CQ

April 1976
$1.00

DXing from Deception Island

...page 16

The Radio Amateur's Journal

HEATHKIT

HAM GEAR

...a tradition for thousands

When you buy Heathkit Ham gear, you continue a tradition established by thousands of Hams the world over. You get fine performing equipment that is designed for you to build, so you learn about your hobby as you contribute to it. And you save money in the process.

Best of all, you're dealing with a company whose reputation for fairness, honesty and outstanding customer satisfaction is the envy of the industry. When we say "We won't let you fail", we mean it! From the extensive troubleshooting and service guides in each of our manuals, to our technical consultant service, we strive to provide quality Ham products that perform better than any ready-mades. And the pride and satisfaction you get when you put it together yourself is a "built-in" bonus with every Heathkit product.

See the exciting line of Heathkit Ham Gear in our bright, new Spring Catalog! Mail coupon today!

1 HWA-202-1 AC power supply lets you use the HW-202 as a base station transceiver—provides smooth, steady AC power.

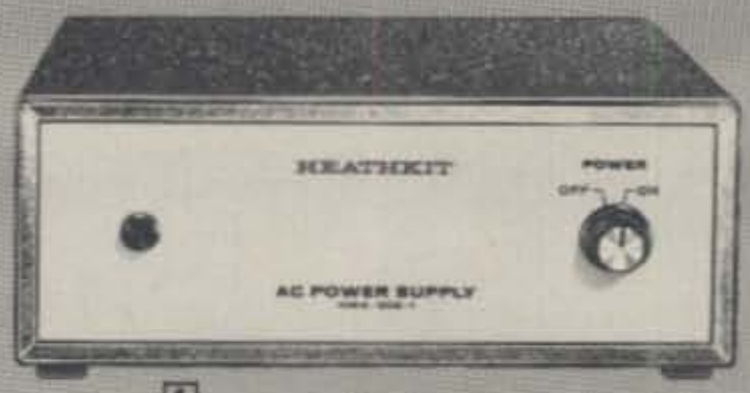
2 HM-2102 VHF Wattmeter helps you know how you're getting out with your HW-202. Has built-in SWR bridge, adjustable sensitivity.

3 HW-2021 hand-held 2-meter transceiver. 1 watt out, 5 receive and 10 transmit channels get you on 2 while you're walking, working, outdoors, anywhere. There's even the HWA-2021-3 auto-patch encoder you can build right in, as shown.

4 HW-202 crystal-controlled 2-meter transceiver. The one used by thousands because of its reliability, performance and low kit-form price!

5 Add up to 8 watts power to your HW-2021 with the HA-201 2-meter amplifier. Withstands infinite VSWR without failure—goes together in an hour or two.

6 The HWA-202-2 tone burst encoder brings even more versatility to your HW-202. Has four tone select buttons to allow the HW-202 to access repeaters. Mounts directly into 202 chassis—not a "Black Box" or cumbersome add-on.



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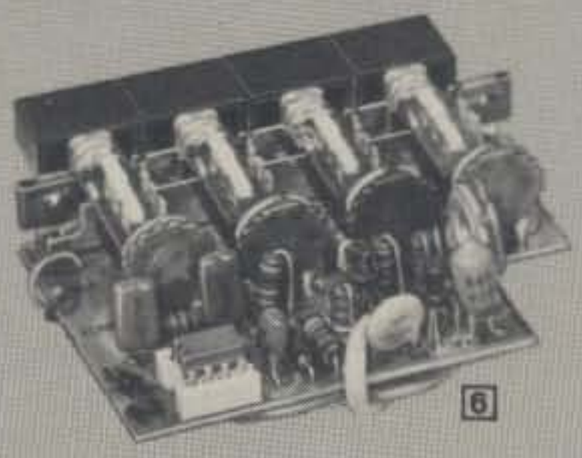
6

Over 400 easy-to-build kits including:

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AM-328

either way is the right way

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the TR-2200A

Kenwood's high performance portable 2-meter FM transceiver . . . completely transistorized, rugged and compact.

12 channel capacity. Built in telescoping antenna can be easily replaced, or stored in carrying case. Connector for external antenna also. External 12 VDC or internal ni-cad batteries, complete with 120 VAC battery charger. 146-148 MHz frequency coverage. 12 channels, 6 supplied. Battery saving "light off" position. Hi-Lo power switch (2 watts –400 mW). Sensitivity: 0.5 uV or less/26 dB S+N/N. Built-in speaker. Size: 5-3/8"x 2-5/16"x 7-1/8", 3-3/4 lbs.

Complete with Dynamic mike, O-T-S carrying case, all cables, speaker/headphone plug and 10 Ni-Cad batteries. Amateur net . . . $229.00.

the TR-7200A

Kenwood's superb 2-meter FM mobile transceiver. Designed to withstand the most severe punishment while providing consistently excellent performance.

Packed with features like the PRIORITY function . . . Put your favorite crystals in channel 7, and the 7200A automatically returns to that frequency when it senses activity there. 146-148 MHz coverage, 22 channels, 6 supplied. Completely solid state. Voltage required: 13.8 VDC. Antenna impedance: 50 ohms. Frequency adjusting trimmers on every crystal. RF output power: 10 watts (or 1 watt at low power). Adjustable frequency deviation (factory set at ±5 kHz). Automatic VSWR protection. Receiver sensitivity less than .5 uV for 27 dB. Selectivity: 12 kHz/–6 dB and 24 kHz/–70 dB. Size: 7-1/16" W x 2-3/8" H x 9-7/16" D, 5-1/2 lbs.

Complete with dynamic mike, DC power cord, mobile mount, mike hanger, auxiliary connector and external speaker plug. Amateur net . . . $249.00.

The perfect companion to the TR-7200A is the PS-5 AC/DC power supply. Together they provide an efficient and handsome base station. The PS-5 is complete with a digital clock and automatic time control feature built in. Amateur net . . . $79.00.

TRIO-KENWOOD COMMUNICATIONS INC. 116 EAST ALONDRA/GARDENA, CA 90248

KENWOOD
. . . pacesetter in amateur radio

CQ

APRIL, 1976 VOL. 32, NO. 4

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200

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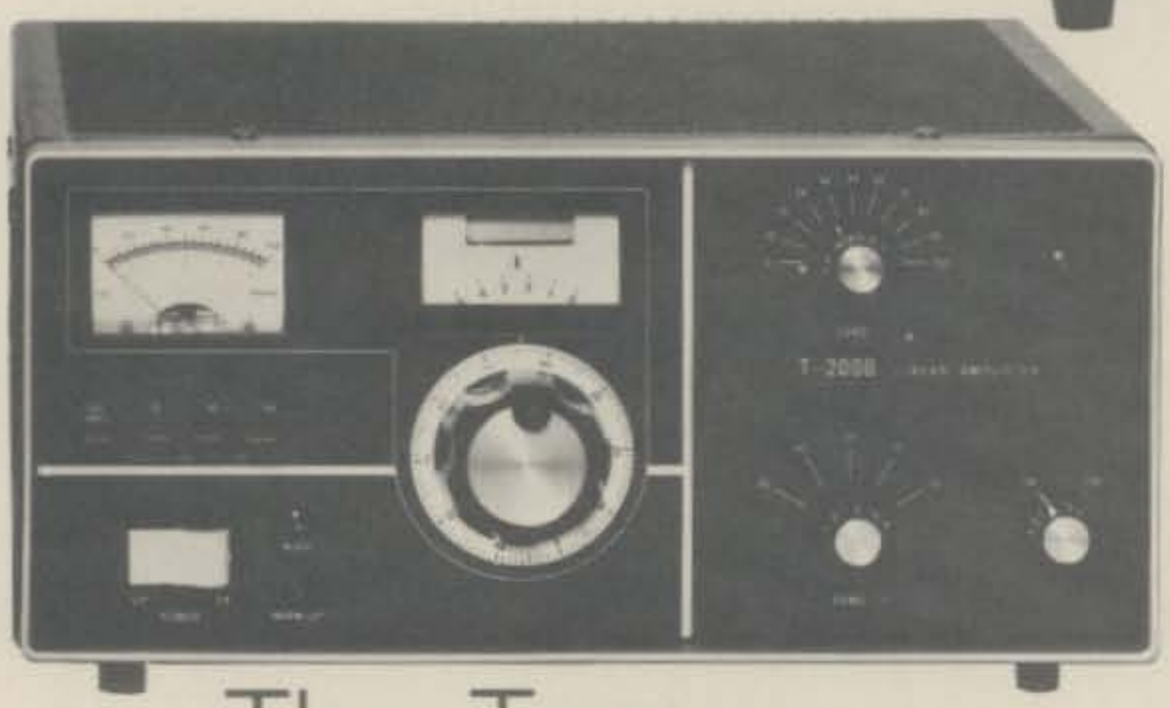
the hottest pair on the air



The Tempo T-2000 LINEAR AMPLIFIER

The brand new T-2000 linear is the perfect companion for the Tempo ONE. It is compact, reliable, and priced right. Uses two Eimac 8873 grounded grid triodes cooled through a large heat sink. The T-2000 offers a full 2 KW PEP input for SSB operation and provides amateur band coverage from 80—10 meters. Provides a built-in solid state power supply, built-in antenna relay, a relative RF power indicator, and built-in quality to match much more expensive amplifiers. Completely wired and ready for operation . . . only $795.00

The Tempo ONE is available at Tempo dealers throughout the U.S.. Also available is the Tempo CL-146A, CL-220, DFD/ONE, DFD/K, FMH, RBF-1 and TDC. Please call or write for specifications and prices.

The Tempo ONE SSB TRANSCEIVER

. . . a proven name, a proven value. Look at the specifications, look at the price tag, ask any of the thousands of Tempo ONE owners about its reliability . . . and the reason for its unparalleled popularity will be obvious.

FREQUENCY RANGE: All amateur bands 80 through 10 meters,
MODES OF OPERATION: SSB upper and lower sideband, CW and AM.
SOLID STATE VFO: Very stable Colpitts circuit
RECEIVER OFFSET TUNING (CLARIFIER): Provides ±5 khz. variation of receiver tuning when switched ON.
FREQUENCY STABILITY: Less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change.
INPUT POWER: 300 watts PEP, 240 watts CW
AF BANDWIDTH: 300-2700 cps
RECEIVER SENSITIVITY: 1/2 μv input S/N 10 dB
AGC: Fast attack slow decay for SSB and CW.
SELECTIVITY: 2.3 khz. (-6 dB), 4 khz. (-60 dB)
IMAGE REJECTION: More than 50 dB.
AUDIO OUTPUT: 1 watt at 10% distortion.
AUDIO OUTPUT IMPEDANCE: 8 ohms and 600 ohms
TUBES AND SEMICONDUCTORS: 16 tubes, 15 diodes, 7 transistors
ANTENNA IMPEDANCE: 50-75 ohms
CARRIER SUPPRESSION: -40 dB or better
SIDEBAND SUPPRESSION: -50 dB at 1000 CPS
THIRD ORDER INTERMODULATION PRODUCTS: -30 dB (PEP)

TEMPO "ONE" TRANSCEIVER	$399.00
AC/ONE POWER SUPPLY	$99.00
DC/1-A POWER SUPPLY 12 volts DC	$120.00

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Zero Bias

People who read such things as magazine mastheads (staff listings) will notice a change in the Editorship of *CQ*. After a little under 12 years as *CQ*'s Editor, I am pleased to step aside and let another person "have a go at it."

Rapid growth within Cowan Publishing Corp., *CQ*'s parent company, has created the need for an Associate Publisher to help carry the mushrooming managerial and administrative load. I have been asked to fill that position, and I have accepted. Additionally, I will be editing a new trade publication, the first issue of which is already in the mail to its readers.

Taking over as Editor of *CQ* is Al Dorhoffer, K2EEK, a long-time friend and associate who, for the past nearly - 12 - years has been as much a part of this magazine as have I. Al's wit and erudition have become evident in *CQ* through his well-researched historical writing and fanciful advertising copywriting for *CQ* products. I hope the responsibility of the Editorship will not suppress these fine talents. I wish him great success.

In closing let me thank the hundreds of contributors, Amateurs and non-Amateurs, who have made my editorial relationship with *CQ* so pleasent and enormously satisfying. And now, after 15½ years on the *CQ* Editorial Staff - one hundred and eighty six consecutive monthly deadlines - it gives me great pleasure to say, "Al it's all yours. I'm taking a vacation!"

VY 73, Dick, K2MGA

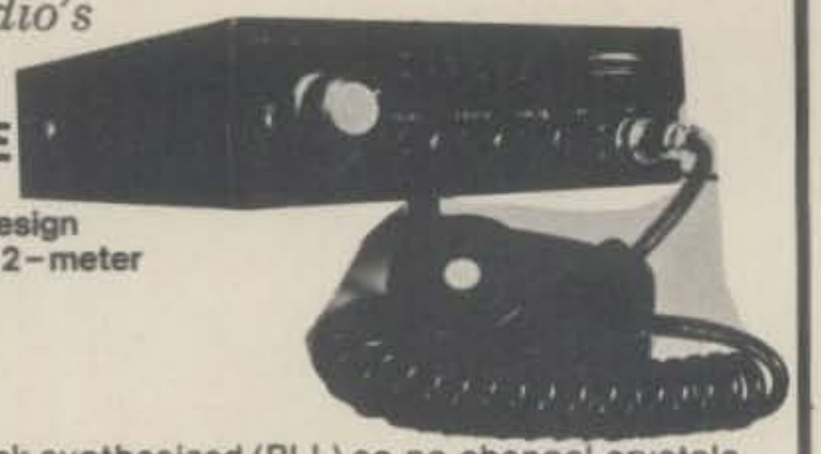
henry radio

a name that says it all

For over 40 years...dedicated to amateur radio...to offering the finest products...to dependable service.

Henry Radio's

TEMPO VHF/ONE



An advanced design synthesized 2-meter transceiver

Full phase lock synthesized (PLL) so no channel crystals are required • Solid-state • 5 digit LED receive frequency display • Full 2-meter band coverage (144 to 148MHz) for transmit and receive • Automatic repeater split (selectable up or down) • 2 built-in programmable channels • $495.00.

TEMPO SSB/ONE (SSB adapter for the VHF/ONE) • Selectable upper or lower sideband • Plugs directly into the VHF/ONE • Noise blanker built-in • VXO for full frequency coverage • $225.00.

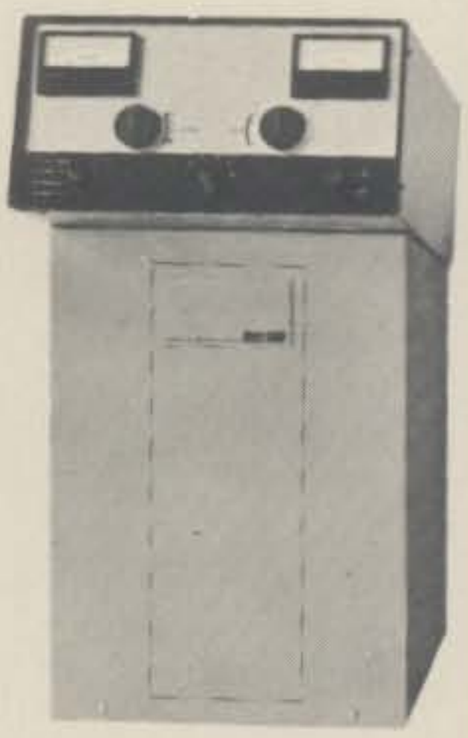
KENWOOD

TS-520

"The trend setter..the hottest little rig on the air." You have heard it on every band..Kenwood's go-every-place/do-everything transceiver. SSB & CW on 80 thru 10 meters, built-in AC & 12VDC power supply, VOX, RIT, noise blanker and all the other features you want. The 520's low price... $629. Write for full description on the 520 as well as Kenwood's new TS-700A 2-meter transceiver and the R-599D/T-599D "twins."

Henry Radio's

2K-4



The 2K-4 linear amplifier embodies all of the famous features of the 2K-3...rugged construction, reliable performance and heavy duty components, plus unique modern styling. The tilted RF deck faces up for easy visibility and convenient operation. If you are one of the more than 3000 happy 2K owners, trade up to the new 2K-4. If you are not one of the group, now is the time to join.

The 2K-4 (console or desk model).....$995.00

Henry Radio's

TEMPO CL 146A

...a VHF/FM mobile transceiver for the 2 meter amateur band. Compact, rugged and all solid state. One channel supplied plus two of your choice. 144 to 148 MHz. Multifrequency spread of 2 MHz. 12 channel possible. Internal speaker, dynamic mike, mounting bracket and power cord supplied. A Tempo "best buy" at $239.00.

TEMPO **VHF/UHF AMPLIFIERS**

Solid state power amplifies for use in most land mobile applications. Increase the range, clarity, reliability and speed of two way communications.

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Bob Henry
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Plus a large staff of highly qualified sales and service personnel pledged to serve you. Henry Radio carries large stocks of all major brands. We take trade-ins, sell used equipment and offer better terms because we carry our own financing. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of new equipment. Export inquiries solicited. Also, military, commercial, industrial, and scientific users...please write for information on our custom line of high power linear amplifiers and RF power generators.

Henry Radio stores can now supply the complete line of Yaesu equipment.

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Butler, Missouri 64730 816/679-3127

Our Readers Say

CQ's New Look

Editor, *CQ:*

Congratulations on the new improved *CQ*! It is all you said it would be, and then more. The January issue is a real eye catcher and an attention holder. The articles are more interesting, and the ads more appealing. Keep up the good work!

A.S. Bielinda, W2IDA
Saddle River, NJ

Editor, *CQ:*

Was just reading in January *CQ* about your "Real Time Reviews" of amateur gear. Sounds like a great idea as it is nice to know more about a piece of gear before making a purchase. Most of the write-ups are a year or two after the equipment is first introduced.

Hope you can get a Signal/One CX-11 and write about it.

Keep up the good work.

Jerry King, W4MLA
Miami, FL

Editor, *CQ*:

Congratulations on *CQ's* new look. You are to be commended.

Leslie Fultz
Pomeroy, OH

Strange Coincidence

Editor, *CQ*:

In reference to your Solor activity graph, (top of page 19, January '76 issue). Did you notice that the dates of catastrophic events coincide (nearly) with low sunspot numbers. Not all are bad events by any means, but they are large ones that had a big effect on humanity.

1776, 1812, 1865, 1898, a dip at 1914, 1930, 1942. The Korean and Vietnam unpleasntnesses are also near dips.

Wonder what 1976 will bring? Hope it isn't another present from Prose Walker.

Keith Olson, W7FS
Belfair, WA

Solar & Xerox Activity

Editor, *CQ*:

I have read with renewed interest the excellent article on "Solor Activity" in your January issue of *CQ* Magazine. I have made several xerox copies and dis-

(continued on page 74)

TALK IT EASY

Get the most out of your rig with LEADER test equipment

Proper modulation means better results when you're out to make longer lasting contacts. What's more, you can get maximum power output and "super" radiation when you work your rig with the help of Leader Test Instruments. You also achieve optimum operating capability, proper impedance matching and minimum TVI problems. Easy to operate, Leader gear is priced to give you the best value for your communications dollar. It is the ideal "performance - test center".

(A) LPM-885 SWR Watt Meter
A sensitive, in-line type power meter which measures SWR of x'mission lines and power output from 1.8 to 54MHz. Facilitates adjustment of transmitter and antenna systems for better results. May be left in circuit for continuous power output monitoring in the 1-1000W range. SWR Power Detector circuit assembly separates for remote measurements. Forward-to-Reverse power ratio is used for accurate SWR readings.
$99.95

(B) LBO-310Ham Oscilloscope with Built-in LA-31 RF Monitor Adapter.
Observe IF circuit waveforms and monitor SSB and AM xmitter signals. The built-in LA-31 Adapter helps provide continuous monitor of RF output (to 500W). This versatile scope will also indicate tuned condition for RTTY operation. The internal 2-tone generator checks SSB. Vert. sensitivity is 20mVp-p/div; DC-4MHz b'width. It's sensitive general purpose scope, too!
LBO-310Ham 3" Scope $269.95

LA-31 adapter for use with our LBO-310A or any scope with direct vert. deflection plate connection. $ 22.95

(C) LPM-880 RF Wattmeter
Measure RF x'mitter power output in the 0.5 to 120W range from 1.8 to 500MHz. Features pushbutton range selection with 50Ω load impedance. Also measures power losses in low pass filters and coaxial cables. Complete with sturdy tilt stand.
$149.95

Complete your Communications "Performance Test Center" by adding these valuable Leader Instruments . . .

LAC-895 Antenna Coupler
For optimum antenna matching & reducing TVI. Has built-in SWR and in-line power meter for accurate measurement in 5 bands.
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For on-site antenna adjustments & better efficiency. Uses 9V batt'y. Checks linear amplifier and receiver impedances.
$99.95

LDM-815 Transistorized Dip Meter
Docks with our LIM-870A to facilitate better antenna matching. Portable, battery operated. Adjust wave traps, etc.
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☐ Ship me the following Leader Communications Test Gear;

☐ LPM-885 SWR Watt Meter	@$ 99.95	
☐ LBO-310Ham 3" Scope w/ built-in RF Monitor	@$269.95	
☐ LA-31 RF Scope Adapter	@$ 22.95	
☐ LPM-880 RF Power Meter	@$149.95	
☐ LAC-895 Antenna Coupler	@$159.95	
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think of yourself as an antenna expert!
—you select your components!

1. Get optimum performance band for band. Choose from medium or high power resonators for your favorite bands.

2. Fold over, 360° swivel mast for quick band change or easy garaging. Select from two versions, fender/deck or bumper mount location.

3. Stainless steel ball mount, 180° adjustable, commercial duty for superior mechanical and electrical performance.

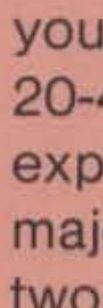
4. Get exceptional reports, broadest bandwidth, lowest SWR. Use with any convenient length 50 ohm coax. Matching devices not required.

5. For convenience, use the Hustler stainless steel resonator spring, and special design quick disconnect.

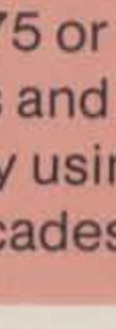
...and you'll mobile with the experts' foremost choice... HUSTLER®

Get fixed station reports from your mobile—operate 6-10-15-20-40-75 or 80 meters with the experts and join the vast majority using Hustler for nearly two decades.

Model SSM-2 Ball Mount



Model QD-1
Quick Disconnect



Model RSS-2
Resonator Spring

Model BM-1
Bumper Mount

Model L-14-240
Mil Spec
50 Ohm Feedline

Model MO-1
For Deck or
Fender
Location

Model MO-2
For Bumper
Mount
Location

Super
Resonators
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2KW PEP
Greatest Band Width

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RM
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HUSTLER ANTENNA PRODUCTS—for sixteen years—original designs—created and manufactured by American ingenuity, labor and materials—used by communicators throughout the world.

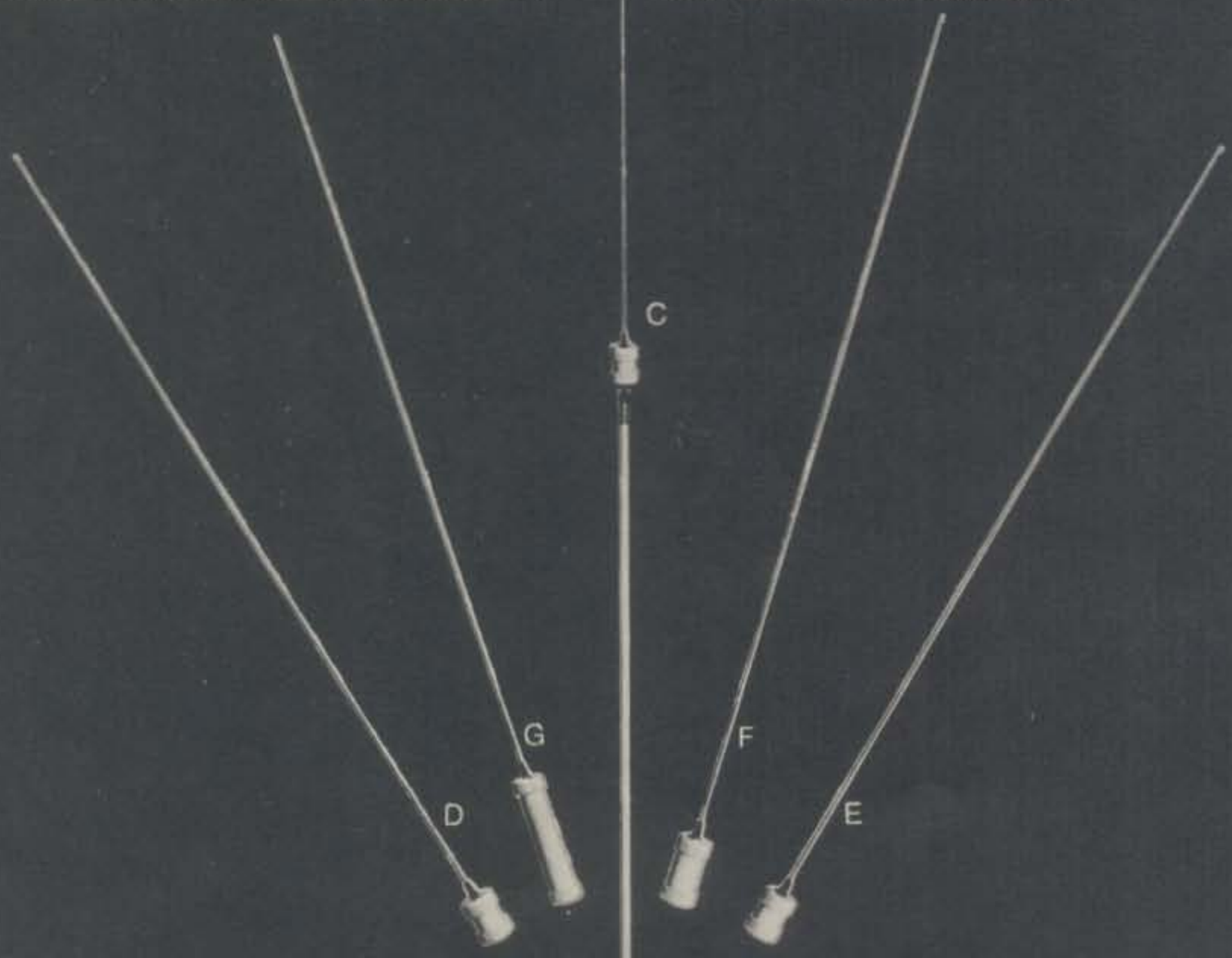
The 280 series.
No-nonsense, no-corrosion 10-80 meter mobile antennas from Hy-Gain.

Now from Hy-Gain, a new concept in tip-changing Ham antennas. The 280 series is designed with no-nonsense, one piece fiberglass masts and tough, one piece baked fiberglass coils. You get maximum power handling capability, minimum heat drift, and no loss to corrosion. Yet, it's lighter than aluminum and just as strong.

All five coils are mandrel wound for absolutely consistent performance, imbedded in fiberglass, then baked to make them impervious to weather. Tough ABS end caps and solid brass coil fittings keep performance in, corrosion out.

Whips are 17-7 ph stainless, the finest antenna steel, and are literally indestructible in normal use.

Nominal 52 ohm impedance on all bands. Any coax length will work. Heavy duty, chrome plated mast and whip fittings. 3/8" x 24 base stud fits all standard mounts.



(A) 60" bumper mount mast **Model 276**
(B) 36" cowl or deck mount mast **Model 277**
(C) 10 meter coil/antenna **Model 280**
(D) 15 meter coil/antenna **Model 281**
(E) 20 meter coil/antenna **Model 282**
(F) 40 meter coil/antenna **Model 283**
(G) 75/80 meter coil/antenna **Model 284**

Quick disconnect unit **Model 531**
Fold over adaptor **Model 409**
Standard stainless spring **Model 492**
Heavy duty bumper mount **Model 415**
Flush body mount **Model 499**
Extra heavy duty stainless spring **Model 511**

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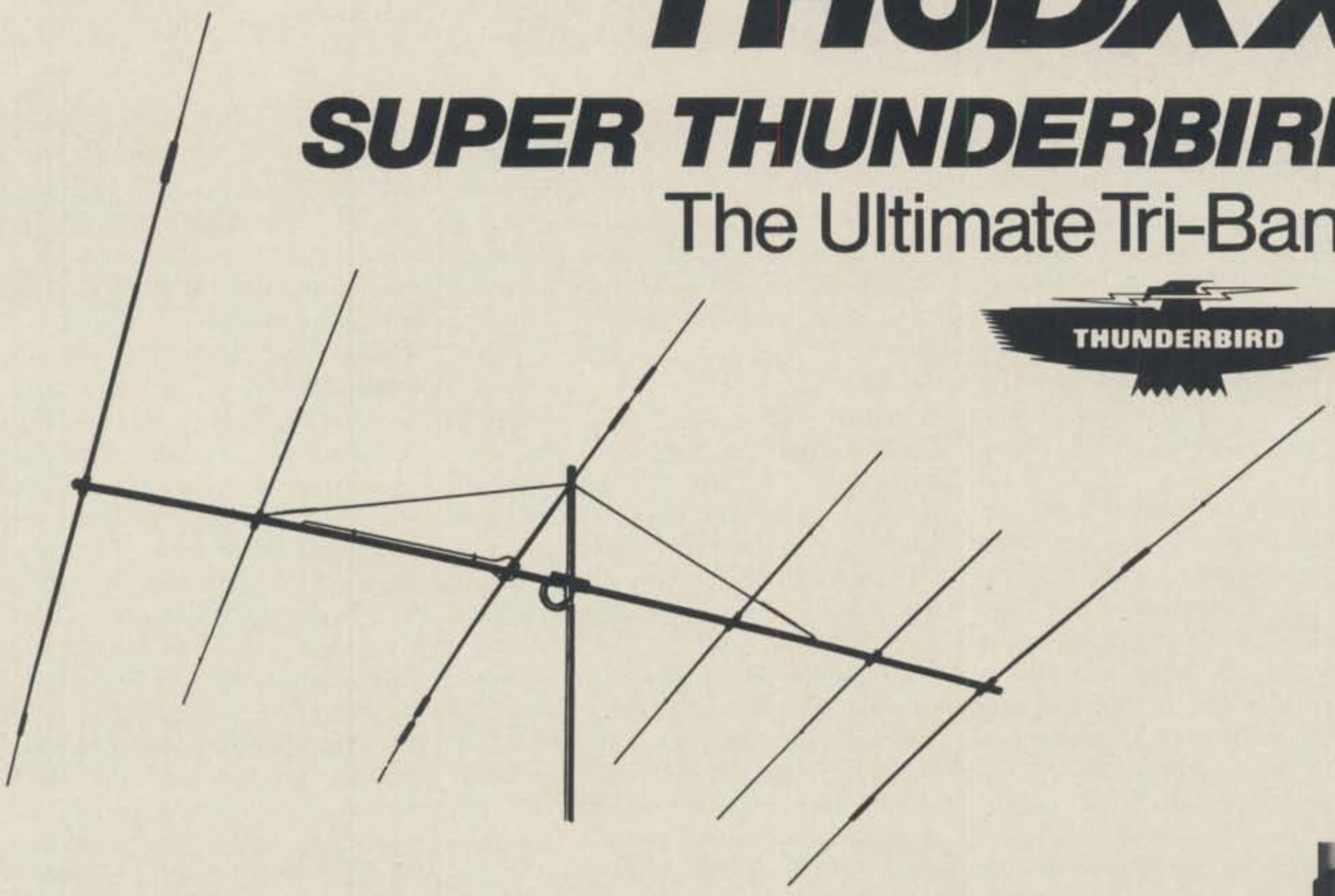
TH6DXX

SUPER THUNDERBIRD

The Ultimate Tri-Band



No other antenna gives you performance on 10, 15 and 20 meters equal to the TH6DXX Super Thunderbird. It's built, without compromise, to be electrically and mechanically superior to everything else.

Separate "Hy-Q" traps are used for each band and they are factory tuned for peak performance. You can get optimum results on transmission, phone or CW, with the easy-to-use tuning charts we supply.

The cast aluminum, tilt-head, boom-to-mast bracket accommodates masts from 1¼" to 2½" and provides mast feed-through for stacking with other antennas. Taper-swaged, slotted aluminum tubing is used for easy adjustments and light weight. Full circumference compression clamps are used throughout, instead of the usual, self-tapping screws. All element-to-boom brackets are formed from extra heavy gauge aluminum.

Hy-Gain's exclusive Beta Match is used to give optimum matching on all three bands and a positive DC ground path.

For tri-band DX, nothing can beat the Super Thunderbird.

Up to 9.5 dB gain over ½ wave dipole
3 active elements on 20 and 15 meters
4 active elements on 10 meters
25 dB front-to-back ratio
SWR less than 1.5:1 on all bands at resonance
24′ boom, 20′ turning radius
6.1 sq. ft. surface area, net weight 61.5 lbs.
For best results, always use a BN-86 Balun

6-element Super Thunderbird	**Order No. 389**
3-element Thunderbird	**Order No. 388**
3-element Thunderbird Jr.	**Order No. 221**
2-element Thunderbird	**Order No. 390**

hy-gain®

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Announcing

• **Erie, PA** – The Radio Association of Erie Inc. is sponsering Radio Classes. Instruction in Radio Code and theory for the Novice and General Class Amateur Radio Licenses. Starting April 5, Monday evening thru June 7. 7pm to 9:30 pm, at the General Telephone Training Center, 16th and Cranberry Streets. For more information call 866-3035 Frank Grace.

• **Lake Tahoe, NV** – The Sierra Nevada Amateur Radio Society is planning a Memorial Day Weekend excursion on the MS Dixie paddlewheeler on Lake Tahoe., on May 29. The trip will consist of a tour of the Lake Tahoe shoreline, a steak dinner and music for dancing. There will also be 9 hours of continuous activity on 80 meters thruough 20 meters (10 and 15 if conditions are good). Cost is $25.00 per person. For more information write to the Sierra Nevada Amateur Radio Society, P.O. Box 7808, Reno, Nevada 89502.

• **Trenton, NJ** – The Delaware Valley Radio Associations annual flea market and auction will be held on Sunday, May 2, at the Pennington Road Fire Co. 1666 Pennington Road, Ewing Township, Trenton, NJ. Flea market at 9 am, auction at 1:30 pm. Registration $1.50, tailgating $2.00. Indoor flea market tables available. Follow signs from Rt. 1 or I-95. Talk-in W2ZQ/2 on 146.07-67 and 146.52 MHz. Refreshments available. For information write: DVRA, P.O. Box 7024, W. Trenton, N.J. 08628,

• **Bellwood, IL** – 160 Meter OPs and SWLs: The Chiburban Radio Mobileers 160 Meter Net operates 1833 and or -2 khz (QRM) every Wednesday night 0200 GMT, as well as 1700 GMT Sundays. All AM, SSB or CW operators, fixed or mobile, are welcome to check in.

• **Morristown, NJ** – A plaque and a $50 prize are being offered to the writer of the best article about ham radio published in an American non-ham radio publication during 1976. Articles will be judged on how well they attract non-hams to ham radio. Photostats of articles with the name and date of the publication should be sent to Ray Collins, WA2GBC, Harter Rd., Morristown, N.J. 07960. Enclose SASE. All entries must be submitted by Jan. 31, 1977.

• **West Liberty, OH** – The Champaign Logan Amateur Radio Club is holding their 6th annual flea market and auction on May 16, at the West Liberty Lions Park. For more information contact: John L. Wentz, Box 102, West Liberty, Oh. 43357.

• **Duluth, MN** – The TWIN-PORTS FM CLUB swapfest is May 8th from 11am to 3pm at the First methodist Church, 6th Ave. East and Mesaba Ave. A 34/94 talkin will be available. Advance registration $1.00 at the door $1.25, booth space $.75. Several restaurants nearby. Write WAØBJY for more information.

• **Evansville, IN** – The Annual Evansville Hamfest is Sunday May 16th at the Vanderburgh Co. 4H Center (8 mi. North of Evansville on Hiway 41). Large indoor flea market area, grand prize, displays, door prizes and auction sponsered by the Tri-State Amateur Radio Society. Lunch will be available. Admission is free. Talk in on 147.75/15 and 146.52/52. For more information contact Tom Dick WA9QDZ, 2851 Wayside Dr. Evansville, IN 47711 (812) 476-2188.

• **Lake Delton, WI** – The Yellow Thunder Amateur Radio Club will sponsor their 6th annual Hamfest on Saturday, May 22, at the Dell View Hotel at 10 am. Swap Shop, DX, VHF, RTTY, MARS, ARPSC, hidden transmitter hunt, ladies activities, liars contest and an evening banquet with entertainment. Grand Prize: A Regency HR2-B. Admission $7.00 in advance or $7.50 at the door. ($1.50 or $2.00 without the banquet.) For further information contact Kenneth A. Ebneter, K9GSC, 822 Wauona Trail, Portage, Wi. 53901.

• **Easton, MD** – The second annual Eastern Shore of Md. Hamfest sponsered by the Easton Amateur Radio Society on May 23, 10 am to 4 pm. Located 5 miles north of Easton, Md. on Rt. 50 at the Talbot County Agriculture Center. Talk in on 52 and 94 simplex and on 146.445 - 147.045 rept. Reasonably priced food and drinks. Admission $2., additional $2. tailgaters. For info contact: Tim Meekins, P.O. Box 805 Cambridge, Md. 21613.

• **Wabash, IN** – The Wabash County Amateur Radio Clubs 8th Annual Hamfest will be held on May 23, at the 4-H Fairgrounds. Major Drawings, Free Camping, Flea Market. For more information contact: Bob Mitting, 663 N. Spring St., Wabash, In. 46992.

• **Sandusky, OH** – The Erie Amateur Radio Society is sponsering its Vacationland Hamfest on May 23, at the Erie County Fair Grounds. Free camping, flea market, amusement park. 1st Grand Prize 1200 watt A.C. gasoline generator. Tickets $1.50 in advance $2.00 at gate. For more information contact: EARS P.O. Box 2037, Sandusky, Oh. 44870.

• **Trenton, TN** –The Annual Humboldt ARC Hamfest will be Sunday, May 30, at Shady Acres City Park in Trenton, Tn. Flea Market, Ladies Activities, Playground. Contact Ed Holmes, 501 N. 18th Ave., Humboldt, Tn. 38343.

• **Vinton, VA** – The Roanoke Valley Amateur Radio Club is sponsoring their Annual Hamfest to be held at the Vinton War Memorial, May 30. Registration will be from 7:00 to 9:00 am., and the Hamfest and Flea Market will be from 9:00 am until 3:00 pm. Tickets $1.50 each 4 for $5.00. Talk in 34/94 28/88, 38/98, and 94 direct. For more information contact W. Dave Peterson, Jr. 4924 Rowe Ridge Rd., N.W. Roanoke Va. 24017.

• **Burlington, KY** – Kentucky Ham-O-Rama will be held on May 30 at the Boone County Fairgrounds, Burlington, KY. 10 minutes south of Cincinnati, Oh. near I-75. Prizes, forums, XYL program, exhibits, flea market. Tickets $1.50 advance. Info: NKARC, P.O. Box 31, Fort Mitchell, Ky. 41017.

• **Lake Tahoe, NV** – The Sierra Nevada Amateur Radio Society is planning a Memorial Day Weekend excursion on the MS Dixie paddlewheeler on Lake Tahoe., on May 29. The trip will consist of a tour of the Lake Tahoe shorline, a steak dinner and music for dancing. There will also be 9 hours of continous activity on 80 meters through 20 meters (10 and 15 if conditions are good). Cost is $10.00 for daytime activities1:00 to 5:00 pm. $16.00 for evening activities 6:00 to 10:00 pm. including dinner. For more information write to the Sierra Nevada Amateur Radio Society, P.O. Box 7808, Reno, Nevada 89502.

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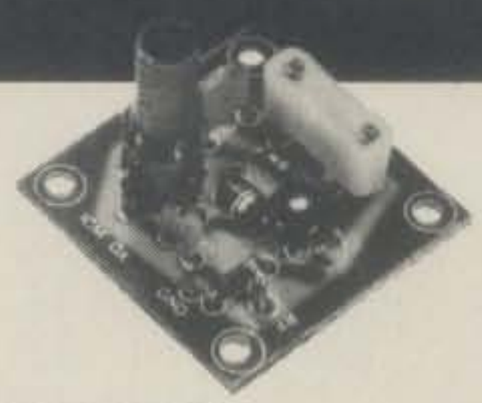

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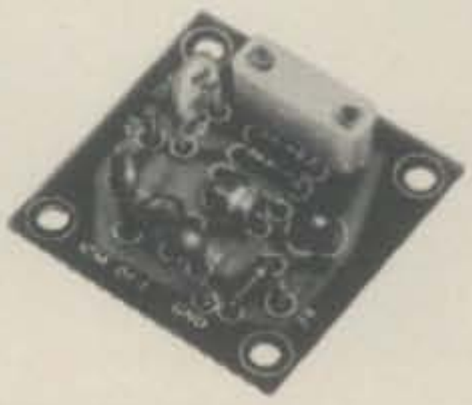

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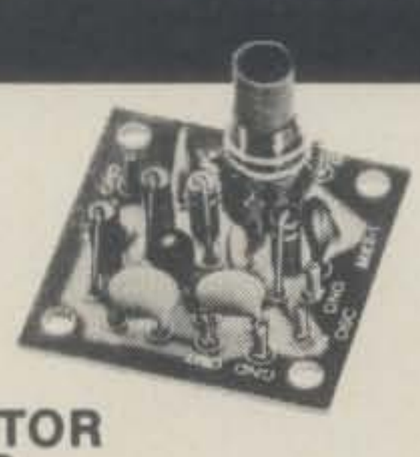

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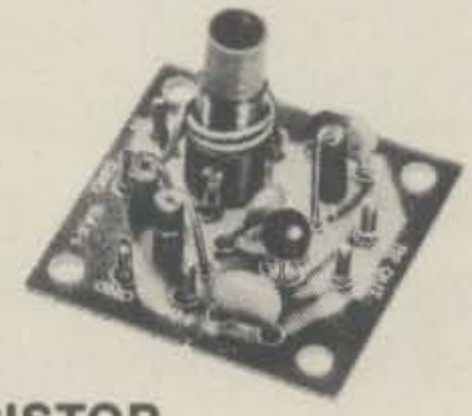

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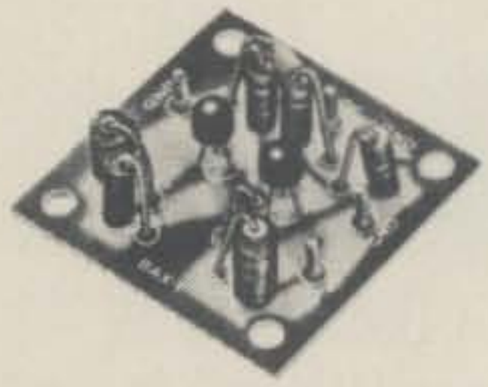

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The recent volcanic eruptions and subsequent tremors had destroyed two out of the three scientific stations in the island. The third station, operated by the Argentine Navy, remained damaged and unsafe with its radio amateur station silent since 1967. But like the volcano itself, LU1ZC was to become active once more . . . this is my story.

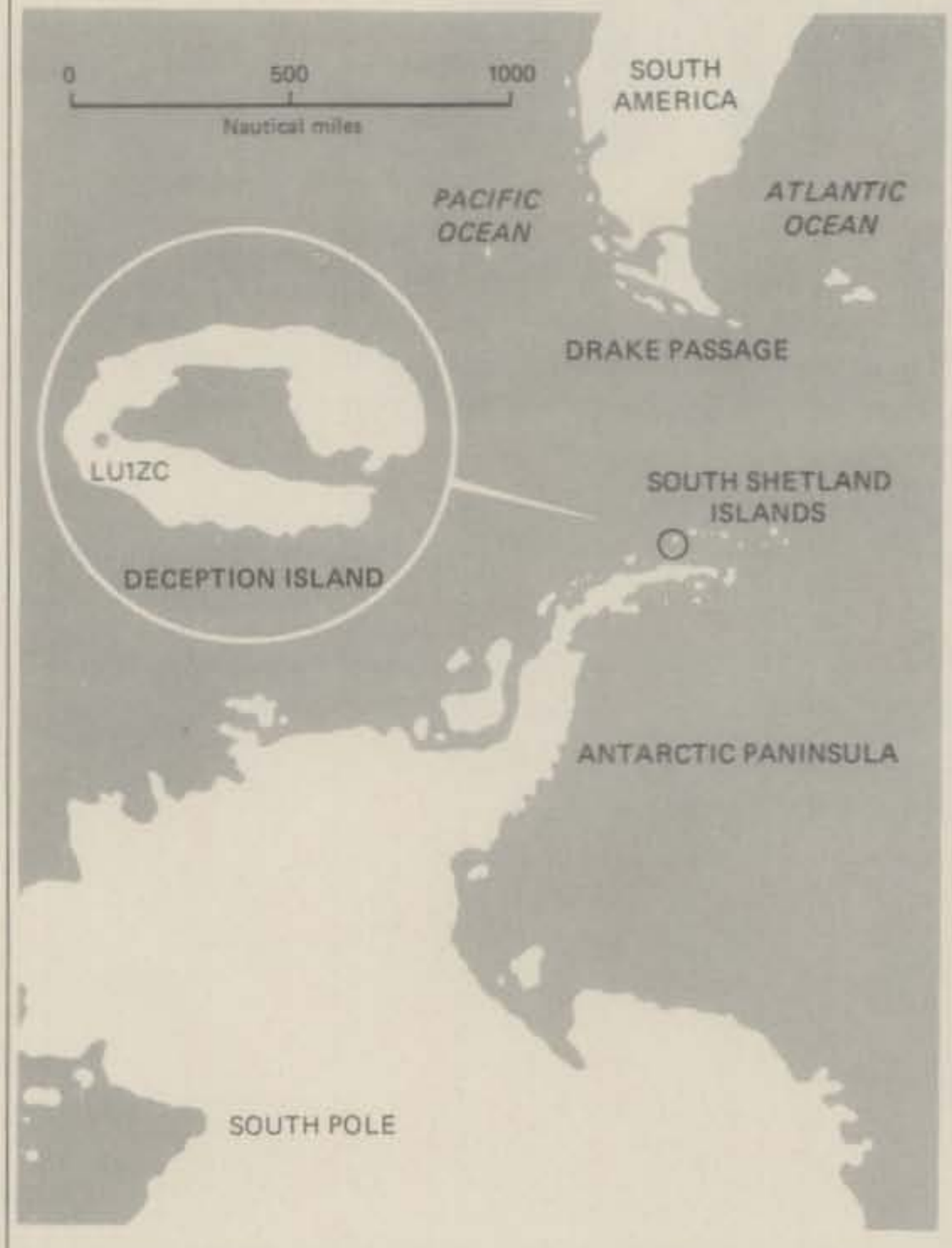
DXing from Deception Island

BY ALBERTO HERNANDEZ, WA3YVN

December 28, 1970, it seems to me that it was only yesterday when I was sitting home waiting for that very special phone call. When the call finally came through, the voice at the other end of the telephone sounded as if it was coming from the bottom of the world. "You have been selected among many applicants. Your job, should you decide to accept it, will be to provide communication/electronic support to scientific expeditions operating in the antarctic peninsula area . . . three weeks later I was south-bound to join the United States Antarctic Research Vessel *Hero*. My new job was taking me to Antarctica, the world's last frontier.

