, Milwaukee 22, Oregon. They have a nice QSL incidentally.

Mrs. B. F. (Mike) Eggert, WA4BMC, 1510 17th Ave. N. Lake Worth, Florida will send you information on the 7-11 Trafic Net on two meters, it meets at 1900 EST seven nights a week. She can also tell you about the Broward County two meter Emergency Net.

Ed Tobias, WV2VKK, 280 First Avenue, New York 9, New York is the manager of The Boy Scouts of America two meter Emergency Net.

Modulator For Low Power Rigs

Last month we gave a thumbnail sketch of modulation theory and practice and this month I will give you the data on a modulator that I use for about every small rig that I build. I have used it on many of the low-powered commercial rigs on the market and countless numbers of home-made rigs. I have three of these modulators and one is part of my 220 mc rig using a 6360 final. Actually I first used one of these for the Heath AT-1. By building this modulator on a small chassis and having it on hand for emergencies it can be one of the most used little gadgets in the shack. By carefully observing the operating parameters of the output tubes and adjustments you can use this modulator to modulate rigs from five to thirty watts output, and do a good job of it at that. The audio output depends upon the plate voltage and the current drawn by the output tubes, and to some extent upon the amount of drive to the tubes, but that is usually adequate for any purpose.

The modulator is simplicity in itself and can be built as shown in the photographs. The design is simple and straightforward, making uncluttered construction practices possible. The chassis for this was a 5 × 9½ × 2 inch aluminum chassis; the same size as my 220 mc rig.

The tube line-up can be changed if you feel up to the task, to use other filament voltages, either seven or nine pin miniature tubes or any type tube that happens to be in the junk-box. You will have to study the tube handbooks and be careful to use the right socket connections for the tubes selected. The tube handbooks give typical operating voltages and currents for the power outputs needed. Use them, and be careful with the socket connections.

Operation

The low voltage output of a high impedance crystal or dynamic microphone is amplified by the 6SJ7 pentode resistance coupled to a 6J5 triode transformer coupled to pushpull 6V6's or similar pentodes. The choice of modulator tubes and supply voltages will determine the modulator output power. By choosing the correct tube line-up the modulator can be used on 12 or even 25 volt filament voltage to furnish modulation to some of the popular surplus equipment. An alternate input circuit is shown in fig. 2 for using a carbon microphone. They furnish good communication quality for modulating a ham rig especially mobile. The frequency response of this unit is good enough for use with either type microphone.

The modulation transformer shown is a surplus item from the popular SCR-522 and almost any small modulation transformer can be used. Seven "Chinese Copies" of this modulator have been made by friends and they have used the transformer from the ARC-3, the Merit A-3008, the Merit A3109, the Stancor A-3845 and the Thordarson T-21M52 and some other makes and sizes. Capacitor C_x can be used to restrict the audio range if you desire. Experiment with the value until the cor-

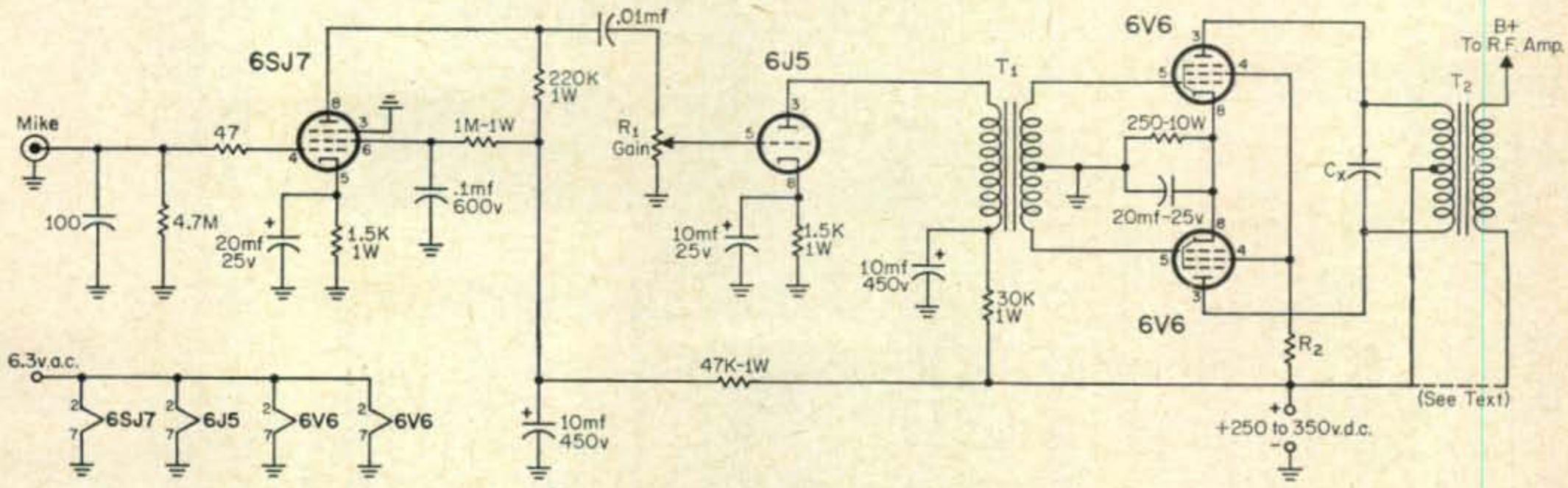


Fig. 1—Schematic of a low power modulator suitable for use with any of the current c.w. transmitters in the 25 watt class.

C_X—.001 mf. See text.
R_1—0.5 meg pot. Audio taper.
R_2—See text.
T_1—Interstage audio transformer. Stancor A-53C or equiv.
T_2—10 or 15 watt modulation transformer. Unit shown is from an SCR-522 modulator.

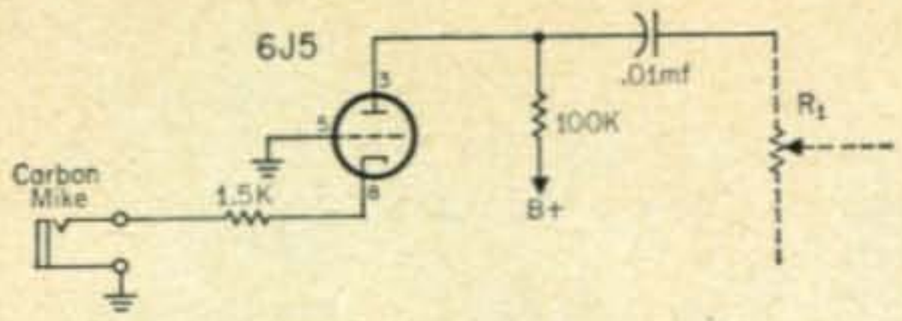


Fig. 2—Alternate speech amplifier circuit for the modulator of fig. 1 for use with a carbon mike.

rect range of frequencies is obtained. Start with an .001 mf 1000 volt unit and go from there. *Do not operate this unit without a load.* This could cause breakdown of the modulation transformer.

Use shielded wire for all circuits carrying audio voltages; use #16 twisted wire for all leads carrying filament voltages and keep the wiring close to the chassis. Wire neatly and you will have a piece of equipment to be proud of when you show your friends.

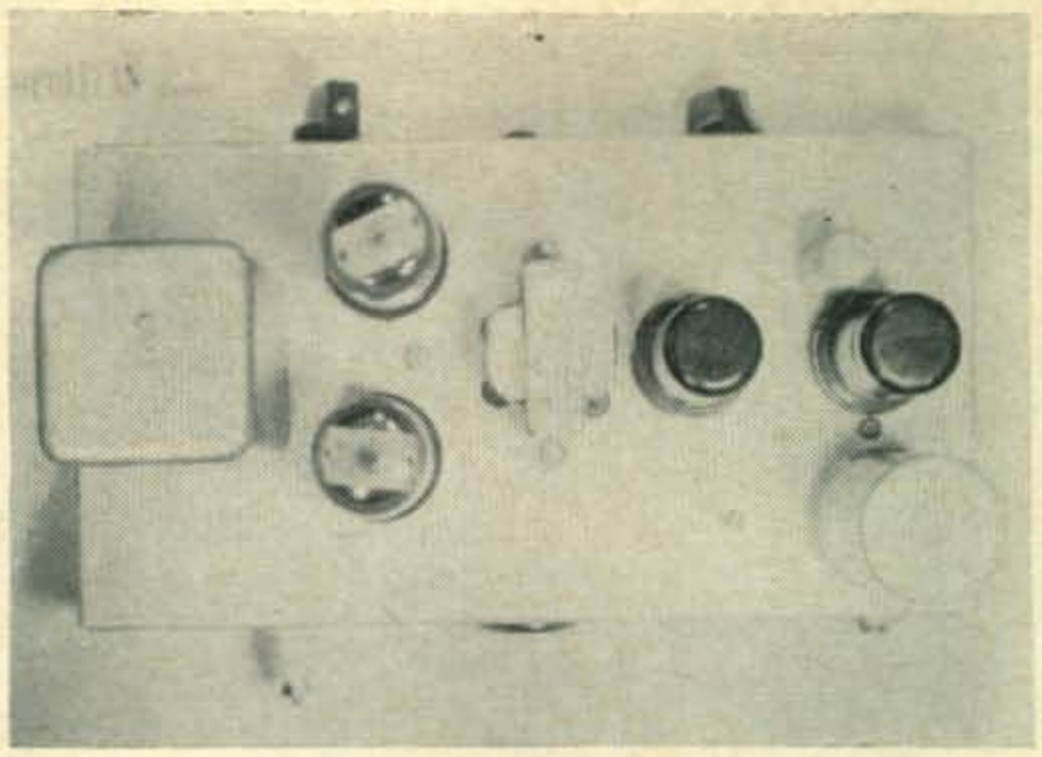
To get the best transfer of power it is necessary to match the plate impedance of the modulator tubes to the plate impedance of the r.f. amplifier. The required secondary impedance of the transformer can be found by dividing the plate voltage of the final by the plate current (milliamps) and multiplying by 1000. Example: 300 volts divided by 100 ma = 3 × 1000 = 3000 ohms. If you use a multimatch transformer, use the taps that are the nearest the optimum value for your r.f amplifier.

An alternate microphone circuit is shown below for a carbon mike. Use this circuit to replace the 6SJ7 circuitry. The microphone current is furnished by the cathode of the 6J5. The two 6J5s could be replaced with a single 12AX7. Using the tube manual, always keep the screen voltage on the modulator tubes at optimum value by adjusting the value of R_{10}. Good luck with your modulator.

Letters

The first YL to write a letter to me was Wanda Kimble, WV2USJ, Box 31, Mahopac Falls, New York. I sure am glad to see the YLs getting into the enjoyment of amateur radio. It certainly makes it more interesting to the rest of us. Welcome to the column YLs.

Wanda writes: "The rig here consists of a DX-20 running at 35 watts and an NC-303 receiver using a long-wire antenna. I have been on the air for 6 months.



Top view of the simple modulator showing parts placement and chassis layout.

I have received over 250 QSLs and worked 40 states (all confirmed). I have also worked VE 1, 2, 3 and 4. I work mostly 40 meters and would like to work some 7s. I am the mother of two children, aged 2 and 3 years. I learned the code and operating in about 5 months by just listening to the other fellows QSO. In 5 months I copied over 200 calls from 43 states and was very happy to get s.w.l. cards from all that I sent cards, every fellow and gal sent a card in reply and from my heart I thank them all, they made studying the code a lot more interesting. Thanks Walt. 73, Wanda, WV2USJ."

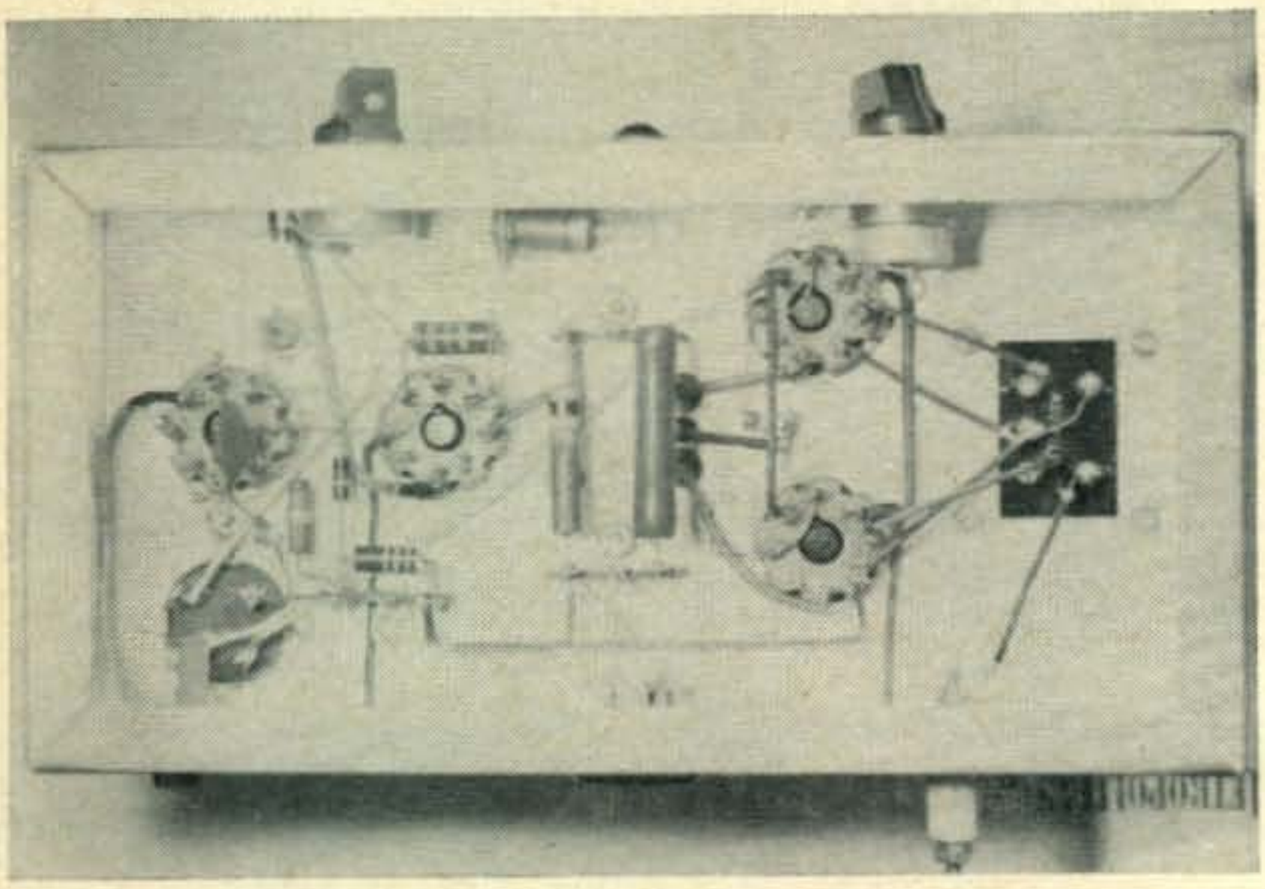
Thanks for the letter Wanda I think that actually copying the fellows on the air makes learning the code easier and by the way when you send an s.w.l. card to an amateur that you have copied on c.w. he will be more likely to QSL as he knows that you are serious about becoming an amateur.

Remember I said I needed letters with ideas? Well if you don't get more than one idea here, give up.

"Dear Walt: I enjoy *CQ* very much and I wish you much success in your Novice Column.

"My rig consists of a Globe Chief, 75 watts to a TA-33-Sr. antenna 45 feet up on an EZ-Way tower, it is turned with a Ham-M rotator. The receiver is a 75A-2. I am also a Technician and work 6 and 2 meters with a Clegg Zeus running 185 watts. Antennas are a 32 element colinear for two meters up 55 feet and a 10 element Cushcraft beam for six meters up 47 feet high. I use Ameco 3-nuvistor converters with power supplies and pre-ams on both v.h.f. frequencies. There are full dipoles for both 40 and 80 meters. The car has a Two-er and a Six-er mobile. A Globe 500B awaits the General license.

"My brag list: WAS—45/44, DX—45/26, BPLs-8, RCC, CP-15 w.p.m., OES, ARRL, AREC, ROHO, SMART, Ga. Peach, YLRL, Floridora, NCS- Seven-eleven Traffic net on 2 meters at 1900 EST seven nights a week and a member of the Broward County 2 meter Emergency net.



Bottom view of the simple modulator. The power resistor at the center of the chassis is the modulator cathode resistor. The Steatite insulator on the rear apron is the modulator output terminal. The potentiometer on the right is not used in the circuit shown in fig. 1.

"I am 44 years of age, a mother and a grandmother. The OM is WA(N)-4AZZ. I have sent out 588 QSLs. I think being a ham is the most fun and the most interesting hobby I have ever tried and I have tried many different hobbies.

"Question: I have never heard Asia, Australia or the islands of the Pacific Ocean. Where and what time and frequency does one listen for these amateurs, why can't I hear them?

"Idea: If the generals don't use the 10 meter band during the declining sun-spot cycle will the FCC take the band and give it to some other service like the citizens band or safety services? Would the FCC possibly assign the 10 meter band to the Technician, somebody should make good use of it.

I love *CQ* and I am behind anything to help my fellow hams. 73. (or should I say 88?) Mike."

Mike is Mrs. B. F. "Mike" Eggert, WA/WN4BMC. 1510 17th Avenue N., Lake Worth, Florida.

Thanks for the letter and this is what I mean when I say I need letters with ideas, hints, kinks and general information for the column. I sure am glad to know that there is somebody in Florida on two meters and I hope that you are my first Florida two meter contact. I have just finished seven years of daily v.h.f. contacts, all were made with low power and above 50 mc. I enjoy the v.h.f. bands and think as you do that if we don't use them we will loose them. I think the intelligent use of our frequencies would dictate the use of two or more bands for the best coverage and operating pleasure.

Lars Palmkvist, SM5TA, Storgatan 32c, Boxholm, Sweden writes this offer: "Dear Walt: I am active on the 15 meter band with 50 watts to a 40 meter dipole and an SX-140 receiver. I have heard lots of KN/WN stations on 15 meters. So if you will tell the KN/WN stations that would like an SM QSO that I am QRV for W Saturday and Sunday from 1300 to 1600 GMT. In the last 3 months I have worked about 100 W/K stations and I get good reports over there. QRG is 21035 and 21120.

"I will also be on the air for a sked. I am sure the boys in the USA can work Europe with their Novice license, I am also a Novice.

"Well 73 es good DX. Lars."

There you are fellows, Lars is waiting for a call from you, if you can't find some one over there to work, read the Novice column. I want to thank Lars for the nice letter and offer to furnish Europe for WAC.

By golly, ole Rich (Richard A. Klobucher, K7QWC, 407 Crestview, Moses Lake, Washington) has left the fold and sent in his final report.

"Dear Walt: As a faithful reader of Novice in *CQ*, I thought I would get in my two cents worth, I have just gotten rid of the "N" in my call. My final WAS was 41/39 and the only DX was Alaska, Hawaii and Japan.

