QST

devoted entirely to Amateur Radio

March 1983 $2.50

Snare a fox with a DF antenna

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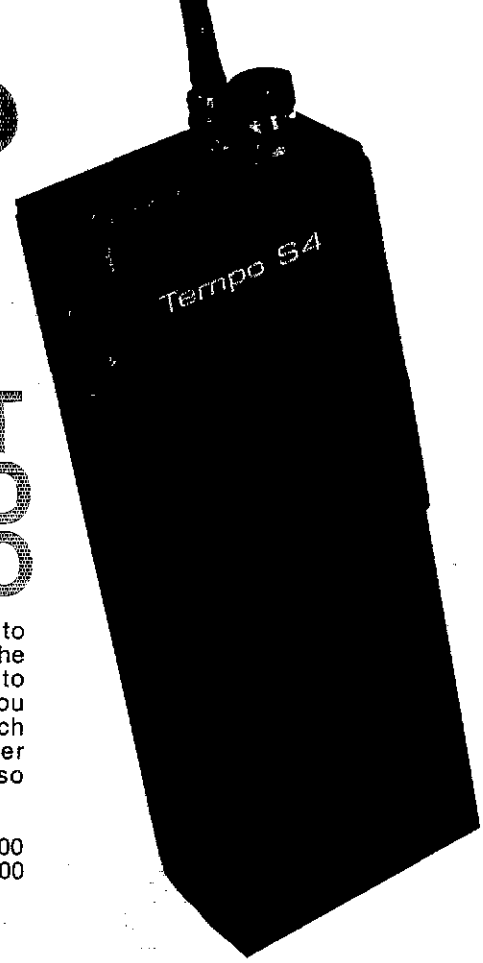
tempo does it again



THE WORLD'S FIRST 440 MHz SYNTHESIZED HAND HELD RADIO

Tempo was the first with a synthesized hand held for amateur use, first with a 220 MHz synthesized hand held, first with a 5 watt output synthesized hand held...and once again first in the 440 MHz range with the S-4, a fully synthesized hand held radio. Not only does Tempo offer the broadest line of synthesized hand helds, but its standards of reliability are unsurpassed...reliability proven through millions of hours of operation. No other hand held has been so thoroughly field tested, is so simple to operate or offers so much value. The Tempo S-4 offers the opportunity to get on 440 MHz from where ever you may be. With the addition of a touch tone pad and matching power amplifier its versatility is also unsurpassed.

The S-4...$349.00
With 12 button touch tone pad...$399.00
With 16 button touch tone pad...$419.00
S-40 matching 40 watt output
13.8 VDC power amplifier...$149.00

Tempo S-1

The first and most thoroughly field tested hand held synthesized radio available today. Many thousands are now in use and the letters of praise still pour in. The S-1 is the most simple radio to operate and is built to provide years of dependable service. Despite its light weight and small size it is built to withstand rough handling and hard use. Its heavy duty battery pack allows more operating time between charges and its new lower price makes it even more affordable.

Tempo S-5

Offers the same field proven reliability, features and specifications as the S-1 except that the S-5 provides a big 5 watt output (or 1 watt low power operation). They both have external microphone capability and can be operated with matching solid state power amplifiers (30 watt or 80 watt output). Allows your hand held to double as a powerful mobile or base radio.

S-30...$89.00* S-80...$149.00*

*For use with S-1 and S-5

Tempo S-2

With an S-2 in your car or pocket you can use 220 MHz repeaters throughout the U.S. It offers all the advanced engineering, premium quality components and features of the S-1 and S-5. The S-2 offers 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 this is the perfect way to get started. With the addition of the S-20 Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz station, the S-2 will add tremendous versatility.

Price...$349.00 (With touch tone pad installed...$399.00)
S-20...$89.00

Specifications:
Frequency Coverage: 440 to 449.995 MHz
Channel Spacing: 25 KHz minimum
Power Requirements: 9.6 VDC
Current Drain: 17 ma-standby 400 ma-transmit (1 amp high power)
Antenna Impedance: 50 ohms
Sensitivity: Better than .5 microvolts nominal for 20 db
Supplied Accessories: Rubber flex antenna 450 ma ni-cad battery pack, charger and earphone
RF output Power: Nominal 3 watts high or 1 watt low power
Repeater Offset: ± 5 MHz

Optional Accessories for all models
12 button touch tone pad (not installed): $39 • 16 button touch tone pad (not installed): $48 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Leather holster: $20 • Cigarette lighter plug mobile charging unit: $6

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal. . . give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$209
10W	130W	130A10	$189
30W	130W	130A30	$199
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159
2W	50W	50A02	$129
2W	30W	30A02	$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.

58 YEARS OF SERVICE

Henry Radio

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For all states except California.
Calif. residents please call collect on our regular numbers.
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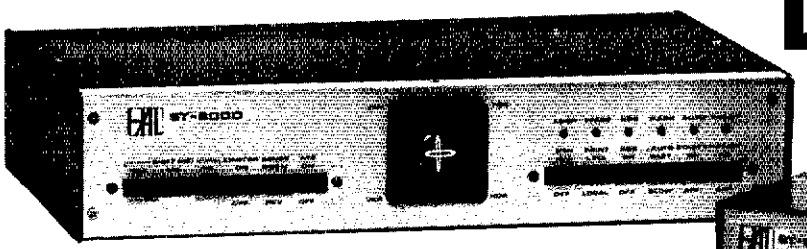
Even WEAK SIGNALS print clearly with a HAL Demodulator.

ST-6000 Demodulator $659.00



ST-5000 Demodulator $239.00

Pulling in weak or distorted signals with a HAL Demodulator is no problem. Even if the band is crowded.

With high-gain, wide-bandwidth limiters and extremely linear active detector circuits, both the ST-6000 and ST-5000 Demodulators convert RTTY tones into strong, readable signals that display bright and clear.

Tones necessary for transmitting RTTY are conveniently generated and receive filters and transmit tones are accurately set and matched to assure on-the-money transceive operation.

Both the ST-6000 & ST-5000 offer these features:

Internal Loop Supply • Internal AFSK Generator with CW ID Tone • Internal Tuning Indicator • Autostart Motor Control • Line/Local Loop Control • TTY Machine Compatibility • RS-232 type DATA Interface • "High" or "Low" Tones • 120/240, 50/60 Hz Power • Normal/Reverse Switch • 170 and 850 Shift • Active Discriminator • Metal Cabinets for RF Shielding.

Special Features of the ST-6000:

Mark-Hold • Antispace • Automatic Threshold Control (ATC) • Decision Threshold Hysteresis (DTH) • Keyboard Operated Switch (KOS) • MIL-188 and CMOS Data Interface • Oscilloscope Tuning Indicator • Crystal Controlled AFSK Tones • Active Input Bandpass Filter • Pre-Limiter AGC • Three Shifts (170 - 425 - 850)

Write or give us a call. We'll be glad to send you our new RTTY catalog.

HAL COMMUNICATIONS CORP.
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For our European customers, contact: Richter & Co. D3000 Hannover 1 • I.E.C. Interelco, 6816 Bissone/Lugano • Radio Shack Ltd., London NW6 3AY • Erik Torpdahl Telecom, DK 3660 Stenlose Denmark

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- 160 thru 15 Meter Operation Including new 10 MHz and 18 MHz WARC Bands
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- Extremely Compact Size/Matching styling to Popular IC701/IC720

SOLID STATE LINEAR AMPLIFIER IC-2KL

ICOM

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3331 Towerwood Dr., Suite 307, Dallas TX 75234

All stated specifications are approximate and subject to change without notice or obligation.

March 1981 *Volume LXV Number 3*

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THE COVER

If thoughts of spring have brought on the urge to do some direction-finding, this antenna/S-meter modification will get you going. See page 43.

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The best amplifier value just got better....
Clipperton-L, now with tuned input.
PLATE
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Clipperton-L suggested price
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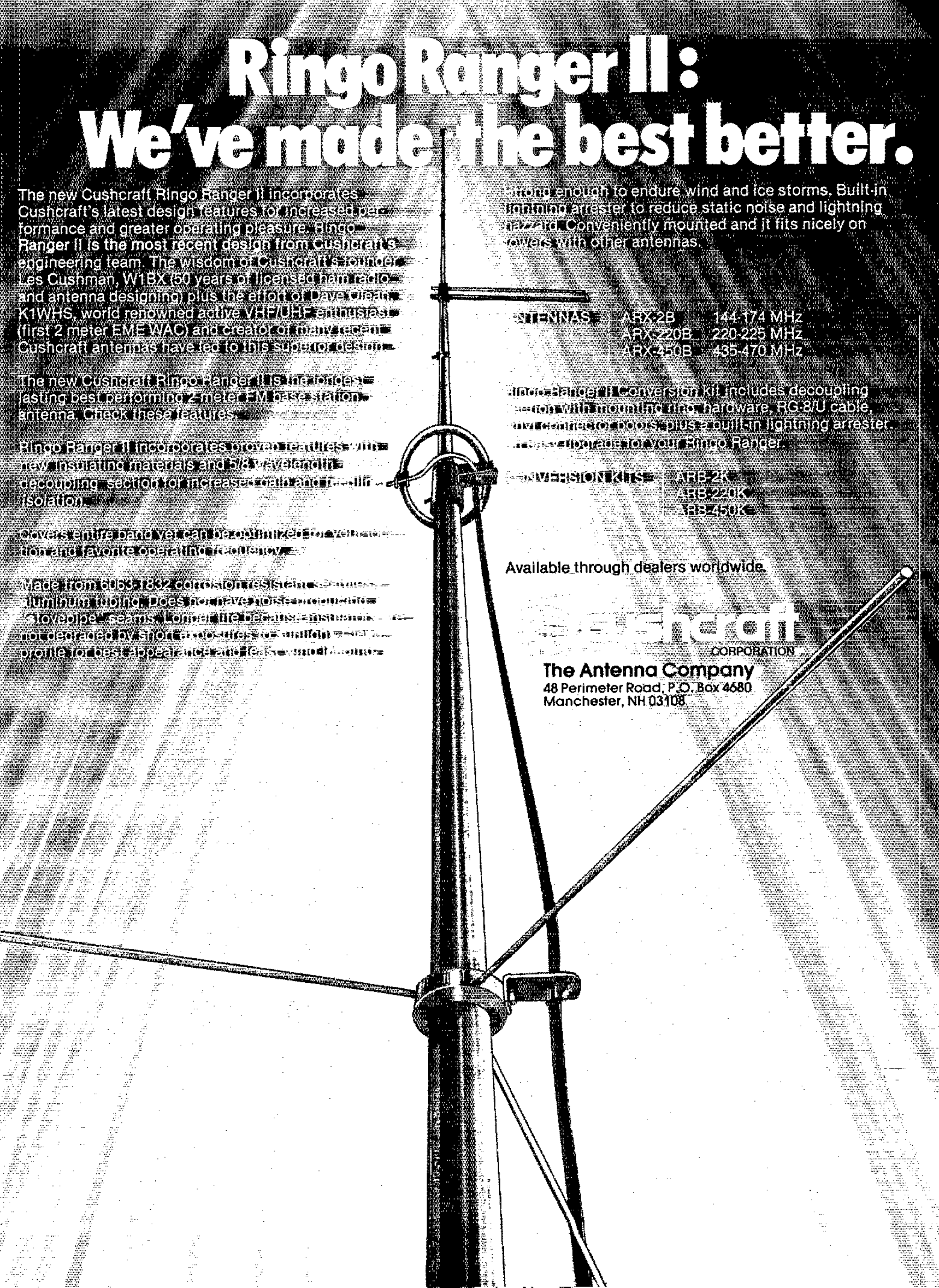
Ringo Ranger II:
We've made the best better.
The new Cushcraft Ringo Ranger II incorporates Cushcraft's latest design features for increased performance and greater operating pleasure. Ringo Ranger II is the most recent design from Cushcraft's engineering team. The wisdom of Cushcraft's founder, Les Cushman, W1BX (50 years of licensed ham radio and antenna designing) plus the effort of Dave Olean, K1WHS, world renowned active VHF/UHF enthusiast (first 2 meter EME WAC) and creator of many recent Cushcraft antennas have led to this superior design.
The new Cushcraft Ringo Ranger II is the longest lasting best performing 2 meter FM base station antenna. Check these features.
Ringo Ranger II incorporates proven features with new insulating materials and 5/8 wavelength decoupling section for increased gain and isolation.
Covers entire band yet can be optimized for your ... tion and favorite operating frequency.
Made from 6063-T832 corrosion resistant ... aluminum tubing. Does not have noise producing "stovepipe" seams. Longer life ... not degraded by short ...
profile for best appearance ...
Strong enough to endure wind and ice storms. Built-in lightning arrester to reduce static noise and lightning hazzard. Conveniently mounted and it fits nicely on towers with other antennas.
ANTENNAS ARX-2B 144-174 MHz
ARX-220B 220-225 MHz
ARX-450B 435-470 MHz
Ringo Ranger II Conversion kit includes decoupling section with mounting ring, hardware, RG-8/U cable, ... plus a built-in lightning arrester. ... upgrade for your Ringo Ranger.
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ARB-220K
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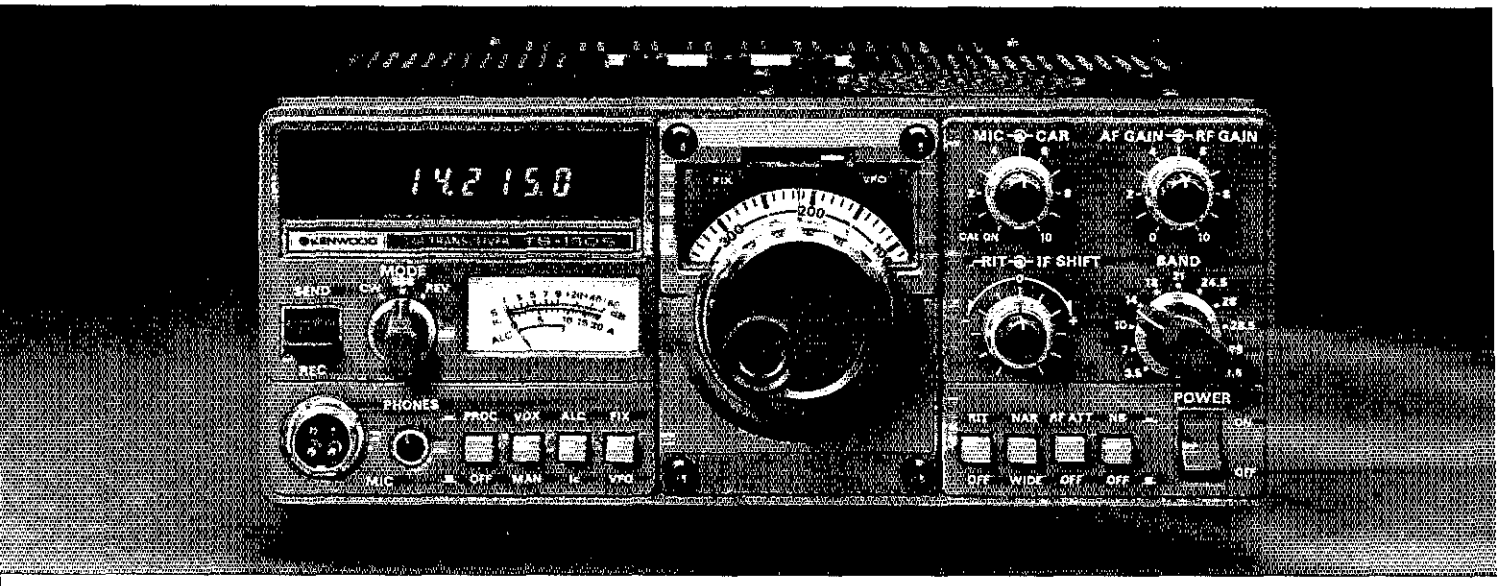
Small wonder.



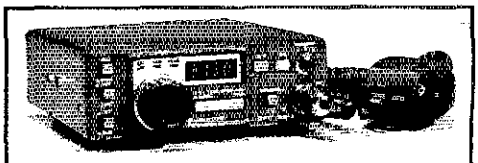
Processor, N/W switch, IF shift, DFC option

TS-130S/V

An incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (on both SSB and CW), and optional DFC-230 digital frequency controller. The TS-130S runs high power and the TS-130V is a low-power version for QRP applications.

TS-130 SERIES FEATURES:

- **80-10 meters, including three new bands**
  Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.
- **Two power versions . . . easy operation**
  TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning, and receiver wideband RF amplifiers eliminate preselector peaking.
- **Built-in speech processor**
  Increases audio punch and average SSB output power, while suppressing sideband splatter.
- **CW narrow/wide selection**
  "N-W" switch allows selection of wide and narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
  "N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
  LSB is selected on 40 meters and below, and USB on 30 meters and above. SSB REVERSE position is provided on the MODE switch.
- **Built-in digital display**
  Six-digit green fluorescent tube display indicates actual operating frequency to 100 Hz. Also indicates external VFO or fixed-channel frequency, RIT shift, and CW transmit/receive shifts. Also analog sub-dial for backup frequency indication.
- **IF shift**
  Allows IF passband to be moved away from interfering signals and sideband splatter.
- **Single-conversion PLL system**
  Improves stability as well as transmit and receive spurious characteristics.
- **Built-in RF attenuator**
  For optimum rejection of intermodulation distortion.
- **Built-in VOX**
  For convenient SSB operation, as well as semi-break-in CW with sidetone.
- **Effective noise blanker**
  Eliminates pulse-type interference such as ignition noise.
- **Built-in 25-kHz marker**
  Accurate frequency reference for calibration.
- **Compact and lightweight**
  Measures only 3-3/4 inches high, 9-1/2 inches wide, and 11-9/16 inches deep, and weighs only 12.3 pounds. It is styled to enhance the appearance of any fixed or mobile station.



Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. very compact.

Ask your Authorized Kenwood Dealer about the compact, full-featured, all solid-state TS-130 Series.

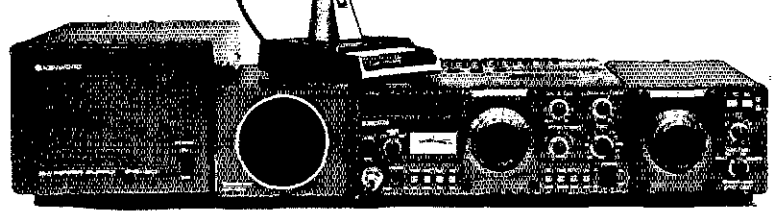
NOTE: Price, specifications subject to change without notice and obligation.

MATCHING ACCESSORIES FOR FIXED-STATION OPERATION:

- PS-30 base-station power supply (remotely switchable on and off with TS-130S power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

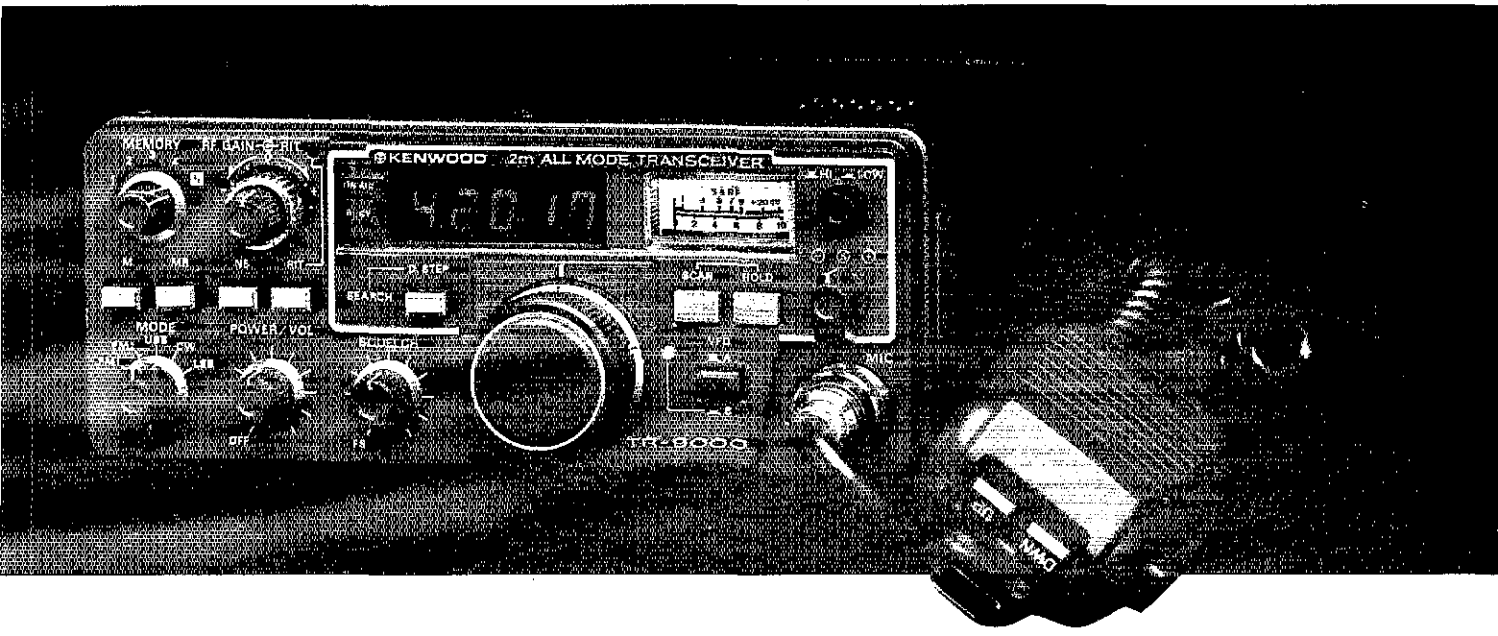
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AT-130 compact antenna tuner (80-10 m, including 3 new bands)
- MB-100 mobile mounting bracket
- MC-30S and MC-35S noise cancelling hand microphones
- PC-1 phone patch
- TL-922A linear amplifier
- HS-5 and HS-4 headphones
- HC-10 world digital clock
- PS-20 base-station power supply for TS-130V



- SP-40 compact mobile speaker
- VFO-230 digital VFO with five memories

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

New 2-meter direction.



A compact transceiver with FM/SSB/CW plus...

TR-9000

Kenwood's done it again! Now, it's the exciting TR-9000 2-meter all-mode transceiver...complete with a host of new features. Combining the convenience of FM with long-distance SSB and CW in a very compact, very affordable package, the TR-9000 is the answer for any serious Amateur Operator! Versatile? You bet! Because of its compactness, the TR-9000 is ideal for mobile installation. Add on its fixed-station accessories and it becomes the obvious choice for your ham shack!

TR-9000 FEATURES:

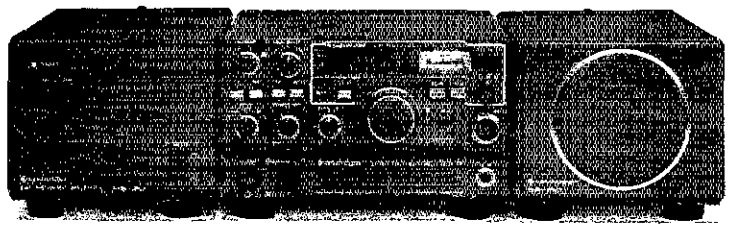
- FM, USB, LSB, and CW...all popular modes
- Compact size...only 6 11/16 inches wide X 2 21/32 inches high X 9 7/32 inches deep
- Digital dual VFOs...with selectable tuning steps of 100 Hz, 5 kHz, and 10 kHz, convenient for each mode of operation
- Digital frequency display...five, four or three digits, depending on selected tuning step
- Extended frequency coverage...143.9000 – 148.9999 MHz
- Five memories:
  M1 – M4...for simplex or ± 600 kHz repeater offset
  M5...for nonstandard offset (memorizes transmit and receive frequency independently)
- Scan of entire band...automatic busy stop and free scan
- SSB/CW search...sweeps over selectable 9.9-kHz bandwidth segments, for easy monitoring
- UP/DOWN microphone (standard)..."beep" sounds with each frequency step
- Noise blanker...eliminates pulse-type noise on SSB and CW
- Low-noise, dual-gate MOSFET and two-stage monolithic crystal filter for improved receiver front-end characteristics
- RIT (receiver incremental tuning) for SSB and CW...effective even on memory channels
- RF gain control
- CW sidetone
- Automatic selection of AGC time constant with MODE switch (slow for SSB and fast for CW)
- Improved power module for reliable and stable linear RF output
- Selectable power outputs...10 W (HI)/1 W (LOW)
- Mobile mounting bracket...easy to mount, with quick-release levers
- LED indicators...ON AIR, BUSY, and VFO
- Accessory terminals on rear panel...KEY, BACKUP DC, STBY, EXT SP, DC, TONE INPUT, and ANT

See your Authorized Kenwood Dealer now for details on the TR-9000. the new direction in 2-meter all-mode transceivers!

NOTE: *Price, specifications subject to change without notice and obligation.*

MATCHING ACCESSORIES FOR FIXED-STATION OPERATION:

- PS-20 power supply
- SP-120 external speaker
- BO-9 System Base...with power switch, SEND/RECEIVE switch for CW operation, backup power supply for memory retention (BC-1 backup power adaptor may also be used for this application), and headphone jack



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N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, WA2MVQ, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa — Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scotts Bluff 69361 (308-632-4337)

New England Division

Connecticut — Stanley Horzepa, WA1LOU, 72 Stiles St., Waterbury 06706 (203-755-1516)
Eastern Massachusetts — Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — John Titterington, W1EOF, 45 Mountain Ave., Riverside 02915 (401-438-3619)
Vermont — Robert L. Scott, W1RNA, 9 Laroe St., Swanton 05488 (802-868-4944)
Western Massachusetts — Arthur Zavarella, W1KK, 1702 Main St., Agawam 01001 (413-786-9115)

Northwestern Division

Alaska — Fred S. Wegmer, KL7HFM, 1910 Rosemary St., Anchorage 99504 (907-274-3464)
Idaho — Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana — Robert E. Leo, W7LR, 6790 South 3rd Rd., Bozeman 59715 (406-586-6147)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford 97501 (503-773-8624)
Washington — Robert L. Klepper, W7IEU, 7027 51st NE, Marysville 98270 (206-659-3005)

Pacific Division

East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
Pacific — J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Arthur P. Samuelson, W6VV, 440 Davis Ct. #811, San Francisco, CA 94111 (415-986-3129)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

Roanoke Division

North Carolina — Ed Stephenson, AB4S, 700 Madison Ave., Cary 27511 (919-467-6832)
South Carolina — Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia — Byron G. "Luck" Hurder, WA4STO, Box 167, Seven Fountains 22653
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

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New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Royce Henningson, K7QEQ, P. O. Box 1267, Moab 84532 (801-259-5018)
Wyoming — Chester C. Stanwaity, W7SDA, 353 S. Ferris St., Powell 82435 (307-754-3624)

Southeastern Division

Alabama — James M. Bonner, K4UMD, Rte. 15 — Box 246, Birmingham 35224 (205-788-2003)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies — Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927

Southwestern Division

Arizona — Willard L. Haskell, AC7D, 3915 N. Campbell Ave. Sp. 102, Tucson 85719 (602-327-3960)
Los Angeles — Stanley S. Brokl, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fred Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melrsa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Roger D. Coday, N5FN, 213 Ave. G, RFD 4, Brazoria 77422 (713-798-7970)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Difficult Decisions in Difficult Times

We have, in recent months, watched with morbid fascination as the reports from certain of the larger corporations show astronomical losses. The magnitude of their financial problems overwhelms those of us who are accustomed to the smaller business operation of the League, and we shudder at the length of time and the drastic steps which must be taken to restore those companies' financial stability or, even, to save them from oblivion. We ask ourselves, how did their management let them sink so far, so fast.

We listen with enthusiasm as our new leaders in Washington promise to change the business and economic climate of this country. They address the extent of government regulation, and the relentless march of inflation, and the problems of productivity — and we are encouraged that perhaps a change is forthcoming within the next three or four years.

But what of the League and now. Those of you who read our annual financial reports (yours for the asking, you know) will perhaps recall that over the past 20 years the League has operated at a deficit for all but three years. Those three years, all within recent times, have been during a period when the League's Board and staff have taken creative action to update the fiscal management of the League.

It is imperative that the League operate in the black, not at a loss. For one thing, we have a commitment to many services which have been judged to be of value to our members. Washington representation, assistance in legal matters, FCC rules interpretation, technical information service, contests, DXCC and WAS (and other) awards, club programs, OSCAR, *QST* — to name just a few — should be maintained and improved if the goals and objectives of the League are to be met.

We must maintain our financial reserves. Fortunately, during the preparation for and participation in WARC-79, we had the financial ability to mount a major effort for the Amateur Radio Service — it was an effort that cost the League out of pocket some six-hundred thousand dollars. Someday, sooner or later, there will be another General WARC, and we must be prepared financially to handle it.

But it's a tough world we live in right now. It is hardly necessary to remind each of you what havoc inflation is causing in your personal life. It's the same for ARRL. The cost of paper, people, postage and printing goes up and up. Last month we had to announce an increase in the cost of membership in Canada, caused by the doubling of postal charges to points outside the U.S. Hard on the heels of that announcement comes word of sizable increases in postage inside the U.S. The cost of people has escalated to the point where the League has great difficulty in meeting the salary requirements of skilled people in certain areas of staff operation, an unfortunate dilemma which results in the degradation of our membership services in some areas, including the quality and variety of our publications. This in turn affects our income.

As we look at the results of our operation for 1980, and then at 1981 and 1982, keeping an eye on the state of the U.S. economy, we see deficits ahead. In fact, a little fancy fingerwork on a calculator, figuring 10% inflation and "fixed" costs of about $3.6 million in 1980, shows us only breaking even in 1981 and in somewhat of a financial fix by 1982.

What to do? That's a problem that the ARRL Board of Directors will have to wrestle with when it meets on March 11 and 12. It will have to consider the goals of this association, the quality of the service to its members which the League must provide, and how to finance the operation. The Board will no doubt review the quality of the library of publications which are offered for sale and which provide us with some of our income. The Board will no doubt review the quality and quantity of advertising in *QST* and other League publications, advertising which already brings in a substantial portion of our annual income. The Board will no doubt look at the dues structure of the League, to consider whether we are overpriced or underpriced in today's market and for the extent of our activity. And finally, the Board will certainly look at the possibilities of other sources of income.

Whatever the Board's collective decision on these matters, you can be sure that each individual director will give the problems and their solutions careful consideration. Each director will base his decision on his own integrity and the courage of his conviction, because it is you, the members of ARRL, to whom each director is responsible, and it is because of his responsibility to you that each director, no matter how painful the decision may be, will do what he believes right for ARRL in the long run. — *Richard L. Baldwin, W1RU*

League Lines...

The suit of Mary Lewis against ARRL has been dismissed by agreement of the parties. Mrs. Lewis' election to the Board of Directors is clearly a vote of confidence in her by the membership of the ARRL in the Northwestern Division. In view of that vote, and of the desire of both Mrs. Lewis and ARRL to remove the cloud of any litigation prior to the first formal meeting of the Board in 1981, the parties mutually agreed to dismiss the case.

The special third-party agreement between the United States and Italy for earthquake relief messages and welfare queries has been terminated. No messages on behalf of third parties should now be handled between amateurs of the two countries.

WANTED: Volunteers with expertise in the area of 900-MHz spectrum allocations. ARRL President W2HD is preparing to name an Ad Hoc Committee of amateurs who are knowledgeable in this area to develop a detailed proposal and supporting rationale for the allocation of a new U.S. amateur band at 902-928 MHz. The Ad Hoc Committee will prepare a draft FCC filing for consideration by the League's Executive Committee. If you're qualified and able to serve, please write to President Dannals, c/o ARRL Hq., with details of your relevant professional and amateur background.

Has your club lost its club station call sign? There has been lots of confusion over the past couple of years about club and military recreation licenses. If you know of a station which failed to renew its license because of this confusion, please send details to Perry Williams, W1UED, at ARRL Hq., Newington, CT 06111, immediately! It may be possible to engineer a one-time "amnesty" for the affected clubs as a class; at least, we'll try it!

The cost per print for copies of the movie, "The World of Amateur Radio," has had to be increased. Film prints (16 mm, optical sound only) are $125 and should be ordered directly from Dave Bell Associates, 3211 Cahuenga Blvd., Hollywood, CA 90068. All film orders must be marked "Attention Teresa Modnik," and full payment must accompany the order.

Videotape copies of the movie are available from the Westlink Radio Network. The prices are as follows: V.H.S. (SP only) or Beta I, II --$45; 3/4" U-Matic -- $75. Send your order with full payment to Westlink Radio Network, 7046 Hollywood Blvd., Suite 718, Hollywood, CA 90028.

At press time there was a possibility of a postal rate increase within the U.S., subject to the approval of the Postal Board of Governors. Should the increase take effect, it is a good idea to send additional postage to your Incoming QSL Bureau.

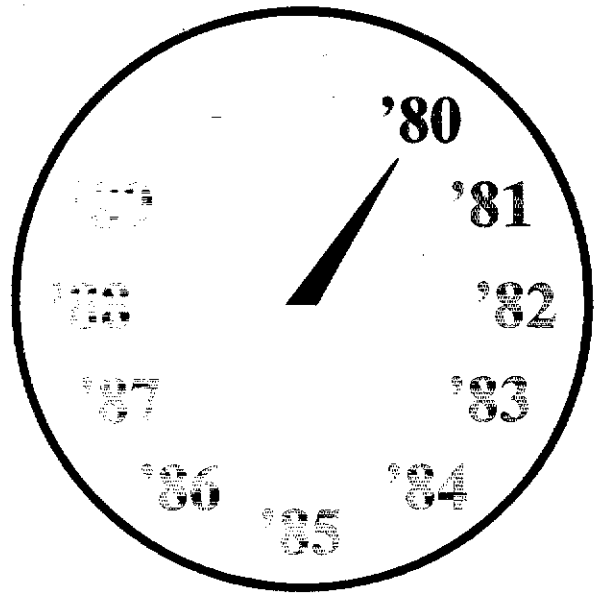
Responsibility for the CRRL Central QSL Bureau has been transferred to the Kennebecasis Valley Amateur Radio Club, and cards should be sent to the CRRL Central QSL Bureau, Box 51, St. John, NB E2L 3X1. We are glad to say that L. J. "Brit" Fader, VE1FQ, former manager of the Central Bureau, will continue to serve as manager of the VE1 Bureau. Cards for Canadian amateurs may be sent to the Central Bureau, or may be sent to the individual call area bureaus. A complete list of bureaus and their addresses may be found on page 65.

IRCs (International Reply Coupons) imprinted with the name of the selling country and issued prior to January 1975 will not be redeemed by the U.S. Postal Service unless they were issued in the United States. All old-style IRCs may be redeemed only by the postal authority in the issuing country. New-style IRCs are not imprinted with the name of the issuing country and can be redeemed for postage stamps in any destination country that is a member of the Universal Postal Union.

RFI Assistance List being revised. The ARRL RFI Task Group has neared completion of updating its list of electronic home-entertainment equipment manufacturers who volunteer help in solving RFI problems. The list originally appeared in February 1978 QST and is presently contained in the ARRL book, Radio Frequency Interference. The revisions will ensure the accuracy of each listing and give the most direct, "one-stop" contact with the manufacturer to facilitate prompt and knowledgeable handling of interference problems. W4CIZ reports that early responses to the Task Group's efforts are very encouraging, and, in many instances, manufacturers are enthusiastic about the Group's services to industry as well as to amateurs. The new list will have many additions and revisions, and QST will publish the finished project.

Radio amateurs in Denmark may now use 160-meter-band segments from 1720 to 1740 kHz and 1830 to 1850 kHz using cw only and no more than 10 watts input on a noninterference basis with other services.

Survey of Amateur Radio, 1980



An independent survey provides a picture of Amateur Radio as we enter the Eighties: where we are, and where we are going.

By David Sumner,* K1ZZ

For almost two years, the ARRL Long-Range Planning Committee has been soliciting and studying comments from members on the future of the League and Amateur Radio.[1,2] For the committee members, analyzing the hundreds of thoughtful letters has been an enriching and educational experience.[3] However, from the start it was recognized that this process would yield only a part of the information needed by the LRPC. Input was needed from the amateur community as a whole, to supplement the thoughts, ideas and opinions of those who would take the trouble to put pen to paper. Some sort of survey was needed.

Although the League has conducted surveys of its own in the past, most recently in 1977,[4] this time it was decided to engage the services of an independent organization with professional experience in social research techniques. Proposals were requested and received from a number of such organizations, and after thorough investigation the Institute for Social Research of Florida State University was selected to conduct the survey.[5] Members of the LRPC collaborated with Florida State on the survey design.

Questionnaires were mailed to one amateur in every 44 in the U.S. and Canada selected on a random basis. The initial mailing was made in April 1980, with a follow-up mailing to nonrespondents in late May and early June. The mailing was done by Florida State, with returns to be sent directly to Tallahassee; the identity of those surveyed has not been divulged to the League. The report of the survey results, delivered in October, contains a wealth of information on the problems, activities and interests of today's radio amateurs. The remainder of this article is a digest of the more than 500 pages of information contained in that report. Here we can just touch the high points; copies of the full report have been provided to all ARRL officers, directors, vice directors and LRPC members. The data presented here are from the Florida State report, but some of the conclusions are the result of further analysis by the ARRL staff.

Survey Design

The sample consisted of 8895 amateurs in the U.S. and Canada drawn on a random basis from the computerized data base maintained by the Radio Amateur Callbook, Inc. These amateurs were sent four-page questionnaires containing 147 questions organized into 36 topics. The cover letter for the first mailing did not identify ARRL as the sponsor; interestingly, a number of members feared that the purpose of the survey was anti-ARRL and questioned League Headquarters about it. The second cover letter did identify the League as the sponsor. Each questionnaire bore a unique number to identify who had and had not responded to the first mailing, but absolute confidentiality of the respondents' identities has been maintained. The first mailing produced a usable return of 48.7% from the U.S. and 63.1% from Canada, the difference caused at least in part by the use of first class mail to Canada. The second mailing went by first class to both, and raised the return rate to 62.9% overall, and 71% for Canada. This is regarded as excellent for a mail survey. A follow-up telephone survey of 186 nonrespondents was used to determine the extent of non-response bias.

The tabulation of results contained in the survey report included crosstabulations of responses according to region of residence, status of membership in the League, level of Amateur Radio activity, year first licensed and class of license presently held. Later, a crosstabulation of female respondents was supplied. These crosstabulations permit a much more in-depth examination of the survey data than would otherwise be possible.

Because of the high rate of return, and because the original sample was a statistically valid random sample, the results are reasonably representative of the U.S. and Canadian amateur population. A comparison with known license figures shows that Novices, Technicians and Generals are slightly underrepresented in the sample, and Advanced and Extra Class licensees are slightly overrepresented. (See Table 1.) Similarly,

Table 1
Comparison of license class reported held by U.S. respondents with actual FCC figures (as of April 30, 1980, based on 370,015 licensees)

	Survey Respondents	*FCC Figures*
Novice	16%	18%
Technician	17	19
General	30	33
Advanced	28	23
Extra	9	7

*Assistant General Manager, ARRL

[1]Notes appear on page 18.

League members are slightly over-represented, by about 7%. The telephone survey revealed that respondents tended to be more active in Amateur Radio than non-respondents, with respondents averaging 6.1 hours per week on Amateur Radio activities and non-respondents (those reached by telephone) averaging 4.2 hours. Respondents spent, on average, $308 in the past year on Amateur Radio while non-respondents spent $216. Respondents also had more money invested in their stations. However, there were no significant differences in the ages, year first licensed, income, education, etc., of the two groups. Nonrespondents were no more inclined to find fault with the League than were respondents. The survey shows that higher-class licensees and League members tend to have a greater investment of time and money in Amateur Radio, which is consistent with the above pattern of non-response. From this it can be inferred that the survey slightly overstates the level of activity of the amateur population, but is much more representative than past surveys.

The significance of the percentages given in this article varies somewhat, depending upon the size of the numerical base from which they are drawn. In general, according to Florida State, variations of less than 3 percent are not significant. Where the percentages are based on a crosstabulation, variations must be somewhat greater to be significant. For example, if the percentage of U.S. respondents with a particular characteristic is 50%, we can be quite confident that the actual number is somewhere in a range of ±3%, or between 47% and 53%. On the other hand, if the number of Extra Class licensees with the same characteristic is 60%, the actual number may be in a range of ±5%, or from 55% to 65%, because the sample size of Extras is smaller.

The Radio Amateur of 1980

If we could find one person who is the "average" or "typical" radio amateur of today, he would be a 46-year-old male living in a single-family home. He attended college and probably graduated. His annual family income is not quite $30,000, $308 of which is spent on Amateur Radio. He was first licensed in 1963, obtained his present class of license in 1968, and has found Amateur Radio to be useful in his career. He has $1668 invested in his station, has had no television or rf interference complaints in the past year, and does not feel limited by zoning or other antenna restrictions where he lives.

Our "typical" amateur spends 6.1 hours per week on Amateur Radio. His on-the-air time mostly is spent ragchewing, most likely on hf phone but followed closely by vhf fm and hf cw. However, he also spends a lot of time not actually transmitting: building and repairing equipment, experimenting, and monitoring repeaters. He probably has equipment that can be operated mobile in an emergency, though he may not have it actually installed in his car. If active, he is probably a member of ARRL; if not a member, it is most likely because he "just didn't bother" to join or rejoin. His attitude toward ARRL is generally favorable. He is likely not to see any amateur magazine except *QST*.

If an Amateur Radio issue comes up which he thinks is important he will express his opinions on the air, but probably not in any other way. He probably does not attend local club meetings regularly. He feels somewhat negative about the FCC if he is in the U.S., somewhat positive about the DOC if in Canada. He strongly supports the Morse code requirement for amateur licensing, especially for operation below 30 MHz. He is very concerned about malicious (deliberate) interference. He does not see phone patch or autopatch abuses as significant problems. Looking toward the future, he is interested in personal computers and amateur satellites, although he has made no plans to be active in either field.

So much for the "typical" amateur. The non-typical amateur is even more interesting, so let's take a closer look at the survey results. Where reference is made to a table or figure, study it carefully; you will see significant differences which are not discussed in the text.

Table 2 lists some selected demographics of our survey population: education, income and residence/station loca-

Table 2

Selected demographics of survey respondents

Highest level of education completed:	
Grade school or less	2%
Some high school	9
High school graduate	19
Some college	32
College graduate	18
Some graduate work	8
Graduate degree	14
Approximate total family income:	
Less than $10,000	10%
$10,000 to $19,999	27
$20,000 to $29,999	29
$30,000 to $39,999	18
$40,000 to 49,999	8
$50,000 or more	7
Station is located in (multiple answers permitted):	
Single-family residence on 1 acre or more	20%
Single family residence on less than 1 acre	63
Apartment, condominium, or other multi-family dwelling	6
College dormitory, military garrison or other group quarters	1
Mobile home	4
Automobile, truck or other vehicle	28
Have hand-held transceiver	17
Currently do not have a station	8

Table 3

Average investment in respondents' Amateur Radio stations and average annual expenditure on equipment, supplies, etc.

	Average investment	*Average annual expenditure*
U.S.	$1651	$308
Canada	$2073	$347
ARRL members	$2273	$456
Former members	$1382	$183
Never members	$882	$192
Old-timers	$2143	$316
Newcomers	$1221	$439

Table 4

Terms Used in this Article

Active — Reports some Amateur Radio activity in a typical week during the previous 12 months.
Inactive — Reports no Amateur Radio activity in a typical week during the previous 12 months.
Newcomer — First licensed in 1978 or later.
Old Timer — First licensed before 1946.
HF — Frequencies below 30 MHz.
VHF/UHF — Frequencies above 30 MHz.
DOC — Department of Communications, the Canadian equivalent of the Federal Communications Commission (FCC).
Ragchewing — Conversing with other amateurs on a wide variety of technical and non-technical subjects.

Table 5

Effect of Amateur Radio on career

	U.S.	*Canada*	*Old Timers*	*Newcomers*	*Novice*	*Technician*	*General*	*Advanced*	*Extra*	*Women*
	%	%	%	%	%	%	%	%	%	%
Am studying, do work, or did work in related field	43	45	66	29	25	41	39	53	65	14
In my career, Amateur Radio is or was:										
Very useful	26	34	57	8	8	19	24	36	42	13
Somewhat useful	27	24	24	17	15	27	27	31	31	16
Not particularly useful	41	38	19	54	53	48	49	31	24	63
Expect it to be useful	7	4	0	22	25	6	5	3	3	9

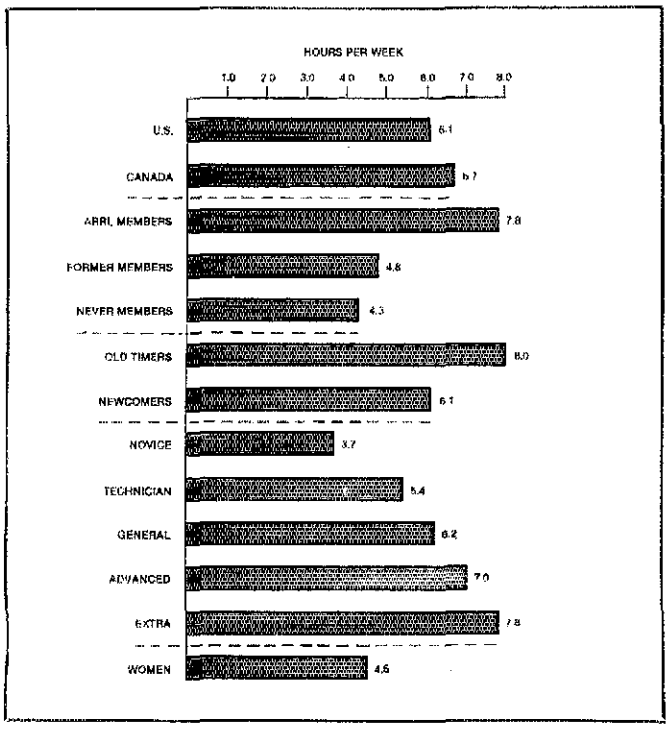


Fig. 1 — Average hours per week spent on Amateur Radio activities.

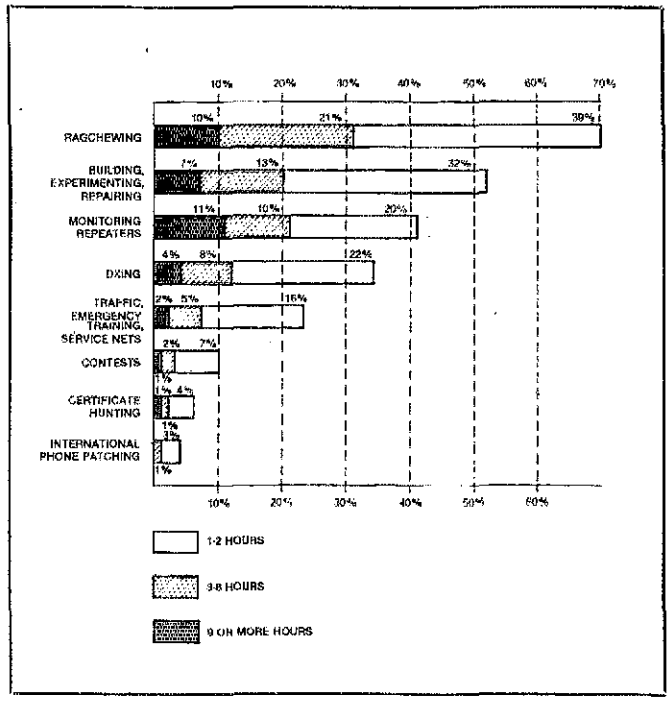


Fig. 2 — Activity by area of operating interest of active respondents. (Average number of *hours per week* during previous 12 months.)

tion. Table 3 shows the financial investment in their avocation of different groups of amateurs. Note that our definitions of "Newcomer" and "Old-timer" are somewhat arbitrary (see Table 4); the survey report broke respondents into five categories according to the year they were first licensed, but we show here only the two extremes because of space constraints. Table 5 analyzes the effect of Amateur Radio on one's career. Newcomers do not expect it to be as useful as old-timers have found it to be; whether this will change as they gain more experience, only time will tell.

Fig. 1 depicts how much time is spent on Amateur Radio activities, and Fig. 2 shows how that time is divided between various activities. Of course, some activities are not listed. Fig. 3 separates the on-the-air activity by band and mode. The results may surprise some who think that "cw is dead" or that "more people are active on 2-meter fm than all other bands combined." Neither statement is true. Predictions of future activity are also important, and are shown in Fig. 4 for some of the more esoteric communications modes. Interest in personal computers and amateur satellites is especially strong, but there is a healthy interest in a number of other new fields.

As a group, amateurs are very conscious of their responsibility to perform public service (Table 6). Emergency communications is seen as especially important, especially among newcomers and women. Table 7 shows that a majority of amateurs possess some capability for providing emergency communications, although only one in six participates in on-the-air training exercises. ARRL members are better prepared for emergencies than non-members. Again looking at Table 6, newcomers and women regard

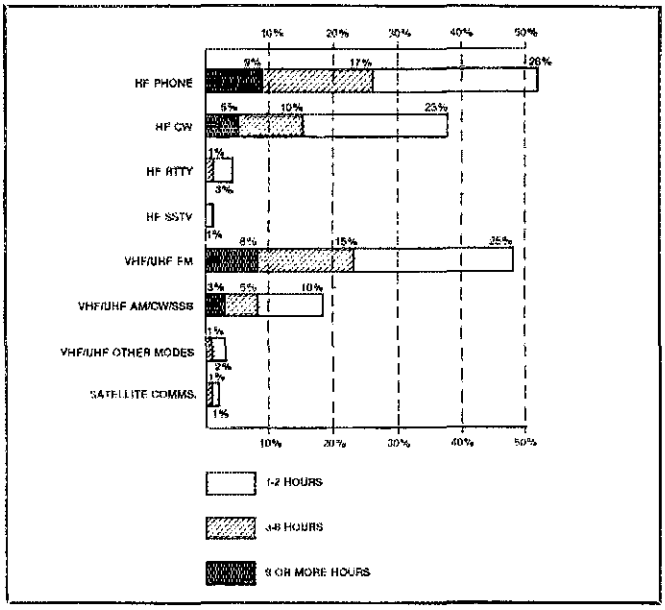


Fig. 3 — Activity by band and mode of active respondents. (Average number of *hours per week* during previous 12 months.)

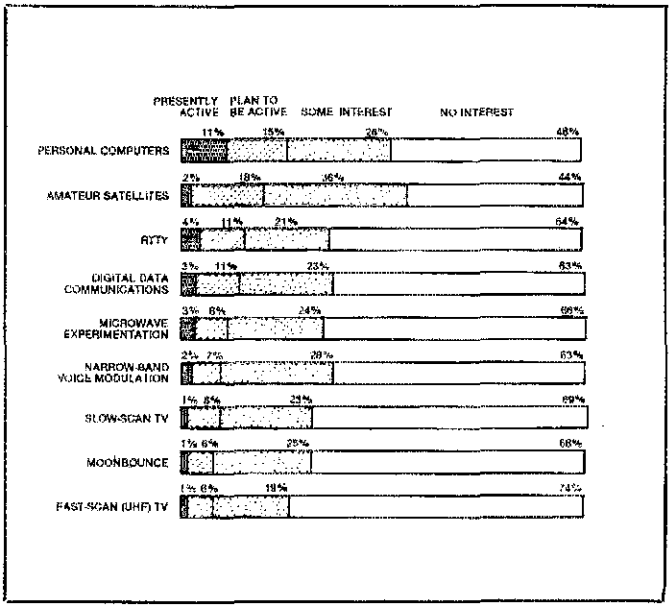


Fig. 4 — Answers to, "How interested are you in the following areas of Amateur Radio activity?"

Table 6

How amateurs rank the importance of the traditional justifications for the Amateur Radio Service

		U.S.	Canada	Old Timers	Newcomers	Novice	Technician	General	Advanced	Extra	ARRL members	Non-members	Women
		%	%	%	%	%	%	%	%	%	%	%	%
Preparation for, and provision of, emergency communications	very important	65	52	59	71	69	70	63	63	61	67	62	79
	important	33	45	39	27	30	28	34	35	36	32	35	20
	not important	2	3	2	2	2	2	3	2	3	2	3	1
Development of operating skills	very important	54	50	52	58	57	47	53	54	59	59	49	62
	important	44	48	46	40	42	51	45	44	39	40	48	38
	not important	2	2	2	2	2	2	2	3	2	1	3	1
Technical training and experimentation	very important	47	47	49	47	44	46	43	50	60	50	45	46
	important	49	49	49	49	49	50	53	47	38	48	50	49
	not important	4	4	3	5	6	4	4	3	2	2	5	5
Enhancement of international goodwill	very important	49	50	43	56	53	44	49	48	48	52	46	57
	important	43	43	47	38	40	45	43	43	45	42	44	39
	not important	8	7	11	6	7	11	8	9	6	6	10	4

Table 7

Level of emergency communications preparedness

(Multiple responses permitted)

	U.S.	Canada	ARRL members	Non-members
	%	%	%	%
Have one or more vhf/uhf mobile stations	50	62	61	42
Have vhf/uhf hand-held equipment	25	18	31	19
Have one or more hf mobile stations	20	23	26	15
Have emergency power for hf fixed station	20	21	25	16
Participate in traffic or emergency training nets	17	16	24	11
Member of ARES or RACES	12	6	18	6
None of the above	34	27	24	43

technical training and experimentation as "very important" less often than the other three traditional justifications for the Amateur Service: providing emergency communications, developing operating skills and enhancing international goodwill. (The four justifications are taken from the FCC Regulations, Section 97.1, which sets forth the "Basis and Purpose" of Amateur Radio in the U.S.)

Attitudes Toward ARRL

One of the most important survey objectives was to find out how amateurs feel about the League. We often hear criticism, constructive and otherwise, of how the organization functions. One of the purposes of the Long-Range Planning Committee is to recommend changes which will make the League more effective in the protection, promotion and advancement of Amateur Radio. To do that, we need to know how well people think the organization is doing now.

The key survey ingredient was a list of complaints a respondent might have about the ARRL. Respondents were asked to indicate which statements they agreed with, and were permitted to check as many as they wished. It was this part of the survey that caused some members to think it was "anti-ARRL," when in fact the objective was to get an accurate picture of amateurs' attitudes toward their national association.

The results are shown in Table 8. Among non-members, the reason for not belonging most often cited was, "Just didn't bother to join or rejoin." This was followed closely by, "Not active in Amateur Radio." Neither can be regarded as a complaint about the League. The only other important reasons given by more than a scattering of non-members had to do with the dues being too high, *QST* not being as good as some other magazine, and the ARRL position on U.S. amateur license restructuring — a throwback to a controversy almost two decades ago. However, the three of these *together* are the "most important reason" for less than one-fourth of the non-members, and are just as likely to be cited by members as by non-members.

While 77% of the members said they were basically satisfied with the League, the survey also showed the reasons for member dissatisfaction. The same three complaints were cited by members, along with three others: the need for the League to do more in public relations, in solving problems at the local level, and in representing Amateur Radio at the national level.

Having given people a chance to say where the League was not measuring up to expectations, the survey also gave them a chance to assess League performance in specific areas on a scale of "excellent" to "poor." Members particularly praised the *Handbook* and *QST* technical content, and in all cases a majority of members gave a rating of "excellent" or "good" (Fig. 5). In view of the results shown in Table 8, it is interesting to note that 28% of members thought the League's representation before Federal agencies was "excellent," 35% "good."

Table 9 shows who is, and who is not, a League member. Membership is highest among old-timers, Extra and Advanced Class licensees and active amateurs, and is lowest among inactive amateurs. A ma-

Table 8

Nonmember vs. member attitudes toward ARRL

	% of non-members agreeing with statement (multiple answers permitted)	Single most important reason for not belonging	% of members agreeing with statement	Single most important reason for member dissatisfaction or lack of interest
Just didn't bother to join or rejoin	41%	17%	0%	0%
Not active in amateur radio	28	14	3	2
Dues too high	24	11	15	9
QST not as good as some other magazine	23	6	16	6
Don't like ARRL position on U.S. amateur license restructuring	12	6	12	7
ARRL does not represent my point of view	10	3	5	2
ARRL not involved in problems at local level	10	3	12	6
ARRL not effectively representing national level	10	2	10	6
ARRL not responsive to needs/desires of amateurs	9	3	7	3
ARRL not doing enough for public relations	9	2	13	7
ARRL not interested in what I think	7	1	6	1
ARRL not effective representative internationally	7	2	5	2
Basically satisfied with ARRL	27		77	

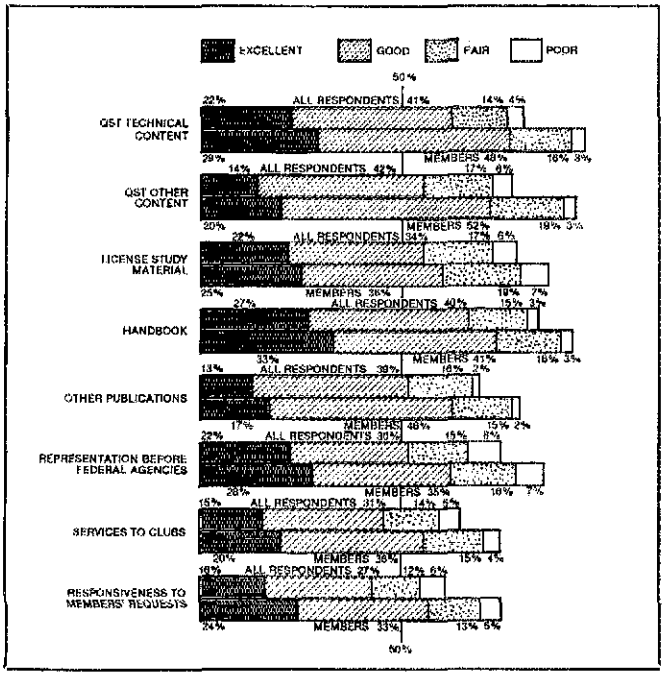


Fig. 5 — Assessment of ARRL performance in key areas. ("No opinion" answers not shown.)

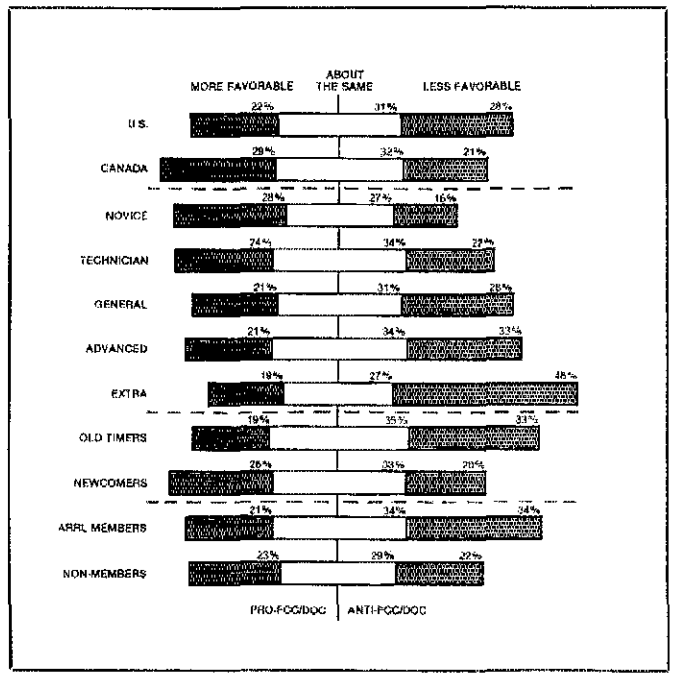


Fig. 6 — Assessment of the direction FCC/DOC are moving in actions affecting Amateur Radio. ("No opinion" answers not shown.)

jority of active amateurs are League members. Of those active three or more hours per week, 58% are League members; the more active the amateur, the more likely he or she is to be a League member.

Who Reads *QST*

Because *QST* is the most visible benefit of League membership, we were particularly curious to compare the readership of *QST* with that of the commercial publications. Table 10 compares the monthly magazines and newspapers serving the national Amateur Radio field in the U.S. and Canada. About 23% of the respondents did not answer this particular question, either because they did not regularly look at any of the listed publications or because they simply skipped the question; it is not possible to separate the two groups, so the percentages shown are calculated on the basis of the respondents who answered "yes" to one or more publications. As a result all of the percentages are slightly overstated in terms of the total amateur population, but the relative effect on all of the figures is the same.

Since the survey was taken, *Ham Radio Horizons* has ceased publication and has been combined with *Ham Radio*. Table 10 shows that one appealed primarily to newcomers and Novices while the other appealed primarily to old-timers and Advanced/Extra licensees, so there was relatively little overlap between the subscriber lists.

While not shown in the table, the survey revealed that the amateur magazine read most by non-members of the League is — you guessed it — *QST*.

How Did You Become a Ham?

When you meet other radio amateurs for the first time, a good conversation-starter is to ask how they happened to get involved in Amateur Radio in the first place. In planning our training efforts it is important to know where the new hams

Table 9

ARRL Membership

(Percentages shown are of those answering the question, "Are you now, or have you ever been, a member of ARRL?")

	U.S.	*Canada*	*Old-timers*	*Newcomers*	*Inactive*	*Active*	*Women*
Present member	46%	32%	64%	41%	22%	52%	32%
Former member	32	37	31	11	41	30	24
Never a member	22	31	5	48	37	18	45

	Novice	*Technician*	*General*	*Advanced*	*Extra*
Present member	29%	34%	41%	58%	76%
Former member	18	31	40	35	21
Never a member	53	35	19	8	3

Table 10

Response to the question, "Which of the following Amateur Radio magazines to you regularly look at?"

(Percentages shown are of those who said they regularly looked at one or more of the listed publications; see text.)

	U.S.	*Canada*	*Old-timers*	*Newcomers*	*Novices*	*Technicians*	*Generals*	*Advanced*	*Extra*	*Women*
CQ	21%	25%	20%	22%	24%	21%	21%	18%	24%	15%
73	37	25	27	36	30	43	35	39	37	32
Ham Radio	20	21	27	9	10	20	15	26	31	11
Ham Radio Horizons	23	12	16	36	35	24	23	18	15	28
Worldradio	7	2	10	7	5	5	5	9	13	9
QST	79	60	87	78	76	69	78	82	89	78
The Canadian Amateur	0	44	2	2	—	—	—	—	—	2

Table 11

Important influences in decision to become a radio amateur

(multiple answers permitted)

	Overall	Newcomers	Canada	Women
Relative	20%	28%	16%	66%
Friend or co-worker	49	47	39	26
CB	16	35	6	17
Shortwave listening	39	28	47	14
Listening to repeaters	5	11	3	13
Book, magazine, newspaper, etc.	26	22	28	8
Film, television, radio, etc.	2	2	2	0
Local or school radio club	16	17	16	15

Table 12

"How useful were each of the following in helping you to obtain your first operator's license?"

	Overall				Old-timers				Newcomers			
	Great help	Some help	No help	Not used	Great help	Some help	No help	Not used	Great help	Some help	No help	Not used
Class or formal instruction	31%	12%	3%	55%	18%	8%	3%	72%	47%	13%	2%	39%
Help from a friend	38	26	2	35	38	24	1	37	31	27	2	39
ARRL publications	37	31	3	30	34	26	2	39	32	35	3	31
Other publications	13	31	4	52	8	23	3	67	20	32	5	43
W1AW code practice	23	18	3	56	13	11	2	74	22	16	4	59
Other on-the-air code practice	19	22	3	55	27	22	1	50	13	22	3	62
Recorded code practice	38	22	2	38	17	10	1	71	57	22	1	19

	Canada				Women			
	Great help	Some help	No help	Not used	Great help	Some help	No help	Not used
Class or formal instruction	46	11	2	40	43	12	3	43
Help from a friend	30	28	4	38	56	18	1	25
ARRL publications	25	29	5	40	41	26	2	31
Other publications	15	34	4	46	20	26	4	50
W1AW code practice	36	11	5	48	27	16	3	53
Other on-the-air code practice	21	23	3	53	19	16	3	63
Recorded code practice	26	20	2	52	54	20	2	25

Table 13

Meeting Attendance

A) How many times have you attended the following types of meetings during the last 12 months?

	None	1-2 times	3-8 times	9+ times
Local (general interest) ham radio club	53%	18%	17%	13%
Specialty club (DX, RTTY, QCWA, etc.)	86	8	4	2
Hamfest	64	27	8	1
Convention	87	12	1	0
Swap meet/flea market	64	26	9	1

B) Those who have attended *at least one* meeting in the last 12 months.

	U.S.	Canada	ARRL Members	Non-members	Old-timers	Newcomers	Novice	Technician	General	Advanced	Extra
	%	%	%	%	%	%	%	%	%	%	%
Local (general interest) ham radio club	47	55	59	37	44	53	40	49	44	50	58
Specialty club (DX, RTTY, QCWA, etc.)	14	10	22	8	23	11	8	12	12	18	27
Hamfest	37	19	46	27	31	41	31	38	34	40	47
Convention	13	14	20	8	16	12	8	12	11	16	23
Swap meet/flea market	37	28	44	30	34	37	31	40	33	39	43

are coming from, so the survey set forth to find out. Respondents were asked to indicate which of a number of possible influences were important in their decision to become radio amateurs. The results are given in Table 11.

The table shows the importance of personal contact in the making of a ham. Just about half were influenced by a friend or coworker, and an increasing number (especially women) are influenced by relatives. CB is the next most important for those licensed in the past three years, although shortwave listening is still a significant source of new hams, especially in Canada. Somewhat disappointing is the apparent lack of impact of media such as films, television and radio. These media may be effective in building a favorable public image of Amateur Radio, but they are not attracting new blood into our ranks.

Once the decision to become a ham has been made, the studying begins. Table 12 shows the study aids used by new amateurs. Especially noteworthy is the sharp increase in the use of licensing classes or other formal instruction, and in the use of recorded code practice. It is also interesting that Canadians use W1AW more than their U.S. counterparts do!

Club and Meeting Attendance

We said that our typical amateur did not attend local radio club meetings regularly. This is borne out by Table 13. Canadians are more likely to attend local club meetings, but are less likely to go to other amateur gatherings. League members are far more likely to attend any kind of meeting than non-members. Newcomers go to local club meetings and hamfests more often than old-timers. (Clubs that sponsor licensing classes undoubtedly attract more newcomers than those that do not.) Compared with the ARRL membership percentages (Table 9), local general-interest clubs come out better among Canadians, newcomers, Novices, Technicians and (narrowly) Generals. Support for specialty clubs generally parallels membership in the League, though about one-third the level. Apparently, we need two complementary efforts at the local level: for local clubs to promote ARRL membership among their newer members, and for the League to encourage the more experienced amateurs to remain active in their local, general-interest amateur organizations.

Amateur's Opinions

To anyone who listens on the amateur bands, it should come as no surprise that amateurs say they express their views on the air more than any other way (Table 14). Local club meetings provide an outlet for about one-third of the amateurs, particularly Canadians. Canadians also are more likely to share their thoughts directly with the DOC than U.S. amateurs are

with the FCC. Novices are particularly reticent.

We were somewhat disappointed to find that only one League member in seven said he would contact or write his ARRL Division Director to express his views on a matter of importance to Amateur Radio. Directors are elected by the members to make policy for the League, and if they are to represent the best interests of the members they must have some input. The corollary is that those who *do* take the time to write their Director may have a disproportionate influence.

The survey sought amateurs' opinions on several issues: the general direction being taken by FCC/DOC (Fig. 6), the importance of continuing the Morse code requirement for amateur licensing (Fig. 7 and 8), and the seriousness of malicious (deliberate) interference on the amateur bands. League members tended to feel the FCC was headed in the wrong direction on amateur matters, while non-members were evenly divided. Old-timers and Extras were the least likely to agree with the Commission's direction, with Novices the most likely to agree.

Amateurs overwhelmingly supported retention of the Morse code requirement, with those saying it was "absolutely essential" for operating privileges below 30 MHz outnumbering those who felt it should be dropped by about eight to one. The margin dropped to about two to one for operating privileges above 30 MHz, with many others feeling it was "important but not essential." In Canada, where a no-code vhf/uhf license with a rigid technical exam was introduced in 1978, amateurs were still opposed to dropping the requirement but were more likely to make a distinction between hf and vhf/uhf.

Malicious interference was seen as a "very serious" problem at hf by one-third of the respondents, and at vhf by one-fourth. However, as shown in Fig. 9, amateurs who are inactive are almost as likely to say it is a problem as those who are active. Here it may be worth quoting directly from the Florida State report:

> Interestingly, this perception of the seriousness of the problem varies only slightly when controlling for hours per week on amateur activities. Even those who report no current activity have very similar opinions about interference. This suggests that attitudes about

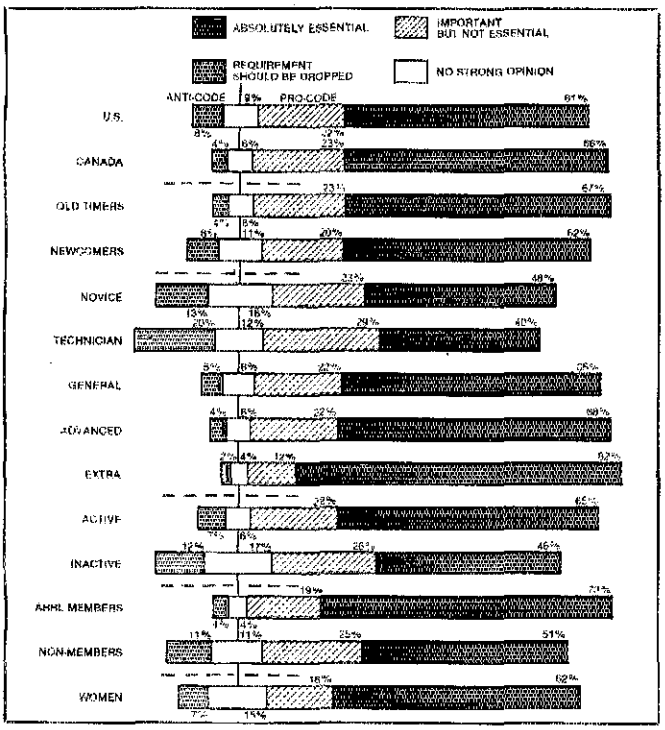


Fig. 7 — Attitudes toward Morse code requirement for hf (below 30 MHz) operating privileges.

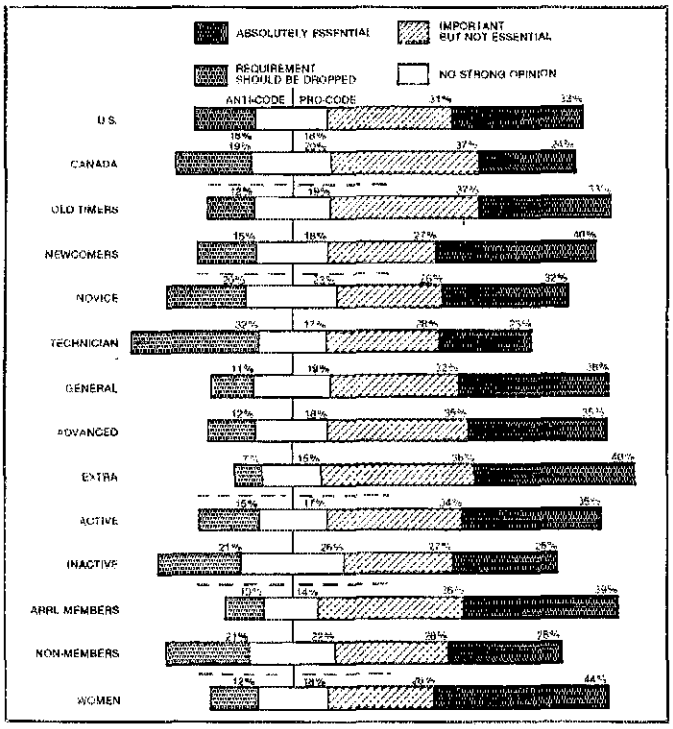


Fig. 8 — Attitudes toward Morse code requirement for vhf/uhf (above 30 MHz) operating privileges.

Table 14

In a matter of importance to Amateur Radio, how do you express your views?

(multiple answers permitted)

	U.S.	Canada	ARRL member	Non-member	Old Timers	Newcomers	Novice	Technician	General	Advanced	Extra	Women
	%	%	%	%	%	%	%	%	%	%	%	%
Talk about it on the air	58	59	65	53	65	42	23	60	62	69	66	45
Bring it up at local club meeting	34	46	42	27	30	33	24	37	31	37	40	40
Write to the FCC/DOC	12	21	15	10	14	10	8	12	11	14	18	11
Contact or write your ARRL division director	8	6	14	3	16	5	5	5	8	10	14	7
Contact or write your ARRL section communications manager	6	4	10	2	11	4	3	4	6	7	11	6
Contact or write ARRL Hq.	10	5	17	4	16	8	7	8	10	11	19	8
None of the above	27	21	17	35	19	38	55	26	26	18	16	35

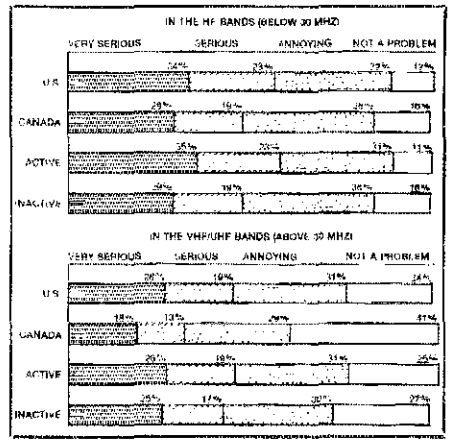


Fig. 9 — Opinions on the seriousness of malicious (deliberate) interference. Percentages are of those expressing an opinion.

interference are as much the result of group norms and beliefs as of experience. From this observation, we may conclude that these data tell us little about the actual number of persons who experience deliberate interference in their operating, only that there is a widespread perception of malicious interference as a serious problem.

This notwithstanding, Canadians are much less inclined to regard it as a serious problem, especially at vhf/uhf.

Women in Amateur Radio

Women always have been a small minority in the ranks of licensed amateurs. Even today, according to the survey, only 6% are women.

If we look more closely at that 6%, though, we see significant changes taking place. Among the newcomers, amateurs licensed since 1978, 14% are women (Table 15). Two-thirds of the female amateurs say relatives were important influences in their decision to obtain licenses (Table 11). Women are much more likely than men to cite "help from a friend" as being a great help in studying, and are more likely to have used ARRL publications and W1AW code practice (Table 12). Although women are less likely to be League members (Table 9), they claim to look at *QST* just as often as men (Table 10), which suggests that there are a lot of potential Family Members in their ranks. At least to now, Amateur Radio has had little effect on women's careers (Table 5).

Women are less active than men, averaging only 4.5 hours per week on Amateur Radio (Fig. 1). Though this information is not included in our tables, the survey also shows that women spend far less time on experimentation and on building and repairing equipment, but are more likely than men to spend a great deal of time (nine or more hours per week) monitoring repeaters and operating traffic/emergency nets. Another survey result not picked up in our tables is that women are more likely to be regular attendees at local, general-interest radio club meetings. This club orientation shows up in Table 14: In expressing their opinion on Amateur Radio matters, women are more likely than men to use the local club as the forum, and less likely to use the airwaves.

Table 15

Respondents' sex by year first licensed.

	Before 1946 %	*1946-60* %	*1961-70* %	*1971-77* %	*1978-80* %	*Overall* %
Male	100	96	96	92	86	94
Female	0	4	4	8	14	6

Women identify emergency communications, development of operating skills and the enhancement of international goodwill as "very important" to Amateur Radio more often than their male counterparts (Table 6). In a result which may be surprising to some, they support the Morse code requirement for licensing on vhf/uhf even more strongly than men (Fig. 8).

The image of the radio amateur as a reclusive chap, misunderstood and unappreciated even by his own family, is fading. Increasingly, Amateur Radio is a family affair, pursued ardently by wives and daughters as well as by husbands and sons.

Other Observations

In some cases the survey report is significant not for what it shows, but for what it *doesn't* show. For example, two of the problems facing amateurs that we hear about most often are antenna restrictions and TVI/RFI. However, 82% said antenna restrictions did not inhibit their Amateur Radio operating, and less than 10% reported receiving TVI/RFI complaints during the previous year, even from their own families. This is little consolation to those amateurs who *do* face these problems, of course.

We have not discussed the "region of residence" breakdown, other than for Canada, because in most cases the differences from region to region do not appear to be significant. However, it is worth noting that in the Western U.S. (W6 and W7 call areas) 24% of the respondents say they face antenna restrictions, as opposed to 17% for the rest of the U.S. and 15% for Canada. Amateurs in the West are less likely to use W1AW code practice, no doubt at least in part because of propagation. They are more likely to regard malicious interference on vhf/uhf as a "very serious" problem, by 37% vs. 23% for the rest of the country.

Conclusion

As the ARRL Long-Range Planning Committee prepares its recommendations for consideration by the Board of Directors, heavy reliance will be placed upon the results of the Florida State survey. In this article, lengthy as it is, it has been possible only to give a broad overview of the results; there is much more information available which will be of use to the LRPC. We wish to acknowledge the work of Dr. E. Walter Terrie, N4WA, and the staff of the Florida State University Institute for Social Research, in designing and executing the survey and in preparing a most comprehensive report. Thanks to their thoroughly professional efforts, we have an accurate benchmark for measuring Amateur Radio's progress in the 1980's and beyond.

Notes

[1] "It Seems to Us," *QST*, April 1979, p. 9.
[2] Clark, "Long-Range Planning," *QST*, December 1979, p. 65.
[3] Clark, "ARRL's Long-Range Planning Committee — A Progress Report," *QST*, June 1980, p. 54.
[4] Waters, "Not Just Bigger — But Better Than Ever," *QST*, April 1978, p. 52.
[5] "Moved and Seconded," Minute 25, *QST*, March 1980, p. 65.

Strays

SPACE SHUTTLE COMMEMORATIVE CERTIFICATE

☐ NASA's George C. Marshall Space Flight Center will hold a special-events operation during the first launch and orbital flight of the space shuttle. It is now scheduled for on or about April 7, 1981. Approximate frequencies will be 3810, 3910 (night), 7210 (day), 14,310, 14,240, 21,310 and 28,610 kHz. Listen for WA4NZD periodically beginning with launch time. A commemorative certificate and other information will be sent to stations who contact WA4NZD during the shuttle's maiden voyage. Send QSL along with time and frequency of QSO to MARC — WA4NZD, c/o NASA Exchange CM21X, Marshall Space Flight Center, AL 35812.

When kids spend Christmas in the hospital, what better way could there be to lift their spirits than to bring Santa Claus to them — via Amateur Radio? At the left, a patient at Mobile Infirmary Hospital chats with Santa via a radio provided by the Mobile (Alabama) ARC. At the right, a young fellow at Newington Children's Hospital asks Santa for a special favor — with the help of Miss Connecticut, Jeanne Caruso, and the Newington Amateur Radio League. *(Photos courtesy The Mobile Register via W9ARC and Newington Children's Hospital)*

T-R Switching With PIN Diodes†

Usable from hf to uhf, this state-of-the-art approach to T-R switching eliminates costly mechanical relays.

By Ian Ridpath,* ZL1BCG

PIN diodes are silicon junction diodes with specific characteristics that allow them to switch high levels of rf power while incurring very low losses. It is now possible to provide T-R switching at power levels in excess of 400 watts at temperatures up to 90° C (194° F) at SWR levels of 1:1 or at 100 watts up to 500 MHz under an infinite SWR condition for the same temperature range. In the past, this could have been done only with mechanical coaxial relays which are expensive and do wear out; solid state devices such as the PIN diodes do not wear out and are comparably less expensive.

The specially doped intrinsic or I layer of the diode allows the normal p-n junction capacitance to be reduced significantly and makes the ON resistance typically less than one ohm. A comparison of various diode types operated at vhf reveals how the properties of PIN diodes make them suitable for rf switching (see Table 1). When the diode is forward biased, it becomes a short circuit and when reverse biased, it is virtually an open circuit.

PIN diodes are available with dissipation ratings of up to 10 watts. Assuming maximum power dissipation and an ON (forward biased) resistance of 0.8 ohm, the diode current would be 3.53 A. This current would correspond to a power level of 625 watts in a 50-ohm impedance line. Naturally, the diode would require some form of heat sinking.

A Practical Application

One application of PIN diodes is shown in Fig. 1. In this example, the transmitter

Table 1
Diode Characteristics at VHF

Diode type	*Frequency (MHz)*	*On Resistance (ohms)*	*Off Resistance (ohms)*	*Capacitance (pF)*
Germanium (point contact)	150	20 to 200	10 k	10 to 20
Silicon (junction)	150	5 to 20	50 k	10
Silicon (high speed)	150	3 to 5	50 k	1 to 5
PIN	150	0.8	10 k	1
PIN	30	0.8	40 k	1 to 2

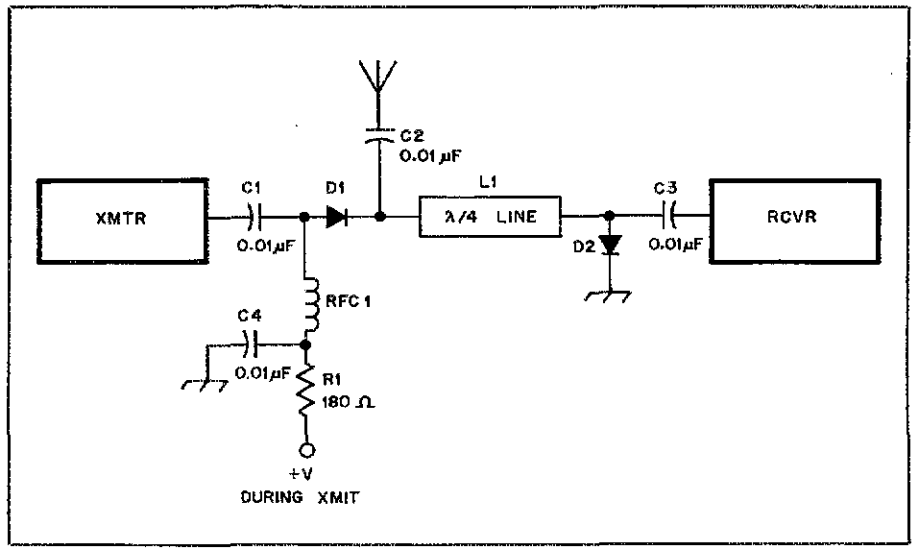


Fig. 1 — The basic PIN diode T-R circuit. D1, D2 — PIN diode, 150 MHz, 1.5 W, Unitrode UM-9401 or equiv. RFC1 — 0.035 µH, 5 turns no. 22 enam. wire, 1/4-in. (6.4 mm) dia., 1-in. (25.4 mm) long.

†Adapted from "Use PIN Diodes for T-R Switching and Throw Away Your Coax Relays" in *Break-In* (NZART), January-February 1980.

*50 David Ave., Manurewa, New Zealand

operates at a frequency of 430 MHz with a power output of 25 watts. The diode current is 55 mA and has an ON resistance of 0.75 ohm. R1 is approximately 180 ohms. A 50-ohm impedance system is used. The rf current present would be:

$$I = \sqrt{P/R} = \sqrt{25/50} = 0.7 \text{ A}$$

Thus, the power dissipated by the diode is $0.7^2 \times 0.75 = 367$ mW. A small, low-power PIN diode could be used such as the Unitrode UM-9401. This unit has a free-air power dissipation rating of 1.5 watts and is low in cost.

When the transmitter PTT line is enabled, both D1 and D2 are forward biased. The current path is through R1, RFC1, D1, the quarter-wave transmission line and D2 to ground. The ON resistance of D1 is about 0.75 ohm — nearly a direct short. This small resistance causes an approximate 0.2-dB loss of transmitter output power. The low impedance to ground at the D2 end of the transmission line is reflected to the D1 side as a very high impedance. For a 50-ohm line, the impedance would be:

$$Z = \frac{Z_o^2}{Z_L} = \frac{50^2}{0.75} = 3.333 \text{ k}\Omega$$

This impedance, compared to the 50-ohm impedance of the antenna line, is very high, so the line is essentially out of the circuit. In reality, a further loss of about 0.2 dB is incurred.

During receive, the voltage on the PTT line is disabled and both diodes are nonconducting. Thus, the effective high impedance of D1 isolates the transmitter from the antenna circuit. At the same time, the 50-ohm quarter-wave line reflects the 50-ohm antenna impedance to the receiver input. The total insertion losses contributed by the diodes and other components is approximately 0.4 dB for both the transmit and receive ports of the network. In theory, 55 dB of isolation is obtainable; in practice, transmitter-receiver isolation on the order of 30 to 40 dB is realized. The reason for the difference is that stray capacitances and the presence of the various components tend to feed some rf around the quarter-wave line and the diodes. At vhf, it is especially important to keep the leads of D2 as short as possible; a couple of extra millimeters of lead length can use a degradation of several dB in the isolation figure.

The theoretical transmitter-receiver isolation can be computed by comparing the rf power at the antenna to that at the receiver input when the transmitter is operated:

$$\text{Isolation (dB)} = 10 \log_{10} \frac{P_{ANT}}{P_{REC}}$$

The amount of power available at the antenna is 25 watts less the 0.4 dB loss or 23 watts. Calculation of the power reaching the receiver is done by using the equivalent circuit of the network when diode D2 is forward biased. It was shown the reflected resistance was 3.333 kΩ, so the rf current flowing in this branch is only:

$$50/3333 \times 23/50 = 7 \text{ mA}$$

This 7-mA current flows through diode D2 and the receiver input with most of the current passing through the low resistance path provided by the diode, 0.75 ohm. The power delivered to the receiver is approximately equal to $0.007^2 \times 0.75$ or 37 microwatts. Thus:

$$\text{Theoretical isolation} = 10 \log \frac{23}{0.000037} = 58 \text{ dB}$$

To improve the practical isolation figure of 30 to 40 dB, a second quarter-wave line section and another diode can be added as shown in Fig. 2. This will tend to add another 10 dB or so of isolation and is sufficient to prevent burn-out of the rf input stage of the receiver.

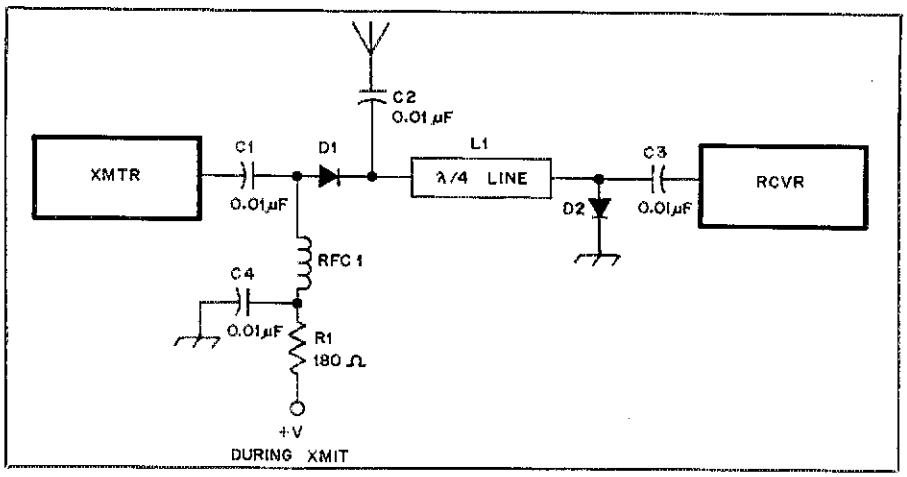


Fig. 2 — An additional quarter-wave line (L2) has been added to the basic circuit to increase the transmitter-receiver isolation by approximately 10 dB.

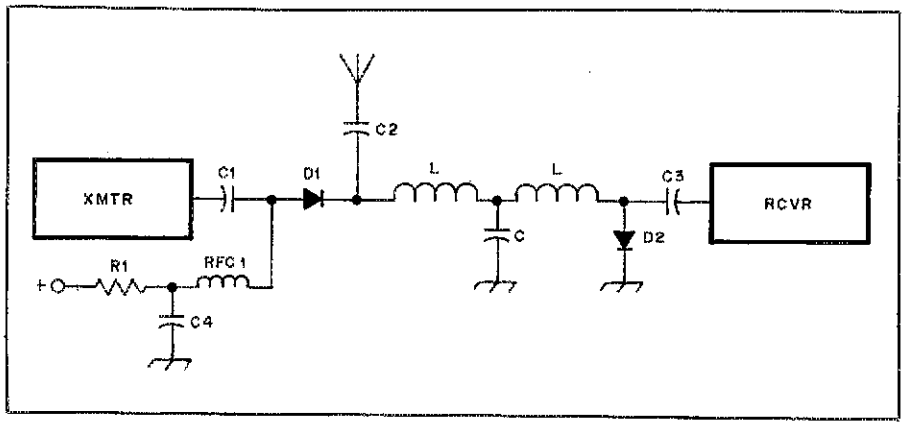


Fig. 3 — A PIN diode switch using lumped LC constants. This arrangement is suitable for use at hf. $L = Z_o/2\pi f$ and $C = 1/2\pi f Z_o$ where: Z_o is the characteristic impedance of the line.

Bandwidth

Since any quarter-wave line section is a quarter wavelength at *one* frequency only, the antenna changeover circuits are frequency sensitive. However, typical curves show that sufficient isolation can be obtained over a frequency range of 10% of the center frequency. That is, isolation values of 30 dB or more and insertion losses of less than 0.5 dB occur over a minimum of ±3% of the center frequency. At 430 MHz, a section cut for 435 MHz will work between 429 and 441 MHz. A system designed for 146 MHz would operate over the entire band from 144 to 148 MHz. At 14 MHz, a bandwidth of 500 kHz could be expected. However, it would be impractical to construct line sections for those frequencies. Lumped L-C networks can be used at hf as shown in Fig. 3. (The foregoing limitation does not apply to antenna switching since it is

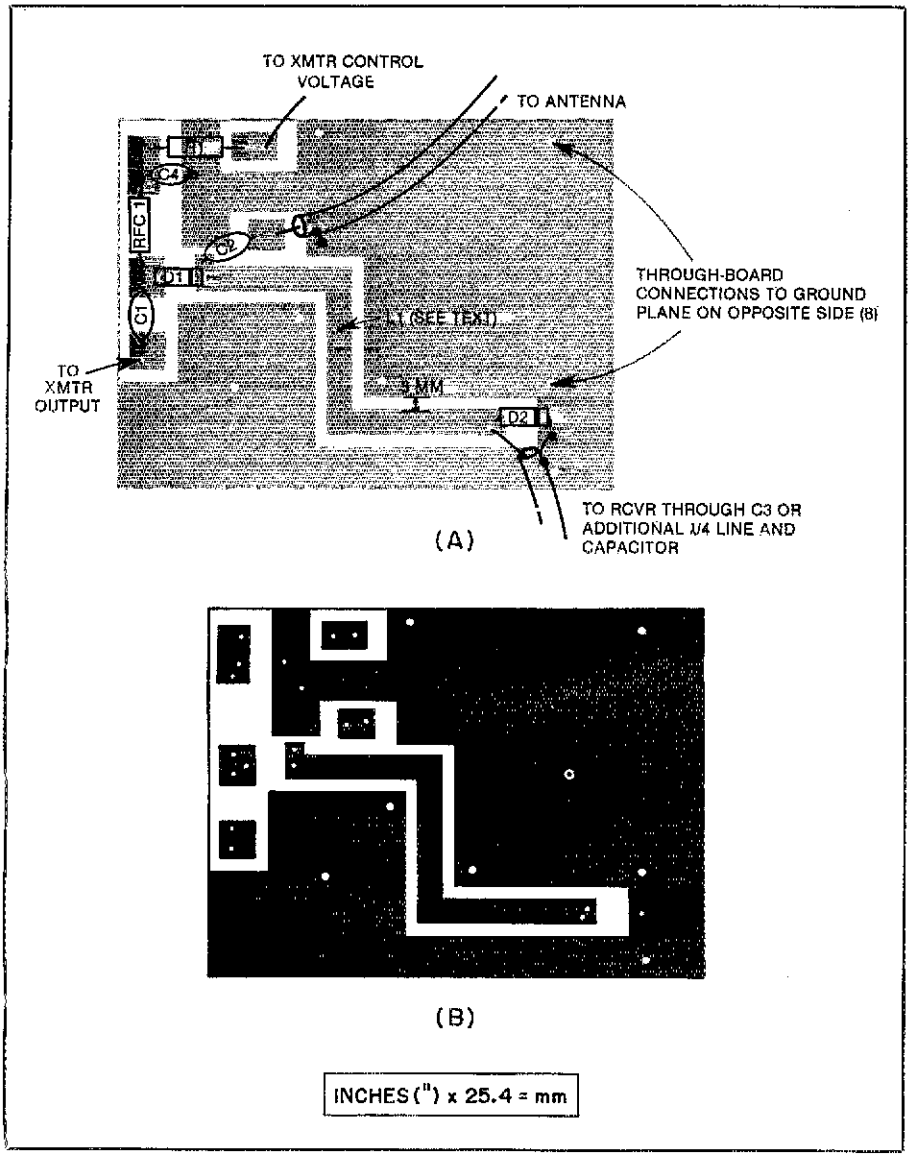


Fig. 4 — At A, a layout for a 430 MHz PIN diode T-R switch using a strip line etched on double-sided pc board. The details of the strip line are given in the text. Eight through-board connections are made between the ground planes on both sides of the board. At B the pattern is reproduced full size with black representing copper.

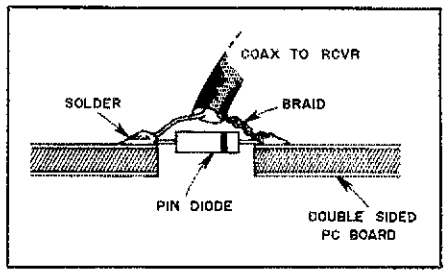


Fig. 5 — One method of attaching the PIN diodes to the double-sided pc board is shown here. Details are given in the text. The coaxial cable leads to the diode should be no longer than approximately 5 mm (0.2 in.).

quite practical to use quarter-wave coaxial cable line sections to perform matching and phase delay functions.)

PIN Diodes at UHF

An example of the use of PIN diodes for performing the T-R function for a uhf transceiver is shown in Fig. 4. In this case, the quarter-wave line section is a strip line etched on a double-sided pc board. It is vital that the diode leads be kept short to ensure good performance. The best way to achieve this is to cut out a small rectangle in the pc board and place the diode in this cutout so that the leads are flush with the plane of the board. The leads can then be soldered to the etched line and the ground plane. The coaxial cable connection to the receiver should be dressed so that very short leads are used at the point of connection to the diode. Fig. 5 shows how this is done.

When calculating the length of the quarter-wave line sections, the velocity factor of the transmission line must be taken into account. At 144 MHz, a quarter-wave section of RG-58/U (with a solid polyethylene dielectric) would be 1/4 × (300/144) × 0.66 m or 344 mm (13.5 in.) in length. At 430 MHz, the length would be 115 mm (4.5 in.).

For a pc board strip line quarter-wave section, other factors must also be considered. The dielectric constant of the board as well as the thickness of the copper affect the velocity factor. If glass-epoxy double-sided board with 1-oz copper is used, a 6 mm (0.24 in.) wide etched line will have a characteristic impedance of about 40 to 45 ohms. At 430 MHz, the length of a quarter-wave section would be found by:

$$L = \frac{1}{4}\left(\lambda\right)\left(\frac{K}{E_R}\right)$$

Where: λ is the free-air wavelength, K is the ratio of the line thickness to width, and E_R is the dielectric constant of the board material. Thus, our line would be:

$$\frac{1}{4}\left(\frac{300}{430}\right)\left(\frac{1.086}{1.58}\right) = 120 \text{ mm}$$

The dimensions of the strip line would then be 120 × 6 mm (4.72 × 0.24 in.). This line may be etched on the top side of the board with the ground plane surrounding it and spaced about 3 mm (0.12 in.) away; the bottom of the board should remain unetched.

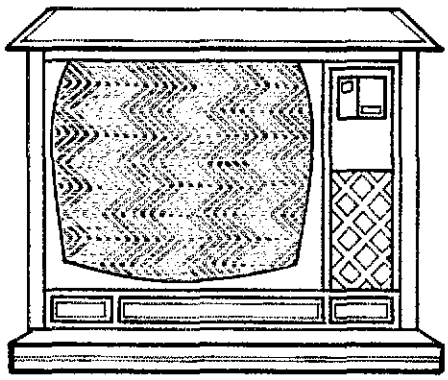
Remarks

For those who wish to experiment, the Unitrode diodes are available from larger distributors.[1] An existing relay type T-R system may be replaced by merely adding two PIN diodes, a resistor, rf choke, some coaxial cable and a few dc blocking capacitors. If you're a bit wary of "pumping" rf into the receiver and damaging it, the receiver port of the switch may be initially terminated with a 50-ohm resistor and the voltage across it measured to ensure that it is at a safe level.

Some of you may wish to try using PIN diodes at hf to switch or phase antennas by applying the dc control voltage to the center conductor of the coaxial cable. Experimenting will no doubt produce some interesting circuits, especially for vhf and uhf antenna switching. Such circuits are now being used commercially and there is no reason why amateurs should not make use of this relatively new technology.

[1]Unitrode Corporation, 580 Pleasant St., Watertown, MA 02172. An application note entitled, "PIN diodes for Two-Way Radio Antenna Switching" is available. Another source of information regarding PIN diodes is the Motorola Application note AN-548A, available from Motorola Semiconductor Products, Inc., P. O. Box 20912, Phoenix, AZ 85036.

Color TVI — A Solution



Got a tough color-TVI problem? Don't give up! A few feet of coax may turn out to be the coil of your dreams.

By Carl Eichenauer,* W2QIP

Suppose you have just put up a new two-band inverted V antenna for 80 and 40 meters. You find it works well — good signal reports, acceptably low VSWR, etc. — it makes you feel it was worth all the effort. Then suppose you took a look across the room at the TV set — what a revolting development! — vivid blue, red and green hash marks run across the screen every time you close the key! To make matters worse, the rig is running "barefoot" on 40 meters. A check on 80 meters reveals that the hash marks are of an even more ghastly nature. If you really want to see a hideous display you flip on the amplifier! How could this be? You *never* had TVI on 80 and 40 meters before!

Things That Didn't Work

You now consult a cadre of seasoned technical experts with whom you are acquainted. "Obviously," says the first expert, "you need a low-pass filter in the output transmission line of your rig." You assure him you have had one there for years and with this interference it makes no difference if the filter is in or out of the line.

A second expert now speaks: "It's apparent that you must not be aware that you should have a high-pass filter installed at the antenna input terminals of your TV set." You assure him that one has been implanted at that location for years. In fact, you connected *two* in tandem. Again, it made no difference.

"Well," says the third expert, "for a case like this you really ought to get rid of that cheap TV twin-lead feed line and use coaxial feed line — complete with balun matching transformers at both ends — between your TV antenna and your TV

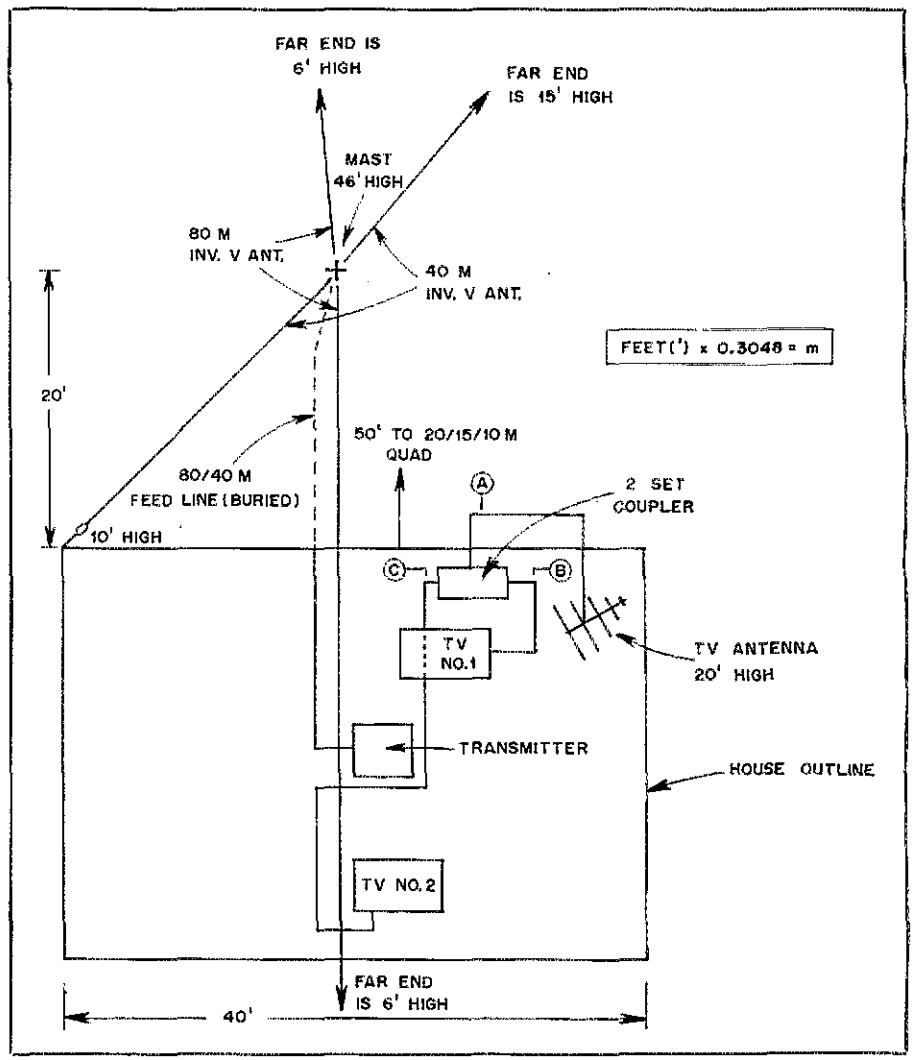


Fig. 1 — Plan view of the antenna, TV and transmitter layout. TV set no. 1, the two-set coupler and the transmitter are slightly below ground level. TV set no. 2 is slightly above ground level. The coaxial cable length from the TV antenna to the coupler is approximately 28 feet (8.5 m); from the coupler to TV set no. 1, 6 feet (1.8 m); and from the coupler to TV set no. 2, 35 feet (10.6 m). All antenna heights shown are relative to average ground level.