During the three years that I participated in the U.S. Antarctic Research Program, I had the rare opportunity to explore many places in the antarctic peninsula region, the South Shetland Islands and the South Orkeney Islands. During those years (1971-1973) I actively operated the radio amateur station aboard the R/V *Hero* . . . KC4AAB/MM. It is difficult for me to single out any one of those remote places as the most beautiful or exciting since they all fit under these categories. However, from a radio amateur's point of view one place stands out all by itself. . . . Deception Island, the home QTH of LU1ZC.

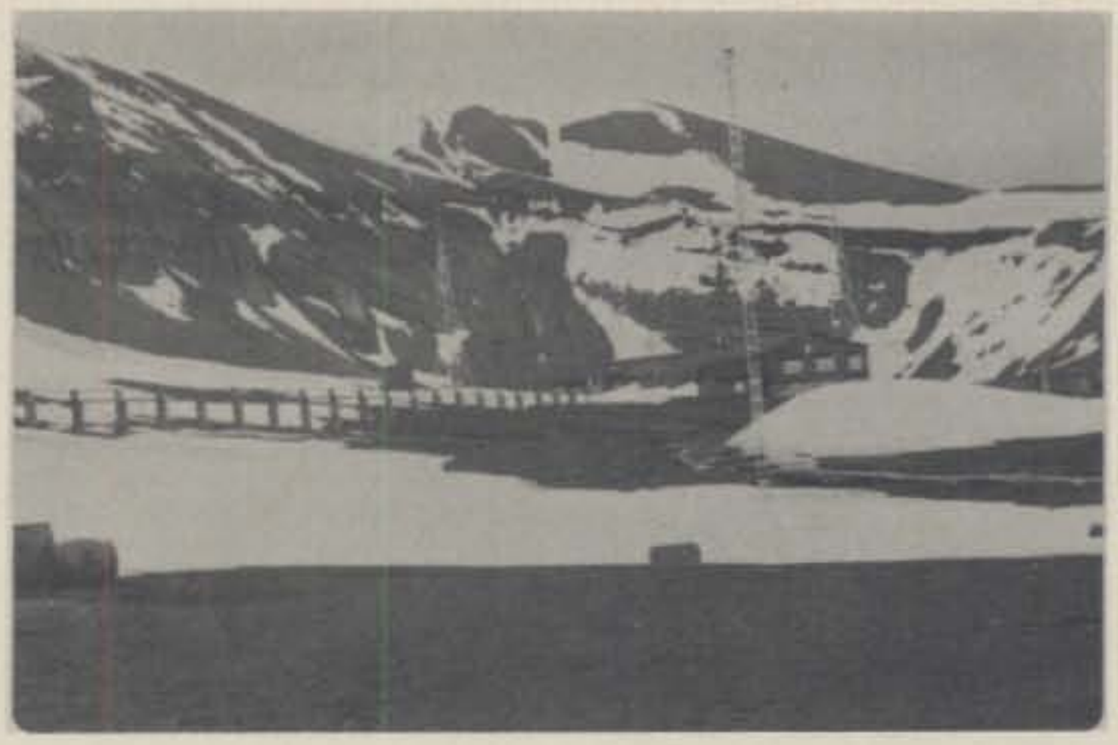
Deception Island has a vivid and exciting history worthy of a special mention. The island was formed from an ancient volcano whose crater is now inundated by the cold waters of the Antarctic Ocean which penetrated through a narrow entrance. De-



Deception Island a very "active" dot on the map between South America and the South Pole.

View of the Argentine research station at Deception Island, QTH of LU1ZC.

The author operating the radio amateur station (KC4-AAB/MM) aboard the R/V Hero.



Closeup view of the Argentine research station at Deception Island.

ception is located 60 miles north of the antarctic peninsula at 62° 59′ latitude South and 60° 43′ longitude West. It is part of a group of islands that run parallel to the antarctic peninsula and known collectively as the South Shetland Islands.

The island resembles a jagged, ice-covered mountainous belt surrounding an internal harbour which is accessible from the sea through a narrow aperture at the southern side of the island. This aperture was carved there a long time ago by the cold waters of the Antarctic Ocean. The aperture measures only half a mile across and is framed by sheer cliffs of red and black rocks rising several hundred feet into the air. It is this physical shape that causes both strong currents at the mouth of the entrance and heavy winds to funnel outward through the aperture. Frequently we encountered very strong winds while passing through the narrow aperture. However, once inside Foster Harbour, the winds diminished considerably just as if we had entered the calm eye of a hurricane. It is this wind phenomenon that gained this entrance the name of Neptunes Bellows, as it is commonly referred to in modern sailing directions.

The captain of the R/V *Hero* once told me that this aperture was also known by other names, specially to those mariners whose ships ran aground while trying to gain access to the internal harbour. "Hells Gates or Dragons Mouth"... you can find it listed both ways in old sailing directions dating back to the shore-whaling days of the early 1900's when Norwegian sailors used Deception as the base of operations for their whaling factories.

Modern day ships equipped with radar, sonar and depth finding equipment are capable of pinpointing their track accurately through the narrow entrance channel reducing somewhat the risk of running aground. Once inside however, the feeling of insecurity always prevailed knowing that we were navigating inside the crater of an active volcano. So active in fact that it has erupted four times in the last ten years.

As we looked inside, the violence of the past eruptions became visible everywhere. At Whalers Bay for instance, only the twisted framework of an old whaling factory remains and next to it the badly damaged buildings of a modern British scientific station. Further to the north and around the inside

Author, erecting the 20 meter wire dipole antenna used in the LU1ZC DXpedition.

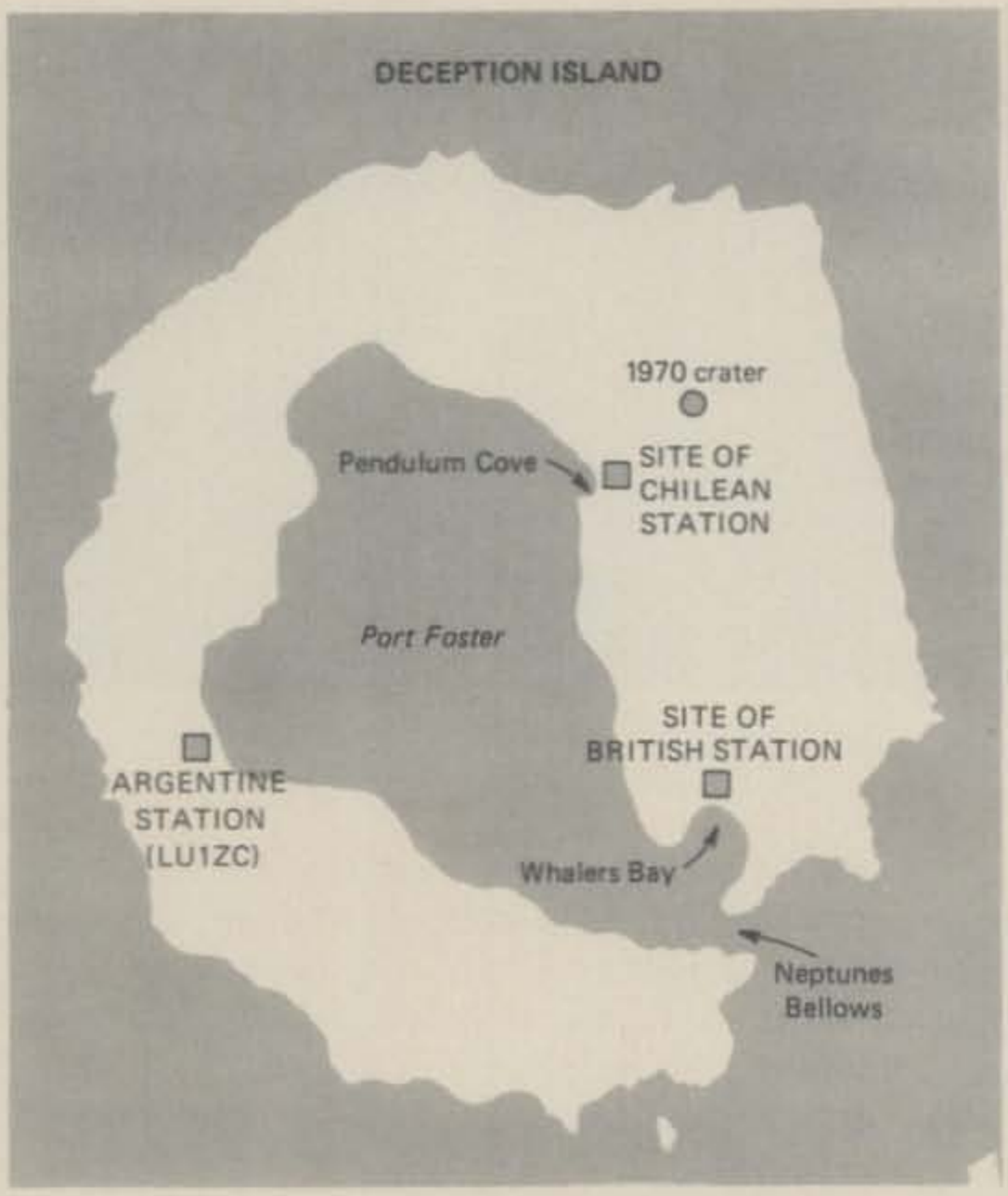
Scientists and crew of the R/V Hero *landing at Pendulum Cove.*

Expedition to inspect some of the new craters forming in the vicinity of the destroyed Chilean research station.

perimeter of the island are the ruins of a Chilean research station, totally destroyed by a volcanic eruption. It was from here that CE9AN was often active until silenced in 1967 by a violent volcanic eruption. In 1969 another eruption totally destroyed the then abandoned Chilean station and a year later, in early 1970, another eruption blew a large crater on top of a hill located directly behind the ruins of the Chilean station. This crater measures several hundred feet across and is filled with algae covered water approximately 300 feet below the rim of the crater.

As we looked around we could see signs of volcanic activity everywhere. New young craters were forming a few hundred feet away from the 1970 crater and the steam escaping from the ground not only kept the water in the harbour warm, but also appeared to be a sign warning us of the eminent danger of another eruption. This however, was not enough to disturb a group of scientists and crew members who did not surrender to the volcano the thrill of swimming in the hot thermal waters of Pendulum Cove.

Across Foster Harbour, on the western side of

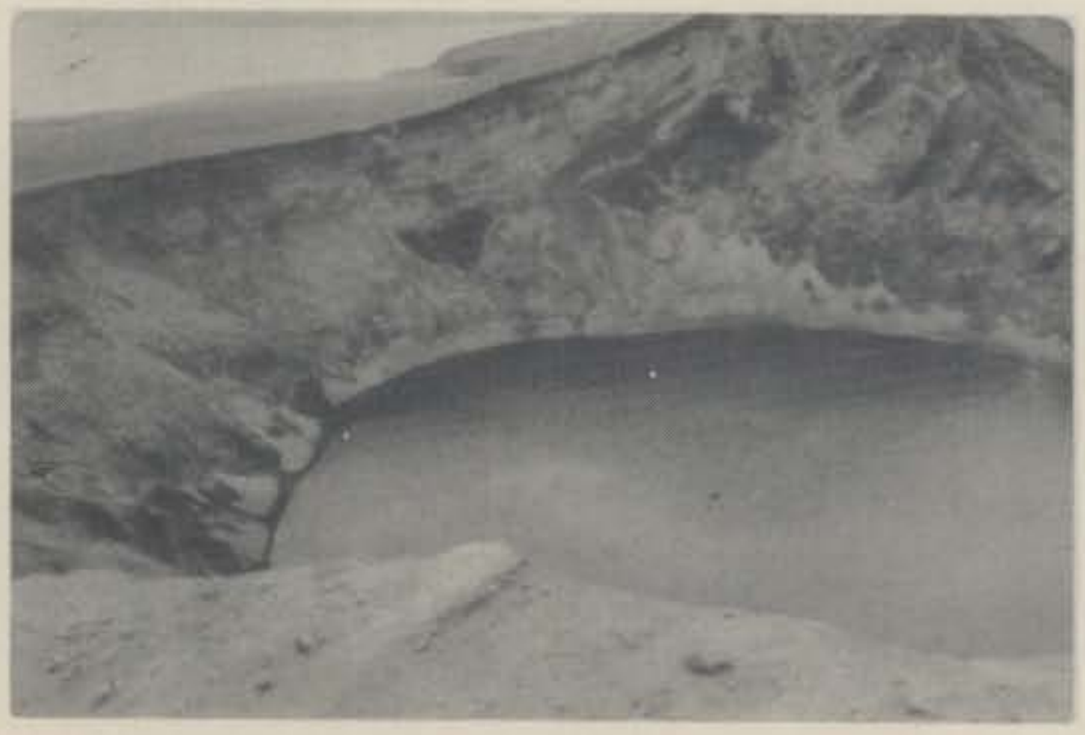


Deception Island showing major site locations.

the island are the buildings of the Argentine research station. This station was only slightly damaged during the 1967, 1969 and 1970 eruptions. It was from here that LU1ZC was frequently active. However, this station was also silenced in 1967 after it was determined that the entire island was unsafe for year-round scientific operations. Every austral summer the Argentine research station is reopened by a group of geologists and volconologists who travel to Deception from different countries to study the development and volcanic activity of the island.

It was during two of those austrial summer scientific programs that I was authorized to activate LU1ZC, twice in 1972 and then again twice in 1973.

QSL card prepared for the LU1ZC DXpedition.



Crater left by the 1970 volcanic eruption.

R/V Hero navigating in the Antarctic Peninsula region.

Expedition to inspect the 1970 crater.

All four times landing with a KWM-2A transceiver, gasoline driven generators and other equipment necessary to activate the radio amateur station. My QSL manager for the Deception Island DX operations was K4MZU, a job which Bob handled very efficiently.

The radio amateur station setup at Deception was simple. Each time I used a Collins 312B-5 v.f.o. in conjunction with the KWM-2A transceiver to work split frequency, transmitting on approximately 14.195 MHz and receiving between 14.200 MHz and 14.210 MHz. The antenna was a wire dipole tuned for those frequencies. In 1972 I first activated LU1ZC on January 9, at approximately 0211Z, and then again on December 29, at approximately 0530Z. In 1973 I activated LU1ZC on January 10, at approximately 0428Z, and finally on January 28, at approximately 0400Z.

The 1972 and 1973 DX activities from Deception were limited to just a few hours of operation each time due to both the tight schedule of the R/V *Hero* and the inclement weather conditions that we en-

(continued on page 73)

Ruins of the Chilean research station, totally destroyed by the 1967, 1969 and 1970 volcanic eruptions.

Scientists and crew of the R/V Hero swimming in the hot thermal waters of Pendulum Cove.

A New Look At Helically Loaded Antennas

BY JOHN SCHULTZ, K3EZ

The advent of PVC (and similar plastic materials) for piping has certainly made simple plumbing jobs easy for the handyman. It has also lead to the birth of a few new ideas for antennas for radio amateurs since the plastic tubing is available in lengths up to 20 feet, in diameters up to several inches and with a variety of accessory T-joints, bends and angles such that almost any antenna form can be constructed. No threading is involved; the parts are bonded together with a special cement. Adapters with threading are available, however, if one wanted to go, for instance, from a PVC boom on a beam to a steel pipe as a mast. The PVC tubing is tough and can be used outdoors under almost any condition.

The PVC tubing can only serve as a form for an antenna, however. One would not want to build a full-size antenna out of PVC since aluminum could then be used as well. So, the PVC material is ideal if one wants to build some form of shortened antenna—be it a dipole (one-element beam), a multi-element beam or a vertical. Articles have appeared before using this idea but the shortened antenna form was achieved either by lumped constant loading (a big inductor) with its consequent losses or by more efficient helical loading. But, the latter required the tedious winding and glueing of wire around the PVC tubing. Fortunately, the advent of stainless steel tape has changed this. This tape can be wound easily around the PVC tubing to form a constant helical loading of an element. Furthermore, it is weatherproof, can be soldered to attach transmission lines and has low loss at h.f. because of its large surface area.

The marriage of PVC tubing and stainless steel tape can produce a variety of efficient, low-cost shortened antenna forms ranging from helical loaded mobile antennas which are more efficient and have greater bandwidth than the usual base or center loaded type; to disguise balcony antennas, to portable antennas, to shortened multi-element beams, etc. The purpose of this article is not to present any specific antenna type, however, but to give the amateur a design guide and method for approaching the construction of such an antenna. One could, of course, rush out to buy PVC tubing, stainless steel tape and start winding the tape around the tubing. Eventually with the use of a grid-dip meter and s.w.r. meter a workable antenna will be developed. But, it would be easier to do a few simple calculations first and consult the graph presented in this article to get the antenna dimensions in the right ballpark at least.

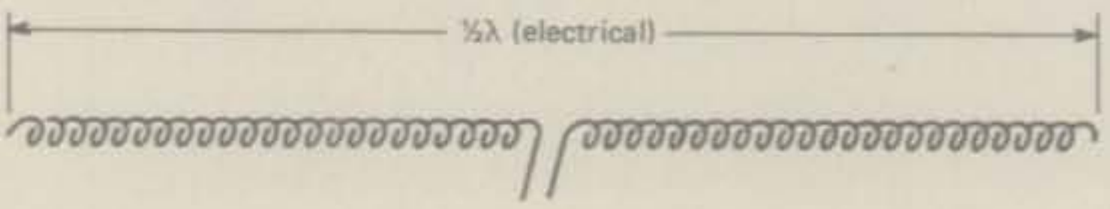


Fig. 1—A helically wound half-wave dipole with a constant diameter and pitch of the windings.

The helical form of loading is simply constant inductive loading along the length of the antenna as shown in fig. 1 for a simple half-wave dipole. The essential characteristics of the dipole are maintained (that is, maximum radiation broadside to the axis of the antenna) as long as the diameter of the loaded element is small as compared to the operating wavelength. This will certainly always be the case on the h.f. bands using PVC tubing. If the diameter starts to become significant in terms of wavelength (perhaps 10% or more) then the basic dipole characteristic will change as significant radiation starts to take place from the ends of the antenna.

Unfortunately, one cannot measure out a half-wave-length of tape for a given band as based on the usual half wave-length formulas, wrap it around the tubing and have an antenna that resonates properly. The spacing (pitch) of the windings, size of the tape width and diameter ratio of the tubing with regards to wave-length all play a role in making the antenna resonate properly. These terms are illustrated in fig. 2. The only exception to this might be if one simply wanted to construct a helically loaded vertical in a space-available situation and then use it with a transmatch at its base to get power into it on any given band. Especially on the

lower frequency bands where the loaded antenna does not exceed a ¼ , this will still get more power radiated than loading into a metal rod of the same length as the tubing.

Fig. 3 presents an emperical graph which can be used to determine the spacing of the windings needed on tubing and possible tubing diameters to use. By another simple formula (given later) one can determine the total length of stainless steel tape needed to be wound on the tubing. The graph does not yield exact, unique solutions for any antenna but rather indicates possible combinations of winding pitches and tube diameters that will work. The graph is good for the cases where one might employ 1" wide steel tape wound on a 4" diameter PVC tube to ½" wide tape on a 1" diameter PVC tube. Naturally, to reduce ohmic losses it is desirable to use a large width tape but the tape width has to be governed by the pitch and this in turn is governed by how much one wants to reduce an antenna in size from its full length.

Some examples will make this clearer. The graph is based on the size reduction desired for an antenna. A ¼ whip for 20 meters in full size would be about 16½ feet long. Say we want to reduce this to about 8 feet or about 50% of its full size by helically loading an 8 foot length of PVC tubing. Entering the graph at 50% we encounter three possible D/L ratios (diameter of tubing to length of tubing) of .01, .02 and .04. Since we know L (8 feet or 96"), the corresponding diameters would be .96", 1.92" and 3.84". For a mobile application, the .96" diameter possibility using 1" diameter PVC looks interesting. The .01 D/L line at 50% produces a P/D ratio (pitch to diameter ratio) of about .75". So, the taped turns have to have a center-to-center spacing of .75" which means the tape can only be about ½" wide to provide a ¼" gap between windings.

For a fixed station installation one might go all the way up to the available 4" plastic tubing for the 3.84" result on the D/L ratio of .04. From the graph again, at 50% size reduction and for a D/L ratio of .04, the P/D result is about 1.5. For a diameter (D) of 4", the pitch is 6 inches. This is long enough to easily use 1" wide tape and to have the spacing great enough so the turns are sufficiently separated even at voltage maximum points on the antenna with high power.

Obviously, all sorts of combinations are possible but size reductions greater than 30-40% usually yield unrealistic results. One could build a 40 meter rotatable dipole only 20 foot long but the tape width would have to be reduced to the point where losses increase significantly, bandwidth would be restricted to a small portion (perhaps 50 kHz) of the band, and the antenna would only be good for low power because of the very close spacing of the turns. But, reasonably size-reduced beams, quads and verticals can all be produced with the helically wound tape method while preserving better efficiency and bandwidth than with lumped constant loading. One can go back and forth with the graph. That is, start with a desired reduction for an antenna, start with a length of space available for tubing, start with a tubing size or even start with a given pitch and then determine how the other factors come out. Don't forget also that various sizes of PVC tubing can be nested together. So, one can produce a tapered helically loaded element by calculating the pitch, etc. for each length of different diameter tubing. This has the nice advantage that the pitch of the larger size tubing can be made so wider tape can be used at the center of a dipole or base of a ¼ vertical, where the current is highest, to reduce ohmic power loss. The graph was based on test results using a constant diameter but there is no reason to believe that it would not be reasonably accurate for the tapered diameter situation also.

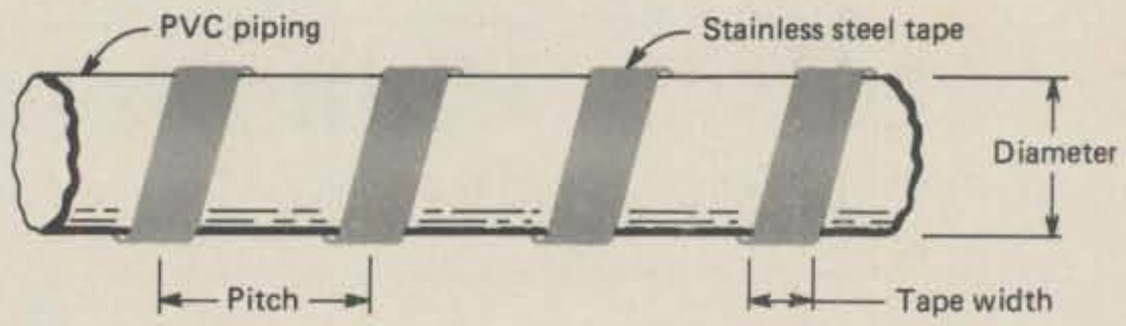


Fig. 2—Stainless-steel tape used over plastic PVC tubing to provide helical loading.

The length of tape needed can be calculated from the formula $\frac{L}{P} \times \sqrt{P^2 + (\pi D)^2}$. This is the number of turns ($\frac{L}{P}$) times the stretched out length of one turn. Steel tape isn't as cheap as Scotch

(continued on page 73)

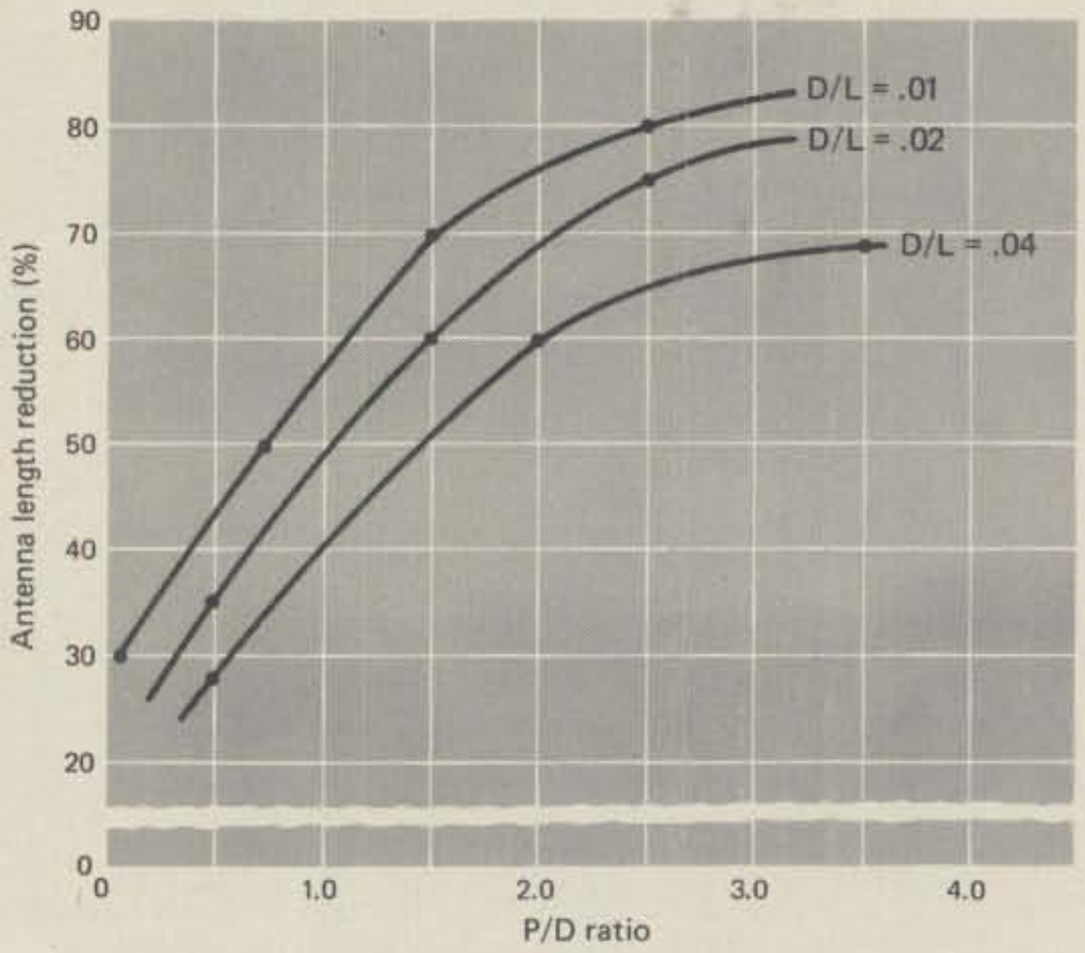


Fig. 3—A graph to determine helically loaded antenna dimensions. Refer to the text for examples of usage.

1975 CQ World Wide DX Contest
High Claimed Scores

The following are high claimed scores received **and processed** by February 1, 1976, so don't be alarmed if you don't see your score listed

Phone

USA
Single Operator
All Band

W7RM	2,220,120
W1ZM	1,685,125
W3LPL	1,527,750
W6RR	1,455,772
W7JST	1,447,016
W3CRE	1,440,373
K4VX	1,188,039
W2HMH	1,171,428
W2GXD	1,118,725
W4QCW	980,590
WB9BPG	838,272
K7RSC	831,111
W5NOP/5	746,171
VE3DXV/W6	703,750
WA2WMT/Ø	680,208
W2RHE	660,536
W3VT	646,170
W5UDK/1	624,102
W5PFL	616,400
W6PLH	607,355
K4PQL	600,357
WA5RTJ	581,828
WA9BWY	574,922
W4UGE	560,320
W3GRF	555,788
W4MYA	555,772
K5FVA	550,500
WAØONL	516,780
W7TML	516,224

USA
Single Operator
Single Band
1.8 MHz

W8LRL	2,871
K1PBW	2,828
WB4QZT	1,425
W2BP	760
W1BB	585

3.8 MHz

W1EBC	79,000
K8INX	65,065
WA2LTQ	62,504
W7KW	58,052
WA2EKH	39,858
WB4QNP	27,972
W3KMV	21,571
W6ITY	19,008
WA1JMP	17,226
W4BAA	17,010
K5ZJP	15,939

7 MHz

W3PHL	111,746
K6QW	108,864
WA6EPQ	93,438
K8LUU	44,548
W1FXD	43,296
WB4QKE	34,470
W9NZM	32,485
W1YN	27,048
W9CH	26,364
WB4KSE	20,935
WB9MOG	18,720
W4DJD	17,219

14MHz

K9PPY	314,440
WA7UWE	242,792
W9ZRX	230,298
WA1NKK	221,551
WA7ABK	209,280
W9IRH/7	203,320
W9YRA	200,202
WØPCO	198,152
WA3OPX	190,653
WB9LHI	190,209
K6UF	189,428
WA3VQP	186,456
WA9JDT	146,489
WAØYFU	130,968
WA7EQL	119,944
W3DBT	118,335
W5TWI	112,125
WB4SIJ	105,408

21 MHz

K1JHX	354,798
WA6EKL	293,440
K4PHY	262,035
W4FDA	214,608
WB9HAD	188,625
WA4OSM	182,778
W2NIN	180,880
W4WSF	154,759
K4ISV	151,927
WB0LLR	151,018
WA8KCX	144,144
WA5SDT	143,637
K4DJC	141,771
WA8DXG	135,135
W9IY	125,073
W1MDO	120,536
WB4IUX	119,574
WB6PNB	102,600
WB8GKG	100,838

28 MHz

WA1HFN	14,196
WB5HIH	13,440
K4HWW	11,515
W8IMZ	11,450
W6HX	11,312
W4OZF	10,854
W6PXG	10,845
K3IGA/4	10,816
WA1UAD	10,339

USA
Multi-Operator
Multi-Single

W6ONV	1,660,395
W2HPF	1,396,747
K3MNT/7	1,300,334
W6PAA	1,096,332
WA1NZT	1,092,000
WA1STN	1,020,621
WA4LZR	1,004,350

Multi-Multi

W2PV	6,052,867
W3AU	5,494,944
WA2ZAA	5,283,540
K6SEN	4,170,084
W3WJD	4,082,784
W3GPE	3,996,737
W4BVV	3,719,430
WB5OOE	3,387,500
WB5DTX	3,293,472
W7SFA	2,888,704

DX
Single Operator
All Band

FY7AK	6,673,500
VP2G	4,334,886
KV4IJ	3,250,842
G3LNS	2,613,132
6W8FP	2,582,838
UB5WE	2,021,592
PJ8YFQ	1,786,934
I4BNR	1,591,779
OK2RZ	1,534,004
ZD8AA	1,508,240
KP4EAJ	1,399,944
VU2DK	1,358,093
KH6IJ	1,334,236
IV3VLS	1,260,345
WB9AJF/6Y5	1,215,654
I4ZSQ	1,136,850
VE2AQS/TG9	1,043,739
I1DOZ	1,031,484
9Y4NP	1,000,692
XJ3HUM	922,176
EP2SN	881,600
LU2AFH	771,390
DL8PC	743,015
XJ7WJ	734,383
LU7MAY	727,712

Single Operator
Single Band
1.8 MHz

XJ3BMV	8,640
PAØHIP	3,024
VE3ECP	2,754
GM3YOR	1,358
OH2BO	1,144
5J4EB	460

3.8 MHz

XJ3EDC	141,726
CN8HD	141,077
I3MAU	113,535
CH1XX	71,640
VE7BWK/3	64,021
VE3BBN	57,456
ZL1AMO	50,634
DK3SN	42,900
VE1AIH	41,672
KH6GQW	36,050
VE6WX	29,450
HI8LC	19,935
SP2BBD	11,395

7 MHz

OH5NW	169,620
I5FCK	92,904
JA2BET	83,187
4M4GD	55,704
SM4CAN	50,743
OA4VR	27,664
JA1MCU	21,645
PY2ELZ	20,592

14 MHz

CW3BR	1,104,072
OH2BH	981,815
G3XYP	810,434
I1GPK	710,646
G3HCT	704,459
YZ2RNE	666,888
C9MJO	665,877
VE7BC	632,082
YV2AMM	608,069
DK4OO	523,050
JH1ECG	422,675
XJ3WT	390,630
SM5BNZ	390,128
3A2GX	379,566
KH6IAC	328,776
WA6LRG/KB6	302,382
LU2DC/KV4	289,692
JA9AG	288,099
XJ6MP	280,476

21 MHz

G3WJN	534,681
CX3BH	501,424
VK6CT	468,309
EA8JJ	455,975
YV4YC	436,008
YZØSRJ	422,816
KZ5JM	416,500
VE3KZ	390,775
OH2BZ	332,920
OK3EA	257,040
I2TTL	239,682
IØDU	232,500
DJØXT	209,781
ZS6YK	199,200
XJ3GCO	183,980
OK3WM	176,640
KP4ECH	175,780
I4DVT	166,171

28 MHz

CV4CR	744,601
CX8BE	271,353
LU8FEU	166,452
PY3BXW	125,624
PY3CFP	38,280
OH3XZ	28,944
9V1SH	23,958
IT9WGI	22,847
9H1CH	22,050
KH6AHZ	18,336
G2BOZ	14,694
GW4CYD	14,240
SP3DOI	11,968

Multi-Operator
Multi-Single

VP2M	5,801,131
EA8CR	4,707,092
DLØWU	4,226,954
UK6APA	4,210,096
VP5WW	3,555,774
FGØMM	3,033,600
PY1EMM	2,875,072
G4DAA	2,743,548
DM2DUK	2,666,988
5L2A	2,407,548
OH2BM	1,875,477
OH6DX	1,735,530
VP2A	1,522,048
G3RCV	1,400,888
JA2YAB	1,228,525
G3RAC	1,108,978

Multi-Multi

DLØPG	7,930,918
PJ1AA	6,989,316
DK2BI	6,064,589
DKØKX	4,479,037
OH1AA	4,376,762
DLØWW	4,204,565
OH2AW	3,631,195
VX9A	3,322,611
GB3MCG	3,123,124

C.W.

USA
Single Operator
All Band

W3LPL	1,003,055
K3GJD	829,836
W2GXD	829,092
W1ZM	724,815
K6CQF	708,295
W3BGN	704,054
K6OVJ	702,800
W2DXL	663,762
W3GRF	563,024
WB4AEX	547,032
W9SZR/3	525,600
W1DAL	525,210
W4YWX	505,440
WA8YVR	491,910
K2TQC	479,895
W2GGE	468,990
WA4LZR	436,320
W1CMH	428,876
W7TML	410,960
W6PLH	400,155

Single Operator
Single Band
1.8 MHz

K1PBW	6,948
W1BB	2,574
W2LWI	1,302
W6RW	1,050
K5JVF	420
WA7OAU	54

3.5 MHz

W1MX	41,616
K4DBZ	27,072
VE3DXV/W6	22,040
W7JLU	21,648
W9LT	11,718
K4EZ	8,648
W1SWX	7,488
K3AV	6,680
W8BDO	6,422
K9UKM/9	1,975
WAØEMS	1,485
W9UDK	1,235

7 MHz

W5WZQ	231,616
W6MUR	196,730
WB5DTX	135,900
K6QZ/6	133,210
W1YG	112,312
K6QW	105,070
W6ITY	103,269
W4QCW	83,018
K2LWR	58,752
WB4KSE	54,648
K8HLR	54,200
W1YN	50,034
K8LUU	33,000
K6DC	32,396
WB7ABK	31,941
K4KQB	27,390
WB4QKE	25,315
WØGTA/9	18,104

14 MHz

K8IDE	220,345
K4VX	207,909
W9MEM	199,017
WB9LHI	195,644
W4WSF	186,876
W2AO	172,264
W8KFL	170,232
WØPCO	169,218
K6SDR	156,618
WA3SWF	149,270
W2AX	145,464
WA5VDH	112,437
WA6IQM	110,295
WA2AJN	100,878
K5BGB	99,123
W5QKR	92,505
W3AFM	79,883
K9CLO	72,576
KØIEA	60,864
K3JGJ	59,400
W9GIL	58,200
K6AO	46,102
W7APN	46,023

21 MHz

W2HBT	61,160
WA8KCX	30,300
WA2MBP	27,720
WA9LZA	23,779
WB9MMR/2	23,040
W9LKI	10,441
WB9MDB	8,532
WA4GQJ	6,157
WA2PAT	1,482
WL7IBE/WN7	782

28 MHz

W8WPC	2,784
WA1HFN	2,380
W8VSK	1,250
W8KLP	1,032
WB2NDR	273
K1LWI	231

Multi-Operator
Multi-Single

W6OUN	1,046,824
W2YD	1,030,887
WA6NGG	788,697

Multi-Multi

W3AU	2,890,680
W3WJD	2,500,656
W4BVV	2,484,820
W3GPE	2,373,672
W6PVB	2,201,045
W3FRY	1,903,448
K6RR	1,607,984
W3BWZ	1,060,668

DX
Single Operator
All Band

EA8CR	3,298,331
YV4AGP	2,816,094
VP2MIR	1,982,268
DJ3KR/OA4	1,632,512
ZF1TW	1,591,118
EA2IA	1,191,900
KH6IJ	1,115,808
C5AJ	1,059,692
ZE1JV	1,011,375
G3LNS	893,784
DL7AV	866,346
JA2JW	749,760
OH6DX	742,074
UB5WF	690,768
XN1KE	623,455
VK3MR	591,894
KH6CF	541,500
I2XXG	488,038
JA2AAQ	480,006
WA1RFM/VP9	417,944
K4JWD/KV4	372,480
DK4PH	354,835

Single Operator
Single Band
1.8 MHz

YV1OB	10,920
PAØHIP	8,932
GD4BEG	8,932
XJ3BMV	7,860
OK1ATP	6,351
OK2PGF	3,080
DJ4KW/P	2,178
G4BXT	2,071
OK1HAS	1,984
G3YMC	1,700
VE3ECP	1,680
OH2BO	1,674

3.5 MHz

KV4FZ	193,213
ZB2X	114,540
FP8AA	108,570
4X4NJ	104,139
G3HTA	72,917
OH1XX	66,134
I3GNQ	58,404
ZL1AMO	42,688
OH1VQ	41,464
DJ2AA	36,890
OH3PE	34,510
DK1FQ	30,120
ZL2BCO	28,079
VE7IG	23,940
KH6GQW	21,336
VP9HP	20,452

7 MHz

VP5GS	262,074
CV4DL	252,735
KG6JFY	176,868
YZ1BCD	153,120
DJ5PA	152,220
YV4NQ	130,496
KH6HSW	106,542
SP4BGR	76,328
OH1PS/2	62,050
VE3BBH	56,604
JA8IEV/JD1	53,063
JA1CWZ	50,100
VK3APN	49,098
I3AWW	43,960
JH1RFM	39,833
OX3AB	36,984
OK1DKR	36,736

14 MHz

CX4CR	948,474
CX7BV	519,930
VK6HD	469,320
PY7AKQ/8	296,529
G3HCT	247,292
OH2QV	191,862
YZ4VCA	175,500
G3RUX	172,700
G3KDB	164,754
SM6CNX	163,400
PY2FRW	157,920
KP4DKX	135,317
JAØCUV/1	135,266
JA2MGE	123,420
JH1JGX	113,653
DK9FY	108,864
G3GRL	107,930
G3SXW	104,312
SM5EXE	104,082

21 MHz

4X4RD	294,768
LU3DSI	126,768
VP5AH	99,360
YV5AMG	92,750
G3RZI/A	87,340
OK3UQ	68,262
TI2WX	60,888
OE1ZGA	59,276
JR6RRD	58,534
DLØBQ	55,361
G4CNY	52,360
SM2COR	47,802
SMØKV/Ø	39,897
VS6BL	37,504
JE1JKL	28,980

28 MHz

LU6EF	23,547
VK4XA	2,448
G2BOZ	2,442
JA1XVF	1,134
JR1INZ/JD1	336

Multi-Operator
Multi-Single

FY7AK	4,197,384
CT3/OZ5OX	3,475,930
4M5ANT	2,853,450
OC4A	2,387,915
VP2DX	2,122,200
ZF1AL	1,167,674
VK6DS	566,010
SK7CE	362,850
SMØPX	254,130

Multi-Multi

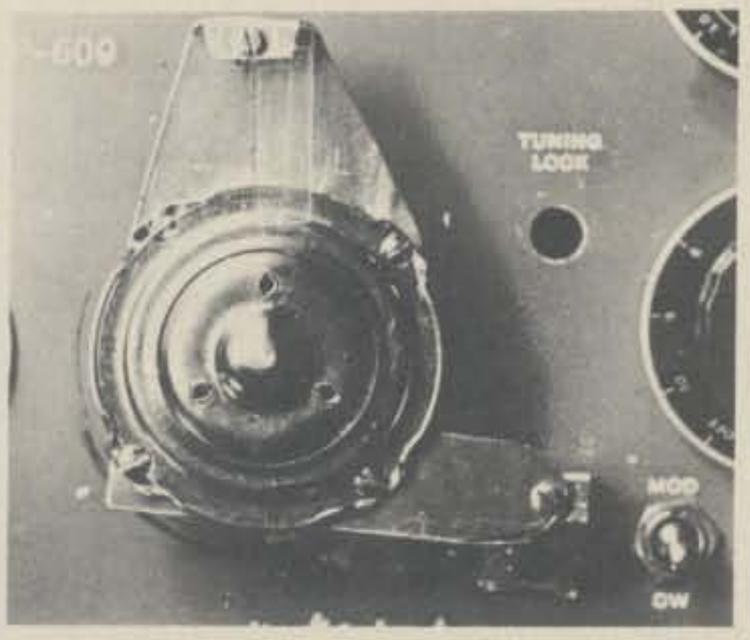
DLØPG	2,033,108
OH2AW	1,612,032
DLØKF	1,371,216
JA3YKC	1,139,277

Cheap and Easy Bandspread For The SP-600-JX Receiver

BY ADRIAN WEISS, K8EEG/Ø

Having been in amateur radio since boyhood, I have fond memories of the effects that certain advertisements had upon my over-fertile imagination: like those I got from ritualistically leafing through a *Walter Ashe Catalogue* or an *ARRL Handbook* and from drooling over the pictures—descriptions of those exotic pieces of equipment—gear that was infinitely beyond my tender and non-existent financial reach.

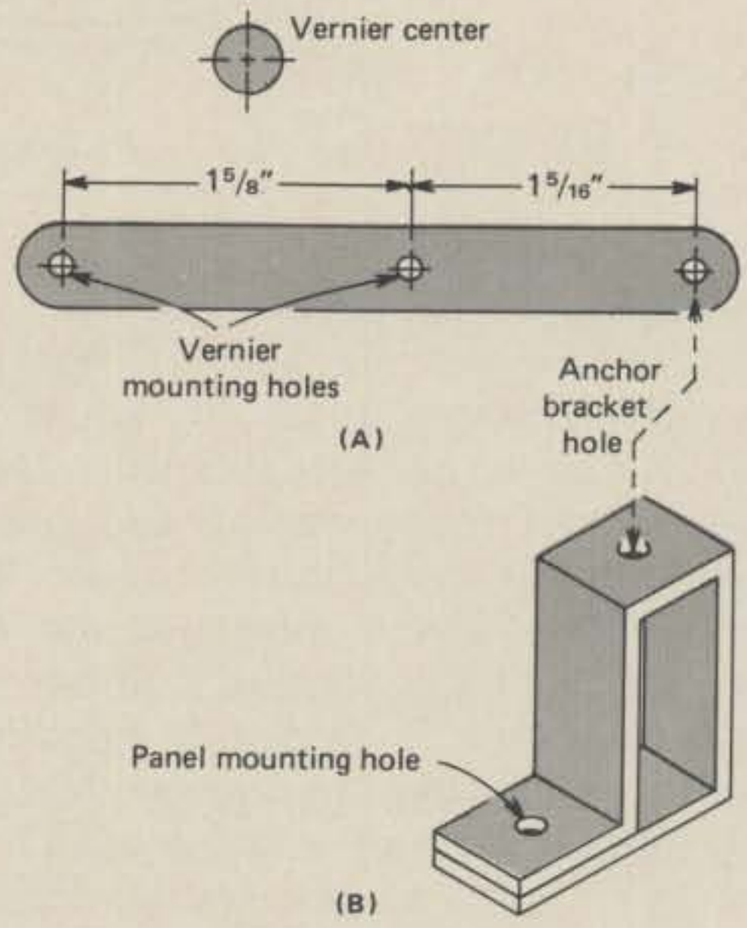
My leafing usually involved a slow repetition of the magic formulae, punctuated by gee and a number of sighs; the magic formulae here—the equipment model numbers; and the longer the number, the better and the more intense the imaginative

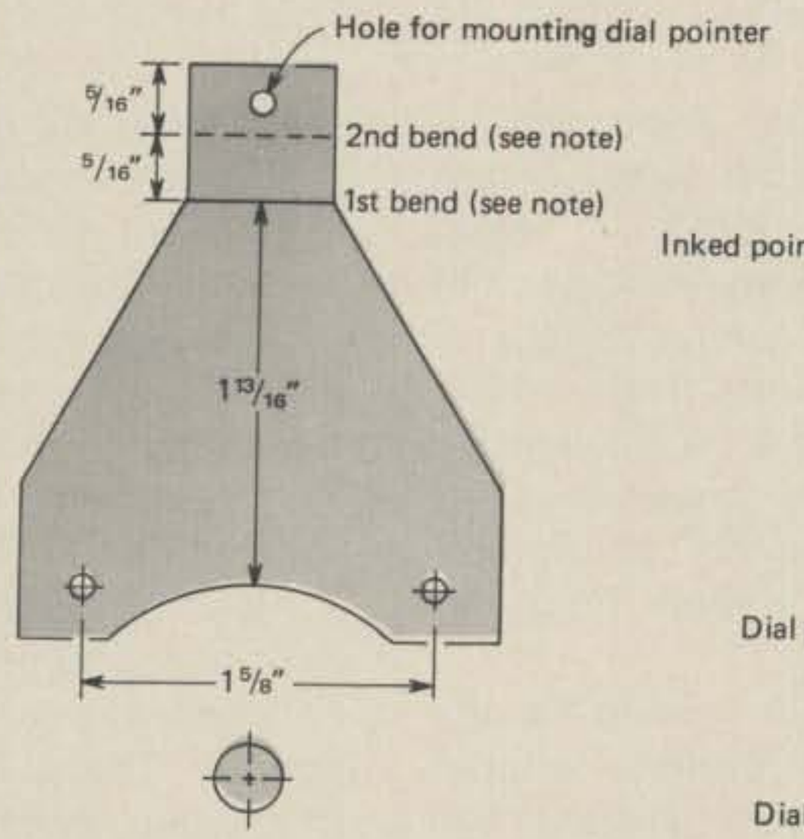


Front view of the tuning mechanism showing the position of the anchor arm, dial pointer and dial pointer mounting plate.

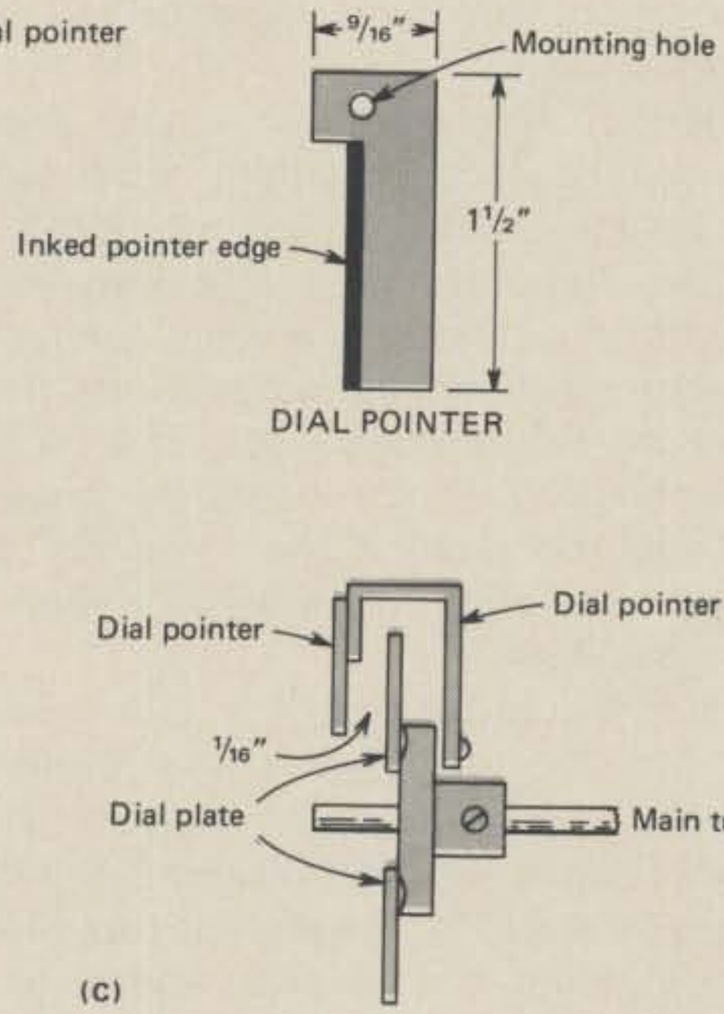
The new calibrated dial is now in place and you're ready to go.

