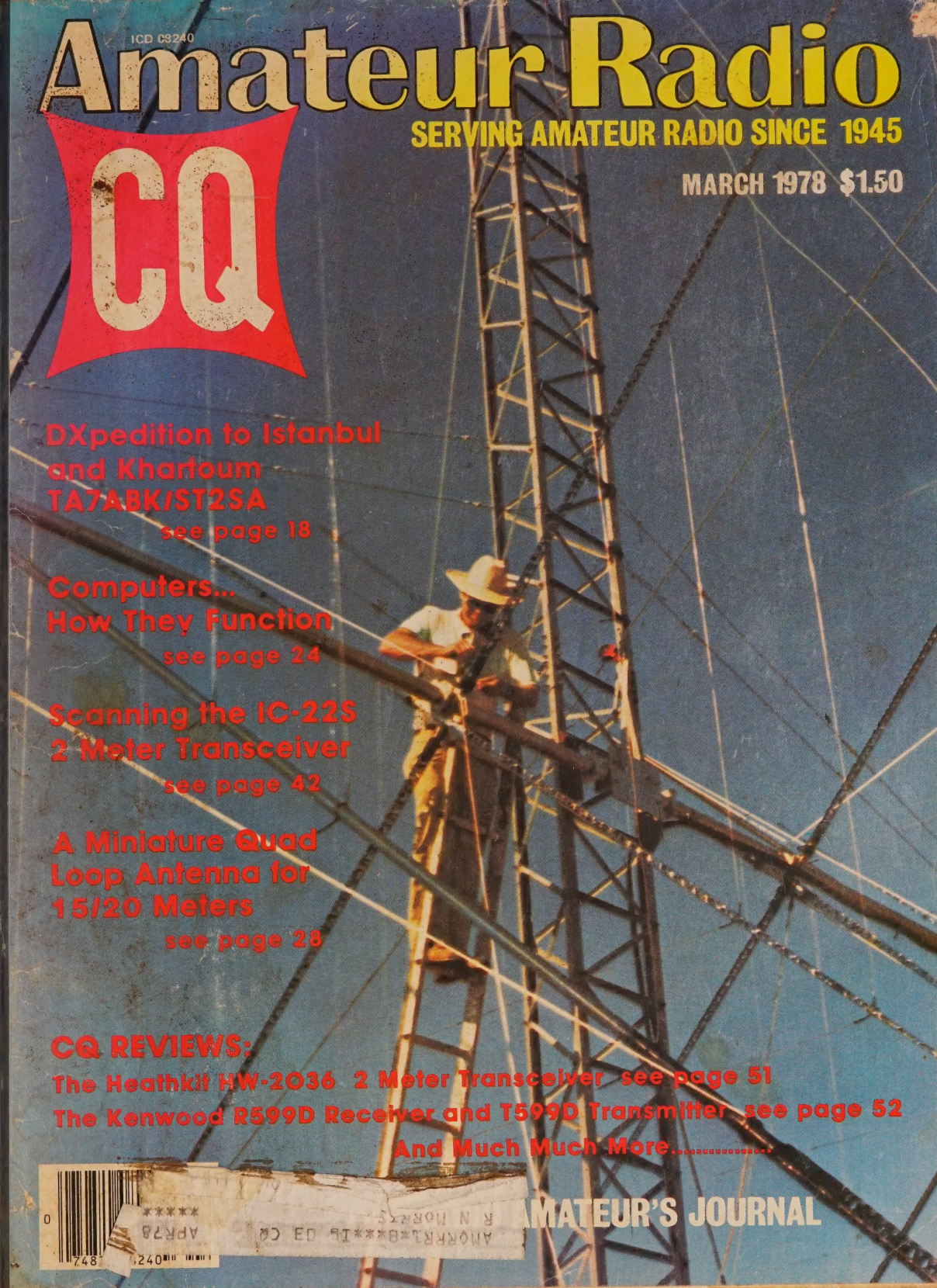
ICD CS240

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

MARCH 1978 $1.50



DXpedition to Istanbul and Khartoum TA7A/BK/ST2SA
see page 18

Computers... How They Function
see page 24

Scanning the IC-22S 2 Meter Transceiver
see page 42

A Miniature Quad Loop Antenna for 15/20 Meters
see page 28

CQ REVIEWS:
The Heathkit HW-2036 2 Meter Transceiver see page 51
The Kenwood R599D Receiver and T599D Transmitter see page 52
And Much Much More.....

AMATEUR'S JOURNAL

KENWOOD

. . . pacesetter in amateur radio

What makes one linear amplifier different than all the rest? Check out these features:

Full amateur band coverage — Includes 160 meters.
Instant heating filaments — The 3-500Z tubes require no warm up period. Just turn it on and go!
Time delay fan circuit — Even after you turn the TL-922 off, the super quiet fan continues to work for approximately 2 minutes to greatly extend tube life.
Adjustable ALC output voltage — Lets you tailor the ALC voltage to your exciter.
Standby position — Provides amplifier bypassing without having to turn the AC power off.
Two independent safety interlocks — One disconnects AC line voltage and the second shorts B+ to ground when tripped.
Vernier plate control — For smooth, easy tune-up.
Diecast side panels — Includes functional carrying handles for easy transportation.
Thermal protection of power transformer — Amplifier automatically switches to standby if power transformer temperature exceeds 145°F.
Tuned Input Circuit — Means improved spurious characteristics.
Line voltage selector — Easily switched between 120 and 240 VAC.
Plate Current Meter — Separate meter allows continuous monitoring of plate current.

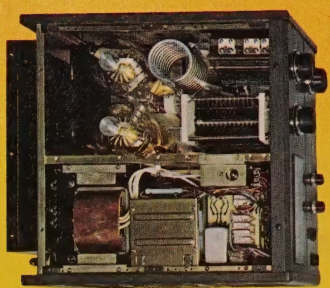
The Kenwood family is growing!

The TL-922, a brand new linear amplifier, is now a reality. Give yourself the "big signal" that commands attention on today's crowded bands. The TL-922 runs the full legal limit on all the ham bands from 160-10 meters and is compatible with most amateur exciters. The TL-922 is a must in any Kenwood station. Make yourself heard like you've never been heard before, with the Kenwood TL-922 linear amplifier.

TL-922

Limited quantities available in the Spring!





Shown with top panels removed

Frequency Range: Amateur bands, 160-10 meters
Drive Power Required: 80 W nom, 120 W max
Mode and Duty Cycle: SSB, cont for 30 min CW and RTTY, key-down cont for 10 min
RF Input Power: SSB: 2,000 watts PEP, CW, RTTY: 1,000 watts DC
Plate Voltage: (at idle) 3.1 KV SSB, 2.2 KV CW, RTTY
Circuit Type: Class AB_2 grounded grid linear amplifier
Input Impedance: 50 Ω, unbalanced at better than 1.5 SWR
Output Impedance: 50 to 75 Ω, unbalanced.
Harmonic Suppression: min 40 db, depending on exciter used.
Fan Motor Delay Time: 140±30 seconds. (at room temperature)

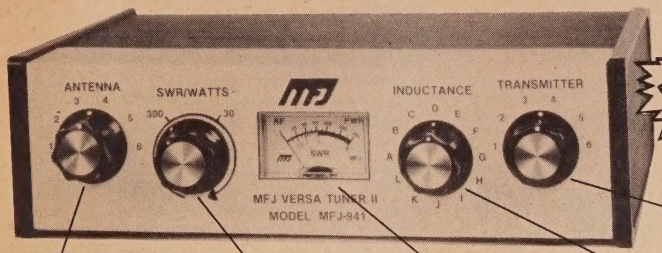
ALC: Neg going, adjustable threshold, −8V DC max output (typ).
Tubes: 2 x Eimac 3-500Z.
Semiconductors: 18 Diodes, 1 Zener diode.
Power Requirements: 120V, 28A; 220/240V, 14A; 50/60Hz; for maximum SSB input.
Dimensions: 390 mm (15⅜") x 190 mm (7½") x 407 mm (16")
Weight: Net 31 kg (68 lbs) Shipping 38kg (83 lbs)

The above specifications are subject to change without notice due to developments in technology.

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines.



BRAND NEW

$79.95

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941 Versa Tuner II with all these features at this price:

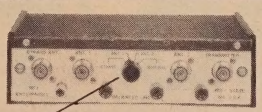
A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balance lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.



ANTENNA SWITCH lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

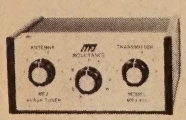
You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 5x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).



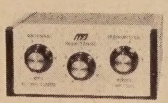
$59.95

BRAND NEW

MFJ-901 VERSA TUNER

New efficient air wound coil for more watts out.

Only MFJ uses an efficient air wound inductor (12 positions) in this class of tuners to give you more watts out and less losses than a tapped toroid. Matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF output. 1:4 balun for balance lines. Tune out the SWR of your mobile whip **from inside your car.** Works with all rigs. Ultra compact 5x2x6 inches. SO-239 connectors. 5 way binding posts. Ten Tec enclosure.



$49.95

BRAND NEW

MFJ-900 ECONO TUNER

Same as MFJ-901 Versa Tuner, but does not have built-in balun for balance lines. Tunes coax lines and random lines.



$39.95

MFJ-16010 RANDOM WIRE TUNER

Operate 160 thru 10 Meters. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz.



$49.95

BRAND NEW

MFJ-202 RF NOISE BRIDGE

This MFJ RF Noise Bridge lets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. Exclusive range extender and expanded capacitance range (± 150 pf) gives you much extended measuring range.

Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR. Adjust your single or multi-band dipole, inverted vee, beam, vertical, mobile whip or random system for maximum performance. 1 to 100 MHz. SO-239 connectors. 2x3x4 inches. 9 volt battery.

For Orders **Call toll-free 800-647-8660**

For technical information, order and repair status, and in Mississippi, please call 601-323-5869.

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

Order By Mail or Call TOLL FREE 800-647-8660 and Charge It On VISA master charge

MFJ ENTERPRISES P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

KENWOOD

. . . pacesetter in amateur radio

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

The R-599D is the most complete receiver ever offered. It is entirely solid state, superbly reliable and compact. It covers the full amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

If you have never considered the advantages of operating a receiver/transmitter combination . . . maybe you should.

Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs and prices of the R/T-599D combination with any other brand of separates. Remember, the R-599D is all solid state (and includes four filters).

Your choice will obviously be the Kenwood.

Kenwood offers this handsome pair for the amateur who appreciates the advantages of operating a receiver/transmitter combination. Discover the difference in performance, features and price of the 599D "Twins".

R-599D/T-599D



Limited quantities available in the Spring!



TL-922

The Kenwood family is growing! The TL-922, a brand new linear amplifier, is now a reality.

Give yourself the "big signal" that commands attention on today's crowded bands. The TL-922 runs the full legal limit on the ham bands from 160-10 meters and is compatible with most amateur exciters. The TL-922 is a must in any Kenwood station.

Make yourself heard like you've never been heard before, with the Kenwood TL-922 linear amplifier.

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

MARCH, 1978 VOL. 34, NO. 3

CQ The Radio Amateur's Journal

EDITORIAL STAFF

Alan M. Dorhoffer, K2EEK
Editor
Irwin Schwartz, K2VG
Technical Editor
Kim Smith
Assistant Editor
Chris Kelly
Editorial Assistant

CONTRIBUTING STAFF

Frank Anzalone, W1WY
Contest Chairman
John A. Attaway, K4IIF
DX Editor
Bill Welsh, W6DDB
Novice Editor
Robert Cox, K3EST
Larry Brockman, N6AR
W.W. Contest Directors
Rod Linkous, W7OM
Assistant DX Editor
William DeWitt, W2DD
SSTV Editor
A. Edward Hopper, W2GT
USA-CA Director
Robert Huntington, K6XP
WPX Award Manager
George Jacobs, W3ASK
Propagation Editor
Irwin Math, WA2NDM
Math's Notes
Donald McClenon, W4IN
160 M. Contest Director
Hugh R. Paul, W6POK
Technical Evaluations
William I. Orr, W6SAI
Antennas
Adrian Weiss, K8EEG/Ø
QRPp Editor
Bernie Welch, W8IMZ
WPX Contest Director

BUSINESS STAFF

Sanford R. Cowan
President
Richard A. Cowan, WA2LRO
Publisher/Advertising Sales
Jack M. Gutzeit, W2LZX
Advertising Sales Manager
Richard A. Ross, K2MGA
Assoc. Publisher
Cary L. Cowan
Controller
Sarah Greenberg
Accounts
Janet T. Kurtz
Circulation Manager

PRODUCTION STAFF

Alan M. Dorhoffer, K2EEK
Production Manager
William H. Travis
Art Director
Liz Beener
Assistant Art Director
Sheryl Stern
Harold Perry
Art Staff
K & S Graphics
Illustrations

FEATURES

DXPEDITION TO ISTANBUL AND KHARTOUM TA7ABK/ST2SA *W. R. Bill Rindone, WB7ABK* 18
H.F. OPERATING—REMOTE CONTROL STYLE *John Schultz, W4FA* 22
COMPUTERS . . . HOW THEY FUNCTION *Theodore J. Cohen, N4XX* 24
THE METAMORPHOSIS OF CQ *Norris K. Maxwell, K5BA* 27
A MINIATURE QUAD LOOP ANTENNA FOR 15/20 METERS *Harry K. Bourne, ZL1OI* 28
WHAT TO DO ABOUT R.F. IN THE SHACK *Philip R. Ewald, W4EWR and Steven R. Ewald, WA4CMS* 30
EASY PC BOARD FABRICATION USING ADDRESS LABELS *Adrian Weiss, K8EEG/Ø* 32
HAMFESTING IN WESTERN OHIO *Bernie Welch, W8IMZ* 38
NOVICE: AMATEUR RADIO STATION TIPS, PART 5 OF 5 *Bill Welsh, W6DDB* 41
WARNING—DANGER TO YOUR EYESIGHT 45
SCANNING THE IC-22S *Carl A. Kollar, K3JML* 46
CQ REVIEWS: THE HEATHKIT HW-2036 SYNTHESIZED 2-METER TRANSCEIVER *Hugh R. Paul, W6POK* 51
A MESSAGE FROM THE PUBLISHER *Richard A. Cowan, WA2LRO* 53
GETTING ON TWO IN A HURRY: SOME NOVEL ANTENNA IDEAS *Karl T. Thurber, Jr., W8FX/4* 56
STATE OF THE RADIO ART, 1929 *Carl C. Drumeller, W5JJ* 60
CQ REVIEWS: THE KENWOOD R599D RECEIVER AND THE T599D TRANSMITTER *Hugh R. Paul, W6POK* 62
ANTENNAS: MORE ON THE MONSTER QUAD *William I. Orr, W6SAI* 65
IN FOCUS: MODIFYING THE ROBOT 400, ALBATROSS CONTEST RESULTS *Bill DeWitt, W2DD* 68
MATH'S NOTES: LED DEVICES *Irwin Math, WA2NDM* 72

DEPARTMENTS

DX: DX AWARDS, ANOTHER POINT OF VIEW *Rod Linkous, W7OM* 73
AWARDS: STORY OF THE MONTH—LYLE TAYLOR, WDØEHB *A. Edward Hopper, W2GT* 78
PROPAGATION: SHORT SKIP CHARTS FOR MARCH & APRIL *George Jacobs, W3ASK* 80
CONTEST CALENDAR: CONTESTS FOR MARCH AND EARLY APRIL, RESULTS OF THE 1977 CAN-AM CONTEST *Frank Anzalone, W1WY* 82

ANNOUNCEMENTS 9
HAM SHOP 92
OUR READERS SAY 9
ZERO BIAS 4

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

CQ (Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second Class Postage paid at Port Washington, N. Y. and other points. Subscription prices: one year $9.95, two years $16.95. Entire contents copyrighted Cowan Publishing Corp. 1978. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.

Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050

Zero Bias

an editorial

New Staff Member

Joining the *CQ* staff this month is Irwin Schwartz, K2VG. If Irwin's name sounds familiar it's because he is the author of *CQ*'s ongoing series "An RTTY Primer". Irwin will be our new Technical Editor. He was formerly with the New York City School System where he taught math and computer sciences. He also teaches a course in amateur radio at the New School.

Mutual Responsibility

In the February issue Ted Cohen presented a capsuled version of the FCC's report on television interference and the Citizens Band Radio Service. At first glance, this article merely points out the tremendous numbers of complaints being received by the FCC in regard to CB operations. The report offers some remedies and some helpful solutions to a monumental problem, namely, interference to home entertainment devices.

Quite possibly, you might think that since we were talking about CB operation it didn't affect you as amateurs, and didn't we already know that the CBers were the cause of all things bad anyway. Well I just made a facetious comment that bears little relationship to the truth. This problem, massive interference, does indeed affect you and me collectively, and is one that we will pay a dear price for.

How we are involved with both the problem and the lack of adequate solution will be made clear. What ultimately can be done to eliminate the problem is not so clear, and the remedies suggested appear to be more stringent than the original problem.

Two recent dockets before the FCC (21116, and 21117) hope to treat the interference problem symptomatically. The FCC admittedly does not have the funding (from Congress) to enforce existing CB regulations. The present administration would like to tighten up on the budget and further restrict the potential capability of the FCC to administer and enforce existing legislation. With little hope of increasing their budget and marginal hope of maintaining what they have now, these two dockets were put forth to "help" solve the problem. Basically these two dockets stipulate a ban on linear amplifiers capable of operating between 24 and 35 MHz and having all amateur radio equipment *type accepted* before it could be marketed in the United States. This would be a punitive step in the amateur radio market in order to control the possibility of amateur radio equipment reaching the hands of CB operators. The ramifications to the amateur radio industry are numerous and would severely limit, if not permanently curtail, 10 meter operation by licensed amateur radio operators. Illegal CB operation and so-called h.f. operation by unlicensed enthusiasts would still go on. The interference would still go on.

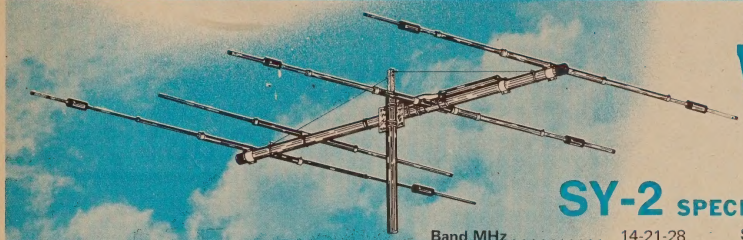
As far as I can tell, the situation becomes deadlocked when irate users of home entertainment devices receiving intereference cannot get satisfaction from whatever they consider normal channels and go directly to their Congressmen. The Congressmen, as has been noted in previous editorials, immediately and with alacrity, funnels all such complaints to the FCC. They do, of course, write back to their constituents stating that the proper authority is looking into the matter. The FCC then must answer, if they can, all of the various and sundry complaints. They cannot do it to any great satisfaction. There are over 200,000 such complaints a year and the number is growing. These very same Congressmen cannot find the money to fund the FCC properly. The FCC is caught in the middle whereby they can effectively do nothing about the situation. In order to maintain funding and hope for some small increase they will try almost anything, including these two dockets. If these two dockets had gone through as proposed (they are still pending as of this writing), the FCC could go to Congress and say that these wonderful dockets will in time clear up the problem. In six months or a year from now, when it becomes apparent that something is wrong and that the situation is the same, if not worse, the FCC can come back with the statement "It will take more time for you to see results". When the problem still persists, the FCC can instigate further rule makings and further restrictions on amateur radio in order to solve the CB problem. These will not work either.

The ARRL has tried with their "Code of Ethics" to restrict the manufacturer and the distributor of amateur products to sell only to licensed amateur radio operators. In fact several people within the electronics industry favor some sort of point of sale provision to

(Continued on page 12)

THE SYSTEM TWO™ TRIBANDER ANTENNA . . .

Top Performance for 20 - 15 - 10 Meters!



Wilson

SY-2 SPECIFICATIONS

Band MHz	14-21-28
Maximum Power Input	4 Kw
VSWR (at Resonance)	1.5:1
Impedance	50 Ohms
F/B Ratio (dB)	20-25
Boom (O.D. x Length)	2" x 18'6"
No. Elements	4
Longest Element (Ft.)	26'7"
Turning Radius (Ft.)	16'4"
Mast Diameter	2" O.D.
Boom Diameter	2" O.D.

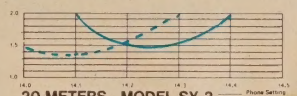
SHIPS BY U.P.S.!!!

Surface Area (Sq. Ft.)	6.15
Wind Loading at 80 mph	153
Assembled Weight (Lbs. - Approx.)	47
Shipping Weight (Lbs. - Approx.)	50
Matching Method	Beta
Only One Feed Line Required	

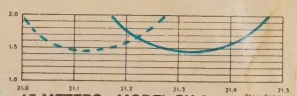
Delivers outstanding performance on 20, 15 and 10 meters. Features Wilson's large diameter High-Q Traps, feeds with 52 ohms coax, a beta match method presents tapered impedance which provides most efficient 3 band matching and DC ground to eliminate precipitation static. The result is SWR less than 1.5 to 1 at resonance on all bands and maximum front-to-back. An added feature is the separate 10 meter reflector for correct monoband spacing. Add to this the rugged boom to element mounting, heavy duty taper swaged elements, and you have

SYSTEM TWO™

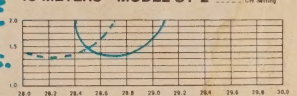
. . . a space efficient, high performing, cost effective new tribander . . . value priced at $199.95!



20 METERS - MODEL SY-2



15 METERS - MODEL SY-2

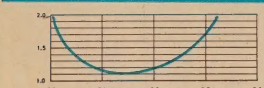


10 METERS - MODEL SY-2

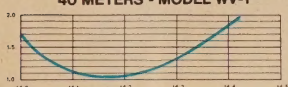
DEALERSHIPS AVAILABLE!!!

We are looking for new Dealers for certain areas of the country. If you are interested, contact us for details.

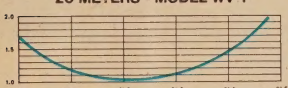
40 THRU 10 METERS VERTICAL TRAP



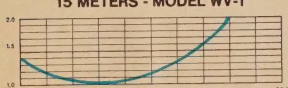
40 METERS - MODEL WV-1



20 METERS - MODEL WV-1



15 METERS - MODEL WV-1



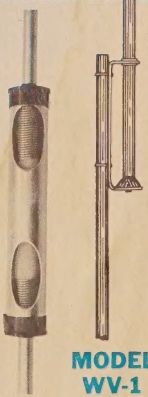
10 METERS - MODEL WV-1

WV-1 WILSON VERTICAL TRAP ANTENNA

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across full width of each band. Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity. Easily assembled, the WV-1 is supplied with base mount bracket to attach to vent pipe or to mast driven in the ground. The new WV-1 Antenna is priced at $65.00 . . . and ships via UPS!

SPECIFICATIONS

Input Impedance: 50 Ohms • Powerhandling capability: Legal Limit • Two High-Q Traps with large diameter coils • Low Angle Radiation Omnidirectional performance • Taper Swaged Aluminum Tubing • Automatic Bandswitching • Mast Bracket furnished • SWR: 1.5:1 on all Bands • 1½" O.D. Heavy wall aluminum tubing • Does not require guying • Overall length: 25' 1½".



MODEL WV-1

Wilson Electronics Corp.

4288 SO. POLARIS AVENUE • P. O. Box 19000 • LAS VEGAS, NEVADA 89119
TELEPHONE (702) 739-1931 • TELEX 684-522

KENWOOD

...pacesetter in amateur radio

FULL COVERAGE TRANSCEIVER

The TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-506 transverter, your TS-520S can cover 160 meters to 6 meters on SSB and CW.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The TS-520S incorporates a 3SK35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

An audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

FINAL AMPLIFIER

The TS-520S is completely solid state except for the driver (12B Y7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time proven tubes are known for their long life and superb linearity.

The TS-520S . . . still the most popular transceiver in the world, is a solid foundation for an expanding series designed to please any ham . . . from Novice to Extra.

TS-520S Series





TL-922

The Kenwood family is growing! The TL-922, a brand new linear amplifier, is now a reality.

Give yourself the "big signal" that commands attention on today's crowded bands. The TL-922 runs the full legal limit on the ham bands from 160-10 meters and is compatible with most amateur exciters. The TL-922 is a must in any Kenwood station.

Make yourself heard like you've never been heard before, with the Kenwood TL-922 linear amplifier.

Limited quantities available in the Spring!

HIGHLY EFFECTIVE NOISE BLANKER
An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built into the TS-520S.

VERNIER TUNING FOR FINAL PLATE CONTROL
A vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

RF ATTENUATOR
The TS-520S has a built-in 20 dB attentuator that can be activated by a push button switch conveniently located on the front panel.

PROVISION FOR EXTERNAL RECEIVER
A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versatility. A switch on the rear panel determines the signal path . . the receiver in the TS-520S or any external receiver.

AC POWER SUPPLY
The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (optional) allows for mobile operation of the TS-520S.

EASY PHONE PATCH CONNECTION
The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

CW FILTER (OPTION) — CW-520
The CW-520 500 Hz filter can be easily installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT
The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

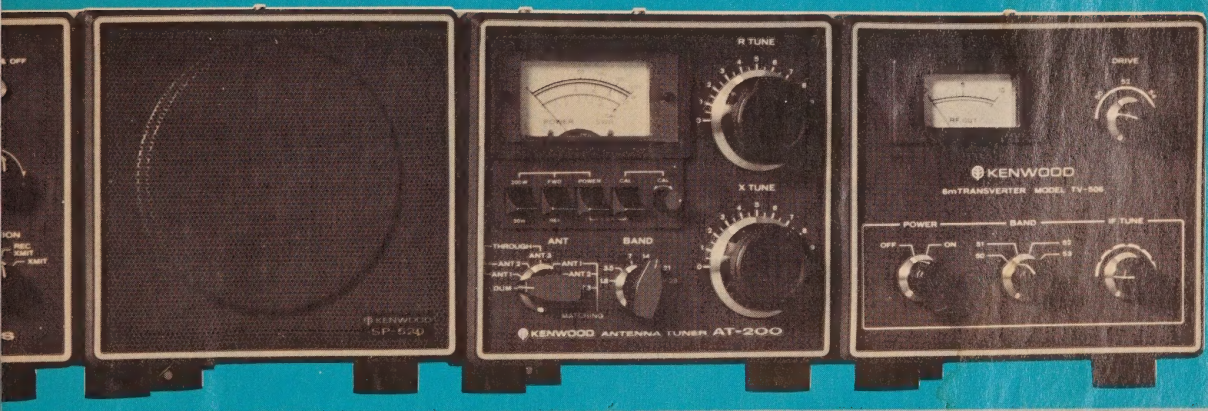
The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.

Specifications

Amateur Bands: 160-10 meters plus WWV (receive only)
Modes: USB, LSB, CW
Antenna Impedance: 50-75 Ohms
Frequency Stability: Within ± 1 kHz during one hour after one minute of warm-up, and within 100 Hz during any 30 minute period thereafter
Tubes & Semiconductors:
Tubes 3 (S2001A x 2, 12BY7A)
Transistors 52
FETs 19
Diodes 101
Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)
Power Consumption: Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension: 333(13⅛) W x 153 (6-0) H x 335(13-13/16) D mm(inch)
Weight: 16.0 kg(35.2 lbs)

TRANSMITTER
RF Input Power: SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression: Better than -40 dB
Sideband Suppression: Better than -50 dB
Spurious Radiation: Better than -40 dB
Microphone Impedance: 50k Ohms
AF Response: 400 to 2,600 Hz

RECEIVER
Sensitivity: 0.25 uV for 10 dB (S+N)/N
Selectivity: SSB:2.4 kHz/-6 dB, 4.4 kHz/-60 dB
Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)
Image Ratio: Better than 50 dB
IF Rejection: Better than 50 dB
AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)
AF Output Impedance: 4 to 16 Ohms



DG-5 (Digital Display)

The Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting *and* receiving.

VFO-520S

The VFO-520S is a solid state remote VFO designed to match the TS-520S. It allows VFO controlled cross channel operation when connected to the transceiver. A built-in RIT circuit, with an LED indicator, permits receiver incremental tuning.

SP-520

The SP-520 is an external speaker designed for use with the TS-520S in place of the transceiver's built-in speaker for added clarity.

AT-200

Here's a new and versatile accessory from Kenwood that belongs in every station. The AT-200 is an antenna tuner, but it's also much more. It's an antenna switch, an SWR bridge and an in-line wattmeter. The AT-200 reduces the clutter and increases the operating efficency of your station . . . and at a surprisingly moderate price.

TV-506

An easy way to get on the 6 meter band with your TS-520/TS-820/T-599D series and most other exciters. Simply plug it in and you're on . . full band coverage with 10 watts output on SSB and CW.

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

Two kinds of experts appreciate Rockwell-Collins equipment: People who buy it, and people who sell it.

Every Rockwell-Collins Distributor is a real pro at answering questions and solving problems.

He'll show you how to operate specific equipment, discuss peripheral gear, check everything out when you get it, even help with installation. And he'll be there to support your needs for years to come.

Get in touch with the distributor in your area. (And ask for a copy of the Rockwell-Collins Amateur Equipment Catalog.) Or contact Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. Telephone 319/395-4493.

ALABAMA
Birmingham — Ack Radio Supply Company

ARKANSAS
De Witt — Moory Electronics Company

CALIFORNIA
Anaheim — Henry Radio Co., Inc.
Burlingame — *Ham Radio Outlet
Los Angeles — *Henry Radio Co., Inc.
San Diego — *Gary Radio Inc.
San Jose — Quement Electronics

COLORADO
Denver — *C. W. Electronic Sales Company

FLORIDA
Miami — Amateur Radio Center, Inc.
Miami Springs — *Argon Electronics Company
Orlando — Amateur Electronics Supply
Pensacola — *Grice Electronics, Inc.

GEORGIA
Atlanta — *Ack Radio Supply

HAWAII
Honolulu — *Honolulu Electronics

ILLINOIS
Peoria — Klaus Radio Inc.

INDIANA
Terre Haute — *Hoosier Electronics, Inc.

KANSAS
Overland Park — *Associated Radio Communications, Inc.

LOUISIANA
Metairie — *Thomas J. Morgavi Electronics

MARYLAND
Wheaton — *Electronics International Service Corp.

MICHIGAN
Muskegon — Electronics Distributors, Inc.

MINNESOTA
Minneapolis — *Electronic Center, Inc.

MISSISSIPPI
Jackson — **Coker Electronic Service

MISSOURI
Butler — Henry Radio Company
St. Louis — *Ham Radio Center
St. Louis — *MidCom Electronics, Inc.

NEBRASKA
Potter — **Western Nebraska Electronics

NEW HAMPSHIRE
Concord — Evans Radio, Inc.

NEW JERSEY
Maple Shade — **Communications Service Company

NEW YORK
Amsterdam — Adirondack Radio Supply, Inc.
Farmingdale, L.I. — *Harrison Radio Corporation
New York — *Barry Electronics Corporation
New York — Harvey Radio Company
Valley Stream — Harrison Radio Company

NORTH CAROLINA
Asheville — Freck Radio & Supply Company
Otto — Slep Electronics Company

OHIO
Cleveland — Amateur Electronic Supply
Columbus — **Central Communications

OKLAHOMA
Ponca City — **Starks Avionics & Communications Service

OREGON
Portland — *Portland Radio Supply Company

PENNSYLVANIA
Drexel Hill — Kass Electronic Distributors
Trevose — *Hamtronics

TEXAS
Abilene — *Howard Radio
Dallas — *Electronic Center, Inc.
Garland — *Teco, Inc.
Houston — *Madison Electronics Supply

WASHINGTON
Seattle — *ABC Communications
Spokane — *HCJ Electronics
Tacoma — C & G Electronic Company

WISCONSIN
Milwaukee — *Amateur Electronic Supply

*DISTRIBUTORS/SERVICE AGENCIES
**SERVICE AGENCIES ONLY



Rockwell International

...where science gets down to business

Announcing

• **Jefferson, WI** — The Tri County ARC Hamfest will be held on March 19, 1978 at a new and larger location in the Activities Building on the Jefferson County Fairgrounds at the west city limits of Jefferson on Highway 18. A limited number of reserved tables are available at $2.00 in advance. Loads of room for your table. Tickets are $1.50 in advance and $2.00 at the door. Extra door prize for advance tickets. Write Glenn Eisenbrandt, WA9VYL, 711 East Street, Fort Atkinson, WI 53538.

• The S.A. Radio League offers an award known as "The Highveld Branch Award", the requirements are as follows: To qualify, ZS amateurs should comply with any three of the following 5 conditions: (1) On 10 meters work any 1 ZS division outside your own. (2) On 15 meters work any 2 ZS divisions outside your own. (3) On 20 meters work any 3 ZS divisions outside your own. (4) On 40 meters work any 4 ZS divisions outside your own. (5) On 80 meters work any 5 ZS divisions outside your own. DX Amateurs should work any three of the following 5 conditions: (1) On 10 meters work any 5 ZS divisions. (2) On 15 meters work any 4 ZS divisions. (3) On 20 meters work any 3 ZS divisions. (4) On 40 meters work any 2 ZS divisions. (5) On 80 meters work any 1 ZS divisions. ZS and DX applicants should forward proof and 1 US dollar or 10 I.R.C.s to our Award's Manager, P.O. Box 117, Edenvale, Transvaal, South Africa.

• Art Ross, W5KR, president of the Amateur Radio News Service, has authorized announcement of the winners of the 1976 publications contest sponsored by ARNS. The contest is conducted annually for the purpose of identifying and recognizing excellence in editing and publishing/ Amateur Radio Newsletters of clubs or groups of clubs. The overall winner was the Amsat Newsletter, edited by Joe Kasser, G3ZCZ, of the Radio Amateur Satellite Corp. Winners in other categories included W6VIO Calling, edited by M.L. MacMedan, W6IUV, Florida Skip, edited by Andy Clark, W4IYT, Trojan Harmonics, edited by D.D. Fleckenstein, K0RXT, and Squelch Tale, edited by Gary Pearce, WA9NSO. A complete list of first, second, and thrid place winners, as well as honorable mentions, is available (S.A.S.E. requested) from Norm Monro, K4FRY, 215 Brindley St., Gadsden, AL 35901.

• **Flemington, NJ** — On March 11, 1978 the Cherryville Repeater Association will hold its annual Hamfest. It will be held at the Hunterdon Central High School, located north of Flemington, on Rt. 31. Admission is $2 and an additional $1 for sellers. Time: 10 am-5 pm.

Our Readers Say

Well Done, Bill Travis

Editor, CQ:

I received today the January 1978 issue of CQ. The cover of this issue very keenly caught my eye. To me, it represents something of amateur radio that is very dear to all of us. The perpetuation of our endeavors into the fascination and good will of ham radio. I can see myself clearly in the picture, both as an "old timer" hoped to be and as a young lad struggling because of the fascination. To become a ham operator, is difficult to explain. The young lad particularly interested me. He reminded me so much of my earlier experiences of night long sessions and companionships with the "old timers"; who without their assistance and encouragement, I could never have made it. I was at one time the lad straining to copy the code, least I disappointed the "old timer". I hope to be the "old timer" helping a young lad experience the memorable impressions that I experienced during my all night visits with the "old timers".

Roy E. Morgan, WA5ULR
Humble, TX

CQ's Ham Shop

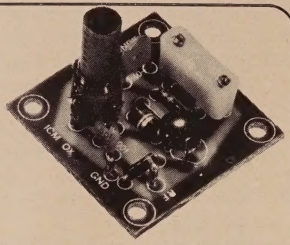
Editor, CQ:

Talk about service! The first time I ever used the Ham section in CQ, I placed an ad for help in finding a T599 & R599 manuals. I didn't have any response for about 3 weeks and didn't see the ad in print, so I thought nothing much about it. Then Friday, Dec. 2nd, I received a card offering to send me the manuals, another one on Saturday, and another one on Monday. I went throught the October and November 1977 issues again looking for my ad. Then on Tuesday, my CQ for January 1978 arrived. I quickly looked for the Ham Shop section and found my ads. So you see how quickly the ham response is in helping others. It is the spirit that keeps them together. Thanks for all the help from everyone.

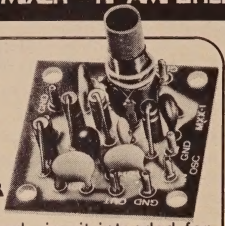
Jung Y. Lem, WA6ROJ
Los Angeles, CA

for the experimenter!

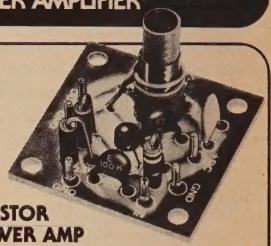
INTERNATIONAL CRYSTALS & KITS
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



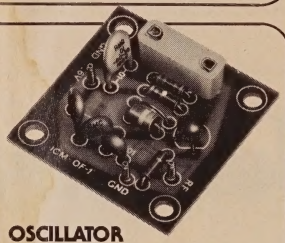
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$4.95 ea.



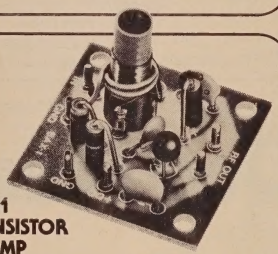
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
$5.50 ea.



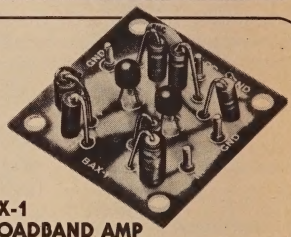
PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
$5.75 ea.



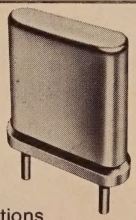
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.
$4.25 ea.



SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.
$5.50 ea.



BAX-1
BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering
$5.75 ea.



.02% Calibration Tolerance
EXPERIMENTER CRYSTALS
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo *Specify when ordering*	$5.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$5.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.75 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.75 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:
M/S Dept., P.O. Box 32497,
Oklahoma City, Oklahoma 73132.

ICM

International Crystal Mfg. Co., Inc.
10 North Lee
Oklahoma City, Oklahoma 73102

SUPER-QUAD FIBERGLASS ANTENNAS



★

COMPLETE KITS INCLUDE HARDWARE, WIRE, ALL MOUNTS, BOOM.

★

STRONGER AND LIGHTER THAN ALUMINUM

★

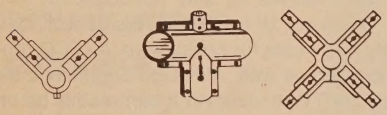
MAXIMUM GAIN.

AVAILABLE IN A COMPLETE RANGE OF KITS

Special Instruction Manual on Kirk's "Super Quads" $2.00

- 2 3 4 ELEMENT TRI BAND
  10 15 20 METER . . . . AMATEUR NET FROM $213.90
- 2 3 4 ELEMENT DUAL BAND
  10 15 OR 10 6 METER AMATEUR NET FROM $125.35
- 2 ELEMENT 40 METER AMATEUR NET $436.25
- UHF 4 ELEMENT 2 OR 6 METER
  AMATEUR NET FROM $60.45

ANTENNA MOUNT KITS



COMPLETE PACKAGED KITS INCLUDING
SPIDERS OR V-SUPPORTS • BOOM TO MAST MOUNT
•ALL NECESSARY ASSEMBLY HARDWARE
•INSTRUCTION MANUAL
HEAVY DUTY CAST ALUMINUM

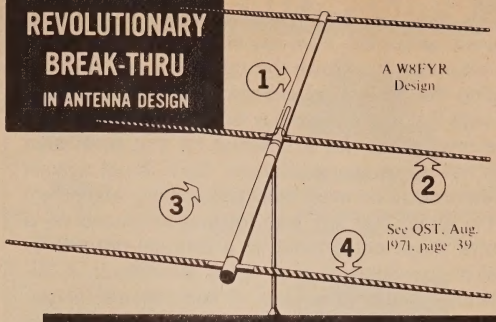
DELTA LOOP MOUNT KIT

DL-1	(2)	1½" Hub V-Supports	
	(1)	1½" Boom to 1½" Mast T-Mount	$16.10
DL-2	(2)	2" Hub V-Supports	
	(1)	2" Boom to 1½" Mast T-Mount	$24.69
DL-3	(2)	3" Hub V-Supports	
	(1)	3" Boom to 2" Mast T-Mount	$40.64

QUAD MOUNT KIT

QM-1	(2)	1¼" Hub Spiders (Small Spider for VHF)	
	(1)	1¼" Boom to 1¼" Mast T-Mount	$11.95
QM-2	(2)	1¼" Hub Spiders (Heavy Spider for 6M & 10M)	
	(1)	1¼" Boom to 1¼" Mast T-Mount	$15.12
QM-3	(2)	1½" Hub Spiders	
	(1)	1½" Boom to 1½" Mast T-Mount	$16.10
QM-4	(2)	2" Hub Spiders	
	(1)	2" Boom to 1½" Mast T-Mount	$24.69
QM-5	(2)	3" Hub Spiders	
	(1)	3" Boom to 2" Mast T-Mount	$40.64

REVOLUTIONARY BREAK-THRU IN ANTENNA DESIGN



A W8FYR Design

See QST, Aug. 1971, page 39

KIRK'S BRAND NEW ALL-FIBERGLASS HELICOIDAL BEAMS

AVAILABLE IN: 2 & 3 ELEMENT · 40 METER
2, 3, 4 & 5 ELEMENT · 10-15-20 METER

CHECK THESE OUTSTANDING

1. ALL FIBERGLASS ELEMENTS & BOOM
2. ELEMENT LENGTHS 25% TO 35% SHORTER THAN METALLIC ARRAYS
3. PRECISION CONSTRUCTION, MINIMUM ASSEMBLY TIME.
   NO TUNING
   NO ADJUSTING

AND EXCLUSIVE FEATURES:

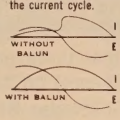
4. COPPER TAPE, SPIRALLY WOUND ELEMENTS COATED WITH DURATHANE
5. VSWR LESS THAN 1.5 AT UPPER & LOWER BAND LIMITS
6. GREAT STRENGTH AND VERY LIGHT
   Example:
   3 Element 40 M – 46 Lbs. $589.50
   3 Element 20 M – 17 Lbs. $249.94
   3 Element 15 M – 9 Lbs. $192.45
   3 Element 10 M – 8 Lbs. $149.95



MODELS 5075-D & 5075-LF For Dipole Antennas Net Wt. 7 Oz.

WORLD'S FINEST BROAD BAND BALUNS 1:1 Or 1:4 RATIO

Kirk Broad Band Baluns are designed for matching an unbalanced line, such as coaxial cable, to a balanced antenna to produce a symmetrical wave form of equal intensity from the current cycle.



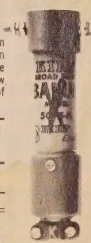
Kirk Baluns provide the greatest breakdown insurance by use of mylar insulation between the tough poly thermaleze winding and the Ferrite Core and a final dip coating of low dielectric impregnation. Handle peak power of 2000 watts provided ratio error is low.

Unique in design, Kirk Baluns are produced in two distinctive models: One for Dipoles and one for Beam Antennas.

NET PRICE $14.25

Application Frequency Coverage & Power Ratings For The Various Models Shown Below

MODEL	APPLICATION	F/MC.	POWER
5075-D	Dipole	3.4-52 mcs	2K PEP
5075-B	Beam	3.4-52 mcs	2K PEP
5075-LF	Dipole	1.7-10 mcs	2K PEP



MODEL 5075-B For Beam Antennas Net Wt. 7 Oz.

WRITE FOR FULL INFORMATION. PRICES DO NOT INCLUDE POSTAGE.
PRICES ARE SUBJECT TO CHANGE

KIRK ELECTRONICS DIVISION

VIKING INSTRUMENTS, INC.

73 Ferry Rd., Chester, CT 06412 •Telephone: (203) 526-5324

Zero Bias *(from page 4)*

regulate who does and who doesn't have the right to buy linear amplifiers. If we say that only licensed amateur radio operators have the right then we are overstepping the federal government who at the present time says that anyone can buy transmitting equipment. Not everyone can *use* it however for that is an area which has numerous regulations. So it is not against the law to buy or even own transmitting equipment and I'm afraid that any such restriction placed on a potential buyer could result in a restraint-of-trade or denial-of-civil-rights suit. It would also result, if implemented, in the elimination of flea-markets, classified advertising, and individual-to-individual sales of amateur radio equipment. Point-of-sale restriction or regulation would, by definition, have to be able to directly control the right to buy and own transmitting equipment, and indirectly, by definition, also be able to punish transgressors. The logic could also be carried to the point that only a certain class of amateur could purchase equipment suitable for their particular class. A Novice, for example, could not buy a high powered amplifier, nor could he purchase equipment capable of operating on frequencies not assigned to the Novice class. The potential for extremes is endless. How far could the definition be carried out? How could all of these marvelous rules be enforced with no money? Is the purpose of amateur radio to be a scape goat, to be offered up to save the Congress and the FCC the embarrassing realization that they and only they are doing the American public the greatest disservice? Congress over the years has sold out the public in this matter by not adequately funding the FCC. The FCC cannot compound this travesty by pushing for further regulations that it knows from the start it cannot enforce or administer. If all of this movement is designed to show the public that something is being done to solve the problem, then the entire country is being ripped off by bureaucratic nonsense.

What can be done to solve the problem? There are several areas which can be worked on positively to cure the interference problem. First, it might be suggested to buck-passing Congressmen that there are three Bills pending (one for almost four years) on the RFI and TVI question. These are the Goldwater Bill, the Benjamin Bill and the Vanik Bill. These, especially the Vanik Bill, would lead to tighter manufacturing standards for the home entertainment (TV etc.) industry. It would appear that the home entertainment industry has a very strong lobby in Washington which doesn't want this legislation passed. The manufacturers might be required to build in filters for their equipment. This doesn't require the Congress to spend more money.

One manufacturer of home entertainment devices, namely Radio Shack, has recently added R.F. Interference Rejection ratings to their f.m. receiver specifications. I think Radio Shack should be applauded for bringing this out in the open for the consumer to see. This reflects a very progressive attitude on Radio Shack's part and I hope many others will follow suit.

Secondly, we might encourage those CB operators who we happen to know to use low-pass filters (that's good advice for amateurs too) on their transmitting equipment. Since it doesn't seem likely that the long standing rift between CBers and amateurs is going to heal itself, and CBers who like CB are not going to make amateurs happy by emulating them, the approach you take is very important. Remember we are sharing information, not dictating terms.

Thirdly, we can all make use of a term not in vogue at the moment—Public Education. How do we go about informing the public just what the problem is? That part is easy. The FCC has done that job for us. In November they brought out an excellent publication called *"How to Identify and Resolve Radio-TV Interference Problems.* This booklet is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 and is Stock No. 004-000-00345-4. The price is $1.50. There are four-color illustrations depicting every form of interference, what causes it, and remedies. It contains complete listings of all manufacturers as well as those who supply free filters for consumers. All FCC regional offices are listed as well. Although originally intended as a primer for TV servicemen it can readily be understood by most laymen and will do a great deal to further the public's understanding of just what it is that's knocking out Sunday's football game. I urge all of *CQ*'s readers to get a copy of this booklet and to pass the information on to both your amateur and non-amateur friends.

Cowan Publishing is reprinting and distributing "How to Identify and Resolve Radio-TV Interference Problems". We are selling the book for $1.00 plus 25¢ for postage and handling. Order the book from whichever source is more convenient but do get at least one copy.

I also urge all radio clubs and groups to form some sort of dialog with CB clubs as to forming area interference committees to work out the interference problem in a mutually satisfactory way. Such groups could also have an effect on local operators who flaunt the law with illegal high power equipment. Perhaps a concerted effort by both groups could lessen the need for more Government intervention. After all, many CBers themselves are subjected to interference by high-powered stations, and they too would like to rid the airwaves of these people. There's nothing like the personal touch of a visit by your neighbors to bring home an educational lesson.

At the present time plans are underway for Public Service Announcements on radio and TV to promote the public's awareness and availability of the FCC booklet and that some answers are available for the problem. I'll have more on that as plans are firmed up.

(Continued on page 90)

Subscribe NOW!



The NEW CQ

Americas oldest and fastest growing magazine for the personal communications enthusiast.

ED GEAR • TEST EQUIPMENT • SPECIALS

AY FULL CREDIT TRADE-IN
NLY **Limited quantities. First come, first served.**
ax., we will ship freight collect)

C-146 Receiver 175
T-44 Transmitter 159
C-111 Receiver 149
C-122 Receiver 249
36 UHF Receiver 125

Hammarlund

Q-110 A VHF Receiver $189
Q-110C Receiver 119
Q-110AC Receiver 149
Q-145X Receiver 169
Q-170C Receiver 159
Q-180 Receiver 379
Q-215 Receiver 259
-600 Receiver 179
K-50 Transmitter 169

Heathkit

I-300 Receiver $199
I-301 Receiver 229
R-10-B Receiver 69
I-303 Receiver 269
I-220 Linear Amp 449
I-102 Trivcvr 379
K-60B Transmitter 69
W-32 Transmitter 85
W-100 Transceiver 249
I-100 Transceiver 299
I-401 Transmitter 249
I-101 Transceiver 349
I-650 Digital Freq. Display 149
W-30 Twoer 29
so Sixer 29
10 Monitor 69
HF-1 Seneca 79
W-12 Transmitter 75
-23 AC Supply 49
-23B AC Supply 59
W-202 2M FM Xcvr 159
-620 Spectrum Analyz 120
-102 Xcvr 369
-610 Scope 95
-20 6m Linear 125
-634 Console 175
-604 Spkr 29.50
-644 VFO 129.50
-230 Linear 359
SB-104 Transceiver 625

ICOM

IC-21 2M FM Xcvr $299
IC-230 Demo 369

Midland

509 H.T. $149

Millen

92200 Transmatch $149
90651-A Grid Dipper 95

National

NC-270 Receiver $119
NC-300 Receiver 129
NCX-5 Transceiver 279
NCX-5MKII Transcvr 299
NC-303 Receiver 199
AC-500 AC Supply 69
NCX-500 Transceiver 199
NCX-3 Transceiver 169
NC-190 Receiver 149
NC-105 Receiver 69

Regency

HR-2B 2M FM $169
HR-220 FM 220 MC 185
AR-2 2M Amplifier 85
HR-25 2M FM 225
HR-6 Meter FM 189

SBE

SB-34 Transceiver $249
SB-33 Transceiver 189
SB-144 2M FM 175
SBZ-LP Linear 179

Standard

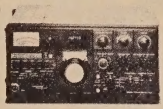
SRC-146 HT $149
826 M Trnscvr 195
SRC-144 395
SRC-851T 250

Swan

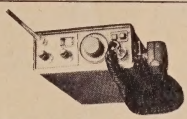
700-CX Xcvr $459
260 Cygnet 289
279 Cygnet 329
500 Xcvr 299
500 CX Xcvr 389
117-XC AC Supply 95
14X DC Module 39
MK II Linear 475
KK VI 6 Meter 550
250 C 6M Xcvr 349
FM 2X2M Xcvr 169
FM-1210A 2M 249



ICOM IC22S
Regular $299, save $50; buy an ICOM IC22S for $299 (no trades) and take a $50 credit for another purchase.



KENWOOD
TS 820 — $869.00
TS820S — $1048.00



KENWOOD TR-2200A
Regular $229, save $30; buy a Kenwood TR2200A for $229 (no trades) and take a $30 credit for another purchase.



YAESU
FT101E — $799.00
FT101EE — $759.00
FT101EX — $699.00

621 VFO 45

B&W Waters

Nuvertor 2+6 Conv. $ 75
6100 SSB Xmitter 395
670 SSB Adaptor 39
Co-Dax Keyer 95

Central Electronics

100V Transmitter 325
MM-2 Scope 69
20-A SSB Adaptor 79

Clegg

22'er FM $129
66'er 6M Xcvr 115
99'er 6M Xcvr 59
Interceptor BRCUR 275
Ant Pre Amp 22
All Bander 69
HT-146 125
2 Vess 259
FM-27-B Xcvr 325

Collins

75 A4 Receiver $395
7553B Receiver 695
75S1 Receiver 349
KWM-2 Xcvr 595
32S1 Xmitter 349
PM-2 AC Supply 95
516 F2 AC Supply 139
312B5 Console 425
361D2 Mount 29

Drake

2A Receiver $149
2B Receiver 189
2AQ SPKR QMULT 29
R4 Receiver 289
R4-B Receiver 349
R4-C Receiver 399
MS-4 Speaker 19
2NT Transmitter 125
2NT Transitter 99
TR-6 695
TR-22 Meter 140
T-4X Transmitter 339
TR-72 2 Meter FM 225

Dycomm

10-0 2 M Ampl $125
35-0 401N 110 Out 130
470-25 450 MC 120
P-1416 16 Amp Supply 95

Eico

720 Transmitter $ 49
722 VFO 39
730 Modulator 39

Elmac

AF-67 Transmitter $ 45
PMR-8 Receiver 79

Genave

GTX-22M FM $165
GTX-200 2M FM 149

Globe/Galaxy

VHF 6+2 Transm $ 39
Chief Transmitter 39
Galaxy III Xcvr 159
Galaxy V Xcvr 189
Galaxy V Mk II 239
GT-550 Xcvr 279
GT-500A Xcvr 329
AC-400 Supply 79
FM-210 2M FM 95

Gonset

Com II 2M $ 75
Com II 6M 69
Com IV 2M 129
GC-105 2M 115
G-28 Xcvr 149
G-50 Xcvr 149

Hallicrafters

S-108 Receiver $ 99
SX-101 Receiver 159
HT-32 Transmitter 179
HT-32B Transmitter 269
SX-99 Receiver 79
SX-115 Receiver 349
HT-37 Transmitter 159
HT-40 Transmitter 49
SX-99 Receiver 99
SX-117 Receiver 189
SR-150 Xcvr 259
SR-160 Xcvr 159

MAIL & PHONE ORDERS WELCOMED. BANK AMERICARD ACCEPTED
ALL UNITS GUARANTEED

HAMTRONICS
DIVISION OF
Trevose Electronics

4033 BROWNSVILLE ROAD TREVOSE, PA. 19047
Telephone: (215) 357-1400 (215) 757-5300

IC-22A 2M FM Xcvr 185
IC-30A 432 MCFM 269

Johnson

1-KW Matchbox/SWR $195
Courier Linear 139
Ranger I Transmitter 85
Ranger II Transmitter 139
Valiant I Transmitter 129
Invader 2000 Xmitt 495

Kenwood

T-599 Transmitter $289
R-599 Receiver 289
TS-520 Tranc 429
QR-666 259
QR-666 Receiver 239
TV 502 Transvertor 179

Knight

T-60 Transmitter $ 39
r-100 Receiver 59
TR-108 Trancur 2M 79

Lafayette

HA-800 Receiver $ 89
HP-350 Receiver 149
HE-45 Transceiver 49

350 Transceiver 269
350C Xcvr 299
600R Receiver 339
600T Transmitter 399
410 VFO 79

Tempo

Tempo one Xcvr $299
AC One Supply 79
FMH 2M H.T. 149
CL-220 Tncur 220 MC 179
FMH 2M w/Talkie 149

Ten Tec

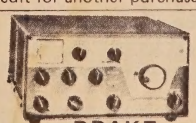
PM-3 Trnsur $ 49
Argonaut Xcvr 199
KR-40 Keyer 79
RX-10 Receiver 49
S-30 Signalizer 29
Triton II 479

Yaesu

FT-401 Xcvr $499
FRDX 400SD Rec 325
FT 2 Auto 2M FM 249
FT-101B Xcvr 549
FL-2100B Linear 295
FV-101 VFO 79
101E Xcvr Demo 695



MIDLAND 13-510
Regular $499, save $100; Buy a Midland 13-513 for $399 (no trades) and take a $100 credit for another purchase.



DRAKE
TR4CW — $799.00

HAMTRONICS USED GEAR • TEST EQUIPMENT • SPECIALS

Join tens of thousands of informed, active radio enthusiasts. Subscribe to the oldest independent magazine in the amateur radio world -



The Radio Amateur's Journal

Zero Bias *(from page 4)*

regulate who does and who doesn't have the right to buy linear amplifiers. If we say that only licensed amateur radio operators have the right then we are overstepping the federal government who at the present time says that anyone can buy transmitting equipment. Not everyone can *use* it however for that is an area which has numerous regulations. So it is not against the law to buy or even own transmitting equipment and I'm afraid that any such restriction placed on a potential buyer could result in a restraint-of-trade or denial-of-civil-rights suit. It would also result, if implemented, in the elimination of flea-markets, classified advertising, and individual-to-individual sales of amateur radio equipment. Point-of-sale restriction or regulation would, by definition, have to be able to directly control the right to buy and own transmitting equipment, and indirectly, by definition, also be able to punish transgressors. The logic could also be carried to the point that only a certain class of amateur could purchase equipment suitable for their particular class. A Novice, for example, could not buy a high powered amplifier, nor could he purchase equipment capable of operating on frequencies not assigned to the Novice class. The potential for extremes is endless. How far could the definition be carried out? How could all of these marvelous rules be enforced with no money? Is the purpose of amateur radio to be a scape goat, to be offered up to save the Congress and the FCC the embarrassing realization that they and only they are doing the American public the greatest disservice? Congress over the years has sold out the public in this matter by not adequately funding the FCC. The FCC cannot compound this travesty by pushing for further regulations that it knows from the start it cannot enforce or administer. If all of this movement is designed to show the public that something is being done to solve the problem, then the entire country is being ripped off by bureaucratic nonsense.

What can be done to solve the problem? There are several areas which can be worked on positively to cure the interference problem. First, it might be suggested to buck-passing Congressmen that there are three Bills pending (one for almost four years) on the RFI and TVI question. These are the Goldwater Bill, the Benjamin Bill and the Vanik Bill. These, especially the Vanik Bill, would lead to tighter manufacturing standards for the home entertainment (TV etc.) industry. It would appear that the home entertainment industry has a very strong lobby in Washington which doesn't want this legislation passed. The manufacturers might be required to build in filters for their equipment. This doesn't require the Congress to spend more money.

One manufacturer of home entertainment devices, namely Radio Shack, has recently added R.F. Interference Rejection ratings to their f.m. receiver specifications. I think Radio Shack should be applauded for bringing this see. This reflec Shack's part ar

Secondly, we who we happen good advice fc equipment. Sin standing rift be heal itself, and make amateurs proach you tak sharing informa

Thirdly, we c at the moment about informing That part is eas In November th tion called *"Ho terference Prob* the Superintend Printing Office, No. 004-000-0(four-color illust ference, what complete listing who supply free offices are liste as a primer for stood by most further the pub that's knocking out Sunday's football game. I urge all of *CQ*'s readers to get a copy of this booklet and to pass the information on to both your amateur and non-amateur friends.

Cowan Publishing is reprinting and distributing "How to Identify and Resolve Radio-TV Interference Problems". We are selling the book for $1.00 plus 25¢ for postage and handling. Order the book from whichever source is more convenient but do get at least one copy.

I also urge all radio clubs and groups to form some sort of dialog with CB clubs as to forming area interference committees to work out the interference problem in a mutually satisfactory way. Such groups could also have an effect on local operators who flaunt the law with illegal high power equipment. Perhaps a concerted effort by both groups could lessen the need for more Government intervention. After all, many CBers themselves are subjected to interference by high-powered stations, and they too would like to rid the airwaves of these people. There's nothing like the personal touch of a visit by your neighbors to bring home an educational lesson.

At the present time plans are underway for Public Service Announcements on radio and TV to promote the public's awareness and availability of the FCC booklet and that some answers are available for the problem. I'll have more on that as plans are firmed up.