*205 Lathrop Rd., Syracuse, NY 13219

set." You assure him that is what you are using already.

"Now look here," says expert number four, "it's clear you have bad filters, a loose or corroded joint in your TV antenna or some other form of shoddy workmanship in your TV system." "Well," you ask, "how come there is no TVI when I aim my quad at the TV antenna on 20 and 10 meters and just a little bit on 15? And, after all, you have to expect some TVI on channel 3 — third harmonic, you know." No answer.

Two experts are left. "Look fella," says expert five, "haven't you ever heard of TVI coming back through your power line cord? You need a line filter!" This you hadn't tried. A trip to the local electronics outlet nets you a filter which "cuts most electrical appliance interference on color and black-and-white TVs. Instant installation." It did indeed install easily. Unfortunately, the TVI was the same with or without the line filter installed.

One expert is left. "Buddy," he declares, "the solution is simple — move out to the country where you have no neighbors, and convince your family that watching TV is bad for their eyes!" You are tempted . . .

Searching the Literature

The preceding tale of woe, while dramatized slightly, describes the problem I encountered and the steps I took to cure it — without success. A search of my *QST* file from the past 10 years yielded lots of TVI articles, but none with a solution to the problem at hand. The basic situation was mentioned obliquely in the ARRL *Handbook* as "color subcarrier interference."[1] The description didn't quite seem to fit my 40- and 80-meter problem, however. Another informative article, "Color TVI," described a situation similar to mine, except the problem occurred primarily on channel 4 and the interference band was 20-meter phone.[2] My problem was interference with channels 3, 5, 9 and 24, while operating 40 or 80 meters on either cw or phone. The Detroit, Michigan, group that was mentioned in the article hadn't found a good solution to their problem.

Then, in *QST*, I discovered an article — not on TVI — but on indoor antennas.[3] This is a subject near and dear to my heart because I've used so many indoor antennas at different locations. I started reading it, mostly to forget my TVI problem and reminisce about the good old days when no one even knew I had a ham station because it had an invisible antenna. Suddenly I got the idea which was responsible for solving my TVI problem.

Experimental Phase

Fig. 1 shows a bird's-eye view of the antenna farm on my 50-foot wide residential lot. Probably your first question is, "Why would anyone in their right mind run one leg of an 80-meter inverted V within 15 feet (4.6 m) of his TV antenna?" The location was dictated by the existing pole in the middle, the tree on one end and the lamp post on the other end. Besides, one doesn't have much leeway in placing a full-sized 80-meter antenna on a lot of such dimensions even under the best of circumstances.

In his article, Fred Brown states, "Inevitably, any conductor in your house, a quarter wavelength or longer, will be parasitically coupled to your antenna." Take a look at the coaxial feed lines going to the TV sets in Fig. 1. Don't they look like they fit the role of being coupled parasitic conductors? It looked that way to me.

Fred wisely counsels that before you spend a lot of time doing wrong things to improve the situation, you should make some initial measurements. He suggests the current-probe instrument shown in Fig. 2. The device is simple to construct, easy to use, and highly effective in measuring the presence of currents in parasitic conductors.

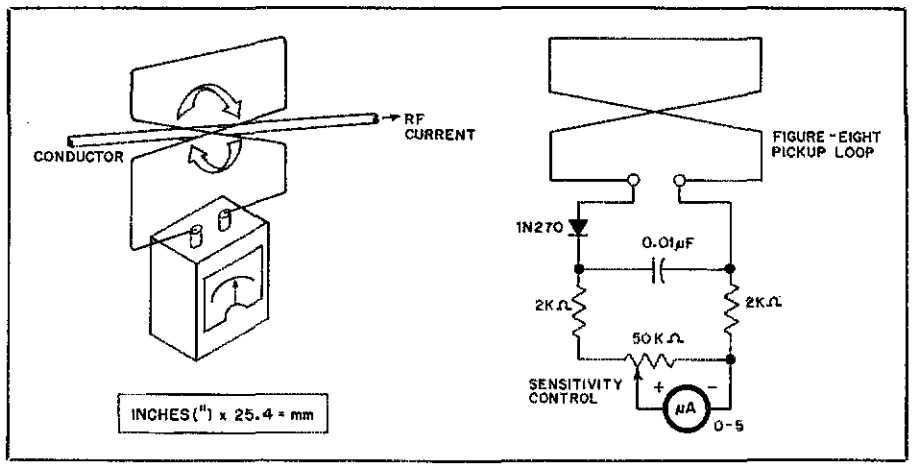


Fig. 2 — This current probe, constructed in a 3 × 4 × 5-inch (76 × 102 × 127-mm) enclosure, can be used to measure relative rf current in any conductor. The instrument may also serve as a field-strength meter or wavemeter. Arrows show how the magnetic field surrounding the conductor threads through the figure-eight loop. This model contains a 5-μA meter, but a less expensive meter movement, such as a 50-μA unit, may be employed. If a 0- to 1-mA meter is used, the sensitivity control should be changed to 10 kΩ.

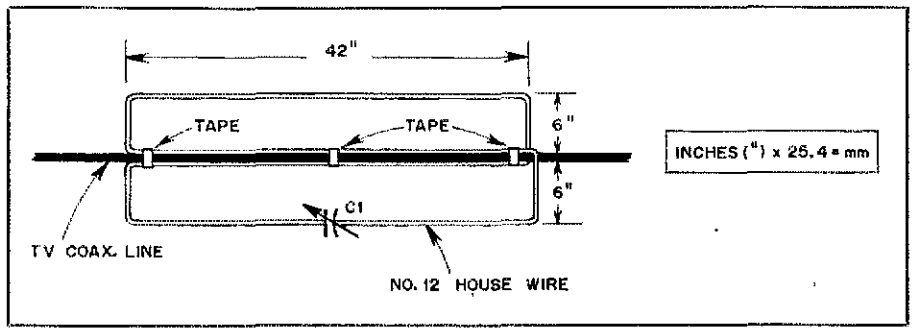


Fig. 3 — The breaker loop for 80 and 40 meters. The loops should be taped securely to the TV coaxial cable at several locations. Gaps between loops and the outer surface of the coax greatly lessen the coupling effectiveness of the assembly. C1 should be adjustable and have a maximum capacitance of 150 pF or more. Either air variables or compression capacitors are satisfactory.

Armed with the current probe, measurements were made at various locations on the outer surface of the TV coaxial feed line with the rig operating at 3580 kHz. This is the frequency of the chroma oscillator in a color TV set and interference at this frequency seems to cause the most hideous TVI displays. There was no doubt left in my mind that substantial parasitic currents were flowing on the feed lines.

What next? Brown suggests the use of a "magic" figure-8 "breaker" loop for indoor antenna work when objectionable parasitic elements are encountered. My version of his breaker loop is shown in Fig. 3. It had to be somewhat larger than the original because Brown's was designed for 14 MHz and mine for 3.5 MHz. I used no. 12 house wire for the loops, tuned it with a 150-pF variable capacitor, and taped it to the TV coax line at location A in Fig. 1, just ahead of the two-set coupler. Placement selection was based on the assumption that "breaking" the feed line at this point would best isolate rf pickup from the vertical down lead of the TV antenna.

The moment of truth had now arrived.

[1]Notes appear on page 24.

The rig was placed in transmit. Slowly, the breaker loop variable capacitor was rotated. Eyeballs were fixed on the grizzly TV-set interference display. Suddenly — eureka! — the lines all but vanished! Who said TVI problems couldn't be licked?!

Wait a minute . . . what about 40 meters? When the SB-101 was keyed on 40 meters, the blue, green and red stripes were as gaudy as ever. Once again the variable capacitor on the breaker loop was slowly rotated to establish resonance on that band. Again success smiled on the experiment. The principle and hardware had passed its second test.

At this point, the third moment of truth arrived. The SB-220 amplifier was placed in action at full legal input power. The picture remained clear on the TV set for several seconds. Then, with an audible snap! the interference returned. The variable capacitor in the breaker loop had actually *arced over* between the plates! A check revealed that one of the plates of the vintage capacitor was bent, thereby reducing its voltage-handling capabilities, but the arc nevertheless indicated that the levels of power on the parasitic TV feed line were more than microwatts and probably more than milliwatts.

The bent capacitor plate was straightened and the breaker loop then kept the TV picture clean for sustained key-down periods. A subsequent test, using a handheld 20-watt fluorescent light bulb positioned in contact with the two-set coupler outer surface showed that this highly *insensitive* indicator could be illuminated to full brilliance when the breaker loop was detuned from resonance! Small wonder that there was 40-meter TVI — the whole outer surface of the TV antenna system must have been near resonance on 40 meters before the breaker loop was introduced into the system.

Some Improvements

Once the source of a problem has been uncovered, one can sit back in his easy chair and conjure up better ways to lick the problem. In my case, there was insufficient room to install more than one of the large breaker loop assemblies in the vicinity of the two-set coupler. Because of the two-set installation, a single breaker loop could not completely eliminate the TVI when operating with full legal power on 80 meters. As a result, the more compact breaker loop design shown in Fig. 4 was devised. All the necessary parts were obtained at the local Radio Shack store.

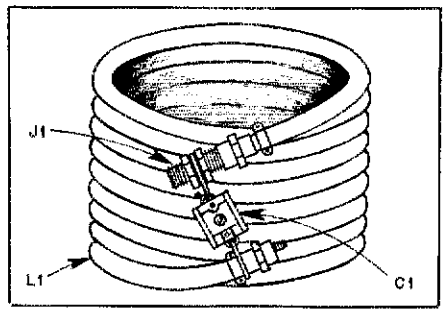


Fig. 4 — The compact breaker loop assembly. Construction of the assembly is discussed in the text.
C1 — 150-pF ceramic trimmer, Radio Shack 272-805.
J1 — F-81 bushing, Radio Shack 278-213.
L1 — 8 feet (2.4 m), 75-ohm coaxial cable with an F-59 connector on each end, Radio Shack 15-1530.

Simply coil the 8-foot (2.4-m) length of 75-ohm coaxial cable into an 8- or 9-turn assembly, and secure the coil with several strips of electrical tape. (The indicated assembly is supplied complete with end connectors.) Insert an F-81 bushing at one end and secure a copper wire of 5 or 6 inches (127 or 152 mm) in length to the bushing by means of the mounting nut that comes with it. Next, twist another 6-inch (152-mm) copper wire to the connector at the other end of the cable. Twist connections are suggested because these connectors do not take solder very well. Solder an appropriate tuning capacitor between the two copper wire ends using the shortest possible lead lengths.

The finished product you now hold in you hand is a resonant circuit comprised of the inductance of the outer surface of the coaxial cable coil tuned to resonance by means of the capacitor. When connected in tandem with your TV transmission line, it displays a high impedance on its outer surface, thereby vastly reducing the flow of any parasitically induced line currents on that surface. Of course, you have to tune the capacitor to make the circuit resonant at the interfering frequency. Resonance may be checked with a GDO or by tuning the capacitor for minimum TV interference. Installation of the breaker loop consists of opening the existing TV feed line connection, inserting the resonator and adjusting the capacitor for minimum interference.

In my particular installation, three breaker loops were used. Referring to Fig. 1 again, one assembly was installed at input port A of the two-set coupler and resonated at 40 meters. The other two units were installed at splitter ports B and C. They were resonated for 80 meters. For a single set installation, the resonator(s) should probably be installed at the coaxial connector closest to the TV set input, although checking of parasitic line currents may indicate a more effective location.

Conclusions

Every amateur/TV antenna installation is unique. Perhaps my system approaches a worst-case situation, but I suspect that a check with a detector such as shown in Fig. 2 will disclose TV feed line parasitic currents to a greater or lesser degree in most cases. One thing is certain: Hf currents on the TV feed line can bypass the front-end circuitry of a TV set and cause undesired displays on the picture tube. My guess is that the capacitance of the TV set components to actual ground provides a path through which the coaxial cable parasitic currents can flow. This idea was essentially borne out by my experience that the upstairs color set was much less severely affected than the downstairs set, which was in close proximity with earth ground.

While this study involved only a coaxially fed TV system, the problem may be as bad (or worse) with parallel-wire fed systems. Perhaps a breaker similar to the type recommended for amateur vhf work (as shown in the ARRL *Handbook*)[4] could be modified to tune to the lower frequency ham bands and produce the desired effect with such systems.

If you have a TVI problem that doesn't respond to the standard elimination measures, you may find the techniques described here (or variations thereof) will help solve your problem. Good luck!

Notes

[1] *The Radio Amateur's Handbook*, 1979 — 1981 editions, p. 15-13.
[2] Dage, "Color TVI," Technical Correspondence *QST*, September 1978, p. 32.
[3] Brown, "Better Results With Indoor Antennas," *QST*, October 1979, p. 18.
[4] *The Radio Amateur's Handbook*, 1966 edition, p. 581.

Strays

I would like to get in touch with . . .

☐ amateurs in Indonesia or Europe (especially The Netherlands) who collect Indonesian stamps. Don Griffith, NØRF, 603 Joyce Ann Dr., Manchester, MO 63011.

QST congratulates . . .

☐ L. Phil Wicker, W4ACY, for his 26 years of outstanding service to Amateur Radio in the Roanoke Division as assistant director, vice director and director. Phil received a special service award from John Kanode, N4MM, president of the National Capitol DX Association. John has since been elected vice director of the Roanoke Division.

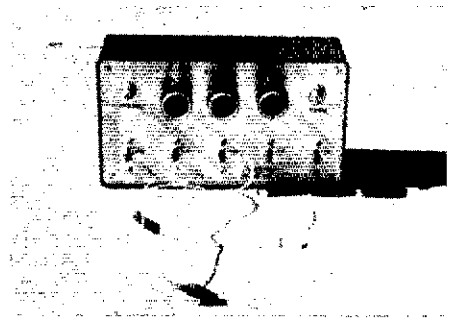
☐ Kenneth M. Miller, K6IR/W9NQT, who has been elected a "Fellow" of The Radio Club of America, Inc.

☐ John Hunt, WB9VJZ, of Madison, Wisconsin, who has been awarded a $3000 American Cancer Society Institutional Research Grant at the University of Wisconsin, Madison.

• *Basic Amateur Radio*

A Cheap Resistance Box

Need a decade resistance substitution box? Let your junk box supplant your bank account. Build this replacement.



By Bill Davidson,* KW4J

Being the "cheap old codger" that I am, I didn't want to spend money to buy a decade resistance substitution box. That meant that I had to build one or do without, which would make experimenting difficult — particularly biasing transistor circuits.

A Logical Switch

Well, one look into a catalog showed me that if I bought the parts separately or as a kit, I would still be spending too much money! For example, a 10-position switch would cost about $2.75 — and I would need 10 of them. This had to be a junk box project.

Some reclaimed potentiometers seemed to be the most logical choice. But how to hook them together? A little reflection indicated that it would be necessary to wire the various values in series with some means of bypassing any particular value without breaking continuity. All that is required is an spdt switch and the chosen value potentiometer. A schematic diagram of my circuit is shown in Fig. 1.

I used three-position slide switches which I bought from a surplus dealer (S1-S5). The potentiometers came from various pieces of equipment that I had cannibalized over the years. The box is from Radio Shack (I had purchased it for another project, but it was too small). I had all the parts on hand to build the resistance box without having to buy anything.

The three-position slide switches did present one problem in that I had more positions than needed. By cutting the slot holes such that the switch lever will slide between two positions only, I made the front panel serve as a mechanical stop. I did cut one of the holes large enough for full movement of the slide lever; I can intentionally break the circuit if need be. If you want this feature and are planning to use spdt toggle switches, I would recommend that one of them be of the center-off variety.

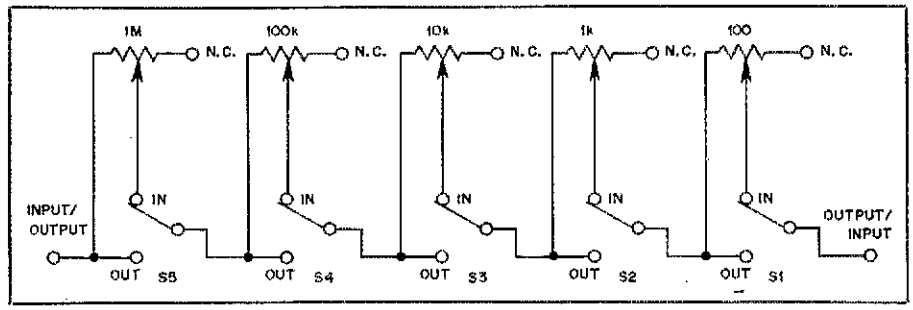


Fig. 1 — Schematic diagram of the cheap resistance box. Resistances are in ohms, k equals 1000, M equals 1000000. Component values, sizes and styles are noncritical. The switches can be any convenient (cheap) variety that provides at least one pole, double throw. The resistance settings of each potentiometer may be indicated by front-panel calibration marks.

My construction techniques may leave a lot to be desired, but they do get the job done. The switch slots were cut with a Dremel tool; a small file would also work. It took about three hours from start to finish, including adding dry transfer lettering. I was unable to put knobs on two of the potentiometers because the shafts were designed for screwdriver adjustment. As far as I am concerned, that is merely a matter of cosmetics and does not interfere with their operation.

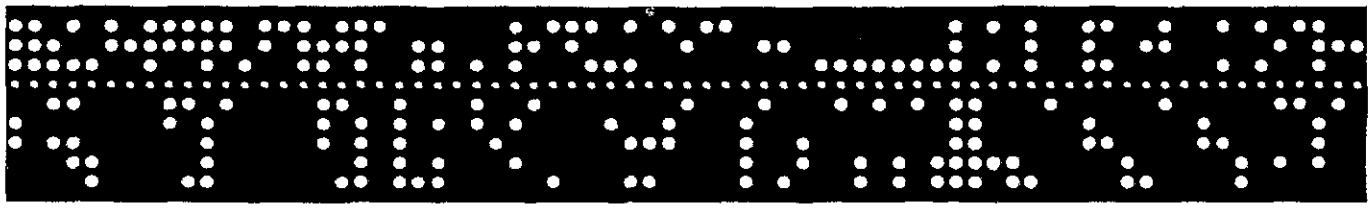
There is one obvious disadvantage to this design as compared with that of a decade resistance box. To adjust or measure a resistance accurately, the box must be disconnected from the circuit and measured with an ohmmeter. The box can be calibrated roughly with the position marked on the front panel. Of course, if multiple-turn potentiometers are used, it will be necessary to note the number of turns for a particular setting.

Another thing about this device is that any type and size of potentiometer can be used. Mine has 1 MΩ through 100-Ω potentiomenters because I had them and they were convenient. Virtually anything will work, even logarithmic taper (volume control) potentiometers.

I have used the box in several applications and found it adequate for my tasks. Perhaps you would be able to make use of a similar design at your work bench. After all, you don't have to be a "cheap old codger" to want to save money these days.

*2337 Regent La., Birmingham, AL 35226

But Do You Understand ASCII?



You may be familiar with the ASCII table. But putting this computer-age mode of RTTY to work depends on some important nitty-gritty technicalities, a few quirks and some fine points.

By Glenn L. Williams,* AF8C

"What is all the excitement about ASCII? I hear the FCC has added more rules to Part 97 by allowing ASCII on the amateur bands. And how will I ever learn what it is all about before I take that exam next month? Why do hams need ASCII anyway?" Perhaps these thoughts have brought concern to more than one amateur trying to upgrade or move into RTTY. The point is that ASCII has become the most important technical improvement in Amateur Radio since the arrival of single sideband. Many new and interesting developments are just in the offing and no one can say that all the implications are even known yet.

Informed amateurs are by now aware of the changes in the wording of Part 97.69 of the regulations as amended by the FCC in March 1980. At long last, the amateurs have a more modern RTTY mode, immediately compatible with their hobby computers and the more modern teleprinters.

Certain technical details of ASCII are not often spelled out in amateur publications. Quite often it is the computer hob-

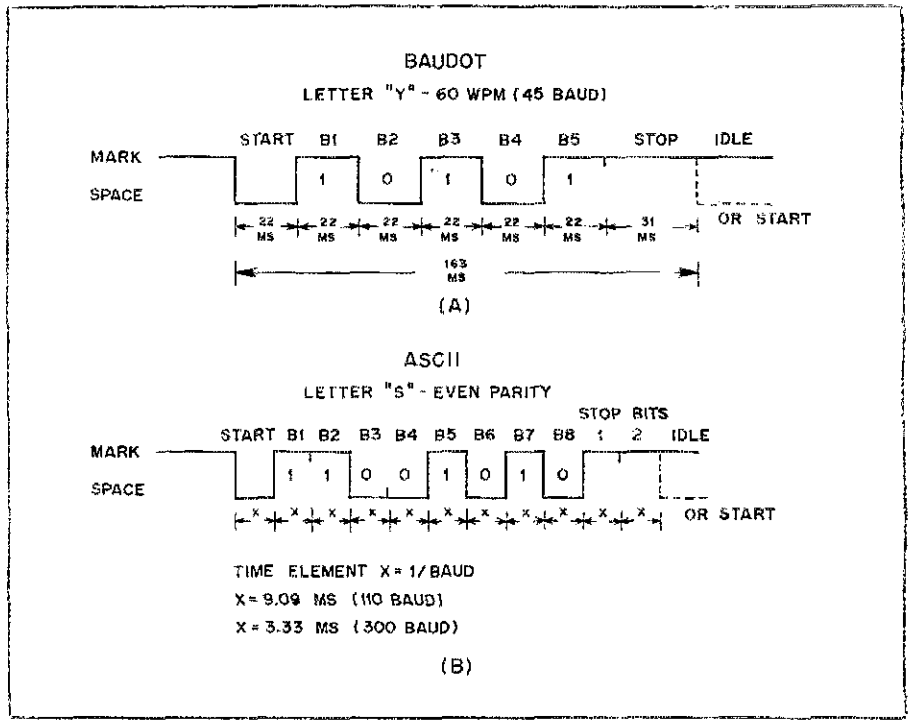


Fig. 1 — The time sequence for the Baudot letter Y is shown at A. B illustrates the time sequence for the ASCII letter S. The eighth ASCII bit is known as the parity bit (see text).

*513 Kenilworth Rd., Bay Village, OH 44140

Table 1

Baudot Code

Code Bits						
B5	B4	B3	B2	B1	Letters	Figures
0	0	0	0	0	blank	blank
0	0	0	0	1	E	3
0	0	0	1	0	LF	LF
0	0	0	1	1	A	–
0	0	1	0	0	space	space
0	0	1	0	1	S	'
0	0	1	1	0	I	8
0	0	1	1	1	U	7
0	1	0	0	0	CR	CR
0	1	0	0	1	D	$
0	1	0	1	0	R	4
0	1	0	1	1	J	bell
0	1	1	0	0	N	,
0	1	1	0	1	F	!
0	1	1	1	0	C	:
0	1	1	1	1	K	(

Code Bits						
B5	B4	B3	B2	B1	Letters	Figures
1	0	0	0	0	T	5
1	0	0	0	1	Z	+
1	0	0	1	0	L	)
1	0	0	1	1	W	2
1	0	1	0	0	H	#
1	0	1	0	1	Y	6
1	0	1	1	0	P	0
1	0	1	1	1	Q	1
1	1	0	0	0	O	9
1	1	0	0	1	B	?
1	1	0	1	0	G	&
1	1	0	1	1	FIGS	FIGS
1	1	1	0	0	M	.
1	1	1	0	1	X	/
1	1	1	1	0	V	=
1	1	1	1	1	LTRS	LTRS

LF = line feed
CR = carriage return

This is a typical Bit Map or Code Map showing the cross-correlation to Baudot code. Punctuation in Figures column may vary slightly depending on original use of the machine.

byist or professional who acquires his knowledge of ASCII by other means and who joins the knowledgeable few on the air to the bewilderment of the non-ASCII hams. These new users of the RTTY frequencies will bring a range of information and skills into the ranks of the old timers. So we will all need to comprehend the rules as set forth in Part 97.

This article explains the ASCII code and some common terminology and potential misunderstandings associated with ASCII and Baudot serial communications. It explains how the FCC rules open up the bands for the new mode but leave certain details unanswered. We will see that when the enthusiast has acquired hardware and invested his time in RTTY already, the adaptation to ASCII becomes as simple as minor speed and shift adjustments[1] and the addition of a new teleprinter.

Bits and Characters

RTTY communications prior to March 1980 used only equipment and methods compatible with International Telegraphic Alphabet No. 2 (commonly called the Baudot code). In that mode, a single character is sent with the well-known *start* bit, then five information bits and finally a *stop* interval about 1-1/2 bits long, as shown in Fig. 1A. The 5-level Baudot code is comprised of five elements of information, each one called a *bit* (from *bi*nary digi*t*) by the computer people.

The *start* bit, by dropping to the *space* current level, initiates movement of the mechanism in a teleprinter to perform printing or punching in the receiving equipment. Then the five bits of information sequentially pull in the selector magnet to set up the mechanism for a character which is completed by the *stop* bits at the *mark* current level.

By amateur regulations in Part 97.69, the length of the bit sequence, bit timing and words-per-minute rate were constrained to be certain standard rates and timing[2] so that amateurs and the FCC both could copy QSOs with commonly available equipment.

Bit sequencing, code and modulation rate were all predefined for the amateur in a mode that is becoming more and more outdated. The Baudot code, shown on a bit-level basis in Table 1,[3] predates ASCII by a number of years. The standard bit sequence of any character from Table 1 is that the *least significant bit* (LSB) is sent immediately after the *start* bit, followed by the other bits in ascending order until the *most significant bit* (MSB) is reached just before the *stop* interval. This is the way the serial code and the teleprinters have always operated, even though the bits could have been sent in reverse or some scrambled order. But to shy away from the standard was, and is, a way to invite incompatibility and confusion. (It is interesting to note that the bit sequencing, as this is called, is not specified in Part 97.69 explicitly. Nor is ASCII, as defined in the cited ANSI standard, defined with the bit sequencing. That definition is a different ANSI standard not mentioned in Part 97.69.)

Now, with bits of code, only 2^5 or 32 different unique codes exist if the code contains only five bits. Since there are 26 letters, 10 numerals (0 through 9) and many special characters (!@#$%¢& for example) obviously, there are more than 32 total characters to be printed. The 5-level code as a result reserves two special codes for FIGS and LTRS to actuate carriage shifting to permit an alternate set of printing characters to accommodate the left-over character requirements (Table 1). The RTTY enthusiast knows only too well what happens when a carriage shift character is lost during a noise "hit" in reception! The following printout is all garbled until order is restored, often too late, with another carriage shift character. A code with more bits would alleviate this problem, one would surmise. Imagine the problem for the computer programmers when the same code could mean one of two characters! The industry avoided this problem by adopting other codes, with ASCII becoming prevalent in the 1960s.

Baud Rate

But first, let us ponder "bauds" for a minute. By technical dictionary definition, loosely paraphrased, baud rate is *modulation rate* and not necessarily bits per second as is often presumed. Obviously, in order to pass information through the communications medium (wire or radio) the bits must be modulated onto some carrier at some keying rate. The simple 20-mA, 60-mA polar or nonpolar current loops are examples of modulation of current flow with bits of information, usually on a one-for-one basis. In this case, "baud per second" or baud rate is equivalent to bits-per-second (bps).[4] The next more complex method is to modulate an rf carrier on and off (A1), change its frequency (F1), change its phase (similar to F1) or do likewise with an audio tone which is then modulated by ordinary means onto an rf carrier (A2 or F2). The result so far still gives one modulation change per bit and is all we are allowed to do by Part 97.69. Here again baud rate and bps are the same.

But to satisfy the requirements for operation in noisy environments or with reduced bandwidths, the bits can also be modulated onto a medium where each bit is converted into a group of pulses (as in floppy disc recording) where some of the pulses provide clocking information, or the bits broken down into pairs which are used to phase-shift key several different audio tones at the same time (QPSK modems). In these circumstances, several changes of signal characteristics in combination result in the transfer of one or more bits at a time. That is, there may be *m* modulation changes per *n* bits transferred (*m* not equal to *n*). This lack of a one-for-one match of modulation changes and bits sent means that the baud rate may be different from the resultant bps rate.[5] Hence, there is some reluctance in the industry to use the term "baud rate" in order to avoid confusion as well as grammatical redundancy. We hams tend to refer to baud rate as meaning bits-per-second without worrying about being precise. Wisely, the rules of Part 97.69

[1]Notes appear on page 30.

limit our maximum baud-per-second rate because it is the modulation rate, not the effective bit rate, that causes rf sidebands.

The effective bit rate in the serial mode of character transmission accounts for less than maximum utilization of the bandwidth. In the case of the serial Baudot character, those *start* and *stop* bit intervals (Fig. 1A) do not convey information; rather they assist the receiving equipment in character synchronization. In particular, during the 163 millisecond (ms) period of one character time at one of the popular speeds, only five bits are transferred. Since five bits make one letter to be printed, there are 1/0.163 = 6.13 letters per second transferred. Presuming that an average word takes five letters and a space, the effective word rate is nearly one per second or about 60 words per minute (wpm). Yet, each bit time was 22 ms (1/0.022 = 45.45, rounded to 45 baud) which, if converted to bps without the lost time of start and stop times, would generate 90 wpm. Similarly, one can derive the relationship between the wpm and baud figures given in Part 97.69 for the Baudot alphabet at speeds other than 60 wpm.

The wording for ASCII section of Part 97.69 merely gives the sending speed in baud, with no correlation to wpm. Note from Fig. 1B that 110 baud is accomplished with 11 bit times per character and that 110/11 = 10 characters per second (cps). In wpm the speed is easily calculated to be 100 wpm at 110 baud. At 300 baud, using 11 elements per character, the calculations give 272 wpm.

In fact, the industry often uses just 10 bits per character at 300 baud (and above), which gives an even 300 wpm. Note that Part 97.69 does not specify the number of stop bits, and amateurs could send only one stop bit and attain that 300 wpm rate. The rub is that use of one stop bit with ASCII works well only on quiet circuits. Keeping the extra stop bit permits additional noise rejection by allowing the receiving equipment to "phase" on the two stop bits before being ready to begin another character.

ASCII

The computer industry long ago adopted forms of character representation other than Baudot. For instance, the Hollerith code was and is used for punched card data entry. IBM adopted a code called EBCDIC for data communications. Eventually, as computers and data terminals proliferated, the industry realized that a common communication code would be advantageous. A joint industry committee of the American National Standards Institute (ANSI) developed the new code, which during the 1960s became ASCII.

ASCII stands for American Standard Code for Information Interchange. Although there was an earlier version of the code, and even in the late 1970s the industry committee was looking at revising it again, the most widely used version of the code has been that adopted in the ANSI standard no. X3.4-1968. In that standard is a code table with explanatory items that break down the usages of the different characters, especially the control characters. The entire table is shown in Fig. 2.*

Implications in Use of ASCII

The ASCII standard has certain implications to the user, and certain aspects of the code are *not* standardized by ANSI STD X3.4-1968. For instance, ASCII does not imply serial only or parallel only, and it does not imply serial baud rate, bit sequencing, current or voltage levels. ASCII is only a code, a correlation of *ones* and *zeros* to particular alphanumeric control symbols.

Certain features are common between serial ASCII and serial Baudot. The start bit and one or two stop bits are used. By another standard, ANSI STD X3.15-1966, the bit sequencing on a serial circuit is defined as LSB first, MSB last, as in the old scheme. (Note: It is interesting that the FCC has stipulated ASCII per X3.4-1968 without including any reference to bit sequencing as in X3.15-1966.)

b7				0	0	0	0	1	1	1	1
b6				0	0	1	1	0	0	1	1
b5				0	1	0	1	0	1	0	1
Bits	b4	b3	b2	b1	Column → / Row ↓	0	1	2	3	4	5	6	7
	0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
	0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
	0	0	1	0	2	STX	DC2	"	2	B	R	b	r
	0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
	0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
	0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
	0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
	0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
	1	0	0	0	8	BS	CAN	(	8	H	X	h	x
	1	0	0	1	9	HT	EM	)	9	I	Y	i	y
	1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
	1	0	1	1	11	VT	ESC	+	;	K	[	k	{
	1	1	0	0	12	FF	FS	,	<	L	\	l	¦
	1	1	0	1	13	CR	GS	-	=	M	]	m	}
	1	1	1	0	14	SO	RS	.	>	N	^	n	~
	1	1	1	1	15	SI	US	/	?	O	_	o	DEL

(A)

NUL Null
SOH Start of Heading (CC)
STX Start of Text (CC)
ETX End of Text (CC)
EOT End of Transmission (CC)
ENQ Enquiry (CC)
ACK Acknowledge (CC)
BEL Bell (audible or attention signal)
BS Backspace (FE)
HT Horizontal Tabulation (punched card skip) (FE)
LF Line Feed (FE)
VT Vertical Tabulation (FE)
FF Form Feed (FE)
CR Carriage Return (FE)
SO Shift Out
SI Shift In
DLE Data Link Escape (CC)
DC1 Device Control 1
DC2 Device Control 2
DC3 Device Control 3
DC4 Device Control 4 (Stop)
NAK Negative Acknowledge (CC)
SYN Synchronous Idle (CC)
ETB End of Transmission Block (CC)
CAN Cancel
EM End of Medium
SUB Substitute
ESC Escape
FS File Separator (IS)
GS Group Separator (IS)
RS Record Separator (IS)
US Unit Separator (IS)
DEL Delete

Related Information

Note: (CC) Communication Control
(FE) Format Effector
(IS) Information Separator

Variations in Names:

DC1	"X-ON"
DC2	"TAPE"
DC3	"X-OFF"
DC4	"TAPE"
DEL	"Rubout"

Machine Variations: Slight differences may appear on keytop legends and print wheel fonts.

(B)

Fig. 2 — The standard ASCII code map at A. This information is taken from the ANSI Standard no. X3.4-1968. Pocket cards with the ASCII code are produced by the Teletype Corporation, 5555 Touhy Ave., Skokie, IL 60076. Definitions of mnemonics appear at B.

It is not obvious whether the amateur shall have to transmit the codes in the normal bit sequence. With fixed teleprinters, the code has always been sent that way. But now, with computers, and the lack of a bit sequence specification, it becomes questionable whether or not the amateur could legally change the order of bits on an agreed-upon basis with another amateur and still call it ASCII.

With seven bits in the ASCII code (Fig. 2), up to 128 different characters can be formed. No longer is the code not long enough to accommodate the number of printing characters commonly used. There are also the control characters (line feed, carriage return, reader on, reader off, punch on, punch off and others) besides lower case (non-capitalized) characters. A character with all ones called DEL (delete) "rubout" may be used to correct errors in punched tape and both DEL and NUL (all zeros) are two non-printing, nonspacing characters that may be used for transmission "fill" characters. Users of ASCII serial links will often send eight bits of code with the eighth bit, the MSB, being used for a parity bit. The basic purpose of the parity bit is to assist in error detection when characters are received through a noisy or distorting medium. An explanation of parity follows later in this article.

With ASCII, a received character, mutilated by noise, is relatively independent of all other characters, with the exclusion of a few control characters that would actuate automatic functions in some teleprinters. But there are often ways to defeat, by operator intervention, the worst of these calamities. At least there is no longer any interaction between figures and letters as there always can be in Baudot when a FIGS or LTRS character is lost.

Control Characters Provide Desirable Features

If the serious reader studies Fig. 2, he or she will note that a large number of desirable features is available with the control characters in columns 0 and 1. These are obtained by typing a normal printing key character on a keyboard while simultaneously holding down a CTRL key, a SHIFT key or both. Thus, the layout of a keyboard keyset is often done with the ASCII table in mind (the so-called ASCII keyboard pattern) so that a normal letter typed with CTRL or SHIFT on will result in the same character as that letter gives when shifted sideways in the ASCII table from its normal column to a control column. However, not all keyboard manufacturers agree on the layout of the ASCII keyboard and one can even find some with essential keys (such as carriage return) missing. More on this later.

Parity

The 1968 version of ASCII may eventually be superceded by even more modern ASCII in which all eight bits of the byte are used. In the 1968 version of ASCII, shown in Fig. 2, the reader will notice that only seven information bits are specified. Most ASCII data transmission is byte oriented; that is, eight bits are transmitted. The user sometimes has the option of transmitting only seven information bits by use of a solid-state encoder, but the modern hard-copy teleprinters are eight-bit machines (including the paper-tape punch and reader) and somehow the eighth bit must be included. The last bit position before the stop bits (MSB) is reserved for this bit if convention is followed.

There are four ways this bit may be used if present, as some form of parity. The first way is to leave the bit always at the *mark* (one) level. The second way is for the bit to always be at the *space* (zero) level. But the essence of parity is to use the bit actively as an error-detecting device. Under "even parity" the bit is made one or zero so that when all eight bits are examined for the total count of the number of one bits, the total is an *even* number (0,2,4,6,8). Under "odd parity" the sum of all the ones must be *odd*, including the parity bit in the sum (for a 1,3,5 or 7 answer).

Those owners of hard-copy ASCII terminals or ASCII paper tape punches can check their parity by punching some random letters or numbers, then adding up the number of ones (holes) in a vertical (crosswise) column punched for a single character. Some machines will be found to always punch (*mark* parity) or never punch (*space* parity) the eighth bit. If the eighth bit varies, then counting a set of bits vertically for a single character will reveal the parity of the machine. For this reason the parity bit is sometimes referred to as the vertical redundancy check (VRC) bit. (Owners of model 33 teleprinters will note that the tape must be punched in "local" to reflect the parity of the keyboard.)

Parity Bit — Something Baudot Did Not Have

The parity bit, while not part of the ASCII code itself, according to ANSI STD X3.4-1968, is something new that Baudot did not have. With ASCII and parity bits on serial RTTY circuits, amateurs can use the parity bit to single out received characters with single (or odd numbers of) errors as a result of noise hits or fading or distortion. Characters with parity errors, on computers or "smart" terminals, can be rejected or at least "flagged" as having errors. Unfortunately, two (or an even number of) errors in a single character cannot be detected with parity checking on an isolated character-by-character basis. Statistically, far fewer errors occur where two bits are wrong than where only one bit is wrong.

However, that is about as fancy as one can go with error checking on the typical RTTY circuit where the characters are received as isolated units of eight bits. Furthermore, after a character is received wrong, for any reason, the rest is history. Only the more enterprising amateurs with more elaborate computers will be able to add up whole blocks of characters, test for other forms of checksums and automatically request retransmission of bad blocks. This protocol procedure of course has been followed in the telecommunications industry for years and is where the amateur begins to be involved in "packet" data transmission.[5]

Stop Bits

At one of the most common Baudot speeds the duration of a single bit is 22 ms (Fig. 1A). The stop interval at this speed is 31 ms, about 1.42 bit times.

In ASCII serial transmission, in the asynchronous mode, the stop interval lasts either one or two bit times which may be called *stop* bits. Model 33 style teleprinters will require two stop bits at 110 baud, whereas solid-state equipment (computers, thermal printers, etc.) running at 300 baud or more may use only one stop bit. The use of ASCII with two stop bits for RTTY may become standard, but the amateur is not restricted from receiving and decoding only one stop bit. The timer interval for the second stop bit can then be used in solid-state equipment to perform other functions (in programs) or used to check that the start bit is not coming too soon (wrong baud rate). Skipping the second stop bit is not a decision to be made lightly as noise tolerance is reduced at the same time.

UARTs

Frequently the amateur will find that acquisition of a hard-copy ASCII teleprinter (model 33 or similar) is more difficult or expensive than building up a video display device (glass teletype) or CRT terminal. Often new video terminals will cost less than new teleprinters and there are numerous kits and construction articles available.

The computers often use program software to decode the ASCII characters (and obviously can then be programmed to interpret 5-level code as well). Both computers and video terminals may use a hardware device instead of software to decode serial characters. These devices are integrated circuits with names like UART (universal asynchronous receiver-transmitter) or USART (universal synchronous-asynchronous receiver-transmitter) or other microprocessor family related names. These MOS devices, when driven by a stable TTL logic-level clock, can receive and send characters "like a teleprinter" and can also check for illegal parity such as wrong number of stop bits, missed characters, or wrong baud rate.

Therefore, they are very useful in computers and video terminals and hard-copy high-speed printers. Some can even handle 5-level code when suitably selected and controlled. *Voilà!* Instant mode and baud-rate switching is available without gears or jammed carriages. Unfortunately, UARTs do not provide hard copy printout by themselves and must be used inside more-involved equipment. Neither do video terminals usually provide hard copy output and many times the amateur must have that final result. The difficult decision of what to use to build up an ASCII terminal will be left to the individual amateur. The following information is provided to help in locating resources.

Source Material and Hardware

It is not the purpose of this article to suggest particular equipment, hardware or integrated circuits for purchase or vendors of the same. The decision of what to purchase to implement ASCII in the shack is left up to the reader and possibly other authors. Table 2 is offered as an aid. The categories of parts there must, however, indirectly infer the vendor or manufacturer sources; but no preference is implied or expressed. The lists of Table 2 are also not intended to be all-inclusive or discriminatory.

Table 2

Source Material and Hardware

ASCII Standards
- Code — American National Standards Institute
  X3.4-1968
- Bit Sequencing — American National Standards Institute
  X3.15-1966
- Parity — American National Standards Institute
  X3.16-1966

Software, Computers
- TRS-80®
- Apple-II®
- North Star®

Books, Magazines, Manuals
- *BYTE*
- *Interface Age*
- Manuals (User's)
  - 6502
  - 6800
  - 8080
  - Z80
- *Specialized Communications Techniques*, ARRL, 1975 (no longer available from ARRL). See the 1981 *Handbook*.
- *TV Typewriter Cookbook* by Don Lancaster, Howard W. Sams and Co., 1976.

Integrated Circuits (UARTs)
- TR1602A
- AY-5-1013
- S1883
- MC 6850
- I8251A

Hard-Copy Printers
- Model 33 Teletype®
- Silent-700®

Application Hints

When looking for a model 33 Teletype, the amateur should seek out used, preferably rebuilt and tested units from used-equipment houses, possibly computer stores, even from classified advertisements. Some used equipment that has not been reconditioned is available from telecommunications industry outlets. Be sure to obtain manuals (three for the ASR 33) and learn how to connect to the input/output connector. Ask for help from a knowledgeable friend, amateur or computer hobbyist if any uncertainties appear.

There are several variations of the ASR (automatic send receive) and KSR (keyboard send receive) models of the model 33 series. These variations have relative advantages and disadvantages depending on the application. These variations or options are:

1) Keyboard parity: Even or mark (popular).

2) Current loop: 20 mA or 60 mA (internal strap).

3) Automatic form feed: On reception of CTRL-L or none (not installed).

4) Paper: Roll or fanfold.

5) Paper feed: Friction or sprocket feed.

6) Print wheel: Many variations (consult manual).

7) Tape reader: Automatic start/stop with character control (DC1, called X-ON; DC3, called X-OFF), *or* reader relay driven by extra pair of wires in input/output connector, *or* manual start/stop.

8) Tape punch: Automatic start/stop with character control (DC2, DC4), *or* automatic start/stop with lock-on feature controlled by operator, *or* manual start/stop.

9) Printer stand: Extra.

10) KSR-33: No paper-tape equipment attached.

11) No option items: 110 baud, oil punch tape (1 inch or 25.4 mm wide).

The serious enthusiast who is looking for a solid-state ASCII keyboard is usually in the market for an assembly or kit with an ASCII keyboard keyset, a printed-circuit board, a keyboard encoder integrated circuit and miscellaneous parts. The finished assembly will give a parallel output byte with strobe (upon key depression) to external smart logic or, in the case of video terminals, perhaps to character generator logic. The external logic will reformat the parallel information into serial output to an RTTY modulator. The external logic can be relatively simple and include a UART or it may be a whole computer system.

It is important for the reader to understand that such solid-state keyboards do have variations from manufacturer to manufacturer, as mentioned above. Some keyboards (such as the author's) do not, for some reason, contain all the desired keys or even necessary ones (in this case the carriage return key). If the reader is "stuck" with one of the these, he should note that the flexibility of the ASCII code, with CTRL and SHIFT variations, may often be used to work around the problem. For instance, CTRL J is really an LF (line feed) character; and CTRL M is in reality a CR (carriage return). Some keyboards may have something like a "new line key" which the user will test and find is actually CR.

In short, to make full use of ASCII, the user will find that keeping an ASCII table around is as vital as having his other handbooks and operating guides. The serious experimenter should plan on studying the ASCII table until he or she understands it fully. ASCII, the language of the computer and the heart of data communications, is now becoming the focal point of amateur RTTY.

APPENDIX

Although there are other ways of defining information elements besides binary, the binary mode is most perfectly suited for the switching actions of teleprinters and computer equipment. "Binary" stands for a number system based on powers of two, similar to our decimal number system which is based on powers of 10. In number systems, the base or radix (2 for binary, 10 for decimal) is not one of the allowed digits. There is no special symbol for 10 in the decimal number system. The allowed symbols are 0 through 9 for a total count of 10 symbols, with the number 10 being formed from combining 0 and 1. Likewise, in the binary number system there are just two symbols, neither of which is 2. They are 0 and 1. To make 2 in this system (this is the same as binary 10), the construction used is $1 \times 2^1 + 0 \times 2^0 = 10_2$. You can say "binary 10" or "decimal two" and mean the same thing. There is even "octal 10" (decimal 8) in base 8 and "hexidecimal 10" (decimal 16) in base 16, but that is outside the scope of this article. QST

Notes

[1]Former demodulators may have to be retuned for increased baud rate and/or wider carrier shift if 200-Hz shift becomes standard.

[2]Henry, "ASCII, Baudot and the Radio Amateur," *QST*, September 1980, pp. 11-16.

[3]See note 2.

[4]As explained in the Henry article, baud rate = 1/time of unit pulse.

[5]See "The New Baud Game," Technical Correspondence, *QST*, August 1980, p. 39.

[6]See Table 2 in the Henry article or *The Radio Amateur's Handbook* (1981), p. 14-26.
But, as Henry points out, they cannot be corrected. (See note 2.)

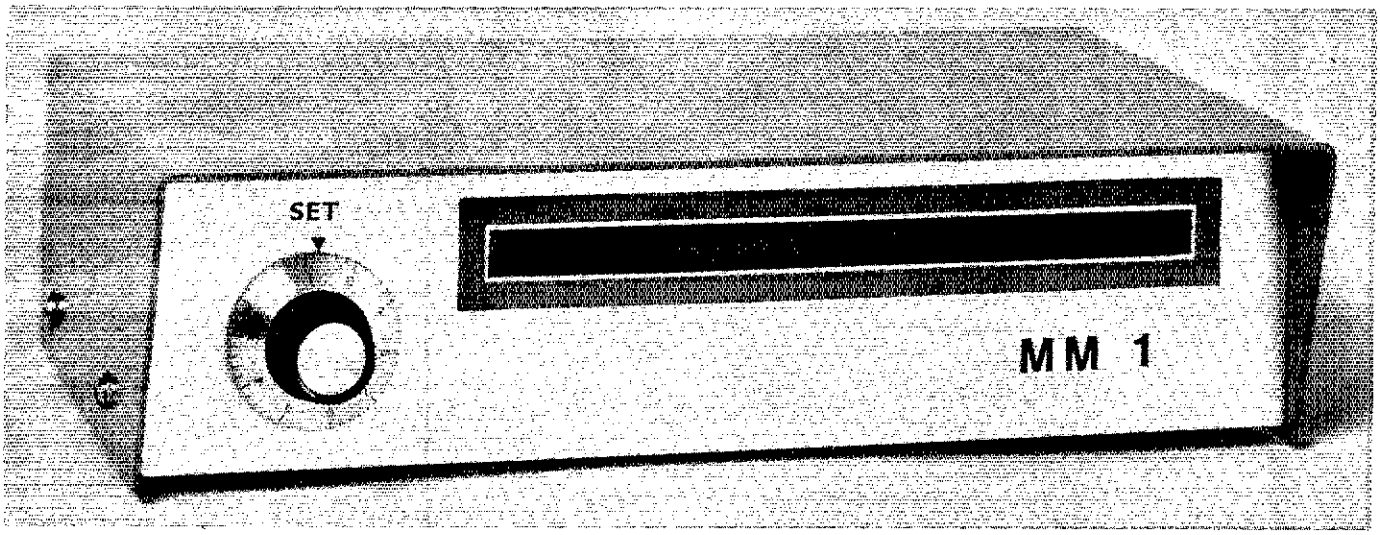
[7]See "An Introduction to Packet Radio," by Jan Hodgson, VE2BEW, *Ham Radio*, June 1979, p. 64.

[Editor's Note: Other information on ASCII may be found in the following material: *The Radio Amateur's Handbook* (1981), Chapter 14; "FM/RPT," *QST*, Feb. 1980, p. 83 and *QST*, April 1980, p. 70; "Happenings," *QST*, April 1980, p. 74.]

A Peak-Reading Bar-Graph Meter for SSB Transmitters

Step up to the bar! Put a little light on the subject of metering with this eye-catching and functional unit.

By Eric Kirchner,* VE3CTP



There's very little that's more annoying than having a DX 'phone contact ruined by an improperly adjusted transmitter operating on a neighboring frequency. In recent years, there has been an increase of such occurrences, possibly caused through the misuse of speech processors. Usually, this kind of QRM is quite unintentional and stems from the fact that many amateurs have no means of knowing when the transmitter final stage has reached the maximum point of linear operation. When this plateau is exceeded, the final amplifier becomes a clipper, which generates square waves (flat-topping). These square waves produce undesirable modulation distortion products (splatter) on either side of the main signal. Splatter can be traced to other sources, but in most cases it is caused by overmodulation.

But My Meter Says . . .

Because of their mass, ordinary moving-coil meters cannot follow the fast amplitude changes of the human voice. The amateur who does not realize this fact is surprised to see that after he has loaded the final amplifier stage of his transmitter to, say, 250 mA of plate current in the cw mode, the meter reads only 125 mA on ssb voice peaks. So the operator increases the mike gain until the meter again reads 250 mA on voice peaks. Without an oscilloscope connected to the transmitter output, he will not be able to see that his signal is now severely "flat-topping."

A rule of thumb was once established saying that the final amplifier plate current meter (or collector current meter) should display half the indicated steady carrier value on voice peaks. However, meters differ from one another in response time. Also, some have shunts connected in parallel with the movement, which further tends to dampen the meter action.

One way out of this dilemma is to eliminate reliance on the conventional milliammeter and use a peak-reading electronic bar-graph indicator such as the one described here. The recent appearance of two semiconductor devices simplifies the construction of such an indicator. One of these devices is the National Semiconductor LM3914,[1] and the other is a single dual-in-line package of 10 LEDs, the RBG-1000, which is manufactured by Litronix.

The LM3914 contains a series of 10 comparators, a ladder resistor network, a reference voltage regulator, 10 current sources to directly drive 10 LEDs, and an input buffer with a fairly high input impedance. Several LM3914s can be connected in series to drive up to 100 LEDs. For more detailed information on this device, consult the National Semiconductor Data Book.

The Circuit

The unit described here was designed for use in 50- or 75-ohm systems with an SWR of 3:1 or less. It is useful within a power range of 50 to 2000 watts, but the range can be changed to lower power

*2 Adirondack Gate, Agincourt, ON M1T 3E7

[1]Notes appear on page 33.

operation by decreasing the value of R1 (see Fig. 1).

The connectors J1 and J2 shown in Fig. 1 are connected to the coaxial feed line from the antenna and to the station transmitter or transceiver. The rf voltage present at the center conductor of the connectors is stepped down by a resistive divider R1-R2.

R2 is a carbon or conductive plastic potentiometer. It permits full-scale adjustment of the bar graph indicator. The stepped-down rf is coupled through C1 to the voltage doubler rectifiers, D1-D2 and the resulting dc is filtered by C2, RFC1 and C3. C3, in combination with R3, determines the decay time of the indicator. From this point, the dc voltage is fed to the buffered inputs of the LM3914s (U1 through U5). Without any rf at the input, the first LED of DS1 (connected to pin 1 of U1), will light when the unit is switched on. This serves as a POWER ON indicator.

Construction

The accompanying photographs show the layout and construction of the unit. Except for the connection between the center pins of J1 and J2 (which should be

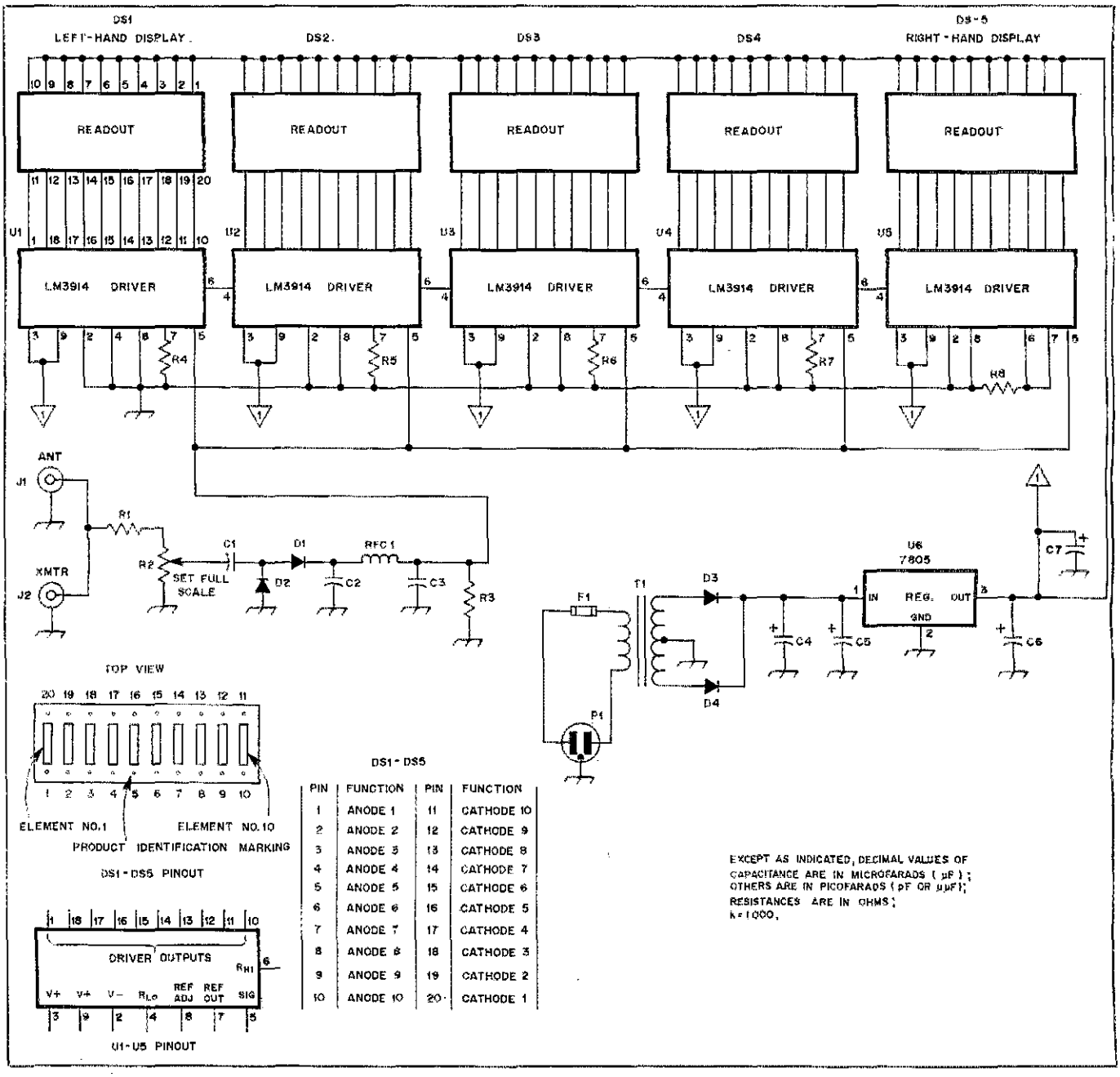
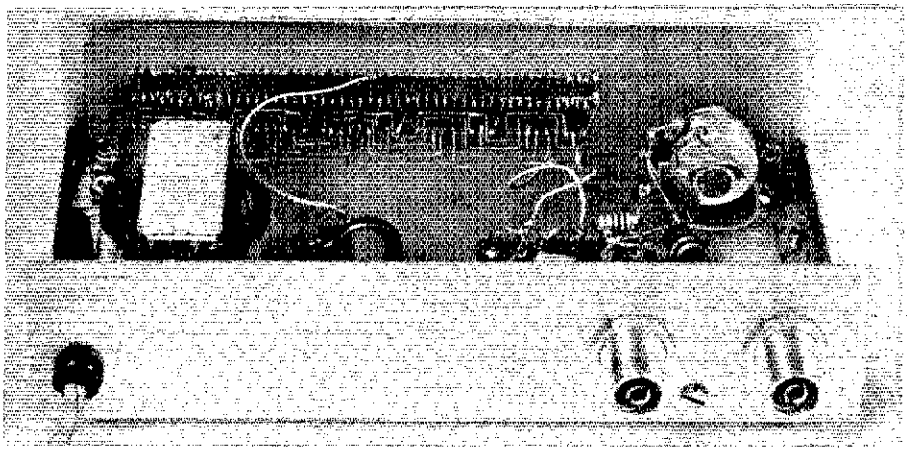


Fig. 1 — Diagram of the peak-reading bar-graph meter. Rf appearing at J1-J2 is sampled, rectified and used as the input voltage for the LM3914s. Pin connections for each driver-readout combination are the same as for U1-DS1.

C1 — 0.01 μF, 500-V disc ceramic.
C2 — 0.033 μF, 50-V disc ceramic.
C3 — 0.1 μF, 50-V disc ceramic.
C4 — 1500 μF, 16-V electrolytic.
C5, C6 — 1 μF, 35-V Tantalum.
C7 — 22 μF, 16-V Tantalum.
D1, D2 — Silicon, fast-switching, 100 PIV, 1N4148 or equiv.
D3, D4 — Silicon, 1 A, 300 PIV, 1N4003 or equiv.
DS1-DS5, incl. — Litronix RBG-1000 LED readouts.
F1 — MDL 1/8-A fuse.
J1, J2 — SO-239 coaxial receptacle.
P1 — Three-conductor ac plug.
R1 — 47-kΩ, 1/2 watt.
R2 — 5-kΩ, 1/2 watt carbon potentiometer, linear taper.
R3 — 220-kΩ, 1/2 watt.
R4-R8, incl. — 1-kΩ, 1/2 watt.
RFC1 — 1 mH, low-current type suitable.
S1 — Spst toggle switch.
T1 — 117-V ac primary, 16-V ct at 0.5-A secondary (Hammond 166G16 or equivalent).
U1-U5, incl. — National LM3914N dot/bar display driver.
U6 — 5-V, 1-A, three terminal positive regulator, 7805 or equiv.



The two jacks at the rear of the unit are used for connection to the transmitter and antenna, and are interchangeable. Although the author used unclad circuit board in this unit, a drilled pc board which provides mounting holes for the rf rectifiers, filters and R2 is available, with instructions, from the author for $12.50; a money order is preferred. The ARRL and *QST* in no way warrant this offer.

as short as possible), the placement of parts is not critical.

The circuit board was first laid out on 0.1 inch (2.54 mm) graph paper using a lead pencil. Then the paper was taped to a piece of unclad circuit board material and used as a template. All hole locations were punched with a center punch, after which the graph paper was removed and the punch marks drilled with a number 60 bit. IC sockets were then installed and the socket pins interconnected using small-diameter wire (one strand of no. 22 stranded wire). With careful layout, no wire crossings are necessary. Only DS1 through DS5, U1 through U5, and resistors R4 through R8 are mounted on the board. The rf rectifier and filter components are soldered to a teminal strip which is fastened to the chassis. C5 and C6 should be soldered directly to the pins of U6. It is important that the housing and shaft of R2 are at ground potential.

Operation

Connect the unit between the antenna feed line and transmitter. Turn the meter on and set R2 to the full counterclockwise position. With the transmitter operating at maximum power in the cw or tune mode, adjust R2 so that the last LED (the one at the extreme right side) just barely lights up. Now set the transmitter mode switch to either usb or lsb and adjust the mike gain control so that the last LED *never* lights up, even on voice peaks. This will ensure that the final amplifier will never flat-top. Should the indicator remain at full scale or part way up the scale, it is an indication that the carrier suppression of the transmitter may be insufficient or a parasitic oscillation may be present. With this bar-graph meter operating at your station, you can be sure *you* won't be an annoying neighbor to those on nearby frequencies. QST

Notes

[Editor's Note: An in-depth look at the LM3914 may be found in *CQ*, May 1980, pp. 85-86.]

Strays

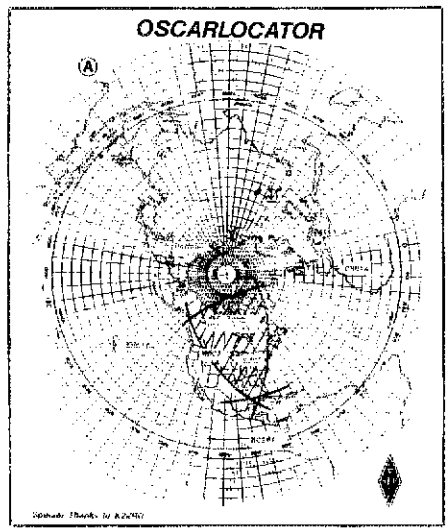
FIRST WAC VIA SATELLITE

All Nick Laub, WØCA, needed for a challenge was someone to say, "You can't work all continents via satellite." For a veteran like Nick, who has been licensed for over 50 years, it didn't take long to plot a satellite track of the six continents to Backus, Minnesota. Once it was determined that it *could* be done, Nick completed the feat in 13 months using only 10 watts of power.

When the last QSL card was received, Nick called ARRL headquarters with the news. Nick said he was sending the cards and wanted them checked to see if he qualified for the IARU WAC award. When the records and cards were checked, it was found that no one had ever worked all continents via satellite; in fact, no one thought it could be done.

Immediately after plotting the track on an OSCARLOCATOR, it was found that a long narrow area did exist from about 25° to 75° north latitude (see polar map). This was found by drawing an arc of 4900 miles, maximum range for AMSAT-OSCAR 7, from each of the six station locations that Nick contacted.

The next thing discovered was that there were no endorsement provisions for satellite WAC. ARRL General Manager/IARU Secretary Dick Baldwin, W1RU, and Hal Steinman, K1FHN, Manager of the Membership Services Department, which administers the IARU award, both agreed that a special first WAC "Via Satellite" award should be made, with provision that all future awards be restricted to satellites orbiting no greater than 1500 miles in altitude.



Drawing a 4900-mile arc (3-1/4-inch radius on OSCARLOCATOR) from each of the distant continent boundaries will determine if you are in the satellite WAC zone for AMSAT-OSCAR 7 operation. For AMSAT-OSCAR 8 the range would be approximately 4000 miles (2-3/4-inch radius on OSCARLOCATOR).

Nick Laub, WØCA, has earned the first "WAC Via Satellite" award. Congratulations, Nick!

Nick received his award at the recent AMSAT annual meeting. IARU/ARRL hq. is planning to issue special plaque awards, like Nick's, to the first 10 amateurs qualifying for the IARU WAC via satellite endorsement. *It can be done!* Who will be number two? — *Bernie Glassmeyer, W9KDR*

A Variable Frequency Crystal Oscillator

What can be done about the trade-off between the frequency range and stability of oscillators? The W3MT VXO, designed to generate a rock-steady signal, offers a practical solution to that exchange.

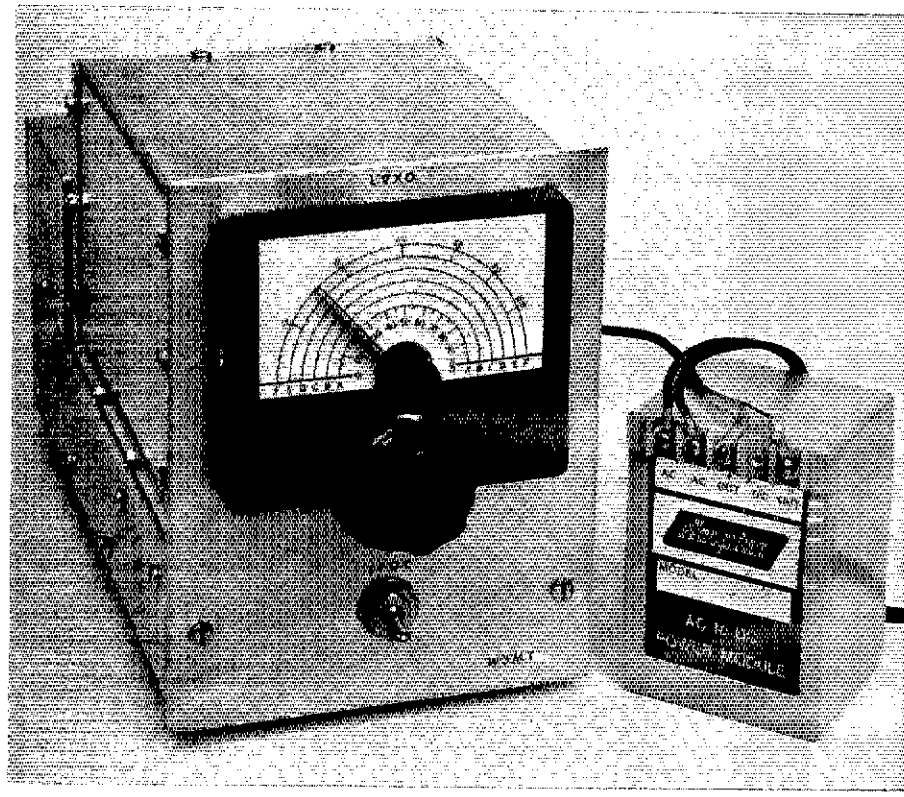
By Frank Noble, MEE,* W3MT

Variable-frequency crystal oscillators (VXOs) are found today not only in Amateur Radio equipment but also in commercial and military communications devices. The stability and resetability of VXOs justify application to equipment designed specifically for these services. For the radio amateur, a VXO solves the crystal/VFO problem at once. Additionally, the use of the VXO provides instantaneous frequency change to any part of a band.

The "rubber crystal" of the 1930s set the stage for the modern VXO. That device of a bygone era enabled the operator to move the crystal frequency a few "kc" by means of a variable pressure control mounted on the crystal holder. Contemporary VXOs, with more sophisticated circuitry, represent an appreciable improvement over the rather simple variable unit of the 1930s.

As the radio amateur approaches the task of designing a VXO, the project should be considered in its entirety. The objective in VXO planning is to design a variable crystal oscillator that not only can be adjusted to the exact frequency, but also to wind up with a unit in which the overall effectiveness is maximized, including a high degree of stability. An accepted manufacturing tolerance is of the order of 20 Hz per MHz. Such a tolerance is not likely to be obtained without careful design and good construction. A significant factor in developing a stable VXO is the coil design. This component is a major element in the determination of the operating frequency.

Although the frequency of a quartz-crystal oscillator can be varied over an appreciable range by connecting variable reactances in series with a crystal, generally this results in a compromise between frequency range and stability. The purpose of this article is to impart an understanding of that compromise. Pertinent equations and results in graphical form are aimed toward this end.



The W3MT variable crystal oscillator with power supply. Contained in the large Minibox directly behind the dial is the shielded frequency-determining circuit. A small shielded box at the rear, protecting Q3 and the output filter, keeps heat away from critical circuits. The spot switch, S1, is located below the dial.

A Thousand Times Better Stability

An amateur is not likely to go to the trouble of designing and building a VXO without being convinced that such an oscillator is far more stable than an induc-

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tively controlled oscillator (LCO). As will be shown graphically later in this article, the CVXO (capacitively tuned variable crystal oscillator) has a minimum stability rating that is 1000 times that of an LCO.

As a means of ensuring a greater amount of stability, the amateur who chooses to capacitively tune a variable crystal oscillator will not go wrong. The reason is that the stability advantage is mathematically at least 1000. On the other hand, an inductively tuned crystal oscillator (LVXO) leaves something to be desired from the standpoint of stability. Under some circumstances, an LCO may prove far more stable than an LVXO.

Crystal Behavior

A quartz crystal is an electromechanical unit that vibrates. It behaves much like a resonant L-C circuit similar to that shown in Fig. 1. More properly, an oscillating crystal may be thought of as a tuned circuit consisting of inductance, capacitance and resistance in series. As in the illustration, there will also be some shunt capacitance. The resistance R is that offered mainly by the crystal through electro-mechanical action. This R value is small in comparison to the inductive reactance at the operating frequency.

Another concern in the design of a crystal oscillator is the impedance of the oscillator. At frequencies lower than resonance, the oscillator network displays a high impedance and is essentially capacitive. As the oscillator is adjusted above resonance, the net reactance of the inductive part of the circuit is determined by calculating the difference between the reactance of L and that of C.

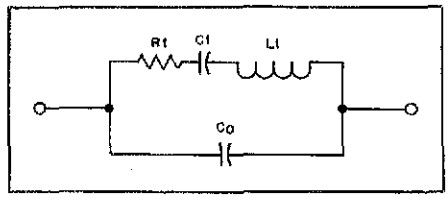


Fig. 1 — A resonant circuit equivalent to that of a quartz crystal resonator.

Whenever power is taken from an oscillator, there is bound to be some effect upon the stability of the circuit. In regard to circuit stability, consideration must be given to the load impedance which significantly affects crystal oscillator performance.

Stability Defined

Inasmuch as we are concerned here with stability, providing a definition of this term seems appropriate. Simply stated, the degree of stability is the percentage change in the load reactance required to produce a given percentage change in frequency. In an academic sense, this is a fair measure yielding useful comparisons.

This definition is unfair to the CVXO, nevertheless. In the real world, capacitors are much more stable than coils. Therefore, the CVXO will, in reality, perform even better than may be predicted in

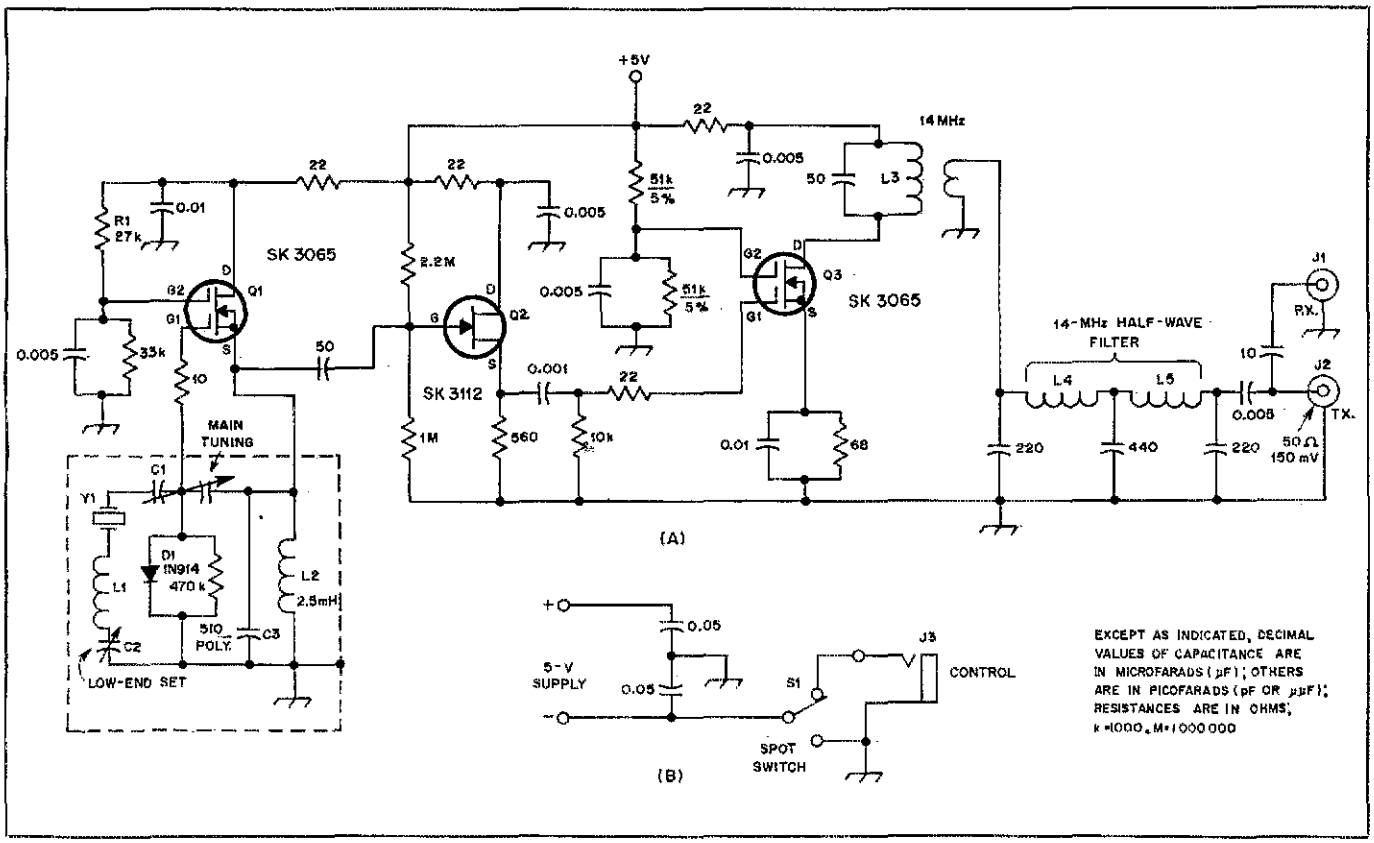
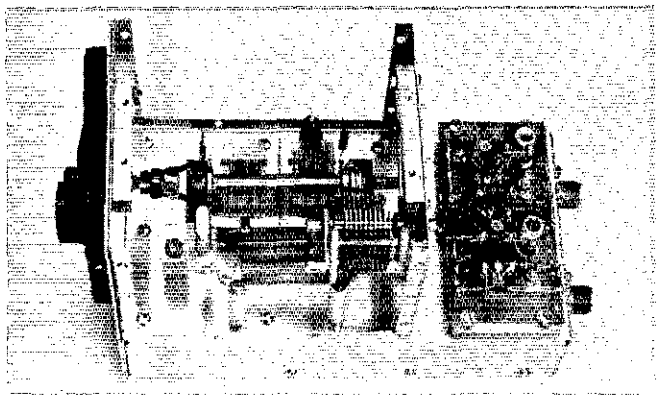
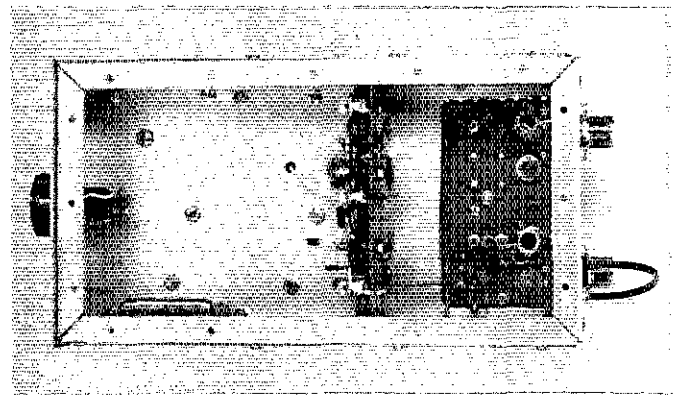


Fig. 2 — The W3MT variable-frequency crystal oscillator. This circuit is designed to provide a high degree of stability. A spotting-switch arrangement is shown at B. Power is provided by an external regulated supply. The control jack, J3, allows the oscillator to be energized from the station T-R switch by completing the connection from the negative lead to ground when transmitting. The spotting switch is for setting the oscillator on frequency when the transmitter is turned off.

C1 — Main tuning capacitor, dual 140 pF with midline plates, Hammarlund no. MCD-140-M or equiv.
C2 — Air-variable capacitor, 140 pF.
C3 — 510 pF, polystyrene.
D1 — Silicon planar diode, general purpose, 1N914.
J1, J2 — SO-239 coaxial connector.
J3 — Open-circuit phone jack.
L1 — Barker and Williamson Miniductor no. 3004, 1/2 inch dia, 32 tpi, 2 inches long, no. 24 wire, 12 μH.
L2 — Rf choke, 2.5 mH.
L3 — Slug-tuned ceramic coil, 3/8 inch, Miller no. 4404, 1.6-3.1 μH range set for 2.6 μH. Link 2 turns of hookup wire wound over cold end of tuned coil.
L4, L5 — 6 turns of hookup wire wound on the same type form as L3, 0.57 μH. See text for adjustment information.
Q1, Q3 — Silicon n-channel depletion dual-gate MOSFET rf amplifier, RCA SK3065 or equiv.
Q2 — Silicon n-channel depletion mode small-signal low-noise af amplifier junction transistor, RCA SK3112 or equiv.
Y1 — Quartz crystal, partially plated AT-cut, fundamental mode, type HC6/U, 14,030 kHz, 32 pF. Available from JAN Crystals, 2400 Crystal Dr., Fort Myers, FL 33907.



A view of the topside of the W3MT VXO chassis. The shaft of C2 projects through the rear of the shield box. Viewed from the front, the circuit board contains (left to right) Q3 and jacks J1 and J2. The control jack, J3, is below J2.



The bottom side of the W3MT VXO. Viewed from the front (left to right), Q1 and Q2 are mounted on a vertical circuit board placed below the rear edge of the large shield box, keeping the oscillator leads short but providing good thermal isolation.

theory. We can safely say that the CVXO is the arrangement of choice for situations where the crystal cost is not an object.

The W3MT Variable Crystal Oscillator

Although this article is mainly intended to be tutorial in nature, the circuit of the complete W3MT VXO is included for the benefit of those *QST* readers who may be interested in the design and construction. (The remaining theory related to VXO design follows in appendix form.)

As you may see by observing the circuit diagram (Fig. 2) the complete circuit is more than just a basic variable oscillator. In order to isolate the oscillator from the transmitter, as a means of avoiding the effect of load changes, buffers are provided.

A dual-gate, n-channel MOSFET (Q1), an SK3065, serves as the signal generator. C1, the main tuning capacitor, is adjustable over the frequency range of 14.000 MHz to 14.025 MHz. It may be rotated over a mechanical range of 15 to 85 percent of the full travel. The gain, adjustable upward by decreasing R1, should be just sufficient for reliable starting. The purpose of C2 is to adjust the low-frequency extreme to exactly 14.000 MHz. In the event of low crystal activity or low transconductance in Q1, the oscillator may be encouraged to start by decreasing C3 to not less than 300 pF or by increasing the drain voltage. Components in the shielded enclosure should be mounted rigidly, with special care given to the lead from gate 1. A ceramic feedthrough insulator is highly recommended for this purpose.

Q2, a source-follower buffer, is very effective in isolating the oscillator from the load changes which may occur in the circuitry that follows.[1] Q3, a tuned voltage amplifier, has a gain of 50. It is the tuned

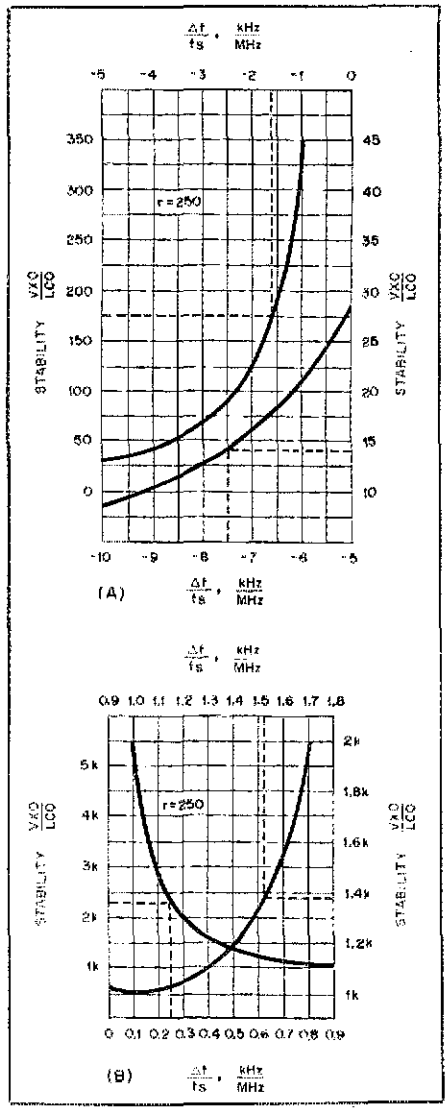


Fig. 3 — The graph at A represents the stability ratio of an inductance-loaded crystal oscillator to the common L-C oscillator vs. scaled frequency deviation below series resonance. At B the stability ratio of the capacitance-loaded crystal oscillator to the common L-C oscillator vs. scaled frequency deviation above series resonance is shown.

circuit that enables Q3 to produce a large amount of gain in addition to ensuring a good waveform at the output. A link winding on L3 matches Q3 to 50 ohms. Following the link is a dual pi-section, half-wave filter for harmonic attenuation. (Coils L3 through L5 should be separated at least 1-1/2 inches (38 mm) to minimize mutual coupling effects).

L4 and L5 are adjusted initially by connecting a 220-pF capacitor across the isolated coil and dipping the resulting parallel circuit at 14 MHz. The slugs in these coils are locked into position. Tuning of the output circuit is performed with the slug in L3.

Frequency spotting has not been overlooked in the circuit design. S1 and an external control via J3 provide the means for this.

You might ask, "May this circuit be keyed?" The answer is yes, but it is not recommended. As oscillator keying goes, this oscillator keys well, but there is a detectable chirp. In the writer's opinion, a heterodyne system with mixer keying is *the* satisfactory way to work break-in.

Power Supply and Enclosures

A 5-volt regulated power supply furnishes the operating voltage for the W3MT VXO. I mount this Acopian no. 5EB250 unit externally to the main chassis as you might gather from the accompanying photograph. The VXO demands only 15 mA, a modest amount easily supplied by the power unit.

For the chassis, a Bud no. AC-403 enclosure is well suited for accommodating the VXO. This Bud product has dimensions of 5 × 9-1/2 × 2 inches (127 × 241 × 51 mm). The oscillator shield box, also a Bud product, is model CU-3007-A which measures 6 × 5 × 4 inches (152 × 127 × 102 mm). A piece of 1/16-inch (1.6-mm) aluminum with dimensions of 5-1/8 × 6-1/2 inches (130 × 165 mm) serves as the front panel. A

[1] Notes appear on page 37.

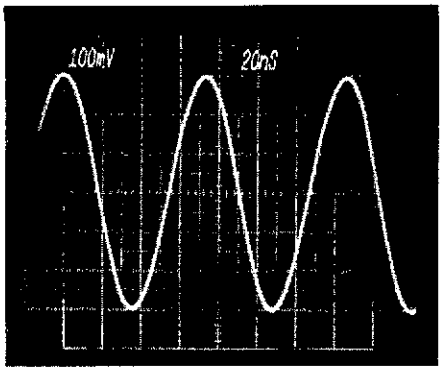


Fig. 4 — A smooth sine wave pattern is observed when an oscilloscope is connected to the VXO output. Filtering provided in the VXO circuit suppresses harmonic output and maintains spurious responses at an acceptable level.

small shield at the rear is homemade, being constructed also from aluminum. Measurements for the shield are 2-1/4 × 3 × 5 inches (57 × 76 × 127 mm). A Minibox is available that is a suitable substitute. For the dial, a Millen no. 10039 was chosen.

Performance

As is the case with any oscillator, the stability will improve with the quality of components and the mechanical construction. For a given amount of care in this regard, this oscillator should out-perform an LCO by a factor of at least 100. See Fig. 3. A sample of the sine-wave output as observed on an oscilloscope appears in Fig. 4.

The model presented here was tested against a tube-type frequency standard having a 7000-kHz FT-243 crystal without temperature control but with Zener regulation. Since the low-frequency extreme of the LVXO is its least stable setting, this is a severe test. The beat at 14.000 MHz remained within 10 Hz for a half hour. It is unclear, however, which oscillator was drifting. We conclude that this particular LVXO, in its worst situation, is approximately as stable as a run-of-the-mill crystal oscillator.[2] QST

Notes

[1]The load isolation provided by Q2 and Q3 is sufficient to prevent *any* frequency change when the 50-ohm output is keyed from open circuit to short circuit.

[2]A detailed mathematical analysis of the VXO has been prepared and copyrighted by the author. Library of Congress card no. TX 243-015.

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"A TTL Crystal Oscillator," *QST*, February 1974, p. 34.

Lisle, "The Tunable Crystal Oscillator," *QST*, October 1973, p. 30.

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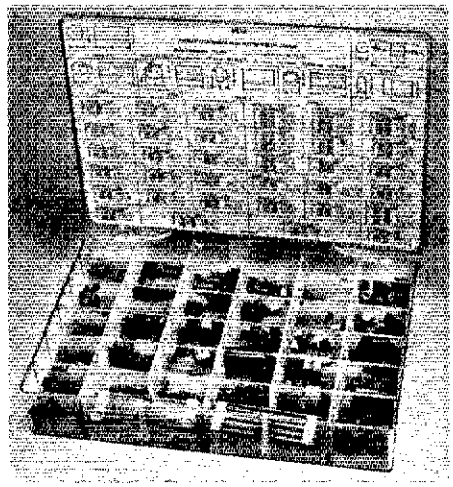
New Products

FAIR-RITE JOULE BOX

☐ In case you've forgotten the definition of "joule," it's the energy expended in 1 second when a current of 1 ampere is flowing through 1 ohm of resistance. So you're perhaps wondering, "What's a Joule Box?" In our opinion, it's an experimenter's dream, if he or she likes to work with magnetic-core materials. Fair-Rite Products Corp. has put together a broad variety of ferrite core devices that today's amateur should find ideal for workshop and laboratory exercises in rf design.



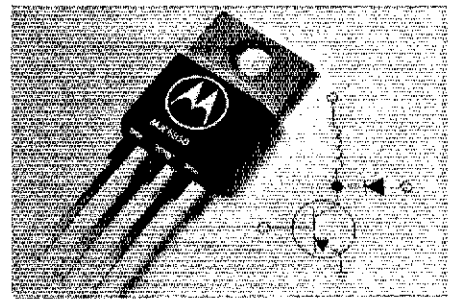
The plastic box is divided into 34 compartments, and each contains a collection of different ferrite cores. There are toroids, sleeves, balun cores, choke forms with pigtails and beads. The inner lid of the Joule Box contains detailed information that describes the contents of each compartment. This includes the part number, dimensions and type of ferrite material. The outer cover of the box lists the initial permeability, gauss, maximum permeability, Curie temperature, volume resistivity and H_C in oersteds.

Amateurs and professionals who like to design and build their own solid-state rf equipment should find the Joule Box as useful as their VOMs and other essential workbench accessories. Additional information on the core material, plus application notes, can be obtained from Fair-Rite's 92-page catalog, *Fair-Rite Ferrite Cores and Assemblies for the Electronics Industry*. Single-lot factory-direct price for the Joule Box is $20, postpaid. It is available also from Fair-Rite distributors for the same price, plus shipping charges. The company address is Fair-Rite Products Corp., Wallkill, NY 12589. — *Doug DeMaw, W1FB*

MOTOROLA PNP HIGH-VOLTAGE POWER TRANSISTORS

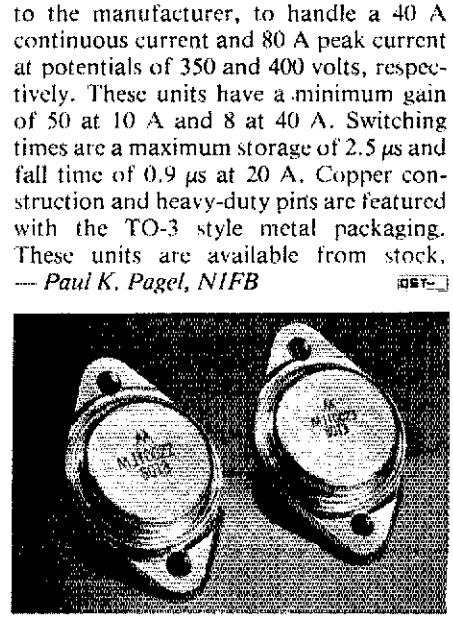
☐ The MJE5850, MJE5851 and MJE5852 are three new high-voltage pnp power transistors introduced by Motorola. These TO-220 plastic-packaged devices have a continuous current rating of 8 A and can handle peak currents of 16 A with $V_{CEO\ (sus)}$ ratings of 300, 350 and 400 volts, respectively, with a power dissipation rating of 80 watts. These units are designed of inductive switching circuits where fall time is critical. Some applications include use as switching regulators, inverters, solenoid and relay drivers, motor controls and in deflection circuits.

This MJE5850 series features fast turn-off times, with 100 ns inductive fall time at 25° C (typ) and 125 ns inductive crossover time at 25° C (typ). The operating temperature range is −65 to +150° C. These devices are complementary to the MJE13006 and MJE13007 npn transistors. — *Paul K. Pagel, N1FB*

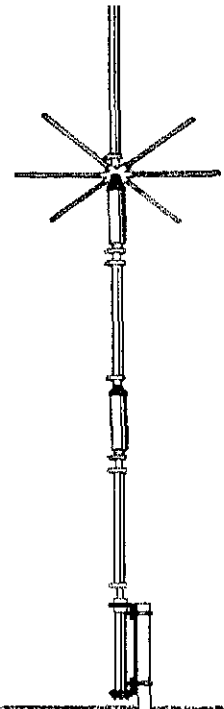


MOTOROLA POWER DARLINGTONS

☐ The MJ10022 and MJ10023 are two new Motorola npn power Darlington transistors. They are designed, according to the manufacturer, to handle a 40 A continuous current and 80 A peak current at potentials of 350 and 400 volts, respectively. These units have a minimum gain of 50 at 10 A and 8 at 40 A. Switching times are a maximum storage of 2.5 μs and fall time of 0.9 μs at 20 A. Copper construction and heavy-duty pins are featured with the TO-3 style metal packaging. These units are available from stock. — *Paul K. Pagel, N1FB* QST

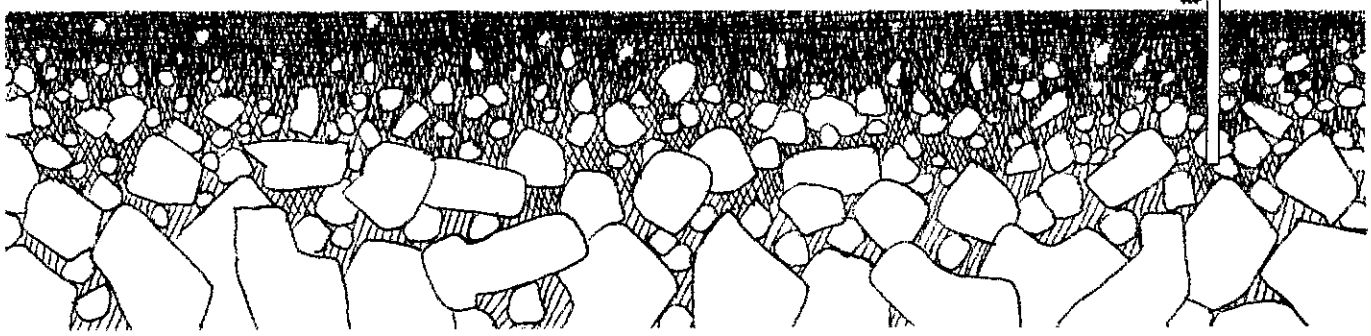


Measuring Soil Conductivity†



Two parameters have the most effect on the efficiency of a vertical monopole — the size of the radial system, and soil conductivity in the vicinity of the antenna. This simple test setup can be used to measure soil conductivity.

By Jerry Sevick,* W2FMI



An important parameter for vertical antennas is soil conductivity. The conductivity of the soil under and in the near vicinity of the antenna is most important in determining the extent of the radial system required and the overall performance. Short verticals with very small radial systems can be surprisingly effective.

Soil Conductivity

Most soils are nonconductors of electricity when completely dry. Conduction through the soil results from conduction through the water held in the soil. Thus, conduction is electrolytic. Dc techniques for measuring conductivity are impractical because they tend to deplete the carriers of electricity in the vicinity of the electrodes. The main factors contributing to the conductivity of soil are

1) Type of soil.

2) Type of salts contained in the water.

3) Concentration of salts dissolved in the contained water.

4) Moisture content.

5) Grain size and distribution of material.

6) Temperature.

7) Packing density and pressure.

Although the type of soil is an important factor in determining its conductivity, rather large variations can take place between locations because of the other factors involved. Generally, loams and garden soils have the highest conductivities. These are followed in order by clays, sand and gravel. Soils have been classified according to conductivity, as shown in Table 1. Although some differences are noted in the reporting of this mode of classification because of the many variables involved, the classification generally follows the values shown in the table.[1,2]

Table 1

General Classification of Conductivity

Material	*Conductivity (millimhos per meter)*
Poor Soil	1-5
Average Soil	10-15
Very Good Soil	100
Salt Water	5000
Fresh Water	10-15

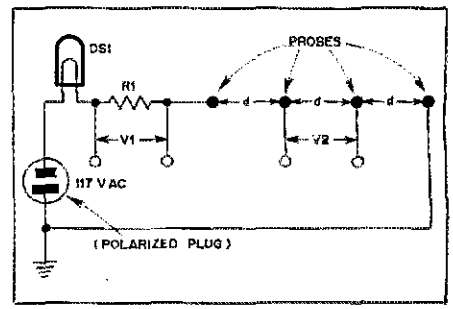


Fig. 1 — Schematic diagram, four-point probe method for measuring earth conductivity.
DS1 — 100-W electric light bulb.
R1 — 14.6 ohms, 5 W. A suitable resistance can be made by paralleling five 1-W resistors, three of 68 Ω and two of 82 Ω. (The dissipation rating of this combination will be 4.7 W.)
Probes — See text.

Making Conductivity Measurements

Since conduction through the soil is almost entirely electrolytic, ac measurement techniques are preferable. Many commercial instruments employing ac techniques are available and described in the literature.[3] But rather simple ac measurement techniques can be used which provide accuracies on the order of 25% and are quite adequate for the radio amateur. Such a setup was developed by a colleague and neighbor, M. C. Waltz, W2FNQ, and is shown schematically in Fig. 1.

†Condensed and reprinted from Sevick's article, "Short Ground-Radial Systems for Short Verticals," which appeared in April 1978 *QST*, page 30.

*Bell Laboratories, Murray Hill, NJ 07974

Notes appear on page 39.

Four probes are used. Each is 5/8 inch (16 mm) in diameter, and may be made of either iron or copper. The probes are inserted in a straight line at a spacing of 18 inches or 460 mm (dimension d in Fig. 1). The penetration depth is 12 inches (305 mm). *Caution*: Do not insert the probes with power applied! A shock hazard exists! After applying power, measure the voltage drops V1 and V2, as shown in the diagram. Earth conductivity, c, may be determined from Eq. 1:

$$c = 21 \times \frac{V1}{V2} \text{ millimhos per meter} \qquad \text{(Eq. 1)}$$

Soil conditions may not be uniform in different parts of your yard. A few quick measurements will reveal whether this is the case or not.

Fig. 2 shows the conductivity readings taken in my yard over the last three months in 1976. It is interesting to note the general drop in conductivity over the three months, as well as the short-term changes from periods of rain.

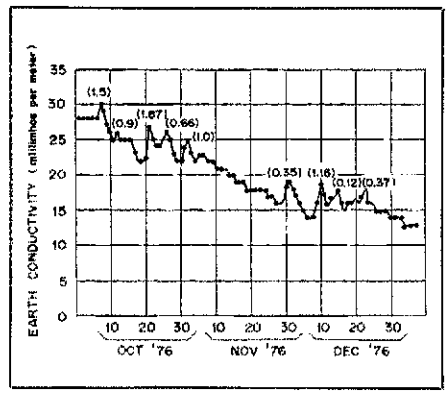


Fig. 2 — Earth conductivity at the author's location during the last three months of 1976. Numbers in parentheses indicate inches of rainfall (multiply by 25.4 for mm).

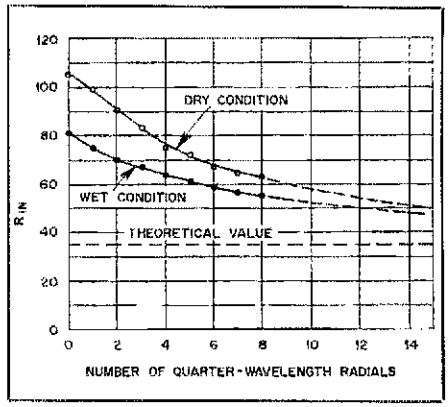


Fig. 3 — Input resistance of a 20-meter resonant quarter-wavelength vertical as a function of the number of radials and the condition of the soil. Under dry conditions the soil conductivity was measured at 10 to 15 millimhos per meter, and 25 to 30 millimhos per meter for wet conditions.

Antenna Efficiency Considerations

Vertical antenna efficiencies are based upon the losses that appear in series with the radiation resistance of resonant verticals. Although this approach to determining efficiency does not give a comparison between the very low angles of radiation (i.e., less than 15 degrees) of various radial systems, it does allow for comparisons in the 15- to 30-degree range, which is important for skywave transmission on the 40-, 80- and 160-meter bands. Mathematically this definition for antenna efficiency can be written as:

$$\text{Antenna efficiency} = \frac{R_{rad}}{R_{rad} + R_g + R_A} \qquad \text{(Eq. 2)}$$

where

R_{rad} = radiation resistance
R_g = ground loss
R_A = ohmic losses caused by loading and in the antenna itself

With high-Q loading coils and practically any size aluminum tubing for the antenna, R_A can be minimized and therefore eliminated from the relationship of Eq. 2. The denominator of the relationship then becomes simply the measured input or feed-point resistance of the radiator.

Experiments show that the efficiency of a vertical antenna system employing small numbers of radials is quite dependent on the moisture content of the soil. The measured input resistance of a resonant 20-meter quarter-wavelength vertical is plotted in Fig. 3 vs. the number of quarter-wavelength radials, from one to eight. The radiation resistance is 35 ohms for the thickness of the verticals used in this experiment.

Consider the case with four radials. The input resistance was measured as 75 ohms under dry soil conditions and 64 ohms under wet conditions. It can be seen from Eq. 2 that the efficiency under dry conditions is therefore 47%, and improves slightly to 55% under wet conditions. This poor efficiency exists for a location with soil conditions that can be considered average. As can also be seen, the difference in efficiency between wet and dry conditions becomes less pronounced as the number of radials is increased. The antenna system also becomes more independent of soil conductivity as the number of radials is increased.

The simple soil conductivity measurement scheme described also gives one a tool for comparing a given location with others, as well as predicting the performance of a vertical antenna system. QST

Notes

[1]Card, "Earth Resistivity and Geological Structure," *Electrical Engineering*, November 1935, pp. 1153-1161.
[2]*Reference Data for Radio Engineers*, fifth edition, Howard W. Sams and Co., Inc., ITT, pp. 26-3 to 26-5.
[3]Lagg, *Earth Resistances*, Pitman Publishing Corp., 1964, pp. 206-229.

LEO C. YOUNG, W3WV

☐ On January 16, 1981, the Amateur Radio fraternity lost one of its pioneers with the passing of Leo C. Young, W3WV, whose earliest ventures into the wireless art took place in 1905 when he was a boy of 14. He was one of the first employees of the Naval Research Laboratory in Washington, DC, when it was officially opened in 1923, and continued with the laboratory as a scientist until his retirement in 1967. In 1922 W3WV was credited with the development of radio equipment used in the detection of ships moving on the Potomac River, making the first use of what is now known as cw radar. In 1930 he supervised research experiments that produced the first detection of aircraft by reflection of radio signals, and in 1934 was responsible for the research that led to the development of the first system using radio pulses for range determination of stationary and moving objects, thus providing the groundwork for radar developments that profoundly affected the outcome of World War II.