Fig. 1—Construction details for hardware needed to add bandspread to the SP-600-JX receiver.





NOTE:
Bends should place pointer within 1/16" of dial surface



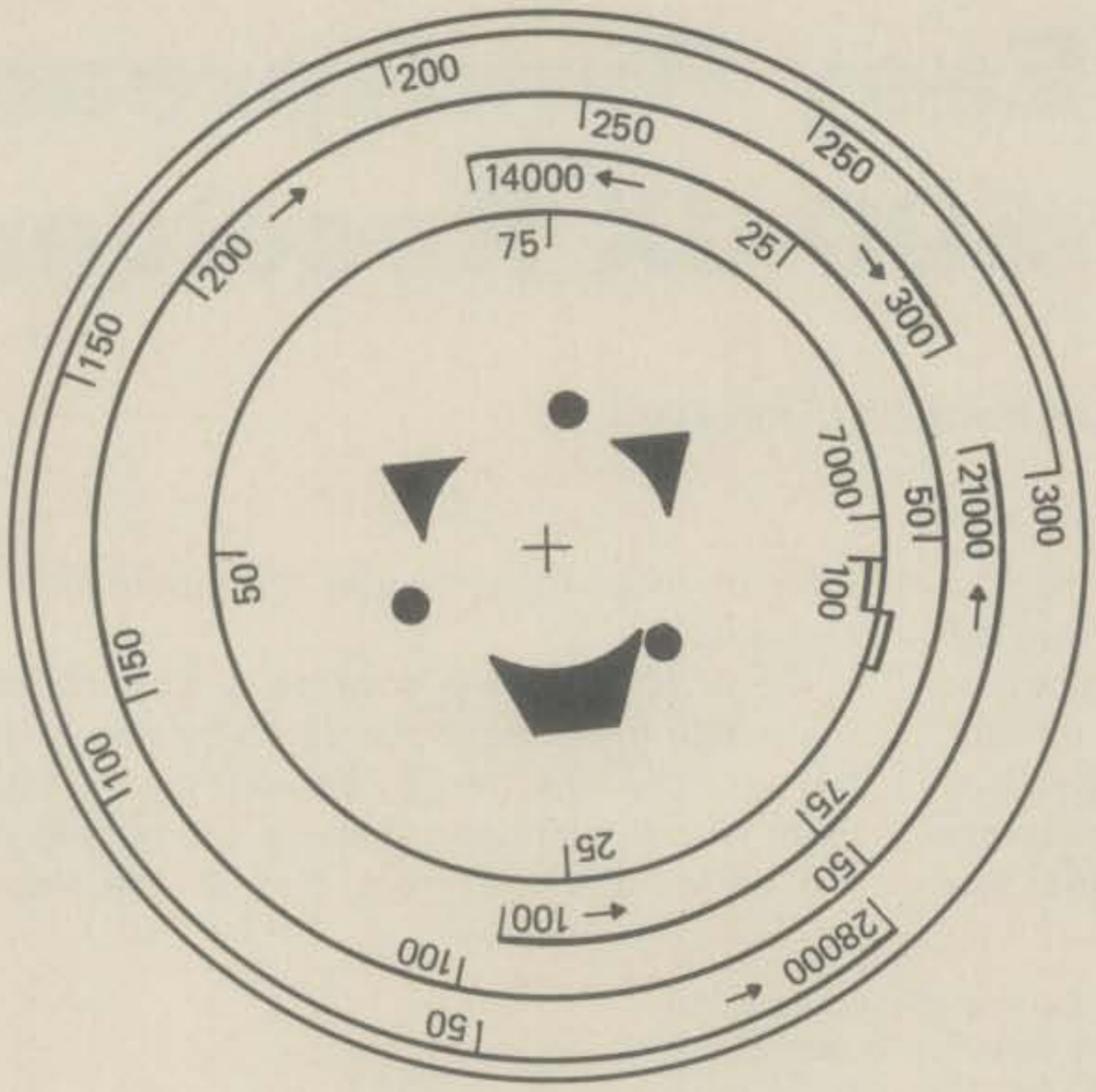


Fig. 2—Dial template for calibrating the receiver.

effort—HRO-50-T, SP-600-JX; NC-303.

Well, one fine day my dream turned into reality. An opportunity arose at an auction to acquire an SP-600-JX at a very reasonable price. Although the receiver looked rough on the auctioneer's block, what with all the grime on the cabinet, fifteen minutes back in the shack convinced me that the SP-600-JX was all I had imagined it to be— it *was* and still *is* a truly fine, high-quality general coverage receiver, with excellent frequency stability (.001%), image rejection (120db), and selectivity in six steps (0.2-13 kHz); with an adjustable crystal phasing filter. All in all, an exceptional receiver. But there was one catch!—no ham bandspread; in fact, no bandspread at all.

What looked like the main tuning knob was, in fact, the bandswitch. A single main tuning knob drives both the main dial and a logging scale dial through an elaborate gear train, an arrangement that results in a totally unusable tuning ratio (1.5 turns covers the *whole* 20-meter band). But a simple thing like no bandspread could not be allowed to stand in the way of my boyhood dream-receiver coming true. So what if there's a no-bandspread *mountain* in the way . . . move it, I said . . . in the best ham tradition.

A vernier would do the trick, but how to tie the vernier into the existing tuning system without permanently modifying the receiver? I discarded the idea of mounting the vernier behind the front panel, because this arrangement provided no easy way of defeating the vernier whenever I wanted to fast-tune. With the vernier in place, such a move would take five minutes of energetic twisting and would bring on an early arthritic attack.

One feature of the SP-600-JX suggested an outboard mounting of the vernier. A "tuning lock" allows one to arrest the movement of the entire gear train. The main tuning knob, which drives the gear train via a friction mechanism, slips when the "tuning lock" is locked. Hence, recalibration when changing bands would be an easy matter with an outboard vernier—the "tuning lock" would simply be locked and secured and the vernier dial "slipped" onto frequency. With all this in mind, I thought of a practicable way of mounting the vernier assembly.

The rigidity of the main tuning shaft indicated that it could easily carry the weight of the vernier so I chose that way of using the vernier instead of some complicated bracket arrangement. I selected a National "Velvet Vernier" for the job, although I could have used a Jackson Brothers vernier with some minor revamping of the mounting arrangement.

Fig. 1(A) illustrates the anchor-arm, which is screwed to the mounting plate of the vernier at one end, and secured by means of a self-tapping screw to the stationary bracket at the other. The bracket (fig. 1(B)) is fastened to the front panel by means of the existing mounting bolt that holds the panel to the chassis. Both pieces are cut from $\frac{3}{32}$ inch cookie-sheet aluminum, and the bracket is bent, to achieve a height of $\frac{7}{8}$ inch from the front panel. This height will give about $\frac{1}{8}$ inch clearane—with reference to the anchor-arm—so that the vernier can be rotated freely during "fast-tuning."

Next, a template to mount the vernier dial-pointer is cut from the cookie-sheet aluminum, as shown in fig. 1(C). The height of the dial-pointer template is determined by the radius of the dial plate, which, in turn, is limited only by the height of the main tuning shaft from the table upon which the receiver sits. Maximum radius is about six inches with a cabinet model SP-600-JX.

After the holes are drilled in the template, it is bent at the top to allow for about $\frac{1}{16}$ inch clearance between the surface of the dial-plate and the dial-pointer. The pointer is made from a stiff piece of thin, clear plastic. Its length should be sufficient to allow it to reach from the mounting template,

(Continued on page 73)

A One Ounce External Oscillator For The FT-101-E

BY FRANK JEROME, K5CM

Want to keep the weight down when you go off to some exotic place DXing but still want to work split frequency? This gadget may be your answer. It is crystal controlled but you need not slide up and down the bands if you are rare enough.

The basic circuit is the International Crystal "OX" oscillator with an added buffer adapted to the eight pin plug on the rear of the FT-101-E. The added transistor is a 2N3904 (or Radio Shack 276-1603). Component values can vary considerable without affecting operation. The "OX" oscillator for the frequency in use calls for the slug *in* the circuit, but works as well with the slug *out*.

Follow the "OX" assembly instructions, and add the 2N3904 as shown in the photo. Tack on the parts, but try fitting to the FT-101-E to make sure there is clearance between this thing and the power transistor heat sink.

For want of a better name I called this the FV-007.

Crystal selection is quite simple. 9180 kHz crystal has output on 7020, 14020, and 21020 kHz. The 9060 kHz crystal puts you on 7140 and 14140 kHz, nice frequencies if you are DX. The 8880 kHz crystal gives you 14320 and 21320, along with 1820 in the old 160 meter band.

You transmit on these crystal frequencies when you select "TX EXT" on the FT-101-E front panel. (The receiver portion remains on the internal v.f.o. of the FT-101-E.)

The pin for the base of the transistor plugs into the "r.f."-out hole in the "OX" circuit board. The collector and emitter pins are wired from the top side of the board. The 2.2 k resistor and output coupling capacitor connect to the emitter pin. The output coupling capacitor is routed up and over the transistor socket, right near the transistor, to the output, octal socket pin 6.

The 100k and 39k resistors connect to the foil side of the "r.f."

(Continued on page 74)

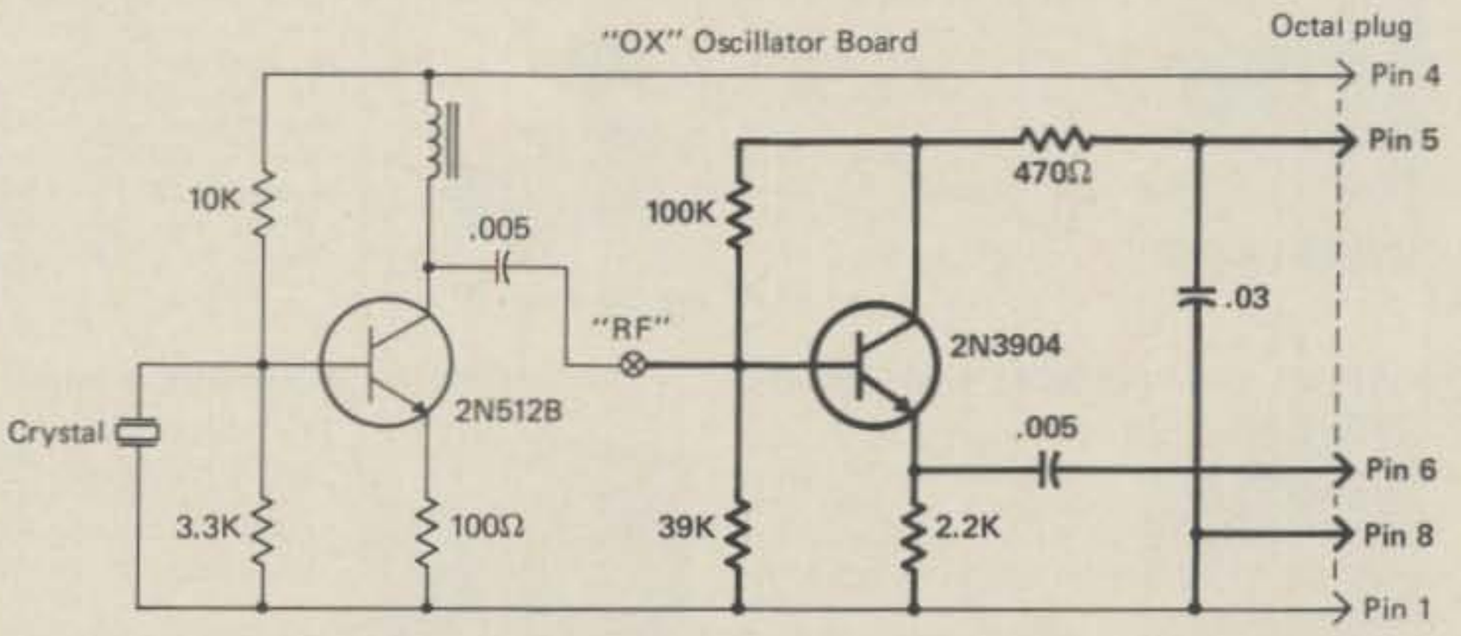
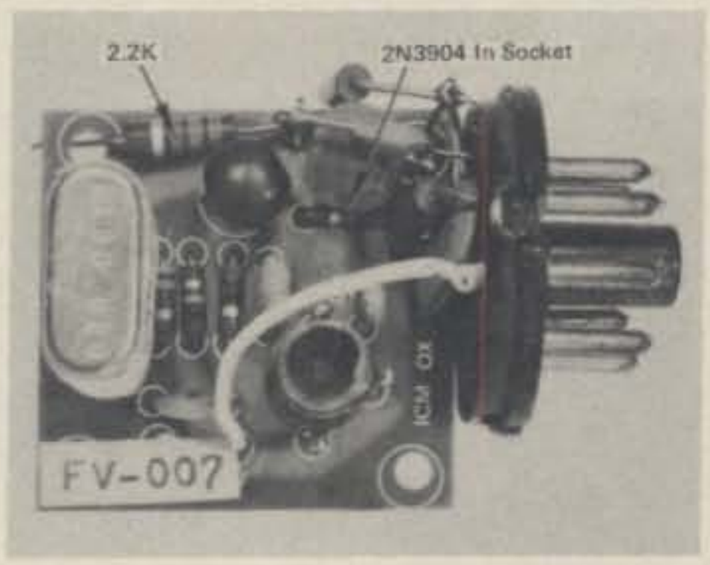
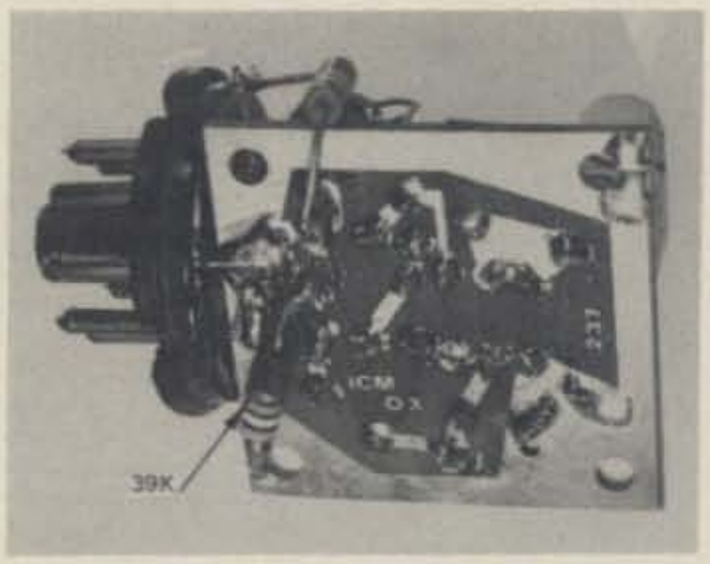


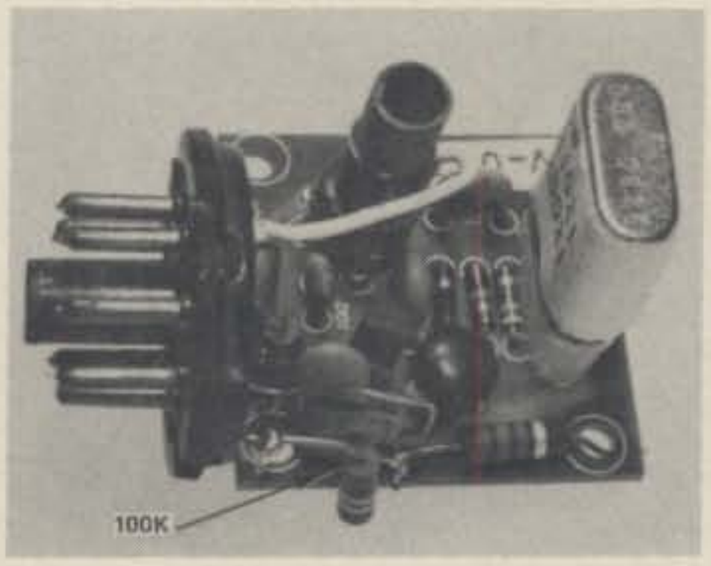
Fig. 1—The completed schematic for external oscillator. It is made from the basic International Crystal "OX" oscillator kit with the addition of the darkened components.



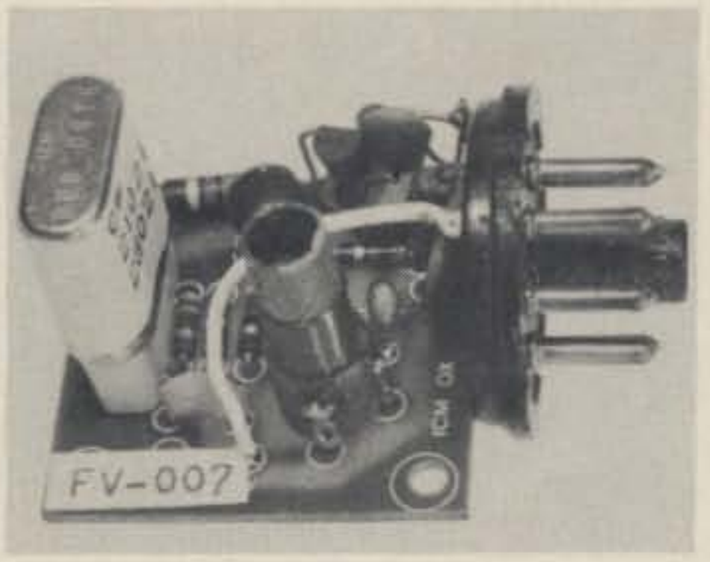
(A)



(C)



(B)



(D)

Photo (A) shows the positioning of the 2.2k resistor plus the 2N3904 transistor and socket. (B) shows the location of the 100k resistor, (C) shows the 39k resistor on the underside of the board, (D) is the completed oscillator ready to go. Be sure all parts are snug to the board and don't interfere with the power transistor heat sink in the FT-101-E.

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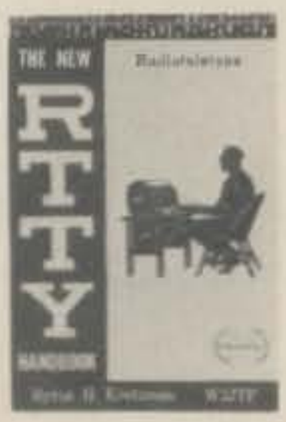

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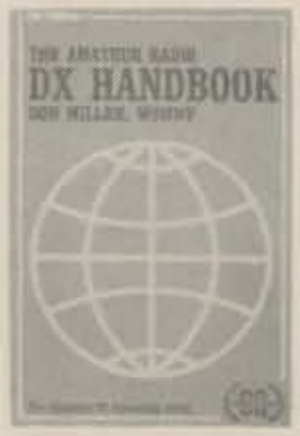

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27th Annual Armed Forces Day Communications Tests

This year's observance of Armed Forces Day (Saturday, May 15) marks the 27th anniversary of an annual event reflecting the long-standing good relations between the amateur radio fraternity and our military radio stations.

A featured highlight of the nation-wide 1976 celebration will be the traditional military-to-amateur communications tests.

These tests give amateur operators their yearly opportunity to demonstrate technical skills and receive proper recognition for their proven expertise.

The proceedings include crossband operations in c.w., s.s.b. and RTTY receiving tests.

Special commemorative QSL cards will be awarded to amateurs achieving a verified two-way contact with any of the participating military stations.

Special certificates also will be sent to amateurs who receive and accurately copy the Armed Forces Day message from the Secretary of Defense, as transmitted in both c.w. and RTTY during the receiving tests.

Interception by short wave listeners (s.w.l.) is not acknowledged by QSL cards. However, anyone with the required equipment and ability can qualify for a certificate by copying the Secretary's message.

In keeping with the Bicentennial spirit, the '76 Armed Forces Day slogan is "Honor America." The emphasis is on the vital role that our armed forces play—and have always played—in defending, protecting and helping to preserve our nation and our great national heritage.

The grave responsibility has been willingly shared by volunteer American amateur radio operators, willing to devote time, effort and applied skill to a mutually beneficial working partnership with U.S. military communicators.

The military-to-amateur crossband operations will be conducted from 15/1300 GMT to 16/0245 GMT. The military stations WAR, NAM, NPG and AIR will transmit on military frequencies and listen for amateur stations transmitting in those portions of the amateur bands indicated below. The operators at the military stations will specify that portion of the amateur sub-band they are tuning.

Station	Military Frequency (kHz unless otherwise noted)	Emission	Appropriate Amateur Band (MHz)
WAR (Army Radio Washington, D.C.)	4001.5	c.w.	3.5-3.75
	4020	l.s.b.	3.775-4.0
	4030	RTTY	3.65-3.775
	6997.5	c.w.	7.0-7.15
	14405	c.w.	14.0-14.2
	20994	u.s.b.	21.25-21.45
NAM (Naval Communications Station Norfolk, Va)	3385	c.w.	3.5-3.75
	4012.5	RTTY	3.65-3.775
	4040	l.s.b.	3.775-4.0
	6970	l.s.b.	7.15-7.3
	7301	c.w.	7.0-7.05
	7380	RTTY	7.1-7.15
	7385	c.w.	7.05-7.15
	13827.5	RTTY	14.1-14.2
	14385	u.s.b.	14.2-14.35
	14400	c.w.	14.0-14.1
	148.410 MHz	f.m.	
	150.90 MHz		
NPG (Naval Communications Station San Francisco, Ca)	4001.5	l.s.b.	3.775-4.0
	4005	c.w.	3.5-3.65
	4010	c.w.	3.65-3.75
	6989	c.w.	7.0-7.075
	7301.5	l.s.b.	7.15-7.3
	7347.5	RTTY	7.0-7.1
	7365	c.w.	7.075-7.150
	13922.5	RTTY	14.0-14.15
	14356	u.s.b.	14.2-14.275
	14375	c.w.	14.0-14.1
	14389	u.s.b.	14.275-14.35
	20983	c.w.	21.0-21.2

	20998.5	u.s.b.	21.27-21.4
	*49.995 MHz	a.m./u.s.b./c.w.	50.0-51.0
	*143.995 MHz	a.m./u.s.b./c.w.	144.0-146.0
	**148.41 MHz	a.m./RTTY	145.0-146.0
	**148.95 MHz	f.m.	146.0-148.0
	*222.0 MHz	a.m./u.s.b./c.w.	221.0-222.5

* To be operated from Mt. Vaca
** To be operated from Mt. Diablo

AIR (Air Force	4025	l.s.b.	3.775-4.0
Radio	7305	l.s.b.	7.15-7.3
Washington, D.C.)	7315	c.w.	7.0-7.3
	13997.5	c.w.	14.0-14.2
	14397	u.s.b.	14.2-14.35

C.W. Receiving Test

The c.w. receiving test will be conducted at 25 words per minute for any person capable of copying International Morse Code. The c.w. broadcast will be a special Armed Forces Day message from the Secretary of Defense to all participants. A ten minute CQ call for tuning purposes will begin at 16/0300 GMT. The Secretary of Defense message will be transmitted precisely at 16/0310 GMT from the following stations on frequencies listed.

Transmitting Station	Frequencies (kHz unless otherwise indicated)
WAR—Army	4030, 6997.5, 14405
NAM—Navy	4012.5, 7385, 14386
NPG—Navy	4005, 6989, 14375, 49.995 MHz 143.885 MHz
AIR—Air Force	7315, 13997.5

RTTY Receiving Test

The RTTY receiving test will be transmitted at 60 words per minute. A ten minute CQ call for tuning purposes will begin at 16/0335 GMT. The special Armed Forces Day message from the Secretary of Defense will be transmitted at 16/0345 GMT. This test is to exercise the technical skill in aligning and adjusting of equipment by the operator, and serves to demonstrate the growing number of amateurs becoming skilled in this method of rapid communications. Transmission will be from the following stations on frequencies listed.

Transmitting Station	Frequencies (kHz unless otherwise indicated)
WAR—Army	4030, 6997.5, 14405
NAM—Navy	4012.5, 7385, 14385
NPG—Navy	4010, 7347.5, 13922.5, 148.410 MHz
AIR—Air Force	7315, 13997.5

Submission Of Test Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign (if any) and address, including zip code of the individual submitting the entry must be indicated on the page containing the test. Each year a large number of acceptable copies are received with insufficient information or the necessary information is attached to the transcription and was separated, thereby precluding the issuance of a certificate.

Entries should be postmarked no later than 25 May, 1976 and submitted to the respective service copied.

Stations copying NAM and NPG should send their entries to:

Armed Forces Day Test
Chief, Navy-Marine Corps MARS
Building 17
8th Street & South Courthouse Road
Arlington, Va. 22204

Stations copying WAR should send their entries to:

Armed Forces Day Test
Commander, United States Army
Communications Command
ATTN: CC-OPS-OM
Fort Huachuca, AZ 85613

Stations copying AIR should send their entries to:

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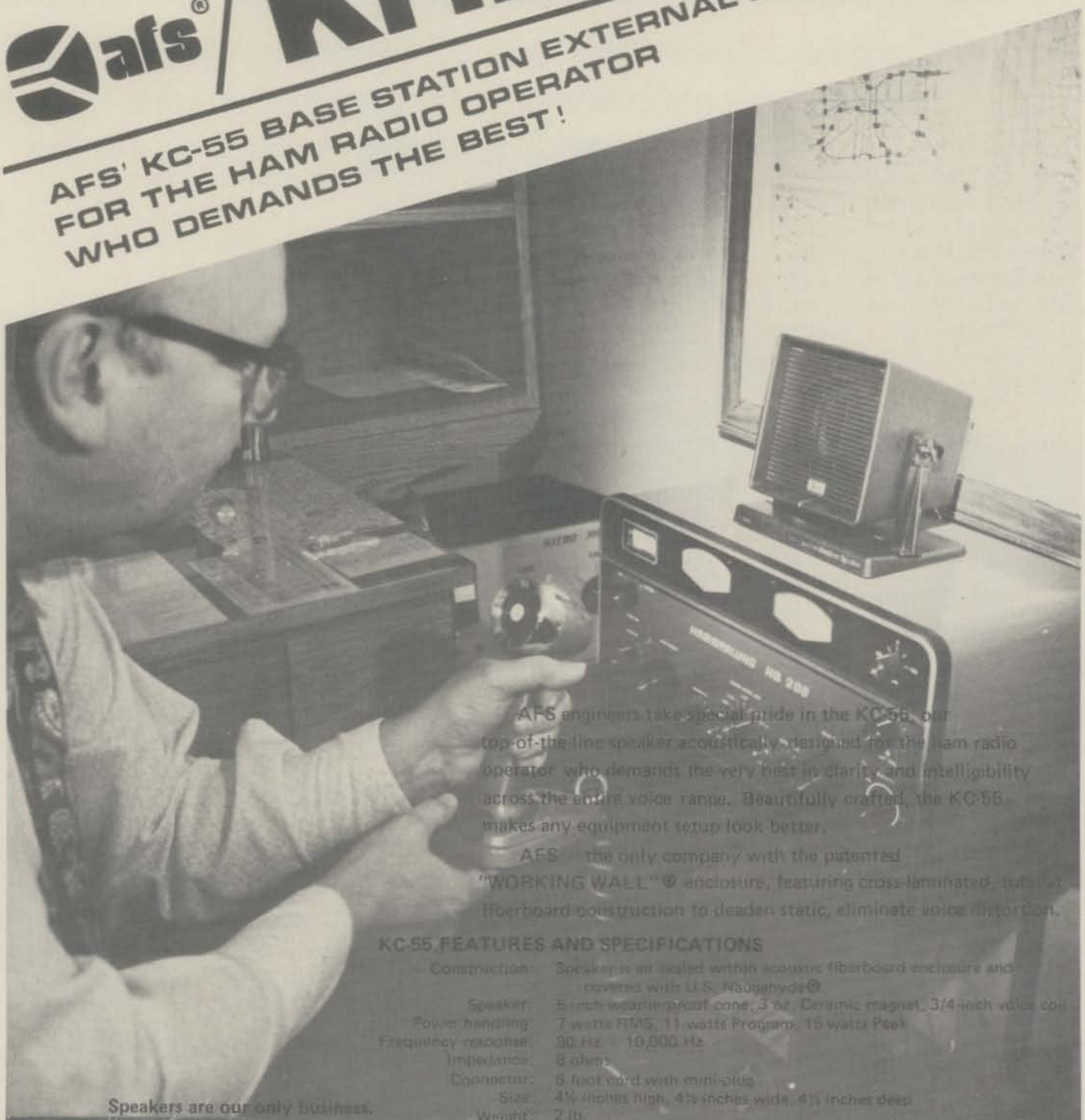

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A Simple Kilowatt (Idea)

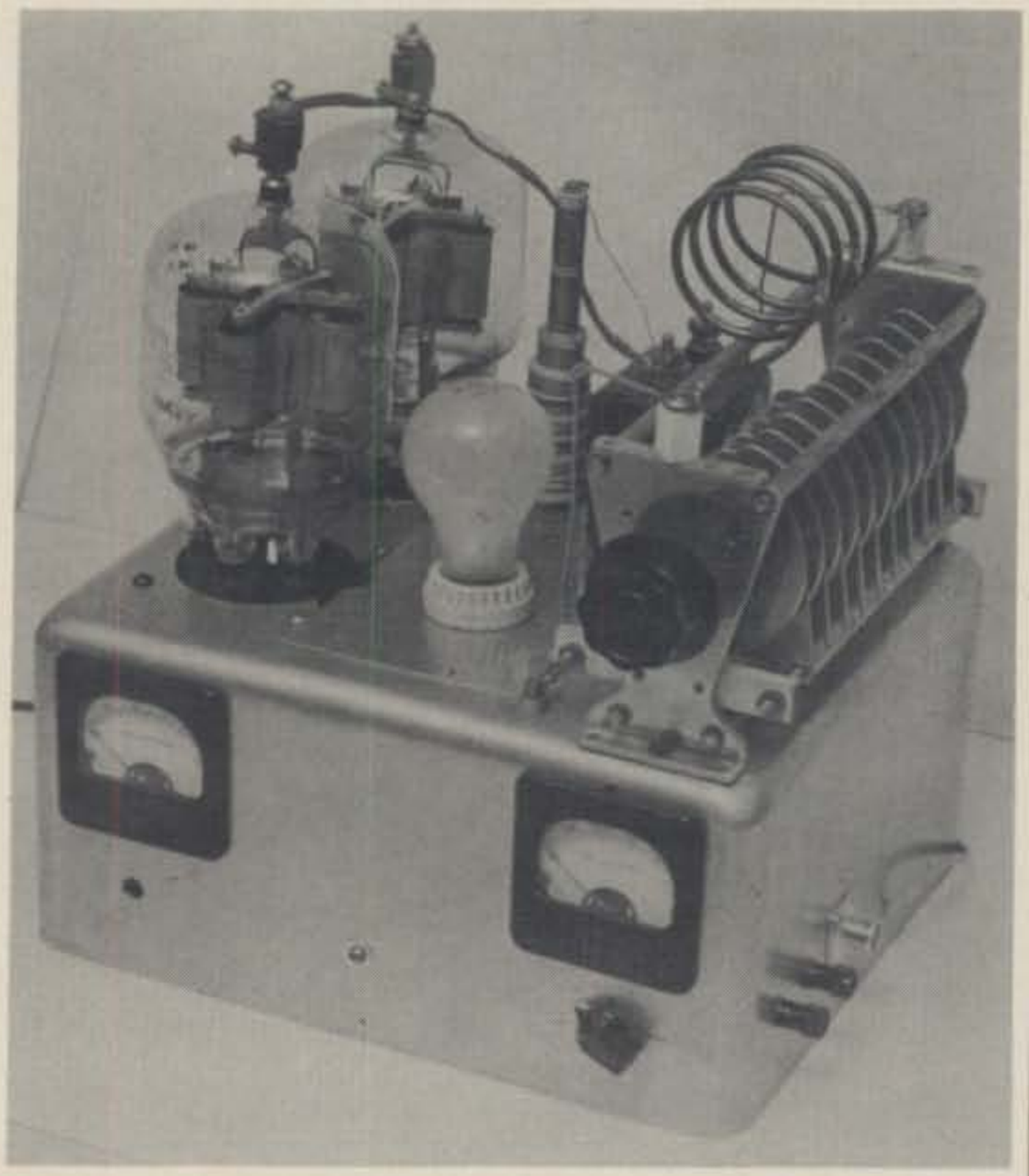
BY BOB BAIRD, W7CSD

So you want to build a kilowatt linear. And you already have a transceiver capable of delivering somewhere between 50 and 100 watts output. Furthermore, lets assume that you have done some home brewing in the past. This is *not* the project for a neophyte. You need a certain amount of know how and basic understanding of circuitry. If you need a cook book recipe for a coil and capacitor to tune forty meters, you are not quite ready for this project. Also you should have due respect for high voltage, 3000 volts is quite lethal, and in fact could easily kill you.

Having considered the above, several possibilities for a linear will present themselves. First of all since you have a sizeable exciter the grounded grid circuit looks very good. In general you need some filament r.f. chokes which may be purchased or hand wound on the right kind of a ferrite core. In either case they take up room and are hard to mount. If you are a purist you may add a tuned circuit on the cathode side which further complicates things. A second obvious choice is the grounded cathode circuit. In this case the usual circuit calls for a tuned input and if you are going to operate on ten meters even the best tetrode you can buy is going to need neutralizing. Needless to say any triode will have to be neutralized. A band switching tuned input circuit is a nuisance and so is neutralizing. Furthermore your 100 watts drive is not needed. (This might be desirable if you have an SB-10 or and Argonaut.)

A third alternative has occurred to this writer. It may appeal to some. A simpler circuit does not exist! The literature down thru the years has alluded to the passive grid circuit. Little has been done with it. One of the *Editors and Engineers Handbooks* has such a circuit for a kw linear. Top Band Systems, now defunct, came out with one using five or six TV tubes in parallel. Both of these circuits dissipate 50 or 100 watts in a non-inductive resistor. This is OK but where do you get a 75 ohm 100 watt non-inductive resistor and how much does it cost? Well, we decided to give the circuit a try and we got our (reasonably non-inductive) resistor at the grocery store. There is no cheaper 60 or 100 watt resistor than a tungsten light bulb! Yep that's what we used, a 60 watt one to be exact. You immediately object, "the resistance will change when you talk into it and the bulb lights up." Yes, that is true too but it is not as bad as you think. At the time the bulb is brightest the load is the lightest (high resistance) but the amplifier input is in parallel with this and it is calling for more power. It is kind of self compensating.

We used the circuit in fig. 1. with a pair of old WE 701A tubes that have been kicking around in the junk box for quite some time. 4-400As, 3-500zs, a single 4-1000A or half a dozen other types would work equally well. The simplicity of the circuit is self evident. The amplifier is completely stable. We did put in the ferrite beads in the grid circuit because it was easy to do. They may be unneccessary. An FT-101 will drive the plate current to 400 mils



Here's something to jog the memory of the good old days. With a little effort and some junk box parts you can model your present day linear from this beauty. (Photo by Gary Gray.)

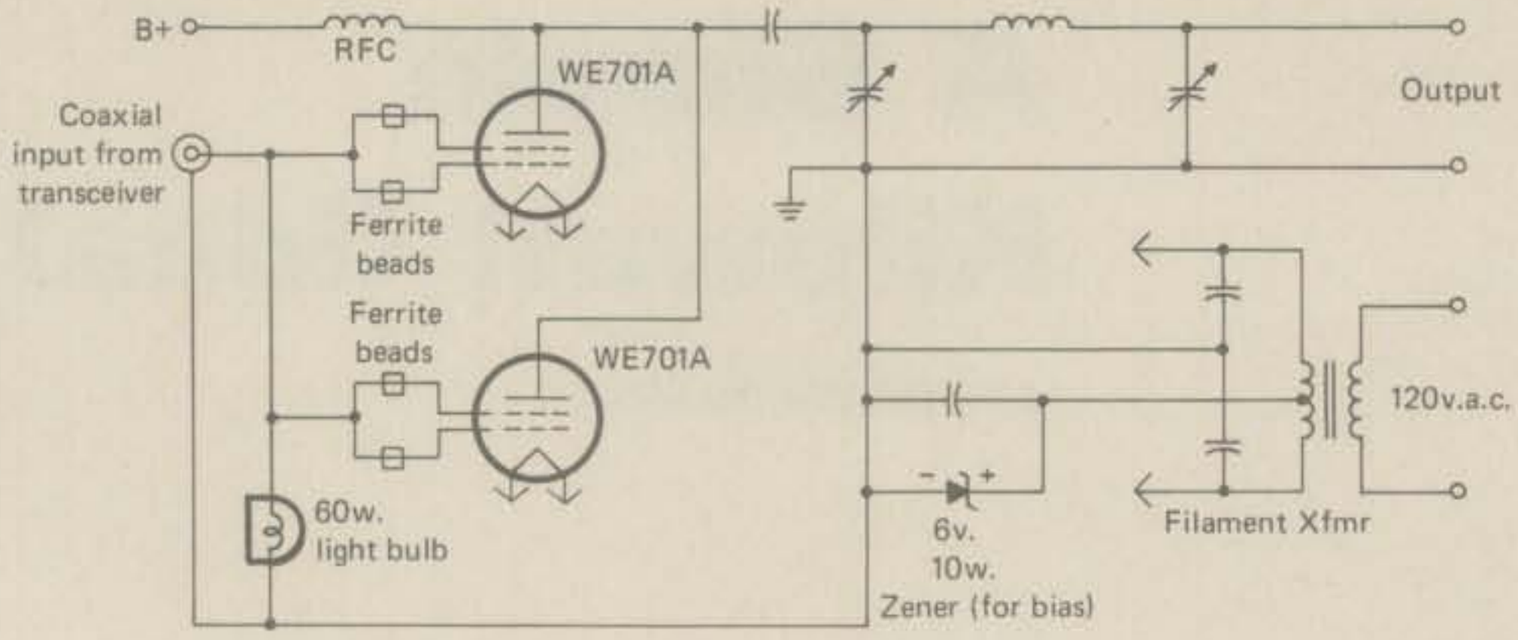


Fig. 1—A simple kilowatt passive grid amplifier.

at 2500 volts very easily. The light bulb does light up. Judging from a "christmas tree" pattern only, it looked exactly like the exciter. On the air tests indicated no difference between the linear and bare foot as far as audio quality was concerned. We did not make inter-modulation measurements but the thing put out a very respectable signal.

It is true that you waste all of the power dissipated in the light bulb. However if you used a grounded grid circuit you would have to count this power as part of your kilowatt, legally. As long as you are building an amplifier this big anyway it might as well deliver all the power. You have no filament choke or tuned circuit in the input and you don't have to neutralize the the amplifier. It's stable as the rock of Gibralter. What more could you ask?

Now as to this exact model. Please OM, don't try to duplicate it. Please don't write me and ask the size of the plate blocking capacitor. As indicated in the opening remarks, build something smaller for your first home-brew effort. Now for those who have a little experience, the photo shows our experimental amplifier. TVI shielded, *it is not!* We have a cabin out in the country with no neighbors within a quarter of a mile. Maybe we can use it there. Any kilowatt amplifier to be used in town would have to be shielded, double shielded, preferably with a power supply built in, have an r.f. filter with the a.c. line, a low pass filter in the r.f. line, and a good earth ground. This particular amplifier was built simply to determine how well it would work. Aside from TVI, exposed high voltage, and not being generally beautiful, it works very fine. Use the *idea* not the *model*. ■

The Prolonged Sunspot Minimum and its Implications With Respect to Future Sunspot Activity

BY PROFESSOR EMIL HEISSELUFT*

Lauton Institute

Grossmaul-an Der Donau, Austria

Dear Readers of CQ,

Things aren't bad enough in this world, now comes along my good friend and protege, Professor Emil Heisseluft, with his forecast that we may be in for a prolonged period of low sunspot activity. I owe Emil special thanks for a very nice article he wrote in the April, 1969, issue of CQ, telling the world about the Distinguished Order for Scientific Effort (D.O.S.E.) that had been bestowed upon me. If it wasn't for this, I would never have permitted him to interrupt my blissful retirement at beautiful Santa Maria beach. But along he came, and I did read his article. I must compliment Emil on his improvement in English, just a few years ago his accent was worse than mine. But what more can I say, dear readers. Facts are facts and truth is truth, whether or not we like what they say. While Professor Heisseluft's article may not have a happy ending, it must be read. So, dear readers, read it very carefully, and seriously think about its consequences.

Auf Wiedersehen!
Jerry Ostermond-Tor, D.O.S.E.
(ex YM4XR)

Editor's Note: Professor Heisseluft is also the author of "Developing a DX Voice," which appeared in the April, 1965, issue of CQ.

Introduction

Late in the last century, Spörer (1887, 1889) and Maunder (1890, 1894) identified a 70-year period (1645-1715) in the historical record of solor activity during which time almost no spots appeared on the surface of the Sun. Called the Prolonged Sunspot Minimum, this anomaly, if it did occur, could have important implications with respect to our attempts to predict future sunspot activity.

In this paper, evidence supporting Spörer and Maunder's finding is examined. The conclusion is that the Prolonged Sunspot Minimum probably did occur, and that similar periods of extremely low solar activity may be observed before the end of this century.

History of Sunspot Observations

The first scientific observations of sunspots were made by Galileo in 1610. However, it was not until some 230 years later, in 1843, that Hendrick S. Schwabe, an amateur astronomer, analyzed the sunspot data he had acquired since 1826, and postulated that sunspot occurence may exhibit a 10-year periodicity. With this discovery, interest in solar activity increased, and in 1848, Rudolf Wolf, Director of the Swiss Federal Observatory, began an effort to record relative sunspot numbers on a daily basis. Wolf also began a review of the historical record on solar activity, and in 1868, he published estimates of yearly mean sunspot numbers dating from 1700, and monthly mean sunspot numbers dating from 1749. Unfortunately, Wolf's data for the interval 1700-1749 have been largely ignored, perhaps because they were not adjusted

*Professor Heisseluft is currently on Sabbatical leave from the Lauton Institute. Correspondence to the Professor may be directed c/o *CQ*, 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050.

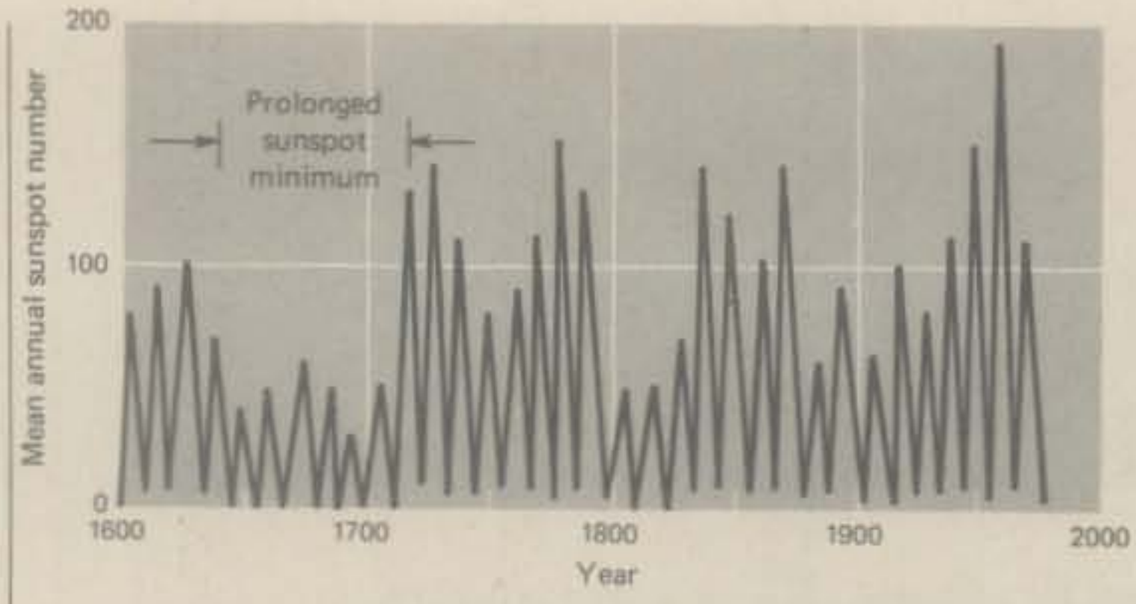


Fig. 1—Mean annual sunspot numbers (schematic representation based on data published by Schove (1955)).

on the same basis as were the numbers after 1749. Thus, it is generally thought that the sunspot numbers computed by Wolf and his successors Wolfer, Brunner and Waldmeier (the latter currently issues monthly bulletins from the Swiss Federal Observatory in Zurich, Switzerland) for the period from 1749 to the present, represent the only valid record of sunspot occurrence, and attempts to predict future sunspot activity are based almost entirely on these data[1].

While sunspot data for the years 1700 to 1749 may be somewhat less acceptable than the data acquired after this date, these observations are useful for examining the general level of solar activity which occurred during this period. Further, numerous, though not necessarily complete, records of solar activity collected by observers working independently on the European Continent permit the sunspot record to be traced back to about 1600 with fair reliability.

Sunspot Activity Since 1600

With respect to sunspot data from 1600 to the present, Schove's (1955) findings, augmented with observations made during the last 20 years, are shown in Table I and fig. 1. Note that from around 1645 to 1715, Schove claims the annual mean sunspot number at sunspot maxima never exceeded 60, and that for one cycle, it dropped to as low as 30. This anomaly in the Sun's behavior was observed by many astronomers during the 17th Century and was rediscovered by Spörer and Maunder late in the last century, but these findings have been largely forgotten. Called the Prolonged Sunspot Minimum by Maunder, this 70-year period of apparent low sunspot activity is one of the most interesting perturbations in the sunspot record.

Because the Prolonged Sunspot Minimum offers to be an excellent period in which to test various solar-terrestrial relationships (e.g., the relationship between solar activity and the climate), it has once

[1]Readers are referred to Cohen and Jacobs, *CQ*, January 1976, for a brief review of some of the prediction methods used. *Editor*

TABLE I

Sunspot Cycles
1600 to the Present
(modified after Schove, 1955)

Year of Maximum	Sunspot Number at Maximum*	Intensity of Maximum**	
1604	(80)	WM	
1615	(90)	M	
1626	(100)	MS	
1639	(70)	WM	
1649	(40)	WW	
1660	(50)	WW	Prolonged Sunspot
1675	(60)	W	Minimum
1685	(50)	WW	
1693	(30)	WWW	
1705	(50)	WW	
1718	(130)	S	
1727	(140)	SS	
1738	(110)	S	
1750	80	M	
1761	90	M	
1769	110	S	
1778	150	SS	
1788	130	S	
1805	50	WW	
1816	50	WW	
1829	70	WM	
1837	140	SS	
1848	120	S	
1860	100	MS	
1870	140	SS	
1883	60	W	
1894	90	M	
1907	60	W	
1917	100	MS	
1928	80	WM	
1937	110	S	
1947	150	SS	
1958	190	SSS	
1969	110	S	

*Mean annual numbers (sometimes referred to as Wolf or Wolfer numbers). Numbers in parentheses are estimated.