Edgar O. Fisher, W8PQZ, Kettering, Ohio is shown at the controls of MARS station AG8FDU just after receiving a letter of appreciation signed by Col. John W. Riggs, K8WRT, Mars Director for operating MARS net #2 so that we received the highest rating in the Air Force Logistics Command MARS Program. Ed is also property custodian of DAAFD MARS.

Paul S. (Steve) Carlock, KØDBJ operating at KA2NY, Yokosuka, Japan is listening for Novices on the 15 meter band every Sunday morning. I suggest that you read his letter and then get acquainted with the time zones and watch for him for Asia for WAC.

"The rig is a Globe Chief 90A and the receiver is a BC-312. I used to use an S-11. Antennas are a 40 meter dipole, 90 foot long-wire and a 15 meter rotary dipole.

"I will be willing to sked anyone needing Grant County for USA-CA on 40 or 20 meters. Thank you and 73. Rich."

Help Wanted

If you need help in getting your license or getting the transmitter figured out from the package of nuts and bolts, or if you need help in finding some one to give you your test, just let me know. Send all the information you can about yourself and tell me what you need. Address this to: Walter G. Burdine, W8ZCV, Waynesville, Ohio.

If you can offer help to any of the following aspirants, please do so and they will certainly thank you.

Morty Sadeguy, P.O. Box 111, Lacolle, Quebec, Canada is a scoutmaster and would like a ticket for himself and some of the scouts in his troop. Here is *your* chance for a good deed.

Mike Schwartz, 58 S. Bath Avenue, Long Branch, New Jersey needs ideas for building a receiver and transmitter. He says he knows the code but needs some practice.

Kenneth Carter (age 14) 611 Piersey Street, Norfolk 11, Virginia. Norfolk Naval Base. Kenneth needs help with the code and theory. His father is in the Navy.

E. Clark Creager, (ex-3PT in '14) 19 Colwyn Lane, Bala Cynwyd, Pa., knows the code. He needs a ham to help him with the difference between the gear of

[*Continued on page 114*]

Royal W. Kramer, W3ZIF, Allentown, Pennsylvania, really runs kilowatt alley, he works for the local power and light company.

The USA-CA Program

BY CLIF EVANS*, K6BX

SEVEN lucky USA-CA winners came in since last month's report.

CHCer Walt Enz, W8NAN, came in for USA-CA-1000 #5 to get a gold seal on his 14 × 21" most beautiful award; did we tell you. . . . USA-CA, most colorful award in world has all fifty of the U.S. state's flags in multicolor as the four outer borders! 'Tis a beauty to perceive and display!

New USA-CA winners were:

USA-CA 1000

W8NAN 5

USA-CA 500

W4NOK 67
W7NPV 68
KØIDV 69
F9BB 70
K7CRL 71
LU1DAB 72

We were not surprised when LU1DAB, Juan Carlos Naon, familiarly known to his host of U.S. friends as "Jaycee," was first in world to get USA-CA-500 on all 28 mc phone. Jaycee, a rancher, (now well on his way to the 1000 level) says that he is most proud of his USA-CA and wishes it to be testimonial to the many friends he's made in the U.S., and particularly "the unforgettable joy of the friendly meetings we had with all the fine Old Chaps and their wonderful families we were happy to visit during our 22,000 driven-miles across Uncle Sam's Land in 1959." Jaycee asked the OLD MAN if he could slip in our column "a Big Hello to the thousands of American Friends we have been so happy to contact during the past thirteen years operating LU1DAB and LUØDAB/mobile." . . . well now Jaycee, we'll see if'n it can be 'arranged' just like they do it on TV.

USA-CA Good Will Club

Last month we told you we'd created the USA-CA Good Will Club, members of which volunteer on a person-to-person basis to help out DXers who need help in identifying U.S. counties for QSLs held but without courtesy of county identity. The way we will work it is to periodically list members in both this column and the Directory *News Letter*, and then DXers may feel free to make direct contacts for help. As of today, the following U.S. hams are members of the USA-CA Good Will Club:

K2PFC
W2JQU
WA2TCW
W4UF
K5USE
W5AWT
K6BX
K7NHV
K9TZH
W9CLH
W9GFF
W9QQG
KØDEQ
WØVBQ

Don't be bashful fellows, send in a postcard to the OLD MAN and be made an honorary member of the club. . . . no dues. . . . just good will.

Speaking of identifying counties, and seeing CHCer WØVBQ's call, reminds us. . . . WØVBQ sent us along word that the USA-CA program caused such a 'rush' on the Government Printing Office that they report they are out of stock on P.O.D. #26, *Directory of* [U.S.] *Post Offices* P.O.D. #26 is the Post Office's 'bible' so this has to be a temporary situation. In any event, P.O.D. #26 is brought up to date and reprinted each July, annually, so place orders for July 1962 issue.

*United States of America Counties Award Custodian, Box 385, Bonita, California.

Results of Fifth QWCA QSO Party

The Fifth Annual QCWA QSO Party held in February was a lively affair even though some QCWAers didn't get the 'word' that this year the Party was open to all hamdom and not an exclusive 'closed corporation' affair.

Winner of the QCWA plaque was CHCer W4FNQ, Edward Zimmerman, Miami, Florida, with 186 contacts with QCWAers along with many contacts with others wishing to meet him as a QCWAer for the regular QCWA awards.

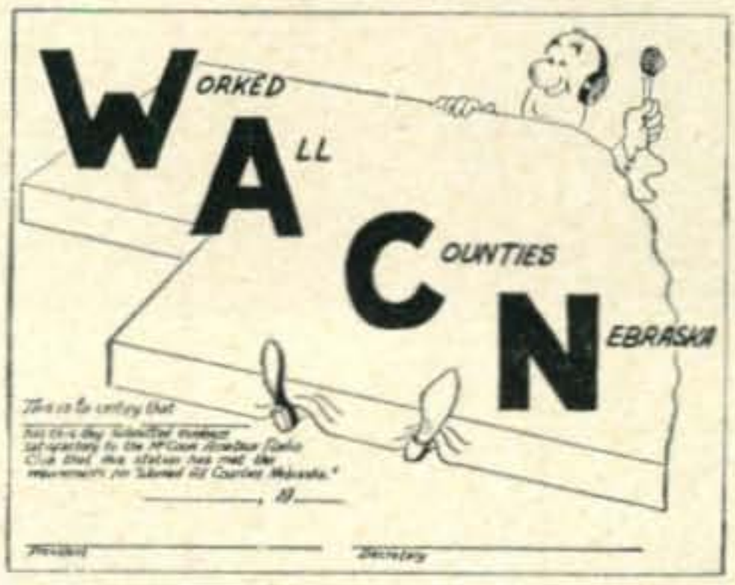
The QCWA plaque has been engraved with Ed's name and call, and plans are being made that it be presented to him by Walter Kinney, W4GJ, of the SE Florida QCWA Chapter at some suitable ceremony.

The QCWA plaque, available only to QCWAers, becomes the personal property of any QCWAer who wins it three times; otherwise it goes the rounds, winner to winner, with each name being added.

Another smaller plaque donated by the QSO Party's two sponsors in 1962, the Boston-Providence and the Delaware Valley Chapters, also will be presented to W4FNQ.

Other winners and their scores were: (contacts) *Second:* HC1AGI, (W3EIS), 156 (tied): WØVBG, 156. *Third:* W6ZPX, 128 (last year's winner) *Fourth:* W1JYH, 127 *Fifth:* K6GIL, 118 *Sixth:* W1GKJ, 117 *Seventh:* W5DWO/W5JD, 115 *Eighth:* W6ABA, 113 *Ninth:* W5BUK, 104 (tied): WA6KNE, 104 *Tenth:* W2AQT, 95.

As most 'hunters' know, QCWA has a regular standing awards program with certificates for working 25, 50, 100 etc. members, providing certain numbers of states and countries also are represented. This was why the 1962 QSO Party, for first time, included and invited contacts from all ham-



Pictured above is the Worked All Counties Nebraska Award sponsored by the McCook, Nebraska, Amateur Radio Club for working 50 of Nebraska's 93 counties with endorsements for each additional 10, plus a special award for working all 93. Send QSLs and return postage only to Custodian, Don H. Morgan, KØTAJ, Box 491, McCook, Nebraska.

dom. It is expected next year's Party also will include contacts with world-wide hamdom.

The OLD MAN, Chairman and Custodian of QCWA's awards program, and also Secretary of CHC, cannot but with pride point out that first place was won by CHCer W4FNQ and that four other winners, W1JYH, W1GKJ, W5DWO/W5JD and WA6KNE also are CHCers. Just goes to show that QCWA has some highly 'active boys' in their organization now about 3050 strong.

The OLD MAN was quite pleased to get this very attractive sYLver DOLLar Award from the Colorado YLs Club. Photographs on the certificate show 1. KØRGU, Tillie, Permanent Awards Custodian; 2. KØWZN, Ann, Historian; 3. KØEPE, Marte, President; 4. K5OPS/Ø, Ethel, Sect'y-Treas.; and 5. KØBTV, Kay, Vice Pres. See story in text.

Live-Wire Colorado YL Club

The Colorado YLs Club, organized in July 1961, now sponsors an attractive sYLver DOLLar Award for working five members. The one received by the OLD MAN has five photos attached of five very pretty gals and which greatly enhanced its 'value.' (see picture).

To get this attractive award you must work five YL members after July 1, 1961 and send log data and 50¢ to CHCer Tillie, KØRGU, 2067 Brentwood St., Denver 15, Colorado.

Membership has grown to 21, representing the Greater Denver Areas.

Tillie, KØRGU, has been 'spark plug' behind forming the new World-Wide CHC YL Chapter #4 which already has 36 members representing 18 states and 6 countries. See Louisa's YL column for details on this exciting 'development.'

Worked Ole Miss Award

The USA-CA Program adds Mississippi to an almost complete list of states now with county awards programs. Announced this issue is the new Worked Ole Miss Award by the Brookhaven Amateur Radio Club, Brookhaven, Mississippi, in five classes for working stated number of Mississippi counties as follows:

Here is the Worked "Ole Miss" Award for working various numbers of Mississippi counties (see story in USA-CA column). The 8½" x 11" award has yellow border and background and is in multi-color.

Class	*W/K, VE, KH & KL*	*DX*
A	82	82
B	75	50
C	50	35
D	25	15
E	10	5

Plus a gold cup for first W/K and first DX station to earn Class A, for working all 82 Mississippi counties.

Letter from Shelton, W5DQK, President of Club, said present plans are to put the Class A award on a miniature cloth Confederate Flag for those winning the gold cups.

The basic award will use stickers for additional classes. Endorsements will be made for all one band or mode operations. (see picture).

Submit applications with certified list of confirmed QSOs, alphabetically by counties, certified by two other licensed amateurs, along with $1 or 10 IRC's to Dena Morgan, W5DRI, P.O. Box 274, Brookhaven, Mississippi.

Shelton, W5DQK advises Club plans many DX-P's into 'rare' Mississippi counties as demands are made known. County 'hunters' are requested to let W5DQK know 'rare' county needs.

Applications for additional county stickers should send certified list as above, stating certificate number, and with only s.a.s.e.

Pennsylvania County Upheaval

In 'talking' stage is possibility the Friendly Amateur Radio Transmitting Society, will take over the old and somewhat 'ridiculous' Pennsylvania All County Award originally sponsored by the Western Amateur Radio Council which we understand is now defunct. The 'ridiculousness' of rules which require "ALL" of some state's counties to be worked to get a basic lowest class of such award is attested by the fact only three of the Pennsylvania All County Awards have ever been issued. This should be concrete evidence that the masses of hamdom's 'hunters' reject 'ridiculous' awards and that such awards have no 'acceptable' value whatever.

It is hoped that the new prospective sponsors get the word as to who assesses an award's value, and that it be re-designed to better meet hamdom's needs for an acceptable award better promoting Pennsylvania and its many hams.

A letter from Bill, W3LMM, of the society says that during the June Field Day, the group, which includes such well known contest boys as W3AOH, MVQ, QJJ, UHN, VKD, WGH and K3DKD, plans to operate from Forest County, Pennsylvania, which county is reputed to be only county in state with-

Above is a new award sponsored by the Motor City Radio Club, Detroit, Michigan for working members; U.S. and Canada stations work seven; others work three; all contacts after Nov. 1, 1961. Send list only (no charge) to Walter Foster, K8DPM, 8096 Prest St., Detroit 28, Michigan.

out a resident ham. This can be understood as Forest County is in wild mountain country and part of the U.S. National Allegheny Forest Park system. They will be on all bands both c.w. and s.s.b. running a kw, and will operate Thursday, 21st, until 2200 GMT on Sunday, 24th, on a 24 hour basis using the call of W3LMM/3. They guarantee 100% QSLs with specially prepared cards and will appreciate s.a.s.e. Don't miss this chance to get Pennsylvania's only known 'rare' county.

Twin Cities Award

As the OLD MAN has repeatedly said, awards can be both challenging, exciting and educational. To illustrate this point, the Algoma Amateur Radio Club, Sault Ste, Marie, Ontario, Canada, now sponsors the "Twin Cities Award" for working hams in cities bearing like names.

Pictured here is the "Twin Cities" Award for working hams in two or more cities bearing "similar" names. See text for awards details.

The purpose of the award is to promote friendship between amateurs living in cities bearing the same (or similar) name. The award is in four classes as follows:

CLASS A—requires contacts with 3 pairs in 3 continents.
CLASS B—requires contacts with 6 pairs in 6 continents.
CLASS C—requires contacts with 10 pairs.
CLASS D—requires contacts with Sault Ste. Marie, Ontario and Sault Ste Marie, Michigan.

Exact "Twin Cities" would be like London, Ontario and London, England, or Moscow, Idaho and Moscow, U.S.S.R., or Portland, Oregon and Portland, Maine. The rules permit counting "Twin Cities" with similar names but with directional or urban prefixes or suffixes (West, North, South, East, New . . . or ville . . . town . . . City . . . etc.), provided they are located in different provinces, states or countries, i.e., Jackson, Michigan and Jacksonville, Florida, or Hartford, Arkansas and West Hartford, Connecticut and such similar "Twin" names.

To make the 'hunt' more exciting, 3 cities of same (similar) name, count as 3 pairs; 4 cities of same name count as 6 pairs, and 5 cities of same name count as 10 pairs.

No special band or mode endorsements are available. To get award, send QSL's or list of contacts with log data certified by club official or two amateurs, along with $1 or 10 IRC to club, P.O. Box 13, Sault Ste. Marie, Ontario, Canada. Cost of additional endorsements, 25¢ or 3 IRC. (see picture of 8½" × 11" blue bordered award with four gold seals attached).

Things of Interest in The Mill

On postal stamps, July 24th a Girl Scout 50th anniversary commemorative is coming up. It will be red, and first day sale will be at Button Bay, Vermont; (bet you never heard of Button Bay!). Then on August 16th there is a stamp paying tribute to the Department of Labor and National Apprenticeship Act's 25th anniversary. It will be multicolored. On October 24th there is scheduled a special stamp honoring Dag Hammarskjold, and later in 1962 will be a stamp honoring Sam Rayburn, late Speaker of the House of Representatives. A report from P.O.D. states that even at this early date over 400 requests have been received for special stamps in 1963, and such in the face of political fact only 15 to 20 subjects are issued each year. On this basis one can understand the tough 'sledding' for obtaining a stamp commemorating ham radio.

Pictured here is the new Tarheel "30" award sponsored by the Morgantown Amateur Radio Club, for working 30 of the possible 100 North Carolina counties. Don't let that "30" figure lull you into any sense of 'easyness' as North Carolina has many hamless counties open to DX-peditions for the future. To get this award send certified list of QSLs signed by two amateurs or a club official, together with full log data and $1 to Club Sect'y., Jos. Benesh, K4AI, 118 Falls St., Morgantown, N.C.

If you haven't already marked your I.Q. on June's calendar, you might note Jeff Davis was born on the 3rd, 1808; the 6th, 1944 was "D" day at Normandy; the 14th is U.S. Flag Day and you swabs show your patriotism by displaying *Old Glory;* then back on the 15th, 1215 no less, the *Magna Charta* was signed . . . and if that is Greek to you, then it's time you looked it up; then on the 17th comes a most important day of year . . . Father's Day . . . and don't you YLs and XYLs forget it; on the 21st, Summer officially begins, and on the 30th, 1930, just imagine only 32 years ago, was the first world broadcast by radio.

Our Fraternal Obligations to Ham Widows

Too few amateur radio clubs have programs which seek to help widows of deceased members in disposal of ham gear to the economic advantage of such widows. In majority of known cases the uninformed and unsuspecting widows and other relatives were in total ignorance of value of equipment in the shack. For some unpleasant reason, ham widows too often are considered fair prey by many who would grab off available ham gear at ridiculously unfair bargains.

We feel this is a mounting problem with the mass advent of commercial equipments which has a pretty well established resale value. We suggest there are two practical approaches to eventually solving the problem wherein too often ham widows are 'fleeced.' First, all hams have an obligation to their XYLs to include in their wills a complete listing and value of all normally resalable units, along with names of two or more local ham friends

[*Continued on page 118*]

VHF

DONALD L. STONER, W6TNS
ALTA LOMA, CALIFORNIA

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

You can say what you want about theory and practice, cut and try, *etc.*, but a good working knowledge of mathematics is indispensable to the v.h.f. enthusiast. One of my few regrets in life is that I did not learn more about math when I had the chance. Now, the pressure of business, hamming and other interests seems to preclude the possibility of making up what I missed in school.

However, something arrived in the mail the other day which has given this situation an entirely different complexion. It was a book titled *Principles and Applications of Mathematics for Communications-Electronics* and was published by the Government Printing Office. I order these books, on the subject of electronics, as a matter of course. When this one arrived I glanced through it and recalled some of the things learned long ago. I was fascinated by this world of mathematics and found the method of presentation superb. As time permits, I tackle a section or chapter and have already acquired enough new information to be valuable in my regular work.

The book, TM-11684, is written in the customary military tech manual style. However, each new problem or term is illustrated with two or more typical examples to show you how they work. It starts out at about the 6th grade level on fractions and percentages and covers virtually everything through college level (algebra through quadratic equations, graphs, logs, plane geometry, trigonometry, radians and vectors). Part two covers the application of these things to electronics, such as a.c. and d.c., transmission problems, electrical problems and binary numbers. The slide rule, of course is included, as is a complete section of tables and measurements.

In this day and age, you seldom get something for nothing. This book, however, seems to be the exception, For less than $2.00 you can actually teach yourself college level mathematics, assuming you have a 6th grade education and an average amount of intelligence. I am included in this group and if I can do it—so can you. You can obtain the book from the Government Printing Office, Washington 25, D. C.