W3WV, in his work at NRL, also made significant pioneering contributions in radio communications, electronic identification systems and radio control of missiles that influenced U.S. advance in these fields. He received the Presidential Certificate of Merit from President Truman in 1946, the Stuart Ballantine Medal of the Franklin Institute in 1957, and the Distinguished Civilian Service Award (the Navy's highest civilian award) in 1958.

Leo participated in the exploration by radio amateurs of the high frequencies for worldwide communications in the early '20s, continuing as an active amateur until declining health curtailed on-the-air operations during the past two years. He was a highly proficient cw operator and enjoyed contests. A charter member of the Naval Research Laboratory Amateur Radio Club, Leo was also a member of the Potomac Valley Radio Club for many years.

He is survived by his wife, Mabel, and two sons, Leo Jr., K3MZY, and Richard, W3PZW. — *Vic Clark, W4KFC*

A Kite-Supported 160- (or 80-) Meter Antenna

"The Parafoil® is a ram-air wing type aerial device that has no rigid parts. If it is shaped like a wing, and looks like a wing, then it must be a wing. A Parafoil rises against NOT WITH the wind." — Domina Jalbert, a pioneer of tethered flight.

By John S. Belrose,* VE2CV

Kite flying is a sport that from early times has been a national pastime of Asian peoples. Kites have also been put to practical use. In 1751, Benjamin Franklin hung a metal key from a kite line and, by attracting electricity during a storm, demonstrated the electrical nature of lightning. In 1901, Guglielmo Marconi[1] flew a kite-supported antenna from Signal Hill, St. John's, Newfoundland and succeeded in receiving radio transmissions from the Poldhu Wireless Station in Cornwall, England. Kites were long used for weather observation, with instruments being carried aloft to record data.

There are about five basic types of kites: the 3-sticker (hexagonal), the Malay (modified diamond), the box kite, the tetrahedral and the parafoil, an aerofoil kite. The shape of the kite can be designed so that the kite will be self-correcting by incorporating a diehedral (two-sided) angle in the surface, or by bowing the main cross-stick to a depth of about 10% of its length. This latter type is the kind of tailless kite that Marconi flew. If not self-correcting, the kite will require a tail for stabilization.

Marconi launches a kite-supported antenna from Signal Hill, St. John's, Newfoundland, and succeeds in receiving radio transmissions from Poldhu, Cornwall, England (1901).

The box kite,[2] the invention of an Australian named Lawrence Hargrave in the 1890s, is identified by its rectangular shape. The frame is twice as long as its width, the ends are left open, and one-third of its length is covered around each end. The bridle consists of two lines, one to each end of one of the vertical sticks, meeting a little above the lower edge of the top panel. The kite flies on one edge and needs no tail.

The tetrahedral kite[3] was invented by Alexander Graham Bell in about 1903. This structure, of triangular construction in every direction (longitudinal as well as transverse), was developed in his Nova Scotia laboratory. It is formed by six equal rods, and has great strength and lightness. Two of the sides of the tetrahedron are covered, and this constitutes the "sail" of the kite. A toy Tetrakite® manufactured by Synestructics, Inc.[4] has four such cells, hence four sails. Their Super Tetrakite has 16 sails.

*3 Tadoussac Dr., Aylmer (Lucerne), Quebec J9J 1G1

[1]Notes appear on page 42.

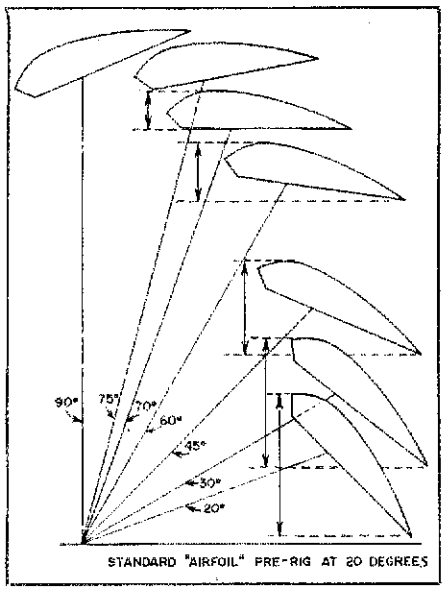


Fig. 1 — Sketch illustrating how stable flight is achieved with a Jalbert Parafoil. If the kite overflies, it stalls; if it underflies, it gains lift. It is a self-correcting device.

The tetrahedron shape is such that in every direction the cross-section is the same, which is the reason that the kite is so steady in flight. The kite flies on one edge of the sail(s) and needs no tail.

For the application considered here, viz. a kite-supported antenna for portable use, the Jalbert Parafoil kite[5,6] is perhaps the best of the various types of kites. The Parafoil is a ram-air wing type aerial device that has no rigid parts. It requires no sticks to carry and assemble. It combines in a marked degree the qualities of strength, lightness, lift and steadiness of flight. The Jalbert aerofoil kite achieves its lift and stability through its excellent aerodynamics, because its shape is that of an aerofoil. The bridal, which resembles the shrouds of a parachute, is prerigged at 20° so the kite flies stably when its kite line makes an angle 70° from the horizontal. If the kite overflies, it stalls; if it underflies, it gains lift. Hence it is always trying to fly at the design angle (Fig. 1).

The leading edge of the kite is open to wind, and it is launched by holding this edge into the wind. The kite fills with air, and becomes "rigid" because of the ram-jet action of the wind. A small amount of the air that enters the kite is bled out at the rear edge of the kite, and these jets blow onto the webbed "tail" flap, providing additional stability. The fins also act like stabilizers, similar to the rudder of an airplane.

Kites as antenna supports can be very successfully employed in the Arctic, on the land above the tree line, at the ocean beach, or anywhere that the wind can be depended upon. The kite flies best in a steady wind between 15 and 30 km/h (9 and 18 mi/h). In the higher winds, a tail is recommended to increase the stability of

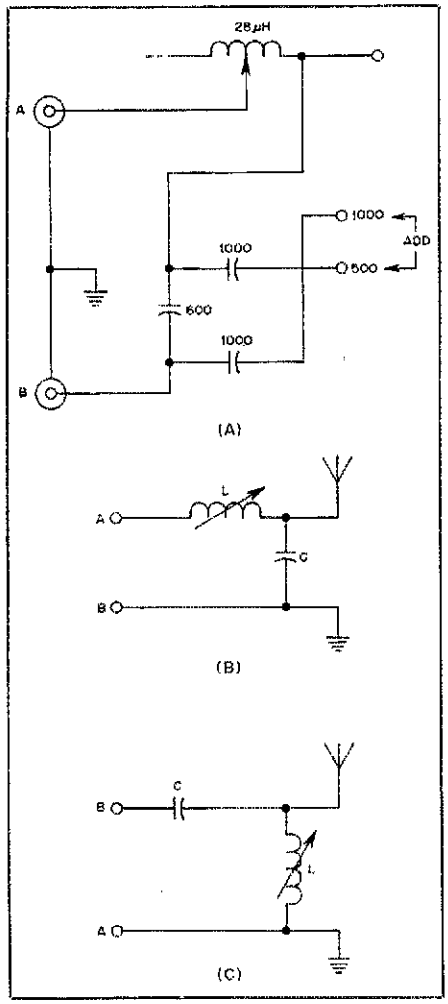


Fig. 2 — L-section matching network. Capacitances are in picofarads. The circuit at A is the schematic diagram of the antenna coupler used by the author. At B it has been configured to match a 1/2-λ antenna to 50 Ω. At C, the circuit will match a 5/8-λ antenna to 50 Ω.

the Parafoil. The best tails are made of plastic strips, 50 mm wide and 3 to 4 m long (2 inches wide and 10 to 12 feet long). Use 5 to 6 multicolored strips to form a tail. A swivel snap attached to one end of each strip should be put on the loop at the center of the trailing edge of the parafoil. The swivel snaps keep the strips from becoming tangled. At all times a winch should be used to facilitate bringing the kite down. Also, never fly a kite carrying a wire antenna near power lines, or during an electrical thunderstorm. And don't fly the kite too high where aircraft are flying.

The Antenna

Two types of antennas have been employed: a simple wire antenna which was end-fed by an L-section matching unit, and a J antenna. The J is an end-fed half-wave radiator, fed and matched by means of a tapped quarter-wavelength shorted transmission line, and constructed from 300-ohm twin-lead.[7]

If the kite-supported antenna is operated from an ocean beach, a 5/8-wavelength wire antenna could be employed and the ocean used as a ground plane. In this situation, the antenna will exhibit some directivity with maximum gain in the direction of the open sea. If an ocean is not available for a "ground plane," a half-wave radiator should be employed, since this antenna works well with no physical connection to the ground.

My wire antennas used braided, bronze fishing line (diameter of the wire is about 0.18 mm or 0.032 inch) and a test strength of 27 kg (60 lbs). Do not kink or solder to this wire; otherwise, it will break at these points. Braided monel and solid monel fishing lines are also available,[8] and in fact either of these lines might have better mechanical properties.

Since the length-to-radius ratio (h/a) is large, an end-fed half-wave radiator for 75 meters has a very high impedance (4000 ohms); the resistance and reactance values for a 5/8-λ antenna are estimated to be 135 − j912 ohms; that is, R_a = 135 ohms and X_a (capacitive) = 912 ohms.[9]

Matching End-Fed Wire Antennas

An L-network impedance-matching device is the simplest type that can provide a perfect match between the transmitter and the antenna. The one I used was the "Wide Range Wire Tuner" manufactured by the Unique Products Company, West Covina, California. This device allows for two configurations for the L-match network, and both are needed for 1/2- and 5/8-λ antennas (Fig. 2).

If the antenna is a resonant 1/2-λ radiator, the values for the inductance and capacitance can be readily calculated using

$$2\pi fL = j\sqrt{R1(R2 - R1)}$$
$$= j\sqrt{50(4000 - 50)}$$
$$= j444 \text{ ohms } (18.6\ \mu H)$$
$$\frac{1}{2\pi fC} = -j\,R2\sqrt{\frac{R1}{R2 - R1}}$$
$$= -j450 \text{ ohms } (93 \text{ pF})$$

where

R1 = desired transmitter impedance = 50 ohms

R2 = antenna impedance (estimated to be 4000 ohms)

The parenthetical values are inductance and capacitance for an operating frequency of 3.8 MHz.

When the antenna impedance is reactive, the L-network parameters can only be calculated by iteration; several settings provide zero reactance, but only one of these settings provides a match to 50 ohms. Also, the "tuning" will be more critical than for resistance matching. An initial dial setting calibration, in our case using a vector impedance meter and "equivalent" lumped-circuit antenna parameters, facilitated tuning in the field.

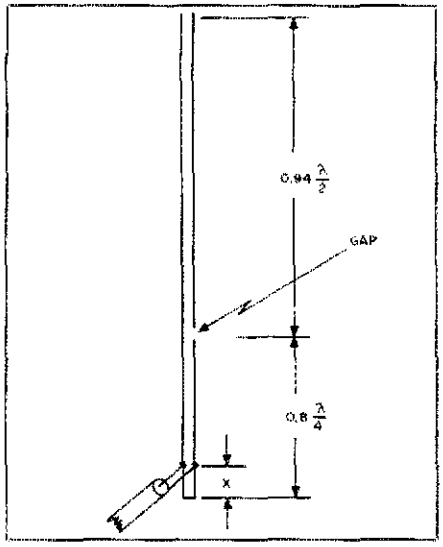
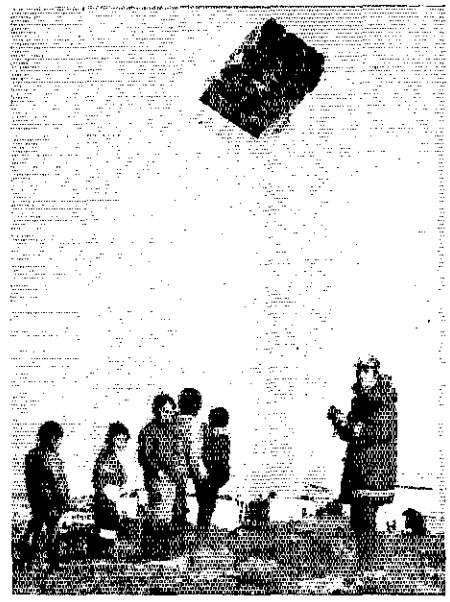


Fig. 3 — Schematic diagram of a J antenna which can be constructed from 300-Ω twin-lead. See text regarding dimension X.

A Parafoil upside down on ground. The bridal resembles the shrouds of a parachute.



The author holds the kite line immediately after launching. As can be seen from the faces of the children, kites are fun whether you have an interest in antennas or not.

Table 1

L-Network Match for Various Antennas

Antenna Type	Estimated Impedance $R_a \pm jX_a$ (ohms)	L-Section L (μH)	C (pF)
Half-wave	4000	20.2	115.4
5/8-λ wire	130-j974 (43 pF)	15	105
5/8-λ whip	100-j600 (70 pF)	10.9	136

These results are given in Table 1.

J Antenna for 75 Meters

A J antenna constructed from 300-ohm transmission line is sketched in Fig. 3. The lengths of the 1/4-λ matching stub and the 1/2-λ radiator are calculated from the conventional wavelength formula

$$\lambda = \frac{300}{f\ \text{MHz}}\ \text{meters}$$

Appropriate factors must be used, which for a 300-ohm twin-lead stub is 0.8 times a free-space quarter-wave (velocity factor for polyethylene is 0.8). For the radiator, the antenna length is about 0.94 times a free-space half-wave. The correct tap point, which must be determined by experiment, is about 0.0134 λ (distance X measured from the shorted end). Thus, for 75 meters (3.8 MHz), the length of the 1/4-λ section is 15.8 meters (51.8 ft) and the length of the 1/2-λ radiator is 37.1 meters (121.7 ft) for an overall length of 52.9 meters (173.5 ft). The tap point is about 1.03 meters (40-1/2 inches) from the shorted end. While any kind of 300-ohm twin-lead will work, that made by Belden (type 8230) was used, since, according to the manufacturer, it is stronger and has more flex-life than equivalent twin-lead. Hence, it should have superior resistance to the pulling, whipping and twisting that it is subjected to as a kite-supported antenna.

I have used kite-supported antennas on trips to Koartak, in an Inuit community on the northwest tip of Ungava Bay in Arctic Quebec. The braided bronze fishing-line antenna was wound on a fishing reel. Sixty to ninety meters (295 ft) of kite line was used above the wire antenna, so the kite flew in stable air.

Lighter-than-air balloons and Kytoons[10] (combining the advantages of a balloon and a kite) can also be used to hoist antennas aloft (see November 1975 *QST*, page 57). Regular meteorological-type balloons are close to useless as antenna supports unless there is no wind, because they tend to "heel over." There are two solutions. Either use a balloon with a very strong lift or use a Kytoon that is designed to fly in the wind. The ILC Dover Company[11] markets an inexpensive 1 cubic meter balloon with a lifting capacity of about 500 grams (1.1 pounds). Both ILC Dover and Jalbert Aerological Laboratories market Kytoons.

Concluding Remarks

Jalbert Parafoil kites are available in three sizes.[12] The kite most suitable for use in the present application is the model J-15. The model J-35 is a much larger kite which *must not* be flown without a winch. This larger kite is suitable for carrying a lightweight battery-operated repeater, or for supporting a vertical antenna for the higher hf or vhf bands where height is desired, and where the kite must support the coaxial feed cable.

In considering the application of a kite-supported repeater, it should be noted that the record height reached by a kite, according to the Encyclopaedia Britannica, was 7265 meters (23,835 ft). This height was reached on May 5, 1910, at Mount Weather, Virginia, using a train of 10 kites on piano wire from a ground winch. A more modest height would be quite satisfactory for a vhf repeater for emergency or experimental use.

Nylon flying line for the above-mentioned kites is available from the manufacturer in 914 m (3000 foot) lengths having 90 and 159 kg (200 and 350 lb) test.

All of us have dreamed of a skyhook for supporting a vertical antenna. If this article encourages you to fly kites in connection with your hobby of Amateur Radio, good luck, have fun, and may favorable winds be at your back when flying your Parafoil. QST

Notes

[1]McNicol, *Radio's Conquest of Space*, Arno Press, New York, 1974, pp. 132-143.
[2]*Encyclopaedia Britannica*, William Benton, publisher, 1964, pp. 421-422.
[3]Bell, "The Tetrahedral Principle in Kite Structure," *The National Geographic Magazine*, Vol. XIV, June 1903.
[4]Synestructics, Inc., 9559 Irondale Ave., Chatsworth, CA 91311.
[5]Jalbert Aerology Laboratories, Inc., 170 NW 20th St., Boca Raton, FL 33432.
[6]Jalbert, "The Jalbert Airfoil," *Annals of the New York Academy of Sciences*, 1969, pp. 163-271.
[7]Belrose, "The Vertical-J for 2-Meters — A Roll-up and Put in Your Pocket Type," *TCA* (The Canadian Amateur), Aug./Sept. 1979.
[8]In Canada, such fishing line is manufactured by the Schindler Co. of Canada, No. 1 Audley St., Toronto, ON M8Y 2X3.
[9]Jordan, *Electromagnetic Waves and Radiating Systems*, Prentice-Hall, New York, 1950, pp. 482-483 and 508.
[10]Ferrier and Baird, "A New Kind of Skyhook," *QST*, October 1946, p. 24.
[11]For more information contact Frank Mathews, ILC Dover, P. O. Box 266 Frederica, DE 19946, tel. 302-335-3911.
[12]See note 5.

Bibliography

Bonadio, "The Balloon Antenna Rides Again," *QST*, March 1947, p. 60.
Griffin, "Tri-County Takes a Holiday or Benjamin Franklin in Reverse," *QST*, June 1939, p. 30.
Walker and Goodman, "Balloon-Supported Antennas," *QST*, April 1940, p. 40.

• *Basic Amateur Radio*

Simple Antenna and S-Meter Modification for 2-Meter FM Direction Finding

Enjoy hunting? Want to go after a tame little bunny or a wild turkey? Here are some tools that may help you.

By Peter O'Dell,* KB1N

"Did you see that silly man and woman driving around with the TV antenna on their car? They must have been down to the dump and picked it up. She was driving and he was holding onto the antenna with his arms stuck out the window. You'd think they would freeze to death in this weather. Funny thing is that they just kept driving back and forth. Some people are just plain crazy!" said the clerk to our friend Danny. Danny just smiled and nodded because he knew that the crazy man and woman were actually two rather inept bunny (hidden transmitter) hunters. They had managed to get close to the bunny, but couldn't locate him once they were in his immediate proximity. Of course Danny waited until a large crowd had gathered on the local repeater before telling us what the clerk had said *about my wife and me*. It sure is nice to have friends.

A Source of Vexation

Bunny hunts or fox hunts are organized events in which one member of the group retires to some out-of-the-way place and periodically transmits a signal. The objective of the other members of the group is to find the bunny as quickly as possible. There are a number of variations on this theme. On the other hand, a wild turkey hunt (well, at least, that's what I call it) occurs when an unknown operator begins transmitting an unidentified signal, intentionally or unintentionally, that causes disruption of service. The objective of the whole group is to find him/her and convince him/her to stop transmitting in such a manner. The generic term for these endeavors is direction finding (DF).

Direction finding is easy for a vhf fm signal; all you need is a map, a compass, a receiver and a directional antenna. If you are a couple of miles from a signal, you should have no trouble getting the general direction of its origin. Move to another location and take a second reading; draw the corresponding lines on your map and, *presto*, you know exactly where the transmitter is located — well, almost.

Most newcomers to DF make the same mistakes that we did. They try to use the same kind of antenna for DF that they use for making distant contacts. The trouble is that the objectives and needs of the two situations are quite different. Typically, a Yagi beam with parasitic reflector and directors will have one main signal lobe, several minor lobes and numerous nulls between the lobes. Hall has recently discussed the interpretation of patterns as presented in *QST*, so that information will not be repeated here.[1] Also, for more detailed information on antenna patterns, consult *The ARRL Antenna Book* (available from ARRL for $5). A pattern with one narrow major lobe is what is needed for making long-distance contacts.

But that is not the most useful pattern for DF operations. Usually, as an operator moves toward the location of the hidden transmitter, the signal strength will increase. Do you know what happens with an antenna/receiver system that determines direction based on the main lobe? Sooner or later the S meter will be fully

*Basic Radio Editor

[1]Notes appear on page 47.

deflected on some or all of the minor lobes as well as the major one. At that point the searchers will probably go back and forth or in circles because the signal will seem to be coming from several different directions at the same time! I speak from experience.

Fig. 1 shows the pattern of an antenna that can be much more useful for DF operations. The antenna has only one lobe in its pattern. Notice that there is only 3 dB difference 90 degrees either side of a bearing of zero degrees. This lobe is virtually useless for direction finding. But take a look at the null. The computer program used to generate plot points for this pattern indicated that the signal level at 180 degrees would be −120 dB. [This is a somewhat nebulous number arising from rounding in the computer's math operations. The theoretical response is $-\infty$ dB. — Ed.] Ten degrees either side, the signal level rises to −40 dB — a difference of many, many dB! The point is, when the null is pointed at a signal, the operator should notice a *sharp* decrease in the received signal strength. This is a significant advantage for DF. Why? Because the antenna pinpoints a direction based on a *minimum* reading, it will be useful when close to the source. Cardioid is the general name applied to patterns with one very broad lobe and one very sharp null.

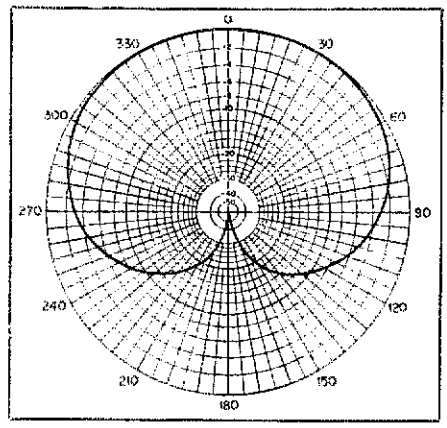


Fig. 1 — This is a cardioid antenna pattern. As the antenna is rotated, an operator would notice little change in the S-meter indication of an incoming signal until the notch was pointed at the signal. Then the S-meter reading should drop dramatically.

The Antenna

What kind of antenna produces a cardioid? Although there may be any number of different antennas that will produce this type of pattern, the simplest design is depicted in Fig. 2. Two quarter-wavelength vertical elements are spaced one quarter-wavelength apart and are fed 90 degrees out of phase. Each radiator is shown with two radials approximately 5 percent shorter than the radiators.

During the design phase of this project we used the TRS-80 computer to predict the impact on the antenna pattern of "slight" alterations in its size, spacing and phasing of the elements.[2] The results suggest that this system is a little touchy and that the most significant change comes at the null. Very slight alterations in the dimensions caused the notch to become much more shallow and, hence, less useable for DF. Early difficulties in building a working model bore this out.

This means that if you decide to build this antenna, you will find it advantageous to spend a few minutes to "tune it" for the deepest null. If it is built using the techniques I used, then this should prove to be a small task which is well worth the extra effort. Tuning is accomplished by adjusting the length of the vertical radiators, the spacing between them, and if necessary, the lengths of the phasing harness that connects them. Tune for the deepest null on your S-meter using a signal source such as a moderately strong repeater. This should be done outside, away from buildings and large metal objects — I tried tuning in our kitchen and found that reflections off our appliances were producing spurious readings. Beware too of distant water towers, radio towers, and large office or apartment buildings. They can reflect the signal and give false indications.

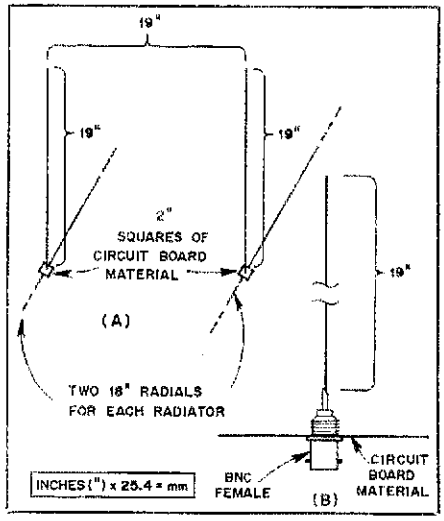


Fig. 2 — At A is a simple configuration that can produce a cardioid pattern. At B is a convenient way of fabricating a sturdy mount for the radiator using BNC connectors.

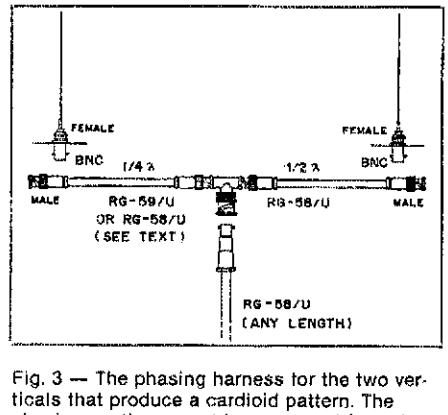


Fig. 3 — The phasing harness for the two verticals that produce a cardioid pattern. The phasing sections must be measured from the center of the T connector to the point that the vertical radiator emerges from shield portion of the upside-down BNC female; i.e., don't forget to take the length of the connectors into account when constructing the harness. If care is taken and coax with polyethelene dielectric is used, you should not have to prune the phasing line. With this phasing system, the null will be in a direction that runs along the boom toward the quarter-wavelength section.

Construction is simple and straightforward. Fig. 2B shows a female BNC connector (Radio Shack 278-105) that has been mounted to a small piece of pc-board material. The BNC connector is held "upside down" and the vertical radiator is soldered to the center solder lug. A 12 in. (300 mm) piece of brass tubing provides a snug fit over the solder lug. A second piece of tubing, slightly smaller in diameter, is telescoped inside the first. The outer tubing is crimped slightly at the top after the inner tubing is installed. This provides positive contact between the two tubes. For 146 MHz the length of the radiators calculates to about 19 in. (480 mm). You should be able to find small brass tubing at a hobby store. If none is available in your area, you might consider brazing rods. I have noticed some available in the hardware sections of discount stores. It will probably be necessary to solder a short piece to the top of these since they come in 18 in. (460 mm) sections. Also, tuning will not be quite as convenient. Two 18 inch (460 mm) radials are added to each element by soldering them to the board. I happened to have two 36 in (920 mm) pieces of heavy brazing rod available so I used them.

The Phasing Harness

One of the requirements to produce a cardioid pattern is that the two elements be fed 90 degrees out of phase. Why not put a 19-in. (480 mm) quarter-wave section of coax between the two elements? Radio waves travel slower in transmission lines than they do in free space. Each type of transmission line has a characteristic known as the velocity factor. This is a fractional figure that will convert the electrical wavelength in free space to the electrical wavelength in the transmission line. Since it is a fractional value, the equivalent length of transmission line will always be shorter than the free space distance. In other words, an electrical quarter wavelength of transmission line will be shorter than the distance between the two radiators.

There are any number of ways of getting around this problem. One simple solution would be to separate the elements by a quarter wavelength and connect them with a piece of transmission line that is electrically three quarter-wavelengths long (or any other odd multiple of a quarter wavelength). Lewallen has noted that some care must be taken to avoid having unequal currents flowing in the two radiators.[3] He suggests the use of a T con-

nector to split the phasing line as shown in Fig. 3. Unequal currents tend to reduce the depth of the null in the pattern, all other factors being equal.

With no radials or with two radials perpendicular to the vertical element, I found that a quarter-wavelength section made of RG-59/U 75-Ω coax produced a deeper notch than a quarter-wavelength section made of RG-58/U 50-Ω coax. However, with the two radials bent downward somewhat, the RG-58/U section seemed to outperform the RG-59/U. There will probably be enough variation from one antenna to the next that it will be worth your time and effort to try both sections and determine which works best for your antenna. The half-wavelength section can be made from either RG-58 or RG-59 because it should act as a 1-to-1 transformer. The most important thing about the coax is that it be of the highest quality (well shielded and with a polyethelene dielectric). The reason for avoiding foam dielectric is that the velocity factor varies from one roll to the next — some say that it varies from one foot to the next. Of course, it can be used if you have test equipment available that will allow you to determine its electrical length. Assuming that you do not want to or cannot go to that trouble, stay with polyethelene-dielectric coax. In short, stay away from coax that is designed for the CB market or do-it-yourself cable-TV market. (A good choice would be Belden 8240 for the RG-58/U or Belden 8241 for the RG-59/U.)

Both RG-58 and RG-59 with polyethelene dielectric have a velocity factor of 0.66. Therefore, for 146 MHz a quarter wavelength of transmission line will be 19 in. (480 mm) × 0.66 = 12.5 in. (320 mm).

A half-wavelength section will be twice this length of 25 in. (640 mm). One thing that you must take into account is that the transmission line is the total length of the cable *and the connectors*. Depending on the type of construction and the type of connectors that you choose, the actual length of the coax by itself will vary somewhat. You will have to determine that empirically.

In my earliest efforts I used a Y connector that mated with RCA phono plugs because it is widely available and the phono plugs are easy to work with. The results with this system were not satisfactory. The performance seemed to change from day to day and the notch was never as deep as it should have been. Although they are more difficult to find, BNC T connectors will provide superior performance and are well worth the extra effort. If you must make substitutions, I would suggest that you go with the UHF type connectors (mate with PL-259s).

Fig. 4 shows a simple support for the antenna. PVC tubing is used throughout. I bought the cheapest (smallest diameter) that I could find. Additionally, you will need a T fitting, two end caps, and possibly some cement. (I didn't cement mine together because I wanted to have the option of disassembly for transportation.) Cut the PVC for the dimensions shown. You can use a saw or a tubing cutter to cut the PVC. I prefer the tubing cutter because it produces smooth, straight edges and is a lot less messy. Drill a small hole through the pc board near the female BNC of each element assembly. Measure 19 in. (480 mm) along the boom (horizontal) and mark the two end points. Drill a small hole vertically through the boom at each mark. Use a small nut and bolt to attach each element assembly to the boom.

Tuning

The dimensions given throughout this article are those for approximately 146 MHz. If the signal that you will be hunting will be above that frequency, then the measurements will probably need to be a bit shorter. If you are to operate below that frequency, then they will need to be a little longer. Once you have built the antenna to the rough size, the fun begins. You will need a signal source near the frequency that you will be using for your bunny hunts (turkey hunts). Adjust the length of the radiators and the spacing between them for the deepest null on your S meter. I would make changes in increments of 1/4 in. (6 mm) or less. If you must adjust the phasing line, make sure that the quarter-wavelength section is exactly one-half the length of the half-wavelength section. Keep tuning until you have a satisfactorily deep null on your S meter.

Adding an S-Meter

You just realized your radio does not have an S meter built into it! What can you do? Adding an S meter is a lot easier and simpler than you might imagine. It seems that most of the hand-held units on the market today do not offer this particular "bell and whistle." I personally think this is unfortunate for the user and rather short-sighted on the part of the manufacturers. Fortunately for you there is only one difficult problem associated with adding an S meter — where to put it. Many of the smaller hand-helds simply do not have enough open space inside to install a meter. The obvious solution is to "outboard" the meter and connect it to the internal circuitry with a pair of wires.

Egads! Wires dangling from my new $300 hand-held! Yich! You can install a jack in the case of your hand-held and use the matching plug to connect the meter when you want it. Such a modification will not harm the appearance or resale value. The components are easy to find (Radio Shack sells a variety of matching plugs and jacks). The meter can be housed in a leatherette film carrier used by photographers to carry extra rolls of 35 mm film. The carriers are available from photography stores and discount stores

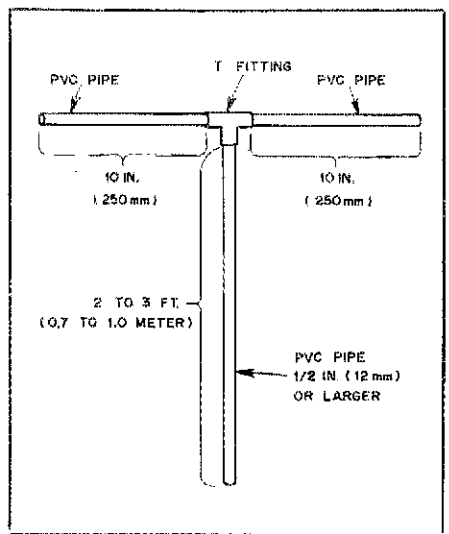
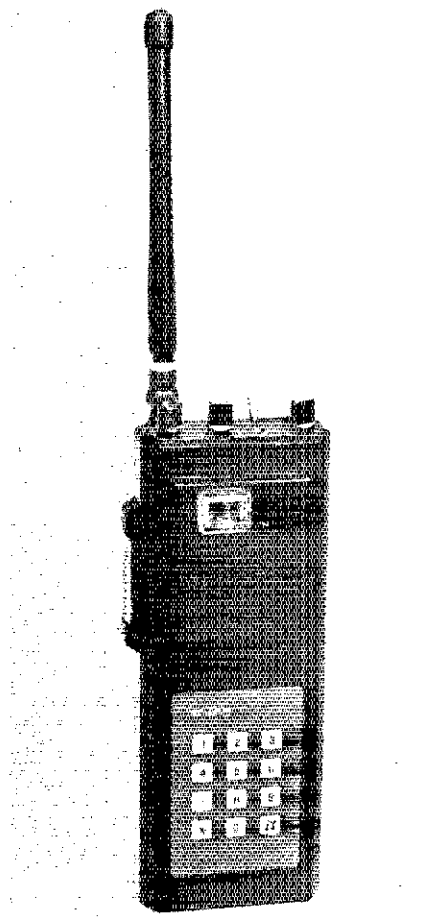


Fig. 4 — A simple mechanical support for the DF antenna made of PVC pipe and fittings.



Heathkit VF-2031 with the S meter added. This hand-held is one of the few currently on the market that has enough room inside for mounting a typically sized S meter.

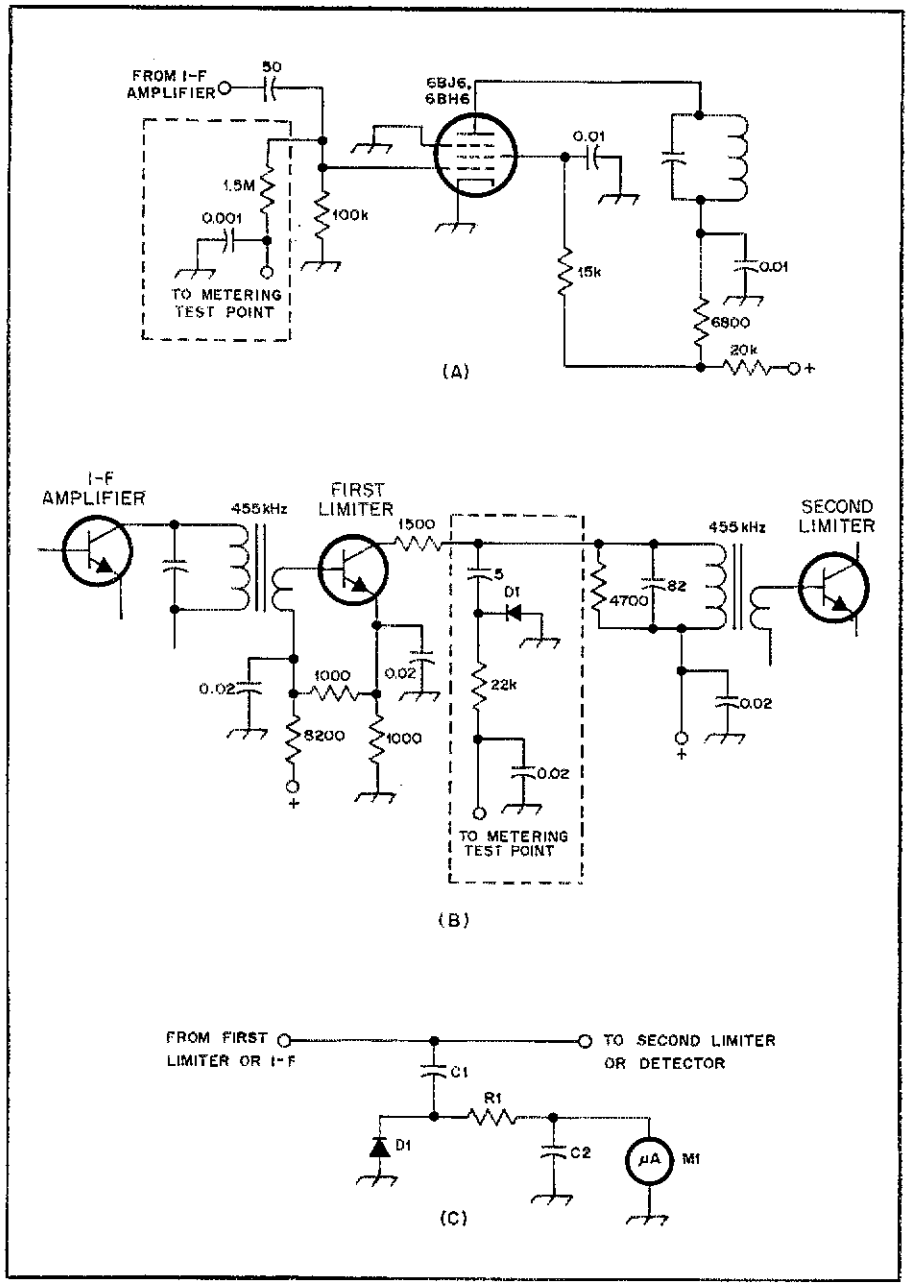


Fig. 5 — At A and B are portions of schematic diagrams of the limiter stages of tube and solid-state receivers, respectively. Many receivers have a test point at this stage for use during front-end alignment. The components associated with the test point are inside the broken lines. If your receiver does not have such a point, you can add the components shown in C. (See text for parts information.)

for less than $2 each. They can be attached to the leather carrying case of your hand-held either with pop rivets or epoxy cement. This very functional modification for your hand-held will not detract from its appearance or resale value (in fact, it will probably boost the resale value slightly).

The detector of an fm receiver detects (decodes) the intelligence from the received signal by demodulating the deviation from the carrier frequency and the rate of change of this deviation. Any amplitude (strength) variations reaching the detector would be detected as noise or distortion of the intelligence in the fm signal. Depending on the design of the receiver, one or usually more stages of high-gain amplification precede the detector. There is an upper limit to the output level from any amplifier, regardless of the level of the input. This characteristic is used by the fm receiver to bring all signals or portions thereof up to the same signal level to minimize noise and distortion in the detected audio. Because these high-gain amplifiers bring the signal up to the upper *limit* of their ability, they are collectively known as the limiter stage(s).

By understanding the above action, you can see it becomes almost trivial to add an S meter to indicate relative signal strength. Fig. 5 (A and B) shows the limiter stages from typical tube and solid-state receivers. Notice that both diagrams have a terminal marked "to metering test point." Typically, a 200-microampere meter will be connected from this point to ground and used to align the front end of the receiver. The stronger the signal reaching the first limiter, the more the meter will be deflected. This is the very action that we are looking for in an S meter! If the schematic diagram of your receiver has such a "test point" indicated, then simply connect your meter here. If not, locate the corresponding point in your receiver and add the circuit that is shown in Fig. 5C. Component values are not critical for the capacitors and diode. Virtually any small-signal diode will be okay for the circuit. C1 and C2 can be any convenient value from 0.001 to 0.05 μF. Determine the value of R1 by substituting a small potentiometer (25 kΩ to 50 kΩ) for the resistor. With the strongest signal available, set the meter for full-scale deflection by adjusting the potentiometer. Once the proper value for full-scale deflection has been determined, remove the potentiometer from the circuit and use an ohmmeter to measure its value. Obtain a quarter-watt fixed value resistor that is close to this resistance and use this resistor for R1. M1 is a surplus S meter that requires up to 350 microamperes for full-scale deflection.

An Example

Some modern fm receivers have abandoned the use of discrete transistors in favor of monolithic ICs with the limiter stages and the detector all on one chip. One example of this approach is the Heathkit VF-2031 which uses the CA3089 chip. Fig. 6 shows a block diagram of the chip circuitry. Notice that pin 13 (bottom, center) is the output for a tuning-meter circuit. Attached to pin 13 is a resistor and a meter. Like most of the other chips in service, the CA3089 was designed primarily for use in fm broadcast receivers. However, a tuning meter will serve the same function as our S meter. A close look at the service manual of your receiver or the IC manufacturer's specification sheet will probably disclose similar possibilities.

Fig. 7 is a portion of the diagram of the VF-2031, showing the circuitry associated with the CA3089. Notice that pin 13 is already being used to trigger the squelch circuit. But notice also that pin 13 is tied to test point 1 (TP1). Guess what TP1 is used for. That's right — aligning the front end! One unexpected problem cropped up when I discovered that pin 13 never had less than 1.25 V dc on it. Three diodes, D1 through D3, serve the function of providing a constant voltage drop of about

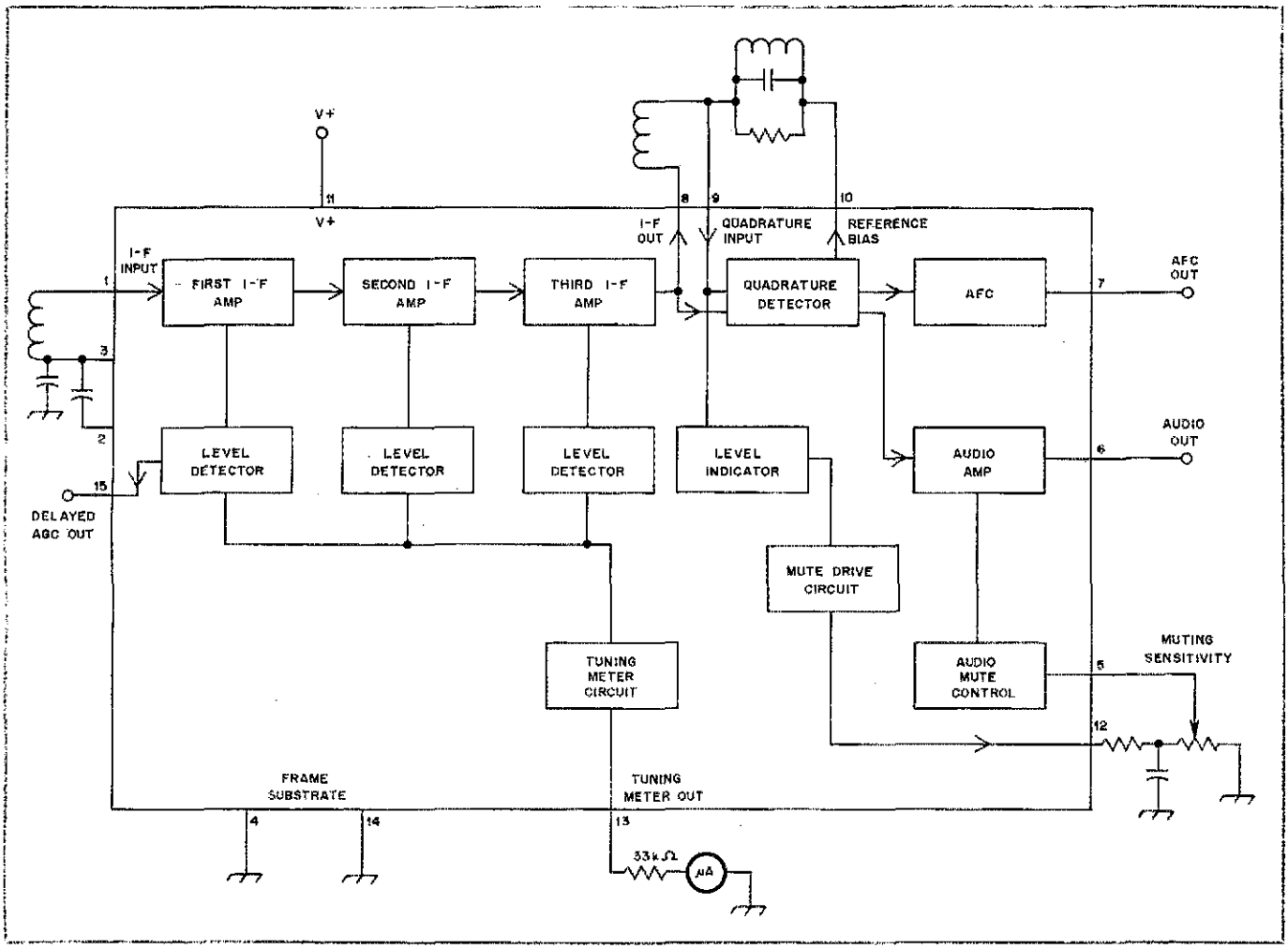


Fig. 6 — Internal block diagram of an RCA CA3089 monolithic limiter/detector IC. Notice that the chip has the circuitry built in for a tuning meter (S meter).

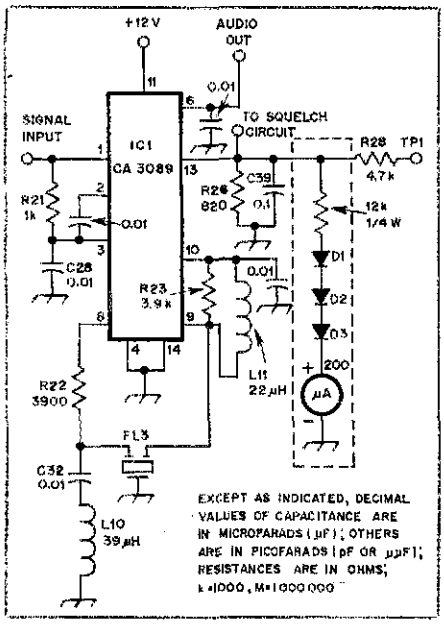


Fig. 7 — Portion of the schematic diagram of the Heathkit VF-2031. The components inside the dotted line were added to provide an S meter.

1.3 V. Without them in the circuit, the meter "idled" at about 1/3 scale when no signal was present. I used the method described earlier to determine the proper value of resistance to produce a full scale meter reading with the maximum voltage present at pin 13. The meter is a surplus unit that was obtained from Poly-Paks.[4]

One of the nicest things about the VF-2031 is the unused space inside which provides ample room for the tinkerer to add any number of options. I drilled a small hole in the front of the case and used a file to enlarge it to the size of the meter housing. I used a small dab of cement to hold the meter in place once I had determined the proper position. The diodes and resistor are encased in heat-shrink tubing and suspended between the meter and the circuit board. It has proved to be a most welcome addition to the transceiver. I suspect that many amateurs would find an S meter a welcome feature on a hand-held.

Go Get the Bunnies

The best offense is a solid defense! If you have the right tools, bunny hunts are one of the most enjoyable things to do with Amateur Radio on a balmy spring afternoon. And now you have the proper antenna and have added an S meter to your receiver (if it didn't already have one). But more important than just having a good time, you will be preparing a large number of the members of your club to track down the next turkey that takes roost on your repeater. If it is public knowledge that your club can pinpoint a turkey in a matter of minutes, he will probably go gobble somewhere else — turkeys are like that. QST

[Note: Next month we will conclude with some useful accessories. In the meantime, go ahead and try the antenna and S-meter combination — you'll like what you find.]

Notes

[1]Hall, "New Look for QST's Antenna Patterns," *QST*, July 1980, p. 26.
[2]See May, "Antenna Modeling Program for the TRS-80," *QST*, February 1981, p. 15.
[3]Lewallen, "Notes on Phased Verticals," *QST*, August 1979, p. 42.
[4]Poly-Paks part number 92CU5786. This meter or similar available from Poly-Paks, P. O. Box 942, South Lynfield, MA 01940, tel. 617-245-3828.

Product Review

Conducted By Paul K. Pagel,* N1FB

HEATH HX-1681 CW TRANSCEIVER

In both styling and circuit design, the HX-1681 QSK cw transceiver is ideally suited to mate with the HR-1680 ssb/cw receiver.[1] Frequency coverage of the '1681 is 500 kHz on each of four bands from 80 through 15 meters and one 500 kHz segment of the 10-meter band (28.0 to 28.5 MHz). There is virtually no extra coverage above or below these 500-kHz segments and WARC band provisions are not included. The analog dial has 5-kHz incremental markings with frequency resolution to approximately 2.5 kHz. Rated power output for the '1681 is 100 watts on 80 through 15 meters and 80 watts on 10 meters. It has provisions for full break-in operation as well as delayed switching output for keying and external power amplifier.

A straightforward heterodyne design is used in the transmitter. The 5.5- to 5-MHz VFO signal is mixed with the crystal-controlled HFO signal in a doubly balanced diode ring mixer. The output products of the mixer are fed to a switched band-pass filter that passes only the difference frequency. By using the difference frequency the dial will tune in the same direction on each band. The on-frequency signal is amplified by a two-stage, transistorized broadband amplifier, which supplies power to the driver stage. A 12BY7 is used as the power-amplifier driver, with its associated tank inductor switched by one wafer of the band switch. The driver-stage tuning capacitor is adjusted from the front panel. A pair of 6146s, operating Class AB1, is used in the final amplifier stage. The tubes are operated in a parallel, grounded-cathode configuration. Two band-switch wafers are used in the output network. One wafer switches in various capacitors to resonate the final tank circuit, and the other wafer inserts fixed low-pass filters for each band. These filters are designed for a 50-ohm terminating impedance. A built-in T-R switch is used to provide break-in (QSK) operation. When the key is closed, a diode in the receive antenna circuit is reverse biased and none of the transmitter output power will reach the receiver input.

The original keying waveform of the HX-1681 is shown in Fig. 3. Informed that this waveshape produced key clicks, Heath responded by supplying some modifications, which were applied to the review unit. The initial modifications were only partially successful; the waveform was softened, but transients appeared that created loud pops in the receiver audio during QSK operation with the HR-1680 receiver. This problem was eliminated using a circuit developed by staff member George Woodward, W1RN, and the writer. It is shown in Fig. 4 at A and B. This circuit keys the mute-sidetone circuitry independently and has a fast-attack/slow-decay action, which is advantageous during QSK operation. All the additional components are mounted on a terminal strip that is attached to the chassis by means of one of the power-supply circuit-board mounting screws. The waveform that resulted after the changes were made is shown in Fig. 5.

These changes were passed on the Heath. The official Heath modification that is being made to all existing stock and is available to '1681 owners at no cost is shown in Fig. 4C; the resultant waveform appears in Fig. 6. Although the rise time is less than 5 ms, no key clicks could be heard in a nearby receiver.

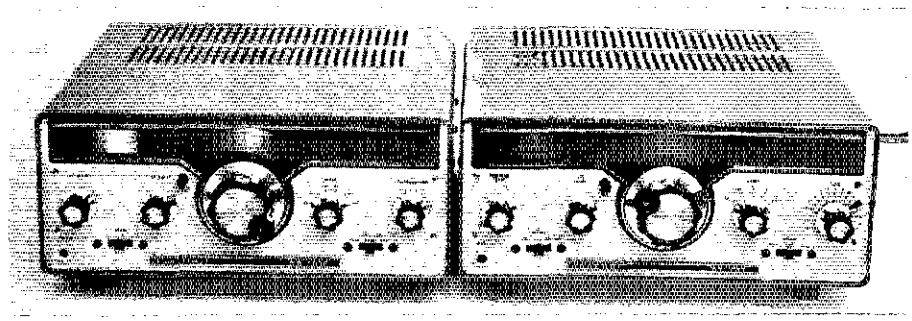


Fig. 1 — The HR-1680 and HX-1681 are compatible in both styling and circuitry. They make an attractive cw-only station.

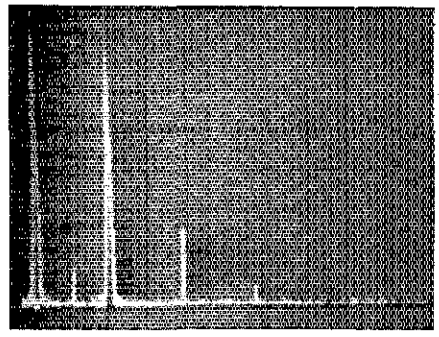


Fig. 2 — A spectrum analyzer photo of the worst-case output of the HX-1681 transmitter on 80 meters. Vertical divisions are each 10 dB. Horizontal divisions are each 2 MHz. The large pip on the far left is generated by the spectrum analyzer, while the next large pip is the fundamental signal. Worst-case harmonic output is 54 dB down and the worst spurious output is 64 dB down. The HX-1681 complies with present FCC specifications for spectral purity. All measurements were taken in the ARRL lab.

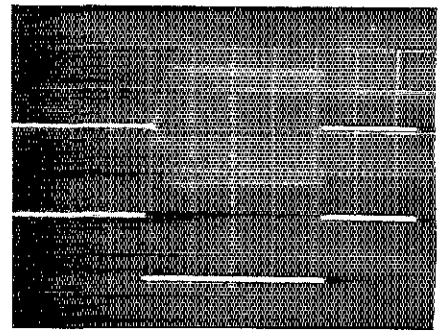


Fig. 3 — The original cw keying envelope of the HX-1681. Each division of the horizontal axis is 5 ms. The lower trace shows the actual key-down time. The wave starts to decay almost instantaneously after key up. The sharp trailing edge will produce key clicks.

A unique feature of the '1681 is the extensive use of diode switching. By diode switching the HFO oscillators and band-pass filters, many physical construction restrictions are removed and only a 4-section band switch is required.

Four pc boards contain the bulk of the transmitter. Construction of the unit took a total of three weekends. No problems were encountered during construction, except when trying to follow directions in the wee hours of the morning!

Operational Results

On-the-air operation with the HR-1680/HX-1681 combination was superb. The QSK action is very smooth, with no popping evident

Table 1
Heath HX-1681 CW Transmitter, Serial No. 908

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Power output: 100 watts on 80 to 15 meters; 80 watts on 10 meters.	>100 watts on 80 to 15 meters, and >80 watts on 10 meters.
Frequency stability: <100 Hz drift in a 30 min. period after 60 min. warm-up.	500-Hz drift during the first 30 min., <100 Hz per 30 min. period thereafter.
Harmonic radiation: 50 dB down at 100-watts output.	Worst case, 54 dB down.
Spurious radiation: 60 dB down at 100-watts output.	Worst case, 64 dB down.
Tuning rate: 15 kHz/turn.	15 kHz/turn
Tuning backlash: 50 Hz or less.	43 Hz.

*Assistant Technical Editor

[1]The Heathkit HR-1680 Receiver, Product Review, *QST*, January 1977.

in the receiver. If the band noise is objectionable or "semi-break-in" operation is desired, the LINEAR mode can be selected on the transmitter. Such operation is designed for use with an external amplifier; under these conditions, the receiver is muted continuously during transmit with a selectable amount of delay being chosen by the operator. Sidetone injection level is adjustable from the front panel. Received signal reports indicated good signal stability, but hard keying and key clicks were evident until the modifications were performed.

While I'm basically pleased with the unit, I'm puzzled by one design feature. There are two tuning controls on the '1681, one for final-amplifier plate tuning and the other for driver plate tuning. If there have to be two controls, why not gang the plate and driver tuning together and have a variable capacitor on the output network to match various load impedances? The fixed 50-ohm output is somewhat of a restriction and a Transmatch must be used with the transmitter to match other than 50-ohm loads.

If you're a Novice or just have a flair for cw, the HX-1681 will provide you with a solid signal on the 80- through 10-meter bands. The transmitter measures 6-3/4 × 12-3/4 × 12 inches (170 × 320 × 300 mm) HWD. It requires a power supply that will deliver approximately 800 V dc at 250 mA, 250 V dc at 50 mA, −130 V at 10 mA, and 12.6 V ac/dc at 2.5 A. A Heath PS-23 was used with the review transmitter. Price class of the HX-1681 is $240. It is available from the Heath Company, Benton Harbor, MI 49022. — *Gerry Hull, AK4L*

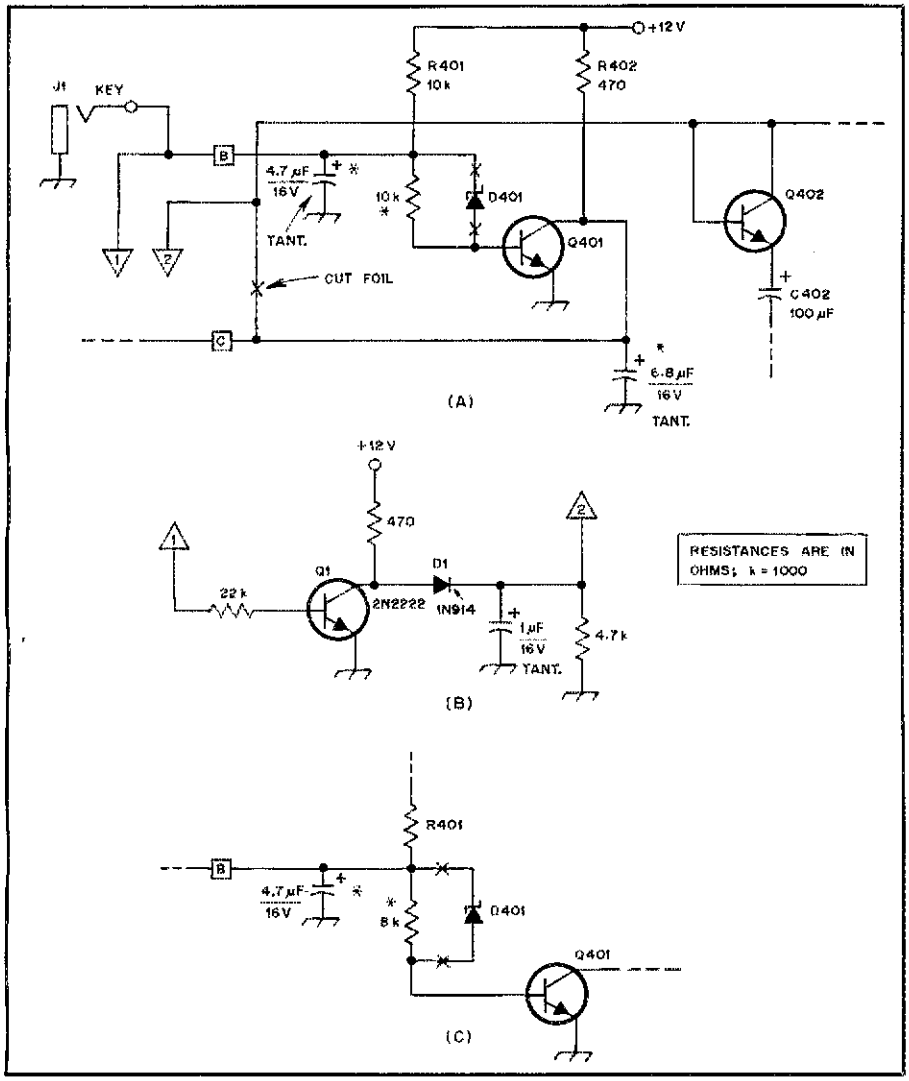


Fig. 4 — The modified circuitry of the HX-1681. At A and B, the circuit as modified in the ARRL lab. One foil cut is required. Added components are denoted by an asterisk; all components at B are added and mounted as described in the text. The circuitry at C uses two added components and does not require the additional components noted at B.
Q1 — Silicon npn 500 mW switching transistor, 2N2222 or equiv.
D1 — Silicon high-speed switching diode, 1N914 or equiv.

C-PROBE II

A nifty product of International Instrumentation, Inc. is the C-Probe II. This lightweight, palm-sized device, when connected to a frequency counter, enables the counter to furnish direct readout of capacitance values from 0.1 pF to over 10,000 µF. An optional circuit provision extends the high-capacitance range to 30,000 µF. The high µF option was not included with the unit tested in the ARRL laboratory.

Features of the C-Probe II include a crystal-controlled time base, 10-turn potentiometers for pF and µF calibration and a 10-turn zero-control potentiometer to compensate for stray capacitance up to 50 pF. Gate times are user selectable. Direct use of the C-Probe II with any frequency counter that has gate times equal to those used by the C-Probe II (0.1, 1 or 10 seconds) is another feature. It will work directly with BK, CSC, Data Precision, Davis, Fluke, Formula Int., Heathkit, HP Leader, Monsanto, NLS, Optoelectronics, Phillips, Poly-Pak, Quest, Radio Shack, Ramsey, Sabtronics, Sencore, Simpson, Systron-Donner and Tektronix counters. The C-Probe II emits frequency bursts containing a number of pulses per output gate time. These are effectively equivalent to the value of the capacitor under test.

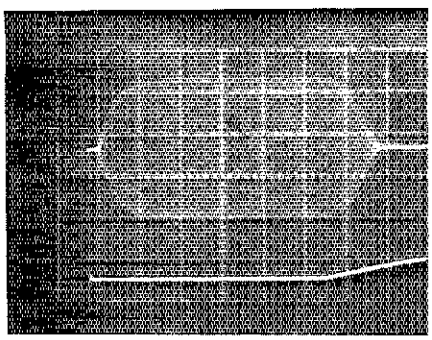


Fig. 5 — The cw waveform shown here, which results after installing the modification of Fig. 4 (A and B), produces no key clicks. At key up, the wave begins an approximate 7-ms decay cycle.

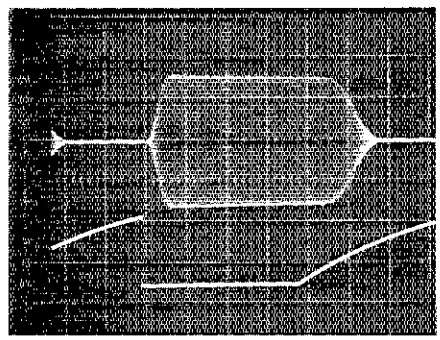


Fig. 6 — This waveshape, with the circuit of Fig. 4C installed, has an approximate 5 ms delay between key up and the start of the wave decay time. This delay may be disadvantageous at higher keying speeds.

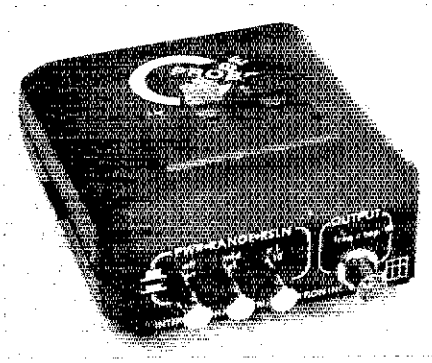


Fig. 7 — The C-Probe II. This accessory for frequency counters enables capacitance measurements to be read with the counter. The device is classified as a precision test instrument.

Table 2
C-Probe II Resolution

Range Switch	*pF*		*μF*	
Resolution Switch	× 1	× 10	× 1	× 10
Measurement Range	$1 - 10^7$ pF	$0.1 - 10^6$ pF	$0.001 - 10^4$ μF	$0.0001 - 10^3$ μF
Accuracy	0.25%	0.25%	0.5%	0.5%
Resolution	1 pF	0.1 pF	0.001 μF	0.0001 μF

Operating power for the C-Probe II is furnished by either an internally mounted 9-V battery or by an optional ac adapter unit. The unit tested had this convenient ac accessory. Other optional items may be ordered at the time of purchase. For instance, the Variable-Output-Attenuation Option is particularly useful with highly sensitive counters. Its purpose is to provide adjustment of the output amplitude of the C-Probe II from 10 mV to 5 V. If the option is ordered with the basic C-Probe II, it is factory installed. When ordered separately, this option is shipped in the form of a kit that is to be installed by the user.

The Hi-Mfd Option, mentioned above, provides a third range for the C-Probe II. This third range extends the upper measurement limit of the C-Probe II to 30,000 μF. If the Hi-Mfd Option is ordered at the same time as the basic unit, it too will be installed and calibrated. It is also available in kit form.

Some limitations in the use of the C-Probe II may be offered by counters with an insufficient number of digits in the readout. A seven-digit counter is sufficient for all measurements made by the probe. A six-digit counter is sufficient for measurements made in the × 1 resolution setting. This device, furthermore, is not intended to be used with counters that exhibit nonrepetitive gate and display times.

Table 2, prepared by the manufacturer, gives the range and resolution for the various settings of the range and resolution push buttons located on the panel of the C-Probe II. Verification of the degree of accuracy would have required precision equipment that was unavailable in the Hq. laboratory.

Dimensions for the C-Probe II are 2.5 × 4 × 5 inches (64 × 102 × 127 mm). Weight, including the battery, is 6.5 oz (184 gm). The enclosure is a molded plastic. Price class: $80. Orders may be sent to International Instrumentation, Inc., Box 3751, Thousand Oaks, CA 91359 — *Stu Leland, W1JEC*

HEATHKIT EE-104 PHASE-LOCKED-LOOP COURSE AND ET-3300 BREADBOARD

If somebody tells me something, I will remember about 10% of it. If they show me something, I will remember about 15% of it. But if they involve me in it, I probably will remember 90% of it. I cut my electronics "teeth" on Heathkits. Over the years, I have had a fondness for their products — partially because they have been very successful in giving me a sense of involvement with the equipment I have built.

It is easy for a programmed text to fall into a trap of merely showing the reader information without eliciting any involvement. Being a bit of a cynic, I wondered how well Heath had avoided this potential pitfall in their phase-locked-loop course. I was pleased to find that the text was authored by Howard Berlin, W3HB, [author of numerous articles in *QST* and other amateur publications. — Ed.]. Usually there are more people involved in the production of a programmed text than just the author; having a good writer didn't ensure that the course would be good, but it certainly didn't hurt either.

Before actually starting the course, I constructed the ET-3300 laboratory breadboard. Either this breadboard or something similar to it is required for full participation in the course. The ET-3300 consists of a chassis with four large breadboarding sockets installed on the top surface. Three dual-wire bus sockets are mounted between the four breadboarding sockets. These bus sockets are particularly useful for connecting various ICs and components to the appropriate power sources or ground. The ET-3300 has three power supplies built in: +5 V at 1.5 A, +12 V at 0.1 A and −12 V at 0.1 A. The supplies are voltage-regulated, current-limiting sources that can save a lot of headaches if a circuit is inadvertently wired improperly.

Each chapter of the program (total of six chapters) begins with an overview and lists the objectives of the unit. Then follows a detailed discussion of the theory of operation of the particular components under study. From the theory, the course moves into the "hands on, build-it-and-see-what-it-does" laboratory section where the student sets up experiments that demonstrate the theories presented earlier. Each chapter concludes with an examination of the most important aspects of the unit. On the page following the examination, Heath has provided answers to the questions. If the student has not answered the questions to his own satisfaction, he is encouraged to go back over the material and work with it until he has mastered it.

Topics covered include phase detectors, VCOs, loop filters, digital synthesizers using divide-by-N counters, and monolithic IC PLLs. Devices that are covered in some detail include the 560 series, the 4046 and the HCTR 0320. In addition to the theoretical discussion and experiments with these devices, there is an appendix that contains extensive manufacturer's data sheets for each chip.

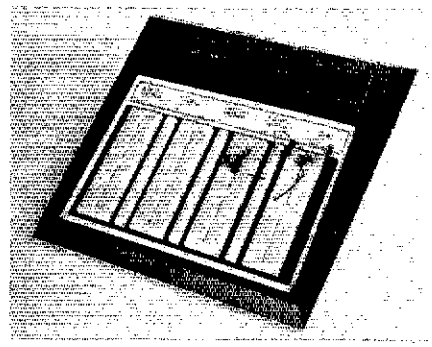


Fig. 8 — The ET-3300 is housed in an attractive case. The breadboarding sockets are made of a high quality plastic. The replaceable, silver-plated contacts also add to the durability and longevity of the unit. It compares very favorably with factory-built models costing up to twice as much.

If I have a criticism of the course, it is that some of the theory could have been backed up with more examples. It is logical and well thought out, but some of the concepts are difficult; some additional elaboration would have helped ease the way past these concepts. (That just means that some of us have to work a little harder.) Heath points out in their catalog that a dc voltmeter and a single-channel oscilloscope are needed to complete the experiments. They recommend a dual-channel scope and an audio signal generator if available. I would concur that some kind of scope and voltmeter are absolutely necessary, but I would add a frequency counter to the list of suggested additional test equipment. A frequency counter won't replace a scope, though. At times it may be advisable to double check the readings of a frequency counter against the scope; the low-percentage duty cycle of some of the wave shapes caused the frequency counter I used to give a false reading.

If the student scores at least 70% on the optional final exam, he'll earn a Certificate of Achievement plus three Continuing Education Units (CEUs).

Recently I enrolled in a college course. Tuition was $360 and the text book was $27.95. The text is full of ambiguities and sometimes about as clear as mud. The professor seems to be struggling to present the author's ideas in some coherent fashion. Also, I am out of the house away from my family two nights a week. Compare that with the Heathkit course — it costs only about $50 and it hasn't kept me away from my family any evening. The text is clear and well written. I've had hands-on experience which I might not get in a college course. Too bad the local college doesn't have the same money-back guarantee that Heath has! If you want to get a quick, inexpensive look at phase-locked-loops, then you may want to consider this course. Price class: course, $50; breadboard, $90; purchased together, $130. — *Peter O'Dell, KB1N*

B&W MODEL 370-15 ANTENNA

Dubbed a broadband folded dipole, this antenna is designed for operation within the frequency range of 3.5 to 30 MHz. The manufacturer claims a power-handling capability of 5000 watts PEP. The 370-15 requires no measuring or cutting; it is fully assembled and pretuned. The radiating elements are made of no. 14 stranded copperweld wire separated by lengths of PVC tubing 17/16 inch (21 mm) in diameter and 17 inches (432 mm) long. A 12:1 balun is supplied, to which is attached a 50-foot (15-m) length of RG-8/U coaxial cable. This balun contains a ferrite core made up of six 1/8 inch (3 mm) thick flat ferrite sticks approximately 4 inches (102 m) long and 7/8 inch (22 m) wide. At the midpoint of the opposite radiator is a balancing network. Investigation showed this network consists of six 3600-ohm noninductive resistors connected in parallel. Each resistor appears to be capable of dissipating approximately 50 watts. Therefore, the network would present a 600-ohm impedance with an approximate 300-watt dissipation factor.

Installation

B&W recommends the 370-15 be installed as

a flat-top or sloper with the low end of the antenna as close as 6 feet (1.8 m) to the ground. The only items necessary for the erection of the antenna are some lengths of rope and a couple of supports. Suggested antenna heights are a minimum of 15 feet (5 m) or an average height of 25 to 40 feet (8 to 12 m). The user is cautioned to uncoil only half of the antenna at a time and not to do so until ready for the actual installation. This is a precaution worth observing since you will more than likely wind up with a "bird's nest" of tangled wires, insulators, coax and homo sapiens if you don't!

When the antenna arrived at Hq., its construction stirred some memories. A bit of investigation revealed a close resemblance between the 370-15 and an antenna described some years ago both in *QST* and *CQ*.[1,2,3] Some of the OTs in the crowd might remember that antenna as the "T2FD." The basic design of the T2FD antenna suggests a feed-point im-

New Books

☐ *A DXer's Technical Guide*, published by the International Radio Club of America, P. O. Box 21074, Seattle, WA 98111. Softbound, 8-1/2 × 5-1/4 inches, 98 pages, $5 postpaid.

One branch of the radio hobby is broadcast-band DXing. It dates back to the 1920s and still attracts its share of radio enthusiasts. Perhaps the oldest of the DXer's associations is the Newark News Radio Club, started by the Newark (New Jersey) *Evening News* back in the '20s; running a close second is the National Radio Club. Coming into existence more recently is the International Radio Club of America with home bases in both Victoria, British Columbia, and Seattle, Washington. I recently came across one of the IRCA publications, *A DXer's Technical Guide*, a 98 page

along with cardinal (1, 2, 5, 100, etc.) and ordinal (1st, 3rd, 10th, etc.) numbers. The major portion of the book contains 147 variations of commonly used phrases grouped into several basic subject areas: ending the QSO, contests, regulations and so on, making it a useful tool for anyone involved in international QSOs. The last section of the book is a 450-word dictionary of Amateur Radio and electronic terms generally not given in the phrase section.

Using the book effectively may require a few tries, as most of us are in the habit of using short sentences or abbreviations and the phrases provided often contain more words than you might need ("Please repeat your QTH" instead of, simply, "QTH?"). There is no attempt to guide the reader on pronunciation — that's the job of the cassette tapes. "Espana" looks easy to pronounce, but would you have guessed ESS-PAHN-YA? Or, how about: "mnje" or "fsjo" in Russian? The

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

INSTANT BREAK-IN FOR THE HEATH SB-200

☐ The recent article by Clements[1] and two earlier articles[2,3] presented similar schemes for adding electronic bias switching to the Heath SB-220. In each case the SB-220 cathode-bias circuit was modified by using a Darlington pair as a series switch to control the bias applied to the 3-500Z final tubes. This bias scheme is readily adapted to the SB-200 even though the SB-200 uses a grid-bias arrangement.

The circuit is shown in Fig. 1. Instead of modifying the Heath bias circuit, a positive voltage is applied to the normally grounded filament winding center tap through the Darlington pair. When excitation is applied to the SB-200, the two transistors turn on, the center tap is grounded and the amplifier operates normally. With no rf applied, the transistors are off, the center tap is at +125 V and the 572B tubes are cut off. The 7500-pF capacitor ensures that the center tap stays at rf ground.

The component values are not critical. I started with Clement's circuit and ended up where my junk box took me. All components were mounted on a small piece of perf board supported by the two spacers which hold terminal strip S (the terminal strip which allows selection of 110- or 220-V operation). The filament-transformer center tap comes through the grommet near the terminal strip.

Installation of the circuit in Fig. 1 can be made in cookbook fashion but much can be gained by a careful reading of the three referenced articles. They are well written and provide insights into how and why the scheme works.

The approach presented here, leaving an existing grid-bias circuit intact and applying cutoff bias to the filaments and cathodes, can be used with many commercial and homemade amplifiers. The scheme is extremely simple and has the added advantage that existing alc circuitry does not have to be changed. I am particularly indebted to Fred Jensen, K6DGW, for technical advice freely given. — *Hank Garretson, K2SSX/W6SX, Loomis, California*

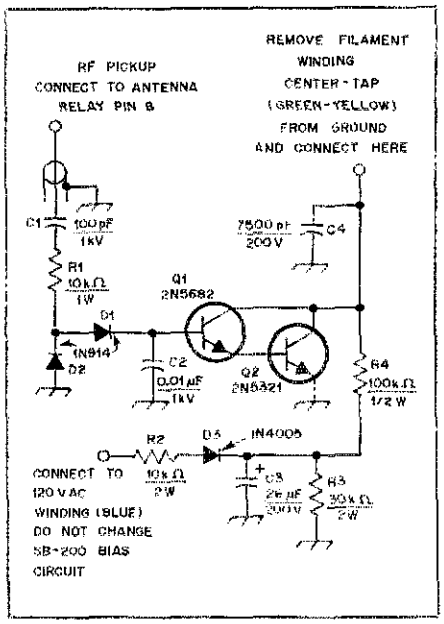


Fig. 1 — Electronic bias switching for the SB-200.

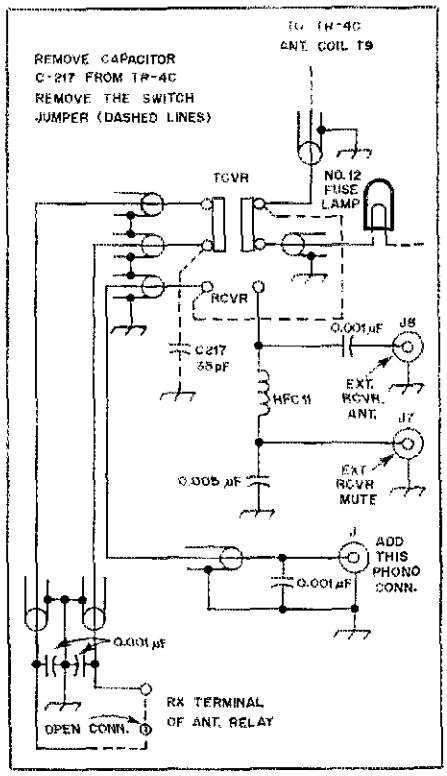


Fig. 2 — These simple changes in the Drake TR-4C provide positive muting when using the set in conjunction with an external receiver. J is an added jack. If feedthrough capacitors are used to bring the switch leads through the under chassis rf cage wall, the shielded leads may be replaced by unshielded wire. Likewise, the two 0.001 μF capacitors from these leads to ground may be omitted. The 0.001 μF capacitor in shunt with J is needed for proper operation.

References

1. Clements, "All Solid-State QSK for the Heath SB-220," *QST*, January 1980.
2. Frey, "How to Modify Linear Amplifiers for Full Break-In Operation," *Ham Radio*, April 1978.
3. Bryant, "Electronic Bias Switching for RF Power Amplifiers," *QST*, May 1974.

POSITIVE MUTING OF DRAKE TR-4C

☐ This modification provides positive muting of the TR-4C when used in conjunction with an external receiver. PTO dial-lamp switching for the R-4C external receiver is also provided as an operational status indicator. Fig. 2 illustrates the circuit modifications.

C-217 is removed from the TR-4C as are the switch jumpers (dashed lines). Add the phono connector J, as shown in the diagram. If the line to J from the receiver side of the transceiver/receiver switch is made very short, it need not be shielded.

Install a cable from J to the PTO lamp jack on the R-4C. The PTO dial lamp on the R-4C is illuminated only when that unit is the active receiver. After modification, you will find that the audio gain on the TR-4C does not have to be turned off when the external receiver is in operation. — *William F. Cade, K5HU, Tupelo, Mississippi*

TEMPO S-1 TRANSMISSION-LINE ADAPTER

☐ I recently purchased a Tempo S-1 transceiver, a fine piece of equipment except for the 1/8-inch (3-mm) phone jack used for connecting the antenna transmission line. In addition to being a nonstandard antenna connector, the jack seems to lack the durability to withstand the leverage exerted by RG-58/U coax. To avoid damage to the connector, I made an adapter consisting of a short length of RG-174/U with the appropriate connecting hardware obtained from Radio Shack.

At one end of the 4-foot (1.2-m) piece of RG-174/U, I soldered a 1/8-inch (3-mm) shielded miniature phone plug (RS no. 274-288). A small length of 1/4-inch (6-mm) dia heat-shrink tubing is slipped over the other end of the RG-174/U and that end prepared as shown in Fig. 3. The coaxial cable is laid aside momentarily. After tinning the center conductor, prepare a solderless PL-259 (RS no. 278-196) by filing 1/4 inch (6 mm) of the plating from the neck of the plug. This area of the plug is then coated thinly with solder.

The next step is to push the braid back, insert the center conductor in the neck and pin of the PL-259 where the conductor is soldered in place. To complete the adapter, the braid is pulled down over the neck of the PL-259 and soldered to the tinned area. After sliding the shrink tubing over the neck of the plug, it is shrunk by heating.

Finally, attach a PL-258 double female connector (RS no. 278-1369) to the PL-259. You now have an adapter that accepts a PL-259 but does not threaten to damage the rig. To ease the minds of the "worry-warts" among us, the insertion loss for such a short piece of RG-174/U is less than 1/2 dB. — *Hal Steinman, K1ET/K1FHN*

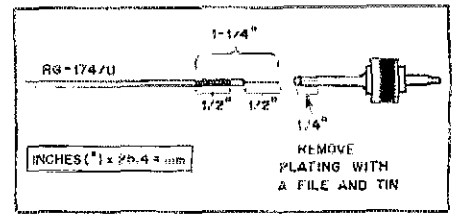


Fig. 3 — The antenna jack on the Tempo S-1 can be protected from possible damage by use of the simple adapter illustrated above. It consists of a short length of RG-174/U and connectors for each end.

ECONOMICAL SIGNAL GENERATOR FOR SSB RIGS

☐ I felt the need for a signal generator that would have high output peaks but low average voltage. It seemed such a device would be useful in tuning up my ssb transmitter and linear amplifier without unduly overpowering the dummy antenna.

*Assistant Technical Editor

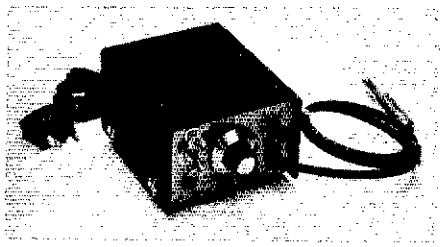


Fig. 4 — This miniature signal generator, which can be held in the palm of your hand, is a reliable ssb tune-up aid at W1ATC. It simplifies transmitter and amplifier adjustments.

The circuit is simple and has proved very useful, not only for transmitter tuning but also for setting the alc control on the linear amplifier. When my Dentron MLA-2500 is driven to the point where the alc starts to clip the peaks, the rf output to the dummy load is 50 watts.

Most of the components for the generator are available at Radio Shack stores. The 1000-ohm potentiometer shown in Fig. 5 is the level control. This control should also lightly load the transformer. — *Henry J. McCarthy, W1ATC, Grantham, New Hampshire.*

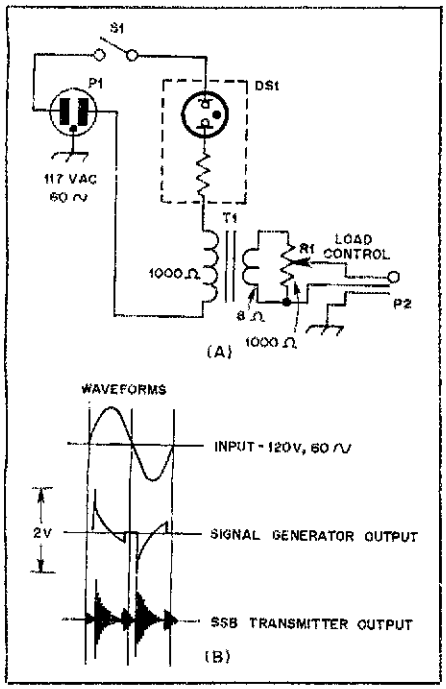


Fig. 5 — This circuit is for a very simple signal generator that can serve as an aid for adjusting ssb transmitters and linear amplifiers. T1 should be tightly loaded. Also shown is a representation of typical waveforms produced by the device and the resulting ssb transmitter output.

DS1 — Neon panel light with built in resistor, RS-272-704.
P1 — Ac plug.
P2 — Three-conductor microphone plug, RS-274-285.
R1 — Centralab potentiometer, 1000 ohms, no. F1-1000 or equiv.
S1 — Spst switch, RS-255-602.
T1 — Audio output transformer, 1000:8 ohms, RS-273-1380.
Misc. — Communications type knob, 0-10, RS-274-413; strain-relief plug; grommet.
Utility Cabinet — 3-1/4 × 2-3/16 × 4 inches, RS-270-251.

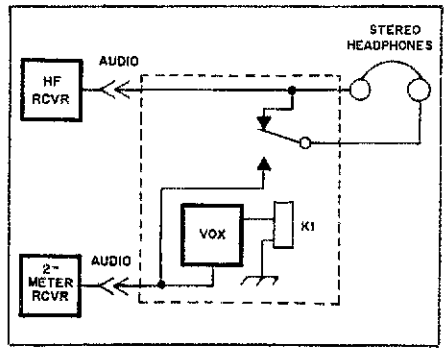


Fig. 6 — Contest operators who wear headsets sometimes miss contest related announcements on 2 meters. This simple arrangement of a VOX-operated relay and stereo phones enables the operator to hear the announcements while continuing contest activity.

CONTEST SPOTTER

☐ A contest operator frequently misses announcements of new multipliers on 2 meters because he is wearing headphones. This idea provides a remedy and can be implemented easily or modified to suit the operator's desire.

My version uses the VOX circuit described on page 404 of the 1977 *Handbook*, minus the antivox audio amplifier and detector. Vcc can be 5 to 12 volts, depending on the relay you have. Under normal conditions, both sides of the stereo phones are connected to the hf receiver. When the spotting net is activated, the VOX circuit, through K1, connects one side of the stereo headphones to the 2-meter receiver. If desired, the operator can mount an override switch near the key so that the 2-meter signal can be killed if 100% concentration on hf is necessary.

For ease of hookup, use the miniature phone plug provided with most 2-meter rigs and the headphone jack on the hf receiver (with matching transformer if needed). Some other variations of the circuit might include replacing K1 with an analog switch (such as a CD14016B). The VOX circuit could also activate a tape to record all spotting announcements for review. — *Ed Goss, N3CW, Beltsville, Maryland*

PREVENTING ROPE FROM UNRAVELLING

☐ To prevent the ends of a length of rope from unravelling, I use "Dip-A-Whip," a white vinyl liquid that hardens when dry. The ends are simply dipped in the substance, removed and allowed to dry. I also find this product is useful as brush-on insulation for places that are not easily insulated in more customary ways such as 4-connector microphone plugs. Since Dip-A-Whip is water resistant, it is useful on soldered connections that are exposed to weather.

Because it is a solvent-based product, usual care should be taken to avoid breathing the vapor or having it contact eyes or skin. Dip-A-Whip is available from the Brookstone Company, Peterborough, NH 03458, and from any marine supply store, in white or red. — *Mark Schlageter, WA2WOV, Sussex, New Jersey*

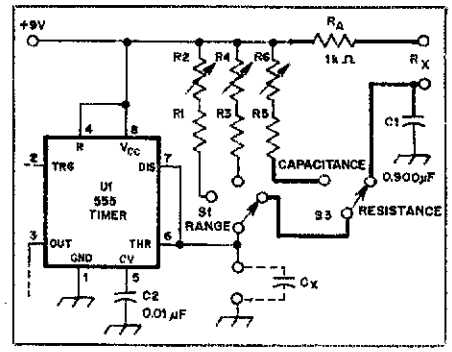


Fig. 7 — The capacitance meter described in August 1977 *QST* may be adapted to measure resistances from 100 to 999,999 ohms with this simple modification furnished by Willlam Huffman, N5CC. R_A is a 1 kΩ precision resistor inserted in the circuit for extra current safety. It is necessary to subtract 1000 from the readings, but this allows resistances below 100 Ω to be measured.

DIGITAL OHMMETER

☐ Kramer's capacitance meter described in August 1977 *QST*, "Using a Frequency Counter as a Capacitance Meter," can easily be made to measure resistance with the modification shown in Fig. 7. All that is involved is an additional switch and a capacitor. The counter will indicate resistances directly with a range from 100 to 999,999 ohms. The accuracy will be close to 1%.

A high-stability type of 0.900 μF capacitor is recommended. The equivalent capacitance may be obtained by a combination of capacitors. To check the value, use the capacitance meter. Alternatively, place a midrange precision resistor across the ohmmeter terminals and trim the capacitor until the correct value of resistance is indicated.

Measurement of resistances below 100 ohms, or shorts on the ohmmeter leads, should be avoided because the circuit draws high current on very low resistances, which will affect battery life. With mid- and high-range resistances, battery drain can be ignored. — *William Huffman, N5CC, Oklahoma City, Oklahoma*

HINTS FOR THE WORKSHOP

☐ The simple receiver (March 1980 *QST*) is an almost perfect fit for a Radio Shack no. 270-253 utility cabinet. — *Jonathan T. Morey, W2HXF, Princeton, New Jersey*

☐ Need a cheap, durable method of recessing switches and connectors? Save the end bells from defunct transformers. Mounted as shown in Fig. 8, the components are protected and slight irregularities in the cabinet hole are concealed. — *Ken Thomson, W5IFH, Pasadena, Texas* QST

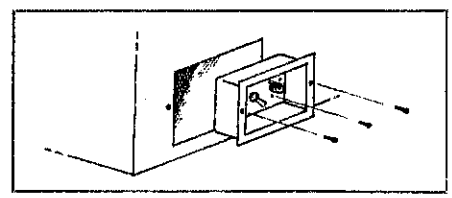


Fig. 8 — End bells from discarded power transformers make good protective covers for switches and connectors.

Happenings

Conducted By W. Dale Clift,* WA3NLO

Planning All-Important for Facing Antenna Regulation

The radio amateurs of Bristol, Connecticut, were understandably upset with the city's zoning commission's proposal to prohibit "private residential radio or television transmission or reception towers" exceeding 35 feet in height. This proposal came about as a result of a professional planner's recommendation to the commission, part of a complete overhaul of the city's zoning laws. Leaders of Bristol's ham community learned that the proposal would be aired at a public hearing and had approximately one week to prepare.

The area's hams held impromptu meetings at Saturday-morning get-togethers and other gatherings to spread the word. Others learned about the proposal at a club meeting and from a bulletin on one of the local repeaters. The message was this: "Show up at city hall and lend your support. If you want to take a more active part in planning a presentation to the zoning commission, contact John Cianci, N1AMB, or Paul Neveu, W1CKA."

A few days before the hearing, the Bristol hams leading the effort met. Everyone had been preparing, and now was the time to pool the resources. Chris Imlay, N3AKD, of ARRL's General Counsel's office, had prepared a letter to be read into the record. State Representative David O. Thorp, KA1KC, had also written a letter and was offering to read it in person at the hearing. The town's civil defense director, Rich Ladisky, WA1NSJ, had obtained a letter of support from the state commissioner of public safety and was preparing one of his own letters as director of civil preparedness. The police chief in a nearby town had offered a letter in support of the hams, based on experiences with amateurs helping his police department with a Halloween patrol and other activities. Another letter came from a Connecticut mayor grateful for hams' emergency communications work when his town was struck by a tornado. The ARRL Public Information Office also supplied brochures suitable for explaining to nonhams the value of amateur communications in times of emergency.

Next, the Bristol hams organized their speakers. They agreed that the presentation would be broken down into separate topics, each being covered by one or two "experts." RFI/TVI, structural safety, public service and legal considerations became the major "divisions of labor." Then each amateur took charge of his assigned topic, and, with the help of written publications, prepared on his own for questions related to his area of expertise. One, a civil engineer, took the subject of structural safety. Another amateur, familar with recent legal developments in antenna legislation, studied the League's General Counsel's letter and a recent *QST* article that reported the Oelkers case. (See December 1980 *QST*, page 68.) Some hams subdivided the public service topic and researched the public service contributions of local hams, and the person in charge of RFI/TVI considerations studied the League's *Radio Frequency Interference* book, sections of the ARRL *Antenna Book* and other materials.

Over 70 radio amateurs showed up at the hearing. The commission's chairman started the meeting by asking if anyone had anything to say about the first page of the draft proposal. Silence. "Page 2?" Nothing. As the chairman finished asking for comments on page seven, a ham rose to his feet and began striding toward the microphone. "Page eight?" Page eight was the page number of the height proposal, and hams had *plenty* to say about it!

Rep. Thorp led off the presentation by reading into the record his concerns that the proposal would adversely affect emergency preparedness. Next came the speaker with structural safety considerations. Next came public service testimonials, etc. No speaker spent more than 10 minutes making his point, and each successive speaker was careful not to rehash covered territory. The zoning commission was visibly impressed. Later, one commissioner remarked that in his many years in local government he had never seen such a well-organized presentation.

After the last ham had spoken, the chairman moved on to comments addressing other parts of the proposal. There was not enough time to hear the rest of the proposal, so the hearing was continued to another time. During the four-week interval some of the Bristol hams acquainted with one of the commissioners gave him a tour of some antenna sites. "I probably wouldn't have even noticed these antennas if you hadn't pointed them out," he commented on one occasion.

The hams assembled for the second and final meeting knowing all that could be said had already been said at the first meeting. Then came a pleasant surprise. A secretary began passing out copies of a memorandum of the changes the zoning commission had decided to make in light of the first hearing. The height limitation affecting amateur antennas had been removed. In its place the zoning commission proposed the following: "All residential radio or reception towers shall conform to the State Building Code and shall require a building permit." The Bristol hams did not have to say another word at the meeting. They had made their point. That night, the hams left city hall knowing that all the hard work preparing for the hearing was worth it.

[Editor's Note: This story is being repeated across the country by amateur clubs and groups. It is more effective to fight an overly restrictive zoning proposal at its inception than waiting until it has been enacted.]

PLAIN LANGUAGE RULES — HAVE YOU COMMENTED?

Here is a reminder that the FCC has proposed a complete rewrite in "plain language" of the Amateur Rules. The FCC would like to have your comments on this proposal. Send them to The Secretary, Federal Communications Commission, Washington, DC 20554. Comment deadline is June 19, 1981, and reply comments are due August 19. Make sure you put "PR Docket 80-729" at the top of the first page.

Information about the proposed rules appeared in a special article on page 49 of last month's *QST*. Also, League Hq. has sent each affiliated club a copy of the approximately 50-page document to encourage responses. If you need your own personal copy of 80-729, write to ARRL, Plain Language Rules, Newington, CT 06111. Please enclose $1 for each request to help us partially defray postage and handling costs. Let your voice be heard!

PETITIONS DISMISSED BY FCC

The FCC has dismissed the following petitions for rulemaking. The Commission will take no further action on the following:

RM-2892 — requested an interim licensing program for amateur operators because of FCC delays in issuing licenses.

RM-3426 — requested that the waiting period for retaking an amateur examination which had been failed be increased from 30 days to 60 days.

RM-3454 — requested that there be reciprocal licensing credit for those who passed the Advanced and Extra Class theory and those who passed Commercial Radio license examination element 4.

RM-3455 — requested that amateurs living outside the United States be permitted to take amateur examinations by mail.

OBSCENITY ON THE AIR RESULTS IN JAIL SENTENCE

A jury in Kansas City, Kansas, has found

*Deputy Manager, Membership Services, ARRL

Herbert L. Beecham of Kansas City guilty of transmitting obscene language by CB radio, using excessive power and causing willful interference to other CB operators. Beecham, whose CB radio name is "Channel Master," will serve three months in jail and forfeit his CB license and equipment to the government. This is the first known instance in which a jury has convicted a radio operator for obscenity. This success is expected to encourage further enforcement actions by the FCC involving obscenity over the airwaves.

FCC TO IMPROVE SERVICE FOR APPROVING ANTENNAS NEAR AIRPORTS

In the near future, FCC approval for amateur antennas that are either located near airports or exceed 200 feet in height will be processed faster. Under the present rules, amateurs are required to file Form 714, in addition to the usual Form 610, if their antennas come under the guidelines of §97.45 of the Amateur Rules. The new procedure will require one form only and will be processed by the Commission's Antenna Survey Branch. The FCC will announce the effective date of the rule change, and this information will be publicized in *QST*.

H.R. 8445

A bill introduced into the U.S. House of Representatives during the last few weeks of the 96th Congress sought to amend the Communications Act of 1934. Its purpose was to permit the Federal Communications Commission to use volunteers for the purpose of monitoring rule violations by Amateur Radio operators.

The bill, H.R. 8445, died at the end of the Congressional session, but the bill's sponsor, Rep. William E. Dannemeyer, R-California, is expected to reintroduce the proposal in the 97th Congress. The bill was intended to give support to the hams' efforts to combat malicious interference on the amateur bands. It would have permitted the FCC to recruit and train any Commission Licensee and accept the voluntary services of any such individual.

RACES STATION MAY DRILL ONE HOUR PER WEEK

The Department of Civil Defense for the Township of Cherry Hill, New Jersey, had submitted a petition (RM-3024) to the FCC asking it to amend its rules for the Radio Amateur Civil Emergency Service (RACES). The petition asked that the one-hour-per-week limitation on drills for RACES stations be extended because one hour is too brief a period to conduct an effective drill.

FCC disagreed with the petitioner. It said that one hour per week is enough time, and the same Amateur Radio operators, using the same equipment, could at any time operate under their Amateur Radio licenses. Therefore, the petition was dismissed and the time limit for RACES station operation stands.

160-METER RTTY PETITION DENIED

The FCC has dismissed a petition filed by Robert J. Roehrig to permit use of F1 emission type on the 1.8- to 2.0-MHz band to encourage radioteleprinter communications. Under the present rules, amateurs share this band on a secondary basis with the Loran-A radionavigation system, and the terms of the sharing agreement permit A1 and A3 emissions only. Loran-A has been phased out in this band in accordance with agreements reached at the 1979 World Administrative Radio Conference (WARC); however, the Commission denied the Roehrig petition because it was premature. FCC intends to initiate proceedings later to determine any new conditions for Amateur Radio use of this band.

Though most amateur radioteleprinter stations use F1 emission, FCC noted that it is both permissible under the rules and technically possible to use A1 emission on the band.

FCC "CENSURE-Y" CLUB

WD8NLS Revoked

FCC Administrative Law Judge Edward Luton has revoked the license of Alexander G. Sullivan, WD8NLS. FCC monitored Sullivan transmitting in the 40-meter amateur band and, as a result, cited him for violation of §97.119 of the rules: Obscenity, Indecency and Profanity. The Commission also cited Sullivan for violations of Sections 97.113 and 97.115; Sullivan had rebroadcast a commercial fm station which contained music.

Sullivan claimed he was intoxicated at the time of his August 1, 3 and 5, 1978 transmissions. He also testified that his transmissions were made during a period when he was a member of an informal group which called itself the "anti-communist free thinkers net."

The Commission concluded that "Sullivan's conduct was contrary to the public interest, and he does not possess the qualifications to remain a Commission licensee." — *Richard Palm, K1CE*

NEW SOLAR EVENT HOTLINE

A solar event hotline service is being provided jointly by the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). Information on sunspots, solar flares, geomagnetic storms and the impact of the sun's behavior on radio transmissions will be provided in daily recorded messages from the Goddard Space Flight Center in Maryland. The telephone number is 301-344-8129. The daily recordings will serve Amateur Radio operators interested in the sun's activities.

YL ISSB MEMORIAL SCHOLARSHIP FUND REMINDER

Just a reminder that the deadline for nominations for this year's YL ISSB Memorial Scholarship is May 1, 1981. The award will be given in September to a qualified student who demonstrates an interest in pursuing electronic, technologic or radio-oriented studies. Additional information and application forms are available from ARRL Foundation Headquarters, 225 Main St., Newington, CT 06111.

BEHIND THE DIAMOND

This edition of Behind the Diamond finds the BTD news team on the doorstep of Tom Frenaye, K1KI, Assistant Communications Manager in the Contest Branch of the Communications Department. Tom oversees the ARRL contest program and is responsible for announcing, scoring, log checking and results reporting of all ARRL contests including such heavy hitters as the November Sweepstakes, International DX Competition and Field Day. One half of the Contest Branch's "Dynamic Duo" (Tom's partner is Bill Jennings, K1WJ), he is an active and devoted contester, and has finished in the U.S. top ten in the ARRL DX test, CQ World Wide DX Contest and SS. Tom is an ardent cw man, preferring key to mike by about 40 dB. Contests are not his only forte — Tom is also an avid DXer and holds a pileup of awards including A-1 Operator Club, WAS, WAC and DXCC. He particularly enjoys chasing the rare USSR regions, with 166 out of a total 178 regions worked!

Contest Branch honcho Tom Frenaye, K1KI

First licensed in 1964 as WN6KIL, he added the Extra Class ticket to his repertoire in 1977 and was issued a good contest call, K1KI. Tom, who is affectionately known as "K one K one," graduated from California State University at Sonoma with a BA in Psychology (contest psych, no doubt) and an MA in Political Science (1975). Tom immediately put his education to work by running two successful political campaigns in 1974-75.

Many New Englanders "fly south" to escape the ravages of winter, but, in 1975, Tom overshot Florida by about one hemisphere when he landed in Antarctica! Not known for its sun-drenched beaches, the Antarctic was home for Tom and the Palmer Station, a scientific research outpost operating under a National Science Foundation grant. (See Tom's article, "Amateur Radio at the Bottom of the Earth" in April 1979 *QST*). He was responsible for all communications from the base as KC4AAC. And incidentally, BTD has learned that KC4AAC was also responsible for a third place finish that year in the CQWW!

In addition to Antarctica, Tom has traveled to many multipliers around the world. Presently, he makes his home in Unionville, Connecticut, with his wife and three feline friends. His diversions include chess, gardening (*contest point*settias?), computers and movies. In compiling this article, this writer checked back issues of *QST* to make sure that a BTD had not already been run on Tom — knowing how much he hates dupes! — *Richard Palm, K1CE*

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

THE WORLD IS OUT THERE

☐ What sparked me to write this letter was the "Correspondence" section of December's *QST*. Well, I have had it. When will U.S. amateurs stop referring to 14.100-14.200 MHz and 7.050-7.100 MHz as the "Canadian subbands"? Do U.S. amateurs *realize* that not only Canadians but the rest of the hams in the world are in there, too? Think about it! Before you scream for more frequencies in the U.S., clean up your act! One only has to listen in the phone bands used by U.S. amateurs; the QRM is terrible!

The problem seems to be the indiscriminant use of linear amplifiers in the U.S. Why use so much power and cause so much interference when it's unnecessary? Who cares if your RS or RST is 59 + 40 dB or if it's 58, as long as the signal is Q5? The signal strength is irrelevant if you can hear each other, right? But no, U.S. hams seem to have to run "legal power" as a matter of course, causing QRM. It's a vicious circle.