**The following abbreviations describe the intensity at maximum:

SSS = Extremely strong
SS = Very strong
A = Strong
MS = Moderately strong
M = Moderate
WM = Moderately weak
W = Weak
WW = Very weak
WWW = Extremely weak

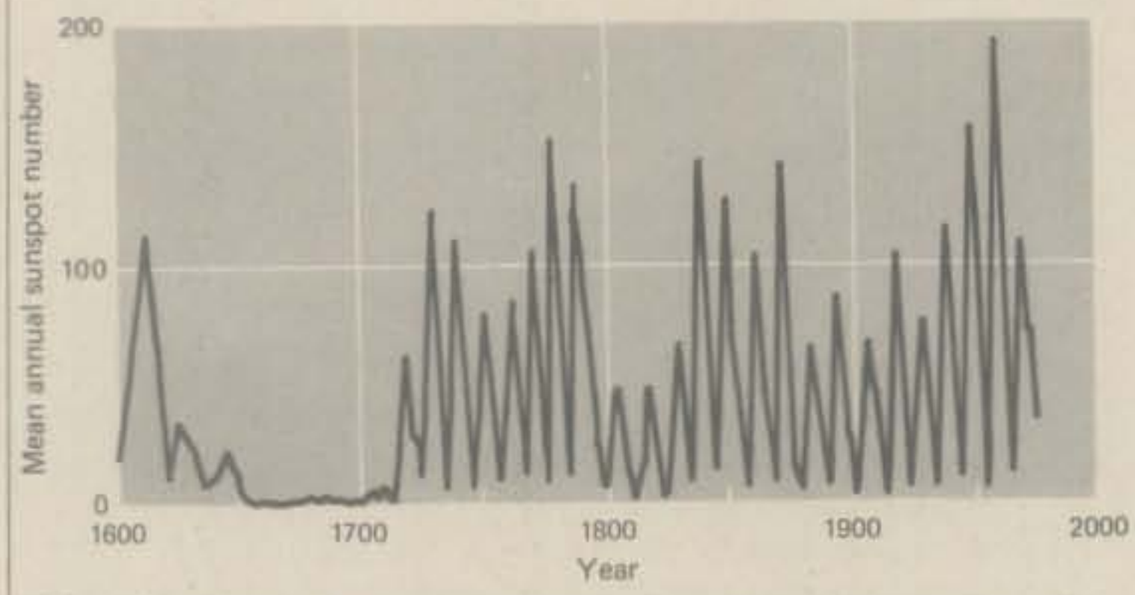


Fig. 2—Mean annual sunspot numbers (modified after Schneider and Mass, 1975).

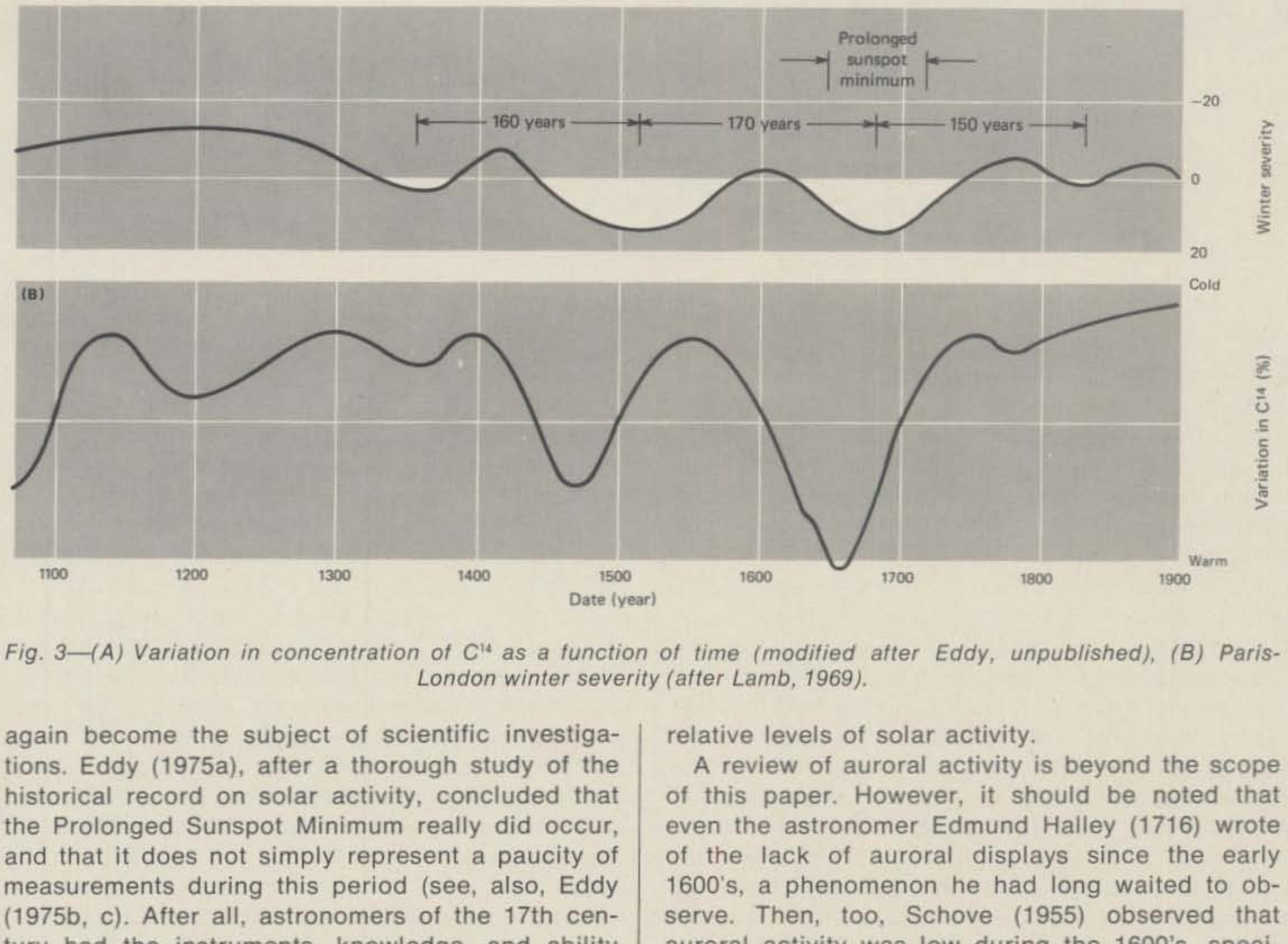


Fig. 3—(A) Variation in concentration of C^{14} as a function of time (modified after Eddy, unpublished), (B) Paris-London winter severity (after Lamb, 1969).

again become the subject of scientific investigations. Eddy (1975a), after a thorough study of the historical record on solar activity, concluded that the Prolonged Sunspot Minimum really did occur, and that it does not simply represent a paucity of measurements during this period (see, also, Eddy (1975b, c). After all, astronomers of the 17th century had the instruments, knowledge, and ability to detect the presence of even small sunspots (Eddy, unpublished). It was during the Prolonged Sunspot Minimum, for example, that astronomers discovered the first division in Saturn's ring (1675) and found five of Saturn's satellites (1655-1684).

Sunspot data assembled by Eddy, augmented with that of Waldmeier (1961, plus data published monthly by the Swiss Federal Observatory at Zurich), and Schneider and Mass (1975), are shown in fig. 2. Here, the almost-total absence of sunspots in the mid to late 1600's is striking, with activity at a level lower than that postulated even by Schove. At no time during the Minimum, according to these results, did the mean annual sunspot numbers exceed 10.

Auroral Activity

The association between the aurora and the Earth's magnetic field was established by Loomis in 1860. Prior to this date, however, a relationship between sunspots and geomagnetic disturbances had been postulated by Sabine (1852), Wolf (1852), and Gautier (1852). Thus, by the latter half of the 19th Century, the relationship between the solar cycle and the aurora was well accepted. Observations of auroral activity, then, can be used to infer relative levels of solar activity.

A review of auroral activity is beyond the scope of this paper. However, it should be noted that even the astronomer Edmund Halley (1716) wrote of the lack of auroral displays since the early 1600's, a phenomenon he had long waited to observe. Then, too, Schove (1955) observed that auroral activity was low during the 1600's, specifically identifying aurorally weak periods in the intervals 1641-1670 and 1681-1715. These and other studies provide additional evidence to suggest that few auroral displays . . . and hence, little sunspot activity . . . was observed during the prolonged Sunspot Minimum.

Regardless of the absolute level of solar and auroral activity thought to occur, the data presented here suggest that for a 70-year period beginning around 1645, the average level of solar activity was significantly lower than at any period since that time.

Implications With Respect to Future Sunspot Activity

That the Prolonged Sunspot Minimum did occur indicates that the sunspot cycle has changed significantly over the past 400 years, and that it may, in fact, be a transitory phenomenon. At the least, it should be recognized that having occurred once, a prolonged period of minimal solar activity may again occur, and specifically, may evidence itself in the interval 1976-2005. This conclusion is based,

(Continued on page 71)

CQ Reviews: The Drake TR-22C 2-Meter Transceiver

BY HUGH R. PAUL, W6POK

One of the longest playing attractions in the amateur two meter equipment field has been the Drake TR-22 transceiver. Now in its "C" version, the unit continues to sell well. While the package design is unchanged, there have been improvements in performance, which make the unit more attractive.

I first encountered the TR-22 while living in W8 land. I was looking for something that could serve as both a portable and a low power base station. The local dealer provided me with a unit for a short trial. At that time there were two repeaters operating in the area. With the TR-22 I could receive both of them with only one set of crystals. The receiver was broad enough that the undesired repeater would break the squelch of the receiver continually. This was distracting to say the least and resulted in the purchase of another brand of transceiver. I lamented the necessary action because the TR-22 package had a number of desirable features that suited my style of operating.

The Drake TR-22C is a 12 channel transceiver covering the entire two meter band. Measuring only 5⅜" × 2⅝" × 7½" and weighing in at 3.75 pounds, the transceiver is too large to hold in the hand, but is comfortable to carry over the shoulder in the vinyl covered carrying case supplied as part of the package.

The transceiver requires 13.0 v.d.c. ± 15% to operate. Included with the unit are ten Ni-Cad batteries, which mount in two holders inside the transceiver. If desired, eight pen light cells may be substituted in the battery pack. For mobile operation an accessory d.c. power cord is included. The internal battery pack is automatically disconnected when operating from an external d.c. source.

I have spoken with several amateurs who thought the TR-22C had a built in a.c. power supply. It does not. It has an internal battery charging circuit that operates from 117 v.a.c. The advertisements for the TR-22C state that a.c. and d.c. power cords are included and they are, but the a.c. cord is to be used for powering the Ni-Cad charger only.

Current drain in the standby receive mode is 45 ma. In the transmit mode, current drain is 450 ma. With the average portable operation, a full days use can be realized from the built-in Ni-Cad battery pack.

An external speaker jack and an 18 inch telescoping antenna are to be found on the front panel. On the rear panel, in addition to the power cord jacks, is a coax fitting that mates with a standard PL259 connector. To operate with an external antenna, you merely retract the built-in antenna and connect any antenna of 52 ohms impedance.

A small meter provides a means of measuring relative signal strength and power output. It also serves as an indicator of battery charge level. The latter function is most important if damage to the Ni-Cad pack is to be avoided by overly discharging.

The Drake TR-22C two meter transceiver offers 12 channels of operation throughout the entire two meter band.

As you can see from the photographs, a lot of parts are packed into the case of the TR-22C. There are two main phenolic circuit boards. One for the receiver circuitry and one for the transmitter. Everything fits snugly into the aluminum main frame and a bit of expertise is required for servicing.

Removal from the case is accomplished by unsnapping two connectors at the back of the unit and pulling on the front panel.

The microphone supplied with the unit is a 500 ohm, dynamic type. It is larger than the old pencil type that used to come with the TR-22 and it is better sounding in my opinion.

The Receiver

The receiver problem experienced with the early TR-22 no longer exists under most operating conditions with the TR-22C. I was unable to come up with a schematic of the early version of the transceiver, thus it is a bit difficult to relate specific circuit changes. The present receiver has dual conversion, with a first i.f. of 10.7 MHz and a second i.f. of 455 kHz.

The r.f. amplifier is a 2SK19 FET. This is the only FET in the transceiver and is a good device, but not as good as a MOSFET such as the 3SK41. The mixers are conventional and not of the balanced type that so many of the manufacturers have gone to in their designs.

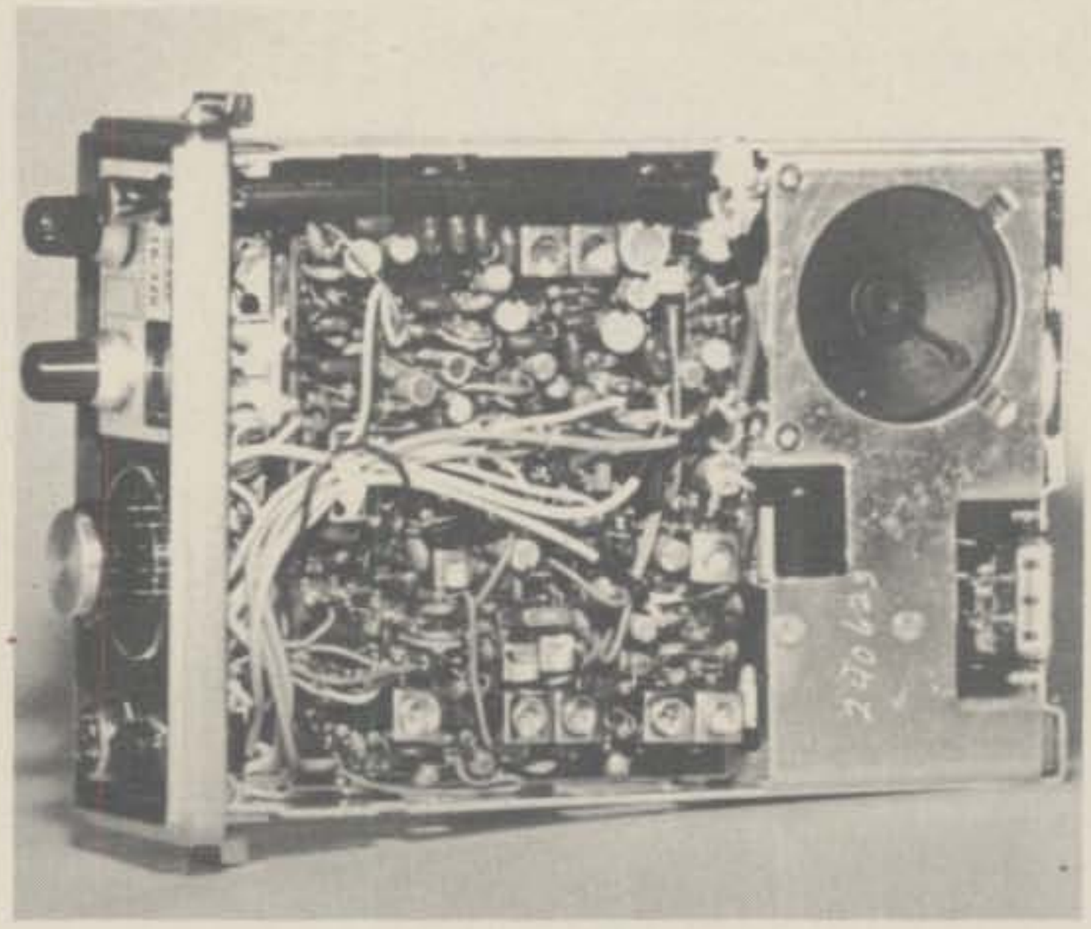
One big change in the receiver is the inclusion of a two pole monolithic crystal filter in the 10.7 MHz i.f., following the first mixer. I would suspect that this filter accounts for the greatest degree of improvement in the receiver. A eight section Murata ceramic filter is used in the 455 kHz second i.f.

A TA7061P, high gain IC, functions as the limiter. This device in conjunction with the diode ratio detector results in good immunity to impulse noise. Once full limiting is reached the audio amplitude remains constant with large increases in signal level. The performance of these two circuits contribute greatly to the overall "sound" of the receiver.

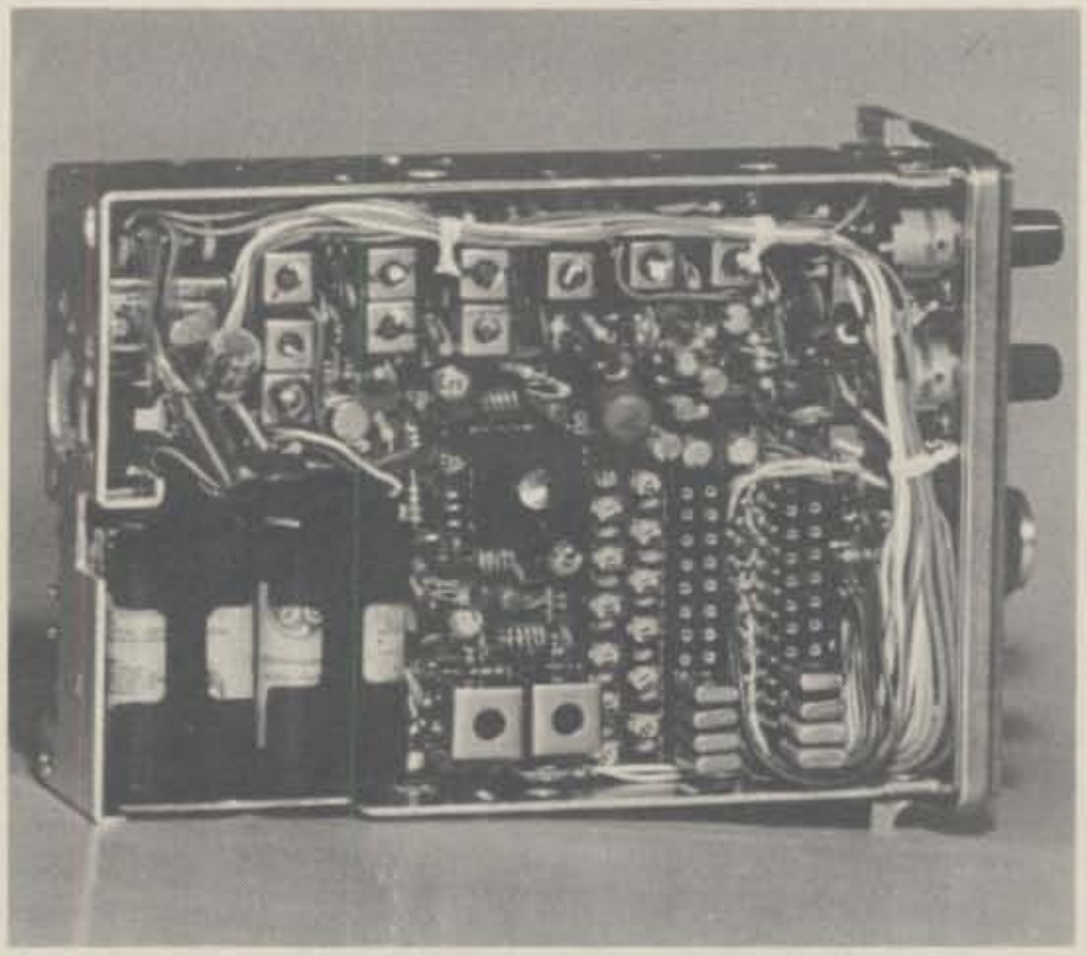
The manufacturer rates selectivity as 20 kHz at the −6 db point and plus or minus 30 kHz at the −75 db point. This is a considerably wider passband than found on most of the newer transceivers and I was anticipating problems as a result.

Mobile operation with the TR-22C proved satisfactory. Some inter-modulation was experienced, but it was not severe enough to inhibit operation under most circumstances. A couple of times the receiver went bananas when in close proximity to another mobile unit operating on an adjacent channel (30 kHz separation).

Drake rates receiver sensitivity as "typically .5 microvolt for 20 db of quieting." The unit under test required .9 microvolt to achieve 20 db of quieting. Squelch opened at about .4 microvolt or less, depending on how carefully you set the threshold and



(Receiver section)



(Transmitter section)

As you can tell from the photographs, a lot of parts are packed into the case of the TR-22C. There are two main phenolic circuit boards. One for the receiver circuitry and one for the transmitter. Everything fits snugly into the aluminum main frame and a bit of expertise is required for servicing.

the state of charge on the Ni-Cad pack.

Audio quality of the receiver is good, but with the built in speaker is not sufficient for mobile use. Connection of a 5 inch speaker to the external speaker jack produced all the audio you could possibly want.

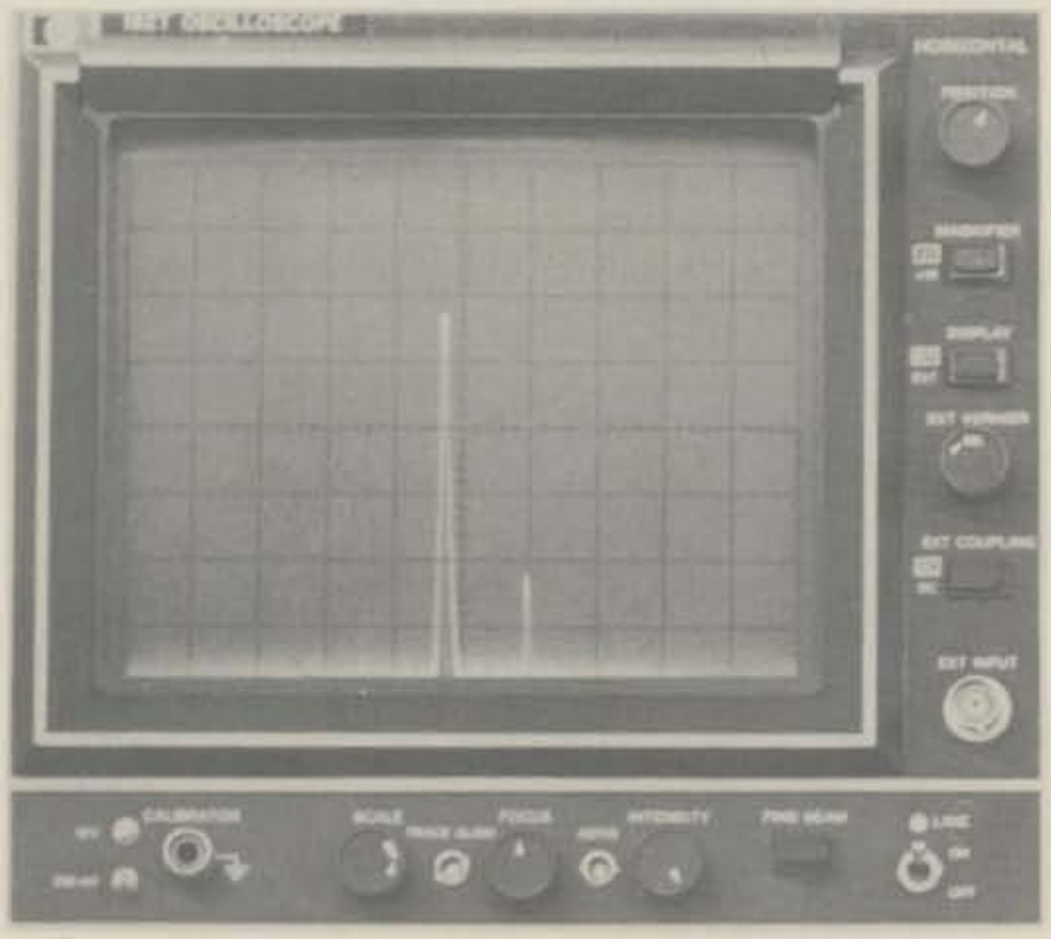
The Transmitter

The transmitter is phase modulated with audio from an IC microphone amplifier. The oscillator uses 12 MHz region, fundamental crystals. Output in the two meter band is achieved by doubling, tripling and doubling again the oscillator frequency.

Fig. 1—Block diagram of the Drake TR-22C two meter transceiver.

Audio is good and can best be described as communication quality.

Power output is conservatively rated at a minimum of 1 watt. Under test conditions, power output ranged from a low of 1.4 watts with 12.6 volts applied, to a maximum of 1.65 watts with 15 volts applied.



The spectrum analysis photograph illustrates a sweep width of 10 MHz per division and an amplitude of 10 db per division. Approximately 12 MHz above the carrier frequency you can see a spur, which is just over —40 db down from the carrier level.

The spectrum analysis photograph illustrates a sweep width of 10 MHz per division and an amplitude of 10 db per division. Approximately 12 MHz above the carrier frequency you can see a spur, which is just over −40 db down from the carrier level. This spur corresponds to the fundamental oscillator frequency of the transmitter. The second harmonic measured −45 db down from the carrier level.

Other spurs are in excess of a −55 db down from the carrier level. With all spurious well out of the two meter band, you need not worry about interference with adjacent channel repeaters. The possibility of interfering with services adjacent to the two meter amateur band is also unlikely due to the attenuation of the average antenna at frequencies that are far removed from the band.

I found the power output of the unit to be adequate for most mobile operation around the Los Angeles area. If you feel that some additional power is required in your area, you could purchase the Drake AA-10 power amplifier for $49.95. The AA-10 is rated at better than 10 watts output, when powered by 13.8 v.d.c. and driven by the TR-22C. Better yet, pick up on one of the many solid state circuits that have been published in the past couple of years and build an amplifier yourself. It's an easy project and will save you a little money.

(Continued on page 71)

WILLIAM I. ORR, W6SAI, ON

Antennas

I pulled slowly into the driveway and parked the car near the garage. Atop the tower, which was mounted next to the garage, I could see my friend Pendergast. He was locked to the tower with his safety belt and was obviously working on his antenna system. I got out of the car and squinted up into the bright sunlight.

"What are you doing up there?", I called. In reply, Pendergast yelled, "Heads!!", and tossed down a handful of tools and rusted nuts and bolts which landed with a thump at my feet. "I'll be right down", he shouted as he unfastened the safety belt and began his passage down the lattice-work tower. When he reached the ground he was puffing.

"You are certainly out of shape". I observed. "A fellow your age shouldn't go about climbing towers like a 20 year old lad".

Pendergast gave me a disdainful glance as he slid out of the safety belt.

"Nonsense", he replied. "A little exercise never hurt anyone. And it is a good idea to look over all the antenna hardware once the winter season is over. Look at these turnbuckles and bolts! All very, very rusty. I've replaced them all, and the tower is ready for another year of hard DX work!"

"Agreed", I replied. "And now you can come over and do the same maintenance work on *my* antenna".

Pendergast ignored the invitation as he wiped his hands on a dirty cloth. He glanced at the car, and asked, "Anything interesting in today's mail?"

"Yes", I replied. "I just received the January issue of *Radio Communication* from England by slow boat. What a great magazine! And this issue has some real good antenna dope in it. You should subscribe to it[1]."

"What's in the January issue that is of interest to antenna buffs?", asked Pendergast, as he tossed the dirty cloth onto the seat of my car.

"Well, 10 or 15 years ago DL1FK designed a two-band dipole. It was described in various magazines and also in my *Beam Antenna Handbook* (fig. 1). I always thought this was a nifty way of working a dipole on two bands. But the idea died. It never caught on".

"How does it work?", asked Pendergast. He walked into the shack, took a copy of the *Handbook* from the shelf and turned to page 133. "Here's what you said about the DL1FK antenna", and Pendergast read:

"The complete antenna element is made self-resonant at the highest frequency of operation. At some lower frequency the element is center-loaded by a parallel tuned circuit consisting of the center of the element, a capacitor connected across the element, and the connecting leads of the capacitor. The element (which is slightly more than ½-wavelength long at the highest frequency) presents a capacitive reactance across the tuned circuit at the lowest frequency of operation. This reactance, plus the reactance of the parallel capacitor are sufficient to resonate with the inductance of the center loop at the lowest operating frequency. At the highest frequency of operation, the tuned circuit exhibits a capacitive reactance which is nullified by lengthening the element a slight amount".

Pendergast placed the Handbook on the table and picked up the issue of *Radio Communication*. "I see that Pat Hawker's *Technical Topics* carries this idea a bit further", he observed. "The discussion comes from

[1]Membership in the Radio Society of Great Britain, plus their magazine, *Radio Communication* costs $15.50/year. Application is made to General Manager G.R. Jessop (G6JP), R.S.G.B., 35 Doughty St., London WC1N TAE (England).

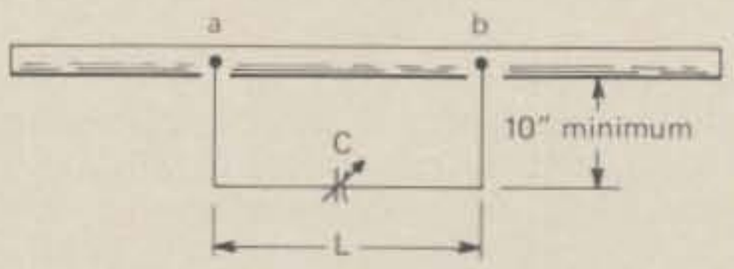


Fig. 1—Representative half-wave dipole or driven element of parasitic beam designed for two frequency operation. Capacitor C in conjunction with the inductance L between points a-b provides a resonance from 0.5 to 1.0 octave above the fundamental frequency. Connections to the capacitor are made with tubing of ¼-inch to ½-inch diameter for a tubing element of 1¼-inch diameter. For 14 MHz, the distance a-b is about 7 feet and capacitor C is about 90 pF.

Les, G6XN, who has done a lot of original work and development with aerials—that means *antennas* in America", said my friend.

"Thanks", I replied. "You are a big help".

Pendergast continued to read from the magazine:

"The illustration (fig. 2) shows how

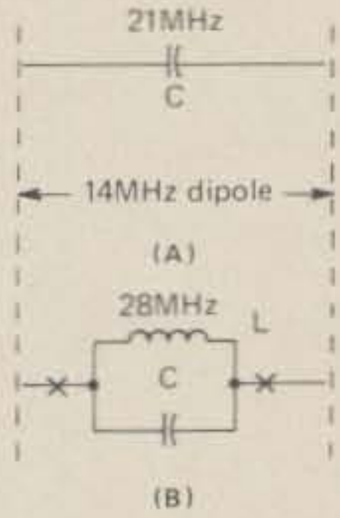


Fig. 2—A 14 MHz element can be resonated at 21 MHz by capacitive loading and at 28 MHz by a combination of L and C. To convert antenna (b) into antenna (a) the capacitor C can be increased so that it turns out L in addition to the inductive reactance of the dipole. However, the presence of L has considerable effect on the fundamental 14 MHz resonance and this must be compensated by series capacitance at points X-X or by shortening the dipole.

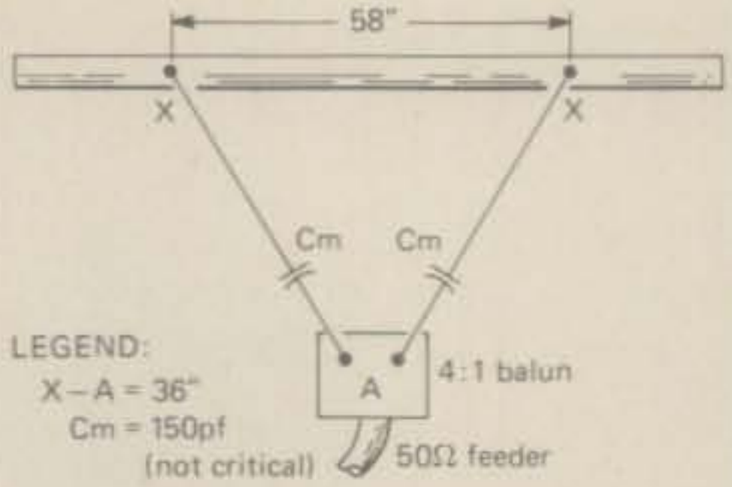


Fig. 3—The G6XN balanced feed system for a multiband driven element. With reference to fig. 1, the capacitor has been split in two and the inductor L has been brought off at angles from the dipole to form a matching device that permits a good match to a 50 ohm unbalanced transmission line via a 4-to-1 balun.

a 14 MHz element can be resonated at 21 MHz by capacitive loading and at 28 MHz by a combination of *L* and *C*. To convert antenna (b) into antenna (a), capacitor *C* can be increased so that it tunes out *L* in addition to the inductive reactance of the dipole. However, the presence of *L* has considerable effect on the fundamental 14 MHz resonance and this must be compensated by series inductance at points X-X or by shortening the dipole.

"Using these techniques, the end product of this approach is the antenna of fig. 1. This antenna can be resonant at 14 MHz, yet span 21 MHz to 28 MHz by adjustment of capacitor *C*. The element is resonated at its higher frequency by the capacitor acting in conjunction with the distributed inductance *L* represented by the section of the element across which *C* is connected. Matching to a driven element is no great problem, G6XN reports, since the radiation resistance of the dual-frequency element, when expressed as a resistance in parallel with *L*, has (or can easily be arranged to have) comparable values at each of the operating frequencies. The feed resistance between any two points along *L tends* to be independent of frequency. The beauty of the system is that the capacitor has virtually no effect on the basic dipole resonance (say 14 MHz) except for a slight, and potentially useful, shift in band-center frequency of the order of 1 percent when a 14 MHz element is being used and *C* is given the appropriate value for 21 MHz."

Pendergast interrupted himself, thought a moment, and then said, "It seems to me that an element such as this should provide some signal gain on the higher frequencies".

"Read on", I invited.

Pendergast continued reading:

"Since the full aperture of the element is used on all frequencies this means that a 14 MHz element can itself give up to 2 dB gain at 28 MHz and up to 1 dB at 21 MHz. There are, of course, no traps to incur losses or to require supporting in the elements, so simplifying construction. When applied to a Quad, as much as 3 db extra gain may be achieved at 28 MHz, plus freedom from the interacting effects of 'nested' elements".

"This is really a very clever idea", I said. "As G6XN points out, dual frequency operation is very simple and tri-band operation seems possible if the user is willing to adjust the value of capacitor *C* when changing bands.

"It seems the experimental work was done on a three element 14 MHz Yagi, with the element arrangement shown in fig. 1. A dual band beam was achieved by simply stringing a capacitor on each element, as indicated in the drawing. For the 14 MHz element, the distance a-b is about 7 feet and the capacitor is about 90 pf. G6XN started out with receiving-type capacitors until he achieved the resonance points he desired and suggests that the capacitor have a 2 kv rating for legal limit operation.

"While element spacing may not be optimum for the higher band, it is not critical and gain is good. Front-to-back ratio, however, seems to suffer with the greater spacing between elements, when the antenna is operating on the higher frequency band."

"Very interesting", commented Pendergast. "How did G6XN feed his dual-band driven element?"

"Look at fig. 3", I replied. "G6XN modified the shunt capacitor arrangement into a triangular shape, and used two capacitors, one in series with each leg. The feed point is at the junction of the capacitors".

"So by placing capacitors on the reflector and director of a 20 meter Yagi, as shown in fig. 1, dual band operation is achieved for these elements. And by using the arrangement of fig. 3 on the driven element, the beam can be fed and matched on two bands," said Pendergast.

"That's about it," I replied. "Of course, no guarantee can be given of equally low s.w.r. on both bands, but there's plenty of room for experimentation. I hope some reader of my column has the time and desire to experiment with this novel idea, as it looks as if a dual-band Yagi can be built up without the use of lossy traps or messy stubs. I like this concept, and hope to have more information on it in the future. Hats off to G6XN and G3VA for a noteworthy contribution to the search for a multi-band antenna."

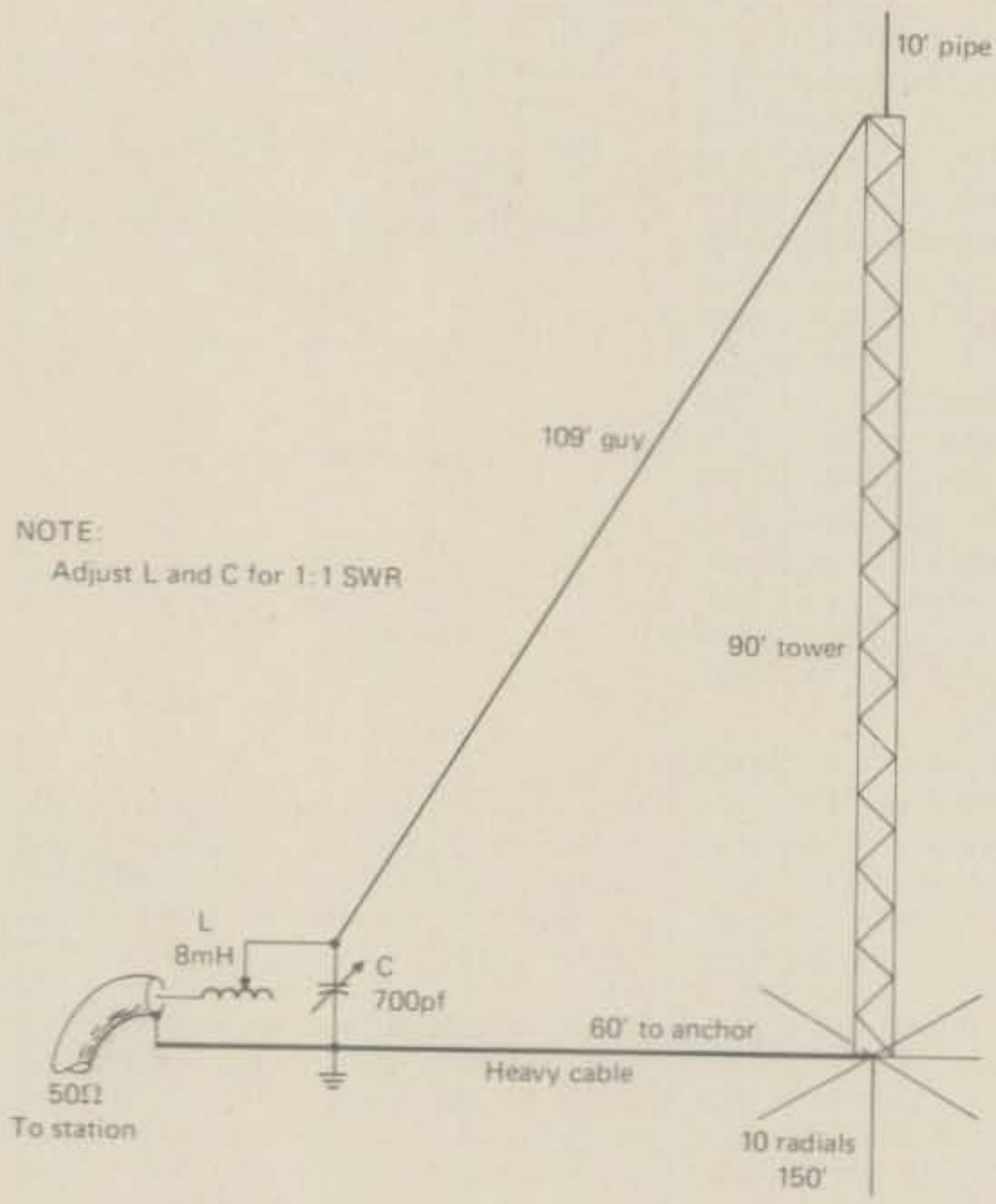


Fig. 4—The W3IN folded unipole for 160 meters. The 90 foot tower is shunt-fed by one of the guy wires. A ten foot extension atop the tower provides a bit of top loading and improves the match at the base of the guy wire. A simple L-network is used to resonate the system. Ten 150 foot radials provide a good ground screen.

Pendergast sighed, then he said, "I wish some of these smart fellows would come up with a good antenna for 160 meter DX for me. I am still using a loaded, 60 foot wire and I can't punch my way out of a paper bag. Have you received any mail on this subject?"

"Yes," I replied, "I have. In fact, I got a fine note from Don, W3IN, who did the summary of the 160 meter DX contest in the December issue of *CQ*. Don has worked 72 countries on 160 meters and was among the top ten high scores in both the *CQ* and the ARRL contests for the past few years. So he qualifies as a DXpert on the top band!

"Don has a 100 foot, guyed tower, top-loaded by a 10-foot "star" made of metal rods. He lights it up at Christmas, too—"

"With R-F?", inquired Pendergast.

"He doesn't say," I replied. "To continue . . . Don says the tower needs guy wires to hold it up, so he uses one of the top guys as a feeder. This transforms the tower into a version of a folded unipole (fig. 4). He places a strain insulator at the ground anchor of one guy and feeds it with an L-network placed in a weatherproof 'dog house' at the foot of the guy. All the other guy wires are broken up with strain insulators, and the top portion of the guys are bolted directly to the tower to act as additional top loading. A heavy cable is buried from the tower base to the feed point to keep the loop resistance low. And, in addition, ten 150 foot radials are laid along the surface of the ground and connected to the tower at the base. A photograph of the installation is shown in fig. 5.

"Don uses a surplus roller coil with 8 millihenry inductance in the matching unit. The capacitor is a three-gang broadcast variable unit, as the voltage across it is quite low. He fed the tower with a few watts of power at 1825 kHz and adjusted the coil and capacitor for minimum s.w.r. on the feed line. He says the s.w.r. is quite low across the whole 160 meter band from 1800 kHz to 2000 kHz."

"Well I heard Don, W3IN, during the last 160 meter test. He put one helluva signal out here in California," said Pendergast.

"Well, he may not be so loud now," I replied. "In his letter, he says he is experimenting with a parasitic director aimed on Europe. It is suspended from a cable between the 90 foot tower and an 80 foot tower about 200 feet away in the desired direction. An insulated 60 foot top-loaded horizontal portion plus a 75 foot down-lead is used for the director, shaped like a T-element. A roller coil from the bottom of the vertical wire to a second set of radials provides the tuning adjustment. A remote relay shorts out the roller coil when a circular pattern is desired. The gain is not spectacular, but on 160 meters, every bit helps!"

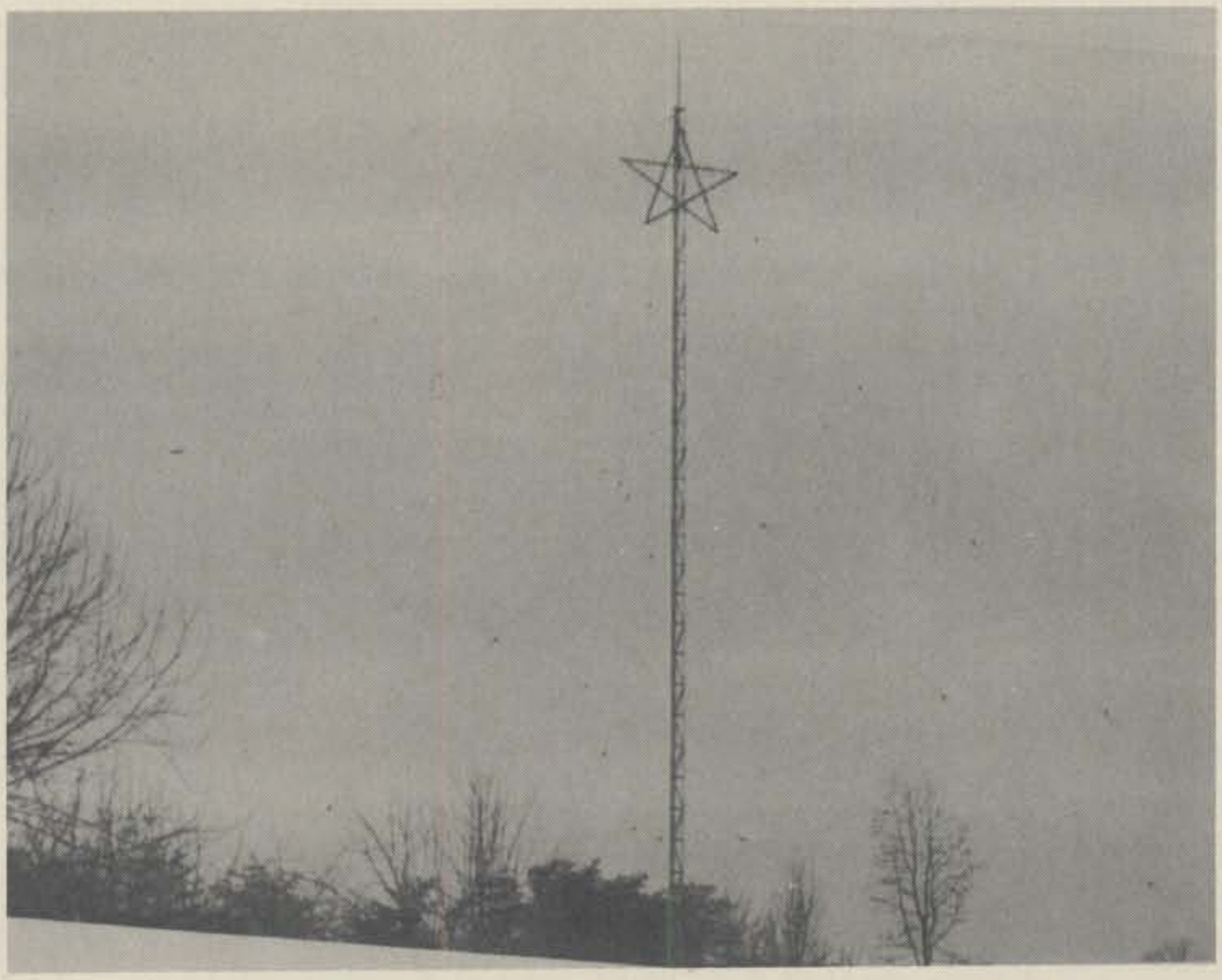


Fig 5.—Neighbor's view of the W3IN folded unipole for 160 meters.

"I'd certainly love to put up something like that," said Pendergast, with a wistful tone in his voice. "It's tough to be loud on a city lot."

"Well, you are a lot luckier than some fellows I know. I got a letter from Jerry, W4IOW/4. He's going to North Carolina State College and lives in a two story, wood frame apartment building. No antennas allowed, naturally. So Jerry merely tossed a small diameter wire across the roof of the building (fig. 6). The antenna lies hidden on the roof and dangles a few feet down the opposite side of the building. He brings one end of the wire in through the window to an L-network and uses the heating system which runs around the baseboards of the room as a ground. He says the simple antenna works well on 40, 20 and 15 meters. He doesn't know how long the wire is, but guesses it is about 35 feet long, judging from the width of the building."

"Necessity is the mother of invention," remarked my friend.

"Now that we're speaking of end-fed wires, I received an interesting note from 'Speed', W8RKD. He's using an end-fed wire that is high in the center, and low at the ends, somewhat in the fashion of an inverted-V. He feeds it with a pi-network, through a coax bridge. He notes that the minimum s.w.r. changes with the weather. During the dry season his s.w.r. is near unity and in wet weather it rises as high as 1.5-to-1. I have noticed that the s.w.r. and also the antenna current on my 160 meter Marconi varies with the dampness of the soil, and I'm pleased to see that someone else agrees with my observations. It proves that the earth under the antenna really exerts a profound influence upon the operation of the antenna."

"Well, I notice that the s.w.r. on my feedline changes when I aim my 20 meter beam into a nearby tree," remarked Pendergast. "And I also notice that the s.w.r. change depends upon the season of the year. The more leaves on the tree—and the more sap in the trunk, I suppose—the higher the value of s.w.r."