VHF Around The World

The v.h.f. bands down under have been agog over the news of the 144 mc contact between VK2ASZ and ZL3AQ on December 30, 1961. Bob, VK2ASZ, was portable at Mt. Allister at the time to take part in the VK2 v.h.f. Midsummer Field Day. He decided to have one last tune across the band before lunch and heard ZL3AQ calling CQ VK. Contact was established at 1310 hours and continued until 1335 hours. ZL3AQ stayed near 5 and 9 for this period and Bob's signal report was 5 and 6 with QSB. Verne, ZL3AQ, was using 30 watts to a 5 over 5 beam and his location was at Ashburton on the east coast of the south island. VK2ASZ was using 12 watts and the antenna was 3 over 3. Unfortunately, first check of the distance at 1355 miles would make it just six miles short of the existing VK record, but final checks may tell a different story. (from *Amateur Radio*, Feb. 62)

John R. Van Lear, VE7IR/VK2IQ, fills us in on the v.h.f. situation in Vancouver. He writes "There are about 10 stations here in Vancouver on six but most of the operation is on Sunday mornings. There is a lot of two meter activity here but as I am only on 147.33 f.m., I can't say much as to what goes on there except that there are about 70 stations in this area on that frequency and a lot of them are also on 146.76 (Seattle freq.). There is also a 6 meter f.m. frequency at 50.2 and another 10 or so operate there. The stations that are on six meters here are as follows: VE7AEZ, AOD, BQ, KD, ND, NM, XW, AKB (who is converting his Ranger) and myself, VE7IR. There is no net frequency and the stations can be found between 50.08 and 50.3. On March 12th I heard W7ZQX on c.w. (Seattle) with his beam south. We work in to the Seattle/Tacoma area often and I have worked K7HEF on c.w. I am building a six meter mobile for the VW and plan to transistor modulate a 6146 into a halo. I already have a nuvistor xtal converter fed into a Gonset Super-Six for the Rx. The XYL and I are planning to go to Mexico in August and I am trying to get a Mexican mobile license. If I do get permission I will try to operate on 50.095. 73 John."

Budo, DJ5LZ, has sent some interesting information which I would like to share with you. He is a member of the Munich VHF- UHF Radio Club, DLØSZ. As you may know this club is very active in promoting v.h.f. interest and are the sponsors of the first continuously operating 70 cm test transmitter in Germany, which operates on 432.008 mc on a north beam. Budo also sent along technical information on the DLØSZ 70 cm Konverter which is responsible for creating so much interest and

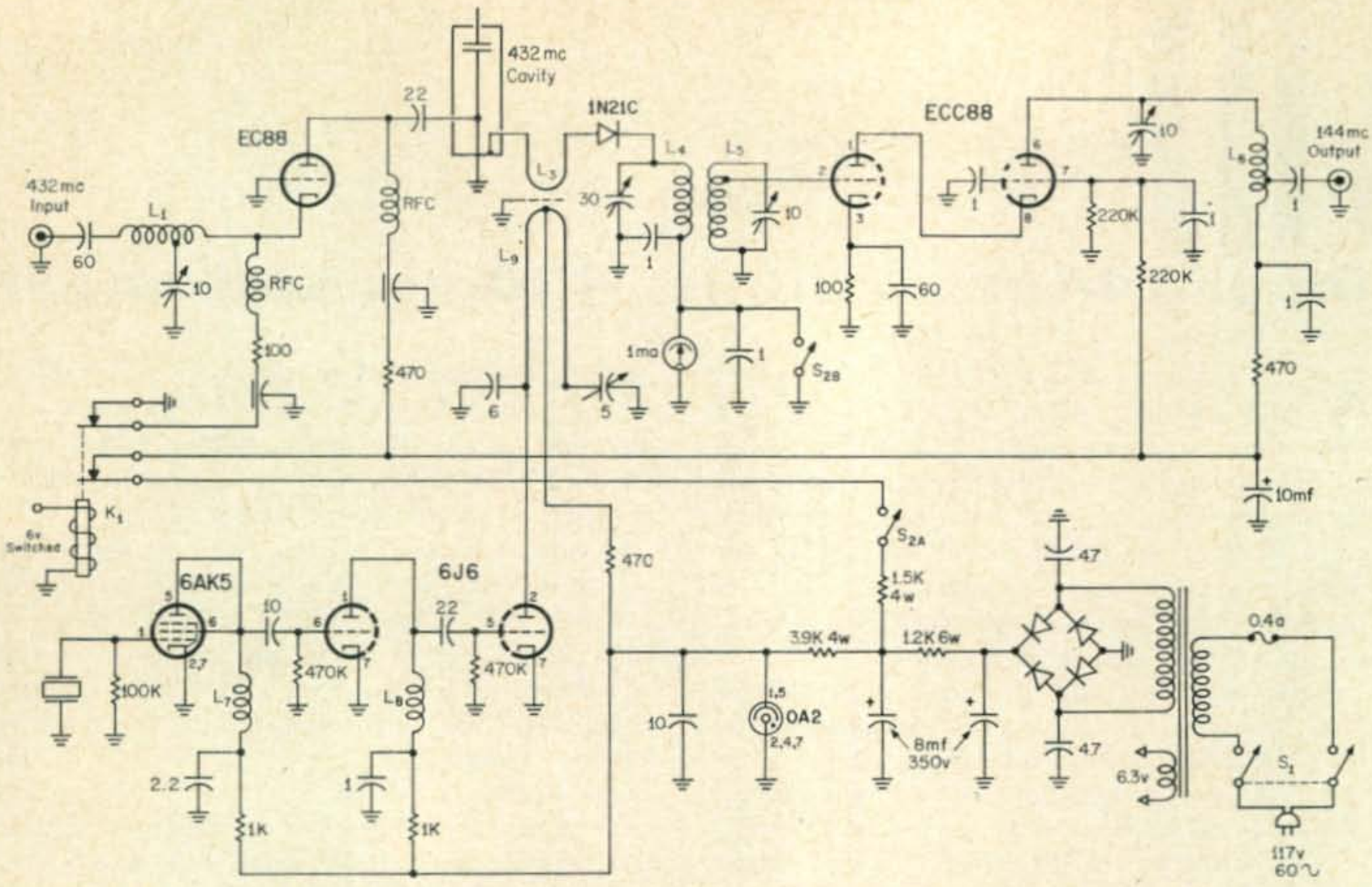


Fig. 1—Circuit of the 432 mc converter now being used at DLØSZ and throughout Europe. The output frequency is 144 mc and excellent performance is reported. Note the use of a relay to break the cathode circuit of the r.f. amplifier and remove high voltage from the mixer stages during transmit while the oscillator multiplier string is left running continuously; an excellent practice although rarely found in US equipment.

activity on 432 in Europe. As the ad says "Mit diesen Konverter wird dem UKW-Amateur die ideale Moglichkeit gegeben, seinen 2 mtr. Empfanger zu einen howhwertigen und sehr leistungs-fahigen Empfangsgerat fur das so interessante 70 cm Band su erweitern." I couldn't agree more! The circuit for the DLØSZ converter is shown in fig. 1.

The High Nets

The Buckeye Ragchewers Net, 33146 Center Ridge Rd., No. Ridgeville, Ohio, is issuing a certificate to anyone who can work 100 stations in Ohio on 6 meters, one of which must be a member of the Net. Contacts must be verified by a certified list of QSL's and the signature of a club officer or two licensed amateurs. There is a handling charge of 50 cents. Applicants may contact H. W. Dennis, K8IGT.

Speaking of certificates, the Century Club awards are now rolling along and I welcome all applicants. They are sent out within 30 days of receipt of your certificated list, or sooner if I have a slow month (that will be the day!) The latest new members are shown in the accompanying list (page 94).

Let's Get Technical

Featured this month is the international Crystals series of transistorized mobile converters called the "Mobilette's". Of particular interest to v.h.f. hams is the TRC-4B for 50.0 to 51.0 mc. and the TRC-5B for any 1 mc portion of the two meter band. These units measure about 1¾" × 4 5/32" and are designed to fit in a case which is slightly larger. Electrically, they operate on 6 to 15 volt supplies and are designed to work into the car radio as an i.f. amplifier, however, other i.f.'s are available on special order. They have a conversion gain of about 20 db and are relatively free of birdies and images.

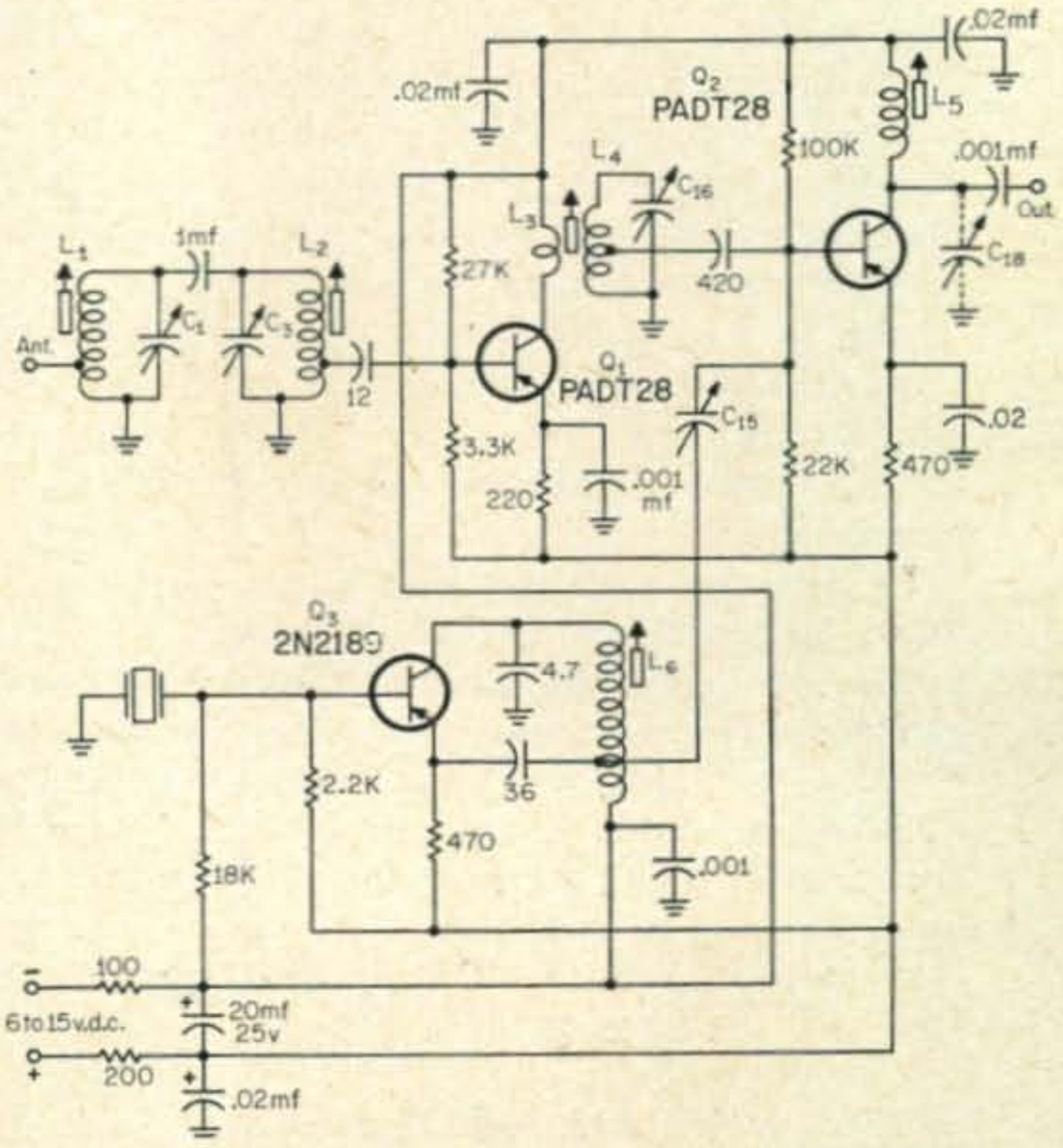


Fig. 2—Schematic diagram of the International Crystal TRC-5B 2 meter converter. The six meter version called the TRC-4B is similar in design, but employs different transistors as outlined in the text.

The circuit for the two meter version is shown in fig. 2 and is very similar to the TRC-4B. The 4B uses three 2N2112 or 2N2189 transistors, while the 5B employs two Amperex PADT28's and a 2N2189 oscillator. Note particularly that the circuit is designed to be used with either a positive or negative ground automobile. The input circuit consists of L_1 and L_2, a bandpass network. Voltage at the tap of L_2 is fed to Q_1, a common emitter amplifier. The amplified signal is coupled to L_4 and applied to the mixer Q_2. Energy from the oscillator (Q_3) is also fed to the base of the mixer through C_{15}. The i.f. output appears across L_5 and is coupled to the car radio input. Note that the on-off switch also accomplishes the antenna transfer function.

I am using both units in my car and find that their performance is good. They have more than enough gain and exhibit a good signal to noise ratio. When you have one of these units, you find it a very simple job to complete your mobile rig by constructing a two or three tube transmitter. You may find, as I did, that ignition noise can be reduced somewhat by running the TRC converter from a small 9 volt transistor battery. It completely isolates the converter from the automotive electrical system. The TRC's are a good buy for anyone needing a mobile converter and International is to be congratulated for a job well done.

Figure 3 shows a 432 tripler circuit (stolen from the *Ragchewer*) designed by John Nance, W4BSS. The circuit may be driven by a 522 or similar 144 mc rig (10 watts or so). Any frequency in the 144 mc. band is suitable for tripling purposes. The plate tank circuit is a U-shaped loop which is tuned by a small copper disc mounted above it. A 60 ma lamp serves as the tuning indicator. Plate line length and positioning on tube pins will vary with 832 tubes. Do not exceed 200 v. B+ during adjustment of tank to resonance to protect tube and lamp. After adjustment, raise B+ to 300 volts. The plate current should be above 60 ma. With an input of 18 to 20 watts, the output will be about 6 watts. It is felt that this tripler offers an easy way for anyone now having a crystal controlled rig on 144 mc to get on 432 as well. No modulator is required. The input-output relationship is relatively linear and modulation impressed on the drive will be faithfully reproduced in the output.

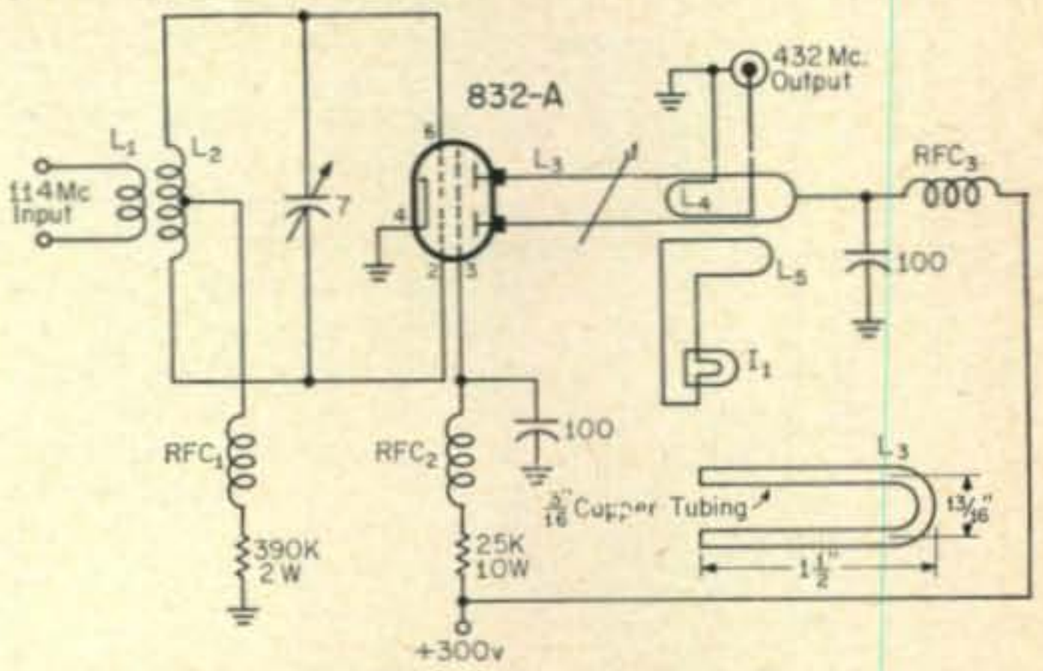


Fig. 3—Circuit of a simple tripler providing 6 watts output on 432 mc when driven by a 10 watt 144 mc signal. See text for details.

I_1—60 ma pilot lamp. Output indicator.
L_1—2t #18 ins. tightly coupled to L_2.
L_2—3t #14 bare ½" d. ½" long.
L_3—Plate line. See sketch.
L_4—Hairpin loop. #14 bare wire.
L_5—Tuning indicator pickup loop. #18 bare wire.
RFC_1—50t # 28 d.s.c. wire on ¼" d. rod.
RFC_2, RFC_3—5t #20 3/16" d. ½" long.

What's New?

The accompanying photograph is not (sob!) my latest antenna, but the Advent communications satellite antenna currently being installed at Camp Roberts, California. This parabolic will be used for communications to the Advent satellites when they are placed in the 22,300 mile high orbits Precise tracking accuracy is required because, if off by one degree, the axis of the tracking apparatus would miss the satellite by 385 miles!

Lafayette Radio has announced a new product called the "Squelcher." It is basically the TNS noise limiter (no relation to W6TNS) so long publicized by *CQ*. The "Squelcher" can be added to virtually any superhet receiver or transceiver. It is priced at $10.95.

The International Crystals "Mobilette" converters for 2 and 6 meters.

ADVENT parabolic dish antenna being installed at Camp Roberts, California, for communication with the "stationary" satellites.

The latest issue of RCA *Ham Tips* has an excellent article on "Transistors as RF Power Amplifiers" by John Fisher, WA2CMR/6. Particular emphasis is on circuits for use on 2 and 6 meters. The same issue of *Tips* describes the new nuvistor, type 6DS4. It has a semi-remote-cutoff feature and can be easily tied to the receiver a.v.c. circuit to minimize cross modulation and overload. A schematic is included to convert the converter in May '61 *Ham Tips*.

Speaking of transistors, the new RCA 2N1491-3 series of silicon N.P.N. transistors are real choice type for use on 6 and 2. They have up to 3 watts dissipation and can deliver a watt or more at 100 mc.

The March 1962 issue of *Semiconductor Products* has several articles of interest to v.h.f.'ers. A completely transistorized aircraft transmitter is described. With slight modifications this device could be used on two. The article I found particularly interesting was on a tunnel diode u.h.f.-TV tuner which should be applicable to both 432 and 1296. This unit, described by Gottlieb and Wolfram of GE employs the low cost GE TD-1A tunnel diode.

VHF Man of the Month

This month *CQ* salutes Russ Wicker, W4ZXI, who has 34 states on 2 meters worked from N.C. Russ, who is currently in Texas is being transferred to Atlanta, Ga. Russ is employed by the FAA and has moved about a great deal in the past couple of years. He has outstanding talent in the v.h.f. field and holds an EE degree from State College. It is almost certain that he will run a gallon of 2 meter c.w. and s.s.b. from Ga., since he has the same rig on in Texas. Russ's N.C. rig was comprised of a 416B pre-amp followed by 417's into a 75A-4 to provide frequency accuracy for DX schedules. The transmitter was a homebrew rig with surplus gallon bottles. His antenna was a 15 el. Telrex Long John for the most part. A 32 element colinear and two 8 element Telrex jobs were also employed. Our man of the month worked W8KAY nightly, year 'round, with this outfit from Sandy Ridge, N.C., which is about 1050 ft. above mean sea level. Meteor burst propagation was his means. Persistence and patience were among his secrets for success. Sounds like an "obit" but anyway, hats off to Russ, W4ZXI.