Granted linear amplifiers are useful tools, like other station equipment, if used properly and judiciously. If you reduce power and cause less QRM, you have more spectrum space on the bands in which to operate. I think there would be less objection to the band expansions if U.S. amateurs cleaned house a bit. You must realize that you are not the only hams in the world. Be considerate and think of others. You presently enjoy enough spectrum space in the bands; why do you want to ruin what little the rest of us have! — *Michael Masella, VE2FSM, Pierrefonds, Quebec*

SET THE RECORD STRAIGHT

☐ I noted in July *QST* in Technical Correspondence and also in a recent review of the new Murch Transmatch some incorrect statements by Doug DeMaw. He stated that the 50-Ohmer Transmatch was developed by the Millen Co. and then copied by me in designing the "Ultimate Transmatch." Not so! The original 50-Ohmer Transmatch first appeared in July 1961 *QST*. In fact, that was the article where the word "Transmatch" was coined. Millen Co. about two to three years later asked for, and received, permission to duplicate the circuit commercially. (Murch Co. did the same thing with the Ultimate years later.)

In the July 1980 issue, the circuit shown at Fig. 1A is not the Ultimate. The Ultimate uses a split-stator capacitor at C1 as Doug correctly points out. In literally hundreds of antenna lectures I have always pointed out that the harmonic suppression from the Ultimate is on the order of 10 to 15 dB. The circuit shown at Fig. 1A has little or no harmonic suppression.

Let's be honest: The FCC now requires a minimum of 40 dB harmonic suppression from the final amplifier stage. With 1000 watts output, the second harmonic would only measure one-tenth of a watt. The Ultimate, with a split-stator at C1 would knock that down at least 10 dB more to one one-hundredth of a watt. Anything else would really be "gilding the lily." So if you bought or built an Ultimate using a split-stator, don't be unhappy with it. It will do the job for you, and will do it very well. — *Lew McCoy, W1ICP/5, Silver City, New Mexico*

[Editor's Note: Publishing of this letter was delayed while the editor had the facts checked. Mac tells it like it is (was). — *W1RU*]

HIGH-FREQUENCY REPEATERS?

☐ You can't believe everything you read in *QST*. Quoting from December 1980, page 9: "High-frequency phone is the most popular amateur activity . . ." (It Seems to Us . . .). December 1980, page 70: "Repeater communication is *the* most popular activity in Amateur Radio today." (Washington Mailbox). And I thought it was ragchewing. — *William C. Mann, W1KX, North Jay, Maine*

[Editor's Note: "Washington Mailbox" lost that round.]

IMPORTANT QSO

☐ In this day and age, when complaining has become a national pastime, it may be refreshing to read the following report.

In the evening of November 29, 1980, I became, together with two neighbors, exposed to a shooting spree in our street. While waiting for a free landline to the police, I used my 2-meter rig to call for help. Two hams responded at once to my emergency QSO, made attempts to contact the police from pay-stations and promised to stand by until I could report the arrival of the police at my house. It is equally commendable that no other radio amateur used the frequency during that time period.

In addition to those courtesies, one of those two amateurs called me later over the landline to verify that all was well.

I am very proud of both the outstanding attitude of radio amateurs and of being in such superb company. — *Rudolf Steiner, WD6CDG, Los Angeles, California*

IMPORTANT QRT

☐ The importance of monitoring SWR and watching out for changes in that measurement was illustrated to me on two occasions.

While running 300 to 400 watts output to an open-wire-fed antenna I suddenly had problems achieving a proper match. After much tuning, the SWR still kept changing. I stopped operating and went outside to discover a dry branch had fallen across the open wire and had almost burned in two.

Another time when using a roof-mounted vertical it became necessary to rapidly compensate for changing loads with the Transmatch. A neighborhood boy saved my house from burning down by ringing the doorbell and telling me the roof was on fire! The far end of one of the radials had broken loose from an insulator. Arcing occurred to the roof flashing, setting off leaves that had gathered there. Quick action saved the house, but other hams could encounter the same situation.

The moral is: Stop transmitting if your SWR is changing. This is very important when running high power. — *Jim Ford, N6JF, Costa Mesa, California*

TECHNOLOGY VS. SKILL

☐ This is in response to KA2GJI's letter in December "Correspondence" under the caption of "Faster Than A Speeding Novice." I, too, was wondering why anyone would be calling CQ in a Novice sub-band at better than 20 wpm. The person I heard turned out to be a Novice who was using a keyboard and a code reader. I have encountered Novices with keyboards many times, so let's not be too quick to blame the so called "Hot Shots." HI. — *Stan Hill, WBØVCA, Tower, Minnesota*

☐ I would like to say "Amen" to Gil Simon, whose letter appeared in the December 1980 issue of *QST*. However, I would like to add a "Hex" on those hams who get a new electronic keyer and go on the air before they know how to operate it. All you can hear is dit, dit, dit, dit, dit, dit . . . — *Robert H. (Hale) Messenger, WD8OTX, Ada, Ohio*

☐ What can be done about the horrific transmitting on the cw bands, particularly on 40 meters? It seems that electronic keyers are a major cause. I have some suggestions that may help.

Set your keyer speed to 18 to 25 wpm and leave it there. Attach a bomb to explode if you go beyond 25 wpm. Use a good general-coverage receiver to tune in WCC, WSL, KPH, KFS, KOK or WNU when they send their traffic lists on 2, 4, 6, 8, 12, 16 and 22 MHz. Also listen on 500 kHz and down. These stations are sending for "real" and for 5 to 25 minutes at a stretch. See how the commercials do it! — *Noble H. Ireland, W4ZWD, Fort Walton Beach, Florida*

SELLING OUT

☐ Now you've gone too far! You're talking about expanding the phone bands again! Do you ever think of anything else? I doubt it.

The past 15 years have seen nothing short of rank discrimination against the cw operator, again and again.

The reasoning is obvious. A 15-year-old rig will still meet state-of-the-art standards on cw, but probably won't on phone. Hence, the wider the phone bands, the bigger the equipment market. So, it seems the ARRL is selling out to the EIA. Maybe the ARRL is secretly owned by the EIA? What would The Old Man say? — *Brian Sherwood, KA9EGW, Elmhurst, Illinois*

*Membership Services Assistant, ARRL

Moved and Seconded...

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November 19, 1980
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Strays

AWARD FROM THE PRESIDENT'S HOMETOWN

☐ The Rock River Amateur Radio Club, of Dixon, Illinois, will issue a certificate bearing President Reagan's signature to stations contacting any Dixon station on Saturday, March 14, between 2 and 8 P.M. CST. Look for them on 80 through 10 meters in the Novice and phone portions of 80 through 10 meters. To receive this certificate, send proof of contact and a large s.a.s.e. to: Clarence Webb, WD9CJB, 618 Orchard St., Dixon, IL 61021.

QRP AWARDS

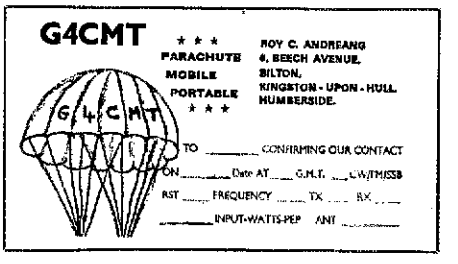
☐ The G-QRP-Club sponsors two QRP cw activity weekends yearly in addition to a quarterly magazine called *Sprat* and an extensive awards program. For 1981 the weekends are February 28-March 1 and September 12-13. Try 14.060 MHz at 1000/1400/2100 UTC and 21.060 and 28.060 MHz at 1100/1600/2000 UTC. Further information is available from George Dobbs, G3RJV, 17 Aspen Dr., Chelmsley Woods, Birmingham, B37 7QX England.

A NEW KIND OF RFI?

☐ We may think we've seen everything, or at least heard about it, when it comes to interference from amateur equipment. But, have you seen "Christmas tree RFI"?

It happened at the W1FB/W1CKK QTH during the holiday season in 1980. The XYL was lying on the living-room sofa in an effort to garner a few moments of much-needed rest after the Christmas furor, while I was downstairs doing some DXing on 40-meter cw. Much to the astonishment of W1CKK, the lights on the tree began to flash on and off in unison with the keying from the ham shack below. The tree lights were of the low-cost variety — the ones that are manufactured in Hong Kong and Taiwan. Apparently the string of lights and the extension cord (plus related house wiring) formed an approximately resonant circuit on 40 meters, permitting the bulbs to serve as dummy loads. Not being skilled at reading the Morse when rendered in "blinker," the XYL was at first perplexed, but upon relating the sidetone from the station to the rate of light flashing, it became apparent that she was witnessing a new type of RFI!

The simple cure was to install an ac line filter at the wall outlet to which the tree lights were connected. This may suggest an entirely new form of Christmas greeting: How about programming the tree lamps to spell out "Merry Christmas"? A simple matrix and a lamp driver should do the trick. It might even inspire Kris Kringle to drop off some ham gear next year instead of the usual ties, handkerchiefs and candy. — *Doug DeMaw, W1FB*



As QSL manager for the October 1980 PJ2CC operation, Bill, AA4M, of Falls Church, Virginia, received a most unusual QSL card from G4CMT. Seems that Roy made 13 QSOs with his 1-watt, 2-meter fm hand-held while descending in a parachute in April 1979. Roy thinks it was the first parachute mobile operation in the UK. [And who are we to argue? — Ed.]

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Call Signs — What the Well-Dressed Ham Will Be Wearing This Year

What's the latest in call sign fashions from the FCC's spring collection? Last December the Commission adopted Phase III of the call sign assignment system, which continues most of the policies established under Phases I and II with a few modifications. A year ago, it was Phase II that was the talk of the town; this year, it's Phase III. Let's put the new changes into perspective and review the entire amateur institution of call signs.

Q. What is the main change under Phase III?

A. With the adoption of Phase III of the FCC's call-sign assignment system, all amateurs not holding calls that reflect their license class are eligible for new calls. (Refer to Table 1: Group A calls are assigned to Amateur Extra Class licensees; Group B calls go to Advanced class ops; Group C calls to Techs and Generals; and Group D calls are issued to Novice class operators.) In addition to the above, amateurs are eligible for new call signs, (1) when upgrading license class, and (2) when moving to a new call-sign district.

Q. Can I keep my present call?

A. Yes — a call sign will not be changed unless the licensee specifically requests, and is eligible for, a call sign change. Licensees always have the option of keeping their present calls in all circumstances — including license renewal, upgrade, change of station location, change of mailing address and change of name.

Q. How do I apply for a call-sign change?

A. To request a change, an eligible licensee must place a mark in item 2F on the new Form 610 (don't use the old form dated September 1977; the Commission will process only those applications made on the new form dated August 1980). Important note: If you do *not* want a new call sign, *do not* check box 2F!

Q. Can I request a specific call sign?

A. No — the Commission will not consider requests for specific calls. Nor will it consider requests for specific formats or Groups. Such requests will result in processing delays of your application.

Q. I'm moving to a new call area and want a new call sign. Which group will it be issued from?

A. You will receive a call sign from the group that corresponds to your license class and new call area. If you presently hold a "preferred" call under the old rules, you may lose this preferred status should you choose a new call. (A hypothetical situation: An old-timer, Eliot, WIMJ, moves to Stratocaster, Nebraska and applies for a change in mailing address and call sign. Since he is a General class licensee, the Commission will issue him a General class call, Group C 1×3 format, such as NØAOK, *not* another 1×2 call.) The Commission will assign you a new call sign that is consistent with your license class.

Q. Are there special call signs for repeaters, clubs or RACES stations?

A. Yes, many are still in existence — however, the Commission is not issuing call signs for *new* club, military recreation, RACES or repeater stations. It will continue to renew and modify existing station licenses for clubs, military recreation and RACES stations, but will not renew or modify repeater station licenses.

Q. Is it possible to receive a secondary station call sign?

A. No. Secondary station licenses will not be issued, renewed or modified. A holder of a secondary station license may request that his or her secondary station call sign become the primary station call (this request must be made prior to the expiration date of the secondary license).

Q. How many call signs are available for distribution?

A. For the contiguous 48 states, there are approximately 100,000 calls in Group A. Groups B and C have roughly 500,000 call signs each. Group D has a whopping 7.2 million. There are enough to last awhile. Phase I started with blocks containing never-before-issued call signs, in most instances, to prevent the assignment of a call already assigned to another station. No schedule has been established for recovering formerly assigned call signs now unassigned. It is doubtful that the Commission will make these call signs available for reassignment for at least two or three years. Present policy calls for the assignment of call signs from the next lower group when the existing group's call sign supply is depleted. For example, once the block number 92 is depleted in Group A, Extra Class licensees will be issued calls from block 93, which is Group B (see Table 1).

Q. How does the Commission decide which call sign to issue?

A. Calls are issued sequentially and systematically. Once the calls in a certain block (see Table 1) are assigned, the next block is opened for use by the Commission. Group A (Amateur Extra Class call signs) is divided into 92 blocks. Blocks 1, 2 and 3 are the familiar K-, N-, and W-prefixed "1 × 2" calls. Blocks 4 through 13 contain AA- through AK-prefixed "2 × 1" call signs such as AJ1R. Block 83 contains the AA-prefixed "2 × 2" call signs — AA6DX, for example. In Group B, the Commission began issuing call signs from block 2 (except in the first call area where block 1 calls were first used). An example of a Group B call sign is KB6FR. Group C calls were first issued from block 2 — N1AFQ, for example. And last, but not least, Group D call signs were first issued from block 1. An example of a Group D call is KAØHJD.

Table 1

Group A Call Signs

Block no.	Contiguous USA
*1	K#cc
*2	N#cc
*3	W#cc
4-13	AA#c-AK#c
14-36	KA#c-KZ#c
37-59	NA#c-NZ#c
60-82	WA#c-WZ#c
83-92	AA#cc-AK#cc
93	Group B

The following prefixes will *not* be assigned to stations in the contiguous 48 states: AH KH NH NL NP WH WL WP. Pacific-area stations will be assigned AH#c KH#c NH#c WH#c, then Group B. Alaska-area stations will get AL7c KL7c NL7c WL7c, then Group B. Atlantic-area stations will be assigned KP#c NP#c WP#c, then Group B.

Group B Call Signs

Block no.	Contiguous USA
1†	KA1cc
2-23	KB#cc-KZ#cc
24-46	NA#cc-NZ#cc
47-69	WA#cc-WZ#cc
70	Group C

†KA prefixes will be assigned only to persons living in the first call district. Other KAs are assigned to U.S. personnel living in Japan. The following prefixes will *not* be assigned to stations in the contiguous 48 states: KH KL KP NH NL NP WH WL WP. Pacific-area stations will be assigned calls in the format, AH#cc, Alaska-area stations, AL7cc, and Atlantic-area stations, KP#cc. Once these blocks are used up, assignments will be made from Group C call signs.

Group C Call Signs

Block no.	Contiguous USA
*1	K#ccc
2	N#ccc
*3	W#ccc
4	Group D

Pacific-area stations will be assigned KH#cc NH#cc WH#cc, in that order; Alaska-area stations KL7cc NL7cc WL7cc; Atlantic-area stations NP#cc WP#cc. After these are depleted, Group D will be used.

Group D Call Signs

Block no.	Contiguous USA
1-23†	KA#ccc-KZ#ccc
24-41	WA#ccc-WZ#ccc

†Except KC4AAA-AAF and KC4USA-USZ
The following call sign formats will *not* be assigned to stations in the contiguous 48 states:
KH#ccc KL#ccc KP#ccc WC#ccc WH#ccc WK#ccc WL#ccc WM#ccc WP#ccc WR#ccc WT#ccc. Pacific-area stations will be assigned KH#ccc WH#ccc; Alaska-area stations KL7ccc WL7ccc; Atlantic-area stations KP#ccc WP#ccc.

*Call signs using these prefixes are not currently being issued.

*Assistant Manager, Membership Services, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

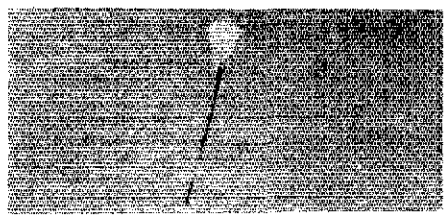
The CARRC and Project Skyhook

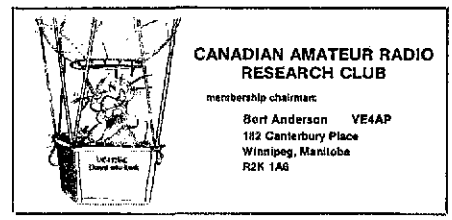
CARRC, the Canadian Amateur Radio Research Club, was organized very quickly in June 1979, when a group of Manitoba amateurs learned that they had an opportunity to fly a package on a high-altitude balloon. In only three short weeks, CARRC members designed that package, tested it and made it flight-ready for "Project Skyhook."

What went up was a 432-MHz beacon transmitter, and a 2-meter "simplex repeater" built from two Marconi DT-85 transceivers back-to-back. Input was on 147.33 MHz with downlink to the control station on 144.33 MHz. Uplink from the control station was on 144.3 MHz with output on 147.33 MHz. A system was devised to keep each receiver section off while a transmitter section was operating on the receiver's frequency. The antenna system was a pair of modified dipoles.

The ground station for Project Skyhook was located at the old Gimli Air Force base 65 miles north of Winnipeg. It consisted of an IC-280 transceiver and a KLM 70-watt amplifier feeding a homebuilt Yagi, adjustable for both azimuth and elevation. The helium-filled balloon was constructed of 0.5 mil mylar. Its inflated volume was 1.5 million cubic feet. Designed to carry a 1200-pound payload to 120,000 feet, it had no difficulty handling the CARRC package.

The launch took place on June 27, 1979. Operation through the airborne repeater began as the balloon approached 30,000 feet. Eventually, the balloon reached an altitude of 102,000 feet, permitting communications over an area with a radius of 400 miles.





Up, up and away! This balloon carried the Canadian Amateur Radio Research Club's repeater, VE4NRC, to an altitude of 102,000 feet in the project Skyhook experiment of July 1979. Amateurs who communicated through this airborne repeater received this distinctive QSL card for their efforts.

Initially, winds carried the balloon east, but as it entered the lower stratosphere, the balloon turned west. After 15-1/2 hours aloft, the balloon and the CARRC package landed unharmed near Broadview, Saskatchewan, about 50 miles northwest of Regina.

Project Skyhook helped CARRC gain recognition in both scientific and industrial circles. Having "flown a mission," CARRC now even qualifies for NASA space shuttle service! Membership in the group has grown from six to about 35, and includes amateurs from Alberta to Newfoundland. There is a particularly active chapter in Ottawa.

At the moment, CARRC has two very exciting projects underway. The Manitoba group is now putting the finishing touches on a microprocessor-controlled portable EME station — complete with parabolic dish mounted on a trailer — for operation on 220, 432 and 1296 MHz. And, of course, there will soon be another balloon flight. This time, the repeater will be microprocessor controlled, with the microprocessor going aloft and the controlling done remotely, from the ground. Launch date will likely be in July. Plenty of advance notice will be given through W1AW and the new CRRL OBS system.

CARRC is looking for new members. If you would like to become part of this very active group, contact the membership chairman Bert Anderson, VE4AP, 182 Canterbury Pl., Winnipeg, MB R2K 1A6.

HAPPENINGS

For the past three years, Brit Fader, VE1FQ, of Halifax, Nova Scotia, has operated the CRRL Central QSL Bureau in an efficient and first-class manner. This bureau handles nearly all the incoming QSL cards received by Canadian amateurs — 400,000 in 1980 alone. Effective February 1, 1981, Brit turned over his responsibilities to Andy McLellan, VE1ASJ, of Saint John, New Brunswick, and Andy's assistants from the Kennebecasis Valley Amateur Radio Club. New address for the CRRL Central QSL Bureau is Box 51, Saint John, NB E2L 3X1. Many thanks to Brit for his fine work in the past, and to Andy and his group, for volunteering to take on this important job.

CRRL President/ARRL Canadian Director Mitch Powell, VE3OT, and Assistant Directors Ralph Zbarsky, VE7BTG, and Harry MacLean, VE3GRO, met with DOC officials in Ottawa on the weekend of January 24. All three are experienced Amateur Radio instructors; Ralph is author of the CRRL training manuals. Purpose of the meeting was to help DOC prepare a new, expanded syllabus for the amateur, advanced amateur and digital amateur licenses. As a result of this work, DOC's TRC-24 will be revised to become a more useful guide for Amateur Radio students and instructors alike.

A question has come up of whether amateur equipment with provisions for the new WARC bands falls under the terms of tariff reduction 44534/2 of October 29, 1980. CRRL Counsel Bob Benson, Q.C., VE2VW, has contacted Tariff Division of the Department of Finance, and explained that most current-production hf amateur equipment now includes these new bands. Bob recommended that at this time, that Tariff Division issue an interim interpretive document to customs officials, to ensure that all such equipment enter Canada duty-free.

Over the past few months, CRRL has submitted several important papers to DOC. Here's a rundown:

1) In "Comments on the Discussion Paper on the Need for Improvements to Television Receivers," CRRL commended DOC for recognizing that most cases of television interference were the result of poor television design. CRRL did express concern that manufacturers were ignoring recommendations made in DOC's Electromagnetic Compatibility Advisory Bulletin 1, issued three years ago. CRRL asked DOC to require television set manufacturers to meet the requirements set out in this bulletin.

2) In "Comments on the New Table of Frequency Allocations," CRRL generally agreed with DOC proposals, but recommended that the new 10.1-10.15 MHz band become Amateur on a primary basis in Canada. At present, there are only a few "classified" Fixed allocations on these frequencies. Since these frequencies will soon be occupied by amateurs worldwide, they will no longer be appropriate for a "classified" service.

3) In "Comments on Amateur Callsigns and Special Prefixes," CRRL generally agreed with DOC proposals. DOC is prepared to issue call signs with special prefixes for significant anniversaries or events as follows: national — two months for use by all Canadian amateurs; provincial or territorial — one month for use by all amateurs in the province or territory; municipal — two weeks for use by amateurs in the local area. DOC would issue only one special prefix per anniversary or event. Regional DOC offices could still issue call signs with special suffixes for displays, special operations and the like.

4) CRRL asked DOC to permit 10-meter repeater operation between 29.52 and 29.69 MHz, in accordance with recommendations of the League's VHF Repeater Advisory Committee.

Amateurs in Saskatoon are planning a CRRL Midwest Convention for the summer of 1982. Watch for details, to be announced in this column. QST

New Assistant Director Gil Frederick, VE4AG, and Public Information Assistant John Gowron, VE4ADS, display their certificates of appointment at a fall meeting of Winnipeg ARC. Recently, John became CRRL's top public information officer. John will be responsible for coordinating the efforts of all League PIAs in Canada.

*163 Meridene Crescent West, London, ON N5X 1G3

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Moonbounce Made Easy

Without a good deal of expense and effort it is not normally possible to assemble a station capable of communicating over the difficult earth-moon-earth (EME) path. Occasionally, however, large professional stations have been active on EME. On 432 MHz the 1000 ft diameter radio astronomy dish at Arecibo, Puerto Rico and the 150 ft dish at Stanford University have been used and have given EME QSOs to stations running relatively low power and small antennas.

Recently a 32 m (105 ft) dish in Kiruna, Sweden, has been used for EME tests at 1296 MHz using the call sign SK2GJ, and this station hopes to be active again in the late spring or summer of 1981. This will present a unique opportunity to relatively modestly equipped stations (by EME standards) to work Sweden by EME.

A consideration of the link budget (see "New Frontier," December 1980) will indicate whether or not your station could work this path, and if not, what improvements would be required to do so. In November 1980 40 W of output power was available at SK2GJ, but this should be increased soon. If we assume that 100 W is present at the feed (they are hoping for 200 W but let's be conservative) of the 32 m dish (around 49.6 dBi gain) and that the path loss will be 272 dB (see ARRL Handbook, 1981 ed., page 14-10), then the strength of the moon-reflected signal at the earth will be −172.4 dBm. As an example of a receiving system, a 1 dB noise figure (77 K) receiver, 30 K antenna temperature, and a 23 dBi gain antenna (e.g. a pair of 38-el loop Yagis) give an effective receiver sensitivity of −174.3 dBm in a 500 Hz bandwidth. With such a system signals from SK2GJ would be 2 dB above the noise under favorable conditions.

The system noise temperature at SK2GJ should be in the region of 90 K. With their 32 m dish this should give them an effective receiver sensitivity of −201.7 dBm in a 500-Hz bandwidth, which is relatively wide by EME standards. 100 W of power and a 23 dBi antenna should give a −199 dBm signal reflected via the moon, producing a signal 2.7 dB over the noise at SK2GJ.

Quite a number of stations being used on tropo work today would probably be capable of working SK2GJ if they could be pointed at the moon. In their past tests linear polarization has been used, so that presents no problem. For EME work, however, it is desirable to have the capability to rotate polarization to compensate for faraday rotation and the geometric rotation which is a characteristic of the path. The ability to rotate polarization greatly increases the chances of completing a successful EME QSO.

If you have or build a system capable of working SK2GJ and would like to try to work them on their next appearance, send me an s.a.s.e. I will return it to you when I hear of their next operation with details of frequencies, times, EME procedure, etc.

It is of course not possible to predict exact signal strengths, but the above should give some idea of what is required. If SK2GJ get their 200 W then they would be 3 dB stronger then predicted. If the moon were at a closer point in its orbit the path loss could be 1 dB less, and so on. It might well be worth pointing any good tropo system at the moon next time they are on. You never know what you might hear.

FOOD FOR THOUGHT

While on the subject of 1296 MHz, you might like to read the following extract of the report on the 1980 vhf field day in the UK: "1.3 GHz — The number of entries for this band was eight more than last year, and over 200 different stations were known to be active in the UK. Equipment has advanced considerably, with all but three stations using ssb." (RSGB *Radio Communication*, October 1980.) The leading station, G3XDY, made 81 QSOs, with 10 other stations making 50 QSOs or more.

While circumstances are different here in the USA (stations tend to be farther apart) it is evident that activity, even in contests, is considerably lower than in the UK (and Europe in General). Perhaps now is not too early to think about getting your 1296 MHz (and above) system ready for the summer DX and contest season.

MICROWAVE COMPONENT SUPPLIES

One of the reasons people often give for not building equipment for use on the higher bands is that they can't find the parts to build it with. From time to time I will try to list some suppliers of microwave-related components. Write to them for catalogs.

For mechanical components and construction materials such as brass and aluminum sheet, bar stock, tubing, screws, nuts, etc., try Small Parts, Inc., 6901 NE Third Ave., P. O. Box 381736, Miami, FL 33138. They have a good selection (and a minimum order of $5).

For high-quality microwave chip capacitors and air-dielectric trimmers direct from the manufacturer, American Technical Ceramics (ATC) at 1 Norden La., Huntington Station, NY 11746, will supply components to individuals; minimum order $25.

Tim Grothause, WD8QWI, has written to say that he has some new microwave chip capacitors, trimmers, Teflon circuit board and a few other microwave-related items for sale. An s.a.s.e. to him will get you a list. Tim's address is 3108 Mt. Vernon Rd. SE, Cedar Rapids, IA 52403.

You might also look in your local phone book yellow pages under Electronic Equipment and Supplies. Most trade distributors will sell to individuals, usually with a minimum order around $25. It often helps to get together with a few other people when buying from distributors, as considerable savings can be made by buying in quantity.

INFORMATION NEEDED

If anyone has any schematic or operating information on the Alfred Microwave (TWT) Amplifier model 528 I'd very much appreciate it if they would let me know. I've been searching for such information without success for several months.

INFORMATION OFFERED

Anyone interested in information on the use of PIN diodes for microwave switching might want to write to Unitrode Corporation, 580 Pleasant St., Watertown, MA 02172, for their applications note on the UM9601-UM9608 series of PIN diodes. For an spdt switch at 1.5 GHz, an insertion loss of 0.2 to 0.35 dB and an isolation of 26 to 28 dB is claimed as typical performance (depending on the diodes used).

Those working with microstrip circuits might like to note an article on page 39 of the December 1980 issue of *Microwave Journal* (a trade magazine which may be available at your local college library). This article describes in some mathematical detail how to calculate microstrip impedance and losses and includes programs for use with TI-59 and HP-67 calculators.

MICROWAVE NEWS

An experimental 23-cm repeater has been established at an altitude of 2000 ft on Red Mountain, Ventura, California, with intended coverage of southern coastal California. The repeater, WA6EJO/RPT operates in the NBFM mode with an input frequency of 1296.1 MHz and an output frequency of 1285.4 MHz (10.7 MHz split), and has an output power of 4 watts to a 13 dBd gain antenna. The 10.7 MHz split was chosen to enable stations to be able to use the repeater with the minimum amount of additional equipment. For example, the transmitter on 1296.1 MHz could be used as the LO for a receive mixer with 10.7 MHz output, compatible with readily available nbfm receiver systems.

The same repeater site houses a 20 mW X-band beacon on 10.256 GHz, also intended for coverage of southern coastal California. This beacon i-d's as "WA6EJO Ventura X band beacon."

*c/o ARRL, 225 Main St., Newington, CT 06111

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Unsanforized Hardware

Raoul may be right.

In the summer of 1978, my friends and I were happily playing with our hand-held radios on 2 meters. I had a Wilson. A couple of others had the Tempo. There was even one fellow with a genuine Motorola HT. No matter what brand we owned, we were all using radios with crystals. A synthesized hand-held was unheard of. But then came along the Tempo S-1 and hand-held synthesis became a reality.

My friend Raoul said that this was only the beginning. His sources told him that there would be synthesized hand-helds for 220 and 450 MHz as well. And eventually, all three bands would be synthesized in one hand-held. This was hard to believe. But after the S-1 came the S-2 for 220 and the S-4 for 450.

Can the missing S-3 be the three-band radio that Raoul was talking about? Is a three-band synthesized hand-held technologically possible?

With the state of the art of integrated circuitry being what it is, anything is possible. Have you taken a look at the latest Radio Shack catalog? Well, on the inside back cover is an advertisement for a pocket computer. This is not a fancy calculator; it is a real computer that can be programed in BASIC with a full alphanumeric keyboard and 1.9 k of random access memory (RAM). Twenty-five years ago, you would need a trailer truck to haul around a computer with the same capabilities. Today, it fits in your pocket. Computers have shrunk to a relatively miniscule size because of IC technology. Miniaturization permeates the electronic industry. So, to those of you who think Raoul is wrong, he will accept your apologies on either 2 meters, 220 or 450 MHz. Pick your band.

EXPLODING BATTERIES!

Many of the new hand-helds on the market today are operating with lower voltages — in the neighborhood of 9.6 volts and some as low as 7 volts. Users are cautioned to use proper charging devices, especially proper cigarette-lighter-plug charging units in the mobile.

At the Shelby Hamfest, Huland Gardner, WB4THL, was displaying his Yaesu FT-202 that had one side completely blown out. Huland said he was charging his FT-202 batteries by means of a normal cigarette lighter plug in his truck. The charging hand-held was lying on the dashboard in the sun. He believes that the combination of 13 to 14 volts coming from the alternator and the hot sun attributed to the explosion that "sounded like a shotgun blast."

To be safe, buy the inexpensive cigarette lighter plug charging unit (with its built-in voltage dropping resistors) that is designed for your hand-held. If you must build your own, be sure to consider the voltage increase when your vehicle is running and, most importantly, do not exceed the recommended voltage for your hand-held. — from "The CVRA Repeater Journal"

REPEATER OF THE SKIES

The Laurinburg, North Carolina repeater has been declared open and available for all aeronautical mobile amateurs by the Scotland County Amateur Radio Society (SCARS). WR4AOX operates on the 146.025/625 pair, which is a clear channel from Washington, DC to Savannah, Georgia.

According to SCARS secretary WA4TFG, several private and commercial pilots from the Laurinburg-Maxton Air Base are already using the repeater. It is hoped that other hams in the southeastern skies will take advantage of the machine.

TEXAS 220

"TEXAS 220" is the name of a new bi-monthly newsletter dedicated to that "amateur radio band so rare that Kenwood or Collins don't officially admit it exists; a band where late night bull sessions can carry on for hours upon hours without being interrupted by someone field-testing his brand new, out-of-the-box-and-plug-it-in 'Super De-Luxe 900' and wanting to know whether or not the repeater has an open autopatch; a band that still has crystal rigs; a band where experimentation is not a dirty word — the world of 220."

Published by the Metro Quarter-Gigahertz group of the Dallas-Fort Worth area, the newsletter will emphasize 220 activity in the Lone Star State. Yet, the first issue was full of information that would be interesting to all 220 fans. If you're interested, send a self-addressed, business-size envelope with first-class postage to Wayne Day, WA5WDB, 1779 Continental Dr., Blue Mound, TX 76131, for details.

REPEATER LOG

During one of my more creative moments working for K1XA in the Public Service branch at ARRL Hq., Newington, I developed the Repeater Log that has appeared regularly in the *QST* Public Service column since May 1979. The purpose of the log was to increase the participation of repeaters in public service activities by highlighting those repeaters involved in emergency communications.

Each month, repeater public service activity reports pour into ARRL headquarters and, although some repeaters seem to appear in the log each month, there are always new repeaters joining the list, too. The log is very popular and to simplify reporting repeater activities, a report card has been created to do the job. The card's Communications Department designation is CD-258. Drop an s.a.s.e. to ARRL Hq. with a request for CD-258s and a handful will be sent your way shortly.

2-METER ORGANIZATION

Like a lot of things . . . there's no end to newcomers on 2 meters. Many 2-meter neophytes want to know how the band is organized — what modes are used where? Some repeater veterans have asked the same question, so here, by popular demand, is an annotated 2-meter organization chart.

144.0-144.1 — cw: Only cw is legal in this part of the band, and most of that activity is between 144.09 and 144.1.

144.1-144.5 — ssb (more specifically usb): 144.2 is a popular calling frequency and most of the activity centers around it.

144.5-144.6 — linear translator inputs: There aren't too many linear translators, so in densely populated areas, fm repeater inputs, with 20-kHz, spacing, may be found here.

144.61-144.89 — fm: Repeater inputs every 20 kHz.

144.9-145.1 — nonchannelized simplex, i.e., weak-signal (non-fm) operation.

145.1-145.2 — linear translator outputs: See 144.5 above.

145.21-145.49 — fm: Repeater outputs every 20 kHz.

145.8-146.0 — OSCAR: Mostly cw and ssb activity uplinking or downlinking with the orbiting repeaters.

146.01-146.37 — fm: Repeater inputs every 30 kHz; in some areas, there are inputs every 15 kHz or an input followed by an output every 15 kHz.

146.4-146.58 — fm: Simplex activity; 146.52 is the "national simplex frequency"; in some densely populated areas, repeater inputs may extend up to 146.46.

146.61-146.97 — fm: Repeater outputs every 30 kHz or outputs (and inputs) every 15 kHz. (See 146.01 above.)

147.0-147.39 — fm: Repeater outputs every 30 kHz or outputs (and inputs) every 15 kHz. (See 146.01 above.)

147.42-147.58 — fm: Simplex activity: W1AW transmits on 147.555.

147.6-147.99 — fm: Repeater inputs every 30 kHz or inputs (and outputs) every 15 kHz. (See 146.01 above.)

FM/RPT SURVEY

My mailbox runneth over. The response to the January FM/RPT survey is greater than I expected and the completed surveys are still coming in at a 20-per-day rate. If all goes well, the next installment of this column will have the results of the survey. So stay tuned. QST

*72 Stiles St., Waterbury, CT 06706

Strays

COSTLY JAMMING

A recent issue of a British publication, *World Business Weekly*, discusses the high cost of jamming international broadcasts. Quoting *World Radio-TV Handbook*, it said: ". . . jamming Voice of America transmissions costs the Soviet Union $43 million a year in power alone, to say nothing of more than $100 million for manpower and maintenance or of the $250 million estimated original cost of a network of some 2500 jamming transmitters."

SECOND OPINION BRINGS GOOD NEWS

A letter to the editor in the Stuart (Florida) *News* entitled "Ham Operators Saved the Day," recounted how the writer, a resident of Caracas, Venezuela, was able to avoid costly and potentially dangerous surgery because he spoke with a U.S. physician/ham over the air. Dr. David Nehme, WD4OOC, of Jensen Beach, Florida, arranged for Marcel Nasr to travel to the U.S. for a second medical opinion — which showed that surgery was unnecessary. In appreciation, the Venezuelan wrote, in part, ". . . I am back to Venezuela thinking how lucky we are in this world to have the ability to communicate with each other and hope the work of people like Dr. Nehme be appreciated both in your community and, through other hams, in other countries. — *information via W4KEB*

I would like to get in touch with . . .

someone who could give me information about the International Police Association Radio clubs or any other police radio clubs. Walt Bearden, KA4MVJ, 1213 Park Glen Rd., Knoxville, TN 37919.

physics instructors and lecture demonstrators to start a net for exchanging ideas and techniques of physics instruction. Sam Strohl, KA4GXT, Physics Department, University of Virginia, McCormick Rd., Charlottesville, VA 22901.

an amateur or TV DXer in the U.S. I am a student at Wesley College, Colombo, which has an amateur station, 4S7WC. I am 15 years of age. M. R. Hassen, 12 Chandra Path off Sinsapa Road, Wellawatte, Colombo 6, Sri Lanka.

QST Profiles

Conducted By Dave Bristol, KA2BNV

CBS' Leonard: DXer and Network News President

William A. (Bill) Leonard II, W2SKE, president of CBS News, was born April 9, 1916, in New York City. He spent most of his childhood in Orange, New Jersey and Westport, Connecticut. Bill received his secondary education at Avon (Connecticut) School, where he was a letterman in baseball, football, track and hockey, as well as being an unaffiliated amateur boxer. Years later, he boxed an exhibition round each with Ezzard Charles and Joe Louis. At Dartmouth, from which he received his BA degree in 1937, he was managing editor of The Daily Dartmouth, *a leading actor in the Dartmouth Players and head of the college's Amateur Radio Club, W1ET. He was first licensed in 1934 as W1JHV, and over the years has also held such exotic calls as HI8SKE, HH2SKE, DJØTZ and FØWL. Bill is married to the former Norma Kaphan Wallace. They have six sons and live in Washington, DC and New York City. With more than 30 years of service to CBS as a news correspondent, broadcast personality, producer, writer and executive, he was responsible for the development and supervision of such successful news programs as: "60 Minutes," which has become the most popular public affairs series in television history; "In the News," an award-winning series of current events broadcasts for children; the "Magazine," a series of monthly daytime informational broadcasts. As the head of CBS News, Leonard has been responsible for: the selection of Correspondent Dan Rather as the successor to Walter Cronkite on the "CBS Evening News"; the critically acclaimed "CBS News Sunday Morning," network television's only regularly scheduled Sunday morning news broadcast; the restructured Monday-through-Friday editions of "Morning"; "Universe," a new science magazine anchored by Walter Cronkite; and the Western Edition of the "CBS Evening News," the only regularly updated network news broadcast.*

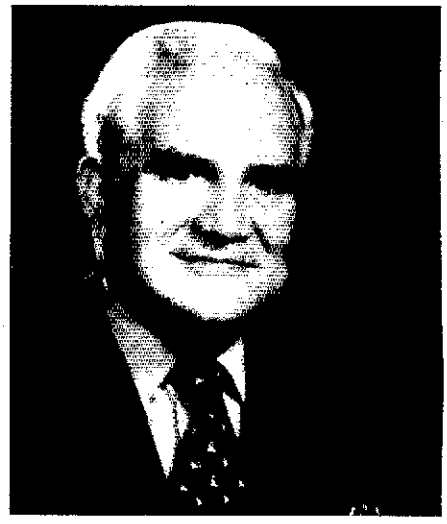
QST: *How and when did you first become interested in Amateur Radio?*

Leonard: I first got interested in ham radio as an SWL to broadcast-band DX stations in the mid 1920s. This interest gradually evolved into a desire to communicate myself, to build and to tinker. I became deeply interested while a student at Dartmouth College in 1934 and got my first ham license in that year. While at college I operated the Dartmouth station, W1ET, and at home, my own station, W1JHV.

QST: *What are your present amateur interests and activities?*

Leonard: I am almost as interested in ham radio as I have ever been — perhaps not quite, because I do not have much time and, frankly, I am getting a little old to pursue DX contests the way I once did. But I am set to operate in my home in Washington, DC, on all bands, 2 meters to 160, phone and cw. In New York, where I work during the week, I am content with a 2-meter hand-held to keep in touch with a few friends every day.

QST: *What do you find especially intriguing about DX operation?*



Although he has the sophisticated technology of a major corporation at his disposal, CBS News President Bill Leonard, W2SKE, hasn't lost his boyish enthusiasm for Amateur Radio.

Leonard: Amateur Radio has always seemed like something of a miracle to me and the more I understand it, the more of a miracle it still seems to be. So it isn't surprising that the farther away someone is, the more excited I get talking to him. Even when I have the equipment and antennas to talk literally anywhere in the world, I recognize that I am pretty much at the mercy of nature. I still get a tremendous kick out of it, particularly DX contests.

QST: *Would you describe the Voice of America Amateur Radio program and your involvement in it?*

Leonard: The VOA program is no longer in existence, but it went on the air regularly for more than 15 years. It was produced by Gene Kern, W2BAK, now retired from the Voice of America, and was written and voiced by me. It consisted of news, interviews and features about ham radio for the benefit of amateurs all over the world.

QST: *What are some of your amateur-related awards?*

Leonard: Almost all of my amateur-related awards are for DX contests. I have never counted them but there must be several dozen of them, going back to the early 1950s. In addition, I hold a DXCC and WAC award.

QST: *What influence has your broadcasting career had on your Amateur Radio avocation?*

Leonard: My broadcasting career and ham radio have been inextricably intertwined. For that matter, my nearly five years in the Navy were closely linked with ham radio. At that time I was engaged in trying to figure out ways to jam German radio-controlled guided missiles. I worked with hams on what really was a do-it-yourself, build-it-yourself, ham radio project which I am glad to say was very successful. I first became interested in ham radio, as I mentioned, from listening to broadcast radio and then became interested in broadcasting as a career as a result of being fascinated by the miracle of radio itself. Life in broadcasting has been richer because there are so many amateurs around you every day. Although I have never been in the engineering side of the business, it has been helpful to me as a journalist and as a broadcaster that I knew something about the basics of the medium that we are using.

QST: *Do you have any thoughts on the newly allocated amateur bands?*

Leonard: Not surprisingly, I feel that the more ham bands we have, the more interesting ham radio becomes. I would rather we had the use of 50 kHz on 10 bands than 500 on one. Each band is a new adventure; each band has new possibilities at different times of the day and in different seasons. I am already thinking of what new antennas I might be able to put together for the three new bands. And I will be there when the gong rings.

QST: *What are your views on "no code" licensing proposals?*

Leonard: I guess I am a conservative on this one. I am not particularly a cw man, and I have always had to struggle at each level of code speed. But I really do feel that having to pass a code test is a good way of separating those who *think* they would like to be hams and those who really want to be. I would oppose any loosening of the code regulations.

QST: *Who is the most memorable amateur you've met, and why?*

Leonard: I have met any number of outstanding amateurs. Certainly one of them is Barry Goldwater, K7UGA, who gave unstintingly of his time and resources to provide facilities for phone patches to Vietnam, year after year, and who never asked for a bit of credit for it. High on my list would also be Bob Gunderson, W2JIO, who has been enormously involved with doing things for other people all of his life, in spite of a handicap that would have stopped many people far short of their first Novice test. Bob, of course, is blind. He is far from the only seriously handicapped amateur who has made very great contributions over the years; he is just one I happened to have known well.

QST: *What do you envision in the future of Amateur Radio?*

Leonard: I have a hunch, and it is only a hunch, that Amateur Radio is going to get more and more tangled up with amateur computer technology as the years go by. I don't know whether that is good or bad, but it seems to be moving in that direction. One thing that bodes well for the future of ham radio is that it is pretty well entrenched. We really have an enormous amount of spectrum space at our disposal and in general we are keeping it pretty well occupied. The real test will come when the entire generation of original radio enthusiasts has passed on. Then the question is whether the next generations care enough about the spirit of experimentation and the miracle of through-the-air communications to carry it on, and inspire others to get interested and become involved. My bet is that ham radio, in one form or another, will be around 100 years from now.

How's DX?

Conducted by Ellen White,* W1YL/4

DX'ing — Love at First Bite

Can *you* remember when you first experienced those ambivalent moments common to incipient DXers?

☐ Working "just one more station" before closing down

☐ Wondering what the DXer on the other end looked like

☐ Calling home to see if the mailman left you any new QSLs,

☐ Worrying over your ratio of worked-to-confirmed

☐ Joining the local DX club

☐ Entering a pileup almost against your will, even though you didn't know the station being called

☐ Being a bit late for work because the band was open

Hasn't it happened to us all — that magical moment of realization that you're really not a casual DXer (someone who can take DX or leave it), but one interested vitally in increasing your countries' total, improving your station with that end in mind, and so on.

Probably about half the readers of this column are newly afflicted with the above ailment for which there probably isn't any *real* cure; the malady goes into remission from time to time but is apt to resurface at unlikely times. Don't fight it; join the crowd!

RECORD KEEPING — THE NECESSARY PAPERWORK

How to easily retrieve all that DX-related data on stations you've worked is an ongoing problem, one that is complicated by the rapidly escalating volume of contacts on various bands. Until computerization of station records is commonplace, it helps to know some time-tested ideas that work. (Speaking of computers, this column makes a dandy forum for those of you who have tips on the use of computers/programs for this very purpose.)

*19620 SW 234 St., Homestead, FL 33031

Incoming Cards

How to file? Alphabetically by prefix "overall," alphabetically by prefix within a country, by continent, etc. Probably the most commonly used system is straight filing alphabetically by prefix, starting with "A" and with numerical prefixes following "Z." Hazards? As prefixes change (and there have been large numbers of changes in recent years) you should remember to refile the cards under the new prefix. If you use this as an active file for use when you work someone (a quick scan for a name when a call is familiar, for example), you may find that the volume of cards in several categories — such as Gs and DLs — is cumbersome, and you may want to keep these in separate shoe boxes. Whatever system works for you, use it on an ongoing basis to make QSL retrieval easy when you're ready to submit cards for an award.

Countries Worked/Confirmed

The most regularly used item in the DXers' arsenal is Operating Aid 7, the ARRL Countries List. Updated on a regular basis, this handy compilation of what counts and what prefixes are current is a must item. (Please forward an s.a.s.e. to ARRL Hq. for one of these handy forms.)

The record of countries worked may be as simple as pencilling a check mark next to the country, changing to an inked check when a QSL is received. This works fine for your overall DXCC but your separate band totals will call for modifications. Here again the easiest way to approach the system is to make copies of the Countries List for each of the bands/modes you're active on. A nice refinement of this is to glue the prefix/country column onto a lined sheet with room for all the bands/modes. At a glance you can readily see (1) what country is confirmed on what bands, (2) what is missing, and (3) your overall country totals.

How about sharing *your* system with column readers?

TIMELY TIPS

☐ *The SARL Highveld Branch 21st Anniversary DX Award* will be specially issued for contacts during the period commencing at 0001Z April 11 through 2359Z April 20. There are two sections, one for DX stations working three Highveld members, and the other for ZS/ZR stations, who must work five of the Highveld members on the hf bands. Submit your QSL, a log extract with applicable data and three IRCs to: Awards Manager, Highveld Branch SARL, Box 10188, Johannesburg 2000, Republic of South Africa. The first DX station to work 10 (at least one on cw) of these stations will receive a special award as well as a year's subscription to *ZS* magazine and *Shacknews*. (The ZS stations that must be worked for the award will all use the suffix /HVB after their call. Closing date for award applicants is May 30, 1981.)

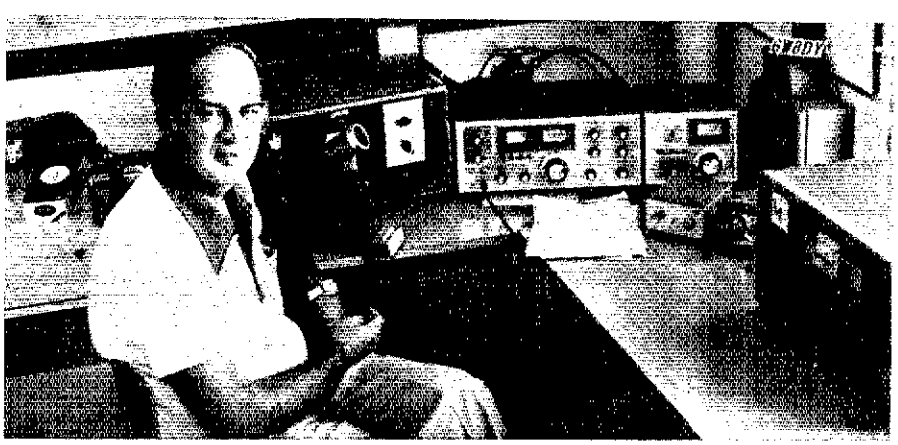
☐ LX2BQ (via WB2RAG) notes that all QSLs sent to him go direct, not via the Bureau, and should be accompanied by two IRCs.

☐ AI3V (via AJ3N) is operating *VQ9AA* until mid-1981. Operations are normally 10-15-20 meters with 40 and 80 hoped to be added. Operations principally on phone. QSL via the Diego ARC.

☐ *FCØFOC* was operated by DJ3TF and *FCØGAJ* by DF7RT during their recent Corsica operation. Their late-summer sojourn saw huge pile-ups and both report a smooth operation thanks to the good procedures of the Ws. W6/W7 propagation was particularly good. Wolfgang, DJ3TF/FCØFOC, looks forward to possible operations from the Dodecanese, San Marino, the Vatican, Channel Islands, or some other seldom-found prefix.

New to DXing?

Take your tip from W1NG, in the new *ARRL Operating Manual*, and set your sights



6W8DY, shown at his station, is certainly one of the best known contest-DXers. Jack's specialty is 80 meters where he used phased dipoles and a 3-L wire beam aimed at North America. Jack is a Canadian teaching school in Dakar, Senegal. He's now on a 12-month leave in Canada (VE3DFJ) and expects to return to Senegal in autumn of this year. On the right Jack is shown with visitor 3A2HB. *(VE4SK photo)*

somewhat realistically. If you are brand new you should have little trouble raising contacts/QSLs in those countries with active and large ham populations: CT DJ DM EA F G GW HA HB I JA K/W/N/A KV/KP2 LZ OE OH OK ON OZ PA PY SM SP VE/VO YU YV ZS1-6.

Almost as easily, a little concerted effort (and a DX contest or two) should bring QSL rewards from: 3D2 4U(UN) 4U(ITU) 4X 5T 5Z 6W 6Y 8P 8R 9A(M1) 9H 9J 9L 9Y C6 CE CM/CO CN CT2 CX EA8 EI EL FC FG FM FP FY GD GI GJ GM GU HC HH HI HK HP HR IS J3/VP2G J6/VP2L J7/VP2D KH6 KL7 KP4 LA LU LX OA OX PJ(NA) SV9GR) TI UA(EUR) UB UC2 UP2 UQ2 UR2 VK VP2M VP9 VQ9 XE YN YO YS ZE ZF ZP.

Higher degrees of difficulty will be reviewed next month.

EDITORIALLY SPEAKING

A new column editor, like a newly bottled wine, needs a period of time to reach the appropriate bouquet. Additionally, until the mechanics of transfer of editorial responsibility are completed there are apt to be a few slips here and there. But, knowing of the DX interest of your new editor, and "background," you may apt to be a bit more patient.

Having successfully made the short-path journey from the northern latitudes of Connecticut to the more favorable propagation of South Florida, your new editor shortly hopes to be reporting additions to her own 310+ DXCC total in addition to *your* DXploits — using the type of journalistic application evident in years of *QST* contest reporting.

More importantly, the column's flavor will reflect your interests in DX, contributions from your experience, photos of your station and antennas, tantalizing tidbits from around the world and advice to those mutually afflicted with DXitis.

This author's concept of a column will be a direct application of what readership feedback delineates. Thus, your suggestions are more than welcome — they're a must! Please address all correspondence for "How's DX?" to the address shown at the bottom of page 63.

Good DXing, one and all.

QSL Corner

Administered By Joan Becker

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.

How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

Claiming Your QSLs

1) Send a 5- × 7-1/2-in. s.a.s.e. to the bureau serving your district.

2) Neatly print your call sign in the upper left hand corner of the envelope.

3) A preferred way to send envelopes is to affix a 15-cent stamp. If you expect to receive more than 1 oz. of cards, please affix postage accordingly.

4) When requesting *any information* from the bureau serving your district, always include a s.a.s.e. for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of 6 to 8 months, or longer, may take place before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

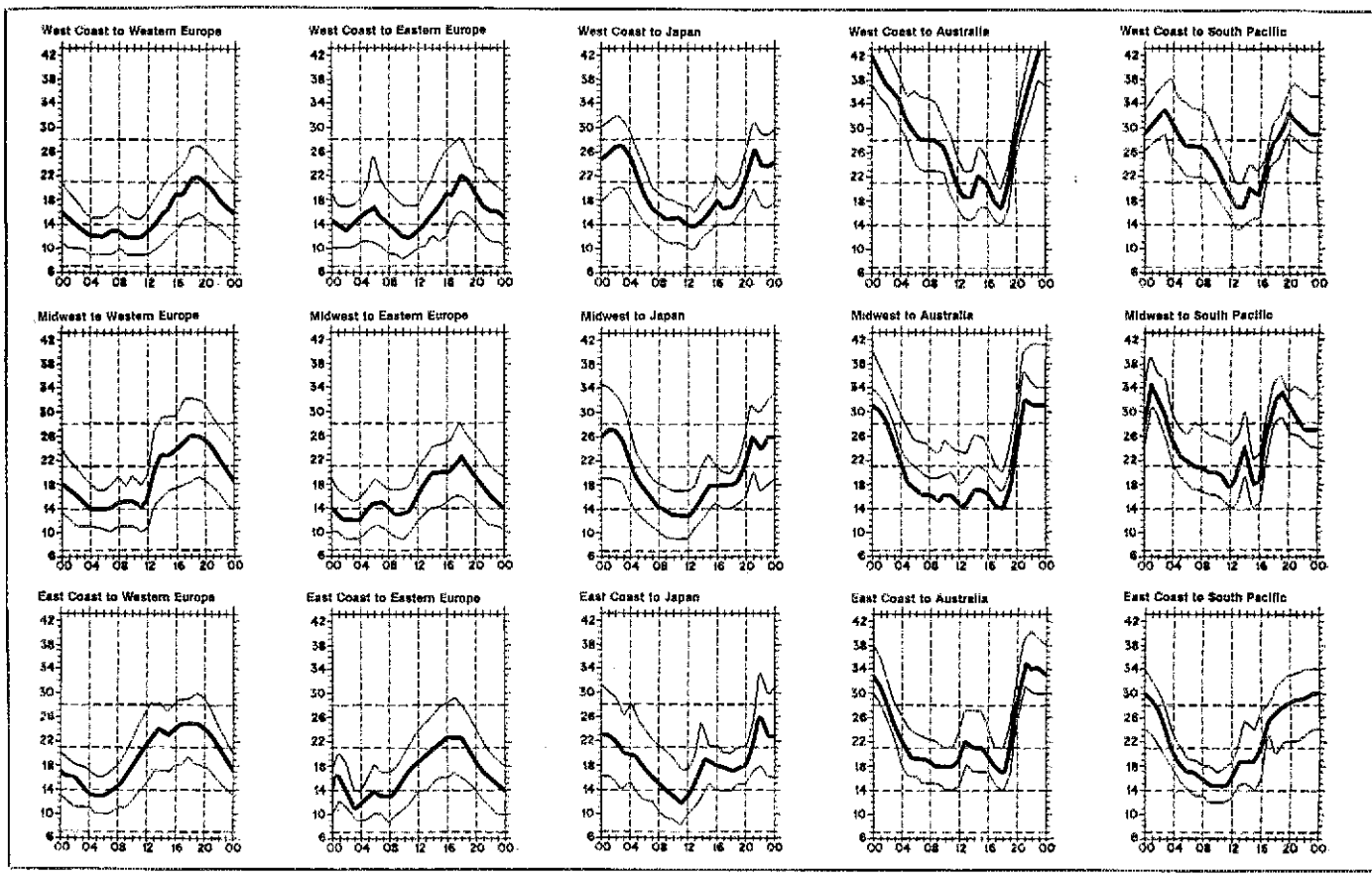
Do keep self-addressed 5- × 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade.

Do include an s.a.s.e. with any information request



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QSL Service" in this column every other month).

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

ARRL DX QSL Bureau System

First Call area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07538.

Third Call Area: all calls* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: single-letter prefixes — Mecklenburg ARS, P. O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls* — Northern Illinois DX Assn. Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P. O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, Kennebecasis Valley Amateur Radio Club, Box 51, St. John, NB E2L 3X1. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, SK S4S 5E3.

VE6* — G. D. Holeton, VE6AGV, 4003 First St., N.W., Calgary, AB T2K OX2.

VE7* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

VY1 — ARRL QSL Bureau, W. L. Champagne, VY1AU, P. O. Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

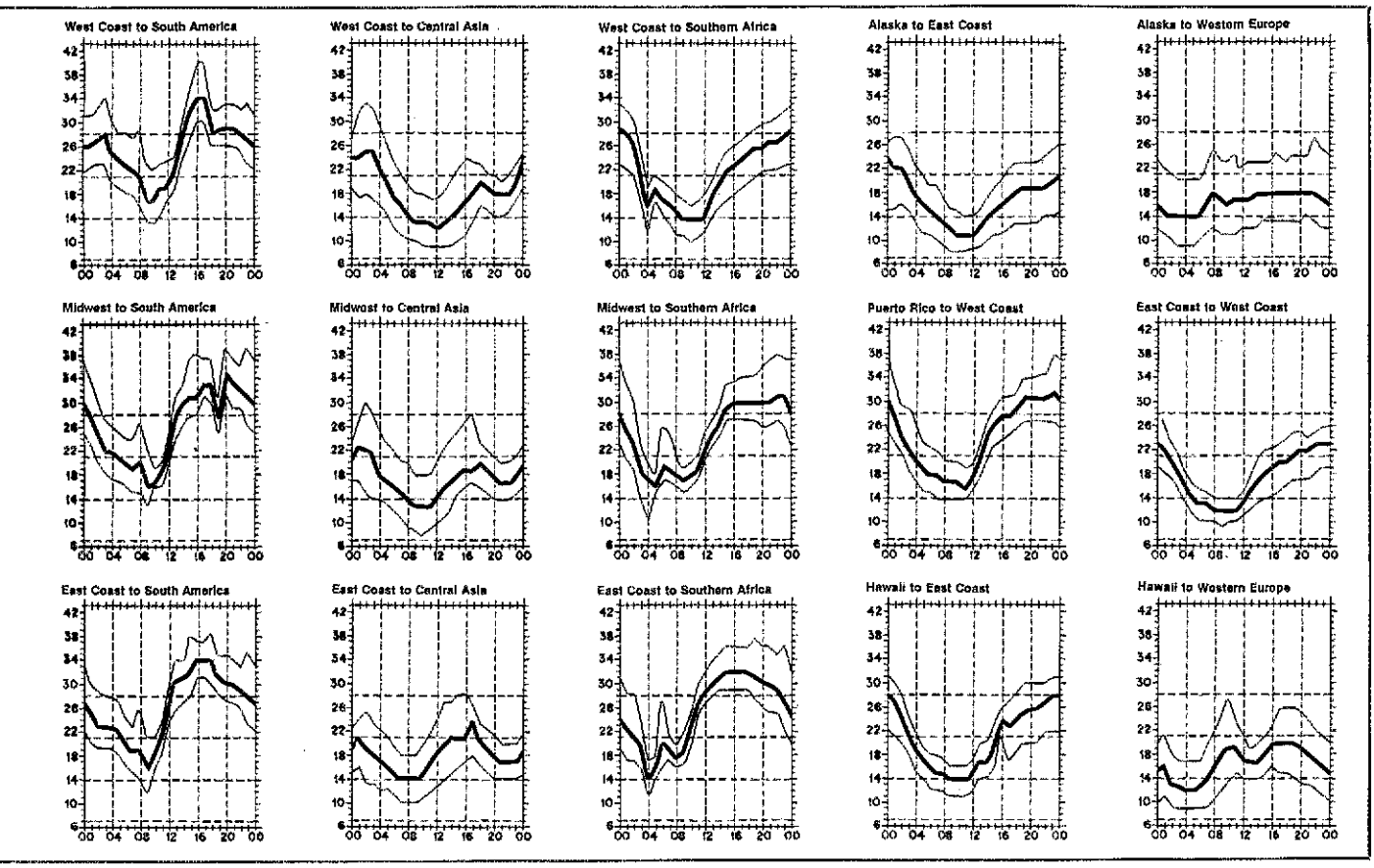
QSL MANAGER VOLUNTEERS

N4DPF	WB9YCK
WAØNAA	WB1GLH
N4FU	KB7MM

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and therefore may not be entirely accurate. The QSL manager's call sign is in parentheses.

A9XDA (N4BPP)
A35PF (K9KB)
C6ADY (VE2EHG) operation Dec. 21-28, 1980 only.
C6AEP (WØCP)
CT2BB (W1EP)
DU6JM P. O. Box 9, Silay City, Phillippines
DU9RG P. O. Box 125, Cota Bato, Mindinao
FPØGAQ (K8CJK)
GM4FDM (KB7MM)
HH2VP (N4XR)
HM1PW (JAØBFZ)
J20/A (K6LPL)
J20CN (K2FV)
KC6KR (JA8ONZ)
KX6OI (AB5K)
OA4DW (N4DW)
PJ8UQ (W3HNK)
SU1BA (K2IJL)
S83W P. O. Box 814 Umtata, Transkei
TU2ØHH (WA4VDE)
YJ8NPS (KB2KN)
YZ7Q (YU7BPQ)
VP5B (N4KE)
WA8UZZ P. O. Box 71, Omen, Israel
ZB2FK P. O. Box 292, Gibraltar
3B8DB (K5BDX)
4U1ITU (W3JPT) Dec. 13-14, 1980 only.
5Z4NO (WD9CIV)
8P6J (N6TR)
9K2EW (WA3SWH)
9Y4NP (W3HNK)

QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for March 15 to April 15, 1981, assume a sunspot number of 138, which corresponds to a 2800-MHz solar flux of 182.

The problem seems to be

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from December 1 through December 31, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

AL7AC/127	HA9RE/110	ON5SY/312	ZL2BDF/103	WA1VWQ/135	K4EED/100	WB4UNW/107	KB6CC/103	KI8H/100
CT2CE/196	HK2YO/175	PT7CLJ/102	ZS6ST/110	K2DSO/128	K4LSP/320	WD4ACJ/110	KD6GW/123	N8BCN/105
DF3MI/111	JA2CXK/135	PY7OD/137	9V1TL/164	KB2HC/122	K4VUD/103	WD4IBA/171	KR6O/126	WD8JSG/105
DF6JC/106	JA3CMD/307	SM5BDV/173	K1CWG/104	N2BIN/116	KA4EMR/112	WD4SDA/103	W6ENK/KH4/130	KC9Z/164
DF6MB/109	JA3MNP/313	SM6DEC/134	K1GSK/279	WA2KAB/100	KA4HWG/104	WD4JNS/114	W6HFL/340	WB9BBG/105
DF9RM/173	JA5AOF/264	SM6JNT/106	KA1BXW/103	WB2GZU/112	KN4Z/103	K5PO/102	WA6VRC/101	WB9BCR/125
DJ5TU/103	JA7AWZ/231	SM7HCW/238	KA1BZ/100	WB2KHH/104	N4BPO/109	KA5BTH/105	WA6YTD/149	WD9COI/109
DK1EK/110	JH7AJY/106	VE3AVG/102	KA1DOS/108	KA3CXB/110	N4CIS/111	KA5ELC/103	WB6DQP/158	KØAB/333
DK6NJ/203	JA8BIO/309	VE3GD/103	KA1JZ/105	W3FPO/107	WA4BSN/101	N5CT/196	KA7CXU/101	KØOGH/147
DKØRB/107	JA8FSJ/273	VE4ADV/165	KA1ML/104	W3POP/108	WA4OET/105	N5PC/107	KB7NP/104	WAØEBZ/118
EA8RL/183	JAØCIU/104	VE7BRZ/271	N1AEC/103	WB3FVJ/107	WA4ZBK/112	W5JQ/103	W7HPI/228	WDØCCW/101
G3SPU/100	LA5IU/217	VK3LG/110	WA1DWE/104	WB3HAG/100	WB4CSK/216	WB5ZQX/100	AB8J/143	WDØCNQ/100
G3VKO/108	NL7K/101	ZL1BIL/294	WA1HXH/157	WB3HWB/119	WB4SMT/110	WB5OXG/100	KA8AWQ/108	WDØEWQ/105
GM4FDM/130								

Radiotelephone

CT2CR/176	GM4FDM/110	LA5IU/216	XE1JFF/103	KA2GDY/108	KC4HO/104	WD5GVJ/100	WB6DQP/157	KB9FQ/110
DF3FU/107	HC1RE/103	OZ3IQ/105	XE1XM/133	KB2HC/116	KN4Z/100	K6GXO/217	AK7T/100	KC9Z/164
DF6RP/119	HK4CZE/165	PAØBDO/102	ZL1BIL/294	KB2IL/112	W4KXP/109	K6RF/294	KA7CBO/100	W9TNZ/122
DF9RM/162	IV3IOX/107	PY5PS/268	ZS3MS/102	WA2TNN/110	WA4UTY/104	KB6CC/103	N7TT/253	WB9WFZ/130
DF9ST/123	JA2CXK/129	PT7LD/101	7X2LS/170	WA2VJL/100	WB4CSK/168	KB6LO/102	W7BNH/104	WD9COI/109
DJ4FO/130	JF2IRT/163	SM5BDV/127	K1CWG/103	WB2CEI/273	WB4LYD/100	KD6CN/100	K7GGJ/101	ACØK/107
DK7DF/218	JA3CMD/304	SM7HCW/218	WA1HXH/137	WB2GZU/104	WD4IBA/161	N6AIT/123	W7HPI/206	KØMPR/127
DL6RY/102	JA3MNP/306	VE6CBX/105	WA1VWQ/135	K3DYX/101	KC5Z/103	N6AMD/162	WB7OTR/106	KØOGH/129
EA2TV/270	JH4OLW/104	VE7BRZ/255	WA1WWH/102	KB3FO/101	N5BBO/114	W6DWL/102	WB7QHV/118	KDØB/128
EA3AAH/224	JA5AOF/176	VK3NSY/104	K2AIO/147	K4SFI/104	N5PC/105	W6JQT/101	AB8J/111	NØAPC/108
EA4AM/282	JA7AWZ/195	VK4AJ/193	K2MRB/172	K4WOS/102	W5RJC/154	W6PGK/122	KA8ECT/100	WØMQJ/128
G3MCF/109	JA8BIO/306	VY1BR/100	K2NJ/193	KA4EMR/108	WB5ZAM/112			

Cw

DK3OI/108	JA5AOF/198	OZ8XW/101	UA1OSM/102	WA1UVX/119	WB2FXK/107	WB4CSK/110	AJ7Z/102	WB9PXR/108
DK6NJ/116	JA7AWZ/124	PAØLUS/101	VE2EAR/143	WB1DCC/100	W3DXK/103	WD4IBA/103	W7JAC/104	KØDEW/116
DK9PY/108	JA8FSJ/191	SM5BDV/133	9V1TL/134	K2AIO/101	KA3BOD/103	AJ6O/111	K9RFW/104	NØATT/102
G3EZZ/108	JAØCIU/104	SM6DEC/127	W1GKJ/101	K2OPJ/123	W4KOP/100	W6MA/182	W9RTD/101	WØOGJ/101
JJ1AOS/110	OZ6ZZ/110	SM7HCW/106	W1TSP/132	WA2VJF/100				

RTTY

KØBJ

160 Meters

K5YY

5BDXCC

K9MK	K3TW	LA9GV	KØCS	N6ZV	OH5PT	UA6JWW	UQ2GW	W6KUT
SP9CTW	UA6JAD							

Endorsements

Mixed

AH2E/225	JA1SJV/277	YU3AE/X/205	K2OLG/272	K4CM/175	K5GH/320	W6FWX/128	K8DL/216	N9RF/275
CT1GC/153	JJ1AOS/152	YU4HA/320	K2PLF/263	K4DDB/276	K5GK/263	W6MA/297	K8MC/177	W9AG/320
CT2CJ/152	JE2LQX/175	YU5FAM/160	K2SB/324	K4HRG/307	K5KLA/310	W6NLG/202	K8ZO/252	W9ALP/220
CT4BD/290	JA7RPC/151	4X4FQ/336	KB2NU/289	K4TWJ/200	K5XE/172	W6PKB/126	KB8IZ/249	W9DDX/280
DF1FX/154	JH7LMZ/252	5T5CJ/267	N2CW/311	K4XG/323	N5AR/333	WA6GFY/300	N8BIK/156	W9ESQ/223
DF4FX/291	JH7UJN/138	AD1V/125	N2JV/265	KB4UO/122	N5OK/305	WA6SZE/175	W8BE/320	W9GW/324
DF8XP/162	JA8BMK/313	K1BV/310	W2BAI/320	KD4S/290	N5RQ/290	WA6TDX/125	W8FF/313	W9IVB/181
DJ2OW/203	KH6CF/300	K1DP/270	W2GND/221	KF4H/195	W5CKT/331	AF7M/224	W8INV/160	W9KDR/179
DJ3TF/185	KH6DL/262	K1KI/313	W2HAZ/305	KG4F/228	W5LW/279	K7CE/138	W8LJP/257	W9NYW/164
DJ3XD/207	KP4EQF/280	K1KTB/252	W2KN/250	KN4F/183	W5MCO/319	K7GM/253	W8QBG/300	W9ZEN/160
DJ5JH/325	LA5WN/201	K1LEC/150	W2OB/290	KX4H/250	W5VSZ/284	KC7E/240	W8UCI/264	W9ZWH/304
DJ9UM/251	LA9HC/281	K1MM/303	W2SLF/179	N4BQD/150	WA5QCH/253	KC7I/200	W8UVZ/289	WA9LEY/241
DK3YD/177	OE1BFW/286	K1RH/247	W2TXB/285	N4DW/312	WA5QZH/201	KD7X/189	W8ZCK/331	WA9TVM/306
DK5AD/281	OK2BBJ/267	K1SF/290	W2VAV/181	N4GE/294	WB5DDI/270	N7ALX/219	WA8AJH/224	WA9WWT/250
DK5WS/287	ON7EJ/262	K1VRT/170	WA2CYQ/245	N4JJ/308	WB5LBJ/DU6/261	W7CMO/332	WB8ZRV/270	WB9VGJ/151
DKØEK/173	OZ6ZZ/211	N1AFC/176	K3TW/307	N4NG/156	WB5NAA/126	W7DV/310	WD8JFE/228	WD9IIC/250
DL1RB/281	OZ8XW/156	N1AMB/151	K3WOK/248	W4NBV/317	AA6AA/298	W7DNY/267	WD8NBD/248	KØCVD/213
DL9NA/270	SM3EVR/311	W1BL/297	KA3DDT/152	W4OVU/270	AJ6V/180	W7EDA/235	AA9U/178	KØDEW/157
EA4MY/299	SM5AJR/270	W1GKJ/272	KA3R/121	W4YE/221	K6AOV/321	W7HRD/165	AI7P/155	KØINR/171
F6BWJ/304	SM6CMU/310	W1HEO/250	N3ACU/150	W4YKH/296	K6BUU/239	W7LHQ/140	K9AGB/286	KØJFN/136
F9XL/227	SM6CST/308	W1IQ/141	N3AUE/158	W4ZMC/273	K6QEH/131	W7QMU/261	K9BWQ/305	KØLST/253
G3EZZ/151	TG4NX/281	W1OR/317	N3GB/273	WA4SKE/260	KB6JK/203	W7TE/320	K9GX/280	KØMOU/266
G3SJH/310	VE2DPJ/150	W1TSP/272	W3GL/297	WB4MXI/225	KB6ZL/177	W7UZA/301	K9LHA/204	NØEL/301
G3TXF/272	VE3BZ/311	WA1LOU/180	W3LPF/338	WB4SLV/205	N6MU/314	W7YF/140	K9WWW/122	WØPT/330
HB9AQW/312	VE3GCE/160	WA1NSJ/222	W3PN/338	WD4NBX/220	N6VF/282	WA7OSO/281	KA9CQM/150	WØUBT/200
I4AND/291	VE3IIU/126	WA1PDG/175	WA3FWA/203	AA5C/201	N6VI/260	WB7FFG/199	KB9IG/227	WØULU/250
IØZSG/181	VE3JGT/177	WB1HKV/120	WB3FSI/244	AE5B/302	W6BSY/337	WB7VUN/175	N9AIB/185	WBØYMR/270
JA1KNZ/143	VE3LNW/191	K2AIO/268	AE4A/157	K5BLV/292	W6CSI/159	AI8S/294	N9AWR/204	WDØAWP/138
JA1QXY/292	VE4ADG/152	K2KGB/323	K4AVU/200	K5BZU/315				

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CT2CE/196
CT2CJ/152
DF4FX/285
DF7QD/175
DF8XP/138
DJ5JH/268
DJ5LA/328
DJ7CX/313
DJ9UM/251
DK1YP/252
DK5AD/270
DK5WS/287
DL4YAH/130
DL6NX/307
DL7EN/326
DL8QS/238
EA3AOC/290
DL8HH/205
EA3SA/303
EA5ACA/228
F6BFI/223
G3SJH/310
G4HK/176
I2HHE/254
I2WTY/230
I2XPD/232
IV3YRN/276
I4AND/250
I6ONE/200
IØRIZ/269
IØZSG/179
JA1DCO/130
JA1DM/318
JE2LQX/160
JA8BMK/288
JH8MXH/150
OE1BFW/283
OK1MP/324
PAØLEG/259
PY5GA/197
WP4API/151
SM6CMU/291
SV8JE/202
TG4NX/281
VE1JS/143
VE3HZH/229
VE3JGT/175
VE3KGK/174
VE3LNW/175
VE4ADG/145
VE4AT/280
XE1MD/149
YU6ZA/133
YV1TP/228
5T5CJ/235
9G1JI/259
9G1JU/270
K1GSK/278
K1KTB/252
K1SF/282
N1AFC/160
N1AMB/151
N1API/148
W1GKJ/214
W1HEO/241
W1WXZ/280
W1NG/309
W1YOU/241
WA1BYE/150
WA1NSJ/187
WB1EAZ/184
K2ARO/256
K2KGB/318
K2OLG/271
K2SGH/245
N2CW/291
W2GT/299
W2NCL/280
W2OB/250
W2TXB/211
WA2EIJ/177
WA2HVZ/163
WA2VEG/322
WB2DND/226
WB2WOU/324
K3HFH/160
N3AUE/142
N3GB/254
W3GL/277
W3HEQ/149
W3IOA/242
W3KBZ/177
W3PN/279
WB3BGI/260
WB3BXQ/127
WB3DJS/186
WB3EFC/220
WB3FSI/241
K4DDB/254
K4HRG/272
K4MEZ/311
K4XG/287
KC4BX/156
KD4S/289
KG4F/215
KN4F/178
KT4U/176
N4AQA/149
N4DW/254
N4JA/260
N4NG/148
W4AVY/324
W4ELB/315
W4JD/254
W4KN/250
W4NBV/301
W4YN/301
W4ZMC/224
WA4CNZ/224
WA4NIB/290
WA4PLR/254
WB4NDX/298
WB4TCH/198
WD4EYD/255
AE5B/301
AE5E/200
K5GK/259
KA5BWU/171
KB5JX/322
N5AML/161
N5DX/301
W5LDH/281
W5TIX/328
W5VSZ/275
WA5BBR/150
WA5MLT/225
WA5QCH/231
WB5LBJ/DU6/261
WB5TED/254
AA6AA/298
K6AO/302
K6AQV/319
K6EV/331
K6MA/306
K6UCG/132
K6XN/250
K6XP/310
KB6JK/202
KB6V/229
KB6ZL/126
N6AHV/160
N6BLN/143
N6MU/289
W6FET/319
W6FQF/255
W6NLG/200
W6FWX/128
W6NAT/179
W6YMH/154
WA6OUA/179
WB6PSY/239
WA6SZE/175
AF7M/176
K7CE/137
K7JNB/120
KC7E/171
W7AEP/175
W7DNY/264
W7FRV/140
W7GLU/252
W7TE/282
WA7OIJ/255
AI8S/294
K8ZO/251
N8BIB/125
W8BE/270
W8COG/316
W8FF/310
W8LJP/256
W8QBG/295
W8UVZ/163
WA8AJH/222
WD8CZR/125
WD8JFE/227
WD8MGQ/282
WD8MJR/163
WD8RKT/163
AA9U/177
AI9U/226
K9GX/280
K9LHA/203
K9MD/280
K9MDO/184
KA9CQM/150
KB9IG/227
KB9IS/250
KB9KD/250
N9AF/323
N9AIB/141
K9BWQ/304
N9AWR/204
N9JK/199
W9AG/250
W9DMH/250
W9IVB/142
W9MMZ/306
W9NWE/318
W9TEI/250
W9DDX/280
W9ZWH/294
WA9PWN/281
WB9VGJ/150
WB9YJW/221
WD9HKI/131
WD9IIC/167
KØINR/145
KØVGB/124
KØVRW/276
KBØHJ/177
NØAMI/204
NØAOP/200
WØQLX/308
WØTJ/329
WØULU/250
WØUQD/309

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DJ5JH/180
DJ7CX/241
DK5AD/222
EA6FD/219
EA8RL/139
F5RS/150
F9XL/171
G3TXF/184
I4AND/186
JA1BN/252
JA1QXY/232
JH7LMZ/251
JH7UJN/126
OK1MP/229
SM3EVR/293
SM6CMU/240
SM6CST/201
TG4NX/125
VE3BX/250
VE3EPN/129
VE3II/143
5T5CJ/154
K1RH/237
W1IQ/120
W1LY/152
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WB1HJF/133
K2IJ/251
N2CW/242
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WB2KXD/212
W3EVW/260
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W7QMU/128
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W8GKM/231
N8BM/224
N8NPF/125
W8ZCQ/273
K9KA/144
W9NUD/128
WD9IIC/186
KØCVD/174
KØLST/219
KBØAB/133
WØBW/282
WBØWRU/125

DXCC Notes

Annual List corrections
Mixed, K9UQN/183. Phone, K2EYJ/251, JA1BN/332.

January *QST* correction
Phone, WA2AUF/107

Honor Roll

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 309 countries of the 318 current countries on the DXCC list.

Mixed

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DJ2BW/357
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DL1JW/352
DL1KB/360
DL6EN/355
DL7AA/360
DL7AP/353
DL7EN/356
DL9OH/351
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G3FXB/357
GW3AHN/359
HB9MQ/357
IØAMU/358
JA1BK/347
LU4DMG/355
LU5AQ/354
LU6DJX/364
OE1ER/362
OH2BH/342
OH2NB/361
OK1ADM/345
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W6ET/352
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W6FW/344
W6ISQ/347
W6KTE/342
W6K2L/356
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W6REH/346
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W6ZM/350
W7AQB/352
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IT9ZGY/354
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JA1BRK/342
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PY2PE/340
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W2GLF/352
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K6KA/334
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LA1KI/337
OH2QQ/351
OH4NS/338
ON4UN/334
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SM3CXS/333
SM5BHW/335
SM6AEK/337
SM6CKS/334
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W1WY/350
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K4DJ/336
K4HJE/333
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W5FFW/353
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AE4X/350
K4CEB/332
K4MPE/336
N4EA/334
N4WW/333
W4JVU/335
W4MGN/345
W4ML/356
WB4OSS/331
K5LIL/335
W5IR/332
W5KGX/353

W5LZZ/335
W5OB/347
W5SJ/333
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Hamfest Calendar

[Note: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL hq. for up to two years in advance.]

***Arkansas:** The Central Arkansas Radio Emergency Net, Inc. (CAREN) will sponsor Little Rock's All Arkansas Hamfest on April 4-5 at the North Little Rock Community Center, Little Rock. Doors will be open from 9-5 on Saturday and 9-2 on Sunday. Dealers, flea market and forums. Food will be available. Talk-in on 34/94. For further info contact John Barnett, N5BPU, 801 Hall Dr., Little Rock, AR 72205.

***Florida:** The 1981 North Florida Swapfest, sponsored by The Playground ARC, will be held from 8-4 on March 21-22, at the Fort Walton Beach Fairgrounds, SR 189, Fort Walton Beach. Admission $2 in advance, $3 at the door. YLs and children free. Free ladies activities. Contests, forums, displays. ARRL, QCWA and 10-X booths. Large indoor swap area — tables $5 per day. Plenty of free parking. Talk-in on 19/79. Write PARC, P. O. Box 3075, Fort Walton Beach, FL 32548, or tel. 904-863-2829.

***Georgia:** The Columbus ARC will hold their annual hamfest March 28-29 at the Columbus Municipal Auditorium, U.S. 27 and 280. Free admission. Table rental $5 per day, per table, deposit required. Free outside flea market. ARES forum. Table reservations from K4RHU, 2701 Peabody Ave., Columbus, GA 31904, tel. 404-322-7001. For more info or tickets, contact N4ATI, 263 Logan Ave., Ft. Benning, GA 31905, tel. 404-687-3272. Talk-in on 28/88.

Indiana: The Randolph ARA will hold their 2nd annual hamfest on Sunday, March 15, from 8-5, in the National Guard Armory, Winchester. Admission $2 in advance, $3 at the door. Table space (by reservation only) $5 with table (limited), $2.50 without. Prizes, programs, new-equipment displays, flea market, food and beverages — all indoors with security. Talk-in 90/30, 30/90 and 52. For advance reservations and information, contact Jack Life, W9VJX, Box 162, Winchester, IN 47394, tel. 317-584-9361.

***Iowa:** The 5th annual Hamboree, sponsored by the 3900 Club and Sooland Repeater Association, will be held Saturday, March 21, at the Marina Inn, So. Sioux City, Nebraska. Exhibitors, flea market, technical forums, cw contest, Novice meeting, ARRL forum, dinner banquet. Tables (3 × 8) $2, contact Al Smith, WØPEX, 3529 Douglas St., Sioux City, IA 51104. Advance registration including banquet $10; at door $12. Hamboree only (no dinner) $2. Write for advance tickets and motel reservations to: Jerry Smith, WØDUN, Box 14, Akron, IA 51001. Talk-in on 37/97. For further info contact Dick Pitner, WØFZO or Glen Holder, KØTFT.

Kentucky: The Paducah ARES Club will hold their 2nd annual ham/swapfest, Sunday, April 5, from 8-5 at the National Guard Armory, Paducah. Many prizes. Dealers will be on hand. Talk-in on 66/06 and 52. Direct inquiries to Larry Reid, A14T, 220 Longview Dr., Paducah, KY 42001.

***Louisiana:** The Lafayette ARC and Arcadiana ARC will hold their annual hamfest on March 21 from 12-6 and March 22 from 8-2, at St. Martin Academy School in Lafayette. DX forum, bingo, ladies tour and NTS forum. Talk-in on 3.905, 81/21 and 22/82. Info and preregistration from AARA, P. O. Box 51174, Lafayette, LA 70505.

***Maryland:** The Baltimore ARC will present the 1981 Greater Baltimore Hamboree and Computerfest on Sunday, March 29 at the Maryland State Fairgrounds, Timonium (exit 16A on I-83, 2 miles north of I-695 near Baltimore). Gates open 8 A.M. to 5 P.M. Admission $3. Speakers and demonstrations, indoor flea-market tables and outdoor tailgating spaces (indoor in the event of rain). Prizes, free parking and food service provided. Talk-in on 07/67 and 34/94 and 52. For further info and table reservations write or call: G. B. H. & C., 2136 Pine Valley Dr., Timonium, MD 21093, tel. 301-321-1404. For recorded announcement dial: 301-HAM-TALK.

Massachusetts: The South Shore ARC of Braintree will hold an indoor flea market on Sunday, March 29, at the Viking Club, 410 Quincy Ave., Braintree, from 11-4. Reserved tables (8-foot) $7.50 each (includes 1 free admission); reservation and check (payable to South Shore ARC) to Ed Doherty, W1MPT, 236 Wildwood Ave., Braintree, MA 02184. Vendors admitted at 10 A.M. Prizes, parking, rain or shine!

*ARRL Hamfest

Michigan: The 20th annual Michigan Crossroads hamfest, sponsored by Southern Michigan ARS and Calhoun County Repeater Assn., will be held March 21 at the Marshall High School, Marshall. Doors open at 7 A.M. for exhibitors, 8 A.M. for buyers and lookers. Free parking and carry-in help. Ladies program. Food available, prizes. Table space at 50 cents/ft, reserved until 9 A.M. For more information, write SMARS, P. O. Box 934, Battle Creek, MI 49016 or call Earl Goodrich, 616-781-3554.

Michigan: The SEMARA (South Eastern Michigan ARA) Swap & Shop will be held April 5 at South Lake High School, St. Clair Shores. Prizes and ample parking. For table space and advance tickets write to: SEMARA, Box 646, St. Clair Shores, MI 48093.

Minnesota: The Rochester ARC and the Rochester Repeater Society will sponsor the Rochester Area Hamfest on Saturday, April 4, at John Adams Junior High, 1525 NW 31 St., Rochester. Doors will open at 8:30 A.M. Indoor flea market, prizes, refreshments and free parking. Talk-in on 22/82. For further info, contact: RARC, c/o WBØYEE, 2253 Nordic Ct. NW, Rochester, MN 55901.

Missouri: The Jefferson Barracks ARC will hold their annual hamfest and auction on March 13 at the Electrical Worker's Hall, 5850 Elizabeth Ave., St. Louis. Doors open at 6 P.M., auction starts at 7:30 P.M. Free coffee and cake. Talk-in on 34/94. For further info, call Vivian Scott, WDØEMS, tel. 314-631-4068 or Marj Tiritilli, KAØFTZ, tel. 314-892-9061.

***Missouri:** The Central Missouri RA will present Columbia Hamfest '81 on April 4, at the Columbia Ramada Inn. Admission is $3 at the door. Advance tickets available for $3 each or 4 for $10. Commercial exhibitors, hard-surfaced "tailgate" area available, forums, association meetings and ladies activities. Talk-in on 76/16 and 34/94. A banquet at 7:30 P.M. at the Ramada Inn will feature talk by Mr. James Dailey, FCC Engineer in Charge, Midwest Region. Banquet reservations, in advance only, $14. Special group rates for overnighters at the Ramada. For tickets, info on reservations or available indoor flea market space, write to "Columbia Hamfest '81", P. O. Box 283, Columbia, MO 65201.

***Nebraska:** (See Hamboree 5, Iowa)

***Nebraska:** The 5th annual Midway Spring Ham Convention will be held Saturday and Sunday, March 28-29, at the Holiday Inn-Holidome, Kearney. Included: ladies day, fashion show, noon luncheon, ladies bazaar, technical symposiums on DX, OSCAR, home satellite and ham TV, vhf, RTTY and home computers. Saturday evening banquet and dance highlighted by nationally known plains historian, folk singer and humorist Dr. Robert "Bob" Manley. Sunday flea market. ARRL Forum with Midwest Division Director Paul Grauer, WØFIR, State Army MARS, State Nets, QCWA noon luncheon and a ham YL's coffee. Awards. Floor activities only — Saturday: $5. Flea market, ladies bazaar, floor activities — Sunday: $3. One fee for all activities and banquet: $14.50 (at the door: $20). For info contact: Charles Kemery, WØCRK, Midway Spring Ham Convention, Box 1231, Kearney, NE 68847, tel. 308-234-1032. Talk-in on 146.31/91, 34/94, 22/82, 222.34/223.94, and 3982 kHz.

New Hampshire: The Interstate Repeater Society Auctionfest '81 will take place March 21 at the Hilton, Merrimack. Doors open at 9 A.M. Admission 50 cents. Features a room for vendor exhibits, a room for items $5 and under and a room for items $75 and over. Dinner, dance and entertainment — tickets $12 per person. Talk-in on 25/85. For further info, contact Ken Soares, N1BAD, tel. 603-882-8765.

New Jersey: The Old Bridge Radio Association will hold its first annual auction on Sunday, March 1, at the Cheesequake Firehouse at Rtes. 35 and 9, Old Bridge. Exhibition begins at 11 A.M., sale at noon. Refreshments will be available. Talk-in on 72/12 and 52. For more info call Fred, 201-257-8753.

New Jersey: The Delaware Valley Radio Association, W2ZQ, will hold their 9th annual flea market on Sunday, March 15, from 8-4 at the New Jersey National Guard 112th Field Artillery Armory, Eggerts Crossing Road, Lawrence Township. Advance registration $2, $2.50 at gate. Adequate indoor and outdoor flea market areas. Sellers provide own tables. Prizes and refreshments. Talk-in on 07/67 and 52. For additional information or tickets, write: DVRA, P. O. Box 7024, West Trenton, NJ 08628, s.a.s.e. please.

New Jersey: The Flemington Hamfest, sponsored by the Cherryville Repeater Association will be held March 21 at the Hunterdon Central High School, Flemington, from 8:30 to 3:30. Flea market, movies, seminars, all indoors. Tables available, prizes. Cafeteria facilities and plenty of parking. Talk-in on 146.52, 975/375, 615/015 and 222.52/224.12. For additional information, write Paul Studer, Box 76, Fairview Dr. Road, Annandale, NJ 08801.

New Jersey: The Irvington RAC hamfest is Sunday, March 22, from 9-4, at the P.A.L. Building, 285 Union Ave., Irvington. Take the Garden State Pky. to Exit 143 northbound or 143A southbound. Talk-in on 34/94 and 52. Refreshments. Admission $1, tables $3. For information call Pete, WB2FAS, tel. 201-763-8220, or write IRAC at P.A.L. address.

New Jersey: The Bergen ARA is holding a ham Swap 'N' Sell April 5 at the Bergen Community College parking lot, Paramus Road, Paramus. Bring your own tables, tailgating only. Sellers $3, buyers free. For more info, contact Wayne Webb, KB2EO, 5 Catherine Ave., Fairlawn, NJ 07410, tel. 201-423-0628.

New Jersey: A ham radio and computer flea market sponsored by the Chestnut Ridge Radio Club will be held April 4, from 9-3, in the Education Building, Saddle River Reformed Church, E. Saddle River Road at Weiss Road, Upper Saddle River. Tables $10, tailgating $5. No admission charge. Hot dogs, soda. Contact: Jack Meagher, W2EHD, tel. 201-768-8360 or Neil Abitabilo, WA2EZN, tel. 201-767-3575.

Ohio: The Canton ARC will hold their annual auction on March 21, at the Nimishillen Grange Hall on Easton Street NE. Doors open at 4 P.M. Prizes. Talk-in on 19/79. For more information send an s.a.s.e. to R. A. Stellarini, WB8VUN, 1003 Shadyside Ave. SW, Canton, OH 44710, tel. 216-453-5896 (after 5 P.M.).

***Ohio:** The Toledo Mobile Radio Association, Inc. will hold its 26th annual auction and hamfest from 8-5 Sunday, March 22, at the Lucas County Recreation Center, Key Street, Maumee. Free auction starts at 10 A.M. Ample free parking all day and overnight. Tickets $2 in advance, $3 at the door. Flea market tables available and displays limited to electronics and ham gear *only*. Commercial exhibits, refreshments, prizes, ladies program. Area repeaters are 01/61, 19/79, 34/94, 147.87/27 and 975/375. Talk-in on 146.52. For more info, write: J. Honisko, N8BGH, 1733 Parkway Dr. N., Maumee, OH 43537.

***Ohio:** The Lake County ARA will present their 3rd annual Lake County Hamfest on Sunday, March 29, at Madison High School, Madison. Doors open at 6 A.M. for exhibitors and 8 A.M. for the public. Admission is $2.50 advance and $3.50 at the door. Table and display space is 85 cents per foot; advance reservations guaranteed. New, larger location — plenty of free parking, all display space is indoors. Talk-in on 81/21. Information and reservations available by sending s.a.s.e. to Lake County Hamfest Committee, 5555 Anaconda Rd., Mentor, OH 44060, tel. 216-953-9784.

Oklahoma: The 35th annual Lawton-Fort Sill Hamfest will be held on April 4-5 at the Sandpiper Inn, Lawton. Dealer and swap tables for flea market, ARRL officials, MARS meetings, QCWA breakfast. Banquet Sunday. For info write W5KS, Box 892, Lawton, OK 73502.

Pennsylvania: The Penn Wireless Assn., Inc. will hold its Tradefest '81 on Sunday, March 29, at the National Guard Armory, Southhampton Road and Roosevelt Boulevard (Rte. 1), half mile south of Turnpike Exit 28. Sellers space (6 × 8) $5. Bring tables, limited number of power connections, $3. General admission $3. Prizes, refreshments, rest areas, displays and surprises. Talk-in 146.115/715 and 52. Contact: Thomas Gallagher, WB3DJF, P. O. Box 734, Langhorne, PA 19047.

Texas: The Midland ARC annual swapfest begins on Saturday, March 14 from 1-7 P.M. and continues on Sunday at 8 A.M., at the Midland County Exhibit Building, east of Midland on Hwy. 80. Preregistration $4.50, $5 at the door. Talk-in on 16/76. Send advance registrations to MARC, Box 4401, Midland, TX 79704.

Wisconsin: The 9th annual Madison Swapfest sponsored by the Madison Area Repeater Association will be held on Sunday, April 5, at the Dane Co. Expo Center Forum Bldg. Doors open 9 A.M. Sellers and exhibitors admitted at 8 A.M. Dealers and commercial exhibitors, free movies, food. Admission $2.50 advance, $3 at door. Children 12 and under free. Tables $4 advance, $5 at door. Reserve early — sellout last year! Ticket and table reservations confirmed by return mail. Ac outlets available to booth exhibitors only. For information and reservations, contact: MARA, Box 3403, Madison, WI 53704.

Coming Conventions

March 21-22
North Carolina State, Charlotte

April 3-4
Michigan State, Muskegon

April 11-12
Missouri State, Kansas City

April 25-26
Mississippi State, Jackson

April 25-26
West Indies Section, Palmas del Mar, PR

May 15-16
Atlantic Division/New York State, Rochester

May 15-17
Pacific Division, Fresno, California

May 16-17
Southeastern Division, Birmingham, Alabama

June 5-7
Northwestern Division, Seaside, Oregon

June 20-21
Georgia State, Atlanta

July 24-26
West Gulf Division, Oklahoma City

ARRL NATIONAL CONVENTIONS

March 13-15, 1981
Orlando, Florida

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

NORTH CAROLINA STATE CONVENTION

March 21-22, 1981, Charlotte

The 1981 North Carolina State Convention and Charlotte Hamfest will be held March 21-22 in the Charlotte Civic Center. With over 100 commercial booths and a tremendous flea market, you will be treated to the ultimate in indoor hamfest enjoyment and comfort. Major equipment manufacturers will host technical programs throughout the two-day event. The latest in equipment from all leading manufacturers will be on display.

Forums will be presented on numerous technical topics, emergency-preparedness and traffic-handling activities, a follow-up program on WARC, as well as several programs of special interest to the DXer and repeater users and clubs. The FCC will have a booth featuring a TVI exhibit, and will conduct a forum. Interested in computers, seeing demonstrations, and attending programs on applications? You will have your chance in Charlotte.

Contact the Radisson Plaza, adjoining the convention center immediately for reservations, and ask for the special hamfest discount — Two NCNB Plaza, Charlotte, NC 28202, tel. 704-377-0400. Several other motels in the area are also featuring special discounts.

Convention registration is $3.50 in advance, $4.50 at the door. Children 12 and under admitted free. Flea market tables are $4 each for the two-day event, in advance or at the door. A wide variety of prizes will be awarded during the convention. For more information or preregistration, write: Charlotte Hamfest, W4BFB, 2425 Park Rd., Charlotte, NC 28203, tel. 704-376-4162.

MICHIGAN STATE CONVENTION

April 3-4, 1981, Muskegon

The Michigan Area Amateur Radio Council will sponsor the ARRL Michigan State Convention and hamfest at Muskegon Community College, a facility with free parking for over 2000 vehicles, dining/cafeteria services and clean, modern facilities. Friday evening, April 3, at the Muskegon Holiday Inn, the "Ham Hospitality" will be open to all. At 10 P.M. there will be a presentation of St. Pierre Island DXpedition by Doug Elzinga, WB8NBT/FPØDE. The Wouff Hong initiation will be put on by the MAARC Players at midnight.

Saturday, April 4, at the college, doors/registration will open at 8 A.M. The event features many technical forums, annual net meetings, commercial exhibits and large swap and shop.

MAARC has made great efforts to present a varied and interesting ladies program featuring demonstrations of crafts, luncheon at the Muskegon Mall, hospitality room during the day of the convention and an opportunity for the gals to see what others have done during the year.

Saturday's tickets are $3 each (no advance or mail ticket sales). Swap and Shop table space may also be purchased on Saturday. Advance registrations are required for the Saturday evening dinner program with guest speaker Leonard M. Nathanson, W8RC, Director of the ARRL Great Lakes Division.

Overnight reservations should be made directly with the Holiday Inn, Ramada Inn or other motels in the greater Muskegon area. For additional information write to MAARC, P. O. Box 691, Muskegon, MI 49443 or contact Convention Chairman Clarke Cooper, K8BP, at 616-865-6198.

MISSOURI STATE CONVENTION

April 11-12, 1981, Kansas City

The PHD Amateur Radio Association, Inc., of Liberty, Missouri, will sponsor the 1981 Missouri State ARRL Convention (12th annual Northwest Missouri Hamfest) on Saturday and Sunday, April 11-12, in the Trade Mart Building at the Downtown Kansas City Airport. There will be a complete program of forums: ARRL, DX, contest, technical, SCM, XYL, commercial exhibits and more than 100 swap tables, all inside the 45,000-square-foot, one-level, air-conditioned building. Unlimited free parking adjoins the site. RVs welcome, no hookups. Doors are open from 10 to 5:30 both days. Commercial exhibitors may set up from 8 to 10 P.M. Friday or 7 to 9 A.M. Saturday. Swappers 9 A.M. Saturday.

There will be a Saturday night banquet at the world-famous GOLD Buffet. Guest speakers will be ARRL President Harry J. Dannals, W2HD, *QST* Managing Editor Laird Campbell, WICUT, and Midwest Division Director Paul Grauer, WØFIR.

Preregistration is $2; admission at the door $3. Banquet tickets $9.50. Those desiring banquet tickets are urged to order them in advance. All preregistrations will be held at the door. Talk-in on 146.34/94. For information and pre-registration write to PHD Amateur Radio Association, Inc., P. O. Box 11, Liberty, MO 64068, tel. 816-781-7313 or 816-452-6953.

WEST INDIES SECTION CONVENTION

April 25-26, 1981, Palmas del Mar, Puerto Rico

The West Indies Section will hold its 1981 Convention in Palmas del Mar, Humacao, Puerto Rico, one of the most beautiful spots in the sunny Caribbean, on April 25-26. This is a combined convention of the West Indies Section of ARRL and the Puerto Rico Amateur Radio Club. The program scheduled for the weekend will include a number of technical presentations, forums, exhibits, swap tables, QSL Bureau and equipment demonstrations. Special events have been programmed for MARS, DX Club, ARES, WINS and other groups. There will be a special program for the ladies.

Attendance at the sessions is free to ARRL members. Those planning to stay for dinner, banquet and other events can purchase tickets beforehand or at the gate. A number of rooms have been reserved at the hotel at special convention rates. Reservations should be made early since rooms are limited.

For further information please write to Julio Negroni, KP4CV, SCM W.I. Section, 269 Georgetown St., Rio Piedras, PR 00927.

YL News and Views

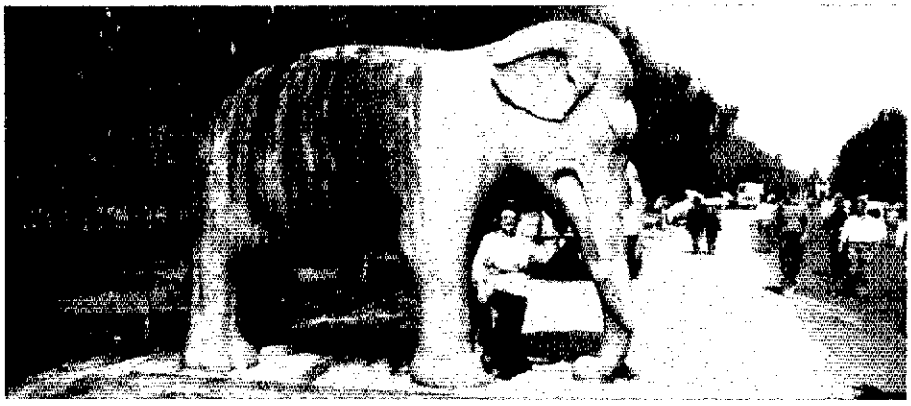
Conducted By Jean Peacor,* K1IVJ

LIDXB's Representative Travels To China

Early in 1980, the China News Conference extended an invitation to the editor of the "Long Island DX Bulletin" to go to China. To his dismay, he was unable to attend. Fortunately, Jean Chittendon, WA2BGE, of Syosset, New York, secretary for the LIDXB, had the good fortune to be able to act as his representative. Jean was the only YL member of the team that included K2BPR, W6AM and W6GC. (See January 1981 *QST*).