"I don't think we know everything about antennas just yet," I observed. One of the things that puzzles me is the often-published graph showing the radiation resistance of a half-wave dipole above ground. Of course, the curve is the theoretical case and may not represent what is going on in real life, where the dipole is suspended above an imperfect ground.

"In any event, the classic curve shows that the radiation resistance of a dipole is about 73 ohms at a

(continued on page 70)

Who is #1??

How Many Are Firsts??

These and other questions are answered in an early report on the CQ sponsored Special Bicentennial Achievement Award:

USA-WPX-76

BY BERNIE WELCH, AC8IMZ

When is an award a contest? It had to be when the "USA-WPX-76" was announced by *CQ* in October 1975. A numbered award presents a special challenge from the start and ours was no exception. As of 0500 GMT, January 1, 1976, the bands became saturated with the special bicentennial-prefix calls. In fact, for the first few hours it sounded like a combination of the *CQ* World Wide DX, the WPX/SSB Contest, Field Day, and Sweepstakes, plus 1 or 2 others. You can bet your old wornout 807 that this QRM included a big percentage of WPXers working contacts toward that number "1" on the award.

How many number "1s" can be awarded. For this award we have three: USA #1—for the Continental USA; DX #1—for outside the Continental USA; SWL #1—for a special version for Short Wave Listener Stations World Wide. Each of these in a separate numbered series.

The USA-WPX-76 DX #1 Award Winner is Richard C. Spenceley, AJ3AA, better known as Dick, KV4AA. This was an excellent endeavor by the person who started it all many years ago. As originator of the WPX Award Program for CQ in October 1958, Dick is aware of the importance placed on his special "AJ3" prefix by WPXers. He is putting forth an all out effort to make it available to the world. As of the first week in Feb., he had made over 2200 contacts. In 1969, Dick was the 4th member selected to the DX Hall of Fame. A QCWA and DXCC member, he rates WAZ tops among his many awards. He is past President YASME Foundation and from 1951-1959 was CQ's DX Editor.

Congratulations To:

Rick, AA5VDH,—USA #1 and Dick, AJ3AA,—DX #1 on their outstanding bicentennial year achievements. Rick and Dick as well as USA #2,—Scott, AA8UUY accomplished this during the early hours the first day of 1976. As yet (early Feb.) no applications have been received for the s.w.l. awards.

Never let it be said that in the quest for #1 there are no "firsts". This award has a "carload" potential. Early examples are Doug, XJ4QZ (Canada); Bob, AK9RMG (Novice); Douglas, G6TA (England); Clara, AB4NXR (YL). And the bold listings in "The USA First 35" block indicate the first award issued for a different prefix and/or state. Can you imagine the number of firsts not yet tapped??

Thanks for your many letters. As a result of queries received, several items pertaining to the rules need clarification. (1) The award is **FREE,** courtesy of *CQ*. Send no money. (2) The award period ends as of 0500 GMT, Jan. 1, 1977. The cut-off date for the acception of applications is March 1, 1977. This is to allow time for boat mail to arrive from rare and isolated areas of the world. (3) Yes, you can qualify for more than one award—a fixed station, all contacts from the same QTH and a mobile station with all contacts mobile, are separate awards. Each could qualify for more than one award in their category, provided all the contacts were with new and different stations using the special USA Bicentennial Prefixes. (4) The use of WPX Award Application Form 1051B **is not** mandatory. You can make your own form. Just

• THE USA FIRST 35 •

AWARD #	CALL	STATE
001	**AA5**VDH	**AR**
002	**AA8**UUY	**WV**
003	**AAØ**TKJ	**KS**
004	**AA9**UEK	**WI**
005	**AB8**IAY	**OH**
006	**AC4**CRW	**VA**
007	**AC7**HKI	**WA**
008	**AA1**EUO	**ME**
009	AC7CKW	**AZ**
010	**ADØ**QIX	**CO**
011	**AC9**LUH	**IL**
012	AC7WMY	WA
013	AC4CHK	VA
014	**AC8**WT	**MI**
015	**AA7**OBH	**MT**
016	**AA4**WTG	**FL**
017	**AA2**AUB	**NY**
018	AC4WSF	VA
019	**AC3**ARK	**PA**
020	**AA6**CPP	**CA**
021	**AK9**RMG	IL
022	AC4OZF	FL
023	**AD9**DAF	WI
024	**AC1**DWA	**MA**
025	AC8KPL	MI
026	**AB4**ZXP	**KY**
027	AA2CCF	**NJ**
028	AA6GLD	CA
029	**AC6**GSQ	CA
030	AC7ULC	**OR**
031	AB4ZTI	**NC**
032	AC7KOI	**NV**
033	**AC2**GA	NY
034	AC8IEC	MI
035	**AD1**RQF	MA

follow the application requirements listed in the rules. (5) QSLs are not required. If you haven't already started to accumulate those special bi-centennial prefixes, there is still ample time to qualify for this very attractive award. Some award-chasing amateurs are working toward "specific numbered" certificates such as: #50, #100, 200, etc. It is not uncommon for others to be a double or triple achiever for the same award. This is even an excellent opportunity for non-award hunters to join the fun.

The USA-WPX-76 is a once in a lifetime award and is definitely a part of the Spirit of '76. **GOOD LUCK!** Watch future issues of *CQ* for additional reports.

Applications for USA-WPX-76 Certificate Awards should be sent to W8IMZ, 7735 Redbank Ln., Dayton, OH, 45424, USA.

The Arkansas DX Association President, Rick Roderick, AA5VDH is the USA #1 Award Winner. Primarily a DXer, Rick enjoys contests and is an enthusiastic award chaser. Among his many accomplishments, he is especially proud of his 20 meter C.W. WAZ #7. He has won WPX Contest certificates, holds WPX Awards for S.S.B., C.W. and Mixed and is on all three WPX Honor Rolls. A DXCC member, he has 5 Band DXCC and WAS. An active radio amateur since 1968, he is past President of the Arkansas Valley Amateur Radio Club. A very remarkable feat, Rick. That extra effort did the job.

Math's Notes

BY IRWIN MATH, WA2NDM

Last month, you will recall, we began discussing various ways to improve test equipment—particularly r.f. generators. This month we will continue in the test equipment area, but instead of improvements we will present several simple but interesting items that will be useful additions to all experimenters labs.

Fig. 1 is a schematic of a versatile decade resistor that can be made of only 4 independent resistance values and a standard 2 pole 10 position rotary switch. The value of "R" should be 1/10 of the full range of the decade desired. For example, if a 0-1K decade is desired, R would be 100 ohms, 2R, 200 ohms and 4R, 400 ohms. If precision resistors are used, then the entire decade will be a precision device. Many surplus houses do offer various assorted precision resistors at give away prices and this is an excellent way to employ them.

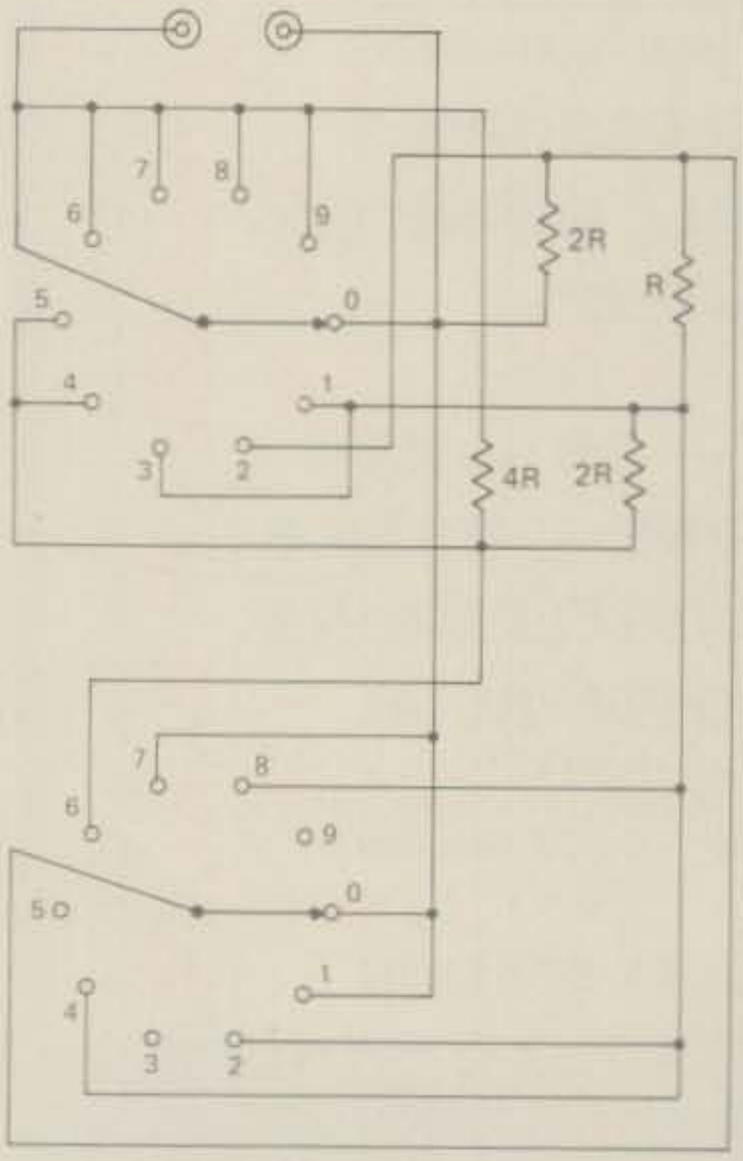


Fig. 1—A simple resistance decade device described in the text.

Several such decades may be mounted in a common cabinet and connected in series and will result in a wide range precise variable resistance. Remember however, the wattage rating of this decade is only as high as the lowest wattage rating of the resistors used.

Fig. 2 is another interesting "decade +" device but this time, with capacitors.

Here we have employed a standard BCD thumbwheel switch to switch a series of 4 capacitors between 0 and 10. The BCD logic of this type of switch is such that the capacitances are paralleled in the correct order to achieve a 0-10 range. The value of C is 1/10 the total value desired by the decade. So, for a 0 to 1 uF decade, C would be .1 uF, 2C .2 uF and so forth. With this scheme, one could also obtain digital thumbwheel switches that go beyond 10 and therefore get capacitances up to 1.5 times the basic value of C. Alternately, slide or toggle switches could be used if you do not mind doing the mental arithmetic—the sum of the switch settings is the capacitance. Like the resistors, these decades could also be "stacked" by placing them in parallel (the "0" position of the switch does not connect any capacitance).

There are two precautions to bear in mind if you do use thumbwheel switches. First is to be certain that the contact ratings are adequate to carry the currents to be encountered—particularly with elecrolytics, and second to take into account the stray capacitance when dealing with very low capacitance values (below about 50 pF).

In fig. 3 we have a neat little gadget that can be quite useful when checking diodes from one of those bargain sources that give you "hundreds for a dollar." This device is simplicity

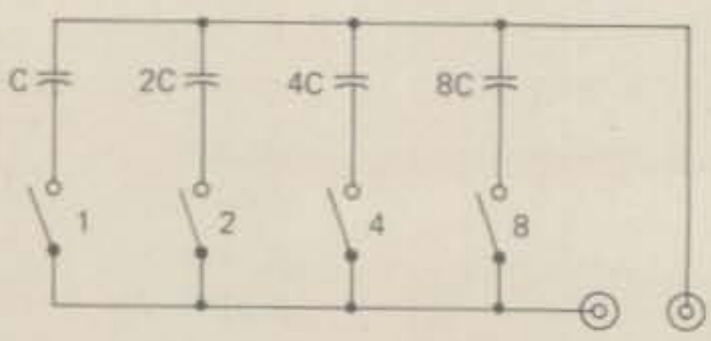


Fig. 2—A "digital" capacitance decade. See the text for details.

in itself but can save hours of time. (Believe me I've used it on many occasions).

As can be seen, half of a 6.3V filament transformer (3.15 volts) is connected in series with a current limiting resistor, the unknown diode and a zero center d.c. milliameter. If a good diode is connected to the circuit, it will rectify the a.c. and cause the meter to deflect. If the diode is open, there will be no meter reading and if it is shorted, a.c. will pass which will not deflect the meter. In addition by building the circuit as shown in the figure, the meter leads may be connected so that the meter pointer points to the cathode terminal, thus unmarked diodes can be easily identified. The operating voltage of the device is also small

(Continued on page 69)

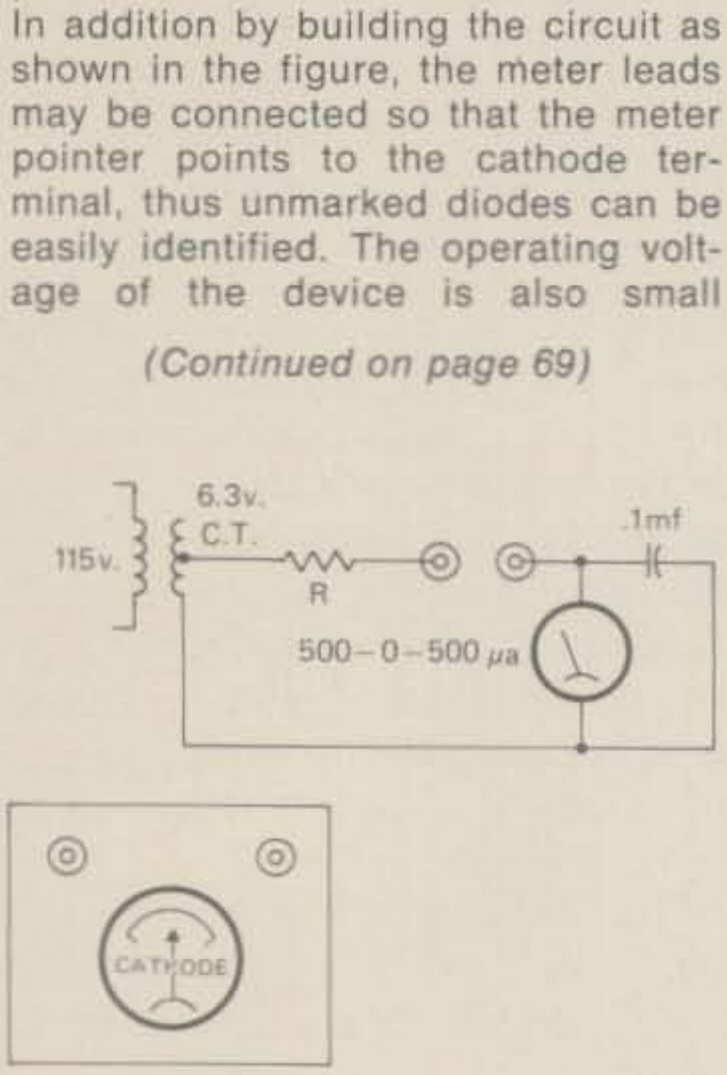


Fig. 3—A simple diode tester/identifier. The value of R should be chosen for full scale deflection of the meter with a good diode.

In Focus

BY BILL DEWITT, W2DD

Yes, You Can Watch SSTV On Your Regular TV Set!

Right from the start, interest in slow scan television has been inhibited by the transient nature of the images viewed on a greenish-hued screen. Because slow scan pictures are transmitted at optional rates ranging from 8 to 34 seconds per frame, it has been necessary to view them on a long persistence CRT screen similar to those used for Radar display. Now, a device called a scan converter makes it possible to see these still pictures in complete form on a "regular TV set". These black and white pictures can be viewed in sequence as received, or individual frames can be "frozen" for extended viewing. If you haven't seen a demonstration of what is currently possible, you just don't know how exciting SSTV can be!

So, scan conversion represents the first revolutionary change to occur in SSTV technology since the introduction of the system by Copthorne MacDonald (now WØORX/VE1) in the late fifties.

Don't get the idea that scan converters are brand new "hot off the press" items. They have been around for several years, but they have not been generally available to amateurs. What then has changed the picture?

I believe that four things are principally responsible for the rapidly increasing number of scan converters used for TV set display of received images. Not necessarily in order of importance, they are: The availability of designs (by WØLMD, WB9LVI, and DL2RZ) for digital scan converters; The lowering of prices of many of the IC chips used in digital scan conversion; The availability of a commercially built storage tube scan converter (Robot Research's Model 300); The availability of PC boards designed for the construction of the digital scan converters mentioned above.

I'm sure that watching SSTV pictures on the long persistence (P-7) type monitors will continue to hold great fascination for a great many hams. The P-7 monitors are less complicated and cheaper by far to build, but there's no doubt about it, the advent of TV-set display of slow scan pictures is broadening the base of interest in SSTV enormously. "In Focus" will offer further comments of a general nature on this subject as time goes on, but now, on to specifics!

Scan Conversion Scoreboard— At Home And Abroad

By the time you read this, I expect that there will be at least 15 or 20 WB9LVI-designed converters (using the W3GKW boards) in use, and more on the way.

Rick Vidmar, W9LXM, of Woodridge, Ill. and Jim Rogers, W4ATK of Birmingham, Ala., have built their own versions of Dr. Steber's design. Rick's converter uses a core plane memory, while Jim's unit employs 2102 RAMs instead of the 1404 memory chips. More details and pictures of W9LXM's converter are included later in this column.

You say wiring up those boards is just too much? You say you can't find the components? You say the whole thing is just too complex? Well, Norris Sapp, W8LFA, has the power of positive thinking. He is building *BOTH* the WØLMD and WB9LVI scan converters! As a matter of fact, he's just finished up the LMD converter and will be working away on the LVI boards during his current voyage on the container ship *Nancy Blykes* (WCUU). Norris is the Radio Officer on the ship.

On the European continent, DL-2RZ's scan converters are finding favor. There may be close to a dozen of them in operation by this time. In England there are 8 or 9 LVI converters taking shape. How about some reports from Africa, Asia, and Down Under?

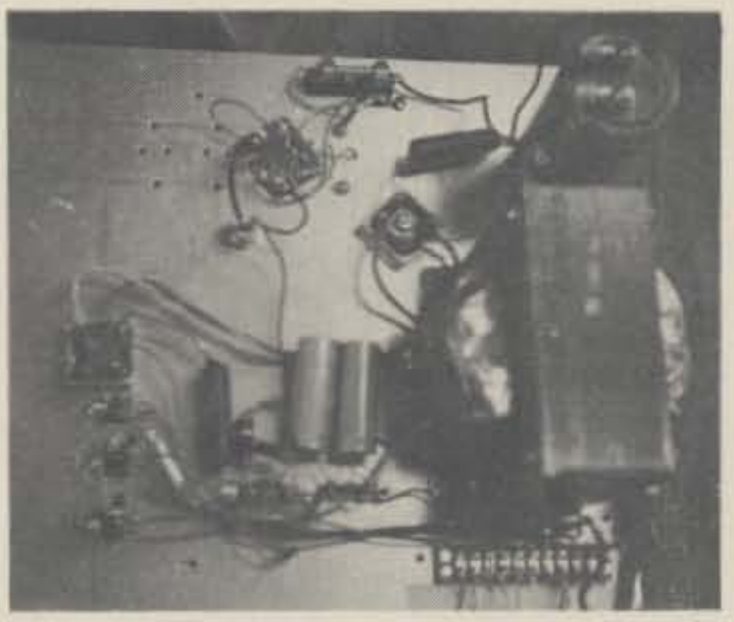


Fig. 1—Power supply board for the W9LXM Scan Converter.

So far as the storage tube approach to scan conversion is concerned, I believe that there are only three or four amateurs using home-brewed storage tube converters. In early February, Joe Hawkins, President of Robot Research told me that they had shipped about 60 Model 300s, still working on a stack of orders.

Dayton bound SSTVers are anxious to see the Sumner HCV-2CS scan converter using Charge-Coupled Devices and the Digital Group's WØLMD Super System on which no details have been available.

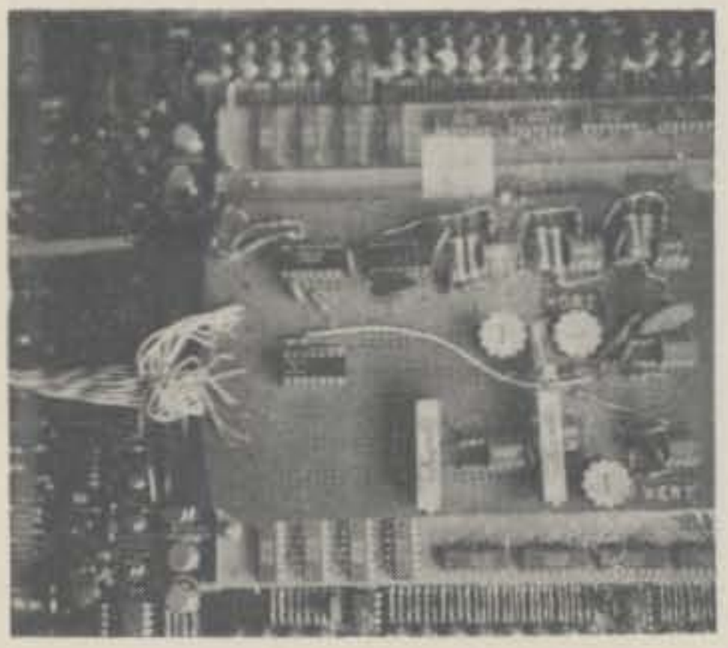


Fig. 2—Horizontal and vertical sweeps are "piggy-backed" atop the Microdata board.

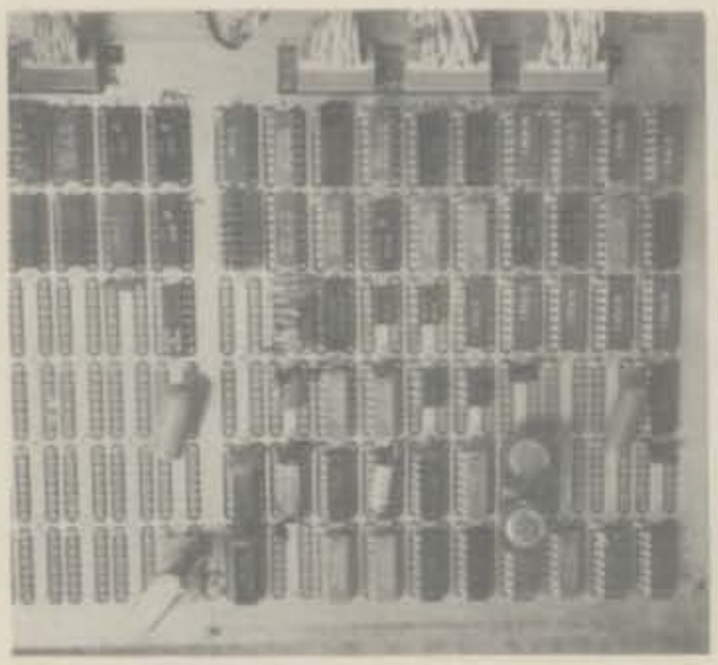


Fig. 3—Augat board (trade name) containing many ICs and associated components. As mentioned in the text, this type of board has excellent Vcc and GRD distribution planes, 30 gauge wire wrapping is used for all connections.

You don't have to be a latter-day Hugo Gernsback or a present day Jeanne Dixon to predict that 1976 is going to be the year of the scan converter!

R-S-V—An SSTV Reporting System

A recent letter from Tom Pollock, WB6ZYE, of Monrovia, CA., reports the use of an effective signal reporting system for slow scan. Come to think of it, we could use a good reporting system!

This system was developed for MARS use, but Tom suggests its use for amateur SSTV. Here's a near verbatim version of the R-S-V system as described by WB6ZYE.

R stands for Readability. **S** stands for Signal strength.

V represents Video Quality according to the following ratings:

V-5, closed circuit quality pictures.

V-4, good pictures with multi-path.

V-3, good pictures with interference.

V-2, readable pictures with multi-path and interference.

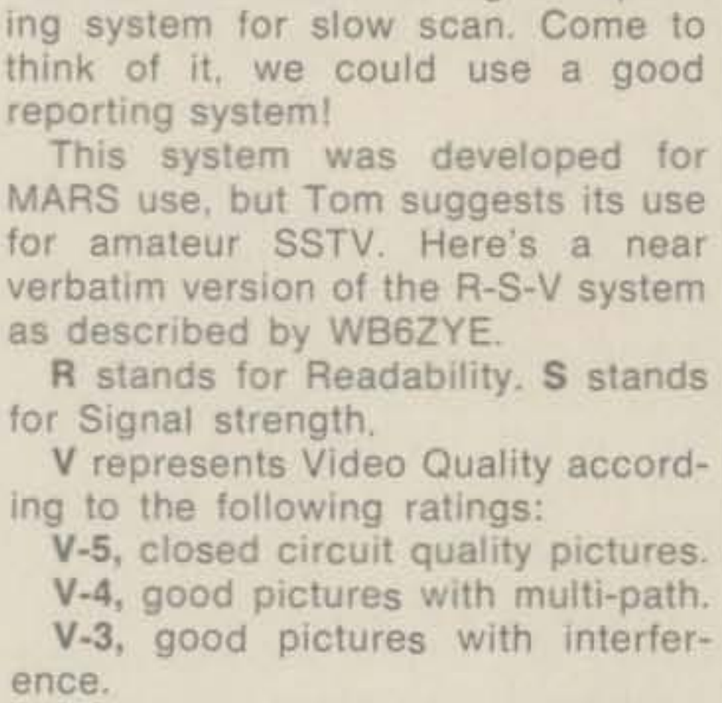


Fig. 4—Off the screen monitor photo demonstrating sharpness and tonal range of W9LXM's system.

V-1, mostly unreadable, loses sync, pictures interrupted.

Ken Wood Jr., K6IIS, is principally responsilbe for this reporting system. He started out with a scale of 9, but soon discarded it as being too cumbersome. The system has been in use on the Navy Marine Corps MARS SSTV Specialty Network for some time. Tom says, "Try it, you may like it!" Not a bad idea, and thanks for the input Tom! Incidentally, that MARS SSTV net meets at 2100Z on Saturdays and Sundays on 13975.5 kHz.

Details On The W9LXM Core Memory Scan Converter

During a recent SSTV contact with Rick Vidmar, W9LXM, he mentioned that he was viewing my transmissions on a 12 inch TV set via a modified version of the scan converter described by Dr. George R. Steber, WB9LVI, in the March and May, 1975 issues of *QST*.

Rick is using a Microdata Core Memory Plane, Part No. 20002208. Core drivers and read-out amplifiers are included on the 8 × 12½ inch board. This was a "rare" surplus find on Rick's part, but there may be others showing up. Unfortunately Rick cannot pin-point any source of these core memories. However, those interested would do well to keep checking their surplus sources for this Microdata board or its equivalent.

As is evident from the information supplied by Rick, the use of a core memory like the Microdata 20002208 can greatly reduce the total effort involved in building a digital scan converter.

The photographs of figs. 1, 2, and 3 show Rick's handwired boards. The line averaging feature of the scan converter was *not* operational at the time that the monitor screen photo of fig. 4 was taken. There will be a paired picture comparison showing the image quality obtainable *with* and *without* line averaging in an early issue. The sharpness, tonal scale, and lack of "whiskers" or other defects in the "girl picture" indicate how effectively Rick has "put it all together."

These preliminary comments are offered as an introduction to Rick's information. I think that Rick's data will provide a timely and useful guide for anyone contemplating the construction of a digital scan converter. —W2DD.

Scan Converter Details Supplied By W9LXM

1. Storage is accomplished by a core memory module that contains 8192 bytes. Each byte contains 8 bits. To fully utilize the memory capacity of 65K bits, the pixels are packed two per word.

2. The memory is accessed at a 474 kHz. rate (.984 MHz. divided by 2). The memory address is driven directly off the outputs of U30, U31, and U33 in WB9LVI's article.

3. A complete memory cycle actually takes only 1.0 microsecond; 0.5 microsec. for a read operation plus 0.5 microsec. for a write operation at the addressed memory location. Each memory cycle always consists of a read followed by a write operation. The write operation however, can consist of re-writing the information just read or writing new information. This function is controlled by a front panel switch to enable writing only desired parts or portions of a re-run of the same frame (to eliminate QRM or destroyed portions of an already stored frame).

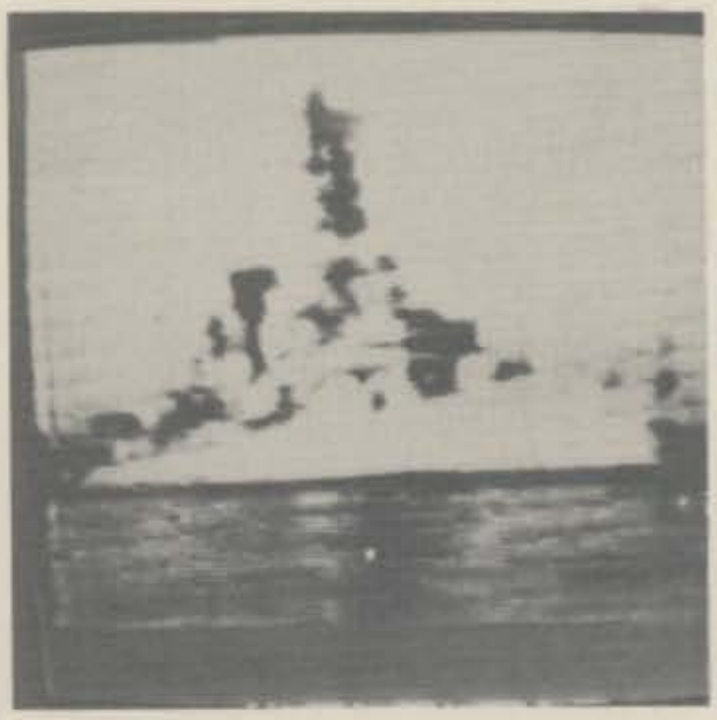


Fig. 5—FLASH! Naval vessel captured by SSTV camera! Blame the little dots on W2DD's tape playback.

4. With the core memory, a picture can be stored indefinitely—even during a power-off condition.

5. The complete scan converter consists of 4 modules:

A. Power Supply
   1. 5V. at 2.2 Amp.
   2. +12V. at .2 Amp.
   3. −12V. at .2 Amp.
   4. −6V. at .1 Amp.
   5. −5V. at .03 Amp.
   6. −16V. at 1.6 Amp.

B. A board corresponding to fig. 3 in WB9LVI's article. These components could have been just as easily mounted on the main Augat board, but were breadboarded separately as insurance against possible problems. Recommend placement on the main board.

C. The main board contains the remaining ICs and associated components. The Augat board

used for the main board has excellent V_{cc} and GRD distribution planes. This greatly reduces noise problems. (No problems were encountered, but this feature virtually eliminates the problems encountered when hardwiring multiple boards. One problem—they are expensive.) 30 gauge wire wrapping is used for all connections.

D. The memory board contains all the necessary X-Y current drivers and read-out amplifiers. Data communication is via a bi-directional data bus to data latches on the main board. The Write data latches are fed by U21 (WB9LVI's article) and the Read-out latches drive U50 and U51 (WB9LVI's article).

Please direct your comments and questions on this information to W2-DD. The courtesy of an s.a.s.e. will be appreciated.

How To Improve Your Solid State And Digi-Power

Heathkit has a couple of winners in the homestudy category. Digital Techniques (Kit EE-3201) covers fundamentals of digital circuit design. This homestudy (NOT correspondence) course is comprised of two large notebooks filled with explanations of most solid state devices commonly used, and directions for their experimental/instructional use. Also included in his kit are six 33⅓ r.p.m. records and 44 parts for use in 24 experiments.

A study program broken into 10 segments (with questions) leads you through the digital "woods" from binary numbers to micro-processors.

As an adjunct to the Digital Techniques course, and for independent experimentation, Heath offers their Digital Design Experimenter/Trainer (Kit ET-3200). This kit consists of a portable typewriter-sized enclosure the top of which is fitted with sockets, switches, and facilities for breadboarding various circuits. The unit also includes three regulated power supplies and many ICs such as LEDs, clocks, etc.

In my opinion, you can learn just so much by reading about something. Until you start putting a few ICs into a circuit, making them work (and blowing a few!), you really don't know what the devil you're talking about.

Slow Scan Rides The Waves

Oh to live in southern California! Last January while I was staring at an unbelievable −15F. on the thermometer and wondering what to do about frozen water pipes, a group of W6's were cruising in the calm Pacific waters just off San Diego—in brilliant sunshine with the temperature at 85F.

Fig. 6—Jerry Foster, WØQWH, enjoying some "armchair copy".

Dave Smith, WB6ZFT, Peter Kuehn, WB6TOC, Paul Babcock, WA6UOU, and Lee Cohen, W6MUX, loaded a 1 kw gasoline-powered generator, a Swan transceiver, a Robot 300, a fast scan monitor, and a camera onto Lee's sloop, *The Papillon*, for a day's cruise and fun slow scan!

Live pictures of the crew, passing boats, and dock scenes were transmitted during the scores of contacts made from *The Papillon*. Congratulations to these enthusiastic SSTVers for getting out of the "graphics rut" and making imaginative use of slow scan! Incidentally, here's a good example of the value of the frame-grabbing approach to slow scan video!

Bill Clasen, W6THR, taped a good share of the contacts between W6-MUX/*Papillon* and land based stations. The "stitching" marks on the picture (fig. 5) made from Bill's tape were caused by a problem with MY tape recorder. Sorry Bill!

A Little Feedback Means A Lot

Mail response to the DCX/CLG SSTV Monitor article (*CQ*, Dec. 1975) has been most gratifying to author Steve McKeown, WA2CLG. Twixt terms at Rensselaer Polytechnic Institute, Steve added 256 line capability to his monitor. If you're interested in the details, drop him an s.a.s.e. at 17 Seneca St., Sidney, N.Y. 13838.

Steve and his Dad, Jim McKeown,

(Continued on page 69)

Fig. 7—When WØQWH says "I'm ready with video", he really means it! Lights, camera, action!

ADRIAN WEISS, K8EEG, ON

QRP

Getting The Thing To Work III: Current Loops And Bypassing

In an ideal situation such as that implied by a circuit schematic, the only r.f. path from one end of a transmitter circuit to the other is thru the components represented by the schematic symbols. The paper circuit assumes theoretical levels of stage amplification and selectivity which are in keeping with design objectives. For example, the designer may choose a double pinet interstage matching network because in theory it will provide a higher magnitude of harmonic rejection than will a single pinet or tank-link matching approach. Many such choices confront the designer, and with care, he may produce a paper design which promises an overall gain of 35db with unwanted harmonics down 40db. Unfortunately, these figures are merely theoretical, which means they are ideal.

Such ideal situations simply do not occur in reality. In a transmitter, we are dealing with r.f. currents which can radiate in all directions from wire leads, foil strips, and the components themselves, all of which can serve as miniature transmitting and receiving antennas. In other words, in an actual transmitter, a multiplicity of paths exist along which r.f. currents can pass to places where they don't belong.

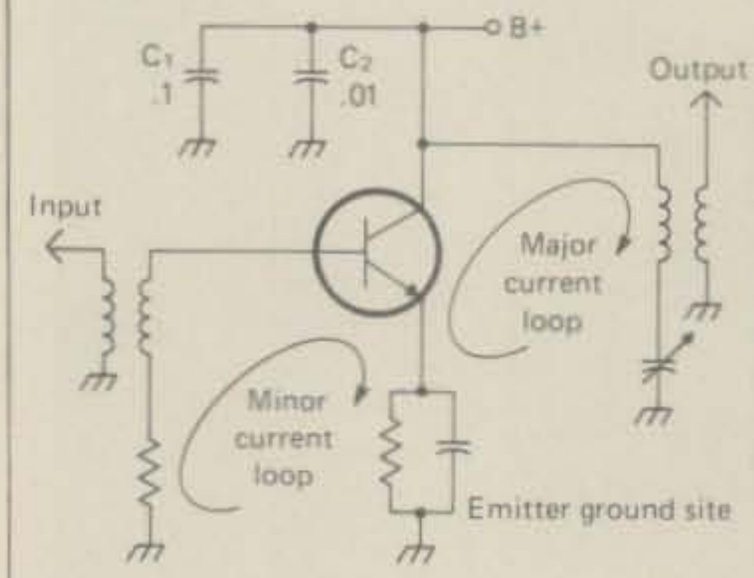


Fig. 1—A typical intermediate amplifier stage used to illustrate bypass theory discussed in the text.

Our primary objective in tinkering with a transmitter, then, is to approximate, as closely as possible, the schematic ideal of a single r.f. path thru the successive stages of an amplifier chain in order to eliminate harmonics, parasitics, and other problems mentioned in an earlier column. This process requires close attention to the physical layout of components on the p.c. board, especially with respect to the major and minor r.f. current loops, and bypassing points; secondly, to interboard connections if more than one board is used; and thirdly, to external connections such as d.c. power leads, key/mike leads, bandswitch leads, tuning capacitor leads, r.f. current bearing switching leads, output ports, and others. While the importance of any of the above three categories varies with the specific transmitter under development, generally speaking, many of the above mentioned items will be of significance in the effort to achieve adequate purity in the amplification of the signal.

Bypassing Strategy

The nature of effective bypassing strategy can be focused in question form: when is a point on a board a real ground point and at what frequency, given the frequency of operation of the stage and the values of the bypassing capacitors? In general, little attention is paid to selection of grounding points for bypass capacitors both in homebrew and commercial p.c. boards. The common assumption seems to be that, given the usual small size of a typical p.c. board, any point on the ground foil is as good as another when bypassing is concerned. That this is not the case has been indicated many times in my experience—but not always. For example, the MFJ 40-T transmitter board has a driver/oscillator stage bypass capacitor grounded at the top side of the board (opposite the bottom, where common emitter ground points are found) that, when changed so that it grounds at the emitter common foil point, produces a small difference in stage gain. That difference is further amplified by the final transistor to produce about a 0.4 Vrms difference in ultimate output of the 40-T. It isn't much, but it does illustrate the point. Similar effects have been encountered with homebrew rigs developed by this writer—until I paid attention to bypass grounding strategy as a matter of course in board layout. The general rule of thumb to follow is: a common grounding point should be used by all bypass capacitors in a given stage, and that point should coincide as nearly as possible with the emitter ground point for that stage.

Consider a typical intermediate amplifier stage shown in fig. 1. The function of B+ bypass capacitors C_1 and C_2 is to remove r.f. current from the B+ lead coming to the stage. This insures that the r.f. developed in the stage will not find a path to other stages through that B+ lead. Capacitor size is chosen to present a very low reactance to r.f. currents to be bypassed to ground. In relative terms, bypass capacitor size is very large for the given frequency of stage operation because it is assumed that very little, or no, inductive reactance will exist in series with the capacitor in the form of capacitor leads or foil strips. Typical bypassing strategy is to choose values whose reactance will (assuming zero lead length) effectively bypass r.f. currents above and below the operating frequency, as well as removing currents at the operating frequency. However, given a 0.1 mf capacitor, it doesn't take much lead length to provide an inductive reactance which, in conjunction with

the capacitive reactance of the capacitor itself, will produce a series resonant circuit in the v.h.f., or even h.f. region. If that occurs, the exact opposite of bypassing occurs with resultant instabilities/harmonics added to the circuit signal, as well as poor B+ isolation.

In practice, then, our objective is to make bypass capacitor lead length as close to zero as possible —including the length of the foil strip reaching to the common emitter ground point for the stage. If this is done, the stage becomes a self-enclosed amplifier, in a sense, with r.f. passing only from input to output. Now, this is not to say that a 1.5 inch foil strip will produce problems related to gain and stability in *every* circuit—merely that it can and has, at least in my experience. An interesting experiment that will illustrate that not every point on a p.c. board ground foil is at zero r.f. potential is performed with a sensitive v.t.v.m. and r.f. probe (reading down to microvolts, and in some cases, millivolts will suffice). Select a common ground point, such as at the emitter of the final amplifier, and proceed to run the probe around the foil. Be sure to avoid picking up stray r.f. as opposed to r.f. currents in the ground foil. Now, not every transmitter will produce readings, but some will. It makes one think twice about "when is ground actually ground?"

Oftentimes the simplest method of bypassing B+ leads with zero lead length is to mount the bypass capacitors underboard rather than aboveboard. Generally, if the board is fairly compact, this method will allow the shortest possible connection to an emitter ground site. One method of layout to definitely avoid is to ground bypass capacitors of successive stages to a thin strip of foil that runs the periphery of a p.c. board, eventually reaching the emitter ground side of the board. This is the case with the MFJ 40-T mentioned above. The total distance of the foil along the edge leading from the above-mentioned bypass capacitor to the actual emitter site of the driver is only about 2 inches, but that is significant in this case: Replacing the capacitor to an underboard position produced the above-mentioned difference in output.

Board layout should be designed, in short, with bypassing strategy in mind. For example, see the board layout for the 13 watt 1.8 MHz amplifier shown on p. 26 of the January, 1976 issue and note the strategy: the B+ lead is positioned on the board so that the three bypass capacitors can be soldered directly to the emitter strip of the final transistor. Note also that ground points for major and minor current loops also are soldered directly to the emitter strips. We'll continue with that subject in the next column.

News

Would you believe it? K8MFO's package of 100+ QSL cards arrived in the mail last week and qualifies him for QRPp DXCC #3!!! Don had to work 126 before all the necessary cards were received. And so, two months after asking in print "Who will be the next to qualify for QRPp DXCC?" we have the answer—K8MFO. I'll have to get to work on the rather gruesome task of photographing a suitable publicity shot of the trophy. Gruesome.

Again, we are getting to work on sorting out and returning mail received by *The Milliwatt*. This is a long process, so patience please. We are looking into the possibility of someone taking over the publication of *The Milliwatt*, since it does not appear that I will be able to continue with it.

Hope to see many of you at the *CQ* booth at Dayton later this month. Until next month, 73's, Ade, K8EEG/Ø

Want to display 320 QSL's in 13 square feet?
Or how about 1120 cards in 23 square feet?
Read on and find out about a good one evening project.

Build Your Own QSL Card Display Rack

BY JOSEPH P. FINCUTTER, W3IK

Do you like to cover the walls of your shack with QSL cards? Why cover up nicely panelled walls? Why use valuable wall space for cards when you could use the same wall space for book shelves to hold textbooks, manuals, magazines and the like? However, if you like to display your QSLs so that you can brag about your accomplishments, I would like to present an idea and some simple construction plans on how to display a large number of QSL cards and not lose much wall space. The photo shows a display for 280 cards in about 10 square feet of wall space. So pick the size of display you want and read on.

Actual construction need not follow the detailed procedures and the dimensions given in the article are approximate, but sufficient information is given for you to design a rack to suit your own needs. The mounting board itself is about 36" long, with hangers spaced about 1-2" apart. The photo shows a rack, made from what was available in the shack, and hung from the ceiling joists. Basically there are a number of triangular hangers mounted in screw eyes on a support board and from each of these hangers two Tepabco hanging files are suspended.

Fig. 1 shows details of the hanger construction. Fig. 1 (A) is a simple bending jig using a board and either wooden dowels or standoff posts to form a uniform triangular configuration to bend the hangers. I used galvanized iron wire about 0.1" in diameter to form my hangers. After a sufficient number of hangers were formed, I held them in a vise so that a pivot wire could be attached. The pivot wire is laid along the groove formed by the overlap of the hanger wire and soldered as shown in fig. 1 (B). The pivot wire should be a little bit longer than necessary at this point until a method of mounting is decided.

You must now decide on a method of mounting the hangers. In my case I mounted them on a board which in turn was hung from the ceiling joists. However if you wanted to mount it directly on a wall you could use screw eyes and a retaining bar. In the photo I show the use of screw eyes and a ¼" square metal bar. Fig. 1 (C) shows this method. Fig. 1 (D) shows the use of some small aluminum angle and channel. However if you have a drill press the channel could be replaced with ½" square bar and drilling all the holes to the same depth.

Cutting the pivot wire to length comes next. This length will be determined by the spacing of either

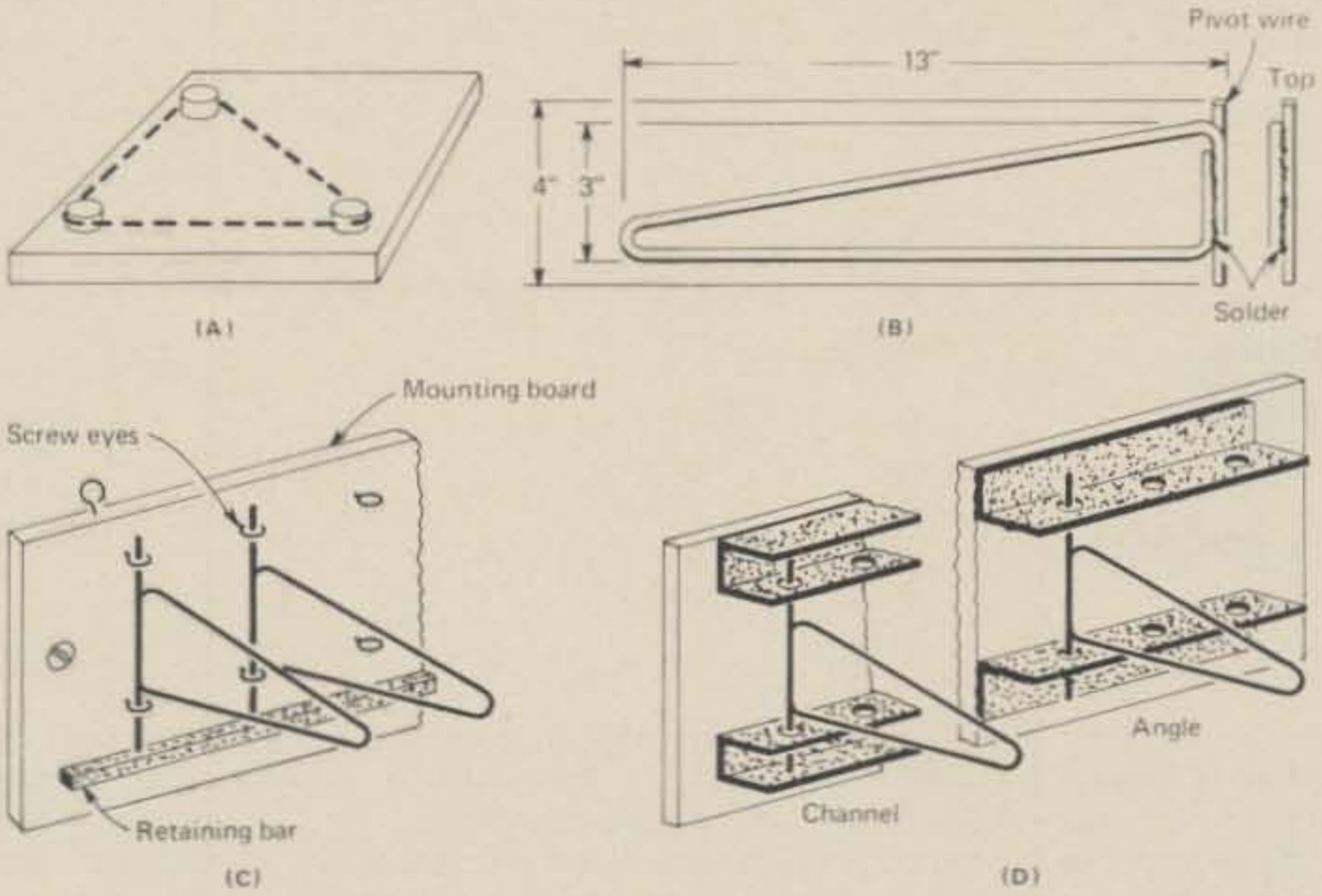


Fig. 1—Construction details for QSL card display discussed in the text.

the screw eyes and the retaining bar or the angle and channel. You want to be able to insert the top of the pivot wire into the top screw eye far enough so that the bottom of the pivot wire can be placed in the bottom screw eye. When the bottom of the pivot wire touches the retaining bar the top of the pivot wire is held inside the screw eye. You have the same problem with the angle and the channel. The spacing between the angle and the bar must be such that the top of the pivot wire goes far enough into the angle to allow insertion of the bottom in the channel then drops down into the channel and is still retained by the angle at the top.