(Continued on page 90)

HAMTRONICS USED GEAR • TEST EQUIPMENT • SPECIALS

30-DAY GUARANTEE ■ 90-DAY FULL CREDIT TRADE-IN
■ FREE SHIPPING VIA UPS ONLY **Limited quantities. First come, first served.**

(if weight or size exceeds UPS max., we will ship freight collect)

Test Equipment Bargains

Boonton "Q" Meter	$295
Tektronix 5140	249
Tektronix 545A	950
5 3/54A Plug-in wide band preamp	75
Hickok 695 Generator	69
Bendix BC221 Freq Meter	39
Polarad Spectrum Analyzers A84T	1695
Hewlett Packard 400C	75
Precision E-400 Signal Generator	125
Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
Bird Mod 43	80
General Radio 650A	150
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

Allied

AX-190 Receiver	$159

Ameco

PV-50	$ 9
CN-50	29
CN-144	39
TX-62	79
621 VFO	45

B&W Waters

Nuvertor 2+6 Conv.	$ 75
6100 SSB Xmitter	395
670 SSB Adaptor	39
Co-Dax Keyer	95

Central Electronics

100V Transmitter	325
MM-2 Scope	69
20-A SSB Adaptor	79

Clegg

22'er FM	$129
66'er 6M Xcvr	115
99'er 6M Xcvr	59
Interceptor BRCUR	275
Ant Pre Amp	22
All Bander	69
HT-146	125
2 Vesta	259
FM-27-B Xcvr	325

Collins

75 A4 Receiver	$395
75S3B Receiver	695
75S1 Receiver	349
KWM-2 Xcvr	595
32S1 Xmitter	349
PM-2 AC Supply	95
516 F2 AC Supply	139
312B5 Console	425
361D2 Mount	29

Drake

2A Receiver	$149
2B Receiver	189
2AQ SPKR QMULT	29
R4 Receiver	289
R4-B Receiver	349
R4-C Receiver	399
MS-4 Speaker	19
2NT Transmitter	125
2NT Transitter	99
TR-6	695
TR-22 Meter	140
T-4X Transmitter	339
TR-72 2 Meter FM	225
AC-4 AC Supply	95
TR-4-C Transceiver	449
CC-1 Console	
CPS-1 Supply	
SC-2 Conv	
SC-6 Conv	
SC-1 Calibrator	
The above all assembled complete pkg.	Only $200

Dycomm

10-0 2 M Ampl	$125
35-0 401N 110 Out	130
470-25 450 MC	120
P-1416 16 Amp Supply	95

Eico

720 Transmitter	$ 49
722 VFO	39
730 Modulator	39

Elmac

AF-67 Transmitter	$ 45
PMR-8 Receiver	79

Genave

GTX-22M FM	$165
GTX-200 2M FM	149

Globe/Galaxy

VHF 6+2 Transm	$ 39
Chief Transmitter	39
Galaxy III Xcvr	159
Galaxy V Xcvr	189
Galaxy V Mk II	239
GT-550 Xcvr	279
GT-500A Xcvr	329
AC-400 Supply	79
FM-210 2M FM	95

Gonset

Com II 2M	$ 75
Com II 6M	69
Com IV 2M	129
GC-105 2M	115
G-28 Xcvr	149
G-50 Xcvr	149

Hallicrafters

S-108 Receiver	$ 99
SX-101 Receiver	159
HT-32 Transmitter	179
HT-32B Transmitter	269
SX-99 Receiver	79
SX-115 Receiver	349
HT-37 Transmitter	159
HT-40 Transmitter	49
SX-99 Receiver	99
SX-117 Receiver	189
SR-150 Xcvr	259
SR-160 Xcvr	159
SX-146 Receiver	175
HT-44 Transmitter	159
SX-111 Receiver	149
SX-122 Receiver	249
S-36 UHF Receiver	125

Hammarlund

HQ-110 A VHF Receiver	$189
HQ-110C Receiver	119
HQ-110AC Receiver	149
HQ-145X Receiver	169
HQ-170C Receiver	159
HQ-180 Receiver	379
HQ-215 Receiver	259
SP-600 Receiver	179
HX-50 Transmitter	169

Heathkit

SB-300 Receiver	$199
SB-301 Receiver	229
HR-10-B Receiver	69
SB-303 Receiver	269
SB-220 Linear Amp	449
SB-102 Trivcvr	379
DX-60B Transmitter	69
HW-32 Transmitter	85
HW-100 Transceiver	249
SB-100 Transceiver	299
SB-401 Transmitter	249
SB-101 Transceiver	349
SB-650 Digital Freq. Display	149
HW-30 Twoer	29
Also Sixer	29
H-10 Monitor	69
VHF-1 Seneca	79
HW-12 Transmitter	75
HP-23 AC Supply	49
HP-23B AC Supply	59
HW-202 2M FM Xcvr	159
SB-620 Spectrum Analyz	120
SB-102 Xcvr	369
SB-610 Scope	95
HA-20 6m Linear	125
SB-634 Console	175
SB-604 Spkr	29.50
SB-644 VFO	129.50
SB-230 Linear	359
SB-104 Transceiver	625

ICOM

IC-21 2M FM Xcvr	$299
IC-230 Demo	369
IC-22A 2M FM Xcvr	185
IC-30A 432 MCFM	269

Johnson

1-KW Matchbox/SWR	$195
Courier Linear	139
Ranger I Transmitter	85
Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

Kenwood

T-599 Transmitter	$289
R-599 Receiver	289
TS-520 Tranc	429
QR-666	259
QR-666 Receiver	239
TV 502 Transvertor	179

Knight

T-60 Transmitter	$ 39
r-100 Receiver	59
TR-108 Trancur 2M	79

Lafayette

HA-800 Receiver	$ 89
HP-350 Receiver	149
HE-45 Transceiver	49

Midland

509 H.T.	$149

Millen

92200 Transmatch	$149
90651-A Grid Dipper	95

National

NC-270 Receiver	$119
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MKII Transcvr	299
NC-303 Receiver	199
AC-500 AC Supply	69
NCX-500 Transceiver	199
NCX-3 Transceiver	169
NC-190 Receiver	149
NC-105 Receiver	69

Regency

HR-2B 2M FM	$169
HR-220 FM 220 MC	185
AR-2 2M Amplifier	85
HR-25 2M FM	225
HR-6 Meter FM	189

SBE

SB-34 Transceiver	$249
SB-33 Transceiver	189
SB-144 2M FM	175
SBZ-LP Linear	179

Standard

SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	250

Swan

700-CX Xcvr	$459
260 Cygnet	289
279 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK VI 6 Meter	550
250 C 6M Xcvr	349
FM 2X2M Xcvr	169
FM-1210A 2M	249
350 Transceiver	269
350C Xcvr	299
600R Receiver	339
600T Transmitter	399
410 VFO	79

Tempo

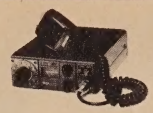
Tempo one Xcvr	$299
AC One Supply	79
FMH 2M H.T.	149
CL-220 Trncvr 220 MC	179
FMH 2M w/Talkie	149

Ten Tec

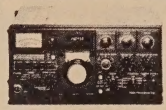
PM-3 Trnsvr	$ 49
Argonaut Xcvr	199
KR-40 Keyer	79
RX-10 Receiver	49
S-30 Signalizer	29
Triton II	479

Yaesu

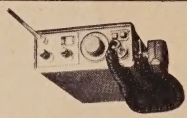
FT-401 Xcvr	$499
FRDX 400SD Rec	325
FT 2 Auto 2M FM	249
FT-101B Xcvr	549
FL-2100B Linear	295
FV-101 VFO	79
101E Xcvr Demo	695



ICOM IC22S
Regular $299, save $50; buy an ICOM IC22S for $299 (no trades) and take a $50 credit for another purchase.



KENWOOD
TS 820 — $869.00
TS820S — $1048.00



KENWOOD TR-2200A
Regular $229, save $30; buy a Kenwood TR2200A for $229 (no trades) and take a $30 credit for another purchase.



YAESU
FT101E — $799.00
FT101EE — $759.00
FT101EX — $699.00

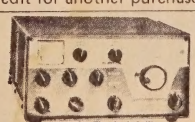
MAIL & PHONE ORDERS WELCOMED. BANK AMERICARD ACCEPTED
ALL UNITS GUARANTEED

HAMTRONICS
DIVISION OF
Trevose Electronics

4033 BROWNSVILLE ROAD TREVOSE, PA. 19047
Telephone: (215) 357-1400 (215) 757-5300



MIDLAND 13-510
Regular $499, save $100; Buy a Midland 13-513 for $399 (no trades) and take a $100 credit for another purchase.



DRAKE
TR4CW — $799.00

HAMTRONICS USED GEAR • TEST EQUIPMENT • SPECIALS



the Tempo ONE is much more than just an inexpensive transceiver

The Tempo ONE is a highly reliable, excellent quality HF transceiver. It has proven itself in worldwide use by thousands of General and Advanced Class amateurs for more than six years. And now under the new FCC regulations the Tempo ONE has become the ideal rig for the Novice and Technician Class also. Study its specifications, talk to any of the thousands of owners, compare the Tempo ONE with other transceivers . . . and we know you can't beat the price. We're sure the Tempo ONE will prove itself to be the "value leader" for you also.

Frequency Range: 80 through 10 meters (28.5-29.0 10M. xtal supplied)
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 10dB
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**
TEMPO VF/ONE External VFO	**$109.00**

AVAILABLE AT SELECT DEALERS THROUGHOUT THE U.S.

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

think of yourself as an antenna expert!

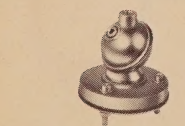
—you select your components!

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.

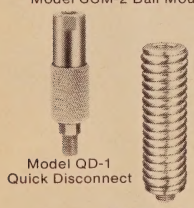
...and you'll mobile with the experts' foremost choice... HUSTLER®

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.



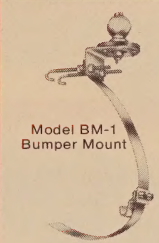


Model SSM-2 Ball Mount



Model QD-1 Quick Disconnect

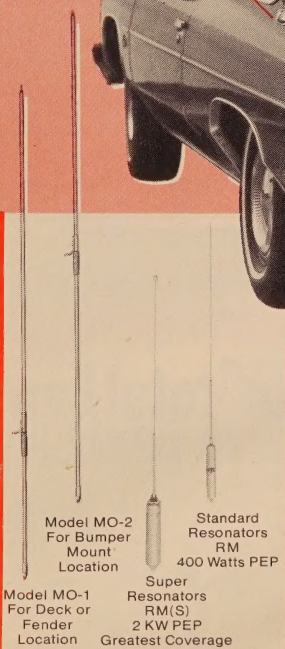
Model RSS-2 Resonator Spring



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 RM(S) 2 KW PEP Greatest Coverage

Standard Resonators RM 400 Watts PEP

"the home of originals"

HUSTLER®

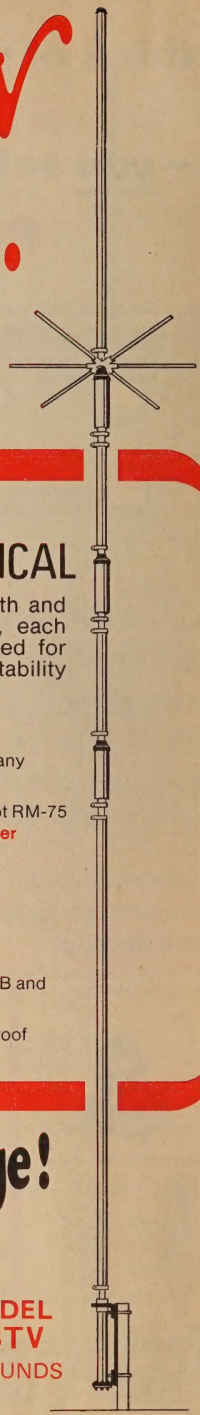
Available from all distributors who recognize the best.

new-tronics corporation
15800 Commerce Park Drive
Brookpark, Ohio 44142
(216) 267-3150

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

Hustler designs are patented under one or more of the following assigned to New-Tronics Corporation 3287732, 3513472, 3419869, 3873985, 3327311, 3599214, 3582951

if the HUSTLER 4-BTV weighs 39% more... what do others leave out?



HUSTLER FIXED STATION FOUR BAND VERTICAL

The 4-BTV is longer for greater aperature, larger in diameter for strength and bandwidth, heavier traps for precision and safety factor. Individually, each subassembly weighs more to collectively give you an antenna designed for convenience of assembly and installation, a wide margin in mechanical stability and far superior electrical performance.

- **Lowest SWR**—PLUS!
- Bandwidth at its **broadest!** SWR 1.6 to 1 or better at band edges.
- Hustler exclusive trap covers **"Spritz" extruded** to otherwise unattainable close tolerances assuring accurate and permanent trap resonance.
- Solid one inch **fiberglass trap forms** for optimum electrical and mechanical stability.
- Extra heavy duty aluminum mounting bracket with **low loss—high strength** insulators.
- All sections **1¼" heavy wall,** high strength aluminum. Length 21'5".
- **Stainless steel clamps** permitting adjustment without damage to the aluminum tubing.
- Guaranteed to be **easiest assembly** of any multi-band vertical.
- Antenna has ⅜"-24 stud at top to accept RM-75 or RM-75-S Hustler resonator for **75 meter operation** when desired.
- Top loading on 75 meters for broader bandwidth and **higher radiation efficiency!**
- Feed with **any length** 50 ohm coax.
- Power capability—**full legal limit** on SSB and CW.
- Ground mount with or without radials; roof mount with radials.

one setting for total band coverage!
40 THROUGH 10 METERS

HUSTLER®

"the home of originals"

New-Tronics patents: 3287732, 3513472, 3327311, 3419869, 3599214, 3873985, 3582951, 1017857 (Canada).

MODEL 4-BTV
15 POUNDS

new-tronics corporation
ANTENNA Engineers, Designers, Manufacturers
15800 commerce park drive
brookpark, ohio 44142
(216) 267-3150

Available from all distributors who recognize the best!

This one's for you.

Because you asked for it . . . we built it. The all-new JR. MONITOR[tm] Antenna Tuner.

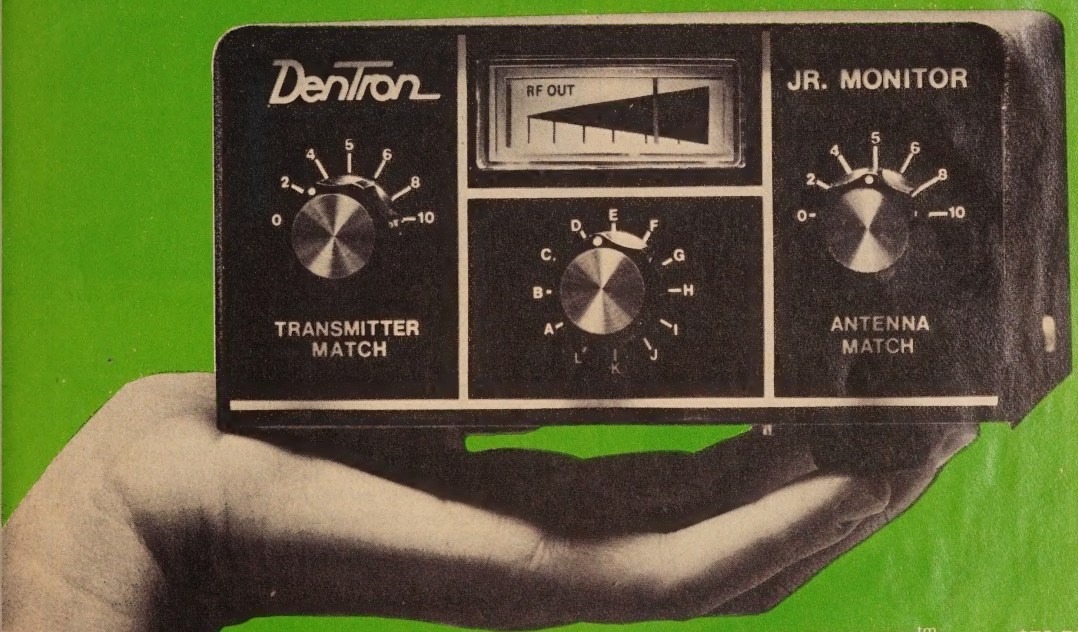
Call it what you will — antenna tuner, matchbox, or matching network, the JR. MONITOR[tm] has it all wrapped up in one neat 5¼"Wx2¾"Hx6"D all metal cabinet.

Here are the features you said you wanted:

Continuous tuning from 1.8-30 MHz. 300 watt power capability. Forward reading relative output power meter — simply tune JR. MONITOR[tm] controls for maximum RF output on the meter. Built-in balun. Mobile mounting bracket. Ceramic rotary 12-position switch. Capacitor spacing 1000 volts. Tapped toroid inductor. Antenna inputs: coax unbalanced SO 239, random wire, balanced feed line 75-660 ohm. Weight: 2½ pounds.

With so many special features — think of the unlimited possibilities you'll have for experimenting with dozens of antennas! For instance, the DenTron All Band Doublet fed with balanced feed line hooked to the JR. MONITOR[tm] covers 1.8-30 MHz in one antenna. . . or try this mobile suggestion: 108"mobile whip fed with coax to the JR. MONITOR[tm] located under the dash will give you 10-40 meter mobile coverage and no coils to change!

It's easy to understand the excitement the JR. MONITOR[tm] has created. Wherever you are — home, boat, car, plane, or campsite you'll always be in contact. It's a fun little tuner that easily fits in a briefcase or coat pocket — but why would anyone want to smuggle it into their radio room?



JR. MONITOR[tm] $79.50
ALL BAND DOUBLET $24.50

DenTron Radio Co., Inc.
2100 Enterprise Pkwy.,
Twinsburg, Ohio 44087
(216) 425-3173

arma
amateur radio manufacturers association

Read Bill Rindone's harrowing tale of adventure as he reports first hand on operating a station during a war.

DXPEDITION TO ISTANBUL AND KHARTOUM TA7ABK/ST2SA

BY W. R. BILL RINDONE*, WB7ABK

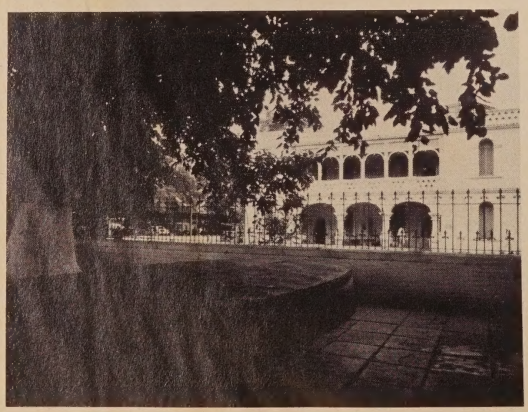
We were back on the trail again! Six weeks at home had done wonders and this time we were headed back to Africa, by way of Istanbul.

Amateur radio is not officially recognized in Turkey, but, still exists in isolated pockets. The Turkish Amateur Radio Club is working hard for governmental approval and recognition, and while it is an uphill climb the final breakthrough may not be too far off.

We flew into Yesilkoy Airport, Istanbul and once again played the customs game. I had been told that customs in Turkey was as thorough as they could make it, and I certainly was not disappointed. My transceiver was soon on the counter being turned upside down, right side up, and almost every way, except loose. Three inspectors had descended upon the gear and the dialog accompanying their investigation was of an obviously pressing nature. After a few short moments, one of them was sent off to fetch the headman, and in due time he returned with a bespectacled gentleman, who was obviously his senior in both age and rank. Without addressing me, he fixed his gaze upon the transceiver and began twisting the knobs and spinning the dials. He was a bit perplexed as there was no obvious way to get inside for a closer inspection, and although he transferred his interest to the titles appearing on its case, he was no closer to identifying the "appliance", than his predecessors had been. As always, I had referred to it as a "radio", as the word "transmitter" seems to conjure up thoughts of intrigue and activity in the style of James Bond. They had been at it for about twenty minutes when I decided to take a "make or break" approach. The senior official had, by this time, turned every dial and caressed the entire cabinet, including inscriptions. Catching his eye, I asked him if he would "like me to explain it" to him. I had obviously struck a sensitive nerve, in full view of his staff, and the quick reply of "No, I understand it!" had come straight from the gut level. He quickly put the rig back in its carrying case, and after noting the make and serial number in my passport, he confided to me the real reason for his close inspection. His explanation was an extension of his personality; "You must understand that the entry of television sets into our country is prohibited and we must be very careful." His apparent justification tickled my funny bone, as the humor of three customs officials searching for the picture screen on my Kenwood, TS-520, gradually sank in.

Soon, we were settled into a local hotel, which was located about 100 yards away from "Radio Istanbul". I hung

*Box 238, Lake Oswego, Oregon 97034



The Palace in Khartoum, one day before it was taken by the rebels.

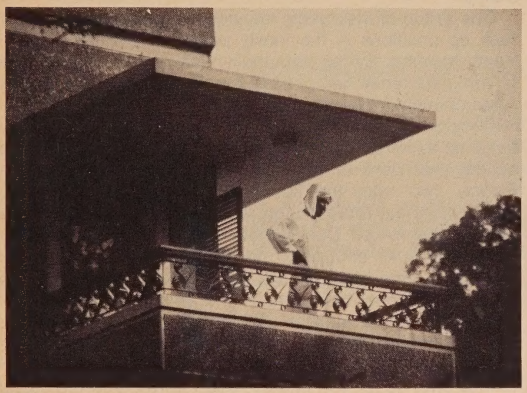


Bill Rindone, WB7ABK, operating as ST2SA.

a dipole vertically over the balcony and was surprised to find the band clean and free from their 50 KW Transmitter.

My contact in Istanbul was Halitt Yetkin, TA1HY, and tho my first try to locate him had been unsuccessful, I had left a message for him to contact me. On the second day, he phoned and then dropped over with a friend.

Halitt appeared nervous and his first comment was to advise us that it was unwise to operate from our present location. His suggestion was to move the station to his QTH, some fifteen miles distant. Halitt's English is limited, but, his manner and inflection were emphatic enough that the phrase "not safe here", provided us with sufficient reason for a post haste QSY. Soon, we were guests in a private home, where we were welcomed with the amenities of Turkish custom and assured of a better operating climate. Halitt had recently disposed of his own transceiver, however, his roof still sported a modified VS1AA antenna. After a bit of third story work, our equipment was again operating on the twenty meter band. Since no government licensing authority has *ever* existed, the matter of a call sign is quite interesting. You may, if you wish, pick your own TA call sign, or if you prefer, utilize any call sign assigned to you with a portable TA designation following it.



The dipole was hung from this roof. The man shown here is watching the war progress.

For the JA amateurs, G5AIA/TA proved to be a good drawing card, while the Europeans took very little note of the call. When the Asians faded out, we switched over to AB7ABK/TA and the Europeans funneled on us. As the eastern U.S. stations started to filter thru, we switched calls again, this time to ZK2AQ/TA, which attracted plenty of interest stateside as well as throughout Europe. The convenience of changing call signs proved to be a fascinating advantage, capable of creating interest in areas you were trying to work, while going almost unnoticed in others.

During one s.s.b. session, we were broken by an S9+40 signal which requested pertinent information and the exact location of our station. There was no mistaking the seriousness of the approach and I quickly ORX'd long enough to get Halitt and hand him the mike. After a short conversation in Turkish the voice returned to English and welcomed me to Istanbul. Such are the vagaries of operating in a country where no amateur radio license has ever been issued!

From Istanbul, we flew south to Athens in order to obtain a visa from the Sudanese consulate. The U.S. Embassy gave us a letter of introduction, and we presented it to the consul, only to be advised that no visa could be issued without approval from higher authorities in the Sudan, which would take weeks to arrange at best. The consul was a likeable fellow who took the project under his wing and he subsequently produced a visa which would allow us entry into the country and which had to be converted and approved within five days of our arrival in Khartoum.

KHARTOUM! To me it had always been a legendary historical name which conjured immediate visions of dervishes, Chinese Gordon, General Kitchener, Muhammad Ahmad, better known as the "Mahdi', and the omnipresent confluence of the White and the Blue Niles.

The plan was simple; we were to lay over in Khartoum for one night and then fly south in the morning to Juba, capital of the Autonomous Southern Sudan, it was to be a nine o'clock flight out of Khartoum airport and we were up at six, all fifty-seven of us. The cockroaches and I braced ourselves for the heat of the Sudanese day, and the walls were still moving as I packed and made ready for the flight south.

The prior afternoon had been one hassle after another, what with having to obtain all of the necessary extensions, permits, and documents required to go south. We had also been assured thru our local contacts that the political conditions, in both north and south, were completely stable. We were told that any rumors of unrest were false and that the country was very quiet. The storm however, was indeed coming, and the calm was entirely illusory.

It was now six-thirty in the morning, and as I made my way down the old stairs of the hotel my thoughts ran over the time schedule of the flight and the details which would accompany it. As I arrived at the desk, I noticed the deserted lobby . . . setting my baggage down, I went off to search for the deskman. When I found him, he was in the back cubby hole, which doubled as an office, gazing intently in the direction of the street. "I want to check out," was my comment, and at this he shook his head. Now my thoughts turned to the cost of the nighs lodging, and at the going rate I understood why he didn't want me to leave. I was familiar wih the tact, so I pressed it home again; "I'm checking out." This time the head shaking was still there, but the arm motions and the verbal "Boom, boom," were new.

I had heard it, when I had first awakened, but, had passed it off as maneuvers. Now, I knew better. We had dropped right into the middle of a war, and there was to be no way out of Khartoum that day, nor for several more. That first day we knew very little. The small arms fire closed to within a hundred feet of us and the tanks were shelling at under two hundred. Communications had been cut both locally and nationally, with vicious and bloody fighting throughout the city. In the evening we huddled around a small transistor radio to listen to the 6:00 p.m. BBC News direct from London. When it came it was short, uninformative and very misleading: "According to Iraqi news sources there was an at-



The North Korean Youth Building and the Omdurman Bridge taken during the shelling.

WB7ABK/TA ZK2AQ/TA G5AIA/TA AB7ABK/TA

TURKEY

TA7ABK

1976
AUSTRAL-ASIAN-AFRICAN
DX PEDITION

tempted coup in the Sudan this morning, which was rapidly put down by loyal forces." Hell! It was to be three days before anyone had any control over the situation, and armed pocket resistance was to continue for several more. —So much for the Iraqi news source.

Days later we pieced the stories all together and the script read as follows: President Nimeri of the Sudan had been in the United States on an agricultural mission and was returning home via a European routing. His scheduled time of arrival was to be 5:00 a.m. on the morning of July 2nd. Due to a series of events he arrived an hour earlier at 4:00 a.m., this one change was to doom the rebel conspiracy and result in the coups failure.

Mercenaries from Libya, Chad, and Eritrea, had infiltrated the capital over a period of three months. In plain clothes their build up had gone undetected and unnoticed. Arms had been cached in the desert over a period of five months and were sufficient for an extended siege. When the main attack force crossed the south eastern Libian border they were equipped with trans Sahara vehicles carrying everything from tanks to ground-to-air missiles.

At precisely 5:00 a.m. commando raids were conducted on the homes of all seven Sundanese Ministers. Ironically the ministers had been called to the airport upon President Neimeri's early arrival, and were in a cabinet meeting at the time of the raids. Their relatives did not fair as well, as the commandos herded all family members and staffs into basements and garages, there to cut their throats or shoot them down in mass executions.

Simultaneously, the raiders captured the main radio station, the four emergency radio stations, the Ministry of Interior, and the Palace, while launching an attack on the armored transport depot near the bridge at Omdurman. The attack on the airport succeeded in destroying the entire Sudanese Airforce while it was still on the ground, however because of the timing they missed both the president and his cabinet. The president's plane had been refueled and prepared for take off, as the Organization of African Unity was meeting in Mauritius and arrangements to attend had been completed. The president was aboard as the attack began

KHARTOUM, THE SUDAN

ST2SA

1976
AUSTRAL-ASIAN-AFRICAN
DX PEDITION

and the ministers were able to slip out by car, just as the circle around the airport began to close. It was a close call, but, history and emerging nations show them as the rule rather than the exception.

During this time, Libian planes with troop reinforcements were circling, awaiting the ground signal to land. For some inexplicable reason, the prearranged signal was never sent. Lacking this the flight soon left the area.

The initial raid had taken place on Friday, which is the Islamic holiday. The day was well chosen and it found less than 35% of the militia on duty or on immediate recall. Because of this factor the Khartoum police were to play a major and commendable part in the early hours of the war. The rebels had hoped to capture the bridge at Omdurman, adjacent to the armored transport depot. The bridge was the key to the depot and was held for twenty-four hours by the local police, while troops were unavailable. Had the tanks and armored vehicles fallen into rebel hands, the death toll would certainly have risen sharply. Local vehicles were impounded and driven on to the bridge to be used as barricades, and for three days the tanks around us shelled the bridge continuously, in order to impede any troop advancements.

One group of insurgents managed to cross the river and took up positions in the newly constructed North Korean Youth building. By the time their position was overrun, the government tanks had shelled the six story building into a mass of incomprehensible rubble.

Through all of this we were fortunate enough to be confined to the area surrounding the Hotel Sudan, which is on the east bank of the Nile River, four blocks from the Palace, two from the Ministry of Interior, and directly across from the radio station, all of which were being held by the rebel forces. During those first days of heavy battle, anyone unlucky enough to be trapped in the area made their way to the hotel to seek refuge. The group there was quite international in character and among us were members of the Saudi Airforce, diplomats from Russia, Sudan, and North Korea, plus business men from west Germany, England, Sweden and Australia. The Saudis had had their planes shot up on the runway, and many of the diplomats feared the eventual outcome. As normal in times of crisis, we banded together and became good friends. Lengthy discussions took place in and among this multi-lingual group and the variation of international thoughts proved quite interesting.

The tales were many and varied, but, the sight of bodies whole and otherwise floating in the Nile, coupled with the stench that accompanied the slaughter of sixteen hundred people in the streets, left an impact that would not be soon forgotten.

Humor comes at strange times and under unusual circumstances. I still often think about that first morning when, after resettling, a young German fellow and I went outside, sat down, and proceeded to watch the war. Not being in a position of carrying a weapon, there really wasn't anything else to do! As we sat there, we heard the drone of an approaching plane. We could see its Lebanese markings and noted that the pilot had lost one of his engines. It was obvious that he had been on some routine patrol, and having lost an engine, was looking for a nice soft spot to land. He had picked Khartoum Airport and was totally unaware of the war going on below. When he was directly overhead, he was greeted by three quick bursts of anti-aircraft and the piercing whine of a ground-to-air rocket. We chuckled to ourselves as he made a dive for the landing strip. Later when I had the opportunity to meet him, we both sat and laughed about his untimely situation.

In the Sudan Club, when the bullets started coming through the walls, womens liberation came of age. One

CQ

FREE INFORMATION SERVICE

To receive Manufacturer's information about products Advertised or Editorially mentioned in this issue . . . Circle the numbers on the card that match the key numbers at the bottom of the Advertisement or Editorial mentioned that interest you.



1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98
99	100	101	102	103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122	123	124	125	126

Please type or print

Card expires one month after cover date of this issue.

Name _____

Address _____

City _____ State _____ Zip _____

C

FIRST CLASS
PERMIT No. 392
Port Washington, N.Y.

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY

CQ Magazine

Cowan Publishing Corp.
14 Vanderventer Avenue
Port Washington, NY 11050

D



$98.00
(Less battery, W/AC supply)
SSK-1 key only)
$23.95

It's NEW!
It's from NYE!

NYE VIKING
IAMBIC KEYER

Right or left handed, you're always "right on" for faster, surer sending! Here's a whole brand new "kit of tools" in one compact, handsome, black cabinet!

A fast, comfortable NYE VIKING Super Squeeze Key with extra-long, form-fitting molded paddles and gold plated silver contacts, combined with a reliable Curtis 9043 keyer chip. . .giving you tireless, accurate sending!

Either internal 9V DC, or 115V AC. . .to key either negative or positive-keyed transmitter up to 200 ma at 250 volts! A NYE VIKING 404 audio oscillator and speaker for monitoring and practicing. Flip a switch and use the "dash" paddle for tuning, or to simulate old-fashioned bug keying! Dimensions: 13 cm x 6 cm x 19 cm. Weight, 1.2 Kg.

Nye Viking

At your favorite dealer's, or
WM. M. NYE COMPANY, INC.
1614 - 130th Ave. N.E., Bellevue, WA 98005 * (206) 454-4524

British matron was openly upset when everyone dived for cover simultaneously. She felt that if you abandoned ship with a "women and children" first policy, then the men shouldn't duck until the women were comfortably situated. Male chauvinism had, at least temporarily, lost some of its advocates.

During the time, that most of this was happening, the gear was operating and I was using a low dipole as a radiator. However the thought of being detected by either side was a definite deterrent to any extended activity. I was advised by reliable sources to dump all of my radio equipment in the Nile, as it was felt that we wouldn't be able to get it out of the area safely. Their reasoning was simply that no matter who won the war, an unknown American with a compact portable radio station could easily draw a firing squad.

Amateur radio is not recognized in the Sudan and there are no laws governing such. A few weeks prior to our arrival, the local police had shut down a Britisher who had been operating. A neighbor had complained, and even with highly stable political conditions, the amateur spent a few days of incarceration. Sid Ahmed Ibrahim, better known as ST2SA or Doctor Sid, has the only semi-official permission to operate in this country. Sid has a letter signed by the Minister of Communications, which states that there are no written laws regarding amateur radio in the Sudan, but, that until such time as they are written, he has permission to operate his equipment. With Sid's blessing we operated under the ST2SA call sign.

After three days the war broke down into isolated skirmishes, pocket resistance, and snipers. The government set a 6:00 p.m. to 10:00 a.m. curfew, and advised that anyone found on the streets during those hours, without a military pass, would be summarily shot. At this point, the military were very edgy, and several regrettable incidences occurred. At the hospital, a soldier was startled by motion and reacted with his sub-machine gun. Several women and children were accidentally gunned down and the cousin of a friend had his leg amputated by the rapid fire that ensued. Elsewhere, a young woman refused to open the door to her home, apparently believing that it could be rebels, she was shot and killed through the closed door. There are many other grisly stories which are best left untold.

It finally became evident that the mercenaries had lost the fight. This set off considerable concern among the diplomats around us, who feared that the rebels would now try to create international problems for the government by assassinating foreign dignitaries and other visitors present in the city. Accordingly a large number of troops were deployed on the roof and grounds of our hotel.

We operated when it was feasible, and aside from the wind blowing a door shut during a c.w. session, no further problems were encountered. After thirteen days the airport was reopened, and one morning before dawn, we set off for the airport in a small van. With the curfew still on, the streets were deserted except for road blocks. Debris was everywhere and the holes left by tank shells were prominent in the major buildings.

At the airport we were subjected to a thorough search and only because my transceiver case was a duplicate to my clothes case, were we successful in boarding the flight south to Juba, capitol of the Autonomous Southern Sudan. ■

John Schultz comes up with several ideas to make our operating a little easier and certainly more interesting.

H.F. Operating— Remote Control Style

BY JOHN SCHULTZ*, W4FA

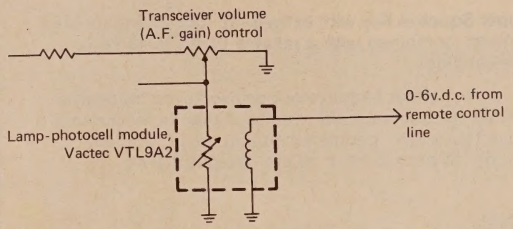


Fig. 1—D.c. remote control of the a.f. gain or similar potentiometer type controls in a transceiver. The lamp-photocell modules can be home-brewed or are available from sources such as Allied Electronics.

Remote control operation of an amateur radio h.f. station is a subject that has intrigued many amateurs for years. After all, who would not prefer to sit outside under a shade tree and communicate rather than stay in a stuffy shack or in a confining automobile. Some pretty elaborate ways have been devised in the past for the remote controlling of a station. But solid-state technology has changed all that—not only in the sense of how control is achieved but in terms of what must be remotely controlled. The newer, solid-state transceivers make great use of broad-banded circuits, so far fewer remote controls are needed for tunable functions. Remote controls are needed mainly for switching functions.

This article explores a few ideas for remote control ranging from the very simple to suggestions for more elaborate possibilities using IC's. None of the ideas presented are intended to fall outside Part 15 or other parts of the FCC regulations. The operator is always presumed to be in the immediate area of the station so he can quickly directly control the station when required.

Wired direct control is the most basic possibility and depending on the remote location involved, it might be the most economical. Multiple conductor ribbon cable is available having 6 to 50 conductors. By hunting around in surplus outlets, one should be able to find a 100 feet of 30 conductor cable for about $30 and suitable mating connector sets for about $4 a set. Smaller cable will be considerably cheaper. The 30 conductor cable is mentioned because it is not too unwieldy to roll up and out and a tremendous number of functions can be remotely controlled with so many conductors. One can wire a remote control socket on a transceiver and use a dummy plug to return to local control whenever desired. The exact wiring required depends on the equipment involved and the degree of overall control one wants to achieve remotely. Low-impedance audio and d.c. circuits can be directly accessed and remoted (paralleling switch contacts with a remote switch, for example). High impedance audio and r.f. circuits require some sort of isolating device so they can be controlled by a d.c. circuit and also to prevent hum picked up by the remoting cable from getting back into the transceiver. One good way to remote control high impedance audio circuits, such as a volume control, is by means of a lamp-photoconductive module as shown in

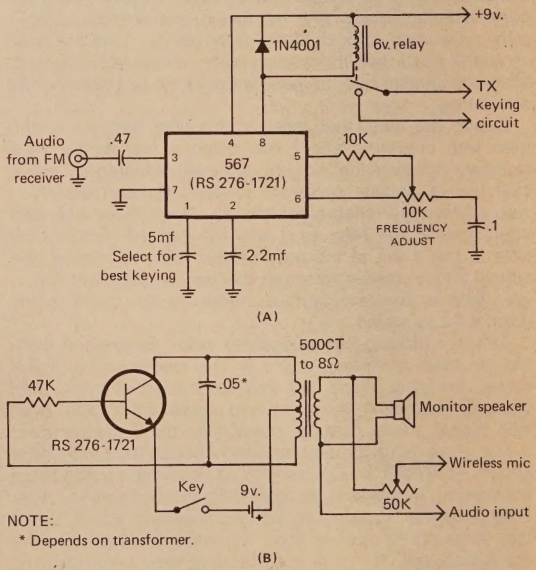


Fig. 2—PLL tone decoder (A) and tone oscillator (B) for use in a control system. The frequency used is about 500 Hz but similar circuits can be used for the entire audio range.

*Box "L", FPO, New York 09544

fig. 1. Such modules can be home made from a lamp and photocell or purchased inexpensively. For instance, the $3 unit mentioned in fig. 1 has a resistance of 60 ohms to 10 megohms as the lamp voltage goes from 6 to 0 volts. So, its presence will not offset the normal operation of a volume control when remote control is not being used. The remote control of r.f. circuits is usually more complicated. Switching circuits can be handled by suitable relays placed within the receiver. Low-level tunable r.f. circuits, such as a v.f.o., can be handled by adding diode varactor tuning. But this requires some experience in circuit work if one is not to foul up the stability of the v.f.o. Also, one must have a positive means of knowing the frequency excursion being covered. Of course, if one is interested only in remotely shifting around a very small frequency excursion, it might suffice to just remote the d.c. control leads for an existing r.i.t. circuit in a transceiver. Another approach is to use a remote v.f.o. Most commercial remote v.f.o.'s for the popular transceiver lines also provide transceive frequency control from the remote v.f.o. Of course, this approach means running a coaxial line along with the d.c. control cable and the r.f. loss in the coaxial line may require compensation. But, one does have full frequency control of the transceiver with frequency readout at the remote position.

Most amateurs would probably prefer some form of "wireless" remote control, even if it does not provide as many control functions as a wired system. A complete wireless remote control system for tunable radio equipment can get as complicated or more complicated than the equipment being controlled. Fortunately, a few new IC's have made a degree of wireless remote control possible without great expense but absolutely total remote control is still not easily achieved.

The simplest wireless remote control system that one might consider is one which just operates the send/receive function on a transceiver and either modulates or keys the transceiver. F.m. wireless microphone setups can be considered for this application since the components are readily available at reasonable prices, although the more elaborate and expensive remote control systems

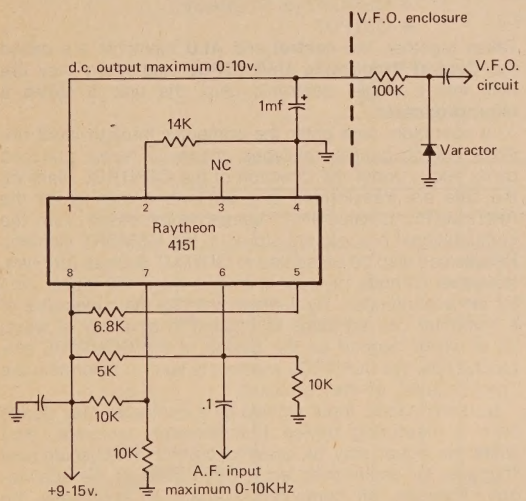
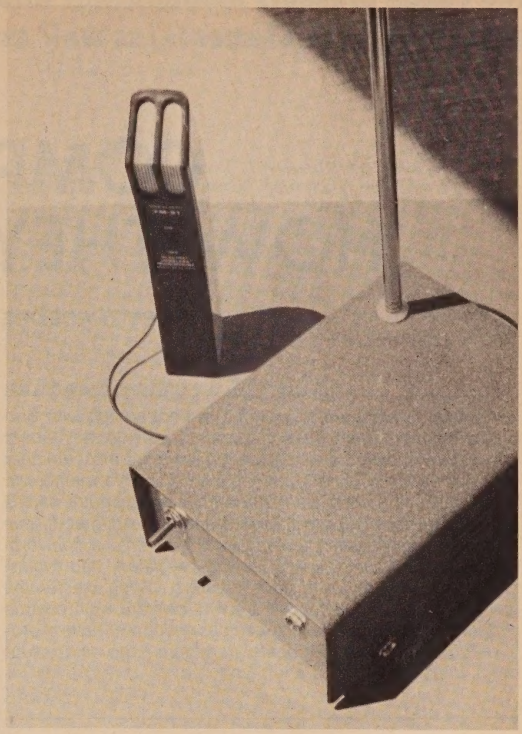


Fig. 3—This single IC frequency to voltage converter can be used to drive a varactor tuning diode. The voltage excursion applied to the diode (and the input frequency range) should be limited to that necessary for r.i.t. operation with a given v.f.o.



Some of the f.m. components discussed in the text. The Wireless Microphone is a Radio Shack FM-91. The enclosure houses the essential parts of an inexpensive f.m. band entertainment receiver along with a Radio Shack #28-131 VOX circuit.

available for other hobby purposes (such as for model airplanes) can also be modified and used.

Using a f.m. wireless microphone and a f.m. receiver to which a VOX circuit has been attached (unless the transceiver used has built-in VOX), one can achieve simple remote control. Another f.m. setup can be used to get the received audio back to the remote point. Each f.m. "link" can be operated at different ends of the f.m. broadcast band and because of the low power employed it will work with inexpensive equipment. The f.m. transmitter used to "broadcast" the received audio can be any inexpensive unit (kits for as low as $3 have been advertised). But, to get good quality transmitted audio, one should use a quality f.m. wireless microphone at the remote point. The Radio Shack FM-91 unit (catalog #33-1048, $19.95) has been found to be particularly good. It employs an electret condenser type microphone with a broad, flat frequency response so it will not foul up the frequency shaping done by any speech processing circuits in use. Radio Shack also has a handy and inexpensive VOX kit (#28-131) which can be used if needed. It includes a relay, sensitivity adjustment, etc. at a low $7 price.

To key a transmitter for c.w. use over a simple f.m. remote setup, the carrier is left on for stability and tone keying is used. The presence of the tone keying can be detected by a VOX circuit and used to control the transceiver send/receive function. The time delay on the VOX

(Continued on page 90)

Ted Cohen presents fundamental information on the five major computer elements, as well as on the "register."

COMPUTERS... HOW THEY FUNCTION

BY THEODORE J. COHEN*, N4XX

As most readers are aware, CQ, in cooperation with Bob Stites, has embarked on a program to provide its readers with selected material on the general subject of computers (see February 1978, CQ). In keeping with this theme, we are pleased to present a tutorial article on computer basics by Ted Cohen, a regular contributor to these pages. In this article, Ted discusses the five major elements which form a computer system, as well as the "register," the fundamental building block of all computers. If you master the material presented here, you are well on your way towards understanding computers . . . devices which will have a profound impact on our way of life, in general, and on amateur radio, in particular.

—K2EEK

With computerized 2-meter transceivers now a reality, it should be apparent that computer-based devices will play an ever-increasing role in our lives . . . whether we are at home, at work, or at play. Computers already monitor engine performance in some automobiles, control the usage of electricity in homes and offices so as to minimize peak-load charges, and even permit us to play sophisticated electronic games at arcades which are located in shopping centers around the country.

While computers are unquestionably a part of our everyday lives, however, relatively few people really understand how they work. With this in mind, the following tutorial article has been prepared. It is intended to present, in a simple and lucid manner, background information on computer systems, and on the manner in which they operate. And while you will not become an instant computer expert by reading the material below, you will, at the least, come to understand how the various elements of computer systems function together.

In this article we will first review the five major elements which are found in *all* computer systems. Following this, it will be shown that a device called a **register** is the elementary building block for all computers. Finally, we will demonstrate how a computer functions by showing how data are transferred from register to register within a computer.

*8603 Conover Place, Alexandria, VA 22308

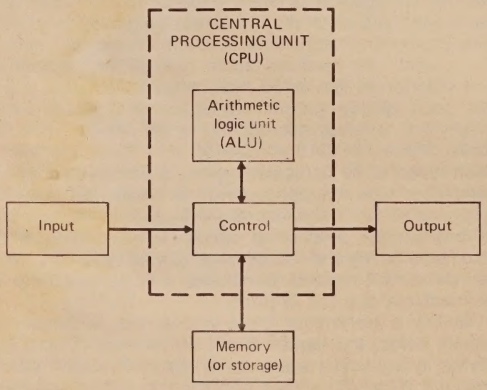


Fig. 1—The five major elements which are found in all computer systems.

A Basic Computer System

All computer systems consist of five major elements (fig. 1):

- INPUT
- CONTROL
- ARITHMETIC LOGIC UNIT (ALU)
- MEMORY (or STORAGE)
- OUTPUT

Taken together, the **control** and **ALU** elements are called the **Central Processing Unit (CPU)**, and when they are built into a single electronic chip, the unit is called a **microprocessor.**

In operation, data enter the computer through input devices (switch panels, teletypes, magnetic tapes, punched cards, etc.). Under the direction of the CONTROL element, the data are transformed in a prescribed manner by the ARITHMETIC LOGIC UNIT. Values which result from the computational process are stored in the MEMORY element. Results can also be presented to OUTPUT devices (printers, teletypes, cathode ray tube displays, magnetic tapes, etc.) for the use intended. By the way, the five main elements of a computer can be made to interact in a variety of ways, all of which depend on the design of the CONTROL element. Thus, the CONTROL element is said to determine the "architecture" of the computer.

In many cases, input signals to a computer may derive from a measuring device (thermometer, ammeter, etc.) while the ouput may be used to control other equipment (furnace, air conditioner, etc.). Regardless of the application, however, all computers operate in essentially the same manner; they take in data, process this data in some prescribed manner, and yield a result.

Registers

The **register** is the basic building block of all computer systems. Simply put, it is an electrical device which is

capable of storing a number. Thus, all computer systems—indeed, all digital systems—can be considered as a collection of interconnected registers, the contents of which are selectively transferred or altered according to a programmed set of instructions. Further, data transfer from register to register takes place in a step-by-step fashion, the rate of which is controlled by a clock.

Let's use the "register concept" to examine the five major computer elements.

Input

As an **input** device, the register serves as a small memory (fig. 2). That is, data are presented at its input, and when the register is enabled by CONTROL, data are transferred into the register. In most cases, more than one entry point, or port, is used on a computer. Thus, several INPUT REGISTERS are required (fig. 3A). It is now necessary, however, to provide for the selection of a particular INPUT REGISTER (IR), and so, an INPUT SELECT REGISTER (ISR) is used. Then too, it is necessary to provide for the transfer of the data from the selected IR to other registers within the computer; this is done through the use of an INPUT DATA REGISTER (IDR).

Memory (or Storage)

A computer **memory** may be considered as a collection of registers, each of which is capable of storing an instruction or a piece of data (i.e., a number). Just as in the case of the INPUT element, it is necessary to provide for the selection of the particular STORAGE REGISTER (SR) desired; this is done through another register called the STORAGE ADDRESS REGISTER (SAR) (fig. 3B). That is, each SR in MEMORY has a numerical address (just like

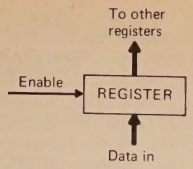


Fig. 2—The "register" used as an input device.

the street number on a house, or the number on an apartment door), and when addressed through the SAR, instructions or data may either be written into the selected SR or extracted from it. Information written into or extracted from a given SR either has been stored, or will be stored, respectively, in another register called the STORAGE DATA REGISTER (SDR). Whether information is written into an SR or is extracted from it depends on whether the READ or WRITE line for that particular register has been enabled by CONTROL.

Arithmetic Logic Unit (ALU)

The **ALU** is another collection of registers which, by means of register transfers, manipulates instructions and data. More specifically, the ALU is capable of performing a wide variety of arithmetic and logical operations under the direction of the CONTROL element.

In operation, data are presented to the ALU through a DATA REGISTER (DR), while the particular operation or function to be performed is transferred into the FUNCTION REGISTER (FR) from CONTROL (fig. 3C). A special register called the ACCUMULATOR REGISTER (ACC) is used to store, temporarily, the intermediate or final results obtained from ALU operations. In essence, the ACCUMULATOR REGISTER acts as the computer's scratch pad.

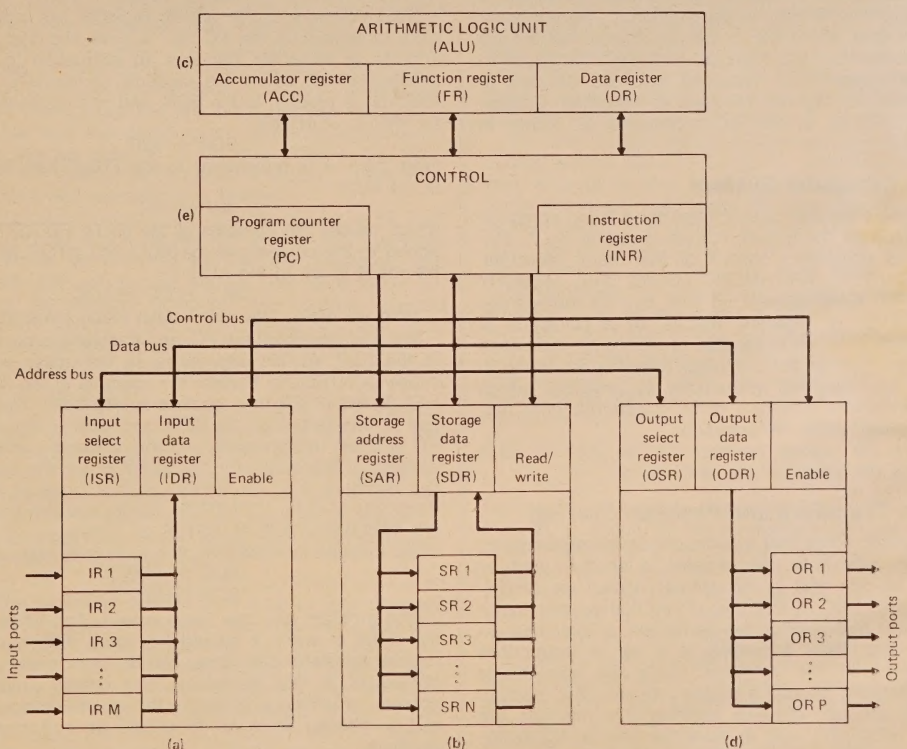


Fig. 3—A computer can be seen as a collection of registers (Modified after Ogdin, EDN, November 1976).

Output

For all intents and purposes, the **output** element of a basic computer functions in a manner similar to that of the INPUT element. Here, however, we speak of the OUTPUT DATA REGISTER (ODR) as being the register through which data are transferred to the OUTPUT REGISTERS, and the OUTPUT SELECT REGISTER (OSR) as being the register which is used to select the desired OUTPUT REGISTER (OR) (fig. 3D).

Control

All registers in a computer are, in one way or another, linked to the **control** element (fig. 3E). This element, in turn, controls the transfer of data from one register to another. These transfers are made to take place in a prescribed manner, or more specifically, according to "instructions" which the computer has been designed to follow. Thus, one computer instruction may cause the transfer of data from the INPUT DATA REGISTER to the STORAGE DATA REGISTER in the computer's memory, while another instruction may direct that the contents of the STORAGE DATA REGISTER be transferred directly to the ACCUMULATOR REGISTER. Regardless of the register transfers to be performed, however, each transfer is "executed" on a step-by-step basis according to a set of instructions which the user has sequenced in such a manner as to solve a particular problem. This set of sequenced instructions is called a **program.** The program is stored in MEMORY, just as are the data to be used.

To obtain instructions or data from MEMORY in the proper sequence requires the use of a register called the PROGRAM COUNTER (PC). The contents of the PC contain the address of a location in MEMORY in which is stored a given instruction, or, depending on a prior instruction, some data which are to be processed. Instructions are transferred from MEMORY to an INSTRUCTION REGISTER (INR), whereupon decoding logic causes data to undergo specific register transfers. A simplified diagram for the CONTROL section of a computer is shown in fig. 3E.

A Basic Computer System

Figure 3 is a detailed presentation for a basic computer system based on the system outline shown in fig. 1. Remember, all computers consist of five major elements: INPUT, CONTROL, ARITHMETIC LOGIC UNIT, MEMORY and OUTPUT. Each element, in turn, can be represented by a collection of registers; that is, by a collection of devices, each of which is capable of storing an instruction or a number. Further, the computer operates according to a set of user-supplied instructions (a program) which causes instructions and data to be transferred from register to register within the computer.

Just how the register transfers can be used to solve problems is the subject of the next section.

Register Transfers and Problem Solving

It was stated above that a computer solves problems by transferring data from one register to another, and by operating on this data in that element called the ARITHMETIC LOGIC UNIT. It was also stated that register transfers and data manipulation are performed, or executed, on a step-by-step basis according to a set of instructions which are called the "program." Let's see how this is done by stepping through a simple program. Our problem will be to add two numbers together (the numbers are stored in MEMORY), and to store the sum in MEMORY. Frequent reference to fig. 3 will be helpful.

We assume that the program begins at that location in MEMORY which corresponds to the number (address) in the PROGRAM COUNTER. As such, let us transfer the contents of the PC into the STORAGE ADDRESS REGISTER of the MEMORY:

$$PC \longrightarrow SAR$$

At this address the MEMORY finds an instruction which is transferred to the STORAGE DATA REGISTER. Since it is an instruction, the contents of the SDR are now transferred to the INSTRUCTION REGISTER in the CONTROL element:

$$SDR \longrightarrow INR$$

This instruction, it will be assumed, will cause CONTROL to transfer the next number which appears in the SDR directly to the ACCUMULATOR REGISTER in the ALU. As such, it is now necessary to fetch the first number to be used in our summing operation. Before we do this, however, it will be necessary to increment the PC by a count of "1." This, too, involves a register transfer:

$$PC + 1 \longrightarrow PC$$

The new contents of the PC are now transferred to the SAR

$$PC \longrightarrow SAR$$

and the number found at this address is transferred to the SDR. Once the number appears in the SDR, CONTROL directs that it be transferred to the ACCUMULATOR REGISTER:

$$SDR \longrightarrow ACC$$

The first number has now been loaded into the ACCUMULATOR REGISTER.

To fetch the second number to be used in the summing operation, we increment the PC by "1," and repeat the steps noted above. In this case, however, let us assume that the appropriate instruction calls for CONTROL to load the second number (which has been transferred to the SDR) into the DATA REGISTER in the ALU:

$$SDR \longrightarrow DR.$$

Both numbers to be added together are now in the ALU. Incrementing the PC by "1," we find that the next address in MEMORY contains an instruction to add the contents of the DR to the contents of the ACC. This instruction is brought to the SDR, and is then transferred to the INR in CONTROL:

$$SDR \longrightarrow INR$$

From here, it is transferred to the FUNCTION REGISTER in the ALU:

$$INR \longrightarrow FR,$$

which causes the contents of the DATA REGISTER to be added to the contents of the ACCUMULATOR REGISTER; the result is left in the ACC:

$$DR + ACC \longrightarrow ACC$$

Hold on now . . . we don't have much more to do!

We now increment the PC, and transfer the next address to the SAR. At this address is an instruction which will cause CONTROL to transfer the contents of the ACCUMULATOR REGISTER to a location in MEMORY. This instruction is transferred to the SDR, and then to the INR. The PC is again incremented, and this address—which is the address of the location in MEMORY where the sum of our two numbers is to be stored—is transferred to the SAR. Once this is done, CONTROL directs that the contents of the ACCUMULATOR REGISTER be transferred to the specified location in MEMORY; this is done in two steps:

$$ACC \longrightarrow SDR$$
$$SDR \longrightarrow SR.$$

The problem has now been solved. And while it looks like a lot of work, it should be noted that many of the register transfers used above can be incorporated, in some computers, in one instruction. This greatly simplifies the process of writing a program, though the computer must still go through all of the operations we performed in this example.

(Continued on page 90)

K5BA supplies us with a bit of nostalgic info on a term we all use and tend to take for granted.

The Metamorphosis Of CQ

BY NORRIS K. MAXWELL*, K5BA

Before the invention of radio, English railway telegraph operators used the procedure signal "CQ" as a general call to attract the attention of all stations along the line. "CQ" was used to precede notices of general importance, disasters, and the daily time signal at 10:00 a.m.

The Marconi Company recruited many of its operators from the telegraph services and the practices and customs of telegraph passed into radio. The original meaning of "CQ" was "Stop sending and listen." The early radio operators needed a more distinctive signal for distress calls, so the letter "D" was added to "CQ" to indicate "danger" or "distress."

In the popular literature of the time writers said this signal meant "Come Quick Danger." Actually "CQD" meant nothing nor does the present distress signal "SOS" have any meaning. Both signals were adopted because they were easily recognized and remembered.

In December of 1898, the English Lightship Service established wireless communications between East Goodwin Sands Lightship and the South Foreland Lighthouse in Dover, 12 miles away. The first radio distress message in history was sent that same month when the lightship reported a steamer aground on Goodwin Shoals. The lightship used the radio to call for help on March 3, 1899 when the lightship was rammed by a freighter.

The Marconi Company and Lloyds signed a 14 year contract in 1901 which agreed that ship-to-shore wireless service would be provided by Marconi. Operators and equipment both ashore and aboard ship were to be furnished by the Marconi Company. The contract required that Marconi stations could communicate only with other Marconi stations and operators. This agreement gave the Marconi Company a virtual monopoly in the ship-to-shore communications service.

In June of 1903 the Hamburg-America Line steamer *Deutschland* got stuck in the mud of lower New York Bay and was unable to proceed for 24 hours. The ship attempted to call for assistance using its German manufactured equipment. She was unable to communicate with the Marconi Company ashore. After this incident the Hamburg-America Line announced that their ships would be equipped with Marconi wireless stations.