When Jean first became licensed as a Novice in 1975, little did she know of the exciting things yet to come. She received her General in a few months and became a most active ham. Founder of the Cracker Barrel Net, which meets each night at 0000 UTC on 3920 MHz, she was also the first president of SAYLARC (Second Area Young Ladies Amateur Radio Club) and served for two terms. She has served as Second District chairman for YLRL, is completing a term as trustee of the Larkfield ARC and will become secretary for that club for the coming year. Jean's a member of Army MARS; the International Association of Airline Hams; YLISSB (9788); YLRL; Life member of ARRL; a member of both Nassau and Suffolk ARES; as well as a member of LIRG, Wantagh ARC, Mount Beacon ARC, Metroplex, Selden ARC and LIMARC. She is an associate member of WRONE and the Buckeye Belles. When you now add "first YL representing radio amateurs to China" to that list of credits, it adds up to incredible accomplishments in her five years of being an amateur.

Amateur Radio Conferences were the team's primary reason for visiting China. All had the opportunity to express the hope of the entire Amateur Radio world that China would soon be active again on all the ham bands, and offered assistance in achieving that objective. The present level of personal radio communications in China is government controlled. Students are being taught radio and trained in cw. Radio operation and equipment construction are also taught in summer Radio Camps. Each year a contest in equipment building is held; last year's second place was won by a woman.



Jean Chittendon, WB2BGE, standing with stone elephant enroute to Peking.

Being the only YL on the team, Jean added good words during the conference for YL operator participation, citing the many facets where YLs aid greatly in world communications — natural disasters, weather watches, medical aid relays and the many areas of emergency public service. She told them about the YLRL and its Adopted Sister program where American YLs sponsor DXYLs as members. To the many ARRL publications already presented, she added YLRL literature and LIDX Bulletins. Hopefully, these, too, may play a part in the ultimate legalization of Amateur Radio in China.

As guests of the Government of the People's Republic of China, the team was encouraged to visit many historical landmarks in and around principal cities. Their travels were extensive.

Since returning to Long Island, Jean has attended a reception for Chinese officials, including the Ambassador to the U.N. The Ambassador expressed his hope that she would again return to China to further the interests of Amateur Radio there.

In Jean's words: "It is too early to even think that our meetings in China may contribute to the hastening of legislation that will open the door to full-scale Amateur Radio privileges. We did what we think you might have done under the circumstances; we tried!"

NATURE'S WAY

Marianna and Ty Kearney, W1WFO and W1WFP, are well aware of the ways of nature. There is no more powerful force. They saw and escaped the eruption of Mount St. Helens.

When the volcano first erupted on March 27, 1980, after 123 years of dormancy, they were vacationing in New Zealand. They learned of the eruption via Amateur Radio at the station of ZL2AQA. Their first reaction: take the first plane home. The closest Cascade peak to their home in Vancouver, Washington, Mount St. Helens is 45 miles away. On second thought, they decided to complete their vacation.

Just 11 days following their return, Marianna and Ty were on their way to the 9977-foot mountain for public service as volcano watchers. Always mountain enthusiasts, they had spent seven summers on a state fire lookout station on a 3000-foot peak 24 airmiles southwest of Mount St. Helens in the '60s. You may have QSO'd them on 6 meters at the time. They had skied and climbed Mount St. Helens, as well as other peaks, several times. Now they would volcano watch.

They had signed up with the Washington State Department of Emergency Services and drove to their assigned observation point on May 13. They were to camp at this point for one week in their camper, "VanGO." Camping at 4240 feet, eight miles west of the summit, they reported daily observations via a RACES Net on 2 meters to N7AGG, Washington State RACES officer in Olympia. Daily seismic reports, originating at the University of Washington, were relayed to the net by Dorothy Armstrong, WB7OBV, in Seattle.

Their outpost was wrapped in solid fog for several days. May 17 dawned nearly perfectly — allowing a few ham friends to visit, Marianna to paint a watercolor, and Ty to pursue his hobby of photography. The mountain was quiet except for a few small steam plumes near the summit (one of the trends they were to report). On this afternoon, Gerry Martin, W6TQF, drove to his post on the north side — about 10 miles northeast of Marianna and Ty and near Coldwater Peak. He was the other volcano watcher.

With only one day left of duty, the fateful Sunday, May 18, arrived. Another nearly perfect morning. Ty was discussing several wispy steam plumes with W6TQF, when a jolting earthquake shattered the peacefulness. It was 8:32 A.M. Mariana was sketching the landscape and saw the first dark clouds boil up out of the summit. Very swiftly followed a lateral explosion of massed billowing black clouds. Ty saw part of the Goat Rocks slide away; the toe of a gigantic landslide. Marianna witnessed a fantastic cloud spewing out boulders and ice blocks. This great force of nature raced northward at 150 miles per hour.

Ty made a quick decision and took seven photos in 14 seconds. They then noted fringes of the cloud dipping into the canyon nearest them. A nightmare ride down the mountain began. For the first one and a half miles it was necessary to drive *toward* the exploding volcano. They were stunned as they drove toward a towering mushroom cloud of churning gray slashed with bolts of orange lightning. With serious doubts that they would make it, relief was theirs as they dropped below exposed ridges into the quiet basin of Lake Merrill. They had just witnessed the mountain's mightiest explosion in over 3000 years. The force equalled that of a 10-megaton nuclear blast. It devastated 156 square miles and took 61 lives, including that of their fellow volcano watcher, W6TQF, a friend they had never met.

The Kearneys, W7WFP and W7WFO. *(photo courtesy of W7NJS)*

Ty's photographs have been used to interpret stages in the initial lateral cloud. They have been visited by two French volcanologists. They've also had the courage to revisit their volcano campsite (with members of the U.S. Geological Survey) and have flown over the area. In Marianna's words: "We had been privileged to live and we feel ever humble."

It's a privilege to write about two such courageous radio amateurs who were willing to share their story. They were eyewitnesses and personally involved in this vivid expression of "Nature's Way."

REMINDER

YL/OM Contest in March. See details in "Contest Corral."

*Country Club Drive, Monson, MA 01057

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A VHF/UHF Primer — Part One

The experienced vhfer is asked to bear with us: The following is not aimed at you.

In the nearly six years since taking over stewardship of The World Above 50 MHz, I have received numerous requests for general information about operation on the vhf and uhf bands. Some have enclosed an s.a.s.e. and a small piece of paper with a note that goes something like, "Please tell me everything I need to know about vhf, including what band to get on first and what equipment is available." I think that everyone can see the impossibility of responding to requests like that short of writing a book, or at least a long article. The lead for this month's column, and that for several others over the next few months, will be devoted to providing information to those who know very little about work on the vhf and higher bands. I will not attempt, however, to go into details such as specific circuits or antenna dimensions. Instead, emphasis will be on what can be accomplished and where to find more information.

First I will run through the vhf and uhf bands and say a little about their propagation characteristics and operating patterns. Officially, vhf, or very high frequency, means frequencies from 30 to 300 MHz, while uhf (ultra high frequency) refers to frequencies between 300 and 3000 MHz. The higher microwave bands are in the shf (super high frequency) range. Thus, 6 meters, 2 meters and 1-1/4 meters are vhf bands. Our uhf bands are 70 cm, 23 cm and 13 cm.

6 Meters — This band extends from 50 to 54 MHz. Being our lowest-frequency vhf band, its propagation characteristics are a cross between what one might find on 10 meters and the higher vhf bands. Sometimes 6 is open for long-distance work of 2500 miles (4200 km) or more. This is true particularly during years of high solar activity such as we have just been experiencing. The best time for such *F2 propagation*, as it is called, is during daylight hours, with the month of November being the most productive of openings, at least in our part of the world. Another type of propagation common on this band is *Sporadic E* or *Es*. Because the E layer of the ionosphere, from whence Es reflections come, is about 60 miles (100 km) above the earth whereas the F2 layer is about 200 miles (330 km) high, the usual distance for single-hop Es skip is 800 to 1200 miles (1300 to 2000 km) rather than the longer distance cited for F2. Nevertheless, multiple hops of Es propagation can and do occur, providing DX of 2500 miles (4200 km) or more. Contacts between the U.S. East Coast and Gibraltar, and the West Coast and Japan, have been made; transcontinental QSOs are quite common. The months of May through August are best for the Es mode, with a secondary peak in December and January. The occurrence of Sporadic E does not appear to be materially affected by the solar cycle. Therefore, one can expect many good Es openings during any year, not just those at the peak of the sunspot cycle as is true for F2.

Like all of our vhf and uhf bands, 6 meters offers a basic reliable range even when no unusual propagation conditions exist. For an average station using ssb or cw, that range is in the order of 150 to 200 miles (250 to 335 km). An average station is defined as one with an output power of about 100 watts into a 10 dB gain antenna approximately 30 to 50 feet (9 to 15 meters) above ground. The consistant range with fm is normally significantly less, perhaps 50 to 100 miles (90 to 160 km). The lower figure results from the greater bandwidth involved and the threshold nature of fm. Once full quieting is reached, however, fm can't be beat in terms of signal-to-noise ratio.

Often extending the normal range of 6-meter signals out to roughly double the normal range is *tropospheric refraction*, in which the signals are bent back to earth within the atmosphere. Such conditions are most prevalent during the warm months and are often set up by advancing weather fronts. Six-meter signals can also be propagated in short bursts by the ionized trails left by meteors entering the upper reaches of the earth's atmosphere. Sometimes, these bursts last long enough or come in such quick succession so as to permit quite good communication over ranges of up to about 1000 miles (1700 km). The aurora borealis sometimes provides good DX, albeit with somewhat buzzy-sounding signals. To take advantage of this interesting mode, one's antenna must be aimed in a northerly direction despite the true bearing of the station being worked.

Most of the ssb work on 6 meters takes place between 50.1 MHz and 50.3 MHz, with cw around and below 50.1. A-m can usually be found from 50.2 to 50.5, with 50.4 being the most popular spot. Fm occupies the band from 52 to 54 MHz, with several spot frequencies above 53 MHz used for model control.

2 Meters — This, our most popular vhf band, extends from 144 to 148 MHz. It is the band which carries the bulk of fm operation and, as such, provides the first taste of vhf operation for many amateurs who have never before ventured above 10 meters as well as those just entering the hobby. Fm operation occupies the band from 144.5 to 148 with three repeater subbands established by the FCC. Within that frequency span there is a 200 kHz window for satellite work between 145.8 and 146 MHz. Weak-signal work using cw and ssb takes place from 144.0 to 144.5 MHz, with 144.2 designated as the calling frequency. Groups promoting the revival of 2-meter a-m operation congregate around 144.4. The span from 144.0 to 144.1 MHz is limited to cw operation by FCC rules.

Propagation on 2 meters is principally via the troposphere although several ionospheric modes are also present from time to time. The reliable range is similar to that exhibited by 6 meters. However, since higher gain antennas for this band are more practical on 2 than on 6 meters, and because, at a particular height, a 2-meter antenna is higher in terms of wavelength, signals over 100- to 200-mile paths are, in many cases, stronger. *Tropospheric refraction* can be considered the "bread and butter" mode on 2 meters. Quite frequently that mode produces strong signals over distances of around 1000 miles (1700 km). A special case of this mode, essentially absent lower in frequency, *tropo ducting*, may result in extremely strong signals over surprising distances. In this mode, signals become "trapped" between two layers of air and are carried over long distances with little loss in strength. This phenomenon can result in a "skip" effect similar to that existing in ionospheric propagation, in which stations located between the ends of the path are not able to participate in the opening, or do so with considerably reduced signal strengths.

As mentioned above, ionospheric propagation modes do occur on 2 meters, although less frequently than on lower bands. F2 has never been observed on this band but Sporadic E, reflection from meteor trails and auroral propagation do occur quite frequently. The characteristics exhibited by these modes are similar to those seen on 6 meters but they occur less frequently and openings are shorter in duration. Nevertheless, these ionospheric modes can be very productive of contacts and lots of fun. The meteor trail reflection mode called *meteor scatter*, or m.s. has been developed by 2-meter operators to such a degree that it has become a very important factor in operation on the band. Almost everyone who has worked more than 30 states or so has contacted one or more of them via m.s. The buzz imparted to signals by reflection from the aurora borealis is frequently sufficient to make voice work impossible, making the use of cw mandatory. Probably the most exciting propagation mode occurring on 2 meters is Es. The 2-meter gang likes to call it "E Skip." It doesn't happen often, perhaps a few times per summer, but when it does, signals literally roar in from 800 to 1200 miles (1300 to 2000 km) away. Even stations with low power and simple antennas can participate.

The 2-meter band is the favorite for *moonbounce*, or *EME*, communication. By reflecting signals from the surface of the moon, worldwide contacts are possible. All of the some 30 stations that have achieved WAS on the band have used moonbounce in working some states. Nevertheless, one does not need to go to the high power and very large antennas necessary for success on EME to have fun, and run up a good state total. One 2-meter operator, WØSD in South Dakota, has worked all of the 48 continental states without the use of moon reflections.

1-1/4 Meters — Our 220 to 225 MHz band has been somewhat of a stepchild for many years, but recently it has been gaining increased

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

activity. Its tropospheric propagation characteristics are very similar to those encountered on 2 meters but ionospheric modes are very much less prevalent. Aurora and m.s. contacts have been reported by none via Es. There was a near miss during the big 2-meter Es opening of July 17, 1980 when WØVB Minnesota and W3IY/4 Virginia both heard one another. EME, being a line-of-sight mode, is very viable on this band. In fact, the slightly smaller antennas needed to resonate on 220 MHz might make it an easier band on which to try moonbounce than is 2 meters. Weak-signal, ssb and cw work take place in the first few hundred kilohertz with 220.1 designated as the calling frequency. General fm operation is largely above 222 MHz. The rest of the band is used for repeater control links and experimental work.

70 cm — Our lowest-frequency uhf band extends from 420 to 450 MHz (430 to 450 MHz in Canada). Weak-signal work is almost exclusively confined to the area just above 432 MHz, with a calling frequency at 432.1. The remainder of the band is used for fm and ATV, with a satellite segment from 435 to 438 MHz. Propagation is almost exclusively limited to tropo and line-of-sight modes, but a few contacts have been made over the years via m.s. and aurora. Es has never been observed. The reliable range is somewhat less than on 2 meters but tropo ducting can produce outstanding signals over ranges from a few hundred to perhaps 1000 miles (1700 km) or more. This band is favored by many moonbouncers. Two 70-cm EMErs, WØYZS and K2UYH, have earned WAS. They, along with a number of others, have worked all continents.

23 cm — Although 70 cm might be classified as a microwave band since its wavelength is less than 1 meter, the 23-cm band is often referred to as our lowest microwave band. It extends from 1215 to 1300 MHz but is due to be cut back to 1240 to 1300 MHz as a result of allocations made at WARC-79. Presently, all weak-signal work is done near 1296 MHz and, just as you will hear 70 cm referred to by weak-signal operators as "432," the 23-cm band is usually called "1296." Propagation is essentially limited to line-of-sight and tropospheric modes, with no ionospheric contacts ever reported. Numerous tropospheric contacts of several hundred miles have been made on 1296, and their successful completion is indeed a notable accomplishment. EME operation is gaining favor. The 23-cm band is a good place for the true experimenter.

13 cm — This is the highest of our uhf bands. It runs between 2300 and 2450 MHz. The top end is where microwave ovens operate. These frequencies are considered line-of-sight in nature, but nevertheless tropospheric propagation is possible and does take place. A few moonbounce contacts have been accomplished between exotic stations constructed by advanced experimenters. The QSO that comes to mind was the first ever made on this band. It took place in 1970 between W3GKP and W4HHK after the two spent three years building and experimenting.

Additional information on the fascinating world above 50 MHz can be found in the ARRL *Handbook* and *The Radio Amateur's VHF Manual*, also published by the League. Useful microwave information is published every month in The New Frontier.

In the next part of this series, I will discuss equipment for the vhf and uhf bands.

SPRING VHF CONTEST ANNOUNCEMENT

The second annual vhf contest sponsored by the Ramapo Mountain ARC will be held beginning at 1800Z March 28 until 0400Z March 30. The exchange is signal report and ARRL section. Contacts on 50 and 144 MHz count one point, those on 220 and 420 MHz are good for two points and all QSOs above 1215 score three points. The multiplier is the sum of ARRL sections worked on each band. Rules are like those in the ARRL June and September VHF QSO parties except that fm is not allowed below 450 MHz. Use the same log forms that you would in League-sponsored vhf contests, or send an s.a.s.e. to the club at P. O. Box 364 Oakland, NJ 07436, for forms. Entries must be mailed by April 27 to qualify for award. All who submit logs will receive a copy of the results.

The group intends this to be a national competition and invites entries from across the U.S. and Canada. Last year's affair represented a good start but California was conspicuous by its non-participation. This conductor has heard many decry the use of fm in vhf contests. The Ramapo event should provide a chance to see what can be done without spending time fighting the battle of five-two. Besides, it gives us something to do between the January VHF Sweepstakes and the June VHF QSO Party.

ON THE BANDS

6 Meters — As this is being written in mid-January one phase of Cycle 21's benevolence appears to be coming to an end. F2 openings on the North Atlantic path between North America and Europe have trailed off markedly over the last few weeks. The last contacts this conductor made were on December 27 when EI2W and PAØRYS were worked two-way and GJ3COJ was contacted via the crossband route. Stations located to the northeast have been faring somewhat better. The New England gang, as well as VE1AVX in Nova Scotia, were still making crossband QSOs through the first week in the new year. Then, about the time everyone thought it was all over, comes January 14 when VE1AVX completed a string of crossband contacts. This despite a 10.7-cm flux reading hovering around 160. That afternoon, WA5IYX San Antonio heard the 45.25 MHz New Zealand video, although the muf got no higher. No one can say, at this point whether or not 1981 will repeat the curve thrown us in 1980 or whether it will emulate 1979 and provide reasonably good conditions to Europe and possibly South America and the Pacific. We should know by the time this column is in the hands of the readers.

Everyone agrees that crossband is not as exciting and rewarding as two-way operation. Imagine how the gang on the other end feels. Many have gone to considerable effort and expense to equip themselves for a band on which they are not allowed to transmit. How frustrating it must have been for them, hearing those signals from this side of the pond, and not being able to put out a 50-MHz signal in response. In recognition of their effort W3IWU, along with a group of fellow Pack Rats and others, have produced a certificate in the name of the "Six Meter Amateur Radio Operators of Region 2." It has been mailed to all Europeans who could be identified as having participated in 6- to 10-meter crossband operation. I am sure that all of us thank Herb and his associates in this worthy project, just as we thank the European crossbanders for their contribution to our enjoyment of 6 meters.

A rare one that we may have a chance to work via Es this summer is HKØBKX San Andres Island. An FT-620B and beam was sent to Fransisco by W4OO but unfortunately there was some damage in shipment. Enter W9UCW/HKØCOP who fixed things up and put the station on the air. Barry has also schooled Fransisco in the ways of 6 meters, so he should know what to look for. 8P6KX and XYL 8P6MH are also active. Their rig is an IC-502 loaned by SM1RK. The loan, or donation of an amplifier, would be most welcome by them as well as those hoping to work them. We shouldn't put barefoot 502s down, however — KØSFH in Kansas can attest to that. Using his 3-watt wonder and a four-element beam, Mike completed WAS between January 1 and December 14, 1980. The last state was NØAFT South Dakota, worked via m.s. The Geminids can be useful on 6 meters too. In addition to cornering all 50 states, Mike can boast 10 countries and he needs only Africa and South America for WAC.

KA4AOK Montgomery, Alabama is trying to get more RTTY activity started on the band. Red calls CQ on 50.7 lsb with 170-Hz shift at 60-wpm between 0130 and 0200Z every evening. He says that WDØFGJ has been worked on that frequency.

2 Meters — Is it that everybody has already worked everyone else, or that the Geminids was not too productive this time around? In any case, not many reports came in on this major shower. VE3FKX, one who was heard from, reported that things appeared to peak on December 13. Rolf worked WØRWG Missouri that day and WBØIUT Nebraska the next. Both of these two represented new states bringing his total to 34. A new convert to the meteor mode is N7BHC Hunter, Utah. Dave managed QSOs with WØSD South Dakota and WB7TYU Oregon, boosting his states worked to 11. He is using an IC-251 driving a KLM 160. Plans call for a kw and 4 Boomers: Intention — EME. Another interested in m.s., KC4EG, pleads for publication of a "standard" set of procedures. Ralph complains that people in different parts of the country seem to do things in different ways. The Central States VHF Society tried to tackle this a few years ago with only moderate success. Nevertheless, I'll attempt to summarize the situation in advance of the Perseids, which occurs in mid-August.

A very nice letter has been received from W2ORI Lockport, New York. John is a real old-timer in vhf, having been active on 2 meters since the 40s. For many years he was the New York State leader in the 2-meter box. Now 76, he was disappointed at not seeing his 37 states listed the last time the box was published. Apparently he hadn't heard about the new two-year rule. I assure you, John, you will be back in next time. That's all I need is some written indication that a person is still around and wishes to continue to be listed.

1-1/4 Meters, 70 cm, etc. — The Washington area has a new 220 MHz station. It is none other than W3XO! After all these years! Yes, this conductor's VE3CRU-modified Microwave Modules transverter finally arrived and works well. I can't wait to try it out in the January VHF Sweepstakes coming up in a few days from this writing. The next step will be to hook the surplus AN/URT-32 to it to raise the power to a few hundred watts. At present, the antenna is a 14-element KLM at 40 feet. It is very nice to be on this band, which has always intrigued me.

A new publication devoted to the 1-1/4 meter band has come to my attention — Texas 220. From the first edition it appears that it is mainly concerned with fm, but the publisher, Wayne Day, WA5WDB, says that the intention is to cover all aspects of operation on the band. Those interested can drop an s.a.s.e. to Wayne at 1779 Continental Dr., Blue Mount, TX 76131.

K2UYH passes along the information that he has resumed his 0400Z nightly skeds with K9KFR on 432.095 MHz. Al says that they always make it over the 600-mile (1000-km) path, although signals are sometimes of EME quality in terms of both strength and frequency dispersion. Frequently joining in are W7EKI/8 and K8WW Ohio and Michigan stations WA8HGX and WA8HCL. The latter runs just 10 watts but is heard frequently nevertheless.

As proof that 70-cm QRP can be fun, take the case of WB8YFE Stevensville, Michigan. Ray is using a Hamtronics transverter which produces 750 mW. This is fed to a 21-element F9FT through about 60 feet of half-inch 75-ohm hard line. Using this set-up he is able to work the Chicago stations about 80 miles (135 km) away. He does plan to increase power but, in the meantime, is having a great time with what he has.

K2UYH's 23-cm state total is up to 18 as a result of completing an EME contact with W6YFK. Other recent moonbounce contacts on that band include DI8QL, G3LTF and G3WDG. Other tidbits of news from the fast-growing 23-cm EME front include G3LTF's activity. He now has homebuilt six-tube amplifier going which produces 250 watts. Recent contacts have been SM6CKU, SK2GJ (the large dish station in northern Sweden reported last month), G3WDG, LX1DB, VE7BBG and PAØSSB. SM6CKU is elated over what he considers to be his first "real" 23-cm EME contact. It was with G3LTF and came after working on his amplifier to raise its output to 90 watts. Before making this improvement, he had worked SK2GJ with only 30 watts from the amplifier and 10 watts at the feed point.

The foregoing 23-cm news came via K2UYH's "432 and Above EME Newsletter."

Club Corner

Conducted by Sally O'Dell,* KB1O

THE CONTINUING SAGA OF ELMER, WHO?

You remember Elmer, don't you? He is the fellow we met in January with Furd, trying to get that antenna out of the basement. Elmer would answer questions on the telephone whenever Furd called. Now that's not too bad. After all, Elmer can't spend all his time at Furd's house. He has other things to do. But Furd does need some of Elmer's "in-person" time.

For instance, Furd and Elmer have been anxiously waiting for Novice Roundup. It's just around the corner for them. Some people find out about Novice Roundup the hard way — just after it ends. But not Furd. Elmer started discussing the "Roundup" with Furd months ago, when they talked about activities other than ragchewing. One was contesting, and here is a contest billed and built especially for Novice and Technician operators. Elmer gave such a good sales pitch that Furd was "chomping at the bit" and ready to go.

Furd was ready but just a bit queasy. "After all, this is my first contest and I haven't done that much operating and maybe no one will answer my call and what if I can't remember how to copy down all those call signs and what if my antenna falls down part way through a QSO and . . ."

"Hold it, Furd, hold it!," Elmer exclaimed holding up one hand and laughing. "This is no laughing matter," insisted Furd defensively.

"I understand your anxiety and sympathize," said Elmer, "but if any of these catastrophies do happen we'll deal with them. Until then, calm down. Work out with weights or take a walk if you start getting so uptight. Maybe one of my experiences will help you over this difficult spot in your quest of 'hamdom.'

"I was all set to operate *The Roundup*. The rig was tuned. I had checked the antennas — long-wires still up, inverted V ready. Did a final tweak on the rig and I was ready to go. I sat in the shack waiting for the clock to roll over to starting time. I entered the time in my log and began. My Elmer (whose name was Clark) was sitting at my elbow ready to smooth the path for me as I slid into my first contest. I listened around for someone calling CQ. (I was listening for CQ NR.) Nothing heard, so I began calling CQ NR CQ NR DE WN8NOK/N WN8NOK/N K with a nice slow fist. Just wanted to get moving with good spacing and a good rhythm. The key moved under my fingers as if it belonged there. I was calling . . . and calling . . . and calling. But even though I waited long enough, no one responded. So I checked my antennas and the rig. Everything was fine. Then I sat back in my chair and tried again. Easy rhythm, good spacing. Nothing.

"Well, that was enough for me. I told Clark I was quitting. He couldn't understand it either and urged me not to give up. We puzzled over this problem for a good two hours — two hours of my operating time that were wasted. Then we did one final check of the rig. We had moved it out for some work a few days earlier. When we shoved it back, someone must have brushed against the side, the side where there is a tiny little switch; one position for operating as a transceiver, the other for operating with an external receiver. Why hadn't I checked the switch? It was in the external receiver position and I don't have one!

"Boy, the hams out there must really have had some strange things to say about me. With the switch in the proper position, my fist was still heard all over the country, but this time I heard the other operators. I was able to make my first contest contact and a few others besides.

"I turned in a fair score for my first contest. Clark was there by my side and I'll be by yours if you need me. Otherwise, I'll just be around."

The Novice Roundup has just ended. It was a good beginning for both Elmer and Furd. Both actively participated and thoroughly enjoyed themselves. For those of you who missed the chance - other contests are coming. See Contest Corral for future operating events. An Elmer is an important person at a time like this — while getting ready for that first contest (or first contact or first radio purchase or first ???). Elmer can help guide the Novice over the harsh "firsties." An Elmer can also guide the quaking Novice through the "secondies" and "thirdies" if he or she is needed. The main idea is that an Elmer gets the Novice started.

Elmer, after you decide to help operate a contest, what is the first thing to do? Do you just sit down and begin making contacts *or* do you plan your initial steps? Those who have operated a contest before know what to do first. Do you, Elmer? Does your protégé?

Here are some ideas. Add your own to this checklist. (1) All equipment is tuned and ready for operation. (2) A copy of the rules in plain sight. (3) Understand the rules (If you don't, contact the contest department at ARRL Headquarters.) (4) Listen . . . tune around . . . and listen some more. (5) Listen to someone making a contact. (6) Follow the exchange and recheck your rules. (7) If you are nervous about this first contact, write down all the steps of the exchange first. (8) Even if you are nervous, be sure to keep your code to a speed no faster than you can receive. Those people who send faster than they can receive are asking for problems. (9) If necessary, be sure to use QRS PSE (slow down, please). (10) Elmer: Work through the first few contacts with your protege. (11) Make your contacts short and sweet. (12) After the contest is over, help your Novice prepare the entry and remind him or her to mail it before the due date. (13) Have fun.

Does your club sponsor one overworked Elmer or a group of Elmers? Do they help your Novices? Why not show your club's appreciation for these Elmers. Throw a party in your Elmers' honor or present them with certificates of appreciation (make up your own). Or just give them some applause at the next club meeting. Show them you care and do it today.

*Club Program Manager

Shirley Wilkerson Jr., W4TBU, of Henderson, Kentucky, was presented with a Dentron Clipperton L Linear Amplifier as a token of appreciation for all the encouragement, advice, schedules, repair jobs and all-around help he provided for his many friends. He is a perfect example of an Elmer.

Strays

When Joe Jansen, DK3CR, of Erfstadt, West Germany, last visited the U.S., he was the guest of the U.S. Government — as a prisoner of war at a camp at Indianola, Mississippi. He recently took a thousand-mile detour to revisit the POW camp during a trip to the U.S. The guest of W6TSH, Joe also visited the *Queen Mary* at Long Beach, California — the same ship that brought him to the States after having been captured.

QST congratulates . . .

☐ Dr. Tom Clark, W3IWI, president of AMSAT, who has been awarded the "NASA Exceptional Performance Award" for his work as NASA group leader in perfecting an approach for a geodetic survey system, the most accurate to date using pulsar techniques.

HF MOBILE — WITH A VENGEANCE!

☐ Whitey Doherty, K1VV, of Sandwich, Massachusetts, likes to operate cw (as well as phone) from his car. The photo shows his neat setup. He uses a Yaesu FT-7 transceiver in combination with the K7ES "Solid-State Titan" from June 1977 *QST*, along with an Accu-keyer and Ten Tec paddle mounted just below the shift-lever knob. Not to overlook 2-meter fm, Whitey has mounted an IC-230 for those times when he wants to render "lip service." In the event that Amateur Radio isn't the order of the day, Whitey can activate his a-m/fm 8-track music system, which reposes under the seat.

All of this gear is installed in the front-seat area of a 1979 Dodge Omni. K1VV says, "The cw sure helps to pass the time," as he drives 55 miles one way to work! This writer can attest to his signal quality and strength, as witnessed on October 30, 1980, when K1VV/M1 worked VP2VGT (W1FB) on 20-meter cw. His signal was RST 579, and his fist was excellent as he drove down the highway toward his home QTH! — *Doug DeMaw, W1FB*

K1VV has made efficient use of the console area in his subcompact car.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AJO, Charles A. Pirro, Riverside, CT
W1BFY, Frederick H. Bassette, New Britain, CT
W1DTW, Freeman I. Searle, Coventry, RI
WA1EYX, Daniel K. Ross, Hampden, MA
ex-1FAV, F. Clifford Estey, Salem, MA
K1GKA, John J. Welland, Acton, MA
W1IVK, Chester A. Balicki, Springfield, MA
K1JAR, Lewis M. Covey, Lynn, MA
WA1MNH, Walter T. Eppler, Pt. Richey, FL
WA1UFK, Clarence Hanover, Clinton, CT
K2AO, Merwin L. Shultis, Sidney, NY
WA2ASI, Terrence R. Marshall, Brooklyn, NY
K2CBS, Ida J. Killets, Beach Haven, NJ
W2CR, Roger J. VanWuyckhuyse, West Webster, NY
WB2DJC, Evan M. Davidson, Sepulveda, CA
W2GWJ, Louis G. Gebhard, Wellesley, MA
W2IM, Raymond D. Jobes, Rochester, NY
W2KJF, William J. Sakal, Pleasantville, NY
W2LEA, Fredrick Oehrlein, New Hyde Park, NY
WA2LIH, John R. Radecki, Buffalo, NY
W2MVE, Robert C. Sibley, Rye, NY
W2OSL, Charles B. Lissner, Huguenot, NY
WA2SJO, George Konnick, Riverhead, NY
WB2TWY, Howard C. Hayes, Amityville, NY
W2WI, Robert A. Worley, Brookside, NJ
N3AGZ, Jules Reichenthal, Wilmington, DE
W3BQU/W3BAH, Howard C. Buerger, Chalfont, PA
WB3BZM, John L. Ogden, Philadelphia, PA
W3KLG, Albert E. Snyder, Berwick, PA
K3KOH, Anthony S. Millard, Philadelphia, PA
W3TDW, Peter Zawojski, Pittsburgh, PA
W3WV, Leo C. Young, Oxon Hill, MD
W3ZV, George Thomas, IV, Coopersburg, PA
WD4ADZ, John W. Klinepeter, Pensacola, FL
WB4EDT, Lionel E. Goff, Indialantic, FL
W4ELY, Hubert W. Brown, Brooksville, FL
KA4FKT, Capt. Robert W. Orrell, Cardinal, VA
KA4FNL, Arnold L. Capps, Fayetteville, NC
K4HRQ, William A. Piercy, Clearwater, FL
W4JEU, William H. Smith, Greenville, NC
K4LG/ex-W3HX, David C. Trafton, Treasure Island, FL
WA4LJE, Merlin R. Roman, Sr., Chesapeake, VA
W4MQF, Elmer R. Strunk, Fort St. Lucie, FL
W4OEN, Roy G. Rickles, Gadsden, AL
W4SMO, Russell K. Spracklen, Falls Church, VA
WA4TPI, Richard E. Wilkerson, Chesapeake, VA
W4ZRH, Carlton R. Commander, Yonge's Island, SC
W4ZVV, Dr. D. L. Howe, Edgewater, FL
W5BSK, Ernest Frisco, Tulsa, OK
W5BUX, George H. Steed, Pine Bluff, AR
W5DCH, Elwood A. Breeding, Tulsa, OK
KA5DOK, Clifton M. Tyler, Overton, TX
N5ET, Frederick Walworth, Dallas, TX
WD5GVR, Leon M. McKinney, Jr., Shreveport, LA
W5IYD, James I. Martin, Jr., Baton Rouge, LA
WA5ORJ, Andy L. Welch, Clute, TX
WB5PHL, E. J. "Jack" Owen, Blytheville, AR
N5XU, Richard W. Griffith, Abilene, TX
W6CLQ, Melvin H. Willey, Arcadia, CA
W6ECG, Merrill G. Strang, Los Angeles, CA
W6EEX, Lloyd A. Saxon, San Jose, CA
WA6EIQ, Henry C. Riehl, San Diego, CA
WA6KTY, Paul O. Anthes, Menlo Park, CA
W6LYH, William F. Dolezal, Lakewood, CA
WA6QGA, Harold Baker, San Francisco, CA
ex-W6QXJ, Merlyn G. Kresge, Susanville, CA
WA6SCC, Roy A. Card, Coronado, CA
WB6SWH, Jefferson F. Jones, Santa Clara, CA
WA6VKE, Paul H. Wildhofer, Campbell, CA
N7AVP, North Burn, Waldron, WA
W7CEN, William F. Reeves, Tucson, AZ
W7HUC, Roy F. Keil, Gig Harbor, WA
K7KJW, Miles W. Anderson, Tacoma, WA
W7KOL, John K. Oliver, Tucson, AZ
AJ7L/ex-WB7BNX, Jack R. Peterson, Vancouver, WA
W7LEC, Adrian L. Piquette, Tacoma, WA
W7MEA, John T. Robinson, Mercer Island, WA
W7ZTS, Harold H. Sargent, American Fork, UT
WA8AOH, Dr. Robert J. English, Toledo, OH
WD8CDI, Phillip K. Sutton, Huntsville, OH
WD8CEI, Thomas J. McMahon, Jr., Cuyahoga Falls, OH
W8FHY, Dr. Joseph P. Bertucci, Ishpeming, MI
W8GZR, S. Miner Clark, Cincinnati, OH
W8HKJ, Wells B. Kohler, Jackson, MI
K8JLH, Alvin C. Turner, Perry, MI
W8JXI, Leland S. Lovell, Newaygo, MI
W8LBW/ex-W7MEO, Henry J. Moeller, Muskegon Hts, MI
W8LZY, Robert L. Tucker, Jr., Detroit, MI
W8QGJ, Henry Novak, Rochester, MI
ex-W8TMZ, Elton H. Nickel, Detroit, MI
WB8TRF, Asa D. Gawthrop, Bridgeport, WV
WA8UEU, Harlan C. Church, Moundsville, WV
W8VI, Raymond A. Bidel, Fair Haven, MI
KA9ANY, Elisha Chestnut, Jr., Jasper, IN
W9BRJ, Byron Essex, Canton, IL
WB9CAJ, Arthur J. Willette, Markesan, WI
W9CMT, Stillman L. Dixon, Peru, IN
K9EOV, William L. Harris, Lafayette, IN
WB9GHJ, Joseph F. Droy, Bensenville, IL
W9GO, Harvey F. Kohnitz, Sr., Hickory Hills, IL
K9JTQ, Glen R. Harvey, Tangier, IN
W9MHE, Charles M. Gephart, New Haven, IN
WA9OKR, Neil G. Thompson, New Carlisle, IN
W9PTN, Lowell F. McNeill, Racine, WI
WA9TJC, John H. Finley, Chicago, IL
K9TVS, Charles Mullauer, Dolton, IL
WB9WTE, John M. Jump, Walton, IN
WB9WZT, Lucille M. Valovius, Mukwonago, WI
KAØAGB, Burell E. Phillips, Raymore, MO
WØCSR, Chester L. Davis, Warsaw, MO
ex-WØDTN, George H. Kingsborough, Warsaw, MO
WØHRS, James D. "Delmer" Jones, Warsaw, MO
WØIRK, Thomas A. Gray, Englewood, CO
WAØITA, Edward C. Dewey, Independence, MO
WØJXI, Robert M. Jones, Lees Summit, MO
WØKVR, Dale Mears, Cedar Rapids, IA
KØLJN, Dr. Donald P. Watson, Elwood, NE
WØNMW, James W. Allspaw, Niangua, MO
WØROY, Charles E. Bradrick, Pittsburg, KS
WØUUE, Dr. Fred C. Holzapfel, Golden Valley, MN
VE2ALB, Marcel Leblanc, Montreal, PQ
VE3AHC, Gladwin C. "Duke" Coutanche, Thunder Bay, ON
*VE3DQA, Cyril Weaver, Hanover, ON
VE3FFU, Thomas Bailey, Midland, ON
VE3FQZ, John H. Adams, Oakville, ON
VE5CJ, Clifford W. Jones, Saskatoon, SK
DL2ZB, Ehrenfried Strabel, Grossbuechelberg, Germany
G3LB, Arthur R. Yates, Ripon, England
JY9MB, Martha F. Blackburn, Amman, Jordan
ON4KD, Adriaan Blancquaert, Lokeren, Belgium
SP2CC, Emil Jurkiewicz, Gdansk, Poland
TG9SY, Sender C. Garcia, Colonia, Altamira
VK5AT, A. W. Taylor, Edwardstown, South Australia
VK5CV, George Lane, Henley Beach, South Australia
VK5NHE, N. E. Hayhoe, Port Augusta, South Australia

*Life Member, ARRL

Note: All Silent Key reports sent to Hq. must include the name, address and call of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

March 1931

☐ About two dozen manufacturers have been authorized to build and sell superheterodynes for broadcast reception, and in his editorial K. B. Warner warns that amateurs might be in for some trouble with BCI that is not their fault. He points out that, unless good design is followed, just because a receiver uses the superheterodyne principle doesn't make it a winner. Oscillator harmonics and lack of front-end selectivity are likely shortcomings of sets made by manufacturers who cut too many corners.

☐ Associate Editor Ross Hull describes a neat master oscillator/power amplifier design that uses an electric fan to cool the oscillator tube and reduce the frequency drift. Frequency-vs-time graphs show the marked advantage of having the fan go on (and off) with the plate power to the oscillator.

☐ "The Old Timer Investigates Push-Pull" is another of the easy-to-read technical articles by Gene Hubbell, W9ERU. He discusses push-pull oscillators working directly into the antenna, not used as driven amplifiers.

☐ "A Home-Made Sub-Standard of Frequency" by E. Dawson Bliley, W8CU, describes a temperature-controlled 100-kc. crystal oscillator. An ingenious home-made thermostat is shown, as well as the construction of the crystal holder and the insulated box housing the crystal. Temperature inside the box is measured by a household thermometer *bent at a right angle*; the bending process is included in this fascinating article.

☐ General Electric engineers H. T. Maser and H. L. Saxton, in "Mercury-Vapor Rectifier Ratings and Circuits", provide guide lines for rectifier tubes like the 866 that are becoming available. Important limitations are pointed out.

☐ In the "Experimenter's Section" several neon-bulb oscillator circuits are shown, including a push-pull version that operates at broadcast frequencies! In the same section, a number of reports on the usefulness or uselessness of filament by-pass capacitors shows no universal agreement. The editor surmises that the changes in efficiency and tone that are experienced might be related to the effectiveness of the r.f. chokes in other parts of the transmitters.

☐ In "I.A.R.U. News" Clint DeSoto reports that the first 'phone WAC was issued to Paul de Neck, ON4UU, in March, 1930. Since then Carter, VK2HC, O'Heffernan, G5BY, and Neill, GI5NJ, have received the coveted award.

25 Years Ago

March 1956

☐ Steady growth of the League is reported in the editorial. At the end of 1955, the full voting membership of Ws and VEs was 54,515. In the past five years, U.S. amateur League membership has increased nearly 80%.

☐ An article destined to help many hams get started on sideband, "Cheap and Easy S.S.B." by Tony Vitale, W2EWL, tells how to convert the war-surplus BC-458 to either 75 or 20 sideband. The phasing method is used, generating the signal at 9 Mc. and using the 5-Mc. VFO of the BC-458 for heterodyning to the output frequency. W2EWL has been on mobile s.s.b. for over three years with versions of the rig.

☐ In "CQ TR" Laird Campbell, W1CUT, describes his two-transistor 7-Mc. transmitter. The output CK761 runs 5 to 6 ma. at 12 volts. Laird finds that "CQ TR" brings more replies than the "CQ QRP" he tried at first, probably because the latter sounded like he only wanted calls from other QRP stations. Best DX so far is 800 miles — no skeds or other arrangements.

☐ Ernest Bernard, W5NSJ, describes "A Crystal-Controlled 432-Mc. Converter" to work into a receiver tuning 14 to 18 Mc. The converter uses a multiplier string to get the 418-Mc. injection power from the 8.5-Mc. crystal; the signal chain consists of two grounded-grid 6AN4 r.f. stages, a crystal mixer and a low-noise 6BQ7 cascode i.f. pre-amplifier. Noise figure runs about 6 db. or better.

☐ Six interesting pages of "V.H.F. Scatter Propagation and Amateur Radio" by Mark Moynahan, W2ALJ, bring the reader up to date on this recently-publicized transmission mode and predict some of the possible amateur applications.

☐ Among the Silent Keys a tribute is paid to long-time League member Dr. Greenleaf Whittier Pickard, W1FUR, a famous radio pioneer and holder of many awards and patents. The crystal detector and the radio compass are among his many contributions. — *Byron Goodman, W1DX*

Rules, Fourth ARRL International EME Competition

Time to start putting the final touches on the amplifier and antenna — the 1981 EME Competition isn't too far off now! Last year saw the first contest EME QSOs on 220 MHz, and perhaps this year we'll see some try at QSOs above 1296 MHz for the first time. If you've never tried to make an EME QSO before, check out the listings from the 1980 contest (September 1980 *QST*) and get in touch with someone who has. Most will be happy to help you out. Good luck!

Rules

1) **Object:** Two-way communications via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.

2) **Contest Period:** Two full weekends, April 11-12 and May 9-10, full 48-hour period UTC each weekend.

3) **Categories:**

A) Single Operator: One person performs all operating, equipment adjustment and antenna alignment.

B) Multioperator: Two or more persons participate; includes neighboring amateurs within one call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups cannot use the same call signs at each location; all calls will be listed in the results.

C) Commercial equipment: Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4) **Exchange:** For a valid contact to occur, each station must send and receive both call signs and a signal report in any mutually understood format, plus a complete acknowledgement of the calls and report. Partial or incomplete QSOs should be indicated in your log, but not for contest credit.

5) **Scoring:**

A) QSO Points: Count 100 points for each complete EME contact.

B) Multiplier: Each U.S. and Canadian call area, plus each DXCC country (not U.S./Canada) worked via EME on each band.

C) Final score: Multiply QSO points by sum of multipliers worked on each band for your final score.

6) **Miscellaneous:**

A) Fixed or portable operation is permitted. Stations operating outside traditional call areas *must* indicate so, identifying the call area of the operating site.

B) Contacts may be on cw or ssb. Only one signal per band is permitted.

C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, except for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

D) There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

7) **Reporting:** Entries must be postmarked no later than 30 days after the contest (June 9, 1981) and must include complete log data. Entries received after mid-July may not make *QST* listings. Your summary sheet should indicate the total number of QSOs on each band, multipliers per band and final score. If possible, include details of your station set-up and a photo.

8) **Awards:** The high-scoring single and multioperator stations in each U.S. and Canadian call area and each DXCC country will receive a certificate. In addition, each station that successfully completes at least one moonbounce contact during the contest period will receive a certificate commemorating that achievement.

9) **Disqualification:** See January *QST*, page 79. QST

April Open CD Party

The April CD Party is open to *all* members of the ARRL Family. Take a few minutes or a few hours to join in and meet other ARRL members.

The rules are relatively simple, and with only 10 hours of operating permitted, it won't take up your whole weekend. This is a very good opportunity to snag those missing states for your WAS or 5BWAS, as activity is usually good on all bands. You might even work the rare ones on five or six bands!

Take a few minutes to write for CD Party forms so you'll have them when the CD Party begins. If you'd like to help out as a volunteer, write to: the Membership Services Department for information on the Intruder Watch or Public Information Assistant program; the Board of Directors for Advisory Committee (Contests, DX, Emergency Communications, VHF-UHF, Public Relations and VHF-Repeater) information; the Technical Department for information on the Technical Advisor program; the Communications Department for information on the Official Observer, Official Relay Station, Official VHF station, Official Emergency Station and Official Bulletin Station appointments, or contact your Section Communications Manager (page 8 of this issue) for information on the various Emergency Coordinator and National Traffic System appointments.

Don't forget to mail your entry for the CD Party early. Logs must be *received* by May 4th at League hq. Everyone sending in an entry will receive copies of the issue of QCD (quarterly publication of the Communications Department) containing the results. Good luck! QST

CD Party Facts and Figures

Phone			*Cw*		
Starts:	1800Z	April 4	Starts:	1800Z	April 11
Ends:	0600Z	April 5	Ends:	0600Z	April 12

Eligibles: Member, Life Member, Charter Life Member, President, Vice President, Past President, Past Vice President, Director, Past Director, Assistant Director, Vice Director, General Counsel, Associate Counsel, Treasurer, QSL Manager, Section Communications Manager, Assistant Section Communications Manager, NTS Officials, Technical Advisor, Advisory Committees, Intruder Watch, Public Information Assistant, SEC, EC, DEC, STM, NM, HQ, OO, OBS, ORS, OES, OVS.

Rules: Logs must be submitted in UTC, not local time. Operate a maximum of 10 hours; timeouts must be at least 30 minutes long. Exchange "status" and ARRL section. Dupe sheets must be included with logs of 200 QSOs or more. You may work each station once per band. Number new sections in the log as worked. Phone and cw contests are separate. Entries must be received at ARRL headquarters no later than May 4, 1981.

Scoring: Multiply valid QSOs by number of different ARRL sections worked plus VE8/VY1 (max. 74).

Suggested frequencies: Phone: 3870-3910 7200-7245, 14,265-14,295, 21,340-21,360 and 28,600-28,630. Cw: Up from 3535, 3715, 7035, 7115, 14,035, 21,035, 21,115, 28,035 and 28,115. Try 10 on the hour 1800-2100 UTC; 160 at 0430 and 0530 UTC. Check the Novice bands frequently. Don't forget 6 and 2 meters.

Public Service

Conducted By Robert J. Halprin,* K1XA

Recruiting Station

At year's end (when this is being written), it is no secret that there has been turmoil in the NTS realm, circa 1980, as a result of the NTS net sequencing that was recommended by the NTS Inter-Area Staff. Where are we now — far down the road of the one-year trial period?

Well, all the TCC schedules are in place, at long last. There is really a nice interface between NTS cycles, and the activation of the four cycle sequence during SET was successful. At this point, however, not all of the traffic from the cycle two area nets reaches the assigned TCC stations. Circuitous routing occurs in certain cases. Moreover, it is unknown whether the Inter-Area plan will ever be completely implemented during the one-year test. Be that as it may, we have made great strides on the unification front. The cycles are no longer isolated from one another, and there has been a profound improvement in traffic flow (for the most part) and efficiency. There has been a melting pot of phone and cw operators, working together for the good of the system. With the cycle two area nets now meeting in the required time slots, resulting in the activation of the TCC schedules, progress has indeed been made, to the credit of the dedicated NTS fraternity. Sure there has been controversy. In the newspaper business, they call it "creative tension."

One of the prime tenets of NTS, as stated in the literature, is that the system comes before operator convenience. Has this become just a shopworn cliche? No — it's real; otherwise what we now call cycle four would not be as tightly organized as it is today, almost a thing of beauty, only failed from time to time by those who lack basic operating skills. Cycle four was established in 1949, yet it took years and years for it to reach the level of efficiency that we presently enjoy. The daytime segment, now designated cycle two, was implemented in a hodge-podge (by today's standards) fashion in 1973. Seven years is almost a blink of an eye in NTS history. NTS restructuring is an attempt to bring some rationality to the daytime sequence. It is a long-term project; whatever schedule ultimately becomes the official cycle two format will not be an overnight success. Amateurs who will serve in major roles of cycle two are people we don't even know yet. They are people who must be recruited. More importantly, they must be individuals who are available during the day.

Admittedly, the evening nets could also use more warm bodies, but the lack of participation in cycle two is, as we all know, particularly acute. The question of the ages is where are all those daytime types who clamored for a daylight NTS function in the early 1970s? For the most part, they have never come forward. But our bands are plenty active during the day. Just listen to the QSOs that are conducted adjacent to the area and region nets. To wit, there is no shortage of operators.

Many of those less than pleased with the Inter-Area plan are amateurs whose daytime hours are relatively free anyway, and this has been a subject that has been addressed previously. However, there are others, sincerely bemoaning the fact that cycle two precludes their participation, who are essentially evening operators. Unfortunately, advocating an adjustment of a daytime region net schedule, for example, to accommodate evening operators is begging the issue. The daytime function must happen in the daytime; if it doesn't, we no longer have a daytime sequence. Cycle two must rise and fall on its own merits. Either the amateurs come forth or they don't. If they don't come forth, perhaps the whole program is not viable. But it is much too early in the game to make that kind of determination.

It is totally inappropriate to jury-rig the NTS schedule to permit evening operators to "carry" cycle two. In fact, it's ludicrous. Again, it must be emphasized that cycle two was not created primarily for people who are already involved in NTS. It is an attempt to bring many new amateurs into the fold and, given enough time, it can succeed. We must bear in mind, along the way, the system concept — no NTS net is an island.

When one considers the challenges that face NTS in the future — satellite TCC schedules, use of ASCII and other enhanced modes, linked repeaters, a more aggressive involvement in overseas emergencies, use of the new 10 MHz band and the like — the meeting times of nets pales in comparison. Finding the hams to meet the cycle two schedule is an issue of recruitment. League officials, primarily but not exclusively at the section level, need to devote energy into the recruitment mode. It is crucial. (Some intensive efforts are being made in the second region, in particular. Contact W2XD for details.)

Through 1981, headquarters will be making available more explanatory literature on traffic handling, to assist these efforts. However, it must be pointed out that the Communications Department already produces more literature on trafficking than on any other of the myriad aspects of operating that fall within the purview of the Department. The number of publications is probably disproportionate when the League membership as a whole is considered. Perhaps the present literature is not "jazzy" enough; that deficiency will be corrected in the ensuing months.

Along these lines, one reality that we must face is that there will be a continual turnover of NTS operators. Once hams reach a certain level of proficiency, they no longer tend to receive the ego gratification or excitement that they did at the beginning. So they gravitate to other activities. For example, most of the top contesters in the U.S. got their start in traffic handling. Clearly, for training purposes, NTS can't be beat, and this is a notion that should be presented to the newcomers.

This may be a tangential item to the essay, but in all organizations the centralized entity is often accused of insensitivity and of acting in a precipitous manner. Sometimes this feeling is justified; other times it is not. It should be mentioned that being a part of the centralized authority, charged to administrate and innovate, can be a very lonely and perhaps dangerous business, in light of the vituperative nature of subsequent attacks. This particular NTS sequencing did not originate at command central, so to speak, but with an advisory body. It was later approved and recommended by the Inter-Area NTS Staff, an unprecedented summit conference of delegates from each of the three areas. There was good faith on all sides. Because of serial distortion, ever-present in organizations (of which we are all guilty), the background information did not filter adequately through the system.

Any structure must adapt to the times, otherwise it will stagnate and fail. Let's not forget the traditional cooperative framework that NTS is known and admired for, and that is vital to the growth and development of our National Traffic System.

STATE POLICE OFFICIALLY RECOGNIZES AMATEUR RADIO SERVICE

Connecticut State Police Headquarters has issued special order 104-A, entitled "Amateur Radio Communications." This order is to inform CSP field services of the systems and capabilities of Amateur Radio and provide guidelines for interfacing Amateur Radio at the troop level. It sets the policy that troop commanders may meet with local Amateur Radio groups to develop plans for supplementary communications in emergency or unusual situations.

The order lists four areas of potential amateur assistance: (1) observation of local conditions; (2) point-to-point communications; (3) mobile operations, including four-wheel drive; and (4) portable operations (searches). The special order explains for CSP personnel how autopatch works, and lists guidelines for amateurs in reporting incidents to the state police.

Types of incidents that should be reported include: accidents, medical emergencies, incidents involving threat of injury, road conditions posing a threat to motorists, a crime being committed that the caller is witnessing, road blockages or lane crossings, and disabled vehicles within the travel portion of the highway.

When reporting an incident, the Amateur Radio operator should: (1) identify the call as "Amateur Radio" and (2) identify FCC-assigned call sign; (3) report the nature of the incident; (4) give exact location — highway route, exit number, direction of travel, major landmark, street and number; (5) give extent of injuries, if any. Are victims trapped? (6) describe vehicles involved — registration number and state; (7) if a truck accident, is it carrying dangerous cargo? (8) add any information to assist responding trooper(s).

Additional recommendations: (1) remain calm. Be specific and concise; (2) Ask the dispatcher if he already has had a report on the incident you are reporting; (3) release the microphone button frequently to allow the dispatcher to interrupt if necessary; (4) remain on the scene until all necessary information has been provided and any questions that the dispatcher may have are answered; and (5) report incidents in which assistance is obviously needed, such as an accident with injuries or in the travel lanes, or incidents in

*Assistant Communications Manager, ARRL

which those involved *have requested assistance.*

While the Connecticut State Police invite and encourage citizen involvement, the new special order cautions against overstepping one's bounds. No Amateur Radio operator should ever place himself in civil or physical jeopardy while assisting the department. — *Bill Clede, K1AH, Wethersfield, Connecticut*

PUBLIC SERVICE DIARY

☐ Hopkinsville, Kentucky — December 29, 1980. A 20,000-gallon gasoline storage tank ruptured, necessitating the evacuation of approximately 60 families over a four-block area. Amateurs provided support for Red Cross personnel at the evacuation shelter and the disaster site. (WA4KLN, EC Christian County)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For December, 29 SEC reports were received, denoting a total ARES membership of 17,428. Sections reporting were: Ala, Atla, Ariz, Ark, Colo, Conn, Del, EBay, Ill, Iowa, La, Mich, NFla, NTex, Ohio, Okla, Ont, SDgo, SJV, SBar, SCV, SC, SFla, SNJ, Va, Wa, WVa, WMass, Wis. At deadline, SEC reports received for 1980 total 404 from 54 different sections.

Reports received for 1980 equalled those received in 1979 (404), but the total number of sections reporting decreased (56). Sixteen SECs reported every month, an increase of 33% over last year (12). Including late reports, the following sections had 100% reporting; the number in parentheses shows how many years of complete reporting have occurred: Ala (1), Alta (3), Ariz (6), Del (7), Ind (1), La (1), NFla (5), Ohio (3), SDgo (10), SJV (3), SCV (1), SFla (29), SNJ (2), Va (4), WVa (5), WMass (1). Over-90% reporters included Mich, Minn, Ont, SV and Wa. The all-time record of 100% reporting still belongs to SFla with 29 consecutive years of reporting.

Nonreporters numbered 19, compared with 18 in 1979. These sections were Alaska, BC, ENY, Ga, Ida, LA, Man, MDC, NMex, NLI, ND, Ore, Pac, Que, SF, Tenn, Vt, W.I., Wyo.

COMMUNICATIONS SERVICE OF THE MONTH

On the morning of the Mount St. Helens eruption, several members of the PHD Net (an unofficial group that meets daily on 7280 kHz), were in communication with Loren, WB7VMG. Loren reported that he was in a frantic flight down the Chinook Highway with his wife and children, attempting to outrun the ash fallout enroute to his home in the Yakima Valley. Loren's camping trip had been interrupted by the impending disaster of the ash cloud, which was decending on his campsite from the mountain.

The next morning, I started a net on 7285 kHz to handle public information and H&W traffic. Because of the widespread coverage of our net, many used our information on the fallout. Reports received from Canada, Alaska and an airport in Montana verified the need for such a net. Our operations ran 12 hours a day, and over 1200 stations were logged in, some handling 60 to 100 pieces of traffic.

While most of the traffic was handled off frequency, emergency and priority traffic was handled immediately on frequency. After a station passed a piece of traffic, he was requested to remain on frequency for confirmation of delivery and for any return traffic. Despite telephone outages, our delivery rate was quite impressive — percentages in the high 90s. Most of the formal traffic was directed at the Longview/Kelso area and was handled through W7DG, a club station in Longview.

Thousands of people were stranded over a wide area and for many, Amateur Radio was the only way of letting families know where they were and that everyone was all right. When commercial channels *were* available, they were indescribably overloaded, so our traffic handlers had to be persistent to get the messages through. These people worked very hard for four days and nights, and deserve a lot of credit. Many checked in every day, ready and willing to serve. Many stations checked in every hour, updating road and weather conditions.

This net was formed quite by accident, because of an increased demand for information from our group. I wish to thank those members of the PHD Net for their support in formation, and those who helped to handle the huge volume of traffic. All of you are a credit to Amateur Radio and have proven that hams will always be there when needed. This is what Amateur Radio is all about. — *Ed M. Baker, W7ARC, Midvale, Idaho*

REPEATER LOG

According to reports received between December 21, 1980 and January 21, 1981, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
K1HF								1		1
W2LWX									1	1
W2VL				4	36	3		1		44
WA2SPD								1	1	2
WB2NQV				4	1					5
WR2ADN								1		1
WR2AHD	2							2	2	6
WR2AOC	5									5
K3MJW								1		1
N3AIA	2			2	32	1	6		3	46
W3CWC	31				6				2	39
W3EEK	1				4	1			4	10
W3UER					3			2	16	1 22
WA3JDX								2		2
WA3ZXG	2									2
WR3ABI								1		1
WR3AJJ								1		1
WR3AJI								1		1
K4HY					1					1
WA4CZW				1	2				1	4
WB4QES			4	1	26	2			6	39
WB4ZSA								7		7
WR4ACY			2	2	23	1	1		5	34
WR4AKV								1		1
WR4AVI								1		1
WR4AZD					2					2
K5DI						1				1
KC5Z								2		2
W6ASH								1		1
W6GAE						1				1
W6IYY					4				5	1 10
W6PVR					2			2	4	8
WA6CNN						1				1
WA6WTT					2				1	3
WB6FUB			1		1	1				3
WB6MQM						1				1
WR6ACJ						2				2
WR6AEN					43					43
WR6AOX					3					3
K7CC			3	2	9					14
W7WGW						4				4
N8ARE									1	1
WA8ULB					3					3
WB8UIN						5				5
WR8ACL								1		1
WR8AES					1				4	5
WR8AJL	1									1
W9FUL									3	3
WB9YJF	1				1					2
WR9ACJ					20					20
KØAW					1					1
WØFXN						1				1
WØVQR						1				1
WBØYEX					1					1
WRØAMX	39									39
Simplex						2		6	1	9
Total	84		10	16	227	28	7	33	59	2 455

NATIONAL TRAFFIC SYSTEM

It is with deep regret that we report the passing of incoming RN6/c4 manager Ralph Smith, W6JXK. His services will be missed by all of those who had the pleasure of working with him. He was always a joy to work, on phone and cw, and his loss to RN6, TCC and NTS is severe.

W2XD has been appointed assistant manager, 2RN/c2, in charge of recruitment. WB7OEX has become assistant manager, RN7/c2. WØHI has issued CAN/c4 certificates to: KB5W, N5BT, WA4RAJ, WA4CNY, WD9IUX and KB9X.

December Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	2824	91.1	1.617	100.0	
CAN	31	1812	58.5	.813	100.0	
PAN	60	1773	29.6	.613	91.4	
Region Nets						
1RN	60	721	12.0	.562	80.4	100.0
2RN	57	874	15.3	.595	80.6	100.0
3RN	31	426	13.7	.356	98.4	100.0
4RN	62	1767	28.5	.761	79.9	100.0
RN5	31	840	27.1	.520	96.7	100.0
RN6	80	966	12.1	.360	76.3	93.5
RN7	62	1035	16.7	.917	100.0	88.7
8RN	62	698	11.3	.632	80.0	100.0
9RN	62	683	11.0	.360	85.0	100.0
TEN	31	496	16.0	.323	74.9	100.0
ECN						100.0
TWN	59	547	9.3	.464	61.6	90.3
TCC						
TCC Eastern	151[1]	1718				
TCC Central	88[1]	1007				
TCC Pacific	104[1]	1034				
Cycle Four						
Area Nets						
EAN	31	5054	163.0	3.039	96.2	
CAN	31	2561	82.6	1.703	99.5	
PAN	31	2681	86.5	1.745	99.5	
Region Nets						
1RN	59	1399	23.7	.776	98.9	100.0
2RN	90	1695	18.3	.909	99.1	90.3
3RN	62	920	14.8	.748	98.9	93.5
4RN	62	1752	28.3	.813	94.9	96.8
RN5	62	1799	29.0	.849	92.9	100.0
RN6	64	1633	25.5	.609	92.0	100.0
RN7	62	1347	21.7	.967	100.0	100.0
8RN	61	1004	16.5	.626	96.2	96.8
9RN	62	895	14.4	.509	97.0	100.0
TEN	62	1047	16.9	.689	94.4	98.4
ECN	62	770	12.4	.765	92.4	100.0
TWN	62	1043	16.8	.528	98.7	98.4
TCC						
TCC Eastern	187[1]	1528				
TCC Central	101[1]	1030				
TCC Pacific	157[1]	2004				
Sections[2]	7113	56,691	8.0			
Summary	8695	106,074	12.1			
Record	7904	97,206	28.5			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (235): APSN ATN (AB), ABN ASN ASSN (AK), AENB AEND AENJ AENK AENM, AENR AENS (AL), APN ARN MBIRD OZK (AR), ATEN HARC (AZ), BCARPS (BC), NCN NCTN (CA), CN HNN (CO), CN CPN NVHFTN WESCON (CT), DEPN DSSN DTN (DE), FAST FMSN FMTN FPON FPTN QFN QFNS SWFTN TPTN (FL), I75MN TLCN (IA), CD FAHM IMN MTN (ID/MT), IEN ILN IPN (IL), ICN IPN IPON ITN IWN QIN (IN), CSTN KPN KSBN QKS SCARC (KS), 4DARES 5DARES BARES KNTN KPON KRN KSN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN WMN WMPN (MA/RI), MMN MTN (MB), MDD (MD/DC), AEN MPSN MSN OXRACES PTN SGN SPSN (ME), MACS MITN MMN QMN SEMTN UPN (MI), MNAMWXN MSN MSPN MSSN (MN), ACE MOSSBN NEMOE (MO), APN (MR/NF), CAEN GSEN MN MSN MTN (MS), CMN CN CNCTN CNN JFK M2MEN NCSSN PCTN THEN TRN (NC), MNEARS NE4ØMN PVTN WNN (NE), GSFM NHN (NH), NJN NJPN NJSN NJVN NWNJVN OBTTN UCETTN (NJ), MNRRN SWN Y2MN (NM), NSN (NV), CDN CNYTN EPN HVN NYPON NYS OCTEN SCRN SDN STAR WDN (NY), BN BNR O6MN ONN OSN OSSBN (OH), OLZ OPEN OTWN (OK), LN OLN OPN OSN (ON), 16/76TN BSN JCARES LBLARES OARES OSN PDXARES PTTN SOFM WCN (OR), 3DARES EPA EPAEPTN NWPATMTN WPA WPAPTN WPATMTN (PA), QSN WQV/UHF (PQ), 5DARES BR2MN LC2MN SCARES SCNTN SCSSBN (SC), SDN WXN (SD), TN TNPHNS TNVHFNS TSN (TN), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), IETN NTN PSTS SCARES (WA), WINC WINS (WE/IN), BEN BWN WIN WNN WSBN (WI), WVN WVFN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

Certificates: TCC-E/c4 — W2CS (fifth annual), WB3GZU (first time); TCC-P/c4 — W6EOT (25th annual), W7DZX (20th annual), WØLQ (8th annual), W7LYA (2nd annual), W7DZX (2nd annual), and first-timers to K7KSA and WA7GYQ.

1	2	3	4	5
Cycle Two				
TCC Eastern	165	91.0	3449	1718
TCC Central	93	94.6	1483	1007
TCC Pacific	124	83.9	2068	1034
Summary	382	89.8	7000	3759
Cycle Four				
TCC Eastern	206	90.8	4941	1528
TCC Central	115	87.8	2003	1030
TCC Pacific	170	92.4	4007	2004
Summary	491	90.3	10951	4562

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (December) *Cycle Two* — Eastern Area (N2YL, Director) — W1s QYY XX, K1XA, WA1UGJ, K2PL, N2YL, W2s CQB RQ ZOJ, WA2MFV, K3JSZ,

N3SJ, WB3GZU, N4AZI, W4JK, WA4CCK, WB4PNY, AF8V, WB8YDZ, VE3s ATU CWA GOL. Central Area (W9JUJ, Director) — W4OGG, WD4HIF, W5KLV, WA5INJ, WA5s BHF INJ, WB5s NKC TAY YDD, K5s BNH KJN PE, KA5BSN, W9s JUJ NXG, WB9WGD, WD9IUX. Pacific Area (WØHXB, Acting Director) — W5JOV, KA5DDW, N5SJ, WB6s EIG MLB PVH, K6OE, KT6A, W7s AK DZX GHT LYA VSE, WØs EJD HXB LQ *RE, WAØOYI, WBØs FFV LFR MTA, WDØAIT, KØDJ,* KDØM, NØs ACW BDE BFH. *Cycle Four* — Eastern Area (W4SQQ, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — N4MD, W4ZJY, W5s RB SBE, K5s GM RG TL, N5s BB BT RB TC, W9s CXY DND NXG, WB9UYU, WØs AM HI, KØs CW EZ EVH. Pacific Area (KØDJ, Director) — K5MAT, N5NG, W5KH, N6s GW PZ, W6s EOT JXK OA VZT, WB6PVH, K7s HLR KSA MC, W7s AK DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ TER, WØs HXB LQ, NØIA, WDØAIT, VE7ZK.

Independent Nets (December 1980)

	2	3	4
Amateur Radio Telegraph Society	31	1881	315
Clearing House	31	417	426
Early Bird	31	1406	413
Empire Slow Speed	31	103	—
Hit and Bounce	31	1009	622
Hit and Bounce Slow	31	250	35
IMRA	60	825	1806
Midwest RTTY	3	10	12
Mission Trail	31	794	1403
New England Teleprinter	16	41	96
North American SSB Traffic	24	277	233
Southwest Traffic	31	231	1421
West Coast Slow Speed	30	149	349
20-Meter ISSB	25	1037	590
75-Meter ISSB	31	1477	1181
7290 Traffic	48	1964	3244

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll December 1980

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

677
KA9CPA
434
WA2MVQ
367
WD4COL
333
WB2IQJ
292
W2ZQ
254
KA1CMR
233
VE3KK
212
WA4PFK
209
WD8LRT
193
K9PNG
190
W4GPL
187
WB3GZU
176
WB1DHW
173
VE3FGU
171
KA1CGP
168
WB2MCO
167
WA4CRI
166
WDØAIT
163
AF2L
149
W7VSE
AD7G
147
WB4FVV
145
VE3GOL
143
KA6A
142
KA1BJY
140
WA1TBY
137
KBØMB
134
KZ4K
133
AF8V
132
NG4J
WD4AWN
VE1WF
131
VE3HTL
WB2HDU
129
AG2R
W7LRB
125
WB3CAI
WB7TQF
124
W5DTR
KØJCF
KE8X
KA4LNA
WD9BCM
W4ANK
123
WA4EIC
W7LNE
WA2SPL
122
KB3DT
120
AA2H
W9YCV
119
WB3FEH
WB7WOW
WA4JDH
118
KA1DZV
WB6OBZ
K2VX
K4SCL
K4DZM
117
KU4W
116
AFØO
W4NFK
KB4OZ
115
VE3QST
W6NTN
KB2HM
N6AWH
114
W9JUJ
113
VE3HGJ
W2MTA
112
W8VPW
K3JL
111
N2BNB
N4ET
W2ZOJ
WA7MEL
110
N2APB
N4AZI
WØOYH
WB1HIH
W2YJR
109
KN6C
N3EE
N7AKX
N9AUG
VE3DPO
W2GLH
108
KA4GFU
KG5L
N1NH
WB2EAG
107
AJ3R
AK1E
KA4ASZ
KA8CPS
W2UEZ
WD8NYN
106
W1EOF
W4NWM
WA3NAZ
WA4CCK
WB4WYG
105
KK5B
104
AK1W
N4PL
W2XD
W7FJZ
WA3WIY
WB2PJU
WB2ZCM
103
K7GXZ
KA1FE
WB7DZX
102
KØPIZ
VE5AE
W2TCA
W5JOV
WA3EHD
WD9IUX
101
KA8DJZ
KB8MX
WA4STO
100
KA2CTU
WØHXB
WØWYX
W1RWG
WA2ZJP
WA4YIU
99
WA1MJE
WB1ABQ
WD6CSL
98
K1JHC
KT6A
N5BT
N7AFY
WA3WQP
WA4SRD
WB5JZP
97
WA2CUW
WB2PEE
WB8MTD
96
K4EV
KB4QW
KCØZ
W4OGG
WB1ESJ
95
N8ABA
W4CKS
W5HMR
WA2MFV
WA4PIZ
WD5JYI
94
AA4FG
KA3T
N3AZT
W4FMN
WDØBQG
93
K3JSZ
K8OZ
N3BFL
W2SQ
WA2KOJ
W2BIW
92
K1BSO
KC4MM
KY4K
N8CW
VE5WM
W2AET
W7GHT
WAØTNM
91
KA5AVQ
W1TN
WD4GNQ
90
VE3GT
W9DM
WB8SYA
89
AE2T
WØFY
WA4EYU
WA4UTC
WD4CNR
WD4HIF
88
KA1BTU
KB5UL
N6GW
WA6LVO
WD8KBW
87
K9BVE
KB6FC
KF4U
N4AXN
WD4JJK
WD5EUE
86
KB3LF
KF8J
VE5HG
WB6OTS
85
N7AFZ
WB8JGW
84
KB7JW
KF5A
W9QLW
WB5NKD
83
K5KV
KA2CYZ
WA7LGN
WB8YDZ
82
K7JV
N2BXB
W5VMY
81
AF5Z
K4ZN
KA2GQQ
W1TM
WB9JSR
80
K4JST
KB5EK
W5CTZ
WD4DIU
WD4FTK
WD8KFN
78
WA1YNZ
WB5UVX
77
WB2MVC
WD8BHE
76
KØSI
KCØT
N5CEK
N8ANL
W7BS
WA3DUM
WA8GMT
WD9AJA
75
K5DY
K7NTG
KA4FDX
KI2D
WB3JYZ
WD4ALY
WA2EQW
74
AF1L
KA2GHM
N5RB
VE3JRT
W1YNE
W6BRO
73
KA7AOB
VE3IXB
W4LXB
WA4LJI
WB6BZZ
WD8DYW
WD8RNQ
72
K5TL
W9NXG
71
AA3B
AA4EI
K8DTG
WB4TZR
70
KB1A
N4BZH
W9IOH
WB7OJV
69
AG9G
KA1KP
N6AED
W6HUJ
W6OA
WA2HEB
WD9DVA
68
K3QXC
K7ZIG
N3AKC
WA8DHB
WA8PIM
67
W9IEM
WB5LAT
WB9WGD
WD8LSV
66
KØDJ
K6YD
KF2T
VE3JLL
W3DKX
W4ZJY
W9JIJ
WA2MIF
WA6QCA
WB2IDS
WB2RMJ/T
65
K4ZB
KB6OT
WØKJZ
W6RNL
W8UE
WA7DPK
WB3HTW
N2BDW
N2JK
64
KA2GSL
KA9IHR
63
K3ARR
K3CR
K6INK
WØNYG
W1EGE
W4HON
WAØTFC
WB2AZW
WDØCID
62
K7TFW
W6JXK
WB5DQJ
WD8QMP
61
KA4BBA
N3BKV
N8BJD
W8GGX
WB7OEX
60
K4EJ
KC4AM
WØOTF
WA7IHS
57
KA7CSP/T
53
KA9GBE/T
50
KA2IFX/T
WD4JTO/N
47
KA2HNQ/T
44
KA5CFP/T
WD8PMW/T
42
KA3DPR/N
KA4ODX/N
40
K6PGX/T

Brass Pounders League December 1980

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: KF2T, WB2EAG, K4ZK and WD8NYN.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

	2	3	4	5	6
W3CUL	795	1223	1667	139	3824
NØBQP	3	1724	188	1087	3002
VE3CWA	17	1149	1177	15	2358
W9JUJ	9	1131	1113	13	2266
N6ANL	20	892	912	12	2036
WA4UDH	19	948	939	18	1960
VE3QST	25	878	864	31	1798
WB1DHW	229	697	733	70	1729
VE3KK	460	392	611	174	1637
WA1TBY	35	742	735	39	1551
WB6EIG	17	763	760	3	1543
W7DZX	37	728	738	7	1510
VE3GOL	59	604	689	58	1410
WB3GZU	102	579	632	86	1399
WA4STO	8	618	633	3	1262
WØWYX	57	601	536	65	1259
WA4CCK	0	592	590	5	1187
W4SIZ	17	568	564	21	1170
WD4AWN	7	554	535	31	1127
WD4COL	153	301	378	271	1103
WB4FVV	3	564	480	46	1093
N4PL	41	462	539	50	1092
WB4PNY	1	476	583	9	1069
W5SHN	236	266	531	24	1057
WAØHJZ	0	635	25	360	1020
K4TH	18	451	279	265	1013
WB5TAY	22	485	480	14	1001
WØBMA	122	376	407	91	996
K3JSZ	6	470	499	3	978
WA4PFK	107	395	337	117	956
W5KLV	4	449	441	34	928
WA2SPL	35	466	391	17	909
W7VSE	10	486	364	48	908
K4SCL	3	468	403	17	891
VE3HGJ	110	309	387	38	844
W7LYA	0	424	392	3	819
WA3WQP	16	404	387	9	816
WØMZI	0	387	23	387	797
WB5YDD	22	351	341	74	788
WAØAUX	87	353	346	3	789
WB7TQF	127	256	322	61	766
WA2HSB	18	378	358	9	763
AF8V	13	374	340	35	762
W7SQT	1	458	3	297	759
KB5W	38	341	358	21	758
VE1WF	55	357	299	32	743
W3VR	242	163	322	14	741
W1YNE	212	207	291	27	737
K@ONK	2	596	113	17	728
W2MTA	20	350	347	7	724
W5UH	94	326	296	0	716
NG4J	21	351	313	30	715
W4LX	317	35	317	29	698
N5AMK	1	337	343	0	681
W6JXK	38	313	321	8	680
WD8LRT	104	261	206	108	679
WØAM	17	245	411	0	673
VE3HTL	37	289	299	47	672
W1EOF	1	314	340	16	671
K4ZK	15	319	321	14	669
KA1CGP	44	231	272	119	666
WAØTFC	0	317	343	0	660
W4SQQ	0	383	258	7	648
K4ZN	76	254	300	13	643
KØDJ	6	342	284	9	641
WB8MTD	0	385	252	1	639
WDØAIT	14	337	287	0	638
W1TM	1	342	276	4	623
KA1BJY	67	256	252	36	611
AJ3R	27	277	301	6	611
WA4CRI	89	192	254	75	610
KN6C	8	288	278	31	605
K4KNP	0	298	303	0	601
KA8CPS	120	192	246	38	596
W9NXG	0	293	275	24	592
WB5NKC	67	213	309	1	590
KZ4K	2	300	252	33	587
WD4CNQ	25	266	271	15	577
AFØO	14	290	251	15	576
KT6A	2	280	271	22	575
K5TFB	4	281	285	1	571
WD8NYN	2	290	267	6	567
W1EFW	21	236	290	18	565
W1UD	12	283	252	18	565
W4ANK	5	308	226	23	562
WB6QBZ	59	239	211	49	558
KD8G	2	288	264	64	558
K9BVE	6	232	302	18	558
WB1CPF	6	295	243	11	556
WD4CNR	12	262	276	2	552
WA4LJI	50	219	271	9	549
K5OWK	232	49	258	16	547
WØHXB	4	280	253	10	547
WA4CNY	27	269	216	34	546
AB4V	2	252	272	5	531
KA1CMR	6	238	75	201	520
WB1EZT	155	132	215	18	520
KØJCF	71	188	214	35	518
W3ATQ	12	248	241	14	515
KA6A	11	235	219	50	515
WØOUD	25	226	249	13	513
K9PNG	28	221	167	106	512
N4AZI	3	251	239	18	511
W5TI	24	255	219	13	511
KF5A	1	255	249	5	510
N5BT	7	271	218	12	508
WA3NAZ	44	223	228	11	506
WD4FTK	40	239	211	16	506
WA4EIC	6	243	205	51	505
W9JIJ	19	243	231	12	505
K1SSH	0	238	263	0	501
WA2SPL (Nov.)	91	226	256	7	580
WA1MJE (Nov.)	13	276	219	31	539
Multioperator Stations:					
WD4IIO	408	42	408	42	900
K3CR	244	40	280	19	583

BPL for 100 or more originations plus deliveries:

K5DG	250	WBØTHZ	118
AK4L	226	WØHZU	113
W7LRB	164	KB4OZ	110
W4GPL	161	KA4FDX	106
WB4EXA	158	WB3CAI	104
WA4YIU	150	VE3FGU	103
K4MC	146	WA4KQW	101
NØAOL	146	VE1KCR	100
VE7FB	123	AB4J (Oct.)	315
WB3JYZ	118		

Multioperator Station:
W8GK 103

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

Woodwork Operators

Woodwork comes in various types. For example, walnut is rigid, sturdy, swarthy. Likewise, oak is durable, knotty, nearly granitic. Poplar, on the other hand, is pliable and pulpy. Some amateurs who fit these same descriptions are sometimes known to hibernate amidst such timbers.

Regardless of individual veneer, one thing is common. That is, radio amateurs of various grain come "out of the woodwork" when needed the most. The arduous Italian earthquake communications is a case in point. The "woodwork operators" make their appearance during every such natural disaster. This has been the subject of some criticism in the past, even on these very pages. And, I risk incurring the wrath of every well-organized ARES and RACES group by suggesting that such woodwork operations are not always bad. In fact, such coniferous species have often proven themselves not to be ever green at all, but quite professional. They offer a very valuable communications resource.

This may be viewed as sacrilege by those who engage extensively in drills and testing of emergency plans. But so often these alerts are conducted with high interest displayed by willing participants year after year, only never to be challenged by a real emergency. By the time disaster strikes, the group has too often long grown weary of simulated tests only to be found again totally unprepared. In the aftermath, the critique causes a regrouping, only to repeat the cycle at a later date. But the question here is this: Even though he is seemingly ill prepared on the surface, does not every licensed amateur inherently possess a certain skill in operating or technical excellence that sees him through the disaster situation? In essence, one who has long been hiding in the woodwork while those around him play "war games," may find himself in the midst of disaster and respond quite adequately. It is suggested here that perhaps the very process of getting a ticket, or at least the very few first weeks of operating, does indeed prepare one for the eventuality of disaster, perhaps more so than anyone before has formally recognized.

If this is indeed a basic truth, then we certainly have a resource of immense magnitude. Although we have a cadre of some 70,000 registered members of the Amateur Radio Emergency Service, whom we can presume to be at some state of superior readiness, there is also the entire amateur population of some 390,000 in the U.S., upon whom the burden of communications responsibility may fall. Located by fate at the doorstep of disaster, we can be reasonably assured that the vast majority will perform admirably; saved by the ham, so to speak, who comes "out of the woodwork."

Of course, there are different levels of latent proficiency in those timbers. Those in traffic circles oftentimes lament the loss of sheep who have gone astray; that is, they "ain't handling traffic anymore." The lure of contests, DX, or chasing women has taken over prime time. FB! They haven't gone astray at all . . . they have already paid their training dues in emergency procedures and are now temporary residents in the woodwork! No cause for alarm — they'll emerge at the right time, as a butterfly from its cocoon. At the other end of the spectrum is the less desirable situation where past criticism has been justified. We refer to those types who are in the constant transmit mode and don't realize they own receivers.

Our objective should be to continue to maintain a high state of readiness. But with the realization that this will not necessarily appeal to the taste of all interested amateurs, we should recognize that more than adequate communications can oftentimes be provided by those seemingly not so well prepared . . . from the woodwork, if you will.

So to those of you of deciduous persuasion, your abilities are both recognized and required when the gods of devastation befall us, at which time you are encouraged to come "out of the woodwork."

W1AW NOTE

The complete W1AW winter operating schedule appears in October *QST*, page 90. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning April 1, 1981:

Uncontested:

Ontario — J. P. Thivierge, VE3GT
Orange — Fried Heyn, WA6WZO

SCM APPOINTMENT

In the Illinois Section, Larry M. Keeran, K9ORP, has been appointed to complete the term (until June 30, 1982) of Edmond A. Metzger, W9PRN (resigned).

FREQUENCY MEASURING TEST

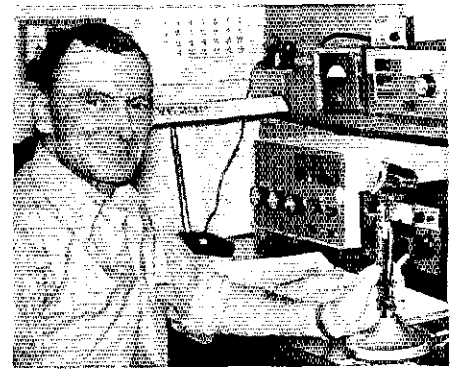
For the FMT of November 15, the umpire measured frequencies for the early run at 14,099.658, 7052.501 and 3511.396 kHz. The late run checked out at 14,008.216, 7084.719 and 3569.668 kHz. A total of 76 entries were received, representing 1267 individual measurements. Sixty-one of the 76 entrants measured within 100 Hz, an annual requirement of Official Observer "precise frequency measurement." They are listed as follows, with an average error preceding their call signs: (0 Hz) W1BGW W1JH WA4AXA K4BE W4IBU W5IJW W6RQ W7KR W8CUJ W9TJ KØMOZ, (1) K1JH W3BFF K3LPP W4NTO W5ZTN W6CBX K6MZN WA7DUY Ex-7HM W8HZA W8NWU W8UCJ W8OK WØUSL, (2) W1PLJ WA3CFC WA3RXE AJ7Q, (3) W4ANK AJ5P, (4) K7CC (5) W3WD WD4HS KØBRS, (6) W4HU WB6AAL K5FSA, (8) W2ND, (11) WØVQL, (12) KF5A, (15) N1QY, (16) W9TGN, (17) W7SK, (20) W1IXO, (25) WØTIV, (29) WB5ONU, (32) WD4NGG N6PE, (35) WA5YTX, (37) W1BKG, (38) W8ZRL WØGW, (39) KD2K, (45) W6DLL, (55) W3FYK, (66) VE7FDR, (67) W4UCL, (69) W6AEE, (94) W3ADE, (98) K4AQ. All entries measuring over 100 Hz have been notified individually.

Excerpts

This FMT was marked here by a complete absence of any QRM (W9TJ). I missed the early run as I wanted to find out "who shot J.R." (KØMOZ). Equipment used: Proxy a modified BC-221 to solid state with a sencore counter (KØBRS). All measurements taken with KWM-380. I used its 800-cycle spotting switch to beat against test signal, then against WWV for correction. Counter reads 10 cycles. I counted beats timed with stop watch to get cycles. Thanks for the experience. If I'm way off, it's me, not the rig (WA5YTX). The system used to measure frequency of received signal is a TS-520 with the three oscillator taps brought out to a switch which is fed to the frequency counter. Each oscillator frequency is measured and the resultant frequency determined mathematically. The signal is zero beat audibly (KD2K). Each frequency was measured once at approximately 30 to 60 seconds before the end of each measuring period. These measurements were taken using a Kenwood TS-120S as the main frequency-measuring device (simply using its built-in readout), and an Opto-Electronics 7010.1, which was counting the beat note present in the speaker. Adding these two readings gave me the results. Because of past success using this method, and because of the minimal equipment required (TS-120S, speaker, beatnote frequency counter), I decided this time to take my reading when operating stationary mobile in front of my QTH. It was fun and fairly easy and I think I'll try it again. Love those FMT's! (WA3RXE). — *Jeannie DeMaw, W1CKK*

MEET YOUR SCM

Harold Moreau, VE2BP, was recently reelected to another term as SCM of Quebec. Harold is retired from Imperial Oil after 32 years as an inspector. WAS, WAC and DXCC are among the awards that adorn the shack wall. Membership is maintained in ARES, the Montreal Amateur Radio Club, and Reseau des amateurs Quebecois. Sponsoring and helping blind students get their licenses has been one of his most rewarding amateur activities. Our Quebec Section Communications Manager holds an Advanced Amateur license and has been an ARRL/CRRL member since 1967. As Harold begins his second term in office, we all wish him *Bonne Chance!* QST



Harold Moreau, VE2BP, Quebec SCM.

*Communications Manager, ARRL

OSCAR Operating Schedule

Date (UTC)	OSCAR 7 Orbit No.	Time (UTC) Hr Mn	EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	Mode	Time UTC Hr Mn	EQX W. Long. (Degrees)
1 Mar.	28,781	0114	95.3	15,225	J	0035	67.0
2 Mar.	28,793	0014	80.1	15,239	A	0040	68.2
3 Mar.	28,806	0108	93.7	15,253	A + J	0045	69.4
4 Mar.	28,818	0007	78.6	15,267	X	0049	70.6
5 Mar.	28,831	0101	92.2	15,281	A	0054	71.8
6 Mar.	28,843	0001	77.0	15,295	A + J	0059	73.0
7 Mar.	28,856	0055	90.6	15,309	J	0104	74.2
8 Mar.	28,869	0149	104.2	15,323	J	0108	75.5
9 Mar.	28,881	0048	89.0	15,337	A	0113	76.7
10 Mar.	28,894	0143	102.6	15,351	A + J	0118	77.9
11 Mar.	28,906	0042	87.5	15,365	X	0123	79.1
12 Mar.	28,919	0136	101.0	15,379	A	0128	80.3
13 Mar.	28,931	0036	85.9	15,393	A + J	0132	81.5
14 Mar.	28,944	0130	99.5	15,407	J	0137	82.7
15 Mar.	28,956	0029	84.3	15,421	J	0142	83.9
16 Mar.	28,969	0123	97.9	15,434	A	0003	59.4
17 Mar.	28,981	0023	82.8	15,448	A + J	0008	60.6
18 Mar.	28,994	0117	96.3	15,462	X	0013	61.8
19 Mar.	29,006	0016	81.2	15,476	A	0018	63.0
20 Mar.	29,019	0110	94.8	15,490	A + J	0022	64.2
21 Mar.	29,031	0010	79.6	15,504	J	0027	65.4
22 Mar.	29,044	0104	93.2	15,518	J	0032	66.6
23 Mar.	29,056	0003	78.0	15,532	A	0037	67.8
24 Mar.	29,069	0058	91.6	15,546	A + J	0041	69.0
25 Mar.	29,082	0152	105.2	15,560	X	0046	70.2
26 Mar.	29,094	0051	90.1	15,574	A	0051	71.5
27 Mar.	29,107	0145	103.6	15,588	A + J	0056	72.7
28 Mar.	29,119	0045	88.5	15,602	J	0100	73.9
29 Mar.	29,132	0139	102.1	15,616	J	0105	75.1
30 Mar.	29,144	0038	86.9	15,630	A	0110	76.3
31 Mar.	29,157	0132	100.5	15,644	A + J	0115	77.5
1 Apr.	29,169	0032	85.4	15,658	X	0119	78.7
2 Apr.	29,182	0126	98.9	15,672	A	0124	79.9
3 Apr.	29,194	0025	83.8	15,686	A + J	0129	81.1
4 Apr.	29,207	0120	97.4	15,700	J	0134	82.3
5 Apr.	29,219	0019	82.2	15,714	J	0138	83.6
6 Apr.	29,232	0113	95.8	15,728	A	0143	84.8
7 Apr.	29,244	0012	80.6	15,741	A + J	0005	60.2

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7373° W. per orbit in a period of 114.9416 minutes.
O 8 progresses an average of 25.8009° W. in a period of 103.1942 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

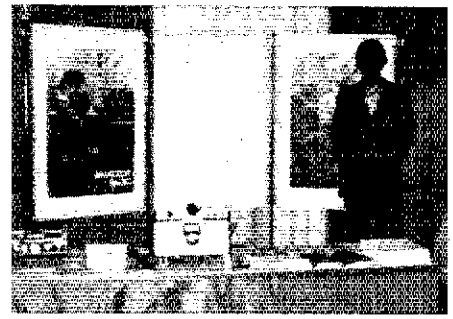
To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Strays

MOVING? UPGRADING?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL Hq. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive *QST* without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each request.



The HANDI-HAM System maintained a booth at the American Academy of Physical Medicine and Rehabilitation Convention held in Washington, DC this past year. Bruce Humphrys, KØHR, Director of the HANDI-HAM System was assisted by Richard Palm, K1CE, the League's coordinator for the Blind and Physically Handicapped Program. The purpose of the booth was to demonstrate the unique rehabilitative and therapeutic qualities of Amateur Radio to the many physicians in attendance. *(photo courtesy KØHR)*

FIRST ATV COMMUNICATION?

☐ In reference to the claim for the first live two-way amateur television communication (November 1980 *QST*, page 33): Preceding this claim by more than five years, there was considerable ATV activity with Bob Melvin, W6VSV, Bob Sutherland, W6PO (then W6UOV), Ollie Nelson, W6MXQ, Bob Grace, W6VQV, myself, and others. As we look back, we were indeed pioneers because our efforts preceded scheduled commercial television broadcasting in the San Francisco Bay area.

All of our equipment was homemade, including the cameras and receivers. All activity was approximately 423 MHz. Antennas were collinears with up to 32 elements. W6VSV put the first station on the air in March 1949. — *George M. Badger, W6TC*

ATTENTION HAMS WHO WORK AT TV STATIONS

☐ The new ARRL film, "The World of Amateur Radio," has been aired at many stations across the U.S. with much success. The 28-minute film can be a valuable promotional tool for Amateur Radio. Amateurs who work at TV stations are encouraged to ask their program directors to schedule the film as a public service. A copy can be obtained from Modern Talking Picture Service, 5000 Park St. N., St. Petersburg, FL 33709, or from your division director (page 8 of *QST*). — *Dan Stoe, WB7NAM, Technical Director, KVAL-TV, Eugene, Oregon*

EARNED YOUR WAB YET?

☐ The Bowie (Maryland) ARC is offering the Worked All Bowie award in two classes: class 1 for contacts with four Bowie stations, and class 2 for two contacts. DX stations must work two Bowie amateurs for class 1 and one for class 2. Send log extracts with large s.a.s.e. to John L. Rouse, KA3DBN, P. O. Drawer M, Bowie, MD 20715.

Amateurs who worked *K3PI during the recent mini-*DXpedition to Garrett Island near Chesapeake Bay should send a large s.a.s.e. to KA3DBN for the Garrett Island award.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

MARCH

Feb. 28-March 1

CQ 160 Meter Contest, phone, January *QST*, page 90.

French Contest, phone, January *QST*, page 90.

7 MHz Contest, cw, January *QST*, page 90.

YL-OM Contest, cw, February *QST*, page 84.

Nebraska QSO Party, February *QST*, page 84.

3

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z March 4 (9 P.M. PST March 3). Frequencies are approximately 3590/7090. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large, self-addressed envelope will help expedite your award/endorsement. The complete W1AW schedule appears on page 90 of October *QST*, or is available for an s.a.s.e. to ARRL.

7-8

ARRL International DX Contest, phone, December *QST*, page 92.

11

W1AW Qualifying Run, 10-35 wpm at 0300Z Mar. 12 (10 P.M. EST March 11). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See March 3 listing for more details.

14-15

10 Meter RTTY Contest, sponsored by DARC, from 1100 to 1700Z. (Three other 1981 contests: May 10, Sept. 26, and Nov. 8.) Exchange signal report, serial number and name. Single and multioperator entries are classified the same. Each complete 2xRTTY QSO is worth one point. For final score multiply QSO points by total countries (WAE and DXCC lists). Each W/K, VE/VO and VK call area is also a multiplier. Mail entries to arrive within 30 days to Klaus K. Zielski, DF7FB, Box 1147, D-6455 Erlensee, West Germany.

South Carolina QSO Party, February *QST*, page 84.

Virginia QSO Party, February *QST*, page 84.

21-22

Bermuda QSO Party, sponsored by the Radio Society of Bermuda, full 48 hours UTC. Open to amateurs from USA, Canada, United Kingdom and Federal Republic of Germany. Single-operator entries only from own QTH only. Operate no more than 36 hours (off periods at least three hours long). 80-10 meters, no cross band or cross mode. All stations exchange signal report. U.S. stations send state; Canadian stations send province; U.K. stations send county; West German stations send DOK number; and Bermuda stations send parish (county). W/VE stations work West German, U.K. and Bermuda stations only. West German and U.K. stations work U.S., Canada and Bermuda only. Each QSO counts five points (only one QSO per band — phone or cw). Multiplier is the number of Bermuda stations worked (the same VP9 can be worked on all five bands). Mail logs so they are received by May 31. Send to Contest Committee, Radio Society of Bermuda, Box 275, Hamilton 5, Bermuda.

Spring RTTY Contest, sponsored by British Amateur Radio Teleprinter Group, from 0200Z March 21 until 0200Z March 23, only 30 hours of operating permitted. Off times must be at least three hours long. Single and multioperator categories, 80-10 meters. Exchange times (UTC), signal report and serial number. Count two points per QSO, except 10 points if on a different continent. Each W, VE and VK call area counts as a multiplier. Final score equals (QSO points × countries) plus (countries × 200 × continents). Mail entries to arrive by May 31. Send to Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex England EN1 4DX.

Tennessee QSO Party, sponsored by the Tennessee Council of ARCs, from 2100Z March 21 to 0500Z March 22 and 1400 to 2200Z March 22. Single operator only, also portable and mobile categories. Exchange signal report and QTH (county for TN; state/province/country for others). Count one point per phone QSO, 1.5 for cw QSOs (except two points on 80 meters). Multiply QSO points by TN counties worked (TN stations multiply by sum of states, VE provinces and TN counties). Additional 1.5 multiplier if 200 W dc or less for entire contest. Portables must set up per Field Day rules. Mobiles add 200 bonus points for each county where 10 QSOs made. Certificates and contest summary to all stations making more than 15 QSOs. Mail by May 1 to Dave Goggio, W4OGG, 1419 Favell Dr., Memphis, TN 38116.

26

W1AW Qualifying Run, 10-35 wpm at 1400Z (9 A.M. EST). See March 11 listing for more details.

28-29

CQ World Wide WPX Contest, phone, sponsored by *CQ* Magazine, 48-hour period with 30 hours of operating permitted. Only five periods of off time permitted. Multioperator stations may operate the full 48 hours. Two-way ssb only (cw: May 30-31) all bands 160 through 10 meters. Competition categories: single op all band; QRPp (5 W output maximum); single op single band; multiop all band only, single transmitter, only one signal permitted (minimum 10 minutes per band) and multi-transmitter, one signal per band permitted. All transmitters must be located within 500 meter circle or limits of property; no remote stations. Exchange RS plus serial number starting with 001. Multi-transmitter stations use separate numbers on each band. Points: contacts between stations on different continents count 3 points on 20-15-10 meters, 6 points on 40-80-160 meters. Contacts between stations in the same continents but not in the same country count 1 point on 20, 15 and 10 meters, 2 points on 160, 80 and 40. Exception: Contacts between different North American countries count 2 points on 20, 15 and 10; 4 points on 160, 80 and 40. This applies only to North American countries. Contacts with your own country for multiplier only. Multipliers are prefixes, to be counted once only. A prefix is considered to be the two- or three-letter/number combination which forms the first part of an amateur call, as in W1, AB2, 4X4, 5A1, etc. For single op: score is total QSO points from all bands multiplied by the number of different prefixes worked; for single band score, QSO points on that band multiplied by the number of prefixes. Scoring for multiops is the same as the all-band scoring for single ops. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken once only regardless of the band. Club competition. Entries must be postmarked by May 10 (July 10 for cw). Send to CQ WPX SSB Contest Committee, 76 N. Broadway, Hicksville, NY 11801.

Spring VHF QSO Party, sponsored by the Ramapo Mountain ARC, from 1800Z March 28 until 0400Z March 30. Exchange signal report and ARRL section. One QSO point for 50-144 MHz QSOs, two points for 220-430 MHz, and three points for QSOs on 1215 MHz and up. Multiply by sum of ARRL sections per band. Rules the same as for ARRL VHF QSO Party except tm operation not permitted below 450 MHz. Use ARRL forms or send s.a.s.e. to RMARC. Results will be sent to all entrants. Mail by April 27 to Ramapo Mountain ARC, Box 364, Oakland, NJ 07436.

YL ISSB QSO Party, cw (phone April 18-19) sponsored by the YL ISSB Communications System, 48 hours UTC, two six-hour rest periods required. Categories: single operator, DX/WK team, YL/OM team. Exchange name, signal report, YLISSB number (if any), country/state, partner's call (if team entry). Count eight points per QSO, one point per nonmember (five and one on phone). Multiplier is total states/provinces/countries (members only). Suggested frequencies: cw — 3665 7070 14,070 21,070 kHz; phone — 3690 3765 3925 7090 7290 14,175 14,332 21,373 28,673 kHz. Mail entry by May 15 to Lyle Shaw, KC4LF, 6329 Fairway Blvd., Apollo Beach, FL 33570.

APRIL

1

West Coast Qualifying Run, 0500Z April 2 (9 P.M. PST April 1). See March 3 listing for details.

4-5

ARRL Open CD Party, phone, this issue page 76.

SP-DX Contest, cw, sponsored by the Polski Zwiazek Krotkofalowcow, from 1500Z Saturday, until 2400Z Sunday (phone contest April 18-19), 80-10 meters. Single operator (single- or multiband) and multioperator single transmitter categories. Polish stations will transmit signal report and a two-letter Wojewodztwo (province) indicator. Others send signal report and serial number. Count three points per SP QSO and multiply by the total number of Wojewodztwos worked (not per band) for final score. Complete log information and a signed declaration that all rules were followed should be mailed by April 30 (May 15 for phone) to PZK, SP DX Contest Committee, P. O. Box 320, 00-950 Warszawa, Poland.

VS6 Activity Days, sponsored by the Hong Kong Amateur Radio Transmitting Society. VS6 stations will be active 160-6 meters, all modes.

Wisconsin QSO Party, sponsored by the West Allis RAC, from 1800Z April 5 until 0200Z April 6. Exchange signal report and state/province/country (county for WI stations). Count two points per cw and one per phone QSO. Multiply QSO points by sum of states/provinces/countries for WI stations, WI counties for others. Suggested frequencies: 3550 3990 7050 7290 14,050 14,290 kHz. WI stations indicate club affiliation on entry. Mail by May 1 to West Allis RAC, Box 1072, Milwaukee, WI 53201.

8-9

DX-YL to North American-YL Contest, cw (phone April 15-16) sponsored by YLRL from 1800Z April 8 to 1800Z April 9. YLs only. Exchange signal report, serial number, state/country. One point per QSO multiplied by total states/provinces/countries worked for final score. Additional multiplier of 1.25 if less than 150 W dc (or 300 W PEP). Alaska counts as DX. Mail entry by May 22 to Kay Eyman, WAØWOF, RR 2, Garnett, KS 66032.