It might be well to discuss cutting the bottom of the pivot wire. This should be a nice smooth cut at right angles to the length of the wire with the sharp edges chamfered slightly. This will prevent unnecessary wear on the retaining bar as the hangers are swung on their axis. Once I got all the hangers built and the pivot wires cut to length, I cleaned them very thoroughly with some steel wool and sprayed them with black enamel. Of course you could choose a color to suit the decor of your shack.

Now comes the problem of putting the hanging files on the hangers. Well, I guess there are many ways in which this could be done. I happened to have some black twine in the shack and I laced two files to each hanger, back to back. Staples could be used; split metal paper fasteners could also be used. I believe that the most important factor is to fasten them in a secure manner so that as you "fold" them back and forth to show off your accomplishments they don't "pull apart".

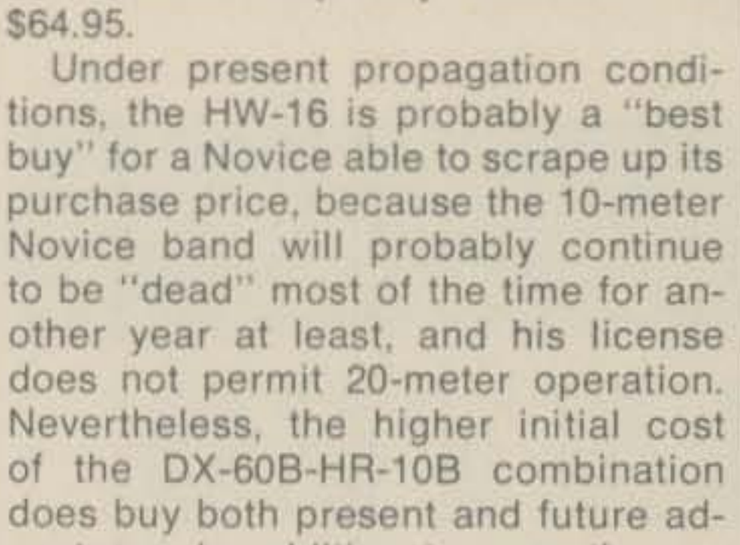
Since writing this article, I have built a new rack using the "angle and bar" method and have space for 520 cards in approximately 11.5 square feet. I won't even try to come up with ideas on how, or in what order, to display your cards. There are just too many ways to "order" the display. Let's think BIG! With 27 hangers on a 6½' board you could display 1120 cards in approximately 23 square feet of wall space. Big enough?

Novice

BY HERBERT S. BRIER, W9EGQ

When a Novice starts looking for new, commercially available equipment specifically designed for his needs, he has at least three choices within the Heathkit line. One choice is the HW-16, 80, 40, and 15-meter c.w. transceiver for $119.95. The others are the DX-60B transmitter and the HR-10B receiver covering the 80, 40, 20, 15, and 10-meter bands at $109.95 per unit. Both the DX-60B and the HW-16 transmit a 75 or 90-watt input, crystal-controlled c.w. signal, and each can be converted to v.f.o. control with the addition of the optional external HG-10 variable-frequency oscillator at $64.95.

Under present propagation conditions, the HW-16 is probably a "best buy" for a Novice able to scrape up its purchase price, because the 10-meter Novice band will probably continue to be "dead" most of the time for another year at least, and his license does not permit 20-meter operation. Nevertheless, the higher initial cost of the DX-60B-HR-10B combination does buy both present and future advantages in addition to operation on two more bands. The HR-10B does a good job of receiving s.s.b. and a.m. phone signals on the 80 through 10-meter phone bands, which are not covered by the HW-16. In addition, a built-in screen modulator makes the DX-60B capable of transmitting a 15-watt a.m. phone signal. While a.m. phone is no longer used extensively by radio amateurs, there is no reason that the DX-60B cannot be used for local a.m. ragchews when the bands close up for DX by operators who have the necessary licenses. Incidently, Bob, WA9WWH, has reported that the c.w. selectivity of the HR-10B receiver can be improved by pulling out one of the crystals in its crystal filter. The idea is easy to try.



Rev. Ben Ranum, WN9QQG, Arena, Wis. 53913, uses the ubiquitous Heathkit HW-16 transceiver and HG-10 v.f.o. for general operating on 80 and 40 meters and to keep a schedule with his son in Terre Haute, Ind. (Photo via K9PKQ).

For those who already have a suitable amateur-band receiver, acquiring only the transmitter makes sense. Besides the DX-60B, other candidates are the CONAR 15-watter covering the 80, 40, and 15-meter bands from National Radio Institute, Washington, D.C., 20016; and the Model 50, solid-state unit from Matric, Box 185A, Franklin, Pa. 16323, selling for $50.00 to $70.00, depending on the options chosen. You should also check into the Ten-Tec series of equipment (Ten-Tec Inc., Sevierville, Tenn. 37862).

For completeness, we include the Heathkit HW-8, 5-watt, 80-through-15-meter c.w. transceiver. Selling for $129.95, the HW-8 lights up the eyes of flea-power *afficianados.* See Adrian Weiss, K8EEG's, monthly "QRPp" column in *CQ*. Flea-power operation can be great fun when done by choice, but we really can't recommend it to an inexperienced Novice just breaking into amateur radio.

Other Options

Although there are few pieces of equipment specifically designed for the Novice being currently manufactured. Novices still have many options in their selection of equipment, governed largely by their ingenuity and the size of their pocketbooks. For those with lots of the former and a small pocketbook, the used-equipment market abounds with possibilities. It includes transmitters like Johnson Adventurers, Navigators, Ranger-IIs. Valiants; Heathkit DX-20s. HX-11s, DX-100s, Apaches; Globe Scouts; EICOs; Collins 32V2s and 32V3s: Hallicrafters HT-40's, Knightkit T-50, T-60, T-150, and many other transmitters. The easiest way to latch on to one of them is to write to an amateur equipment dealer for his latest list of guaranteed, reconditioned equipment. But to get a real bargain, you have to pick up the unit from an individual at flea markets at hamfests, through hamads, or at club meetings and put it in operating condition yourself.

You will need a volt-ohm-meter to test components for shorts and opens and the unit's instruction manual. In fact, you probably can get by servicing a simple two or three-tube (plus rectifier) unit without the manual by consulting a "handbook" and a tube manual. The equipment instruction manual is easier and quicker, however. If the unit is not too dirty, a vacuum cleaner and a damp cloth will be sufficient to clean out the spider webs and accumulated dirt, but if it is really dirty, the best thing to do is to wash it with soap and water. An automatic dish washer is ideal for the purpose. Do not leave the chassis in the machine to long, though; otherwise the identification marks disappear from the chassis and individual components. After rinsing with clear warm water, drain the unit and allow to dry in a warm place for at least 24 hours before applying power to it. Use the warm air from a hair drier to accelerate the drying process.

The idea that electronic equipment can be washed is greeted by disbelief by most technicians, but it is true, nevertheless. However, old paper bypass capacitors with their wax end seals cracked and bulging may sizzle and pop when power is applied to the unit after its bath. But

such capacitors should be replaced with modern disc ceramic or polyester bypass capacitors of the same ratings, anyway. To be honest about it, however, I did discover too late that the calibration marks on one glass dial were water colors and not waterproof ink! That was embarrassing! After the chassis has thoroughly dried out and obvious defects like a dried-out power cord have been repaired, the conservative approach is to use your ohmmeter to make sure that there are no shorts across the high-voltage circuits and to check the resistance across various components before plugging it in. Resistors should measure within 10 percent of their rated values; by pass and copling capacitors should indicate very high resistance across their terminals. High-capacitance electrolytic capacitors (identified by their + and — polarity markings) should cause the ohmmeter pointer to flip over to the zero-resistance mark when the test prods are first touched to the capacitor terminals and then gradually fall back to indicate a final resistance of 10,000 to 100,000 ohms or more as the ohmmeter battery charges the capacitor through the ohmmeter's internal resistance. The time it takes the meter pointer to settle down to its steady value depends on the capacitance of the capacitor and the ohms range the meter is set on. High resistance and capacitance means a slow time constant. An approximate check on the capacitance remaining in an old electrolytic capacitor (They eventually dry out.) can be made by comparing the meter action on the old capacitor and a new one of the same capacitance — the slower the action, the better the capacitor. Often other components connected directly or indirectly to the same terminal as the component being checked will modify its apparent resistance; temporarily disconnect one lead of the component being tested from the rest of circuit when in doubt.

(To Be Continued)

Kurt Kirkey, WN9QMJ, 327 So. Lincoln Ave., Mundelein, Ill. 60060, started his radio career building crystal sets. It wasn't until he was nine, last summer that he got his Novice license. He operates 80, 40, and 15 meters using a Heathkit HW-16—HG-10B v.f.o. combination to drive a signal into inverted-Vee antennas. He has worked all U.S. call areas and a couple of Canadian provinces, too. A 10-w.p.m. code-proficiency certificate competes for space with his QSL cards on the shack wall. We are sending WN9QMJ a one-year subscription to CQ Magazine for submitting this winning picture in our monthly Photo Contest. If you would like to enter the contest, send a clear photo (preferrably black and white) and some information about your radio career to: Photo Contest, c/o Herbert S. Brier, W9EGQ, 409 So. 14th Street, Chesterton, Ind. 46304. Even if you don't win, suitable pictures will be printed as space permits.

News And Views

Dave Bennett, VE7AZG/XJ7AZG, 3145 — 176 St., Surry, B.C., Canada V3S 4N8 was hoping to work some Novices using their Bicentennial call signs in the 1976 "Novice Roundup" — especially on 10 meters. He also corrects the statement in VE6UP's letter in last December's "News And Views" that Canadian amateurs are authorized to use "XJ" in 1976 in honour of Canada's Bicentennial which will occur in 2067. The reason is in honour of the Summer Olympic Games to be held in Montreal in July. Incidentaly, Newfoundland and Labrador stations may use the "XN" prefix, instead of "VO."

Congratulations to **Robert J. Nemeth, AK9RMG**, for being the first Novice to qualify for the "USA-WPX-76" award in the first few weeks of January. Complete rules for the USA-WPX-76 were published on page 27, October, 1975, *CQ*. Rules and application blanks can be obtained upon request accompanied with a large, stamped return envelope. Mail to: WPX Contest Director, Bernie Welch, 7735 Redbank Lane, Dayton, Ohio 45424. Quite unusual in this day of increasing costs, this attractive award is *free*.

Coincidentally, the first letter I picked up after finishing the above item about USA-WPX-76 and Bob Nemeth, was from our hero himself. **Robert J. Nemeth, WN9RMG (AK9RMG)**, 1017 Wellman Ave., Montgomery, Ill. 60538, is 14 years old and has had his license for eight months. His Heathkit HW-16 and HG-10B v.f.o. has worked over 30 countries and 48 states in the course of making over 900 contacts. Bob was a Ragehewers Club (RCC) certificate in addition to a 15-w.p.m. code-proficiency certificate. He is also a member of the "THN" Teen Ham Net.

News And Views

Charles L. Goldsmith WL7IBE/W7, 6133 East 34th St., Tuscon, Arizona 85711, has gone places with his license. He was first licensed as

(Continued on page 68)

HUGH CASSIDY, WA6AUD, ON

DX

There are some changes apparent in the DX field and this may be particularly noted in the future in the application of the country criteria for new countries.

The January ARRL Board of Directors adopted a resolution that the DX Advisory Committee would be consulted in future instances where the DX country status of an area is to be determined. It does seem that there has been instances where DXAC members found out about country changes by calls from friends or information passed over the air. It is not clear that the DXAC will be consulted when there are negative decisions on the matter of an area being named a new DXCC country but their position may be a bit stronger.

Another matter is the apparent stiffening of position on naming new countries, there being a possibility that instances of an area being a 'country' because of that part of Point 1 which makes it a country because . . .' . . . of a distinctively separate administration' such as was the instance for Sable Island in the operation last Fall, on St. Paul the criteria cited was Point 3, ". . . separation by a foreign land". Point 1 apparently was used because Sable is administered by the Canadian Department of Transportation. The matter of the 'foreign land' for St. Paul is a bit harder to see and understand at first glance.

Bill Callahan, WA7QFW/4, was once familiar to DXers as HS4AFG. Awards were much easier to come by with an HS4 call, but Bill is hard at work on WAZ from his new stateside QTH.

The WAZ Program

Single Band WAZ

15 Meter Phone

2...EA8CR

20 Meter C.W.

9...W4KN

20 Meter Phone

19...JA3BQE
20...I2SLA
21...WB4SIJ
22...I4ZSQ

S.S.B. WAZ

1302...JA1IBX
1303...JAØOE
1304...JA1SKE

C.W.-Phone WAZ

3913...W6BJH
3914...WA4YVQ
3915...W6OKK
3916...W3HHV
3917...WA5UBV
3918...WA9LUD
3919...DM3BE
3920...DM2CJJ
3921...JA6EYD
3922...WØNAR
3923...JA1IBX
3924...F6AUS
3925...DL8OH
3926...DL6TQ
3927...WB9DRE

Complete rules for the Single Band WAZ Program appear on pgs. 57-58 of the December, 1972 issue of *CQ*. Complete rules for regular WAZ are found beginning on pg. 46 of the April, 1975 issue. Application blanks and reprints of the rules for all WAZ awards may be obtained by sending a self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

The indicators are that these type of countries may be a bit more difficult to gain approval for in the future. While it was possible to rationalize individual instances such as the Kingman Reef item, the precedents being established might have caused some second thoughts. It also may run into the factor that it is usually easier to give than to take back.

South Sandwich/China

A couple of months back there was mention of the chances for operations from South Sandwich, China and Iraq. There have been some indicators that an Argentine effort for South Sandwich late this year is an excellent possibility. Some have been working to interest the LU-Naval authorities in the matter and the initial indicators were that they were taking a serious look at operations in the South Sandwich area, possibly in the period from December to February which is their summer in the southern hemisphere.

The group which was working on the LU2XR plans this last January will also be interested in the possibility this Fall. While there is yet to be a solid commitment, the Argentine admiral who will be making the decision is reported receptive to the idea.

On the matter of a possible BY-China activity, there were reports last Fall of possible VS6-type being able to operate in China. A query to a long time Hongkong resident and active amateur indicated that this most likely was more wishful thinking than anything solid. However, the VS6er did feel that the possibilities of some activity has improved in recent years but that activity probably would come from Chinese nationals within the country and operating a station at a technical school or a radio club station. This may not add up to anything real solid but definitely it should keep the hopes and anticipation alive.

CQ WPX Award

The new prefixes heard since January has stimulated a lot of interest in the *CQ* Bicentennial Award. While the regular 1051B form can be used to apply for the Bicentennial WPX, the award itself is being handled by Bernie Welch, K8IMZ. Your application for the award should go direct to K8IMZ. The full details were in the October *CQ*.

Vegetti, I2VDX, and his portable Yaesu FT-101 station. He has earned C.W.-Phone WAZ No. 3841 with this dandy rig.

DXpeditions

A couple of DXpeditions should be active at this time, actually they should have come to your notice some weeks back. The JA-group which planned to operate from VR8-Tuvalu during the *CQ* WPX Test the last week-end in March were due to operate for three days from April 8th from 3D2-Fiji; for four days from April 11th from YJ8-New Hebrides; for three days from April 14th from VR4-Solomons; for three days from April 16th from C21-Nauru and would return to Japan from Nauru. This group was planning to have JA2PJC, JA3KWJ and JAØCUV/1 as its operators.

Gus, W4BPD, was planning to depart the latter part of February on one of his trips and the indicators were that his itinerary would include the SouthEast Asia area including some Himalayan possibilities plus other areas on the southern edge of the Asian continent and the Indian Ocean areas. It is also possible that Gus was joined along the way with another West Coast DXer for some joint efforts along the way.

San Hutson, K5QHS, is aiming for a HKØ-BAJA Nuevo effort this summer, this initially having been scheduled for the April period but put off a couple of months on the advice of those familiar with the area. The advice was that it might be a bit drier in mid-summer at Baja Nuevo than it might be in April.

Northern California DX Foundation

The NCDXF has changed its approach somewhat since the Kingman effort, the feeling being that it might be more productive to attempt to get some of the semi-rare ones on the air rather than seek another blockbuster like the KP6KR effort. The Foundation did have CR9AK on the air for a short run in December, W6ISQ, K6AHV and W6MAV putting this one on but band conditions were not favorable during much of the operation. However, the Foundation did arrange to have a beam shipped to CR9AJ who has been active from Macao since he took over the lighthouse duties there and is often found at 14225 kHz from 2300 with W7PHO. The feeling in this instance is that the stronger signal with a sustained operation will benefit more DXers than short efforts which are presently at the mercy of the sunspot cycle.

The NCDXF has also been directing some inquiries to the possibility of getting some better antennas to some of the stations in the Indian Ocean and African areas, especially in those areas where there is a station often active but using a vertical for an antenna.

Abu Ail

FL8OM operated from Abu Ail in the Red Sea a few months back and the reports are that it was around a ninety minute operation. While the maintenance crew was attending to the lights on the island, FL8OM got ashore, put up an antenna and feverishly worked a number of stations, mostly in the Middle East and European areas.

However, FL8OM is planning to be back at Abu Ail during April for about a week or operating during the Easter period. Another FL8-operator will be along and they plan to work as much and often as possible. A late check of the possibilities may give you the operational up-date on these plans of FL8OM.

Isao, JA1OCA, operating from Nauru Island as C21DX.

Chaplain Jim DeMott, KA6DE, received Single Band WAZ #12 on 20 meter phone. In 14 months operation from Okinawa, Jim worked over 220 countries.

Fresno International DX Meeting

This big annual gathering of the DXers on the West Coast will be at the Fresno Hilton May 14/16th. W6EJJ, Jay Holladay, and W6AOA, Frank Cuevas, are co-chairmen for the gathering and the Southern California DX Club will be the host club this year. A good gathering of big name DXers has been promised and an inquiry to either of the chairmen will bring more information on this big annual event.

Club Notes

Louis Muhleisen, K5FVA, was named the Delta DX Assn's "DXer of the Year" down there in the New Orleans territory. The new officers for 1976 in the North Jersey DX Assn are: President Lou Amoroso W2ZZ; Vice-President Leo Cunniff, W2OEH; Secretary Bro. Pat Dowd, W2GK; Treasurer Charles Moraller, WB2UKP. The North Jersey DX Assn is also the custodian for the QSL duties in the W2 area.

J. Harvey McCoy, W1IYX, is the new editor for the *Long Island DX Assn. Bulletin.* John Heisey, K2FL, handles the awards for the Frankford Radio Club, this including Frankford Radio Club Award which you get for working 25 club members . . . and it comes free!

No doubt many readers have worked Kuni, JA1DIO, one of Japan's most active DXers. Kuni recently qualified for CQ's Worked All Zones (WAZ) Award.

Joe, PY7YS, in the doorway of his PY0YS QTH on Trinidade Island. Joe handles the cards for this operation and also has logs and cards for CR8AG and CR8AL. He is looking forward to future operations from Fernando de Noronha (PU0YS), Atol de Rocas (PR0YS) and St. Peter and Paul Rocks (PS0YS).

New officers in the Southern California DX Club are: President, John Cashen, W6KNC; Vice-president, Cleyon Yowell, WB6EHT; Treasurer, Marty Woll, WB6VZI; Secretary, Joe Westheimer, WB6KUC and Directors Irv Emig, W6GC, Jay Holladay, W6EJJ and Harvey Hetland, WA6KZI is the SCDXC Bulletin editor.

Some Random DX Notes:

W1BB has the recent issue of the *160 meter bulletin* available for a s.a.s.e. Stew continues to jump with joy over the 160 meter openings that are being found in the low part of the sunspot cycle. W8LRL made WAC on 160 in two hours is an example of how things are on the top band.

FR7AI who supplied a good number of Glorioso QSOs around the turn of the year will be going to Europa in June for a tour of duty. This will count for Juan de Nova.

The Vanik RFI legislation, H.R. 7052 is expected to be at the critical point in the second session of Congress about this time. If you have not already, it would be timely to write in support of this needed measure. W4UMF will supply an RFI packet if you will send him a sase envelope with 24c on it.

Palle Madsen, OZ3FU, of Stige, Denmark, received C.W.-Phone WAZ No. 3882 for his excellent effort using only 100 watts to a dipole. Palle is 66 years old and a retired sailor. He celebrated his WAZ with the purchase of the new TR-4C proudly displayed on the bench.

The Colvins made over 18,000 QSOs from Funafuti with the VR8B operation. Previously they made 4,000 as VR1Z. They were in the Fijis signing 3D2KG after leaving Tuvalu and will be at Fresno for the International DX meeting. In a note from 3D2, their feelings on repeat contacts was made very clear, they do not want them even though they are calling "CQ". They finally shut down at VR8B when the number of repeaters got to be more than they wanted to cope with.

In the Brazilian Contest last year, John Irwin, K6SE/2 and signing KC2ITN racked up over 70% of the U.S. score all by himself, getting 29.6 K points out of the 40.9 K reported for U.S. stations. This was the 6th World Telecommunications Day Contest and the 7th should be along next month.

A2CCY has been living in Canada and while Bob does not have the logs for his Botswana operations available right now, he says to send QSLs and eventually he will get everything answered. His address is: Bob Furzer, Apt 411, #20 Carabob Court, Agincourt, Toronto. And the address for F2QQ, which often gives a bit of trouble, is: Richard Gemehl, F2QQ, 52 rue de Saussure, 75017 Paris, France. Variations have shown up but this is the latest true-blue one.

K6KNH returned in February from his around-the-world trip and brought back a number of 4S7-QSLs plus a few others that he picked up along the way. Clyde volunteered to personally get QSLs in some instances where things had been slow and difficult. EA8CR made a final operation from EA9-Spanish Sahara late in January and this was the last action out of that country, it being subdivided between Morocco and Mauritania at the end of February and with Algeria seeking to get a bit for itself. It should have joined the deleted countries by now. If 3B8DA has not made it already, he should be on St Brandon about now, Alex operating last year from Rodriguez as 3B9DA. He will be signing 3B6DA from St Brandon, the SSB activity coming from the rig shipped out by the NCDXF.

ZL3NC/C is often found on the lower bands from Chatham and he will be there for some time. VR3AH was going to be on from Christmas Island as soon as his gear arrived and he will be there for a long stay. ZK2AO closed down from Niue in February and asked QSLs to his home QTH.

W4KN has picked up his fourth WAZ, he getting No. 9 twenty meter C.W. WAZ. Previously he has earned WAZ as W7BE, KH6VP and W4KN. VC9UM was a special call for the Festival of Life and Learning at the University of Manitoba in Winnipeg.

The JAs are looking for some close-in action after a JARL official in January announced that they were going to ". . . have a brand new country in Japan". Some are looking towards Parece Vela as the possibility and it may have surfaced by the time you read this. If this is not the hot prospect, look for the Senkaku Archipelago.

AP2KS, Khalid, has been hospitalized a number of times in early parts of this year. Apparently someone has been using his call at times for c.w. work.

The WPX Program

2X SSB

887...DU1REX 888...DJ5TH

C.W.

1445...LZ1XL
1446...DM2BYJ
1447...K9DAF
1448...SP4BGR
1449...SP5GOL
1450...WA8TDY
1451...LZ1XZ
1452...K8YPD
1453...PT2GFK

Mixed

513...WB6AGP

WPNX

86...WN4QMQ

Endorsements

S.S.B.: 1050 WA6MWG; W4NJF 1300; I1ZSQ 950; 700 UW3IN; 650 WB9EBO; 600 WB9EBO 400 DU1-REX, UK3ABB; 350 DU1REX, UK3ABB, UL7NW, WA7OBH

C.W.: 1200 W8LY, W8KPL; 1050 WB2FMK; 1000 WA-6MWG; 950 W3ARK; 900 W3ARK; 750 W4WST, WA5VDH; 550 W1DMD, KØDEQ; 500 K9DDA, KØ-DEQ; 450 UB5VK, 350 JH3AIY, UY5GG

MIXED: 1550 W4LRN; 1350 WA6WMG; 1300 W2NUT, 1200 WB2FMK, 1000 WA5VDH; 800 SP9AI; 700 YU3DQ; 650 KØDEQ; 600 KØDEQ, W6CLM; 550 KØ-DEQ, WB4TPU; 500 JH1VRQ

VPX: 550 UA4-133-21; 500 UA4 133-21; 450 UA4 133-21; 400 UA4 133-21, 350 JA0 1893/1, UA4 133-21

160 Meters: WA8TDY
80 Meters: LX1XL, SP5GOL, YU3DQ
40 Meters: UB5VK, YU3DQ
20 Meters: UAØBL, UY5GG, YU3DQ, UA4 133-21
15 Meters: JH3AIU, YU3DQ
Asia: UW0IE, UA4-133-21, JA0-1893/1
Europe: DM2BYJ, K9DDA, LZ1XL, SP5GOL, UA0BL, UW0IE, UY5GG, WB4TPU, UA4 133-21, W5-10353
North America: W0MHK
Oceania: PAØSNG, UWØIE

Complete rules for WPX may be found on Page 67 of the February 1972 issue of CQ. Application forms may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to: CW DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

De Extra

The DXer As An Internationalist . . .

Last week I processed a S.S.B. for Welikodnyj Wiacheslav who signs UL7NW in the Chimkent area of the Kazahk Republic of Soviet Russia. On the forms a note was appended noting the contact with Slava back in September 1970.

Last Christmas there were many cards from amateurs around the world, including three from behind

The CQ DX Award

SSB

421...WA4WTG
422...WA2SPG
423...JA2UYS
424...PAØEE
425...WA7LAG
426...WB6AGP
427...ZL2BCO

CW

195...UA6BV
196...ZL2BCO

Endorsements

CW: 150 ZL2BCO
SSB: 275 WA4WTG, W7YBX; 250 WA4WTG; 200 W4DPS, WA4WTG; 150 W4DPS, WA4WTG, WB6AGP, ZL2BCO.

Complete rules and application forms for the CQ DX Award Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to: CW DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

the Iron Curtain. A VS6 a few weeks back called from the airport as he passed through the area. Another amateur in South Africa wrote recently on another trip he was taking.

Is all of his unusual? Most DXers would hardly give this a second thought for it is an ongoing experience with them. DXers, in a world which seems to be more difficult to understand every year, are a group whose scope of operation is truly international and every DXer is a true Internationalist. And there is nothing within amateur radio, nor very little elsewhere, that can match the degree or breadth of the friendships that exist within the DX ranks.

WARC 1979 is looming higher on the amateur radio horizons. There are studies going forward to develop the position of the United States at this meeting which will consider revisions to the International treaties under which the radio frequencies are allocated. There are being heard plans to attempt to foster friendly feeling toward the United States and its delegations by an intensive program of cultural exchanges, there being often mentioned the possibility of running 'phone patches' so that people can get acquainted and the warm feelings will engender a groundswell that will bring strong support for the U.S. position at Geneva.

Maybe it will. Maybe it won't. And phone patches are still prohibited in most of the world, just in case you forgot. In Asia, Israel is the only possibility, in Africa, Liberia is the lone possibility and in Europe there is no possibility at all.

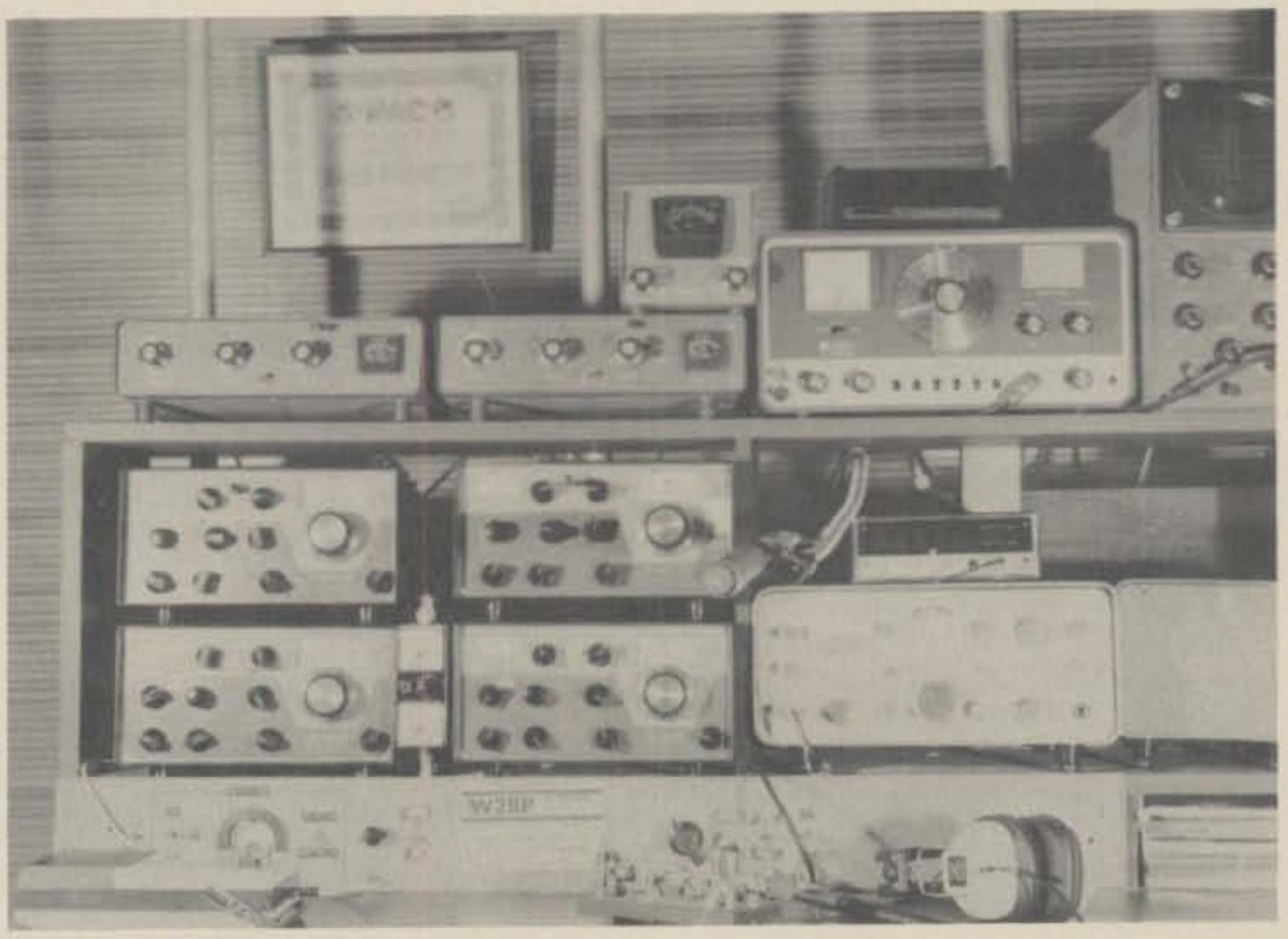
If it is friendship and understanding that is needed, those amateur radio internationalists, the DXers, have it already. If it is day to day meetings that cement the bonds of comradship over the years, the DXers have it already. In the international fields, DXers were there a long time ago and still are.

If you work for Madison Avenue you will quickly learn that "new" is the essential adjective. "New" is what sells. "New" is what attracts attention.

Perhaps it is time to stop and look again at WARC 1979. The feeling is sometimes that it is only the U.S. that has any stake in the results of the ITU meetings and that few other nations have. Communications are essential to all nations, whether they be industrialized or emerging and many of the newer nations are going directly to the satellite phase of providing for their internal communications and by-passing the intermediate stages. It can be felt that the ITU is a meeting of common interests and with common needs and goals. If we need friends, the DXers have worked that field for years. Maybe it is the time to evaluate some of the 'new' panaceas and take another look at the DXers.

For they are truly Amateur Radio's Internationalists. They have been and they will be . . . every day, every month, every year. Always!

Alex, PJ9CDC/W1CDC pounding out a QSO on 20 meters during his visit to Santa Martha Bay, Curacao. Alex made 1,040 contacts in 58 countries all on c.w.



Al Segen, W2BP's neat 160 meter DX station at Pleasantville, N.J. He has worked over 80 countries and WAC! He's taken some of this gear and DXpeditioned/160 at VP2G, FGØADT/FS7, VP2LH, FMØADT, VP2MAD, and VP2DAE, giving a "new one" to many. (photo via W1BB).

QSL Information

A2CGD—To SM3CXS
HD5EE—To WA8TDY
JA8IEV/JD1—To JA8JL
LU2A—To LU2AFH
PJ8HR—To W2JKN
PY0PO—To PY7PO
PY8BXC—To PY7BXC
FK8BG—To W7OK
VE2AQS/TI—To VE2KQ
VC9UM—To VE4VV
VP2SV—To K3GYD
VP2KC—To W7OK
VK9XI—To VK6RU
VK9XW—To VK6RU
VU2ANI/VU7ANI—Direct
VP5BR—To K4GWK
YS1MAE—To W2KF
ZD7WT—To W3KT
ZE1JH—To WA6VNR
ZF1WW—To W3KT
ZF1TM—To W0ZTC
ZK2AP—To W0JRN
ZS5PD/ZS3—To WA4HHG
ZS6BNF—To SM4ANV
5N2FAX—To W1WTE
7P8AG—To SM3CXS
7P8AH—To SM3CXS
9L1BH—To SM3CXS
9Y4TR—To WA5CFS
3D2KG—To YASME Foundation, Box 2025, Castro Valley, Ca. 94546
4U1ITU—To W4KA for October 26/27th 1975 Only
CR6OZ—To Jorge Fidalgo, Rua Marques de Pombal No. 4, Tomar, Portugal
VE7 QSL Bureau—To Howard Martin, VE7AFY, 45-9960 Wilson Road, Ruskin, British Columbia V0M 1R0
XJØNEH—To HMCS IROQUIS, FMO, Halifax, Nova Scotia

73, Hugh, WA6AUD

Ed DuBois, F9IL, recently qualified for all phone WAZ #506. Ed is also a winner of CQ's US-CA 500 certificate.

GEORGE JACOBS, W3ASK, ON

Propagation

The Swiss Federal Solar Observatory has published the official sunspot numbers for 1975. The following are the *monthly mean* numbers reported:

1975			
Jan.	18.9	July	28.2
Feb.	11.5	Aug.	39.7
Mar.	11.5	Sept.	13.9
Apr.	5.1	Oct.	9.1
May	9.0	Nov.	19.4
June	11.4	Dec.	7.8

The *yearly* mean was 15.5. This is the lowest level of yearly mean solar activity observed since 1965.

There were a total of 82 days during 1975 when the sun was completely spotless. The highest daily level was 104 reported on August 6. The only other day that had a level in excess of 100 was August 7, with a count of 102.

The monthly mean values observed during 1975 result in the following smoothed sunspot numbers, upon which the sunspot cycle is based:

1974		1975	
July	34	Jan.	23
Aug.	33	Feb.	22
Sept.	32	Mar.	21
Oct.	30	Apr.	19
Nov.	28	May	17
Dec.	25	June	16

The Swiss Observatory reports a monthly mean number of 8.5 for January, 1976. This results in a provisional smoothed sunspot number of 15 centered on July, 1975. A smoothed sunspot number of 7 is forecast for April, as the present cycle continues to decline slowly toward a minimum value.

April DX Propagation

During April, *20* meters should be the optimum band for DX propagation conditions during most of the daylight hours, and into the early evening hours as well. Somewhat fewer openings are expected on *15* meters compared to the winter months, but some fairly good DX still should be possible towards southern and tropical areas, especially during the afternoon hours when conditions are HIGH NORMAL or better. Few *10* meter DX openings are expected this month, but an occasional one should be possible from all USA time zones towards South America, and from the western states towards the South Pacific. Be sure to check this band during the afternoon hours when conditions are HIGH NORMAL or better.

For a few hours *after* sunset, optimum DX propagation conditions should be shared between *20* and *40* meters. Good openings to many parts of the world are forecast for both bands between sunset and Midnight, and on *40* meters from Midnight to sunrise. Some good DX openings should also be possible on *80* meters during the hours of darkness and at sunrise. There is also a good chance for some *160* meter DX openings during this same time period.

Seasonably favorable propagation conditions over long paths between the northern and southern hemispheres, for example, to Australasia, South America, southern Africa, etc., should continue during April on all h.f. bands.

Thunderstorm activity increases during April in the northern hemisphere, and this should result in increased levels of static on all h.f. bands, especially *40, 80* and *160* meters.

V.H.F. Ionospheric Openings

Chances for some unusual v.h.f. ionospheric openings during April look pretty good.

Some Auroral-type openings should be possible during periods of radio storminess. Check the *Last Minute Forecast* at the beginning of this column for those days during April that are expected to be BELOW NORMAL or DISTURBED.

Lyrids, a major meteor shower is due April 22-24. It will probably peak late April 22 or early on the 23rd, with an average of about 15 good-sized meteors entering the earth's atmosphere every hour. This should considerably increase chances for v.h.f. meteor-scatter type openings.

Sporadic-E propagation usually begins to increase during April, and it should continue to do so through the spring and summer months. Look for an increase in short-skip openings on both the *10* and *6* meter bands during the month. Most openings on *10* meters should fall between approximately 750 and 1300 miles. Sporadic-E openings, as the name infers, may occur at any time of the day or night, but there is a tendency for them to peak between 8 a.m. and Noon and again between

LAST MINUTE FORECAST

Day-to-Day Condtions Expected For April, 1976

Propagation Index	*Expected Signal Quality* (4)	(3)	(2)	(1)
Date				
Above Normal: Apr. 19	A	A	B	C
High Normal: Apr. 10, 16, 18, 26	B	B	C	D
Low Normal: Apr. 1, 5-6, 8-9, 11-12, 14-15, 17, 20-21, 24-25, 27	B	C	D	E
Below Normal: Apr. 2-4, 7, 13, 23, 28-30	C	D	E	E
Disturbed: Apr. 22	D-E	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of (3) will be *fair* (C) on April 1, *poor* (D) on the 2nd, 3rd and 4th, and *fair* again (C) on the 5th and 6th, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768, or check WWV at 14 minutes past each hour.

5 and 9 p.m., local time.

Short-Skip Propagation

For openings between 50 and 250 miles, use *80* meters during the day and *160* meters at night. Between 250 and 750 miles, use *40* meters during the day, *80* meters at sunrise and sunset, and *160* meters during the hours of darkness. For openings between 750 and the short-skip limit of 2300 miles, use *20* meters during the day, *40* meters at sunset and sunrise, and *80* meters during the night. Expect an increase in short-skip openings on *15* and *10* meters between distances of about 500 and 1300 miles, during the daylight hours, but these will occur sporadically. There is also the possibility for openings on *15* meters during the afternoon hours between distances of approximately 1300 and 2300 miles. Check the *CQ Short-Skip Propagation Chart* which appeared in last month's column for more details.

DX propagation predictions for each amateur band between *10* and *160* meters for the period *April 15 through June 15, 1976* appear in the *DX Charts* on the following page. Beginning this month and continuing through the summer and fall, the times shown in the *Propagation Charts* will be local *daylight* time (EDT, CDT, MDT and PDT).

Check the day-by-day *general* propagation forecast for April, which appears in the *Last Minute Forecast* at the beginning of this column.

73, George, W3ASK

April 15-June 15, 1976

Time Zone: EDT (24-Hour Time)

EASTERN USA TO:

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

* Indicates best time for 160 Meter opening.
** Indicates best time for 10 Meter opening.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 p.m., etc. Appropriate *daylight* time is used, *not GMT*. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw. p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level: for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

April 15-June 15, 1976

Time Zones: CDT & MDT

(24-Hour Time)

CENTRAL USA TO:

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

(continued on page 68)

Contest Calendar

BY FRANK ANZALONE, W1WY

We have extended the mailing deadline for your WPX SSB Contest logs to May 10th this year giving you an extra 10 days to get them off to us.

The Radio Sports Federation of the USSR has made some changes in their "CQ-M" contest this year. Dates have been moved to later in the month, and this year for the first time contacts may be made on c.w. or s.s.b.

The multiplier is now determined by the countries and regions worked on *each band*, same as in our WW Contest. I suggest you review the rules.

It was unfortunate that the disasterous Guatamala earthquake occurred just before the ARRL Phone Contest in February. The 20 meter band carried a heavy load of emergency traffic and contest operating sometimes created a problem. I noted however that any QRM to the emergency nets was seldom caused by the contesters who stayed on the low end of the band and QSYed when requested, but by the "ragchewing" roundtables who refused to leave their pet frequencies. The same groups that are always complaining that contests interfere with their daily schedules.

73 for now, Frank, W1WY/AC1WY

Calendar of Events

**Apr.	3-4	Polish (SP) DX Contest
*Apr.	4	SIX Meter Contest
Apr.	3-5	ARRL "Open" CD C.W.
*Apr.	10-11	County Hunters SSB
*Apr.	10-11	Novice QSO Party
Apr.	10-12	ARRL "Open" CD Phone
**Apr.	17-18	Florida QSO Party
*Apr.	17-19	ZERO District QSO Party
*Apr.	18	TWO Meter Contest
*Apr.	24-25	Bermuda Phone Contest
*Apr.	24-25	PACC DX Contest
*May	1-2	Swiss "H-22" Contest
May	1-3	Connecticut QSO Party
*May	8-9	Bermuda C.W. Contest
May	8-9	Vermont QSO Party
May	8-10	Georgia QSO Party
May 9—	Nov. 29	Yugoslavia YZ-30 Contest
May	14-16	YL ISSBers QSO Party
May	15-17	Michigan QSO Party
May	22-23	USSR "CQ-M" Contest
May	22-23	New York State QSO Party
May	22-23	Wisconsin QSO Party
June	4-7	CHC/FHC/HTH Party
June	12-13	RSGB National Field Day
June	12-13	ARRL VHF QSO Party
June	26-27	ARRL Field Day
July	3-25	Space Net VHF Contest
July	17-19	County Hunters C.W.
July	24-25	ARRL Bi-Centennial

*Covered in March Calendar
**Covered in February Calendar

Connecticut QSO Party

Starts: 2100 GMT Saturday, May 1
Ends: 0200 GMT Monday, May 3

This party is again sponsored by the Candlewood ARA. The same station may be worked on each band and each mode for QSO credit.

Exchange: QSO no., RS(T) and QTH. County for Conn., ARRL section or country for others.

Scoring: One point per QSO, 2 points if it's with a Novice. Conn. stations multiply total by ARRL sections worked. Others use Conn. counties for their multiplier. (max. of 8) Conn. to Conn. QSOs permitted.

DX contacts count for QSO points but only one additional multiplier. W1QI/1 will be active on all bands and both modes. Contacts with him are worth 5 points, each band and mode.

Frequencies: C.W. — 3540, 7040, 14040, 21040, 28040. Phone — 3925, 7250, 14300, 21375, 28540. Novice — 3725, 7125, 21125, 28125. (C.W. on odd hours, Phone on even hours.)

Awards: Certificates to the highest scorer in each ARRL section, DX County and Conn. county. (min. of 6 QSOs) In addition, a special WACC certificate will be awarded to stations working all 8 Conn. counties.

Mailing deadline for logs is June 1st to: Candlewood A.R.A., c/o Charles Paulsen, WA1SCV, 2 Ryders Lane, Danbury, CT 06810.

Vermont QSO Party

Starts: 2100 GMT Saturday, May 8
Ends: 0100 GMT Monday, May 10

The Central Vermont ARC has changed the dates of their QSO Party to a more suitable time of the year when operation from this comparatively rare state is not so difficult. This change should now make some of the rare counties available.

The same station may be worked on each band and mode for QSO and multiplier credit and mobiles in each county change.

Exchange: QSO no., RS(T) and QTH. County for Vermont, ARRL section for others.

Scoring: Vermont stations score 1 point per contact, and multiply total by number of ARRL sections and countries worked. All others score 3 points for each Vermont station worked, and multiply total by Vermont counties worked *on each band.* (14 per band possible)

Frequencies: 3685, 3909, 3932, 7060, 7265, 7290, 14060, 14290, 14325, 21060, 21375, 28160, 28600, 50260, 50360, 144-144.5, 145.8 (Try c.w. on odd hours, phone on even hours GMT)

Awards: Certificates to top scoring stations in each ARRL section, DX countries and 2nd, 3rd and 4th place in Vermont. Also multi-operator and mobile stations operating in Vermont. There are Trophies for the top scoring single operator in Vermont and out-of-state.

Contacts made during the Party may be credited for the W-VT Award for working 13 out of the 14 Vermont counties.

Mailing deadline is June 15th to: Peter Kragh, W1AYK/K2UPD, 170 Summit Ave., Ramsey, N.J. 07446. Include a s.a.s.e. with your entry.

Georgia QSO Party

Starts: 2000 GMT Saturday, May 8
Ends: 0200 GMT Monday, May 10

This is the 15th annual QSO party sponsored by the Columbus ARC. There are no time or power restrictions and the same station may be

worked on each band and mode. Ga. -to-Ga. contacts are permitted.

Exchange: QSO no., RS(T) and QTH. County for Ga.; state, province or country for all others.

Scoring: Each QSO counts 2 points. Ga. stations multiply total by total number of different states and VE provinces worked. Out-of-state stations use Ga. counties for their multiplier. (max. of 159) Dx may be worked for QSO points but have no multiplier credit.

Frequencies: C.W. — 1810, 3590, 7060, 14060, 21060, 28060. S.S.B.— 3900, 3975, 7245, 14290, 21360, 28600. Novice — 3718, 7125, 21110, 28110. Try 160 at 0300Z, 10 on the hour and 15 on the half hour during daylight hours.

Awards: Certificates to the highest scorer in each state, province, country and Georgia county. Also 2nd and 3rd place awards where warranted. Awards to Novice, both out-of-state and in Georgia. There are Plaques for the top single and multi-operator Ga. stations, top out-of-state, and top Ga. mobile and portable operating outside own county.

Make up your log in the usual sequence, include a summary sheet with the scoring and etc., and the usual signed declaration.

Mail by June 7th to: Columbus A.R.C., Att: John T. Laney III, K4BAI, P.O. Box 421, Columbus, Georgia 31902. Include large s.a.s.e. for copy of the results.

Yugoslavia YZ—30 Contest

From: May 9th To: November 29th

In celebration of the 30th Anniversary of Liberty, the S. R. J. has organized the YZ-30 Contest. All Yugoslavian stations will use the special YZ prefix.

All bands and modes will be used but no cross-band or cross-mode. The exchange will be a signal report only.

Only requirement for the colorful YZ-30 certificate is contacting 30 or more YZ stations.

Your log should contain time and date, YZ station worked, signal report and frequency. It is requested that you also include the usual signed declaration, and 3 IRC's to cover mailing.

Send to S.R.J. YZ-30 Contest, P.O. Box 48, 11001 Belgrad, Yugoslavia.

YL ISSBers QSO Party

Starts: 1901 GMT Friday, May 14
Ends: 1900 GMT Sunday, May 16

Rules for this one are rather lengthy. It is suggested you write to W7EOI for more details and party log forms.

The same station may be worked on different bands for QSO points, but the multiplier is counted only *once*. There are 2 six hour rests that can be taken any time in the contest.

Categories: DX/WK, YL/OM teams and single operator. (Non-members use latter)

Exchange: Name, RS(T), SSB no., country, state, partner's call if any. Non-members send "no number."

Points: Two points for member contacts on same continent, 4 points if on different continents, and 1 point for non-member contacts. Double above points if contacts are on c.w.

Multiplier: USA states, DX/WK teams and YL/OM teams.