Later in 1903, Prince Henry of Prussia visited the United States. The Kronprinz traveled on a German ship equipped with a Marconi Company station. The royal visitor was able to arrange the details of his visit by radio prior to his arrival in New York. On the return trip he traveled on a different ship carrying German equipment and operators. The Marconi station on the island of Wright refused to accept messages addressed to Henry's brother, Kaiser Wilhelm II. Upon his arrival in Berlin, Prince Henry no doubt discussed his communications problems, and the German government invited the principal maritime powers of the world to the first international conference on radio which met in Berlin in August of 1903.

The first item on the agenda of the "Preliminary Conference on Wireless Telegraph" proposed that ". . . coast stations are bound to receive and transmit telegrams from, or destined to, ships at sea without distinction of the system of wireless telegraph employed."

The British did not approve of the proposal because of the existing contract between the Marconi Company and Lloyds. The Italians voted against the suggestion because of close national ties with the Company. Other participants at the conference approved the agenda article which questioned the single wireless system.

The Italian delegate suggested uniform radio procedures to facilitate international communications. He recommended that the Conference adopt "SSS DDD" as a distress signal. The British favored "CQD". The Germans wanted "SOE". The Conference adjourned without agreeing on a standard international radio distress signal.

The first "CQD" from an American ship was sent by Ludwig Arnson aboard the Red Star liner *Kroonland* bound from Antwerp to New York. On December 7, 1903 in the North Sea heavy seas broke the tiller. The ship was able to steer using her engines and turned back to Ireland. The radio operator established communications with the Marconi station on Cape Clear 130 miles away.

Convenience to passengers caused more favorable comment than the more serious distress signal and ship's business. The *London Times* reported, "Saloon passengers speak in highest terms of praise of the utility of the Marconi wireless with which the passengers were able to communicate with friends in England, Scotland, and the Continent and even America and get replies before the Irish coast was sighted."

The Marconi Company officially adopted "CQD" as a radio distress signal in January 1904. The Second Berlin Conference on Wireless Telegraph met in 1906 and agreed that "SOS" should be the international distress signal, but "CQD" was heard for several more years. When the *Republic* was rammed by the *Florida* in 1909 Jack Binns sent "CQD" to get help. When the unsinkable *Titanic* went down in April of 1912, radio operators John Phillips and Harold Bride sent both "CQD" and "SOS."

In modern radio practice "CQ" retains its original meaning, "A general call to all stations." Ships in the maritime service send "CQ" before transmitting weather reports, traffic lists, or press. In the amateur service "CQ" is an invitation for other amateurs to answer. Radio communication is a comparatively recent development, but "CQ" is older than radio. ■

*623 Ute Drive, Stillwater, OK 74074

Harry Bourne comes through again with another simple antenna design that will add to your enjoyment of amateur radio.

A MINIATURE QUAD LOOP ANTENNA FOR 15/20 METERS

BY HARRY K. BOURNE*, ZL10I

Amateurs living in suburban areas with a small space around the house, often obstructed by trees or by an overhead power line, with insufficient space for the erection of a full size Yagi or quad antenna, may obtain quite good DX results with a single element quad of reduced size. This antenna is very light in weight, has little wind resistance, is inexpensive to build and uses easily available materials. It may be erected by one person without assistance, is much less obtrusive than a normal quad and is suitable for use when height and space are limited.

The quad loop is an efficient radiator and has useful directional properties. The theoretical gain over a dipole is about 2 dB, but in practice, especially on reception, the effective gain often exceeds this. With its low angle of radiation, even at a low mounting height, the loop can give good DX performance. At ZL10I, good results have been

*54 Whitehaven Road, Glendowie, Auckland 5, New Zealand

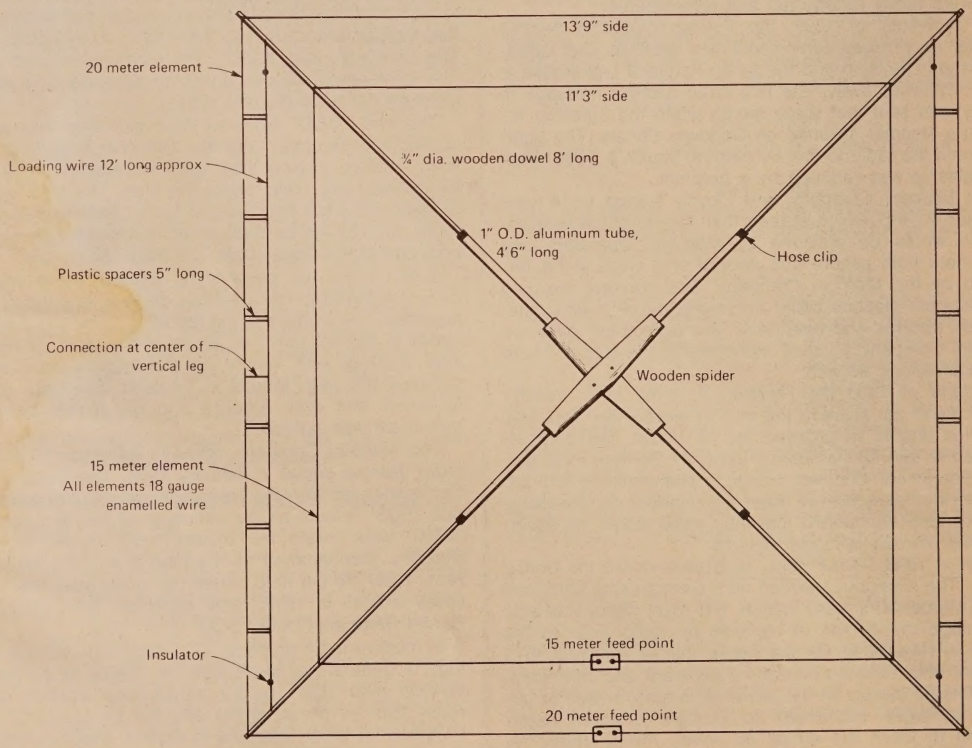


Fig. 1—The miniature 15/20 meter quad loop antenna.

obtained with the center of the quad loop 30 feet above the ground, a height insufficient for the best operation of a dipole or Yagi antenna on 20 meters.

The quad loop is bidirectional, with two broad lobes of radiation in directions perpendicular to the plane of the antenna, towards the front and the back, with strong nuls of over 20 dB on each side. The antenna is a relatively quiet performer and often provides good reception in locations subject to line noise and other man-made interference. As the directional pattern is broad, aiming of the antenna is not critical, and with rotation through only 90 degrees providing complete coverage in all directions, no elaborate turning mechanism is required. At ZL1OI the antenna is mounted on a tubular aluminum mast which may be rotated by hand, generally into one of two set positions, one facing Northeast for working into North America and the other at right angles to this for Europe.

The arrangement and dimensions for a quad loop for 20 and 15 meters are shown in fig. 1. The 20 meter element is less than the normal size with capacity loading by two loading wires with their mid points connected to the centers of the vertical legs and spaced from them by about 5 ins. This method of linear loading is well known and was described some years ago by G3FPQ in *QST* magazine and more recently by G3MWV and G6XN in *Radio Communication*. This method of loading enables the sides of the 20 meter element to be shortened with very little loss of efficiency.

The 15 meter element is full size and is mounted inside the 20 meter loop. Each loop is fed through a quarter wave matching section of 70 ohm coaxial cable to improve the match to a 50 ohm feeder. The length of the matching section is trimmed to give resonance at the lower end of each band with a grid dip oscillator coupled to one end of the matching section which is shortcircuited by a small loop. Connections are shown in fig. 2.

A quad loop has a fairly low Q and will cover the whole 20 or 15 meter band but for maximum efficiency the elements may be trimmed to resonate at the desired frequency of operation with a grid dip oscillator coupled to a one or two turn coil connected across the feed point with the feeder removed. The antenna may be trimmed in a position about 10 feet above the ground but an allowance must be made for a small increase in resonant frequency when it is raised into the operating position. This may be done by measuring the s.w.r. in the two positions of the antenna. The final length of the loading wires will depend on their spacing from the vertical legs of the loop and the amount of metal in the support arms. The 15 meter element is trimmed in the normal way. Balanced operation may be obtained by feeding the antenna through a balun between the matching section and the 50 ohm coaxial feeder. No noticeable improvement by using the balun has been observed at ZL1OI so in this case no balun is used.

Constructional details of the antenna are shown in figs. 1 and 2. A wooden spider supports the arms carrying the elements. The arms are varnished wooden dowels which fit into aluminum tubes bolted to the spider as shown. The loops are of 18 gauge enamelled wire threaded through screw eyes in the wooden dowels.

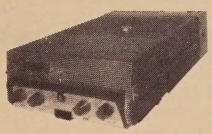
This antenna has been in use at ZL1OI for a considerable time and has been compared by switch-over tests with a trapped vertical antenna with radials mounted on a 20 foot high pole. On the average, the quad loop gives signals about one S point stronger on transmission, and often more than this on reception. Reception is markedly better than on the vertical antenna as the directional properties of the quad minimize QRM from the sides, and the antenna is much less susceptible to noise pickup. Signals which are unreadable in a background of noise with the vertical antenna may often be copied easily with the quad loop.

The antenna will operate on 28 MHz but in this case the angle of radiation is higher and DX results are not as good. Better results could be obtained by adding a 10 meter loop inside the 15 meter loop for tri-band operation.

It is hoped that this article may be of assistance to those who are unable or unwilling to erect a full size quad or Yagi with reflector, and yet wish to obtain results noticeably better than those from a vertical or dipole antenna. ■

GREGORY ELECTRONICS
The FM Used Equipment People.

G.E. T.P.L. SPECIAL



FE53JA6, FRONT MOUNT, 150-170 MHz, 12 volt, 35 watts, fully solid state receiver, 4 tubes in transmitter, sold LESS accessories, not bench tested

(early model) $35.00

master charge
BANKAMERICARD

GREGORY ELECTRONICS CORP.
243 Rt. 46, Saddle Brook, N.J. 07662
Phone: (201) 489-9000

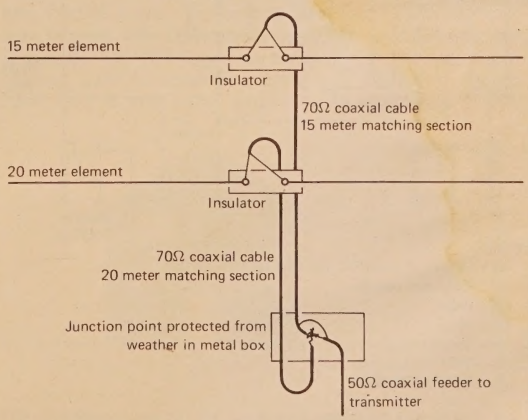


Fig. 2—Arrangement of connections to the loops.

Want to keep r.f. out of the shack and out in the air where it belongs? Read the following article and start to clean up your "act".

What To Do About R.F. In The Shack

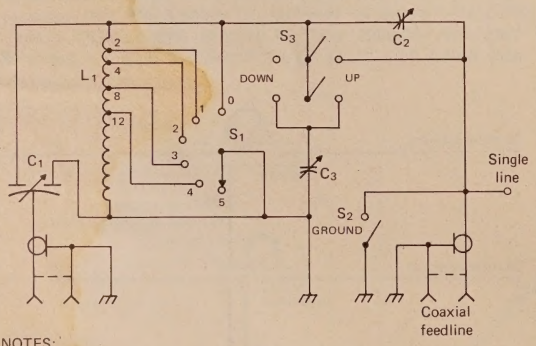
BY PHILIP R. EWALD*, W4EWR AND STEVEN R. EWALD*, WA4CMS

In olden days, all band antenna coverage was readily obtained using tuned feeder antennas such as the Zepp, or a single piece of wire. Both leaked r.f. into the shack, the first a little, and the second sometimes a lot. Nowadays, the watchword is to standardize r.f. feed into 50 ohm coax and then send it away to the high radiator. This takes care of r.f. in the shack. Unfortunately for the all-band amateur, the consequence of using coax is either a forest of antennas cut for different frequencies or some tricky arrangements which usually lead to problems at some points of the spectrum.

The alternative is to go back to the tuned feeder system, this time using a matchbox for the 50 ohm transmitter output, or, we can take one small step back for hamkind and return to the single wire which is easy to hang out of 2nd story windows, apartments, condominiums and field day camps. It will work if we can find a suitable match box and can cope with r.f. in the shack. Operationally, perhaps the simplest boxes are of the differential capacitor input, tapped coil/series capacitor output type. Unfortunately, they work well only at lower antenna impedances such as are encountered in feeding beams. The single wire impedance can go mighty high, and the simplicity of these boxes precludes adjustment for r.f. feedback problems. This was promptly verified for the above box when a 50-watt linear was hung onto the 5-watt QRPp rig. On several bands, as soon as the s.w.r. was reduced towards unity, the signal became mushy, sometimes the linear would oscillate, and finally the power supply overload would kick off, indicating positive feedback into the rig. One solution would have been to install an all band, 50-watt phase shifter to introduce more negative feedback. How this shifter could be built though is not clear. Another alternative would have been to embark on an extensive shielding program.

Then the light dawned. Why not make good use of the adversity by letting the rig overload problem be an indicator of positive feedback and simply tune out the offending phase? Adjustment for minimum s.w.r. would be made as usual.

*949 Ponder Rd., Knoxville, TN 37919



NOTES:
L_1 = 24 turn, 2" dia. 6TPI, No. 12. Tapped as shown
C_1 = 150pf each section
C_2 = 150pf
C_3 = 250pf
S_1 = Ceramic receiving type. 6 positions
S_2 = SPST knife switch
S_3 = DPDT knife switch

Fig. 1—Circuit diagram for the match box described in the text.



The match box is shown as an integral part of this fine QRPp station. The large knobs on the match box help to make fine adjustments.

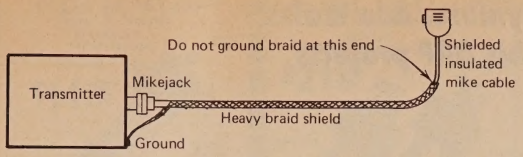


Fig. 2—Shielding of the microphone cord to avoid "hot mike" or an additional source of r.f. in the shack.

Construction

Revision of the match box is easily accomplished by adding one variable capacitor and one d.p.d.t knife switch to offer as wide a range of series or parallel reactance as will be needed. Fig. 1 shows the new capacitor, C_3, which is parallel with the inductance. When the new switch S_3 is open, C_3 is disconnected and the box is back to the original state. When S_3 is closed, series antenna capacitor C_2 is in or out depending on switch position.

Other points should be noted. The inductance L_1 has been tapped non-linearly to give a wide range with 5 switch positions. Both sides of the tap switch, S_1, are paralleled to increase current carrying ability. The mike cord, which can act as an antenna, has been covered with heavy braid to avoid a "hot mike" as noted in fig. 2. The front panel has been strapped down to ground to eliminate body capacity. The strap is tied to all possible

Band	S_1	S_3	C_1	C_2	C_3
80	5	up	90	—	20
40	4	open	30	½	—
20	2	up	48	—	37
15	1	down	55	full	35
10	1	up	52	—	50

Table I—Workable settings for the match box.

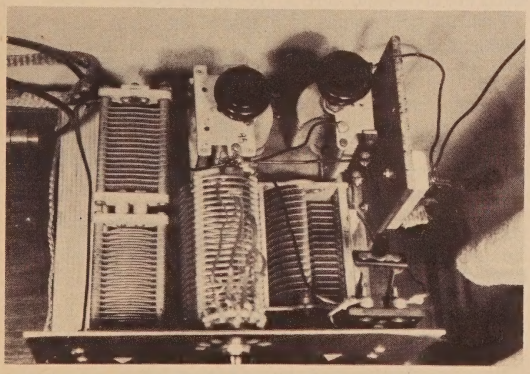
metal in the area such as rig chassis, shelving, air ducts, and a cold water pipe to bring up the effective ground to the shack as shown in fig. 3.

Operation

The positions of C_1 and C_3 are critical and must be set by trial and error to those values where the s.w.r. is unity without kicking off the transmitter, hence the big dials. It should be noted that several combinations of C_1, C_3, L_1 and the transmitter loading control may give unity s.w.r., but only those resulting in a clean signal can be used. The series capacitor, C_2, is not critical and can be set to the nearest quarter of full capacity. An example of settings found to be workable is given in Table I.

Operation on all bands is now a simple and reliable procedure. The jr. author has worked a number of countries on several continents, and now anticipates that the only antenna improvement needed will be to open S_3 and hang on a beam for the high bands.

The authors wish to apologize for not trying out the antenna on 160, such gear was not on hand. It should be noted that for operation on 80, when the antenna was less than ¼ wave, *i.e.* about 60 feet long, a loading coil was needed with consequent reduction of efficiency. Inferentially, for 160 it would be advisable to make the antenna over ¼ wave long, as should be done for any band, and to add more inductance to L_1. ■



Interior view of the match box.

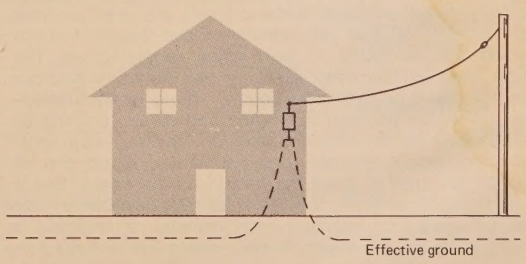


Fig. 3—Strapping all the exposed metal in the shack together and to ground brings the effective ground to the shack.

MORSE CODE COURSES

INCLUDES SPECIAL PREP FOR THE NEW COMPREHENSIVE CODE EXAM

Specially Designed for Beginners

OUR 2 NOVICE COURSES TAKE YOU FROM DAY 1 (NO KNOWLEDGE OF ANY CODE) THRU 6 OR 8 WORDS PER MINUTE

NO CLASSES-LEARN AT HOME

OUR NEW METHOD SUCCESSFULLY USED BY PEOPLE FROM 10 THRU 65 YEARS OLD. PLENTY OF PRACTICE MATERIAL, OUR 6 & 7 CASSETTE METHODS SUCCEED WHERE 1 & 2 FAIL.

INCLUDES EXCLUSIVE NOVICE TRAINING SCHEDULE ALL REFERENCE MATERIALS, CHECKING SHEETS TO VERIFY ACCURACY, INFO ON OTHER HAM LICENSE REQUIREMENTS.

STANDARD 2 TRACK MONAURAL CASSETTES PROVIDE 60 MINUTES EACH OF SCIENTIFICALLY PREPARED CODE PRACTICE (LETTERS, NUMBERS, PUNCTUATION, CODE GROUPS, WORDS) CASSETTES ARE DESIGNED TO MINIMIZE LEARNING PLATEAUS, EMPHASIZE NEW MATERIAL.

SET 1 0-6 WPM (Novice License)	6 CASSETTES	$15.95
SET 2 0-8 WPM (Novice License)	7 CASSETTES	17.95
SET 3 7-14 WPM (Gen. Cl. License)	3 CASSETTES	8.95
First class postage and handling required per CASSETTE		0.40

SPECIALISTS-- OUR ONLY PRODUCTS ARE TAPE COURSES

THE HERRMAN CO.
DEPT F, BOX 1101, LARGO, FLA. 33540

CLUBS - GROUPS ANY 10 OR MORE SETS
10% OFF + 25¢ PER CASSETTE 1st CL. POST & HNDLG.

No need to put off those pc projects anymore. Ade Weiss shows you how to get a head start on his QRP projects as well as starting some of your own.

Easy PC Board Fabrication Using Address Labels

BY ADRIAN WEISS*, K8EEG/Ø

Nearly all circuits appearing in the literature currently are solid-state and require the use of a well-designed p.c. board for proper operation. Often a p.c. board design accompanies the circuit, but at times, the experimenter must design his own board for a specific circuit. Quite a few newcomers and old timers alike shy away from attempting such project because of the need for fabricating a p.c. board. This is very unfortunate, because p.c. board fabrication is a lot easier than making mashed potatoes, if you know how to go about the job! In this article a quite simple method of producing professional quality p.c. boards by using readily available addrss labels will be described, and hopefully, will enable many of you to give solid-state gear a try.

Materials

Production of a p.c. board requires relatively few items. All are available at Radio Shack, local electronics parts stores, and from numerous firms advertising in the amateur mags. First, copper-clad printed circuit board is the basic item, and comes in a multitude of thicknesses and dialectrics, as well as single-sided and double-sided types. Just about any board material will do, but some cheaper epoxy composite laminate types do poorly when repeated soldering of a given copper foil is necessary. Glass epoxy boards are superior. Second, ferric chloride etching solution is used to etch away the unwanted copper foil from the p.c. board. Here again, any etchant will do. Third, self-adhesive address labels are used to mask the copper foil that will remain on the board. Address labels can be found in most office supply stores. The type used by this writer is Avery Self-Adhesive Address Labels "No Lick-Stick at a Touch". There is no substantial difference between this brand and others, as long as the label is backed with an adhesive. Finally, several tools are required. A straight-edge and sharp tipped pen or pencil are used to draw the design on the board, and a sharp-tipped penknife, X-acto® knife, or single-blade razor to cut away the unwanted label material. A hacksaw is needed to cut the board to size, and a file is helpful in smoothing edges. Steel wool polishes the board and removes label adhesive. Depending upon the type of project, small drills may be needed: a #60 bit produces proper size holes for most component leads, and can be found in most well-stocked hobby stores. Some larger components will require the use of a 1/32″ and 1/16″ bit.

*83 Suburban Estates, Vermillion, SD 57069

Board Layout Design

The most tedious aspect of p.c. board fabrication is designing the layout of the components, for it requires considerable trial and error in order to produce a neat and compact layout. The use of self-adhesive address labels simplifies the trial-error process considerably, since component positions can be penciled directly onto the labels, erased, rearranged etc. until a satisfactory layout is achieved. The place to begin is with a close study of the circuit schematic accompanied by an attempt to visualize circuit component sizes and possible locations on a board. Usually the published schematic will suggest a logic for the board layout, with the common B+ supply line across the top of the page, and all ground points across the bottom of the schematic. At times, *QST* departs from this simple two-sided approach and runs the B+ across the bottom of the schematic with a resultant loss of clarity. In such a case, redraw the schematic with the B+ line at the top. Some hints follow which will help in translating the schematic logic to p.c. board logic.

First, all connections to a single line on a schematic represent a single pad on a p.c. board, no matter how long the schematic line may be. We will use the 7 MHz Seiler v.f.o. or fig. 1 as a board layout design example. Notice that the B+ line runs across the top of the entire schematic. On the p.c. board, the B+ pad can be made as small as will accommodate the leads connected to it, or it can be extended to points convenient to component placement. A glance at the accompanying photos will show that the B+ pad actually is quite different from the schematic straight-line, and reaches to the components, rather than the components reaching to it. Or again, note the common connection of C2, 47K, D1, C3, and G-Q1. In this case, component placement required no stretching of the common pad, it is simply a rectangle in the center of the board.

This v.f.o. design is discussed in detail in an earlier issue of CQ (December 1977, page 88).

THE BIG SIGNAL

UNADILLA "W2AU" BALUN

$14.95

HANG-UP HOOK

S/S HARDWARE

BUILT-IN LIGHTNING ARRESTER

SILVER PLATED SO-239

FULLY ENCLOSED

*UNADILLA ORIGINATED!

World Famous Among Hams Armed Forces Communications Industry. Why?
- Each BALUN 2KW PEP tested
- Lightning Arrester
- 600# Pull — No Insulator Needed
- Only 7 oz. and 6" x 1¼" diameter
- Reduces TVI
- Improves F/B ratios
- Weatherproof
- Complete Instructions
- Antenna Length Table

DEALERS WANTED—NOW OVER 200 WORLD-WIDE

THE OLD RELIABLE ™

REYCO "W2VS" ANTENNA COILS

$21.95 pair

ALUM/POLY CAPACITOR

WEATHERIZED COIL

KW – 40 – 20 – 15 – 10

MACHINE-GROOVED POLY COIL FORM

*FREQUENCY-MATCHED PAIRS!

Turns Your Antenna Into A Multi-Band! Professionals Demand Reyco! Why?
- Precision Machined
- Frequency-Matched Pairs
- Only 8 oz. and 5½" x 1¼" diameter
- Rugged – Over 300# Pull
- Weatherized
- Models for 10, 15, 20, 40 Meters
- Complete Instructions
- Multi-Band Length/Tuning Data

the indispensable BIRD 43 THRULINE WATTMETER



Power Range	Frequency Bands (MHz) 2-30	25-60	100-250	200-500	400-1000
5 watts	—	5A	5C	5D	5E
10 watts	—	10A	10C	10D	10E
25 watts	—	25A	25C	25D	25E
50 watts	50H	50A	50C	50D	50E
100 watts	100H	100A	100C	100D	100E
250 watts	250H	250A	250C	250D	250E
500 watts	500H	500A	500C	500D	500E
1000 watts	1000H	1000A	1000C	1000D	1000E
2500 watts	2500H				
5000 watts	5000H				

MODEL	PRICE
43	$120
Elements (Table 1) 2-30 MHz	42
Elements (Table 1) 25-1000 MHz	36
Carrying case for Model 43 & 6 elements	26
Carrying case for 12 elements	16

Read RF Watts Directly. (Specifiy Type N or SO239 connectors)

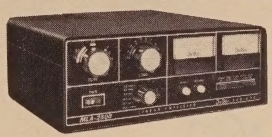
0.45-2300 MHz, 1-10,000 watts ±5%, Low Insertion VSWR — 1.05. Unequalled economy and flexibility: Buy only the element(s) covering your present frequency and power needs, add extra ranges later if your requirements expand.



BOMAR TWO METERS

Crystal Company
Motorola HT 220 Crystals in Stock!
Novice Crystals (Specify Band Only)

In Stock: Standard / Icom / Heathkit / Ken / Clegg / Regency / Wilson / VHF Eng. / Drake — and others! $4.50 @ Lifetime Guarantee; indicate make/model, xmit. frequency, rec. frequency.



DenTron MLA-2500 $799.50

DenTron Radio has packed all the features a linear amplifier should have into their new MLA-2500. Any Ham who works it can tell you the MLA-2500 really was built to make amateur radio more fun.

- ALC circuit to prevent overloading
- 160 thru 10 meters
- 1000 watts DC input on CW, RTTY or SSTV Continuous Duty
- Variable forced air cooling system
- Self-contained continuous duty power supply
- Two EIMAC 8875 external anode ceramic/metal triodes operating in grounded grid
- Covers MARS frequencies without modifications
- 50 ohm input and output impedance
- Built-in RF wattmeter
- 117V or 234V AC 50-60 hz
- Third order distortion down at least 30 db
- Frequency range:
  1.8MHz (1.8-2.5) 3.5MHz (3.4-4.6)
  7MHz (6.0-9.0) 14MHz (11.0-16.0)
  21MHz (16.0-22.0) 28MHz (28.0-30.0)
- 40 watts drive for 1 KW DC input
- Rack mounting kit available (19" rack)
- Size: 5½" H x 14" W x 14" D Wt. 47 lbs.

Why Waste Watts? SWR-1A $25.95



SWAN ELECTRONICS
A subsidiary of Cubic Corporation

SWR-1 guards against power loss! If you're not pumping out all the power you're paying for, our little SWR-1 combination power meter and SWR bridge will tell you so. You read forward and reflected power simultaneously, up to 1000 watts RF and 1:1 to infinity VSWR at 3.5 to 150 MHz.

Got it all tuned up? Keep it that way with SWR-1. You can leave it right in your antenna circuit.

Pipo Communications TROUBLE FREE TOUCH-TONE ENCODER

POSITIVE TOUCH (KEYS DEPRESS) ● MOBILE ● HANDHELD
DESK MOUNT ● NO POTTED PARTS (SERVICEABLE)
MIL. SPEC. COMPONENTS ● NO RFI ● SELF CONTAINED
XTAL CONTROLLED ● LEVEL ADJUSTABLE FROM FRONT
Pat. Pend.



PP-1

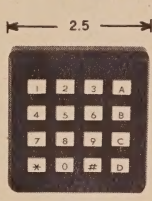
M series is for mounting to surfaces inaccessable from the rear, walls - mobiles - systems interface panels - test equipment, etc.

K series is self contained with a relay inside the encoder. When Keys are pressed contact closer occurs with a 2 sec. delay, (adjustable). Contacts are rated at 110ma @ 28 Volts switched, 500ma carry. PP-2K contains delay exclusion for the forth column. However, by jumpering D-5, 4th column delay is restored.

Pipo Communications has developed a trouble free reliable instrument to be free of any defects for years. Unit is constructed with the best components available, without compromise in quality. Unit is operable from 4.5 - 60 Volts at temperatures from below 0 to + 140°F. Output level will drive any transmitter or system. Adjustable output level is controlled with an extremely stable multiturn trimpot, with access from the front of the encoder (not behind), saving time for level setting, which amounts to hours when involved with a system.

PP-1	$55	12 Keys	PP-2	$58	16 Keys
PP-1m	$55	(Lettering Optional)	PP-2m	$58	(Lettering Optional)
PP-1K	$66	Add $1.00	PP-2K	$69	Add $1.00

PP-1A $68 For Standard Comm. Hand Held



PP-2

TRIPLETT



- General Multi-purpose V-O-Ms
- Drop Resistant
- Hand Size
- Model 310 V-O-M
- Type 3

1. **Drop-resistant, hand-size V-O-M with high-impact thermoplastic case.**
2. **20,000 Ohms per volt DC and 5,000 Ohms per volt AC; diode overload protection with fused Rx1 Ohms range.**
3. **Single range switch; direct reading AC Amp range to facilitate clamp-on AC Ammeter usage.**

RANGES

DC Volts: 0-3-12-60-300,1,200 (20,000 Ohms per Volt).
AC Volts: 0-3-12-60-300-1,200 (5,000 Ohms per Volt).
Ohms: 0-20k-200k-2M Ω -20M Ω (200 Ohm center scale on low range).
DC Microamperes: 0-600 at 250 mV.
DC Milliamperes: 0-6-60-600 at 250 mV.
Accuracy: ± 3% DC; ± 4% AC; (full scale).
Scale Length: 2-1/8".
Meter: Self-shielded; diode overload protected; spring backed jewels.
Case: Molded, black, high impact thermoplastic with slide latch cover for access to batteries and fuse, 2-3/4" w x 1-5/16" d x 4-1/4" h.
Batteries: NEDA 15V 220 (1), 1½V 910F (1): Complete with 42" leads, alligator clips, batteries and instruction manual. Shpg. Wt. 2 lbs.
Model 310 Cat. No. 3018 ..... $53.00

sample page!*

TUFTS

Radio Electronics
209 Mystic Avenue
Medford MA 02155
(617) 395-8280

FREE Gift With Every Order!

Name _____ Call _____
Address _____
City _____ State _____ Zip _____
Order: _____

□ Check enclosed □ Visa □ Master Charge □ American Express
Credit card # _____
Signature _____ Card expiration date _____

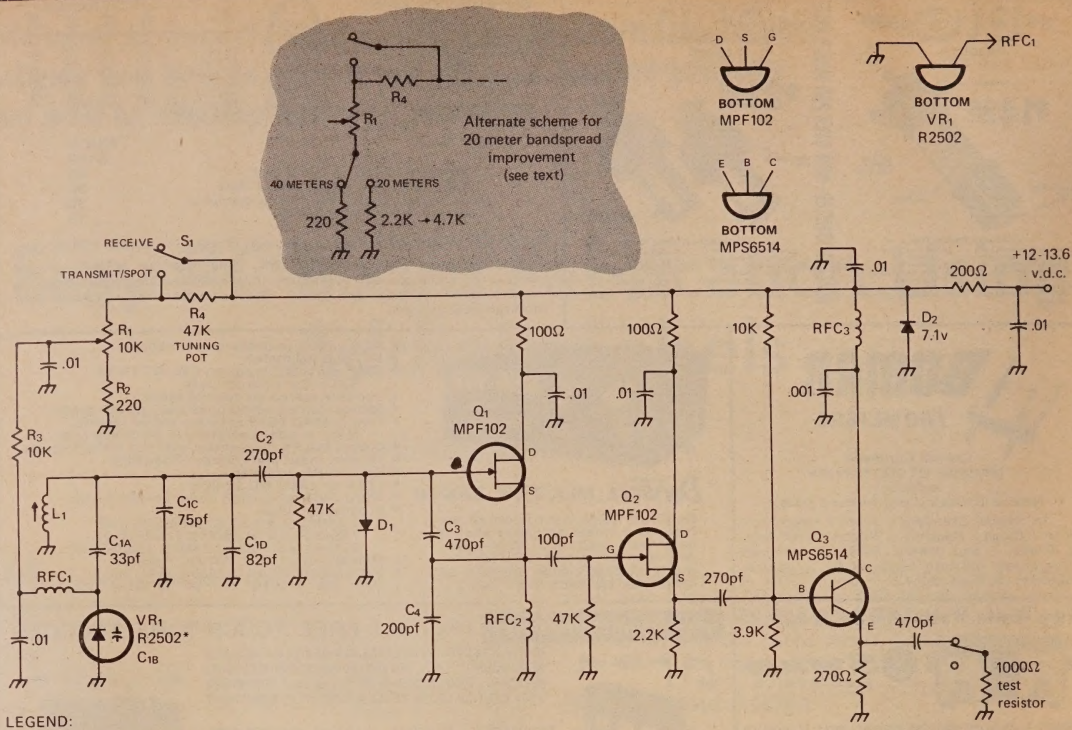
Dealer Programs NOW Available

Master Charge
American Express
Visa

Prices FOB Medford MA. MA residents add 5% sales tax. **Minimum $3.00 for shipping & handling on all orders.**

C

*Sample page from our very large mail order catalog, free for the asking!
(We also have a dealer program now available.)*



LEGEND:

L_1 = 17t No.24,.281" x .750" slug tuned form (J.W. Miller 23A014—3, green dot)
VR_1 = Motorola R2502/MV2105, 15pf varactor diode or HEP R2502
RFC_1 = 25t No. 28, Amidon FB-43-801 "jumbo bead" (or 100μh, Miller 4632-E)
RFC_2 = 14t No. 28, Amidon FB-43-801
RFC_3 = 22t No.28, Amidon FB-43-801
D_1 = 1N456, 1N914 or similar switching diode
D_2 = 6.8/9.1v. Zener, 1N4736/1N4739 or 1N757
R_1 = 10K linear taper potentiometer
Capacitors in pf are polystyrene type

Fig. 1—The 7 MHz Seiler v.f.o. circuit. Capacitors in pf are polystyrene type.

Second, components can bridge pads or foil leads. In laying out the board, all leads and foils should be kept as short as possible in r.f. circuits. At times, this is best accomplished by running a foil under the belly of a component, rather than around it. For example, in fig. 1, it was desirable to ground C4/RFC2 at the same point as L1/C1a-d. This would have been difficult in view of the fact that the 47K/D1 gate components would be in the way. So, C4/RFC2 were located in the desired position, and the foil connecting them to the source of Q1 positioned under the 47K/D1 gate components.

Third, attempt to extend the ground foil as close to the top of the board as possible. This simplifies grounding bypass capacitors associated with the B+ side of the circuit. As can be seen in the accompanying photos, most of the copper ground foil remains on the board, and only a small portion of the total foil area is etched away. This requires less etchant solution than the removal of most of the foil.

Further hints on board layout can be found in the series "Getting the Thing To Work, Parts II-VI" (*CQ*, March, April, May, July, 1976).

Once the circuit has been studied, work on the board can begin, and follow these steps.

1. **Cover the p.c. board with address labels.** Estimate the amount of area that the circuit will require, and cover with labels. Take care that there is a small overlap along the edges of continguous labels, and that the overlapping label is firmly attached to the foil along its edge. The back edge of a knifeblade can be run along the seam to insure good contact with the foil. It is more convenient to use large size labels rather than the small ones shown in the photo, since four of these were required to cover an area that a single large label would have covered.

2. **Roughly sketch pad positions on the labels.** This step requires fitting actual-size parts into place on the board, as is illustrated in fig. 2. As each part is added to the growing design, its exact connection point is marked on the board, and its schematic symbol drawn between the connection points. Inevitably, some erasing and rearranging will be required. As each complete set of common connections are added to the board, such as those at the regulated end of the B+ line, a pad can be roughly sketched onto the board. The product of this step is shown in fig. 3, with all the pads sketched in, connection points marked, and schematic symbols drawn in.

3. **Outline the pads.** Once a satisfactory layout is produced, a straight-edge and sharp tipped pencil are used to first accurately outline the pads, as seen in fig. 4. Next, outline the ground foil, leaving about 1/16" clearance between it and the pads, as shown in fig. 5.

4. **Expose the unwanted foil by removing excess label material.** The purpose of this step is to carefully cut away

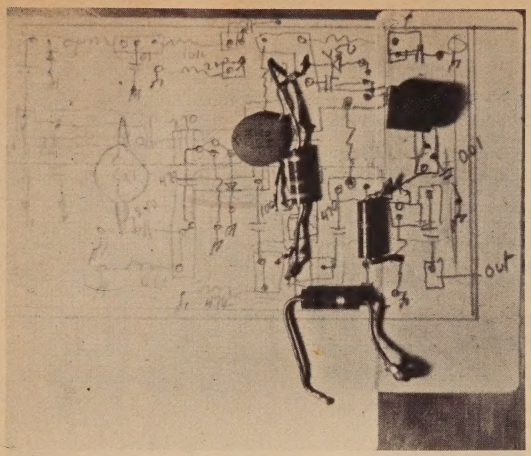


Fig. 2—P.c. board stock has been covered with address label material, with seams firmly rubbed down to insure good contact along edges with the copper foil. Actual size parts have been laid out on the board and connection spots marked, with schematic symbols of parts drawn on in pencil.

the label material which is neither part of the pads nor the ground foil. A sharp tipped penknife or other instrument is necessary. Carefully place the straight-edge along the line to be cut, and run the sharp tip along it. It is more convenient to first cut all edges running horizontally along the board, and then do the vertical edges. Once all edges have been cut, use the tip of the knife to raise the ends of the unwanted label strips, and peel them away. The knife tip can be worked under the unwanted strip material along its length if necessary for removal. Fig. 6 shows the board with unwanted copper foil exposed and ready for etching.

5. **Cut the board to size.** Use a sharp hack-saw and carefully cut the board to the desired size. File away burrs along the edges.

6. **Etch until unwanted foil is removed.** Etching is perhaps the simplest part of this process. The only precaution to follow is never to use metal containers for the etching process. Also, the etchant can stain most materials, so avoid splashing, etc. A small plastic drawer from the standard bench-top cabinet works well as an etchant tray, although any container large enough to accommodate the board will do, so long as it is plastic or glass. Etching time varies with the temperature of the solution, and the amount of agitation. Usually etching a board requires about a half-hour, and perhaps twenty minutes if the solution is frequently agitated. When the board is placed in the etchant, the etchant on the exposed sections of copper foil will begin to turn black. This indicates that the foil is being eaten away. The objective of agitating the solution is to remove the blackened etchant away from the exposed copper and move fresh solution to it. After about 15 minutes, the board can be lifted out to check on the progress of etching. When all unwanted foil is removed, wash the board off, and then remove the label materials. The paper will rub right off, but the adhesive backing will remain. This adhesive backing can be removed with steel wool. The remaining copper foil should be bright and shiny. Fig. 7 shows the finished p.c. board. As can be seen, rather exact tolerances are possible with this address label technique. Fig. 8 shows the completed circuit with all parts soldered in place and ready to go.

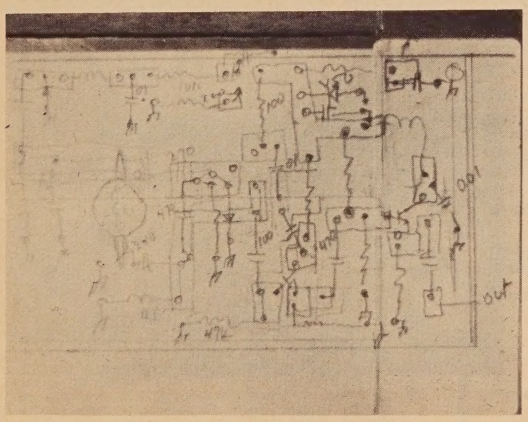


Fig. 3—Board with roughly sketched pads and parts locations.

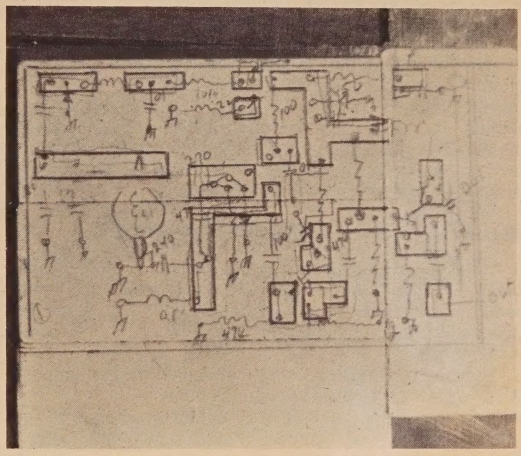


Fig. 4—A straight-edge and sharp tipped pencil are used to outline the pads in final form.

Underside Foil Strip Boards

The example board discussed above uses the "isolated pad" approach which has two major advantages: 1.) no drilling of holes is required, and 2.) components may be very easily removed in a trial-and-error effort at optimizing the circuit. Many projects in the literature provide board designs which require etching away the underside foil to create connecting foil strips, with holes drilled through, and components mounted on the top side of the board. The address label approach applies equally well to this type of board. Two variations in technique should be noted for it though. First, the holes for component leads must be marked accurately during layout design. Hole marks can initially consist simply of an "x", and when final lining is being done, the holes can be drilled out before the excess label material is cut away. Or, a sharp point stylus or nail can be used to lightly punch an impression in the copper foil underlying the label material if the experimenter desires to put drilling off until the board is etched. Secondly, published board designs often show foil strips with curved edges. Naturally, it is a more tedious task to cut away

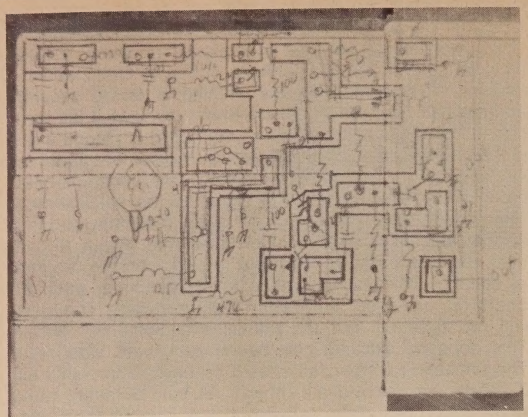


Fig. 5—The ground foil outline is penciled in around the pads. About 1/16-inch clearance between pads and ground foil remains. The label material between pads and ground foil will be removed to permit etching of exposed copper.

excess label material from curved foil strips than from straight strips. The experimenter can choose to convert the curved strips to ones exhibiting 90 degree turns if he wishes. Or, the use of a French Curve ruler will greatly simplify the task. These are available in most office and art supply stores. Otherwise, the process is the same as outlined above for isolated pad boards.

Working From Published Template

A majority of published circuits include a full-sized p.c. board template. This makes the experimenter's task much simpler, eliminating board layout design, and steps 2-3 above. To use a published p.c. board template, the following steps apply.

1. Cut the p.c. stock to the size specified by the template.
2. Cover with self-adhesive address labels.
3. Trace, xerox, or cut out the published p.c. board design, and tape firmly over the address label side of the board.
4. Drill holes as specified by the template.
5. Cut away excess template and address label material, leaving exposed the copper foil to be removed.

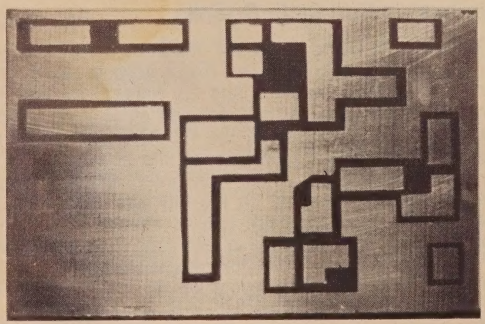


Fig. 7—The finished p.c. board after etching and removal of address label adhesive. Considerable accuracy is possible with this technique, as the address label is backed with an excellent adhesive that permits very sharp edges. The board can be made as neat as time permits.

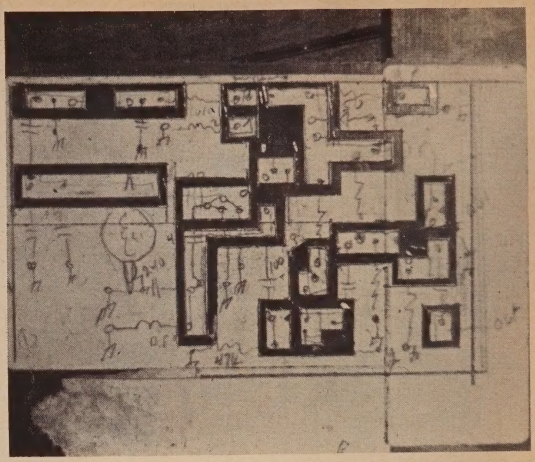


Fig. 6—A straight-edge and sharp tipped knife have been used to cleanly cut away the unwanted label material, leaving exposed the copper foil that is to be removed.

6. Etch as per above.

If a template is available, a finished p.c. board can be produced in a relatively short time.

Conclusion

I hope that the above discussion will help many readers in their first attempt at p.c. board fabrication. I suspect that some experienced homebrewers will want to give the address label approach a try also. They will find the address label material much easier to work with than the usual black tape material, both in terms of adhesive firmness, and the added advantage of being able to layout a board directly on the etch-resist material. Likewise, butt-edge joints with no trace of etching are easily attained with the address label material, where a great deal of care and cutting is necessary for the black tape material. In short, if you haven't done a board yet, drop by your local radio parts jobber, pick up some p.c. stock and etchant, address labels at the office supply store, and get to work on a project. Once the board is completed, the project almost "falls together." The end result is a very sturdy, durable piece of equipment. ■

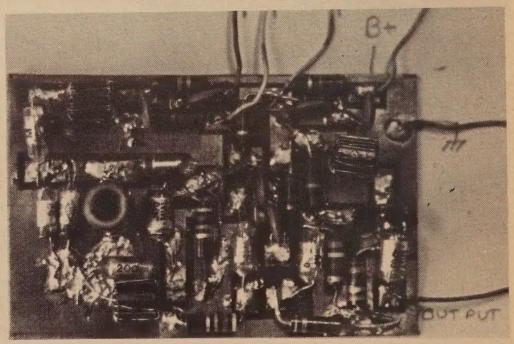


Fig. 8—The finished project with parts soldered in place on the proper pads.

FREE



THE NEW HEATHKIT CATALOG

Send for your copy of the world's largest selection of quality electronic products in easy-to-build, money-saving kit form! Nearly 400 kits in all — all with Heath's world-famous assembly manuals that take you step-by-step from unpacking to final plug-in.

fill in card and mail today

Please rush me my personal copy of the new Heathkit catalog.

I am not on your mailing list.

Name_____

Address_____

City_____ State_____

PC-126 Zip_____

CQ MAGAZINE Dept. 012-390



Send for your

FREE

HEATHKIT CATALOG

Complete descriptions and specifications of nearly 400 electronic kits including:

stereo components; auto, marine and aircraft accessories; digital clocks and weather instruments; Amateur Radio; color TV; personal computers and lots more!

FREE
HEATHKIT
CATALOG

PLACE
STAMP
HERE

The Post Office will not deliver mail without postage

HEATH COMPANY
Benton Harbor MI 49022

FREE

THE BIG NEW HEATHKIT CATALOG

FEATURING AMATEUR RADIO, CW, SSB and QRP TRANSCEIVERS



Every Heathkit product is easy and fun to build, with a comprehensive instruction manual that takes you step-by-step from unpacking the kit to final plug-in. Thousands of people have discovered the satisfaction—and savings—that comes with handcrafting a fine piece of electronics equipment. You can too!

Choose from nearly 400 kits including:
• Amateur Radio Equipment • Hi-Fi • Color TV • Digital Clocks and Weather Instruments • Personal Computers • Auto, Marine and Aircraft Accessories • Test Equipment • Home Improvement • Learn-at-Home Electronics Courses • Lots More!

NEW! Amateur Radio NOVICE COURSE

Get your ticket or your money back!* *If you fail to pass your FCC Novice exam after completing this course, we'll REFUND the money for the course text material.



FREE! Send for your HEATHKIT CATALOG TODAY!

You can get a FREE retail catalog by redeeming this coupon in person at any of the 50 Heathkit Electronic Centers (Units of Schlumberger Products Corporation) in major markets coast-to-coast, where Heathkit products are sold, displayed and serviced. (Retail prices on some products may be slightly higher.)

Check the white pages of your telephone book.

HEATH
Schlumberger

Heath Company, Dept. 012-390
Benton Harbor, Michigan 49022

Please send me my FREE Heathkit Catalog.
I am not on your mailing list.

Name _____

Address _____

City _____ State _____ Zip _____

CL-647

Hamfesting in Western Ohio

BY BERNIE WELCH*, W8IMZ

Last year's warm months seemed to slip by so quickly for me, as I had the pleasure of attending four of the very best amateur gatherings held in Ohio—or for that matter, anywhere. I was also fortunate in that they were all located within a one-hundred mile driving distance of my home QTH. Each of these Hamfests: Lima, Findlay, Cincinnati or Dayton; had their own special atmosphere and certain unique attractions.

*7735 Redbank Lane, Dayton, Ohio 45424

Dayton

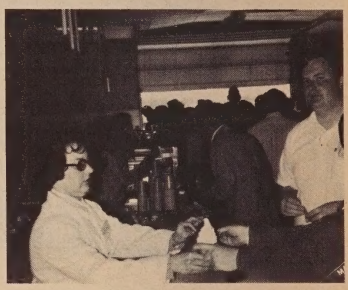
It all began with the Dayton Hamvention, (April 29 thru May 1), at the Hara Arena & Exhibition Center. I was one of about 17,000 to attend the world's largest hamfest. It's difficult to expand on what has already been said and publicized about this giant. Just attending one of the many fine forums would be well worth the price of admission, not to mention the exhibits, awards, hospitality rooms, flea market, prizes and banquets available. Dayton has always had world renowned amateur radio personalities in attendance.



Dayton: Enjoyed chatting with Hamvention Banquet Guest Speaker, Roy Neal, K6DUE (right). He's famous NBC News Correspondent you've probably seen on the network's Nightly News, Today, *and specials. (W8IMZ)*



Dayton and Cincinnati: Jack, K8TUY, Srepco Electronics of Dayton, made it to both hamfests as did some of the other exhibitors.



Dayton: Even amateurs get hungry.



Dayton: How is this for a giant flea market? It's located behind the Hara Arena. (Photo courtesy DARA)



Dayton: A view from the prize booth in the early hours of the Hamvention. (Photo courtesy DARA)



Dayton: Like I said—almost everyone attends the Hamvention.

This affair is sponsored by the Dayton Amateur Radio Assn., Inc., a club of over 500 members. As one Hamvention becomes history, they are already working on the next one.

Findlay

A trip to Findlay was next on the agenda. I arrived at Riverside Park on September 11th, for the 35th Annual Hamfest, sponsored by the Findlay Amateur Radio Club. Riverside is a beautiful city park, with many tall trees, colorful bushes and flowers. It is closed for the season on Labor Day, however the local authorities permitted the Findlay Club to re-open it the following Sunday of each year to hold their family-type hamfest. Commercial exhibitors occupied the open air park buildings; flea market booths lined the sidewalk and paths; and amusement rides, picnic areas, boating and fishing facilities and concession stands offered activities for everyone. Estimated attendance was about 4,000.

Cincinnati

On September 18, I headed south for the Cincinnati Hamfest at Strickers Grove near Ross, Ohio. Their 41st annual event, the oldest hamfest of the four, is sponsored by the Greater Cincinnati Amateur Radio Association. The price of admission covers lunch, supper, coffee, doughnuts, hot dogs, hamburgers, and all the cool beverages, including beer throughout the day. A radio-controlled model airplane show, lasting two hours in mid-afternoon, was thrilling and spectacular. Continuous musical entertainment was provided in the covered eating area. For commercial exhibitions, an enclosed building was used, while the flea market was set up in rows near the parking area. Although the club planned for 4200 persons, the attendance was near 4500.

Lima

The Northwest Ohio Amateur Radio Club held their third annual event, on October 9th at the Allen County Fairgrounds on the outskirts of Lima. On such a windy and rainy day, I had doubts as to how the outdoor flea market would function. What a pleasant surprise to find the entire hamfest in full operation inside two large, permanent, fair exhibition buildings. Free camping space was available for early arrivals Saturday night. The fairground area provided more than adequate parking for everyone. The club YL amateurs provided home-made pies and operated the large snack bar. Attendance was over 1,600 at this fairly new, well organized hamfest.

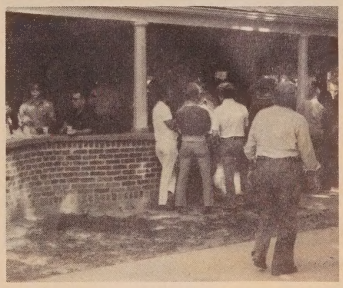
Hamfests, I believe, provide an opportunity to renew the pleasures and interests of all radio amateurs. How many hamfests did you manage to attend? At least one should be on a radio amateur's agenda yearly. Please check the CQ Magazine for listings of upcoming hamfests and their locations.



Findlay: The central control point.



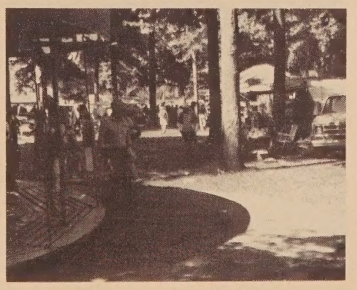
Findlay: Tall trees shaded the flea market throughout the park.



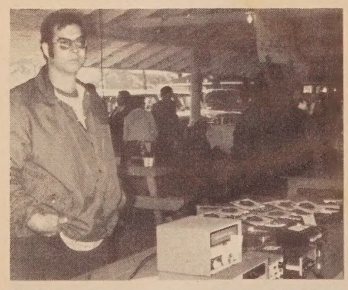
Findlay: The very busy food concession.



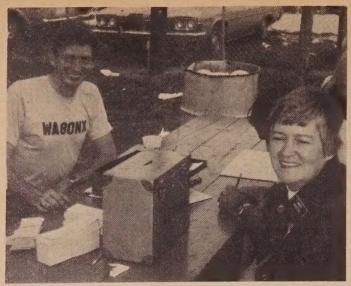
Findlay: Riverside Park boating area. If you got tired walking and gawking at radio goodies you could go for a boat ride.



Findlay: Flea marketing around the Merry-Go-Round.



Findlay: Club member, Dave, WA8ZCH, displaying his personal radio gear for sale. He said he couldn't remember when the hamfest had ever been rained out.



Cincinnati: Top raffle man Keith, WA8ONX used to build model boats. He wanted to radio-control them, found out about amateur radio, got FCC license and on the air —has not touched boats since. That's Mary WA8TRV (right) committee member.



Cincinnati: Elmer, W8ALW (center) has been chairman of the Hamfest for 25 years. Committee members Stan, K8OGH (left) and Don, W8CNV have been active for many years too.



Cincinnati: Members of the Greater Cincinnati Radio Control Club presented a thrilling air show. They have a membership of 188 and Father Schneider (2nd from the left) is their president. Popular 6 meter enthusiast, Jim, WB8TJI is 4th from left.



Cincinnati: DXer, Jerry, K8RA came out number one in the food pile-up.



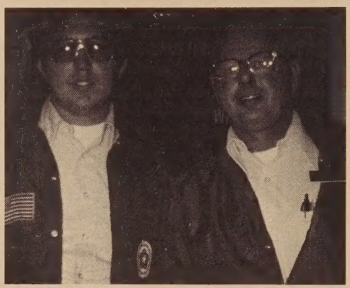
Cincinnati: Just about everyone browsed thru the long rows of the flea market.



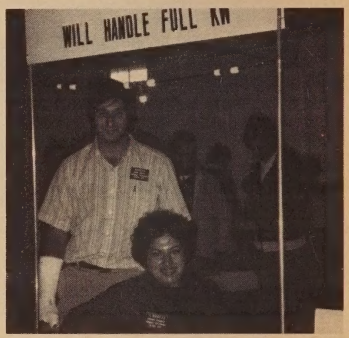
Cincinnati: Bob, WB8QWY first in line and about to get refreshed.



Lima: Dorothy, WB8YHT guarding those delicious pies that she and club YL amateurs Pat, WB8VLQ, Pam, WB8YME, Lee, WB8NKS, Vi, WB8VIT, Peg, WD8EHP and Joan, WB8VCO baked. They also operated the food concession.



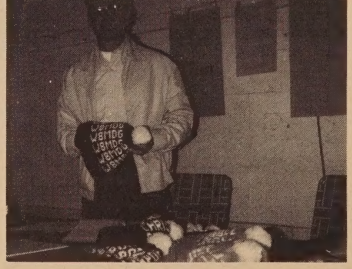
Lima: Larry, WB8LIG, (left) Club President and Ron, K8CLV, Hamfest Chairman and Club VP.



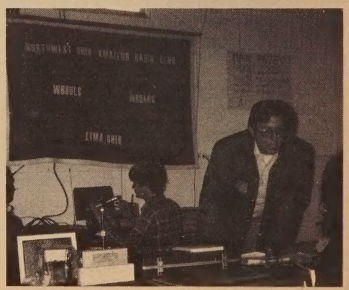
Lima: Also seen at Cincinnati and Findlay were Barry, WB8EAV and his XYL of Benbarry Enterprises, Toledo. They merchandise a broadband dipole antenna, sometimes called a "Double Bazooka".



Lima: Solid state items are very popular.



Lima: Tom, W8POF showing a custom knitted "Ham Hat" from his Creative Knits and Gifts Co. He'll also put your call sign on a scarf. Unique?



Lima: Control Center, a very busy place.

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Amateur Radio Station Tips, Part 5 of 5

Introduction

The past four issues of this column contain information that will help Novices establish efficient amateur radio stations. There are 5 parts to this series and it will help new amateurs to carefully read every part at least twice. Read this series of articles through just to pick out the highlights the first time; then read everything again very carefully, underlining the information that is most useful to help you solve your station problems. Each part of this series of related monthly columns is written so that it provides helpful information which can be used without having to refer to other parts in this series. However, since this is the concluding part, you now have the opportunity to make use of the entire series. This month's column discusses the station accessories that are important parts of good stations. Interference is also covered in this issue to ease concerns about this beast.