Who's News?

Perry King, KØTSD, of Denver, has worked and confirmed 35 states (that's right 35) using only a Heath "Sixer" and five element beam 30 ft. high. That's what I call an accomplishment.

Jack, KL7AUV, reports in *The Northern Lights Carrier* (mag of the Anchorage Radio Club), that Carl, KL7FLC, on the floating ice island also went into orbit and recorded 42 passes of OSCAR over his little chunk of ice. It appears that he recorded nine consecutive passes and apparently approached that figure several times! I'll bet nobody can top that! Carl's only helpers were the little Arctic foxes that chew up his cables. KL7BZO and BGH have been trying to poke a signal from Anchorage to Fairbanks by operating from the top of a 14 story building. They have definitely heard carriers and more attempts are in the offing. Ken, KL7BTW, on Middleton Island is firing up on six and two. Lots of new 2 meter beams are being whipped up in Fairbanks as a direct result of Winter Field Day contacts and project OSCAR. Even some talk of 2 meter interferometers for the next OSCAR.

From up Seattle way, we learn that Bert, K7DTH, is getting close to a full gallon to work the forward scatter DX via c.w. A group of Seattle XYL's have formed the Puget Sound XYL Net to operate on six meters each afternoon.

Don Hasek, K8NUE, 3318 Ralph Ave., Cleveland 9, Ohio, reports that the Cleveland 50 mc DX Club will hold its first annual banquet Saturday May 12th. I hope everyone had a good time for by the time you read this it will be history. Fellows—if you have dated material, such as this, get it in at least 2 months before the event. I make up the column on the first of the month *sharp* and by the time the proofs make their rounds many weeks have passed. For example, today is April 2 and this column will appear in the June issue which you receive about the end of May.

Joe N. Bean, W7VBH, 2560 S.E. 5th Avenue, West Linn, Oregon, has been taping six meter scatter from W6FZA all winter and has caught his sig's every Sunday morning since November 12, 1961. Along with W6FZA he has captured 6NLZ, 6GRX and 6YY on c.w. plus W7DTH in Seattle answering them off the back of his beam. W6FZA, 6NLZ and K6HCP all put Q5 signals in there on s.s.b. W7MAH (Ole mister Reno), John G. Webb, now lives at 11520 N.W. Damascus, Portland 10, Ore., and fired up his s.s.b. rig for contacts with Alan and John on Feb. 25. Alan, 6FZA, has copies of all these tapes. The time of these scatter signals vary from 1510 GMT until 1720. Mostly it's from 1530 until 1650. C.w. is used 'til 1630 then to s.s.b. on 50.122 mc. Joe is thinking about building an s.s.b. exciter to power a scatter final (4X150's) after the circuit on page 48 of the *CQ Sideband Handbook*.

Dale B. Schermerhorn, W7JCU/4, 1957-B Brill Rd., Mobile, Alabama, fills us in on the latest scoop from 'bama. "There was a 144 mc band opening on Feb. 13 and 14. On the 13th I worked K4GKR/4 Orlando, Fla., K4FTI, Pensacola, Fla., W5IVI, Covington, La., and W5UQR, Slidel, La. On the 14th I worked W4ZGS, Ft. Walton, Fla., WA4DRJ, Winterhaven, Fla., K4QKR/4, Orlando, K4PJD, Coco Beach, Fla., K4IXC, Melbourn, Fla., all from Mobile, Alabama. There are 9 active 2 meter stations here. I heard a W5 in Houston on the 14th. There was so much activity that day that I heard QRM! I have a pair of 4X250B's at 150 watts on 144 mc. and an 11 element ant. 70 ft. high. With this I work 100 miles almost every nite. Plan on upping to 350 watts soon."

Bill Dillon writes an interesting letter to fill us in on the WA6LGE QTH. "So far the DX on 6 is 3/3 most done wtih a Heathkit Sixer. The rig is now a home brew transmitter using a 2E26 in the final. The receiver is a BC-342 with a Tecraft converter in front of the receiver. The antenna is a HyGain five element beam which is 20 feet in the air. Am still working for my Century Club Certificate. So far I have 94 QSL's on 6 meters. To date I have worked 205 stations on 6 meters, not counting the DX contacts. I have the Baylarc OM award (#52) which is given for working 6 of the Baylarcs' I am trying for the second six endorsement. I have nine to date. I also have the Caravaner (64) which is for working six members of this organization. I am also the Net Control Station for the Brads (46) net. This net meets at 0100 Sunday morning as it is on 50.25 mc. There are 65 members with about 10 or so checking into the net. I have heard stations that could be called semi-DX on six meters. I have heard W6FZA, Porterville, which is about 250 miles from here. I have worked WA6KOI, Patterson, which is about 150 miles away. I hope to be on 2 meters fairly soon and that will mean slaving for the Century Club Certificate for two meters." Good luck, Bill, it's worth it.

That fills our cavity for another month. BCNU-all around these parts next month.

73, de Don, W6TNS

CQ Century Club Awards

50 Mc

James A. Classock, KØRTH
Helen Baber, W8EFB
David T. Badley, K6AMA
J. E. Payne, Jr., WA4AQI
Betty S. Mangum, WA4CCK
Ronald W. Mangum, K4GPL
Stanley F. Brigham, W3TFA
Ed Tobias, WV2VKK
Leroy Coley, W4OD
Arthur Pearl, WA2JDO
John Godwin, Jr., K4MHS

144 Mc

Wm. D. Harris, W4BUZ

sideband sideband sideband

SIDEBAND

IRV and DOROTHY STRAUBER,
K2HEA/K2MGE
12 ELM STREET, LYNBROOK, NEW YORK

SSB DX HONOR ROLL

T12HP	261	WØUUV	209
VQ4ERR	258	K6ZXW	206
W8EAP	258	W3KT	205
W8PQQ	256	W2LV	203
W6UOU	248	W2VCZ	203
W2ZX	247	PZ1AX	201
W2FXN	240	W2VZV	201
WØQVZ	236	TG9AD	200
K9EAB	235	K1EJO	200
MP4BBW	232	K1IXG	200
K4TJL	231	K4PUS	198
K2MGE	230	W2YBO	194
ON4DM	230	W1AOL	190
W6PXH	229	K6LGF	188
W2JXH	228	W3VSU	188
K8RTW	226	G8KS	186
W6RKP	226	G2BVN	185
W4OPM	225	K2FW	181
W1LLF	221	W6EKZ	181
W6WNE	220	W5RHW	180
W6BAF	219	K6MLS	180
W3LMA	219	K4AJ	176
W5IYU	217	G3NUG	175
W3MAC	213	W1ORV	175
WØCVU	210	PJ2AA	170

CQ SSB STICKERS AND CERTIFICATES

Worked 225
MP4BBW ON4DM W6RKP

Worked 200
K1IXG W2VZV W2VCZ

Worked 175
G3DO W6EKZ

Worked 150
G3CCN G3NUY W4UWC K9PPX G3KHE

Worked 125
W3AYD K9MGF

Worked 100
DL6VM W6WWQ WA2SFP W3AYD WA6MAZ G3KZI W4NJF G2PL K5QWZ DL1PM

Worked 50
W4EEE WA2NZS F2KC K4BMS

CROWDING into the exhibition area, over two thousand sidebanders, embryo sidebanders, friends of sidebanders and curious a.m.'ers, made the 1962 Sideband Dinner and Hamfest the biggest in the 11 year history of the affair. Sponsored by the Single Sideband Amateur Radio Association, the dinner, held at the end of an all day Hamfest, overflowed the spacious Grand Ballroom of the Statler Hilton and had the Dinner Committee busy up to the last minute arranging to squeeze in the 900 who attended and saw and heard Bill Leonard, W2SKE MC a terriffic Hawaiian show complete with hula dancers.

The exhibits featured some of the latest in the way of s.s.b. equipments including the Collins 62S-1, Hallicrafters' new mobile transceiver, Hammarlunds HX-500 exciter, Heath's new Marauder and mobile sideband units and Bob Water's new *Q* multiplier for the 75S-1 and KWM-2 units. There were so many interesting exhibits that we wish we had more space to report everything in detail. In some cases the crowds around the booths were three deep!!

The Sidebander of the Year Award was presented to Ray Meyers, W6MLZ for his efforts on behalf of amateur radio and s.s.b. specifically; Dana Atchley, W1HKK received the Members Award for his winning score in the WAS SSB contest held in September 1961.

The high spot of the evening for Al Feder, K2CUI was to come late, in fact not until the very last minute of the dinner when "Butch" Griswold, ex-KØDWC pulled his name from the prize drum and Al found he was the winner of the KWM-2 Suitcase package!! The walk to the stage was a short one, but Al was so dazed and excited it took him a full ten minutes to negotiate the distance!

For those of us who were there from the opening gun at 10 A.M., it was a fourteen hour QSO—people came from all over the states and several DX visitors made the trip from as far away as England and Germany expressly for this dinner!!

One of the interesting features added to this year's Hamfest was a DX Luncheon sponsored by the Hallicrafters Company and attended by the DX visitors and American hams who had the opportunity to visit in person with the people they had talked with over the air for many years. Bill Leonard, W2SKE and Gene

Len Rough, ZL3DT, is strictly a homebrew man. Not only has he turned out a fine sounding sideband station, but he has also built a tape recorder and is currently building an organ. (Photo courtesy W1DBN/2).

Kern, W2BAK recorded the luncheon and interviewed the DX visitors for broadcast over Bill's Voice of America ham program. Among those at the luncheon were: Les, G8KS; Sid, G3NUY; Wolf, DL1SD; Lot, DJ1BZ; Hardi, DJ3DZ; Alicia, KP4CL; Felix, KP4CK; Ramon, KP4SV; Pedro, KP4AAN; Kurt, HB9ET; and Walter, HB9SI.

During the afternoon, Bill Orr, W6SAI showed color slides of the "Oscar I" launch together with a tape recording of the sounds of the actual launching. Carlos, XE1CV showed color movies of the Socorro DXpedition, XE4BB, to the DX chasers.

Looking backwards, superlatives beyond our abilities are needed to adequately describe the fourteen magnificent hours we spent that day! The only regrets we all had was that it had to end and that it would be 364 days until the next one! See you next year!

Sixth Annual CQ WW SSB Contest

The special order which we put in for super conditions over the March 24-25 Contest Weekend was filled and then some! Now that it's all over, we must confess that our fingers were tightly crossed for months before as winter conditions and the sunspot lull combined to wipe the bands clean of DX operation for long periods at a time. But along came the s.s.b. Contest and with it some fabulous DX operation . . . so much so, in fact, that, in some quarters, we're now considered propagation experts, a field which we'd much rather leave to George Jacobs.

It is much too early on the basis of logs received to make any advance guesses as to who the winners will be but listening intently both during and after the Contest, it's a sure bet that over 1,000 contacts each were made by some of the leading contenders for the winner's crown, a number way ahead of that made heretofore by past champions.

We hope that all of you, no matter how small your score, have sent in your logs. In past contests, we have noted with regret that many stations display a notable lack of self confidence and assume that their scores are too small to bother with. Then when the final scores are published, their sighs of anguish are loud and long.

Our thanks to all of you who participated in the Sixth Annual *CQ* WW SSB Contest and who made it the tremendously enjoyable and successful Contest that it was. Now that the deadline for logs has been passed, we're getting right to work on checking out the scores and will announce the winners as soon as the results are finalized.

Irv Richter, W2IVW, proudly displays the special plaque that was awarded to him at the Sideband Dinner for his long and valuable service to the SSBARA. Seated beside him is Kitty Binger, K2TEX, XYL of Bing, SSBARA President.

Rhodes and Corsica on Sideband

Al Gray, one of the gang at SVØWT, has asked us to notify sideband DXers that the Island of Rhodes will be active again with s.s.b., a.m., and c.w. on all bands starting in June with a KWM-2 for sideband operation. SVØWY and SVØWH will use a Heathkit MT-1, HX-20, and SX-100. Dipoles and ground planes will be the antennas in use. The operators will be Al, W5GMS/SVØWH; Tony, KØCGE/SVØWY; and possibly Ron, K3SLZ, all from the SVØWT Radio Club on Crete. QSLs should go to KØCGE, Minnesota.

Great Britain was ably represented at the Sideband Dinner by Les Hill, G8KS, left, and Sid Almond, G3NUY, both of whom specially flew to New York to join in the sideband festivities. Also present was Bob Morgan, G3KGC, who unfortunately was not present when the shutter was being clicked.

News of another interesting sideband DXpedition comes from Pete, DL5HI, who is planning to join Walter, DL9PF, on a visit to Corsica. They will leave on July 8th and expect to be on the air by the evening of July 9th, with some operation also being devoted to a.m. and c.w. on all bands 10 through 80 meters. This is good news indeed since the last sideband operation from Corsica proved most unsatisfactory as far as confirmations were concerned.

From Our Mailbag

As usual, our mailbag has been crammed with interesting letters from sidebanders all over the world, some of whose comments we'd like to share with you.

From Alan Reid, VK3AHR: "My wife, Gladys, and I will be visiting New York next August or early next September, coming home from Europe." (We know that many of Alan's W/K friends will be looking forward to a visit from the Reids as we are.)

From Larry Eisler, W3JTC: "I am very pleased that you found space to present the 'Something Must Be Done' article. I like the W2ZX suggestion regarding the s.s.b. usage problem on 14 mc. It has, however, one major fault in that it adds to an already overworked FCC monitoring effort. Dale's suggestion increased the workload by effectively adding an additional band edge for the FCC to patrol, *i.e.*, the upper phone (14330 kc) band edge. Increases in workload for the FCC have little chance for acceptance.

Many sidebanders have worked Paul, F3II, who has been very active recently, so it is our pleasure to bring you a photo of this fine looking gentleman.

"Your suggestion unless enforced by the FCC would not mean too much. In actual practice, you will find that what you have suggested is already in effect. During weekends when both regular a.m. and s.s.b. activity is high, you will find s.s.b. usage rather heavy as far down the band as 14260 kc.

"A final thought—To extend our 14 mc phone allocation would not help matters. That inefficient use of 14100-14200 portion by our neighbors to the South is really not our business. They could well say the same about our usage of frequencies, etc. Really, there is but one solution, reverse the s.s.b. and a.m. usage on 14 mc. I think you and many others would be very much surprised as to how quickly the change would take place and settle down. . . ."

From Doug Edwards, G3DO: "80 meters has been very good here for some time [wintertime conditions—ed.] and more and more stations are operating s.s.b. on this band. As a matter of interest, I have worked the following stations recently on 80 meter s.s.b.; ZS6TE; VQ4RF; EP2AT; OX3AI; CT3AV; VE3BQL/SU; HZ1AB; CN8IK; 3V8CA; UL7JA; UC2AA; UB5UW; HK4EB; YV5ANS; XE1CV; KZ5WZ; YU1FC; VK3AHO; VK3BM; ZL1ACG; ZL2AAG; ZL3UG; ZL4OD; ZL4II; and other ZL's; All W Districts except W7; 4X4DK; and VE7, 2, 3. Things are certainly looking up on this band and it is going to carry a lot of traffic during the next few years."

Sam, W2ENM, is a man of many talents as witness the fine photos he takes and the fine shack he has assembled. Operating from Manasquan, N. J., Sam is a regular on 3805

From John Gubernard, HL9KT: "I guess you thought there was only one station on s.s.b. in Korea! Well, there is one more, we at HL9KT. We do most of our operating on 20 meters but we hope to get set up soon on 15 with a 3 element beam up about 70 feet. Our gear here is the Collins S-line and the present antenna on 20 meters is a doublet which really works out good. Our QSL address is via KARL, Central Box 162, Seoul, Korea, or direct to "B" Company, 304th Sig. Bn., APO 301, c/o P.M., San Francisco, Calif."

From both Al, CN8FU, and George, KØRDP: "Please publish another plea to all to be very careful about dates and times and indication of 2 way s.s.b. when QSLing. When many cards have to be answered, it is very time consuming to have to stop and figure out what the local time was in terms of GMT." [We thought by now that everyone knew the importance of keeping his log in GMT and including accurate information on a QSL card but looks like we'll have to keep reminding you—ed.]

From Norm Gignal, K1QIM/TF2WGE: "Prompted by your item in April, 62 regarding the non-QSLing type TF2s's and PJ2AA's plight, I take pen in hand and hope what I write will result in a satisfactory explanation of my particular situation. Last October (1961), I ordered my TF2WGE, Keflavik Internation Airport, QSLs from a '48-hour' service printer. Here it is, the end of March, and after many haranguing letters, I may finally receive the cards I ordered, paid for, and had not received. Just as soon as I possibly can, I will be sending out my QSL cards to all those with whom I have had the pleasure of a

[*Continued on page 114*]

Silent Keys

The sideband fraternity lost two of its most active and valued members during early Spring with the passing of Clyde Warne, XE1IG, of Mexico City, Mexico, and Henry Frey, W2MAF, of Jackson Heights, New York. Our sincere sympathy is extended to the families of our departed friends.

YL

BY LOUISA B. SANDO, W5RZJ
4417 ELEVENTH ST., N.W.,
ALBUQUERQUE, N. M.

CONGRATULATIONS to the new All-YL Chapter of the Certificate Hunters Club! Officers have just been elected (as we write this in March) and the chapter is rolling along with over thirty members, plus associate members. Officers are: Pres. & General Net Mgr., KØGIC, Dot (alternate, W5JCY & KØIKL); Publicity & secy, K7CHA, Bertha (alt., K5BNQ); Membership & treas., W1YPH, Leona (alt., W8WUT); By-laws, K8MZT, Shirley.

The YL Chapter of CHC is only the fourth local chapter to be formed. Aims of the YL chapter are to maintain a high level of achievement in keeping with the original purpose of CHC. The chapter will sponsor one or more certificates and will have nets on several bands.

Carrying the ball during the planning stage was KØRGU, Tillie with help from KØMAS, K5OPT, K8MZT, KØEPE and others. Tillie will continue to serve the group as certificate custodian for YL-CHC-Ch. 4. The rules and certificate are in preparation and we should have more news of this and other YL-CHC activities, including member calls, next month. In the meantime, if you are a YL and hold the CHC award, you are invited to join the All-YL Chapter. Dues are $1 per year (no charge to DX YLs). Full members may sponsor associate members.

Nets are being set up on 15, 20, 40 and 80 meters on phone, and VE7BBB is setting up a c.w. net. Fairly definite as of this writing are: 21.335 on Fri. at 1900, NCS W5JCY, ANCS K6OQD; 7.25 on Tues. at 1900, KØGIC or W5JCY NCS.

All-Ham Families

All-Ham families are not a rarity, but we still get a bang out of hearing of these folks who can enjoy their hobby together. Here are two in Texas: the Fred Maretts at Houston, and the Earl Vandervoorts at Sweetwater.

