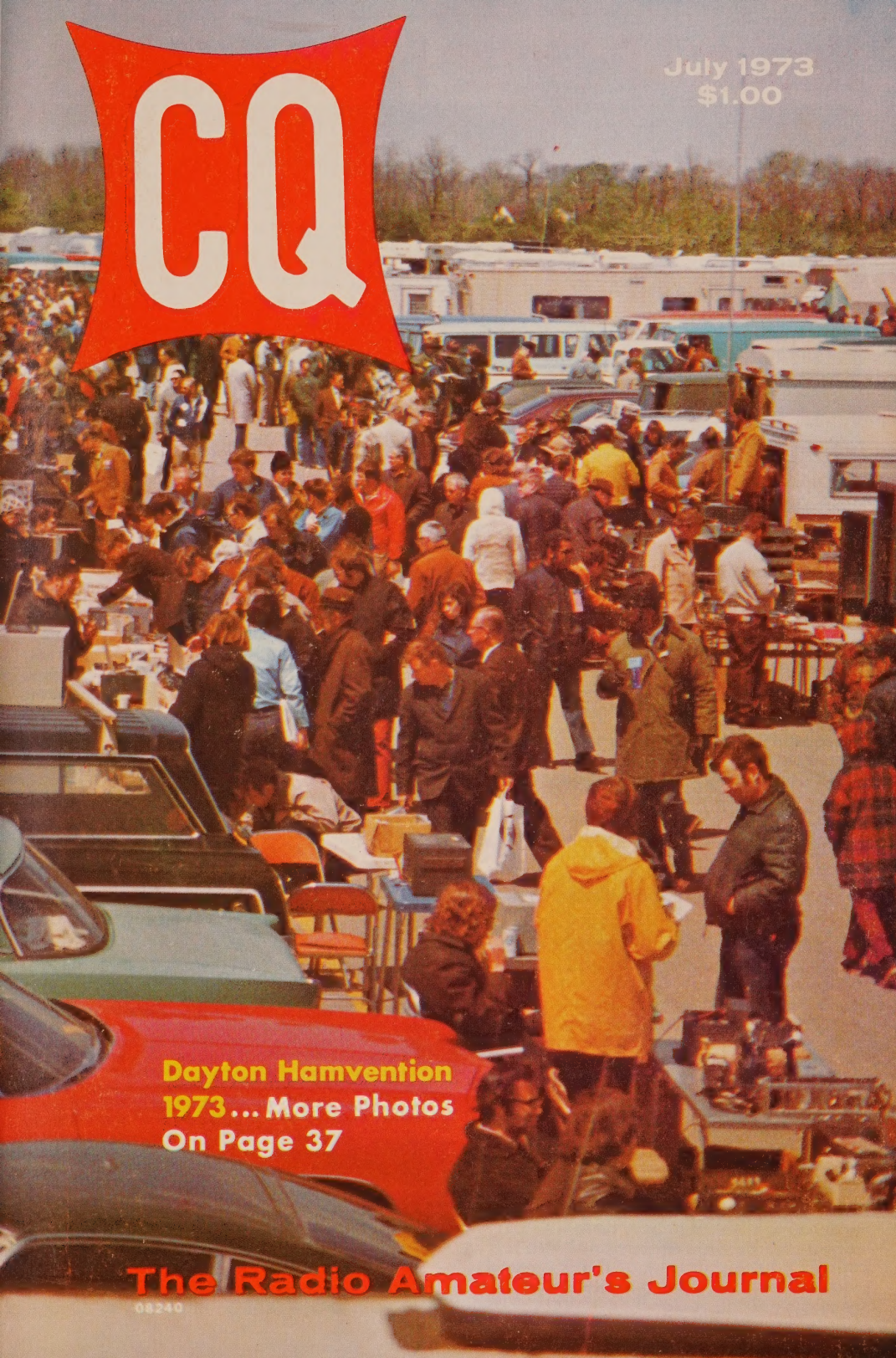
The Radio Amateur's Journal
14 Vanderventer Ave.
Port Washington, L.I., N.Y. 11050

2nd CLASS POSTAGE
PAID AT PORT WASHINGTON
L.I., N.Y. AND
AT ADDITIONAL
MAILING OFFICES

75 APR7301163
R N MORRIS-W7JLU
RFD 1 BOX 273-U
MULINO OR 97042

# CQ

July 1973
$1.00



Dayton Hamvention 1973... More Photos On Page 37

The Radio Amateur's Journal

08240

# Heathkit® 2-Meter FM gear is here!



HW-202 shown above with Tone Burst Encoder installed.

**NEW Heathkit 2-Meter FM Transceiver**

**179.95***

***• All solid-state design • Can be completely aligned without instruments • 36-channel capability** — independent push-button selection of 6 transmit and 6 receive crystals • **10-Watts Minimum Output** — designed to operate into even an infinite VSWR without failure • **Optional Tone Burst Encoder** — mounts inside, gives front-panel selection of four presettable tones*

The Heathkit HW-202 compares with the best wired amateur 2M/FM rigs. Plus it has: 36-channel capability via independent selection of 6 transmit and 6 receive crystals. Solid-state circuitry with complete built-in alignment procedures using only the manual and the front-panel meter allow operation over a 1 MHz segment from 143.9 to 148.3 MHz. Removable front-panel bezel permits installation of the new Heathkit HWA-202-2 Tone Burst Encoder.

**10-15 watts transmission into an infinite VSWR** — indefinitely, with no failure! The HW-202 needs no automatic shut-down — it continues to generate a signal regardless of antenna condition. Transmitter deviation is fully adjustable from 0 to 7.5 kHz, with instantaneous deviation limiting. Harmonic output is greater than −45 dB from carrier. The push-to-talk ceramic microphone supplied has an audio response tailored to the HW-202.

**Excellent reception** — 0.5 uV or less produces 12 dB Sinad, or 15 dB quieting. Output at the built-in speaker is typically 2 watts at less than 3% total harmonic distortion. The receiver circuitry utilizes diode-protected dual-gate MOSFETS in the front end; an IC IF that completely limits with less than a 10 uV signal; dual conversion, 10.7 MHz and 455 kHz via a 4-pole monolithic 10.7 MHz crystal filter. Image response is −55 dB or better. Spurious response is −75 dB or better.

**The Heathkit HW-202 comes with two crystals** used in initial set-up and alignment, give you simplex operation on 146.94. Kit includes microphone, quick-connecting cable for 12-volt hook-up, heavy duty alligator clips for use with a temporary battery, antenna coax jack, gimbal bracket, and mobile mount that lets you remove the radio from the car by unscrewing two thumbscrews. The HWA-202-2 Tone Burst Encoder provides four presettable pushbuttons for instant repeater access. Fixed station operation is as easy as adding the HWA-202-1 AC Power Supply. The HA-202 2-Meter Amplifier puts out 40 watts for 10 watts in, and externally it's a perfect mate for your HW-202.

**Kit HW-202,** 11 lbs., mailable ..... **179.95***

**Kit HWA-202-2,** Tone Burst Encoder, 1 lb. . . **24.95***

**Kit HWA-202-1,** AC Power Supply, 7 lbs. . . **29.95***

**Kit HWA-202-3,** Mobile 2-Meter Antenna, 2 lbs. ..... **17.95***

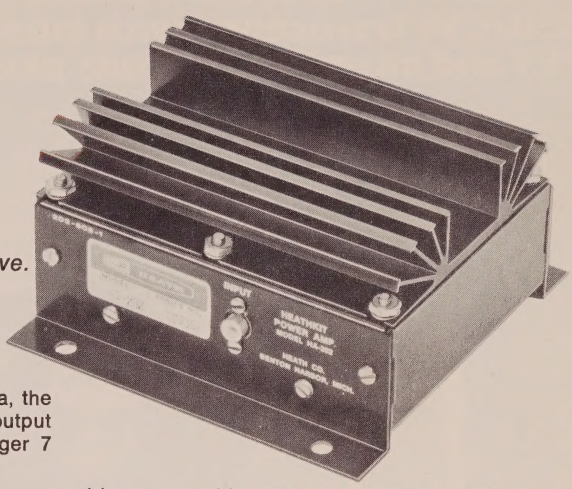
**Kit HWA-202-4,** Fixed Station 2-Meter Antenna, 4 lbs. ..... **15.95***

**HW-202 SPECIFICATIONS — RECEIVER — Sensitivity:** 12 dB SINAD* (or 15 dB of quieting) at .5$\mu$v or less. **Squelch threshold:** 3 $\mu$v or less. **Audio output:** 2 W at less than 10% total harmonic distortion (THD). **Operating frequency stability:** Better than ±.0015%. **Image rejection:** Greater than 55 dB. **Spurious rejection:** Greater than 60 dB. **IF rejection:** Greater than 75 dB. **First IF frequency:** 10.7 MHz ±2 kHz. **Second IF frequency:** 455 kHz (adjustable). **Receiver bandwidth:** 22 kHz nominal. **De-emphasis:** −6 dB per octave from 300 to 3000 Hz nominal. **Modulation acceptance:** 7.5 kHz minimum. **TRANSMITTER — Power output:** 10 watts minimum. **Spurious output:** Below −45 dB from carrier. **Stability:** Better than ±.0015%. **Oscillator frequency:** 6 MHz, approximately. **Multiplier factor:** X 24. **Modulation:** Phase, adjustable 0-7.5 kHz, with instantaneous limiting. **Duty cycle:** 100% with ∞ VSWR. **High VSWR shutdown:** None. **GENERAL — Speaker impedance:** 4 ohms. **Operating frequency range:** 143.9 to 148.3 MHz. **Current consumption: Receiver** (squelched): Less than 200 mA. Transmitter: Less than 2.2 amperes. **Operating temperature range:** −10° to 122° F (−30° to + 50° C). **Operating voltage range:** 12.6 to 16.0 VDC (13.8 VDC nominal). **Dimensions:** 2¾″ H x 8¼″ W x 9⅞″ D.

*SINAD=$\frac{\text{Signal + noise + distortion}}{\text{Noise + distortion}}$

# ...and here!

**NEW Heathkit**
**2-Meter Amplifier for cleaner FM copy on the fringe... 69.95***



***40 watts nominal out for 10 watts in*** — *requires only 12 VDC supply.*

***Fully automatic operation*** — *with any 2-meter exciter delivering 5-15 watts drive.*

***Solid-state design*** — *all components mount on single board for fast, easy assembly.*

If you're regularly working from a fringe area, the new Heathkit HA-202 can boost your mobile output to 40 watts (nominal), while pulling a meager 7 amps from your car's 12-volt battery.

Install it anywhere...in the trunk, under the hood or dashboard. Use it with any 2-meter exciter delivering 5-15 watts drive. Features fully automatic operation. An internal relay automatically switches the antenna from transmit to receiver mode when you release the mike button.

All solid-state design features rugged, emitter-ballasted transistors, combined with a highly efficient heat sink, permitting high VSWR loads. Tuned input-output circuits offer low spurious output to cover the 1.5 MHz segment of the 2-meter band without periodic readjustment. All components mount on a single printed circuit board for easy, 4-hour assembly. Manual shows exact alignment procedures using either a VOM or VTVM. And installation is just as simple.

Kit includes transceiver connecting cable, antenna connector. Operates from any 12 VDC system — additional power supplies are not required. Add HA-202 power to your mobile 2-meter rig, and boom out of the fringe. **Kit HA-202,** 4 lbs.

**HA-202 SPECIFICATIONS — Frequency range:** 143-149 MHz. **Power output:** 20W @ 5 W in, 30W @ 7.5W in, 40W @ 10 W in, 50W @ 15 W in. **Power input (rf drive):** 5 to 15W. **Input/output impedance:** 50 ohms, nominal. **Input VSWR:** 1.5:1 max. **Load VSWR:** 3:1 max. **Power supply requirements:** 12 to 16 VDC, 7 amps max. **Operating temperature range:** −30° F. to +140° F. **Dimensions:** 3″ H x 4¼″ W x 5½″ D.

# ...and here!

**New Heathkit**
**VHF Wattmeter/SWR Bridge . . . 29.95***



Perfect tune-up tool for your 2-meter gear. Tests transmitter output in power ranges of 1 to 25 watts and 10 to 250 watts ±10% of full-scale. 50 ohm nominal impedance permits placement in transmission line permanently with little or no loss. Built-in SWR bridge for tuning 2-meter antenna for proper match, has less than 10-watt sensitivity. **Kit HM-2102,** 4 lbs.

**HM-2102 SPECIFICATIONS — Frequency range:** 50 MHz to 160 MHz. **Wattmeter accuracy:** ±10% of full-scale reading.* **Power capability:** To 250 W. **SWR sensitivity:** less than 10 W. **Impedance:** 50 ohms nominal. **SWR bridge:** Continuous to 250 W. **Connectors:** UHF type SO-239. **Dimensions:** 5¼″ W, 5 1/16″ H and 6½″ D, assembled as one unit.
*Using a 50 Ω noninductive load.

## See them at your Heathkit Electronic Center — or fill out coupon for FREE Heathkit catalog

### HEATHKIT ELECTRONIC CENTERS

**ARIZ.: Phoenix,** 2727 W. Indian School Rd.; **CALIF.: Anaheim,** 330 E. Ball Rd.; **El Cerrito,** 6000 Potrero Ave.; **Los Angeles,** 2309 S. Flower St.; **Pomona,** 1555 Orange Grove Ave. N.; **Redwood City,** 2001 Middlefield Rd.; **San Diego (La Mesa),** 8363 Center Dr.; **Woodland Hills,** 22504 Ventura Blvd.; **COLO.: Denver,** 5940 W. 38th Ave.; **CONN.: Hartford (Avon),** 395 W. Main St. (Rte. 44); **FLA.: Miami (Hialeah),** 4705 W. 16th Ave.; **GA.: Atlanta,** 5285 Roswell Rd.; **ILL.: Chicago,** 3462-66 W. Devon Ave.; **Downers Grove,** 224 Ogden Ave.; **IND.: Indianapolis,** 2112 E. 62nd Ave.; **KANSAS: Kansas City (Mission),** 5960 Lamar Ave.; **MD.: Baltimore,** 1713 E. Joppa Rd.; **Rockville,** 5542 Nicholson Lane; **MASS.: Boston (Wellesley),** 165 Worcester St.; **MICH.: Detroit,** 18645 W. Eight Mile Rd. & 18149 E. Eight Mile Rd.; **MINN.: Minneapolis (Hopkins),** 101 Shady Oak Rd.; **MO.: St. Louis,** 9296 Gravois Ave.; **N.J.: Fair Lawn,** 35-07 Broadway (Rte. 4); **N.Y.: Buffalo (Amherst),** 3476 Sheridan Dr.; **New York City,** 35 W. 45th St.; **Jericho, L.I.,** 15 Jericho Turnpike; **Rochester,** Long Ridge Plaza; **OHIO: Cincinnati (Woodlawn),** 10133 Springfield Pike; **Cleveland,** 5444 Pearl Rd.; **PA.: Philadelphia,** 6318 Roosevelt Blvd.; **Pittsburgh,** 3482 Wm. Penn Hwy.; **TEXAS: Dallas,** 2715 Ross Ave.; **Houston,** 3705 Westheimer; **WASH.: Seattle,** 221 Third Ave.; **WIS.: Milwaukee,** 5215 Fond du Lac.

HEATH
Schlumberger

**HEATH COMPANY, Dept. 12-7**
Benton Harbor, Michigan 49022

☐ Please send FREE Heathkit Catalog.
Enclosed is $_____, plus shipping.
☐ Please send model(s)_____
Name_____
Address_____
City_____ State_____ Zip_____

*Mail order prices; F.O.B. factory AM-281

# New FPM-300, a low-priced, versatile, compact SSB/CW transceiver with latest high performance FET and integrated circuits plus extended coverage.




This new radio, with built-in AC-DC power supply, is compactly designed with modular construction techniques for effective and reliable service in fixed, portable and mobile use for amateur, Civil Defense, CAP, MARS, RACES and other utility HF Communications Services.

The new transceiver has premium type glass epoxy printed circuit board construction for greater reliability, routine maintenance and features the latest state-of-the-art solid state devices throughout. The All-American made radio, priced at only $595, is also equipped with a unique integrated circuit speech compressor design for extended "talk power" plus many other built-in features—all good reasons why you should be talking with a Hallicrafters.

For additional data see your Hallicrafters distributor or write or phone:

The Hallicrafters Co., 600 Hicks Road, Rolling Meadows, Ill., 60008 U.S.A.
Phone: 312/259-9600

# You should be talking with a Hallicrafters.

JULY, 1973 VOL. 29, NO. 7

# CQ

## The Radio Amateur's Journal

**STAFF**

**EDITORIAL**

*RICHARD A. ROSS, K2MGA*
*Editor*

*ALAN M. DORHOFFER, K2EEK*
*Managing Editor*

*WILFRED M. SCHERER, W2AEF*
*Technical Consultant*

*SUSAN BUSCHLINGER*
*Editorial Assistant*

**CONTRIBUTORS**

*FRANK ANZALONE, W1WY*
*Contest Chairman*

*FRED CAPOSSELA, W2IWC*
*Contest Consultant*

*GEORGE JACOBS, W3ASK*
*Propagation Editor*

*A. EDWARD HOPPER, W2GT*
*USA-CA Director*

*JOHN A. ATTAWAY, K4IIF*
*DX Editor*

*JERRY HAGEN, WA6GLD*
*Assistant DX Editor*

*GORDON ELIOT WHITE*
*Surplus Sidelights*

*GLEN E. ZOOK, K9STH/5*
*FM Editor*

*IRWIN MATH, WA2NDM*
*Math's Notes*

*COPTHORNE MACDONALD, W1GNQ*
*SSTV Editor*

**BUSINESS**

*SANFORD R. COWAN*
*President*

*RICHARD A. COWAN, WA2LRO*
*Publisher*

*JACK N. SCHNEIDER, WA2FPE*
*Advertising Director*

*GLORIA FORSYTH*
*Circulation Manager*

**PRODUCTION**

*ALAN M. DORHOFFER, K2EEK*
*Production Manager*

*WILLIAM H. TRAVIS*
*Art Director*

*PETER C. ANTHONY*
*Art Assistant*

# FEATURES

GUEST EDITORIAL: SSTV: TOY OR TOOL ? *Copthorne MacDonald, W0ORX* 5

THE GOLDEN THIRTIES...THE AMATEUR COMMUNICATIONS RECEIVER COMES OF AGE. THE NATIONAL FB7 SINGLE SIGNAL SUPERHETERODYNE *William I. Orr, W6SAI* 30

IMPROVED C.W. BREAK-IN WITH THE HEATH SB-SERIES EQUIPMENT *Erwin Aymar, W3SU* 35

DAYTON HAMVENTION 1973 37

CONVERTING THE WESTERN UNION TELEFAX MACHINE FOR AMATEUR USE, PART IV—CONCLUSION 38

F.M.: REGULATED A.C. SUPPLY FOR SMALL RIGS, F.M. INDEX *Glen E. Zook, K9STH/5* 42

A TTL/DTL TEST PROBE FOR $2.00 *Pete Walton, VE3FEZ* 45

SSTV: SSTV AT DAYTON, CALLING AND WORKING FREQUENCIES *Copthorne MacDonald, W0ORX* 47

MATH'S NOTES: LIGHT EMITTING DIODES (LED) *Irwin Math, WA2NDM* 54

IMPROVED AGC FOR THE ALLIED RADIO SHACK 190 RECEIVERS *Bruce L. Mackey* 55

SOME IDEAS FOR MONITORING A.C. POWER LINES *John R. Nelson, WB0AIK* 56

# DEPARTMENTS

Q&A: FREE TECHNICAL ASSISTANCE *Charles J. Schauers, W6QLV/HB9* 10

DX: JOE HILLER, W4OPM ELECTED TO DX HALL OF FAME *John A. Attaway, K4IIF* 58

CONTEST CALENDAR: RESULTS OF ALL ASIAN 1972 CONTEST *Frank Anzalone, W1WY* 63

AWARDS: STORY OF THE MONTH—DOYLE COPE, K5KDG *A. Edward Hopper, W2GT* 67

PROPAGATION: MAIL-A-PROP, SHORT SKIP PREDICTIONS FOR JULY AND AUGUST *George Jacobs, W3ASK* 70

SURPLUS SIDELIGHTS: THE CV-483/URA-17 DEMODULATOR *Gordon E. White* 73

ANNOUNCEMENTS ..... 8 OUR READERS SAY ..... 7

HAM SHOP ..... 86 ZERO BIAS ..... 5

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 and Phillipsburg, N.J. Subscription Prices: one year, $6.00; two years, $11.00; three years, $15.00. Entire contents copyrighted 1973 by Cowan Publishing Corp. 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**

*The most powerful signals under the sun!*

hy-gain

# 550A

# The Total Communication System



The Hy-Gain 550A is the complete amateur system. Designed from the ground up to work together for total performance. Each element is matched to the system, for simple, plug-in expansion of your capabilities.

**GT-550A Transceiver** The matchless heart of the 550A System. No other transceiver can give you this performance for the price. Operating fixed station or mobile, the GT-550A is guaranteed to have top frequency stability after warm-up. A graph showing stability during final check-out is included with each unit. 25 KHz calibrator and VOX, optional.

**Frequency Coverage** – 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-29.0 MHz crystals supplied. Other 10 meter coverage optional. Power Output – 300 watts PEP (nominal) on SSB, 180 watts on CW and RTTY, into 50 ohm resistive load.

**Harmonic and Spurious Radiation** – Carrier suppression in excess of 45 db down, unwanted side bands minus 55 db oscillator feed through and mixer spurious products down 50 db. Second harmonic minus 40 db and third order distortion in excess of minus 45 db.

**Noise Level** – In excess of 40 db below single tone carrier.

**Audio Frequency Response** – Minus 6 db approximately 300/2400 Hz determined by side band filter.

**RF Compression Characteristics** – Up to 10 db RF compression without distortion.

**Receiver Sensitivity** – Better than .5 uv for 10 db S+N/n ratio.

**Receiver Selectivity** – 2.1 KHz with 1.8 shape factor for SSB or 300 Hz sharp selectivity with optional CW filter.

**Receiver Spurious Response** – Image rejection better than 40 db down. Internal spurious below 1 uv equivalent input.

**Frequency Calibration** – Interpolation to 1 KHz in 5 KHz increments.

**Frequency Stability** – Within 10 Hz during any 30 minute warm-up period, less than 100 Hz in any 15 minute warm-up period, not more than 100 Hz with a plus or minus 10% line voltage variation.

**Calibration Accuracy** – Interpolation to 1 KHz after calibration.

**Back Lash** – Not more than 50 Hz.

**Output Impedance** – Variable 50 ohms nominal capable of matching up to 2-1 SWR (30-100 Ohms).

**Automatic Volume Control** – Fast attack, slow release on all receiver modes.

Order No. 855 Ham Net $595.00

**RF550A** contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

**RV550A** is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

**SC550A** Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

**AC400** Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

**G-1000** 12V D C Mobile power supply with cables. Order No. 802 Ham Net $129.95

## HY-GAIN ELECTRONICS CORPORATION

Box 5407-FG Lincoln, Nebraska 68505

ZERO BIAS

*The following is the text of a thought-provoking talk presented before the SSTV forum at the 1973 Dayton Hamvention by CQ's SSTV editor, Copthorne Macdonald, W◊ORX, inventor of the SSTV system now in use throughout the world.*

# SSTV: Toy or Tool?

A GUEST EDITORIAL BY COPTHORNE MacDONALD, W◊ORX

WHAT is the justification for allowing a group of individuals known as Radio Amateurs the exclusive use of large chunks of valuable radio spectrum space? The FCC in the Basis and Purpose section of the amateur rules mentions six things. They are: the communication service that amateurs provide for the public (especially emergency communications), their advancement of the radio art, advancing of technical skills, expansion of the reservoir of trained personnel, the enhancement of international good will, and the advancing of communication skills. Of the six, the most neglected by hams is the advancemnet of skills for communicating. It's too bad, but we hams do very little deep communicating. Stereotyped exchanges of signal reports, weather reports, and QTH's are a kind of arms length protection from getting near each other and into what each of us really cares about. Senseless taboos against communicating exist and permeate almost the entirety of ham radio. Not only are there taboos against discussing politics and religion, but there also seems to be a blanket taboo against having any sort of personally meaningful discussion. Getting into a heavy intellectual rap, or anything charged with emotion while on the air seems to be frowned upon.

It's time to discard the taboos and start using our amateur hardware as a tool for serious interpersonal communication. The only opposition is going to come from people who are afraid of personal contact, or controversy, or perhaps life itself. They make unsubstantiated assertions that serious talk does not belong, somehow, in ham radio. Serious subjects are not in "good taste." They would have us play with our rigs and shut up. Perhaps the critics of free speech on the ham bands are afraid of some sort of governmental retaliation or repression. If the First Amendment has been effectively eliminated, I for one would like to know about it without delay! In the meantime I think I'll continue to say what I feel, on the air or off.

The restrictions that these people would place on us do not appear in the FCC rules. The FCC restricts hams from commercial communications, broadcasting, transmitting music, obscene language, and sending secret codes. But the name of the ham radio game is, "radiocommunication . . . solely with a personal aim." That aim is whatever we want it to be so long as it does not transgress these few restrictions. If the aim we choose is that of improving our skills at really communicating, the amateur rules actively support and encourage us.

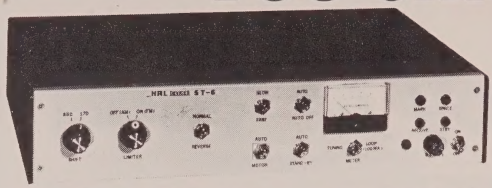
There has never been a greater need for people to share their thoughts and ideas with each other. Our world is in deep trouble. The Club of Rome report, *Limits to Growth,* has pointed out that the joyride for the U.S. and the other rich nations may not last another hundred years. The most probable collapse mode, they figure, is mass starvation of the large population due to failure of agriculture. Agriculture has failed because of lack of the products of industry —fertilizers, gasoline, and tractors. Industry has failed because the easy-to-get raw materials are gone, and there just isn't enough capital to get sufficient quantities of the hard-to-get stuff.

Throughout the country, people are reexamining their goals, and values, and life choices. Communication can play a vital role in their reexamination process. I'm not speaking here of depersonalized mass communication, but of probing, questioning,

[*Continued on page 80*]

CW or RTTY, whichever way you go,

# HAL HAS TOP QUALITY YOU CAN AFFORD!



**TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU.** Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*




**TOP QUALITY...WITH THE HAL 1550 ELECTRONIC KEYER.** Designed for easy operation; perfectly timed CW with optional automatic ID for sending call letters, great for DX and RTTY; TTL circuitry, transistor switching for grid block, cathode keying. Handsome rugged crackle cabinet with brushed aluminum panel. With ID, only $90.00; without ID, $65.00.*

**OTHER HAL PRODUCTS INCLUDE:**

| | |
|---|---|
| ID-1 Repeater Identifier (wired circuit board) | $ 75.00* |
| ID-1 (completely assembled in 1½" rack cabinet) | $115.00* |
| HAL ARRL FM Transmitter Kit | $ 50.00* |
| W3FFG SSTV Converter Kit | $ 55.00* |
| Mainline ST-5 TU Kit | $ 50.00* |
| Mainline AK-1 AFSK Kit | $ 27.50* |



**TOP QUALITY... WITH THE HAL MKB-1 MORSE KEYBOARD.** As easy as typing a letter—you get automatic CW with variable speed and weight, internal audio oscillator with volume and tone controls, internal speaker, and audio output jack. Smooth operation; completely solid-state, TTL circuitry using G10 glass boards, regulated power supplies, and high voltage transistor switch. Optional automatic ID available. Assembled MKB-1, $275.00. In kit form, $175.00. *



**NEW FROM HAL—TOP QUALITY RVD-1002 RTTY VIDEO DISPLAY UNIT.** Revolutionary approach to amateur RTTY . . . provides visual display of received RTTY signal from any TU, at four speeds (60, 66, 75, and 100 WPM), using a TV receiver modified for video monitoring. Panasonic solid-state TV receiver/monitor, or monitor only, available. RVD-1002, $525.00; Panasonic TV receiver/monitor, $160.00; monitor only, $140.00.*

**TOP QUALITY...WITH THE HAL RKB-1 TTY KEYBOARD.** Gives you typewriter-easy operation with automatic letter/number shift at four speeds (60, 66, 75, and 100 WPM). Use with RVD-1002 video display system, or insert in loop of any teleprinter, for fast and easy RTTY. Completely solid state, TTL circuitry using G10 glass boards, regulated power supplies, and transistor loop switch. RKB-1 assembled, only $275.00.*

HAL provides a complete line of components, semi-conductors, and IC's to fill practically any construction need. Send 24¢ to cover postage for catalog with info and photos on all HAL products available.

*Above prices do not include shipping costs. Please add 75¢ on parts orders, $2.00 on larger kits. Shipping via UPS whenever possible; therefore, street address required.

HAL COMMUNICATIONS CORP., Box 365 C, Urbana, Illinois 61801

# OUR READERS SAY

## Super Power

Editor, *CQ:*

Just got hold of your February issue, and hasten to add my heart-felt "amen" to your editorial.

I've been a ham since 1954, but active only at long intervals since 1959 -- my work for the State Department has had me out of the country and QRT for much of this time. As a result, when I do get back into the hobby, I have a feeling somewhat akin to "time-lapse" photography -- all changes seem to be vastly speeded up. And what I've seen during my last couple of exposures is at best unpleasant.

Whatever happened to the idea that this was a hobby, to be pursued for fun? I'm as competitive as the next guy, in fact get my main enjoyment from contest operating. But 50 Kw? And what about signals 20 kHz wide from some of the big DXers on 20 phone. And jamming on King Hussein because someone doesn't like his politics. And just plain bad manners so much of the time.

My only beef with your editorial is that you aren't tough enough. Let's get the FCC back in the business of enforcement -- it wasn't that long ago that a few of the California Kw's were shut down for years by FCC action. And as for self-enforcement, I suggest that any major violation of FCC rules, such as super-power, whenever it occurs, if confirmed by FCC, forever disbar the culprit from participation in *CQ* or ARRL activities. And let's publish the name, call and full details in a prominent place in both *CQ* and *QST.*

Strong medicine? Perhaps, but must we wait for FCC to set our criteria for proper amateur operation?

Peter G. Smith, K4FOK
San Francisco, CA

Editor, *CQ:*

Re: Editorial, April *CQ.*

You're right about excessive power. To gain a significant advantage these fellows must run considerably over the limit: 2, 3 or even 5 kw d.c.

If it wouldn't mean giving up some of our autonomy, I would even suggest reducing maximum input to 500w. or 250w. signals would not suffer much (3-6 db) but QRM would be less of a problem especially for DX stations.

Capt. G.W. Kessler
Washington, D.C.

Editor, *CQ:*

Why not a QRP DX contest limited to those with the legal 1 kw power?

Les Devoe, W9LQ
Indianapolis, IN

Editor, *CQ:*

In Zero Bias, April *CQ,* I read with dismay and horror the suggestion that the FCC regulations be changed to limit the plate dissipation of the final tube or tubes to 1000 watts, rather than limit the plate input to the final tube or tubes to 1000 watts. My reply to this suggestion is no, no, no! Let's take a practical example to illustrate why I am against such a regulation.

A single 4-1000A has a plate dissipation of 1000 watts. Hence it would be "legal" under such a regulation. However, a quick look in the General Electric Industrial Tube Product Guide reveals that a 4-1000A can be safely operated with 6000 volts on the plate and with a plate current of 700 ma (class C operation). That's a plate input of 4200 watts! At such a power input, GE gives the approximate output as 3440 watts. Can you imagine a rash of legal 4 kilowatt stations on the air! Horror of horrors! Sure, I am only talking of c.w. operation, but imagine the QRM in the c.w. band segments if such a regulation were adopted.

I believe the regulations must stand. Ideally, the regulation should read that the maximum power output should be 1000 watts, or whatever power level is agreed on. But measurement of power output is not as easy as measurement of input power (unless you are lucky enough to own a wattmeter. I don't). You only need a VOM to measure input power.

Anyway, regardless of whatever regulation is adopted, (hopefully they stay as is) there will always be the one lid who can't abide by the rules. The only solution to the problem is self regulation. Disqualify such an operator from contests and awards. Don't associate with him. Report him to Uncle Charlie. And above all, don't be tempted by him. Keep your own signal clean and legal. We've got a problem on our hands, and if we don't solve it, Uncle Charlie will.

Gregory P. Latta, WA8ZVC
Akron, OH

## Royal Signals

Editor, *CQ:*

I have recently been posted to the School of Signals to take over the responsibilities of General Secretary and Editor of the Royal Signals Amateur Radio Society.....

At present we have nearly 1,000 members all ex-Service or Serving personnel and we produce a quarterly magazine "Mercury" for distribution to members only.....

We do have several members in the U.S.A., some expatriates and some U.S. citizens. In order to qualify for membership, the applicant should be a serving or ex-serving member of the U.S. Army Signal Corps who has served with, been attached to, or worked in close liason with Royal Signals at any time. Needless to say, the U.S. citizen member of the RSARS is a pretty rare 'bird' but several have qualified. Each case is considered on its merits the final decision being vested in the President of the RSARS who is the Brigadier, Director of Telecommunications (Army). If any *CQ* reader thinks he may qualify, I will be happy to process his application.

Capt. (TOT) J. Cooper, G3DPS
MASEE MRSGB Royal Signals
General Secretary,
Royal Signals Amateur Radio Society,
School of Signals,
Blandford Camp,
Blandford Forum,
Dorset, England

## Millen 16000 SERIES TRANSMITTING CAPACITORS

# Designed for Application

**FEATURES:** The 16000 Series has sturdy construction, thick, round-edged, polished aluminum plates with 1¾" radius. Also has constant impedance, heavy current, multiple finger rotor contactor of unique design. Available in single and double sections and many capacities and plate spacings. Other features: aluminum frame, Grade L423 ceramic bars, brass hardware, nickel-plating.

| Cat. No. | Sections | Capacity per Sect. (mmf) | Peak Voltage |
|---|---|---|---|
| 16550 | 1 | 13. – 52 | 6000 |
| 16510 | 1 | 17. – 101 | 6000 |
| 16520 | 1 | 37. – 203 | 6000 |
| 16530 | 1 | 45. – 297 | 6000 |
| 16559 | 2 | 11. – 65 | 9000 |
| 16512 | 2 | 40. – 128 | 9000 |
| 16200 | 2 | 15. – 195 | 3000 |
| 16250 | 2 | 20. – 255 | 3000 |
| 16030 | 2 | 8.5 – 27 | 6000 |
| 16050 | 2 | 12. – 51 | 6000 |
| 16100 | 2 | 19. – 101 | 6000 |
| 16029 | 2 | 11. – 29 | 9000 |
| 16059 | 2 | 20. – 64 | 9000 |



TEL. (617) 324-4108

Priced from $25.75

JAMES MILLEN MANUFACTURING COMPANY, INC.
150 EXCHANGE ST., MALDEN, MASS. 02148


# Announcements

### Cary, North Carolina

The Cary Amateur Radio Club will hold a Swapfest on Saturday, July 21, at 1:00 p.m. at the Lions Club Shelter, Cary, NC rain or shine. No admission, no commission. Talk-in on 146.94 and 3923. For info: K4FBG, 1022 Medlin Dr., Cary, N.C. 27511.

### Marshall, Indiana

The Wabash Valley Amateur Radio Assoc. will hold the 27th annual VHF Picnic and Hamfest on Sunday, July 29, at Turkey Run State Park near Marshall, IN. Registration is $1.50 or 4 for $5.00. Prizes, XYL Bingo, flea market. For info: John H. Derry, Wabash Valley Amateur Radio Assoc., Terre Haute, Indiana.

### Centralia, Washington

The second annual picnic of NAMS, Northwest Amateur Monitoring Service, will be held on July 15 at the Lewis and Clark State Park near Centralia, Washington, off Interstate Highway 5 onto State Highway 12, turning south at Mary's Corner on to Old Highway 99. Basket lunch, free coffee, entertainment, tent, camper, and trailer sites. For info: Park Ranger, Rt. 1, Box 520, Winlock, Wash. 98595.

### McKeesport, Pennsylvania

The Two Rivers Amateur Radio Club will hold its ninth annual Hamfest on Sunday, July 22, at the Green Valley Fire Department grounds, off of U.S. Rt. 30, near McKeesport, PA. For info: Robert E. Zimmer, WA3OGS, 205 Commonwealth Ave., West Mifflin, PA 15122.

### Junction, Texas

Third Annual Amateur Radio Appreciation Day will be held July 29 in Junction, Texas, sponsored by the Kimble County Chamber of Commerce to show its appreciation for the many public services and disaster assistance amateur radio operators provide. Free bar-b-q for amateur license holders and family. For info: Lewis Ransom, WB5BBT, Junction, TX 76849 or the Kimble County Chamber of Commerce, 603 Main, Junction, Texas.

### Booneville, Missouri

The Annual Hambutchers Net Picnic will be held on July 21 and 22, at the Park in Booneville, Missouri. Music and dancing on the 21st, covered dish dinner and prizes on the 22nd. For info: Herbert M. Peery, WØGQR, Box 313, Trenton, Mo 64683, Net Manager.

### Evansville Freedom Festival

The Tristate ARS of Evansville, Ind., operating under W9OG, will be on the air daily from June 29 through July 4, operating from the 4th annual Evansville Freedom Festival. All amateurs are cordially invited to attend in person or call CQ Freedom Festival during the festival. An appropriate QSL card will be sent to all stations worked.

### Lassen & Plumas Co., California

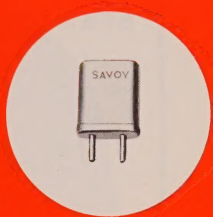
The Lassen-Plumas QSO Party sponsored by LARC will be held from 0001 GMT July 21 to 2359 GMT July 22. Exchange: (Lassen and Plumas county operators) RST, County, QSO number.

[*Continued on page 84*]

# Savoy




$3.75
Postpaid in U.S.A.
TYPE 900 A TYPE 901




## HIGH ACCURACY CRYSTALS
### FOR OVER 30 YEARS

Either type for amateur VHF in Regency, Swan, Standard, Drake, Varitronics, Tempo, Yaesu, Galaxy, Trio, Sonar, Clegg, SBE, Genave.

Quotes on request for amateur or commercial crystals for use in all other equipments.

Specify crystal type, frequency, make of equipment and whether transmit or receive when ordering.

**BASSETT**

**High efficiency mobile and portable antennas for all amateur bands, CAP, MARS, CB, SECURITY, PUBLIC SERVICE, MARINE, AND GOVERNMENT USE.**

- 2-6-10-15-20-40-75
- Identical size, cost, and appearance
- FULLY ADJUSTABLE TO FREQUENCY IN FIELD
- Low weight, low drag, high strength fiberglass
- Polished chrome brass standard ⅜-24 thread
- High gain collinear on 2 meters

MODEL DGA-2M
$29.50 postpaid
in U.S.A.





BASSETT VACUUM TRAP ANTENNA SYSTEM
Complete packaged multi-band antenna systems employing the famous Bassett Sealed Resonators and Balun from which air has been removed and replaced with pure helium at one atmosphere. Operating bands are indicated by model designation.

| | |
|---|---|
| MODEL DGA-4075 | $59.50 |
| MODEL DGA-204075 | $79.50 |
| MODEL DGA-2040 | $59.50 |
| MODEL DGA-152040 | $79.50 |

## BASSETT VACUUM BALUN



The famous sealed helium filled Balun . . . employed with the DGA Series Antenna Systems. Solderless center insulator and easily handles more than full legal power while reducing unwanted coax radiation. Equipped with a special SO-239 type coax connector and available either 1:1 or 4:1.

MODEL DGA-2000-B . . . $12.95
Postpaid in U.S.A.

CONTACT YOUR DISTRIBUTOR OR WRITE FOR DATA


## Savoy Electronics, Inc.
P.O. Box 7127 - Fort Lauderdale, Florida - 33304
Tel: 305-566-8416 or 305-947-1191

with **TELREX**

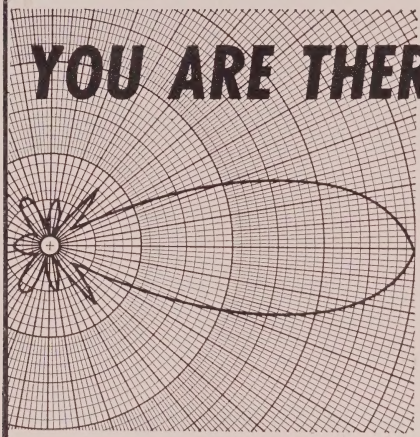
**Professionally Engineered**

"BEAMED-POWER"

"BALANCED-PATTERN"

"PERFECT-MATCH"

**Antenna Systems**




The design, craftsmanship and technical excellence of Telrex —

Communication Antennas.

have made them the standard of comparison throughout the world! Every Telrex antenna model is engineered, precision machined, tuned and matched, then calibrated for easy and correct assembly at your site for repetition of our specifications without 'cut and try' and endless experimentation.

*"the-performance-line"*

**with a "MATERIAL" difference!**

Also: Rotator-Selsyn-Indicator Systems, Inverted-V-Kits, "Balun," Towers, "Bertha" Masts, 12-Conductor Control Cable and Co-ax. SEND FOR PL-73

COMMUNICATION SYSTEMS SINCE 1921 **telrex** Laboratories

ASBURY PARK, NEW JERSEY 07712, U.S.A.

# Q AND A

BY CHARLES J. SCHAUERS,* W6QLV



THIS is a note to *manufacturers* and *distributors* — especially their customer service departments.

Over the years I have answered thousands of questions from amateurs and electronic experimenters relative to malfunctioning equipment, modifications information and on other allied subjects.

In nearly every batch of mail I receive at least one letter which tells me that an amateur has written a company and received either an unresponsive or no reply. Who is to blame?

The service we offer costs the distributor, manufacturer or dealer *nothing;* in fact, we believe we are doing all of them a *great* service by answering questions which costs them time and money if they do the task themselves. But believe me, trying to obtain manuals, schematics and other information from *most* of them (especially) service bulletins and modifications information is difficult. Q&A should *not* have to continually write letters for information to help out fellow amateurs. Service information etc., should be sent without any prodding.

Let us hope that those involved in the manufacturing of amateur equipment or the selling of it will help us out with more information so we *can* help them as well as the amateurs they serve!

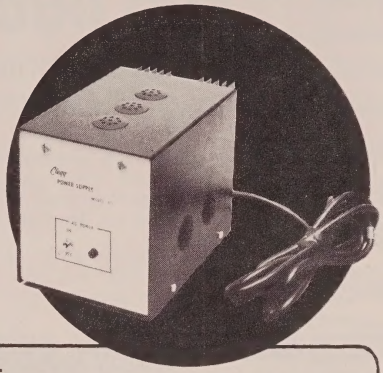
### Shunt Fed Vertical Antennas

"I have looked through most all of the literature and cannot find a mathematical formula for determining how a grounded vertical can be shunt fed. Can you help?"

Q & A is a free technical assistance program offered by **CQ** to its readers. We ask your cooperation to enable us to assist as many amateurs each month as possible. Always include a self-addressed stamped envelope with your question. Only one question per letter, please. Before writing to ask where a published article appeared, try to find it yourself by consulting the annual indexes of the various amateur magazines. Mail questions to: **CQ** Q & A, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

# COMPANIONS FOR CLEGG'S FM 27B TRANSCEIVER AND ALL 2 METER RIGS

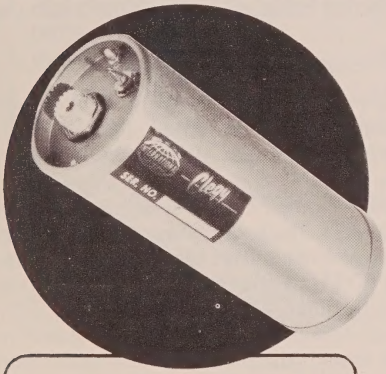
## POWER SUPPLY



Clegg's Model 011 Power Supply delivers a highly filtered, regulated source of 13.5 volts for base station mobile radio sets handling up to 6.5 Amperes current. Model 011 offers reliable service with any of the popular 5 to 25 watt transceivers and many other devices which operate within the 011's voltage and current levels.

**SPECIFICATIONS:**

**Output Voltage: 13.5, ± 0.5 VDC / Input Voltage: 105-125 VAC, 60 Hz / Maximum Current: 6.5 Amps, DC**
**Regulation: Less than 0.2 volt change: a. for load current from 100 Ma to 6.0 Amperes b. for line voltage from 105 to 125 volts with load current at 6.0 Amperes.**
**Output Ripple: Less than 50 MV RMS at full load with 110 VAC supply**
**Amateur Net: 79.95**



**SPECIFICATIONS:**

| | |
|---|---|
| **Gain in Receive:** | **14-18 dB** |
| **Pass Band:** | **±3 dB, 143.5-148.5 MHz** |
| | **—30 dB at 130 and 160 MHz** |
| **Noise Figure:** | **Less than 2.5 dB (typical)** |
| **Input/Ouput Impedance:** | **50 ohms** |
| **V S W R on Xmit:** | **Less than 1.1** |
| **Insertion loss on Xmit:** | **Less than 0.1 dB** |
| **Power Required:** | **10-15 VDC, 100 Ma** |
| **Connectors:** | **UHF Females SO-239** |

**Amateur Net: 47.50**

## T/R BOOSTER ANTENNA PREAMPLIFIER

*A Point About Receiving Sensitivity:*

The usable sensitivity of any receiving system is determined by the system's first stage Noise Figure. Typically, a 3 to 10 dB feed line loss exists between the antenna and receiver input. This must be added numerically to the receiver unit's attenuation to derive a realistic System Noise Figure. Many good 2 meter receivers have Noise Figures as low as 2 dB. Adding the attenuation of usual antenna/receiver interconnecting cable can result in as much as a 6 dB Noise Figure. Adding a preamplifier at the receiver barely improves the condition.

The Clegg T/R Booster Antenna Preamplifier is designed to establish a receiving Noise Figure where it counts—at the antenna, thereby avoiding feed-line loss. Relay actuated (in receive mode), 14 to 18 dB gain is provided with a 2-3 dB noise figure.

SIGNAL AND CONTROL INTERNATIONAL CORPORATION

**Clegg DIVISION**

**3050 Hempland Road**
**Lancaster, Pennsylvania 17601**
**(717) 299-3671 Telex: 84-8438**

CLEGG—*the PROFESSIONAL amateur line!*

# exactly what you need

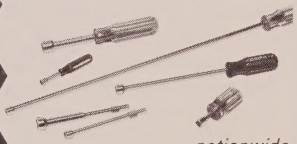
## LARGEST SELECTION ANYWHERE

Xcelite, first with color-coded nutdrivers, offers you a size and type to drive any hex head screw or nut. Yes, metrics, too.

- hex sizes from 3/32" to 3/4" and 3 mm to 17 mm
- 3½" Midgets to 21" "Super Longs"
- nickel chrome plated or plastic-dip-insulated shanks
- with clearance hole or full hollow shafts
- tough, cold drawn, accurately formed sockets, regular or magnetic
- fixed-handle or interchangeable shanks
- straight and tee handles—regular or ratcheting types
- available individually or in handy kits and sets

Made in U.S.A. to highest standards.

REQUEST FREE TOOL CATALOG 171



*nationwide availability through local distributors*

XCELITE®

**professional nutdrivers**

XCELITE INC. • 62 BANK ST., ORCHARD PARK, N.Y. 14127

Send complete tool catalog, which includes information on all Xcelite nutdrivers.

name_____

address_____

city_____ state & zip_____

In Canada contact Charles W. Pointon, Ltd.

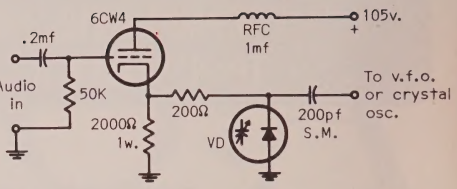




Fig. 1—An easy modulator for f.m. See text.

There is relatively little information on this. I looked through the books I have (I don't have them all!) and could not find what you seek. However, information that may be helpful can be found in the book, *Radio Antenna Engineering* by Laport (McGraw Hill Co.) on pages 104 through 109. With shunt fed antennas the transformation ratio is known but the phase shift between the current at the feed point and the current in the radiator is indeterminate. The optimum application for shunt feed is with a vertical quarterwave radiator working into a low-impedance feeder. This feed is analogous to the delta feed commonly used with horizontal dipoles at h.f., but with the horizontal the shunt feed is balanced. Anyone have info on this?

### T-Notch, Drake R-4B

"The T-notch on my Drake R-4B does not work well as it once did. Tubes check ok; voltages not affected (as originally recorded); receiver seems to work ok after a slight alignment job—bandpass control seems ok; letter from Drake no help (I realize it is difficult to diagnose at a distance); notch seems to work when a 50 kHz signal from an a.f. generator is fed to the filter—scope shows about a 50% decrease at some point as control is rotated—but this is with the receiver *off*. What's your suggestion?"

First check out the 50 kHz amplifier stage. Check the coupling to the bandpass tuning section. Check the two 3300 pf capacitors across the NOTCH CONTROL (variable inductor). Check the loading of the NOTCH CONTROL on the left side (50 kHz input, mixer and crystal). Good luck!

### Easy F.M. Modulator

"Can you supply me with an easy circuit so that I can convert a couple of two meter a.m. rigs that I have for f.m. These are tubed sets and I do not care to get involved in transistorized circuits. Can you help?"

Yes. See figure 1. The little modulator may be fed directly from a mike or be fed via the

# BIG PUSH!

HUSTLER

GET SUPER GAIN PERFORMANCE

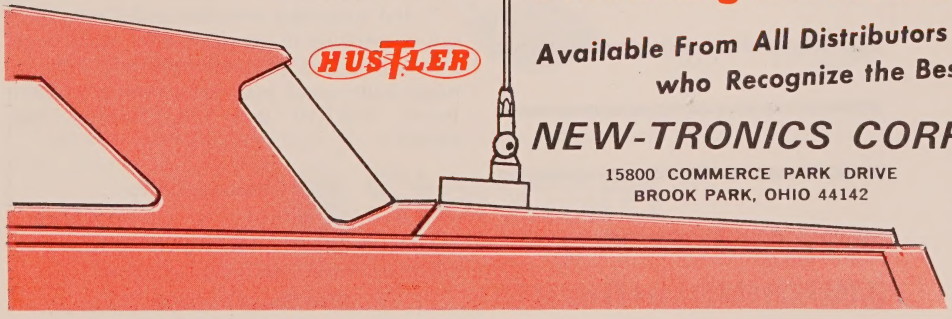
## Two Meter—5.2 db Power Gain Colinear Mobile Antenna

- ! 5.2 db gain over 1/4 wave ground plane
- ! SWR at resonance . . . typically 1.1:1
- ! Bandwidth . . . 7 MHz for 1.5:1 or better SWR
- ! Power Rating . . . 200 watts FM
- ! Height, including mount . . . 78″
- ! Radiator . . . 17-7 PH stainless steel
- ! Field adjustable for lowest SWR

**CHOOSE FROM TWO VERSIONS**

**MODEL CGT-144** (illustrated) antenna complete with trunk lip mount for easy, no holes installation on side or edge of trunk lip. 180° swivel included for adjustment of antenna to absolute vertical. Supplied operational with 17′ MIL spec RG-58-U and PL-259 transceiver connector factory attached. Antenna is removable from mount. Shpg. Wt. 3.34 lbs. . . . **$37.95**

**MODEL CG-144** — Antenna only with 3/8″-24 base to fit all standard mobile ball mounts. Shpg. Wt. 1.84 lbs. . . . . **$24.95**




give your mobile signal the big push! this large aperature, two meter antenna will create a new dimension in amateur mobile communications. —where action counts, get the decisive advantage of colinear power gain performance; transmitting and receiving

**Available From All Distributors who Recognize the Best!**

*NEW-TRONICS CORP.*

15800 COMMERCE PARK DRIVE
BROOK PARK, OHIO 44142




your electronics
buying guide
for precision made
radio crystals
and electronic
equipment

INTERNATIONAL

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

Please Print NAME

ADDRESS

CITY

STATE ZIP


first a.f. stage (mike amplifier). Pay careful attention to the GAIN CONTROL (audio) and keep it *down!* It doesn't take much power to drive the Nuvistor nor the v.f.o. or crystal controlled oscillator in your rig. Deviation will depend on the varactor diode used. A type similiar to the Sylvania No. D-4140 is recommended, and these can often be found in surplus.

### Licenses Etc

"Chuck, I'm a newcomer to *CQ* and think the magazine is great. But tell me, what licenses do you have?"

To begin with, I have a First Class Radiotelephone License with Radar indorsement, a Second Class Radiotelegraph License and an Extra Class ham license—all issued by the FCC. I also have a Swiss amateur license (HB9ALJ) and a special Franch license FØEU). (Ever try to take an amateur exam in 3 languages—I did—French, German and English!) Incidentally, I had a CB license which I let expire.

### Centerfed Antenna

"I have a centerfed antenna with a 67 foot flat-top and I use 300 ohm twin lead feeders. I use a Johnson Matchbox tuner. I want to work 15 to 80 meters but it will load only a couple of bands. Have changed the length of the leadin but no good. Any suggestions?"