Transmission Lines

It is not sensible to go to the trouble and expense of installing a good antenna and excellent equipment, and then interconnecting the antenna and rig with an inefficient transmission line. Most amateurs use coaxial cable (coax) for their transmission lines because it is convenient to use and easy to install. Coax can do the job well, but you should avoid the use of lossy coax. I often find RG-58C/U (50 ± 2 ohms) or RG-59B/U (75 ± 3 ohms) coax used as the antenna transmission line. These types of coax are popular because they are thin (less than 0.2 inch diameter), less expensive, and easier to install than their more efficient counterparts. Unfortunately, RG-58C/U has twice as much loss as RG-213/U coax and less than one fifth as much power handling capability. Similarly RG-59B/U has almost twice as much loss as RG-216/U coax and less than half as much power handling capability. What makes the coax situation even worse is that amateurs often use earlier and less efficient versions of these coax types, such as RG-58/U, RG-58A/U, RG-59/U, and RG-8/U (RG-213/U predecessor). These older types of coax rate about as well as their newer counterparts, but their losses increase about ten times faster. The losses in these older coax types start to increase from the day they are made and it is normal for loss to be doubled within two years after they are made, even if they are still in a good environment, in a store or warehouse. RG-213/U (50 ± 2 ohms, 0.405 inch diameter) and RG-216/U (75 ± 3 ohms, 0.425 inch diameter) are preferred antenna transmission lines; they are well worth the extra trouble and expense. To put this matter in proper perspective, assume that you are operating on 10 meters and that your transmitter is feeding 100 watts to the radio shack end of a 100 foot long transmission line connected to the antenna. Under these conditions the most power to reach the antenna would be less than 50 watts. This unnecessary loss of useful output power is hard to accept but it is not the real culprit which will cost you many long distance (DX) contacts. The worst thing about using a lossy coax is that the received signals are also greatly attenuated (reduced) as they travel from your antenna to your receiver. Since DX signals are often 10 microvolts (ten millionths of one volt) or less, it is obvious that we cannot afford to reduce signal levels by using lossy coax. If you want a thorough explanation of coax cables, send a large (at least 9½ by 12 inches) self-addressed envelope with double first class postage to me and I will send you a free copy of a class aid I wrote on this subject.

It is sometimes difficult to find a good way to bring antenna transmission and rotator control wiring into the radio shack. If your station is located on the ground floor, it is usually best to run these cables under the house (or through the cellar) and to bring them up into the radio shack through a hole (or holes) drilled in the floor. If it is necessary to bring these leads in through a window, it is preferable to construct a window panel replacement containing the required connectors and holes. If an antenna lead-in panel is to be made, it is usually better to install a double-female coax connector in this panel for each line into your shack. The barrel connectors are readily available at good suppliers and they provide a watertight connection through a panel with low rf loss.

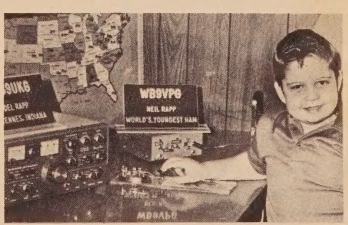
If you have an excess length of coax, do not coil it or leave it in your shack for possible future use. Just leave enough slack in each coax line to reach your gear with no strain and cut off the rest of the coax. Every inch of transmission line causes loss and it is sensible to cut off unnecessary extra coax. When an extra long coax transmission line is coiled, it has an inductive characteristic which can contribute to interference and antenna loading problems.

Station Accessories

Receivers, transmitters, and antennas have been discussed first because they are the major parts of a station. However, there are several other items which are important to the establishment of a good station, and these things will be discussed in subsequent paragraphs.

Desk or Table

Once you have selected the best location for your station, obtain a large sturdy table or desk to hold your equipment. The table can be metal or wood. If it is metal, ground it to the station



Here is Rusty Rapp (WB9VPG) of Vincennes, Indiana at his operating position.

*2814 Empire Ave., Burbank, CA 91520

ground point at the transmitter's ground stud. The top surface must be large enough to leave plenty of operating room after the equipment is positioned for use. The only way you can send correct code with a handkey is to have your elbow resting comfortably on the surface of the operating table. It sometimes helps to move a table a few inches away from a wall and to let the major equipment overhang the back end of the table.

Keys

Handkeys

It has been my experience that nothing develops confirmed voice-only amateurs faster than bad sending practices. The best way to develop a good fist is to learn how to use a handkey (manual telegraph key) and to stick with it until your code receiving proficiency has reached about 13 wpm. Proper spacing between letters and words helps make code pleasant to copy at any speed. Do not use a junk handkey because it makes it more difficult to develop proper sending technique. Select a good handkey with adjustable keying contacts gap, adjustable return spring (keying) pressure, well machined (smooth) and adjustable arm pivot points and matching pivot point receptacles, good alignment between the entire upper and lower keying contact surfaces, and good plating on the keying contacts. Many handkeys are not acceptable, so take care to select a good one. Unfortunately, it is not safe to assume that all handkeys are good because some expensive ones are not acceptable. Do not use a skirt on the knob of a handkey because it tends to encourage improper grasp of the knob, resulting in poorly sent code characters. A skirt is a flat piece of insulating material about the size of a half dollar and it is located immediately below the handkey knob. A new operator would most likely let his/her fingers rest against the top of a skirt. This failure to properly hold the knob impairs normal transfer of force as the wrist is raised and lowered while sending. The resulting degradation of the sending action ruins the consistency in the lengths of dits and dahs and causes uneven spacing between the individual parts of code characters. Some handkeys are mounted on large base plates that raise the knob uncomfortably high above the operating surface of the table. Many handkeys have such poor alignment between the upper and lower keying contacts that very little of the total contact surface functions when the key is closed. It helps to mount a handkey so it will not move as you send. The handkey can be mounted directly on the operating table, but it is usually mounted on a thin but heavy piece of plastic or wood to avoid marring the table surface. If the handkey is to be attached to a base, the base should not be more than one half inch thick and it should be at least three inches wide by eight inches long. The handkey is mounted near one end of the base with the key knob towards the center of the base. Modern adhesives make it easy to mount handkeys on a wide variety of base materials. Whether it is mounted on a base or directly on the operating table, the handkey is positioned where it is comfortable to reach when the operator is seated close to the table with his/her elbow on the table.

Bugs and Keyers

It is much easier to develop good sending rhythm (spacing) with a handkey than with a semi-automatic key (bug) or an electronic keyer. Many amateurs fail to develop good sending techniques before they start using a bug or keyer and this results in poor sending that causes unsatisfactory results when they try to complete on-the-air code contacts. Speed should not be the primary objective of new amateurs because it is far more important to develop good code sending rhythm, which makes one a pleasure to contact at any speed. When your code receiving proficiency reaches about 15 wpm, it is advisable to develop alternate sending capability with a bug or keyer since either permits one to transmit fast code with very little effort. It is not good to use both a bug and a keyer with the same hand because their differences in keying actions tend to harm an operator's timing and spacing of code characters. When using a semi-automatic key, the operator sends each dah manually and just makes a single motion to send a series of dits. When using an electronic keyer, dits and dahs are automatically sent as long as the operator holds the paddle to the right or left side, respectively. When you are ready to get a high speed code sending instrument, select a very good one. Junk bugs and keyers are no bargain at any price.

Writing Instruments

Before leaving the subject of code, I want to advise you to get a good writing instrument to use when copying code. If you use a pencil, use a sharpened one with a number two (or softer) lead. I have had special code practice pencils made for my students and these pencils have grade one and one half lead. If you use a mechanical pencil, computer lead should be used for copying ease. Computer lead is called electrographic mark sensing lead and it is available from major computer outfits. When copying code with a pencil or pen, it is called copying by stick. If you use a ballpoint pen when copying code, it should not be retractable, because they have some tip movement each time they are applied to (or removed from) the paper. This motion will slow you down and can reduce your code receiving speed. I believe the best code practice writing instrument is the new series of fine-line felt-tip marking pens. Regardless of which kind of writing instrument you use, it should provide a dark (readable) mark with very little pressure required.

If you are serious about becoming an extremely proficient code operator, you should shift to using a typewriter at about the same point (15 wpm) where you change to a bug or keyer. There are special typewriters intended for use by code operators and these machines are called telegraph mills. It has been my experience that used typewriter shops sometimes have mills for sale and their price is usually quite low since few people want them. If you are not able to obtain a mill, there is nothing wrong with simply learning to copy code with a regular typewriter. If you do not know how to type, pick up

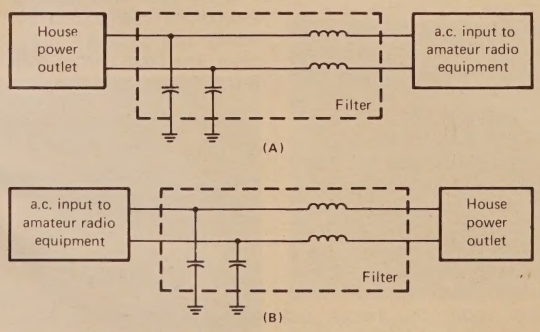


Figure 1—Power Line Low-Pass Filter Connection. (A) Configuration used to keep household electrical interference out of amateur equipment. (B) Configuration used to keep amateur station interference out of house power line.

CAREER ELECTRONICS TRAINING

For
Free School Catalog

Call CIE
Toll-Free

**800
321-2155**

(In Ohio, call 800-362-2105)

See our ad in this magazine

sound great to you but it is just noise

CAREER ELECTRONICS TRAINING

For
Free School Catalog

Call CIE
Toll-Free

800
321-2155

(In Ohio, call 800-362-2105)

See our ad in this magazine

writing instrument to use when copy-

a text book on this subject at your local public library. It is easy to teach yourself how to type correctly and you will often benefit from this capability. Naturally, you will have to practice code at a much slower rate when you first switch to a typewriter or mill. However, as your typing proficiency improves, you will be pleasantly surprised by how rapidly your code receiving capability rises. If you want a copy of a class aid listing worldwide sources of code practice, send your request to me in writing and supply a large (9½ by 12 inch, minimum) self-addressed envelope with quadruple first class postage attached.

Headphones and Speakers

It is extremely important to minimize any possibility that operation of your amateur radio station will disturb others in your home. One major step towards making your station operation acceptable is to use headphones instead of a loudspeaker. The station you are listening to or working on the air may sound great to you but it is just noise to non-amateurs in your home. Code can have a very piercing quality that penetrates walls, floors, and ceilings too well to suit others. The use of headphones provides the added advantage that it greatly improves an operator's ability to hear weak stations. There is also much less chance that an operator will be distracted from the signal being copied if he/she uses headphones to become isolated from household and street noises. It is best to get a very good set of communication headphones at the outset because they are one thing you probably won't change, no matter how long you are an amateur. Good communication headphones have a limited (narrow) frequency range, are very sensitive to small input signals, have extremely effective earmuffs, and can easily be adjusted to minimize operator discomfort.

QSL Cards

Immediate Need. New amateurs are very anxious to receive confirmations (QSL cards) of their two-way contacts with other amateur radio stations. Unfortunately, most new amateurs don't order their own QSL cards until they learn that one has to send cards to have a better chance of receiving them. Get a plentiful supply (500 - 1000) of top quality QSL cards as quickly as possible and send confirmations as you work stations. Good cards generate a better response ratio than junk ones and postage costs are so high that one may as well mail good cards. Many operators consider the QSL to be an integral part of each contact with a station they have not previously worked on the air. Some operators send many cards and others send very few. Good operators usually record cards sent and received in their logbooks and make it a practice to be sure they have at least sent a QSL in response to each card received.

Display. Most Novices like to display some of the QSL cards they receive and the best way to display them is in clear plastic holders. These QSL display holders are advertised in amateur radio magazines and their use eliminates any need to damage prized QSL cards with tape or thumbtacks. It is also easy to rearrange cards being displayed in these holders. Similar clear plastic holders are available to conveniently display the operating certificates one earns.

DX Cards. Before leaving the subject of QSL cards, I want to advise you that almost all QSL cards being sent to American amateurs are received through the ARRL Incoming DX QSL Bureau. It takes too much time for a busy DX (foreign) operator to look up the name and address of each station worked and to write this information on each card. No name or address is required on cards sent through the bureau, saving a lot of time and effort for busy operators. Also, relatively large groups of cards are packaged for shipment to each bureau, which is much cheaper than individually mailing each card. The foreign (DX) operator almost always routes QSL cards through the bureau system and you must have self-addressed stamped envelopes (SASEs) on file with your call area DX QSL bureau to receive your incoming DX cards. Call area DX QSL bureaus are listed in the domestic (U.S.A.) and foreign (DX) amateur radio callbooks advertised in amateur radio magazines. If you want a free copy of a class aid about how the ARRL DX QSL Bureau functions for both incoming and outgoing DX cards, send your written request to me, including a self-addressed and stamped envelope. California Novices will also receive a sheet specifically detailing operation of their bureau. Get your envelopes into your bureau as soon as you start to operate, particularly if you operate 10 and 15 meter Novice bands where it is common to work foreign stations.

Logbooks and Legal Considerations

Logs. Recent FCC rule changes have minimized our logging requirements but most amateurs still prefer to maintain accurate and detailed station logs. It is advisable to obtain a full size (not mobile type) station log and to record all station activities in the logbook.

Current Address. Don't be fooled by recent FCC rule changes related to easing modification requirements for relocated stations. The FCC still must be able to reach you at the mailing address you listed on your form 610 amateur radio station/operator license application. You have trouble if the FCC can't reach you at your stated mailing address, so keep your address current. It is also important to keep your station address correct so that other amateurs can find it in callbooks when they want to send QSL cards to you. It is good code practice to exchange names and addresses on the air but some amateurs do not like to do this if they have been listed correctly for several years in callbooks. It is also impractical to exchange addresses during contest contacts. If your finances will allow you to do it, get a current set of domestic and DX callbooks and order the matching updating supplements that are issued in March, June, and September.

Rules and Regulations. Each amateur should maintain a current set of part 97 of the FCC rules and regulations. This part covers our amateur radio service and we are required to know these rules and regulations. Amateur radio is dynamic and this causes frequent changes to part 97. An up-to-date copy of part 97 can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, as part of FCC Rules and Regulations, Volume VI. Part 97 is also available separately and at less cost ($1.30) from the same source by ordering their stock number 004-000-338-1.

Third Party Agreements List. Maintain a current list of countries (by their callsigns) with which we have third-party agreements permitting the exchange of non-commercial messages between amateurs in different countries. It is possible that a DX contact will ask you to handle a message for him and you should know whether or not it is legal to perform this service.

Interference

Sources and Sufferers. You may become aware of interference problems when you start operating. Contrary to what you may be thinking, it is much more likely that you will be bothered by interference than that your station operation will cause interference. Past experience in a major city's interference (elimination) committee taught me that any electric or electronic device can cause interference. It is common to trace interference to such commonplace things as fluorescent lights, light dimmers, neon signs, hair dryers, refrigerators, freezers, electric motors, electric drills, TV sets, electric blankets, heating controls, air conditioners,

electric fans, and just about anything else one can name. Interference enters the receiver through the ac power line or the antenna input. It takes patience and effort to isolate and eliminate each source of interference.

Power Line Interference. It is usually effective to eliminate or minimize power line interference by installing a low pass filter between the house power electric outlet and the electric power input to the station equipment. If a power line filter is being installed to reduce interference to the receiver, the filter configuration should be as shown in part (a) of figure 1. If you have a particularly troublesome source of interference in your home, it is advisable to install a low pass filter between this unit and its electric power input; the configuration of this type of filter should be as shown in part (b) of figure 1. If a station is causing interference through the electric power wiring, the filter configuration shown in part (b) of figure 1 should be used to eliminate this problem.

Radiated Interference

If your station causes interference due to radiated energy, it can be reduced or eliminated, but this is not always easily accomplished. A good low pass filter in the transmitter rf output line can help eliminate radiated interference, particularly in a case of television interference (TVI). Adding a high pass filter between the TV antenna and the TV set can further minimize TVI but the filter should be mounted directly on the TV tuner (channel selector) to be most effective. Do not install filters or other interference reduction devices on anyone's home entertainment units because you make yourself liable for their future equipment repairs, even though the later problems may be completely unrelated to the changes you made. Be cooperative, friendly, and helpful in helping neighbors resolve any interference problems, but do not touch their equipment.

Helpful Attitude. Very few interference complaints against amateur radio stations are found to actually be the fault of amateur stations. Nevertheless, it is very important to go out of your way to cooperate with any neighbor who reports interference. Very few people are experts on interference and the extent of their knowledge is usually that they have no problem except when you operate your station. Frankly, there is no reason to expect your neighbors to know what causes interference or how to eliminate this problem. Patience and understanding can help the two of you resolve any difficulty, can keep you on good terms with your neighbors, and can help keep your station on the air without interruption. Amateur radio has long enjoyed a very favorable image with the general public and it is worth the effort to maintain this situation.

Precautions. The possibility of your station causing interference can be minimized by using properly designed equipment, establishing an excellent station ground, using properly matched monoband antennas, and taking care to operate the transmitter properly. Interference possibilities increase with higher rf output power and it is often possible to minimize or eliminate a critical interference problem by reducing transmitter rf output power until the difficulty has been remedied.

Perspective.

Don't let an interference problem of any type cause you to panic and stop operating. Very few problems are not easily resolved. There are excellent books and magazine articles that can help you solve any problem. Stores have very effective low pass (power line and rf types) and high pass filters for sale at reasonable prices. There are also many experienced amateurs who can discuss interference problems with you and can suggest ways to isolate and eliminate interference. However, if you have an interference problem, you are the person with the most interest in finding an effective solution.

Broadcast interference (BCI), television interference (TVI), and telephone interference are usually much easier to eliminate than interference to unshielded high gain audio amplifiers and other electronic home entertainment equipment.

The preceding interference information is not included due to interference being a common problem to amateurs. Frequent contacts with active licensed amateurs has shown that less than one third of them have received a report that their operation has caused any interference. Most of the problems that do occur concern equipment in the amateurs home. Almost all interference cases involving neighbors are quickly and easily eliminated. Interference is covered in this article because it can occur and you may have to take steps to eliminate it. Although very few amateur stations cause interference, almost all of them are bothered by interference. Even dirty insulators on electric power utility poles can ruin reception at one's station.

Summary

The information in this associated series of Novice columns is intended to help new amateurs set up original stations, or to improve existing stations. Please bring this information to the attention of other people you know who are just getting started as amateurs. Installation of a good station is a big step toward regular activity on the air, which leads to continued interest in amateur radio and license upgrade. I have helped several thousand Novices set up their first stations and this series of columns is intended to help you avoid the most common mistakes. This material has been prepared to serve as a guideline and each subject requires a lot of study to be fully understood. I hope your knowledge has been increased to where you will be a better student and a much more active operator.

FCC Examinations at Civil Service Offices

An experimental program was conducted between about July 1974 and July 1976 in which FCC amateur radio and commercial operator examinations were administered by civil service personnel at about 100 civil service offices scattered around the country. Code receiving tests were run using pre-taped cassettes. Code sending tests were administered by taping the applicant's test run and having FCC personnel check the content of the cassette. Code test results were only graded by FCC people. A unique feature of the FCC examinations conducted at the Anchorage, Chicago, Detroit, Honolulu, and Seattle (only) civil service offices was that if an applicant failed an overall examination but passed any part of it, she/he was given credit for the portions passed when they next attempted to pass the examination. In other words, if one passed the 13 w.p.m. code tests and failed the written examination when attempting to obtain a General class amateur radio operator's license, they did not have to take the code tests as part of their next examination; they simply had to pass the written test to qualify for the General ticket the next time around. Although code sending tests are still a required portion of amateur radio FCC examinations conducted by volunteer (non-FFC) examiners, these sending tests were deleted about a year ago from amateur radio operator in-person examinations conducted at FCC examination offices. Since the FCC also switched to using a code comprehension receiving test shortly before they dropped the code sending test, it is now possible for someone with no knowledge of the International Morse Code to conduct the entire existing amateur radio operator's examination. This sequence of associated events leads me to believe that the FCC may soon cease conducting amateur radio (and perhaps, commercial) operator examinations and that such exams will then be administered only at civil ser-

vice examination offices. Do not be surprised if this change is announced in the near future.

The following stations were worked recently on the Novice bands: WB1DZJ Brett @ New Haven, Conn. WA2LIV Bill @ Long Valley, N.J., WB3DCA Steve @ Whetton, Maryland, WD4BGJ Tim @ Daytona Beach, Fla., WD5BTK Paul @ Hattiesburg, Miss. WD6CSM Hessel @ Glendale, Ca., WB7NHL Tom @ Portland, Oregon, WD8KNX Jim @ Rochester, Michigan, WB9ZAM Ron @ Addison, Illinois, WDØASX Fred @ Davenport, Iowa, KP4ENO Pol @ Lares, P.R.

I am alway glad to receive good black-and-white pictures of Novices at their operating positions. If you send one, it may appear in a future Novice column. Please enclose an SASE if your picture must be returned. Send me your news, views, and problems.

73, Bill, W6DDB

WARNING

Protect Your Eyesight

Thanks to Bill Welsh, W6DDB, *CQ*'s Novice Editor, this item has been brought to our attention.

This warning concerns anyone about to do repairs on fiberglass items. The catalyst or hardening agent that is added to the resin prior to the application of the resin is extremely hazardous to eyesight. The agent is called MEKP (methyl ethyl ketone peroxide) and it can completely destroy eyesight if not used properly.

If you are going to repair fiberglass items always wear safety glasses and keep a supply of water on hand. If by chance some MEKP does get in your eyes you only have about 4 seconds to wash your eyes out with water. There is no known chemical or neutralizer that can reverse the process once the MEKP has a chance of doing its damage. Water is the only effective way to deal immediately with the situation. The damage that can be done rapidly is not reversible, nor is there a known way of stopping the destruction or repairing the damage. Safety glasses should be a must and are the surest method of protection.

Please pass this information on to others who may plan fiberglass repair or construction projects, especially children. Warnings should be posted around schools and in the home.

Remember, immediate flushing of the eyes can prevent damage but in the long run the cost of safety goggles is a very small price to pay for the protection of one's eyesight.

How You Can Convert Your Rohn 25G Tower to a FOLD-OVER

CHANGE, ADJUST OR JUST PLAIN WORK ON YOUR ANTENNA AND NEVER LEAVE THE GROUND.

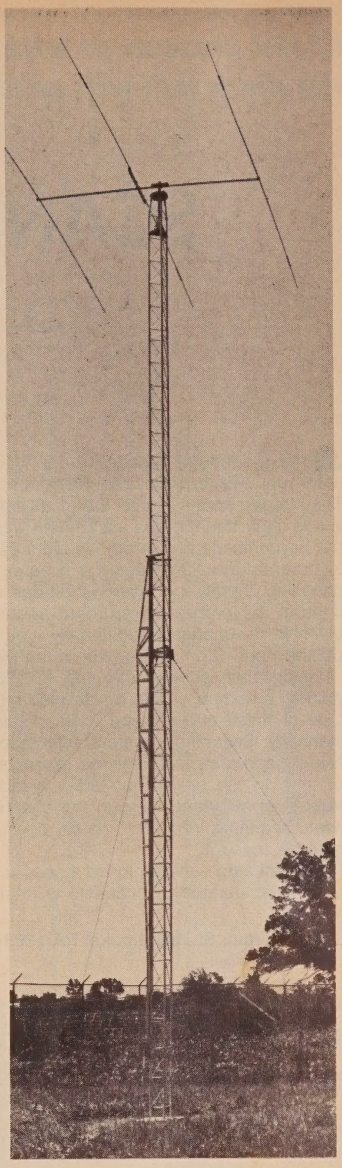
If you have a Rohn 25G Tower, you can convert it to a Fold-over by simply using a conversion kit. Or, buy an inexpensive standard Rohn 25G tower now and convert to a Fold-over later.

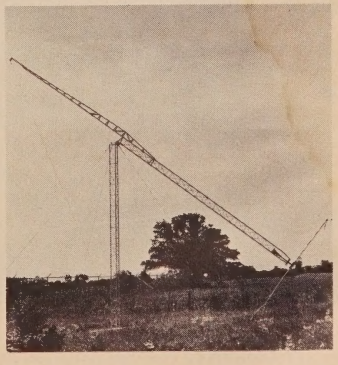
Rohn Fold-overs allow you to work completely on the ground when installing or servicing antennas or rotors. This eliminates the fear of climbing and working at heights. Use the tower that reduces the need to climb. When you need to "get at" your antenna . . . just turn the handle and there it is. Rohn Fold-overs offer unbeatable utility.

Yes! You can convert to a Fold-over. Check with your distributor for a kit now and keep your feet on the ground.

AT ROHN YOU GET THE BEST

Do not attempt to raise antenna or antenna support near power lines—You can be KILLED.





Unarco-Rohn
Division of Unarco Industries, Inc.
P.O. Box 2000, Peoria, Illinois 61601

K3JML presents us with a very interesting addition to the shack that will enhance the Icom IC-22S's use on 2 meters.

SCANNING THE IC-22S

BY CARL A. KOLLAR*, K3JML

After a series of successful rigs, ICOM did it again and came out with another extremely popular rig, the IC-22S. They began appearing on the local repeater in droves and it was clear that the ops using them were well pleased with the performance of this rig. It's features included the ability to program any 22 repeater or simplex frequencies of your choosing merely by inserting diodes in the proper positions in the programming board according to instructions given in the manual. Additionally, you could copy the repeater input with just the flick of the *Dup-A/Dup-B* switch.

Predictably, shortly after the IC-22S appeared on the market, a myriad of add-on devices for it were introduced. One of these allowed you to scan the whole band automatically. Scanning 2 meters automatically always seemed like a good idea for someone like myself who spent a lot of time in the shack but didn't want to go through the trouble of switching through the channels manually. However, scanning repeater inputs doesn't turn me on for obvious reasons.

The solution seemed to be a scanner which would scan a selected number of channels of interest. Not owning an IC-22S, the whole selective scanning idea was only of academic interest until Bing, WA3YYC, became the proud owner of a 22S and asked how difficult it would be to scan the 22S on 10 channels. This set the wheels in motion and the circuit of fig. 1 was developed.

*1202 Gemini St., Nanticoke, PA 18634



The completed scanner mounted on the Icom IC-22S.

Features

1. Ability to scan up to 10 channels with no crystals
2. Simultaneous scan of transmit and receive
3. Scan delay after carrier goes off
4. Scan 146 MHz or 147 MHz repeaters or simplex without the need to actuate the *Dup-A/Dup-B* switch
5. Scan hold while mike is depressed
6. Automatic scanner turn-on when channel 22 is selected and automatic disconnect on any other channel

IC-22S Channel Select Circuit Description

Figure 2 is the schematic diagram of the diode matrix unit/duplex control circuit. For our scanner, we are primarily interested in the diode matrix unit. It can be seen that the common on the *channel select* switch is connected to a 9 volt supply. When a channel is selected, the 9 volts forward biases diodes connected to that line and, in turn, distributes the voltage to the proper lines and enables the proper IC's. Using steering diodes allows this distribution while maintaining the integrity of each channel position. Therefore, all that is needed to actuate a particular channel is the application of 9 volts to that channel buss. With this knowledge in mind it becomes a simple matter to design a circuit which will sequentially apply 9 volts to the correct channel busses to actuate that channel.

Scanner Circuit Description

The Clock: Referring to fig 1, Q1 is a unijunction oscillator. When power is first applied, capacitor C1 charges through R1. When the voltage across C1 is large enough, the unijunction fires and the capacitor discharges through it. When the capacitor discharges sufficiently, there is not enough emitter current and the unijunction shuts off. The capacitor then starts to recharge, and the cycle begins again. The result is a train of trigger pulses at B1.

The Decade Counter: These trigger pulses are then fed to pin 14 of the 7490 which is its input. The 7490 decade counter "counts" these pulses and presents their number in binary form on pins 12, 9, 8 & 11 which are the Q1, Q2, Q4 and Q8 outputs respectively. e.g. count #5 will be presented as a "high" (5 volts) on pins 12 and 8.

The BCD to Decimal Decoder: This BCD coded information is then presented to the BCD inputs of U2 which is a BCD to one of 10 decoder/drivers. As the information is

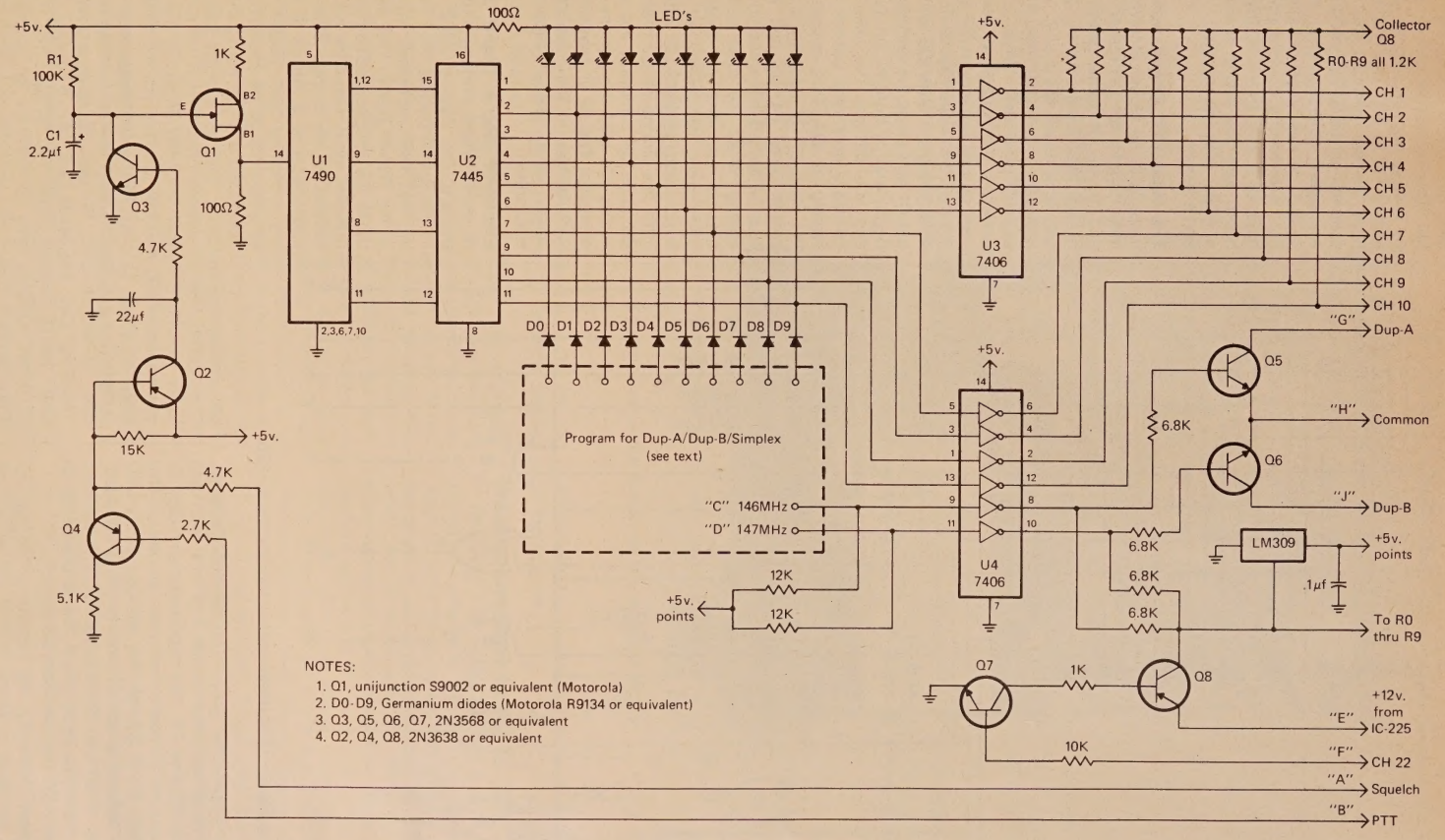


Fig. 1—The scanner for the IC-22S.

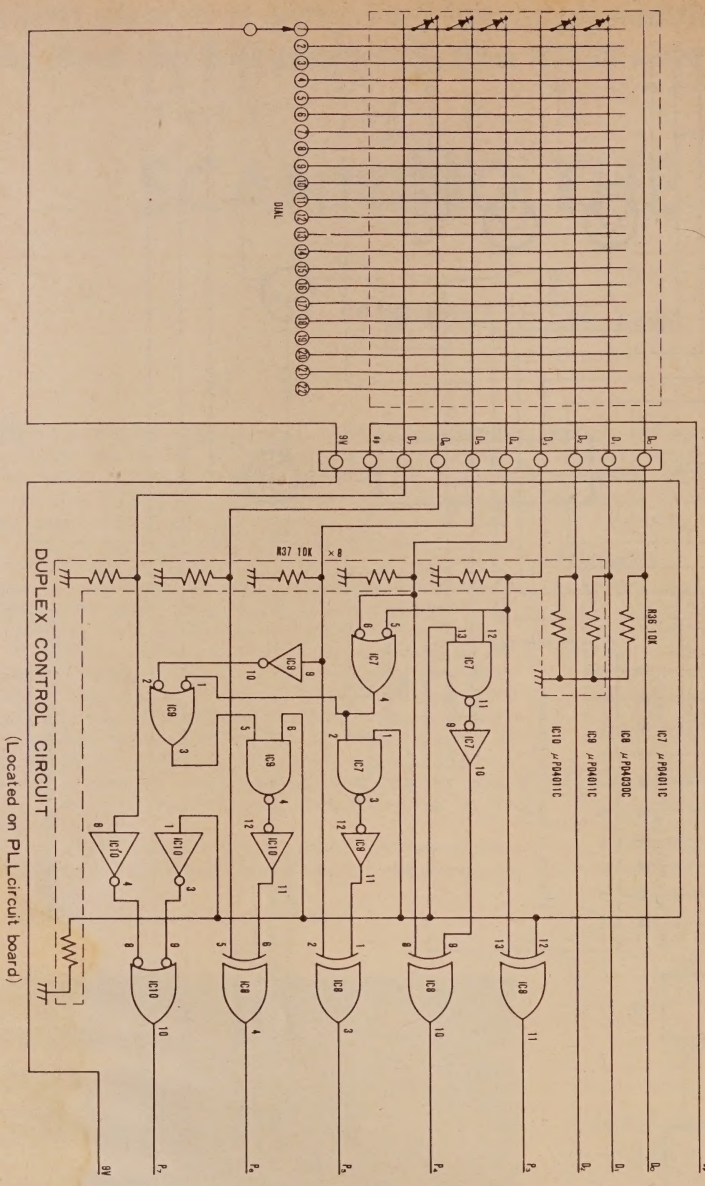


Fig. 2—The diode matrix unit for the IC-22S.

applied to the inputs, the proper output line becomes grounded, all others are open circuit. e.g. with BCD info present on pins 13 and 15, this represents a binary 5. Therefore, output line #5 (pin 6) becomes grounded. This does three things: (1) it grounds the cathode of the LED turning it on to indicate which channel is being activated. (2) The cathode of D0 thru D9 is grounded (the purpose of this will be explained later). (3) A low is presented to the inputs of the 7406 hex inverters U3 and U4.

The Hex Inverters: Normally, the outputs of the hex inverters (which are open collector output) are at ground because the input is high. When a hex inverter input is selected, it goes low as explained earlier. This causes its output to go high by voltage applied through pull-up resistors R0 to R9. This voltage is applied to the channel points to be scanned on the IC-22S program board. An open collector hex inverter is needed in this stage because a standard hex inverter could supply a maximum of 5 volts to the IC-22S program board and the board is designed to operate with an applied voltage of about 9 volts.

The Hold/PTT Circuit works as follows: With no signal received and the mike button not depressed, points A and B are at some positive voltage greater than 5 volts turning off Q2 and Q4. As a result, Q3 is shut off and the unijunction oscillator operates as explained previously. When a signal is received, the voltage at point A goes near ground turning on Q2 and charging the 22 uf capacitor on its collector. This forward biases Q3 which shorts out C1 and stops the outpulsing of Q1. If you wish to transmit on that channel and you depress the mike button, it causes a near zero voltage at point B turning on Q4. This insures a low at the base of Q2 keeping it turned on (which turns on Q3 and keeps the scanner turned off) while you're transmitting. When the mike button is released and the received carrier disappears, Q2 turns off removing supply voltage from C2. After a short time, the charge on C2 drains off and Q3 turns off removing the short from across C1 and the scanner resumes scanning. The 22 uf capacitor and the 4.7k resistor in the base of Q3 thus serves as a "delay" circuit for scan resumption.

Electronic Dup-A/Dup-B Switching: Normally when working 146 MHz repeaters, the *Dup-A/Dup-B* switch is in the *Dup-A* position and when working 147 MHz repeaters, the switch is in the *Dup-B* mode. The switch *must* be in the proper position or else the repeater input frequency will be heard instead of the output. This would be undesirable so a means of electronically switching from *Dup-A* to *Dup-B* or simplex must be provided. The last two sections of U4 along with Q5 and Q6 provide that switching. They work in the following way: The *Dup-A, Dup-B,* simplex choice must be programmed in by running a jumper from the anode of the diode for each channel (D0 thru D9) to either point C (146 MHz repeaters), Point D (147 MHz repeaters) or none at all (simplex). e.g. if the following channels are to be scanned Ch1: 147.81/21 Ch2: 147.93/ 33 Ch3: 147.60/00 Ch4: 146.07/67 Ch5: 146.34/94 Ch6: 147.78/18 Ch7: 146.22/82 Ch8: 146.52 simplex Ch9: 146.16/76 Ch10: 146.04/64. *(Channel numbers refer to channels on scanner, not on 22S)* Jumpers would be run from point C (146 MHz) to anodes of D3, D4, D6, D8 and D9. Also jumpers would be

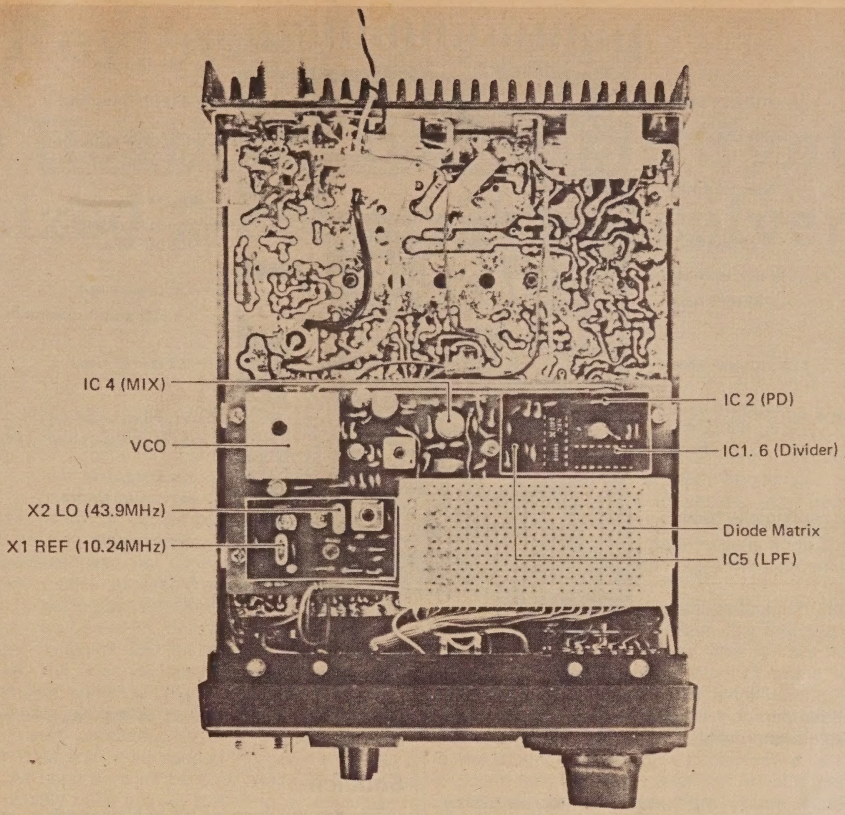


Fig. 3—Interior view of the bottom of the transceiver.

needed from point D (147 MHz) to anodes of D0, D1, D2 and D5. No jumper is run to anode of D7 because simplex operation is desired.

Operation of this circuit is as follows: On a simplex channel (no jumper to point C or D) the 12K resistors connected to pins 9 and 11 (input to two hex inverters) insures a high on the input which gives a ground on pins 8 and 10, their respective outputs. This ground removes bias from Q5 and Q6 turning them off. This puts the Icom in the simplex mode. When channel 2 is activated, the cathode of D1 goes to ground. Since it is forward biased and of the germanium type, its forward drop voltage of about .3 volts is all that is now seen by point D to which it has been jumpered in our above example. Point D (pin 11 of U4) is seen as a low and the output of the inverter (pin 10) goes open circuited allowing current from the 12 volt supply to turn on Q6 through the two 6.8K resistors putting the Icom in the Dup-B mode for 147 MHz repeaters. The same process takes place when a channel for 146 MHz is scanned but this time Q5 would be turned on.

The 5 volt supply is a standard LM 309 I.C. regulator which takes the 12 volt supply voltage and provides a regulated 5 volts for the I.Cs.

The electronic power switch for the scanner is engaged when channel 22 is selected. The diodes having been removed from that position, the 9 volts from the switch common is now applied to the 10K resistor in the base of Q7 turning it on, which in turn turns on Q8 applying power to the scanner.

Interconnection to the IC-22S

Channels 1-10 on the scanner are pins 2, 4, 6, 8, 10, 12 on U3 and pins 6, 4, 2 and 12 on U4 respectively. Since each of these points has a 1.2K resistor connected to it, it becomes a convenient tie point for attaching the wire which will be connected to the diode matrix board. I found it convenient to use 20 conductor ribbon wire between the scanner and the matrix board. One end is connected to the points called out above, while the other end of the cable is tack-soldered to the matrix board. See fig. 3 (inside bottom view). With the rig opened and positioned as shown, you can see the wires connected to the front of the diode matrix board. These wires come from the channel select switch. The corresponding channel numbers are printed on the board near each wire. If you wish channel 1 of the scanner to scan, e.g., existing channel 5 in your 22S, the first wire from the scanner (pin 2 of U3) would be soldered to the point on the diode matrix board labelled 5. Do not disconnect the original wire from the channel select switch connected to that point and be careful of solder bridges. If, e.g., you wish channel 2 of the scanner to scan the repeater you've got programmed into channel 10 on your 22S, connect the 2nd wire of the ribbon cable (which is connected to pin 4 of U3) to the point marked "10" on the matrix board etc. Don't forget to wire in the

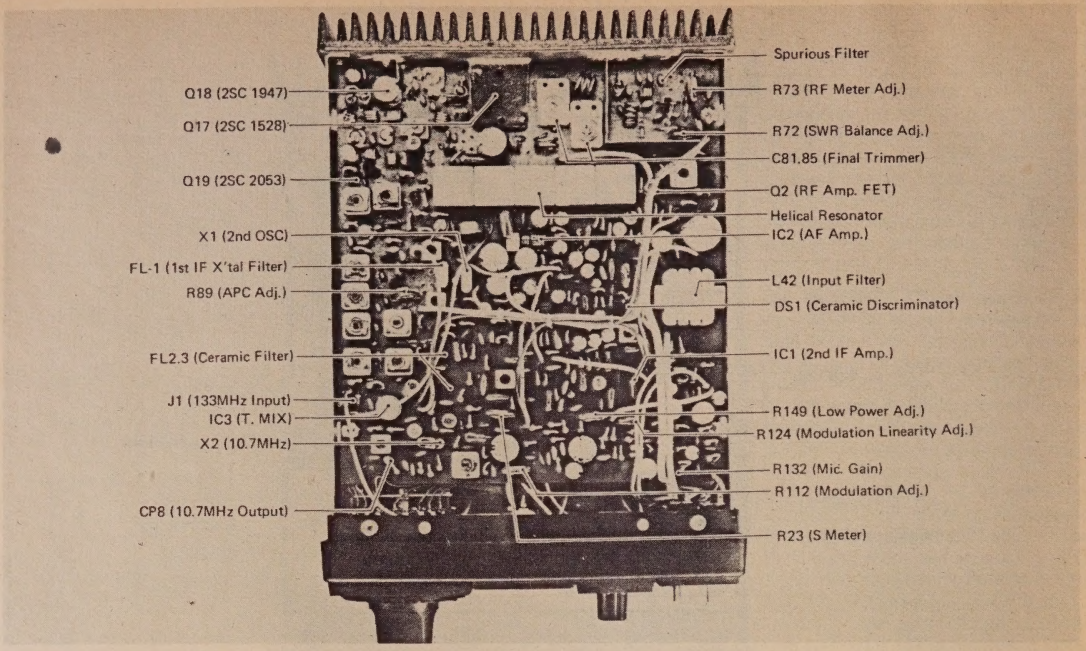


Fig. 4—Inside top view of the IC-22S.

Dup-A/Dup-B jumpers on the scanner board for each channel as explained previously.

Power

Refer to fig. 4 (inside top view). The toggle switch toward the center of the rig (high-off-low) controls the application of power to the 22S. To obtain 12 volts which is controlled by the on-off switch, a wire in the ribbon cable should be connected to the top left terminal as the rig faces you. The other end is connected to point "E," the emitter of Q8 electronic switch on the scanner. A ground wire in the ribbon cable is connected from any convenient ground point on the Icom to the ground buss on the scanner. So that the scanner will be activated when channel 22 is dialed in, first remove any diodes you may have programmed into that position. Referring to fig. 3 (inside bottom view), the channel 22 buss is the next to last buss on the right side of the diode matrix board. The last buss is not used. Solder a wire from the ribbon cable to the channel 22 buss. The other end should be connected to point "f" on the scanner schematic. This will allow power to be applied to the scanner when channel 22 is dialed in.

Squelch

To stop the scanner when a channel is active, connect a wire in the ribbon cable from point "A" on the scanner to the 22S as follows: Refer to fig. 4 (inside top view). With the front of the rig facing you, locate the 1000 ohm resistor mounted on a phenolic board against the front panel (about center). Tack-solder the other end of the above wire to the right side lead of this resistor.

PTT

The circuit which keeps the scanner stopped while the mike button is depressed is connected by soldering another wire in the ribbon cable to point "B" in the scanner. The other end of the wire is connected to the very last solder connection on the left side of the phenolic board with the 1K resistor referred to above.

(Continued on page 88)

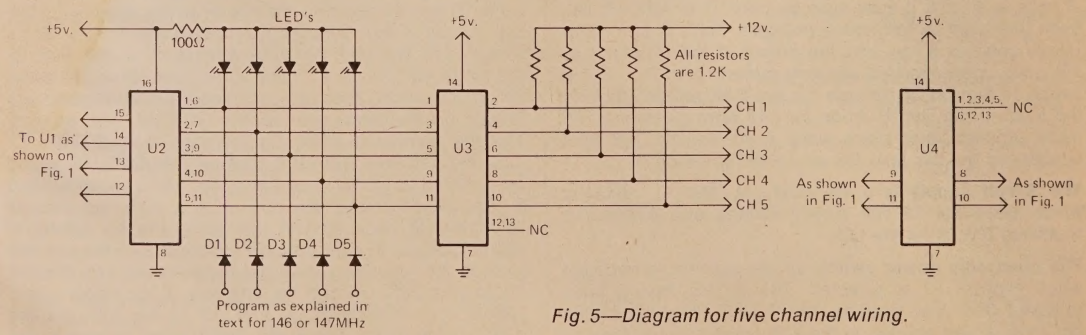


Fig. 5—Diagram for five channel wiring.

CQ Reviews:

The Heathkit HW-2036 Synthesized 2-Meter Transceiver

BY HUGH R. PAUL*, W6POK

A couple of years ago Heathkit introduced a new synthesized f.m. 2 meter transceiver, the HW-2026. This rig performed very well except for some amateurs operating in large metropolitan areas such as Los Angeles. The HW-2026 had a number of in band spurs, which even though they were down in excess of a —48 dB from full output, would on occasion interfere with a repeater to which the transceiver was not tuned. The result of this problem was that Heathkit initiated the first ever mass recall of a piece of amateur equipment. Not only did they refund the price of the transceiver kit, but they gave each registered owner an additional $50 for the labor required to construct the kit. The financial loss for Heathkit was considerable. A smaller company might have suffered bankruptcy under similar circumstances.

Heathkit engineers proceeded to do a complete redesign of the HW-2026 and re-introduced the new version as the HW-2036. As soon as a kit became available *CQ* acquired one. I usually build any kit that is to be evaluated myself, but it soon became evident that I just didn't have time to do it. I turned the kit over to one of the other staff members for construction. He also took on the job of constructing the matching a.c. power supply, the HD-1982 microphone with touch tone pad and the HA-202 power amplifier. This gentleman has not built many kits so his experiences should be typical of the average amateur.

The majority of construction of the HW-2036 involves five major circuit boards. They are for the transmitter, receiver, power amplifier, VCO, and synthesizer. The boards and a myriad number of components mount in a cabinet measuring approximately 9″×7¼″×2¾″. Construction time for the transceiver was 31 hours. Our staff member reported that 1½ hours of that total time was spent in checking the components against the parts lists to be certain that everything was there.

There have been a number of changes made in the construction manual. Heathkit has either supplied new pages to be inserted or lists corrections to be made to individual construction steps on designated pages. It is highly recommended that you make all corrections to the construction manual prior to starting work on the kit.

The transceiver may be aligned to operate over any 2 MHz segment of the two meter band. Frequency control on both transmit and receive is by means of a voltage controlled oscillator (VCO) and synthesizer circuit operating in a phase locked loop configuration. Frequency selection is by means of three lever switches, which display the last three digits of the selected frequency. In addition there is a 5 kHz offset switch which means that all repeater frequencies in the 2 meter band are available to you.

*291 Macalester Dr., Walnut, CA 91789.

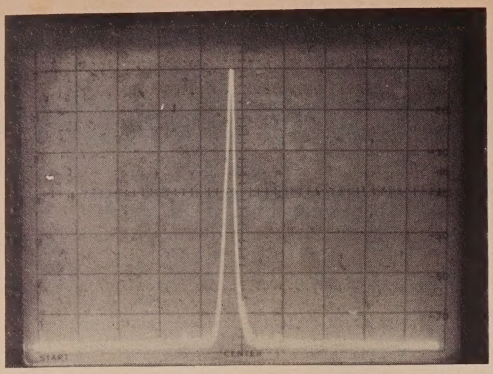
Both plus and minus 600 kHz offset as well as simplex or an auxiliary crystal controlled channel may be selected by the mode switch. A built-in tone generator provides three continuous tone squelch frequencies for those repeaters requiring a tone for access. Tone frequencies may be readily changed provided you have a frequency counter available. LED status lights indicate when the channel is in use and warn you in the event the frequency synthesizer has lost lock.

The receiver section is dual conversion employing dual gate MOS FETs as r.f. amplifier, first and second balanced mixers. An eight pole crystal filter follows the first mixer and an integrated circuit provides all of the 10.7 MHz first i.f. amplification. A single FET amplifies the 455 kHz second i.f. prior to being applied to an integrated circuit limiter and quad detector. Squelch control is by means of a noise amplifier/detector controlling a Schmitt trigger, which in turn controls a transistor squelch gate across the audio preamplifier stage. An IC audio amplifier supplies from 1½ to 2 watts of audio to the built-in 2″×6″ speaker. There is no problem getting enough audio when mobile with this transceiver.

Receiver performance was good in all aspects. Sensitivity measurements gave over 20 dB of quieting with .5 microvolt input. Squelch opened at between .2 and .3



Front view of the HW-2036 as it looks sitting on the HW-2036-3 a.c. supply.



Spectrum analyzer photograph of the HW-2036 transmitter. This shows that there are two spurs (—65 dB down), each about 1 MHz removed from the carrier frequency.

microvolt, the latter at the band edges where sensitivity drops slightly, but is well within specification.

Heathkit rates the bandwidth of the receiver as 15 kHz at —6 dB and 30 at —60 dB. Rather than running lab tests to verify these figures we took the transceiver into the real world, opened the squelch and monitored in 5 kHz steps above and below the strongest Los Angeles repeaters. Nothing could be detected beyond 15 kHz above and below these repeaters. At the 10 kHz points a 1 microvolt signal captured the receiver with no audible crossmodulation. This doesn't mean that you will never experience some crossmod or intermod with the HW-2036, but it is unlikely under average operating conditions.

At a number of frequencies throughout the tuning range of the receiver you will notice internally generated spurious (birdies). Most of these do not fall on repeater frequencies and all but two of them (146 MHz, 148 MHz) are very low level, less than an equivalent 1 microvolt signal. They will disappear if you advance the squelch slightly. I should point out that with the squelch completely on, all but the weakest repeaters will open the squelch. These birdies would rarely cause any operating problems.



The Heathkit HA-202 solid-state 2 meter amplifier.

The transmitter section of the HW-2036 can be best described as clean. If you look at the spectrum analyzer photograph you will note two spurs, each about 1 MHz removed from the carrier frequency. These spurs are —65 dB down from full output. Harmonics were down even further. Heathkit specs call for spurs within 20 MHz of the carrier to be a —70 dB down and all other spurs and harmonics a —50 dB down. Except for the two spurs illustrated, the unit tested exceeds the Heathkit specs by a wide margin. It is possible to drop the two spurs further by careful realignment of the transmitter tuned circuits while observing the transmitter output on a spectrum analyzer. What you see in the photograph is the result of following the alignment procedure outlined in the construction manual. Heathkit has done a remarkable job of designing a kit for a very complex piece of equipment that can rival the best of the factory built gear for clean performance.

Frequency modulation is achieved by applying the pre-emphasized and clipped audio from the audio amplifier section across a varicap diode in the voltage controlled oscillator. The resulting f.m. is of a quality that prompts compliments. It is not easy to over deviate the transmitter once set.

The HD-1982 touch tone microphone has been reviewed before. Some problems regarding tone frequency reported in earlier models appear to have been corrected in these later versions. Power for the touch tone pad comes from a 9 volt battery mounted in the microphone case. The microphone and pad is compatible with most of the f.m. transceivers on the market and may be purchased as a separate kit from Heathkit.

The companion a.c. supply is housed in a cabinet that matches the transceiver cabinet in size and style. The power supply may be wired to operate from 110 to 130 v.a.c. or 220 to 260 v.a.c. 50/60 Hz primary power. The d.c. output is adjustable from 12.5 to 14.5 v.d.c. at 2.7 amperes, 40% duty cycle. Regulation is better than 1%.

The HA-202 is a solid-state 2 meter amplifier designed for mobile use. It will give a power out increase of approximately four times when driven by a transceiver with 5 to 15 watts output. When driven by our HW-2036 transceiver with its 11.5 watts output the amplifier delivered a healthy 47 watts of power to the antenna. Unfortunately during the initial tests in the car our jury rigged mount failed and allowed the amplifier to be damaged. We were unable to complete our test procedure which was to include spectrum analysis. As soon as we obtain the parts to repair the unit we will continue our testing and publish a more in-depth report in a later issue. Initial reaction to the amplifier is very favorable.

The HW-2036 is a sophisticated kit to build. Our intrepid staff assembler would not recommend construction by a beginner or a more experienced amateur who is very impatient. I, however, am of a more optimistic outlook. If you know how to solder and can read English at the high school level, I believe you have it made (or should I say "constructed"?). At the very extreme the Heathkit service department is great at bailing out the inept constructor at reasonable rates. Give it a try. The prices for the kits are as follows: HW-2036 ($269.95), HW-2036-1 (with Micoder II Microphone $289.95), HWA-2036-3 a.c. supply ($39.95), HA-202 amplifier ($59.95). For more information, request a catalog from Heath Company, Benton Harbor, Michigan 49022. ■

A Message From The Publisher

MORE ABOUT THE COMMUNICATIONS ATTORNEY SERVICE

During the past few weeks, several calls have come in from around the country inquiring if there's a connection between either *CQ* or Cowan Publishing Corp. and the Communications Attorney Service. Readers will recall that we published a story to the effect that CAS had released an announcement that they intended to sue the ARRL on the Code of Ethics program. Just so there's no further misunderstanding, we want to go on record officially by stating that we in no way are connected with Communications Attorney Service, nor do we endorse or sanction that company's activities.

My first introduction to CAS was via a phone conversation with Richard B. Cooper, founder and sole entrepreneur behind CAS. During that conversation Mr. Cooper informed me that he was an attorney in California, that his law firm was named Cooper, Bryan and Hertz, and that CAS was retaining attorneys throughout the country to defend members who might have legal problems related to radio transmissions, be they amateur or CB. I have since that time made a thorough investigation of CAS and find that Mr. Cooper is not a member of the California bar, nor is any such law firm as Cooper, Bryan and Hertz listed with either the California Bar Association or the telephone company. Nor, for that matter, is there a listing for Raymond Bryan, a name passed on to me by Mr. Cooper as being a member of his firm. No trace of the Martin Hertz that Mr. Cooper maintains to be the third member of the firm has been found either.

We have also learned that Communications Attorney Service is not listed with the phone company, and that the phone number on the CAS letterhead uses a Paramount exchange, although the mailing address for CAS is listed as a Post Office box in Van Nuys, some fifty miles away. Mr. Cooper has, more recently, admitted to me by phone that he is not licensed to practice law in California, but inferred that he is licensed to practice elsewhere. When pressed on this issue, he declined further elaboration.

Several questions have also been raised as to Mr. Cooper's status as a licensed amateur. Several amateurs from California have assured me that the call letters being used by Mr. Cooper were not, in fact, issued in his name. This also, is under investigation.

Frankly, I have serious questions as to the purposes behind CAS and the abilities of that organization to represent amateurs or CBers within the legal system as they claim they are able to do. I urge all readers to thoroughly investigate CAS on their own before committing any contributions or membership dues to this service. If it's really on the up and up, Mr. Cooper should have no objections to answering the questions that have been coming at him from numerous amateur fraternity groups.

RUSSIAN SCIENTISTS INVENTED RADIO CB ON 220? IT'S DEAD! AND THE ARRL SLEW IT!

My messages in the December and January issues of *CQ* have brought some pretty heavy mail from readers. As I had anticipated long before those issues were even printed, the response from most quarters has been negative. I've made a lot of readers angry.

Well, guys, I wanted to make you angry. More important, I wanted to get you thinking about what's happening out there in Amateur Radio politics. I wanted to make you realize that everything isn't roses and lollipops as our friends in Newington would have you believe.

Let's take a recent case in point. Less than two weeks ago I received at home a news letter from the ARRL with a blaring headline that read: "CB ON 220? IT'S DEAD! AND THE ARRL SLEW IT." If it weren't so sad and so dangerous, it would be very funny. Listen guys and gals. 220 CB is not a dead issue. It's been temporarily tabled by the FCC simply because the outstanding dockets on the subject were outdated in the information they contained. But the fact remains—and I got this right from the top staffers at FCC—a uhf CB service on 220 or 900 or some other frequency in the future is a very real possibility.

Besides which, it wasn't ARRL that killed off the earlier 220 CB dockets. It was a combined effort by the Canadian and Mexican governments, the television industry lobby, and some pretty smart people in the FCC chief engineer's office who were concerned with RFI problems that might result. The point I'm making is simply this. ARRL is once again, as they've

done for decades, trying to take the credit for something with which they had little to do.

In my sarcastic attempts to discuss the "Code of Ethics" problem in a recent editorial, I indicated that I felt that the League was simply offering lip service with their mandatory code as a basic requirement for a manufacturer or distributor to advertise in *QST*. I indicated that when the chips were down, and the industry refused to kowtow to their blackmail, the advertising restrictions would be lifted. Well, guys, nasty old WA2LRO hit it on the head again. They've completely backed off on the mandatory code program because the industry totally refused to go along with it. If the League had stuck to their guns, as they promised, they would have lost more than 80% of the advertising in *QST*. And fellows, they just couldn't do that. Because, whether you'll admit it to yourselves or not, ARRL is primarily a publishing company that survives on *QST*'s advertising revenue. As I've stated in earlier editorials, more than 90% of all income and cash outlay at the League is related to magazines, books, and other publishing ventures.

What frightens me about the whole subject is the attitude that prevails throughout our fraternity that a criticism of ARRL is a personal attack on individual members. Not so. The League would run totally rampant if independent publishers didn't have the interest and courage to tell it like it is. Every time I print an editorial that criticizes the League, I alienate hundreds or thousands of readers who can't stand "their" organization being attacked. Fellows, believe me, it isn't your organization being taken to task. It's the inept management. It's the philosophy in Newington that unless it was invented by ARRL it simply can't be good for Amateur Radio. It's the attitude ARRL was the inventor, nursing mother, and salvation of Amateur Radio for the past 60 years. Guys, the ARRL has done an incredible propaganda job on people for those sixty years to make you believe just that.