11-12

ARRL Open CD Party, cw, this issue, page 76.

ARRL International EME Contest, part 1, this issue, page 76.

International Gagarin Cup Competition, sponsored by the IARU/Krenkel Central Radio Club, 24-hour period UTC April 12. 80-10 meters, cw only. Categories: single operator (single or all band) and multioperator (single transmitter only). Exchange signal report and ITU zone. Count one point for QSOs on your own continent, three points on a different continent. Multiplier is ITU zones worked per band. Mail entry by May 10 to Krenkel Central Radio Club, Box 88, Moscow, USSR.

Common Market DX Contest, sponsored by Belgian Union of Radio Amateurs, from 0600 to 2400Z April 11, cw (April 12 for phone). 80-10 meters. Categories: single operator — all bands, high bands (20-15-10) and low bands (80-40) — and multioperator/club station. Exchange signal report and serial number. Non-European stations count five points per QSO with Common Market countries (DL EI F G I LX ON OZ PA SV), two points with other European countries. Multiplier is call areas worked in Common Market countries. Count 25 extra QSO points and one multiplier for QSO with ON4UB. Mail by May 31 to CM Contest Committee, Le Bon Michel, ON4GO, Box 537, B-1000, Brussels, Belgium.

15-16

DX-YL to NA-YL QSO Party, see April 8-9 listing.

18-19

SP-DX Contest, phone

YL ISSB Contest, phone

QRP ARC QSO Party

25-26

ARRL Morning Special

Helvetia (HB9) QSO Party

Trophy H. M. King of Spain Contest

*Assistant Communications Manager, ARRL

Section Activities

A-1 OPR ≤ EC ≤ DXCC ≤ RCC ≤ WAS ≤ STM ≤ OES ≤ OTS ≤ NM ≤ SCM ≤ ARES ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤ CP ≤

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — Several 2M rptrs inoperative due antenna damage, interference and equipment troubles. The Hinton rptr burned to the ground but efforts are being made to rebuild. Isolated areas this time of year don't help. Re Cdn tfc cct: yours truly sent a letter East indicating Alberta is interested. I raised strong objection to the use of the CARF message form. We have enought confusion now with message forms with EMO, DND etc. Traffic: VE6CHK 322, VE6BBL 152, VE6VV 122, VE6ABC 53, VE6QN 22, VE6XC 19, VE6AHB 16, VE6FZ 7, VE6WN 6, VE6AMB 4, VE6CE 4, VE6AAT 3, VE6YW 3.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — BCEN and BCARPS nets did their share in handling Christmas Traffic. The phone net recorded a total of 4670 for the month, one night 151 check-ins. Several hams have been hospitalized; VE7HM Hammie 21 days, VE7AIR heart problems. VE7CDF suffered stroke, and VE7CZ had an operation. VE7DGB who instructed so many in code and theory to become amateurs passed away. VE7AFY who was our QSL Manager for past years did all his work from a wheel chair. The Burnaby ARC took over the QSL Manager's post. They received donations from VE7's and presented Marty with a complete ht station. Traffic: VE7FB 349, VE7ZK 258, VE7FAZ 207, VE7COA 154, VE7BLO 80, VE7CCJ 40, VE7EDN 28, VE7CZU 26, VE7BZI 16, VE7BLK 9.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: VE4JP. SEC: VE4TR. STM: VE4RO. NMs: VE4s VJ AEJ NM TE. We wish VE4s GJ, US and OW, a speedy recovery. Total traffic on all the nets was good and indications are that more interest is on the cw net. News is that VE4AG is now our Assistant ARRL/CRRL director and VE4ADS is the public relations for Western Canada. Both should do well. MTN: QNI 305, QTC 154, sess. 31. MMN: QNI 492, QTC 31, sess. 31. WRIN: QNI 117, QTC 0, sess. 4. MEPN: QNI 1233, QTC 68, sess. 31. Traffic: VE4PG 102, VE4AEJ 93, VE4RO 79, VE4JA 50, VE4ACX 47, VE4QU 39, VE4FK 30, VE4TE 27, VE4AJE 19, VE4AED 18, VE4IX 17, VE4AAD 15, VE4AAU 14, VE4CR 13, VE4NM 5, VE4AES 7, VE4CF 7, VE4LB 7, VE4ADS 6, VE4AFZ 6, VE4AGR 6, VE4NE 6, VE4LU 4, VE4XN 4, VE4EN 2, VE4GW 1, VE4LN 1, VE4OE 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — Asst./SCM: VO1FG. NMs: VO1JN & VE1WF. SEC: VE1EJ. STM: Open. New appts.: EC: VE1ZB. ORS: VE1BSH. Silent Keys: VO1BC VO1EF. VE1OC volunteers to read bulletins on nets. VE1BXC reports 3,000+ QSOs as VE1QST during ARRL SS Week. Kings Co. (NS) ARC reports on visit of VE1SAT, talk on AMSTAT. Also reprint of section of ARES program. Exec. HOWL: VO2AG, Pres.; VO2CC, V. P.; VO2CZ, Sec.; VO2AH, Treas. SONRA: VO1FX, Pres.; VO1IM, V.P.; VO1MG, Secy.; VO1CR, Treas. Congrats to all. Effective Feb. 1 VE1ASJ assumes managership of VE Incoming QST Bureau from VE1FQ, who still handles the VE1 QSL Bureau. Nets: APN: 3654 kHz at 0000Z dy. 31 sess. 194 QNI. Traffic: VE1WF 743, VE1LCR/RO 294, VE1XF 56, VE1AUL 18, VE1KR 18, VE1BPM 9, VE1BXA 6, VE1BZO 4.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3ATU. With VE3CWA leading the way, the NTS was very active during the past Christmas holiday season as traffic totals below will indicate. BPLs were earned by VE3s CWA QST(ATU), KKI460 originations) GOL, HGJ, HTL and FGU. Much traffic was originated on behalf of senior citizen residents and staff in the Kitchener-Waterloo area by VE3KK and in the Thunder Bay area by VE3s AJ CH CI ARN AYZ BKY DPJ EFC EDW HJS JAB LMB and KRO. To all of those who participated on the NTS during this record breaking month, my sincere thanks. As you all very well know, it's the team work that counts. ONTARS, sponsored by the RSO, celebrated its 9th anniversary with a checkin total for the day of 900 plus. VE3GFN, during the holiday break, worked 90 countries from the Bahamas. VE3DPO celebrates his 26th year as a League member. As I commence my third term as your SCM in April, I solicit your support to keep activities moving within the section. VE3GV has established an ARES net on 7170 kHz Sundays at 1900Z. QCWA welcomes VE3s AFY and LJH as new members. VE3EFX, who worked his 47th state on OSCAR 7 mode B, is active on SSTV. VE3s AWE and a group from Peterboro headed by VE3BZB have new Omni 'Cs' on the air. VE3ILN has a new TR-7800 on 2 metres. The following have regretfully been reported as Silent Keys: VE3s BKM FPW and HEP. VE3ACY (now 5Z4YW) who monitors 28.520 kHz usb on a continuous basis can also be found on Mondays around 21.235 kHz usb at 1830 UTC. VE3GMD is now VE3AOA which stands for Alpha Omega Alpha, the Honour Medical Society of which he has been a member for many years. Traffic: (Dec.) VE3CWA 2358, VE3QST 1798, VE3KK 1637, VE3GOL 1410, VE3HGJ 844, VE3HTL 672, VE3DPO 354, VE3FGU 351, VE3JLL 281, VE3GNW 185, VE3GT 176, VE3JRT 173, KB6FR/VE3 146, VE3ISW 143, VE3CYR 129, VE3AWE 123, VE3IXB 102, VE3EUI 100, VE3DVE 96, VE3BVG 91, VE3GFN 77, VE3WM 64, VE3LOU 48, VE3EHL 46, VE3AYZ 40, VE3FGV 39, VE3BZB 35, VE3KXB 35, VE3DUK 32, VE3DZH 28, VE3GXM 28, VE3EWD 26, VE3IFP 25, VE3WG 22, VE3FPI 17, VE3DZK 15, VE3ANJ 14, VE3MZJ 13, VE3EFX 3. (Nov.) VE3ISW 124, VE3CYR 60, KB6FR/VE3 30, VE3DZK 17, VE3FGV 6.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2FFE. New appointee, VE2PJ as ORS. VE2EAR, is a new member of the DX century club with 146 countries confirmed. Le Reseau de la Mauricie (VE2MO) is a new daily traffic net at 0045 UTC on VE2CTR (146.67/07). With deep regret, I have to report the passing of two well known and respected amateurs: VE2AA and VE2FJ. C'est avec regret que j'ai a vous annoncer le deces de ces deux amateurs. Adrien et Fernand nous laisse de tres bons souvenirs et nous nous souviendrons. Traffic: (Dec.) VE2FKI 151, VE2FFE 94, VE2PJ 70, VE2BP 58, VE2EC 33, VE2EKC 22. (Nov.) VE2FFE 25.

SASKATCHEWAN: SCM, Norm Waltho, VE5AE — STM: VE5XC. SEC: VE5WM. NMs: VE5WM VE5HG VE5DC VE5SF. Net Reports for Dec: PWXN 701, SPN 1394 QNI 315 QTC, SKTN 2M 286 QNI, RARA 440 QNI 6 QTC, SATN 478 QNI 110 QTC. End of the year reports for the Sask nets SATN 5533 QNI 380 QTC; SPN 14053 QNI 624 QTC; PWXN 6406 QNI; SKTN 2M 3176 QNI 24 QTC; RARA 2M 8213 QNI 26 QTC. From the looks of it the NTS has had a very good year in the province. This is my last report as SCM for the province and I hope that you will give all your support to the new SCM VE5WM in the future. Traffic: VE5WM 165, VE5AE 164, VE5ACM 110, VE5TH 76, VE5MP 74, VE5XC 71, VE5HG 69, VE5QY 54, VE5ACN 50, VE5UX 33, VE5AAT 26, VE5RQ 20, VE5TT 13, VE5XS 12, VE5NJ 9, VE5KS 8, VE5RB 4, VE5ADI 3, VE5HF 3.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY: PSHR: K3JL 112, WA3WIY 104, WA3DUM 76, N3AKC 68, W3DKX 66, KA3DPR 42. Hope all Del. hams make the Kent Co. Court House at 8 P.M. March 11 for the Kent Co. ARC Auction. Congrats to WA3HFL on DXCC and to N3BDG and KA3EHI on making Extra and Tech. respectively. Ex Delawarian W3WYO puts a good sig. into the DTN from Oak Hill, FL. DEPN: QNI 58, QTC 20. DTN: QNI 391, QTC 98, DSSN: QNI 50, QTC 12, NCC 2-mtr EN QNI 13, QTC 11. Traffic: W3QQ 364, W3PQ 283, K3JL 100, WA3WIY 100, N3AKC 83, WA3DUM 62, W3DKX 61, WB3DUG 44, WA3ZBI 30, KA3DPR 29, WB3FOC 17, WB3EOU 16, W3FEG 11, W3WD 7, K3ZKP 6, WA3PWT 3, WA3RTX 3, WB3ILX 2.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ.

Net	Freq.	Time	QNI	QTC	Sess.	Mgr.
EPA	3610	7/10 P.M. Dy	577	564	60	AA3B
EPAEPTN	3917	6 P.M. Dy	556	398	31	AJ3R
PTTN	3610	6:30 P.M. Dy				AG3R
PFN	3958	5 P.M. M-S	368	500	27	WA3WQP

Local and vhf nets reports: D3ARES Luz Cty ARES and ATN with a total QNI 297 QTC 89 in 24 sess. BPL to K3JSZ WA3WQP AJ3R WB3CAI WB3JYZ. OBS reports: WB3FVJ WB3JYZ and W3VA. OO: W3GVR. OVS reports: W3GOA and KA3DZD. PSHR reports: W3GOA N3AIA K3JSZ WB3CAI KA3DZD AJ3R WA3WQP W3EEK KB3LF WB3JYZ K3ARR WB3FEH N3BFL WB3HTW WA3EHD K3QXC N3AZT and AA3B. New appointments: N3BFL to EC for Monroe Cty and WA3EHD to ORS, congrats. Upgrades: WB3ESS to Extra and WB3FEH also to Extra and waiting for new call sign. PTTN welcomes KA3EAQ N3AIW N3BKV and WB3AFL. EPAEPTN welcomes N3AIW and WB3CQN. N3AIA reports 2 mtr rig installed at York Cty Emergency Comm Center. KA3DZD sez SKN was lots of fun. W3IPX reports Dec a big month for him with lots of traffic. WA3YOE reports 13 hams participated in Luzerne Cty emergency drill on Jan 4. PFN welcomes N3AIW and WB3LGY. KB3LF and N3BHF report very successful Xmas Special Events from W3OK/3 in Bethlehem sponsored by Del-Lehigh ARC. Congrats to K3PA top winner in PA QSO Party with a total of 746 QSOs and Penn Wireless Assn tops in club scores. Hazelton ARC also made a fine showing in the Party. New Officers Harrisburg RAC: WB3HNI, Pres.; KA3EAJ, V. P.; W3MWK, Secy.; and WA3TKU, Treas. N3BFL announces ARES group being formed in Monroe Cty and all amateurs in that county are invited to join. For info contact him or K3WPI. DF8UZ of Langenenslingen W. Germany visited WA3ILP recently. New officers Dauberville DX Assn: WB3FYL, Pres.; WB3FPA, V. P.; WA3VUE, Secy.; and WB3NYX, Treas. Murgas ARC new officers are: WB3FYT, Pres.; WB3FAA, V. P.; WA3YON, Secy.; and K3JML, Treas. Directors AD3L K3RLI K3SAE W3KUA and W3VRB. Traffic: K3JSZ 978, WA3WQP 816, AJ3R 611, WB3CAI 459, KB3LF 379, K3PA 373, AA3B 363, WB3JYZ 339, WB3FEH 329, W3IPX 323, W3FAF 209, W3BI 190, WA3EHD 180, W3DP 147, N3BFL 142, N3AZT 135, W3VA 101, N3CD 113, WA3OFD 101, K3QXC 99, W3ID 68, W3ADE 58, WB3CUF 50, WB3HTW 50, K3ARR 35, K3WPI 34, WA3VIL 29, N3AIU 28, K3KW 25, K3EIP 20, WB3FVJ 18, W3CL 16, KA3DZD 14, N3AIA 12, N3CP 12, AF3Z 12, WA3CKA 8, W3EEK 5, W3OML 5, K3NGN 3, K3AKN 1, W3HK 1, W3RJ 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrew, W3FA — WA3TAI and the EC's run the ARES show — join 'em. W3ZNW is anxious to get back on 80M RTTY. K3HPG is inundated with his own contest logs. W3CDQ had her hand in the SKN. KA3T got the mobile perking real good for his New England trip. WB3LTA had KA3DXZ, KA3EKZ, WB3HAD, KA3EWV, W3FWS and WB3LHT along with the REACT team looking for a lost child Dec 21st. OO K3DI has his eye on Army MARS band edge operations. W3JPT gets back from 4U1ITU and CCIR Study Group 8 business about as fast as his mail. W3CVE sends W3CUL all his traffic. W5NZ/3 finds a little more time for hamming. Congrats W3ECN and WB3CES new Extra and Advanced respectively. New call change for WB3CES soon. WA3FYZ/M is finding the problems of mobile operations. WB3JRW has new equipment — this means rewiring the shack to handle the load! WB3KJT is giving MDD a tentative try. N4DR is having fun on NTS. KA3DUC likes cw and nets. K3EUG checks is as time permits. KB3AP reports WA3ZKV-learning the metric system, and K3RMX, WA3BPC are a couple of rabbits for the hidden XMTR hunters. K8SYH has transferred his OO shop to Maryland and QRL grad studies U of Md. WB2TJR/WB3EPN is now K5GX Oakland. K3OMN to replace W3DFW Allegany EC. N3AFM still finds 6 meters fascinating. K3MVL relays WB3GEJ net info. W3LDD brings life to 3RND. N3QA is an expectant father. W3OYY has a working snow blower. W3FZV has just about got that new tangled keyer tamed. WB3BFK puts a lot of MARS traffic on the local nets. AK3X has a sore arm from SKN. W3DQI has many bylines in Auto-Call. WB3GZU has a red headed daughter. The new leaders for AARC are W3AAN, Pres.; W3HGV, V. P.; KB3HH, Secy.; WA3UJE, Treas.; and N3BMB is Bulletin Editor. With the nets: Net/Manager sessions/tfc/QNI average. MDD/W3PQ 62/427/7.2. Brass W3QQ, K3JL and W3FZV. MEPN/WB3GZU 30/273/27.7. Toppers WB3BFK, W3LDD, K3ONU others N3AGM, WA3IHW and WA2YFM. W R PON/W3DFW 23/46/22.2. MDC PON/W3OYY 4/19/25. WA County M/WA3GEJ 4/16/16. Traffic: (Dec.) WB3GZU 1399, W3FA 260, N3QA 163, W3FZV 138, AK3X 132, WB3BFK 122, N4DR/3 119, KA3T 113, W3DQI 73, W3LDD 60, W3ECN 32, KA3DUC 20, WB3JRW 16, KA3DXZ 12, WB3LTA 6, W5NZ/3 4, W3ZNW 2. (Nov.) W3CVE 266.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — STM: KF2U. SEC: W2HOB. December was a very busy month in traffic circles. Several shopping mall message centers were set up and these did wonders in generating traffic. All concerned had a great time and traffic figures were quite high. Another important happening was the annual New Jersey Nets confab, this year held at Bell Labs in Holmdel. Topics discussed were ARES, the statewide vhf traffic net, the New Jersey Slow Net, a special talk on emergency communications by WA7DPK and a very excellent presentation by W1XX. His talk covered many areas among which were ARES, 2RN, vhf traffic handling and the like. One of the most important events at the confab was the presentation of the W2SWE Memorial Award, given each year in the memory of Ed Matecki to the traffic handler who, in the opinion of the New Jersey leadership, has contributed the most to traffic handling in the state. This year the award went to WB2IQJ for his very fine efforts in running the New Jersey Slow Net and in implementing the cw training program. He has invested many, many hours out of his busy schedule to further the cause and all of New Jersey owes him a debt of thanks. Traffic: W2ZQ 1839, WB2IQJ 1206, KC2A 263, AA2H 230, WA2CUW 190, WB2NBJ 142, K2UL 134, WA2HEB 115, K2YBN 112, WB2LCC 102, KB2OE 64, WA2TWK 59, WB2PKG 48, WA2GYF 35, WA2GTJ 34, KA2GSL 30, KF2U 15, KD2Q 8.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. NMs: N2APB WB2AZW W2FR K2KIR K2KQC WA2MFV WA2PUU WA2ZJP W2ZOJ. ECs: N2ALI K2CWD K2DUR K2OIU KA2AYZ W2BYO W2EWO W2FEY W2GLH WA2DHB WA2GJI WA2HSB WB2JWD WA2LWH WA2NAC WB2NAO WA2OVT WA2PUU WA2PHH WB2QZL WA2VAM WA2VCM. December net reports:

Net	Freq.	Time/Day	Sess.	QNI	QSP	Mgr.
NYSCN	3677	1000/Sun	4	41	4	W2MTA
NYPON*	3913	1700/Dy	31	658	359	K2KQC
NYSPTEN	3925	1800/Dy	31		173	WB2OTC
ESS	3590	1800/Dy	31	441	103	W2WSS
OCTEN*	34/94	1815/Dy	31	468	147	WA2MFV
STAR*	325/925	1830/Dy	31	225	138	WB2AZW
Q NET	31/91	1830/Dy	31	501	7	KA2CMQ
BSN	93/33	1900/Dy	31	587	14	WA2WXG
NYS/E*	3677	1900/Dy	31	586	509	W2ZOJ
SLVARES	31/91	1930/Sun	40	4	4	WB2NAO
JCARN	10/70	2000/Dy	31	277	12	WA2WAX
OARCN	25/85	2015/Wed	5			K2VTT
WDN*	04/64	2100/Dy	31	851	280	N2APB
CNYTN*	90/30	2115/Dy	31	521	152	
NARASEN	22/82	2130/Sun	4	79	0	WA2JPM
NYS/L*	3677	2200/Dy	31	400	383	W2ZOJ

*Part of National Traffic System

December BPL: WA2HSB W2MTA. WB2MVC gave traffic talk at his lodge, offering audience message service. PSHR: W2MTA 113 W2ZOJ 111 N2APB 110 W2GLH 109 KA2CTU 100 WA2ZJP 100 WB2PEE 97 WA2MFV 95 WA2KOJ 93 W2AET 92 AE2T 89 N2BXB 82 WB2MVC 77 KI2D 75 KA2GHM 74 WB2IDS 66 WB2AZW 63. Attention: Cattaraugus, Chautauqua, Chenango, Delaware, Essex, Fulton, Hamilton, Herkimer, Ontario, Otsego, Schoharie, Schuyler, Seneca and Wayne counties, Amateur Radio Emergency Service (ARES) needs Emergency Coordinators, provide public service to your community, contact W2BCH or W2MTA. Congrats new officers: Tompkins County ARC W2CFP KA2DUV AF2A; Ogdensburg RC KA2JJG KA2FKK WA2RXO; Oswego County ARA WB2QFE WA2MNA WB2KBE. OCARA "Ham of Year" KA2BHR. RAGS Review knocks Woodpeckers I and II. Mark calendar now, New York State Convention and Atlantic Division Conventions, Rochester, May 15-17. RARA Fifty Years Anniversary Contest rules available K2KWK or WA2PUU. Solar Flare Hotline by NASA, call (301)344-8129. Appointments: (ORS)AF2A KA2GHM WA2ZJP. (EC)WA2PUU. Traffic: (Dec.) WA2HSM 763, W2MTA 724, W2ZOJ 385, WA2MFV 367, N2APB 341, KA2CTU 286, N2BXB 269, WA2ZJP 238, AE2T 223, WB2AZW 192, WB2IDS 172, W2AET 166, KA2CLT 153, W2GLH 149, KI2D 139, WB2OWO 138, W2FR 133, WA2KOJ 116, AF2K 105, KG2D 96, KA2GHM 88, WB2MVC 86, WB2QIX 82, WB2PEE 80, N2BLX 60, WA2PUU 52, KB2GT 47, W2GJ 45, WA2MFU 33, W2RQF 30, W2PPS 27, KA2HAB 24, WA2ANU 22, WA2AIV 20, KB2NW 19, AF2A 17, WB2IJH 17, WB2LJK 17, WB2NAO 11, WB2OTC 10, KA2BDB 8, K2VR 4, K2UAN 2. (Nov.) K2GWN 112, W2GJ 20. (Oct.) AF2K 22.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM. SEC: WA3JBQ. DEC: WB3JDI. STM: N3EE. NMs: W3NEM W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	31	442	415	3585	7:00 P/D
WPAPTN	31	639	423	3983	6:30 P/D
WPA2MTN	31	604	175	146.28/88	8:00 P/D
NWPA2MTN	28	383	32	146.04/64	9:00 P/D

We have two Silent Keys to report: K3AFZ and WA3MWH. Our sympathies go to their families. New Club officers for 1981 are: PHOS K3RN, Pres.; K3TP, V. P.; K3VX, Sec.; AI3E, Treas. Radio Assn of Erie WB3KHK, Pres.; WA3HRJ, V. P.; K1DB, Sec.; KA3BFX, Treas. Indiana Cty ARC W3DMB, Pres.; N3ATN, V. P.; W3FVU, Sec./Treas. Beaver Valley ARA K3OTS, Pres.; KB3L, 1st V. P.; WB3JZN, 2nd V. P.; WB3HWB, Treas.; and KA3DJD, Sec. Beaver Valley FM A. KA3EBF, Pres.; K3NPW, V. P.; WB3HWB, Treas.; WB2FVI, Sec.; KB3L Ch. Eng. WACOM: WB3JOB, Pres.; WA3DIP, V. P./Sec.; WB3GWR, Treas. The Radio Amateurs of Corry: WB3BNH, Pres.; WA3WPV, V. P.; WA3SJM, Treas.; AB3X, Sec. W3DMB has upgraded to Advanced congrats. A very nice four days was spent with W3KT the Atlantic Division Director. He was a very gracious visitor and the members of the clubs he visited enjoyed his talks and answers to their queries. The NARC Penna QSO Contest was a success as reported by W3AS. The out of state top scorer was K1TS and the PA top scorer was K3PA. Does your county have an EC, how about volunteering? Traffic: (Dec.) K3CR 583, WA3PXA 471.

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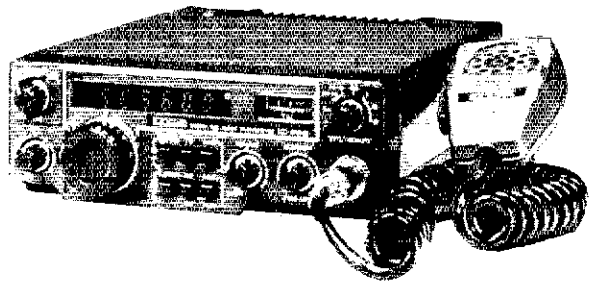

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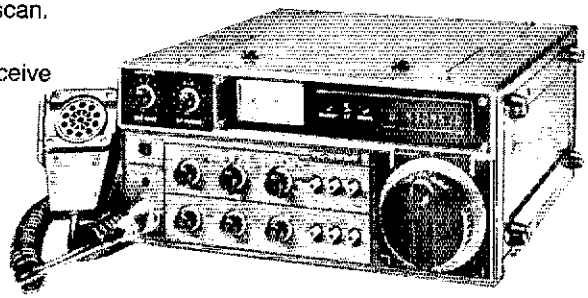
- Multifunction multimode.
- Available from authorized ICOM dealers in either 430-439.9999 or 440-449.9999 megahertz versions.



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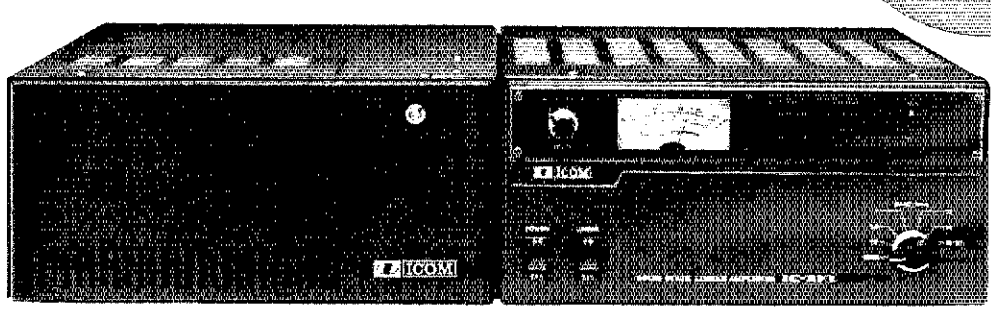

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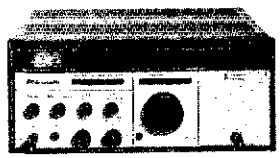

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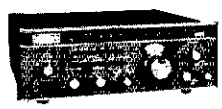

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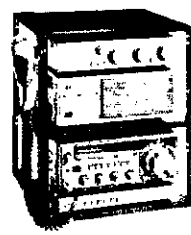

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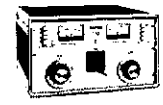

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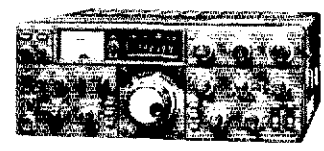

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CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU. SEC: W9QBH. NMs: WA9KFK and WB9JSR. STM: WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	0030/0400		62
Ill Phone	3915	2130 Dy	256	31
NCPN	3915	1200/1700		
IEN	3940	1400 Su	11	4
W9VEY Mem. Stn.	2 mtr		11	8

This will be my farewell column for the Illinois Section. I was first elected January 1958 and have written 264 monthly reports during the last 22 years. It has been a great 22 years and the cooperation I received from the Illinois gang with their traffic reports, EC reports, news items and club papers made the column and the job enjoyable. I have appointed Larry M. Keeran, K9ORP of 706 East Fremont, Bloomington, Illinois 61701 to carry on the Illinois SCM tradition effective January 1st 1981. Larry has done a great job as the McLean County Emergency Coordinator position. As I move to Division Director I will continue to cooperate with the SCM and his great Illinois Amateurs. The Amateurs for Better Communications (ABC) Radio Club, Waukegan, IL has been elected a League affiliated Club by the executive committee. K9RVG has been appointed an OVS station, KB9RC has been appointed EC of Warren County, and WA9NPZ as EC of Kendall County. WD9HXG has upgraded to Advanced Class license. K1CE of ARRL headquarters will be guest of honor at the Starved Rock Radio CLub Hamfest at Princeton, Sunday June 7, 1981. WB9EUU was the centerfold of the month for HAMGAB, (Hamfesters). The Sterling Rock Falls ARS will set up their club station on Jan 20 to commemorate the inauguration of President Elect Ronald Reagan at Tampico, his birthplace. KA9GPT is now a Tech. KA9BJM has completed his 50 MHz WAS. K9LFM is now on 2-mtr ssb with a new ICOM 245. WB9EDP has a new ICOM 251A. The Gateway Amateur Convention will be held March 21 and 22 at Stouffers Inn in St. Louis, Mo. The new officers of the Argonne Amateur Radio Club are K9KZB, WD9AGR, WA6CFM and Dick George. KB9QO is now KD9D. N9ACA an Advanced licensee has received his 2nd class license. W5KLV reports that the CAND for December passed 1812 messages during 31 sessions. The DRN9 report 100 per cent participation for Illinois and stations WD9FDB W9HOT W9JIJ W9NXG WB9WGD WB9ZCR and W9COB checking in. WB9ZBF, WB9ZFO, are new President and Vice-President of the Starved Rock Radio Club. WA9VRD WB9QLE and KA9FUA are new Generals in the ranks of the *CENOIS Amateur Radio* Club. W9NXG K9BVE K9PNG and W9JIJ are BPL recipients for December. Traffic: (Dec.) W9NXG 592, K9BVE 558, K9PNG 512, W9JIJ 505, WB9JSR 220, K9EEA 217, WB9WGD 212, WD9DMV 164, W9TLU 162, W9HOT 151, W9OK 150, W9OYL 109, WD9FDB 89, W9LNQ 36, W4IZI 30, N9TN 29, W0RJW 28, W9QBH 25, WD9HZF 24, W9HBI 20, W9PRN 20, W9HPG 19, W9KR 19, N9DR 19, WA9AON 11, K9DCG 6, WD9EBO 1, K9LFM 1 and WB9MII/9 1. (Nov) W0RJW 16 and WB9EDP 6.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF. IPON K9RGF. Net reports:

Net	Freq.	Time/UTC	QNI	QTC	Time	Sess.
ITN	3910	1330/2300 Dy	2636	574	2791	62
QIN	3656	1430/0100/0400 Dy	932	642	2847	93
ICN	3708	0014 Dv	114	37	624	31
IPN	3910	2130 Dv	1345	323	1350	31
IWN	3910	1315 Dy	1719		389	31
IPON	3910	1300 Su	90	3	101	4

Hoosier vhf nets report: ONI 2287, QTC 171, Bulletins 17, Time 2768 for 14 nets. D9RN Indiana stations 100 percent W9JUJ W9QLW K9CGS W9DLF K9FZX. 9RN 100 percent Indiana stations: W9JUJ N9AEI W9EI W9QLW W9XD WA9OCF N9HZ K9WWJ WB9UYU WD9GXW. CAND report D9RN 100 per cent. Indiana stations: W9JUJ W9QLW K9CGS W9DLF. Appts: ORS — WD9EXI, OBS — K9POP, EC — KA9BLN Johnson County, WD9JAB Wells County. *Silent Keys:* WA9TJS WD9IOP W9LY N9AVK. EC reports: WB9WWB N9AST K9IVN WB9LCN WA9OHX WD9DVA WB9VIW K9UJK WA9UGP W9QWI K9POP WD9BHR KC9C KB9JK WD9JLT W9MJI N9BLK WD9BKA KA9FDF N9EV WA9KWH N9GS KØKJ. Several groups deserve a special thanks for their Christmas spirit. The Clark County ARC for their annual trip to Bethlehem Indiana. They had over 500 contacts in 41 states and 9 foreign countries. They received PR from 3 TV stations and a newspaper article. Many members of the church they operated from came by to view the activity. The Columbus ARC and The White Water Valley ARC operated from shopping center malls giving many local residents the chance to send Christmas greetings to many parts of the USA. The Fort Wayne ARC and the White Water Valley ARC provided a realistic visit with Santa at the North Pole via 2m. At Richmond, the YLs and XYLs who are hams, visited the hospital and Claud Smalley was Santa. The dialogue from the newspaper article was just great. A special thanks to K9FZX W9JUJ W9QYY and W9DLF who handled most of our out of state Christmas traffic. Credit is also due W9WKM and I am sure many others. As with IPN, W9DLF gets the credits, but W9WKM does the work. The state INCERT board met this month and I spoke to a meeting of meteorologists of the National Weather Service from Indiana, Ohio, and Illinois. Our Skywarn program and participation reporting were discussed. Let's all be on our toes this spring. Traffic: W9JUJ 2266, W9FC 319, WB9UYU 313, W9QLW 305, K9FZX 282, WB9LCN 283, N9AEI 201, W9QYY 175, W9EI 167, N9PS 129, W9WKM 128, WD9GXW 112, WD9DWD 107, WA9OCF 98, W9PMT 80, WA9VJA 80, KA9EJT 63, K9WWJ 60, WD9CIS 59, W9XD 54, W9IOH 53, W9DLF 51, K9KTB 51, W9URQ 43, W9WEI 33, N9ACG 31, WD9ART 31, K9TKE 29, WB9AWI 28, KA9BLN 26, WA9GJZ 25, WB9YAY 24, WD9JAB 23, N9AST 22, K9CGS 21, K9DIY 21, WA9KWH 21, WA9OKK 20, KC9C 15, WD9EXI 15, W9ZGC 14, WA9JNC 12, WA9OHX 12, W9RTH 10, W9OZJ 9, WD9EPU 8, WB9OTX 8, W9YEW 7, WD9BHU 7, N9BLK 7, K9OUP 7, W9UPI 7, W9BUQ 5, WD9CIV 3, W9BDP 2, W9KMY 1, WB9KQT 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC:

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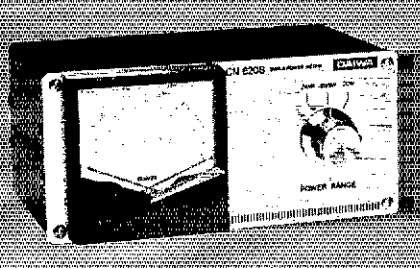

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6.5 x 3 x 4 in.

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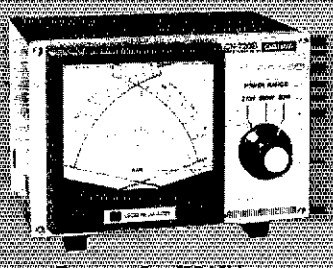
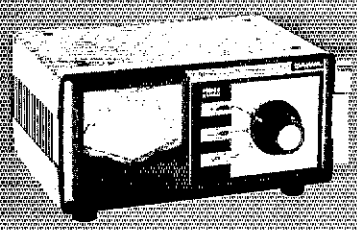


Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 180 x 120 x 130 mm;
7 x 4.75 x 5 in.

Model CN-630



Frequency Range: 140—450 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 2 Ranges (Forward, 20/200 Watts)
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Dimensions: 180 x 85 x 120 mm;
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Power Rating: 500 Watts PEP
Internal Dummy Load: 50 Watts/1 Minute
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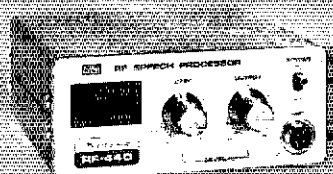

Talk Power: Better than 6 dB
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Panel Meter indicates clipping level
Bandwidth: 2200 Hz at 6 dB down
Frequency Response: 300-3000 Hz at 12 dB down
Distortion Less than 3% at 1 kHz, 20 dB clipping
Output Level: More than 50 mV at 1 kHz

Coaxial Switches

Power Rating: 2.5 kW PEP, 1 kW CW
Impedance: 50 Ohms
Insertion Loss: Less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz
Isolation: Better than 50 dB at 300 MHz;
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Connectors: SO-239

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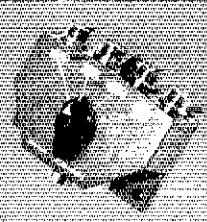
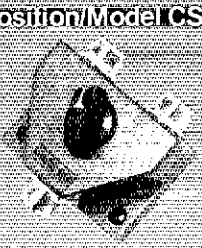


2-Position/Model CS-201



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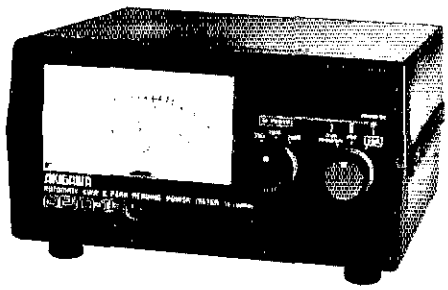

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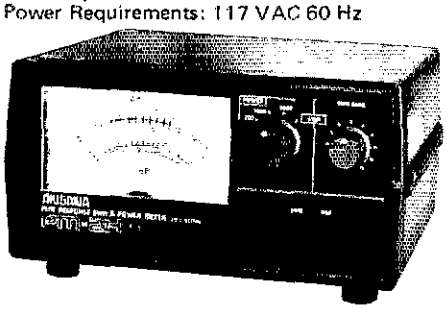
Power Requirements:	117 VAC 60 Hz

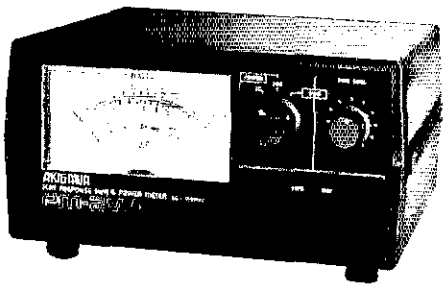
AUTOMATIC SWR & PEAK READING VHF POWER METER
MODEL APM-1V $99.95

Frequency Coverage:	50 – 150 MHz
Input Impedance:	50 – 52 ohms
Power Range:	0 – 20, 200W
SWR Range:	1:1 – 10:1
Power Modes:	Average & PEP
Accuracy:	±10%
Power Requirements:	117 VAC 60 Hz



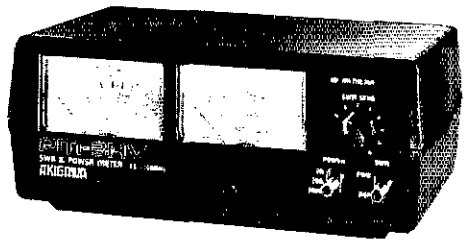
FLAT RESPONSE SWR & POWER METER FOR HF
MODEL PM-2H $89.95

Frequency Coverage:	1.8 – 60 MHz
Input Impedance:	50 – 52 ohms
Power Range:	0 – 200, 1000, 2000W
SWR Range:	1:1 – 3:1
Accuracy:	±10%
Power Requirements:	None



FLAT RESPONSE SWR & POWER METER FOR VHF
MODEL PM-2V $89.95

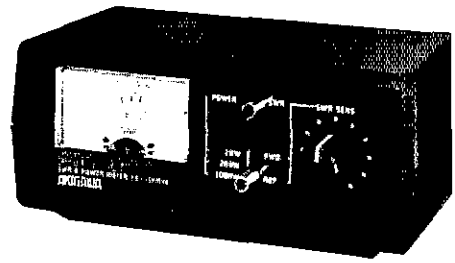
Frequency Coverage:	50 – 150 MHz
Input Impedance:	50 – 52 ohms
Power Range:	0 – 20, 200W
SWR Range:	1:1 – 3:1
Accuracy:	±10%
Power Requirements:	None



SWR & POWER METER FOR HF/VHF
MODEL PM-3HV $54.95

Frequency Coverage:	3 – 150 MHz
Input Impedance:	50 – 52 ohms
Power Range:	0 – 20, 200, 1000W
SWR Range:	1:1 – 5:1
Accuracy:	±10%
Power Requirements:	12 VDC

Illuminated meters for mobile operator



SWR & POWER METER FOR HF/VHF
MODEL PM-4HV $44.95

Frequency Coverage:	3 – 150 MHz
Input Impedance:	50 – 52 ohms
Power Range:	0 – 20, 200, 1000W
SWR Range:	1:1 – 3:1
Accuracy:	±10%
Power Requirements:	None

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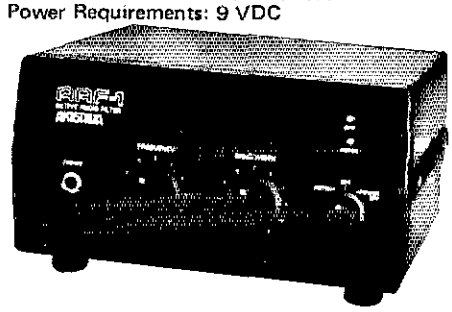
Power Requirements:	9 VDC



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Output Impedance:	8 ohms
Output Power:	1W max.
Power Requirements:	9 VDC 150 mA

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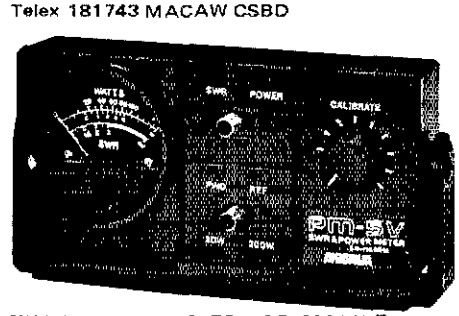

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MODEL PM-5H (HF) $49.95
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Frequency Coverage:	1.8 – 30 MHz (PM-5H)
	50 – 150 MHz (PM-5V)
Input Impedance:	50 – 52 ohms
Power Range:	0 – 20, 200 W ±10%
Power Requirements:	12V DC

Complete with directional coupler unit

PRESELECTOR
MODEL PR-1 $109.95

Frequency Coverage:	3 – 30 MHz
Gain:	20 dB at 7 MHz, Variable
RF Attenuation:	–20 dB & –10 dB
Input/Output Impedance:	50 – 75 ohms
Relay Power Capability:	200W CW
Power Requirements:	117 VAC 60 Hz

W9OAK. STM: K9UTQ. BWN 3985 1230Z QNI 1005, QTC 1084; WB9YPY. BEN 3985 1800Z QNI 803, QTC 256; WB9ESM. WSBN 3985 2300Z QNI 1152, QTC 461; WD9ESZ. WNN 3723 0000Z QNI 251, QTC 50; N9AUG. WIN-E 3662 0100Z QNI 419, QTC 206; W9DM. WIN-L 3662 0400Z QNI 295, QTC 183; K9LGU. XPO 3925 1801Z QNI 503, QTC 52; WA9NIX. WIN-E QNI for month of November should have been 384. W9NN has nice award for having a ham license for 60 years. We wish W9FDY all the best in his retirement, nice to hear you mobile, take care. KA9GNY (ex-W9QOQ) is back on air working DX, etc. K9ODK YTARC club station had 35,000 points in ARRL 160-meter contest using WBOO tower, 266 feet high. Sorry to report WA9JGI's wife passed away, our sympathy. New EC Waupaca County KA9CPA. Among the distinguished guests at Milwaukee ARC's Old Timers night at Pabst Hall in Milwaukee were W1RU K9EN W9HPG. Very nice evening, hospitality was excellent. New licenses: WD9DEE, Extra; WB9PAW, Extra; W9WAQ, Extra; KA9HKL, General; KA9GBE, Tech.; K9GM, 2nd class commercial. BPLs made by: KA9CPA, WD9IUX, WD9ESZ, W9CXY. WD9ERN, new EC Manitowoc county. Green Bay 2 meter net had 6 QNI. NWTN had 497 QNI, 47 QTC. Traffic: (Dec.) KA9CPA 2117, W9CXY 641, WD9IUX 585, WD9ESZ 557, W9YCV 309, N9AUG 289, W9DND 231, W9IEM 231, WB7OJV 214, WD9BCM 190, WB9YPY 173, WD9DHF 164, K9FHI 139, W9UW 86, W9DM 82, N9CP 80, WA9WYS 80, K9AKG 78, WB9ESM 61, W9CJE 56, AG9G 50, WB9NRK 49, WD9AJA 46, K9JPS 44, KB9NG 41, K9AQ 40, W9IHW 40, W9LDO 40, W9SO 39, KA9EMF 38, WB9JSW 38, K9LGU 38, K9GDF 37, KB9FM 36, N9BCX 33, AB9F 32, K9HDF 32, WB9ABF 29, WA9GGH 29, WB9PAW 29, W9UCL 29, W9FDY 25, W9RTP 25, WB9WHQ 24, K9UTQ 22, WA9GYF 21, WB9ICH 20, K9UU 19, KA9GBE 17, WB9YPZ 14, KA9HPQ 13, N9BPQ 12, WB9BRE 12, W9NF 2. (Nov.) W9BCC 12. (Oct.) W9DM 73.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØQIT. STM: AFØO. Our hearty congratulations to the entire Minnesota Section traffic system, who performed admirably during the month of December and the Holiday traffic pile-up. Five stations made the coveted Brass Pounder's League for their efforts: WAØTFC led the pack with a total of 660 messages handled, followed by AFØO with 576, KØJCF with 518 and WØHZU and WBØTHZ with 113 and 118 originations and deliveries. That's what I call teamwork and supporting Amateur Radio's prime purpose of Public Service in its finest sense. The MSPN/E Net had over 1000 check-ins. This is an appropriate time to extend our deepest thanks for the year past to our Net Managers: MSPN/E, KCØT; MSPN/N, WAØAIN; MSSN, KCØZ; MSN/1, AFØO; MSN/2, KØJCF and MNAWXN, WDØCGM. Here's looking forward to a bigger and better 1981. A big welcome back to the traffic nets to KAØEPY of Minneapolis, after an absence of 25 years, who used to go under the callsign of WØHPD. Great to have you back. KBØMB, also of the Twin Cities will be putting on a program at the King of Kings School on February 13th, in the hope of scaring up some more interest in Amateur Radio and a possible Novice class in the near future. By next month, maybe our SCM will be back on the air after her long hospital stay. Net reports:

Net	Mgr.	Freq.	Time	QNI	QTC
MSN/1	AFØO	3685	0030Z	204	214
MSN/2	KØJCF	3685	0300Z		
MSPN/N	WAØAIN	3945	1700Z	651	115
MSPN/E	KCØT	3929	2345Z	1065	336
MNAWXN	WDØCGM	3929	0015Z	538	403
MSSN	KCØZ	3710	2315Z		

Traffic: (Dec.) WAØTFC 660, AFØO 576, KØJCF 518, KBØMB 384, WBØTHZ 302, WØHZU 213, KØPIZ 129, WDØCGM 112, KCØT 111, WØDFX 85, KØCSE 76, WAØQIT 73, WAØAIN 66, WBØQEU 62, WBØNZB 61, KAØEPY 61, KCØZ 35, WBØSCN 34, WDØCEX 20, NØBRC 18, WAØYVT 17, NØAXU 15, AFØQ 12, WAØEXQ 6, WDØGUX 6. (Nov.) NØJP 18.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: WDØCLB. I would like to thank all of you for electing me as SCM and making my job easier through your cooperation. Congrats to Novices KAØJSJ and WDØAYA, upgraded to Tech. WDØBRL Gen. to Extra. Grand Forks 34-94 has installed a new antenna on top of United Hospital. New Pres. of FARC Club is WDØAQY and KAØHDN as Activity Director. Net reports:

Net	Freq.	Time/Day	Sess.	QNI	QTC
Goose	1990.0 kHz	1500Z-Su	4	48	7
Fliver (Nov)			5	67	3
DATA	3996.5 kHz	0030Z-Dy	27	350	64
¥L WX	3996.5 kHz	1330Z-Dy	29	375	371

Traffic: WAØRWM 299, KBØIP 124, NØAFP 58, WAØCRH 26, KA7AWS, 21, WØDM 10.

SOUTH DAKOTA: SCM, Erwin C. Heimbuck, KØOTZ — Congratulations to WØMZI on making BPL this month! This is a note to all the club secretaries to get some information to me on their clubs activities. Special note: WØDVB, WØKJZ, KAØDDS, WBØUHI and WØVP appeared on a local radio talk show and answered questions about ham radio from call ins. The SCM's from this area are planning on meeting in Sioux City during the Hamboree. Hope to see you there. Work is slowly progressing on the new 16/76 repeater for the nothern hills. Hope to have it on by summer. Net Reports sessions/QNI/QTC. SDN: 31/108/113. Even Net: 31/1633/97. WXN: 23/765/783. NJO: 31/28/31. Traffic: WØMZI 797, WAØTNM 209, WAØVRE 194, KØFRE 188, WAØUEN 137, WØDVB 130, WØHOJ 129, KØAIE 107, WØKJZ 42, WBØOMF 28, WØHWE 9.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: K5TML. NMs: WA5LGN W5MYZ W5POH WA5ZWZ. Nets: ARN 3.995 0030/dy 1171 131 WA5LGN; OZK 3.760 0100/dy 214 50 W5MYZ. APN 3.937 1200/M-S 806 41 W5POH. M-Bird 3.928 2230/M-F 805 45 WA5ZWZ. SCARC 28.765 0230 M&T 66 16 WA5VSV. Report K5KIX is Silent Key, sympathy to his family. Correction: In Jan. issue of QST this column should have read "On Sept 19, members of MARC assisted in providing communications at Children's Hospital in Little Rock." New officers of MARC: WD5BIV, pres.; KB5QL, v.p.; KA5JCA, sec.; N5ARW, treas. Activities Ch N5CMA. New officers NWAARC: K5GO, pres.; KA5BMK, v.p.; WB5BDD, sec.; KA5BML, treas. Editor of RAGCHEWER, KA5HEV. OBs: WB5KUI 3, W5UAU 2. Traffic: K5BIL 87, W5QFU 65, WB5GQH 53, N5EL 39, W5UAU 39, W5BLP 27, W5KL 12, W5POH 12, WB5KUI 2.

LOUISIANA: SCM, Jim Giammanco, N5IB — Members of the Vermillion ARC provided communications for the

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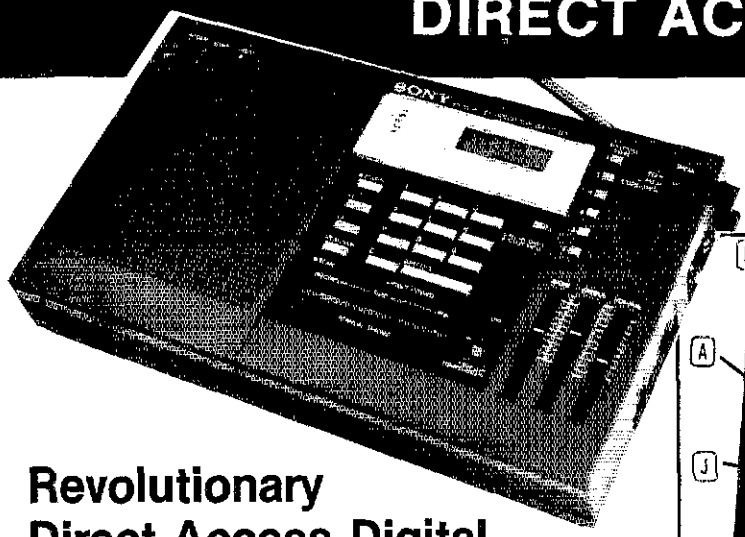

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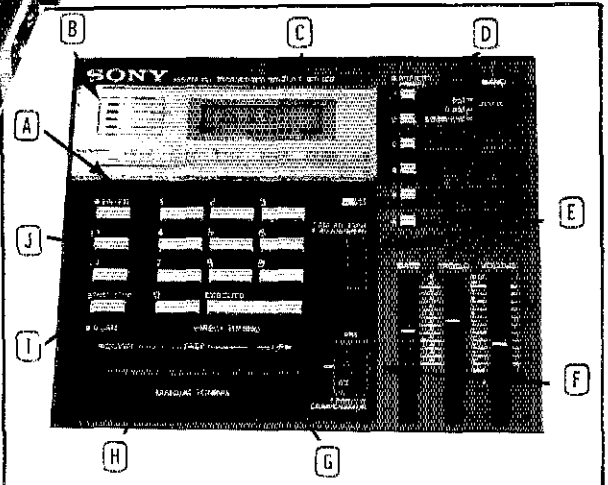

A Enter Button
B Signal Strength Indicator
C Liquid Crystal Display
D Memory Preset Buttons
E Antenna Adjustment Dial
F SSB/CW Compensator
G Execute Bar
H Manual Tuning Buttons
I Scan Button
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A WHOLE NEW BREED OF RADIO IS HERE NOW! No other short wave receiver combines so many advanced features for both operating convenience and high performance as does the new Sony ICF-2001. Once you have operated this exciting new radio, you'll be spoiled forever! Direct access tuning eliminates conventional tuning knobs and dials with a convenient digital keyboard and Liquid Crystal Display (LCD) for accurate frequency readout to within 1 KHz. Instant fingertip tuning, up to 8 memory presets, and continuous scanning features make the ICF-2001 the ultimate in convenience.

Compare the following features against any receiver currently available and you will have to agree that the Sony ICF 2001 is the best value in shortwave receivers today:

DUAL PLL SYNTHESIZER CIRCUITRY covers entire 150 KHz to 29.999 MHz band. PLL_1 circuit has 100 KHz step while PLL_2 handles 1 KHz step, both of which are controlled by separate quartz crystal oscillators for precise, no-drift tuning. **DUAL CONVERSION SUPERHETERODYNE** circuitry assures superior AM reception and high image rejection characteristics. The 10.7 MHz IF of the FM band is utilized as the 2nd IF of the AM band. A new type of crystal filter made especially for this purpose realizes clearer reception than commonly used ceramic filters. **ALL FET FRONT END** for high sensitivity and interference rejection. Intermodulation, cross modulation, and spurious interference are effectively rejected. **FET RF AMP** contributes to superior image rejection, high sensitivity, and good signal to noise ratio. Both strong and weak stations are received with minimal distortion.

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OPERATIONAL FEATURES

INSTANT FINGERTIP TUNING with the calculator-type key board enables the operator to have instant access to any frequency in the LW, MW, SW, and FM bands. And the LCD digital frequency display confirms the exact, drift-free signal being received. **AUTOMATIC SCANNING** of the above bands. Continuous scanning of any desired portion of the band is achieved by setting the "L_1" and "L_2" keys to define the range to be scanned. The scanner can stop automatically on strong signals, or it can be done manually. **MANUAL SEARCH** is similar to the manual scan mode and is useful for quick signal searching. The "UP" and "DOWN" keys let the tuner search for you. The "FAST" key increases the search rate for faster signal detection. **MEMORY PRESETS.** Six memory keys hold desired stations for instant one-key tuning in any mode (AM, SSB/CW, and FM), and also, the "L_1" and "L_2" keys can give you two more memory slots when not used for scanning. **OTHER FEATURES:** Local, normal, DX sensitivity selector for AM; SSB/CW compensator; 90 min. sleep timer; AM Ant. Adjust.

SPECIFICATIONS

CIRCUIT SYSTEM: Fm Superheterodyne; AM Dual conversion superheterodyne. **SIGNAL CIRCUITRY:** 4 IC's, 11 FET's, 23 Transistors, 16 Diodes. **AUXILIARY CIRCUITRY:** 5 IC's, 1 LSI, 5 LED's, 25 Transistors, 9 Diodes. **FREQUENCY RANGE:** FM 76-108 MHz; AM 150-29,999 KHz. **INTERMEDIATE FREQUENCY:** FM 10.7 MHz.; AM 1st 66.35 MHz., 2nd 10.7 MHz. **ANTENNAS:** FM telescopic, ext. ant. terminal; AM telescopic, built-in ferrite bar, ext. ant. terminal. **POWER:** 4.5 VDC/120 VAC **DIMENSIONS:** 12¼" (W) X 2¼ (H) X 6¾ (D). **WEIGHT:** 3 lb. 15 oz. (1.8 kg)

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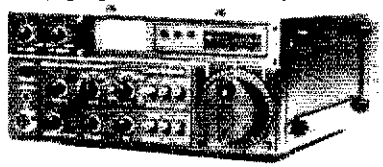

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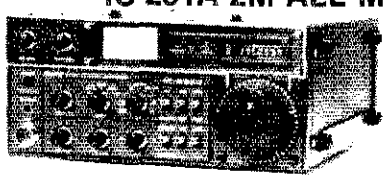
50.000-53.9999MHz, 80W (551D) 10W(551) SSB, CW FM (optional) and AM at reduced power. Dual VFO's with 3 memories. Dual all mode scanning system. PS-20 power supply required for IC-551D. Pass Band Tuning and VOX optional on IC-551.

IC-251A 2M ALL MODE



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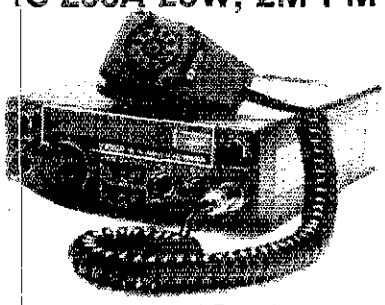
143.8000 - 148.1999 MHz, 10W,SSB,FM,CW. Dual VFO's with 3 memories. Dual all mode scanning system. AC supply self-contained.

IC-255A 25W, 2M FM



143.800-148.195 MHz, 25W FM. Dual VFO's with 5 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

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Optional Encoding Microphone Available

IC-260A 2M, ALL MODE

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143.8000-148.1999 MHz, 10W FM, SSB (USB/LSB) and CW. Dual VFO's with 3 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

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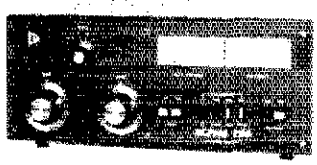
ALPHA



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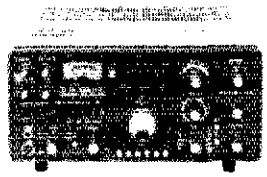

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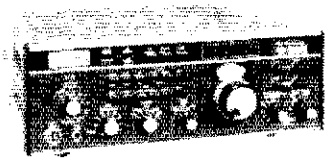

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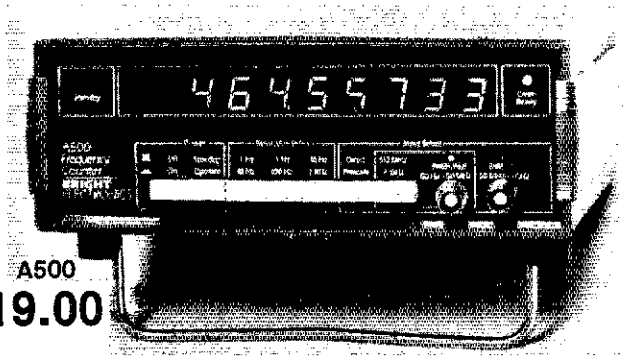

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BRIGHT's new frequency counters feature RFI shielding, easy-to-read large LED's and professional styling that make the A500 and A500E compatible with the equipment in your shack. The A500 is not just another "pretty face." It is a highly reliable, accurate counter that will put you precisely on frequency every time. It will even show you the input that is selected!

PARAMETER	A500	A500E (Extended Range)
Frequency Range	50Hz-500MHz	50Hz-1100 MHz
Dynamic Range (Typical)	35Dbm@50Ω	35Dbm@50Ω
Resolution 50Hz-50MHz	.1Hz	.1Hz
(best available gate times vary) 50MHz-500MHz	10Hz	10Hz
500MHz-1100MHz	NA	100Hz
Accuracy over Temperature (short term)	1 PPM 17°C.-30°C.	1 PPM 17°C.-30°C.
Sensitivity 50Hz-50MHz	1-10MV	1-10MV
50MHz-500MHz	10-50MV	10-50MV
500MHz-1100MHz	NA	50-100MV
Time Base Description	10MHz Proportional Oven	10MHz Proportional Oven
Size and Number of Digits	9@.5"	9@.5"
Price incl. antenna & AC supply	$219.00	$249.00

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"Twins" Owners: The model FR-4 Readout/Counter is designed to update the T-4X, T-4XB, T-4XC transmitters and R-4, R-4A, R-4B and R-4C receivers. Just $159.95.

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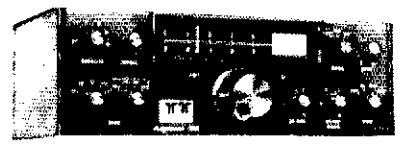
TEN-TEC

OMNI

546	OMNI-C9 Band Digital XCVR	$1059
255	Deluxe Power Supply w/Spkr	169
280	Standard Power Supply	149
217	500Hz 8 Pole CW Filter	55
218	1800Hz 8 Pole SSB Filter	55
219	250Hz 6 Pole CW Filter	55
243	Remote VFO	169

DELTA

580	9 Band 200w. SSB/CW XCVR	$ 759
255	Deluxe Power Supply w/Spkr.	169
280	Standard Power Supply	149
282	200Hz 6 Pole CW Filter	49
283	Remote VFO Unit	169
285	500Hz 6 Pole CW Filter	45
287	Mobile Mount	TBA
289	Noise Blanker	39
1140	D.C. Circuit Breaker	10



ARGONAUT

515	Argonant-5W. 80-10mtr. XCVR	$ 399
210	Power Supply	34
206A	Crystal Calibrater	36
208A	Notch/CW Filter	56

HERCULES

444	Hercules 160-15 mtr. All Solid State 1KW Amplifier	$1349

ACCESSORIES

214	Mike for Model 234	$ 39
215PC	Ceramic Mike w/Coil Cord	34
234	Speech Processor	129
227*	Antenna Tuner	75
645	Dual Paddle Keyer	79
670	Single Paddle Keyer	39

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Abbeville Jaycees Christmas parade. The VARC also conducted Operation Santa Claus, using 10 and 15 meters to let the kids talk to Santa. N5JM is operating a low power beacon on 50.028 MHz from New Orleans. Congrats to WB5LBR and her OM, WA5VUC, on the birth of their son. BRARC began a new series of Novice classes in January. At the New Orleans FCC office, ham tests will now be given only on the first and third Tuesdays and Wednesdays, with code tests on the Tuesdays only. W5FMO, of New Orleans, is the newly elected president of the Old Old Timers Club. Don't forget the *Lafayette Hamfest, March 21 and 22, at the St.* Martin Academy in St. Martinville. We hope to have a meeting of traffic handlers and net members during the hamfest. WD5EAE is planning to run LSN seven days a week on a trial basis, same time and frequency.

Net	Freq	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 PM, Dy	278	205	N5RB
LTN	3910 kHz	6:30 PM, Dy	368	141	N5EK
LSN	3703 kHz	7:30 PM, M-F	94	41	WD5EAE
LRN	3587.5 kHz	6:30 PM Su. 8 PM W	15	14	N5RB
LEN	3910 kHz	8:00 PM, Su	—	—	———

Traffic: K5TL 261, N5RB 151, WD5FLM 146, W5VMY 145, K5KV 138, WB5UVX 105, WB5ODJ 90, N5BFV 72, WD5EAE 65, N5IB 60, WB5JZP 32, K5WOD 18, WD5GJB 15, KA3BER 13, KB5AS 9, WB5IKT 6.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. WB5SNB has been elected new SCM and will do a fine job. Congrats to N5AMK upgrading to Extra. CAND (W5KLV) sess 31, QTC 1812, with DRN5 rep. 100% by Miss. Station N5AMK. DRN5 (WB5NKD) sess 31, QTC 840, with MS rep. 100% by W5EFT KA5AFT N5AMK WD5EYM K5GVR WB5HAS KB5W WB5VAL. CGCHN (KB5NX) sess 31, QNI 3059, QTC 423. MSBN (WD5EYM) sess 31, QNI 2290, QTC 107. MTN (K5OAF) sess 31, QNI 124 QTC 80. MN (WB5RMW) sess 31, QNI 505, QTC 6. MSN (KA5GGG) sess 12, QNI 37, QTC 11. RACES (N5AMK) sess 4, QNI 146, QTC 1. CAEN (KA5AGD) sess 4, QNI 73, QTC 2. GSEN (KB5W) sess 22, QNI 515, QTC 77. Traffic: KB5W 758, N5AMK 681, K5OAF 348, W5EDT 262, WB5SNB 87, W5XT 29, WD5EYM 25, KA5AFT 17, K5MK 2.

TENNESSEE: SCM, *Earl Leonard*, KB4G — SEC: W4NZW. STM: WB4PRF. At the first meeting of the year the Oak Ridge Amateur Radio Club presented their Outstanding Amateur award, in the form of a beautiful plaque, to the most deserving amateur, K4LQ. Congratulations. Many thanks for a job well done to K4VM who has resigned as net manager for the evening session of the Tennessee Phone Net. Welcome to the new net manager K4YOL and his assistant, W4CSY. Congratulations to both you fellows. Let's get behind these guys and give them all our support. While we are passing out the congrats and well wishes, let's extend the same to W4NZW who has been appointed a member of the Emergency Communications Advisory Committee. Traffic: NG4J 715, W4ZJY 480, W4OGG 438, W4WXH 372, WB4PRF 349, WB4BKF 182, W4MRD 173, W4DDK 146, K4JGW 89, W4DPO 73, K4WOP 63, K4VM 40, WD4NJR 30, W4RUW 30, W4PFP 29, W4TYV 26, KA4GSS 24, WB4ZSZ 19, W4VS 18, KA4BSG 17, WA4BWW 17, W4EWR 12, KY4L 12, W4PSN 12, WA4CGK 9, K4UMW 4, AF4T 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joseph E. Miller, K4DZM. STM: KZ4G. SEC: WB4ZML. Nets reporting:

Net	QNI	QTC	Net	QNI	QTC
KSN	177	60	BARES	72	6
KYN	325	315	4-ARES	35	10
KNTN	373	194	5-ARES	32	5
KTN	1569	476	6-ARES	137	—
MKPN	1226	253	PAEWTN	436	53
KRN	537	65	SEKEN	24	1
SRN-D	40%	683	CARN	164	24
CAN-D	100%	1812	TRI-ST	445	108
KPON	66	9	EWPN	239	1

Congrats to KZ4G who will be the new SCM April 1. Thanks to all for the largest traffic total reported. Traffic: K4YZU 350, KB4OZ 300, WA4JAV 285, K4DZM 257, K4JLX 214, KA4AZT 210, WD4LXX 178, KC4AV 173, K4HOE 134, WA4SWF 131, KS4V 116, WA4AVV 111, W4RHZ 111, WA4EBN 97, KA4GFU 89, KA4MZY 80, WA9OTD 78, WD4IYI 77, WA4BSC 76, WD4OMH 76, WD4ONV 72, WA4JTE 71, WA4AGH 61, W4PKX 42, WD4JTO 41, KZ4G 35, WB4ILF 33, WB4APC 32, KA4SAA 31, W4CDA 30, K4MHL 28, WB4AUN 27, WD4CQF 23, KA4FJR 20, WA4YPQ 17, WA4NOG 15, KA4IKH 14, K4AUX 13, WA4GAL 13, WD4IYH 8, WD4CJQ 7, WD4LTD 4.

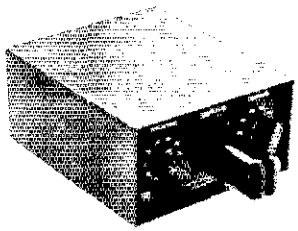
MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: WB8FLK K8RCT W8VWY. NMs: WD8BHE WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr.
QMN*	3663	1800 Dy**	1434	701	93	WA8PIM
MITN*	3953	1900 Dy	743	545	31	WD8LRT
GLETN	3932	2100 Dy	1484	308	31	K8DTG
MACS*	3953	1100 Dy	798	229	31	K8LNE
MNN*	3722	1730 Dy**	575	215	61	WD8BHE
UPN*	3922	1700 Dy	893	163	35	WA8DHB
SEMTN*	146.64	2045 Dy	165	72	28	WA8RNB
WSSBN	3935	1900 Dy	745	28	30	W8POZ
BR	3930	1730 Dy	498	27	27	W8HIN
MEN	3930	0900 Su	190	5	4	W8HIN
VHF Nets	15 reports		1025	187	0	WD8NKT

*NTS nets. Times Local. **QMN late net, 2200 MNN late net 2000. 3932 kHz is MI emergency frequency. Traffic workshop Sundays 3953 kHz at 1600. ARES net Sundays 3932 kHz at 1730. ARES (U.P.) Thursdays 3922 kHz at 1730. New EC (Washtenaw): W8KJ. New NM for vhf activity: WD8NKT. New OO: AC8Y. New ORS: WD8RHU. OO reports: K8JH W8QG KE8X. OBS reports: WD8IYA WB8MPD WA8RNB. Silent Keys, with deep regret: K8JED K8KIT K8SGA WB8UCI. Thanks to retiring Washtenaw EC W8LMT for over 4 years fine service. New officers for Branch County ARC: WD8RHU, pres.; N8BJD, vice pres.; WA8LGQ, treas.; K8XE, secy.; W8QK, act. mgr. N8AG (ZF2AG) had 2800 QSOs from Grand Cayman, requests s.a.s.e.s for QSLs. L'Anse Creuse ARC was top in MI QSO Party for 6th year in a row. WB8BNN, Van Buren EC, is now KI8Z. "Can I count traffic that I pass on non-NTS nets?" "As an ORS, do I have to work only NTS nets?" Gee, where do these ideas come from?! ALL traffic handled on amateur bands in standard ARRL form can and should be counted and reported, in or out of NTS. Many fine independent nets, such as ARTS, ISSB, HBN, our own GLETN, provide invaluable public service, and ORS appointees are free and welcome to work these

NYE VIKING IAMBIC KEYERS . . .

Put the "pro" in proficient keying!

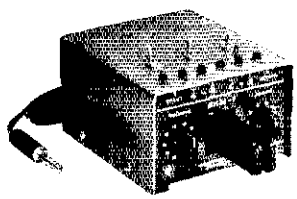


IAMBIC KEYER No. SSK-1-K $105.00

The Nye Viking Iambic Keyer combines all the excellent features of Nye's popular Super Squeeze Key with the superb reliability of Cmos integrated circuitry. The exclusive form-fitting, extra-long paddles make for tireless keying and provide an easy "change of pace" without changing key adjustments.

A Nye Viking 404 audio oscillator and speaker is included for monitoring and practicing keying. The unit will key either negative or positive keyed transmitters up to 200 ma. at 250 volts. A switch on the rear of the chassis determines the polarity. Output is terminated in a shielded cable with standard ¼" phone jack. A switch is provided to allow tune-up and slow speed hand keying with the dash paddle. It also simulates the old-fashioned bug keying when in the test or "tune-up" position.

The keyer operates on an internal Nicad 9V battery that is rechargeable with a plug-in 115VAC charger.



MEMORY KEYER No. SKM-001 $184.50

The Nye Viking Iambic Memory-Keyer features a 1024-bit memory, plus our popular SSK-1-K Keyer, all in a handsome, compact, top-of-the-desk package!

SKM-001 Features Include:

All Cmos ICs including memory chip • Automatic return to play-back after recording eliminates accidental erasure of recorded message • In the record mode, the clock does not start until the first character is keyed. Puts beginning of message in first bit of memory. In play-back, message starts the instant button is pressed • Internal Nicad battery maintains memory months without recharging • All push buttons on top for ease of operation • Your choice of 4,256-bit memories, 2 512-bit, or 1 1024-bit memory, at the flick of a switch • Repeat switch and a "reset" button. Memory also resets if keyer paddle is operated • Five to 50-word-per-minute speed control • 404 tone generator with loud speaker, volume control and on-off switch • Combination tune-up switch and output polarity switch allows keying any transmitter up to 250 volts at 200 mills, positive or negative • Manual dash control switch allows key to function the same as an old-fashion bug, or permits hand key operation by keying sideways or by laying keyer on its left side.

Nye Viking

Available at leading dealers throughout the USA

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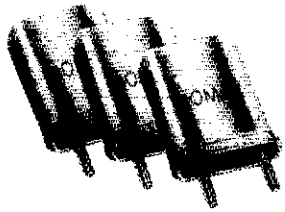

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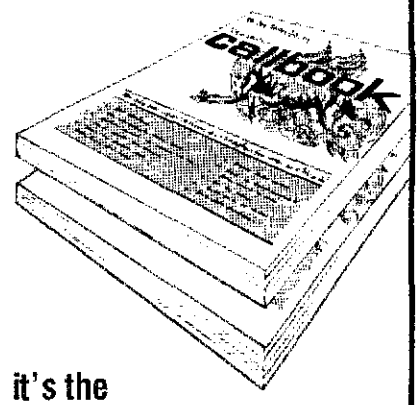

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or any other nets. NTS participation is encouraged, but by no means required. BPL for December: KA8CPS WD8LRT WB8MTD AF8V. Traffic: AF8V 762, WD8LRT 679, WB8MTD 639, KA8CPS 596, WA8PIM 370, W8VPW 369, WB8YDZ 326, KB8MX 274, K8DTG 269, N8ABA 201, K8KMQ 198, WD8KZX 197, WB8ITT 189, W8LCU 173, WA8QAF 169, WA@TAQ 141, W8UE 131, KE8X 124, WA8DHB 119, WB8BSE 115, WD8MJB 103, WB8YRY 97, WD8BHE 92, WD8RNQ 91, WD8NKT 79, WD8RHU 76, W8SCW 75, K8GXV 67, K8LUY 65, WD8EIB 64, WB8SYA 63, WB1HX 61, K8RV 59, W8EOI 58, N8BJD 57, W8VIZ 57, WD8LSV 56, W8YIQ 54, AD8X 49, W8CUP 45, WB8YWA 45, KB8GT 43, K8LNE 43, WD8JRT 40, WD8RWR 40, WB8HPZ 39, WD8OEP 37, WD8IBY 34, W8LDS 33, WB8TTA 33, K8DD 32, WD8ROK 32, K8OCP 29, WB8ZIY 29, KB8GC 28, WD8OSE 28, WB8DJS 25, WD8IXZ 23, WB8ZNS 23, KB8PW 22, K8UPE 22, WD8JUP 21, W8JXJ 21, KI8Z 21, KI8Q 19, W8HIN 18, W8MOF 18, W9NXD 18, W8PBO 17, W8JUP 16, W8TBP 14, N8BNC 11, WD8JFF 10, WB8NDB 10, W8BEZ 7, WD8BEN 6, WB8HSN 6, KC8K 6, WB8AXI 5, WD8IYA 5, WA8VBF 5, WD8OKU 4, KB8Q 3, W8LOU 2, W8WVL 2, KJ8A 1.

OHIO: SCM, Allan L. Severson — Asst SCMs: W8MOK AF8O. SEC: K8AN. STM: K8OZ. NMs: K8AAZ WD8KBW K8OZ WD8QMP WB8YGW. Net Reports.

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN	623	562	62	6:45/10 P.M.	3.577
NR	150	17	17	6 P.M.	3.605
NN	160	64	29	6:30 P.M.	3.708
SN	265	237	31	6:10 P.M.	3.577
SSBN	3330	1768	94	10:30 A.M., 4:15/6:45 P.M.	3.9725
6MN	385	54	31	9 P.M.	50.160

Let's ponder these questions: Can we operate without commercial electricity? If not, do we know who can? Do we know who can handle health and welfare traffic, or any other disaster-related traffic? Do we know who can be relied on to deliver messages accurately from our area or elsewhere in this small world? How will you communicate locally if your telephones are out? Do you know which amateurs can be counted on to help the police, Red Cross, DSA, fire departments, plus any other official or quasi-official bodies which may have overtaxed communications, or no communications? I suspect that a majority of us would have no answers for many of these questions. That's why I pose them. So let's see what we can do to maximize our preparedness before the need, not after a crises strikes. I can extend sympathy to Dave and Nan Kersten — N8AUH and KA8DGO — who have assumed the world's most thankless job, (next to SCM), editing of the Westpark Radlops Log, from WA8NVW. Cleveland area amateurs provided communications over almost an entire night to a major hospital in which a boiler exploded and 382 patients were transferred to area hospitals. Don't forget the Ohio ARRL Convention in the Cincinnati area June 13 and 14.

Local Nets	QNI	QTC	Sess.
BRTN	358	213	31
OARES	99	3	4
FIRELANDS RED CR.	56	3	5
CNWARES	357	200	27
MASER (Nov)	80	5	5
ARA	53	0	4
SRAC	718	98	34
WCEN	40	4	4

Traffic: W8PMJ 633, WB8DMF 545, W8QEM 534, K8OZ 517, WD8KFN 375, N8XX 323, K8AAZ 278, W8QZK 243, WD8DYW 236, KA8DJZ 230, WB8MZZ 213, WA8GMT 211, WD8KBW 211, WB8UBR 203, K8DL 185, WB8QHU 170, N8CW 161, WA8SSI 156, W8UMD 149, WB8JGW 149, WB8QHV 146, WD8DTG 145, WB8SIQ 145, W8TP 141, N8CDO 134, W8ENI 132, KF8J 128, WB8WTS 111, WB8MEK 106, WD8QMP 104, W8MOK 95, W8WEG 93, WB8TKU 91, WA8BUW 88, KA8KFW 85, WD8EMS 85, AB8P 84, WB8SRC 82, WD8NEC 76, N8AKS 75, WD8NJO 75, K8AN 74, WB8BHL 74, WB8TTQ 72, WB8DDE 72, WD8RIB 68, K3RC 63, WB8YTD 62, WD8OYO 57, W8GGZ 57, WB8MRL 53, WB8ICL 48, WA8HGH 46, WA8QYJ 42, WB8KQJ 42, WA8MAZ 41, WD8AWM 32, WB8SED 31, WA8YGW 31, WD8PMW 30, K8YUW 30, KA8IUK 29, WB8PIY 29, W8EK 28, N8JR 27, WD8LZW 27, WD8OYK 27, N8AUH 25, WA1QAA 25, WD8NEB 24, WB8YVI 24, KA8FBQ 22, W8MGA 21, WB8SGL 21, W8PTN 20, W8IM 19, W8UMH 18, K8CKY 17, WA8TSX 17, W8ODL 16, WB8CKU 15, W8EMK 14, WD8QZM 14, W8DYF 12, WB8HOE 12, KA8CDE 11, WD8EKI 11, WB8NHV 11, WB8TRK 11, W8ZM 11, N8AHK 10, WA8BOV 9, WA8CDC 9, WA8ZID 9, W8WAV 8, WD8CHL 7, WD8MIO 7, W8RG 7, W8CAR 6, WB8VLR 6, WB8WNH 6, WB8YUS 6, K8BNL 3, N8AJU 2, N2NS 2, W8HVA 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2TM. STM: WA2SPL. ASCM: KB2KW W2IT K2AV. NM: W2WSS WB2IXR N2BDW WB2ZCM WB2EAG WA2SPL WB2HDU. Nets: EPN 6 P.M. 3902; NYPON 5 P.M. 3913; ESS (slow) 6 P.M. 3590; NYSPTEN 6 P.M. 3925; NYS 7 P.M. 10 P.M. 3677; CDN (Troy) 6:30 P.M. 34/94; HVN (Beacon) 7:30 P.M. M-F 37/97; SDN (White Plains) 9:30 P.M. 66/06; SCRN (Catskill) 8 P.M. 135/735. This is the last column in which you will see reports which arrived at my station after the 10th. Thanks to all those who made the attempt to make the ENY staff meeting at Kingston on the 10th of January! Special thanks to W2XL who made arrangements and provided refreshments. Well, next PD is only a few weeks away when we will see how all measure up using slightly different guidelines. Enjoyed meeting quite a few members of the Albany Amateur Radio Club on the 9th of January. Thanks. For info on appointments: WA2SPL takes care of NM and ORS. KB2TM takes care of OES and EC. KB2KW takes care of OBS, OO, OVS. Results of Oct PD will be mailed out to all ECs. BPL: WA2SPL. PSHR: N2BDW W2BIW WB2EAG WA2EQW WB2HDU N2JK WB2MCO WA2SPL W2YJR WB2ZCM. Traffic: WA2SPL 909, WB2EAG 409, WB2MCO 356, WB2HDU 314, W2YJR 287, WB2ZCM 215, W2BIW 181, W2EFU 174, WA2EQW 137, WB2IXR 98, N2JK 98, W2IQK 89, N2BDW 87, K2AMU 58, K2MI 46, WA2CJY 33, AA2Y 33, K3HNW 24, N3EF 15.

NEW YORK — LONG ISLAND: SCM, John Smale, K2IZ — Asst. SCM, Dwight Ernest, KA2CNN. SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section, please check in: NLI CW 3630 kHz 1900/2200 WB2TQC Mgr. NLI Phone 3928 kHz 1815 WA2SEL Mgr. NASSAU VHF 146.04/64 2100 MWS 2100 WA2SOE Mgr. Big Apple M-F 147.915/315 2000 KA2DBW Mgr. Suffolk vhf M-F 144.74/145.37 2030 N2BKK Mgr. NLI Ten Mtr Phone 28.710 2100 Tue, Th, Sat KA2GFU Mgr. All times are local. Please note the new vhf nets. LIMARC also has one, time, freq and days to be listed in the future.

WB2YUJ is now a General, finally. Suffolk County is again sponsoring the FCC Amateur Radio exams at Stony Brook on May 9, please send 1980 610 forms only along with s.a.s.e. to WB2QIY, cut off date is 15 April. The LIMARC Flea Market is May 17. The Long Island Marathon is on May 3. As you can see by the heading of the column, I'm back, with an Associates Degree in Marketing and Management and also another harmonic, that makes four. WB2DCJ is compiling a list of speakers that have been at various clubs in the section, any clubs needing fresh ideas for speakers at their meetings please contact me or Harry for further details. Please send all station reports and club news letters to me so I can put them in the column. Don't forget Field Day this year.

NORTHERN NEW JERSEY SCM, Robert Neukomm, WA2WVQ — SEC: WB2VUF. STM: W2XD. NMs: N2CR N2BOP W2PSU KA2GQQ W2TCA W2UEZ & WB2IQJ.

Net	Mgr.	Freq	Time/Days	Sess.	QNI	QSP
NJN/E	W2UEZ	3695	7 P.M. Dy	31	490	345
NJN/L	W2UEZ	3695	10 P.M. Dy	31	369	268
NJSN	WB2IQJ	3735	6:30 P.M. (Nov.) Dy	30	257	81
NJPN	N2CR	3950	6 P.M. Dy	35	676	532
NJVN	W2TCA	49/49	10:30 P.M. Dy	38	382	282
OBTTN	N2BOP	72/12	8 P.M. Dy	31	620	277
UCETTN	KA2GQQ	085/6857	30 P.M. Dy	31	247	202
NWNJVN	N2BNB	90/30	8:30 P.M. W	5	33	17
NJRTTY	W2PSU	147.51	Autostart	30	54	309

Holmdel ARC radiogram exhibit at Bell Labs Doll and Toy nite very popular — lots of traffic generated. Participants included net regulars W2CQB and W2XD. Sussex County ARC members participated in "Operation Northpole" in which children in two county hospitals were able to speak to Santa Claus via 2 meters. KA2HAE & KA2FZW to General and N2BNC to Advanced. On the evening of January 1st a weak cw signal was heard on NJPN. Some suspected a rare DX, but it was none other than WB2RMI with 35 watts to a "tri-bander". Let's hope we hear more from you this year! WA2YMK is NC of Greenbrook Repeater Net, 34/94 Wed at 2100 EST. All are welcome to call in. WA2MVQ was portable 7 during Christmas week. OO reports from WA2QZD and WA2MVQ. Metroplex has its 440 MHz repeater on 446.750/441.750. Metroplex had a FB Xmas party and the day after found Metroplexers at Babies Hospital, Columbia Presbyterian in NYC and at St. Josephs in Paterson with HTs so that the children could talk directly to Santa. Metroplex now has 590 members and lists the following upgrades: WA2VOI to Advanced. The following Ramapo Mountain ARC members participated in the Italian earthquake traffic: AG2N KB2EW WB2WEX KA2COQ WA2WFF WA2MVQ and W2PSU. TCRA News reports that N2IS won the right to keep his Amateur Radio tower. N2CDZ to General. Old Bridge ARC reports that KB2TY is in the hospital recovering from a heart attack. Fairlawn ARC officers: WA2TWH, pres.; KA2DKC, vice pres.; KA2DPM, secy.; WB2RSR, treas.; N2AYJ, act. mgr.; WB2UVU, tech. dir. Upgrade: to Technician, KA2CZS; to General, N2CCD. Sussex ARC has incorporated. A Novice class will be held and anyone interested contact WB2LHY or N2WM. K2YHY AC2A and W2HEP have RTTY gear and have it on the Sussex ARC repeater. How about you fellows checking into 147.51? Split Rock ARC advises that W2XD and K2UL made a traffic presentation to the club. The following repeaters were used for handling Italian earthquake traffic: WR2ADB WR2AHD and WR2ANF. Traffic: (Dec.) W2RQ 887, W2UEZ 632, AF2L 561, KF2T 500, AG2R 428, K2VX 414, WA2MVQ 309, W2CQB 299, W2XD 234, KB2HM 174, W2TCA 168, W2SQ 161, KA2GQQ 147, N2BNB 145, KA2CYZ 132, N2BOP 110, WA7DPK 95, WB2RMJ 81, W5DTR 76, KA2IFX 68, K2WM 64, N2XJ 60, W2ZEP 44, KA2HNQ 42, N2SU 37, WA2CLP 34, WA2MIF 34, WB2KLF 32, WB2GHN 26, W2CC 24, W2UH 21, WB2AIU 8, N2BC 7, W2NKD 6. (Nov.) W2CQB 211, WB2GHN 12.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NM: WBØAVW WØYLS WDØHND. The Iowa Traffic and Emergency Net (ITEN) has been started and will combine NTS traffic with ARES Bulletins on Sunday at 2200Z on 3970. WØYLS will be NM. Appreciate the hospitality of the CIRAS and the North Iowa Club upon my visit. The Eastern Iowa ATV Assn has been formed to deal with ATV and SSTV. Contact WBØQCD. Activity on ATV in Cedar Rapids and Muscatine. Congrats to KBØTI who has started with an Advanced. KFØR has weekly schedule with her cousin DA1EY. December has shown great volume of traffic, good work. WAØAUX with another BPL. KØGP add to DTRN roster. EIDXA: WØEJ, pres.; ADØF, vice pres. Hats off to upgrades NØAQE KFØZ KDØA KAØEIY KAØDDY WØLJU and KAØGVT. WBØGGI doing a great job with repeater council. Keep monthly reports coming as well as newletters. Receiving new newsletters from the North Iowa and Davenport clubs. WBØWKQ gearing up for Color SSTV. Iowa was 100% in TEN and DTRN, very consistent rep. Send Net reports to STM. Good response from SEC/SCM newsletters.

Net	Freq.	UTC Days	QNI	QTC	Sess.
IOWA 75 M	3970	1830-2330 M-S	2478	244	54
TLCN	3560	0030-0400 Dy	424	213	62
ICN	3713	0100 M Th S	24	5	6

Traffic: (Dec.) WAØAUX 789, WØSS 274, WØYLS 198, KØCY 155, AEØR 154, KAØX 122, WBØUPF 113, NØSM 92, KØGP 82, WBØAVW 38, WØRPK 25, WDØCON 20, KØJGI 16, WBØQAM 16, WDØHND 10. (Nov.) KØJGI 8.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØOYH phone; WØFT cw. The number of traffic handlers seem to be getting smaller, at least the number reporting each month. Tragedy could strike any where and at any time. Let us all be prepared to know how to represent our hobby well by being able to handle third party traffic if needed. Do join a section net and send us a report each month. Clubs holding elections and results follows: Jayhawk ARS — WBØKIA, pres.; WBØZON, vice pres.; KØTHP, secy.; KØBXF, treas.; WDØGPR WBØIBZ, bd mem. Kans. Nebr. ARC: KAØALB, pres.; WØBBM, vice pres.; WØDSY, secy.; WØWXY, treas. Blue Valley Rptr Assn: WBØYUV, pres.; WØFDJ, vice pres.; KØAOQ, secy.; WDØHOE, treas. Net reports: KWN QNI 940, QTC 595; OKS QNI 322, QTC 229; KSBN QNI 1329, QTC 264; KPN QNI 318, QTC 54; CSTN QNI 1552, QTC 175. WØPB off air due to rig troubles. WØAM having tower problems again — cracks in factory welds at the top no less. Going to attempt welding without taking it down. It is close to heaven you know. HI. NØLL reporting great 6-mtr conditions during November, due to the F2 propagation at the peak of the sunspot cycle. Larry now

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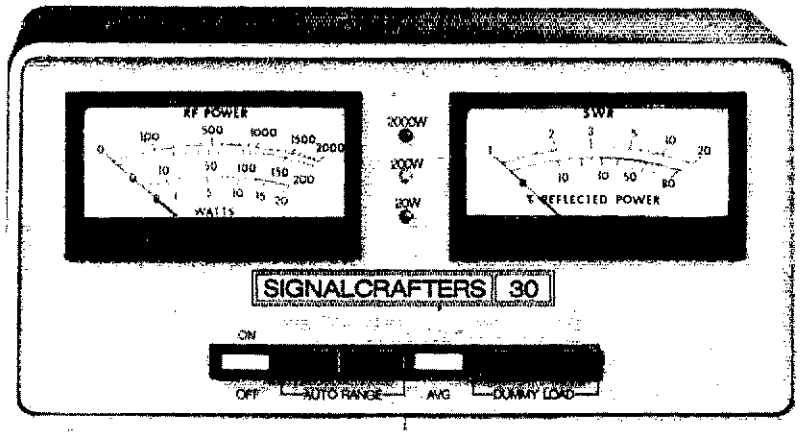

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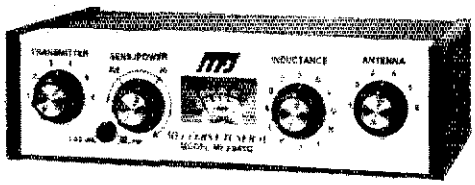

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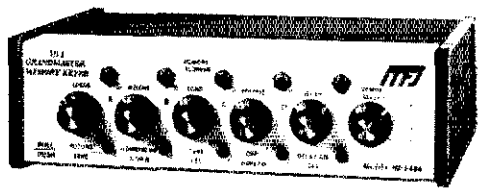

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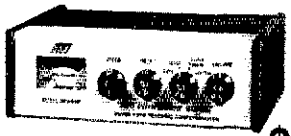

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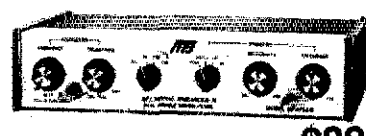

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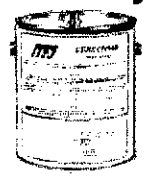

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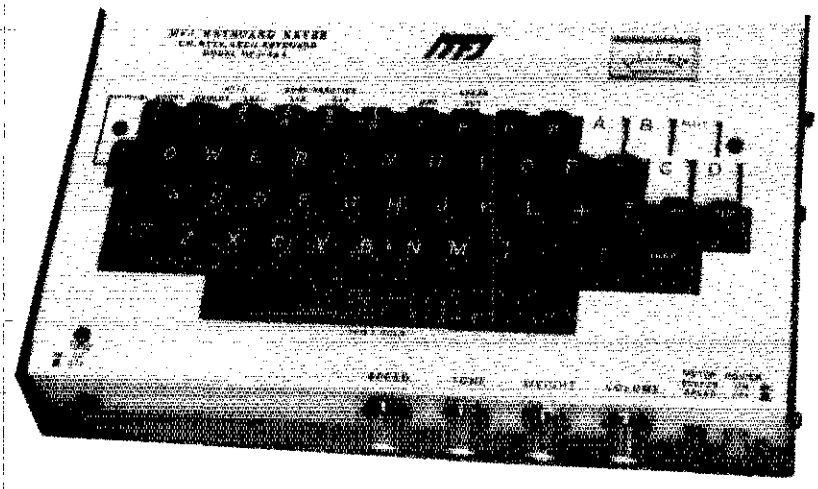
- **Add shipping & handling charges in amounts shown in parentheses**

Write for FREE catalog, over 60 products

MFJ ENTERPRISES INCORPORATED
Box 494; Mississippi State, MS 39762



MFJ Super Keyboard

For $279.95 you get: CW, Baudot, ASCII, buffer, programmable and automatic messages. Morse code practice, full featured keyer, human engineering.

Sending CW has always been a task, especially when you get a little tired. Electronic keyers help, but it's still too much work.

Now MFJ has a Super Keyboard that makes sending perfect CW effortless. It also sends Baudot RTTY and ASCII.

"Big deal" you say. "What's so special about that. There are lots of keyboards." Yes, but this one is different.

HUMAN ENGINEERED

A lot of thought has gone into human engineering the MFJ-494 Super Keyboard.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings.

A meter gives continuous readout of buffer memory and speed. Two characters before full, the meter lights up red and the sidetone changes pitch.

PROGRAMMABLE, AUTOMATIC MESSAGES

Four automatic messages and two programmable message memories (A and B) are provided. Messages A and B can be a total of 30 characters. B starts where A ends.

When recalled, each message takes only one character of the buffer. They may be chained and/or repeated via the buffer.

"Well," you say, "that sure is not much memory." But it's more than it seems because of the built-in automatic messages.

For example, type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A). Press twice to send twice, etc.

The other automatic messages work the same way: CQ TEST DE (message A), DE (message A), QRZ (message A).

Special keys for KN, SK, BT, AS, AA, and AR.

TEXT BUFFER

The 50 character text buffer sends smooth perfect code even if you "hunt and peck."

Since each automatic or programmable message takes only one buffer character, this gives a far larger effective buffer.

You can preload a message into the buffer. Then when you are ready to transmit press the control key.

You can hold the buffer by pressing the shift key and space bar.

With the buffer in hold, you can send a comment with an external paddle as a keyer. To resume sending buffer, press the control key.

Simply backspace to delete errors.

RTTY: BAUDOT, ASCII

5 level Baudot is transmitted at 60 WPM. RTTY and CW ID are provided via message A.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. After 70 characters the function is initiated without a space. This gives unbroken words at the receiving end and frees you from sending the carriage return.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear any garbles in reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable list. With answer list.

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic only or alphanumeric plus punctuation. Pause function lets you stop and then resume.

IT'S A KEYER, TOO

Plug in a paddle to use it as a deluxe full feature keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MORE FEATURES

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300 V, 10 ma. Max, +300 V, 100 ma. Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded, RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"D x 7"W x 1¼"H (front) x 3½"H (back).

9-12 VDC or 110 VAC with optional adapter.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+ $3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300 V, 60 ma. loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+ $3).

BENCHER IAMBIC PADDLE. $42.95 (+ $4).

110 VAC ADAPTER. $7.95 (+ $3).

A PERSONAL TEST

Give the MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC or mail check or money order for **$279.95** for MFJ-494 Super Keyboard, **$39.95** for MFJ-53 AFSK module, **$29.95** for the MFJ-54 loop keying module, **$42.95** for Bencher Paddle, and **$7.95** for the 110 VAC adapter. Include $5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today.

TO ORDER OR FOR YOUR NEAREST DEALER
CALL TOLL FREE 800-647-1800

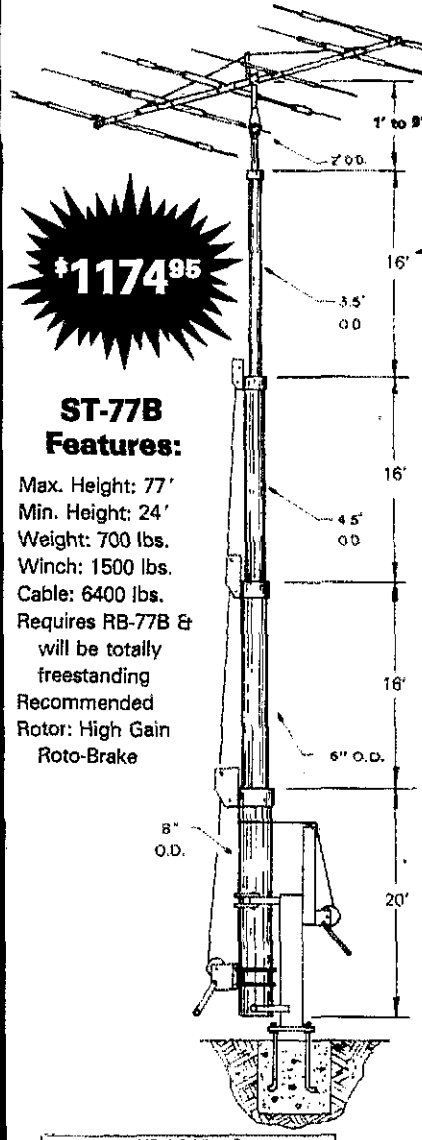
Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

Write for FREE catalog, over 60 products

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

WILSON SYSTEMS TOWERS

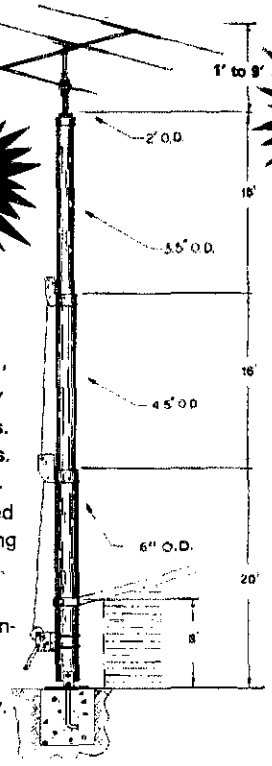
— FACTORY DIRECT —



$1174.95

ST-77B Features:

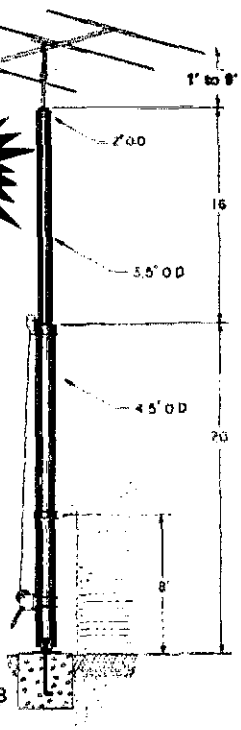
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding
Recommended Rotor: High Gain Roto-Brake



$674.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



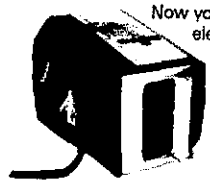
$409.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	16	Square Footage Based on 50 MPH Wind
	77	10	
MT-61B	53	16	
	61	12	
TT-45B	37	18	
	45	12	

NEW! Wilson Electric Winch



Now you can raise and lower your Wilson Tower electrically. The electric winch will replace the hand-operated winch. Available for use on the TT-45, MT-61 and ST-77 towers.

EW-45 (TT-45)
EW-61 (MT-61)
EW-77 (ST-77)
$249.95

Remote Switch $24.95

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
RB-61B	3' x 3'	5½'
ST-77B	See Below	
RB-77B	3½' x 3½'	6'

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3½"-.095; 4½" & 6"-.125; 8" -.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

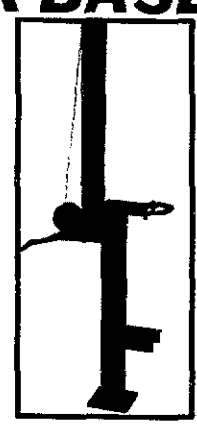
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

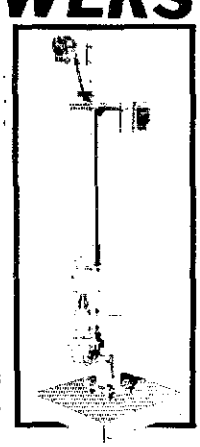
FB-45B.. 112 lbs... $209.95
FB-61B.. 169 lbs... $299.95

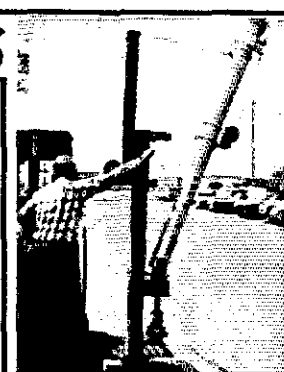


ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B.. 144 lbs... $289.95
RB-61B.. 229 lbs... $379.95
RB-77B.. 300 lbs... $569.95





Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

ORDER FACTORY DIRECT 1-800-634-6898

Prices Effective 3-1-81 thru 3-31-81
Specifications Subject to Change Without Notice

WSI WILSON SYSTEMS, INC.
4286 S. Polaris Ave., Las Vegas, Nevada 89103

WILSON SYSTEMS, INC. MULTIBAND ANTENNAS

WV-1A $64.95

FACTORY DIRECT

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

NOTE: Radials are required for peak operation. (See GR-1 below)

SPECIFICATIONS

- 19′ total height
- Self supporting—no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

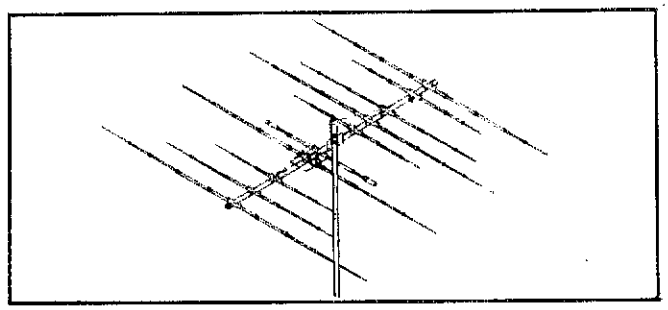
GR-1 $14.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150′ of 7/14 stranded aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

33-6 MK $64.95

Now you can have the capabilities of 40-meter operation on the SYSTEM 36 and SYSTEM 33. Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line. The 33-6 MK adds approximately 15′ to the driven element of your tri-bander, increasing the tuning radius by 5 to 6 feet. This addition will offer an effective rotatable dipole at the same height of your beam.