What "couple of bands"? The "box" will work on most antennas and do a good job. But until you tell me what "couple of bands" how can I analyze your problem? What set are you feeding the antenna with? Bill Orr's *Radio Handbook* (especially the 17th edition) contains info on an all-band tuner for center fed antennas.

### Central Electronics 20A

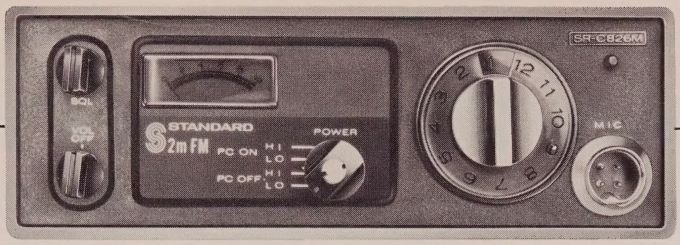
"I'm having trouble tuning my old CE-20A which I obtained recently. Any special instructions?"

I had four 20A manuals and I sent them out in response to queries—*none* came back. I can't help you. If anyone wishes to help another ham: send your information to Herb Peery, WØGQR Box 313, Trenton, Mo. 64683.

### VHF-1 Seneca Chirp

"How do I get rid of a chirp and poor T note in my Seneca VHF-1 when on v.f.o.? My friend's does not perform like mine."

[*Continued on page 78*]




# MAXIMIZE YOUR AMATEUR RADIO MONEY.

What new 2M FM gives me most for my money, performance vs. price? The answer's as clear as the superb reception you'll get on the new Standard 826MA, 10 watt, 2 meter FM transceiver. You'll find such outstanding features as 12 channels — with the four most popular ones included — and a RF output meter with selection of 10 watts or 0.8 watt for battery conservation. And of course, our "Astropoint" system that assures: top selectivity, great sensitivity, and rejection of unwanted signals on today's active 2M band. **Helical Resonators** & FET front end provide the performance needed for tomorrows crowded channels. Provision for **tone coded squelch** to activate modern repeaters. A radio that won't become obsolete. Occupies less than 200 cu. in. Weighs less than 5 lbs. It has all the same "Astropoints" as entire Amateur line.

**NEW 22 CHANNEL BASE STATION**
**SRC-14U**

Ultimate in a 2M FM Transceiver features:

- ☐ 22 channels
- ☐ AC & DC supplies Built In
- ☐ 10W (1, 3 & 10 selectable)
- ☐ Receiver offset tuning
- ☐ VOX
- ☐ Three Front Panel Meters
- ☐ Plus many more exciting features.



*For detailed information on these; the complete Standard line and the name of your nearest dealer write:*

**Standard**
**Communications Corp.**

213 / 775-6284 · 639 North Marine Avenue, Wilmington, California 90744



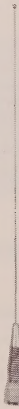

# for over 20 years we've been designing VHF-FM antennas for some pretty tough customers.

# we know you're just as tough.

A product in the amateur market gets a reputation very quickly. It measures up to what you expect in engineering, performance and quality —or else. That's why A/S amateur antennas are built to the identical design and construction standards as their commercial counterparts. Standards that have made them specified for more police and public safety vehicle installations than all other brands combined.



**HM-177**
**2 Meters**
Features new high conductivity copper and nickel coated 17-7 PH stainless steel whip. Shunt fed coil encased in waterproof PVC jacket. All fittings chrome plated brass. Easy snap-in mounting. 3 dB gain.*



**NEW! HM-223**
**1¼ Meters**
**(220 MHz)**
High performance ⅝ wavelength design for the new 220 MHz activity! Directly fed with low loss coil in new low-profile design. Spring and whip easily removable leaving only 1 3/16" high base for car wash clearance. 3 dB gain.*



**HM-175**
**¾ Meters**
Collinear design with truly hot performance! Base fittings have silver plated contacts. Can handle 100 watts. Whip and phasing coil assembly is a one piece molded design to resist vibration and moisture. 5 dB gain.*



**HM-4**
**2 Meters**
Tough, virtually indestructible antenna for hand-helds. Completely insulated. Base fitting matches Motorola HT, E. F. Johnson, and Standard portables.

**HM-5**
Same as above but for Drake and other packset portables with SO-239 fittings.

**NEW ASCOM® TOWERS**
High strength, low maintenance aluminum towers for HF and VHF antenna installations. There is a complete line of ASCOM self-supporting towers—in heights from 30 to 90 feet—at attractive prices!

*Measured over a ¼ wavelength whip

*WRITE FOR FREE AMATEUR ANTENNA and/or TOWER CATALOGS*

as ® "Stripes of Quality"

**the antenna specialists co.**

Division of ORION INDUSTRIES, INC., 12435 Euclid Ave., Cleveland, Ohio 44106

# FREE:

Apply for your personal SWAN Credit Card simply by completing and mailing this form to **SWAN ELECTRONICS**, 305 Airport Road, Oceanside, CA 92054.

## SWAN REVOLVING CREDIT SERVICE APPLICATION C

(PLEASE PRINT)

Name: _____
(First Name) (Middle Name) (Last Name)

Mailing Address: _____
((Street) (City)

_____ How long at this address: _____ Phone: _____
(State) (Zip Code) (Area Code) (Number)

Former Address _____
(If less than two years at present address:)

_____ How Long: _____

Occupation: _____ Birthdate: _____

Social Security #: _____ Amateur Radio Call: _____

Employer: _____ How Long: _____

Company Address: _____
(Street) (City) (State) (Zip Code)

Former Employer: _____ How Long: _____

Name of Your Bank: _____

Address: _____
(Street) (City & State)

Savings_____ Checking_____ Loan_____ Home Loan Account No.: _____

Bank Loans, Finance, etc.:

_____
(Name of Firm) (Address) (City & State) (Account #)

Current Credit Cards:

_____
(Name) (Account No.) (Name) (Account No.)

_____
(Name) (Account No.) (Name) (Account No.)

Relative or Personal Reference:

_____
(Name) (Address) (City) (State)

The above information is true and correct. I/We will make no charge purchase until reading the Swan Credit Service Agreement and Disclosure to be provided.

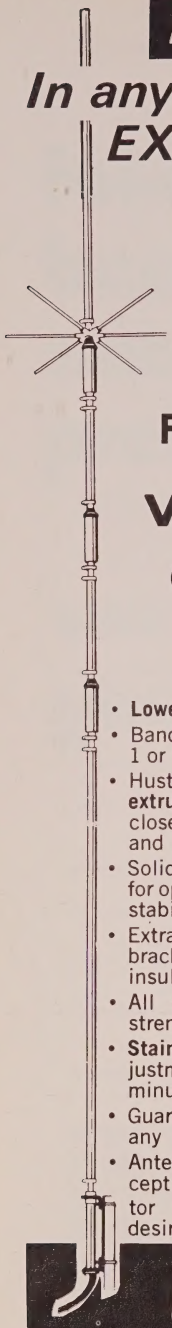
Your Signature: _____ Date: _____

Signature of Spouse: _____ Date: _____

# MORE GREAT BUYS FROM ARROW

## In any class... From NOVICE to EXTRA... Go FIRST CLASS with THE HUSTLER 4BTV has everything

**$47.95**



### FIXED STATION TRAP VERTICAL

40 THROUGH 10 METERS

### One Setting for TOTAL BAND COVERAGE...

- **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-75S 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.

**MODEL 4-BTV Wgt. 15 lbs.**

### HUSTLER HIGH FREQUENCY MOBILE ANTENNAS

**Model MO-1**— Price: **$12.50**
54" Mast for Deck or fender mount— Folds at 15" above base
The original hinge and sleeve clutch mechanism.



**Model MO-2**— Price: **$12.50**
54" Mast for Bumper mount Folds at 27" above base
Rotates 360° in horizontal plane

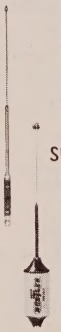


STANDARD HUSTLER RESONATORS—
**400 Watts Power-Normal SSB Duty Cycle**

| | | |
|---|---|---|
| Model RM-10 | 10 meter resonator | $ 8.50 |
| Model RM-15 | 15 meter resonator | 9.50 |
| Model RM-20 | 20 meter resonator | 10.50 |
| Model RM-40 | 40 meter resonator | 12.50 |
| Model RM-75 | 75 meter resonator | 19.50 |
| Model RM-80 | 80 meter resonator | 14.50 |

SUPER HUSTLER RESONATORS—
**Legal Power Limit—Normal SSB Duty Cycle**

| | | |
|---|---|---|
| Model RM-10S | 10 meter resonator | $11.95 |
| Model RM-15S | 15 meter resonator | 13.95 |
| Model RM-20S | 20 meter resonator | 15.95 |
| Model RM-40S | 40 meter resonator | 19.95 |
| Model RM-75S | 75 meter resonator | 24.95 |
| Model RM-80S | 80 meter resonator | 24.95 |



Rockland County Hams - Visit our Nanuet Store for great Local Service - Dept. D

**ARROW ELECTRONICS, INC.**

**NEW YORK CITY, N.Y. 10007,** 97 Chambers Street, 212-349-4411, Between Broadway and Church Street
**BAYSIDE, QUEENS, N.Y. 11361** 207-02 Northern Blvd., 212-423-0910, Half Block East of Clearview Expressway
**NANUET, N.Y. 10954** 195 West Route 59, Half Mile East of Thruway Exit 14
**FARMINGDALE, L.I., N.Y. 11735** 900 Route 110, One Mile South of Republic Aviation
**MINEOLA, N.Y. 11501** 525 Jericho Turnpike, One Half Block East of Herricks Road
**TOTOWA, N.J. 07511** 225 Route 46, 201-256-8555
**NORWALK, CONN. 06850** 18 Isaac Street, Shopping Pl., 203-838-4877

MIDLAND
ELECTRONICS COMPANY

# What are we handing you?




## The most exciting 2-meter, hand-held on the market. . . 2-watt, 6-channel

Now Midland—for years one of the top names in communication equipment—brings you a high performance hand-held transceiver in the 2-meter amateur band. What do you get? A full 2 watts output power with automatic deviation control. 6-channel capability with crystals installed for .16/.76, .34/.94 and .94/.94. A high performance receiver with mechanical filters, IC and MOSFET front end. Built-in battery/S meter. Compact 9″ x 3″ x 1⅞″ size. Jacks for external speaker, microphone, antenna and charge/power. Operation on 8 "AA" cells, ni-cad battery pack or AC power supply (all optional). With carrying case, less batteries. Model 13-520

**Write for Midland's full-line amateur radio brochure: P.O. Box 19032, Kansas City, MO 64141**

**DEALERS: inquire about an exclusive Midland amateur radio area franchise**

MIDLAND
ELECTRONICS COMPANY
*"Coming on Strong in Amateur Radio"*

# SERIOUS RADIO OPERATORS RELY ON SWAN

No fooling around. If you want superior full-band performance combined with ease of operation, then it's time you invest in SWAN equipment. Reliable equipment that gives dependable service every time you're on the air.

Here are two single-sideband transceivers that seasoned radio amateur veterans put their trust in, both at home and on the move:



Install a SWAN 500CX and join an elite legion of hams whose experiences have made this the most desired 550 watt P.E.P. transceiver in its class. Enjoy unsurpassed tuning ease, extraordinary signal sensitivity, and transmissions that'll push through noise which would obscure readability in a lesser piece of gear.

**500CX,** less power supply . . . . $529.95; 117XC, matching AC power supply with speaker . . . . $109.95; 14-117, DC power supply (can be adapted to AC use with $8.00 optional line cord) . . . . $139.95.



Perhaps portability is your need. You can have confidence in the deluxe 270B Cygnet. Compact and lightweight, it has 260 watts P.E.P., a built-in power supply and loudspeaker, plus a solid-state VFO. 12 volt operation is easily adaptable with an optional plug-in DC converter . . . should fit well with vacation plans.

**270B,** with built-in power supply . . . . $469.95; 14-A, DC converter . . . . $44.95

Both the 500CX and the 270B cover the five most popular frequency bands — 10, 15, 20, 40 and 80 meters with CW or selectable sideband operation. See SWAN's 1973 catalog for complete specifications.

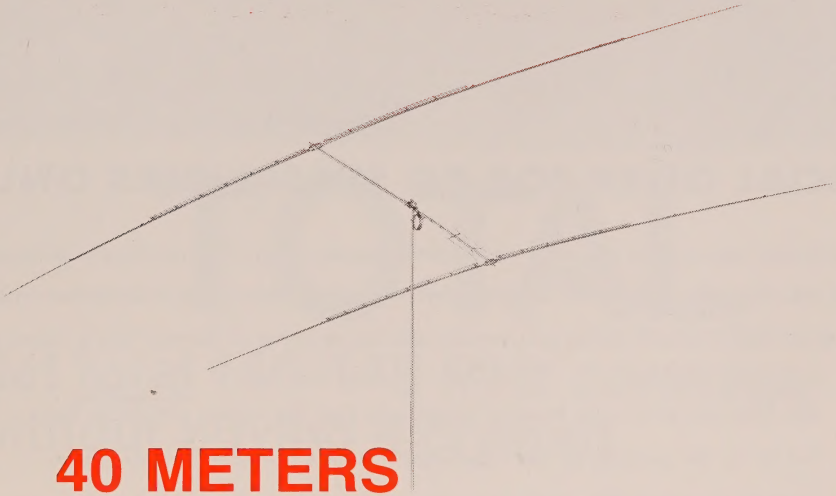
If you're serious, send us a 10% down payment to your SWAN REVOLVING CREDIT SERVICE account and we'll deliver your choice before another month goes by . . . we don't fool around.

**SWAN**
**ELECTRONICS**
*A subsidiary of Cubic Corporation*

**305 Airport Road • Oceanside, CA 92054 • Phone (714) 757-7525**

*The Most Powerful Antennas Under the Sun*

# hy-gain 402BA
# DX DEMON!



## 40 METERS

If 40 meters is your bag, try this one for best 40 meter performance...you'll work signals on 40 meters that you never knew existed!

The Model 402BA attenuates unwanted signals off the side and back at 12 to 25 db while amplifying signals for 4.9 db minimum forward gain. Unique linear loading stub delivers maximum performance without lossey center coils. Easily stacks with tribander or 20 meter beam; requires only 10' separation. 52 ohm feed. Beta Matched. 16 ft. boom, 43 ft. elements. Maximum power input 1 kw, AM.

**Order No. 397** **$169.95**

**Hy-Gain 402BA...*the 40 meter DX Demon!***

**HY-GAIN ELECTRONICS CORPORATION**

Box 5407-FG Lincoln, Nebraska 68505




# SPECIAL OFFER FOR CQ SUBSCRIBERS ONLY

Our circulation department has made an exhaustive study of the costs involved in processing renewal subscriptions. This study indicates that the average short term subscription renewal costs approximately $2.00, taking into account postage, printing of renewal forms, labor, etc.

We feel that this is an extreme waste, and that the money would be far better in the pockets of our subscribers. Since CQ enjoys a renewal percentage of about 80% each year, the savings will be substantial for the amateur fraternity as a whole.

Thus, we offer present subscribers only, the opportunity to place low-cost, long term subscriptions, while the present subscription is still in effect.

The cost of these subscriptions will be $12.00 for the first three years extension, and $3.75 for each additional year thereafter. Not only will the CQ long-term sub save you substantial money, but it will reduce drastically the possiblity of computer errors on future renewals.

This offer may be made only on the special post card printed on the magazine mailing wrapper which is used for subscriber copies only. We may have to withdraw this offer at any time, so prompt action is suggested.

*Dick Cowan, WA2LRO*
*Publisher of CQ*




# TOTAL

## Get total 146-148 MHz coverage without buying a crystal!

The modified Clegg FM 27B transceiver now covers the entire range of 146-148 MHz . . . and needs NO additional crystals. It's the only 2 meter rig *available now* with built-in total coverage that also offers greater than 25 watts output power, uses 10 IC devices, and has Teflon* wiring throughout. Not a single bi-polar device is in the RF path in transmitter or receiver . . . ensuring greater reliability. Accessory power supply and sub-audible tone on transmit are available too. At home or in your car, the FM 27B gives you the ultimate in total 2 meter performance. See your Clegg Dealer NOW or write or phone us today for detailed data sheet on our 2 meter leader.

### CHECK THESE SPECIFICATIONS

**GENERAL**

**POWER REQUIREMENTS:** 12 to 14 VDC
Current Consumption at 13.5 VDC:
Receive: 4 amps squelched, 1.2 amps unsquelched.
Transmit: 6 amps max.

**DIMENSIONS:** 7⅜" x 3½" x 9¼" deep; 4 lbs. net weight.

**RECEIVER**

**TUNING RANGE:** 146.00 to 148.00 MHz, continuously tuneable with reset capability of approx. 1 KHz to any frequency in range.

**SENSITIVITY:** .35 μv max. for 20 db quieting; .1 μv for reliable squelch action.

**SELECTIVITY:** 11 KHz at 3 db; Less than 30 KHz at 70 db. Adjacent (30 KHz spaced) channel rejection more than 70 db.

**AUDIO OUTPUT:** 2.0 watts (min.) at less than 10% THD into internal or external ohm speaker.

**TRANSMITTER**

**TUNING RANGE AND CONTROLS:** Same as RECEIVER.

**POWER OUTPUT:** 25 watts Min. into 50 ohm load. P/A transistor protected for infinite VSWR.

**MODULATION:** Internally adjustable up to 10 KHz deviation and up to 12 db peak clipping.

*DuPont trademark

*Amateur Net* **$479.95**

SIGNAL AND CONTROL INTERNATIONAL CORPORATION

Clegg DIVISION

3050 Hempland Road, Lancaster, Pennsylvania 17601

Tel. (717) 299-3671 Telex: 84-8438

# TRANSMIT THE CLEANEST SIGNAL ON THE AIR



*. . . with a New SWAN Fully Solid-State Transceiver!*

You'll appreciate the comments about your signal. You'll get outstanding reports on your readability, strength and tone. Be a proud owner of a truly reliable all solid-state rig . . . at a price you can afford!

SWAN ELECTRONICS offers you superb craftsmanship you can see, feel, and hear. Inside, these units are uniquely designed. Progressive, proven engineering state-of-the-art techniques are enriched by the most practical advanced components available. Externally, Swan has designed these new transceivers to be appreciated by every ham, because it was hams who told us what they wanted. It's all here . . . up-to-the-minute in styling and convenience . . . easy to operate.

- DESIGNED and MANUFACTURED by SWAN ELECTRONICS – At our factory in Oceanside, California U.S.A.
- AUTOMATIC POSITIVE-SELECT TUNING – There are no tedious adjustments to mess with. Juse one simple dial controls it all.
- INFINITE VSWR PROTECTION – The final stage won't burn out. It's designed to handle any load from a short to an open circuit.
- ALL SOLID-STATE COMPONENTS – Longer life, lower heat, compact size, and conserves energy. Includes FET's, IC's, Operational Amplifiers.
- ALL CONTROLS ARE OUT FRONT – Easy to reach, comfortable and simple to use, everything you need is at your finger tips.
- CLEAR, CLEAN TRANSMISSION – The finest quality on the air. Your signals are strong, stable and easy to read.

Get the full story on these New transceivers and their style-matched accessories in SWAN's latest Amateur Radio Equipment Catalog. Learn about SWAN's exclusive Revolving Credit Service, too. Visit any authorized SWAN ELECTRONICS DEALER or write directly to us for your FREE copy, today!

**SWAN**
**ELECTRONICS**
*A subsidiary of Cubic Corporation*

**305 Airport Road • Oceanside, CA 92054 • Phone (714) 757-7525**

# NAME YOUR ANTENNA...

## MORE POWER, MORE FLEXIBILITY FOR THE Fixed Station...

### Here are just a few

**Five-Band Verticals**
**Model 18HT HY-TOWER 80 thru 10 Meters**
- Outstanding omni-directional performance
- Automatic band switching
- Installs on 4 square feet of ground
- Completely self-supporting

Order No. 182 $199.95

**Multi-Band Hy-Q Trap Verticals**
**Model 18AVT/WB 80 thru 10 Meters**
- Wide band performance with one setting
- Automatic band switching: three Hy-Q traps and top loading coil
- SWR 2:1 or less at band edges

Order No. 386 $69.95

**Model 12AVQ 10, 15, 20 Meters**
Order No. 384 $29.95

**Tribander Beams for 10, 15, 20 Meters**
**Model TH6DXX SUPER THUNDERBIRD DX**
- Six elements; new Hy-Q traps
- Up to 9.5db forward gain
- 25db front-to-back ratio
- SWR less than 1.5:1 on all bands
- Takes maximum legal power

Order No. 389 $179.95

**Model TH3Mk3 SUPER THUNDERBIRD**
- Three elements
- Up to 8db forward gain

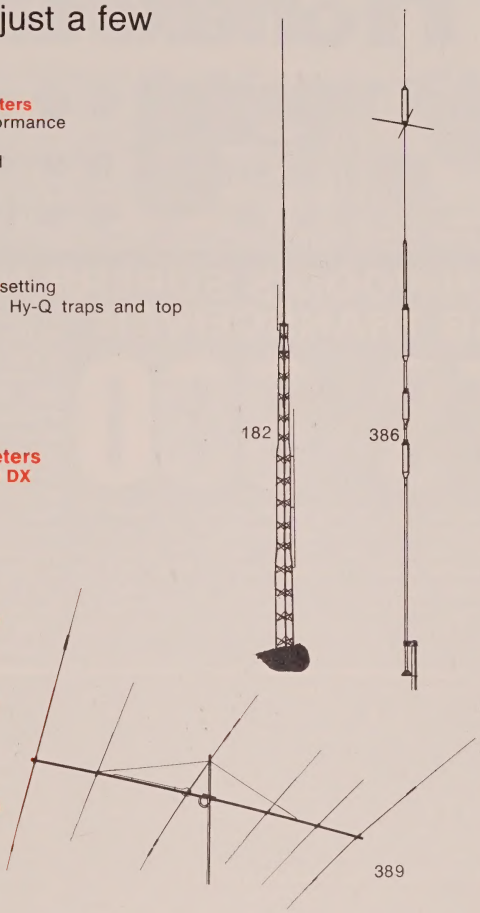
Order No. 388 $144.95

**Model TH3JR THUNDERBIRD JUNIOR**
- Three elements
- Meets space problems
- Up to 8db forward gain

Order No. 221 $99.95

**Model TH2Mk3 SUPER THUNDERBIRD**
- Two elements
- Up to 5db forward gain

Order No. 390 $99.95




EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED EQUIPMENT • Nearly all makes and models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin. Export inquiries invited.

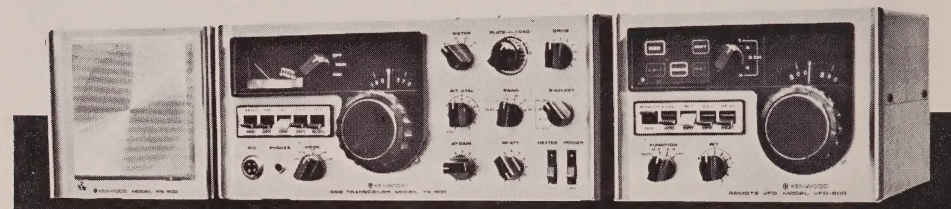
**TED HENRY** (W6UOU) **BOB HENRY** (W0ARA) **WALT HENRY** (W6ZN)

**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

*"World's Largest Distributor of Amateur Radio Equipment"*

# amateur radio's new standard of excellence



## KENWOOD'S SUPERB NEW SOLID STATE SSB TRANSCEIVER

# TS-900

**FEATURES:** • Break - in CW with sidetone • Built - in 100 KHz and 25 KHz crystal oscillator • Built - in RIT and RIT indicator light • Built - in RTTY frequency shift for FSK • Built - in noise blanker • Built - in VOX • Modular construction — repair in or out of equipment • RF AGC to prevent front end overload to strong signals • Completely solid state except final section • 1 KHz readout

**GENERAL SPECIFICATIONS:** Frequency Range: 3.5 - 30 MHz Amateur Bands and WWV • Mode: SSB, CW, or FSK • Power Output: 150 watts PEP nominal into 50 ohms for SSB, 100 watts nominal into 50 ohms for CW, 50 watts nominal into 50 ohms for FSK • Frequency Stability: Within 100 Hz during any 15 minute period after warmup. Within ± 2 KHz during the first hour after 1 minute of warmup • Receiver Sensitivity: 0.5 microvolts for a 10 db (signal + noise)/noise ratio • Receiver Selectivity: SSB and FSK — 2.2 KHz bandwidth (6 db down), 4.4 KHz bandwidth (60 db down), CW — 0.5 KHz bandwidth (6db down), 1.5 KHz bandwidth (60 db down), (with optional CW filter installed) • Dimensions: 12.6" wide × 5.5" high × 12.6" deep • Weight: 26.5 pounds (32.5 pounds shipping weight) • Price: TS - 900 $795.00, PS - 900 (AC Supply) $120.00, DS - 900 (DC Supply) $140.00, VFO - 900 (Remote VFO) $195.00.

**THE KENWOOD R-599 RECEIVER** . . . 1.8 to 29.7 MHz (Amateur Bands) • Dial readout to ½ KHz • Special detectors for SSB, AM, and FM • Transceive operation with T-599 • Built-in 100 KHz and 25 KHz calibrators • Built-in 500 cycle CW filter • Provision for 2 meter and 6 meter coverage with accessory self-contained converters • 120/240 VAC or 12 VDC operation • All solid state • R-599 — $389.00 Converters — $31.00 S-599 Speaker — $16.00.

**THE KENWOOD T-599 TRANSMITTER** . . . Clear, stable, selectable sideband, AM and CW • 4-way VFO flexibility plus RIT when used with the R-599 • Amplified ALC • Built-in VOX • Full metering • Built-in CW sidetone monitor and semi-automatic break-in CW • Built-in power supply for 120/240 VAC operation • Only 3 vacuum tubes • 200 watts PEP input nominal • Full amateur band coverage (3.5 to 30 MHz). T-599 — **$429.00**

✓ NOTE: The TS-511S still sells for the same low price... Still the same high quality

**THE KENWOOD TS-511S TRANSCEIVER** . . . a powerful five band transceiver (3.5 to 30 MHz, amateur bands) for operation on SSB and CW • Built-in VOX • Built-in crystal calibrator • Built-in noise blanker • Receiver Incremental Tuning (RIT) • 1 KHz frequency readout • Eight pole filter • Exceptional stability • Provisions for installation of an accessory high selectivity CW filter • 500 watts PEP input for SSB • .5 μv sensitivity nominal • Full metering — Cathode current (IP), plate voltage (HV), ALC, and relative power output (RF) as well as an S-meter • Amplified ALC • Heavy duty 120 VAC external power supply. TS-511S — $415.00 PS-511S — $105.00 VFO-5SS — $105.00 CW-1 — $39.00

Prices subject to change without notice.

**EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • Good RECONDITIONED EQUIPMENT • Nearly all makes and models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin. Export inquiries invited.**

**TED HENRY** (W6UOU) **BOB HENRY** (W0ARA) **WALT HENRY** (W6ZN)

**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

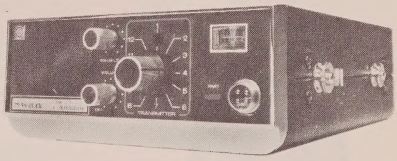
# JOIN THE MOBILE BUNCH on 2 Meter FM!

It's easy with the "Performables" from Swan Electronics.

Your choice of two value-packed performers is now available for mobile operation without the need to buy an AC power supply. Choose the 12 channel FM-2X or the more versatile 144 channel combination model FM1210-A. Simply hook up either of these superior quality transceivers to a 12V DC battery and your mobile antenna — then you're ready for the excitement of ham mobile performance at its best.



FM-2X



FM1210-A

SWAN FM-2X — 12 channels. Crystals installed for Channel 1 to transmit and receive on 146.94 MHz, Channel 2 to transmit on 146.34 and receive on 146.94 MHz, and Channel 3 to transmit on 146.34 and receive on 146.76 MHz . . . . . $259.00

SWAN FM-2X — AC Power Supply, Accessory . . . . . $ 39.95

SWAN FM1210-A — Independent switching of 12 transmit and 12 receive frequencies with eight crystals installed: Transmit on 146.22, 146.34, 146.76 and 146.94 MHz; Receive on 146.28, 146.76, 146.88 and 146.94 . . . . . $319.00

SWAN FM1210-A — AC Power Supply, Accessory . . . . . $ 49.95

Common features include: Frequency coverage from 144 to 148 MHz; a nominal 10 watts RF power output; a fully solid-state transmitter with automatic protection of the output transistor from improper-load damage; phase type frequency modulation for exceptional clarity; push-to-talk dynamic microphone; frequency stability of ± .001%; spurious radiation is held to -60 dB below carrier; and both units have a 0.5 microvolt sensitivity for 20 dB quieting.

SWAN ELECTRONICS
A subsidiary of Cubic Corporation

305 Airport Road
Oceanside, CA 92054
Phone (714) 757-7525

Gentlemen:

I'm interested in joining the "Mobile Bunch" with Swan!

Please send me: ☐ An FM-2X ☐ An FM1210-A ☐ More Information

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

☐ Full payment enclosed (I understand I'll be billed for any shipping charges and applicable taxes.)

☐ Charge my Swan Account #_____ (Down payment enclosed)

☐ Please send an application for Swan's Revolving Credit Service.

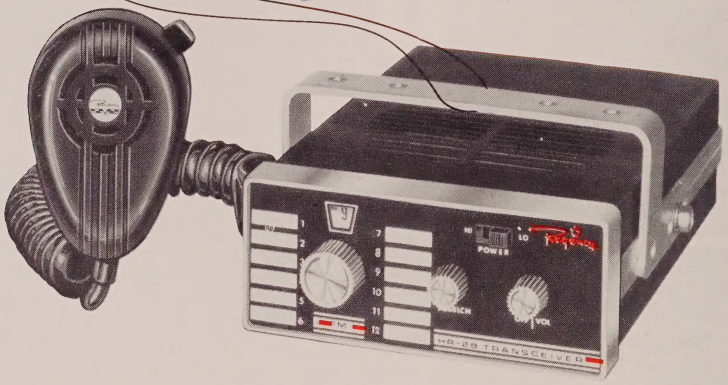
# If you like 2 METER...

## *YOU'LL LOVE OUR*

**ALL NEW**

# HR-2B

**NARROW BAND FM TRANSCEIVER**



### 15 OR 1 WATT POWER OUT/SWITCH SELECTABLE/ FULL 12 CHANNEL TRANSMIT AND RECEIVE CAPABILITY

You'll like the crystal clear transmit and receive performance of this compact, 2 meter unit and so will those listening. The 12 transmit channels are provided with individual trimmer capacitors for the optimum in point-to-point and repeater applications. A HI/LO power switch provides 1 watt output or full rated output. The receiver has an audio output of 3 watts at excellent sensitivity. Solid state, American made quality at a low price.

**$229.00** AMATEUR NET

includes plug-in ceramic mike, mounting bracket and transmit and receive crystals for 146.94 MHz.

Regency
the first name in solid state

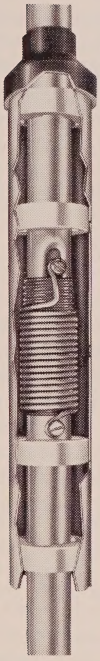
**THE FM LEADER IN 2 METER AND 6 METER...AND NOW 220 MHz**

*The voice of*

# HY-GAIN'S THUNDERBIRD 10-15-20

*is heard around the world*





## Here's why Thunderbirds outperform all other tri-banders:

- **Thunderbird's "Hy-Q" traps** provide separate traps for each band. "Hy-Q" traps are electronically tuned at the factory to perform better at any frequency in the band—either phone or CW. **And** you can tune the antenna, using charts supplied in the manual, to **substantially** outperform any other antennas made.
- **Thunderbird's superior construction** includes a new, cast aluminum, tilt-head universal boom-to-mast bracket that accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning and provides mast feed-thru for beam stacking.

  Taper swaged, slotted tubing on all elements allows easy adjustment and readjustment. Taper swaged to permit larger diameter tubing where it counts! And less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping metal screws.
- **Thunderbird's exclusive Beta Match** achieves balanced input, optimum matching on all 3 bands and provides DC ground to eliminate precipitation static.
- 25 db front-to-back ratio.
- SWR less than 1.5 to 1 on all bands.
- 24-foot boom...none longer in the industry.
- Extra heavy gauge, machine formed, element to boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support.
- Interlaced, optimum spaced elements for higher gain and better pattern control.
- 3 active elements on 20 and 15 meters. 4 active elements on 10 meters.

**New 6-Element Super Thunderbird**
Model 389
Suggested retail price, **$179.95**

**Improved 3-Element Thunderbird**
Model 388
Suggested retail price, **$144.95**

**Fabulous 3-Element Thunderbird, Jr.**
Model 221
Suggested retail price, **$99.95**

**Popular 2-Element Thunderbird**
Model 390
Suggested retail price, **$99.95**

*Buy one today at your favorite Hy-Gain distributor!*

**HY-GAIN ELECTRONICS CORPORATION**
P.O. Box 5407-FL Lincoln, Nebraska 68505

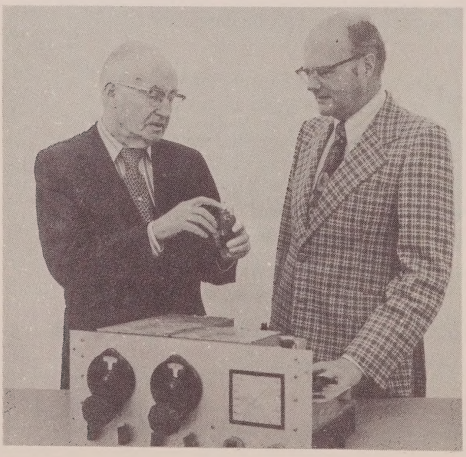
# The Golden Thirties--- The Amateur Communications Receiver Comes of Age

# The National FB7 Single Signal Superheterodyne

BY WILLIAM I. ORR,* W6SAI

*Once again W6SAI takes you on an old-time radio adventure covering the early development leading to today's sophisticated, solid state amateur communications receiver, the end result of over 40 years of research and development.*

*It all started in the "golden thirties", the depression years that were vintage amateur radio, when the mere fact of hearing* any *shortwave signal was a feat unto itself, let alone knowing the signal strength, frequency or other attributes! A few pioneers led the way and W6SAI tells the story. Some of the "golden" receivers of this by-gone era were the McMurdo Silver 5C, the RME 69 and the AGS. These receivers, and principally the National FB7, were the early ancestors of today's sophisticated sideband receiver. Read this interesting story of the early days and enjoy the trials of the Old Timers as they struggled with their cranky and unpredictable receivers. Would you have done as well?*



It all started very simply and quietly. The 19,000 or so radio amateurs in the early thirties built their own receivers, usually variations of the regenerative detector plus one or two audio stages. A few "commer-

*48 Campbell Lane, Menlo Park, CA 94025

Fig. 1—Jim Lamb (ex-W1AL), inventor of variable crystal i.f. filter (left) and Bill Orr, W6SAI, examine 1939 homemade single signal superheterodyne receiver built by Ken Caird, W9ADG. Receiver was described in February, 1939 QST and is magnificent example of "home brew" work. Thirty three years later, the W9ADG receiver still holds its own against modern s.s.b. receivers in sensitivity and selectivity. Jm Lamb, now retired and living in California, still has keen interest in latest developments in amateur radio.



Fig. 2—The National FB-XA receiver and preselector. First advertised in March, 1933, this compact and inexpensive superheterodyne receiver revolutionized amateur radio. Combining good sensitivity and selectivity, the FB-XA relegated the regenerative receiver to the trash can.

The FB-XA featured full bandspread on the four ham bands covered by the plug-in coils and a calibration chart was provided for quick frequency read-out. I. f. gain was controlled by horizontal control directly below the main tuning dial. Control dial was calibrated in signal strength units to provide a quick and easy indication of signal strength.

cial" short wave sets existed, such as the luxurious *Hammarlund Comet Pro* (but who could afford to pay $88.20 for a receiver in those dark depression days?). Some amateurs built the popular Pilot Super Wasp regenerative receiver kit, but the majority assembled their own "blooper" from easily available parts salvaged from defunct broadcast receivers. The new *National SW-3* a.c. operated regenerative receiver looked promising as 1931 rolled around.[1] In any event, the regenerative set was king as far as amateur radio was concerned.

### Jim Lamb and the Superheterodyne Receiver

The know-how to build an advanced amateur shortwave receiver, however, was at hand. Broadcast and shortwave listeners were popularizing the efficient and sensitive superheterodyne circuit and many a DX-minded amateur was taken aback when he visited his BCL (broadcast listener) buddy and operated the new *Silver-Marshall 727SW* shortwave "super-het" which ran rings around his beloved, two tube, plug-in coil regenerative receiver.

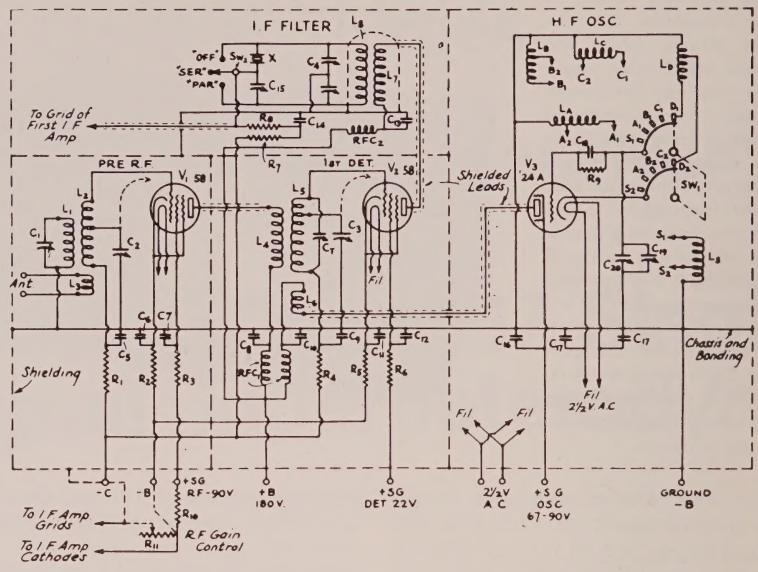
The die was cast in August, 1932 when James Lamb, ex-WA1AL, the then technical editor of *QST*, wrote his famous two-part article entitled, "Short Wave Receiver Selectivity to Match Present Conditions" (Constructional and Operating Features of the Single-Signal Superheterodyne). For the first time the features of a stable, sensitive single conversion receiver having excellent selectivity for good c.w. work were described in amateur terms (fig. 1). The use of an i.f. filter (patented by Lamb) was part of the secret, and a whole new world of first-class shortwave reception was suddenly at hand that soon swept the regenerative receiver into the junk box.

The startling new superheterodyne was slow to gain acceptance at first. The conversion technique was confusing, the circuit was complex (fig. 3) and the components many and expensive. The idea of interstage shielding was complicated. However, several stores advertised a kit of parts for the receiver and in December *Hendricks and Harvey Co.* announced the first single-signal crystal filter receiver. However, at a guess, less than a handful of such receivers were actually built from scratch and only a small number were ordered from Hendricks and Harvey, as the kit cost ran well over one hundred dollars. It seemed, by the end of 1932, that a good idea was about to die on the vine, as the home-made "sniggle-snigglesuper" seemed to have run its course.

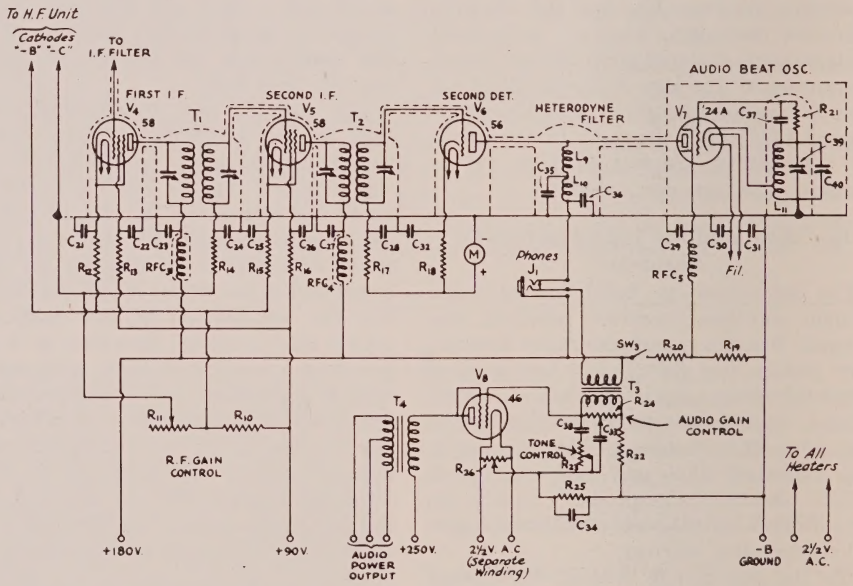
### James Millen and the FB-7 Receiver

The great idea, of course, was not dead at all. It merely took time to come to fruition. At *National Company* (Malden, Mass.) a good friend of Lamb, James Millen (W1AXL, now W1HRX), and his staff of engineers were hard at work designing a simple and inexpensive version of the Lamb receiver that would fit the thin purse of the

[1]Orr, "The Year is 1931. National Radio Introduces the SW-3 All Wave Receiver", *CQ*, July, 1971.




(A) R.F. Amps., Mixer and Osc.




(B) I.F., Detector and audio stages.

Fig. 3—The "grand-daddy" single-signal superheterodyne receiver (*QST*, 1931). The receiver employed a 58 r.f. tube, a 58 first detector with grid injection of the oscillator signal and a 24A conversion oscillator. Second harmonic oscillator injection was used for the higher frequency bands. The Lamb crystal filter was used for both c.w. and phone reception. Two 58's served as 500 kHz i.f. amplifiers, followed by a 56 triode detector, with the b.f.o. signal injected in the plate circuit. A single 46 class A connected served as the audio stage, with tone and volume controls in the grid circuit. Years ahead of its time, this basic design is the cornerstone of the modern s.s.b. receiver of today.

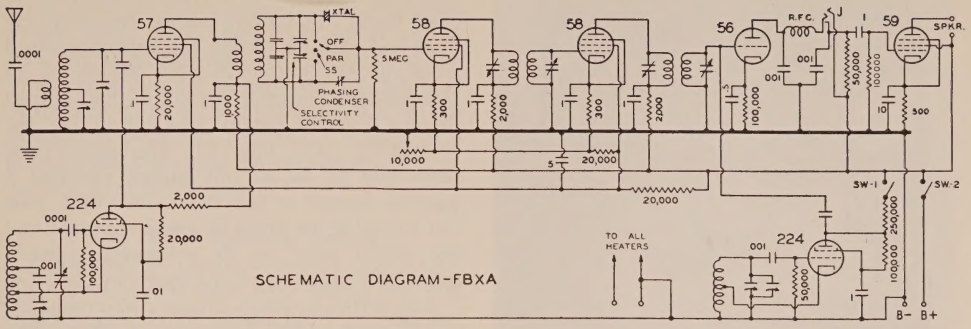



Fig. 4—Schematic of FB-XA receiver is simple enough to be drawn on the back of an envelope. A 57 mixer used grid injection from a 24 oscillator to provide 500 kilocycle i. f. signal. Two 58 tubes in cascade provided sufficient i. f. gain to overcome substantial signal loss in the crystal filter. A 65 triode served as a second detector, with a second 24 as a beat oscillator. A single 59 pentode provided loud speaker operation for strong signals.

Receiver was connected to an external power supply by a long cable, which required that power unit provide 2.8 volts to overcome filament voltage drop in the cable. Many amateurs who built their own power supply for the FB-XA were disappointed at apparent lack of receiver gain, as filaments ran cold due to voltage drop in power cable. National supply cleverly provided high filament voltage to overcome this handicap.

radio amateur pocketbook (fig. 1). In March, 1933, the first advertisement for the new *National* receiver appeared in *QST*. It was called the FB-7 (fone band, seven tubes) and sold for a rock-bottom price of $26.46 amateur net! The receiver was without the all-important crystal filter, but the advertisement assured the prospective buyer that "the receiver and chassis had been designed for ready addition of a quartz filter for full single-signal operation" when the user's pocketbook could stand the extra outlay.

The low-low price was less tubes, power supply and included only one set of plug-in coils. Unfortunately, *National* could not hold the price line with such a complex receiver and the net price was soon raised to $34.20. Even so, it still was an impressive buy for those depression days! With the rise in price, improved i.f. transformers were added and the receiver rechristened the FB-7A. Finally, in early 1934 the impressive Lamb crystal filter was added and the receiver, now known as the FB-XA, was re-

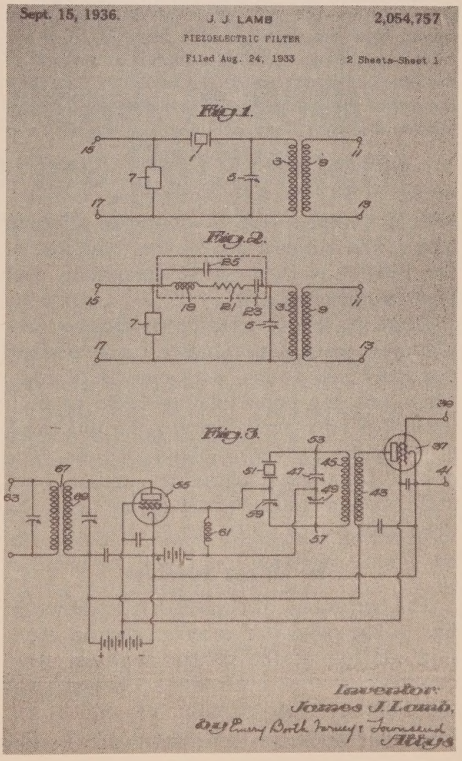



Fig. 5—US patent for "piezoelectric filter" was granted to Jim Lamb in 1936. From this basic circuit, the multi-element s.s.b. filters of today can trace their ancestry. While filters of this type had been in use prior to 1933 when the application was filed (notably the "Stenode" filter), Lamb's circuit was unique in that it permitted adjustment and rejection of an interfering signal.

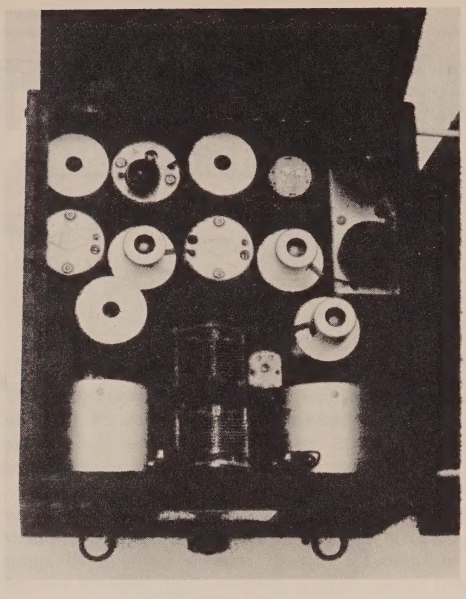


Fig. 6—Interior view of FB-XA. Lamb crystal filter unit is in rear corner of receiver. Crystal phasing control is on left side of receiver along with selector switch. The external preselector is bolted to the side of the receiver and obtains its power from the receiver. The two-gang tuning capacitor is driven from the slide-rule dial assembly, with oscillator padding capacitor mounted at the side of the rear condenser gang. The oscillator tube is to the left of the tuning condenser, with the detector tube to the right. Beat oscillator is at the left, rear of the compartment.

priced at $47.70, less accessories. Actually, with a complete set of coils for all ham bands, and a power supply the total cost of the FB-XA worked out to something over one hundred dollars!

Even so, the stripped-down receiver was a great bargain. Most amateurs only worked one band and needed only one set of coils. Then, too, the power supply could be built up out of junk parts, holding the total cash expenditure to sixty dollars or less. The crystal filter superheterodyne had *arrived*, and amateur radio would never again be the same.

### The FB-XA Receiver

The schematic of the FB-XA is shown in fig. 4. Basically, this receiver was an economy version of the deluxe *National AGS* commercial superheterodyne designed for the Bureau of Air Commerce, which was the predecessor of the present CAA. The amateur version used the same components and plug-in coils, but a much less expensive sheet metal cabinet and chassis and economy dials and variable tuning capacitor borrowed from the SW-3. Luckily, Jim Millen, in an independent personal operation, had helped finance Lamb's patent application for the crystal i.f. filter (fig. 5). The patent was later sold to *RCA*, but Millen retained a paid-up license to use the Lamb filter, plus the expertise to build it. National thus had the initial edge on its competitors for a quick introduction of the new device.

The FB-XA was a single conversion receiver with a 500 kilocycle i.f. strip. The antenna was coupled directly to the first mixer stage without benefit of r.f. preselection, the Q of the input coil being relied upon to suppress image signals. The crystal filter was placed between the mixer and the two i.f. stages. A triode detector, pentode audio amplifier and separate beat oscillator completed the receiver. (fig. 6).

Viewing yesterday's design from today reveals the shortcomings of the FB-XA. The lack of an r.f. stage left it prey to bad image signals. In addition, the receiver was designed to work with a short wire antenna and the antenna coupling to the mixer stage was quite tight. Connecting the FB-XA to a modern beam antenna will promptly overload it and the bewildered user will be confronted with a babble of spurious signals all over the dial.

In addition, the low-C mixing oscillator is full of harmonics which gives rise to spurious signal responses. On 160 meters, in particular, the receiver picks up the 80 meter band quite as well as it does the 160 meter band by virtue of the second harmonic of the mixing signal and the closely coupled antenna! Wise owners of the FB-XA helped the situation by reducing the coupling between antenna and the mixer stage.

Eventually, National alleviated the problem somewhat by providing an external preselector, to be bolted to the side of the FB-XA in the manner of a wart on a dill pickle, and reducing the number of turns on the antenna winding of the detector coil.

The FB-XA owner, too, quickly learned to hand-pick the 224A high frequency oscillator tube, as most early screen grid tubes were highly microphonic, making the receiver ring like a bell when subjected to shock or vibration.

While the FB-XA incorporated no automatic volume control, some technical minded owners made this modification, replacing the 56 second detector tube with a double-diode triode. Interestingly enough, the FB-XA performs well on s.s.b. even without a.v.c., as the designers unwittingly provided a version of a product detector, long before single sideband became a household word!

### The FB-7A Receiver Today

Undoubtedly many thousand FB-7 and FB-XA receivers were sold during the five year life-span of the design; however, they are hard to locate today and are considered a rare collector's item by radio connoisseurs. Even rarer, it seems, is the companion *PSK* preselector, and a mint condition FB-7A receiver / preselector combination is today worth much more than it was 35 years ago!

The receiver requires a 2.5 volt, 10 ampere filament supply and a 250 volt, 75 milliampere high voltage supply. Since no output transformer is supplied with the receiver, either high impedance magnetic earphones must be used, or a "6000 ohm to voice coil"

[*Continued on page 78*]

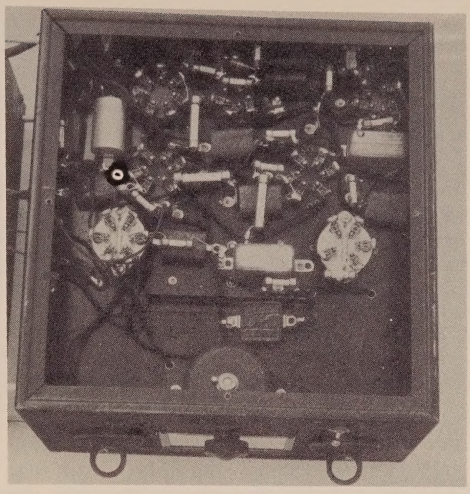


Fig. 7—Under-chassis view of FB-7 receiver. Ground connections were made to painted chassis with lock washer and rivet! Simple, point-to-point wiring and open space permitted owner to quickly and easily service the receiver in case of difficulties. At top of photo is the r. f. gain control, mounted below the main tuning dial and calibrated on rim in signal strength units. This particular receiver has the preselector bolted to the side of it (right).

# Improved C.W. Break-In With The Heath SB-Series Equipment

BY ERWIN AYMAR,* W3SU

UPON contacting the Heath Company for advice in modifying my SB-301 and SB-401 combination for full break-in capability, Heath referred me to K4DC's excellent article in January, 1971, *CQ*.[1]

Although K4DC's instructions worked out very well, I nevertheless found it desirable to add some of my own modifications. These may be of interest to c.w. operators of the Heath SB-series or of other s.s.b. equipment.

The most objectionable feature after the QSK modification was a 1000-Hz carrier that appeared on the operating fequency when the rig was in the TRANSCEIVE function. This 100-Hz carrier was not noticeable when I was receiving strong signals, and was tolerable when I was receiving moderate ones, but with the gain turned up, the carrier was too strong.

The culprit turned out to be the c.w. crystal oscillator, which produces the equivalent of a carrier in the receiver, offset 1 kHz from whatever frequency the receiver is tuned to. It was no use trying to kill the carrier by keying another tube—the carrier came through as long as the oscillator was running. I tried keying the oscillator, but doing this made for unreliable operation and generated key clicks.

The receiver and transmitter are connected, for transceive operation, by three

*3461 S. Leisure World Blvd., Silver Spring, Md. 20906

[1]Kochendorfer, D.C., "QSK With The Health SB-Series Equipment," *CQ*, Jan. '71 p. 16.