If I don't like apple pie, am I being unAmerican? If I resist ARRL's self-perpetuating oligarchy, am I anti-amateur radio? That's what many of you have come to believe.

Let me give you a little insight on some of the behind-the-scenes doing within "your" organization. Back in the late 1950s my father, then publisher of *CQ*, made a trip to League headquarters in West Hartford with the sales manager from our printer. The same company, by the way, also printed *QST* in a different plant. What the printer proposed was a minor change in page size for both *QST* and *CQ* to allow both magazines to be printed on presses that would allow both magazines greater economies. The savings it was pointed out, would be between $3,000 and $5,000 a month for *QST*. That was an incredible saving in those days, and still is.

The general manager of the League listened politely to the proposal and then asked what the saving would mean to *CQ*. He was told that we would save between $2,000 and $2,500 monthly. He then informed the printer that even should the saving to *QST* amount to $10,000 a month, he wouldn't make the switch if *CQ* would benefit by as little as a hundred dollars. Imagine, fellows, how much those savings would have meant in keeping your membership dues down.

Now let's move on to another episode that might interest you. Back in the 60s, when RCA was the back-cover advertiser in both *QST* and *CQ*, many of their ads were drawn around construction projects that had appeared in *QST*. None ever came from *CQ* editorial. I made a trip to Harrison, New Jersey to inquire how we could get a *CQ* article into an RCA ad. They recommended that we work up a project around their 6146, a tube which was then very popular in vhf transmitters. We did just that. The article appeared in *CQ*, with a very neat little 6 meter transmitter as the end product. The ad was prepared by RCA's ad agency and was sent to both *CQ* and *QST* for the back cover. Guess what happened?

You got it. *QST* refused to run the ad with any mention of *CQ*. RCA bit the bullet and allowed them to run a different ad. I wonder if any manufacturer would allow himself to be pushed around by *QST* today. Frankly, judging from the "Code of Ethics," reaction, I have my doubts. But the point very simply was this: *QST* would not allow any mention of a competitor to appear in their magazine.

If you think I'm kidding, dig back into your files of QSTs from the late 40s through the mid 60s. See if you can find a single reference to *CQ* in the bibliographies at the end of articles in all those issues. You don't even have to bother. You won't find any. How come? If it wasn't invented in Newington (or West Hartford before that) then it couldn't appear in *QST*.

All of which is very interesting, but drifting away from the original point. At any rate, I've attempted to show my readers that there are two sides to the different political stories occurring within the Amateur Radio ranks: The League line is available to you through *QST*. If you want to get a different slant you can find it here. If you want to take the position that the League can do no wrong, or that to criticize the League is to weaken amateur radio, then avoid *CQ*. Because I intend to continue telling it like it is. It may hurt financially, but I sleep better nights realizing that at least I've tried. And you saw what happened in Munich in 1939 when no one bothered to care. . . .

Richard A. Cowan, WA2LRO

Mail this postage-paid card today for

FREE SCHOOL CATALOG

or call this toll-free number: 800-321-2155 (In Ohio . . . 800-362-2105)

Tell us which electronics programs interest you most. Check one or more:

☐ Basic ☐ Intermediate ☐ College Level ☐ FCC License Preparation

☐ Equipment Troubleshooting

By return mail we will send you a FREE CIE school catalog including authoritative information about the value of the FCC License and how to get one . . . plus a complete package of home-study information.

Print Name _____

Address _____ Apt. _____

City _____ State _____ Zip _____

Age _____ Phone (area code) _____ / _____

Check box for G. I. Bill information ☐ Veteran ☐ Active Duty CQ-58

CIE **Cleveland Institute of Electronics, Inc.**
1776 East 17th Street, Cleveland, Ohio 44114

DETACH AND MAIL TODAY!

Electronics independent home-study courses in elec-

yourself . . .
Electronics is not an "easy" science and C

FIRST CLASS
Permit No. 8685
Cleveland, Ohio

BUSINESS REPLY MAIL

No postage necessary if mailed in the United States

Postage will be paid by

CIE

Cleveland Institute of Electronics, Inc.
1776 East 17th Street
Cleveland, Ohio 44114

ad agency and was sent to both CO and OST for the

How to have fun and make money.



Patterns shown on screens are simulated.

As a ham operator, you've already proved you like electronics and know something about it. Now there's a way to change a money-consuming hobby into a money-making career . . . full time or part time. And you can do it in your spare time, at home without giving up your present job and its income.

Find out now about CIE-Cleveland Institute of Electronics independent home-study courses in electronics. With this specialized technical training, you can prepare for a challenging, rewarding future in electronics. Think of the career opportunities . . . computers, aerospace, 2-way radio communications, radio/TV broadcasting, medical electronics, to name just a few.

And all you need to do to qualify for one of these exciting career fields is to build upon the technical aptitude you already have. Just put your hands and your head to work with a CIE Electronics Career Course.

You learn by doing

CIE's unique study methods do a lot to keep you interested. Since electronics starts with ideas . . . CIE's Auto-Programmed® Lessons help you get the idea — at your own most comfortable pace. They break the subject into bite-sized chunks so you explore each principle, step by step, until you understand it thoroughly and completely. Then you start to use it. In some CIE courses, you'll perform "hands-on" experiments and tests with your own CIE Experimental Electronics Laboratory. And, if electronics troubleshooting is your main interest, you can select from several courses that involve working with and troubleshooting professional electronics equipment. This equipment (including a Zenith color TV, triggered-sweep oscilloscope and a solid-state color bar generator) is part of the course and yours to keep.

This combination of "head and hands" learning locks in your understanding of the crucial principles you'll use on the job in your new career. But, don't kid yourself . . .

Electronics is not an "easy" science and CIE courses are not "snaps." Subject matter is technical, thorough, and challenging. It has to be. We're training you for a career. So the presentation of ideas is logical, written in easy-to-understand language . . . you progress step by step, at your own pace.

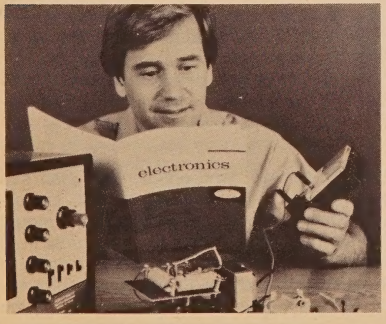
Why an FCC Radiotelephone License is important.

For some jobs in electronics, you must have your FCC License. For others, employers often consider it a mark in your favor. It's a government-certified proof of specific knowledge and skills!

In continuing surveys, nearly 4 out of 5 CIE graduates who take the exam get their Licenses. More than half of CIE's courses can prepare you for it . . . and the broadest range of career opportunities!

Free Catalog!

Mail the coupon. If you prefer to write, mention the name of this magazine. We'll send you a copy of CIE's FREE school catalog — plus a complete package of independent home-study information! For your convenience, we'll try to have a representative call to help you with course selection. Mail the coupon . . . or write: CIE, 1776 East 17th Street, Cleveland, Ohio 44114.



CIE **Cleveland Institute of Electronics, Inc.**
1776 East 17th Street, Cleveland, Ohio 44114
Accredited Member National Home Study Council

☐ **YES** . . . I'm interested in a full-time or part-time career in electronics. Send me my FREE CIE school catalog — including details about FCC License preparation — plus my FREE package of home-study information!

Print Name _____

Address _____ Apt. _____

City _____ State _____ Zip _____

Age _____ Phone (area code) _____

Check box for G.I. Bill Information ☐ Veteran ☐ Active Duty

Mail Today! CQ-57

W8FX/4 presents us with some practical "quickie" antenna suggestions for getting on two.

Getting On Two In A Hurry: Some Novel Antenna Ideas

BY KARL T. THURBER, JR.*, W8FX/4

If you enjoy portable or mountain-top hamming, field-day or vacation operation, or just need an "instant" temporary antenna that's almost *too* simple, read on. This article is for you.

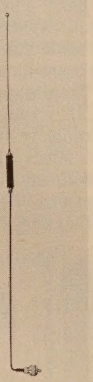
Upon moving to a new QTH where it would be some time before I'd get down to re-installing the antennas, I recalled that I had two "back-of-set" type Citizen Band antennas. Could they be adapted for double-duty for "instant" 2-meter use?

I found that both could be made to work on two meters very easily, at practically no expense. And, since no permanent modification of the antennas is required, they can be quickly restored to their original condition. In this article, we'll show how several popular v.h.f. monitor and CB antennas can be modified for two-meter use. We'll also suggest some other handy "instant" antennas for two.

Modifying Indoor CB and VHF Antennas

It's easy to modify many of these antennas for portable and temporary operation on two meters. I first experimented with an old Lafayette HE-19 base-loaded indoor CB antenna, circa 1964. This antenna, picked up at a hamfest for about $1, is designed for direct mounting to the CB transceiver. It has a sturdy whip antenna that telescopes from approximately 15" to 40" when fully extended. There is a plastic-enclosed series base-loading coil for impedance matching, and a special PL-259-type connector that can be "swivelled around" to permit direct top, side, or rear mounting. The loading coil was of the series type and did not have a shunt winding, so all that had to be done was remove the top cover and bridge across the ends of the coil, thereby shorting it out. The whip is telescoped down to about 19" and adjusted with a v.h.f.-type s.w.r. bridge for a good match to the transceiver. For best results, the s.w.r. bridge should be mounted right at the output connector of the transceiver. Of course, with this "modification" (and the one to be described next), there isn't any *real* modification to the antenna itself. Just restore the antenna to its fully-extended length and remove the coil jumper for regular CB operation.

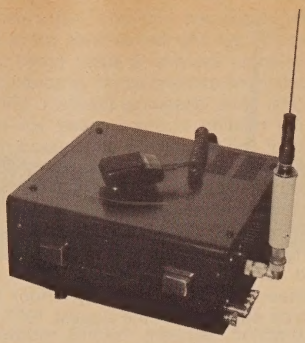
You probably don't have one of these old Lafayette antennas in your treasure chest, although you may find one at a swapfest. But you may have in your "junkbox" a Radio Shack #21-921 center-loaded antenna, which is of more recent design and still available new. This antenna, also designed for back-of-set indoor use, has a short stainless steel top section, a "slim-line" center-loaded coil, and a rigid bottom section which is curved into a right-angle arc and which terminates in a PL-259 (See photo). The antenna is modified for 2-meter use by simply unscrewing the loading coil and top section and clipping a short length of wire (using an alligator or crocodile clip) onto the protruding end of the bottom section to make it a quarter-wavelength (19"). Try a length of wire of about 9½", cutting this down until you get a good match to the transceiver's 50-ohm output. Again, use an s.w.r. bridge mounted directly to the r.f. output connector to adjust the antenna. Simple!



This "back-of-set" indoor CB antenna can be adapted for 2-meter operation in a few minutes simply by unscrewing the loading coil and top section. A 9½" section of stiff wire or bus bar is clipped to the top by an alligator or crocodile clip to make the antenna a resonant quarter-wavelength. (Photo courtesy Radio Shack)

Being a v.h.f. public-service band enthusiast, I also had a Radio Shack #20-161 dual v.h.f. Hi/Lo band, center-loaded monitor antenna. This whip is used to direct-mount to scanners, allowing indoor monitoring of both bands from one antenna (See photo). The antenna telescopes down to about 16" when collapsed and out to 40" when fully extended. It has a Motorola-type auto antenna plug which

*233 Newcastle Lane, Montgomery, AL 36117



⅝-wavelength two-meter antenna using modified CB base loading coil. The antenna is shown installed on a Yaesu FT-221R transceiver. The method of mounting the antenna is described in the text and in fig. 2.

most scanners use. To use this antenna on two, it is necessary only to build a Motorola-to-PL-259 adapter, mount it and the antenna on the back of the transceiver, and telescope the antenna down until about 3½" extends beyond the loading coil. This will approximate a quarter wavelength of 19", the coil having negligible effect. It is adjusted, again, by "tweaking" the length while watching the s.w.r. bridge and adjusting for a near 1:1 match. The coax adapter is easily made by soldering a Motorola-type jack (Radio Shack No. 274-712) into an ordinary PL-259 connector, center-pin to center-pin and shield-to-shield. Ready-made adapters are available commercially, from Antenna Specialists, though it's easy enough to make your own. Fig. 1 shows how it's done.

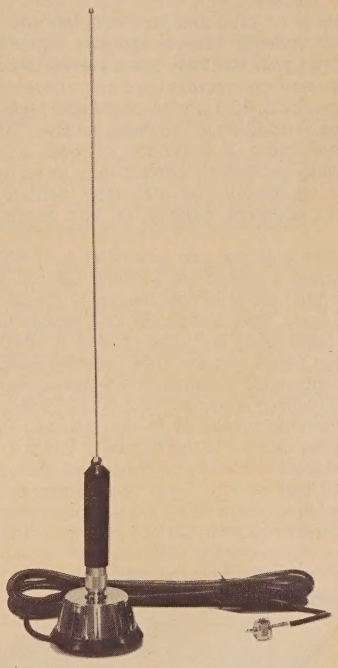
One point to keep in mind: while the CB antennas will easily take the output of your transceiver, the v.h.f. monitor antenna is really designed for receiving only, so keep the power down. The coil may be damaged if you try to apply power levels out of the 10-20 watt class.

Some Other "Instant" 2-Meter Antenna Ideas

While all three of the antennas described work quite well —at least as well as any indoor antennas can be expected to work—you can have some fun homebrewing your own "instant" two meter antennas at minimum cost.

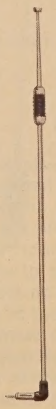
Easiest of all is the basic quarter-wave vertical rod. This antenna is easily constructed using a 19" length of stainless steel whip (such as off a junked auto or CB antenna), a UG-175/U or UG-176/U coax reducer, a PL-259, and a standard right-angle coax connector. The stainless steel rod is simply inserted into the center-pin of the PL-259 and reducer combination and is epoxy-glued into place. You can start with a slightly longer whip if you like and can clip off a ⅛" at a time until the s.w.r. is "right on." Of course, if your transceiver has a top-mounted coax connector, you won't need the right-angle connector, whose purpose is to allow the antenna to be oriented vertically from the connector on the back of the set. I have also used this antenna indoors with a HW-202 transceiver, which uses an RCA-type phono-jack for r.f. output connections. In this case, I also use a PL-259-to-RCA-type adapter to allow the antenna to be installed on the back of the set.

There is also a "plus" in building this antenna: If you have a standard CB trunk-mount installed on your car, you will find that you can unscrew your CB coil assembly and screw on the 2-meter whip. All that has to be done to mate with most standard mounts is to cut down the center pin on the antenna's PL-259 a bit, until it is able to screw on to the threads of the mount. You have to cut the center pin down some, since the standard PL-259 center pin would "butt" against the center pin of the trunk-mount too tightly, preventing the outer shell threads from "catching". Just cut back enough of the pin to allow the threads to catch and the antenna to be screwed onto the mount.



If you're looking to go mobile in a hurry, this Kantronics quarter-wavelength 2-meter antenna kit *may be for you. The most interesting feature is its price: $8.95! (Photo courtesy Kantronics, 1202 E. 23rd St., Lawrence, Kansas 66044).*

Another antenna that will work well indoors is the ⅝ wavelength vertical, mounted directly to the transceiver. The problem in using a ⅝ wavelength antenna, of course, is that an impedance-matching coil is needed to get its base impedance to match the transceiver's 50-ohm output. To



This Radio Shack v.h.f. monitor antenna will give a good account of itself on two meters with no modification at all—just collapse it until it is a quarter-wavelength long, about 19". You will need to make a simple Motorola plug-to-PL259 coax adapter to mate with most transceivers. (Photo courtesy Radio Shack)

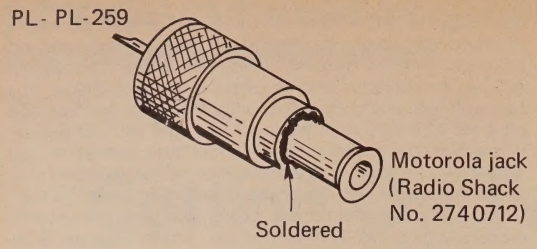
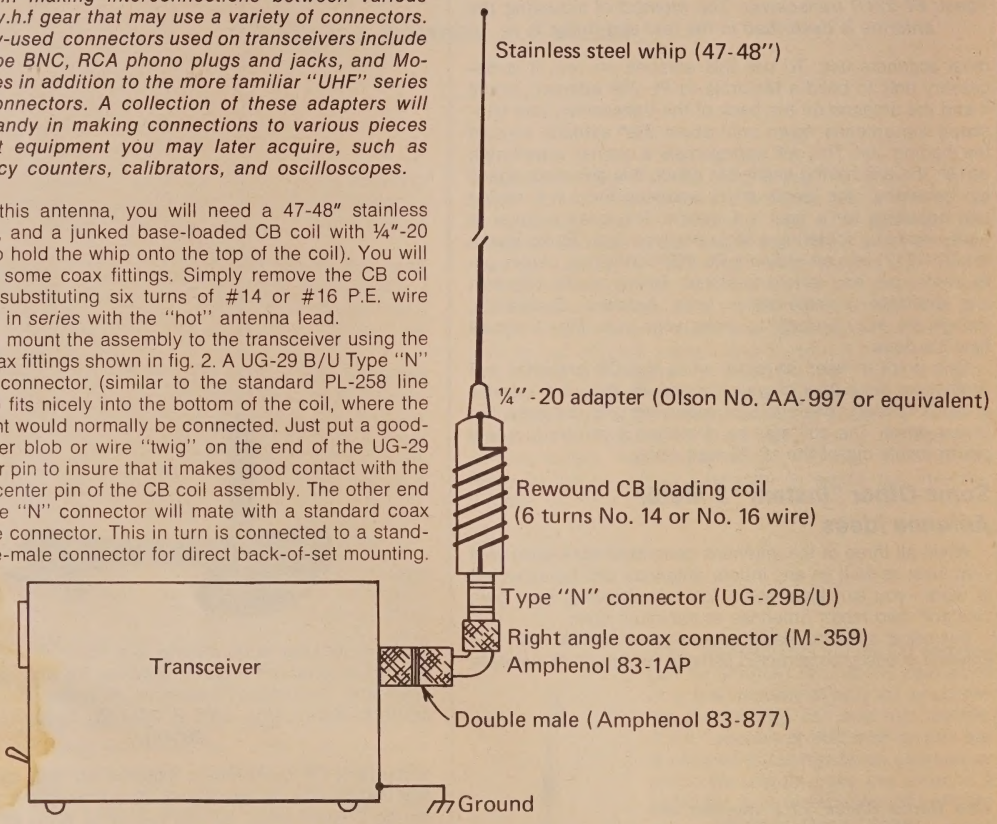


Fig. 1—Motorola to PL-259 adapter. This handy adapter is used for connecting Motorola "car radio" type fittings to standard coax connectors. It can be fashioned in a few minutes from a PL-259 plug and Motorola-type jack. While your soldering iron is still warm, consider making up a variety of r.f. plug and jack adapters that will come in handy in making interconnections between various pieces of v.h.f gear that may use a variety of connectors. Commonly-used connectors used on transceivers include type F, type BNC, RCA phono plugs and jacks, and Motorola types in addition to the more familiar "UHF" series coaxial connectors. A collection of these adapters will also be handy in making connections to various pieces of r.f. test equipment you may later acquire, such as frequency counters, calibrators, and oscilloscopes.

construct this antenna, you will need a 47-48" stainless steel whip, and a junked base-loaded CB coil with ¼"-20 adapter (to hold the whip onto the top of the coil). You will also need some coax fittings. Simply remove the CB coil windings, substituting six turns of #14 or #16 P.E. wire connected in *series* with the "hot" antenna lead.

You can mount the assembly to the transceiver using the special coax fittings shown in fig. 2. A UG-29 B/U Type "N" coax line connector, (similar to the standard PL-258 line connector) fits nicely into the bottom of the coil, where the base mount would normally be connected. Just put a good-sized solder blob or wire "twig" on the end of the UG-29 B/U center pin to insure that it makes good contact with the recessed center pin of the CB coil assembly. The other end of the Type "N" connector will mate with a standard coax right-angle connector. This in turn is connected to a standard double-male connector for direct back-of-set mounting.

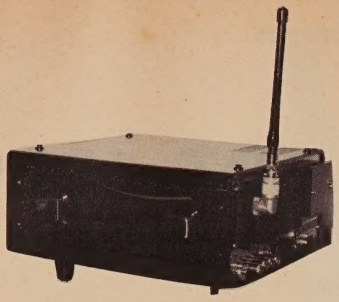


The only part that may give you some problem is finding the N-connector. However, these are common and cheap at surplus outlets and at practically every hamfest. You can substitute a standard PL-258 double female coax line connector by soldering a piece of wire to the recessed center pin to allow it to make good contact with the CB coil's center pin. Also, you can use a long telescoping walkie-talkie whip for the top section if you can't conveniently obtain a 47" stainless steel rod. However, you may have to experiment to see how to mechanically adapt it to fit the top of the coil, as they're all different. These replacement whips are available for about $2 up from Lafayette Radio, Olson Electronics, Burstein-Applebee, and other major mail-order suppliers. Be sure you get one that extends out to at least 47".

The ⅝-wavelength antenna is easily tuned to frequency by either adjusting the antenna length or squeezing/spreading apart the coil turns, observing the s.w.r. bridge and adjusting for a 1:1 reading. In some cases, you may have to remove a turn of coil winding to get a good match. Trial-and-error is the only practical way to do this.

There is a "plus" with this antenna, too. Since you now have an assembly that is compatible with standard CB hardware, you can also use the antenna for mobile operation by unscrewing the coax adapter hardware and screwing your modified CB coil onto your regular trunk mount. This idea is explained in detail in my article, "Rock Bottom 2-m Antenna," which appeared in the August 1977 issue of *73 Magazine*.

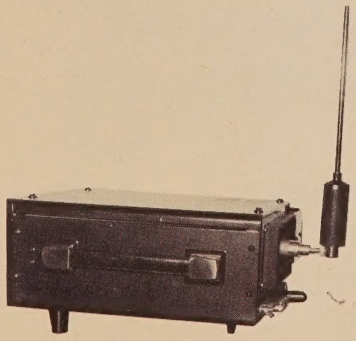
Fig. 2—Back-of-set ⅝-wavelength antenna. The antenna shown here uses a rewound CB loading coil and some coaxial hardware to make an improved back-of-set radiator. The CB coil is converted by removing both series and shunt windings, and rewinding a single series winding of about 6 turns on the form. Final adjustment should be made using an SWR bridge connected at the r.f. output of the transceiver. While not shown in the diagram, a standard CB spring can be mounted above the rewound loading coil if desired. This would be useful if you want to use the antenna mobile—it will, of course, fit the standard trunk mounts and can be used very successfully for mobile work.



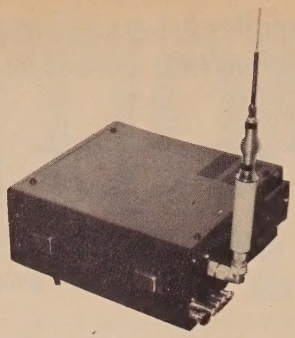
Hy-Gain "Rubber Ducky" installed on back of author's transceiver allows almost "instant" portable operation. Antenna fittings on the transceiver require the use of a "BNC-to-UHF" adapter on the "Rubber Ducky" and a standard coax elbow-joint, as described in the text.

Incidentally, if you have trouble in adjusting any of these antennas using an s.w.r. bridge, it may be due to the bridge getting into the field of the antenna, causing unreliable readings. Once you're close to the right length, you can trim the antenna so that the r.f. output meter on the transceiver reads about the same as when you use a 50-ohm dummy load. This should approximate a good match and give satisfactory results.

Not to be overlooked as sources of quick, instant 2-meter portable antennas are walkie-talkie "Rubber Duckies." While these won't give as good an account of themselves as ¼ or ⅝-wavelength whips, they are better than no antenna at all. The problem, of course, is that most of them are designed for walkie-talkie use which usually means that they use small-diameter connectors, such as "BNC" or "F"-types. If your walkie-talkie uses either of these, you can still use the "duck" with your standard PL-259-type transceiver by constructing adapters to mate with it. For example, you can use an F-type chassis mount soldered to the rear of a PL-259 to use Wilson-type rubber ducks with standard fittings, using a right-angle coax connector to allow the duck to be oriented vertically. You can do the same thing with BNC chassis connectors. Since BNC's are also readily available in right-angle types, you have the choice of using either a right-angle BNC or standard coax elbow connector for vertical mounting. Ready-made BNC-to-coax adapters are commercially available, and are known as the UG-273/U. One caution: Don't roast the duck! Keep the power levels into the ducks reasonable—they're not designed for high-power work.



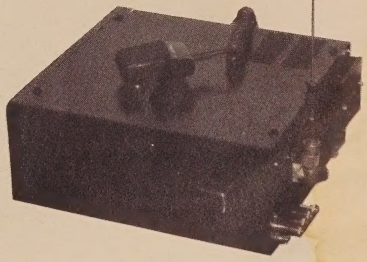
Lafayette indoor CB antenna used as a "quickie" two meter antenna by merely shorting across the loading coil and adjusting the telescoping whip sections for minimum s.w.r. or best loading of the transceiver.



⅝-wavelength two-meter antenna using modified CB base loading coil. Antenna is installed on top of author's FT-221R transceiver. See text for details.

Interestingly, while on the subject of "rubber ducks," Russell Industries (3069 Lawson Blvd., Oceanside, NY 11572) makes an unbelievable assortment of practically any kind of flexible antenna you might want. These are available in any type of connector, from CB frequencies through u.h.f. I counted more than 85 different versions in their 1977 price list!

In addition to the "instant" antenna we've described in some detail, if your idea of ham fun is to take your f.m. rig to the mountains, you may want to invest in a *directional* antenna for "physical selectivity." You can buy small multi-element Yagis from a number of manufacturers such as Cush-Craft, Hy-Gain, and many others. Or, since physical construction is a "snap" at these short wavelengths, you can easily build your own. You can even cut down a Channel 6 TV antenna for 2-meter use!



Simple quarter-wavelength whip is installed in a PL-259 for back-of-set portable operation. The black object above the connector is added for appearance only (a test-lead cover made of rubber).

A small point, but one worth making: If you plan to do any extensive v.h.f. operating and experimenting, make up a few sets of the most frequently needed adapter plugs and jacks. Various combinations of adapters, such as BNC-to-coax, F-to-BNC, F-to-coax—to name a few—will come in very handy once you've accumulated a variety of antennas, test equipment and transceivers having connectors that don't match. Swapfests and hamfests are the best and least-cost sources of the connectors needed to make these adapters.

(Continued on page 86)

Carl Drumeller brings a vintage rig to life and proves the old axiom that more is not always better.

STATE OF RADIO ART, 1929

BY CARL C. DRUMELLER*, W5JJ

The Federal Radio Commission laid down hard rules for technical standards relating to amateur radio transmitters. These went into effect in 1929 and were drastic enough to cause a minor revolution in the design of equipment built for years to come. Frequency stability for the first time became a matter of primary consideration.

There was the usual protest from those who were devoted to the old standards; rather, the old lack of standards. But radio amateurs, as is ever their custom, rose to compliance with the new guidelines. One result was "The 1929 Transmitter."

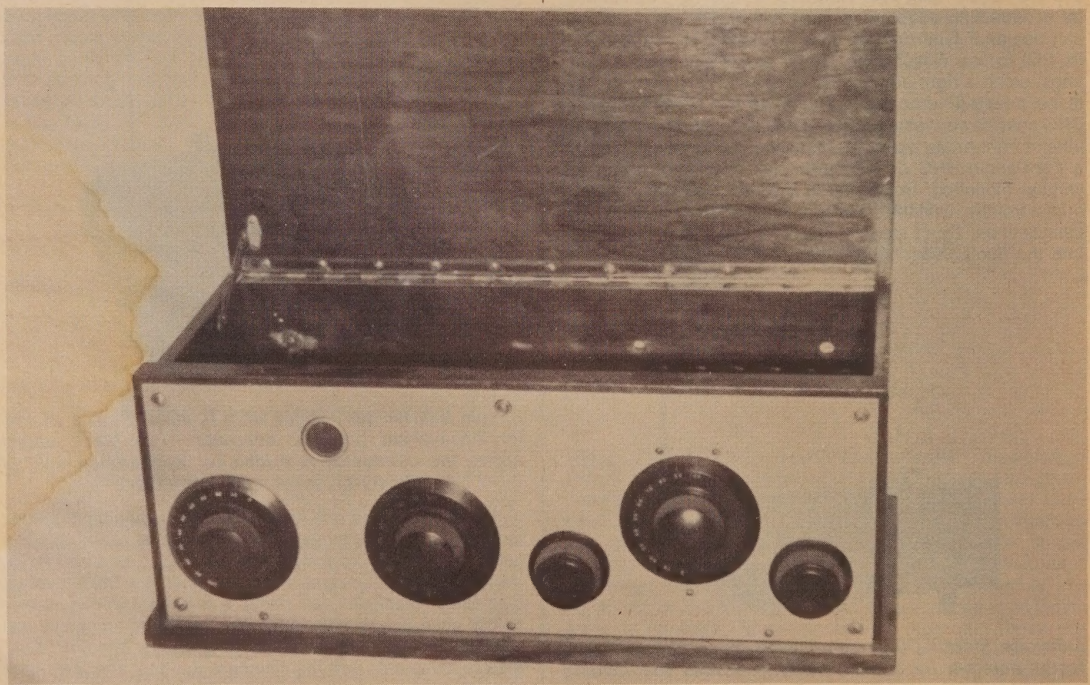
Unlike previous designs, the 1929 transmitter featured rugged construction. The tuning capacitor had much higher capacitance than formerly. The tuning coil was of copper tubing, even for transmitters of a few watts input power. The purpose, of course, was to achieve a high Q in the frequency-determining "tank" circuit. So those components were made as low in loss as possible and were mounted so as to exhibit high mechanical stability.

Such techniques produced results that are impressive, even by today's standards. That statement is based upon the writer's having recently operated a 1929 transmitter on 3.5 MHz radio-telegraphy. The received reports differed in no degree from those relating to transmissions made from a modern transmitter!

In 1929 the writer's older brother, G. Edward Drumeller, at that time W9FXQ, built a transmitter and a separate receiver in one cabinet. The transmitter was built to strict compliance with the specifications for "The 1929 Transmitter." It, as was the usual practice for that time, used the UX-210 triode tube in a Hartley oscillator circuit. The receiver had the customary tube line up of three UX-230s as regenerative detector and two stages of audio frequency amplification. Transformer coupling was used. This transmitter/receiver combination performed admirably well on the 3.5, 7, and 14 MHz bands. Plug-in coils, wound on

(Continued on page 88)

*5824 NW 58, Warr Acres, OK 73122



Front view of the transmiter/receiver. From left to right: transmitter frequency control, transmitter loading, receiver regeneration control, receiver frequency control, receiver volume control.

VENTION® 78

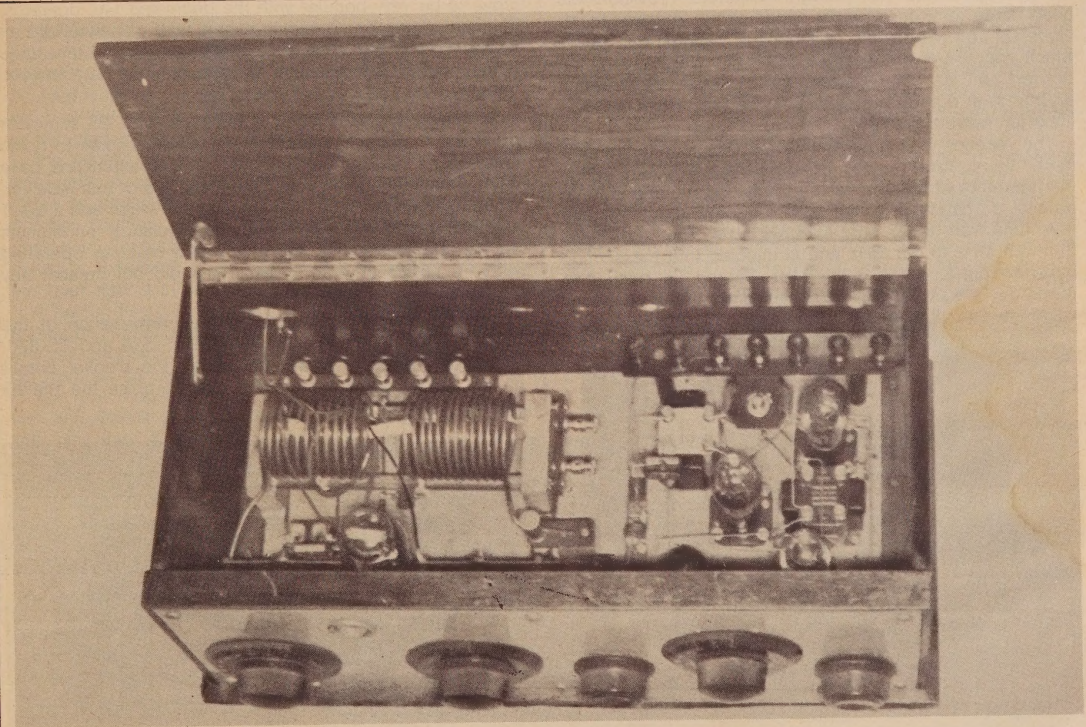
If you have registered within the last 3 years you will receive a program and information brochure in March.

Admission $3 in advance, $4 at the door. Saturday night banquet $8 per person. Flea Market space $5 to $8 per space depending on number of spaces. At door only. Make check payable to: Dayton Hamvention, P.O. Box 44, Dayton, Ohio 45401.

For special hotel/motel rates and reservations information write to above address. Inquiries: call 513-854-4126.

See you at the world's largest Ham Convention!

Saturday evening April 29.



Top view of the transmitter/receiver. Note the use of heavy copper tubing for the inductors; also not the square-corner, bus-bar wiring of the receiver.

Carl Drumeller brings a vintage rig to life and prov the old axiom that more is not always better.

STATE OF RADIO A

BY CARL C. DRUMELLER*, W5JJ

The Federal Radio Commission laid down hard rules for technical standards relating to amateur radio transmitters. These went into effect in 1929 and were drastic enough to cause a minor revolution in the design of equipment built for years to come. Frequency stability for the first time became a matter of primary consideration.

There was the usual protest from those who were devoted to the old standards; rather, the old lack of standards. But radio amateurs, as is ever their custom, rose to compliance with the new guidelines. One result was "The 1929 Transmitter."

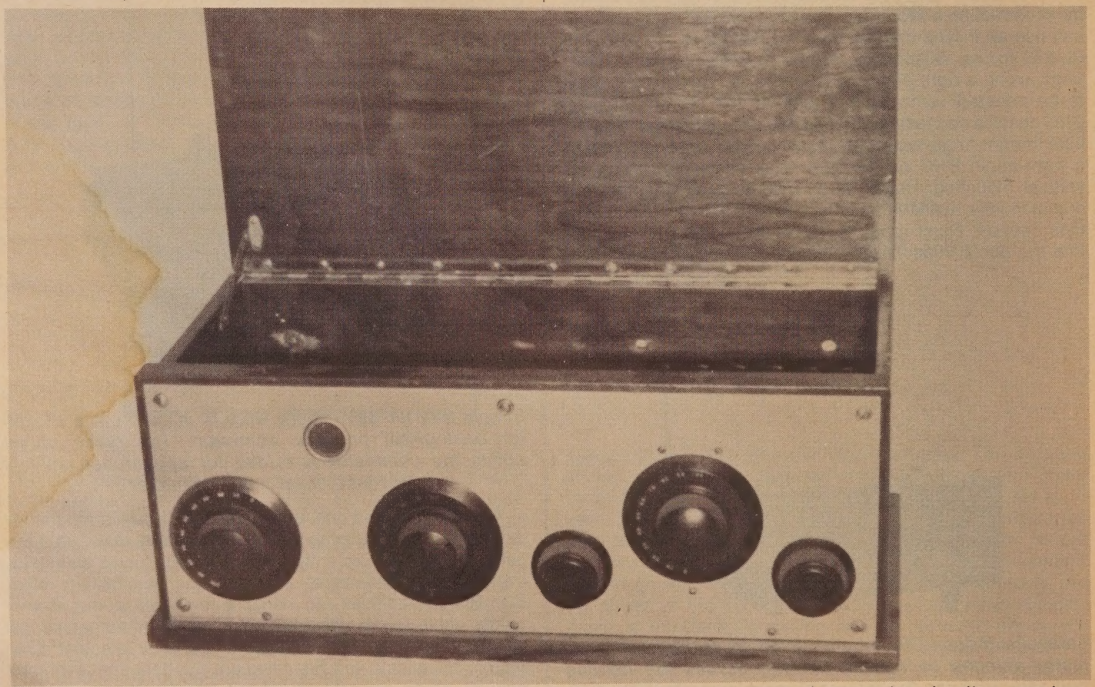
Unlike previous designs, the 1929 transmitter featured rugged construction. The tuning capacitor had much higher capacitance than formerly. The tuning coil was of copper tubing, even for transmitters of a few watts input power. The purpose, of course, was to achieve a high Q in the frequency-determining "tank" circuit. So those components were made as low in loss as possible and were mounted so as to exhibit h

Such technique even by today's s the writer's having 3.5 MHz radio-tel no degree from th a modern transm

In 1929 the wri at that time W9F> ceiver in one ca compliance with mitter." It, as wa the UX-210 triode receiver had the customary tube line up of three UX-230s as regenerative detector and two stages of audio frequency amplification. Transformer coupling was used. This transmitter/receiver combination performed admirably well on the 3.5, 7, and 14 MHz bands. Plug-in coils, wound on

(Continued on page 88)

*5824 NW 58, Warr Acres, OK 73122



Front view of the transmiter/receiver. From left to right: transmitter frequency control, transmitter loading, receiver regeneration control, receiver frequency control, receiver volume control.

HAMVENTION® '78

April 28, 29, 30.
At Hara Arena,
Dayton, Ohio

This year's Dayton Hamvention promises to be the biggest and best yet!

Start with more exhibit and flea market space than before. Then: • informative programs • new products • technical sessions • ARRL and FCC forums • special and group meetings • ladies' programs • transmitter hunts • total value of prizes exceeds $15,000.

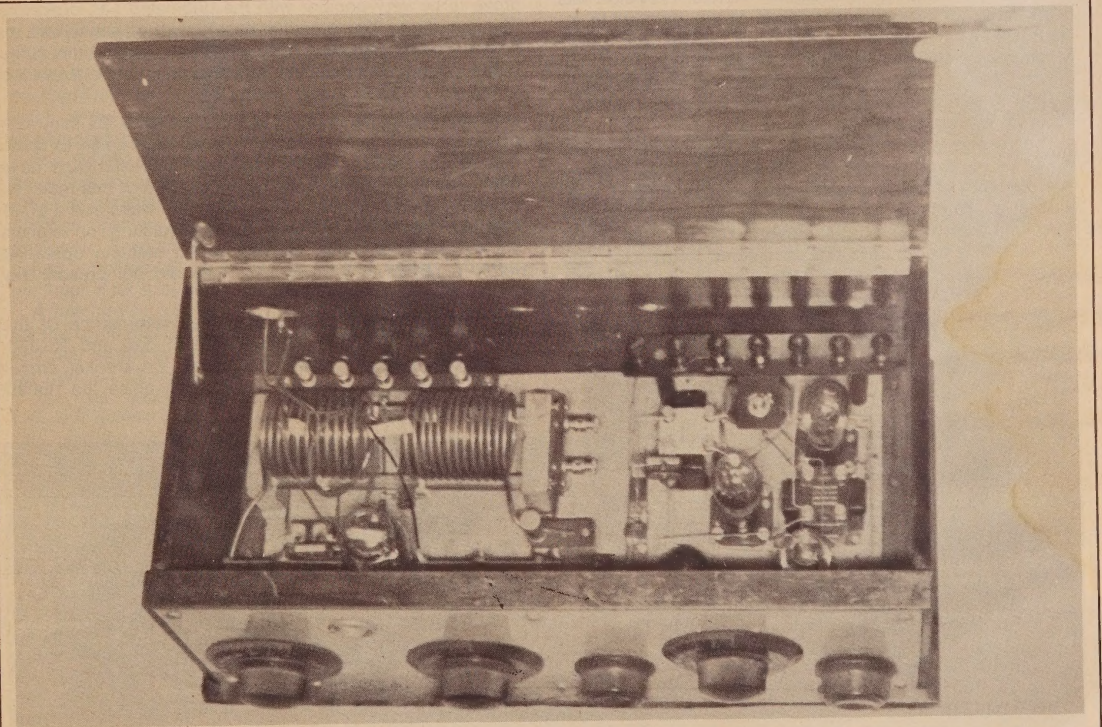
Top it all off with the Grand Banquet, Saturday evening April 29.

If you have registered within the last 3 years you will receive a program and information brochure in March.

Admission $3 in advance, $4 at the door. Saturday night banquet $8 per person. Flea Market space $5 to $8 per space depending on number of spaces. At door only. Make check payable to: Dayton Hamvention, P.O. Box 44, Dayton, Ohio 45401.

For special hotel/motel rates and reservations information write to above address. Inquiries: call 513-854-4126.

See you at the world's largest Ham Convention!



Top view of the transmitter/receiver. Note the use of heavy copper tubing for the inductors; also not the square-corner, bus-bar wiring of the receiver.

CQ Reviews:
The Kenwood R599D Receiver and the T599D Transmitter

BY HUGH R. PAUL*, W6POK

The development of the amateur transceiver into its present form has been viewed by this author as a mixed blessing. High performance in a compact portable package is a wonderful thing, but there are still situations where separate transmitter/receiver combinations make sense. The more ardent c.w. operators among us usually prefer separate units, while Oscar devotees find a separate receiver for use with converters almost mandatory. Over the coming months we will make an effort to evaluate some of the available transmitter/receiver combinations.

The Kenwood R599D receiver and T599D transmitter are the latest versions of a model that first appeared on the market in the late sixties. While the appearance of the units has changed very little over the years there have been internal changes which have improved performance, primarily in the receiver.

The R599D receiver is an all solid state device covering the amateur bands 160 through 10 meters. Provision has been made for extending the range of the receiver to include six and two meters by means of optional converters which may be easily installed internally. Selection of the desired v.h.f. band is by means of an auxiliary band switch on the lower right front panel. The unit tested did not have these converters installed.

The receiver is a dual conversion design with the first mixer being fixed tuned. Bandswitched crystals control the frequency of the heterodyne oscillator. The first i.f. consists of a band pass filter with a bandwidth of 600 kHz extending from 8.895 MHz to 8.295 MHz. The v.f.o. tunes from 4.9 MHz to 5.5 MHz and is injected into the second mixer to produce the 3.395 MHz second i.f. frequency. 3SK22 FETs are used for the r.f. amplifier, first and second mixers and the first stage of the second i.f. There is a total of three stages of amplification in the second i.f.

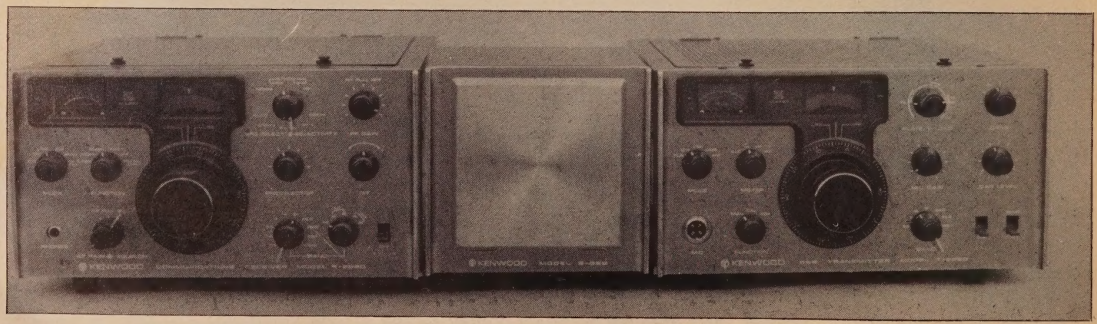
Crystal filters determine the selectivity of the second i.f. A total of four are included with the R599D, one each for c.w., s.s.b., a.m. and f.m. Bandwidth of the filters at the −6 dB points are 500 Hz, 2.4 kHz, 5 kHz and 20 kHz. A unique feature of this receiver is the means of selecting the desired crystal filter for a given mode. Any crystal filter may be switch selected while in a given mode or the appropriate filter can be automatically selected by the mode switch. When working c.w. I like to use the 2.4 kHz s.s.b. filter because the resulting audio response is more pleasing to my ear. If the QRM becomes too great then I switch in the narrower bandwidth c.w. filter.

There are three separate audio detectors in the R599D: a balanced ring type diode detector for c.w. and s.s.b., a single diode detector for a.m., and a ratio detector preceded by a limiter stage for f.m. A squelch circuit is also included, but it is of the audio derived type and thus requires a really strong signal to trigger it open. It would not prove to be very popular with the dedicated f.m. operator. The audio amplifier provides over 1 watt of power into an 8 ohm load at less than 10% distortion. I found the audio quality to be very pleasing with the companion Kenwood speaker.

Sensitivity of the receiver is excellent with .25 microvolt providing a signal in excess of 10 dB plus noise to noise ratio on all bands. Crossmodulation characteristics have been greatly improved over earlier models of this receiver. When my ham neighbor was on with 200 watts and a quad antenna, there was definite crossmodulation on signals out to about 100 kHz. More powerful stations operating within a radius of from ½ to 1 mile did not present any problems.

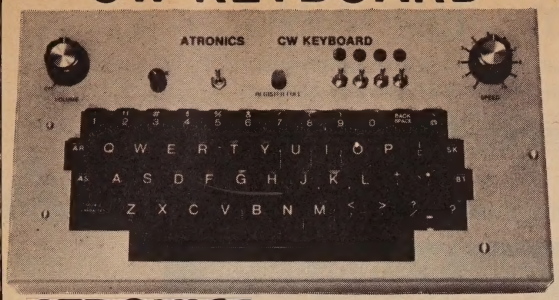
It was interesting to compare the performance of the noise blanker in the R599D with the TS-520 and TS-820. On certain types of power line noise the blanker circuit in the R599D was superior. On ignition noise the R599D was not quite as good.

*291 Macalester Drive, Walnut, California 91789



Front view of the Kenwood station. From left to right, R599D, S599D and the T599D.

CW KEYBOARD



Plug it in like a key and send perfectly timed Morse code as easily as typing a letter. Sidetone and buffer register make it simple to send at the speed you select.

Available directly from the factory for $225 plus. postage & handling. Mastercharge or Bankamericard accepted. Call or write to order or request complete specifications.

MEMORY OPTION

Now available for $89.00 with Keyboard

ATRONICS Box 2946 • Laguna Hills, CA 92653 • Phone: (714) 830-6428

GET ORGANIZED!

Here's a set of 4 sturdy files that holds over 4 years of your favorite 8½ × 11 magazines.

4 MAG FILES $4.95

Send $4.95 plus $1.00 for postage and handling to:
DGM INDUSTRIES
P.O. Box 222, Cheshire, CT. 06410
(Conn. residents add 7% sales tax)



DIPOLES TRAPS COILS

NEW 160-80-40 TRAP DIPOLE 104 FT. LONG
See CQ Jan'78 Page 30. TD-160 $41.95 & 3.00 UPS
Other Models Available - Trap - Parallel 80-10
Send Stamp or SASE for Catalog
Phone Orders Welcome - VISA - Mastercharge

BALUNS

ANTENNA SUPERMARKET

(813) 585-9688
P.O. Box 1682
Largo, FL 33540

MULTIBANDS

VERTICALS PORTABLES

Apollo Products-Little Giant Trans Systems Tuner Kit — $122.50

Designed and engineered after "Apollo" — "Little Giant" 2500X-2, for an "engineered performance" Trans Systems Tuner and Adaptations of the Lew McCoy Transmatch, with power handling at the KW plus level!



Kit includes:

1 200 pfd wide-spaced variable with isolantite insulation rated 3,000 volts
1 200 pfd dual section parallel condenser isolantited
2 finger-grip pointer knobs 2" diam. white indented
1 pvc insulated shaft couplings ¼ to ¼
3 SO-239 coax chassis connectors. Tunes 52 ohm or 52-300-600* or random wires
1 heavy inductance for 10-15-20-40-80 meters
6 pvc stand-offs, 4 for condensers and 2 for inductance
1 HD switch for band catching 10 thru 80 meter coverage
1 pkg 12-gauge tinned round wire
Cabinet included — Apollo "Shadow Boxes" M Kit includes schematic. Recommend parts layout.
INFO NOTE *377 OHM and **600 OHM "Open wire spaced ladder line" air dialectric.
*53 x wire diam. **84 x wire diam. info only — not supplied.

Apollo Products, Box 245, Vaughnsville, Ohio 45893 419-646-3495
Subsidiary "Little Giant Antenna Labs"

Earlier versions of the R599 used a stepped attenuator pad in the front end to control receiver gain. In the current model there is a standard r.f. gain control, made possible by improvements in the strong signal handling characteristics of the receiver. Fast or slow a.g.c. can be selected or disabled by the function switch.

The R599D can be interconnected with the T599D for transceive operation. A switch selects either the transmitter or receiver v.f.o. for frequency control of both units. Another position of the same switch allows independent operation. Frequency stability of the transmitter and receiver is extremely good, with drift well under 100 Hertz per hour after a three minute warmup.

A few birdies can be found at various spots on the dial, mostly on the 80 and 15 meter bands. They did not cause any real problems since they were down in excess of —50 dB from an S9 signal.

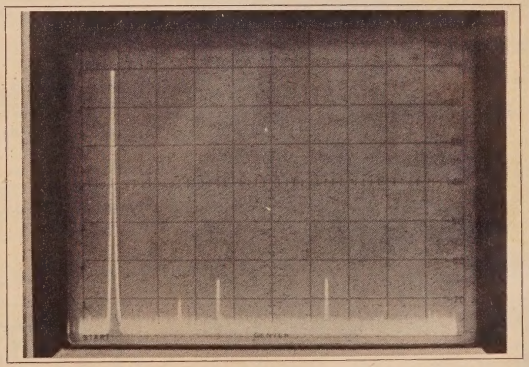
The dial mechanisms are extremely smooth in operation and exhibit very low backlash. Dial accuracy is good with less than 1 kHz error when tuning from one end of the band to the other. A WWV receive position on the receiver band switch facilitates calibration of the built in 25 kHz calibration oscillator.

The T599D transmitter has not changed a great deal over the years. It is solid state except for a 12BY7 driver and a pair of 6146B finals. Unlike the receiver, the transmitter does not cover 160 meters. I think this a mistake and hope that Kenwood will rectify this omission in the future.

Transmitter power input is rated at 160 watts on c.w., 200 watts PEP on s.s.b., and 80 watts on a.m. Power output on c.w. ran from 90 to 105 watts, depending on the band. Third order distortion products averaged 29 dB below the single tone of a two tone test. Carrier suppression was a —48 dB, while sideband suppression was exactly —40 dB on upper sideband and a —38 dB on the lower sideband. The spectrum analysis of the 10 meter output shows the second and third harmonics down from full output by a —55 dB. All other spurious was in excess of a —60 dB down from full output.

On the air tests with the T599D resulted in reports of good audio quality. When compared with a TS520 and its built-in audio speech processor, stations reported that the R599D lacked the audio punch of the TS520. With the speech processor disabled, listening stations could not tell any difference in audio quality between the two units. It

(Continued on page 88)



The spectrum analysis of the 10 meter output shows the second and third harmonics down from full output by a —55 dB.

A VERY IMPORTANT ANNOUNCEMENT FROM MOR-GAIN

WORLD'S LARGEST SPECIALISTS IN THE DESIGNING, DEVELOPING AND MANUFACTURING OF "NO COIL, NO TRAP" ANTENNA SYSTEMS.



multi-band HF communications antennas – half size · full performance

We're Pleased to Introduce Two New Models Specifically Designed for the Novice or Technician

80-10HD(N/T) 69' overall length ... for 80/40/20/15/10 meter coverage $81.50

80-40HD(N/T) 69' overall length ..... for 80/40 meter coverage $63.75

No antenna tuner required. Completely factory assembled and tuned specifically for the novice/technician bands. Both models can be easily re-tuned for higher license class allocations in just a few minutes.

● *There is no better antenna at any price . . .* ***W9QIO*** ● *I had a Mor-Gain antenna and liked it extremely well . . .* ***K4JMR*** ● *The antenna has worked out well with very good reports . . .* ***W2TVK*** ● *I can only give glowing reports about it . . .* ***WA2IRN*** ● *I have used these fine antennas before and see no reason to change now . . .* ***W6BF*** ● *It has given me excellent service and results . . .* ***W6CZS*** ● *I believe I have "sold" your antenna to almost every ham I have talked to . . .* ***W4AHN*** ● *Its performance here far surpasses any other antenna that I have had . . .* ***WA5GGS*** ● *For several years I have used the Mor-Gain and have been very satisfied . . .* ***K2TSD*** ● *Am letting everybody know that it has been doing a good job for me . . .* ***VE2VW*** ● *The antenna is performing just beautifully . . .* ***W8WDZ/6*** ● *My 75-40 has performed beautifully and I'm very happy with it . . .* ***WB8DMB*** ● *Another chap said he had also used it and that it was the greatest . . .* ***W4NSP*** ● *I do not hesitate to recommend the antennas to others . . .* ***K0SPR*** ● *I heard a ham extolling the virtues of your antenna . . .* ***WB0PTM*** ● *I worked a station last night and the Mor-Gain was doing quite a job for him . . .* ***WA3TCV***

NO TRAPS, NO COILS, NO STUBS NO CAPACITORS



MOR-GAIN HD DIPOLES . . . ● One half the length of conventional half-wave dipoles. ● Multi-band, Multi-frequency. ● Maximum efficiency - no traps, loading coils, or stubs. Fully assembled and pre-tuned - no measuring, no cutting. ● All weather rated - 1 KW AM, 2.5 KW CW or PEP SSB. ● Proven performance - more than 15,000 have been delivered. ● Permit use of the full capabilities of today's 5-band xcvrs. ● One feedline for operation on all bands. ● Lowest cost/benefit antenna on the market today. ● Fast QSY - no feedline switching. ● Highest performance for the Novice as well as the extra-class op.

EXCLUSIVE 66 FOOT, 75-10 METER DIPOLES

● All models above are furnished with crimp/solder lugs. ● All models can be furnished with a SO-239 female coaxial connector at additional cost. The SO-239 male coaxial cable connector. To order this factory installed option, add the letter 'A' after the model number. Example: 40-20 HD/A. ● 75 meter models are factory tuned to resonate at 3950 kHz. (SP) models are factory tuned to resonate at 3650 kHz. See VSWR curves for other resonance data.

No. 16 40† Copper Weld wire annealed so it handles like soft Copper wire - Rated for better than full legal power AM/CW or SSB-Coaxial or Balanced 50 to 75 ohm feed line - VSWR under 1.5 to 1 at most heights - Stainless Steel hardware - Drop Proof Insulators - Terrific Performance - No coils or traps to break down or change under weather conditions - Completely Assembled ready to put up - Guaranteed 1 year ONE DESIGN DOES IT ALL; 75-10HD - Only $12.00 a band!

Model	Bands (Meters)	Price	Weight (Oz/Kg)	Length (Ft/Mtrs.)
40-20 HD	40/20	$49.50	26/.73	36/10.9
80-40 HD	80/40 ½ 15	57.50	41/1.15	69/21.0
75-40 HD	75/40	55.00	40/1.12	66/20.1
75-40 HD (SP)	75/40	57.50	40/1.12	66/20.1
75-20 HD	75/40/20	66.50	44/1.23	66/20.1
75-20 HD (SP)	75/40/20	66.50	44/1.23	66/20.1
75-10 HD	75/40/20/15/10	74.50	48/1.34	66/20.1
75-10 HD (SP)	75/40/20/15/10	74.50	48/1.34	66/20.1
80-10 HD	80/40/20/15/10	76.50	50/1.40	69/21.0

NOVICE LICENSE OPERATION. The MOR-GAIN HD Dipole is the ideal antenna for the new or Novice operator. As the Novice progresses to higher license classes, he can easily re-tune the HD Dipole to the new frequencies of his higher frequency privileges. The HD Dipole is thus a one-time investment. HD Dipoles are available for all Novice frequencies.

LEAST COST. Dollar for dollar, the HD dipoles are the highest performance, least cost multi-band antennas on the market today. For example: the 5-band 75-10 HD dipole costs less than $15.00 per band - an unbeatable low cost.

LIMITED REAL ESTATE. Where real estate for antenna installation is limited, the HD dipole is the ideal solution. Operation on 80/75/40 meters is now possible since the HD dipole is only half the length of a conventional half-wave dipole. For all around operation, the HD dipole will outperform any trap loaded horizontal or vertical dipole.

Above Models furnished with lug terminations. Cap-female SO-239 connector assembly – $3.75 additional. Include $2.50 for Shipping & Insurance with your order.

Mor-Gain
2200 C South 4th Street
Leavenworth, Kansas 66048
(913) 682-3142
Monday-Friday: 9AM-5PM CST

MOR-GAIN

BankAmericard, Visa, and Mastercharge are available.

BANKAMERICARD master charge VISA

Please write for fully descriptive 6-page brochure. Contact your favorite dealer or order direct from Mor-Gain.

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast slit open the fat envelope with a practiced hand. He extracted a bulging bundle of photographs and studied them intently. There was a long silence. Finally, I said, "What are the pictures? Are they porno?"

My friend chuckled with delight. "They are better than that", he replied with a grin. "Look at these. When Don, K5DUT, in Cow Town (Fort Worth) sees them, why, he'll cut his throat with a rusty razor blade".

"Do you mean that Cow Town is loosing its claim as the Quad Antenna capitol of the world?", I asked.

In reply Pendergast tossed the photographs across the table to me.

"Look at these pictures from John, K5JA, in McKinney, Texas", he replied. "How about a six element Quad? A tribander for 20, 15 and 10? And how about adding a two element 40 meter Quad to that? And all on a 40 foot boom! What do you think of that?"

"Did I ever tell you the story about the Texans? Well, once an airliner landed in Dallas and everybody was surprised when a whole plane load of midget Texans got off. They all had cowboy boots and Stetson hats and chaps and spurs and the works. However they were only six inches high. Then somebody said to the pilot that they never saw Texans six inches high before. And the pilot said, Well these are . . . (Editor's note: *remainder of joke censored*) . . ."

Pendergast laughed until tears came to his eyes. "That's a great story. I'll have to remember it", he said.

"Suppose you let me see the pictures before you dissolve", I commanded. I took the photos from Pendergast's grasp and studied them.

"Fig. 1 gives you a good idea of K5JA's Monster Quad. The whole antenna weighs close to 200 pounds. The boom is 3" in diameter and 40 feet long. In this picture it is laced to the tower for assembly. The array consists of six elements on 10, 15 and 20 meters having 8 foot spacing. The two larger spiders also have 40 meter elements on them. That makes a two element beam for 40 meters with 24 foot spacing.

"Fig. 2 is a closeup of K5JA atop a 20 foot ladder working on the antenna. Each antenna has its own coaxial feed system".

"How tall is the tower?", asked Pendergast in a subdued tone. "No wonder these guys beat me out. Jeepers".

"John has a 160 foot tower—among others", I replied. "Look at fig. 3. Here is the crew hard at work. K5JA is at the right, working on an element. The other DXers are having a siesta at the foot of the tower. And notice the nice, wide-open countryside".