LYL in the Marett family is Liz, K5YIT, who started with a Novice in '59 and General in Jan. '60. It was her son Rodney who got Liz interested. He passed his Novice at age 11 and General at 12 and taught his mother the code and theory. Rodney's twin brother Robert was the third in the family to get his General, in 1960, with call K5ZWG. The twins are now 16. Son Fred III was the fourth to receive his license, while living at Seattle,

These 26 Buckeye Belles from 17 different cities met at Worthington, Ohio on March 4, '62. The group accepted By-Laws for the club and nominated officers for the coming year. L. to r., 1st row: K8RLS, K8WZF and her jr. YL Amy; K8GWF; 2nd row; K8VJH, W8LGY, K8RPQ, KN8BXO, K8TFL, K8KKP; 3rd row; K8MZT, KN8AOT, K8TLG, K8VWW, W8OIS; 4th row: K8ZHP, K8TFG, K8ITF, K8RZH, K8WRH, K8CEN, K8RGY; 5th row: K8USP, K8YVC, K8PSE, K8VBO, K8UKM.

The all-ham family at Houston includes, l. to r., Fred, W5AF; 16-year old twins Rodney, K5QFW, and Robert, K5ZWG, and Liz, K5YIT. Not pictured, Fred III who is WA6QOI at San Diego.

Wash. And Liz adds that one of the greatest thrills she's ever had since being licensed was the time she was tuning across the bands and heard Fred III calling CQ—on c.w. in the Novice band—and they had their first contact. Liz comments, "There will never be any rarer DX for me!"

Following a visit from the family at Seattle in the summer of '60, at which time the twins practiced code with him, Fred III passed his General. Since then he has moved to San Diego, holds the call WA6QOI, and they keep regular skeds, especially to check up on Liz' two grandsons! Last in the family to get his license was Liz' OM, Fred, who received his call W5AF in June '61. But it was nothing new to Fred for he was originally 5CO, and was listed in the 1919-20 call books. After 40 years he returned to the hobby—"of necessity," Liz adds.

The Maretts work all bands, and one or another is on most any time. They use a Collins KWM-2. 312B-5 and the 30L1 linear, plus Mosley Tri-band on a crank-up tower about 40 ft. high. On 40 and 75 they use an inverted V. Liz says they have no special interests in Ham radio—they just enjoy it all.

Liz keeps busy with many other activities: GAYLARK (past secy-treas.), circle chairman at church; secy to Civic Club, member of garden club, plus attending sewing classes. But she's always ready when anyone suggests "go," and she's especially ready for a good visit on the air.

W5FFH-W5VLU

In the Vandervoort family OM Earl also was an old time operator, having served as "sparks" in the Navy in WW I. After the war he and Katharine married, had a son and daughter, and radio was forgotten. Then during WW II Earl Jr. was a radio operator in the Air Force. When he returned home he got his Ham ticket, W5PCC, and persuaded "Pop" to get his. This was easy as Earl Sr. had not forgotten his code and had only to brush up on theory. His call is W5VLU.

When Earl Jr. married he got his wife, Kay, interested, taught her and she got her ticket and call, W5QIR, in 1947. Subsequently, Earl Jr. aroused his sister's interest and tutored her. Jean received her call, W5CHR, in 1951.

Katharine says, "That left me the low man on the totem pole. I was studying but for the life of me could not get anybody to send me code. I could send up a storm but could not receive. Finally I got mad, laid down the law, and through Earl Jr.'s tutoring and examination (he was really hard on me) got *my* ticket and call, W5FFH; this was in 1953."

Jean teaches school at Amarillo. Earl Jr., Kay and five jr. ops have been moving around, and although they don't at present keep regular skeds, they have in the past. Earl Sr. and Katharine operate on 10, 15, 20, 40 and 75, a.m. and s.s.b. They have Collins S-line gear at home and a Viking II which they keep at their summer cabin at Ruidoso, N.M. We first met W5FFH on the LCL net; she also is a member of TYLRUN. Since an accident a couple of years ago when one of her knees was badly crushed, Katharine has not been as active on the air. We hope that you will soon be completely well, Katharine. Best wishes to you, and to all members of these 100% Ham families!

Portable Four Corners

Novel operation in our area is from the Four Corners, the only point in the U.S.A. where four states meet—New Mexico, Arizona, Utah and Colorado. By setting gear astride a state line and stringing the antenna across the corners of the four states, operators can sign their calls portable 5 ∅ 7. A single contact with such operators counts for all four counties, but not 4 states—you take your choice for that, or work another of the ops for a different state.

During the 2nd DX weekend in March W5CK-W5LEF-K5UYF operating both phone and c.w. from this location made some 300 contacts. The Caravan Club of Albuquerque makes trips to the Four Corners occasionally on weekends, as do members of the Totah Radio Club of Farmington, N.M., so be on the lookout for them. Certificate hunters can obtain one for just *one* contact with a station signing /5 ∅ 7; the certificate is offered by the Totah Club; cost 50¢.

Ladies Day

Let's all remember Ladies Day. This is not a contest, but a YLRL sponsored invitation for all licensed YLs to meet on the air on the second Monday of each month. Get on your favorite band, or bands, and you'll find plenty of other LYLs looking for contacts.

[*Continued on page 116*]

Ham Clinic [*from page 36*]

Transformer—"I have a transformer rated at 2000 volts, 400 ma output with 220 volts a.c. input. What can I expect from it with 110 volts a.c. input?"

1000 volts at 800 ma. But I suggest loading it to 400 ma only; this will keep the transformer cool. Any transformer operated at maximum load will warm up—sometimes too much. When he comes on I pick him up on a number of spots on my dial. I'm using a 417-A 2 meter converter, a good antenna and an SX-28-A receiver. I say he is putting out spurious signals, he says its my converter. Who is correct?"

He probably is. Real strong 2 meter r.f. signals can swamp your converter. I'll bet if you install a 10K ohm pot in the cathode of your converter r.f. stage to ground, and use it, your problem will be solved. Intermodulation because of strong signals is a problem!

Improved HQ-100 Performance—"How can I obtain improved c.w. performance with my HQ-100 receiver?"

You can improve c.w. performance by adding the b.f.o. kit, Hammarlund Part Number KIT-38657-G6. When this kit is installed, the *Q* multiplier is no longer thrown into oscillation and can therefore be used to peak up a signal.

HQ-110 A.V.C.—"When receiving s.s.b. with my HQ-110 I note a lack of sensitivity. Can anything be done about this?"

Yes. It is extremenly important to turn off your HQ-110's a.v.c. when trying to receive s.s.b. or a.m. Failure to do so will either completely paralyze the receiver or make it extremely insensitive. This is due to the type of product detector employed.

HQ-180s Below Serial Number 1335—"How can I add a vernier mechanism to my HQ-180 for aiding me in tuning s.s.b. and c.w. signals?"

Suggest that you obtain Hammarlund's vernier tuning kit Part Nr. 42188-G1. This is the answer to the fine tuning problem.

HX-500—"Anything new on modifications to the HX-500 s.s.b. transmitter?"

A service bulletin is currently being prepared which will be mailed to all those requesting it. It covers the following items: push-to-talk modifications; VOX hang-up; falling off of s.s.b. output; chirp on c.w.; spurious signals removed 60 kc from desired signal, particularly in the calibrate position; elimination of 3950 kc standby spurious signal; elimination of hash in receiver standby position and better VOX sensitivity.

S-200 Speakers—Reduced base response emphasizing speech band frequencies can be achieved with the Hammarlund type S-200 speakers by removing the back cover. This is a matter of personal listening choice and therefore Hammarlund continues to ship these speakers with the back on.

I wish to thank Hammarlund, and especially Mr. Stuart Meyer (W2GHK) for his assistance in providing the information on Hammarlund units. His cooperation is truly indicative of the manufacturer's willingness to please all those who buy his products. By making current modifications available to HAM CLINIC and all ham users, maximum efficiency and enjoyment are derived from the equipment purchased.

Tips for Techs

Never try to remove the tip from a cold soldering iron. You'll find it much easier to remove the tip when the iron is hot.

The YL's or XYL's long, flat, brass bobby pins make excellent heat sinks when soldering transistor or midget part leads. Simply clip one close to the transistor body before soldering. It will carry enough heat away so that your soldering job is a good, solid one. Brass bobby pins can also be used in holed circuit boards. Merely insert them through the holes, clip off enough to leave about ½ inch of pin. Wires can then be slipped into the jaws of the pins for temporary contacts.

If you need a good heat dissipating tube connector for the 807, 6146, 2E26 and other power tubes, go to pop's desk drawer and retrieve one of those paddle paper clips. They work fine.

When you are working with the small potentiometers used in transistor circuits it is hard to find a knob which will fit their small shafts. I find small clock knobs ideal. Merely put a little rubber cement on the shaft and in the knob and slip on.

A 'fuse-out' indicator is simple to wire up. Connect an NE-2 neon bulb in series with an 18K resistor and place it across the fuse. When the fuse blows the NE-2 will light up.

When you are working with small covered wire, a fine stripper can be made out of a pair of nail clippers. Merely file a notch in the jaws of the clipper (a mite larger than the wire to be stripped). One pinch and one pull and the insulation is gone!

Thirty

I sincerely hope you have enjoyed this long HAM CLINIC column. If you did, let the editor know about it. As long as I was able to help you with just *one* problem, or my writing gave you some new idea, my time has been well spent.

Until next month—73, 75 and 72 to our overseas friends.

Chuck, W4VZO

Reciprocal Licensing Bill S. 2361 needs your support. Write your representative today!

NOW . . . PROOF OF DX PERFORMANCE

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida
Gentlemen:

I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am
Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-TI2TG)

V-80 VERTICAL ANTENNA FACTS

- If K6INI can do it, so can you
- Absolutely no guying needed.
- Radials not required.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Four metal mounting straps furnished.
- Special B & W loading coil
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.

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THE CQ HAM MART

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This is a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous pages, only *$1.50* postpaid.

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SIDEBAND HANDBOOK

Written by *Don Stoner, W6TNS*, was almost one full year in the preparation of this terrific volume. This is not a technical book. It explains sideband showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots of how to build-it stuff, gadgets, receiving adaptors, exciters, amplifiers. Price, only *$3.00*.

CQ ANTHOLOGY

Most amateurs do not have a good file of back issues of *CQ*. So we've looked back through the years *1945-52* and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a mere *$2.00*.

VHF FOR THE RADIO AMATEUR

You can't afford to be without this dynamic new handbook designed with the VH Famateur in mind. Filled from cover to cover with all new and original construction material presented so that you can understand it. Written by *Frank C. Jones W6APF*, nationally acclaimed for his VHF pioneering. Available now for only *$3.50*.

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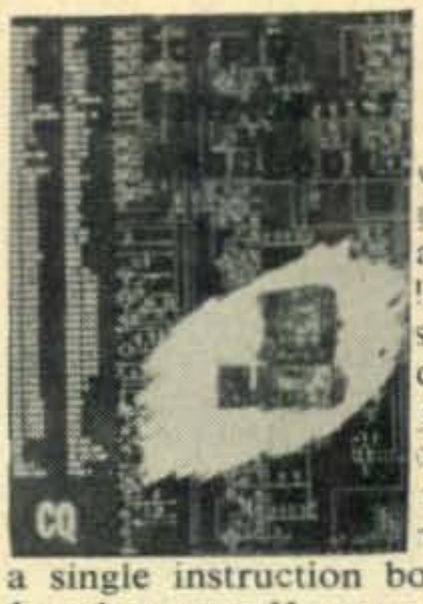
212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator. All this for only *$2.50*.

TVI HANDBOOK

W1DBM's TVI book (2nd edition) covers all aspects of curing TVI from both the Ham's viewpoint and that of the TV viewer or the TV serviceman. It includes 2- and 6-meter TVI as well as Citizen's Band, Industrial, Medical and Utility TVI. Profusely illustrated with diagrams, photos, charts, tables and FCC regulations pertaining to radio and television interference. Price *$1.75* postpaid, USA, *$2.00* foreign.

MOBILE HANDBOOK

Anyone who tries to go mobil without getting this book, shoul think twice before going ahead. *Bi Orr, W6ASI* has put everything yo need to know in this book, Build-it by the dozen . . . solutions to ignitio problems, keeping the battery charge noise . . . only *$2.95* postpaid.



SURPLUS SCHEMATICS HANDBOOK

This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry cold turkey can be many times more difficult than the most involved puzzle, and purchasing a single instruction book can run as high as $3.50. Why knock yourself out when you can have a book with complete coverage on hand in your library? All this for only *$2.50*.

DIODE SOURCE BOOK

Cat. #150 Up-to-date individual charts of all diode types compiled by National Bureau of Standards. Enables user to select the right diode for a particular application. Includes separate source chart listing diodes and manufacturers. Contains design article for each diode type. 126 Pages.

USA-CA RECORD BOOK

This book contains county outline maps of all 50 states, rules, regulations, certification forms, alphabetical list of counties by state, cross-indexed maps. 108 pages, 8½ by 11". Price only *$1.25*, postpaid.

DX ZONE MAP

Amateur Radio World-Wide DX & Zone Map complete, and up to the minute with Prefix Zone Boundaries, Great Circle beam bearings. 4 colors, 36 by 42 inches on heavy vellum paper. Mailed in heavy cardboard mailing tube. Only *$3.00*.

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Now you can talk in broken *French, Spanish, Italian, German, Swedish, Serbo-Croat* [*Yugoslav*] *Russian. Finnish*, and *English*. This handy little book gives all the popular ham conversation in nine languages, including letters and numbers. Only *$1.50* postpaid.

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This is a reference book that will be put to good usage around your house if you have any children. 7 lbs. of colored maps and all up to date information for only *$12.50*, and you get a years subscription to *CQ*.

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Contest [*from page 72*]

Latvia					
UQ2KAR	15,318	204	19	50
UQ2KAX	11,625	135	17	58
Lithuania					
UP2KNP	87,616	375	40	108
UP2KBC	72,565	381	37	78
Moldavia					
UO5KAA	64,974	543	26	76
Ukraine					
UB5KAG	198,592	510	67	165
UB5KED	155,220	522	63	132
UB5KAI	122,670	568	45	129
UB5KEP	27,552	242	25	71
UB5KAU	12,383	182	18	49
White Russia					
UC2KAC	29,610	263	24	63

Oceania

Australia					
VK5NQ	709,000	1001	83	167
	(VK5NQ, NO)			

MULTI-OPERATOR

Multi-Transmitter

North America

W3MSK	1,405,767	1126	138	313
	(W3MSK, FYS, KDP, KZQ, MCG, PZW, W6HOH/3)			
W6RW	538,486	638	110	188
	(W6RW, BXL, JZH, K6ERT, PJY)			
W2JT	521,554	604	99	203
	(W2JT, HTI)			
W4KXV	326,435	442	102	171
	(W4KXV, K3EST)			
W4NUC	273,304	409	89	165
	(W4NUC, FFV, 3AFM, IPO)			
K6EVR	145,860	302	82	113
	(K6EVR, W6GFE)			

Europe					
DJ3JZ	1,451,437	1,750	103	256
	(DJ3JZ, 1BP, 1BZ, 4LI, DL1CR, 3AO, 7BA)			
UB5KBB	1,203,350	1858	114	296
	(Club Station)			
OK1KKS	371,448	1107	71	181
	(Club Station)			
OH1AA	370,237	743	63	170
	(Club Station)			
G3JUL	50,400	247	40	100
	(G3JUL, KGM, LOV, OLN)			
G3OHM	26,264	180	25	42
	(G3ITH, KDB, LNS, NXV, OVA, 5SS)			
Poland					
Club Stations					
SP9KAD	67,832	315	45	94
SP3KAU	43,575	299	31	74
SP8ZR	17,628	285	10	42
SP3KET	7548	97	17	34
SP9KDE	252	20	3	11
Roumania					
Club Stations					
YO3KPA	83,709	341	35	96
YO7KAJ	49,572	306	24	78
YO9KAG	18,634	185	20	57
YO6KAF	8840	153	15	37
YO4KBJ	3654	81	11	31
Sweden					
SM6VR	120,554	361	48	110
	(SM6VR, ANC, BSK, CSC, CWD, VQ)			
SM5BFE	64,944	262	47	97
	(SM5BFE, CMM, CPU)			
SL2ZA	39,625	253	32	93
	(SM2ALT, BJS, CFE)			
SL6BH	22,560	350	15	45
	(SM5CTY, 6AMD, CKU, VY, 7CUY)			
SL6BF	14,688	294	27	41
	(SM6CKV, CWP)			
Vatican City					
HV1CN	529,356	1437	52	134
	(W9IOP, W8DUS)			

Yugoslavia					
YU3HY	131,772	496	45	113
	(YU3HY, CG)			
U.S.S.R.					
Club Stations					
European					
UA4KHW	245,100	582	64	194
UA1KAC	230,560	708	56	164
UA3KAB	142,550	630	55	155
UA6KTB	113,778	366	52	137
UA4KYA	67,584	370	31	101
UA3KND	58,850	310	30	77
UA3KMB	53,046	296	29	97
UA3KYA	36,844	226	35	87
UA1KMD	29,700	220	34	65
UA1KIA	23,424	226	19	45
UA6KAA	22,515	182	29	66
UA4KAB	19,656	161	22	56
UA6KAB	19,532	203	17	59
UA3KTB	16,456	212	18	50
UA3KIB	16,280	201	19	55
UA4KKU	12,505	152	14	47
UA1KAY	6708	153	17	45
UA6KAE	3588	84	18	34
Estonia					
UR2KAM	858	37	5	17
Karelo-Finnish					
UN1KAA	851	67	9	14

Our thanks to the following stations for sending us their logs for checking purposes: DOK: H3ø, EL1C, G3MIX, G8PL, K9IWS, LA5HE/M, LA7SG, OK1AAE, AAZ, AJT, ADP, AMS, GS, HHW, KAY, KIX, KNH, KNV, NK, KPU, KRF, KSL, TI, TJ, YV, OK2BBI, BBQ, BDJ, ABU, KEZ, KNP, KOJ, LE, OK3CAW, CDE, JS, PY1FM, SP5AIM, SP8HT, SP9CS, PT, SM3CJD, SM4CDO, SM5AIO, UU, SM6BWM, BZE, CNX, SM7MS, TQ, VE3AO, VP7NY, VQ2MS, W1APA, RWU, W2GRA, IP, W3PVZ, W4NO, ZQK, W5ARJ, WA6IVM, W8HA, MCC, W9HT, LZ, YO2-ø31, YO2-1511, YO5-195, YV5ANT, ZE1AK, and ZL2HY.

OSCAR Orbit [*from page 59*]

passages. This points out the importance of knowing the period as accurately as possible. Each time the period is revised, be sure to revise the parameters in equations 2 through 6 accordingly.

Another factor must also be taken into account when making orbital predictions beyond a few days in advance. For every 8 revolutions OSCAR makes (requiring 12 hours and 16 minutes for a 92 minute period), the earth revolves on its axis 184 degrees. This means that if OSCAR passes directly overhead on a morning orbit, it will pass 4° further west as it crosses the equator on a corresponding evening passage, and 4 more degrees to the west on the next morning's orbit, etc. With each successive corresponding orbit, the satellite gets further and further out of range. After several days, a particular family of orbits moves out of range completely, and a new family of passes comes into range.