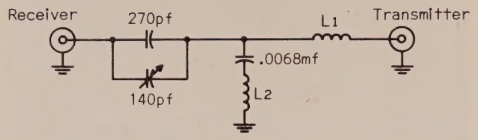



Fig. 1—High-pass filter for removing unwanted c.w. carrier signal riding in on LMO cable. Filter is inserted between receiver and transmitter LMO terminals. $L_1$ is 11 turns #14 e. 5/8" dia.; $L_2$ is 9 turns #16 hookup wire 1/2" dia.

r.f. cables: BFO, HET OSC, and LMO—the LMO being Heath's term for v.f.o. In the c.w. mode, the b.f.o. connection is not used.

Injection of the unwanted carrier rode into the receiver over two of the three cables. Even though the b.f.o. lead was disconnected in the transmitter by the MODE switch in the CW position, the lead still picked up the oscillator signal. I therefore installed an extra relay to ground the b.f.o. line. But an even easier remedy is simply to pull the b.f.o. plug from the rear of the transmitter.

The HET OSC contribution to the carrier injection was negligible; but even after I had eliminated the b.f.o. cable, the signal still rode in on the LMO cable. The remedy for this was surprisingly easy: a simple high-pass filter connected between the receiver and transmitter LMO terminals. The offending oscillator is a steady 3395.4 kHz, and the LMO works between 5.1 and 5.4 mHz. The trick is to let the LMO signal get through, but block out or bypass the oscillator signal, which has no business being there anyway. I make no claim as a filter-designer, but the filter shown in fig. 1 did the trick.

With the carrier killed—at least to the extent it did not bother me with any receiver-gain setting—another annoyance popped up: slight to moderate hash from the transmitter final, which idles at 50 milliamps plate current. The remedy for this has was the cheap and easy circuit shown in fig. 2.

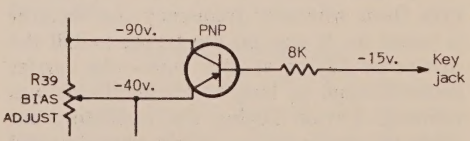



Fig. 2—Circuit for eliminating hash generated by final amplifier in key-up condition due to PA idle current.

I can't identify the transistor, except that it's a PNP. It's a small one that I salvaged from a surplus board—the kind you see marked 5 for $1.00. Resistor $R_{39}$, connected between the transistor base and the key jack, was selected to permit setting of the normal idling current with the key-jack connection grounded (without excitation), and cutoff with the connection made, and key up. There's 50 volts between the emitter and collector, and 40 volts to ground; but this little surplus-board transistor stands up to it. As an extra bonus, this circuit eliminates about 40 watts of heat from the transmitter while its idling, a feature that makes this circuit worthwhile by itself. ■

# Revisions to K4DC QSK Modifications

The following five steps should be substituted for the original five steps that appeared in my *CQ* article entitled "QSK With The Heath SB-Series Equipment" second column, page 18, January 1971.—*K4DC*

Revised modification procedure

1. Disconnect the Wht-Brn wire from terminal 10 of the relay.

2. Install a single insulated terminal under the chassis, using one of the screws near $V_4$ at the corner of the mixer-bandpass board. Install a silicon diode (any type will do) with its cathode connected to the newly installed terminal and its anode connected to terminal 10 of $RL_1$.

3. Connect the Wht-Brn wire removed from $RL_1$ to the cathode of the diode.

4. Remove the Blk wire between terminal 1 of M2R and terminal 4 of terminal strip AB. This wire should be shortened and reconnected between terminal 8 of M1F and terminal 10 of $RL_1$.

5. Lift the lower end of $R_{201}$ from ground and connect it to the lower end of $R_{207}$. This can be accomplished by installing a single insulated terminal on the *top* of the chassis, using the same screw as indicated in Step 2. The presently grounded end of $R_{201}$ can be unsoldered from the board and fastened to the terminal, the .01 mf capacitor connected from the terminal to the hole vacated by $R_{201}$, and a wire run from the terminal to point G on the board.







# Dayton Hamvention: 1973

Bigger, bustlier, broader, brawnier than ever, the Dayton Hamvention just keeps on growing. Inside, new products and audience-participation demonstrations (like THREE SSTV exhibits!) kept the boothtenders busy. Outside.... well, there's never been a match for the flea markets in Dayton. But let's let the pictures tell their own story. Here's a *CQ* scrapbook for those of you who couldn't make it to Dayton this year....and for those of you who could.

*WB8LBV*



# Converting The Western Union Telefax Machine For Amateur Use

BY IRWIN MATH,* WA2NDM

**Part 4—Conclusion**

At this point everyone should be merrily transmitting and receiving FAX pictures but in case you aren't, we will first look at some of the more common problems encountered with this conversion. Because of the interest in converting these machines, and because of the enthusiasm with FAX, the following problems were collected from a selection of questions received over a two month period from *CQ* readers, as well as enthusiastic personnel at the author's place of business, where quite a few Western Union machines were converted from the manuscripts of this series of articles prior to actual publication. In discussing these problems we will assume that the basic wiring is correct and that all motors actually turn when they are supposed to.

### Receiving Problems

A. No picture received.

1. Check all tubes and be certain that they're okay. We've found quite a few bad ones and so there's a good chance you will!

2. Check the lead to the stylus. Its insulation may have broken down. If you suspect anything here, replace the whole wire.

3. Check the receiving gain pot. setting. Too low a setting will give no picture while too high a setting will result in one that is all black.

4. Check the stylus to be sure it has good contact with its holder and that it contacts the paper. Remember that suitable stylus wire can be gotten from a wire brush but that it must be made of iron or steel—not copper.

B. Receiver will not sync properly.

1. Check relay spring tension and contact condition—we have found several intermittent relays (contacts) that required "readjustment."

2. Check tuning of the IC sync-tone decoders to be sure that they are actually adjusted to receive the proper sync frequencies from the transmitting station.

3. Check the phase contacts to be sure that they are okay.

### Transmitting Problems

A. Negative picture transmitted.

1. Check alignment of the "optical inverter;" its position is critical.

B. Weak, noisy picture being transmitted.

1. Check optical alignment of lamp path and photocell path.

2. Check all tubes.

3. Incorrect setting of transmit again pot.

C. Poor resolution.

1. Check optical alignment of lamp path and photocell path.

While the preceding comments may be thought of as broad, all of the above did actually occur. You will find that it takes a bit of playing around with the machine until you do get it to operate perfectly, but don't despair—it can certainly be done! In about 2-3 months, we will publish a short follow-up article with answers to specific questions that will undoubtedly arise when the bulk of the readers complete their conversions. In the interim, we will attempt to explain the operation of the machine at this time so that impatient, knowledgeable amateurs with problems can solve them immediately.

### Circuit Description

Figure 1 is a schematic of the complete machine. In the receive mode, the received FAX signal is fed to the input line transformer and to the top of the 500K receiving gain control. Also by means of the IN-

*5 Melville Lane, Great Neck, N.Y. 11023.

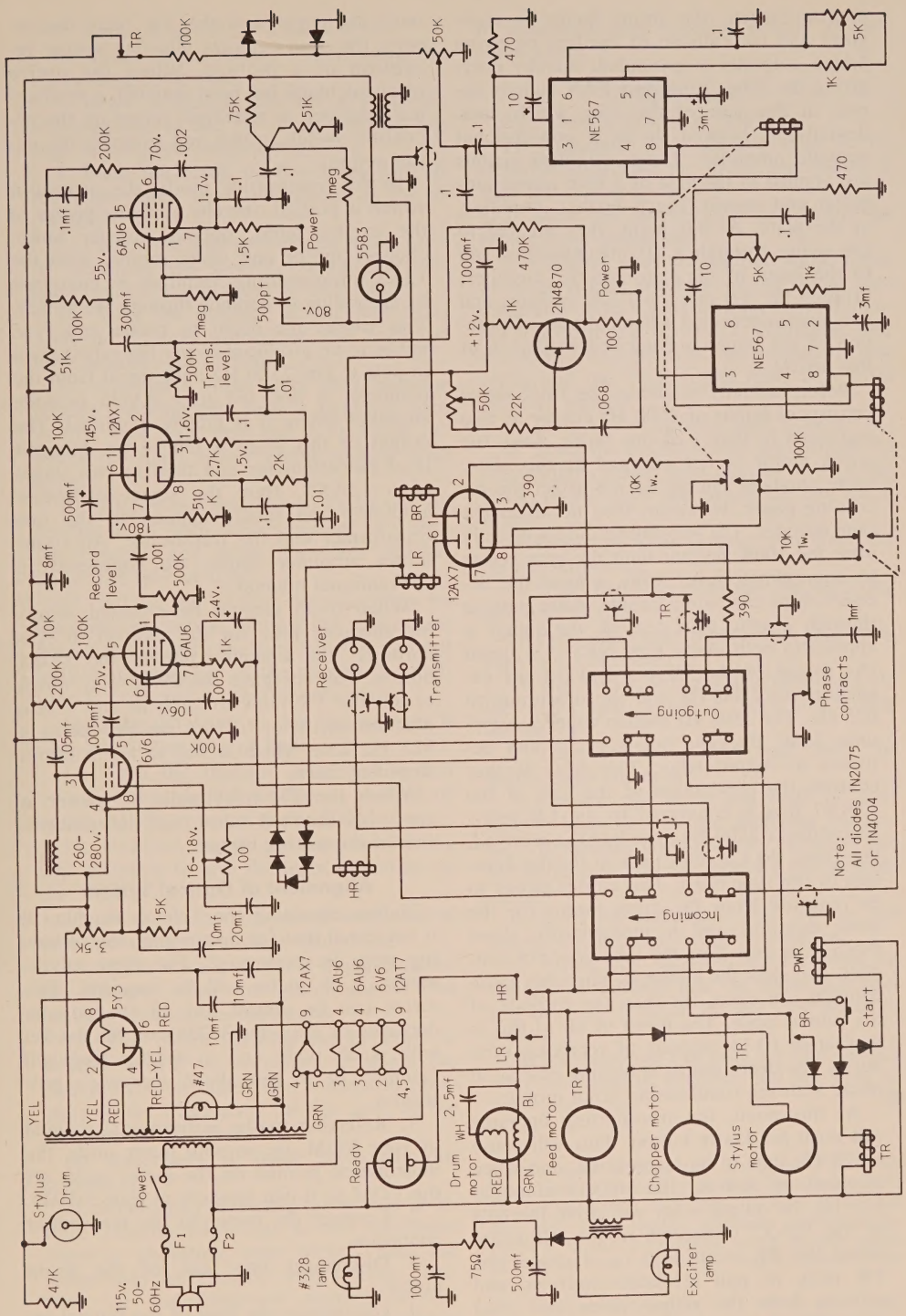



Fig. 1—Schematic of completed Telefax machine.

COMING switch, the drum motor is energized and the cathode of the first receiving 6AU6 amplifier is grounded, thereby energizing the tube. Amplified FAX signals appear at the plate of this tube which, incidentally, is hooked up as a conventional pentode amplifier. These amplified signals are applied to the grid of a 6V6 power amplifier and appear, much further amplified, at the plate. At this point, they are fed to the stylus, through a .05 mf capacitor, and to the input of the sync decoder circuitry, through the TR relay, a 100K resistor, and two cross-connected silicon diodes. Operation of the paper is described in Part 1 of this article.

Before actually receiving, the FAX signal consists of bursts of 2500 Hz energy as also explained in Part 1 of this series. Since the stylus motor is not engaged at this time, these bursts of energy do not affect the recording paper. However, they do affect the sync decoder. The two silicon diodes directly after the 100K resistor limit the sync bursts to approximately 0.7 volts, a level the decoder chips can safely handle. After passing through a sync gain control, the signal is applied to both chips. One NE567 is tuned (by means of the 5K pot and 0.1 mf capacitor) to 2500 Hz and the other one to 625 Hz. The 2500 Hz section triggers everytime 2500 Hz sync bursts occur and activates its output relay. This relay further controls the conduction of the half of the 12AX7 that is connected to the LR relay. Everytime a 2500 Hz sync burst is received, therefore, the LR relay pulls in for the duration of the sync burst. This causes power to be removed from the drum motor for the same duration and it momentarily slows down. The only time the tube does not conduct, and slow the motor, is when the phase contacts are open, for then the cathode of the tube is open. The result of all of this is that after 10-15 seconds of receiving sync bursts, the drum motor is turning exactly in phase with the transmitting drum motor.

At this point, the transmitting operator will push his START button. This will cause a 625 Hz tone to be transmitted, and when received, to activate the NE567 tuned to 625 Hz. Its output relay will drive the half of the 12AX7 connected to the BR relay. When the BR relay pulls in, it causes the TR relay to pull in, latch itself in, and activate both the stylus motor and feed motor. Now the stylus moves to contact the receiving paper and the TR relay disconnects the sync circuitry allowing proper reception of a picture. When the entire receiving blank has been scanned, a mechanical interlock is activated, returning the INCOMING switch to OFF and stopping the entire action.

In the transmitting mode, the OUTGOING switch is pushed, thereby applying power to the exciter lamp, optical inverter lamp, chopper motor and drum motor. Also the 12AX7 transmitting amplifier is energized by grounding its cathode through the switch. This causes the drum to rotate and sync pulses to be produced as per the explanation in part 1. The 2500 Hz light signal from the photocell is first fed to a 6AU6 pentode amplifier where it is greatly amplified. The output of this stage is fed to the transmit level potentiometer and then to two stages of a 12AX7. Here the signal is further amplified and finally applied to the line transformer and the transmitter. All transmitter amplifier stages are connected in conventional manner.

When 10-15 seconds have passed, allowing adequate time for the receiver to synchronize, the operator presses the START button. This energizes the PWR relay which causes the TR relay to latch in and a unijunction oscillator to turn on, producing a 625 Hz tone which is fed to the transmit amplifier chain.

When the TR relay pulls in, power is applied to the feed motor, and the transmission of the picture begins.

### Alignment of Optical System

Before operating the Telefax machine ti is suggested that for best results, the following steps be performed. For these adjustments, a db meter will be required. This meter can be almost any of the popular domestic or imported VOM's on the market with a db scale and a suitable one will certainly be in just about everyone's possession.

1. Referring to the instructional manual of your VOM, or, as with many units, the information printed on the meter scale, set the VOM so it can measure at least ±10db.

2. Connect the meter to the transmitter connector.

3. Disconnect one lead of the drum motor.

4. Disconnect one lead of the optical inverter lamp if you are using this device.

5. Turn on power.

6. Press the OUTGOING button when the ready lamp comes on.

7. Draw a pencil line on a receiving blank parallel to and 9/16" away from the top edge of the paper (horizontal).

8. Place the blank on the drum with its top edge under the drum flange as far as possible.

9. Center the light spot on the pencil line by loosening the screws, holding the lens band bracket and moving the lens band.

10. Vary the distance of the lens band until the position is obtained that gives the most intense spot of light.

11. Cut out a small piece of a halftone picture (photograph) from a magazine such as *CQ*. This piece only has to be about ½" square so don't worry about ruining your copy.

12. Attach the halftone piece to the receiving blank with rubber cement or a similar product and align the piece directly under the spot of light.

13. Adjust the pickup lens assembly by loosening the screws holding the pickup lens barrel and moving the lens band in and out until a sharp image of the dots in the halftone is projected on the pinhole plate.

14. Turn the drum so that the halftone is now out of the spot of light.

15. Turn the transmit level pot to full output which should produce a reading of about +10db or more on the VOM.

16. Readjust slightly the lamp condensing lens assembly to give the highest reading on the VOM.

17. Now reduce the transmit level control until a reading of +5db is reached.

18. Place a piece of heavy paper between the chopper wheel and phototube so that no light reaches the phototube.

19. The meter reading should drop to infinity. It will be necessary to shield the phototube from other light sources in proximity to the transceiver for this step, or the reading will be affected.

20. Reconnect all leads previously disconnected.

If problems in obtaining the proper levels were encountered, it may be that the lenses, lamp or phototube were dirty. These elements may be cleaned with a clean, lint-free rag and isopropyl alcohol or any standard lens cleaning agent. Just be sure to handle all glass components carefully and to reassemble lens elements exactly as they came apart.

## Operation

Operation is simply as follows:

**To Transmit:** 1. Wrap the copy to be transmitted around the drum and secure it with the sliding spring.

2. Turn on power and wait until the Ready lamp comes on.

3. Connect your transmitter audio input or other telefax machine to the transmitter connector using a suitable impedance matching transformer if necessary. Remember that the output impedance of the machine is 600 ohms and the FAX signal itself is a 2500 Hz a.m. signal.

4. Press the OUTGOING push button.

5. Press the START button and adjust the transmitter's audio gain control so that the FAX signal does not overdrive the transmitter.

6. Press the STOP button and then the OUTGOING button.

7. Wait 10-15 seconds for the receiving machine to sync.

8. Press the START button and your message is on the way.

**To Receive:** 1. Wrap a receiving blank on the drum and secure it with the sliding spring.

2. Turn on power and wait until the Ready lamp comes on.

3. Connect the voice coil leads of your receiver's speaker to the receiving connector. The speaker should be left connected into the hookup so you can monitor the received signal.

4. Press the INCOMING push button and receive the message being transmitted.

5. Adjust the receiving level control on the telefax machine and the audio gain control of your receiver for the best received picture.

At this point we can only say best of luck with your telefax machine and we hope to "see" everyone. ■

NOTE: Since starting this series of articles we have been informed by K & R Electronics, 251 Hicksville Road, Bethpage, N.Y. 11714, that they will have telefax machines converted according to the instructions given in this series of articles. Any interested people should write to them for particulars.

An additional supplier of *unconverted* machines is Newsome Electronics, P.O. Box 176C, Trenton, Miss. 48183.

# F. M.

BY GLEN E. ZOOK,* K9STH5/5

## High Power

FM operators may have noticed the recent Editorials by Dick Ross, K2MGA, about super power on the lower amateur frequencies. These comments dealt with power levels in excess of the 1000 watt input limit imposed by FCC regulations. But, the same regulations state that only the necessary power to maintain communications shall be used by amateur stations. Often this power level is only a matter of a watt or two, especially when short distances are to be covered. Although the "super power" craze has not yet invaded the f.m. ranks to any noticable extent, use of the "quarter kw" and similar "legal" power level equipment is becoming more and more apparent. In some cases the use of higher power levels is justified, especially when trying to work great distances (like on 146.520 mHz). However, the times when 250 or more watts output is needed are relatively rare. When working through most repeaters the 10 watt "rigs" often are quite sufficient from the base station. In the mobile 100 watts output is usually more than adequate, with the 40 watt output level being about an equilization between receiving and transmitting range.

A few f.m.'ers believe that they must have the most powerful signal on the air so that they can tie up the local repeater (and any other repeater on the same channel for quite a radius) anytime they desire. Or, they use this high power on a simplex channel to talk a very few miles, thus making the channel unusable for others many miles away. Such operations are a violation of not only the spirit of the amateur regulations, but of the spirit of amateur radio itself. F.M. has been relatively free of the power wars of 20 meters. 10 watts does fine, 60 watts excellent. There is no need for more power in 99% of v.h.f. f.m. operations. Thus, we need to drop back and make a re-evaluation of the situation. If we are to keep f.m. free of the problems of the lower frequency bands, we must make sensible use of power as well as undertaking great and glorious frequency plans. Think about it.

* 410 Lawndale Drive, Richardson, TX 75080

## Technical Talk

A circuit that is often requested is one that will let the average low powered mobile rig operate from the household a.c. lines. Or, to put it more directly, a regulated d.c. supply. This month's "Technical Talk" is such a regulated supply. The supply will provide enough current to run the average 10 watt output solid-state 2 meter f.m. rig. Although the circuit is quite similar to the one that Motorola uses to run their "Mocom 10" lowband equipment, it has been modified to use commonly available parts. One was built by this columnist to use with a Regency HR-2 which pulls about 2.5 amps on transmit. Although the transformer is rated at 2.0 amps continuous, it worked with no overheating. The only problem encountered was a tendency of the regulator transistor to run a bit warm. However, no heat-sink other than the aluminum mini-box was provided. With a bit more heat-sinking, no overheating should be encountered. To date the original 2N424 is still working.

The transistors used were straight from the junk box. 2N2222's are quite common, but the 2N424 is a bit old. According to the Motorola semi-conductor manual it can be replaced with a 2N3446. The diodes were also from the junk box. However, any 2 amp or more current rated diode at at least 50 volts p.i.v. should work (1N4719 series). The transformer selected was from the "Calectro" series of GC Electronics since many local parts stores and amateur supply stores stock this line. Construction is not critical at all. A mini-box large enough to sit the transceiver on is suggested for convenience.

## For Newcomers Only

Many newcomers to f.m. are oldtimers in amateur radio. Therefore, these individuals often have back issues of the various amateur magazines lying around. Hopefully these back issues also include *CQ*. As an aid to where to find f.m. articles in *CQ*, the following list of articles, reviews, and contents of columns for 1971 and 1972 is provided.

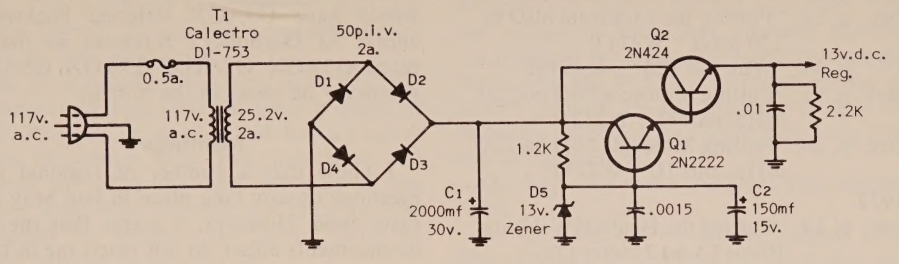



Fig. 1—An a.c. supply for 10 watt solid-state transceivers. All resistors are 1/2 watt.

$C_1$—2000 mf, 30 v. (min.)
$C_2$—150 mf, 15 v. (min.)
$D_{1,2,3,4}$—Min. 50 p.i.v., 2 amp.
$D_5$—13 v. Zener.
$Q_1$—2N2222.
$Q_2$—2N424.
$T_1$—25.2 v.a.c., 2 Amp. Calectro D1-753 or equiv.

This list will be enlarged upon at various times to keep the newcomer abreast of what has happened in *CQ*.

### F.M. Columns

**1971**

Jan. p. 31; General alignment of f.m. equipment.
Feb. p. 28; Basic 2 meter repeater.
Mar. p. 89; Repeater control systems.
Apr. p. 50; Repeater i.d. systems and logging; xtal formulae.
May p. 65; Changing crystal frequencies.
June p. 35; Ross & White Tone Encoder; Texas 450 mHz plan.
July p. 41; Setting up test bench; attenuator pad; Ringo review
Aug. p. 45; Test Bench Cont'd; Club newsletter list.
Sept. p. 43; Universal Control Head; Tone Burst Encoder.
Oct. p. 27; Narrowband Techniques; Motorola test meter.
Nov. p.24; Phase modulator for A.M. gear; "Tips & Tidbits"
Dec. p. 40; Putting Sensicon "A" receiver and "G" Tx on 220 mHz

**1972**

Jan. p. 46; 220 mHz final amplifier; Solid state COR.
Feb. p. 25; Multi-frequency oscillators.
Mar. p. 35; Repeater Directory.
Apr. p. 38; F.M. channel marker generator.
May p. 30; Antenna tips.
June p. 42; problems with imported equipment; Channel marker modifications; Hustler CGT-144 antenna.
July p. 28; cleaning up older equipment; house hunting.
Aug. p. 41; Antenna patterns; FAA regulations and the ham.
Sept. p. 31; 8 frequency transmitter deck for Motorola.
Oct. p. 50; Solid-state 2 meter 30 watt amplifier.
Nov. p. 54; Commentary on Docket 18803.
Dec. p. 33; Tape Recorder control; f.m. detector (i.c.); d.c. source for pre-amps.

### Equipment Reviews

**1971**

Feb. p. 38; Regency HR-2
p. 40; Standard SR-C806MA
Mar. p. 34; Inoue IC-2F
May p. 68; Drake ML-2 "Marker Luxury"
June p. 36; Ross & White Tone Encoder
July p. 31; Simpson Marine Model "A"
p. 41; Cush-Craft AR-2 "Ringo" antenna
Aug. p. 45; Cush-Craft DX-120 colinear antenna
Oct. p. 64; Swan FM-2X
Nov. p. 34; Standard SR-C826M

**1972**

Jan. p. 23; Sonar FM-3601
May p. 25; Inoue IC-21
June p. 37; Ross & White RW BND
p. 46; Hustler CGT-144 antenna
July p. 32; Tempo 1002-3 amplifier
Dec. p. 47 Swan FM1210-A

### Misc.

**1971**

Apr. p. 21; "Tips & Tidbits for; the FM Newcomer"; K9STH

June p. 61; "FM: How to Speak it"; K9STH
Oct. p. 16; "Putting the Motorola 80D on 220 mHz"; W2JTP
p. 34; "Why use FM?"; K9STH
Nov. p. 51; "Putting Motorola 80D on 220 mHz, part II"; W2JTP
Dec. p. 28; "Putting Motorola 80D on 220 mHz, part III"; W2JTP

**1972**

Jan. p. 14; "Putting the Heath HW-17 and HW-17A on 2 meter f.m."; WA2NDM

Using the above lists, it is possible to look at the back issues of *CQ* and see just what has been happening in f.m. over the past few years!

### 220 Receives A Shot In The Arm

Clegg has just announced that it will be making 220 mHz repeaters available in an effort to bring 220 activity into the world of most radio amateurs across the country.

Clegg started delivering its 220 mHz repeaters at the rate of one per week in late May to such areas as Milwaukee, Wisc.; Oakland, Cal.; Peterborough, New Hamp.; Philadelphia, Pa.; Cleveland, Ohio; Boston, Mass. and Long Island, New York.

Although these 220 mHz repeaters are valued at approximately $1,200 each, Clegg is now *leasing* them to amateur radio clubs at a cost of only $25 per month. Each purchase of a Clegg FM-21 220 mHz f.m. transceiver in a respective area reduces the lease price by $1.00 per month for a period of one year.

The repeater is leased complete (except antenna and feed line) with features that include automatic identification, all solid-state, and built-in timers. It operates at 10 to 15 watts, uses a Phelps-Dodge duplexer, and has approximately 0.4$\mu$v sensitivity. It includes an a.c. supply, local mic, and metered signal strength and discriminator.

Clubs are invited to contact Clegg if interested in getting their club into the repeater program. They may write Phil Theis, K3TUF, Clegg Division, 3050 Hempland Road, Lancaster, Pennsylvania 17601, or telephone him at (717) 299-3671 for more information.

### Correction

For some reason, typesetting errors keep creeping in on this columnist's United Kingdom correspondent, Karl Kanalz. Karl's U.K. call is G5AGX, not G4IGX or G5AGK, or some other call. I promised that I would have G5AGX tattooed backwards across Al Dorhoffer's forehead so that it reads G5AGX G5AGX G5AGX G5AGX whenever he looks in the mirror.

### Meetings

I know that a number of regional f.m. meetings usually take place in late May and early June. However, it seems that the announcements either do not reach me in time for column deadlines or not at all. In order for announcements to make the column they must arrive a minimum of three months ahead of the 1st of the month of the activity. Also, it is best to send two announcements, one direct to *CQ* at Port Washington and another to myself. The first is so that the activity makes the hamfest calendar in the front of the magazine and the second is so that the activity makes the column.

### Post Office

Does anyone have a pony so that we can start the "Pony Express" all over again. The mail service is so bad that this columnist does not know when mail is going to make it if at all. For example, my copy of *CQ* is mailed after the normal distribution. However, it is sent by first class mail, taking usually about one week to get from Port Washington to Richardson. Other amateurs in the area who receive their copy by normal channels, get their copies two or even three weeks after my copy arrives! Letters from readers of this column take from three days to two weeks if they arrive at all! Many readers still address letters to the Brentwood Lane house. Although this mail should be forwarded immediately, it does not always happen. Therefore, to insure a reply, please send all inquiries to the Lawndale Drive address at the beginning of this column. Also, S.A.S.E. please!

### Q & A

**Q.** Is diode switching of crystals an effective method of multi-frequencing equipment?

**A.** Yes, but only if quality switching diodes are used. If not, more than one crystal will often operate, producing many spurious signals.

**Q.** Is there a service manual available on the Regency HR-2 series?

**A.** Yes, contact Regency directly. The price on one recently acquired by this columnist was $1.50.

**Q.** Can I convert the older GE and Motorola hy-brid "lunch box" portable equipment to fully solid-state?

**A.** It is possible, but very involved, expensive, and you will still have a piece of gear 20 years or so old, that has a market value of almost zilch. Put your time and money to better use and get one of the newer solid-state commercial units or one designed for amateur use only. You'll be much happier in the long run.

**Q.** Is frequency stability dependent only upon the stability of the crystal.

**A.** Definitely not! Many factors enter into just how stable an oscillator is. They include temperature, tolerances of capacitors and other components, crystal current, layout, and many other factors. Whenever this column has pointed out using high stability crystals in amateur equipment it is assumed that the oscillator circuit is properly designed and will hold the desired tolerance. Since most f.m. gear being sold on the amateur market is an adaptation of equipment designed for Marine Service, it is likely that the oscillators have that inherent stability (as required for type-acceptance for Marine Service by the FCC). Therefore, choice of proper crystals by the amateur is the one thing the individual can do to help keep f.m. rigs on frequency.

**Q.** Airplanes make excellent f.m. shacks, right!

**A.** Go back and re-read the August 1972 FM COLUMN to see how the FAA and airlines feel about this!

### Finale

Inputs have slowed down a bit. Looks like I'm going to have to take the camera out and do some shooting myself just to take up space, hi. All kidding aside, this column relies on information supplied by the readers to keep it going. Hints as to what YOU want to see herein are WANTED. Suggestions, projects, news, and photographs keep FM in *CQ*. Have fun and see you next month.

73, Glen, K9STH/5

# A TTL/DTL Test Probe for $2.00

BY PETE WALTON,* VE3FEZ

HERE is a handy probe for use in troubleshooting DTL and TTL digital integrated circuit projects. If you haven't had too much experience with digital troubleshooting techniques you might ask, "Why use a probe?" Since these circuits are either in the ON state with an output of 0v., why not just use a v.o.m. Well, if you do use a meter for troubleshooting digital applications you can very easily be led up the garden path. Here's why.

Figure 1 represents a hypothetical transmitter control circuit using a TTL AND gate and a TTL OR gate. In this circuit, if transmitter high voltage is present, the bias is on and either modulator 1 or modulator 2 is ready, then all three inputs to the AND gate will be at zero volts. The AND circuit will conduct and the Transmitter Ready light will be on. However, if the lead coming from the OR block were broken at point X then we would not have 0v. on the bottom leg of the AND; it would be floating. Even though all other conditions seem to be met we would not be able to get the Ready light on.

Now out comes our station engineer with his trusty meter to find out why the transmitter won't indicate Ready. He puts his meter on pins A, B, and C of the AND circuit and finds that they are all at zero volts. Even though the bottom leg is disconnected due to a broken connection it will still read zero volts on the meter and the poor fellow will end up scratching his head and saying unkind things about the manufacturer. Now you can see why we can't trust a meter in trouble-shooting digital circuits.

The TTL/DTL test probe described here, on the other hand, will indicate whether a circuit or input is at the zero or plus level, or if the circuit is open. Power for the

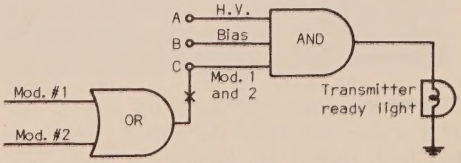



Fig. 1—Hypothetical digital control circuit.

* 421 Lodor Street, Ancaster, Ontario, Canada.

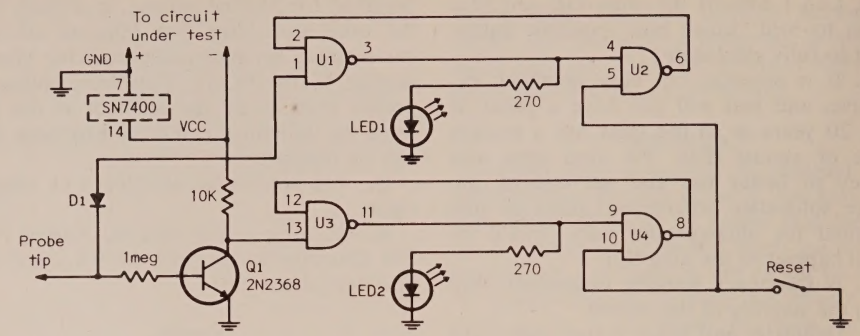



Fig. 2—Circuit of the $2.00 TTL/DTL test probe. $U_1$-$U_4$ is a single Signetics SN7400 quad NAND gate, or equal. Circuit is constructed on a small piece of perf board within a plastic cigar tube. A discarded test probe tip is mounted at one end of the tube, while a momentary contact normally open push button switch is located at the opposite end for Reset. Two flexible test leads fitted with alligator clips are run through a hole in the side to provide power connections.

probe's logic circuitry is taken from the circuit under test through two flexible test leads. Touching the probe tip to a circuit or input will cause either of two LEDs in the probe to be energized indicating that either a zero (0 v.) or plus (5 v.) state exists in that circuit. An open circuit will be indicated by neither LED lighting. A push button switch at one end of the probe resets the probe logic circuitry to its "ready" state for the next test. The probe will also respond to pulses of more than about 10 ns, in addition to fixed levels. A pulse of this short duration could never be seen on a meter.

The fact that the LED lights and stays lit until the reset button is pressed is also handy as a trouble-shooting aid. Its use is what is called "baby sitting" in digital trouble-shooting techniques. For example, suppose you suspect that a certain flip flop or gate is being turned on intermittently by a noise pulse. The only way to prove this is to hook the meter up to the output of the flip flop or gate and then sit and watch it to see if the circuit is being turned on. Not everyone has the time to sit and watch a meter for hours on end to see if a circuit is being turned on or not. And even if you do have the time you might miss it because it could happen so fast. This is where the babysitting feature comes in handy. Just hook the probe up to the output of the circuit and go away as long as you want. When you come back look at the probe and see if the light is on. If it is then you know the circuit under test has been turned on. Hence the probe has been babysitting for you.

Enough about what it does, now how does it do it? Referring to fig. 4, if you touch the probe tip to a plus five volt level the plus five volts will be applied to the base of transistor $Q_1$ causing it to conduct. When $Q_1$ is conducting, its collector will be at or very close to zero volts. This zero volts is applied to pin 13 of NAND circuit $U_3$. Pin 12 of $U_3$ also has zero volts applied to it because $U_4$ has not been turned on yet. Since $U_3$ is a NAND circuit and both inputs are now at zero volts it will conduct. When $U_3$ conducts the output will go high or plus. The plus potential is applied to $LED_2$ and the Plus light on the probe will now be turned on. The plus five volts applied to the probe tip cannot get to pin 1 of $U_1$ because of diode $D_1$; therefore, the Minus light cannot be turned on with a positive input.

Now touch the probe tip to zero volts. This minus level is applied to pin 1 of $U_1$ through the diode. This causes the minus NAND circuit to be turned on in the same manner as the plus circuit. To reset, Push the Reset button causing pins 5 and 10 to be grounded. Any time you ground the input pin of a TTL NAND gate it will cause the output to go plus. This plus is then fed back to the input pins on the NANDs, causing them to be deconditioned and the lights to be turned out.

### Construction

This is very simple and should not take

[*Continued on page 78*]

# Slow Scan TV

BY COPTHORNE MACDONALD,* W1GNQ/ϕ

SOMEONE quipped that the Saturday Slow-Scan net probably wouldn't meet that day. I don't know whether it did or not because I was in Dayton too, along with the three net control stations (K7MOV, W9NTP, and W1JKF) and perhaps a hundred other SSTV enthusiasts. Don Miller ventured that by noon on that April 28th, when the Amateur TV Forum ended, slow-scan would not be the same. I had to agree. Bob Suding, W0LMD, was scheduled to give us his predictions on SSTV technical developments during the next two years, but unfortunately was tied up with his doctorial exam and couldn't make it.

Mike Tallant, W6MXV, gave us more than a glimpse of this future, however, in a talk about the new fast-scan to slow-scan converter that he designed. Mike's converter takes the video output of a standard *unmodified* fast-scan vidicon camera (4:3 aspect ratio, horizontal scan and all) and converts it into a 128 line, 1:1 aspect ratio, 8 second scan, amateur slow-scan picture! First, the unit takes the fast-scan video signal and converts it, in a fast A to D converter, into a 5 bit digitally coded signal. This means that for each picture element there are 5 bits describing the grey level of that element. Since $2^5 = 32$, the system can differentiate between 32 different grey levels—enough to eliminate contouring, the "paint by numbers" effect. The "Magic" is supplied by two digital shift registers, each capable of storing 1280 bits, representing the 256 picture elements in one line of the fast scan picture. It works like this. Line 1 of the fast-scan picture is converted to digital bits and stored in the first shift register. (This takes only 63 microseconds.) Three-fourths of this information is "clocked out" of the shift register during a 1/15 second period, and it is converted back to an analog signal in a D to A converter. This analog signal is the video for line one of the slow-scan picture. (Only 3/4 of the original line is used, in order to make the conversion from 3:4 to 1:1 aspect ratio.) The second shift register stores line 3 of the same fast-scan field that line 1 was taken from. This becomes the second line in the slow-scan frame. By automatically switching "clock-in" and "clock-out" back and forth between the two shift registers, alternate lines of the fast-scan field are converted to slow-scan lines without a break in the continuity of the slow-scan output signal. Mike plans to make boards and details available in the near future. He estimated the total cost of the I.C.'s at $150 to $200.

The general feeling in Dayton was that the sophisticated SSTV gear of the future will be heavily digital. Digital because of the rapid drop in the cost of digital storage devices. When we can afford enough storage to store two frames instead of two lines, it will be possible to convert from slow-scan



Mike Tallant, W6MXV, holding the signal processing boards for his digital fast-scan to slow-scan converter. His project won first prize in the SSTV homebrew contest at Dayton.

* P.O. Box 483, Rochester, Minn. 55901

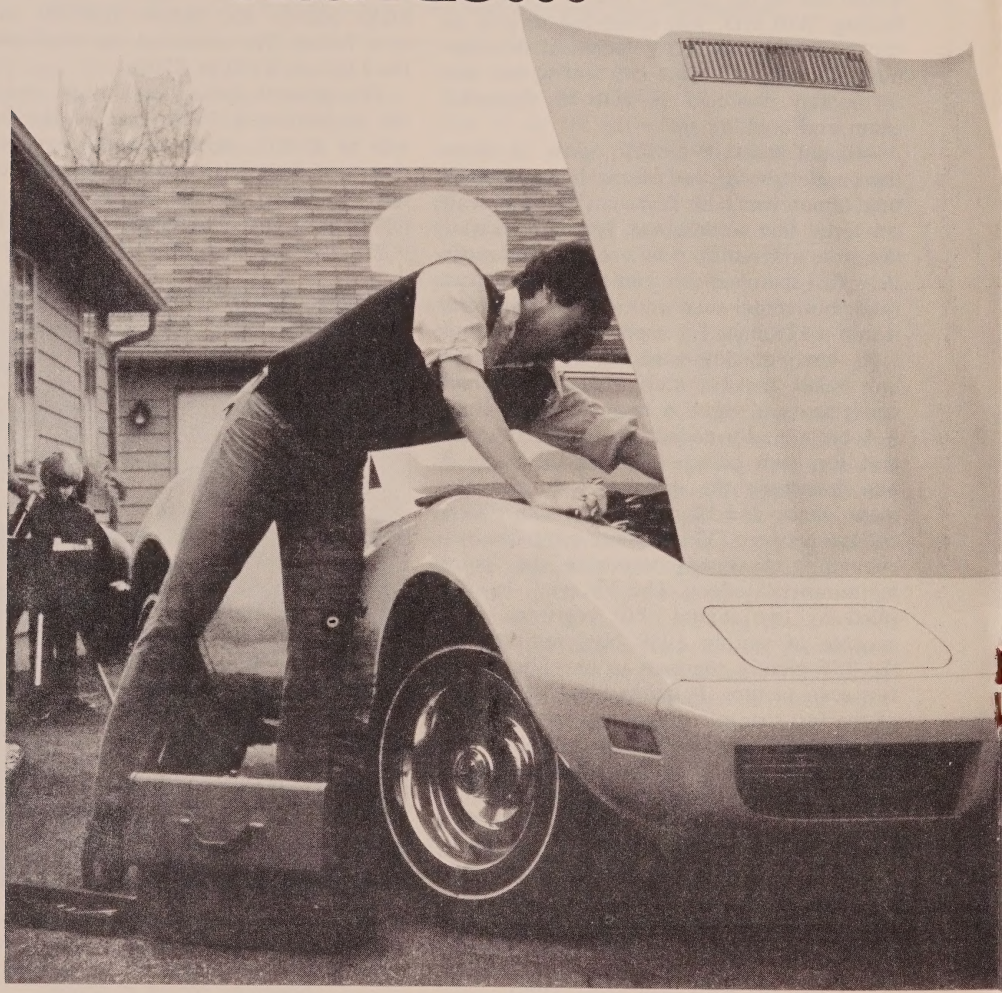
# If you like to work with your hands...

...you're a special breed. Always taking things apart to find out how they work. Always wanting to know why they work the way they do. The kind of guy who uses his head and his hands.

If that sounds like you, you've got a head start on an exciting future. You already have skills you could turn into a profitable career in two-way radio electronics communications.

And this Bell & Howell Schools learn-at-home program can give you the know-how you need to make it happen.

Get the facts.
Mail the postage-free card now!



You're a pretty lucky guy. You know what you like to do in your spare time. How would you like being able to do it *all* the time – in a rewarding new career or maybe even a business of your own?

This unique Bell & Howell Schools learn-at-home program in two-way radio electronics communications will give you the "tools" you need to have the career you want – thorough knowledge of electronics, plus "hands on" experience with $1,500.00 worth of commercial-grade equipment.

You'll need *both* to take full advantage of growing opportunities in two-way radio electronics communications. Two-way radio communications is a vital growth area in the electronics industry.

And it's lucrative. Almost two million commercial two-way radio systems now serve as vital communications links for trucks, planes, boats and taxis. The FCC requires each system to have its equipment serviced regularly by a licensed technician.

That adds up to at least two million service calls a year for licensed technicians. Maybe *you*. But you need career-oriented training – and that's where we come in.

**FCC Regulations are your key to a rewarding new career . . . or a profitable business of your own!**

It's almost like having a ready-made market for your skills. As a Bell & Howell Schools graduate, you'll have the technical know-how you need to take advantage of it.

With your FCC license, you could eventually build your own business, or work for a top corporation that needs full-time on-the-spot troubleshooters and licensed technicians for its massive two-way communications system.

Or service equipment in your spare time for extra cash. FCC regulations could mean security and regular income for you!

**But first you'll need practical, career-oriented training.**

To get ready for your new career in two-way radio, you need: 1) Career-oriented training; 2) FCC License; 3) "Hands on" experience with commercial-grade equipment. Bell & Howell Schools now offers this unique at-home training program that helps you get all three. (See FCC License Warranty on attached card.)

You're probably already skilled with the tools you'll use in your new career. Bell & Howell Schools provides the theory and practical know-how you'll need.

You build your knowledge one step at a time. And you practice your new skills in experiments you perform in your own home – with Bell & Howell Schools exclusive Electro-Lab® electronics training system!

**NEW! With your first lesson you get . . .**

. . . the brand-new Laboratory Starter Kit! A volt-ohm-meter (VOM) with design panels, modular connectors, experimental parts, battery power source. Gives you "hands on" experience with your very first lesson.

**You also build the improved Bell & Howell Schools Electro-Lab® electronics training system . . .**

. . . Gives you troubleshooting experience with precision instruments you assemble and use in your new career:

**Design Console**
"Breadboard" circuits without soldering for both solid state and vacuum tube experiments.

**Oscilloscope**
Professional technician's diagnostic instrument.

**Transistorized Voltmeter**
Measures current, voltage, and resistance.

**Put your new skills to work on the real thing – $1,500.00 worth of commercial-grade equipment!**

When you're servicing two-way radio systems for aircraft or advising trucking companies about their mobile communications system, you'll need troubleshooting experience with the real McCoy. This unique new Bell & Howell Schools learn-at-home program includes "firing line" experience with professional, commercial-grade equipment.

You can work with the equipment by attending one of our special "help sessions" or by dropping by one of the Bell & Howell resident schools. If neither of these plans is convenient, you can have the equipment shipped to your home in return for a $100 deposit, which is refundable when you return it.

**This is the equipment you'll work with during your Bell & Howell Schools training program!**

*Commercial-Band FM Transceiver* . . . exactly the kind of two-way radio you'll be servicing in your new career.

*Deviation Meter* . . . model favored by many working technicians to check modulation of transmitted signal.

*Frequency Meter* . . . highly sensitive instrument used to check signal frequency within precise tolerances established by government standards.

*Power Output Meter* . . . meter used almost universally by trained and licensed technicians to check power output – or wattage – of signal.

*Alignment Generator* . . . a custom-designed unit you use to generate test signals for transceiver alignment.

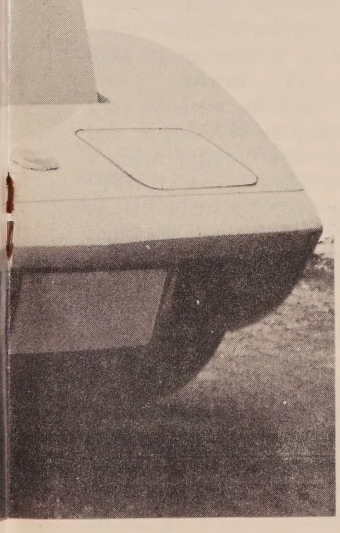
**Bell & Howell Schools offers you these special advantages:**

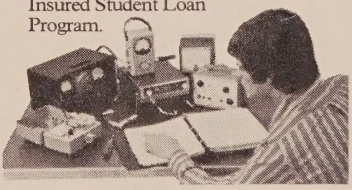
*Help Sessions* Scheduled regularly at the Bell & Howell Schools and in many other cities throughout the U.S. and Canada.

*National Career Placement Center* Helps you locate a job that fits your background and interests any time after you complete your program.

*Veterans' Benefits* We are approved by the state approval agency for Veterans' Benefits.

*Student Financial Aid* We are an eligible institution under the Federally Insured Student Loan Program.

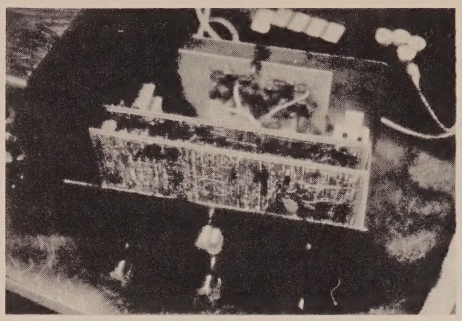




**Mail the postage-free card today!**

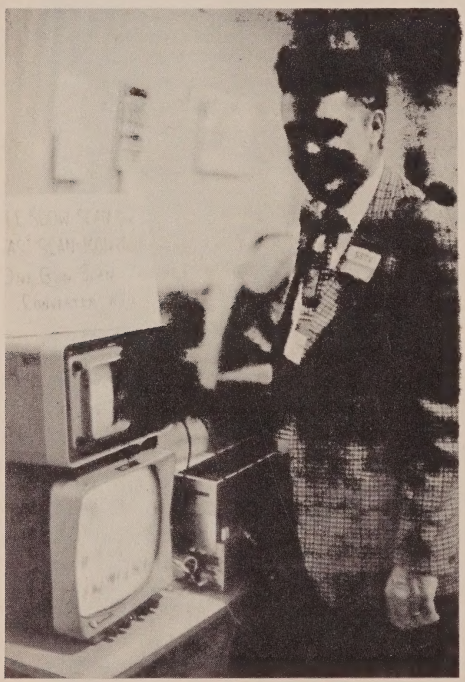
If card has been removed, write:
*An Electronics Home Study School* 507A
DeVRY INSTITUTE OF TECHNOLOGY
ONE OF THE
BELL & HOWELL SCHOOLS
4141 Belmont, Chicago, Illinois 60641

"Electro-Lab" is a registered trademark of the Bell & Howell Company.



A view of the W6MXV scan converter with the boards in place.

to fast scan with constant brightness pictures, switching instantly from one slow-scan frame to the next. When the cost drops even further, color SSTV with a CRT display will be practical. One frame of storage would let us build a stop-motion version of Mike's converter. Memory costs are now approaching a tenth of a cent per bit, and still falling, so it shouldn't be too long before boxes that convert freely back and forth between fast and slow-scan are economically practical. Mike's fast-to-slow converter is a most welcome "first" that makes us realize that some of these things we'd like to do are economically practical today.



Don C. Miller, W9NTP, displaying the slow-to-fast storage tube scan-converter that won second prize in the homebrew contest.

### Homebrew Contest

Mike's converter won first prize in the homebrew contest. Tapes of the converter output produced excellent pictures, but unfortunately, one of the boards was damaged in transit to the show, so we didn't get an on-the-spot demonstration. (With over 60 I.C.'s in the unit, damaged wires are not only easy to come by, but hard to find!)

Second and third prizes went to SSTV pioneers, and co-authors of the very informative *Slow-Scan Television Handbook*: Don C. Miller, W9NTP, and Ralph Taggert, WB8DQT. Don's project was a slow-scan to fast-scan scan-converter using the Thomson-CSF TME 1238 single gun storage tube. This tube is similar in principle to the Princeton Products *Lithocon* tube, and RCA's *Alphecon,* in that it permits one frame of slow-scan information to be written on the target, and then read-off non-destructively over a period of several minutes into a fast-scan TV monitor.

Ralph Taggert's project was a solid state triggered-sweep monitor using standard components. To assist those who would like to build the monitor, he is making available a glass-epoxy etched circuit board, schematic, parts layout, and instructions for $9.95. The same package with the board wired and tested is $99.95 (His address is 4515 Oakwood Dr., Okemos, Mich. 48864). Ralph said that *his* particular thrust these days is simple, reliable equipment to help people get started in SSTV. Bravo!

Other interesting projects were a very nicely packaged monitor by WA9MFF, and a direct view storage tube monitor using a Hughes *Tonotron* by Him Hicks, K4JPE. Other speakers were W9NTP—who talked about fast scan techniques, and W4TB—who described his "Trix Box" special effects generator. I spoke about using our hardware as a tool for serious interpersonal communication (See "SSTV: Toy or Tool?", page 5, this issue).

### Calling and Working Frequencies

Ralph Taggert moderated a panel that fielded questions from the group attending the ATV forum. Among the matters discussed was the choice of SSTV operating

frequencies. Several points were brought out. Congestion on 14230 is extreme. Slow-scanners are QRMing other slow-scanners, and even the Saturday SSTV net. It is almost as though some slow-scanners feel that they must operate only on that one frequency. This, of course, is not so. There was general agreement that 14230, and the gathering spots in other bands, should be used only as calling frequencies, and that once having made contact, SSTVers should move off the calling frequency to carry on QSOs. Twenty meters has special problems, 14230 was selected long ago when there were other limits to the SSTV portion of the band. In Dayton there was a concensus that it would be best for SSTVers, as well as DXers, if we moved the SSTV operations up the band, preferably above 14250. The problem is that 14230 has been well publicized, and is difficult to abandon overnight.

Ralph pointed out that 40 meters will be carrying more SSTV as the sunspot cycle approaches its minimum. The present calling frequency of 7220 kHz is very poorly located for evening operation because of the European broadcast and jamming stations in that part of the band. He suggested a new calling frequency of 7171 kHz (easy to remember) and it was enthusiastically endorsed by the group. Table 1 is a summary of what I understand to be the desires of the majority of slow-scanners in the matter of operating frequencies. It reflects not only the expression of the group at Dayton, but also of letters I have received from both slow-scanners and DXers. Let's give it a try and review the situation at Dayton next year.

### New Nets

A few months ago I threw out the idea of an ISB net in which individuals would prepare SSTV programs to be transmitted via simultaneous voice and SSTV to the others in the group. Bob Gervevack, W7FEN, has suggested, as a first step, that we schedule an ISB get together Saturdays on 20 meters. His idea is to schedule it to overlap the time of the regular SSTV net somewhat, so that those around for the regular net could get a taste of ISB operation. Let's try this out in September.

Now in the final planning stages, and hopefully ready-to-go in September, is the New Directions Roundtable. It will be a gathering place for those of us trying to



Ralph Taggart, WB8DQT, adjusting his solid-state monitor that won third prize.

make positive changes in our own lives and in the world around us. We will deal with goals and values and life choices. We'll explore new vocations, and world problems, and possible solutions. We will, as FCC Commissioner Nicholas Johnson put it, "share with each other such incomplete and imperfect insights as we've evolved." For resources we'll bring in non-hams having something worthwhile to say, on tape or in person. We'll go into our own personal experiences and philosophies. And we'll do reviews and summaries of books and magazine articles we want to share. Slow-scan will be used when and where it adds to communications effectiveness, but voice-only people will feel at home too. What we're working toward is a forum that breaks geographic barriers; a forum where forward

**Table I—SSTV Operating Frequencies**

| *Calling Freq.* | *Suggested Working Freq. Ground rules* |
|---|---|
| 3845 (kHz) | Expand operations up and down from 3845, preferably up the band. |
| 7171 | Expand operations up and down from 7171 as necessary to avoid foreign broadcast stations. |
| 14230 | Expand operations *up* the band only, preferably above 14250. Expand operations up and down from 21340. |
| 28680 | Expand operations up and down from 28680. |

Table 1—Revised slow-scan calling frequencies, and suggested ground rules for selecting a working frequency.