Pendergast sniffed. "That's OK if you like countryside".

I ignored the remark and continued. "Fig. 4 shows K5JA at the top of the 160 foot tower and a catenary cable slung down. The idea is to pull the Monster Quad up the cable, clearing the guy wires on the way up. The Quad is on the catenary cable in fig. 5 and K5JA is starting up the tower. Everything looks very ship-shape, doesn't it?"

"I have to admit it does", replied

*48 Campbell Lane, Menlo Park, CA 94025.

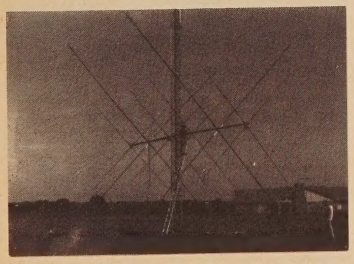


Fig. 1—The Monster Quad of K5JA (McKinney, TX) on the ground, ready to go up the tower. Six spiders are used on a 40 foot boom. A two element 40 meter Quad is on the larger spiders.



Fig. 2—K5JA putting the finishing touches on the beam. There are six elements on 20, 15 and 10 meters. Boom diameter is three inches and antenna weight is about 200 pounds.

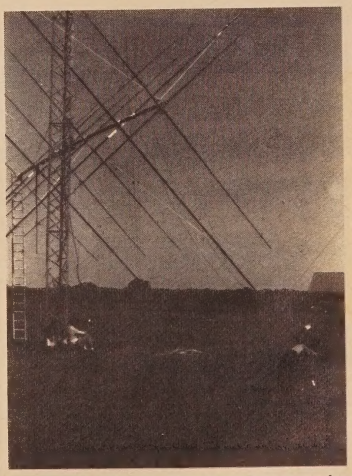


Fig. 3—K5JA hard at work on 40 meter element. Helpers are taking a noontime siesta. Twenty foot ladder in background is used to work on antenna boom when Quad is lashed to tower base.

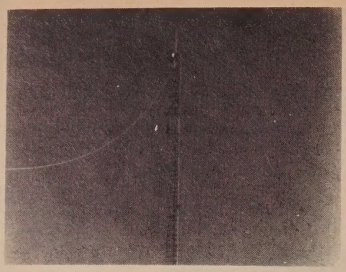


Fig. 4—The 160 foot tower at K5JA with the Old Man at the top. The Monster Quad will be run up the catenary cable in the foreground. A mast is rigged at top of the tower to pass power cable used to tug antenna upwards.

Pendergast with interest. "They certainly do big things down in Texas, don't they?"

"Look at fig. 6", I exclaimed. "Now the Monster Quad is on the catenary cable, just starting up the side of the tower. This is about the stage of the game where—with my luck—I'd drop the antenna! And if you look at fig. 7, you'll see the Quad about half-way up the cable . . . on the way to the top. And *voila!* Look at fig. 8. The Quad is at the top of the tower, safely, and in one piece!"

"Wow", said my friend. "What a project! He looked at the photograph more closely. "What is that object at the bottom of the tower?", he asked.

"That's a two element Mosley F-402 beam for 40 meters. And it's not at the bottom of the tower, it is at the 80 foot level and is aimed at the Caribbean area".

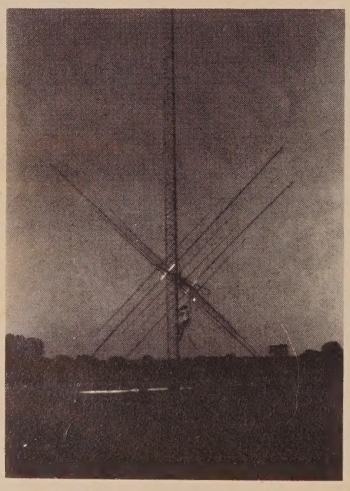


Fig. 5—Final inspection is completed and K5JA returns to ground level. The trick will be to pull the Quad to the tower top without getting entangled with tower guy wires.

"Well, I'll be damned", said Pendergast almost to himself. "Why would anybody want a two element miniature 40 meter beam at 80 feet when they have a two element Quad at 160 feet? Seems very odd".

"Simple", I replied." John says the angle of radiation of the high Quad is so low that he overshoots the Carribean area. In-close, he uses the Mosley at 80 feet. But for long-range 40 meter DX, the high Quad is at least 10 dB better than the Mosley at 80

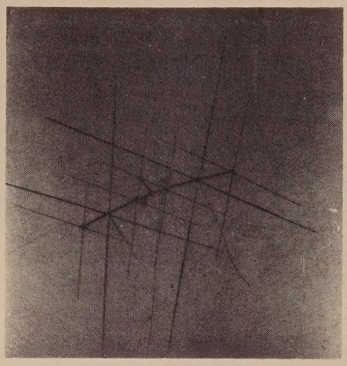


Fig. 6—Operation Skyhook is underway! Huge Quad is being pulled up the catenary cable and is about 20 feet clear of the ground.



Fig. 7—Viewed from the ground, the Quad progresses up the catenary cable. The two large 40 meter elements are visible in this view. Quad is about 50 feet in the air.

feet. What do you think of that?"

"Amazing", replied Pendergast. "And does K5JA have any other antennas to fill in the gaps?"

"Certainly", I said. Look at fig. 9. At the top of the first 160 foot tower is the Monster Quad, with the two element 40 meter beam below it. The second 160 foot tower in the rear has a four element 20 meter beam on it. That's a nice combination".

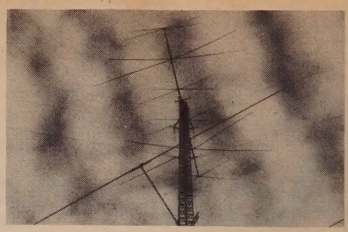


Fig. 8—The Monster Quad safely atop the 160 foot tower at K5JA. A two element beam is affixed to the tower at the 80 foot level for "local" coverage.

"How does the six element Monster Quad on 20 meters compare with the four element Yagi?", asked Pendergast eagerly.

"John says the Quad has the edge, but not by much. Sometimes they are equal on tests, and sometimes the Quad is better. But the Yagi is never better than the Quad".

Pendergast sighed deeply. "Seems to me it's a heck of a lot easier to put a Yagi up than a Quad".

"Perhaps", I replied. "But you have the advantage of multiband operation with the Quad, as opposed to a single-band Yagi. "I think you are just jealous".

Pendergast picked up the last photograph (fig. 10). "Nice sky shot", he remarked.

"Just to make you feel better, and to realize that K5JA isn't the only Big Shot with a Monster Quad, here's a photo of the Quad of K2ON. Look at fig. 11. This array is five elements on 20 meters and *seven* elements on 15

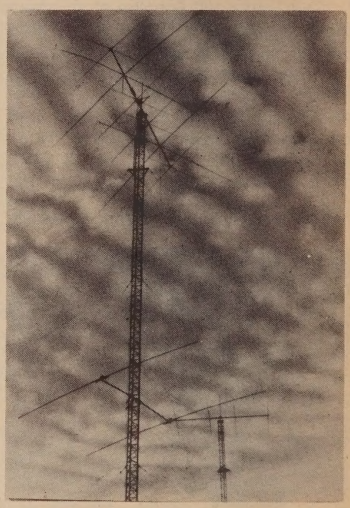


Fig. 9—The K5JA monster Quad with the two element beam below it. In the background is the second 160 foot tower with a wide spaced four element, 20 meter beam on it.

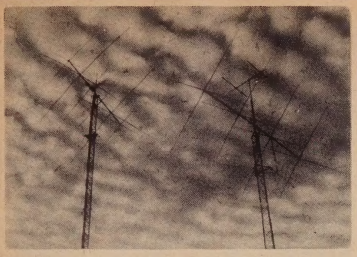


Fig. 10—The four element Yagi at K5JA has been replaced with a four element, triband Quad and a stacked, two meter array. You can do a lot of things if you have the time, space and money!

and 10 meters. I don't know any of the details, as I got the pix of the K2ON Quad from a friend. But it proves that all the big signals don't come from Texas!"

"I must admit I am mentally exhausted from looking at pictures of monster antennas", admitted my friend. "Doesn't *anybody* have a down-to-earth amateur station like mine?"

"Well, I got a note from Joe, WB5LMN, that dispels the big Quad idea. Joe says, 'Just so you won't think that all the Big Guns here in Cow Town (Fort Worth) are using Monster Quads, I am enclosing a picture of perhaps the Top Gun in the area (fig. 12). The antenna is a genuine three element *Bandsmasher* on a 12 foot boom at 13 feet. The antenna exhibits 22 dB gain over a wet noodle.' "

"During the recent DX contest this antenna has demonstrated its superior performance over the Monster Quads over the short path (Fort Worth to Bugtussle). So it all goes to prove that quality, not quantity, is what really counts in snagging those rare ones".

Pendergast snatched the photograph from WB5LMN. He turned it over and read on the back, "This hamshack was spotted in a vacant field near Arlington, Texas. Don't know who it belongs to, but thought you might get a kick out of the picture. 73, and thanks for the fine column each month".

"Well", I said. "Obviously WB5LMN is a gentleman and an astute observer of human nature. This disproves the story I told you earlier about the six inch high Texans!" ■

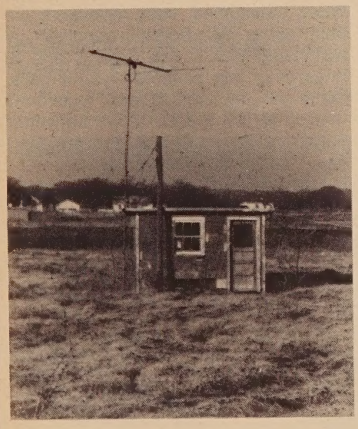


Fig. 11—Showing that all the big signals don't come from Texas, K2ON put up this seven element Quad array. It has five elements on 20 meters and seven elements on 15 and 10 meters. OSCAR satellite antenna is in foreground.

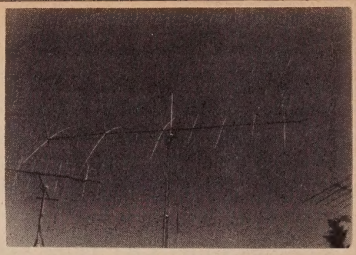
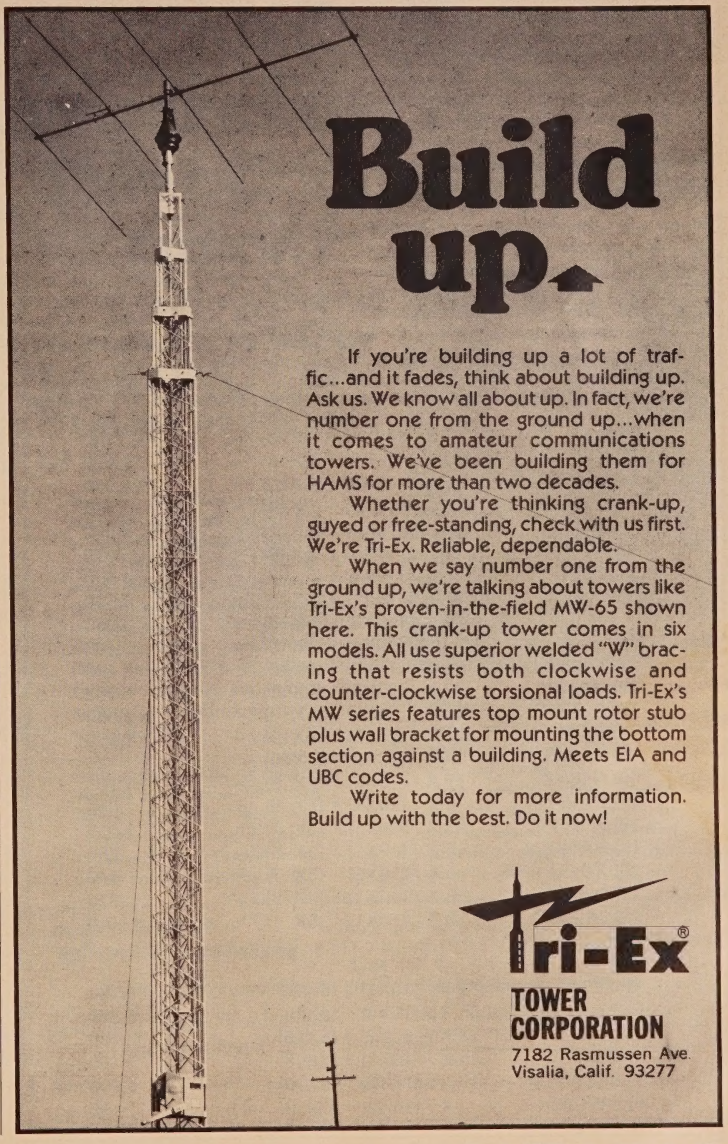


Fig. 12—Just to prove that most Texas amateurs are down-to-earth fellers, WB5LMN sent in this photo of typical Big Gun station near Fort Worth (Cow Town). Antenna has 22 dB gain over a wet noodle, claims WB5LMN.



a monthly feature by

BILL DEWITT, W2DD

In Focus

Television on the Amateur bands

Winners of 2nd Albatross SSTV Contest Announced!

Courtesy of Professor Franco Fonti, I4LCF, we have the results of the 2nd Albatross SSTV Contest. N5EA, W9NTP, and WA2FZT, captured 1st, 2nd and 3rd places respectively in this competition. Congratulations to the winners!

As is the case with most amateur contests, the percentage of those participating who submit logs is very low. A letter from Franco expresses his disappointment that slow scanners seemed reluctant to send in their logs. It's a lot of fun to work new countries, renew old acquaintances, and to see so many pictures coming through during a contest—so why not go one more step and send in your log! When that next contest comes along, BE SURE to submit a log.

*2112 Turk Hill Road, Fairport, N.Y. 14450

When is the next contest? The week end of March 18th and 19th brings us the 8th World Wide SSTV Contest. Where do you send your log? To Prof. Franco Fonti, I4LCF, Via Dollolio n. 19, Bologna, Italy. A contribution of $1.00 helps defray the cost of mailing out contest results etc.

Slow Scan Station of the Month, W7FV (ex K7MRO, WØJKV, W8LFA)

Norris Sapp, W7FV, is a long-time slow scanner whose occupation is the kind of work that most amateurs only dream about! He's the Radio Electronics Officer aboard the container ship S/S Arizona (Radio call sign, WLDL).

For the past several months, Norris has been sailing between the United States and the Saudi Arabia/Yemen areas. Norris currently makes his home in Alma, Mich., but will be moving to Cody, Wyoming in the very near future.

In response to my request for information regarding an up-to-date shipboard station, Norris supplied the photograph shown in Fig. 1. Here's Norris' description of the lay-out: "The console houses the following equipment from left to right and top to bottom. Left bay—Selective ringer calling device, harmonic filter, 1KW linear amplifier, frequency synthesized SSB/CW exciter and a frequency synthesized 10 kHz. to 30 MHz. receiver. Center bay—Antenna transfer switch, 500 watt l.f. xmtr. and auto alarm. Right bay—Emergency battery charger, solid state emergency transmitter, frequency synthesizer VHF receiver, Drake SPR-4 Emergency receiver, Receiver antenna and audio patch panel, and another HF synthesizer receiver, and my Morse keyboard type electronic keyer." What a mouth-watering collection of gear! (Note from W2DD: Back in the twenties, the first question on the Commercial exam was to draw a complete circuit diagram for a shipboard installation. I would hate to have to draw the diagrams of all the gear that is in Norris Sapp's command on the S/S Arizona!)

Norris sent along two views of the WB9LVI-designed scan converter he built using PC boards supplied by N3TV and W3LY, see Figs. 2 and 3. Regarding the pictures, Norris says, "This is my completely homebrew version of the WB9LVI scan converter (both fast to slow and slow to fast) and built-in WØLMD keyboard.

"This is the first homebrew project I have built since I was first licensed in 1959. It is also my first experience with IC's and I built it without any knowledge about how integrated circuits work. It contains 23 PC boards and around 300 ICs!

"Building this unit was a real education for me—and a terrific challenge. I had a lot of help from N3TV, W3LY, K4CNP, and W8OZA, working out the bugs."

Norris' scan converter with built-in keyboard is another shining example of what a determined amateur can do *a la* homebrew. It must have been a most rewarding moment when the last bug was eliminated and Norris sat down to operate that beautiful piece

Complete Listing of Submitted Logs for 2nd Albatross SSTV Contest

1) N5EA	186 X / (10X4) + (5X23) / =	28,830
2) W9NTP	171 X / (10X3) + (5X18) / =	20.520
3) WA2ZFT	118 X / (10X4) + (5X20) / =	16.520
4) YU2PKW	85 X / (10X5) + (5X24) / =	14.450
5) G8PY	60 X / (10X4) + (5X22) / =	9.000
6) IS0RUH	42 X / (10X3) + (5X18) / =	5.040
7) SP3PJ	28 X / (10X4) + (5X27) / =	4.900
8) W6WDL	51 X / (10X1) + (5X16) / =	4.590
9) HA6VV	36 X / (10X3) + (5X16) / =	3.960
10) I4LRH	29 X / (10X4) + (5X16) / =	3.480
11) IS0PEM	31 X / (10X2) + (5X18) / =	3.410
12) HA1ZH	32 X / (10X3) + (5X15) / =	3.360
13) G3TKR	28 X / (10X2) + (5X13) / =	2.380
14) I0VMV	23 X / (10X2) + (5X 9) / =	1.495
15) PA0DXY	14 X / (10X3) + (5X10) / =	1.120
16) G4CVZ	17 X / (10X2) + (5X 9) / =	1.105
17) CT1BY	19 X / (10X1) + (5X 9) / =	1.045
18) W9HR	23 X / (10X1) + (5X 7) / =	1.035
19) HA5KBM	15 X / (10X1) + (5X 8) / =	750
20) XE1SA	8 X / (10X2) + (5X 7) / =	440
21) DJ6KA	8 X / (10X1) + (5X 6) / =	320
22) JA2CGC	3 X / (10X1) + (5X 1) / =	150
	SWL	
1) I4YMO	87 X / (10X5) + (5X24) / =	14.790
2) LZ 10-90	55 X / (10X3) + (5X19) / =	6.875
3) CT4BY	23 X / (10X2) + (5X15) / =	2.185
4) DJ8BT	18 X / (10X3) + (5X18) / =	2.160
5) BRS34898	17 X / (10X2) + (5X 9) / =	1.105
6) JA9CWJ	3 X / (10X2) + (5X 3) / =	105

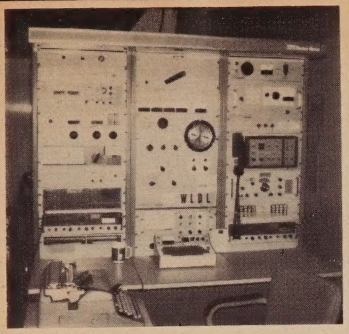


Fig. 1—Norris Sapp, W7FV, is the Radio Electronics Officer who presides over this beautiful shipboard station on the S/S Arizona. See text for details.

of gear!

With his move to Wyoming coming along, Norris has sold a good share of his amateur gear—but will be back on the air, full force, once he gets established in the wilds of Wyoming.

In addition to his amateur radio interest, Norris is an avid photographer and outdoorsman. He likes trout fishing, camping, and banging around mountain trails in a four wheel drive rig.

Thanks to Norris for sharing those fine pictures with his slow scan friends. After seeing that excellent combination scan converter and keyboard, I'm sure that I'll have many requests for info on the availability of the PC boards for the LVI scan converter. Sorry, W3LY reports that there are NO MORE "LVI" PC boards available PERIOD. W8OZA does have PC boards for the LMD keyboard.

If there are any other slow scanners out there on the high seas pounding brass—let us hear from you!

California Video De Luxe, K6SVP's Station

Dick Piety, K6SVP, of La Canada, Ca. is another six-lander who's gone all-out for SSTV. No small wonder—Dick's vice president of the JPL Amateur Radio Club. N6V was the club's special call sign for the Mars picture transmission, enjoyed by slow scanners everywhere (and shown to millions on broadcast TV via the Today Show).



Fig. 2—How esoteric can you get with a scan converter? W7FV combined his LMD keyboard with a WB9LVI-designed scan converter to produce this top-notch piece of slow scan gear.

That "exercise" really sold Dick on SSTV. He didn't own any slow scan gear, but when the N6V operation was finished he says, "I saved my pennies, studied for the Advanced class ticket and made up my mind that I'd get on SSTV or bust". He passed the exam and the accompanying photographs tell the rest of the story.

Figs. 4 and 5 show the well-equipped station of K6SVP. SSTV gear includes an RCA camera, Panasonic 9 inch monitor and a Robot 400 scan converter. Dick's FT-101 transceiver gets a little added punch from a Henry 2K linear. His antenna is a Mosely Tribander.

In a recent letter, Dick offers the following comments regarding SSTV operation in the 20 meter band: "In regards to frequencies, I had a QSO recently with W4CVS. He suggests we retain 14230 as a call up frequency (only) and add 14240 as another. Then QSOs can move between the two after the initial call upon either frequency. I think this would work out great by still retaining 14230 and yet moving guys off—since 14230 gets awfully jammed." (Note from W2DD—Sounds like a good suggestion—why don't we try it?)

Dick is working hard to make WAS on SSTV. He's also a strong contest

modern electronics

is here!

a dazzling, fresh approach to hobby electronics, new from the publishers of CQ.



Modern Electronics covers all facets of hobby electronics. But its editorial approach will be drastically different from that of other magazines already in the field. Those other publications do an adequate job for the electronics enthusiast who's already firmly entrenched in the hobby. But they completely overlook the millions of newcomers to hobby electronics.

We'll cover personal computers, amateur radio, stereo, CB, experimental electronics, short wave listening, and remote control modeling. Modern Electronics will be fun reading in all areas.

Modern Electronics will be the "how to" magazine for hobby electronics that will appeal to expert and novice alike. It'll be the most colorful, most exciting, most informative electronics magazine to be found on any newsstand Subscribe today at the low introductory rate of $9.95.

modern electronics
14 VANDERVENTER AVENUE
PORT WASHINGTON, NEW YORK 11050

Regular Sub. Price will be $12.00 Subscribe now for $9.95

Check One: ☐ Check ☐ Money Order ☐ Master Charge ☐ Bank Americard

My account number is

Name _____

Address _____

City _____ State _____ Zip _____

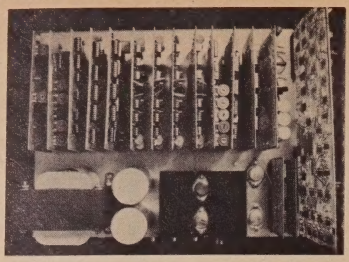


Fig. 3—Here's the LVI-designed scan converter all by itself prior to inclusion in the console of fig. 2.

competitor. In a recent contest he racked up enough points to win third place but lacked info on where to send his log! (See above SSTV contest item, Richard!)

Here's another interesting quote from Dick's letter: "If you have not heard, here's what must be a FIRST: I had a 2 way exchange of pictures on the 27th of November with Fred, W7UKG who was in a 747 jet at 39,000 feet, over St. Paul Island headed for Japan. Fred is a 747 pilot (and a slow scanner!). I believe he had a recorder on his lap patched into the plane radio. What will happen next?" Well, there you are, another example of how slow scan can be fun.

Dick's amateur-related activities include giving talks on SSTV to local clubs and handling the sale of the N6V-Mars SSTV picture tapes. (A real collector's item.)

Thanks to Dick Piety for the fine pictures and letter regarding K6SVP's SSTV operations.

Microprocessors Plus SSTV— Perfection De K9RT

It's a temptation to hold this story for later publication with more details, but the photographs of a microprocessor/SSTV unit built by Ron Tauber, K9RT, of Lombard, Ill. are so good that I am publishing them NOW.

A letter accompanying the general views of Ron's shack, Figs. 6 and 7 and his microprocessor keyboard/control unit, Fig. 8 contains only the following information: "At the press of a button, I may use the microprocessor for normal functions, or in the second position, it becomes a slow scan keyboard feeding a Robot 400. The 30 LEDs in the middle serve as a cursor to show me where I am at all times, when being used as a slow scan character generator. The camera is a Sanyo with a Macro Zoom Lens, monitor is a Shibaden 9 inch job. Toughest part of the whole project was building the case!"

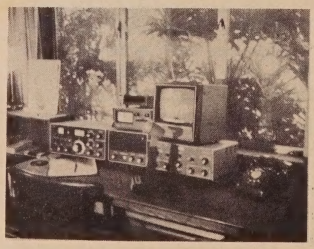


Fig. 4—K6SVP can look out at the beautiful palm trees waving in the breezes as he operates this deluxe SSTV station.

We're asking Ron to tell us what the "normal functions" of the microprocessor are, and more details about the total capability of this unusual unit.

Apart from the newsworthy MP unit, the picture of Ron's shack shows one way to hold down the (floor) square footage consumed by an extensive assemblage of amateur gear. Ron's use of a neat shelving arrangement for all of his amateur gear plus logs, books, and publications is both useful and unusual. Thanks Ron, for the pictures and letter, but PLEASE, more info on that beautiful microprocessor unit!



Fig. 5—Live camera shots add a great deal of interest to an SSTV contact. K6SVP keeps his RCA camera on line all the time. That's a Henry 2K linear just visible in the background!

Modify Your Robot 400? Remember The Warranty!

The thought of modifying a Robot 400 scan converter evokes about the same feeling as coming out against Motherhood, Baseball, apple pie, and THE FLAG! But an epistle from north of the border suggests just that. Ron Kramer, VE3BSZ, of Port Colborne, Ontario, Canada has come forth with an extremely simple "mod" for the 400. The purpose of the modification is to eliminate the individual pixels or cross-hatch look typical of the 400 fast scan display.

Here's how it goes:

1. Remove IC 104.
2. Bend pins #1 and #5 UP.
3. Solder a jumper from pin #1 to top of pin #4.
4. Solder a jumper from pin #5 to top of pin #2.
5. Re-insert into socket. *Make sure that pins #1 and #5 do not go into socket.*

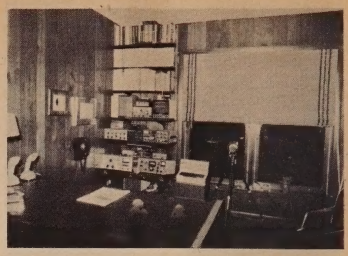


Fig.6—If you're short of desk space and want a neat-looking shack, try K9RT's stunt of using shelves. Note the books and other publications right up to the ceiling. That's efficient use of floor space!

6. Place a 470 pfd. capacitor in parallel with R92.
7. Turn on and see the difference.

Several amateurs who have tried this modification have expressed satisfaction with the appearance of the display minus the so-called cross hatch look. It should be understood that this kind of modification may be in conflict with the conditions of the Robot warranty. (I'd suggest checking with Robot directly.)

Although I have not personally tried this suggested modification by VE3BSZ, I have discussed it on the telephone with Joe Hawkins, President of Robot Research. Joe's comments are, in effect, as follows: "Robot tried a system virtually the same as described by VE3BSZ's originally and switched to the present circuitry because of an apparent improvement in display sharpness offered by the cross-hatch pattern (created by a blanking effect between pixels). The addition of the 470 pfd capacitor across R92 reduces bandwidth of the video, and although it has a smoothing effect, it reduces picture definition." (I hope that I have not distorted Joe Hawkin's comments by poor note-taking during our phone conversation!)

It will be interesting to see who tries Ron Kramer's modification, and what their reaction to the picture quality will be. Comparison of various modes of display without any standard of reference can lead to confused

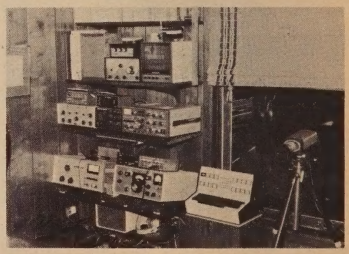
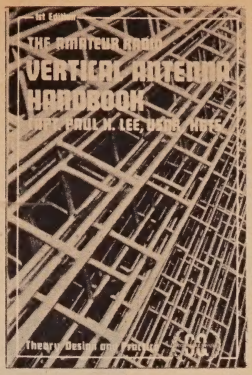


Fig. 7—All that SSTV gear and a microprocessor too! Ron Tauber, K9RT is really WITH the digital age.

VERTICAL ANTENNA HANDBOOK



Compiles 22-years worth of material from the pages of *CQ* on vertical antenna theory, design, installation, construction. Covers verticals arrays, feeding and matching, short verticals, ground effects, multi-band and single-band verticals, answers the most common questions about vertical antennas. 6" X 9" 136 pages. **$5.00**

Please send me _____ copies.

Name _____ Call _____

Address _____

City _____

State _____ Zip Code _____

CQ Magazine
14 Vanderventer Avenue
Port Washington, N.Y. 11050

The Lightweight Champ.



only $79.95

Kantronics 8040-B Receiver

The **8040-B** is a versatile CW receiver at a modest price! This **battery-powered** unit makes a great camping and vacationing rig.

Prospective hams can **copy real QSOs** with a reasonable investment. Watch for our **companion transmitter,** available soon!

Coverage runs from 3.650 to 3.760 MHz, and 7.050 to 7.150 MHz. **Write us for more details!**

KANTRONICS
The Lightweight Champs.

Telephone 913-842-7745
Lawrence, Kansas 66044
1202 East 23rd St.

results. If you decide to try this idea, my suggestion would be to include a resolution chart as one test object in your evaluation and standardize your viewing conditions to the greatest extent possible. If you do try it, please drop me a line and let me know what you think of it.

Final-Final

We'll have more info on the early days of slow scan directly from the reports of Cop Macdonald in the April issue. Please keep those letters and pictures coming my way.

73 de Bill, W2DD.

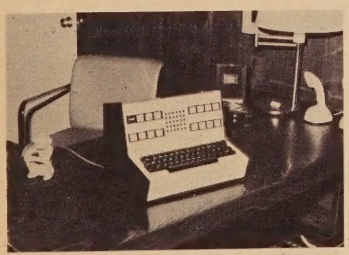


Fig. 8—A nifty combination of an SSTV keyboard and a microprocessor. K9RT built this beauty and it really works. See text for the meager details and we'll bring you more info next month!

SAGAL ELECTRONICS INC.
COMMUNICATIONS SYSTEMS
TWO-WAY RADIO • MOBILE PHONES
AMATEUR RADIO
SERVICE FACILITY ON PREMISES
1219 ST. Georges Ave. E., Roselle, NJ 07203
(201) 289-2390

QUADS – TOWERS

Complete quads from $119.95

2, 3, 4 el-pretuned. Three kinds of spreaders to choose from. Telescoping or one piece.

**Send 26c stamps for lit. on quads, towers, or both, or tel. 1-813-988-4213 day or night.

Two towers to choose from. The Aluma tower or the E Z Way steel tower. Both crank down and tilt over. All towers discounted. Prices start at $153.00 — less discount.

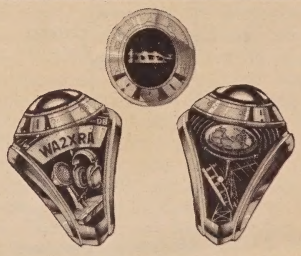
SKYLANE PRODUCTS – W4YM
406 Bon Aire Avenue
Temple Terrace, Fla. 33617

MILITARY SURPLUS WANTED

Space buys more and pays more. Highest prices ever on U.S. Military surplus, especially on Collins equipment or parts. We pay freight. Call collect now for our high offer. 201 440-8787.

SPACE ELECTRONICS CO.
div. of Military Electronics Corp.
35 Ruta Court, S. Hackensack, N.J. 07606

INTRODUCING THE A.R.O. UNITY RING . . .



"An idea whose time has come." It's new. Personalized and one of a kind. Group III Sales has designed this beautiful 10 karat gold ring for you, the Amateur Radio Operator. Each ring is personalized with your call letters. Both sides are exquisitely handcrafted and display the symbols that are most meaningful to all amateurs. We invite you to QSL for full color brochure and complimentary ring sizer.

No Obligation

master charge
BANKAMERICARD
VISA

Group III Sales Co.
DEPT: 31 P.O. Box 259
Little Neck, N.Y. 11362

©Copyright 1977 Patent Pending
Ring shown approximate actual size

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

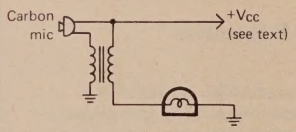


Fig. 1—Ultra Simple Audio/Light Modulator. The Transformer Can Be A Common Audio Output Type Operated Backwards.

After our two previous columns on Fiber Optics, we received a number of letters requesting information on optical communications directly through the air—without fibers. Since this type of system is basically electromagnetic (light being just extremely high frequency radiation), we thought that it would be appropriate to discuss this form of "sub-microwave" operation here.

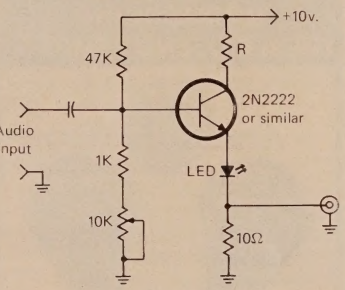


Fig. 2—LED Modulator Discussed In Text. This Circuit Will Drive Most Common LEDs.

The basic optical transmitter, like its lower frequency counterpart, accepts audio, video, etc. signals and uses them to modulate a carrier. The carrier in this case, is light. Depending on the application, either visible or infra-red light can be used. The modulation techniques are the same for either. Figure 1 is the schematic of a very simple modulator for white light. Here, we are using an old standby, the carbon microphone, to provide varying high level audio signals to the primary of a step-up audio transformer (such as is normally used to match a speaker to an audio stage). The secondary is connected in series with a fast-responding lamp such as a no. 222 or 1-2 volt penlight lamp and a voltage source that is half the normal lamp voltage.

With no input, the lamp glows at half the brilliance. This is analagous to an a.m. transmitter with no modulation, where the carrier sits at 50% output. When we now speak into the microphone, the stepped up audio adds or subtracts from the lamp battery and the lamp flickers at the audio rate. Best results (100% modulation) occur when the audio level just cuts off the lamp, or just allows it to reach full brilliance.

The lamp transmitter works reasonably well with audio signals but the delay of the filament when heating or cooling severely limits the frequency response of such a system to audio alone—and not even high fidelity audio. To increase the modulating bandwidth, we need a much faster light source.

The requirements for high speed with reasonable output is nicely met by the light emitting diode. These devices, some of which will respond in nanoseconds (10^{-9} seconds) are the ideal choice for optical communicators. Figure 2 is the schematic of a simple modulator stage that will accommodate most common LEDs normally available by adjusting the potentiometer, the bias of the transistor is varied until the LED is at its half output point. Then, audio will cause it to vary above and below this point. The purpose of R1 is to limit the current through the LED to a safe level and the purpose of the 10 ohm resistor is to allow a portion of the modulating signal to be observed on a scope.

Note that we have only discussed a.m. modulating systems here as they

(Continued on page 85)

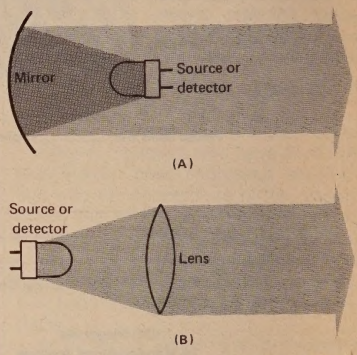


Fig. 3—Simple "Antenna" Methods For Optical Communications.

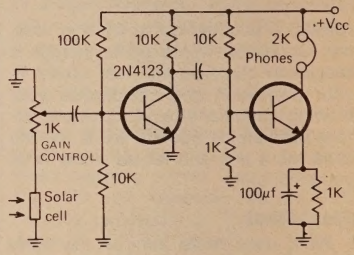


Fig. 4—Solar Cell Audio Amplifier For Increased Sensitivity.

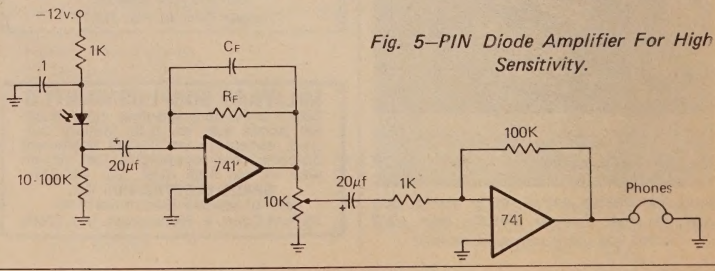


Fig. 5—PIN Diode Amplifier For High Sensitivity.

*5 Melville Lane, Great Neck, NY 11020

This month by
ROD LINKOUS, W7OM

DX

News of communications around the world

Did you ever ask yourself, why do I chase DX? The answers will vary widely from the satisfaction of the accomplishment to the significance of an international communique. The pursuit of the QSL cards from the DX station usually for an ultimate DX award is the standard answer.

DX Awards—Another Point of View

What is in the certificate for DX accomplishments? The answer again varies as widely as the personalities in the game. Yet there is a common thread—pride.

When you go into the avid DXer's shack there are normally two certificates (at minimum) hanging for all to see—DXCC and WAZ. Even DXers with the smallest shacks find room to display them. Why? Simply, the pride of accomplishment and being a member of the DX community.

Some spend a lifetime of dedication and devotion to accomplish what seems to be an impossible goal—to get to the top, the Honor Roll. To be among the best of their peers is worth any cost to some. Not unlike other goals in life, the road to the top can be a clean, honest highway or a dirt track. Sometimes the difference is only a point of view.

Recently on a DX repeater (as a visitor to the area), I listened to a very lively discussion on what is a sign of success in DXing. The DXCC and WAZ certificates were the *first* answers. The DXCC Honor Roll eventually evolved as a point of common agreement only to fall through an attack of logic by the technically minded participants. Before long, the appliance operators began to agree. The DXCC Honor Roll was a yard stick but not without a serious flaw—the requirement of time.

Then on the round table, a young newcomer to DX said it all—"the DXCC Honor Roll is an unrealistic goal *for me.* It takes at least ten years to make it. You can't work them if they are not on and there are over twenty countries that haven't been on in the last five years."

An Honor Roll-er joined in the round table with, "except for those countries that have not been on, I've worked everything else at least once in the past five years." He did agree that a fellow Honor Roll-er who had been in ill health has been off the air for about six years and is still on the roll.

Now we know the problems, back to the basic question—what is in DX accomplishments? A close friend of mine doesn't have the certificates but he has all the countries. Mac McCulloch, W7 *A*lways *P*icking *A*pples, has a log book with entries that boggle even the avid DXer's mind. He doesn't normally QSL. (I treasure one of his rare hand made cards.) His pride in DX accomplishment is in his attitude. He qualifies for most DX awards and the Honor Roll but they aren't necessary to him. He knows that all of us locally know he has worked them while some of us didn't. His honesty is such that proof isn't required. His inner pride in the accomplishment in having made a clean contact, which to him *is the DX game.* Even with ill health, Mac is in there working the DX and giving a helping hand to others. He is an avid DXer personified.

Back with another point of view. A

*5632 47th Ave. S.W., Seattle, Washington 98136

The CQ DX Awards Program

S.S.B.

532...JH1EIG
533...KP4AM
534...I8KUT
535...ZS6BOK
536...G4BYA
537...HI8CDS

C.W.

292...VE1BDT
293...WA8LWK
294...DK6NC
295...DL3NU
296...9J2CL
297...K5MHG/6

S.S.B. Endorsements

310...F9RM
310...I0AMU
310...WA2RAU
300...K6JG
300...K9MM
300...SM5SB
300...VE2WY
300...WB6DXU
275...JH1EIG
275...K3EH
275...W6FET
275...W8ILC
250...JH1EIG
200...I1DWH
200...JH1EIG
200...WB0CGJ
150...JH1EIG
150...WB0CGJ
28MHz HI8LC

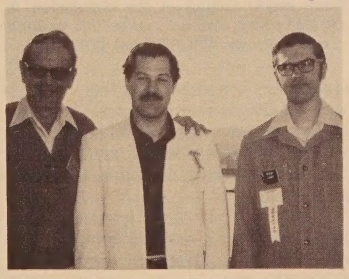
C.W. Endorsements

300...K6JG
275...K9MM
200...DK3FD

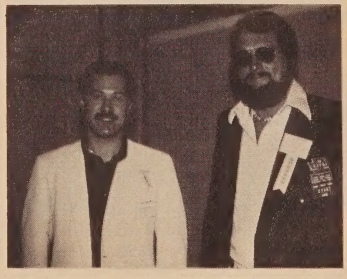
Complete rules and application forms for the CQ DX Awards program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX Awards", 5632 47th Avenue, S.W., Seattle, Washington 98136 U.S.A.



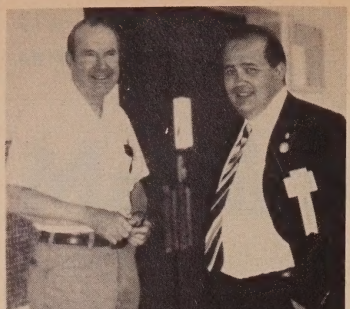
The YL voice of the Eastern Carolines is Sue Moses, KC6SM. From her Ponape home, Sue runs traffic in and out of the islands when not giving many a new country. (Photo KG6SW)



George Giacomin, I3DSE (center) of Vicenza, Italy was the guest of Larry Ryan, W7GDP, (right). Joined on a trip aboard a Puget Sound ferry is Bill Guimont, W7KW. (Photo W7IIT)



Conventions are a great time for DXers to finally get together. Here George Giacomin, I3DSE (left) and that traveling DXer Don Riebhoff, K7ZZ (CT4AT, XU1DX, etc) meet in Seattle, Washington. (Photo W7IIT)



The big signals got together to tell a DX convention how to do it. Rush Drake, W7RM, (left) told over 500 how to put up those BIIIIG antennas and John Devlodere, ON4UN, spoke to the group on (what else) 80 meter DXing. (Photo W7IIT)

Japanese DX friend recently wrote to me about DXCC. To the JA DXer, DXCC is a supreme award for two reasons: 1) it is perceived as an IARU award and 2) the integrity of the decision process. The letter was basically about a recent violation in the rule decision process. He thought that many in the USA did not share their (JA) alarm in the seriousness of the decision which challenged the integrity of the award. The letter closed with a different insight into DXCC—it is not an ARRL award, it is *the* recognized international standard for DX. As an issuing agent, ARRL manages DXCC. Granted it is not technically an IARU. However, it is perceived by most to be an international award. Therefore, to a foreign DXer, the DXCC rules are *international* law above any individual or organization. This speaks well of DXCC's acceptance. He was swift to compliment Bob White, W1CW, for the manner in which he executed the trust vested in him through those shaky years.



F. A. "Jeff" Jefferies, G8PX, is the distinguished gentleman behind the mike at his Oxford QTH. The neat shack includes a homebrew 4CX250B linear and antenna couplers. Jeff is active on the low bands and 2 meters. His DX activities recently qualified for a CQ DX award for 2XSSB.

I share that basic premise, the DXCC and WAZ awards are the ultimate in DXing, internationally recognized accomplishments. Yet the WAZ was a much bigger challenge than the 100 countries. Getting those last two zones was an unbelieveable feat; almost as tough as working Malpelo or Bouvet. Just think Fernando Juan Fernandez, EA8CR and Dale Hoppe, K6UA worked WAZ on 75 SSB. The DXCC and WAZ certificates are two of my prized amateur possessions. So the answer to my question—pride in accomplishment. Without the pride they are shallow pieces of paper as purchaseable as the gear we run.

CQ DX Honor Roll

The *CQ* DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, *Less Delted Countries,* is used as the country standard. Total number of current countries on the DXCC list as of this listing is 319. Honor Roll listing is automatic when submitting application or endorsement for 75 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted anyttime.

C.W.

W6PT 319	W8KPL 310	W9DWQ 304	K6JG 300	W4BQY 297
K6EC 316	W4YWX 308	N6AV 304	DL3RK 297	K9MM 289
ON4QX 314	W2GT 307	W6ISQ 301	N6FX 297	DJ7CX 276
W6ID 314	W8LY 305			

S.S.B.

W2TP 318	W6EUF 312	W9KRU 306	F9MS 297	W6HUR 286
IØAMU 317	W6REH 312	I4ZSQ 305	G3DO 296	DJ7CX 285
WA2RAU 317	I8AA 311	KH6BB 305	HP1JC 296	OE3WWB 285
DL9OH 316	IØZV 310	W4IC 305	OZ3SK 296	G3KYF 284
G3FKM 316	IT9JT 310	K6WR 304	W2CNQ 295	N6FX 284
K2FL 316	K4RTA 310	VE2WY 304	JH1EIG 294	K3EH 283
TI2HP 315	W6KTE 310	VE3GMT 303	DJ9ZB 293	N6AW 282
W4EEE 315	W9QLD 310	ZL1AGO 302	K6AQV 292	WB2RLK 282
XE1AE 315	K6JG 309	K9LKA 301	K8PYD 292	YV1LA 282
W3NKM 314	K8DYZ 309	W6NJU 301	WA2HSX 292	WA4WTG 281
W6RKP 314	SM6CKS 309	WB6DXU 301	VE7CE 291	WAØKDI 281
W9DWQ 314	SM6CWK 309	XE1KS 301	W6FET 291	XE2YP 281
K4MQG 313	WA2EOQ 309	ZS6LW 301	WØYDB 291	N2SS 280
VE3MJ 313	F2MO 308	K6XP 300	DL6KG 289	W9QQ 280
VE3MR 313	K6EC 308	VE3GCO 300	G3WW 289	DL1MD 279
W3AZD 313	K9MM 308	W3GG 300	OE1FF 289	K4SB 279
W4SSU 313	OE2EGL 308	I5WT 299	W6FW 289	OK1MP 279
W6EL 313	SM5SB 308	W6KZS 299	K4HJE 288	W7OM 279
W9JT 313	W4DPS 308	W9OHH 299	SP5BSV 288	VE7HP 277
F9RM 312	WA6AHF 308	WØSD 299	YS1O 288	K8LJG 275
I8KDB 312	I8YRK 307	YV1KZ 299	DK2BI 287	W8ILC 275
K6YRA 312	ZL3NS 307	EA4LH 298	G3RWQ 286	
W2QK 312	I6FLD 306	N4MM 298	K1KNQ 286	

SSTV

W8YEK 108	G3IAD 100



Contests and DX are the subjects when these three Northwesters get together. (left to right) Al Clark, K7UR, is a frequent low-band DX contest winner. Tony Garland, N7DX, was the 1976 All Asia c.w. champ. George Loetz, K7NF, the Western Washington DX Club president is mister consistent contest and DX performer in many ways. Taking in the discussion is the gal who's support makes this column possible, my XYL, Donna, WB7OUN.

The CQ WPX Program

Mixed

613...DA1DS	616...K7LAY
614...WB9CGL	617...HB9AFI
615...VE2DGQ	618...K5GOE

S.S.B.

1011...I1YRS	1013...I2LPA
1012...W4BQY	1014...VE1ANH

C.W.

1658...PY2RG	1661...W4BQY
1659...VE1BDT	1662...N2CC
1660...OK1DKW	

WPNX

107...WB3DCT

VPX

132...VE3-9094

Endorsements

Mixed: 1500 W2NUT, 1050 DL1MD, 850 HB9AFI, 750 KØDEQ, 700 YU1OBA, VE7DP, 650 K9UQN, 550 WB9CGL, 400 DK8KC, VE2DGQ, DA1DS, K7LAY, K5GOE.

SSB: 1150 K2POA, 950 DL1MD, 700 ZL1AGO, 650 W4BQY, 600 I6CCI, 500 I2LPA, 450 I5AFC, 300 I1YRS, VE1ANH.

CW: 1000 W4BQY, 900 K5UR, 650 OK1KYS, DL1MD, KØDEQ, 600 LZ1XL, 500 VE3HLC, K8LJG, N8BM, 450 JH1VRQ, 400 N2CC, 350 K6ARE, 300 OK1DKW, PY2RG, VE1BDT.

80 meters: OK1DKW.

160 meters: OK1DKW.

Asia: I5AFC, JH1VRQ.

Europe: I1YRS, OK1DKW, JH1VRQ, DK8KC.

No. America: OK1KYS, VE1BDT, K5GOE.

Complete rules for WPX can be found in the May, 1976 issue of CQ Magazine. Application forms may be obtained by sending a business-size, self-addressed, stamped envelope to "CQ WPX Awards", 5014 Mindora Dr., Torrance, Ca 90505. U.S.A.

DX Hot Spot

Again it is Saipan, the Marianas. At least for 40 of the 48 hours during the 1977 CQ World Wide DX contest it had the hottest mike in the world. Chip Margelli, K7JA, the 1976 World Wide c.w. champ as KP4AST was headed for the world phone record when the flu bug took him out for eight hours of bed rest. But not until he had a great start as KG6SW. After some rest and tender loving care from the Kaufers (Len Kaufer is KG6SW), Chip got back to the mike for another go at a much slower pace. Yet, he broke the world single operator phone QSO record. He had over 5,000 contacts in less than 40 hours (a rate of over 125 QSOs per hour). It is no wonder that Chip is considered by most contesters as Mr. Uno (Mr. Ichiban to the JA's).

For those station buffs: the KG6SW station is at 1,000 feet above sea level with a clear shore in all directions. The antenna system includes a Mosely TA-36 at 60 feet and a Mosely S402 two element short 40 meter beam at 40 feet fixed on Europe (guyline problem). The rig lineup is a Kenwood TS-820S with external VFO to a Drake L4 linear. Doesn't sound like the standard big DX contest station and it isn't. But Len keeps it in top performance as he handles a lot of traffic in and out of Saipan. The typhoon threat means the antenna system comes down and goes up in response to wind warnings. Therefore no big antennas. Since January 1971, Len has been one of the most consistent DX signals from Zone 27.

The WAZ Program

Single Band WAZ

15 Meter C.W.

2...EA8BK

15 Meter Phone

3...JE1BSD

40 Meter C.W.

4...JA8IEV

20 Meter C.W.

29...JA6BVU
30...JA1IBX
31...JA2RGH

20 Meter Phone

66...W4NNH
67...K6OC
68...DF7QK
69...JA3DX
70...I8MPO
71...I8KDB

S.S.B. WAZ

1401...K7RI
1402...WB2NIC
1403...KØALL
1404...VK2AVZ
1405...HB9AHL
1406...JH1AQ

C.W.—Phone WAZ

4168...K6ACU
4169...JR1BAS
4170...JH1PEZ
4171...N7SD
4172...KL7GN
4173...K5ETA
4174...I6ANZ
4175...I6CCI
4176...JA5JGY
4177...JR3PYW

The complete rules for all WAZ awards are found in the May, 1976 issue of CQ. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

The 80 Meter Sport

There is an unwritten code among the 80 meter DXing gang that warrants proliferation to the other bands. Unlike 20 meters, the presence of DX on 80 is spotty and isolated often with only one DX station on at one time. Therefore, the DX pileups are usually managed. Management takes on many forms but one thing is standard—*reports shall not be relayed.* In order to work a DX station, both stations must get their reports through. The DX pileup manager or mcee will tell you if it is a valid exchange. If not, it usually is not logged and no QSL cards can result.

The old scheme of saying "thanks for the report" and "you are 55" won't make it on this band. The entire gang on frequency sense a common bond and have vowed to abide by a common code. Thus, you'll find one station getting more than one try as the propagation changes. The sense of comradery is keen making 75 phone DXing a pleasure even when times are tough and the rules are rigid.

Feedback

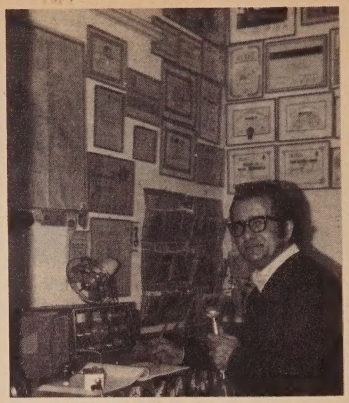
In a recent column, I discussed operating by the list system. The example



Lynn Igou (exKA6YL) and her supportive husband Bob (exKA6RI) traveled over 5,000 miles to meet Len Kaufer, KG6SW (right) in person for the first time in Seattle. Yet when the Igou's were in Okinawa it was less than 1,000 miles and QSO's between them were frequent. Lynn is now in Germany using her new call DA1GF.

I chose was the TT8SM operation from Chad. This was one of the most successful operations from a real rare country. Thomas Meadows, K5CO, the operator of TT8SM was home on leave and took time to write to me about the list system from his point of view. He gives us an insight that is rare and deserves to be shared.

DE TT8SM/K5CO—BT I tried every type of operation that I could think of: wide open, come what may; USA by call area; USA wide open; Europe wide open; Europe by call prefix; Europe only; USA only; North Europe only; and South Europe only. Also, not

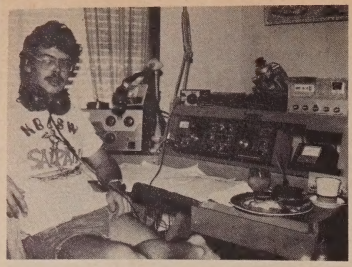


Joe Cauchi, 9H4L, has over 200 countries since being licensed in 1973. Joe is one of twelve 9H4's (9H4A thru 9H4L); only 11 operators as 9H4J is the Malta technical Institute station where Joe teaches. The recent addition of a homebrew quad makes DXing a little easier than the ground plane. He reports the island of Gozo is 9 miles long by 4.5 miles wide with a population of 26,000 people.

working that area today—will tomorrow etc. But there is one thing that I found that I could not do and that was *work USA only* if there was any opening to Europe. The USA was 5X6, Europe was 9X5 + 60; work the states and you're out of your mind. So I would have one station get me a list of USA stations and another get me a list of European stations. Then take turns between the two lists. That was a way I could keep a lot of the uproar down. I say down, but not stop it. There is no way in the world of stopping it. Another thing I thought that lists gave the guy with 200 watts, and a ground plane a chance, as I did work quite a few of them. But if it was just left up to them to call me direct, I never heard them.



The proud owner/winner of those awards is Luis P. Caamano, HI8LC. Most DXers in the game for any time can show you a HI8LC QSL, as Luis is not only very active but QSL's. He gets a lot of help from his QSL manager W2KF.



A very tired and recovering (from the flu bug) champion Chip Margelli, K7JA. Chip holds the current CQ WW c.w. title and the All Asia c.w. record. With the short operation from KG6SW he may now be the new holder of the Oceania phone record. Here he sits at the controls of the modest KG6SW station 2 minutes after the final gun of the 1977 CQ WW phone contest. (Photo WA7WMB)

Another thing was the equipment I had to operate with. All of us are use to good receivers and transmitters here, but over there you have to get along with what you can get your hands on. I was using a very old RCA SSB-1 Mark IV. They were so old they must have come over on the ark. They had SSB filters but were still 6 KHz wide. Both the transmiter and receiver were crystal controlled. Try that one on for size during a ten thousand station pileup. The antenna was a ground plane, that was all I could get up. And there was no way to get any good equipment into the country.

As for the bad operators: Yes, I must say I was bothered by them. In fact at times they just about drove me out of my mind. But even though the USA amateurs are the best in the world, they even have a few bad ones. But overall, when you figure how many amateurs there are, it is only a very small percentage that are that way. But those small few can really make things bad for you from that end. The worst to me were the . . . (ed—quess who.)



Chris Page, G4BUE, operates this neat shack on all bands. The antenna system includes a 2 element quad at 65 feet with slopers at 75 feet for 40 and 80 meters.

Next, let me cover a few you did not say anything about, of which I think something should be said. Here we have the guy who gives his call 52 times, why?—I don't know. Next there's the one who is in the pileup and when you return his call, this is what you hear "Roger TT8SM, worked you a few weeks ago. Got your card all okay, just wanted to call you and tell you that you were still 5 by 6." Then there's the one who gives you every bit of info that he can. His whole life history, station setup, power, antenna, weather, and what he had for chow at the last meal. So you sit there looking at the receiver with a stupid look on your face wishing this guy would go away and get lost. Now we are working by call areas and what do you hear? It goes something like this: "TT8SM when are you going to get to the eights?" Myself, I thought the eights came after the sevens and before the nines. But I guess some of them can't count.

About the mcees: They are the ones who I really liked to have in there helping me. Some of those guys stayed around for hours trying to keep things from getting all fouled up. In



Bell Filho, PT2JB, is the awards manager for L.A.B.R.E. Bell also serves as the CQ DX awards checkpoint for Brazil.

all, I think they did a great job for me. They kept a lot of stations off of my back, policed the frequency, and overall made things run much smoother. But I don't think they got as hard nosed as I would have liked for them to be at times. If a station is going to be a fool on the air, let him know it. Tell him that he is making a fool of himself.

The ones who never get any credit for any of this DX operation is the QSL manager. What he has to go through! A card comes from someone who is not in the log, then it starts. The card is returned to the station who sent it. Back comes a nasty letter telling him that he is wrong and he knows for sure he is in the log. Next a phone call about it; then if the QSL manager gets on the air, someone is always on his back about not being in the log or why hasn't the card been sent. Here comes the card with no SASE or money for postage. So they want the guy to pay for the printing of the cards and then supply the cost of postage on top of it.

I also worked as K5CO/5A from Libya. Libya does not issue calls themselves. But I did get an okay to operate in the twenty meter band. But under that call I only worked about one thousand stations. And tried to make sure what operating time I had was during the time the band was open to the USA. I only worked about ten percent into Europe. I tried to stay away from the Europe hassel as much as I could, as I knew I could only operate for a limited amount of time. You know, work, sleep, etc. Knowing that I was only going to be in that area for a short time. That is after I got permission to operate. I was there fourteen months before I could make any head way. AR

That sheads a different light on things. It is quite apparent the sacrifices some DX stations go through to give us another new one, and we are often unaware of what it took to put the station on the air. Fortunately for us all, he is headed back to Africa for another tour of QRM. This time he will make a try to put both TY and TZ on the air. As I tried to say before, when you hear a DX station working the pileup, observe his rules. There is usually a very good reason why he chose to work the way he does. He is doing *us* a favor and it is not the other way around. Thanks to Thomas Meadows, K5CO, for letting me share his informative letter with you.

DX Extras

DE W7NYO—BT I have been the licensee of record for VP1WS in Belize City, Belize, C.A. for many years and have been so indicated in all issues of the Foreign Callbook. During this period, I have experienced no trouble with bootleggers until recently. During the period of July through November 1977, I have received anywhere from 30 to 60 QSL's per month indicating contacts with VP1WS and some VP1WOS contacts. As I have religiously maintained my amateur radio license status in Belize, it is current and I have not operated VP1WS in sometime, those contacts were with a bootlegger. AR

DE N4MM—BT We got back from Martinique (FMØFC) in one piece. What a trip! The four of us got *revenge*! We started the contest (CQ WW 1977 phone) half sick. The only thing that held up was the gear. We managed to get 5,800 QSO's and about 6.4 million points after dupes. AR

DE CT1UA—BT Portugal celebrated their 50 years of amteur radio with the special CT50 prefix from October

CQ

FREE INFORMATION SERVICE

To receive Manufacturer's information about products Advertised or Editorially mentioned in this issue . . . Circle the numbers on the card that match the key numbers at the bottom of the Advertisement or Editorial mentioned that interest you.



1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98
99	100	101	102	103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122	123	124	125	126

Please type or print

Card expires one month after cover date of this issue.

Name _____

Address _____

City _____ **State** _____ **Zip** _____

E

FIRST CLASS
PERMIT No. 392
Port Washington, N.Y.

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY



Magazine

Cowan Publishing Corp.
14 Vanderventer Avenue
Port Washington, NY 11050

F

The Most Outrageous HAM Novelty Ever! Your Very Own Pet Transistor!