Frequencies: C.W. — 3565, 7085, 14070, 21070. Phone — 3873, 7273, 14333, 21373, 28673. Listen for DX on 3775, 7090.

Awards: Certificates to the 1st & 2nd place winners in each country and state. Plaques to the Top world single operator and DX/WK & YL/OM teams.

Pairing of DX/WK teams must be cleared by W7EOI. YL/OM teams must be related pairs. Write to Lyle for more information.

Logs must be postmarked no later than June 30th and go to: Lyle W. Coleman, W7EOI, 412—19th Street, S.W., Great Falls, Mont. 59404

Michigan QSO Party

Starts: 1800 GMT Saturday May 15
Ends: 0200 GMT Monday May 17

This year's party is sponsored by the Oak Park ARC. Phone and C.W. are separate contests, but one may enter logs for each mode. The same station may be worked on each band and mode, portable/mobiles in each county change, and Mich. stations can work other Mich. stations for county multipliers.

Exchange: RS(T), QSO no., and QTH. County for Mich., state or country for others.

Scoring: For Mich.—1 point per QSO times (states + countries + Mich. counties)

Out-of-state—1 point for each Mich. QSO, 5 points if its a Novice or special events station. Multiply QSO points by Mich. counties worked. (max. 83)

V.h.f. entries score same as above but add multiplier from each band for total multiplier.

KH6 and KL7 count as states, VE as country.

Frequencies: C.W. — 1810, 3540, 3725, 7035, 7123, 14035, 21035, 21125, 28035, 28125. Phone — 1815, 3905, 7280, 14280, 21380, 28580. V.H.F. — 50.125 and 145.025. Try 15 on the hour, 10 on the half hour.

Awards: C.W. and Phone certificates to leaders in each state, country and Mich. county. Plaques and Trophies to Top C.W. and Phone, Novice, V.H.F. and aggregate Club in Michigan. And C.W. and Phone out-of-state. (Single Operator only)

A summary sheet is requested and a signed declaration. Mailing deadline June 18th to: Mark Shaw, WA8-EDC, 3810 Woodman, Troy, Mich. 48084

May 15-22 has been designated as Michigan Week. Achievement Certificates will be issued to stations making Michigan contacts during this period.

European 1975 Contest Results
Single Operator

C.W.	Trophy Winners	Phone
G3FXB	Europe	DK5WL
VQ9D	Africa	5L7F
4X4VE	Asia	4X4NJ
WA1KID	N. Amer.	W1ZM
CX9BT	S. Amer.	YV4YC
KG6JAR	Oceania	VK6CT

C.W.
U.S.A.

WA1KID	**414,304**
W2GXD	**354,456**
W3LPL	**297,200**
W3GRF	**287,742**
K3GJD	**253,327**
W3CRE	101,808
WA1STN	76,320
K4YFQ	**54,487**
K8IDE	**51,660**
WB9IVC	**41,085**
W1FYZ	35,738
W4BV	34,010
WB2FMK	31,756
WA1LKX	24,495
W7IR	**24,480**
WA5ZWC	**21,750**
W3APK	19,720
K6AQ	**16,820**
WB7ABK	15,488
W4HOS	10,010
WA6EPQ	9,774
W2KHT	8,568
W1YNE	6,120
WA8KDI	5,896
K9UIY	5,838
WA8TDY	2,880
W1CNU	2,280
WA3DMH	2,160
W9QWM	1,988
W1OPJ	1,288
WA1FCN	580
WA4KAM	504
W6DQX	450
VE2CK/W1	360
W6DCH	300
W6GBY/4	168
WA1UAX	144
W6MAR	132
K2KF	112
WB4WHE/4	100
KG6JAR	**13,920**
KH6IJ	**5,100**

Multi-Op.

K3EST	**349,432**

(Trophy Winner)

PHONE
U.S.A.

W1ZM	**421,080**
W2GXD	**144,648**
K2CW/2	104,608
WB2JJN	15,694
WA1PID/7	**12,240**
WA2EAH	7,626
W4DQD	5,434
W2LEJ	2,390
WA1SQB	2,144
WA1RGW	1,200
W6DGH	504
W6RDF	144
W3GCQ/m	108
KP4QA	7,130

Canada

XJ3FFA	**26,950**
XN1AW	8,268

Multi-Op.

WA2MBM	**85,400**
K8HLR	**68,598**

RTTY
U.S.A.

W3EKT	**43,152**

(Trophy Winner)

K6WZ	8,658
K8IDE	4,599

Canada

VE2JR	80

Multi-Op.

W1MX	**32,148**

All Asian 1975 Contest Results
Continental Top Scores

Single Opr.			Multi Opr.	
5Z4OM	10,260	Africa	—	
UA3SAQ	56,648	Europe	UK3AAI	871,812
9M8NK	80,886	Oceania	—	
CX3BH	2,368	So. Am.	—	
W6MAR	115,714	No. Am.	K6SEN/6	170,964
4Z4IX	137,172	Asia	UK9ABA	210,672

Single Opr.

CANADA
14 MHz

VE3FFA	**1,120**
VE3AXO	144

U.S.A.
7 MHz

WB6CEI	**1,880**

14 MHz

K6HIH	**35,322**
W6KHI	12,090
K7RSC	3,772
K8HLR	3,692
K8CFU	406
W4BAA	400
WA6UFY	220
WA1STN	204
W6DGH	88
W4EEO	9

21 MHz

K6SDR	**10,450**
W6RNF	3,045
K3MNT/7	200

All Band

W6MAR	**115,714**
W9IRH/7	**41,024**
WA6WZO	12,524
W6BJB	3,388
WA5VDH	**1,314**
W4WSF	**640**

Multi Opr.

K6SEN/6	**170,964**
K6SVL	109,388
W6ONV	106,536
W6OKK	91,791
W1ARR/6	66,483

Michigan stations will give information about their state which must be reported by the receiving station. They must make at least 15 out-of-state contacts for the certificate.

Out-of-state stations must work at least 5 Mich. stations, and DX stations at least one for the Achievement award.

Logs with the information received from the Mich. contact go direct to: Governor William Milliken, Lansing, Mich. 48902 and must be postmarked by July 1st.

USSR "CQ-M" Contest

Starts: 2100 GMT Saturday, May 22
Ends: 2100 GMT Sunday, May 23

This is a world wide contest so do not confine your activity to working USSR stations only. This year contacts can be made on c.w. or s.s.b., 3.5 thru 28 MHz. The same station may be worked *once* only regardless of the mode.

Categories: Single operator, both single and all band. Multi-operator, single transmitter all band only. And s.w.l.

Exchange: RS(T) plus a progressive 3 figure QSO number. The USSR boys will send RS(T) plus the number of their region (oblast)

Points: Contacts between stations on the same continent 2 points, different continents 5 points. Same country may be worked for multiplier credit but no QSO points.

S.w.l. get one point for reporting one exchange, 3 points if both exchange numbers are reported.

Multiplier: Is determined by the number of countries and regions worked on *each band*. The "R-150-S" list is the standard, essentially same as the DXCC list plus some additional oblasts.

Final Score: Total QSO points from all bands times the country/oblast multiplier from all bands.

Awards: In the form of certificates and badges will be made to the Top scorers in each continent and each country in each category. A special certificate and badge will be awarded to all participants who make 50 or more contacts with Soviet stations. There is a special award for the contest leaders.

Contest contacts may be credited for the many USSR awards in lieu of QSL cards if request is made with your log. (R-150-S, R-100-O, W-100-U, R-15-R, R-10-R, R-6-K)

All entries must be postmarked no later than July 1st and go to: Krenkel Central Radio Club, "CQ—M" Contest Committee, P.O. Box 88, Moscow, USSR.

New York State QSO Party

Two Periods (GMT)
1600 Sat. May 22 to 0400 Sun. May 23
1200 to 2359 Sunday May 23

The Radio Club of Rensselaer Polytechnic Institute, W2SZ again sponsors this one.

The same station may be worked on each band and mode, N.Y. stations may work other N.Y.ers for QSO and multiplier credit. Out-of-state stations may work N.Y. mobile and portables in each county change.

Exchange: RS(T), QSO no. and QTH. County for N.Y.; state, province or country for others.

Scoring: One point per QSO times the multiplier. States, provinces and countries for N.Y., and N.Y. counties for others. (max. of 62)

Frequencies: C.W. — 1810, 3560, 7060, 14060, 21060, 28060. Phone — 3975, 7275, 14285, 21375, 28575. Novice — 3725, 7125, 21125, 28125.

Indicate each new multiplier as worked. Check sheet is required for stations making over 100 contacts.

Appropriate certificates to all winners.

Mailing deadline June 30th to: John C. Yodis, WA2EAH, 43 Beacon Avenue, Albany, N.Y. 12203. Include large s.a.s.e. for results.

Wisconsin QSO Party

Starts: 0000 GMT Saturday, May 22
Ends: 2400 GMT Sunday, May 23

The annual QSO Party is sponsored by the Neenah-Menasha ARC. The same station may be worked on each band and mode, and Wis. stations may work in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for Wis., ARRL section or country for others.

Scoring: For Wis.—W/K and VE QSOs 1 point, DX 3 points. Multiply QSO points by ARRL sections worked. (max. 74)

Out-of-state—Multiply Wis. QSOs by Wis. counties worked. (max. 72)

KP4, KH6, KL7 and KZ5 count as DX and also section multiplier.

Frequencies: 1810, 3550, 3735, 3900, 7050, 7135, 7235, 14050, 14280, 21050, 21135, 21300, 28050, 28600. Also 50-50.5 and 144-146.

Awards: Certificates to high scoring Fixed, Portable, Mobile, Novice and V.H.F. both in Wis., each ARRL section and DX country.

Indicate each multiplier the first time worked and include a summary sheet with your entry.

Logs must be received by June 15th (July 1st for DX) and go to: Neenah-Menasha ARC, Att: Mark Michel, W9PJT, 700 Kinzie Court, Menasha, Wis. 54952 ■

...de W1WY

START

"Hi Frank, we've got some good news"

"On one hand our readers look forward to it."

"We're sure you're going to like this one."

"... and some bad."

"And on the other you seem to always like it."

"Cause it's our way of saying we like you."

"The good news is that we're not going to do something silly to your column this April."

"Just think of it as a 'Contest'."

"So relax and enjoy it."

"The bad is that we're still planning something."

"To think of what we're going to do."

"And think of what's coming next year."

A. EDWARD HOPPER, W2GT, ON

Awards

Although Leroy Friestad, WA9OFF, became a silent key after this story was written, it was felt that all his friends would not want to miss this story.

Ed., W2GT

As told by Lee, here is the April, "Story of The Month":

Leroy M. Friestad, WA9OFF

All Counties #97, 2-23-73

"My first introduction to County Hunting came about when I was shown an article in the local newspaper about Ralph Alley, W9JR and his many awards and accomplishments, back in 1966. Each morning after chasing DX, I would generally end up on 20 meters and listen to the County Hunters. After months of listening to how the Net operated, I decided to 'get my feet wet'! My DXing came to an immediate halt and I became hooked on County Hunting.

"As the photograph will show, I'm handicapped, or in medical terminology, I am a quadraplegic. I have only limited use of my right arm. I state this only to explain why and how I operate on the Net. Only a few amateurs ever knew of my disability while County Hunting. I preferred this, not because I am ashamed or embarrassed, but felt I didn't want any special treatment, mainly from Mobile Operators. My goal, like many other County Hunters, was to reach that magical number. I wanted to reach this without too many special favors from the very thoughtful County Hunters.

"My disability is due to an auto accident in 1952. In 1959, after visiting four Polio victims who are friends of mine, and seeing the enjoyment they got out of amateur radio, I decided that this was for me. In 1963, I took the examination and got my license, which then opened up a whole new world and way of living for me.

"I am laying here now, just thinking back over the last seven/eight years of happenings while County Hunting. I think of the many mobile trips that I followed from my bed. Michigan to Washington State, through a snowstorm; Washington, D.C. to California, many times; New England to Florida and back again; and the countless days and nights of following and working mobile expeditions. The trips with salesmen from customer to customer and state to state. Trips through windstorms, dust storms, rain storms, and ice and snow storms. Also one mobile trip by a single individual and his tape recorder, that ran 5,000 miles. This was accomplished by W9JR (Ralph, I hope your Wife doesn't read this).

"I also think about the countless number of friends I made while County Hunting, and those who assisted and co-operated with me during the almost 2 years of operating as a Net Control on weekdays. It really was fun! I wish to thank all of those who acted as backups while I ran the Net, and I sincerely appreciate all the counties I collected from many, many Mobile Operators. I wonder if all you County Hunters realize that without help from the Mobile Operators, no one would ever reach that magical number? I wish to express a special thanks to them, and wish that I could reciprocate for all the time and money they gave, not to mention the wear and tear on their cars, equipment, and they themselves.

Lee, WA9OFF at his complicated operating set-up.

Special Honor Roll
(All Counties)
#138 Robert C. Holt, GW3NWV 10-21-75.

USA-CA Honor Roll

2000	1000	500
WB4UPW 238	WB4UPW 379	WN1TAI 1077
1500		WB4UPW 1078
WB4UPW 284		

"I owe a very special thanks to Cleo, WAØSHE, for her determination in giving me my last county. It took three tries to do it. The first attempt was stopped by an ice storm; the second try was stopped by a snow storm; and the third time, halfway there she developed rig trouble, went back to her home QTH, exchanged rigs and tried it again; and we finally made it. Incidentally, these trips were made from Kansas City to Nebraska, I'm sure that Cleo knows the mileage. I know that I developed an ulcer from it. I also developed a few pressure sores, wore out my equipment, and in general, just collapsed in the heat.

"What I am about to say now, I hope will not scare people away from County Hunting, but like so many others who have completed them all, I too have developed that disease called '3079itis'. I know that in the past many who have completed them all have just disappeared from the Net, while others have remained. I wish to be remembered in the remaining category, and should be back on the Net long before this

VA-VIBA Award.

story gets into print.

"I know that time and space will not permit me to list all the names and calls of those I would like to thank. I'm sure they know and realize how appreciative I am for the many happy hours I had while County Hunting.

88s to those YLs/XYLs I know and 73s to all the OMs".

(Note—Lee waited until he had them *all* before sending his application 2-23-73 and received 500 through 2000 endorsed All 14 S.S.B., and 2500 through *all* endorsed All S.S.B.).

Awards Issued

Bob Holt, GW3NWV was happy to gain them *all*. He is the only GW station to receive any USA-CA Award.

Frank Winn, WB4UPW was issued USA-CA-500 endorsed All Fone, All 14, All 7 and All 3.9; USA-CA-1000 All 14 Fone; 1500 All Fone and Mixed USA-CA-2000.

Bob Czajkowski, WN1TAI (now WA1TAI and with Advance license) got USA-CA-500 endorsed All A-1 and became the 4th Novice to get USA-CA-500. The others were; WN4-EBE (now WA4EBE); WN4UCC (now WA4EMA); and WN7IRD (now WA7-IRD) and "Willie" was the only YL/XYL Novice to get an award. Others with Novice endorsements were: K8ZNI, and K8SWW/WØJSW who not only got 500 so endorsed, but got the only 1000 so endorsed.

Awards

Virginia Independence Bicentennial Award (VA-VIBA): The Virginia Independence Bicentennial Commission and the Richmond Amateur Radio Club of Richmond, Virginia are pleased to announce a new award. This award is being issued from Richmond, Virginia, to commemorate the Bicentennial Year of 1976, and is available to all licensed amateurs. Requirements are:

(a) **United States and Canada** (Does not include Alaska and Hawaii). One contact with each of the original thirteen Colonies and five contacts with Richmond Stations. The five contacts are in addition to the one required for Viriginia as a Colony.

(b) **Rest of the World** (Including Alaska and Hawaii). One contact with each of the Original Thirteen Colonies and three contacts with Richmond Stations. The three contacts are in addition to the one required for Virginia as a Colony.

Henrico and Chesterfield County Stations will count as Richmond Stations.

Contacts shall have been made during the period January 1, 1976, to December 31, 1976 inclusive.

Worked Hampden County Radio Association Award.

Awards are based on c.w., phone or a combination of both.

Stickers will be available for additional groups of contacts as required under (a) and (b). Make same application as original, but there will be no additional charge.

Applications for this *award* shall be addressed to the Richmond Amateur Radio Club, P.O. Box 73, Richmond, Virginia 23201. An Alphabetical list of calls shall accompany the application giving the date, GMT time and mode. This list shall be signed by two other licensed amateur operators or an officer of the local radio club, certifying the fact that the applicant has the QSLs in his possession, verifying the contacts. A fee of $0.75 or 3 IRCs shall accompany the application. The Richmond Amateur Radio Club reserves the right to request any one of the QSLs for verification (GCR-rule). The thirteen Original Colonies are: Connecticut: Delaware, Georgia, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Virginia.

WHCRA Certificate Of Achievement: This Award, sponsored by the Hampden County Radio Association, Inc., of Springfield, Massachusetts, is issued for working 15 members of their organization. Send s.a.s.e. for list of members and for the Award, simply send a list of the stations worked and s.a.s.e. for the Award to: C. Norman Peacor, K1IJU, Cote Road, Monson, Massachusetts 01057. The club also publishes a large club paper titled *Zero Beat* which is mailed to all members on a monthly basis.

Notes

Sad news to report, deaths of:

Anne Carnette, WB9IMH (XYL of Jim, W9UZC, USA-CA-500-#464).

Dr. J. Blasi, W4NXD (exKR6IX, KA6IX, W5ROP—ALL COUNTIES #30).

Jack DuBois, K200 (exK2CPR, W3BXE, FP8AA — ALL COUNTIES #56).

Jeff M. Holt, GD3GMH, USA-CA-500 #849—Only GD with any USA-CA and brother of GW3-NWV—ALL COUNTIES #138).

"Tex" Sweeny, K2KL/W2DXX member of NJDXA.

I wanted to reminisce about meeting my friend, with whom I had my very first QSO back in 1921, after not seeing him in over 50 years—but that story will have to wait for more space at a later date. How was your month? 73, Ed., W2GT.

Surplus Sidelights

BY GORDON ELIOT WHITE

Anyone who works much with surplus, as I do, sooner or later picks up equipment which requires 400 Hz a.c. power. A great deal of the aircraft electronics used 400 Hz and some units not generally thought of as airborne come with 400 Hz motors or transformers. The MITE teleprinters, for example, are often seen on sale with 400 Hz motors, and a lot of servo equipment and servo or motor-tuned communications or navigation gear needs at least a small 400 Hz power source.

If you can use the 400 Hz gear,

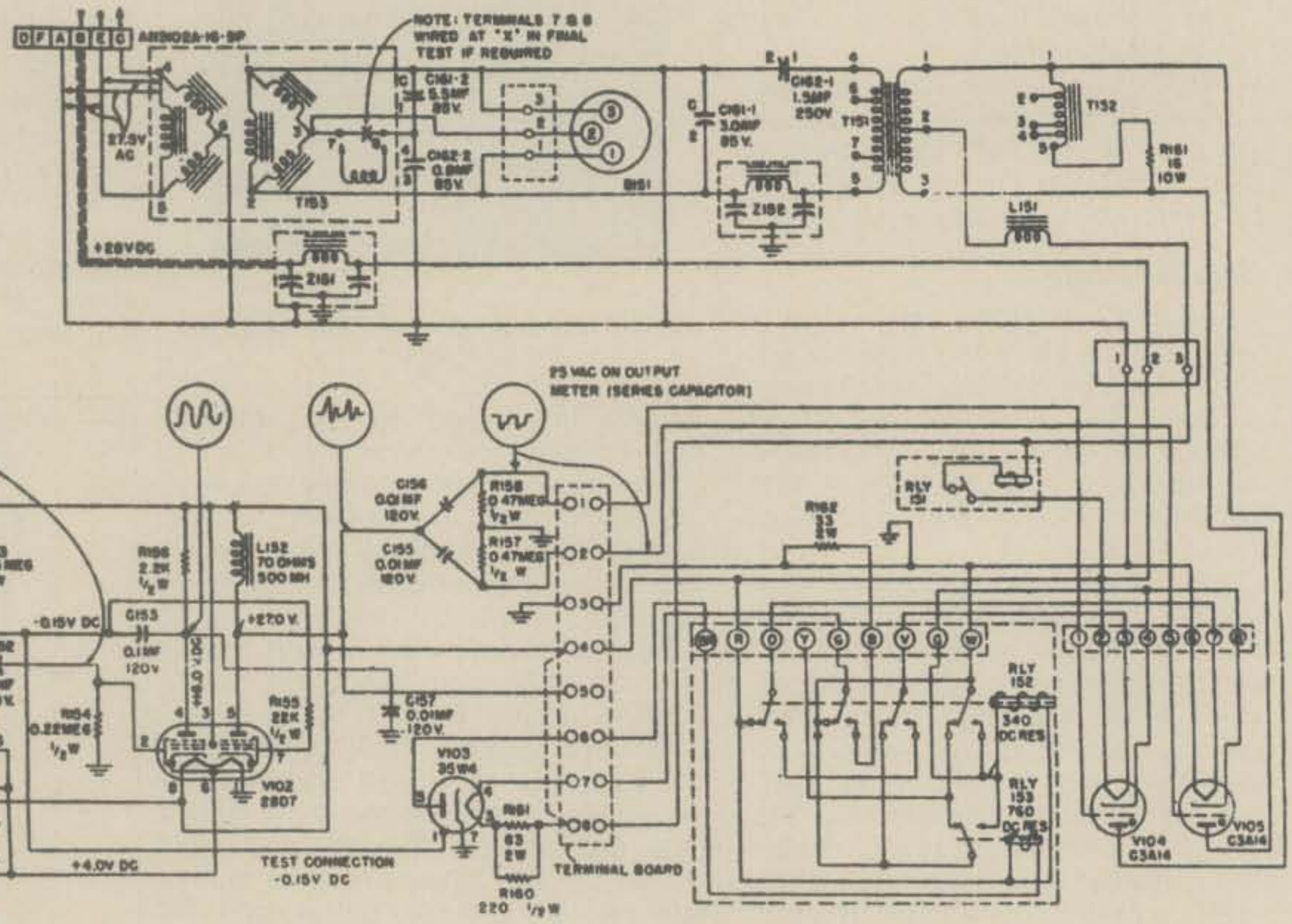


Fig. 1—Schematic diagram for the D-2 gun bomb rocket sight power supply.

COMPONENT VALUES

Component	Terminals		Measured Values	
	From	To		
B151	1	2	28	ohms
	2	3	28	ohms
	3	1	28	ohms
RLY151	A	B	0.03	ohms
RLY152*	Red	White	340	ohms
RLY153	Brown	Red	725	ohms
L151	Brown	Yellow	0.09	ohms
L152			70	ohms
T151	1	2	0.15	ohms
	4	5	2.8	ohms
T153	1	5	5.0	ohms

Component	Terminals		Measured Values	
	From	To		
T153	1	2	3.9	ohms
	2	3	3.9	ohms
	3	1	3.9	ohms
	4	5	0.55	ohms
	5	6	0.55	ohms
	6	4	0.55	ohms
	7	8	0.40	ohms
Z151	Red	Braided lead	0.018	ohms
	Red	Ground	2.8	mf
	Ground	Braided lead	2.8	mf
Z152	Orange	Black	0.18	ohms
	Orange	Ground	1.0	mf
	Ground	Black	1.0	mf
Y151	Red	Ground	5000	ohms
	Blue	Ground	3000	ohms

*With RLY153 closed

you can often get the piece far more cheaply than the 60 Hz versions. The MITE 60 Hz A.C. motors, for example, are expensive items. Some gear has no 60 Hz counterpart, and if you don't have 400 Hz available, you can't use it.

The item I will describe this month is therefore, a handy item to have around the shack, as it will supply a modest amount of 28 volt, 400 Hz power—enough to operate light servo equipment at least. Though the construction appears to be rugged and oversize for the published ratings, I am not prepared to guarantee that it would run a teleprinter motor. There is a possibility that converting the unit to heavy-duty solid-state components in place of the Thyratons could improve its efficiency to handle heavier loads.

This unit is known as the D-2 gun bomb rocket sight power supply (ruggedized). The D-2 was built by the Sorensen Company for the Air Force F-86 jet fighter of Korean War days. It is one of those undistinguished black boxes often seen in surplus stores and kicked aside with the observation "I wonder what it's good for, if anything."

Although the D-2 is probably commonly found wherever surplus is sold, I found mine at a nearby military export dealer, Air Supply International, box 4148, Alexandria, Va., 22303 (3121 Colvin St.)

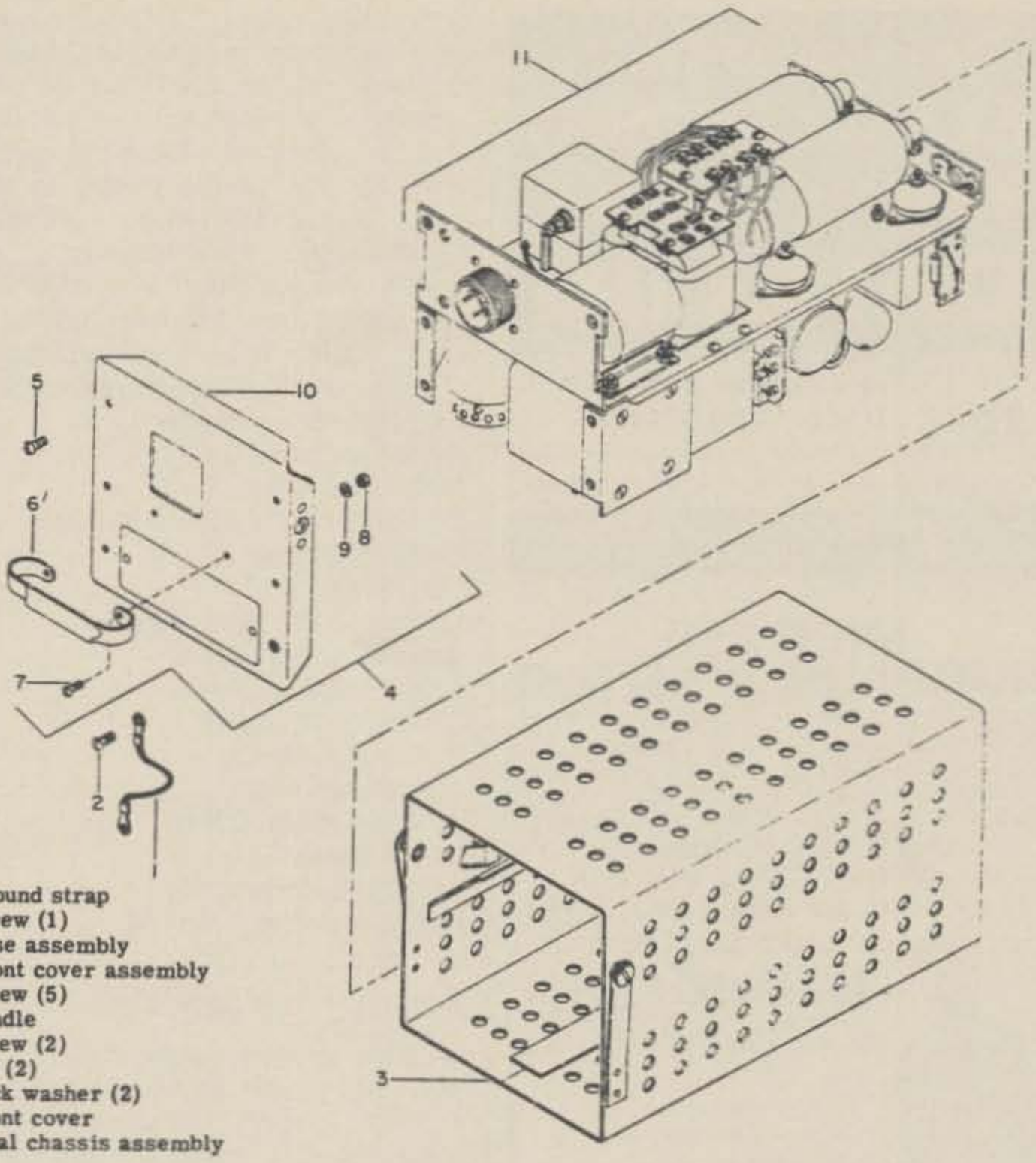
The Air Force manual on the D-2 is *AN 03-5FD-12*.

The vital statistics on the D-2 are that it requires 28 volts dc at 10 amps. It puts out 28 volts a.c. at 400 Hz, three phase. Connection is normally Delta, one leg grounded. Power ratings are from 9.98 watts to 14.5 watts. The box is 12¼ inches long and 6½ inches square. Weight is 18.5 pounds, and it requires one AN3102A-19-9P cable connector.

This is a piece that is well-suited to being stuck out of sight under the work table. I connected mine to a stout 28 volt rack-mount d.c. power supply, a G.E.M. 314795-9 model built for the National Aeronautics and Space Administration by the Valor Instrument Co., of Gardena, California. The supply produces 25 amps of 28 volt d.c. with good regulation and circuit-breaker protection. I recommend the G.E.M., or any similar supply, for the 28 volt d.c. needs around the shack.

Fig. 1 is the schematic of the D-2 supply.

As may be seen from the diagram, the circuit consists of a tuning-fork frequency standard (at 400 Hz) using a 26A6 oscillator followed by a 28D7 dual pentode driver and a pair of



1 Ground strap
2 Screw (1)
3 Case assembly
4 Front cover assembly
5 Screw (5)
6 Handle
7 Screw (2)
8 Nut (2)
9 Lock washer (2)
10 Front cover
11 Final chassis assembly

An exploded view of the D-2 power supply.

C3A14 thyratron power tubes. The fork (Y-151) is contained in a sealed can and is quite stable and accurate.

It should be possible to tap into the a.c. output of the isolation transformer (T-151) to get single-phase 400 Hz, if desired. At that point the voltage may be stepped up to, say, 117 volts for some applications, using common transformers designed for 50 Hz a.c. current. You can run 400 Hz through a 60 Hz inductance because the 60 Hz unit has plenty of iron in it to handle higher frequencies. Running 60 Hz power through a 400 Hz unit leads to overheating, smoke and fire because the 400 Hz unit has too little metal, and draws more current at 60 Hz than it can handle. The difference is, of course, the reason for using 400 Hz power in aircraft, where weight is an important factor. The same basis is behind using 28 volts dc in aircraft, a change made early in World War II. Before that, 12 volts systems were common in military aircraft.

Dayton Get-together

As the historian of the Command Sets, I have had some requests for a possible get-together of collectors of the equipment. The Dayton hamvention later this month was suggested but for several reasons 1976 was not a suitable year. I solicit any discussion interested readers might have on having such a meeting in 1977. I suggest that if possible we might meet at the Air Force Museum, in Dayton, Saturday afternoon of the Hamvention. I would like to invite many of the designers, technicians, pilots and engineers who worked on the Command design and the units which led to it.

I would plan to bring with me my collection of Command gear, including prototype set Type 1 serial #1, examples of the RAT, RAT-1, and R-112 and T-90 tuneable v.h.f. equipment, the 28-41 Mhz Eighth Air Force receiver, the Navy crystal-controlled ARA receiver and the late AN/ARN-59 and R-1021/ARN-30D navigation sets.

Anyone with equipment to display, or information to add to the Command Set history I urge to contact me, as well as all those who have written me about this equipment over the years.

Jet Engine Starters

My recent mention of using surplus jet engine starters to power electric automobiles elicited quite a bit of response. More, in fact, than I had

expected among readers of this column. Jack Nugent, 5111 NE 125th St., Vancouver, Washington, 98665, publishes a manual giving a great deal of data on converting a small gasoline-engined car to battery power. I recommend writing him before starting any projects.

Jack has rebuilt several Renault Dauphines to electric power, and recommends them as a starting point. The Renault, he points out, will carry as many batteries as the Volkswagen, but weighs 700 pounds less. Weight is the key factor in range of an electric car. He also points out that the MG sedan weighs 1,000 pounds more than the Renault, and although the Fiat 600 weighs 200 pounds less, it does not have enough room to carry sufficient batteries.

I feel that a couple of points are worth discussing, however: he suggests doing away with the clutch and shifting the transmission by synchronizing car and motor speeds. From my own experience with just a non-synchro-transmission Model A Ford, I feel it is more practical to retain the clutch and flywheel, despite the slight weight penalty. Most people will save more battery power with the clutch than they will lose because of weight.

Jack also offers a resistive motor controller, using heavy nichrome wire resistors to dissipate power in starting the vehicle. This of course wastes a certain amount of power, and provides a reliability problem with contact points (likely to stick.) I find that a solid-state controller is significantly more convenient—not unlike the accelerator pedal of your gas car; it saves battery power, too, even though it is more expensive.

Jack lists five possible sources for d.c. motors usable in cars:

Airborne Sales Co.
8501 Stellar Dr.
Culver City, California 90230

Surplus Center
1000 West O St.
Lincoln, Nebraska, 68501

Groban Supply Co.
9300 S. Drexel Ave.
Chicago, Ill. 60619

Palley Supply Co.
11630 Burke St.
Whittier, Calif. 90610

C & H Sales
2167 E. Colorado Blvd.
Pasadena, Calif. 91170 ■

Novice *(from page 53)*

WL7IBE in Anchorage, Alaska, where his father was stationed in the Air Force in March, 1974. He then operated for six months from Tampa, Florida and had been in Tucson five months when he wrote. Chuck uses a Heathkit HW-101 he assembled to feed a Hy-Gain 18AVT/WB vertical antenna. His favorite band is 15 meters, but he also works 40 and 10 meters. Although school work keeps him off the air, except on weekends and on some holidays, he has worked 43 states and 15 countries from Tucson. He likes all facets of amateur radio, including ragchewing, DX chasing, exchanging QSL cards, and handling traffic. Chuck passed his Advanced class exam many weeks before he wrote; therefore it is difficult to predict what call letters he will be signing when you read his story. By the way, Chuck has some 2-meter a.m. and f.m. gear waiting for the new license.

The latest proposal from the Federal Communications Commission is to relax the regulations requiring amateurs operating "mobile" or "portable" to include the portable or mobile designator when sending their call signs. It will not be illegal to do so, however, if the operators wishes to indicate his approximate location during such operation—almost a necessity in contest operation.

We are again at the spot on the page where we invite you to send your pictures, "News And Views," suggestions for discussion, and comments for *your* column, no matter what your class of license. Mail all material to me directly or care of *CQ* magazine. *73, Herb, W9EGQ*

Propagation *(from page 59)*

April 15-June 15, 1976

Time Zone: PDT (24-Hour Time)

WESTERN USA TO:

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

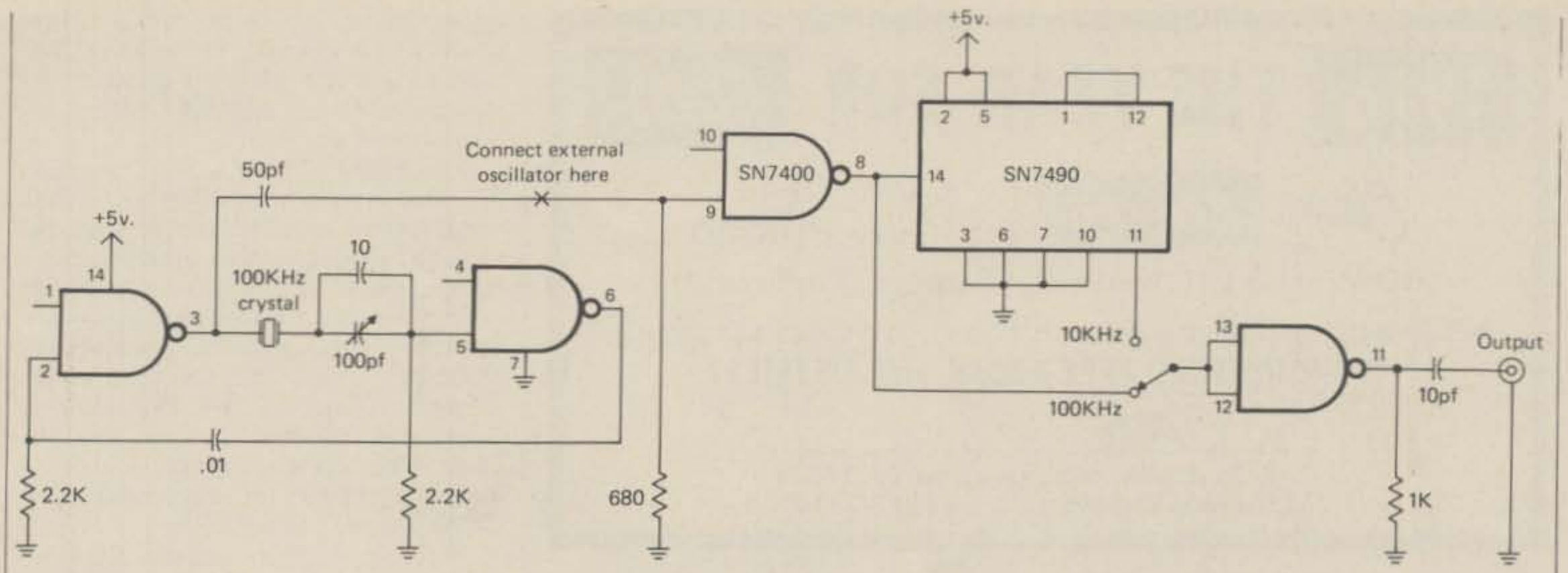


Fig. 4—A 10 kHz/100 kHz harmonic generator. For best results the 100 kHz crystal should be as stable as possible—even put in a crystal oven if possible.

Math's Notes *(from page 44)*

enough to not give erroneous readings on zener diodes and these may be checked by same way as standard diodes.

For our final offering we have the circuitry shown in fig. 4. This is nothing more than a driver and 7400 TTL chip which may be connected to an existing, common 100 kHz crystal frequency standard such as those used to calibrate receivers or used with the 100 kHz TTL oscillator shown on the schematic.

The purpose of the circuitry, is to generate very fast rise and fall time square waves (or pulses if you wish) that are rich in harmonics all of the way up to the u.h.f. spectrom. By employing a decade divider, 10 kHz as well as 100 kHz marker pulses may be obtained.

After fabrication the unit should be very carefully calibrated to WWV by beating the WWV carrier with its appropriate harmonic. Coupling the output to the antenna of a receiver along with the regular antenna will do the trick.

One immediate use for this device is as a simple aid to lining up 6 meter, 2 meter etc. repeater channels. To do so simply switch to the 10 kHz position (which should be within the passband of the receiver) and then adjust the appropriate slug in the receiver to center the signal in the passband using the S meter to detect maximum received signal.

While the preceeding items were all quite simple, they all are very handy devices and should serve to make experimentation that much easier. I also hope that these simple devices answer at least some of the questions we have recently received.

73, Irwin, WA2NDM

In Focus *(from page 47)*

WB2DCX, are now giving some thought to a means of providing "House Sync" as painlessly as possible.

In order to combine various slow scan video inputs (such as camera and keyboard) without sleight-of-hand or other exotic techniques, it is necessary to apply a common sync signal to the sundry inputs. Hence the term House Sync. More on this in an early issue.

Globetrotting

Ahmed Ebrahim, EP2AD, the well-known DXer of Pakistan is still planning to get going on SSTV. At this writing, he's gathering up components and making the big push to get operational. Ahmed expects to be in business on slow scan by April. He already has a tape made up for

transmission, so look for a "new country" very soon! Incidentally, Ahmed has a two element quad at 65 feet pumping an excellent signal all over the world.

Old friend Richard Thurlow, G3-WW, brings up a good point: What constitutes a valid SSTV two-way exchange? This question arises in connection with DX-Expeditions which do not carry a monitor and obviously cannot verify satisfactory reception of SSTV signals until the tape is reviewed following the expedition. Comments on this subject are invited. Meanwhile, Richard is preparing a proposal for acceptance by BATC, ARRL, and RSGB.

'Way out West in Kansas, Stanley, Kansas, that is, lives a handsome gentleman with an impressive array of amateur gear. Not only that, he's well known in SSTV circles for his excellent picture "programs". The accompanying pictures (figs. 6 and 7) show Jerry Foster, W0QWH, enjoying some "armchair copy" and busy with his nifty program board/camera.

Final-Final

I would like to express my thanks for the continuing support of this column from all over the globe. In addition to bringing you news and pictures of the slow scan world, "In Focus" can also serve as a clearing house for your problems. If you need help with some phase of a construction project or have discovered a means of getting around a common problem, please don't hesitate to drop me a line. "In Focus" hopes to serve as a meeting place for all slow scanners, so keep those letters and pictures coming! 73, Bill, W2DD

Antennas *(from page 41)*

height of one half wavelength. As the height of the dipole above ground decreases, the radiation resistance of the dipole rises, until it reaches nearly 100 ohms at a height of about 0.3 wavelength above ground.

"Well, this represents a height of about 40 feet at 80 meters. And a lot of fellows, including myself, have 80 meter dipoles at that elevation. I can't speak for others, but I've found that the radiation resistance of the dipole at that height runs closer to 30 or 40 ohms than it does to 100 ohms. So, I don't think it is too wise to put too much trust in charts or diagrams that show radiation resistance as a function of antenna height. The imperfections of the average ground prevent such a conclusion from being reached."

"Next thing, you'll be telling me that there's no Santa Claus," said Pendergast with a laugh. ■

CQ Reviews: Drake TR-22C *(from page 38)*

If you intend to do a great amount of mobile operation with the TR-22C you may want to spend another $9.95 for the under the dash mounting bracket. The transceiver simply slips into the mount and is held in place by two knurled knobs that place tension on the side of the transceiver case. It's quick and easy, as I'm sure your local thief will testify.

Conclusions

The Drake TR-22C is a good compromise between a hand held and a larger base/mobile transceiver. Its performance is better than some hand held units and worse than some mobile units. If that sounds like another compromise, its not. When you consider the price is only $229.95 including microphone, Ni-Cad battery pack, built in charger and carrying case, that's a good buy. I like the Drake TR-22C. I liked it enough that I bought one for myself. What more can I say? ■

Sunspot Minimum *(from page 35)*

among other things, on the work of Cohen and Lintz (1974)[2].

Using the Maximum Entropy Spectral Analysis (MESA) method, Cohen and Lintz found that the spectrum of the 12-month smoothed sunspot numbers exhibited significant components at periods of 89.6, 57.1, 11.2, 9.9 and 8.1 years. To a first approximation, then, the repetition period for a waveform produced by the superposition of sinusoids having these periods is in the range 170-180 years ($2 \times 89.6 = 179.2$ years; $3 \times 57.1 = 171.3$ years; $16 \times 11.2 = 179.2$ years; $18 \times 9.9 = 178.2$ years, and $22 \times 8.1 = 178.2$ years). Put another way, this analysis suggests that the major characteristics of the sunspot cycle should repeat every 170 to 180 years.

If a fundamental 170-180 year repetition period in solar activity exists, another period of low sunspot activity should have occurred in the early part of the 19th century. A review of figures 1 and 2 shows that a prolonged, though not so severe, period of low solar activity did indeed occur from about 1795 to 1835. Further, by this same reasoning, the sun would again be expected to exhibit relatively low sunspot activity over the next 30 years. In this regard, a review of Cohen and Lintz' data shows that the maximum expected sunspot numbers for Cycle 21 (1977-1988) and Cycle 22 (1988-2002) are in the low to mid 40's. However, the data assembled by Schove and Eddy, as interpreted here, protend even lower values.

[2]See also, Cohen and Lintz, *CQ*, March, 1974. *Editor*

(continued on next page)

Solar Activity and Associated Terrestrial Phenomena

Amateur operators are well aware of how variations in solar activity affect ionospheric propagation. What may not be well understood, however, is how these variations affect other terrestrial phenomena. One of the more interesting effects is the variation in the production of the isotope C^{14} (Carbon 14) with changes in solar activity.

It is currently thought that C^{14} is formed by galactic cosmic rays which impinge on the Earth's atmosphere. The influx of these cosmic rays is inhibited during periods of solar maxima, and conversely, increases during solar minima. Thus, measurements in the relative abundance of C^{14} over time (from tree rings, for example) give a proxy indication of variations in solar activity.

Fig. 3(a) shows the variation of C^{14} as a function of time. Note the significant increase in the relative concentration of C^{14} which occurred during the Prolonged Sunspot Minimum. A similar, though not as pronounced, increase is also observed early in the 1800's, very close in time to the period of minimum sunspot activity observed between 1795 and 1835. Positive excursions in the relative concentration of C^{14} are also observed in the middle of the 1300's, and in the last half of the 1400's and first half of the 1500's. From these observations, it may be inferred that sunspot and auroral activity were low during these periods. This inference is supported by Schove (1955) who shows quiescent periods of solar activity from 1326 to 1351, and from 1468 to 1516.

Though the positive deviations in C^{14} concentration are broad in nature, the existence of a 150 to 170-year periodicity in these data is not to be overlooked. These data, then, also suggest that an extended period of low solar activity should be expected before the year 2000.

Finally, any examination of long-term variations in solar activity and associated effects on terrestrial phenomena should include some reference to the possible relationship between the sunspot cycle and the climate. For purposes of comparison, fig. 3(b) shows the remarkable similarity between the severity of western European winters and the variation in C^{14} concentration. The conclusion to be drawn, though still considered speculative by some, is that climatic variations are associated with variations in solar activity, and that long periods of low solar activity may be associated with significant regional cooling.

It is interesting to note that the interval from 1430 to 1850 is known as the Little Ice Age, and records such as those assembled by Lamb (1969) identify two periods of cold extrema in the 15th and 17th centuries. During the Little Ice Age, and principally during the years which define the Prolonged Sunspot Minimum, glaciers in Alaska, Scandinavia, and the Alps advanced to positions last reached thousands of years ago during major ice ages. At this same time, Arctic pack ice isolated the Norse colony in Southwest Greenland and caused it to perish, while in Iceland, grain that had grown for centuries was no longer able to survive (United States Committee for the Global Atmospheric Research Program, 1975).

Conclusion

Recent evaluations of solar activity indicate that the Prolonged Sunspot Minimum (1645-1715) did occur. Further, whether the mean annual sunspot numbers during this period were as low (<10) as those indicated by Eddy, or somewhat higher (<60) as postulated by Schove, the fact remains that the Sun exhibited anomously low activity during this period. A second period of relatively low solar activity was observed between 1795 and 1835, and based on an approximate 170 to 180-year repetition in solar activity, some observers predict that the maximum mean annual sunspot numbers during the next two solar cycles may not exceed 50. Finally, though speculative, the possibility can not be overlooked that for extended periods between 1976 and 2005, almost no spots will be observed on the surface of the Sun.

Acknowledgement

I gratefully acknowledge the assistance of my dear colleague, Professor Jerzy Ostermond-Tor, who reviewed the original manuscript of this work, and made valuable suggestions which improved the presentation.

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Deception Island *(from page 19)*

countered. I later learned that another volcanic eruption had occurred just a few months after we departed from Deception Island.

It is hard to predict when LU1ZC will be activated again, but if the scientists that have studied the volcanic activity of the island are correct in their predictions, the volcanoes that once silenced the radio amateur stations in the island will remain very active for a long time. ■

Helically Loaded Antennas *(from page 21)*

tape yet so it pays to do a bit of hunting around for a good price if a considerable quantity is desired (20 feet, one inch wide should run about $2 at most auto/hardware outlets).

The final turning of an antenna will have to be done using a grid-dip meter and a s.w.r. bridge by pruning turns at the ends of the elemen(s). Turns can be removed or a few turns wound more closely (and with smaller width tape) at the end to vary resonance. The grid-dip meter is used to check approximate resonance and then a s.w.r. meter used for final tuning within a band.