A view of the P.C. board for Ralph's monitor. See text for info on availability.

looking people can share ideas, even if living far away from each other. Check the September column for time and frequency specifics, or drop me a line.

### Flying-Spot Scanner Optics Transparencies In Contact With The CRT

SSTV takes us into some unfamiliar technical areas. Optics is one of them. If you are a photography bug you've got a head start, but even if you're not, it isn't hard to learn enough basic optics to tackle a homebrew project like an FSS. The simplest optical system is shown in fig. 1. The idea is to avoid the necessity of using a lens by placing a transparency directly on the face of the CRT. It works (and works very well) if a few basic requirements are met. First, the

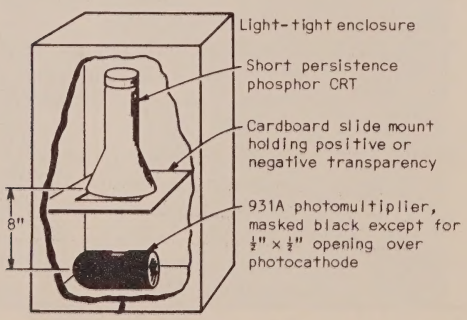



Fig. 1—Simplest form of flying-spot scanner optical system, where a transparency is placed directly against the CRT faceplate.

CRT spot size must be small enough for the transparency size used. Ideally, the spot diameter should be 1/120 of the transparency height, or less. With a 3" electrostatic tube such as the 3RP7 or 3RP11 it is possible to achieve a spot size of .015 inch or less. A 3" tube lends itself well to a 2" × 2" raster. If we divide 2" by 120 we get .0167 inches, so the 3RP-tube meets our spot size requirement for a 2" raster. Two inches is also a fortunate size photographically. Type 120 and 620 film produces 2¼" × 2¼" negatives, giving just enough border to tape the negative, or the positive transparency to a homemade cardboard 3" × 5" frame. (This size film, incidentally, fits both exotic cameras like the Hasselblad and Rollei, and antique Kodak folding and box cameras.)

What happens if we try to put a 35mm transparency up against a 3" CRT? It depends on what the CRT spot diameter really is. The 35mm picture height is about 15/16 inch. We would have to shrink our raster down to this size, and unless the spot diameter is .008" or less, the raster lines would overlap each other, and the resolution would be less than optimum. If 35mm is your medium and you're looking for a fast way to get on the air, I'd give it a try. For serious 35mm work, however, consider getting some lenses into the act. More on that later.

What if you're using a 5" or larger CRT? You will either have to shrink the raster down to 2" × 2", or use a larger transparency. If you shrink the raster, you may lose resolution due to excessive spot size, depending upon the particular CRT. If you keep the raster large, you'll have to borrow someone's 4" × 5" press camera, or have a photographer friend make you some 4" × 5" positive transparencies using his enlarger and a slow speed 4" × 5" film. Of course, with any size CRT, you can make hand drawn, or dry transfer lettered, acetate transparencies. You could even write with a black china marking pencil right on the CRT face, for instant line drawings and written messages.

Whatever sized transparency is used, it should be placed in direct contact with the glass faceplate. This is to reduce parallax and minimize the loss of resolution that parallax causes. Photomultiplier placement is a compromise. If it is placed close to the

[*Continued on page 78*]

# SBE

# SCAN-VISION

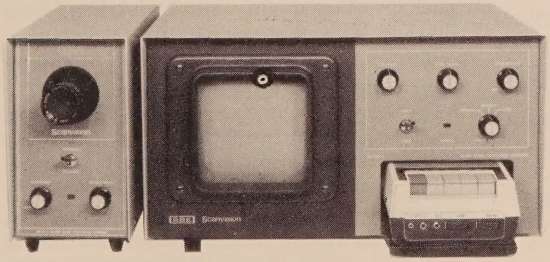
Now—unexcelled picture performance with exclusive-feature equipment of highest quality in which the most advanced SSTV techniques are expertly applied—**SBE Scanvision.** Here, carefully considered design has simplified operation to the point where the non-engineer radio amateur can have his **SBE Scanvision** monitor connected and start enjoying slow scan in just a matter of minutes.

Most of the many hundreds of SS TV'ers now active on the air agree that the full excitement and enjoyment of SSTV can best be realized only when a tape recorder is part of the system. Incoming pics are taped for future viewing on SS monitor—pre-taped pictures, scenes, I-D—can be transmitted. So—exclusive!—every **SBE Scanvision monitor has a cassette-type tape recorder built-in**—wired—ready to go and selectable with panel switch. Here is the ultimate in convenience.

**SBE Scanvision** is conservative—reliable, with picture-proved circuitry and is all solid-state except for the scope tube in the monitor and the videocon picture pickup tube, heart of the SB-1CTV camera. Both tubes are standard types with predictable characteristics—not surplus.

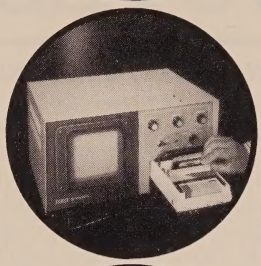
High quality is everywhere evident—throughout, the to-be-expected **SBE approach**—fastidious— professional. The **SBE Scanvision,** SB-1MTV Monitor, complete with casette recorder and SB-1CTV Camera with f/1.9, 25mm lens, connect with patch cable to comprise a **system.** Units are also separately available.

**SEE SCANVISION AT YOUR SBE DEALER**

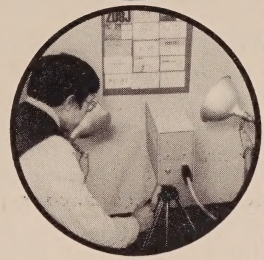




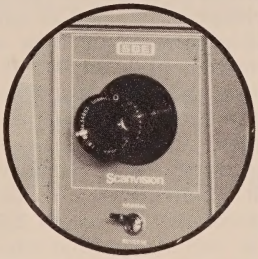

Fully meets all accepted SSTV standards. Compatible.



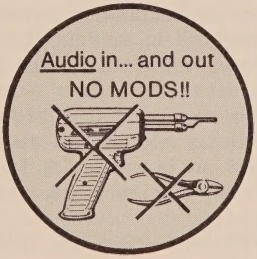
**Exclusive!** Built-in, casette-type recorder. Ready Instantly



Available—camera with high quality videocon for "live" or "still" pics.



Camera is supplied with quality f/1.9, 25 mm lens. No extra charge.




Monitor connects to spkr or phones for receive—to mic input for transmit.



"Live" SSTV pic photographed from monitor. Unretouched.

**SBE**

**LINEAR SYSTEMS, INC.**
220 Airport Blvd.
Watsonville,
CA 95076.

# MATH'S NOTES

BY IRWIN MATH,* WA2NDM

ONE of the more interesting devices to come along is the light emitting diode or LED as it is usually referred to. This device is a specially fabricated semiconductor diode with the unique ability of producing visible (or infrared) radiation when suitably forward biased.

Because the LED is a semiconductor, it has many of the desirable features of one. It is rugged, small, operates on small amounts of current, and has an extremely long life. These features make it a strong contender as a replacement for the miniature incandescent lamps so widely used as indicators today.

Light Emitting Diodes are made of compounds consisting principally of gallium, arsenic, and phosphorus as well as other substances. The percentage of each element determines the color of the LED, and at present, red, yellow, and green devices are available commercially. In an attempt to replace the incandescent lamp, packages other than the one shown in fig. 1 have been developed. These consist of units that look like and interchange mechanically with the T1 3/4 miniature lamp as well as ones that interchange with the somewhat less familiar cartridge type lamps. As time goes on, no doubt LED's will also be produced in the other, more familiar lamp styles.

Fig. 1 is a drawing of a typical LED as supplied by Hewlett Packard. This device produces red light and only cost 55¢ for lots of 1-99, 37¢ for 100-999 and 33¢ for 1000 and up. Incidentally, for all of you large users, 100,000 pieces will cost 17¢ each! The Hewlett Packard part number is 5082-4850/4484 and the devices are in stock at HP distributors.

*5 Melville Lane, Great Neck, N.Y. 11023.

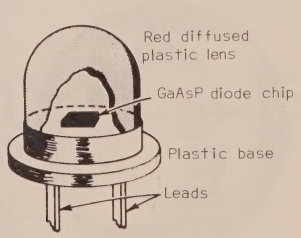



Fig. 1—A typical LED package.

In fig. 2 we show how to hook up a typical LED. The value of the dropping resistor is a function of the voltage available, current required by the LED, and operating voltage of the LED. All of the LED parameters are available from their data sheets and you should obtain the one pertaining to the LED you plan to use.

We have received two items that we would like to comment on at this time. The first of these is *Catalog* #73 of G & G Radio Electronics Co., 45-47 Warren Street, New York, N.Y. 10007. These people, in business since 1920, have a 24 page catalog with a host of reasonably priced government surplus items that should make any experimenter quite happy. All of the old standbys from ARC-5's to SCR-522's to LM's etc., are there as are many accessories for these. Some of G & G's more interesting items are a M'Elroy Automatic Keyer for code practice ($9.50), a *complete* APN-9 or APN-4 LORAN system (great for you yachtsmen) in new condition for $59.50, and a bunch of 3 and 5 inch CRT's, all new, for prices ranging from $1.95 to $4.50 each. Write to them at the above address for a catalog.

Remember that great breadboard being offered by El Instruments, 61 First Street, Derby, Conn. 06418? Well, they now have a few accessories to make using their breadboard even easier. The BP-24 pin is a solderless reusable adapter that allows the use of leads up to #16 gauge in the breadboard. This means that you can now use electrolytics, 1 and 2 watt resistors, and other similar items without deforming your breadboard. The BP-24's are $8.95 per 100 pieces. Also available (for the lazy ones) is a set of 160 pre-cut #22 black and red jumpers in lengths of 1" to 12". Cost for these is $4.95 for the package. You might write to El for details on these as well as the SK-10 breadboard.

On the semiconductor scene this month we have several interesting offerings.

First of these is a new group of low cost dual N channel insulated gate MOS FETs from Texas Instruments, 13500 N. Central Expressway, Dallas, Texas 75222. These devices are intended for high frequency use, have internal protective diodes, and come matched, in TO-18 cans. We do not have any

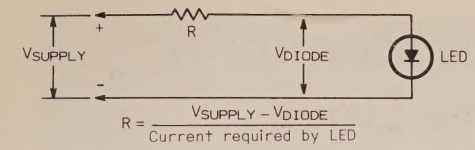



Fig. 2—The hookup of a LED.

more data this soon, but the 3N211, 3N212 and 3N313 only cost 90¢, 90¢ and 95¢ each in 100 quantity and T1 will be glad to send data sheets at no cost.

Another new items is a tachometer/pulse repetition integrated circuit, the SW781, being offered by Stewart Warner Microcircuits, 730 East Evelyn Avenue, Sunnyvale, California 94086.

This 14 pin DIP device, shown in a typical hookup in fig. 3 is actually a special purpose monostable multivibrator whose output is independent of temperature of voltage variations. In the circuit shown, a chain of input pulses results in a series of uniform pulses that are easily integrated by a panel meter to give an analog representation of the input pulse rate. For use as a tachometer, input pulses would be tapped from the distributor; for othe ruses pulses would come from the appropriate circuitry. Potentiometer $R_T$ con-

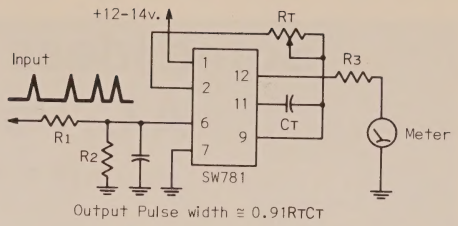



Fig. 3—The hookup of the SW781 integrated circuit discussed in the text.

trols the output pulse width in conjunction with $C_T$ (which should be a paper or mylar type) while $R_1$ and $R_2$ serve as input dividers. $R_3$ is used as a meter range resistor. The data sheet for the SW781 shows other hookups and more pertinent data. Cost in lots of 1-24 is $5.25 each, and in 100 quantity, the SW781 is $3.75.

Our last item is some good news from Fairchild Semiconductors, 464 Ellis Street, Mountain View, California, 94040. They have announced a significant drop in price of their 1/4" LED 7 segment display. This seems to be the first non-surplus, LED (direct from the original manufacturer) readout to be sold, in lots of 1-99 for $3.50. The FND-70

[*Continued on page 84*]

# Improved AGC For The Allied Radio Shack 190 Receivers

BY BRUCE L. MACKEY*

OUR first article in the March 1973 issue dealt largely with improving the Allied Radio Shack 190 series receivers with regard to s.s.b. performance. This one will deal with improving the overall a.g.c. characteristics for all modes of reception. The modifications outlined here in conjunction with those listed in the initial article will produce an a.g.c. curve which will hold the audio output to within 6 db for signal variations of 150 db.

In the a.g.c. circuit itself the following modifications should be made. Replace $TH_2$, a 10K thermistor with 100K ¼ watt resistor. Replace $C_{66}$ (1 mf) with .01 mf 50 v.d.c. This will increase the sensitivity of the a.g.c. amplifier. To retain S meter calibration change $R_{68}$ 430 ohm to 150 ohm ¼ watt resistor. It is suggested tha $R_{55}$ 100 K shunt on the output of the first mechanical filter be removed. While this resistor tends to suppress to some extent the slight tuning peaks which occur on each side of resonance of the filter, it also tends to generally reduce the selectivity of the filter and more important, the sensitivity of the receiver.

The final modification is designed to provide more control in the r.f. stage where control is most valuable. Remove $R_5$ 10K a.g.c. feed resistor and replace with a 1 amp silicon diode. Remove $R_6$ 33K a.g.c. voltage divider and replace with 100K ¼ watt. This combination will result in a more rapid decrease of a.g.c. voltage as applied to the r.f. a.g.c. amplifier with an increasing signal, and consequently greater a.g.c. compression in the first r.f. stage. The logarith-

[*Continued on page 82*]

*Chief Engineer, WKRT Radio, 44 Owego Street, Cortland, N.Y. 13045

# Some Ideas for Monitoring A.C. Power Lines

BY JOHN R. NELSON,* WBØAIK

You look at your 24-hour clock which you had so carefully set with WWV, and wonder whether a momentary line failure has destroyed its accuracy. Or you check on a digital project which has been running on your bench and wonder if it has "lost its mind" because of a power interruption. Does this or a similar situation sound familiar? If it does, then you need a monitor on your a.c. power system.

A few parts from your junk box and a few minutes of assembly time are all it takes to construct the simple circuits of fig. 1(A) or 1(B). In either case you plug the circuit into the a.c. line and press the SET button, lighting $PL_1$. If there is a line failure, $PL_1$ goes out and will not come back on when power returns.

The circuit of fig. 1(B) is simpler, but fig. 1(A) has a couple of other advantages. First of all it consumes less power than fig. 1(B), especially if a neon bulb is used. Secondly $C_1$ causes a time delay on shut-off so that transient sags in line voltage (such as those caused by an air conditioner starting up) will not trigger the circuit.

If you have an application where power interruptions are critical and you need to be warned of them instantly, you may want to build an audio alarm line monitor similar to that shown in fig. 2. In this circuit, a power failure de-energizes $K_1$ allowing $C_2$ to power an audio oscillator long enough to produce a warning tone. The one I built produces a tone which is audible three rooms away. The duration of the tone depends on the value of $C_2$. I used 2900 mf and the tone lasts about one second. A larger $C_2$ would produce a longer tone. ■

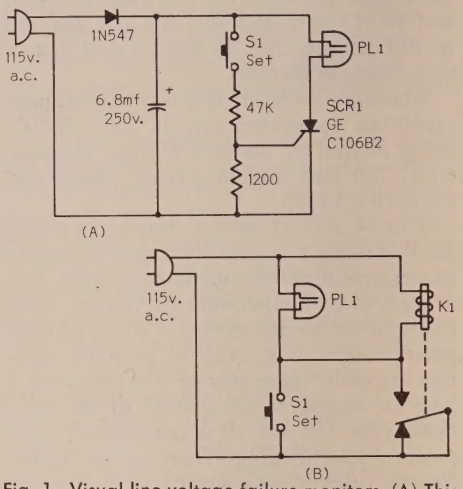



Fig. 1—Visual line voltage failure monitors. (A) This circuit protects against occasional line voltage dips which can give false indications. (B) For many simple applications this circuit will suffice, although it is susceptible to false triggering from air conditioner start-ups, etc. $K_1$ is a 115 v. a.c. s.p.d.t. relay. Pilot light $PL_1$ is a neon lamp with built-in dropping resistor.

*700 35th Street, No. 288, Marion Iowa 52202

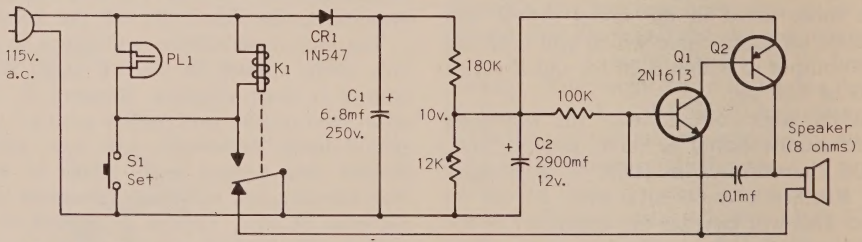



Fig. 2—An audio oscillator coupled to the simple circuit of fig. 1(B) gives an alerting tone in the event of a momentary power failure. The duration of the tone is governed by the size of $C_2$. $Q_2$ is a Delco PNP audio transistor (any PNP audio power transistor may be used); $K_1$ is a 115 v. s.p.d.t. relay.

# Digipet-60 Frequency Counter 1 KHz-60 MHz

**(130–160 MHz with optional converter)**

**only $299**

A frequency counter with a range of 1 KHz to 60 MHz (or 130-160 MHz when used with our Digipet-160 converter). With a resolution of 1 KHz or 1 Hz (at 1 ms. or 1 s. gate times). It can be operated on either AC or DC, with complete overload protection. Plus a stability aging rate of 1 part in $10^6$/week. And the whole unit is a mere 7" deep by 2½" high! In other words, a fine piece of equipment at a terrific price: $299. From one of the most respected names in electronics, no less. For further information, contact: Miida Electronics, a division of Marubeni America Corp., 2 Hammarskjold Plaza, New York, N.Y. 10017 Phone (212) 973-7152.

**Miida**




Distributorships available



# DX

BY JOHN A. ATTAWAY,* K4IIF

FROM the low input of new WAZ applications this month, it appears that many DXers are taking advantage of improving weather to catch up on outside sports. With declining sunspots and the usual mid-summer propagation doldrums there probably won't be a lot of activity this month either. July is normally a disappointing month for DX and we expect poor conditions, particularly on 10 and 15 meters. However, there will be openings from time to time and the secret is to be listening at the right time. If you can't stay near your receiver this will be an excellent time to stay in touch with *CQ's* propagation forecasts. A simple phone call, anytime day or night, to Area Code 516, 883-6223, will give you the latest propagation outlook. If conditions appear dismal you can catch up on your sleep instead of spending half the night listening to a half-dead band.

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



Charlie Smith, WN4UCC, with his neat rig at the University of Georgia. Charlie plans a DXpedition next year and hasn't ruled out BY-land. He is the first Novice to earn the USA-CA Award endorsed All Novices-A1.

**DX Hall of Fame**

GUS M. BROWNING, W4BPD
NOV. 1, 1967
JOHN M. CUMMINGS, W2CTN
MARCH 23, 1968
STEWART S. PERRY, W1BB
AUGUST 16, 1968
RICHARD C. SPENCELEY, KV4AA
MARCH 1, 1969
DANNY WEIL, VP2VB
SEPT. 15, 1969
H. DALE STRIETER, W4DQS
MAY 23, 1970
STUART MEYER, W2GHK
OCT. 31, 1970
MARTIN LAINE, OH2BH
JAN. 22, 1972
C. J. (JOE) HILLER, W4OPM
MAY 8, 1973

Information for the *CQ Dial-A-Prop* propagation forecasts is supplied by PROPAGATION EDITOR George Jacobs, W3ASK, who is internationally famous as an expert in forecasting band conditions. Dial-A-Prop is a supplement to George's regular monthly column in *CQ*, and predicts conditions on 160-2 meters for a one week period, Monday through Sunday.

### De Extra

The recent cancellation of the DXCC Phone Award by the ARRL will probably help the *CQ* DX Award program where both S.S.B. and C.W. awards are offered. However, this action seems unpopular with most DXers despite the fact that the League's DX Advisory Committee made the recommendation. Consequently we asked the members of the CQ DX Award's Advi- respective areas. Each member of the *CQ* reception areas. Each member of the *CQ* Committee represents a major DX club and it was felt that a "grass roots" sampling would be interesting.

The *CQ* Committee was first asked to pass on the propriety of comments by this column. The vote was 3 to 1 in favor of expressing an opinion, since the Committee feels that as the League is not a private organization the DXCC awards belong to all members. Each Committeeman made a few comments of his own, and these are more eloquent than anything this writer could say. A short summary follows with pro-phone DXCC opinion listed first.

**The CQ DX Award Program**

| C.W. DX | S.S.B. DX |
|---|---|
| 114—3B7DA | 272—W2MPK |
| 115—3B8DA | 273—WØLJF |
| | 274—W6EL |

**Endorsements**

*C.W.*: W4YWX—300.
*S.S.B.*: K3GKU—300 and DL6KG—275.

Complete rules for the CQ DX Award Programs may be found on pg. 58 of the January, 1971 issue. Application blanks and copies of the rules may be obtained by sending a business size, self-addressed stamped envelope to the Assistant DX Editor, P.O. Box 1271, Covina, CA 91722, or to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

"Phone DXCC should be continued. Many people have worked for years to achieve the Phone DXCC Honor Roll. They are most unhappy over the cancellation." —VE3GMT

"We were shocked and distressed over cancellation of DXCC Phone. This is a giant step backwards which adversely affects all present holders of Phone DXCC certificates as well as the countless number of future aspirants. This action should be challenged by all DXers."—K1DRN

"Although I'm not a phone man I feel that Phone DXCC should be continued and I have so advised my Director and the DXCC Advisory Committee. It's their business and strictly up to them now."—W2GT

"The DXCC Committee should be thinking of things to add to the program, not eliminating an established award which is very popular. Why not a 5-band 2-way s.s.b. DXCC and a 5-band 2-way c.w. DXCC. The National Capitol DX Association voted 100% in favor of keeping DXCC Phone." —W4WSF

"The Phone Honor Roll is much tougher than mixed and should be continued. If space is the problem, publish one list one month and the other list the next month." —W4NJF

"It would have been better to make the c.w. certificate more meaningful by establishing a minimum % of c.w. confirmations. Under the present regulations one c.w. QSL will qualify you for the c.w.-phone award. Require 75% c.w. contacts and it will give c.w. DXing a real boost."—K4AEB

"With many DXpeditions operating only on phone the demand for the phone award will increase, not decrease."—K5AAD

"The Northern Illinois DX Association objects to elimination of Phone DXCC and has petitioned ARRL for a reconsideration." —W9DWQ

"I appreciate the workload involved in the DX program but it doesn't justify this action. It is suggested that a few industry proven clerical systems be installed to replace the ponderous one man methods which prevail at the DXCC desk in Newington." —W0YDB.

"We should *not* comment. The members will make their feelings known."—W1WY

"I approve of the Committee's action. No comments to the League are necessary."— K6AHV

"They are probably economizing. It would be a waste of time to comment."—W3GHD

The above represent all of the Committee members whose comments were received prior to press time. Feelings are so strong on this issue that possibly Phone DXCC will have been reinstated by the time this column reaches you.

**DX Hall of Fame**

The *CQ* DX Awards Advisory Committee is pleased to announce the election of another prominent DXer, Charles J. (Joe) Hiller, W40PM, to the select list comprising the DX Hall of Fame.

Joe Hiller was an amateur who literally lived DX from the day he was first licensed in 1916 until his death in 1972. He was instrumental in founding the Virginia Century Club, one of the most prominent DX clubs in the U.S., and was a member of the first *CQ* DX Awards Advisory Committee in 1967.

W40PM was a quiet man who worked



The late Mr. Charles J. (Joe) Hiller, W4OPM, recently elected to the CQ DX Hall of Fame. See story above.



Jess Marino, YB3AAY, just before he went QRT from Surabaya, Indonesia last fall. Jess gave many DXers a new one.

behind the scenes as a QSL Manager, a supporter of DXpedition efforts and was active in obtaining equipment for overseas operators whose stations were limited. As a QSL Manager he kept regular schedules with FM7WQ, FM7WF, 8P6CC and other stations whose cards he handled. A postcard or a phone call to Joe would guarantee a sked for any DXer needing a contact with one of Joe's stations. He was also an active member of the Intruder Watch.

As a DX operator Joe was incomparable. When he passed away last year he was on top of 3 WPX Honor Rolls. Less deleted prefixes, his Mixed Honor Roll count was 1162 prefixes, his S.S.B. WPX count was 1075 prefixes and his C.W. WPX Honor Roll count was 950 prefixes. He was also a member of the *CQ* C.W. DX Honor Roll with 307 countries confirmed and the *CQ* S.S.B. DX Honor Roll with 314 countries confirmed. His all time country total, including deleted countries, was 340.

Prior to his retirement Joe was a Lieutenant in the U.S. Coast Guard where he was in charge of LORAN equipment.

### The WAZ Program

**S.S.B. WAZ**

| | |
|---|---|
| 1080.....WA5VDH | 1083.....9H4G |
| 1081.....DK1DY | 1084.....WB9DVV |
| 1082.....DL2JO | 1085.....VE6SB |

**C.W.—Phone WAZ**

| | |
|---|---|
| 3532.....W6DOT | 3537.....DJ4VO |
| 3533.....JA3QXH | 3538.....DJ6BW |
| 3534.....W6HQN | 3539.....DJ1KV |
| 3535.....WA7BPS | 3540.....W7ORH |
| 3536.....W0YUA/4 | 3541.....OK2BKL |

Complete WAZ rules are shown on pages 64-66 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, Florida 33880.

### The WPX Program

**C.W. WPX**
1237—3B8DA
1238—K9DDA

**Mixed WPX**
386—PAØVB

**WPNX**
56—WN8IOT
57—WN7UMU

**VPX**
52—DL-14077

**WPX Endorsements**

*S.S.B.:* W9DWQ—900, W3DJZ—750, WA6-AHF—650, W3YHR—600, W8PQD—550, WB4SIJ—450 and WA5VDH—400.
*C.W.:* G2GM—800, KØDEQ—450, SM6-BZE—400, K1WJB—400 and WA4EPM 350.
*Mixed:* W9DWQ — 1100, W8ROC — 950, W3PVZ—950, W8CNL—600, WB4SIJ—500 and KØDEQ—500.
*VPX:* WDX5FEB—350.
*Africa:* W4HHN.
*Asia:* YU1AG and W4HHN.
*Europe:* YU1AG and WA3GNW.
*North America:* WA5VDH.
*Oceania:* DK2BL.

Complete rules for WPX, WPNX and VPX may be found on pg. 67 of the February, 1972 issue. Application blanks and reprints of the rules may be obtained by sending a business size, self-addressed stamped envelope to the Assistant DX Editor, P.O. Box 1271, Covina, CA 91722, or to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

### Rare and Unusual Prefixes

**HC**—Prefix hunters also chasing the WAHC Award will be pleased by the level of activity from Ecuador. Some HC prefixes reported are as follows: HC2CN, HC2PT, HC3WD, HC4LL, HC5ND, HC7BA, HC7-RD and HC8PS are in the Halo Net, meeting daily at 1730-2000 GMT on 21390 kHz s.s.b.; HC4PB is on daily at 2330 GMT on 14170 s.s.b.; HC6SH is also on s.s.b. and has been reported on 14240 at 2330; ten meters offers a shot at HC8FN who operates around 28600 on s.s.b.; HC9WC was reported on 14130 s.s.b. at 2330 while HCØ-HM was logged on 14190 at 1800 GMT.

**HP4**—HP4RC is a good prefix catch from Panama. He has been reported on 3810 kHz around 0300 GMT and 14203 at 1230-1300 GMT.

**WT3**—WT3REE was activated again May 17-20, 1973 by the Indiana County, Pennsyl-

## CQ DX AWARD HONOR ROLL

The CQ DX Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 273 or more countries for the mode indicated. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard. The total number of current countries on the DXCC list as of this listing is 320.

### C.W.

| | | |
|---|---|---|
| K6EC ..... 315 | WØAUB ..... 302 | W4BQY ..... 294 |
| W6ID ..... 315 | DL3RK ..... 301 | K1SHN ..... 292 |
| W8LY ..... 309 | W6ISQ ..... 301 | WA6EPQ ..... 291 |
| W4IC ..... 305 | W4YWX ..... 300 | WA6MWG ..... 284 |
| K6LEB ..... 305 | ON4QX ..... 299 | WA8DXA ..... 283 |
| VK3AHQ ..... 304 | W6NJU ..... 296 | DJ7CX/ ..... 275 |

### 2XSSB

| | | |
|---|---|---|
| W2TP ..... 319 | I1AA ..... 310 | WA3IKK ..... 298 |
| TI2HP ..... 318 | W4IC ..... 310 | YV1KZ ..... 298 |
| WA2RAU ..... 317 | W6YMV ..... 309 | SM6CKS ..... 297 |
| W3NKM ..... 317 | XE1AE ..... 309 | K1SHN ..... 297 |
| W9ILW ..... 317 | OZ3SK ..... 308 | YS1O ..... 297 |
| DL9OH ..... 316 | F2MO ..... 307 | ZL3NS ..... 297 |
| G3FKM ..... 316 | VE2WY ..... 307 | WØYDB ..... 294 |
| IØAMU ..... 316 | G3DO ..... 305 | WB2RLK ..... 291 |
| K2FL ..... 316 | K3GKU ..... 305 | XE2YP ..... 291 |
| W6REH ..... 315 | WA5AHF ..... 305 | YV1LA ..... 291 |
| W6RKP ..... 315 | W9QLD ..... 305 | K8GQG ..... 288 |
| SM5SB ..... 313 | K4RTA ..... 304 | WAØKDI ..... 288 |
| W6EL ..... 313 | VE3ACD ..... 304 | K1KNQ ..... 284 |
| W6EUF ..... 313 | F9MS ..... 303 | WØSFU ..... 283 |
| W6KTE ..... 313 | K6EC ..... 303 | HP1JC ..... 282 |
| W6NJU ..... 313 | KH6BB ..... 303 | DL6KG ..... 280 |
| K6WR ..... 313 | I1ZV ..... 302 | OE2EGL ..... 278 |
| ZS6LW ..... 313 | WA2HSX ..... 302 | K6GUY ..... 277 |
| I8KDB ..... 312 | W6KZS ..... 301 | OK1MP ..... 277 |
| VE3MR ..... 312 | W6FW ..... 300 | WAØCPX ..... 276 |
| W3AZD ..... 312 | WA6MWG ..... 300 | DL1MD ..... 274 |
| W3DJZ ..... 312 | VE3GMT ..... 299 | W8ZOK ..... 274 |
| W9JT ..... 312 | K4HJE ..... 299 | K9LUI ..... 274 |
| IT9JT ..... 311 | W9KRU ..... 299 | G3KYF ..... 273 |
| WA2EOQ ..... 311 | ZL1AGO ..... 299 | G3WW ..... 273 |
| W9DWQ ..... 311 | G3RWQ ..... 298 | |



The chap with the pipe is Wilf. DJ6TK. On the right is Aris, SV1GA. The occasion was a visit by Aris & his XYL to the home of DJ6TK last March. Wilf informs us that he can confirm QSLs for DXers in Europe and overseas for the SV1GA and SV1DB DXpedition to Mt. Athos in October, 1972. His address is Wilfried Graeper, Gelsenkirchen-Horst, West Germany. *(Photo via DJ6TK)*

vania Amateur Radio Club in recognition of the Christmas TREE capital of the world. QSL to the club at 98 Rex Ave., Indiana, Pa. 15701.

**XG1**—XG1J was Pepe, XE1J, using the special prefix to commemorate the 450th. Anniversary of Colima.

**ZVØ**—Les, PY2WH, signed ZVØWH from Fernando de Noronha in March. QSL to W3DJZ.

**3E1**—A new prefix used by Panama. 3E1-KC has been active on 80 meter s.s.b.

**4K1**—Since Jan. 1, 1973, Russian stations in the Antarctic have been using this prefix.

**7XØ**—7XØGM was reported on 14125 kHz at 1705 GMT.

**9C9**—EP stations in Iran used this special prefix prior to Feb. 19, 1973. QSL 9C9DO to KL7BJW.

### Here and There

**Country Status, Germany:** D.A.R.C., the German Amateur Radio Club, has proposed to A.R.R.L. that East and West Germany be given separate country status on the DXCC list. West Berlin would not be a separate country as it is only 72.5 miles from West Germany. As always, opinions should be directed to the League's DX Advisory Committee.

**160 Meters:** The *CQ* 160 Contest was a great one. W1WY worked 16 countries including VP8KF and LU5HFI. W9PNE worked VP9, KP4, PJ2, KV4, HR2, PY1, KH6, OA8, LU5, 8P6, HB9, G3 and VP8.

KV4FZ now has 91 counties confirmed after 4 years of top band operation from St. Croix. He now appears an odds-on favorite to be the 2nd operator in the world to work 100 countries on 160. The first was W1BB.

**EA8 Awards:** K6GAK writes: "I have received the EA8 awards for about 75 stations who applied for this certificate. They were sent to me for U.S. distribution but the cost is prohibitive. Anyone who earned the award but hasn't received the certificate should write to me and enclose $1.00 to cover postage and handling. The award will be forwarded promptly.

**For the Novice:** Jim Alley, WN7UMU, is now our unofficial coordinator of Novice DX reports. He will appreciate reports of

HUSTLER
and HENRY RADIO
have the right antenna for every situation.

THE MODEL 4-BTV FIXED STATION TRAP VERTICAL
*40 through 10 meters*

ONE SETTING FOR TOTAL BAND COVERAGE

• 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-75S 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. • Weight: 15 pounds • Price: $47.95 Amateur Net

Henry Radio features the complete line of New-Tronics products. Please come in, phone or write.

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

DX worked by Novices.

Anyone who thinks there isn't any DX on the Novice bands should read Jim's report below and take heart. These goodies were all worked from W7-land which is a lot tougher than from the east coast:

| | Frequency Station | Time of QSO in GMT |
|---|---|---|
| CN8CG | 21.110 | 1600 |
| CT1KS | 21.110 | 1630 |
| EI9CF | 21.120 | 1550 |
| FM7WG | 21.105 | 1530 |
| FM7WH | 21.115 | 1500 |
| KG6AAY | 21.100-150 | 2400-0200 |
| HC1LE | 21.120 | 0100 |
| HV3SJ | 21.115 | 1630 |
| TF1DNI | 21.125 | 0130 |
| OH4SL | 21.125 | 1620 |
| TF3AW | 21.105 | 1830 |
| UAϕMO | 21.120 | 0120 |
| | | (Zone 19, Tough Zone) |
| VK7JB | 21.125 | 0100 |
| ZS6ADE | 21.115 | 1900 |
| ZS6AFL | 21.110 | 1930 |
| 9J2ED | 21.110 | 2000 |

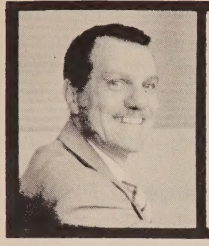
Remember Novices, *CQ's* WPNX Award is still the only award offered by a major amateur publication *exclusively* for Novices. Rules and application blanks are available from the Asst. DX Editor, P.O. Box 1271, Covina, CA 91722.

**Canadian World DXpedition:** The group is still hard at work on the boat and equipment. Suggestions and help can be channeled through R. Sutherland, VE6BAA, 201-10428, 123rd St., Edmonton, Alberta, Canada.

## QSL Information

**A2CUU & A2CCY**—Via K4DZ
**A35FX**—To ZL2AFZ
**A4FD**—c/o G3XEC
**CR7FR**—Via W7PRO
**CR8AG**—To JA2KLT
**CR8AK**—c/o CT1CY
**EP2EJ**—E. F. Diehl Jr., Box R-136, PAGE Comm. Engineers, Inc., APO, N.Y. 09205.
**FG7TD**—Via WB8ABN
**FK8BB**—To DJ9ZB
**FP8DH**—c/o VE6AYU
**JD1AHC**—Via JA8AWH
**JW7FD**—To LA3UC
**HCϕHM**—c/o GW3AHN
**KA1DX**—Via WA6AHF
**MP4TEE**—To G3LQP
**SK1AQ**—c/o SM1CXE
**TA1KT**—Via K4IEX
**TT8AC**—To DJ1LP
**TY1AAA**—c/o DJ8DE
**TY3ABF**—Via DL8OA
**TY7ABM**—To DL7JK, Am Goldbergfeld 5, 8018 Hesselfurt, W. Germany
**VE8DJ**—c/o VE3DAM
**VKϕWW**—Via VK3FF
**VP2LY**—To VE3MMV
**VP2VV/FS7**—c/o F6AEV
**VP2VAM**—Via VE3GMT
**VP5GR**—To W6MAR
**VP5LD**—c/o WA1HAA
**VP5RF**—Via G3RWU
**VP7CK**—To VE3COK
**VS5RL**—c/o WB5HJZ
**VS6AV**—Via G3SGQ
**VS6AW**—To SM0EGE
**VS6DO**—c/o W2GHK
**WA9VYR/TF**—To W9MKZ

[*Continued on page 78*]



# Contest Calendar

BY FRANK ANZALONE,* W1WY

**Calendar of Events**

| | |
|---|---|
| July 7-8 | Venezulan Contest |
| July 7-8 | Oregon QSO Party |
| July 21-22 | Colombian Contest |
| July 21-22 | Space Net VHF Contest |
| July 28-29 | Pan American Contest |
| July 28-29 | YV Air Force C.W. Contest |
| July 28-29 | Kentucky QSO Party |
| July 28-30 | County Hunters C.W. Contest |
| Aug. 4-5 | Illinois QSO Party |
| Aug. 11-12 | WAEDC C.W. Contest |
| Aug. 18-19 | New Jersey QSO Party |
| Aug. 18-19 | SARTG RTTY Contest |
| Aug. 25-26 | All Asian C.W. Contest |
| Sept. 8-9 | WAEDC Phone Contest |
| Sept. 15-16 | Space Net VHF Contest |
| Sept. 15-17 | Washington State QSO Party |
| Sept. 15-16 | SAC C.W. Contest |
| Sept. 22-23 | SAC Phone Contest |
| Sept. 29-30 | Delta QSO Party |
| Oct. 6-7 | VK/ZL/Oceania Phone |
| Oct. 13-14 | VK/ZL/Oceania C.W. |
| Oct. 13-14 | RSGB 21/28 mHz Phone |
| Oct. 20-21 | RSGB 7 mHz C.W. Contest |
| **Oct. 27-28** | **CQ WW DX Phone Contest** |
| Nov. 3-4 | RSGB 7 mHz Phone Contest |
| **Nov. 24-25** | **CQ WW DX C.W. Contest** |

### Colombian Contest

Starts: 0001 GMT Saturday, July 21
Ends: 2359 GMT Sunday, July 22

This year's contest will commemorate a double celebration, the 163rd Independence Anniversary of Colombia, and the 40th anniversary of the L.C.R.A. (Liga Colombiana de Radioaficionados).

All bands, 3.5 thru 28 mHz, both phone and c.w. And three classes, Single operator, single and all band; and Multi-operator, single transmitter.

**Exchange:** RS (T) plus 3 figure contact number starting with 001.

**Points:** QSO's with HK's, 5 points; with stations in the North American boundaries, 3 points; all other DX countries, 2 points; and with stations in the same country, 1 point.

**Multiplier:** Total of different DXCC countries worked on each band.

**Final Score:** Sum of QSO points from each band multiplied by sum of different countries worked on each band.

**Awards:** Ten silver plaques, six to the continental winners, three for each category and one for the world leader. There are certificates for the winners in each country.

Use a separate sheet for each band, indicate the country multiplier only first time it is worked and include a summary sheet with scoring.

A minimum of 300 QSO's must be shown by all awards winners.

The usual rules of disqualification will be in effect. Excessive duplicates, incorrect QSO's or multipliers and violation of rules.

Mailing deadline is Sept. 30th and go to: L.C.R.A. Concurso Independencia, Att: Contest Manager HK3AFB, Apartado Postal 584, Bogota, Colombia.

### YV Air Force C.W. Contest

Starts: 0000 GMT Saturday, July 28
Ends: 2400 GMT Sunday, July 29

This is a new one organized to commemorate the 53rd Anniversary of Venezuelan aviation.

Its a world wide type contest so concentration should be to all areas. Especially since the Top Scorer will be invited to Caracas as guest of the Air Force to receive his award. (*I can vouch from experience that General Miliani is a wonderful host.*)

**Categories:** Single Operator, both single and all band; Multi-operator, single and multi transmitter.

**Exchange:** Seven figures, RST plus a progressive 4 digit contact number starting with 0001.

**Contact Points:** 2 points for each QSO with a YV, 1 point with stations in other countries. (QSO's with stations in same country not valid.)

**Multiplier:** Sum of different countries (DXCC), YV call areas (1-9) and USA call areas (1-0) from each band. (10 thru 80)

**Final Score:** Total QSO points times the sum of the multiplier from each band.

**Awards:** Trophies for the winners in each

* 14 Sherwood Road, Stamford, Conn. 06905.

category and the leaders in each continent and Central America.

Certificates will also be awarded to stations with the following totals. Stations in the Americas, working 20 YV's and stations in 10 other countries. Stations in other continents, working 5 YV's and stations in 5 other countries.

S.w.l.'s must report at least 50 stations in the contest for a certificate.

Mailing deadline for entries is Sept. 30th and they go to: Comandancia General de la Aviacion, Concurso 53, Aeropuerto La Carlota, Caracas, Venezuela.

### Kentucky QSO Party

Starts: 2000 GMT Saturday, July 28
Ends: 0200 GMT Monday, July 30

The Bluegrass ARC is sponsoring this one. A station may be worked once per band but not on each mode.

**Exchange:** Signal report and QTH. County for Kentucky; state, province or country for others.

**Scoring:** One point per QSO, 2 points if it's with a Novice. (Up to 20 QSOs) Ky. stations multiply total by number of states, provinces and countries worked. Others use Ky. counties for their multiplier. (max. of 120).

**Frequencies:** Phone—3910, 7250, 14285, 21360, 28600. C.W.—60 kHz up from lower band edge. Novice—10 kHz from lower Novice band edge.

**Awards:** Certificates to top scorers in each state, province and country, and top novice in each state. There is a plaque for the Top Kentucky station and certificates 2nd—5th place.

Mail logs by Sept. 5th to: Michael Wheeler, WB4YDX, 3259 Roxburg Drive, Lexington, Ky. 40503 A s.a.s.e. will get you copy of results.

### County Hunters C.W. Contest

Starts: 0000 GMT Saturday, July 28
Ends: 0600 GMT Monday, July 30

The C.W. County Hunters Net encourages and invites mobile and portable operation from the less active counties during this contest.

The same station may be worked on each band for QSO points. Portable and mobiles changing counties may also have repeat QSOs. Stations on county lines exchange only one number but each county is counted as a multiplier.

**Exchange:** QSO no., category (F—fixed, P—portable, M—mobile) RST, state, province or country and county. (for US stations)

**Scoring:** QSO's with fixed stations 1 point, with portable or mobiles 3 points. Multiply total by number of U.S. counties worked.

**Frequencies:** 3575, 7055, 14070, 21070, 28070.

**Awards:** Certificates in three categories.

F—Top fixed or fixed portable in each state, province or country, 1000 or more points.

P—Top score in each state by a portable operating from a county other than its normal QTH, 1000 or more points.

M—Top scoring mobile in each state operating from 3 or more counties, with a minimum of 15 QSO's per county.

There are Trophies for the Top single operator Portable and Mobile in the United States.

Stations with 100 or more QSO's *must* include a check sheet of counties worked.

Mailing deadline is Sept. 1st to: C. W. County Hunters Net, c/o Jeffrey P. Bechner, W9MSE, 64 North Pioneer Parkway, Fond du Lac, Wisc. 54935.

### Illinois QSO Party

Starts: 2000 GMT Saturday, August 4
Ends: 2400 GMT Sunday, August 5

This is the 11th annual party sponsored by the Radio Amateur Megacycle Society. The same station may be worked on each band and mode for QSO and multiplier credit.

**Exchange:** QSO no., RS(T) and QTH, County for Ill., state, province or country for others. (Ill. may work in-state stations)

**Scoring:** One point per QSO. Ill. multiply total by sum of states, provinces and DXCC countries worked. Out-of-state use Ill. counties for their multiplier. (max. of 102)

There is a bonus multiplier of 1 for each group of 8 contacts with the same county.

In addition, stations using a power input of 5 watts or less can multiply score by 3.

Count US, Canada, Hawaii and Alaska as country multipliers, and Hawaii and Alaska again as states. (Ill. may be used by all)

**Frequencies:** 3560, 3735, 3900, 7060, 7175, 7260, 14060, 14275, 21060, 21100, 21360, 28060, 28160, 28660. Phone on hour, c.w. on half hour.

**Awards:** Certificates to the top station in each state, VE province, DX country and 1st three places in Illinois. Single and multi-operator stations compete separately.

A summary sheet showing the scoring and other pertinent information is requested. Include a large s.a.s.e. if results are desired.

Mailing deadline is September 15th to: Radio Amateur Megacycle Society, K9CJU, 3620 N. Oleander Ave., Chicago, Ill. 60634

### European DX Contest

**C.W.**—Aug. 11-12 **Phone**—Sept. 8-9
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 19th year the DARC has sponsored this very popular European contest.

Use all bands, 3.5 thru 28 mHz. There are two classes, Single operator, all Band and Multi-operator, single transmitter.

Only 36 hours out of the 48 hour contest period may be used by single operator stations. The 12 hour rest period may be taken in one but not more than 3 periods, anytime in the contest.

**Exchange:** A five or six figure number, RS/RST plus a QSO number starting with 001.

**Scoring:** One point per QSO and one point for each QTC reported.

**Multiplier:** For non-Europeans, number of EU countries worked on each band. Europeans will use the ARRL country list and call areas in following: JA, PY, VE/VO, VK, W/K, ZL, ZS, UA9/UA0. In addition the multiplier on 3.5 may be multiplied by 4, on 7 mHz by 3 and on 14/21/28 by 2.

**Final Score:** Total QSO points, plus QTC points, times the sum total multiplier from all bands.

**QTC—Traffic:** This feature is often overlooked. Additional QSO point credit may be realized by reporting a QTC. This is a report of a QSO that has taken place earlier in the contest and later sent back to a European station.

The general idea being that after a number of EU stations have been worked a list of these can be reported back during a QSO with another station. An additional 1 point can be earned for each QSO reported. A QTC can be only sent from a non-European to a European station.

A QTC contains the time, call and QSO number of the station being reported. ie: 1300/DK2BI/134. This means that at 1300 GMT you worked DK2BI and received his number 134. A QSO can be reported only once and not back to the originating station.

A maximum of 10 QTC's to the same station is permitted per band. The same station may be worked several times to complete this quota. Only the original contact however has QSO point value.

Keep a uniform list of QTC's sent. QTC 3/7 indicates that this is the 3rd series and that 7 QSO's are being reported.

**Awards:** Certificates to the highest scorers in each country and call area listed above. Continental leaders will also be honored. Also stations having at least half the score of the continental leaders.

**Disqualification:** Violation of the rules of the contest, or unsportsmanship conduct, or taking credit for excessive duplicate contacts or multipliers will be deemed sufficient cause for disqualification. Decision of the Committee is final.

It is suggested that you use the official DARC log and summary forms. A s.a.s.e. with sufficient IRC's should be sent to address below. Figure 40 QSO's to the page if you make your own. And use a separate sheet for each band. (W/K and VE stations can send their request to W1WY).

Mailing deadline for logs is Sept. 15th for C.W. and Oct. 15th for Phone. To the

### Results All Asian 1972 Contest
### United States & Canada

**Single Operator.**

**All Band**

| | |
|---|---|
| **W7RM** | **110916** |
| **W6OAT** | **92412** |
| **VE7ZZ/W7** | **65337** |
| WA6IVM | 41138 |
| **W3AU** | **37845** |
| **W5WZQ** | **32184** |
| WB6OOL | 25678 |
| W6OKK | 22608 |
| **WA1LKX** | **15960** |
| WA7OBL | 8556 |
| W6DGH | 7488 |
| W6KYA | 6480 |
| W6OVO | 4788 |
| W6JSO | 4522 |
| WA3HMM | 4368 |
| W7YS | 2117 |
| W6GEB | 1624 |
| **W2GKZ** | **1537** |
| **WØBMM** | **1500** |
| **WB8EUN** | **1350** |
| W6RQZ | 1258 |
| WA5JDR | 880 |
| W6CLM | 621 |
| K3ZOL | 408 |
| K5MHG/6 | 280 |
| W6EJA | 88 |
| W2PXL | 63 |
| W2MLO | 56 |

**21 mHz**

| | |
|---|---|
| **K6EBB** | **12840** |
| W2TA/Ø | 2530 |
| W2LWI | 1224 |
| W6JKK | 1190 |
| WB6ZUC | 1005 |
| W1QV | 969 |
| W6LQO | 715 |
| K6CL | 675 |
| W8IBX | 49 |

**14 mHz**

| | |
|---|---|
| **W6FZS** | **15867** |
| K6ERT | 15036 |
| W5EQT | 11544 |
| W6AFI | 10200 |
| K6EIV | 10030 |
| K1JHX | 5859 |
| WA1NNC | 2322 |
| K4RDU | 1950 |
| K1OME | 1716 |
| WA3KOZ | 1100 |
| W3CRE | 612 |
| W4JUK | 448 |
| W9IRH | 372 |
| W6GBY | 144 |
| WA3DMH | 78 |

**7 mHz**

| | |
|---|---|
| **W6RGG/6** | **11448** |
| K6DC | 8675 |
| WA6TQK/6 | 8616 |
| WA6IVN | 7986 |
| WB4LEH/6 | 20 |

**3.5 mHz**

| | |
|---|---|
| **W6CUF** | **1428** |
| WA6DKF | 1080 |
| W6KJG | 275 |

**Multi Opr.**

| | |
|---|---|
| **K6NA** | **90240** |
| K6UA | 59082 |
| K6HQN | 56070 |
| W6ITD | 53054 |
| W6BIP | 45661 |
| **W9EXE** | **5280** |

**All Band**

| | |
|---|---|
| **VE2NV** | **6302** |
| **VE7HQ** | **684** |
| **VE7AZG** | **510** |
| VE4MF | 351 |

**14 mHz**

| | |
|---|---|
| **VE3GCO** | **1122** |
| VE6AVO | 312 |

**Multi Opr.**

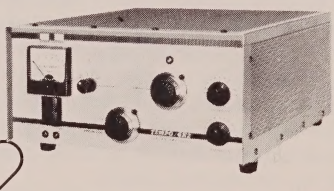
| | |
|---|---|
| **VE2WA** | **209** |

# they're both Tempo... so you can't go wrong



THE TEMPO 2001 LINEAR AMPLIFIER

Small but powerful, reliable but inexpensive, this amplifier is another top value from Henry Radio. Using two 8874 grounded grid triodes from Eimac, the Tempo 2001 offers a full 2 KW PEP input for SSB operation in an unbelievably compact package (total volume is .8 cu. ft.). The 2001 has a built-in solid state power supply, a built-in antenna relay, and built-in quality to match much more expensive amplifiers. This equipment is totally compatible with the Tempo One as well as most other amateur transceivers. Completely wired and ready for operation, the 2001 includes an internal blower, a relative RF power indicator, and full amateur band coverage from 80-10 meters. PRICE: $545.00



THE TEMPO 6N2

The Tempo 6N2 combines most of the fine features of the 2001 for 6 and 2 meter amateur operation. The amplifier uses the same small cabinet, the same modern tubes, the same inherent quality for 2000 watts PEP input on SSB or 1000 watts input on FM or CW. The rig is completely wired in one small package with an internal solid-state power supply, built-in blower, and RF relative power indicator.

$595.00

Prices subject to change without notice

**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

*"World's Largest Distributor of Amateur Radio Equipment"*


DARC WAE Contest Committee, D—895 Kaufbeuren, P.O. Box 262, West Germany.

**European Country List**

C31 — CT1 — CT2 — DL — DM — EA — EA6 — E1 — F — FC — G — GC Guer GC Jer — GD — GI — GM — GM Shetland — GW — HA — HB9 — HB0 — HV I — IS — IT — JW Baer — JW — JX LA — LX — LZ — M1 — OE — OH OR0 — OJ0 — OK — ON — OY — OZ PA — SM — SP — SV — SV Crete — SV Rhodes — TA1 — TF — UA1346 — UA2 UB5 — UC2 — UO5 — UN1 — UP 2 UQ2 — UR2 — UA Franz Josef Land YO — YU — ZA — ZB2 — 3A — 4U1 9H1.