It's true! Less expense than owning or even adopting a puppy, will not stain your carpet! Unlike messy and potentially hostile pet rocks, will not leave unsightly sand and gravel around the house. Your lovable pet transistor will bring you long years of clean fun and contentment. The absolutely PERFECT gift, for yourself or any of your DX friends. Comes complete with outrageous and hilarious instructions--must be seen to be believed-biggest sensation to hit the HAM world since the discovery of DX! Only $2 each, postpaid (get 2 for only $3.00). Dealers wanted! Order yours now from:

Sunshine Radio Co.
18 Boat Lane
Pt. Washington, N.Y. 11050

This MFJ RF Noise Bridge . . .

lets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. Exclusive range extender and expanded capacitance range gives you much extended measuring range.



BRAND NEW

$49.95

This new MFJ-202 RF Noise Bridge lets you quickly adjust your single or multiband dipole, inverted Vee, beam, vertical, mobile whip or random system for maximum performance.

Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR over any portion of a band.

MFJ's exclusive range extender (included) and expanded capacitance range (± 150 pf) gives unparalleled impedance measurements from 1 to 100 MHz.

Works with any receiver or transceiver. SO-239 connectors. 2 x 3 x 4 inches. 9 volt battery.

Other uses: tune transmatch; adjust tuned circuits; measure inductance, RF impedance of amplifiers, baluns, transformers; electrical length, velocity factor, impedance of coax; synthesize RF impedances with transmatch and dummy load.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This bridge is unconditionally guaranteed for one year.

To order, simply call us toll free 800-647-8660 and charge it on your VISA or Master Charge or mail us a check or money order for $49.95 plus $2.00 for shipping and handling.

Don't wait any longer to enjoy maximum antenna performance. Order today.

MFJ ENTERPRISES

P. O. Box 494
Mississippi State, MS 39762

Call Toll Free 800-647-8660
In Mississippi call 601-323-5869.

through December 1977. During this period the CT1 and CT4 stations used the special prefix in the following manner: CT1AL used CT50/1AL and CT4-AL used CT50/4AL. AR

DE W2GHK—(DXpedition of the Month) BT The following stations were recently active under the banner of D0TM and QSLing is in process: A9XCA; WB2IEC/S21; WB2IEC/HI8; K4RT/HR1 and K4RT/8R1. 5L2A-EL2A has now closed down and returned to the states. The following stations remain active and cards are handled by D0TM: (ed. See QSL Information.) A complete updated list is now available for an SASE to Box 7388, Newark, NJ 07107. AR

DE DJ9ZB - BT A QSL-Manager-Directory with over 2,000 DX stations and their QSL managers is now available. The directory is a 38 page book available for $3.00 including postage. Copies are available from Franz Langner DJ9ZB, Carl Kistner Str. 19, D-7800 Freiburg, Federal Republic of Germany. AR

DE W7YBX V et al BT In 1970 I worked 5VZDB in Togo for a new one. For several years I tried in vain to get a card both via the W4 manager and direct. Then, out of the blue, came the card from WA4WTG. Bob Kaplan, WA4WTG, took up the job of clearing the seven year old contacts. On behalf of us all THANKS!! AR

QSL Information

A2CBW—To DK3KD
A2CCY—To VE4ACY
A6XP—To DK3NK
AP2TN—To OZ1VY
AP5HQ—To NØRR
C5AR—To G3LQP
C5AT—To OH2BFJ
C6ABC (77 CQ WW)—To W4KA
C6ANY—To DOTM*
C31MR—To EA3XO
CN8CC—To F6CVE
CN8HD—To DOTM*
CWØ—To CX bureau
EP2IA—To W4YE
EP2MS—To W8CXS
EP2OD—To K4OD
EQ2ITU—To K4OD
FGØDWT/FS7—To F6BLK
FH8GV—To F8FI
FHØFX—To W2PPG
FK8CD—To W7LLC*
FMØFC—To W1JFL
FR7ZS—To F5DV
GU4DAA—To G3FXB
HH5HR (c.w.)—To W4ORT
HH5HR (s.s.b.)—To K4UTE
HH5RB (c.w.)—To W4ORT
HH5RB—(s.s.b.)—To K4UTE
HH5TW (c.w.)—To W4ORT
HH5TW (s.s.b.)—To K4UTE
HI8XDF—To K3BHL
I1MOL—To DOTM*
IG9KSO—To IT9ZGY
J3AJ—To W7LLC*
J28AD—To I8JN
JA8AQN/JD1—To JA8JL
JA8UI/PZ—To JA8AHA
JT1AN—To W7PHO
JY6AS—To WA3HUP
JY6RS—To WA3HUP
KG4DX—To WB0QWU
KG4OO—To KØPMZ
KG4TS—To WBØQWU
KG6RI—To K7NF*
KM1CC—To W1GDB
KM6FC—To K5YMY
KM6FD—To K5YMY
KV4FZ—To DOTM*
KV4IF—To W2AAF
KZ5JA—To DOTM*
KZ8DX—To KZ bureau
LU1ZA—To LU2CN
LXØRL—To LX1DC
P29CG—To WA1JLD
P29JK—To DOTM*
PJ9CQ—To WB4EHX
PJ9YN—To W1YNT
PY2PA—To DOTM*
PY2PE—To DOTM*
PYØBXC—To PY7BXC
ST2SA—To DJ9ZB
SV1IV—To DJ9ZB
TG7GAS—To FG7XA
TR8MFB—To WB4IWW
TU2GO—To WA4OUF
UVØEX—To W7PHO
VC9UM—To VE4VV
VK9XI—To DOTM*
VP1AJ—To N5UR
VP1UR—To N5UR
VP1WCS—To K5AFJ
VP2DD—To W2BZL
VP2GWM—To W8JWY
VP2MJE—To W6EL
VP2MSA—To OE2GSA
VP2SAA—To W4UG
VP8ML—To W4MWT
VP8PL—To G3LIK
VP9GR—To DOTM*
VR4BT—To W0VU
VU2KMK—To W7UT
VU2LE—To WA6OET
VY9C—To VE3GMT
W9MR/DU1—To K3RLY
WA4TWE/VQ9—To K5HWO
WA6QXZ/VQ9—To K5HWO
WB7TBK/SU—To WA7JRL
WD9FCC/VQ9—To K9GM
XF4JJ—To WB4KPZ
XP1AB—To WA2UUK
YBØAAG—To DJ2JB
YBØACP—To K6MQG
YBØPG—To WA2DWE
ZB2DM—To W1JFL
ZD8H—To K0ETY
ZD8HAL—To K0ETY
ZD8RW—To WB8MBT
ZF1RE—To N5UR
ZF2AH—To WA6VNR
ZF2AP—To W4YHK
ZK1DR—To WA0WCR
ZL1AA/k—To W6ORD
ZL1YL/k—To W6ORD
ZS5IB/MM—To G3XCS
ZS6IW—To DOTM*
3C1X—To SM6PF
3D2AJ—To W6SC
3D2CC—To VE6AKV
3D2RM—To WB5MXO
3D6BP—To W1OX
4A1U—To XE1U
4U1ITU—To DOTM* (U.S. only)
5B4DI—To WA4APD
5N2BCF—To I2JL
6W8FZ—To DJ7BG
6W8MM—To WA1SQG
6W8PZ—To DK3IA
7X2BK—To WA3HUP
8Q6AS—To G4CIR
8R1X—To VE3IXE
9D5B—To K4OD
9G1JD—To WB8WBZ
9G1JN—To W3HNK
9G1RP—To W7FLE
9J2KC—To N8JW
9J2SJ—To N8JW
9J2TJ—To N8JW
9L1SL—To WA3NCP
9Y4KK—To K0ETY
9Y4VT—To DOTM*

*DOTM - Box 7388, Newark, NJ 07107

HS1ALC—Ron Bostick, U.S. Embassy, APO SFC 96346
***K7NF**—3241 S.W. 166th, Seattle, WA 98166
***W7LLC**—10316 Aztec Dr Sun City, AZ 85373
VK9NI—Box 27, Norfolk Island

WANTED—DX station to QSL manage for:

W7VRO
WA4ZXC
WB9UKE

Thanks!

I wish to thank the following publications for their support and inputs to this column: *The DXer, DXer Magazine* (W4BPD), Geoff Watt's *DX News-Sheet, Long Island DX Bulletin* (W2IYX), *Long Skip* (VE1AL/3), *North Florida DX Assn. News* (N4UF), *Totem Tabloid* (WA7-RVA), *VERON DX News* (PAØTO) and the *West Coast DX Bulletin* (WA6AUD).

73 and best of DX, Rod W7OM

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The March, "Story of The Month" as told by Lyle is:

Lyle Taylor, WD0EHB
All Counties #170, 7-21-77

Born at Fort Bragg, California, a sawmill and fishing town on the California coast midway between San Francisco and Eureka, Lyle Taylor, ex-WN6ZUD, WA6ZUD, WB7QXV, is now 57.

All his young life was spent in northern California where he graduated from Trinity County High School in 1940.

He worked in a garage until going into the Armed Forces in August 1942 where 4½ years were spent in the U.S. Air Force.

At about that time he married a girl who had gone through high school with him. She passed away in 1969, lacking two months from having 28 fine years of married life which gave them three boys and two girls.

From 1955 to 1965, Lyle worked for the Trinity County Road Department as a heavy duty mechanic. Part of his job was to keep the Motorola two-way radios going, for the Trinity County Road Department and the Sheriff's Office. They used the same repeater and frequency. During that period he was also the Civilian Defense Radio Officer.

Lyle was a Deputy Sheriff for 28 years and naturally when he started they had no radios and thus they would stop at someone's house to use the telephone, regardless of the time of day or night.

A man moved into town, working for the Telephone Company, and he put a note in the local newspaper that he was starting a Novice class for anyone interested in amateur radio. Lyle's wife thought that he should go to the classes, as long as he was working on radios. So that is how WN6ZUD came into being, and after 6 months on CW, Lyle passed the General test and became WA6ZUD for 16 years.

In 1968 in dialing across the bands, he ran into the County Hunter Net on 1430 and being invited to join by a couple of very friendly ladies, Orma Donkle, W9BJH and Tillie Curlington, KØRGU, he became active on the Net.

At that time there were not as many mobiles checking in, so Counties came slowly.

Lyle quit the Trinity County Road Department and bought a Kenworth Diesel Dual Drive tractor, a 40 ton Pierce lowboy trailer and went into business for himself hauling cats, graders, and all kinds of heavy equipment for the U.S. Government contractors, loggers and etc. Also during heavy snow storms, he would operate some of the contractors equipment plowing snow, helping the State of California keep their highways open.

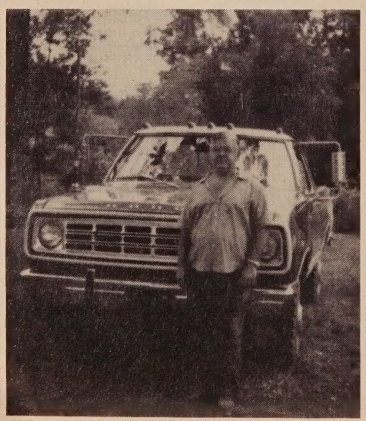
A remarriage came in 1970 and the young lady is still putting up with Lyle. When they got married, she had six children, all married, so Lyle and his new wife adopted a boy and girl (now 10 and 11) so together they have 13 children. Congratulations to them all.

In 1970, Lyle joined the Independent County Hunters Net and he says, "I have never met a finer group of Ladies and Gentlemen, they sure help each other".

When Lyle got down to his last County, he asked Curt George, W4SSU (who had already given him many) if he would like to give him the last one. Curt said he would like Bob Hudson, W4HR to get the credit. So on July 16, Curt and Bob made the trip to Towns County, Georgia for the final one!

Lyle is a member of: the Independent County Hunter Net, the Mid-State Weather Net, the Mobile Amateur Radio Awards Club, the California Weather Net, the Tri-County Emergency Net, and the Mobile QSL Bureau.

*P.O. Box 73, Rochell Park, NJ 07662



Lyle Taylor, WD0EHB and his shiny new truck.

USA-CA Honor Roll

3000		1000	
K7LQI	196	W4KFA	459
WA1UVX	197	W2UJ	460
2500		K3YAY	461
VE3RN	250	WB2TSL	462
WB7AYN	251	CT1RM	463
WA5KQD	252	500	
2000		WBØICP	1205
K3YAY	291	W2UJ	1206
K9GTQ	340	K3YAY	1207
K3YAY	341	WB2TSL	1208
WA2DFC	342		
CT1RM	343		



S. R. Makedonija Award.



ISWL Heard or Worked All Continents.

In 1976 he retired and in 1977 moved to Texas County, Missouri and now has the call, WDØEHB.

Lyle wants all County Hunters, Mobiles and Net Controls to know how much he really appreciates all the help given to him—Thanks!

Awards Issued

Frank McJannet, K7LQI added to his collection USA-CA-3000.

Bob McCarthy, WA1UVX also added USA-CA-3000 to his collection.



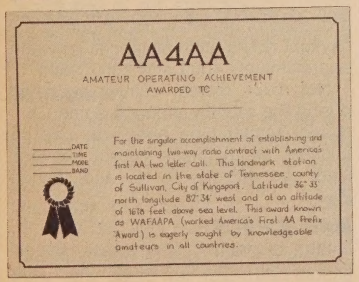
ISWL Century Club Award.

Lee Foster, VE3RN acquired USA-CA-2500 endorsed All SSB.

Larry Sitton, WB7AYN claimed USA-CA-2500.

Gordy Baker, WA5KQD obtained USA-CA-2500, endorsed All A-1 (Yes, CW is still very much alive).

David Holland, K3YAY waited until he had 2000 and then applied for USA-CA-500 through 2000, endorsed All SSB.



AA4AA Award.

Tom Ross, K9GTQ qualified for USA-CA-1500 endorsed All SSB, All 75, All Mobiles.

Fred Lampert, WA2DFC collected USA-CA-1500 in his new QTH.

Adilio La-Salette, CT1RM gained USA-CA-1000 and 1500, endorsed All SSB.

Richard Peterson, W4KFA won USA-CA-1000, endorsed All SSB.

Russ Sawyer, W2UJ (ex WA2MXQ, WA1AXB) got USA-CA-500 endorsed All SSB, and USA-CA-1000.

Ken Jarvis, WB2TSL, who got USA-CA-500 as VP2KJ, had me send him USA-CA-500 and 1000 endorsed All SSB, All 14, All Mobiles.

Ronald Richards, WBØICP was sent USA-CA-500 endorsed All SSB.

Awards

Iowa Counties Award: This Award is sponsored by the Mississippi Valley Radio Club and will be issued to any amateur who has worked 19 Iowa Counties, cost is $1.00. For each additional 20 Counties a new Award will be issued at the cost of 50¢. Send usual log information certified by two other amateurs or one radio club officer to: The Mississippi Valley Radio Club, 3518 Columbia, Davenport, Iowa 52804. Thanks to Arnold, WBØUCP, President, for sending along the data.

Morokulien Award: The growing international interest in working with handicapped or disabled Radio Amateurs takes a special form in the "country" (not for DXCC) of Morokulien. It is located on the border between Norway and Sweden, and was established in 1959 during the International Refugee Year. Both governments allocated a couple of square kms. to the new state. In the center of Morokulien is the Peace Monument erected in 1914 to commemorate 100 years of peace between Norway and Sweden. The Norsk Radio Relae Liga, NRRL, and the Foreningen Sveriges Sandareamatorer, SSA, maintain an Amateur Station there with the special call signs of LG5LG and SJ9WL/SKØWL. Morokulien is a combination of the Norwegian and Swedish words for "fun".

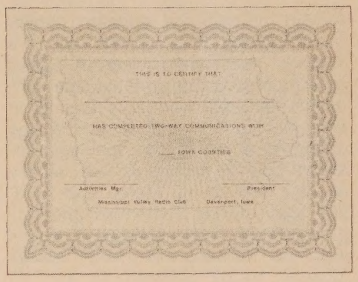
This Award is available to all licensed amateurs and SWLs. Contacts from July 1968 are valid. Do not send the QSLs but send a list showing full details of the QSOs and all modes of transmission are OK. The fee for the award is 15 N. kr. or $3.00 (13 IRSs). Contacts required: For Europe—each call-sign, LG5LG and SJ9WL/SKØWL, is to be contacted on two bands and different days. For DX—Each call sign, LG5LG and SJ9WL/SKØWL, can be contacted one band but on different days. Apply to: Ulf A. Strandberg, LA2ZN, Konglevegen 3, N-2200 Kongsvinger, Norway. When you QSO these



ISWL Heard or Worked All States.

stations and you desire a QSL direct, please send 4-IRCs with your QSL. Thanks to W2LZX, VE3AW and VE3-FPF for this information.

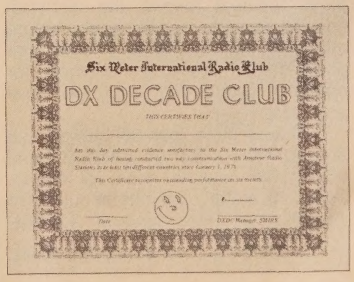
WAFAAPA (Worked America's First AA Prefix Award): This Award is issued for two-way radio contact with AA4AA, America's first AA two letter call. This landmark station is located in the State of Tennessee, County of Sullivan, City of Kingsport. Apply to: Kenneth H. Maness, AA4AA, 3946 Skyland Drive, Kingsport, Tennessee 37660.



Iowa Counties Award.

DXDC Award (DX Decade Club): This Award is sponsored by SMIRK, Six Meter International Radio Klub, It is available to any Amateur, SMIRK member or not, who can present confirmed proof of Contact with ten (10) foreign countries (U.S. included), from the ARRL country list, on the 6 meter band. All contacts must have been made on or after January 1, 1976, foreign contacts prior to this date do not count.

(continued on page 84)



a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

Springtime propagation conditions begin in the northern hemisphere during March. These are typified by *fewer* east-west openings on *10* and *15* meters; more hours in which DX openings can occur on *15* and *20* meters as the hours of daylight increase; fewer hours for DX openings on *40, 80* and *160* meters as the hours of darkness shorten; *improved* openings on all bands between the northern and southern hemispheres, and a seasonal increase in the static levels on all bands.

During March and continuing into April, relatively similar h.f. radio propagation conditions exist in the temperate regions of both the northern hemisphere (where it is spring) and the southern hemisphere (where it is fall), as compared to the more extreme conditions that exist when it is summer in one hemisphere and winter in the other. As a result, DX openings *between* both hemispheres are usually at their best during March and April, and again during September and October. Good inter-hemisphere openings are forecast this month on all amateur bands between *15* and *40* meters, with some openings possible on *10, 80* and *160* meters as well! Typical of these openings are the paths between the United States and South America, Australasia and the central and southern regions of Africa.

The best times to look for inter-hemisphere openings are shortly *before* local sunrise and again shortly *after* local sunset on the *160, 80* and *40* meter bands; for an hour or two *after* sunrise and again for an hour or two *before* and *after* sunset on *20* meters. On *15* and *10* meters, check for these openings towards the southeast and south from a few hours before noon, through the early afternoon hours. Check later in the afternoon for openings towards the south, southwest and west.

It should be a toss-up between *15* and *20* meters for the best DX band during the *daytime* hours of March. Some *10* meter openings should also be possible. From sundown to Midnight, honors will likely be shared between *20* and *40* meters, with some fairly good *80* meter openings also possible. From Midnight to sunrise, best bands should be *40* and *80* meters, with some DX also possible on *160* meters. For more detailed information, refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains *Short-Skip Propagation Charts* which are valid throughout March and April, as well as *Propagation Charts* centered on Alaska and Hawaii. The Short-Skip Charts contain band opening predictions for predominantly one-hop paths, ranging in distances between approximately 50 and 2300 miles.

For day-to-day changes in h.f. propagation conditions expected during March, see the *Last Minute Forecast,* which appears at the beginning of this column.

*11307 Clara St., Silver Spring, MD 20902.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected For March, 1978

	Expected Signal Quality			
Propagation Index	*(4)*	*(3)*	*(2)*	*(1)*
Day				
Above Normal: 18, 26	A	A	B	C
High Normal: 10-11, 15, 17, 19, 25, 27	A	B	C	C-D
Low Normal: 4-5, 9, 13-14, 16, 20-22, 24, 28	B	C	D	D-E
Below Normal: 1, 3, 6-8, 12, 23, 29, 31	C	D	D-E	E
Disturbed: 2, 30	C-E	D-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 to poor (C-D) on March 1st; poor to no opening (D-E) on the 2nd; fair to poor on the 3rd (C-D); and fair (C) on the 4th and 5th, 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

Sunspot Cycle Progress

The Swiss Federal Observatory at Zurich reports a mean sunspot number of 26.6 for November, 1977. Daily numbers ranged from a high of 51 on the 19th to a low of 7 on the 26th and 28th. This results in a running smoothed sunspot number of 24, centered on May, 1977, as the new cycle continues to increase slowly. A smoothed number of about 45 is forecast for March, 1978.

V.h.f. Ionospheric Openings

Trans-equatorial scatter propagation (TE) usually improves during March and the spring season, and some *6* and possibly *2* meter openings should be possible by way of this mode during the month. TE openings must cross the magnetic equator at or near a right angle, and the best time for such openings is between 8 and 11 p.m., local time. Conditions favor openings between the southern tier states and the southern countries of South America, but some openings may be possible from northern states as well.

Auroral activity also tends to increase during March, and there is a good chance for a number of v.h.f. ionospheric short-skip openings by means of auroral-scatter propagation. Check the "Last Minute Forecast" for those days that are expected to be BELOW NORMAL or DISTURBED, since these are the days on which v.h.f. auroral openings are most likely to occur during March.

A seasonal increase in short-skip openings due to sporadic-E propagation is also expected during March, and an occasional *6* meter opening should be possible during the month. Short-skip openings due to sporadic-E propagation generally occur during the daylight hours, over distances between approximately 1000 and 1300 miles.

Not much meteor activity expected during the month, although some v.h.f. meteor-scatter type openings may be possible when minor meteor showers peak on March 15-16 and March 25-26.

MAIL-A-PROP

MAIL-A-PROP is a bi-weekly propagation newsletter for those who want

updated propagation forecasts and predictions. It has achieved a high level of accuracy during the past four years. The format changes a bit with each issue, so that over a short period of time, band-by-band, continent-by-continent and major time periods throughout the day are covered with detailed forecasts, predictions and analyses. Short-skip forecasts are given at least monthly. Newsworthy items concerning radio propagation, solar activity, progress of the sunspot cycle, v.h.f. band openings, schedule of meteor showers, review of observed conditions, etc., are also included.

An annual subscription to MAIL-A-PROP, 26 issues, is $25, postpaid. ($35 outside of North America). A *two-month* trial subscription of five issues is available for $6 postpaid in North America, $8 elsewhere. For a free sample send a self-addressed stamped envelope, legal size, to:

George Jacobs, W3ASK
Editor, MAIL-A-PROP
P.O. Box 1714
Silver Spring, MD 20902

Propagation Handbook

One of the questions that I am asked most frequently is to recommend a good book on the practical aspects of h.f. radio propagation. Unfortunately, there just aren't any. The few good ones written in the past are long out of print and hard to come by. Those presently available are too far advanced for most radio amateurs and other shortwave enthusiasts.

To remedy this, Dr. Theodore J. Cohen, N4XX, and I have recently completed the text for a book entitled *The Shortwave Radio Propagation Handbook*. It stresses the practical side of shortwave propagation and has been written specifically for the radio amateur, shortwave listener, CB'er, and all others who make use of the shortwave radio spectrum. It features "do-it-yourself" forecasting and prediction techniques, and it's written in relatively easy to understand language.

The book is being published by Cowan Publishing Corp., the publisher of *CQ* and *S9* magazines, and should be available for sale sometime this month. Check for advertisements in this issue of *CQ*.

Anniversary

This month's column marks the beginning of my *27th* year as Propagation Editor for *CQ*. Reckoned in terms of sunspot cycles, this extends from the middle of Cycle 18, through cycles 19 and 20, and now into Cycle 21. Special recognition is due the Editors and Publishers of *CQ* for recognizing the importance of familiarizing radio amateurs with easy to understand propagation forecasts and predictions, and for taking the lead in publishing a regular propagation column. Sunspot cycle 21 looks like another interesting one, and you can expect *CQ* to continue to bring you the best and the latest in shortwave propagation every month throughout this cycle.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (15 through 80 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts,

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. 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) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this 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.

3. Times 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. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; The Alaska and Hawaii Charts are based upon a transmitter power of 250 watts cw or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 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 10db loss, it will lower by one level.

5. 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.

CQ Short-Skip Propagation Chart
March & April, 1978
Band Openings Given In
Local Standard Time
At Path Mid-Point Using
24-Hour Time System

Band (Meters)	*Distance From Transmitter (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	*Nil*	08-09 (0-1) 09-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-18 (0-1)	08-09 (1-0) 09-12 (2-1) 12-14 (3-2) 14-16 (2-3) 16-17 (1-2) 17-18 (1) 18-20 (0-1)
15	*Nil*	08-09 (1) 09-15 (0-2) 15-17 (0-1)	07-08 (0-1) 08-09 (1) 09-10 (2) 10-15 (2-4) 15-17 (1-3) 17-18 (0-2) 18-20 (0-1)	07-08 (1-0) 08-09 (1) 09-10 (2-3) 10-15 (4) 15-17 (3) 17-18 (2-3) 18-20 (1-2) 20-21 (0-1)
20	11-13 (0-1) 13-15 (0-2) 15-16 (0-1)	07-10 (0-1) 10-11 (0-2) 11-13 (1-3) 13-15 (2-4) 15-16 (1-3) 16-18 (0-3) 18-20 (0-2) 20-07 (0-1)	06-08 (1-2) 08-10 (1-3) 10-13 (3-4) 13-15 (4) 15-18 (3-4) 18-20 (2-3) 20-22 (1-2) 22-06 (1)	06-07 (2-1) 07-08 (2) 08-10 (3) 10-15 (4-3) 15-18 (4) 18-20 (3-4) 20-22 (2-3) 22-02 (1-2) 02-06 (1)
40	06-07 (1-2) 07-09 (2-3) 09-18 (3-4) 18-19 (2-3) 19-21 (1-2) 21-00 (0-1)	06-07 (2-3) 07-09 (3-4) 09-11 (4-3) 11-13 (4-2) 13-15 (4-3) 15-18 (4) 18-19 (3-4) 19-20 (2-4) 20-21 (2-3) 21-00 (1-2) 00-06 (0-1)	06-07 (3-2) 07-08 (4-2) 08-09 (4-1) 09-11 (3-1) 11-13 (2-1) 13-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-20 (4) 20-21 (3-4) 21-00 (2-3) 00-02 (1-3) 02-06 (1-2)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (3) 02-05 (2-3) 05-06 (2)
80	07-08 (2-3) 08-11 (3-4) 11-18 (4-3) 18-20 (3-4) 20-22 (2-3) 22-02 (1-2) 02-05 (1) 05-07 (1-2)	07-08 (3-2) 08-11 (4-1) 11-16 (3-0) 16-18 (3-2) 18-20 (4-3) 20-22 (3-4) 22-02 (2-4) 02-05 (1-2) 05-07 (2)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-02 (4) 02-05 (2-3) 05-07 (2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-02 (4-3) 02-05 (3-2) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-2) 03-05 (3-2)	05-06 (1-0) 06-19 (0) 19-20 (1-0) 20-22 (2-1) 22-03 (2) 03-05 (2-1)

ALASKA
March & April, 1978
Openings Given in GMT #

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	21-23 (1)	20-21 (1) 21-23 (2) 23-01 (1)	20-23 (1) 23-02 (2) 02-05 (1)	06-13 (1) 07-12 (1)*
Central USA	21-00 (1)	20-22 (1) 22-00 (2) 00-02 (1)	20-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-09 (1) 09-12 (2) 12-14 (1) 08-12 (1)*
Western USA	21-01 (1)	20-22 (1) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-21 (1) 21-00 (2) 00-03 (3) 03-05 (2) 05-07 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 09-10 (1)* 10-12 (2)* 12-13 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

* Indicates best time for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

HAWAII
March & April, 1978
Openings Given in Hawaiian
Standard Time #

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	10-12 (1) 12-14 (2) 14-15 (1)	08-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-13 (1) 13-15 (2) 15-19 (3) 19-21 (2) 21-05 (1) 05-07 (2)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-01 (2)* 01-02 (1)*
Central USA	10-11 (1) 11-14 (2) 14-16 (1)	06-08 (1) 08-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-05 (1) 05-08 (2)	18-19 (1) 19-22 (2) 22-01 (3) 01-04 (2) 04-05 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*
Western USA	09-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	15-18 (4) 18-20 (3) 20-00 (2) 00-04 (1) 04-06 (2) 06-09 (4) 09-11 (3) 11-13 (2) 13-15 (3)	17-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-06 (1)*

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

I observed that many of the overseas stations were using unusual prefix calls in the WW Contest last Fall. Personally I see no advantage in doing this. As a matter of fact it's a disadvantage since it presents a confusing country identification.

Exotic prefix calls could be used to better advantage in the coming WPX SSB Contest, where a new prefix adds to the multiplier but the identity of the country does not contribute to the scoring.

My contest operating efforts are somewhat limited by available time, equipment, and capabilities. However meeting the gang each year and being greeted by name more than makes up for my inability to run up a good score.

The following new Trophies are being added to our long list of awards in our World Wide DX Contest.

U.S.A.—3.8 MHz All Band Phone. (Donated by Arnold Tamchin, W2HCW)

Oceania—21 MHz Phone. (Donated by Lee Wical, KH6BZF)

Oceania—21 MHz C.W. (Donated by the Pacific Radio Amateur Transmitting Society)

World—All Band Phone/C.W. (Donated by John Knight, W6YY)

*Sherwood Rd., Stamford, Conn. 06905



In a group picture in my October Column I had Erik Sjolund, SMØAGD identified as Don Reibhoff, CT4AT, which of course was in error. Don finally caught up with me at the Hartford Convention last Fall. He does not seem to be convinced with my explanation of how it happened. One of these days Erik will be coming back state-side and will also require an accounting.

Calendar of Events

*Mar.	4-5	ARRL DX Phone Contest
*Mar.	4-5	YL - OM C.W. Contest
Mar.	11-12	Commonwealth Contest
Mar.	11-12	Trieste DX Contest
*Mar.	18-19	ARRL DX C.W. Contest
**Mar.	25-26	**CQ WW WPX SSB Contest**
Mar.	25-27	BARTG RTTY Contest
†Apr.	1-2	Polish "SP" C.W. Contest
Apr.	1-2	Tennessee QSO Party
Apr.	1-3	ARCI QRP QSO Party
Apr.	8-9	Swiss "H22" Contest
Apr.	11-12	DX to W/VE YL C.W. Party
Apr.	15-16	Polish "SP" Phone Contest
Apr.	15-16	Common Market Contest
Apr.	22-23	Bermuda Contest
Apr.	22-24	ZERO District QSO Party
Apr.	25-26	DX to W/VE YL Phone
Apr.	29-30	Dutch "PACC" Contest

*Covered last month.
**See January issue.
†Not official.

Arnold, W2HCW is making his award available for the recent 1977 Contest. Lee, KH6BZF and the Pacific R.A.T.S. 21 MHz awards will be included in the 1978 listing, as will John's W6YY combined phone and c.w. award.

That leaves a vacancy for the Multi-operator, Single Transmitter Phone award that Johnny has been donating these past many years. Any takers?

73 for now, Frank, W1WY

Commonwealth Contest

Starts: 1200 GMT Saturday, March 11
Ends: 1200 GMT Sunday, March 12

This is the old BERU contest in which eligibility is limited to RSGB residents in the United Kingdom and amateurs licenced to operate within the British Commonwealth and British Mandate Territories. This makes it of special interest to our Canadian and Caribbean neighbors.

Activity will be on c.w. only, and it is requested that operation be confined to the lower 30 kHz of each band. Contacts are not permitted between stations in own call area.

Exchange: Just a signal report.

Scoring: Each completed contact is worth 5 points. In addition, a bonus of 20 points may be claimed for the 1st, 2nd and 3rd contact with each Commonwealth call area. (All of the British Isles is considered as one area.)

Entries may be single or multi-band, with separate log sheets required for each band. Add total from each band for your final multi-band score. Multi-band entries are not eligible for single band awards, but you may request that a single band be judged for competition. (Only single operator permitted)

There is a *s.w.l.* category with scoring same as above. Report of station heard as well as call of station being worked should be listed. Credit may be claimed for both entries heard. Include a check list of call areas heard on each band.

Awards: Certificates to the first three places, multi-band in the U.K. and overseas. And for each single band. There are Rose Bowl Trophies to the overall winner and runner-up, and to the leading U.K. station.

Logs go to: D. J. Andrews, G3MXJ, 18 Downview Crescent, Uckfield, East Sussex TN22 1UB, England. They must be received before May 15th to be eligible.

Trieste DX Contest

Starts: 0000 GMT Saturday, March 11
Ends: 2400 GMT Sunday, March 12

Organized by the Trieste DX Radio Club to celebrate the anniversary of their organization, the action in this one will be between 13 stations and the rest of the world.

Competition is for single operator stations only, but also open to s.w.l.s., on all bands, phone and c.w., 10 thru 80. (2 meters also permitted)

Exchange: Just a signal report. I3 stations will also include 2 letters identifying their province.

Scoring: Multiply total number of QSOs by the sum of different provinces worked on each band. (max. of 12 per band). The same station may be worked on each band for QSO and multiplier credit.

S.w.l.s must report the call of the I3 station as well as the station being worked. Scoring same as above.

Awards: Certificates to all participants. And a plaque representing the 14th century seal of Trieste City to the top scoring station in each DXCC country. There are also awards for I3 stations.

Mailing deadline for all entries is

May 31st. To: Trieste DX Radio Club, P.O. Box 1342, 34100 Trieste, Italy. Award winners are expected to cover mailing charges. (10 IRCs or 2 U.S. dollars.)

CQ WW WPX SSB Contest

Starts: 0000 GMT Saturday, March 25
Ends: 2400 GMT Sunday, March 26

No changes from last year's rules. A complete run-down will be found in the January issue. We have added two new features however.

1. A separate section for QRPp operation.

2. A Club competition award, same as in the World Wide Contest.

Briefly the rules are as follows: Contacts between stations on different continents count 3 points on 14, 21 and 28 MHz, and 6 points on 7, 3.5 and 1.8 MHz.

On the same continent but not the same country, 1 point on 14, 21 and 28 MHz, and 2 points on 7, 3.5 and 1.8 MHz. (Exception: Contacts between North American countries are worth 2 points on the high bands and 4 points on the low bands.)

Contacts are permitted between stations in the same country for the purpose of obtaining a Prefix multiplier, but have no QSO point value.

The multiplier is determined by the number of different prefixes worked. Each prefix may be counted *once* only, not once per band.

The exchange is simple, the RS report plus a contact number starting with 001.

Only 30 hours out of the 48 hour contest period may be used for scoring. The 18 hours of non-operating time may be taken in up to 5 periods. That's for single operator stations, who must also show 12 hours of operating time to be eligible for an award. There is no time limit for multi-operator stations who must show a minimum of 24 hours operating time.

Besides the usual certificates for the different classifications there are now 10 Trophies for the Top scorers. (Plus the Club Plaque)

Mailing deadline is May 10th to: CQ WPX SSB Contest Committee, 14 Vanderventer Ave., Port Washington, N.Y. 11050 USA

BARTG Spring RTTY Contest

Starts: 0200 GMT Saturday, March 25
Ends: 0200 GMT Monday, March 27

Sponsored by the British Amateur Radio Teleprinter Group this contest is open to all amateurs and s.w.l. There are three categories, Single opr., multi-operator and s.w.l.

All bands may be used, 3.5 thru 28 MHz, but not more than 30 hours out of the 48 hour period may be used for scoring. The 18 hours off may be taken any time but not in less than 3 hour periods. Indicate on/off times in your log and summarize in your summary sheet.

Exchange: RST plus a three figure contact number and time in GMT. (full 4 figures)

Points: Contacts with stations within ones own country 2 points. With stations in other countries 10 points. And a bonus of 200 points per country worked on each band, including own. The same station may be worked on each band for QSO and multiplier credit.

Multiplier: Total sum of countries worked on each band. And number of continents worked. (counted once only) Use the ARRL country list and each W/K, VE/VO and VK call areas.

Final Score: (a) Total QSO points × country multiplier. (b) Country multiplier × bonus points × continents worked. Add sum of (a) and (b) for your final score.

Awards: Certificates to the leading scorers in each category and also each continent. And in each W/K, VE/VO and VK call areas.

Final position will be valid for entry in the World RTTY Championship. There are also awards for working 25 DXCC countries and for working all 6 continents. (Get info from G8CDW)

Logs must be received by May 31st and go to: Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, England EN1 4DX.

Polish DX Contest

C.W.: April 1-2 Phone: April 15-16
Starts: 1500 GMT Saturday
Ends: 2400 GMT Sunday

The SP DX Contest is now a two week-end affair, c.w. and phone, each independent of the other.

Poland is now divided into 49 Provinces. (Wojewodztwo). This replaces the old smaller districts. (Powiat). Two letters denoting the WOJ will be sent in the exchange by the SP stations.

There are three categories. Single operator, single and all band. Multi-operator, all band only. And s.w.l.

Exchange: RS(T) plus a 3 figure QSO number for foreign stations. Polish stations will send the RS(T) and their WOJ. (i.e. 579KA)

Scoring: Each QSO with a SP/SQ/3Z counts 3 points.

Multiplier: Each different province (WOJ) worked. Counted once only. (max. of 49)

1977 CAN - AM Contest

Over 200 entries were received in the initial running of this contest. Unfortunately space does not permit a complete listing of the results. For complete list of the results contact VE3BMV, Box 292, Don Mills, Ont. Canada M3C 2S2.

Top Ten

PHONE			CW		
VE	**W**	**MULTI**	**VE**	**W**	**MULTI**
CY7CC	WA6VEF	VE3BMV	CY7CC	WA6VEF	VE3BMV
VA7BGK	K6XO	VC9UM	VE5DX	KØMM	VC9UM
VE5UA	N4UF	CY1NN	CY3EDC	K4BAI	VE2BPT
CY4SW	KØMM	VE1AWN	VE3KZ	K5NW	W8LT
CY3BBH	WA6NEL	W8LT	VE3IR	N6MU	WA3UKY
VE3KZ	W6OKK	WA3UKY	VE2HY	K1ZZ	N4UF
VE6MP	K8MR	W4NVU	VE7AV	W5JW	WD8KDR
VE7AV	WBØPYD	VE8ML	CY1AGP	N5CT	W4NVU
VE8RO/6	WDØBRJ	W9WI	VE7DSA	W2SC	CY1NN
VE3MR	WA4NTP	WB3GPR	VE2YU	W6BIP	

TOP TEN COMBINED Phone/C.W.

VE—Single OP		VE—W Multi OP		W—Single OP	
CY7CC	1,008,527	VE3BMV	822,527	WA6VEF	695,756
VA7BGK	570,222	VC9UM	628,385	KØMM	303,871
CY3EDC	382,566	W8LT	242,834	K4BAI	189,230
VE3KZ	356,150	VE2BPT	194,680	K6XO	187,293
VE5UA	350,106	WA3UKY	192,199	K5NW	165,447
CY4SW	308,716	CY1NN	180,351	N6MU	159,619
VE5DX	288,982	VE1AWN	145,262	W5JW	149,030
CY3BBH	222,219	W4NVU	124,212	K1ZZ	144,508
VE7AV	210,697	N4UF	74,470	N4UF	132,209
VE6MP	194,186	VE8ML	72,312	W6OKK	130,475

CLUB COMPETITION:
1. Toronto DX Club 1,720,125
2. Murphys Marauders 203,171

TROPHY WINNERS:
CANADIAN CHAMPION TROPHY—
CY7CC, Lee Sawkins
AMERICAN CHAMPION TROPHY—
WA6VEF, Gary Coldwell
CANADIAN PHONE TROPHY—
VA7BGK, Sid Kemp
AMERICAN PHONE TROPHY—
K6XO, Alan Brubaker
CANADIAN CW TROPHY—
VE5DX, Jim Bearman
AMERICAN CW TROPHY—
KØMM, Fred Minnis
MULTI OPERATOR TROPHY—
VC9UM, University of Manitoba ARC
SPECIAL PLAQUE (Multi Op Champion)—
VE3BMV, Yuri Blanarovich
CLUB COMPETITION PLAQUE—
Toronto DX Club

Final Score: Total QSO points multiplied by number of provinces worked. The same station may be worked on each band for QSO points, but not a WOJ.

Awards: Certificates to the top scorers in each category and mode, in each continent, each country, and each call area of Australia, Canada, USA and USSR.

Contest contacts may be credited for the PZK awards in lieu of QSL cards, providing they are confirmed in the logs of the SP stations, and an application is made.

S.w.l. entries must report the call of the Polish station as well as the station being worked. Scoring same as above.

Use a separate log sheet for each band and include a summary sheet with the scoring and your name and address in Block Letters. The usual signed declaration is also requested. Disqualification rules for excessive duplicate contacts and etc. will be strictly enforced.

Entries must be postmarked no later than April 30th for c.w. and May 15th for phone. They go to: PZK Contest Committee, P.O. Box 320, 00-950 Warszawa, Poland.

Tennessee QSO Party

Two periods (GMT)
2100 Sat. April 1 to 0500 Sun. April 2
1400 to 2200 Sunday, April 2

Many counties with low activity will be activated by portable and mobiles in this the 8th annual party.

The same station may be worked on each band and each mode, mobile and portables in each county change. Tenn. may work in-state stations for QSO and multiplier credit. Phone and c.w. should be scored separately.

There is a bonus period for out-of-state stations. Look for Tenn. mobile and portables on Sunday between 0500 and 0600 on 75 meters.

Exchange: Signal report and QTH. County for Tenn., state, province or country for others.

Scoring: One point per QSO, 3 points if it's with a Tenn. mobile or portable. Tenn. stations multiply total QSOs by sum of (states + provinces + Tenn. counties) worked. Out-of-state stations, QSOs by Tenn. counties worked (max. of 95).

There is a 200 point bonus for mobile and portables for each county change outside own county. (min. of 10 QSOs per county).

Frequencies: C.W. - 3550, 7050, 14050, 21050, 28050. Phone - 3980, 7280, 14280, 21380, 28580.

Awards: Certificates to each station submitting a log with 15 or more contacts. Plaques to top phone and c.w. scores in Tenn. and out-of-state. And winning mobile and portable stations.

Use a separate log sheet for each band with 25 or more contacts.

Mailing deadline is May 1st to: Dave Goggio, W4OGG, 1419 Favell Drive, Memphis, Tenn. 38166. Include a s.a.s.e. if eligible for a certificate.

ARCI QRP QSO Party

Starts: 2000 GMT Saturday, April 1
Ends: 0200 GMT Monday, April 3

Sponsored by the QRP Amateur Radio Club International, this activity is open to all Amateurs, both members and non-members. Stations may be worked once per band for QSO and multiplier credit.

Exchange: RS(T) and state, province or country. Members will include their QRP number, non-members their power input.

Scoring: Contacts with a member 3 points, non-member 2 points, stations other than W/VE 4 points.

Multiplier: Each state, province and country worked on each band.

There is a power multiplier as follows: Over 100 watts input, × 1; 25 to 100 watts, × 1.5; 5 to 25 watts, × 2; 1 to 5 watts, × 3; and less than 1 watt, × 5.

Final Score: QSO points × (states + provinces + countries) × power multiplier.

Frequencies: C.W. - 3540, 7040, 14065, 21040, 28040. S.S.B. - 3960, 7260, 14300, 21360, 28600. Novice: 3720, 7120, 21120, 28040.

Awards: Certificates to the highest scoring station in each state, province and country. Additional awards depending on activity. And a certificate to the station showing three "skip" contacts using the lowest power.

Include a summary sheet with your entry with a breakdown of the scoring, bands used, equipment, antennas and power input. Your name and address in Block Letters and the usual signed declaration.

Logs must be received before May 30th and go to: E. V. "Sandy" Blaize, N5BE, 417 Ridgewood Drive, Metairie, LA 70001. Include a large s.a.s.e. for copy of the results.

Awards *(from page 79)*

The cost of the AWARD will be $3.00 payable to SMIRK. Money made from this Award will be used to finance "DX-peditions" and equipment for use by amateurs in foreign Countries who would like to operate 50 MHz.

Additional endorsements for every five (5) Countries over the original ten (10) are available for $1.00 each. Apply or request an application form via s.a.s.e. to: D. G. Gardner, WA1LXN, SMIRK 1026, DXDC Assistant Manager, 186 Broad Street, Apartment 2L, Marlboro, MA 01752.

The International Short Wave League Awards Program: Each Award is a separate colored certificate, available to all, members or not. GCR list of QSLs with $2.00 U.S. or 10 IRCs for each award (free to ISWL members) to ISWL Awards Manager, Clifford A. Tooke, 6 Chelmer Avenue, Rayleigh, Essex, SS6 7TB England. In the past, all these Awards have been on a "heard" basis, but after ten years they have new printed Awards and they are for heard or worked confirmations.

Century Club Award: For verified contacts with 100 Countries as defined on ISWL Country List, with stickers for each additional 25 Countries.

Heard/Worked All Continents: For verified contacts with 10 stations in each of the six Continents, a total of 60 QSLs.

Heard/Worked All States: For verified contact with the 48 States of the Continental U.S.A. (KH6 and KL7 excluded).

Note: ISWL have a fine QSL Bureau, for full details of ISWL membership with the benefits of this QSL Bureau, send s.a.s.e. and couple IRCs to: ISWL Hqts., 1 Grove Road, Lydney, Gloucestershire, GL15 5JE, England. Data on more ISWL Awards next month.

"S. R. Makedonija Award": The Radio Amateur's Society of Socialistic Republic of Macedonia announces this new certificate, which is available to all licensed Radio Amateurs and SWLs throughout the world.

Rules:
1. Confirmed contacts with Amateur Radio Stations located in Towns of S. R. Macedonia.
   YU amateurs need 15 QSOs with 12 different towns.
   EU amateurs need 10 QSOs with 8 different towns.
   Other amateurs need 5 QSOs with 3 different towns.
2. Contacts must be made January 1, 1977 and after.
3. Any mode and any band may be used.
4. No QSLs required, only log information certified by two other licensed amateurs or a Radio Club Officer.
5. The Award is free but please include 2 IRCs to cover postage to: YU5 Award Manager, P.O. Box 14, 91001—Skopje, Yugoslavia.

Note: Data on more YU5 Awards next month.

Notes

As this is being written, Christmas is coming close and I have not yet obtained proper gifts for Helenmae (Wife) so I better get at it before I'm in the dog house.

Nice note from Dave, W6CCM to say

Since CQ 1945

The Radio Amateur's Journal

HALF PRICE

Yes, I'd like to receive CQ every month at half the newsstand price

☐ $16.95 for 24 issues—Save $19.05

☐ $9.95 for 12 issues—Save $8.05

Name

Address

City

State Zip

(Foreign subscribers add $3.00 for each year. Foreign subscriptions payable ONLY in U.S. funds by international draft or money order.)

My account number is

☐ BankAmericard ☐ Mastercharge

master charge

BANKAMERICARD

IMPORTANT: BE SURE TO ENCLOSE YOUR CHECK OR MONEY ORDER



WHAT ELSE IS THERE TO THINK ABOUT?

DON'T MISS THE NEXT ISSUE . . .

Subscribe NOW!

G

THE

NEW 1978 E

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

RETURN ADDRESS
Please Print or Type

FIRST CLASS
PERMIT No. 392
Port Washington, N.Y.

BUSINESS REPLY CARD

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY

CQ Magazine

Cowan Publishing Corp.
14 Vanderventer Avenue
Port Washington, N.Y. 11050

Math's Notes *(from page 72)*

are simple to build and understand. Other modes such a FM, PM, etc. are certainly possible and will be the subject of a succeeding column if interest warrants.

With the transmitter built, the next step is, of course, the transmitting antenna. For optical communications applications this device is very similar to those used in microwave work. The most common antenna is the parabolic dish (or mirror) as shown in fig. 3. This reflector concentrates most of the radiation from the lamp or LED into a narrow collimated beam. By proper positioning of the light source, the output beam can be made parallel, diverging (spreading apart) or converging to focus at a distant point. Another common "antenna" method is the use of a lens where all of the requirements just mentioned can also be met. Lenses tend to accept less light than properly designed parabolic reflectors however, and the latter are almost always used where long distances are to be covered.

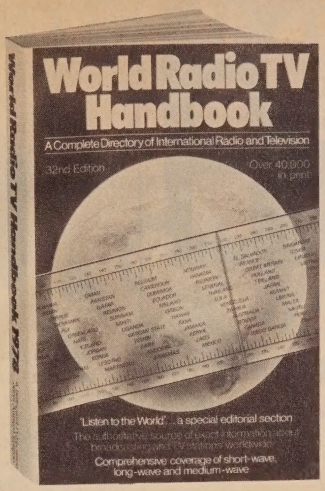
In cases where extremely long distances are to be covered, lasers are often used. The output of these devices is a very narrow beam that can be transmitted over miles of terrane without elaborate optics or mirrors on the transmitting end. Alignment of these devices is extremely critical however, and as they are not usually available to the experiementer, we have not thought it necessary to go into this approach in this particular column. Again, if there is enough interest we will be only too glad to do so.

The same antenna considerations apply to the receiving and with the exception being that the light source is replaced by a photocell. It should be kept in mind that the light beam from the transmitter will always spread somewhat and as a result the apeture, or diameter of the receiving lens (or mirror) should be as large as possible to collect as much light as possible. Often, in commercial use, the receiving antenna takes the form of a high power telescope.

In addition to collecting as much light as possible, the very narrow beamwidth requires that the alignment of transmitting and receiving antennas be done very carefully. Similarly, the mounting method for both antennas must be absolutely stable.

The detector, as we have already mentioned, is a photo-sensitive device that converts the incoming light back

(Continued on page 94)



World Radio TV Handbook 1978

A Complete Directory of International Radio and Television

The most exhaustive and authoritative guide to broadcasting and television stations around the world today, **WORLD RADIO TV HANDBOOK 1978** is an indispensable manual for anyone with a working interest in radio and television. Features:

- Names and addresses of broadcast companies and stations by country
- Names and titles of leading officials and personnel
- Listing by frequency of shortwave stations around the world
- Program data including frequencies, wave lengths, transmitter power, call signs, times, announcements (in each language)

Plus, a special, in-depth editorial section with professional articles, suggestions and tips—and much, much more. **WORLD RADIO TV HANDBOOK 1978** is available now for only $11.95. Order your copy today for a **FREE 10-DAY EXAMINATION.**

WORLD RADIO TV HANDBOOK 1978
Billboard Publications
2160 Patterson Street, Cincinnati, Ohio 45214

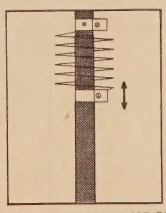
Please send me_____ copy (copies) of the WORLD RADIO TV HANDBOOK 1978 @ $11.95. A check or money order is enclosed, including applicable sales tax in the states of NY, OH, MA, CA, TN, NJ. I understand that if I am not satisfied with my purchase, I may return the book(s) within 10 days for full credit or refund.

Name _____
Address _____
City _____
State _____ Zip _____
Signature _____
2200

THE
HF5V-II
Trap Vertical. A lot more for your money!

COMPLETELY AUTOMATIC BANDSWITCHING ON 80-10 METERS WITH LOW VSWR..160 METERS TOO, WITH ADD-ON UNIT...LOW ANGLE OF RADIATION FAVORS DX....NO PART OF THE RADIATING LENGTH "TRAPPED OUT ON 40, 20, OR 10 METERS... GREATER EFFICIENCY AND BETTER VSWR BANDWIDTH...SOLID ALUMINUM ALLOY/PLASTIC/FIBERGLASS DESIGN....INCLUDES MOUNTING POST AND COAXIAL MATCHING LINE WITH CONNECTOR...26 FEET TALL.

ONLY $74.50 POSTPAID, CONT. USA (MN RESIDENTS ADD 4%)

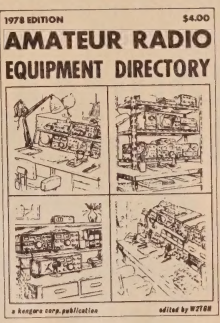


EASY TO USE SLIDE-ADJUSTABLE 80-40 METER INDUCTORS.

BUTTERNUT ELECTRONICS CO.
ROUTE 1
LK. CRYSTAL, MN. 56055
phone 507-947-3126

VISA AND MASTERCHARGE ACCEPTED.
ADD-ON 160 OPTIONAL EXTRA.
OTHER TRAP ANTENNAS FROM $34.50.

NEW 1978 EDITION



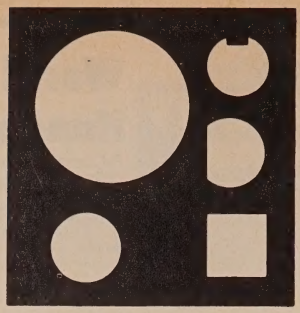
The most complete directory of Amateur Radio Equipment ever published. The all new 1978 Edition includes specifications, pictures, and prices of transceivers, transmitters, receivers, amplifiers, power supplies, transverters, antennas, tuners, towers, meters, microphones, keyers, VFO's, preamps, test gear, etc. etc. No ham library will be complete without a copy of the 1978 Amateur Radio Equipment Directory.

$4.00 Postpaid (U.S.)
Canada $5.00, Foreign (Air) $7.00

KENGORE CORP. Dept.Q
9 James Avenue
Kendall Park, N. J. 08824

SEND FOR YOUR COPY TODAY





Put more punch in your work.

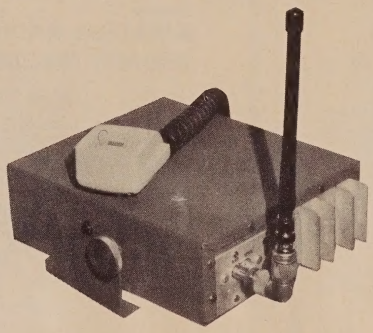
With a Greenlee Chassis Punch you can punch clean, true holes in seconds. Round, square, key or D. In 16-ga. metal, hard rubber, plastic or epoxy. Available at radio and electronics parts dealers. Write for catalog E-730. Greenlee Tool Co, Rockford, Ill. 61101.

The Timesavers

GREENLEE TOOL CO

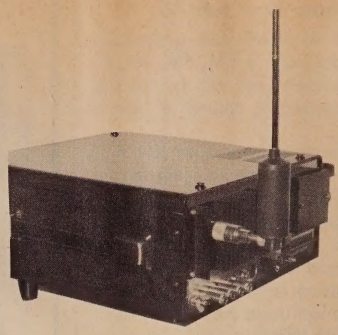
a subsidiary of

Ex-Cell-O Corporation



Author's Heath HW-202 transceiver shown with Hy-Gain Rubber Ducky mounted to rear r.f. output connector. As the HW-202 uses RCA-type phono connectors for r.f. output, a UHF-to-RCA adapter is needed to mount the Duck to the transceiver.

One final point: I wonder how many 2-meter transceivers are grounded to a good earth or cold-water pipe ground? While at v.h.f. frequencies the length of the ground lead often precludes getting a really good *r.f.* ground, from a shock and lightning-protection standpoint, the transceiver case should be grounded. When using the indoor-type antennas described here, the ground may materially enhance performance by improving the "ground plane" under the antenna, essential for good results with any vertical antenna.

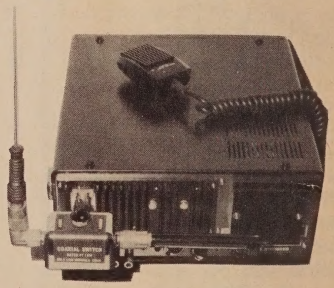


Early Lafayette indoor CB antenna is shown here mounted to the rear of a Yaesu FT-221R transceiver. To use this antenna, it is only necessary to short across the loading coil and adjust the telescoping whip sections for a low SWR. If difficulty is experienced in adjusting the antennas for a good s.w.r., it may be due to introduction of the meter itself into the field of the antenna. Try adjusting antenna length until the antenna loads to the same relative r.f. output when using the antenna as with a good 50-ohm dummy load connected to the output terminals.

Summing Up

In this article, we've shown how you can get on two meters very quickly and inexpensively for temporary and portable operation using a variety of "raw materials." We've looked at converting indoor CB and v.h.f. monitor antennas, building a simple back-of-set 5/8-wavelength antenna, and constructing a "quickie" 1/4-wavelength vertical. We've also suggested using your walkie-talkie's rubber ducky in a pinch.

There is no replacing a good outdoor vertical or beam for 2-meter work, and the antennas described here are not designed to take their places. The results using *any* antenna indoors are not likely to set any DX records, but for temporary setups—particularly when working simplex or going through nearby repeaters—you should get very satisfactory results using any of them. And, to boot, they can all be made to work with very little trouble and a minimum of expense. Antennas for two? Easier done than said! ■



Quarter-wavelength whip shown installed on the back of author's FT-221R Transceiver. Use of a coaxial switch mounted directly at the r.f. output terminals allows easy selection of dummy load or antenna. The dummy load shown is a 10-watt unit made by Raytrack Corp. of Columbus, Ohio. Author has found that it fits the gap between the small 5-watt CB-type units and high-power dummy loads, both of which are not very useful in working with the typical 10-20 watt v.h.f. transceiver.

YOUR HAM TUBE HEADQUARTERS!

TUBES BOUGHT, SOLD AND TRADED
SAVE $$$ – HIGH $$$ FOR YOUR TUBES

MONTHLY SPECIALS

3CX1000A7/8283	$285.00	811A	10.80
3CX1500A7/8877	240.00	813	18.00
3-500Z	58.00	6146B	4.95
3-1000Z	145.00	6360	3.75
4-125A	42.00	68838	5.25
4-400A	48.00	8122	51.00
4-1000A	198.00	8236	22.00
4CX250B	27.50	8908	5.25
572B	24.00	8950	4.75

The intelligent Ham alternative to CB Two meter mobile 40 watt rf power transistor 2N6084 – $16.00

Eimac Tubes & Accessories In Stock
Write or phone for types not listed

BRAND NEW**FACTORY GUARANTEED**
TOP BRAND Popular Receiving Tube Types. BRAND NEW 72% Off List* Factory Boxed. FREE LIST Available – Includes full line of RF Power Transistors. Minimum Order $25.

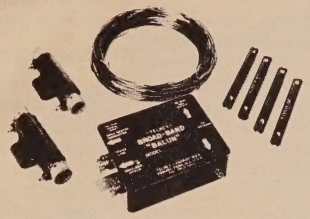
Use toll free # 800-221-0860

CQ

CeCo
COMMUNICATIONS, Inc.
2115 Avenue X
Brooklyn, NY 11235
Phone (212) 646-6300
SERVING THE INDUSTRY SINCE 1922

STEP UP TO TELREX

WITH A
TELREX "BALUN" FED—"INVERTED-VEE" KIT
THE IDEAL HI-PERFORMANCE
INEXPENSIVE AND PRACTICAL TO INSTALL LOW-FREQUENCY
MONO OR MULTIPLE BAND, 52 OHM ANTENNA SYSTEM



Telrex "Monarch" (Trapped) I.V. Kit
Duo-Band / 4 KWP I.V. Kit $62.50
Post Paid Continental U.S.