In summary, we were able to predict the times when OSCAR I would appear over or near our QTH by using equation (2) for successive orbits; equation (4) for corresponding day-to-night orbits; equation (5) for corresponding night-to-day orbits; and equation (6) for corresponding day-to-day and night-to-night orbits over several days. The accuracy of the predictions, although variable, were quite good. Accuracy, depended, for the most part, upon a precise determination of the satellite's period.

Dec. 1961	Predicted and Observed Orbits, GMT							
	Night Passes				*Day Passes*			
16		—	—	*0049*		*1024*	*1156*	*1328*
		—	2317	0049		1023	1155	R
17		*2217*	*2349*	*0121*		*1055*	*1227*	*1400*
		R	2344	0117		1049	1221	R
18		*2343*	*0015*	*0147*	*0947*	*1119*	*1251*	
		R	0012	0144	0944	1116	R	
19		*2307*	*0039*	*0211*	*1011*	*1143*	*1318*	
		2306	0037	R	1012	1142	R	
20	*2202*	*2334*	*0106*		*0907*	*1039*	*1209*	..
	R	2332	0105		R	1037	1209	

Fig. 2—Based only on the observed pass of 2317 GMT on Dec. 16, I1BMV was able to predict future passes of OSCAR I as shown above. Italic figures indicate predicted-time; other, observed time. "R" indicates signals not heard, as satellite was out of range. Note how new family of passes came into range as an old family of of orbits passes out out of range. For example, the 1400 GMT pass on Dec. 17 was replaced by a new family beginning at 0944 GMT on Dec. 18.

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Model 2BDP — 15, 40 & 80 meters..... **$19.95**
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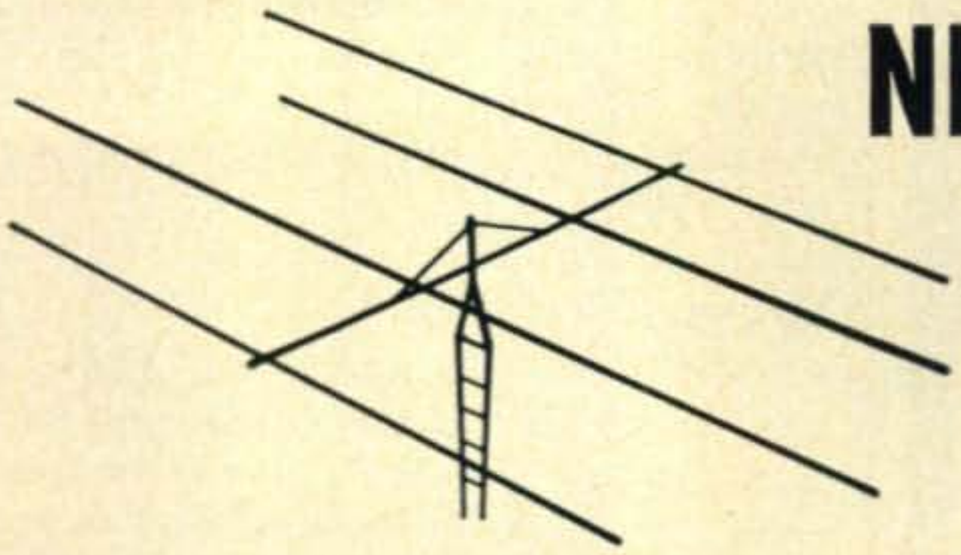

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Model DB-24 ..... **$169.50**

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103 West 43rd Street, New York 36, N. Y./JUdson 2-1500

For further information, check number 34, on page 128

After a series of passages have been observed, the value of the period used in equations 2 through 6 should be revised by the observer for more accurate forecasts.

One additional observation. Since the satellite is in range for only five or six minutes at most, it is advisable to begin listening about 10 minutes before the predicted time. It would be wise, also, to prepare for three consecutive observations, listening for the earliest pass and the later one, in addition to the predicted main pass. In this way, we were able to determine when a family of passages drifted out of range, or a new family came into range. It was sometimes possible to hear all three consecutive orbits. Fig. 2 shows a part of the information appearing in I1BMV's log indicating how the predicted orbit items were entered as guides, and how they compared to observed values. ■

50 mc Filter [*from page 55*]

loading should be about the same as before. The filter should not have to be retuned so long as you stay within a few hundred kc of the original frequency.

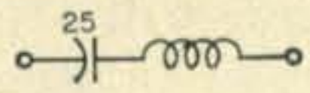

Fig. 4—A series tuned trap that may be installed at the TV set antenna terminals to eliminate 50 mc interference. The coil has 9 turns of #20 E and is air wound ¾" long and ⅜" in diameter.

If you still have TVI on a low TV channel, try to null it out with C_5, repeaking C_4 afterward. If C_5 has no effect, the interference is probably the result of 50 mc r.f. and can be cured only at the receiver. A trap tuned to 50 mc (fig. 4), placed across the TV set antenna terminals will usually do the job. The coil should be adjusted by squeezing or spreading the turns after being connected across the twin lead. ■

Space [*from page 80*]

send in your observation. All reports, no matter how simple or sophisticated, will be of great assistance to this radio amateur space experiment. No other amateur activity in recent years has so fired the imagination and thoughts of so many people throughout the world. Here's your chance to become a part of it.

OSCAR II's Orbit

If all goes according to plan, OSCAR II's orbit should be the same as OSCAR I's. It is planned to be launched towards the south, in a polar orbit. All daytime passes will be in a north-south direction, and all nighttime passes in a south-north direction. OSCAR II's period should be approximately 92 minutes. Once the actual launch time is announced, accurated orbital predictions may be computed readily, as explained in I1BMV's article appearing in this month's *CQ;* "Predicting OSCAR's Orbit With Ease."

[*Continued on page 108*]

Space [from page 106]

OSCAR Third-Party Traffic

On December 29, 1961, the FCC announced that provision 1561 of the Geneva Radio Regulations concerning third-party traffic *is not* applicable to the handling of OSCAR reception and tracking reports relayed by overseas ob-

[Continued on page 112]

Propagation [from page 79]

WESTERN USA To:

TIME ZONE: PST (24-Hour Time)

	10/15 Meters	20 Meters	40 Meters	80/160 Meters
Western & Central Europe	*Nil*	05-07 (1) 12-15 (1) 15-17 (2) 17-22 (1)	19-00 (1)	*Nil*
Eastern Europe & European USSR	*Nil*	05-07 (1) 10-14 (1) 19-22 (1)	*Nil*	*Nil*
Southern Europe & North Africa	13-16 (1)	05-07 (1) 12-14 (1) 14-18 (2) 18-22 (1)	19-22 (1)	*Nil*
South Africa	11-13 (1)	05-08 (1) 11-14 (1) 20-21 (1) 21-23 (2) 23-00 (1)	19-20 (1) 20-21 (2) 21-22 (1)	19-21 (1)
Eastern Mediterranean	*Nil*	05-07 (1) 11-14 (1) 19-22 (1)	*Nil*	*Nil*
Central Asia	*Nil*	07-17 (1) 22-01 (1)	*Nil*	*Nil*
Southeast Asia	20-23 (1)	07-09 (2) 09-14 (1) 22-02 (1)	02-06 (1)	*Nil*
Far East	20-23 (1)	06-08 (1) 08-10 (2) 10-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	01-02 (1) 02-05 (3) 05-06 (2) 06-07 (1)	03-05 (1) 03-05 (1)†
Samoa & Pacific Islands	18-20 (1)* 09-12 (1) 12-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	04-07 (1) 07-09 (3) 09-10 (2) 10-18 (1) 18-20 (2) 20-23 (4) 23-01 (3) 01-04 (2)	22-00 (1) 00-04 (3) 04-06 (2) 06-07 (1)	23-01 (1) 01-04 (2) 04-06 (1) 01-04 (1)†
New Zealand	14-19 (1)* 11-16 (1) 16-18 (2) 18-20 (4) 20-21 (2) 21-23 (1)	17-19 (1) 19-21 (2) 21-23 (4) 23-03 (3) 03-06 (1) 10-14 (1)	22-23 (1) 23-00 (2) 00-04 (3) 04-06 (2) 06-07 (1)	00-02 (1) 02-04 (2) 04-06 (1) 02-04 (1)†
Australia	13-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-23 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-03 (2) 03-08 (1) 11-14 (1)	23-00 (1) 00-04 (2) 04-07 (1)	00-01 (1) 01-03 (2) 03-06 (1) 01-03 (1)†
South America	13-16 (1)* 06-11 (1) 11-14 (2) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	13-15 (1) 15-18 (2) 18-21 (4) 21-23 (3) 23-00 (2) 00-04 (1) 04-06 (2) 06-13 (1)	18-20 (1) 20-00 (3) 00-02 (2) 02-04 (1)	19-20 (1) 20-23 (2) 23-03 (1) 20-23 (1)†
McMurdo Sound, Antarctica	12-16 (1)	11-16 (1) 16-17 (2) 17-19 (1)	19-21 (1) 02-07 (1)	*Nil*

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Sensitivity is 1.0 microvolt for 10 db, Signal to Noise ratio. Selectivity is ± 0.8 KCS at —6db with Q-MULTIPLIER. TUBES: 6BA6—RF Amp, 6BE6 Mixer, 6BE6 OSC., 6AV6 Q-Multiplier—BFO, 2-6BA6 IF Amp., 6AV6 Det-AF Amp. ANL, 6AQ5-Audio output, 5Y3 Rectifier.

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.....enclosed for Stock No. .....

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Address.....

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

For further information, check number 38, on page 128

For further information, check number 39, on page 128

For further information, check number 40, on page 128

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51J-4 Receiver	1464.00	52.69
51S-1 Receiver	1828.00	65.83
KWM-2 Transceiver	1150.00	41.35
DL-1 Dummy Load	58.00	1.91
351D-2 Mobile Mount (KWM-2)	120.00	4.15
CC-2 Carrying Case	85.00	2.88
MP-1 15V DC Power Supply	198.00	7.10
PM-2 Portable Power Supply	150.00	5.24
516F-2 AC Power Supply (32S/KWM-2)	115.00	3.97
321B-3 Speaker (S-Line)	32.00	.97
312B-4 Speaker Console (S-Line, KWM-2)	195.00	7.00
312B-5 PTO Console (KWM-2)	350.00	12.45
399C-1 PTO Speaker	164.00	1.99
F455Q-5 Mechanical Filter (75S)	52.00	1.70
302C-3 Directional Wattmeter	130.00	4.51
189A-2 Phone Patch	67.00	2.10
440E-1 Cable (516E-1 to KWM-2)	17.00	.43
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Address .....

City .....State.....

☐ Send reconditioned equipment bulletin

For further information, check number 41, on page 128

Space [*from page 108*]

servers to American amateurs for forwarding to the Project OSCAR Association. In many cases relay by amateur radio circuits will be the fastest way of getting this information from foreign locations to Sunnyvale. All reports sent via amateur radio should be followed up with a written report, however, for QSL verification.

WARNING!

OSCAR II's signal on 145 mc will often be weak. It is making history, and will be copied in every corner of the globe. KEEP THE CHANNEL CLEAR. It's a great tribute to amateur radio that there was not a single report of QRM on OSCAR I's frequency. Let's keep this record, and the frequency clear.

SEND IN THOSE REPORTS.

73, George, W3ASK

RTTY [*from page 83*]

boards for the W2JAV transistorized terminal gear described in the February, March, and April RTTY COLUMNS. We can now report that it is a sure thing, and at a very reasonable price. The details may be obtained by dropping a line to your RTTY Editor at 431 Woodbury Road, Huntington, New York. Don't forget to enclose the stamped self-addressed envelope.

See you on RTTY. How about 52.6 mc f.m.?

73, Byron, W2JTP

Birdcage [*from page 45*]

end of the driven element stub. The s.w.r. with this arrangement was about 2:1. Good reports were received in Europe, Canada and most districts of the U.S., both on a.m. and c.w. Several U.S.S.R. stations were also worked on c.w. Since this arrangement technically and mechanically, hardly seemed a good one, some solution had to be provided for the needed increase in length between the upper and lower portions of the antenna. The amount of physical separation could not be increased without adding to the "pendulum like" members and raising the antenna higher on the tower. This solution was not considered satisfactory. Next coils were placed in each vertical wire. This arrangement worked, but didn't satisfy me due to G4ZU's comments about loss of power in antenna coils. The final method consisted of adding the required length to each of the vertical wires and then pulling the centers of each, in toward the tower and securing them with nylon cord tied to the "pendulum like" members.

The technical advantage, pointed out by G4ZU, of having the antenna voltage points clear of surrounding materials, was lost with this arrangement, although there has been no apparent practical disadvantage.

Just why this particular "Bird Cage" required 15 feet of additional length over the calculated values, using G4ZU's formula, is not known. However, there are several differences between G4ZU's proposed "Bird Cage" support and this

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I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

City .....State.....

☐ Send reconditioned equipment bulletin CQ-6

For further information, check number 44, on page 128

tower-mounted "Bird Cage". The 10 meter, 3 element beam is 2 feet from the top elements and the 40 foot tower runs between the driven and reflecting elements. These factors *may* account for the required change of "Bird Cage" length. The reflector, with the present arrangement, was "grid dipped" with the 300 ohm stub at 13.5 mc. The reflector will be properly tuned later.

Final Results

With this arrangement, the standing wave ratio is nearly 1:1 over the entire 20 meter band. From local reports, the front to back ratio appears to be around 20 db. Little radiation is indicated from the antenna sides and sharp directivity is evident to the front.

In spite of the miserable conditions existing on 20 meters during the test period, particularly during weekends, the antenna has performed well. Over a two week period, with 150 watts input, about 70 contacts were made. Most of these were on a.m. All U.S. districts heard, were worked. Europe, Africa and Alaska were contacted on a.m., and three U.S.S.R. stations were worked on c.w. Reports have averaged 10 db over S9 on a.m. ■

Novice [*from page 87*]

1914 and the present type equipment. Come on fellows, help.

Steve Skinner (13) 3518 Lakin Avenue, Great Bend, Kansas, needs some brother ham's advice and help to get the Novice ticket.

James V. Kelly, 13024 Clovis Avenue, Los Angeles 59, California, Phone: NEvada 63662. Jim says he is willing to work all that is necessary and then some to get in this hobby. By golly, most people don't want to work enough!

Douglas F. Goldsmith, 278 Chestnut Street, Liberty, New York would like a local ham to help explain what cooks.

Arthur R. Tolp (age 46), 1124 Rose Avenue, Fort Myers, Florida needs help: is there a local code and theory class in Fort Myers?

Help Wanted: Letters, hints, kinks and anything of interest to our many readers to make this column interesting. See address at head of column.

There it is fellows. I thank all of you for the interesting letters and for the pictures. You can see the difference between this month and last month, you sent no pictures last month. And as I said, we welcome letters from other countries; you read this don't you? Good DX and no QRM. 73 Walt

Sideband [*from page 97*]

contact from up in Iceland." [Norm went on to list a number of stations to whom he will send cards and noted that he and George, PJ2AA had a QSO on the very last day of Norm's operation from Iceland so George, be patient!—ed.]

From Alfred Schlosshauer, DJ4WN: "I have written a description of the 2-watt exciter which was published in *DL-QTC* of October, 1961. With the sunspot cycle as it is, I turned some of my s.s.b. activities to 3.8 mc and I was very much surprised to hear and work some ZL's on this band. A ground plane antenna 60 feet high was quickly erected one Saturday afternoon in October, made of a bamboo fishing whip and some insulated hookup wire. Limited garden space gave some problems how to place the four radials. On October 24, ZL4OD and ZL4KD were worked with

5 and 8 reports from both sides. Consequently, WAC could be worked on 3.8 mc s.s.b. with the normal grounded grid home brew final.

"The vertical antenna gave 3 more db than the dipole, as reported from ZL, but since I have taken down my dipole and pulled up a 41-meter windom with 300-ohm feeder, I cannot find a difference in reports between the two antennas in most cases."

From V. Mayree Tallman, K4ICA: "The DX girls have issued a statement of consent for other Stateside girls to participate in the YL Fins net, but only by sections. The 1, 2, 3 section one week, then 4, 5, etc. the following week, to continue in this way until the West Coast is included. Then every 4th week, no Stateside YL's except Floridoras who, of course, participate each week. In the beginning, we met at 1800 GMT, 14.277. Time was changed to 1700 GMT because the European girls declared the band went out early in their area. Now, however, the band stays in longer and 1700 is a very bad time to begin so we will return to starting the YL Fins net at 1800 GMT."

We hope that you have enjoyed reading over our shoulder and encourage more of you to write in and let us know what's on your minds regarding sideband and sidebanders.

73, Dorothy and Irv

YL [*from page 99*]

Here and There

Congratulations to W4SGD, Katherine, for being the first YL to earn YLCC/1000! Confirmed QSOs with a thousand YLs is a real achievement; only other holder of this award is W2QHH (who also was No. 1 to earn YLCC). . . . Congrats to Sheila Goodhue for achieving WAZ a second time! For most of us even once is unattainable, but Sheila earned it first as KL7BHE and now again as KH6DLD (whither next, Sheila?). . . . Congrats also to W2OWL, Ruth, for earning DXCC; Ruth operates s.s.b. exclusively.

Correction: In March *CQ*, runner-up in the Miss Amateur Radio contest in connection with the SW Div. convention—Kathy's call is WV6RTL (not WV6RTZ as published).

Attention hams living and operating in trailers and trailer parks: W5CA is doing research on this subject; he'd appreciate any info you may have. Send to W5CA at Tijeras, N.M.

With the Clubs

The girls of the Los Angeles YLRC have decided to permit contacts made on a net to count toward the Lads 'n' Lassies certificate. Here are the complete rules:

1. Work 10 members of LAYLRC since Jan. 1, 1952;
2. Copy of log showing name, call, date, time band and type of emission may be sent in lieu of QSLs;
3. Special recogniiton will be shown on the certificate if all contacts are on c.w.
4. It is not necessary for all contacts to have been made from one QTH;
5. Only one certificate shall be awarded to an individual

Custodian: K6KCI, Irma Weber, 762 Juanita Ave., Santa Barbara, Calif.

New certificate custodian for the Floridora award is K4RNS, Marge Campbell.

33, W5RZJ

USA-CA [*from page 90*]

who have mutually agreed to advise and aid in event of the ham's death.

Secondly, we feel that if we are to call ourselves a fraternity, then our leadership should cause programs to be brought about and committees formed in clubs which take on the humanitarian task of serving ham widows not otherwise provided for in the first case.

We suppose that our League should be the logical organization to bring about such a program on a national scale . . . in any event, it is a fraternal and moral obligation now lacking any recognized action in solution, and we ask frankly, what is the mass will of the fraternity?

Publicity and Public Relations

This column is dedicated to publicity support of all U.S. awards and all U.S. awards sponsors and to our good friends across the border; however they, not we, generate the news. We can't promise any specific coverage but you can bet we are always on the prowl seeking high, mass interest material.