**All Asian DX C.W. Contest**

Starts: 1000 GMT Saturday, August 25

Ends: 1600 GMT Sunday, August 26

Rules are the same as last year and will be given in detail next month. Logs go to: The J.A.R.L., Contest Committee, Central Post Office, Box 377, Tokyo, Japan.

**Editor's Notes**

We had high hopes of publishing the Phone results of the October '72 Contest in this issue but it just didn't work out that way. There's much more to the reporting the results of a contest than just listing the calls of the entries. The scores are not always what they claim to be.

To the many inquiries, "where's my certificates, names, addresses etc. was lost in the mail between Connecticut and New York. Can you imagine the job of digging back through the final results and the *Callbook* to compile this information all over again? It's being done at this writing and some of you may have received your award by the time you read this.

Anyway I'm sure the 1972 WPX Contest certificates have been received. Those went out in early March, thanks to Bernie Welch, W8IMZ and his daughter Irene.

73 for now, Frank, W1WY

**CQ Country Chart**

A two color, wall-sized country chart is available on poster stock and in large type for only $1.25 per copy postpaid. Address request to: CQ DX Country Chart, CQ Magazine, 14 Vandeventer Ave., Port Washington, N. Y. 11050.



# THE awards PROGRAM

BY ED HOPPER,* W2GT

**Special Honor Roll**
**All Counties**

#99—Daniel E. Earhart, W6UNP, 3-28-73.
#100—Daniel P. Bisset, K8DCR, 3-29-73
#101—Charles A. Rudloff, W4LK, 4-4-73.

**USA-CA HONOR ROLL**

| 3000 | | 2000 | | 1000 | |
|---|---|---|---|---|---|
| W6UNP | 121 | W6UNP | 178 | W6UNP | 296 |
| K8DCR | 122 | K8DCR | 179 | K8DCR | 297 |
| W4LK | 123 | W4LK | 180 | K4HHD/WB2CDZ | 298 |
| | | | | W4LK | 299 |
| **2500** | | **1500** | | **500** | |
| W6UNP | 152 | W6UNP | 219 | WA4TDQ | 931 |
| K8DCR | 153 | K8DCR | 220 | W6UNP | 940 |
| W4LK | 154 | W4LK | 221 | W4LK | 941 |

THE July, "Story of The Month" as told by "Steve" is:

### Doyle "Steve" Cope, K5KDG

*(#45, All Counties, 10-26-1970)*

"My beginning in County Hunting was more or less an accident. A friend of mine, K5JEW told me one morning that he had run across amateurs on 3943 kHz the previous evening and they were hunting counties. He was in Baxter County and said he worked over 60 stations and thought they were a bunch of nuts.

"Well, the next night I sat listening to 3943 to all those nuts and decided they were having such a good time I should join them. I was in Izard County, Arkansas at that time and needless to say, I had my hands full for about an hour. Some of my first contacts on May 10, 1967 were with W2BLM, K3AER and WA1CXE. On May 12, 1967 I worked W9ADF, K0AYO and K9CSL and this was the start of a great adventure. My biggest total of counties worked in one day was 45 on November 24, 1967.

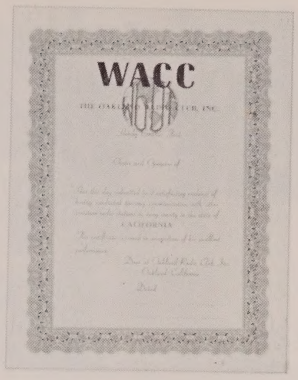
"I was very happy to be one of the first eyeballers of the present bunch of County Hunters at Jackson, Mississippi March 8 and 9, 1969. After returning home, Paul, W4YWX and I were talking on 75 meters about having an annual convention. Paul said, You do it. So July 4, 1969 was the start of our annual affairs, which have grown to be quite a thing (that's putting it mildly!). I think all the old members still have a special feeling for the 1st.

"On October 4, 1970, I was down to just 5 counties (needed ) and decided after hearing about 4 or 5 other hunters say they just needed a few, that I better get on the stick if I wanted to get in the first 50 to get their 3079 Award. I called KH6BAS in Kauai County, Hawaii by telephone and set up a schedule with him for 75 meters that evening. At 2 A.M. CST I worked him through a thunderstorm that came in my area. On 4 October I worked W4YWX in Candler County, Georgia leaving only 3 to go. Norm, W4ARH went to the county line of Upshur and Camp in Texas on 9 October, leaving only Telfair County, Georgia. The next day Paul, W4YWX was preparing to get my last county when I realized he was



Steve Cope, K5KDG.

*P.O. Box 73, Rochelle Park, N.J. 07662




Worked All California Counties Award. See rules page 73 December 1972 CQ. Sponsored by The Oakland Radio Club Inc. For rules, send s.a.s.e. to Charles Dumm, K6OXK, 6102 Hillmont Dr., Oakland, Calif. 94605.

going to *Taliaferro* County, not *Telfair*. Well I got him turned around and it wasn't long until we made the big contact. I was grateful to Paul for the last one, but those other 3078 were all important (rare) counties. A big thanks goes to all the other mobilers and especially Net Control Stations.

"All the family enjoyed the past conventions and plan to be in Ft. Wayne this year. I have one request, I forgot my flash for my camera for the Peoria convention and didn't get any slides. If any of you have some, I sure would like to have them and I can have copies made of them. I am getting a pretty good collection from all the conventions. 73 & 88 to the gang, and see you at Ft. Wayne."

Our records show that "Steve" waited until he had collected 2500 counties and then was issued USA-CA-500-#752; 1000 #179; 1500 #117; 2000 #83; and 2500 #58, on October 24, 1969. He acquired USA-CA-3000 #58 (yes, also #58) on October 15, 1970 and was issued All Counties #45 on October 26, 1970.

Other photographs of Steve include the nice one on page 86 of November '72 *CQ*; and the following group fotos: page 82, January '73 *CQ*; page 87, November 1972 *CQ*; page 73, January '72 *CQ*; page 69, January '71 *CQ*; page 69, October '69 *CQ*; and page 87, June '69 *CQ*.




MARAC County Hunter Contest Award.

### Awards Issued

*THREE* is sure the magic number, as you can see from the Special Honor Roll.

Dan Earhart, W6UNP surprised me by waiting until he had them *all* before applying.

Dan Bissett, K8DCR has been so busy mobiling and helping everyone else, he did not take time out for all the paper work until now. He brought the endorsement for his USA-CA-500-Award #296, dated 11-24-63 to All S.S.B.; All 7 MHZ; and All 14 MHZ. His 1000, 1500, 2000, and 2500 endorsed All 14 S.S.B. His USA-CA-3000 All S.S.B. and All Counties, Mixed.

Chick Rudloff, W4LK also surprised me by waiting until he had them *all*. He got All Counties and USA-CA-3000 Mixed and all the rest All 14 S.S.B.

Speaking of All Counties, Les Jeffery, W8WT (#93 dated 1-3-73) brought his endorsement to All S.S.B. and is now working on making it All 14 MHZ.

Lou Geis, K4HHD (exWB2CDZ) added USA-CA-1000 to his collection.

Hugh Maddox, WA0TDQ qualified for USA-CA-500 endorsed All S.S.B.

### Awards

**Mobile Amateur Radio Awards Club Inc. Cliff Corne Jr., K9EAB Memorial Award:** This award issued in memory of Cliff Corne, Jr., K9EAB who was the first amateur operator to reach the top by working other amateur radio stations in All 3079 Counties of the U.S.A. It is awarded for working holders of the USA-CA All Counties Award. The award is given in the following classes:

Basic Award... 10 contacts.
Class C..... 25 contacts (blue seal).
Class B..... 50 contacts (red seal).
Class A..... 75 contacts (gold seal).
Class AA.....100 contacts (2nd gold seal).

Rules:

1. Only contacts after the date the USA-CA All Counties Award was issued to the holder, will be considered.
2. Submit a list showing stations worked, date and USA-CA Award number.
3. The list must be certified by two amateur radio operators (any class), a club official, or by a Notary Public, stating that the cards have been checked and listing is correct. Stations may submit cards in lieu of the above, but must include sufficient postage for return of cards.
4. The award is available to all licensed amateur radio stations (s.w.ls on a heard basis), throughout the world.
5. The award will be issued free of charge to USA-CA All Counties Holders, upon receipt of information by letter to awards custodian. Free to B/P. Basic Award $1.00 or 10 IRCs. Seals for s.a.s.e. or 1 IRC. (IRCs accepted from DX stations only). Endorsements, all one mode, band or mixed on the basic award only. Send applications to MARAC, 602 Jefferson Street, Lee's Summit, Missouri 64063.

**MARAC Mobile Plaques:** This is a three dimensional walnut auto plaque with Hustler type antenna. Two of these plaques are issued free each year. One for the "Best Net Control" and one for "The Best Mobile" of the year. Selection is made by a MARAC membership vote. The best "Net Control" can be won by the same amateur each year. The "Best Mobile" can be won only once by the same amateur. This plaque is also issued under MARAC regular awards—as listed in this column last month. Pertinent information is engraved on plate mounted on side of the plaque.

*Note:* To repeat, for MARAC AWARDS send log data, alphabetically by States and Counties, certified by two amateurs or club official for all awards. Basic $1.00. Seals and ribbons s.a.s.e. Plaques *free* unless otherwise stated. No fee to handicapped. Only contacts after January 1, 1969 will count for MARAC awards, unless otherwise stated.

**New Mexico Award:** The Albuquerque Amateur Radio Club is offering an appropriate numbered certificate signed by Governor Bruce King and bearing the official gold seal of the State commemorating the 60th year of statehood of New Mexico,

[*Continued on page 76*]





5 ELEMENT YAGI
GAIN: 12 db.
Model: MY-144-5

9 ELEMENT YAGI
GAIN: 16 db.
Model: MY-144-9

Matching system incorporates a 200 Ohm folded dipole with a 4 to 1 coaxial balun. Element length is adjustable for critical tuning.

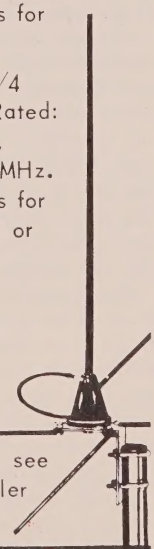
**VERTICAL GROUND PLANE...**

with special custom features for 150 to 170 MHz.

Gain: 3.4 db. compared to 1/4 wave ground plane. Power Rated: 1 KW AM; 2 KW P.E.P. SSB. Frequency Range: 144 - 148 MHz. with special custom features for 150 - 170 MHz.. VSWR: 1.5/1 or better at resonance.

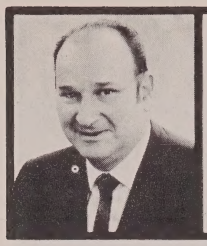
DIPLOMAT - 2
Model: DI-2

DIPLOMAT SPECIAL
Model: DI-2A



For detailed specifications, see your authorized Mosley Dealer or write Dept. 212 . . .

**Mosley Electronics, Inc.**
4610 N. Lindbergh Blvd., Bridgeton, Mo. 63044



# Propagation

BY GEORGE JACOBS,* W3ASK

JUDGING from the ringing of the DIAL-A-PROP phone in *CQ*'s office (Area Code 516-883-6223), there is more than a considerable interest in weekly updated propagation forecasts.

In response to numerous requests, *CQ* has investigated possibilities for making this service available to a greater number of users, and hopefully at less cost than a three minute long-distance telephone cost. Unfortunately, the high cost of an Area Code 800 telephone number (almost $2000 monthly) rules this out. But there is a solution MAIL-A-PROP.

MAIL-A-PROP will contain exactly the same information as recorded on DIAL-A-PROP every Tuesday. In single sheet newsletter form, it will cover day-by-day the latest propagation data for an entire week (Tuesday-to-Tuesday).

Written in simple language, day-to-day conditions on the various amateur bands are described as *above normal, normal, below normal* or *disturbed*. Band openings are described as *excellent, good, fair* or *poor*. MAIL-A-PROP will contain the latest assessment of solar activity, band-by-band DX tips, a forecast of ionospheric openings on the v.h.f. bands and special forecasts for *CQ* and *ARRL* DX Contests.

MAIL-A-PROP will be sent AIRMAIL to all subscribers more than 200 miles from N.Y.C., so that it should arrive in either Monday or Tuesday's mail, in time for *full* use. In a more convenient written form for ready reference at any time, it will also cost most subscribers considerably less than a long-distance telephone call.

MAIL-A-PROP is ready now! For subscribers anywhere in North America (including the 50 states, Canada, Mexico and the Caribbean area) it will cost:

Monthly (for *five* weekly issues): $2.50.

Semi-Annually (*thirty* weekly issues): $12.50.

Annually (*sixty* weekly issues): $20.

At the annual rate this amounts to less than 35¢ for a weekly forecast, which is a fraction of the average three minute long-distance charge for DIAL-A-PROP.

Subscriptions for MAIL-A-PROP should be sent to MAIL-A-PROP, P.O. Box 86, Northport, N.Y. 11768.

*11307 Clara Street, Silver Spring, Md. 20902

## LAST MINUTE FORECAST

*Day-to-Day Conditions Expected For July, 1973*

| | *Rating & Forecast Quality* | | | |
|---|---|---|---|---|
| *Propagation Index* | (4) | (3) | (2) | (1) |
| *Date* *July* | | | | |
| Above Normal: 2, 15, 23, 25-27, 29. | A | A | B | C |
| Normal: 1, 3, 5-8, 14, 16-18, 20-22, 24, 28, 30. | B | C | D | E |
| Below Normal: 4, 9-11, 13, 19, 31. | C | D | E | E |
| Disturbed: 12. | D | D | E | E |

Where *expected signal quality* is:

A—Excellent opening, exceptionally strong, steady signals.

B—Good opening, moderately strong signals with little fading and noise.

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

D—Poor opening, signals weak 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 quuality associated with the particular opening for any day of the month. For example, all openings shown in the Charts with a *propagation index* of (4) will be Good on July 1. Excellent on July 2, Good on July 3, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP or use MAIL-A-PROP.

### July Conditions

With longer hours of daylight and the sun high in the northern sky, h.f. propagation conditions should be considerably more stable during July than they were during the spring months.

Twenty meters is expected to be the optimum band for long distance propagation during the month. It should remain open to one area of the world or another almost around-the-clock. Peak conditions are forecast for several hours after local sunrise, and again during the late afternoon and early evening hours. Fifteen meters is forecast to open fairly frequently during the late afternoon on more or less north-south paths, and occasionally to other areas of the world. A few good 10 meter openings may still be

possible during the afternoon hours, to southern and tropical areas.

During the hours of darkness, 40 meters is expected to open to many areas of the world, but seasonally high static levels may often make DX reception difficult. High static levels are also expected to hinder DX conditions on 80 meters, although some long distance openings are forecast during the hours of darkness. Not many DX openings are predicted for 160 meters during July, because of seasonally high levels of static and solar absorption.

DX Propagation Charts for July appeared in last month's column. For an assessment of day-to-day conditions expected during the month, see the "Last Minute Forecast", which appears at the beginning of this column. For more updated information try DIAL-A-PROP or MAIL-A-PROP.

### Peak Short-Skip Conditions

This month's column contains Short-Skip Propagation Charts for July and August, as well as Charts centered on Hawaii and Alaska. The Short-Skip Chart contains propagation forecasts for circuits varying in distance between 50 and 2300 miles.

Short-skip propagation conditions are expected to be optimum during July as a result of a seasonal peak in sporadic-E propagation. During the daylight hours, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approximately 500 and 1300 miles, with some openings extending out to beyond 2000 miles. Around-the-clock short-skip openings are expected on 20 meters, between distances of 300 and about 2300 miles. Conditions on 20 should peak during the late afternoon and early evening.

Good daytime short-skip openings on 40 meters are forecast for distances between 100 and about 750 miles, with good nighttime openings expected between 250 and 2300 miles. Conditions on 80 meters are also expected to be good during the daylight hours, with openings up to approximately 300 miles. During the hours of darkness, good openings should be possible up to the short-skip limit of 2300 miles. While no short-skip openings are expected on 160 meters during the hours of daylight, some good openings should be possible during the hours of darkness up to a distance of about 2300 miles.

### V.H.F. Ionospheric Openings

Intense sporadic-E ionization during July is likely to result in numerous 6 meter, and occasional 2 meter short-skip openings. Fairly frequent 6 meter openings should be possible, over distances between approximately 500 and 1300 miles, with some openings extending out to as much as 2300 miles. While short-skip openings can occur at just about any time of the day or night, statistics indicate that conditions peak for a few hours after noon and again during the early evening.

During intense sporadic-E openings, as the skip distance is observed to be *decreasing* on 6 meters, the MUF will be *increasing*. When skip stations are heard on 6 meters as near as about 500 miles, check 2 meters for openings in the same direction. As a good rule of thumb, when the 6 meter skip distance falls below 500 miles, 2 meter openings should be possible between distances of about 1000 and 1300 miles.

Check the early hours of July 29 for meteor scatter openings on the v.h.f. bands. The very brief *Delta Aquarids* shower is expected then, with a meteor count of about 20 an hour when it peaks at approximately 4 A.M., EST.

Some v.h.f. short-skip openings may result from auroral activity during July. Check the "Last Minute Forecast" at the beginning of this column for periods that are forecast to be disturbed of below normal. These are the dates on which auroral v.h.f. openings are most likely to occur this month.

July is usually a poor month for Trans-Equatorial (TE) propagation, and few if any openings are expected. If you live in the southern third of the USA, and are very patient, check the 6 meter band for an occasional TE opening to South America between 8 P.M. and midnight.

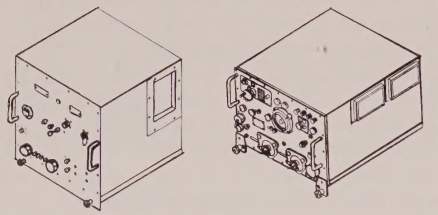
### Sunspot Cycle

The sunspot cycle continues to decrease steadily. The Swiss Federal Solar Observatory at Zurich reports a monthly mean number of 45 for March, 1973. This results in a smoothed sunspot number of 62 centered on September, 1972. A smoothed sunspot number of 40 is forecast for July, 1973.

73, George, W3ASK

[*Charts start on next page*]

**WANTED: SHORAN • HIRAN**
**AN/APN-84/ AN/CPN-2A**
**HIGHEST PRICES EVER**



**Needed immediately. Hundreds of dollars paid. Want complete units or parts in any condition. AN/APN-84 consists of IP-186/APN-84 Receiver-Indicator and T-342/APN-84 Transmitter. AN/CPN-2A consists of IP-68/CPN/2A Receiver-Indicator, T-230 A Transmitter and 0-18 Oscillator. Wire collect immediately for top prices.**
**Also wanted: RADIO SETS: RT-581/URC-9; AN/GRC-106; AN/ARC-51 AX; AN/ARC-102; AN/ARC-94; AN/ARC-131; AN/APN-133; RECEIVERS: R-1388/ARN-82; R-1391/ARN-83; TACAN; AN/ARN-52; PLOTTING TABLES; PT-434/ASA-13; AN/ARM-22; MD-83A/ARN; SG-2A/GRM; SG-1A/ARN. We also purchase all Collins Modules and Plug in Units as well as Indicator and Controls. What have you got in Military equipment?**

**SPACE ELECTRONICS**
div. of Military Electronics
76 Brookside Drive
Upper Saddle River, N.J. 07458
(201) 327-7640 *TELEX 134-599*



**TECO ELECTRONICS**

**ALL ITEMS CHECKED AND OPERATING, SHIPPED FOB GARLAND, TEXAS, 10 DAY MONEY BACK GUARANTEE IF NOT SATISFIED (RETURNED PRE-PAID)**

Miida 60 Counter as in CQ and QST Mag. 60mHz Solid State 50 MV Sensitivity.....$299.00
URM-25D Signal Generator, 10kHz-52mHz with Calibrated Output, Built-in Xtal Calibrator, AM Mod. Small Size.....$125.00
PRM-10 Grid Dip Meter 2mHz-400mHz.....$ 60.00
HP-524B Counter DC-10mHz Neon Readout.....$ 95.00
HP-524C Counter DC-10mHz Nixie Readout.....$275.00
HP-524D Counter DC-10mHz Neon Readout.....$195.00
HP-525A or B Plug-in 10mHz to 220mHz.....$ 50.00
HP-540A Transfer Oscillator for 525 Counters Extends Range 10mHz to 5gHz.....$ 50.00
HP-540B Same as above but to 12.4gHz.....$125.00
HP-233A Audio Generator 50Hz-500kHz.....$ 65.00
HP-400HR AC VTVM to 4mHz 1MV-300V.....$ 65.00
HP-430C/477B Power Meter and Mount.....$ 85.00
CMC 707D Xsistor 7 Digit 50mHz Counter.....$395.00
Lambda 12V/11A PS 0.02% Reg. New Units.....$ 65.00
TEK 535 Scope DC-11 Delayed Sweep.....$295.00
Fluke 801 DC DVM to 500 Volts 0.05% ACC.....$ 40.00
Fluke 803 Same as above but AD-DC.....$ 85.00
Gertsch FM-7 & DM-3 Frequency Meter.....$795.00
Polarad TSA/STU-1 Spect. Anal. 10mHz-1gHz.....$225.00
Sorensen 500BB PS 0-500V/300MA 0.5% Reg.....$ 45.00
L&N K3 Universal Pot. New Condition.....$275.00
Teletype Corp. LS200 Distortion Test Set.....$ 50.00
Electronics Tube Corp Dual Beam Scope.....$175.00
HP-650AR Audio Generator 10Hz-10mHz.....$ 75.00
HP-330BR Distortion Analyzer.....$225.00

OVER 15,000 ITEMS IN STOCK, PRICED TO SELL. WRITE TODAY WITH YOUR REQUIREMENTS OR CALL.

**TECO ELECTRONICS**
P.O. Box 1050-C, Garland, Texas 75040 / 214-276-4931
STORE HOURS 11 A.M. to 7 P.M. CLOSED SUN. & MON.


## CQ Short-Skip Propagation Chart
## July & August, 1973
## Local Standard Time At Path Mid-Point
## (24-Hour Time System)

| *Band (Meters)* / | *50-250* | *250-750* | *750-1300* | *1300-2300* |
|---|---|---|---|---|
| 10 | *Nil* | 07-09 (0-1)<br>09-13 (0-3)<br>13-17 (0-1)<br>17-21 (0-2)<br>21-23 (0-1) | 07-09 (1)<br>09-13 (3)<br>13-17 (1-2)<br>17-21 (2-3)<br>21-07 (1) | 07-09 (1-0)<br>09-13 (3-1)<br>13-17 (2-1)<br>17-21 (3-1)<br>21-07 (1-0) |
| 15 | *Nil* | 07-09 (0-2)<br>09-13 (0-3)<br>13-17 (0-2)<br>17-19 (0-3)<br>19-21 (0-2)<br>21-07 (0-1) | 07-09 (2)<br>09-13 (3)<br>13-17 (2)<br>17-19 (3)<br>19-21 (2)<br>21-23 (1-2)<br>23-07 (1) | 07-09 (2-1)<br>09-13 (3-2)<br>13-17 (2-3)<br>17-19 (3)<br>19-21 (2)<br>21-23 (2-1)<br>23-07 (1-0) |
| 20 | 09-00 (0-1) | 06-09 (0-2)<br>09-15 (1-4)<br>15-20 (1-3)<br>20-00 (1-2)<br>00-06 (0-1) | 06-09 (2-3)<br>09-16 (4)<br>16-21 (3-4)<br>21-00 (2-3)<br>00-06 (1-2) | 06-09 (3-2)<br>09-15 (4-2)<br>15-16 (4-3)<br>16-21 (4)<br>21-00 (3-2)<br>00-06 (2-1) |
| 40 | 07-11 (1-2)<br>11-16 (2-4)<br>16-20 (3-4)<br>20-22 (1-2)<br>22-07 (0-1) | 07-09 (2-3)<br>09-11 (2)<br>11-16 (4-2)<br>16-17 (4-3)<br>17-20 (4)<br>20-22 (2-4)<br>22-07 (1-3) | 07-09 (3-1)<br>09-16 (2-1)<br>16-17 (3-1)<br>17-20 (4-3)<br>20-22 (4)<br>22-05 (3-4)<br>05-07 (3) | 07-17 (1-0)<br>17-20 (3-2)<br>20-05 (4)<br>05-07 (3-1) |
| 80 | 06-11 (3-4)<br>11-15 (4-3)<br>15-21 (4)<br>21-04 (3-4)<br>04-06 (3) | 07-09 (4-1)<br>09-11 (4-0)<br>11-15 (3-0)<br>15-17 (4-1)<br>17-19 (4-2)<br>19-21 (4-3)<br>21-04 (4)<br>04-06 (3)<br>06-07 (4-2) | 07-09 (1-0)<br>09-15 (0)<br>15-17 (1-0)<br>17-19 (2-1)<br>19-21 (3-1)<br>21-04 (4)<br>04-06 (3)<br>06-07 (2-1) | 07-17 (0)<br>17-19 (1-0)<br>19-21 (1)<br>21-03 (4-3)<br>03-04 (4-2)<br>04-05 (3-2)<br>05-06 (3-1)<br>06-07 (1) |
| 160 | 17-18 (1-0)<br>18-19 (1)<br>19-21 (3-2)<br>21-23 (4-3)<br>23-05 (4)<br>05-07 (3-2)<br>07-08 (1)<br>08-09 (1-0) | 18-19 (1-0)<br>19-20 (2-0)<br>20-21 (2-1)<br>21-23 (3-2)<br>23-03 (4-2)<br>03-05 (4-3)<br>05-07 (2-1)<br>07-08 (0-1) | 20-21 (1)<br>21-00 (2-1)<br>00-03 (2)<br>03-05 (3-2)<br>05-06 (1)<br>06-07 (1-0) | 20-22 (1-0)<br>22-00 (1)<br>00-05 (2-1)<br>05-06 (1-0) |

## ALASKA
## Openings Given in GMT†

| *To:* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Eastern USA | *Nil* | 00-02 (1) | 12-15 (1)<br>22-01 (1)<br>01-03 (2)<br>03-05 (1) | 07-10 (1) |
| Central USA | *Nil* | 00-04 (1) | 13-16 (1)<br>23-00 (1)<br>00-02 (2)<br>02-04 (3)<br>04-05 (2)<br>05-06 (1) | 08-12 (1) |
| Western USA | 01-04 (1) | 17-23 (1)<br>23-04 (2)<br>04-06 (1) | 13-15 (1)<br>15-19 (2)<br>19-23 (1)<br>23-01 (2)<br>01-03 (3)<br>03-05 (4)<br>05-06 (3)<br>06-08 (2)<br>08-10 (1) | 07-09 (1)<br>09-13 (2)<br>13-14 (1)<br>09-12 (1)* |

*Indicates predicted 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2) or higher.

†See "How To Use Short-Skip Charts", in box at beginning of this column.

[*Continued on page 76*]

# SURPLUS sidelights

BY GORDON ELIOT WHITE*

THE only solid-state military RTTY demodulator we have seen in any sort of quantity is the AN/URA-17, a Navy unit which is now beginning to show up in at least modest numbers in the surplus trade. This column will outline the general characteristics of the unit.

The RTTY boys are familiar with the standard AN/URA-8 demod, of which the CV-89 is the usable section. This rack-mount or tabletop unit has been in wide use for at least ten years, and is one of the surplus items which has established a stable value, going for about $125 over almost all of the time it has been available.

The CV-483/URA-17 demod is almost a direct conversion of the CV-89 into solid-state circuitry, and should offer comparable performance with the increased reliability and decreased current drain. The unit is not awfully sophisticated, and does not have such refinements as the Signal Decision Threshold Computer of the Frederick 1200, or the motor control circuits of the ST-6, but the URA-17 is certainly a good general-purpose demod for high-frequency work. It is neither overly complex, nor is it one of the simple demods designed for wire line or v.h.f. AFSK work where fading is not a problem. The latter, such as the Northern Radio #152 are simply worthless on 40 meters where fading and distortion are heavy.

Fig. 1 is a front-panel view of the CV-483.

*1502 Stonewall Rd., Alexandria, Va. 22302

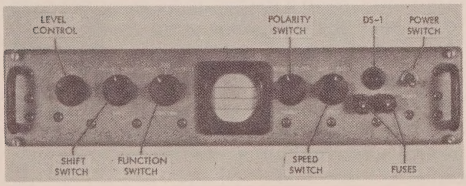



Fig. 1—Front panel view of the CV-483/URA-17, showing controls and tuning 'scope. When properly tuned, the demodulator shows two lines which "flip" as mark or space information is received.

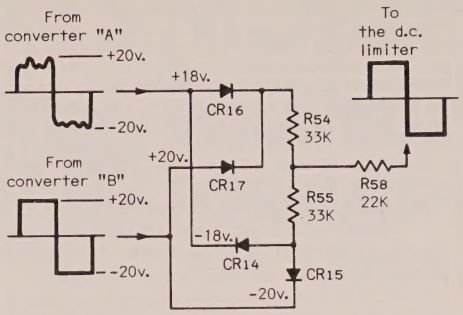



Fig. 2—Comparator circuit of the URA-17, showing how two CV-483's are connected so as to have the stronger signal drive the limiters.

In use by the Navy the unit is generally operated in parallel with a second demod, each attached to a separate receiver for diversity work.

Diversity, for the uninitiated, is the technique of using two or more receivers in order to be certain of getting a continuously reliable signal despite propagation conditions which cause signal fading. Diversity is based on the fact that fading on slightly different frequencies is not simultaneous, and that a fade on one signal is of opposite sense at points a half-wavelength apart. Space diversity, the only type usable by amateurs, involves erecting two antennas located a half-wavelength or more apart. When the signal is at a minimum at one location, it is likely to be at a maximum, or at least adequate, at the other.

It is of course not sufficient to merely tie the two antennas together, as phase cancellation can result. Two receivers are necessary,

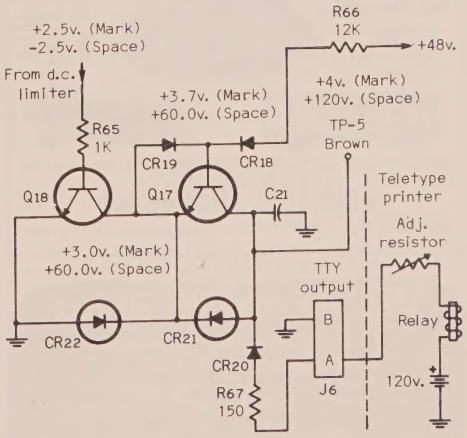



Fig. 3—Keyer (electronic relay) of the CV-483.

**SP-600(*) RECEIVER** 0.54-54 MHz continuous, overhauled, aligned, grtd, w/book ..... **$250.00**
**SSB CONVERTER CV-591A:** Get upper or lower sidebands from any rcvr. OK grtd, w/book ..... **$137.50**
**BRAND NEW FREQ-SHIFT TTY MONITOR: NAVY OCT-3:** FM Receiver type, freq. range 1 to 26 MHz in 4 bands, cont. tuning. Crystal calib. Reads up to 1500 Hz deviation on built-in VTVM. Cost $1100.00 each! In original box, with instruct. book & cord, FOB Mariposa, Cal. Min. signal needed: 15 mv; shipping wt. 110 lbs. ..... **$49.50**

**HIGH-SENSITIVITY WIDE-BAND RECEIVER**
**COMMUNICATIONS • BUG DETECTION**
**• SPECTRUM STUDIES**

**38-1000 MHZ AN/ALR-5:** Consists of brand new tuner/converter CV-253/ALR in original factory pack and an exc. used, checked OK & grtd main receiver R-444 modified for 120 v. 50/60 hz. The tuner covers the range in 4 bands; each band has its own Type N Ant. input. Packed with each tuner is the factory inspector's checkout sheet. The one we opened showed **SENSITIVITY:** 1.1 uv at 38.4 mhz, 0.9 at 133 mhz, 5 at 538 mhz, 4½ at 778 mhz, 7 at 1 ghz. The receiver is actually a 30 mhz IF ampl. with all that follows, including a diode meter for relative signal strengths; an atten. calibrated in 6 db steps to 74 db, followed by an AVC position; Pan., Video & AI outputs; switch select pass of ±200 khz or ±2 mhz; and **SELECT AM or FM!** With Handbook & pwr. input plug, all only ..... **$375.00**
CV-253 Converter only, good used w/book ..... **$89.50**
Meas. Corp. No. 59 Grid Dipper 2.2-420 mHz ..... **$75.00**
**NEMS-CLARKE No. 1670** FM Rcvr 55-260 MHz, like new. ..... **$275.00**
**WWV Rcvr/Comparator** 2½ - 20 MHz, w/scope. **$250.00**
**RECEIVER/COMPARATOR FOR 60 KHZ WWVL** standardizes to 1 part in 10 billion with inexpensive oscillators- **$495.00**

**Attention!**
**Buyers, Engineers, advanced Technicians:**
*We have the best test-equipment & oscilloscope inventory in the country so ask for your needs . . . don't ask for an overall catalog . . . we also buy, so tell us what you have. Price it.*

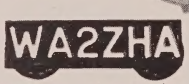
**R. E. GOODHEART CO., Inc.**
**Box 1220 GC, Beverly Hills, Calif. 90213**
**Phone: Area Code 213, Office 272-5707**

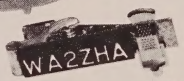
**PERSONALIZED ENGRAVING**

ELECTRIC
**ON-THE-AIR SIGN**
WITH CALL




Works on 110 VAC
**$12.95**




**Metaltex Lapel Bar — $1.50** **Metaltex Tie Clip — $2.25**
SEND FOR FREE CATALOG
**ARNOLD'S ENGRAVING**
**2041 Linden St.** **Ridgewood, N.Y. 11227**

**TELETYPE-RIBBONS-TOROIDS**
*Lowest prices anywhere!*
**88 mhy TOROIDS 30/$10. ppd. —**
**Fresh RTTY Ribbons 12/$3.50 ppd.**
**MACHINES – GEARS – SUPPLIES – TAPE**
Stamp for CATALOG **VAN W2DLT** 302Y PASSAIC AVE STIRLING, N J 07980

and their output signals are fed into the diversity demodulation system which chooses the stronger one.

The CV-89 units required a separate diversity combiner, which was hard to use, however the CV-483 has combiner circuits right in the demod. All that is needed is to hook up a pair of the units. Fig. 2 indicates the operable combining circuit. As shown in the diagram, the signal from converter A has a 20 volt peak, but is noisy, and the constant 20 volt peak on Converter B will develop a greater voltage across $R_{55}$, $R_{54}$ which will reverse bias $CR_{14}$, $CR_{16}$, and prevent the "A" signal from reaching the d.c. limiter. Obviously fading will also reduce one of the signals, allowing the stronger to take over. This is a great deal simpler than some previous comparator circuits and might be attractive for homebrew demods.

The URA-17 design is about 12 years old, and was built by Hoffman Electronics, in Los Angeles. Hoffman also built the CV-89/URA-8. The quite similar CV-60/URA-6 was the RCA version, made on another contract.

Power requirements are 117 v.a.c., 50 to 400 Hz. Signal input should be 600 ohm audio. Shifts may be wide or narrow from 10 to 1000 Hz. The unit will handle signal speeds up to and beyond 100 w.p.m. It will key the standard 60 milliampere RTTY loop, but does not contain a loop power supply. The only vacuum tube in the set is the 2BP1 'scope tube. There are 24 transistors and 34 diodes in the circuit.

Overall, the demod weighs 26 pounds. The Manual is *NavShips 94028*.

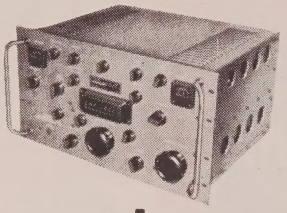
Hookup is pretty much self-explanatory. Unless a remote 'scope is to be used, or a second demod to be hooked up for diversity, those terminals may be ignored. On the TTY OUTPUT connector, A is positive and B is negative d.c.

The design is straightforward limiter-discriminator, with a matching transformer used to balance the 600 ohm input to the 8,000 ohm impedance of the bandpass filter Z-1. Either wide or narrow shift is selectable from the front-panel control. Narrow shift is 10-200 Hz, wide shift is 200-1000 Hz.

The discriminators are double-peaked, rather broadly tuned circuits, the narrow one centered at 1000 Hz, the wide one at 2550 Hz. They do not offer the ultimate in sharpness, but are a compromise allowing for copy with a variety of transmitted shifts and are

# LIBERTY PAYS MORE!!

**WILL BUY FOR CASH ALL TYPES**



**WILL BUY FOR CASH ALL TYPES**

- ELECTRON TUBES
- SEMICONDUCTORS
- Military Electronic Equipment
- Test Equipment

WIRE, WRITE, PHONE COLLECT! WE PAY FREIGHT ON ALL PURCHASES

## Liberty Electronics, Inc.

548 Broadway, New York, New York 10012, Phone 212-925-6000

## WORLD QSL BUREAU

5200 Panama Ave., Richmond, CA USA 94804

THE ONLY QSL BUREAU to handle all of your QSLs to anywhere; next door, the next state, the next country, the whole world. Just bundle them up (please arrange alphabetically) and send them to us with payment of 5¢ each.

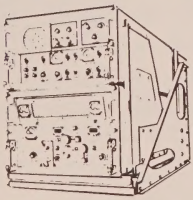
WE PAY HIGHEST CASH PRICE FOR ELECTRON TUBES & SEMICONDUCTORS

IMMEDIATE PAYMENT ON UNUSED TUBES

**H & L ASSOCIATES**

ELIZABETHPORT INDUSTRIAL PARK
ELIZABETH, NEW JERSEY 07206
(201) 351-4200

## Save over $9,000.00 on this AN WRR-2 SSB Receiver!



Original government cost: over $10,000.00! One of Navy's most modern radio receiving sets. Built by National Radio Co. in last decade. A triple conversion super-heterodyne. Frequency range: 2 to 32 MC. continuously, or in 1 kc increments. 4 bands. Featuring full carrier suppression, unit receives AM, CW, MCW, voice, facsimile, Teletype and ISB. REQUIRES NO MODIFICATION! Greatly superior to earlier R390A/URR model. Good cond. Complete, operational. Spec sheet available. Spare parts as needed.

**$495.**

Overhauled and certified.... **$595.00**

Xerox copy of Operation Repair Manual: $35. Add $100.00 for 1/2 kc in lieu of 1 kc increments.

### RADIO RECEIVER R-108/GRC

Late model Army Comm. Recvr! 20-28 Mc. FM. Cont. or pre-set freq. OK for AM with simple modification. With schematic and hook-up info. Like new. Smashing low price! **$19.95**

24 VDC POWER SUPPLY for above.....$4.95

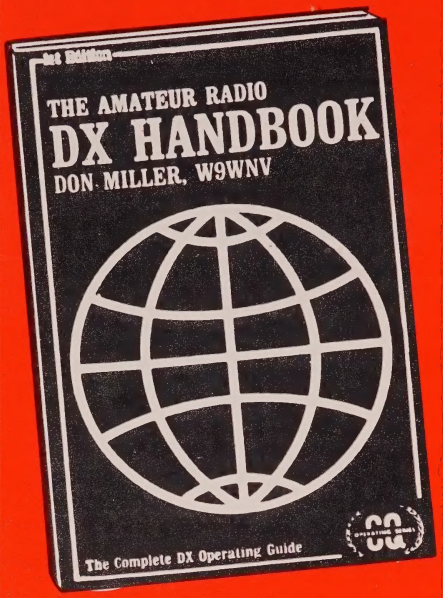
### NAVY TCS TRANSMITTER

Just arrived! This collector's item is now available in new condition! 1.5 to 12 Mc. CW and AM. 50 watt CW. Ideal for a raft of multi-purpose uses. Designed by Collins Radio. Brand new! A Columbia special.....**$75.00**

## Columbia Electronic Sales, Inc.

P.O. Box 9266-Q, 7360 Atoll Ave, North Hollywood CA 91609 Tel (213) 875-2970 & 764-9030

Here's what the DXer has been asking for!




THE AMATEUR RADIO
DX HANDBOOK

- Great Circle Bearing Charts
- Designing the DX Antenna Farm
- Finding the rare DX
- International + local regulations
- Scoring on DX contests

$5. postpaid

CQ Magazine
14 Vanderventer Ave
Port Washington, LI, NY 11050

Please send me _____ copies of the DX Handbook. $ ____ enclosed

Name _____

Address _____

City _____ State _____ Zip _____


tolerant of considerable receiver mis-tuning.

The detectors are followed by a keying filter, the d.c. differential amplifier, and an axis restorer, designed to restore symmetry to the signal despite drift of the signal in transmission.

The d.c. limiter provides post-detection limiting, helpful in reducing garble from strong noise pulses.

The loop keyer, fig. 3 is merely a d.c. switch in the loop circuit. The Mark-hold circuit will lock up the printer and prevent it running "open" during interruptions of the incoming signal, or during long, deep, fades.

Internal power supplies in the CV-483 are 48 volts d.c. for the signal circuits and -560 volts d.c. for the CRT.

## Propagation [*from page 72*]

### HAWAII

Openings Given in Hawaiian Standard Time†

| *To:* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Eastern USA | *Nil* | 11-14 (1)<br>14-16 (2)<br>16-18 (1) | 13-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-02 (1)<br>02-04 (2)<br>04-08 (1) | 18-20 (1)<br>20-00 (2)<br>00-02 (1)<br>21-00 (1)* |
| Central USA | *Nil* | 08-13 (1)<br>13-17 (2)<br>17-19 (1) | 07-09 (2)<br>09-13 (1)<br>13-16 (2)<br>16-18 (4)<br>18-20 (3)<br>20-22 (2)<br>22-05 (1)<br>05-07 (3) | 18-21 (1)<br>21-22 (2)<br>22-01 (3)<br>01-02 (2)<br>02-03 (1)<br>20-22 (1)*<br>22-00 (2)*<br>00-02 (1)* |
| Western USA | 14-17 (1) | 08-11 (1)<br>11-18 (2)<br>18-19 (1) | 06-08 (3)<br>08-13 (2)<br>13-15 (3)<br>15-18 (4)<br>18-20 (3)<br>20-22 (2)<br>22-04 (1)<br>04-06 (2) | 18-19 (1)<br>19-20 (2)<br>20-02 (4)<br>02-04 (3)<br>04-05 (2)<br>05-06 (1)<br>19-20 (1)*<br>20-22 (2)*<br>22-02 (3)*<br>02-03 (2)*<br>03-04 (1)* |

*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.

## Awards [*from page 69*]

which took place in 1912. Any radio amateur can avail himself of this certificate by sending a transcript of his log of 12 entries showing contacts with New Mexico amateur radio stations dated from January 1, 1972 to December 31, 1973. Send request and 8¢ postage (I assume DX stations should include sufficient postage or IRCs to cover postage to them) to: William Obrist, W5FT, 808 San Pedro Drive S.E., Albuquerque, New Mexico 87108.

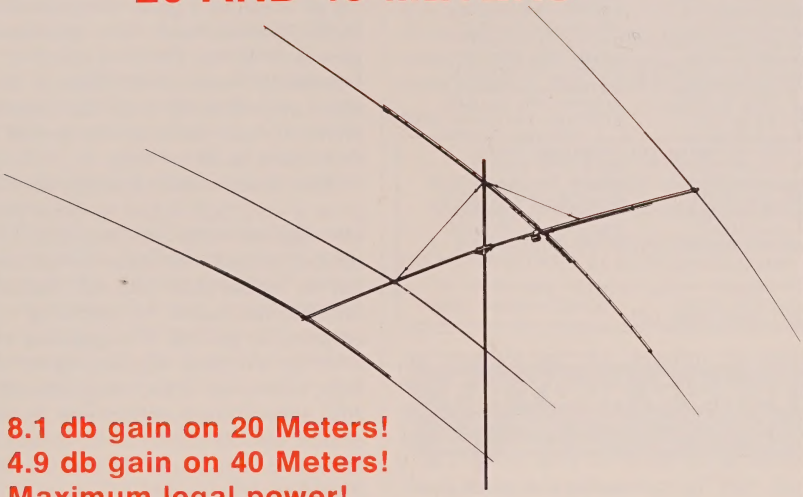
The Most Powerful Antennas Under the Sun

hy-gain

# DB-24B

## DuoBand Does It Best!

## 20 AND 40 METERS



**8.1 db gain on 20 Meters!**
**4.9 db gain on 40 Meters!**
**Maximum legal power!**

The Hy-Gain DB-24B is the top combination for top performance on 20 and 40 meters. Uses three full-sized elements on 20 meters and two 2/3 size elements in conjunction with Hy-Gain's perfected linear loading on 40 meters. Unique linear decoupling stubs make two band operation possible without inductance and capacity traps. Feeds with 52 ohm coax and is equipped with balun and Beta Match for optimum energy transfer. F/B Ratio: 20 meters, 20-30 db; 40 meters, 10-20 db. Boom length 24 ft., longest element 43 ft., maximum input 1 kw, AM.

***DB-24B...for top duoband performance!***

**Order No. 396** **$199.95**

**HY-GAIN ELECTRONICS CORPORATION**
Box 5407-FG Lincoln, Nebraska 68505

### Notes

Sad to report the loss of two County Hunters, if space permitted, I could fill the column telling all the accomplishments of both. Olin Munger, WAØZCQ on March 9 and Mike Lintener, WA3HGV, #21 All Counties, "Story" page 74, September 1970, *CQ*. May we *all* express our sympathy to their families and friends.

Ran out of space, How was your month?

73, Ed., W2GT.

---

**DX** [*from page 62*]

**XT2AA**—Via W1AM for Jan. 31-Feb. 7, 1973 operation only.
**XT2AG**—W/K/VE operators QSL to W1AM
**XT2AK**—W/K/VE operators QSL to W1AM
**XT2AM**—c/o W1AM
**XV5AC**—Via W1YRC
**ZE6JP**—To K6AQV
**ZS2MI**—c/o ZS6LW
**1S1A**—Via W1YRC
**3B8DX**—To WB9BPG
**3D2GK**—c/o K7DVK
**3D6AM**—Via K6KII
**3D6AX**—To WA5EEV
**3X1P**—c/o SMØKV
**4C4AA**—Via W2GHK
**5B4AA**—To G3XMQ
**5H3JL**—c/o WØNNC
**5T5BH**—Via OH2NB
**5W1A**—To W6KNH
**5X5NK**—c/o DJ3JV
**6J1M**—Via XE1FFC
**6V8WS**—To W2GHK
**8R1MD**—c/o VE3FLE
**9C9TW**—Via GI3HXV
**9F3USA**—For period April 1, 1971-Jan. 19, 1972 QSL c/o VE3IG.
**9H1C**—To W9SCD
**9L1JT**—c/o W4ZYQ
**9N1MM**—Via W3KVQ
**9X5MV**—To DJ2AZ
**9X5NA**—c/o W7LEA
**9Y4T**—Via CE3CBG

73, John, K4IIF

---

**Q & A** [*from page 14*]

Check all voltages. Let the set heat up, check the voltages to the v.f.o. section. Then let it get cold—then turn on the set and immediately check the same. I suspect voltage regulation is the cause of your chirp. Use a vacuum tube voltmeter. On the other hand, check set alignment and your operational loading!

73, Chuck, W6QLV

---

**Test Probe** [*from page 46*]

more than one evening. I built mine in a clear plastic cigar tube, but you can use any form of container you might have available. A circuit board of 3/4 × 2 inches is large enough for all components and the parts layout is not at all critical. Almost any NPN switching type of transistor will work for $Q_1$. I just used one out of the junk box. The best part of this project is the cost. The SN7400 IC is currently selling for 24 cents. The LEDs are called "micro mini #50 red LEDs" and are currently selling for 50 cents each. The transistor, if you don't have one in the junk box, sells for about 25 cents. So as you can see, you can build a really useful project for less than $2.00. ■

**SSTV** [*from page 52*]

CRT, the signal output goes up, but the resolution is reduced because the relatively large area photocathode "looks at" the transparency and the spot behind it from several angles at once. Since the spot is spaced behind the transparency by the 1/16 to 1/8 inch glass thickness, the resolution will go down. A .015" wide black line, for example, will never completely block the photomultiplier cathode's view of the .015" diameter spot on the CRT face. The answer is moving the photomultiplier away from the CRT face, and masking off part of the photocathode area. I have found a spacing of 8" to be a good compromise. The effective photocathode size, projected on the glass wall of the 931-A is about 1" × 3/8". I generally mask off all but a 1/2" × 1/2" clear area directly over the center of the photocathode, covering the rest of the glass with black paint or tape.

This direct contact transparency approach gives a very high signal to noise ratio. Since spot size normally gets smaller if CRT beam current is reduced, some of this excess signal to noise ratio can be traded for increased resolution by reducing the beam current. In general it is possible to achieve both an excellent signal-to-noise ratio and high resolution. This, coupled with the low cost, ease of construction, and freedom from critical optical adjustments, makes it a very attractive approach. More on other approaches next month.

### Things For Sale

I am delighted to pass along word about available bargain slow-scan goodies when available in reasonable quantities. Recently, I have received a couple of requests to pass along word about individual pieces of equipment for sale. This does not seem to me an optimum use of our column space. I suggest that both sellers & searchers use the *Ham Shop* classified ads for this sort of thing. I just looked through the ads in the May issue and found eight ads concerning video gear. (Remember that these ads are free to *CQ* subscribers, up to a 3 line maximum per month.)

Vy 73, Cop, W0ORX

---

**FB7 Receiver** [*from page 35*]

output transformer used in conjunction with a loud speaker. For normal earphone use, an output jack is provided in the plate circuit of

the 56 detector stage. When earphones are used, it is suggested that the 59 audio tube be removed. If it is run with no output transformer, or without a proper load, the screen grid of the tube will run red hot!

Finally, the user must always remember to turn off the B-plus switch on the panel of the receiver before changing coils. If he neglects to do this, it is possible to get a nasty shock from the oscillator coil if it is not plugged in properly. Aside from these cautions, the receiver works smoothly and easily.

The lucky owner of a "new" FB-7 should check all the bypass capacitors before he turns the set on. Once the receiver is working properly, he should peak the trimmer capacitor in the detector coil for maximum signal response with the particular antenna in use. Finally, he should make sure that antenna coupling is sufficiently loose so that he is not plagued with spurious signals. A variable mica capacitor of about 100 pf placed in series with the antenna lead is very helpful in this respect.

The FB-7 type receiver is mechanically and electrically unstable, judged by today's standards. The use of a voltage regulated power supply is recommended and it is suggested that the bolts holding the main tuning capacitor be loosened and the capacitor moved about a bit until sideways strain on the dial mechanism is reduced to a minimum. This tends to reduce residual backlash in the tuning mechanism.

By judicious adjustment of the oscillator and mixer padding capacitors it is possible to make the receiver track roughly with the dial chart placed on the front panel by the optimistic designer. The years have taken their toll, however, and most FB-7 receivers tested by the author have aged in such a fashion that the original calibration chart is in error by 10 kilocycles, or more, at one end of the dial, or the other. Perhaps it was never better than this . . . who knows?

However, even with the built-in faults, the FB-7 remains a classic example of superheterodyne receiver design of the early "thirties." The set looks as if it was handwired beneath the chassis and a modern circuit designer will shudder when he notices that component grounds were achieved by riveting a soldering lug and lock washer combination directly to the *painted* chassis (fig. 7). Good or bad, the idea worked, and the odd-looking ground connections seem to be as good today as the day they were made!

### Good Bye to the FB-7

Compared to the SW-3, the life span of the FB-7 design was quite short, as the advertisements for the receiver disappeared from the pages of the ham magazines around 1937. Newer receivers featuring bandswitching, preselection and the high transconductance 6.3 volt tubes began making their appearance and production of the FB-7 was eventually discontinued. But for a brief spell, the FB-7 had led the field, introducing the radio amateur to the delights of single signal reception, using the Lamb crystal filter. The way was open for the appearance of the modern bandswitching communication superheterodyne. After a pause, two giants strode into the arena and in the span of a few years, the concept of a real communication receiver became a reality. But that's another story! ■


**WANTS TO BUY**

**All types of military electronics equipment and parts. Call collect for cash offer.**

SPACE ELECTRONICS division of
MILITARY ELECTRONICS CORP.
76 Brookside Drive, Upper Saddle River
New Jersey 07458 / (201) 327–7640.

**FM YOUR GONSET**

(or your Clegg 22'er, Poly-Comm 2, PC-62, Johnson 6N2, Aerotron 500, HA-460, TX-62 or VHF-1)

- New! Plug-in modulator puts the Communicator transmitter on FM.
- No modification or rewiring on your Communicator. Just plug into mike jack and crystal socket.
- Compact self-contained modulator measures 4" x 3" x1½".




- Works with Communicator I, II, III, IV and GC-105, and other rigs listed.
- FM at a tenth the cost of a new rig.
- Frequency adjust for netting built in.
- $34.50 postpaid U.S.A. $36.50 for PC-2, PC-62, HA-460. Specify transmitter model. California residents add 5% sales tax. (HC-6/U crystal and 9 volt transistor battery not supplied.)
- Send for free descriptive brochure.

**PALOMAR ENGINEERS**
BOX 455, ESCONDIDO, CA 92025

individual-to-individual communication. FCC Commissioner Nicholas Johnson, a man about my own age has said it so well that I must pass along this quote from his book *Test Pattern for Living:*

"No age is easy; but being in one's thirties at this time is especially difficult. You are caught between cultures. The temptation is to take sides, to move either forward or backward in time. The challenge is to stand firm, to try to discover as precisely as you can your honest-as-possible self, to pick the best from all possible worlds, and try to encourage constructive communication between two generations that seem to be missing most of what the other is saying. That is what many my age realize to be their responsibility and their opportunity; it is what I am trying to do."