Optimum, full-size doublet performance, independent of ground conditions!
"Balanced-Pattern", low radiation angle, high signal to noise, and signal to interference ratio!
Minimal support costs, (existing tower, house, tree).
A technician can resonate a Telrex "Inverted-Vee" to frequency within the hour!
Minimal S/W/R is possible if installed and resonated to frequency as directed!
Pattern primarily low-angle, Omni-directional, approx. 6 DB null at ends!
Costly, lossy, antenna tuners not required!
Complete simplified installation and resonating to frequency instructions supplied with each kit.

For technical data and prices on complete Telrex line, write for Catalog PL 7

COMMUNICATION SYSTEMS SINCE 1921 **telrex** Laboratories
ASBURY PARK NEW JERSEY 07712 U.S.A.

JAN CRYSTALS KEEP YOU ON THE AIR



- CB
- CB standard
- 2 meter
- Scanners
- Amateur Bands
- General Communication
- Industry
- Marine UHF
- Micro processor crystals

easy to charge

THE NEW WAY master charge THE INTERBANK CARD

BANKAMERICARD

Send 10¢ for our latest catalog
Write or phone for more details

JAN CRYSTALS
2400 Crystal Drive
Ft. Myers, Florida 33901
all phones (813) 936-2397

NEW WORLD DIGITAL TIMER BY COPAL.



World's first pocketable, battery operated, digital alarm clock. Has Dial-a-time . . . a programmed world time-zone readout system. Shows the actual time in 24 different cities and places all over the globe. For the executive on the go. Sugg. List Price: $129.95. Now $99.95. Save $30.00.

24 HOUR (MILITARY TIME) DIGITAL CLOCKS BY COPAL.



Model 802-M (Top)
Color: White
Size: 11 1/4" x 5" x 1 1/2"
Sugg. List Price $81.95
Now $69.95 Save $12.00

Model 227-M with Alarm (Left)
Color: White
Size: 5-3/4" x 2-3/4" x 3-3/8"
Sugg. List Price $24.95
Now $19.95 Save $5.00

Model 225-M (Right)
Color: White and Black
Size: 5 1/2" x 2-3/4" x 3 1/4"
Sugg. List Price $17.95
Now $16.95 Save $1.00

● All UL Listed ● Operates on AC 120V. 60 Hz
● Warranty: 12 months

Order direct from this ad! Send check or use your Mastercharge or Visa. Allow $2.00 extra for shipping/handling charges.

United High Power Associates, Inc.
389 Fifth Ave., New York, NY 10016
Phone (212) 685-2888
Dealer Inquiries Invited For N.Y. State deliveries, please include Sales Tax

Dummy Load/Wattmeter

LIGHTWEIGHT CHAMPION!

Under $100.



Under 2 lbs

B&W Model 333 for medium and low power.

A Professional Instrument for bench or field. Ideal for testing transmitters, DC to 300 MHz

- ☐ **2-Way Mobile, CB**
- ☐ **Marine VHF & SSB**
- ☐ **Amateur**

up to 250 watts output, in 4 ranges: 0-5, 0-50, 0-125, 0-250. Low VSWR.

See your B&W dealer. Made in the U.S.A. by

B&W **Barker & Williamson**
10 Canal Street • Bristol, PA 19007

State of the Art - 1929 *(from page 61)*

tube bases, were used in the receiver section, but rugged coils of ¼-inch diameter copper tubing was used for the transmitter; these coils were bolted in and were supported on glass rods to ensure utmost mechanical stability. The combination remained in limited use, primarily as a portable rig, until the mid-30s, when it was retired to storage.

Upon my brother's death, the transmitter/receiver was given to this writer. Unfortunately, all the coils had been lost other than an 80-meter transmitter and a 40-meter receiver coil.

Being between rigs, that is, awaiting a new Drake TR-4C after having sold a Drake TR-4, the writer dusted off the 1929 transmitter, connected a regulated 350 v. power supply, and attached it to a dipole antenna through a Drake MN-4 antenna coupler. On the 80-meter c.w. band many contacts were made. Reports received were invariably good! Modern operators, using modern receivers, and accustomed to the high stability of modern transmitters found the quality of signals quite acceptable and quite comparable to those from today's transmitters! I consider that a compliment to my late brother's building ability. ■

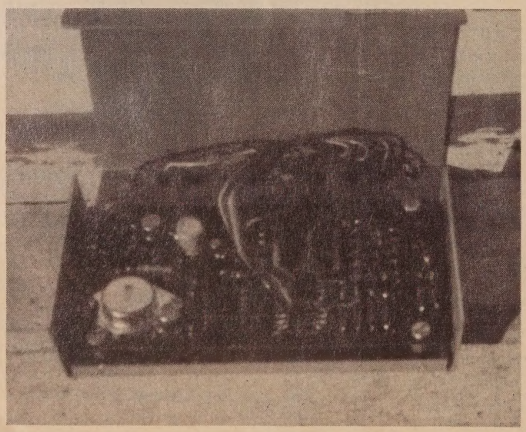
CQ Reviews: Kenwood R599D & T599D *(from page 63)*

would be a decided advantage if Kenwood would incorporate the audio processor from the TS520 into the T599D. Keying characteristics are good and the built-in sidetone oscillator which injects a tone into the R599D receiver helps make c.w. operation a real pleasure. The a.l.c. circuit is of the amplified type; thus it functions on c.w. as well as s.s.b. An external a.l.c. input is provided on the back panel for use with a linear amplifier.

Other features include an efficient but quiet cooling fan for the final tubes and a good VOX circuit. Controls for VOX and bias adjustment are located under the lift-up top of the transmitter. Provisions for interconnecting the Kenwood 2 meter and 6 meter transverters are located on the back panel.

The R599D and T599D combination offers a great deal of operating flexibility, and as illustrated in the photograph with the matching Kenwood speaker, is a most attractive amateur station. The R599D and the T599D are priced at $499.00 each. The matching speaker, S599D, is $25.00. For more information contact Trio-Kenwood Communications, Inc., 1111 West Walnut, Compton, California 90220.

Scanning The IC-225 *(from page 50)*



The scanner opened to reveal the components and the wiring to the LEDs.

Electronic Dup-A/B switching

Referring to fig. 4 (inside top view), the *Dup-A/Dup-B* switch is the extreme right side toggle switch. It is a DPDT switch with the side toward the chassis edge unused. Looking at it as shown, connect a ribbon cable wire from the bottom left hand terminal of this switch (brown wire on this terminal) to point "G" on the scanner. Connect another ribbon cable wire from the center terminal on the toggle (red wire on this terminal) to point "H" on the scanner. Finally, another wire in the ribbon cable is connected from the top left terminal of the toggle switch (orange wire on this terminal) to point "J" on the scanner.

Operation

With the scanner connected as just explained, operation of the transceiver with the channel selector on any channel beween 1 and 21 should be as normal. The scanner is engaged by first putting the *DUP-A/DUP-B* switch in the simplex position. This switch **must** remain in this position while the scanner is in use or proper operation will not be realized. The channel switch is then turned to "22". The scanner should begin scanning immediately as indicated by the LEDs. When a channel is in use, the scanner will stop and remain there until the channel is clear. When the carrier drops, a delay of about 5 seconds will hold the scanner and then, if no further activity is encountered, scanning will resume. If you would like to transmit on that channel to answer a call on the repeater or whatever, all that is necessary is to press the mike button to transmit. The scanner will remain on that channel. To return to normal operation, simply dial up the channel you'd like to operate on, and put the duplex switch in the proper position.

Customizing

Lock-out switches: The easiest way of adding this useful feature is to add miniature SPST switches from pins 2, 4, 6, 8, 10 and 12 of U3 and pins 6, 4, 2 and 12 of U4 to ground for channels 1 to 10 respectively. When on, they would keep the outputs of the hex inverters from ever going high thus deactivating that channel. The one disadvantage to this method is that the channel lights will still come on for that locked-out channel even though that channel is not being activated.

Scan speed can be increased by decreasing the value of R1 or C1. Alternately, the speed may be decreased by increasing their values. Caution: increasing scan speed too fast will cause the scanner to overshoot to the next channel before the scanner has a chance to stop.

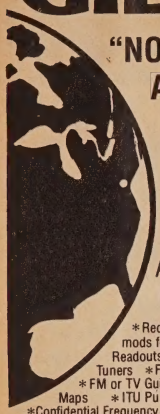
Scan hold time can be increased by increasing the value of the capacitor in the collector of Q2 or decreased by decreasing this value. It is not recommended that the value of the 4.7K resistor in the base of Q3 be decreased. The base to emitter junction of Q3 could be damaged by too much base drive.

Less than 10 channel operation: As shown, the scanner will scan 10 channels. For 5 channel scanning, refer to fig. 5.

Eight channel scanning: Refer to fig. 1. (1) Disconnect pin 11 of U1 from pin 12 of U2. Let pin 11 open and ground pin 12. (2) Use only the following hex inverter outputs: pins 2, 4, 6, 8, 10 and 12 of U3 and pins 6 and 4 of U4. Pins 2 and 12 of U4 will never go high, and the counter will only count to 8. If operation above 8 channels is never contemplated, the LEDs connected to pins 10 and 11 of U2 may be eliminated along with D8 and D9.

I would be happy to answer any inquiries regarding this scanner when accompanied by a SASE. My thanks to Bing, WA3YYC, for the use of his rig in developing this circuit. ■

GILFER

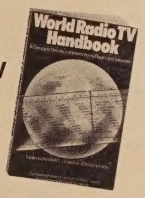


"NORTH AMERICA'S SHORTWAVE MAIL ORDER PLACE"

One-Stop Armchair Shopping For All SWL Needs

*Receivers — Drake, Yaesu — special mods for better performance *Frequency Readouts *Receiving Antennas *Antenna Tuners *Frequency Calibrators *Log Books *FM or TV Guides *QSL Albums *AM Pattern Maps *ITU Publications *QSL Address Books *Confidential Frequency List *Clocks *All SWL Books

The New 1978 32nd Edition WORLD RADIO TV HANDBOOK Is Ready!



Listen to the world with this comprehensive directory of stations at your side. Best there is! Only $11.95 ppd.

FREE SWL MINI-CATALOG

GILFER SHORTWAVE

Dept. CQ3 , Box 239, Park Ridge NJ 07656

2 METER CRYSTALS MANY IN STOCK

FOR THESE RADIOS ON STANDARD ARRL REPEATER FREQUENCIES

Clegg HT-146
Drake TR-22
Drake TR-33 (rec only)
Drake TR-72
Genave
Heathkit HW-2021 (rec only)
Heathkit HW-202
Icom/VHF Eng
Ken/Wilson
Lafayette HA-146
Midland 13-505
Regency HR-2
Regency HR-212
Regency HR-2B
Regency HR-312
Regency HR-2MS
S.B.E.
Sonar 1802-3-4, 3601
Standard 146/826
Standard Horizon
Swan FM 2X
Tempo FMH
Trio/Kenwood
Trio/Kenwood TR2200
Trio/Kenwood TR7200

$3.95 each

in quantities of 10 or more, $3.50 each

Certified check or money order only . . . NO COD's

Rolin Distributors

P.O. Box 436, Dunellen, N.J. 08812

(201) 469-1219

R-X Noise Bridge



- **Learn the truth about your antenna.**
- **Find its resonant frequency.**
- **Adjust it to your operating frequency quickly and easily.**

If there is one place in your station where you cannot risk uncertain results it is in your antenna.

The Palomar Engineers R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this in one measurement reading. And it works just as well with ham-band-only receivers as with general coverage equipment because it gives perfect null readings even when the antenna is not resonant. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams multiband trap dipoles and verticals. No station is complete without this up-to-date instrument.
Why work in the dark? Your SWR meter or your resistance noise bridge tells you only half the story. Get the instrument that really works, the Palomar Engineers R-X Noise Bridge. Use it to check your antennas from 1 to 100 MHz. And use it in your shack to adjust resonant frequencies of both series and parallel tuned circuits. Works better than a dip meter and costs a lot less. Send for our free brochure.

The price is $49.95 and we deliver postpaid anywhere in the U.S. and Canada. California residents add sales tax.

Italy write i2VTT, P.O. Box 37, 22063 Cantu. Elsewhere send $52.00 (U.S.) for air parcel post delivery worldwide.

Fully guaranteed by the originator of the R-X Noise Bridge. ORDER YOURS NOW!

Palomar Engineers

Box 455, Escondido, CA. 92025 • Phone: [714] 747-3343

Computers... How They Work *(from page 26)*

Summary

In this article we learned that there are five major elements which are found in all computer systems: INPUT, CONTROL, ARITHMETIC LOGIC UNIT, MEMORY and OUTPUT. Further, we have seen that each of these elements can be described in terms of a collection of registers. Finally, we have learned that computers operate by transferring the contents of one register to another, and by performing arithmetic and logical operations on data entered into the computer. ■

H.F. Operating *(from page 23)*

can be set as desired for semi break-in operation. Another circuit is used to detect the tone and activate a keying relay. A suitable circuit for the latter function is shown in fig. 2 (A). It employs a 567 Tone Decoder PLL and can be easily driven by the low impedance output of a f.m. receiver. Fig. 2 (B) shows a simple audio oscillator which can be keyed at the f.m. transmitter end of the link.

The usage of tone oscillators and tone decoders can be easily expanded so other functions can also be remotely controlled when operating c.w. For instance, another tone oscillator operating at about 1500 Hz and a 567 Decoder driving a relay were used to switch on a CQ Caller accessory at the transceiver. When this tone is on it will also activate the VOX circuit which, depending upon the application the tone is used for, may or may not be desirable. The VOX circuit can be replaced by another oscillator/decoder combination for completely independent transceiver send/receive switching. The oscillator/decoder combinations can be used to also select different crystal-controlled operating frequencies at the transceiver either by activating a stepping relay or by using different tones to operate relays for the desired frequencies. For a few simple control functions, the single-tone oscillator/decoder circuits will work fine. But, if one desires a more elaborate set-up one should employ the touch-tone encoder/decoder techniques common to repeater operations. These techniques will also work for s.s.b. operation but then one has to set the tone control frequencies above 3,000 Hz and use two simple filters at the audio output of the f.m. receiver at the h.f. transceiver. A low-pass filter to pass the audio to the transceiver and a high-pass filter for the tones to the decoders.

The complete wireless remote, continuous tuning of a transceiver imposes many demands on the circuitry used to ensure stability, provide remote frequency indication, etc. and is beyond the scope of this article. However, a relatively simple remote operating convenience that one might try to achieve is control of the receiver incremental tuning in a transceiver. This can be accomplished mechanically, by having tones actuate a reversible d.c. motor attached to the r.i.t. shaft, or electronically. The electronic approach uses a variable frequency oscillator at the control transmitter and a frequency to voltage converter at the receiver. The varying d.c. voltage controls a varactor diode to provide r.i.t. in the transceiver. A suitable circuit for a frequency to voltage converter is shown in fig. 3. The application of the circuit will vary from transceiver to transceiver depending on the range of voltage needed to achieve satisfactory r.i.t. operation. In many cases, only a few volts d.c. variation across a varactor will be sufficient, so the variable audio oscillator at the remote control point need only cover a few kHz range. ■

Zero Bias *(from page 12)*

Remember amateurs have always prided themselves on the concept of self-policing. We don't need nor want regulations which are punitive and do not address themselves to the problem. If we are to "pay" for someone elses problem then we certainly should voice our input to the solution. We can do a lot to curb a great deal of interference both amateur and CB and foster a better understanding of the services in the minds of the public. If Anwar Sadat can meet with Menachin Begin, then certainly amateur can meet with CBer to find a solution to the problem. If we talk a numbers game, and if there aren't too many amateurs, 300 to 400 thousands and perhaps anywhere from 14 to 28 million CBers out there depending on who you listen to, you also have to remember that there are still an additional 200 plus million "civilians" out there who also want something from the airwaves and the government. They want and deserve to be able to watch and listen to a football game or whatever is their individual pleasure, and those are the kinds of numbers that count.

Lastly, we can all work towards getting more funding for the FCC in the hopes, and I emphasize hope, that they can begin to put some teeth in their enforcement branch and resolve part of the interference problem with existing legislation. Attrition and passing fad interest is already at work within the CB ranks with the number of license requests going down each month. On the other hand the number of amateurs is steadily increasing each month so it will become a matter of semantics eventually, as to who is more responsible for the problem. The one certainty is that we shouldn't waste time on saying who is more at fault and just accept the fact that we are all involved and we should find ways and means of working together rather than continually shift the balance of blame to make one group pay for the other.

The last thing amateur radio and CB radio need, at this time, is a continual barrage of legislation and edicts that will eventually put us all off the air. We don't need a formal decree from Newington on who should be able to buy what and where, when this does not address itself to the problem. Legitimate amateur radio manufacturers and dealers shouldn't be so quick to grab up the responsibility for clearing up the ranks of illegal CB operation when most of the equipment that is being used illegally is of the "black box" variety, certainly not up to amateur radio standards. Perhaps one obtuse consideration should be to let the illegal operators have access to some good quality amateur radio equipment and perhaps we would have far less interference right off the bat. If we're forced to legalize or condone everything else by lack of government enforcement, it might just be an interesting consideration.

The basic problem is interference . . . let's not forget it. What we eventually do about it or have done to us is basically up to all of us. If we do nothing or wait for someone else to do it, including the League, then we should be prepared for and accept the consequences.

73, Alan, K2EEK

Ham it up for $4.50.



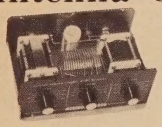
Amateur crystals 143.99 - 148.01 only for this trim price (and it's postpaid). Florida residents add 4% sales tax. Send frequencies, make and model when ordering. Our price includes most gear on our free Parts List. For equipment not listed, we'll provide prices on request and slice up something special. Master Charge & Bankamericard telephone orders accepted. No C.O.D.'s.

Savoy Electronics Inc.

P.O. Box 5727, Fort Lauderdale, Florida 33310
305/563-1333

Manufacturers of Quality Quartz Crystals Since 1937

Let's Think Antenna Coupler



Model HC/500A

- This coupler will match most types of antennas and helps to lower VSWR of antenna systems down to 1 to 1.
- The LC circuit used is effective for reduction of TVI, BCI and FMI due to the inherent bandpass filter effect which attenuates the harmonic and spurious signals.
- This antenna coupler will help improve S/N ratio and cross-modulation distortion.
- It is suited for auto and other mobiles, space limited apartments and the great outdoors.

Model	HC/75	HC/250	HC/500A	HC/2500
MHZ	3.5-28	3.5-28	1.9-28	1.9-28
Max Input Power	75W PEP	250W PEP	500W PEP	2500W PEP
Input Impedance	50-75	50-75	50-75	50-75
Output Impedance	10-600	10-250	10-600	10-600
Size(inch) WxHxD	6 3x 2.8x7.9	6 3x 2.8x7.9	9 4x 3.9x6.3	13 4x 5.9x10
Weight (Lbs)	2.4	3.3	6.8	18.7
Price	$29.95	$59.95	$89.95	$179.95

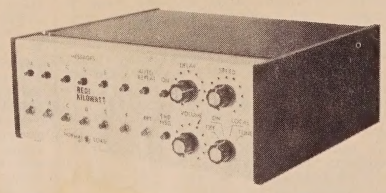
Order direct from this ad! Send check or use your Mastercharge or Visa. Allow $3.00 extra for shipping/handling charges.

United High Power Associates, Inc.
389 Fifth Avenue New York, NY 10016
Phone (212) 685-2888
For N.Y. State deliveries, please include Sales Tax

PROGRAMMABLE MEMORY KEYER SYSTEM

$199.95*

*(plus sales tax for PA residents and $2.50 shipping and handling charges)



GENERAL INFORMATION

All solid-state reprogrammable memory keyer with six 25 character (512 bit) "MOS" memories with adjustable auto-repeat mode. Full IAMBIC keyer with triggered clock DOT & DASH MEMORIES operates from 2 to 50 WPM. Silent grid-block and cathode keyed output. Built-in monitor and speaker.

FEATURES

- Designed for contests or daily QSO's
- Programmable as fast as you may send
- Speed adjustable from 2 to 50 WPM
- Full erase feature (4 seconds) or record over old message
- Six 512 Bit (25 character) messages, i.e., CQ CQ DX CQ DX DE W3HXK W3HXK
- Automatic repeat mode adjustable from 0 to 2 minutes
- Individual message, auto repeat, and end of message lamp indicators
- Silent output for grid block and cathode keyed circuits
- Full IAMBIC operation with DOT and DASH memories
- Optional remote control available
- Built-in monitor/speaker with volume control and tune
- Mode switch allows normal operate, local and tune
- 115 VAC 50/60 Hz or 8 to 16 VDC 6 watts (220 VAC 50/60 Hz optional available)
- Size 4-9/16" H x 7-13/16" W x 6-9/16" D
- Weight 2 lbs.

DEALER INQUIRIES INVITED
100% MANUFACTURED IN U.S.A.

REDI-KILOWATT INTERNATIONAL, INC.
P.O. Box 662 Holland, Pa. 18966
(215) 357-9214

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

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.

SIX METER, folded dipole YAGI Antenna. Unused, 5 element, Gov't surplus in original box with instructions and blueprint, $175.00 FOB. WB0ZSA, 10925 Morris Ave. S., Bloomington, MN 55437.

QSL CARDS—Something completely different! Nothing even close to it on the market! The "Cadillac" of QSLs! Samples: $1.00 (Refundable with order) W5YI Print; Box no. 1171-E: Garland, Texas 75040.

QSLs WITH CLASS! Unbeatable quality, reasonable price. Samples, 25 cents. QSLs Unlimited, Box 27553-C, Atlanta, GA 30327.

EMBLEMS, PATCHES Embroidered. Custom made from your design. Order 10 to 1000's. Russell, 1109 Turner St., Auburn, Maine 04210.

EZ DOES IT BEST. Deals, that is, on Yaesu, ICOM, Drake, Swan, Cushcraft, Larsen, KLM, Dentron, VHF Engineering, and Wilson. For new or used gear, call, see or write, W0EZ, Bob Smith Electronics, 12 So. 21st St., Fort Dodge, IA 50501. 515/576-3886.

PANASONIC Portable Video Tape Recorder, Camera, Charger/A.C. Adapter & Accessories. Excellent condition. Model WV3082. Howard Weinstein, 3655 Leewood Lane, Jacksonville, FL 32217. (904) 353-7484.

NEED: Heathkit HW-18-01 SSB-(CAP) Transceivers any condition, pay $75-$200 bare set w/o power or with power units. Ernest Oberbillig, 619 Grove St., Boise, Idaho 83702.

TECH MANUALS for Govt. surplus gear—$6.50 each: SP-600JX, URM-25D, OS-8A/U. Thousands more available. Send 50 cents (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

FREE Catalog. Flash Tubes, Nicads, Kits, Calculators, Digital Watch Modules, Ultrasonics, Strobes, LEDS, Transistors, IC's, Unique Components. Chaney's, Box 27038, Denver, CO 80227.

NAVASSA ISLAND W.I. K4N1 QSL Cards, 1928, later, collector wants price. Send: Vern Ardiff, Box 118, Sunnymead, CA 92388.

WANTED: ARC-5 WW-11 Command Set receiver. Q-5er, 3-6 MHz or 6-9 MHz. Please reply with condition & price. Ernie Neumann, 7800 DeBarr, no. 47, Anchorage, Alaska 99504.

QSL CARDS—500/$10. 400 illustrations, free samples. Bowman Printing, Dept. CQ, 743 Harvard, St. Louis, MO 63130.

TOWERS—Aluma crank-up towers and stack sections. Special discount prices. T50H only $635. Other models available. Robert D. McClaran Sales, (W4ZGG), P.O. Box 2513, Vero Beach, FL 32960 or 430 Franklyn Ave., Indialantic, FL 32903. 305/723-4793 after 6 p.m.

BEARCAT 210 $259.95. Regency Touch $249.95. All CB's Discounted. Free shipping. Visa/Master. Call (707) 544-4388 or write for a specific price quote. McDonald Electronics, Box 7492(c), Santa Rosa, CA 95401.

TELETYPE FOR SALE: Model 28ASR's, KSR's, typing reperfs, and TD's. New and used parts available including cabinets, tables, Mod Kits, gears and gearshifts. Some 8-level Model 33 and 35 equipment available. Send S.A.S.E. for complete list and prices. Lawrence R. Pfleger, K9WJB, 2141 N. 52nd Street, Milwaukee, WI 53208.

27th DAYTON HAMVENTION at Hara Arena April 28, 29, 30, 1978. More room this year! Technical forums, exhibits, and huge flea market. Program brochure mailed March 6th, to those registered within past three years. For accommodations or advance flyer, write Hamvention, P.O. Box 44, Dayton, OH 45401 or call (513) 854-4126.

HAMMARLUND HQ180AC Gen Coverage Rec. $280, SBE-1 SM Sentinel I Hi/Lo scanner $80, Ameco TX-62 6 & 2 AM/CW transmitter $60, Lafayette HA520 tunable Hi/Lo PS monitor $50, Midland 13-774 (pair) 6 ch 5w CB HT's w nicads charger and crystals $75, Amplidyne 220 MHz converter $20, Pierce-Simpson Gladding 25 2M FM transceiver 25 w 12 ch. (capri board) with crystals $125, Drake ML-2 2M FM transceiver 10w AC/DC $165, Golding RF wattmeter 2-30 MHz 10/100/1000 w $25, Ameco CB-2 2M converter 14-18 MHz IF $15, Golding 1000 w inline wattmeter 2-30 MHz $25, Gonset G-63 80-10 M ham band rec. $80. Charles Strauch, WA2MKY, 742 Woodfield Rd., West Hempstead, NY 11552.

MOBILE IGNITION SHIELDING provides more range with no noise. Available most USA engines, some imports. Free literature. Bonding straps on sale now. Estes Engineering, 930 Marine Drive, Port Angeles, WA 98362.

CLUB BADGES 1 1/4 x 3 1/4, 3 lines, first name, call, club, or slogan, $1.25 each. Blue, Black, Red with white letters or reverse. Arnold Linzner, 2041 Linden Street, Ridgewood, NY 11227.

ELIMINATE QRM AND QRN problems with our superior CW and SSB Filters. Also CW Keyers, speech compressors, power supplies, teletype converters, and multiband antennas assembled or in kits. Dealer Discounts. Dynamic Electronics, Box 896, Hartselle, AL 35640. 205/773-2758.

D & V RADIO PARTS—Variable & Trimmer Capacitors, RF Chokes, Air Wound Coils, Transmatch Components. Send stamp for complete listing of in stock components. 12805 W. Sarle, Freeland, Michigan 48623.

EMBROIDERED EMBLEMS, Custom Designed Club Pins and Medallions; Trophies and Ribbons. Highest Quality, Fastest Delivery and Lowest Prices Anywhere. Free Info: NDI, Box 6665J, Marietta, GA 30065.

I'M LOOKING FOR CW/PHONE SKEDS. Need QSL's for 5BWAS/DXCC. All letters answered. W3HU, Box 522, Levittown, PA 19058.

JOHNSON VALIANT 2 transmitter 160 thru 6 meters $225.00, Collins 75A3 receiver $225.00. A. Linzner, 2041 Linden St., Ridgewood, NY 11227.

ROHN 11G tower $19.00 section, 25G $29.00 section, Dealers wanted for Rohn, Regency, Antenna Specialist, business and amateur radios and systems. Hill Radio, 2503 G.E. Road, Bloomington, IL 61701, (309) 663-2141.

ESTATE SETTLEMENT. Mint Collins Station 32S-3A, 75C-3C, 312B-4, 516F-2, SM-3. Best offer. Drake SPR-4 e/w SCC-4, 5-NB, RY-4, $450.00. Drake MN-2000, $175. W0NIZ, R.R. 5, Box 761, Golden, CO 80401. (303) 277-0884.

BEAUTIFUL multi-colored decal with your call and state, $3.95. Forwardco, Box 76, Massillon, Ohio 44646.

CUSTOM EMBROIDERED EMBLEMS, your design, low minimum, Emblems, Dept. 10, Littleton, New Hampshire 03561.

A.C. VOLT METER: Monitor your A.C. house current. Steel gray metal cabinet, 0-150 ACV meter, with AC line cord, just $19.95: Also handle all lines of CB and Ham gear. Write: The Outlet, P.O. Box 697, Eustis, FL 32726.

WANTED: Pre-war issues of Short Wave Craft magazine, Bill Orr, W6SAI, Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI, Eimac, 301 Industrial Way, San Carlos, CA 94070.

SSTV AND PHOTOGRAPHERS—Make offer; 1 each, like new, Fujitar Lenses, 135 mm, f 4.5, telephoto, 35 mm, f 3.5, wide angle. Cary Cowan, c/o CQ Magazine, or call (516) 883-6200.

WANTED: Antique Glass-Looking for old milkglass, purple, slag, carmel, and greentown. Tell me what you have. I pay the highest prices. Write: Jack Schneider, 14 Vanderventer Ave., Port Washington, NY 11050.

SALE: Heath IM-28 VTVM Kit. New, perfect. Ordered by mistake. $40. Schultz, Box "L", FPO New York 09544.

I AM A RETIRED Broadcast Engineer who would like to meet active hams, on the air, who are interested in the historical processes of photography such as Carbo, oil, bromoil, etc. For the purpose of exchanging data on the air with the hope of working together to preserve the knowledge of these beautiful processes for future generations of ham-photographers. I work all bands, 2 thru 160 meters, AM or SSB. For sked info please contact: Tracey Diers, W2OQK, 58-14 84th St., Elmhurst, NY 11373.

UNUSUAL TEST INSTRUMENTS and electronic components from around the world. Send for list. IIE, Box 985, Anaheim, CA 92803.

WANTED: Old time straight key with heavy bar type arm. Ralph Sieloff, RD 2, Lagrangeville, NY 12540.

WANTED: Knight T-60 transmitter, Need not be in working order. All letters answered. Wayne Hubbard, WB1CBT, Box 123, Short Beach, Branford, CT 06405.

WANTED: Signal/one speaker and filters, Pre-1921, QSTs, and National Radio equipment of the 1930s. Paul Kluwe, W8SOP, 610 West Hone St., Edmore, MI 48829.

WANTED: Hammurland HX50 transmitter. Must be in good condition. Michael Nelson, 307 Babcock, Coon Valley, WI 54623.

DRAKE MN-4 matcher, wattmeter, $90. Dick Shideler, 3731 Evergreen, Visalia, CA 93277.

WANTED: S-meter for Sky Champion S2OR Hallicrafters RX. G2DRT, 84 Cock Lane, High Wyeombe, HP137EA, Great Britain.

SELL: NC-183 receiver, with matching speaker, $135, perfect; HQ-170 receiver, like new condition; HW-101 transceiver, this is new. Stamp for info. K0JHW, 7061 Idlewild Ave., Jennings, MO 63136.

WANTED: Heath SB-303 with CW and AM crystal filters, mint condition only. Dennis Jacques, 1202 University Ave., Green Bay, WI 54302.

WANTED: Any old home brew equipment transmitter, especially needed can't afford much. Rick Wallis, WD4IOW, 6351 Holiday Rd., Buford, GA 30518.

NOVICE ALL—AMERICAN certificates: Work a novice in all 10 call areas. Send list and $1. WB6QBJ, 25 Rudnick Ave., Novato, CA 94947.

NEED: Two 3-500 z and two 4-400A tubes plus Johnson Viking SSB adapter. W0VT, 10406 W. 52nd St., Shawnee, Kansas 66203.

SELL: Raytrack kw plate tank coil fr 80 & 40 plus kw bandswitch, $16. UTC S-50 6 kv c.t. 300 ma, new, pick-up only, $75. R. Ross, 95 Norwood Ave., Northport, NY 11768.

The book "CQ YL" has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June '76. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher Louisa Sando, 9412 Rio Grande Blvd., N.W., Albuquerque, NM 87114. Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy, or a gift copy, from W5RZJ, $3.50, postpaid.

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field, should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. (617) 233-1234.

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.

FOR SALE: Spectra Physics 137P 2 mw laser tube, brand new, never used, $80. G.R. 572B, 1 KHz, Hummer $15. Irwin Math, 320 Northern Blvd., Great Neck, NY 11021.

FOR SALE: Old issues of Ham Radio, 73, QST, CQ. Some complete runs. Send s.a.s.e. for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

CAN ANYONE HELP? Need a 3RP1A CRT to repair my scope. Schultz, W4FA, US Consulate, Box "L", FPO New York 09544.

SACRIFICE: Drake T-4X, R-4B, spk-MS-4 with p. sup., $595. Atlas 210X with console $685. All in mint condition. CB Mart, Box 5024, Conalville, Iowa 52241.

HW-202 w/built-in Sandlin scanner; ITC Multi-2000; Bearcat 101 scanner. All good condition. Karl Thurber, W8FX/4, 233 Newcastle Lane, Montgomery, AL 36117.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, Eimac, 301 Industrial Way, San Carlos, CA 94070.

CQ AND QST 1950-1975 issues for sale. Send s.a.s.e. if ordering 73, Ham Radio, or other CQ and QST issues. One dollar minimum order and all issues cost 25 cents each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

CERTIFICATE FOR PROVEN TWO-WAY RADIO CONTACTS with Amateurs in all ten (10) USA call areas. Award suitable to frame and proven achievements added on request. SASE brings TAD data sheet from W6LS, 2814 Empire Ave., Burbank, CA 91504.

WANTED: SB400 or SB401 Also HW101 with AC and DC supplies. Rodger Legg, 24 Tower Rd., Wayne, NJ 07470.

WANTED: Heath HW-16 with HG-10 VFO, $125. Brian, WB2QOV, (914) 357-5820.

FOR SALE: Kenwood TS-520S, $550. Digital display DG-5, $150. William D. Shevtchuk, 1 Lois Ave., Clifton, NJ 07014.

QRP STN: HW-8, HS-1661 speaker with built-in Lambda regulated supply and IC audio amplifier, mint. W7ESE, 1208 E. Fairmont, Tempe, AZ 85282. (602) 966-5244.

REBUILT Johnson 275W Matchbox w/SWR, good condtion. Also, L.S. 300 MHz frequency counter, needs work. Karl Thurber, W8FX/4, 233 Newcastle Lane, Montgomery, AL 36117.

WANTED: Schematic for Motorola T43A 150 MHz transceiver. Billy Nielsen, WB4APC, P.O. Box 338, Radcliff, KY 40160.

APACHE TX-1 and SB-10 w/manuals and cables. Cheyenne MT-1 and HR-20 w/manuals and home brew AC supply. $250.00. Don Roof, WA0GKP, 480 S. Lewis St., Lakewood, CO 80226.

MODEL GSB-1 SSB adapter, by TMC, $100. SP600JX Hammurland receiver, $350. Both excellent. prefer pick-up. L.G. Basham, 735 Caves Highway, Cave Junction, OR 97523.

WANTED: Excellent 811 A's and 3-500 Z's. Bill Thee, WB8RMD, 6507 Spruce Dr., Birmingham, MI 48010.

COLLINS 312B5, Collins xtal pack. Best offer gets 'em. Don, K5CKQ, 912 Bell, Lawton, OK 73501.

SELL: SB200 linear only one year old, never used, $299 plus shipping; Heath G-1 sig. gen. works fine, $18; Heath Electronics Keyer, new, perfect, $39.00. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamond, CA 93560.

SELL: National Gen Cov/Ham receiver, NC-183D and speaker, Mint, $170. Heath deluxe SWL receiver, GR-54, $85. W2NXC, (201) 725-5093.

SALE: Clegg 22, Mark II, w/manual. Perfect condition. Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355.

WANTED: Heathkit HW-7 or HW-8 transceiver also any external CW filter that can be added to Realistic DX 150. F. Eldredge, 5151 Corvallis Dr., Mt. Pleasant, MI 48858.

WANTED: Galaxy wattmetter model RF-550 or RF-550A. Ralph Sieloff, RD 2, Lagrangeville, NY 12540.

SELL: Joystick system J indoor antenna system. Cost $99 asking $50. R. Hajdak, 1644 Morris St., SE, Mineral Rdige, OH 44440.

WANTED: Schematics for Heath HR-10B receiver, or Knight T60 xmtr to buy or borrow. WB9ZFG, Karl Zemlin, 1519 W. Park Ave., Champaign, IL 61820.

HELP! Need info on rotator selsyns, have miniature 155VAC units. Jay L. Davis, W3FBT, 802 Chain St., Norristown, PA 19401.

WANTED: QSLs from all over the world, we QSL 10090. CB and Ham. Steve Gloff, 2078 Bush St., St. Paul, MN 55119.

WANTED: Johnson or Nye matchboxes, small and large; also homebrew. Mike Wetzel, W9RE, 7880 Shelbyville Rd., Indianapolis, IN 46259.

FOR SALE OR TRADE: 11 meter 14 MHz VFO. Danny Burt, Rt. 3, Box 153, Tullahoma, TN 37388.

QSL CARDS: White, high gloss coated stock. Send 24 cents, no. 10 s.a.s.e. for samples and price list. Marv Mahre, W0MGI, 2095 Prosperity Ave., St. Paul, MN 55109.

WANTED: Old broadcast engineering magazines, IRE Proceedings; 1930-1960. W1JS/5, 312 W. 24th St., Houston, TX 77008.

SELL: Excess receivers, transmitters, transceivers, parts. SASE for list. Wanted—Drake C-4 station control. J. Forman, 2001 Jefferson Davis Highway, Arlington, VA 22202.

FOR SALE OR TRADE: Hal ST-6 RTTY terminal unit with 850-170 shift and AK2 AFSK oscillator, provisions for UT-4 with all manuals and documentation. Need Heath SB-614 or FB2 meter rig. Also Swan model 45 HF 5 band antenna, new never used with warranty card, $60.00. Kenneth Dado, 4821 E. Riverside Dr., no. 141, Austin, TX 78741.

FOR SALE: Hallicrafter SX-62A gen. cov. receiver, manual, .550 to 108 MHz. $125. J.M. Budzowski, WB3ECF, 128 Tally Dr., Pittsburgh, PA 15237.

ASR 35 TELETYPE: Mint condition, best offer over $500. WA0FSQ, Jack Hovden, 2310 S. 8th St., Marshalltown, IA 50158.

WANTED: Heath SB600 speaker. Len Siedinski, 18 Ames Ave., Tonawanda, NY 14150.

WANTED: Old or dust catching "bus" key. Must be very reasonable. Disabled vet. Wm. J. Roven, RR1, Box 91, Bass Lake, South Boardman, MI 49680.

WANTED: Model 122 Johnson VFO for Viking II xmtr. Tommy Gray, WD5HGO, Rt. 2, Box 186A, Jonesboro, LA 71251.

WANTED: Circuit for a Freshman Masterpiece radio, circa 1925. Am wondering if somewhere in your files you might have a copy of such a schematic or if you might know where I can get one. Emery A. Houle, 148 Social St., Woonsocket, RI 02895.

WANTED: V.S. Callbook, years 1948 to 1954. H.L. Schultz, Jr., 610 Young Rd., Erie, PA 16509.

WANTED: Commercial outdoor type 50 ohm dummy load; 2 kw or greater. Rod, W7OM, 5632 47th Ave., SW, Seattle, WA 98136.

WANTED: One copy of the May 1976 issue of Ham Radio Magazine. Irwin Schwartz, K2VG, c/o CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

SELL: 2 meter FM Sonar transceiver, AC P/S, mobile bracket $175. Heath HW-32A with spare tubes $65. George Pataki, WB2AQC, 34-24 76th St., Jackson Hgts., NY 11372.

BE FIRST TO KNOW precisely when and where to work all the choice DX. Bi-weekly LI DXA DX Bulletin has: Hot DX News—Time and Frequency of each goodie—QSL Info—Propagation Forecast—and more. Send business size SASE for free sample copy or $8 for 1-year domestic subscription. Long Island DX Association, DX Bulletin, P.O. Box 173, Huntington, NY 11743.

HIGH SPEED CODE TAPES—40 to 80 wpm. Inquire K4KHT, 4330 N.E. 13th St., Ocala, FL 32670.

COAXIAL SWITCHES, Transco no. 1460-822, DPDT, High Performance, Water-proof, perfect for Oscar, HF, UHF, New-$40 each or trade. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

WANTED: Heath AM Tuner model AJ-21 with manual. Allan Nadler, Jr., WA5KOG, 102 Hynes Dr., Plaquemine, LA 70764.

WANTED: Old radio magazine, books, catalogs, call books, Handbooks and old radio receivers, parts, etc. E.A. Rasmussen, W6YPM, 164 Lowell St., Redwood City, CA 94062.

WANTED: Operation manual with schematic for Johnson Viking 500 transmitter, Bob Grinnell, 11014 Harney, Omaha, NE 68154.

HEWLETT—PACKARD: Programmable calculator HP-65. 1/2 price at $400. Hardware is included. Free gift with purchase. Mark Alpiger, 8607 Ivinell Ave., Fern Creek, KY 40291.

FEW NEW COAXIAL RELAYS: Only $5 each; SPDT, 12v DC, go to 500 MHz. Use own terminals or solder in set. W4API, Box 4095, Arlington, VA 22204.

DONATIONS of working radio gear wanted to help start off newly formed high school radio club. WA2INJ, 12 Algonquin Dr., Hunt. Station, NY 11746.

VIBROPLEX Semiautomatic key, like new, $20.00. Realistic DX-150A all band receiver, like new, $80.00. I Ship. WB4FJO, Sherman A. Harrison, Rt. 13, Edens View, Kingsport, TN 37664.

Math's Notes *(from page 85)*

into electrical signals. For cases where the signal level is very high, a simple self-generating silicon solar cell may be used directly connected to a pair of earphones. For most moderate to low input light signals however, additional amplification will be necessary. Figure 4 is a simple two state audio amplifier that can be added to a solar cell to increase its sensitivity. The circuit is small enough to mount right at the detector and a neat package can be made of the entire receiver.

When very low signals are present, high gains are necessary and the noise of the detector comes into the picture—just like the noise figure of a receiver's front end determines how weak a signal it can detect.

In this case, the detector must be a device such as the silicon PIN diode. These detectors offer very low noise levels with the result that they can be followed by high gain stages. Figure 5 is a schematic of a typical PIN diode receiver. The diode is connected in a current-to-voltage converter configuration and the value of Rf adjusted to give the the desired amount of gain. The capacitor, Cf is used to adjust the overall bandwidth of the stage. With a value of 1 megohm, LED signals from a point across the room, with no antenna, can be received. The addition of a suitable antenna can then extend the range considerably.

The information given here is intended to spark some interest in communications in the area of 7×10^8 MHz (approximate frequency of visable light). Experimental and commercial systems have been built that allows such communications over 10 mile ranges and no doubt, by careful experimentation even this can be extended. There are probably all sorts of interesting phenomena to be discovered and breakthroughs that amateurs could make (such as bouncing signals off clouds for really long distance communications).

Please let us know what works, if any you have performed. We will be glad to share your results with other interested people.

73, Irwin, WA2NDM

SWAN VOX $35; H.B. P.S. for Swan $20. Tone pad $25. Floppy disks, $3. WA1GFJ, 17 Whitney St., E. Hartford, CT 06118.

SELL: Heath HW2036, $240. HP-13B, $55. UPS Paid. Maurice Beale, 307 Oak Grove, Apt. B, S. Beloit, IL 61080.

WANTED: Older alm. faced Tempo One W/PS. Need not work, but no busted, dropped units. Pay up to $250.00. K3HBP, 14 Balsam Rd., Wilmington, DE 19804.

WANTED: Manual for Sireno Model 144 VHF frequency converter. Rusty West, 4300 H, Foxridge, Blacksburg, VA 24060.

NEED: FT243 crystals. 3510-35 25 MHz. R. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

RADIO STATION OPERATORS: Group of 10 long established camps located in New York Adirondacks, Mass. and Conn. Berkshires, and Maine offer excellent opportunity for broadcast and amateur radio operators. Graduate and undergraduate students. Experience necessary in announcing, setting up equipment, and organizing program. 8 week summer season. For application and further information write: Enclose full details as to your qualifications) Kathy Singer, Placement Advisor, 105 Fairview Ave., Port Washington, NY 11050.

WANTED: SB500 2 meter transverter. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamond, CA 93560.

ARGONAUT with outboard CW filter Mod, Microphone and antenna tuner. $200 FOB. or consider swap for Ten-Tec Century/21 transceiver. K7BD, 103 E. Bartlett Ave., Selah, WA 98942.

FOR SALE: CQ January 1945 to Dec. 1975 all original copies in dinders. Make offer. A. Jablonsky, W0BK, 1022 N. Rock Hill Rd., St. Louis, MO 63119.

FOR SALE: New England Quasi-Logarithmic Speech Processor $30.00. Superior VTVM (Large meter) $20.00. Hitachi (Exide Portable 12V Power pack and charger, $15.00). Motorola solid-state AM auto radio $13.00. New Sonar VHF Sentry Model FR-106SA, $20.00. W0JRJ, 8328 Willow Way, Raytown, MO 64138.

HALLICRAFTERS S-41G wanted. R. Randall, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Old HRO parts, BFO tuning condensor plus switch; metal-skirted knobs; Pse arimail letter first, Jock, ZL2GX, Lytton, Gisborne, New Zealand.

TRADE FOR RADIO GEAR—Mint stamp collection from Kingdom of Bhutan. A gift and I don't collect stamps! Write: W5YI, 1322 Edgewood; Richardson, TX 75081.

TRADE: Mint Kenwood TS-520 with digital readout for Kenwood TS-700S. Trade Genave GTX-600 plus cash for Kenwood TS-600A. F.H. Kauppi, Rt. 2, Box 171, Gilbert, MN 55741.

ROBOT 300 Slow Scan converter factory modified and updated with manual, $460. Gerald R. Tetrault, 1369 Front St., Manchester, NH 03102.

SELL: Excellent Drake T4XAC4, R4A, $550. No alterations. Nels, Collett, 446 1/2 W. Long Longden, Arcadia, CA 91006.

SELL: SB-10 Heathkit SSB adapter factory aligned and tested working condition, make offer. Robert Smith, WA6ZLA, 320 Park St., Ft. Braddi, CA 95437, (707) 964-4931.

DO YOU SAVE QSL CARDS? Start collecting them from all over the world! Join the carnival QSL Club of the World. Write for application blanks to: Chris Huston, 1124 High Blvd., Dubuque, IA 52001.

SELL: 432 back issues of QST from 1935 through 1975, many in binders, $150 plus shipping; 130 back issues of 73 from 1960 through 1974; $75 plus shipping. Bob Mayo, WB2VUB, 32-24 73rd St., Flushing, NY 11370.

SELL: Shrink tubing, 0.187" and 0.250" I.D. Shrinks 50 percent, $8.00 per 100 ft. coil-either size. W4JGO, 643 Diamond, Salem, VA 24153.

WANTED: First class equipment in first class shape with third class price! Just fetting started. Prof. Wm. R. Endsley, 1701 W. Freeman, Carbondale, IL 62901.

SPARE the operating manual and schematic diagrams for Hallicrafters Model S-53A also for the TA-12B transmitter, brand name unknown. Lance Thomas, Box 201, Airdrie, Alta. Canada.

WANTED: Late model Mini-Beam. State condition and best price. George Scott, W2LFX, 34 Chatham Place, Vincentown, NJ 08088.

CALL LETTER LICENSE PLATES: Wanted for collection. Will pay postage. Art Phillips, WA7NXL, P.O. Box 201, Flagstaff, AZ 86002.

SELL: Frequency Standard with Bliley 100 kHz xtl. and oven. Accuracy 0.00015 percent Feb. 1963, page 88. New condx. $37.50. W4JGO, 643 Diamond, Salem, VA 24153.

WANTED: I.F.T.'s and BFO coils 175 455 239 KCS (from ARC/5) prefer nat'l or Hammarlund air tuned. R.E. Winn, W8BHD, Millersburg, MI 49759.

SELL: Tempo One (White face) w/AC one pwr sup., $325.00. Drake R-4B rec. w/MS-4 speaker, $350.00. Barry Martz, P.O. Box 214, Clare, MI 48617.

TEMPO 2020 $650.00, 3 months old, excellent condition. J.P. Johnson, 135 W. 9th St., Jacksonville, FL 32206.

SB200 absolutely mint, $299, 3 years old. SB160 monitor scope, $99. Jack Larson, W6TBA, Rt. 1, Box 105B, Rosamond, CA 93560.

SK800-B socket and SK-806 chimney for use with 4CX 1000A tube. Hugh Allen, W2BZ, 401-Third Ave., Haddon Heights, NJ 08035.

QST 65 copyies, 1928-1936, $32.50 plus transportation. H. Dawson, 1520 So. Oakes, Tacorna, WA 98405.

SELL: 96 ft. aluminum self-supporting tower, 8 sq. ft. ant. in 80 MPH wind, $1250. New commercial built sold-state linear, 13.6 VDC and 60-160 watts drive for 1 kw out, 10-80 m $750. W5ILR/4, 4421 Templar Dr., Portsmouth, VA 23703.

SELL: 2 T.V. Sylvania camera model RF-300 120v. 50 watt excellent condx. $75.00 each. Eugene P. Baker, Rt. 1, Box 9, Antigo, WI 54409.

DRAKE L4B linear, less than 4 hours, $650. Ralph Senechal, 938-A Avenida Mojorca, Laguna Hills, CA 92653.

WANTED: Coaxial bulkhead lighting arrostors and SP4T coax relays both with type "N" connectors. Charles T. Huth, 1233 1/2 W. State, Fremont, OH 43420.

WANTED: CRC-874 tube for RAL-7, RAK-7 receiver power supply. Van Heath, Rt. 1, Box 523, Jamesville, NC 27846.

DXers! Use ham sentences in 54 languages on your outgoing QSL and get results. K3CHP's DX QSL Guide, $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

HURRY—HURRY—HURRY: QSL Cards needed. Send QSL cards to: Philip Steven Kurkland, 357 East 201 St., Apt. 1-F, Bronx, NY 10458.

WANTED: Schematic diagram for Zenith Trans Oceanic Model 1600 chassis 6L40. Frank Cirillo, 212 West 22 St., NYC, NY 10011.

MORROW MB560A xmtr power supply wanted. R.W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

CQ BUMPER STICKERS reads "dihdidahditdahdahdidah" Send $1 to: D. Mollan, WB7FDE, 7805 NE 147th Ave., Vancouver, WA 98662.

Barry Electronics

THE NAME THAT'S KNOWN AROUND THE WORLD

COLLINS



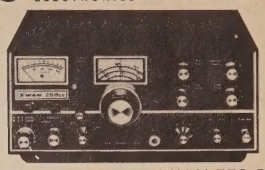
COLLINS 75S-3C

DRAKE



DRAKE TR-4CW

SWAN ELECTRONICS



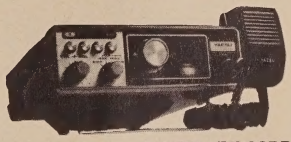
SWAN 750-CW

ICOM



DENTRON MLA 2500

YAESU



YAESU FT-227R



ICOM IC-211

ATLAS RADIO INC.



ATLAS 350-XL

YAESU



YAESU FT-101E

Wilson

WILSON MARK IV



New York City's *LARGEST STOCKING HAM DEALER COMPLETE REPAIR LAB ON PREMISES–*

Open Mon./Fri. –9:00 a.m. - 5:30 p.m. Sat. until 3:00 p.m.

MAIL ALL ORDERS TO: BARRY ELECTRONICS CORPORATION
512 BROADWAY, NEW YORK CITY, NEW YORK 10012
BARRY INTERNATIONAL TELEX 12-7670 212-925-7000

WE SHIP WORLDWIDE

BIRD WATTMETER, YAESU, DRAKE, ICOM, TEMPO, SHURE, KDK, TURNER, ASTATIC, HYGAIN, LARSEN, WILSON- DENTRON-VHF-ENG.-STANDARD COMM-TUBES-3-500Z, 572B-etc. IN STOCK. **TOP TRADES GIVEN ON YOUR USED EQUIPMENT.**

ADVERTISER'S INDEX

New Reader Service System

To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound between pages 72 and 73, and circle the numbers on the card which correspond with the Reader Service numbers listed in the advertiser's index below. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

R.S. No.		Page
1	Antenna Supermarket	63
2	Apollo Products	63
3	Atronics	63
4	Barker and Williamson	87
5	Barry Electronics	95
6	Butternut Electronics Co.	85
7	CeCo Communications Inc.	87
8	Cleveland Institute of Electronics, Inc.	55
9	Collins Radio (Rockwell Int'l)	8
10	DGM	63
11	Dayton Hamvention	61
12	Dentron	17
13	Eimac, Div. of Varian	Cov. IV
14	Gilfer	89
15	Greenlee Tool Co.	86
	Gregory Electronics	29
16	Group III Sales Co.	71
17	Hamtronics	13
18	Heath Co.	37
19	Henry Radio	14
20	Herrman Co.	31
21	International Crystal Mfg. Co.	10
22	Jan Crystals	87
23	Kirk Electronics Div. of Viking Instruments	11
24	Kantronics	71
25	Kengore Corp.	85
26	Kenwood	Cov. II, 2, 6, 7
27	MFJ Enterprises	1, 77
28	Mor-Gain	64
29	Newtronics Corp.	15, 16
30	Wm. M. Nye Co., Inc.	21
31	Palomar Engineers	89
32	Redi-Kilowatt	91
33	Rolin Distributors	89
34	Sagal Electronics	71
35	Savoy Electronics	91
36	Skylane Products - W4YM	71
37	Space Electronics	71
38	Telrex	87
39	Tri-Ex Tower Corp.	67
40	Tufts Radio Electronics	33
41	Unarco-Rohn	45
42	United High Power	87, 91
43	Watson-Guptill Publications	85
44	Wilson Electronics	5
45	Yaesu Electronics Corp.	96, Cov. III

FT-901DM

COMPETITION-GRADE HF TRANSCEIVER

SPEAK TO THE WORLD IN ANY MODE



Price And Specifications Subject To Change Without Notice Or Obligation

member arma amateur radio manufacturer's association

YAESU

The smart radio

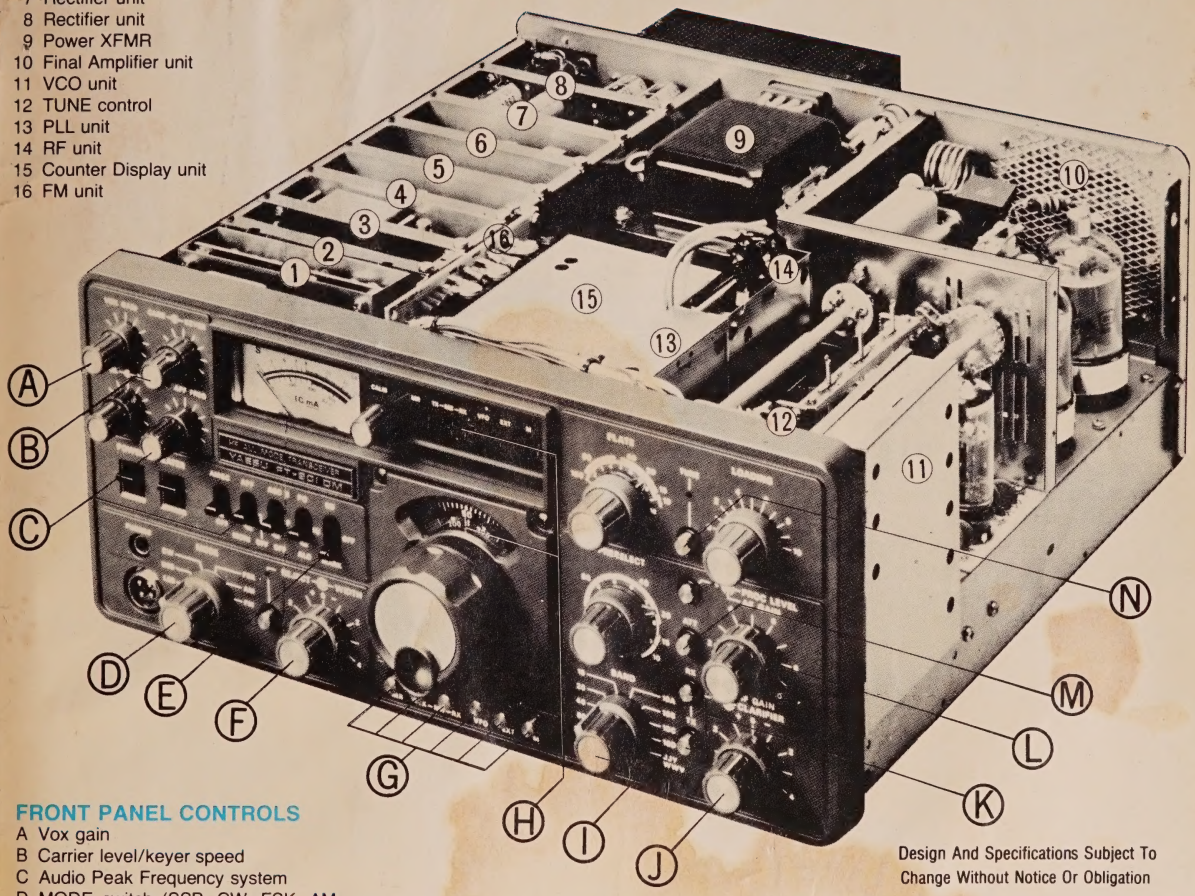
YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 (213) 633-4007
YAESU ELECTRONICS CORP., Eastern Service Ctr., 613 Redna Ter., Cincinnati, OH 45215

1B78

FT-901DM

BOARDS INSIDE CABINET

1 CARR OSC unit
2 VOX unit
3 AF unit
4 IF unit
5 Filter unit
6 Noise Blanker/RF Processor
7 Rectifier unit
8 Rectifier unit
9 Power XFMR
10 Final Amplifier unit
11 VCO unit
12 TUNE control
13 PLL unit
14 RF unit
15 Counter Display unit
16 FM unit



FRONT PANEL CONTROLS

A Vox gain
B Carrier level/keyer speed
C Audio Peak Frequency system
D MODE switch (SSB, CW, FSK, AM, FM)
E Crystal calibrator/Noise blanker
F Rejection tuning/variable IF passband tuning
G Frequency memory system
H Digital plus analog frequency readout
I Band switch (160-10 meters + WWV/JJY receive)
J Clarifier control
K RX/TX Clarifier selector
L RF Processor level
M RF attenuator
N TUNE control (Places transmitter in "TUNE" condition for ten seconds, then returns to "receive" condition to protect final tubes from excessive key-down time)

Design And Specifications Subject To Change Without Notice Or Obligation

YAESU

THE SYMBOL OF TECHNICAL EXCELLENCE

YAESU

The smart radio

1C78

member: arma amateur radio manufacturer's association

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 (213) 633-4007
YAESU ELECTRONICS CORP., Eastern Service Ctr., 613 Redna Ter., Cincinnati, OH 45215

The first three of a new family of power tubes are available today from EIMAC. These ceramic-metal triodes provide the high power, gain and efficiency of tetrodes, along with long life and reliability up into the UHF spectrum.

EIMAC can supply cavity or cavity design guidance for these tubes in CW as well as pulse service. Because of the circuit simplicity of triodes, this EIMAC family allows the circuit designer to take full advantage of simple cavity design. No tricky screen bypass capacitors or critical isolation circuits are required.

Look at the numbers:

EIMAC	Typical CW Performance Data			Maximum Ratings	
Type	Gain	Power Output	Frequency	Plate Dissipation	Maximum Frequency
3CX400U7	13.5dB	225W	900MHz	400W	1000MHz
3CX600U7	14.0dB	445W	775MHz	600W	1000MHz
8938	12.8dB	1570W	400MHz	1500W	500MHz

For full information, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or call any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

EIMAC delivers triode simplicity with tetrode performance at UHF

varian