News space in what is deemed a technical journal like *CQ* is limited to materials of national-level interest. Many times high-interest matter has to be thrown out because basic details are lacking. In many cases an action picture or a completed sample award makes the difference of selected materials. Fact is, many times such news is just 'garbage' without supporting props.

We are here to serve but we must have the materials to weave . . . so we suggest all awards sponsors send along both background material and a reproducable copy of awards sponsored. Such copy should be complete with seals and ribbons if used and be a duplicate copy of ones issued. We have no use for defaced samples of awards.

Thanks muchly for listening folks, and thanks also for the many, many letters expressing appreciation of *CQ*'s flegling USA-CA column, which, as the man said, covers one whale of a lot of territory. Good Hunting es 73,

The OLD MAN, K6BX

50 mc Propagation [*from page 42*]

sentative number on all v.h.f. bands entered into cooperative effort of this kind, effort *requiring no special talents or equipment*, and pooled their long-term findings, they could and would make significant contributions to the presently limited knowledge of v.h.f. propagation and its effects. The results of such effort would be of benefit to amateurs of all nations.

Aside from the scientific value of such cooperative programs of study, those engaged in them would find their DX scores mounting. Fifty U. S. states and 36 foreign prefixes have been recorded in our 50 mc logs in 37 months. We have even experienced the rather rare six meter pleasure of working and confirming Alaska and Hawaii both as "countries" and states—but not recently! ■

Terry (W9DIA) "King of Traders"

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	Price	Monthly Payments
S-38E Rcvr	$ 59.95	$ 1.98
SX-62A Rcvr	359.00	14.08
S-94 Rcvr	69.95	2.35
S-95 Rcvr	69.95	2.35
SX-100 Rcvr	325.00	11.56
SX-101A Rcvr	445.00	15.89
S-107 Rcvr	94.95	3.25
S-108 Rcvr	139.95	4.87
SX-110 Rcvr	169.95	5.96
SX-111 Rcvr	279.50	9.91
*SX-115 Rcvr	599.95	21.48
S-120 Rcvr	69.95	2.35
SX-140 Rcvr	124.95	4.33
SX-140K Rcvr	104.95	3.61
SR-34AC Transcvr	395.00	14.08
R-47 Spkr	12.95	.29
R-48 Spkr	19.95	.54
HT-32B Xmtr	725.00	26.00
HT-33B Xmtr	995.00	35.75
*HT-37 Xmtr	495.00	17.69
HT-40 Xmtr	109.95	3.79
HT-40K Xmtr	89.95	3.07
HA-4 Keyer	59.95	1.98
HA-2 2-Meter Transvtr	349.50	12.44
HA-6 6-Meter Transvtr	349.50	12.44
P-26 Sup for above	99.50	3.41
FPM-200 Mob. Transcvr	1995.00	71.86
HT-41 KW Lin	395.00	14.08
S-119 SWL Rcvr	49.95	1.62
S-119K Kit	39.95	1.26
CB-3 C.B. Transcvr	149.95	5.23
CB-4 C.B. Hand Held	89.95	3.06

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SX-25 Rcvr	$ 74	SX-101A Rcvr	289
SX-28 Rcvr	99	S-102 Rcvr	34
SX-40 Rcvr	49	SX-111 Rcvr	179
SX-40B Rcvr	69	HT-18 VFO	39
SX-62 Receiver	149	HT-30 SSB Exciter	199
SX-62A Rcvr	279	HT-31 Lin Amp	179
S-85 Rcvr	79	HT-32 Exciter	395
SX-95 Rcvr	49	HT32A Exciter	425
SX-99 Rcvr	99	HT-33 Lin	249
SX-100 Rcvr	189	HT-33A Linear	449
SX-101 Mark II Rcvr	229	HT-37 Exciter	345
SX-101 Mark III Rcvr	249		

WRITE FOR OUR LATEST LISTING. 10% DOWN—up to one year to pay on $60.00 order, two years on $120.00 order and three years on $180.00 order—$5.00 deposit to hold—Subject to Prior Sale.

Terms above apply to three year contract. Minimum order financed for 1 year, $60; 2 years, $120; 3 years, $180. Persons signing time pay contracts must be 21 or over and employed.

TRADES . . .

Get our terrific allowances. Use coupon.

AMATEUR ELECTRONIC SUPPLY

Two Stores to Serve You

PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

MANAGER, STEVE, W9EAN

MILWAUKEE, WISCONSIN
3832 Lisbon Avenue
Phone: WEst 3-3262

MANAGER, "DOC", W9HJS

CHICAGO, ILLINOIS
6430 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept. C-65
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....
I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years

I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

City ..... State .....

☐ Send reconditioned equipment and Pre-inventory sale bulletin

For further information, check number 52, on page 128

Ham Shop

Rates for the HAM SHOP are 5¢ per word for advertising which, in our opinion is obviously of a non-commercial nature. A charge of 25¢ per word is made to all commercial advertisers or business organizations.

Your copy should be preferably typewritten, double spaced on one side of the page only.

We do not bill for advertising in the HAM SHOP Full remittance *must* accompany all orders.

Closing date is the 15th of the 2nd month preceding date of publication.

We reserve the right to reject advertising which we feel is not of an amateur radio nature.

Because the advertisers and equipment contained in the HAM SHOP have not been investigated, the publishers of *CQ* cannot vouch for the merchandise listed therein.

TOROIDS: 88 mhy with mounting hardware. Uncased like; new. Information sheet included. $1 ea., 5/$4.00 Postpaid. KCM, Box 88, Milwaukee 13, Wisconsin.

"The VHF Amateur" At last a magazine for VHF'ers! Don't miss a single issue! Send $2.00 for year or $1.00 for six big issues. 67 Russell, Rahway, N.J.

ATTENTION Mobileers! Leece-Neville 6 volt 100 amp system $50; 12 volt amp system $50; 12 volt 60 amp system $60; 12 volt 100 amp system $100. Guaranteed no ex-police car units. Herbert A. Zimmermann, Jr. K2PAT. 1907 Coney Island Ave., Brooklyn 30, N. Y. Tel. DEwey 6-7388.

ONE THIN DIME brings 50 page eye-popping war surplus electronics catalog. Fabulous bargains. Meshna, Lynn, Mass.

TOROIDS: Uncased 88 mhy like new. Dollar each. Five $4.00 P.P. DePaul, 309 South Ashton, Millbrae, Calif.

WANTED: Teletype printers, perforators, reperforators transmitter-distributors test equipment: Model #14, #15, #19, #26, #28, etc. All types Collins receivers, 51J, R-388, R-390, 75A, etc. Cash, or trade for NEW amateur equipment. Write Tom, W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (RIchmond 2-0048).

WANTED: TEST EQP'T TS or AN/URM, UPM, ARM, etc. TELETYPE TG-7, Models 14, 15, 19, 26, 28, printers & reperforators: Revrs & xmtrs: BC 610E, I; AN/GRC-3 & higher, RT-66, -67, -68, Collins 51J 17L3, -4, 18S-2, R-388 -390, -391; ARN-14 and 30; APR-9, -10, ARC-21, -34; APS-10, -31, -33, -42 etc. We pay freight Amber Industrial Corp, 75 Varick St., New York 13, N. Y.

FREE—RCA, GE, etc., tubes catalog. Discounts to 75% from list. Picture tubes at 75¢ inch and up. Parts, (Parts kits at 1/10 original cost. Needles, tube testers, silicons, seleniums, 7" TV test tube $6.99 and more. Arcturus Electronics Corp. CQ 502-22nd St., Union City, New Jersey.

PRESERVE YOUR HAM TICKET, Social Security Card, small photo, passes and anything else of value that is wallet-size. We will laminate it in clear plastic, guaranteed for life. Lamination will prevent it from getting torn, soiled or frayed. Send your ticket or anything of value with $1 in stamps or cash for each item that you want preserved. 24-hour service. Send to *CQ* Magazine, Dept. H.W., 300 W. 43rd St., N.Y. 36, N.Y.

QSLs. Samples, Dime. Print Shop, Corwith, Iowa.

QSL—Kromkote 3 color . . . order 200 get 25 each of 8 different styles—many styles. Samples 10¢—Progress Printing, Box 1154, Biloxi, Miss.

QSL's four colors glossy stock forty design send $5 for 200 and get surprise of your life. 48 hour service satisfaction guaranteed. Constantine Press, Bladensburg, Md.

GLOSSY 3-color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, Somerset, N.J.

QSL's SWL's. That are different, colored, embossed card stock and "Kromekote." Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QSL's Samples 15¢. Rubber stamps: Name, Call Address $1.35. Harry Sims, 3227 Missouri Avenue, St. Louis 18, Missouri.

QSL's, SWL's, WPE, CB. Samples 5¢ Nicholas & Son Printery P.O. Box 11184, Phoenix 17, Arizona.

CREATIVE QSL CARDS—New catalog and designs being completed. Free samples and catalog. Personal attention given. Wilkins Creative Printing, P.O. Box 1064-2, Atascadero, California.

GOODIES: Engraved Shack Plaques—badges—desk plates. Printed Call Card Mailing Envelopes—etc. Illustrated list 10¢ (refundable) K1VRO, Shirley Decker, 36 Hampden Street, Westfield, Mass.

HUNDRED QSLs: 80¢. Samples, dime. Meininger, Jesup, Iowa.

QSL's-SWL's samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio.

QSL's. SWL's XYL-OM's (Sample assortment approximately 9¾¢). Covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fantabulous, DX-attracting, protoypay, snazzy, unparasoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minnesota.

QSL's 100 $1.25 Free Samples. L. Keller 3036 Ridgeview, Normandy, Mo.

EMBOSSED LABELS: Label your instrument panel and equipment with I-DENT-TAG vinyl labels. 3/16" white lettering on color background; black, red, blue, green or brown. Adheres to any surface or shape. 4 for $1.00. I-DENT TAGS, Box 3827, Oak Park, Michigan.

RUSPRINT QSLs—SWLs. 100 2-color glossy $3 postpaid; QSO file cards $1 per 100; Rusprint, Box 7507, Kansas City 16 Minnesota.

"RUBBER STAMP, CALL, NAME, ADDRESS, INK PAD, CASE." $1.00. E. PERRY, BOX 937, ALLANDALE, FLA.

QSL's?? SWL's?? WPE's?? CB's?? Samyle 20¢ (refunded) Sackers, W8DED, Holland, Michigan.

QSL's . . . Real Gassers . . . Dime. Filmcrafters . . . Martins Ferry, Ohio.

WORLD'S LARGEST CRYSTAL CATALOG 100,000 available crystal frequencies 32 pages. Send 25¢ coin or stamps to cover costs. QUAKER ELECTRONICS, Mountain Top, Penna.

BARGAINS! Used equipment Sold-Traded-Wanted by other Hams in "Equipment Exchange Bulletin." Sample copy free! Write: Brand, Sycamore, Ill.

DX-100 OWNERS: Increase power by 50%. Run 240 watts AM-300 watts CW or SSB. Complete kit and instructions for adding another 6146 to final only $19.95. Similar kit for TX-1. Order or write. Best Radio Service—W4KUV, 610 N. Madison Ave., Goldsboro, North Carolina.

Deluxe, cushioned, indexed Rubber Stamp with handle. 4 lines $1.80. Prompt service. Free information. Ellsworth, 920 Southlawn, East Lansing, Michigan.

Convert any television to sensitive, big-screen oscilloscope. Only minor changes required. Plan $1.95. Relco Industries, Box 10563, Houston 18, Texas.

Multiplex Adapter—Circuit board, set of 5 coils, sockets and complete instructions $15.00. D. L. Stoner, Box 7388Q Alta Loma, California.

CUP—Core Inductances, excellent for sharp or band-pass 50 to 100 kc i.f. or b.f.o. Very high *Q*. Unused cased; adjustable; solder terminals. Type 1, 2.9 mh. Type 17, 3.7 mh. Dollar each postpaid U.S. proper. Circuit suggestions included. Woods, 2346 Clover Lane, Northfield, Illinois.

COMMUNICATION. Teletype. Unusual surplus bargains. Free flyer. MDC 923 W. Schiller. Phila 40.

SSB exciter described in February CQ, $250. F.O.B. Dallas, W5VU.

WANTED: BC639 receivers, advise price, condition. We pay freight. Amber Industrial Corp. 75 Varick Street, New York 13, N.Y.

USED RADIO RACK CABINETS: Panel size 12¼ x 19. Cabinet size 13 x 20 x 13. Gray wrinkle finish, $7.50 each, FOB Marietta, Pa. U.S. Aluminum Corp., Marietta, Pa.

FREE—R.C.A., GE, etc., tubes catalog. Discount to 75% from list. Picture tubes at 75¢ inch up. Parts, parts kits at 1/10 original cost. Needles, tube testers, silicones, seleniums, 7" TV bench test tube—$6.99—and more. Arcturus Electronics Corp. CQ 502 22nd St., Union City, New Jersey.

Industrial tubes type 5555 $95.00 ea. frequency shift converters An-7 Ura-6 frequency shift converters $295.00 or will swap for other gear. Spera Electronics, 37-10 33 St., L.I.C., N.Y.

FOR SALE: Complete instructions including 28 page booklet and 22" x 36" schematic for converting the ART/13 transmitter to AM and SSB. Satisfaction guaranteed. $2.50. Sam Appleton, 501 N. Maxwell St., Tulio, Texas.

HAMS-EXPERIMENTERS. Free list of our interesting "surplus" surplus items sent on request. Bargains. Ariel Electronics, Box 725 Sag Harbor, New York.

A-1 reconditioned equipment guaranteed. On approval. Trades. Terms. Hallicrafters, Hammarlund, Nationa., Gonset, Central, Johnson, Collins, Elmac, Globe, Heath, RME, and many other items. List free. Write or phone about any equipment. Henry Radio Company, Butler, Mo.

Aluminum for every ham need. Write to Dock's, 62 Cherry Avenue, Tiffin, Ohio, for list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits.

WANTED: Commercial or Surplus Airborne, ground transmitters, receivers, testsets, 18S, 17L, 51R, 618S, HC611, BC1000, GRC, PRC, ARN 14, RT77/GRR, Bendix, Collins, others . . . RITCO, Box 156, Annandale, Virginia.

TOROID BONUS: Free .033 (space 3) & .068 (mark) 200 V. mylars during June, July; August '62 with order of five toroids. 88 mhy., uncased, like new, with mounting hardware; information sheet. $1 ea. 5/$4.00 Postpaid. KCM Box 88, Milwaukee 13, Wis.

For Sale or Trade for Ham Gear: 40 coin operated hospital radios with built in bed lamp and pillow speakers. 6 tube chassis with RF stage. Complete with mounting bracket. Original cost $75 each. Best offer accepted. Roy Lund, 149 2nd Ave. S.E., Valley City, N. Dak.

Sale 80' towers $240 heavy duty, triangular, galvanized 20' sections 30" sides approx. 1700# Neil Webster, Buttenberg, Iowa.

"Breakfast Club Hamfest" July 28-29 at Terry Park, Palmyra, Illinois.

Sell or tade: National SW-54, Hickok model 505 scope, and Viking Adventurer. Best offer. KØGCJ, 1110 7th St. NW, Austin, Minn.

HT-32A excellent condition $475.00. Will deliver free within 150 mile radius. W5NRI, 4507 Woodlawn, Wichita Falls, Texas. Phone 692-2480.

NOVICE: Sell Lafayette HE-10 Receiver—$40.00, Knight T-50—$25.00. Both in excellent condition. WA6PXI, Rt. 1, Box 3120, Anderson, California.

Crystals. 2-80 meters. Clearance sale. Your last chance to buy crystals at real surplus prices. 6 for $1. Postpaid. Send for list of available frequencies. W6IMC, 210 Alden Road, Hayward, California.

WANTED: 6 and 2 meter receiver and transmitter. Send description and price. Dick Whiteside, 26277 No. Mooney Blvd., Tulare, Calif.

FOR SALE—Heath Seneca, excellent condition and modulation reports. Hallicrafters S-76, converters, All for $200. Prefer local deal. K2EKP, So. Farmingdale, N.Y., CH9-6594.

Trade A-1+ equipment, on the air right now—DX-100, HQ-140-X, RME 10-20 Conv. Hornet Beam, Trio Rotator, Champion Vibroplex, Speedex Key (chrome on marble), D-104 mike, kCommando Mike, Heath Conelrad, phones, meters, books and boxes of parts, ant. tuner, strength ind., etc. All this equipment is A-1+ with instruction books, and I'll trade all of this for a "Jeep", of the last ten years vintage, must be A-1. Write. Lou J. Francisco, Jr., W3YQP, Route 1, Box 11, Clarksburg, Pa.

Printed circuit board material bargain single copper clad 1/16" phenolic 9" x 10½" sheet $1.00 postpaid, Buchan, 2994 Sibley Hwy., St. Paul 18, Minn.

SELL: 178 issues QST 1939 thru 1960. From Sept. 1946 thru Dec. 1960 complete. Offer? W2EQS.

For Sale; Hallicrafters SX-110 in excellent condition for $115 or best offer. Also matching R-48 Speaker for $10. Robert Williamson W9ENX; Box 557; Pickstown, So. Dak.

FOR SALE—Viking Ranger Transmitter, factory wired, push-to-talk, includes mike, key and crystals. Excellent condition. $190. Terry Bateman, 821 Glenway Drive #1, Inglewood 3, Calif.

FOR SALE: KWS 1—new PTO—new Collins knob, $900; 75A4, 3 & 6 kc. filters—new Collins knob—$495; 51J—3 & 6 kc. filters—new Collins knob—in Collins table top cabinet—$600; CE gated compression amplifier GC-1, $35; 10M beam—Telrex 3 el super mini, $30; 20M beam—Telrex 2 el mini beam, $20; Tribander—Mosley TA-33, $45; Control Unit—built in BC 221, 5 inch millen scope (complete with amplifier), Beam rotator control & indicator. All AC power supplies for units built in. Conelrad alarm control and panel in unit—$250; Micro Match-SWR coppler and indicator—$30; Precision V. O. M.—Model 120, $20; B&W grid dip meter, $20; Heath kit—wired—includes probe V.T.V.M.—$30; Microphones—D104—push to talk stand, EV. Cardex, EV. 664 and table stand. 3 extra 4 x 250B ceramic for KWS1. Johnson Beam Rotator—$85. 15 ft. tower, aluminum, with bushings for drive shaft—$75. Will not ship. Must be seen and picked up. All above in most excellent condition. K2BQ—Call Office: FL 9-2090 and leave message.

FOR SALE: HALLICRAFTER HT 30 and SX-101. Used about nine months; in excellent condition. FOB East Haven, Conn. $300. E. E. McAviney W1BIC, 109 Hellstrom Rd., East Haven, Conn.

12 Position transmit and receive unit: complete with two switches. Allows crystal control cross channeling, external mounting in attractive grey cabinet. Easily attached to your present crystal sockets. Only $19.95. Send check or money order Dumore Electronic Products, P.O. Box 244, Mays Landing, N.J.

Johnson phone patch new—$14. WO88A RCA scope F/W $75. Two new 833A tubes @ $20 each. 3½" round Micro O to 500 meters, $2. each. W3YHQ 500 Hudson, Altoona, Pa.