It is what I am trying to do also, and I can think of no better tools than ham radio and slow-scan TV to help in the process. Broadcast TV is a one-way medium with Big Money deciding what you'll see and what you won't. Slow-scan TV is do-it-yourself audio-visual dialogue with each individual deciding that part of his life he wants to share. Slow-scan makes it easy and natural to step into another person's life; if he wants to let us in, and share his feelings with us. If we restrict ourselves to the stilted, formula kind of communication that now fills the h.f. bands, we have no tools, just very expensive toys. Let's put this in perspective. I figure that the typical ham on the air with slow-scan has spent a couple of thousand dollars on ham gear. The typical Latin American would have to work at physical labor, 10 hours a day, 6 days a week, for over 6 years to make $2000. Don't misunderstand me, if a society has an excess of wealth, I think it's quite appropriate to spend some of that wealth on tools for communication. The crime, to me, is in spending the money, and then letting the tools rust. Like spending $600 for slow-scan gear and then sending only cheesecake photos, and test patterns, and "cute" comments.

"OK, I want to use my toys as tools. Where do I start?"

There are many directions. The first involves making our casual QSO's something other than casual. We can start by getting our images together. By gathering those pictures together that tell something about ourselves. Pictures that get into some of the things outside of ham radio that we're interested in. Pictures that help us tell how we feel about some of the important questions we're all facing. To quote Nicholas Johnson again: "It seems to me we ought to share with each other such incomplete and imperfect insights as we've evolved. We ought not be shy about the personal facts of our lives just because we're unsure of ourselves. We ought to help each other. We damn sure aren't getting any help from Big Business, Big Broadcasting, or Big Government." What a tool ham radio could be for finding others and sharing those insights!

Most of the other directions involve a considerable expansion of the roundtable concept. First, an expansion in the variety of participants. There are innumerable non-hams who would be glad to share their special knowledge with a group of hams in an on-the-air roundtable. The rules allow you to permit "any third party to participate in amateur radio communication . . ." over your station. Imagine roundtables involving some of your most interesting non-ham friends. Roundtables that include slow-scan tapes that you have made of them doing their thing, or some of their slides transferred to slow-scan.

Second, is a great geographic and cultural expansion. Let's look at some of the possibilities. How about honest and open dialogue between people in different cultures—perhaps with "I'm OK/you're OK" ground-rules? In this country alone there are a number of cultures and sub-cultures. The middle class culture. The youth culture, or counterculture. The urban Black culture. The Puerto Rican culture. The Southern culture. The Mexican-American and American Indian cultures. True, most hams come from the middle class straight American culture, but through "third party" roundtables a Montana rancher might have his first rap with a New York Black man. Crossing international boundaries opens another layer of possibilities. How does your outlook differ from the outlook of a Canadian or a New Zealander? How well does Sweden's welfare state *really* work? How does an Isreali view internal U.S. problems? We need inputs from outside the U.S.

Some doors to dialogue will be closed, of course. While travelling in the South Pacific I met a ham who told me that things were

# 100 WATTS from a TR-22?

## YES... WITH NEW DYCOMM MODEL 1-10-0 BOOSTER

- 1-2 WATTS IN GIVES YOU 90-100 WATTS OUT
- THE ULTIMATE IN MOBILE POWER USING YOUR PERSONAL PORTABLE

**$220.00**

## UHF *models now available...*

| | | | |
|---|---|---|---|
| MODEL 470-25 | 3-7 WATTS IN | 15-30 OUT | $197.00 |
| MODEL 470-30 | 1-2 WATTS IN | 20-30 OUT | $227.00 |

## PLUS *the old reliables...*

| | | | |
|---|---|---|---|
| 10-0 | 10 W input | 100 W output | $195.00 |
| D | 10 W input | 40 W output | 99.95 |
| ES | 1 W input | 40 W output | 99.95 |
| ECHO in Rack Mounted Repeater | | | 600.00 |

*Write for data sheets on all MODELS*

948 AVE. E. P. O. Box 10116
RIVIERA BEACH, FLA. 33404

**DYCOMM**

# EARSPLITTER

*"The distinctive Warning Signal"*

**$35.95**

Introductory Price

1.5 pounds
Size 6" x 5"



## ELECTRONIC SIREN ES-900

Now being used by:
Vol. firemen, aux. police, boats, fire alarm systems, burglar alarm systems, etc.

**The EARSPLITTER ES-900** emits a loud, attention-getting, penetrating, rapid yelping sound, just like the new sirens used on the latest police, fire, and emergency vehicles.

**No moving parts to wear out or rust!**

- The tone varies from low to high automatically.
- Draws less than 1 ampere from battery.
- Will operate on (2) 6 volt lantern batteries.
- Optimum voltage is 13 volts D. C.
- Electronic and aluminum trumpet horns are built into one integral unit which is totally waterproof.

When YOU need attention..... get EARSPLITTER

Also available as car theft alarm ..... $39.95

Send Check or M.O. to
**HOUSE OF POWER**
P. O. Box 306 Merrick, N. Y. 11566

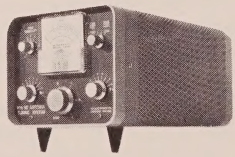
# KW107 *it's beautiful!*

**$134.95**
Ppd in USA & Canada
Money back Guarantee

## SUPERMatch

- E-Z Match Tuner
- SWR Meter
- Power Meter
- Dummy Load
- Antenna Switch
- 350 watts PEP

Clean up the unsightly tangle of wires around the shack and your wife will think it's beautiful.



**KW Electronics**
10 Peru St., Plattsburgh, N.Y. 12901
In Canada: 4564 Dufferin St. Downsview, Ontario

Send for FREE Literature

# Van's W2DLT Electronics

**201-647-3639**




**DESKFAX 6500a**
2/$29

- EXCITER BULBS $3. ppd.
- STYLUS & CLIP 3/$1. ppd.
- OTHER PARTS (SFO)
- TXC-1 BIG FAX WITH P.S. EXC. $100.
- TOROIDS & RTTY
- TOO. NEW PICTURE CATALOG-STAMP

READY TO GO !!!
- PAPER $4/pkg. (250 sheets)
- $15/case 5 pkg. Cut to size $5
1000 blanks.....

**302Y Passaic Ave., Stirling, NJ 07980**

so controlled in his country that he could not even discuss the population of the country on the air. In those countries which permit freedom of expression, however, what is our excuse for not discussing the subjects that vitally concern the future of our Planet —matters of war, and of peace, of natural resources, and human needs?

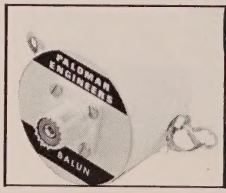
The third dimension of roundtable expansion is subject matter. Our concept of what education is all about is changing drastically. We're beginning to see the limitations and damaging side effects of traditional schooling. People are realizing that it is the end result (competence) that counts, not the process by which an individual acquires that competence. Ivan Illich in his book, *Deschooling Society,* says that, "A good educational system should have three purposes: it should provide all who want to learn with access to available resources at any time in their lives; empower all who want to share what they know to find those who want to learn it from them, and finally, furnish all who want to present an issue to the public with the opportunity to make their challenge known."

Think how well ham radio and slow-scan TV mesh with this concept of education. Geographic barriers are gone. A farmer in Oregon could hold his free organic gardening classes every day at noon on 14235, and interested individuals and groups all over the country could participate. The Saturday afternoon slow-scan net is an example of this right now. Now many Saturdays has Ralph Taggart held the interest of the group by informally teaching about some phase of slow-scan? In bringing those who know, together with those who want to know, SSTV has incredible possibilities. Even in the matter of bringing issues before the public, ham radio might be useful. Unlike a broadcast talk show where the M.C. picks the topic, in an amateur roundtable each ham is as free as the next to pick the subject or change it. There is no reason why national "town meetings" couldn't be held on-the-air on particular topics. The group would not have to be limited to hams only. A group of tens or even hundreds of people might participate, carrying on a discussion of issues around the country; or around the world, where third party regulations permit. And let's not forget that ham radio, by its very nature, is a First Amendment insurance policy. I cannot imagine a regime repressive enough to completely silence amateur radio. The Nazis tried to silence the Dutch and Norwegian hams in World War II, and failed. Today there must be a million ham rigs spread around the earth. Too many for communication between geographically separated people ever to be completely cut off, no matter what political or other disaster should strike.

Where do we go from here? Really communicating is not going to appeal to a lot of hams. Some hams are happy with the status quo. They don't want to probe into themselves or into anything upsetting or unpleasant. Some hams are scared. There are psychologists who feel that many hams hide behind their black boxes and are afraid of real communication. This won't be for them. Some hams are hung up on hardware. They are into electronic communication techniques, not communicating. They're into the *process* of communication, not the content. Fortunately, there is room enough in ham radio for a great diversity of interests. If all this talk about communicating turns you off; fine—continue to do your thing, whatever it is. I think and hope though, that we will find a growing group that are not going to remain satisfied to use their $2000 worth of equipment only to exchange signal and weather reports. Those of us who are concerned with meaningful communication — let's get in touch, and keep in touch. There's a lot to be done. ■

**AX-190 Improvements** [*from page 55*]

mic transfer characteristics of the diode will produce a gain control curve of the front end of the receiver which will produce a very constant output from the r.f. stage for widely varying signal strengths. It is important that the polarity of the diode be observed, and it should be installed so that the cathode is connected to the base of $Q_2$, the a.g.c. amplifier transistor for the r.f. stage. ■


**New! BALUN**

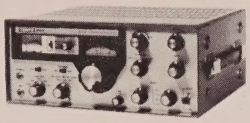
- 1:1 for dipole or inverted Vee.
- 1.7 to 30 MHz. Full KW power.
- Sealed — weatherproof.
- $12.95 PPD USA. 5% tax in Calif
- Order direct. Free brochure.

**PALOMAR ENGINEERS**

BOX 455, ESCONDIDO, CA 92025

TS 900
SSB TRANSCEIVER
$795.00
R–599 SOLID STATE
RECEIVER
$389.00
T–599 HYBRID
TRANSMITTER
$429.00
TS-511S
SSB TRANSCEIVER
$415.00

KENWOOD



"ONE"
SSB TRANSCEIVER
$349.00
AC/ONE
POWER SUPPLY
$99.00
DC/1A
POWER SUPPLY
$110.00

TEMPO



SBE
SSB TRANSCEIVER
$969.00
(AC Supply Included)

SBE



SB-36

*These and other popular Ham Equipment available at:*

SPECTROSONICS, INC.

NORTH:
10349-59 S. Western Ave.
Chicago, Ill. 60643
(312) 233-8094

SOUTH:
106 E. Washington St.
Momence, Ill. 60954
(815) 472-6610

SEND FOR FREE CATALOGUE





# Build NRI's NEW 25" Solid State Color TV as you learn Radio-TV Servicing in your home

Start earning $5 to $7 an hour in your spare time servicing television and radio sets . . . with NRI's TV-Radio Servicing Course. NRI supplies you with simple "bite-size" texts, a step-by-step learning program; and an exclusive 25" square picture tube, solid state, color TV set that you build yourself as you learn.

NRI also offers home study courses to obtain your FCC license; automotive mechanics, appliance servicing, computer electronics, air conditioning and refrigeration. Get full details about any of the home-study programs offered by NRI . . . the leader in its field. Mail the coupon for your free catalog. There's no obligation. NO SALESMAN WILL CALL. NRI Training, 3939 Wisconsin, Washington, D.C. 20016.

AVAILABLE UNDER GI BILL. If you served since January 31, 1955, or are in service, check GI line in coupon.

**MAIL NOW for FREE CATALOG**

NRI TRAINING 28-053
3939 Wisconsin Avenue, Washington, D.C. 20016

Please rush me the free catalog I have checked below. I understand there is no obligation. NO SALESMAN WILL CALL.

- ☐ TV-Radio Servicing (with color)
- ☐ Advanced Color TV
- ☐ Complete Communications Electronics
- ☐ FCC License
- ☐ Aircraft Communications
- ☐ Mobile Communications
- ☐ Marine Communications
- ☐ Amateur Radio
- ☐ Electrical Appliance Repair
- ☐ Air Conditioning & Refrigeration
- ☐ Master Automotive Technician
- ☐ Automotive Tune-Up & Electrical Systems
- ☐ Computer Electronics
- ☐ Electronics Technology
- ☐ Electronics for Automation
- ☐ Basic Electronics
- ☐ Math for Electronics
- ☐ Basic Data Processing & Computer Programming

☐ CHECK HERE FOR FACTS ON GI BILL.

Name _____ Age _____
(Please Print)
Address _____
City _____ State _____ Zip _____

Accredited Member National Home Study Council





**AMERICA'S FINEST telescoping, tilt-over amateur radio towers.**

*SAVE! Buy direct from the factory!*

Heights to 115 feet. Immediate delivery! Guyed towers also available to any desired height. See your dealer or phone us direct: Area Code 813/ 971-1961. Write or phone TODAY!

E-Z WAY Products, inc.
P.O. Box 17196
Tampa, Florida 33612

THE BIG SIGNAL

# "W2AU" BALUN $12.95




IT'S WHAT'S INSIDE THAT COUNTS!

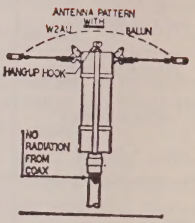
1. **HANDLES FULL KW INPUT—THEN SOME.** Broad-Banded 3 to 40 Mc.
2. **HELPS TVI PROBLEMS** By Reducing Coax Line Radiation
3. **NOW ALL STAINLESS STEEL HARDWARE.** SO239 Double Silver Plated
4. **IMPROVES F/B RATIO** By Reducing Coax Line Pick-Up
5. **REPLACES CENTER INSULATOR.** Withstands Antenna Pull of Over 600 Lbs.
6. **BUILT-IN LIGHTNING ARRESTER.** Protects Balun —Could Also Save Your Valuable Gear
7. **BUILT-IN HANG-UP HOOK.** Ideal For Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads

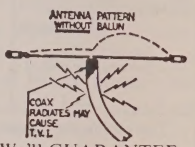
NOW BEING USED EXTENSIVELY BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER

***BIG SIGNALS* DON'T JUST HAPPEN—GIVE YOUR ANTENNA A BREAK**

Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

*AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT*




We'll GUARANTEE no other balun, at any price, has all these features

**UNADILLA RADIATION PRODUCTS**
MFRS. OF BALUNS & QUADS
Tel: 607-369-2985
**UNADILLA, N.Y. 13849**
Dept. CQ

**CASH PAID..... FAST!**
For your unused TUBES, Semiconductors, RECEIVERS, VAC, VARIABLES, Test Equipment, ETC. Fair Dealings since 1938. Write or call now! Barry, W2LNI.
**BARRY ELECTRONICS, 512 Broadway, New York, N. Y. 10012. (212-WA5-7000) (We buy factory termination & from individuals).**

## Math's Notes [*from page 55*]

is a true LED unit, .3" by .5" in a DIP package, with a digit size of .270" by .160" and readable over a 140 degree viewing angle. The device requires only 10 to 25 milliamperes per segment and may be directly interfaced with all 5 volt TTL circuitry. Incidentally, the device is a common cathode device; you feed your signals to seven anodes of the LED's. For the volume users, 100-999 price is $2.80, and 1000 and up is $2.50.

See you next month. 73, Irv, WA2NDM

## Announcements [*from page 8*]

Others add ARRL Section. Freqs.: 7065, 7290, 21065, 21440 plus 40 and 15m. Novice bands. Send complete logs to WB6HNX by August 15, 1973.

### Stolen Equipment

Stolen from car of W4GF at Dayton, Ohio, Apr. 29: Yaesu FT-101 w/160m & c.w. filter, No. 82G12279; Regency HR-2 w/147.00, 146.97, 94, 91, 76, 37, 34, 31 & 16 xtals, No. 03-02030. Reward for info leading to recovery. Contact Bill Grenfell, W4GF, 7216 Valleycrest Blvd., Annandale, VA 22003. Tel. 703-560-5229.

### Palmyra, Illinois

The Quad-Co. Amateur Radio Club, Inc., will sponsor the 16th Annual Hamfest of the "Breakfast Club" on July 14 and 15 at Terry Park, 3/4 mile east of Palmyra, IL. All groups invited giving prior notice. Dancing and movies Saturday night, basket lunch, sandwiches and soft drinks available, games, contest, golfing and fishing. Bring your swap gear. Pre-registration until July 4th is $1.00, $1.50 at the gate. Write "Hamfest," c/o Quad-Co. ARC, Box 81, Chatham, IL 62629.

### Oak Creek, Wisconsin

The South Milwaukee ARC will hold its Swapfest '73 on Saturday, July 14, from 7 a.m. until ?, at the VFW Post 434, 9327 Shepard Ave., Oak Creek, Wis. Admission $1.00. Food available, prizes, "Happy Hour." WA9TXE/9, talk-in 146.94.

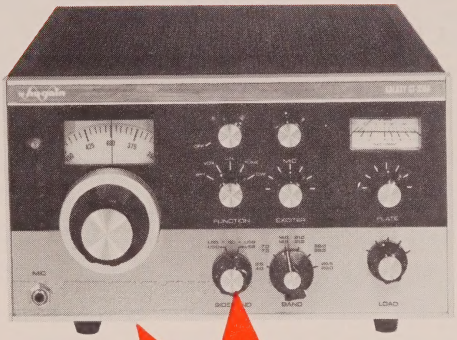
### Dunseith, North Dakota and Boissevain, Manitoba

The yearly International Hamfest dedicated to friendly cooperation between Canadian and American amateurs is scheduled for July 7 and 8 at the American Lodge in the International Peace Garden between Dunseith, North Dakota and Boissevain, Manitoba. It is hoped to have amateur stations operating on all usable bands most of the weekend. An International Peace Garden Award is offered for working North Dakota and Manitoba stations. Send s.a.s.e. for rules to: Milo A. Shelton, WØFNZ, Box 31, Carbury, N.D. 58724, or see rules August 1973 Awards Program.

*Save big money on the big transceiver value!*

# hy-gain GALAXY GT-550A

- Power output—300 watts SSB, 180 Watts CW and RTTY
- 80-40-20-15-10 meter coverage
- Ultra-smooth 2-speed vernier tuning
- Extra-fast AGC for no-pop SSB or CW
- Most compact in its class
- CW provisions
- *The best value*—Mobile or Fixed Station!



***ORDER NOW FROM HI AND GET THESE ACCESSORIES WORTH $54.95***

**FREE!**

**$595.00**

**VOX ACCESSORY** Solid state, instant plug-in VOX for GT-550A. Provides voice operation and semi-break-in CW. Separate gain, anti-vox and delay controls. VOX-35C (shipping wt. 1 lb.) Reg. $29.95.

**CALIBRATOR** Ideal for currently allocated sub-bands. Solid state 25 KHz plug-in calibrator operates from front panel switch on GT-550A. CAL-250 (shipping wt. 1 lb.) Reg. $25.00.

***OTHER ACCESSORIES AVAILABLE...***

| AC-400 | G-1000DC | GTM |
|---|---|---|
| AC power supply | DC power supply | Mobile mounting bracket |
| **$99.95** | **$129.95** | **$8.95** |

***When you need HAM gear and accessories, call me at HI...ask about the HI-Savings Plan!***

Hi Hobby Industry

*73, Al*

*Al McMillan WØJJK*
BOX 864
COUNCIL BLUFFS, IA. 51501
CALL: Tues.-Sat., Noon-5 PM
712—323-0142

# 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 Publishers 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.**

Rubber address stamps. Free catalog. 45 type styles. Jackson's, Box 443F, Franklin Park, IL 60131.

QSLs. Second to none. Same day service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah 84015.

QSL'S "Brownie," W3CJI, 3111 Lehigh, Allentown, PA 18103. Catalog 25 cents.

WANT OLD RADIO TRANSCRIPTION DISCS. Any size or speed. Send full details to W7FIZ, Larry, 7554 132nd Ave. N.E., Kirkland, Wash. 98033.

CANADIANS Free 120 page Electronics Catalog. ETCO, 464A McGill, Montreal.

WANT TO BUY: Collins KWM-2 with AC supply, or complete S-line also want 30L-1 or 30S-1. Must be clean and priced right. Richard Schark, 417 North Ferry, Ottumwa, Iowa 52501. Ph. 515-682-5741.

FOR SALE: Must sell brand new Signal/One CX7A. $1600.00. Contact Lewis Grigsby Jr., Farmers State Bank, Pittsfield, IL 62363. 217-285-2194.

FOR SALE: Please make offer. 2 Collins mechanical filters 455Z4 and 455Z5. 2 704/4CX250F (new) (26 V filaments), 1 7580 w/4CX250R(new) 1 Eimac SK606 socket, 2 plate connectors for 4CX250. 2 Ohmite Z7 chokes (new), 2 air variables 200-15 ad 12-70pf, 1 2mf at 2kv cap (oil), 1 6 V at 3 amp trans, 8 7100 sc at 26 watt resistors, 1 455 kc xtal. For sale: $75.00 each: Quan. 4, Aerotrons, high-band 2 meter transceivers, single freq., 15 watt out, hybrids, dash mount, with accs. 1 only, Aerotron, base/mobile, High band 2 meter, transceiver, tube type, single freq., 15 watt out, with mic, AC cord, 6N1S.. W.M. McCormick, 3100 W. Walnut, Apt. 211, Garland, Texas 75042. 214-272-8883 WA5VJO, Mike.

HAM HAWAII, Maui oceanfront three bedroom two bath luxury penthouse apartment for rent by week or month completely furnished plus Yaesu, TH6DXX and automobile. K6OE, Box 218, Carmel Valley, CA 93924.

WANTED: 4 RTTY Models in good condition. Tape perforator, 20 meter Ham gear - needed for Youth Outreach Program. Tax deductible receipt written for value. Box 4594, Clearwater, FL 33518

Detailed Blue-Prints - 40 mtr mobile. World famous GILTENNA $3. WA5TFF, Richard Adkins, 1321 Eddy St., Pecos, TX 79772.

NCX-500 factory overhauled, with AC/PS, manual, set spare tubes, excellent, used West African DXpedition, $300. WB2AQC, (212) 639-8195.

Drake SW4 receiver. Hardly used, excellent condition $160. Dominic Pace, 218 Bay 31th Street, Brooklyn, NY 11214. 212-373-8171.

Send long stamped envelope for list of electronic items, tubes, equipment, miscellaneous parts. W. Huneycutt, Box 411, Hartsville, S.C. 29550.

WANTED: 6 volt car radio vibrators, car radios or parts (anything will help), books or any information on servicing older auto radios, owners manuals, service manuals. W. Huneycutt, Box 411, Hartsville, S.C. 29550.

DESIGN 1 to 300 mHz parallel resonant circuits. Find Q, inductance, capacitance turns, etc. rapidly. 19 scales, durable plastic coated slide chart. Guaranteed. $2.75 pp ComRec Company, Box 93, Penacook, N. Hampshire 03301. Foreign except Canada add 75 cents.

HOOSIER ELECTRONICS-Your ham headquarters in the heart of the Midwest where only the finest amateur equipment is sold. Individual, personal services by experienced and active hams. Factory-authorized dealers for Drake, Regency, Standard, Clegg, Ten-Tec, Galaxy, Hy-Gain, Cush Craft, Mosley Ham-M, Hustler, electronic pocket calculators, plus many more. Orders for in-stock merchandise shipped the same day. Write or call today for our quote and try our personal, friendly Hoosier service. Hoosier Electronics, R.R. 25, Box 403, Terre Haute, Indiana 47802.

MAGAZINES FOR SALE: CQ/73/QST/HAM RADIO issues at 10 cents each (plus shipping) from Lockheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

SAFETY BELTS Tower Climbing, Nylong (new), Lanyard/snap (used), $23.50. Link, Rt. 111, Monroe, CT 06468.

WE Would like to correspond with many radio amateur operators in the United States. The purpose of our club is to make friends through radio and by mail. Please give us letters to the following address. THE GREEN CLUB, Z.C.-591 1-25, Shinonome, Sakai, Osaka, Japan, Club Manager, Masuo Inoue, JH3BCZ.

TRADE: 8MM Movie outfit, mint; for Mint SB-200; SB220; 30L1 Linear. Replies Answered. WA-BGVX, George, 1422 So. Pearl, Independence, MO 64055.

NEWS: Free sample copy of "Worldradio," Amateur Radio's Newspaper. 2509-B Donner Way, Sacramento, CA 95818.

SALE: Sencore Mighty Mite TC109 tube checker, $40; Heath IG62 Color Bar Generator, $40; Heath IG18 transistor checker $20; Triplett 630 VOM $35; Sprague KT1 Capacitor checker $10. Plus shipping. Art Lound, Lawrence McNamee, 10 Hyacinth Lane, Holbrook, NY 11741.

TECH MANUALS for Govt. Surplus gear $6.50 ea. R-390/URR, R-389/URR, R-220/URR, URM-25D, BC0779B, TT-63A/FGC, CV-591A/URR, TS-382D /U, URM-32, TS-497B/URR. Hundreds more. Send 50 cents (coin) for list. W3IHD, 7218 Roanne Dr., Washington, D.C. 20021.

ROANOKE DIVISION CONVENTION - Sept. 14-16, 1973, Reston, VA. (near Dulles Airport) Unusual wide interest programs and sessions. Write K4-MD, Box 7388, Warrenton, VA 22186.

KWM2, yours can perform much better in 1 hour - you do it. Write to W8SNF, Box 105, Kearney, Nebr.

WANTED: Skyrider Marine receiver or equivalent covering 375 to 515 kHz. Write Henry Weinberg, 2301 Sunset Circle, Tampa, FL 33612.

SUPER-T-ENNA. Designed by Mike Ercolino of Telrex for K4GHF. One price takes all, engineering drawings, cables, antenna and rotor. Antenna, Telrex 20m-646 wide spaced 20 mtr beam; Fwd gain 14 DB F.B. Ratio 28 DB. Rotor Telrex 477-HRIS with 1/4 HP motor. System cost over $1300. First check for $650.00 takes all. M.R. Burger, 1811 Grant St., Elkhart, Indiana 219-264-7260.

WANTED: early Sam's photofacts (any number from 1-500). Also auto manuals AR-1 and up (any numbers), bargain priced. W. Huneycutt, Box 411, Hartsville, S.C. 29550.

CAPE COD'S fabulous Hyannis! N.E. ARRL Convention Sept. 28 & 30. Flea market, seminars, FM, SSTV, AMSAT, VI trips, 2 pools, golf, beaches sailing. Early bird registration $3. WI2QQ, 17 Barnes Ave., East Boston, MA 02128.

Can you Furnish? Hammarlund, HXL-1 late model linear. Clean only, cash. J.F. Wind, 5754 Wooddale Edina, MN 55424.

Thanks to MARAC members and mobileers who made possible my completion of all USA counties. W8WT, Box 134, Fairburg, MI

For sale: Caringella Electronics Compressor-Preamp Model ACP-1, $15. RP Elect. RPC-3 speech processor for T4XB, $15. Bell, Box 73, Altadena, CA 91001.

Sell: telescope Criterion 6 Dynascope 4 millimtr, orthoscope lense. $150. Halli SX-133, gen coverage $175. Both mint condx. Andy, Jr., 212-296-7905.

CE-600L broadband all band amplifier manual new tubes ss rectifier $150 & shipping. K4DP, 1004 Drake Ave., Huntsville, Ala 35802.

Wanted: Ameco PC-2 or PC, Ronald Nagata, 1330 Curtis St., Berkeley, CA 94702.

Morrow Twins w/ac $65. AF-67 $25. KE-83 Pierson w/ac $75. Apache $65. Gonset Commander $20 Regency ATC-1. WA6DDN, 1475-31st Ave., San Francisco, CA.

For sale: Heath SB-310 $240, SB-200 $175, HW-32A and ac sup $100, Central Elec. 100-V $300, Drake TR-4 AC-3, RV-3 must sell as pkg $539. All mint. Upay ship. Certified check or P.O. Ron Conley, K7LTV, 37 Wyoming Av., Billings, MT

FMers attention - 8 pole Tyco xtal filters. 10.7 Mhz-30 Khz BW. 3 available at $12 ea plus shipping. R. Vaculiuke, W9SEK, 17W540 Hillcrest, Wood Dale, IL 60191.

Want: 6-meter Parks preamp. J.L. Wentz, W8HFK, West Liberty, OH 43357.

Wanted: Vibroplex bug. Price, condx first letter. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419

For sale: Eico Model 232 vtvm $10, Drake 1000V filter $10, Heath swr bridge Model AM-2 $7.50. K8OUQ, 268 Annis Ct., Chillicothe, OH 45601.

Antique Tubes, sell or swap. List SASE, WA4NED, Box 2123, Gainseville, GA 30501.

For sale: WWS-1 No. 1388, 75A4 No. 2235, 0.5, 3.1, 6.0, spkr, manuals, CR-3253, 51R2 No. 1360, 32V3, $125. 200-V, $250. HT32, $150. Much more James Craig, 29 Sherburne, Portsmouth, NH 03801

1 Element 6 meter beams, new in the box $45. Pr. WA8RLV, 1008 Englewood Dr., Parma, OH 44134

BRAILLE DIALS for the blind (at cost) on Drake transmitting and receiving units and VFO's. Remove knob, slip on Braille dial and replace knob, that's all. Please state model type. $2.00 ea. P.Pd. Verion Page, W8EXJ, 1969 Manz St., Muskegon, MI 49442.

Mix Pleasure with Pleasure. 1973 Hamburg International Hamfest on September 15 only 45 minutes from fabulous Niagara Falls. RV parking for weekend use. Flea Market, Hook-up. Details: Valerie Orgera, K2KQC, 187 Main, Hamburg, NY 14075.

DISCOUNT SPECIALS! Clegg FM-27A @ $378! Standard SR-C146 @ $219.50, SR-C526M @ $258! Genave GTX, Mosley, Tri-Ex, Gladding, Sonar, Shakespeare, many others. Also Marine and C.B. ARENA COMMUNICATIONS Dept. C., 1169 N. Military Highway, Norfolk, VA 23502.

Electronics Equipment; Test Equipment; Panel Meters; Connectors; Capacitors; Tubes; Transistors; etc. Inquiries invited. F.F. Williams, P.O. Box 7057 Norfolk, VA 23509.

SIDEWALK SALE-Every first Saturday-now in its fourth year. Turn over your surplus electronics into cash at the Southwests's leading ham store-it's FREE Electronics Center, Inc., Dallas, TX 75204.

FOUNDATION FOR AMATEUR RADIO annual Hamfest Sunday 21 October 1973 at Gaithersburg Maryland Fairgrounds.

SALE: Hallicrafters SX111 Hamband receiver, Knight KG635 5 mHz oscilloscope, HP211A square wave generator. All excellent condition. Dana Geiger, 212-799-5745 evenings.

Will trade novice ham gear or cash for Ameco pt. pre amp. Box 8352, Savannah, Georgia 31402.

TRADE: Grebe CR-9, SW-3 and Atwater-Kent model 9 for equitable desireable receivers. Joe Horvath, W6GPB, 522 Third St., San Rafael, CA 94901

SELL: Heath SB-610, R-390 receiver, CV-157 SSB adapter, best offer or trade for ? Can pack and ship K9HJU 312-349-9002.

WANTED: Ham equipment ssb cw reasonable price WN3UDV, 3256 Old Berwick Rd., Bloomsburg, Pa 17815.

L.A. AREA: Excellent Collins 75S-3B, $525. Mint Hallicrafters HT37, $135. Buy both for $600 and get station accessories. WB6JAN, 1908 Vascones Dr., Hacienda Hts., CA 91745 (213) 330-3818.

2 m FM Handie Talkie GE Voice Commander III xtals 10/3, Nicads, charger, $115, WA3DYG, 2613 Marhill Dr., Wilmington, DE 19803. 302/475-1207.

QRPp QRPp QRPp--The Milliwatt, devoted exclusively to under-five watt ham radio. Feature: "Is Five Watt DX Possible?" Plus projects, news etc. $3. Ade Weiss, Editor, 213 Forest, Vermillion, SD 57069.

WANTED: Ham band xtals FT243 holders send list and price to L. Ryan, Box 277, Wrightwood, CA 92397.

SELL OR TRADE: HQ170-AVHF, Seneca VHF-1 Want SSB/Mobile, send for other items. K1UVR, 54 Kaynor Dr., Waterbury, CT 06708.

Digital Readouts - 6.3 volts, 1.. high alpha numerics w/bulbs. $2 ea, 15 $22. WB2FKA, 28 Bridlemere Ave., Interlaken, NJ 07712.

SELL: Argonaut solid state SSB/CW xcvr like new. $225. Will pay shipping. WA5ZCE/HL9KK, J. Tidball, HHC EUSA (G-4), APO, S.F. 96301.

Heath HW17A, HWA-17-1 DC, mike VFO, man., all mod, found in CQ. Excel $125, Drake TC-2 $200 WA2HQD, Colella, 105 18 131 St., Richmond Hill, NY 11419. 212-641-2559.

WANTED: TL series mobile "Topper" by Hy-Gain for 75 meters. KL7HBC, John Wyatt, Rt. 4, Box 4303, Juneau, Alaska 99801.

SELL: National Technical Schools Master Course in Color TV Servicing $985 with goodies. $50 takes 120 lessons PPD. John Larson, Star Rt. 1, Box 105-B, Rosamond, CA 93560.

Sell or Trade: Regency HR-212 94-94-10-76-3476 with Regency 107 Aeps Larsen Mobile ant. Hy-Gain ground plane. Like new. Don Spreeman, Kaukauna, WI 54130. 414-766-1175.

FOR SALE: 1 mod. 15 TT Stoner RTJ TV unit, 1 AN-FGC-7A TT Repeater Set. All books of instructions $175 or best offer. U pick up. W9VSR.

Cleaning shack, a ton mostly hermetically sealed power and filament transformers and chokes. Very reasonable. WA4RDV, 1145 Kerns Ave., Roanoke, VA 24015.

FOR SALE: GE Progess line 2 meter FM, 30W. 2 channel-transistor pwr sup $125.80 watt pwr sup, module for TPL Trade. Bernie Nickles, K4BPY, 1-205-881-3908.

CQ-QST-Ham Radio magazines $5. per year plus postage. Send SASE for list. K2POA, 29 Boonie St., Bethpage, NY 11714.

SRR11 15kc to 600kc $150. URR27 100mc to 195mc $135. ARR7 550kc to 42mc p.s. prod det $55. John G. Murray, W2OAP, 40-33 61st St., Woodside, NY 11377.

FOR SALE: Hy-Gain 400 Roto-brake Rotator. Perfect. $110. W9GB, 9044 Linder Ave., Morton Grove, IL 60053.

Oscilloscope, KG635, dc to 5 mhz, 5" w/electronic switch for dual trace. $80, W9TVV, 2028 Oriole Trail, Michigan City, IN 46360.

Hammarlund HQ-170C rcvr, 160 to 6 mtrs, w/clock good condx. $170. W6AUD, 5877 W 78 Street, Los Angeles, CA 90045.

Want: Heath HW101 and/or SB200. Must be in gud condx. Quote price, age and condx. K2QBE, 46 Fairchild Pl., Whippany, NJ 07981.

Sell: Humidity sensing elements. Res. varies w/humidity change. 3% accuracy. Cost $8 ea. Sell units for $3.75 ppd. W4JGO, 643 Diamond Rd., Salem, VA.

For sale: AC adaptors, 6 vdc 150 ma, standard plug, brand new, $3.50 ppd. K2MFY, 2 Nutley Court, Plainview, NY 11803.

For sale: Vintage rcvr Hallicrafters Skyrider, Defiant rcvr Model SX-24, Gud condx. U ship. $35. K. Grandmaison, 102 Ave. A, Turners Falls, MA.

Linear Builders send SASE for low prices list of HI Power parts & goodies. MACE, 8600 Skyline Dr., Hollywood, CA 90046.

Touch Tone Pads like new tin full leads, 12 buttons, $13 PPD/insured. Trimline telephone like new $40. Swank Rotary, WA6GNT, 11103 Barbarosa Dr., Dallas, TX 75228. 214-328-9307.

1972 Anniversay Issue USA Callbook Mint spotless condx, $4.75 PPD. W2JBL, 123 Davis Ave., Hackensack, NJ 07601.

Doctors Directory-compiles & published by International Docotrs Club of IARS & lists over 1500 who are hams. Dr. Wm. Fulcher, Sec/Tres, 105 Frestfrun Dr., Hendersonville, TN 37075 for $2.00

WANTED: Drake TC-2, CC-1, SC-2, CPS-1, and SSC-1. State cond. & lowest price. T. McIntyre, WA0UGX, 13508 Fordam, Rosemount, MN 55068

Building a Linear? Save $25 by ordering my 30 amp filament choke for pair 4-400A's, 3-500Z's, etc. $5. ea. V. Murrell, K4HHA, Rt. 6, Newport, TN 37821.

SELL: Like new, Lampkin 105B, Bird mod. 45e/w 100 W slug both for $250. K. White, 1309 Woodlawn, Bucyrus, OH 44820. 419-562-6180.

FOR SALE: New surplus tubes in original cartonmake offer: 32-872A; 24, 304TL; 4,250TH; 6, 5D21; 4, 75T. W6OFD, 941 College Ave., Modesto CA 95350.

Johnson Viking SSB Adapter, A-1 cond, with pwr. sup., cables, manual and orig. carton; for sale - $100 A. Capener, St. Paul Island, Alaska 99660.

FOR SALE: Heath Q Multiplier $10, Ameco 2m conv, 6m conv, pwr sup $40. Hammarlund spkr $10. Philco sig. gen. 7170 $20. 516-781-3996.

CW Ops call in Wednesdays 2300Z 7055 kHz Saturdays 1430Z 14070 kHz County Hunder Nets.

Want: Dust cover & rcv xtals for SP-600. State freqs and price. W4BGQ, 65 Georgia Av, Merritt Island, FL 32952.

FM base, 19x37H cab. w/mot PA8337C 30w xmtr & FMTRU-16V rcvr no ship $75. Mot P33BAM 5w HT $75. Holsten, 65 Nantucket, Fishkill, NY 12524

Wanted: Schematic or manual on Air Force recvr URG-60 WA5AER, Box 3214 Ft. Smith, Ark. 72901

Sell: Heath SB610 scope, new $72 pp. First certified check or MO. Mal Kinney, 2 Howard Blvd. Hyde Park, NY 12538.

For sale: AC adaptors, 6vdc 150ma, standard plug, brand new, $3.50 ppd. K2MFY, 2 Nutley Ct., Plainview, NY 11803.

Sell: Clegg Zeus, Interceptor B, all-bander perfect $600. W2RQ, 78-20 74st Brooklyn, NY 11227 Ph. 212-456-7755.

Microphones: Shure 488A noise-cancelling mobile type $15. Shure 7455 Unidex unidirectional ceramic, mount on stand or use as lavalier $12. E-V 674 Variable-D dynamic cardiod $45. E-V 630 dynamic $30. W.M. Scherer, W2AEF, 100 E. Palisade Ave., Englewood, NJ 07631. 201-568-6904.

Drake 2B, 2BQMult.-spkr, 2ac xtal calibrator, 2 extra receive xtals, manual, orig. owner, excel. $185. WB2FJX, Gerry Skloot, 158-14 85 St., Howard Beach, NY 11414. (212) 641-4573.

Swan 250C like new $250, NC270 rcv. 6-80 mtr $75. Will ship UPS. G.L. Silva, 1494 Oceanaire Dr., San Luis Obispo, CA 93401.

Sell Trade: Hammarlund recvrs HQ-170C & HQ-110C, looking for Swan VX-1, FP-1, 406B, Mark II linear, etc. Herbert Peery, Box 313, Trenton, MO.

AN/FR4/FR5/FR6 - freq. mtr trio for sale. .1 to 500 mHz like new (shipping trunks for FR5 & 6) $100 ea. Mary, K2VHW, 1504 New Durham Rd., So. Plnfld, NJ 07080.

Drake 2A recvr. w/2AQ QMult. other acces. Heath DX-40 xmtr VFO like new $185. D. Dewar, 449 N. Franklin Rd., Indianapolis, IN.

Drake 2B w/Q Mult $135. NCX3-AC like new $145 WB6VNR (213) 346-5871.

For sale: Wilson 4el 20 3el 15 mtr Yagi Skyland 2el glass 3-band Quad- 2el 3-band Quad. W7KSG, 1876 E. 2990 So. SLC, UT 84106.

New Triplett 0-10 D.C. Ammeters, Model 327 in 3x3x2-1/1" bakelite case w/bind, posts. $7 ea. ppd. T.C. Bering, 3804 32nd, Detroit, MI 48210.

Sell: 51J-2 w/prod. det., sil. rect., reg. p.t.o. fil. & plate supplies (CQ, Dec. '68), with cab. Pick-up only $325. Waters Model 369 dual-meter reflectometer. 1kw fwd; 200 w. ref. $60. Waters Codax keyer $50. Eico 717 keyer $40. Heath IM-17 FET VOM $18. Ten Tec PM-1 80/40m c.w. transceiver $20. Eico 488 Electronic Switch $10. All items excellent. Shipping extra via UPS. Cash, M/O, or certified check. Personal check accepted but shipment delayed till check clears. W.M. Scherer, W2AEF 100 E. Palisade Ave., Englewood, NJ 07631. 201-568-6904.

Transformers: UTC S-44 1150/1050 v.c.t., 500 ma $10 & 23 lbs. shpg. UTC S-47 3000/2500/2000 v.c.t. 300ma $15 & 28 lbs. shpg. Thord. T19P56 1800/1600 v.c.t. 225 ma $10 & 10 lbs. shpg. Thord T22R07 700 v.c.t. 200 ma plus fils. $5 & 8 lbs. shpg. UTC S-61 7.5/6.3 v.c.t. 10a. 3kv insul. $7. Cash, M/O, or certified check. Shipping extra. W. M. Scherer, W2AEF, 100 E. Palisade Ave., Englewood, NJ 07631. 201-568-6904.

Sell: 4-6DK6's unused, $4 per matched pair. Three others $1.50 ea. National HRO (PW) dials $10. With gear box & single gang variable cap. (1 only) $12.50 BC-221 Tuning capacitor w/gear drive and dial $5. Par Metal enclosed rack, 60" panel space. Black wrinkle, rear door, casters. Ideal for repeater. Pick-up only $25. Cash, M/O or certified check. Shipping extra. W.M. Scherer, W2AEF, 100 E. Palisade Ave., Englewood, NJ 07631. 201-568-6904.

Sell: KWM2 $65, 312B5 round $400. CPI xtal, 115 xtals $210, 30L1 linear $375. Marty, 215-884-6010.

Want CE10 ar 20 any condition for repairs. H.R. Combs, Grant City, MO 64456.

Sell: BC696, BC459, BC457, master mobile "Micro-Z-Match," Dow T-R switch DKC-TR, Klystron 2K25, make offer, FOB, JJ Crowl, Box 74, Ingram, TX 78025.

Wanted matchbox w/swr manuals. K6ZZE, 1437 Pine Grove Way, San Jose, CA 95129.

Swan gear complete and mint cond. Please send for list and prices. Louis Gongwer, 404 60th St. SW, Albuquerque, NM 87105.

Wanted-trade ham gear for motorcycle. W.R. Hampkins, 100 Main St., Denison, TX.

Wanted-news items on ham radio, articles on TVI. WAIGFJ, Gabe 17 Whitney, E. Hartford, CT06118.

Wanted-E.H. Scott Philarmonic catalogs, radio news prior to 1923. Precision E-310. Conn Strobosconn. R. McNeill, Box 472, Yorkton, Sask., Canada.

Trade for ham gear, collection professional test equip, HP, Gertsch, GR, etc. Also swap VHF/UHF gear, list SASE. W4API, Box 4095, Arlington, VA.

For sale-6 & 2m Heatnkit SB conv. $15 ea. 2m DL6SW conv. $25. WA5LTA, Bill Lee, 4100 Redwood Dr., Groves, TX 77619.

Trade-mint Pro Leica outfit, list over $900 for Drake or Henry linear SASE for list. J. Barchard, 6097S Sandalwood Trail, Joshua Tree, CA 92252.

Wanted- Swan 1200 linear amp. Russell 19680 Mountville Dr., Maple Hts, OH 44137. 216-622-2175.

Want to buy: used 6m gain vertical for base station use. Used Heathkit ignition analyzer scope with man W0OSP, John Stiles, Box 1D, Sherwood, ND 58782

Heath GR-78 solid state general coverage recvr new built for resale $150 or best offer. Shipped prepaid. (201) 239-1050. Also HRO-500.

Oscilloscope: 5in., DC to wide band, Knight KG-635 with sep. switch for dual trace. $75. FOB. W9TVV, 2078 Oriole Trail, Michigan City IN 46360.

Wanted: SX-146, spkr, HA-19 VOX, W4BTZ, Box 52701, Atlanta, GA 30305.

SELL: Heath SB220 linear $350 mint. E-V664 mike like new $25. W0UGD, RR2, Goodland, KS 67735. Ph 913-899-2766.

The QRPp Experience -- the ultimate in ham radio. Read about it in The Milliwatt devoted to QRPp news, projects etc. $3.40 per year. Ade Weiss, K8-EEG, 213 Forest, Vermillion, SD 57069.

Sale: Radiola IV (Model ER-880) Radiola Grand, Heathkit DX40, HD 10 keyer, CE100V, 304TL tubes, and other things of interest. Trade or sell. WA5RTG.

Wanted: accumulations of old QSL cards. Will pay cash or swap old parts, mags, etc. K8IKO, Box 222, Worthington, OH 43085.

For sale: LM freq. mtr. with Cal Book and pwr sup $40. EV mike mod 920 $12.50, Mars hybrid phone patch mod. LE-2 $18.50. W6GAH, 2421 Boundary St., San Diego, CA 92104.

Anyone with information confirming Hadley Beebe 6Z0 Reno Nevada 1916 & 17 please advise. W7CX, 2273 Sunrise Dr., Reno, NV 89502.

Sell: 6m xcvrs Clegg 99er w/8 xtals $75, Lafayette HE35 $15, Both $80. U ship. R. Sieffert, R6, Box 30, New Castle, IN 47362.

Sell LM2 freq mtr w/calibration & instruction book needs ac pwr sup $20. W2FLD, 322 Marvard Rd., Garden City, So., NY 11530.

Swan MKII linear new $475. TR4C pwr sup, ext. vfo 3 mo old make offer. K4ADT, P.O. Box 6, Morgantown, NC 28655.

Swan MKII linear new 1475. TR4C pwr sup, ext. vfo 3 mo old make offer. K4ADT, P.O. Box 6, Morgantown, NC 28655.

Moving soon, will sell or swap anything & everything many goodies, list for stamp or your list. WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755.

Wyoming antenna farm - 10 acres $20 down, $20 month. K6ICS, Dr. Michael K. Gauthier, 9418 Florence Ave., Downey, CA 90240.

Wanted: Beg, borrow, buy or steal a schematic diagram or manual for a Hallicrafters SX-28A. Dennis, K6KRV, 3604 Christensen Ln., Castro Valley, CA.

Wanted: 4 freq. deck for G.E. progress line - W4-LRR, 234 Elden Dr., N.E. Atlanta, GA 30342.

For sale: Clean Gonset 6-50 $90, Ameco CN-50 14-18 mHz IF $20. WB2WTJ, 1720 77 St., Bkln., NY 11214. 212-331-6634.

For sale: New prop pitch motor $50 plus freight. Iron cored Chicago Plate transformer 2700-0-2700 v sec 117v pri 300ma $25 plus freight. W6BLZ, 528 Colima St., La Jolla, CA 92037.

Recordio tape recorder Cost $60 sell $20. Good condx. K8OUQ, 268 Annis Court, Chillicothe, OH 45601.

Avcom TN-421 tone burst $15. Crystals for Drake TR-22, 46/88, 88/88, 147.45/75 $6 pr. Auslander, 1499 N. Meadow Rd., Merrick, NY 11566.

Canadians: Brand new Eico 753 xcvr with solid state osc. with 751 AC sup $250 with demon. Peter Posnikoff, VE3BBN, RR1, Port Hope, Ont.

For sale: Drake TR-3, RV-3, AC-3, DC-3. All in operating condx but need work. $150 takes all. K4-NVI, 17 Loganberry Cir., Valdosta, GA 31601.

Have $175. Want HR-212 without crystals. W8VVD Box 452, Birmingham, MI 48012.

Sell: Mini-products B-24 plus RK-3 3el beam $50. AR-22R rotator $20. WB4WME, 106 Colby Rd., Oak Ridge, TN 37830.

For sale-Eimac 7203/4CX250B tubes. Never used. $20 ea. W6DOR, 2921 Loyola Dr., Davis, CA. 95616.

Swap-1 Realistic Globster 5bd recvr in excel condx. for either a Hallis S-120A, S-125, Eico DX-718, Heath SW-717 Midld 13-900 in gd to excel condx. S. Ballinger, 11 Lown Ct., Pough, NY 12603.

Will swap excess ham gear for military relics -medals helmets, swords, uniforms, etc. W2WLJ, 17 Coleman Rd., Berlin, NJ 08009.

VHF gear-6, 2, 220 & 432 gear, am & cw. SASE — list. WB2CHO/1, Taft School, Watertown CT. 067-95. 203-274-0129 evenings.

Wanted Gonset 2m amp. 903A also 220 mHz gear. WA8MEC, 352 Cambridge, Mt. Clemens, MI 48043.

Sell Heathkit twoer $25, Knight G50 GDO $15, Heath DX-60B, $50. W9TNZ, 9501 Lorel Skokie, IL 60076.

Drake TR3 and AC3 $350. Lafayette HA460 $75. Drake 2B and 2BQ $170. RME 4350 recvr $50. Sase for list. 212-641-2559. Colella, WA2HQD, 105 18 131 St., Richmond Hill, NY 11419.

Sell Pair 833 tubes guaranteed perfect one or both also one new Jan 100 th with porcelain socket. Make offer. WA4RDV, 1145 Kerns Ave., S.W., Roanoke, VA 24015.

Sell: BC-640D, SCR-522, teletypewriter set AN/TGC-3, TTY T-D for AN/TGC-3, typing reperforator TT-56/MGC, Navy Mod. TBW and TBW-1. Make offer. W2BGO.

Wanted: Manual for model 305 Hickok scope or pertinent information on same. R.A. Hooper, 1033 W 35th St., Erie, PA 16508. WA3OOM.

Neon Test Lamps NE-2 bulb and resis. mounted in insulated housing with test point and binding post. 24 ea. for $3.75 ppd. W4JGO, 643 Diamond Rd., Salem, VA 24153.

Wanted: Boemhe, Klienschmidt, Creed or McElroy Wheatstone perforator in gd condx. P. Ballinger, W8VYU, 1331 Concord N.E., Massillon, OH 44646

For sale: Center reading milliampere meters 0-150 $2.50 ppd. Goodman, 5876 S. Western, Chicago, IL 60636.

Sell: QST from Oct 1924, CQ from Feb 1946, 73 from Oct 1960, Ham March 1968 all to present. Best offer. I will ship. W2ASI, 914-NE3-7077.

Sell: Eico 723 60 watt cw xmiter with 722 vfo. Best offer. Bill Mervine, WA3TAG, 10 Burns Rd., Claymont, Del 19703.

Wanted Hams in Belmont, Guernsey, Monroe and Noble Counties in Ohio to participate in AREC nets on 6 & 10m new being activated. For info contact WA8KPN.

Teletype mod. 14: T.C. $15, Strip printer with keyboard $30, typing reperf $30, all in excel condx. National HRO-500 $1100. K2MVR 201-239-1050.

RTTY enthusiasts: military test set/scope, like new, for sale $15 plus post. WB2BYY, 31 Crossbow Ln., Commack, NY 11725.

Realigned Hammarlund HQ170, 160-6 meters great rcvr $155. Pearce-Simpson 23ch CB, Mobile or base $60. G. Reid, Box 7002, Amarillo, TX 79109.

Wanted: mech. fil. mod. for collins 75A2. Also fil. 455B or 455C. Heath HD-15 for sale. beat offer. Dornback, K9MKX, 2515 College Rd., Downers Grove, IL. 60515.

Mechanical fils: 455 kHz 2.1 kHz $18.95, 300 Hz $22.95. J.A. Fredricks, 314 South 13th Ave., Yakima, WA 98902.

For sale QSL guide that lets you write in 54 languages. $3.95 or write K3CHP, Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

Collins 180-S-1 ant. tuner w/man and a Narda mod. 440 pwr meter w/man and a General Microwave N401 mount. Covington, 700 Dominik, Apt. 3008, College Station, TX 77840.

Sale: components for 1kw pwr sup including plate and filament transformers, choke, and oil capacitor $15 pick up only. K3KUL.

Sell: Unused Manson Lab/Hallicrafter precision freq source solid state xtal osc/oven. $65 ppd. W6HB, P.O. Box 637, Menlo Park, CA 94025.

Recvr Hammarlund HQ170-AC mint condx $140. Knight R-195 gen. cov. $50. K4GT, Frank Shannon 140 Bosphorus Ave., Tampa, FL 33606.

Eico Signal generators 315 and 360 both $30. W. J. Kinne, 1163 Ingerson Rd., St. Paul, MN 55112.