Although stainless steel tape is weatherproof by itself, further protection can be afforded by spraying the finished element with a clear plastic coating such as Krylon. Although no test data is available, it would seem that painting an antenna element with an acrylic resin base paint will not effect its electrical performance if one wants to hide the presence of the shiny stainless steel tape.

This article has not presented the reader with specific numbers on antenna construction, except for the design example. It may take a little time to figure out dimensions for a given antenna need but think of the simplicity of construction—steel tape wound on PVC tubing—as compared to constructing, waterproofing and tuning other loading devices.

Bandspread for SP-500-JX *(from page 24)*

across the dial-plate, to under the main tuning knob, which is supplied with the vernier; the width is not important. A line is drawn down the middle of the dial-pointer, and then half the plastic is cut away. This will leave only the permanent-ink line and half the plastic piece. This aids in calibration-marking later. The pointer is then mounted on the template with a self-tapping screw.

Finally the dial plate is cut from stiff, thin aluminum stock and a ½-inch hole punched in the center

to facilitate the attachment to the vernier face once the original vernier dial is removed. For calibrating the dial, you can use the template shown in fig. 2, or make one to your own special requirements. The white face of my dial was made by sticking self-adhering labels to the dial plate and then by trimming the edges. A compass is used to inscribe the desired number of circles. In my case, I wanted the lower ends of the 40-10 meter bands, since I work only c.w. A single rotation of the dial plate was calibrated with the resulting bandspread shown in fig. 2. If you work s.s.b., the reverse approach might be taken, by calibrating from the high end of the desired band, down one full rotation. As you will notice, several inches of bandspread can be had on each band.

Before attempting calibration, it's a good idea to disengage the rotary-and-arm switch connector from the "frequency control" shaft in the upper right hand corner of the front panel, and to put the b.f.o./v.f.o. selection switch in the v.f.o. position. Poor contacts could otherwise ruin calibration.

Calibration is simple[1]. With a crystal calibrator or an accurate transmitter v.f.o. tuned to the band-edge, the calibrating signal is found on the receiver and a line is inscribed on the dial face, using the dial-pointer as a ruler. The frequency can be penned in, or, as I did, typed on a self-adhering label, cut out, and stuck to the dial face. The process of finding the calibrator signal and inking in the line on the dial face is repeated, at whatever intervals you desire, until the band is completed. Then do the next band.

When you are tuning from the high end of the main dial to the low end (as when going down to the 3.5 or 21 mHz band), it is necessary only to remove the screw that secures the anchor-arm to its bracket, and to turn the whole vernier assembly in "fast-tune." The crystal calibrator is switched on, the "tuning lock" secured, and the vernier dial slipped into frequency—and you're ready to tune that band. Because of the excellent tracking of the gear train tuning system, my vernier dial is accurate to within ± 1 kHz.

A few dollars in material and a few hours of your time will turn this general coverage receiver into a truly fine hamband receiver—one that, in my opinion equals the performance of most $300 transceivers in selectivity, and probably surpasses most of them in sensitivity and image rejection. My new SP-600-JX is a dream come true. ■

[1]Bandedge calibration for setting the bandspread dial is easily accomplished by using the 3.5 MHz second oscillator signal on its harmonics at 14, 21, and 28 MHz. A calibrating signal of sufficient strength can be obtained simply by removing the shield can from V8 and holding the tube lightly. If a permanent signal is desired, simply insert the end of an 18 inch piece of insulated wire into the V8 shield can and attach the other end to the antenna terminal.

External Oscillator *(from page 25)*

-out hole of the "OX" circuit board. The 470 ohm resistor and bypass .03 mf capacitor are located as near the octal socket pins with as short leads as is possible.

The mechanical support of holding the "OX" board to the octal socket is done by foil ground pins connected to pins 1 and 8 of the octal socket.

While not fragile, the FV-007 will take only so much man-handling. I have built two, and the one in the photo has been knocking about a suitcase down to Sint Maarten and back and still works good. I usually remove the FV-007 from the FT-101-E to remove and re-insert a crystal, and re-install it in the FT-101-E. ■

Our Readers Say (continued from page 7)

tributed them to fellow hams, who have also indicated their interest in this very well written and most interesting article. I believe that every DX'er should have a copy in his files. We are looking forward to more articles of this nature, keep up the good work.

Leo Haijsman, W4KA
Cape Coral, FL

Squeeze The Trigger

Editor, *CQ*:

Although I am not a subscriber to your magazine, I feel that the attached letter to me from the Better Business Bureau, Chicago, Illinois regarding non-delivery of paid for merchandise with Trigger Electronics of River Forest, Illinois might be of some interest to you and your readers.

David D. Davis, W7MWF
Las Vegas, NE

Please be informed, Mr. Davis, that during the past year, the Bureau has received approximately 30 complaints involving non-delivery of merchandise against subject firm of which unfortunately, the majority have not been settled. Because of the nature and the number of complaints we've received the Bureau is presently advising all complainants to take further legal action through the following agency. We regret we have been unable to assist you. Attorney General's Consumer Fraud Bureau, 134 No. LaSalle St. Rm. 204, Chicago, IL.

Editor, *CQ*:

Referring to the problems with Trigger Electronics, Chicago. Trigger-Electronics is very active in the mail-order business. I received their catalog unsollicited. Apparently they send their catalog to every new-licensed radio-amateur.

I recently passed the FCC exam and now hold an American license, new call, WBØRSQ.

Herman Aalderink, PJ2HA

Editor, *CQ*:

I am writing to pass along my experiences with Trigger Electronics, 7361 North Ave., River Forest, IL 60305. I only wish I had sent a setter such as this sooner and I hope I can save some of you the problems I've encountered.

I sent Trigger an order about September 20, 1975 and my check cleared soon afterward. I waited several months before I wrote and checked the order and was told it would be sent "as soon as possible". I wrote in January asking for my money back and received a reply that the item would reach me in 3 weeks. It's now 5 weeks late and I've sent them another letter cancelling my order. I intend to take them to small claims court if this isn't done.

I hope you will join me in not purchasing from this company in the future.

Thomas J. Santros, WN2VPF
Ithaca, NY

Bicentenial Calls

Editor, *CQ:*

You won't find me on your subscrber list but I do read *CQ* via a nearby ham friend so I think the communication following suits the times and 1976:

Our American prefixes, W and K, are so well known and for such a long time that there is no real reason to have or to use that juvenile "AC" for 1976. I am proud of the W1, and W8 and W9 calls I have had for 44 years and intend to stay USA with "W" and not dress up like a juvenile.

Temple Nieter, W9YLD
Evanston, IL

Shedding Light on Light

Editor, *CQ*:

I received the January issue of *CQ* and was happy to see W6HDM's article on light. Undergraduates here at OSU learn that the energy of a photon is E= hxf where h is Planck's constant and f is the frequency. It can be shown that the energy of a photon has nothing to do with the speed of photons. Other than these errors, the article was well written and informative.

Stan Quayle, WB8HMG
Columbus, OH

That's What it's all About

Editor, *CQ*:

I'm writing to let you know what several hams are up to out in Southern Middle Tennessee.

I live in a spiritual farming community in Tennessee, where we use ham radio several hours a day to keep in touch with sister communities in Wisconsin, Alabama, Missouri, New York, New Hampshire, and Florida.

This Farm supports a thousand people and a very active 8-man radio crew. We can really be close to the other farms around the country using the air waves. We run our own net on 7245 and 7160 most weekday mornings at 9:00 a.m. C.S.T.

I'm going to send you a Hey Beatnik magazine and a couple of flyers telling what we're up to in various directions, you might be interested in the radio page in Hey Beatnik.

The flyer on our Plenty relief organization has a lot to do with our radio work, too. We sent a man and his wife down to Guatamala last week to survey the earthquake damage and report back to us by radio. Thanks to such dedicated hams at TG9LW, TG9PW, TG9XX, and TG9HS, we know what medical and food supplies are the most needed, and how we can best help out down in that country. I felt very privileged to be a ham and to help out with the Guatamala relief traffic.

Hams In The Farm Net

Tennessee
Albert, WB4BWR
William, K4IAP
William, WA4KCF
Daniel, WA4MZX
Martin, WB4JLA
Patrick, WA4GFE
Jeffery, WB4KDH
Mark, WA4LXC

Wisconsin
Robert, WB9NRY

Mobile
William, WA4GFE/4
Jerry, WB4MYN

Washington
Randy, WA7BKR

Illinois
Phil, K9FHP

New York
Michael, WA2ZRJ
Gary, WA4ZDX/2

William Brady, WA4KCF
Summertown, TN

Cool it!

Editor, *CQ:*

In regard to your editorial in the February Issue, don't do it! please don't do it! Don't start down the path of politicizing a first class journal! As sure as night follows day you'll only end up radicalizing a part of your readers, and turning off a lot of the rest of us. Our hobby can't stand much more that the one radicalizer extraordinaire up there in New Hampshire. You're running a fine magazine; you've organized it superbly; and you've got a stable of contributors who as specialists in their respective areas do an excellent job. What's the sense of devoting even the occasional page to a diversion like the recent "anti" ARRL. It's all we've got. If you're not for it, your against it. Somehow this point is vaguely akin to the "motherhood" bit. Arrogance: we've all got it, one way or another. You've got it by even writing a piece like this one, with as little evident understanding of a broad and complex problem as you show. Of course our Newington friends show some arrogance; I've gotten it too. They sit at the power center of our whole international problem, and they know it, and they're human. It comes out with that superior bias. You must be raising this point from a simple pique about something. Cool it. The selection of the headquarters staff: the janitor too? Work to choose your leaders correctly and they'll hire the right servants! And the meanest cut of all, Dick, was to suggest there's a strong self-serving bias to the actions of headquarters staff. Sure there may be an element of it, like you've got in you and I in me, each in our own ambient. But if you've got something on your mind here, speak up. Straight out, but no broad innuendos. Finally, on spending "the kitty". Trying to outdo the Petersboro boy? It doesn't wash.

Look Dick, I sucked myself into picking apart some of the nitty gritty that offended me. Nothing personal. Just telling you how I reacted to some of it. Why not just keep *CQ* the clean constructive journal it's always been. Leave the crap to the expert up there. Use the system to put forward concrete constructive proposals meriting league action. Drum up support if you must, but don't start a second path to radicalization!

Robert F. Holtz, W6RXA
La Jolla, CA

HAM SHOP?

YES, once again we are able to offer CQ subscribers free use of the Ham Shop on a non-commercial basis. Here's your chance to buy, sell, or swap your way into that ultimate station or just pick up some extra spending money. Join the crowd rushing to get in on the action. Run a different ad every month, and get your ads in early. Remember that we have a two month lead time in preparing CQ. Also keep in mind that with CQ's larger format there is far more room for your ads, so act now.

Fill out the form below and send it in with a recent mailing label. It's just that simple.

CQ HAM SHOP
14 Vanderventer Ave.
Port Washington, N.Y. 11050

Please run this in the next available issue of CQ:

Name _____

Address _____

City _____

State _____ Zip _____

HAM SHOP

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Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: **CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050,**

WANTED: SSB Exciter for Johnson Viking Valliant, Working condition prefered. Bert A. Stephens, P.O. Box 105, Fort Lyon, CO 81038.

RADIO MUSEUM now open. Free admission. 15,000 pieces of equipment from 1850 telegraph instruments to amateur and commercial transmitters of the 1920's. Amateur station W2AN. Write for information. Antique Wireless Assn. Main St., Holcomb, N.Y. 14469.

160 METER OPs and SWLs: The Chiburban Radio Mobileers 160 Meter Net operates 1833 & or - 2 khz (QRM) every Wednesday night, 0200 GMT, as well as 1700 GMT Sundays. All AM, SSB or CW operators, fixed or mobile, are welcome to check in.

CUSTOM EMBROIDERED CLUB EMBLEMS Your design, low minimum, informational booklet, Write Emblems, Dept 10, Littleton, NH 03561.

REPAIRS. K6BE. 415-548-1889.

UNSCRAMBLE POLICE CODE with decoders. Works on all scanners and receivers. For prices and brochure, write: Don Nobles, Route 7, Box 265B, Hot Springs, Ark. 71901. 501/623-6027.

QSL CARDS - Something completely different. Nothing even close to it on the market! Samples: 25 cents. W5UTT, Box 1171E, Garland, Tx. 75040.

MOULTRIE AMATEUR RADIO KLUB 15th annual hamfest April 25, Wyman Park, Sullivan, IL. Indoor-outdoor market. Advance ticket sales by mail only, $1.25 or $1.50 at gate. Write : MARK P.O. Box 327, Mattoon, IL 61938.

WANTED: Old magazines, Books, Catalogs, Call books and early Radio receivers, parts etc. Erv Rasmussen W6YPM 164 Lowell, Redwood City Ca. 94062.

CUSTOM EMBROIDERED PATCHES, no minimum, no shape or color limits. Double-knit vests, nylon jackets, custom imprinted tee-shirts LePhCo, 2860G Pinkerton, Zanesville, Oh. 43701 (614) 453-6966.

25th DAYTON HAMVENTION at HARA Arena April 23, 24, 25, 1976. Technical forums, exhibits, and huge flea market. Program brochures mailed March 8th, to those registered within past three years. For accommodations or advance flyer, write Hamvention, P.O. Box 44, Dayton, Oh. 45401.

NORTHWESTERN PENNSYLVANIA Swapfest. May 1, Crawford County Fairgrounds, Meadville. Free Admission. $1 to display. Flea market begins at 10 AM. Hourly door prizes; refreshments. Commercial displays welcome. Indoor if rain. Talkin 146.04/64 and 146.52 Mhz. Details, Crawford Amateur Radio Society, Box 653 Meadville, Pa. 16335.

FOR SALE: 480 back issues of QST from 1935 through 1973, most in binders. 116 back issues of 73, including first 3, from 1960 through 1968. For price list send a sase to Ed Hopper, W2GT, P.O. Box 73, Rochelle Park, N.J. 07662.

FOR SALE: 4 Jennings JB-12 JO-Bloks, 12 KV P.I.V. at up to 1.0 amp. $16.00, Stencor PC-S401 plate-filament transformer, $5.00, Filament transformer 110v to 6.3 v.c.t. at 10 amps, $5.00, Raytrack 30 amp. filament choke $4.00, Bud type H-9116 chrome handles $3.50, Raytrack 6 meter plate choke on 3/4" steatite form $2.50, Ratron Model 2A, type 4000 air flow switch $4.00, 3 pairs Raytheon circuit board Mounting brackets,1 1/2" 2", 2 1/2", $2.00, 3 Raytheon knobs (2 - MS91528-3F 2B, 1- MS91528-1F2B) $1.75. A Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

DID YOU KNOW that supplements to the book, "CQ YL" are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 4417 - 11th St., NW, Albuquerque, NM 87107. Please enclose two thirteen cent stamps to cover cost of mailing. The one and only book about YLs in ham radio, "CQ YL" contains 21 chapters, over 600 photographs. Order your autographed copy or a gift copy from W5RZJ, $3.00 postpaid.

LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952 but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

SELL: 4-1000 A used, $30. 1,000 pf loading cap. $7. Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch $16. UTC S-50 6kv c.t. 300 ma, new, pick-up only, $75. 7200 v.c.t. 1 a. 115/230 v. pri. $35. Pick-up only. OZ-PAKS: Large (several kw) $30; small (2 kw) $20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

CRYSTALS - 50 cents each, send stamped envelope and 25 cents for list, (refunded with order). Artrip, Box 1630, Ivy, Va. 22945.

LOOKING FOR USED GEAR? Buyers & Sellers radio brokerage has the equipment you want at the prices you want to pay. Call our Ham Gear Hotline: 617-536-8777, Weekdays 9-5 EST.

LEARN CODE in a few days with audio reflex method of teaching letters, numbers, punctuation. One hour cassette only $7.00. Television diagnostic repair course by master technicians. Lessons $6.00 each. Optional matching cassette tape $6.00. Send for first lesson and master index. Guardian Electronics 20 East Main, Ramsey, N.J. 07446.

WANTED: Robyn "Digital 500A" Transceiver complete with AC power supply & Speaker. D.L. Coleman, 4130 Colorado St. Duluth, Mn. 55804.

FREE CATALOG. LEDS, Microphones, Nicads, IC's, Relays, Ultrasonic Devices, Precision Trimmer Capacitors, Digital Thermometers, Unique Components. Chaney's Box 15431, Lakewood, CO 80215.

COLLINS S. Line. Four pieces mint condition $1900.00 manuals. Al Evelyn, 65 Hibiscus Dr. Ormond, FL 32074.

TECH MANUALS for Govt. surplus gear, $6.50 each: SP-600JX, URM-25D, SG-3/U, TS-173/UR, TS-174/U, LM-21, OS-8B/U. Thousands more available. Send 50 cents (coin) for 22 page list. W3IHD, 7218 Roanne Drive, Wa. 20021.

NEED Manual For gonset Linear Using 4-572B will copy and return. Paul Wiegert 625 Van Duzer St. Staten Island, NY 10304.

SELL: Excellent SB-200 $225. WANTED: SB-220, Protax 375, IC-22, GTX-200, SB-610 F.H. Kauppi, Rt. 1 Box 171 Gilbert, Mn. 55741.

SWAP: CIE Electronic Tech. Course 1971 complete 73 lesson orig. cost $490. Swap for VFO, Matchbox. Larry Kellough, R.R. 2 Robinson, IL 62454.

TRADE or SELL: Tape Recorder, 7" reel to reel, V-M Model 711-A. T-V Antenna Amplifier, Blonder-Tongue. B. Nastoff, 320 W. 56th Place, Merrillville, In. 46410.

FOR SALE: Yaesu Cooling Fan for FT-101 series Tranceivers. $12.00 Postpaid. WB5LMN 1432 Pamela St., Hurst, Tx. 76053.

GOVERNMENT SURPLUS: Porcelain insulator set, five sets, $10.00 government cost, now $1.00, prepaid. Colonel Wayne D. Russell, 9410 Walhampton, Louisville, KY 40222.

WANTED: R-390A, R-389, motor operated coax switches, silicon bronze antenna wire and Telrex rotator. Joseph Marshall, 147 Middleville Road, Northport, NY 11768.

WANTED: Quality general coverage receiver thats good on SSB - All band turnable Preamplifier - Hammatlund HC10 Slices. P.K. Outlaw Rte. 1 Box 60 Bethime, SC 29009.

WANTED: HQ 180, SP600 JX. Ranger 2, Viking Thunderbolt, also 2 meter equipment which is tunable to cover the whole band. R.C. Stone, P.O. Box 147 Sylvania, Oh. 43560.

TRADE: 3 Motorola D33BAT 12 volt Transceivers for a 2 meter walkie talkie ready to go on 94-94 W0OSP John Stiles Sherwood, ND 58782.

WORLD WIDE QSL-DX CARDS needed send to: Philip Steven Kurland, 3000 Valentine Ave. Apt. 1A Bronx, NY 10458.

TRIBANDER WANTED: small and reasonably cheap preferred. Briggs, 515 East 75th St., NY, 10021. 212-628-3986.

SELL: Heath SB-401, SB-303, SB-620 with Spkr. and Mic. All connect Cables and manuals, Mint Condition. Best offer, all or part. Feely, 15 Locust Hill, Yonkers, N.Y. 10701.

COLLINS R-388URR - Mint Recvr. W/Spares and manual $350.00 Heath 6&2 Xmtr. mint w/manual $100.00. S. B. Cohen, 813 2nd St. Ronkonkoma, N.Y. 11779.

EICO VTVM no. 221, VTVM no. 249, Signal Gen. no. 315. Best offer. M. Talluto, 9422 - 209 St. Queens Village, NY 11428.

WANTED: Swan 420 VFO. Leslie J. Benton, 14610 Lilva Drive, Centreville, Va. 22020.

FOR SALE: BC-610-E, Johnson Viking II, Valiant and 6N2. Best offer on any or all. All working condition. E.K. Afflerbach, P.O. Box 172, Coopersburg, Pa. 18036.

SWAP: Three VHF ARC-5 xmtrs 50, 144, 220 mhz w/pwr supply-modulator for what-have-you? R. Voelker, 101-23 Lefferts Blvd. Richmond Hill NY 11419.

SELL: New Simpson 1699 Milliohmmeter $150.00, New Recorder mikes $300, new AC adaptors, various voltages $350. K5ENL Ed Block, Rte. 4 Box 127, Grandview Tx. 76050.

FOR SALE: Mosley CM-1 Rcvr. needs work $60, AN/USM 50 Oscilliscope in fair operating condition. $55. J. Weger Box 816 71 E. 32, Chicago IL 60616.

B&W 5100 $125. Viking Valiant $125. Clegg Zeus P'S $350. Hallicrafter SR46A $125. Homemade KW Linear $50. Others. C.M. Rowe, 9924 NW 6th Place. Gainesville, Fl. 32601.

FOR SALE: Magnum six speech processor for Collins 32S1/32S3, Hewlett Packard 200J audio oscillator, RCA WO-56A oscilloscope, Heath GD-48 metal locator, Times RG-331/U coax. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, Ma. 01056.

FOR SALE: FET V.FO. and power supply, 8-9 MHz, extremely stable, as per QST article, Dec. 1966, p. 11. All high quality components used throughout $35.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO, issues at 20 cents each (including USA shipping) from Lockheed Ham Club, 2814 Empire, Burbank, Ca. 91504. Send list and check. Available issues and any refund due will be sent promptly.

FOR SALE: Ranger II, 75 Watt xmtr, perfect working cond., repainted face, $85.00. Harold Peters, P.O. Box 1264, Tipton, Pa. 16684.

NO DX QSLs? Try ham sentences in 54 languages on your card. It works! Still have some DX QSL Guides, $3.95. Joe Mikuckis, 6913 Furman Pkwy. Riverdale, MD 20840.

FOR SALE: Robot-camera Model 80 $250.00 Like new- Realistic Patrolman - Hi-Lo Band Police Rx - $50.00. W.E. Cann, Box 264, Hampton Beach NH 03842.

Cleaning House - Test Gear-Radio Recvrs and Xmtrs. Tubes - Transformers - Fil-Mod Fil High and Low Power 545A Scope and Plug ins - SAE for list or individual request. Jack Hughes, 2278 W. 236 Pl. Torrance Ca. 90501.

FOR SALE: Murdock, Trimm, Western Electric, Brandes large earplines $5.00 pair. Small Trimm and Acme, $2.50 a pair, Baldwins, mint - $10.00 a pair. FOB. M.J. Douglas, 2254 Pepper Dr. Concord Ca. 94520.

MAKE OFFER: 2 Leeds and Northrup Speedomax W Chart recorders (chart spd 6 in/hr). Ed McLinn, 1732 Highland Ave. E., Twin Falls Id. 83301.

R-390A in vy good cond. with all manuals and some spare parts, $450. Crutchfield 477 Rita Drive, Odenton, Md. 21113.

MEDICAL: Any licensed amateur radio operator in the medical or para-medical field should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906.

MODERN 60 MIN. CODE CASSETTES. Novice 0-5 wpm, Progressive 5-13 wpm, General 13-15 wpm, Extra 20-22 wpm. $3 Ea. 4/$10. Royal Box 2174 Sandusky Oh. 44870.

ROCHESTER HAMFEST 1976 is Saturday, May 22. Your name added to mailing list or information. Write: Rochester Hamfest, Box 1388, Rochester N.Y. 14603.

HAM RADIO CLUBS - Engraved Pin Badges, 2 lines $1.50, 3 Lines $1.75. Desk Plates and Door Signs, also available. Free Samples for clubs. REMS, 28 Depot St. Richmondville, N.Y. 12149.

SELL: Swan 350 with 117 XC, $225; Heathket SB-630 Station Console, $50; Allied SX-190 Communications reciever, $160; all excellent. Koss ESP/7 Headphones, $40; Garrard SL 72B Turntable with pickering XV 750 and Shure M91ED and Dust Cover, $70; Pioneer Auto-Reverse car cassette player, $40 all good condition. Gary Marks, WB2MEY, 159 Rochelle Pk., Tonawanda, N.Y. 14150.

BUY-SELL-TRADE. Write for free mailer. Give name, address, call letters. Complete stock of major brands new and reconditioned equipment. Call us for best deals. We buy Collins, Swan, Drake, etc. SSB & FM. Associated Radio 8012 Conser, Overland Park, Ks. 66204 913-381-5901.

SELL: Heath GR-64 rcvr. I ship. $30. Tom Johnson, RR1, Famhamville Ia. 50538.

CLEGG FM27B complete 2m fm coverage! pft, near new (ser no. 27054-4149) incl. extra mic & 2 mobile brackets, $290; matching AC PS $65, Hustler 2m mobile colinear $15, or all for $350. Neal, WB7CUK, (206) 485-2079, 14602 NE 169th, Woodinville, Wa. 98072.

WANTED: Touch-tone panel phone and Touch-A-Matic. Box 1684; Washington, D.C. 20013.

SAROC Second Hawaiian Convention, Kuilima Hotel, North Shore, Oahu, Hawaii, August 28, 1976, technical sessions, exhibits, banquet and registration $15.00. Del Webb World Travel OTC charter via United Airlines from Los Angeles depart August 24 return 31 only $300.00 per person, double occupancy in hotel room: includes roundtrip from Los Angeles only, ground transportation and baggage handling airport/hotel in Hawaii, seven nights accommodations KUILIMA hotel, SAROC registration with banquet, tax and gratuity. SAROC Las Vegas Convention, January 6-9, 1977. Details on both from SAROC, POB 945, Boulder City, Nevada 89005. Telephone 702-293-2091.

SAROC Second Hawaiian Convention, KUILIMA Hotel, August 28, 1976, Technical sessions, exhibits and banquet. SAROC Las Vegas Convention, January 6-9, 1977. Details from SAROC, POB 945, Boulder City, Nevada 89005. Fone 702-293-2091.

NEW YORK CITY Third Annual Hall of Science Radio Club Auction Flea Market Saturday June 5 at Worlds Fair Grounds, Flushing L.I. Admission $1.00 Sellers $2.00. No sellers commission but 10% fee on auctioned items. Zoo, boating, childrens farm, art and science museums adjacent. Field Day goodies galore. Box 1032, Flushing, 11352.

SURPLUS TELEPHONES? Standard Commercial Modern dial desk phones. Excellent condition. Cost $30.00, fine for ham shack, bedroom, etc. Special to hams $6.95 prepaid U.S.A. only. Surplus Center, W0BOH, Box 82209, Lincoln, Nebr. 68501.

TV-COLOR- BAR Generator 16 patterns, Pocket size. CMOS-LSI Chip, one transistor. Complete Plans $5. Workshop, Box 393, Bethpage, N.Y. 11714.

RARS FOURTH ANNUAL HAMFEST. April 11 at Crabtree Valley Mall, US 70 West, Raleigh, N.C. Expanded Flea Market still under cover. Four big prizes, many others. Meetings, ladies activities. Walk to nearby motels, restaurants, shopping. For more details write: RARS, Box 17124, Raleigh, N.C. 27609.

FOR SALE: GTX10 Factory Modified Pre Amp and 30 watts Mobile whip - Power package less batterys - 7 sets of Xtals. $150. Charles E. Manning 2306 N. Moreland, Indianapolis, In. 46222.

WANTED: Manual or Schematic for G.E. Signal Generator YGS-3. A. Bielenda, W2IDA, 43 Chestnut Ridge Rd., Saddle River, NJ 07458.

FOR SALE or TRADE for: 2M and or 6M XCVR, 1 Hallicrafters S-101 Rcvr. 1 Johnson Adventurer XMTR, 1 Johnson Viking II XMTR. Gary Gerber, Box 84 Gage Ok. 73843

WANTED: Hunter 2000B Linear reasonably priced. Ralph Sieloff RD2, Lagrangeville, NY 12540.

WANTED: Swan Mobile Motor Driven Antenna. W5EKT 214-376-7305.

FOR SALE: CQ/73/QST/HR. SASE for list. E.D. Guimares Jr. RFD 2 Box 480 Atwood Ave. Middleboro Ma. 02346.

WANTED: Ham radio magazines, books, newsletters. State price. Donald Erickson, 6059 Essex St., Riverside, Ca. 92504. (714) 687-5910.

FOR SALE: Drake R4 Rcvr. $225.00. Heath HW-7 Xcvr. $55.00. W0MS, (303) 798-6255.

HEATH DX-60 with HG-10, $95; HQ-100AC rcvr, $110; SX-96 rcvr, $115; Ameco 2 mtr. conv., $30: D-104 mic., $15. Kurz, 2711 29 St. Zion, IL 60099.

FOR SALE: Yaesu FT-401B, Mint condition with new finals $470.00. After 5pm. (212) 781-8667.

WANTED: Old National 5880 or 5886 power supply and 40 meter bandspread coils for SW-SW-3 also old radio magazines for 1920 - 1926. Clarence E. Filley, 1109 South 2nd St., Hamilton, Montana, 59840.

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WANTED- R390 or 51-J-4. Also copy of ARRL, Vol no. 1 of Hints and Kinks. W6QV, 10912 Sherman Grove, Sunland, Ca. 91040.

HEATH HW-22A $40., HP-13 DC Supply $40., Hustler 40 Mtr. Mobile Ant. $15., HM-15 SWR MTR $15. P.J. Serafinas, 925 Coleridge Rd. Baltimore, Md. 21229.

WANTED: 5ADP7 or 5ABP7 and 3AP5 or any crt. with a P5 Phosphor. Also 931-A tubes. W. Letourniaw, 2338 E. South Ave., No. St. Paul, Mn. 55109.

SELL: SB301, CW filter excellent $210. HRO-50 T1. A,B,D,2D,E,F,G,AC, coils. $110. Manuals. Donald W. Conrad, 1126 N. Hilton Rd. Wilmington, Del. 19803.

LIKE NEW: Ten-Tec PM3-A $39, 14 AVQ Vertical $25. K3AQR, P.O. Box Y Conneautville, Pa. 16406.

WANTED: Galaxy AC-35 power supply. Jim Johnson, W4JUG, 815 Coleman St. Raleigh, N.C. 27610.

WANTED: Heathkit: IG-14 Post-Marker Generator in excellent condition, Albarra, P.O. Box 8525, San Jose, CA 95155.

SELL: Heath HW7 Factory Alligned with AC Supply $60.00. Tom Dornback, K9MKX, 2515 College, Downers Grove, IL 60515.

SELL: SB-144 with 34/94, 94/94, 16/76, 25/85, 52/52 $150.00. R.R. Gobel, 1500 H. St. Fairbury NE, 68352.

FOR SALE: Drake 2 meter VHF-FM Transceiver ML-2 Operates 117 VAC or 12 VDC. 12 Channels 10 Watts. Xtal for 6. Mint Condition $200.00. K2BGM 9 Sprague Dr., Valley Stream, N.Y. 11580.

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FOR SALE: CQ Magazines 1945 No. 1 to date 75.00 — 60 Watt 432 MHZ Rig $225.00 SASE. K0JHW, 7061 Idlewild Ave., Jennings, Mo. 63136.

WANTED: DX40 in top Condition. WA2SET, RFD 3, Dundee, NY 14837.

RECEIVERS: Background Music, SCA Multiplex, Commercial quality. Browning Labs., SASE for specs., $30. W4JGO, 643 Diamond, Salem, Va. 24153.

WANTED: Jennings Vac. Variable type UCSL — 1000, also turns counting dial. L. R. Dickinson, 633 — 40th St. Richmond, Ca. 94805.

WANTED: SCR 522 Converted or unconverted. Stan Zuchora, 2748 Meade, Detroit, Mi. 48212.

URGENTLY: Need 160 meter antenna coil for NC 300 receiver. Need information where I can purchase one, new or used. William Toben, 1244 W. Schaefer Dr. Tucson Az. 85705.

WANTED: Good used Millen Grid Dip Meter all coils and manual. Wm. Carroll Thayer, 3001 Gold Star Drive, Apt. A-27, Long Beach Ca. 90810.

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FOR SALE: NCX-Smk II W/AC Needs Work, R-390A, HW-32A, TS-175, 75A3, Sell or Swap. E. A. Sjolander Jr., Box 453, Ashland Wi, 54806.

SELL OR TRADE: RME DB-23 Preamp for CB rig, LW Rcvr. W.R. Smith, Brown Terr. Uxbridge, Ma. 01569.

HEATH HP-13 Mobile Power Supply with Cables $40.00 C.E. Moore, 3329 March Lane Garland, Tx. 75042. (214) 272-9996.

URGENTLY NEED: 163 tube, (dual triode same as 2-6v6's in one envelope). Pay cash or trade. William Toben, 1244 W. Schafer Dr., Tucson Az. 85705.

FOR SALE: Lafayette HA-600A AM/CW/SSB Receiver with HE-48C, Speaker and manual. Like new condition $182.00 value will sell for $120.00. Herbert W. Hatton, 720 North Park St. Carrollton, Ga. 30117.

SB-12 Panadapter W/AC Scp $85, G.E. 30-50 MC Monitor AC Rec $30. K6KZT 2255 Alexander Ave., Los Osos, Ca. 93402.

FOR SALE: Hallicrafter S38E Gen Cov. Receiver $25.00. Hallicrafter R-46 Speaker $10. Eico VTVM, Model 232 $18.00. ARC 5's, 3-6 mc. Rec and 5.3-7 mc xmt $7.50 each, waters 2 pos. coax switch $4.00. Tubes: 813's new, boxed, $15.00 each. T. Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport Ca. 95453.

CALL LETTER LICENSE PLATES, wanted for collection.Will pay for collection. Will pay postage. Art Phillips WA7NXL, 3401 No. Columbus Apt. 5-0, Tucson, Az. 85712.

WANTED: Swan speaker or speaker/phone patch. Swan Wattmeter or wattmeter/swr. Heath MP-10 or MP-14 inverter, also Heath Line Voltage monitor, Heath HDP21A mic., GD973A motor speed control. T. Coddington WB6AWC 7825 Scotts Valley Rd., Lakeport, Ca. 95453.

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E.F. Johnson Speed - X Bug Key. Good Condition. $11. Postpaid. WA2GMD, 8 Hollis Pl., Huntington Station, N.Y. 11746.

FOR SALE: 9 Globar 470 ohm 50 watt non-inductive resistors, fuse-clip mtg. $10., IRC 5K, 225 watt adjustable power resistor, $2.75 Simpson Model 29 4" O - 500 v.d.c. meter, $6.00, Simpson Model 29 4" O - 1.5 ma d.c. meter, $6.00, 10 transmitting capacitors, 500 mmf (7-20KV, 3-10KV), $10.00, 4" National Steatite pillar (X 3/4") screw top, mtg. base $2.00, Plate Transformer, 7200 v.c.t. @ 1 amp 115/230 pri., $35.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave. Port Washington, N.Y. 11050.

B&W 5 Posit. Coax Sw. $5; Vibroplex gold bug $30; HA410 $65; Dow Key DKC TRM $10; R4A loaded xtra $250; Drake AC4 $65; FOB Art Ford 56 Gildare, East Northport, NY 11731.

Western Digital ER-1422B & ER-1432B Eight Digit Calculator chips including 26 page manual. Brand new, $14.50 Postpaid. G. Alfred Dodds, P.O. Box 25, Brunswick, Oh. 44212.

WANTED: Vibroplex bug, SX-117 and HT-44 R. Voelker, 101-23 Lefferts Blvd. Richmond Hill, NY 11419.

TWO METER FM XCVR WANTED: W. Gustafson, K8KQD, 5224 Bronson Blvd., Portage, Mi. 49081.

WANTED: Allied CX-190 or AX-190 model receiver, James Glendening, 11414 E. 215th St. Lakewood, Ca. 90715.

SELL: Heath SB-303, SB-401, SB-600, All Mint $500. Want DX Eng. Speech Proc. For Drake TR-4, P. Feely, 15 Lucust Hill, Yonkers, NY 10701.

WANTED: Regency HR-2A 2 meter or something similar. Ted Thode, 322 - 1st Ave. W. Sisseton, S.D. 57262.

PLEASE don't throw away your old Call Books, please mail them to me, I'll remail them to Eastern Europe where they are wanted. Joseph Bryda, 60 Orchard St. Springfield, Ma. 01107.

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FOR SALE: QST/73/CQ/HR SASE for list. E. D. Guimares Jr. Atwood Ave. Middleboro, Ma. 02346.

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BOOK WANTED: Radio Antenna Engineering by Edmund A. Laport. C.E. Hicks W4MIP 4729 Bouldercrest Rd. Ellenwood Ca. 30049.

HELP NEEDED: Any info appreciated to repair and operate Berkely-Beckman 5571 Freq. Meter. D.F. Schwab Box 187, Frederic Wi. 54837.

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TV-DX! Cavity tuned antenna preamplifier. Jerrold TPR4 65 to 85 MHz Factory set at TV ch. 5 Brand new. A. Randaccio Suite 100 381 West Notre Dame, Montreal Canada H2Y1V2.

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FOR SALE: CDE HAM M Antenna Rotor, $60.00. WANTED: 4CX1000 used but in good condition. H.A. Seyse, 103 Lou Dr., Depew, NY 14043.

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SELL: Heath Apache TX-1 XMTR and SB-10 SSB Adapter, $110 plus shipping. WA9MFZ, 306 Greenwood Ave., Waukegan, IL 60085.

QSL - DX - Send QSL and DX Cards to: Phillip Steven Kurland 3000 Valentine Ave. Apt. 1A Bronx, NY 10458.

TENTEC PM3-A, WRL TC6A, Slinky antenna All mint. K8RXD, 147 S. Wise, N. Canton, Oh., 44720.

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WANTED: Collins 75A4 Receiver Triex HZN or LM470D Tower. F.P. Heinemann, Brockway Landing, Lyme, Ct. 06371.

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WANTED: HR0500, HQ215 or Equal Receiver. W4JWG, 1201 Inwood Terr. Jacksonville, Fl. 32207. (904)398-8918.

FOR SALE: Magnum Six speech processor for Collins 32S-1/32S-3, RCA WO-56A 7" oscilloscope. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, Ma. 01056.

National NCX-5 Mk II transceiver and NXA power supply. Vy clean with manuals and orig cartons. F.O.B. $300 or equiv in OM-1 MD camera and access. H. Lowenstein, W2HWH, 60 Parkway Dr., East Orange NJ 07017.

HEATH GR-78 Gen. Cov. Receiver. Batt. or AC 150 Kc-30 Mc. Current Catalog $149 sell at $85. Very clean with manuals or swap for Freq. counter. H. Lowenstein, 60 Parkway Drive E. East Orange. NJ 07017.

WANTED: 66-039 Electric clock for Galaxy PSA-300 Console, Cm-52 Cesco Reflectometer. Don Speck, RD 1 Box 134-B Huntington, Pa. 16652.

SELL: Clemens Standard Sig Generator, solid state, $125; few 6939 tubes for SSB mixer/amps, 2-6-220-432 $5 ea; List shack cleanup SASE. W4API, Box 4095, Arlington, Va. 22204.

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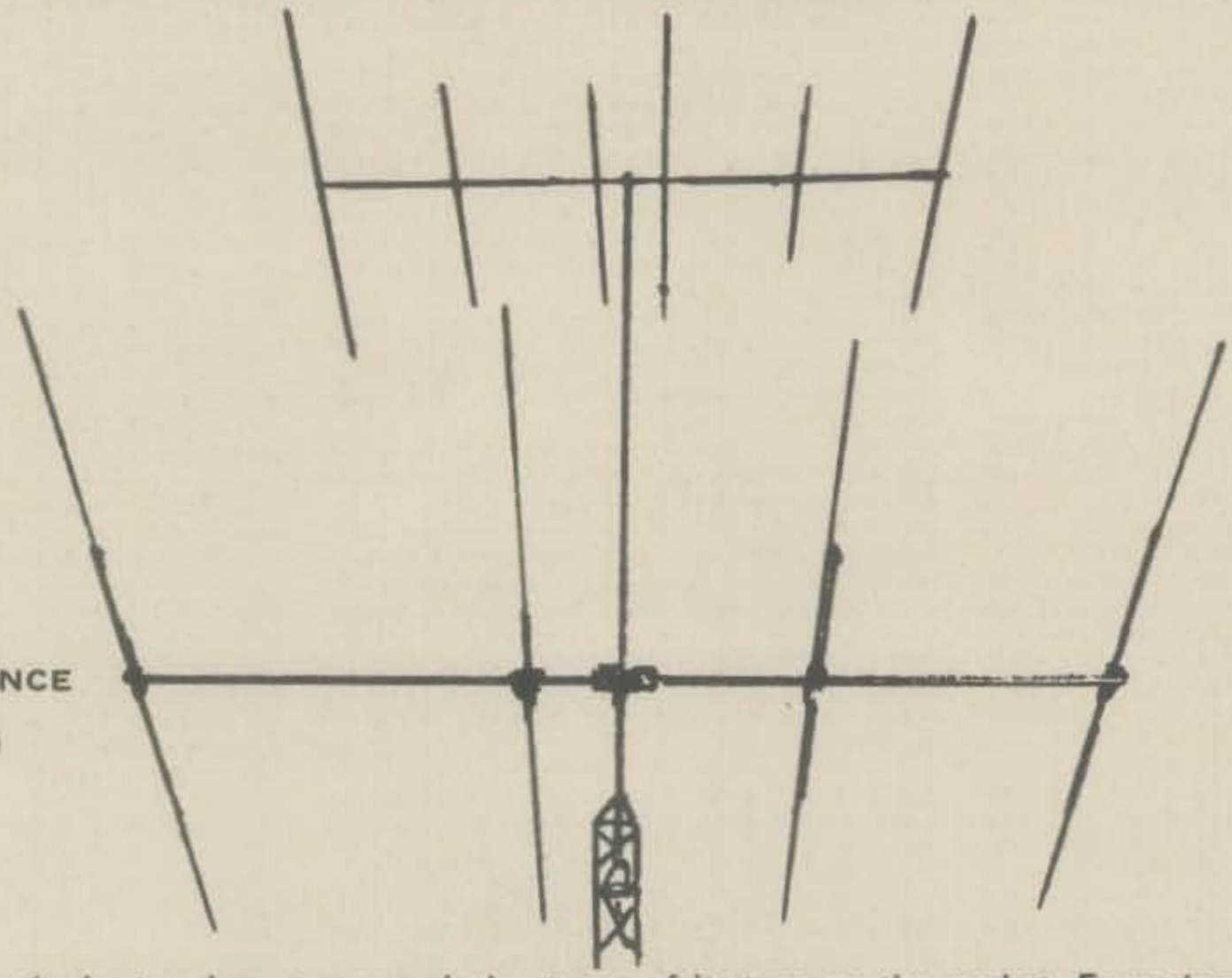
Wilson Electronics Corp.

WILSON 204 MONOBANDER PLUS DB33



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WILSON AMATEUR ANTENNA SPECIFICATIONS

	Forward Gain (dB)	Front-to Back Ratio (dB)	Front-to Side Ratio (dB)	Boom Length (ft)	Number Elements	Longest Element (ft)	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
M240	5.5	17	30	30	2	73'0"	39'6"	10.0	250	60	63	$299.00
M520	12.0	26	30	40	5	36'4"	27'0"	5.0	125	90	96	269.00
M204	10.0	25	30	26	4	36'4"	22'6"	3.9	100	46	49	139.00
M155	12.0	26	30	26	5	24'3"	18'0"	3.7	93	41	44	139.00
M154	10.0	25	30	20	4	24'3"	15'9"	3.0	75	30	32	89.00
M106	13.0	26	30	31	6	19'0"	16'1"	2.9	73	34	36	99.00
M104	10.0	25	30	17	4	18'0"	12'9"	2.0	50	20	22	64.95
DB54(20)	12.0	26	30	40	5	36'4"	27'0"	7.9	198	105	119	299.00
(15)	10.0	25	30		4	24'3"						
DB43(15)	8.5	20	30	26	4	24'3"	15'8"	4.3	108	36	38	119.00
(10)	10.0	25	30		3	18'0"						
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(10)	8.5	20	30		3	18'0"						

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- Three way metering: S-meter, power output, and FM discriminator
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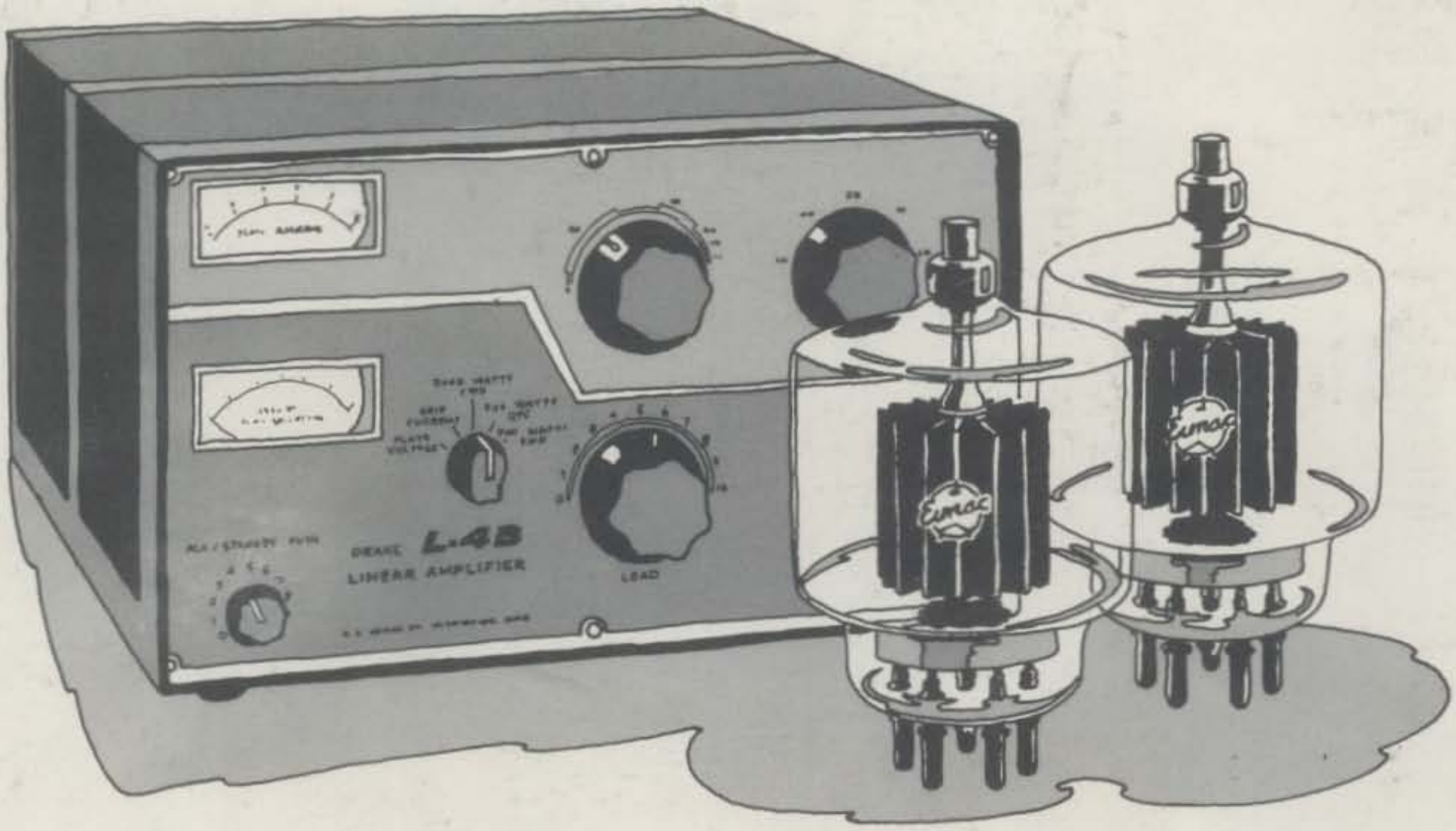

EIMAC 3-500Z triodes.

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