"Breakfast Club Hamfest" July 28-29 at Terry Park, Palmyra, Illinois.

Collins 75S1;-Ser. 3264. Mint Condition, $370. Telrex Model 10M—56-235. 6 Element Beam, $125. K1QXP, 117 Dunn Ave., Stamford, Conn.

KWM1 and homebrew AC supply $425. will take receiver on trade. C.E. Model A slicer $25. New 304 TL $7. 4, 803's $2 ea. Ground grid single 813 final $25. David M. Dennis, K8ATS, R#1 Adrian, Mich.

FOR SALE—Hallicrafters Finest Receiver SX73 Cost $975. Picture and Description in ARRL 1954 Handbook. Also equipped for RTTY and 6 xtal channels. $195 Less speaker. E. Shafer, 3479 Kersdale Rd., Cleveland 24, Ohio.

HRO 60 Sell or Trade, 10 to 80 coils, matching speaker, very nice best offer over $300. Want Johnson KW. K9UIV, Wilber Cox, 810 Pendleton Ave., Anderson, Ind. Phone 642-2233.

SELL: Multi-Elmac Trans-Citer AF 67 60 watt $85. Multi-Elmac Power Supply M1470 $50. Both in very good condition. Beach, 2 Hall's Lane, Rye, New York.

Wanted, complete transmitter-receiver station, must be new or perfect condition. Send complete information first letter. Calleja, Box 2807, Mexico City.

Collins station—KWM=2 11643ULU, PM=2 Power supply, PM-1 mobile power supply, 351D-2 mobile mount, 312B vfo console, cc-1 carrying case, GG linear, all vacuum variables and vacuum switch. Priced for quick sale as a package—$1600.00, or sell separately. Ray Powers K6HEG, 1015 Lucky Ave., Menlo Park, Calif. DA 2-3568.

Sell: Like new globe King 500B $450. SX71 Recvr $125. RME Preselector (new) $30. RME DB23 Clipper $30. Johnson TR switch $20. Bud TVI Filter LF601 $12. Two UTC CVMI modulation transformers $10 each. Stancor A3808 modulation transformer $10. George Edward Magera, W4YLT, 123B, Dogwood Dr., Mullins, S.C.

RF Amplifier with power supply. Linear grounded grid using two 4-1000A tubes. Covers 3-24 mc. pi-network output using vacuum variable capacitors. High voltage is variable from 0-6000 volts. Entire unit is mounted in two 6-ft. enclosed relay racks. $650. white, 945 Contra Costa Drive, El Cerrito, Calif.

WANTED—RADIO OPERATOR/TECHNICIANS. The U.S. Government has a continuing requirement for single and married men between the ages of 20 and 30 with radio operator/technician experience. Individuals with less than minimum required experience can qualify for training. Persons with past applicable experience who for some time have been out of touch with this type of activity will be retrained. Assignments are overseas as interesting foreign posts. Starting annual salaries, which will be determined by the applicant's experience and ability, range from $4830 to $5885. Normal promotional progress within this salary range may be expected when quality of performance dictates. Beyond this latter level advancement possibilities exist on a selective and competitive basis. Standard government allowances are paid in addition to the salary. A variety of foreign posts is available. Rotation of the employee and his family from post to post is accomplished in accordance with standard government regulations and usually involves tours of 24 months duration at each post followed by Stateside leave between assignments. Work is challenging and varies from post to post. If you are in good health, not subject to military draft, and are interested in the above openings, please write, giving us the following information: (1) name, address, telephone number, and hours when you can be reached; (2) date of birth; (3) military history, including dates, schools, experience, grade or rank, and mos (primary and others); (4) Civilian training and experience; (5) FCC license, if any; (6) CW speed; (7) typing speed; (8) marital status and dependents. If your letter indicates that you have the required qualifications, a formal interview will be arranged in the near future. Address letter to Mr. Carlton H. Broadnax, P.O. Box 8254, Southwest Station, Washington 24, D.C.

For Sale: HQ110 Hammarlund Rec. Viking Challenger Transmitter. Both brand new. Factory Wired. $325.00. Philip Laspina—ES 4-7986, 137 Sunset Avenue, Newark, New Jersey.

Must sell for best offer (suggested prices shown): HT-32 XMTR, a few scratches but otherwise perfect, $295.00; HT-33A only a few hours use; will accept package deal for both. 4-1, 000-A Tubes: Used $55.00, new (never out of carton) $80.00; both for $120.00. 250TH's—2 used & 1 new 3/$35. Power XFRMR, 2250 V @ 625 ma, $35.00 —for $70.00 will also include Filament XFRMR, 10V @ 12 amp, KW modulation XFRMR, and 500 Watt Audio XFRMR, all in good shape. Collins NBFM Adaptor, $15.00. Write—Don Miller, M.D., W9WNV, 2718 W. Foster Ave., Apt. J-2, Chicago 25, Illinois.

SELL Collins 51J-4 like new to the highest bidder. New pair 4CX300 and sockets $45 each 4X250B and sockets $30 each; 304TL $18; 500 cps and 2/1 mech. filter for the 75A-4 $40 each, M500 silicon rectifiers 10 for $8; CRL 858S xmit. cap. 4 for $5; 50 mmfd. vacuum cap. $3.50, used 250th (less than 10 hrs.) $10. Box 120, CQ

WANTED—Catholic priest would like some equipment to get back into ham radio. Fr. Benedict MS.SS.T. W8CUU, Box 1097, Lorain, Ohio.

WANTED: All types Military Electronic Equipment, GRc-PRc, Bc-UPM, also teletype of all types. Phil Rickson, K2HJC, Morrisonville, New York.

HAMFEST—Starved Rock Radio Club, June 3rd. For details write—SRRC/W9MKS, G. E. Keith, Secretary, RFD #1, Box 171, Oglesby, Illinois.

FOR SALE: Viking Valiant Xmtr. $325. SX-99 rcvr. with Heathkit Q Multiplier $90. 3 element 15 meter beam $15. Complete rig—$410. All in like new condition. K4IQI 9540 Byron Avenue, Miami Beach 54, Fla.

AN/FGC TERMINAL UNIT never out of crate. New complete with spares, extra set tubes, tools and manual. Price $135.00 FOB W8NLT, Mel Swillinger, 209-55th St., S.E. Charleston, West Virginia, Phone WA5-3447 or DI6-6483.

BARGAIN: Like new Gonset G-76 transceiver with Minneapolis-Honeywell transistor power supply including instruction books $325. W4QI, L. Holland, Siler City, N.C.

Will trade my DX-35 in good condition for guitar; also need UV-199 tube. Kip Durrin, WA4AGI/4, 1023 Wertland, Charlottesville, Va.

Giant World Maps beautiful colors, 48x36 inches. $1.00. E. Perry. Box 937, Allandale, Fla.

USED RADIO RACK CABINETS: Panel size 12¼ x 19. Cabinet size 13 x 20 x 13. Gray wrinkle finish. $7.50 each, FOB Marietta, Pa. U.S. Aluminum Corp., Marietta, Pa.

VIKING Challenger $84.50; NC-98 $79.50. "Grid" W4GJO, Box 1294, Sarasota, Fla.

COLLINS 32V-1 transmitter in good condition, $250. Larry Lockwood, 515 Birch St., McMinnville, Oregon.

170 WATT 6 METER RIG: 4X-150 final, 807's modulating; built in VFO; power supply and transmitter in separate rack panel cabinets; excellent condition, built by "Bud" K2LYR; must sell for college: ask $120 or best offer; P. Houpt, 100 Lake Dr., West Wayne, N.J. W2PUO.

FOR SALE: Used two-way equipment. Two Hallicrafters (SX-104 & SX-105) each $55. BC-683, Built-in AC Power supply—$30. Montiradio PR-31A—$35. RCA Mobile Radio 144-156 $45. Two Vocaline Transceivers—each $20. Philip Petersen, Box 390, Spencer, Iowa.

WANTED—Gracie is fixin' up the boodwar and wants to trade Eimac 4-250A for an Ivory French style dial telephone. Larry Kleber, K9LKA/W9CPD, Belvidere, Illinois.

WANTED—Eimac SK-500 Air-Systems socket and chimney for 4-1000A. 21 amp. 7.5V filament transformer. B&W Model 850A inductor. Plate transformer 4000 0-4000 volts, 500 MA or 750 MA. Larry Kleber, K9LKA/W9CPD, Belvidere, Illinois.

FOR SALE—1962 model Heath "Q" meter $44.95. Larry Kleber, K9LKA/W9CPD, Belvidere, Illinois.

FOR SALE: All in excellent condition. Sell separately or make offer on lot. Drake 1A w/xtal cal. S/N 356—$165.00; Eico Model 720 xmitter w/Dow Key ant relay—$75.00; Eico Test Equipment; 425 scope—$45.00; 324 R.F. Sig. Gen. —$27.00; 360 Sweep Gem—$35.00; 232 V.T.V.M.—$30.00; 352 Bar Gen.—$15.00. Misc: meters, mikes, parts tty pwr sup, ant rotor, mech filter, TTY TD, etc. Write for list—$100.00. WØBCV 2491 Capital S.W. Battlecreek, Michigan.

POLAR RELAYS UNUSED PULLOUTS 255A or D-164816—$2.90 Postpaid. 255A Sockets $.40 Martin Brothers, 1420 So. 10½ Springfield, Illinois.

TRAVEL, abroad costs less, and is lots more fun when arranged by "The International Ham-Hop Association" non-profit, Non Political. Members in 50 countries, write now for full information to, W6THN/1, Lee Gunther, 165, Lloyd, Providence 6, R.I. Canadian Hams, write VE3XF Len Humphries, 41 Kildonan Drive, Scarborough, Ontario.

COLLINS 75A-4, like new, $435.00; KWS-1, perfect, $850.00; 75S-1 with noise blanker, $435.00; 30L-1, unopened $475.00; KWM-1, $450.00; Mount, $50.00; KWM-2 DC supply, Mount, and Blanker (Brand New), 25% off; 312B-4, $160.00; C.E. 600-L, $300.00; 75A-1, $215.00. W8WGA. PHONE: AREA 513. 277 0409.

VHF Transmitter, six meters, crystal controlled, phone-cw, five watts output, 115vac nine tubes, NEW $28.00. 4-1000A, slightly used, $15.00; 6AF4A paramp pump oscillators 400-970 megacycles, $2.00; 220 megacycle converter, tunable, 28.1 megacycle if. Silver plated, $5.00; Jacob's ladder, 10,000 volt sparks rise up a three foot column, Doll up your shack! $5.00. Olean, 157 Imperial Avenue, Westport, Connecticut.

RTTY 15 printer, synch. motor, keyboard and W2PAT converter $150.00. B&W 370 SSB slicer (20Kc filter) like new $45.00. 4/1000A with Eimac air socket $75.00. Jennings vacuum variable 10/400 mmfd, 10KV $35.00. Fixed vacuums 50 mmfd 20KV, 3 for $10.00. WE 416B new, 2 at $5.00 each. ELMO #8-S 8MM camera, electric eye, reflex viewer, F-1.8 zoom lens, pistol grip, plus Wollensak #715 750 watt projector, both recently purchased. Both for $165.00. Will consider trades on movie equipment. Al Waring, W2CFT, Box 483, Lake Ronkonkoma, N.Y. SE 2-3308.

EXCELLENT CONDITION; 75 Watt C.W. Transmitter for home, mobile, portable operation, $27.00, shipped free. George Hansen, 215 Lobos, Pacific Grove, California.

A CAMP COUNCILOR WANTED who would be interested in working with boys and girls ages 9 through 13 in summer camp (8 weeks). We want someone who really likes kids and is skilled in ham radio, intercom, TV. We have closed circuit TV camera, control room, reproducing units. Salary: depending on experience and age, $200 to $300.

JOHN SEEGER, CAMP KILLOOLEET, Hancock, Vt.
or 424 East 89 Street, New York 28 FI 8-3774

For further information, check number 25, on page 128

For further information, check number 58, on page 128

CQ ADVERTISERS INDEX

VHF MEN-LOOK!

COMPLETE DELUXE 185-WATT 6 AND 2 METER TRANSMITTER

ALLIED SUPER-BONUS PACKAGE

SAVE $91.83

185 WATTS OF SOLID "TALK POWER"

Get the most in carrier output and highest level of modulation power. Have 185 solid watts on *both* AM and CW, with *automatic* modulation control that will actually let you "out-talk" many kilowatt rigs! Put a ZEUS on 6 and 2 and watch the QSO's roll in!

SPECIFICATIONS: 2-unit construction—handsome 15 x 9 x 9" tabletop unit (illustrated) contains all RF stages, audio pre-amp and VFO; remote unit 17 x 11 x 13" (not illustrated) contains all power supplies, audio driver stages and Class B modulator system • Automatic feedback control of low level speech clipping permits 120% positive modulation peaks for maximum splatter-free talk power • Visual monitoring of modulation • Frequency response flat ±2 db between 400 and 3400 cps and down at least 18 db at 150 and 4500 cps • Hum and noise levels down to at least 40 db below 70% modulation • Up to 18 db speech clipping, adjusted with calibrated panel control • VFO maintains frequency stability of 1 part in 10^6 per degree F. per hour after 15-minute warmup • Zero back-lash flywheel dial • Maximum TVI suppression • 6 meter output fed through pi network • 2 meter output coupled to high efficiency tank • Units supplied complete with 10-ft. interconnecting power cable. Complete shpg. wt. 111 lbs.

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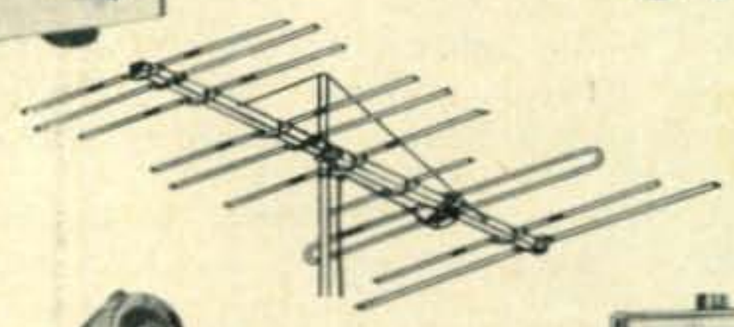

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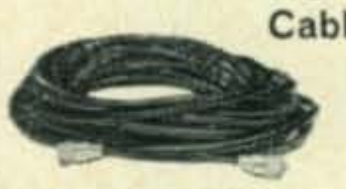

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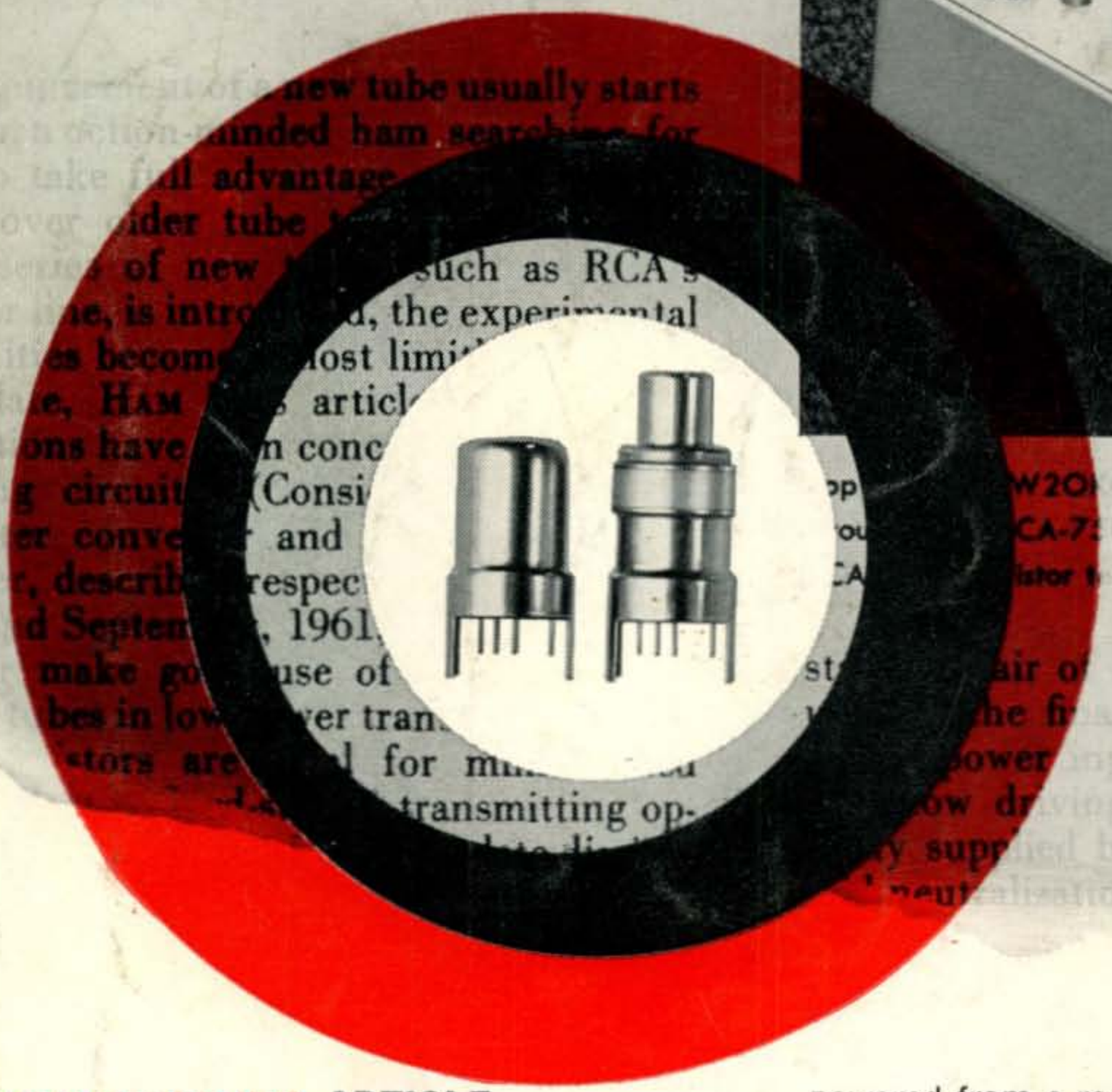
RCA HAM TIPS

7½-WATT ALL-NUVISTOR 2-METER TRANSMITTER



A "HOW-TO-BUILD-IT" ARTICLE ON A NUVISTOR RIG

The unquestioned superiority of RCA nuvistor tubes in VHF receivers is a well-known fact. Not so well known, however, are the advantages of the tiny nuvistor in VHF transmitter applications.

The article in the Spring 1962 issue of Ham Tips shows how to build a sturdy, compact nuvistor transmitter for "2". This stable three-stage rig (crystal oscillator → tripler → p-p final) uses two type 7586 and two type 7587 nuvistors. It can be powered from a receiver-type power supply—take 7½ watts plate input at 240 volts!

Announcement to Amateurs

For complete story, get a copy of this issue of Ha Tips today—from your RCA Industrial Tube Distri utor, or write Section F-15-M. RCA, Commerci Engineering, Harrison, N. J. This issue also give details on a new subscription plan.

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