Logic Modules (Not ICs) 2 cents each, sase for list. K5BCQ, 5114 Geneva, Friendswood, TX 77546.

Wanted: Collins 312B-5, 136B-2, Drake MN-2000, WA6UDV, P.O. Box 146, Moffett Field, CA 94035.

For sale: DX100 xmtr $100, Ameco TX-62 6 & 2 meter xmtr $100, both gud condx. no ship. Fl. Kurz, P.O. Box 347, Zion, IL 60099.

Linear HB1600 WPEP 80-10, compact PRO design. Request details. M. Caldwell, 1068 Windsor, Morgantown, WV 26505.

Sell: unusual split lvl home. 66' tower, beam, radio room, beach, marina, exc. area, 4 bdrms, 2 miles from NYC conv. to everything. $46,000. W2ASI, 15 Kensington Oval, New Rochelle, NY 10805. 914-NE3-7077.

Wanted NTS color TV course Want answer sheets only to the 136 lessons for master color RV course. Send condx & price to William Fulcher, 105 Freshrun Dr., Hendersonville, TN 37075.

WANTED: Mini Products RK-3 Reflector Kit. Also Speech Processor for Drake TR-4. P. Feely, 15 Locust Hill, Yonkers, NY 10701.

TCS-13 MANUALS, brand new, $8.00 each. Oscar 6 az-el-range computer printouts for your QTH. WA0TAS, 2001 Dunbar, Manhattan, KS 66502.

FOR SALE OR TRADE my entire coll. of CQs and QSTs back to WW II. Write your needs. K1MBI, 21 Freestone Ave., Portland, CT 06480.

WANTED: FT-243 type of xtal holders or out of band of same w/mounted blanks. No lots under 500 will be considered. W6DOR, 2921 Loyola, Davis, CA 95616.

WANTED: Robot model 80 camera and accessories. Mike Ludkiewicz, 143 Richmond Road, Ludlow, MA 01056.

DRAKE 2B, 2BQ QMult/spkr, 2AC Xtal Calib, 2 extra rcv xtals, manual, original owner, $185. Gerry, WB2FJX, 158-14 85 St., Howard Bch., NY 11414. (212) 641-4573.

OMEGA-T Model TE7-01 wanted. H. Anderson, 639 N. Wahsatch, Colo. Springs, CO 80903.

BUILDERS: Electronic parts for sale. W2EZM, PO Box 323, Maple Shade, NJ 08052.

DRAKE TR-3, AC-3 exc. cond. $400. K3NXU, 9118 Kilbride Rd., Baltimore, MD 21236. Phone: (301) 661-5588.

SELL: 3600-0-3600 volt 1 amp Xfmr $30. 1.7 Amp $45. With 110-220 primaries. FOB W0AIH, Paul Bittner, 814 4th St S, Virginia, MN 55792.

WANTED: April & May, '67 QST. P. E. Morin, WA9KWS/3, RD 2, Box 184A, Havre de Grace, MD 21078.

Sell: Ameco TX-62 and matching 621 VFO $85. Will swap for QRP cw rig. Chuck Mathis, 119 Nova Albion Way, Apt 109, San Rafael, CA 94903.

Must sell: Swan 270, Hustler mobile ant, ball, base rod, 10-15-20-40 m reson, mike, mtg shelf - $350 fob. R. Sievert, W8OZA, 1411 Lonsdale Rd., Columbus, OH 614/866-2406

For sale: SB-401 w/o xtal pack $200. HP-1 3 $55. W8CUT, 1776 Walnut St., Coshocton, OH 43812.

Computer grade capacitors: 510 MFD at 350 VDC. Brand new Sprague & Mallory. 10 for $16. M. WB6NWW, P.O. Box 15015, Long Beach, CA 90815.

Sell or trade: SSB receiving conv. CV-591A/URR w/manuals, complete & unchecked. Clements Duval 33727 Brownlea, Sterling Hts, MI 48077.268-2467.

Sell: Hammarlund recvs HQ-170C & HQ-110C, Gonset GSB xmtr, dr trade. Want Swan VX-2, FP-1, 406B & Heath SB-610, Swan Mark 2 linear. Peery, Box 313, Trenton, MO 64683.

Want: 8072 or 8072W tubes, Bird Mod. 43 plug-in elements, wide-band oscilloscope (50 mhz). Emerald 8956 Swallow Ave., Fountain Valley, CA 92708.

Motorola HT200 on 28/88 w/nicad & case. Asking $250. Make offer. A. LaBella, 1100 Cleve Rd., Staten Island, NY 10301.

LC80Q, 80 m loading coil for 14AVQ, complete, never used, $8. C. Berg, 43 Franklin, Warren, RI 02885.

For sale: complete Wheatstone code tape set up, keyboard punch, boehme keyer, supply of tape. $175 takes all. Erickson, 13 Robert Circle, South Amboy, NJ 08879.

Wanted: Heath HW-18 transceiver. John Killar, 811 Greenwood, Waukegan, IL 60085.

Sell: Drake 2B, mint, orig owner, used as a standby recv - $210. Alan Glick, 748 Lawrence St., Elmont NY 11003.

Canadians: Heath SB-401. Fine operating condx. $400. Going transceive. Doug Renwick, 2420 Eastview, Saskatoon, Sask., Canada.

Morrow falcon rcvr & ac sup $35. 62S-1 Collins 6 nz $500. Want zmtr Tecraft xmtr. W8UCI, 11320 Darla Ct., Warren, MI 48089.

Wanted: used book "Single Sideband Principles & Circuits" by Pappenfus et al. Advise condx, price, Worcester, RD 1, Frankfort, NY 13340.

Swap or cash offers: Hi-band fm gear Motorola, Bendix, etc. Also transmitting tubes. Sase for list. Clem K8HWW, 352 Cambridge, Mt. Clemens, MI 48043.

Galaxy V, MK3, acps, RV-1 remote VRO $300. Galaxy DAC-35 clock, patch, swr, spkr, console $50. Both for $335. A. Koenigsberg, WB2UKY. (212) 941—0710.

Boonton 245-A rf voltage standard $50. Weston cased 641 wattmtr 2KW, 150v, 30A max. dc to 125 hz. $50. Benson, 7554 Trask, Playa del Rey, Ca

For sale: Drake 1A, clean, ready $100. QST's 37, 38, 46, 47, 49. Many old TV serv mags & radio news tv/news mag. Sase for complete list. K4LRX, Hilyerd, 2146 Vanguard Ave., Henderson, KY.

For sale: HT-37 - what am I offered? Local buyer, pick up only. W2OWL, 212-896-1662 evenings.

Hunter Bandit 2000C linear, used less than 3 hrs. $350. Ameco PCL-P preamp $17.50. Tappehorn, WB4UYJ, 2536 Kings Hwy., Louisville, KY 40205.

Wanted: FL2000B linear tower appx 50 ft & crank-up. New York area. Harry Adelman, W2VYV, 516/BA3-5454.

Sell: Heli: HT-32B, mint $250; SX-101A, mint $125 Heath SB-200, excellent $150; Millen KW trans-match mint $95; Monitorscope No. 90932 mint $70; Hy-gain 14AVQ-WB, new $30. Martin, 160 Meadowstream, Buffalo, NY 14226.

FCC first class license course by NRI. Complete set of manuals for course. Make offer. Beebe, WA8RXU RD 2, Gallipolis, OH 45631.

WANTED: Waterman Picket Scope with or without CRT, give cond. & price. L.C. Bowen, W4LYG, Rte. 3, Marietta, GA 30060.

1st Class FCC Test Questions $4.00. CRD Assoc., Box 291, Western Springs, IL 60558.

BC-342, 1.5-18.1 mHz rcvr, with manual and mathcing LS-3 spkr, AC pwr. $50. Silbert, White Sulphur Springs, NY 12787.

RV-3 with spkr in matching cabinet and room for AC-3 pwr sup. $65 or trade. Fred Galla, 147-37 Roosevelt Ave., Flushing, NY 11354.

LED'S $18 per 100, 741's 10 for $5.00. 709's 10 for $4.00. Nixies $2.50 sockets 25 cents. Schrenk, 2707 McDivitt Rd., Madison, WI 53713.

WANTED: Manual for a Collins 51-S-1 recvr. H.P. Westler, 596 Fletcher Dr., Atherton, CA 94025.

Every Wednesday Night 2300Z CW County Hunters' Net (CHN) 7055 kHz. All Welcome.

SELL: B & W Coax Sw $8. Two 100 ft. coils No. 12 copperweld wire $3 ea. Ruffs, KI FTR, RFD Sebage Lake, ME 04075.

FOR SALE: Factory aligned transceiver Heath HW 16 $85 or best offer. Crystals & Spare tubes avail. WN6PGX, 1137 Harbor Hills Dr., Santa Barbara, CA 93109.

Send stamp for giant 6 page list of ham gear, test equip., components, home brewer's bargains, etc. WA2JTN, 300 Lawrence Ave., Oakhurst, NJ 07755

Estate Sale: 32S1 $300, 75S3 $425, Console $140, Swan 240 w/ac $250, EV664 $35, GD104 $25, others. D. Larison, 22127 Hwy 99, Edmonds, WA 206-776-8441.

3-400Z 5-band linear w/p.s. Professional homebrew see Sept. '69 73 Mag. $200 plus shipping & pkg. M. Burggraaf, 1942 St. Mary's Dr., Salt Lake City, UT 84108.

Wanted: Heath HW-18-3 ssb xcvr for 160 mtrs. Joe Roberts, W7DRR, 9251 N. 37th Ave., Phoenix, AZ

For sale: Keyer - Curtis EK39 and Brown Bros Lever used very little $60. C.D. Combs, W9LHL, 547 West Jackson, Chicago, IL 60606.

For sale: KWM-1 w/ac supply, SX-96, 12AVQ, Antec I Matchbox, gud condx. Bill (ET3GK) 301/981-4142 (business).

Ten-X members - The Long Island Amateur Radio Service Chapter of the Ten-X net meets Wednesday's at 2130 and Thursday's at 0100 GMT. 28.620 mhz.

Sell gud condx R-388 rcr w/built-in product detector and manual $275. W4AIS, 300 Thornwood, Taylors, SC 29687.

Wanted: B&W 850A band switching inductor. W9-BPG, 609 Henrietta St., Gillespie, IL 62033.

Over 1,000 magazines - CQ 47-73, QST 42-73, Radio News 41-71. Radio Elec. 52-72. 73 & Ham Radio Make offer. Some missing. Dupont, 15 Fitchdale, Bedford, MA 01730.

For sale: Hy-Gain Halo's Ants, HH2BA and HH6-BA. Both $10 unused, new. Kinne, 1163 Ingerson, St. Paul, MN 55112.

Vertical ant 18' w/coax es connectors. 80-10 meters $12 l ship. WA3LPK, 2300 Louise Ave., Balto, Md. 21214.

Wanted: Vol I Riders Diagrams, M.R.L. booklets,; 1940 to 55, ABT Servicing mags. Don Ryan, Star Rt., South Plymouth, NY 13844.

For sale: Heathkit DX-60B w/HG-10BVFO & HR-10B rcvr. U ship. $135. All in excellent condx. Ed Danford, 109 Colby Rd., Oak Ridge, TN 37830

Wanted: W8FYO key, Ameco Model PLF preamp, Millen ss dipper. K9WEH, 201 E. Marion, Prospect Heights, IL 60070.

Fishermen - attract fish to your line w/transistorized electronic fish callers. Small, liteweight, bat operated. $4 pp. Swap 1 or more for any ham gear. James Shank, 21 Terrace Ln, Elizabethtown, PA 17022.

Sell: Dumont scope, type 208 unused 4-1000A. Make offer. Jerry Macari, WA2KDB, 138-23 59th Ave., Flushing, NY 11355.

For sale: Model 19, Tee Dee, Referferator, TU, GE TPL 70 watt, Lysco 600, NC-300. W0ICU.

For sale: Hygain 5BDQ dipole & invented antenna w/hygain balun $50. Also HMBNW 20 meter 3 ele beam. Gp antenna $10. WA6PXY, 5403 Newcastele No. 20, Encino, CA 91396.

Want SB100A transceiver and ps HP23A and HP-13. C. Feil, 11639 26 SW, Seattle, Wash 98146. Tel. CH 3-5439.

Want to buy: B&W LPA-1 gg linear. State condx & price. Also want Ham-m. K5GKN, Box 249, Osceola, Ark. 72370.

Mechanical Filters: 455 kHz 2.1 kHz $18.95. 300 Kz $22.95. J.A. Fredricks, 314 South 13th Ave., Yakima, WA 98902.

HB linear 1400 WPEP 80-10 free pictures. Mort Caldwell, W8IFN, 1068 Windsor, Morgantown, W. VA 26505.

FOR SALE: Swan 508 VFO, $105. Swan 14-117 DC pwr sup with all cables, $95. Will ship at your expense. Richard Carter, 17024 Faysmith, Torrance CA 90504. 213-324-1227.

Synthesizer interpolations osc module, 90-100 Kc in 10 cps steps (0-10 cps continuous), oven, w schematic $10 new. J. Cavett, 8570 Herbert, Pennsauken, NJ 08109.

SELL: HT44 80-10 m ssb exc 200 w & pwr supply $170. HT41 Lin. 1500 w $130. Dumont 304H scope rac mt. $60. K2BVO, 201-797-6539.

WANTED: Tone rcvr SD98148. Sell: Gonset Aircraft Tuner (108-128 mc) w/squelch, Topaz 250 watt mobile p.s. No. 2 E, 1301 Estes, Chicago 60626.

SELL: HW16, 6 crystals included $80. HP13A Heath DC sup. and cables $49. NC300 rcvr $49. Ken Falls, WB5BCI, Drawer J, Naples, TX 75568.

SELL: Kirk 14MH4 fiberglass rotary beam weighs 19 lbs. Pick up only. $85. Harris, 1169 Amalfi, Pacific Palisades, CA 90272.

WANTED: Drake MN-2000. State condx. and best price. WA9HEU, Rt. 2, Box 284, Marinette, WI 54143.

WANTED: Instructograph with tapes. State price and cond. Elmer Potzmann, K9OCN 2230 Windsor Dr., Florissant, MO 63033.

WANT: Nat. NC-183-D. Trade for F. wired Valiant I, AF-67 with M-1070 or G-66B plus 2 p.s. So. Cal. only. W6DJZ, 213-294-0284.

FOR SALE: S-95 Hallicrafter Hi-Band (152-174 mc) rcvr with squelch. FB cond. $35. 817-872-5237.

WANTED: Riders Radio Manuals 9 thru 15. State price & cond. H.E. Parr, Clifton Hill, Missouri 65244.

Hallicrafters 3X-62-75.00 SX-62-A $95, SX-100 $75. H.P. 410-B VTVM $50. 7426 U.S.42 Florence KY 41017.

Call letter license plates wanted for collection. I'll reimburse postage. Art Phillips, WA7NXL, 3401 N. Columbus, Apt. 5-0, Tucson, AZ 85712.

SELL: H.B. Pwr sup for SB101, HW100, etc., $15. K.W. plate transformer, 2500 volt, 1000 M.A., $15. B. Nastoff, 320 W. 56th Place, Merrillville, IN 46410.

SELL: Basic test equipment precision meters., voltage dividers, resistance decades. Send SASE. J. Lisaius, 116 Orton Rd., W. Caldwell, NJ 07006

Radio Control Model Airplane Enthusiasts please contact Jim Brink WB4FTR, POB 3734, Fayetteville, NC 28305. 919-485-3600.

Hy-Gain Hy-Tower Verticals have 2 model 18-HT verticals. $90 for one and $75 for the other. Pick up. James Shank, 21 Terrace La., Elizabethtown, PA 17022.

SELL: 32S1 $425, AC supply $125, 75S1 w/waters $325, 75S3 $450, 312B console $150 All high serial numbers SW240/AC sup. $230. Larry, W7HKI, Travelers Lodge, Edmonds, WN 206-776-8441.

Sell or Trade: Rty Models 28, 15, 14, Printers, Reperfs & T.D.'s. UR8-A convertors, 11/16" tape, paper. Looking for Ham-M Rotator. Send offer for Cash or trade to: WB5DXR, P.O. Box 401, Wilburton, OK 74578. Ph: 918-465-3547.

BC-342 recvr, 1.5-18.1 mHz. With manual and matching LS-3 spkr. AC pwr. $50. Silbert, White Sulphur Springs, NY 12787.

Sell: RCA test probe, WG-299D, $4, brand new Eimac 4-1000-A; want SB610. B. Nastoff, 320 W., 56th Place, Merrillville, IN 46410.

NCX-5, MK II transceiver, operable, needs work. NCX-A & NCX-D pwr suplies. $300. W4NI, 3600 Old Vineyard, Winston-Salem, NC 27103.

Dress up your shack w/large 24-hr wall clocks. Battery or electric. Top quality. Write for prices. WB5-BNM, 1524 N. Okla. Ave., Shawnee, OK 74801.

Wanted: Halli HA-5 VFO in gud condx. K3GEO, 4229 Estates Ct., Allison Pk., PA 15101.

Send for the Antique Radio Advertisers Directory, $1.50 pp. James Fred, R1, Cutler, IN 46920.

Trade for ham gear choice pieces of quality test & VHF/UHF equip. Send lge sase for list. W4API, Box 4095, Arlington, VA 22204.

For sale: Johnson 6N2 xmtr, $85. BC-799B rcvr w/ac ps $75. Northern rtty 5sk keyer type 105 Model 4A w/ac ps $65. HQ-160 rcvr $100. All w/manuals. Ashley, Box 254, Ware Shoals, SC 29692.

Make offer: CE-20A & 458 vfo; ARC-4; BC-191; 2-510X, 240 M.A. xformer; 1-1000 X 1000 X 250 M.A.; 1-Vac. variable type U-10-300 P.F. All fob KS RME, POB 74, Ingram, TX 78025.

Canadians: For sale: Ranger, good condx $85. Mint HQ-110C $125; or both $175. U ship. Box 176, Burns Lake, B.C.

New SB-401 xtal kit $25; excellent Drake 2-C & 2-CQ $175. WN4UCC, No. 96 Hallmark Estates, Athens, GA 30601.

Johnson 6N2 vfo, $20 pp. Bob Dufon, 4114 Northcote Ave., East Chicago, Ind. 46312.

Sell or trade: CQ, QST, 73 & other old radio mags for early radio & wireless eqpt as well as old radio books, catalog, callbooks, etc. Rasmussen, 164 Lowell St., Redwood City, CA 94062.

Kilowatt switches. 5 position, 3 poles, Centralab JV9003. 5KV at 20 amps. brand new. $5 each. Marty WB6NWW, Box 15015, Long Beach, CA

Wanted: skeds w/Maine & VT, 40 m ssb to complete my WAS. Joe Hypnarowski, 3785 Mt. Blackburn, San Diego, CA 92111.

For sale or trade: hy-gain 402BA 2 el, 40 m beam. 203BA, 3 el mono beam, 20 m. Mosley MP-33 tribband, 3 el beam. Hygain coax balun. Ameco cope practice oscillator. K0TVY, Raymond, Iowa 50667

Lakeshore phasemaster 11A & bandhopper vfo 160-10 ssb, gud condx $100. Don Burns, 4410 Reading, Dayton, OH 45420. 513-256-0345.

Wanted: Catwhisker xtal sets Zenith 3R, Grebe CR-18, or any pre electric old set. WA4NED, Box 468, Gainesville, GA 30501.

Tri-band quad: Hy-Gain Hy-Quad 244. Never out of box. U ship. Save $20 & tax. $120 firm. K8TUR, 1094 McNaughten, Columbus, OH 43213.

Sony tape recorders for sstv; TC122 stereo tape deck $75. TC60A ac/dc $45. Mikes, etc. Send sase. WA3LRJ, 1160 King George Ct., Pittsburgh, PA.

Two GE pole pig transformers in orig containers in oil, approx 2300 volts. $25 ea. Pick up only. W. Carr 1145 Kerns Ave., S.W., Roanoke, VA 24015.

$100 cash for mint SX-146. Sell 811A, 813, 211, 872A. $3 each. John, 605 Cherry, Vandenberg, CA

Sell: Swan 500C, 508, vox, cw fltr, 14-117 ps, Johnson patch xcl cndx $575. New TA-33, Hy-gain balun, $125. Pkge deal $650. K2HPG, 208 Cypress, Floral Pk., NY 11001. 516-352-9663.

Want: DK-78 coax switches all types, and Sonar ssb monobander for 10 meters. VE3CKU, 45 Paisley West No. 1008, Cooksville, Ont., L5B1E4.

Welcome Home P.O.W. Captain Ronald Bliss from Joseph Schwartz, K2VGV and Family.

Wanted: touch tone rcvr SD98148. Garton, 1301 W. Estes Ave., Chicago 60626.

Send large sase for list of duplicate items in my antique radio collection. For trade or sale. McKenzie, 1200 W. Euclid, Indianola, Iowa 50125.

Wanted: complete yrs of CQ for 59 &6, in binders if possible. L. Sharp, VK4NS, 19 Kelso St. Cherm side, Queensland 4032, Australia.

Wanted: RM50 adaptor for Central Elec. MM-2 scope & panadaptor useable w/50 kc i.f. D. Bell, P.O. Box 73, Altadena, CA 91001.

SWAP: Two each: Blonder-Tongue TV camera, ITT monitor chassis, camera control. Fully transistorized, rack mounted. For SWAN cygnet, 270B in working condition. Write: Oberstein, 55 Knolls Crescent. Bx., NY 10463.

WANTED: Heathkit Cheyenne any condx. Price, condition first letter. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

SELL: Mint SR-160 with AC & DC supplies. $250. Jim Fleming, 6N705 Harvey, Medinah, IL 60157.

SP-600, $250.00. SB-620, $75. Want Swan 250 or TR-6. K4MSG, Box 2606, Avon, NC 27915.

FREE: Capacitive Discharge Automotive Ignition System Research Report. K6ICS. Dr. Michael K. Gauthier, 9418 Florence Ave., Downey, CA 90240

FREE: Report on Ham Radio. K6ICS. Dr. Michael K. Gauthier, 9418 Florence Ave., Downey, CA 90240.

SELL: DX-100; B SSB VFO, $55. HQ-110C 105. CB Rig HB-400 $85; CLR2 Vert. Buy: Beam, Trap Vertical, Linear, WN3SCP, 340 W. 2nd Ave., Latrobe, PA 15650. 539-3384.

FOR SALE: Swan 117-X Power Supply 117 VAC, $40. Swan 14-C DC Power Supply Module for 117-X $40. Shipping included. Both for $75. Write: R. Rapp, 87 Little Plains Rd., Huntington, NY 11743.

SELL: VFO for 20A, HW30 excel. GE450, gud. HX1-50 wt 80-10M. Riggs, 880 Hawthorne Dr., Walnut Crk., CA 94596.

WANTED: Good Phonetics for my call sign WA8GNY, 614 Omar Circle, Yellow Sprgs., OH 45387.

FOR SALE: Center reading milliampere meters 0-150, $2.50 pp. Goodman, 5826 S. Western Chicago, IL. 60636.

TR-44 CDR Ham Rotor complete with cable, $40. Turner Dynamic on Home brew stand, $8.00. NO shipping. Henry Van Handle, 139 Howe Ave., Passaic, NJ 07055.

FREQUENCY LISTINGS: 10 Khz to 30 Ghz, Computer Printout, WB9HWS, 408-51st Western Springs IL 60558.

FCC EXAMS: 1st and 2nd Class Exam Manual, $4.00. Autopatch Sys. Ltd. Box 291, Western Springs, IL 60558.

WANTED: Johnson 275W matchbox. W9BYO. G. Foerster, 4304 SW Anthony Wayne Dr., Fort Wayne, IN 46806.

SWITCHES: 5 band heavy duty ceramic for Linear Amplifiers.$5.00 P.P. (48) K4VCP, 2537 Cannaday Rd. NE, Roanoke, VA 24012.

CHESTER COUNTY (PA) ARC meets last Thursday in West Chester, for information call 827-7374.

HEATH SB station, 301-401-200. Testers, scope, keyer, ant., misc. SASE for complete list. G. Beyer, 15426 Comstock, Grand Haven, MI 49417.

CE20A with QT and 458 VFO, $80.00, new cal and sidetone for NCX 1000, $15.00, Clegg-22er. $140. (216) 658-2287.

WANT: A transceiver everything in one, due to no space. New or used but good. Send full details to: K3BDA, 2004 Phila. Ave., Chambersburg, PA. 17201.

BC-342, 1.5-18.1 mhz rcvr with manual and matching LS-3 spkr. AC pwr. $50.00. SILBERT Box 77, White Sul. Springs, NY 12787.

New UG-58A/u coax connectors. 5 for $3.50 ppd. Bill Hayward, W8PEM, 1307 NE 57th Terr. Gladstone, MO 64118.

Conical Monopole antennas. Collins 237-W1 X 3-30 mHz, 3.2 db gain, Worth $7200 sell for $350 perfect condx. WA1EMS, P.O. Box 11, Liberty, MO.

Sell or swap: Motorola HT 300 2 mtr, 4 ch, Handi-Talkie, 4CX1000 tube and socket. Need 4-1000A tube. WA6TAY, 4802 NE Chouteau Dr, Kansas City, MO 64119.

Wanted: Yaseu FV-400-S external VFO (8400-8900 kHz model) mint only -all answered. WB8BOI 1951 Burns Ave., Ypsilanti, MI 48197.

Wanted Central Electronics Signal Slicer. N.R. Silk, 24023 Bessemet, St. Woodland Mills, CA 91364.

Sell: Viking Valiant - converted to Valiant II excel working condx $100 plus ship. M. Sorochka, 9501 243 St., Bellerose, NY 516-488-3166.

Wanted Hallicrafter spkr, R-42 or R-46. Also SX 122 Gen coverage rcvr & cond. rotor cable. Tom Coddington, W9AWC, 7825 Scotts Valley Rd., Lakeport, CA 95453.

National HRO 60 with all coils. Excel $150. RME 4330. 10 to 60 meters. $50. Drake C-4 $280. new. Others. Sase. WA2HQD, 105 18 131 st, Richmond Hill, NY 11419.

Wanted working SB-10 reasonable. WA2ECI, 11 Ft. George Hill, NY, NY 10040 (212) WI2-5818.

QST Magazines for '58, '59, '60 $2 per year 20 cents ea. plus postage. W2JBL, 123 Davis Ave., Hackensack, NJ 07601.

Sell Swan plug-in VOX access. VX2 $28 like new. Postage paid. W2ASI, 15 Kenington Oval, New Rochelle, NY 10805.

Sale: Used Posi-check for General class exams. $2.25 in good condition. J.S. Looney, Rt. 1, Box 260-A, Grundy, VA 24614.

Sell: H-P 525A plug-in $28, H-P 525A $25, Robert Ireland, Pleasant Valley, NY 12569.

For sale: SX-101A $140. Joe Turkal, K8EKG, 1020 Fourth St. S.W. Massillon, OH 44646.

Sell: 4 RCA new 829B tubes at $4, Eico 710 grid dipper $10, Eico geiger counter $5, gen. radio 1000 cycle audio osc model 213 $10. W2ASI, 15 Kensington Oval, New Rochelle, NY 10805.

Robot SSTV monitor - new no time for hamming. $275. You pay UPS or pick up. W7DOP, Rt. 2, Box 292-B, Albany, OR 97321. 503-926-3205.

Trade unused 4X150A tubes for other ham gear. Sell Weston No. 301 0-200 microamp mtrs $3.50 ppd. SASE for list. Samkofsky, 4803 Brenda Dr., Orlando, LF 32806.

Collins Vernier knob for 75A4, Vibroplex presentation bug, "Mill" typewriter, and Ham-M rotator sincerely wanted. Please state price & shipping & condx. W1WQH, Howie Ryder, Wire Rd., Merrimack, NH 03054. 603-424-5883.

Wanted: Mint SX-62A or B recvr, Tecraft 220 mc transmitter, Johnson "Signal Sentry." VE3CKU, 45 Paisley West No. 1008, Cooksville Ont. L5B1E4

DX-60B, perfect cond., 80m VFO, Manuals, all $85 Want Var. Cap. for 500 watt transmatch. WN9JHS 6092 Chase Ave., Downers Grove, IL 60515.

Want to buy Simpson 260 VOM. Late model reasonable. 2537 Cannaday Rd., N.E., Roanoke, VA 24012.

Sale: German ham magazines, QRV 1948/49, DL-QTC 1950 to May 1969, xtal marker gen., 2m transmtr TCXQ, 24 VHC 40A reg. Paquee, 53 Jerome Av, Trumbull, CT 06611.

Fishermen - attract fish to you line with out trans. electronic fish callers. Small, light and bat. op. $4 ppd. James Shank, 21 Terrace La., Elezabethtown PA 17022.

Sell: Surplus Electronic parts. W2EZM, P.O. Box 323, Maple Shade, NJ 08052.

Novice Ham in poor condx needs Keyer-Wattmeter-General Amateur theory course with tapes. Box 246, Bridgehampton, NY 11932.

Wanted: Magnum Six speech processor for Collins. Heath SB-650 freq. display. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01506.

For sale: W2AU Balun $9. Ameco CN144 Converter $25. Heath PFI Q-mult. $10. Heath HM10A tunnel dipper $15. Others. T.H. Bean, 205 Ellinger Ave., Ft. Washington, PA 19034.

30 amp Filament Chokes for GG linears. Perfect for pair 4-400A's, 3-500Z's, or single 4-1000A, 3-1000Z, etc.$5 ea plus ship. V.R. Murrell, K4HHA, 712C Rich Rd., Newport, TN 37821.

Sale: Fisher Master-control, 400C $25. Fisher AM-FM tuner 101-R $25. Sony recorder 555-A $50. others. W2IZT, 447 S. Ocean Ave, Patchogue, NY.

Trade: 390/URR rcvr excel working condx. Want: crank-up, tilt-over, approx. 40' tower. You pay ship for both units. K3BCD (301) 866-5441.

APX-6 transponder, cavities machined for 1 ghz band $10, SB-3 brand new, $60. K2AHZ, 5 Shasta Pass, Fanwood, NJ 07023.

Almost 100& DX QSL return? Yes! Money, stamps, IRCs, and gifts unnecessary. Send sase. K3CHP, Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD

Vacuum Variables USC750 $45, USC375 $40, one counter dial $7, 4-250 tube $30. Basham, 735 Caves Hwy, Cave Jct, OR 97523.

For sale: Viking KW $500, 75S3-B $850, 312B-5 $375, KWM-2, 516F2, $1250, 32V-3 $150, HT-32 $175 others. James Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

FOR SALE: Gonset Model 3357 v.f.o. for 6, 2, and 220. Can be used with Models I, II, III and IV Communicators. Price $35. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

Transformers rewound. Jess Price, W4CLJ, 506 Raehn, St., Orlando, FL 32806.

Sell: Swan 500 with pwr sup 117-X mint, $420. Heath HW-32A w/pwr HP-23A $140. Need 75A4 mint. W3HQO, 519 Lincoln Ave., Hulmeville, PA

Sell: Ameco CB2 &PS1 $15. 24 hr clock $5. Telrex 2m 5el Yagi $5. 20m rotatable dipole 12ft $5. Poloroid 80B $10. Swinger jr. $5. K2HTO.

Scotch brand 1.5 mill magnetic recording tape size from 1/4" by 7" reels @ $1 to 1/2" by 14" @ $5. what do you need: P.O. Box D, Springfield, OR 97477. WA7NUZ.

Sell: H/P500B freq. meter $65. H/P 506A optical tachometer $25, Precision E-400 sweep generator $35,813's new $8, new 811A's $4. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

Sell or swap URM-7 mint cond. Complete Vincent T. Kalup, 4213 Bent Lane, Aston, PA 19014.

For sale: Like new Johnson tone alert V (250-0896-01/10) $40. Ross Hansen, WN7TZU, Preston, Idaho 83263.

For sale: VHF 1 Seneca 6N2 $65. John Wrobel, 3304 W. Palmer St., Chicago, IL 60647.

Wanted: W8FYO key, Ameco PLF preamp, Millen solid-state dipper. John Becker, 201 E. Marion, Prospect Heights, IL 60070.

Sell: Unused Swan 250-C, 117CX and 600-S spkr. $400. Richard Miller, K3JXO/4, RD3, Box 111, Warrenton, VA 22186.

Sell: SR-160 with AC & DC sup. Mint $250. Jim Fleming, K9FRZ, 6N705 Harvey Rd., Medinah, IL 60157.

Want: Photoflash caps. Approx. 500 mf 450 VDC. Max. dimensions 1-1/2"D x 6"L. WB2FKA, 28 Bridlemere, Ave., Interlaken, NJ 07712.

Selling out, converters, transmitters, antennas. Send for list include stamps. KIUVR, 54 Kaynor Dr., Waterbury, CT 06708.

How much am I offered for rare issues No. 1 and 2 of 73, in fine cond? Highest bid gets them. Kenneth Scharf, WA2MZE, 2569 W. 3nd St., Bklyn, NY.

Sell: Motorola HT-200/2 freq. with xtals and acces. Also Drake TR-22 with acces. K2VWZ, Box 500, Oceanside, NY 11572.

Wanted: the 1937, 38, 39 ARRL Handbooks. Must be in good condx with covers intact. Stipulate price including parcel post. C.O. Peacor, RFD 1, Dover Foxcroft, ME 04426.

Sell: R-388, Product Detector good condx $275, also Model 15 teletype, per. condx, $50. W4AIS, 300 Thornwood Dr., Taylors, SC 29687.

For sale: Heath SB-102, HP-23, spkr., HD-15, HD-10, AR-22R and Box, others. All great cond. $450. takes all. WA2NPL, 2307 Beverly Rd., Cinnaminson, NJ 08077.

CV-591A/URR: SSB receiving conv. input 225-1500 kHz. with manual, complete & unchecked. Sell or swap. Clem, K8HWW (1-313-268-2467).

8168/4CX1000A. Brand new, never used, in orig. packing, $100 or best offer. 5 in. Eico scope,mod. 425 good condx. $35. RCA volt ohmyst, $25. Al Parker, WA8VFK.

Want 160m coils for 200V. Sell or trade CV-31D dual diversity RTTY t.u. W.E. Waldschmidt, Box 163, Cannelton, IN 47520.

Wanted: Kodak 616 or 620 camera in working cond also 6x9 camera with roll film back. WA8MLV, 1008 Englewood Dr., Parma, OH 44134.

Must sell: Ten-Tec PM3A xcvr, AC4, AC5, and FR4 cw filter $55 complete ppd. All mint condx. WA9STJ, R. Pomerleau Osseo, MN 55369.

Sell or trade: I have a few 4CX250B tubes (new) looking for HP23A or what have you. Larry Langevin, 42 Prospect St., Ludlow, MA 01056.

Heath counter and scaler $325. Motorola W43GGV 3 freq. Others. Write WA5CMC, 2309 Bullington, Wichita Falls, TX.

Inspirational Reading! Summer Special! I've Been Had by Tank Harrison. 50 cents ea. plus 25 post. & hand. CK/MO Birthday required. K4CLA, 5/111-A Oak, Lexington, SC 29072.

Sell all parts for 1-1/2 kw pow. sup. including cab. $50. pick up only. Bruno Budny, Rt. 2, Box 28, Winter, WI 54896.

Swap: Minolta K-7 Movie Camera and Yashica 8P-3 projector, both Super 8 mm, in mint cond. for mint SB-220. R.O. Davis, W9KK, RR 1, Colfax, IN 46035

Cleaning out shack: tubes 53 cents up. Electronics components 99 cents bag. 1001 items, pp. Sase for list. A.R. Bergeron, WA5USU, 616 N. 11th, Carlsbad, NM 88220.

Sale: Knight T60 with extra final, xtals and key $30 Hy-Gain full sized 15 meter beam $20. S.D. Price, WB9FUT, RR 1, Nappanee, IN 46550.

Novice and VHF/UHF. Have hundreds of FT-243 type crystals for 40/15/10m and 6m and up. Sase for list. W6DOR, 2921 Loyola Dr, Davis, CA 95616

Sell: Johnson 250-20 kw-LP filter $10 ppd. 1967 domestic callbook, 1964 foreign callbook, offers? P. Feely, 15 Locust Hill, Yonkers, NY 10701.

Want: Telephone answering machine. Call Marty, WB6NWW, 213 5972631, or write Box 15015 Long Beach, CA 90815.

Doctors Directory compiled & pub. by Inter. Doctors Chpt of IARS & lists over 1500 MD, DDS, etc., who are hams. Dr. Wm. Fulcher, 105 Freshrun Dr., Hendersonville, TN 37075 for $2 per copy.

Technician wishes to correspond with experts in field of computers or others building computers. WN7VAT, 1071 Prosser, Prosser, WA 99350.

Dow Key DKC-TRM1 $10, B&W 52 ohm LPF $10, PS500 & MT150 $65, PS150DC sup. $45. Autronic keyer $40. Art Ford, 56 Gildare Dr., East Northport, NY 11731.

National HRO dial. Brand new in box with all hard. and right-angle gear mech. $10 ppd. Marty, WB6-NWW, Box 15015, Long Beach, CA 90815.

Panadapter SA-3 $75, Hallicrafters CRX-1 30-50 mc fm rec $35, Millen ant bridge new $30, 220V Variac $15. W. Davis, K6KZT, 4434 Josie Ave, Lakewood, CA 90713.

Transceiver Heath SB-101 with cw fil. and HP-23 pow sup. condx excel. $325. FOB. A. Emerald, 8956 Swallow Av, Foundtain Valley, CA 92708.

Sell: SB401 without xtal pack $200. W8CUT, 1776 Walnut St., Coshocton, OH 43812.

Wanted: Antique radio tubes made prior to 1920. W2EZM, Box 323 Maple Shade, NJ 08052.

Used Radio correspondence courses wanted for my own study to prepare me for higher class licenses. JW Taylor, WN5ISK, Box 4391, Wichita Falls, TX

For sale or trade: Mint Lampkin 105B freq. meter, $125 or will trade for VHF sideband gear. WA9KJJ Fred Clinger, 640 Grove Ave, Galion, OH 44833.

Wanted: old tubes, like Taylor T-300, DeForest spherical triode Audio etc., needed for amateur museum. W9LGH, 610 Monroe Ave., River Forest IL 60305.

RTTY 28 ksr Cabinet with Leso and wiring. Also Ribbon mechanisms for typing reperforators and intermediate gear assem. D.C. Harrington, 1620 Gardena Ave., Fridley, Minn 55432.

Mint Swan 350, 117vac supply, VOX, new lifetime output tubes, $240. W9ORU, OS236 Church, Winfield, IL 60190.

SB-620 $75. Want Swan 250, TV-2. K4MSG, Box 1606, Avon, NC 27915.

Wanted: 455 kHz quartz crystals. Advise quantity, price, holder. J. Worcester, RD 1, Frankfort, NY 13340.

Sell Standard com. SR-C826M with AC pwr sup. Positively mint condx. Best offer. I. Jacobson, 21010 Anza Ave., Torrance, Ca 90503.

Sale: SSIV squires sanders video bandscanner, polycomm 62 trans, 800 cps F455FA-08 fil., & mis. tubes. Want: HP13A and mob. ant. Jim K4VBH, Box 268, Americus, GA 31709.

Wanted: Atwater Kent rcvrs and catalogs. Precision E-310, E.H. Scott cat. Radio News mags. R. McNeill, Box 472, Yorkton, SASK, Canada.

Sell or swap: SSB rec. conv. CV-591A/URR I.F. input 225-1500kHz with man. K8HWW, 33727 Brownlea, Sterling Hts, MI 48077.

Sell Collins 3 rcvr control monitor rack mount enclosed, CI012 FRR, 3m, 2 crystals $20. Joe Lisaius 116 Orton Rd., W. Caldwell, NJ 07006.

Want: old transmitter tube talor, T-100, T-200, T-300, Eimac T-1500, T-2000. W9LGH, 610 Monroe Ave., River Forest, IL 60305.

Used Magazines books & periodicals on Radio and TV Servicing & repairing. Take them away instead of me throwing them away. E. Ezekiel, HJ2 Shaviv Herzlia H6-221 Israel.

Invader 200 $120. BC221 freq $50 WA2KWB 609-585-4188 Trenton, NJ and 302-368-7711 Newark, Del.

TTL-2A with custom panel, fully metered, all fea. plus some. $175 or trade? K8NGV, 26496 W. Six Mile, Detroit 48240.

Send sase for copies of articles on Ham Radio & TVI. Gabe, WA1GFJ, 17 Whitney E. Hartford, CT 06118.

Wanted: W8FYO key, amprobe, color bar and dot generator. For sale RME DB-23 preselector $25. K9WEH, 201 E. Marion, Prospect Heights, IL 60070

Worked South America certificate: Work all 13 countries. Send list and $1. HCI TH, 4805 Willowbend Blvd., Houston, TX 77035.

Wanted Drake L4B. W1DBS, John Savonis, 410 Blake Rd., New Britain, CT 06053.

College Student, short on funds, needs help in obtaining six and two meter am gear. WA1MYZ, 18 Sonrel St., Woburn, Mass 01801.

Sell: Clegg 99'er with HA-5 VFO and micro. All, $90. Russell, 19680 Mountville Dr. Maple Hts, OH 44137. 216-662-2175.

Meters, parts, etc. Send for list. Barlowe, WA2PZO, 55 Wilson Lane, Bethpage, NY 11714.

For sale: Johnson AC pwr sup (239-0125-001), $22.50. Ross Hansen, WN7TZU, Preston, Idaho 83263.

For sale: West. Elec paper cone spkr drive unit with mount $7.50. Separate drive no mount $5. Plus post. Douglas, 2254 Pepper Dr., Concord, CA 945-20.

Wanted: Out-of-print records by George Segal. Advise price, RPM and condx in first letter. Dr. W.C. Hess, W6CK, P.O. Box 19-M, Pasadena, CA 91102.

Special purchase. Collins 2.1 kc 455 if filters new $21.50 ppd. K9ARV, 2925 Wildwood Ct. NE, Cedar Rapids, IA 52402.

Hy-gain DB10-15A Duobander antenna with Hy-gain balun. Never used $65. Chuck, K5FKD, 431 Monte Vista, Dallas, TX 75223. 214-321-1864.

For sale: Projector teletype. Best offer. You pay freight. Pitts, Box 88, Snellville, GA 30278.

Sell: HW32 $75, SR464 $65, Viking II & 122 VFO $75. offer? will pay 50% shipping. K9VPS, 3110 Wisconsin, Berwyn, IL 60402.

Mechanical filters: 455kHz 2.1kHz $18.95. 300Hz $22.95. J.A. Fredricks, 314 South 13th Ave., Yakima, Washington 98902.

Q Meter wanted, boonton or Heath. Must be reasonable. Ed, W6IZJ, 408 N. Alabama, San Gabriel, CA 91775.

For sale: Two RCA 6161 & sockets, 180 watts @ 900mhz. Orig cost $225 ea. First $75 takes both. WN6GGD, 5107 Red Barn Lane, St. Joseph, MO 64503.

Wanted KWM-2 ac or dc sup Buy sell or trade Narco MK-5 & VOA-4. F.H. Wakefield, Franklin, KY. 42134.

For sale: New 4-400A, 2 sockets, 2 plate caps, 2kw pi-net, 2kw band-switch, 150mmf 3kv vair. capac., Eimac SK-500 for 4-1000A. $30 plus ship. K8TBW P.O. Box 445, Bettsville, OH 44815.

Wanted: 1 or 2 PL-175A Penta tubes for Johnson 2000. L.K. Rush, W4TM, 309 Walnut, Jackson, TN 38301.

For sale: Hallicrafters HR-34 2 and 6 meter transcvr $50. Needed meter for DX-100. H. Ray, Asheville High School, Asheville, NC 28803.

Wanted: linear systems model 400-12 or 500-12 mobile pwr sup. K6SHA, 411 Mission Dr., Camarillo, CA 93010.

For sale or trade: Elenco com. amp. $25, Elenco Bi-lateral amp $75, Johnson Messinger 2 cb $80, others. Jim Harris, 2925 Del Monte Ave., Bay City, TX 77414.

Wanted: Used Collins preselector 55G-1, must be in top shape. State firm price fob in reply. K.D. Symington, VE6XJ, 4711 Coronation Dr., Calgary, T2S 1M7, Alberta, Canada.

Sell: ssb-cw 3 band transcvr Eico 753 mod. with 6146's in final and a.c. pwr sup. $100 fob. Richard Gilson, W3NQA, 10 Kenmore St., Warren, PA. 16365.

For sale: Plans & spec. for 45' crank-up twr, self-supporting, easy to build. Send $2 to D&D, 1007 Janlee, Burkburnett, TX 76354.

Wanted: Drake T4XB & R4B MS-4, AG4, Reasonable. Sell Eico 720 & 730 mod, SX140, Knight VFO $110 with out mod. Jeff Krueger, WN9IHB.

Mystified by solid state RF design? Read out common man's down-to-earth series on this subject in the Milliwatt. $3.40 per year. Ade Weiss, K8EEG, 213 Forest, Vermilion, SD 57069.

For sale: 2 new boxed 811's $6 plus postage. Antique Morris coil winder $10. BC-453 and pwr sup $25. W6BLZ, 528 Colima St., La Jolla, CA 92037.

For sale: TA33 beam you pick up $50. John Kersten, WØNY, 171 Crest Ave., Fort Dodge, Iowa 50501.

Want to buy most often needed Radio diagrams published by Supreme Publications for years 1926 thru 1942. I. Prahl, R 1, Odin, IL 62870.

Desperately need an old tube, 5X4G for a non-ham friend. Info to R.D. Lucier, Birch St., W. Brookfield, Mass. 01505.

RTTY 32 and 33 ASR for sale. Excel. both 100 wpm. Write W1NPL, 136 Woodlawn St., Chicopee falls, Mass. 01020.

Sell BC-610E for best offer, also GSB-101 linear never used. W3BRH, Blue Church Rd., Coopersburg RD 2, 18036.

For sale: SBE 33 trans w/dc. $170. Johnson 6 & 2 Converter $25 Clegg Zeus VHF xmitter $240. K8RXD, Dean, 8464 Cleveland Ave N.W., North Canton, OH 44720.

Wanted: Heathkit counter and scaler, IB-101 and IB-102. Have mint Heathkit HW-32 trans. pwr sup. HP-23A. Paul J. Uhlig, 1342 Estate Ct., Wichita, Kans 67208.

For sale: Eimac AF-67, PMR-7, M-1070. Excel con. Great novice rig 40' tower, CB beam. Gene WN5-IFF, Rt., 3, Box 570, La Grange, TX 78945.

SB-220 used 1 hour $345. UPS collect. W9UZC, Southwest acres, RR 2, Harrisburg, IL 62946. 618-252-7064.

FT-101 Yaesu SSB, am, cw transcvr. like new. 260 watts pep with built in 110/220 volt ac and 12 volt dc pwr sup. $555. Schedler, W3GQS, 14322 Heatherfield, Houston, TX 77024.

Robyn digital 500 almost new, with ac sup/spkr, $625 or best offer. J.D. Harrop, 711 Weedon St., Fredericksburg, VA 22401.

HT44, SX117, PS150, $400. HAL $40, DB23 $40, 250w Matchbox $20. Warrior KW $125. Hustler whip w KW15/20m coils $40. K5MWZ. 817-292-5764.

Hallicrafters SX-146 rcvr, HT-46 xmtr $299. Collins MP-1, 351D-2, $99. Ameco TX-62, 621 VFO $75, eachmint. WA3HMQ, 717-761-1107.

Wanted: Johnson Navigator. State price & cond. Ppay trans. V. Francis, WØSZF, 211 E. 4th St., McCook, NB 69001.

Clegg 99er 6 m xcvr, excel condx, Telrex beam $49. WA2PCL, 101-23 Lefferts Blvd, Richmond Hill, NY 11419.

Wanted: Heath SS10-SSB adapter with cables and man, or Heath 80m to 10m ssb xmitter. D. Nardo, 912 Dorothea St., Baden, PA 15005.

Sell: Motorola P-9303 single tone RX. 2000 cps will ship $15. KØUPL, 1269 Forest Home Dr, St. Louis, MO 63137.

For sale: RCA mfg. 50 mc amp, 4-125s TVI shield, and 866 pwr sup. Both rack mtng. Make offer, Lemon, 3154 Stone Pt. Rd., Santa Rosa, CA 95401.

For sale: CIE 1st class course with answers $495. $100 Heath DX60B, many xtals like new $50. WN2KHN, A. Vail, 29 Prospect St., Amityville, NY.

Sell: SB101, HP-23, SB-600 $300. 4-BTV $35, John son TR $20 also many tx & rx tubes. WB2TIU, 360 Constitution, Forked River, NJ 08731.

Sell: AF68A, PMR8, M1070 $100, RME MB3 fone cw monitor $5, Millen RF amp 90881 w/coils $25, others. A. Bell, Slickville, PA 15684.

For sale or trade: BEZ21 freq. meter best offer or what have you? Also want Bird watt mtr. WØMDM, 18 N 7th St., Estherville, IA 51334.

NCL-2000 linear, has new 8122W (Eimac) $350. Want NTS master color TV course lessons & answer. Bill Fulcher, K4RTA, 105 Freshrun Dr., Hendersonville, TN 37075.

Sell: URT/2B xmtr. CW-am-fsk-fax 300 kHz to 26 mHz. Accur. 0.1 hz. cool kw input. Govt. cost abt $15k. $450. Sase WA6JXJ.

Wanted SX-122 and R-42 or R-46 spkr also Heath Soldering iron, motor speed control SP-600 spkr, and 8 cond. rotor cable. Tom Coddington, 7825 Scotts Valley Rd., Lakeport, CA 95453.

Sell: Heath UT-1 pwr sup $15, 4BTV vert. ant $20. RCA fm xcvr $55, 2m Motorola 80D $45, Halli. Handi-talkie $15. Dennis Grahs, WB9EZS, 715-834-3690 days.

Heath Pawnee 2m mint $150. URR27 110 mc to 195 mc $125. Model 15 Teletype table $65. John G. Murray, 40-33 61st St., Woodside, NY 11377.

Pay cash for matched pair of low voltage small or medium size selsyn motors. L.L. Turner, 2213 Sunland Ave., Las Vegas, NV 89106.

T-shirts with your call in 4" letters. State color and size $3. Bill Zandrew, K9VPS, 3110 Wisconsin, Berwyn, IL 60402.

SB-220 $200, SB-303 $265, SB-401 $235, Gladding 25 TX .16/.28/.34/.94 RX.76/.88/.94 and 5/8 whip $200. K4TRJ/6, 940 J Ave., Coronado, CA 92118.

Pick-up light wgt. 40' crank-up tile over tower $89. New 6 element beam Mosley Tri Band TA36 $108. Dutcher, 201 Syosset Woodbury Rd., Syosset, NY 11791.

T43GGV, Heath Counter and Scaler GE Pacers, WA5CMC, 2309 Bullington, Witchita Falls, TX 76301.

Sell: Hallicrafters SR-160 with AC and DC sup. mint $250. Jim Fleming K9FRZ, 6N705 Harvey Rd., Medinah, IL 60157.

For sale: 51S-1 $1050, 75S3-C $800, KWM-2 Waters Q-mult, DX engin. speech processor, 516F-2 $1200. others. James Craig, 29 Sherburne Ave., Portsmouth, NH 03801.

Standard 146-A still in factory carton with warranty card. $238.70. W4OAQ, Box 17222, Nashville, Tenn 37217. 615-834-8999.

Linear Builders: 30 amp filament chokes for GG linears. Perfect for pair 4-400A's, 3-500Z's, 813's, etc. $5 ea, 2 for $9.50. V. Murrell, K4HHA, Rt. 6, Newport, TN 37821.

Sell: HW12A, HP13, mike, spkr, hustler ant, man., expert wired, extra finals, $185. W3AJQ, 4808 Brinkley, Camp sprs, MD 20031.

Stereo: Garrard & Lenco turntables $35 ea. Sansui 200 am/fm rcvr $85. WN4UCC, Box 386, St. Marys GA 31558.

Dress up your shack with a battery or electric 24 hour clock. Write for details. Steve Antosh, WB5-BNM, 1524 N. OK, Shawnee, OK 74801.

Wanted: Science and Invention mags 1920-1931, will buy bound volumes. Geiger counter and variometer. KYKER, 172 Freihage Dr, N.E., Sierra Vista AZ 85635.

Sell-Swap: Hewlett-Packard pwr sup. All'73' all Short Wave Radio, CQ from Jan '47. W6QV, 10912 Sherman Grove, Sunland, CA 91040.

Bargain: New Westinghouse 110-220 volt AC linemeters $4 ppd. Want 6" telescope. Samkofsky, 4803 Brenda Dr., Orlando, FL 32806.

Sell: TTY model 19 ASR with paper winder, model 14 rotr and mainliner TTL/2, Viking Valiant II. M. Sorochka, 95-01 243rd St., Bellerose, NY.

Heath SB station, 301-401-200. Tester, scope, keyer, ant., misc. Sase for com. list. G. Beyer, 15426 Comstock, Grand Haven, MI 49417.

Mint TCS tx $25, 3" os-8 LIL scope $40, 38-54 vdc reg. p.s. new $23. Conley, 605 Cherry, Vandenberg, CA 93437.

Cash for operable ac or dc p.s. for Gonset G-76 xcvr State price. I pay shipping. W. Kipping, P.O. Box 253, Box Elder, SD 57719. 605-923-2531.