SY-40 $349.95



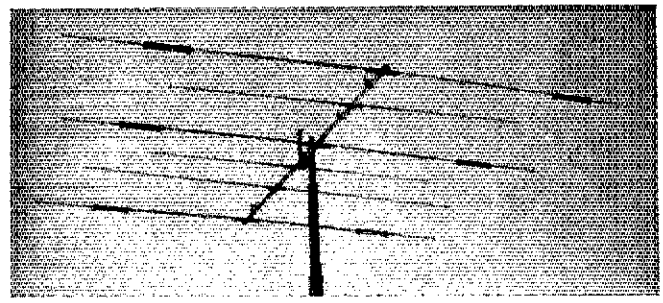
★ 3 MONOBANDERS on 1 Boom
- 4 elements on 20 mtrs FULL SIZE
- 4 elements on 15 mtrs
- 5 elements on 10 mtrs

The System 40 is the answer to the DXer who does not have space to stack monobanders yet wants the advantages they offer. Through the use of our split beta matching method, only one feed line is required and complete coverage of both the phone and cw bands are available with only one setting.

SPECIFICATIONS

Max. Pwr. Input.....Legal Limit	Matching Method.....Split Beta	Surface Area.....12.1 sq.ft.
VSWR @ Res.....1.2:1	F/B Ratio.....Call Factory	Wind Loading @ 80 mph.....309 lbs.
Impedance.....50 ohm	Boom.....2" x 26'	Assem. Weight.....75 lbs.
Feed Method.....Balun Supplied	Longest Element.....36'	Shipping Weight.....97 lbs.
Gain (dBd).....Call Factory	Turning Radius.....22'6"	

SY-36 $209.95

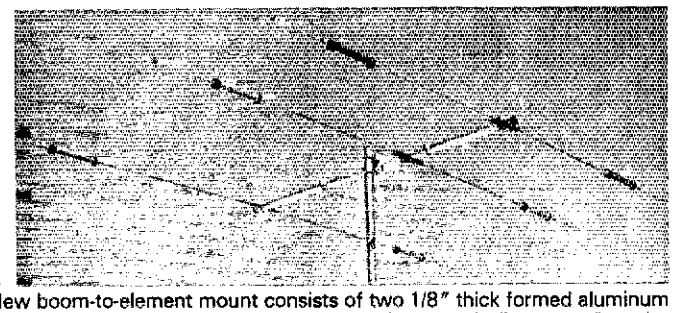


A trap loaded antenna that performs like a mono-bander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weatherproof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz.....14-21-28	Boom (O.D. x Length).....2" x 24'2½"	Wind Loading @ 80 mph.....215 lbs.
Maximum Power Input.....Legal Limit	Number of Elements.....6	Maximum Wind Survival.....100 mph
Gain (dBd).....Call Factory	Longest Element.....29'6⅛"	Feed Method.....Coaxial Balun (Supplied)
VSWR @ Resonance.....1.3:1	Turning Radius.....18'6"	
Impedance.....50 ohm	Maximum Mast Diameter.....2"	Assembled Weight (approx).....53 lbs.
F/B Ratio.....Call Factory	Surface Area.....8.6 sq. ft.	Shipping Weight (approx.).....62 lbs.

SY-33 $159.95



Capable of handling the Legal Limit, the SYSTEM 33 is the finest compact tribander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the SYSTEM 33. New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q Traps in the SYSTEM 33 makes it a high performance tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the SYSTEM 33 quick and simple.

SPECIFICATIONS

Band MHz.....14-21-28	Boom (O.D. x Length).....2" x 14'4"	Wind Loading @ 80 mph.....114 lbs.
Maximum Power Input.....Legal Limit	Number of Elements.....3	Assembled Weight (approx).....37 lbs.
Gain (dBd).....Call Factory	Longest Element.....27'4"	Shipping Weight (approx).....42 lbs.
VSWR at Resonance.....1.3:1	Turning Radius.....15'9"	Direct 52 ohm feed.....No Balun Required
Impedance.....50 ohm	Maximum Mast Diameter.....2" O.D.	Maximum Wind Survival.....100 mph
F/B Ratio.....Call Factory	Surface Area.....5.7 sq. ft.	

ORDER FACTORY DIRECT 1-800-634-6898

Prices Effective 3-1-81 thru 3-31-81

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

has WAS on 6 mtrs. WØKL in hospital at the time of this report - flu or worse. Traffic: WØAM 673, NØAOL 309, WØOYH 231, WDØACG 164, WBØYLP 163, WØHI 127, WØFIR 104, WØKL 95, WØFT 90, KØBXF 52, WØCHJ 43, WØNYG 35, KØYTA 32, WØASY 31, WØFDJ 20, WØRBO 11, NØOAG 1.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst SCM: Joe Flowers, WØOTF. Congratulations to the following upgrades: Tech — KAØISM WAØRMX; General — KAØAVJ KAØHKL WDØGGF; Extra — WBØCJB WD4SNB and WAØWRC. 50 people attended the Christmas party thrown by the Eastern Ozark Amateur Radio Club.

Net	QNI	QTC
ACE	40	0
HBN	366	61
MOSSBN	721	155

New officers for the Ozark Amateur Radio Society are: WBØOQV, pres.; WBØVXV, vice pres.; WDØCHZ, treas. Officers for the PHD ARC are: WBØOCW, pres.; KØMAT, vice pres.; AKØH, secy. Officers for the HARC are: KØVBU, pres.; KØRWL, vice pres.; WBØUZJ, secy.; WBØYBC, treas. New officers for the Kansas City DX Club are: KBØU, pres.; KBØX, vice pres.; AKØA, secy/treas. Now that everyone has held elections and the new officers have taken over, I am expecting an increase in news. The transition is complete and everybody will be getting down to business. Don't forget to let me know what you're up to. Traffic: WØBMA 996, KØONK 728, WØOUD 513, KØSI 268, KØBM 199, WØBV 172, KØPCK 83, WØOTF 73, WDØGCZ 57, KAØP 48, KØRWL 6.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: WAØASM. Congrats to AFØY new Extra and WØHTA for Certificate of Merit Award, 26 yrs as NC. Congrats to WDØCID WBØSXM WDØBQG KØBRS WØEUT WØFQB on FB job with Dec. QTC. HAM HUM, Nov, 1980, nice tribute to DX QSL Bureau. Some new nets listed:

Net	Freq.	UTC	NM	QNI	QTC
Chey Co., 2-Mtr.	25/85	0330 M	WDØBPA	39	0
Ne 40-Mtr.	7234	1900 Dy	WDØAHV	639	60
Ne 160-Mtr.	1995	0130 Dy	WBØEVS	717	1
Pawnee 2-Mtr	04/64	1230 M-F	AFØN	143	0
Mid Ne ARES	34/94	0100 Dy	WBØSIN	163	2

Traffic: WDØCID 397, WBØSXM 338, WDØBQG 293, KØBRS 255, WØFQB 116, WØEUT 114, KAØBCB 37, WAØOOX 32, WBØSXN 27, WAØPCC 22, WØZNI 22, WAØQEX 15, WAØLOY 14, WØNIK 12, WBØGWR 10, WDØHOP 10, WAØWRI 8, KØODF 6, NØAJQ 5, WØWZR 4, WØYFR 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1ATU.

Net-NM	Freq. EST	Sess.	QTC	QNI
CN-K1EIR	3640 1900 + 2200	60	425	355
CPN-K1EIC	3965 1800/1000 Su	31	184	317
NENN-WB1CPF	3720 1815			
Netmeg-WA1ELA	28/88 2130	31	144	393
RTN-WB1CPF	13/73 2100 M-Sa	12	33	78
WESCON-WB2PJU	78/18 2030	31	168	411

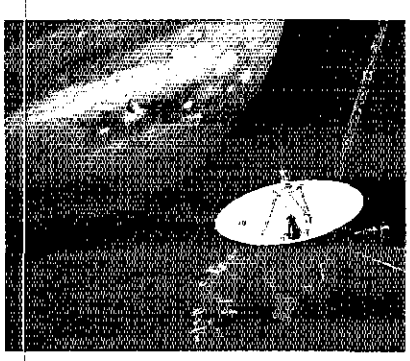
Hi QNI CN: K1EIC WB1ESJ WB2PJU. CPN: K1AOE. Hi QTC Netmeg: W1EFW. Congratulations to WB1CPF and W1EFW for BPLs. New appointees: WB1GIL EC Windsor, WB1CPF NM RTN, K1EFI OBS, K1KI OO. RASON Traffic Net (RTN) expanded to a six day schedule. W1SY let state ARES members participating in the "Mass Casualty Exercise" staged by the N. Central CT Emergency Medical Services Council to simulate and test the Council's communications system. WB3GPR operated from ZF-Land during holidays. 16 students completed the Novice license course given by the Greater Fairfield ARA. N1ABY is loud on 40 meters with a wire beam antenna. New officers Stamford ARA: W1GOZ, pres.; K1ADA, vice pres.; W1ICH, secy.; WA1LOR, treas.; WA1FVZ, trustee. Wallingford ARS: WA1WVA, pres.; WB1AFV, vice pres.; WA1WOA, secy.; KA1FEM, treas. K1OQG got new skyhook. WA1KRX upgraded to Advanced and KA1BDI became KA1H. Radio and romance don't mix...first you hide your two-meter transceiver in the trunk along with your mag-mount antenna so that she won't think you are a c.b. nut...next you miss your Monday night net control station assignment because you are on the phone with her...Abu All is loud on ten meters, but you haven't turned on the rig in weeks...you stop attending the Friday night club meetings and have a hard time even remembering the club's name... the ham magazines are piling up unread, QSLs are unanswered...! Traffic: W1EFW 565, WB1CPF 556, WB2PJU 259, KA1DZV 238, K1GF 225, WB1ESJ 173, WB1DGR 137, W1XX 127, W1DFT 108, W1BDN 102, KA1BHT 92, WB1GXZ 71, K1XA 69, WB1CRH 64, K1AQE 57, WA1WQG 44, KA1KD 41, KA1KP 40, K1CE 37, W1GVT 28, W1ICF 27, WA1LOU 27, K1EUW 14, W1KV 14, W1CUH 4, K1OQG 2, W1QV 1.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	321	474
EMRIPN	KA1BJY	3.898	1730/Dy	369	479
EM2MN	KA1CGP	90/30	2000/MWF	113	89
EM2MN	KA1CGP	145.8	2000/TTh	—	—
NEEPN	K1BZD	3.945	0830/Su	61	30
HHTN	K1BSO	04/64	2230/Dy	671	489
EMRISS	WB1DHW	3.715	2030/Dy	107	58

Every December is a very heavy month for traffic and 1980 was no exception. Some individuals handled more traffic themselves in December than is handled in slower months for the entire section. It is no coincidence that these folks are either past or present net managers. In short they're interested in traffic and are making sure that the work gets done (they also enjoy it). So hats off to everyone that worked the traffic booths at the malls and saw to it that the tfc into and out of EMASS was handled efficiently in December. I'm still receiving news clippings about EMASS hams who helped during the Italian quake. In more than one case ham radio was the only successful mode of communication with the area so good mileage was made PR-wise. WB1EZT is organizing a large communications effort for a parade in Brockton in May. Contact him for more details. WA1IDA has been working with WBZ-TV to reinforce ham radio as an emergency aid to the station. Next Framingham flea market will be on April 12th in Framingham. Chelmsford Club has started another Novice class. Billerica Club's new president, W4HMV, gave a talk on recent visit to Chelmsford (England) where he met with some of the hams in the weekly sked between the two Chelmsford's. New Capeway officers are group manager, WA1OWQ; Asst. group manager, KA1Q; Treas.; KA1ACL; Sec Rec., W1TPB; Sec corr., K1LOE. Traffic: WB1DHW 1729, WA1TBY 1551, KA1CGP

SSTV
now offers you more than ever before!

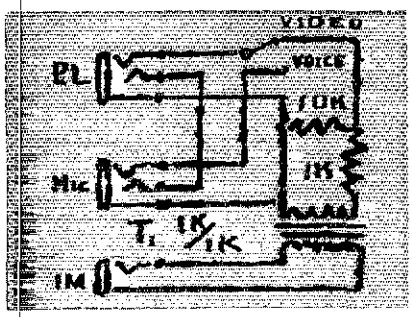


Pictures from Mars, Saturn and Jupiter.

Within seconds after these photographs were received on Earth from Voyager I and II, SSTV'ers all over the world were viewing and recording them on their own SSTV sets. Another pass-by Saturn is scheduled for mid 1981 by Voyager II. As space exploration continues to expand, this phase of SSTV activity will become increasingly exciting.

Broadcast pictures of your home brew activities.

Ever try to describe a schematic or new circuit design by voice. With SSTV you can transmit pictures of the designs and changes you are making on your station and equipment, and they can be photographed on the receiving end. It's an ideal communication system for experienced hams involved in technical experimentation.



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2. New SSTV frequency allocations may be opening soon.
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5. Contacts are easy to make. 13,000 stations in operation. Tune in to 14.23 MHz 2 PM Eastern time and you'll see for yourself.
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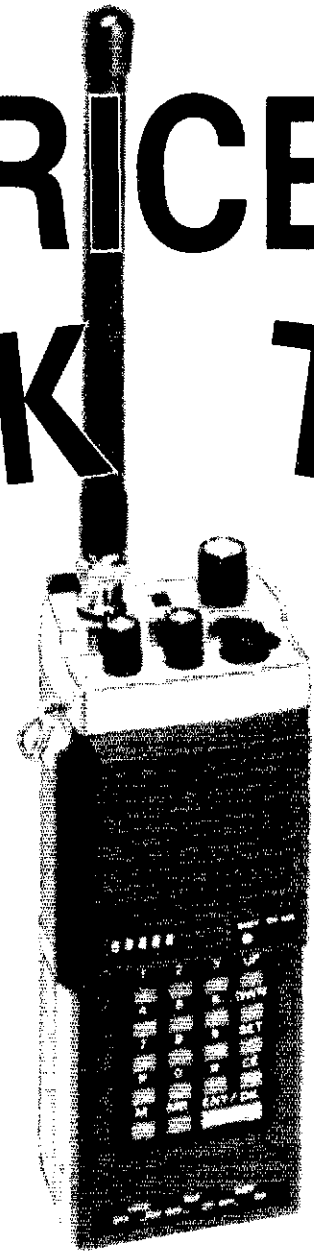

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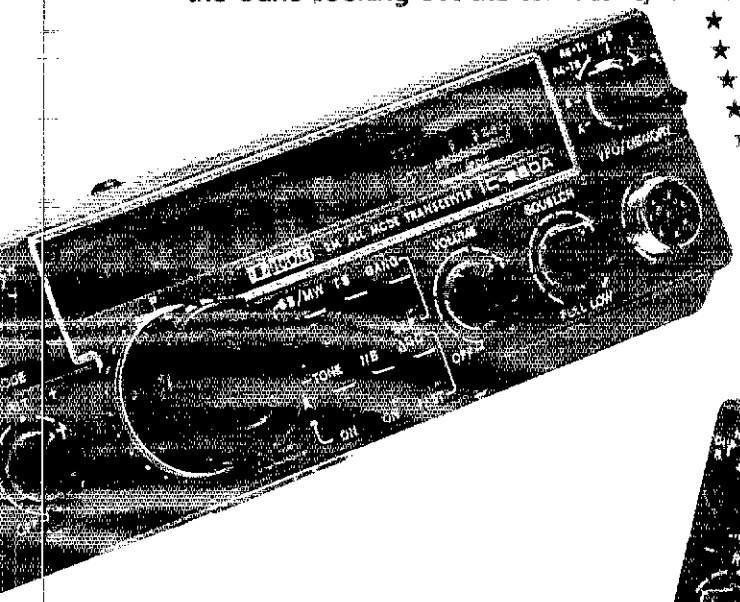

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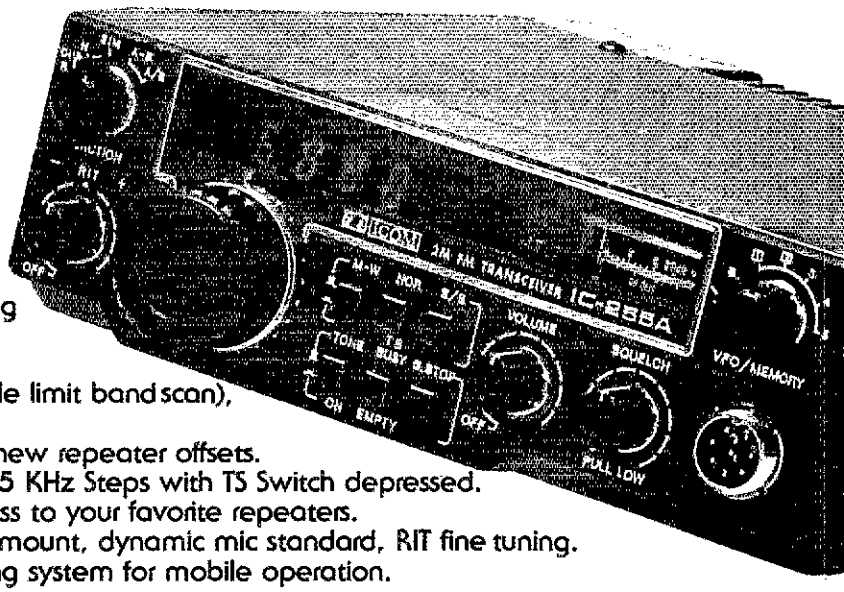

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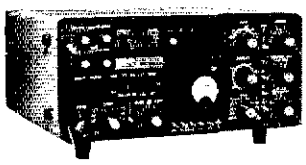

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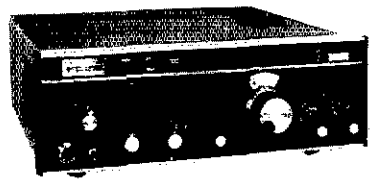
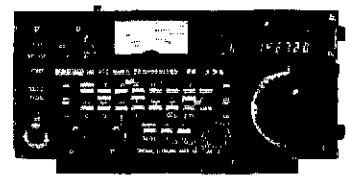
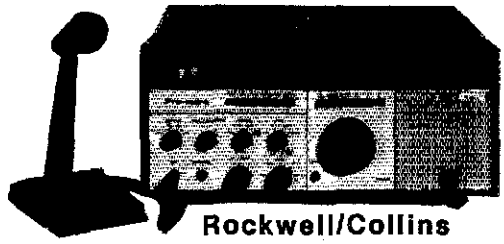
FT-101ZD, FT-107M, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM



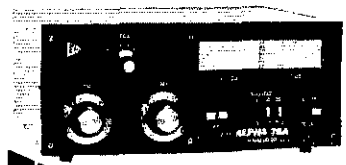
DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier



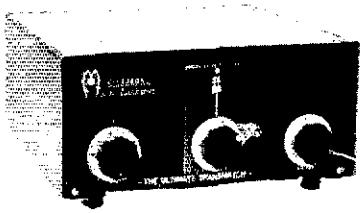
ICOM Model -720



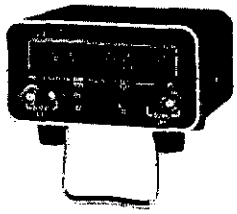
Rockwell/Collins
KWM-380



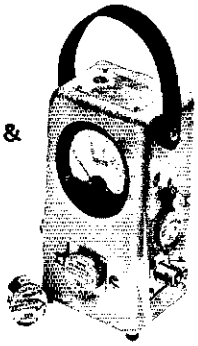
ETO Alpha 76PA
2 + KW PEP/3-8874 FINALS



Murch Model UT2000B



TRIONYX Model TR-1000
Digital Frequency
Counter 0-600 MHz



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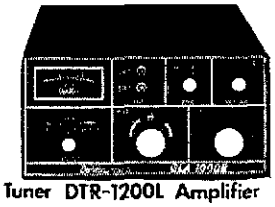

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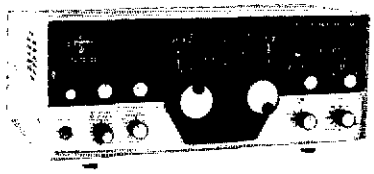
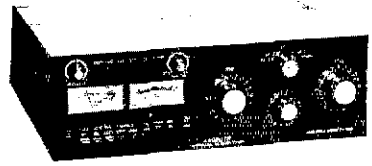


CUBIC 103 Cubic 102, & 100MX



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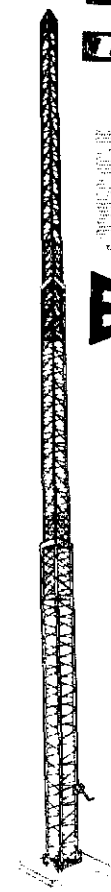

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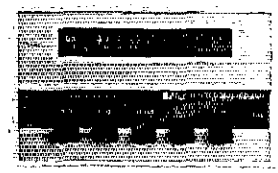
TOWERS



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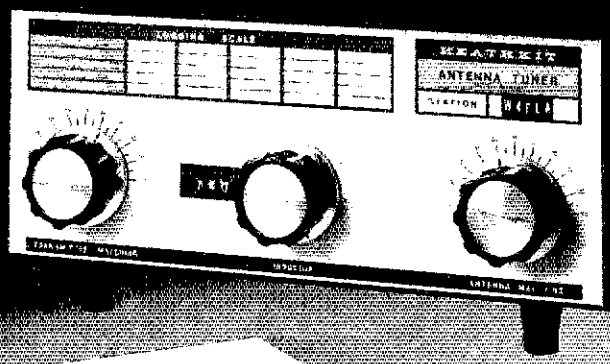

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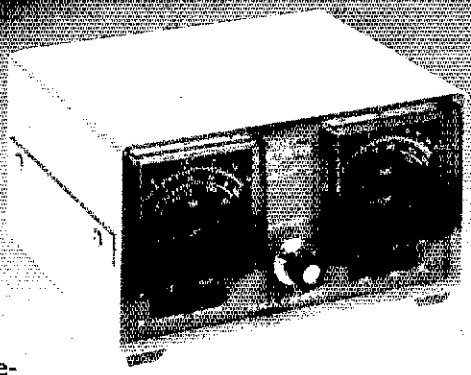

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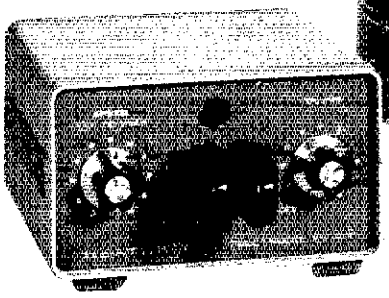

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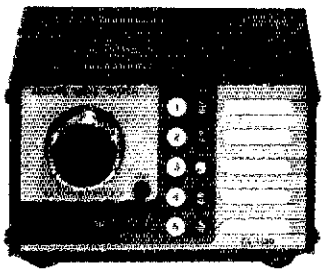

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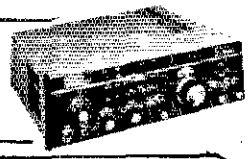

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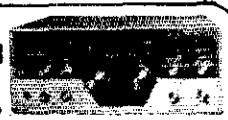

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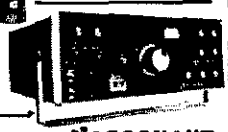

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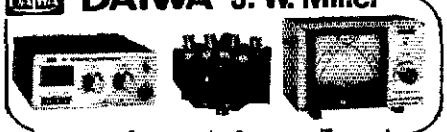

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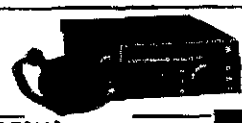

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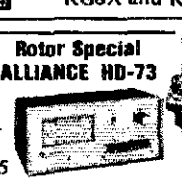

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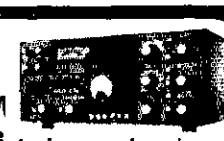

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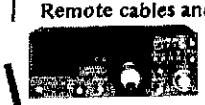

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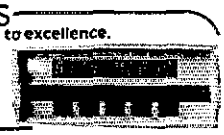

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The purchaser is responsible for the transportation costs of returning the equipment to and from Encomm, Inc. or its designated repair center for purposes of obtaining the warranty service described in this form.

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FOR A PERIOD OF TWO (2) YEARS FROM DATE OF PURCHASE THE ORIGINAL PURCHASER MAY OBTAIN EXTENDED SERVICE ON ALL THE SEMICONDUCTOR COMPONENTS USED IN THIS UNIT NOT INCLUDING FINAL TRANSISTORS. FAILURES CAUSED BY IMPROPER INSTALLATION, STATIC DISCHARGE, ABUSE, OR UNAUTHORIZED ALIGNMENT ARE NOT INCLUDED. MAXIMUM CHARGE FOR THIS SERVICE WILL BE ONE HOUR AT THE THEN CURRENT ENCOMM, INC. SHOP RATE.

The above warranty does not include incidental or consequential damages and Encomm, Inc. disclaims any liability for any such damages. All implied warranties, if any, are limited in duration to the above-stated 90 day warranty period. Some states do not allow the exclusion of limitation on incidental or consequential damages or on how long an implied warranty lasts, so the above limitations may not apply to you.

The completion and return of the enclosed registration form is a condition precedent to the warranty coverage and the above undertaking to repair. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

The Santec HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

Encomm, Inc.
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Plano, TX 75074

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- PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL: Frequency is selected by buttons on the front panel or microphone.
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- INSTANT MEMORY 1 RECALL: By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
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- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
- GREEN FREQUENCY DISPLAY: Frequency numerals are green LEDs for superior visibility.
- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
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- OTHER FEATURES: Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
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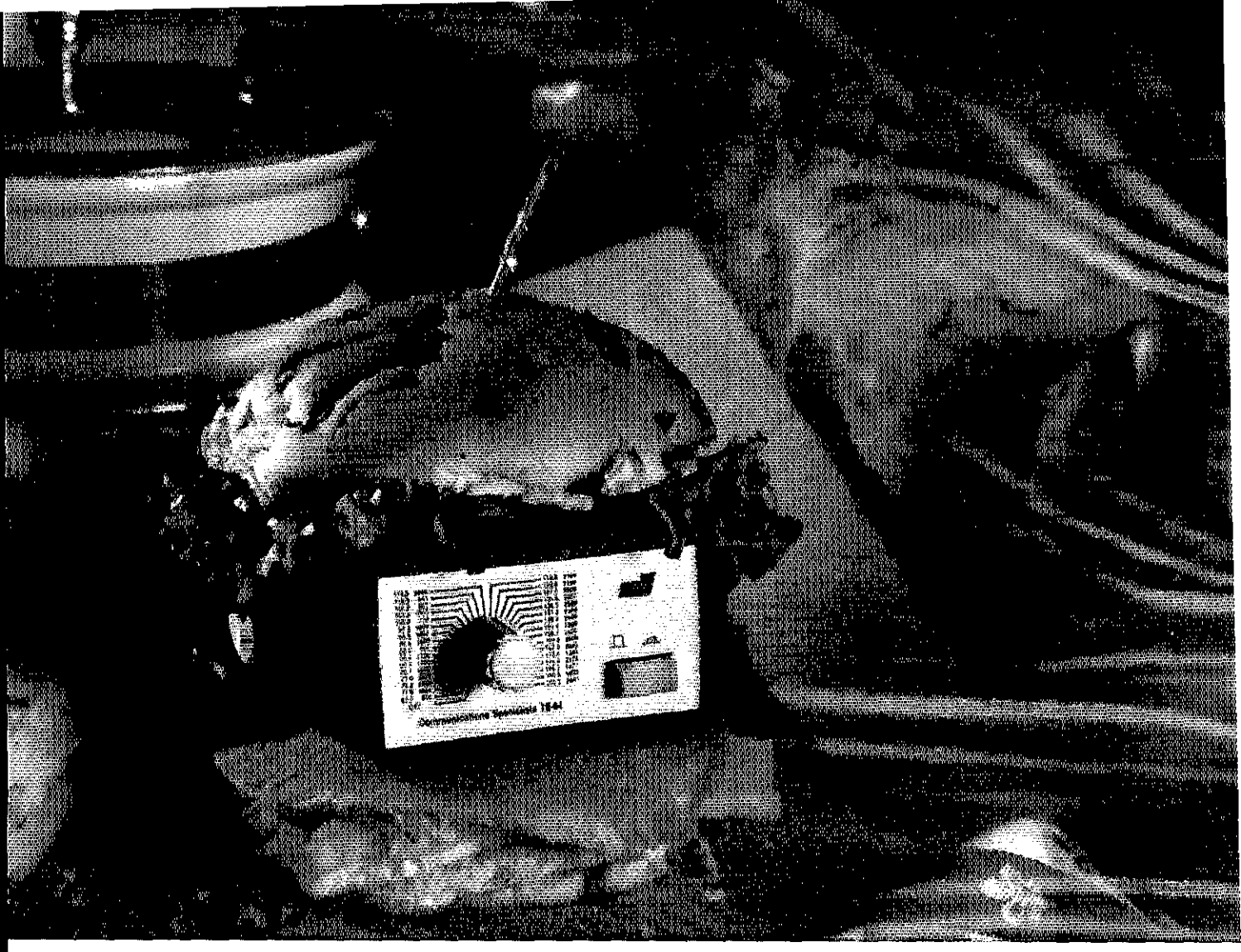

Food for thought.

Our new Universal Tone Encoder lends it's versatility to all tastes. The menu includes all CTCSS, as well as Burst Tones, Touch Tones, and Test Tones. No counter or test equipment required to set frequency-just dial it in. While traveling, use it on your Amateur transceiver to access tone operated systems, or in your service van to check out your customers re-peaters; also, as a piece of test equipment to modulate your Service Monitor or signal generator. It can even operate off an internal nine volt battery, and is available for one day delivery, backed by our one year warranty.

- All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- Immune to RF
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- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
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- Off position for no tone output.
- Reverse polarity protection built-in.

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67.0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 1Z	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

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2175	941 1633	1750	2000	2300	2550
2805		1800	2100	2350	

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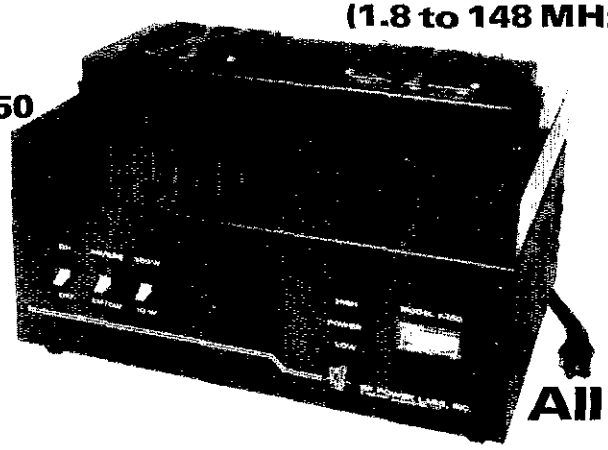

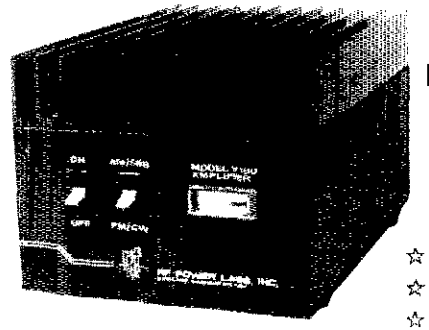

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MODEL	FREQUENCY	INPUT	OUTPUT	SIZE WxDxH	WEIGHT	FAN KIT REQUIRED	PRICE
**C500X	2-22MHz	15-40W	500W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	$1395.00
A1000	160-15 Meter	50-100W	600W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	1395.00
**A1000X	160-10 Meter	15-40W	600W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	1395.00
V76	50-54MHz	8-15W	100-120W	216x330x178mm	11.7 kg (26 lbs)	No	399.00
V360	50-54MHz	5-10W	400-450W	432x330x203mm	23.4 kg (52 lbs)	Yes	1085.00
V70	144-148MHz	10-15W	75-90W	216x330x178mm	11.7 kg (26 lbs)	No	349.00
V71	144-148MHz	1-3W	75-90W	216x330x178mm	11.7 kg (26 lbs)	No	399.00
V180	144-148MHz	5-15W	170-200W	216x330x178mm	13.5 kg (30 lbs)	CW & FM	599.00
V350	144-148MHz	10-20W	350-400W	432x330x203mm	23.4 kg (52 lbs)	Yes	1085.00
F110	Fan Kit, 115VAC			135x135x50mm	1 kg (2.2 lbs)	—	$ 39.00
F220	Fan Kit, 230VAC			135x135x50mm	1 kg (2.2 lbs)	—	39.00
*F135	Fan Kit, 115VAC			381x140x89mm	3.2 kg (7 lbs)	—	75.00
*F235	Fan Kit, 230VAC			381x140x89mm	3.2 kg (7 lbs)	—	75.00
RM-1	19 Inch Rack Adaptor			483x3x178mm	1 kg (2.2 lbs)		29.00
*RM-2	19 Inch Rack Adaptor			197x32x28mm	.5 kg (1.1 lbs)	—	19.00

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666, KA1BJY 611, WB1EZT 520, KA1CMR 520, K1GN 333, K1BZD 247, K1BSO 240, KA1EMQ 139, WA1DXT 127, N1ADY 116, N8TM 104, W1CE 83, W1DMH 71, W1ATX 54, W1EGE 52, K1UR 50, W1MJ 47, K1LCQ 33, WA1FNM 20, W1XA 19, KA1R 17, K9HI 16, K1LWI 3, WB7TPY 3.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1KX. SEC: KL7IJG. On Jan. 24 your SCM will lead a group from Yankee RC in providing comm for a 700-mile road rally (ME, NH, VT). PAWA elected W1CLL, pres.; N1SD, vice pres.; KA1FI, secy.; WB1GDZ, treas.; W1GX ch op. Editors W1MBR WA1TNJ K1ND (13/73 rptr). UofM ARC active with new Novices KA1GFD KA1GFM KA1GGV and supports club stn WA1ZBH. Gorham Area RC upgrading membership with seminars on state of the art. PSHR: AK1W 104, W1RWG 100, WA1YNZ 78, AF1L 74. Sessions/QNS/QTC: SGN 27/1197/278; PTN 31/392/256; BN 27/1028/10; MSN 14/87/25; CMEN 14/197/20; SPSN 13/132/36; AEN RACES 4/61/9. Traffic: W1KX 269, WB1BYR 226, W1BJ 207, W1RWG 117, AF1L 109, AK1W 104, W1HDC 99, N5YX/1 84, WA1JZP 82, KA1AYC 81, W1JTH 57, KA1EKT 49, KA1CNG 39, WA1ZJL 37, K1TVT 28, W1OTQ 26, WA1YNZ 23, W1AHM 18, WA1JHT 17, KA1AIF 16, KA1ENI 16, W1BMX 15, W1GKJ 14, K1BUC 11, WA1MUX 10, KA1CFU 9, KL7IJG 7, WA1JCN 4.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — NMs: N1NH & AK1E. Cheer up, spring is right around the corner. W1BYS is enjoying sunny, warm Florida. K1JUL continues to edit the excellent Nashua Club paper. N1AIX WB2QLL W1TN & WB1BRE provided communications for the Veterans Day Parade. W1JB skeds W1EAW/4 in Florida. W1EJ has new IC502A, and waiting SOMC WAC. The NHN had 186 check-ins & 209 traffic. EC reports received from KB1A & W1FYR. New DXCC is KA1BXA, editor of GBARA paper. W1WS WB1HJO & KA1BXA on 2-M SSTV. My thanks to all you folks handling traffic. New Hampshire is now up there with the best. Congrats to state trooper, WA1VIB, featured in newspaper article Law's Eye in the Sky. The GSFM Net had 585 check-ins & 258 traffic. New Amherst Club officers: KA1ACC, pres.; W1FBX, vice pres.; W1PH, secy. Traffic: (Dec) AK1E 389, N1NH 289, W1TN 247, W1MHX 134, KB1A 102, KA1CXP 119, N1ALM 93, K1OSM 78, KA1BBI 45, W1CUE 43, WA1PEL 34, W1ALE 30, KA1ILZ 27, W1JB 18, KA1CJI 13, N1BAP 5, K1NH 4, W1NH 4. (Nov) W1TN 151, K1OSM 48.

RHODE ISLAND: SCM, J. Titterington, W1EOF — Big news of month — Italian Earthquake coverage by RTTY via W1YNE and a R.I.-E. Mass. group consisting of WA1KKP N1NA K1GK KA1DYD WB1CUS K1BSO WA1YDU N1RI WA1USA KA1BAT WA1YVV N1ASR W1GO KA1ABI. EBAWA made a good showing in 160-mtr. contest. KA1EHR and WB1DXQ are new Generals. KA1EHY and KA1EHZ are new Technicians. WA1OSL in & out of hosp. W1JFF submits RIEM 2-mtr. tfc net report: sess. 23 QNI 244 Tfc. 83. Christmas tfc. reached a new high. Anyone with RTTY equipment invited to QNI NE Teletype Net on 3620 kHz, at 7:00 P.M. local time Mon.-Wed. & Fri. Traffic: (Dec.) W1YNE 737, W1EOF 671, KA1BTU 327, KA1FE 122, N1RI 31, AE1S 20. (Nov.) W1YNE 216.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. STM: WB1ABQ. KA1EAN reports working 45 states & 5 countries on 6 mtrs. since July; also W1CW 35 states, W1AIM & K1LPS 49 states. KA1BKQ in the wilds of Killington, no telephone, found a Husky dog. Contact on 75 with N1ARI, who through the dog tag info, contacted the vet & located the owner. K1LJL spoke at VT Section IEEE meeting in Waterbury on the AMSAT Communications Satellites (Oscar). W1PRE, Brattleboro, Silent Key Dec. 26. SBN 31/553/203; GMN 27/545/64; Carrier 27/391/38; VTN 31/119/57; RFD 4/70/28; VPN 4/69/5. VTN, 3614 1900 hours, slo-speed cw, welcomes all brass pounders, part time or full! Stations invited to contact SCM for various ARRL station appointments — full ARRL membership required. Traffic: WB1ABQ 172,K1BQB 91, N1ARI 77, W1RNA 52, AE1T 23, WA1YUH 3.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCMs: W1BVR K1BE. STM: W1TM. SEC: W1JP. NMs: W1MJE W1UPH W1UD. New OES: K1NWE W1JTL K1JHC W1YI WB1DBN. We applaud: W1YI's handling long lists of Italy earthquake casualties to local Red Cross via NE Teleprinter Net; WA1OPN for article in DIALOGUE on NTS message service; the Montachuset Club members keeping Santa in radio contact with children in Leominster, Fitchburg, Ayer hospitals, W1ZPB back from balmy San Fran. mid-winter safari to resume WMN and Academy skeds. W1BVR still troubled with bad sending arm but in process of repairs. W1DVW making slow but steady return to cw. Traffic total Dec over 3.2K with FB assist from local (ARES) nets. PSHR: WB1HIH 110, W1TM 81, K1JHC 98, WA1MJE 99. Traffic: (Dec.) W1TM 623, W1UD 565, K1SSH 501, WA1MJE 438, WB1HIH 217, K1JHC 190, K1IJV 142, K1NWE 98, W1KK 95, W1YI 87, WB1FXJ 47, WA1OPN 47. W1JP 38, W1EFC 36, W1ZPB 23, WA1YYW 22, W1BVR 17, K1BE 14, WA1DNB 11, WB1CWH 5, W1UPH 4. (Nov.) WA1MJE 539.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred Wegmer, KL7HFM — ASCM: AL7AC KL7IBG. STM: AL7O. SEC: KL7EWQ. Alaskan hams were busy with Christmas traffic, Santa should be grateful. Congrats to KL7M getting on the "Green Keys." Congrats are also in order to all the upgrades. KL7CUK and KL7CV are keeping daily skeds back to Alaska from their Florida retreat. KL7PJ and KL7MF back from their European jaunt and full of DX stories. WB4WBL is a very welcome newcomer. Congrats to KL7IEN on his very first BPL, keep up the good work. Fairbanks area has a new rag chew net called the MOTLEY Group, if you listen closely, you may hear them on 3949 kHz at 0700Z. Seattle's gain is definitely Alaska's loss as KL7IUI moves to the big city. Good luck, Seattlites watch for his DX-Hound (Butch) whom we hear has already passed 5 wpm. Traffic: KL7IEN 236, KL7JFT 88, KL7IYX 36, KL7HFM 20, AL7O 4.

IDAHO: SCM, Lem Allen, W7JMH — Club News: Elmore Cty ARC is looking for a 2-mtr freq. and a used repeater for the MT home area. Contact WB7QYU or WB7NSW. Many DX and East Coast stations worked on 6 mtrs. by KA7COI WB6LVR KA7COV. The Boise Club ran a "holiday crash Novice course" and reported better than 50% passed their code tests so far. Good luck on the exams, gang! The Treasure Valley Club held a very successful Christmas banquet in Fayette. About 60 of us and fun was had by all. Net reports:

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935 ssb	7 P.M. Dy	30	1416	61
CD	3990 ssb	8:10 A.M. M-F	23	638	26

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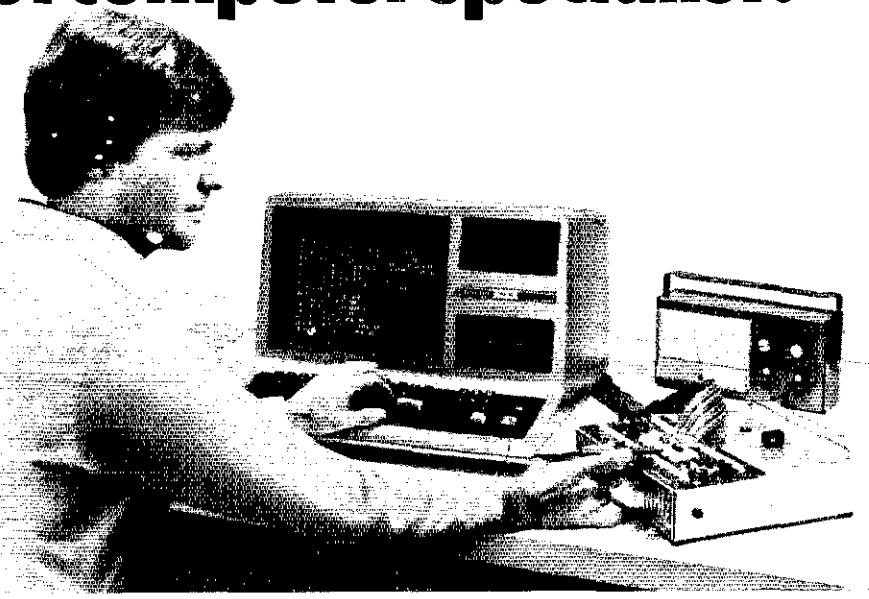

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Traffic: (Dec) W7GHT 444, K7JV 137, AC7P 110, W7JMH 41, W7GBO 6. (Nov) K7JV 84.

MONTANA: SCM, Robert Leo, W7LR — IMN: QNI 224, QTC 131. WB7BWZ, EC, Billings, met with Red Cross & Civil Defense. New Yellowstone ARC officers: KA7BNE, pres.; KB7KB, vice pres.; WB7TWG, sec./treas. Many license upgrades Extra K7LTV WA7OBH, Advanced N7AXR K7TIM WB7UKK WA7LSF, General WB7SWH. WA7OBH QRV Queen Mary W6RO. State RACES drill 11 April. QNI 194 for 40 meter daytime net. W7DB sent bulletins. WB7DZX on the Public Service Honor Roll again. WB7UTJ new Advanced. WB7DZX & KA7FVP issued new Libby area newletter: LARK. Hams there had 2-meter net go QRT, but meet for coffee instead. KA7BNO new General. 1981 NW ARRL division convention Seaside, Oregon, June 5, 6, 7 1981. Glacier-Waterton hamfest at Three Forks campground East Glacier — July 17, 18 19. W7TYN new ATH: Gen Del 1507 Bella Vista, Scappoose, OR 97056. MT RTTY net doing well on 3618 02Z 170 Hz shift 60 wpm 5 level. W7LR QSO A9XDD VP8SU. MTN: Nov QNI 815, QTC 85. MT Section Net going well on 7240 9:30 A.M. Sundays. Two very complete reports from WB7DZX & WA7PDC about ham public service efforts in the Lincoln County floods. Hams used 2 meters, 2-meter repeaters, and 75-meter ssb to augment and at times replace several different radio dispatch facilities, report on flood conditions, get info to county crews and others, etc. It was a job well done, and added a lot of support for ham radio. WB7UTJ sent in two newspaper articles about ham radio for more support for our hobby. Traffic: (Dec) WB7DZX 227, W7IXD 116, W7DEO 80, W7NEG 17, WB7UTJ 17, W7LBK 6, W7LR 6. (Nov) W7TGU 364, W7IXD 52.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7OLN. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	Mgr.
BSN	0145Z Dy	3908	893	135	K7WPC
OSN	0230/0600Z Dy	3587	468	487	KB7JW
WCN	0300Z Dy	3702	349	149	K7ZIG
OARES	0115Z Dy	3993.5	479	143	W7HLF
	0230Z Dy		92	20	
PTTN	0300Z Dy	146.76	556	137	W7LRB
PdxARES	0330Z Dy	147.32	499	35	K7WWR
LBLARES	0330Z Dy	146.79	879	19	WB7QOH
JCARES	0315Z Th-Sa	147.06	128	44	W7VSE
SO FM	0230Z Tu	146.64	131	2	W7FDU
MP ARES	0300Z Mo	146.85	No Rpt		WA7ZAF
	0300Z Th	147.02	No Rpt		

Thanks to all who supported my election as SCM. Keep activity reports coming to SCM. Jackson Co. ARES net will move 1 Jan to King Mtn 146.94 Rptr to include Douglas, Klamath, and Josephine Co. coverage. Net meets Wed/Fri at 1915 PST. Congrats to KA7HID and WB7PTZ for upgrade. New Novice in Sutherlin, KA7JFC. K7LIX/R now operational NE of Grants Pass with autopatch capabilities. OTVARC has grown by leaps and bounds from 28 to 1979 to 94 at present. '81 officers are WB7SIC, pres.; W7XI, vice pres.; WB7WHO, secy.; N7BIJ, treas. Good luck!! Traffic: W7VSE 908, KB7JW 457, W7LRB 388, W7LNE 173, KA7AOB 171, WA7LGN 152, WA7IHS 142, WB7OEx 98, WA7WBE 61, K7WWR 39, W7FDU 34, W7LT 20, W7TC 7.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX. SEC: WA7RWK. Nets Reporting: WARTS QNI 3310, QTC 478; WSN QNI 659, QTC 373; IETN QNI 235, QTC 163; NTN QNI 1359, QTC 152; PSTS QNI 189, QTC 151; EWTN QNI 90, QTC 80; NWSSBN QNI 725, QTC 36; SCARES QNI 123 QTC 1. We handled almost 5500 pieces of traffic. In addition many phone patches were made from Korea, one stn reported he had run 81 patches. A hearty thank you to all of you who take time to get involved. Effective this month the ORS is reinstated, I have plenty of openings for ORS and ORS II, if interested let me know and I'll send you an application. EC, K7RBT, reports that all Jefferson County Fire District buildings will be equipped with 2-mtr antennas, courtesy the Sheriff's Dept. Sorry to report K7NLT and K7UXN have become Silent Keys. New officers of West Seattle ARC are: KE7Z, Pres.; AI7L, Vice Pres.; AB7R, Treas.; W7CQB, Sec.; W7AUK W7HCH N7AIF WB7RCY W7WOG Trustees. ARRL has a new form (CD-20) for SCM/STM to register Nets. If yours is a Public Service net and I don't have the information, please send it to me a.s.a.p. W7UU airs Westlink Bitns at 5:45 P.M. on 3970 kHz on Mon, Tues, Fri. KB7G hopes he won the 10-mtr. Test (cw), also has 13 states on Oscar 8. New officers of North Seattle ARC are: W7GR, Pres.; K7KPC, Vice Pres.; W7GPS, Treas.; KA7APK, Sec. Radio Club of Tacoma's Loggers Bark reports K7ETU and K7QLC received 5BWAS in 1980. Clark Cty ARC stn W7AIA active over Xmas handling msgs for children in Barnes Hospital. Clallam Cty ARC's Boondocker reports W7KMG knocking off DX with new QRP rig. KA7DSB is new Special Events Chairman for RASC. W7AIB still enjoys checking into WSN and RN7 on occasions. N7CT's new trap inverted vee working well. Evergreen Amateur Radio Service (EARS) new officers are: WA7UDB, Pres.; W7TXS, Vice Pres.; WB7QVO, Sec.; WB7UGF, Treas.; K7RBT, Activities Coordinator. KA7IVQ involved in arranging TV coverage of Mike and Key Club Santa talks. Lower Columbia ARA 450 rptr about ready to go on the air. Mt. Baker ARC reports a successful auction. K7VNI conducting Advanced classes. Lower Columbia ARA General Classes were a success, 14 started the class and 6 upgraded before completing the course. K7ZBF has expanded his WX net (Bears Rptr 6 A.M. and 4:30 P.M.) to include TV coverage on KIRO. WA7RWK still looking for stations in remote areas to work with the ARES/NWS WX net. You don't have to join anything just be able to get the WX in your area to the net on 3910 kHz at 10 A.M. Daily, or, via 2 mtrs. Contact WA7RWK if interested. Traffic: W7DZX 1510, WB7TQF 766, WB7WOW 443, K7GXZ 435, W7FJZ 372, N7AFZ 272, AD7G 261, W7GB 175, K7CTP 167, W7IEU 153, WA7BDD 113, N7RV 72, W7LG 49, KA7CSP 46, W7BUN 45, WA7RCR 34, W7APS 30, AJ7B 30, N7DH 27, WB7CFH 22, W7ERH 20, WA7EDQ 14, KA7IVQ 9, N7CT 8, AG7M 6, K7RBT 4, WA7TWB 4.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF, VE2AQV/W6. SEC: WB6KQU. W6ZF's West Coast Bulletin is back on the air, 8:00 P.M. PST Mondays, 22 wpm on 3540 kHz. W6JXK has made BPL again! FB job, Ralph. EBARC buying a 2-meter rig for their Salvation Army HQ station and starting a 2-meter net. LARK's General class going well under the guidance of KB6BD KA6LEW KA6FQL. Their member, N6DOA, recently upgraded and using a new 2 meter hand-held. SBARA's Novice class successfully graduated six new hams. Their members, KA6DFL N6DNC KA6MVF have upgrad-

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ed to General. New editor KA6MVF has changed the format of their publication, THE GROUND PLANE. 1981 officers of SARO are K6TI, Pres.; K6AJA, Vice Pres.; W6IKQ, Sec.; W6CMZ, Treas.; WA6BJW, Comm Mgr. MDARC's THE CARRIER has as its new editor WD6GDG. Inflation hits clubs, too, and their dues have been increased to $10. New officers for 1981 are WB6NMU, Pres.; WA6TXM, Vice Pres.; KA6AOC, Sec.; WA6YXY, Treas.; WA6OFI, EC; K6XC, WA6GON, B/D. Traffic: W6JXK 680, W6OA 217, K6UGS 139, WA6BOB 22, KA6ERF 12.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. Congratulations to N7AKX for BPL. See below. TARA had a beautiful Christmas party at Frier House. Seems as if W7CKH is still active with new hams showing up in Henderson area. Nevada Sagebrush Net in need of net control stations. Net meets nightly 7:30 P.M. on frequency of 3906 kHz. Traffic: N7AKX 650, W7BX 211.

PACIFIC: SCM, Pat Corrigan, KH6DD — STM: KH6IQU. SEC: KH6CKJ. Had nice note from former SCM, N7HR (KA2HR) at Xmas with 73 to all in Pac. Sect. You can find him on Sat. on Pac. Inter. Ist Net. HARC Xmas banquet was very nice and graced with presence of Pac. Div. Director Stevens, W6ZM and N.W. Div. Director Mary Lewis, W7QGP. Most high power we've had here in a long time. Thanks to KH6IH for help from Big Island on W. Pac. Tfc. Net. Peacock Flats 2-m machine (.16/.76) up as well as Windward (.04/.64) in new location above Waimanalo. EARC and Oahu Civ Def hope to enhance both soon. KH6HGG now /2 in N.Y. on big property. AH6C/4 returning for visit this year. KH6BHJ moving to Pac. NW. Pac. Div. Convention in Fresno, May 15-17. Traffic: KH6H 32.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM Al6T. New officers for the Golden Empire ARS in Chico are: WA6WJZ, pres.; W6BIN, vice pres.; KD6KM, secy.; Jeanne Cross, treas., WB6COF, pub.; WB6AKF WD6FAN and W6HNL, bd. The New Official Broadcast Station for the Marysville/Yuba City area is N6DDP. WA6OWH/R of the Yuba/Sutter ARC is now all solid state. The North Hills ARC is now all solid state. The North Hills ARC reports that member N6CVH is now a Silent Key. N6JV operated from Utah over Christmas. N6JM finally bought a 2-meter rig. K6ZY has been building electronic keyers. Traffic handlers having problems passing tfc on local repeaters. Ham radio doesn't stop at 10 meters. QRV OM? Traffic: W6RSP 79, W6SX 32, W6DEF 7.

SAN FRANCISCO: SCM, Art Samuelson, W8VV — SEC: WB6ZRK. STM: K6TP. New officers of K6GWE/R are K6LRN, pres.; WB6DLT, vice pres.; WB6VLM, sec.; WA6MGK, treas. The club is considering packet radio at one of its UHF repeater sites and has a "mailbox" for retrieval of messages on its VHF RTTY machine. W6CYM was appointed an OES. N6AUP is now KS6W. San Francisco RC and Sonoma County RA report successful holiday dinners. AA6DX and KN6Q have new TS130's and WB6SXJ has a new TS120. WA6ICB installed a triband beam, while AA6DX is cultivating his own antenna farm. W6BIP was admitted to San Francisco RC Hall of Fame. Station activity reports are due by the fifth of the month. PSHR: W6RNL. Traffic: W6IPL 443, W6RNL 236, K6TWJ 210, K6TP 180.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst SCMs: W6TRP WA6YAK WA6HIN. New officers of the Sierra ARC are N6KE, pres.; WB6SON, 1st vice pres.; WD6FPZ, 2nd vice pres.; WA6CAY, sec.; K6IDP, treas. Kings ARC treas. is KA6GCA. Stockton ARC pres is N6AHC. New officers of Stanislaus ARA are: WD6EYX, pres.; KB6GJ, vice pres.; KI6U, secy.; WA6DYF, treas. Thanks to the following appointees for 100% reporting in 1980: WA6YAB N6AWH WD6FRS N6CDD W6DPD and WA6KZV. K6PAX is Silent Key. The Fresno 10-X Chapter meets on Tuesdays at 2000 hours on 28.845 mHz. WD6CFQ is CH. W6KRO is CM. WA6OMC is KS6N. Recent upgrades: Extra W6KRO; Advanced KA6GCC; General KA6IRP KA6FCH KA6GCB KA6KWO KA6JSL W6JBH; Tech KA6LGD KA6GBZ KA6MGP KA6LGN KA6LGK KA6GCF KA6LGQ KA6MGO KA6LGH KA6KGC KA6FCL KA6LGP KA6NAL KA6SCL. W6RMC works 2-mtr. DX on 146.52 with 1 W. N6COY and WB6MCG have TR9000. W6JPU has an IC2A. N6CDD has a TR2400. W6BWJ, W1FB and K1FHN will represent Hq Staff at the ARRL Pacific Division Convention in Fresno May 15-17, 1981. Hear K6DUE at the banquet. Get your reservation in now. Traffic: N6AWH 248, WA6YAB 37, W6DPD 34, K9YBM 32, WA6JDB 19, WD6FRS 18.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. It is with sadness that I report the passing of W6JXK the first week of the new year. Ralph was an active ham, and was dedicated to traffic work on NCN and lately as manager of RN6. WA6IXT and WB6PZT are helping a visual handicap student to get a Novice license, WA6HAD arranged for the help at the request of Courage Center. W6ASH handled HW tfc from Italy after the big quake. WB6HBL, using long wire on 20 cw, W6MMG busy with SOWP net and rpts K6QZX upgraded to Advanced class. WA6HAD checks into NCN when he can. W6ZRJ busy with traffic for a change. W6YBV and W6KZJ with big tfc totals. WB6FGC spoke on "Single-Handling a Small Boat and Ham Radio" to the PAARA, and KA6NDX became a new member. Pacific Division Directors meeting had a good turn-out in Concord. W6PLT send in rpt of last years activity, mostly emergency oriented. New officers for West Valley ARA are: WD6FOI, pres.; KO6D, vice pres.; KA6KCM, sec.; KA6HBC, treas., K6UD spoke on China at FARS annual bash. WA6TJX and WA2MCT are new members of FARS. LERA ARC elected the following officers: KJ6Z, pres.; WB6PCW, vice pres.; N6AHH, secy.; WB6WIC, treas., and took in KA6CBT as a new member. KA6KCM went from novice to extra in less than a year and awaits a new call. New members of GARC in the garlic capital are KA6HDW, WA6OWE and WB6TTD. W6LIO/R now has a rcvr for picking up Emergency Locator Tx (ELT) and tied into rptr. CCRC has new officers: WB6VTG, pres.; W6NVO, vice pres.; WB6AAJ, sec.; and K6RTU, treas. New general tickets to KA6DFL, KA6MVF and N5DNC. Traffic: W6YBV 410, W6KZJ 234, W6ZRJ 83, N6DNC 47, W6OII 40, W6ASH 32, WA6HAD 12, W6CF 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: WD8NYN. SEC: WA4BFT. NMs: CN AB4V, CMN WD8NYN, THEN WD4CNR, JFK, WD4CNQ, NCSSBN WB4CES, CNN WD4JJK. Big traffic effort section-wide for Christmas. All the nets were busy. Got lots of PR. That is really why we do it. Wake Co. hams at

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Crabtree Valley Mall with 310 originations. Not a record, but good. Novice classes getting under way. Let me know about your club's plans. Silent Key, WD4KFM, Locust, NC. Six BPLs in December. Wife/husband BPLs — WD4CNQ/WD4CNR. Please put AB4S on your club mailing list for news and events in your area. Charlotte, Metrolina Hamfest, March 21-22. Plan to be there. Field Day coming up soon. Make you plans early and well. Traffic: (Dec.) WD4CNQ 577, WD8NYN 567, WD4CNR 552, AB4V 531, K4DHX 434, K4MC 418, WB6OTS 393, WA5UTC 284, WB4WII 276, KU4W 246, W4FMN 234, WD4JJK 227, AB4S 215, KC4AM 213, WA4SRD 204, WB4DAR 200, W4PCN 188, W4OWD 185, W4HKB 154, WB4CYN 133, W8PJS 132, WB4TOP 120, N4BEK 117, K4NLK 107, N4CJJ 100, WA4CUD 81, W4WXZ 66, WA4OBR 65, W4EAT 64, WD4AIE 57, WD4SCH 53, KZ4A 49, WB4UJH 46, WB4RGS 42, WD4LOO 40, ND4B 38, NE4J 38, N4UE 38, WA4OJU 38, K4IWW 35, KA4ODX 28, W4ACY 26, K4FTB 24, AA4R 20, K4XE 18, W4VTP 14, W4EHF 13, N4ARY 12, WD4BCX 11, WB4SLF 8, WA4IHG 6, W6MVZ 2. (Nov.) K4MC 51, WD4BCX 14. (Oct.) W6MVZ 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NM: WA4SJS W4ODE. Congrats to the following: W4ANK & K4ZN for making BPL; KA4PIC, new Novice; KC4LB for receiving the William E. Wall award, given by The Columbia ARC to the amateur who has contributed most to his hobby, the community and the club. W4BDT recovering from serious illness, W4NQL-under the weather, hope these fellows get well soon. Tnks to all hams for their cooperation for the past two years, looking forward to working with them for the next two. Check-ins/traffic: SC SSBN 1337/247; Blue Ridge 2-m Net 1602/69; CN 710/798; SC NTN 320/177; Lancaster County 2-m Net 174/13; Western SC Emergency Net 149/6; Newberry County ARES Net 73/4; Carolina State Line Net 60/2; District 5 ARES Net 6/3; CNN 226/51; York County ARES Net 115/8; Dixie 6-m SSBN 27/0; SC 2-m SSBN 57/0; SC ARES Net 12/4. Traffic: (Dec.) K4ZN 643, W4ANK 562, W4ODE 250, K4ZB 203, W4NTO 191, W4FMZ 169, K4KEP 58, WD4PPM 58, WA4MIY 56, K4FRX 45, WB8TCT/4 45, W4MTK 43, WB4UDK 42, AF4E 33, NC4Y 32, KA4AUR 30, NC4F 26, WA4MCG 21, K4FVC 21, N4ATP 19, WD4NMF 14, WD4EDM 12, N4EE 12, K4LYU 9, W4DRF 8, K4LQO 8, WA4VYS 8, WD7DOL 2, WB4NBK 2, WB4QHF 2, WD4OLV 1. (Nov.) NC4Y 6.

VIRGINIA: SCM, Luck Hurder, WA4STO — SEC: N4AZI, STM: KY4K. Chief OO: W4HU. Chief OBS: K3RZR. Chief OVS: N4CD.

Net	Time	QTC	QNI	NM
VSBN	6:00	688	731	KZ4K
VSN	6:30	232	433	WB4KSG
VN	7/10	774	752	W4SUS
VLN	10:15	464	720	KY4K
VNTN	Noon	593	404	WD4FTK

December - What a month! 13 people earned the coveted Brass Pounders League award; 11 of us made sufficient efforts to get on the Public Service Honor Roll, and 80 proud people sent in traffic reports providing a combined total of 13,494 message points! That's a lot of public service communicating, folks, and my personal thanks to each of you. Particular kudos to AK4L (home on vacation from Newington) WA4YIU KB4WT WD4RDF and the many others who helped out with message centers in malls. WA4EQW/M did it again - all cw all mobile BPL! Pat's on his way to the medallion. W4PVA and KB4OF report that the ole Va. hams supplied communications to help the Manassas COC coordinate their Christmas parade. W4YE and W4KFC both active in 160-m contest. KZ4K and his RTTY fully operational now and N4AZI has new TRS 80 model 3. W4PVA and W4PJP installed 2-m emergency communications antenna on Prince William County Red Cross building. WA1VRL and your new STM, KY4K, spent holidays away from VA, but were glad to get back. OBS WA4FGJ reports participation in T-hunt, where the beam antenna was located on a sprinkler, requiring 360 degrees. Strange signals! Every appointee is again reminded that lack of reports will result in cancellation of the appointment. Keep your appointment active by reporting each appointment you may have to the appropriate person. Mark your calendars for the Roanoke Division League planning meeting on May 9 and 10 at Tysons Corner. See you there! Traffic: (Dec.) WA4STO 1262, WA4CCK 1187, WB4PNY 1069, W4SOQ 648, K4KNP 601, KZ4K 587, WA4LJI 549, WD4FTK 506, W3ATO 515, N4AZI 511, AK4L 476, W3BBN 394, WA4TIU 373, K4JST 335, W4JK 325, W4YVG 259, KB4WT 239, N4YO 214, WB4FLT 208, WA4EQW/M 205, W4NWM 204, W4SUS 194, KY4K 171, KA3DTE 165, K4JM 158, W4SVG 156, WD4RDF 150, WD4ALY 144, N4RF 134, W4SHJ 114, W4LXB 105, WB4UHC 97, WB4RWY 80, KA4HLI 78, WB4ZTJ 70, WA3LVC 68, N4BJX 67, K4EJ 67, WA2WDT 61, K4KDJ 57, K4VWK 53, WB4ZNB 40, KA4ETG 38, WA4QWC 35, KC4HN 34, WB4KIT 34, WB4FDT 32, W3BBQ 29, K3RZR 26, KC4QL 24, K4DHB 23, KA4IUM 21, W4KFC 20, WA1VRL 20, WA4RTS 18, W4PVA 17, KA4ERP 14, WA4PBG 14, WA4ONR 13, WB4DQZ 12, W4KXE 12, KB4OF 12, WA4WQG 10, N4DW 8, WB4FNW 7, W4YE 5, WA4EGW 4, K4GR 4, N4NK 3, WB4EUV 2, KI4W 2, KM4X 2. (Nov.) K4GR 64, N4CIR 10, W4KFC 10, N4DCL 7, N4ATT 4, N4NK 4, KA4HLI 3, W4TZC 1.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8OEW. STM: KD8G. NMs: K8MHR W8FZP WD8LDY. Midday Phone Net now operates on 7235 at 12 noon. Hillbilly Net now operates at 1600Z Su on 14290. Chas. area hams assisted Red Cross with annual blood drive. Sec. of State A. James Manchin was speaker at KARC's annual dinner. WA8PFB, Lewisburg, is now a Silent Key.

Net	Freq.	Time(Z)	QNI	TRF	Sess.
Hillbilly	14290	1600 Su	204	96	4
CW	3567	2400 Dy	230	121	31
Phone	3990	2300 Dy	699	300	31
Midday	7235	1700 Dy	318	56	31
Novice	3730	2315 Dy	97	28	31
KFC/2M	87/47	0130 Tu	69	6	4

Traffic: KD8G 558, N8AJC 139, KC8C 136, W8GK 108, W8HZA 88, KD8X 87, KA8ETV 75, W8JWX 60, WD8PQG 57, WB8TDA 54, K8MHR 36, W8FZP 34, WD8DJN 24, W8CAL 23, K8BS 21, AI8I 20, W8CKX 17, W8CNF 17, KA8FEU 17, WD8BQK 10, WB8ZMX 10, KA8AHT 7, WD8AXY 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJ — SEC: WØACD. STM: WBØMCL. NM: WØHXB WDØAIT. My last activities report as your SCM. K3PUR ill be the new SEC upon WØACD's assuming this job. Those who may have already sent their December reports to the new SCM and not in this traffic listing will be included in the January report. WØWYX saw winds over 100 mph on Squaw Mt.

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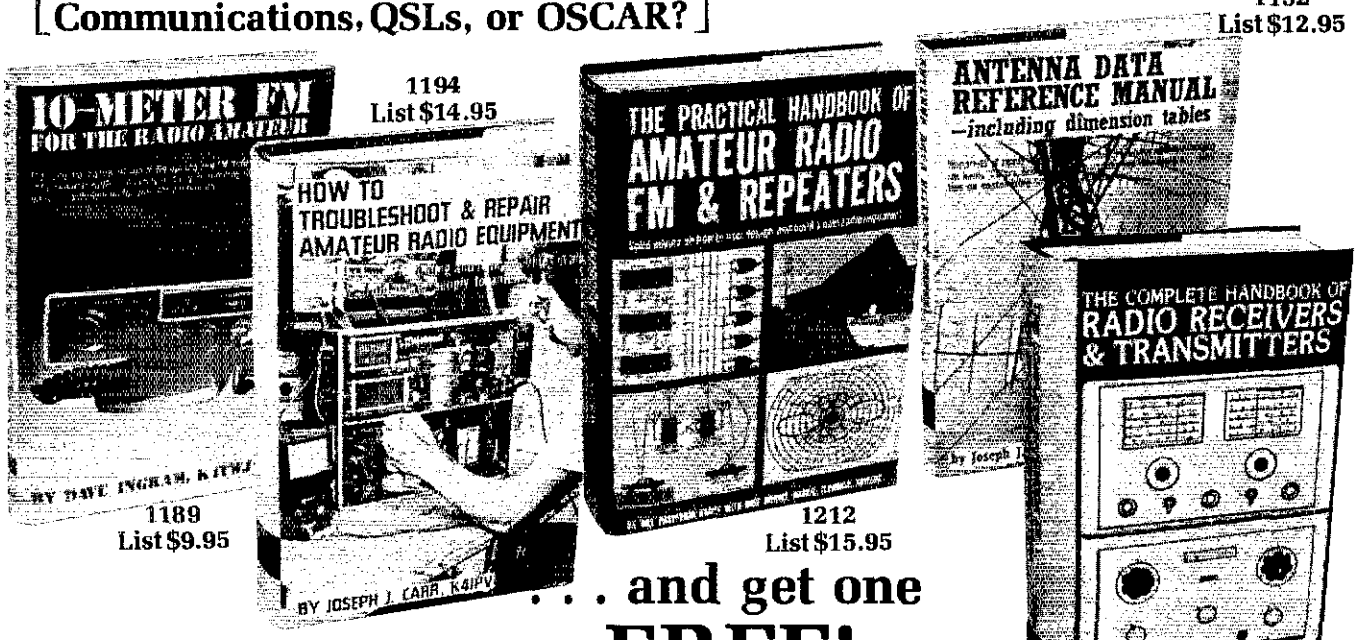

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much of December, hampering some of the antenna work planned for the 34/94 repeater. W0HXB reports making PSHR for the twelfth consecutive time. Many made BPL by handling the huge influx of Christmas traffic. Rocky Mountain VHF Society planning their annual hamfest in Boulder on May 17. Antenna problems plagued W0LCE. A contest club is being planned for Southern Colo. by N0ST and others in the Colo. Springs area. Although late by the time this reaches you, happy 1981 to all. Nets: Columbine 27 sess, QNI 1116, QTC 117, informals 188, QNF 1260; CWN 31 sess, QNI 274, QTC 298, QNF 1392; HNN 31 sess, QNI 1658, QTC 207, informals 253, QNF 1326. Traffic: N0BQP 3002, W0WYX 1259, WA0HJZ 1020, K0DJ 641, WD0AIT 638, W0HXB 547, W0EJD 449, W0RE 223, N0BLU 128, KB0Z 100, KD0M 98, W0GO 92, W0LQ 91, W0LAE 46, KA0GFA 41, W0LCE 3, W0GW 2.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WB5NNG KG5L. Southwest Net (SWN) meets daily on 3583 kHz, at 1930 local and handled 374 msgs with 282 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 250 msgs with 1246 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 107 msgs with 814 checkins. Yucca 2-Mtr Net handled 33 with 875 checkins. Vy sorry to report the passing of WB5RPE. W5FPB recovering after three heart attacks in a few weeks. All of us pulling for WB5HBF in his battle with cancer. Several SAR missions this month. Traffic: W5UH 716, W5JOV 406, W5DAD 372, KA5DDW 279, W5ENI 217, KG5L 192, WA5MIY 64, W5BWV 19, KB5LI 14.

UTAH: SCM, Royce Henningson, K7QEQ — The Utah VHF Society Weather and Road Conditions Net was reactivated for the season on Dec. 8, 1980. Net manager is W7BE, NCS are W7RO WB7AMR W7FSC W7KIP and W7BE on 146.34/94 7 to 8 A.M. and 4:30 to 5:30 P.M. Traffic: WA7KHE 201, WA7MEL 116, W7OCX 28, W7RO 25, K7UM 8.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — Congratulations to K7ISG new Advanced in Cody. WB7UFP reports ARES has 31 members in Laramie County. The Cedar Mountain ARC members originated 147 Christmas messages from several locations in Cody. This is the second year the club has conducted the pickup of these messages. Amateurs taking part in this exercise were: W7PT K7IKO K7ISG WA7BPD WA7IXH WB7BVT and KA7ACA. WB7NHR reports WCN held 23 sessions with 699 QNI and 95 QTC. WA0PFJ reports Jackalope Net held 26 sessions with 559 QNI and 3 QTC. Traffic: W7LYA 819, W7SQT 759, WA7GYO 319, WB7NHR 214, K7TFW 160, WA7SGG 136, W7PT 74, K7SLM 39, W0OGH/7 28.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. My attention was called to an error I submitted for Jan. '81 QST. The HAYLARC is a separate unit of its own and not the YL's arm of HARC. Muscles Shoals ARC has nominees for new officers: K4JXS, pres.; WA4ZDW, secy/treas. A vice pres. has not been nominated at this date. The club will note on these hams in Feb. '81. Interprise ARC reports KA4AFI and WB4YSJ passed their Advanced license. New member of Birmingham ARC, KA4GPB. We all regret the Silent Key of K4HFX in Dec. She was a member of the AENM Net. If you attended the ARRL National Convention Mar. 13-15, you will want to attend the Southeastern ARRL in Birmingham AL May 16-17th 1981. So make your plans now to be there. Net manager WA4JDH of the AENB Net cw (3.575 kHz) QNI 228, 130 messages in 31 sessions. The net is in need of Net Control Stations. Check-in and give your support. W4CKS, Net Manager AEND, (3.725 kHz) QNI 185, 132 messages in 29 sessions, this is a slow speed net. Ala. was represented 100% by W4CKS WA4JDH into DRN5 with 840 messages. We need more stations to go to DRN5. Ala. was well represented into the Gulf Coast Emergency Net by 10 Ala. amateurs liaison with AENB - AENM Nets. Is your net registered with ARRL. Call your SCM and I will get it registered. Traffic: WA4JDH 1960, W4CKS 237, WA4PIZ 145, K4AOZ 88, WD4DHI 68, AA4U 37, KC4MT 29, K4UMD 28, N4CSX 27, W4IBU 26, WB4TVY 8, KC4GS 8, K4HJX 6.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC: WA4PUP. STM: W4WXA. Chief OBS: W4BIA.

Net	Freq.	Time (All EST)	Mgr.
GCN	3995	0700 Dy 0800 Su	W4HON
GSN	3595	*1900 & 2200 Dy*	*W4PIM*
GTN	3718	1815 MWF	WA4ZBR
GSSBN	3975	1830 Dy	WB4ZVX
ARES	3975	1700 Su	N4BGH
GA TFC	7243	1200 Dy	W4GH
GERN (RTTY)	3620	2030 Fri	WA4ZHC

1981 Colquitt County HRS officers are: W4NWB, pres.; K4UPP, vice pres.; AA4P, secy/treas.; WB4MYJ, trustee. The section has been fortunate with no bad weather this winter, but as spring approaches, let's all be prepared as in the past, furnishing communications as needed. K4VHC has the ARES program rolling, so let your EC know that you are willing to help. WA3NAZ K4EV W4HON & AA4EI made PSHR again. Many more of you I know qualify, so send me your report. Columbus will kick off the 1981 hamfest tour on March 28 & 29. W4EEE holder of first 160-meter WAS certificate. N4UZ reports working 34 states during recent 160-meter contest. Congrats to WA3NAZ on making BPL. Conyers Amateur Radio Group 1981 officers are: N4BLC, pres.; N4CI, vice pres.; WA4BLM, treas.; KA4OWE, secy.; WB4SLZ, act mgr. Atlanta RC continues with FB programs at their meetings. This keeps attendance at a high level. WA4ZHC reminds all "Green Keyers" GERN meets each Fri evening at 2030 local on 3620. He offers a real beautiful certificate to net members. All OBS getting our promptly. Tnx guys. Local nets in the state continue to grow. Please inform your SCM of date, time etc. I can furnish you a Local Net Certificate for the members. Again tnx to all for all your help & hope to see most of you at one hamfest or another. Traffic: (Dec.) WA3NAZ/4 506, W4PIM 253, W4MXA 192, K4EV 119, W4GH 94, KA4ATM 72, WB4LBM 56, W4HON 43, W4ELO 37, W4FIZ 37, N4UZ 34, AA4EI 33, WD4ADV 29, WB4RUJ 16, KA4PBD 13, K4JNL 12, W4BIA 10, W4CMX 7, K4PIK 6, K4BAI 2, AA4GA 2. (Nov.) W4AAY 28.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA3GIN. STM: N4WA. NMs: N4BZH WD4DNC KF4U. ASCM: WA4CRI WB4QBB W4BSP WD4ASW WA4OEM. KF4U new mgr. of Gater Net. All nets did outstanding job with holiday traffic barrage. 1981 DBARA officers are WB4FKL, pres.; WB4WTJ, vice pres.;

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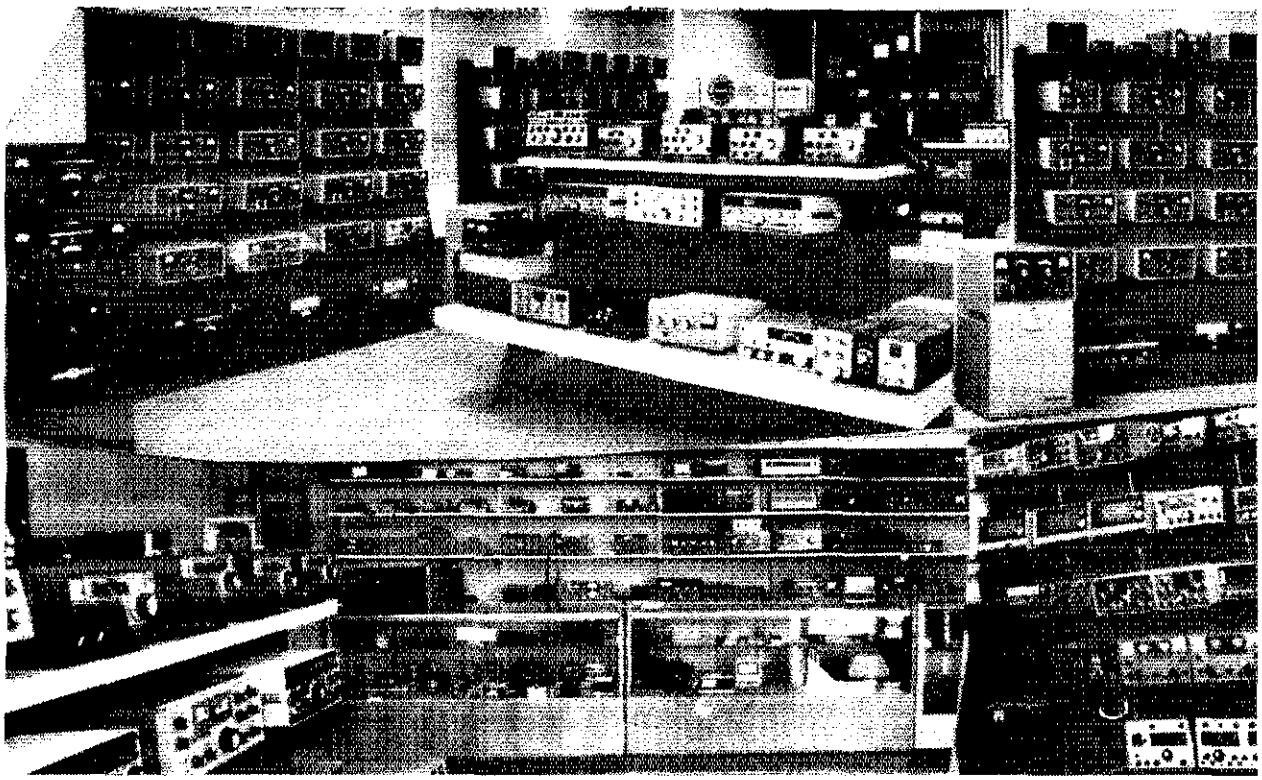

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KA4PIR, secy.; KA3BGU, treas.; W4PLO W4MGO W4MB directors. KB4T is rptr chmn. KA4OOZ is now N4DWF and WD8DMQ now KI8U. GCARC had "Homebrew Night." Elected to office for 1981 were KC4LJ, pres.; N4AYH, vice pres.; WA2UNQ, secy., KC4JL, treas. OPARC already planning for FD. KJ4N & W4WHK presented program on DX at OPARC meeting. W4PTT did same for NOFARS. KC4N & KA4OCF named Tallahassee Hams of the Year at club banquet. WA4PWF named GARS Ham of the Year. WD4MND passed 2nd Class FCC Phone exam and WA4OEM active on 2-m ssb. N4AEE is new RANGE membership chairman. WR4ACE has been allotted space on the WUFT-TV tower in Gainesville and a new 19/79 machine is operational from Santa Fe Comm. College. FMTN handled over 100 messages in one session on at least 4 occasions in December thanks to split frequency system. You may qualify for the new Florida Public Service Award. This certificate is sponsored jointly by the SCMs of Northern & Southern Florida. The ARRL Info Net going strong on 3,940 kHz at 1300Z each Sat. All amateurs invited to check in & ask questions of their League officials. ARRL National Convention is this month. "Sunshine State ARRL Forum" is scheduled for Sun morning 9-12 at the Orlando Hamcation. Traffic: (Dec.) W4SIZ 1170, N4PL 1092, WD4IIO 900, WA4CRI 610, WB4EXA 351, WD4HIF 341, W4MGO 230, WA4EYU 213, AF4U 206, KC4MM 196, WD4DIU 190, W4KIX 176, WB4TZR 179, AA4FG 172, N4BZH 152, N4EC 85, N4AXN 88, W4JL 88, WB4ADL 77, N4UF 70, WB4DTS 66, W4BSP 65, KA4ASJ 42, KB4T 39, W3IDO 34, WB4YKV 28, K4RNS 24, WA4STZ 23, WB8USE 9. (Nov.) N4EC 193, KB4T 26.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. It is no news to anybody that December was a busy month for traffic. Section total for the 46 stations reporting was 17,582. I believe we hit 22,000 a few years ago — but then we had about 100 stations reporting. It looks like we are losing a lot of traffic count for the record because many stations don't bother to report. Your reports are important — even if you didn't handle many messages. The number of stations reporting is an important factor in comparing this section with others. Anyway, we had 11 stations qualified for BPL. Congrats to all. Also congrats to K4ZK for hitting a new high of 669. Look at the PSHR scores and see how stations you know in our section compare with the "national average." I think you'll be proud, as I am. Seems like we are pulling together pretty well (for a change), and we can all be proud of that. The Official Traffic Station appointmet is no more. All OTS appointees automatically became Official Relay Stations on Jan. 1, 1981. If you are active in traffic and don't have an appointment, I encourage you to apply for ORS. Other appointments available include OES, OBS, OVS and OO — See "Operating an Amateur Radio Station." All are limited to ARRL members. Our congrats to K1PLR of Fort Myers who qualified for WAS. He has also been heard several times on FAST Net and says he is "kind of getting the traffic bug!" Welcome and good luck. W4BK reports he is revamping his whole station. He is very active as QCWA National Treasurer. We received a mailing from AMSAT soliciting funds to help with another Phase III attempt. Not being flushed with money, as who is these days, I sent my donation anyway. I'm sure I'll feel proud that I helped, and you can too, when we get a good Phase III bird in orbit. Hope I can get my 450 MHz transverter working by then. It's tough to be stuck on Mode A. Be looking for you at the National Convention in Orlando. Traffic: W3CUL 3824, WD4AWN 1127, WD4COL 1103, WB4FVV 1093, K4TH 1013, WA4PFK 956, K4SCL 891, W3VR 741, W4LX 698, K4ZK 669, WA4EIC 505, NC4H 468, W4NFK 458, WB4WYG 423, N4KB 410, W4GPL 369, K4EUK 339, W1NJM 261, WB4AID 228, KA4LNA 208, WB4PIB 205, N4ET 197, KA4ASZ 198, W4IRA 191, KE4O 170, WD4APM 155, WD4CHO 112, W3TLV 108, KB4OW 65, KA4BBA 53, WA4HXU 50, WA4FKE 46, W4ESH 37, WB4GCK 37, WA4BYT 29, WB4SNX 28, W4KMN 26, WD4LWT 18, WD4PUV 17, N4APE 12, W4ROA 12, W4SMK 12, W4BK 8, W4UIO 7, W4JM 4, K1LPR 4.

WEST INDIES: SCM, Julio Negroni, KP4CV — Enthused by the success of WINS, STM NP4D and KP4EMX have started WINC (West Indies Net Central) one of three phone traffic nets planned for the section. WINC operates daily at 2130Z on 16/76. WINC is producing fine traffic ops, who are now starting to key down to WINS. 80 mtrs is producing rare DX to Europe and South America with signals pounding in. NP4O is now experimenting with short antennas so that more newcomers decide to operate on WINS. Plans are in high gear for the PRARC/West Indies Section Convention which will be held this year at Palmas del Mar, Humacao, Puerto Rico on April 24 and 25. Convention is dedicated to KP4DJ who just recently received his 50 year plaque as an ARRL member. New appts: KP4EMX as Net Manager of WINC. Traffic: KP4DJ 123, KP4U 106, KP4EMY 75, KP4FBT 35, NP4AU 10.

SOUTHWESTERN DIVISION

ARIZONA: SCM, W. L. Haskell, AC7D — SEC: N7EH. STM: W7EP. A joint effort of both Phoenix and Tucson amateurs contributed to the success of the eighth annual U of A Camp Wildcat Bike-a-Thon. 227 bicycle riders participated in this 125 mile ride fm Tuc to Tempe. Providing comm: N7ADU WB7AUZ N7BYK N7BXX WB7CGO K7CO K7CRN WA7DAO N7EH W7HNR WA6III WA7JCK WA7JEI AF7M WB7NQJ K7NTG K7OMR WB7OOY WB7PKP WB7QJS WB6TIX WB7TXQ WA7UVE and WB9WWF. Also tnx to TRA's 28/88 and several Phnx. repeaters. W7AMM rpts he will be in 4X4-Land (Jan to ?). Keep your ears on! N7AOU, pres. pro tem of AAA5 Club Phnx., rpts 30 members in new ATV group. By the time you read this, there may be an ATV rep. Freqs at this writing are or will be 1265 in 434 and 2380 MHz, out, capable of video, ASCII, RTTY and GEOS satellite weather reception!! Keep us posted fellows! WA7JRL, Tucson, finished 27 months in the Sinai with a *JSU*, is now located in the Negev Desert and his call now is WA7JRL/4X. SWN Net is giving out certificates for 100 QNI, so put key in hand and ck in, (3585 0300Z). OPRC 81 officers: WB7DTX, pres.; N7BXX, vice pres.; W7JQE, secy.; N7EH, treas.; WB7VGB, compt. TRA 81 officers: WB7TLS, pres.; W7OMR, vice pres.; WA0NNC, secy.; N7EH, treas. N7EH is probably one of the most dedicated amateurs that I've known over the years! Arizona repeater listing is available by contacting ARCA or W7WGW. Net mgr: A-10, QNI 1048, QTC 486; SWN, QNI 282, QTC 374. Traffic: W7EP 344, W7AMM 307, AF5Z 286, W7LVB 132, K7NTG 116, K7NMQ 111, KB7HA 89, WA7KOE 76, KA5DDW 70, K7UXB 56, K7JKM 44, W7LBW

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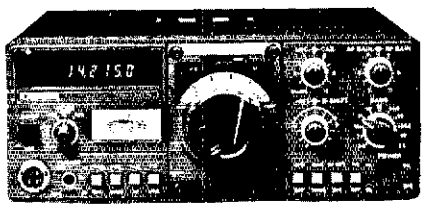

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TS-130V 25w PEP 8-band digital Xcvr	599.95
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DFC-230 Digital freq. controller	279.95
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VFO-230 Digital remote VFO	299.95
VFO-120 Analog remote VFO	159.95
YK-88C/YK-88CW 500 Hz CW filter	59.95
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DG-5 Remote Dig. display/counter	199.00
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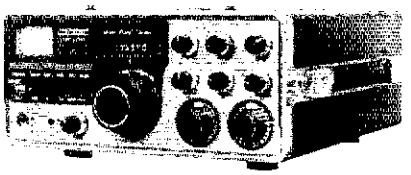
VFO-520S External VFO	155.00
SP-520 External speaker	33.00
CW-520/YG-3395C 500 Hz CW filter	59.00



TS-700SP 2m FM/SSB/CW/AM Xcvr	$799.00
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SP-70 External spkr for TS-600/700SP	33.00
TBM Tone burst module - specify freq	14.00
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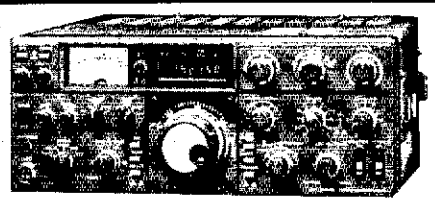

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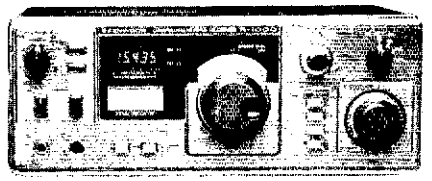

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YG-455C 500 Hz CW filter (2nd IF)	85.00
YG-455CN 250 Hz CW filter (2nd IF)	109.00
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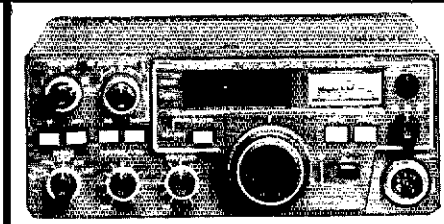

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PS-20 4.5A power supply	74.95
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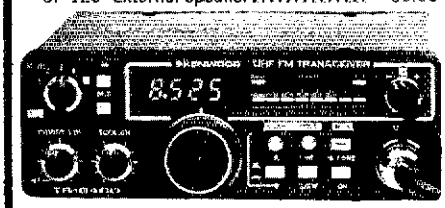

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22, WB7QOM 17, WA7NXL 8, AC7D 7, N7EH 5, WA7WEB 4, K7GLA 3.

LOS ANGELES: SCM, Stan Broki, N2YQ — ASCM: N6UK. SEC: WB6FAK. STM: W6INH. New appointment: K6INK OTS. AK6Y reported a Red Cross drill in Nov and on Dec 1 a real emergency developed when an oil line ruptured. AK6Y and the Long Beach ARES group responded and provided communications for the police and fire departments with links to the Red Cross shelter. WB6MKA reports the SGV ARES provided communications for the American Diabetes Assn Bike-A-Thon and the Covina Christmas Parade with 30 amateurs participating. Additionally during the Bradbury-Azusa fires 10 operators participated in a fire watch. N6VI worked the CQWW from KH6XX with over 1900 QSO's on 10 meters. WB6MOQ reports that RACES, SCATV, SPARK, SPARC, SGVRC, and the JPLARC using 102 Amateur Radio operators provided complete communications for the Pasadena Rose Parade. Included were 5 Amateur Radio color TV stations with a motorcycle mobile amateur TV station. K6IYK, EC SFV ARES, assisted in crowd control. K5DY reports heavy traffic during the holidays. The totals below bear this out. Help is still needed in the section for traffic handlers, ECs, OOs or just an ARES member. Please contact me, the STM, SEC, or ASCM to help. Congrats to WA6YEO president for the SFVARC W6SD. Congrats to WB6FAK for receiving the W6IN Memorial Trophy for 1980. Traffic: (Dec.) WA6LVO 250, W6INH 224, KB6FC 159, K6INK 121, KB6OT 117, N6PZ 117, WA6OCM 112, K5DY 107, W6BRO 97, KT5D 52, W6NKE 41, K6CL 39, W6BWG 26, WB5EKU 22, K6PGX 3. (Nov.) N6PZ 30.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. WA6WZO has been reelected SCM for another 2 year term starting April 1st. WA6IKH will act as Asst. DEC for San Bernardino County in addition to his regular duties as EC (and Radio Officer) for RACES Dist. #2 which includes Fontana, Rialto & Colton. Please report all local ARES, RACES, NTS and related nets to Asst SEC KA6HNY, who will maintain an updated list. KA6NLY has been appointed AEC (& OES) as ARES liaison to the West/Coast ARC. WB6ULU has been appointed AEC (& OES) as a liaison to Flotilla 24 of the USCG Auxiliary; also he has been promoted to AUXMIS Officer of Division 2 with WB6OKJ replacing him as AUXMIS Officer to Flotilla 24 of the USCG Auxiliary. DEC WB6YZY, recovering from the burning down of his home, is continuing to develop a disaster plan for Inyo County including a recent meeting with EC W6DQR. Bishop ARC pres WD6EBI and SCM WA6WZO. Also DEC WA6TLE held an Orange County ARES meeting which included speakers WA6WZO WA6CUP WB6JBI WD6AWP and KA6G who presented the OC Red Cross Disaster Communications Plan. So. Ca. DX Club new officers: N6NI, pres.; AA6AA, vice pres.; W6PN, secy.; W6GC, treas. Rio Hondo ARC new officers: W6CBA, pres.; KA6ETP, vice pres.; WA6GCV, secy.; WB6ISR, treas.; KA6DJK, equip. trustee. Victor Valley ARC new officers: K4KUN, pres.; WB6IJL, vice pres.; KA6GMO, secy.; WA6ARI, treas. Anaheim ARA new officers: WB6ARK, pres.; W6GCKG, vice pres.; N6BNM, rec. secy.; KB6HK, corr. secy.; KB6IW, treas. EC W6GAE reported successful West San Bernardino County 5 hospital SET supported by WA6VEV WA6CEA WB6WWB W6RPZ WB6LOF WB6RPB. AA6DP & WB6LAR continue to give outstanding OO support. Please note the fantastic amount of traffic handled by N6ANL for the month of December; also WD6CSL WB6QBZ WA6QCA W6NTN N6AED WB6BZZ KA4FDX KA6A KN6C WB6EIG made BPL and/or PSHR. "Operation Santa Claus" was a great success under the leadership of W6AOP with coordinators N6BVU WB6NAQ WA6MHN N6ZH — Santa (W6BWC) talked to 357 kids in 25 hospitals! Traffic: (Dec) N6ANL 2036, WB6EIG 1543, KN6C 605, WB6QBZ 558, KA6A 515, WB6BZZ 328, KA4FDX 253, K6ZCE 242, N6AED 229, W6NTN 186, AI6E 160, WD6CSL 123, WA6QCA 84, KA6HNY 71, W6RE 60, K6WI 27, WB6LGL 22, W6CPB 20, KA6HJK 10, WA6WZN 2, WA6WZO 1. (Oct.) W6NTN 193.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW (222-5575). SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). WB6PVH, now KT6A, handled 5347 msgs in 1980 and made BPL 6 times. WA6GZT is now KD6NU. Former SCM W6GBF and XYL, WA6HXB, visited San Diego in Dec. Upgraded: N6AIM to Extra, N6DCX to General. Palomar ARC's North County Net held 30 sessions, handled 136 msgs. Club officers for 1981: North Shores ARC — WA6EOO, pres.; KA6IYT, vice pres.; WA6VMO, secy.; W6JMA, treas.; Palomar ARC KD6BW, pres.; WB6HMY, vice pres.; WB6TBQ, secy.; K6SLA, treas. Palomar ARC sponsors a swap-meet on third Saturday of each month at the Valley Drive-In Theater on Mission Ave, Oceanside. WA6COE is new secretary of ARC of El Cajon. K06Z's activity curtailed by school. KM6I was off the air for several weeks due to rig failure. ARES HF SSB Nets

1100 Sun	1.818 MHz	SW Division
0900 Sun	3.905 MHz	SD Section
1000 Sun	29.275 MHz	SD Section
2000 Mon	28.585 MHz	SD Section

Traffic: KT6A 575, N6GW 441, W6HUJ 406, K6HAP 133, KM6I 86, KR6K 37, N6AT 31, WA6UFY 14.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — ECs/AECs in place most communities. OBS all counties, OOs 2 counties, losses in NTS. SCM/SEC at L.A. Council's annual review of div's emerg. Resp. USER-AGENCY agreements increasing. So. Cal. Emerg. Svcs. Assn. setting stds for data exchange with amateur computers for Crisis Relocation. Ventura Co. Red Cross Northstar coupling to ARES. Chapter Comm. van being readied. Clubs: Dir., W6EJJ, installs KA6BPH as pres. at Poinsettia banquet. WD6ARO new editor. Appts: KB6PX, WB6BWZ new AF MARS ECs. Pub. Svc: Camarillo Xmas Parade synchronized by W6RIC's Apple plus 21 ARES ops. Satellite ARC demo stn at Xmas in Santa Maria Mall & VAFB Rec. Cntr. Dozen ops supplied marathon comms. SBAR CNTY OES coord., WA6HCX, arranged 3 hospital drills using 6 ARES ops under K6QYL; WA6ZYG joins HF/VHF Net as NCS. PSHR: K6YD 62, W6POE 27, N6MA 22, N6YH 22, K6DZT 8. Traffic: K6YD 217, WB6TRP 64, N6MA 27, W6POE 12, W1UUQ 6, N6YH 6, K6DZT 4.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: AE5C. SEC: W5GPD. STM: W5VMP. NMs: AE5I AA5J W5HMR N5BT KK5B. Local and section nets proved their mettle during the holiday season, with tfc totals reaching over 4200! If we could have documented all the tfc handled, I have no doubt that it would be an all-time high. Please send me your station activity rpt.