Modernize your shack with a ham wall clock. Battery or electric. Write for info. Steve WB5BNM, 1524 N. OK, Shawnee, OK 74801.

For sale: Heathkit HW-16 and 7 xtals, great condx, fac. aligned $80 or best offer. WB0IOH, 7674 Ideal Ave., So., Cottage Grove, Minn. 55016.

Sell: 4 4CX250B and 1 4CX350B tubes. Routine maintenance pull outs from microwave. Any reasonable offer. Willie Carr, WA4RDV, 1145 Kerns Ave., S.W., Roanoke, VA 24015.

Sell: UGS-300 vac var. $25, HP500B freq. mtr $48, Heath grid dipper $10, Midland swr bridge $7, and others. Trammell, 1507 White Oak Ct., Martinsville, VA 24112.

Sell: Heath phone patch, $15, binoculars 7 x 50 and case $10, TR3 and Drake ac sup $300. J.V. Oliveri, 447 S. Ocean Ave., Patchogue, NY 11772.

SP400X, GSB100, 40ft. twr, prop pitch mtr, plug much more. $200 takes all. You pick up. W6HZB, 9355 Glndn Way, Rsmd, CA 213-280-9574.

TV test equip. used but excel. 1/2 off list. Sale or trade. Basham, Cave Junction, OR 97523.

Want: 3 or 4 section var. recvr capacitor with ea. section up to about 400-450 uuf. H. Marhoff, P.O. Box 569, Largo, FL 33540.

Wanted: Rotating ring & base assy. for Tri-ex HZR-47IN rotating twr. A. Emerald, 8956 Swallow Ave., Fountain Valley, CA 92708.

Wanted: R/C proportional servos. Send details and price. WB2FKA, 28 Bridlemere Ave., Interlaken, NJ 07712.

Wanted: 275W Johnson Matchbox or Millen transmatch. WA5OKC, 12823 Westleigh, Houston, TX 77077.

Sell: HT-37 xmtr $140. D43GGV front mount 2 freq. 25W with .94/.94 xtals $80. Kalas, R1, Box 108, Valparaiso, IN 46383.

Need book or print for HRO-5 can copy also 900 to 2050 kc and 14 to 30 mc coils. Jake, WA7IHU, QRTS 370-4, Warren AFB, Wyo 82001.

Sacrifice: Ameco TX-62, 621 vfo $75, Collins DC sup & mobile mnt $75, Swan 250, 117xc, $235, others. WA2RJV, 301 Blacksmith Rd., Camphill, PA 17011.

Sell/Swap: 2 mtr fm, LM-13 w/callbook, JT30 mike, HW-100 & HP-13A excit. Want 40 mtr beam, comdel, ant tuner. W6NOS.

For sale: I will have a few 4CX250B for sale or trade. Looking for sstv mon. or cam. Magnum 6 for TR-4C. L. Langevin, 42 Prospect St., Ludlow, MA. 01056.

Wanted: 616 size Kodak 'Vigilant' Folding cam. Also 620 size Kodak folding, cam. WA8MLV, 1008 Englewood Dr., Parma, OH 44134.

Clegg 99er, mike xtal, manual with Telrex beam, fb condx $49. WA2PCL, 101-23 Lefferts Blvd., Richmond Hill, NY 11419.

BC-683-A with pwr sup, CB walky/talky, & some parts, trade for Johnson matchbox or equiv. WN2-EOO, Jules, 3 Lincoln Ave., Port Chester, NY

Tech books, courses, mags, bought, sold & traded. Don Ryan, Star Rt., Box 301A, South Plymouth, NY 13844.

HW12A 75 mtr xcvr. HP23B ac sup and GH-12A mike $120 U ship WA7RFH.

DX stations. I'm available as a qsl manager. I will answer all inquiries by air. Bob, WA1QBH, 1 Fernwood Dr., Simsbury, CT 06070.

# 400% MORE AVERAGE SSB POWER OUTPUT

USE A **MAGNUM SIX**
THE QUALITY R F SPEECH PROCESSOR



Collins–Heath..... $129.95
Drake ..... $149.95
Yaesu FT101 ..... $139.95
Kenwood ..... $139.95
Add 5% Tax in Washington

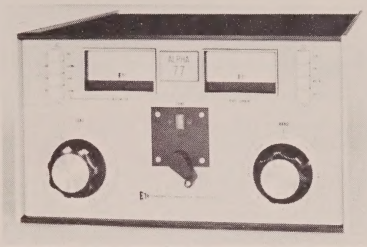
- 4 TIMES THE SSB POWER ON ALL BANDS
- ADDED PUNCH FOR PILE-UPS
- EXCELLENT VOICE QUALITY
- SPLATTER FREE, NARROW BAND OUTPUT SIGNAL
- SOLID STATE DESIGN
- PUT YOUR TRANSMITTER TO WORK FOR THE FIRST TIME IN ITS LIFE. POWER UP WITH A MAGNUM SIX FOR MORE ADDED POWER PER $ THAN ANY OTHER METHOD!

Send for FREE Brochure
Communication Technology Group
31218 Pacific Highway South
Federal Way, Washington 98002

A Division of Bitcel Systems Inc.

*Payne Radio Presents the Incomparable*

# ALPHA 77



Featuring the new Giant from Eimac, the 8877, grounded grid triode with 1500 watts of Plate dissication. Now only **$1495.**
12 months warranty with 24 months on Power transformer and oil-filled filter capacitor.

*Phone/write* **DON PAYNE,** *K4ID for a brochure and a King-size trade.*

## PAYNE RADIO

**Box 525**
**Springfield, Tenn. 37172**

Phone six days
(615) 384-5573

Phone Nites-Sundays
(615) 384-5643

# CRYSTAL BARGAINS

***Depend on . . .***

**We supply crystals from 16KHz to 100 MHz. Over 6 million crystals in stock.**

**SPECIAL**
**Crystals for most amateur 2-Meter F.M. Transceivers:**
**$3.75 Each**
**Inquire about quantity prices. Order direct. Send check or money order.**

For first class mail add 15¢ per crystal...for airmail add 20¢ ea.

JAN CRYSTALS

DIVISION OF BOB WHAN & SON ELECTRONICS, INC.

**2400 Crystal Dr.**
**Fort Myers**
**Florida 33901**
**(813) 936-2397**

Send 10¢ for new catalog with oscillator circuits and lists of thousands of frequencies in stock.

**SPECIALS! CRYSTALS FOR:**

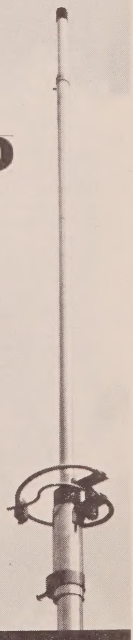
| | |
|---|---|
| Frequency Standards | |
| 100 KHz (HC13/U) | $4.50 |
| 1000 KHz (HC6/U) | 4.50 |
| Almost All CB Sets, Trans. or Rec. (CB Synthesizer Crystal on request) | 2.50 |
| Any Amateur Band in FT-243 (Except 80 meters) | 1.50<br>4 for 5.00 |
| 80 Meter Range in FT-243 | 2.50 |
| Color TV 3579.545 KHz (wire leads) | 1.60<br>4 for 5.00 |

# FM RINGO

**3.75 db GAIN**

**AR-2 – $12.50**

WORLD'S BEST VHF FM ANTENNA, IN STOCK AT YOUR LOCAL DISTRIBUTOR.



Cush Craft CORPORATION

621 HAYWARD STREET
MANCHESTER, N.H. 03103

For sale: Teletype equip, model 15, mod 19, mod 28 RO, 29 ksr, 28 asr Pieces and com machines. sase for list. L. Pfleger, 15000 w. Cleveland Ave., Apt. 225, New Berlin, Wis. 53151.

Swan 500 cx, 117 xc, Swan mobile mick, mobile p/s Swan Bumper mnt and mod. 45 mobile ant. 10-80 mirs. New $700 or $625 cash. QSL to Chuck Parker WA7 QPX.

Wanted: coils for HRO60 recvr, also Ham-M complete. Good condition, please. P. Joseph Barrett, WA1 QFB, 112 Sunny Cove Dr., Warwick, RI 02886.

Wanted: Tower, 70' up, crank up or tilt, Stan Talago, W8 PRM, Rt 3, Box 130 A, Bridgeport, W.Va. 26330.

Wanted: Motorola T-1056, 1057, test set, Lampkin mod. 205 A dev, mtr, bird mod. 43 thruline, Motorola, GE-RCA service Manuals. WB2 YYX.

Sell New Eimac 4EZ7 A, W.E. 701 A, W.E. VT-4 orig. box brass base $10 ea. ppd. S. Diamond, K6-PUH, 12559 Baseline, Etiwanda, CA 91739.

New 80-10 ac-dc ssb-cw FPM-300 warranty card. Orig. carton $475 & shipment Certify check. W9-HLA, 713 Oak, Lake Bluff, IL 60044.

Sell Eico R-C bridge/C-L comparator $30, Eico signal gen. $33, cash fob. W5 LGY, 1505 Monroe, Commerce, TX 75428.

Sell: Adventurer xmtr like new $40, Heath AT1 xmtr fb condx $25, S-40 B rcvr fb $50. K4 ADT, P. O. Box 6, Morgantown, NC 28655.

Sell: Hammarlund rcvrs, HQ-170 C & HQ-110 C, A-1 manuals. Want Heath SB-610, Swan 406 B, FPJ, VX2. Herbert Perry, Box 313, Trenton, MO 64683.

Wanted: RAX-1 rcvr, CG46116, BC610 parts-tubes Autodyne, Box 26, Bethpage, NY 11714.

Dowkey relay 110 v $10, SWR am-2 $8 fac fitted case for SBE-34 $20. CQ-QST 5 cent postage 4 x5 foto enlarger want HW12/32. K0TQM, Frentz Deerwood, MN 56444.

Sell: New Eimac SK-500 socket (3-1000 Z, 4-1000 Z) with chimney (3-1000 Z) $30 plus ship. Steve Roth, Santiago, Dept. of State, Washington, D.C.

For sale: Swan 350 mint, HB pwr usp $250. ART-13 with fsk pwr sup $50. Navy RBS gen cov rcvr $40. WA8 QBJ, Clinton, OH. 44216.

Wanted: Book 'Electronic Transformers and Circuits' by Rubin Lee. Good condx. J. Sodaro, 2214 Barry, Los Angeles, CA 90064.

New Jersey QSO Party. August 18-19. Rules in July issue.

For Sale: CQ/QST mags 1968 to date plus some odd runs 1966-67; 30 cents plus postage. Morris Rosen, W2 KNP, 240 First Ave., New York, NY 10009.

For sale: HT32 A, good condx, best offer over $100 You pay shipping. M.E. Knowles, 9 Brown St., No. Billerica, MA 01862.

Novices, xtals, for new 10 mtr, and 40 mtr bands, also other novice bands. Sase for list. Reasonable K8 LJQ, 355 Mower Rd., Pinckney, MI 48169.

Oscilloscope: DX/wid band 5" Knight KG635 all instruc. and sep. sw for dual trace. $70 fob. W9 TVV 2028 Oriole Trail, Michigan City, IN 46360.

NEEDED: Manual on Hallicrafters HT-19. Will pay copying cost. WN5 IEU, 15603 Rill, Houston, TX 77058.

FCC 1st and 2nd Class Commercial Test Answers, $4.00. CRD, Box 291, Western Springs, IL 60558.

Answers. Only $2. CRD, Box 291, Western Springs, IL 60558.

Wanted: Motorized Hoist for E—Z Way Tower—Saul Slonim, 320 Rose St., Massapequa, NY 11762.

QSLS WANTED. Accumulations of old QSL cards wanted. Buy or swap old radio bks., magazines or parts. K8 IKO, Box 222, Worthington, OH 43085.

HW22 A, $85. HW12 A, $85. HW23 A, $50. ESE Counter, six digit readout to .1 khz for above gear. $95, all like new. W8 HXR, 657 Willabar, Washington C.H., OH 43160.

SWAP: 35 mm 500 DTL mamiya w/200, 400 mm telephotos for good ham rcvr and/or xmtr. R. Benjamin, 171 Circle Dr., Rantoul, IL 61866. (217) 893-0871.

FOR SALE Swan 350 & HB pwr sup, $250; TS-175 with book, $30; H/P-410 B $40; others. WA8 QBJ, 6305 Redbird Terr., Clinton, OH 44216.

FOR SALE: Johnson Viking Mobiver tran 75-10 m (kit), $50. Eico 901 Yoke & fly tstr, $22.50; others. R. Wendel, WB2 YYX, 160-20 Grand Central Pkwy., Jamaica, NY 11432.

WANTED: Robot 80 camera and macro lens. Also magnum six for Collins. M. Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

SELL: Hallicrafters SR-160 with AC & DC supplies. Mint condx. $250. Jim Fleming, K9 FRZ, 6N705 Harvey Rd., Medinah, IL 60157.

JOHNSON VIKING TRANS., 275 W matchbox & Hall. SX96 rcvr. For sale. WA1 NGR, P.O. Box 76, Chester, CT. 06412.

WANTED: Millen Model 90800 Exciter. For sentiment. Be reasonable. Price and condx. A. S. Gillespie, K4 TP, 618 Hillcrest Ave., Gastonia, NC. 28052.

SALE: Motorola 45 Amp Alternator with electronic regulator. Mint, best offer. A. L. Perkins, W2-APQ, Box 457, Cazenovia, NY 13035.

SELL: New Heathkit IM-17. VOM, $18 Kit or $23 wired. A. E. Johnson, K1 IIK, PO Box 77, W. Dover, VT 05356.

NOTICE, WA3 LRJ/8 new QSL address is 135 Overhill Rd., Birmingham, MI 48010.

MAKE OFFER: Two 3500 MF X 100 V. W. E. Condsr. Coil assembly and cond. for BC221. Roller coil w/12 V drive. FOB. J. J. Crowl, POB 74, Ingram, TX 78025.

SELL: Hallicrafter SX101 Mk III rcvr 10 thru 160 $120. TX 62 xmtr $115. Both in gud cond and manuals. Bryan Hines, WB2 OUZ, (201) 278-1764.

ALL HEATH GEAR: SB303, $250. SB650, $160. SB650, $160. SB640, $150. Others. Phone: (212) 641-2559, Colella, WA2 HQD, 105 18 131 St., Richmond Hill, NY 11419.

OLD RADIO SHOWS: Bought and sold on tape. Write for info. W1 WQH, H. D. Ryder, Jr., Wire Rd., Merrimack, NH 03054.

Electronic parts for sale at give-away prices. W2-EZM, P. O. Box 323, Maple Shade, NJ 08052. C-C RX w/2-CQ, 2-AC & 2-NT TX, $365. HW-12 A w/cal & SB-600 w/HP-23 B, $165. WA8 UUY, 104 Henrietta St., Ravenswood, WV 26164.

FOR SALE: Standard 806-M 2-mtr transcvr w/crystals and orig. instruc. book, excel condx, $225. FOB. K7 MNK, RT 1, Box 2086, Florence, OR. 97439.

LINEAR BUILDERS: 30 amp filament chokes for 6 JG linear. Perfect, Bifilar wound. $5 ea., 2 for $9.50, plus 50 cents postage. V. Murrell, 712 C Rich Rd., Newport, TN 37821. K4 HHA.

TRADE EARLY QST's, CQ's and other radio mags. for old broadcast radio rcvrs. Want magazines, call bks., catalogs of early wireless days. E. Rasmussen, 164 Lowell, Redwood City, CA 94062.

WANTED: Star altitude tapes and 1,000,000:1 Mercator charts for Autrograph (WWII). H. Gauntt, W4 MZL, 1501 30th Ave., Vero Beach, Fl 32960

FOR SALE: AC adaptors, 6 VDC 150 MA, standard plug, new, $3.00 ppd. K2 MFY, 2 Nutley Ct., Plainview, NY 11803.

FOR SALE: Clegg Interceptor B and Ailbander Conv. $225. Telco 6M Converter, $15; other items at York Hamfest, SASE list. K3 MGO, 12 Larchwood Rd., Wyomissing, PA 19610.

SELL/TRADE Mint US Stamps, plate blocks and FD Covers. Want SSB Transceiver. 1 st class, no 2 Mtrs. W4 WBD, Maple St., Box 6, Eddyville, NY. 42038.

SELL: AF-67 Xmitter, 160-10 AM-FM-CW with M-110 AC-DC PS and manuals. $65. W6 DJZ, 3748 Floresta Way, LA, CA 90043.

SRR-13 A 2MC to 32 MC, needs work, $35. Seneca 2& mtr am/cw $95. Contact Ronald M. Nacata, 1330 Curtis, Berkeley, CA 94702.

NEW JERSEY QSO Party August 18-19. Rules in this issue.

WANTED: RAX-1 Rcvr, CG46116, BC610 parts, tubes, Autodyne, Box 26, Bethpage, NY 11714.

WANT BOOKS: Kraus ASTRONOMY, NBS Mono 22, ICC 71, Rhodes MONOPULSE, Skolnik H'bk, Hansen SCANNING ARRAYS, W3 AFM, P. D. Rockwell, 5800 Hillburne Way, Chevy Chase, MD 20015.

SELL: SSB Transverter, 6907 output complete w/ integral P.S. and Collins style cabinet, $60.00. Factory wired Knight GDO, manual, Complete $11. G. Vilardi, WA2 VTR, 14 Oakwood Terr., Spring Valley, NY 10977.

WANT TO BUY Foreign Officers Visored Dress Caps for Private museum. A. J. Lopez, WB6 CPG, 4896 Dewey Ave., Riverside, CA 92506.

BIRD Mod 611 wattmtr 0-500 MC perfect, $75; GE Pro-Mine 4 freq Xcvr on 146.94 w/control $125, K6 KZT, 4434 Josie Ave., Lakewood, CA 90713.

SELL: SB101/CW filter/HP23/SB600 $325. Mint SB640 $100. WA2 AMU. J. Glennon, 208 3rd Ave., Kingston, NY 12401.

FOR SALE: CQ/QST magazines 1968 to date, plus some odd runs 1966-67; 30 cents plus postage. Morris Rosen, W2 KNP, 240 First Ave., NY, NY 10009.

SELL: Laf. HA-600 A like new, $75 ppd. Want Eico test equip. Dave Barr, 708 Buffalo St., Franklin, PA. 16323.

1296 mHz converter as per ARRL current manual. 2-1296 mHz preamps. 1 or 2 stage. $20 or 30 sase for details. WA2 VTR, 14 Oakwood T., Spring Valley, NY 10977.

Selling extra gear, novice, tech, vhf, sase for list. Suydam, R.D. 2, Warwick, NY 10990.

Heath IG57 A sweep/marker gen. Brand new. Fac. wired, perfect $141. P. Carron, 205 Ridgewood Rd., Easton, PA 18042.

Lafayette 80-10 m vert. base loaded with coax and connectors, $10 ppd. WA3 LPK, 2300 Louise Ave., Baltimore, MD 21214.

28 ksr cabinet with Lesu and cabling. Typing reperfs and flying head TD's needing repair. Int gears and ribbon mech. D.C. Harrington, 1620 Gardena Ave., Fridley, MN 55432.

Amateurs, SWLs! N.J. SWL assoc., 10 Bulletins, Membership cert. $3 yr. WN2 FQS, J. Corrigan, 3 Garden St., Toms River, NJ 08753.

Want 32 S3 w/p/s trade 16 mm Bell & Howell cart. loading movie cam. w/turret head, wide angle, stan. and telephoto lens, plus cash. W6 AT, 367 Northwest, Vacaville, CA 95688.

Wanted: old radio mags such as Radio Broadcast, Pop Radio, Radio, Radio News, Science & Invention etc. Cash. Rasmussen, 164 Lowell, Redwood Ctiy, CA 94062.

Sell: Motorola Port. test set P-8501, com. FM use, Write and make offer. K7 AB, P.O. Box 685, Crystal Bay, NV 89402.

Genuine German drinking mugs. Crockery, with local brewery insignia, $4.50 ea shipped. WN4 UCC, Box 386, St. Marys, GA 31558.

Hallicrafters SX-100 rcvr. Selective 50 kHz 2nd IF. Write for details. exc. condx. Book was $325. Sell for $150. K9 YRA/9, 60 E. 32 St., Apt. 704, Chicago, IL 60616.

Drake MN2000 $95, 10-D mike with G stand $20. WB6 VNR, 7104 Deveron Ridge, Canoga Pk, CA 91304.

Antenna sell Mosley S-401 rotatable 40 mtr dipole $50 min. very good ocndx. (617) 862-2353. Hams Strauch, 81 Pleasant St., Lex., Mass. 02173.

Sell Heath HW100 mint $220. W0 LBR, C. Stanton, 845 Lawther, Dubuque, Iowa 52001.

Sell: Hallicrafter SX99 rcvr, DX60 B txmr, vfo, dc pwr sup plus more. Send for details. M. Mason, 677 Berry Ln, Lexington, KY 40502.

T43 Motorola, 12 vdc 25 watts, or 34-94 $75. 41 V Motorola 12 vdc, 10 watts on 34-94 $60. Motorola ac base station 10 watts. J. Tuxlow, 8 Elmwood dr. Quiney, IL 62301.

Sell: Lafayette HE-30 rcvr $50, Knight T-150 A xmtr $55, Eico 368 sweep gen & marker $50 ppd. R. Herr, 525 River View Dr., San Jose, CA 95111.

Like new 15 th edition Ed and Engrs handbook $5 ppd. Vibroplex orig. bug mint $12 ppd. K8 OUQ, 268 Annis Ct., Chillicothe, OH 45601.

For sale: Raytheon VR6115 voltage stabilizer, 95-130 to 115 volts, 500 watts. $60. K4 HVI, 13001 Old Cutler Rd., Miami, FL 33156.

Hammarlund Cap. MC-35-S .95 MC-100-M or s 1.45 MC-150-S 1.65 components list. Sase. Ken Maas, Burlington, Wis. 53105.

Swap: 1 realistic 'Globster' 5 bd sw port recvr in excel condx for an yof foll: Heath GR-54 or 64. Mid 13-900. Halls S-120 A or S-125 Eico DX-718. Ballinger, 11 Lown Ct., Pough., NY 12603.

Wanted: E coil for HRO-7, 51S1 Collins rcvr, K4-BKF/6 c/o C. Gregg, 405 Lock St., Waverly, OH 45690. 614-947-2380.

TMC GSB-1 ssb adaptor, excellent $90 firm. Basham, Cave Junction, OR 97523.

Wanted: old battery operated radios and crystal sets of the early 1920's. Need not be working. McKenzie, 1200 West Euclid, Indianola, IA 50125.

For sale: Hammarlund HQ110 C w/spkr $85, Rotary tank inductors for 2kw final $15. ea. D.D.C. Box 405, Duarte, CA 91010.

For sale: Swan 350 w/ps A1 shape $260. D. Dressen, 17 Woodlyn Lane, Bradbury, CA 91010.

Wanted: Schedules with 4th & 5th grade classes for 73-74 school year. K7 CUY, Box J, Snowflake, AZ 85937.

Wanted: Collins 51-S1, 75-S3 B, 75-S3 C, Kwm-2 A, in mint condx. Reasonable. Details, condx, serial in first letter. Martin, PCS Box 1903, 475 ABWG, APO, San Fran 96328.

Linear-HB, 1300 WPEP 10-80. Pro job. Sase for info and pix $100. Caldwell, 1068 Windsor, Morgantown, WV 26505.

Cleaning out shack-tubes 53 cents up, elec. com. 99 cents bag. 1001 items, pp. sase for list. A.R. Bergeron, WA5 USU, 616 N. 11th, Carlsbad, NM

Sell Heath IB-1101 and IB-102 counter and scaler. Perfect condx. $300 for the pair. W4 AIS, 300 Thornwood Dr., Taylors, SC 29687.

Wanted: Stancor A3888 cathode modulation transformer. W7 JI, 235 E. 15 St., Tempe, AZ 85281.

For sale: 2 chokes, 6 hy, 500 ma, 75 ohms DC. RMS 7500 best offer. M.E. Knowles, 9 Brown St., No. Billerica, MA 01862.

Tektronix Scope model 310 cal. vert. and horiz. DC to 4 mHz. Recent cal spare tubes probes book $275. T. Adams, 9707 Hansford, Austin, TX 78753.

Sale: Hallicrafters HT-32, mark 1, offer, mint, immaculate inside, no scratches, w/inst. manual, Lemon, 3154 Stony Pt., Rd, Santa Rosa, CA 95401.

CW ops join county hunters Weds 2300 Z 7055 kHz Sat 1430 Z 14070 kHz.

Looking for correct QTH of WA3 JLZ, Don Waddell. Callbook incorrect. Any info, pse contact WB-9HQO, Tom Workman, 4366 Xavier St., Denver, Col. 80212.

Urgently need manual to copy or buy for HT-20 xmtr. Will pay. K4 ADT, 117 Chestnut St., Morganton, N. Car. 28655.

Sell: CQ, QST, 73, Audio, PE, EW, Radio News and PS. Most from 1950 some before. W8 ACG, 10-36 24th St., Portsmouth, OH 45662.

Free report: Amateur Radio: It's effect on Society. K6 ICS, Mike Gauthier, 9418 Florence Ave., Downey, CA 90240.

Instructograph, mint, complete with key, all tapes, and headset $35. FM solid state rcvr. Nems-Clarke 1037 G. 50-250 mHz, interal scope for band pass display best offer over $250. WA8 VFK, Springfield OH 45506.

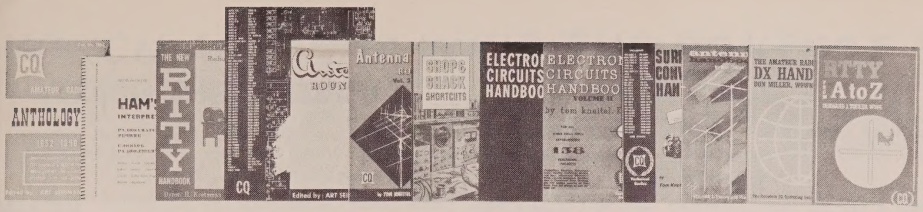
Wanted: Junked Heath rigs and also want HP-13 pwr sup. State model of rig and also cost. WB5 GMY Rt. 1, Box 162, Weimar, TX 78962.

Wanted: Manual or schematic for McElroy keying head model XTR-442-C. Will purchase or copy and return. P. Ballinger, W8 VYU, 1331 Concord NE, Massilon, OH 44646.

Lab. Standard Polystyrene capacitors. Western Elec 0.2631 mfd. 250 V., 0.1%, 10 ea for $3.75 ppd. W4-JGO, 643 Diamond Rd., Salem, VA 24153.

Want Schematic for DuMont Scope, Model 274. J. Korkames, 1826 E. Barbara, Tyler, TX 75701.

NY, NJ-LIARS chap 10/10 net Wed 4:30 local. Thurs 8 local. 28.620 check ins welcome.




# CQ BOOK SHOP

### Ham's Interpreter

This valuable book is imported from Germany and written by DL1CU. It contains a collection of phrases and expressions designed to assist those amateurs who wish to enlarge their knowledge of various languages for use on amateur radio. It is a must for every DX'er. $1.50

### CQ Binders

Convenient and economical are the words for CQ's beautiful maroon and gold binders. Individual issues can be removed quickly and easily without damage to the magazine. Save precious time as reference copies are within immediate reach in this handy binder. $5.00

### The New RTTY Handbook

A treasury of vital and "hard-to-get" information, this book is loaded with valuable equipment schematics, adjustment procedures, etc. A boon to beginner and pro. A special section on getting started, written by Byron Kretzman, W2JTP, a well-known authority in the field. $3.95

### Surplus Schematics

Ken Grayson has loaded this book with schematics for currently popular pieces of conversion gear, making it invaluable to amateurs as a guide to surplus gear. $2.50

### Antenna Roundup I

Edited by Art Seidman, a 160 page mass of antenna information directed at answering a multitude of questions surrounding the mysterious antenna. $3.00

### Antenna Roundup II

Ten big theory articles backed up by 82 detailed and illustrated construction projects from VLF to microwave, long wires to 17 element beams and Sterba Curtain arrays. $4.00

### Shop & Shack Shortcuts

A volume packed with hundreds of hints & shortcuts collected by Don Stoner, this will help anyone to dress up his shack, improve shop techniques and increase efficiency and equipment. $3.95

### CQ Anthology II

1952-1959 250 pages of more recent but still hard-to-get important articles from glorious yesteryear. $3.00

### Electronic Circuit Handbook I

Written by Tom Kneitel, WB2AAI, this details 150 of the most often needed circuits in 11 great chapters. Invaluable for beginners and old-timers alike. $3.00

### Electronic Circuit Handbook II

Tom Kneitel's own sequel to Vol 1, this volume delivers 159 additional circuits that will appeal to all amateurs. Each circuit is fully described in text with complete schematics. $3.00

### Surplus Conversion Handbook

Compiled by Tom Kneitel, WB2AAI, this contains 192 pages of conversion articles, covering almost every piece of surplus gear worth the effort to convert to ham use. $3.00

### Antenna Handbook I

All new information on transmission line theory, Attenuation, Impedance, Standing waves, Resonant and nonresonant lines, current distribution, free space 3 dimensional patterns of long wires of all practical length and much, much more by Ken Glanzer. $4.00

### The New DX Handbook

Don Miller's 200 pages of valuable technical information and operating aids, most of which has never been published before and can be found in no other volume contains Great Circle Bearing Charts. $5.00

### RTTY From A To Z

This new RTTY Classic has been produced to fill the gaps in RTTY knowledge among amateurs and professionals alike. 16 chapters and 224 pages. This book is a must in your technical library. $5.00

### 103 - Simple Transistor Projects

The aim of this book is to familiarize the beginner and advanced experimenter with the handy source of reference circuits. $3.45

---

- ☐ CQ Anthology II ..... $3.00
- ☐ Ham's Interpreter ..... $1.50
- ☐ CQ Binders ..... $5.00
- ☐ New RTTY Handbook ..... $3.95
- ☐ Surplus Schematics ..... $2.50
- ☐ Antenna Roundup I ..... $3.00
- ☐ Antenna Roundup II ..... $4.00
- ☐ Shop & Shack Shortcuts ..... $3.95
- ☐ Electronic Circuits Handbook I ..... $3.00
- ☐ Electronic Circuits Handbook II ..... $3.00
- ☐ Surplus Conversion Handbook ..... $3.00
- ☐ Antenna Handbook I ..... $4.00
- ☐ New DX Handbook ..... $5.00
- ☐ RTTY From A To Z ..... $5.00
- ☐ 103 - Simple Transistor Projects ... $3.45

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

New York City and State residents must add sales tax applicable to your area.

COWAN PUBLISHING CORP. Book Div.
14 Vanderventer Avenue • Port Washington, L.I., N.Y. 11050

## READER SERVICE

**To obtain literature from advertisers, simply check the box to the name of each advertiser listed below whose product or service is of interest to you.**

### JULY, 1973

- ☐ Antenna Specialists Co., The
- ☐ Arnold's Engraving
- ☐ Arrow Electronics
- ☐ Barry Electronics
- ☐ Bell & Howell Schools
- ☐ Clegg Division of I.S.C.
- ☐ Columbia Electronic Sales, Inc.
- ☐ Communication Technology Group (Bitcil)
- ☐ Cush-Craft Corp.
- ☐ DYCOMM.
- ☐ E-Z Way Products, Inc.
- ☐ Eimac, Div. of Varian
- ☐ Goodheart, R.E., Co.
- ☐ Gregory Electronics
- ☐ H & L Associates
- ☐ Hal Communications Corp.
- ☐ Hallicrafters Co.
- ☐ Heath Company
- ☐ Henry Radio
- ☐ Hobby Industry
- ☐ Hy-Gain Electronics Corp.
- ☐ International Crystal
- ☐ Jan Crystals
- ☐ KW Electronics
- ☐ Liberty Electronics, Inc.
- ☐ Linear Systems, Inc. (SBE)
- ☐ Midland Electronics Co.
- ☐ Miida Electronics
- ☐ Millen, James, Mfg., Co., Inc.
- ☐ Mosley Electronics
- ☐ National Radio Institute
- ☐ New-Tronics Corp.
- ☐ Palomar Engineers
- ☐ Regency Electronics
- ☐ Savoy Electronics, Inc.
- ☐ Space Electronics
- ☐ Spectrosonics, Inc.
- ☐ Standard Communications Corp.
- ☐ Swan Electronics
- ☐ Teco Electronics
- ☐ Telrex Communications Engineering Laboratories
- ☐ Unadilla Radiation Products
- ☐ Van W2DLT Electronics
- ☐ World QSL Bureau
- ☐ Xcelite Incorporated
- ☐ Yaesu Musen

CQ Reader Service
14 Vanderventer Ave.
Port Washington, N.Y. 11050

**Name** ..... **Call** .....

**Street Address** .....

**City** ..... **State** ..... **Zip** .....

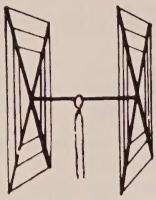
## ADVERTISER'S INDEX


| | |
|---|---|
| Antenna Specialists Co., The | 16 |
| Arnold's Engraving | 74 |
| Arrow Electronics | 18 |
| Barry Electronics | 84 |
| Bell & Howell Schools | 48, Insert, 49 |
| Clegg Division of I.S.C. | 11, 23 |
| Columbia Electronic Sales, Inc. | 75 |
| Communication Technology Group (Bitcil) | 91 |
| Cush-Craft Corp. | 91 |
| DYCOMM. | 81 |
| E-Z Way Products, Inc. | 83 |
| Eimac, Div. of Varian | Cov. IV |
| Goodheart, R.E., Co. | 74 |
| Gotham | 95 |
| Gregory Electronics | 96 |
| H & L Associates | 75 |
| Hal Communications Corp. | 6 |
| Hallicrafters Co. | 2 |
| Heath Company | Cov. II, 1 |
| Henry Radio | 25, 26, 62, 66 |
| Hobby Industry | 85 |
| House of Power | 81 |
| Hy-Gain Electronics Corp. | 4, 21, 29, 77 |
| International Crystal | 14 |
| Jan Crystals | 91 |
| KW Electronics | 81 |
| Liberty Electronics, Inc. | 75 |
| Linear Systems, Inc. (SBE) | 53 |
| Midland Electronics Co. | 19 |
| Miida Electronics | 57 |
| Millen, James, Mfg., Co., Inc. | 8 |
| Mosley Electronics | 69 |
| National Radio Institute | 83 |
| New-Tronics Corp. | 13 |
| Palomar Engineers | 79, 82 |
| Payne Radio | 91 |
| Regency Electronics | 28 |
| Savoy Electronics, Inc. | 9 |
| Space Electronics | 72, 79 |
| Spectrosonics, Inc. | 83 |
| Standard Communications Corp. | 15 |
| Swan Electronics | 17, 20, 24, 27 |
| Teco Electronics | 72 |
| Telrex Communications Engineering Laboratories | 10 |
| Unadilla Radiation Products | 84 |
| Van W2DLT Electronics | 74, 81 |
| World QSL Bureau | 75 |
| Xcelite Incorporated | 12 |
| Yaesu Musen | Cov. III |

# WHICH ANTENNA WINS THE CONTEST ?

In open competition against thousands of commercial and home-brew antennas, WA1JFG won the New England championship with a Gotham beam, by a margin of 5,982 points! WB2JAM won the sectional award for the Sweepstake contest in 1969 and 1970 with a Gotham 4-element 15 meter beam! Hundreds of unsolicited testimonials from grateful hams are our proof that Gotham antennas give you the best design, and the best materials. Forget our low prices - rely on the results of open, competitive contests. Ask yourself: Why do Gotham antennas win?

**QUADS** Worked 42 countries in two weeks with my Gotham Quad and only 75 watts... W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.; 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.
Radiating Elements: Steel wire, tempered and plated, .064" diameter.
X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.
Radiator Terminals: Cinch-Jones two-terminal fittings
Feedline (not furnished); 52 ohm coaxial cable

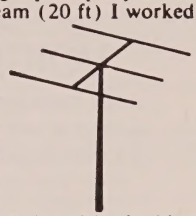
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

| | |
|---|---|
| 10-15-20 CUBICAL QUAD | $41.00 |
| 10-15 CUBICAL QUAD | 36.00 |
| 15-20 CUBICAL QUAD | 38.00 |
| TWENTY METER CUBICAL QUAD | 31.00 |
| FIFTEEN METER CUBICAL QUAD | 30.00 |
| TEN METER CUBICAL QUAD | 29.00 |

(all use single coax feedline)

**GOTHAM**
**1805 Purdy, Dept. CQ,**
**Miami Beach, Fla. 33139**

**BEAMS** The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

| | | | |
|---|---|---|---|
| 2 EL 20 | $25 | 4 EL 10 | 24 |
| 3 EL 20 | 31* | 7 EL 10 | 38* |
| 4 EL 20 | 38* | 4 EL 6 | 24 |
| 2 EL 15 | 21 | 8 EL 6 | 34* |
| 3 EL 15 | 25 | 12 EL 2 | 31* |
| 4 EL 15 | 31* | *20' Boom | |
| 5 EL 15 | 34* | | |

## ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!
*FLASH!* Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK. OZ4H. and over a thousand other stations!

| | |
|---|---|
| V40 vertical for 40, 20, 15, 10, 6 meters | $18.95 |
| V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters | $20.95 |
| V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters | $22.95 |

"HOW TO ORDER: Send money order (bank, store, or United States) in full. We ship immediately by best way, charges collect. DEALERS WRITE."

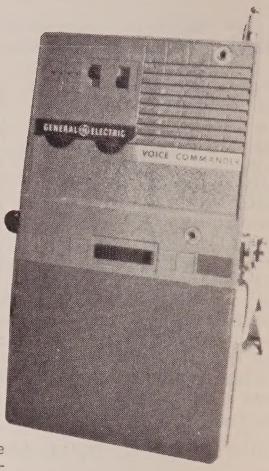
# GREGORY ELECTRONICS CORP.

*The FM Used Equipment People.*

249 Route 46, Saddle Brook, N. J.
Phone (201) 773-7550

*SEND FOR NEW 1973½ CATALOG*

## GENERAL ELECTRIC
## VOICE COMMANDER III




- **Full Solid State FM Transmitter-Receiver**
- **132-150 and 150-174 MHz/Size: 9.5″ x 5.3″ x 1.7″**
- **1 watt output, .5 micro-volt sensitivity.**

High performance, completely self-contained two-way FM radio. Compact, lightweight, easily operated and hand-carried. Housed in high-impact, 2-section case. All external hardware polished stainless steel. Top section has transmitter and receiver modules, built-in mike and speaker, antenna, carrying handle, all switches and controls. Bottom section has battery power supply. Power connections to top section made by plug and jack connection.

**$138.** Includes rechargeable nickel cadmium battery pack and charger.

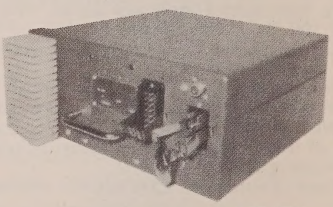
Crystals and tuning, add $50.

Proper chargers available separately, each $15.

Lots of 5 less 10% — $124.20
Lots of 10 less 15% — $117.30

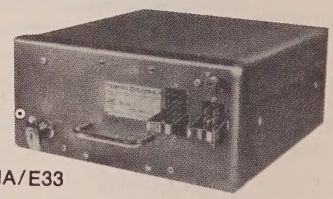
## TWO METER MOBILE UNITS

**GENERAL ELECTRIC PROGRESS LINE**
**14″ or 17″ case, complete accessories, fully narrow band.**



MT/33

**MT/33, 12 volt, 30 watts, transistor power supply.....$158**
**with wide band receiver.....$143**



MA/E33

**MA/E33, 6/12 volt, 30 watts.**
**vibrator power supply.....$88**
**with wide band receiver.....$73**

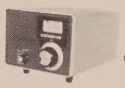
# YAESU

## YOUR ASSURANCE OF PERFORMANCE & QUALITY

SP101-P $59.00
SP101 19.00



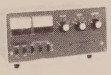
FV101 $99.00
160M THROUGH 10M



FT101 $649.00
TRANSCVR 260W PEP



FL2100 $339.00
80M THROUGH 10M
1200W PEP



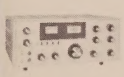
The SP101-P Landliner provides phone patch operation as well as speaker. Front panel: Patch switch, meter, TX and RX gain controls. Rear apron: Receiver 4 ohm output, receiver 600 ohm output, monitor null switch, balance control, line jack, transmitter high Z jack.

The FV-101 permits split frequency operation and control from either the FT-101 or FTDX401.

The FT-101 exciter covers 160, 80, 40, 20, 15, (CB), and 10 meters and comes complete with microphone cable and plug, fused DC power cable and plug. AC cable with plugs and all necessary plugs are furnished. AC and DC supplies are internal.

The FL-2100 linear amplifier needs only 3 wire cable and coax cable. Connectors are furnished.

FTDX401 $599.00
TRANSCVR 560W PEP



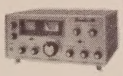
FV401 $99.00
EXTERNAL VFO
80M THROUGH 10M



FL2000B $399.00
LINEAR AMP
1200W PEP



FRDX400 $299.00
RECEIVER
160M THROUGH 10M

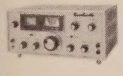


FTdx401 features high power, super sensitivity and sharp selectivity. The FT-dx401 includes: AC power supply, noise blanker, 100 KC and 25 KC calibrators. VOX break-in, phone patch terminal, cooling fan. Covers 3.5 through 10 MHz plus WWV. 560 watts PEP. All that is required to get on the air is a microphone and speaker.

The FV-401 permits split frequency operation for the DX chaser or net operator. Covers 80 through 10 meters.

FL 2000 B 1200 watts PEP, 1000 watts CW, 600 watts AM. Drive power required 100 watts. Has two cooling fans and uses two 572 B tubes.

FLDX400 $399.00
EXCITER
80M THROUGH 10M



FL2000B $399.00
LINEAR AMP
1200W PEP



SP401-P $59.00
SP401 19.00
SPEAKER/PATCH



FP-2
AC POWER SUPPLY



FRdx400 includes 2 mechanical filters plus "T" notch rejection tuning, and clarifier for easy zero set for SSB. Crystal control 1st mixer and tunable 1st I.F. provides stable operation and high spurious rejection. 100 KC and 25 KC calibrators. VFO can be used in transceive operation in conjunction with F series transmitter.

FLdx400 operates SSB, (USB LSB selectable), AM, CW and FSK. Circuitry can be built in for RTTY operation. 240 watts PEP. VOX, PTT, and break-in CW.

FL-2000B grounded grid linear uses a pair of 572 B tubes. Plate meter VSWR monitor, 2 fans, built-in power supply, 80 through 10 meters, 1200 watts PEP with distortion product in excess of 30 DB down.

FT2FB $239.00
144-148Mhz
10W HIGH 1W LOW



FT2-AUTO $379.00
144-148Mhz



FP-2 AC power supply specifications: Output - 13.5 volts, 2 amps. AC input - 100/117/220/234 volts. Speaker - 5" x 3-1/5". Portable or home base operation can be achieved with the addition of the optional FP-2 power pack. This AC power pack provides regulated DC power for the transceiver and charging voltage for optional leak proof rechargeable colloidal type batteries. In addition, a high fidelity elliptical style speaker is built into the pack.

The FT-2FB opens the door to noise free broadcast quality 2 meter operation, and thanks to the repeater stations throughout the country, the 2 meter band is no longer restricted to line of sight. General coverage 144 to 148 MHz, 12 channels (3 supplied). Push to talk. Receiver .3 amps, transmit 1.7 amps, power source 13.5 volts + 10%. Dimensions 6-3/8" w. x 2-1/2" h. x 10" d., weight 4 lbs. Comes with dynamic microphone, connector plug, DC cord, fuse and mobile mount.

YC355-D $289.00
DIGITAL COUNTER BUILT IN PRESCALER



Complete with
A.C. Power Cord 6 Ft.
D.C. Power Cord 6 Ft.
Signal Test Lead with
BNC Connector 3 Ft.

The FT-2 auto is a compact base or mobile VHF/FM transceiver, covering 146 to 148 MHz, featuring electronic scanning up to 8 stations between 146-148 MHz with priority channel sampling while locked on another channel. Adjustable tone burst push-button lock on for repeater actuation. The FT-2 auto is self-contained. Two power cables are supplied with the transceiver, including all mounting hardware, cables, connectors, and accessories required for both mobile and base installation, as well as dynamic push to talk microphone. Operates from various AC voltages or 13.5 DC. Dimensions 8-3/4" w. x 4-1/4" h. x 11-5/8" d. Weight 9 lbs.

SPECIFICATIONS

| | YC-355D |
|---|---|
| Frequency range | 5Hz to 35MHz (50Hz to 200MHz) |
| Accuracy | Time base stability + 1 count |
| Display | 5 Digit |
| Sampling time | 1 milli-sec or 1 sec |
| Display time | 0.1 sec 2 sec |
| Frequency Unit | KHz, MHz |
| Display | Display tube |
| Input Voltage | 20mV~20Vp-p (0.15V~5Vp-p) |

| | | YC-355D |
|---|---|---|
| MAX Input Voltage | | 60Vp-p, less than 10 sec (5V p-p) |
| Input Impedance | | HIGH: 1 M ohm, Low: 56 ohms |
| Input Capacity | | Less than 20pF |
| Time base Frequency | | 1 MHz Crystal controlled |
| Stability | | 0.0005% at 25° C<br>0.0025% at 0° ~ 40° C |
| Power Requirements | A C | 100/110/117/200/220/234V 50/60Hz 18V A |
| | D C | 12~14.5V 1A |

| | | YC-355D |
|---|---|---|
| | | 220(W)X80(H)X270(D) (8 3/4 W X 3 3/4 H 10 1/2 inches) |
| Weight | | |
| Tube | Display tube | 5 |
| Semi-conductors | Silicon diode | 12 |
| | Silicon transistor | 9 |
| | FET | 1 |
| | IC | 26 |

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

FACTORY SERVICE IS AVAILABLE WHERE WARRANTY HAS EXPIRED. MODIFICATION KIT MK-160 (160M) $16.00 WITH XTAL PLUS LABOR. MODERNIZATION KIT MIR-1 FOR OLDER MODEL FT101 $40.00 PLUS LABOR. BROCHURES WITH SPECIFICATIONS ARE AVAILABLE AT YOUR DEALERS LISTED BELOW:

HENRY RADIO STORES/213-477-6701
Los Angeles, Anaheim, Cal.; Butler, Mo.
HAM RADIO OUTLET/415-342-5757
Burlingame, Cal.
RACOM ELECTRONICS/206-255-6656
Renton, Wash.

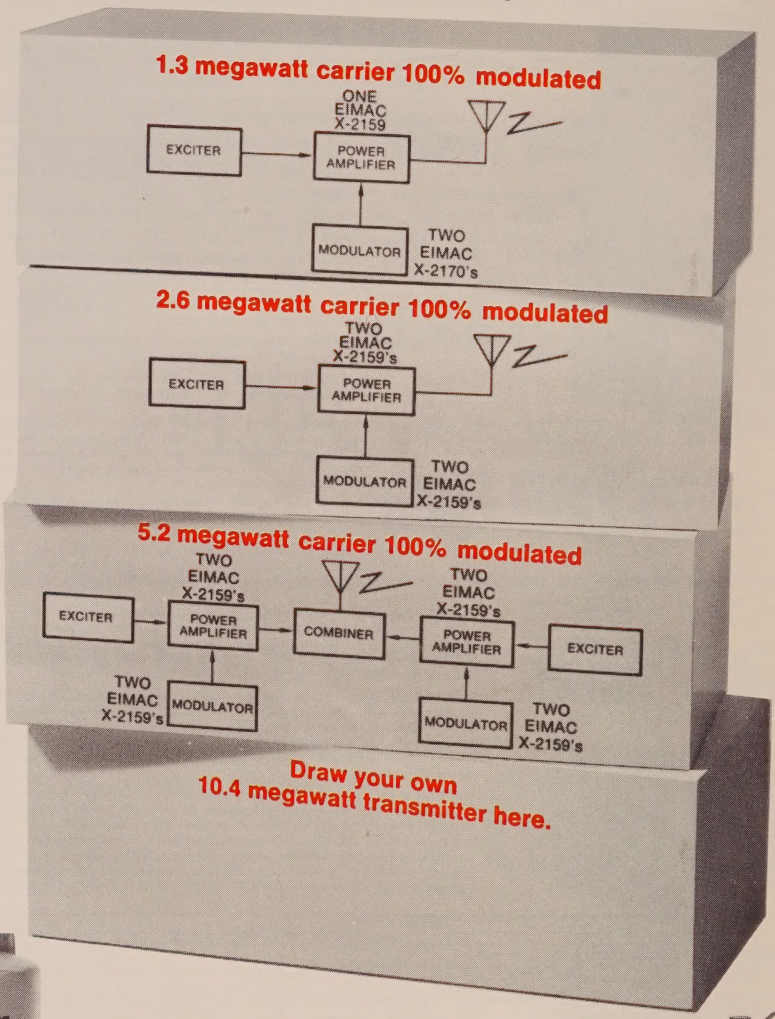
WILSON ELECTRONICS/702-457-3596
Pittman, Nev.
ED JUGE ELECTRONICS/817-926-5221
Fort Worth, Tex.
AMATEUR ELECTRONICS SUPPLY/414-442-4200
Milwaukee, Wis.; Cleveland, Ohio

FRECK RADIO & SUPPLY/704-254-9551
Asheville, N.C.
HARRISON RADIO/516-293-7990
Farmingdale, L.I. Valley Stream, L.I. New York City, N.Y.


YAESU MUSEN USA INC.
7625 E. ROSECRANS AVE. UNIT 29 PARAMOUNT, CAL. 90723
TWX 910-346-7624
TEL 213-633-4007

# 10,400,000 Watts!

EIMAC super-power tetrodes provide transmitter "building blocks" up to 10.4 megawatts, 100% modulated.

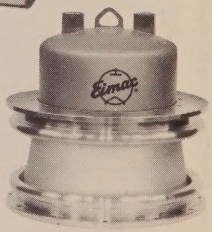






X-2159

For information on the X-2159 and X-2170 super-power tetrodes, contact the EIMAC Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian /EIMAC Tube and Device Group Sales Offices throughout the world.




X-2170

Eimac®
division
varian

# CQ SUBSCRIBER SPECIAL

Please extend my present subscription to CQ for years.

NAME (PLEASE PRINT)

STREET ADDRESS

CITY

STATE ZIP

| | |
|---|---|
| 3 years | $12.00 |
| 4 years | 15.75 |
| 5 years | 19.50 |
| 6 years | 23.25 |
| 7 years | 27.00 |
| 8 years | 30.75 |
| 9 years | 34.50 |
| 10 years | 38.25 |
| LIFE | 75.00 |

Mail with full remittance and your regular mailing strip to:

CQ CIRCULATION DEPARTMENT
14 Vandeventer Ave.
Port Washington, N.Y. 11050

FIRST CLASS
Permit No. 341
Mount Kisco
New York

BUSINESS REPLY MAIL

NO POSTAGE NECESSARY IF MAILED IN UNITED STATES

POSTAGE WILL BE PAID BY—

CQ Magazine
Reader Service Dept.,
Box 509
Mount Kisco N.Y. 10549

## READER SERVICE

**To obtain literature from advertisers, simply check the box to the name of each advertiser listed below whose product or service is of interest to you.**

### JULY, 1973

- ☐ Antenna Specialists Co., The
- ☐ Arnold's Engraving
- ☐ Arrow Electronics
- ☐ Barry Electronics
- ☐ Bell & Howell Schools
- ☐ Clegg Division of I.S.C.
- ☐ Columbia Electronic Sales, Inc.
- ☐ Communication Technology Group (Bitcil)
- ☐ Cush-Craft Corp.
- ☐ DYCOMM.
- ☐ E-Z Way Products, Inc.
- ☐ Eimac, Div. of Varian
- ☐ Goodheart, R.E., Co.
- ☐ Gregory Electronics
- ☐ H & L Associates
- ☐ Hal Communications Corp.
- ☐ Hallicrafters Co.
- ☐ Heath Company
- ☐ Henry Radio
- ☐ Hobby Industry
- ☐ Hy-Gain Electronics Corp.
- ☐ International Crystal
- ☐ Jan Crystals
- ☐ KW Electronics
- ☐ Liberty Electronics, Inc.
- ☐ Linear Systems, Inc. (SBE)
- ☐ Midland Electronics Co.
- ☐ Miida Electronics
- ☐ Millen, James, Mfg., Co., Inc.
- ☐ Mosley Electronics
- ☐ National Radio Institute
- ☐ New-Tronics Corp.
- ☐ Palomar Engineers
- ☐ Regency Electronics
- ☐ Savoy Electronics, Inc.
- ☐ Space Electronics
- ☐ Spectrosonics, Inc.
- ☐ Standard Communications Corp.
- ☐ Swan Electronics
- ☐ Teco Electronics
- ☐ Telrex Communications Engineering Laboratories
- ☐ Unadilla Radiation Products
- ☐ Van W2DLT Electronics
- ☐ World QSL Bureau
- ☐ Xcelite Incorporated
- ☐ Yaesu Musen

CQ Reader Service
14 Vanderventer Ave.
Port Washington, N.Y. 11050

**Name** ..... **Call** .....

**Street Address** .....

**City** ..... **State** ..... **Zip** .....

# Special Long Term CQ SUBSCRIPTION Offer On Reverse Side