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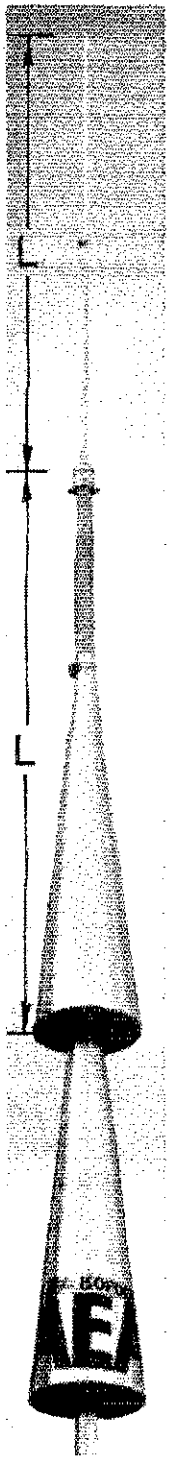

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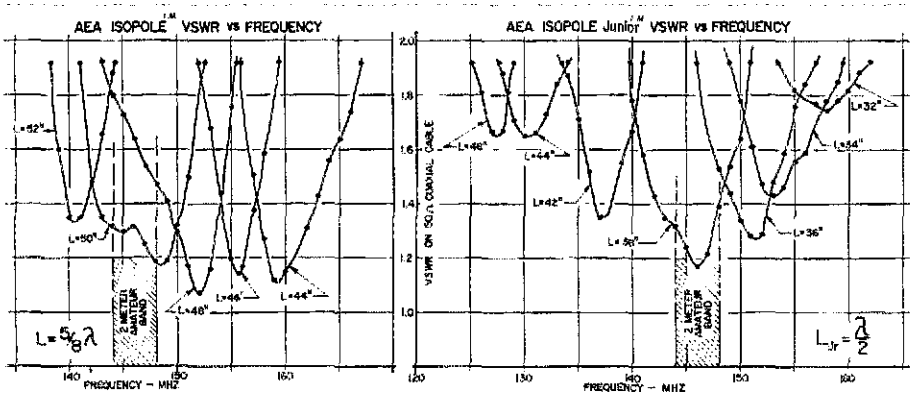
The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state transceivers. **Typical SWR is 1.4 to 1 or better across the entire band!**



Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic *cones are the only appreciable wind load and are attached directly to the* support (a standard TV mast which is **not supplied**)

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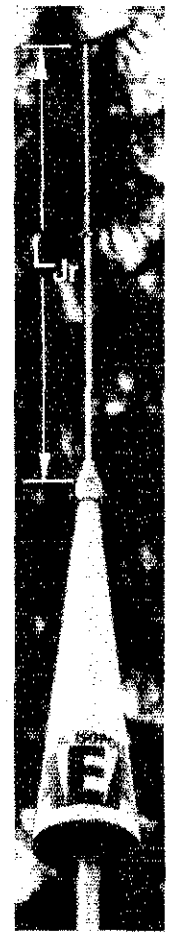

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when you handle tfc. You will be surprised how the little reports all add up to a big total! No report is "too small"; let's hear from you tfc. handlers out there each month. My address is on page 8 this issue. The annual picnic of the Central Gulf Coast Hurricane/Southwest Tfc. Net will be June 13th @ Toledo Bend Lake. Your hosts will be WD5FLM and KB5NX. Contact them for full info. TSN (Dy @ 2000L; 3745 kHz) QNI 302, QTC 93 in 31 ssns. D/FW (Dy @ 1830L; 146.28/.88) QNI 525, QTC 252/223 in 31 ssns. The Texas Traffic Net (Dy @ 1800L; 3961 kHz.) for the year 1980: QNI 17,479, QTC 4415 in 371 ssns. Attention ECs: please send your monthly EC report in to your District EC by the first of each month so it may be forwarded on to the SEC by the 3rd of the month deadline. All that is necessary to report are any changes since your annual report that you sent in January, 1981. Otherwise, a report card or radiogram to your DEC stating "NO CHANGES" each month is all that is necessary. It's time to check out that portable emergency gear again, as spring wx season is upon us. Traffic: W6TI 511, N5BT 508, K5BNH 434, W5CTZ 426, KB5UL 309, W5HMR 207, WA5INJ 179, KA5AZK 161, KK5B 154, WD5EUE 154, AE5I 142, WB5BKM 119, KA5AVQ 118, WD5JYI 104, N5CEK 94, WA5KHE 90, WB5LAT 70, WA5QFD 64, KA5CFP 51, WB5YYK 50, W5VMP 47, KA5IWF 31, W5ERT 30, AJ5F 28, AA5J 28, W5TAH 25, WD5BUE 22, WA5EZT 18, W8DCX 17, W5GPO 14, K5HGX 14, K5PC 12, K5QKM 10.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Oklahoma Net Managers: WB5TTU WD5IRB K5CAY WA5OUV and W5UYH. These net managers always welcome more participation in their nets. Last month these 5 nets averaged 17 check-ins daily, 3644 messages were reported handled by 30 ORS. Much of this was handled by liaison stations taking it on to the other nets. Only 310 messages were reported delivered in Okla. WB5NKC and KF5A made BPL working this traffic. Pott. County Net operated extra sessions to help with Xmas traffic. KA5KML & KA5KOU, new calls in Altus area. K5KXL has new beam in air. W5IQL had 100% participation in Weather Net for second straight year. W5UGA and W5VXU were close behind. WA5UBO has new antenna farm at Blackwell. WA5RKU in new QTH at Tulsa. W5JJ found a new TS-130S under Xmas tree. Also quite a few new computers showed up. Traffic: WB5NKC 590, KF5A 510, WB5NKD 476, W5REC 375, W5RB 272, WD5DYI 171, K5CXP 149, KB5EK 106, W5UYH 101, WA5FSN 91, WD5IRB 90, WB5ELG 85, W5IQL 80, WA5OUV 70, W5VXU 67, WB5EAY 59, WD5IFB 54, W5SUG 43, WD5IRR 38, K5CAY 33, WD5ETB 27, W5BLW 27, W5BOR 27, W5RW 26, WB5AXH 23, WD5EAA 19, W5FKL 14, N@IN 10, WA5RKU 10, W5JJ 1.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — Asst. SCM/STM: N5TC. SEC: AK5N. Traffic handlers in the STX Section did a tremendous job during the holiday rush. 29 stations reported handling 7169 messages. KB5TC W65YDD WB5TAY W5KLV WA5RVT N5TC KB5NX WB5MMI K5DG WD5DQR WD5FGY and W5BGE all made PSHR. W5SHN WB5TAY W5KLV WB5YDD W5TFB K5OWK and K5DG made BPL. K5RG reports rig trouble during the Holidays. K5OWK, an Okla. transplant, is keeping the traffic nets active from San Benito. N5AF is now active on TEX and still sends regular OVS reports. WA5QCP says 6-mtr has been poor except for some Es. WD5JJS has a new 5 el 6-Mtr yagi at 43 ft. WD5AAH is now a NCS on SWTN. WA5KHE has been doing a lot of work in organizing the Tex. Slow Speed Training Net. The net meets 0100 UTC, 3945 kHz daily. Congrats to WB5EFJ on his recent upgrade to Extra. W5KR and N5BJV editing a very interesting bulletin for CHARRO. New officers for San Antonio ARC are KC5S, pres.; K5TYV, vice pres.; W5TQS, secy.; WB5NOL, treas.; KA5GCJ, sgt-at-arms; WA5RNY, director. KA5CHW is doing a great job editing the TDXS bulletin, "THE BULL SHEET." WD5KDK is the new EC for Galveston County. AK5N and I are wanting to generate more ARES activity in the section. If your county doesn't have an EC, notify one of us for an appointment. Be sure to report all ARES activity at least bimonthly. Traffic: (Dec.) W5SHN 1057, WB5TAY 1001, W5KLV 928, WB5YDD 788, W5TFB 571, K5OWK 547, K5DG 432, N5TC 337, KB5TC 331, KB5KZ 158, WB5MMI 109, WA5RVT 109, N5FN 104, KB5NX 101, WD5FGY 97, WB5YRV 76, WB5EFJ 74, KA4GYJ 72, W5BGE 65, WD5JIM 62, WD5AAH 31, WD5GKH 31, WB5UYV 21, AK5M 19, KD5O 19, WD5DQR 16, K5RG 7, K5RVF 6. (Nov.) K5DG 88.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal *Zip code. No cash or contract discounts or agency commission* will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievements added upon request. S.a.s.e. brings TAD data sheet. W6LS 2814 Empire, Burbank, CA 92504.

ANNUAL Flemington, N.J. Hamfest Saturday March 21 from 8:30 to 3:00 at the Hunterdon Central High School Field House. 20,000 square feet of heated indoor area. Gigantic flea market, 200 tables, major manufacturers, informative seminars. Bring the XYL, kids and friends. Flemington is located between NYC and Philadelphia at intersection of routes 202 and 31 just 10 miles south of 78, and is tourist area. Talk in 146.52, 147.375, 147.015, 224.12. Admission $3. donation. For reservations or info call 201-788-4080 or write Cherryville Repeater Ass. C/O W2FCW, Box 76, Farview Ave., Annandale, N.J. 08801.

CENTURY 21 ARC — Low power QRP'ers — cw nets — contests — awards — s.a.s.e. KA4EBW.

YAESU OWNERS — join the ten-year old International Fox-Tango Club. Receive valuable newsletter monthly, catalogue of modifications, free advertisements, technical consultation, FT Net, more. Annual dues still $7 per year US, $8 Canada, $10 overseas airmail. Send to N4ML, Box 15944, West Palm Beach, FL 33406.

WARRENARA 24th Annual Hamfest, Sunday, August 16, 1981, KSU-Trumbull campus, Outerbelt/Rt. 45. Huge flea market on lawn; equipment displays/sales inside; meals, snacks sold all day. $4,200 awards TenTec Omni' two TenTec Deltas; three IC-218s; plus hourly awards. Details: QSL WARA, Box 809, Warren, OH 44482.

SEVENTH ANNUAL Northwestern Pennsylvania Hamfest. May 2, 1981, Crawford County Fairgrounds, Meadville, PA. Gates open 8 AM. Bring your own tables. $5 per table to display inside, $2 per car space outside. $3 admission, children under 12 free. Refreshments. Commercial displays welcome. Talk-in 04/64, 81/21, 63/03. Details C.A.R.S. P. O. Box 653, Meadville, PA 16335. Attn: Hamfest Committee.

MISSOURI State ARRL Convention/Northwest Missouri Hamfest April 11-12 Old Airport, Kansas City Missouri, over 50,000 ft of commercial, fleamarket, forums, free parking. Information PHD PO Box 11, Liberty, Missouri.

NEW JERSEY: The Irvington Radio Amateur Club's hamfest is Sunday March 22, from 9 A.M. to 4 P.M. at the P.A.L. Building, 285 Union Ave., Irvington. Take the Garden State Pky to Exit 143 North or 143A. South. Talk-in on 34/94 and 52. Refreshments. Admission $1. Tables $3. For information call Pete WB2FAS 201-763-8220 or write IRAC at PAL address.

The 12th ANNUAL B*A*S*H will be held on the Friday night of the Dayton Hamvention, April 24, 1981 at the Convention Center, Main and Fifth Streets. Parking in adjacent City Garage. Admission is free to all. Sandwiches, snacks and C.O.D. bar available. Live entertainment provided for a super social evening. Don't miss it . . . Awards include a new synthesized HT. For further information contact the Miami Valley FM Assn., P. O. Box 263, Dayton, Ohio, 45401.

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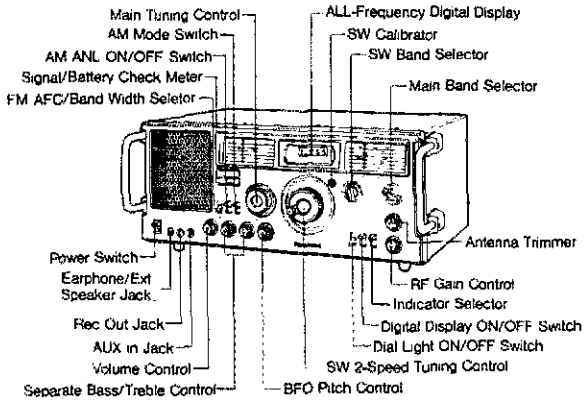

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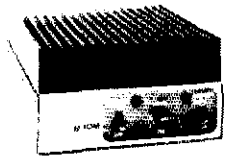

Features: 10W in — 80W out, Built-in Receive Preamp, Adjustable Delay for SSB. Automatic Internal or External Relay Switching, Frequency Range 144 to 148 MHz. Works for SSB, CW or FM Modes, Receive Preamp Provides 10db Gain Min., 5 year Warranty (1 Year on Power Trans.).

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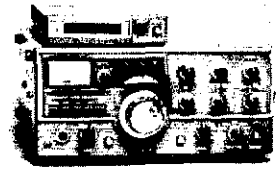

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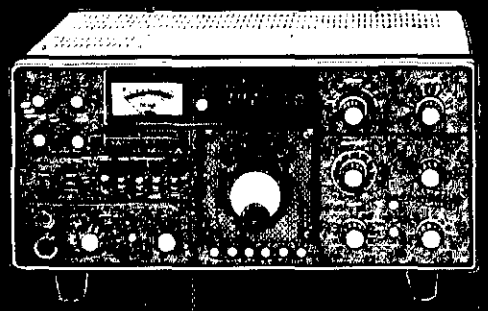

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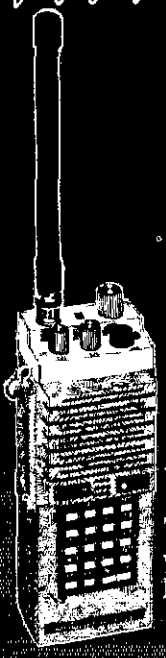

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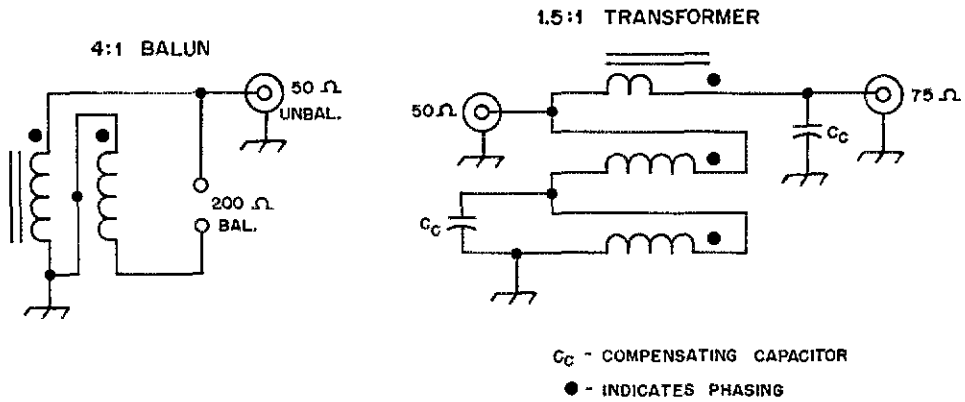
UNMASKING THE BALUN TRANSFORMER



Unfortunately, there seems to be a lot of mystery about balun transformers among radio amateurs. The word "balun" is derived from the expression "*bal*anced to *un*balanced." In effect, we can think of the device as a transformer that lets us go from a single-ended to a push-pull condition. A balun is not a "baylun," a "bal-oon" or a "ballum," although these terms are frequently tossed around by amateurs. But, more importantly, a balun does not function in the intended manner unless certain conditions are met. It is not a magic panacea for a host of antenna ills, nor is it shrouded in Black Magic.

If, for example, we elected to place a balun at the balanced feed point of an antenna that exhibited a characteristic feed impedance of 200 ohms, we could take advantage of the 4:1 transformation ratio and match the antenna to a 50-ohm unbalanced transmission line, such as RG-8/U cable. The balun will perform this desired transformation only if the antenna presents an *exact* 200-ohm load to the balun. There are very few antennas that present a constant feed impedance over a wide frequency range. Normally, the desired impedance occurs at a frequency where the VSWR is 1:1. The farther we move the operating frequency from that ideal VSWR point, the greater the mismatch in the system. For example, if the antenna feed impedance looked like 150 ohms at a specified frequency in its operating range, the step-down would be 150/4, or 37.5 ohms — hardly a correct match to 50-ohm coaxial cable! Under extreme conditions, such as we would encounter in a narrow-band antenna system (80-meter dipole for one), a balun can cause more harm than good. At high VSWR levels it can saturate (assuming it has a ferrite core) and seriously degrade antenna performance. Saturation of the core also generates harmonic currents and TVI may result. It is vital, therefore, that the balun core be of sufficient gauss rating to withstand high levels of developed rf voltage in order to prevent saturation at the highest anticipated rf-power level.

If a balun is used in a multiband antenna system, it must have a bandwidth characteristic that enables it to operate correctly at all frequencies of interest. A good design requires proper core selection and winding techniques: We dare not be casual when making a homemade balun.

Unbalanced-to-balanced broadband transformers can also be used in antenna systems to effect transformation ratios other than 4:1. The 1981 edition of *The ARRL Radio Amateur's Handbook* (chapter 19) shows how to make a high-power broadband transformer that will permit us to use CATV Hardline (75 ohms) when using a 50-ohm system (1.5:1 transformation ratio). There is also a substantial amount of information in that part of the volume concerning baluns of assorted styles. You can make your own easily, but the bottom line remains the same: A balun or broadband matching transformer can only achieve its design objective if it is terminated by the load it was intended to accommodate. Any significant departure from that condition renders the transformer ineffective with respect to its purpose. If you haven't picked up your copy of the 1981 *Handbook*, now is the time! — *Doug DeMaw, W1FB*

For more information about *The 1981 Radio Amateur's Handbook*, see page 133 of November 1980 *QST*. To order, see page 132 of this issue.

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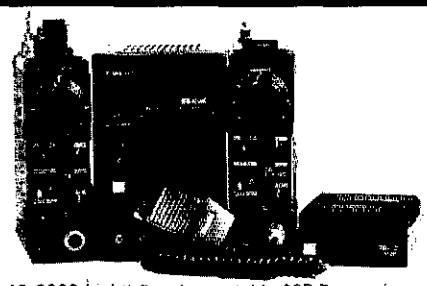

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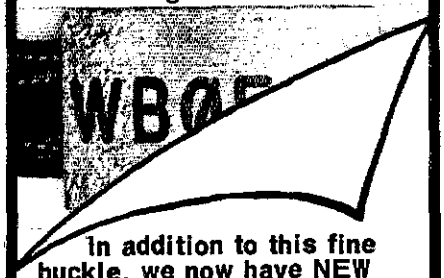

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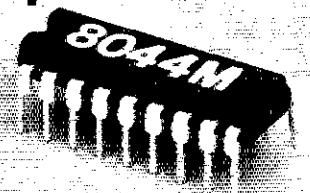

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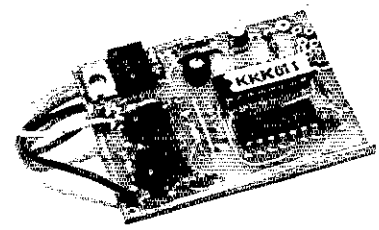

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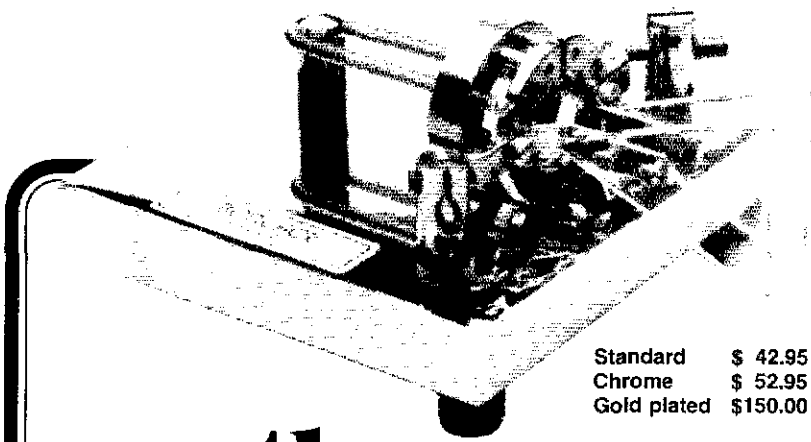

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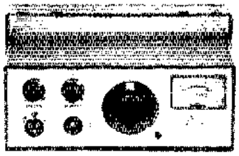

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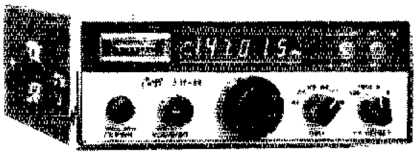

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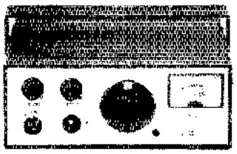

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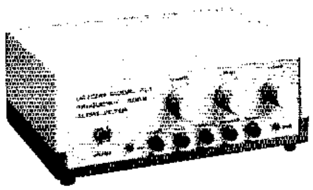

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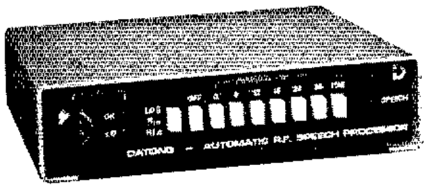

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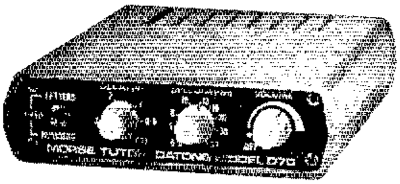

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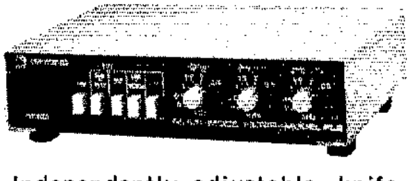

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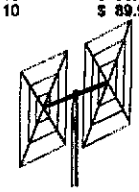

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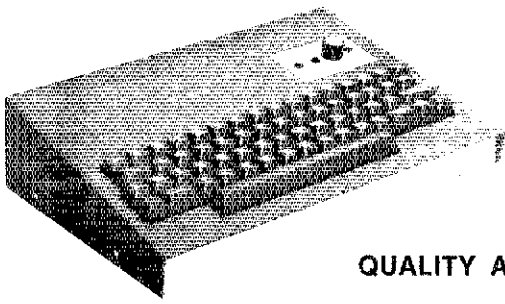

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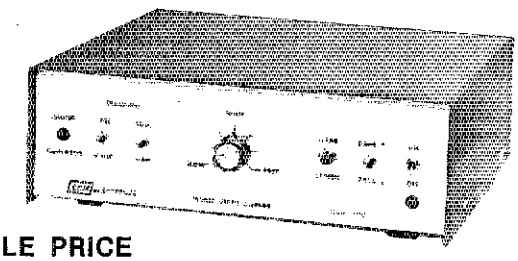

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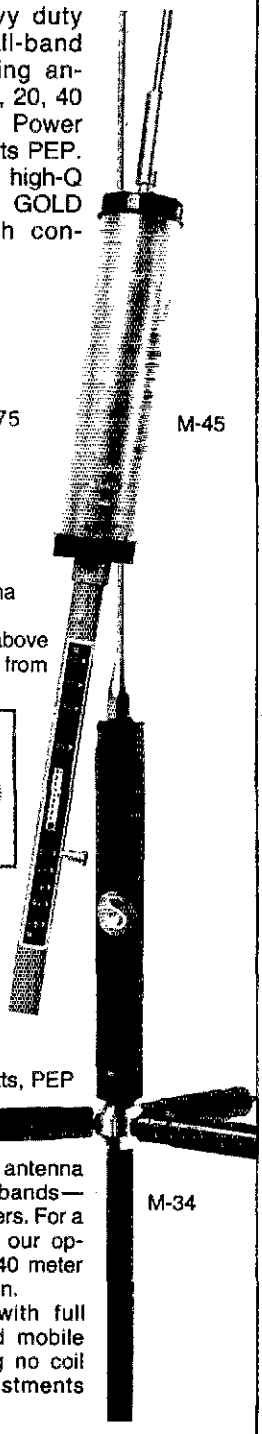

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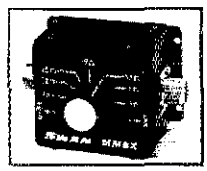

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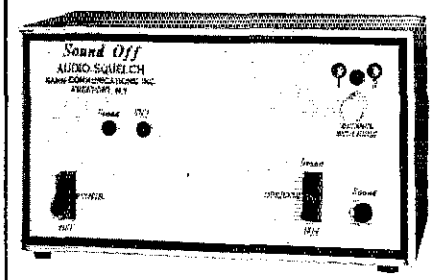

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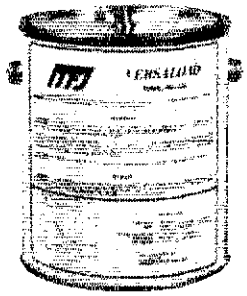

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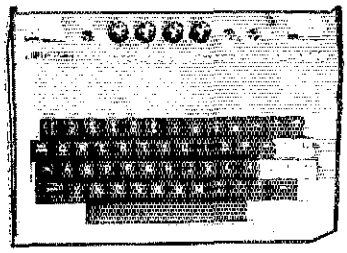

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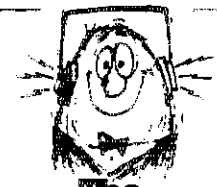

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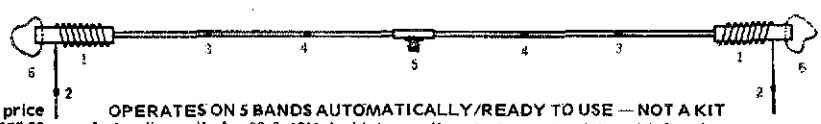

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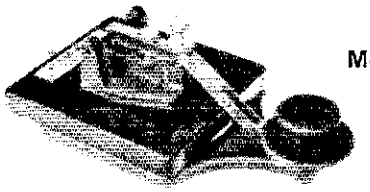

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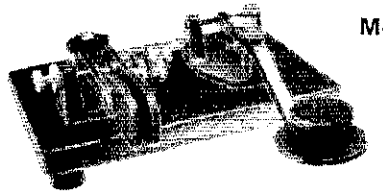

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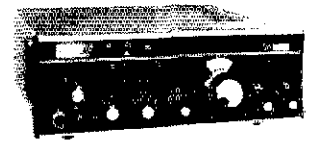

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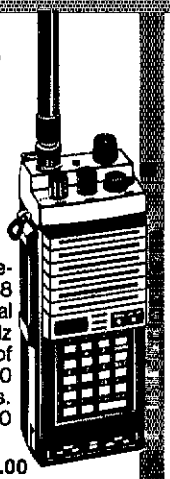

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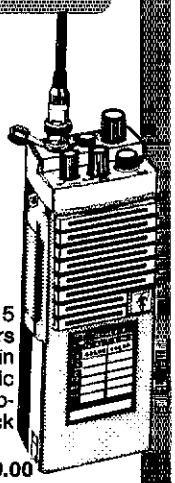

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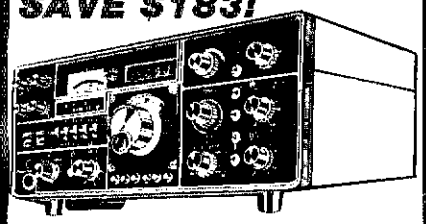

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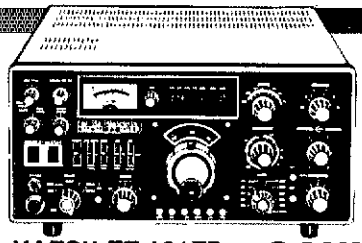

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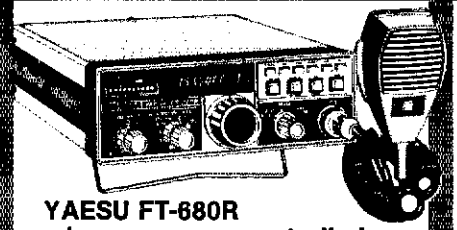

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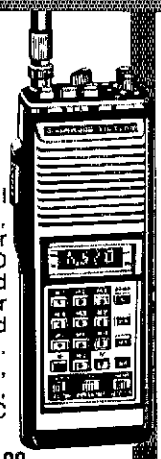


KENWOOD TR-2400 synthesized 2m hand-held transceiver

Features LCD digital readout, 10 memories, auto and mode switch for standard repeater ±600 kHz, offset, simplex, and nonstandard repeater splits. Has touch tone pad selection of 5 kHz chs. from 144 to 148 MHz, MARS 1.5 W., RF output, NiCad battery pack and AC wall charger.

349.10 List Price 395.00

KENWOOD

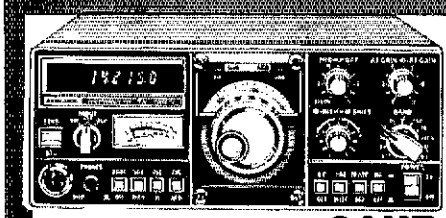
KENWOOD Accessories for the TR-2400

SMC-24 speaker mic	**29.95**
PB-24 NiCad battery pack	**28.00**
ST-1 base stand	**84.95**
BC-5 DC quick charger	**39.95**
LH-1 leather case	**34.95**
MC-30S dynamic mic, 500 ohms imp	**29.00**

KENWOOD TR-9000 2-meter all-mode transceiver

Covers all 2m freq. plus MARS and CAP freq. 143.90 thru 148.99. Features digital dual VFOs with selectable tuning of 100HZ, 5kHz and 10kHz, 5 memories; auto busy stop scan and free scan, RIT, noise blanker and AGC. RF power output: Hi (SSB, FM, CW) -10W, Lo (FM, CW) - 1W 13.8 VDC. PS-20 AC power supply optional.

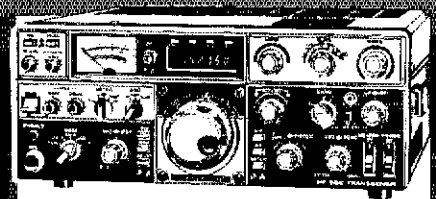
449.95 List Price 499.95



KENWOOD TS-130 S HF SSB transceiver **SAVE $76!**

This compact, solid state transceiver covers 80 thru 10 meters (including 3 new bands) on SSB and CW. Has built-in speech processor, IF shift, noise blanker, X-tal calibrator, VOX, RF attenuator, and analog and digital readout. Weighs only 12 lbs. 13.V DC. MB-100 mount optional.

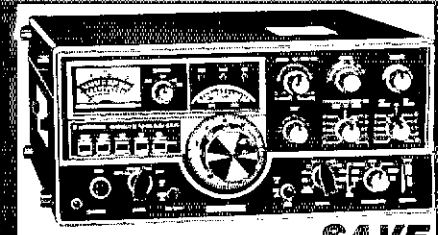
683.95 List Price 759.95



KENWOOD TS-830S high performance SSB/CW transceiver **SAVE $93!**

Covers 160-10 meters (SSB and CW) including 10, 18, and 24 MHz bands. Features variable bandwidth tuning, IF filter and IF shift, noise blanker, speech processor, digital freq. readout and 6146B final tubes. Self-contained AC power supply runs off 110 or 220 V. 220 watts PEP.

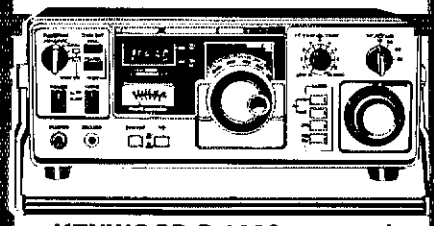
836.95 List Price 929.95



KENWOOD TS-520SE HF transcevier **SAVE $80!**

200W. PEP SSB, 160W., DC CW, 160-10 meters, noise blanker, AGC, RIT, 8 pole crystal filter, built-in calibrator, VOX, PTT, speech processor, semi-break-in CW with sidetone, 20 dB RF attenuator and built-in speaker.

566.96 List Price 629.95



KENWOOD R-1000 compact communications receiver

Covers 30 bands for 200 kHz to 30 MHz. Features PLL synthesizer, digital display quartz digital clock with timer. RF attenuator, noise blanker, IF filter, and built-in speaker. AC power 100, 120, 220 or 240 VO. Has calibrated S meter and AF gain control. LSB/CW, USB, narrow AM or wide AM.

449.96 List Price 499.95

SAVE $50!

KENWOOD TR-8400 synthesized UHF FM mobile transceiver

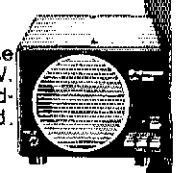
The small (5" x 2" x 8") TR-8400 covers 440-450 MHz. Has 5 memories, dual VFO's with memory scan. LED bar meter. Output power 10W or 1W switchable. Requires 12VDC.

449.95 List Price 499.95

KENWOOD SP-180 external speaker

A matching speaker for the TS-180S. Max. input: 2W. 8 ohms impedance. Headphone jack included.

69.95



SAVE $17!

KENWOOD VFO-180 remote VFO

Provides split frequency operation for the TS-180S. Features RIT control and covers 50 kHz above and below each band.

161.96 List Price 179.95

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IN ALABAMA CALL 1-800-292-8668 9 AM TIL 5:30 PM CST, MONDAY THRU FRIDAY

STAY TUNED WITH MFJ!

SAVE $15!

MFJ 410 "Professional Morse" random code generator/keyer

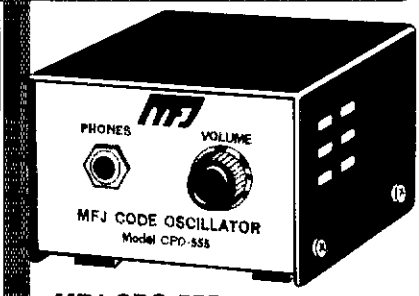
The 410 sends out unlimited supply of precision morse code in random groups. Send alpha only or alphanumeric. Full feature keyer with speed readout (5-50) WPM). AC adaptor optional 7.95

134.95 List Price 149.95

MFJ-408 deluxe Electronic Keyer II with speed readout

Read up to 50 WPM. Has socket for Curtis memory, random code generator & keyboard. Uses Curtis 8044 1C & features dot-dash memories, weight, speed, volume, tone controls & speaker. Sends iambic, auto., semi-auto. & manual. RF proof keying. Battery operated. 2.5 mm phone jack for external power. (6-9 VDC) Optional AC adaptor.

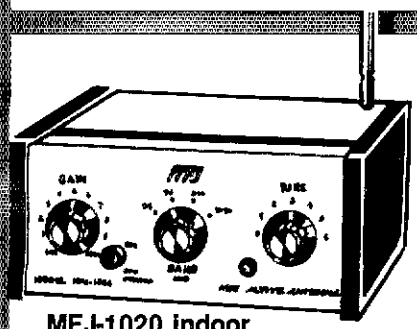
79.95



MFJ CPO-555 code oscillator

Send crisp clear code with plenty of volume. Features self contained speaker, tone and volume controls. Uses 9V battery and 555 IC timer.

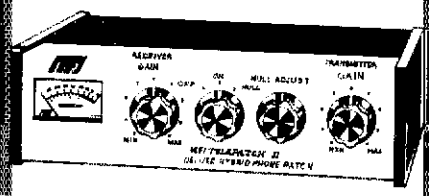
17.95



MFJ-1020 indoor active antenna

Minimizes intermod, provides RF selectivity and reduces noise. Can be used as preselector for external antenna. Covers 300 kHz. 110 VAC, 9-18 VDC or 9V battery.

79.95



MFJ-624 telephone patch

The MFJ-624 is a telephone patch for crisp, clear audio. Features VU meter monitoring line level and null adjustment.

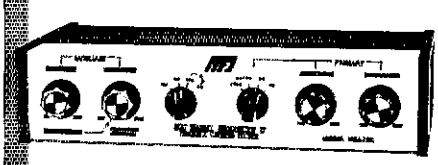
59.95

SAVE $11!

MFJ 525 Speech Processor

Plugs between mic and rig. Has VU meter, 4 pin mic jack, 6 db SSB power, bypass switch. 12-18 VDC or optional AC adaptor.

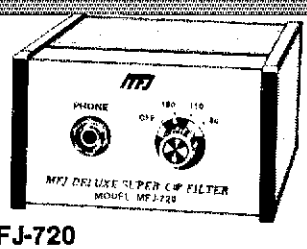
107.96 List Price 119.95



MFJ-752 dual tunable SSB/CW filter

The primary filter lets you peak, notch, low pass, or high pass signal. Features switchable noise limiter, 100 V AC adaptor supplied. Works on any rig.

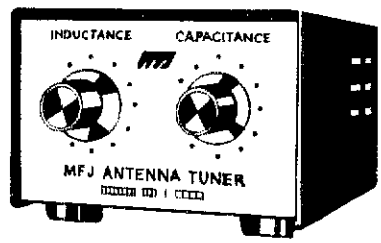
89.95



MFJ-720 deluxe super CW filter

For the ultimate in performance. Features 80 Hz CW filter, SSB filter, and selectable peak and thorough noise limiting. Plugs into phone jack and has 2 watts per speaker. Speaker and phone jacks, inputs for 2 rigs and aux. 2 watt amp. 20 db. Requires 9-18 VDC.

44.95



MFJ 16010 random wire tuner

Up to 200 W RF output. Match high and low impedances by interchanging input and output. SO-239 connectors. Ultra compact 2" x 3" x 4".

32.95

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Long's Electronics

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ACCESSORIES FROM LONG'S

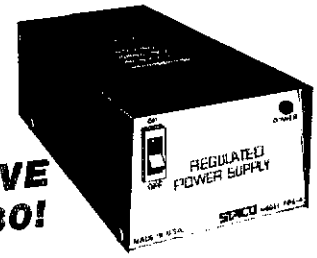
DRAKE TV I filters

TV-3300-LP low pass filter. Attenuation: better than 80dB above 41 MHz, 200 W PEP, SO-239 connectors. **26.60**

TV-42-LP TVI filter a four-section filter attenuation in all TV channels for transmitters operating at 30 MHz and lower. Rated 100 watts input. . . **14.60**

TV-300-HP high pass TV filter. Attenuation: 40dB at 52 MHz & lower for use with 300 ohm twinlead . **10.60**

TV-75 HP high pass TV filter. Same as above except for use with 75 ohm TV coaxial cable. TV type connectors installed. **13.25**



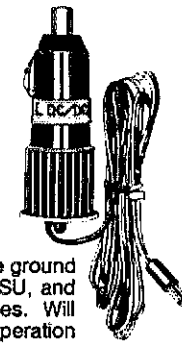
SAVE $30!

STACO RPS-4 power supply

Converts standard household voltage (120 AC) to 13.8 V DC. Fully regulated and filtered. Features overload and short circuit protection. Thermal protected. Output 13.8 V DC.

19.95 List Price 49.95

CALL TOLL FREE!



L & L DC/DC auto charger

12/15 volt negative ground for Kenwood, YAESU, and ICOM handie talkies. Will charge and allow operation while mobile.

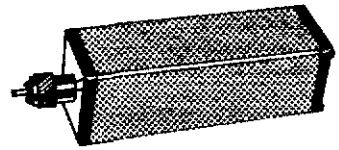
21.95

SAVE $49!

TURNER 450D dynamic mic

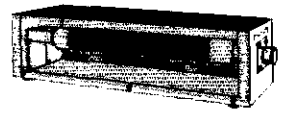
This low impedance (200 ohms) noise cancelling mic features a frequency response of 100-8,000 Hz. 4-conductor, 2 shielded 5 ft. coiled cord with spring strain relief.

25.50 List Price 75.00

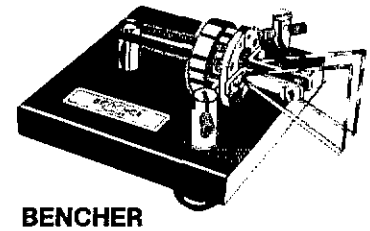


DRAKE dummy loads

DL-300 dry dummy load requires no oil, 300 W and PL-259 coax connector. VSWR 1.1:10-30 MHz 1.5 max, 30-160 MHz. **26.95**



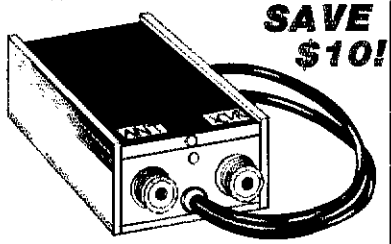
DL-1000 dry dummy load with 100W for 30 sec. with derating curve to 5 min. VSWR 1.5:1 max. 0-30 MHz SO-239 coax connector. **53.00**



BENCHER iambic paddles

BY-1 with solid silver contact points, full range adjustment, non-skid feet and heavy steel black textured base. **42.95**

BY-2 has all the features of the BY-1 but has a chrome base. **52.95**

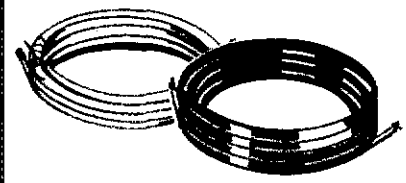


SAVE $10!

KLM PA2-25B 2m power amplifier

The PA2-25B gets you mobile with a big boost in power! Covers 144-148 MHz, FM and CW. 2W in./25W out. 4W in/35W out typ. SO-239 connectors, VSWR 1.4:1 or less, 13.5 VDC. Small size 1½" x 2½" x 4½".

89.95 List Price 99.95

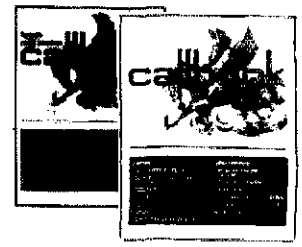


WEST PENN WIRE CO. coax and rotor cable

810 RG-8/U 52 ohms impedance, foam dielectric. 95% braid. Center conductor standard 7 x 20, 11 AWg . . . . . **28¢ ft.**

812 RG-58/U 52 ohms impedance, foam dielectric. 95% braid. Center conductor standard 19 x 32, 20 AWg . . . . . **15¢ ft.**

387 8-conductor rotor cable 8-22 AWg conductors, 2-18 AWg. . . **21¢ ft.**



DX Callbook- 1981 ed. contains listings for foreign Radio Amateurs, their addresses and call signs, license class, postal information and more. **16.95**

U.S. Callbook- 1981 ed. contains listings for U.S. Radio Amateurs, their addresses and call signs, license class, time charts and more. **17.95**

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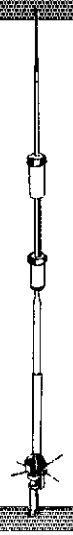
SAVE $12!



MOSLEY RV4C vertical antenna

Covers 10,15, 20 and 40 meters. 2000W PEP. This low angle, omni-directional has ¼ wave length, automatic band switching VSWR 1.5/1 or better and surface area of 2.049 sq. ft. 22 ft. high. 52 ohms imp. Add 75/80 meters with the optional RV-8C **39.50**

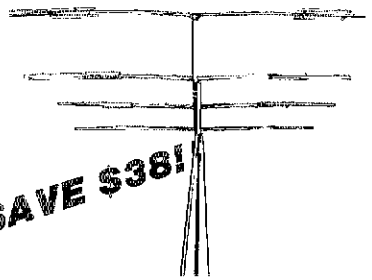
69.95 List Price 82.00

SAVE $122!

MOSLEY CL-36 6-element beam antenna

Covers 10, 15 and 20 meters with 2KW PEP and wind survival of 80 mph. Automatic band switching by means of high impedance "Trap-Circuits".

269.95 List Price 392.75

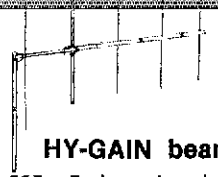


SAVE $38!

KLM KT-34A tribander

Frequency 20, 15 and 10 meters. Feed impedance 50 ohms unbalanced. 4 elements on each band with a power rating of 4 KW PEP. Wind survival 100 mph.

350.95 List Price 389.95



HY-GAIN beam antennas

205- 5-element antenna with end mount configuration and coaxial balun. Boom length 6.25 ft., longest element 3.28 ft. surface area .74 sq. ft. **21.95**

214 2m 14-element antenna with high efficiency coaxial balun. Boom length 15.5 ft. Longest element 3.3 ft. Surface area 1.65 sq. ft. **34.95**

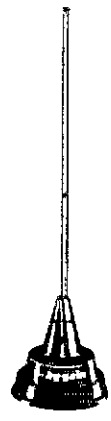
cushcraft

AEA

CUSHCRAFT ARX2B VHF AM/FM antenna with ¾ wavelength decoupling section for increased gain and feed line isolation. Freq. 137-160 MHz. VSWR 2:1, 100 W. matched to 50 ohm imp. **44.95**

AEA 144 isolole VHF antenna. Freq. 135-160 MHz. VSWR 2:1, bandwidth 8 MHz @ 146 MHz. 50 ohms imp. 1000W Length 125.5 in. **49.95**

hy-gain



HY-GAIN 287 hy-bander mag mount fold over antenna

5/8 wave design provides low angle radiation for maxium gain. Ratchet foldover adjust thru 180° arc and will hold its position up to 120 mph. Less than 1.4:1 VSWR, 144-148 MHz, 150W and DC grounded.

19.95

USED HAM EQUIPMENT

KENWOOD

KENWOOD TS-820S **749.00**
KENWOOD TR-2200A (new) . **189.00**
KENWOOD PS-5 . . . . . **49.00**

DRAKE

DRAKE SPR-4 . . . . . **399.00**
DRAKE TR-4C **399.00**
DRAKE T4XC **399.00**
DRAKE R4B **349.00**
DRAKE 7075 . . . . . **20.00**
DRAKEDC-4 . . . . . **74.95**

YAESU

YAESU FT-101E **599.00**
YAESU FTV-250 . . . . . **189.00**
YAESU FRG-7 . . . . . **239.00**
YAESU FT-221R **399.00**

ICOM

ICOM IC-21A **179.00**
ICOM DV-21 . . . . . **129.00**
ICOM IC-3PA **49.00**
ICOM IC-245/SSB (new) **454.00**
ICOM IC-21 (demo) **579.00**

DenTron

DENTRON tuner with mtr. **229.00**
DENTRON super super tuner . **175.00**

AND OTHERS

TENTEC Omni A (demo) **725.00**
REGENCY HR-312 . . . . . **222.00**
REGENCY AR-2 (new) **69.00**
TPL 750 (new) **299.00**
TPL 350 (new) **139.00**
COLLINS KWM-2 . . . . . **575.00**
COLLINS 516E-1 . . . . . **69.00**
COLLINS 312-B4 . . . . . **199.00**
COLLINS PM-2AC **125.00**
COLLINS CC-1 case **69.00**
COLLINS 30L-1 . . . . . **599.00**

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ENTIRE STATION for sale — Yaesu FT-901 D.M., SP-901, with filters, Heath SB-220 with 10 meters, Dentron Super, Super Tuner, Drake dry dummy load, FT-101 recv with filters, radio desk. Tristao CZ-454 tower with HD motorized winch. Telrex TB5EM, Ham III, perf cond all. Taking bids. Barry WB2ESL 516-922-6163.

WANTED: Collins 30L1, 30S1, KWM 380, F455J05 (75A4), 4CX1000A, Telrex monobanders. W9QYH, 1605 Ridge Road, Green Bay, WI 54304.

COLLINS S-line station, used very little. 75S-3B S-17095, 32S-3 S-101735, 516F-2 w/spkr, all round emblems, manuals. Will pay shipping in 48-USA in original factory cartons. Complete $1,200. K6LOS 214-856-5874.

COLLINS 75S-3B (winged) mint condition, $390. Collins 500Hz filter, $65. W4VCI, 509 Orange Lawn, Valrico, FL 813-689-6504.

SELL Comtronix FM-80 complete rig. $180. Call evenings, David K2CQV, 914-268-6937.

DRAKE TR-4C with noise blanker, AC-4C power supply, RV-4C V.F.O. Extra set of finals, Mint condition $550. WB9AAQ 18527 Rose Street, Lansing, IL 60438 312-474-0705.

SELL: Collins 75S-3B winged 500 cps filter and speaker Collins modifications to present specifications $495. WB2NDL 7 Thorn Place, Spring Valley NY 10977 914 356-3732 evenings.

FOR SALE: Mod 14 reperf, Mod 14 TD K7UXB.

COLLINS 75S3-B mint, like new condition; $475. Fred Maas WA5YTX, Rte. 3 Box 88-H, New Mexico 87501.

HT: Standard 146-A. Factory modified for 52/52 and 147.81/21. Ten pairs crystals. Charger, case, antennas. $175. W2HDN, 516-997-4625.

TEKTRONIX triggered laboratory oscilloscopes, fine condition: Model 545 $350, 531A $275, 315D $175. Fred, WA2BJZ, 201-257-8753 eves., 609-734-2160 days.

WANTED: Drake MN-2700 tuner. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

ICOM IC2AT: With ICHM9 speaker microphone, A.C. adapter charger, ICDC1 D.C. converter, KLM 2 meter amplifier, 1 watt in 25 out, package deal only $340. 914-753-5223.

2-Meter synthesized transceiver, 10 watts, made by Yaesu for Sears, $160. signal generator, HP-608C, (TS-510), 10-440 MHz, $180., WB4OTQ, 241 San Juan, Melbourne, FL 32935 305-254-0112.

SELL Alda 105 solid state transceiver, 5 bands, 200W, $300. W4OMY 305-272-2176.

FOR SALE: or swap — Hammarlund super Pro receiver $60. Lafayette general coverage receiver $35. RCA-VTVM $15. ART 13 — transmitter $35. Marine transceiver $35. Ken-Hand WB2EUF — P. O. 708- East Hampton NY 11937.

SALE: Murch Ultimate tuner, UT-2000-B. Real mint, like brand new, few hours use. $175. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

YAESU FT101F, mint condition, ssb/cw filters Yaesu desk mic., SP101PB spkr/phone patch. $600 plus shipping. Dentron GLA1000 amp. with 10 meters. $240 plus shipping. Rick, KB5FN, 713-944-9867, Box 34884, Houston, TX 77034.

WANTED: Collins KW-1. Chuck, Box 766, Dahlgren, VA 22448.

HEATH HW-101 transceiver, HP-23B power supply, cw filter, manuals, $345. Hallicrafter SX-101A, $150. W1GVL, 255 Emerson Rd., Lexington, MA 02173. 617-861-0044.

COMPLETE STATION, all in original boxes with cables and manuals in mint condition. TS-520 with cw filter and digital adapter kit installed $550, DG-5 digital readout $150, AT-200 antenna tuner $100, VFO-520 remote VFO $100, SP-520 speaker $20, Turner 450C mic $15, Dentron MLA-2500B $675. WB9FLW 35 Norspur, Rt. 4 Edwardsville, IL 62025.

DRAKE SW-4A $210. Allied/Realistic A-2516 (am-ssb-cw) $110. Both preselector operated. Like new. Postpaid. Patrick Matthews, White Oak, SC 29176.

DRAKE R4 $185, R390A $275, Ham 3 $75, Ham 3/tailtwister control $35, 1/2" Andrews Heliax w/connectors, HR2 $90. W9ZR 1-414-532-6643.

SELL: Collins R-390/URR receiver plus C-2019A/GR control group. In cabinets. Work great. $350. Pick up only. Van, K2AHJ, Valley Stream, N.Y. 516-825-3545.

TEN-TEC 540 with noise blanker and cw filter, Model 240 160M converter, and 252 M powersupply. Very clean $600. Clark Fletcher WA5KCZ 214-593-3954.

SSTV-complete station. SBE Scanvision monitor, camera, recorder. $295. D104 amplified mike $25. Mike Aldrich KA2BWT. 2 Rod Rd., Marilla, NY 14102 716-652-7680.

DRAKE R4C with nb, extra extals, T4XC with spare finals, AC-4 MS-4, latest factory installed mods, cartons, manuals, ex. cond. $875. K1ZDI 2 Aglipay Dr., Amherst, N.H. 03031 603-882-8896.

SSTV W6MXV P7 monitor, fast slow converter, WB9LVI slow fast converter, W9LMD key board, fast slow convertr boards, RCA 501 camera, W1ZX/3 301-645-5584.

EXPERIMENTES KIT — Iron powder toroids. Includes one T25-12, T80-2, T106-2; two T25-6, T37-6, T50-2 T50-6; three T68-2 plus winding chart, applications information and toroid data. $7.50 plus $2 shipping U.S. and Canada. Palomar Engineers, 1520-G Industrial, Escondido CA 92025.

BULLETIN

WHY PAY MORE?

We've said it all before . . . and, we'll say it once again.

DEAR OM:

There are TWO IMPORTANT FACTORS in any purchase of ham radio equipment— the PRODUCT and the DEALER.

Did you ever wonder "WHY" most major manufacturers market their products through a DEALER network rather than selling on a "DIRECT" basis? The answer, quite simply, is "S-E-R-V-I-C-E!"

Hence, at BURGHARDT AMATEUR CENTER, we not only stock and sell TOP-QUALITY BRAND/NAME merchandise — we also fully "GUARANTEE" and "S-E-R-V-I-C-E" what we sell — and many that we don't.

Let's face it! We could just as easily offer "liberal" discounts or "cash-and-carry" incentives in order to increase sales and attract more customers — like YOU — but . . .

If there's one lesson we've learned in over 43-YEARS of serving this nation's ham radio operators, it's that — above all else — THERE IS NO SUBSTITUTE FOR GOOD "S-E-R-V-I-C-E!"

Long after the price you pay has been forgotten, the kind of TREATMENT you received — before, during and especially AFTER THE SALE — is what really sticks in your mind.

And, that is, "WHY" we don't pretend to be "Big Operators" or "Wheeler-Dealers" but choose instead to offer FRIENDSHIP, PERSONAL "S-E-R-V-I-C-E" & RELIABILITY to our customers.

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THE POINT IS: Our prices on new and used equipment are NOT the "lowest in the land" because WE KNOW — and YOU know — that "THERE'S MORE TO A 'GOOD DEAL' THAN JUST THE 'LOWEST' PRICE!"

In the final analysis, the quality or value of any product is only as GOOD as the "REPUTATION" of the DEALER standing behind YOU and your purchase.

At BURGHARDT AMATEUR CENTER, WE WANT TO TAKE CARE OF YOU by providing the "BEST" possible "S-E-R-V-I-C-E" for your dollar. And, thus, it is OUR POLICY to only sell "quality" merchandise at "fairly" established prices.

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MOTOROLA ht (Mod 100?), half size ht, 2 ch, 19/79, 52/52, whip and duckie antenna, good cond, $275. Glen, AH6BF, 5197 Iroquois Dr., Ewa Beach, HI. 96706. 808-499-2825.

FOR SALE: QST & 73 1971-1979, Kilobaud 1977-1979, National Geographic 1965-1979, $3. per year plus postage. K1APA, 3 Sunny Acres, Brattleboro, VT 05301.

WANTED: SW3. State condition, coils, minimum price first letter. No dickering. All responses answered. W8OZA.

BUILD antenna tuner from brand-new ARC-5 transmitters. Conversion data included $18.95. Send for Gov't. surplus catalogue 50c. G & G Radio 45-47 Warren Street, New York, NY 10007 212-267-4605.

SWAN 350, ac supply w/speaker, dc module, just factory aligned, spare finals, $350. WBØRLD 12648 N.E. 109th St., Kirkland, WA 98033.

COLLINS 75S-1 $250. 32S-1 $250. 312B-4 $175. KAØHPH, 1-612-222-4241.

TOWER, Heights Model CUA-64, 64 foot 12 sq. ft., SOFOK motorized tilt-over base with TowTec winch and CDE T2-X rotor. $2000 Rick Berg, WA2RLQ, 716-544-0776.

FOR SALE: R390A, mint condition, used only approx. 50 hours, with manual. $450. ssb/fm receiving adaptor for R390A (for sale only with R390) $60. N1RM, 4 Maple Lane, Brookfield, CT 06804. 203-775-4061.

ANTIQUE Hallicrafters "Sky-Buddy" receiver annd R-42 speaker (mate for SX-42). WØPUL, 316-624-3988.

DRAKE R4B, T4XC, AC4, MS4, W4, cables, manuals, excellent. $790, write WD9IGJ or call 414-273-3652 mornings.

YAESU FL2100-F linear with 10 meters, excellent condition, $300 KB9OF, John Bayne, 3912 Rugen Rd., Glenview IL 60025.

WANTED: Collins 455 kHz mechanical filters, F455 variety. Give me bandwidth, condition and price. Paul Sexauer, W9JTO, 515 Lee Road, West Chicago, IL 60185.

ANNOUNCING a new Ham Radio recognition and reference volume. "Who's Who In Amateur Radio." Details s.a.s.e., Users International Radio Clubs 606 Brack Rd., Ft. Pierce, FL 33450.

DRAKE T4XC, R4C with 1.5, 500, 250 filters n.b. AC-4, DC-4, MS-4 speaker $830. HQ-1 Mini Quad, $90. 80-10 mtr linear mobile 12V Bob KA2ILD P.O. Box 112, Elmwood Pk., NJ 07407 201-772-2388.

SELLING: TS-820 w/DG-1 and cw filter installed. Instruction and service manuals. Xlnt condition. $650, U-pay UPS. Moe Joffe, 7259 Willoughby Ave., Los Angeles, CA 90046.

NCX-3, NCX-A power supply, $200. WA9TFB 309-662-8210.

ATLAS 210X, Shure 414 mic, excellent condition $450. WB5OCL P. O. Box 61353 Houston, TX 77208.

HEATH SB-101 transceiver, HP-23 ac supply, SB-600 spkr. SWR meter $400; HW-12A transceiver, HP-23 ac supply, HP-13 dc supply $175. WB2DFK, 20 White Birch Dr., Guilford, CT 06437.

FOR SALE: Yaesu FTV-250 2mtr transverter with internal preamp. $200. Microwave Modules transverter 432-435 MHz 10 mtr. I.F. $200. Call 609-585-9011 after 5 P.M. WA2QZP.

WANTED: Antenna noise bridge. WA6JYD 707-539-3413.

BEST OFFER takes 40 years QST 1934-1974 Ham Radio. First issue 1968-1975 73 1965-1975. Also, two turn of century meters, Murdock spark gap, multiple crystal detector and many other antiques. S.a.s.e. for list. W1JRM, 67 Continental Drive, Portland, ME 04103.

NAVY RBC's (2) with 110-Vac power supply, cable and manual. All for $400. Also CU-168 couplers (2), both for $100. TDA-2 telegraph scope with manual $75. Shipping extra. Larry W8JYQ, 985 Richwood, Hamilton, OH 45013. 513-868-9131.

COMPLETE STATION Yaesu FT-101EE & matching speaker, Ameco PT-2 preamp Autek QF-1 filter Dentron MT2000A tuner watt & SWR meters Ten-Tec kewer KR20A Mosley TA33JR. Alliance H.D. ham rotor — best offer KA1BSA — 203-729-3557.

AR22 rotor $50, Heath HP13 mobile supply $70, Typewriter keyer with memory $100. WA6IGU 805-498-7251.

HEATH GD-1112 telephone amplifier, $15. Two 6-meter helmet receivers small 3/4 x 1-1/2 x 6, $15 each both $25. Microphone compressor as described in Nov. 1969 QST, $25. Add postage. David Rogers, 1807 Ashwood, Nashville, TN 37212.

SELL — Drake T4XB, R4C w/nb and 0.5 filter, AC4, MS4, manuals, spare finals, always factory serviced. $800 plus UPS. C.R. Tatman, WØPEL, 7920 Oak St., Arvada Co. 80005, 303-420-5529.

DRAKE C-line: R-4C w/nb, FL500, FL250; T-4XC; MS-4; AC-4. Mint condx. $1050. Jim AC4H, 214-722-9042.

HEATHKIT, as set only, transmitter DX60B receiver HR10B — no speaker. VFO HG10B with manuals. Ant. switcher, no manual. Best offer plus shipping. Dick KA3FRO 207 East Green St., West Hazelton, PA 18201.

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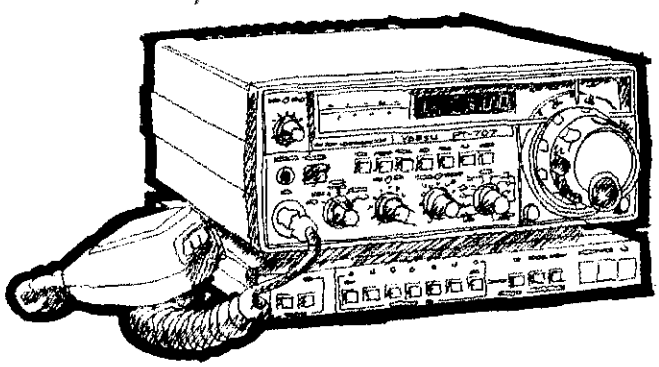

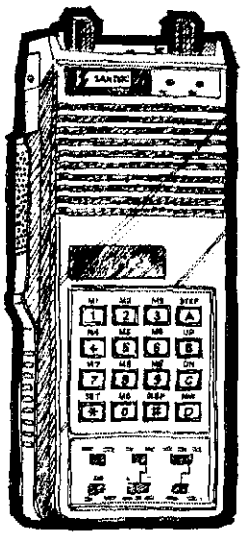

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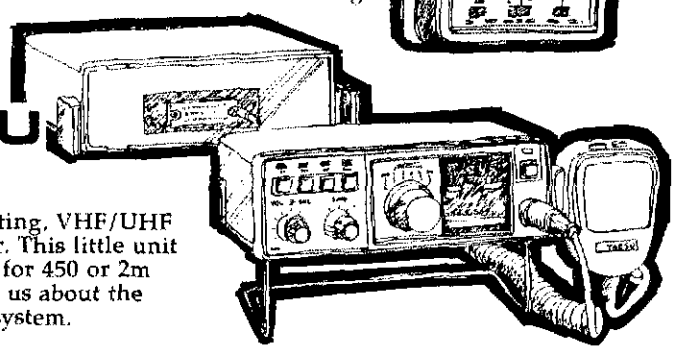

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SELL: 75A-4 3000 series, 3.1, vernier, clean, $375; R390A, $375; HX50, clean, 160m, $150; Swan 160X, 117XC, ICAF, $375; CE10B, $35; BC610E, $150; SP-200, $100; Pierson *KP81, $100; Viking II, VFO, $100; h.b. kW, 204TH, 6tt.* rack, spares, $300; 80m kW, 100TH's, 4 ft. rack, spares, $150; Telrex 3 el xmas tree, rotor, 58 foot HD CU, $950; 402BA, $150; 204BA, $150; 4 el 10m Finco $45; 180 foot H.D. tower, $1500; 80 foot towr, $500; Grebe Synchrophase console, $100; 6 foot rack, $75; Sorenson 115V ac regulator, $75. F.O.B. Want RG17 coax, 80m beam, 300 foot towers. K8CCV 216-427-2303 weeknights, 6-9PM.

KENWOOD TR-7600, like new $225 or make offer. Carl Morgan N5AOK, 1314 Oakbluff, Lancaster, TX 75146 214-227-7005.

WANTED: HW-22, P.S. 23, microphone, tube replacements, manual excellent to mint. W8LAO, Karel Slatmyer, Mattawan MI 49071.

FOR SALE: Infotech M300 $295, Curtis EK480M $65, 5R4 *silicon plug-ins $1.50, R-390A manual $6, Heath IT-5283* $25, HRO dial/drive $15, Collins 1.6 kHz/455 kHz c.f. mechanical filter $25. You ship. Paul K. Pagel, N1FB 4 Roberts Rd., Enfield, CT 06082.

ATLAS 350-XL, 350-PS power supply. Excellent condition, $700. WB2QMA, Box 6046, Lawrenceville, N.J. *08648, 609-896-0003.*

COLLINS: S-line: DX Engineering processor $60, F455FA08 $75, F455FA21 $50, F455J05 (75A4) $95, New 312B4 cabinet $25, New 51S1 PTO and meter, knobs, *overlays, etc. Schaaf, Box 301, DePere, WI 54115* 1-414-532-6643.

HEATH IO-101 color bar-dot generator/vector scope. Perfect working condition. $165. Phone K7GFL 209-582-3807.

YAESU 901DM, mint condition, $999, 607-669-4521, WA3EFE, Box 268 RD2 Park Ave., Binghamton, NY 13903.

SINGLE PHASE to three phase 230 Volt rotary converter. Will deliver well over 2kW PEP. Quiet and efficient. Nearly new. Cost approximately $400. Sell best offer. Bennett, W8BH, Rte. 1 Box 1030 Safford, AZ, 85546. 602-428-4477.

OMNI-C, brand new, warranty, with 1.8 filter, 255 P.S., $1195; Hy-Gain 10-15 meter beam, factory sealed carton, DB-1015A, $130; Alpha 77-SX, 6 months old, $4225; Signal-One CX-7A, $975; Wilson 10-15 meter beam, DB-33, $100; KWM-2 with PM-2, 312-B, $660; Homebrew 4-1000A amplifier, $700; N4WF, 217 Bluegrass, Hendersonville, TN 37075.

SELL TS820S w/cw filter, VFO-820, manuals, new finals, mint condx, newly aligned. $895. K8CSG, 14834 Falling Creek, Houston, TX.

WANTED: January 1930 issue of QST state condition and price. W1HZ 86 Whittemore St., Concord, MA 01742 617-369-2390.

HEATHKIT Microprocessor — EE-3401 course, ET-3400 trainer, ETA-3400 expansion accessory $250. HW-101, HP-23B, $325 402-475-2770. KØHKB, 5111 W. Mulberry Lincoln, NE 68522.

TRITON I with p/s, mint $275. Hallicrafters HT-32 with all crystals $180, Yaesu FT-650B six meter transverter, mint $110, Heath SB-500 two meter transverter $95, HA-201 10 watt two meter amplifier assembled, unused $30, *Hammarlund HQ-150 $125, Johnson 275 watt Matchbox $65.* Wm. Wallace, K8HYY, 122 Sperling Lane, Xenia, OH 45385.

SB102 cw/filter xceiver, HP-23B, supply-speaker. Exter*nal VFO SB640. Your freight $483. Manuals. Cope 5011 F* St., Little Rock AR 72205 501-666-7504.

YAESU FT101E, Spectronics DD-1, 3 microphones, excellent condition. $1,000. 203-421-3607. R. F. Tobey.

SALE: Drake R4-C receiver, with extra crystals, excellent — $400. Yaesu Memorizer, 2-meter, 10-watts, systhesized base with memory. $250 or best offer takes it. Autek QF-1 audio filter, $45. Call Jay, KD2L, 201-354-5860.

WANTED: Heathkit HW202, phone K7GFL, 209-582-3807.

EXCELLENT NOVICE or standby rig: Hammarlund HQ-110 rcvr and Heath DX-60B transmitter w/HG-10B VFO. All with original manuals and in excellent condition. Electronic T-R switch and other accessories included. $250. WB4IKO, 6416-F The Lakes Dr., Raleigh, NC 27609, 919-876-3387.

KENWOOD TR2200A: 11 xtal pairs; 12V p.s.; nicads, charger. Original owner. $165. Ed, WA3FSL, 215-777-9378.

YAESU FT901 DM transceiver. excellent condition. AF4K — 5131 Raywood Lane. Nashville, TN 37211.

FOR SALE: Heath receiver HR-1680 excellent $160, Hamtronics XV-2 2 meter transmitting converter $30. Tecraft 2 meter receiving converter $15. Cushcraft A432-20T $20. All with manuals. W1PV 203-792-2774.

SELL, Yeasu FR101D receiver, FL101 transmitter, *landliner, phone patch speaker with manuals and* original cartons. Mint condition. $700. Ron Crowe, KB5SZ, 713-962-0643, 3809 Lay Ave., Groves, TX 77619.

SELL: Drake TR33C 8 crystals $125, 2 meter KLM power *amp 10W/in 140W/out $125. Ten-Tec squeeze keyer KR40* $60. 2 meter Lunar preamp $30. OSI C4P computer 24K $700 K2USV 201-738-4696.

FOR SALE: Drake TR-4, MS4, AC4. $400 or trade for linear or 2m gear. Will deliver to 100 miles. Peter Murphy, N6CNY, 5475 Fruitland Rd., Marysville, CA 95901. Ph.: 916-742-1370 evenings.

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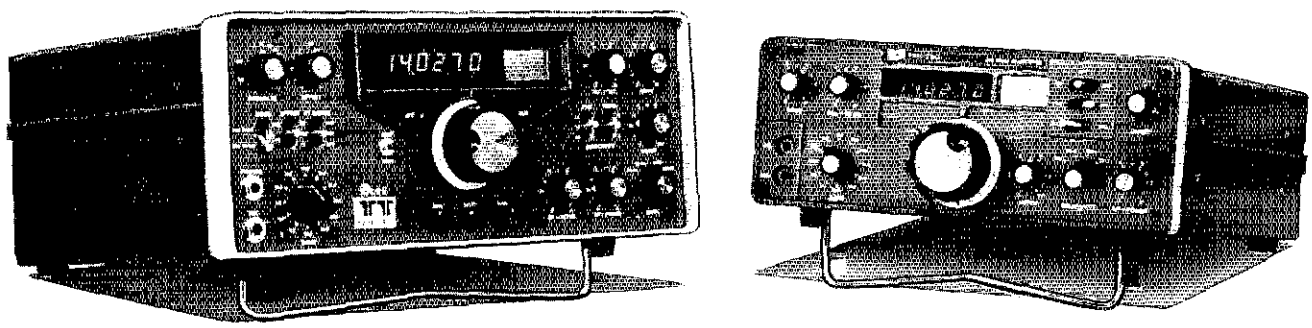

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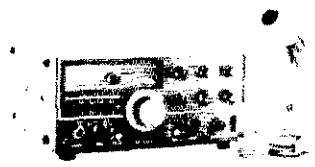

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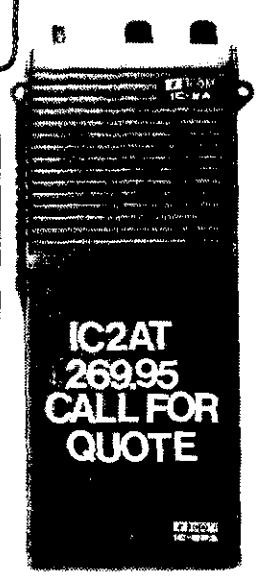

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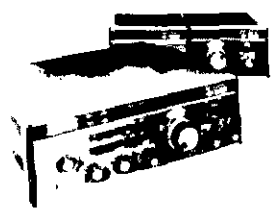

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No. of Cond. — 8
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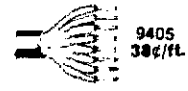
6-27 (7 × 79)
2-18 (16 × 30) (1.19)



9405 38¢/ft.

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2-16 (26 × 30)
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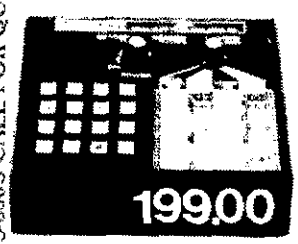

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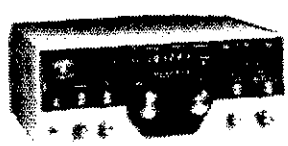

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DRAKE TWINS, T4X, R4, MN-4, MS-4, AC-3, manuals and cables. $625. 906-774-1169 AF8J.

DRAKE TR4-C transceiver, RV4-C remote VFO, 34PNB noise blanker AC-4 ac supply. TR4-C refurbished by factory about 1 year ago. All excellent condition. $548.73. I ship anywhere in 48 Peter O'Dell, AE8Q/1, Brian Rd., South Windsor, CT 06074. 203-555-1541 days, 203-644-3543 evenings before 10 and weekends.

QSTs for sale all issues nineteen twentytwo (1922) to date twelve QST binders best offer K2BRG, FOB 21 Liberty Street Westhampton Beach NY 11978. 516-288-2788.

SWAP? My Hallicrafters HT32 for Hammarlund HQ145/HQ180. Also trade Atlas 210X for 215X. WA9VLK 815-939-0036.

BUY-SELL-TRADE. Send $1. for catalog. Give name address and call letters. Complete stock of major brands new and reconditioned Amateur Radio equipment. Call for best deals. We buy Collins, Drake, Swan, etc. Associated Radio 8012 Conser, Overland Park, KS 66204 913-381-5900.

CRYSTALS: Build something — experiment. FT-243's General, Novice, any frequency, .01%, 7000-8700 kilocycles $1.50 minimum five $1.25 each. 3500-4000 $2.95, five $2.50. 160m $3.45, five $2.95. Sockets 50c. Airmail 20c per crystal. "Crystals Since 1933" WØLPS. Stamp for 1700-60000 kilocycles — listings-circuits. C-W Crystals, Marshfield, MO 65706.

SELL: Heath H-88-5 Cassette Interface, H-88-18 Cassette Operating System, cables, manual. $65. KA7V, 322 NW 18th Street, Ontario, OR 97914.

SIGNAL ONE CX7B — Cunningham's Personal CX7B, probably, nicest in existence, many special mods including plug in IC's and transistors, dual heat sinks, amber LED's, plus cw filter, very low time. $1195, Contact Jerry Gunsolley, 711 E. 21st, So. Sioux City, NB 68776 Ph. 402-494-4232 or 494-1507.

CONSOLE-TYPE desk kit, for ham gear. Unfinished, precut and drilled 3/4 inch plywood. Modern sloped design. $129. Plus shipping. For information or ordering write R. J. Mulrean, P. O. Box 10, Cornwall, NY 12518.

LINEAR: Two kW Dentron MLA2500, 160 thru 10, low hours, mint condition, going mobile $495 F.O.B. K4JK, 31 Sulphur Creek, Elkmont, AL 35620, 732-4575.

TR-7 OWNERS — Sherwood Engineering speech processor, Model 7-SP, mint, works great, $200. Bill Fowler, N8FB, 304-457-2859.

MY SURPLUS computer paper (both 14-7/8" & 8-1/2" widths), can be yours for $15 a box. (I bought too much) Call Van, WD8AAM, 1-816-429-6788.

HW101-WF with accpcps $350, HW2036A $130, Waters wattmeter $40, patch $25, Kentucky 606-887-1147 after 6. AG4A.

DRAKE RECEIVER SSR-1, .5-30 MHz, Mint. $225. W1WTF.

TEN-TEC Century 21, complete station $300. Argonaut 509, complete station $550. Heathkit, (basic five test instruments) $200. George Frainey, Box 64, Foresthill, CA 95631.

WANTED: Manual for DX60A. WA9SGA 454 So 20TH St. Terre Haute IN 47803.

SELL: Drake T-4XC and AC-4 in good condition $475, will ship. Also Heath AA-1640 audio power amp 200 watts per channel and AP-1615 preamp $500 pickup only WA2HAL 212-877-0980.

WANTED: Regency HR-2B KA8CSJ 616-746-4592.

SELL: ATLAS 210X 215X, $400 each; portable ac power supply for same $75. Microlog Morse-to-printing converter AVR-1 $200; video printer VM-12 $150. Plate transformer 7300 Volts, 3650 Volts each side center tap, weight 53 pounds, 6-1/2 x 8 x 9 inches $50. FOB K4EC.

SEARS 40 channel ssb-am 10m conversion. No time to use! Great condition, commercial conversion, $125. I ship U.P.S. Keith Arnold, 1273 Erickson Rd., Columbus, OH 43227.

COLLINS 62S-1 transverter, winged, new. Still sealed in plastic bag in original box. $1,000, will ship as specified collect. James Flynn, W5UMA, Box 193, Crawford, TX 76638.

QST: 1958 thru 1975. All like new, going to best offer. K4VIR.

ROBOT Mod-400, $500 TS-820-S mint $725, T368F/URT and BC-939-B both mint WB7ULN, 1-602-536-7202.

HEATH HW-8 w/HWA-7-1 p/s, mint, $100. BC-455B w/spare tubes, $25., Heath Sixer $12.50. Six-meter converter, etc. UPS extra. K4JCX 121 Maple, Oak Ridge, TN 37830.

TS-120S like new $500. WA1RQU 305-269-6820.

T4XC-R4C + power supply, all 160 + 10 meter xtals, noise blanker, 1.5 xtal filter, excellent condition $875 firm. Royce 40-channel Model 642. Sold new $545, sell $150. Callbooks: 1942, 1946, 1951, 1953, 1958, 1959, 1964. Xmitting tubes: 1625, 807, V7OD, 813, 4-125A + socket, 24G, T240, 2E26, 829B, 4-400, 805s + sockets, also many receiving tubes. Bendix TA12B. Pair Motorola portable Model H13/AH complete except batteries. WØRWC, 1-319-242-0591.

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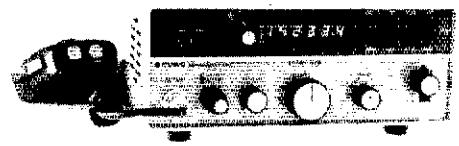

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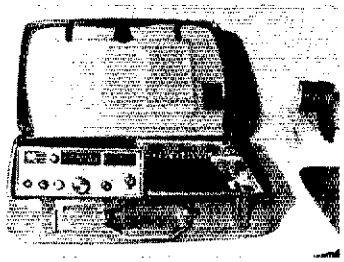

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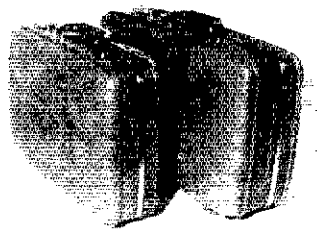

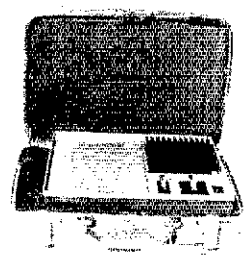

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DEAR FRIENDS;

THIS IS ONE OF THOSE LETTERS YOU ENJOY GETTING!

THE HEART OF MY NEW HAM STATION IS YOUR KLM-34A TRI-BANDER AND WOW WHAT AN ANTENNA!!!!!!

I'M 34, WAS A BROADCASTING ENGINEER FOR A FEW YEARS, BUT JUST GOT INTO HAM OVER THE SUMMER. MY TICKET CAME THE FIRST OF OCTOBER. THE FINE FOLKS AT AMATEUR ELECTRONIC SUPPLY HERE IN ORLANDO TALKED ME INTO A KLM-34A FOR THE TOP OF MY ROHN 25G 50 FT. TOWER. I BOUGHT IT AND WITH THE HELP OF 2 OF MY EMPLOYEES (NON-TECHNICAL PEOPLE I SUPERVISED AND ASSEMBLED) WE PUT IT TOGETHER. IT WAS WORTH IT!!!!! IT FEEDS DOWN TO MY KENWOOD TS-180'S TRANSCEIVER.

WITHIN THE LAST MONTH I'VE FILLED 6 PAGES IN THE LOG OF U.S.A. ALMOST TOTALLY, GERMANY, JAPAN, PERU, ENGLAND, FRANCE. I DON'T CHASE THE DX, IT CHASES ME! HEY, I'm ONLY USING 75 TO 100 WATTS!!!!!!

NOW UNDERSTAND, I'M A REAL LID (SO TO SPEAK, RANK NOVICE MIGHT BE A BETTER TERM) BUT THIS DOG GONE SYSTEM DOES THE JOB! I THOUGHT YOU GUYS WOULD LIKE THIS KIND OF FEED BACK.

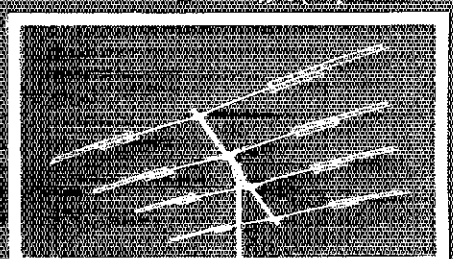
YOUR INSTRUCTIONS WERE GOOD, EASY TO FOLLOW AND I PUT IT TOGETHER EASILY. YEP, IT'S A DEVICE TO BUILD, TIME CONSUMING, BUT LOADS OF FUN AND WELL WORTH THE EFFORT TO DO. IT'S AN EDUCATION ON ANTENNA'S (BILL ORR EAT UR HEART OUT!). I MADE A SWING AND I'VE HOISTED IT UP THE J-POLE AND CLAMPED IT ON MY HAM IV.

BINGO!!!! SKIP THE QUADS (FLORIDA WX BLOWS THEM TO PIECES), FORGET A DIPOLE (IT HAS LESS GAIN THAN A BOX OF FIGURINES) TO HECK WITH VERTICALS (MAY AS WELL LOAD UP MY FISHING POLE), OTHER YAGIS ARE SECOND CLASS CITIZENS (COMPARED TO BIG MACS TO STEAK PORTERHOUSE) GIVE ME MY KLM-34A!

I GO UPGRADE THIS WEEK FROM NOVICE. YES, KLM GETS SOME OF THE CREDIT! NO, I WON'T GET A 34X KIT NOW, I'M SUITED & GOULONT HANDLE THE DX!!!! GIVE ME AT LEAST ANOTHER MONTH, O.K.!!!!!

SERIOUSLY, TNX FER THE ANTENNA, IT'S EVERYTHING YOU CLAIM AND DOGGONE NICE WITH MY SET-UP (SOLID-STATE TOUGH-GUY PROTECTION CIRCUITS) KEEP UP THE GOOD WORK — I'LL BUY KLM ALWAYS.

73s
Dennis



KLM's KT-34A

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FOR SALE: Hammarlund HQ129X, good condition $100 W9AYL 2003 Newton, Park Ridge, IL 60068.

ICOM CRYSTALS needed, these pairs: 07/67, 13/73, 04/64, 75/15, 96/36, 19/79 Will pay $4/pair. Pete Wang, 200 Blackstone Blvd., Providence, R.I. 02906.

FOR SALE: Heathkit HR-1680 receiver with station speaker. Assembled. $120. Mallinger, 129 Elatan, Pittsburgh, PA 15243.

YAESU FT-707 with 350 Hz cw filter and FP-707 power supply. $675. Yaesu FT-207R. $240 Ten-Tec Century/21. $235. All mint. WB7VOO, 602-298-4820.

QST, 230 issues since 1957, make offer, John Malm, W5PRK, 4865 Camelot Drive, New Orleans, LA 70127.

T4XB, AC4 $350. 2C, Calib. xtra xtals $150 WA3GFP 302-998-7694.

WANTED: Hallicrafters SX-88. 455 kHz band-pass filters, 2.1 kHz bw & 300 to 500 Hz bw. Similar to Collins units. 415-728-7136. W6OWD.

COLLINS 75A-4 excellent $325. Plus shipping. KØRFQ, 714-869-6884.

COLLINS KWM2 winged, PM2 ps, Waters rejection unit, manuals, $495. K1IKE, Newberry Road, East Haddam, CT 06423 203-873-1100.

FOR SALE: Heath SB303, 401 & 610. Fine condition. Total $500. Phone 215-446-2337.

MINT IC-211, hand mike $500. New Tempo S-5 TTP acc. $310. KA4OMQ 1-919-736-7249.

NEED CASH, for sale: Atlas 210XNB transceiver, Atlas 220CS ac console, Shure 404C microphone, dc cable, manuals, Trac TE-201 electronci memory keyer. Make offer. WD4GDB, Chet. 622 Meadowvale Drive. Orlando, FL 32817. 305-275-5880.

DRAKE TR-3, RV-3, AC-3, SWR, Turner 454X microphone $450. Dennis Quinn 4152 Highway J Cross Plains, WI 53528.

MINT KENWOOD TS120S with MC50 mic, $500; Heathkit HD1410 keyer $25; pickup only, Rick WB1ASG 203-237-6106.

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68' EZ Way crankup tower — beam rotor estate phone 215-295-3276 Morrisville, PA 19067.

YAESU FT-301 transceiver, FP-301 supply, mint condition, $575, K5EFW 505-877-2731.

TOWTEC electric tower hoist. New, unpacked, warranteed. $225. W7CXW, 10636 Ohio, Los Angeles, CA 90024. 213-475-3014.

WANTED: Drake RV-6, Harvey Watkins, 160 West End Ave., New York City 10023.

HAL DS-3000 KSR version III RTTY/cw with 14" monitor, HAL ST-5000 demodulator. Original cartons. Used one hour. cost $2000. sell $950. K4BOK 1225 Branchwater Lane B'ham AL 35216 1-205-979-6005.

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SELL YAESU FT-101-EE with fan external speaker National receiver 1-10 and power supply Hammarlund receiver SP-600-JX-17, new Hammarlund cabinet. Heath HW-12 and power supply Cardwell BC-221 frequency meter with power supply. Many other ham parts W4OYJ Bennettsville SC 29512 803-479-4095.

WANTED: Vertical amplifier chassis Tecktronic 545A Bill Rodriguez, K2WT, Montvale NJ 07645 201-391-4097.

ICOM 215 2-fm portable, 15 channels, 7 included, new TT-pad, mint. $175. K8JH 616-874-8057.

YAESU FT227R new boxed $225. Pair 2 channel Motorola HT200 on 2m $100. GE Porta Mobil walkie talkie 2 channel, 8 watts on 2m complete with mic, ant, nicad, built in charger $200. First five years Ham Radio $35. Unused 3X2500 A3, offer? K6AVF, 1047, Sherri St., Ridgecrest CA 93555.

WANTED: 1980 Callbook; ARRL handbooks; Taylor 32 and C130 charts; Dyke's auto and engine books; National NC-46 to NC-125; RME-84 or other receiver same size or smaller; Robert Ireland, Pleasant Valley, NY 12569.

ICOM IC22S w/Syntcoder loaded $225. Clegg. 2M fm $50. Clegg 66 $50 Drake TC2 $300, Drake R4B $295, Dentron MT3000 $225. Heath HR10B $65. DX60B $65. Reliant rcvr, xmtr, ps. manual $475. Collins, 32S1, xmtr $275. SBE2LA amp. $185. W2FNT, 18 Hillcrest Ter. Linden, NJ 07036. 201-486-6917.

SELL Heath HR1680, DX60B, HG10B, HN31 dummy load, Johnson TR switch, all manuals, $300. KAØDOF, Howard Co. 81233, 303-942-3320.

MONITOR 146.94, .70, .91, .88, .55, 147.255 from car, shack. Clean 8 ch. Fanon scanner. $75. Hot front end. K3AI 215-968-3659.

DRAKE T4XC, AC4, MS4, $450 WB5DJA 817-387-0461.

WANTED: TR4CW with RIT, AC4 and MS4. K1DL 603-448-3654.

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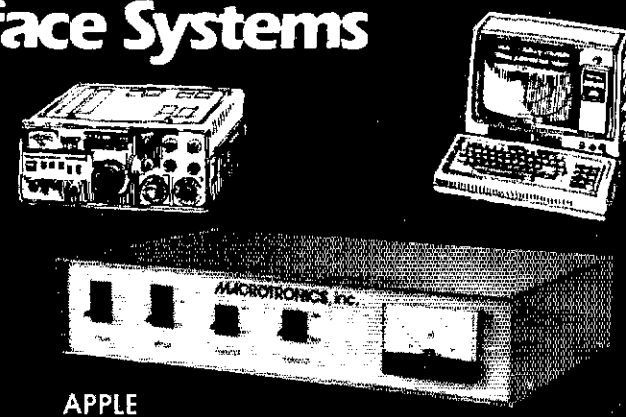

TRS-80
- **M80** Send / Receive CW & RTTY Software. Interface PC Board, Manual **$149.**
- **CM80** Same as M80-in cabinet **$279.**
- **TM80** Complete! Includes Software, computer interface, active filter RTTY demodulator. AFSK in attractive cabinet with RTTY tuning meter. EASY HOOKUP! EASY OPERATION! **$499.**
- **M800** adds advanced RTTY (split screen) to M80 / CM80 / TM80 **$99.***
- **M8000** adds disk based RTTY including Mailbox **$150.**

*only $75 with CM80 order $50 with TM80 order

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- **M65** Send / Receive RTTY & CW Software. Interface PC Board, Manual **$149.**
- **M650** Advanced RTTY (split screen) & CW in cabinet **259.**
- **TM650** Adds active filter RTTY demodulator and AFSK to M650 **$499.**

APPLE
- **CA650** Advanced RTTY & CW (split screen) in cabinet **$279.**
- **TA650** Adds active filter RTTY demodulator and AFSK to CA650 **$499.**
- **A6500** Adds Disk Based RTTY to CA 650 / TA650 **$50.**

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- **S80** Send / Receive CW & RTTY Software, Interface PC Board, Manual **$149.**
- **CS80** Same as S80-in cabinet **$279.**
- **TS80** Adds active filter RTTY demod. & AFSK **$499.**

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WANTED TRS80 16K Level II complete. Yaesu FV101 or FV101B Landliner ph. patch. Gonset G76 G28 HA410 xcvrs FT101 series xcvr. John Kakstys. 18 Hillcrest Ter. Linden N.J. 07036, 201-486-6917.

WANTED: To buy HO-10 monitor scope, Heath Hamscan. Douglas Cooper, 1615 Henderson, Beloit, WI 53511.

DRAKE "C" line-T4XC, R4C, AC4, MS4, FL500, nb. Static B mike, Chrome Vibraplex paddle, accessories. Mint. $1025. Knight T-150 transmitter, Knight SWR meter. $75. MiniQuad HQ-1, balum. $95. Trionyx frequency counter. New. $85. Gerald, WD9IEP 317-259-7562.

HEATHKIT SB401 with crystals $200, Galaxy R530 communications receiver $300. Paul Adler WA2ITK, 716-381-8408.

YAESU FT-301D, mint never mobile, with mike $525. With power supply $650. Plus shipping. Four used Dentron EX-1 verticals for $95. W7LJI 503-886-8879.

YAESU FR101S rcvr. 160-2 meters plus fm conv. Mint condition, new 1/31/80, Hardly used. $400 firm. Original box and manual included. You ship. Jim 1-413-783-3172 or WA1EDN in Callbook.

FT-901DM, mint, $850 or offer. BT1-LK2000 linear, Tempo S-1, make offers. Tatar, 1625 North Park, Cleveland Heights, OH 44106.

COLLINS S-line — Mint condx-one owner. 75S1 with 500 cycle filter and Waters tuning. 32S1 and 516F-2 power supply. $595 firm FOB. Cashiers check. Ship UPS. W5HFQ 208 Tupelo Monroe, LA 71203 318-343-5477.

DRAKE T4XB, R4B, MS-4, AC-4; ICOM IC-215, w/10 xtals and Touch Tone. Please make offer, WØRA, 303-773-6260.

TRITON IV, blanker, cw filter, etc. $380. 262G 110-220 supply with VOX and speaker $95. Remote VFO $95. All $540. K8RQG, 2251 Euclid, Benton Harbor MI 49022. 616-925-6392.

HQ-180 mint $250, SB 610/620 mint $250. pr., Tektronix 545-A $200. Also SX-71, S-20R, VFO. want military weapons, GRC-109, RBZ, TR-1. W8MFL 616-683-1093.

KLM 432 MHz ssb Echo 70cm $395. Atlas 210X $575. Wilson uhf T4602-MX with PL hand-held $375. Drake Wattmeters — WV4 $59, W4 $49. All items are in mint condition. WA7AWA, Hank Samplin 4432 West Larkspur Glendale, AZ 85304 602-938-8643.

HEATHKIT SB200 linear $325. Will ship U.P.S. continental USA 209-838-3771 W6MMH.

DRAKE R-4C w/nb, Sherwood and cw filters. T-4XC, AC-4, MS-4. Mint $850. K5QY 214-423-3982.

KENWOOD TS-520-SE, $495. R-1000 $350. Both mint. Pair, $825. 503-649-1617. Bruce.

AMATEUR REPAIR — Professional service, reasonable rates, all brands. USA KDK repair center. Amateur Radio Repair Center, 1020 Brookstown Ave., Winston-Salem, NC 27101 1-919-725-7500.

WANTED: Yaesu SP401 or SP560 speaker cabinet. WA3LPK, 2300 Louise Ave., Balto, MD 21214.

LESS THAN 1/2 original cost, all RAM, ROM, keyboard, clock, display and an 8080 on common PC board with power supply and teaching manual, all from Integrated Computer Systems. Connector strip for interfacing to complete your own personal or ham computer. $259. Drake, WØIPT, P. O. 727, Ft. Collins, CO 80522.

Wanted — Yaesu FV-101B and FL-2100B. Both in excellent condition to complete my station. Please call or write: "Chaz" Grant, WA2NCL, 1001 Florida Grove Manor, Keasbey, N.J. 08832. 201-324-1033.

WILSON Mark IV, TTP, 2 batteries, desk charger, leather case, 3 antennas, $249, K2AM, 201-687-3518.

3EL BEAM 10m. 3el beam 15m. SB-200. ARC-5 rcvr 500-1500 kHz. homebrew rcvr 10-80m. Homebrew audio osc 6-20 kHz. VHF regen grid dipper. Heath SWR bridge. MAC-KEY bug. W8KV.

SALE: (new) Kenwood SP-820 speaker $60, MFJ 262 dry dummy $45, 941-B transmatch $60, 101 clock $25; (excellent) Murch UT-2000A $95. (new), 68A antenna $45; (re-Draked) TR-4/AC-4 $395, 2-NT $70; (good) BC-348R (new tubes) $50; (excellent) Hallicrafters SX-96 $80, (mint) SX-122 $165; (new) Heath coax switch $12; 1980 domestic/foreign callbooks $8 each. Inquiries s.a.s.e. John, Box 253, Cedargrove, NJ 07009.

FOR SALE: Yaesu FR101 digital receiver, absolutely mint condition $400, Teletype model 32 $250. WA3LWR.

ICOM-230 with ac power supply, 2 mics, mobile brackets, xtra bulbs and power cord. $175. K1SEO, 203-777-7371.

WANTED: set of six pushbuttons for Accu-Memory keyer. K3QM, 19A Liberty Street, Dover, NJ 07801.

HT32A Hallicrafters ssb transmitter $175 excellent. Beautifully built. SX122 GC Hallicrafters ssb-am last model $160. Giant Telefunken am-fm stereo console with phone, 2 SW bands. Exc $95. You pick up in Sunny SC. N4DFX, Box 5247, Spartanburg, SC 29304 803-583-3081.

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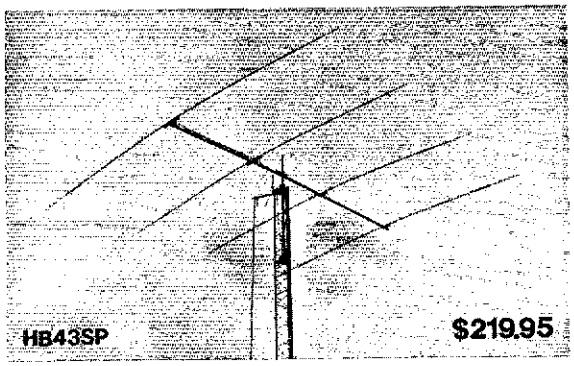
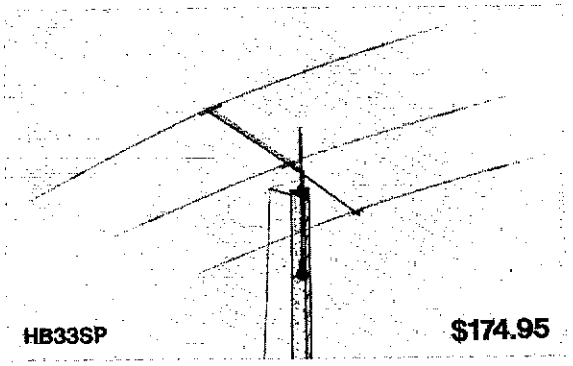


HB43SP $219.95



HB33SP $174.95

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HB43SP	14/21/28	4	4	2KW	BELOW 1.5	50 Ohm	27'	19'8"	16'9"	6.62 s.f.	131.3 lbs.	2"	1½-2"	38 lbs.
HB33SP	14/21/28	3	3	2KW	BELOW 1.5	50 Ohm	27'	13'2"	15'0"	4.73 s.f.	102.0 lbs.	1-9/16"	1¼-2"	27 lbs.

- State of the art antenna technology. Designed to provide phone and CW operation with solid state transceivers without using an antenna tuner.
- Dual driven elements for maximum power transfer and broad bandwidth.
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TE43L 40/15/10M Triband Yagi, 4 Elements	174.95
MV4BH 40 thru 10M Vertical	59.95
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MV3BH 20/15/10M Vertical	47.95

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HB10F4 10M 4 Element Broadband Beam	77.95
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HB15F4 15M 4 Element Broadband Beam	135.95
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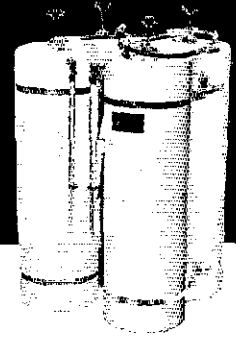

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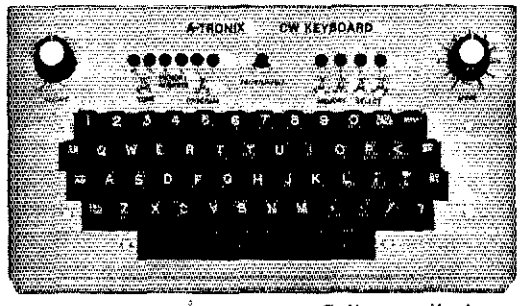

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P-5	C-5	5	P-354		35, 40
P-68	C-68	6, 7, 8			
P-91	C-91	9, 10, 11			
P-10	C-10	10			
4P-12	4C-12	12, 13, 14			
P-14	C-14	14			
OP-16	OC-16	16, 18, 20			
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T-56 5-8; T-134 13, 14; T-204 20-24. FCC type tests.

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YAESU FT-901DM, less than one year old, rarely on air, original carton, $925. Yaesu FT-207R synthesized Handle, mint, extra nicad, wall charger, $295. Dentron antenna tuner MT-2000A, mint, original carton, $129. Jay Sewell, W5SL, 1100 North 19th, Abilene, TX 79601.

KENWOOD TS520S DG-5 digital display MC-50 microphone new condition $625. Gary 913-782-0567.

HEATH HW-8, factory aligned, modified for speaker, dial light, internal mercury battery, mint cond. $90. KA1FCS, 617-548-3267.

SELL: IC-551, mint, $340, 203-666-6109. WØMHK.

MICROWAVE TV antenna, new, 2 GHz band. $350. Tom Howell, N3BMG, 6513 Westmoreland Ave., Apt. 3-D, Takoma Park, MD 20012. 301-270-8359.

QUAD KITS $18.-$33. S.a.s.e. for information. WAC, 404 Sanders Rd., Huntsville, AL 35802.

RCA reel-to-reel solid state tape deck and mics, 3 speeds, pair Phillips stereo speakers for car 10 oz. magnets 8 ohms. Pair traps for dipole, each trap 32 inches long overall. Each trap contains 3 coils of 14/33 and 27 turns traps 2 inches in diameter. Mint Hallicrafters S-108 rcvr. s.a.s.e. details. Mint Realistic DX-150A rcvr. RCA solid state rcvr for blind, am/fm also has TV audio. I have no other info on the traps — would appreciate word from anybody that has knowldge of them. Jim Hall, W4BLX, Rte. 3, Box 281A, Staunton, VA 24401 703-363-5797.

MINT digital Sony ICF-6700W rcvr and Sony stereo/regular earphones, manual. Hallicrafters HT-40 Novice xmtr 70 watts and about 25 Peterson xtals for 40 mtrs. Jim Hall, W4BLX. 703-363-5797.

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SELL: 8 Amp regulated supply, $50. 35 Amp regulated supply with meters, $150; without meters, $135. 10m converted Pace 1000-M, $155. WB2OEI, 158-20 80th Street, Howard Beach, NY 11414. 212-848-7961.

COLLINS — 32S-3 (incl. DX Eng proc), 512F-2 (ps), 312B-4 (patch, watt meter, SWR, control), 75S-3 (500 Hz fil), $1,175. 30L-1 (new tubes) $450. All $1,500. W7WE 702-322-0265.

HALLICRAFTERS SX-146, HT-46 transceive pair, p.s. tr-sw, 180W, cables, manuals, exec cond. asking $325, Call Marc WB2FGV 203-562-6826 eves.

WANTED: Accessories for Yaesu FT-101E. FL-2100B linear amplifier, FV-101B external VFO, SP-101PB, speaker/patch, YP-150 dummy load and Watt meter. KA9HEK 219-637-3307.

2 METER fm transceiver, Sonar FM-3601, mint condition, w/ps, manual, $200/b.o. 353-8252. WA1VCJ, 229 Commercial St., Provincetown, MA 02657.

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CAMP COUNSELOR — Over 20 preferred with General or Extra Class ticket. Boys camp in Maine. July/August. Exc. salary + benefits. Allowance to bring own rig. Write: P. O. Box 178 Carle Place, NY 11514.

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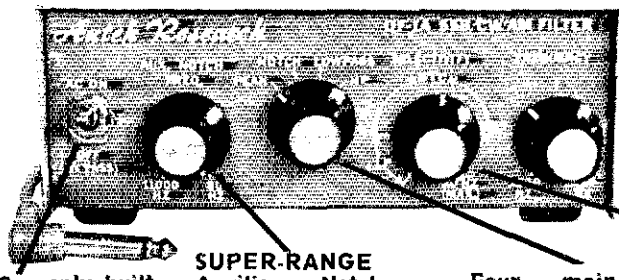

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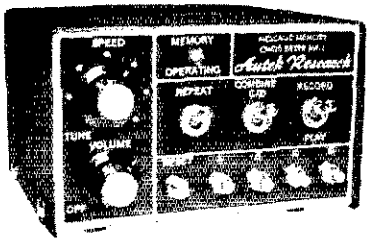

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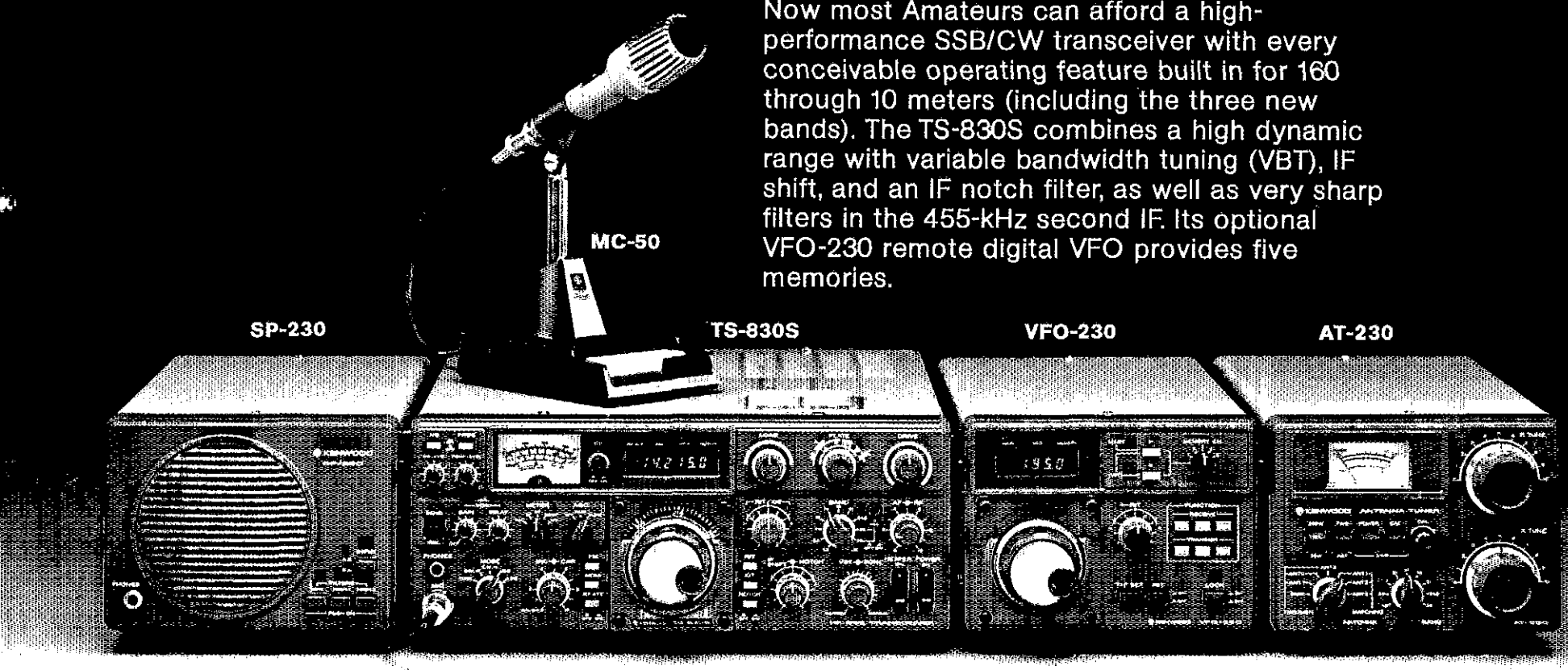

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